TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Groundwater Sustainability Plan

Red Bluff Subbasin

JANUARY 2022

PREPARED BY

Luhdorff & Scalmanini
Consulting Engineers

RED BLUFF SUBBASIN
GROUNDWATER SUSTAINABILITY PLAN

ACKNOWLEDGMENTS

The Tehama County Groundwater Sustainability Agency gratefully acknowledges the funding contribution from the California Department of Water Resources.

TEHAMA COUNTY GROUNDWATER SUSTAINABILITY AGENCY BOARD OF DIRECTORS

The Tehama County Flood Control and Conservation District, a local and regional authority, serves as the exclusive GSA for the Red Bluff Subbasin. The GSA Board of Directors are same members of the Tehama County Board of Supervisors.

Bob Williams
Candy Carlson
Dennis Garton
John Leach
William Moule

GROUNDWATER SUSTAINABILITY PLAN GROUNDWATER COMMISSIONERS

In June 2016, the District established the Tehama County Groundwater Commission to serve as an advisory commission to the Tehama County Flood Control and Water Conservation District Board of Directors for GSA related matters. The Commission consists of 11 members. The Groundwater Commission provided input, review of draft GSP content, defined sustainable management criteria, and provided input on next steps for GSP implementation. Tehama County Groundwater Sustainability Agency appreciates the contributions of the 11 members listed below:

Kristina Miller, City of Corning
Clay Parker, City of Red Bluff
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Kris Lamkin, El Camino Irrigation District
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Martha Slack, Rio Alto Water District
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PLANNING, TECHNICAL, AND FACILITATION SUPPORT

Consensus Building Institute, Inc.
Davids Engineering
MBK Engineers
Water Resource Consulting
Pacific Agroecology

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Luhdorff & Scalmanini Consulting Engineers performed modeling, planning, and other technical support for the Tehama County Groundwater Sustainability Agency in addition to composing the Red Bluff Subbasin Groundwater Sustainability Plan.

On behalf of the Tehama County Groundwater Sustainability Agency, thank you to all of the community members who participated in public meetings, information sessions, and various outreach events. Your input was vital to shaping this Plan.

PUBLIC DRAFT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

September 2021

Prepared For:

Tehama County Flood Control and Water Conservation District

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AB	Assembly Bill
bgs	Below Ground Surface
BMP	Best Management Practices
CalEPA	California Environmental Protection Agency
CalGEM	California Geologic Energy Management Division
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CNRA	California Natural Resources Agency
CV-SALTS	Central Valley Salinity Alternatives
CWA	Clean Water Act
CWC	California Water Code
DDW	Division of Drinking Water
DMS	Data Management System
DO	Dissolve Oxygen
DPR	Department of Pesticide Regulation
DQO	Data Quality Objective
DTSC	Department of Toxic Substance Control
DTW	Depth to Water
DWR	California Department of Water Resources
DWR	Department of Water Resources
EC	Electrical Conductivity

ft/yr	feet per year
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	Groundwater Dependent Ecosystem
GMP	Groundwater Management Plan
GQTM	Groundwater Quality Trend Monitoring
GSA	Groundwater Sustainability Agency
GSE	Ground Surface Elevation
GSP	Groundwater Sustainability Plan
GWE	Groundwater Elevation
GWMP	Groundwater Management Plan
HCM	Hydrogeological Conceptual Model
ILRP	Irrigated Lands Regulatory Program
InSAR	Interferometric Synthetic Aperture Radar
IRWMP	Integrated Regional Water Management Plan
Mas	Management Actions
MCL	Maximum Contaminant Level
Mg/L	Milligrams per Liter
MO	Measurable Objective
MT	Minimum Threshold
NAVD88	North American Vertical Datum of 1988
NDVI	Normalized Difference Vegetation Index
ORP	Oxidation-Reduction Potential
PBO	Plate Boundary Observatory
PMAs	Projects and Management Actions
QA	Quality Assurance
QC	Quality Control
RMS	Representative Monitoring Sites
RP	Reference Point
RPE	Reference Point Elevation
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria

SMCL	Secondary Maximum Containment Level
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
Tehama County FCWCD	Tehama County Flood Control and Water Conservation District
UNAVACO	University NAVSTAR Consortium
USBLM	Bureau of Land Management
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFS	United States forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCR	Well Completion Report
WDR	Waste Discharge Requirements

FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

(Executive Summary)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

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EXECUTIVE SUMMARY

ES 1. Introduction

In 2014, the California legislature enacted three bills, AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act (SGMA) in response to overdraft conditions of California's groundwater resources. Since 2016, the Tehama County Flood Control and Water Conservation District (Tehama County FCWCD) (District), a local and regional authority, is the exclusive GSA for the Red Bluff Subbasin. The Tehama County Groundwater Commission serves as an advisory commission to the Tehama County Flood Control and Water Conservation District Board of Directors for GSA related matters. Groundwater Commission meetings, which are open to the public, were held on the 4th Wednesday of each month, except holidays.

The GSP provides information demonstrating that the past and present actions of the GSA have created a sustainably managed groundwater basin. The GSP outlines planned management oversight and activities that will result in continued sustainability of the groundwater resources in the Red Bluff Subbasin.

This Executive Summary and the companion GSP are organized as follows:

- Executive Summary
- Section 1 Introduction
- Section 2 Plan Area, Basin Setting and Water Budgets
- Section 3 Sustainable Management Criteria and Monitoring Network
- Section 4 Projects and Management Actions
- Section 5 Plan Implementation
- Appendices

The following sections provide factors about the Subbasin and an overview of technical content in the GSP.

The Red Bluff Subbasin (Subbasin) (DWR Subbasin No. 5-21.50) (**Figure ES-1**) has been identified by the California Department of Water Resources (DWR) as a high priority subbasin. Under SGMA high priority subbasins are required to prepare and be managed under a GSP by January 31, 2022. This GSP, prepared by the GSA, adequately defines groundwater conditions in the managed area and establishes criteria to maintain and/or achieve sustainability within 20 years of the GSP adoption.

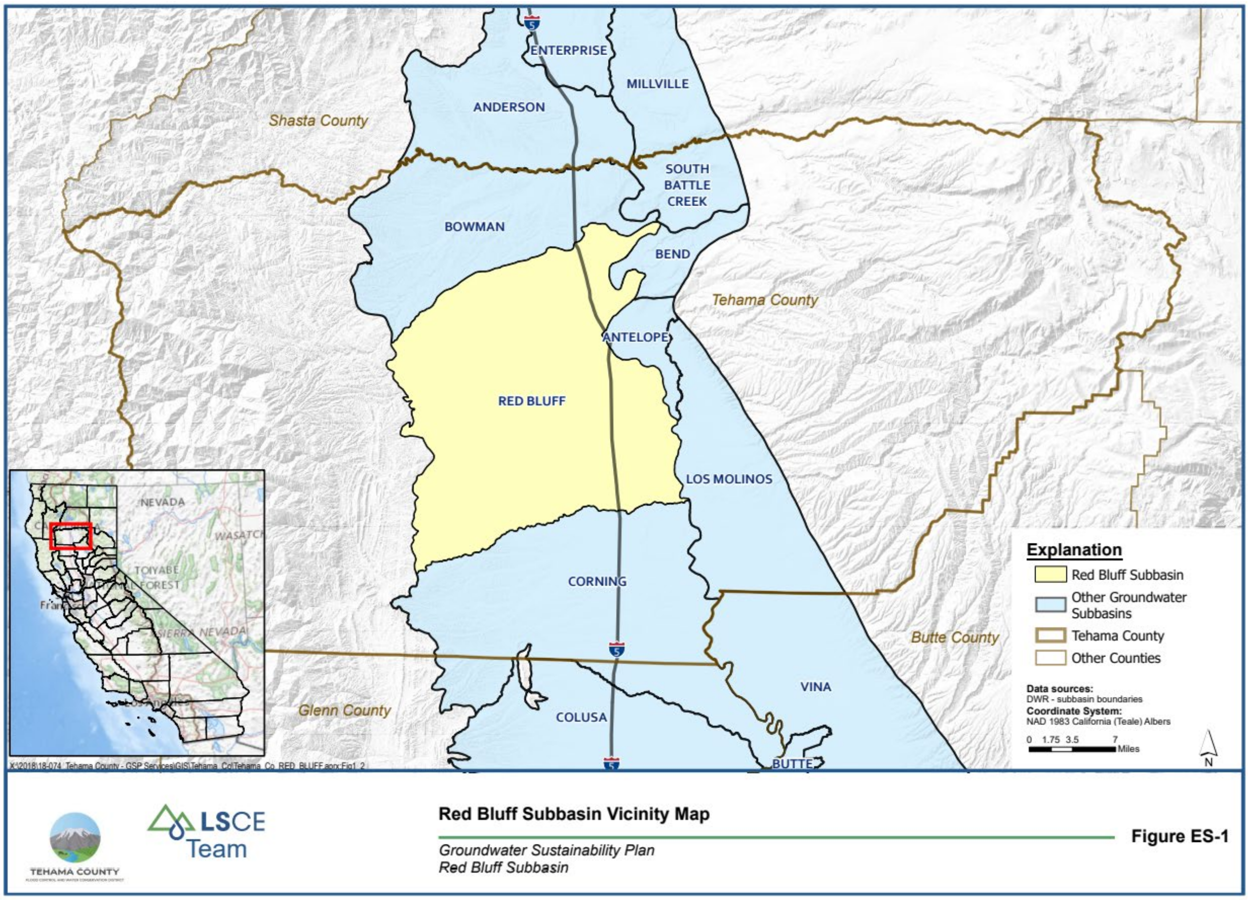

Figure ES-1. Red Bluff Subbasin Location Map

A Public Draft GSP was made available for public review and comment on September 24, 2021, for a period of 45 days. The GSA will receive comments, review, and prepare responses to comments, and revise the Draft GSP. The Final GSP will include those revisions. Comment letters and responses will be included as GSP appendices.

ES 2. Summary of Plan Area

The Red Bluff Subbasin (DWR Subbasin No. 5-021.54) covers 271,800 acres and is in the Northern Sacramento Valley Groundwater Basin (**Figure ES-1**). Red Bluff is one of seven (7) subbasins within Tehama County. The Tehama County FCWCD is the exclusive GSA for six (6) of those subbasins: Antelope, Bend, Bowman, Los Molinos, Red Bluff, and South Battle Creek. The seventh, the Corning Subbasin, extends into Glenn County, and the GSP for that subbasin is being developed in a coordinated effort between the Tehama County FCWCD and Corning Sub-basin GSA.

The lateral extent of the Subbasin is consistent with Bulletin 118 (DWR, 2018). It is bounded on the north by the Bowman Subbasin on the east by the Bend Subbasin, the Antelope Subbasin, and the Los Molinos Subbasin, on the south by the Corning Subbasin and on the west by the Coastal Mountain Range. The eastern and western boundaries of the Subbasin generally follow the Sacramento River and Coastal Mountain Range, respectively, and the southern boundary generally follows Thomes Creek. The vertical boundaries of the Subbasin are the land surface (upper boundary) and the definable bottom of the basin (lower boundary). The definable bottom is the base of fresh water located at depths approximately from 400 to 2,400 feet below ground surface (bgs) at different locations within the Subbasin.

Lands in Red Bluff Subbasin are mostly privately owned with state and federal agencies owning a small portion. Private lands are majority farmland with nearly equal amounts riparian and other native vegetations. Over 5,000 groundwater wells exist in the Subbasin, and most are domestic wells. A small number of wells are operated for the public water supply and roughly fifteen times that number of wells are maintained for agricultural production. Numerous monitoring programs are operated in the Subbasin by federal, state, and local public agencies including the EPA, USGS and DWR. Monitoring programs collect data on groundwater levels, groundwater quality, land subsidence and surface water conditions. Data from these programs were incorporated (as applicable) into the evaluation of basin conditions within this GSP and were part of previous management plans including the Tehama County AB3030 Groundwater Management Plan (GWMP) and the Northern Sacramento Valley Integrated Regional Water Management Plan (IRWMP). Components of these management plans were incorporated into this GSP.

ES 2.1. Basin Setting and Hydrogeologic Conceptual Model

The ground surface generally slopes from the west to east with steeper slopes in the west of the Subbasin and water generally flows eastward towards the Sacramento River. Aquifer recharge contributions to the deeper geologic formations occur where the formations outcrop at the surface, however recharge of the Subbasin primarily occurs from the flow of the Sacramento River and perennial streams where saturated hydraulic conductivity of soils is high. Water flows downward in the Upper Aquifer driven by natural recharge. Gaining conditions along streams represent discharge from the aquifer to surface water and occur seasonally. Larger sources of discharge from the aquifer are likely from production of wells even though a portion of the water returns to the aquifer via recharge from irrigations. Even with the noted groundwater withdraw there is little to no reported evidence of subsidence within the Subbasin.

A horizontal groundwater gradient magnitude ranges from about 9 ft/mile to 20 ft/mile in the valley floor, and 30 and 38 ft/mile in hillslopes. Seasonal high water levels range between about 10 and 110 ft bgs. Groundwater quality is good with no widespread presence of contaminants at undesirable levels reported in the Subbasin.

The Subbasin is defined as a two-aquifer system with unconfined to semi-confined conditions in the Upper Aquifer and semi-confined to confined conditions in the Lower Aquifer. Fresh water occurs as groundwater to a maximum depth of over -2,400 ft msl in the east of the Subbasin. The major water bearing formations within the Subbasin are the Tuscan and Tehama Formations with some contribution from the shallower Quaternary sedimentary deposits. More recent geologic history is dominated by fluvial and alluvial deposition.

ES 2.2 Water Budget

In accordance with technical guidance documents provided by DWR, water budget scenarios were evaluated using a groundwater flow model that quantified historical, current, and projected groundwater budget conditions. The water budgets were developed through application of the Tehama Integrated Hydrologic Model (Tehama IHM), a numerical groundwater flow model that characterizes surface water and groundwater movement and storage across the entire Subbasin and extending outside of the Subbasin. The Tehama IHM is an integrated groundwater and surface water model developed for the purpose of conducting sustainability analyses within Tehama County. The model used foundational elements of DWR's SVSim regional model for the Sacramento Valley (DWR, 2021) and was refined locally for improved application in the Subbasin area. Use of publicly available modeling platforms is a guiding principle under DWR Best Management Practices and facilitates independent assessment of modeling results.

The model was calibrated using records from 1990-2019 (29 years). This period represents long-term average hydrologic conditions and is considered the historical water budget period. The current water budget presents information on the effects of recent hydrologic and water demand conditions on the groundwater system and spans five different recent periods. The historical and current water budget periods were selected to evaluate conditions over discrete representative periods considering the following criteria: Sacramento Valley water year type; long-term mean annual water supply; inclusion of both wet and dry periods, antecedent dry conditions, adequate data availability; and inclusion of current hydrologic, cultural, and water management conditions in the Subbasin. Water budgets were calculated for a projected 50-year period, 2022 through 2072. The 50-year projected water budget uses hydrologic conditions representative of the most recent 50 years of hydrology in the Subbasin, with adjustments applied in scenarios for evaluating the water budget under climate change and altered water supply and demand conditions.

Model results indicate that over the historical period the largest outflow from the groundwater system (GWS) comes from groundwater pumping (on average 80 thousand-acre feet (taf) per year). Groundwater discharge to the surface is 55 taf per year. Deep percolation is the largest net inflow to the GWS (39 taf per year). Subsurface inflows from adjacent subbasins and upland areas represents 49 taf per year gain to the GWS. Groundwater root uptake represents a small flux of 9.7 taf per year of the leaving the GWS. Over the 29-year historic period cumulative change in storage was around -310 af per year.

The recent three-year period from 2016 through 2018 is believed to provide a reasonable representation of the recent water budget conditions based on an evaluation of past water budgets and the hydrologic conditions over these recent periods. A comparison of several future modeled water budgets was made to define the possible effect of different climate change and management action scenarios. Overall projected storage change in the Subbasin is small and differs little between the different climate change conditions.

The sustainable yield was estimated to be 150,000 acre-feet per year, which is equal to the volume of groundwater extracted annually in the Subbasin (by pumping and by uptake) minus the simulated change in storage in the projected model scenario with future land use and 2070 climate change conditions. Under these conditions groundwater extractions total about 154,000 acre-feet per year on average. Projected change in storage is nearly -4,100 acre-feet per year which results in the sustainable yield equaling 150,000 acre-feet. Assuming potential uncertainty of 25 percent associated with the water budget estimates, an associated range of values for the estimated sustainable yield would be 112,500 to 187,500 acre-feet per year.

ES 3. Sustainability Management Criteria

Sustainable management criteria include establishing a sustainability goal for the Subbasin, defining undesirable results, and quantifying minimum thresholds and measurable objectives.

The sustainability goal for the Red Bluff Subbasin GSP is to manage the groundwater Subbasin to:

- Protect and maintain safe and reliable sources of groundwater for all beneficial uses and users.
- Ensure current and future groundwater demands account for changing groundwater conditions due to climate change.
- Establish and protect sustainable yield for the Subbasin by achieving measurable objectives set forth in this GSP in accordance with implementation and planning periods.
- Avoid undesirable results defined in the GSP in accordance with SGMA.

Sustainable management criteria (SMC) also define the conditions that constitute sustainable groundwater management. Note that undesirable results have not occurred historically in the Red Bluff Subbasin and are not projected to occur in the future. The sustainable management criteria will commit the GSA to meeting the sustainability goal for the Subbasin.

Sustainability indicators are measurable indicators that are used to set Measurable Objectives (MO), interim milestones and Minimal Thresholds (MT) to ensure that the sustainability goals are met. Undesirable results occur when significant and unreasonable effects are caused by groundwater conditions for a given sustainability indicator. Sustainability indicators are listed in **Table ES-1** along with whether undesirable results occurred in the subbasin and if they are likely to occur in the future without GSP implementation. Sustainability indicators will be measured at representative monitoring sites (RMS) selected based on location, aquifer, and historical data. MOs, MTs and undesirable results are defined in **Table ES-2.**

Table ES-1. Summary of Undesirable Results Applicable to the Plan Area

SUSTAINABILITY INDICATOR	HISTORICAL PERIOD	EXISTING CONDITION	FUTURE CONDITIONS WITHOUT GSP IMPLEMENTATION
Chronic Lowering of Groundwater Elevations	No	No	Yes
Reduction of Groundwater Storage	No	No	No
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	Limited	Limited	Limited
Land Subsidence	No	No	No
Depletion of Interconnected Surface Water	Data Gap	Data Gap	TBD

Table ES-2. Summary of MT, MO, and Undesirable Results

SUSTAINABILITY INDICATOR	MINIMUM THRESHOLD	MEASURABLE OBJECTIVE	UNDESIRABLE RESULT
Chronic Lowering of Groundwater Elevations	**Upper Aquifer:** Spring groundwater elevation where less than 10% or less than 20% of domestic wells could potentially be impacted. **Lower Aquifer:** Spring groundwater elevation plus 20 to 120 feet	**Upper & Lower Aquifer:** Spring 2015 groundwater elevation minus five feet (for wells with increasing or no groundwater trends) or projected Spring 2042 groundwater elevation minus five feet for wells with declining groundwater elevations	25% of groundwater elevations measured at same RMS wells exceed the associated MT for two consecutive measurements.
Reduction of Groundwater Storage	**Upper & Lower Aquifer:** Amount of groundwater in storage when groundwater elevations are at their minimum threshold	**Upper & Lower Aquifer:** Amount of groundwater storage when groundwater elevations are at their measurable objective	Same as chronic lowering of groundwater levels
Land Subsidence	Two feet over 20 years (i.e., no more than 0.5 feet of cumulative subsidence over a five-year period (beyond the measurement error), solely due to lowering of groundwater elevations	One foot over 20 years (Zero inelastic subsidence, in addition to any measurement error). If InSAR data are used, the measurement error is 0.1 feet and any measurement 0.1 feet or less would not be considered inelastic subsidence	50% of RMS exceed the minimum threshold over a 5-year period that is irreversible and is caused by lowering of groundwater elevations
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable

SUSTAINABILITY INDICATOR	MINIMUM THRESHOLD	MEASURABLE OBJECTIVE	UNDESIRABLE RESULT
Degraded Water Quality	**Upper & Lower Aquifer:** TDS concentration of 750 mg/L at all RMS wells	**Upper & Lower Aquifer:** California lower limit secondary MCL concentration for TDS of 500 mg/L measured at RMS wells	At least 25% of RMS exceed the minimum threshold for water quality for two consecutive years at each well where it can be established that GSP implementation is the cause of the exceedance
Depletion of Interconnected Surface Water	Same as chronic lowering of groundwater levels (Initial)	Same as chronic lowering of groundwater levels (Initial)	25% of groundwater elevations measured at RMS wells drop below the associated threshold during two consecutive years in the Upper Aquifer.

ES 3.1. Chronic Lowering of Groundwater Elevations

Groundwater levels declined over the historical period. This trend is expected to continue without GSP implementation. The MOs for Chronic Lowering of Groundwater Elevations indicator is defined at each of the RMS (wells) as that well's spring 2015 groundwater elevation minus five feet or projected 2042 groundwater elevation minus five ft for wells with declining groundwater elevations. MTs are defined as the groundwater level at RMS wells that are estimated to impact (potentially run dry) less than 10% or less than 20% of nearby domestic wells. It is considered an Undesirable Results for Chronic Lower of Groundwater Elevations if 25% of groundwater elevations measured at RMS wells exceed the associated MT for two consecutive measurements.

ES 3.2. Reduction of Groundwater Storage

The groundwater storage reduction sustainability indicator will be evaluated using groundwater levels as a proxy in conjunction with annual evaluations of monitored groundwater level changes. Based on considerations applied in developing the groundwater level minimum thresholds, reduction in groundwater storage minimum thresholds do not exceed any identified significant and unreasonable level of depleted groundwater storage volume.

ES 3.3. Subsidence

Land subsidence is not known to have occurred in the subbasin, is not occurring presently and is not expected to occur without GSP implementation. MOs have been defined as a decline of one foot over 20 years. Subsidence is based on InSAR data. InSAR measurement error is 0.1 feet and any measurement 0.1 feet or less would not be considered inelastic subsidence. MTs are defined by a decline of two feet over 20 years. Undesirable Results are defined as 50% of RMS exceeding the minimum threshold over a 5-year period that is irreversible and is caused by lowering of groundwater elevations. RMS for subsidence are the InSAR pixels collocated or near the water level RMS wells.

ES 3.4. Degraded Water Quality

Groundwater quality in the Subbasin is good with no widespread presence of contaminants at undesirable levels reported in the Subbasin. Present conditions are unchanged from conditions within the historical period however conditions could worsen without GSP implementation. MOs are defined by the California MCL for TDS of 500 mg/L measured at RMS wells. MTs are set at 750 mg/L measured at RMS wells. Undesirable Results occur if 25% of RMS exceed the minimum threshold for water quality for two consecutive years at an individual well where it can be established that GSP implementation is the cause of the exceedance.

ES 3.5. Seawater Intrusion

Due to the location of the Subbasin relative to any potential source of seawater this sustainability criterium is not applicable to this subbasin.

ES 3.6. Depletion of Interconnected Surface Waters

The interconnected surface water sustainability indicator could not be properly defined due to gaps in historical surface and groundwater monitoring programs. It is not known if conditions will worsen without GSP implementation without a reliable way to correlate the groundwater and surface water elevations. Due to the lack of data associated with this sustainability indicator the MOs and MTs are considered interim and will use the Chronic Lowering of Groundwater Elevations sustainability indicator as a proxy. An Undesirable Result is defined as 25% of groundwater elevations measured at upper aquifer RMS wells dropping below the associated threshold during two consecutive years.

ES 3.7. Monitoring Network

Monitoring networks are developed to quantify current and future groundwater conditions in the Red Bluff Subbasin, as well as within individual GSA jurisdictions. The monitoring network for sustainability indicators is summarized in **Figure ES-2.** There are a total of eight RMS wells in the Red Bluff Subbasin, seven in the Upper Aquifer and one in the Lower Aquifer. In addition to these eight wells the monitoring network will include three new TSS wells that will be completed to monitor both aquifers. The seven Upper Aquifer wells and three TSS wells serves as the monitoring locations for the Chronic Lowering of Groundwater Elevations, Reduction of Groundwater Storage, Depletion of Interconnected Surface Water, and Water Quality indicators. The Lower Aquifer wells and TSS wells are associated with the first three indicators, but not the Interconnected Surface Water Depletion indicator. The InSAR RMS are pixels collocated or near the water level RMS wells. Measured water level elevations will inform MO and MTs for Chronic Lowering of Groundwater Elevations, Reduction of Groundwater Storage, Depletion of Interconnected Surface Water indicators. Water quality samples taken from RMS wells will inform the MOs and MTs for the Degraded Water Quality indicator. Land Subsidence will be informed at RMS (select pixels) using satellite InSAR data. The monitoring network will be periodically reviewed and modified as needed; for instance, additional RMS wells may be added to better understand interconnected surface waters.

A Data Management System (DMS) was developed to store and analyze data collected as part of this GSP. With submittal and implementation of the Red Bluff Subbasin GSP, there will be a publicly accessible weblink to view reports, maps, graphs, and current data under the Subbasin monitoring plan.

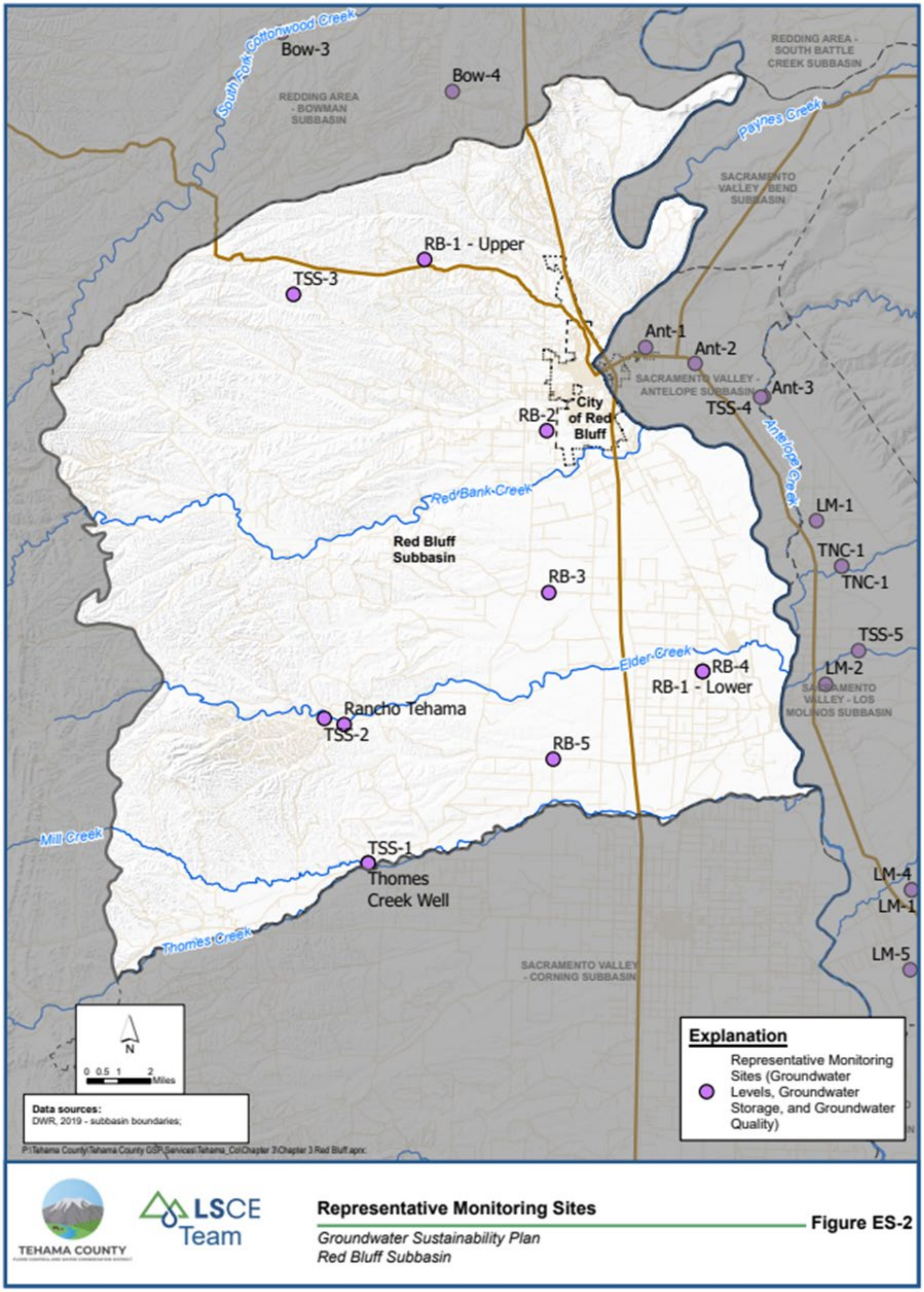

Figure ES-2. Map of all Sustainability Indicator Wells

ES 4. Overview of Projects and Management Actions

In accordance with 23 CCR §354.44, Projects and Management Actions (PMAs) were developed to achieve and maintain the Subbasin sustainability goal by 2042 and avoid undesirable results over the GSP planning and implementation horizon. Projects generally refer to structural features whereas management actions are typically non-structural programs or policies designed to support sustainable groundwater management. Because the Red Bluff Subbasin is currently and projected to be sustainable (i.e., no onset of undesirable results), PMAs are not expected to be essential for sustainability. However, future conditions are uncertain and PMAs will be employed through the principle of adaptive management on an as-needed basis.

Regardless the GSA will monitor sustainability indicators throughout GSP implementation and will initiate and scale PMAs as needed to ensure that the measurable objectives are met. The following describes PMAs identified for the Red Bluff Subbasin.

ES 4.1. PMAs Planned for Implementation

The GSA has identified PMAs that are planned to be completed prior to 2042. These projects and management actions are expected to support the GSA in achieving the GSP sustainability goal and responding to changing conditions in the Subbasin.

ES 4.1.1. Multi-Benefit Groundwater Recharge Programs

A multi-benefit recharge program will provide groundwater recharge through normal farming operations while also providing critical wetland habitat for shorebirds migrating along the Pacific Flyway. The Nature Conservancy (TNC) has prepared guidance to assist GSAs in planning on-farm multi-benefit groundwater recharge programs.

ES 4.1.2. Grower Education and Outreach

This program will provide growers with educational resources that help them to plan and implement on-farm practices that simultaneously support groundwater sustainability and maintain or improve agricultural productivity.

ES 4.1.3. Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge

Project to divert flood flows from Thomes Creek and Elder Creek. This diversion could provide direct or in-lieu groundwater recharge benefits to the Subbasin and support local groundwater sustainability. During periods of flood flow in the winter and spring, project participants would divert a portion of the flows along Thomes Creek and Elder Creek for either (1) off-stream storage and subsequent use for irrigation, or (2) direct groundwater recharge via flood managed aquifer recharge (Flood-MAR), dedicated recharge basins, or modified stream beds.

ES 4.1.4. Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District

This project would incentivize expanded use of CVP supply by irrigators in Proberta Water District (PWD) and Thomes Creek Water District (TCWD), with the goal of using the full contract supply available to each district. By encouraging irrigators to use more surface water, this project would offset groundwater demand and provide in-lieu recharge benefits to Red Bluff Subbasin.

ES 4.1.5. El Camino Restoration Project

To support groundwater sustainability in the Red Bluff Subbasin, the El Camino Irrigation District plans to restore and modernize its water supply infrastructure. This project would identify and fix the most inefficient pumps in the El Camino Irrigation District conveyance and distribution system, replace concrete pipelines with more durable PVC pipe, replace hub gates, and install flowmeters on each discharge pipe from every pump.

ES 4.1.6. Elder Creek Non-Native, Invasive Species (NIS) Plant Control

This project would remove invasive plant species in the Elder Creek watershed, with a focus on giant reed (Arundo donax) and salt cedar (Tamarisk). The goal of this project would be to reduce demand on riparian and groundwater resources, with benefits to increased groundwater availability for all beneficial users of groundwater in the Subbasin and improved surface water conveyance and ground and surface water interactions.

ES 4.1.7. Tehama West Non-Native, Invasive Species (NIS) Plant Control

This project would identify and strategically remove non-native, invasive plant species from riparian zones in watersheds originating in the western edge of Tehama.

ES 4.2. Proposed Potential PMAs

Projects and Management Actions in this category are proposed as potential options that GSAs may wish to implement, as needed, to support ongoing sustainability, to adapt to changing conditions in the Subbasin, and to achieve other water management objectives.

ES 4.2.1 Direct Groundwater Recharge

Potential projects would support efforts to recharge groundwater with excess surface water in wet years for use in dry years. Recharge may be done in conveyances such as unlined canal and laterals, natural drainages such as creek beds, recharge basins, agricultural fields, and aquifer storage and recovery (ASR) wells. Projects could also be directed at making improvements to stormwater management facilities to enhance groundwater recharge of stormwater, capture rainfall through modification of on-field conditions and facilitate use of recycled water for groundwater recharge.

ES 4.2.2. Groundwater Demand Reduction

Groundwater demand reduction can be achieved by conveyance improvements such as removal of invasive plants from creeks and irrigation canals. Plant removal would reduce conveyance issues, reduce evapotranspiration (ET), and allow for more water in the shallow groundwater areas, restoring conditions for GDEs and native riparian species.

ES 4.2.3. Surface Water Supply Augmentation & In-Lieu Groundwater Recharge

Programs directed at promoting inter-basin surface water transfers or exchanges can potentially subsidize surface water costs so that it is less expensive than groundwater. Construction, renovation, or conversion of flood control facilities to water supply reservoirs can increase available supply of surface water.

ES 4.2.4. Education/Outreach, In-Lieu Groundwater Recharge

This management action assist growers with conversion to efficient and dual-source irrigation systems, improve surface water conveyance and irrigation infrastructure to allow growers to utilize both surface water and groundwater for drip irrigation of orchards, assist growers with capital improvements to irrigation infrastructure, from use of groundwater to use of surface water or dual-source systems.

ES 4.2.5. Groundwater Demand Reduction.

Management actions aimed at reduction of groundwater demand may offer incentives for urban, residential, and commercial projects that improve water use efficiency, such as high efficiency appliance rebates and incentives for lawn removal, low-water landscape installation, rain barrels, graywater reuse, etc. Action may promote the conversion of agricultural lands to less water intensive crops to reduce water use while continuing to promote agriculture land use.

ES 4.2.6. In-Lieu Groundwater Recharge

Management actions aimed at increasing In-Lieu recharge may incentivize use of surface water for irrigation when available to allow groundwater levels to recover in between drought years when surface water is not available. Effective management actions may also increase use of surface water by creating a water market for exchanging surface water and groundwater.

ES 4.2.7. Monitoring to Fill Data Gaps & Programs to Support Wells

Several data gaps have been identified in this GSP. Additional studies of GDEs and groundwater surface water interactions, expanded subbasin monitoring and aquifer testing, install additional agroclimate stations, maintain and expand groundwater level monitoring network, and a one-time groundwater quality snapshot are all actions that can be taken to improve data gaps.

To support well owners and reduce impacts of potential undesirable results a county-wide system to tracking dry domestic wells will better inform and lead to better management of assistance to domestic well owners when water levels drop, and wells go dry.

ES 5. Plan Implementation

This GSP will be implemented to achieve the Subbasin sustainability goal by 2042 and avoid undesirable results through 2070 as required by SGMA and GSP regulations. Implementation of this GSP includes PMAs in addition to on-going activities that will be completed by the GSA related to monitoring, management, administration, updates, reporting, and public outreach.

GSP implementation costs include both costs specific to projects and management actions and costs for the GSA to administer and operate all other tasks associated with the GSP over the 20-year implementation period. The total cost is estimated to be approximately $19,757,000.

These costs may be subject to change, as they are projections based on the time of development of this report. GSP implementation and GSA support costs are estimated on an annual basis and are described in further detail below.

Table ES-3. Estimated GSP Implementation Costs through 2042

FISCAL YEAR	GSA ADMINISTRATION	MONITORING	5-YEAR UPDATES	10% CONTINGENCY	TOTAL
2022	$470,000	$104,000	$0	$57,000	$631,000
2023	$484,000	$107,000	$0	$59,000	$650,000
2024	$499,000	$110,000	$0	$61,000	$670,000
2025	$514,000	$114,000	$0	$63,000	$690,000
2026	$529,000	$117,000	$150,000	$80,000	$876,000
2027	$545,000	$121,000	$150,000	$82,000	$897,000
2028	$561,000	$124,000	$0	$69,000	$754,000
2029	$578,000	$128,000	$0	$71,000	$777,000
2030	$595,000	$132,000	$0	$73,000	$800,000
2031	$613,000	$136,000	$169,000	$92,000	$1,010,000
2032	$632,000	$140,000	$174,000	$95,000	$1,040,000
2033	$651,000	$144,000	$0	$79,000	$874,000
2034	$670,000	$148,000	$0	$82,000	$900,000
2035	$690,000	$153,000	$0	$84,000	$927,000
2036	$711,000	$157,000	$196,000	$106,000	$1,170,000
2037	$732,000	$162,000	$202,000	$110,000	$1,205,000
2038	$754,000	$167,000	$0	$92,000	$1,013,000
2039	$777,000	$172,000	$0	$95,000	$1,044,000
2040	$800,000	$177,000	$0	$98,000	$1,075,000
2041	$824,000	$182,000	$227,000	$123,000	$1,357,000
2042	$849,000	$188,000	$234,000	$127,000	$1,397,000
Total	$13,478,000	$2,983,000	$1,502,000	$1,798,000	$19,757,000

Development of this GSP was funded through Proposition 1 and Proposition 68 Grants. Ongoing implementation, monitoring, and reporting are expected to be funded through fees and outside grants and funding. The GSA is currently developing a financing plan that will include one or more of the following financing approaches

- Grants and low-interest loans: GSA will continue to pursue grants and low interest loans to help fund planning studies and other GSA activities. However, grants and low-interest loans are not expected to cover all of the GSA operating costs for GSP implementation
- GSP Implementation Costs: Initial implementation costs not covered by grant funding will be assessed through either land-based charge or groundwater usage charge. In the future the GSA may adopt a volumetric charge on groundwater extracted from the Subbasin.
- Taxes: This could include general property related taxes that are not directly related to the benefit or cost of a service (ad valorem and parcel tax), or special taxes imposed for a specific purpose related to GSA activities.

The GSA is pursuing a combined approach, targeting available grants and low interest loans, and considering a combination fee and assessment to cover operating and program-specific costs. The GSA will comply with statutory and California constitutional requirements to adopt any rate, fee, charge, or assessment to fund implementation of the GSP.

This GSP will be adopted and submitted to DWR by January 31, 2022. The implementation timeline will begin thereafter and will allow the GSA to develop and implement projects and management actions to meet sustainability objectives by 2042. GSP implementation also includes annual and periodic evaluations and submittals to DWR. The full schedule for implementation is subject to change and will be evaluated and updated as necessary based on implementation progress, sustainability goals, monitoring, and other factors that could affect implementation. The implementation timeline as presently described is outlined below in **Figure ES-3**.

The GSP uses best available information and the best available science to provide a road map for the Red Bluff Subbasin to meet its sustainability goal by 2042 and comply with SGMA regulations. During each five-year update, progress will be assessed, and the GSP revised as necessary, to achieve the sustainability goal by 2042 and comply with SGMA regulations.

Annual reports will be completed and submitted to DWR by April 1 of each year pursuant to GSP Regulation §356.2. Annual reports will include sections on general information, basin conditions, and plan implementation progress for the reporting period. The annual report submitted to DWR will comply with the requirements of §356.2. The GSA will evaluate the GSP every five years and whenever the plan is amended. The evaluation will be submitted to DWR and include the elements of the Annual Report, a summary of the GSP, project, and management action implementation progress, and progress toward meeting the sustainability goal of the Subbasin.

Figure ES-3. GSP Implementation Schedule

TASK NAME	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Plan Implementation																					
GSP Submittal to DWR	x																				
Outreach and Communication	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
Monitoring and DMS	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
GSP Reporting																					
Annual Reports	x	x	x	x	x		x	x	x	x		x	x	x	x		x	x	x	x	
5-year GSP Evaluation Reports						x					x					x					x

x Indicates a submittal.
🟦 Indicates ongoing event.

ES 6. Overview of Governance

In adopting the Sustainable Groundwater Management Act ("SGMA"), the Legislature made clear that nothing in SGMA "determined or alters surface water of groundwater rights under common law or any provision of the law that determines or grants surface water rights. In other words, the Legislature intended that actions undertaken in accordance with SGMA to respect common law water rights.

This GSP established the objectives of maximizing the beneficial use of water with the Red Bluff Subbasin, without causing undesirable results. The powers of the GSA are set forth in SGMA. This GSP meets the requirements of SGMA and vests the management authority in the GSA. Authorities include Powers of the Board, Rules and Regulations, Committees, Specific Powers, Variances and Complaints.

FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan (Chapter 1 – Introduction)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

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LIST OF ACRONYMS & ABBREVIATIONS

AB	Assembly Bill
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CWC	California Water Code
DWR	California Department of Water Resources
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
TAC	Technical Advisory Committee
Tehama County FCWCD	Tehama County Flood Control and Water Conservation District

1 INTRODUCTION

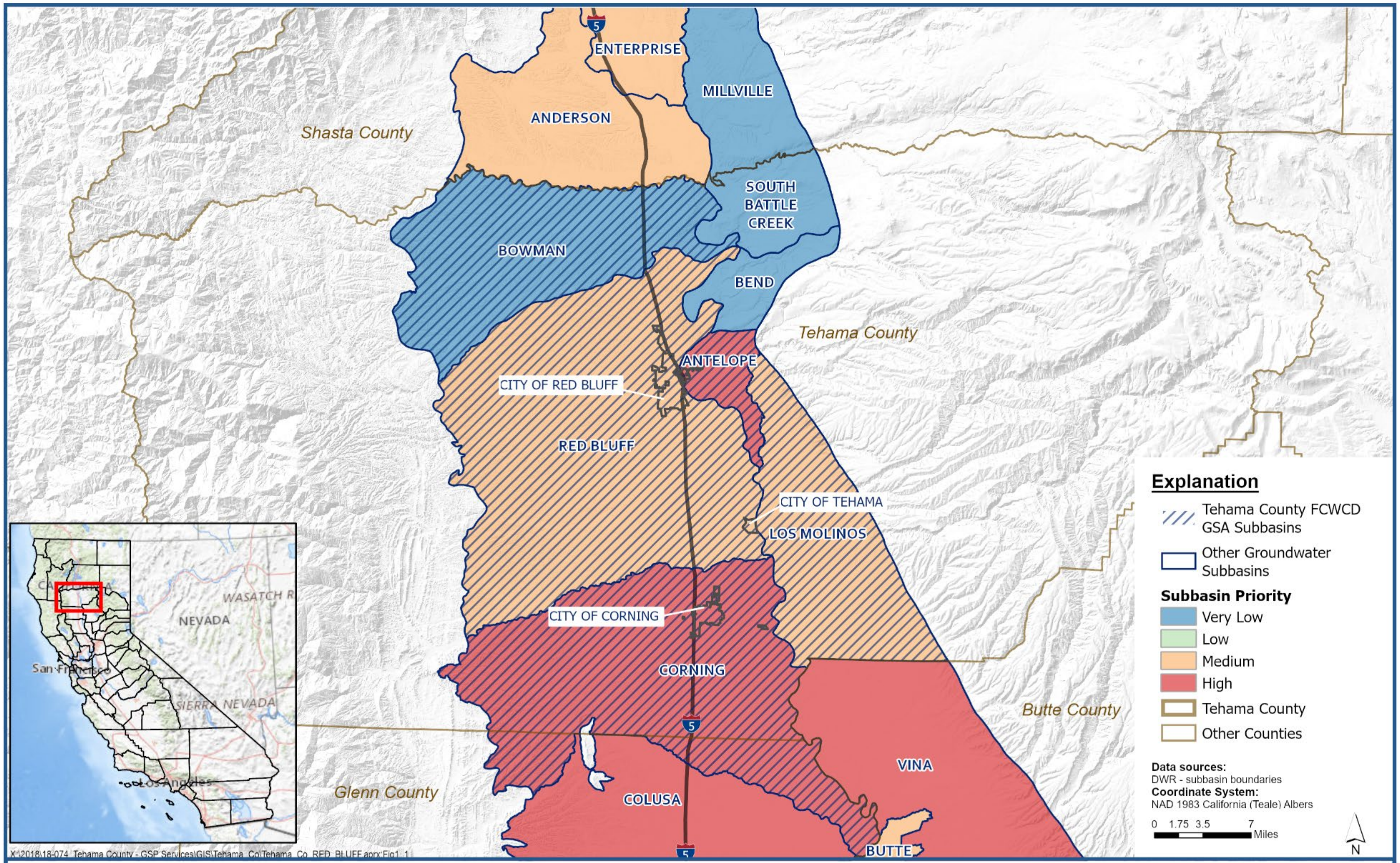
Groundwater serves as an important source of supply for agricultural, municipal, domestic, environmental, and industrial beneficial uses throughout Tehama County, which underlies approximately 1.9 million acres of the County. Agriculture in Tehama County relies on groundwater to produce an array of commodities that contribute to the agricultural economies of the County. Groundwater also supports the majority of domestic, municipal, and industrial water use in and around the City of Corning, City of Red Bluff, and City of Tehama. Thus, the sustainable management of groundwater in the County is important for long-term prosperity.

The Red Bluff Subbasin, which is entirely located within Tehama County, is comprised of approximately 271,800 acres, and relies on an average of approximately 75,200 acre-feet (AF) of groundwater annually for agriculture (1991-2019), has been identified by the California Department of Water Resources (DWR) as a medium priority subbasin. Under the Sustainable Groundwater Management Act (SGMA) of 2014, medium priority subbasins are required to prepare and be managed under a Groundwater Sustainability Plan (GSP, or Plan) by January 31, 2022 (California Water Code (CWC) Section 10720.7(a)(1)) (**Figure 1-1**).

SGMA provides for local control of groundwater resources while requiring sustainable management of these resources. SGMA requires groundwater basins or subbasins to establish governance by forming local Groundwater Sustainability Agencies (GSAs) with the authority to develop, adopt, and implement a GSP. Under this Plan, GSAs must adequately define and monitor groundwater conditions in the Subbasin and establish criteria to maintain or achieve sustainable groundwater management within 20 years of GSP adoption without causing "undesirable results" as defined by SGMA: significant and unreasonable lowering of groundwater levels, loss of groundwater storage and supply, degradation of water quality, land subsidence, and surface water depletion. Sea water intrusion, while a SGMA-defined undesirable result, is not applicable to the Red Bluff Subbasin.

1.1 Purpose of Groundwater Sustainability Plan

The purpose of this GSP is to optimize groundwater use and groundwater storage in the Red Bluff Subbasin while meeting the regulatory requirements set forth in the three-bill legislative package, Assembly Bill (AB) 1739 (Dickinson), Senate Bill (SB) 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act which became effective in California in January 2015 (Water Code §§ et seq). Under SGMA, all high or medium priority groundwater basins or subbasins must form a GSA to represent the subbasin or a portion thereof and submit an adopted GSP to DWR) by January 31, 2022. The Red Bluff Subbasin (DWR Subbasin No. 5-021.50) of the Sacramento Valley Groundwater Basin was assigned a medium priority designation by DWR and is required to submit a GSP. The Tehama County Flood Control and Water Conservation District (Tehama County FCWCD) (District), a local and regional authority, serves as the exclusive GSA for the Red Bluff Subbasin.



Data sources:
DWR - subbasin boundaries
Coordinate System:
NAD 1983 California (Teale) Albers

X:\2018\18-074_Tehama County - GSP Services\GIS\Tehama_Co\Tehama_Co_RED_BLUFF.aprx:Fig1_1

TEHAMA COUNTY

LSCE Team

Tehama County FCWCD GSA Subbasins

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 1-1

There are seven (7) subbasins within Tehama County. The Tehama County FCWCD is the exclusive GSA for six (6) of those subbasins: Antelope, Bend, Bowman, Los Molinos, Red Bluff, and South Battle Creek **(Figure 1-2).** The seventh, the Corning Subbasin, extends into Glenn County, and the GSP for that subbasin is being developed in a coordinated effort between the Tehama County FCWCD and Corning Sub-basin GSA. Both GSAs retain jurisdictional authority over the portion of the Corning Subbasin that is within their county. Of the seven (7) subbasins in the County, the Antelope, Corning, Los Molinos, and Red Bluff Subbasins are designated as medium or high priority and required to submit a GSP in January 2022 **(Figure 1-1).** The Bowman Subbasin was initially designated as medium priority and the District was awarded funding for the Bowman Subbasin under the Proposition 1, Round 2 grant. The District has elected to lead development of a SGMA compliant Plan for the Bowman Subbasin (subsequently, the subbasin's prioritization was changed by DWR to a very low priority) to be submitted in January 2022.

The GSPs for the Antelope, Bowman, and Los Molinos, and Red Bluff Subbasins are being developed concurrently, and will be submitted as four (4) separate GSPs. The Corning Subbasin GSP will be submitted in a coordinated effort between the District and the Corning Sub-basin GSA.

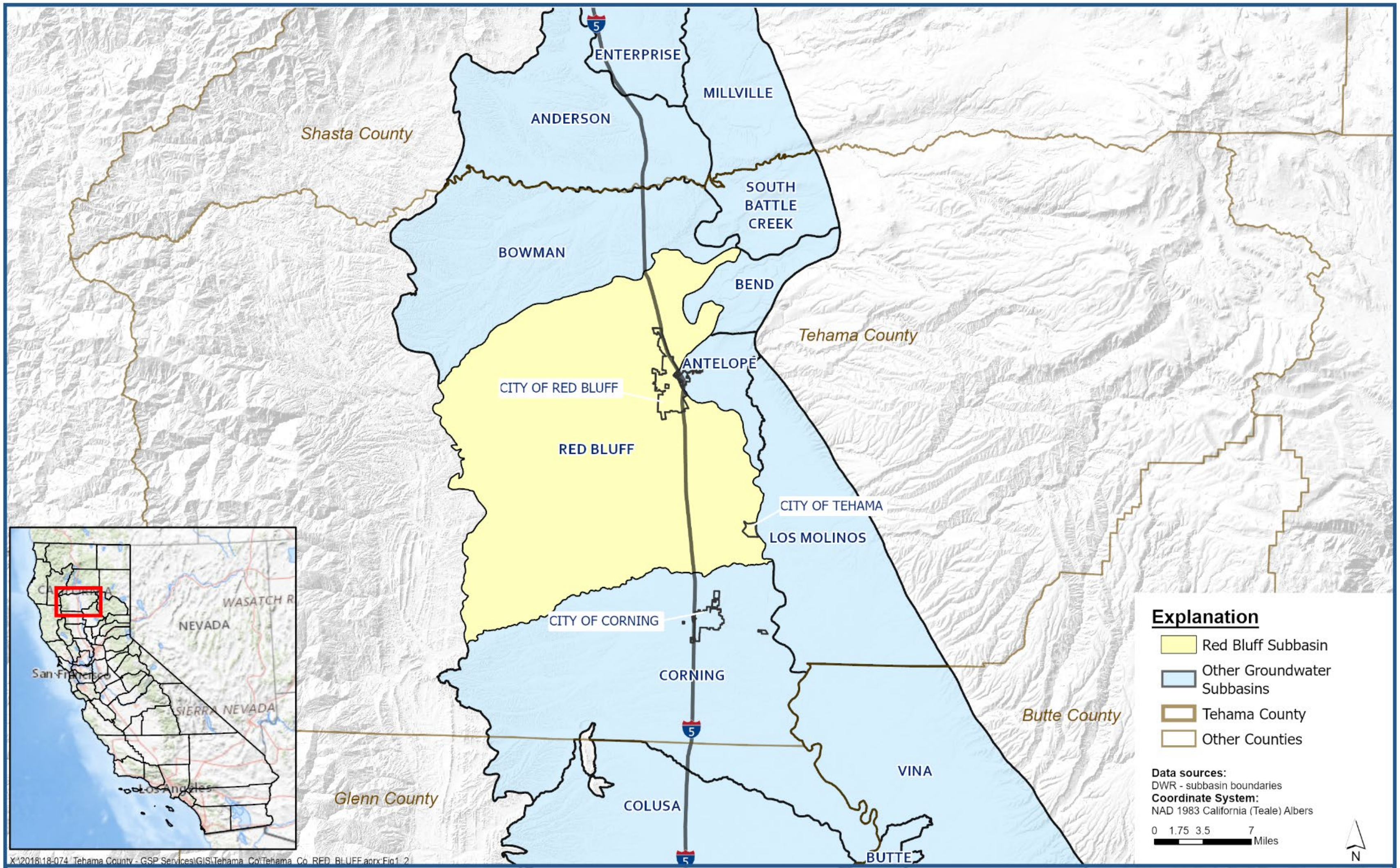
SGMA defines sustainable groundwater management as "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon (50 years from 2022 through 2072) without causing undesirable results" (Water Code, § 10721(v)). Undesirable results, caused by groundwater pumping in the Subbasin, are recognized as:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Each applicable sustainability indicator will be addressed in this GSP and integrated into subbasin-wide monitoring programs based on existing hydrogeologic conditions and current management practices in the Subbasin. Measurable objectives and minimum thresholds have been set for each sustainability indicator based on an analysis of projected hydrologic conditions simulated by a numerical groundwater flow model. This GSP will be implemented over the next 20 years with the intention of establishing sustainable use of groundwater resources for all beneficial users in the GSA and the Subbasin.

1.1.1 Justification for Management Area

Management areas are not being incorporated into this GSP for the Red Bluff Subbasin.



Data sources:
DWR - subbasin boundaries
Coordinate System:
NAD 1983 California (Teale) Albers

TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Red Bluff Subbasin Vicinity Map

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 1-2

1.2 Sustainability Goal

The Tehama County FCWCD will manage groundwater resources responsibly and sustainably in order to maintain acceptable standards and prevent undesirable results, as defined by SGMA, while recognizing the importance of maintaining groundwater supplies and quality for the beneficial users of groundwater within the Subbasin over the 50-year planning and implementation horizon. As mandated under Title 23 of the California Code of Regulations (CCR) Section 354.24, the GSA within the Red Bluff Subbasin has established a "sustainability goal for the basin that culminates in the absence of significant and unreasonable undesirable results within 20 years of the applicable statutory deadline." Specifically, this sustainability goal establishes that the Red Bluff Subbasin will be operated within its sustainable yield by 2042, or 20 years following GSP adoption and implementation in January 2022.

SGMA regulations define sustainable yield as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, which can be withdrawn annually from a groundwater supply without causing an undesirable result" (CWC Section 10721(w)). Subbasin sustainable yield must therefore be determined in the context of the complete basin setting, which includes historical, current, and projected conditions regarding groundwater, surface water, and land use.

To achieve the sustainability goal, this GSP details the accounting of the Subbasin's sustainable yield and establishes the sustainable management criteria to guide the District in sustainably managing the groundwater resources in the Subbasin. Monitoring networks, projects, and management actions are proposed to achieve and verify sustainable groundwater use. The GSA will review the progress of the GSP in meeting the sustainability goal during the five-year periodic reviews and update the GSP as needed to ensure the GSP will achieve subbasin sustainability. To facilitate review, **Table 1-1** aligns the regulations with this GSP's corresponding section.

Table 1-1. Sustainability Goal Development and Associated GSP Sections

SUSTAINABILITY GOAL DEVELOPMENT	23 CCR SECTION	REQUIREMENT	GSP SECTION
Context, Basis for Goal	§ 354.12	Basin Setting	2.2
	§ 354.14	Hydrogeologic Conceptual Model	2.2.1
	§ 354.16	Groundwater Conditions	2.2.2
	§ 354.18	Water Budget	2.3
	§ 354.20	Management Areas	2.4
Establishment of Goal	§ 354.24	Sustainability Goal	3.1
	§ 354.26	Undesirable Results	3.4
	§ 354.28	Minimum Thresholds	3.3
	§ 354.30	Measurable Objectives	3.2
Measures of Ensuring Goal Achievement	§ 354.32	Introduction to Monitoring Networks	3.5
	§ 354.34	Monitoring Network	3.5
	§ 354.36	Representative Monitoring	3.6.8
	§ 354.38	Assessment and Improvement of Monitoring Network	3.6.9
	§ 354.44	Projects and Management Actions	4

1.3 Agency Information

The Red Bluff Subbasin is comprised of 271,793 acres within Tehama County in the northern portion of the Sacramento Valley Groundwater Basin **(Figure 1-2)**. It is bordered by the Bowman Subbasin (DWR Basin 5-006.01) to the north, the Corning Subbasin (DWR Basin 5-021.51) to the south, the Bend Subbasin (DWR Basin 5-021.53), the Antelope Subbasin (DWR Basin 5-021.54), and the Los Molinos Subbasin (DWR Basin 5-021.56), to the east, and the Coastal Mountain Range to the west. The Tehama County FCWCD was formed in 1957 by the Tehama County Flood Control and Water Conservation District Act and is based in Gerber, California **(Appendix 1-A Act of District Formation)**. Upon formation, the Act defined the area of the District as “all that territory of the County of Tehama lying within the exterior boundaries thereof.”

Tehama County FCWCD is responsible for disseminating drought information, levee system management, providing emergency flood information, water resource management, groundwater monitoring, and sustainable groundwater management. The District provides this information and management for public use within the County. Groundwater information maintained and managed by the District includes monitoring wells that are part of the California Statewide Groundwater Elevation Monitoring (CASGEM) program, a Groundwater Management Plan (GWMP), and compliance with SGMA.

1.3.1 Organization and Management Structure of the GSA

The Tehama County FCWCD is governed by a five-member Board of Directors, these five directors are the same five members of the Tehama County Board of Supervisors. The Board of Supervisors members are elected officials within Tehama County, serving 4-year terms. The Tehama County Flood Control and Water Conservation District Board of Directors meetings, which are open to the public, are held the 4th Wednesday of each month. Meeting agendas and minutes are available on the District's website https://tehamacountywater.org/.

In June 2016, the District established the Tehama County Groundwater Commission to serve as an advisory commission to the Tehama County Flood Control and Water Conservation District Board of Directors for GSA related matters. The Commission consists of 11 members with one member from each of the following entities:

- City of Corning
- City of Red Bluff
- City of Tehama
- El Camino Irrigation District
- Los Molinos Community Services District
- Rio Alto Water District
- Five at-large members appointed by the Tehama County FCWCD Board of Directors

The five at-large commission members represent each of the five Supervisorial Districts, which include two private pumpers, two surface water agencies or districts, and one at large member within the County and are selected by the Tehama County FCWCD to represent various areas of groundwater interest. These five at-large members initially selected for the Commission had varying term expirations: two members with a one-year term, one member with a two-year term, one member with a three-year term, and one member with a four-year term. Thereafter, all positions are appointed for a term of four years. Members representing cities or districts were selected by their respective agencies and have no term expiration.

Groundwater Commission meetings, which are open to the public, are held the 4th Wednesday of each month, except holidays. Meeting agendas and minutes are available on the Tehama County meeting portal: https://tehamacountywater.org/meetings/groundwater-commission/#meetings.

The GSA Governing Body is the Tehama County FCWCD Board of Directors which has responsibilities that include, but are not limited to, the following:

1. Approve the final GSP and any future amendments, and all GSA ordinances, rules, regulations, and fees.
2. Provide primary responsibility for funding, resources, and staffing
    - Provide staff assistance to Groundwater Commission and Board of Directors throughout GSP development and implementation process
    - Where necessary, provide additional resources from FCWCD's existing funding or grant opportunities pursued by Tehama County FCWCD
    - Apply for and receive grants to fund GSA activities (with the Commission's recommendation), including responsibility for executing and implementing grant contracts and associated requirements

  - Further revenue measures, if any, would be reviewed by the Commission prior to adoption by the Board of Directors

3. Decide on appeals, if any, from decisions of the Groundwater Commission on permits, similar entitlements, and enforcement matters
4. Confirm appointments of the five "Supervisorial District Representative" members of the Groundwater Commission (upon recommendation of the Commission)

The Groundwater Commission's responsibilities include, but are not limited to, the following:

1. Develop GSP and any future amendments, and all GSA ordinances, rules, and regulations, including holding public hearings and making final recommendations to the Board of Directors.
2. Conduct investigations to determine the need for groundwater management, monitor compliance and enforcement, propose, and update fees, and make final recommendations to the Board of Directors.
3. Review all proposed grant applications and advise Board of Directors regarding grant funding opportunities.
4. Issue permits or similar entitlements issued by the GSA e.g., well spacing (with appeal).
5. Make quasi-judicial decisions in GSA enforcement matters (with appeal).
6. Provide recommendations to the Board of Directors for selection of the five (5) representatives from each County Supervisorial District

The AB3030 Technical Advisory Committee (TAC) also provides technical assistance as needed. The TAC provides input on groundwater management in Tehama County based on the District's AB3030 GWMP. The TAC consists of three agricultural pumpers, three water district representatives, one natural resources representative, and one representative each from the City of Corning, the City of Red Bluff, and the City of Tehama.

Contact information for the District's GSP Manager is provided below:

Agency:	Tehama County Flood Control and Water Conservation District
Address:	9380 San Benito Avenue Gerber, CA 96035-9701
Plan Manager:	Ryan Teubert, CFM – Flood Control and Water Resources Manager
Phone:	530-385-1462
Email:	rteubert@tcpw.ca.gov

1.3.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin is eligible to become a GSA. A single local agency can decide to become a GSA, or a combination of local agencies can decide to form a GSA by using a joint powers authority, a memorandum of agreement, or other legal agreement (DWR, 2016). A timeline of the authoritative actions by the District for GSA formation and GSP submission is provided in **Table 1-2** below. GSA formation documents are provided in **Appendix 1-B**.

Table 1-2. GSA Formation Timeline

DATE	EVENT
January 1, 2015	SGMA became effective
June 2, 2015	Public Hearing
November 3, 2015	Public Hearing
August 17, 2015 – December 18, 2015	**Letters of Support** were provided by local Cities and Districts: City of Corning, City of Red Bluff, City of Tehama, El Camino Irrigation District, Gerber Las Flores Community Services District, Los Molinos Community Services District, and Rio Alto Water District
November 3, 2015	**Resolution No. 05-2015 Adopted:** A Resolution of the Board of Directors of the Tehama County Flood Control and Water Conservation District Electing to be the Groundwater Sustainability Agency for all those Portions of the Rosewood, Bowman, South Battle Creek, Red Bluff, Bend, Antelope, Dye Creek, Los Molinos, Corning, Vina, and Colusa Subbasins Located within Tehama County
November 4, 2015	**Notice of Intent** to Become a Groundwater Sustainability Agency for all eleven (11) Groundwater Subbasins located within Tehama County was submitted to DWR
February 11, 2016	**Listing as an Exclusive GSA** for the following Subbasins or portions of Subbasins within Tehama County: Rosewood, Bowman, Red Bluff, Corning, Colusa, Vina, Los Molinos, Dye Creek, Antelope, Bend, and South Battle Creek
February 18, 2016	**Jurisdictional Consolidation** of portion of Colusa Subbasin within Tehama County into the Corning Subbasin
June 7, 2016	**Ordinance 2016-1 Adopted:** An Ordinance of the Tehama County Flood Control and Water Conservation District Board of Directors establishing the Tehama County Groundwater Commission
June 30, 2017	GSA establishment deadline
September 27, 2018*	**Jurisdictional Consolidation** of portion of Vina Subbasin within Tehama County and the Dye Creek Subbasin into the Los Molinos Subbasin
September 27, 2018*	**Jurisdictional Consolidation** of the Rosewood Subbasin into the Bowman Subbasin
September 27, 2018*	**Jurisdictional Consolidation** of portion of Millville Subbasin within Tehama County into the South Battle Creek Subbasin
January 31, 2022	Adopted GSP Due to DWR

*Following the consolidations on September 27, 2018, the number of subbasins in Tehama County was reduced from eleven (11) to seven (7).

1.3.3 Estimated Cost of Implementing the GSP

The GSA is responsible for the finances of GSP implementation, GSA staffing, contracting, and daily operations related to Red Bluff GSP implementation. The Antelope, Bowman, Los Molinos, and Red Bluff Subbasin GSP development costs were funded through Proposition 1 and 68 grants totaling $2,998,160 (Proposition 1, Round 2 total was $1,498,960 and Proposition 68, Round 3 total was $1,499,200). The grant funding represents the cost of GSP development. Funding for the development of the Corning Subbasin GSP (~$1 million) was awarded to Glenn County under Proposition 1, Round 2.

The GSP implementation estimated annual costs (in current dollars) are estimated to be $470,000 for GSA Administration, Management, and Operations of all five GSPs managed by the Tehama County FCWCD and $104,000 for annual monitoring associated with the Red Bluff GSP as described in Chapter 5. Plan updates are also expected to cost $300,000 (current dollars) every five years. Estimated annual operations and maintenance (O&M) costs for all Red Bluff GSP projects and management actions are described in Chapter 4. All costs are preliminary estimates that will be refined by the GSA as the GSP is implemented. The GSA will manage the financing of GSP implementation, GSA staffing, contracting, and daily operations related to Red Bluff GSP implementation. Additional information is provided in Chapter 5 of this GSP.

1.4 GSP Organization

This GSP is organized according to DWR's "GSP Annotated Outline" for standardized reporting (CA DWR SGMP, 2016) and DWR's Elements Guide. To facilitate DWR review and assure compliance with all applicable GSP regulations, **Table 1-3** was prepared to cross-reference sections of this GSP to applicable sections and the GSP regulations. Terminology in this GSP has also been used in alignment with the SGMA definitions provided in California Water Code (CWC) Section 10721 and 23 CCR Section 351. These definitions are provided as **Appendix 1-C**. of this GSP. Refer to the Elements Guide in **Appendix 1-D** for a detailed breakdown of the required GSP elements and their location in this GSP. The structure of the GSP is as follows:

Executive Summary:

Provides a consolidated overview of the GSP.

Chapter 1 - Introduction:

Describes the purpose of the plan, Subbasin sustainability goal, agency formation and contact information, and the organization of the GSP.

Chapter 2 - Subbasin Plan Area and Basin Setting:

Section 1 provides a general overview of the Plan Area including a summary of the jurisdictional areas, relevant water resource monitoring and management programs, description of applicable general plan elements, and GSP notification and communication.

Section 2 describes the hydrogeologic setting of the Subbasin, current and historic groundwater conditions, and provides details on groundwater modeling and the water budget.

Chapter 3 - Sustainable Management Criteria:

Establishes the Subbasin sustainability goal to be achieved. This section also establishes measurable objectives, minimum thresholds, and undesirable results for each sustainability indicator, followed by a description of the proposed monitoring network to track and verify progress toward the Subbasin sustainability goal.

Chapter 4 - Projects and Management Actions:

Describes the programs and management actions the Tehama County FCWCD has determined will achieve the sustainability goal for the Subbasin.

Chapter 5 - Plan Implementation:

Includes an estimate of GSP implementation costs, schedule, and a plan for annual reporting and 5-year updates.

Chapter 6 – References

Table 1-3: Cross Reference of GSP Regulations and Associated GSP Sections

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
1. Administrative Information	4. General Information	(a)	Executive summary	Executive Summary
		(b)	List of references and technical studies	6
	6. Agency Information	-	Agency information pursuant to CWC Section 10723.8, along with:	App. 1
		(a)	Agency name and mailing address	1.3
		(b)	Agency organization and management structure, persons with management authority for Plan implementation	1.3.1
		(c)	Plan manager name and contact information	1.3
		(d)	Legal authority of agency	1.3.2
		(e)	Estimate of Plan implementation costs and description of how Agency plans to meet costs	1.3.3, 5.1
	8. Description of Plan Area	(a)	Maps of Plan area	2.1
		(b)	Written description of Plan area	2.1
		(c)-(d)	Identification of existing water resource monitoring and management programs, and description of any such planned programs	2.1.2
		(e)	Description of conjunctive use programs	2.1.2
		(f)	Description of the land use elements or topic categories	2.1.3
		(g)	Description of additional Plan elements (CWC Section 10727.4)	2.1.4
	10. Notice and Communication	(a)	Description of the beneficial uses and users of groundwater in the Subbasin	2.1.5
		(b)	List of public meetings	2.1.5
		(c)	Comments and responses regarding the Plan	2.1.5
		(d)	Description of communication procedures	2.1.5

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
2. Basin Setting	12. Introduction to Basin Setting	-	Information about the basin setting (physical setting, characteristics, current conditions, data gaps, uncertainty)	2.2
	14. Hydrogeologic Conceptual Model	(a)	Description of the Subbasin hydrogeologic conceptual model	2.2.1
		(b)	Summary of regional geologic and structural setting, Subbasin boundaries, geologic features, principal aquifers, and aquitards	2.2.1
		(c)	Cross-sections depicting major stratigraphic and structural features	2.2.1
		(d)	Maps of Subbasin physical characteristics	2.2.1
	16. Groundwater Conditions	(a)-(g)	Description of current and historical groundwater conditions including: 1. Groundwater elevation 2. Change in storage 3. Seawater intrusion 4. Groundwater quality issues 5. Land subsidence 6. Interconnected surface water systems 7. Groundwater dependent ecosystems	2.2.2
	17. Water Budget	(a)	Water budget providing total annual volume of groundwater and surface water entering and leaving the Subbasin, including historical, current, and projected water budget conditions, and change in storage	2.3
		(b)-(f)	Development of a numerical groundwater and surface water model to quantify current, historical, and projected: 1. Total surface water entering and leaving by water source type 2. Inflow to the groundwater system by water source type	2.3

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
2. Basin Setting			3. Outflows from the groundwater system by water use sector 4. Change in groundwater storage 5. Overdraft over base period 6. Annual supply, demand, and change in storage by water year type. 7. Estimated sustainable yield	
	20. Management Areas	(a)	Description of management areas	2.4
		(b)	Describe purpose, minimum thresholds, measurable objectives, monitoring, analysis	2.4
		(c)	Maps and supplemental information	2.4
3. Sustainable Management Criteria	22. Introduction to Sustainable Management Criteria	-	Criteria by which an Agency defines conditions that constitute sustainable groundwater management for the Subbasin	3
	24. Sustainability Goal	-	Description of Subbasin sustainability goal, including basin setting information used to establish the goal, sustainability indicators, discussion of measures to ensure the Subbasin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved and maintained	3.1
	26. Undesirable Results	(a)	Processes and criteria used to define undesirable results applicable to the Subbasin	3.4
		(b)-(c)	Description of undesirable results, including cause of groundwater conditions and potential effects on beneficial uses and users of groundwater	3.4
	28. Minimum Thresholds	(a)	Establish minimum thresholds to quantify groundwater conditions for each applicable sustainability indicator	3.3

SUBARTICLE	SECTION	PARAGRAPH	REQUIREMENT	GSP SECTION
		(b)-(d)	Describe information and criteria to select, establish, justify, and quantitatively measure minimum thresholds	3.3
	30. Measurable Objectives	(a)-(g)	Establish measurable objectives, including interim milestones in increments of five years, to achieve and maintain the Subbasin sustainability goal	3.2
4. Monitoring Networks	32. Introduction to Monitoring Networks	-	Description of monitoring network, monitoring objectives, monitoring protocols, and data reporting	3.5
	34. Monitoring Network	(a), (e)-(g)	Development of monitoring network to yield representative information about groundwater conditions	3.5.1
		(b)-(d)	Monitoring network objectives	3.5.1
		(h)	Maps and tables of monitoring sites	3.5.1
		(i)	Monitoring protocols	3.6
	36. Representative Monitoring	(a)-(c)	Designation of representative monitoring sites	3.6.8
	38. Assessment and Improvement of Monitoring Network	(a)-(d)	Evaluation of monitoring network, including uncertainty, data gaps, and efforts to fill data gaps	3.6.9
		(e)	Adjustment of monitoring frequency and density to assess management action effectiveness	3.6.9
	40. Reporting Monitoring Data to the Department	(f)	Copy of monitoring data from data management system	
5. Projects and Management Actions	44. Projects and Management Actions	(a)-(c)	Description of projects and management actions to achieve and maintain the Subbasin sustainability goal	4

FINAL REPORT

Red Bluff Subbasin
Sustainable Groundwater Management Act

Groundwater Sustainability Plan

(Chapter 2A – Plan Area)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

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LIST OF ACRONYMS & ABBREVIATIONS

AB	Assembly Bill
bgs	Below Ground Surface
BMP	Best Management Practice
CalEPA	California Environmental Protection Agency
CalGEM	California Geologic Energy Management Division
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CNRA	California Natural Resources Agency
CV-SALTS	Central Valley Salinity Alternatives
CWA	Clean Water Act
CWC	California Water Code
DDW	Division of Drinking Water
DPR	Department of Pesticide Regulation
DTSC	Department of Toxic Substance Control
DWR	California Department of Water Resources
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	Groundwater Dependent Ecosystem
GMP	Groundwater Management Plan
GQTM	Groundwater Quality Trend Monitoring
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
HCM	Hydrogeological Conceptual Model
ILRP	Irrigated Lands Regulatory Program
IRWMP	Integrated Regional Water Management Plan
MCL	Maximum Contaminant Level
MO	Measurable Objective
MT	Minimum Threshold
RWQCB	Regional Water Quality Control Board

SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
Tehama County FCWCD	Tehama County Flood Control and Water Conservation District
USBLM	Bureau of Land Management
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCR	Well Completion Report
WDR	Waste Discharge Requirements

2 SUBBASIN PLAN AREA AND BASIN SETTING (REG. § 354.8)

Per DWR GSP regulations section §354.8, this section of the GSP describes the components of the plan area of the Red Bluff Subbasin along with the basin setting. The plan area includes information on land use, existing groundwater wells, monitoring and management in the Subbasin, and notice and communication methods used during the GSP development and implementation process. The basin setting includes a description of the hydrogeologic conceptual model, groundwater conditions, and subbasin water budget.

2.1 Description of Plan Area

The Red Bluff Subbasin (DWR Subbasin No. 5-021.50) covers 271,800 acres located in the Northern Sacramento Valley Groundwater Basin (Figure 2-1). The lateral extent of the Subbasin is defined by the Subbasin boundaries provided in Bulletin 118 (DWR, 2018). It is bounded on the north by the Bowman Subbasin (DWR Subbasin No. 5-006.01) on the east by the Bend Subbasin (DWR Subbasin No. 5-021.53), the Antelope Subbasin (DWR Subbasin No. 5-021.54), and the Los Molinos Subbasin (DWR Subbasin No. 5-021.56), on the south by the Corning Subbasin (DWR Subbasin No. 5-021.51) and on the west by the Coastal Mountain Range. The eastern and western boundaries of the Subbasin generally follow the Sacramento River and Coastal Mountain Range, respectively, and the southern boundary generally follows Thomes Creek. The vertical boundaries of the Subbasin are the land surface (upper boundary) and the definable bottom of the basin (lower boundary). The definable bottom is the base of fresh water located at approximately 400-2,400 feet below ground surface (bgs) and was established as part of the development of the hydrogeologic conceptual model (HCM) discussed in the Basin Setting section of this GSP (Section 2.2).

2.1.1 Summary of Jurisdictional Areas and Other Features

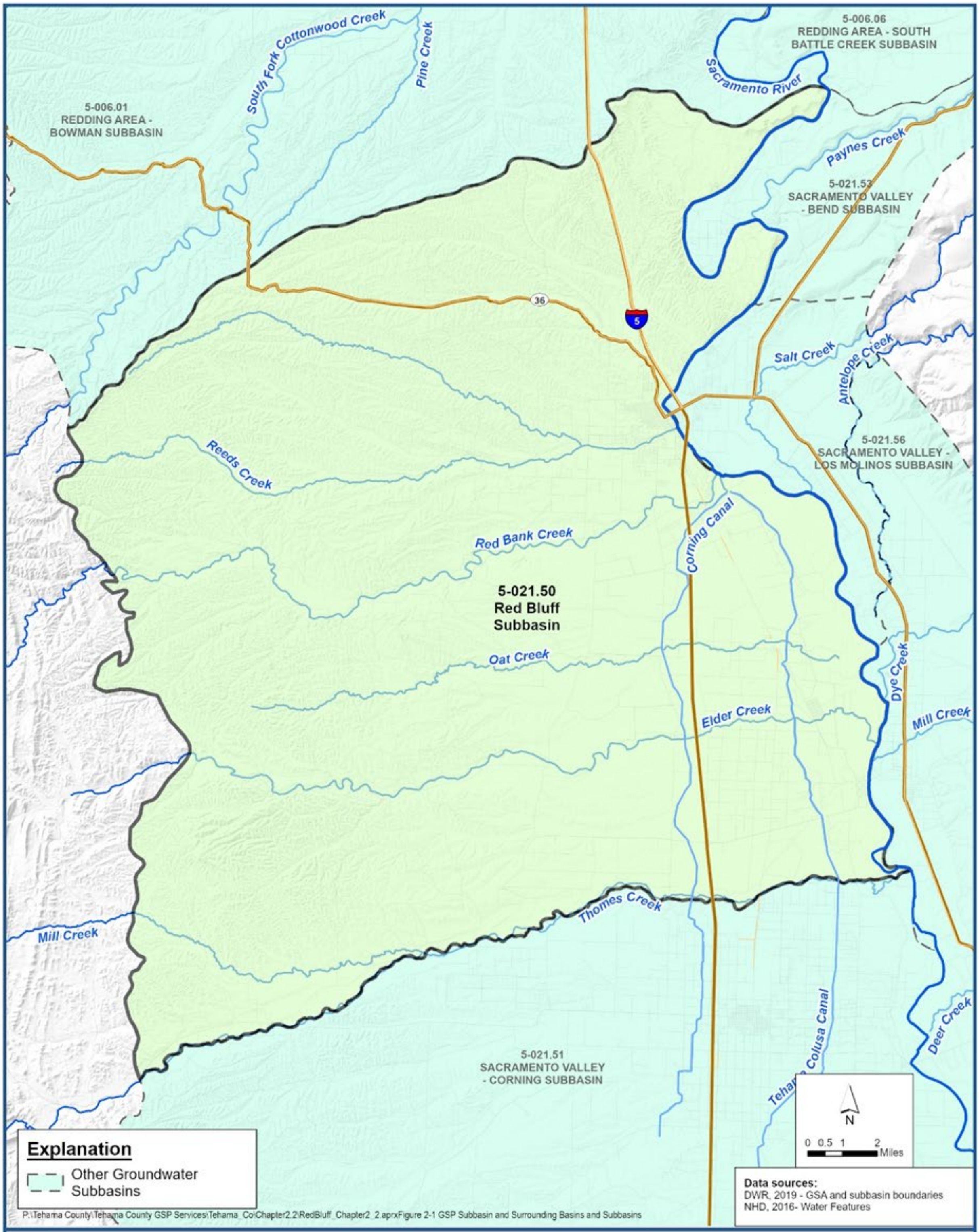
2.1.1.1 Land Ownership

This GSP covers the entire Subbasin, all of which falls within the jurisdictional boundaries of Tehama County. There are no known adjudicated areas within or surrounding the Subbasin.

State and federal agencies with land ownership in the Subbasin comprise a very small portion of the Subbasin. Federal and state land ownership includes:

- Mendocino National Forest (U.S. Forest Service (USFS)) (0.01%, 26 acres)
- Sacramento River National Wildlife Refuge (United States Fish and Wildlife (USFWS)) (0.9%, 2,507 acres)
- State Lands (0.2%, 434 acres)
- United States Bureau of Land Management (USBLM) (0.8%, 2,104 acres)
- USFWS (0.07%, 186 acres)

The remaining 98% of land is privately owned (**Figure 2-2**).



P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2.2\RedBluff_Chapter2_2.aprx\Figure 2-1 GSP Subbasin and Surrounding Basins and Subbasins

Data sources:
DWR, 2019 - GSA and subbasin boundaries
NHD, 2016- Water Features

TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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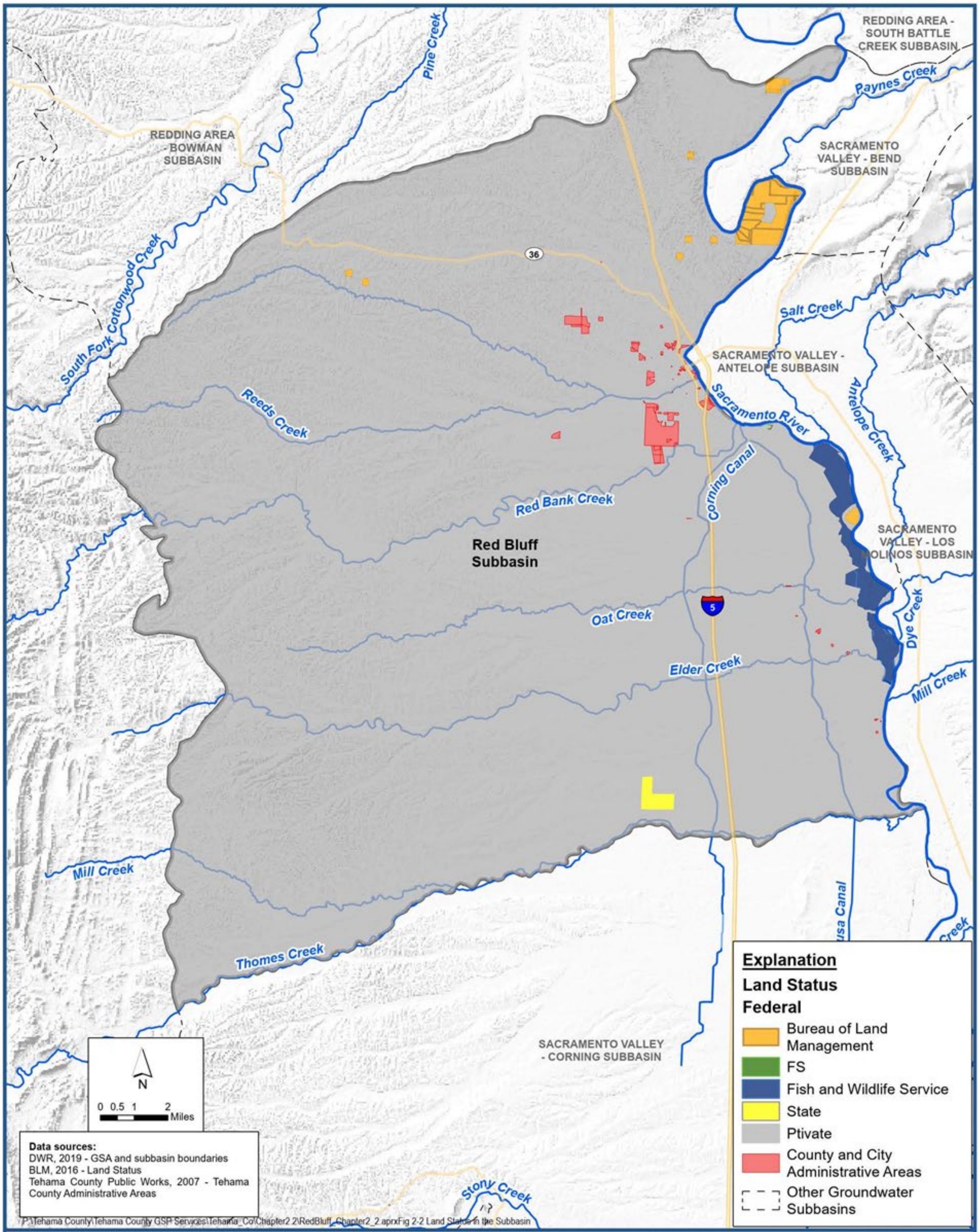
Red Bluff Subbasin
and Surrounding Groundwater Subbasins

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-1



Data sources:
DWR, 2019 - GSA and subbasin boundaries
BLM, 2016 - Land Status
Tehama County Public Works, 2007 - Tehama County Administrative Areas

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2 2\RedBluff_Chapter2_2.aprx Fig 2-2 Land Status in the Subbasin

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Land Status in the Subbasin

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-2

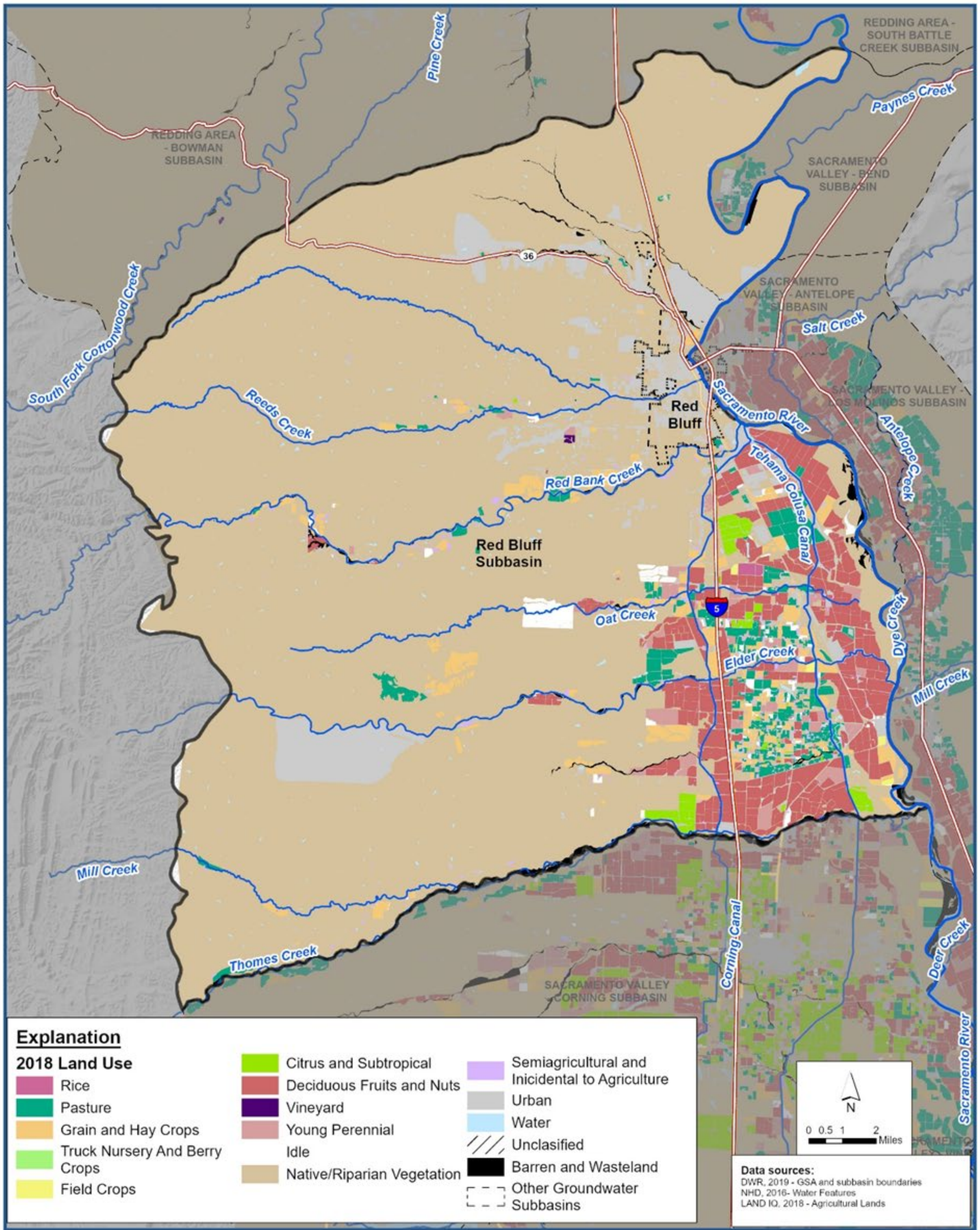
2.1.1.2 Land Use

Land use in the Red Bluff Subbasin was categorized as: agricultural, urban, and native and riparian vegetation based on the Land IQ dataset which primarily focuses on irrigated lands:

- Agricultural: includes all agricultural crops reported in the Subbasin: rice, pasture, grain and hay crops, truck nursery, and berry crops, field crops, citrus and subtropical, deciduous fruits and nuts, vineyards, young perennial crops, and idle land/land that was cultivated but is now in a state of disuse/abandoned.
- Refuge Area: includes managed wetlands in the Subbasin.
- Native Vegetation: includes all land covered by native vegetation, riparian vegetation, and water surfaces.
- Urban: includes lands classified as urban and semi-agricultural to incidental to agriculture. The only significant urban area in the Subbasin is the City of Red Bluff.

Figure 2-3 displays the land use in the Red Bluff Subbasin as reported in 2018 through Land IQ-remotely-sensed land use data (Land IQ, 2018).

Annual land use (acres) within each of the four main land use sectors**:** agriculture, urban, refuge area, and native and riparian vegetation are depicted in **Figure 2-4** and **Table 2-1** for the Red Bluff Subbasin from 1985 to 2019. The data from 1985-2017 and 2019 came from the model generated as part of this GSP; the 2018 data is from Land-IQ. The total land use acreage (271,960 acres) shown in **Figure 2-4** and **Table 2-1** varies slightly (0.06%) from the total Subbasin acreage and 2018 data (271,793 acres) due to the depiction of the model domain. As displayed in the table, native and riparian vegetation (84%) is the leading source of land use within the Subbasin with approximately 13% dedicated to agriculture, 2% dedicated to urban use, and 0.001% dedicated to refuge areas. Agricultural land use categories are further detailed in **Figure 2-5** and **Table 2-2**.



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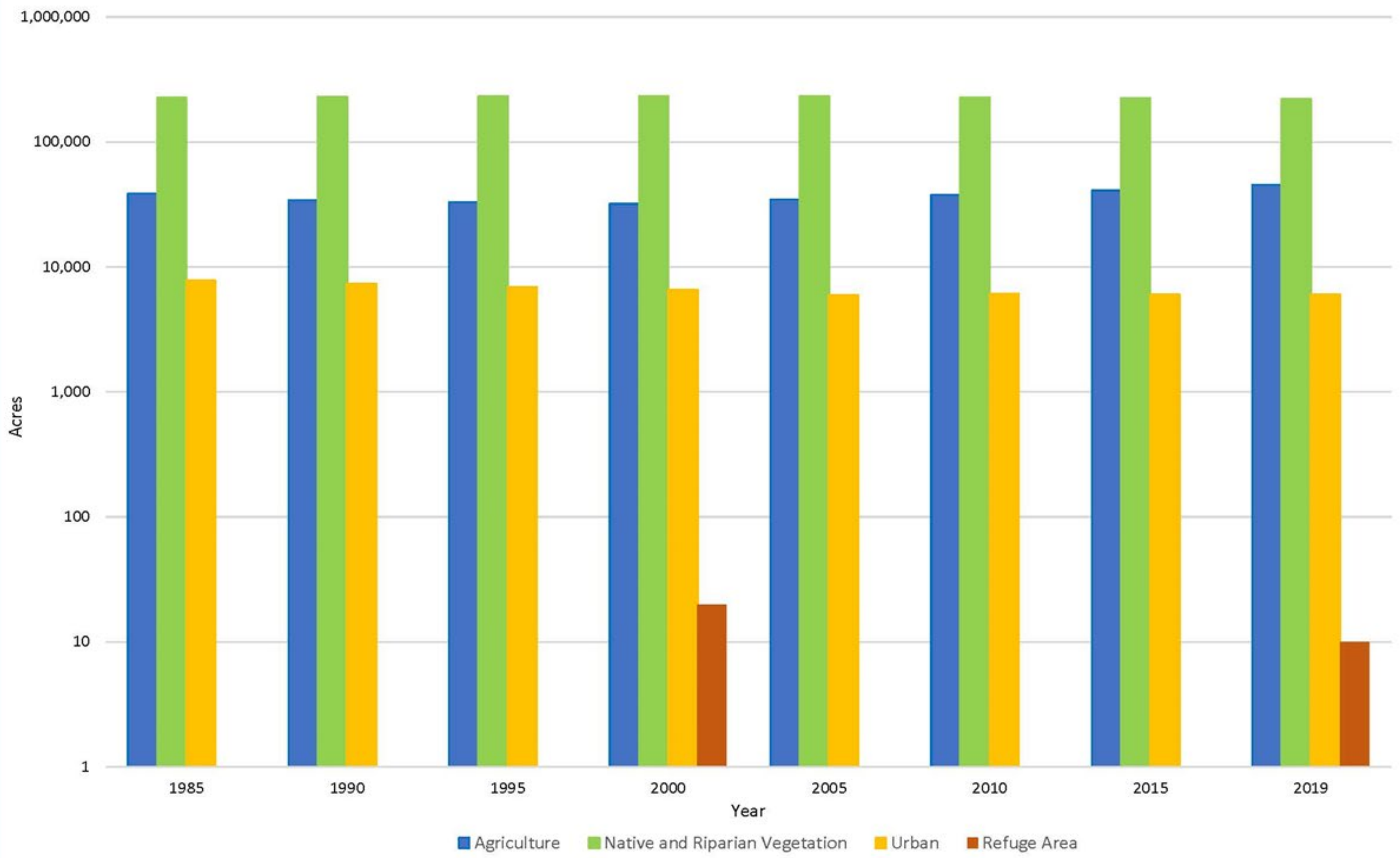
2018 Land Use

Figure 2-3

Groundwater Sustainability Plan
Red Bluff Subbasin



Note: 1978-2013 total Subbasin acreage = 271,955 and 2018 total Subbasin acreage = 271,234. This is due to different data sources

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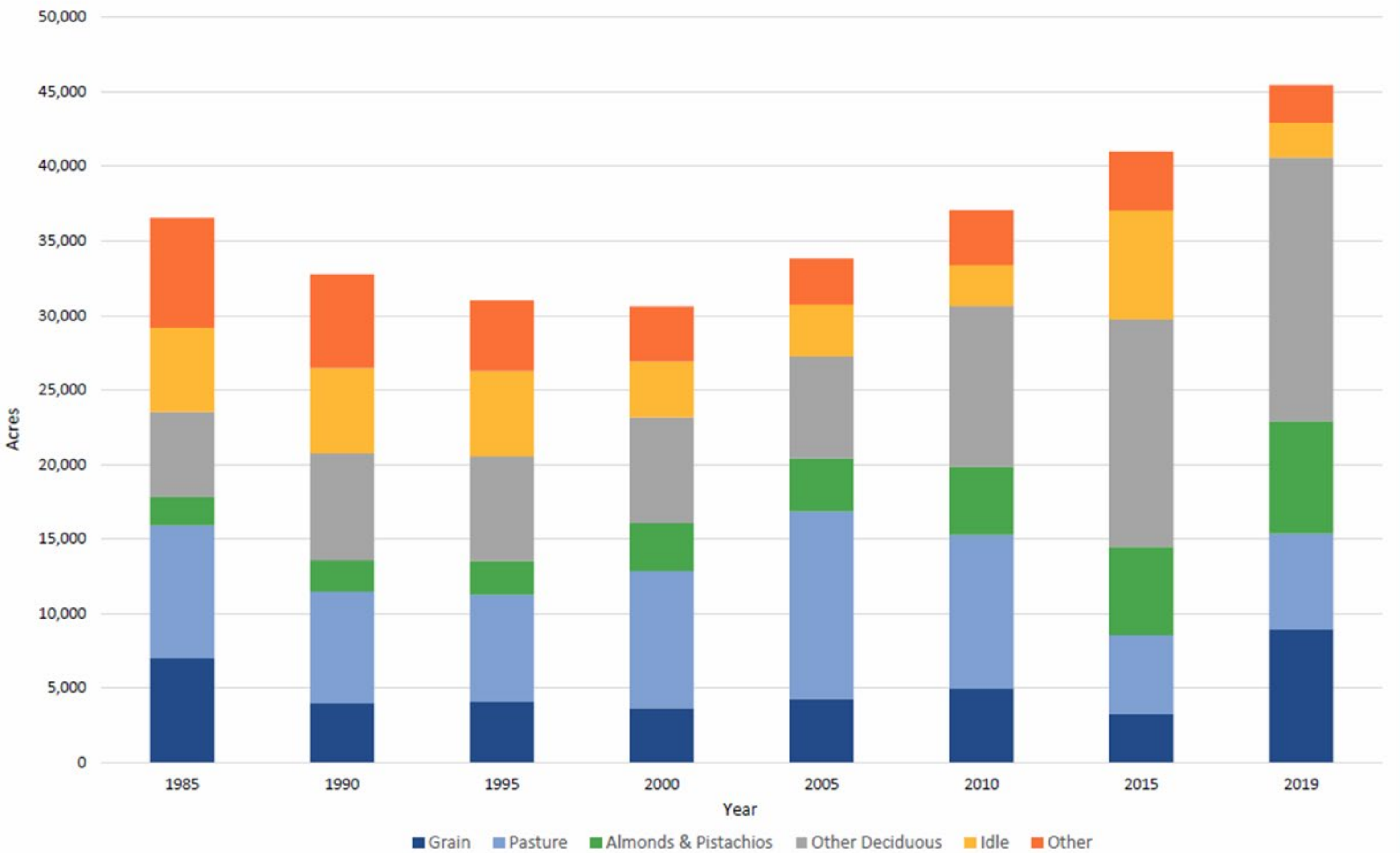
Red Bluff Subbasin Land Use

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-4



Note: "Other" includes agricultural land use that is less than 5% of the total: sugar beets, corn, dry beans, safflower, other field, alfalfa, other truck crops, curcurbits, citrus & subtropical, and vineyards

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Red Bluff Subbasin Agricultural Land Use

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-5

Table 2-1. Red Bluff Subbasin Land Use (Acres)

YEAR	AGRICULTURE	NATIVE VEGETATION	REFUGE AREA	URBAN	TOTAL
1985	38,660	225,540	0	7,760	271,960
1986	36,350	227,920	0	7,680	271,950
1987	34,820	229,530	0	7,600	271,950
1988	37,010	227,420	0	7,520	271,950
1989	34,870	229,650	0	7,440	271,960
1990	34,120	230,490	0	7,350	271,960
1991	34,380	230,310	0	7,270	271,960
1992	34,490	230,290	0	7,180	271,960
1993	35,340	229,490	0	7,120	271,90
1994	36,060	228,820	0	7,080	271,960
1995	32,990	232,050	0	6,920	271,960
1996	33,950	231,060	10	6,940	271,960
1997	35,760	229,280	10	6,910	271,960
1998	34,130	230,970	10	6,840	271,950
1999	32,310	232,850	20	6,780	271,960
2000	31,900	233,450	20	6,580	271,950
2001	33,990	231,450	10	6,500	271,950
2002	33,480	232,100	10	6,360	271,950
2003	33,510	232,250	10	6,190	271,960
2004	34,610	231,290	0	6,050	271,950
2005	34,720	231,300	0	5,930	271,950
2006	33,630	232,400	0	5,920	271,950
2007	34,540	231,460	0	5,960	271,960
2008	33,990	232,030	0	5,930	271,950
2009	35,280	230,620	0	6,050	271,950
2010	37,850	228,000	0	6,100	271,950
2011	37,250	228,600	0	6,100	271,950
2012	36,020	229,820	0	6,120	271,960
2013	37,950	227,930	0	6,080	271,960
2014	39,880	226,030	0	6,040	271,950
2015	40,840	225,110	0	6,000	271,950
2016	41,840	224,150	0	5,960	271,950
2017	43,340	222,550	0	6,070	271,960
2018	45,310	220,530	0	6,110	271,950
2019	45,300	220,600	10	6,050	271,960

*Values were rounded to the nearest 10 acres. These totals differ from the Subbasin acreage (271,793) due to the depiction of the model domain.

Table 2-2. Red Bluff Subbasin Agricultural Land Use (Acres)

AGRICULTURAL LAND USE TYPE	1985	1990	1995	2000	2005	2010	2015	2019
Grain	7,006	3,978	4,090	3,651	4,278	4,965	3,255	8,929
Pasture	8,920	7,498	7,189	9,203	12,596	10,320	5,303	6,446
Almonds & Pistachios	1,919	2,099	2,261	3,225	3,552	4,586	5,937	7,531
Other Deciduous	5,695	7,186	7,022	7,088	6,841	10,760	15,248	17,691
Idle	5,653	5,713	5,712	3,755	3,463	2,757	7,302	2,354
Other*	7,338	6,279	4,722	3,688	3,083	3,664	3,937	2,511

*"Other" includes agricultural land use that is less than 5% of the total: sugar beets, corn, dry beans, safflower, other field, alfalfa, other truck crops, cucurbits, citrus & subtropical, and vineyards.

2.1.1.3 Well Distribution and Density

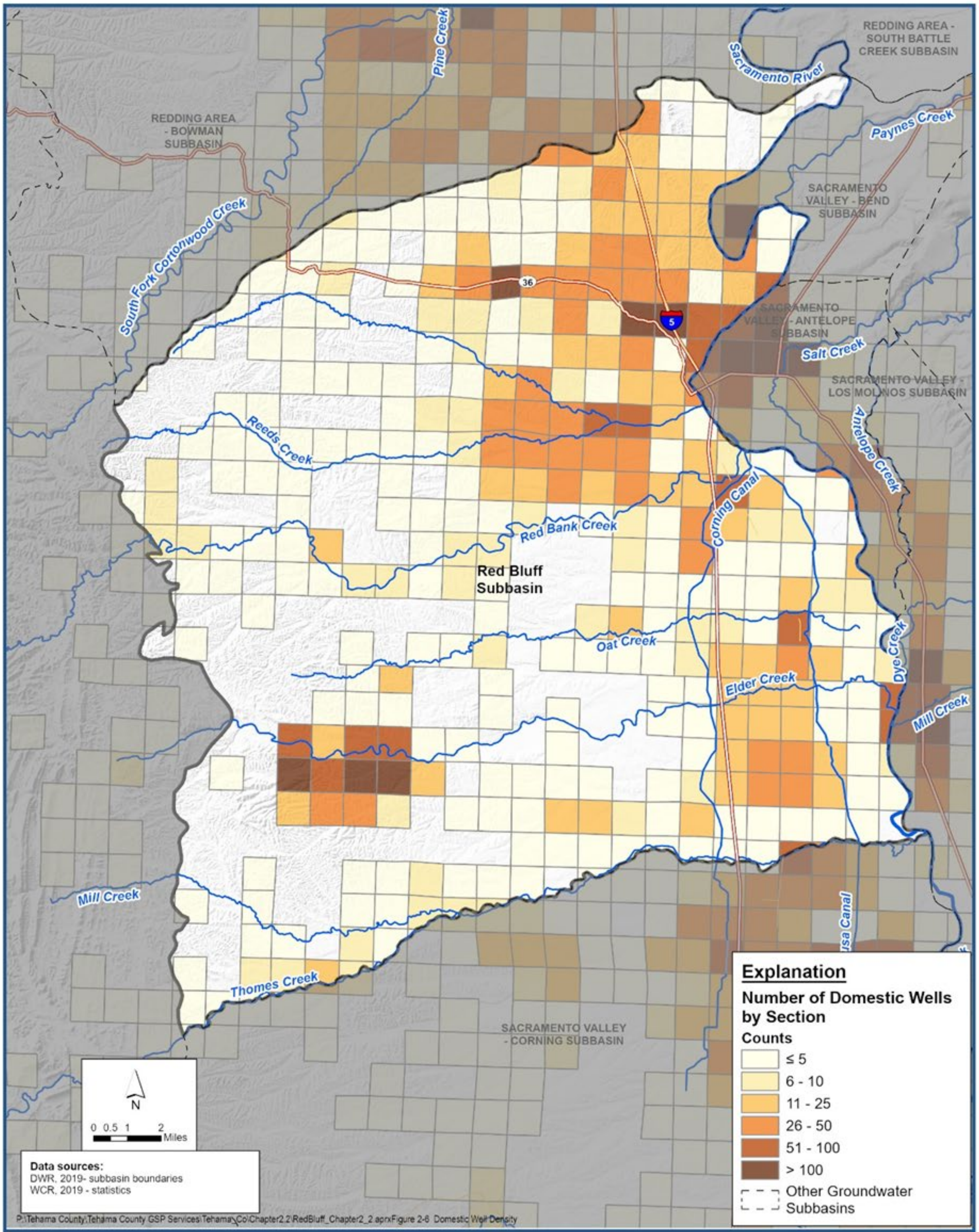
Well construction, type, and distribution for wells in the Subbasin were obtained from Tehama County, DWR's Well Completion Report Map Application (DWR, 2018), the Groundwater Ambient Monitoring and Assessment Program (GAMA), and the CASGEM program.

Wells within the Subbasin are categorized as domestic, production, and public supply. These categories are based on the well use information submitted with the well logs to DWR (**Table 2-3**):

Table 2-3. Well Density

TYPE OF WELL	WELL COUNT
Domestic	5,318
Production	641
Public Supply	39
TOTAL	5,998

Well density maps were prepared to illustrate the distribution of these wells (**Figures 2-6, 2-7, and 2-8**). The well distribution may not reflect the total number of existing or active wells in the Subbasin. The highest concentration of domestic wells is centered around the City of Red Bluff, production wells are generally located along the eastern boundary of the Subbasin, and there are few public supply wells located in the Subbasin. A detailed analysis of domestic well depths and distribution is included as **Appendix 2-A**.



Data sources:
DWR, 2019- subbasin boundaries
WCR, 2019 - statistics

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2.2\RedBluff_Chapter2_2.aprxFigure 2-6 Domestic Well Density

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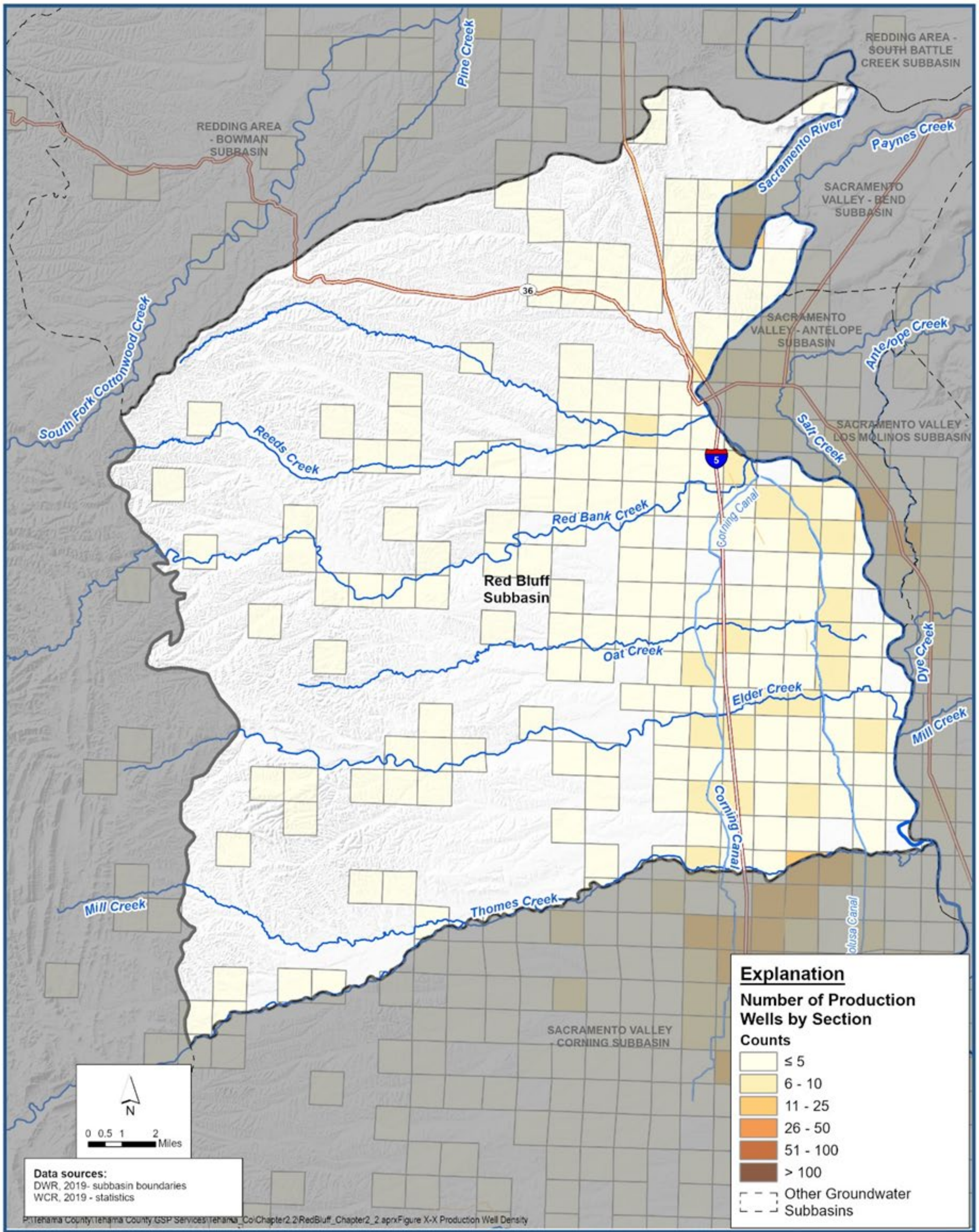
Domestic Well Density by Section

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-6



Data sources:
DWR, 2019- subbasin boundaries
WCR, 2019 - statistics

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2.2\RedBluff_Chapter2_2.aprxFigure X-X Production Well Density

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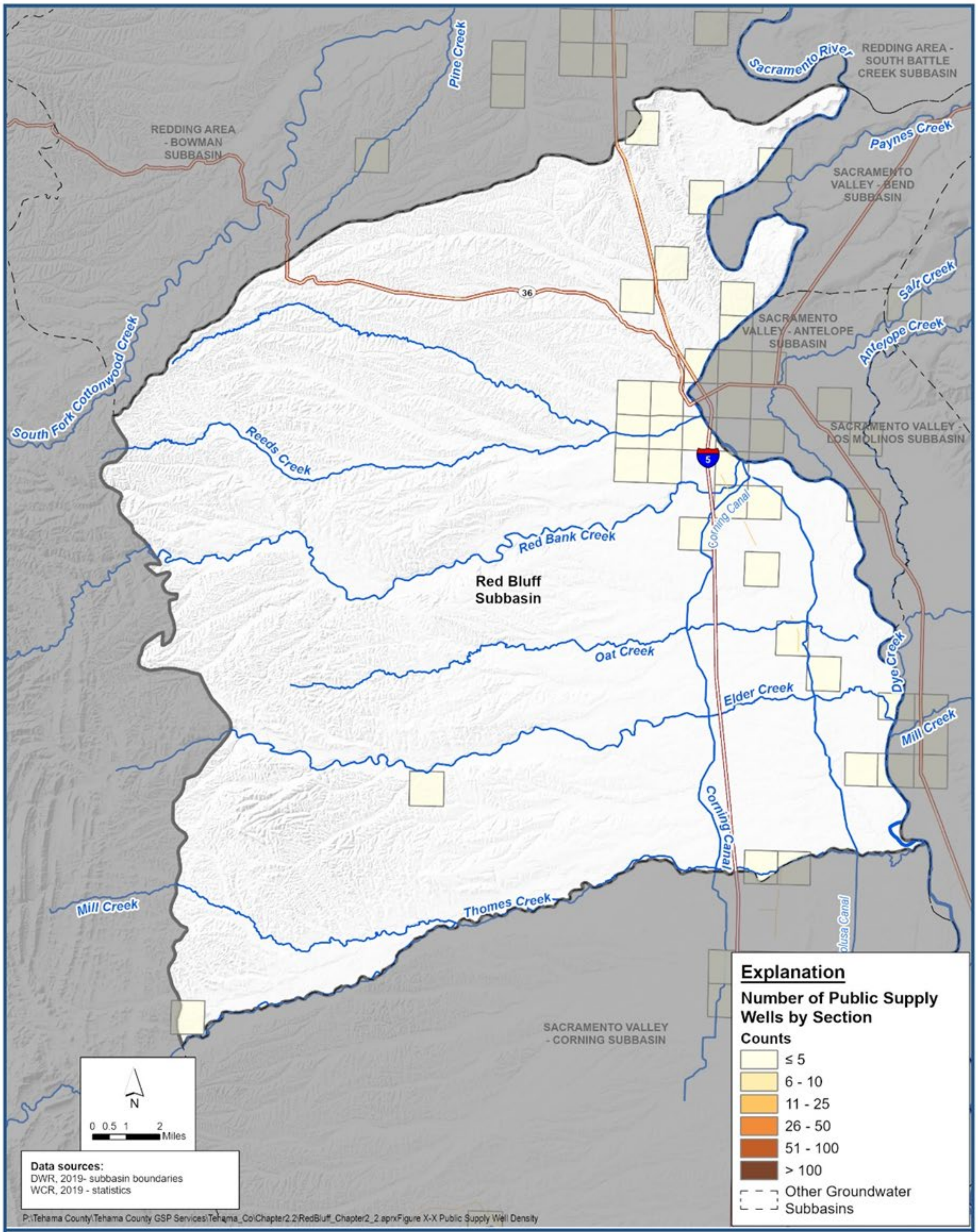
Production Well Density by Section

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-7



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Public Supply Well Density by Section

Figure 2-8

Groundwater Sustainability Plan
Red Bluff Subbasin

2.1.2 Water Resource Monitoring Entities, Management Programs, and Data Sources

The Tehama County FCWCD is responsible for surface water and groundwater resource management in Tehama County, including the Red Bluff Subbasin. The District has been attempting to manage groundwater resources through existing monitoring, management, and regulatory programs in the Subbasin. These existing programs also support the development of the GSP and monitoring network (described in Chapter 3). Each of these programs and a summary of the water planning documents applicable to the GSA are detailed below.

Existing monitoring programs within the Plan area include those implemented by federal, state, and local public agencies to meet regulatory requirements. Data from these programs and associated projects were incorporated (as applicable) into the evaluation of basin conditions and the GSP monitoring network described in Section 3. These entities, programs, and data sources include:

- United States Environmental Protection Agency (USEPA)
- United States Geological Survey (USGS)
- California Natural Resources Agency (CNRA)
- California Geologic Energy Management Division
- DWR
- CASGEM
- California Environmental Protection Agency (CalEPA)
- California Department of Pesticide Regulation (DPR)
- California Department of Toxic Substances Control (DTSC)
- California State Water Resources Control Board (SWRCB)
- Surface Water Monitoring Programs
- Division of Drinking Water (DDW)
- GAMA
- Central Valley Regional Water Quality Control Board (RWQCB)
- Other Existing Management Programs and Plans
- Existing Regulatory Programs
- Conjunctive Use Programs

Local monitoring programs include the City of Red Bluff and other municipal water system Supervisory Control and Data Acquisition data, monthly pumping records, and surface water delivery data. Existing monitoring entities and programs are described in further detail below. Data from these programs was incorporated as applicable into the development of this GSP.

2.1.2.1 United States Environmental Protection Agency (USEPA)

The USEPA administers the Clean Water Act (CWA) for surface water and wetlands in coordination with state and tribal governments. The CWA designates the SWRCB and RWQCBs as the responsible agencies for water quality, safe and reliable drinking water, and water rights. In addition to water quality oversight, the federal Comprehensive Environmental Response, Compensation and Liability Act established a program to clean up uncontrolled or abandoned hazardous waste sites, accidents, spills, and other emergency releases of pollutants and contaminants. The USEPA seeks cooperation and funding from parties potentially responsible for contaminated "Superfund" sites. Both state and federal Superfund programs maintain a list of sites, with the federal list referred to as the USEPA's National Priority List and the state list referred to as the "Hazardous Waste and Substances Site List."

2.1.2.2 United States Geological Survey (USGS)

The USGS works with state, federal, and local agency data providers to monitor groundwater levels using the framework of the National Groundwater Monitoring Network. The USGS maintains a publicly accessible database (National Water Information System) of water quality and groundwater level information that houses data that has undergone QA/QC by the USGS.

2.1.2.3 California Natural Resources Agency (CRNA)

California Geologic Energy Management Division (CalGEM)

CalGEM (previously the Division of Oil, Gas, and Geothermal Resources) regulates the drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells in California. Through Waste Discharge Requirements (WDRs), RWQCBs regulate well development drilling fluid, mud disposal, and produced water disposal and reuse, which includes disposal discharge to ponds, roads, and the use of produced water as irrigation water. Water quality is also monitored through the Water Quality in Areas of Oil and Gas Production – Regional Groundwater Monitoring Program undertaken by the SWRCB, which serves to improve the understanding of threats posed to groundwater resources by oil and gas operations.

California Department of Water Resources (DWR)

DWR is responsible for the management and regulation of water usage throughout the State. DWR implements the State Water Project (SWP) which is the nation's largest state-built water conveyance system and manages the submission of Well Completion Reports (WCRs) for construction, alteration, or destruction of water wells, monitoring wells, cathodic protection wells, and geothermal heat exchange wells. WCRs are added to the statewide dataset by the CNRA, made publicly available with private information redacted, and included in DWR's web application. DWR further maintains a variety of databases that contain hydrologic data for the State of California, including the Water Data Library, the Water Data Information System, SGMA Data Viewer and database, and the CASGEM program.

DWR also collects and maintains monitoring data and assists GSAs in the implementation of SGMA through various technical, financial, and planning services. Technical services provided by DWR include offering statewide data and tools for water levels, WCRs, and climate change, publishing best management practices (BMPs), guidance documents, and technical reports. Financial services provided by DWR include the Sustainable Groundwater Planning Grant Program to assist local agencies in the development of GSPs.

The development of this GSP includes DWR monitoring data, technical tools, and guidance documents. Financial assistance was also attained through DWR Grant programs, Proposition 1 and Proposition 68 funding, Technical Support Services, and Facilitation Support Services.

CASGEM

In 2009, Senate Bill SBX7-6 established that all subbasins need to collect and report groundwater elevations to track seasonal and long-term trends in California's groundwater basins and subbasins. To participate in CASGEM, well owners are minimally required to measure and report groundwater levels annually. DWR maintains this data and allows it to be publicly accessible.

2.1.2.4 California Environmental Protection Agency (CalEPA)

CalEPA maintains regulatory jurisdiction over safe drinking water quality requirements, hazardous waste management and remediation requirements, and pesticide use and reporting requirements. These requirements are maintained under the California DPR, DTSC, and the SWRCB. CalEPA maintains the Regulated Site Portal, a website (https://siteportal.calepa.ca.gov/nsite) that combines data from a variety of state and federal databases from these environmentally regulated sites and facilities in California into a single, searchable database. Regulated activities include hazardous materials and waste, state, and federal cleanups, impacted groundwater and surface waters, and toxic materials. The portal integrates data from the following entities:

- CalEPA's California Environmental Reporting System, which tracks hazardous materials and waste
- SWRCB's California Integrated Water Quality System, which manages information pertaining to sites discharging to surface water
- EnviroStar system, which tracks hazardous waste facilities and sites with known or suspected contamination
- SWRCB's GeoTracker sites, which track sites that impact or have the potential to impact water quality in California with an emphasis on groundwater
- SWRCB's Stormwater Multiple Application and Report Tracking System, which collects information on industrial and construction stormwater management
- Toxics Release Inventory which contains information on chemicals managed by industrial or other facilities in California

California Department of Pesticide Regulation (DPR)

The DPR is responsible for enforcing state laws and regulations consistent with the Federal Insecticide, Fungicide, and Rodenticide Act, which mandates regulation of pesticide distribution, sale, and use. County agricultural commissioners are responsible for enforcement and permitting the use of restricted pesticides. DPR conducts regular surface water and groundwater sampling to monitor for pesticide contamination. Additionally, the Pesticide Contamination Prevention Act requires the DPR to protect groundwater from pesticide pollution through its groundwater protection program. This program includes thresholds for pesticides posing risks to groundwater, a database of wells sampled for pesticides, identification of areas sensitive to pesticide contamination (known as groundwater protection areas), and mitigation measures developed to prevent pesticide transport to groundwater in those areas. DPR maintains databases of groundwater pesticide testing results and provides summaries of annual sampling and test results to the state legislature.

California Department of Toxic Substances Control (DTSC)

The DTSC regulates hazardous wastes through enforcement of the federal Resource Conservation and Recovery Act and California's Hazardous Waste Control Law. Through DTSC's Hazardous Waste Management Program and Site Mitigation and Restoration Program, groundwater is protected through the oversight of hazardous waste management and remediation. DTSC maintains an online database of permitted hazardous waste sites, corrective action facilities, and information regarding site cleanup. DTSC enforces the Toxic Injection Well Control Act and the Toxic Pit Cleanup Act, both of which require monitoring and hazardous waste containment. DTSC shares toxic site cleanup responsibilities with California's RWQCBs.

California State Water Resources Control Board (SWRCB)

SWRCB is responsible for the management of WDRs, underground storage tanks, groundwater cleanup programs, and groundwater and surface water quality policies and enforcement. The SWRCB administers water rights, water pollution control and water quality functions for the state. Through California's Porter-Cologne Water Quality Control Act (Porter-Cologne Act), the SWRCB shares authority with the RWQCBs to implement the federal CWA. The SWRCB provides policy guidance and budgetary authority to the RWQCBs, who adopt Water Quality Control Plans. The Red Bluff Subbasin is located within the jurisdictional area of the Central Valley RWQCB.

SWRCB and RWQCB enforce groundwater quality protection through WDRs which have control over the following:

- agricultural runoff
- domestic septic systems
- injection wells
- wastewater recycled for reuse or discharged to land
- dairy operations
- timber harvesting

If contamination occurs in violation of any WDR, the State and Regional Boards are responsible for cleanup and abatement of groundwater sites impacted by the contamination. SWRCB maintains an online database containing records of investigations, actions related to cleanup activities, identified known contaminant cleanup sites, and permitted underground storage tanks.

SWRCB maintains environmental data for their regulated facilities in their GeoTracker database. GeoTracker was initially developed in 2000 pursuant to a mandate by the California State Legislature (AB 592, SB 1189 (Stats. 1997, Chapter 814 and 185). Data from these regulated facilities typically includes groundwater level measurements and samples from groundwater monitoring wells at each regulated site.

SWRCB Surface Water Monitoring Programs

In collaboration with the RWQCBs, the SWRCB also implements the National Pollution Discharge Elimination System, stormwater permitting requirements, and the Surface Water Ambient Monitoring Program. The NPDES program was introduced in 1972 and aims to control water pollution by regulating point sources that discharge pollutants, such as rock, sand, dirt, and agricultural, industrial, and municipal waste. Stormwater permitting is managed under General Permits which regulate stormwater discharges and authorized non-stormwater discharges and enforce implementation of Stormwater

Pollution Prevention Plans to monitor surface water runoff and pollutants during construction activities. The Surface Water Ambient Monitoring Program conducts monitoring and assessment of water quality in all of California's surface waters to support water resource management in the State.

SWRCB Division of Drinking Water (DDW)

DDW is responsible for enforcing the Safe Drinking Water Act in California. DDW ensures safe access to drinking water through water quality regulations and monitoring requirements for regulated public water systems. Beginning in 2001, Title 22 of the California Code of Regulations Sections 64469 and 64819 established requirements and the format for reporting public water systems' water quality analyses results. All public water systems, certified drinking water analytical laboratories, including those that are subcontractors of other laboratories, are required to submit water quality data directly to the SWRCB DDW in digital, electronic form (Electronic Data Transfer). The Electronic Data Library supplies links to water quality monitoring schedules, files for the DDW water quality database, and houses county small water system water quality data files. All drinking water quality data of public water supply systems submitted to DDW through the Electronic Data Transfer portal can be accessed through the SWRCB DDW Safe Drinking Water Watch Program. Title 22 also includes designated Maximum Contaminant Levels (MCLs) for constituents to ensure water quality meets drinking water standards.

Groundwater Ambient Monitoring and Assessment Program (GAMA)

SWRCB created GAMA in 2000 to house groundwater elevation and groundwater quality data. SWRCB works with agencies from the State and Regional Water Boards, DWR, DPR, USGS, Lawrence Livermore National Laboratory, water agencies, and private owners to provide groundwater data to the public. Data collected by regulatory agencies that submit reports to SWRCB are made accessible through the GeoTracker GAMA database. This differs from the GeoTracker database used for environmental sites. GAMA data was an important source of data used in the development of this GSP. Goals of the GAMA Program include:

- Improve statewide comprehensive groundwater monitoring
- Increase the availability to the public of groundwater quality and contamination information
- Establish ambient groundwater quality on a basin-wide scale
- Continue periodic groundwater sampling and groundwater quality studies in order to characterize chemicals of concern and identify trends in groundwater quality
- Centralize the availability of groundwater information to the public and decision makers to better protect groundwater resources.

Central Valley Regional Water Quality Control Board (RWQCB)

The RWQCB regulates water quality in groundwater and surface water in the Central Valley of California. The RWQCB is responsible for developing Water Quality Control Plans, governing requirements for WDRs, issuing WDRs, taking enforcement action against dischargers who violate permits or otherwise harm water quality in surface waters, and monitoring water quality. The RWQCB’s overall mission is to protect surface waters and groundwater in the region through the following tasks:

- Addressing region-wide water quality concerns through the creation and triennial update of a Water Quality Control Plan (Basin Plan)
- Preparing new or revised policies addressing region-wide water quality concerns

- Adopting, monitoring compliance with, and enforcing waste discharge requirements and NPDES permits
- Maintaining the 303(d) list of impaired surface water bodies and administering oversite of Total Maximum Daily Loading projects
- Providing recommendations to the SWRCB on financial assistance programs, proposals for water diversion, budget development, and other statewide programs and policies
- Coordinating with other public agencies that are concerned with water quality control
- Informing and involving the public on water quality issues.

The Basin Plan contains descriptions of the legal, technical, and programmatic bases of water quality regulation for the region. At the regional level, the Basin Plan outlines water quality objectives to define the appropriate levels of environmental quality and to control activities. The Basin Plan provides a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses in a manner that will result in maximum benefit to the people of California. The Basin Plan fulfills the following:

- Conformance to USEPA requirements in order to allocate federal grants to cities and districts for construction of wastewater treatment facilities
- Provides a basis for establishing priorities as to how both state and federal grants are disbursed for constructing and upgrading wastewater treatment facilities
- Meets the requirements of the Porter-Cologne Act that call for water quality control plans in California
- Provides a basis for the RWQCB to establish or revise waste discharge requirements and for the SWRCB to establish or revise water rights permits
- Establishes conditions for discharge prohibitions that must be met at all times
- Establishes or indicates water quality standards applicable to waters of the Region, as required by the federal CWA
- Establishes water quality attainment strategies, including Total Maximum Daily Loads required by the CWA, for pollutants and impaired water bodies.

The RWQCB also manages the Irrigated Lands Regulatory Program (ILRP) which includes the Sacramento Valley Groundwater Quality Trend Monitoring Program (GQTM). RWQCB *Order No. R5-2014-0030-R1 Waste Discharge Requirements General Order for Growers in the Sacramento River Watershed that are Members of the Third-Party Group* requires the Sacramento Valley Water Quality Coalition to develop and implement a the GQTM program. The GQTM program involves groundwater quality sampling through a network of wells to monitor regional and long-term trends in groundwater quality in relation to agricultural practices as outlined in Coalition GQTM Workplan submittals to the RWQCB.

2.1.2.5 Groundwater Level Monitoring

Groundwater levels are monitored in the Subbasin and reported from the various sources and programs listed above. A significant amount of the existing groundwater level monitoring information included in the development of this GSP originated from GAMA and CASGEM data sets.

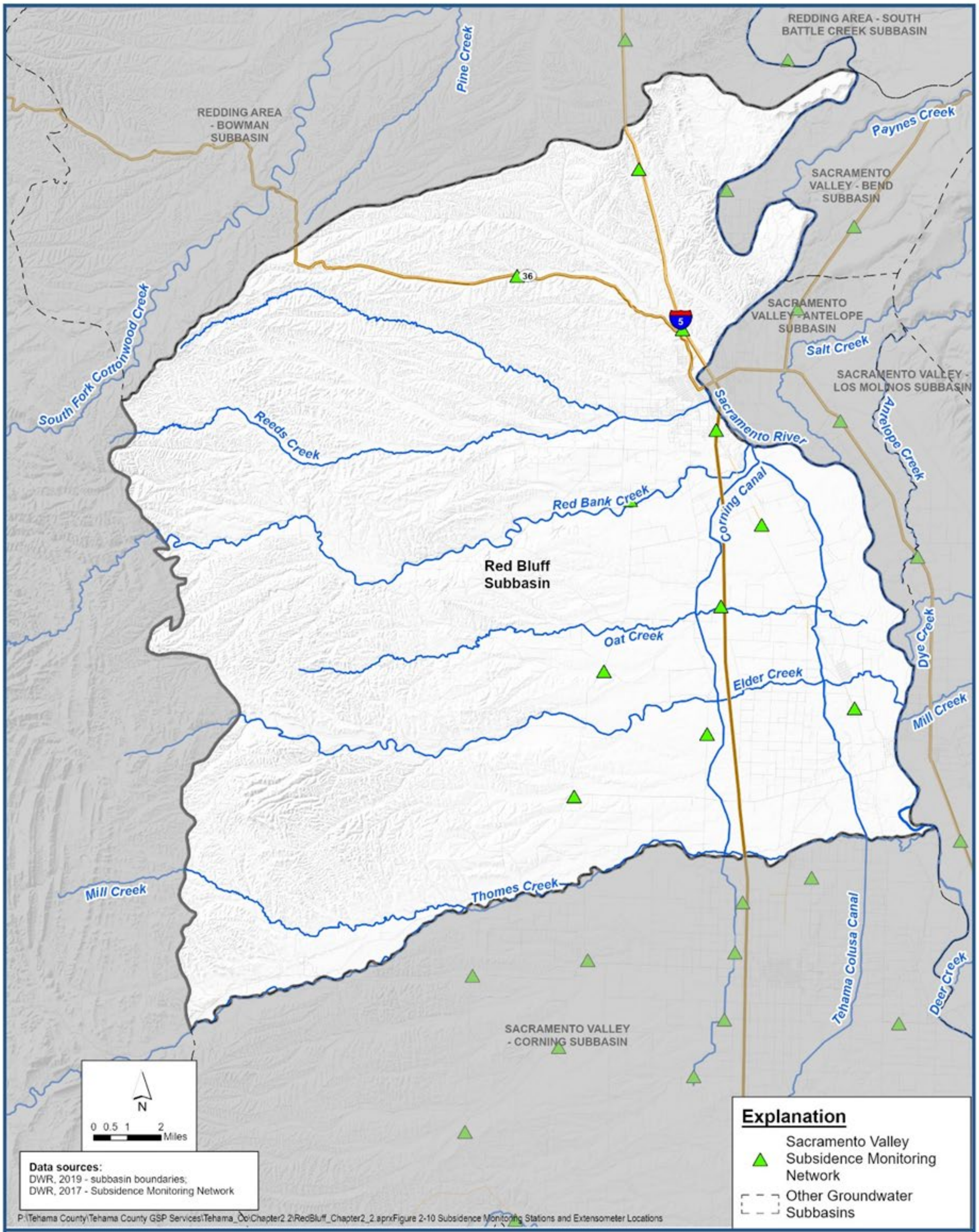
Tehama County has 52 wells that are part of the CASGEM program. Ten (10) of these wells are in the Red Bluff Subbasin. Groundwater elevations have generally been reported 2-3 times per year with measurements dating back to the early 1970's. Measurements are typically taken during March/April (Spring), July/August (Summer), and October/November (Fall). CASGEM monitoring wells were incorporated into this Plan's groundwater monitoring network as needed.

2.1.2.6 Groundwater Quality Monitoring

Groundwater quality monitoring in the Subbasin has been conducted by a variety of entities. As described in the AB3030 GWMP (Section 253), the Tehama County FCWCD worked with USGS, SWRCB, DWR, California Department of Public Health, and the U.S. Department of the Interior to complete extensive water quality monitoring of wells in Tehama County as part of the GAMA program from 2005-2007. Water quality monitoring is also completed as part of the ILRP, the Sacramento Valley Water Quality Coalition GQTM, and other DWR and Central Valley RWQCB programs (Tehama County, 2012) as described above.

2.1.2.7 Land Subsidence Monitoring

The Tehama County FCWCD established 34 GPS land surface elevation benchmarks in 2008 for use in land subsidence monitoring as part of the Sacramento Valley Subsidence Project. These benchmarks are approximately 3-5 miles apart, covering the valley floor. There are eleven benchmark locations within the Red Bluff Subbasin and eleven additional benchmarks within two miles of the Subbasin boundary. These benchmark locations are shown on **Figure 2-9**. When this project was completed, it was anticipated that land elevations would be measured at each benchmark every 5 years to monitor potential changes in land surface elevation and land subsidence (Tehama County, 2012). These benchmarks were resurveyed in 2017 and exhibited little to no change in subsidence (DWR, 2017).



TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Subsidence Monitoring Stations

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-9

2.1.2.8 Surface Water Monitoring

Surface water monitoring is completed through the various federal, state, regional, and local programs listed above. Surface water monitoring stations located within the Subbasin are shown in **Table 2-4** and on **Figure 2-10**. The points of surface water diversion, which are the locations where water may be diverted from surface water sources by the water right holders, are also shown on **Figure 2-10**. Water right holders that use diverted surface water are required to file an annual statement of water diversion with the SWRCB. Most individual diverters use all diverted water in areas close to the source, while water diverted under the Central Valley Program may be delivered to distal areas from the source.

Table 2-4. Surface Water Monitoring Stations

WATERWAY	SOURCE	SITE ID	AVAILABLE DATA PERIOD
Red Bank Creek	USGS	11378800	1959-1982
Red Bank Creek	USGS	11378860	1964-1967
Elder Creek	USGS	11380000	1930-1941
Elder Creek	USGS	11380500	1949-1979

2.1.2.9 Other Existing Management Programs and Plans

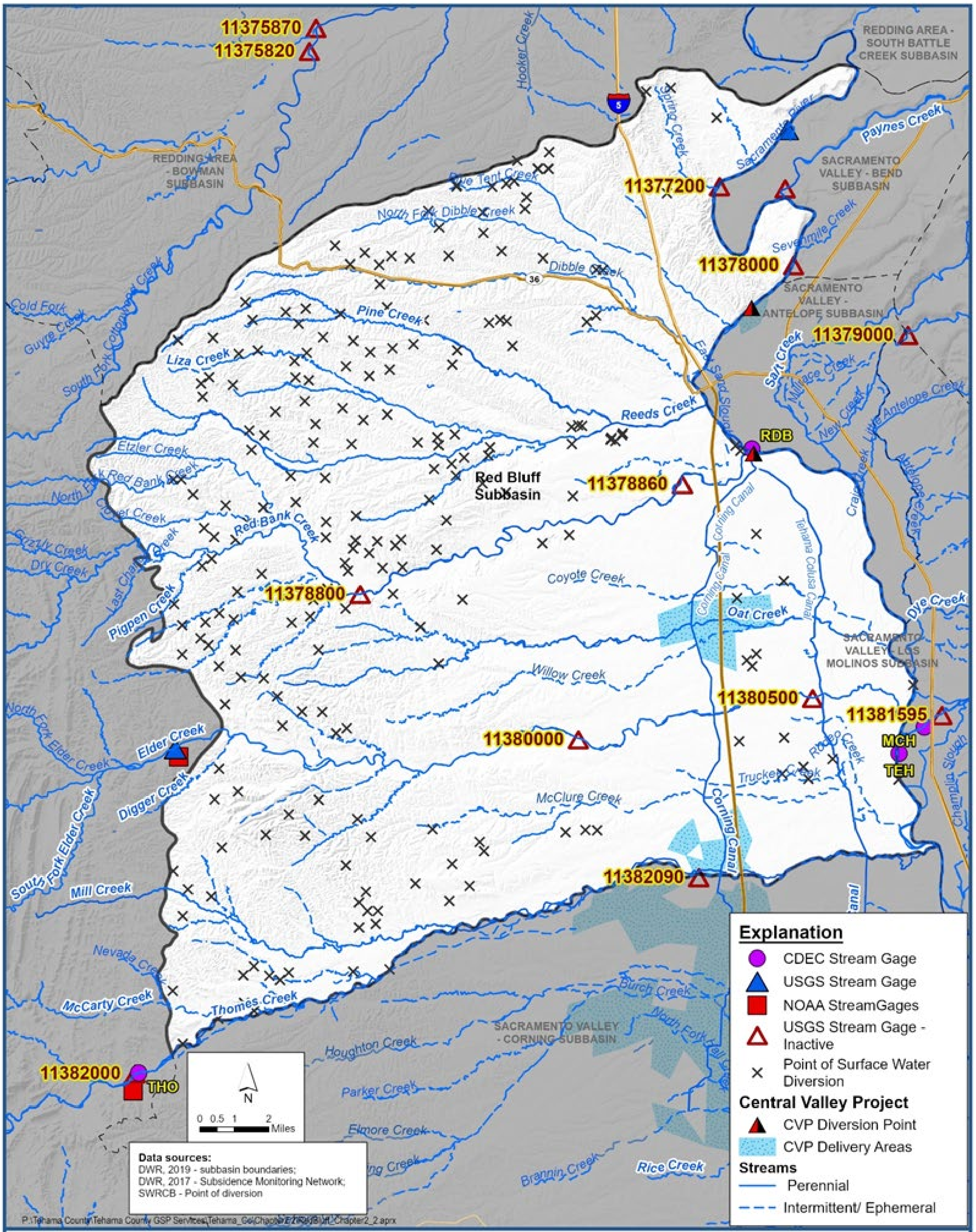
State Water Use Efficiency Programs

The California Irrigation Management Information System hosts a network of automated weather stations owned and operated by DWR and local agencies. These stations provide “real-time” weather data to estimate crop and landscape evapotranspiration rates for irrigation management decisions.

DWR also conducts land use and water use data collection activities in support of statewide water planning. The program includes land use surveys, public water system statistics surveys, statewide irrigation methods surveys, agricultural land and water use estimates, agricultural water use models, and the California Seasonal Application Efficiency Program.

Tehama County AB3030 Groundwater Management Plan (GWMP)

The Tehama County GWMP was first adopted in November 1996 to comply with California Assembly Bill 3030 (AB3030). An update to the GWMP was provided in 2012 through a collaborated effort among the Tehama County FCWCD TAC, the University of California Cooperative Extension, and DWR. Prior to the completion of the AB3030 GWMP, background documents and technical memoranda were developed: Water Inventory and Analysis (2003) and Proposed Groundwater Trigger Levels and Awareness Actions (2008). Separate proposed Groundwater Trigger Levels and Awareness Actions technical memoranda were written for the Subbasins of Tehama County: Antelope, Bend, Bowman, Corning East, Corning West, Dye Creek, Los Molinos, Red Bluff East, Red Bluff West, Rosewood, South Battle Creek, and Vina. Some of the subbasins have since been consolidated (**Section 1.3.2, Table 1-2**).



Data sources:
DWR, 2019 - subbasin boundaries;
DWR, 2017 - Subsidence Monitoring Network;
SWRCB - Point of diversion

TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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Surface Water Monitoring Stations

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-10

The purposes of the AB3030 GWMP include:

- Sustain groundwater levels that balance long-term extraction and replenishment
- Sustain groundwater levels in a manner that allows existing groundwater well infrastructure within Tehama County to remain operational over a long period of time
- Develop a comprehensive groundwater management program to ensure sufficient groundwater supplies of useable quality are maintained for reliable, efficient, and cost-effective extraction
- Implement the GWMP through the development of county-wide consensus where possible

The AB3030 GWMP includes a description of the study area within Tehama County, which includes: location, geology, climate, population, economy, local GWMP interest, groundwater basin conditions, existing monitoring, historic groundwater levels and pumpage, groundwater recharge, and groundwater quality issues. It also provides a three-phase approach to achieving the elements of the plan purpose that includes:

- Phase I – Passive Management
    - data inventory and evaluation
    - monitoring strategies and coordination
    - TAC
    - public education
- Phase II – Tasks
    - water conservation
    - coordination with local land use planning agencies
    - identification and management of wellhead protection areas
    - identification of well construction policies
    - protection of beneficial uses
    - conjunctive management operations
    - development of relationships with state and federal regulatory agencies
- Phase III – Activities
    - construction and operation of groundwater management facilities
    - regulation of contaminated groundwater migration
    - control of saline water intrusion and other contaminants

Many of these actions, assessments, and data are useful in the development of the GSP and align with the GSP requirements under SGMA. Components and data from the AB3030 GWMP were incorporated into the development and implementation of this GSP, as necessary.

Northern Sacramento Valley Integrated Regional Water Management Plan (IRWMP)

The IRWMP was developed in 2006 to guide water management policies, programs, and projects in the Sacramento Valley. It was intended to serve as a platform for coordination to allow improved water management to occur at the local, regional, and state level. The main objectives of the development and implementation of the IRWMP are to improve the economic health of the region, improve water supply reliability, improve flood protection and floodplain management, improve, and protect water quality, and to protect and enhance the ecosystem. These objectives were developed based on existing water management plans in the Sacramento Valley to ensure mutual objectives are developed for stakeholders and enhanced coordination can be obtained. The IRWMP includes a summary of the

Tehama County local setting, current and future land and water use, and recommendations. The highest priority land use/water related issues identified in the County include:

- Potential groundwater impacts from urban development and protection of county groundwater resources
- Lack of baseline groundwater information and need for more monitoring
- Potential development of the Lower Tuscan and Tehama Formations and funding needed for further study and peer review of existing hydrogeologic data
- Continued protection of water quality

Recommendations listed in the IRWMP include: implementation of the Lower Tuscan Recharge Investigation Program, creation of a database, exploration of funding opportunities for a subsidence monitoring network, exploration of research and funding opportunities to expand knowledge base for the Tehama Formation, continued cooperation with nearby counties, encouragement of agricultural uses and development through land use planning policies, support of efforts to evaluate flood potential, coordination with the Tehama County Planning Department, and support of IRWMP proposed projects (NCWA, 2006).

Issues identified in Tehama County related to land and water use and efforts to integrate and implement the IRWMP were included in the development of this GSP, as necessary.

2.1.2.10 Existing Regulatory Programs

Tehama County Groundwater Ordinances

Three applicable ordinances related to groundwater management have been enacted in the County:

- Tehama County Board of Supervisors Ordinance No. 1617 –limits the export of groundwater for use in areas outside of Tehama County
- Tehama County Board of Supervisors Ordinance No. 2006 – amends Titles 9 and 10 of the Tehama County Code relating to groundwater aquifer protection and water wells to require a permit for extraction of groundwater use off-parcel, amend well permitting requirements, and provide requirements for maintenance of dormant wells
- Tehama County Flood Control and Water Conservation District Board of Directors Ordinance No. 2016-1 – establishes the Tehama County Groundwater Commission

Irrigated Lands Regulatory Program (IRLP)

The ILRP was created to mitigate impairment of surface water and groundwater due to waste discharges (sediments, pesticides, nitrates) from irrigated land runoff in the Central Valley of California. The Central Valley RWQCB manages the program and requires irrigated landowners to verify effective water quality protection practices and submit information to their coalition or the RWQCB. Irrigated landowners must adhere to WDRs under this program (California Waterboards, 2020). Components of this program and water quality data were considered in the development of this GSP, as necessary.

Central Valley – Salinity Alternatives for Long-Term Sustainability (CV-SALTS)

CV-SALTS is a collaborative stakeholder managed program aimed to develop sustainable salinity and nitrate management planning in the Central Valley. CV-SALTS is in the process of developing scientific and regulatory tools to create a management plan to minimize the impacts of salt and nutrients on water quality. Data from CV-SALTS monitoring was included in the development of this GSP, as necessary.

2.1.2.11 Conjunctive Use Programs

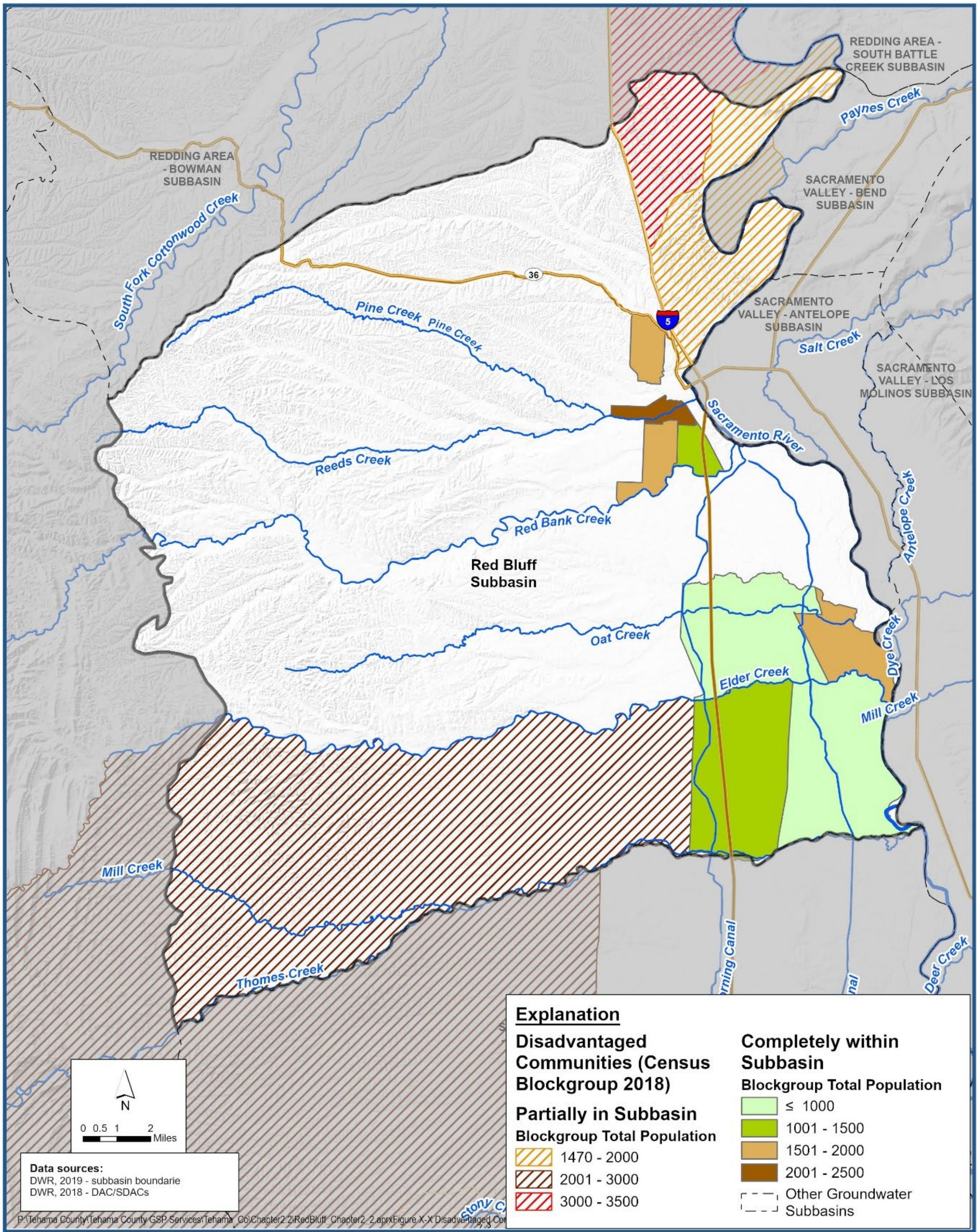
There are no formal conjunctive use programs in the Subbasin.

2.1.2.12 Water Planning Documents

Several water planning documents have been prepared and adopted on a County and region-wide basis to support water and resource management. There have also been several reports and analyses generated to aid in water monitoring and management. These include:

- Regional Plans
    - Northern Sacramento Valley Drinking Water Quality Strategy Document (2005)
    - Sacramento River Basin-wide Water Management Plan (2004)
    - Sacramento Valley Integrated Regional Water Management Plan (2006)
    - Tehama, Butte, Glenn, and Colusa Four-Counties Memorandum of Understanding (2006)
- Tehama County Groundwater Management Plan
    - AB3030 Groundwater Management Plan (Adopted in 1996, Updated 2012)
- Tehama County Groundwater Ordinances
    - No. 1617
    - No. 2006
    - No. 2016-1
- General Plans
    - City of Red Bluff General Plan (2000)
    - Tehama County General Plan (2009)
- Urban Water Management Plan
    - City of Red Bluff (2015)

Information included in these plans and applicable studies completed in Tehama County regarding surface water, groundwater, land use, and monitoring has been included in the development of this GSP, as necessary. Development and implementation of the GSP will continue to consider the interests of all beneficial uses and users of groundwater including agricultural users, municipal water users, domestic users, disadvantaged communities (**Figure 2-11**), groundwater dependent ecosystems (GDEs), and other stakeholders.



TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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Disadvantaged Communities

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-11

2.1.3 Land Use Elements or Topic Categories of Applicable General Plans

The Red Bluff Subbasin lies entirely in Tehama County, in which the Tehama County General Plan is applicable. The majority of the City of Red Bluff also lies within the Red Bluff Subbasin; thus, the City of Red Bluff General Plan and City of Red Bluff Urban Water Management Plan are appliable.

The development and implementation of this GSP will support all goals, policies, and implementation measures described in these general plans, in conjunction with SGMA and GSP regulations, while considering the beneficial uses and users of groundwater.

2.1.3.1 Tehama County General Plan

The Tehama County General Plan, updated in 2009 and in effect until 2029, provides structure for the "physical development of the county or city, and any land outside its boundaries which bears relation to its planning." It creates guidelines for future development and decision-making, and it is detailed in the General Plan that "agriculture remains one of the primary uses of land in Tehama County." The General Plan is comprised of the following elements:

- Land Use (LU)
- Transportation and Circulation (CIR)
- Public Services (PS)
- Economic Development (ED)
- Open Space and Conservation (OS)
- Agriculture and Timber (AG)
- Safety (SAF)
- Noise (N)

All elements focus on the protection and enhancement of agricultural land within the County, as agriculture is depicted as "a way of life and the foundation of the quality of life in Tehama County."

The Tehama County General Plan contains goals, policies, and implementation measures relating to surface water and groundwater resource protection (**Table 2-5**).

Table 2-5. Tehama County General Plan Relevant Goals, Policies, and Implementation Measures

GOAL OR POLICY	DESCRIPTION
Goal ED – 7	Protect and enhance environmentally sensitive lands and natural resources while, at the same time, promoting business expansion, retention, and recruitment.
Goal OS – 1	To ensure that water supplies of sufficient quality and quantity will be available to serve the needs of Tehama County, now and into the future.
Goal OS – 3	To protect, preserve, and enhance fish and wildlife species by maintaining healthy ecosystems.
Goal PS – 4	To promote development in areas where existing water districts have available resources to accommodate development or where existing districts may be expanded to serve new development in a cost-effective manner.
Policy ED – 7.1	The County shall continue to preserve Tehama County's natural resources including agriculture, timberlands, water and water quality, wildlife resources, minerals, natural resource lands, recreation lands, scenic highways, and historic and archaeological resources. The protection of natural resources is of the utmost importance and promoting business expansion, retention, and recruitment should complement and enhance the natural resources while reducing negative impacts.
Policy LU – 10.1	The County shall actively promote the implementation of the County's Groundwater Management Plan: implement the recommended management and monitoring actions of the GWMP and identify and quantify the water production, water quality, and groundwater recharge activities occurring within the County.
Policy OS – 1.1	The County shall protect and conserve water resources and supply systems through sound watershed management: • Maintain local water ordinances to protect the integrity of water supplies in Tehama County (Implementation Measure 1.1a) • Consider and evaluate the need for a Water Conservation Ordinance (Implementation Measure 1.1b) • Ensure that projects adhere to the regulations of the State of California Reclamation Board, California Department of Fish and Game, Regional Water Quality Control Board, and U.S. Government (Implementation Measure 1.1c) • Continue to maintain and implement the Adopted AB3030 GWMP to protect and preserve water supplies and water quality in Tehama County (Implementation Measure 1.1e) • Encourage involvement in Local, Regional, and Statewide Water Resource coordination, cooperation, and collaboration to protect and preserve water supplies and water quality (Implementation Measure 1.1f) • Discourage the export of water from Tehama County (Implementation Measure 1.1h)

GOAL OR POLICY	DESCRIPTION
Policy OS – 1.2	The County shall work to ensure continued reasonable alternate water supplies: • Encourage water supply agencies and companies in the County to identify and develop water supply sources, other than groundwater, where feasible (Implementation Measure 1.2a) • Require development project approvals to include a finding that all feasible and cost-effective options for conservation and water reuse are incorporated into project design (Implementation Measure 1.2b) • Encourage the use of treated wastewater to irrigate parks, golf courses, and landscaping (Implementation Measure 1.2c) • Promote the installation of sufficient groundwater monitoring wells and data collection facilities to assure non-injury to surrounding areas in the development of community and specific plan projects (Implementation Measure 1.2d)
Policy OS – 1.3	Surface water quality and stream flows for water supply, water recharge, recreation, and aquatic ecosystem maintenance shall be protected while respecting adjudicated and appropriated (California recognized water rights) rights of use: • Protect surface and ground water from major sources of pollution, including hazardous materials contamination and urban runoff (Implementation Measure 1.3a) • Restrict hazardous materials storage in the 100-year floodplain to prevent surface water contamination (Implementation Measure 1.3b) • Educate the community on laws governing the proper handling of hazardous materials, especially those laws which pertain to discharging materials into creeks (Implementation Measure 1.3c) • Require clean-up of contaminated ground and surface water by current and/or past owners or polluters (Implementation Measure 1.3e) • Require development to incorporate runoff control measures into their site design or to participate in an area-wide runoff control management effort consistent with standards developed by the Public Works Department (Implementation Measure 1.3f) • Establish and require the use of best management practices to protect receiving waters from the adverse effects of construction activities, sediment, and urban runoff (Implementation Measure 1.3g)
Policy OS – 1.4	The County shall encourage development of land for the purposes of improving groundwater recharge: • Consistent with the General Plan, development pattern and where deemed a reasonable on- or off-site improvement by the Advisory Agency, division of lands within all water district or County Service Area boundaries shall be conditioned based on maintaining right-of-way access to irrigation infrastructure and the continued use of open irrigation ditches (Implementation Measure 1.4a)

GOAL OR POLICY	DESCRIPTION
Policy OS – 1.5	The County shall ensure the high quality of groundwater by emphasizing programs that minimize erosion and prevent the intrusion of municipal and agricultural wastes into water supplies: • Natural Resource Lands land use subcategories shall be used to indicate areas essential to the recharge of groundwater and to afford protection from stream bank erosion (Implementation Measure 1.5a) • The Regional Water Quality Control Board shall monitor irrigation runoff to prevent infiltration of herbicides/fertilizers/pesticides and municipal wastes into streams and rivers of the groundwater basin. The County shall also encourage irrigation water recycling (Implementation Measure 1.5b) • As appropriate and feasible, the County shall install water-conserving landscaping and irrigation on County-owned facilities (Implementation Measure 1.5c)
Policy OS – 1.6	The County shall explore and encourage new water projects that are of local benefit: • Work with local, regional, and state water suppliers to determine the necessary water storage required for projected growth in the County. Investigate potential federal and state funding opportunities related to water infrastructure. Apply for funding to establish water storage facilities (Implementation Measure 1.6a).
Policy OS – 1.7	The County shall encourage new development to incorporate water conservation measures.
Policy OS – 3.1	The County shall preserve and protect environmentally-sensitive and significant lands and water valuable for their plant and wildlife habitat, natural appearance, and character.
Policy PS – 3.2	The County shall ensure that water supply and delivery systems are available in time to meet the demand created by new development or are guaranteed to be built through the use of bonds or other financial sureties.
Policy PS – 4.1	The County shall encourage future development to be located with respect to type and intensity/density of land use in order to ensure the long-term, economically feasible and environmentally sound provision of adequate water supply and quality.

GSP Implementation Effects on Water Demands and Sustainability

Implementation of the proposed land use developments under the General Plan are not expected to greatly affect water demands due to the nature of the land use and efficient water management practices encouraged in the County. Policies included in the Tehama County General Plan encourage the implementation of urban water conservation measures (Policy OS-1.7), groundwater recharge (Policy OS-1.4), consideration of reasonable alternate supplies, and water resource management. According to the Tehama County General Plan, population growth within the County can be described as “slow to moderate,” and urban growth that occurs is generally limited to areas with access to resources and services which typically occur around the major transportation corridors in Tehama County. The majority of the land use in the County is agricultural, and the County has several policies related to the protection of resource lands for agricultural and other beneficial uses. Therefore, it is not expected that land use changes based on the Tehama County General Plan will have a significant impact on the implementation of this GSP. Additionally, consistent with GSP regulations, minimum thresholds (MTs) and measurable objectives (MOs) established in this GSP were based on long-term planning water and land use assumptions established in the Tehama County General Plan.

GSP Implementation Effects on Water Supply Assumptions

Projects and management actions (Chapter 4) may result in changes in pumping and groundwater recharge to ensure the Subbasin operates within its sustainable yield over its implementation horizon. Expected changes in agricultural water use are described in Chapter 4. Urban water use is not expected to be significantly impacted by the implementation of this GSP, as the majority of water use in the Subbasin is agricultural, and there are not any significant expected changes in land use. Efficient urban water use is also encouraged by the General Plan and regulated by other statutory requirements such as the Urban Water Management Planning Act and the Model Water Efficient Landscape Ordinance.

Goals and policies related to land use, water supply, water resources, wetlands, native/riparian areas, and open spaces were considered in the development of this GSP and are expected to align with GSP implementation efforts to achieve Subbasin sustainability.

2.1.3.2 City of Red Bluff General Plan

The City of Red Bluff General Plan is built on the following major themes:

- Housing Element
- Safety Element
- Noise Element
- Land Use Element
- Circulation Element
- Economic Development Element
- Natural Resource Element

Goals, objectives, policies, and implementation measures included in the City of Red Bluff General Plan relevant to resource protection and the development and implementation of this GSP include:

- Promote a continued supply of high-quality ground and surface water in the City of Red Bluff
- Conserve and improve groundwater, natural habitat, mineral, aesthetic, soil, and air resources in the Red Bluff Planning Area

- Maintain and protect watershed and recharge area
- Encourage all existing and new development (residential, commercial, and industrial) to incorporate water conservation methods into plan design so that water waste, use, and runoff can be minimized
- Ensure the continued high quality of groundwater by encouraging projects which minimize soil erosion
- Limit, and wherever possible disallow the intrusion of industrial and agricultural pollutants into the groundwater table
- Continue to preserve and promote Red Bluff's natural resources including agriculture, timberlands, water and water quality, wildlife resources, minerals, natural resource lands, recreation lands, scenic highways, and historic and archaeological resources. The protection of natural resources is of the utmost importance and promoting business expansion, retention and recruitment should complement and enhance the natural resources while reducing negative impacts

GSP Implementation Effects on Water Demands and Sustainability

Any new urban development that occurs in the City of Red Bluff based on the land use described in the General Plan is required to follow the statutory water conservation requirements of the Urban Water Management Planning Act and Model Water Efficient Landscape Ordinance. Therefore, implementation of the Red Bluff Subbasin GSP is not expected to significantly impact water demands in the City of Red Bluff.

GSP Implementation Effects on Water Supply Assumptions

Implementation of this GSP is not expected to significantly affect the water supply assumptions in the City of Red Bluff General Plan due to the water resource protection goals and policies defined in the General Plan, the expectation that land use will not significantly change, and efficient conservation measures imposed on new developments.

2.1.3.3 City of Red Bluff Urban Water Management Plan

Urban demand and water management planning in the City of Red Bluff is also regulated by the 2015 City of Red Bluff Urban Water Management Plan. The Urban Water Management Plan was developed pursuant to the CWC to maintain efficient use of urban water supplies, to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide responses to drought conditions. The City of Red Bluff relies entirely on groundwater for urban water use, and the Urban Water Management Plan identifies efforts to maximize local water resources and reduce water waste. These efforts include water waste prevention ordinances, metering, providing financial incentives to customers who use less water, public education and outreach, and implementation of programs to assess and manage distribution system water losses. A Water Shortage Contingency Plan is also included as part of the Urban Water Management Plan which identifies measures that will be taken to reduce water use and water waste during drought conditions. Furthermore, the City of Red Bluff supported the Tehama County FCWCD's proposal to become the GSA for the groundwater basins in Tehama County, as stated in the Urban Water Management Plan.

GSP Implementation Effects on Water Demands and Sustainability

Due to the urban water conservation measures already included in the Urban Water Management Plan, the implementation of this GSP is not expected to significantly impact water demands or sustainability in the City of Red Bluff.

GSP Implementation Effects on Water Supply Assumptions

Implementation of this GSP is not expected to significantly affect the water supply assumptions in the City of Red Bluff Urban Water Management Plan due to the water conservation measures already included in the Plan. Urban water purveyors are required to submit an updated plan every five years; for the upcoming submittal cycle, the City of Red Bluff will also have the opportunity to align policies with those included in this GSP as needed.

2.1.4 Additional GSP Elements

2.1.4.1 Well Construction, Destruction, and Abandonment Policies

Well construction, rehabilitation, repair, and destruction policies are described in Section 9.42 of the Tehama County Municipal Code and permitting is under the jurisdiction of the Tehama County Environmental Health Department. The Municipal Code includes requirements for: well location, annular seal, surface construction features, well labeling, disinfection, and sanitary requirements, sealing off strata, casing, well development, redevelopment, well conditioning, water quality testing, large-diameter shallow wells, driven wells, rehabilitation, repair, deepening of wells, inspection, well driller’s reports, and well maintenance. To obtain a permit to construct a well, a plot plan showing the location of the proposed well, shall be filled out and submitted to the Tehama County Environmental Health Department. Public supply wells must also undergo a DWR review and approval process. Review may be required by additional Tehama County entities if necessary: Planning Department (applies to zoning), Building Department (applies to flood hazard areas), and/or the fire department (applies to parcels formed after 1992).

Abandoned or unused wells in the County, including exploration and test holes, are required to be properly destroyed to assure that the groundwater supply is protected and preserved for future use and to eliminate potential physical hazards. Wells shall be destroyed and/or abandoned per Section 9.42 of the Tehama County Municipal Code which includes requirements for: preliminary work, filling and sealing conditions, materials, placement of materials, and temporary covers.

In response to drought conditions prior to 2015, the Tehama County Board of Supervisors adopted Ordinance No. 2006, “An Ordinance of the Board of Supervisors of the County of Tehama Amending Titles 9 and 10 of the Tehama County Code Relating to Groundwater Aquifer Protection and Water Wells.” This ordinance included permit requirements for extraction of groundwater use off parcel, changes to well permitted use, maintenance of dormant wells, and administrative civil penalties. These changes were made to decrease potential impacts of well construction, use, destruction, and abandonment on the groundwater aquifer.

2.1.4.2 Efficient Water Management Practices

Tehama County promotes water conservation through both urban and agricultural efficient water management practices. As described in the AB3030 GWMP, these practices include:

- Coordination with the Tehama County Planning Department to provide groundwater conservation information to prospective developers in the County
- Coordination with the Tehama County Department of Building and Safety to provide groundwater conservation information to builders in the County
- Encouragement of recycled water use
- Collaboration with the Cities of Corning, Red Bluff, and Tehama to support activities that promote urban water conservation
- Providing educational materials to assist agriculture operations to become as efficient as possible
- Providing references to public and private programs and materials designed to improve agricultural efficiency
- Coordination with DWR, Tehama County Farm Bureau, University of California Cooperative Extension, Shasta Tehama Watershed Education Coalition, Tehama County Cattlemen's Association, and the various agricultural water districts in the County to expand upon and further support agriculture efficiency and water conservation programs

County Irrigation systems for agriculture have transitioned to primarily drip- and microsprinkler- type for efficient water management. Additionally, the Tehama County Resource Conservation District offers a free Mobile Irrigation Lab which provides on-site evaluations of agricultural irrigation systems to allow producers to receive comments, suggestions, and recommendations related to the performance of their irrigation systems.

2.1.4.3 Impacts on Groundwater Dependent Ecosystems

Potential impacts on GDEs are described in detail in Section 2.2.2.7.

2.1.4.4 Control of Saline Water Intrusion

Due to the significant distance of the Red Bluff Subbasin from the Pacific Ocean, seawater intrusion is not a concern. As noted in the AB3030 GWMP, the potential for saline water intrusion into freshwater aquifers exists in some areas from vertical migration via unsealed or improperly sealed natural gas wells and associated test holes that are no longer active. This is not a significant concern in the Red Bluff Subbasin. Well construction, protection, and abandonment standards and regulation by CalGEM exists for natural gas wells to best mitigate saline water intrusion.

2.1.4.5 Wellhead Protection and Recharge Areas

As identified in the AB3030 GWMP and 1986 Safe Water Drinking Act, a wellhead protection area is "the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." Therefore, wellhead protection can refer to both the immediate location of the well and the broader surrounding area.

Wellhead protection is attained for drinking water systems through the completion of Drinking Water Source Assessments and Source Protection Assessments. Municipalities and community services districts use these assessments to identify potential sources of contamination and potential management practices for mitigating such contamination. Drinking water supply wells are also protected by completion requirements regulated by DDW. Wellhead protection for agricultural wells is managed by the DPR Groundwater Protection Program which focuses on preventing potential contamination of groundwater recharge areas by farming activities.

2.1.4.6 Migration of Contaminated Groundwater

Potential groundwater contaminants identified in the AB3030 GWMP include saline water, pesticides, nitrate from sewage systems, and fertilizer practices, and organic compounds from industrial activities, and naturally occurring elements in underlying soil and rock formations. As described in the AB3030 GWMP, contaminants have the potential to enter the groundwater system as result of lateral or vertical migration through abandoned wells, wells with long screens, and unsealed or improperly sealed wells. These wells can be active or abandoned wells, water supply wells, and associated test holes. Water quality results for non-drinking water wells in the Subbasin associated with regulated sites have exhibited DDW primary drinking water MCL exceedances for inorganics such as bromate, aluminum, arsenic, barium, beryllium, cadmium, chromium, fluoride, nickel, nitrate, perchlorate, thallium, and gross alpha, synthetic organic compounds such as ethylene dibromide, 1,2,3-TCP, dibromochloropropane, atrazine, benzo(a)pyrene, dinoseb, heptachlor, heptachlor epoxide, di(2-ethylhexyl)phthalate, hexachlorobenzene, hexachlorocyclopentadiene, and pentachlorophenol, and volatile organic compounds such as such as 1,1-dichloroethylene, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,2-dichloropropane, 1,2,4 trichlorobenzene, 1,4-dichlorobenzene, benzene, carbon tetrachloride, monochlorobenzene, cis-1,2-dichloroethylene, ethylbenzene, MTBE, tetrachloroethylene, toluene, trans-1,2-dichloroethylene, trichloroethylene, vinyl chloride, and xylene. Secondary MCL exceedances have occurred for specific conductivity, total dissolved solids, chloride, iron, manganese, and sulfate in wells in the Subbasin.

Regulation and oversight for contaminants is provided by CalGEM, SWRCB, the Tehama County Environmental Health Department, the Tehama County Department of Agriculture, and other federal, state, and regional agencies. Identified sources of control for upward migration of contaminants include enforcement of well construction policies, extraction reduction, artificial recharge, and coordination with regulatory agencies. Identified sources of control for downward seepage of sewage, agricultural, or industrial contaminants include coordination with land use planning agencies, coordination with the regulatory agencies discussed above, and public education. Identified sources of control for inter-aquifer migration of contaminated groundwater include enforcement of well construction and abandonment standards.

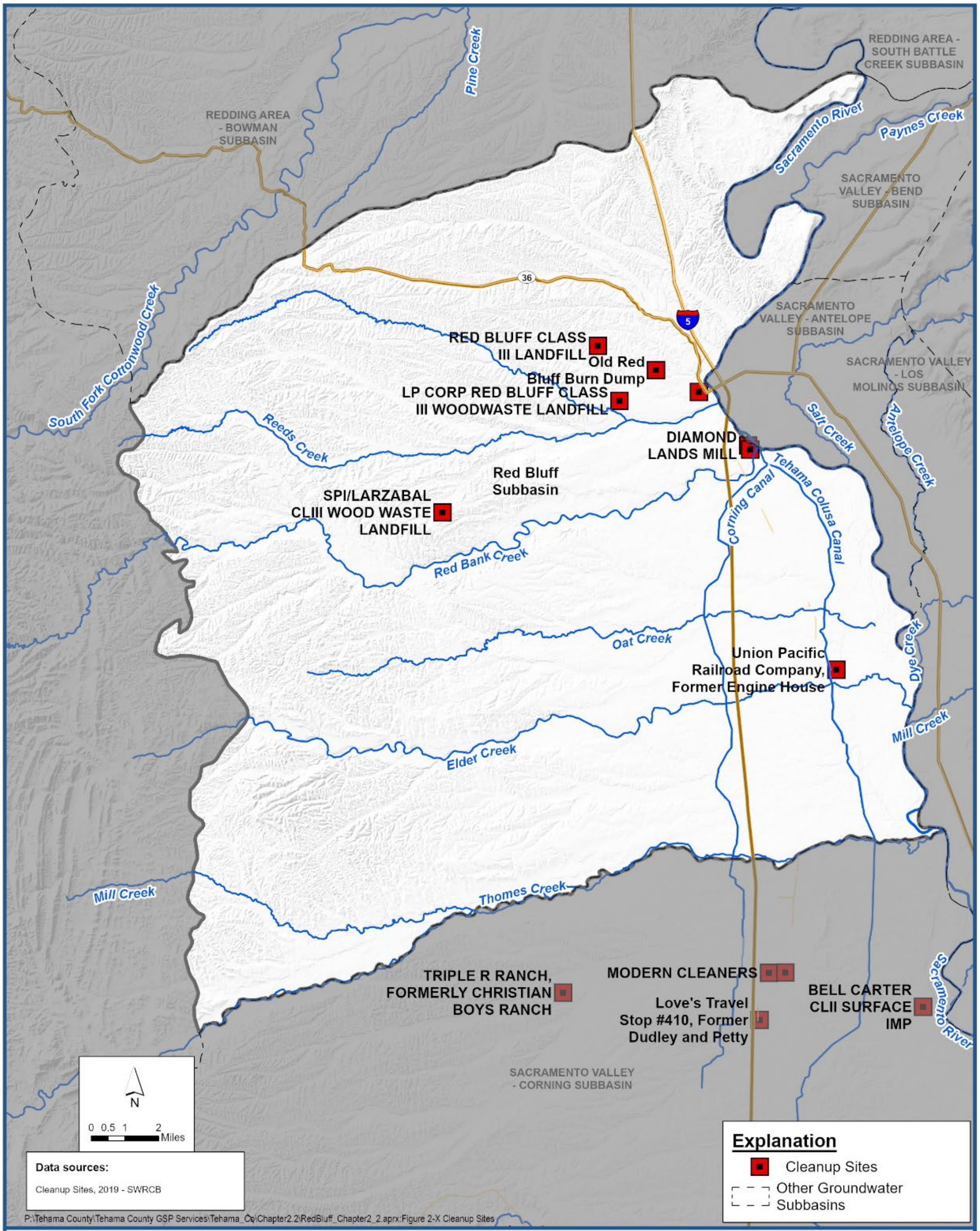
Groundwater cleanup sites are identified on the GeoTracker database which includes leaking underground storage tank sites, Department of Defense Sites, and Cleanup Program Sites. Cleanup sites located within the Red Bluff Subbasin are displayed on **Figure 2-12**.

2.1.4.7 Relationships with State and Federal Regulatory Agencies

The GSA has developed relationships with state and federal interests in the Red Bluff Subbasin to ensure the proper communication of GSP information and allow stakeholder input on the development of the GSP. **Table 2-6** identifies state and federal agencies with beneficial use and/or users in the Subbasin.

2.1.4.8 Consideration of Existing Land Use Plans

The GSA considered the land use policies of applicable cities in the Subbasin and Tehama County in the development of this GSP. Land use plans are described in Section 2.1.3 (Land Use Elements or Topic Categories in Applicable General Plans).



TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Cleanup Sites

Groundwater Sustainability Planning
Red Bluff Subbasin

Figure 2-12

2.1.5 Notice and Communication

GSP Regulations Section 354.10 requires that the GSA consider the interest of all beneficial groundwater users. Under the requirements of SGMA, GSAs must encourage diverse, social, cultural, and economic elements of the population to be actively involved in GSP development. Cooperation and engagement of all beneficial users (described below) of groundwater will assist in the successful implementation of the GSP and sustainable management of groundwater in the Subbasin on the path forward.

To facilitate stakeholder involvement in the GSP development process and ensure interested parties could participate in the development of the GSP, a Communication and Engagement Plan (**Appendix 2-B**) was created to:

- Enhance understanding and inform the public about water and groundwater resources in the District subbasins, the purpose and need for sustainable groundwater management, the benefits of sustainable groundwater management, and the need for GSPs.
- Engage a diverse group of interested parties and stakeholders and promote informed feedback from stakeholders, the community, and groundwater-dependent users throughout the preparation and implementation process of the GSPs.
- Coordinate communication and involvement between the subbasins and other local agencies, elected and appointed officials, and the general public.
- Utilize the District Board of Directors and Groundwater Commission meetings to facilitate a public engagement process.
- Employ a variety of outreach methods that make public participation accessible and that encourage broad participation.
- Respond to public concerns and provide accurate and up-to-date information.
- Manage communications and engagement in a manner that provides maximum value to the public and constitutes an efficient use of the GSA's resources.

In addition, the Tehama County FCWCD will coordinate with neighboring GSAs through GSP implementation as part of the Northern Sacramento Valley Inter-basin Coordination Report (**Appendix 2-C**).

2.1.5.1 Beneficial Uses and Users of Groundwater

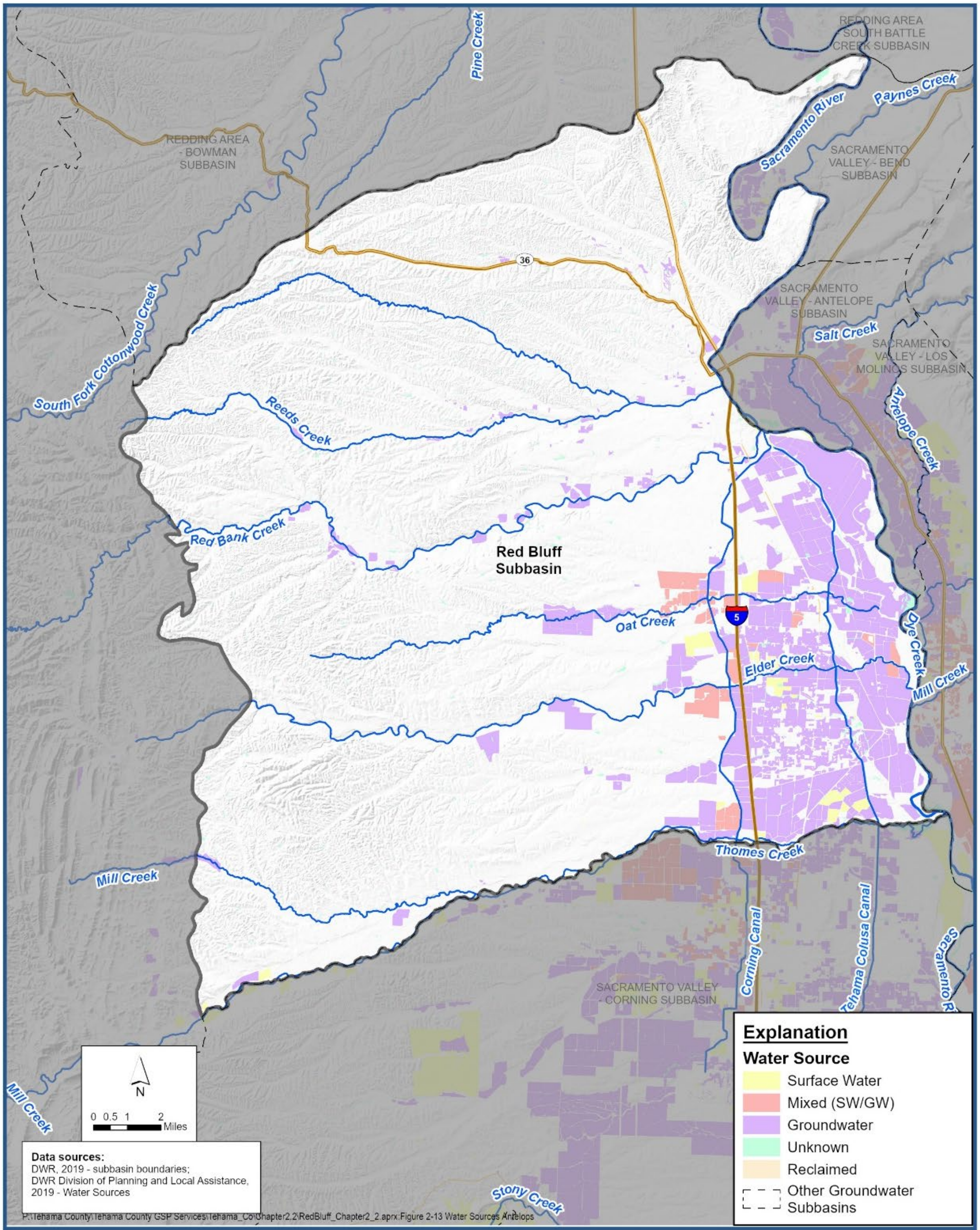
Under the requirements of SGMA, all beneficial uses and users of groundwater in the Subbasin must be considered in the development and implementation of the GSP, and the GSA must encourage the active involvement of such parties. In the Red Bluff Subbasin, beneficial users include any stakeholders that have interest in groundwater use and/or management in the Subbasin. Beneficial uses and users, as identified in the Communication and Engagement Plan are displayed in **Table 2-6** below. Subbasin water sources are shown in **Figure 2-13** and public water districts are shown in **Figure 2-14.**

Table 2-6. Beneficial Uses and Users of Groundwater

CATEGORY OF INTEREST	STAKEHOLDER GROUPS
General Public	• Interested individuals or interested parties • Tehama County School District • Latino Outreach of Tehama County • University of California Cooperative Extension • Tehama County Board of Supervisors • Shasta College • Red Bluff-Tehama County Chamber of Commerce • Rancho Tehama Association • City of Tehama • City of Red Bluff • Rancho Tehama Elementary School • Gerber Union Elementary • Red Bluff Union Elementary School District • Red Bluff Joint Union High School District • Antelope Elementary School District
Land Use	• Tehama County Planning Department • Tehama County Planning Commission • Tehama County Environmental Health Department • Tehama County Department of Agriculture • City of Red Bluff • City of Tehama • Gerber Las Flores Community Services District • Paskenta Community Services District (outside of Subbasin) • Reeds Creek Community Services District
Urban/ Commercial & Non-Commercial Agricultural	• Tehama County Farm Bureau • Tehama County Cattlemen’s Association • Tehama County Cattlewomen’s Association • Tehama County Agricultural Commissioner • University of California Cooperative Extension • Resource Conservation District of Tehama County • Shasta Tehama Watershed Education Coalition • El Camino Irrigation District • Proberta Water District • Rancho Tehama Association • Elder Creek Water District • Rawson Water District

CATEGORY OF INTEREST	STAKEHOLDER GROUPS
	• Gerber Las Flores Community Services District • Golden Meadows Community Services District • City of Red Bluff • City of Tehama
Other Commercial/Municipal Users	• Renewable Power Companies • CAL FIRE Stations • Crain Processing Plants • Sierra Pacific Industries • Tehama County • SPI • Pactiv • CAPAX • Wilcox Oaks Golf Club • Oak Creek Golf Club • LA-Pacific Corp • Walmart Distribution Center
Environmental and Ecosystem	• Audubon Society • The Nature Conservancy • California Department of Fish and Wildlife • United State Fish and Wildlife Service • United States Bureau of Reclamation • United States Bureau of Land Management • United States Forest Service • Natural Resources Conservation Service • DWR • California State Parks • Fire Safe Councils (Tehama Glenn FSC) • California Department of Fish and Wildlife Interest in Butler Slough, Eco Reserve, Thomes Creek Preserve
Surface Water	• Mutual Water Companies • Water Districts • Agricultural Users • Riparian Water Right Holders • Corning Water District • Tehama Colusa Canal Authority • Thomes Creek Water District • USFWS
Economic Development	• Tehama County Board of Supervisors

CATEGORY OF INTEREST	STAKEHOLDER GROUPS
	• James Gallagher (SA) • Jim Neilson (Senator) • Tehama County Planning Commission • Red Bluff-Tehama County Chamber of Commerce • U.S. Economic Development Administration • Red Bluff City Council • City of Tehama City Council
Human Right to Water	• Private Well Owners • Small Water Systems • Disadvantaged Communities • Proberta • Gerber Las Flores Community Services District • City of Tehama • City of Red Bluff • Rancho Tehama • Mira Monte Water Company • Surrey Village Water Company • Golden Meadows Community Services District
Tribes	• California Indian Water Commission • Greenville Rancheria
Integrated Water Management	• IRWMP Stakeholders • Mid Upper Sacramento Regional Flood Management Group



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2.2\RedBluff_Chapter2_2.aprx:Figure 2-13 Water Sources Antelops

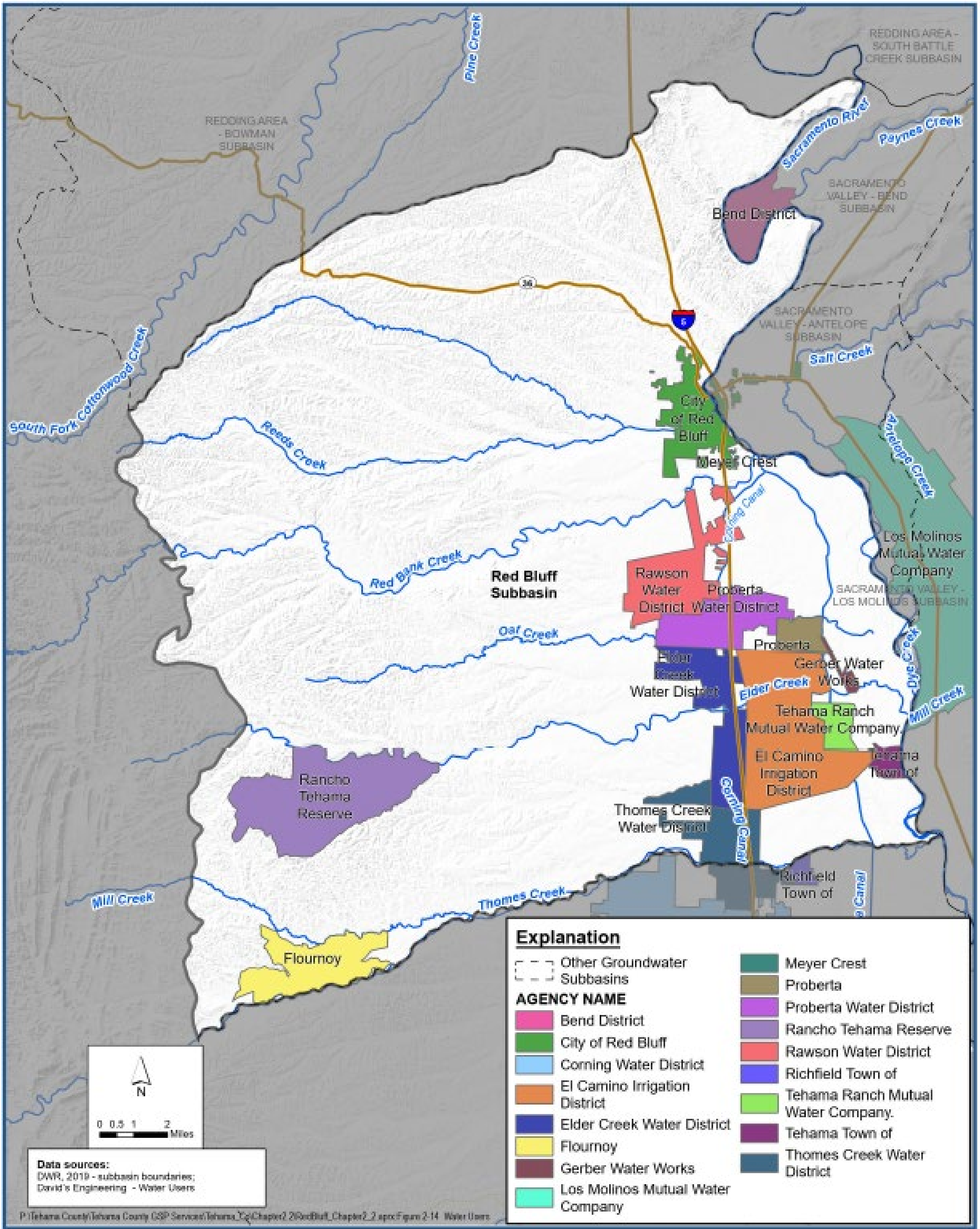
TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Water Sources

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-13



Data sources:
DWR, 2019 - subbasin boundaries;
David's Engineering - Water Users

P:\Tehama County\Tehama County GSP Services\Tehama_Cp\Chapter2 2\RedBluff_Chapter2_2.aprx Figure 2-14 Water Users

TEHAMA COUNTY

LSCE Team

Public Water Districts

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-14

2.1.5.2 Opportunity for Public Engagement

Involvement of social, cultural, and economic elements and interested parties was encouraged through public meetings and workshops, public availability of SGMA, GSA, and GSP information, public comment opportunities, and collaboration with cities, districts, state and federal agencies, neighboring GSAs, and stakeholders in the Subbasin. SGMA, GSA, and GSP information was made available to the public through the Tehama County FCWCD website, public hearings, meetings, and workshops.

The Groundwater section of the Tehama County Flood Control and Water Conservation District website (tehamacountywater.org) provides: Groundwater Commission Bylaws and general information, GSA formation documents including: notices of public hearings, resolutions, notices of intent, ordinances, letters of support, formation notifications, basin boundary modification documents, groundwater monitoring data, groundwater related resource materials, and information on the Tehama County Groundwater Commission. The website also includes meeting dates and links to agendas and meeting minutes for Groundwater Commission and Board of Directors meetings and Groundwater Sustainability presentations. Additionally, the public may register for the interested parties list, via the website or by contacting GSA staff, to receive information and notices concerning SGMA, GSP development, and the GSA. The list of GSA outreach events and current list of interested parties is included as **Appendix 2-D**.

Active involvement of the public and stakeholders was encouraged in a variety of ways:

- Public Meetings – Groundwater Commission and District Board of Directors meetings were open to the public and followed the requirements of the Brown Act. The public had opportunities to provide comments on programs, plans, and proposals at these meetings.
- Public Hearings – Public hearings were held prior to the adoption of any fees, GSP elements, and the final GSP.
- Public Workshops – These included all educational opportunities where the public could learn about SGMA, GSA, and GSP elements. These events were typically held as tailgates and webinars.
- Public Notices – Notices were sent to the public prior to the initial development of the GSP and to inform the public of ways in which they could be involved in the GSP development and implementation process.
- Stakeholder Briefings – Groundwater Commission members regularly communicated with and disseminated information to the stakeholder groups they represent.
- Newsletters - Quarterly newsletters were provided to update the public and stakeholders on GSP development.

A full list of meetings, public hearings, and workshops during which the public had the opportunity to be engaged is included in **Table 2-7**. Additionally, presentations were provided to stakeholder groups as listed in **Appendix 2-D**.

Table 2-7. Opportunities for Public Engagement

EVENT NAME	DATE	LOCATION
Tehama County FCWCD Board of Directors Meeting	January 22, 2015, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	May 14, 2015, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Public Hearing TCFCWCD Board of Directors (GSA Formation)	June 2, 2015, 1:30 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	August 13, 2015, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Public Hearing TCFCWCD Board of Directors (Notice of Intent)	November 3, 2015, 1:30 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	December 10, 2015, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	January 27, 2016, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	March 23, 2016, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County Public Meeting	April 4, 2016	
Tehama County FCWCD Board of Directors Meeting Public Meeting	May 25, 2016, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County Public Meeting	June 27, 2016	
Tehama County FCWCD Board of Directors Meeting	July 27, 2016, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	August 2, 2016, 2:00 PM	Tehama County Dept. of Agriculture 1834 Walnut Street Red Bluff, CA
Groundwater Commission Meeting	September 12, 2016, 9:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA

EVENT NAME	DATE	LOCATION
Tehama County FCWCD Board of Directors Meeting	September 26, 2016, 2:00 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	November 9, 2016, 10:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	December 14, 2016, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	January 23, 2017, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	February 22, 2017, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	March 20, 2017, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	March 22, 2017, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	April 26, 2017, 2:00 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	May 15, 2017, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County Public Meeting	May 30, 2017	
Groundwater Commission Meeting	June 28, 2017, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	July 17, 2017, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County Public Meeting	August 9, 2017	
Groundwater Commission Meeting	September 27, 2017, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	October 24, 2017, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA

EVENT NAME	DATE	LOCATION
Groundwater Commission Meeting	October 25, 2017, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	December 4, 2017, 2:00 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	March 19, 2018, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	April 25, 2018, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	May 21, 2018, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	June 14, 2018, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	June 19, 2018, 1:30 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	August 22, 2018, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	September 17, 2018, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	October 24, 2018, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	November 19, 2018, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	January 23, 2019, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	March 18, 2019, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	April 24, 2019, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA

EVENT NAME	DATE	LOCATION
Tehama County FCWCD Board of Directors Meeting	May 20, 2019, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	May 22, 2019, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	August 28, 2019, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	September 16, 2019, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	October 23, 2019, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	November 18, 2019, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	December 18, 2019, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	January 7, 2020, 10:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	January 27, 2020, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	February 26, 2020, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	March 16, 2020, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	April 22, 2020, 8:30 AM	Virtual
Groundwater Commission Meeting	May 27, 2020, 8:30 AM	Virtual
Groundwater Commission Meeting	June 24, 2020, 8:30 AM	Virtual
Tehama County FCWCD Board of Directors Meeting	July 20, 2020, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA

EVENT NAME	DATE	LOCATION
Groundwater Commission Meeting	August 26, 2020, 8:30 AM	Virtual
Tehama County FCWCD Board of Directors Meeting	September 23, 2020, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	September 23, 2020, 8:30 AM	Virtual
Regional Public Outreach Series (webinar) SGMA and GSP Overview	October 8, 2020, 6:00 PM	Virtual
Tehama County FCWCD Board of Directors SGMA Presentation	October 20, 2020, 1:30 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Public Outreach Series (Red Bluff) SGMA and GSP Overview	October 21, 2020, 5:30 PM	Tailgate outdoor meeting Tehama County Public Works 9380 San Benito Ave Gerber, CA
Groundwater Commission Meeting	October 28, 2020, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	November 16, 2020, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	December 9, 2020, 8:30 AM	Virtual
Regional Public Webinar Progress Update on GSP Development	December 9, 2020, 6:00 PM	Webinar
Tehama County FCWCD Board of Directors Meeting	January 25, 2021, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	January 27, 2021, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	February 24, 2021, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	March 15, 2021, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	March 24, 2021, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA

EVENT NAME	DATE	LOCATION
Tehama County FCWCD Board of Directors Meeting	April 19, 2021, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Public Outreach Series (Red Bluff) Plan Area and Basin Setting, SMC	April 20, 2021	Virtual
Groundwater Commission Meeting	April 28, 2021, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	May 17, 2021, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	May 26, 2021, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	June 23, 2021, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	June 28, 2021, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	July 28, 2021, 8:30 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	August 16, 2021, 11:00 AM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Public Outreach Series (Red Bluff) SMCs, PMAs, Public Review Schedule	August 19, 2021, 6:00 PM	Virtual
Groundwater Commission Meeting	*September 22, 2021, 8:30 AM*	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Regional Public Webinar	*September 29, 2021, 6:00 PM*	Virtual
Tehama County FCWCD Board of Directors Meeting	*October 18, 2021, 11:00 AM*	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Regional Public Webinar	*October 20, 2021, 6:00 PM*	Virtual
Groundwater Commission Meeting	*October 27, 2021, 8:30 AM*	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA

EVENT NAME	DATE	LOCATION
Tehama County FCWCD Board of Directors Meeting	*November 15, 2021, 11:00 AM*	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Regional Public Workshop	November 15, 2021, 6:00 PM	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Groundwater Commission Meeting	*December 8, 2021, 8:30 AM*	Board of Supervisors Chambers 727 Oak Street Red Bluff, CA
Tehama County FCWCD Board of Directors Meeting	*December 20, 2021, 11:00 AM*	Board of Board of Supervisors Chambers 727 Oak Street

2.1.5.3 Comments on the Plan

Comments that the Tehama County FCWCD received on the GSP were considered in the preparation of the GSP by the GSA and consultants. Copies of comment letters received are provided in **Appendix 2-E**.

2.1.5.4 Agency Decision Making Process

The Tehama County FCWCD is the GSA for the Red Bluff Subbasin and has the final decision-making authority for the Subbasin. To assist in the development of the GSP, meetings were held with the Groundwater Commission, Tehama County FCWCD Board of Directors, Tehama County Board of Supervisors, ad hoc committees, and AB3030 TAC to discuss GSP elements as needed. As discussed in Section 1.3.1, the Board of Directors/Board of Supervisors is the five-member elected governing body of the Tehama County FCWCD, the Groundwater Commission is an eleven-member advisory committee for the Board of Directors for GSA related matters, and the AB3030 TAC consists of stakeholders with various interests: agricultural pumpers, water district representatives, a natural resource representative, and city representatives. The ad hoc committees consist of a smaller group of Groundwater Commission members that assemble when needed to address specific topics, make recommendations, and report information back to the full Groundwater Commission for direction or recommendation to the FCWCD Board of Directors. Once the specific topic was addressed, the committee would dissolve. These committees formed and met throughout the development of the GSP to ensure specific topics were addressed. Final decisions were then made by the GSA and in coordination with stakeholders and with input from consultants and advisory committees as needed.

2.2 References

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FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater
Management Act

Groundwater Sustainability Plan
(Chapter 2B – Basin Setting)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini, Consulting Engineers

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LIST OF ACRONYMS & ABBREVIATIONS

AB	Assembly Bill
bgs	Below Ground Surface
BLM	Bureau of Land Management
BOD	Tehama County Board of Directors
BLM	Bureau of Land Management
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CDEC	California Data Exchange Center
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CE	Communications and Engagement
CFS	Cubic Feet per Second
CV-SALTS	Central Valley Salinity Alternatives
CVRWQCB	Central Valley Regional Water Quality Control Board
CWC	California Water Code
dS/m	Decisiemens per Meter
DAC	Disadvantaged Community
DDW	Division of Drinking Water
DOI	Department of the Interior
DWR	California Department of Water Resources
DPR	Department of Pesticide Regulation
EC	Electrical Conductivity
ft^2/d	Square Feet Per Day
ft/d	Feet Per Day
ft/mile	Feet per Mile
ft bgs	Feet Below Ground Surface
ft msl	Feet Above Mean Sea Level
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	Groundwater Dependent Ecosystem
GMP	Groundwater Management Plan

GPS	Global Positioning Systems
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCM	Hydrogeologic Conceptual Model
iGDE	Indicators of Groundwater Dependent Ecosystems
ILRP	Irrigated Lands Regulatory Program
InSAR	Interferometric Synthetic Aperture Radar
IRWMP	Integrated Regional Water Management Plan
JPA	Joint Powers Authority
LLNL	Lawrence Livermore National Laboratory
LSCE	Luhdorff & Scalmanini, Consulting Engineers
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter
MO	Measurable Objective
MOA	Memorandum of Agreement
MT	Minimum Threshold
MTJ	Mendocino Triple Junction
MWELO	Model Water Efficient Landscape Ordinance
NCCAG	Natural Communities Commonly Associated with Groundwater
NRCS	Natural Resources Conservation Service
NWIS	National Water Information System
SAGBI	Soil Agricultural Groundwater Banking Index
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
SVWQC	Sacramento Valley Water Quality Coalition
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
Tehama County FCWCD	Tehama County Flood Control and Water Conservation District
TM	Technical Memorandum
USDA	United States Department of Agriculture

USBR	United States Bureau of Reclamation
USFS	United States Forest Service
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
UWMPA	Urban Water Management Planning Act
WDL	Water Data Library
WDR	Waste Discharge Requirements
µg/L	Micrograms per liter
µmhos/cm	Micromhos per Centimeter

2 SUBBASIN PLAN AREA AND BASIN SETTING (REG. § 354.8)

2.1 Description of Plan Area

2.2 Basin Setting

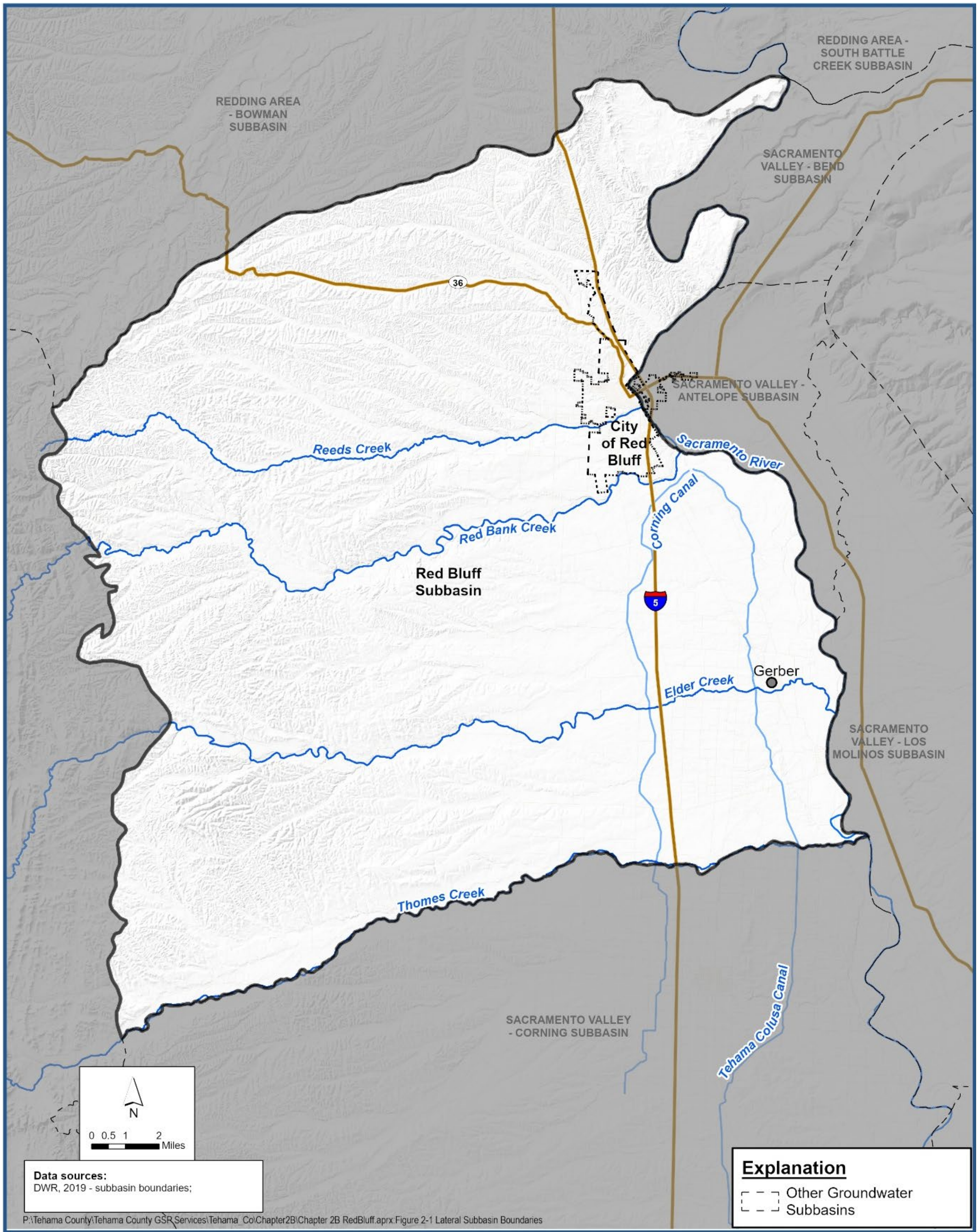
The Basin Setting section is a description of available information used as a background to develop the sustainability criteria for the Subbasin. It includes a detailed review of studies and historic groundwater conditions in the Subbasin. This information provides context about the quantity and movement of water in the Subbasin. The Basin Setting supports numerical modeling used to define groundwater budgets.

2.2.1 Hydrogeologic Conceptual Model

The Hydrogeologic Conceptual Model (HCM) is the framework for the movement of water in the Subbasin. An HCM is developed through the use and interpretation of historical geologic, hydrogeologic, and hydrologic data and investigations to describe the geologic features, the water sources, and movement of surface and groundwater. The HCM also describes groundwater quality and the origin and migration of chemicals of concern to beneficial users. The development of the HCM is based on the availability of data and is updated periodically as new hydrogeologic data is collected, analyzed, and interpreted. The development of an HCM begins with a review of historical reports and available data. The HCM presented herein of the Red Bluff Subbasin is the result of updating previous HCMs. The HCM is also the foundation for the numerical model used to produce the historic and current water budgets and the future projections of groundwater use. The components of the HCM including the Subbasin's lateral boundaries, topography, geologic setting, soil characteristics, principal aquifers, definable bottom of the aquifer system, surface water features, and recharge areas, are presented in the following sections.

2.2.1.1 Subbasin Boundaries

The lateral extent of the Red Bluff Subbasin is defined in the DWR Bulletin 118 and based on surface water and geologic features. Initial subbasin boundaries for California were published in 2004 with updates published in 2016 and 2018. No changes to the Red Bluff Subbasin boundary descriptions were included in the 2016 or 2018 Bulletin 118 updates. Surface water and geologic features are used as lateral bounds as they often control divergent groundwater flow (DWR, 2004). The Subbasin is bordered to the north by the Bowman Subbasin separated by the Red Bluff Arch. The western boundary is defined as the Coast Ranges and the eastern boundary is defined as the Sacramento River (DWR, 2004). Thomes Creek separates the Subbasin from the Corning Subbasin to the south although the Red Bluff Subbasin geologic material is likely contiguous and connected to the Corning Subbasin (DWR, 2004). The bottom of the Subbasin is defined as the base of the post-Eocene continental deposits where the transition from marine derived sediments to terrestrial derived sediments corresponds to the transition from saline/brackish groundwater to fresh groundwater. Fresh groundwater is defined as water with an electrical conductivity of less than 3,000 micromhos per centimeter (µmhos/cm) as mapped by Berkstresser (1973) (DWR, 2014). This depth is corroborated by DWR's review of geophysical logs and water quality samples (DWR, 2014). The lateral subbasin boundaries are presented in **Figure 2-15** and the bottom of the basin is discussed further in section 2.2.1.6 and presented in **Figure 2-16** and **Figure 2-17**.



Data sources:
DWR, 2019 - subbasin boundaries;

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-1 Lateral Subbasin Boundaries

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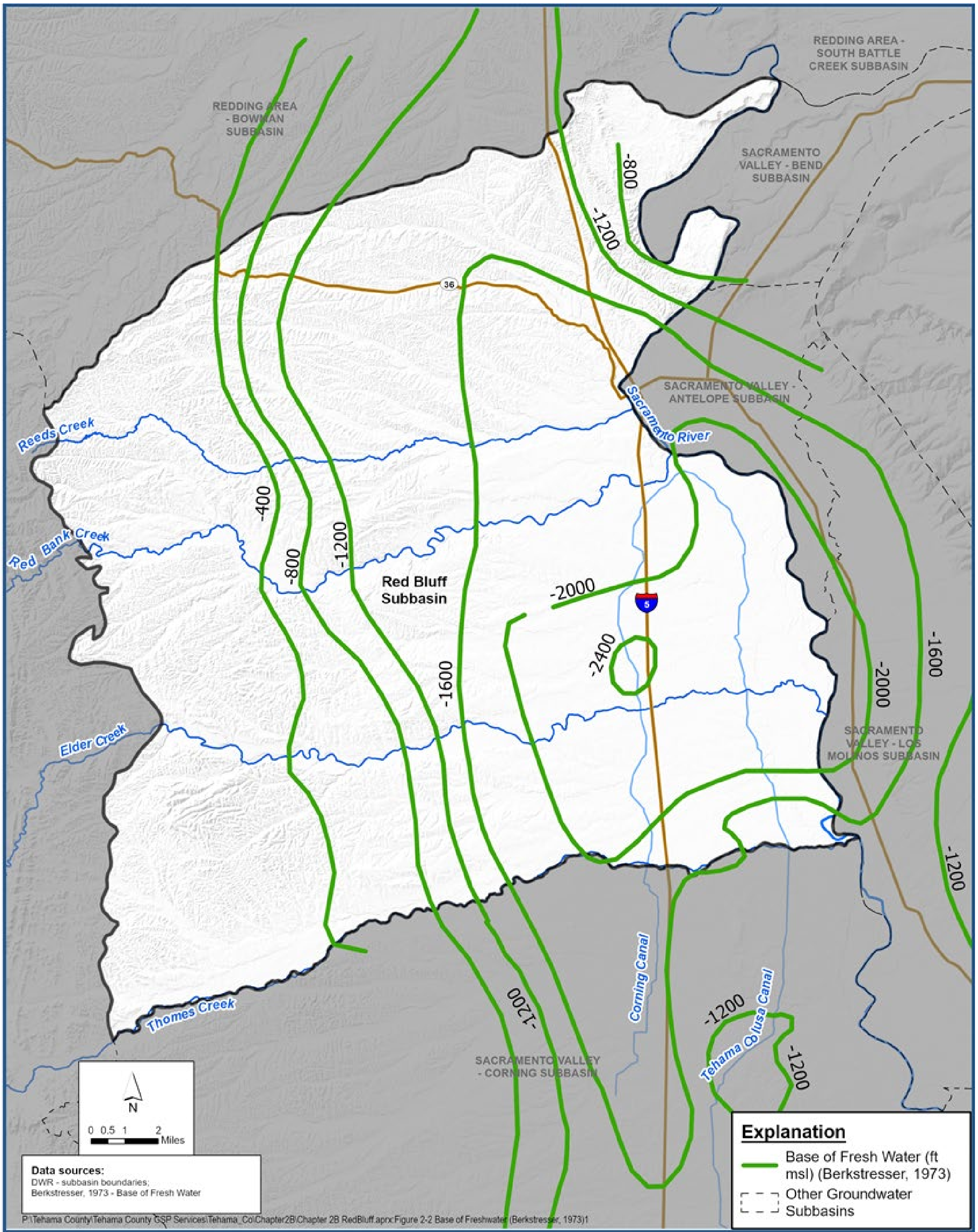
Lateral Subbasin Boundary

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-15



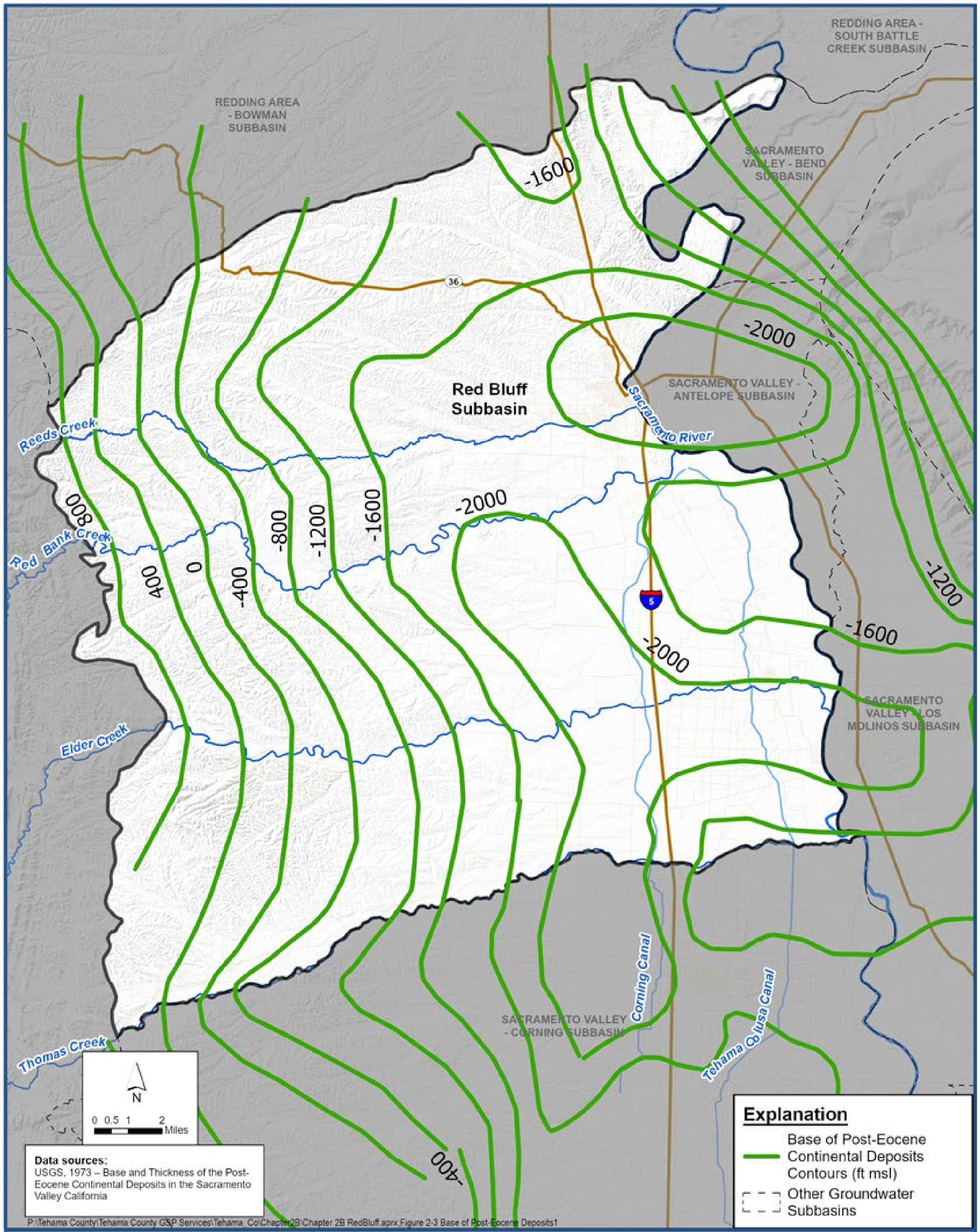
Data sources:
DWR - subbasin boundaries;
Berkstresser, 1973 - Base of Fresh Water

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-2 Base of Freshwater (Berkstresser, 1973)1

Contours of Equal Groundwater Elevation, Base of Freshwater

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-16



Data sources:
USGS, 1973 – Base and Thickness of the Post-Eocene Continental Deposits in the Sacramento Valley California

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-3 Base of Post-Eocene Deposits1

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Contours of Equal Elevation, Base of Post-Eocene Deposits

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-17

2.2.1.2 Topographic Information

The Red Bluff Subbasin is characterized by a relatively flat topographic setting along the western side of the Sacramento Valley groundwater basin. Topography is highest along the western border of the Subbasin where the Coast Ranges foothills transition to the valley floor. The topographic slope is steep in the west (10% - >50%) and is generally shallow in the eastern half of the Subbasin (<2%) (**Figure 2-18**). The ground surface elevation ranges from over 1,000 feet above mean sea level (ft msl) in the southwest corner of the Subbasin to less than 750 ft msl in the majority of the Subbasin (**Figure 2-19**).

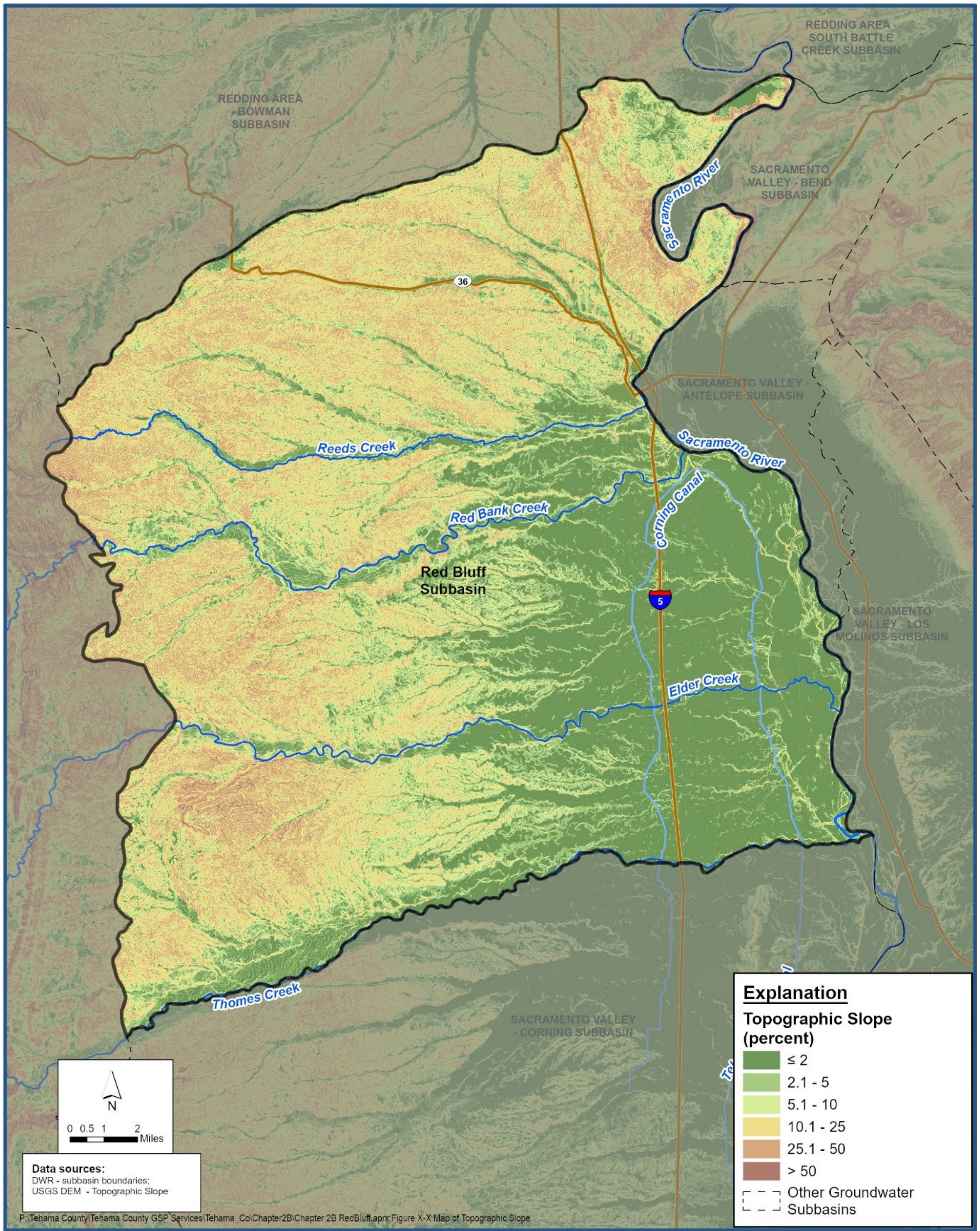
2.2.1.3 Geologic Setting

In the 1960s and 1970s, early studies of the geology in the northern Sacramento Valley were conducted for oil and gas exploration and characterization of geologic resources like groundwater. Studies by the USGS and independent researchers consolidated earlier work and conflicting nomenclature into more standardized and agreed upon definitions and characterized the water bearing potential and origin of the younger geologic units in the Sacramento Valley (Olmstead and Davis, 1961; Lydon, 1968; Ojakangas 1968). Depositional environments and geologic history of the older and deeper rocks were also characterized during the same period for oil and gas resources and academic purposes (Garrison, 1962; Bailey et al., 1970; Redwine, 1972; Dickinson and Rich, 1972; Mansfield, 1979).

In the 1980s and 1990s, further research was conducted on the older Great Valley Sequence geologic units (Ingersoll and Dickinson, 1981; Bertucci, 1983). Extensive mapping and seminal studies of the younger geologic formations were conducted by the USGS that further defined and separated the distribution and lithologic character of the geologic units in the Sacramento Valley (Marchand and Allwardt, 1981; Harwood et al., 1981; Helley and Jaworowski, 1985; Helley and Harwood, 1985; Harwood and Helley, 1987; Blake et al., 1999).

More recent studies in the 2000s and 2010s have attempted to further characterize the geologic material and contextualize the information as it relates to groundwater resources (DWR, 2004; DWR, 2008; Gonzalez, 2014). The Department of Water Resources (DWR) conducted an extensive literature review and study to compile the most current geology and groundwater information in a 2014 report (DWR, 2014).

The geologic history of the northern Sacramento Valley, where the Subbasin is located, is dominated by a series of mountain building events leading to provenance changes in basin sedimentation. During the Mesozoic, a subduction zone created the plutonic emplacement of the Sierra Nevada. The uplift of the Sierra Nevada isolated the Pacific Ocean from its previous extent, moving the shoreline west (DWR, 2014). The uplifting mountains created a source of sediment that filled the forearc basin through erosional processes (Olmstead and Davis, 1961). On the western boundary of the forearc basin, the eastward dipping subduction resulted in accretionary forces forming the metamorphic rocks that would later make up the Franciscan Formation and Coast Range Ophiolite (DWR, 2014).



Data sources:
DWR - subbasin boundaries;
USGS DEM - Topographic Slope

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure X-X Map of Topographic Slope

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Map of Topographic Slope

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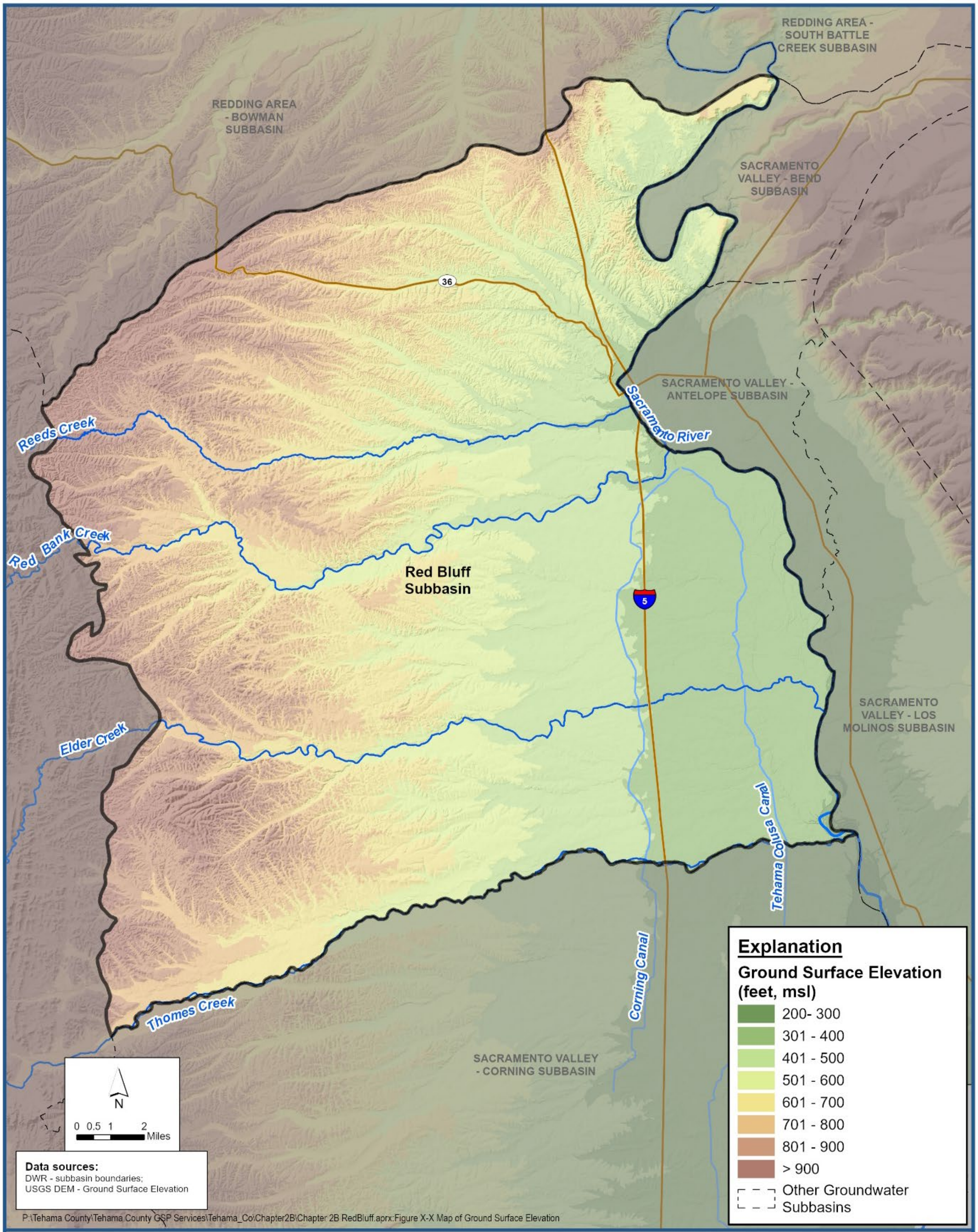
Red Bluff Subbasin

Figure 2-18



Data sources:
DWR - subbasin boundaries;
USGS DEM - Ground Surface Elevation

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure X-X Map of Ground Surface Elevation

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Map of Ground Surface Elevation

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-19

During the early part of the Cenozoic Era in the Paleogene Period, the tectonic forces that dominated during the Mesozoic were still present (DWR, 2014). These tectonic forces resulted in periods of marine regression and transgressions that carved and subsequently filled a large canyon known as the lower Princeton Submarine Valley (DWR, 2014). Marine transgressions and regressions continued throughout the Paleogene and into the Miocene while older Cascade volcanism occurred on the eastern margins of the valley (DWR, 2014).

Continued sedimentation filled the valley throughout the Paleogene until a marine regression and sediment accumulation caused a transition from a marine to terrestrial depositional environment in the Neogene. During this period, sedimentation sourced from the uplifting coast ranges, Klamath Mountains, and ancestral Cascades filled the basin (DWR, 2014). Throughout the Neogene epoch the tectonic regime was transitioning from subduction to transverse in a northward pattern until the present day where it is expressed as the Mendocino Triple Junction (MTJ). Tectonic forces associated with the northward migration of the MTJ resulted in geologic structures in the valley like the Chico Monocline, Red Bluff and Corning Faults, and the Los Molinos Syncline (DWR, 2014).

2.2.1.3.1 *Regional Geology*

The terrane surrounding the Subbasin is the source for the sediments that are deposited in and comprise the Sacramento Valley. It is important to understand the surrounding geologic provinces to properly characterize and contextualize the stratigraphy of the Subbasin. The Northern Portion of the Sacramento Valley where the Subbasin is located is bordered on the east by the Cascade Range Province and the Klamath and Coast Range Geologic Provinces are to the west (**Figure 2-20**).

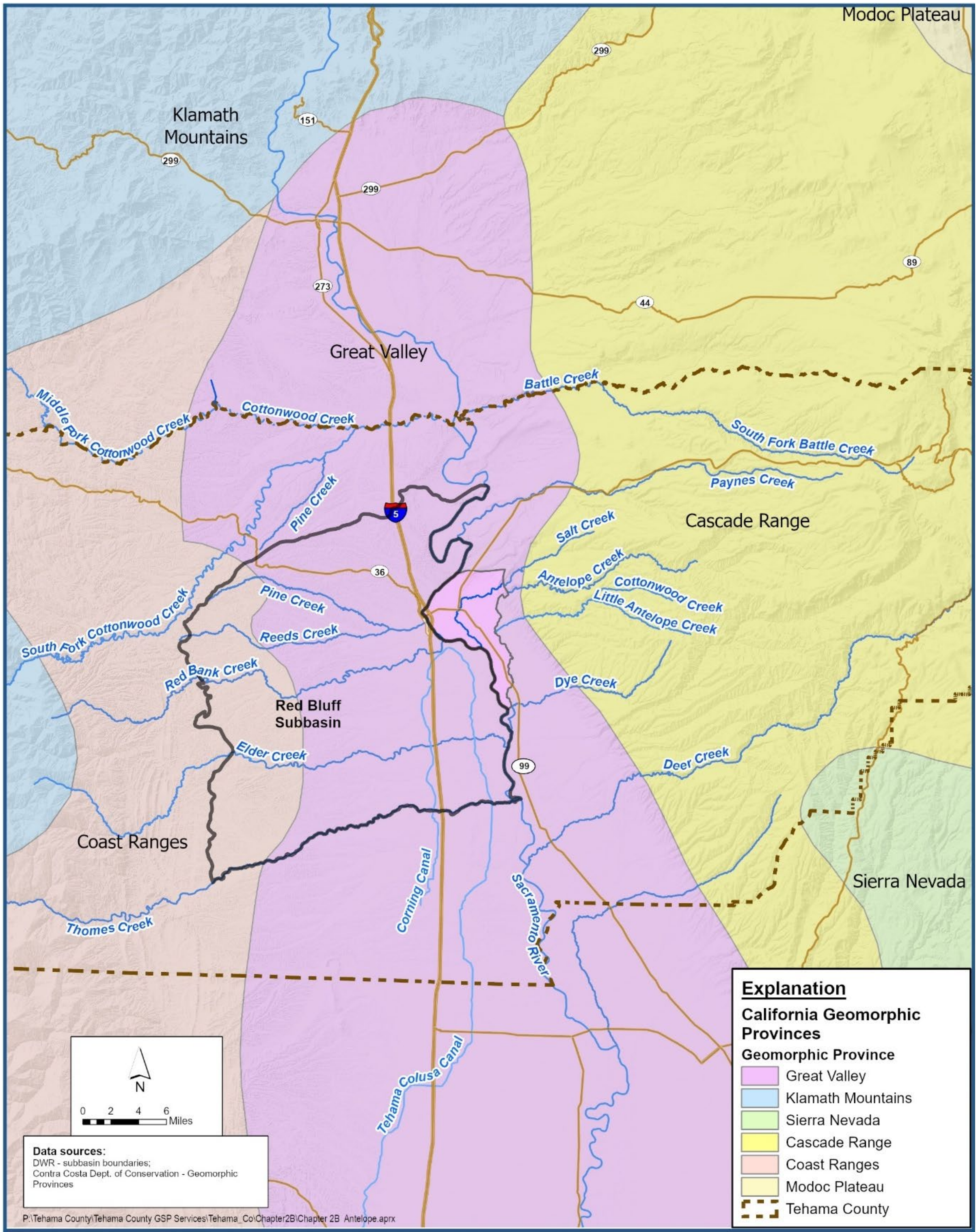
Klamath Geologic Province

The mountains to the northwest of the Subbasin make up the Klamath Geologic Province. The mountain range is steep with peaks of approximately 6,000 ft to 8,000 ft. The Klamath Mountains are comprised of accreted terranes consisting of oceanic crust and accreted island arcs (Blake et al., 1999). To the northwest of the Subbasin, the province consists of Jurassic and older metamorphic-plutonic basement overlain by the east to southeast dipping Great Valley Sequence (Blake et al., 1999). No streams and tributaries drain the Klamath Geologic Province in the vicinity of the Subbasin.

Coast Range Geologic Province

West of the Sacramento Valley and the Subbasin lies the northern portion of the Coast Range Geologic Province. The northern Coast Range Geologic Province in the vicinity of the Subbasin is steeply sloped with peaks around 5,700 ft.

The mountains here form the boundary between the northern Sacramento Valley and the California Coast. Major creeks that flow through the Subbasin that feed the Sacramento River drain this area of the Coast Ranges.



Data sources:
DWR - subbasin boundaries;
Contra Costa Dept. of Conservation - Geomorphic Provinces

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Map of Geologic Provinces

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-20

The rocks exposed in the western area of the Coast Range Province are composed of metamorphosed deep sea marine sedimentary rocks (Franciscan Complex). The Franciscan rocks are subdivided into two separate terranes, the Pickett Peak terrane and the Yolla Bolly terrane, which are further divided into sub-groups separated by thrust faults (Blake, 1999). The Franciscan Complex is separated from Jurassic and Cretaceous sedimentary rocks of the Sacramento Valley western foothills by the Coast Range Fault.

The recent and Quaternary history of the basin is similar to present day conditions. The MTJ continued its migration north to its present location causing flexural structures to form like the Willows fault system (DWR, 2014). Sedimentation continues to occur along stream channels that feed the Sacramento River and is sourced from the surrounding terrane and reworking of emplaced sediment.

Sacramento Valley western foothills

Along the west side of the Sacramento Valley are the foothills of the Coast Ranges and the Klamath Mountains. These foothills form a transition from the steeply sloped peaks of the Coast Ranges to the shallower slopes of the Sacramento Valley. Many streams drain the western foothills and feed the streams and channels in the Sacramento Valley.

The Jurassic and Cretaceous rocks of the Great Valley sequence that are exposed in the western portion of the province consist of marine sourced sedimentary rocks (DWR, 2014). These deposits are exposed due to folding and tilting and form the west limb of a structural trough (DWR, 2014). In the northwest of the province the outcrops are in depositional contact with the Coast Range Ophiolite and in the southwest they are in fault contact (Blake, 1999). In the most northern areas of the western foothills the Great Valley Sequence is in contact with the Klamath Mountains (Blake, 1999). The marine origin of the Great Valley sequence causes the groundwater contained therein to be saline and brackish (connate water).

Cascade Range Province

The Cascade Range Province borders the northern Sacramento Valley to the east. The Cascade Range is a series of andesitic and basaltic-andesite volcanic cones that extend from Lassen Peak in the south through Washington and Oregon in the north (USGS, 2002; Clynne and Muffler, 2010). The ancestral southernmost volcano of the Cascade Range, Mt. Yana, was the principal source of sediment for the Tuscan Formation (Lydon, 1968). The Cascade Range is an active volcanic arc that is driven by the eastward subduction off the coast of Washington, Oregon, and Northern California. No streams and rivers currently drain the Cascade Range in the vicinity of the Subbasin. Eastern fluvial systems feed the Sacramento River and transport sediment to the Sacramento Valley Groundwater Basin.

Great Valley Province (Sacramento Valley Province)

The Great Valley Province encompasses the entire central valley of California. The northern region of the Great Valley Province where the Subbasin is located is referred to as the Sacramento Valley Province. The Sacramento Valley Province (Great Valley Province on **Figure 2-20**) is relatively flat and gently slopes on either side toward the south draining Sacramento River. Stream channels, flood plains, and natural levees dominate the interior of the province which is bordered by the Coast Ranges to the west and the foothills of the Cascades to the east. The underlying sediments are dominated by the freshwater bearing Tehama Formation in the west and the Tuscan Formation in the east (Blake et al., 1999).

The alluvial plains of the western side of the province were formed by the ancestral Sacramento River and its tributaries. The streams deposited large amounts of sediment sourced from the uplifting Coast Range and to a lesser extent, the Klamath Mountains, during the Pliocene (Blake et al., 1999). These Pliocene sediments were later cut and filled by younger streams and tributaries (Blake et al., 1999). Outcrops of these younger sediments often occupy currently active streams and tributaries (Blake et al., 1999).

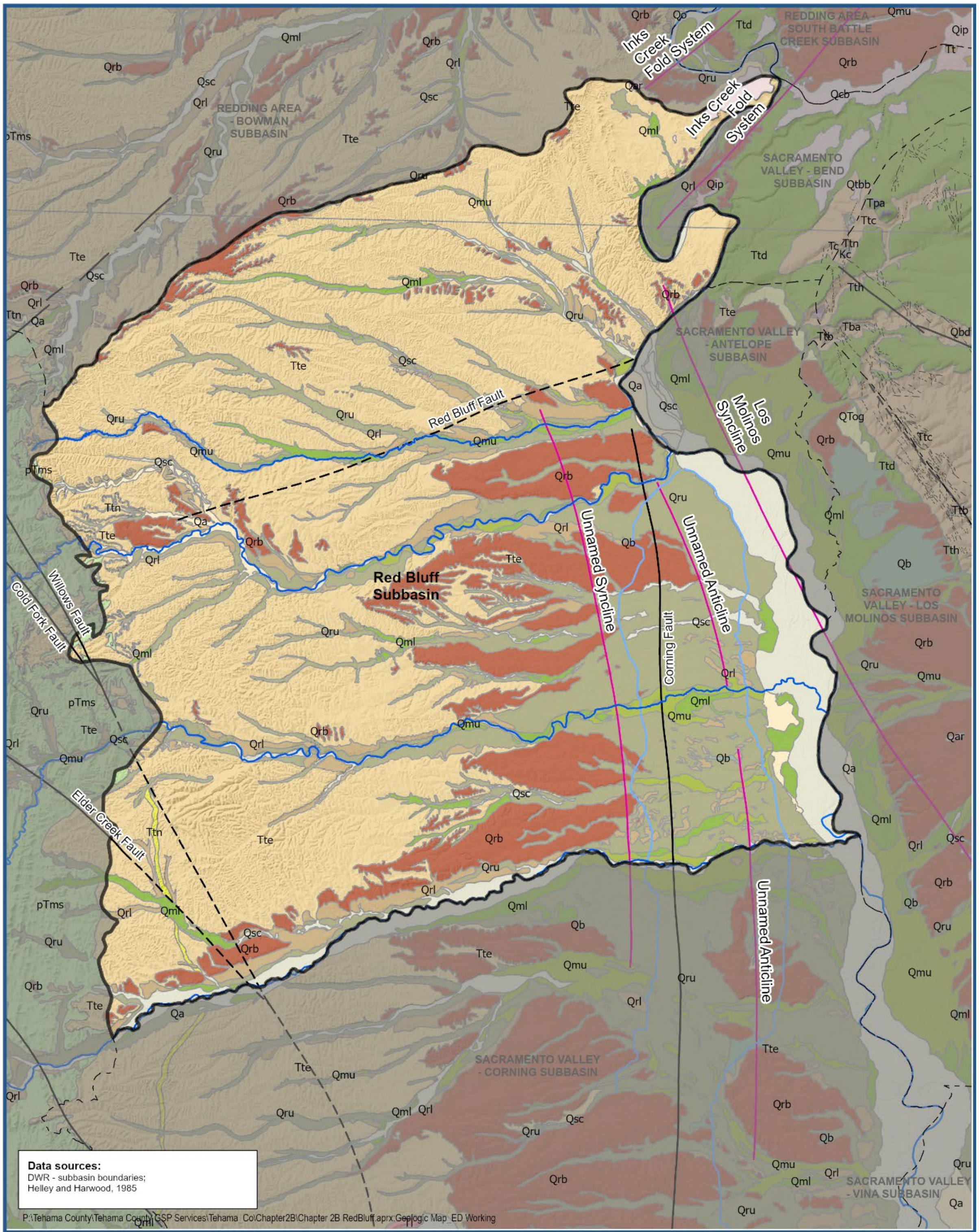
The topography on the east side of the Province is similar to that of the west. It has steeply sloping drainages in the east that shallow into alluvial fans in the vicinity of the Sacramento River. The major difference between the west and the east side is the provenance of the Pliocene sediments. The Pliocene sediments of the east side were sourced from the Cascade Range (DWR, 2014).

2.2.1.3.2 *Geologic Formations*

Geologic formations were mapped by Helley and Harwood (1985) and digitized by DWR (2014). The digitized maps were modified and are presented as **Figure 2-21** and **Figure 2-21B**. Geologic Cross sections were constructed using available data, locations of cross sections are presented as **Figure 2-22** and **Figure 2-22B,** and cross sections are presented as **Figure 2-23** through **Figure 2-26**. In addition, two DWR cross sections (DWR, 2003; DWR, 2008) that include the Subbasin and extend into neighboring subbasins, are presented as **Figure 2-27**, **Figure 2-28,** and **Figure 2-27B and 2-28B Combined**. A summary of stratigraphic relationships and water bearing character is presented as **Table 2-8**.

Great Valley Sequence

The Great Valley sequence (pTms on **Figure 2-21**) is characterized by Late Jurassic and Cretaceous deep-marine turbidites comprised of interbedded marine sandstone, siltstone, and conglomerate (Bailey et al. 1970; Bertucci, 1983; DWR, 2014). The Great Valley sequence can be seen on the east and west edges of the northern Sacramento Valley and underly the younger deposits throughout the Subbasin. The deposits have been observed to be 45,000 feet thick (Ingersoll and Dickinson, 1981). The depth to the top of the Great Valley Sequence can be over 3,500 ft bgs in the Subbasin (**Figure 2-27**). The source material was the ancestral Sierran-Klamath terrane (Ojakangas, 1968; Dickinson and Rich, 1972; Mansfield, 1979; Ingersoll and Dickerson, 1981; DWR, 2014). The eroded sediments were deposited off the continental shelf as turbidity flows and submarine fans. The groundwater contained in the Great Valley sequence is primarily saline due to the marine depositional environment (DWR, 2014).



Data sources:
DWR - subbasin boundaries;
Helley and Harwood, 1985

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Geologic Map with Faults

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-21

Explanation

- —— Folds
- —— Fault, certain
- – – – Fault, approx. located
- – – – Fault, approx. located, queried
- – – – Chico Monocline Lineaments

Lithology

- 🟪 Kc - Chico Formation
- 🟨 QTog - Older Gravel Deposits
- 🟨 Qa - Alluvium
- 🟥 Qar - Rockland Ash Bed
- 🟩 Qb - Basin Deposits, Undivided
- 🟫 Qbd - Olivine Basalt of Devils Half Acre
- ⬜ Qcb - Basalt of Coleman Forbay
- 🟥 Qip - Basalt Flows of Paynes Creek
- 🟩 Qml - Modesto Formation
- 🟩 Qmu - Modesto Formation
- 🟨 Qo - Overbank Deposits
- 🟥 Qrb - Red Bluff Formation
- 🟫 Qrl - Riverbank Forrmation
- 🟩 Qru - Riverbank Formation
- ⬜ Qsc - Stream Channel Deposits
- 🟥 Qtbb - Basalt of Tuscan Buttes
- 🟫 Tba - Basaltic Andesite of Antelope Creek
- 🟨 Tc - Channel Deposits
- 🟥 Tl - Lovejoy Basalt
- ⬛ Tpa - Platy Andesite
- 🟧 Tt - Tuscan Formation
- 🟧 Ttb - Tuscan Unit B
- 🟧 Ttc - Tuscan Unit C
- 🟩 Ttd - Tuscan Unit D
- 🟧 Tte - Tehama Formation
- 🟧 Tth - Tuff of Hogback Road
- 🟨 Ttn - Nomlaki Tuff Member
- 🟩 pTms - Metamorphic, Intrusive, and Sedimentary Rocks
- ⬜ Qsc

Data sources:
DWR - subbasin boundaries;
Helley and Harwood, 1985

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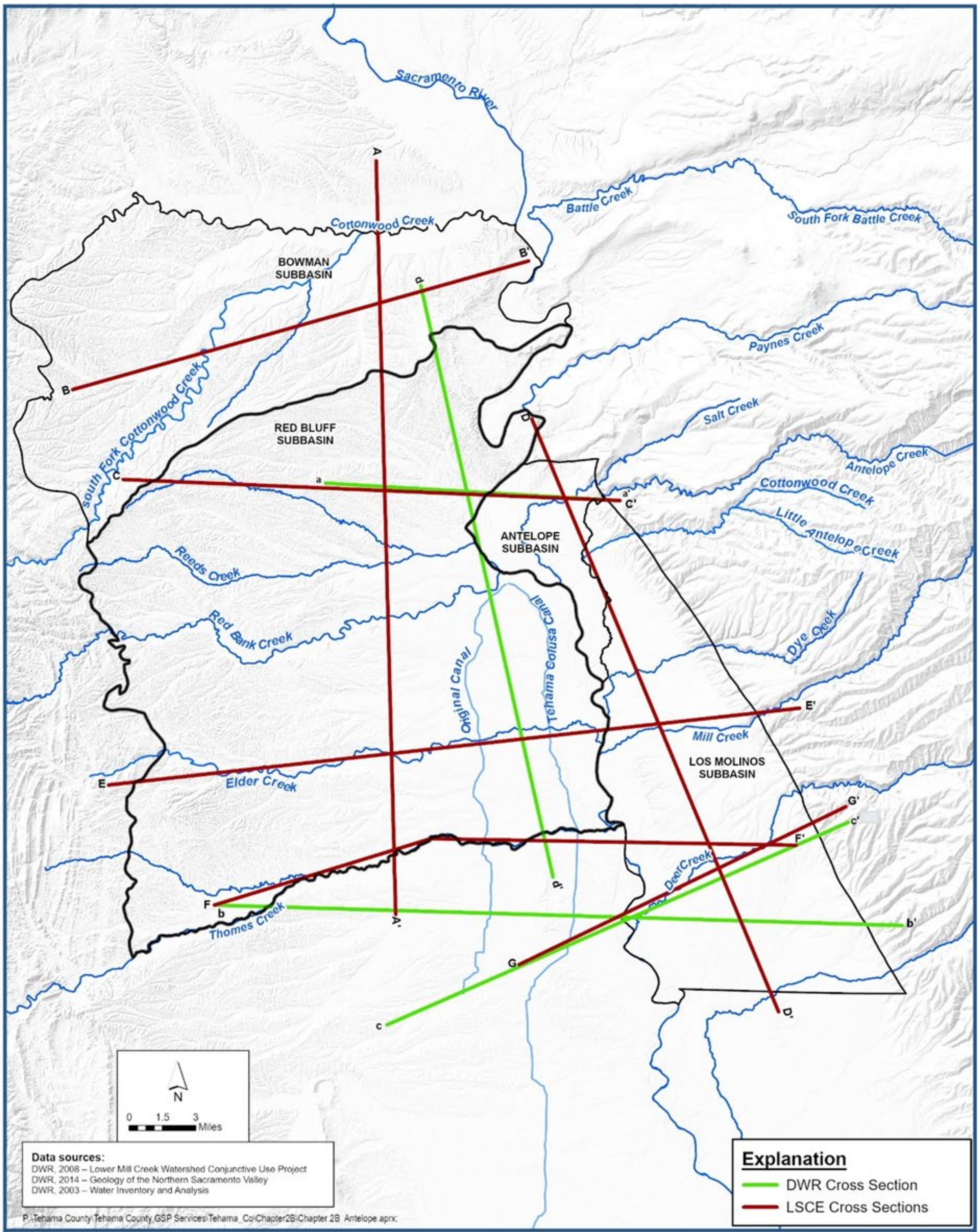
Geologic Map with Faults

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-21B



Data sources:
DWR, 2008 – Lower Mill Creek Watershed Conjunctive Use Project
DWR, 2014 – Geology of the Northern Sacramento Valley
DWR, 2003 – Water Inventory and Analysis

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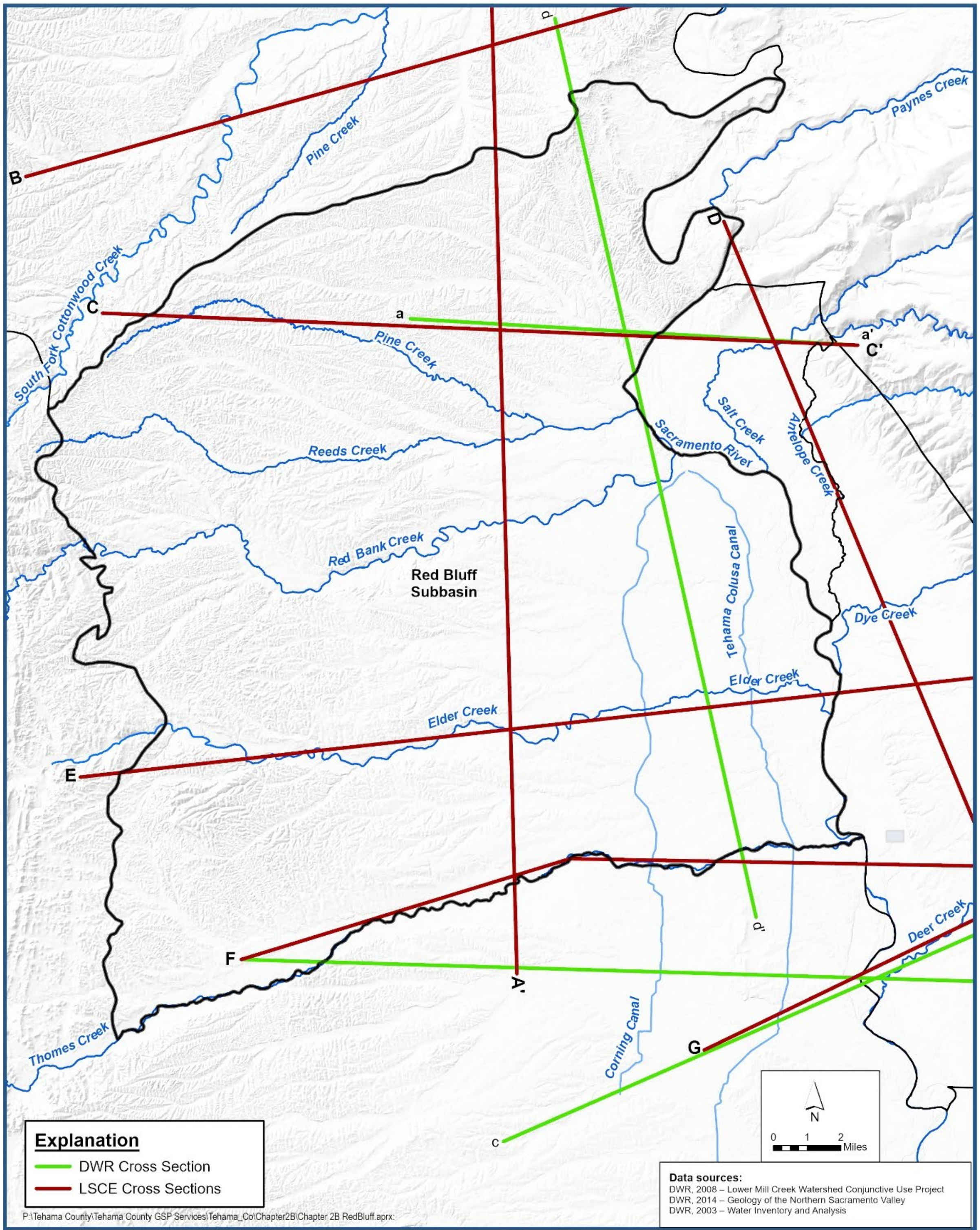
Map of Cross Section Locations

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-22



Data sources:
DWR, 2008 – Lower Mill Creek Watershed Conjunctive Use Project
DWR, 2014 – Geology of the Northern Sacramento Valley
DWR, 2003 – Water Inventory and Analysis

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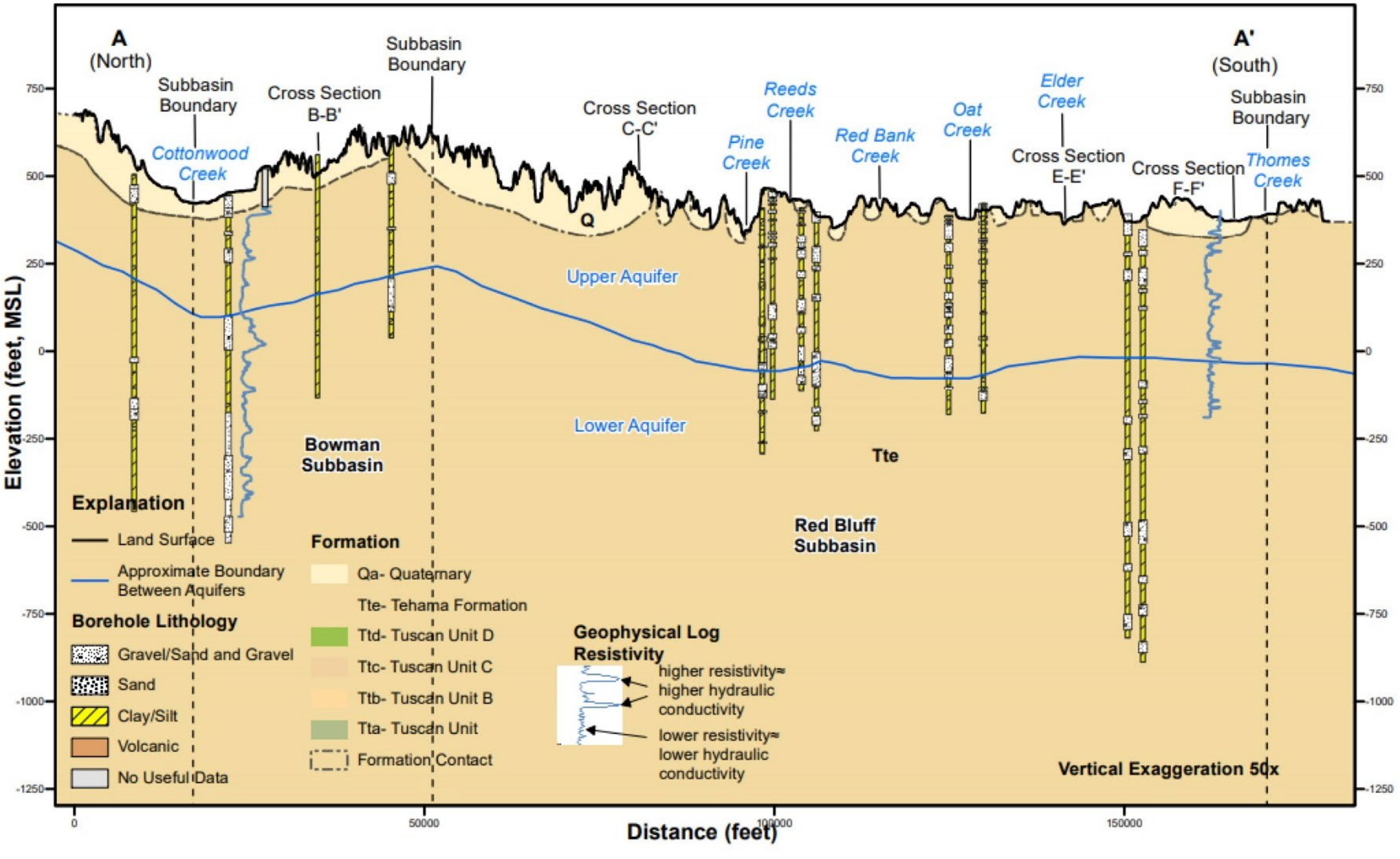
Map of Cross Section Locations

Groundwater Sustainability
Red Bluff Subbasin

Figure 2-22B



P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-11 DWRcrossSectionA_A

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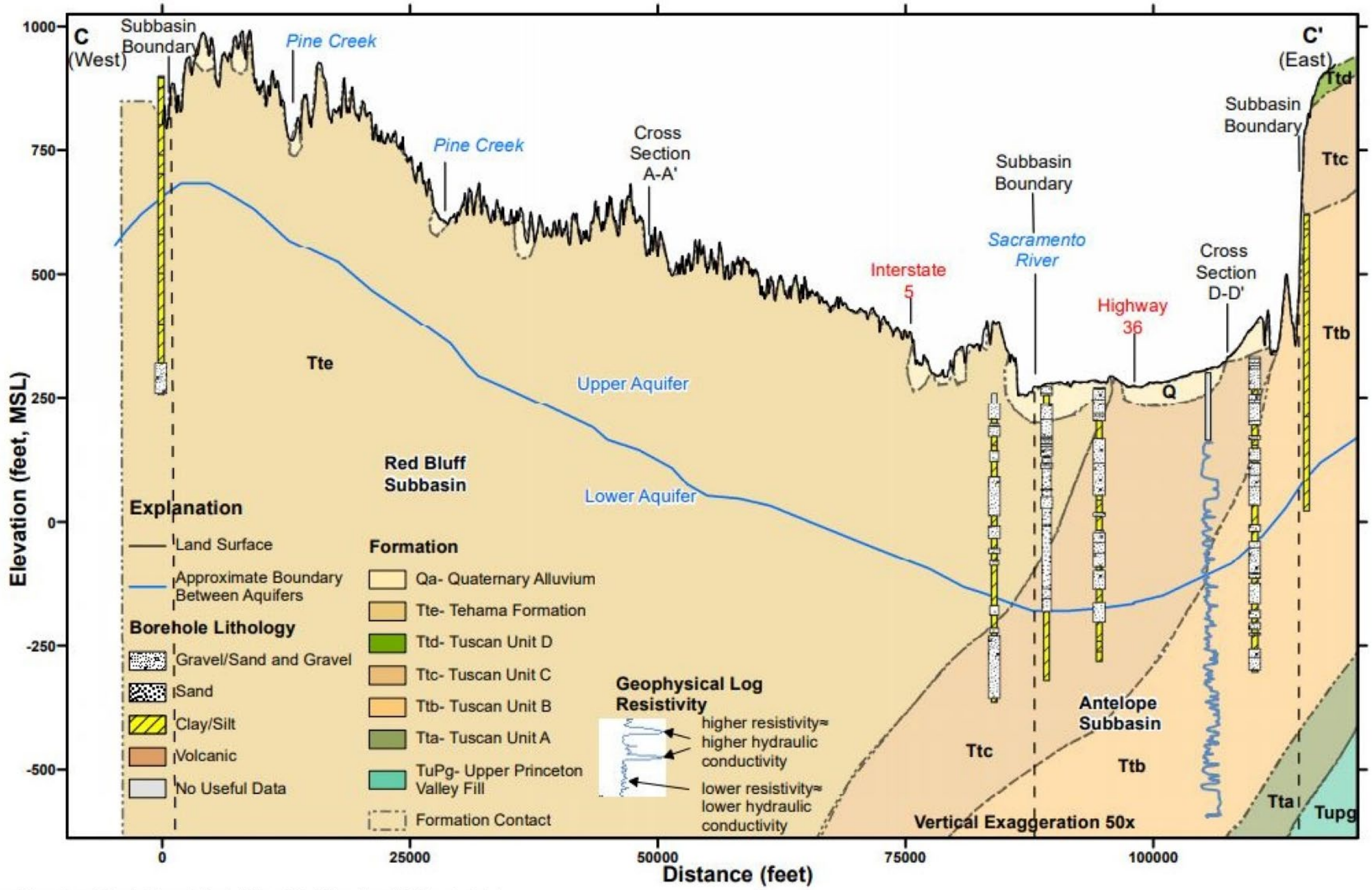
Cross Section A-A'

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-23



P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-11 DWRcrossSectionA_A

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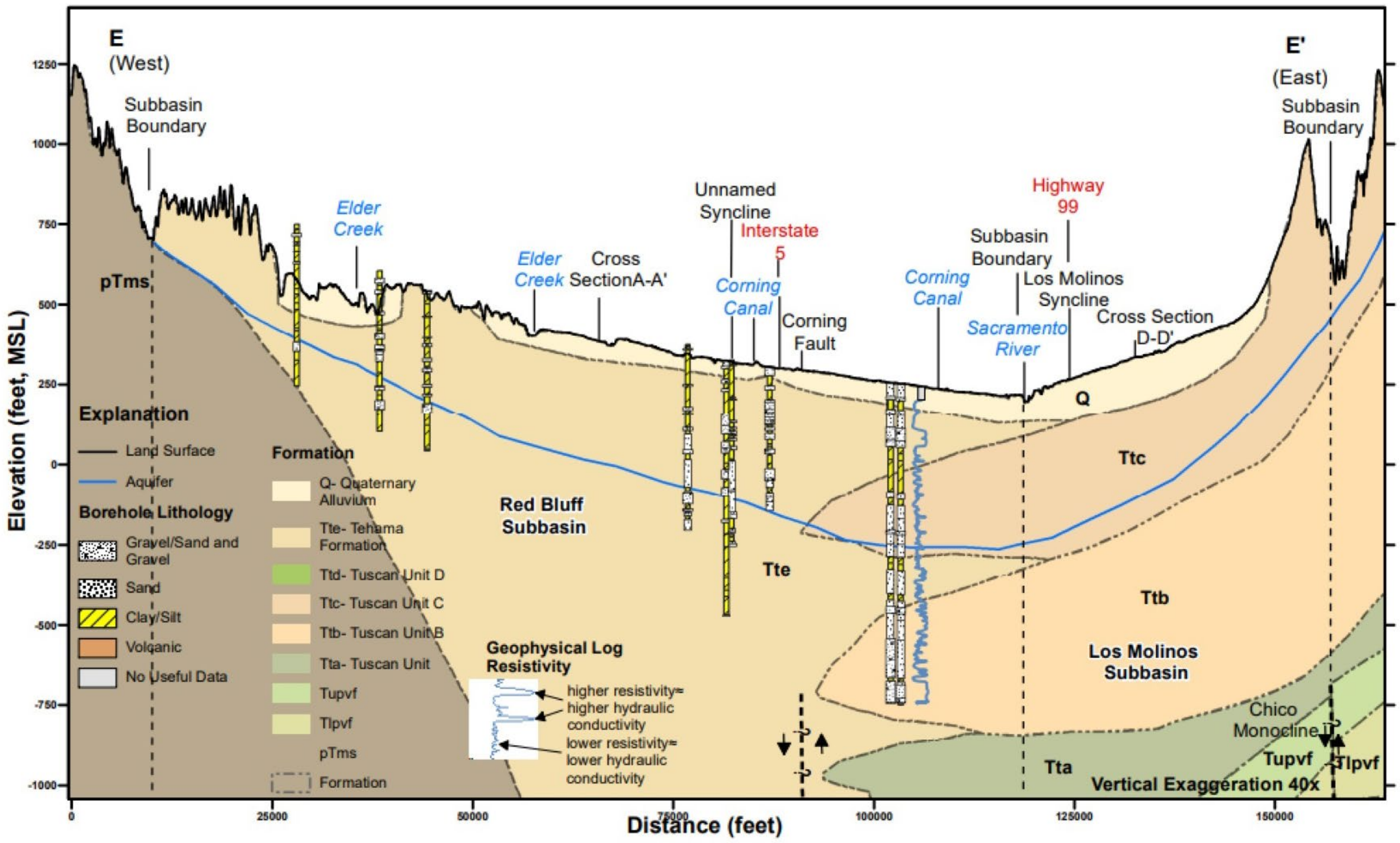
Cross Section C-C'

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-24



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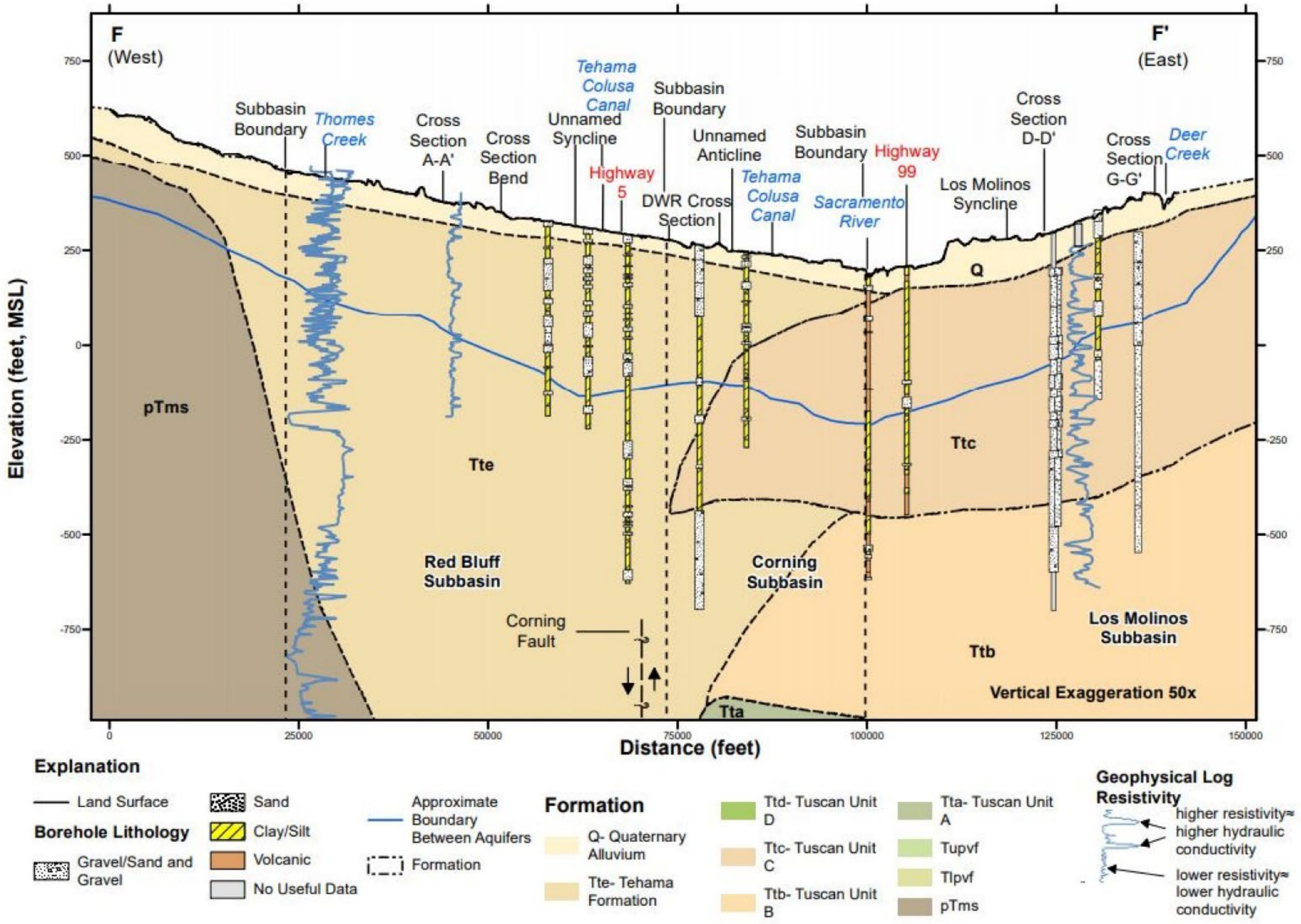
Cross Section E-E'

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-25



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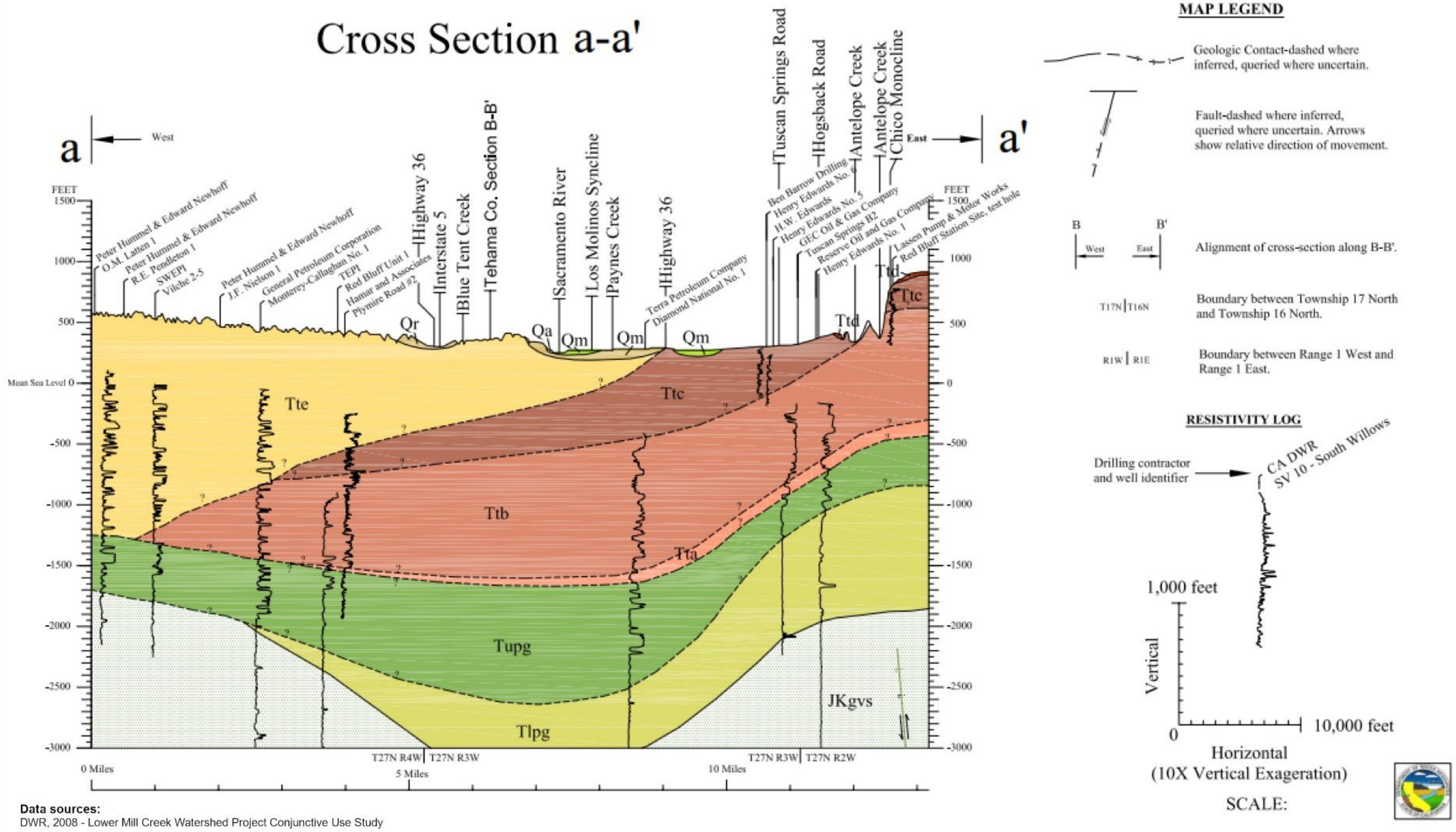
Cross Section F-F'

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-26



Data sources:
DWR, 2008 - Lower Mill Creek Watershed Project Conjunctive Use Study

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-11 DWRcrossSectionA_A

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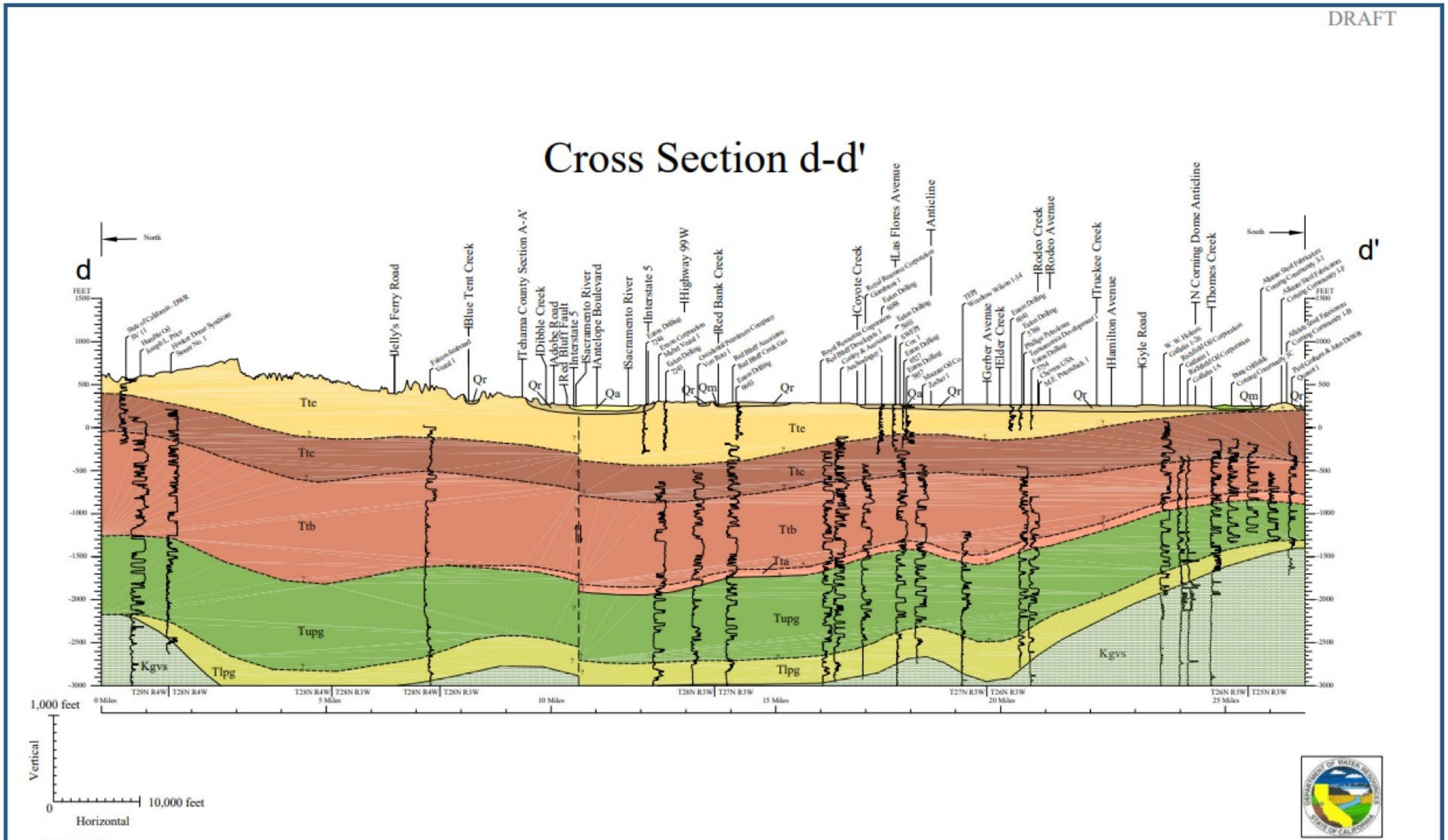
DWR Cross Section a-a'

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-27



Data sources:
DWR, 2003 - Water Inventory and Analysis

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DWR Cross Section d-d'

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-28

DESCRIPTION OF MAP UNITS

Qa	**Alluvium** (Holocene)-Includes surficial alluvium and stream channel deposits of unweathered gravel, sand and silt, maximum thickness 80 ft. *(adapted from Helley & Harwood, 1985)*.
Qb	**Basin Deposits** (Holocene)-Fine-grained silt and clay derived from adjacent mountain ranges, maximum thickness up to 200 ft. *(adapted from Helley & Harwood, 1985)*.
Qm	**Modesto Formation**, undifferentiated (Pleistocene)-Alluvial fan and terrace deposits consisting of unconsolidated weathered and unweathered gravel, sand, silt and clay; maximum thickness approximately 200 ft. *(adapted from Helley & Harwood , 1985).*
Qr	**Riverbank Formation**, undifferentiated (Pleistocene)-Alluvial fan and terrace deposits consisting of unconsolidated to semi-consolidated gravel, sand and silt; maximum thickness approximately 200 ft. *(adapted from Helley & Harwood, 1985).*
Tte	**Tehama Formation** (Plio-Pleistocene)-Includes Red Bluff Formation on west side. Pale green, gray and tan sandstone and siltstone with lenses of pebble and cobble conglomerate; maximum thickness 2,000 ft. *(adapted from Helley & Harwood, 1985).*
Ttd	**Tuscan Unit D** (Plio-Pleistocene)-Fragmental flow deposits characterized by monolithic masses containing gray hornblende and basaltic andesites and black pumice, maximum thickness 160 ft. *(adapted from Helley & Harwood, 1985).*
Ttc	**Tuscan Unit C** (Plio-Pleistocene)-Includes Red Bluff Formation on east side. Volcanic lahars with some interbedded volcanic conglomerate and sandstone, and reworked sediments; maximum thickness 600 ft. *(adapted from Helley & Harwood, 1985, DWR Bulletin 118-7, 2001, draft report).*
Ttb	**Tuscan Unit B** (Pliocene)-Layered, interbedded lahars, volcanic conglomerate, volcanic sandstone and siltstone; maximum thickness 600 ft. *(adapted from Helley and Harwood, 1985; DWR Bulletin 118-7, 2001, draft report).*
Tta	**Tuscan Unit A** (Pliocene)-Interbedded lahars, volcanic conglomerate, volcanic sandstone, and siltstone containing metamorphic rock fragments; maximum thickness 400 ft. *(adapted from Helley & Harwood, 1985; DWR Bulletin 118-7 (in progress), 2001).*
Tl	**Lovejoy Basalt** (Miocene)-Black, dense, hard microcrystalline basalt; maximum thickness 65 ft. *(adapted from Helley & Harwood, 1985).*
Tupg	**Upper Princeton Valley Fill** (Late Oligocene to Early Miocene)-Non-marine sediments composed of sandstone with interbeds of mudstone and occasional conglomerate and conglomerate sandstone; maximum thickness 1,400 ft. *(adapted from Redwine, 1972)*.
Ti	**Ione Formation** (Eocene)-Marine to non-marine deltaic sediments, light colored, commonly white conglomerate, sandstone and siltstone, which is soft and easily eroded; max. thickness 650 ft. *(adapted from DWR Bulletin 118-6, 1978; Creely, 1965).*
Tlpg	**Lower Princeton Submarine Valley Fill** (Eocene)-includes Capay Formation. Marine sandstone, conglomerate and interbedded silty shale, maximum thickness 2,400 ft. (*adapted from Redwine, 1972*)
JKgvs	**Great Valley Sequence** (Late Jurassic to Upper Cretaceous)-Marine clastic sedimentary rock consisting of siltstone, shale, sandstone and conglomerate; maximum thickness 15,000 ft.
JKf	**Franciscan Formation** (Jurassic to Cretaceous)-Dominated by greenish-grey greywackes with lesser amounts of dark shale, limestone and radiolarian chert, maximum thickness up to 25,000 ft. *(adapted from strand, 1962 and Norris & Webb, 1990).*

Data sources:
DWR, 2008 - Lower Mill Creek Watershed Project Conjunctive Use Study

P:\Tehama County\Tehama County GSP Services\Tehama Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-11 DWRcrossSectionA A

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Description of Map Units for
DWR Cross Section a-a' and d-d'

Antelope Subbasin Groundwater Sustainability Plan
Tehama County, California

Figure 2-27B and 28 B Combined

Table 2-8. Stratigraphic Summary with Hydrogeologic Properties

AGE		GEOLOGIC UNIT	LITHOLOGY DESCRIPTION	APPROXIMATE THICKNESS INTERPRETED IN SUBBASIN	AQUIFER UNIT	HYDROGEOLOGIC CHARACTER
PERIOD	EPOCH					
Quaternary	Holocene	Surficial Alluvium	Unweathered gravel, sand, and silt (DWR, 2014)	25-50 ft (DWR, 2008)	Upper	Moderately permeable but not a significant source of groundwater in the Subbasin due to limited extent (DWR, 2004)
	Pleistocene & Pliocene	Modesto Formation	Alluvial fan and terrace deposits consisting of unconsolidated to semi-consolidated gravel, sand, silt, and clay (DWR, 2014)	50 ft (DWR, 2004; DWR 2008)	Upper	Moderately to highly permeable. Limited source of groundwater due to limited thickness and extent in the Subbasin (DWR, 2004).
		Riverbank Formation	Alluvial fan and terrace deposits consisting of unconsolidated to semi-consolidated gravel, sand, and silt (DWR, 2014)	100 ft (DWR, 2008)	Upper	Moderately to highly permeable. Limited Source of groundwater due to limited thickness and extent in Subbasin (DWR, 2004)
		Red Bluff Formation	Thin veneer of highly weathered, bright red gravels (DWR, 2014)		Upper	Water is available only where local perched conditions exist. Provides limited water due to limited extent and thickness in the Subbasin (DWR, 2004).
Neogene		Tehama Formation	Pale green, gray, and tan sandstone, and siltstone with lenses of pebble and cobble conglomerate (DWR, 2014)	750 ft (DWR, 2008)	Upper/Lower	Low to moderate permeability with localized areas of high permeability (DWR, 2003). Well yields can range from 475 gpm to 950 gpm (DWR, 2003)
		Tuscan Formation	Interbedded lahars, volcanic conglomerate, volcanic sandstone, siltstone, and pumiceous tuff (DWR, 2014)	1500 ft (DWR, 2004)	Upper/Lower	Low to high permeability and is the main water-bearing formation in the Subbasin (DWR, 2004)
Paleogene	Miocene	Upper Princeton Valley Fill	Non-marine sediments composed of sandstone with interbeds of mudstone, occasional conglomerate, and conglomerate sandstone (DWR, 2014)	1100 ft (DWR, 2008)	Brackish	
	Eocene	Lower Princeton Submarine Fill	Marine Sandstone, conglomerate, and interbedded silty shale (DWR, 2014)	350 ft (DWR 2008)	Saline	
Cretaceous		Great Valley Sequence	Marine clastic sedimentary rock consisting of siltstone, shale, sandstone, and conglomerate (DWR, 2014)	1100 ft (DWR, 2008)	Saline	

Lower Princeton Submarine Valley Fill

The lower Princeton Submarine Valley fill is composed of Eocene aged interbedded marine shale and sandstones (DWR, 2014; Redwine, 1972). The formation is not visible at the surface but has been observed to be approximately 1,500 ft deep in the Sacramento Valley based on the interpretation of lithologic logs from oil and gas wells (Redwine, 1972). The extent of the Lower Princeton Submarine Valley Fill within the Subbasin is limited to the west and thins to the east; eventually pinching out near the Chico Monocline (**Figure 2-27;** DWR, 2014). The formation was deposited under marine conditions therefore formation groundwater is saline (Redwine, 1972). The formation is unconformably overlain by the upper Princeton Valley Fill in the Subbasin (DWR, 2014).

Upper Princeton Valley Fill

The upper Princeton Valley Fill is composed of Miocene-age sandstone with frequent interbeds of pelite (mudstone) and occasional conglomerate (Redwine, 1972). The formation is not observed on the surface but extends throughout the northern Sacramento Valley from Red Bluff to the Sutter Buttes with maximum thicknesses of 1,400 ft (DWR, 2014; Redwine 1972). Similar to the lower Princeton Submarine Valley Fill, the upper Princeton Valley Fill is thickest in the west and thins to the east, eventually pinching out near the Chico Monocline (**Figure 2-27;** DWR, 2014). The formation sandstone contains interstitial brackish water and occasionally fresh water (DWR, 2014; Redwine, 1972). The formation sediments were deposited by a meandering stream, following a similar trajectory to the modern Sacramento River (Redwine 1972).

Tuscan Formation

The late Pliocene Tuscan Formation is comprised of interbedded lahars, volcanic conglomerate, volcanic sandstone, siltstone, and pumiceous-tuff sourced from ancestral Cascade Volcanoes (DWR, 2014; Helley and Harwood, 1985; Lydon 1968). The formation can be seen in outcrops along the eastern side of the Sacramento Valley groundwater basin from the Redding area in the north to near Oroville in the south (DWR, 2014). In the subsurface, the volcanic sourced deposits of the Tuscan interfinger with the metamorphic sourced sediments of the Tehama Formation in the vicinity of the Sacramento River, forming the western extent of the Tuscan Formation (Garrison, 1962; Lydon, 1968). The westward extent of this interfingering can be west of the Sacramento River (DWR, 2014). Beneath the valley sediments, the Tuscan Formation is relatively flat lying, dipping 2 to 3 degrees on the western side of the valley (Olmstead and Davis 1962). Thicknesses of the formation ranges from 300 ft at the westward extent to 1,700 ft in the east (Lydon, 1968). In the Subbasin, the thickness can be 1,500 ft.

The Tuscan Formation was deposited by volcanic mudflows and stream channels carrying debris from the ancestral Cascade volcanic centers (Lydon, 1968). These volcanic mudflows and stream channels flowed westward and fanned out in the valley resulting in variation of the formation thickness (DWR, 2014). The volcanic mudflow deposits were cut over time by streams flowing from the east (DWR, 2014). Lastly, the stream channels were subsequently filled by reworked volcanic sand and gravel that now contain fresh groundwater in pore spaces (DWR, 2014; Lydon, 1968).

The depositional history resulted in a formation that is heterogeneous and is divided into four units (oldest to youngest: Unit A, Unit B, Unit C, and Unit D). Tuscan Unit A is composed of metamorphic clasts in interbedded lahars, volcanic conglomerate, volcanic sandstone and siltstone, and fractured tuff breccia (DWR, 2004). Groundwater in Unit A is associated with sandstone and conglomerate layers as well as the fractured tuff breccia (Tehama County FCWCD, 2003). Unit B (Ttb on **Figure 2-21**) similarly yields water readily. Unit B is composed of lahars, tuffaceous sandstone, and conglomerate (DWR, 2004). Groundwater in Unit B is contained in the reworked sand and gravel layers and is the main source for Tuscan Formation groundwater in Tehama County (DWR, 2003). Unit C (Ttc on **Figure 2-21**) mainly consists of low permeability volcanic mudflow deposits that act as confining layers for groundwater contained in Unit B (DWR, 2004). Unit D (Ttd on **Figure 2-21**) is characterized by masses of andesite, pumice, and fragments of black obsidian in a mudstone matrix (Gonzalez, 2014). In the Subbasin, the Tuscan formation's extent is limited to the subsurface in the vicinity of the Sacramento River.

Tehama Formation

The Tehama Formation (Tte on **Figure 2-21**) is composed of Pliocene-age noncontiguous layers of sandstone and siltstone, with lenses of pebble and cobble conglomerate (Blake et al., 1999; Helley and Harwood, 1985). The sandstone and siltstone are predominately composed of metamorphic clasts with some volcanic clasts (Blake et al., 1999; Helley and Harwood, 1985). The formation is present from the foothills of the Coast Ranges in the west to the vicinity of the Sacramento River in the east where the Tehama Formation intermixes with the Tuscan Formation in the Subsurface (DWR, 2014). The northern-most outcrops of the Tehama Formation can be seen near Redding and stretch as far south as Vacaville (DWR, 2014). The Tehama Formation outcrops in the majority of the Subbasin (**Figure 2-21**). Thickness of the Tehama Formation can be up to 1,700 ft in the Subbasin (**Figure 2-27**).

The Tehama Formation was deposited by streams flowing eastward off the Coast Ranges and, to a lesser extent, south from the Klamath Mountains (DWR, 2014). The streams flowed and deposited sediment under floodplain conditions (DWR, 2014). This depositional environment resulted in non-continuous series of poorly sorted sediments cut by non-lenticular channels of coarser sediments (DWR, 2014; Russell, 1931). The Tehama Formation's maximum thickness over its entire mapped extent is 2,000 ft (Olmstead and Davis, 1961).

Saturated groundwater conditions exist in the gravel and sand layers of the Tehama Formation (DWR, 2014; Olmstead and Davis, 1961). The base to fresh water is widely reported to be at the base of the Tehama Formation or sometimes within the Tehama Formation (DWR, 2014; Olmstead and Davis, 1961; Springfield and Hightower, 2012). The Tehama Formation is overlain and cut by the younger Modesto, Red Bluff, and Riverbank Formations (DWR, 2014).

Red Bluff

The Red Bluff Formation (Qrb on **Figure 2-21**) is composed of sandy gravels on 0.45 to 1.08 mega-annum (Ma) pediment surfaces. The Red Bluff Formation weathers to a bright-red color (Helley and Harwood, 1985; Helley and Jaworowski, 1985). The formation is discontinuously exposed in the northern Sacramento Valley overlying the Tehama and Tuscan Formations from the Redding area to the vicinity of Cache Creek (DWR, 2014; Russell, 1931; Olmstead and Davis, 1961; Helley and Harwood, 1985). Studies propose that the Red Bluff Formation is the result of alluvial fans depositing reworked metamorphic (Klamath origin) and volcanic (Cascade origin) sediments upon a pediment (Gonzalez, 2014; Harwood et al., 1981; Helley and Jaworowski, 1985). The pediment deposition has resulted in sparce perched aquifer conditions in the 3 ft to 33 ft thick formation (DWR, 2014; Olmstead and Davis, 1961). In the Subbasin, the Red Bluff Formation's extent is mainly limited to the south and east (**Figure 2-21**).

Riverbank

The Riverbank Formation is composed predominately of gravel, sand, and silt deposits that were deposited unconformably on the Tehama, Tuscan, and Red Bluff Formations (DWR, 2014; Marchand and Allwardt, 1981). The formation extends from Redding to Merced discontinuously (Marchand and Allwardt, 1981). It is generally found along higher-elevation terraces beneath the pediment surface of the western tributary systems including the Thomes, Elder, and Oat Creeks (Tehama County FCWCD, 2012). The thickness varies from 1 ft to over 200 ft (Helley and Harwood, 1985). In the Subbasin the Riverbank Formation is predominately in the east and on the banks of the creeks and streams that feed the Sacramento River (**Figure 2-21**).

It is divided into upper and lower members that are lithologically similar but differ in stratigraphic position and degree of soil development (Helley and Harwood, 1985; Blake et al., 1999). Both members contain gravel, sand, silt, and clay derived from the surrounding mountain ranges (Klamath, Coast Ranges, and Cascades). The upper member (Qru on **Figure 2-21**) occupies the lower terrace positions while the lower member (Qrl, on **Figure 2-21**) occupies the higher positions (Helley and Harwood, 1985). The upper member consists of semi-consolidated sediments while the lower consists of unconsolidated but compact alluvium (Helley and Harwood, 1985). Both members display soil development with B horizons and local hardpans however, the soils are more developed in the lower member (Blake et al., 1999). The Riverbank Formation yields limited water due to its aerial extent and limited thickness (1 to 200 feet) (Helley and Harwood, 1985). The thickness in the Subbasin has been interpreted to be up to 100 ft based on cross sections constructed by DWR (2003), (**Figure 2-28**). The Formation is overlain by the younger Modesto Formation, basin deposits, or surficial alluvium (DWR, 2014).

Modesto

The Modesto Formation is composed of 0.14- to 0.42-million-year-old stream channel deposits that were laid down in a manner similar to the Riverbank Formation (Marchand and Allwardt 1981). It can be seen on the ground surface from Redding to the San Joaquin Valley (DWR, 2014). The formation ranges in thickness from less than 10 ft to 200 ft (Helley and Harwood, 1985). The Modesto Formation is present at the surface along streams and creeks within the Subbasin and at thicknesses up to 50 ft (**Figure 2-21; Figure 2-28)**. Groundwater occurs in the formation under unconfined conditions (DWR, 2014).

The Modesto Formation consists of a lower member (Qml on **Figure 2-21**) occupying higher topographic areas and an upper member (Qmu on **Figure 2-21**) visible at lower topographic areas (Helley and Harwood, 1985). Both the lower and the upper members are composed of unconsolidated gravel, sand, silt, and clay. The main difference between the two is that the lower member is slightly more weathered (Helley and Harwood, 1985). The Modesto Formation sedimentary deposits often border currently active stream channels and were likely deposited by the same streams they border (Helley and Harwood, 1985).

Surficial Alluvium

The surficial alluvium (Qsc, Qo, and QTog on **Figure 2-21**) is the youngest of the geologic units in the Subbasin. The alluvium consists of gravel, sand, and silt sourced from the Klamath, Coast Range, Cascade, and Sierra Nevada Ranges that was transported and deposited by modern streams and rivers (Helley and Harwood, 1985). It is present throughout the northern Sacramento Valley forming natural levees and along current rivers and streams (DWR, 2014). The maximum thickness of the surficial alluvium has been observed up to 30 feet (Helley and Harwood, 1985). Based on cross sections from DWR, (2008), the maximum thickness in the Subbasin is interpreted to be up to 25 ft (**Figure 2-27**). It is not a major source of water due to its limited thickness and extent (DWR, 2014).

2.2.1.3.3 *Geologic Structures*

Geologic structures are a result of tectonic forces leading to deformation in the geologic material. The deformation can control direction and rate of groundwater flow. This section is a description of major geologic structures in the area. The Corning Fault, Red Bluff Fault, Willows Fault, Elder Creek Fault, and the Red Bluff Arch are present in the Subbasin, and the other structures are discussed for regional context (**Figure 2-21**).

Los Molinos Syncline

The Los Molinos Syncline is a 1.0- to 2.5-million-year-old north northwest-trending syncline that locally controls the Sacramento River (Blake et al., 1999). The syncline generally follows the topographically low elevations and lies between the Chico Monocline and the Corning Fault. The Los Molinos Syncline may influence the direction of groundwater flow.

Elder Creek Fault

The Elder Creek Fault is a northwest-trending reverse fault that lies south of the Willows fault (Helley and Harwood, 1985). The fault converges with the Stony Creek Fault at the Coast Range Ophiolite (DWR, 2014). Estimated movement along the fault is as recent as 3.4 million years ago (DWR, 2014).

Red Bluff Fault

The Red Bluff Fault is a 15-mile-long south-dipping normal fault that has surface expressions northeast of the City of Red Bluff (DWR, 2014). Strike is generally 60 degrees east and has been observed to have late Cenozoic displacement as it affects the base of the Pliocene rocks, offsetting them about 500 feet (Blake et al., 1999).

Willows Fault

The Willows Fault is a north-trending high-angle reverse fault with no surface expression (DWR, 2014). The main evidence for the fault is subsurface surveys in previous studies (Redwine, 1972; Harwood and Helley, 1987). The fault has been observed at a dip of over 74 degrees east with greater degrees of offset on older rocks (DWR, 2014).

Corning Fault

The Corning Fault is a north-trending reverse fault with no surface expression. It branches off the Willows Fault south of Tehama County. The main evidence for the fault is subsurface surveys performed by Harwood and Helley (1987). The fault has been observed at a dip of 74 degrees east with greater degrees of offset on older rocks (DWR, 2014; Helley and Harwood, 1985). The fault generally follows the trend of Interstate 5 until its terminus at the Red Bluff Fault and Chico Monocline north of Red Bluff (DWR, 2014).

Inks Creek Fold System

The Inks Creek Fold System is a series of northeast-trending folds that occur to the north of the Subbasin (DWR, 2004). The fold system is composed of a dome on the west side of the Sacramento River, and a southwest-plunging anticline and syncline that locally control the major bends in the Sacramento River (Harwood and Helley, 1987). The system is a hydrologic drainage divide that separates the Red Bluff Arch in the west from the Chico Monocline in the east (DWR, 2014). The system is a part of the Red Bluff Arch, a hydrologic drainage divide that separates the Redding Area groundwater basin and the Sacramento Valley groundwater basin (DWR, 2014).

Chico Monocline

The Chico Monocline is a flexure feature in the east side of the Subbasin that roughly follows the boundary of the valley. It is a northwest-trending feature that deforms the Tuscan Formation in the east, causing the beds to increase from a dip of 2 to 5 degrees in the middle of the valley to 25 degrees in the east (DWR, 2014).

Red Bluff Arch

The Red Bluff Arch is an area of regional compression that encompasses multiple tectonic features in the area (DWR, 2014). It is a northeast-trending feature that is made up of a collection of smaller geologic structures. Major structures that encompass the Red Bluff Arch are the Red Bluff fault, the Inks Creek Fold System; and the Seven Mile, Tuscan Springs, Salt Creek, and Hooker Creek domes (DWR, 2014). The collection of features regionally creates a barrier to groundwater flow separating the Sacramento Valley Groundwater Basin from the Redding Area groundwater basin (DWR, 2014).

2.2.1.4 Soil Characteristics

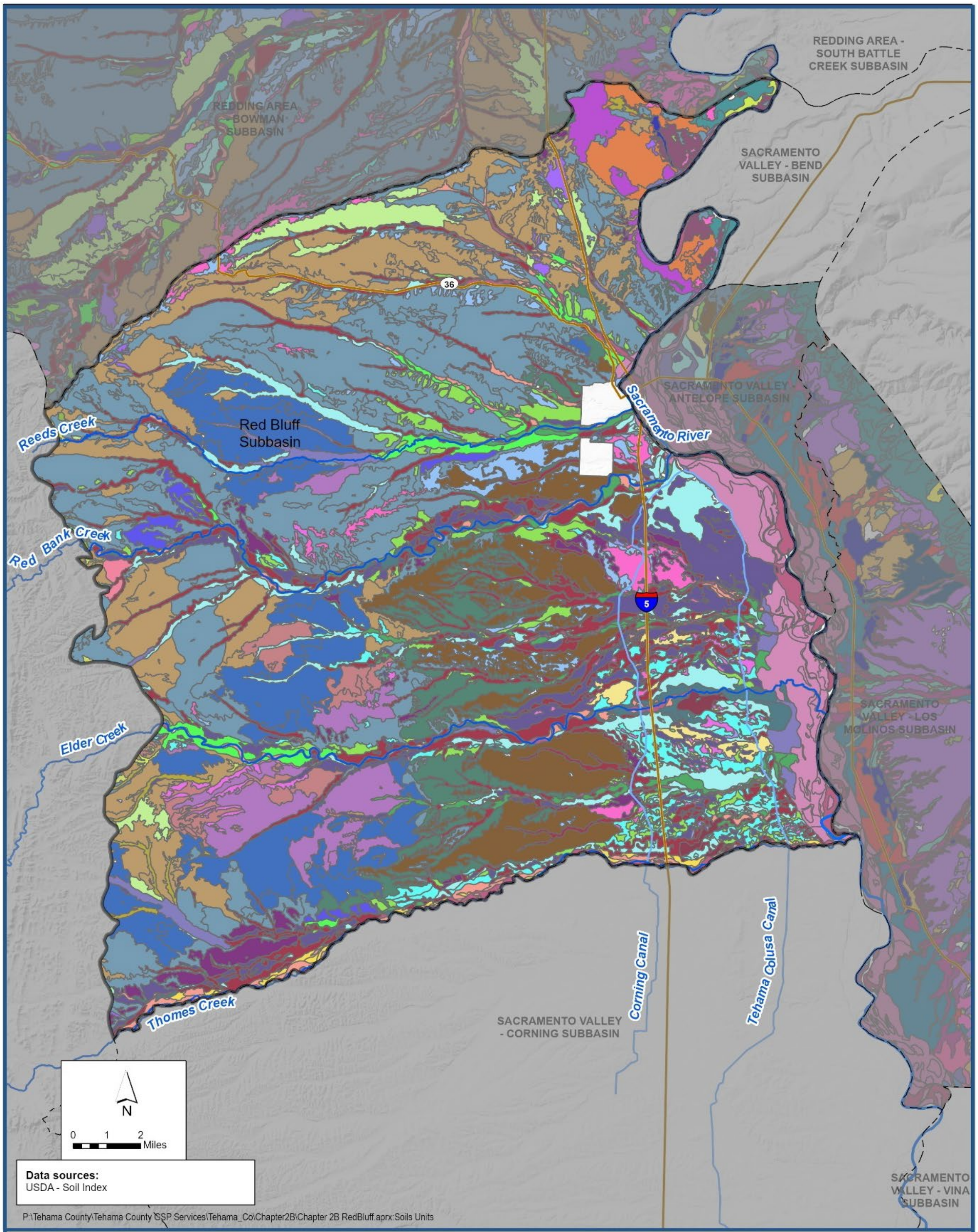
The characteristics of a soil influence the movement of surface water (e.g., water sourced from rainfall, stream flow, or anthropogenic activities such as irrigation). Coarse, porous soils promote infiltration of surface water, while relatively impermeable soils promote surface runoff. Chemical properties of a soil (e.g., salinity and pH) can alter the chemistry of water that percolates through it. Therefore, understanding of the spatial variability of soil characteristics is important to conceptualize the hydrogeologic system of the Subbasin. Surficial soil property data were obtained from the US Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS). NRCS soil surveys use soil "map units" to delineate geographical areas that have soils with similar characteristics. A "soil series" is a unique collection of map units. It represents a three-dimensional soil body that is composed of soils that have a relatively narrow range of properties. Detailed descriptions of soil map units and series are available in USDA Soil Survey Manual, Handbook No. 18 (Soil Science Division Staff, 2017).

Soils – Type

Surficial soil types that are present in the Red Bluff Subbasin belong to 131 unique map units. These soil types are grouped into 36 soil series and shown in **Figure 2-29** and **Figure 2-29B**. The most dominant soil series in the Subbasin is the Newville series. The Newville series is abundant in uplands in the northern area (north of the Red Bank Creek) and along the western boundary covering about 32% of the Subbasin. These soils are moderately deep, well drained, and formed from weathering of calcareous shale and sandstone. The Corning series soils are abundant in foothills south of the Red Bank Creek. These soils are very deep, well or moderately well drained, and composed of gravelly alluvium derived from mixed rock sources. The Arbuckle series soils occur throughout the Subbasin in narrow terraces. These soils are very deep, well drained and formed in alluvium from sedimentary and metamorphic rocks. Most low terraces in the Subbasin are covered by Hillgate, Tehama, and Perkins series soils. These soils collectively account for about 14% of the Subbasin area. All other soil series that exist in the Subbasin collectively cover about 19% of the land surface, and the contribution of each series varies from less than 1% to 2%.

Soil Texture

Soil textural classes are defined based on relative percentages of sand, silt, and clay (Soil Science Division Staff, 2017). Spatial distribution of soil textural classes in the Red Bluff Subbasin are shown in **Figure 2-30**. Loam (a soil composed mostly of sand and silt with a small amount of clay), and different variations of loam are the dominant surficial soil textures in the Subbasin. Gravelly loam soil (loam soil with abundant gravel) covers about 60% of the surface area and exists throughout the Subbasin. Silty clay loam (loam soil with abundant silt and clay) predominantly exists in the valley floor along the southeastern boundary covering about 15% of the Subbasin. Loam covers about 10% of the surface and predominantly occurs in highlands in the western areas. All other soil textures make up 5% or less of the land cover each.



Data sources:
USDA - Soil Index

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Soils - Type by Soil Series

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-29

Explanation

Soils Type

Soil Series

- ■ Alltamont
- ■ Anita
- ■ Anita-Galt
- ■ Anita-Keefers
- ■ Arbuckle
- ■ Arbuckle-Tehama
- ■ Berrendos
- ■ Bosquejo
- ■ Charger
- ■ Clear Lake
- ■ Colluvial Land
- ■ Columbia
- ■ Corning
- ■ Corning-Newville
- ■ Corning-Redding
- ■ Cortina
- ■ Dibble
- ■ Dibble-Gullied
- ■ Doemill-Jokerst
- ■ Farwell
- ■ Gianella
- ■ Hillgate
- ■ Inks
- ■ Jokerst-Doemill-Typic
- ■ Keefers
- ■ Kimball
- ■ Langlier
- ■ Lodo-Millsholm
- ■ Los Robles
- ■ Maywood
- ■ Millrace
- ■ Millsap
- ■ Millsholm
- ■ Millsholm-Millsap
- ■ Moda
- ■ Molinos
- □ No Available Data
- ■ Munjar-Tuscan
- ■ Myers
- ■ Nacimiento
- ■ Nacimiento-Altamont
- ■ Nacimiento-Newville
- ■ Newville
- ■ Newville-Dibble
- ■ Newville-Laniger
- ■ Orland
- ■ Perkins
- ■ Perkins-Kimball
- ■ Peters
- ■ Peters-Newville
- ■ Pleasanton
- ■ Red Bluff
- ■ Redding
- ■ Redding-Newville
- ■ Redsluff
- ■ Redtough-Fallager-Anita
- ■ Redtough-Redswale
- ■ Reiff
- ■ Riverwash
- ■ Sehorn
- ■ Sehorn-Millsholm
- ■ Supan
- ■ Tailings and Placer Diggings
- ■ Tehama
- ■ Toomes
- ■ Toomes-Supan
- ■ Tuscan
- ■ Tuscan-Igo-Anita
- ■ Vina
- ■ Wafap-Hamslough
- ■ Wyo
- ■ Yolo
- ■ Zamora
- ⬚ Other Groundwater Subbasins

Data sources:
USDA - Soil Index

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Soils Units

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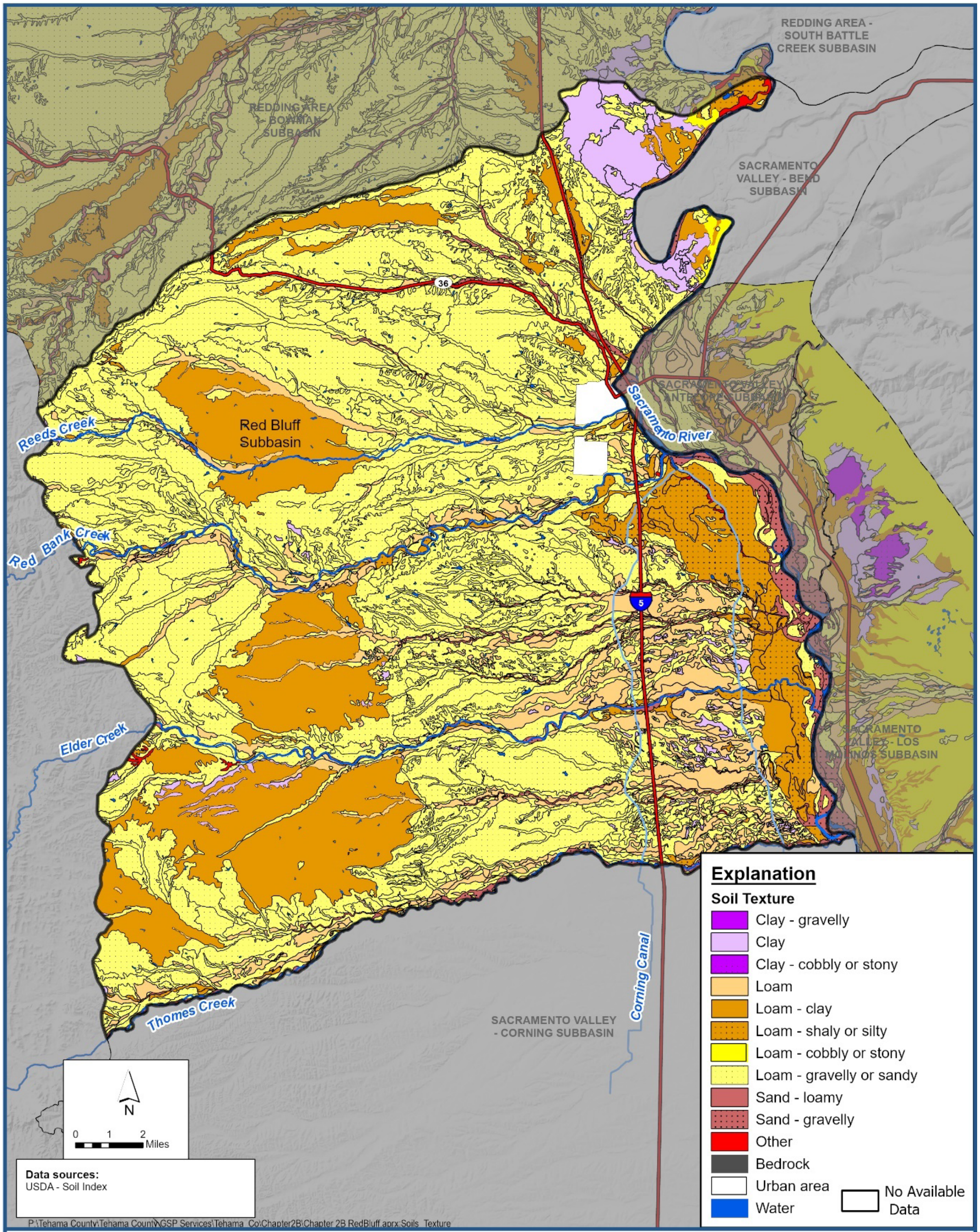
Soils - Type by Soil Series

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-29B



Data sources:
USDA - Soil Index

P:\Tehama County\Tehama County\GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Soils_Texture

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Soils - Texture

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-30

Hydraulic Conductivity

The saturated hydraulic conductivity of surficial soils, which is a measure of a soil's ability to transmit water under a hydraulic gradient, ranges from approximately 0.5 ft/d to 26 ft/d in the Red Bluff Subbasin (**Figure 2-31**). The spatial distribution of hydraulic conductivity throughout the Subbasin is related to the distribution of soil texture. Relatively fine texture soils such as clays, clay loam and loam have low hydraulic conductivities. Coarse texture soils such as sandy, gravelly, or cobbly loams, and gravelly sand have high hydraulic conductivities. Hydraulic conductivities over 2.0 ft/d are limited to areas of flood plains and natural levees of streams, where soils with gravelly sand texture are common (about 13% of the Subbasin area). Approximately 14% of the Subbasin is characterized by soils with values ranging from 1.0 ft/d to 2 ft/d. About 73% of the Subbasin area has surficial soils with hydraulic conductivities of less than 1.0 ft/d, most likely due to the presence of low-permeability, fine-textured soil horizons.

Drainage

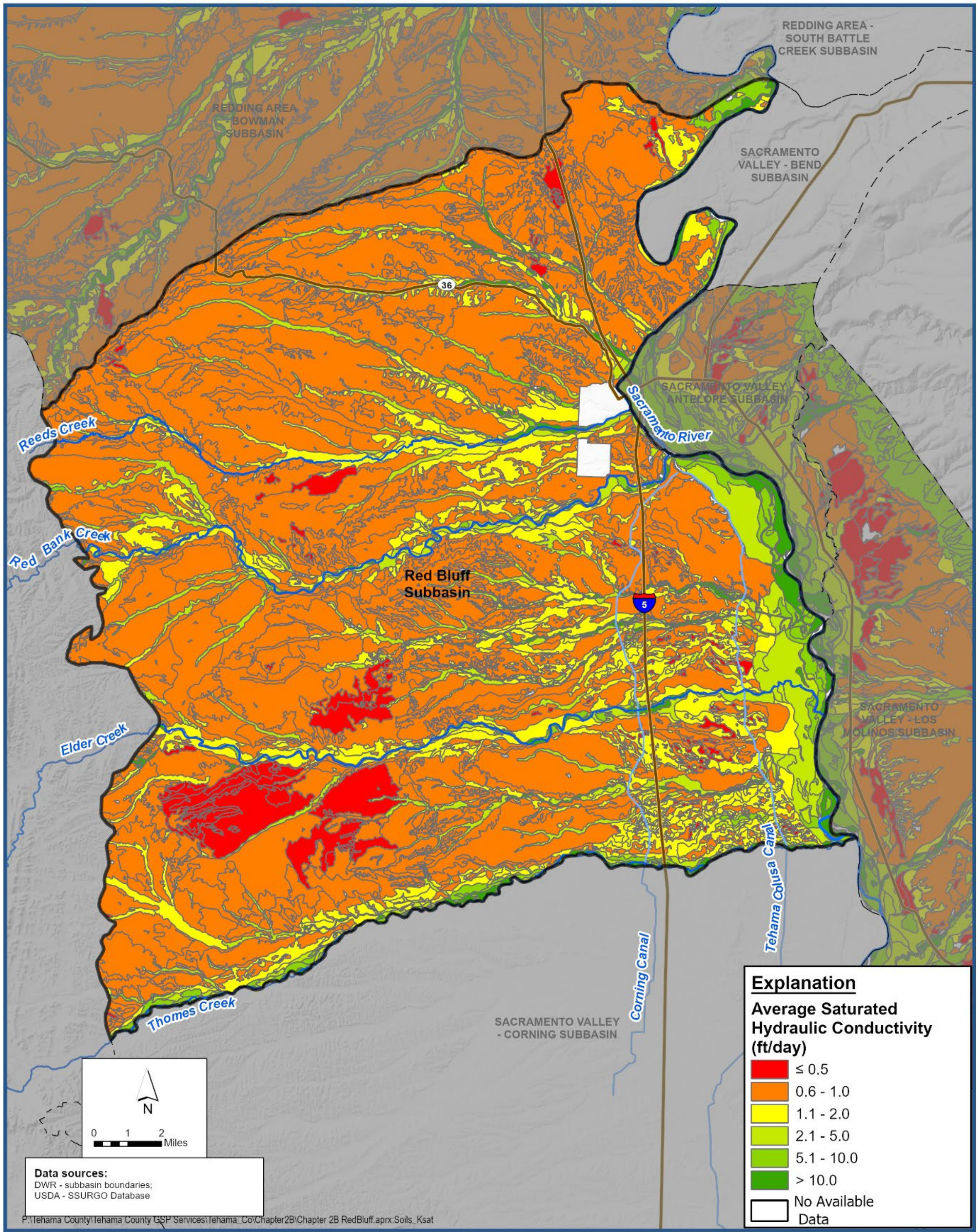
Soil drainage classes indicate the ability of a soil to drain water. Spatial distribution of soil drainage properties in the Red Bluff Subbasin closely resembles the distribution of saturated hydraulic conductivity and soil texture (**Figure 2-32**). About 88% of the Subbasin area is categorized as well drained soils, while about 9% of the area (mostly where Corning series soils exist) is categorized as moderately well drained soils. Somewhat excessively drained and excessively drained soils occur adjacent to drainage ways, where coarse soils are abundant, covering a total of about 4% of the area. Small patches of poorly drained soils cover less than 1% of the Subbasin.

Electrical Conductivity

Electrical Conductivity (EC) of a soil is an indirect measure of the amount of salt present in that soil. Percolating water can leach and transport salts from saline soils to groundwater, resulting in the increase of the salinity of groundwater. All surficial soils in the Red Bluff Subbasin fall into non-saline class, where EC values are less than 2 decisiemens per meter (dS/m) (2,000 µmhos/cm). As per NRCS soil data, EC of surficial soils in more than 90% of the Subbasin is zero dS/m, while that of soils in the remaining areas is 1 dS/m (1,000 µmhos/cm) (**Figure 2-33**).

pH

Soil pH is a measure of the acidity or alkalinity of that soil, which influences chemical interactions between soil minerals and percolating water. A pH of 7 is considered neutral. Increasing pH values indicate more alkaline soil conditions and decreasing pH values indicate more acidic soil conditions Soil pH in the Red Bluff Subbasin ranges between 5.0 and 7.9, but the range is between 5.6 and 7.0 in about 80% of the area (**Figure 2-34**). Soils with pH values less than 5.6 occur throughout the Subbasin in small patches (about 6% of the area), but these soils are more common in the valley floor close to the southeastern boundary. The remaining 14% of soils are alkaline, ranging from 7.0 to 8.0 and generally occur in the west of the Subbasin. In general, solubility of minerals increases with acidity of the soil and water. Acidity or alkalinity of surficial soils in the Subbasin are not expected to adversely alter water quality.



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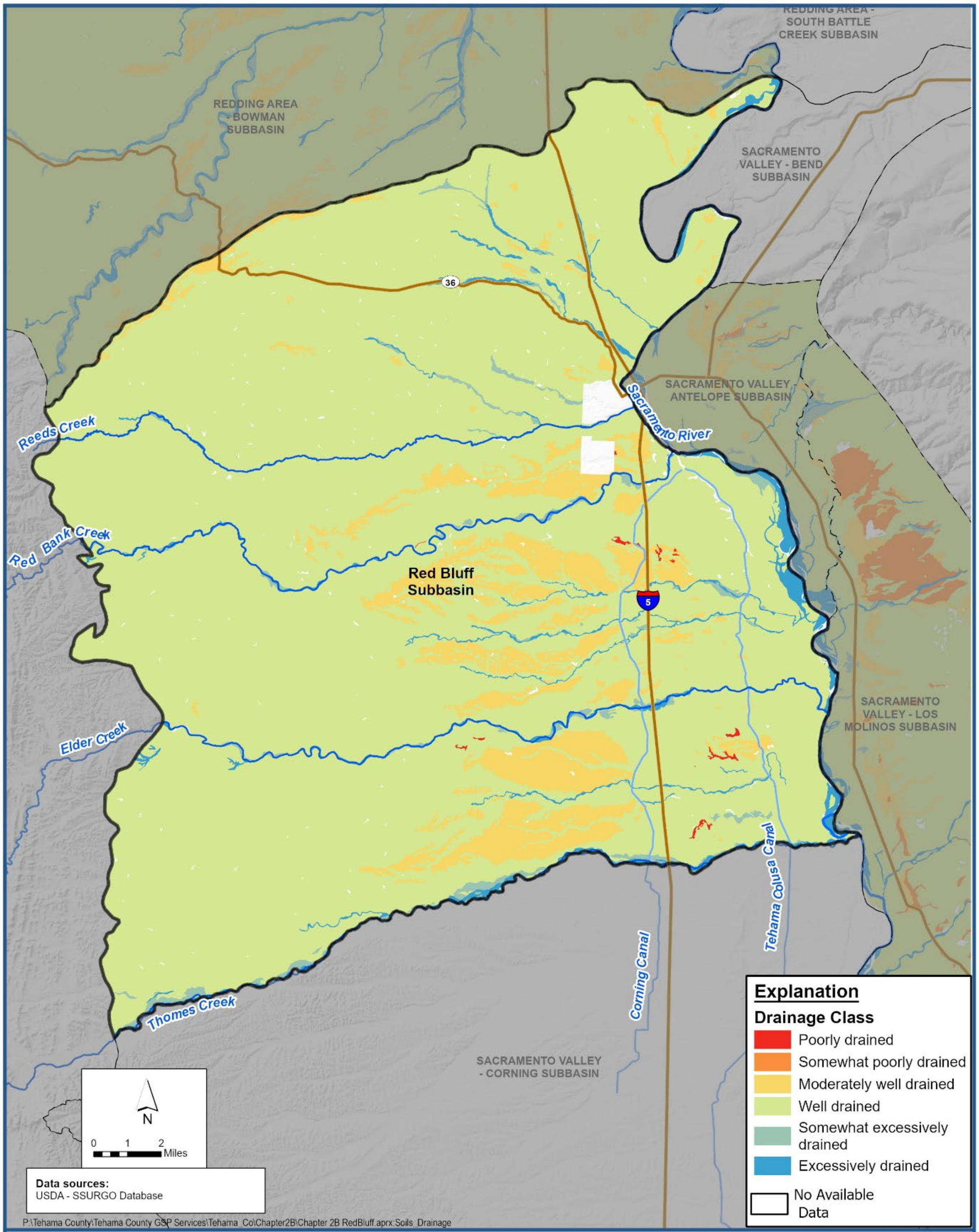
Soils - Saturated Hydraulic Conductivity

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-31



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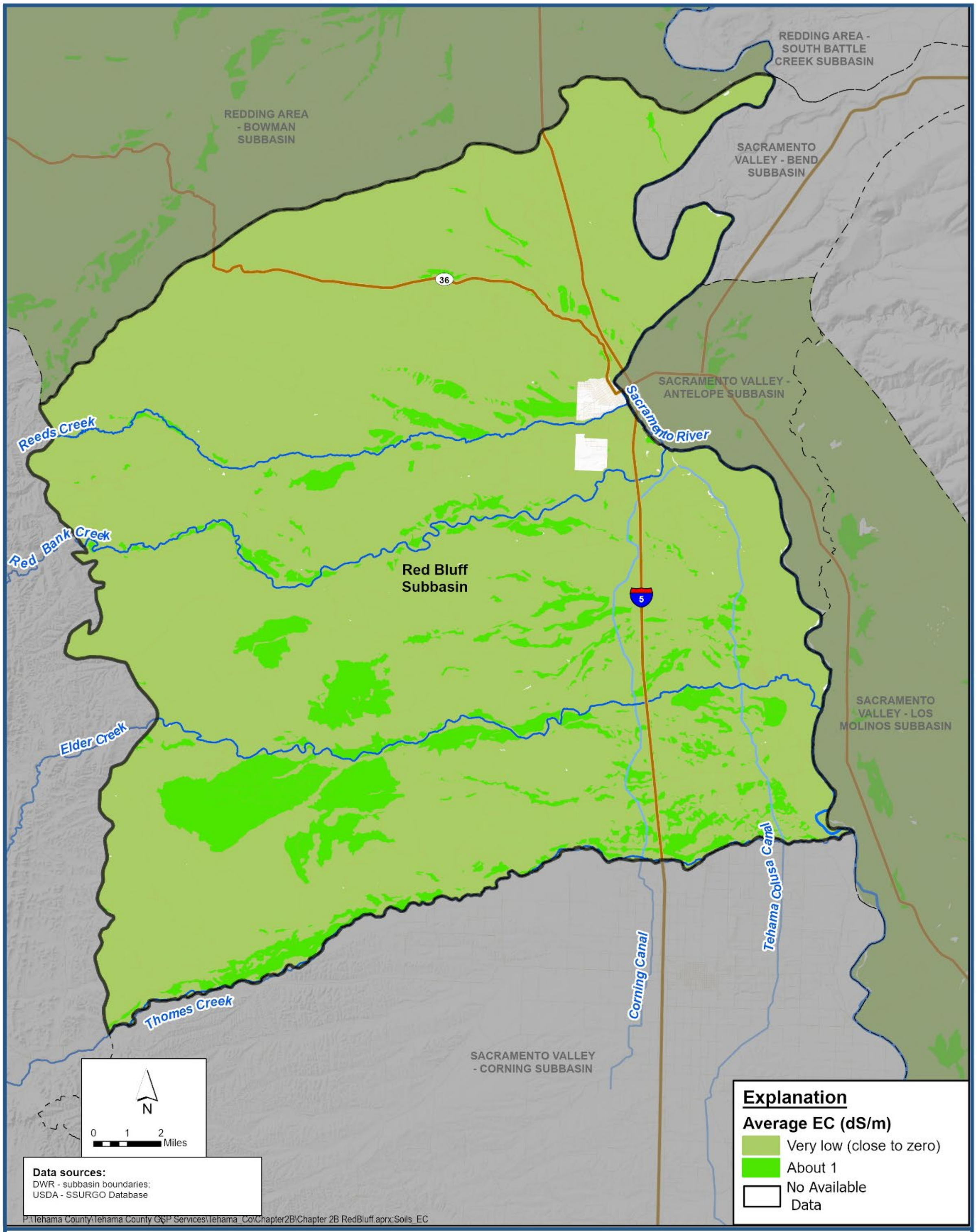
Soils - Drainage Class

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-32



Data sources:
DWR - subbasin boundaries;
USDA - SSURGO Database

Explanation

Average EC (dS/m)

🟩 Very low (close to zero)
🟩 About 1
☐ No Available Data

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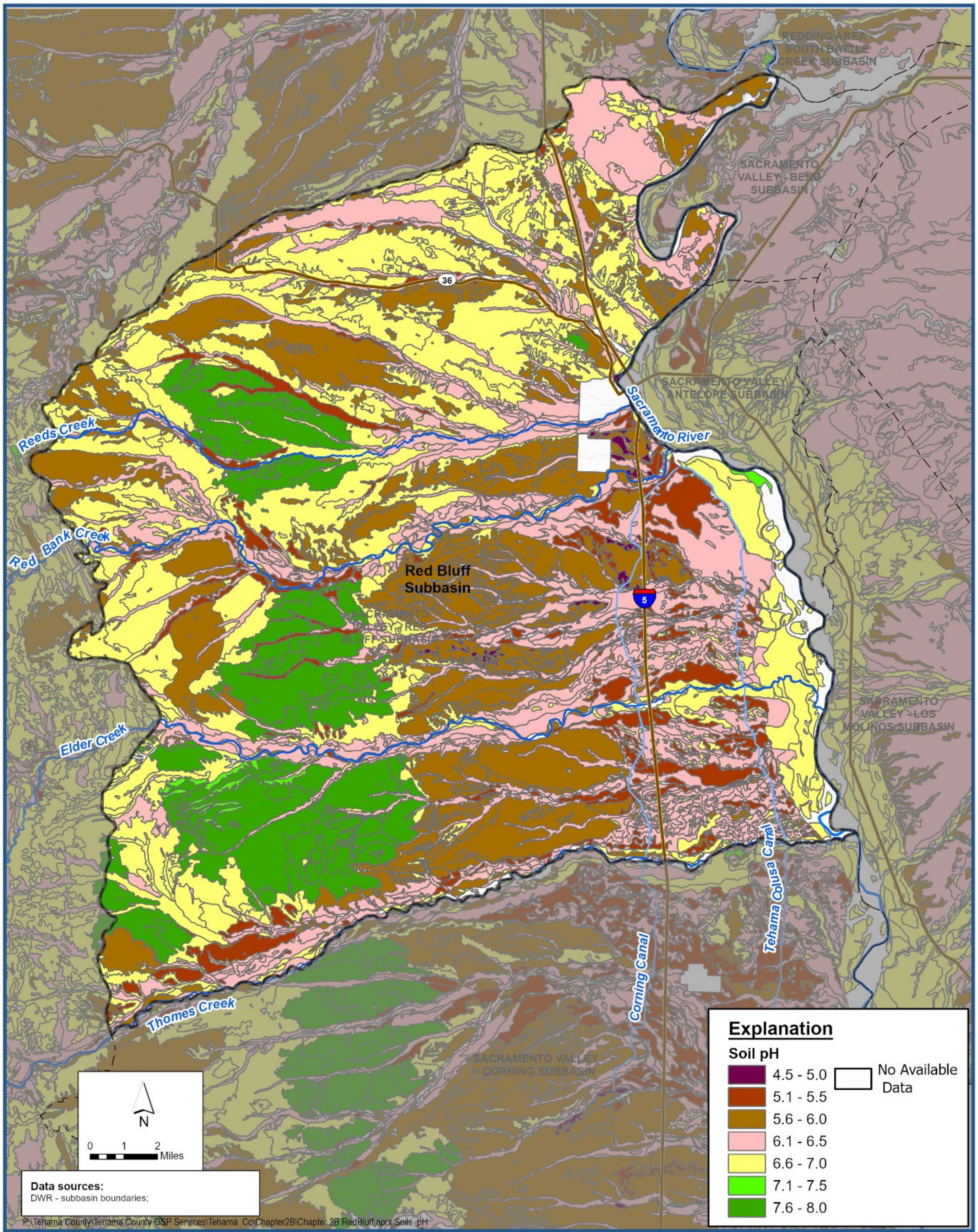
Soils - Electrical Conductivity

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-33



Data sources:
DWR - subbasin boundaries;

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx Soils_pH

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Soils - pH

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-34

2.2.1.5 Identification/Differentiation of Principal Aquifers

Two principal aquifer units are defined in the Subbasin: Upper Aquifer and Lower Aquifer. The two-aquifer designation is based on an examination of time-series groundwater elevation hydrographs, electric resistivity data from geophysical logs, lithologic logs, well construction details, and review of previous studies in the Subbasin. The northern Sacramento Valley depositional environment is dominated by fluvial and alluvial deposition after the Eocene marine depositional environment transitioned to a subaerial one. The Pliocene depositional environment is similar to the current depositional conditions, with eastern depositional streams sourced from the Cascade Range and western depositional streams sourced from the Coast Ranges draining onto a central floodplain. This depositional environment resulted in a complex and varied series of water bearing sedimentary deposits and the Tuscan/Tehama Formations that collectively form a two-aquifer system in the Subbasin and beyond. Within singular water bearing formations there are areas where confined or unconfined conditions can be dominant. Generally, confined aquifer conditions are encountered at depth and unconfined conditions are seen in the shallower porous media. The complexity of the geologic materials and similarly among the formations makes it difficult to define a singular widespread aquitard or distinctive change in geologic materials separating an upper and lower aquifer. To delineate between areas with a higher likelihood of confined conditions, well construction data throughout the Subbasin were examined. Most of the wells in the Subbasin are screened or completed above 400 feet below ground surface (ft bgs). The bottom of numerical model layer 5 best corresponds with this depth. The bottom of model layer 5 is used as the delineation between the Upper and the Lower Aquifer (**Figure 2-23 through Figure 2-26**). Lastly, the degree of heterogeneity and anisotropy (directional preferable flow) is likely significant, but not easy to define based on current information.

Upper Aquifer

The Upper Aquifer is defined as the water bearing material from ground surface to the bottom of model layer 5 (approximately 350-450 ft bgs in the majority of the Subbasin). The aquifer has unconfined to semi-confined water conditions. Water bearing geologic units in the Upper Aquifer include the Quaternary formations and the upper portions of the Tehama and Tuscan Formations. Wells screened in the Upper Aquifer are largely for domestic purposes. The depth to the bottom of the Upper Aquifer is approximately 350-450 ft bgs (**Figure 2-22 through Figure 2-28**). The storage capacity of the Red Bluff Subbasin Upper Aquifer is estimated to be approximately 4,200,000 acre-feet to a depth of 200 feet (DWR, 2004).

Site-specific Aquifer properties obtained from aquifer tests are available for localized areas of the Subbasin. In addition, aquifer tests were conducted in surrounding subbasins. Hydraulic conductivity (rate at which water moves through an aquifer), transmissivity (hydraulic conductivity multiplied by aquifer thickness), and storage coefficients (ability of the aquifer to store water, commonly expressed as specific yield for water table/unconfined aquifers and storativity for confined aquitards) have been estimated at the Rancho Tehama Reserve and in neighboring subbasins. The Tehama Formation has an average transmissivity of approximately 4,000 ft^2/d, an average storativity of 0.00089, and an average hydraulic conductivity of 120 feet per day (ft/d) based on a 1989 constant discharge aquifer test at the Rancho Tehama Reserve (McManus, 1993; DWR, 2003). In the Los Molinos Subbasin to the southeast, the transmissivity of the upper portion of the Tuscan Formation (70-530 ft bgs) is estimated to be approximately 14,000 square feet per day (ft^2/d) to approximately 55,000 ft^2/d (DWR, 2003). The studied interval of the Tuscan Formation extends past the bottom of the Upper Aquifer however, the majority of the studied depth does fall within the boundaries of the Upper Aquifer.

Lower Aquifer

The Lower Aquifer is defined as the freshwater bearing geologic units throughout the Subbasin from the bottom of model layer 5 at approximately 350-450 ft bgs, to the bottom of the Subbasin. The aquifer has confined to semi-confined conditions. Water bearing geologic units include the lower portions of the Tehama and Tuscan Formations. Lack of a continuous confining layer in the Subbasin creates challenges for defining the top of the Lower Aquifer.

The lack of wells screened in the Lower Aquifer in the Subbasin creates a data gap for hydraulic properties. Hydraulic properties of the Tehama Formation have been characterized in the Subbasin but are not specific to the Lower Aquifer. The Tehama Formation has an average transmissivity of 4,341 ft^2/d, an average storativity of 0.00089, and an average hydraulic conductivity of 120 feet per day (ft/d) based on a 1989 constant discharge aquifer test at the Rancho Tehama Reserve in the Red Bluff Subbasin (McManus, 1993; DWR, 2003). The Tuscan Formation has not been directly characterized in the Subbasin; however, the lower Tuscan Formation (Units A and B) has a hydraulic conductivity estimate (via an aquifer test south of Deer Creek and North of Little Chico Creek) of 41-88 ft/d (Brown and Caldwell, 2013). Transmissivity of the lower parts of the Tuscan Formation (340-920 ft bgs) have been estimated in the Los Molinos Subbasin ranging from 5,415 ft^2/d to 49,986 ft^2/d (DWR, 2003). Storativity in the Los Molinos Subbasin is estimated to be 0.0025 and hydraulic conductivity is estimated to be 40 ft/d to 60 ft/d (Harrison, 1989; Ely, 1994; DWR, 2003).

2.2.1.6 Definable Bottom of Basin

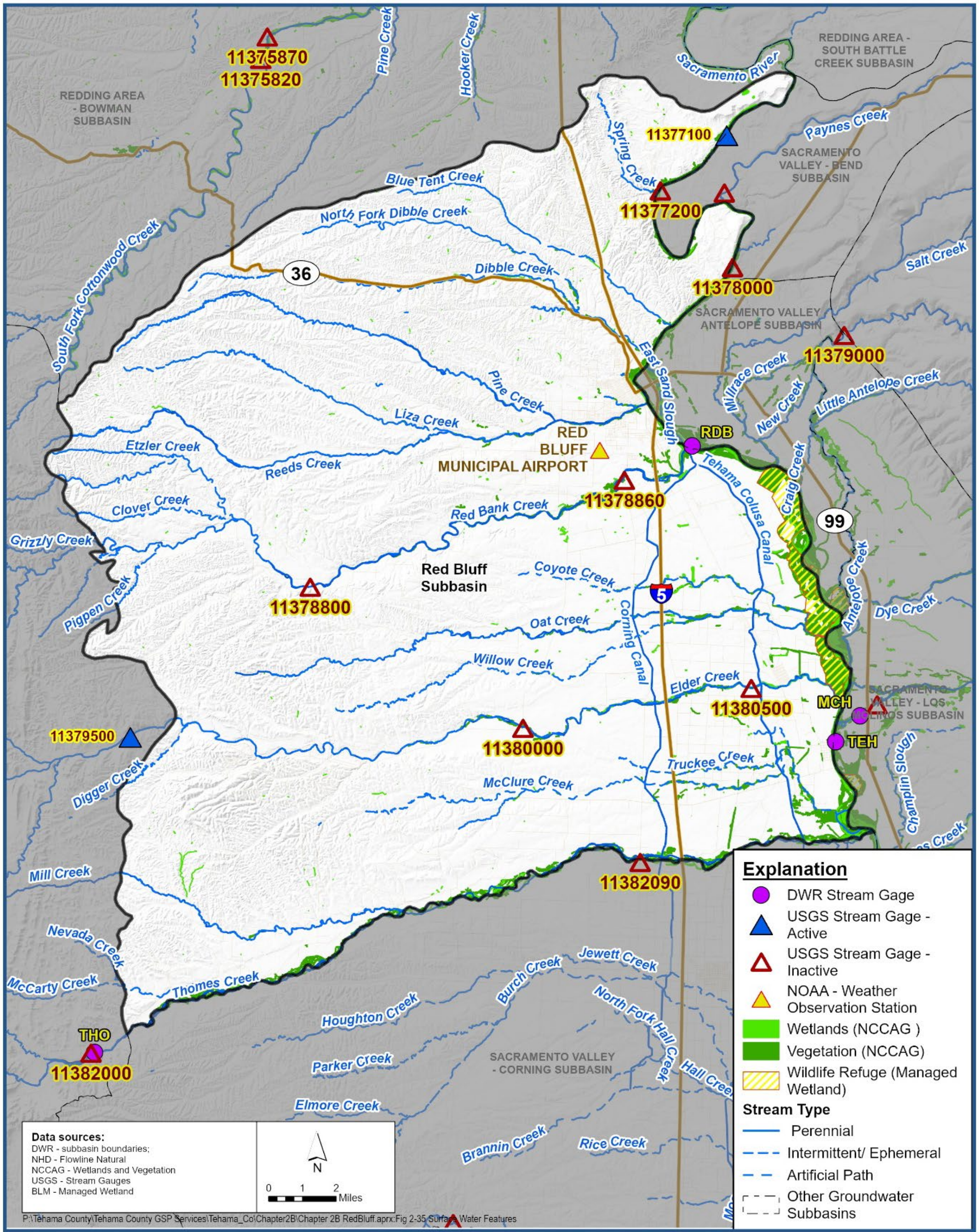
The base of the post-Eocene continental deposits is defined as the bottom of the basin. The post-Eocene deposits are the deepest locations where fresh water may exist. Contours of the base of post-Eocene deposits (**Figure 2-17)** are on the base of the Upper Princeton Valley Fill in the majority of the Subbasin. The upper Princeton Valley Fill is a transitional formation from marine to terrestrial deposition. Interstitial fresh and brackish water is contained in the Upper Princeton Valley Fill and fresh water can intersect with the formation in places (USGS, 1974; Tehama County FCWCD, 2012). Fresh water is defined as having a maximum electrical conductivity of 3,000 micromhos per centimeter (µmhos/cm) (Berkstresser, 1973). The base of fresh water is the shallowest in the west at elevations above -400 ft, mean sea level (msl) and deepest in the east at elevations deeper than -2,400 ft, msl (**Figure 2-16;** Berkstresser, 1973). Fresh water depth based on electrical conductivity is corroborated by studies by DWR (2014).

2.2.1.7 Surface Water Features and Areas of Recharge

The primary surface water features in the Subbasin are the Sacramento River, Pine Creek, Reeds Creek, Red Bank Creek, Oat Creek, Elder Creek, Mill Creek, and Thomes Creek (**Figure 2-35**). There are also a multitude of smaller streams within the Subbasin. In addition, the Tehama Colusa and Corning canals, which convey water diverted from the Sacramento River at Red Bluff pumping plant to irrigate lands in Red Bluff, Corning, and Colusa Subbasins, also run through the Subbasin. The Sacramento River and Thomes Creek flow throughout the year (perennial), but Elder Creek, Oat Creek, Red Bank Creek, Reeds Creek, and Pine Creek flow seasonally. The Sacramento River flows southward along the eastern boundary of the Subbasin. The other streams flow eastward draining the east side of the Coast Ranges and entering the Sacramento River at the eastern boundary. Several small seasonal ponds (surface area less than 10 acres) occur along streams, but there are no natural lakes or reservoirs within the Subbasin.

Groundwater recharge of the Subbasin primarily occurs from the flow of the Sacramento River and the other streams and tributaries in the Subbasin (DWR, 2004). Some of the groundwater recharge contributions from smaller streams and tributaries likely supports low flow conditions in the Sacramento River as baseflow. Relatively high hydraulic conductivity of streambeds and soils located adjacent to these streams create favorable conditions for percolation of surface water (**Figure 2-32**). However, the Soil Agricultural Groundwater Banking Index (SAGBI; O'Geen et al., 2015), which indicates the suitability of land for groundwater recharge by flooding, gives “poor” and “very poor” deep percolation rating to many areas of flood plains and natural levees of streams despite the presence of highly conductive surficial soils (**Figure 2-36**). The poor rating in these areas can be attributed to the presence of low-permeable soil layers and a relatively shallow groundwater table, which are unfavorable for groundwater banking operations or managed aquifer recharge. Lastly, recharge likely also occurs along 1) the hill front due to runoff and groundwater movement down into the valley, 2) disperse aerial recharge from natural precipitation, and 3) irrigation water.

Seasonal wetlands exist adjacent to many streams, and most notably along the Sacramento River, Thomes Creek, and lower reaches of Elder Creek (**Figure 2-37**). A portion of the Sacramento River National Wildlife Refuge, a managed wetland, also exists at the southeastern part of the Subbasin (**Figure 2-35**). These wetlands may indicate the seasonal occurrence of groundwater discharge when the groundwater table rises to the land surface. However, data are not available to distinguish between wetlands fed by groundwater and those fed by surface water (from streams and precipitation run-off).



Data sources:
DWR - subbasin boundaries;
NHD - Flowline Natural
NCCAG - Wetlands and Vegetation
USGS - Stream Gauges
BLM - Managed Wetland

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Fig 2-35 Surface Water Features

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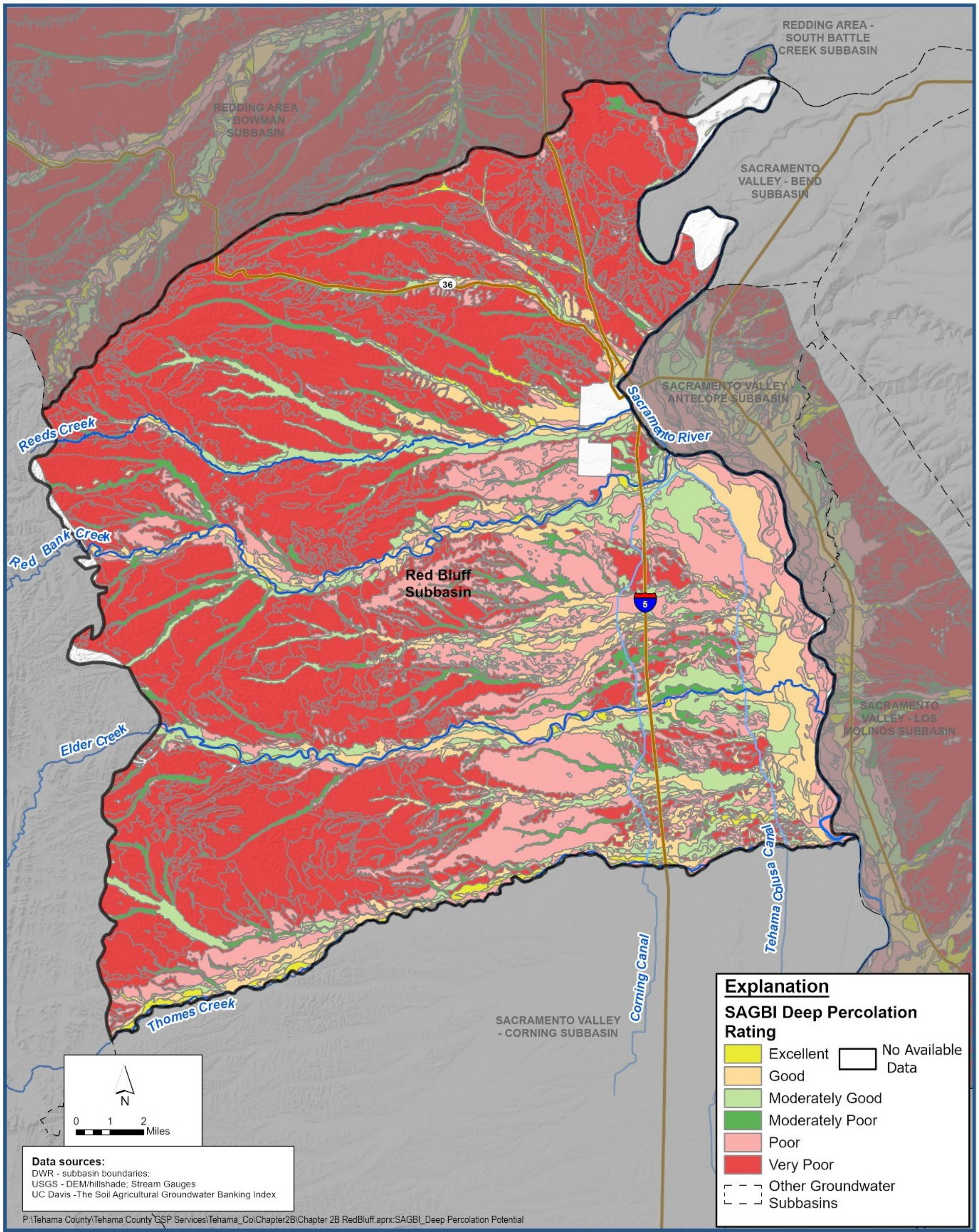
Map of Surface Water Features

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-35



Data sources:
DWR - subbasin boundaries;
USGS - DEM/hillshade; Stream Gauges
UC Davis -The Soil Agricultural Groundwater Banking Index

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:SAGBI_Deep Percolation Potential

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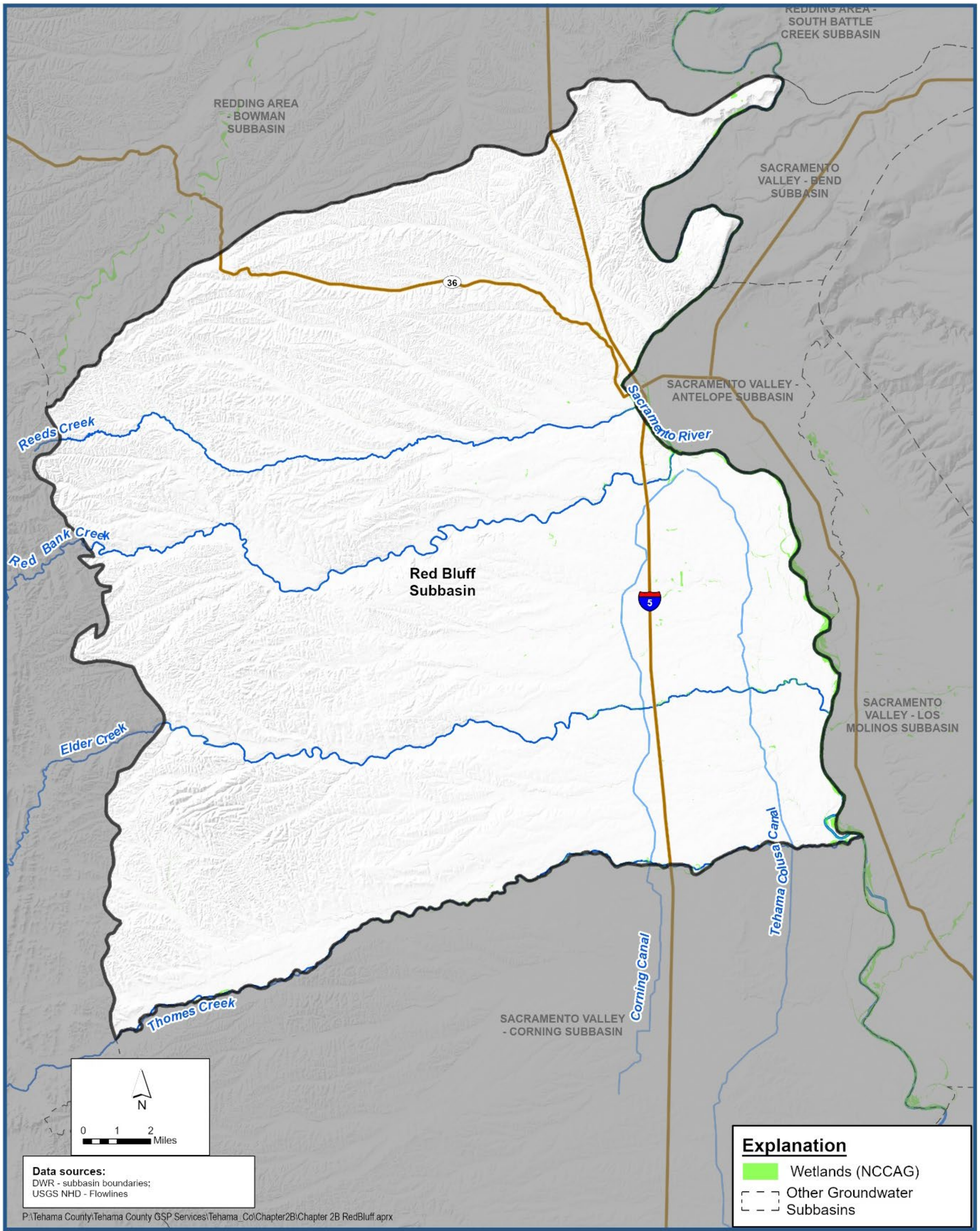
SAGBI Groundwater Recharge Rating

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-36



Map of Discharge Areas – Wetlands, Springs, Seeps

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-37

2.2.1.8 Data Gaps and Uncertainty

Stratigraphy

The general stratigraphy of the subsurface within the Subbasin is characterized based on past studies and LSCE's interpretation of well completion reports and geophysical logs, however, specific thicknesses and lateral extent of formations is poorly understood. The western extent of the Tuscan Formation in the vicinity of the Sacramento River is poorly defined and the extent of the interfingering between the Tuscan and Tehama Formations in the subsurface is not known. The Hydrogeologic properties differ between the two formations, and it would be beneficial to know where the properties change so aquifer zones could be better constrained and future wells could be screened in targeted intervals.

Hydrogeologic Parameters

Estimates of hydrogeologic parameters are available for site-specific areas in the Subbasin. Parameters have been estimated for geologic formations within the Subbasin at localized sites; however, the formations vary with extent and may be different in different areas of the Subbasin. Parameters like storativity, transmissivity, and hydraulic conductivity can be estimated based on geology however, without field and lab measurements the range of values is significant. Future pump tests and testing of soil collected from drilling will help characterize the parameters specific to the Subbasin.

Surface Water and Recharge

Surface water and groundwater interconnectivity is based on observable relationships between streams and shallow groundwater. There is a lack of shallow wells near active stream gages, a condition needed to establish the relationship. Future frequent monitoring from the existing- and from new- stream gauges along the major waterways and from new proximal shallow monitor wells would help to describe interaction between surface water and groundwater.

2.2.2 Current and Historical Groundwater Conditions

An understanding of groundwater levels and the direction of flow is essential to sustainable groundwater management. This includes both the spatial and temporal variation of groundwater levels which are a function of geology, groundwater management, land use, and climatic conditions. Historical and current groundwater levels of the Subbasin were evaluated using data obtained from public databases (DWR, SWRCB, and USGS) and information available in the literature. LSCE performed a quality assurance/quality control (QA/QC) process on compiled data, which included evaluation of data for completeness and duplication, as well as identification of questionable data.

The following discussion on groundwater levels, flow directions, and groundwater quality are mostly limited to the Upper Aquifer due to the lack of data from the Lower Aquifer. Data from wells that were completed or screened entirely within the Upper Aquifer were selected to characterize groundwater conditions of the Upper Aquifer. Only five wells that were completely or partially constructed in the Lower Aquifer had groundwater level or quality data. Lack of data to characterize conditions in the Lower Aquifer is identified as a data gap.

2.2.2.1 Groundwater Levels and Flow Direction

2.2.2.1.1 *Groundwater Levels*

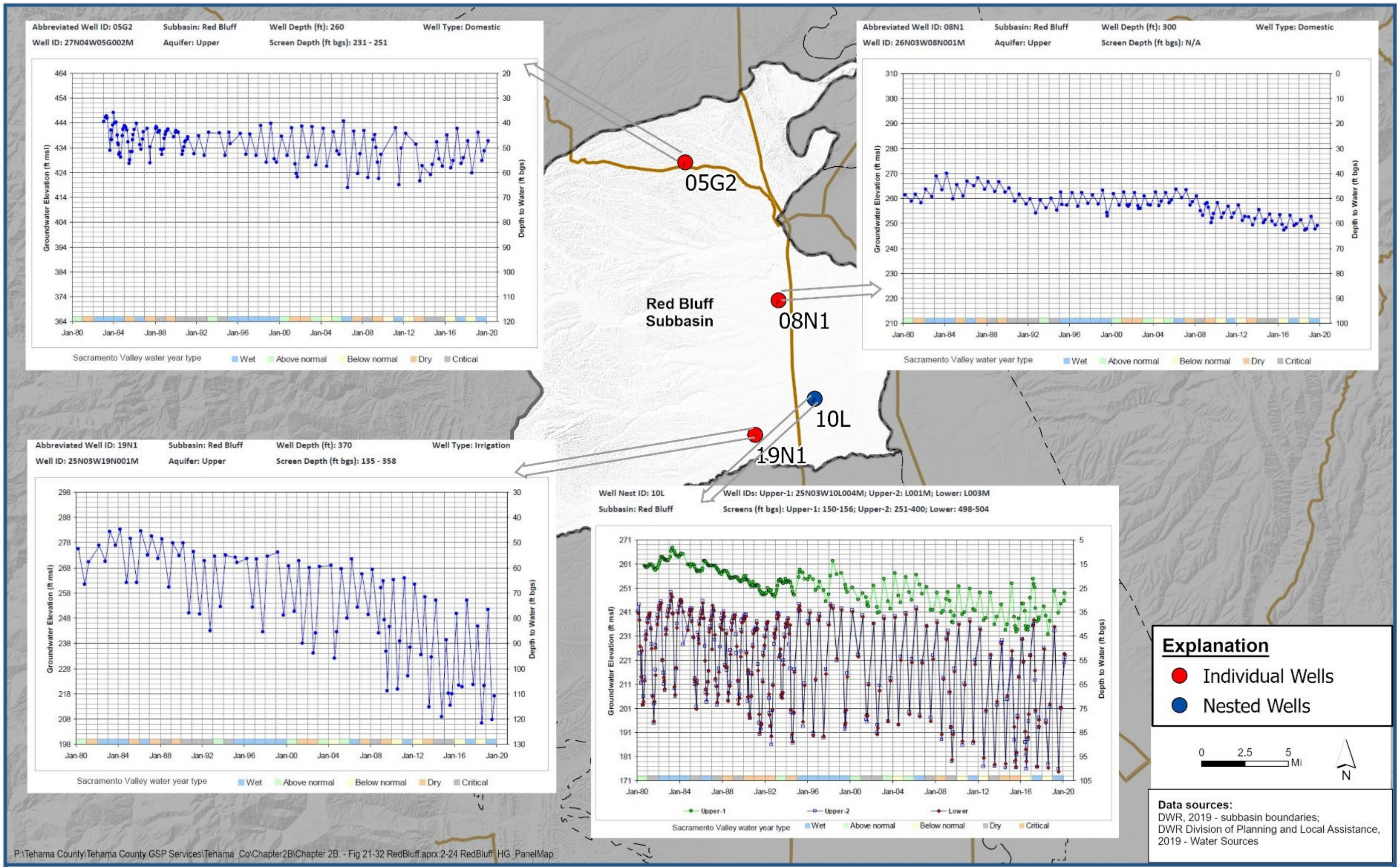
To gain a historical perspective of trends in groundwater levels, hydrographs were generated for wells with historical time series data of sufficient period of record. Representative hydrographs and the locations of corresponding wells are shown in **Figure 2-38**, while all hydrographs used for the groundwater level evaluation are in **Appendix 2-F**. A graphical illustration that describes information shown on a hydrograph is also included in **Appendix 2-F**. Trends of groundwater levels can be observed over various time periods when data is available. The time-series data also show seasonal variations and changes that correspond to wet and dry periods of the Subbasin. The total annual precipitation measured at the Red Bluff Municipal Airport (RBF) shows a strong positive correlation with the Sacramento Valley Water Year Index (Pearson's correlation coefficient = 0.72). **Figure 2-35** shows the location of the rain gage, and **Figure 2-39** shows the annual precipitation and cumulative departure curve of precipitation. Between water years of 1990 and 2018 (representative base period of this GSP that represents long-term average annual hydrologic conditions), multi-year wet periods occurred in 1995-1999, while multi-year dry periods occurred in 1990-1992 (started in 1987), 2007-2009 and 2013-2015 in the Sacramento Valley (**Table 2-9**).

Upper Aquifer

Seasonal high-water levels in the Upper Aquifer (in winter/spring seasons) ranges from about 10 to 110 ft bgs during wet periods. Most wells with water levels deeper than about 80 ft bgs exist in the areas west of Paskenta Road, north of Red Bank Creek, and south of Pine Creek. Groundwater levels decreased during dry periods likely due to the combined effect of increased withdrawal from wells and reduction in recharge. The lowest groundwater levels in recent history (since 1980) occurred during the 2013-2015 drought. During that period, seasonal high-water levels decreased by up to 30 ft compared to previous wet periods. Recent data indicate that the groundwater levels partially or completely recovered to pre-drought levels since then. Seasonal water level fluctuation at any well during a water year ranges from a few feet to about 50 ft depending on well location, construction, and local water use. In general, magnitude of seasonal fluctuations is less than 10 ft at wells shallower than about 200 ft, and fluctuations are higher at wells screened below 200 ft.

Lower Aquifer

Seasonal high-water levels of the Lower Aquifer in the southeastern area (depths deeper than about 450 ft bgs) range from 20 to 40 ft bgs during wet periods. In dry periods, water levels in the shallow part of the Lower Aquifer decreased by about 10 ft, but the decrease in the deeper part of the aquifer (at a depth of about 950 ft bgs) was less than five feet. During seasonal low conditions, groundwater elevation in the shallow part of the Lower Aquifer can decrease by up to 50 ft, but the decrease in the deep part is about 20 to 30 ft. Groundwater elevations in the Lower Aquifer are only available from three Lower Aquifer wells in the southeastern area near Gerber (in two separate sets of nested wells located about 1.5 mile apart). Hydrographs of these nested wells (**Appendix 2-F**) show similar temporal water fluctuations in the shallow part of the Lower Aquifer and deep part of the Upper Aquifer, which indicates hydraulic connection between the two aquifers.



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

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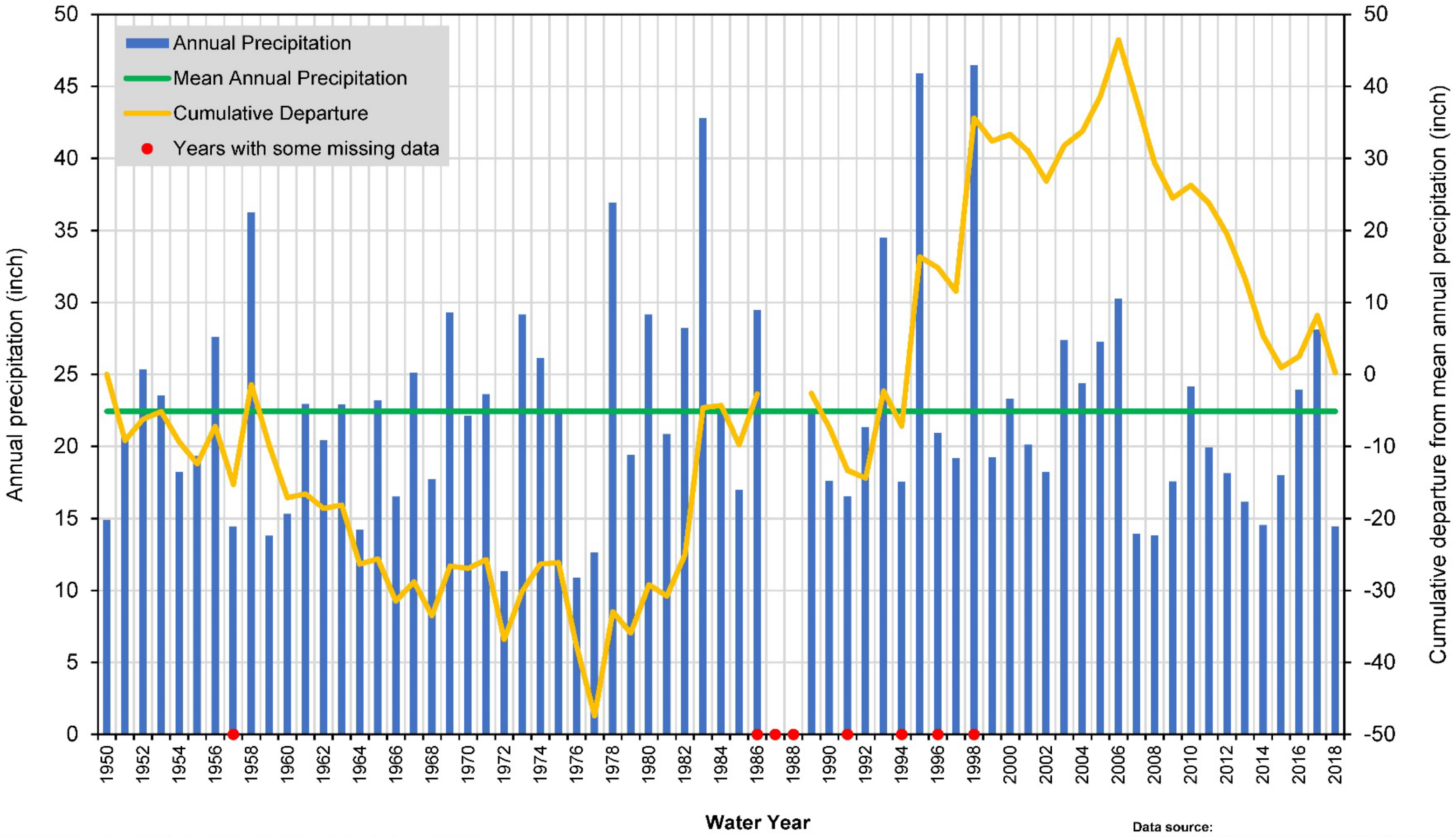
Panel Map of Selected Groundwater Elevation Hydrographs

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-38



X:\2018\18-074 Tehama County - GSP Services\DATA\Precipitation\CumulativeDepartureCurves_20210211.xlsx

Data source:
https://cdec.water.ca.gov/dynamicapp/staMeta?station_id=RBF

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Annual Precipitation and Cumulative Departure at Red Bluff Municipal Airport

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-39

Table 2-9. Sacramento Valley Water Year Types since 1980

WATER YEAR	WATER YEAR INDEX	WATER YEAR TYPE
1980	9.04	Above Normal
1981	6.21	Dry
1982	12.76	Wet
1983	15.29	Wet
1984	10.00	Wet
1985	6.47	Dry
1986	9.96	Wet
1987	5.86	Dry
1988	4.65	Critical
1989	6.13	Dry
1990	4.81	Critical
1991	4.21	Critical
1992	4.06	Critical
1993	8.54	Above Normal
1994	5.02	Critical
1995	12.89	Wet
1996	10.26	Wet
1997	10.82	Wet
1998	13.31	Wet
1999	9.80	Wet
2000	8.94	Above Normal
2001	5.76	Dry
2002	6.35	Dry
2003	8.21	Above Normal
2004	7.51	Below Normal
2005	8.49	Above Normal
2006	13.20	Wet
2007	6.19	Dry
2008	5.16	Critical
2009	5.78	Dry
2010	7.08	Below Normal
2011	10.54	Wet
2012	6.89	Below Normal
2013	5.83	Dry
2014	4.07	Critical
2015	4.00	Critical
2016	6.71	Below Normal
2017	14.14	Wet
2018	7.14	Below Normal
2019	10.34	Wet

Source - https://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST
Accessed in January 2021

Trends in Groundwater Levels

Statistical analysis of data from 18 wells (17 in the Upper Aquifer and one in the Lower Aquifer), that have data that span the entirety of the 1990 through 2018 hydrologic base period, show small declines in seasonal high groundwater levels. Fifteen of these wells exist east of Paskenta Road and south of Reeds Creek, limiting our understanding of long-term water levels in the northern and western portions of the Subbasin. Five Upper Aquifer wells in the southeastern area (south of Oat Creek and east of Paskenta Road) show declines ranging from approximately nine feet to 25 ft during the 1990-2018 period (about 0.5 to 0.9 ft/year). Water level declines of the other wells, including the Lower Aquifer well in the southeastern area, are less than nine feet during this period (less than 0.5 ft/year). Results of the groundwater level trend analysis, which used both parametric (Ordinary least squares regression) and nonparametric (Mann-Kendall and Theil–Sen) methods, are included in **Appendix 2-F**. The trend of groundwater levels is not an indication of overdraft, but likely due to removal of temporary surplus of groundwater. Temporary surplus removal is the extraction of a volume of aquifer storage to enable the capture of recharge and reduction in subsurface outflow from the Subbasin without impacting beneficial users of groundwater to an unreasonable degree.

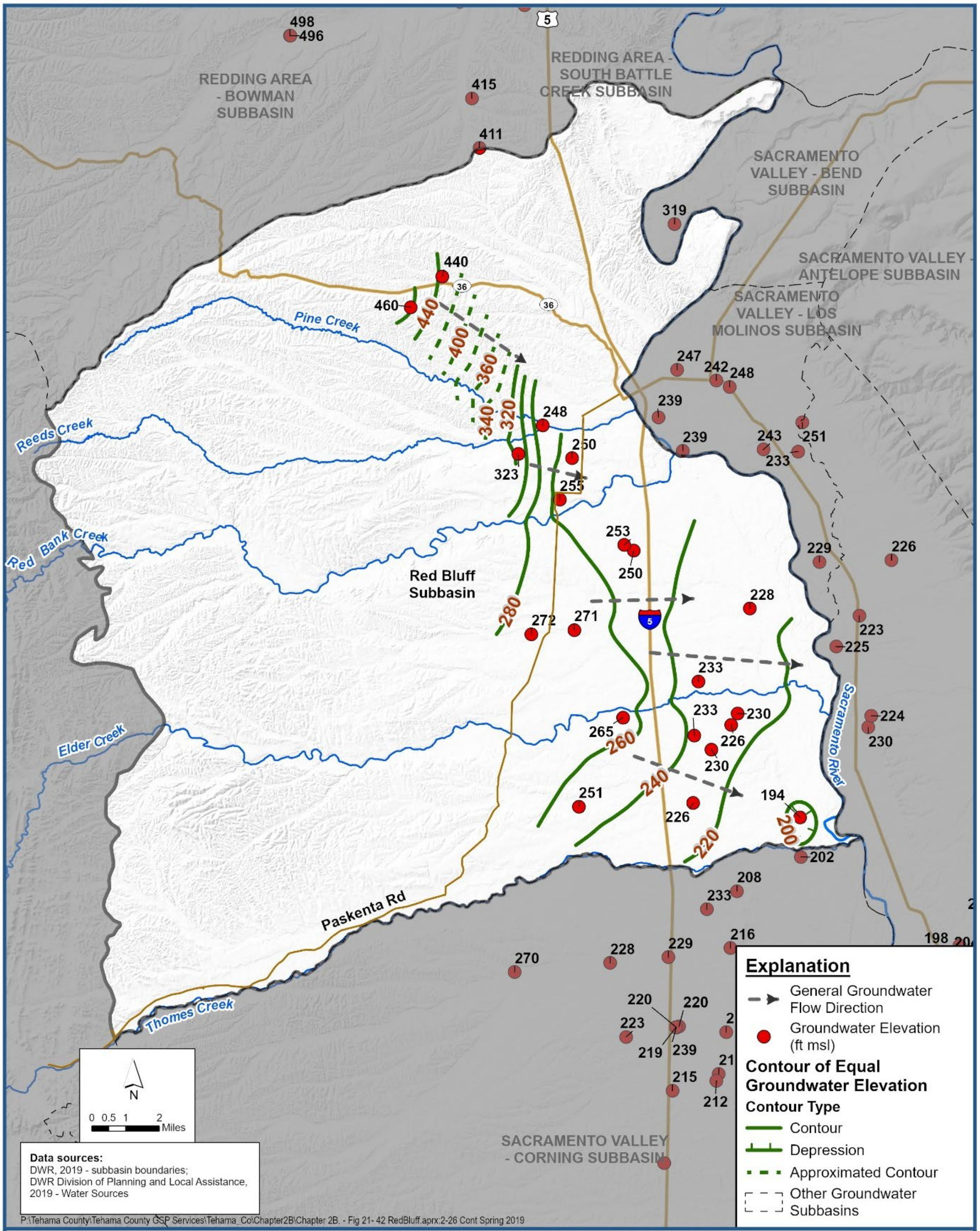
A factor in trends observed in groundwater elevation change is the potential gradual increase of groundwater withdrawal. Even though the actual amount of extracted groundwater from wells is not metered or directly measured, changes in land use and the number of wells constructed over time could be used to indicate an increase in groundwater withdrawal in the Subbasin. Well completion reports obtained from DWR show that approximately 3,080 new wells (all types, domestic, irrigation and public supply) were constructed from 1970 to 1999. Construction continued into the last two decades, 2000-2009 and 2010-2019, with approximately 1,180 and 500 new wells, respectively. The increase of total wells in the Subbasin suggests increased total pumping (withdrawal) contributing to observed declining groundwater level trends. Land use details are presented in Section 2.2.2.1, and water budgets are discussed in detail in Section 2.3.

2.2.2.1.2 *Groundwater Elevation Contours and Flow Directions (§354.16(a)(1))*

Groundwater elevation contour maps were created to evaluate general groundwater flow directions in the Upper Aquifer. Seasonal high and seasonal low water elevations of Upper Aquifer wells were used to develop contours of equal groundwater elevation ("Contours"). Water levels of wells that are entirely screened within the top 50 ft bgs and wells without construction details were excluded from contouring, since these wells are likely not representative of the areas of the aquifer where groundwater pumping occurs. Contours were initially developed using spatial analyst tools in ArcGIS software, and then modified based on professional judgement. Contours were not developed for those areas of the Subbasin where data was lacking (most areas west of Paskenta Road and north of Beegum Road/Highway 36W). Also, contours were not created for the Lower Aquifer because of the lack of data.

Contour maps were created to evaluate seasonal high and seasonal low groundwater conditions in multiple years that included wet, dry, and critical water year types between 1990 and 2019. Contours of current groundwater conditions are represented using the seasonal high and seasonal low groundwater elevation of water year 2019 (**Figures 2-40 and 2-41**). After evaluation of groundwater level hydrographs with long-term data and the Sacramento Valley water year type record (**Table 2-9**), water years 2017, 2013 and 2015 were considered to represent groundwater conditions in wet, dry, and critical years, respectively (**Figures 2-42 through 2-47**).

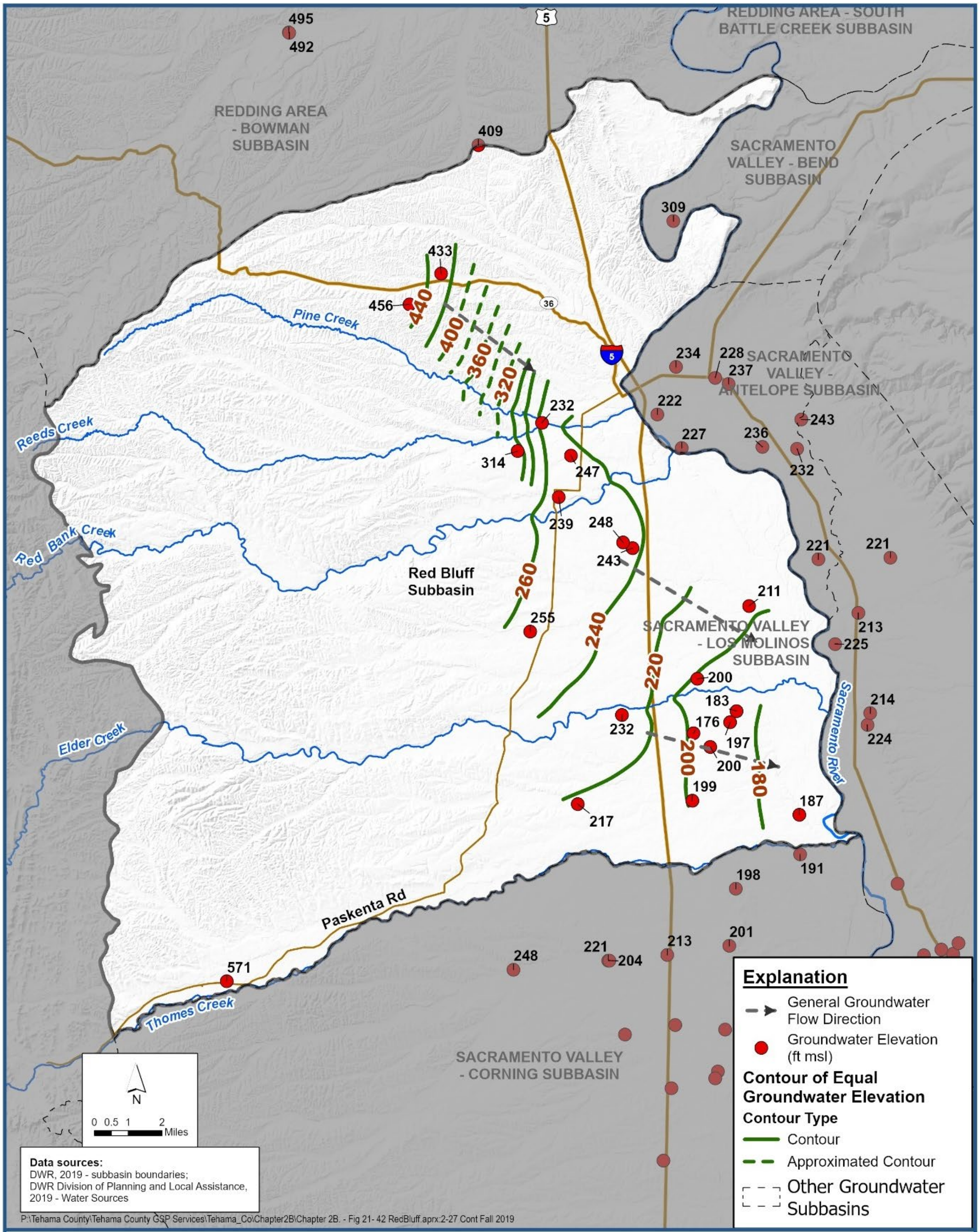
Groundwater elevations are highest in the northern and western highland areas of the Subbasin and lowest in the southeastern portion. During a wet year, seasonal high groundwater elevations in the Upper Aquifer range from about 200 ft (in southeast) to 470 ft msl (in north) (**Figure 2-42**). However, during seasonal low conditions (**Figure 2-33**), groundwater elevations in the northern area decrease by five feet to 15 ft at different locations, but in some areas of the southeast the decrease is about 50 ft. In a dry year, groundwater elevations are about 10 ft deeper in the southeastern portion compared to a typical wet year (**Figures 2-44** and **2-45**), but the elevation differences in the other areas of the Subbasin are unnoticeable. Groundwater elevations in a critical year remains nearly similar to elevations of a dry year (**Figure 2-46** and **Figure 2-47**). Water levels in the western portion of the Subbasin are very sparse and limited to measurements at one Upper Aquifer well near the southwestern boundary of the Subbasin since the fall of 2014. Seasonal high groundwater elevations of this well remained between 581 and 586 ft msl, while the seasonal low elevations remained between 570 and 574 ft msl.



Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal High of 2019

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-40



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

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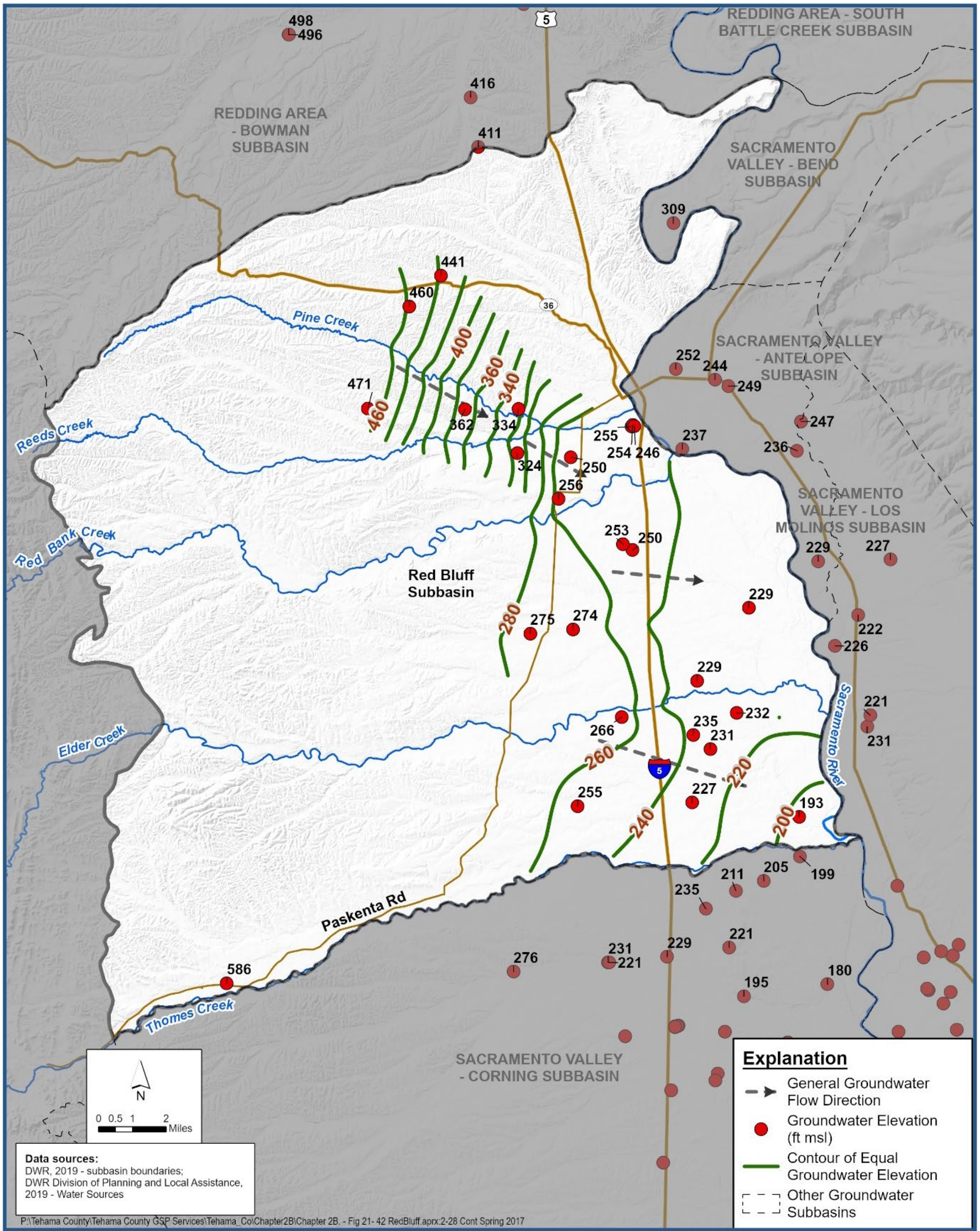
Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal Low of 2019

Groundwater Sustainability Plan
Bowman Subbasin

Figure 2-41



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

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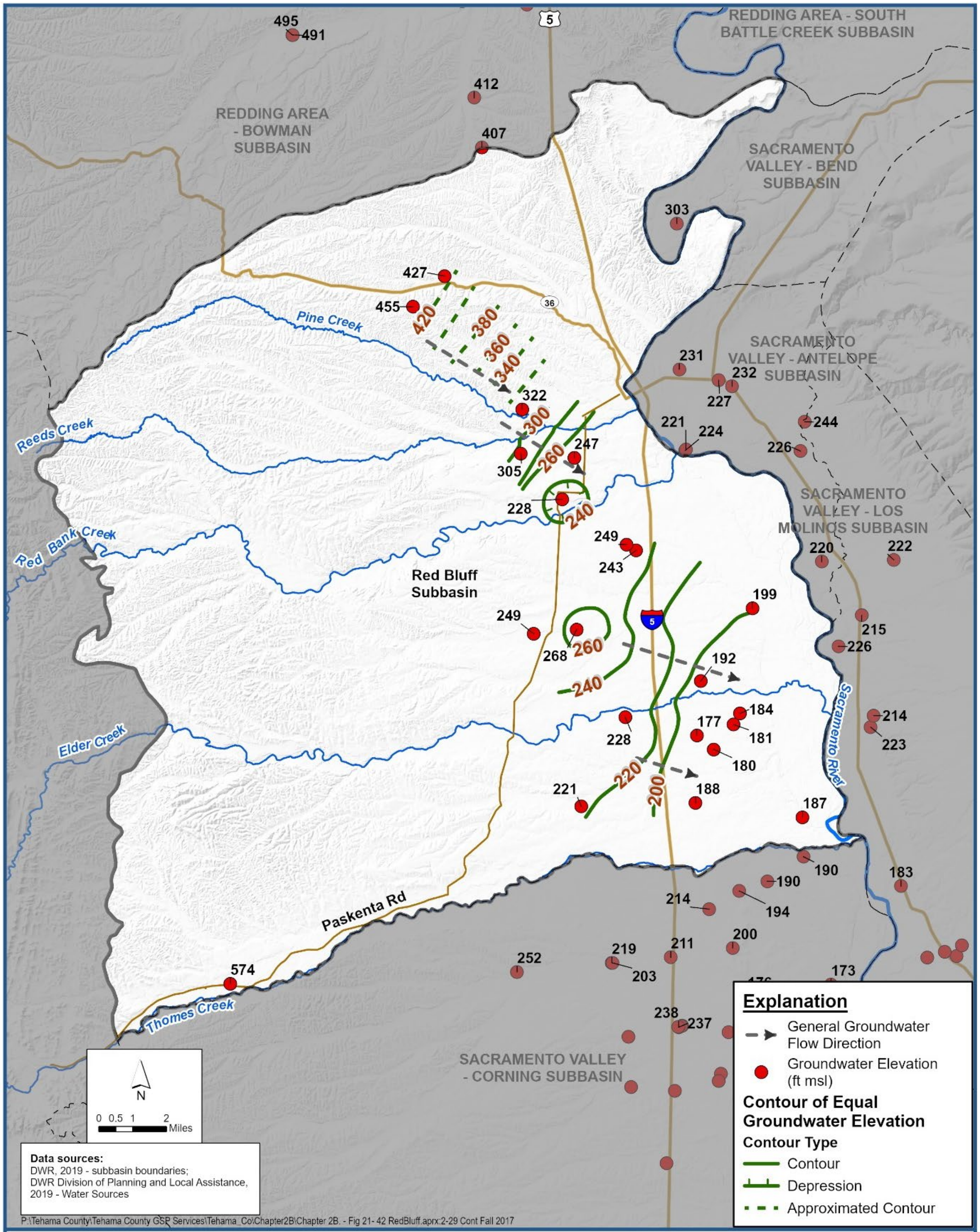
Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal High of 2017

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-42



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

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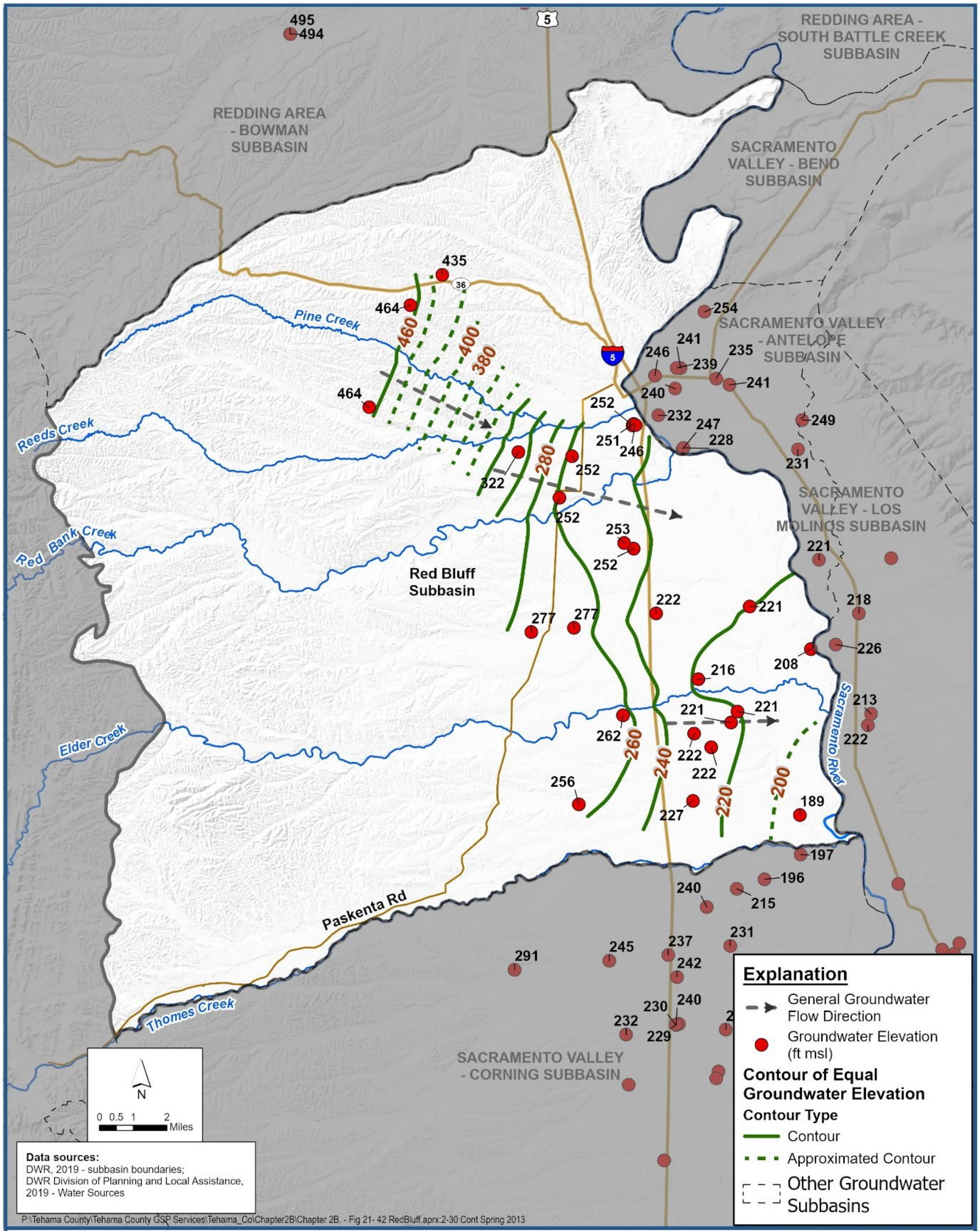
Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal Low of 2017

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-43



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

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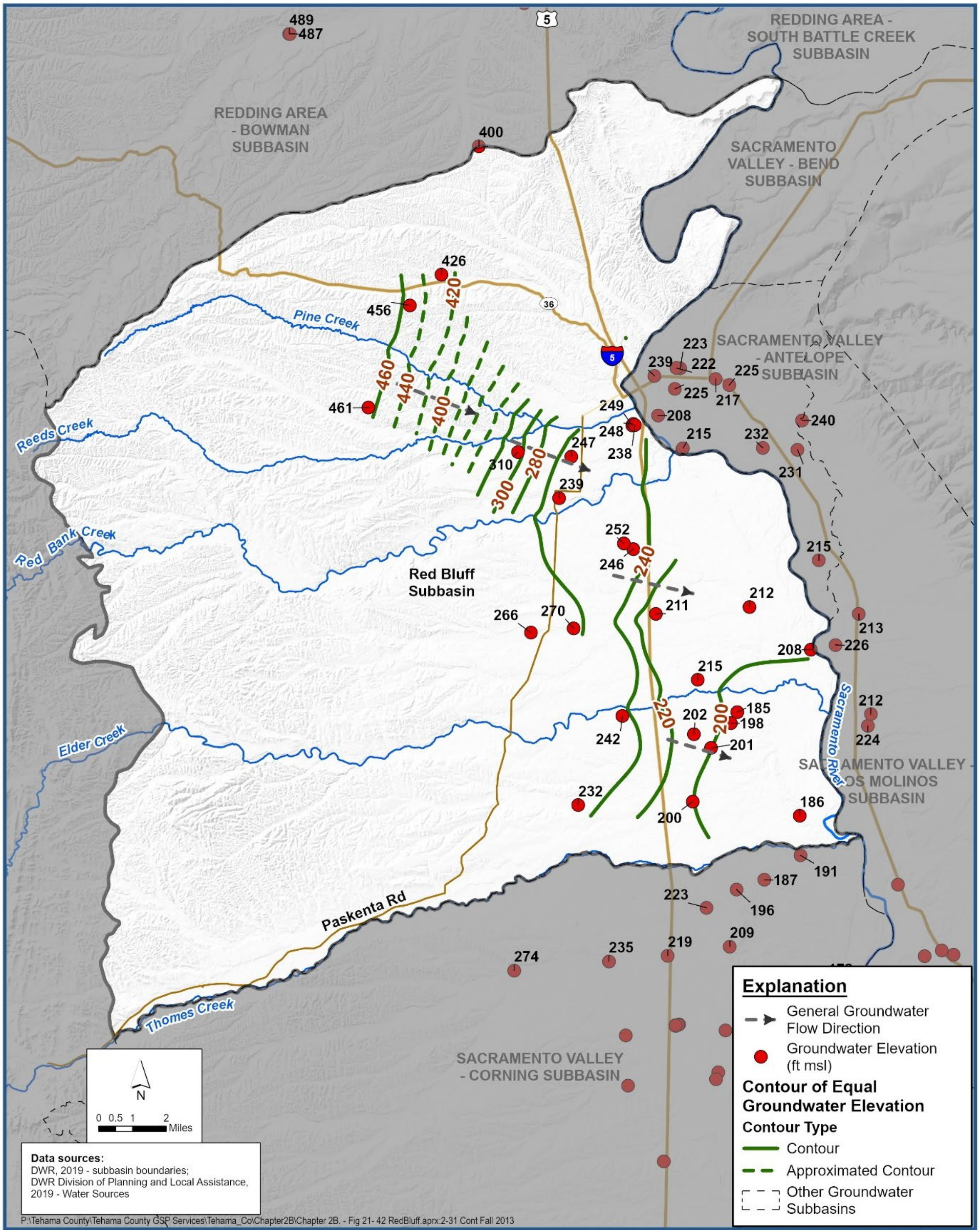
Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal High of 2013

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-44



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B. - Fig 21- 42 RedBluff.aprx:2-31 Cont Fall 2013

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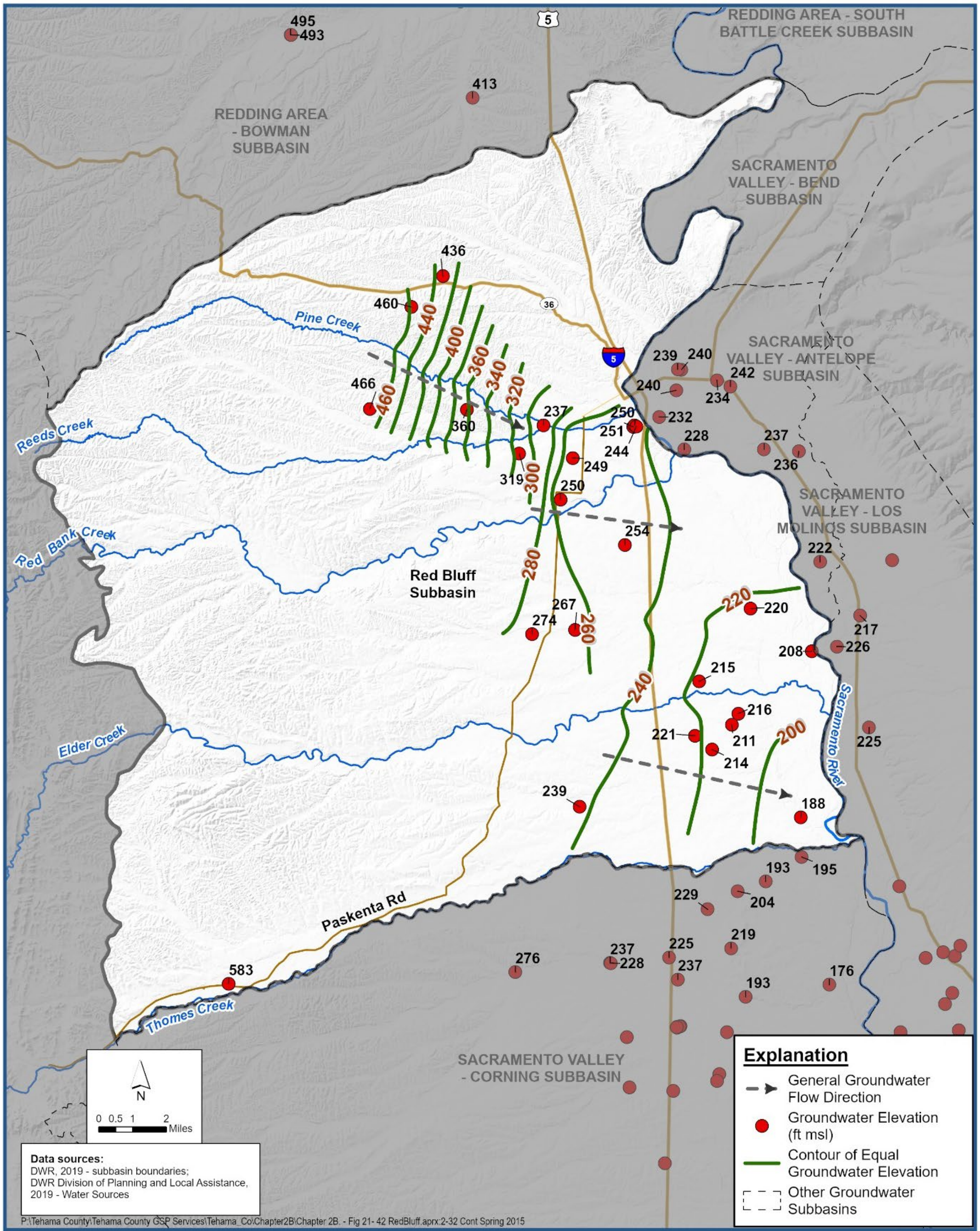
Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal Low of 2013

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-45



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B. - Fig 21- 42 RedBluff.aprx:2-32 Cont Spring 2015

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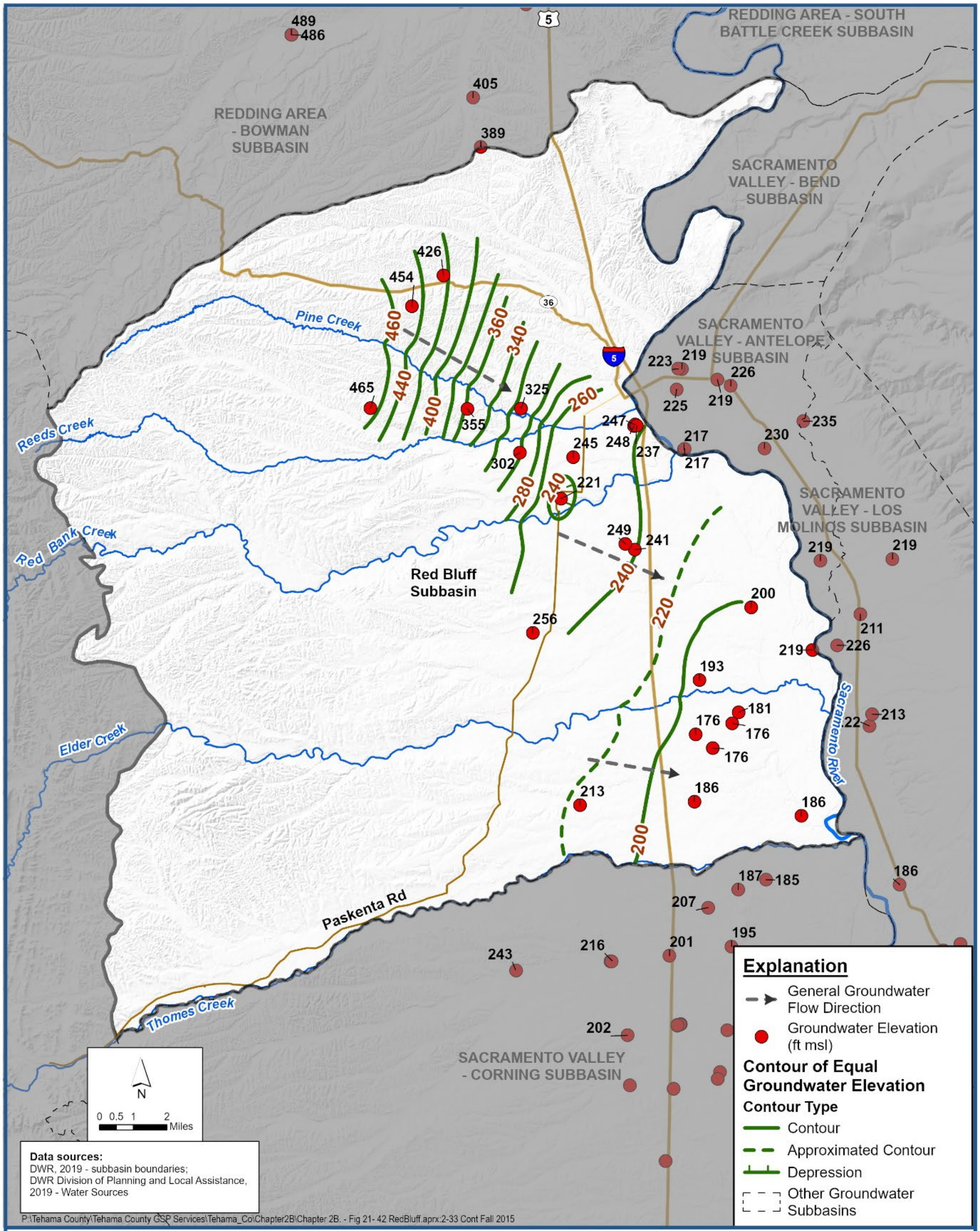
Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal High of 2015

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-46



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Contours of Equal Groundwater Elevation, Upper Aquifer - Seasonal Low of 2015

Groundwater Sustainability Plan
Red Bluff Subbasin

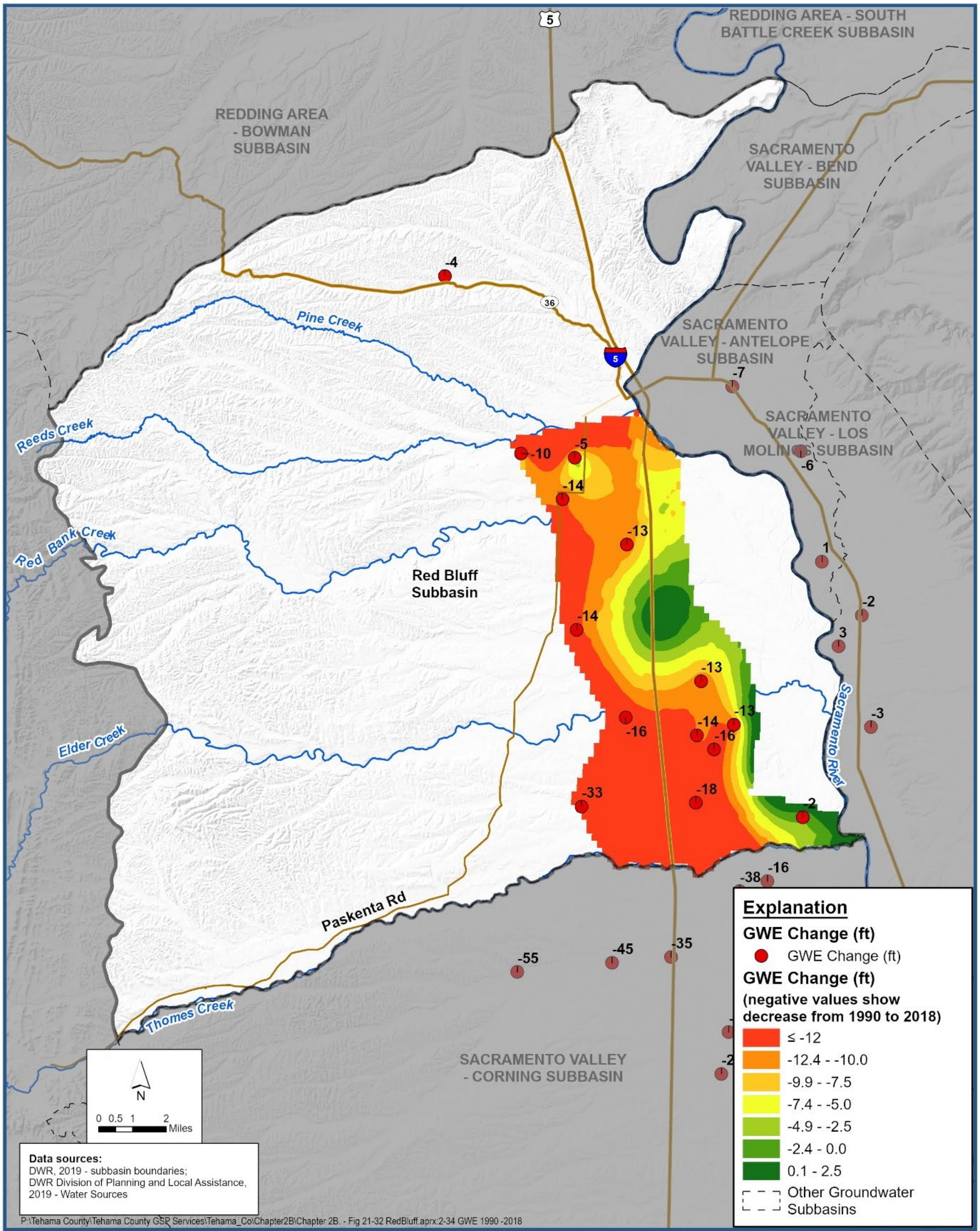
Figure 2-47

Groundwater contour maps of the Upper Aquifer indicate an easterly (in areas south of Reeds Creek) and southeasterly (in areas north of Reeds Creek) general flow from the elevated areas of the valley towards the Sacramento River in the valley floor. General groundwater flow directions in the Subbasin are primarily determined by the topography and influenced by local-scale groundwater withdrawal and recharge. Groundwater contour maps also show that the general horizontal hydraulic gradient in the eastern and southeastern areas of the Subbasin (east of Paskenta Road and south of Reeds Creek) increase from the winter/spring to fall within a water year, as well as from a wet year to a dry or critical year. In a wet year, hydraulic gradient in these areas ranges from about 9 to 12 feet per mile (ft/mile) during the winter/spring, and from about 12 to 15 ft/mile during the fall. During a dry or critical year, horizontal gradient ranges from about 10 to 20 ft/mile throughout the year without distinct seasonal changes. Horizontal gradient in the highlands north of Reeds Creek and south of Beegum Road/Highway 36W remain between 30 and 38 ft/mile without distinct variations corresponding to seasons or climatic conditions.

Water level data from nested wells near Gerber indicate a vertically downward hydraulic gradient in the Upper Aquifer ranging between about 0.07 and 0.12 in the winter/spring and between 0.2 and 0.3 in the summer/fall. The direction of vertical hydraulic gradient between the Upper Aquifer and the Lower Aquifer changes; upward gradients up to 0.03 over multi-year periods usually during and after dry climatic conditions, and downward gradients up to 0.01 at other times. The vertical gradient within the Lower Aquifer typically remained downward (up to 0.02) during the winter/spring, and upward (between 0.02 and 0.07) during the summer/fall.

2.2.2.2 Change in Groundwater Levels and Storage

Change in seasonal high groundwater elevations (spring to spring) from 1990 to 2018 was estimated to evaluate changes in groundwater storage during the hydrologic base period. Groundwater elevation surfaces for 1990 and 2018 were separately created by interpolating available water levels in each year; the difference between these two surfaces (**Figure 2-48)**, which encompasses a volume of both water and porous media, was calculated. Sufficient water level data were available to evaluate groundwater level changes only in a southeastern portion of the Subbasin shown in **Figure 2-48**. Between 1990 and 2018, groundwater elevations decreased by approximately 13 ft in this part of the Subbasin (mainly areas east of Paskenta Road, west of Tehama Colusa Canal and south of Reeds Creek. The area where groundwater elevation change was estimated is approximately 40,200 acres, which is about 15% of the Subbasin area. However, this area includes about 54% of all irrigated lands in the Subbasin (2018 land use data). The change of groundwater elevations corresponds to a decrease of approximately 41,000 acre-feet of groundwater in the Upper Aquifer of this area, using the volume between the two groundwater surfaces and a specific yield of 0.079 (DWR, 2004). The specific year-to-year historical groundwater storage changes are also estimated using a surface water-groundwater flow model discussed in the Chapter 2C.



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B. - Fig 21-32 RedBluff.aprx:2-34 GWE 1990 -2018

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Change of Groundwater Elevation from Spring 1990 to Spring 2018

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-48

2.2.2.3 Groundwater Quality

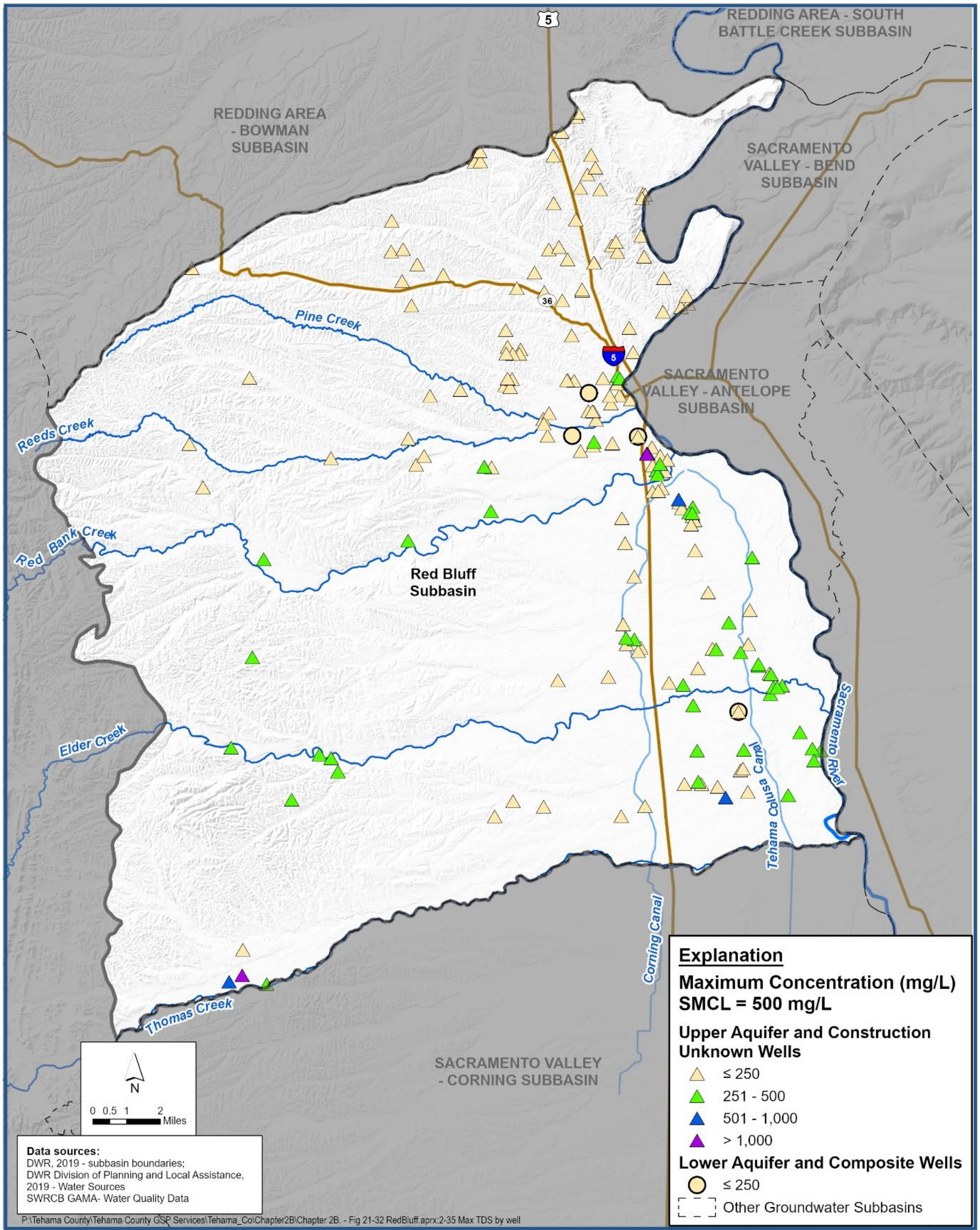
The evaluation of groundwater quality in the Subbasin included a literature review (e.g., Bennett et al., 2011; DWR, 2020; SWRCB, 2009 and Tehama County FCWCD, 2012) and evaluation of groundwater quality data collected from SWRCB GeoTracker and GeoTracker GAMA databases. SWRCB GeoTracker database identifies eight currently open groundwater clean-up sites within the Subbasin (shown in **Figure 2-12** in Chapter 2.1). Five of these sites, including three land disposal sites that are currently being monitored, are not currently in operation. The other three sites are currently being monitored and/or undergoing remedial actions. Occurrence of synthetic organic compounds and volatile organic compounds associated with industrial products and pesticides, as well as chemicals associated with disinfectant byproducts at concentrations higher than their Maximum Contaminant Levels (MCL), have been reported in the Subbasin. These contaminants are listed in Chapter 2.1. Widespread presence of contaminants at undesirable levels has not been reported in groundwater samples in the Subbasin. The following discussion focuses on total dissolved solid (TDS), nitrate, arsenic, iron, and manganese concentrations in the Subbasin.

Total Dissolved Solid (TDS)

The occurrence of Total Dissolved Solids (TDS) at undesirable concentrations is not a concern at present. Long term TDS records show temporal fluctuations within narrow ranges without any noticeable trend. A total of 799 groundwater samples were tested for TDS since 1952; only 12 sample results exceeded the Secondary Maximum Contaminant Level of 500 milligrams per liter (mg/L). These 12 samples were collected from six Upper Aquifer wells: one sample in 2018 and all others between 2003 and 2008 (**Figure 2-49**). TDS concentrations of 22 samples collected from eight Lower Aquifer and composite (screened in both Upper Aquifer and Lower Aquifer) wells since 1989 have not exceeded 250 mg/L.

Nitrate

Occurrence of nitrate (nitrate, expressed as nitrogen) concentrations that exceed the Maximum Contaminant Level (MCL) of 10 mg/L is not widespread in the Subbasin. Results of 88 of 2,698 samples tested since 1952 exceeded the MCL. Samples exceeding the MCL were collected from 11 of the 322 tested wells. These 11 wells are predominantly (10 of 11) about five miles south from the City of Red Bluff (**Figure 2-50**); however, construction details are only known for three wells (Upper Aquifer). Test results of a municipal well in this area (Well 5200525-001) show a trend of decreasing nitrate concertation since 2009 without distinct seasonal fluctuations (**Appendix 2-G**). However, results from another municipal well (well 5200655-001) show an increasing trend of nitrate concentrations, as well as substantial seasonal fluctuations (concentrations over 10 mg/L in the summer and below 5 mg/L in the winter/spring). Elevated levels of nitrate in drinking water pose a serious health risk for infants. Potential sources of nitrate in the Subbasin include sewage disposal systems and fertilizer used in agriculture.



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources
SWRCB GAMA- Water Quality Data

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B. - Fig 21-32 RedBluff.aprx:2-35 Max TDS by well

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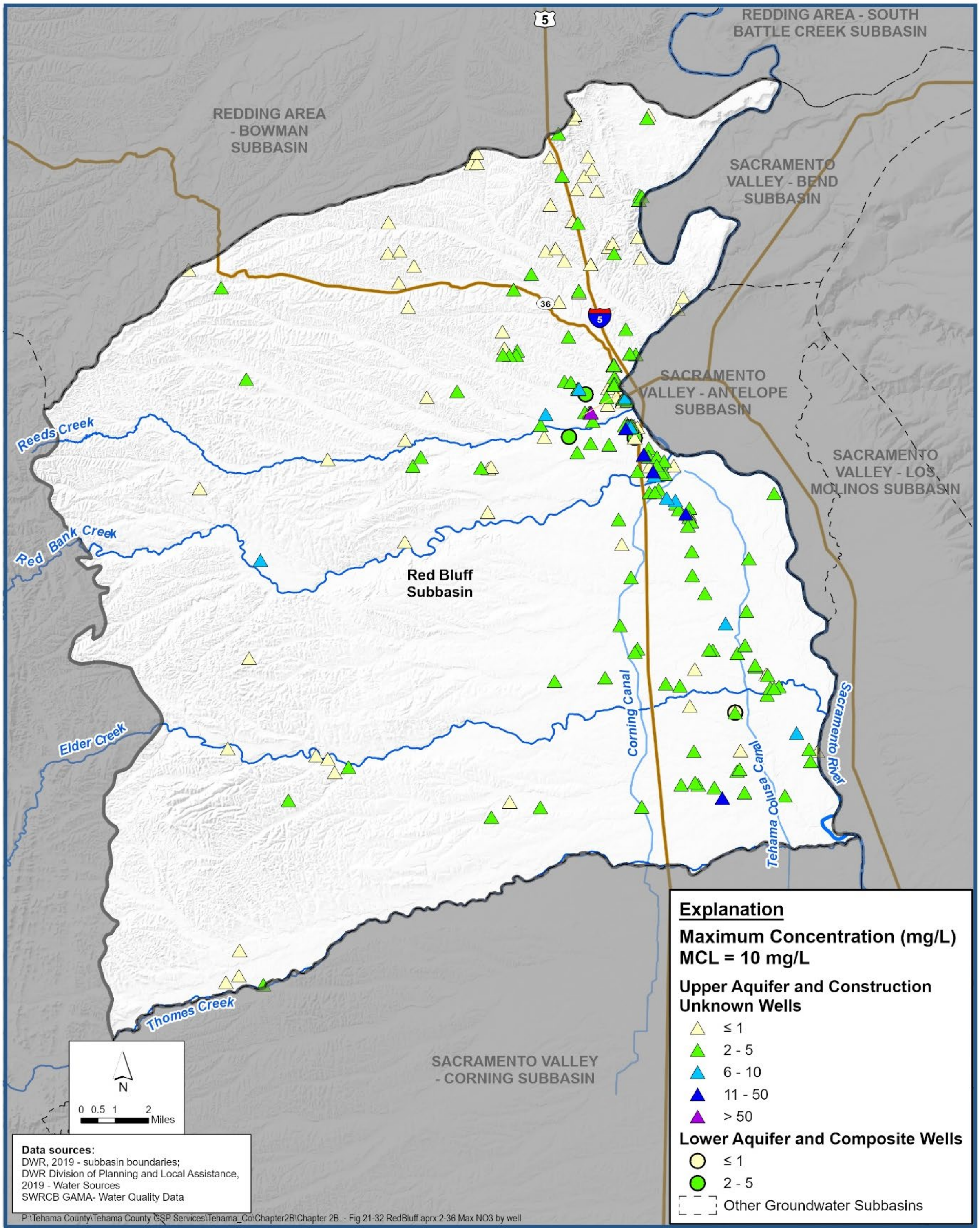
Maximum Historical TDS Concentration by Well

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-49



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources
SWRCB GAMA- Water Quality Data

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Maximum Historical Nitrate Concentration by Well

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-50

Arsenic

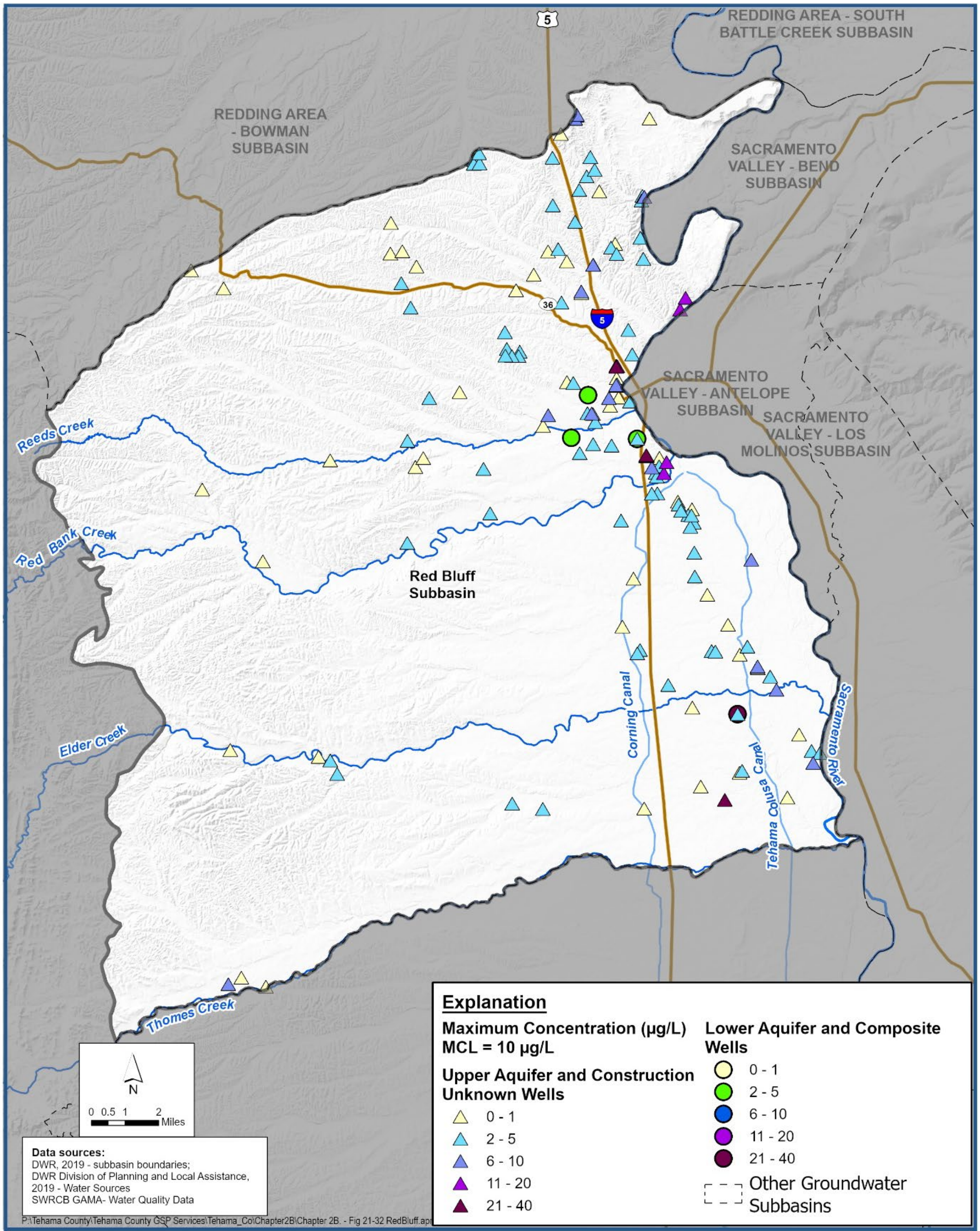
The occurrence of arsenic at concentrations exceeding the MCL of 10 micrograms per liter (µg/L) is not a widespread groundwater quality concern in the Subbasin, however there are several wells with test results exceeding the MCL. Since 1956, 642 samples collected from 2,020 wells were tested and only 30 samples from 15 wells exceeded the MCL (**Figure 2-51)**. All five samples from two nested wells screened in the Lower Aquifer (25N03W11B002M and 25N03W11B003M) close to Gerber have arsenic concentrations between 10.6 and 28.9 µg/L (sampled between 2005 and 2015). Five of eight test results (sampled between 2003 and 2007) of an Upper Aquifer municipal well located about three miles south from these two wells exceeded the MCL, with four values between 31 and 36 µg/L. However, no identifiable trend can be determined from any well based on analysis of timeseries data (**Appendix 2-G**). Arsenic is a naturally occurring chemical that originates from volcanic rocks of the Tuscan formation (Tehama County FCWCD, 2012).

Iron and Manganese

Groundwater samples with iron and manganese concentrations that exceed the Secondary Maximum Contaminant Level of each chemical (SMCL) are common in the Subbasin. Exceedances of SMCL values do not present a risk to human health but may indicate aesthetic conditions like taste, color, or odor. A total of 719 samples were tested for iron since 1959 and 174 sample results exceeded the SMCL of 300 µg/L. A total of 1,125 samples were tested for manganese since 1956 and 570 sample results exceeded the SMCL of 50 µg/L. About 35% of wells tested for iron (83 of 238) and 26% of wells tested for manganese (64 of 245) have exceeded the corresponding SMCL at least once. All samples with above-SMCL concentrations are from Upper Aquifer wells and wells without construction details. Iron and manganese in groundwater may originate from weathering of minerals in rocks (Tehama County FCWCD, 2012). High concentrations of iron and manganese also can be an artifact of steel well casings; therefore, these test results may not accurately represent the ambient concentrations in groundwater (DWR, 2020).

2.2.2.4 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator for the Red Bluff Subbasin because it is not likely to occur in the Subbasin due to its distance from the Pacific Ocean (about 90 miles).



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources
SWRCB GAMA- Water Quality Data

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Maximum Historical Arsenic Concentration by Well

Figure 2-51

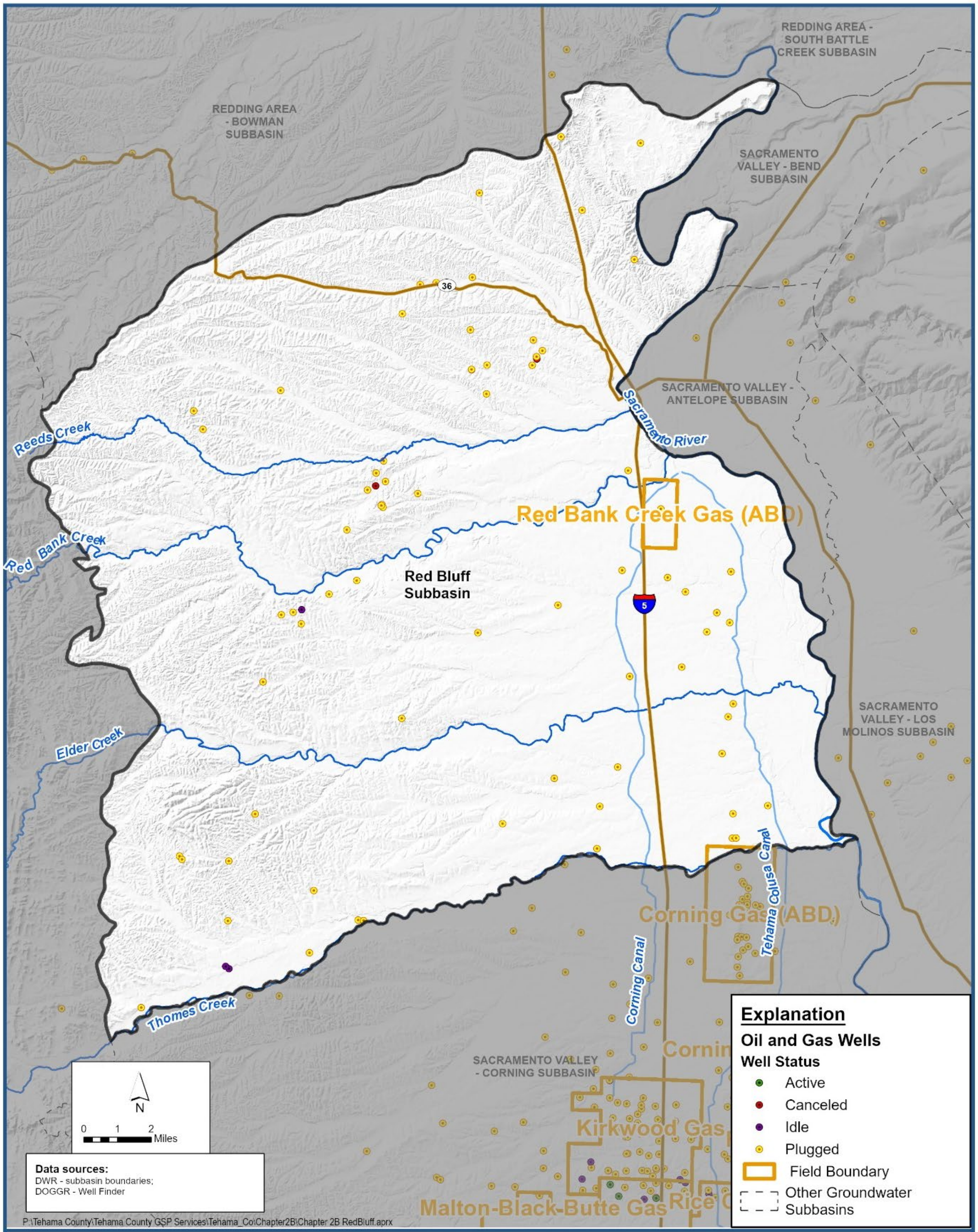
2.2.2.5 Subsurface Compaction and Land Subsidence

Red Bluff Subbasin has little to no reported evidence of subsidence. Subsidence occurs when groundwater is extracted from the pore spaces in the geologic material leading to compaction. The compaction causes the ground surface elevation to drop. In addition to groundwater extraction, oil and gas extraction can lead to subsidence. There are no active oil or gas wells in the Subbasin (**Figure 2-52**). Subsidence monitoring in the Subbasin is available from three main surveys conducted by DWR and UNAVCO. The subsidence measured in these studies is likely elastic, meaning the land surface can recover (rise) if groundwater is recharged and again fills the pore spaces. Negative subsidence measurements indicate a downward vertical movement of the land surface and positive values indicate an upward movement.

In 2018 DWR released a report on land subsidence from 2008-2017 using Global Positioning systems (GPS) survey methods. In 2008, DWR contracted the installation of a series of survey monuments across 11 counties; 11 survey monuments are within the Subbasin boundaries (**Figure 2-53**). These monuments were surveyed to establish a baseline elevation and then resurveyed in 2017. Results from 2008 and 2017 were compared to establish an average change in ground surface elevation over the almost ten-year study period. In the Subbasin, measured ground surface elevation ranged from -0.095 ft at the station near I-5 and Oat Creek to -0.027 ft at the station near Elder Creek and the Sacramento River (**Figure 2-53**). On average, subsidence in the Subbasin was -0.0061 feet per year over the duration of the study.

In 2015 DWR began reporting Interferometric Synthetic Aperture Radar (InSAR) surveys to assist with subsidence studies related to SGMA. Vertical measurements are collected by the European Space Agency Sentinal-1A satellite and compared to previous measurements to establish a change in surface elevation. The vertical measurements are collected as point data sets that represent 100-meter by 100-meter areas and are used to interpolate GIS rasters (**Figure 2-54**). Maximum vertical displacement measured using the InSAR approach from July 2015 to June 2019 was <-0.15 ft in the Subbasin over the entire period of study (**Figure 2-54**).

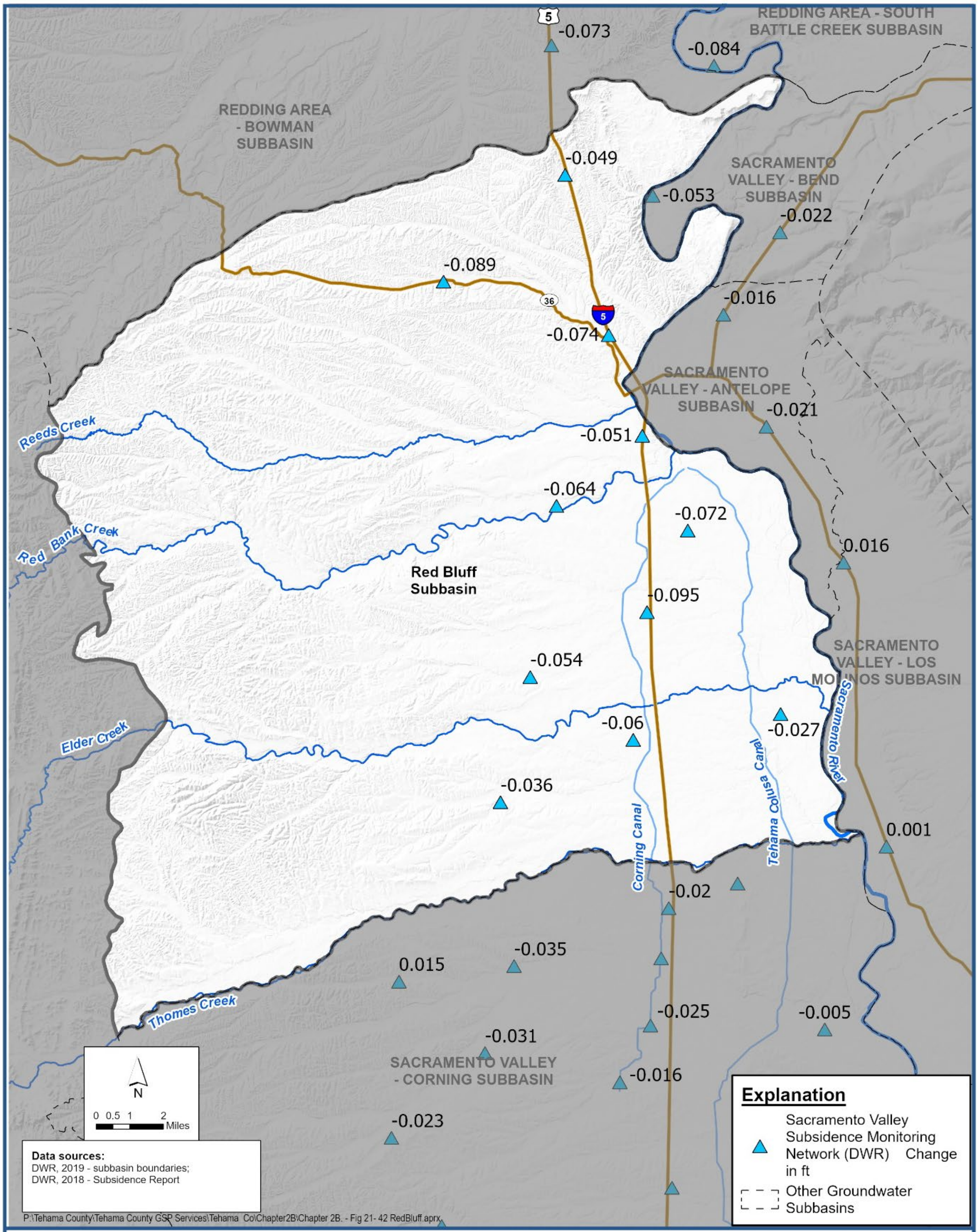
Between 2003 and 2008, UNAVCO installed GPS survey stations to record lateral and vertical land surface movement as part of their Plate Boundary Observatory (PBO) project. The GPS stations for the PBO record movement on a centimeter to millimeter scale. There is one PBO monitoring station within the Subbasin (P345) (**Figure 2-55**). Since recording at P345 began in 2005, there has been an overall decrease in ground surface elevation of approximately 0.1 ft. On average, in the last 14 years, ground surface elevation decreased 0.007 ft/yr at station P354. This station recorded large fluctuations (>-0.2 ft) between 2006 and 2009. These measurements are questionable and likely not representative of subsidence in those years.



Map of Oil and Gas Fields and Wells

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-52



Data sources:
DWR, 2019 - subbasin boundaries;
DWR, 2018 - Subsidence Report

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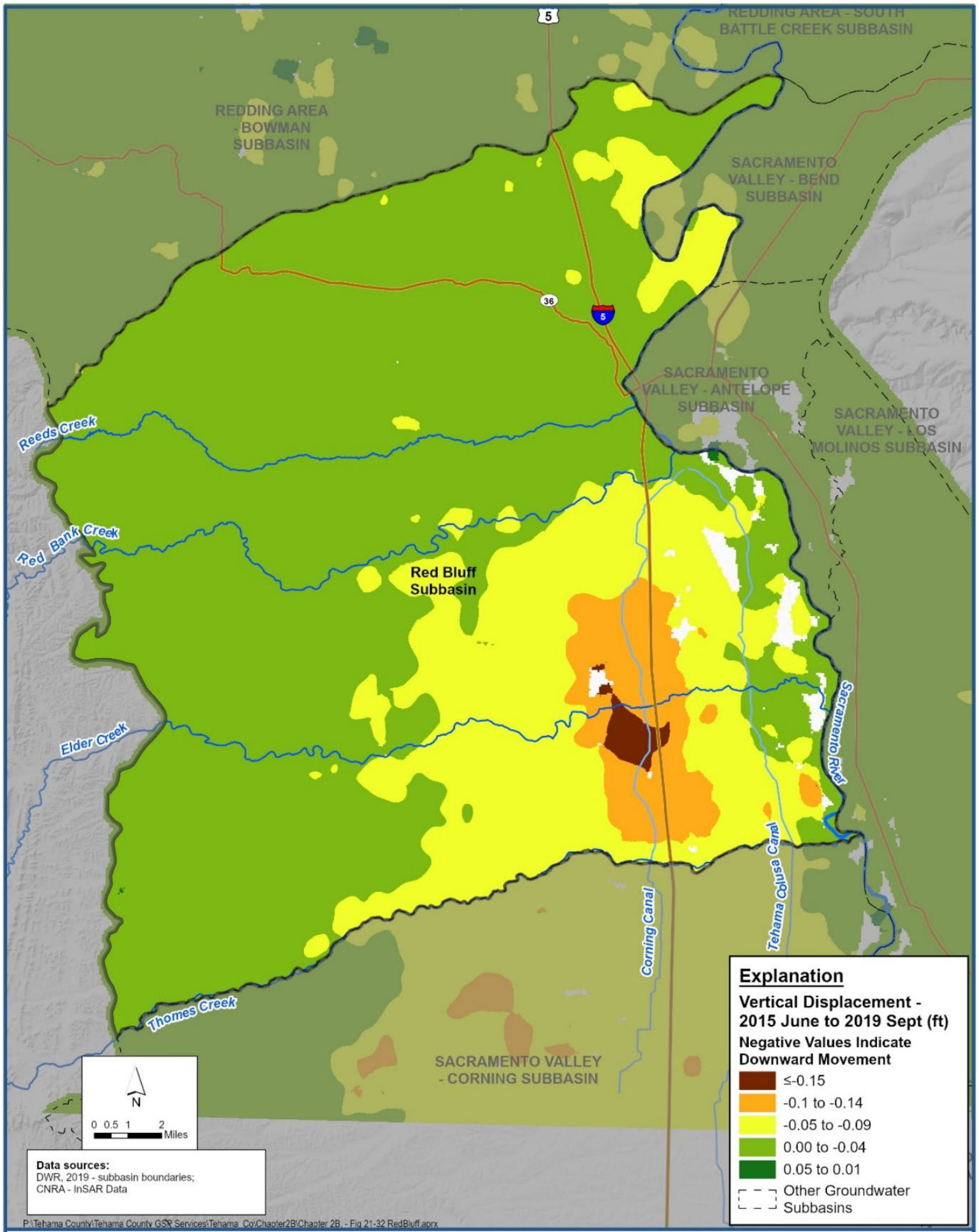
Subsidence Measurements Between 2008 and 2017

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-53



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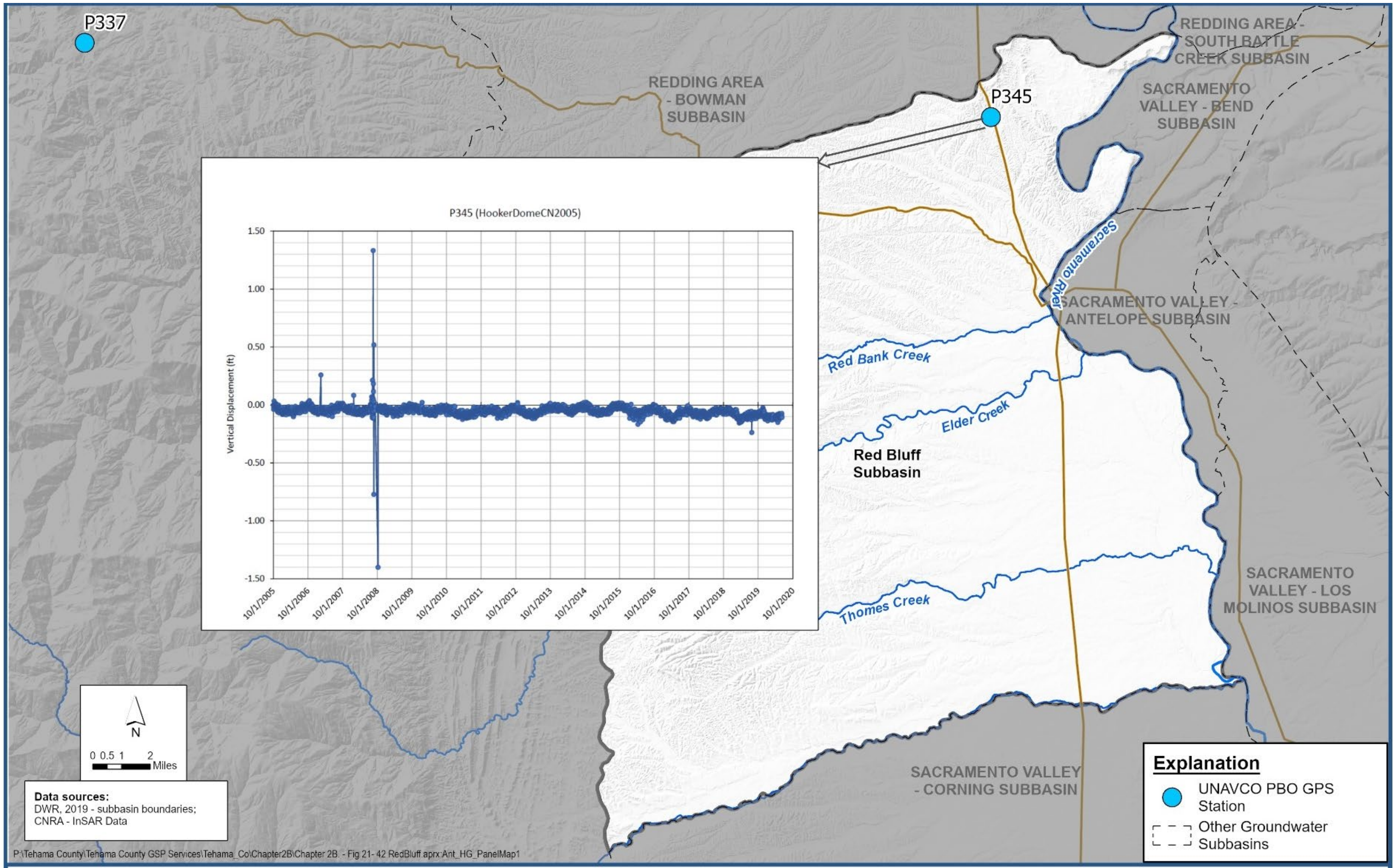
DWR InSAR Subsidence Map

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-54



Data sources:
DWR, 2019 - subbasin boundaries;
CNRA - InSAR Data

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UNAVCO PBO GPS Measurements

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-55

2.2.2.6 Surface Water Conditions

Historic and current surface water flow data is limited in the Subbasin. As discussed in Section 2.2.1.7, the Sacramento River, Thomes Creek, Elder Creek, Oat Creek, Red Bank Creek, Reeds Creek, and Pine Creek are the main surface water features. The Sacramento River and Thomes Creek flow throughout the year (perennial), but Elder Creek, Oat Creek, Red Bank Creek, Reeds Creek and Pine Creek flow seasonally. Only the Sacramento River has active stream gages within the Subbasin (**Figure 2-35**). Thomes Creek and Elder Creek have currently active gaging stations just to the west of the Subbasin boundary (**Figure 2-35**).

The Sacramento River has three currently active gaging stations close to the Subbasin; USGS/USBR station #11377100 at Bend Bridge (BND), USBR station at Red Bluff Diversion Dam (RDB), and DWR station at Tehama Bridge (TEH). USGS/USBR station #11377100 (BND) is located about a mile downstream of the northern boundary of the Subbasin (**Figure 2-35**) with a daily record since 1963. Historical data from BND shows a mean annual flow rate of about 12,500 cubic feet per second (CFS) with highest flows from January through March (historical mean over 16,800 CFS), and lowest flows in October (historical mean about 7,000 CFS) (USGS NWIS stream flow data). Station RDB is located at the eastern boundary of the Subbasin (**Figure 2-35**) and TEH is located about three miles upstream from the southern boundary of the Subbasin. Stations RDB and TEH are only equipped with stage sensors and only directly measure stage; however, CDEC's website presents flow data (assumed to be calculated from stage).

Flow of Thomes Creek is currently measured at Paskenta (station THO operated by DWR) about a mile upstream of the western boundary of the Subbasin. The mean annual flow rate is about 300 CFS according to flow records from THO (1997 to 2020) and historical data of currently inactive USGS station # 11382090 located close to THO (1921 to 1996). In general, the flow is highest in January and February (mean of over 700 CFS), and it is lowest in August and September (mean of less than 10 CFS). Based on historical data from USGS station #11382090 (located approximately 7 miles west of the Sacramento River; 1978 to 1980) the mean annual flow rate is about 389 CFS, with highest flow in January and February (mean of about 1,210 CFS), and typically no flow from July through September.

Flow of the Elder Creek has been measured since 1949 at USGS station #11379500 located about a mile upstream of the western boundary of the Subbasin. The mean annual flow rate of is about 170 CFS, with highest flows in January and February (mean of about 250 CFS), and the lowest flows in August and September (mean of about 3 CFS). Additional historical data for Elder Creek is available from two USGS stations. Station #11380000 located approximately 9 miles west of the Sacramento River, with available historical data from 1931 to 1941 has a mean annual flow rate of about 106 CFS, with highest flow in February and March (mean of about 291 CFS), and mostly no flow from July to October. Station #11380500 located approximately 3 miles west of the Sacramento River, (historical data from 1950 to 1969) has a mean annual flow rate of about 110 CFS, with highest flow in January and February (mean of about 326 CFS), and mostly no flow from July to October.

Red Bank Creek was measured at a USGS station about eight miles downstream of the western boundary of the Subbasin (#11378800) (1960 to 1982) with a mean annual flow rate of about 70 CFS, with highest flow in January (mean of about 180 CFS), and mostly no flow from July to October. Additional historical flow data of Red Bank Creek (1965 to 1967) are available from a USGS station approximately two miles upstream from where Red Bank Creek enters the Sacramento River (#11378860). The mean annual flow at this location is about 64 CFS, with highest flow in January (mean of about 285 CFS), and typically no flow from July to October.

2.2.2.6.1 *Interconnected Surface Water Systems*

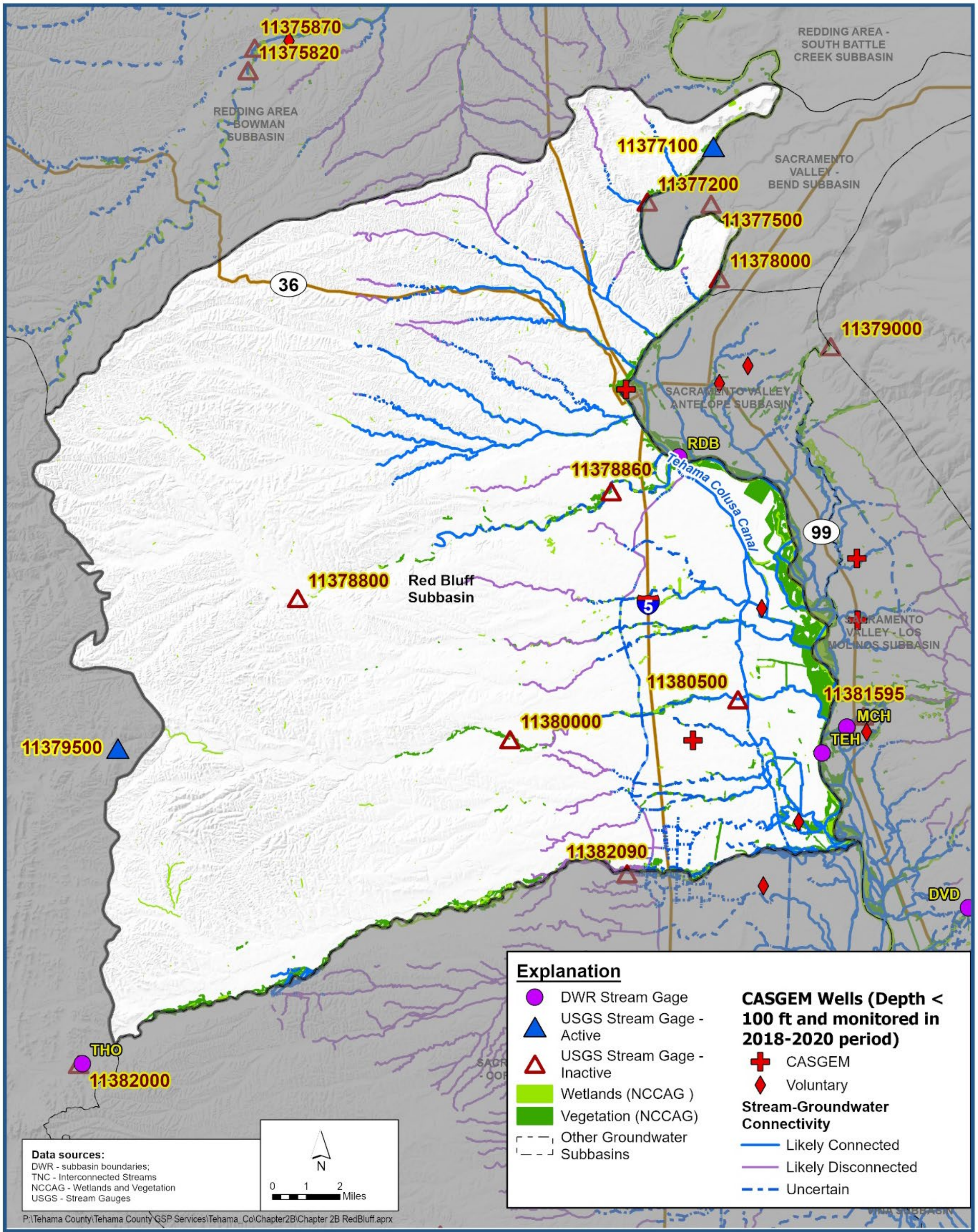
Characterizing the connectivity of the surface water systems in the Subbasin is challenging due to the limited data. Modeling surface water and groundwater interaction will also be a means to address the connectivity and is discussed in chapter 2.3. When a stream stage is higher than that of the groundwater table the stream will lose water to the ground via infiltration of water through the streambed (losing conditions). If losing conditions are present but the depth of the water table is too deep, the stream is considered losing and disconnected. Losing conditions with groundwater just below the stream are connected. When the water table elevation is higher than the stream stage, groundwater will infiltrate into the stream causing the stream to gain water (gaining conditions). Groundwater and surface water are always connected under gaining conditions. To establish if streams are connected, stream data like flow magnitude or stage height coupled with shallow groundwater elevation or flow direction is needed.

The Subbasin does not contain active stream gages near shallow monitoring wells needed to accurately define interconnectivity of surface water and groundwater (**Figure 2-56**). As discussed in section 2.2.2.6, USGS station #11377100 (BND), DWR station RDB, and DWR station TEH are the only currently active sources of stream stage data within the Subbasin. There are three currently monitored shallow CASGEM wells in the Subbasin. The closest CASGEM well to an active station is two miles away from TEH. Of the several inactive gages one has an overlapping record with a well on a tributary of the Sacramento River **Table 2-10**. Installation of shallow monitor wells near currently active gage stations would help to characterize the interconnectivity of the Sacramento River and the groundwater in the Subbasin.

Figure 2-56 shows likely interconnected, likely disconnected and interconnectivity uncertain stream reaches based on a dataset developed by The Nature Conservancy (TNC, 2021). This dataset categorizes the likelihood of the interconnectivity based on approximated streambed elevation at a selected point and the minimum depth to groundwater at a nearby well recorded between 2011 and 2018. A stream segment that was hydraulically connected to groundwater at any time during that period is categorized as likely interconnected. Therefore, a large uncertainty exists about the seasonal and year-to -year variability of interconnectivity of streams. Losing and gaining stream segments categorized using the calibrated Tehama Integrated Hydrologic Model are included in **Sub-appendix G** of **Appendix 2-J.**

Table 2-10. Details of the Stream Gage and Well with Overlapping Historical Record Periods

STREAM GAGE			GROUNDWATER MONITORING WELL		
Station Number	Start Year	End Year	State Well Number	Start Year	End Year
11380500	1949	1979	25N03W03L001M	1952	1970



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Surface water and Shallow Groundwater Monitoring Stations

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-56

2.2.2.7 Identification of Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) are defined in the GSP regulations as, "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" (23 CCR § 351(m)). Freshwater species in Red Bluff Subbasin are listed in **Appendix 2-H**. These species were geographically selected from the California Freshwater Species Database (CDFW, 2015). The approach used to both identify and prioritize GDE's was modified from the guidance document *Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act – Guidance for Preparing Groundwater Sustainability Plans* (The Nature Conservancy, 2018. The guidance document was produced by The Nature Conservancy (TNC), an environmental stakeholder who has been actively involved in GSP development and review throughout the state. The dataset of Natural Communities Commonly Associated with Groundwater (NCCAG) provides indicators of potential groundwater dependent ecosystems (iGDEs). This dataset, provided by DWR, is a compilation of 48 publicly available state and federal agency datasets that map vegetation, wetlands, springs, and seeps in California (Klausmeyer et al., 2018). NCCAG data show the occurrence of iGDEs adjacent to perennial and intermittent streams, as well as seasonally flooded wetlands in the Subbasin (**Figure 2-57**). The process used to identify potential GDEs in the Subbasin was accomplished by:

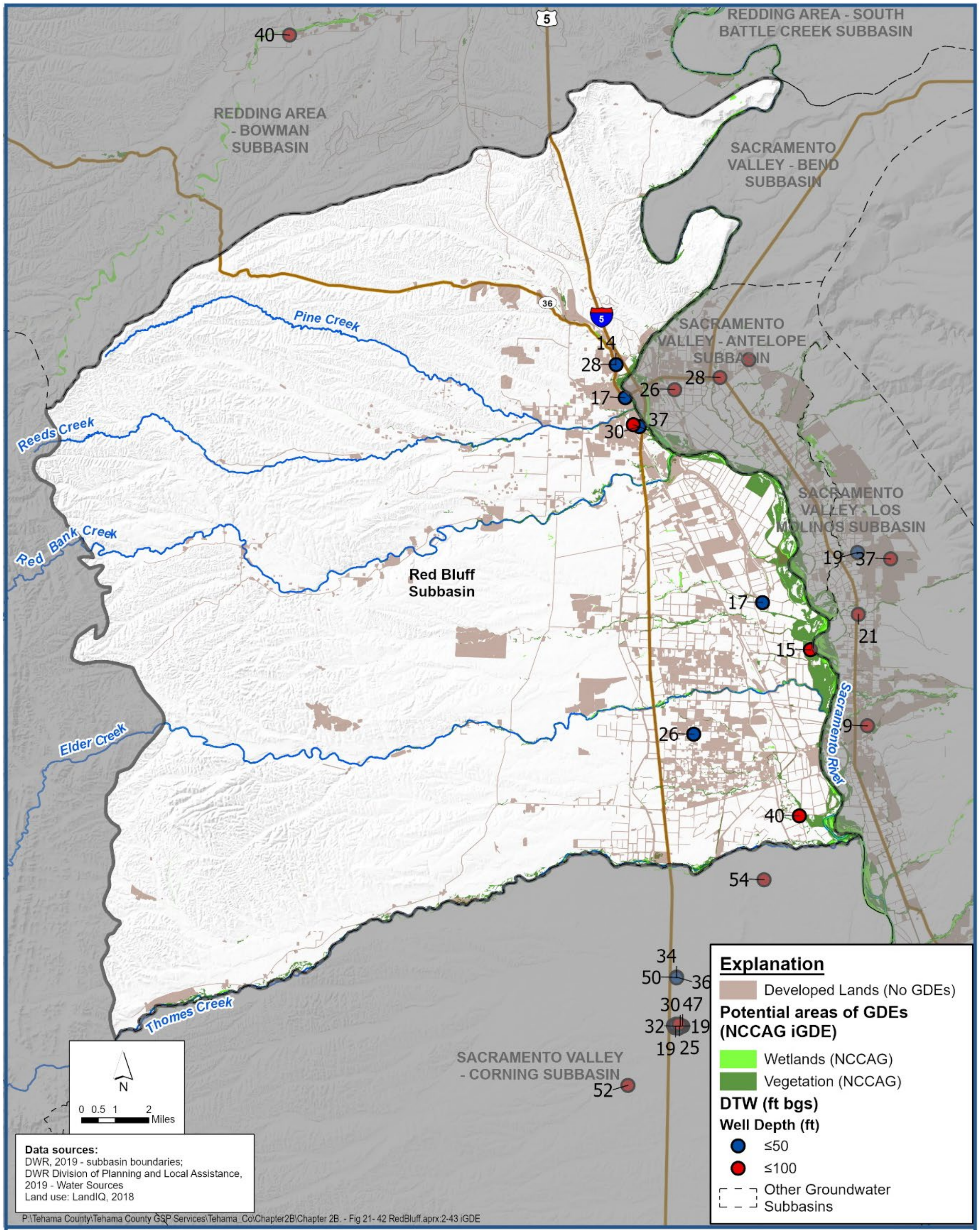
- a comparison of iGDEs with recent land cover data to update the map of iGDEs. This step is required because some iGDEs given in the NCCAG dataset are sourced from datasets mapped many years before 2015, which is the baseline year of SGMA. IGDEs found to exist within developed or irrigated lands were excluded during this step.
- an evaluation of groundwater conditions that can support GDEs. GDEs are likely to exist in areas where the seasonal high groundwater levels do not fall deeper than 30 ft bgs (TNC, 2019). Therefore, identifying areas with shallow groundwater that can support GDEs is important to identify GDEs. IGDEs within 1 mile of wells and with 2015-seasonal-high water deeper than 30 ft were excluded in this step.

A detailed description of methodology of GDE identification and prioritization is presented in a separate Technical Memorandum in **Appendix 2-I,** Surface Water Depletion and GDE Methodology and Analysis. The steps above reduce the original NCCAG dataset of iGDEs from an area of 4,800 acres to 4,333 acres of GDEs, a reduction of 10%.

Identified GDEs were then prioritized for future monitoring using two Vegetation Metrics available at the GDE Pulse web application developed by TNC; Normalized Derived Vegetation Index (NDVI) that indicates vegetation greenness and Normalized Derived Moisture Index (NDMI) that indicates vegetation moisture (Klausmeyer et al., 2019). An annual NDVI value based on summer conditions was assigned to each individual GDE. Then a linear regression was performed to determine the trend of NDVI values between 1990 and 2018 (representative base period of this GSP). A negative trend of NDVI indicates a decrease in vegetation greenness during this period. GDEs with negative NDVI trends were classified as high priority (trend less than -0.1) and low priority (trend between -0.1 and zero) for future monitoring. High priority GDEs cover an area of about 404 acres within the

Subbasin (**Figure 2-58**). In the future, low priority GDEs will be observed outside of the established monitoring program and may be reclassified as high priority depending on future conditions.

High priority GDEs were further evaluated to determine if temporal changes of vegetation metrics and local groundwater levels were correlated. Identifying such correlations would be useful to establish groundwater levels that can sustain GDEs. Only wells that were perforated within the top 100 feet below ground surface (near surface wells) and located within approximately one mile from the GDEs were included in this analysis. None of the wells that met above criteria had sufficient historical water level data to identify correlations with vegetation metrics of high priority GDEs. Considering the lack of groundwater level monitoring close to high priority GDEs at present, installation of shallow groundwater monitoring wells near or within these GDEs is recommended.



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources
Land use: LandIQ, 2018

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B. - Fig 21- 42 RedBluff.aprx:2-43 iGDE

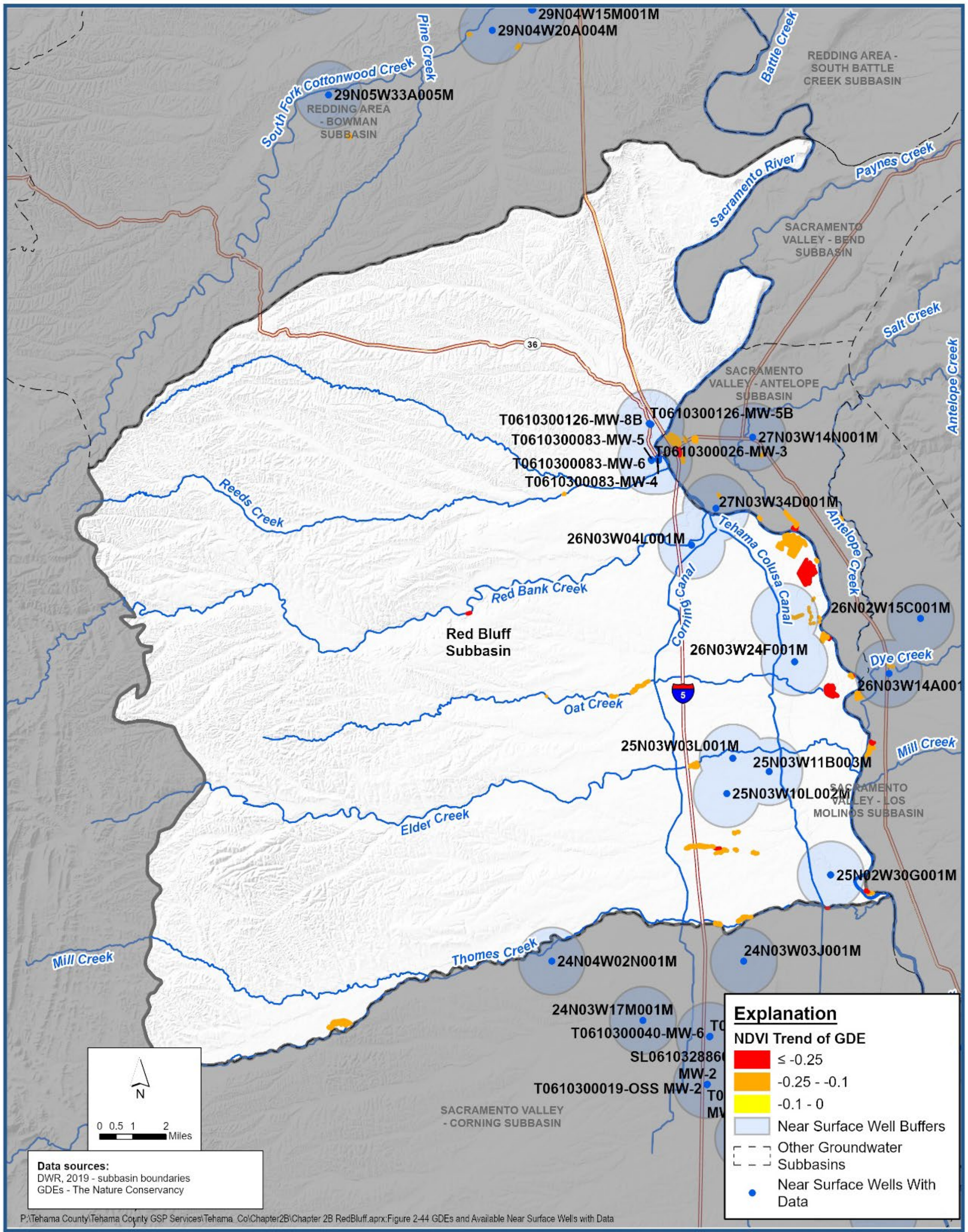
TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Map of Potential Groundwater Dependent Ecosystems

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-57



Data sources:
DWR, 2019 - subbasin boundaries
GDEs - The Nature Conservancy

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B RedBluff.aprx:Figure 2-44 GDEs and Available Near Surface Wells with Data

NDVI Trend of GDEs

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 2-58

2.2.3 Basin Setting Summary

In the Red Bluff Subbasin, water generally flows in an east to southeastern direction with downward vertical movement in the Upper Aquifer driven by natural recharge. Water typically follows topography flowing from high elevation areas in the west toward low elevations near Sacramento River in the east. Recharge contributions to the deeper geologic formations occurs where the formations outcrop at the surface. Aquifer recharge also generally occurs along the Sacramento River and perennial streams where saturated hydraulic conductivity of soils is high. Proximal to these surface water features groundwater likely flows outward when groundwater elevations are lower (losing conditions). Discharge from the groundwater also occurs in these areas when the water table rises to the ground surface elevation (gaining conditions). The larger source of discharge is likely from production of water wells. A portion of applied water (irrigation) also contributes to recharge. There is a two-aquifer system in the Subbasin with unconfined to semi-confined conditions in the Upper Aquifer and semi-confined to confined conditions in the Lower Aquifer.

The concepts discussed in Section 2.2 will be further discussed and refined in Chapter 2.3, the Water Budget. Section 2.2 provided basic concepts needed to understand the geometry of the Subbasin, distribution and character of water bearing material, distribution and movement of groundwater and surface water, and historic and current groundwater conditions including water quality. Basic physical Properties of the Subbasin include:

- The Red Bluff Subbasin is bounded to the north by the Red Bluff Arch, to the east and southeast by the Sacramento River, to the south by Thomes Creek, and to the west by the Coast Ranges Geologic Province.
- Fresh water occurs as groundwater to a maximum depth of over -2,400 ft msl in the east of the Subbasin.
- The bottom of the Subbasin is defined as the base of the post-Eocene continental deposits.
- The more recent geologic history is dominated by fluvial and alluvial deposition.
- The major water bearing formations are the Tuscan and Tehama Formations with some contribution from the shallower Quaternary sedimentary deposits.
- The ground surface generally slopes from the west to east with steeper slopes in the west of the Subbasin.
- Widespread presence of contaminants at undesirable levels has not been reported in groundwater samples in the Subbasin.
- Red Bluff Subbasin has little to no reported evidence of subsidence, with recent rates of -0.0061 feet/year or less.

Based on available data, a two-aquifer system is defined in the Subbasin. Groundwater conditions in the Subbasin include:

- The Upper Aquifer is defined as model layers 1-5 (approximately 350-450 ft bgs) and the Lower Aquifer is defined as model layers 6-9. The model layers will be further discussed in Chapter 2C.
- Recharge of the Subbasin primarily occurs from the flow of the Sacramento River and the other streams and tributaries in the Subbasin (Pine Creek, Reeds Creek, Red Bank Creek, Oat Creek, Elder Creek, Mill Creek, Thomes Creek etc.).
- Subsurface geologic formations can be recharged directly where they outcrop in the Subbasin.
- Groundwater contour maps of the Upper Aquifer indicate an easterly/southeasterly general flow from the elevated areas of the valley towards the Sacramento River in the valley floor.
- Horizontal groundwater gradient magnitude ranges from about 9 ft/mile to 20 ft/mile in the valley floor, and 30 and 38 ft/mile in hillslopes.
- Seasonal high-water levels of the Upper Aquifer range between about 10 and 110 ft bgs during wet periods, and seasonal water level fluctuation ranges from a few feet to about 50 ft.
- Seasonal high-water levels of the Lower Aquifer in southeastern area range from 20 to 40 ft bgs during wet periods, and seasonal fluctuation ranges from a about 20 to 50 ft.
- Dry year to a wet year comparison indicates groundwater elevations are up to 30 ft deeper in the Upper Aquifer and up to about 10 ft deeper in the Lower Aquifer.
- A vertically downward hydraulic gradient (0.07 to 0.12 in the winter/spring and 0.2 to 0.3 in the summer/fall) exists in the southeastern area of the Upper Aquifer.
- Direction of vertical hydraulic gradient between the Upper Aquifer and the shallow part of the Lower Aquifer has changed over time (upward gradients up to 0.03 typically during and after dry conditions, and downward gradients up to 0.01 at other times).
- Vertical gradient within the Lower Aquifer has predominately remained downward (up to 0.02) during the winter/spring, and upward (between 0.02 and 0.07) during the summer/fall.
- Wells with long-term water level data show small declines of groundwater levels over time (1990 to 2018) with rates up to about 0.50 ft/year in most wells (a decline of less than nine feet in 1990-2018 period).
- At present, groundwater quality is good with no widespread presence of contaminants at undesirable levels reported in groundwater samples in the Subbasin.

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FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

(Chapter 2C – Water Budget)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini, Consulting Engineers

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LIST OF ACRONYMS & ABBREVIATIONS

af	Acre-feet
AN	Above normal Sacramento Valley water year type
AWMP	Agricultural Water Management Plan
BMP	Best Management Practice
BN	Below normal Sacramento Valley water year type
C	Critical (dry) Sacramento Valley water year type
CCR	California Code of Regulations
D	Dry Sacramento Valley water year type
DWR	Department of Water Resources
ET	Evapotranspiration
GMP	Groundwater Management Plan
GSP	Groundwater Sustainability Plan
GWS	Groundwater System
SWS	Surface Water System
taf	Thousand acre-feet
Tehama IHM	Tehama Integrated Hydrologic Model
UWMP	Urban Water Management Plan
W	Wet Sacramento Valley water year type
WMP	Water Management Plan

2 SUBBASIN PLAN AREA AND BASIN SETTING (REG. § 354.8)

2.1 Description of Plan Area

2.2 Basin Setting

2.3 Water Budget (Reg. § 354.18)

An integral component of the GSP is the quantification of the water budget, which is an accounting of water movement and storage between the different systems of the hydrologic cycle (**Figure 2-59**). The Subbasin water budget includes an accounting of all inflows and outflows to the Subbasin. The difference between the volume of inflow and outflow to the Subbasin is equal to the change in storage as illustrated in **Equation 2-1**.

$$\text{Inflows} - \text{Outflows} = \text{Change in Storage}$$

Equation 2-1. Water Budget Equation

DWR has published guidance and Best Management Practice (BMP) documents related to the development of GSPs, including Water Budget BMPs (DWR, 2016a). The Water Budget BMPs recommend a water budget accounting structure, or conceptual model, which distinguishes the subbasin surface water system (SWS) and groundwater system (GWS). The SWS represents the land surface down to the bottom of plant root zone[1], within the lateral boundaries of the Subbasin. The GWS extends from the bottom of the root zone to the definable bottom of the Subbasin, within the lateral boundaries of the Subbasin. The complete Subbasin water budget is a product of the interconnected SWS and GWS water budgets. The lateral and vertical boundaries of the Subbasin are described in **Section 2.2** of the GSP.

Consistent with these BMPs, this section presents the methodology and results for the historical, current, and projected water budgets of the Red Bluff Subbasin. The water budgets were developed through application of the Tehama Integrated Hydrologic Model (Tehama IHM), a numerical groundwater flow model developed for the Subbasin area that characterizes surface water and groundwater movement and storage across the entire Subbasin, including extending into areas extending outside of the Subbasin. The Tehama IHM is an integrated groundwater and surface water model developed for the purpose of conducting sustainability analyses within Tehama County, including for the Red Bluff Subbasin. The model utilized foundational elements of DWR's SVSim regional model for the Sacramento Valley (DWR, 2021) and was refined locally for improved application in the Subbasin area. Key model refinements made during development of the Tehama IHM include, but are not limited to, extending of the simulation period through water year 2019, refinement of land use conditions based on recent land use mapping information, review and modification to land use crop coefficients based on local remote sensing energy balance data, refinement of surface water supplies and diversions, and enhancements to the sediment textural model used for aquifer parameter. After conducting refinements, the Tehama IHM was calibrated using local groundwater level and streamflow data. The Tehama IHM has a historical simulation period spanning from water year 1985 through 2019, although the calibration period is 1990-2019. Detailed documentation associated with the development of the Tehama IHM is included in **Appendix 2-J.**

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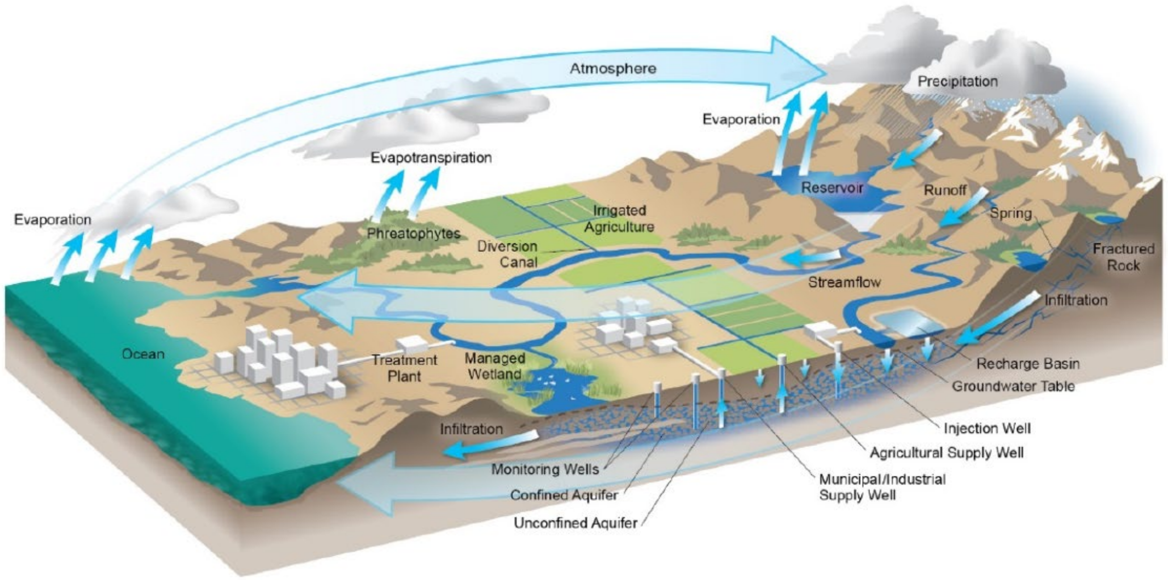
[1] The root zone is defined as "the upper portion of the soil where water extraction by plant roots occurs." The depth to the bottom of the root zone varies by crop, but typically ranges from 2-7 feet (ASCE, 2016).

This section presents the historical, current, and projected water budget results for the Red Bluff Subbasin. Water budget results for the SWS and GWS are presented individually and as part of a complete water budget for the Subbasin. This section describes the different water budget components and the results of water budget estimates derived from the Tehama IHM. The section includes discussion of the estimated uncertainties associated with the water budget analysis, data sources, and results with additional details related to these topics also described in the model documentation included as **Appendix 2-J**. The water budget results presented in this section are rounded to two significant digits consistent with the typical uncertainty associated with the methods and sources used in the analysis. Water budget component results may not sum to the totals presented because of rounding.



2.3.1 Water Budget Conceptual Model

A water budget is defined as a complete accounting of all water flowing into and out of a defined volume[2] over a specified period of time. When the water budget is computed for a subbasin, the water budget facilitates assessment of the total volume of groundwater and surface water entering and leaving the subbasin over time, along with the change in volume of water stored within the subbasin.

2.3.1.1 Water Budget Structure

For accounting purposes, the Subbasin's water budget is divided into the surface water system (SWS) and groundwater system (GWS), described above. These systems are referred to as *accounting centers*. Flows between accounting centers and storage within each accounting center are water budget *components*. A schematic of the general water budget accounting structure is provided in **Figure 2-60**.

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[2] Where 'volume' refers to a space with length, width and depth properties, which for purposes of the GSP means the defined aquifer and associated surface water system.

The conceptual model (or structure) for the Subbasin water budget is presented in **Figure 2-61**, including presentation of terms used in the following section to describe individual aspects of the water budget. The required components for each accounting center are listed in **Table 2-11**, along with the corresponding section of the GSP Regulations (California Code of Regulations Title 23[3] (23 CCR) §354). Separate but related water budgets were prepared for each accounting center that together represent the overall water budget for the Subbasin.

This section discusses the inflows and outflows from each of the SWS and GWS parts of the Subbasin. The water budgets are calculated using the Tehama IHM, which integrates flows between the SWS and GWS. The GWS water budget incorporates all inflows and outflows from the SWS into an accounting of the net effect of the hydrology and water use on groundwater storage in the Subbasin.

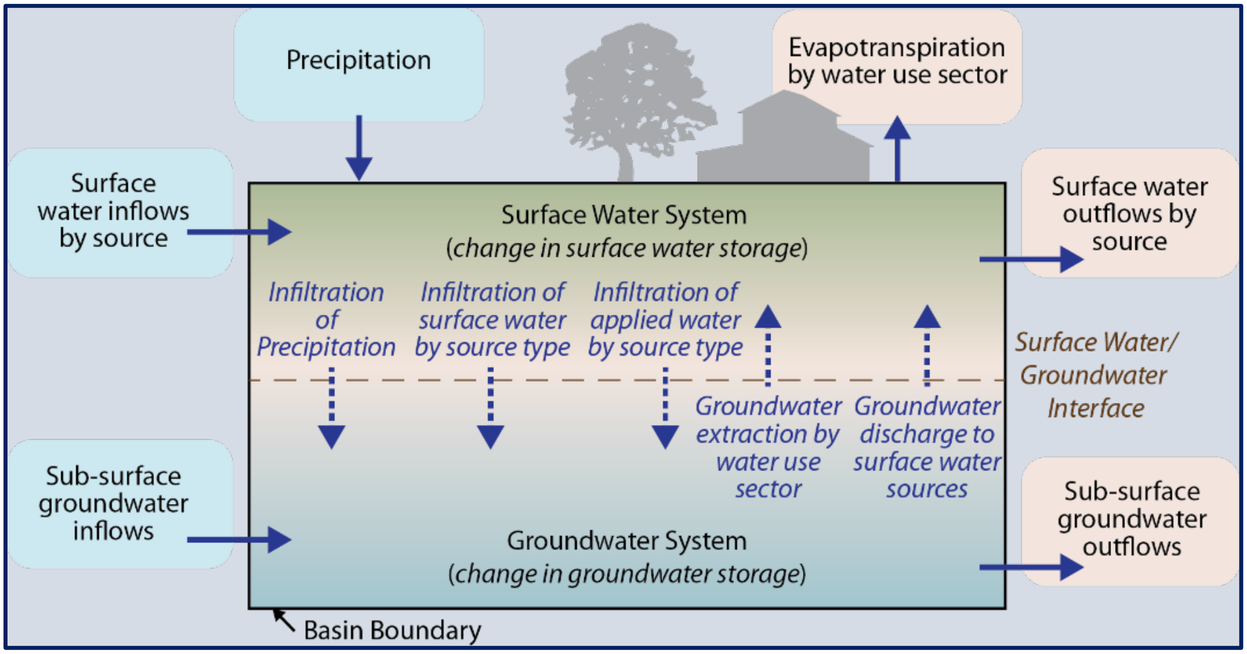

Figure 2-60. Water Budget Accounting Structure (Source: DWR, 2016a)

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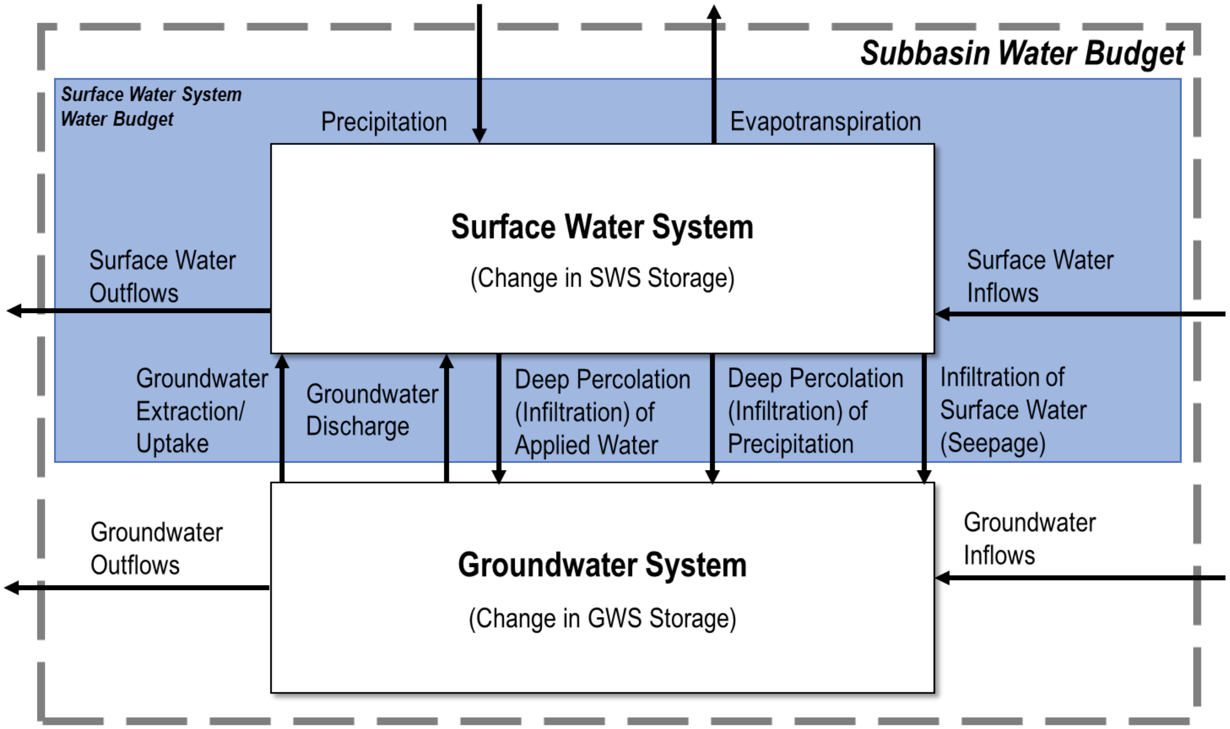
[3] California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2 Groundwater Sustainability Plans, Article 5 Plan Contents



Net Recharge from the SWS =
(Deep Percolation of Applied Water + Deep Percolation of Precipitation + Infiltration of Surface Water) – Groundwater Extraction/Uptake

Figure 2-61. Subbasin Water Budget Conceptual Model

Table 2-11. Water Budget Components by Accounting Center and Associated GSP Regulations

ACCOUNTING CENTER	WATER BUDGET COMPONENT (FLOW DIRECTION)	GSP REGULATION SECTION[1]
Basin	Surface Water Inflow[2] (+)	§354.18(b)(1)
	Precipitation (+)	Implied
	Subsurface Groundwater Inflow (+)	§354.18(b)(2)
	Evapotranspiration[3] (-)	§354.18(b)(3)
	Surface Water Outflow[2] (-)	§354.18(b)(1)
	Subsurface Groundwater Outflow (-)	§354.18(b)(3)
	Change in Storage	§354.18(b)(4)
Surface Water System	Surface Water Inflow[2] (+)	§354.18(b)(1)
	Precipitation (+)	Implied
	Groundwater Extraction (+)	§354.18(b)(3)
	Groundwater Discharge (+)	§354.18(b)(3)
	Evapotranspiration[3] (-)	§354.18(b)(3)
	Surface Water Outflow[2] (-)	§354.18(b)(1)
	Infiltration of Applied Water[4,5] (-)	§354.18(b)(2)
	Infiltration of Precipitation[4] (-)	§354.18(b)(2)
	Infiltration of Surface Water[6] (-)	§354.18(b)(2)
	Change in SWS Storage[7]	§354.18(a)
Groundwater System	Subsurface Groundwater Inflow (+)	§354.18(b)(2)
	Infiltration of Applied Water[4,5] (+)	§354.18(b)(2)
	Infiltration of Precipitation[4] (+)	§354.18(b)(2)
	Infiltration of Surface Water[6] (+)	§354.18(b)(2)
	Subsurface Groundwater Outflow (-)	§354.18(b)(3)
	Groundwater Extraction (-)	§354.18(b)(3)
	Groundwater Discharge (-)	§354.18(b)(3)
	Change in GWS Storage	§354.18(b)(4)

1. California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2 Groundwater Sustainability Plans, Article 5 Plan Contents
2. By water source type.
3. Evapotranspiration includes total evapotranspiration and evaporation, by water use sector. Total evapotranspiration includes the combined evaporation from the soil and transpiration from plants, resulting from both applied water and precipitation. In this context, evaporation is the direct evaporation from open water surfaces.
4. Synonymous with deep percolation.
5. Includes infiltration of applied surface water, groundwater, and reused water
6. Synonymous with seepage. Includes infiltration of lakes, streams, canals, drains, and springs.
7. Change in storage of root zone soil moisture, not groundwater.

2.3.2 Water Budget Analysis Periods

Per 23 CCR §354.18, each GSP must quantify the historical, current, and projected water budget conditions for the Subbasin.

2.3.2.1 Historical and Current Water Budget Periods

The historical water budget for the Subbasin must quantify all required water budget components starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the water budget (23 CCR § 354.18(c)(2)(B)). The historical water budget period effectively represents long-term average hydrologic conditions. The current water budget must include the most recent hydrology, water supply, water demand, and land use information (23 CCR § 354.18(c)(1)). The historical water budget enables evaluation of the effects of historical hydrologic conditions and water demands on the water budget and groundwater conditions within the Subbasin over a period representative of long-term hydrologic conditions. The current water budget presents information on the effects of recent hydrologic and water demand conditions on the groundwater system.

The historical and current water budget periods were selected to evaluate conditions over discrete representative periods considering the following criteria: Sacramento Valley water year type; long-term mean annual water supply; inclusion of both wet and dry periods, antecedent dry conditions, adequate data availability; and inclusion of current hydrologic, cultural, and water management conditions in the Subbasin. Water years, as opposed to calendar years, are used as the time unit for defining analysis, following the DWR standard water year period (October 1 through September 30). Unless otherwise noted, all years referenced in this section are water years.

Based on these criteria, the following periods were identified for presentation of historical and current water budgets:

- **Historical Water Budget Period**: Water years 1990-2018 (29 years) using historical hydrologic, climate, water supply, and land use data.
- **Current Water Budget Periods**: Consideration of five different recent water year periods (listed below) using the historical hydrologic, climate, water supply, and land use data over each period.
    - Recent 10 years (2009-2018)
    - Recent 5 years (2014-2018)
    - Recent 3 years (2016-2018)
    - Recent 1 year (2018)
    - Recent 1 year (2019)

For the historical water budget, the period from 1990-2018 was selected to represent long-term average hydrologic conditions following evaluation of precipitation records and DWR Sacramento Valley water year type classification (**Table 2-12**). Further information and discussion of the historical water budget period, including discussion of historical hydrology and the base period selection process, are presented in **Section 2.2** of this GSP. Discussion of the historical water budget water results is included in **Section 2.3.4.**

Table 2-12. Sacramento Valley Water Year Type Classification during the Historical Water Budget Period (1990-2018)

SACRAMENTO VALLEY WATER YEAR TYPE	ABBREVIATION	NUMBER OF YEARS,1990-2018	PERCENT TOTAL YEARS,1990-2018
Wet	W	8	28%
Above Normal	AN	4	14%
Below Normal	BN	5	17%
Dry	D	5	17%
Critical	C	7	24%
Total		**29**	**100%**

For consideration in estimating the current water budget, the results for several recent periods were presented, including recent 1-year, 3-year, 5-year, and 10-year periods. These various periods result in widely varied inflows and outflows, much of which is attributed to varied precipitation and water supplies in individual years (see results in **Section 2.3.5**). Although the model simulations were run for the period 1990-2072, results for 2019 are only shown in the current water budget comparison table for the purpose of considering variability in water budget over different recent time periods. The water budget for year 2019 is not explicitly included in the historical, current, or projected water budgets for the Subbasin although it was simulated in the model to span the years between historical (1990-2018) and projected (2022-2072) water budget periods. Details of model inputs are presented in **Appendix 2-J**. Because of the year-to-year variability in water budget results, the current water budget summarizes results from the various recent periods considered to provide an appropriate and reasonable representation of the current water budget based on recent conditions.

2.3.2.2 Projected 50-Year Hydrology and Water Budget Period (§354.18c3)

The projected water budget is intended to evaluate the effects of anticipated future conditions of hydrology, water supply availability, and water demand over a 50-year GSP planning period on the Subbasin water budget and groundwater conditions. The projected water budget incorporates consideration of potential climate change and water supply availability scenarios and evaluation of the need for and benefit of any projects and management actions to be implemented in the Subbasin to maintain or achieve sustainability. The 51-year projected water budget uses hydrologic conditions representative of the most recent 50 years of hydrology in the Subbasin, with adjustments applied in scenarios for evaluating the water budget under climate change and/or altered water supply and demand conditions.

To evaluate projected water budgets, fifty years of future hydrology inputs to the Tehama IHM were developed through consideration of the historical hydrology from 1968 to 2018. Because of the availability of higher quality data and characterization of conditions in the Subbasin during more recent years spanning the historical base period (1990-2018), the projected water budget analyses used surrogate years from the historical period to construct a future hydrology and water budget period representative and consistent with hydrologic conditions over a historical 50-years period from 1968 to 2018. Surrogate years from the historical period were assigned to represent 50 years of future hydrology based on 1) the Sacramento Valley water year index from DWR for each year, 2) mimicking variability (wet and dry) in the historical precipitation conditions in the Subbasin and replicating precipitation consistent with the annual average historical precipitation, and (3) replicating regional streamflow conditions based on flows in the Sacramento River. The frequency of water year types used in the projected hydrology is representative of the 50 years of hydrology for the period 1969-2019 and includes approximately equal proportions of water years with above normal (wet and above normal; 48%) and below normal (below normal, dry, critical; 52%) hydrologic conditions (**Table 2-13**).

The approach and inputs used in development of the projected water budget are described in greater detail in the Tehama IHM documentation included as **Appendix 2-J**.

Table 2-13. Sacramento Valley Water Year Type Classification Over the Projected Water Budget Period (2022-2072)

SACRAMENTO VALLEY WATER YEAR TYPE	ABBREVIATION	NUMBER OF YEARS,2022-2072	PERCENT TOTAL YEARS, 2022-2072
Wet	W	18	35%
Above Normal	AN	7	14%
Below Normal	BN	7	14%
Dry	D	9	18%
Critical	C	10	20%
Total		51	100%

2.3.3 Surface Water System (SWS) Water Budget Description

Water budgets for the SWS were developed to characterize historical and current conditions in the Subbasin relating to the individual inflows and outflows and overall SWS water budget. The general approach used in the SWS water budget calculations is described in **Section 2.3.3.1**. **Section 2.3.4** presents the results of the historical SWS water budgets within the boundary of the Subbasin and **Section 2.3.5** presents results for current SWS water budget analyses. The analyses and results relating to the projected water budget are presented in **Sections 2.3.6** through **2.3.8**. Additional detailed discussion of the procedures and results of the SWS water budgets is included in documentation of the Tehama IHM development and results presented in **Appendix 2-J.**

2.3.3.1 General SWS Water Budget Components and Calculations

SWS inflows and outflows were quantified on a monthly basis, including accounting for any changes in SWS storage, such as changes in water stored in the root zone (**Equation 2-2**).

Total SWS Inflows – Total SWS Outflows = Change in SWS Storage (monthly)

Equation 2-2. Equation for Red Bluff Subbasin SWS Water Budget Analysis

As shown in **Figure 2-60** and **Table 2-11**, inflows to the SWS include surface water inflows (in various rivers, streams, and canals), precipitation, groundwater extraction (pumping and groundwater uptake), and groundwater discharge to surface water sources (from areas of high groundwater levels). Outflows include evapotranspiration (ET), surface water outflows (in various rivers, streams, and canals), infiltration of applied water (deep percolation from irrigation), infiltration of precipitation (deep percolation from precipitation), and infiltration of surface water (seepage).

The ET outflow component includes the following: ET of applied water (ET from soil and crop surfaces, of water that is derived from applied surface water, groundwater, and reused water); ET of precipitation (ET from soil and crop surfaces, of water that is derived from precipitation); and evaporation from rivers, streams, canals, reservoirs, and other water bodies. 'ET of applied water' differs from 'applied water' in that applied water is the volume of water that is directly applied to the land surface by irrigators (from all water sources), whereas ET of applied water is the volume of that applied water that is consumptively used by crops, vegetation, and soil surfaces.

Change in SWS storage is also depicted in **Figure 2-60** and **Table 2-11**. This represents the change in root zone soil moisture throughout the year. This is not the same as change in groundwater storage.

Net recharge from the SWS is defined as the total groundwater recharge (total infiltration from all sources) minus groundwater outflows to the surface water system, including both groundwater extraction and groundwater uptake by crops and vegetation.[4] Groundwater discharge to the SWS is not included in the net recharge term but is summarized separately as an exchange between the SWS and GWS. Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS.

More information about the net exchanges of surface water and groundwater in the Subbasin is provided in **Appendix 2-K**.

2.3.3.2 Detailed SWS Water Budget Accounting Centers and Components

To estimate the water budget components required by the GSP Regulations (**Table 2-11**), the SWS water budget accounting center is subdivided into detailed accounting centers representing the Land Surface System, the Canal System, and the Rivers, Streams, and Small Watersheds System (waterways conveying natural flow and surface water supplies into the Subbasin).

The Land Surface System represents inflows and outflows from irrigated and non-irrigated land. The Canals System represents flows through the canals and conveyance systems of diverters with access to surface water. The Rivers, Streams, and Small Watershed Systems represent inflows and outflows through waterways that convey natural flow, upgradient runoff, and drainage.

The Land Surface System is further subdivided into water use sectors, defined in the GSP Regulations as "categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation" (23 CCR Section 351(al)). Principal water use sectors in the Subbasin include Agricultural (irrigated crop land and idle agricultural land), Native Vegetation (native and riparian vegetation), and Urban (urban, residential, industrial, and semi-agricultural[5]).

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[4] Groundwater discharge to surface water is not included in the calculation of net recharge from the SWS, as groundwater discharge is more dependent on shallow groundwater and soil characteristics along waterways and is much less dependent on the management of the surface layer. Net recharge from the SWS is intended to describe the impacts of the SWS on the GWS, but groundwater discharge is more reflective of the GWS effects on the SWS.

[5] As defined in the DWR crop mapping metadata, semi-agricultural land includes farmsteads and miscellaneous land use incidental to agriculture (small roads, ditches, etc.) (DWR, 2016b).

2.3.3.2.1 *SWS Inflows*

2.3.3.2.1.1 *Surface Water Inflow by Water Source Type*

Per the GSP Regulations, surface inflows must be reported by water source type. According to the Regulations (23 CCR § 351(ak)):

> *"Water source type" represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.*

Major surface water inflows to the Red Bluff Subbasin are summarized below according to water source type. Additionally, runoff of precipitation from upgradient areas adjacent to the Subbasin represents a potential source of SWS inflow.

Local Supplies

Local supply inflows to the Red Bluff Subbasin predominantly include runoff from upgradient small watersheds adjacent to the Subbasin and surface inflows along Red Bank Creek and Elder Creek. A portion of these local supplies are diverted by local water rights users for beneficial use within the Subbasin.

Central Valley Project

Central Valley Project (CVP) inflows to the Red Bluff Subbasin include surface water delivered along the Corning Canal to Proberta Water District and the portions of Thomes Creek Water District that overlie the Red Bluff Subbasin.

2.3.3.2.1.2 *Precipitation*

Precipitation falling on the landscape within the Subbasin is an inflow to the SWS. Precipitation inflows are accounted for by the land use (water use sector) on which they occur.

2.3.3.2.1.3 *Groundwater Extraction and Uptake*

Groundwater extraction is an inflow to the SWS (an outflow from the GWS). Groundwater extraction is accounted for by agricultural and urban (urban, residential, semi-agricultural, industrial) water use sectors. Urban groundwater pumping includes domestic well pumping. Groundwater uptake is water taken up by plant roots directly from the GWS.

2.3.3.2.1.4 *Groundwater Discharge to Surface Water*

Groundwater discharging to surface water features can occur where groundwater is very shallow and where groundwater levels are higher than the stage in surface water bodies. Groundwater discharge to surface water represents an inflow to the SWS (an outflow from the GWS).

2.3.3.2.2 *SWS Outflows*

2.3.3.2.2.1 *Evapotranspiration*

Evapotranspiration (ET) is accounted for by water use sector (urban, agriculture, native) and according to the source water (applied water or precipitation). ET from land includes from applied water and precipitation sources. Evaporation also occurs from rivers, streams, canals, and drains throughout the Subbasin.

2.3.3.2.2.2 *Infiltration*

Infiltration (deep percolation) is water that infiltrates below the root zone and recharges the GWS. Infiltration can occur from applied water (e.g., irrigation) or precipitation occurring on the landscape within the Subbasin. Alternatively, infiltration of surface water (stream seepage) can occur from surface water that seeps through the bottom of surface water features and recharges the GWS.

2.3.3.2.2.3 *Surface Water Outflow*

In the Red Bluff Subbasin, surface water outflows consist entirely of local supplies that traverse the Subbasin, or that drain from lands within the Subbasin or runoff into the Subbasin from upland areas outside the Subbasin. As described above, substantial local supply volumes enter the Red Bluff Subbasin along Sacramento River and tributary waterways, although much of this water passes through the Subbasin.

2.3.3.3 SWS Water Budget Overview

Water budget components are defined for each detailed accounting center in **Table 2-14** through **Table 2-16**. Within the Land Surface System accounting center, water budget components are also defined for each water use sector. These detailed water budget accounting centers and components are quantified based on the best available data and science, including information from water management plans (WMPs), groundwater management plans (GMPs), agricultural water management plans (AWMPs), urban water management plans (UWMPs), and other sources.

Each detailed accounting center was computed for the Subbasin. The Subbasin boundary SWS water budget components are identified in **Table 2-17**. The water budget includes the crop demands, available water supplies, and other characteristics specific to the Subbasin, including diversions, evaporation, and infiltration of surface water within the Subbasin.

Table 2-14. Land Surface System Water Budget Components

DETAILED ACCOUNTING CENTER	DETAILED COMPONENT	FLOW DIRECTION	DESCRIPTION
Land Surface System *Water Use Sectors: Agricultural, Native Vegetation, Urban*	Deliveries	Inflow	Deliveries of surface water supply for use within the Subbasin.
	Groundwater Extraction	Inflow	Groundwater pumping to meet water demands, and groundwater uptake by crops and vegetation.
	Precipitation	Inflow	Direct precipitation on the land surface.
	Reuse	Inflow	Reuse of percolated water from the unsaturated zone[1].
	ET of Applied Water	Outflow	Consumptive use of applied irrigation water.
	ET of Groundwater Uptake	Outflow	Consumptive use of shallow groundwater uptake.
	ET of Precipitation	Outflow	Consumptive use of infiltrated precipitation.
	Net Return Flow	Outflow	Net runoff of applied irrigation water, accounting for reuse[2].
	Runoff of Precipitation	Outflow	Direct runoff of precipitation.
	Infiltration of Applied Water	Outflow	Deep percolation of applied water below the root zone.
	Infiltration of Precipitation	Outflow	Deep percolation of precipitation below the root zone.
	Change in SWS Storage	Storage	Change in root zone soil moisture throughout the year; does not represent change in groundwater storage.

[1] "The unsaturated zone is below the land surface system and represents the portion of the basin that receives percolated water from the root zone and either transmits it as deep percolation to the GWS or to reuse within the land surface system, or both." (DWR, 2016a).

[2] Includes tailwater and pond drainage for ponded crops.

Table 2-15. Canal System Water Budget Components

DETAILED ACCOUNTING CENTER	DETAILED COMPONENT	FLOW DIRECTION	DESCRIPTION
Canal System	Diversions	Inflow	Diversions of surface water supply from waterways, a portion of which is delivered and used within the Subbasin.
	Deliveries	Outflow	Deliveries of surface water supply for use within the Subbasin.
	Infiltration of Surface Water (Seepage)	Outflow	Seepage from canals to the GWS.
	Evaporation	Outflow	Direct evaporation from canal water surfaces.
	Spillage	Outflow	Spillage from canals used for conveyance.

Table 2-16. Rivers, Streams, and Small Watersheds System Water Budget Components

DETAILED ACCOUNTING CENTER	DETAILED COMPONENT	FLOW DIRECTION	DESCRIPTION
Rivers, Streams, and Small Watersheds System	Stream Inflows	Inflow	Surface water inflows at the upstream boundary of waterways that traverse the Subbasin; includes natural flow and spillage, drainage, and runoff from canals and land surfaces upgradient of the Subbasin.
	Small Watershed Inflows	Inflow	Surface water inflows of drainage from upgradient small watersheds.
	Groundwater Discharge	Inflow	Discharge from shallow groundwater into rivers and streams.
	Spillage	Inflow	Spillage from canals used for conveyance.
	Stream Outflows	Outflow	Surface water outflows at the downstream boundary of waterways that traverse the Subbasin; includes natural flow and spillage, drainage, and runoff from canals and land surfaces.
	Small Watershed Outflows	Outflow	Surface water outflows of drainage from upgradient small watersheds at the downgradient boundary of the Subbasin.
	Diversions	Outflow	Diversions of surface water supply from waterways, a portion of which is delivered and used within the Subbasin.
	Infiltration of Surface Water (Seepage)	Outflow	Seepage from rivers, streams, and small watershed inflows to the GWS.
	Evaporation	Outflow	Direct evaporation from river and stream water surfaces.

Table 2-17. Subbasin Boundary Surface Water System Water Budget Components

DETAILED ACCOUNTING CENTER	DETAILED COMPONENT	FLOW DIRECTION	DESCRIPTION
Rivers, Streams, and Small Watersheds System	Stream Inflows	Inflow	Surface water inflows at the upstream boundary of waterways that traverse the Subbasin; includes natural flow and spillage, drainage, and runoff from canals and land surfaces upgradient of the Subbasin.
	Small Watershed Inflows	Inflow	Surface water inflows of drainage from upgradient small watersheds.
	Groundwater Discharge	Inflow	Discharge from shallow groundwater into rivers and streams.
Canal System	Diversions *(in select cases)*	Inflow	Diversions of surface water supply from waterways *at a point outside or along the boundary of the Subbasin*, a portion of which is delivered and used within the Subbasin.
Land Surface System *Water Use Sectors: Agricultural, Native Vegetation, Urban*	Groundwater Extraction	Inflow	Groundwater pumping to meet water demands, and groundwater uptake by crops and vegetation.
	Precipitation	Inflow	Direct precipitation on the land surface.
	ET of Applied Water	Outflow	Consumptive use of applied irrigation water.
	ET of Groundwater Uptake	Outflow	Consumptive use of shallow groundwater uptake.
	ET of Precipitation	Outflow	Consumptive use of infiltrated precipitation.
	Runoff of Applied Water	Outflow	Direct runoff of applied irrigation water^2.
	Runoff of Precipitation	Outflow	Direct runoff of precipitation.
	Infiltration of Applied Water	Outflow	Deep percolation of applied water below the root zone.
	Infiltration of Precipitation	Outflow	Deep percolation of precipitation below the root zone.
	Change in SWS Storage	Storage	Change in root zone soil moisture throughout the year; (not change in groundwater storage)
Canal System; and Rivers, Streams, and Small Watersheds System	Infiltration of Surface Water (Seepage)	Outflow	Seepage from canals, streams, and small watershed inflows to the GWS.
	Evaporation	Outflow	Direct evaporation from canals, rivers, and streams.
Canal System	Spillage	Outflow	Spillage from canals used for interior conveyance.
Rivers, Streams, and Small Watersheds System	Stream Outflows	Outflow	Surface water outflows at the downstream boundary of waterways that traverse the Subbasin; includes natural flow and spillage, drainage, and runoff from canals and land surfaces.
	Small Watershed Outflows	Outflow	Surface water outflows of drainage from upgradient small watersheds at the downgradient boundary of the Subbasin.

2.3.4 Groundwater System (GWS) Water Budget Description

Water budgets for the GWS were developed to characterize historical and current conditions in the Subbasin utilizing the Tehama IHM for different historical and current time periods described above. **Sections 2.3.4** and **2.3.5** present the results of the historical and current GWS water budgets within the lateral and vertical boundaries of the Subbasin. Discussion of the general approach used in developing model scenarios to evaluate projected GWS water budgets for the Subbasin with the Tehama IHM and the results from these projected water budget analyses are included in **Sections 2.3.6** through **2.3.8**. More details related to the procedures and results of the GWS water budgets are also included in documentation of the Tehama IHM development presented in **Appendices 2-J and 2-K.**

2.3.4.1 GWS Water Budget Components and Calculations

Inflows and outflows of the GWS were quantified on a monthly basis, including accounting for any changes in GWS storage (**Equation 2-3**).

$$\text{Total GWS Inflows} - \text{Total GWS Outflows} = \text{Change in GWS Storage (monthly)}$$

Equation 2-3. Equation for Red Bluff Subbasin GWS Water Budget Analysis

As shown in **Figure 2-60** and **Table 2-11**, inflows to the GWS include some of the outflow components from the SWS including infiltration (deep percolation) of precipitation and applied water and infiltration (seepage) of surface water. Additional GWS inflows include lateral subsurface groundwater inflows from adjacent subbasins and from adjacent upland or foothill areas outside the Subbasin (small watersheds). GWS outflows include exchanges with the SWS including groundwater discharge to surface waterways, groundwater extraction through pumping, and root water uptake by plants occurring directly from shallow groundwater. Lateral subsurface groundwater flows to adjacent subbasins represent additional GWS outflows. Water budget components representing exchanges between the GWS and the SWS are also included in discussions and presentations of the SWS conceptual water budget and results.

2.3.4.1.1 *Lateral Subsurface Flows*

Subsurface groundwater flows to and from the Red Bluff Subbasin occur between the Bowman Subbasin to the north, the South Battle Creek Subbasin to the northeast, the Bend, Antelope, and Los Molinos Subbasins to the east, and the Corning Subbasin to the south. Additional subsurface groundwater inflows occur from the upland (small watershed) areas adjoining the Red Bluff Subbasin.

2.3.4.1.2 *Deep Percolation From the SWS*

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components represent inflows to the GWS and are also included in the SWS water budget as outflows from the SWS.

2.3.4.1.3 *Net Stream Seepage/Groundwater Discharge to Surface Water*

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined in the GWS water budget as a net volume of stream seepage. Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

2.3.4.1.4 *Groundwater Extraction and Uptake*

Groundwater extractions and groundwater uptake are exchanges that occur between the GWS and the SWS and represent an outflow from the GWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs whereas groundwater uptake occurs through uptake of water by plants directly from the GWS.

2.3.4.2 GWS Water Budget Overview

Change in GWS storage as represented by change in groundwater storage is also depicted in **Figure 2-60** and **Table 2-11**. The change in groundwater storage represents the total change in the volume of water in storage in the groundwater system as a result of exchanges between the GWS and the SWS and the balance of all inflows and outflows of the GWS. The change in groundwater storage is directly related to changes in water levels in the groundwater system, both of which are sustainability indicators to be considered during development of a sustainable yield for the Subbasin. Each of the detailed components of the Subbasin boundary GWS water budget are identified in **Table 2-18** and were computed for the Subbasin to develop a complete GWS water budget. The HCM discussed in **Section 2.2** identifies two principal aquifers within the GWS: an Upper Aquifer and Lower Aquifer. Vertical groundwater flow does occur between these aquifers and change in storage of the entire GWS and also within each principal aquifer zone are considerations for sustainable groundwater management.

Table 2-18. Subbasin Boundary Groundwater System Water Budget Components

ACCOUNTING CENTER	DETAILED COMPONENT	FLOW DIRECTION	DESCRIPTION
Groundwater System	Lateral Subsurface Groundwater Flows Between Adjacent Subbasins	Inflow	Lateral subsurface groundwater inflow from adjacent subbasin.
	Lateral Subsurface Groundwater Flows Between Adjacent Upland or Foothill Areas	Inflow	Lateral subsurface groundwater inflow from adjacent upland or foothill areas.
	Infiltration of Surface Water (Seepage)	Inflow	Seepage from canal, streams, and small watershed inflows from the SWS.
	Infiltration (Deep Percolation) of Applied Water	Inflow	Deep percolation of applied water below the root zone from the SWS.
	Infiltration (Deep Percolation) of Precipitation	Inflow	Deep percolation of precipitation below the root zone from the SWS.
	Lateral Subsurface Groundwater Flows Between Adjacent Subbasins	Outflow	Lateral subsurface groundwater outflow to adjacent subbasin.
	Groundwater Extraction	Outflow	Groundwater pumping to meet water demands, and groundwater uptake by crops and vegetation.
	Groundwater Discharge	Outflow	Discharge from shallow groundwater into rivers and streams.
	Vertical Subsurface Groundwater Flows within the GWS	Storage	Vertical subsurface groundwater flows between the Upper and Lower Aquifers within the GWS
	Change in GWS Storage	Storage	Change in volume of water stored within the groundwater system, representative of total accrual or depletion of groundwater storage.

2.3.5 Historical Water Budget

The following section summarizes the analyses and results relating to the historical SWS water budget for the Subbasin. Detailed descriptions and presentation of results for each of the individual water budget components, and the processes and data sources used in their development are included in **Appendices 2-J and 2-K**.

2.3.5.1 Land Use

Characterizing historical land use is foundational for accurately quantifying how and where water is beneficially used. Land use areas are also used to distinguish the water use sector in which water is consumed, as required by the GSP Regulations. **Figure 2-62** and **Table 2-19** summarize the annual land use areas over the historical period (1990-2018) in the Red Bluff Subbasin by water use sector, as defined by the GSP Regulations (23 CCR § 351(al)). In the Red Bluff Subbasin, water use sectors include agricultural, urban, and native vegetation land uses. The urban water use sector covers all urban, residential, industrial, and semi-agricultural[6] land uses. See Plan Area section 2.1.1.2, Land Use

On average, agricultural, urban, and native vegetation land uses covered approximately 36,000 acres, 6,400 acres, and 229,500 acres, respectively, between 1990 and 2018. Since 1990, the total area of native vegetation has decreased by approximately 10,000 acres, corresponding with a similar increase in agricultural acreage.

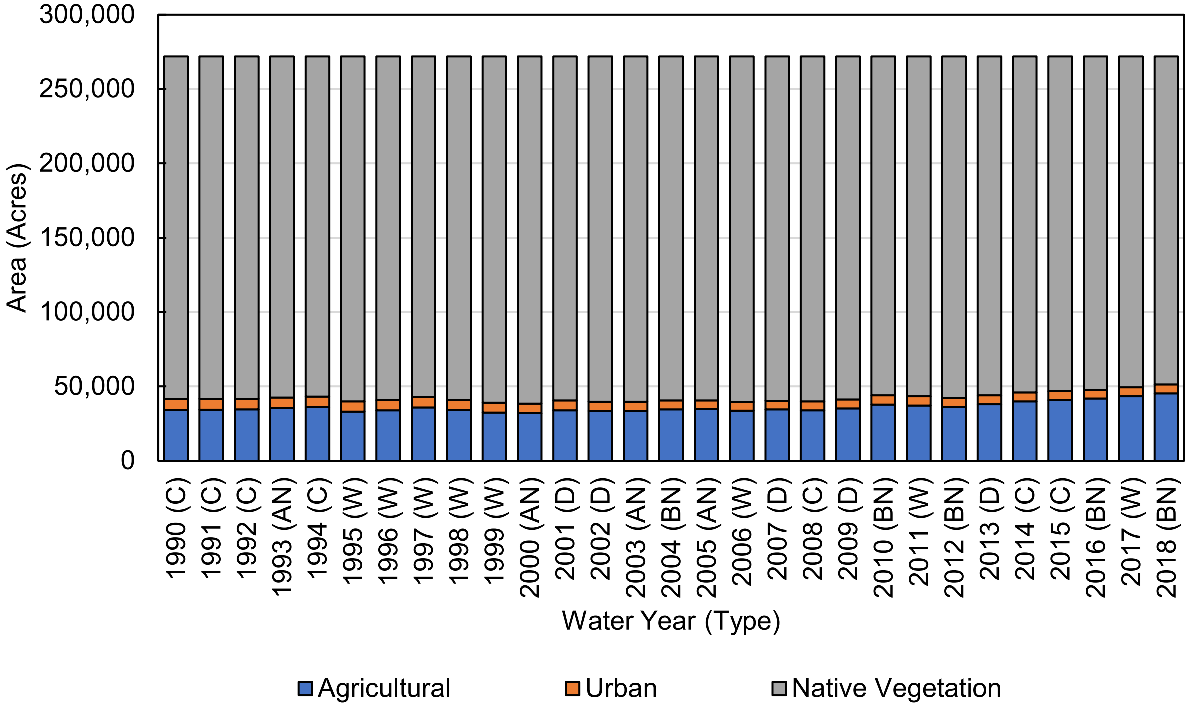

Figure 2-62. Red Bluff Subbasin Land Use Areas, by Water Use Sector

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[6] As defined in the DWR crop mapping metadata, semi-agricultural land use subclasses include farmsteads, livestock feed lot operations, dairies, poultry farms, and miscellaneous semi-agricultural land use incidental to agriculture (small roads, ditches, non-planted areas of cropped fields (DWR, 2016b).

Table 2-19. Red Bluff Subbasin Land Use Areas, by Water Use Sector

WATER YEAR (TYPE)	AGRICULTURAL	URBAN[1]	NATIVE VEGETATION	TOTAL
1990 (C)	34,117	7,351	230,485	271,953
1991 (C)	34,375	7,265	230,312	271,953
1992 (C)	34,486	7,177	230,290	271,953
1993 (AN)	35,338	7,124	229,491	271,953
1994 (C)	36,057	7,078	228,818	271,953
1995 (W)	32,991	6,917	232,045	271,953
1996 (W)	33,955	6,937	231,062	271,953
1997 (W)	35,768	6,911	229,275	271,953
1998 (W)	34,140	6,842	230,971	271,953
1999 (W)	32,329	6,780	232,844	271,953
2000 (AN)	31,918	6,582	233,453	271,953
2001 (D)	33,998	6,503	231,452	271,953
2002 (D)	33,493	6,357	232,103	271,953
2003 (AN)	33,518	6,191	232,244	271,953
2004 (BN)	34,617	6,051	231,286	271,953
2005 (AN)	34,721	5,931	231,301	271,953
2006 (W)	33,633	5,921	232,399	271,953
2007 (D)	34,542	5,955	231,455	271,953
2008 (C)	33,992	5,935	232,026	271,953
2009 (D)	35,280	6,050	230,623	271,953
2010 (BN)	37,851	6,099	228,003	271,953
2011 (W)	37,252	6,098	228,603	271,953
2012 (BN)	36,018	6,115	229,820	271,953
2013 (D)	37,950	6,077	227,926	271,953
2014 (C)	39,884	6,043	226,025	271,953
2015 (C)	40,839	6,004	225,110	271,953
2016 (BN)	41,839	5,961	224,153	271,953
2017 (W)	43,342	6,065	222,546	271,953
2018 (BN)	45,309	6,115	220,529	271,953
Average (1990-2018)	35,985	6,429	229,540	271,953

[1] Area includes land classified as urban, residential, industrial, and semi-agricultural.

Agricultural land uses are further detailed in **Figure 2-63**and **Table 2-20**. Historically, a majority of the agricultural area in the Red Bluff Subbasin has been comprised of pasture, grain, and various orchard crops. Since the early 2000s, irrigated agricultural areas within the Red Bluff Subbasin have expanded, primarily due to increases in orchard acreage, especially walnuts and almonds.

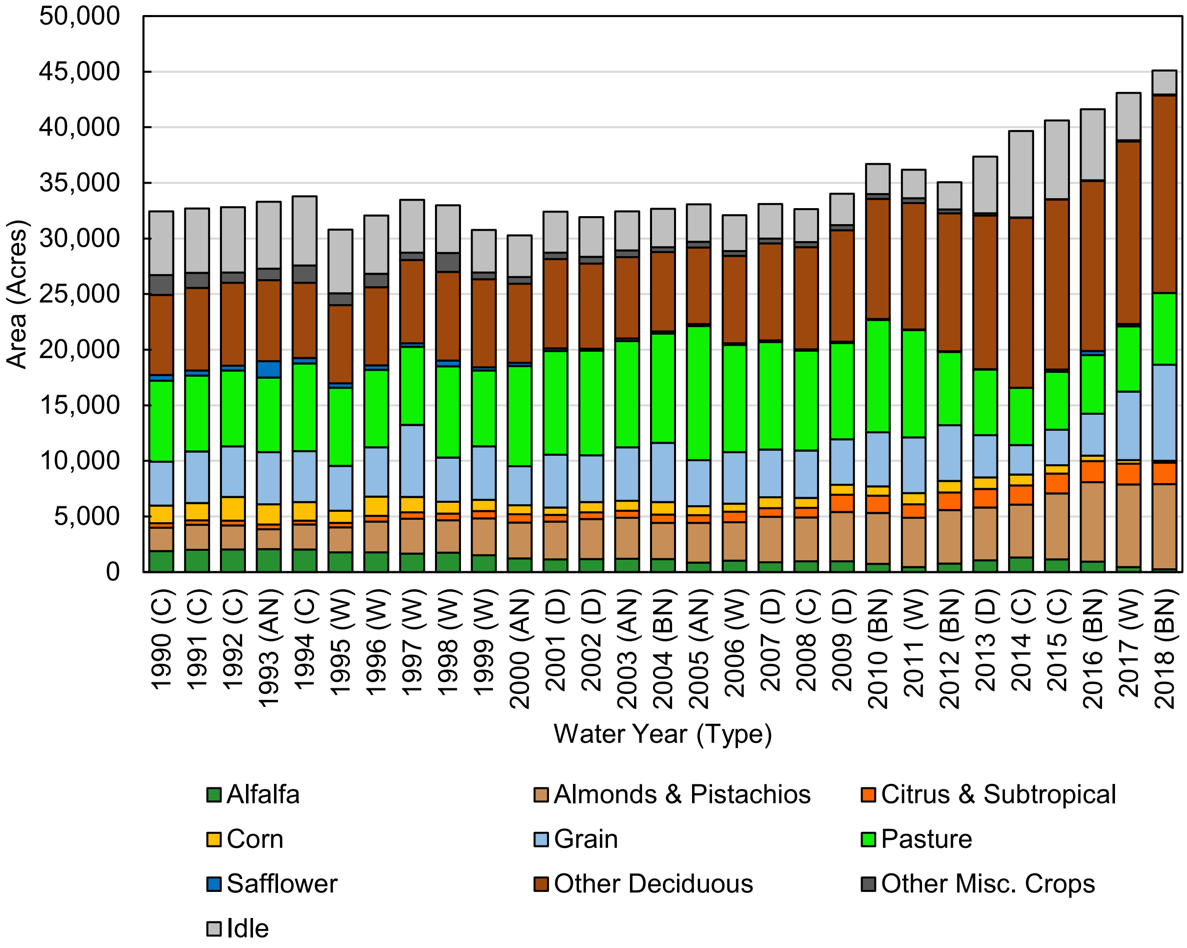

Figure 2-63. Red Bluff Subbasin Agricultural Land Use Areas

Table 2-20. Red Bluff Subbasin Agricultural Land Use Areas (acres)

WATER YEAR (TYPE)	ALFALFA	ALMONDS & PISTACHIOS	CITRUS & SUB-TROPICAL	CORN	GRAIN	PASTURE	PONDED (RICE)	SAFFLOWER	OTHER DECIDUOUS[1]	OTHER MISC. CROPS[2]	IDLE	TOTAL
1990 (C)	1,902	2,092	414	1,566	3,954	7,271	1,672	525	7,206	1,793	5,722	34,117
1991 (C)	2,001	2,249	407	1,565	4,611	6,840	1,668	468	7,408	1,366	5,793	34,375
1992 (C)	2,026	2,162	442	2,117	4,565	6,822	1,661	417	7,481	917	5,876	34,486
1993 (AN)	2,056	1,793	423	1,834	4,691	6,690	2,036	1,489	7,287	1,038	6,002	35,338
1994 (C)	2,038	2,231	365	1,668	4,563	7,895	2,258	479	6,783	1,553	6,224	36,057
1995 (W)	1,770	2,259	400	1,077	4,036	7,042	2,200	383	7,046	1,062	5,716	32,991
1996 (W)	1,773	2,772	507	1,727	4,440	6,974	1,880	397	7,034	1,190	5,261	33,955
1997 (W)	1,659	3,156	559	1,379	6,471	7,049	2,288	303	7,488	663	4,754	35,768
1998 (W)	1,740	2,911	606	1,057	3,984	8,206	1,148	530	7,961	1,688	4,308	34,140
1999 (W)	1,505	3,335	661	999	4,818	6,800	1,547	286	7,929	617	3,833	32,329
2000 (AN)	1,229	3,230	731	816	3,513	9,018	1,631	282	7,114	619	3,737	31,918
2001 (D)	1,155	3,396	605	643	4,757	9,337	1,601	234	8,014	594	3,661	33,998
2002 (D)	1,169	3,593	617	931	4,197	9,396	1,561	191	7,649	604	3,587	33,493
2003 (AN)	1,215	3,663	636	893	4,812	9,556	1,071	240	7,314	587	3,533	33,518
2004 (BN)	1,167	3,263	733	1,143	5,306	9,827	1,951	194	7,151	435	3,448	34,617
2005 (AN)	869	3,558	697	794	4,146	12,083	1,648	170	6,865	536	3,357	34,721
2006 (W)	1,027	3,460	941	725	4,649	9,630	1,548	154	7,841	428	3,230	33,633
2007 (D)	900	4,060	794	968	4,293	9,673	1,451	139	8,732	446	3,088	34,542
2008 (C)	965	3,960	858	882	4,277	8,974	1,356	123	9,178	468	2,952	33,992
2009 (D)	965	4,440	1,563	896	4,069	8,682	1,261	106	10,006	474	2,818	35,280
2010 (BN)	735	4,592	1,544	850	4,859	10,109	1,163	89	10,782	442	2,686	37,851
2011 (W)	445	4,429	1,227	1,007	5,016	9,632	1,066	71	11,357	443	2,560	37,252
2012 (BN)	783	4,797	1,577	1,051	4,997	6,606	971	53	12,413	344	2,425	36,018
2013 (D)	1,062	4,761	1,656	1,025	3,825	5,881	590	28	13,835	187	5,100	37,950
2014 (C)	1,322	4,735	1,737	987	2,642	5,163	209	4	15,265	30	7,790	39,884
2015 (C)	1,135	5,945	1,783	746	3,196	5,224	215	194	15,269	53	7,079	40,839
2016 (BN)	953	7,142	1,897	492	3,749	5,277	219	385	15,269	78	6,379	41,839
2017 (W)	458	7,423	1,861	321	6,179	5,865	241	195	16,422	95	4,281	43,342
2018 (BN)	250	7,655	1,945	170	8,626	6,442	212	6	17,758	109	2,140	45,309
Average (1990-2018)	1,251	3,899	972	1,046	4,594	7,861	1,322	280	9,719	650	4,391	35,985

[1] Includes primarily walnuts and prunes.

[2] Area includes land classified as cotton, cucurbits, dry beans, onions & garlic, potatoes, sugar beets, tomatoes, vineyards, other field crops, and other truck crops.

2.3.5.2 Historical Surface Water System Water Budget Summary

Annual inflows, outflows, and change in SWS root zone storage during the historical water budget period (1990-2018) are summarized in **Figure 2-64** and **Table 2-21.** Inflows in **Figure 2-64** are shown as positive values, while outflows and change in SWS root zone storage are shown as negative values. Review of the variability in component volumes across years provides insight into the impacts of hydrology on the SWS water budget.

Of particular note in the historical SWS water budget results are the volume of precipitation that makes up a large part of the Subbasin SWS inflows. Over the historical period, precipitation to surface water averaged about 580 taf per year. Surface water inflows and groundwater extraction/ uptake also represent large SWS inflow components averaging about 120 and 90 taf per year, respectively. Groundwater discharge to surface water and groundwater extraction/ uptake represent relatively smaller SWS inflows in the Subbasin averaging about 42 taf per year over the historical water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation and surface water outflow make up large fractions of the total Subbasin SWS outflows. ET of precipitation averages about 350 taf per year. The surface water outflows total about 340 taf per year on average, a value that corresponds with the large volumes of precipitation and surface water inflow (a total of about 700 taf per year). By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of applied water and deep percolation of precipitation averaging about 61 and 55 taf per year, respectively. The outflows of deep percolation of applied water, ET of groundwater uptake and infiltration (seepage) of surface water are about 15, 9.7, and 2.4 taf per year on average, respectively. Evaporation from surface water averages about 0.7 taf per year over the historical water budget period.

Detailed results for the historical SWS water budget are presented in **Appendix 2-K**.

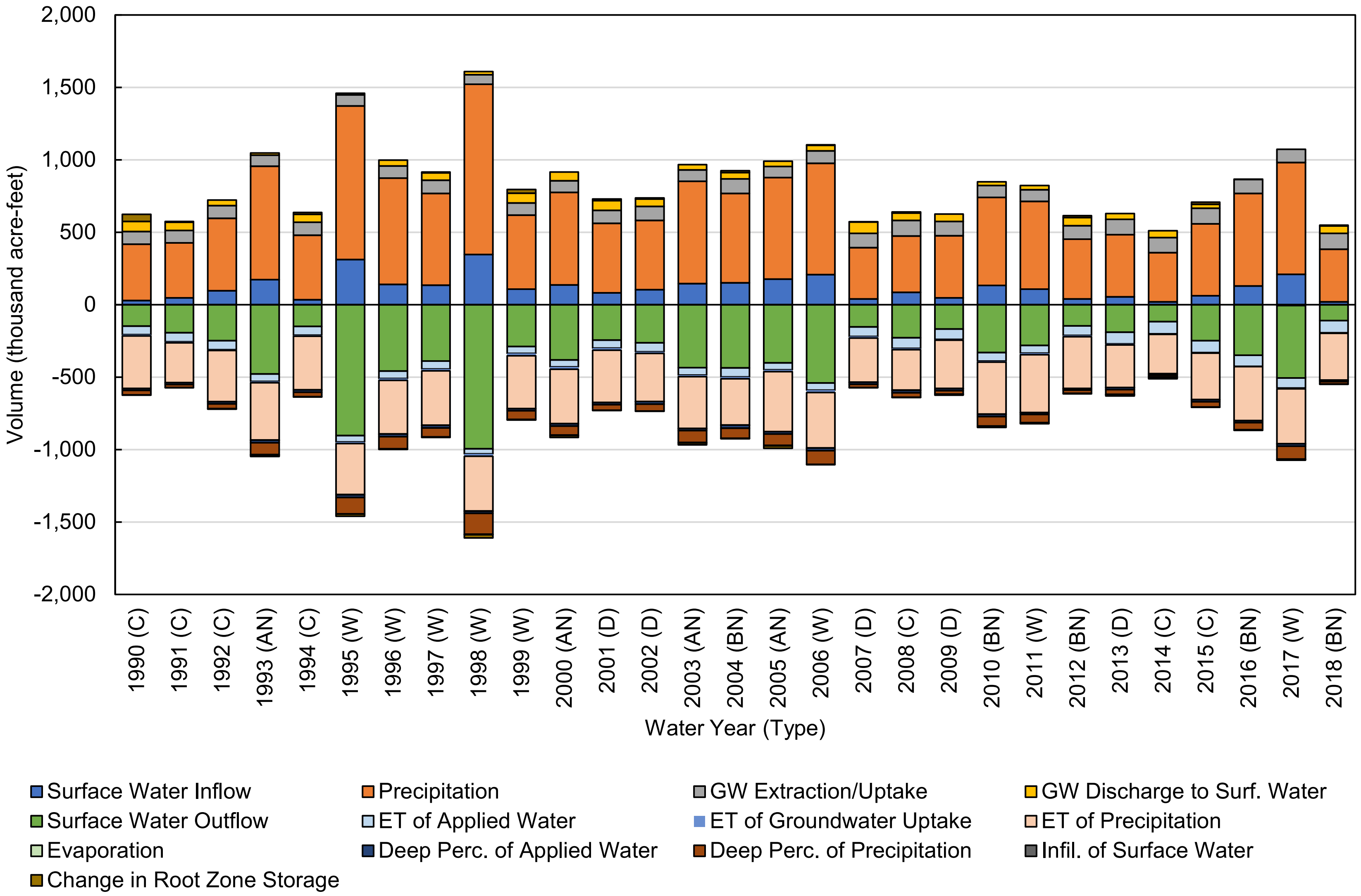

Figure 2-64. Red Bluff Subbasin Surface Water System Historical Water Budget, 1990-2018

Table 2-21. Red Bluff Subbasin Surface Water System Historical Water Budget, 1990-2018 (acre-feet)

WATER YEAR (TYPE)	INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
	SURFACE WATER INFLOW	PRECIPITATION	GROUNDWATER EXTRACTION/ UPTAKE	GROUNDWATER DISCHARGE[1]	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUNDWATER UPTAKE	ET OF PRECIPITATION	EVAPORATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPITATION	INFIL. OF SURFACE WATER	
1990 (C)	29,000	390,000	87,000	69,000	150,000	58,000	9,400	360,000	240	13,000	31,000	2,100	-50,000
1991 (C)	47,000	380,000	87,000	57,000	190,000	62,000	6,300	280,000	330	13,000	21,000	2,000	-4,200
1992 (C)	97,000	500,000	87,000	38,000	250,000	62,000	5,800	350,000	380	14,000	34,000	2,200	1,600
1993 (AN)	170,000	780,000	76,000	15,000	480,000	52,000	7,900	400,000	280	17,000	83,000	2,800	10,000
1994 (C)	35,000	440,000	90,000	55,000	150,000	60,000	7,200	370,000	290	15,000	31,000	2,100	-12,000
1995 (W)	310,000	1,100,000	76,000	11,000	900,000	45,000	10,000	350,000	280	20,000	110,000	2,900	14,000
1996 (W)	140,000	730,000	84,000	40,000	460,000	51,000	13,000	370,000	440	18,000	84,000	2,800	310
1997 (W)	130,000	630,000	92,000	50,000	390,000	55,000	13,000	370,000	560	17,000	63,000	2,400	-6,100
1998 (W)	350,000	1,200,000	66,000	21,000	1,000,000	35,000	16,000	380,000	380	15,000	150,000	3,000	21,000
1999 (W)	110,000	510,000	83,000	67,000	290,000	48,000	17,000	360,000	690	16,000	59,000	2,800	-26,000
2000 (AN)	140,000	640,000	81,000	59,000	380,000	48,000	15,000	380,000	640	16,000	63,000	2,800	13,000
2001 (D)	83,000	480,000	89,000	68,000	250,000	55,000	13,000	360,000	690	14,000	39,000	2,400	-11,000
2002 (D)	100,000	480,000	97,000	51,000	260,000	62,000	11,000	330,000	760	17,000	48,000	2,600	-7,300
2003 (AN)	150,000	710,000	79,000	37,000	430,000	51,000	12,000	360,000	700	15,000	82,000	2,600	13,000
2004 (BN)	150,000	620,000	100,000	44,000	440,000	62,000	13,000	320,000	920	21,000	70,000	3,000	-13,000
2005 (AN)	180,000	700,000	77,000	35,000	400,000	47,000	13,000	410,000	580	15,000	80,000	2,600	16,000
2006 (W)	210,000	770,000	87,000	37,000	540,000	49,000	16,000	380,000	630	18,000	95,000	3,000	-5,100
2007 (D)	40,000	350,000	98,000	78,000	150,000	64,000	12,000	300,000	800	15,000	21,000	2,300	-2,500
2008 (C)	85,000	390,000	110,000	51,000	230,000	73,000	9,400	280,000	1,000	17,000	31,000	2,400	-8,400
2009 (D)	47,000	430,000	97,000	51,000	170,000	70,000	6,900	330,000	910	14,000	24,000	2,100	6,000

WATER YEAR (TYPE)		INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
		SURFACE WATER INFLOW	PRECIPITATION	GROUNDWATER EXTRACTION/ UPTAKE	GROUNDWATER DISCHARGE[1]	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUNDWATER UPTAKE	ET OF PRECIPITATION	EVAPORATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPITATION	INFIL. OF SURFACE WATER	
2010 (BN)		130,000	610,000	82,000	26,000	330,000	58,000	7,900	360,000	780	15,000	67,000	2,400	7,500
2011 (W)		110,000	600,000	80,000	29,000	280,000	54,000	9,900	400,000	680	13,000	57,000	2,500	4,500
2012 (BN)		41,000	410,000	93,000	57,000	150,000	66,000	8,800	360,000	810	11,000	22,000	2,300	-12,000
2013 (D)		54,000	430,000	110,000	41,000	190,000	81,000	6,500	290,000	1,100	15,000	31,000	2,500	9,200
2014 (C)		20,000	340,000	100,000	48,000	120,000	85,000	3,800	270,000	940	8,800	13,000	1,600	11,000
2015 (C)		62,000	500,000	110,000	28,000	250,000	82,000	3,200	320,000	900	13,000	37,000	1,700	-14,000
2016 (BN)		130,000	640,000	96,000	2,200	350,000	76,000	3,400	370,000	1,100	13,000	50,000	2,200	830
2017 (W)		210,000	770,000	91,000	-6,300	500,000	68,000	6,600	380,000	950	16,000	90,000	2,500	4,200
2018 (BN)		20,000	360,000	110,000	51,000	110,000	85,000	4,200	320,000	850	9,700	17,000	2,000	-6,100
Average (1990-2018)		120,000	580,000	90,000	42,000	340,000	61,000	9,700	350,000	670	15,000	55,000	2,400	-1,600
1990-2018	W	200,000	780,000	82,000	31,000	540,000	51,000	13,000	380,000	580	17,000	88,000	2,700	930
	AN	160,000	710,000	78,000	37,000	420,000	49,000	12,000	390,000	550	16,000	77,000	2,700	13,000
	BN	95,000	530,000	96,000	36,000	270,000	69,000	7,500	350,000	890	14,000	45,000	2,400	-4,500
	D	65,000	430,000	97,000	58,000	200,000	67,000	10,000	320,000	850	15,000	32,000	2,400	-1,200
	C	53,000	420,000	95,000	50,000	190,000	69,000	6,400	320,000	580	13,000	28,000	2,000	-11,000

2.3.5.3 Historical Groundwater System Water Budget Summary

Summarized results for major components of the historical water budget as they relate to the GWS are presented in **Figure 2-65** and **Table 2-22**. Among the outflows from the Subbasin SWS, groundwater pumping makes up the largest fraction of the total SWS outflows (on average -80 taf per year). Highly negative net seepage values (on average -39 taf per year) represent net groundwater discharging to surface waterways and leaving the GWS. Deep percolation is the largest net inflow component averaging about 70 taf per year. Positive net subsurface flows (on average 49 taf per year) represent the combined subsurface inflows from adjacent subbasins and upland areas.

Groundwater (root water) uptake directly from shallow groundwater (on average -9.7 taf per year) represents a smaller outflow from the GWS. Overall, the water budget results for the 29-year historic period indicate a cumulative change in groundwater storage of about -310 taf, which equals an average annual change in groundwater storage of only about -11 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 1.1 acre-feet per acre on average over the 29 years and an annual decrease of less than 0.04 acre-feet per acre across the entire Subbasin (approximately 272,000 acres). **Figure 2-65** provides a conceptual illustration of the historical water budget. **Figure 2-66** highlights the cumulative change in groundwater storage that has occurred over the 1990-2018 period, with a notable decline in storage over the generally dry period since the mid-2000s. The decrease of groundwater storage during relatively dry years is not an indication of overdraft, but likely due to removal of temporary surplus of groundwater. Temporary surplus removal is the extraction of a volume of aquifer storage to enable the capture of recharge and reduction in subsurface outflow from the subbasin without impacting beneficial users of groundwater creating unreasonable results. In contrast, overdraft is defined as “the condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts” (DWR, 2003).

Additional details on the historical GWS water budget are presented in **Appendix 2-K**.

Figure 2-65. Diagram of the Red Bluff Subbasin Historical Average Annual Water Budget (1990-2018)

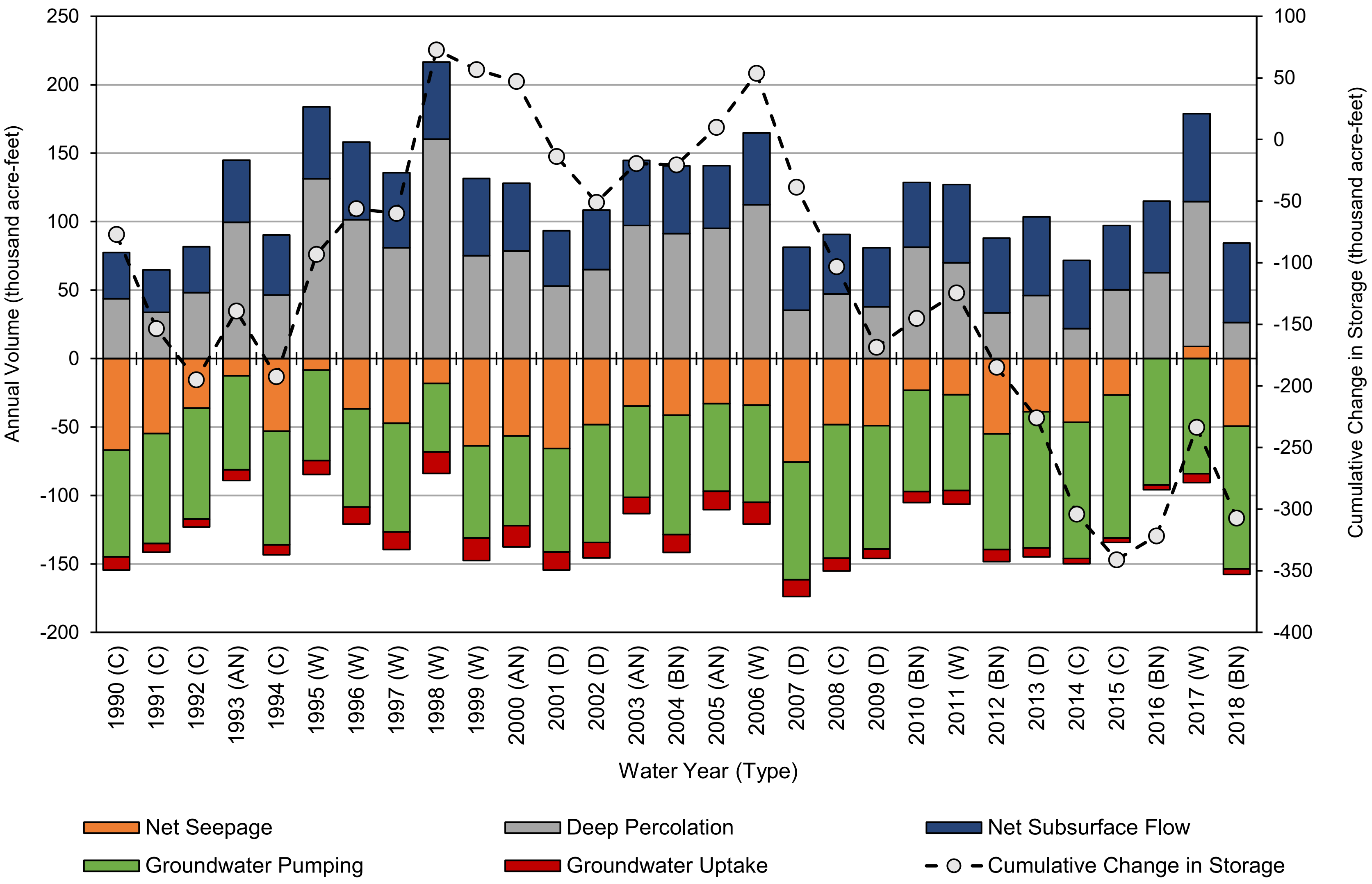

Figure 2-66. Red Bluff Subbasin Historical Water Budget Summary

Table 2-22. Red Bluff Subbasin Historical Water Budget Summary (acre-feet)

<table>
<tr><th colspan="2">WATER YEAR (TYPE)</th><th>NET SEEPAGE</th><th>DEEP PERCOLATION</th><th>NET SUBSURFACE FLOWS</th><th>GROUNDWATER PUMPING</th><th>GROUNDWATER UPTAKE</th><th>ANNUAL GROUNDWATER STORAGE CHANGE</th><th>CUMULATIVE GROUNDWATER STORAGE CHANGE</th></tr>
<tr><td colspan="2">1990 (C)</td><td>-67,000</td><td>44,000</td><td>34,000</td><td>-78,000</td><td>-9,400</td><td>-77,000</td><td>-77,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>-55,000</td><td>34,000</td><td>31,000</td><td>-80,000</td><td>-6,300</td><td>-77,000</td><td>-150,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>-36,000</td><td>48,000</td><td>33,000</td><td>-81,000</td><td>-5,800</td><td>-41,000</td><td>-200,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>-13,000</td><td>100,000</td><td>45,000</td><td>-69,000</td><td>-7,900</td><td>56,000</td><td>-140,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>-53,000</td><td>46,000</td><td>44,000</td><td>-83,000</td><td>-7,200</td><td>-53,000</td><td>-190,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>-8,300</td><td>130,000</td><td>53,000</td><td>-66,000</td><td>-10,000</td><td>99,000</td><td>-93,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>-37,000</td><td>100,000</td><td>57,000</td><td>-72,000</td><td>-13,000</td><td>37,000</td><td>-56,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>-47,000</td><td>81,000</td><td>55,000</td><td>-79,000</td><td>-13,000</td><td>-3,900</td><td>-60,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>-18,000</td><td>160,000</td><td>56,000</td><td>-50,000</td><td>-16,000</td><td>130,000</td><td>73,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>-64,000</td><td>75,000</td><td>57,000</td><td>-67,000</td><td>-17,000</td><td>-16,000</td><td>57,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>-57,000</td><td>79,000</td><td>49,000</td><td>-66,000</td><td>-15,000</td><td>-9,500</td><td>47,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>-66,000</td><td>53,000</td><td>40,000</td><td>-76,000</td><td>-13,000</td><td>-61,000</td><td>-14,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>-48,000</td><td>65,000</td><td>44,000</td><td>-86,000</td><td>-11,000</td><td>-37,000</td><td>-51,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>-35,000</td><td>97,000</td><td>48,000</td><td>-67,000</td><td>-12,000</td><td>31,000</td><td>-20,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>-41,000</td><td>91,000</td><td>49,000</td><td>-87,000</td><td>-13,000</td><td>-1,000</td><td>-21,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>-33,000</td><td>95,000</td><td>46,000</td><td>-64,000</td><td>-13,000</td><td>30,000</td><td>9,900</td></tr>
<tr><td colspan="2">2006 (W)</td><td>-34,000</td><td>110,000</td><td>52,000</td><td>-71,000</td><td>-16,000</td><td>44,000</td><td>54,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>-76,000</td><td>35,000</td><td>46,000</td><td>-86,000</td><td>-12,000</td><td>-93,000</td><td>-39,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>-48,000</td><td>47,000</td><td>44,000</td><td>-98,000</td><td>-9,400</td><td>-65,000</td><td>-100,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>-49,000</td><td>38,000</td><td>43,000</td><td>-90,000</td><td>-6,900</td><td>-65,000</td><td>-170,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>-23,000</td><td>81,000</td><td>47,000</td><td>-74,000</td><td>-7,900</td><td>23,000</td><td>-150,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>-26,000</td><td>70,000</td><td>57,000</td><td>-70,000</td><td>-9,900</td><td>21,000</td><td>-120,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>-55,000</td><td>33,000</td><td>55,000</td><td>-85,000</td><td>-8,800</td><td>-60,000</td><td>-180,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>-39,000</td><td>46,000</td><td>58,000</td><td>-99,000</td><td>-6,500</td><td>-41,000</td><td>-230,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>-47,000</td><td>22,000</td><td>50,000</td><td>-99,000</td><td>-3,800</td><td>-78,000</td><td>-300,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>-27,000</td><td>50,000</td><td>47,000</td><td>-100,000</td><td>-3,200</td><td>-37,000</td><td>-340,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>82</td><td>63,000</td><td>52,000</td><td>-92,000</td><td>-3,400</td><td>19,000</td><td>-320,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>8,800</td><td>110,000</td><td>64,000</td><td>-84,000</td><td>-6,600</td><td>88,000</td><td>-230,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>-49,000</td><td>26,000</td><td>58,000</td><td>-100,000</td><td>-4,200</td><td>-74,000</td><td>-310,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>-39,000</td><td>70,000</td><td>49,000</td><td>-80,000</td><td>-9,700</td><td>-11,000</td><td></td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>-28,000</td><td>100,000</td><td>56,000</td><td>-70,000</td><td>-13,000</td><td>50,000</td><td></td></tr>
<tr><td>AN</td><td>-34,000</td><td>93,000</td><td>47,000</td><td>-66,000</td><td>-12,000</td><td>27,000</td><td></td></tr>
<tr><td>BN</td><td>-34,000</td><td>59,000</td><td>52,000</td><td>-88,000</td><td>-7,500</td><td>-18,000</td><td></td></tr>
<tr><td>D</td><td>-56,000</td><td>47,000</td><td>46,000</td><td>-87,000</td><td>-10,000</td><td>-59,000</td><td></td></tr>
<tr><td>C</td><td>-48,000</td><td>42,000</td><td>40,000</td><td>-89,000</td><td>-6,400</td><td>-61,000</td><td></td></tr>
</table>

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

2.3.6 Current Water Budget

As described above in **Section 2.3.2**, several recent water budget periods have been considered for use in representing the current water budget. Because the hydrology and land use conditions can vary year to year, estimating the current water budget can be challenging. To evaluate the current water budget, water budget results from the historical model run were summarized for five different recent time periods to evaluate variability and trends. The five different recent water budget periods evaluated include the following:

- Most recent 10 years (2009-2018)
- Most recent 5 year (2014-2018)
- Most recent 3 years (2016-2018)
- Recent single year 2018
- Recent single year 2019

Comparison of these recent water budget periods provides a representation of how water use varies with precipitation and water supply conditions from year to year. Based on these comparisons and consideration of the hydrologic conditions over these recent periods, the recent three-year period from 2016 through 2018 is believed to provide a reasonable representation of the recent water budget conditions. For reporting a current water budget in the GSP, the average water budget for the three-year period between 2016 and 2018 is considered to be representative of the current water budget and representative of current hydrologic and land use conditions. This period incorporates recent land use conditions and spans three years (two below normal years and one wet year) that collectively have precipitation and hydrology similar to the long-term average. Although the 2016 through 2018 period provides a summary of the water budget for recent years that appear to be reasonably representative of recent typical conditions, it is not necessarily representative of any longer-term average conditions. Understanding the recent water budget years is helpful in anticipating longer-term conditions under a scenario where current land uses are maintained in the Subbasin (see **section 2.3.7**). The results from comparisons of the recent water budget periods evaluated are presented below, including the results and discussion of the selected current water budget period of 2016-2018. The projected water budget with a current land use condition, as described in **Section 2.3.6** also is insightful on the current water budget conditions

2.3.6.1 Surface Water System Water Budget Summary

The comparison of the different recent SWS water budget periods provides a representation of how individual SWS water budget components vary from year to year depending on water demands, precipitation, and water supply conditions. The SWS water budget results for these different recent time periods are presented in **Table 2-23**. The single year SWS water budget results highlight the high variability between these two years, which included a below normal year in 2018 and a wet year in 2019. The water budget inflows and outflows from the SWS vary by about 660 taf between these two single years. Most of the variability in the total SWS inflows and outflows is a result of variability in precipitation, surface water inflow and surface water outflow. When comparing the average annual water budget results for recent multi-year periods, the variability is considerably reduced with a maximum difference in both inflows and outflows of about 110 taf per year between the three different recent multi-year periods evaluated.

The selected current water budget period of 2016-2018 (highlighted blue in **Table 2-23**) has total SWS inflows and outflows of about 830 taf per year, with the largest SWS inflows being precipitation (590 taf per year) and the largest SWS outflow being the ET of precipitation (360 taf per year). Current SWS water budget inflows also include 120 taf per year of surface water inflow, 98 taf per year of groundwater extraction and uptake, and 16 taf per year of groundwater discharge to surface water. Other SWS outflows in the current SWS water budget include 320 taf per year surface water outflow, 76 taf per year ET of applied water, 52 taf per year deep percolation of precipitation, 13 taf per year of deep percolation of applied water, and additional smaller outflows for infiltration of surface water, ET of groundwater uptake, and evaporation from surface water.

Table 2-23. Comparison of Recent SWS Water Budget Periods (acre-feet)

FLOW PATH		RECENT WATER BUDGET PERIODS				
		RECENT 10 YEARS	RECENT 5 YEARS	RECENT 3 YEARS	RECENT 1 YEAR	RECENT 1 YEAR
		(2009-2018)	(2014-2018)	(2016-2018)	2018	2019
Inflow	Surface Water Inflow	83,000	88,000	120,000	20,000	200,000
	Precipitation	510,000	520,000	590,000	360,000	880,000
	Groundwater Extraction/Uptake	96,000	100,000	98,000	110,000	88,000
	Groundwater Discharge to Surface Water	33,000	25,000	16,000	51,000	-20
	Total Inflows	***720,000***	***740,000***	***830,000***	***540,000***	***1,200,000***
Outflow	Surface Water Outflow	240,000	260,000	320,000	110,000	580,000
	ET of Applied Water	72,000	79,000	76,000	85,000	71,000
	ET of Groundwater Uptake	6,100	4,200	4,700	4,200	6,300
	ET of Precipitation	340,000	330,000	360,000	320,000	400,000
	Evaporation	900	940	960	850	800
	Deep Percolation of Applied Water	13,000	12,000	13,000	9,700	15,000
	Deep Percolation of Precipitation	41,000	41,000	52,000	17,000	82,000
	Infiltration of Surface Water (Seepage)	2,200	2,000	2,300	2,000	2,800
	Change in Root Zone Storage	1,100	-880	-380	-6,100	16,000
	Total Outflows	***720,000***	***740,000***	***830,000***	***540,000***	***1,200,000***

2.3.6.2 Groundwater System Water Budget Summary

Comparing the different recent water budget periods provides a representation of how the overall GWS water budget components vary from year to year depending on conditions including inflows/outflows between the SWS and subsurface flows. The GWS water budget results for these different recent time periods are presented in **Table 2-24**. As with the results for the current SWS water budget summaries, the single year results for the GWS water budget highlight the high variability between the two individual years of 2018 and 2019, which included a below normal year (2018) and a wet year (2019). Although some of the individual water budget components are relatively stable between the two different recent water budget years, the total change in groundwater storage varied by about 149 taf ranging from a decrease in storage of about -74 taf in 2018 (a below normal year) to an increase in storage of nearly 75 taf in 2019 (a wet year). Differences in net seepage and deep percolation account for most of the difference in change in storage between the two single years. There is considerably less variability in most of the different water budget components when comparing between the three different recent multi-year periods, although the net seepage and deep percolation do show relatively higher differences between the three recent periods. Average annual change in storage is between -20 taf and -16 taf per year for the recent 10-year and 5-year periods, respectively, and indicates an average increase in storage of about 11 taf per year for the recent three-year period. This difference is likely attributable to the drought years consisting of dry and critical years that occurred between 2013 and 2015, which are included in the recent five- and ten-year periods, but not included in the most recent three-year period from 2016-2018.

The selected current water budget period of 2016-2018 (highlighted blue in **Table 2-24**) has total net seepage of about -13 taf per year, indicating net discharge of groundwater to surface waterways. Net subsurface flows total about 58 taf per year of inflow on average over the current water budget period and deep percolation represents an additional 65 taf per year of inflow to the GWS. Groundwater pumping is an outflow from the GWS and averages about -94 taf per year during the current water budget period; groundwater uptake represents an additional GWS outflow of about -4.7 taf per year.

Table 2-24. Comparison of Recent GWS Water Budget Periods (acre-feet)

GWS WATER BUDGET COMPONENT	RECENT WATER BUDGET PERIODS				
	RECENT 10 YEARS	RECENT 5 YEARS	RECENT 3 YEARS	RECENT 1 YEAR	RECENT 1 YEAR
	(2009-2018)	(2014-2018)	(2016-2018)	2018	2019
Net Seepage	-31,000	-23,000	-13,000	-49,000	1,000
Deep Percolation	54,000	53,000	65,000	26,000	96,000
Net Subsurface Flows	53,000	54,000	58,000	58,000	66,000
Groundwater Pumping	-90,000	-97,000	-94,000	-100,000	-82,000
Groundwater Uptake	-6,100	-4,200	-4,700	-4,200	-6,300
Annual Groundwater Storage Change	-20,000	-16,000	11,000	-74,000	75,000

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

2.3.7 Projected Water Budgets

To evaluate projected water budgets in the future, projected model runs were developed using Tehama IHM. The projected model runs are intended to evaluate the effects of anticipated future conditions of hydrology, water supply availability, and water demand on the Red Bluff Subbasin water budget and groundwater conditions over a 50-year GSP planning period. The projected model runs also incorporate consideration of potential climate change and water supply availability scenarios and evaluation of the need for and benefit of any projects and management actions to be implemented in the Subbasin to maintain or achieve sustainability. The projected model runs use hydrologic conditions representative of the most recent 50 years of hydrology in the Subbasin, with adjustments applied in scenarios for evaluating the water budget under climate change and/or altered water supply and demand conditions. A number of projected future scenarios were simulated in Tehama IHM to compare possible outcomes, including different projected land uses and potential climate change impacts. Additional information about the development of the projected model scenarios is provided in **Appendix 2-J**.

2.3.7.1 Projected (Current Land Use) Water Budget

This section presents the results of the Projected (Current Land Use) scenario. The Current Land Use scenario assumes constant land use conditions based on 2018 conditions.

2.3.7.1.1 *Projected (Current Land Use) Surface Water System Water Budget Summary*

Annual inflows, outflows, and change in SWS root zone storage during the projected (current land use) water budget period (2022-2072) are summarized in **Figure 2-67** and **Table 2-25.** Inflows in **Figure 2-67** are shown as positive values, while outflows are shown as negative values. Review of the variability in component volumes across years provides insight into the impacts of hydrology on the SWS water budget.

Of particular note in the projected (current land use) SWS water budget results are the volume of precipitation that makes up a large part of the Subbasin SWS inflows (average about 600 taf over the projected period). Surface water inflows and groundwater extraction also represent large SWS inflow components averaging about 120 and 100 taf per year, respectively. Groundwater discharge to surface water is a relatively smaller SWS inflow in the Subbasin averaging about 26 taf per year over the projected (current land use) water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation and surface water outflow make up large fractions of the total Subbasin SWS outflows. ET of precipitation averages about 360 taf per year. The surface water outflows total about 330 taf per year on average, a value that corresponds with the large volumes of precipitation and surface water inflow (a total of about 720 taf per year). By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of applied water and deep percolation of precipitation averaging about 80 and 54 taf per year, respectively. The outflows of deep percolation of applied water, ET of groundwater uptake and infiltration (seepage) of surface water are about 13, 6.3, and 4.5 taf per year on average, respectively. Evaporation from surface water averages about 0.9 taf per year over the projected (current land use) water budget period.

Detailed results for the projected (current land use) SWS water budget are presented in **Appendix 2-K**.

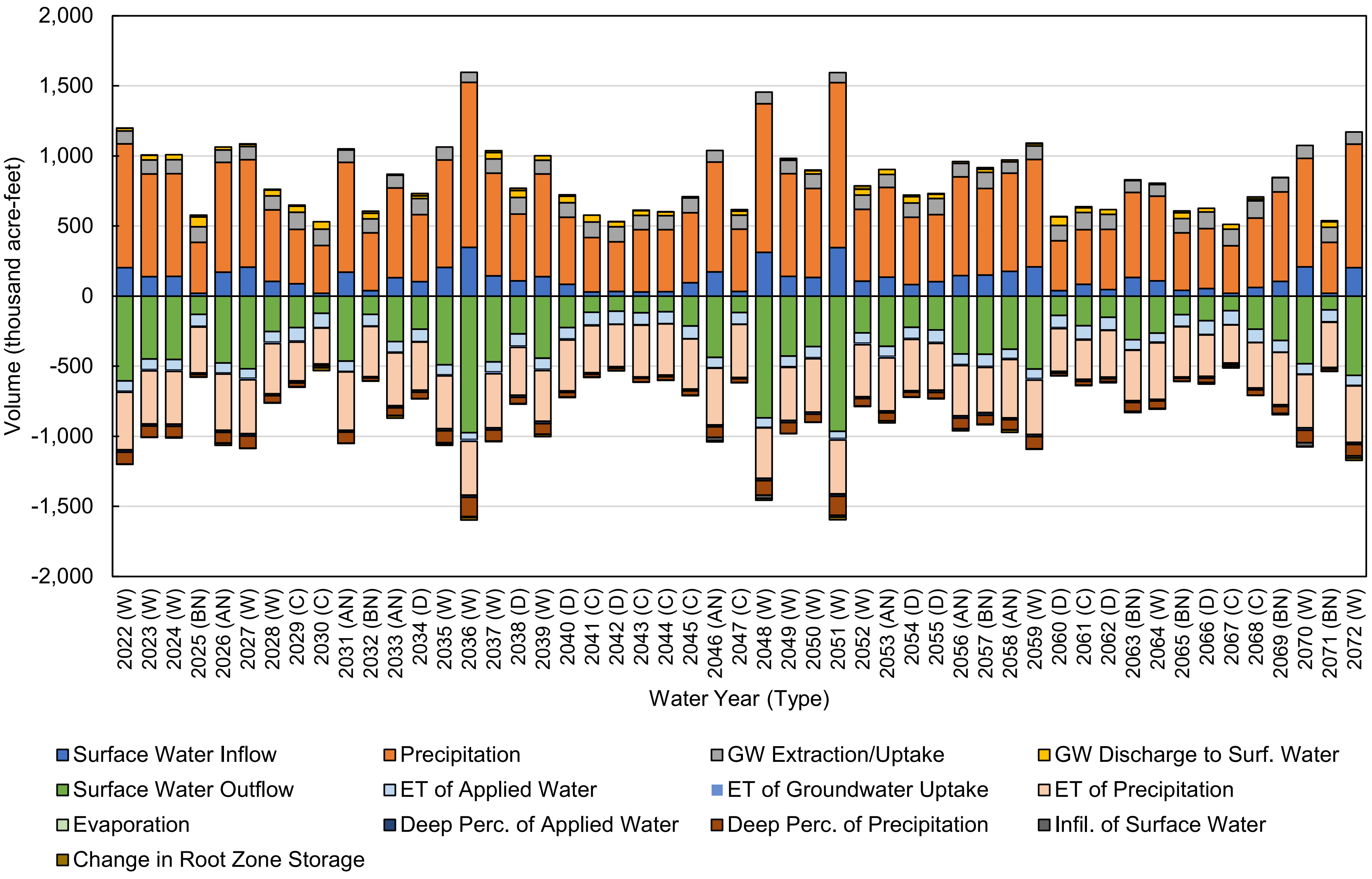

Figure 2-67. Red Bluff Subbasin Surface Water System Projected (Current Land Use) Water Budget, 2022-2072

Table 2-25. Red Bluff Subbasin Surface Water System Projected (Current Land Use) Water Budget, 2022-2072 (acre-feet)

WATER YEAR (TYPE)	INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
	SURFACE WATER INFLOW	PRECIPI-TATION	GROUND-WATER EXTRACTION / UPTAKE	GROUND-WATER DISCHARGE	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUND-WATER UPTAKE	ET OF PRECIPI-TATION	EVAPO-RATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPI-TATION	INFIL. OF SURFACE WATER	
2022 (W)	200,000	880,000	93,000	19,000	600,000	73,000	7,300	410,000	760	16,000	84,000	2,700	-2,000
2023 (W)	140,000	730,000	100,000	34,000	450,000	75,000	9,300	380,000	890	15,000	78,000	2,700	-2,100
2024 (W)	140,000	730,000	100,000	36,000	450,000	75,000	10,000	380,000	870	15,000	77,000	2,800	60
2025 (BN)	21,000	360,000	110,000	70,000	130,000	85,000	6,700	330,000	910	10,000	17,000	2,000	-14,000
2026 (AN)	170,000	780,000	89,000	20,000	480,000	72,000	7,600	400,000	900	13,000	77,000	2,900	13,000
2027 (W)	210,000	770,000	94,000	15,000	520,000	68,000	11,000	390,000	720	15,000	87,000	2,900	-4,800
2028 (W)	100,000	510,000	100,000	41,000	250,000	75,000	11,000	360,000	880	13,000	49,000	2,700	-5,500
2029 (C)	88,000	390,000	120,000	44,000	220,000	95,000	7,800	280,000	1,200	13,000	28,000	2,500	-6,200
2030 (C)	21,000	340,000	120,000	52,000	120,000	100,000	3,700	260,000	1,000	10,000	13,000	1,700	21,000
2031 (AN)	170,000	780,000	89,000	2,700	460,000	73,000	4,900	420,000	1,000	13,000	78,000	2,900	-4,700
2032 (BN)	40,000	410,000	100,000	41,000	130,000	83,000	4,200	360,000	810	8,800	20,000	2,300	-14,000
2033 (AN)	130,000	640,000	91,000	7,300	320,000	75,000	4,800	380,000	910	13,000	54,000	2,600	16,000
2034 (D)	100,000	480,000	110,000	20,000	240,000	88,000	5,000	340,000	1,000	14,000	44,000	2,600	-17,000
2035 (W)	210,000	770,000	92,000	0	490,000	73,000	7,200	380,000	850	15,000	84,000	9,500	10,000
2036 (W)	350,000	1,200,000	73,000	0	970,000	50,000	12,000	380,000	460	15,000	140,000	5,600	20,000
2037 (W)	150,000	730,000	100,000	45,000	470,000	71,000	14,000	390,000	780	15,000	79,000	2,900	-14,000
2038 (D)	110,000	480,000	120,000	49,000	270,000	85,000	11,000	340,000	1,100	15,000	45,000	2,700	-16,000
2039 (W)	140,000	730,000	99,000	32,000	440,000	78,000	9,900	360,000	890	15,000	75,000	2,800	15,000
2040 (D)	84,000	480,000	100,000	48,000	220,000	79,000	8,300	360,000	970	11,000	33,000	2,500	-9,500
2041 (C)	30,000	390,000	110,000	49,000	120,000	90,000	4,700	340,000	900	9,900	18,000	2,100	570

WATER YEAR (TYPE)	INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
	SURFACE WATER INFLOW	PRECIPITATION	GROUNDWATER EXTRACTION / UPTAKE	GROUNDWATER DISCHARGE	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUNDWATER UPTAKE	ET OF PRECIPITATION	EVAPORATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPITATION	INFIL. OF SURFACE WATER	
2042 (D)	33,000	350,000	110,000	37,000	110,000	92,000	3,000	300,000	920	11,000	16,000	1,800	-830
2043 (C)	30,000	440,000	100,000	34,000	120,000	86,000	2,500	370,000	800	10,000	25,000	1,800	-2,800
2044 (C)	31,000	440,000	99,000	27,000	110,000	85,000	1,900	370,000	830	9,800	24,000	1,900	-80
2045 (C)	96,000	500,000	110,000	8,000	210,000	90,000	1,700	360,000	1,100	11,000	30,000	2,100	1,200
2046 (AN)	170,000	780,000	84,000	0	440,000	73,000	2,600	410,000	1,100	13,000	76,000	21,000	10,000
2047 (C)	35,000	440,000	98,000	29,000	120,000	82,000	2,400	380,000	890	9,600	26,000	2,100	-12,000
2048 (W)	310,000	1,100,000	84,000	0	870,000	66,000	4,300	360,000	830	16,000	100,000	23,000	13,000
2049 (W)	140,000	730,000	96,000	11,000	430,000	76,000	6,200	380,000	1,100	14,000	76,000	2,700	-510
2050 (W)	130,000	630,000	100,000	23,000	360,000	80,000	6,800	380,000	1,100	14,000	57,000	2,400	-5,200
2051 (W)	350,000	1,200,000	72,000	0	960,000	51,000	11,000	390,000	480	15,000	140,000	13,000	19,000
2052 (W)	110,000	510,000	100,000	42,000	260,000	73,000	12,000	370,000	860	13,000	54,000	2,800	-25,000
2053 (AN)	140,000	640,000	93,000	35,000	360,000	72,000	10,000	380,000	800	13,000	56,000	2,800	12,000
2054 (D)	83,000	480,000	100,000	46,000	220,000	79,000	7,900	360,000	960	11,000	33,000	2,400	-11,000
2055 (D)	100,000	480,000	120,000	29,000	240,000	90,000	6,200	330,000	1,000	15,000	43,000	2,600	-6,100
2056 (AN)	150,000	710,000	95,000	14,000	410,000	76,000	6,600	360,000	920	15,000	76,000	2,600	13,000
2057 (BN)	150,000	620,000	120,000	22,000	410,000	87,000	7,800	320,000	1,200	18,000	64,000	3,000	-12,000
2058 (AN)	180,000	700,000	82,000	12,000	380,000	65,000	8,700	420,000	670	12,000	72,000	2,600	15,000
2059 (W)	210,000	770,000	96,000	14,000	520,000	68,000	12,000	390,000	720	15,000	87,000	3,000	-6,100
2060 (D)	40,000	350,000	110,000	60,000	140,000	88,000	7,800	310,000	1,000	11,000	17,000	2,300	-4,200
2061 (C)	85,000	390,000	120,000	32,000	210,000	97,000	5,100	280,000	1,100	13,000	28,000	2,400	-7,700
2062 (D)	47,000	430,000	110,000	34,000	150,000	91,000	3,300	330,000	980	10,000	21,000	2,100	4,800

WATER YEAR (TYPE)		INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
		SURFACE WATER INFLOW	PRECIPITATION	GROUNDWATER EXTRACTION / UPTAKE	GROUNDWATER DISCHARGE	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUNDWATER UPTAKE	ET OF PRECIPITATION	EVAPORATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPITATION	INFIL. OF SURFACE WATER	
2063 (BN)		130,000	610,000	84,000	6,100	310,000	70,000	4,000	360,000	910	12,000	61,000	2,400	6,900
2064 (W)		110,000	600,000	83,000	11,000	260,000	65,000	5,500	400,000	810	11,000	52,000	2,500	4,200
2065 (BN)		40,000	410,000	100,000	42,000	130,000	82,000	4,700	360,000	800	8,800	20,000	2,300	-14,000
2066 (D)		54,000	430,000	120,000	26,000	170,000	99,000	3,400	290,000	1,000	13,000	30,000	2,500	8,400
2067 (C)		20,000	340,000	120,000	35,000	100,000	100,000	2,000	270,000	940	10,000	13,000	1,600	10,000
2068 (C)		62,000	500,000	120,000	14,000	240,000	95,000	1,500	320,000	940	14,000	36,000	1,700	-14,000
2069 (BN)		100,000	640,000	100,000	0	320,000	84,000	1,600	370,000	1,200	13,000	49,000	9,100	-60
2070 (W)		210,000	770,000	93,000	0	480,000	74,000	3,400	380,000	1,100	16,000	89,000	27,000	3,300
2071 (BN)		20,000	360,000	110,000	40,000	97,000	86,000	2,500	320,000	890	9,800	16,000	2,000	-7,000
2072 (W)		200,000	880,000	85,000	0	560,000	72,000	3,900	400,000	900	14,000	81,000	15,000	16,000
Average (2022-2072)		120,000	600,000	100,000	26,000	330,000	80,000	6,300	360,000	910	13,000	54,000	4,500	-50
2022-2072	W	190,000	790,000	93,000	18,000	520,000	70,000	8,700	380,000	830	15,000	82,000	7,000	2,000
	AN	160,000	720,000	89,000	13,000	410,000	72,000	6,500	390,000	900	13,000	70,000	5,300	11,000
	BN	73,000	490,000	100,000	32,000	220,000	82,000	4,500	350,000	950	11,000	35,000	3,300	-7,700
	D	73,000	440,000	110,000	39,000	200,000	88,000	6,200	330,000	1,000	12,000	31,000	2,400	-5,700
	C	50,000	420,000	110,000	32,000	160,000	92,000	3,300	320,000	970	11,000	24,000	2,000	-910

2.3.7.2 Projected (Current Land Use) Groundwater System Water Budget Summary

Summarized results for major components of the historical water budget as they relate to the GWS are presented in **Figure 2-68** and **Table 2-26**. Among the outflows from the Subbasin SWS, groundwater pumping makes up the largest fraction of the total SWS outflows (on average -94 taf per year). Highly negative net seepage values (on average -21 taf per year) represent net groundwater discharging to surface waterways and leaving the GWS. Deep percolation is the largest net inflow component averaging about 67 taf per year. Positive net subsurface flows (on average 53 taf per year) represent the combined subsurface inflows from adjacent subbasins and upland areas.

Groundwater (root water) uptake directly from shallow groundwater (on average -6.3 taf per year) represents a smaller outflow from the GWS. Overall, the water budget results for the 59-year projected (current land use) period indicate a cumulative change in groundwater storage of about -94 taf, which equals an average annual change in groundwater storage of only about -1.8 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 0.34 acre-feet per acre on average over the 59 years and an annual decrease of less than 0.01 acre-feet per acre across the entire Subbasin (approximately 272,000 acres). **Figure 2-68** provides a conceptual illustration of the projected (current land use) water budget. **Figure 2-69** highlights the cumulative change in groundwater storage that would occur during anticipated multi-year wet and dry periods within the projected period.

Detailed results for the projected (current land use) period GWS water budget are presented in **Appendix 2-K**.

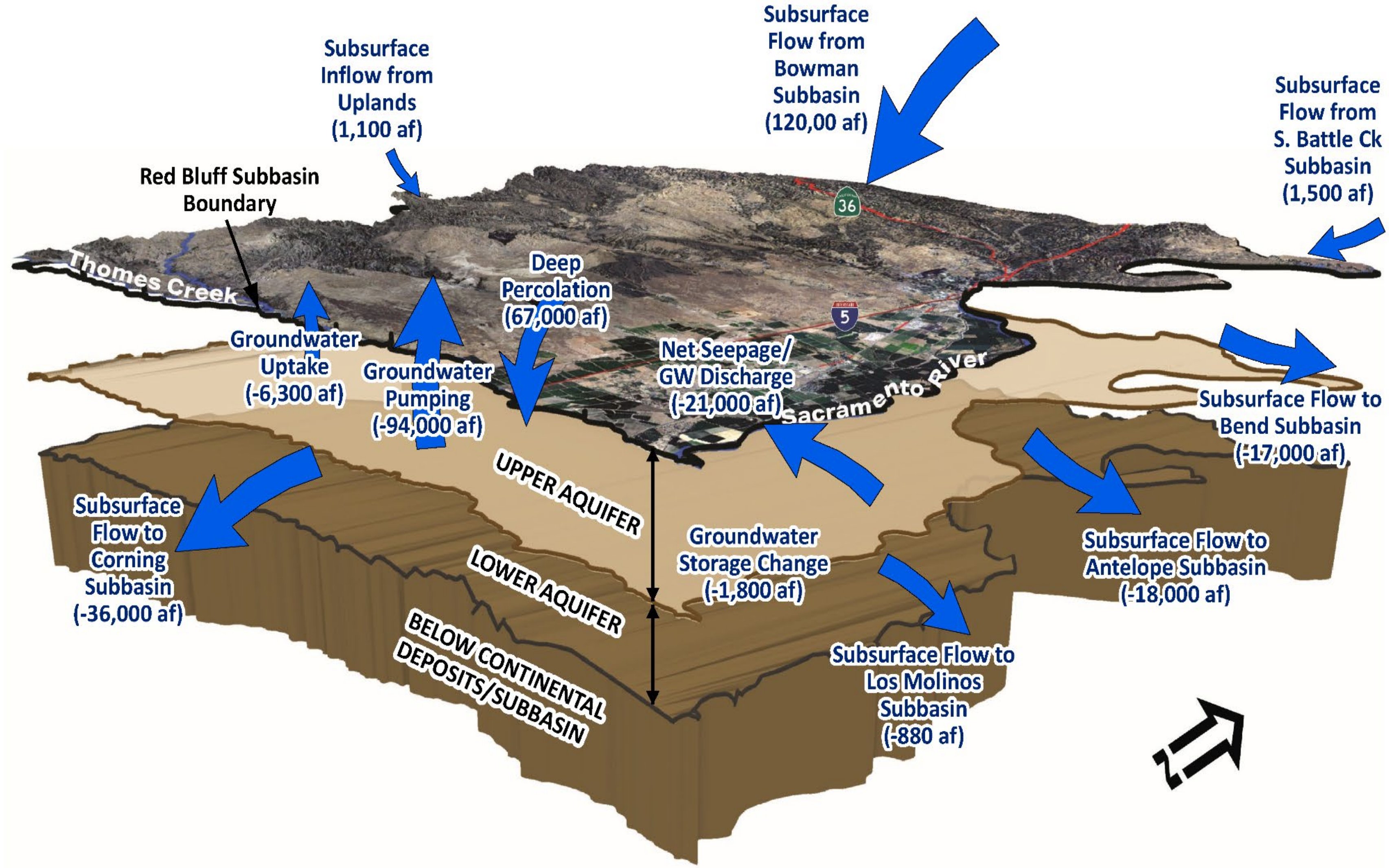

Figure 2-68. Diagram of the Red Bluff Subbasin Projected (Current Land Use) Average Annual Water Budget, 2022-2072

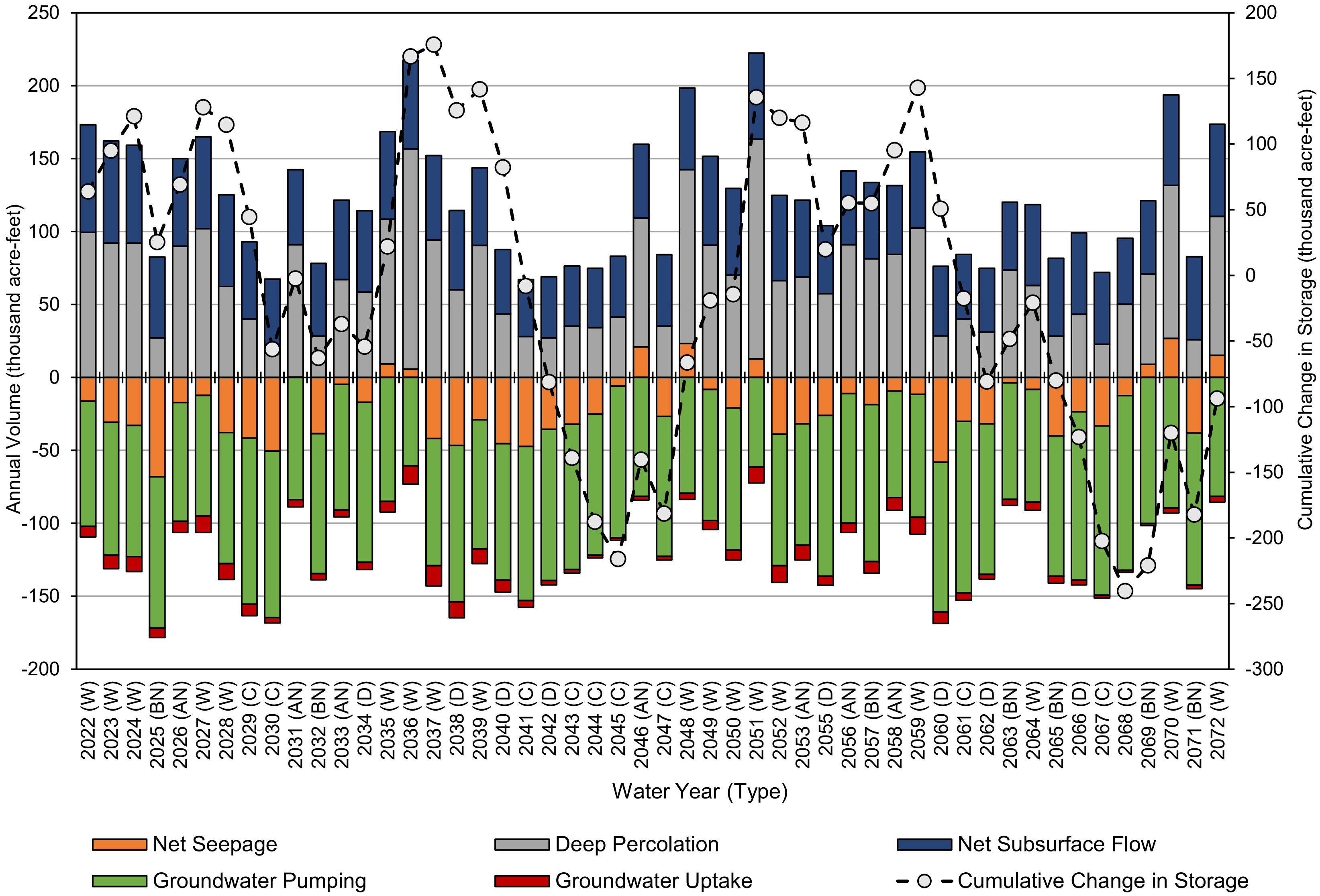

Figure 2-69 Red Bluff Subbasin Projected (Current Land Use) Water Budget Summary

Table 2-26. Red Bluff Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet)

WATER YEAR (TYPE)	NET SEEPAGE	DEEP PER-COLATION	NET SUBSURFACE FLOWS	GROUND-WATER PUMPING	GROUND-WATER UPTAKE	ANNUAL GROUNDWATER STORAGE CHANGE	CUMULATIVE GROUNDWATER STORAGE CHANGE
2022 (W)	-16,000	100,000	74,000	-86,000	-7,300	64,000	64,000
2023 (W)	-31,000	92,000	70,000	-91,000	-9,300	31,000	95,000
2024 (W)	-33,000	92,000	67,000	-90,000	-10,000	26,000	120,000
2025 (BN)	-68,000	27,000	55,000	-100,000	-6,700	-96,000	25,000
2026 (AN)	-17,000	90,000	60,000	-81,000	-7,600	44,000	69,000
2027 (W)	-12,000	100,000	63,000	-83,000	-11,000	59,000	130,000
2028 (W)	-38,000	62,000	63,000	-90,000	-11,000	-13,000	110,000
2029 (C)	-42,000	40,000	53,000	-110,000	-7,800	-70,000	45,000
2030 (C)	-50,000	23,000	45,000	-110,000	-3,700	-100,000	-56,000
2031 (AN)	170	91,000	51,000	-84,000	-4,900	54,000	-2,400
2032 (BN)	-39,000	28,000	50,000	-96,000	-4,200	-61,000	-63,000
2033 (AN)	-4,700	67,000	54,000	-86,000	-4,800	26,000	-37,000
2034 (D)	-17,000	59,000	56,000	-110,000	-5,000	-17,000	-54,000
2035 (W)	9,500	99,000	60,000	-85,000	-7,200	76,000	22,000
2036 (W)	5,600	150,000	61,000	-60,000	-12,000	140,000	170,000
2037 (W)	-42,000	94,000	58,000	-87,000	-14,000	9,200	180,000
2038 (D)	-47,000	60,000	55,000	-110,000	-11,000	-50,000	130,000
2039 (W)	-29,000	91,000	53,000	-89,000	-9,900	16,000	140,000
2040 (D)	-45,000	44,000	44,000	-94,000	-8,300	-59,000	82,000
2041 (C)	-47,000	28,000	39,000	-110,000	-4,700	-90,000	-8,100
2042 (D)	-36,000	27,000	42,000	-100,000	-3,000	-73,000	-81,000
2043 (C)	-32,000	35,000	41,000	-100,000	-2,500	-58,000	-140,000
2044 (C)	-25,000	34,000	41,000	-97,000	-1,900	-49,000	-190,000
2045 (C)	-5,900	41,000	42,000	-100,000	-1,700	-28,000	-220,000
2046 (AN)	21,000	88,000	50,000	-81,000	-2,600	76,000	-140,000
2047 (C)	-27,000	35,000	49,000	-96,000	-2,400	-41,000	-180,000
2048 (W)	23,000	120,000	56,000	-79,000	-4,300	110,000	-66,000
2049 (W)	-8,200	91,000	61,000	-90,000	-6,200	47,000	-19,000
2050 (W)	-21,000	70,000	59,000	-97,000	-6,800	4,600	-14,000
2051 (W)	13,000	150,000	59,000	-61,000	-11,000	150,000	140,000
2052 (W)	-39,000	66,000	58,000	-90,000	-12,000	-16,000	120,000
2053 (AN)	-32,000	69,000	53,000	-83,000	-10,000	-3,600	120,000
2054 (D)	-44,000	44,000	43,000	-94,000	-7,900	-58,000	58,000
2055 (D)	-26,000	58,000	47,000	-110,000	-6,200	-38,000	20,000
2056 (AN)	-11,000	91,000	51,000	-89,000	-6,600	35,000	55,000
2057 (BN)	-19,000	81,000	52,000	-110,000	-7,800	-380	55,000
2058 (AN)	-9,300	84,000	47,000	-73,000	-8,700	41,000	95,000
2059 (W)	-12,000	100,000	52,000	-84,000	-12,000	47,000	140,000

WATER YEAR (TYPE)		NET SEEPAGE	DEEP PER-COLATION	NET SUBSURFACE FLOWS	GROUND-WATER PUMPING	GROUND-WATER UPTAKE	ANNUAL GROUNDWATER STORAGE CHANGE	CUMULATIVE GROUNDWATER STORAGE CHANGE
2060 (D)		-58,000	29,000	48,000	-100,000	-7,800	-92,000	51,000
2061 (C)		-30,000	40,000	44,000	-120,000	-5,100	-68,000	-18,000
2062 (D)		-32,000	31,000	44,000	-100,000	-3,300	-63,000	-81,000
2063 (BN)		-3,700	74,000	47,000	-80,000	-4,000	32,000	-48,000
2064 (W)		-8,100	63,000	55,000	-77,000	-5,500	28,000	-21,000
2065 (BN)		-40,000	28,000	53,000	-96,000	-4,700	-59,000	-80,000
2066 (D)		-24,000	43,000	56,000	-120,000	-3,400	-43,000	-120,000
2067 (C)		-33,000	23,000	49,000	-120,000	-1,900	-79,000	-200,000
2068 (C)		-12,000	50,000	45,000	-120,000	-1,500	-38,000	-240,000
2069 (BN)		9,100	62,000	50,000	-100,000	-1,600	20,000	-220,000
2070 (W)		27,000	100,000	62,000	-89,000	-3,400	100,000	-120,000
2071 (BN)		-38,000	26,000	57,000	-100,000	-2,400	-62,000	-180,000
2072 (W)		15,000	95,000	63,000	-81,000	-3,900	88,000	-94,000
Average (2022-2072)		-21,000	67,000	53,000	-94,000	-6,300	-1,800	
2022-2072	W	-11,000	97,000	61,000	-84,000	-8,700	54,000	
	AN	-7,500	83,000	52,000	-83,000	-6,500	39,000	
	BN	-28,000	47,000	52,000	-98,000	-4,500	-32,000	
	D	-36,000	44,000	48,000	-100,000	-6,200	-55,000	
	C	-30,000	35,000	45,000	-110,000	-3,300	-62,000	

2.3.8 Projected (Future Land Use) Water Budget Summary

This section presents the results of the Projected (Future Land Use) scenario. The Future Land Use scenario assumes a static (held constant over the entire projected period) land use condition reflecting a potential future development or land use condition envisioned for the Subbasin at the end of the 50-year GSP planning horizon. The future land use condition was developed through discussion with local stakeholders and consultation with the Tehama County Planning Department. The future land use condition includes an increase in urban area reflective of the recent rate of urban increase experienced for the County, especially in more densely urbanized areas around the City of Red Bluff. Additionally, the future land use condition envisioned by the Subbasin includes increased agricultural development in previously undeveloped areas of the Subbasin with soil characteristics suitable for agricultural production.

Land uses in the projected (future land use) condition include approximately 58,000 acres of agricultural land, 7,000 acres of urban area, and about 207,000 acres of native vegetation. The future land use condition evaluated at the end of the 50-year GSP planning horizon represents increases in agricultural acreage of about 13,000 acres and in urban area of about 500 acres over the current (2018) land use condition. The additional agricultural acres in the future land use condition are represented as almond orchards for the purpose of the water budget analyses. The projected (future land use) condition includes an overall decrease in native vegetation area over the 50-year planning horizon by about 14,000 acres from the current land use condition.

Land use areas are used to distinguish the water use sector in which water is consumed, as required by the GSP Regulations. **Figure 2-70** and **Table 2-27** summarize the annual land use areas over the projected (future land use) period (2022-2072) in the Red Bluff Subbasin by water use sector, as defined by the GSP Regulations (23 CCR § 351(al)). In the Red Bluff Subbasin, water use sectors include agricultural, urban, and native vegetation land uses. The urban water use sector covers all urban, residential, industrial, and semi-agricultural[7] land uses.

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[7] As defined in the DWR crop mapping metadata, semi-agricultural land use subclasses include farmsteads, livestock feed lot operations, dairies, poultry farms, and miscellaneous semi-agricultural land use incidental to agriculture (small roads, ditches, non-planted areas of cropped fields (DWR, 2016b).

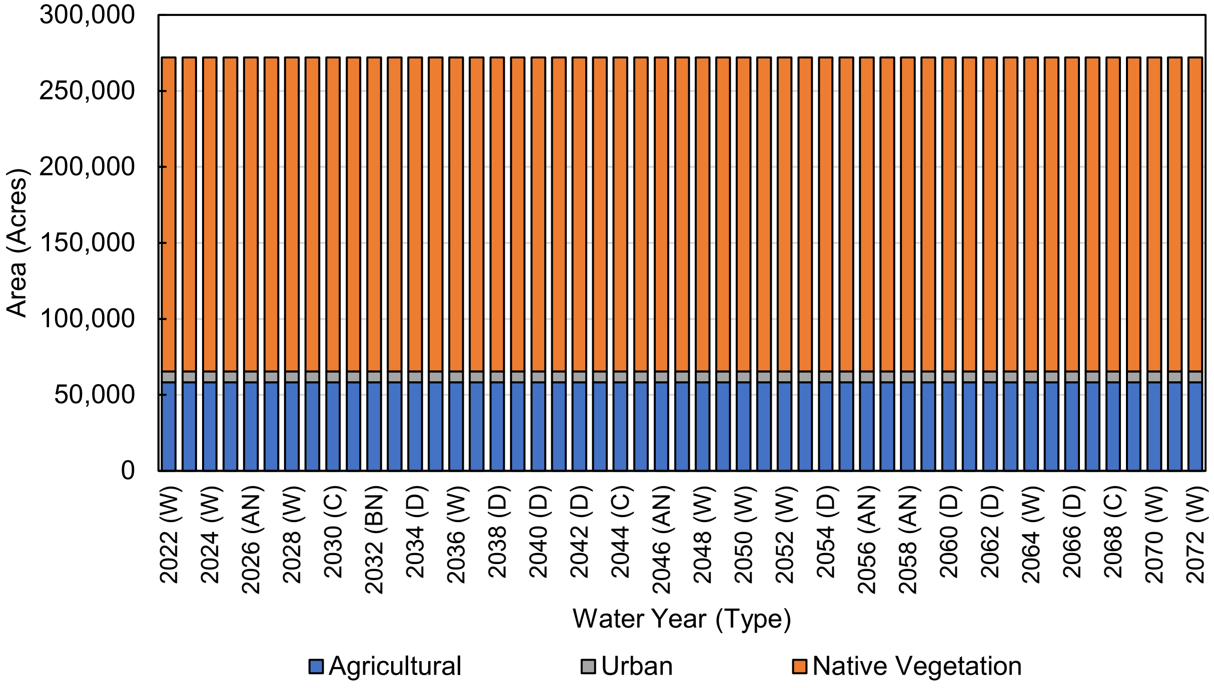


Figure 2-70. Red Bluff Subbasin Future Land Use Areas, by Water Use Sector

Table 2-27. Red Bluff Subbasin Future Land Use Areas, by Water Use Sector (acres)

PROJECTED PERIOD (FUTURE LAND USE)	AGRICULTURAL	URBAN[1]	NATIVE VEGETATION	TOTAL
2022 -2072	58,360	6,970	206,610	271,940

[1] Area includes land classified as urban, residential, industrial, and semi-agricultural.

Projected future agricultural land uses are further detailed in **Figure 2-71** and **Table 2-28**. In the future, a majority of the agricultural area in the Red Bluff Subbasin is projected to consist of almonds/pistachio, deciduous crops, grain, and pasture. Because the projected (future land use) model scenario evaluates the water budget under a land use condition projected to exist in 2072 over a 50-year projected hydrologic period, all land use areas within the Red Bluff Subbasin remain stable during the entire projected period.

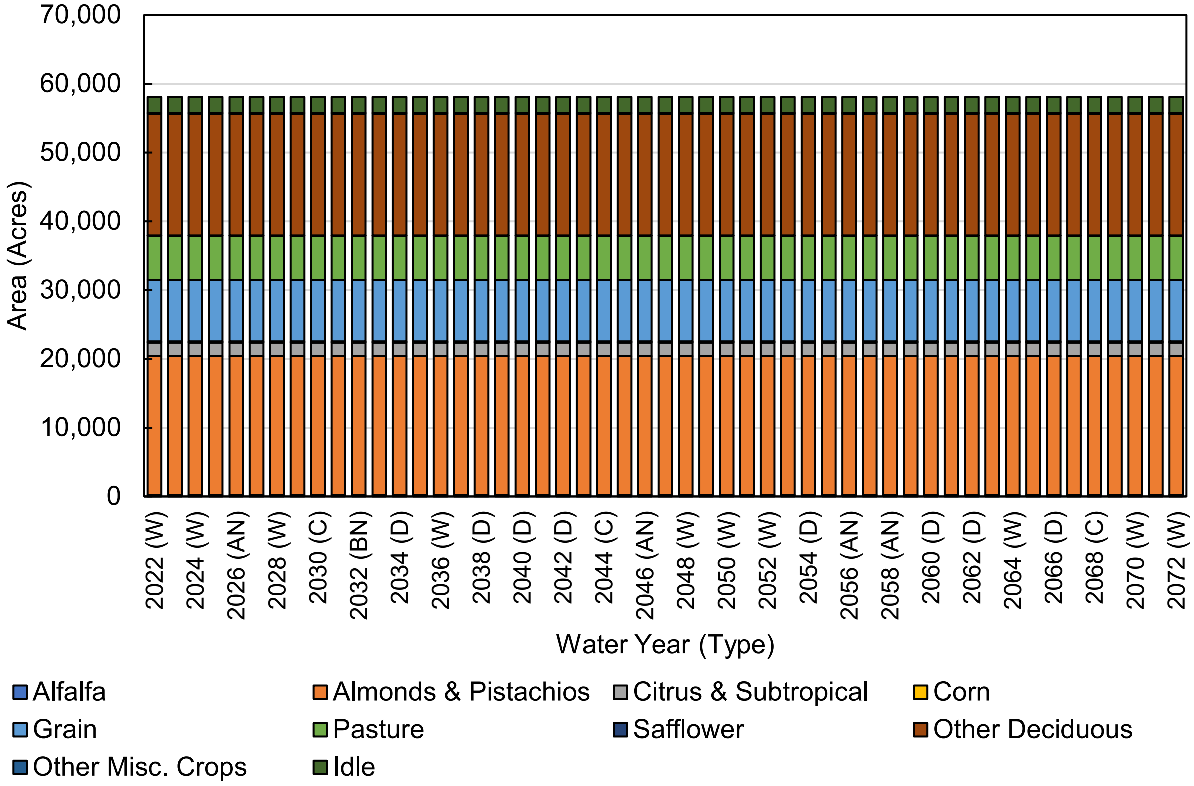


Figure 2-71. Red Bluff Subbasin Projected Agricultural Land Use Areas

Table 2-28. Red Bluff Subbasin Projected Agricultural Land Use Areas (acres)

PROJECTED PERIOD (FUTURE LAND USE)	ALFALFA	ALMONDS & PISTACHIOS	CITRUS & SUB TROPICAL	CORN	GRAIN	PASTURE	PONDED (RICE, REFUGE)	SAFFLOWER	OTHER DECIDUOUS	OTHER MISC. CROPS	IDLE	TOTAL
2022-2072	230	20,160	1,990	170	8,930	6,440	260	10	17,690	130	2,350	58,360

2.3.8.1 Projected (Future Land Use) Surface Water System Water Budget Summary

Annual inflows, outflows, and change in SWS root zone storage during the projected (future land use) water budget period (2022-2072) are summarized in **Figure 2-72** and **Table 2-29**. Inflows in **Figure 2-72** are shown as positive values, while outflows are shown as negative values. Review of the variability in component volumes across years provides insight into the impacts of hydrology on the SWS water budget.

Of particular note in the projected (future land use) SWS water budget results are the volume of precipitation that makes up a large part of the Subbasin SWS inflows (average about 600 taf over the projected period). Groundwater extraction and surface water inflows also represent large SWS inflow components averaging about 140 and 120 taf per year, respectively. Groundwater discharge to surface water is a relatively smaller SWS inflow in the Subbasin averaging about 16 taf per year over the projected (future land use) water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation and surface water outflow make up large fractions of the total Subbasin SWS outflows. ET of precipitation averages about 360 taf per year. The surface water outflows total about 330 taf per year on average, a value that corresponds with the large volumes of precipitation and surface water inflow (a total of about 720 taf per year). By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of applied water and deep percolation of precipitation averaging about 110 and 51 taf per year, respectively. The outflows of deep percolation of applied water, ET of groundwater uptake and infiltration (seepage) of surface water are about 17, 4.8, and 7.1 taf per year on average, respectively. Evaporation from surface water averages about 0.97 taf per year over the projected (current land use) water budget period.

Detailed results for the projected (current land use) SWS water budget are presented in **Appendix 2-K**.

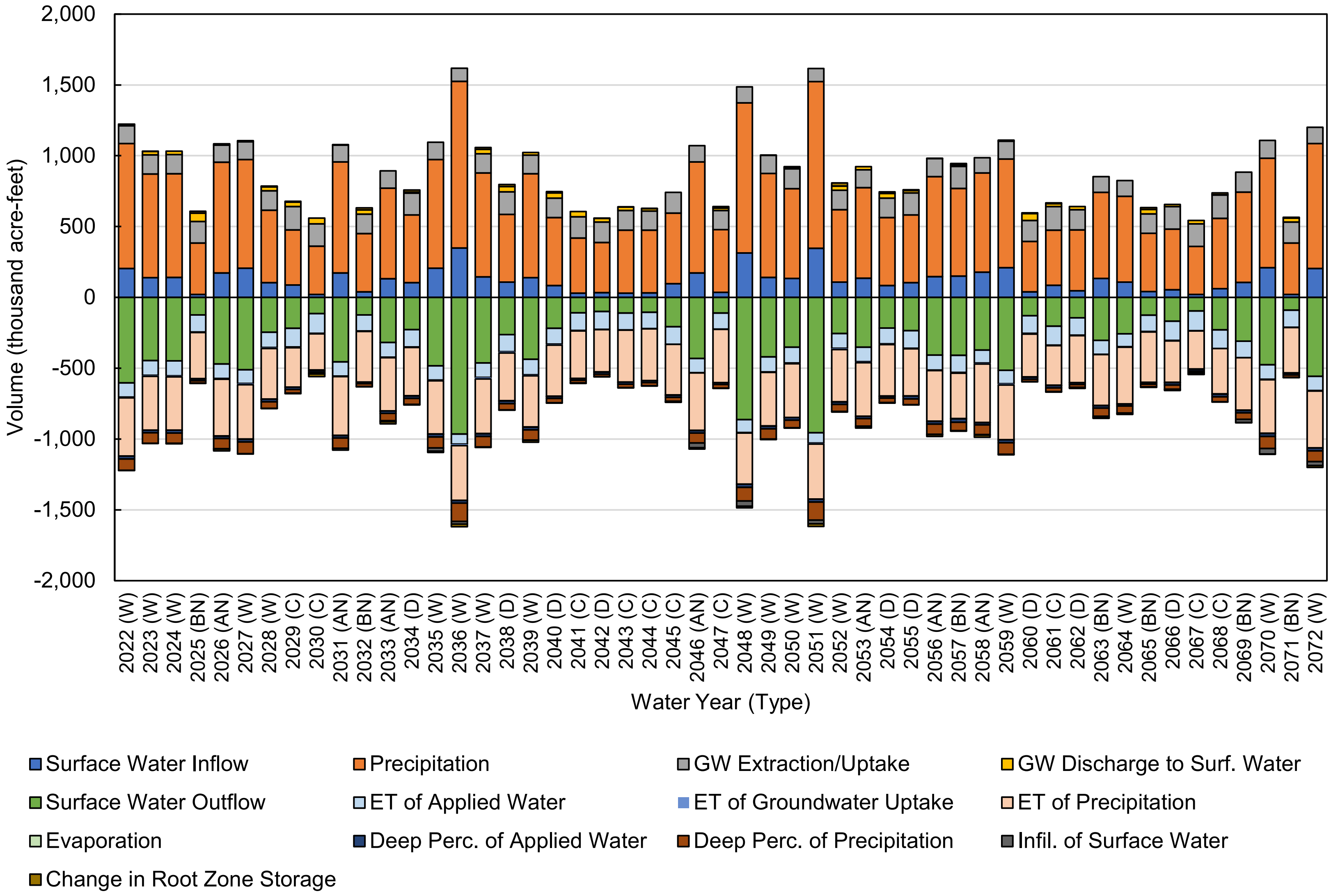


Figure 2-72. Red Bluff Subbasin Surface Water System Projected (Future Land Use) Water Budget, 2022-2072

Table 2-29. Red Bluff Subbasin Surface Water System Projected (Future Land Use) Water Budget, 2022-2072 (acre-feet)

WATER YEAR (TYPE)	INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
	SURFACE WATER INFLOW	PRECIPITATION	GROUNDWATER EXTRACTION/ UPTAKE	GROUNDWATER DISCHARGE TO SURFACE WATER	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUNDWATER UPTAKE	ET OF PRECIPITATION	EVAPORATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPITATION	INFIL. OF SURFACE WATER	
2022 (W)	200,000	880,000	130,000	9,800	600,000	100,000	5,900	410,000	800	21,000	79,000	2,700	-2,300
2023 (W)	140,000	730,000	140,000	24,000	450,000	100,000	7,600	380,000	950	19,000	73,000	2,700	-1,100
2024 (W)	140,000	730,000	130,000	25,000	450,000	110,000	8,200	380,000	940	19,000	73,000	2,800	20
2025 (BN)	21,000	360,000	150,000	60,000	120,000	120,000	4,900	330,000	880	13,000	17,000	2,000	-12,000
2026 (AN)	170,000	780,000	120,000	8,500	470,000	100,000	5,800	400,000	980	17,000	72,000	2,900	13,000
2027 (W)	210,000	770,000	130,000	2,900	510,000	95,000	8,900	390,000	770	19,000	82,000	2,900	-4,500
2028 (W)	100,000	510,000	140,000	29,000	250,000	110,000	8,500	360,000	950	17,000	47,000	2,700	-5,200
2029 (C)	88,000	390,000	160,000	32,000	220,000	130,000	5,800	280,000	1,200	16,000	26,000	2,500	-5,700
2030 (C)	21,000	340,000	160,000	41,000	110,000	140,000	2,900	260,000	1,100	13,000	12,000	1,700	18,000
2031 (AN)	170,000	780,000	120,000	0	460,000	100,000	3,500	420,000	1,100	16,000	74,000	13,000	-3,200
2032 (BN)	40,000	410,000	140,000	30,000	120,000	110,000	3,100	360,000	890	12,000	19,000	2,300	-13,000
2033 (AN)	130,000	640,000	120,000	0	320,000	100,000	3,500	380,000	940	17,000	51,000	7,600	15,000
2034 (D)	100,000	480,000	150,000	7,800	230,000	120,000	3,700	340,000	1,000	18,000	43,000	2,600	-16,000
2035 (W)	210,000	770,000	120,000	0	480,000	100,000	5,400	380,000	910	20,000	79,000	23,000	9,300
2036 (W)	350,000	1,200,000	94,000	0	970,000	71,000	10,000	390,000	490	19,000	130,000	19,000	18,000
2037 (W)	150,000	730,000	130,000	33,000	460,000	100,000	11,000	390,000	830	19,000	75,000	2,900	-13,000
2038 (D)	110,000	480,000	160,000	37,000	260,000	120,000	8,600	340,000	1,100	19,000	43,000	2,700	-14,000
2039 (W)	140,000	730,000	130,000	19,000	440,000	110,000	7,600	360,000	970	20,000	70,000	2,800	14,000
2040 (D)	84,000	480,000	140,000	36,000	220,000	110,000	6,100	360,000	1,000	14,000	31,000	2,500	-8,900
2041 (C)	30,000	390,000	150,000	38,000	110,000	120,000	3,400	330,000	1,000	13,000	18,000	2,100	1,500

WATER YEAR (TYPE)	INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
	SURFACE WATER INFLOW	PRECIPITATION	GROUNDWATER EXTRACTION/ UPTAKE	GROUNDWATER DISCHARGE TO SURFACE WATER	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUNDWATER UPTAKE	ET OF PRECIPITATION	EVAPORATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPITATION	INFIL. OF SURFACE WATER	
2042 (D)	33,000	350,000	140,000	26,000	100,000	130,000	2,300	300,000	1,000	15,000	16,000	1,800	-2,500
2043 (C)	31,000	440,000	140,000	23,000	110,000	120,000	1,800	370,000	860	14,000	24,000	1,800	-1,100
2044 (C)	31,000	440,000	130,000	16,000	100,000	120,000	1,400	360,000	870	13,000	24,000	1,900	-40
2045 (C)	96,000	500,000	150,000	0	210,000	120,000	1,200	360,000	1,100	15,000	29,000	5,300	1,300
2046 (AN)	170,000	780,000	120,000	0	430,000	100,000	1,900	410,000	1,200	17,000	71,000	34,000	9,700
2047 (C)	35,000	440,000	130,000	18,000	110,000	110,000	1,800	380,000	960	13,000	25,000	2,100	-11,000
2048 (W)	310,000	1,100,000	110,000	0	860,000	92,000	3,100	360,000	900	21,000	97,000	36,000	12,000
2049 (W)	140,000	730,000	130,000	0	420,000	110,000	4,500	380,000	1,100	19,000	72,000	4,400	-1,300
2050 (W)	130,000	630,000	140,000	11,000	350,000	110,000	5,000	380,000	1,100	18,000	54,000	2,400	-4,400
2051 (W)	350,000	1,200,000	94,000	0	960,000	71,000	8,700	390,000	510	19,000	130,000	26,000	18,000
2052 (W)	110,000	510,000	140,000	30,000	260,000	100,000	9,100	370,000	930	17,000	51,000	2,800	-23,000
2053 (AN)	140,000	640,000	120,000	23,000	350,000	100,000	7,800	380,000	870	17,000	53,000	2,800	11,000
2054 (D)	83,000	480,000	140,000	35,000	220,000	110,000	5,800	360,000	990	14,000	32,000	2,400	-11,000
2055 (D)	100,000	480,000	160,000	17,000	230,000	120,000	4,500	330,000	1,000	19,000	41,000	2,600	-4,800
2056 (AN)	150,000	710,000	130,000	810	410,000	110,000	4,800	360,000	990	20,000	72,000	2,600	12,000
2057 (BN)	150,000	620,000	160,000	8,800	410,000	120,000	5,800	320,000	1,200	23,000	61,000	3,000	-11,000
2058 (AN)	180,000	700,000	110,000	0	370,000	91,000	6,400	410,000	730	16,000	68,000	3,700	14,000
2059 (W)	210,000	770,000	130,000	1,700	510,000	96,000	9,100	390,000	770	20,000	82,000	3,000	-5,500
2060 (D)	40,000	350,000	150,000	49,000	130,000	120,000	5,500	300,000	1,100	15,000	17,000	2,300	-5,400
2061 (C)	86,000	390,000	170,000	21,000	200,000	130,000	3,700	280,000	1,200	17,000	26,000	2,400	-5,500
2062 (D)	47,000	430,000	140,000	22,000	140,000	120,000	2,500	330,000	1,100	14,000	20,000	2,100	4,400
2063 (BN)	130,000	610,000	110,000	0	300,000	97,000	3,000	360,000	940	16,000	58,000	8,600	6,100

WATER YEAR (TYPE)		INFLOWS				OUTFLOWS								CHANGE IN ROOT ZONE STORAGE
		SURFACE WATER INFLOW	PRECI-PITATION	GROUND-WATER EXTRACTION/ UPTAKE	GROUND-WATER DISCHARGE TO SURFACE WATER	SURFACE WATER OUTFLOW	ET OF APPLIED WATER	ET OF GROUND-WATER UPTAKE	ET OF PRECIP-ITATION	EVAPO-RATION	DEEP PERC. OF APPLIED WATER	DEEP PERC. OF PRECIPI-TATION	INFIL. OF SURFACE WATER	
2064 (W)		110,000	600,000	110,000	0	260,000	91,000	4,000	400,000	890	14,000	50,000	3,600	4,500
2065 (BN)		41,000	410,000	140,000	32,000	130,000	110,000	3,500	360,000	850	12,000	19,000	2,300	-13,000
2066 (D)		54,000	430,000	160,000	15,000	170,000	140,000	2,600	290,000	1,100	18,000	29,000	2,500	6,600
2067 (C)		20,000	340,000	160,000	24,000	96,000	140,000	1,400	270,000	1,000	13,000	13,000	1,600	10,000
2068 (C)		62,000	500,000	160,000	2,800	230,000	130,000	1,100	320,000	1,000	19,000	35,000	1,700	-13,000
2069 (BN)		110,000	640,000	140,000	0	310,000	120,000	1,100	370,000	1,200	17,000	47,000	21,000	820
2070 (W)		210,000	770,000	130,000	0	480,000	100,000	2,500	380,000	1,200	22,000	84,000	40,000	2,100
2071 (BN)		21,000	360,000	150,000	29,000	90,000	120,000	1,800	320,000	950	13,000	16,000	2,000	-5,700
2072 (W)		200,000	880,000	110,000	0	560,000	100,000	2,800	400,000	970	19,000	76,000	28,000	13,000
Average (2022-2072)		120,000	600,000	140,000	16,000	330,000	110,000	4,800	360,000	970	17,000	51,000	7,100	-50
2022-2072	W	190,000	790,000	120,000	10,000	510,000	98,000	6,800	380,000	880	19,000	78,000	12,000	1,700
	AN	160,000	720,000	120,000	4,600	400,000	100,000	4,800	390,000	960	17,000	66,000	9,400	10,000
	BN	73,000	490,000	140,000	23,000	210,000	110,000	3,300	340,000	990	15,000	34,000	5,900	-7,000
	D	73,000	440,000	150,000	27,000	190,000	120,000	4,600	330,000	1,100	16,000	30,000	2,400	-5,700
	C	50,000	420,000	150,000	22,000	150,000	130,000	2,400	320,000	1,000	15,000	23,000	2,300	-500

2.3.8.2 Projected (Future Land Use) Groundwater System Water Budget Summary

Summarized results for major components of the projected (future land use) water budget as they relate to the GWS are presented in **Figure 2-73** and **Table 2-30**. Among the outflows from the Subbasin SWS, groundwater pumping makes up the largest fraction of the total SWS outflows (on average -130 taf per year). Negative net seepage values (on average -9.3 taf per year) represent net groundwater discharging to surface waterways and leaving the GWS. Positive net subsurface flows and deep percolation are the largest net inflow components averaging about 74 and 68 taf per year, respectively. Groundwater (root water) uptake directly from shallow groundwater (on average -4.8 taf per year) represents a smaller outflow from the GWS. Overall, the water budget results for the 51-year projected (future land use) period indicate a cumulative change in groundwater storage of about -150 taf, which equals an average annual change in groundwater storage of only about -2.9 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 0.54 acre-feet per acre on average over the 51 years and an annual decrease of about 0.01 acre-feet per acre across the entire Subbasin (approximately 272,000 acres). **Figure 2-73** provides a conceptual illustration of the projected (future land use) water budget. **Figure 2-74** highlights the cumulative change in groundwater storage that would occur during anticipated multi-year wet and dry periods within the projected period.

Detailed results for the projected (future land use) GWS water budget are presented in **Appendix 2-K**.

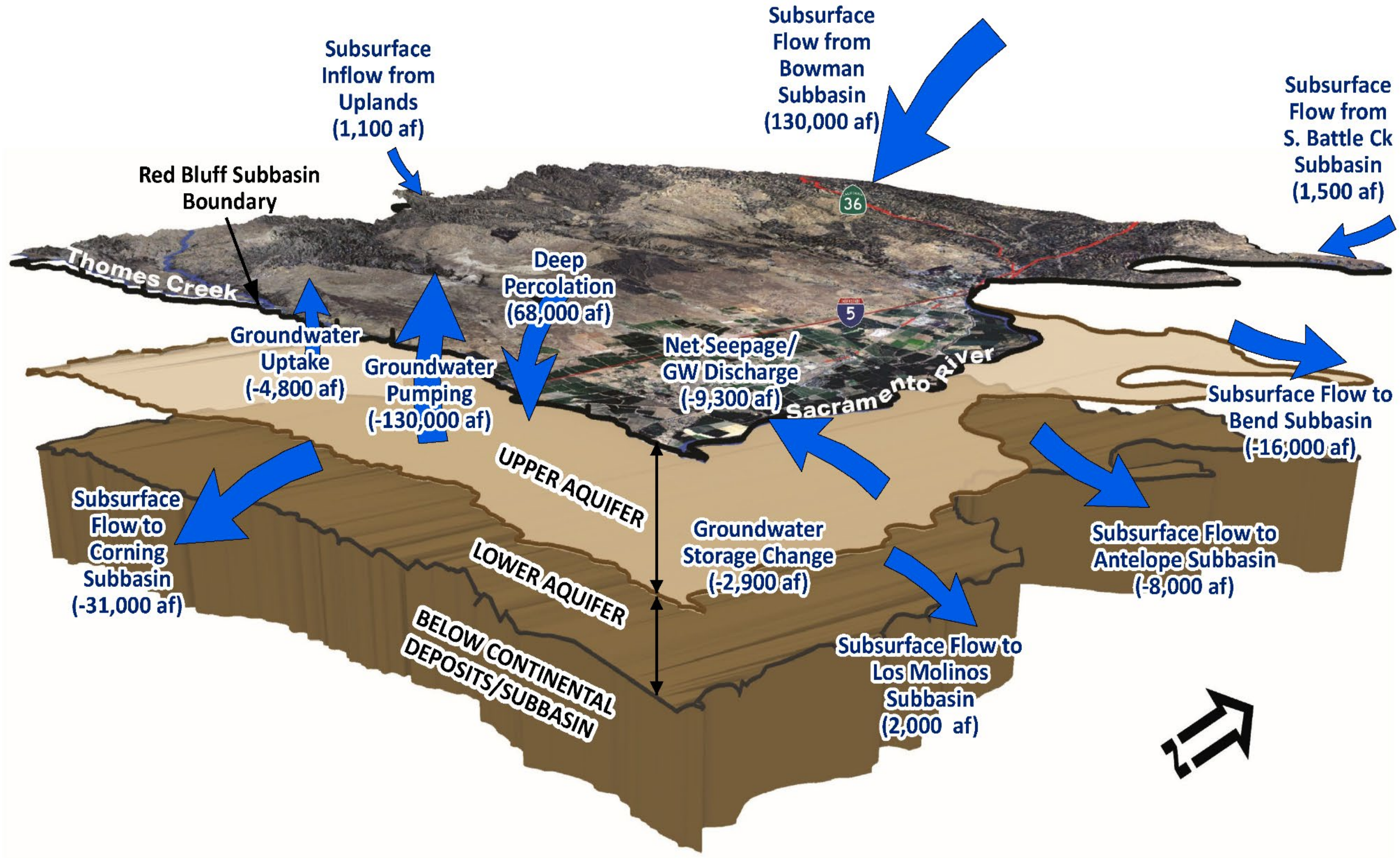


Figure 2-73. Diagram of the Red Bluff Subbasin Projected (Future Land Use) Average Annual Water Budget, 2022-2072

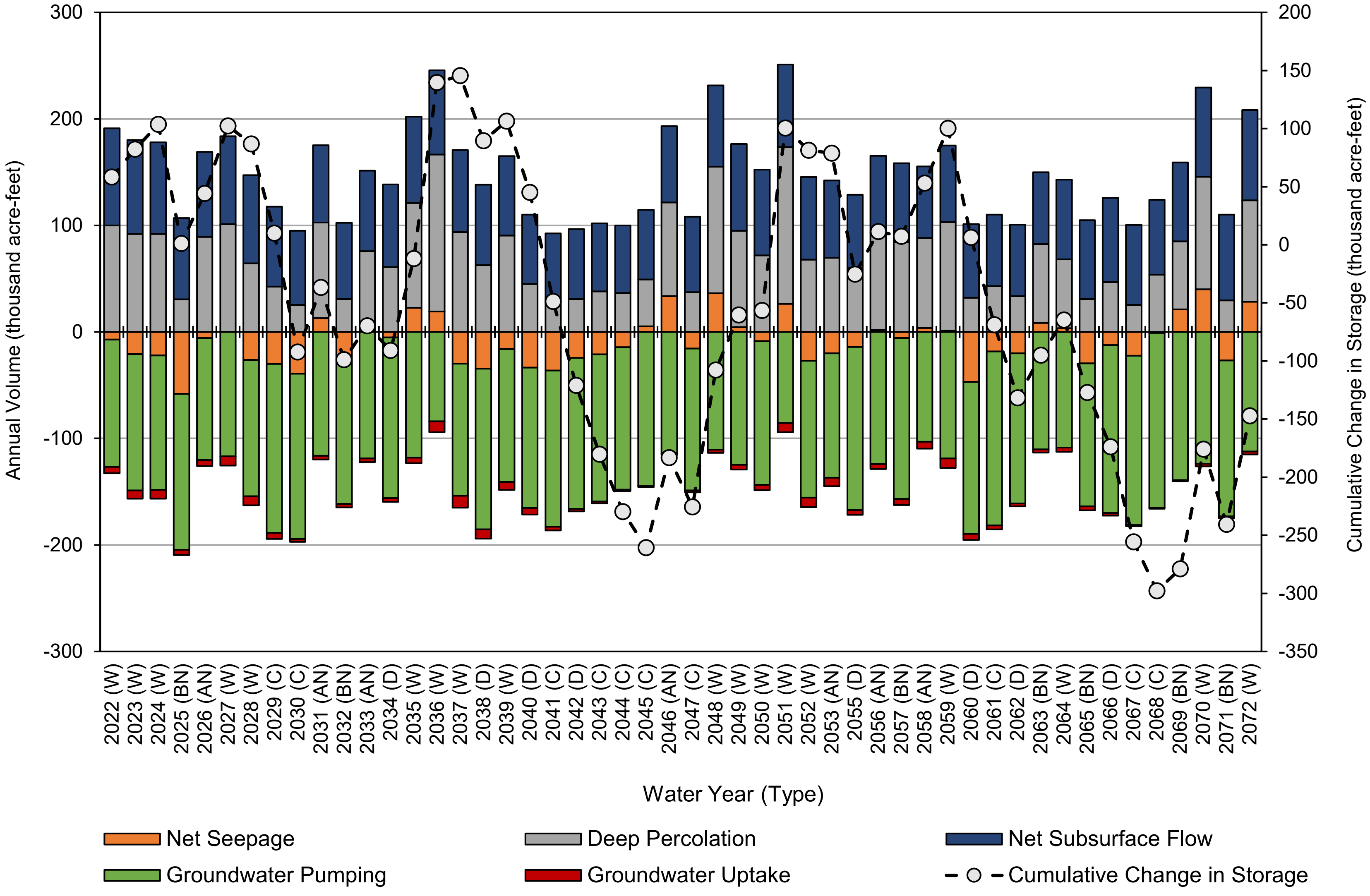


Figure 2-74. Red Bluff Subbasin Projected (Future Land Use) Water Budget Summary

Table 2-30. Red Bluff Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet)

WATER YEAR (TYPE)	NET SEEPAGE	DEEP PERCOLATION	NET SUBSURFACE FLOWS	GROUND-WATER PUMPING	GROUNDWATER UPTAKE	ANNUAL GROUNDWATER STORAGE CHANGE	CUMULATIVE GROUNDWATER STORAGE CHANGE
2022 (W)	-7,000	100,000	91,000	-120,000	-5,900	58,000	58,000
2023 (W)	-21,000	92,000	88,000	-130,000	-7,600	24,000	82,000
2024 (W)	-22,000	92,000	86,000	-130,000	-8,200	21,000	100,000
2025 (BN)	-58,000	31,000	76,000	-150,000	-4,900	-100,000	1,000
2026 (AN)	-5,600	89,000	80,000	-110,000	-5,800	43,000	44,000
2027 (W)	-47	100,000	83,000	-120,000	-8,900	58,000	100,000
2028 (W)	-26,000	64,000	83,000	-130,000	-8,500	-16,000	87,000
2029 (C)	-30,000	43,000	75,000	-160,000	-5,800	-77,000	10,000
2030 (C)	-39,000	25,000	69,000	-160,000	-2,900	-100,000	-92,000
2031 (AN)	13,000	90,000	73,000	-120,000	-3,500	56,000	-37,000
2032 (BN)	-27,000	31,000	72,000	-130,000	-3,100	-62,000	-99,000
2033 (AN)	7,600	68,000	76,000	-120,000	-3,500	29,000	-70,000
2034 (D)	-5,300	61,000	77,000	-150,000	-3,700	-21,000	-91,000
2035 (W)	23,000	99,000	81,000	-120,000	-5,400	79,000	-12,000
2036 (W)	19,000	150,000	79,000	-84,000	-10,000	150,000	140,000
2037 (W)	-30,000	94,000	77,000	-120,000	-11,000	5,900	150,000
2038 (D)	-35,000	63,000	76,000	-150,000	-8,600	-56,000	90,000
2039 (W)	-16,000	90,000	75,000	-120,000	-7,600	17,000	110,000
2040 (D)	-34,000	45,000	65,000	-130,000	-6,100	-61,000	45,000
2041 (C)	-36,000	31,000	61,000	-150,000	-3,400	-94,000	-49,000
2042 (D)	-24,000	31,000	66,000	-140,000	-2,300	-72,000	-120,000
2043 (C)	-21,000	38,000	64,000	-140,000	-1,800	-59,000	-180,000
2044 (C)	-14,000	37,000	63,000	-130,000	-1,400	-50,000	-230,000
2045 (C)	5,300	44,000	65,000	-140,000	-1,200	-31,000	-260,000
2046 (AN)	34,000	88,000	72,000	-110,000	-1,900	78,000	-180,000
2047 (C)	-16,000	37,000	71,000	-130,000	-1,800	-42,000	-230,000
2048 (W)	36,000	120,000	76,000	-110,000	-3,100	120,000	-110,000
2049 (W)	4,400	90,000	82,000	-120,000	-4,400	47,000	-60,000
2050 (W)	-8,600	72,000	81,000	-130,000	-5,000	4,000	-56,000
2051 (W)	26,000	150,000	78,000	-85,000	-8,700	160,000	100,000
2052 (W)	-27,000	68,000	78,000	-130,000	-9,000	-19,000	81,000
2053 (AN)	-20,000	70,000	73,000	-120,000	-7,800	-2,600	79,000
2054 (D)	-33,000	45,000	63,000	-130,000	-5,800	-61,000	18,000
2055 (D)	-14,000	60,000	69,000	-150,000	-4,500	-43,000	-25,000
2056 (AN)	1,800	91,000	72,000	-120,000	-4,800	37,000	11,000
2057 (BN)	-5,800	84,000	74,000	-150,000	-5,800	-4,100	7,200
2058 (AN)	3,700	85,000	67,000	-100,000	-6,400	46,000	53,000
2059 (W)	1,300	100,000	72,000	-120,000	-9,000	47,000	100,000

WATER YEAR (TYPE)		NET SEEPAGE	DEEP PERCOLATION	NET SUBSURFACE FLOWS	GROUND-WATER PUMPING	GROUNDWATER UPTAKE	ANNUAL GROUNDWATER STORAGE CHANGE	CUMULATIVE GROUNDWATER STORAGE CHANGE
2060 (D)		-47,000	32,000	69,000	-140,000	-5,500	-94,000	6,300
2061 (C)		-18,000	43,000	67,000	-160,000	-3,700	-75,000	-69,000
2062 (D)		-20,000	34,000	67,000	-140,000	-2,500	-63,000	-130,000
2063 (BN)		8,600	74,000	67,000	-110,000	-2,900	37,000	-95,000
2064 (W)		3,600	65,000	75,000	-110,000	-4,000	30,000	-65,000
2065 (BN)		-30,000	31,000	74,000	-130,000	-3,500	-62,000	-130,000
2066 (D)		-12,000	47,000	79,000	-160,000	-2,600	-47,000	-170,000
2067 (C)		-22,000	26,000	75,000	-160,000	-1,400	-82,000	-260,000
2068 (C)		-1,000	54,000	70,000	-160,000	-1,000	-42,000	-300,000
2069 (BN)		21,000	64,000	74,000	-140,000	-1,100	19,000	-280,000
2070 (W)		40,000	110,000	84,000	-120,000	-2,500	100,000	-180,000
2071 (BN)		-27,000	30,000	81,000	-150,000	-1,800	-65,000	-240,000
2072 (W)		28,000	95,000	85,000	-110,000	-2,800	93,000	-150,000
Average (2022-2072)		-9,300	68,000	74,000	-130,000	-4,800	-2,900	
2022-2072	W	1,300	97,000	81,000	-120,000	-6,800	54,000	
	AN	4,800	83,000	73,000	-120,000	-4,800	41,000	
	BN	-17,000	49,000	74,000	-140,000	-3,300	-34,000	
	D	-25,000	46,000	70,000	-140,000	-4,600	-58,000	
	C	-19,000	38,000	68,000	-150,000	-2,400	-65,000	

2.3.9 Projected Water Budgets with Climate Change

Additional projected scenarios were developed to model potential climate change scenarios. Climate change scenarios were developed using the DWR guidance for the 2030 and 2070 central tendencies. The climate change scenarios were implemented following DWR's guidance related to the 2030 and 2070 central tendency climate change scenarios and associated adjustment factors applied to model inputs such as precipitation, ET, and surface water inflows. In the Tehama IHM area, the DWR climate change guidance and adjustment factors tend to result in increases in precipitation, ET, and streamflows. Additional detail about the development and results of these scenarios can be found in **Appendices 2-J and 2-K**.

2.3.9.1 Projected (Current Land Use) Water Budget

A comparison of the major components of the projected (current land use) water budget as they relate to the GWS are presented in **Table 2-31**. Net seepage becomes less negative under climate change scenarios, indicating less groundwater flow to SWS. Greater streamflow volumes entering the Subbasin under the climate change scenarios likely results in greater stream seepage although deep percolation and net subsurface flows remain change only minimally under climate change scenarios. Groundwater pumping increases by between 5.0 and 16 taf per year under climate change scenarios, becoming a greater outflow from the groundwater system. Still, the overall water budget results suggest that annual change in storage is only very slightly more negative under the climate change scenarios.

Table 2-31. Comparison of Annual Projected (Current Land Use) GWS Water Budgets with Climate Change Adjustments (acre-feet)

GWS WATER BUDGET COMPONENT	PROJECTED (CURRENT LAND USE)		
	NO CLIMATE CHANGE ADJUSTMENT	CLIMATE CHANGE (2030)	CLIMATE CHANGE (2070)
Net Seepage	-21,000	-18,000	-12,000
Deep Percolation	67,000	67,000	64,000
Net Subsurface Flows	53,000	54,000	56,000
Groundwater Extractions (Pumping and Uptake)	-100,000	-100,000	-110,000
Annual Groundwater Storage Change	***-1,800***	***-1,900***	***-2,400***

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

2.3.9.2 Projected (Future Land Use) Water Budget

A comparison of the major components of the projected (future land use) water budget as they relate to the GWS are presented in **Table 2-32**. Overall, the climate change scenarios to not appear to change the overall Subbasin GWS water budget in a considerable way, at similar magnitudes as in the projected (current land use) conditions. Net seepage becomes less negative under 2030 climate change scenario indicating a reduction of groundwater flow to SWS. Net seepage becomes slightly positive under 2070 climate change scenario indicating seepage from surface water to GWS. Deep percolation remains nearly unchanged under climate change scenarios. Net subsurface flows to the Subbasin slightly increase under climate change scenarios. Groundwater pumping increases between about 10 taf per year under the climate change scenarios; however, overall change in storage is only slightly more negative under the climate change scenarios.

Table 2-32. Comparison of Projected (Future Land Use) GWS Water Budgets with Climate Change Adjustments (acre-feet)

GWS WATER BUDGET COMPONENT	PROJECTED (FUTURE LAND USE)		
	NO CLIMATE CHANGE ADJUSTMENT	CLIMATE CHANGE (2030)	CLIMATE CHANGE (2070)
Net Seepage	-9,300	-6,000	830
Deep Percolation	68,000	68,000	66,000
Net Subsurface Flows	74,000	77,000	80,000
Groundwater Extractions (Pumping and Uptake)	-140,000	-140,000	-150,000
Annual Groundwater Storage Change	***-2,900***	***-3,000***	***-4,100***

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

2.3.10 Projected Groundwater Storage Change by Aquifer

This section presents the projected groundwater storage change in the Upper Aquifer and Lower Aquifer under Current Land Use and Future Land Use conditions with and without the climate change conditions. Note that the total water budget numbers presented below by aquifer may differ from the sum of the average annual values because of rounding. Additional detail about the development and results of these scenarios can be found in **Appendices 2-J and 2-K**.

2.3.10.1 Projected (Current Land Use) Storage Change

A comparison of the groundwater storage change under the projected (current land use) conditions with different climate change assumptions is presented in **Table 2-33**. The results suggest reduction of storage is only slightly greater under climate chance scenarios, with more of the storage change occurring in the Lower Aquifer. Overall projected storage change in the Subbasin is relatively small and differs little between the various climate change conditions evaluated. The projected average annual storage change decreases range from -1.8 to -2.4 taf per year and are equivalent to very minimal change on a per-acre basis over the 51-year projected period. Projected annual storage changes in the Upper Aquifer range from annual storage decreases of -0.51 to -0.75 taf per year with and without climate change conditions. Storage changes in the Lower Aquifer range from decreases of about -1.3 taf per year without climate change to -1.7 taf per year on average with 2070 climate change. The small amounts of change in the entire Subbasin, including individual aquifers, is small and is likely within the range of uncertainty of the water budget results, considering the magnitude of many of the other water budget components. For the projected (current land use) conditions with 2070 climate change factors, storage changes in the Upper and Lower Aquifers equate to annual basinwide storage changes of about -0.009 acre-feet per acre per year on average and about -0.44 acre-feet per acre cumulatively over the 51-year projected period.

Table 2-33. Comparison of Annual Projected (Current Land Use) Aquifer-Specific GWS Water Budgets with Climate Change Adjustments

PROJECTED (CURRENT LAND USE)		AVERAGE ANNUAL CHANGE IN STORAGE			CUMULATIVE CHANGE IN STORAGE		
		UPPER AQUIFER	LOWER AQUIFER	TOTAL	UPPER AQUIFER	LOWER AQUIFER	TOTAL
No Climate Change Adjustment	acre-feet	-510	-1,300	-1,800	-26,000	-68,000	-94,000
	acre-feet per acre	*-0.002*	*-0.005*	*-0.007*	*-0.10*	*-0.25*	*-0.34*
Climate Change 2030	acre-feet	-560	-1,400	-1,900	-28,000	-70,000	-98,000
	acre-feet per acre	*-0.002*	*-0.005*	*-0.007*	*-0.10*	*-0.26*	*-0.36*
Climate Change 2070	acre-feet	-750	-1,700	-2,400	-38,000	-86,000	-120,000
	acre-feet per acre	*-0.003*	*-0.006*	*-0.009*	*-0.13*	*-0.31*	*-0.44*

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

2.3.10.2 Projected (Future Land Use) Water Budget

A comparison of the groundwater storage change in primary aquifers under the projected (future land use) conditions with different climate change assumptions is presented in **Table 2-34**. Consistent with the comparison project (current land use) results, the results suggest reduction of storage is only slightly greater under climate chance scenarios, with more of the storage change occurring in the Lower Aquifer. Overall projected storage change in the Subbasin is relatively small and differs little between the various climate change conditions evaluated. The projected average annual storage change decreases range from -2.9 to -4.1 taf per year and are equivalent to small changes on a per-acre basis over the 51-year projected period. Projected annual storage changes in the Upper Aquifer range from annual storage decreases of -0.74 to -1.1 taf per year with and without climate change conditions. Storage changes in the Lower Aquifer range from decreases of between -2.1 taf per year without climate change to -3.0 taf per year on average with 2070 climate change. The small amounts of change in the entire Subbasin, including individual aquifers, is small and is likely within the range of uncertainty of the water budget results, considering the magnitude of many of the other water budget components. For the projected (current land use) conditions with 2070 climate change factors, storage changes in the Upper and Lower Aquifers equate to annual basinwide storage changes of about -0.015 acre-feet per acre per year on average and about -0.77 acre-feet per acre cumulatively over the 51-year projected period.

Table 2-34. Comparison of Projected (Future Land Use) Aquifer-Specific GWS Water Budgets with Climate Change Adjustments

PROJECTED (CURRENT LAND USE)		AVERAGE ANNUAL CHANGE IN STORAGE			CUMULATIVE CHANGE IN STORAGE		
		UPPER AQUIFER	LOWER AQUIFER	TOTAL	UPPER AQUIFER	LOWER AQUIFER	TOTAL
No Climate Change Adjustment	acre-feet	-740	-2,100	-2,900	-38,000	-110,000	-150,000
	acre-feet per	*-0.003*	*-0.008*	*-0.011*	*-0.14*	*-0.40*	*-0.55*
Climate Change 2030	acre-feet	-810	-2,200	-3,000	-41,000	-110,000	-150,000
	acre-feet per	*-0.003*	*-0.008*	*-0.011*	*-0.15*	*-0.42*	*-0.57*
Climate Change 2070	acre-feet	-1,100	-3,000	-4,100	-58,000	-152,000	-210,000
	acre-feet per acre	*-0.004*	*-0.011*	*-0.015*	*-0.21*	*-0.56*	*-0.77*

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

2.3.11 Uncertainty in Water Budget Estimates

2.3.11.1 Uncertainty in SWS Water Budget

Uncertainties associated with each SWS water budget component have been computed or estimated following the process described by Clemmens and Burt (1997). In summary:

1. The uncertainty of each independently-estimated water budget component (excluding the closure term) is calculated or estimated as a percentage that approximately represents a 95 percent confidence interval for the average annual component volume of the component. Uncertainty percentages are based on the accuracy of measurement devices, the uncertainty of supporting calculations and estimation procedures, and professional judgement.
2. Assuming random, normally-distributed error, the standard deviation is calculated for each independently-estimated component as the average uncertainty on a volumetric basis (uncertainty percentage multiplied by the average annual component volume) divided by two.
3. The variance is calculated for each independently-estimated component as the square of the standard deviation.
4. The variance of the closure term is estimated as the sum of variances of all independently-estimated components.
5. The standard deviation of the closure term is estimated as the square root of the sum of variances.
6. The 95 percent confidence interval of the closure term is estimated as twice the estimated standard deviation.

Estimated uncertainties were calculated following the above procedure for the Subbasin water budget and all GSA water budgets. **Table 2-35** provides a summary of typical uncertainty values associated with major SWS inflows and outflows, along with the sources of these uncertainty values. For surface water flows, deliveries, and diversions, the uncertainty is estimated based on typical accuracy of streamflow gages and measurement devices. For IDC root zone water budget inflows and outflows, the uncertainty is based on typical accuracies given in technical literature and the cumulative estimated accuracy of all inputs used to calculate the components. These uncertainties provide a basis for evaluating confidence in water budget results and help to identify data needs that may be addressed during GSP implementation.

Table 2-35. Estimated Uncertainty of Major Water Budget Components

FLOWPATH DIRECTION (RELATIVE TO SWS)	WATER BUDGET COMPONENT	DATA SOURCE	ESTIMATED UNCERTAINTY (%)	SOURCE
Inflows	Surface Water Inflows	Measurement	5%[1]	Accuracy of USGS streamflow gages, with adjustment for infiltration and evaporation of inflows upstream/downstream of nearest measurement site.
	Deliveries	Measurement	6%	Required delivery measurement accuracy for Reclamation contractors, per the USGS 2017 Standard Criteria for Agricultural Water Management Plans)
	Water Rights Diversions	Measurement / Estimate	10%	Required diversion measurement accuracy, per California Senate Bill 88.
	Precipitation	Calculation	20%[2]	Clemmens, A.J. and C.M. Burt, 1997.
	Groundwater Extraction	Calculation	20%	Typical uncertainty when calculated for Land Surface System water budget closure. The uncertainty of the accounting center closure is a product of the combined uncertainty of all other inflows and outflows, and the relative magnitude of each component.
Outflows	Surface Water Outflows	Measurement	15%	Estimated streamflow measurement accuracy with adjustment for infiltration and evaporation.
	Evaporation	Calculation	20%	Clemmens and Burt, 1997; typical accuracy of calculation based on CIMIS reference ET and free water surface evaporation coefficient.
	ET of Applied Water	Calculation	10%	Clemmens and Burt, 1997; typical accuracy of total irrigation water consumption on irrigated land, parsed into ET of Applied Water and ET of Precipitation by daily root zone water budget component based on reference ET, precipitation, surface energy balance crop coefficients, and annual land use.
	ET of Precipitation	Calculation	10%[2]	Clemmens and Burt, 1997; accuracy of total water consumption on irrigated land, parsed into ET of Applied Water and ET of Precipitation by daily root zone water budget component based on reference ET, precipitation, surface energy balance crop coefficients, and annual land use.
	Infiltration of Applied Water	Calculation	20%[2]	Estimated accuracy of daily IDC root zone water budget based on annual land use and NRCS soils characteristics. Similar accuracy anticipated for monthly results.
	Infiltration of Precipitation	Calculation	20%[2]	Estimated accuracy of daily IDC root zone water budget based on annual land use, NRCS soils characteristics, and CIMIS precipitation.
	Infiltration of Surface Water	Calculation	15%	Typical accuracy of daily seepage calculation using NRCS soils characteristics and measured streamflow data compared to field measurements.

[1] Higher uncertainty of 10-20 percent is typical for estimated surface water inflows, including ungaged inflows from small watersheds into creeks that enter the Subbasin.

[2] IDC root zone water budget inflows and outflows. The uncertainty of these water budget components is based on typical accuracies given in technical literature and the cumulative estimated accuracy of all inputs used to calculate the components.

2.3.11.2 GWS Water Budget Uncertainty

Uncertainty associated with the GWS water budget results estimated using the Tehama IHM depends in part on the model inputs relating to the SWS with additional sources of uncertainty associated with model inputs relating to the GWS, including aquifer and streambed properties, specification of boundary conditions, and other factors. The uncertainty estimates associated with SWS water budget components that are also inputs or outputs of the GWS water budget are noted above. The overall uncertainty of other water budget components simulated for the GWS, including subsurface flows, groundwater discharging to surface water, and change in groundwater storage are estimated to be slightly higher, in the range of 15 to 30 percent. These GWS water budget components are subject to higher uncertainty as a result of limitations in available input data and simplification required in modeling of the subsurface heterogeneity. However, the uncertainty in GWS water budget results derived from a numerical model such as the Tehama IHM depends to a considerable degree on the calibration of the model and can vary by location and depth within the Subbasin. The Tehama IHM is a product of local refinement and improvements made to the SVSim model and calibration at a more local scale. The Tehama IHM simulates the integrated groundwater and surface water system and metrics relating to the calibration of the model indicate the model is reasonably well calibrated in accordance with generally accepted professional guidelines and is sufficient for GSP-related applications. The calibration and sensitivity of the model and different model parameters are presented in **Appendix 2-J**.

2.3.12 Estimate of Sustainable Yield

GSP Regulations require the GSP quantify the sustainable yield for the Subbasin. Sustainable yield is defined as “the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, which can be withdrawn annually from a groundwater supply without causing an undesirable result” (CWC Section 10721(w)). Historical and projected model results show that the conditions in the Subbasin under the historical and anticipated future land use conditions and hydrology, including with potential climate change conditions (2030 and 2070), will not cause the occurrence of undesirable results in the Subbasin over the 50-year GSP planning period based on sustainability indicator Minimum Thresholds (MTs) developed for the Subbasin.

A summary comparison of the results from the different historical and projected water budget scenarios is included in **Table 2-36**. Over the historical base period, the average annual volume of groundwater pumping in the Red Bluff Subbasin is estimated to be about 80,000 acre-feet per year. An additional 9,700 acre-feet of groundwater was estimated to be taken up and consumed directly by plants reflecting a total historical groundwater extraction volume of about 90,000 acre-feet per year on average. Observed groundwater level conditions and simulated water budget results suggest there has been some historical long-term change in groundwater storage in the Subbasin, although areas of observed groundwater storage depletion are more localized resulting from local hydrogeologic characteristics and are not representative of basinwide conditions.

Projected water budgets intended to assess longer-term conditions over a 50-year planning horizon with hydrology consistent with the most recent 50 years of hydrology suggest relatively little or no change in storage is anticipated under the future projected scenarios evaluated. In the projected water budget scenarios (current land use and future land use conditions) without any assumed climate change, total groundwater extraction (combination of groundwater pumping and uptake) within the Subbasin increases overall to about 100,000 acre-feet per year for the projected (current land use) condition and to approximately 135,000 acre-feet per year for the projected (future land use) condition. The projected water budgets with climate change conditions indicate total groundwater extraction rates of between 105,000 to 154,000 acre-feet per year, depending on the land use and climate change scenario (**Table 2-36**).

Table 2-36. Summary Comparison of Annual Historical and Projected Water Budgets (acre-feet)

WATER BUDGET COMPONENT	HISTORICAL	PROJECTED (CURRENT LAND USE)			PROJECTED (FUTURE LAND USE)		
		BASE-LINE	CLIMATE CHANGE (2030)	CLIMATE CHANGE (2070)	BASELINE	CLIMATE CHANGE (2030)	CLIMATE CHANGE (2070)
Net Seepage	-39,000	-21,000	-18,000	-12,000	-9,300	-6,000	830
Deep Percolation	70,000	67,000	67,000	64,000	68,000	68,000	66,000
Groundwater Pumping	-80,000	-94,000	-99,000	-110,000	-130,000	-140,000	-150,000
Groundwater Uptake	-9,700	-6,300	-6,200	-5,500	-4,800	-4,600	-4,100
Total Net Subsurface Flows	49,000	53,000	54,000	56,000	74,000	77,000	80,000
Flow from/to Antelope Subbasin	*-25,000*	*-18,000*	*-17,000*	*-15,000*	*-8,000*	*-6,800*	*-4,400*
Flow from/to Los Molinos Subbasin	*-2,200*	*-880*	*-390*	*360*	*2,000*	*2,600*	*3,700*
Flow from/to Bowman Subbasin	*120,000*	*120,000*	*120,000*	*120,000*	*130,000*	*130,000*	*130,000*
Flow from/to Corning Subbasin	*-28,000*	*-36,000*	*-36,000*	*-37,000*	*-31,000*	*-31,000*	*-31,000*
Flow from/to South Battle Creek Subbasin	*1,500*	*1,500*	*1,500*	*1,500*	*1,500*	*1,500*	*1,500*
Flow from/to Bend Subbasin	*-18,000*	*-17,000*	*-17,000*	*-17,000*	*-16,000*	*-16,000*	*-16,000*
Flow from Uplands	*1,100*	*1,100*	*1,100*	*1,100*	*1,100*	*1,100*	*1,100*
Annual Change in Groundwater Storage	**-11,000**	**-1,800**	**-1,900**	**-2,400**	**-2,900**	**-3,000**	**-4,100**

While the groundwater extraction water budget component increases in the projected water budgets, the increased groundwater extractions are counterbalanced by increased subsurface inflows and net seepage. As a result, the projected water budgets suggest very little or no change in storage under all of the projected scenarios, when considered in the context of the typical uncertainty associated with water budget estimates and the magnitude of other water budget components. Review of results from the projected model simulations suggests that the Subbasin will be sustainable for at least the 50-year GSP planning horizon by avoiding undesirable results as defined in the GSP. The simulated changes in projected subsurface flows, most notably increases in subsurface inflows from Bowman and decreases of subsurface outflows to Antelope Subbasins, are not unreasonable changes and are not expected to adversely affect the ability of any adjacent Subbasins to achieve or maintain sustainability.

Potential for significant and unreasonable stream depletion resulting in adverse impacts on surface water beneficial users through decreased groundwater discharging to surface water or increased induced stream seepage in and along the Subbasin was also considered in estimating the sustainable yield of the Subbasin. The projected net seepage volumes do exhibit change across the different water budget scenarios. Differences in hydrology between historical and projected water budget periods and also climate change scenarios can greatly affect the net seepage. Understanding the influences of projected conditions on interconnected surface water is confounded by the different factors involved. While net seepage quantities the overall exchange of groundwater and surface water, it does not distinguish changes that are a result of groundwater conditions from changes that result from streamflow conditions. Both groundwater conditions and streamflow conditions can and do change based on the hydrology (e.g., precipitation, surface water inflows) and climate. For example, increases in streamflow entering the Subbasin can result in greater stream seepage and increases in net seepage (i.e., less negative, or more positive net seepage number); conversely decreased streamflow entering the Subbasin can result in lowered stream seepage and lowered net seepage numbers. Similarly, lowered groundwater levels can lead to decreased groundwater discharge resulting in increased net seepage.

A review of simulated net streamflow gains from groundwater in the Sacramento River in the reach traversing the Red Bluff Subbasin in different projected scenarios provides a meaningful comparison of the influence of Subbasin conditions on the exchange of groundwater and surface water, especially in relation to surface water beneficial users. **Figures 2-75** and **2-76** and **Table 2-37** present the net streamflow gains in the Sacramento River as it traverses the Subbasin for the different water budget scenarios and highlight the small changes in streamflow gains from groundwater that occur through the Subbasin under the different projected scenarios in relation to the total volume of streamflow in the River. Notably, the simulated results indicate the River is gaining flow from groundwater through this reach during all water year types and all water budget scenarios, with average annual streamflow gains from groundwater of about 9 to 10 taf per year with lower values occurring in the projected climate change scenarios when compared to similar runs without climate change (**Figure 2-75**). The differences in annual gain in flow from groundwater between the projected current and future land use scenarios is very small, especially when considered as a fraction of the total streamflow in the River (**Figure 2-76**).

Although the scenarios with climate change tend to exhibit relatively less flow gained from groundwater, the higher streamflows anticipated to occur during some months under the climate change scenarios (most notably the 2070 climate change scenario) will have a tendency to reduce the net discharge of groundwater to surface water features resulting in reduced gains from groundwater. Therefore, the volume of net flow gain from groundwater in climate change scenarios is affected by the different streamflow conditions that are unrelated to groundwater management in the Subbasin. Direct comparisons of projected and historical streamflow gains are confounded by the differences in hydrology between the water budget periods; however, comparing simulated streamflow gains between projected scenarios suggests the streamflow gains from groundwater are equally or more sensitive to the climate conditions than land use and associated groundwater conditions. Simulated streamflows in the Sacramento River indicate that on an average monthly basis, the months of June through August exhibit streamflow conditions that decrease in a downstream direction. It is notable that monthly streamflow gains from groundwater in the Sacramento River through the Red Bluff Subbasin are relatively stable between months (and always positive), including during the months of June through August.

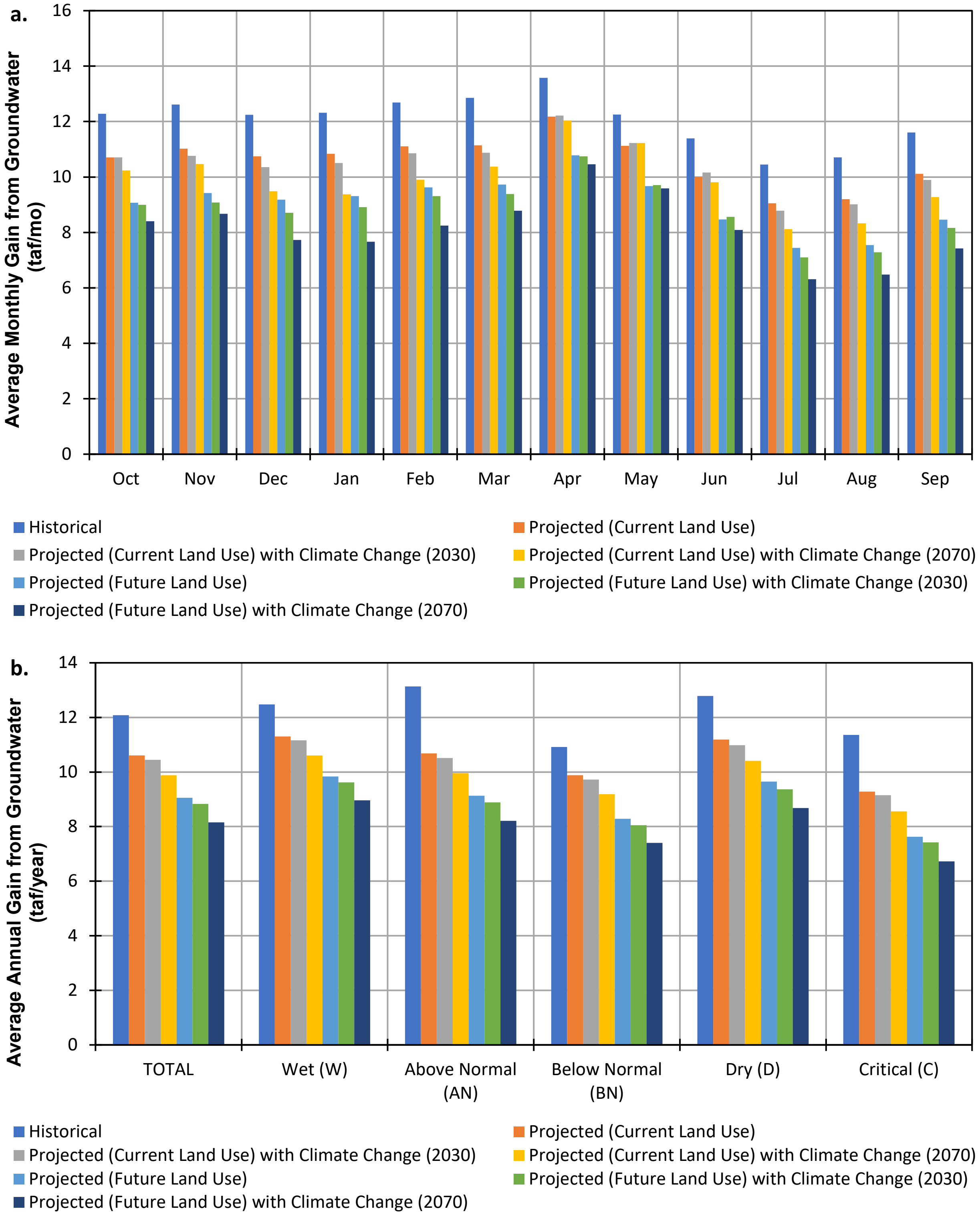
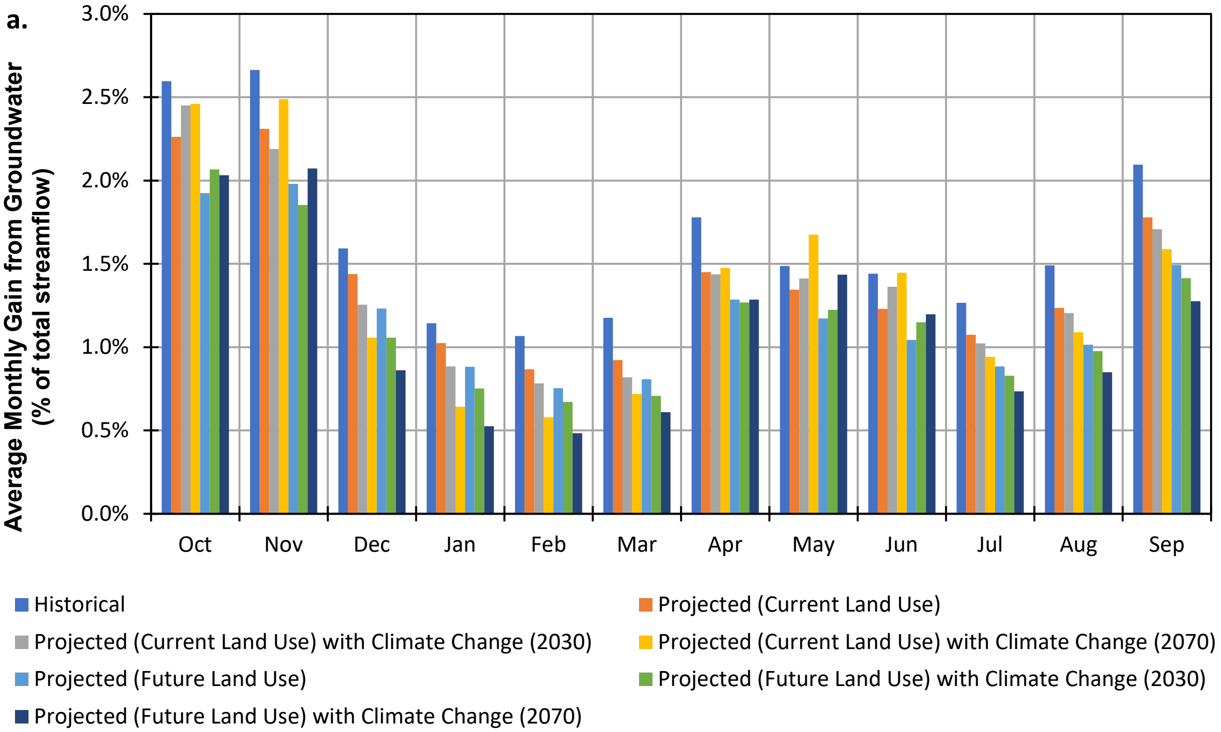


Figure 2-75. Comparison of Gains from Groundwater in the Sacramento River through the Red Bluff Subbasin by Water Year Type and Month



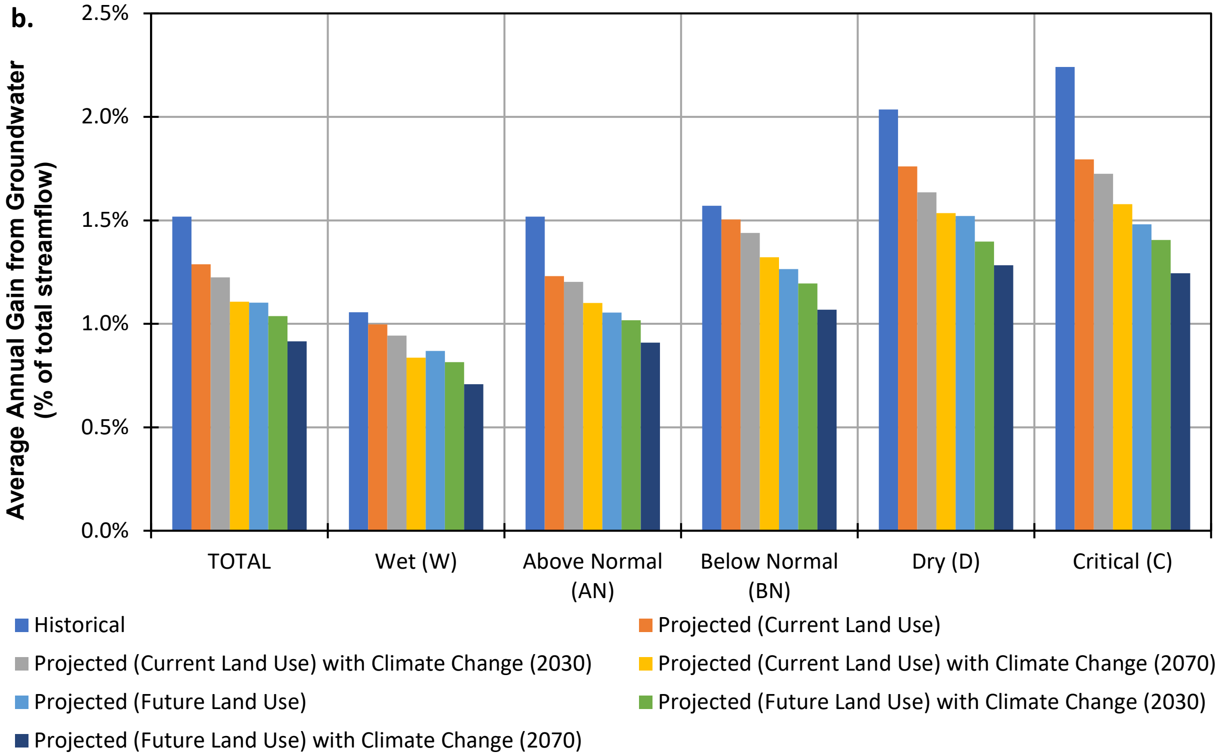


Figure 2-76. Comparison of Gains from Groundwater in the Sacramento River through the Red Bluff Subbasin as Percent of Total Streamflow by Water Year Type and Month

Table 2-37. Sacramento River Streamflow Gains through the Red Bluff Subbasin as Percent of Total Streamflow

		HISTORICAL	PROJECTED (CURRENT LAND USE)	PROJECTED (CURRENT LAND USE) WITH CLIMATE CHANGE (2030)	PROJECTED (CURRENT LAND USE) WITH CLIMATE CHANGE (2070)	PROJECTED (FUTURE LAND USE)	PROJECTED (FUTURE LAND USE) WITH CLIMATE CHANGE (2030)	PROJECTED (FUTURE LAND USE) WITH CLIMATE CHANGE (2070)
Average Monthly Gain from Groundwater (percent of total streamflow)	Oct	2.6%	2.3%	2.4%	2.5%	1.9%	2.1%	2.0%
	Nov	2.7%	2.3%	2.2%	2.5%	2.0%	1.9%	2.1%
	Dec	1.6%	1.4%	1.3%	1.1%	1.2%	1.1%	0.9%
	Jan	1.1%	1.0%	0.9%	0.6%	0.9%	0.8%	0.5%
	Feb	1.1%	0.9%	0.8%	0.6%	0.8%	0.7%	0.5%
	Mar	1.2%	0.9%	0.8%	0.7%	0.8%	0.7%	0.6%
	Apr	1.8%	1.5%	1.4%	1.5%	1.3%	1.3%	1.3%
	May	1.5%	1.3%	1.4%	1.7%	1.2%	1.2%	1.4%
	Jun	1.4%	1.2%	1.4%	1.4%	1.0%	1.1%	1.2%
	Jul	1.3%	1.1%	1.0%	0.9%	0.9%	0.8%	0.7%
	Aug	1.5%	1.2%	1.2%	1.1%	1.0%	1.0%	0.9%
	Sep	2.1%	1.8%	1.7%	1.6%	1.5%	1.4%	1.3%
Average Annual Gain from Groundwater (% of total	TOTAL	1.5%	1.3%	1.2%	1.1%	1.1%	1.0%	0.9%
	W	1.1%	1.0%	0.9%	0.8%	0.9%	0.8%	0.7%
	AN	1.5%	1.2%	1.2%	1.1%	1.1%	1.0%	0.9%
	BN	1.6%	1.5%	1.4%	1.3%	1.3%	1.2%	1.1%
	D	2.0%	1.8%	1.6%	1.5%	1.5%	1.4%	1.3%
	C	2.2%	1.8%	1.7%	1.6%	1.5%	1.4%	1.2%

Simulated results also indicate minimal influence on streamflows in Thomes Creek and Elder Creek, two westside tributary streams in the southern part of the Subbasin where groundwater withdrawals tend to be greater. As illustrated in **Figures 2-77** and **2-78,** monthly gains from groundwater in Thomes and Elder Creeks exhibit small changes under the different projected water budget scenarios, especially when comparing between projected conditions that utilize the same hydrology (e.g., projected current land use and projected future land use). Positive gain values in **Figures 2-77** and **2-78** indicate net groundwater discharging to the surface feature whereas negative gain values indicate net losing streamflow conditions (streamflow seeping into groundwater). The magnitude of the volume of groundwater losses is greatest during the months of December through May, when streamflows are high in the creeks; however, these losses and the changes in losses between different projected scenarios represent a small fraction of the total streamflow. Available historical streamflow gage data over the period between 1949 and 1980 indicate that Thomes Creek and Elder Creek can be characterized as intermittent streams near to where they join the Sacramento River. Historical gage data indicate that average monthly flows during the months of July through October are very small with a high percentage of years experiencing zero streamflow during these months. In fact, historical gage data indicate zero streamflow conditions in the creeks during July in approximately one third of the years and during August through October zero streamflow conditions occurred during approximately two-thirds to three-quarters of the years with gage data. This trend is consistent with the graphs of simulated gains from groundwater, which indicate a very small volume of exchange during the months of July through October and very small changes in the volumes of gain from groundwater between different projected scenarios. The larger magnitude of simulated losses as a percentage of the total streamflow occurring during these months are a function of the very small amount of streamflow occurring during these dry months. The projected modeling suggests limited effects on streamflow in these tributary streams in the projected runs, especially when considering the uncertainty that should be associated with simulated results.

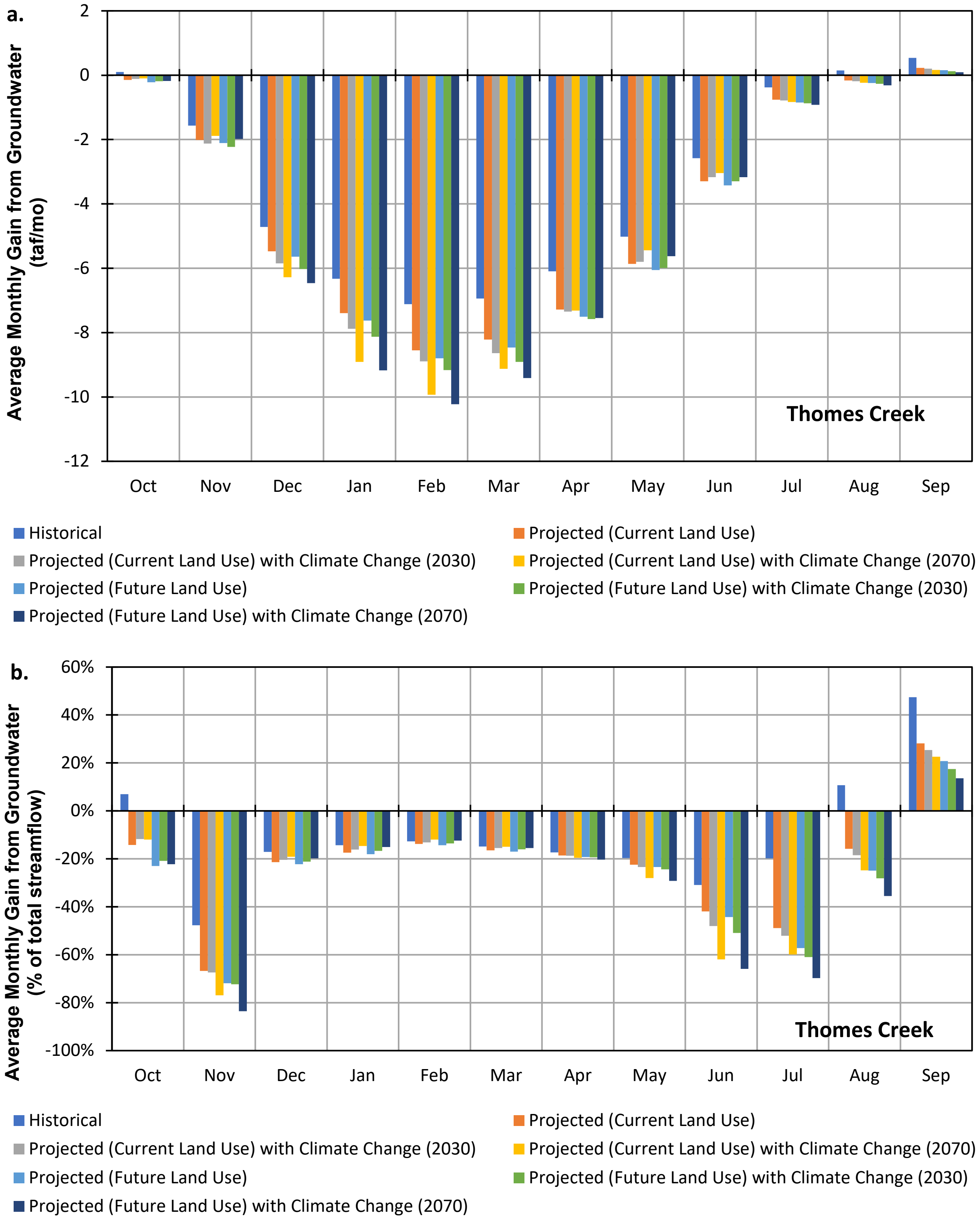


Figure 2-77. Comparison of Monthly Gains from Groundwater in Thomes Creek

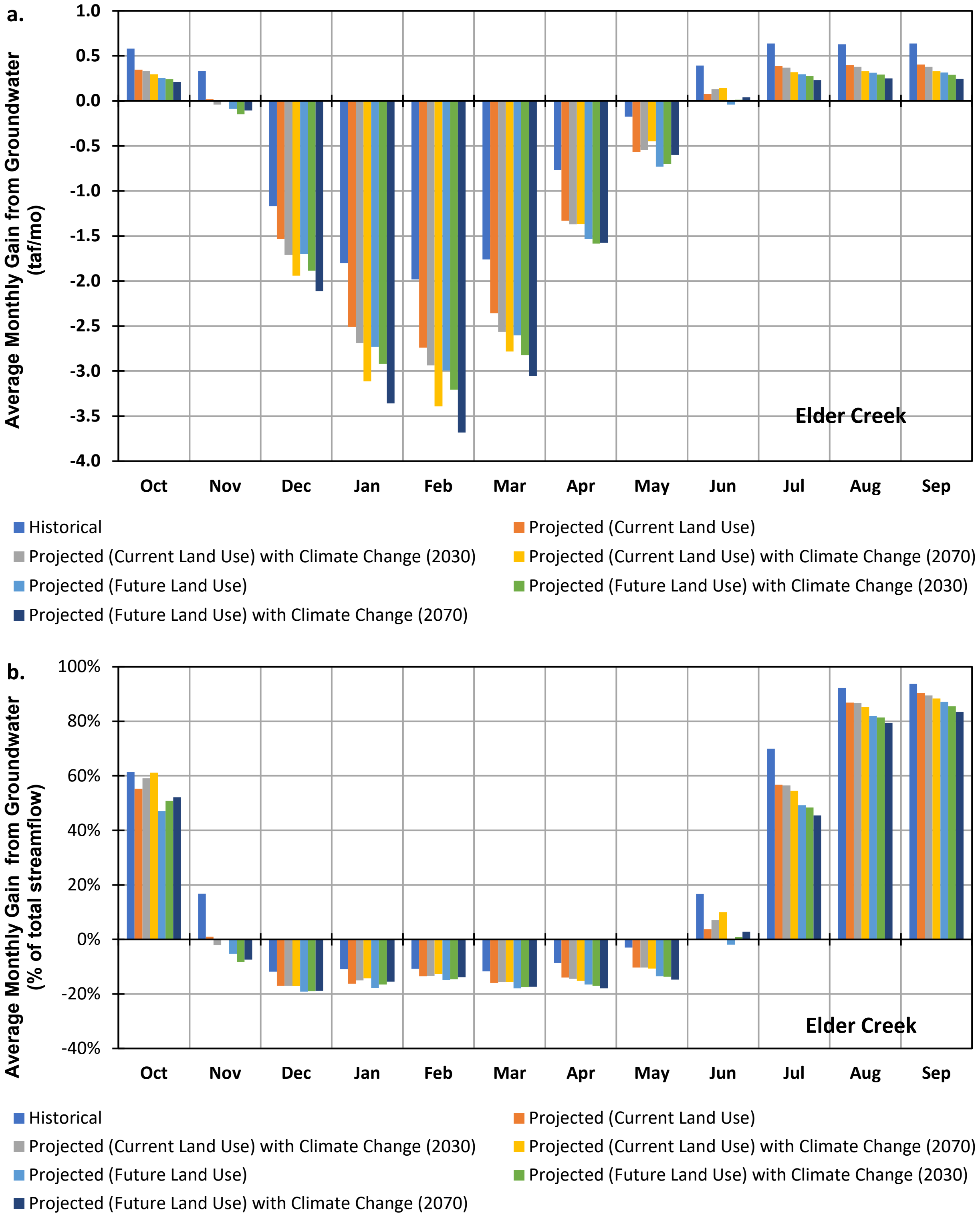


Figure 2-78. Comparison of Monthly Gains from Groundwater in Elder Creek

The small magnitude of potential change in streamflow exhibited in the Sacramento River and in tributary streams under the projected future conditions, including with climate change suggests that it is unlikely that any beneficial users of surface water would be significantly and unreasonably adversely affected by groundwater management under any of the projected future conditions evaluated. Accordingly, for the purpose of the GSP, the sustainable yield is estimated to be 150,000 acre-feet per year, which is equal to the volume of groundwater extracted annually in the Subbasin (by pumping and by uptake) minus the simulated annual decrease in storage under the projected model scenario with future land use and 2070 climate change conditions and considering the level of uncertainty associated with water budget estimates. This volume is approximately equal to the annual volume of vertical inflows from deep percolation and lateral inflows from subsurface flow occurring within the Subbasin. Assuming potential uncertainty of 25 percent associated with the water budget estimates, an associated range of values for the estimated sustainable yield would be 112,500 to 187,500 acre-feet per year. It is possible that the true sustainable yield is higher as no model scenarios were developed to test the maximum possible volume of groundwater extraction. The sustainable yield estimate provided here is consistent with the sustainability goal for the Subbasin and will be reviewed as the Subbasin implements the GSP, including through periodic review and updates to the Tehama IHM and water budget results, ongoing monitoring of Subbasin conditions as required by GSP Regulations, and filling of any data gaps identified in the GSP or during GSP implementation.

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FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

(Chapter 3 – Sustainable Management Criteria)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

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LIST OF ACRONYMS

BMP	Best Management Practices
CASGEM	California Statewide Groundwater Elevation Monitoring
DMS	Data Management System
DO	Dissolve Oxygen
DQO	Data Quality Objective
DTW	Depth to Water
DWR	Department of Water Resources
EC	Electrical Conductivity
ft/yr	feet per year
GDE	Groundwater Dependent Ecosystem

GSA	Groundwater Sustainability Agency
GSE	Ground Surface Elevation
GSP	Groundwater Sustainability Plan
GWE	Groundwater Elevation
InSAR	Interferometric Synthetic Aperture Radar
MAs	Management Actions
Mg/L	MIligrams per Liter
MOs	Measurable Objectives
MTs	Minimum Thresholds
NAVD88	North American Vertical Datum of 1988
NDVI	Normalized Difference Vegetation Index
ORP	Oxidation-Reduction Potential
PBO	Plate Boundary Observatory
PMAs	Projects and Management Actions
QA	Quality Assurance
QC	Quality Control
RMS	Representative Monitoring Sites
RP	Reference Point
RPE	Reference Point Elevation
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SMCL	Secondary Maximum Containment Level
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
UNAVACO	University NAVSTAR Consortium

3 SUSTAINABLE MANAGEMENT CRITERIA

This chapter of the Groundwater Sustainability Plan (GSP or Plan) defines sustainability goals, measurable objectives, interim milestones, minimum thresholds, undesirable results, and the monitoring network for each sustainability indicator within the Plan Area encompassed by the Red Bluff Subbasin GSP.

This is the fundamental chapter that defines sustainability in the Plan area, and it addresses significant regulatory requirements pertaining to the Sustainable Management Criteria (SMC) and corresponding monitoring network. The measurable objectives (MOs), minimum thresholds (MTs), and undesirable results presented in this chapter define the future sustainable conditions in the Plan area and commit Tehama County to actions that will achieve these future conditions.

Sustainable Management Criteria are the quantitative metrics which collectively consist of sustainability goals, MOs, interim milestones, MTs, and undesirable results. The SMC definitions require considerable analysis and evaluation of many factors. This chapter presents the data and methods used to develop the SMC and demonstrates how they relate to beneficial uses and users. The SMC presented in this chapter are based on current available data and applications of the best available science.

The Groundwater Sustainability Agency (GSA) will periodically evaluate this GSP, assess changing conditions in the Plan area that may warrant modifications of the GSP or management objectives, and may adjust components accordingly. The GSA will focus their evaluation on the efficacy of actions under the GSP to meet the Plan's management objectives and the sustainability goal of the Plan area.

This chapter is organized to address all the Sustainable Groundwater Management Act (SGMA) regulations regarding SMC and is organized in accordance with Department of Water Resources' (DWR) GSP annotated outline. This chapter includes a description of:

- How locally defined significant and unreasonable conditions were developed
- How MTs were developed, including:
    - The information and methodology used to develop MTs
    - The relationship between MTs and relationship of these MTs to other sustainability indicators
    - The effect of MTs on neighboring basins
    - The effect of MTs on beneficial uses and users
    - How MTs are related to relevant federal, state, or local standards
    - The method for quantifying measurable MTs
- How MOs were developed, including:
    - The methodology for setting MOs
    - Interim milestones
- How undesirable results were developed, including:
    - The criteria defining when and where the effect of the groundwater conditions cause undesirable results based on a quantitative description of the combination of MTs exceedances
    - The potential causes of undesirable results
    - The effect of these undesirable results on the beneficial uses and users

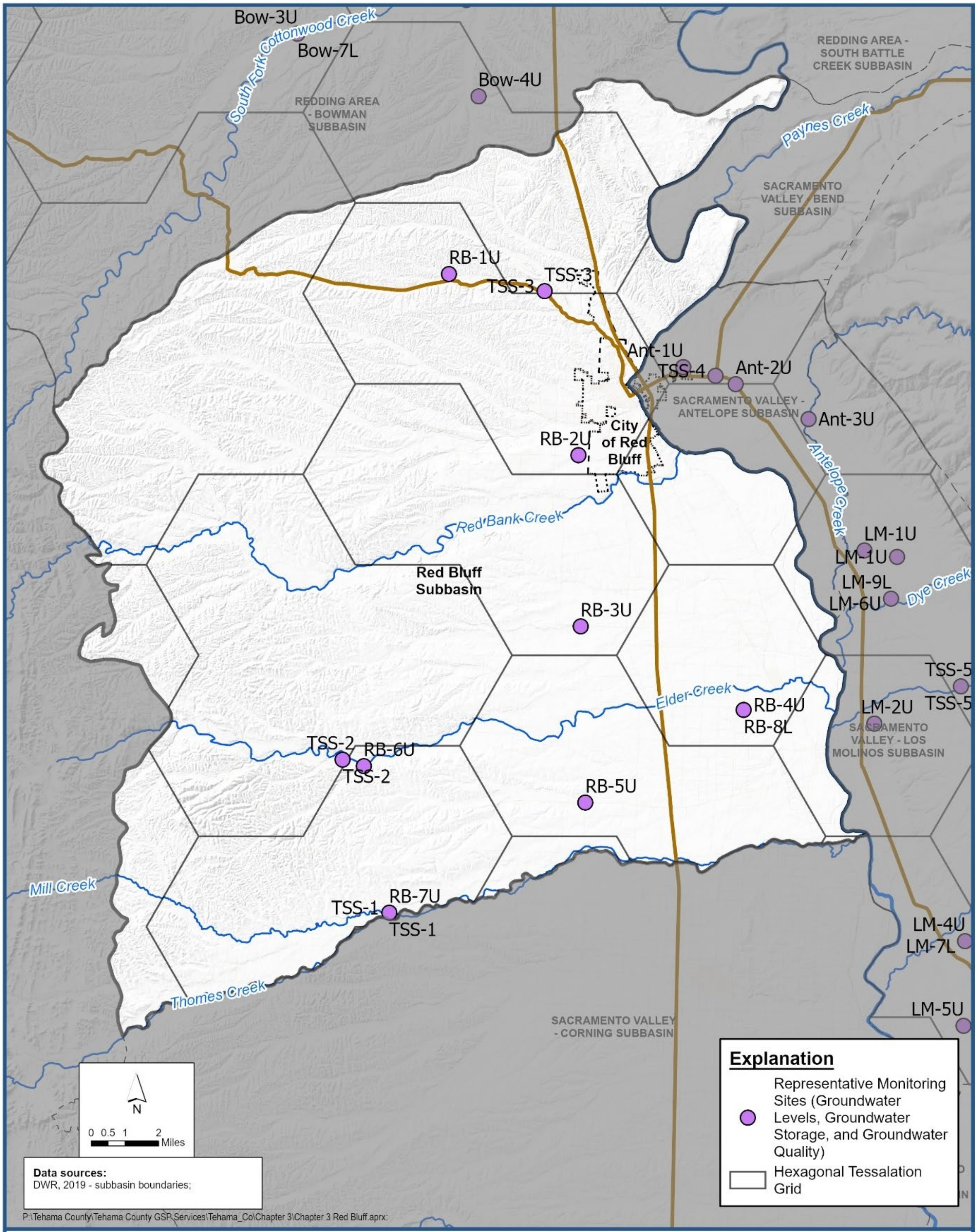
The SMC presented in this chapter were developed using information from stakeholder and public input, public meetings, hydrogeologic and groundwater dependent ecosystem analysis, and meetings with GSA representatives. The general process for establishing SMC includes:

- GSA public meetings that outlined the GSP development process and introduced stakeholders to the SMC.
- Conducting GSA public meetings to present proposed methodologies to establish MTs and MOs and receive additional public input.
- Reviewing public input on preliminary SMC methodologies with GSA representatives.
- Providing a Draft GSP for public review and comment.
- Establishing and modifying MTs, MOs, and definition of undesirable results based on feedback from public meetings, public/stakeholder review of the Draft GSP, and input from GSA staff/technical representatives.

To ensure the Plan area meets its sustainability goal by 2042, the GSA has proposed projects and management actions (PMAs) to address undesirable results which are described in **Section 4**. The projects expected to be implemented can include recharge basins, flood water on agricultural land, and in-lieu recharge. Projects and management actions may include revised well permit ordinances and demand reduction efforts. The overarching sustainability goal and the absence of significant and unreasonable levels of undesirable results are expected to be achieved by 2042 through implementation of the PMAs. The sustainability goals will be maintained through proactive monitoring and management by the GSA as described in this and the following chapters. **Table 3-1** presents a summary of the six (6) undesirable results and whether each has occurred, is occurring, or is expected to occur in the future without GSP implementation. The table also presents a summary of the proposed PMAs that have been developed to address each of the undesirable results that may be presently occurring or have historically occurred in the Subbasin. Representative Monitoring Sites (RMS) are identified for monitoring of interim milestones, MOs, and MTs for each sustainability indicator, and are also known as sustainability RMS wells. Locations of all sustainability RMS wells are shown in **Figure 3-1.**

Conditions within the Subbasin will be considered sustainable when all the following goals are met:

1. Long-term aggregate groundwater use is equal to the Subbasin's estimated sustainable yield.
2. The average annual rate of groundwater storage change within the Subbasin, averaged across indicator wells is generally stable when groundwater storage is equivalent to 2015 baseline conditions.
3. Groundwater levels are maintained at elevations necessary to avoid undesirable results. Lowering groundwater levels potentially leading to significant and unreasonable depletions of available water supply for beneficial use could occur if groundwater levels decline to levels that result in the loss of water availability for well users.
4. Groundwater quality will exhibit trends consistent with the existing Basin Plan and proposed Basin Plan Amendment and exhibit groundwater quality concentrations that significantly impact beneficial users of groundwater.
5. Subsidence is maintained at current levels or below current levels to avoid undesirable results such as impacts to critical infrastructure and inelastic subsidence.
6. Interconnected surface waters are maintained at levels needed to avoid impacts to beneficial users and the degradation of groundwater dependent ecosystems.
7. Sustainability goals for seawater intrusion are not provided because this undesirable result is highly unlikely to occur in the Subbasin (the Subbasin is approximately 90 miles away from the Pacific Ocean and not connected to a coastal aquifer).



Data sources:
DWR, 2019 - subbasin boundaries;

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Representative Monitoring Sites

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 3-1

Table 3-1. Summary of Undesirable Results Applicable to the Plan Area

SUSTAINABILITY INDICATOR	HISTORICAL PERIOD	EXISTING CONDITION	FUTURE CONDITIONS WITHOUT GSP IMPLEMENTATION	PROJECTS AND MANAGEMENT ACTIONS IMPLEMENTED TO MEET THE GSP SUSTAINABILITY GOAL
Chronic Lowering of Groundwater Elevations	No	No	Yes	TBD
Reduction of Groundwater Storage	No	No	No	TBD
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	Limited	Limited	Limited	TBD
Land Subsidence	No	No	No	TBD
Depletion of Interconnected Surface Water	Data Gap	Data Gap	TBD	TBD

3.1 Sustainability Goal (Reg §354.24)

The sustainability goal for the Subbasin has three (3) sections:

1. A description of the sustainability goal,
2. A discussion of the measures that will be implemented to ensure the Subbasin will operate within the sustainable yield, and
3. An explanation of the Subbasin's pathway to achieve the sustainability goal within 20 years of GSP implementation and maintained through the planning and implementation horizon (through 2072)

3.1.1 Goal Description

The goal of this GSP is to develop PMAs that result in the sustainable management of the groundwater resources of the Subbasin for long-term community, financial, and environmental benefits of residents and businesses in the Subbasin. This GSP outlines the approach to achieve sustainable management of groundwater resources within 20 years, while maintaining the unique cultural, community, and agricultural aspects of the Subbasin. The GSA's sustainability goal is to ensure that by 2042, and thereafter within the planning and implementation horizon of this GSP (50 years to 2072), the Subbasin is operated within its sustainable yield and does not exhibit undesirable results considered significant and unreasonable.

3.1.2 Description of Measures

Meeting this goal requires achieving a balance of water demand with available water supply, while protecting groundwater quality, by the end of the GSP implementation timeframe, carrying through the SGMA planning and implementation horizon.

3.1.3 Description of Measures and Explanation of How the Goal Will Be Achieved in 20 Years

To ensure the Subbasin meets its sustainability goal by 2042, the GSA proposed several PMAs, described in Chapter 4, to address any undesirable results that may occur. The overarching sustainability goal as well as the absence of undesirable results are expected to be achieved by 2042 through implementation of the PMAs. The sustainability goal will be maintained through proactive monitoring and management by the GSA as described in this GSP.

3.2 Measurable Objectives and Interim Milestones *(Reg. § 354.30)*

Measurable objectives, as well as interim milestones that represent the path to sustainability in five (5)-year increments, are detailed below. Measurable objectives represent the expected groundwater extraction operating conditions for the Subbasin. If the GSA successfully manages groundwater extraction that results in the achievement of the MOs described, the Subbasin will be operating sustainably. A description of the MOs and how they were established are provided, along with recognition of the anticipated fluctuations in basin conditions around the established MOs. In addition, this section describes how the GSP helps to meet each measurable objective, how each measurable objective is intended to achieve the sustainability goal for the Plan area for the long-term beneficial uses, and how the interim milestones are intended to reflect the anticipated progress toward the MOs during the 2022 to 2042 Implementation Period.

The GSP regulations (California Code Water Code - Division 6 - Conservation, Development, and Utilization of State Water Resources, Part 2.75 - Groundwater Management, Chapter 3 - Groundwater Management Plans) define MOs as specific, quantifiable goals for the maintenance or improvement of specific groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.

Per GSP Regulations (354.30):

1. Measurable objectives shall be established, "…including interim milestones in increments of five (5) years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon." (354.30.a)
2. "Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metric and monitoring sites as are used to define the MTs." (354.30.b)
3. "Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty." (354.30.c)
4. "…a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators…" may be established where "…the Agency can demonstrate

that the representative value is a reasonable proxy for multiple individual MOs as supported by adequate evidence." (354.30.d)

5. "Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of 5 years." (354.30.e)

The MOs developed for each applicable sustainability indicator in this GSP are based on the current understanding of the Plan Area and Basin Setting as discussed in detail in Chapter 2.

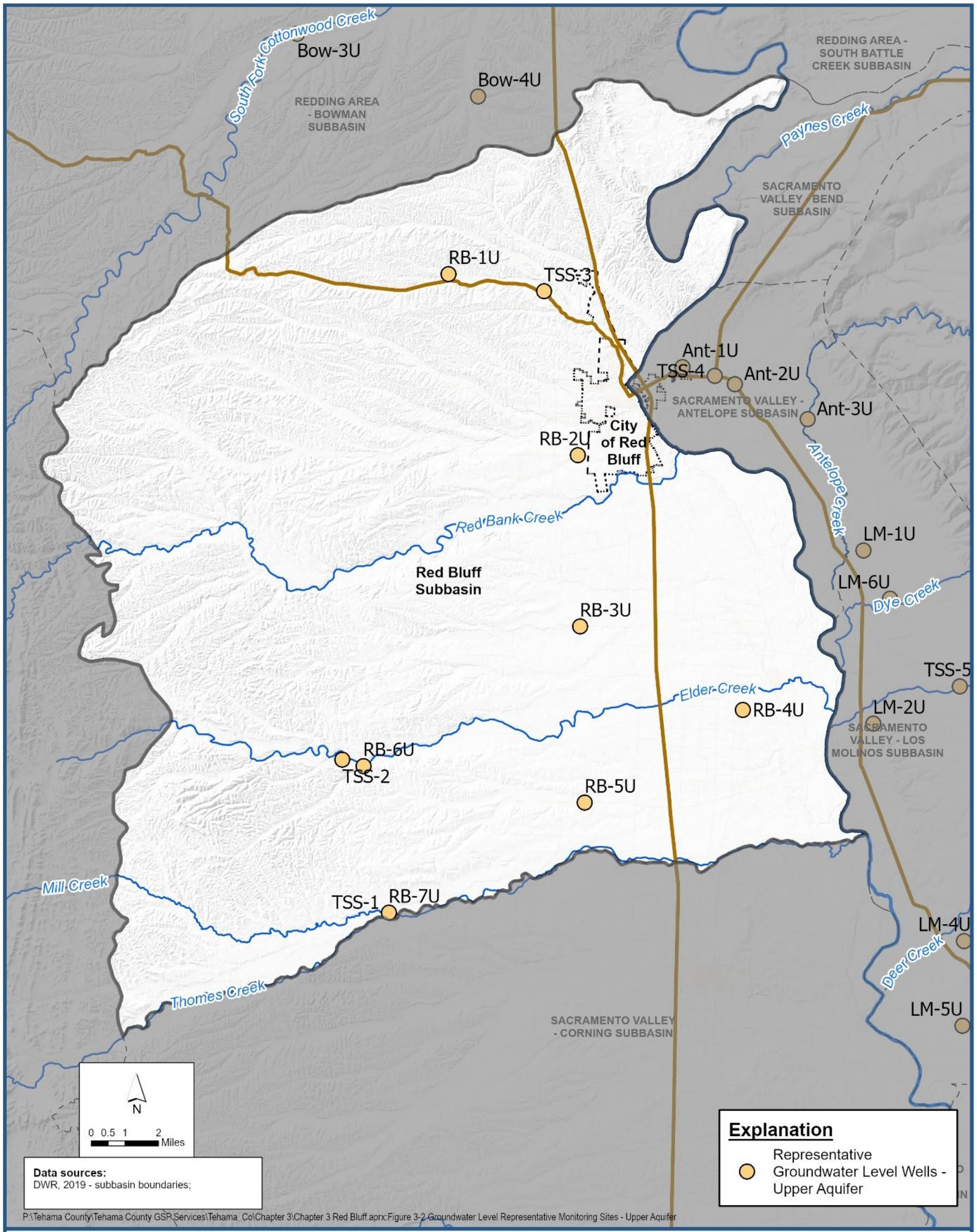
3.2.1 Measurable Objectives for Chronic Lowering of Water Levels

3.2.1.1 Description of Measurable Objectives

Measurable objectives for groundwater levels were established by analyzing historical groundwater level data and determining approximately how many domestic wells may be negatively impacted at different measurable thresholds. Both annual (variability from year to year) and seasonal variability were considered in the development of MOs. Groundwater elevation SMC were developed based on historic measurements and a sustainability goal of preventing negative impacts to domestic wells. Measurable objectives were set at each of the monitoring sites (**Table 3-2 through 3-3 and Figure 3-2 through 3-3**) These sites were selected to provide an even distribution of coverage over the Subbasin and based on each individual well's ability to capture the general groundwater trend for other wells in their vicinity.

Specifically, to determine MOs, historical water elevations and projected water level trends were analyzed. The Subbasin aims to become sustainable by 2042 and therefore, MOs were set to spring 2042 projected elevations minus five (5) feet for wells with a decreasing projected trend and at spring 2015 water levels minus five (5) feet for wells with an increasing projected trend in water elevations or with no trend. These MOs allow for operational flexibility while maintaining sustainability within the Subbasin.

Groundwater level hydrographs showing MOs for each groundwater level sustainability indicator well are provided in **Appendix 3-B.** Measurable objectives for each groundwater level monitoring well in the upper and lower aquifers are summarized in **Tables 3-2 and 3-3.**



Data sources:
DWR, 2019 - subbasin boundaries;

Explanation

● Representative Groundwater Level Wells - Upper Aquifer

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter 3\Chapter 3 Red Bluff.aprx:Figure 3-2 Groundwater Level Representative Monitoring Sites - Upper Aquifer

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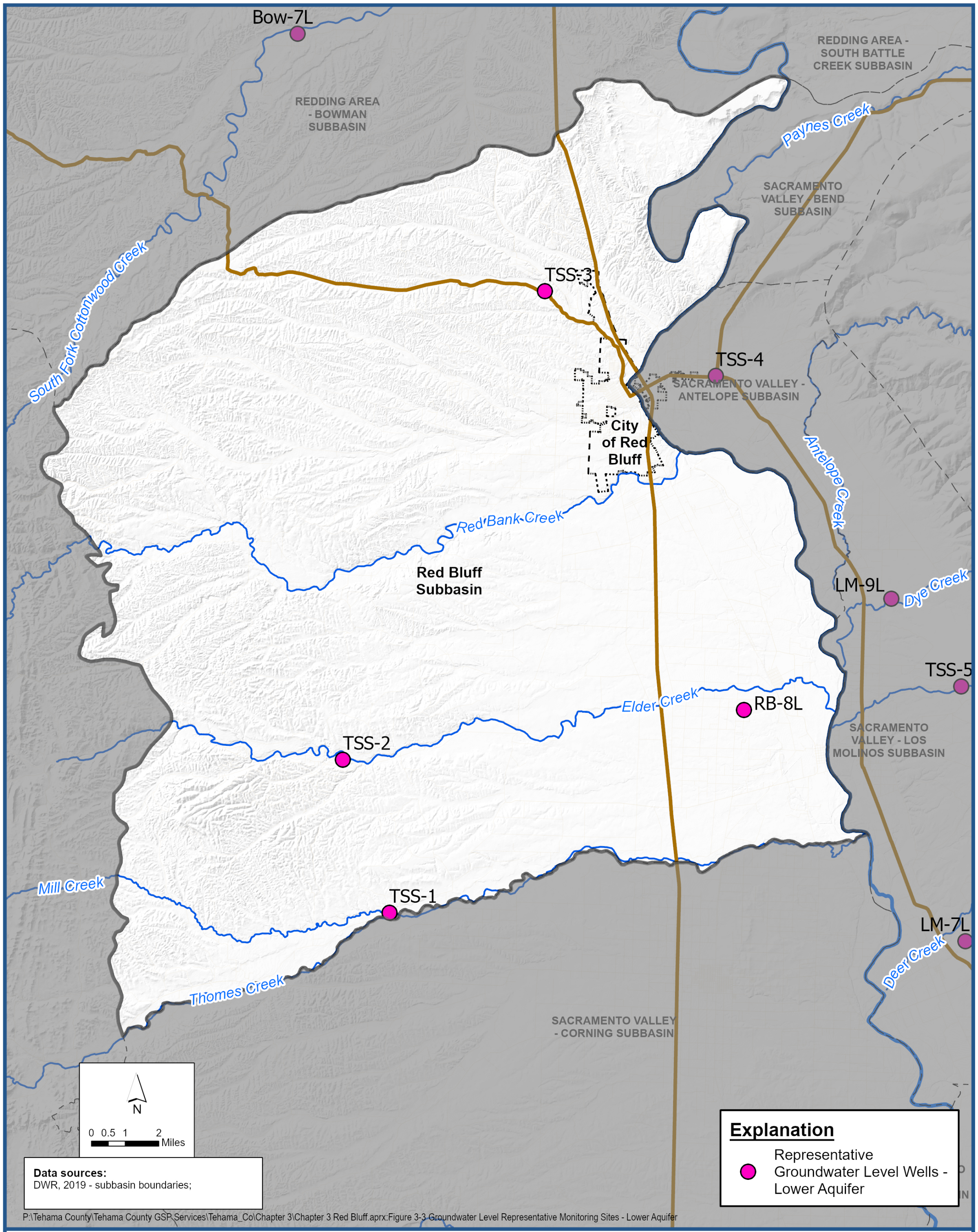
Groundwater Level Representative Monitoring Sites - Upper Aquifer

Figure 3-2

Groundwater Sustainability Plan
Red Bluff Subbasin



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Groundwater Level Representative Monitoring Sites - Lower Aquifer

Figure 3-3

Groundwater Sustainability Plan
Red Bluff Subbasin

Table 3-2. Measurable Objectives and Interim Milestones for the Chronic Lowering of Groundwater Elevations – Upper Aquifer

WELL NAME	STATE WELL NUMBER (SWN)	INTERIM MILESTONE 5 YEARS (FT NAVD88)	INTERIM MILESTONE 10 YEARS (FT NAVD88)	INTERIM MILESTONE 15 YEARS (FT NAVD88)	MEASURABLE OBJECTIVE (FT NAVD88)
RB-1U	27N04W05G002M	433.9	433.4	432.9	432.4
RB-2U	27N04W36G001M	245.8	244.4	243.0	241.5
RB-3U	26N04W25J001M	262.0	260.4	258.7	257.1
RB-4U	25N03W11B001M	213.9	210.2	206.6	203.0
RB-5U	25N03W19N001M	238.1	233.5	228.9	224.2
RB-6U	25N05W24D001M	408.5	406.1	403.7	401.3
RB-7U	N/A	347.6	341.5	335.3	329.1
TSS-1	TBD	TBD	TBD	TBD	TBD
TSS-2	TBD	TBD	TBD	TBD	TBD
TSS-3	TBD	TBD	TBD	TBD	TBD

Table 3-3. Measurable Objectives and Interim Milestones for the Chronic Lowering of Groundwater Elevations - Lower Aquifer

WELL NAME	SWN	INTERIM MILESTONE 5 YEARS (FT NAVD88)	INTERIM MILESTONE 10 YEARS (FT NAVD88)	INTERIM MILESTONE 15 YEARS (FT NAVD88)	MEASURABLE OBJECTIVE (FT NAVD88)
RB-8L	25N03W11B002M	212.0	208.7	205.3	202.0
TSS-1	TBD	TBD	TBD	TBD	TBD
TSS-2	TBD	TBD	TBD	TBD	TBD
TSS-3	TBD	TBD	TBD	TBD	TBD

3.2.1.2 Interim Milestones (Reasonable Margin of Safety for Operational Flexibility)

Interim milestones at five (5), ten (10), and fifteen (15) years are summarized in **Table 3-2 and Table 3-3** above**.** Interim milestones demonstrate progress towards achieving sustainability as represented by the MOs. The 2021 spring measurement was used as the starting point in the development of interim milestones for all the wells.. The interim milestones were set to split the difference between the MOs and the starting point.

3.2.1.3 Path to Achieve and Maintain the Sustainability Goal

Considering historic trends, projected groundwater extraction and planned PMAs it appears that the subbasin will be on a reasonable path to maintain the sustainability goal with stable groundwater elevations. Recent water levels remain above the MOs. Since recent groundwater levels are higher than the MOs, a recovery of groundwater elevation is not needed to reach the sustainability goal. The interim milestones serve to maintain the existing sustainable conditions. The sustainability goal for groundwater elevation is to prevent a negative impact on no more than 20% of the domestic wells within the upper aquifer. Planned PMAs in conjunction with coordination of SMC with adjacent subbasins will ensure the MOs for groundwater elevations are met.

The combination of interim milestones and MOs reflect how the GSA anticipates achieving and maintaining sustainability. It should be noted that future projections require assumptions about future hydrologic conditions, including the sequence of wet, average, and dry climatic years. The future climatic assumptions for the Implementation Period (through 2042) used in this GSP incorporate sequences of wet, average, and dry years that represent overall long-term average historical climatic conditions over the Implementation Period, without any prolonged periods of extremely dry or extremely wet years.

3.2.1.4 Impact of Selected Measurable Objectives on Adjacent Basins

The MOs established for the Subbasin provide a good basis for evaluation of anticipated impacts on adjacent subbasins from implementation of the GSP. This is because MOs are set to reflect the average groundwater levels to be maintained during the Sustainability Period. Ultimately, the potential for impacts on adjacent subbasins will be primarily a function of average water levels in the Subbasin during the Sustainability Period, average water levels in adjacent subbasins during the Sustainability Period, and natural groundwater flow conditions that would be expected to occur at Plan area boundaries. The average groundwater levels expected for the Plan area are reflected in the Measurable Objectives. Tehama County is also the GSA for the surrounding Antelope, Bowman and Los Molinos Subbasins. The MOs for these surrounding subbasins were set in a concurrent fashion using the same methodology as the Red Bluff Subbasin. Furthermore, the GSA has also reviewed the MOs for the Vina and Corning subbasins during the development of the GSP. Red Bluff MOs were compared to those set for the northernmost wells in these two subbasins for consistency. Therefore, no adverse impact on adjacent basins is likely to occur.

3.2.2 Measurable Objectives for Reduction in Groundwater Storage

3.2.2.1 Description of Measurable Objectives

The MOs for storage were established using the chronic lowering of groundwater elevations MOs. They are set to the amount of groundwater storage that exists when the groundwater elevations are at their MOs.

3.2.2.2 Interim Milestones (Reasonable Margin of Safety for Operational Flexibility)

Interim milestones at five (5), ten (10), and fifteen (15) years are summarized in **Table 3-2 and Table 3-3** for groundwater levels. The 2021 spring measurement was used as the starting point in the development of interim milestones for all the wells.

3.2.2.3 Path to Achieve and Maintain the Sustainability Goal

The combination of interim milestones and MOs reflect how the basin will achieve and maintain sustainability. Since groundwater levels serve as a practical proxy for evaluating reduction in groundwater storage, achieving, and maintaining sustainability relative to this indicator is similar to that described above in the groundwater level section.

3.2.2.4 Impact of Selected Measurable Objectives on Adjacent Basins

The groundwater model used for Red Bluff also encompasses the neighboring four (4) subbasins (Antelope, Bowman, Corning, and Los Molinos). Projections for future water levels in the Red Bluff Subbasin were generated while accounting for conditions at these surrounding subbasins. Furthermore, MOs for water elevations for Vina and Corning subbasins were compared with those set for Red Bluff and considered in the development of this GSP. Therefore, no adverse impact to surrounding subbasins is anticipated.

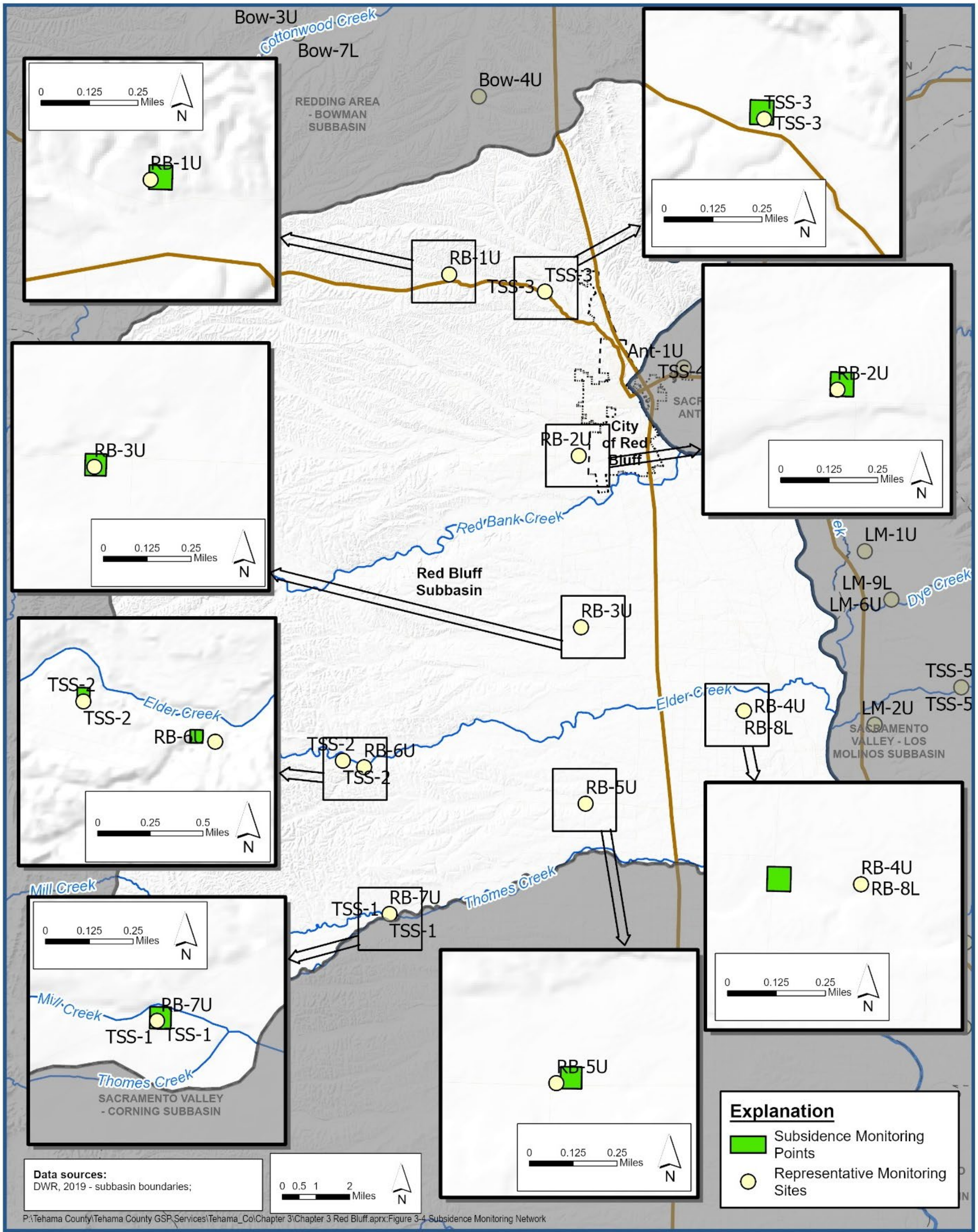
3.2.3 Measurable Objectives for Subsidence

3.2.3.1 Description of Measurable Objectives

The MOs for subsidence represent target subsidence rates in the Subbasin. The MOs were set to vertical displacements of 0.25 feet ever 5 years or one foot over 20 years at each (zero inelastic subsidence, in addition to any measurement error) in each InSAR pixel. If InSAR data are used, the measurement error is 0.1 feet and any measurement 0.1 feet or less would not be considered inelastic subsidence. Prior to determining this value, subsidence data from three (3) different sources (PBO, DWR, InSAR) was analyzed for historical and current trends. The MOs were set by examining the vertical displacement observed at the pixels from June 2015 to September 2019. The current subsidence monitoring InSAR pixels are shown on **Figure 3-4**. Based on the existing monitoring system the subsidence MOs are shown in **Table 3-4**. Note historical ground elevations for these pixels are presented in Appendix 3-C InSAR Subsidence Timeseries Data.

Table 3-4. Measurable Objectives and Interim Milestones for Subsidence

INSAR PIXEL	INTERIM MILESTONE 5 YEARS (FT)	INTERIM MILESTONE 10 YEARS (FT)	INTERIM MILESTONE 15 YEARS (FT)	MEASURABLE OBJECTIVE (FT)
DV3OYJD	-0.25	-0.5	-0.75	-1.0
DTP3463	-0.25	-0.5	-0.75	-1.0
DSC9KKE	-0.25	-0.5	-0.75	-1.0
DRPN3N0	-0.25	-0.5	-0.75	-1.0
DQY95R7	-0.25	-0.5	-0.75	-1.0
DR76NQR	-0.25	-0.5	-0.75	-1.0
DQ1IBER	-0.25	-0.5	-0.75	-1.0
DR8YYJU	-0.25	-0.5	-0.75	-1.0
DUZIXC8	-0.25	-0.5	-0.75	-1.0



Explanation

🟩 Subsidence Monitoring Points

○ Representative Monitoring Sites

Data sources:
DWR, 2019 - subbasin boundaries;

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter 3\Chapter 3 Red Bluff.aprx:Figure 3-4 Subsidence Monitoring Network

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Subsidence Monitoring Network

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 3-4

3.2.3.2 Interim Milestones (Reasonable Margin of Safety for Operational Flexibility)

Interim milestones at five (5), ten (10), and fifteen (15) years are summarized in **Table 3-4.**

3.2.3.3 Path to Achieve and Maintain the Sustainability Goal

Historic trends and planned groundwater extraction and PMAs provide a reasonable path to maintain the sustainability goal with levels of subsidence that will not exceed historical trends. As discussed in the basin setting, subsidence has not been an issue for the Red Bluff Subbasin. Even so, continued monitoring at InSAR pixel locations will highlight and help to mitigate any increases in subsidence through PMAs. The interim milestones served to maintain the existing sustainable conditions. The sustainability goal for subsidence is to prevent a trend of increasing rates of subsidence. Planned PMAs will ensure the MOs for subsidence are met.

3.2.3.4 Impact of Selected Measurable Objective on Adjacent Basins

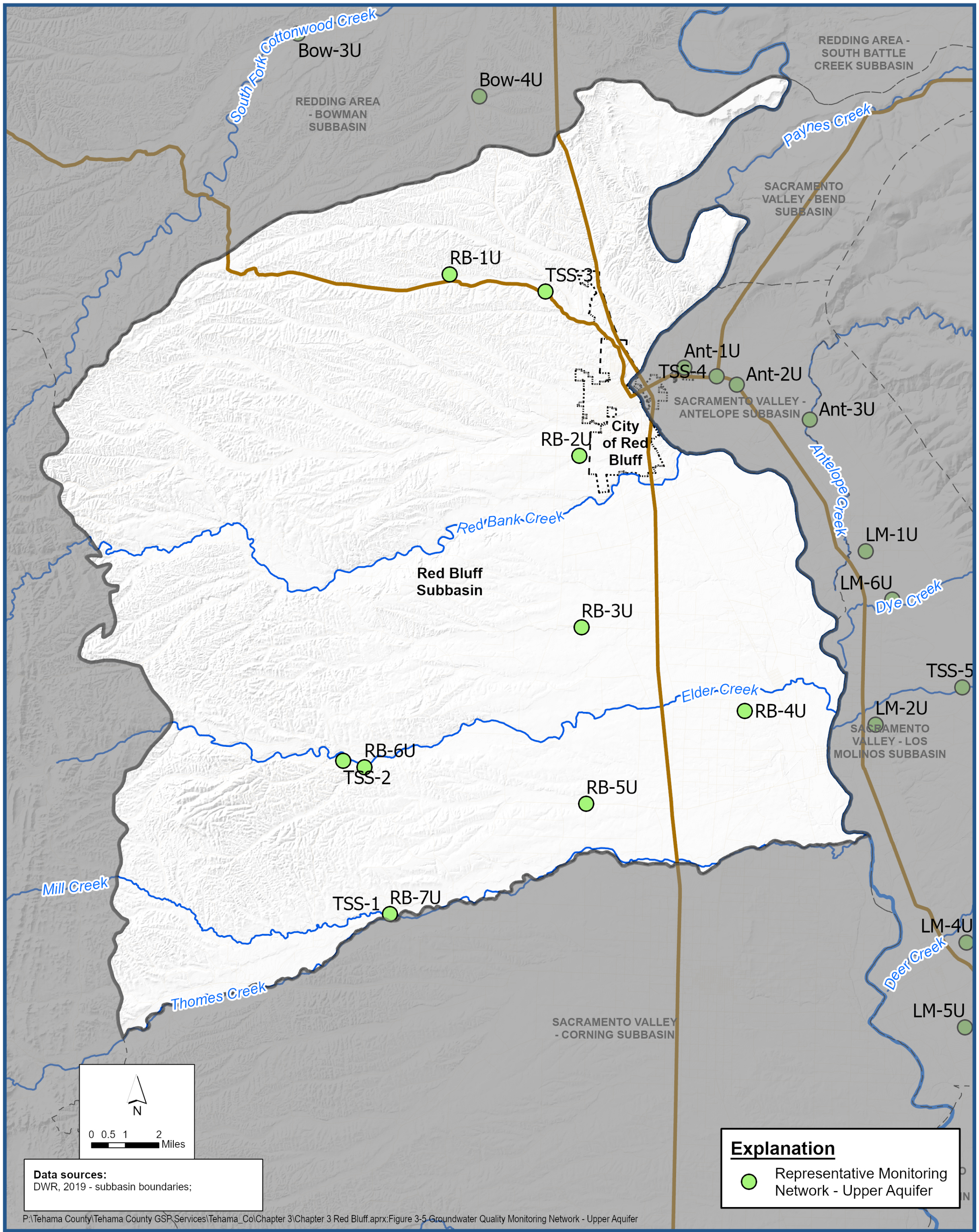
The anticipated effect of the subsidence MOs on each of the neighboring subbasins is not expected to be significant because of the following factors:

- The Subbasin has not been subject to large levels of subsidence in the past
- Three neighboring subbasins are also managed by the same GSA and sustainability efforts are to be coordinated between subbasins to avoid adverse impacts. The GSA has also reviewed the objectives set by the Vina and Corning subbasins for consistency in MOs

3.2.4 Measurable Objectives for Degraded Water Quality

3.2.4.1 Description of Measurable Objectives

The MOs for minimizing the degradation of groundwater quality are based on groundwater sample concentrations meeting water quality objectives and groundwater quality at concentrations similar to historical observations in the groundwater basin. Based on the review of groundwater quality in Chapter 2, the constituent being evaluated for all beneficial users is total dissolved solids (TDS). The basis for establishing the measurable objective is to minimize the additional contribution and migration of TDS. The GSA is aware of nitrate issues within the Subbasin, and TDS will be used to monitor the overall groundwater quality. Additional needs for nitrate monitoring will be evaluated on an ongoing basis and the plan will be modified as needed. Measurable objectives for wells in the monitoring network are summarized in **Table 3-5** and shown on **Figure 3-5.** All water quality monitoring wells are constructed in the upper aquifer as TDS is not a concern in the lower aquifer and more pumping occurs from the upper aquifer. The MOs for groundwater quality are concentrations of TDS that are generally representative of secondary drinking water standards for urban and domestic beneficial and tolerable for most crops grown in the Subbasin without blending with surface water supplies. The measurable objective is established at 500 mg/L which represents recommended secondary drinking water standards.



Data sources:
DWR, 2019 - subbasin boundaries;

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter 3\Chapter 3 Red Bluff.aprx:Figure 3-5 Groundwater Quality Monitoring Network - Upper Aquifer

TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Groundwater Quality Monitoring Network - Upper Aquifer

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 3-5

Table 3-5. Measurable Objectives and Interim Milestones for Groundwater Quality

Well Name	State Well Number (SWN)	Interim Milestone 5 Years (TDS mg/L)	Interim Milestone 10 Years (TDS mg/L)	Interim Milestone 15 Years (TDS mg/L)	Measurable Objective (TDS mg/L)
RB-1U	27N04W05G002M	242.5	328.5	414.5	500.0
RB-2U	27N04W36G001M	192.5	295.0	397.5	500.0
RB-3U	26N04W25J001M	TBD	TBD	TBD	500.0
RB-4U	25N03W11B001M	305.0	370.0	435.0	500.0
RB-5U	25N03W19N001M	TBD	TBD	TBD	500.0
RB-6U	TBD	TBD	TBD	434.5	500.0
RB-7U	N/A	254.0	336.0	418.0	500.0
TSS-1	TBD	TBD	TBD	TBD	500.0
TSS-2	TBD	TBD	TBD	TBD	500.0
TSS-3	TBD	TBD	TBD	TBD	500.0

3.2.4.2 Interim Milestones (Reasonable Margin of Safety for Operational Flexibility)

Recent water quality data was not available in the Subbasin for establishing baseline conditions and calculating interim milestones over the GSP implementation period. To establish baseline water quality, samples were collected from RMS wells and were analyzed for TDS. Details of sampling activities and lab results are included in **Appendix 3-D**. Interim milestones were established using available lab results. This table will be updated as more results become available. Interim Milestones are summarized in **Table 3-5.**

3.2.4.3 Path to Achieve and Maintain the Sustainability Goal

The GSP monitoring program for groundwater quality will provide the GSA with a comprehensive understanding of groundwater quality in the Subbasin and identify areas with degraded water quality. This data will be used by the GSA to develop future PMAs, as necessary, to address areas with degraded water quality.

3.2.4.4 Impact of Selected Measurable Objectives on Adjacent Basins

Currently, the state of migration of TDS is unknown and therefore it is not possible to quantify the impact from the MOs on adjacent subbasins. As more data is collected, the impact to adjacent subbasins will be reassessed. However, the MOs for TDS have been set to the same limit as the surrounding subbasins of Antelope, Los Molinos and Corning and below those set for Vina so no negative impacts are anticipated.

3.2.5 Measurable Objectives for Interconnected Surface Waters

3.2.5.1 Description of Measurable Objectives

Interim MOs (**Table 3-6**) have been established for this indicator due to extensive data gaps which are discussed in **Section 3.7.8.7.** The MOs for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within one mile of interconnected surface water features will be used for monitoring groundwater levels (**Figure 3-6**). Future shallow groundwater monitoring proposed in this plan will provide data to characterize stream-aquifer interaction and establish MOs for interconnected surface water. Until sufficient data is available, it is assumed that existing surface water – groundwater interactions will not considerably change when sustainable groundwater levels occur in the Subbasin.

3.2.5.2 Interim Milestones (Reasonable Margin of Safety for Operational Flexibility)

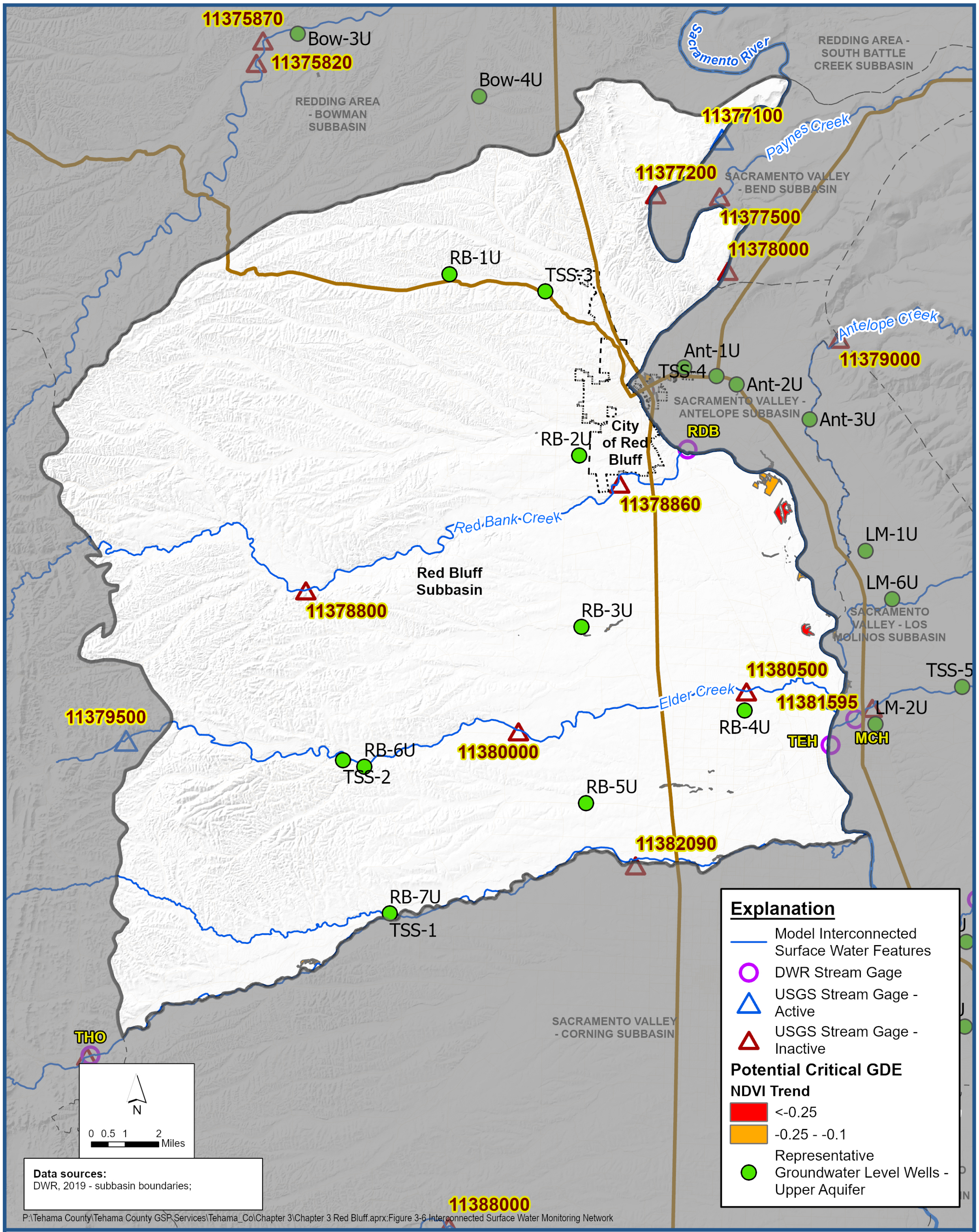
Temporary interim milestones have been established for this indicator due to extensive data gaps which are discussed in **Section 3.7.8.7**. The interim milestones for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within one (1) mile of interconnected surface water features will be used for monitoring groundwater levels.

Table 3-6. Initial Measurable Objectives and Interim Milestones for Interconnected Surface Water

WELL NAME	SWN	INTERIM MILESTONE 5 YEARS (FT NAVD88)	INTERIM MILESTONE 10 YEARS (FT NAVD88)	INTERIM MILESTONE 15 YEARS (FT NAVD88)	MEASURABLE OBJECTIVE (FT NAVD88)
RB-1U	27N04W05G002M	433.9	433.4	432.9	432.4
RB-2U	27N04W36G001M	245.8	244.4	243.0	241.5
RB-3U	26N04W25J001M	262.0	260.4	258.7	257.1
RB-4U	25N03W11B001M	213.9	210.2	206.6	203.0
RB-5U	25N03W19N001M	238.1	233.5	228.9	224.2
RB-6U	25N05W24D001M	408.5	406.1	403.7	401.3
RB-7U	N/A	347.6	341.5	335.3	329.1
TSS-1	TBD	TBD	TBD	TBD	TBD
TSS-2	TBD	TBD	TBD	TBD	TBD
TSS-3	TBD	TBD	TBD	TBD	TBD

3.2.5.3 Path to Achieve and Maintain the Sustainability Goal

No MOs have been established for this indicator due to extensive data gaps which are discussed in **Section 3.7.8.7**. For the interim, MOs for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within one (1) mile of interconnected surface water features will be used for monitoring groundwater levels.



Data sources:
DWR, 2019 - subbasin boundaries;

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter 3\Chapter 3 Red Bluff.aprx:Figure 3-6 Interconnected Surface Water Monitoring Network

TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Interconnected Surface Water Monitoring Network

Figure 3-6

Groundwater Sustainability Plan
Red Bluff Subbasin

3.2.5.4 Impact of Selected Measurable Objectives on Adjacent Basins

No MOs have been established for this indicator due to extensive data gaps which are discussed in **Section 3.7.8.7**. For the interim, MOs for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within the upper aquifer will be used for monitoring groundwater levels. As data gaps are bridged and more data becomes available, the GSA will continue to evaluate the MOs and their potential impacts on adjacent subbasins.

3.3 Minimum Thresholds (*Reg. § 354.28)*

The regulations define undesirable results as occurring when significant and unreasonable effects are caused by groundwater conditions occurring throughout the Plan area for a given sustainability indicator. Significant and unreasonable effects occur when MTs are exceeded for one or more sustainability indicators. Minimum thresholds refer to a numeric value for each sustainability indicator used to define undesirable results. A GSP must establish MTs that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site. The numeric value used to define the MTs shall represent a point in the Subbasin that, if exceeded may cause significant and unreasonable undesirable results. A GSA may establish a representative MTs, such as groundwater elevation (GWE) to serve as the value for multiple sustainability indicators, if the GSA can demonstrate the representative value is a reasonable proxy for multiple individual MTs, as supported by adequate evidence. Minimum thresholds are not required for sustainability indicators that are not present and not likely to occur in the Subbasin.

The description of MTs shall include the following:

1. The information and criteria relied upon to establish and justify the MTs for each sustainability indicator. The justification for the MTs shall be supported by information provided in the basin setting, and other data or models as appropriate and qualified by uncertainty in the understanding of basin setting.
2. The relationship between the MTs for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each MTs will avoid undesirable results from each sustainability indicator.
3. How MTs have been selected to avoid causing undesirable results in adjacent basins or affecting adjacent basin’s ability to achieve sustainability goals.
4. How MTs may affect the interests of beneficial users and users of groundwater or land uses and property interests.
5. How state, federal, or local standards relate to the relevant sustainability indicator. If the MTs differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.
6. How each MTs will be quantitatively measured, consistent with the monitoring network requirements.

3.3.1 Minimum Thresholds for Chronic Lowering of Groundwater Elevations

3.3.1.1 Description of Minimum Threshold

Groundwater levels will be measured at existing or new monitoring wells to gauge if MTs are being met. The groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Section 3.11. Furthermore, the groundwater level monitoring will meet the requirements of the technical and reporting standards included in the GSP regulations. As noted in Section 3.11, the current groundwater monitoring network includes seven (7) wells in the Upper Aquifer and one (1) well in the Lower Aquifer (**Figure 3-2 and Figure 3-3**). The GSA will also install three (3) nested monitoring wells (TSS 1-3) in the Subbasin which is included in this monitoring network (**Figure 3-1**). These wells are designed to monitor both the upper and lower aquifers.

The GSP regulations provide that the "MTs for chronic lowering of groundwater elevations shall be the groundwater level indicating a depletion of supply at a given location that may lead to undesirable results." Chronic lowering of groundwater elevations in the Subbasin cause significant and unreasonable declines if they are sufficient in magnitude to lower the rate of production of pre-existing groundwater wells below that necessary to meet the minimum required to support overlying beneficial use(s) where alternative means of obtaining sufficient water resources are not technically or financially feasible. In addition, GWEs will be managed at levels above the MTs to ensure the major aquifers in the Subbasin are not depleted in a manner to cause significant and unreasonable impacts to other sustainability indicators.

The MTs are intended to protect against significant and unreasonable levels of chronic groundwater storage declines, water quality degradation, subsidence in areas where critical infrastructure is located. These MTs are also being utilized as initial MTs for interconnected surface waters and are intended to protect against negative impacts to GDEs and the depletion of interconnected surface waters. The development of MTs for chronic lowering of groundwater elevations included a review of historical groundwater levels and the projected water levels trends in 2042. Minimum thresholds were established based on these historical and projected data and the GSA's consideration of undesirable results. The MTs for chronic lowering of groundwater elevations are based on documented screen intervals of key wells located both in the upper and lower aquifers in the Subbasin. The MTs were set to the following:

- Upper Aquifer: Spring groundwater elevation where less than 10 – 20% (on average) of domestic wells could potentially be impacted.
- Lower Aquifer: Spring groundwater elevation minus 20 to 120 feet

RMS wells and the subsequent MTs are listed in **Table 3-7 and Table 3-8**. Groundwater level hydrographs from which the MTs were developed are provided in **Appendix 3-B.**

Table 3-7. Minimum Thresholds and Interim Milestones for the Chronic Lowering of Water Elevations – Upper Aquifer

WELL NAME	SWN	INTERIM MILESTONE 5 YEARS (FT NAVD88)	INTERIM MILESTONE 10 YEARS (FT NAVD88)	INTERIM MILESTONE 15 YEARS (FT NAVD88)	MEASURABLE OBJECTIVE (FT NAVD88)	MINIMUM THRESHOLD (FT NAVD88)
RB-1U	27N04W05G002M	433.9	433.4	432.9	432.4	302.5
RB-2U	27N04W36G001M	245.8	244.4	243.0	241.5	207.4
RB-3U	26N04W25J001M	262.0	260.4	258.7	257.1	223.5
RB-4U	25N03W11B001M	213.9	210.2	206.6	203.0	152.1
RB-5U	25N03W19N001M	238.1	233.5	228.9	224.2	177.5
RB-6U	25N05W24D001M	408.5	406.1	403.7	401.3	355.6
RB-7U	N/A	347.6	341.5	335.3	329.1	276.0
TSS-1	TBD	TBD	TBD	TBD	TBD	TBD
TSS-2	TBD	TBD	TBD	TBD	TBD	TBD
TSS-3	TBD	TBD	TBD	TBD	TBD	TBD

Table 3-8. Minimum Threshold and Interim Milestones for the Chronic Lowering of Water Elevations – Lower Aquifer

WELL NAME	SWN	INTERIM MILESTONE 5 YEARS (FT NAVD88)	INTERIM MILESTONE 10 YEARS (FT NAVD88)	INTERIM MILESTONE 15 YEARS (FT NAVD88)	MEASURABLE OBJECTIVE (FT NAVD88)	MINIMUM THRESHOLD (FT NAVD88)
RB-8L	25N03W11B002M	212.0	208.7	205.3	202.0	92.0
TSS-1	TBD	TBD	TBD	TBD	TBD	TBD
TSS-2	TBD	TBD	TBD	TBD	TBD	TBD
TSS-3	TBD	TBD	TBD	TBD	TBD	TBD

3.3.1.2 Quantitative Measurement

The quantitative measurement for chronic lowering of groundwater elevations will be the annual spring measurements taken at the RMS wells. The data obtained will be appended to existing data to generate hydrographs for the wells. These hydrographs will be analyzed for changing trends in water elevations and compared to established MTs to ensure they are not exceeded.

3.3.1.3 Existing Local, State, or Federal Standards

No federal, other state, or local standards exist for chronic lowering of groundwater elevations.

3.3.1.4 Avoidance of Undesirable Results

A prolonged period of extracting groundwater greater than the sustainable yield can cause chronic lowering of groundwater elevations in the Subbasin and could cause an undesirable result in the future. Impacts of declining groundwater levels would be considered undesirable results if 25% or more of the RMS wells are below the MTs for two (2) consecutive annual spring measurements. Effects of the Beneficial Uses and Users of Groundwater

The primary detrimental effect to beneficial users from allowing a multi-year (more than two (2) years of readings in 25% or more of the RMS wells) exceedance would be loss of well capacity, increased costs due to higher pumping lifts, lack of groundwater extraction due to groundwater levels declining below the pump setting, or subsidence impacts on well structures and above ground infrastructure.

3.3.2 Minimum Thresholds for Reduction in Groundwater Storage

3.3.2.1 Description of Minimum Threshold

GSP Regulation §354.28 (c)(2) states that the MTs for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be calculated based on historical trends, water year type and projected water use in the Subbasin. Reduction in groundwater storage is not a parameter that can be directly measured; rather, change in storage is calculated from change in groundwater levels and aquifer material storage coefficients. Change in groundwater storage will be regularly estimated based on either the Subbasin water budget or monitoring results derived from analysis of groundwater elevations and aquifer properties. The MTs for groundwater storage is set to the amount of groundwater storage when groundwater elevations are at their measurable objective.

3.3.2.2 Quantitative Measurement

The MTs for reduction in groundwater storage is a single value of average groundwater elevation over the entire Subbasin. Therefore, the potential conflict between MTs at different locations in the Subbasin is not applicable. The reduction in groundwater storage MTs was selected to avoid undesirable results for other sustainability indicators as outlined below:

1. Chronic lowering of groundwater elevations. Since groundwater elevation will be used for estimating changes in groundwater storage, the reduction in groundwater storage would not cause undesirable results for this sustainability indicator.
2. Degraded water quality. Exceedances of the MTs for declines in groundwater storage is not expected to lead to a degradation of groundwater quality.
3. Subsidence. Future average groundwater levels and changes in long-term aquifer storage will be stable and will not induce any additional subsidence within the Subbasin.
4. Interconnected surface water. Groundwater elevations will also be used for interconnected surface waters for the interim. Therefore, the MTs for groundwater storage is not anticipated to

cause undesirable results for this indicator. The GSA will work to bridge the data gaps for this indicator and continue to reassess any potential impacts from the storage MTs.

Groundwater levels will be measured at existing and new monitoring wells. The groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Section 3.11. Furthermore, the groundwater level monitoring will meet the requirements of the technical and reporting standards included in the SGMA regulations. As noted in Section 3.11, the current groundwater monitoring network includes seven (7) wells in the Upper Aquifer and one (1) well in the Lower Aquifer. The GSA intends to install three nested monitoring wells which is included in the network. The change in groundwater elevations from year to year will be determined and multiplied by the storage coefficients associated with the specific aquifer being measured and multiplied by the areal extent of the Subbasin to derive the annual change in storage.

3.3.2.3 Existing Local, State, or Federal Standards

No federal, other state, or local standards exist for reduction in groundwater storage.

3.3.2.4 Avoidance of Undesirable Results

A prolonged period of extracting groundwater in excess of the sustainable yield can cause groundwater storage declines when coupled with reductions in imported water supplies and could lead an undesirable result in the future. Conditions that may lead to an undesirable result include the following:

- Over-pumping of groundwater. High rates of extractions from the aquifers can cause excessive drawdowns that can lead to undesirable results by dropping monitoring well levels below the MTs.
- Extensive, unanticipated drought and associated drastic curtailments of imported surface water supplies. Minimum thresholds were established based on historical groundwater elevation and reasonable estimates of future groundwater elevations. Extensive, unanticipated droughts and associated curtailment of imported water supplies will likely lead to excessively low groundwater elevations and undesirable results.

3.3.2.5 Effects of the Beneficial Uses and Users of Groundwater

The practical effect of the reduction in groundwater storage undesirable result encourages no net change in groundwater elevation and storage during long-term average hydrologic conditions. Therefore, during average, long-term hydrologic conditions, beneficial uses, and users will have access to the same amount of groundwater in storage that currently exists, and the undesirable result will not have a significant negative effect on the beneficial users and uses of groundwater. Pumping during dry years will temporarily lower groundwater elevations, reduce the amount of groundwater in storage and could result in short-term impacts from a reduction in groundwater in storage on all beneficial uses and users of groundwater. However, the GSP is designed to promote conjunctive use in the Subbasin and acknowledges the sustainable yield as an average value that can experience annual variations in storage.

3.3.3 Minimum Thresholds for Subsidence

3.3.3.1 Description of Minimum Threshold

GSP regulations state that the MTs for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Information used to establish the land subsidence MTs include:

- Historical land surface elevation data from GPS locations in the Subbasin and satellite imagery of subsidence.

Subsidence monitoring in and adjacent to the Subbasin includes several different data collection programs:

- PBO UNAVCO continuous subsidence monitoring stations
- 2017 GPS survey of the Sacramento Valley Subsidence Network (DWR)
- InSAR satellite-based subsidence monitoring

Data collected by the programs listed above was evaluated against water levels observed at the monitoring network wells. The compiled data was also compared to observe historical trends against current conditions. This analysis showed that the Subbasin had experienced minimal levels of subsidence historically and there was no indication of changes in that trend in current conditions. Past subsidence is likely elastic. Minimum thresholds were set at InSAR pixel locations near water level monitoring network wells based on these trends. The InSAR pixel MTs was established by calculating the vertical displacement from June 2015 to September 2019 and doubling the value. These pixels and their corresponding monitoring wells are depicted in **Figure 3-4**. InSAR vertical displacement data is currently provided by DWR. The GSP anticipates that DWR will continue to provide this data in the future for use in GSP updates. The MTs for subsidence are set to two feet over 20 years (i.e., no more than 0.5 feet of cumulative subsidence over a five (5)-year period (beyond the measurement error), solely due to lowering of groundwater elevations.

These measurable thresholds are listed in **Table 3-9**.

Table 3-9. Minimum Thresholds and Interim Milestones for Subsidence

INSAR PIXEL	INTERIM MILESTONE 5 YEARS (FT)	INTERIM MILESTONE 10 YEARS (FT)	INTERIM MILESTONE 15 YEARS (FT)	MEASURABLE OBJECTIVE (FT)	MINIMUM THRESHOLD (FT)
DV3OYJD	-0.25	-0.5	-0.75	-1.0	-2.0
DTP3463	-0.25	-0.5	-0.75	-1.0	-2.0
DSC9KKE	-0.25	-0.5	-0.75	-1.0	-2.0
DRPN3N0	-0.25	-0.5	-0.75	-1.0	-2.0
DQY95R7	-0.25	-0.5	-0.75	-1.0	-2.0
DR76NQR	-0.25	-0.5	-0.75	-1.0	-2.0
DQ1IBER	-0.25	-0.5	-0.75	-1.0	-2.0
DR8YYJU	-0.25	-0.5	-0.75	-1.0	-2.0
DUZIXC8	-0.25	-0.5	-0.75	-1.0	-2.0

3.3.3.2 Quantitative Measurement

The quantitative metric for assessing compliance will be to continue to use vertical displacement data from InSAR at the individual pixels (**Table 3-9**) which will be downloaded annually. This data will be appended to existing data and plotted. Both quantitative and qualitative assessments of the data will be performed to assess if any trends are apparent, and if the annual subsidence is greater than the MTs.

3.3.3.3 Existing Local, State, or Federal Standards

No federal, other state, or local standards exist for currently exist for subsidence reduction.

3.3.3.4 Avoidance of Undesirable Results

Undesirable results are considered to occur at a 50% exceedance of a MTs over a five (5)-year period that is irreversible and is caused by lowering of groundwater elevations.

Conditions that may lead to an undesirable result of a significant and unreasonable amount for land subsidence arise due to groundwater extraction that causes reductions in the viability of the use of water conveyance and flood control infrastructure over the planning and implementation horizon of this GSP.

3.3.3.5 Effects of the Beneficial Uses and Users of Groundwater

The subsidence MTs are set to prevent subsidence that could lead to significant and unreasonable results. Unchecked subsidence can impact critical water conveyance and flood control infrastructure. Damages to water conveyance systems impacts all agricultural and urban users retrieving water from such systems. The impact is primarily manifested in increased cost and loss of flexibility in water conveyance operations. Higher levels of subsidence can also damage public infrastructure such as roadways and highways causing impacting populations outside of immediate beneficial users. Damages such as these can result in costly repairs and long-term traffic issues. Subsidence also has the capacity to increase flooding by causing damage to flood control infrastructure and creation of low elevation land. Potential impact on residents in flood prone areas may cause extensive financial hardships to those affected.

3.3.4 Minimum Thresholds for Groundwater Quality

3.3.4.1 Description of Minimum Threshold

The MTs for degraded water quality is protective of existing and potential beneficial uses and users in the Subbasin. SGMA's water quality objective focuses on a constituent's contribution due to activities at the land surface rather than on the presence of naturally occurring constituents. Based on the review of groundwater quality in Chapter 2, the constituent of concern for beneficial users in the Subbasin is TDS. TDS is being monitored as an overall indicator of groundwater quality within the Subbasin. The basis for establishing a MTs is to minimize the additional contribution and migration of high concentrations of TDS. The MTs for TDS is 750 milligrams per liter (mg/L). This threshold is lower than the California State Water Resources Control Board (SWRCB) upper secondary maximum containment level (SMCL) of 1,000 mg/L as set by SWRCB for taste and odor. Minimum thresholds for all wells are summarized in **Table 3-10.**

Table 3-10. Minimum Thresholds, Measurable Objectives, and Interim Milestones for Groundwater Quality

WELL NAME	INTERIM MILESTONE 5 YEARS (TDS MG/L)	INTERIM MILESTONE 10 YEARS (TDS MG/L)	INTERIM MILESTONE 15 YEARS (TDS MG/L)	MEASURABLE OBJECTIVE (TDS MG/L)	MINIMUM THRESHOLD (TDS MG/L)
RB-1U	242.5	328.5	414.5	500.0	750.0
RB-2U	192.5	295.0	397.5	500.0	750.0
RB-3U	TBD	TBD	TBD	500.0	750.0
RB-4U	305.0	370.0	435.0	500.0	750.0
RB-5U	TBD	TBD	TBD	500.0	750.0
RB-6U	TBD	TBD	TBD	500.0	750.0
RB-7U	254.0	336.0	418.0	500.0	750.0
TSS-1	TBD	TBD	TBD	500.0	750.0
TSS-2	TBD	TBD	TBD	500.0	750.0
TSS-3	TBD	TBD	TBD	500.0	750.0

3.3.4.2 Quantitative Measurement

Groundwater quality will be monitored on an annual basis at representative monitoring wells (listed in **Table 3-10**). All measurements will comply with the Sampling and Analysis Plan and Quality Project Plan and be recorded in the GSA's data management system. The monitoring network and monitoring protocols are described in **Section 3.11** (Monitoring Network and Monitoring Protocols for Data Collection). **Table 3-10** includes each well being monitored in the GSP monitoring program for groundwater quality, along with the MTs, measurable objective, and interim milestones. The MTs of 750 milligrams per liter (mg/L) are tolerable for most crops grown in the Subbasin without blending with surface water supplies. However, the GSA will continue to monitor TDS concentrations and changes in spatial or temporal trends to ensure MTs are not being exceeded and undesirable results are not being experienced by beneficial users.

3.3.4.3 Existing Local, State, or Federal Standards

The MTs for TDS is based on current background data in the Subbasin and set at 750 mg/L. This threshold is lower than the SWRCB upper secondary maximum containment level (SMCL) set by SWRCB for taste and odor of 1,000 mg/L.

3.3.4.4 Avoidance of Undesirable Results

Undesirable results will have occurred when:

- at least 25% of RMS exceed the MTs for water quality for two (2) consecutive years at each well where it can be established that GSP implementation is the cause of the exceedance

Changes in land use practices involving increased leaching of TDS into the groundwater system or increased extractions leading to dropping water levels and migrations of elevate TDS waters can lead to undesirable results. Through the monitoring network, the GSA aims to prevent such outcomes by analyzing long-term trends in water quality and deploying appropriate projects and managements to mitigate or deter undesirable results.

3.3.4.5 Effects of the Beneficial Uses and Users of Groundwater

The effect of degraded groundwater quality on agricultural beneficial users is manifested in crop damage and reduced yields, and a reduction in the use of land for irrigated agriculture if the sole water supply is groundwater.

Urban and domestic beneficial uses are impacted if degraded water is the only source for potable use. The impacts include the need to use alternative sources of water that may be more expensive than groundwater and potential undesirable aesthetic qualities without pre-treatment of the degraded water prior to use.

3.3.5 Minimum Thresholds for Interconnected Surface Water Depletions

3.3.5.1 Description of Minimum Threshold

Minimum thresholds are interim and will be the same water levels used in for the chronic lowering of groundwater elevations described in **Section 3.3.1.1.** Extensive data gaps are discussed in **Section 3.7.8.7.** The GSA will continue to evaluate new monitoring information and determine these thresholds later. For the interim, MTs for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within one mile of interconnected surface water features will be used. The MTs are summarized in **Table 3-11**.

Table 3-11. Initial Minimum Thresholds and Interim Milestones for Interconnected Surface Water Depletions

WELL NAME	SWN	INTERIM MILESTONE 5 YEARS (FT NAVD88)	INTERIM MILESTONE 10 YEARS (FT NAVD88)	INTERIM MILESTONE 15 YEARS (FT NAVD88)	MEASURABLE OBJECTIVE (FT NAVD88)	MINIMUM THRESHOLD (FT NAVD88)
RB-1U	27N04W05G002M	433.9	433.4	432.9	432.4	302.5
RB-2U	27N04W36G001M	245.8	244.4	243.0	241.5	207.4
RB-3U	26N04W25J001M	262.0	260.4	258.7	257.1	223.5
RB-4U	25N03W11B001M	213.9	210.2	206.6	203.0	152.1
RB-5U	25N03W19N001M	238.1	233.5	228.9	224.2	177.5
RB-6U	25N05W24D001M	408.5	406.1	403.7	401.3	355.6
RB-7U	N/A	347.6	341.5	335.3	329.1	276.0

WELL NAME	SWN	INTERIM MILESTONE 5 YEARS (FT NAVD88)	INTERIM MILESTONE 10 YEARS (FT NAVD88)	INTERIM MILESTONE 15 YEARS (FT NAVD88)	MEASURABLE OBJECTIVE (FT NAVD88)	MINIMUM THRESHOLD (FT NAVD88)
TSS-1	TBD	TBD	TBD	TBD	TBD	TBD
TSS-2	TBD	TBD	TBD	TBD	TBD	TBD
TSS-3	TBD	TBD	TBD	TBD	TBD	TBD

3.3.5.2 Quantitative Measurement

No MTs have been established for this indicator due to data gaps. For the interim, MTs for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within one mile of interconnected surface water features will be used.

3.3.5.3 Existing Local, State, or Federal Standards

No current local, other state, or federal standards currently exist for this indicator.

3.3.5.4 Avoidance of Undesirable Results

Undesirable results have not been established for this indicator due to data gaps. For the interim, MTs for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within one mile of interconnected surface water features will be used.

3.3.5.5 Effects of the Beneficial Uses and Users of Groundwater

No MTs have been established for this indicator due to data gaps. For the interim, MTs for the chronic lowering of groundwater elevations will be used as a proxy for interconnected surface waters. Wells within one mile of interconnected surface water features will be used.

3.3.6 Relationship Between the Established Minimum Threshold and Sustainability Indicator(s)

The monitoring sites described in **Tables 3- 2** through **Table 3-9** are in locations that reflect a wide cross section of Subbasin groundwater conditions. These locations are representative of the overall Subbasin conditions because they are spatially distributed throughout the Subbasin both vertically (across the upper and lower aquifers) and laterally. The GSA determined that use of the minimum elevation thresholds at each of the listed wells will help avoid the undesirable results of chronic lowering of groundwater elevations because it should preserve access to adequate water resources for beneficial users within the Subbasin.

Groundwater elevation MTs can influence other sustainability indicators. The groundwater elevation MTs were selected to avoid undesirable results for other sustainability indicators.

1. Change in groundwater storage. A significant and unreasonable condition for change in groundwater storage is a decrease in the total volume of groundwater that can be withdrawn without causing undesirable results. The sustainable yield of the Subbasin can be affected by excess pumping leading to the chronic lowering of groundwater elevations. Minimum thresholds have been set at levels to avoid a decline in sustainable yield. This Subbasin has not yet been fully

developed and MTs reflect this lack of development. However, the MTs also account for the maintenance of groundwater storage.

2. Degraded water quality. Preserving groundwater quality is important to the groundwater resource. A significant and unreasonable condition of degraded water quality is exceeding regulatory limits for constituents of concern in groundwater due to actions proposed in the GSP. Water quality could be affected by low groundwater elevations if they caused deeper, poor-quality groundwater (saline groundwater located below the base of freshwater) to flow upward into existing wells.
3. Subsidence. A significant and unreasonable condition for subsidence is any measurable permanent subsidence that results in severe impacts to the operations of existing infrastructure to a degree that would require design and construction projects to mitigate the impact. Subsidence is caused by dewatering and compaction of clay-rich sediments in response to lowering groundwater levels. Continued exceedances of water level MTs could result in subsidence over time. Minimum thresholds have been established based on historical data and GSA consideration of unreasonable and significant results and are not expected to lead to increased levels of subsidence.
4. Depletion of interconnected surface waters. Due to data gaps, MTs for interconnected surface waters have been established at groundwater level monitoring wells within one mile of these sites. Chronic lowering of groundwater can sever the connection between groundwater and surface water. Water level declines can also result in the depletion of these surface waters. Interim MTs have been established at groundwater level monitoring sites in the vicinity of interconnected surface waters. Once data gaps are filled, MTs will be established at new monitoring sites to prevent undesirable results.

3.3.7 Minimum Thresholds Impacts to Adjacent Basins

The MTs established at the Red Bluff Subbasin are not expected to impact the surrounding subbasins. The GSPs for three (3) of the surrounding subbasins in the (Antelope, Bowman and Los Molinos) are being developed simultaneously by the same GSA. These subbasins were accounted for when establishing MTs. Furthermore, the GSA also compared MTs set for Red Bluff with those set for the Vina and Corning subbasins and were found to be similar to those set by these two subbasins. Due to this coordination with other subbasins and the interconnectedness of the GSPs, MTs in Red bluff are not likely to have adverse impacts on adjacent subbasins. Instead, the co-development of the GSPs will result in cooperative sustainability goals.

3.3.8 Minimum Thresholds Impacts on Beneficial Users

The MTs established for the sustainability indicators that are present in the Subbasin may have several effects on beneficial users and land use in the Subbasin. The Red Bluff Subbasin has not been fully developed and its extraction potential has yet to be realized. Therefore, although in some cases MTs may be set at water levels not previously experienced in the Subbasin, they are not anticipated to cause adverse impacts to most sectors.

Historical water level trends, future water level projections, and domestic well water levels were all considered when establishing MTs. No more than 20% of Upper aquifer wells are expected to go dry under MTs conditions set for the Upper aquifer This impact does not apply to the MTs set for the lower aquifer. If MTs are met for two (2) consecutive spring readings, PMAs will be triggered to raise water levels.

3.4 Undesirable Results *(Reg. § 354.26)*

According to GSP Regulations, the GSP's description of undesirable results is to include the following:

1. The cause of groundwater conditions occurring throughout the basin that would lead to or has led to the undesirable results based on information described in the basin setting, and other data or models as appropriate.
2. The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of MTs exceedances that cause significant and unreasonable effects in the basin.
3. Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.

Under SGMA, undesirable results occur when the effects caused by groundwater conditions occurring throughout the basin cause significant and unreasonable impacts from any of the six (6) sustainability indicators on beneficial users of groundwater. That is "significant and unreasonable occurrence of any of the six (6) sustainability indicators constitutes an undesirable result". These sustainability indicators are:

1. Chronic lowering of groundwater elevations,
2. Reduction of groundwater storage,
3. Seawater intrusion,
4. Degraded water quality,
5. Land subsidence, and
6. Depletion of interconnected surface water

A summary of criteria used to define undesirable results is provided below in **Table 3-12**, and detailed discussion of each sustainability indicator is provided in subsequent sections of this chapter.

Table 3-12. Summary of Minimum Thresholds, Measurable Objectives, and Undesirable Results

SUSTAINABILITY INDICATOR	MINIMUM THRESHOLD	MEASURABLE OBJECTIVE	UNDESIRABLE RESULT
Chronic Lowering of Groundwater Elevations	**Upper Aquifer:** Spring groundwater elevation where less than 10% or less than 20% of domestic wells could potentially be impacted. **Lower Aquifer:** Spring groundwater elevation minus 20 to 120 feet	**Upper & Lower Aquifer:** Spring 2015 groundwater elevation minus 5 feet (for wells with increasing or no groundwater trends) or projected Spring 2042 groundwater elevation minus 5 feet for wells with declining groundwater elevations	25% of groundwater elevations measured at same RMS wells exceed the associated MTs for 2 consecutive measurements.
Reduction of Groundwater Storage	**Upper & Lower Aquifer:** Amount of groundwater in storage when groundwater elevations are at their MTs	**Upper & Lower Aquifer:** Amount of groundwater storage when groundwater elevations are at their measurable objective	Same as chronic lowering of groundwater levels
Land Subsidence	Two feet over 20 years (i.e., no more than 0.5 feet of cumulative subsidence over a five-year period (beyond the measurement error), solely due to lowering of groundwater elevations	One foot over 20 years (Zero inelastic subsidence, in addition to any measurement error). If InSAR data are used, the measurement error is 0.1 feet and any measurement 0.1 feet or less would not be considered inelastic subsidence	50% of RMS exceed the MTs over a 5-year period that is irreversible and is caused by lowering of groundwater elevations
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	**Upper & Lower Aquifer:** TDS concentration of 750 mg/L at all RMS wells	**Upper & Lower Aquifer:** California lower limit secondary MCL concentration for TDS of 500 mg/L measured at RMS wells	At least 25% of RMS exceed the MTs for water quality for 2 consecutive years at each well where it can be established that GSP implementation is the cause of the exceedance
Depletion of Interconnected Surface Water	Same as chronic lowering of groundwater levels (Initial)	Same as chronic lowering of groundwater levels (Initial)	25% of groundwater elevations measured at RMS wells drop below the associated threshold during 2 consecutive years in the Upper Aquifer.

3.4.1.1 Groundwater Elevation

Significant and unreasonable levels of the chronic lowering of groundwater elevations is defined as a fraction of the groundwater elevations measured in the GSP monitoring well network that are less than the MTs values. For the Red Bluff Subbasin, this fraction is estimated as 25% of groundwater elevations measured at same RMS wells exceed the associated MTs for 2 consecutive measurements.

3.4.1.2 Groundwater Storage

Undesirable results for the levels of groundwater storage would occur when 25% of groundwater elevations measured at same RMS wells exceed the associated MTs for two (2) consecutive measurements. For the Red Bluff Subbasin, this exceedance will result significant and undesirable levels of groundwater level declines that could impact the use of existing wells and beneficial users of groundwater. The significant and unreasonable decline in storage would result in limiting the volume of groundwater available for agriculture, municipal, industrial, and domestic uses without any PMAs to mitigate the impact by new and deeper wells.

3.4.1.3 Subsidence

For the Red Bluff Subbasin, historical data indicates minimal levels of subsidence has occurred and this trend has not changed when analyzing current conditions. Therefore, undesirable results are considered to occur at a 50% of RMS exceed the MTs over a five (5)-year period that is irreversible and is caused by lowering of groundwater elevations.

3.4.1.4 Groundwater Quality

Water quality degradation will lead to an undesirable result when at least 25% of RMS wells exceed the MTs for water quality for two (2) consecutive years at each well where it can be established that GSP implementation is the cause of the exceedance. This result will be considered unreasonable and significant if it causes reduction in the long-term viability of domestic, agriculture, municipal wells, or environmental uses over the planning and implementation of the GSP.

3.4.1.5 Interconnected Surface Waters

Initial undesirable results for depletion of interconnected surface water were developed for this GSP due to data gaps. These interim undesirable results mirror those established for chronic lowering of groundwater elevations. Therefore, undesirable results will occur when 25% of groundwater elevations measured at RMS wells drop below the associated threshold during two (2) consecutive years in the Upper Aquifer.

3.4.2 Potential Effects on the Beneficial Users of Groundwater

For agricultural beneficial users of groundwater, the most significant undesirable results are groundwater levels, groundwater storage, groundwater quality, and subsidence. The undesirable results for interconnected surface waters will not have a direct impact on agriculture. Undesirable results for any of the sustainability indicators of concern will limit the ability of agricultural users to extract groundwater and irrigate crops.

For domestic beneficial users of groundwater, the most significant undesirable results are groundwater levels, groundwater storage, and groundwater quality. Undesirables results for any of these three (3) sustainability indicators could potentially restrict the ability of households to use water for domestic purposes. Subsidence and interconnected surface waters will not have direct impact on domestic users.

For environmental beneficial uses of groundwater in the Subbasin, the most significant undesirable results are subsidence and the depletion of interconnected surface water. Significant subsidence can damage flood control infrastructure which can cause damage to the surrounding environment through landslides and soil loss. The depletion of interconnected surface waters could damage groundwater dependent ecosystems and other vegetation and native species reliant on these surface water sources.

3.5 Management Areas

Management areas have not been established in the Subbasin.

3.6 Monitoring Network

This section describes the proposed monitoring network, including GSA monitoring objectives monitoring protocols, and data reporting requirements. This section has been prepared in accordance with GSP Regulations. The monitoring network has been developed to collect enough data to characterize groundwater and related surface water conditions in the Subbasin and evaluate changing conditions and GSP implementation. The monitoring network has been designed to collect data to allow for the analysis of short- and long-term trends, seasonal variations and estimate annual changes in aquifer storage. The monitoring sites have been distributed across the Subbasin to provide a comprehensive analysis of current and ongoing conditions within the plan area. This widespread distribution coupled with the monitoring frequency will allow the GSA to chart its progress towards the established sustainability goals and ensure real time tracking of any impacts on beneficial users. Specifically, the monitoring program will allow the GSA to quantify changes in groundwater storage, elevations, and quality and assess the efficacy of any implemented management programs. This data will facilitate changes to management programs to maintain continued progress towards the GSA's sustainability objectives.

The GSP regulations require monitoring networks to be developed to promote the collection of a data set of enough quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the Subbasin and to evaluate changing conditions that occur through implementation of the GSP. The monitoring network should accomplish the following:

- Demonstrate progress towards achieving MOs described in the GSP;
- Monitor impacts to the beneficial uses and users of groundwater;
- Monitor changes in groundwater conditions relative to MOs and MTs; and
- Quantify annual changes in water budget components

The MTs and MOs for the network are described above.

GSP regulations require that if management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the Subbasin setting sustainable management criteria specific to that area. At this time, management areas have not been defined for the Subbasin. If management areas are developed in the future, the monitoring network will be reevaluated to ensure that there is sufficient monitoring to evaluate conditions.

3.6.1 Description of Monitoring Network (*Reg. § 354.34*)

The GSP monitoring network is composed of aquifer specific wells that are screened in the Upper or Lower Aquifers. The network will not include composite wells that span both the Upper and Lower aquifers. The network will enable the collection of data to assess sustainability indicators, the effectiveness of PMAs to achieve sustainability and evaluate the MOs of each applicable sustainability indicator (i.e., chronic lowering of groundwater elevations, reduction in groundwater storage, degraded water quality, land subsidence, interconnected surface water depletion). The Subbasin is isolated from the Pacific Ocean; therefore, this GSP does not provide monitoring for seawater intrusion sustainability indicators.

Within the Red Bluff Subbasin, 270 monitoring wells were found to have water level data. However, for the purposes of the GSP monitoring program, a subset of these wells was identified that represent geographical variation along with a historical data record if possible. This effort resulted in the selection of seven (7) wells in the Upper Aquifer and one (1) well in the Lower Aquifer as documented in **Table 3-13** (the selection process is described further below) in addition to the three (3) new TSS wells. The GSA has complete well construction information for these wells, which allows the GSA to determine the aquifer being monitored with certainty. Furthermore, composite wells that span both the upper and lower aquifers were not selected for this GSP monitoring program to provide aquifer specific data. The same representative monitoring wells were selected as part of the groundwater quality monitoring network **(Table 3-13).** As previously described in this Chapter, subsidence monitoring will be conducted using InSAR satellite data. Nine (9) pixels from the satellite data have been selected for subsidence monitoring. Currently, the groundwater level monitoring network is serving as a proxy for interconnected surface waters, using wells within the upper aquifer. This proxy network was established due to extensive data gaps in the availability of monitoring sites. This data gap is discussed further in Section 3.7.8.7.

These wells are distributed throughout the Red Bluff Subbasin to provide ample coverage of the entire area. This coverage allows for the collection of data to evaluate groundwater gradients and flow directions over time and the annual change in storage. Furthermore, the monitoring frequency of the wells will allow for the monitoring of seasonal highs and lows. Because wells were chosen with the existing length of historical data record in mind, future groundwater data will be able to be compared to historical data.

Table 3-13. Proposed Monitoring Network

WELL NAME	LATITUDE	LONGITUDE	AQUIFER	GROUNDWATER ELEVATION	GROUNDWATER STORAGE	GROUNDWATER QUALITY	SUBSIDENCE	INTER-CONNECTED SW
RB-1U SWN: 27N04W05G002M	40.2273	-122.3376	Upper	X	X	X		X
RB-2U SWN: 27N04W36G001M	40.150704	-122.262514	Upper	X	X	X		X
RB-3U SWN: 26N04W25J001M	40.077036	-122.258963	Upper	X	X	X		X
RB-4U SWN: 25N03W11B001M	40.042815	-122.166514	Upper	X	X	X		X
RB-5U SWN: 25N03W19N001M	40.0013	-122.254	Upper	X	X	X		X
RB-6U SWN: 25N05W24D001M	40.0147	-122.3785	Upper	X	X	X		X
RB-7U	39.951929	-122.362222	Upper	X	X	X		X
TSS-1	TBD	TBD	Upper	X	X	X		X
TSS-2	TBD	TBD	Upper	X	X	X		X
TSS-3	TBD	TBD	Upper	X	X	X		X
RB-8L SWN: 25N03W11B002M	40.042815	-122.166514	Lower	X	X			
TSS-1	TBD	TBD	Lower	X	X			
TSS-2	TBD	TBD	Lower	X	X			

WELL NAME	LATITUDE	LONGITUDE	AQUIFER	GROUNDWATER ELEVATION	GROUNDWATER STORAGE	GROUNDWATER QUALITY	SUBSIDENCE	INTER-CONNECTED SW
TSS-3	TBD	TBD	Lower	X	X			
DV3OYJD	40.2274	-122.3371	Upper				X	
DTP3463	40.1509	-122.2623	Upper				X	
DSC9KKE	40.0771	-122.2589	Upper				X	
DRPN3N0	40.0429	-122.1705	Lower				X	
DQY95R7	40.0015	-122.2532	Upper				X	
DR76NQR	40.0150	-122.3802	Upper				X	
DQ1IBER	39.9520	-122.3620	Lower				X	
DR8YYJU	40.017737	-122.3903	Lower				X	
DUZIXC8	40.2210	-122.2838	Lower				X	

3.6.2 Groundwater Elevation Monitoring Network

The MTs and MOs for the chronic lowering of groundwater elevations sustainability indicator are evaluated by monitoring groundwater levels. The SGMA GSP Regulations require a network of monitoring wells to demonstrate groundwater occurrence, flow direction and hydraulic gradients between principal aquifer and surface water features.

The objectives of the groundwater level monitoring program include the following:

- Improve the understanding of the occurrence and movement of groundwater; monitor local and regional groundwater levels including seasonal and long-term trends; and identify vertical hydraulic head differences in the aquifer system and aquifer-specific groundwater conditions, especially in areas where short-term and long-term development of groundwater resources are planned;
- Detect the occurrence of, and factors attributable to, natural recharge (e.g., direct infiltration of precipitation), irrigation, and surface water seepage to groundwater or recharge project and management actions (recharge basins, aquifer storage and recovery) that affect groundwater levels and trends;
- Identify appropriate monitoring sites to further evaluate groundwater-surface water interaction, and recharge/discharge mechanisms, including whether groundwater utilization is affecting surface water flows;
- Establish a monitoring network to aid in the assessment of changes in groundwater storage; and
- Generate data to better estimate groundwater basin conditions and assess local current and future water supply availability and reliability; update analyses as additional data become available.

Figures 3-2 and **3-3** illustrate the locations of the wells selected for monitoring of groundwater levels in the upper and lower aquifers, respectively. **Tables 3-14** and **3-15** list the well identification, location, monitoring frequency, well construction data (which includes well depth, perforation intervals, and ground surface elevation (GSE)), and measurement years, and number of measurements for the Upper and Lower Aquifer, respectively.

In order to assist local agencies with the preparation of their GSP's, DWR released a series of best management practices (BMPs). The BMPs document for monitoring networks provides guidance on determining an appropriate number of monitoring wells. The method developed by Hopkins (1984) was applied to the Red Bluff Subbasin. This methodology states that for districts pumping more than 10,000 ac-ft/yr per 100 square miles, they should have one (1) monitoring wells for every 25 square miles. The Red Bluff Subbasin is approximately 425 square miles, yielding two (2) monitoring wells at the minimum per aquifer. Additional wells were added based on informational needs resulting from PMAs and historical trends in groundwater levels.

After computing the appropriate number of monitoring wells for the Subbasin based on the Hopkins method, a hexagonal tessellation was generated in ArcPro for the Red Bluff and three (3) adjacent subbasins (Bowman, Los Molinos, and Antelope) **(Figure 3-1)**. Portions of 22 different hexagons overlapped with the Red Bluff Subbasin.

All available wells with complete construction data and aquifer assignment were then mapped onto this grid. Water level data from each well was evaluated on the following criteria:

- evidence of recent monitoring
- length of historical record
- overlap with model timeframe

The wells were then plotted against the hexagons and each hexagon was examined separately for both the upper and lower aquifers. Wells were selected based on the evaluation criteria listed above. When possible, preference was given to wells that not only met the criteria but were also apart of either the California State Groundwater Elevation Monitoring (CASGEM) or Tehama County Monitoring Network. The final selection of wells for the monitoring network is presented in **Tables 3-14 and 3-15** for the upper and lower aquifers, respectively. The selection rationale for all water level monitoring wells is summarized in **Table 3-16.**

Table 3-14. Groundwater Level Monitoring Well Network – Upper Aquifer

WELL ID	LATITUDE	LONGITUDE	MONITORING FREQUENCY	WELL DEPTH	WELL SCREEN INTERVAL	GROUND SURFACE ELEVATION	FIRST YEAR OF DATA	LAST YEAR OF DATA	YEARS MEASURED	NUMBER OF MEASUREMENTS
RB-1U SWN: 27N04W05G002M	40.2273	-122.3376	Bi-annual (Fall/Spring)	260 (ft, bgs)	231 - 251 (ft, bgs)	482.53	12/7/1983	3/9/2020	38	146
RB-2U SWN: 27N04W36G001M	40.150704	-122.262514	Bi-annual (Fall/Spring)	155 (ft, bgs)	135 - 155 (ft, bgs)	TBD	9/8/1989	3/10/2020	31	192
RB-3U SWN: 26N04W25J001M	40.077036	-122.258963	Bi-annual (Fall/Spring)	128 (ft, bgs)	116 - 124 (ft, bgs)	333.46	1/3/1973	3/9/2020	48	120
RB-4U SWN: 25N03W11B001M	40.042815	-122.166514	Bi-annual (Fall/Spring)	255 (ft, bgs)	150 – 180 (ft, bgs)	252.1	6/23/2004	3/11/2020	17	94
RB-5U SWN: 25N03W19N001M	40.0013	-122.254	Bi-annual (Fall/Spring)	370 (ft, bgs)	135 – 358 (ft, bgs)	327.49	5/12/1965	3/9/2020	56	127
RB-6U SWN: 25N05W24D001M	40.0147	-122.3785	Bi-annual (Fall/Spring)	N/A	N/A	515.6	9/15/1988	10/15/2020	32	45
RB-7U	39.951929	-122.362222	Bi-annual (Fall/Spring)	N/A	N/A	466	6/30/2013	4/4/2021	8	16
TSS-1	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-2	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-3	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A

Table 3-15. Groundwater Level Monitoring Well Network – Lower Aquifer

WELL ID	LATITUDE	LONGITUDE	MONITORING FREQUENCY	WELL DEPTH	WELL SCREEN INTERVAL	GROUND SURFACE ELEVATION	FIRST YEAR OF DATA	LAST YEAR OF DATA	YEARS MEASURED	NUMBER OF MEASUREMENTS
RB-8L SWN: 25N03W11B002M	40.042815	-122.166514	Bi-annual (Fall/Spring)	789 (ft, bgs)	680 – 750 (ft, bgs)	252.03	6/23/2004	3/11/2020	17	95
TSS-1	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-2	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-3	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A

Table 3-16. Summary of Rationale for Selection for Wells Using Groundwater Levels

SITE	AQUIFER	BASIS FOR SELECTION
RB-1U SWN: 27N04W05G002M	Upper	Period of record, CASGEM and TC Well
RB-2U SWN: 27N04W36G001M	Upper	Period of record, CASGEM and TC Well
RB-3U SWN: 26N04W25J001M	Upper	Period of record, CASGEM and TC Well
RB-4U SWN: 25N03W11B001M	Upper	Period of record, CASGEM and TC Well
RB-5U SWN: 25N03W19N001M	Upper	Period of record, CASGEM and TC Well
RB-6U SWN: 25N05W24D001M	Upper	Period of record, CASGEM and TC Well
RB-7U	Upper	Period of record, CASGEM and TC Well
TSS-1	Upper	Location, New Well
TSS-2	Upper	Location, New Well
TSS-3	Upper	Location, New Well
RB-8L SWN: 25N03W11B002M	Lower	Period of record, CASGEM and TC Well
TSS-1	Lower	Location, New Well
TSS-1	Lower	Location, New Well
TSS-1	Lower	Location, New Well

3.6.3 Groundwater Storage Monitoring Network

The objectives of the monitoring program are:

- Use groundwater level data and knowledge of aquifer storage coefficients to calculate changes in groundwater storage.
- Improve the understanding of the occurrence and movement of groundwater.
- Monitor local and regional groundwater levels including seasonal and long-term trends.
- Monitor groundwater levels where projects and s are planned.

Changes in groundwater storage cannot be measured directly, therefore this GSP adopts groundwater levels as a proxy for assessing change in storage, as described previously in Chapter 3. Change in storage will be estimated using the changes of groundwater levels measured at monitoring wells and storage coefficients of aquifer materials. The wells selected for monitoring changes in groundwater storage will be the same wells used for groundwater level monitoring. **Figures 3-2** and **3-3** illustrate the locations of the wells selected for monitoring of groundwater levels for the Upper and Lower Aquifers, respectively. **Tables 3-17** and **3-18** list the well identification, location, monitoring frequency, well construction data, and measurement years, and number of measurements for the Upper and Lower Aquifer, respectively. The same wells for water level monitoring are proposed for groundwater storage monitoring and the selection process and rationale for selection is consistent with section 3.11.1.1 (**Table 3-19**).

Table 3-17. Groundwater Storage Monitoring Network – Upper Aquifer

WELL ID	LATITUDE	LONGITUDE	MONITORING FREQUENCY	WELL DEPTH	WELL SCREEN INTERVAL	GROUND SURFACE ELEVATION	FIRST YEAR OF DATA	LAST YEAR OF DATA	YEARS MEASURED	NUMBER OF MEASUREMENTS
RB-1U SWN: 27N04W05G002M	40.2273	-122.3376	Bi-annual (Fall/Spring)	260 (ft, bgs)	231 - 251 (ft, bgs)	482.53	12/7/1983	3/9/2020	38	146
RB-2U SWN: 27N04W36G001M	40.150704	-122.262514	Bi-annual (Fall/Spring)	155 (ft, bgs)	135 - 155 (ft, bgs)	TBD	9/8/1989	3/10/2020	31	192
RB-3U SWN: 26N04W25J001M	40.077036	-122.258963	Bi-annual (Fall/Spring)	128 (ft, bgs)	116 - 124 (ft, bgs)	333.46	1/3/1973	3/9/2020	48	120
RB-4U SWN: 25N03W11B001M	40.042815	-122.166514	Bi-annual (Fall/Spring)	255 (ft, bgs)	150 – 180 (ft, bgs)	252.1	6/23/2004	3/11/2020	17	94
RB-5U SWN: 25N03W19N001M	40.0013	-122.254	Bi-annual (Fall/Spring)	370 (ft, bgs)	135 – 358 (ft, bgs)	327.49	5/12/1965	3/9/2020	56	127
RB-6U SWN: 25N05W24D001M	40.0147	-122.3785	Bi-annual (Fall/Spring)	N/A	N/A	515.6	9/15/1988	10/15/2020	32	45
RB-7U	39.951929	-122.362222	Bi-annual (Fall/Spring)	N/A	N/A	466	6/30/2013	4/4/2021	8	16
TSS-1	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-2	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-3	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A

Table 3-18. Groundwater Storage Monitoring Network – Lower Aquifer

WELL ID	LATITUDE	LONGITUDE	MONITORING FREQUENCY	WELL DEPTH	WELL SCREEN INTERVAL	GROUND SURFACE ELEVATION	FIRST YEAR OF DATA	LAST YEAR OF DATA	YEARS MEASURED	NUMBER OF MEASUREMENTS
RB-8L SWN: 25N03W11B002M	40.042815	-122.166514	Bi-annual (Fall/Spring)	789 (ft, bgs)	680 – 750 (ft, bgs)	252.03	6/23/2004	3/11/2020	17	95
TSS-1	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-2	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-3	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A

Table 3-19. Summary of Rationale for Selection for Wells Used for Storage

SITE	AQUIFER	BASIS FOR SELECTION
RB-1U **SWN: 27N04W05G002M**	Upper	Period of record, CASGEM and TC Well
RB-2U **SWN: 27N04W36G001M**	Upper	Period of record, CASGEM and TC Well
RB-3U **SWN: 26N04W25J001M**	Upper	Period of record, CASGEM and TC Well
RB-4U **SWN: 25N03W11B001M**	Upper	Period of record, CASGEM and TC Well
RB-5U **SWN: 25N03W19N001M**	Upper	Period of record, CASGEM and TC Well
RB-6U **SWN: 25N05W24D001M**	Upper	Period of record, CASGEM and TC Well
RB-7U	Upper	Period of record, CASGEM and TC Well
TSS-1	Upper	Location, New Well
TSS-2	Upper	Location, New Well
TSS-3	Upper	Location, New Well
RB-8L **SWN: 25N03W11B002M**	Lower	Period of record, CASGEM and TC Well
TSS-1	Lower	Location, New Well
TSS-2	Lower	Location, New Well
TSS-3	Lower	Location, New Well

3.6.4 Subsidence Monitoring Network

Data from different monitoring programs for subsidence is available for the Red Bluff Subbasin. These programs include four (4) PBO stations within the vicinity of the Subbasin, 2017 GPS Survey Data from DWR, and InSAR satellite vertical displacement data. None of the PBO stations exist inside the Subbasin so these sites were not selected for the monitoring program. The data collected by DWR showed minor levels of subsidence, but these readings fell within their margin of error of 0.17 ft. These stations were also not included in the final monitoring program. Lastly, InSAR data spanned the entirety of the Subbasin, and data pixels were available at or near each groundwater level monitoring well. This data has a relatively small error margin (18 mm or 0.06 ft) and is available to download on a monthly or annual basis with continuous measurements.

Therefore, the sustainability indicator for land subsidence is evaluated by monitoring land surface elevation at select InSAR data pixels near groundwater level monitoring wells. Specifically, nine (9) pixels are monitored for vertical displacement. Selecting pixels near the groundwater monitoring wells will allow the GSA to study the impact of falling and rising water levels on subsidence in the same location and develop a relationship between water levels and subsidence over time. The pixels and rationale for selection are presented in **Table 3-20 and Table 3-21.**

Table 3-20. Land Subsidence Monitoring Network

SITE ID	SITE TYPE	MEASUREMENT TYPE	YEARS OF RECORD
DV3OYJD	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DTP3463	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DSC9KKE	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DRPN3N0	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DQY95R7	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DR76NQR	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DQ1IBER	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DR8YYJU	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019
DUZIXC8	InSAR pixel	Vertical Ground Surface Displacement	2015 - 2019

Table 3-21. Summary of Rationale for Selection of Subsidence Monitoring Sites

SITE	SITE TYPE	BASIS FOR SELECTION
DV3OYJD	InSAR pixel	Proximity to GWL well
DTP3463	InSAR pixel	Proximity to GWL well
DSC9KKE	InSAR pixel	Proximity to GWL well
DRPN3N0	InSAR pixel	Proximity to GWL well
DQY95R7	InSAR pixel	Proximity to GWL well
DR76NQR	InSAR pixel	Proximity to GWL well
DQ1IBER	InSAR pixel	Proximity to GWL well
DR8YYJU	InSAR pixel	Proximity to GWL well
DUZIXC8	InSAR pixel	Proximity to GWL well

3.6.5 Groundwater Quality Monitoring Network

The sustainability indicator for degraded water quality is evaluated by monitoring groundwater quality at a network of existing monitoring wells.

The objectives of the groundwater quality monitoring program for the Subbasin include the following:

- Evaluate groundwater quality conditions in the various areas of the basin, and identify differences in water quality spatially between areas in the aquifer system;
- Detect the occurrence of and factors attributable to natural (e.g., general minerals and trace metals) constituents of concern as represented by total dissolved solids (TDS);
- Assess the changes and trends in groundwater quality (seasonal, short- and long-term trends); and
- Identify the natural and human factors that affect changes in water quality

Figures 3-5 illustrates the locations of the wells selected for monitoring of groundwater quality.

Table 3-22. Groundwater Quality Monitoring Network

WELL ID	LATITUDE	LONGITUDE	MONITORING FREQUENCY	WELL DEPTH	WELL SCREEN INTERVAL	GROUND SURFACE ELEVATION	FIRST YEAR OF DATA	LAST YEAR OF DATA	YEARS MEASURED	NUMBER OF MEASUREMENTS
RB-1U SWN: 27N04W05G002M	40.2273	-122.3376	Bi-annual (Fall/Spring)	260 (ft, bgs)	231 - 251 (ft, bgs)	482.53	6/27/1985	8/27/2021	2	2
RB-2U SWN: 27N04W36G001M	40.150704	-122.262514	Bi-annual (Fall/Spring)	155 (ft, bgs)	135 - 155 (ft, bgs)	TBD	8/19/2021	8/19/2021	1	1
RB-3U SWN: 26N04W25J001M	40.077036	-122.258963	Bi-annual (Fall/Spring)	128 (ft, bgs)	116 - 124 (ft, bgs)	333.46	N/A	N/A	N/A	N/A
RB-4U SWN: 25N03W11B001M	40.042815	-122.166514	Bi-annual (Fall/Spring)	255 (ft, bgs)	150 – 180 (ft, bgs)	252.1	6/29/2005	8/27/2021	4	6
RB-5U SWN: 25N03W19N001M	40.0013	-122.254	Bi-annual (Fall/Spring)	370 (ft, bgs)	135 – 358 (ft, bgs)	327.49	N/A	N/A	N/A	N/A
RB-6U SWN: 25N05W24D001M	40.0147	-122.3785	Bi-annual (Fall/Spring)	N/A	N/A	515.6	8/19/2021	8/19/2021	1	1
RB-7U	39.951929	-122.362222	Bi-annual (Fall/Spring)	N/A	N/A	466	8/19/2021	8/19/2021	1	1
TSS-1	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-2	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-3	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A

Table 3-22 lists the well identification, location, monitoring frequency, well construction data, and measurement years, and number of measurements for the monitoring wells.

Similar to the approach for groundwater level monitoring above, monitoring wells were distributed across the Subbasin using the Hopkins method to provide thorough coverage. Although spatial and temporal data gaps exist in groundwater quality data, this network will allow for a comprehensive mapping of TDS trends. Continuous monitoring at the sites selected will establish a temporal record moving forward and assist in evaluating PMAs implemented moving forward. The distribution of wells across the Subbasin will not only help delineate spatial differences in TDS concentration but will also highlight areas in need of project and management actions in the future. Subsequent updating of the groundwater quality constituents will be developed in future GSP updates based on annual evaluation of TDS concentrations. The groundwater quality monitoring wells were ultimately chosen to be the same wells as the groundwater level monitoring wells. This approach will allow for ease of sampling and allow for future comparisons of changing water levels with water quality.

The selection rationale for groundwater quality monitoring wells is summarized in **Table 3-23.** Each site will comply with the data and reporting standards that are described in **Section 3.5.2.**

Table 3-23. Summary of Rationale for Selection for Wells Used Groundwater Quality

SITE	AQUIFER	BASIS FOR SELECTION
RB-1U SWN: 27N04W05G002M	Upper	CASGEM and Tehama County Well
RB-2U SWN: 27N04W36G001M	Upper	CASGEM and Tehama County Well
RB-3U SWN: 26N04W25J001M	Upper	CASGEM and Tehama County Well
RB-4U SWN: 25N03W11B001M	Upper	CASGEM and Tehama County Well
RB-5U SWN: 25N03W19N001M	Upper	CASGEM and Tehama County Well
RB-6U SWN: 25N05W24D001M	Upper	CASGEM and Tehama County Well
RB-7U	Upper	CASGEM and Tehama County Well
TSS-1	Upper	Location, New Well
TSS-2	Upper	Location, New Well
TSS-3	Upper	Location, New Well

3.6.6 Interconnected Surface Water Monitoring Network

Groundwater level monitoring wells within 1 mile of water bodies will be used as a proxy for monitoring. These wells are summarized in **Table 3-24** below. The basis for the selection of these wells in the interim is summarized in **Table 3-25**. There are extensive data gaps in the availability of monitoring sites. This data gap is discussed further in **Section 3.7.8.7.**

Table 3-24. Interconnected Surface Water Monitoring Network

WELL ID	LATITUDE	LONGITUDE	MONITORING FREQUENCY	WELL DEPTH	WELL SCREEN INTERVAL	GROUND SURFACE ELEVATION	FIRST YEAR OF DATA	LAST YEAR OF DATA	YEARS MEASURED	NUMBER OF MEASUREMENTS
RB-1U SWN: 27N04W05G002M	40.2273	-122.3376	Bi-annual (Fall/Spring)	260 (ft, bgs)	231 - 251 (ft, bgs)	482.53	12/7/1983	3/9/2020	38	146
RB-2U SWN: 27N04W36G001M	40.150704	-122.262514	Bi-annual (Fall/Spring)	155 (ft, bgs)	135 - 155 (ft, bgs)	TBD	9/8/1989	3/10/2020	31	192
RB-3U SWN: 26N04W25J001M	40.077036	-122.258963	Bi-annual (Fall/Spring)	128 (ft, bgs)	116 - 124 (ft, bgs)	333.46	1/3/1973	3/9/2020	48	120
RB-4U SWN: 25N03W11B001M	40.042815	-122.166514	Bi-annual (Fall/Spring)	255 (ft, bgs)	150 – 180 (ft, bgs)	252.1	6/23/2004	3/11/2020	17	94
RB-5U SWN: 25N03W19N001M	40.0013	-122.254	Bi-annual (Fall/Spring)	370 (ft, bgs)	135 – 358 (ft, bgs)	327.49	5/12/1965	3/9/2020	56	127
RB-6U SWN: 25N05W24D001M	40.0147	-122.3785	Bi-annual (Fall/Spring)	N/A	N/A	515.6	9/15/1988	10/15/2020	32	45
RB-7U	39.951929	-122.362222	Bi-annual (Fall/Spring)	N/A	N/A	466	6/30/2013	4/4/2021	8	16
TSS-1	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-2	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A
TSS-3	TBD	TBD	Bi-annual (Fall/Spring)	TBD	TBD	TBD	N/A	N/A	N/A	N/A

Table 3-25. Summary of Rationale for Selection for Wells for Interconnected Surface Waters

Site	Aquifer	Basis for Selection
RB-1U SWN: 27N04W05G002M	Upper	Upper aquifer well
RB-2U SWN: 27N04W36G001M	Upper	Upper aquifer well
RB-3U SWN: 26N04W25J001M	Upper	Upper aquifer well
RB-4U SWN: 25N03W11B001M	Upper	Upper aquifer well
RB-5U SWN: 25N03W19N001M	Upper	Upper aquifer well
RB-6U SWN: 25N05W24D001M	Upper	Upper aquifer well
RB-7U	Upper	Upper aquifer well
TSS-1	Upper	Upper aquifer well
TSS-2	Upper	Upper aquifer well
TSS-3	Upper	Upper aquifer well

3.7 Description of Monitoring Protocols (*Reg. § 354.34)*

3.7.1 Protocols for Monitoring Sites

The monitoring protocols that will be used by the GSA as part of implementing this Groundwater Sustainability Plan are largely based on the *Best Management Practices for the Sustainable Management of Groundwater: Monitoring Protocols, Standards, and Sites* produced by the DWR. The recommended monitoring protocols were adjusted and added to fit the specific monitoring needs of the Subbasin to achieve sustainability. Monitoring protocols for interconnected surface waters are the same as those for groundwater levels due to the proxy network. Also, monitoring protocols for seawater intrusion were not necessary as the Subbasin is not connected to the coast. The monitoring protocols that are described in this document will provide the necessary data to track the MTs and MOs for each of the sustainability indicators. The monitoring protocols established herein will be reviewed every five (5) years as a part of periodic GSP updates. The following protocols will be applied to all monitoring sites:

- Long-term access agreements. Access agreements should include year-round site access to allow for increased monitoring frequency.
- A unique identifier that includes a written description of the site location, date established, access instructions, type(s) of data to be collected, latitude, longitude, and elevation.
- A modification log is to be kept to track all modifications to the monitoring site.

All data collected and acquired should be added to the GSA's data management system or DMS. A description of the DMS is in Appendix 3-A.

3.7.2 Groundwater Level Elevation

3.7.2.1 Protocols for Measuring Groundwater Levels

Protocols for measuring groundwater levels including the following:

- Measure depth to water in the well using procedures appropriate for the measuring device. Equipment must be operated and maintained in accordance with manufacturer's instructions. Groundwater levels should be measured to the nearest 0.01 foot relative to the Reference Point (RP).
- For measuring wells that are under pressure, allow time for the groundwater levels to stabilize. In these cases, multiple measurements should be collected to ensure the well has reached equilibrium such that no significant changes in water level are observed. Every effort should be made to ensure that a representative stable depth to groundwater is recorded. If a well does not stabilize, the quality of the value should be appropriately qualified as a questionable measurement. If a well is artesian, site-specific procedures should be developed to collect accurate information and be protective of safety conditions associated with a pressurized well. In many cases, an extension pipe may be adequate to stabilize head in the well. Record the dimension of the extension and document measurements and configuration.
- The groundwater elevation should be calculated using the following equation.

  GWE= RPE−DTW

  Where:
  GWE = Groundwater Elevation in NAVD88 datum
  RPE = Reference Point Elevation in NAVD88 datum
  DTW = Depth to Water

- The measurements of depth to water should be consistent in units of feet, to an accuracy of tenths of feet or hundredths of feet.
- The well caps or plugs should be secured following depth to water measurement.
- Groundwater level measurements are to be made on a semi-annual basis at a minimum during periods which will capture seasonal highs and lows.

3.7.2.2 Recording Groundwater Level Measurements

- The sampler should record the well identifier, date, time (24-hour format), RPE, height of RP above or below ground surface, DTW, GWE, and comments regarding any factors that may influence the depth to water readings such as weather, nearby irrigation, flooding, or well condition. If there is a questionable measurement or the measurement cannot be obtained, it should be noted. Standardized field forms should be used for all data collection.
- All data should be entered into the GSA data management system (DMS) as soon as possible. Care should be taken to avoid data entry mistakes and the entries should be checked by a second person.

3.7.2.3 Installing Pressure Transducers and Downloading Data

The following procedures will be followed in the installation of a pressure transducer and periodic data downloads:

- The sampler must use an electronic sounder or chalked steel tape and follow the protocols listed above to measure the groundwater level and calculate the groundwater elevation in the monitoring well to properly program and reference the installation. It is recommended that transducers record measured groundwater level to conserve data capacity; groundwater elevations can be calculated later after downloading.
- The sampler must note the well identifier, the associated transducer serial number, transducer range, transducer accuracy, and cable serial number.
- Transducers must be able to record groundwater levels with an accuracy of at least 0.1 foot. Professional judgment will be exercised to ensure that the data being collected is meeting the Data Quality Objectives (DQO) and that the instrument is capable. Consideration of the battery life, data storage capacity, range of groundwater level fluctuations, and natural pressure drift of the transducers should be included in the evaluation.
- The sampler must note whether the pressure transducer uses a vented or non-vented cable for barometric compensation. Vented cables are preferred, but non-vented units provide accurate data if properly corrected for natural barometric pressure changes. This requires the consistent logging of barometric pressures to coincide with measurement intervals.
- Follow manufacturer specifications for installation, calibration, data logging intervals, battery life, correction procedure (if non-vented cables used), and anticipated life expectancy to assure that DQOs are being met for the GSP.
- Secure the cable to the well head with a well dock or another reliable method. Mark the cable at the elevation of the reference point with tape or an indelible marker. This will allow estimates of future cable slippage.

- The transducer data should periodically be checked against hand measured groundwater levels to monitor electronic drift or cable movement. This should happen during routine site visits, at least annually to maintain data integrity.
- The data should be downloaded as necessary to ensure no data is lost and entered into the basin's DMS following the quality assurance/quality control (QA/QC) program established for the GSP. Data collected with non-vented data logger cables should be corrected for atmospheric barometric pressure changes, as appropriate. After the sampler is confident that the transducer data have been safely downloaded and stored, the data should be deleted from the data logger to ensure that adequate data logger memory remains.

3.7.3 Groundwater Storage Measurements

The monitoring protocols for evaluating change in groundwater storage are the same as the protocols described above for groundwater levels.

3.7.4 Groundwater Quality Measurements

Annual monitoring of groundwater quality will include sampling and laboratory analysis of TDS. Additional constituents will be considered in the future as additional information becomes available. During the first sampling event, these wells will also be tested for major anions (carbonate, bicarbonate, chloride, sulfate) and major cations (boron, calcium, sodium, magnesium, potassium). Following the first sampling event, these anions and cations will be tested for every five (5) years. During sampling events, measurement of select water quality parameters will take place in the field. These field parameters should be measured at an annual frequency and include electrical conductivity at 25 °C (EC) in µS/cm, pH, temperature (in °C), and dissolved oxygen (DO) in mg/L. The annual testing is summarized in **Table 3-26**.

The GSP monitoring program will use the following protocols for collecting groundwater quality samples:

- Prior to sampling, the analytical laboratory will be contacted to schedule laboratory time, obtain appropriate sample containers, and clarify any sample holding times or sample preservation requirements.
- Each well used for groundwater quality monitoring will have a unique identifier. This identifier will appear on the well housing or the well casing to verify well identification.
- In the case of wells with dedicated pumps, samples should be collected at or near the wellhead following purging.
- Prior to sampling, the sampling port and sampling equipment will be cleaned of any contaminants. The equipment will be decontaminated between each sampling locations or wells to avoid cross-contamination.
- The groundwater elevation in the well should be measured following appropriate protocols described above in the groundwater level measuring protocols.
- For any well not equipped with low-flow or passive sampling equipment, an adequate volume of water should be purged from the well to ensure that the groundwater sample is representative of ambient groundwater and not stagnant water in the well casing. Purging three (3) well casing volumes is generally considered adequate. Professional judgment should be used to determine the proper configuration of the sampling equipment with respect to well construction such that a representative ambient groundwater sample is collected. If pumping causes a well to be

evacuated (go dry), document the condition and allow well to recover to within 90 percent of original level prior to sampling.

- Field parameters of pH, electrical conductivity and temperature should be collected during purging and prior to the collection of each sample. Field parameters should be evaluated during the purging of the well and should stabilize prior to sampling. Measurements of pH should only be measured in the field; lab pH analysis are typically unachievable due to short hold times. Other parameters, such as Oxidation-Reduction Potential (ORP), Dissolved Oxygen (DO) (in situ measurements preferable), or turbidity, may also be useful for assessing purge conditions. All field instruments will be calibrated daily and evaluated for drift throughout the day.
- Sample containers should be labeled prior to sample collection. The sample label must include sample ID (often well ID), sample date and time, sample personnel, sample location, preservative used, and analytes and analytical method.
- Samples should be collected under laminar flow conditions. This may require reducing pumping rates prior to sample collection.
- All samples requiring preservation must be preserved as soon as practically possible, ideally at the time of sample collection. Ensure that samples are appropriately filtered as recommended for the specific analyte. Entrained solids can be dissolved by preservative leading to inconsistent results of dissolve analytes. Specifically, samples to be analyzed for metals should be field filtered prior to preservation; do not collect an unfiltered sample in a preserved container.
- Samples should be chilled and maintained at 4 °C to prevent degradation of the sample. The laboratory's Quality Assurance Management Plan should detail appropriate chilling and shipping requirements.
- Samples must be shipped under chain of custody documentation to the appropriate laboratory promptly to avoid violating holding time restrictions.
- Groundwater quality samples shall be collected annually.
- All data will be entered into the GSA data management system (DMS) as soon as possible. Data entries should be checked by a second person to avoid incorrect data.

Table 3-26. Summary of Groundwater Quality Monitoring Constituents and Measurement Frequency for Representative Monitoring Sites

SITE	FIELD MEASUREMENTS	LABORATORY MEASUREMENTS (ANNUAL)	LABORATORY MEASUREMENTS (5-YEAR)
All Wells	Specific Conductance pH Dissolved Oxygen ORP Temperature	TDS	Carbonate Bicarbonate Chloride Sulfate Calcium Sodium Magnesium Potassium Nitrate

3.7.5 Subsidence Measurements

Subsidence monitoring for WWD will include the following protocols:

- Download and review subsidence data from the nine (9) pixels designated as monitoring points for subsidence.
- Review groundwater level data collected at monitoring wells near each pixel. Analyze both datasets to determine if any meaningful correlations can be identified.

3.7.6 Interconnected Surface Water Measurements

Groundwater level monitoring wells within the upper aquifer will be used as a proxy for this indicator.

3.7.7 Representative Monitoring (*Reg. § 354.36*)

Representative Monitoring Sites (RMS) are defined in the GSP regulations as a subset of monitoring sites that are representative of conditions in the Subbasin. All the monitoring sites in this section are considered RMS using methods of selection consistent with best management practices described above under the groundwater level protocols. Groundwater elevation monitoring will be used to determine changes in groundwater storage. As previously stated in Chapter 3, reduction in groundwater storage cannot be directly measured. However, groundwater level data will be used in conjunction with aquifer parameters and the groundwater model to compute changes in groundwater storage subbasin wide. In the case of subsidence, no highly susceptible areas exist in the Subbasin. However, nine (9) InSAR pixels will be monitored for vertical displacement and over time, the GSA will examine this data in conjunction with water level data collected to determine whether changes in water levels can be used as an early detection method for compaction, if possible.

3.7.8 Assessment and Improvement of Monitoring Network ((*Reg. § 354.38*)

As described in section 354.38 of the GSP Regulations, each agency is required to analyze the monitoring network for improvements as follows:

- Each GSA shall review the monitoring network and include an evaluation in the Plan and each five (5)-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.
- Each GSA shall identify data gaps wherever the basin does not contain enough monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the GSA.
- If the monitoring network contains data gaps, the Plan shall include a description of the following:
    - The location and reason for data gaps in the monitoring network
    - Local issues and circumstances that limit or prevent monitoring
- Each GSA shall describe steps that will be taken to fill data gaps before the next 5-year assessment, including the location and purpose of newly added or installed monitoring sites

- Each GSA shall adjust the monitoring frequency and distribution of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of PMAs under circumstances that include the following:
    - Minimum threshold exceedances
    - Highly variable spatial or temporal conditions
    - Adverse impacts to beneficial uses and users of groundwater
    - The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin

Monitoring frequency and density of sites for all sustainability indicators are described in previous sections in Chapter 3 of this Plan.

3.7.8.1 Review and Evaluation of the Monitoring Network

The monitoring networks described above for each of the applicable sustainability indicators will be evaluated on a yearly basis. This evaluation will involve a review of the described MTs and MOs and their comparison to observed trends in the networks. Furthermore, a more comprehensive review of the monitoring networks will be conducted every five (5) years as part of the GSP updates. During this review, projects and s will be evaluated, and the monitoring networks will be assessed for their efficacy in tracking progress based on the actions and projects. These evaluations and assessments also will highlight any additional data gaps and recommended changes to the monitoring networks.

3.7.8.2 Identification and Description of Data Gaps

Identification and description of data gaps for the monitoring networks described above for each of the applicable sustainability indicators are described below.

3.7.8.3 Groundwater Elevation

Groundwater elevation data has been extensively collected within the Subbasin over the past several decades therefore no data gaps were identified for this indicator.

3.7.8.4 Groundwater Quality

Data gaps in water quality monitoring exist on a temporal basis but not a spatial basis. During well selection, the limiting criteria was the record of TDS measurements. Historical data related to TDS was not continuously collected for a long period of time at any monitoring wells and no wells had TDS data spanning the base period of the model. The RMS wells were chosen to monitor groundwater quality within the Subbasin. The GSA plans to monitor these wells on a yearly basis and will establish a continuous monitoring record moving forward. This data collection will enable the GSA to identify any additional data gaps or noticeable trends in water quality.

3.7.8.5 Groundwater Storage

Groundwater storage data gaps are described in the groundwater elevation section as water levels are being used as a proxy for groundwater storage.

3.7.8.6 Subsidence

No data gaps are presently evident in the Subbasin for subsidence monitoring; however, the network will be reevaluated on a yearly basis for any emerging data gaps.

3.7.8.7 Interconnected Surface Waters

The interconnected surface water indicator had the most prominent data gaps compared to all other indicators. The two (2) contributors to this data gap were the lack of shallow (< 50 feet) monitoring wells in the vicinity of interconnected surface waters and critical groundwater dependent ecosystem (GDEs) and the lack of stream gages. Additionally, shallow well and stream gage based historical measurements were another form of data gap.

All GDEs within the Red Bluff Subbasin were examined and high priority GDEs were identified based on the change in the normalized difference vegetation index (NDVI). The high priority GDEs were mapped alongside shallow monitoring wells (**Figure 3-7**). However, no suitable monitoring wells for these GDEs could be identified due to the distance of wells from the GDEs (> 1 mile), the depth of the wells (> 50 feet), or the lack of correlation between the water level data to GDE health indicators.

Model results were used to identify interconnected surface waters within the Subbasin. The locations of these surface waters were compared to shallow monitoring wells. However, this analysis did not yield any viable monitoring wells within a one-mile radius of the surface waters (**Figure 3-8**). Furthermore, many surface water features lacked stream gages. Therefore, no meaningful comparisons could be made between surface water feature levels and groundwater levels if shallow monitoring wells were available.

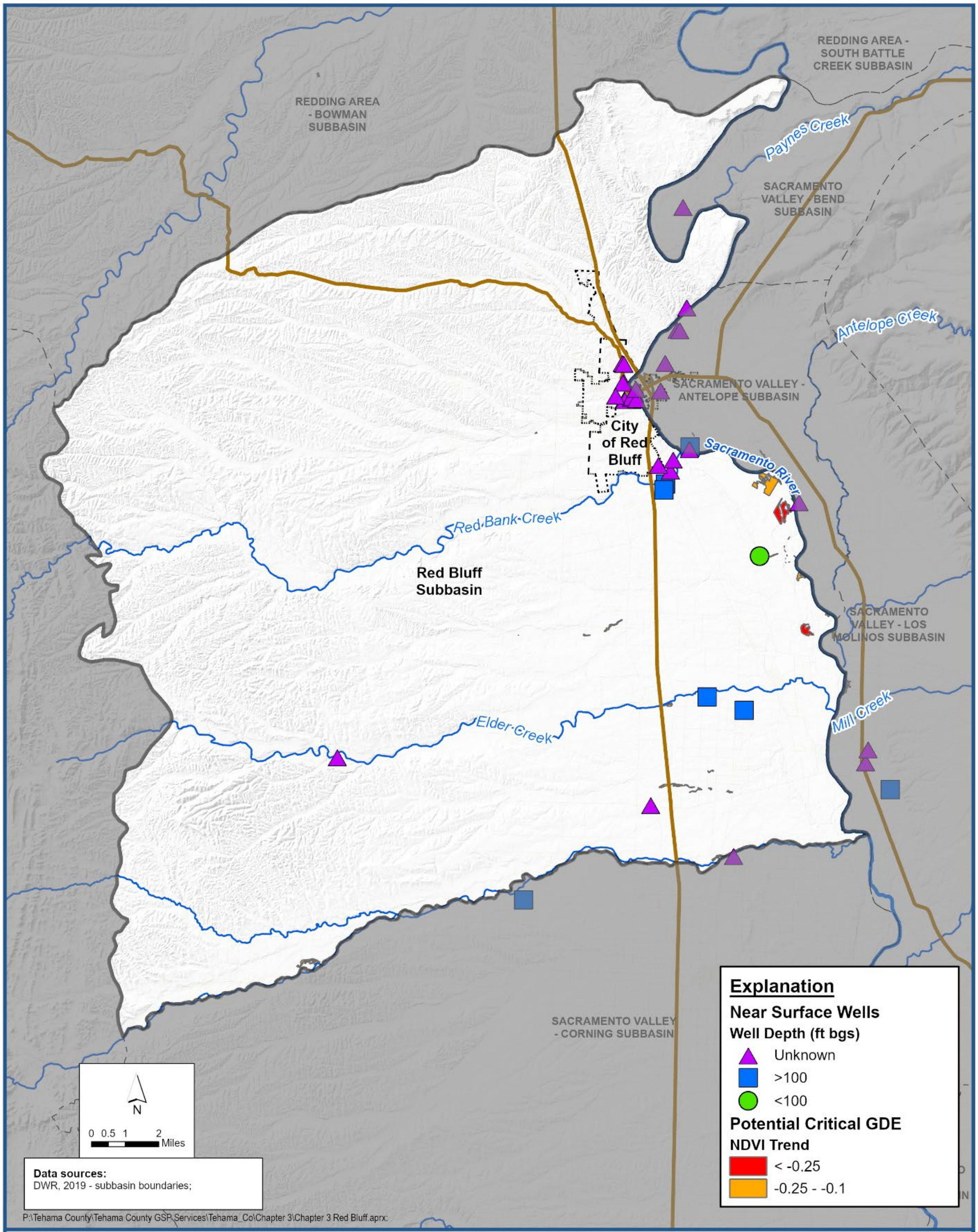
Due to these extensive data gaps, groundwater level monitoring wells within the upper aquifer will be used as a proxy for monitoring.

3.7.8.8 Description of Steps to Remedy Data Gaps

Data gaps have been presented in the groundwater elevation, groundwater quality, and groundwater storage monitoring networks. The GSA will take the following steps, prior to the first five (5)-year GSP update in 2027 to address these data gaps:

- The GSA will install three new aquifer-specific nested monitoring wells within the Subbasin. This new well has been included as part of the groundwater level monitoring program. Being a nested well, this well will provide valuable data from both aquifers from the same location which can be used to directly compare conditions in both aquifers.
- Sampling events will be coordinated with well owners to prevent pumping and access issues.
- Although no monitoring network is currently in place for interconnected surface water, the GSA will look at the data gaps brought forth in the GDE and surface water data assessment and aim to bridge these gaps through the installation of shallow monitoring wells and stream gages near areas of concern. Also, it will consider conducting synoptic stream gaging where conditions are safe to do so.

In addition to these steps, the monitoring networks will be evaluated on a yearly and five (5)-year basis. If additional data gaps arise, the GSA will consider the implications of these gaps, associated costs, and importance to the continued implementation of the GSP and take appropriate actions to address the gaps.



Data sources:
DWR, 2019 - subbasin boundaries;

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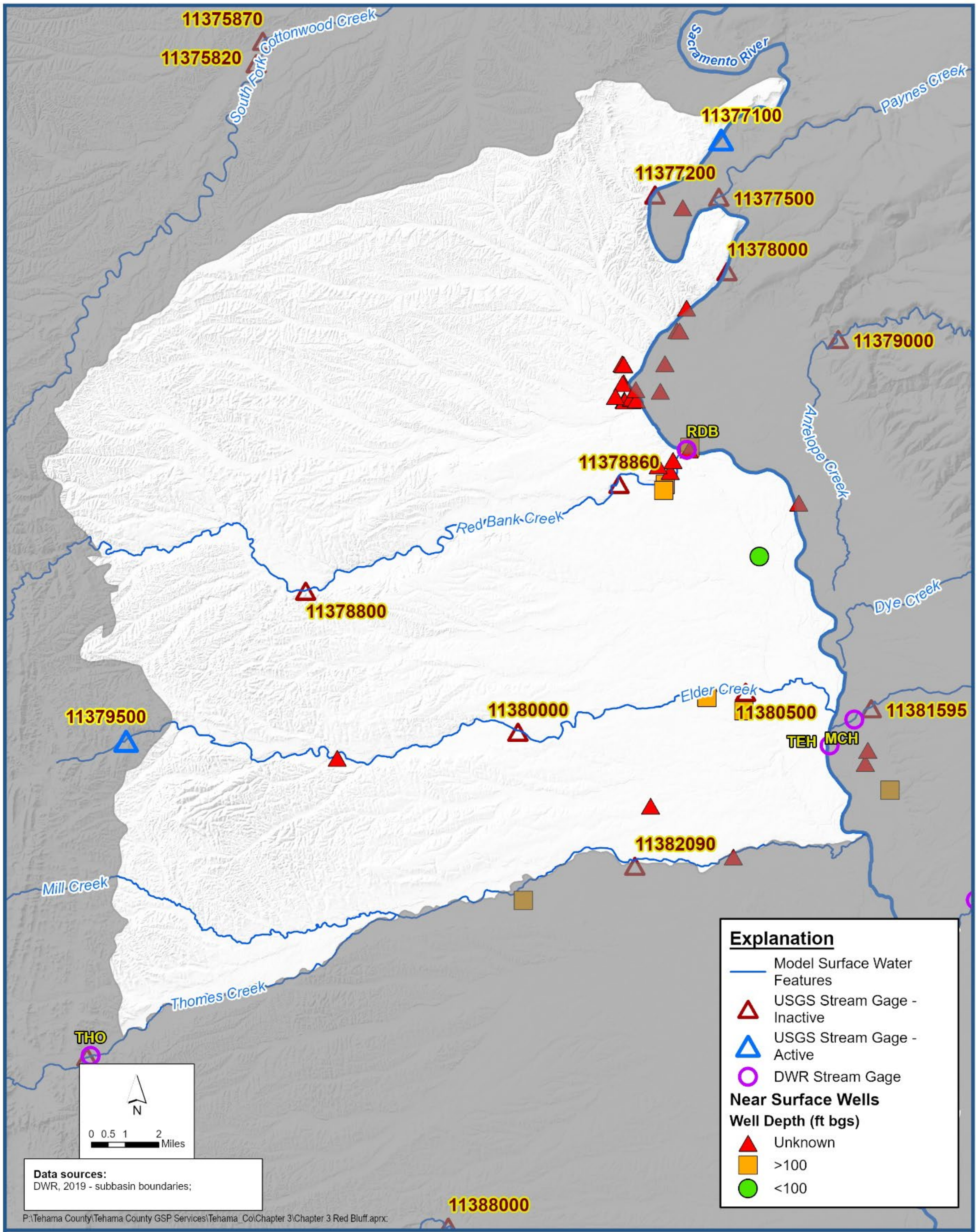
TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Identification of Data Gaps (GDE)

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 3-7



Data sources:
DWR, 2019 - subbasin boundaries;

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TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Identification of Data Gaps (Surface Water Features)

Groundwater Sustainability Plan
Red Bluff Subbasin

Figure 3-8

FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

(Chapter 4 – Projects and Management Actions)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

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4 GROUNDWATER MANAGEMENT: PROJECTS AND MANAGEMENT ACTIONS (§ 354.44)

4.1 Introduction

This section describes the projects and management actions (PMAs) that are planned or considered for implementation in the Red Bluff Subbasin (Subbasin). In accordance with 23 CCR §354.44, PMAs were developed to achieve and maintain the Subbasin sustainability goal by 2042 and avoid undesirable results over the GSP planning and implementation horizon. Projects generally refer to structural features whereas management actions are typically non-structural programs or policies designed to support sustainable groundwater management.

4.1.1 Development Approach

PMAs were developed and prioritized through a tiered approach, beginning with an initial exploration with stakeholders of various PMA concepts, and then refining those concepts to a specific set of PMAs developed for implementation in the Red Bluff Subbasin, and a set of conceptual PMAs for further development if monitoring indicates they are needed. The following sections describe the process used to evaluate potential future changes in Subbasin conditions, identify PMAs for implementation, and achieve and maintain sustainability through adaptive management. The adaptive management approach planned for the Subbasin involves ongoing monitoring of Subbasin conditions and addressing any challenges related to maintaining groundwater sustainability by scaling and implementing PMAs in a targeted and proportional manner in accordance with the needs of the Subbasin.

4.1.1.1 Evaluation of Current and Future Subbasin Conditions

PMAs were formulated and evaluated for their potential to support sustainable groundwater management in the Red Bluff Subbasin. PMAs developed for implementation are designed to mitigate localized, adverse effects of current groundwater conditions in the Subbasin, and to address possible future changes in Subbasin conditions that could cause undesirable results over the long term.

Current Subbasin conditions and possible future changes in Subbasin conditions were assessed through comparison of the projected water budget with current land use and the projected water budget with future land use, adjusted for 2070 central tendency (2070CT) climate change. Water budget results from the Tehama Integrated Hydrologic Model (Tehama IHM) represent the best available data and science for describing projected future groundwater conditions in the Red Bluff Subbasin at the time of GSP development (consistent with 23 CCR §354.44(c)). Use of 2070CT climate change is regarded as a conservative approach for evaluating possible future changes in Subbasin conditions related to climate change. While the 2070CT climate change adjustment assumes that the 2070CT effects are occurring every year in the projected water budget period, in actuality these effects will occur gradually over time with significant uncertainty in their magnitude and interannual variability.

Table 4-1 provides a comparison of key water budget parameters considered in formulation of the PMAs, and **Table 8-2** summarizes the changes in projected Subbasin conditions following implementation of two PMAs developed for implementation (described later in this section). Average water budget results are presented for three scenarios:

- the projected with current land use scenario (assuming 2019 land use occurs in all years),
- the projected with future land use and 2070CT climate change scenario (assuming that urban land increases slightly and orchard acreage increases significantly over the future period and that 2070CT climate change factors occur in all years),
- the projected with future land use, 2070CT climate change, and PMAs scenario (same assumptions as the projected with future land use and 2070CT climate change scenario, with the addition of two simulated PMAs developed for implementation)

Model results are expressed in average annual volumes of acre-feet per year (af/yr) over the 2022-2072 projected water budget period, unless otherwise indicated.

As indicated in **Table 4-1**, without projects and management actions groundwater storage in the projected future land use 2070CT scenario is expected to decline by approximately 3,600 af/yr. This is a further decline of 1,800 af/yr below the change in groundwater storage of -1,800 af/yr that occurs in the projected current land use water budget (approximately 2 percent of total inflows to the groundwater system). This decline in groundwater storage coincides with increases in groundwater pumping, net seepage, and net subsurface inflow from adjacent subbasins relative to the projected current land use water budget. Projects and management actions were thus developed for implementation to address these imbalances by reducing groundwater pumping and increasing groundwater recharge.

As indicated in **Table 4-2**, with simulation of two PMAs the total groundwater pumping and net subsurface inflows from adjacent Subbasins are each expected to decrease by approximately 1,600 af/yr, on average, relative to the projected future land use 2070CT scenario without PMAs. Decreases in groundwater pumping and net subsurface inflow both support ongoing sustainable management of the Subbasin. Deep percolation is also expected to increase by 700 af/yr, on average. While the average change in groundwater storage with simulation of two PMAs remains approximately -3,500 af/yr (a decline in storage) across the entire Subbasin (-0.01 feet per acre), this change is within the estimated uncertainty of the projected water budget results (described in **Section 2.3**).

Other PMAs were also developed for implementation in the Red Bluff Subbasin that will also support groundwater sustainability. The PMAs that were developed but not simulated include a grower education program that would provide in-lieu recharge benefits to the Subbasin, a multi-benefit recharge project, and projects to remove non-native, invasive species from riparian corridors that would reduce demand for shallow groundwater along waterways. These PMAs can be configured and scaled to address localized groundwater concerns and respond to changing groundwater conditions in the Subbasin.

Altogether, the PMAs developed for implementation are expected to support sustainable groundwater management in the Red Bluff Subbasin. The GSA plans to continue monitoring sustainability indicators throughout GSP implementation and will initiate and scale PMAs as needed to ensure that the measurable objectives are met. Groundwater sustainability will be maintained through adaptive groundwater management, described below. Section 3, Monitoring Networks, and Section 2.1, Basin Setting, identify data gaps that will be addressed as part of GSP implementation (Section 5). Addressing data gaps will improve the modeled outputs, water budget parameters, and understanding of groundwater conditions in the Red Bluff Subbasin. Improvements in understanding of groundwater conditions will inform adaptive management of the Red Bluff Subbasin.

Table 4-1. Summary of Key Groundwater System Water Budget Parameters Influencing Formulation of Projects and Management Actions in the Red Bluff Subbasin (average annual volumes in acre-feet per year, rounded).

GROUNDWATER SYSTEM WATER BUDGET PARAMETER[1]	PROJECTED, CURRENT LAND USE (2022-2072)	PROJECTED, FUTURE LAND USE WITH 2070CT CLIMATE CHANGE (2022-2072)	DIFFERENCE (PROJECTED, FUTURE – PROJECTED, CURRENT)	PERCENT DIFFERENCE[2]
Net Seepage	-20,200	1,800	22,000	-109%
Deep Percolation	66,600	65,900	-700	-1%
Subsurface Flow from Uplands (Small Watersheds)	1,100	1,100	0	0%
Groundwater Pumping	-94,100	-146,300	-52,200	55%
Root Water Uptake	-6,300	-4,100	2,200	-35%
Net Subsurface Inflow from Adjacent Subbasins	52,000	78,900	26,900	52%
Change in Groundwater Storage				
Average Volume (acre-feet per year)	-1,800	-3,600	-1,800	-2%
Average Rate (acre-feet per acre per year)	-0.007	-0.013	-0.006	

[1] Positive values indicate a net inflow to the groundwater system. Negative values indicate a net outflow from the groundwater system.

[2] Percent difference is calculated as the "Difference" column divided by the Projected, Current Land Use average volume for that parameter, except for the average annual change in groundwater storage, for which the percent difference is calculated relative to the Projected, Current Land Use average total inflows to the groundwater system.

Table 4-2. Summary of Key Groundwater System Water Budget Parameters to Evaluate the Potential Effects of Projects and Management Actions on the Red Bluff Subbasin (average annual volumes in acre-feet per year, rounded).

GROUNDWATER SYSTEM WATER BUDGET PARAMETER[1]	PROJECTED, FUTURE LAND USE WITH 2070CT CLIMATE CHANGE (2022-2072)	PROJECTED, FUTURE LAND USE WITH 2070CT CLIMATE CHANGE AND PROJECTS AND MANAGEMENT ACTIONS[2] (2022-2072)	DIFFERENCE (PROJECTED, FUTURE WITH PROJECTS AND MANAGEMENT ACTIONS – PROJECTED, FUTURE)	PERCENT DIFFERENCE[3]
Net Seepage	1,800	1,900	100	6%
Deep Percolation	65,900	66,600	700	1%
Subsurface Flow from Uplands (Small Watersheds)	1,100	1,100	0	0%
Groundwater Pumping	-146,300	-144,700	1,600[4]	-1%
Root Water Uptake	-4,100	-4,200	-100	2%
Net Subsurface Inflow from Adjacent Subbasins	78,900	77,300	-1,600[4]	-2%
Change in Groundwater Storage				
Average Volume (acre-feet per year)	-3,600	-3,500	100	0%
Average Rate (acre-feet per acre per year)	-0.013	-0.013	0.000	

[1] Positive values indicate a net inflow to the groundwater system. Negative values indicate a net outflow from the groundwater system.

[2] Includes simulation of two PMAs: the Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge project, and the Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District project. Other PMAs are also developed for implementation that were not simulated in the model.

[3] Percent difference is calculated as the "Difference" column divided by the Projected, Future Land Use with 2070CT Climate Change average volume for that parameter, except for the average annual change in groundwater storage, for which the percent difference is calculated relative to the Projected, Future Land Use with 2070CT Climate Change average total inflows to the groundwater system.

[4] Difference corresponds to a reduction in groundwater pumping and a reduction in subsurface inflows to the Subbasin, both of which are supportive of groundwater sustainability in the Red Bluff Subbasin.

4.1.1.2 PMAs Identified for Adaptive Groundwater Management

Recognizing the GSP data gaps and uncertainties in the basin setting (per 23 CCR §354.44(d)), PMA development and implementation in the Red Bluff Subbasin applies an adaptive approach informed by continued monitoring of groundwater conditions.

The adaptive approach includes two categories of PMAs:

- **PMAs developed for implementation** that would help to achieve and maintain groundwater sustainability while supporting other local goals. These PMAs include a project that would divert available surface water from Thomes and Elder Creek onto fields in the Subbasin for direct or in-lieu recharge benefits, and an in-lieu recharge project that would expand use of existing CVP contract supplies in Proberta Water District (WD) and Thomes Creek WD. Other PMAs developed for implementation include a proposed grower education program, a proposed multi-benefit groundwater recharge project that would supply groundwater recharge and provide habitat for migrating shorebirds, a proposed pump restoration project in El Camino Irrigation District, and two projects aimed at invasive species removal along various waterways in the Red Bluff Subbasin.
- **A portfolio of other potential PMAs** that could be implemented, as needed, to achieve and maintain long-term sustainable groundwater management across the Red Bluff Subbasin. These potential PMAs would be further evaluated and selected for implementation if Subbasin conditions changed such that they would be necessary to maintain groundwater sustainability. Management actions include a potential demand management program that could be implemented as a backstop to other PMAs to ensure groundwater sustainability.

PMAs are presented in this GSP according to these two categories of implementation for adaptive management. In accordance with 23 CCR §354.44(a), PMAs developed for implementation are expected to support the GSA in achieving the Red Bluff Subbasin sustainability goal and avoid exceedance of MTs defined in this GSP under future, potentially changing conditions. PMAs developed for implementation are described in greater detail in this GSP, in accordance with all the requirements in 23 CCR §354.44(b). The portfolio of other potential PMAs is described in lesser detail, reflecting their conceptual nature at the time of GSP development. It is anticipated that additional information will be provided in annual reports and periodic, five-year GSP updates, if these PMAs are needed, evaluated for feasibility, and selected for implementation.

Per 23 CCR § 354.44(b)(9), PMAs described in this GSP are expected to maintain the balance of groundwater extractions and recharge to ensure that lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels and storage in other years. In particular, in-lieu and direct recharge benefits of the PMAs developed for implementation are expected to increase the use and recharge of available surface water supplies during wetter years, offsetting any potential increases in groundwater pumping during drought when surface water supplies are limited. The expected recharge benefits of these PMAs are described in each project description in Section 4.4. The GSA's extensive portfolio of other potential PMAs will also be informed by continued monitoring of groundwater conditions and implemented, if needed, to maintain long-term sustainable groundwater management.

These remaining subsections are structured as follows:

- Section 4.2 provides an overview of all PMAs described in this GSP.
- Section 4.3 introduces the various PMA concepts that were explored as part of GSP development.

- Sections 4.4 and 4.4.3 describe the specific PMAs developed for implementation and the portfolio of other potential PMAs that may be implemented through adaptive management of the Red Bluff Subbasin. Within each category, PMAs are further classified by type (project or management action).

A matrix summary of all developed and potential PMAs is also provided in **Appendix 4-A**.

4.2 Summary of Projects and Management Actions

4.2.1 Overview of All Proposed Projects and Management Actions

Table 4-3 summarizes all PMAs identified for the Red Bluff Subbasin GSP. Summary information includes the PMA name, type, proponent, and a brief description of activities that would be completed as part of the PMA. The main PMA categories include:

- Direct groundwater recharge: PMAs that recharge groundwater using available surface water, flood water, stormflows, or other supplies.
- In-lieu groundwater recharge: PMAs that offset groundwater pumping by supplying or otherwise incentivizing use of surface water or other water supplies “in lieu” of groundwater.
- Groundwater demand reduction: PMAs that reduce or remove sources of groundwater demand and extraction, such as invasive and non-native plant species along riparian corridors.
- Management action: Non-structural programs or policies designed to support sustainable groundwater management (e.g., grower education, demand management)

PMAs are grouped into subsections in the table according to their implementation category (PMAs developed for implementation, or other potential PMAs). As described above, PMAs developed for implementation are planned to be implemented before 2042 to maintain groundwater sustainability while supporting other local goals. Other potential PMAs could be implemented, as needed, to achieve and maintain long-term groundwater sustainability, depending on changing conditions in the Red Bluff Subbasin.

PMAs are described in this GSP according to the requirements of 23 CCR §354.44(b). PMAs developed for implementation are described in greater detail. Other potential PMAs are described concisely and more generally, reflecting the conceptual nature and need for future development of these PMAs as they are needed. Additional project development and description will occur as those projects are needed, evaluated for feasibility, and selected for implementation.

Table 4-4 summarizes the estimated groundwater recharge benefit and capital, operating, and maintenance costs of PMAs developed for implementation. Specific project benefit and cost information is limited for many other proposed projects because a detailed feasibility assessment has not been completed. If needed, the GSA may further develop projects during the GSP implementation period and after 2042 and refine estimated costs as projects are identified for implementation. Additional information about all PMAs is provided in a matrix format in **Appendix 4-A**.

As GSP implementation proceeds, the GSA will continue to accept additional PMAs proposed by agencies and stakeholders. A list of all proposed PMAs will be maintained on the GSP website. PMAs can be added to the matrix (**Appendix 4-A**) at any time, and will be reviewed for inclusion in the GSP at the discretion of the GSA. Review of new projects and management actions will occur during the periodic, five-year GSP updates, and at other times at the discretion of the GSA.

Table 4-3. Summary of Projects and Management Actions Proposed for the Red Bluff Subbasin.

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
Projects and Management Actions Developed for Implementation: Projects and Management Actions in this category are planned to be completed prior to 2042. These projects and management actions are expected to support the GSA in achieving the GSP sustainability goal and responding to changing conditions in the Subbasin.			
Multi-Benefit Recharge	Direct Groundwater Recharge (Project)	Multi-Agency/ Jurisdiction	The Nature Conservancy (TNC) has prepared guidance to assist GSAs in planning on-farm, multi-benefit groundwater recharge programs. A multi-benefit recharge program will provide groundwater recharge through normal farming operations while also providing critical wetland habitat for waterbirds migrating along the Pacific Flyway. Fields with soil and cropping conditions conducive to groundwater recharge will be flooded and maintained with shallow depths to benefit waterbirds. Water will be sourced from existing or new water rights, depending on availability. The GSA may also consider incentives for participants, offsetting field preparation, irrigation, and water costs.
Grower Education	Education/ Outreach (Management Action)	Multi-Agency/ Jurisdiction	A grower education and outreach program is proposed as a management action for all subbasins in Tehama County. The program will provide growers with educational resources that help them to plan and implement on-farm practices that simultaneously support groundwater sustainability and maintain or improve agricultural productivity. This program would be accomplished through workshops and distribution of educational materials, as well as on-site irrigation system evaluations and irrigation water management assistance. The program would continue and expand the irrigation evaluation services currently in place through the Mobile Irrigation Lab (MIL), operated in Tehama County by the Tehama County Resource Conservation District since 2002.

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge	Direct or In-Lieu Groundwater Recharge (Project)	Multi-Agency / Jurisdictions	Thomes and Elder Creek originate to the west of the Red Bluff Subbasin and flow eastward into the Red Bluff Subbasin. During periods of flow in the winter and spring, a portion of these flows could be diverted for either (1) off-stream storage and subsequent use for irrigation or (2) direct groundwater recharge through Flood-MAR, dedicated recharge basins, or modified stream beds.
Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District	In-Lieu Groundwater Recharge (Project)	Multi-Agency / Jurisdictions	This project would incentivize expanded use of CVP supply by irrigators in Proberta WD and Thomes Creek WD, with the goal of using the full supply available to each district on the Corning Canal. Encouraging irrigators to use more surface water would offset groundwater demand, providing in-lieu recharge benefits to Subbasin.
El Camino Restoration Project	In-Lieu Groundwater Recharge (Project)	El Camino Irrigation District	This project would identify and fix the most inefficient pumps in the El Camino Irrigation District conveyance and distribution system, replace concrete pipelines with more durable PVC pipe, replace hub gates, and install flowmeters on each discharge pipe from every pump.
Elder Creek Non-Native, Invasive Species (NIS) Plant Control	Groundwater Demand Reduction (Project)	Tehama County Resource Conservation District	This project would identify the location of and remove non-native plants in the Elder Creek watershed, with a focus on Arundo donax and Tamarisk.
Tehama West Non-Native, Invasive Species (NIS) Plant Control	Groundwater Demand Reduction (Project)	Tehama County Resource Conservation District	This project would identify the location of and remove non-native plants in the Tehama West watersheds (excluding Elder Creek; a separate project is proposed for Elder Creek because of the levee systems), with a focus on Arundo donax and Tamarisk.
Portfolio of Other Potential Projects and Management Actions: Projects and Management Actions in this category are proposed as potential options that the GSA may wish to implement, as needed, to support ongoing sustainability, to adapt to changing conditions in the Subbasin, and to achieve other water management objectives			

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
Projects			
Direct Groundwater Recharge of Stormwater and Flood Water	Direct Groundwater Recharge		• Recharge groundwater with excess surface water in wet years for use in dry years. Recharge may be done in conveyances such as unlined canal and laterals, natural drainages such as creek beds, recharge basins, agricultural fields, and aquifer storage and recovery (ASR) wells. Areas identified for recharge should have suitable recharge surficial geology, low enough groundwater levels to provide storage for recharge, and access to surface water. • Divert floodwater for off-stream temporary storage on private lands, providing direct recharge and potentially in-lieu recharge.
Stormwater Management Improvements	Direct Groundwater Recharge		• Improve stormwater management facilities to enhance groundwater recharge of stormwater. • Maintain stormwater pumps and ensure stormwater holding basins are of adequate size for retention. • Restore watersheds burned in wildfires and restore unused grazing land to reduce runoff and improve recharge.
Levee Setback and Stream Channel Restoration	Direct Groundwater Recharge		• Restore stream channel and levee setback to increase groundwater recharge, provide wildlife habitat, and improve the overall riparian ecosystem.
Rain-MAR	Direct Groundwater Recharge		• Capture additional rainfall through modification of on-field conditions and recharge the aquifer
Recycled Water Projects	Direct Groundwater Recharge, In-Lieu Groundwater Recharge		• Facilitate use of recycled water of suitable quality (e.g., treated wastewater) for groundwater recharge and for urban or agricultural irrigation. • Enhance wastewater treatment facilities to supply tertiary-treated Title-22 effluent for use as irrigation water.

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
			• Construct and operate wetlands as a discharge site for treated wastewater (e.g., the Rio Alto Water District Wastewater Treatment Plant & Constructed Wetlands Project in the Bowman Subbasin). Creation of constructed wetlands would enhance the surrounding community by increasing natural habitat for waterfowl and wildlife, while offering educational and recreational opportunities for local schools and community residents through the development of walking trails and informational kiosks.
Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	Groundwater Demand Reduction		• Remove invasive plants from creeks and irrigation conveyance canals (e.g., Arundo donax, tamarisk, Himalayan blackberry). Many small tributaries in the watersheds of Tehama County have decreased conveyance, high levels of siltation, and diminished flood-carrying capacity due to invasive vegetation overgrowth. Debris-clearing is a challenge due to environmental permitting restrictions. Plant removal would reduce conveyance issues, reduce evapotranspiration (ET), and allow for more water in the shallow groundwater area, restoring conditions for GDEs and native riparian species.
Inter-Basin Surface Water Transfers or Exchanges	In-Lieu Groundwater Recharge		• Promote inter-basin surface water transfers or exchanges and potentially subsidize surface water costs so that it is less expensive than groundwater. • Import underutilized surface water and other supplies from other subbasins in Tehama County and use for direct recharge or in lieu of groundwater pumping. Potential opportunities include: ○ Treated wastewater from the City of Red Bluff ○ Trout Unlimited Groundwater substitution transfers ○ Groundwater substitution transfers.

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
Water Supply Reservoir Construction, Renovation, or Conversion	Surface Water Supply Augmentation		• Construct, renovate, or convert flood control facilities to a water supply reservoir.
Enhanced Boundary Flow Measurement	In-Lieu Groundwater Recharge		• Enhance measurement of boundary outflows resulting from precipitation runoff and irrigation return flows, which are estimated to be a substantial component of the water budget. Improved understanding of boundary outflows, which vary substantially from year to year, can facilitate capture of and use of this water for in-lieu recharge.
Well Metering	In-Lieu Groundwater Recharge		• Meter larger agricultural wells to better assess the total volume of groundwater pumped in the Subbasin. Data will help to better manage continued sustainability of the Subbasin within its sustainable yield and improve management of pumping for in-lieu recharge benefits.
Management Actions			
Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements	Education/ Outreach (Management Action), In-Lieu Groundwater Recharge (Project)		• Assist growers with conversion to efficient and dual-source irrigation systems. Related efforts may include soil mapping to customize irrigation timing and duration and grower education to encourage soil management to improve moisture retention. • Improve surface water conveyance and irrigation infrastructure to allow growers to utilize both surface water and groundwater for drip irrigation of orchards. Typical components required for a dual-source system are a surface water irrigation “turnout” or point of delivery to the field, a pipeline or ditch to convey water from the turnout to a pump station, a pump or pumps for pressurization, and filtration. Improvements in the Subbasin may include installation of regulating reservoirs, filters or treatment, and pressurization equipment.

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
			• Assist growers with capital improvements to irrigation infrastructure, from use of groundwater to use of surface water or dual-source systems.
Incentives for Residential and Municipal Water Use Efficiency Improvements	Groundwater Demand Reduction		• Offer incentives for urban, residential, and commercial projects that improve water use efficiency, such as high efficiency appliance rebates and incentives for lawn removal, low-water landscape installation, rain barrels, graywater reuse, etc. • Evaluate municipal water system operation and reduce losses to reduce municipal groundwater pumping demand.
Demand Management	Groundwater Demand Reduction		• Promote conversion of agricultural lands to less water intensive crops to reduce water use while continuing to promote agriculture land use. Would be considered if other planned PMAs are insufficient to maintain sustainability. • Considered if other planned PMAs are insufficient to maintain sustainability: ○ Coordinate with county to restrict land use changes that increase water demand in the Subbasin. Management would primarily focus on development of new agricultural land, and to restrict growth in areas with no surface water supply. ○ Implement tiered fee structure for groundwater extractions to incentivize reduced groundwater use. ○ Curtail and/or restrict groundwater extractions through a groundwater extraction allocation program. ○ Curtail and/or restrict groundwater extractions through a land fallowing program. ○ Coordinate with county to develop policies that align with sustainable groundwater management goals. Possible ordinances include regulations and limits for groundwater

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
			use, export, and illegal diversion of surface water. County could create additional guidelines during the well permitting process to reduce competition between nearby wells (i.e., well spacing or suggestions regarding total well depth, depth of well perforations, and location of a new well relation to existing wells). Efforts could be designed to be protective of domestic wells.
Incentives for Use of Available Surface Water and Recycled Water	In-Lieu Groundwater Recharge		• Incentivize use of surface water for irrigation when available to allow groundwater levels to recover in between drought years when surface water is not available. • Provide incentives for use of recycled water of suitable quality (e.g., treated wastewater) for groundwater recharge and for urban or agricultural irrigation to decrease groundwater demand.
Water Market for Surface Water and Groundwater Exchange	In-Lieu Groundwater Recharge		• Create a water market for exchanging surface water and groundwater, allowing for flexibility in water use to meet irrigation demands in the Subbasin while remaining within the overall sustainable yield.
Tehama County Domestic Well Tracking and Outreach Program	Additional Monitoring Programs to Support Wells		• Provide domestic well owners with resources and funding for well testing, inspection, and replacement. Target well owners in locations where domestic wells are known to go dry or have water quality impacts. • Create a county-wide system to track dry domestic wells. Information will allow Tehama County to better manage assistance to domestic well owners when water levels drop and wells go dry, identify if wells need to be replaced, and provide information on well replacement.
Well Deepening or Replacement Program	Programs to Support Wells		• Create a program to deepen or replace shallow wells and/or wells that go dry.

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
Review of County Well Permitting Ordinances	Well Permitting Ordinances		• Review existing ordinances and assess if additional well permitting requirements are warranted. Follow updated DWR well construction recommendations (Bulletin 74), as needed. Improve the well permitting and installation program to help protect water quality, allow for better screening, and avoid interference or impacts on neighboring wells.
Other Activities (Studies, Monitoring, Modeling)			
Coordination and Development of Public Data Portals	Coordination and Data Sharing		• Continue coordination with member units and other water purveyors to develop shared public data portals. Coordination would determine the types of data and data formats available, and establish standard methods for receiving, storing, and sharing data with the public, DWR, other agencies. • Continue coordination and information sharing among agencies in Tehama County and with agencies in neighboring subbasins. Coordination would include holding regular public meetings, attending meetings in neighboring subbasins, coordination with land use planning entities, and fostering relationships with relevant agencies and organizations. • Continue and improve sharing of contaminant data across organizations, including data to track and monitor contaminant plumes.
Additional Studies of GDEs and Groundwater - Surface Water Interactions	Additional Monitoring		• Analyze the relationship between groundwater levels and GDE health to improve the understanding of how GDEs are affected by conditions in the groundwater aquifer accessed by pumping. • Analyze the water supplies accessed by potential GDEs, potentially using a combination of surface water data, shallow groundwater level data, and remote sensing data related to vegetative cover.

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
			• Evaluate the need for additional studies or monitoring of groundwater-surface water interactions. Additional information would improve the understanding of how GDEs relate to the groundwater aquifer accessed by pumping, and may allow for refinement of how GDEs and their water supply needs are monitored
Expanded Subbasin Monitoring and Aquifer Testing	Additional Monitoring		• Aquifer testing will improve the understanding of aquifer conditions, particularly the level of confinement, connectivity between depths, connectivity with surface water bodies, and the understanding of hydraulic properties needed for simulation within the Tehama IHM and an improved estimate of recharge entering the Subbasin. • Collect LIDAR (Light Detection and Ranging) data across the Subbasin to support monitoring all sustainability indicators. • Identify locations in the Subbasin that are potentially vulnerable to damage from subsidence.
Install Additional Agroclimate Stations	Additional Monitoring		• Install additional stations that monitor agriculture-related weather and climate parameters. Improved data will inform agricultural water use practices and potentially enhance water conservation. Data can also improve the accuracy of the Tehama Integrated Hydrologic Model (Tehama IHM).
Maintain and Expand Groundwater Level Monitoring Network	Additional Monitoring		• Maintain existing monitoring network to improve the understanding of aquifer conditions and dynamics and to monitor groundwater conditions related to sustainable management criteria. • Maintain existing coordination with other monitoring entities to support the use of identified monitoring locations as part of the monitoring network and to share relevant collected data. • Identify existing wells that may be incorporated into the groundwater level monitoring network. Wells may be used to

PROJECT/MANAGEMENT ACTION NAME	PROJECT/ MANAGEMENT ACTION TYPE	PROPONENT	BRIEF DESCRIPTION
			fill data gaps and improve understanding of aquifer conditions and dynamics, and groundwater conditions related to GDEs and surface water depletions. • Identify new monitoring sites that may be added to the groundwater level monitoring network. Wells may be used to fill data gaps and improve understanding of aquifer conditions and dynamics, and groundwater conditions related to GDEs and surface water depletions.
One-Time Groundwater Quality Snapshot and Evaluation	Additional Monitoring		• Conduct a one-time sampling of groundwater quality parameters over a wide range of wells in Tehama County. Data will improve understanding of groundwater quality conditions and provide a basis for refinement of monitoring networks. • Evaluate groundwater quality monitoring options, potentially informed by the one-time groundwater quality snapshot. Consider options to better characterize widespread groundwater quality conditions and address localized groundwater quality concerns.
Tehama County Well Inventory and Registration Program	Additional Monitoring		• Create a county-wide well inventory to compile all available information on active wells in Tehama County and improve understanding of well distribution, construction, and hydrogeology. Inventory will be useful for filling monitoring data gaps. • Create a well registration program to collect well locations, screening information, and pumping data for use in GSP updates.

Table 4-4. Benefits and Costs of Projects and Management Actions Developed for Implementation.

PROJECT/ MANAGEMENT ACTION NAME	PROPONENT	FIRST YEAR OF IMPLEMENTATION	GROSS AVERAGE ANNUAL BENEFIT AT FULL IMPLEMENTATION (AF/YR)	ESTIMATED CAPITAL COST ($)	ESTIMATED ANNUAL COST AT FULL IMPLEMENTATION ($/YR)
Multi-Benefit Recharge	Multi-Agency / Jurisdictions	To Be Determined[1]	1,160	(Reported as part of annual cost)	$77,000
Grower Education	Multi-Agency / Jurisdictions	To Be Determined[1]	N/A[2]	N/A	$10,000
Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge[3]	Multi-Agency / Jurisdictions	To Be Determined	690	To Be Determined[4]	To Be Determined[4]
Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District[3]	Multi-Agency / Jurisdictions	To Be Determined	1,640	To Be Determined	To Be Determined
El Camino Restoration Project	El Camino Irrigation District	To Be Determined	To Be Determined	To Be Determined	To Be Determined
Elder Creek NIS Plant Control	Tehama County Resource Conservation District	To Be Determined	To Be Determined	To Be Determined	To Be Determined
Tehama West NIS Plant Control	Tehama County Resource Conservation District	To Be Determined	To Be Determined	To Be Determined	To Be Determined

[1] Planned initiation of the project or management action will occur before 2042, though the precise year will be determined as GSP implementation and annual reporting proceeds. The timing of implementation will be informed by improved understanding of basin groundwater conditions over time, and will be planned to manage changing hydrologic or groundwater conditions to achieve the GSP sustainability goal.

[2] Grower education does not have a specific annual volumetric benefit, but is expected to generally improve use of existing surface water supplies and reduce net consumption of groundwater supplies, supporting groundwater sustainability efforts.

[3] Project was modeled in the Tehama IHM projected with future land use, 2070CT climate change, and PMAs scenario. The gross average annual benefit at full implementation comes from the Tehama IHM results.

[4] Potential estimated on-farm costs (per site), and potential estimated capital and indirect costs for diversion infrastructure (per diversion point) are provided in Section 4.4.3.4.

4.2.2 Sustainability Indicators Benefitted by Projects and Management Actions

The sustainability indicators expected to directly benefit from each type of project or management action are summarized in **Table 4-5**. Among the proposed PMAs with anticipated direct benefits to sustainability indicators, all are expected to benefit groundwater levels and groundwater storage, whether through direct or in-lieu groundwater recharge, or improved management and augmentation of water supplies. All projects with anticipated benefits to groundwater levels are also expected to reduce surface water depletion by enhancing understanding and management of interconnected surface water. Grower education is expected to also benefit water quality by encouraging on-farm management of nutrient application, tailwater, and pumping to reduce potential degradation of water quality.

Table 4-5. Sustainability Indicators Expected to Benefit from Projects and Management Action Types Proposed for the Red Bluff Subbasin.

PROJECT/MANAGEMENT ACTION TYPE	SUSTAINABILITY INDICATORS EXPECTED TO DIRECTLY BENEFIT			
	GROUNDWATER LEVELS	GROUNDWATER STORAGE	WATER QUALITY	SURFACE WATER DEPLETION
Coordination and Data Sharing	-[1]	-[1]	-[1]	-[1]
Direct Groundwater Recharge	X	X		X
Education/Outreach	X	X	X	X
Groundwater Demand Reduction	X	X		X
In-Lieu Groundwater Recharge	X	X		X
Monitoring to Fill Data Gaps	-[1]	-[1]	-[1]	-[1]
Programs to Support Wells[1]	-[2]	-[2]	-[2]	-[2]
Surface Water Supply Augmentation	X	X		X
Well Permitting Ordinances	X	X	X	X

[1] Coordination, data sharing, and additional monitoring are beneficial to GSP implementation and tracking progress toward the Subbasin sustainability goal. However, there are no anticipated direct benefits to specific sustainability indicators.

[2] Programs designed to support wells (e.g. well tracking, well deepening or replacement) are beneficial for monitoring and addressing any potential impacts to those beneficial uses and users of groundwater during GSP implementation. However, there are no anticipated direct benefits to specific sustainability indicators.

4.2.3 Achieving and Maintaining Sustainability

Ongoing management of the Red Bluff Subbasin under this GSP is planned to achieve and maintain sustainability and respond to unforeseen future conditions that may impact sustainable operation of the Red Bluff Subbasin. The GSA plans to achieve and maintain sustainability through an adaptive management strategy: continuing to monitor sustainability indicators throughout the GSP planning and implementation horizon and implement PMAs as needed to ensure that the sustainability goal is achieved and that undesirable results do not occur.

PMAs developed for implementation are expected to support ongoing sustainability. Grower education is planned to encourage on-farm practices that support direct and in-lieu recharge, and multi-benefit groundwater recharge is planned to supply direct recharge of available floodwater to the Subbasin while also providing habitat to migratory shorebirds. Other potential PMAs would also be evaluated and selected for implementation if the GSA finds that established measurable objectives (MOs) cannot be maintained and/or if minimum thresholds (MTs) are being approached. This adaptive approach will be informed by continued monitoring of groundwater conditions, using the monitoring network and methods described in Section 3.

4.3 Overview of Concepts Explored

This section provides a brief overview of various concepts explored when proposing and identifying PMAs for the Red Bluff Subbasin. While not all concepts were proposed for implementation in the Red Bluff Subbasin, exploring these concepts is useful for identifying the types and scale of potential PMAs that could be explored and implemented in the future to maintain sustainability, depending on future changes in subbasin conditions.

4.3.1 Well Permit Revision

The need for and benefit from potential modifications to well regulations was considered as a potential mechanism to ensure that groundwater sustainability is achieved and maintained in the Subbasin. Well permitting regulations can help avoid adverse impacts on groundwater beneficial users by reducing potential for mutual well interference or streamflow depletion through limitations on well screen depths and well spacing and/or setbacks.

4.3.2 Demand Management

Demand management broadly refers to any water management activity that reduces the consumptive use of irrigation water. When considered as a management action to support sustainable groundwater management, demand management must result in a net reduction in groundwater pumping (pumping net of recharge). Activities that, for example, reduce canal seepage or reduce deep percolation to the groundwater system are generally ineffective at demand management for groundwater planning. While they may decrease the quantity of water diverted or applied, they also reduce the quantity of recharge to usable groundwater, resulting in no (or little) net reduction in groundwater pumping.

Demand management activities considered as concepts for implementation in the Red Bluff Subbasin include:

- **Management and Restrictions of Land Use Changes**: Implementing county water use ordinances or other policies to restrict land use changes that would increase water demand in the Subbasin. Policies would generally restrict development of new agricultural land, restrict growth in areas with no surface water supply, and/or promote conversion of agricultural lands to less water intensive crops.
- **Pumping Fees:** Implementing tiered fee structures for groundwater extractions to incentivize reduced groundwater use.
- **Groundwater Extraction Allocation Program:** Creating groundwater extraction allocations to curtail or restrict the volume of groundwater extraction allowed. Could be implemented with pumping fees.
- **Land Fallowing Program:** Curtailing and/or restricting groundwater extractions by creating and enforcing or incentivizing a land fallowing program.

Demand management actions are scalable to suit the volume of groundwater reduction that is needed, both in the timing and the spatial extent of implementation. While long-term, wide-ranging demand management actions may be necessary to achieve and maintain sustainability in severely overdrafted areas, shorter-term and localized demand management actions are also possible to address localized groundwater concerns.

As described previously, other PMAs developed for implementation are expected to allow the Red Bluff Subbasin to be managed sustainably by 2042 and without undesirable results over the GSP planning and implementation horizon. Demand management actions are thus considered only as conceptual, “backstop” measures that would be considered and implemented only if other planned PMAs are insufficient to maintain sustainability.

4.3.3 Multi-Benefit Recharge Project

Multi-benefit recharge projects have emerged as promising tools to maximize the benefits of recharge projects for numerous groundwater and environmental water uses and users. The multi-benefit recharge projects explored in Tehama County are specifically focused on strategic flooding of agricultural fields for managed aquifer recharge (MAR).

The main goals of these multi-benefit recharge projects are to simultaneously:

- recharge groundwater supplies using available surface water supplies, and
- create temporary habitat for migratory shorebirds along the Pacific Flyway

These multi-benefit recharge projects are distributed, operating through participating growers who voluntarily flood their fields during peak migratory periods to create temporary habitat for the shorebirds while also recharging the underlying aquifer. These projects can offer incentives to encourage grower participation and can also offer assistance for field preparation prior to flooding. The scale of implementation may vary depending on grower interest, which in turn may vary depending on water availability, water reliability, outreach, local interests, and incentives (if applicable).

Successful multi-benefit recharge projects will realize the greatest benefit from selecting sites with high groundwater recharge potential, flooding those sites at times when the environmental benefits to migratory shorebirds are highest, and implementing recharge with the greatest practicality. Ideal sites have soil and crop conditions favorable for flooding and recharge during peak migratory periods (generally July 15-October 1 and/or March 15-April 30). Practical sites have existing access to surface water and infrastructure that supports flooding.

Multi-benefit recharge is a concept with great potential to support environmental surface water users and all beneficial users of groundwater in the Subbasin. Thus, a multi-benefit recharge project has been developed for implementation in the Red Bluff Subbasin (see Section 4.4.1 for more information).

4.3.4 Flood Managed Aquifer Recharge (Flood-MAR)

Conceptually, projects that use floodwater for on-farm managed aquifer recharge (i.e., Flood-MAR) are similar to the multi-benefit recharge projects described in the previous section, although the timing of Flood-MAR projects are confined to periods when flood water is available rather than the migratory periods of shorebirds. Flood-MAR projects operate through distributed, voluntary participation of growers, who divert and apply floodwater to fields when it is available to supply groundwater recharge.

Implementation of Flood-MAR can occur at various scales, from individual landowners diverting flood water from creeks and streams using existing infrastructure, to larger facilities operated by one or more agencies to divert larger volumes of floodwater to detention and recharge areas. Besides groundwater recharge, Flood-MAR can also provide benefits to flood risk reduction, ecosystem enhancement, water quality improvement, climate change adaptation, and recreation in the Red Bluff Subbasin.

While no specific Flood-MAR project is specifically developed for implementation in the Red Bluff Subbasin at this time, Flood-MAR is proposed among other potential PMAs that could be implemented to support adaptive management of the Subbasin.

4.3.5 Rainfall Managed Aquifer Recharge (Rain-MAR) to Capture Runoff from Fields

Rainfall Managed Aquifer Recharge (Rain-MAR) projects considered in Tehama County would be designed to modify on-field conditions and infrastructure to capture and hold precipitation, taking water that would have otherwise run off the field and instead recharging that to the groundwater system through on-field infiltration. Like the multi-benefit recharge and Flood-MAR projects described above, Rain-MAR projects would provide distributed groundwater recharge throughout the Subbasin, operating through voluntary grower participation. Besides groundwater recharge, Rain-MAR can also provide benefits to flood risk reduction by decreasing runoff and to ecosystem enhancement by creating habitat for birds and other wildlife.

A Rain-MAR project is a scalable and potentially low-cost option for addressing localized groundwater issues or for responding to future climate change effects greater than those simulated. While no specific Rain-MAR project is specifically developed for implementation in the Red Bluff Subbasin at this time, a Rain-MAR project is proposed among other potential PMAs that could be implemented to support adaptive management of the Subbasin.

4.3.6 Other Groundwater Management Strategies (Projects and Management Actions and Cost Feasibility)

Various other groundwater management strategies have also been discussed in the Subbasin. Some of the strategies discussed include use of recycled water, incentivizing maximum use of all surface water available through existing or potential future water rights or allocations, and coordinated and cooperative management between key groundwater user groups (e.g., urban, agricultural, environmental), and groundwater ordinances. The feasibility of different management strategies in the Subbasin is closely tied to cost. Cost makes some groundwater management strategies difficult to implement, although these management strategies are available for consideration if needed in the future.

4.3.7 Ongoing Evaluation of Groundwater Management Efforts (LSCE)

In accordance with SGMA and GSP regulations, the GSA will conduct ongoing assessments of groundwater conditions in the Subbasin, including annual GSP reporting and five-year GSP evaluations. Ongoing assessments will evaluate new information on changes in water use, changes in Subbasin and management area groundwater conditions, the efficacy or benefits from management actions implemented, and will consider additional management tools or actions needed to achieve and maintain Subbasin sustainability. These efforts will support adaptive management of the Subbasin groundwater resources and enable the GSA to respond to groundwater management needs if they arise.

4.4 Projects and Management Actions Developed for Implementation

This section describes the PMAs that were developed for potential implementation in the Red Bluff Subbasin. Implementation of these PMAs would address adverse groundwater conditions that currently exist in the Subbasin, and will support the GSA in its efforts to achieve the Subbasin sustainability goal, maintain sustainability, and adapt to potential future changes in Subbasin conditions. These PMAs are described below, and will be scaled as needed to support adaptive management of the Subbasin.

4.4.1 Multi-Benefit Recharge Project

4.4.1.1 Overview

An on-farm, multi-benefit groundwater recharge program has been developed for potential implementation in the Red Bluff Subbasin based on guidelines provided by The Nature Conservancy (TNC). The program would build on the successful TNC BirdReturns program by strategically flooding agricultural fields with the goals of (1) recharging groundwater supplies while (2) simultaneously creating critical winter habitat for shorebirds migrating along the Pacific Flyway. GSAs may consider offering financial incentives to growers to compensate them for recharging groundwater through field flooding in the course of normal farming operations, with multiple benefits to the underlying aquifer and shorebirds migrating along the Pacific Flyway.

The multi-benefit recharge project would be implemented through the coordinated actions of growers who volunteer to participate and flood their fields during the course of normal farming operations. During the migratory period, fields with soil and cropping conditions conducive to groundwater recharge would be flooded and maintained with shallow water depths, recharging groundwater while also providing critical wetland habitat for migrating shorebirds. If an incentive structure is established, the program could provide financial incentives to growers, potentially paying for field preparation, irrigation, and water costs to encourage grower participation.

This section summarizes implementation activities, operation and monitoring efforts, and related costs and benefits of a multi-benefit groundwater recharge program in the Red Bluff Subbasin.

4.4.1.2 Implementation

Implementation of a multi-benefit groundwater recharge program in the Red Bluff Subbasin would occur in multiple phases, with expansion of the program over time as voluntary grower participation increases. Multi-benefit recharge would be implemented at selected sites in the Red Bluff Subbasin, with multiple-benefits to groundwater recharge and temporary wetland habitat for migrating shorebirds. Recharge and wetland habitat benefits in the early phases of the project would be analyzed, reported, and used to inform development and later implementation of the program.

Implementation of this project would commence with selection of sites suitable for multi-benefit recharge, and initiation of any necessary permitting and environmental documentation. The GSAs would use tools and resources provided by TNC to identify fields with soil and cropping conditions conducive to groundwater recharge and temporary wetland habitat formation.[1]. In later phases of project implementation, suitable fields would continue to be identified following similar criteria, with refinement according to lessons learned from early project implementation.

Suitable project sites would be selected by the following characteristics:

- Soil characteristics that are conducive to recharge, as indicated by:
  - Soil types
  - SAGBI rating relationship
- Crop types that are conducive to high-quality, open wetland habitat suitable for shorebird stopovers when flooded (i.e., not orchards)
- Crop types that are suitable for recharge (i.e., suitable for flooding in February through April, and conducive to deep percolation)
- Water supply and infrastructure characteristics that are suitable for flooding (i.e., existing flood irrigation infrastructure, existing surface water supply)

The process for identifying and enrolling suitable fields in the program is documented extensively on the TNC BirdReturns project website (https://birdreturns.org/).

The GSA would conduct or coordinate outreach to local growers to identify willing participants that irrigate fields where multi-benefit groundwater recharge can be implemented. Outreach would be conducted through existing communication pathways described in the GSP. Participant responses would be gathered and organized through surveys that request information regarding:

- Field characteristics (location, size, cropping, field preparation methods)
- Existing water supply characteristics (water supply source(s), timing of water source(s))
- Existing measurement and monitoring infrastructure (flow meters, groundwater well)
- Other relevant information

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[1] TNC offers an online Multi-Benefit Recharge Suitability Tool for identifying areas potentially suitable for multi-benefit recharge:
https://tnc.maps.arcgis.com/apps/webappviewer/index.html?id=b898ab568d374cc9baf89f762d9bb78c.

The GSA, with potential support from other proponents in the Subbasin, would then coordinate with participating growers to implement on-farm, multi-benefit groundwater recharge. Following initial site selection and completion of any necessary permitting and environmental documentation, fields would be prepared for flooding and monitoring. At that time, necessary monitoring equipment would be installed, as needed. The program could be designed to pay for field preparation, irrigation, and water costs through an GSA-planned incentive structure.

During the "flooding window" (generally February through April), enrolled fields would then be flooded and maintained at a shallow water depth to supply groundwater recharge and temporary open wetland habitat for migrating shorebirds. Finally, after completion of the program requirements, contract fees (if applicable) would be paid to participants.

4.4.1.2.1 Implementation Schedule

A typical annual timeline of project implementation is provided in **Table 4-6.** At this time, the multi-benefit groundwater recharge program has been developed and evaluated only at an investigative, planning level. This project will ultimately be selected for implementation according to the criteria identified in Section 4.4.1.2.5. At that time, the GSA would develop and implement the program annually following the general implementation schedule presented in **Table 4-6**.

Table 4-6. Expected Annual Implementation Timeline for the Red Bluff Subbasin Multi-benefit Groundwater Recharge Project.

TIMELINE ACTIVITY	START	END
Participant Applications	December-January	March
Site Selection	January-February	March
Construction, Site Preparation	February	March
Operation	February	April
Financial Incentive Payment	April	June

4.4.1.2.2 Notice to Public and Other Agencies

The public and other agencies will be notified of project implementation activities through outreach and communication channels identified in the GSP.

4.4.1.2.3 Construction Activities and Requirements

This project may be configured and operated to utilize existing diversion and conveyance infrastructure available within the Subbasin or may require construction of new diversion and conveyance infrastructure. If existing infrastructure and facilities are available and used for this project, there would be no anticipated infrastructure construction activities and requirements. If new diversion and conveyance infrastructure must be constructed, it is anticipated that this project would require one or more diversion structures, each equipped with a pump, fish screen, and magnetic flow meter. Conveyance pipeline and metered turnout structures would also be required to supply water to participating fields, and to facilitate project monitoring and reporting. The precise configuration and capacity of necessary infrastructure would be refined during future project development.

The project may also require on-farm activities for participating growers to enhance field flooding and recharge on existing fields. The program is designed to work within existing field infrastructure and irrigation systems. Any on-farm water management modifications are expected to be modest to increase standing water on fields outside of the growing season to support both recharge and habitat.

Prior to field flooding, the GSA could facilitate a survey of the fields and install pressure transducers and/or flow meters at inlets and outlets and in adjacent wells to facilitate measurement of applied water depths and changes in groundwater depth.

4.4.1.2.4 Water Source

Surface water used in this project is expected to be available from existing or new surface water rights contracts from waterways within or adjacent to the Subbasin. The availability and reliability of surface water for projects is described in Section 8.8. Existing or newly constructed diversion and conveyance infrastructure would be used to supply surface water to participating fields for multi-benefit groundwater recharge. Surface water would be delivered during a "flooding window," generally from February through April.

4.4.1.2.5 Circumstances and Criteria for Implementation

The primary constraints on the operation of this project are (1) the availability of sufficient surface water supply, and (2) the participation of growers with fields conducive to groundwater recharge.

Surface water supply conditions needed for this project include:

- Availability of surface water supplies that are sufficient to flood participating fields according to the specified flooding depth and duration
- Appropriate timing of surface water supply availability during the project "flooding window" (generally February through April), when wetland habitat for shorebirds migrating along the Pacific Flyway is needed
- Reliability of surface water supplies, based on historical reliability and expected future reliability

Grower participation needed for this project includes:

- Willingness of growers to participate in this program, informed by program applications
- Availability of participating fields suitable for groundwater recharge, based on soil texture, crop type, and availability of suitable surface water flood irrigation infrastructure

A multi-benefit groundwater recharge program is planned for future implementation pending funding and changes in future groundwater conditions in the Red Bluff Subbasin. The GSA will monitor groundwater levels in the Subbasin through the monitoring plan in this GSP. If groundwater levels decline near or below minimum thresholds, this project may be prioritized to support in-lieu recharge in those areas where undesirable results may occur. The GSA may also decide to implement this project at an earlier time to achieve these multi-benefits for the Subbasin.

Ongoing implementation of a multi-benefit groundwater recharge program does not depend on the implementation or performance of other projects or activities. While operation of this program is not expected to terminate, any future changes will be made to align with the GSA's goals and the overall Subbasin sustainability goal.

4.4.1.2.6 Legal Authority, Permitting Processes, and Regulatory Control

The following entities and agencies have potential permitting roles for the multi-benefit groundwater recharge project: Tehama County, the State Water Resources Control Board (SWRCB), and USBR (if using CVP contract supply). If necessary, the GSA or other project proponent will obtain land grading permits from the County. If necessary, the GSA or other project proponent will apply or facilitate applications for permits required from the SWRCB for diversion of surface water to the extent that diversion is not already permitted under existing water rights and contracts. Recharge projects may also require an environmental review process under CEQA. If required, this project would need a Negative Declaration or Mitigated Negative Declaration.

4.4.1.3 Operation and Monitoring

Following site selection, operation of the multi-benefit recharge project would begin with site preparation. Field preparation would be completed prior to flooding to enhance wetland habitat and recharge potential. Existing vegetation may be removed or incorporated, depending on recommendations or requirements associated with initial field conditions. Flow rate and groundwater level monitoring equipment may also be installed in the fields, as needed, to facilitate project monitoring. Soil and water samples could be collected to ascertain water quality prior to wetting, as desired. Wooden stakes should also be installed to support monitoring of water depths and bird presence.

After site preparation, multi-benefit groundwater recharge would be implemented through field flooding. During the implementation period (generally February through April), participants would spread water on their fields and maintain a shallow depth (four inches maximum) for typically four to six weeks. Participants would record any changes in water flow in an irrigation log. Meanwhile, the GSA or other project proponent would coordinate monitoring of field depth, bird presence, water delivery volume, and changes in groundwater depth.

4.4.1.4 Project Benefits and Costs

The expected benefits and costs of the multi-benefit recharge program are summarized in **Table 4-7**. Potential benefits to the groundwater system are estimated based on soil infiltration rates and analyses of potential recharge areas in the Red Bluff Subbasin (documented in **Appendix 2-J, Tehama IHM Model Documentation**). Habitat benefits are estimated to be equal to the participating area.

While actual participation in the program would vary from year to year, depending on grower interest, water availability, changes in cropping, and other factors, preliminary mapping was done to identify potential recharge areas that may be suitable for participation in the project. The total area suitable for the multi-benefit recharge project was evaluated based on recharge potential and cropping, as described in **Appendix 2-J**. Recharge potential was quantified based on the area-weighted soil agricultural groundwater banking index (SAGBI) rating of fields in the Subbasin, considering only fields with a SAGBI rating of “moderately good” or higher (UC Davis, 2021). Crop areas suitable for multi-benefit recharge were evaluated based on 2018 Land IQ spatial land use data, filtering land areas by crop type to exclude permanent crops, rice, crops with growing seasons unsuited to the flooding window, and non-agricultural areas. In total, approximately 1,310 acres in the Red Bluff Subbasin are potentially suitable for multi-benefit recharge according to these criteria. Additional information is described in **Appendix 2-J**. Of this total, it is estimated that an average of approximately 660 acres may participate in the multi-benefit recharge program in a given year (approximately 50 percent of the total potential recharge area).

Based on observed infiltration rates from a multi-benefit recharge pilot project conducted on fields with soil infiltration characteristics similar to potential recharge areas identified in the Red Bluff Subbasin[2], infiltration rates are expected to range between 0.2 and 1.2 inches per day for participating fields in the Red Bluff Subbasin. Assuming an average of 30 days of flooding per year, the average expected recharge benefit of the multi-benefit recharge program is approximately 1,160 AF per year (ranging from 330 to 1,980 AF per year, depending on actual field recharge rates and areas participating). Analyses in Section 4.8 indicate that the potential water available for diversion from waterways in the Subbasin are generally sufficient to supply at least several hundred acre-feet of water for this project each year. While changes in water availability may impact the extent of program participation from year to year, the program could operate in most years, providing both groundwater recharge and migratory bird habitat along the Pacific Flyway.

Besides groundwater recharge and habitat, the multi-benefit recharge project can also provide benefits to flood risk reduction and climate change adaptation. Those potential benefits are not quantified at this time.

Typical program cost components are summarized in **Table 4-8**, on a per site basis. These costs include only on-farm equipment and direct costs and estimated program operation costs, and do not include costs for any new diversion and conveyance infrastructure that may be needed. The precise configuration and costs of any new diversion and conveyance infrastructure would be identified and refined during future project development.

Slightly higher on-farm and program costs are typically incurred in the first year a site participates in the program, as more coordination and site preparation is typically required. As a site continues to participate in the program, lower costs are anticipated from year to year. Costs per site may vary depending on future changes in program requirements and incentives. The total costs of the program will vary over time, depending on the number of sites enrolled and the extent to which new sites are enrolled or returning sites continue to participate in the multi-benefit recharge program.

Table 4-7. Estimated Average Recharge Volume and Temporary Wetland Babitat Formation for the Multi-benefit Groundwater Recharge Project.

PROJECT	ESTIMATED POTENTIAL RECHARGE AREA (ACRES)	ESTIMATED PARTICIPATION AREA (ACRES/YEAR)	ESTIMATED AVERAGE ANNUAL RECHARGE[1] (AF/YEAR)	ESTIMATED AVERAGE ANNUAL ON-FARM COST[2]	AVERAGE ANNUAL ON-FARM COST PER AF BENEFIT
Multi-Benefit Groundwater Recharge	1,310	660	1,160	$77,000	$66

[1] Average estimated benefit, assuming 660 acres flooded for 30 days each year, with an estimated recharge rate ranging from 0.2-1.2 inches/day (330 – 1,980 AF/year).

[2] Assumes that on average 50% of sites are new and 50% of sites are established in a given year, and that average participating field sizes are 30 acres. See Table 8-8 for unit costs per site.

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[2] Observed infiltration rates for fields with a SAGBI rating of “moderately good” or higher for a 2020 pilot project conducted in Colusa County.

Table 4-8. Estimated Capital Cost and Average Annual Operating Cost per Site for the Multi-benefit Groundwater Recharge Project.

COST COMPONENT PER SITE	ESTIMATED AVERAGE ANNUAL COST AT NEW SITES ($)[1]	ESTIMATED AVERAGE ANNUAL COST AT ESTABLISHED SITES ($)
CAPITAL COSTS		
Equipment and Direct Cost	$2,000	$1,000
Operations and Maintenance Costs		
Labor, Coordination, Administration, and Analysis	$2,000	$2,000
Total	**$4,000**	**$3,000**

[1] Costs estimated based on implementation costs for a multi-benefit recharge pilot project in Colusa County. Typical costs will vary between individual programs, depending on how the GSA and/or participating agencies plan to implement and monitor the program.

4.4.2 Grower Education Relating to On-Farm Practices for Sustainable Groundwater Management

4.4.2.1 Overview

A grower education and outreach program is proposed as a management action for the Red Bluff Subbasin. The program will provide growers with educational resources that help them to plan and implement on-farm practices that simultaneously support groundwater sustainability and maintain or improve agricultural productivity. Implementation of these on-farm practices will be recorded, along with estimated or measured benefits to groundwater sustainability resulting from these practices.

This program would be accomplished through workshops and distribution of educational materials, as well as on-site irrigation system evaluations and irrigation water management assistance. The program would continue and potentially expand the irrigation evaluation services currently in place through the Mobile Irrigation Lab (MIL), operated in Tehama County by the Tehama County Resource Conservation District since 2002.

Four categories of on-farm practices, or on-farm management actions, which may be covered in this program are:

1. maximizing the use of surface water (e.g., “in-lieu” recharge),
2. managing soils to improve infiltration and root zone soil moisture storage,
3. reducing (and minimizing) non-beneficial ET, and
4. precision nutrient management.

In aggregate, these on-farm practices will promote both agricultural productivity and economic benefits along with sustainable groundwater management[3]. **Table 4-9** identifies the sustainability indicators that will be supported by each category of on-farm management actions.

General topics identified for the grower education program are summarized below. Additional information and topics are summarized in **Appendix 2-J**.

Table 4-9. Sustainability Indicators Benefitted by On-Farm Management Actions.

ON-FARM MANAGEMENT ACTION	SUSTAINABILITY INDICATORS BENEFITTED
Maximizing surface water use	groundwater levels, groundwater storage
Managing soils to improve infiltration and root zone soil moisture storage	groundwater levels, groundwater storage
Reducing non-beneficial ET	groundwater levels, groundwater storage
Precision nutrient management	water quality

4.4.2.1.1 Maximizing Use of Surface Water ("in-lieu" recharge)

The use of surface water for irrigation whenever it is available is a crucial practice to support sustainable groundwater management. The use of surface water both offsets local groundwater demand through reduced groundwater pumping ("in-lieu" recharge) and increases groundwater recharge through the non-consumptive recoverable flow of deep percolation of applied surface water from the land surface to the underlying aquifer. The on-farm practices to maximize the use of surface water include implementing a dual-source irrigation system, reducing tailwater resulting from irrigation, and other actions to promote the conjunctive management of surface water and groundwater. This education program could be coupled with an incentive program to encourage additional use of surface water in-lieu of pumping groundwater. This would be particularly effective in instances where groundwater is, from the perspective of the grower, effectively cheaper than surface water.

A dual-source irrigation system is capable of utilizing surface water for irrigation from an irrigation water supplier's conveyance system when available and utilizing groundwater if surface water is unavailable. Developing a dual-source irrigation system generally involves adding on-farm infrastructure to connect the on-farm irrigation system, that currently uses groundwater, to an irrigation water supplier's distribution system. The benefits of this practice are that every acre-foot of surface water that is utilized is an acre-foot of groundwater that remains in the aquifer ("in-lieu recharge"), supporting sustainable groundwater levels and maintaining groundwater storage. Additionally, the applied surface water will inevitably result in some direct groundwater recharge through deep percolation. These positive impacts will initially occur in the aquifer directly beneath the grower's lands, while also influencing surrounding lands. The potential drawbacks to this system are the initial construction costs and higher maintenance costs associated with a more complex irrigation system that can draw from two water sources, as well as the potential for sediments and debris in surface water to obstruct irrigation systems. If the dual-source

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[3] In most cases, not all on-farm practices will be able to be implemented. Also, some practices will not work in tandem with one another. For example, maximizing the use of available surface water and precision irrigation scheduling are not possible on the same field at the same time.

irrigation system is designed to accommodate this, surface water and groundwater could be intermixed during irrigation to mitigate these effects.

The on-farm management practice of reducing tailwater from irrigation and holding that water within the irrigated area will either increase the ET, increase the deep percolation, or some combination of the two. The practical steps taken to achieve these will vary from field to field. If there are irrigation application uniformity issues with over-irrigation occurring in certain parts of the field, addressing these issues will promote tailwater reduction. Also, if there are low-lying portions of a field or border strips that are not in agricultural production, excess applied water can be directed to these areas where it can be contained by topography or the construction of low berms and allowed to infiltrate the ground and recharge the underlying groundwater system, rather than flowing off the field.

The two practices above are examples of conjunctive management, which recognizes that surface water and groundwater are interdependent and seeks to combine and balance the beneficial use of both water sources to promote sustainable water use while minimizing any negative economic or environmental impacts that have the potential to occur (Dudley and Fulton, 2006). Conjunctive management is often practiced on a larger scale, but it can be applied by individual growers through the practices above (and others) to maximize surface water usage when available and promote groundwater sustainability.

4.4.2.1.2 Managing Soil to Improve Infiltration and Root Zone Soil Moisture Storage

Another on-farm practice that will promote groundwater sustainability is management of soil at the ground surface and within the root zone to improve infiltration of applied water and reduce runoff or ponding on the ground surface. This can be implemented through a variety of on-farm practices including planting cover crops or utilizing crop rotations to increase organic matter content in the root zone, application of manure or other organic material, limiting soil compaction by minimizing use of heavy equipment, and if there is a restrictive layer near the surface of the ground, potentially using deep ripping or tillage to improve infiltration past the restrictive layer (Sanden et al, 2016; USDA-NRCS, 2014). Improving infiltration will result in increases in direct recharge and improving soil moisture storage may increase effective precipitation and slightly reduce the required volume and frequency of irrigation.

4.4.2.1.3 Reducing Non-beneficial Evapotranspiration

This section describes two potential methods for reducing non-beneficial ET through altering and carefully controlling the timing and volume of applied water.

4.4.2.1.3.1 Precision Irrigation Scheduling

Precision irrigation scheduling has the potential to benefit both grower profits and sustainable groundwater management. Precision irrigation scheduling enables growers to accurately identify the timing and volume of irrigation water to apply to maximize crop productivity while minimizing water application. It typically requires real-time or near real-time information on soil moisture and weather conditions and is crop dependent. When effectively implemented, precision irrigation scheduling promotes sustainable groundwater management through increased water use efficiency; water that otherwise would have been applied to the field remains in the groundwater system or is available for use elsewhere.

4.4.2.1.3.2 Regulated Deficit Irrigation

Regulated deficit irrigation applies irrigation water during important drought-sensitive growth stages for a crop and reduces applied irrigation water (i.e., deficit irrigation) during other growth stages where there will be little to no effect on crop yields. This on-farm management practice needs to be prudently applied, but it has the potential to reduce applied water and associated irrigation costs while having little to no impact on crop yields. It promotes sustainable groundwater management through reduced consumptive use; water that otherwise would have been applied to the field is not consumed and remains in the groundwater system or is available for use elsewhere.

4.4.2.1.4 Precision Nutrient Management

Another negative impact to the groundwater system that can result from irrigated agriculture is the degradation of groundwater quality occurring from excess application of nutrients (i.e., nitrogen, phosphorus, etc.) and pesticides or herbicides. As applied water infiltrates the ground and percolates to the aquifer, it can transport excess nutrients, pesticides, or herbicides applied on the land surface during crop production or liberate these constituents that are present in the ground from historic practices. At high concentrations, these materials are a health concern if this groundwater is pumped and used for human consumption. Improving on-farm nutrient management and efficiency of nutrient application will save on-farm costs and reduce the nutrient influx to the groundwater system.

4.4.2.2 Implementation

The GSA would implement the grower education program by planning, preparing, and conducting outreach efforts related to the topics above, or by facilitating such efforts. Outreach efforts may include seminars, trainings, workshops, and publications on topics related to on-farm water management and groundwater sustainability. The program would continue and expand the irrigation evaluation services currently in place through the Mobile Irrigation Lab (MIL), operated in Tehama County by the Tehama County Resource Conservation District since 2002.

As the GSA begins to conceptualize and implement specific grower education programs and tools, it may consider partnering with local grower groups, educational and agricultural extension professionals, and others who are experienced in grower outreach and are knowledgeable about local agricultural practices. Potential agencies and groups that the GSA may consider partnering with are:

- University of California Cooperative Extension (UCCE)
- California State University, Chico (Chico State)
- University of California, Davis (UC Davis)

Staff and researchers at UCCE, Chico State, and UC Davis regularly partner with counties and other local agencies to conduct applied research and education programs throughout California.

4.4.2.2.1 Implementation Schedule

A general implementation schedule for the grower education program is presented in **Table 4-10**. Planning and partnership development are expected to begin in the first two years of GSP implementation, recurring as needed over the GSP implementation period. As topics are planned and partnerships are developed, education programs are expected to occur throughout GSP implementation.

It is anticipated that the public and other agencies will be notified of planned grower education activities through outreach and communication channels identified in the GSP.

Table 4-10. Grower Education Program Implementation Schedule.

PHASE/TIMELINE ACTIVITY	DESCRIPTION	YEAR START	YEAR END
Education Topic Planning	Identifying specific education topics relevant to local agricultural practices and groundwater conditions	Year 1 of Project Implementation	Ongoing
Partnership Development	Identifying and teaming with partner agencies to plan and implement grower outreach	Year 2 of Project Implementation	Ongoing
Education Program Implementation	Conducting grower education and outreach activities	Year 3 of Project Implementation	Ongoing

4.4.2.2.2 Notice to Public and Other Agencies

The public and other agencies will be notified of planned grower education activities through outreach and communication channels identified in the GSP.

4.4.2.2.3 Construction Activities and Requirements

There are no anticipated construction activities that would affect the grower education program. The grower education program will primarily require development and distribution of technical and educational resources, which the GSA will prepare through the partnerships described above.

4.4.2.2.4 Water Source

While there is no water source directly used in this program, the grower education program will promote conjunctive use of groundwater and all surface water sources available to growers and will promote reduction in non-beneficial ET of all water sources.

4.4.2.2.5 Circumstances and Criteria for Implementation

Grower education programs will add value to other groundwater sustainability efforts at any time during GSP implementation. Because on-farm water management decisions are so impactful to achieving and maintaining groundwater sustainability, implementation of grower education programs is anticipated throughout GSP implementation, with planning efforts beginning the first year of GSP implementation. Over time, programs will be tailored to reflect current technologies and best practices in on-farm water management, especially as the GSA’s understanding of groundwater conditions in the Red Bluff Subbasin grows.

4.4.2.2.6 Legal Authority, Permitting Processes, and Regulatory Control

The GSA has the authority to plan and partner with other groups to implement grower education activities. There are no anticipated permitting or regulatory processes that would affect the grower education program.

4.4.2.3 Operation and Monitoring

The grower education program will be accomplished by the GSA through partnerships with agencies, as described under the implementation section, above. The GSA and partner agencies will develop and distribute educational materials on topics relevant to local agricultural practices and groundwater conditions.

Grower responses to specific educational topics will be assessed and monitored through pre- and post-workshop surveys. These surveys will be designed to identify the extent to which growers adopt recommended practices.

All benefits to sustainability indicators in the Red Bluff Subbasin will be evaluated through groundwater monitoring and water quality monitoring at nearby monitoring sites, identified in the GSP.

4.4.2.4 Benefits and Costs

Implementation of grower education activities is ultimately expected to benefit groundwater levels, groundwater storage, and water quality. Encouraging growers to implement on-farm water management practices that maximize surface water use and reduce non-beneficial ET is expected to provide in-lieu recharge benefits to the groundwater system. Encouraging soil management to enhance infiltration is expected to enhance direct groundwater recharge. Both in-lieu and direct recharge are anticipated to benefit groundwater levels and groundwater storage. Encouraging growers to implement precision nutrient management is also expected to help manage nutrient loading in the subbasin, with benefits to water quality.

The benefits of grower education are expected throughout program implementation, beginning the first or second year of education program implementation (**Table 4-10**). These benefits will be monitored as described in the operation and monitoring section, above.

The total cost of the grower education program will vary depending on the types and extent of educational outreach. Grower outreach and education through social media communication may be inexpensive or virtually free, while seminars, trainings, workshops, and publications will likely incur planning and development costs. Total costs are expected to be proportional to the expansion of the education program over time. Conceptual-level estimated costs for grower education are approximately $10,000, assuming approximately two workshops per year, and that $5,000 is required for workshop preparation, implementation, and related distributed materials. These efforts and costs may be distributed across one or more Subbasins in Tehama County. Refined costs will be developed, and actual costs will be described in the GSP annual reports as specific education activities are planned and implemented.

4.4.3 Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge

4.4.3.1 Overview

A project to divert flood flows from Thomes Creek and Elder Creek has been developed for implementation in the Red Bluff Subbasin that could provide direct or in-lieu groundwater recharge benefits to the Subbasin and support local groundwater sustainability. This project is referred to in this section as the Thomes Creek and Elder Creek groundwater recharge project.

During periods of flood flow in the winter and spring, project participants would divert a portion of the flows along Thomes Creek and Elder Creek for either (1) off-stream storage and subsequent use for irrigation, or (2) direct groundwater recharge via flood managed aquifer recharge (Flood-MAR), dedicated recharge basins, or modified stream beds.

Project implementation would be distributed across participating fields and areas, operating through voluntary participants with access to existing or newly constructed diversion, conveyance, and other infrastructure suitable for Flood-MAR and/or off-stream storage and recharge. The project would be implemented each year that stormflows are available.

The objectives of the Thomes Creek and Elder Creek groundwater recharge project are primarily to benefit:

- All beneficial uses and users of groundwater, by replenishing groundwater through direct or in-lieu groundwater recharge, and
- Environmental water users, including wildlife and migratory shorebirds, by creating temporary shallow wetland habitat on fields (if implementing recharge through Flood-MAR) and by enhancing riparian habitat (if implementing recharge through modified stream beds).

This project is one of two potential projects developed for implementation that were modeled in the Tehama IHM as part of the projected with future land use, 2070CT climate change, and PMAs scenario. Assumptions and results of this scenario are summarized in Section 4.1.1.1 above and described in greater detail in Section 2 of the GSP. While the actual project configuration may use off-stream storage, recharge basins, and/or modified stream beds, for purposes of preliminary evaluation and modeling it was assumed that this project would be conducted through Flood-MAR. Thus, the project costs, benefits described, and configuration discussed in this section assume that Flood-MAR will be used.

4.4.3.2 Implementation

Thomes and Elder Creek originate to the west of the Red Bluff Subbasin, and generally flow eastward through the Red Bluff Subbasin, eventually draining into the Sacramento River. During periods of flow in the winter and spring, a portion of these flows would be diverted for either (1) off-stream storage and subsequent use for irrigation or (2) direct groundwater recharge through Flood-MAR, dedicated recharge basins, or modified stream beds. The actual project configuration will vary depending on the availability of infrastructure, landowner participation, and the timing and volume of water availability. However, for purposes of preliminary evaluation and modeling it was assumed that this project would be conducted through Flood-MAR.

Prior to and during project implementation, the GSA or other project proponents would identify potential recharge areas and coordinate with growers willing to participate in this project. Following site selection and identification of voluntary participants, operation of the project would begin with site preparation. Field preparation would be completed prior to flooding to enhance recharge potential and wetland habitat. Existing vegetation may be removed or incorporated, depending on recommendations or requirements associated with initial field conditions. After site preparation, participants would implement Flood-MAR on their fields, diverting and spreading water whenever available.

While actual project participation will vary from year to year depending on water availability and grower interest, preliminary mapping was done to identify potential recharge areas that may be suitable for participation in the Thomes Creek and Elder Creek groundwater recharge project. Potential recharge areas were identified as the intersection of fields considered to be suitable for project participation according to the following criteria:

- **Groundwater recharge suitability**: Groundwater recharge suitability was evaluated using the Soil Agricultural Groundwater Banking Index (SAGBI). SAGBI is a suitability index indicating the potential for groundwater recharge on agricultural land, determined according to five main factors: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. SAGBI ratings for lands in California are developed by the California Soil Resource Lab at UC Davis and UC-ANR and are available online (https://casoilresource.lawr.ucdavis.edu/sagbi/). Areas with "Excellent," "Good," and "Moderately Good" SAGBI ratings were identified as potentially suitable for project participation.

- **Cropping suitability:** Cropping was evaluated using the Land IQ 2018 statewide crop mapping dataset. The dataset represents a statewide, comprehensive, field-scale assessment of agricultural land use that was prepared by Land IQ and made available through the DWR SGMA Data Viewer (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer) to provide consistent, current land use information for SGMA planning. Crop classifications identified as potentially suitable for project participation include various annual and field crops[4], alfalfa, pasture, grain, and fallowed land. Permanent crops (orchards, vineyards, etc.) and other non-agricultural land uses were generally excluded from participation.

- **Proximity to Thomes Creek and/or Elder Creek**: Areas potentially suitable were evaluated within a buffer region extending from 0.25 mile to 1.0 mile around Thomes Creek and/or Elder Creek. These buffer regions were selected to identify fields within a distance suitable for diversion and conveyance, using either available existing infrastructure or newly constructed infrastructure, while screening fields directly adjacent to waterways where flood water may flow back to the waterway instead of infiltrating to the underlying aquifer.

- Of the total area found to be suitable for project participation according to these criteria, only a fraction is expected to participate from year to year. Other factors that will need to be considered during project implementation are the availability of existing diversion, conveyance, and on-farm infrastructure for field flooding, or the need for new infrastructure and field preparation. In practice, the location and scale of the project will also depend on grower interest and willingness to participate. Locations will depend on grower participation and could be anywhere within the Red Bluff Subbasin where recharge conditions are favorable and where surface water supplies from Thomes or Elder Creek are available.

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[4] Crops include beans, corn, cucumbers, melons, sorghum, squash, sudan, sunflowers, tomatoes, and all other miscellaneous field and truck crops.

To encourage project participation, the project may be developed to offer financial incentives to growers. Steps for developing financial incentives may include:

- Evaluation of grower interest, and the types and extent of economic incentives that may be required to support project participation.
- Evaluation of options for funding sources to support project participation. This may include state funding earmarked for the Department of Conversation to support multi-benefit agricultural land repurposing, or additional funding that may be allocated under potential bill AB-252 or similar initiatives.
- Development of program incentives and funding opportunities to encourage enrollment. This may require regular program monitoring and revision in response to grower feedback and changing incentive conditions in the Red Bluff Subbasin (e.g., changes in the returns to farming that would affect willingness to accept payment to participate in the program).

4.4.3.2.1 Implementation Schedule

A typical annual timeline of project implementation is provided in **Table 4-11**. At this time, the project has been developed and evaluated at an investigative, planning level. Should the GSA or other project proponents obtain funds for implementation of the project, the program would be implemented each year following the general implementation schedule presented in **Table 4-11**.

Table 4-11. Potential Annual Implementation Timeline for the Westside Streams Stormwater Capture Project.

TIMELINE ACTIVITY	START[1]	END[1]
Participant Applications	April-May	August-September
Site Selection	June-July	July-September
Site Preparation (If Needed)	June-July	July-September
Operation (Field Flooding)	July-October	March-April
Financial Incentive Payment (If Applicable)	October	June

[1] Start and end dates assume that participants could implement Flood-MAR beginning in the fall migratory period along the Pacific Flyway (generally July 15-October 1) and ending in the spring migratory period (generally March 15-April 30), or whenever stormflows are available.

4.4.3.2.2 Notice to Public and Other Agencies

The public and other agencies will be notified of planned project implementation activities through outreach and communication channels identified in the GSP.

4.4.3.2.3 Construction Activities and Requirements

This project may be configured and operated to utilize existing infrastructure available within the Red Bluff Subbasin. Availability and agreements for these uses would need to be refined during project planning and design. If existing infrastructure and facilities are available and used for this project, there would be no anticipated infrastructure construction activities and requirements.

If new diversion and conveyance infrastructure must be constructed for this project, it is anticipated that one or more diversion points would be required on each creek to divert flood flows, each equipped with a pump (precise sizing may be refined during future project development), a magnetic flow meter, and a fish screen. Each diversion point would supply water through a conveyance pipeline to turnouts also constructed with magnetic flow meters to facilitate project monitoring and reporting.

The project may also require on-farm activities for participating landowners to enhance field flooding and recharge on existing fields. The program is designed to work within existing field infrastructure and irrigation systems. Any on-farm water management modifications are expected to be modest to increase standing water on fields outside of the growing season to support both recharge and habitat. Prior to field flooding, the GSAs may facilitate a survey of the fields and install pressure transducers or flow meters at inlets and outlets and in adjacent wells to facilitate measurement of applied water depths and changes in groundwater depth.

4.4.3.2.4 Water Source

The surface water source for the project will be flood flows along Thomes and Elder Creeks. Subject to availability, flood water from the creeks would be conveyed and applied to participating fields. It is anticipated that flood flows will be available along the westside streams in wet and above normal years. The availability and reliability of water along Thomes and Elder Creeks are discussed further in Section 4.8.

4.4.3.2.5 Circumstances and Criteria for Implementation

The primary sources of uncertainty and potential constraints on the operation of this project are: (1) the availability of sufficient surface water supply, and (2) the participation of growers with fields conducive to groundwater recharge.

Surface water supply conditions needed for this project include:

- Availability of flood flows that are sufficient to flood participating fields
- Appropriate timing of stormflow availability relative to the timing of wildlife habitat needs, e.g., during migratory periods along the Pacific Flyway
- Reliability of flood flows, based on historical reliability and expected future reliability

Grower participation needed for this project includes:

- Willingness of growers to participate in this program, informed by program applications
- Availability of participating fields suitable for groundwater recharge, based on soil texture, crop type, and availability of suitable surface water flood irrigation infrastructure
- Proximity of participating fields to streams with sufficient flood flows

The Thomes Creek and Elder Creek groundwater recharge project is planned for future implementation pending funding and changes in future groundwater conditions in the Red Bluff Subbasin. The GSA will monitor groundwater levels in the Subbasin through the monitoring plan in this GSP. If groundwater levels decline near or below minimum thresholds, this project may be prioritized to support in-lieu recharge in those areas where undesirable results may occur. The GSA may also decide to implement this project at an earlier time to support groundwater sustainability in the Subbasin.

Ongoing implementation of the Thomes Creek and Elder Creek groundwater recharge project does not depend on the implementation or performance of other projects or activities. While operation of this program is not expected to terminate, any future changes will be made to align with the GSA's goals and the overall Subbasin sustainability goal.

4.4.3.2.6 Legal Authority, Permitting Processes, and Regulatory Control

If the Thomes Creek and Elder Creek groundwater recharge project is implemented using Flood-MAR (as anticipated at this time), the project would be organized by the GSA or other proponent as a collaborative effort with private landowners or growers that have the legal authority to implement this project and facilitate Flood-MAR on their lands. Implementation will be done in accordance with the required County permitting processes and regulatory controls.

The following agencies have potential permitting roles for the project if it is implemented via Flood-MAR: Tehama County and the State Water Resources Control Board (SWRCB). The project may also require applications for permits required from the SWRCB for diversion of surface water to the extent that diversion is not already permitted under existing water rights and contracts. Recharge projects may also require an environmental 1199 process under CEQA. If required, this project would need likely need a Mitigated Negative Declaration.

4.4.3.3 Operation and Monitoring

This project would directly recharge groundwater and may also offset groundwater pumping if implemented to provide off-stream storage of flood water for later use in irrigation. All benefits to groundwater conditions in the Red Bluff Subbasin will be evaluated through groundwater monitoring and water quality monitoring at nearby monitoring sites, identified in the GSP. Project performance would be summarized as part of GSP annual reports and 5-year updates

Benefits to groundwater conditions in the Red Bluff Subbasin would be evaluated by comparison of without- and with-project monitoring. If this project is implemented using Flood-MAR, as anticipated at this time, monitoring would track applied water depths and changes in groundwater depths in the vicinity of participating fields. During site preparation, flow rate and groundwater level monitoring equipment may be installed in the fields, as needed, to facilitate monitoring. Soil and water samples could also be collected to ascertain water quality prior to wetting, as desired, to evaluate any potential project effects on groundwater quality. Throughout GSP implementation, evaluation of benefits to groundwater conditions (especially groundwater levels and groundwater storage) will also be supported by modeling using the Tehama IHM used for GSP development.

As applicable, benefits to migratory shorebirds would be evaluated by monitoring bird presence. During site preparation, wooden stakes should also be installed to support monitoring of water depths and bird presence. During Flood-MAR, participants would record any changes in applied water in an irrigation log. Meanwhile, the GSA or other proponent would coordinate monitoring of changes in groundwater depth and bird presence.

4.4.3.4 Benefits and Costs

Implementation of this project is expected to primarily benefit groundwater levels and groundwater storage in the Red Bluff Subbasin. The project would also help to prevent potential depletions of interconnected surface water or land subsidence, to the extent that these are connected to changes in groundwater levels and groundwater storage in and around the project area. These benefits are expected throughout program implementation, beginning the first or second year of program implementation (**Table 4-10**)**.** These benefits will be monitored as described in the operation and monitoring section, above.

The expected direct groundwater recharge benefits of this project are summarized in **Table 4-12**. Benefits to the groundwater system were modeled in the Tehama IHM by simulating potential diversions from Thomes and Elder Creek to potential recharge areas over the projected future water budget period. Habitat benefits are estimated to be equal to the participating area.

As described previously, the total potential area suitable for this project was evaluated based on recharge potential, cropping, and proximity to the creeks. In total, approximately 2,070 acres are expected to participate in the project each year, assuming that not all potential recharge areas will participate in the program. Actual participation in the project will vary from year to year, depending on grower interest, water availability, changes in cropping, and other factors.

Based on these assumptions, estimated benefits to the groundwater system are approximately 690 AF/yr (0.33 AF/acre), and estimated annual habitat benefits are approximately 2,070 acres/yr. While changes in water availability may impact the extent of program participation from year to year, the program is anticipated to continue every year, providing both groundwater recharge and migratory bird habitat along the Pacific Flyway.

Besides groundwater recharge, the Thomes Creek and Elder Creek groundwater recharge project can also provide benefits to flood risk reduction and climate change adaptation. Those potential benefits are not quantified at this time.

Table 4-12. Estimated Average Recharge Volume and Temporary Wetland Habitat Formation for the Thomes Creek and Elder Creek Groundwater Recharge Project (2022-2072).

PROJECT	ESTIMATED PARTICIPATING AREA (ACRES/ WATER YEAR)	ESTIMATED AVERAGE ANNUAL RECHARGE[1] (AF/WATER YEAR)	ESTIMATED AVERAGE ANNUAL RECHARGE DEPTH (AF/AC-WATER YEAR)	ESTIMATED ANNUAL HABITAT BENEFIT (ACRES/ WATER YEAR)
Thomes Creek and Elder Creek Groundwater Recharge Project	2,070	690	0.33	2,070

[1] Average annual increase in deep percolation in the Red Bluff Subbasin attributed to the Thomes Creek and Elder Creek groundwater recharge project, calculated as the difference between the Tehama IHM projected future water budget results with 2070CT climate change and projects, and the projected future water budget results with 2070CT climate change but without projects.

Typical project costs for field preparation, flooding, and project administration are summarized in **Table 4-13**, on a per site basis. Slightly higher costs are typically incurred in the first year a site participates in the project, as more coordination and site preparation are typically required. As a site continues to participate in the project, lower costs are anticipated from year to year. Costs per site may vary depending on future changes in project requirements and incentives (if applicable). The total costs of the program will vary over time, depending on the number of sites enrolled and the extent to which new sites are enrolled or returning sites continue to participate in the project.

This project may be configured and operated to utilize existing infrastructure available within the Red Bluff Subbasin. If existing infrastructure and facilities are available and used for this project, the infrastructure construction costs would be less. If new diversion and conveyance infrastructure must be constructed for this project, it is anticipated that this project would diversion structures, each equipped with a pump, fish screen, and magnetic flow meter. Conveyance pipeline and metered turnout structures would also be required to supply water to participating fields, and to facilitate project monitoring and reporting. The precise configuration and capacity of necessary infrastructure would be refined during future project development. Typical estimated costs for constructing a single new pumped diversion site with approximately 3,900 feet of conveyance line and 10 turnouts are summarized in **Table 4-14**. These costs are considered to be preliminary costs per diversion site, and would be refined during future project development, according to the selected project configuration and requirements.

Table 4-13. Estimated Capital Costs and Average Annual Operations and Maintenance Costs Per Site for the Thomes Creek and Elder Creek Groundwater Recharge Project.

COST COMPONENT PER SITE	ESTIMATED AVERAGE ANNUAL COST AT NEW SITES ($)[1]	ESTIMATED AVERAGE ANNUAL COST AT ESTABLISHED SITES ($)[1]
Capital Costs		
Equipment and Direct Cost	$2,000	$1,000
Operations and Maintenance Costs		
Labor, Coordination, Administration, and Analysis	$2,000	$2,000
Total Costs	**$4,000**	**$3,000**

[1] Costs estimated based on implementation costs for a multi-benefit recharge pilot project to conduct Flood-MAR and create wetland habitat for migratory shorebirds in Colusa Subbasin. Typical costs will vary between individual programs, depending on how the GSAs plan to implement and monitor the program.

Table 4-14. Estimated Costs per Diversion Site for Construction of New Diversion and Conveyance Infrastructure for the Thomes Creek and Elder Creek Groundwater Recharge Project.

COST COMPONENT	NOTES	APPROXIMATE ESTIMATED COST PER SITE ($)
Capital Costs		
Diversion and Conveyance Infrastructure	Includes: diversion structure equipped with one 20 CFS pump, a magnetic flow meter, and fish screen; 3,900 feet of PVC conveyance pipe (assuming 250-260 acres served per diversion, 15 feet per acre); 10 grower turnouts and magnetic flow meters	$900,000
Indirect Costs		
Planning, Admin, and Construction Contingencies	Includes: Mobilization/demobilization, bonds, and insurance, permits; planning, design, and environmental costs; construction management and admin; monitoring and assessment; stakeholder outreach; easement acquisition and access agreements; and other contingencies	$470,000
Total Costs		**$1,370,000**

4.4.4 Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District

4.4.4.1 Overview

Proberta Water District (PWD) and Thomes Creek Water District (TCWD) each encompass more than 2,000 acres of land in the Red Bluff Subbasin. The entire service area of PWD and approximately half of the service area of TCWD are located within the Red Bluff Subbasin. Both districts have existing contracts for Central Valley Project (CVP) water supplies that are delivered along the Corning Canal. These CVP supplies are generally used for irrigation as a supplement to local surface water and groundwater supplies. The maximum contract quantity available to PWD is 3,500 AF/yr, and the maximum contract quantity available to TCWD is 6,400 AF/yr, subject to seasonal restrictions and potential curtailments depending on water year type and water supply conditions. CVP contract supplies available to both districts are used for agricultural purposes. Historically, irrigators in PWD and TCWD have not used the full contract quantity.

This project would incentivize expanded use of CVP supply by irrigators in PWD and TCWD, with the goal of using the full contract supply available to each district. By encouraging irrigators to use more surface water, this project would offset groundwater demand and provide in-lieu recharge benefits to Red Bluff Subbasin.

This project is one of two potential projects developed for implementation that were modeled in the Tehama IHM as part of the projected with future land use, 2070CT climate change, and PMAs scenario. Assumptions and results of this scenario are summarized in Section 4.1.1.1 above and described in greater detail in Section 2 of the GSP.

4.4.4.2 Implementation

This project has been proposed for implementation as one strategy for achieving and maintaining groundwater sustainability in the Red Bluff Subbasin. The overarching goal of this project is to reduce groundwater use and dependence by expanding utilization of available surface water supplies within the Subbasin. The project is planned for implementation before 2042, with the exact timeline dependent on grower willingness to take additional surface water and/or availability of funding for project incentives.

PWD and TCWD have existing water contracts, infrastructure, and associated permitting in place to operate the proposed program:

- Existing CVP contract supplies, subject to seasonal limitations and potential curtailments depending on water year type and water supply conditions
    - PWD contract: 14-06-200-7311-LTR1
    - TCWD contract: 14-06-200-5271A-LTR1
- Existing district infrastructure for delivering available CVP supplies to irrigators
    - Water is delivered in PWD through a district-maintained pipeline distribution system
    - Water is delivered in TCWD through a landowner-maintained canal system

Initial program implementation may require a planning study of program costs and financial parameters, and an evaluation of the costs of groundwater relative to the costs of surface water for irrigators. This would establish program feasibility and potential program scale.

Benefits are expected to begin accruing as early as the second or third year or project implementation, depending on voluntary grower willingness to participate and establishment of program incentives. Accrual of benefits would depend on water supply conditions, as all CVP contracts contain a shortage provision allowing Reclamation to reduce the amount of water made available for a variety of reasons, such as drought.

4.4.4.2.1 Implementation Schedule

A general implementation schedule for the project is presented in **Table 4-10.** At this time, the project has been developed at an investigative, planning level. The precise start date for the project may depend on grower willingness to take additional surface water and may depend on funding for project incentives. The precise timeline for implementation will be reported in GSP annual reports and periodic evaluations when known.

Table 4-15. Project Implementation Schedule

PHASE/TIMELINE ACTIVITY	DESCRIPTION	YEAR START	YEAR END
Project Planning and Concept Development	Evaluate lands, existing infrastructure, permitting, and irrigators potentially willing to take additional surface water.	Year 1 of Project Implementation	Year 2 of Project Implementation; Ongoing as needed
Program Development and Incentives Analysis	Develop program costs and financial parameters; assess groundwater costs relative to surface water costs and irrigators' willingness to accept incentives; establish program costs and structure	Year 2 of Project Implementation	Year 3 of Project Implementation
Program Operation	Program implementation, monitoring, updates, and ongoing agreements	Year 2/3 of Project Implementation	Ongoing

4.4.4.2.2 Notice to Public and Other Agencies

The public and other agencies will be notified of planned project implementation activities through outreach and communication channels identified in the GSP.

4.4.4.2.3 Construction Activities and Requirements

There are no anticipated infrastructure construction activities and requirements, as the project will use existing infrastructure and facilities.

4.4.4.2.4 Water Source

This project would use CVP supplies that are currently available to PWD and TCWD through existing contracts with Reclamation. Water is diverted to both districts from the Sacramento River at the Red Bluff Diversion Dam and conveyed through the Corning Canal.

PWD has a contract for 3,500 AF/yr of CVP supplies, depending on water year type, through contract number 14-06-200-7311-LTR1. The contract volume is subject to seasonal limitations (water is available May 15th – September 15th) and may be restricted depending on water year type and water supply conditions, as described in the contract shortage provisions. CVP supplies have been delivered to PWD since 1961 and are generally considered to be reliable. Table 8-16 summarizes the average annual allocation to PWD and the estimated unused allocation by water year type over the period 1992-2019.

TCWD has a contract for 6,400 AF/yr of CVP supplies, depending on water year type, through contract number 14-06-200-5271A-LTR1. The contract volume is subject to seasonal limitations (water is available May 15th – September 15th) and may be restricted depending on water year type and water supply conditions, as described in the contract shortage provisions. CVP supplies have been delivered to TCWD since 1971 and are generally considered to be reliable. Table 8-16 summarizes the average annual allocation to TCWD and the estimated unused allocation by water year type over the period 1992-2019.

Table 4-16. Summary of Annual Allocations and Estimated Unused Allocations of CVP Supply

DISTRICT:	PROBERTA WATER DISTRICT	THOMES CREEK WATER DISTRICT
Maximum Contract Quantity	3,500 AF/year	6,400 AF/year
SACRAMENTO VALLEY WATER YEAR TYPE	**AVERAGE ANNUAL ALLOCATION[1] (AF/WATER YEAR, 1992-2019)**	**AVERAGE ANNUAL ALLOCATION[1] (AF/WATER YEAR, 1992-2019)**
Wet (W)	3,500	6,400
Above Normal (AN)	3,500	6,400
Below Normal (BN)	3,500	6,400
Dry (D)	2,625	4,800
Critical (C)	735	1,344
All Years, Weighted Average	2,850	5,211
SACRAMENTO VALLEY WATER YEAR TYPE	**AVERAGE ESTIMATED UNUSED ALLOCATION[1,2] (AF/WATER YEAR, 1992-2019)**	**AVERAGE ESTIMATED UNUSED ALLOCATION[1,2] (AF/WATER YEAR, 1992-2019)**
Wet (W)	1,510	2,760
Above Normal (AN)	900	1,640
Below Normal (BN)	1,440	2,630
Dry (D)	330	600
Critical (C)	180	320
All Years, Weighted Average	960	1,760

[1] Based on historical allocations and analysis of Central Valley Operations data for the period 1992 through 2019.

[2] Average Estimated Unused Allocation assumes the CVO-reported deliveries from the Corning Canal were delivered to individual contractors based on percent of contracts held by the individual contractors (64.5% to Corning Water District, 12.5% to PWD, and 22.9% to TCWD).

4.4.4.2.5 Circumstances and Criteria for Implementation

The primary sources of uncertainty and potential constraints on the operation of this project are: (1) the participation of irrigators willing to take additional surface water supplies, (2) the availability of CVP contract supplies relative to irrigation demand, and (3) the availability of funding for program incentives.

Irrigator participation needed for this project includes:

- Willingness of irrigators to participate in this program, informed by requests for surface water deliveries and program applications (if applicable)
- Availability of participating fields able to take surface water from the PWD and TCWD distribution systems

Surface water supply conditions needed for this project include:

- Appropriate timing of CVP contract supply availability relative to the timing of irrigation demand (CVP supplies are available May 15th – September 15th)
- Reliability of CVP contract supplies, based on historical reliability and expected future reliability
- Program funding needs for this project may include:
- Identification of funding for program development (to cover costs for incentive studies, etc.)
- Identification of funding for program incentives

This project is planned for future implementation pending funding and changes in future groundwater conditions in the Red Bluff Subbasin. The GSA will monitor groundwater levels in the Subbasin through the monitoring plan in this GSP. If groundwater levels decline near or below minimum thresholds, this project may be prioritized for earlier implementation to support in-lieu recharge in those areas where undesirable results may occur. The Districts may also decide to implement this project at an earlier time to support groundwater sustainability in the Subbasin.

Ongoing implementation of this project does not depend on the implementation or performance of other projects or activities in the Subbasin. While operation of this program is not expected to terminate, any future changes will be made to align with the GSA's and/or Districts' goals and the overall Subbasin sustainability goal.

4.4.4.2.6 Legal Authority, Permitting Processes, and Regulatory Control

PWD and TCWD have the legal authority to deliver additional CVP supplies to irrigators up to their maximum contract amount (or less, depending on the water year type). The planning and implementation of this project will be done in accordance with all required permitting processes and regulatory control. PWD and TCWD already have CVP contracts, permitting, and infrastructure in place to operate the program. No additional permitting requirements are anticipated, though PWD and TCWD will consult with governing agencies, as needed.

4.4.4.3 Operation and Monitoring

PWD and TCWD (or landowners in TCWD) will operate, maintain, and monitor existing facilities that would be utilized for the project during implementation and operation. No new additional facilities are planned for development.

Ongoing project monitoring will include a range of activities to evaluate the benefits described in the next section. This will include local monitoring to track the use of additional volumes of surface water made available through the project and estimates of the reduction in groundwater use relative to pre-project baselines. Assessments of economic incentives will also be conducted to evaluate their utility in encouraging surface water usage. Monitoring may include additional outreach to irrigators and landowners, which would be used to refine the program design and encourage additional adoption.

The benefit of utilizing additional surface water for in-lieu recharge on sustainability indicators in the Red Bluff Subbasin (groundwater levels, groundwater storage, interconnected surface water, and land subsidence) will be monitored using the monitoring network sites and monitoring practices described in the GSP.

4.4.4.4 Benefits and Costs

The primary anticipated benefit of the project is reduction of groundwater pumping resulting from in-lieu groundwater recharge. As described previously, reduction in groundwater pumping is expected to primarily benefit groundwater levels and groundwater storage in the Red Bluff Subbasin. The project would also help to prevent potential depletions of interconnected surface water or land subsidence, to the extent that these are connected to changes in groundwater levels and groundwater storage in and around the project area. These benefits are expected throughout program implementation, beginning the second or third year of project implementation (Table 8-15). These benefits will be monitored as described in the operation and monitoring section, above.

The expected in-lieu groundwater recharge benefits of this project are summarized in Table 8-17. Benefits to the groundwater system were modeled in the Tehama IHM by simulating potential deliveries of CVP supplies to irrigated lands in PWD and TCWD, up to the maximum contract quantity. Based on model results, the simulated reduction in groundwater pumping attributed to this project is approximately 1,640 AF/yr over the projected future water budget period. While changes in water availability may impact the extent of project benefits and program participation from year to year, the program is anticipated to continue every year that additional CVP supplies are available. A more detailed assessment of project benefits would be completed during GSP implementation, as additional information is available.

The primary project cost of this project would be the incentives offered to irrigators to encourage expanded use of available CVP supplies. A detailed assessment of the project incentive structure and associated costs is beyond the scope of this initial project investigation for the GSP. Project planning costs and program incentives will be identified through further project development and will be reported through GSP annual reports and periodic evaluations when known.

It is anticipated that the costs of the project would primarily be recovered through GSA assessments as all water users in the Red Bluff Subbasin will realize regional benefits through this project. Other potential funding sources include grants, and loans.

Table 4-17. Estimated Average Reduction in Groundwater Pumping Resulting from the Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District (2022-2072).

DISTRICT	ESTIMATED AVERAGE ANNUAL REDUCTION IN GROUNDWATER PUMPING, 2022-2072 (AF/WATER YEAR)
Proberta Water District	810
Thomes Creek Water District	830
Total	**1,640**

4.4.5 El Camino Restoration Project

4.4.5.1 Overview

The El Camino Restoration Project is proposed by the El Camino Irrigation District to monitor and reduce groundwater use within the district. The El Camino Irrigation District was formed in 1921 to provide water for irrigation and domestic needs and uses. The primary water source supplied to irrigators in the district is groundwater pumped from district-owned wells.

To support groundwater sustainability in the Red Bluff Subbasin, the El Camino Irrigation District plans to restore and modernize its water supply infrastructure. This project would identify and fix the most inefficient pumps in the El Camino Irrigation District conveyance and distribution system, replace concrete pipelines with more durable PVC pipe, replace hub gates, and install flowmeters on each discharge pipe from every pump.

4.4.5.2 Implementation

This project is proposed for implementation in the El Camino Irrigation District. The district plans to replace the most inefficient pumps in its system, replace concrete pipelines with PVC pipelines, replace hub gates, and install flow meters. The precise location and configuration of these improvements are not specified at this time but would be determined and reported following further evaluation.

The project would provide in-lieu groundwater recharge benefits to the Red Bluff Subbasin by monitoring and reducing groundwater use within the district.

4.4.5.2.1 Implementation Schedule

This project is currently in the early, conceptual planning phase. The start and completion dates for this project are not reported at this time but will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years following improvements to the system, potentially beginning the first year of project implementation.

This project would be implemented and monitored with respect to groundwater conditions. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin

4.4.5.2.2 Notice to Public and Other Agencies

The public and other agencies will be notified of planned project implementation activities through outreach and communication channels identified in the GSP.

4.4.5.2.3 Construction Activities and Requirements

This project will require:

- Installation of new pumps to replace the most inefficient pumps,
- Installation of PVC pipelines to replace concrete pipelines,
- Replacement of hub gates, and
- Installation of flow meters on each discharge pipe from every pump.

4.4.5.2.4 Water Source

This project would not directly use water supplies but would improve management and utilization of groundwater supplies in the Red Bluff Subbasin within sustainable conditions, as defined according to the sustainable management criteria.

4.4.5.2.5 Circumstances and Criteria for Implementation

This project is currently in the early, conceptual planning phase. The project is planned for future implementation pending funding and changes in future groundwater conditions in the Red Bluff Subbasin. The GSA will monitor groundwater levels in the Subbasin through the monitoring plan in this GSP. If groundwater levels decline near or below minimum thresholds, this project may be prioritized to support in-lieu recharge in those areas where undesirable results may occur. El Camino Irrigation District may also decide to implement this project at an earlier time to support groundwater sustainability in the Subbasin or other district objectives.

Ongoing implementation of the El Camino restoration project does not depend on the implementation or performance of other projects or activities. While operation of this program is not expected to terminate, any future changes will be made to align with the GSA’s and district’s goals and the overall Subbasin sustainability goal.

4.4.5.2.6 Legal Authority, Permitting Processes, and Regulatory Control

Districts have the authority to plan and implement projects. Required permitting and regulatory review will depend on the precise configuration of the project and will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include but is not limited to: the County of Tehama, DWR, SWRCB, the Regional Water Board, and others.

4.4.5.3 Operation and Monitoring

This project is currently in the early planning stage. Thus, the expected timeline and operation of this this project are not reported at this time but will be reported in GSP annual reports and five-year updates when known.

Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.

All benefits to sustainability indicators in the Red Bluff Subbasin will be evaluated through groundwater monitoring and water quality monitoring at nearby monitoring sites, identified in the GSP.

4.4.5.4 Benefits and Costs

The primary anticipated benefit of the project is reduction of groundwater pumping resulting from reducing losses in the distribution system and better monitoring of the volumes pumped. The project would also help to prevent potential depletions of interconnected surface water or land subsidence, to the extent that these are connected to changes in groundwater levels and groundwater storage in and around the project area. Benefits are expected to accrue in all years following improvements to the system, potentially beginning the first year of project implementation. Benefits will be monitored as described in the operation and monitoring section, above.

This project is currently in the early planning stage. Thus, the expected yield and anticipated cost of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. It is anticipated that El Camino Irrigation District would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.4.6 Elder Creek Non-Native, Invasive Species (NIS) Plant Control

4.4.6.1 Overview

The Tehama County Resource Conservation District has previously initiated efforts to remove non-native, invasive plant species (NIS plants) from riparian zones throughout Tehama County. This project would initiate a similar effort to first identify and then strategically remove NIS plants in the Elder Creek watershed, with a focus on giant reed (Arundo donax) and salt cedar (Tamarisk). On account of the levee systems along Elder Creek near Gerber, CA, this project would require permitting and regulatory control processes through the Army Corps of Engineers (ACOE).

The goal of this project would be to reduce demand on riparian and groundwater resources, with benefits to increased groundwater availability for all beneficial users of groundwater in the Subbasin and improved surface water conveyance and ground and surface water interactions.

It is anticipated that follow up treatments would be required as part of this project to assure control of invasive species and ensure healthy functioning of the watershed. Once formerly infested sites are free of infestations, native plants may also need to be reestablished in order to expedite the development of the Creek's riparian corridor. This project could also be implemented to enhance existing riparian habitat by filling-in fragmented areas with native species, controlling erosion along creek banks, implementing riparian fencing, and/or obtaining conservation easements to protect riparian resources.

4.4.6.2 Implementation

Implementation of the Elder Creek NIS plant control project would occur in phases, with periodic follow-up after project initiation. This project will be implemented or coordinated by the Tehama County Resource Conservation District, with potential support from other agencies in the Subbasin.

Project work entails the identification and removal of NIS plants species along the riparian corridor, particularly giant reed (Arundo donax) and salt cedar (Tamarisk). The amount and extent of NIS plant growth would first be identified, followed by strategic removal. Due to the growth characteristics of Arundo donax and Tamarisk in particular, follow up treatments are expected to be required in order to achieve control of infested sites and to treat missed areas of infestation. At appropriate intervals, additional sites for removal would be identified, with refinement according to lessons learned from earlier project implementation.

Once formerly infested sites are free of infestations, native plants may also need to be reestablished in order to expedite the development of the Elder Creek riparian corridor and to prevent erosion of creek banks. The project may identify fragmented riparian areas that need to be filled-in, and where riparian fencing and conservation easements would be beneficial. This would be followed by the appropriate actions for each location: planting of native species, obtainment of proper permitting, and construction of riparian fencing. The GSA would work with appropriate authorities to obtain permissions where necessary.

Benefits to groundwater demand reduction and wetland habitat improvement would be analyzed, reported, and used to inform later, phases of project implementation.

4.4.6.2.1 Implementation Schedule

At this time, the project has been developed at an investigative, planning level. Thus, the implementation and termination dates of the ongoing follow-up portion have yet to be determined. Criteria for implementation will depend on the availability of funding, regrowth of invasive species and other factors. The precise timeline for implementation will be reported in GSP annual reports and periodic evaluations when known.

4.4.6.2.2 Notice to Public and Other Agencies

The public and other agencies will be notified of planned project implementation activities through outreach and communication channels identified in the GSP.

4.4.6.2.3 Construction Activities and Requirements

If deemed appropriate for specific locations along Elder Creek, riparian fencing could be constructed as part of this project. Requirements for such construction would include permission from landowners, identification of location for fence posts, and installation of posts and fencing.

Appropriate permits will be obtained for work around and near the surface water infrastructure described in this project. While mechanical means may be used to remove trees and transport them to an appropriate disposal facility, this project does not involve any major construction activities.

4.4.6.2.4 Water Source

This project would not directly use water supplies but would reduce demand for shallow groundwater consumed by non-native, invasive species in the Red Bluff Subbasin. Reduction in groundwater demand will support achievement and maintenance of sustainable groundwater conditions, as defined according to the sustainable management criteria.

4.4.6.2.5 Circumstances and Criteria for Implementation

The circumstances for implementation of this project will depend on the availability of funding, regrowth of invasive species, timing of required permitting activities, and other factors.

4.4.6.2.6 Legal Authority, Permitting Processes, and Regulatory Control

GSAs, Districts, and individual project proponents have the authority to plan and implement projects. The County has a permitting role for this demand management project. This project would also require permitting and regulatory control processes through the Army Corps of Engineers (ACOE), particularly related to the levee systems along Elder Creek near Gerber, CA. This project may require an environmental review process under CEQA. If required, this project would need either an Environmental Impact Report and Negative Declaration or Mitigated Negative Declaration.

4.4.6.3 Operation and Monitoring

Expert knowledge will be required to identify and mark invasive species for removal. Both herbicide and manual removal methods would be employed. Monitoring will occur over the course of project implementation. Periodic follow-up will take place through visual inspection and will follow the same procedure.

Sustainability indicators that are expected to benefit from this project include increased groundwater levels and groundwater storage, as well as reduction in depletions of interconnected surface water. All benefits to sustainability indicators in the Red Bluff Subbasin will be evaluated through groundwater monitoring and water quality monitoring at nearby monitoring sites, identified in the GSP.

4.4.6.4 Benefits and Costs

There are multiple expected benefits of this project. Through the control of NIS plants, the threat of their spreading into the Sacramento River's main stem is reduced as is their impacts on those portions of the Creek's riparian zone which now contain infestations. The project is also expected to improve surface water infrastructure conveyance and decrease groundwater demand in riparian zones. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and will be reported in annual reports when known.

Restoration of the natural riparian habitat around Elder Creek has multiple expected benefits as well. Filling-in fragmented areas with native species, controlling erosion along creek banks, implementing riparian fencing, and/or obtaining conservation easements to protect riparian resources will increase recharge potential along Elder Creek. Improved native habitat may increase the ability of the area surrounding the creek to reduce flood water velocity and to recharge flood water into the groundwater while simultaneously assisting with erosion control and sediment trapping (NRCS, 1996). Recycling of nutrients and other chemical reactions within the riparian zone may also improve groundwater quality through absorption of chemicals and nutrients.

Evaluation of benefits will be quantified through post project monitoring. Post project monitoring will be compared to pre-project data as a means of quantifying the benefit. Post project monitoring may include but is not limited to: flow measurement consistent with state regulations, consumptive use analysis, reductions in groundwater use, well monitoring, determination of infiltration rates, water balance analysis, as-built drawings, and stream gaging.

This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in annual reports when known. Potential funding sources are being evaluated as project planning continues; they include, but are not limited to, the following: grants, loans, bonds, assessment fees, and cost-sharing programs. Potential funding sources will be reported in annual reports when known.

4.4.7 Tehama West Non-Native, Invasive Species (NIS) Plant Control

4.4.7.1 Overview

This project would identify and strategically remove non-native, invasive plant species (NIS plants) from riparian zones in watersheds originating in the western edge of Tehama County (the Tehama West watersheds), with the exception of the Elder Creek watershed which is covered in the previous project.

Most components of the proposed project are similar to the Elder Creek NIS plant control project, except that the Elder Creek project would require additional permitting and regulatory control processes through the Army Corps of Engineers (ACOE) on account of the levee systems along Elder Creek near Gerber, CA.

The goal of this project would be to reduce demand on riparian and groundwater resources, with benefits to increased groundwater availability for all beneficial users of groundwater in the Subbasin and improved surface water conveyance and ground and surface water interactions.

It is anticipated that follow up treatments would be required as part of this project to assure control of invasive species and ensure healthy functioning of the watershed. Once formerly infested sites are free of infestations, native plants may also need to be reestablished in order to expedite the development of the riparian corridors. This project could also be implemented to enhance existing riparian habitat by filling-in fragmented areas with native species, controlling erosion along creek banks, implementing riparian fencing, and/or obtaining conservation easements to protect riparian resources.

4.4.7.2 Implementation

Like the Elder Creek NIS plant control project, implementation of the Tehama West NIS plant control project would occur in phases, with periodic follow-up after project initiation. This project will be implemented or coordinated by the Tehama County Resource Conservation District, with potential support from other agencies in the Subbasin.

Project work entails the identification and removal of NIS plants species along riparian corridors, particularly giant reed (Arundo donax) and salt cedar (Tamarisk). The amount and extent of NIS plant growth would first be identified, followed by strategic removal. Due to the growth characteristics of Arundo donax and Tamarisk in particular, follow up treatments are expected to be required in order to achieve control of infested sites and to treat missed areas of infestation. At appropriate intervals, additional sites for removal would be identified, with refinement according to lessons learned from earlier project implementation.

Once formerly infested sites are free of infestations, native plants may also need to be reestablished in order to expedite the development of the riparian corridors and to prevent erosion of creek banks. The project may identify fragmented riparian areas that need to be filled-in, and where riparian fencing and conservation easements would be beneficial. This would be followed by the appropriate actions for each location: planting of native species, obtainment of proper permitting, and construction of riparian fencing. The GSA would work with appropriate authorities to obtain permissions where necessary.

Benefits to groundwater demand reduction and wetland habitat improvement would be analyzed, reported, and used to inform later, phases of project implementation.

4.4.7.2.1 Implementation Schedule

At this time, the project has been developed at an investigative, planning level. Thus, the implementation and termination dates of the ongoing follow-up portion have yet to be determined. Criteria for implementation will depend on the availability of funding, regrowth of invasive species and other factors. The precise timeline for implementation will be reported in GSP annual reports and periodic evaluations when known.

4.4.7.2.2 Notice to Public and Other Agencies

The public and other agencies will be notified of planned project implementation activities through outreach and communication channels identified in the GSP.

4.4.7.2.3 Construction Activities and Requirements

If deemed appropriate for specific locations along the Tehama West creeks, riparian fencing could be constructed as part of this project. Requirements for such construction would include permission from landowners, identification of location for fence posts, and installation of posts and fencing.

Appropriate permits will be obtained for work around and near the surface water infrastructure described in this project. While mechanical means may be used to remove trees and transport them to an appropriate disposal facility, this project does not involve any major construction activities.

4.4.7.2.4 Water Source

This project would not directly use water supplies but would reduce demand for shallow groundwater consumed by non-native, invasive species in the Red Bluff Subbasin. Reduction in groundwater demand will support achievement and maintenance of sustainable groundwater conditions, as defined according to the sustainable management criteria.

4.4.7.2.5 Circumstances and Criteria for Implementation

The circumstances for implementation of this project will depend on the availability of funding, regrowth of invasive species, timing of required permitting activities, and other factors.

4.4.7.2.6 Legal Authority, Permitting Processes, and Regulatory Control

GSAs, Districts, and individual project proponents have the authority to plan and implement projects. The County has a permitting role for this demand management project. This project may also require permitting through the Army Corps of Engineers (ACOE). This project may require an environmental review process under CEQA. If required, this project would need either an Environmental Impact Report and Negative Declaration or Mitigated Negative Declaration.

4.4.7.3 Operation and Monitoring

Expert knowledge will be required to identify and mark invasive species for removal. Both herbicide and manual removal methods would be employed. Monitoring will occur over the course of project implementation. Periodic follow-up will take place through visual inspection and will follow the same procedure.

Sustainability indicators that are expected to benefit from this project include increased groundwater levels and groundwater storage, as well as reduction in depletions of interconnected surface water. All benefits to sustainability indicators in the Red Bluff Subbasin will be evaluated through groundwater monitoring and water quality monitoring at nearby monitoring sites, identified in the GSP.

4.4.7.4 Benefits and Costs

There are multiple expected benefits of this project. Through the control of NIS plants, the threat of their spreading into the Sacramento River’s main stem is reduced as is their impacts on those portions of the riparian zone which now contain infestations. The project is also expected to improve surface water infrastructure conveyance and decrease groundwater demand in riparian zones. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and will be reported in annual reports when known.

Restoration of the natural riparian habitat around the Tehama West watersheds has multiple expected benefits as well. Filling-in fragmented areas with native species, controlling erosion along creek banks, implementing riparian fencing, and/or obtaining conservation easements to protect riparian resources will increase recharge potential along waterways. Improved native habitat may increase the ability of the area surrounding the creek to reduce flood water velocity and to recharge flood water into the groundwater while simultaneously assisting with erosion control and sediment trapping (NRCS, 1996). Recycling of nutrients and other chemical reactions within the riparian zone may also improve groundwater quality through absorption of chemicals and nutrients.

Evaluation of benefits will be quantified through post project monitoring. Post project monitoring will be compared to pre-project data as a means of quantifying the benefit. Post project monitoring may include but is not limited to: flow measurement consistent with state regulations, consumptive use analysis, reductions in groundwater use, well monitoring, determination of infiltration rates, water balance analysis, as-built drawings, and stream gaging.

This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in annual reports when known. Potential funding sources are being evaluated as project planning continues; they include, but are not limited to, the following: grants, loans, bonds, assessment fees, and cost-sharing programs. Potential funding sources will be reported in annual reports when known.

4.5 Portfolio of Other Potential Projects and Management Actions

In addition to the PMAs developed for implementation, the GSA has identified a portfolio of other potential PMAs that could provide benefits with respect to one or more of the sustainability indicators. These PMAs are still under development and require additional information that would be determined through future monitoring and evaluation, and as the GSA continues to identify and collect additional data. This section provides descriptions for these other potential PMAs that could be selected for future implementation in the Red Bluff Subbasin if needed to maintain sustainability.

While the Red Bluff Subbasin is currently sustainable and is expected to be managed sustainably throughout the GSP planning and implementation horizon, the GSA has planned an adaptive management strategy that will be informed by continued monitoring of groundwater conditions throughout GSP implementation. If monitoring indicates that established measurable objectives (MOs) cannot be maintained and/or that minimum thresholds (MTs) are being approached, one or more of these potential PMAs could be evaluated and selected for implementation to ensure that the sustainability goal is achieved and that undesirable results do not occur.

The portfolio of potential PMAs is summarized below, organized according to PMA type. “Projects” generally refer to structural features or activities that may require construction and related permitting activities (e.g., recharge basins, Flood-MAR). “Management actions” are typically non-structural programs, policies, or efforts that serve to change behaviors and practices around groundwater use designed to support sustainable groundwater management (e.g., education programs, well ordinances). Per 23 CCR §354.44(b)(2), the potential management actions include demand management efforts that could be rapidly implemented and scaled if the Red Bluff Subbasin is approaching minimum thresholds specified in the GSP. Projects and management actions are expected to benefit specific groundwater sustainability indicators through their implementation, for example improving groundwater levels, groundwater storage, or water quality. "Other" activities are also proposed that do not directly benefit specific groundwater sustainability indicators but are still beneficial for effectively implementing the GSP. Examples of other activities include studies, monitoring, and improvements in modeling to better understand groundwater conditions in the Subbasin.

Potential PMAs are described at a reconnaissance-level of detail relative to the PMAs described in Section 8.4, above. However, PMA information is still reported in accordance with 23 CCR §354.44(b). The required information is summarized in a table following a brief description of each potential PMA.

4.5.1 Potential Projects

This section describes potential projects that would be implemented if determined to be necessary, pending future conditions in the Red Bluff Subbasin. **Table 4-18** lists the potential projects described in the subsections that follow.

Table 4-18. List of Potential Projects Proposed for the Red Bluff Subbasin

PROJECT	PRIMARY PROJECT TYPE(S)[1]
Direct Groundwater Recharge of Stormwater and Flood Water	Direct Groundwater Recharge
Stormwater Management Improvements	Direct Groundwater Recharge
Levee Setback and Stream Channel Restoration	Direct Groundwater Recharge
Recycled Water Projects	Direct Groundwater Recharge, In-Lieu Groundwater Recharge
Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	Groundwater Demand Reduction
Inter-Basin Surface Water Transfers or Exchanges	Surface Water Supply Augmentation
Water Supply Reservoir Construction, Renovation, or Conversion	Surface Water Supply Augmentation
Enhanced Boundary Flow Measurement	Additional Monitoring
Well Metering	Additional Monitoring

[1] The primary function of the project as conceptualized, although during implementation projects may be used for multiple functions to support groundwater sustainability.

4.5.1.1 Direct Groundwater Recharge of Stormwater and Flood Water

This project would recharge groundwater using excess surface water available in wet years. Additional recharge during wet years provided by this project would offset increased demand for groundwater during drier years (23 CCR §354.44(b)(9)). It is anticipated that this project would primarily use floodwater and stormwater, diverted directly from waterways, or delivered to recharge areas through existing conveyance infrastructure. Recharge may occur through conveyance structures such as unlined canal and laterals, natural drainages such as creek beds, recharge basins, agricultural fields, and aquifer storage and recovery (ASR) wells. Specific recharge areas are not yet identified but should have characteristics that are suitable for recharge (e.g., suitable surficial geology, low enough water levels to support recharge, and access to surface water). A summary of the project is provided in **Table 4-19.**

Table 4-19. Direct Groundwater Recharge of Stormwater and Flood Water: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation in areas of the Subbasin that have access to stormwater and/or flood water. The precise location would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would provide direct groundwater recharge to the aquifer. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years when stormwater and flood water is available, potentially beginning the first year of project implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This project would use flood water and stormwater when available along creeks, streams, and channels in and adjacent to the Red Bluff Subbasin. See Section 8.8 for additional information regarding water available for projects in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.2 Stormwater Management Improvements

This project would improve stormwater management efforts to enhance groundwater recharge during periods when stormwater is available. Improvements to existing facilities may include maintenance and repairs of pumps and holding basins to ensure they have adequate capacity to manage and retain anticipated stormwater. Improvements to the watershed and landscape may include restoration of areas affected by wildfires and of unused grazing land to reduce runoff and improve recharge. A summary of the project is provided in **Table 4-20**.

4.5.1.3 Levee Setback and Stream Channel Restoration

This project would restore stream channels and levee setbacks in the Subbasin to increase groundwater recharge of surface water along waterways. The project is also expected to provide other benefits to environmental water users, providing wildlife habitat, and improving the overall riparian ecosystem. A summary of the project is provided in **Table 4-21**.

Table 4-20. Stormwater Management Improvements: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation in areas of the Subbasin with existing stormwater management infrastructure, and in wildfire-affected areas or grazing land that may contribute to undesirable stormwater runoff characteristics. The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would provide direct groundwater recharge to the aquifer by reducing runoff and by improving or increasing the recharge potential of stormwater detention facilities. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years when stormwater flows occur, potentially beginning the first year of project implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability (§354.44(b)(6))	This project would use stormwater when available along creeks, streams, and channels in and adjacent to the Red Bluff Subbasin. See Section 4.8 for additional information regarding water available for projects in the Red Bluff Subbasin
Legal Authority, Permitting Processes,	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing

ITEM IN GSP REGULATIONS	DESCRIPTION
and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

Table 4-21. Levee Setback and Stream Channel Restoration: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation along stream channels in and surrounding the Subbasin boundaries. The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would provide direct groundwater recharge to the aquifer by restoring channel and levee characteristics, with additional benefits for environmental water users. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years stream flows occur, potentially beginning the first year of project implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This project would not directly use water supplies but would improve management and conveyance of existing flows along stream channels in and surrounding the Red Bluff Subbasin. See Section 8.8 for additional information regarding water available for projects in the Red Bluff Subbasin.

ITEM IN GSP REGULATIONS	DESCRIPTION
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.4 Rain-MAR

This project would modify on-field conditions and infrastructure to capture and hold precipitation, taking water that would have otherwise drained from the field through runoff and instead supplying that to the groundwater system through rainfall managed aquifer recharge (Rain-MAR). Rain-MAR would provide distributed groundwater recharge throughout the Subbasin, operating through voluntary grower participation. Besides groundwater recharge, Rain-MAR can also provide benefits to flood risk reduction by decreasing runoff, and to ecosystem enhancement for birds and other wildlife. A summary of the project is provided in **Table 4-22**.

Table 4-22. Rain-MAR: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation in agricultural areas of the Subbasin, particularly those with soil and slope characteristics suitable for retaining runoff and supplying recharge to the aquifer. The precise location would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would provide direct groundwater recharge to the aquifer. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years when precipitation and runoff occurs, potentially beginning the first year of project implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability (§354.44(b)(6))	This project would capture precipitation on-field, preventing runoff and using that water to recharge the aquifer instead. Precipitation may be available in all years, with additional precipitation in wetter years. See Section 2.3 for the Subbasin water budget, including average annual precipitation over the projected water budget period. This project increases subbasin recharge only in wet years when precipitation volume is high, such that some precipitation flows out of the subbasin,
Legal authority, permitting processes, and regulatory control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.5 Recycled Water Projects

Recycled water projects would identify and facilitate use of recycled water of suitable quality in the Subbasin. Recycled water could be used for groundwater recharge, urban or agricultural irrigation, or other purposes. Potential sources of recycled water include treated wastewater or treated process water from agricultural facilities. To generate additional supply, the projects may also explore enhancements to wastewater treatment facilities to supply tertiary-treated Title-22 effluent for irrigation. Projects may also explore construction of wetlands as a discharge site for treated wastewater, modeled after the completed Rio Alto Water District Wastewater Treatment Plant & Constructed Wetlands Project. Constructed wetlands may provide groundwater recharge benefits while also enhancing habitat for waterfowl and wildlife and provide other educational and recreational opportunities for the community. A summary of the projects is provided in **Table 4-23**.

Table 4-23. Recycled Water Projects: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation in all areas of the Subbasin with access to recycled water of suitable quality. The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. Depending on how and where recycled water is used, the project could provide direct groundwater recharge (e.g., when used to create wetlands) and in-lieu groundwater recharge (e.g., when used for irrigation) benefits. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years recycled water is available, potentially beginning the first year of project implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This project would use available recycled water supplies of suitable quality. This project is currently in the early planning stage. Precise sources and reliabilities of recycled water would be identified if/when the project is evaluated and selected for implementation. Those will be reported in GSP annual reports and five-year updates when known.
Legal Authority, Permitting Processes, and Regulatory Control	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not

ITEM IN GSP REGULATIONS	DESCRIPTION
(§354.44(b)(3); §354.44(b)(7))	limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.6 Invasive Plant Removal from Creeks and Irrigation Conveyance Canals

This project would remove invasive plants from creeks and irrigation conveyance canals (e.g., Arundo donax, tamarisk, Himalayan blackberry). Many small tributaries in the watersheds of Tehama County have decreased conveyance, high levels of siltation, and diminished flood-carrying capacity due to invasive vegetation overgrowth. Debris-clearing is a challenge due to environmental permitting restrictions. Removal of these plants along other waterways would reduce conveyance issues, reduce non-beneficial consumptive use of shallow groundwater and surface water, and restore conditions for GDEs and native riparian species. A summary of the project is provided in **Table 4-24**.

Table 4-24. Invasive Plant Removal: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation along stream channels and irrigation conveyance canals in the Subbasin. The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would reduce groundwater demand of those invasive species removed, with additional benefits for other environmental water users. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue beginning the first year of project implementation.

ITEM IN GSP REGULATIONS	DESCRIPTION
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	While there is no water source directly used by this project, removal of invasive plants species will reduce non-beneficial consumptive use of shallow groundwater and surface water, preserving an equal volume of water for other uses in the Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.7 Inter-Basin Surface Water Transfers or Exchanges

This project would promote inter-basin transfers or exchanges of underutilized surface water supplies from other subbasins in Tehama County. As part of this project, incentives for surface water use could also be explored to encourage in-lieu groundwater recharge. Potential opportunities for transfers and exchanges include, but are not limited to:

- Transfers of treated wastewater from the City of Red Bluff
- Trout Unlimited Groundwater substitution transfers, and
- Other Groundwater substitution transfers.

A summary of the project is provided in **Table 4-25**.

Table 4-25. Inter-Basin Surface Water Transfers or Exchanges: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation in all areas of the Subbasin with access to surface water supplies, particularly along irrigation conveyance canals or channels that could be used to transfer water. The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would augment surface water supplies available to users in the Subbasin, which could be used for direct groundwater recharge and/or in-lieu groundwater recharge, depending on how and where the water is used. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue beginning the first year of project implementation, pending potential transfers or exchanges.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This project would use surface water supplies procured through potential transfers or exchanges from other agencies in Tehama County. This project is currently in the early planning stage. Precise sources and reliabilities of surface water transfers or exchanges would be identified if/when the project is evaluated and selected for implementation.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.8 Water Supply Reservoir Construction, Renovation, or Conversion

This project would explore opportunities to construct, renovate, or convert flood control facilities to a water supply reservoir. Additional surface water storage would augment available surface water supplies for use in the Subbasin, with potential direct recharge or in-lieu recharge benefits depending on how or where the surface water is used. A summary of the project is provided in **Table 4-26.**

Table 4-26. Water Supply Reservoir Construction, Renovation, or Conversion: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation at existing flood control facilities in the Subbasin, or potentially at other locations identified as suitable for construction of a new water supply reservoir. The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would augment surface water supplies available to users in the Subbasin, which could be used for direct groundwater recharge and/or in-lieu groundwater recharge, depending on how and where the water is used. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to begin following reservoir construction, renovation, or conversion. Benefits are expected to accrue in all years when stormwater flows occur, potentially beginning the first year of project operation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This project would augment surface water supply resources by managing and storing flood flows along stream channels in and surrounding the Red Bluff Subbasin. See Section 8.8 for additional information regarding water available for projects in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling.

ITEM IN GSP REGULATIONS	DESCRIPTION
	Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.9 Enhanced Boundary Flow Measurement

This project would enhance measurement of boundary outflows from lands in the Subbasin. Outflows of interest include surface water outflows from canals and drains, and distributed outflows from irrigated lands, such as precipitation runoff and irrigation return flows. Distributed outflows, in particular, are believed to be a substantial component of the water budget but are largely unquantified at this time. Improved understanding of boundary outflows, which vary substantially from year to year, can facilitate, capture, and use the water for in-lieu recharge. A summary of the project is provided in **Table 4-27.**

Table 4-27. Enhanced Boundary Flow Measurement: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation at locations where surface water outflows occur (e.g., measurement sites at the ends of canals and drains), or at locations where surface water outflows can be estimated more accurately (e.g., measurement sites at strategic locations along streams and creeks). The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. The project would help to improve management of existing surface water supplies in the Subbasin, allowing this water to be captured and used for in-lieu recharge or other beneficial uses. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue beginning the first year of project operation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.

ITEM IN GSP REGULATIONS	DESCRIPTION
Water Source & Reliability (§354.44(b)(6))	This project would not directly use water supplies but would improve management and utilization of existing surface water supplies in the Red Bluff Subbasin. See Section 4.8 for additional information regarding water available for projects in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While enhanced boundary flow measurement is beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.1.10 Well Metering

This project would enhance monitoring of groundwater extractions in the Subbasin by installing meters on larger agricultural wells. The data collected through this project would help the GSA to better manage continued sustainability of the Subbasin within its sustainable yield and improve management of pumping for in-lieu recharge benefits. A summary of the project is provided in **Table 4-28.**

Table 4-28. Well Metering: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This project is proposed for implementation at larger agricultural wells in the Subbasin. The precise location of the project would be determined through further evaluation if/when the project is selected for implementation, depending on the characteristics of the chosen project configuration. Data collected through this project would help to manage continued operation of the Subbasin within its sustainable yield and allow better management of pumping for in-lieu recharge benefits. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue beginning the first year of project operation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This project would not directly use water supplies but would improve management and utilization of groundwater supplies in the Red Bluff Subbasin within the sustainable yield of the Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While well metering is beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

4.5.2 Potential Management Actions

This section describes potential management actions that would be implemented if determined to be necessary, pending future conditions in the Red Bluff Subbasin. **Table 4-29** lists the potential management actions described in the subsections that follow.

Table 4-29. List of Potential Management Actions Proposed for the Red Bluff Subbasin.

MANAGEMENT ACTION	MANAGEMENT ACTION TYPE(S)[1]
Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements	Education/Outreach, In-Lieu Groundwater Recharge
Incentives for Residential and Municipal Water Use Efficiency Improvements	Groundwater Demand Reduction
Demand Management	Groundwater Demand Reduction
Incentives for Use of Available Surface Water and Recycled Water	In-Lieu Groundwater Recharge
Water Market for Surface Water and Groundwater Exchange	In-Lieu Groundwater Recharge
Tehama County Domestic Well Tracking and Outreach Program	Additional Monitoring, Programs to Support Wells
Well Deepening or Replacement Program	Programs to Support Wells
Review of County Well Permitting Ordinances	Well Permitting Ordinances

[1] The primary function of the management action as conceptualized, although during implementation management actions may be used for multiple functions to support groundwater sustainability.

4.5.2.1 Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements

This management action would provide growers assistance with on-farm irrigation infrastructure improvements, especially capital improvements that support groundwater sustainability and allow growers to convert to dual-source irrigation systems. Dual-source irrigation systems support in-lieu groundwater recharge by allowing growers to use both surface water and groundwater for drip irrigation of orchards and other crops. Typical components required for a dual-source system are a surface water irrigation "turnout" or point of delivery to the field, a pipeline or ditch to convey water from the turnout to a pump station, a pump or pumps for pressurization, and filtration. Other improvements to water conveyance infrastructure may also support on-farm irrigation using surface water, including installation of regulating reservoirs, filters or treatment, and pressurization equipment.

Implementation of this management action together with the planned grower education program (Section 4.4.2) would further encourage on-farm practices that support groundwater sustainability. A summary of the management action is provided in **Table 4-30.**

Table 4-30. Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This management action is proposed for implementation in irrigated areas of the Subbasin that have access to surface water supplies (e.g., surface water supplier service areas, areas with surface water rights adjacent to waterways). The precise location would be determined through further evaluation if/when the management action is selected for implementation. The management action would provide in-lieu groundwater recharge by encouraging and incentivizing use of surface water for irrigation when available. This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years when surface water is available and used by participants in-lieu of groundwater, potentially beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This management action would use existing surface water supplies when available in the Red Bluff Subbasin. See Section 4.8 for additional information regarding water available for projects in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, depletion of interconnected surface water, and potentially water quality. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.2.2 Incentives for Residential and Municipal Water Use Efficiency Improvements

This management action would offer incentives for urban, residential, and commercial projects that improve water use efficiency. Residential and municipal water in the Subbasin is primarily supplied by groundwater. Improvements in residential and municipal water use efficiency thus support in-lieu groundwater recharge. Potential incentives and offers through this management action may include rebates for high efficiency appliances and incentives for lawn removal, low-water landscape installation, rain barrels, graywater reuse, or other activities that offset groundwater demand. Among these, only incentives for lawn removal and low-water landscape installation are expected to impact the Subbasin water budget, although all would offset some groundwater demand. This management action may also evaluate municipal water system operations and losses for other opportunities to reduce municipal water demand. A summary of the management action is provided in **Table 4-31**.

Table 4-31. Incentives for Residential and Municipal Water Use Efficiency Improvements: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This management action is proposed for implementation in residential areas and municipal service areas in the Subbasin. The precise location would be determined through further evaluation if/when the management action is selected for implementation. The management action would reduce groundwater demand by reducing residential and urban water demands, which are mainly met by groundwater in the Subbasin. This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This management action would not directly use water supplies but would improve management and utilization of groundwater supplies in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.

ITEM IN GSP REGULATIONS	DESCRIPTION
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.2.3 Demand Management

While demand management is not expected to be required in the Red Bluff Subbasin during GSP implementation, demand management has been identified as a backstop to other potential PMAs if those are insufficient to maintain sustainability over the GSP planning and implementation horizon.

If needed, this management action would implement any of various water management activities that reduce demand for groundwater, primarily by reducing the consumptive use of irrigation water and reducing net groundwater pumping (pumping net of recharge) in the Subbasin. The demand management activities proposed in this management action are configurable and scalable, allowing the GSA to implement only those activities needed to address localized groundwater concerns.

As described in Section 4.3.2**,** potential demand management activities that could be implemented in Tehama County include:

- **Management and Restrictions of Land Use Changes**: Implementing county water use ordinances or other policies to restrict land use changes that would increase water demand in the Subbasin. Policies would generally restrict development of new agricultural land, restrict growth in areas with no surface water supply, and/or promote conversion of agricultural lands to less water intensive crops.
- **Pumping Fees:** Implementing tiered fee structures for groundwater extractions to incentivize reduced groundwater use.
- **Groundwater Extraction Allocation Program:** Creating groundwater extraction allocations to curtail or restrict the volume of groundwater extraction allowed. Could be implemented with pumping fees.
- **Land Fallowing Program:** Curtailing and/or restricting groundwater extractions by creating and enforcing a land fallowing program.

- **Other County Ordinances**: The County may develop or review policies and ordinances that align with sustainable groundwater management goals. Possible ordinances include regulations and limits for groundwater use, export, and illegal diversion of surface water. The County could also create additional guidelines during the well permitting process to reduce nearby competition between wells (i.e., well spacing or suggestions regarding total well depth, depth of well perforations, and location of a new well relation to existing wells). Efforts may be designed to be protective of domestic wells.

A summary of the management action is provided in **Table 4-32.**

Table 4-32. Demand Management: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	Demand management is proposed for scaled implementation in areas of the Subbasin where groundwater conditions may cause undesirable results. While demand management is not expected to be required in the Red Bluff Subbasin during GSP implementation, demand management has been identified as a backstop to other potential PMAs if those are insufficient to maintain sustainability. The precise location would be determined through further evaluation if/when the management action is selected for implementation. The management action would reduce groundwater demand by reducing pumping (through fees or allocations) and by reducing consumptive water requirements (through fallowing or policies to restrict land use changes). This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This management action would reduce utilization of groundwater supplies in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.

ITEM IN GSP REGULATIONS	DESCRIPTION
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.2.4 Incentives for Use of Available Surface Water and Recycled Water

This management action would incentivize the use of surface water and/or recycled water for irrigation whenever those water sources are available. Incentivized pricing structures and conveyance infrastructure improvements that enhance the utility of these water supply sources are expected to reduce groundwater demand among growers who irrigate with groundwater for reasons of cost and convenience. By offsetting groundwater demand with a like volume of surface water or recycled water, this management action is expected to provide in-lieu groundwater recharge benefits to the Subbasin. A summary of the management action is provided in **Table 4-33**.

4.5.2.5 Water Market for Surface Water and Groundwater Exchange

This management action would create a water market for growers and other water users in the Red Bluff Subbasin, allowing them to exchange surface water and groundwater. A surface water and groundwater exchange would allow for flexibility in water use to meet irrigation demands, while maintaining groundwater extraction within the overall sustainable yield of the Subbasin. A summary of the management action is provided in **Table 4-34.**

Table 4-33. Incentives for Use of Available Surface Water and Recycled Water: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This management action is proposed for implementation in irrigated areas of the Subbasin that have access to surface water supplies (e.g., surface water supplier service areas) and/or areas adjacent to waterways and conveyance infrastructure that could be used to convey recycled water. The precise location would be determined through further evaluation if/when the management action is selected for implementation. The management action would provide in-lieu groundwater recharge by encouraging and incentivizing use of surface water and/or recycled water for irrigation when available. This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation, depending on availability of surface water and recycled water.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This management action would use surface water supplies and available recycled water supplies of suitable quality. See Section 4.8 for additional information regarding water available for projects in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

Table 4-34. Water Market for Surface Water and Groundwater Exchange: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This management action is proposed for implementation in irrigated areas of the Subbasin. The precise location would be determined through further evaluation if/when the management action is selected for implementation. The management action would provide flexibility to water users to manage the use of groundwater within the sustainable yield of the Subbasin. This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation, depending on participation and availability of surface water.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This management action would use surface water supplies and manage use of groundwater supplies within the sustainable yield of the Subbasin. See Section 4.8 for additional information regarding water available for projects in the Red Bluff Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.2.6 Tehama County Domestic Well Tracking and Outreach Program

This management action would create a system for tracking groundwater conditions at domestic wells across Tehama County. The centralized information in this system would allow the County to better manage and focus assistance and resources for domestic well owners in areas where monitoring indicates that groundwater levels have dropped, or in areas where wells are reported to have water quality impacts or have gone dry. This management action would also provide domestic well owners with resources and funding for well testing, inspection, and replacement, especially in areas where the tracking system indicates that wells have gone dry or that water quality concerns exist. Together, these actions will allow the County to be more proactive in supporting beneficial use of groundwater by domestic well users throughout GSP implementation. A summary of the management action is provided in **Table 4-35**.

4.5.2.7 Well Deepening or Replacement Program

This management action would create a program to deepen or replace shallow wells and/or wells that have gone dry in Tehama County. This program would complement the well tracking and outreach program described in the previous section. A summary of the management action is provided in **Table 4-36.**

Table 4-35. Tehama County Domestic Well Tracking and Outreach Program: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This management action is proposed for implementation throughout Tehama County. The management action would track dry domestic wells and offer outreach and assistance services to all domestic well users to support their ongoing beneficial use of groundwater. This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation, depending on participation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This management action would not directly use water supplies but would improve management and utilization of groundwater supplies in the Red Bluff Subbasin within the sustainable yield of the Subbasin.

ITEM IN GSP REGULATIONS	DESCRIPTION
Legal authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While domestic well tracking and outreach are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

Table 4-36. Well Deepening or Replacement Program: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This management action is proposed for implementation throughout Tehama County. The management action would create a program to deepen or replace shallow wells to support ongoing beneficial use of groundwater by those users. This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation, depending on participation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.

ITEM IN GSP REGULATIONS	DESCRIPTION
Water Source & Reliability (§354.44(b)(6))	This management action would not directly use water supplies but would improve management and utilization of groundwater supplies in the Red Bluff Subbasin within the sustainable yield of the Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While a well deepening and replacement program is beneficial to supporting beneficial uses and users of groundwater in the Subbasin, there are no anticipated direct benefits to specific sustainability indicators. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.2.8 Review of County Well Permitting Ordinances

Through this management action, Tehama County would review existing well permitting ordinances and assess whether additional well permitting requirements are warranted to maintain sustainable groundwater conditions in the Subbasin. As needed, county ordinances could be updated to follow the latest DWR-recommended well standards (described in DWR Bulletin 74). The management action may also improve the well permitting and installation program to help protect water quality, allow for better screening, and avoid interference or impacts of pumping on neighboring wells. A summary of the management action is provided in **Table 4-37**.

4.5.3 Potential Other Activities

This section describes other potential activities that could be implemented if determined to be necessary, pending future conditions in the Red Bluff Subbasin. These potential “other” activities are not expected to directly benefit specific groundwater sustainability indicators but are still beneficial for effectively implementing the GSP. Examples of other activities include studies, monitoring, and improvements in modeling to better understand groundwater conditions in the Subbasin

Table 4-38 lists the potential other activities described in the subsections that follow.

Table 4-37. Review of County Well Permitting Ordinances: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This management action is proposed for implementation throughout Tehama County. The management action would review existing County well permitting ordinances and assess whether additional well permitting requirements are warranted to support groundwater sustainability. This management action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other PMAs. This will be done in the context of Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This management action is currently in the early planning stage. Thus, the start and completion dates for this management action have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This management action would not directly use water supplies but would improve management and utilization of groundwater supplies in the Red Bluff Subbasin within the sustainable yield of the Subbasin.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While reviewing and updating County well permitting ordinances may be beneficial to supporting ongoing operation of the Subbasin within its sustainable yield, there are no anticipated direct benefits to specific sustainability indicators. This management action is currently in the early planning stage. Thus, the expected yield of this management action has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This management action is currently in the early planning stage. Thus, the anticipated costs of this management action have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

Table 4-38. List of Potential Other Activities Proposed for the Red Bluff Subbasin

OTHER ACTIVITY	OTHER ACTIVITY TYPE(S)[1]
Coordination and Development of Public Data Portals	Coordination and Data Sharing
Additional Studies of GDEs and Groundwater - Surface Water Interactions	Additional Monitoring
Expanded Subbasin Monitoring and Aquifer Testing	Additional Monitoring
Install Additional Agroclimate Stations	Additional Monitoring
Maintain and Expand Groundwater Level Monitoring Network	Additional Monitoring
One-Time Groundwater Quality Snapshot and Evaluation	Additional Monitoring
Tehama County Well Inventory and Registration Program	Additional Monitoring

[1] The primary function of the activity as conceptualized, although during implementation actions may be used for multiple functions to support groundwater sustainability.

4.5.3.1 Coordination and Development of Public Data Portals

This activity would maintain ongoing coordination and information sharing among water purveyors and agencies in the Tehama County subbasins and neighboring subbasins. As part of this activity, agencies may develop shared public data portals to track and monitor groundwater sustainability indicators. Coordination would determine the types of data and data formats available, and establish standard methods for receiving, storing, and sharing data with the public, DWR, other agencies. Coordination would also foster relationships with neighboring Subbasins, land use planning entities, and relevant local, state, and federal agencies and organizations. A summary of this activity is provided in **Table 4-39.**

Table 4-39. Coordination and Development of Public Data Portals: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This activity would foster joint coordination and information sharing among agencies in the Tehama County subbasins and neighboring subbasins. Information sharing may include development of shared public data portals to track and monitor groundwater sustainability indicators. This activity may be initiated to support GSP implementation if determined to be necessary or useful for maintaining ongoing sustainability in the Red Bluff Subbasin, pending future conditions. The details of this effort would be determined through further evaluation if/when the action is selected for implementation. Implementation will be done in the context of the Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This activity is currently in the early planning stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This activity will not directly use water supplies.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement coordination and data sharing efforts. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While coordination and data sharing are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators This activity is currently in the early planning stage. Thus, the expected yield of this activity has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This activity is currently in the early planning stage. Thus, the anticipated costs of this activity have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The County and/or other proponents would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.3.2 Additional Studies of GDEs and Groundwater - Surface Water Interactions

This activity would investigate the relationship between groundwater levels and access to surface water supplies on the health of groundwater dependent ecosystems (GDEs). Supporting analyses may consider a combination of surface water data, shallow groundwater level data, and remote sensing data related to vegetative cover to improve the understanding of how GDEs are affected by conditions in the groundwater aquifer accessed by pumping. Findings of these analyses may be used to refine how GDEs and their water supply needs are monitored and protected during GSP implementation. This activity would also evaluate the need for additional studies or monitoring of groundwater-surface water interactions to address potential data gaps, as needed. A summary of this activity is provided in **Table 4-40**.

4.5.3.3 Expanded Subbasin Monitoring and Aquifer Testing

This activity would expand monitoring efforts across the Subbasin to improve understanding of existing groundwater conditions, monitor changes in groundwater conditions throughout GSP implementation, and improve simulation of the Subbasin water budget within the Tehama IHM. Specific monitoring efforts may include:

- Aquifer testing to improve the understanding of aquifer conditions, particularly the level of confinement, connectivity between depths, connectivity with surface water bodies, and hydraulic properties.
- LIDAR (Light Detection and Ranging) data collection and analysis across the Subbasin to support monitoring of all sustainability indicators.
- Identification of locations in the Subbasin that are potentially vulnerable to damage from subsidence.

A summary of this activity is provided in **Table 4-41**.

Table 4-40. Additional Studies of GDEs and Groundwater - Surface Water Interactions: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This activity would analyze the water supplies used to support GDEs and evaluate the need for additional studies or monitoring of groundwater-surface water interactions to improve overall understanding of GDEs and address potential data gaps, as needed. This activity may be initiated to support GSP implementation if determined to be necessary or useful for maintaining ongoing sustainability in the Red Bluff Subbasin, pending future conditions. The details of this effort would be determined through further evaluation if/when the action is selected for implementation. Implementation will be done in the context of the Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This activity is currently in the early planning stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This activity will not directly use water supplies.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement studies. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While studies of GDEs and groundwater-surface water interactions are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This activity is currently in the early planning stage. Thus, the expected yield of this activity has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This activity is currently in the early planning stage. Thus, the anticipated costs of this activity have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The County and/or other proponents would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

Table 4-41. Expanded Subbasin Monitoring and Aquifer Testing: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This activity would expand monitoring efforts across the Subbasin (e.g., aquifer testing, LIDAR data collection) to improve understanding and modeling of groundwater conditions and address potential data gaps, as needed. This activity may be initiated to support GSP implementation if determined to be necessary or useful for maintaining ongoing sustainability in the Red Bluff Subbasin, pending future conditions. The details of this effort would be determined through further evaluation if/when the action is selected for implementation. Implementation will be done in the context of the Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This activity is currently in the early planning stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This activity will not directly use water supplies.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement monitoring and data collection efforts. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While Subbasin-wide monitoring and data collection efforts are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This activity is currently in the early planning stage. Thus, the expected yield of this activity has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This activity is currently in the early planning stage. Thus, the anticipated costs of this activity have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The County and/or other proponents would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.3.4 Install Additional Agroclimate Stations

This activity would install additional "agroclimate stations" that monitor agriculture-related weather and climate parameters. Data collected by these stations would help to inform agricultural water use practices and potentially enhance water conservation efforts through strategic irrigation scheduling. These data may also improve the accuracy of the Tehama IHM. A summary of this activity is provided in **Table 4-42.**

Table 4-42. Install Additional Agroclimate Stations: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This activity would install additional stations that monitor agriculture-related weather and climate parameters to inform agricultural water use practices, improve modeling of groundwater conditions, and address potential data gaps, as needed. This activity may be initiated to support GSP implementation if determined to be necessary or useful for maintaining ongoing sustainability in the Red Bluff Subbasin, pending future conditions. The details of this effort would be determined through further evaluation if/when the action is selected for implementation. Implementation will be done in the context of the Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This activity is currently in the early planning stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This activity will not directly use water supplies.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement monitoring and data collection efforts. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While monitoring and data collection efforts are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This activity is currently in the early planning stage. Thus, the expected yield of this activity has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.

ITEM IN GSP REGULATIONS	DESCRIPTION
Costs (§354.44(b)(8))	This activity is currently in the early planning stage. Thus, the anticipated costs of this activity have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The County and/or other proponents would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.3.5 Maintain and Expand Groundwater Level Monitoring Network

- Maintenance of wells in the existing monitoring network
- Identification of existing wells in the Subbasin that may be incorporated into the groundwater level monitoring network
- Identification of new monitoring wells that may be added to the groundwater level monitoring network.

- Ongoing coordination with other monitoring entities to support the use of identified monitoring locations as part of the monitoring network and to share relevant collected data.

- Maintaining and improving the monitoring network would improve the understanding of groundwater conditions in the Subbasin. Additional wells may be used to fill data gaps and improve understanding of aquifer conditions and dynamics, and groundwater conditions related to GDEs and surface water depletions.

A summary of this activity is provided in **Table 4-43**.

4.5.3.6 One-Time Groundwater Quality Snapshot and Evaluation

This activity would conduct a one-time sampling of groundwater quality parameters over a wide range of wells in Tehama County, providing a “groundwater quality snapshot” in Tehama County. The data collected through this effort would improve understanding of groundwater quality conditions in the Subbasin and provide a basis for refinement of the groundwater quality monitoring network. Evaluation of these data can also inform the selection of groundwater quality monitoring options that better characterize both widespread groundwater quality conditions and localized groundwater quality concerns.

A summary of this activity is provided in **Table 4-44.**

Table 4-43. Maintain and Expand Groundwater Level Monitoring Network: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This activity would maintain and expand the Subbasin groundwater level monitoring network to improve understanding of aquifer conditions and dynamics, and groundwater conditions related to GDEs and depletions of interconnected surface water. Monitoring will address potential data gaps, as needed, and improve modeling of groundwater conditions throughout GSP implementation. This activity may be initiated to support GSP implementation if determined to be necessary or useful for maintaining ongoing sustainability in the Red Bluff Subbasin, pending future conditions. The details of this effort would be determined through further evaluation if/when the action is selected for implementation. Implementation will be done in the context of the Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This activity is currently in the early planning stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue in all years beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This activity will not directly use water supplies.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement monitoring and data collection efforts. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While monitoring and data collection efforts are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This activity is currently in the early planning stage. Thus, the expected yield of this activity has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This activity is currently in the early planning stage. Thus, the anticipated costs of this activity have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The County and/or other proponents would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

Table 4-44. One-Time Groundwater Quality Snapshot and Evaluation: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This activity would conduct and evaluate a one-time sampling of groundwater quality parameters over a wide range of wells in Tehama County. The data collected in this study will improve understanding of groundwater quality conditions and provide a basis for refinement of the Subbasin monitoring network. This activity may be initiated to support GSP implementation if determined to be necessary or useful for maintaining ongoing sustainability in the Red Bluff Subbasin, pending future conditions. The details of this effort would be determined through further evaluation if/when the action is selected for implementation. Implementation will be done in the context of the Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This activity is currently in the early planning stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue following evaluation of data collected in the one-time groundwater quality snapshot.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This activity will not directly use water supplies.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement monitoring and data collection efforts. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation methodology (§354.44(b)(5))	While monitoring and data collection efforts are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This activity is currently in the early planning stage. Thus, the expected yield of this activity has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This activity is currently in the early planning stage. Thus, the anticipated costs of this activity have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The County and/or other proponents would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.5.3.7 Tehama County Well Inventory and Registration Program

This activity would create a county-wide well inventory to compile all available information on active wells in Tehama County and improve understanding of well distribution, construction, and hydrogeologic characteristics. The inventory would be useful for identifying and filling monitoring data gaps. Complementary to the inventory, Tehama County could also create a well registration program to collect well locations, screening information, and pumping data for use in GSP updates.

A summary of this activity is provided in **Table 4-45.**

Table 4-45. Tehama County Well Inventory and Registration Program: Summary (23 CCR §354.44(b)).

ITEM IN GSP REGULATIONS	DESCRIPTION
Implementation (§354.44(b)(1)(A); §354.44(b)(6))	This activity would create an inventory and registration program for all wells in Tehama County. Data collected through this program would improve understanding of well distribution, construction, and hydrogeology, and support ongoing Subbasin modeling and GSP implementation. This activity may be initiated to support GSP implementation if determined to be necessary or useful for maintaining ongoing sustainability in the Red Bluff Subbasin, pending future conditions. The details of this effort would be determined through further evaluation if/when the action is selected for implementation. Implementation will be done in the context of the Sustainable Management Criteria to ensure sustainable operation of the Red Bluff Subbasin.
Timeline (§354.44(b)(4))	This activity is currently in the early planning stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known. Benefits are expected to accrue beginning the first year of implementation.
Notice to Public and Other Agencies (§354.44(b)(1)(B))	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
Water Source & Reliability (§354.44(b)(6))	This activity will not directly use water supplies.
Legal Authority, Permitting Processes, and Regulatory Control (§354.44(b)(3); §354.44(b)(7))	The GSA, Districts, and individual proponents have the authority to plan and implement monitoring and data collection efforts. Required permitting and regulatory review will be initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Tehama, and CARB.
Benefits and Benefit Evaluation Methodology (§354.44(b)(5))	While monitoring and data collection efforts are beneficial to GSP implementation and supporting Subbasin sustainability, there are no anticipated direct benefits to specific sustainability indicators. This activity is currently in the early planning stage. Thus, the expected yield of this activity has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-action measurements supported by modeling.

ITEM IN GSP REGULATIONS	DESCRIPTION
	Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the Tehama IHM model used for GSP development.
Costs (§354.44(b)(8))	This activity is currently in the early planning stage. Thus, the anticipated costs of this activity have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The County and/or other proponents would identify funding sources to cover costs as part of development. These may include grants, fees, loans, and other assessments.

4.6 Project Financing

The plan and content related to project financing is in development.

4.7 GSA Coordination

4.7.1 Goals, Policies, and Ordinances

The Tehama County Flood Control and Water Conservation District (District) GSA is the exclusive GSA for the Red Bluff Subbasin. As a county-wide agency, the District was established in 1957 by legislation to, among other functions, provide for the control and conservation of flood and storm waters; the protection of watercourses and watersheds; and for the acquisition, retention, conservation, and distribution of drainage, storm, flood, and other waters for beneficial uses in Tehama County. These goals are aligned with the goals of other agencies within the Subbasin, and with GSAs in neighboring subbasins in Tehama County, many of which are also exclusively managed by the District GSA.

The District Board of Directors is composed of members of the Tehama County Board of Supervisors, who are responsible for passing ordinances and policies related to well permitting, groundwater aquifer protection, and groundwater use in the Subbasin. This overlapping organizational structure facilitates direct coordination of policies and ordinances that are directly aligned with the subbasin sustainability goal established by the GSA and the PMAs described in this GSP.

Specific policies and ordinances that may be reviewed during GSP implementation include:

- Well permitting ordinances to align well construction recommendations with DWR Bulletin 74, as needed, and/or to help protect water quality, allow for better screening, and avoid interference or impacts of pumping on neighboring wells. Efforts could be designed to be protective of domestic wells.
- Ordinances to regulate or limit groundwater use, export, and illegal diversion of surface water (would be considered if other planned PMAs are insufficient to maintain sustainability)

4.7.2 Well Owner Outreach and Education

Education and outreach efforts to well owners about proper well protection, maintenance, and monitoring will benefit individual well owners and all groundwater beneficial users. Wellhead protection efforts can help protect groundwater quality from impacts from surface activities. Regular well maintenance and monitoring will maximize the life of a well and its pumping equipment. Monitoring of well performance and groundwater conditions in a well will keep well owners aware of well or groundwater conditions that may impact the reliability or quality of water produced by their well. Well monitoring and reporting of monitoring information by well owners can also greatly benefit the Subbasin in understanding groundwater conditions, including identification of any groundwater management-related concerns. Outreach and education efforts by the Subbasin can coordinate with well owner outreach content available through other agencies and programs including ILRP, SWRCB, DWR, USGS, and others.

4.7.3 Participation in IRWMPs/GMPs/SNMPs/etc.

The GSA's and local stakeholders' continued role and participation in other water resources management efforts occurring with the Subbasin and at a more regional level are important to ensure coordination within and between groundwater subbasins in the area across different levels of water resources management. This involvement includes coordinating in development or updating of the Tehama County Groundwater Management Plan (GWMP), assisting with preparation and implementation of the North Sacramento Valley Integrated Regional Water Management Plan (IRWMP), and participation in other planning efforts involving salt and nutrient management plans, Irrigated Lands Regulatory Program (ILRP) and other groundwater quality related programs.

4.8 Subbasin Water Available for Projects

The Red Bluff Subbasin has three primary sources of surface water that could be a supply for groundwater recharge projects: the Sacramento River that is the western boundary of the subbasin, Elder Creek that runs through the subbasin, and Thomes Creek, the southern boundary of the subbasin. The information presented in this section illustrates the analysis that quantifies the potential water available for groundwater recharge projects.

Elder Creek originates in the foothills of the Coastal Ranges in the Mendocino National Forest and flows east to join the Sacramento River. The watershed upstream of the Sacramento Valley is approximately 90 square miles. The United States Geological Survey (USGS) has maintained a gage on Elder Creek from 1948 to present. The Elder Creek gage is located approximately 16 miles west of Highway 5 and 21 miles west of the Sacramento River near where Elder Creek enters the agricultural lands of the Sacramento Valley floor as shown in **Figure 4-1**. The average annual runoff from Elder Creek for the period of observed flows was approximately 72,000 acre-feet per year.

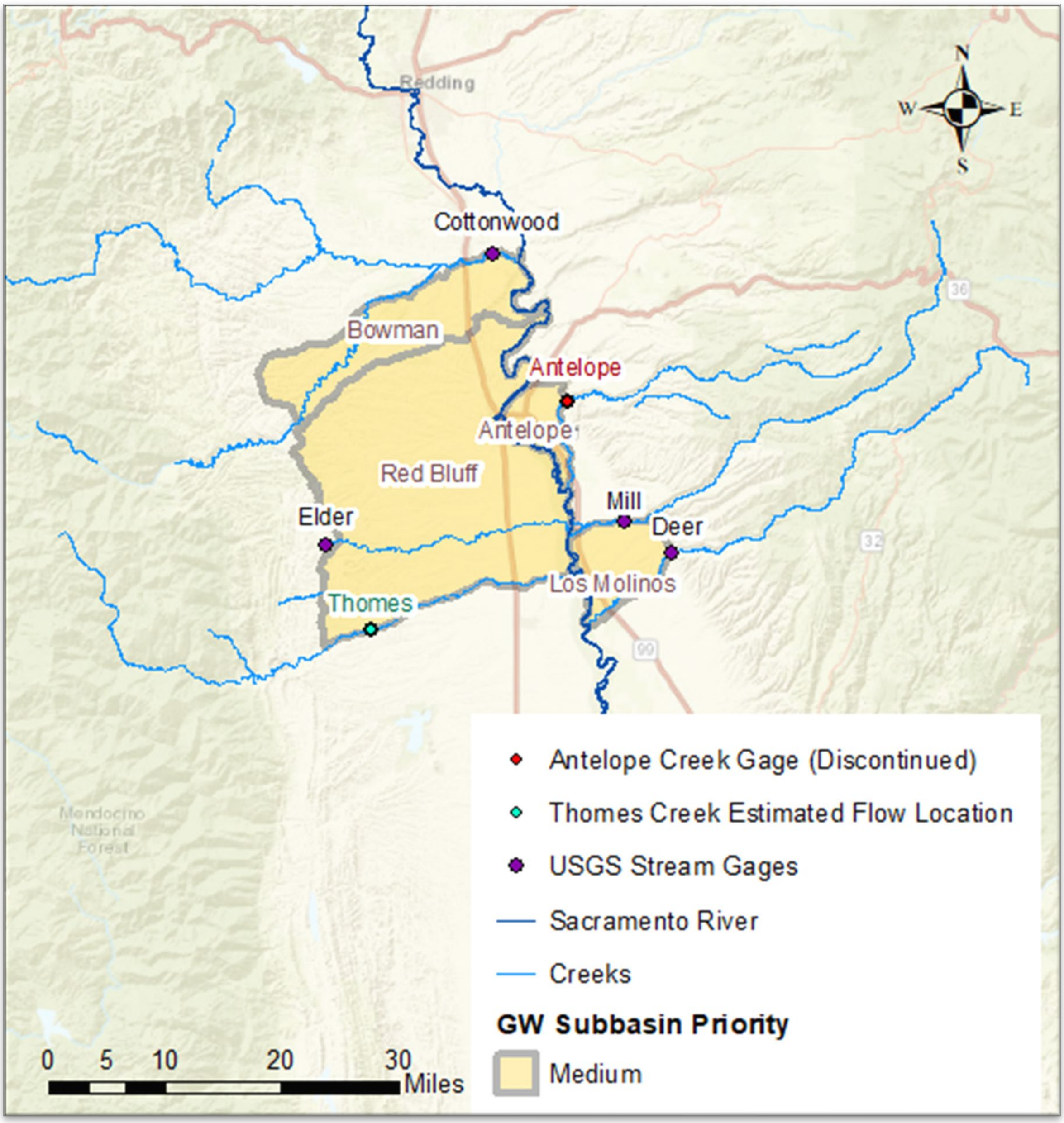

Figure 4-1. Map of Tehama County with Stream Gages and Groundwater Subbasins

The gaged daily flows for the period of water year 1949 through 2020 were used as a common period for surface water availability for Tehama County subbasins. **Figure 4-2** shows the monthly flow volume in Elder Creek averaged by water year type with the study period of 1949 -2020. The water year types shown in the figure are defined in the Sacramento Valley Water Year Hydrologic Classification (SWRCB Decision 1641) as shown in **Table 4-46**. The index is the Sacramento Valley unimpaired runoff for the water year.

Table 4-46. Water Year Classification Defined in Sacramento Valley Water Year Hydrologic Classification

CLASSIFICATION	ABBREVIATION	INDEX (MILLIONS OF ACRE-FEET)
Wet	W	>= 9.2
Above Normal	AN	7.8 – 9.2
Below Normal	BN	6.5 – 7.8
Dry	D	5.4 - 6.5
Critical	C	<= 5.4

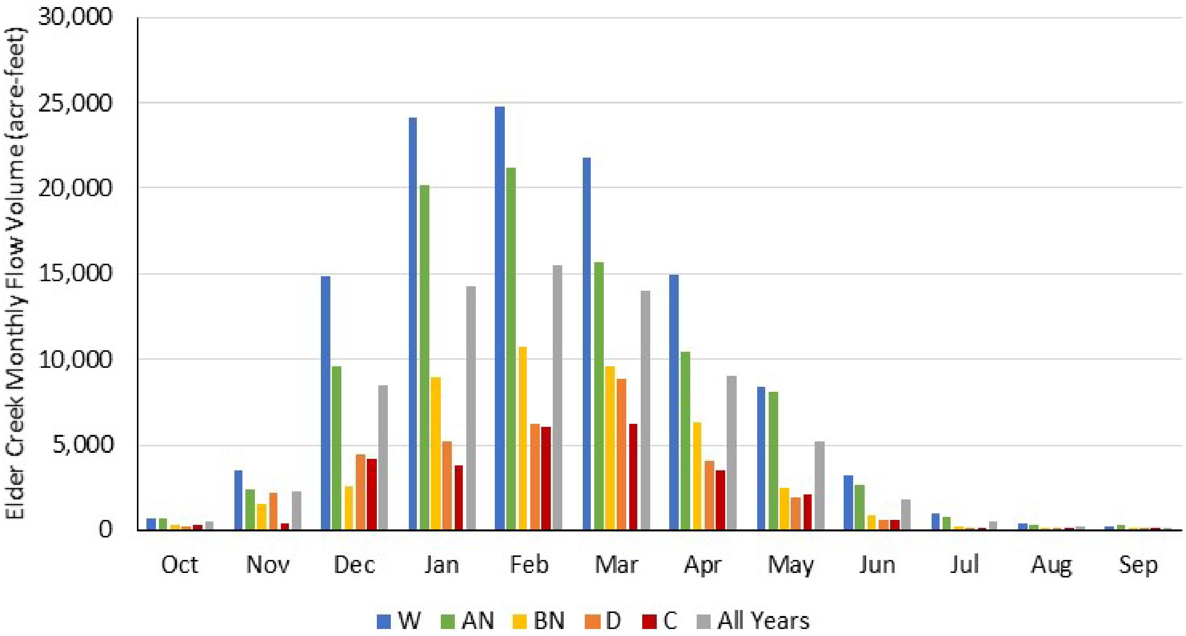

Figure 4-2. Elder Creek Monthy Flow Volume by Water Year Classification

Figure 4-2 shows flow in Elder Creek is higher in wetter years and lower in dry years with the highest monthly flows occurring in the months of January through March.

4.8.1 Thomes Creek

Thomes Creek originates in the foothills of the Coastal Ranges in the Mendocino National Forest and flows east to join the Sacramento River. The watershed upstream of the Sacramento Valley is approximately 230 square miles. The United States Geological Survey (USGS) does not have a gage on Thomes Creek, so the streamflow was estimated by prorating streamflow in Elder Creek using the ratio of watershed areas. The watershed area for Thomes Creek is approximately 2.5 times that of Elder Creek, assuming a diversion point close to Flournoy as shown in **Figure 4-1**. This diversion point is located approximately 13 miles west of Highway 5 and 19 miles west of the Sacramento River near where Thomes Creek enters the agricultural lands of the Sacramento Valley floor. The average annual runoff from Thomes Creek for the period of observed flows was approximately 183,000 acre-feet per year.

Figure 4-3 shows the monthly flow volume in Thomes Creek averaged by water year type with the study period of 1949 -2020. The water year types shown in the figure are defined in the Sacramento Valley Water Year Hydrologic Classification (SWRCB Decision 1641) as shown in **Table 4-46**.

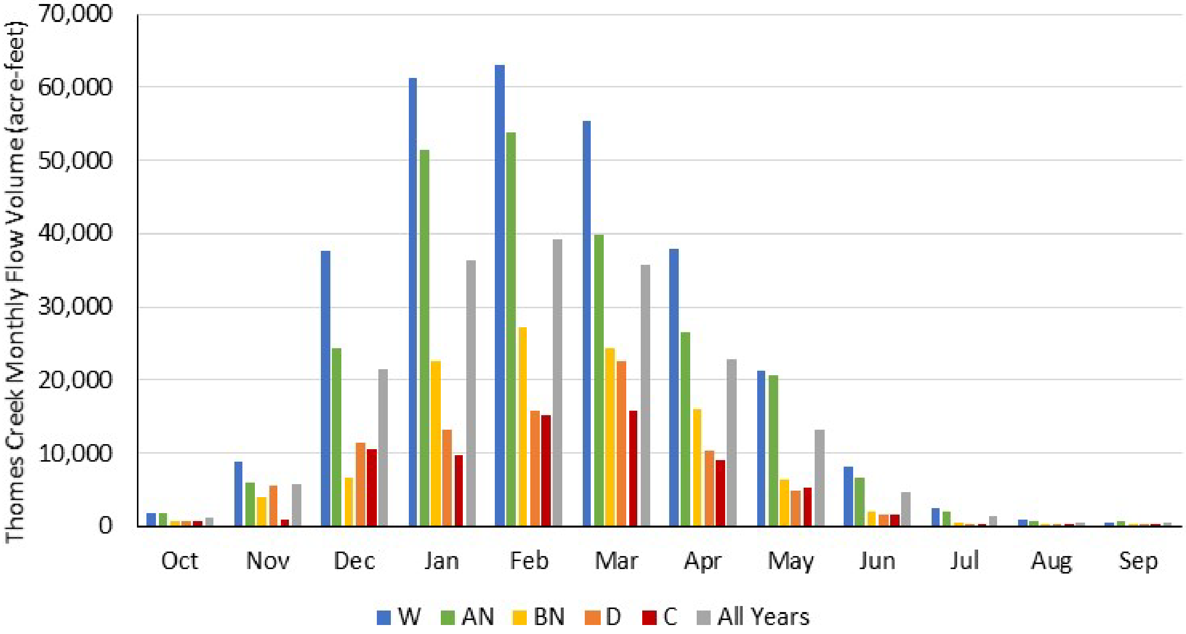

Figure 4-3. Thomes Creek Creek Monthy Flow Volume by Water Year Classification

4.8.2 Water Right Permits

A water right or permit will be required to divert and store water from Elder and Thomes creeks for groundwater recharge and beneficial uses. The State Water Resources Control Board (SWRCB) issues and administers water rights in California. There are two categories of water right permits available through the SWRCB to divert water for groundwater recharge projects: standard permits and temporary permits. Both permits require an application be filed with the SWRCB. Temporary permits allow for short-term periods of diversion and storage, e.g., 180-days, but are not water rights. Temporary permits are a conditional approval to divert and use available water.

Standard permits are available through two different application processes: standard and streamlined. A standard water right application is typically more involved and may require significant effort and many years of review and processing by the SWRCB. The streamlined application process is relatively new and was designed to divert water during high flow events to recharge groundwater basins. The goal of the streamlined application process is to help GSAs address SGMA and reduce the impact of groundwater extractions. The GSA can also apply for a temporary permit and a streamlined permit at the same time, as it could take several years for the streamlined permit to get approved.

4.8.3 Potential Water Available from Elder Creek for Groundwater Recharge

An analysis of Elder Creek was performed based on the eligibility criteria for streamlined application processing of a standard permit. The following criteria were applied to the observed Elder Creek gage data to determine the water available for potential diversion:

- season of diversion of December 1 through March 31
- flow at the point of diversion is above the 90th percentile for the day based on the gage record
- the diversion rate is limited to no more than 20 percent of the total flow.

The 90th percentile flow for each day was calculated based on the gaged record of flows. The observed daily flow was then compared to the 90th percentile flow for each day to determine when water could be diverted during the December 1 through March 31 period each year. The daily water available was limited to no more than 20 percent of total flow, and further limited based on an assumed diversion and groundwater recharge capacity of 100 cfs. A multi-benefit recharge project on Elder Creek is at a preliminary planning level of development and the actual diversion capacity of existing or new facilities will need to be verified or designed. A recharge capacity of 100 cfs would require approximately 3,500 acres assuming a recharge rate of 0.7 inches/day. This recharge rate is the middle of the range of recently observed rates in Colusa County. **Figure 4-4** shows the potential diversion for flow when above the 90th percentile for the winter of 1998 as an example of the analysis for a wet year.

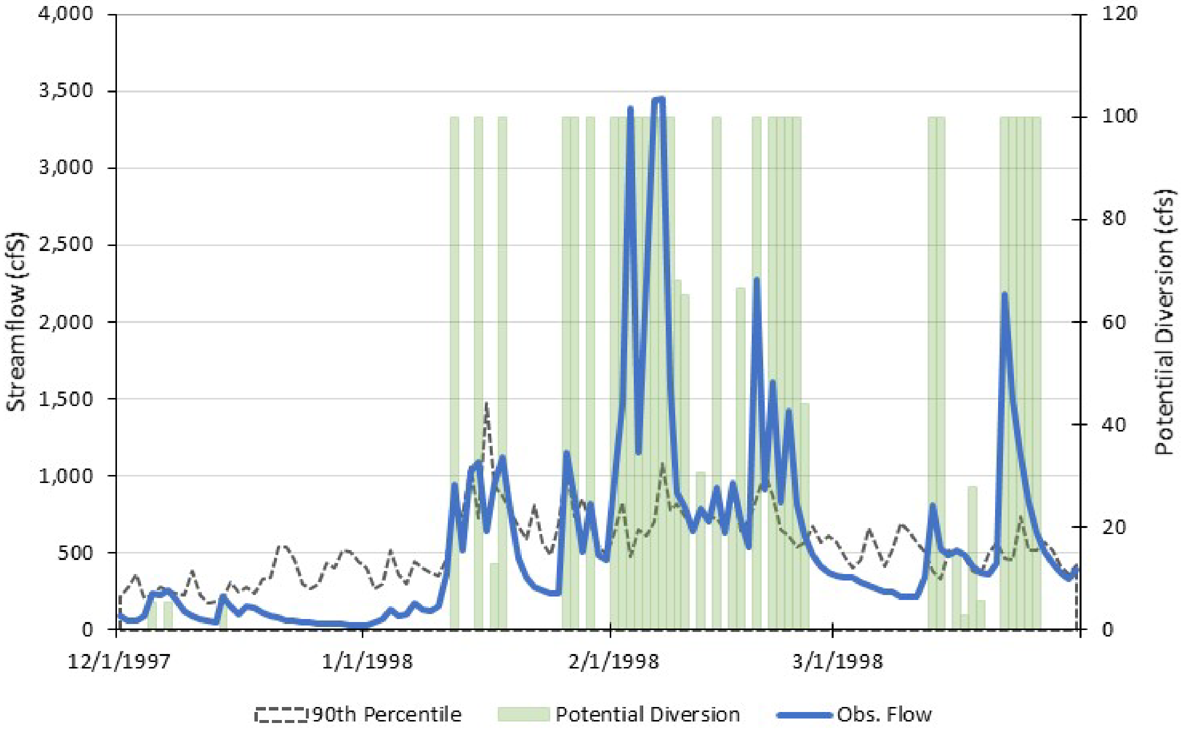

Figure 4-4. Potential Diversion for Elder Creek in Example Wet Year: Winter 1998 under Streamlined Permit

In 1998 the estimated flow in Elder Creek went above the 90th percentile for brief period in January, and a more extended period in February and again near the end of March. During these periods, the green shading illustrates potential diversion of 100 cfs under the criteria for a streamlined water right permit. The total volume of diversion for water year 1998 was estimated to be approximately 6,100 ac-ft. **Figure 4-4** illustrates a few key considerations for the use of Elder Creek as a source for groundwater recharge. The relatively "flashy" nature of rain-fed streams like Elder Creek will need projects that can respond quickly to divert and recharge water when available. Additionally, the potential recharge available is dependent on the capacity to divert and recharge the water when it is available.

The analysis illustrated for a single year in Figure 8-4 was performed for each of the 72 years in the period of analysis. **Figure 4-5** shows the average monthly potential diversion by water year type from Elder Creek that could be used for groundwater recharge from December to March.

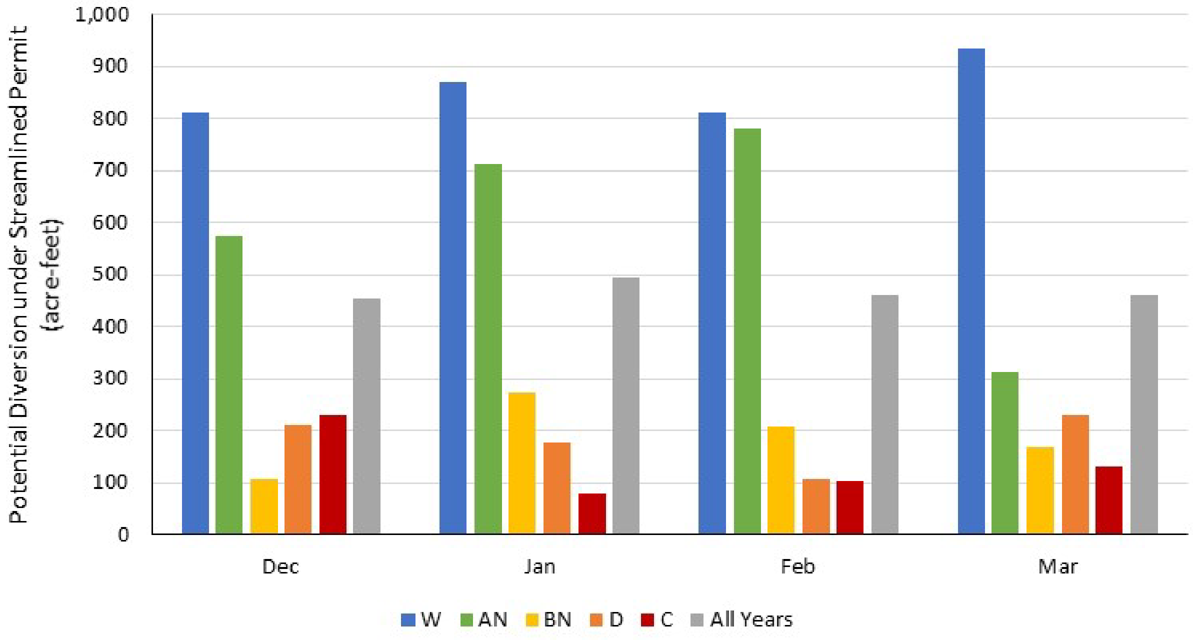

Figure 4-5. Potential Diversion for Elder Creek under Streamlined Permit by Water Year Classifcation

Results summarized in Figure 8-5 show potential diversions of several hundred acre-feet in most months in wet and above normal years and a limited amount of water available in critical years.

The potential water available for groundwater recharge varies depending on the rainfall each year, as shown in **Figure 4-6**. There would have been water available for recharge in 63 of the 72 years studied. The average yearly potential groundwater recharge from Elder Creek is approximately 1,870 acre-feet/year, assuming a diversion and recharge capacity of 100 cfs.

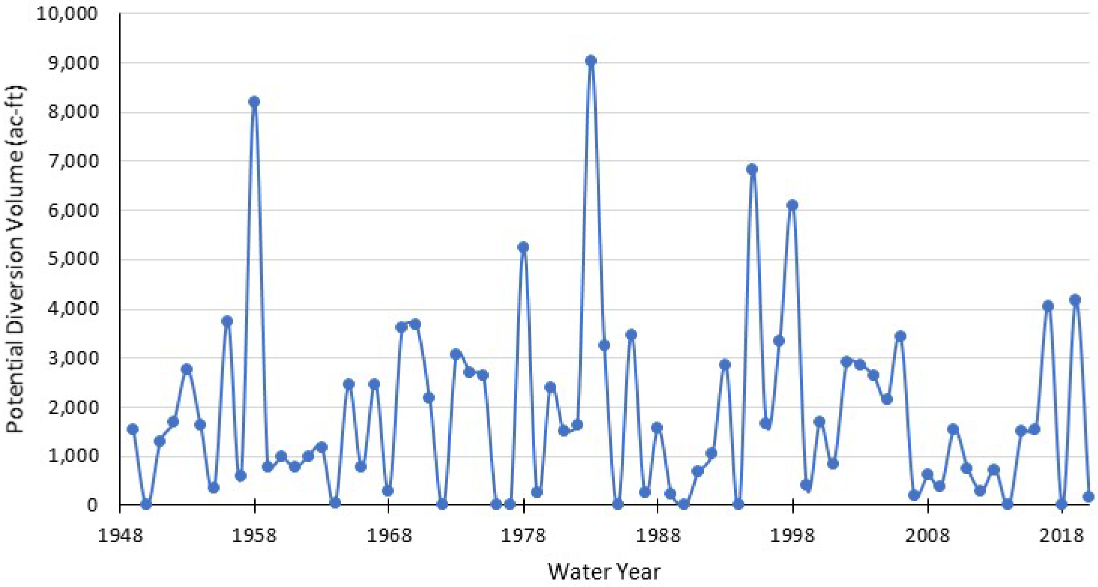

Figure 4-6. Potential Diversion Volume for Elder Creek for Water Years 1948-2020

As described above, the water available for groundwater recharge from Elder Creek is dependent on the assumption for the diversion and recharge capacity. A simple sensitivity analysis was performed to understand how the annual average water available for recharge varies based on the assumed diversion/recharge capacity. **Figure 4-7** illustrates the results of this analysis and indicates that a capacity of approximately 200 cfs on Elder Creek would more than provide for the projected storage deficit under current and future land use (1,800 ac-ft/yr and 2,900 ac-ft/year respectfully). The water budget deficit for the Red Bluff Subbasin for the historical period from 1990 to 2018 was approximately 10,600 ac-ft per year. The possible annual potential diversion from Elder Creek reaches its maximum at approximately 4,700 ac-ft even with a recharge capacity of 1,000 cfs as shown in **Figure 4-7**.

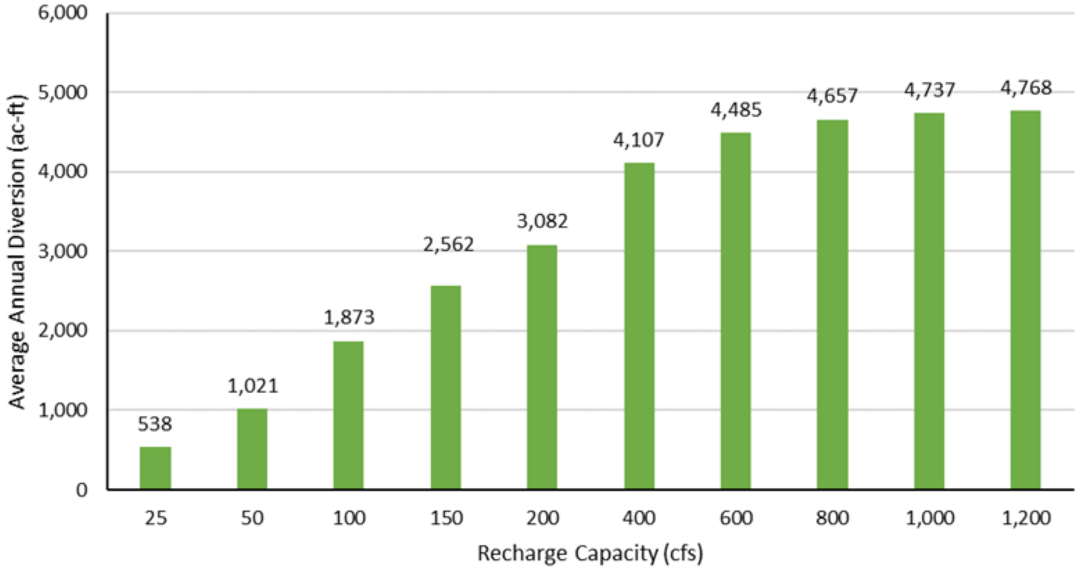

Figure 4-7. Average Annual Potential Diversion for Elder Creek under Streamlined Permit with varying Recharge Capacity

4.8.4 Potential Water Available from Thomes Creek for Groundwater Recharge

A similar analysis of Thomes Creek was performed based on the eligibility criteria for streamlined application processing of a standard permit. A multi-benefit recharge project on Thomes Creek is at a preliminary planning level of development and the actual diversion capacity of existing or new facilities will need to be verified or designed. A recharge capacity of 100 cfs would require approximately 3,500 acres assuming a recharge rate of 0.7 inches/day. This recharge rate is the middle of the range of recently observed rates in Colusa County. **Figure 4-8** shows the potential diversion for flow when above the 90th percentile for the winter of 1998 as an example of the analysis for a wet year.

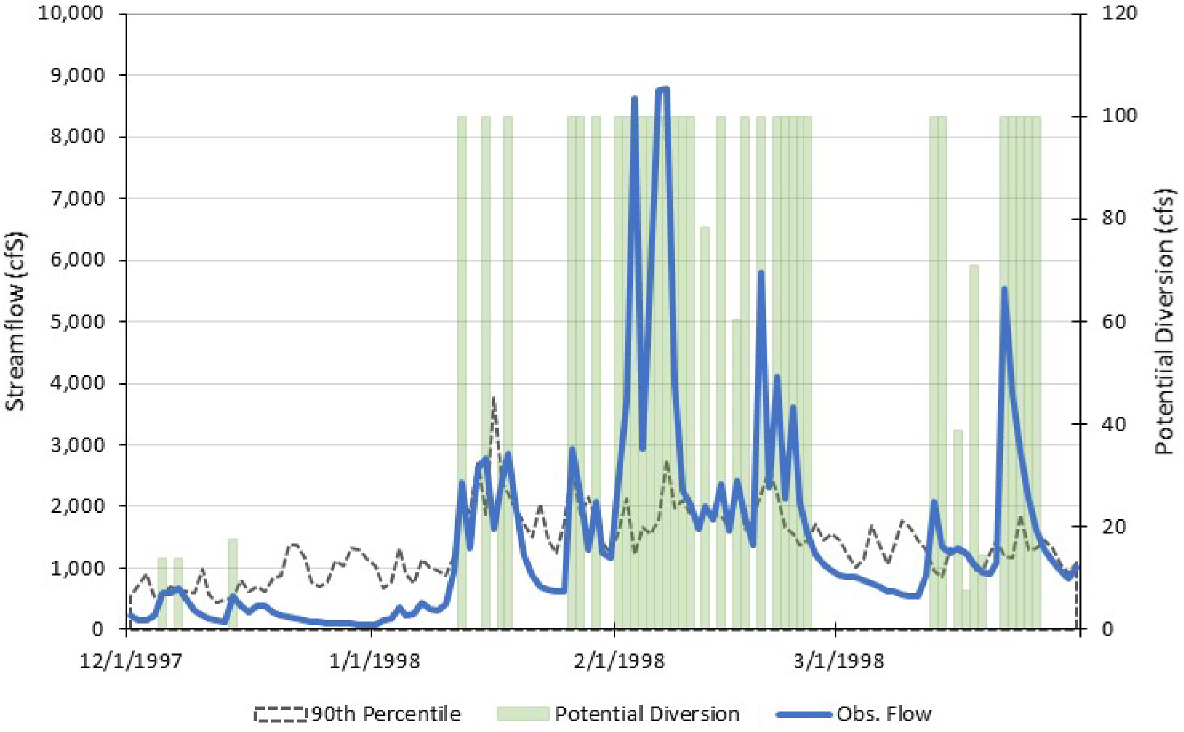

Figure 4--8. Potential Diversion for Thomes Creek in Example Wet Year: Winter 1998 under Streamlined Permit

In 1998 the estimated flow in Thomes Creek went above the 90th percentile for brief period in January, and a more extended period in February and again near the end of March. During these periods, the green bars illustrate potential diversion of up to 100 cfs under the criteria for a streamlined water right permit. The total volume of diversion for water year 1998 was estimated to be approximately 6,840 ac-ft. Figure 4-8 illustrates a few key considerations for the use of Thomes Creek as a source for groundwater recharge. The relatively "flashy" nature of rain-fed streams like Thomes Creek will need projects that can respond quickly to divert and recharge water when available. Additionally, the potential recharge available is dependent on the capacity to divert and recharge the water when it is available.

The analysis illustrated for a single year in Figure 4-8 was performed for each of the 72 years in the period of analysis. **Figure 4-9** shows the average monthly potential diversion by water year type from Thomes Creek that could be used for groundwater recharge from December to March.

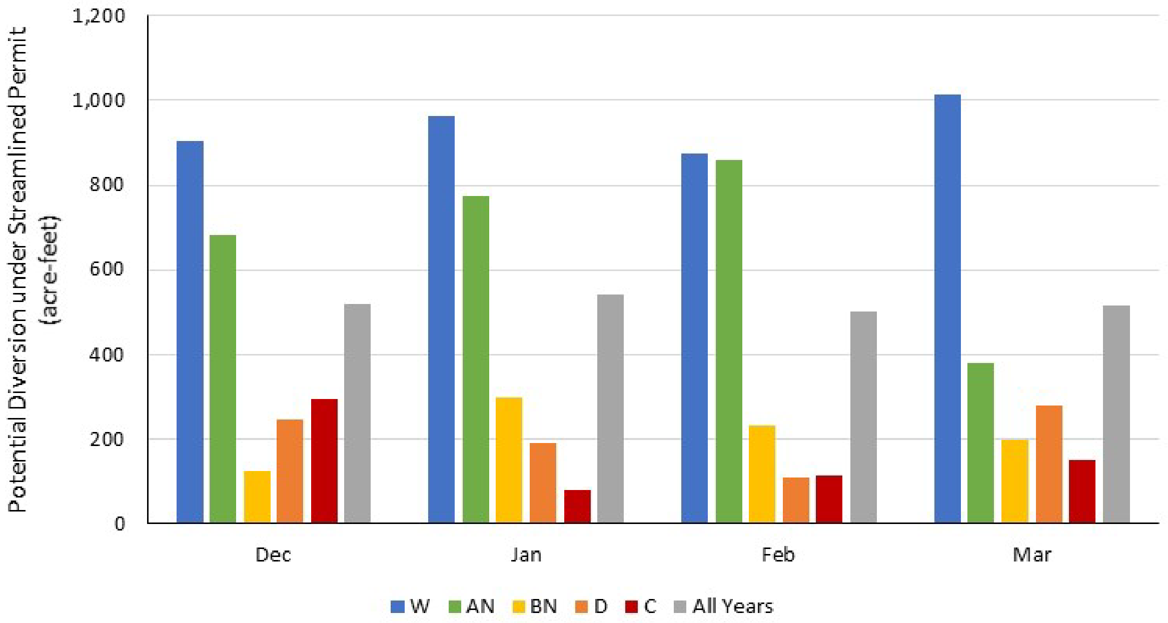

Figure 4-9. Potential Diversion for Thomes Creek under Streamlined Permit by Water Year Classifcation

Results summarized in **Figure 4-9** show potential diversions of several hundred acre-feet in most months in wet and above normal years and a limited amount of water available in critical years.

The potential water available for groundwater recharge varies depending on the rainfall each year, as shown in **Figure 4-10**. There would have been water available for recharge in 63 of the 72 years studied. The average yearly potential groundwater recharge from Thomes Creek is approximately 2,080 acre-feet/year, assuming a diversion and recharge capacity of 100 cfs.

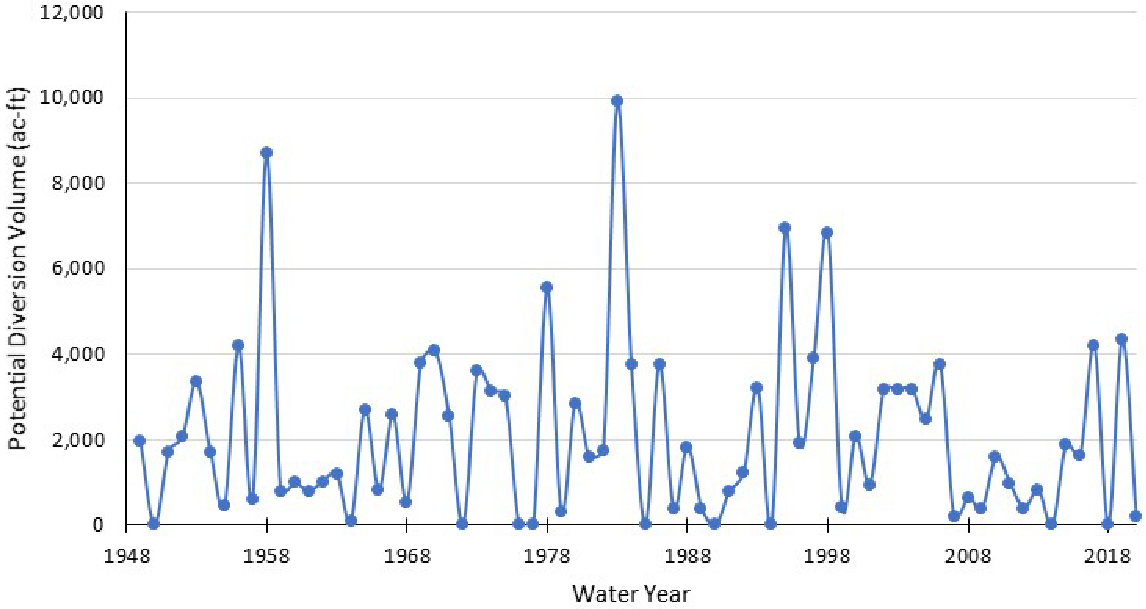

Figure 4-9. Potential Diversion Volume for Thomes Creek for Water Years 1948-2020

As described above, the water available for groundwater recharge from Thomes Creek is dependent on the assumption for the diversion and recharge capacity. A simple sensitivity analysis was performed to understand how the annual average water available for recharge varies based on the assumed diversion/recharge capacity**. Figure 4-11** illustrates the results of this analysis and indicates that a capacity of approximately 200 cfs on Thomes Creek would more than provide for the projected storage deficit under current and future land use (1,800 ac-ft/yr and 2,900 ac-ft/year respectfully). The water budget deficit for the Red Bluff Subbasin for the historical period from 1990 to 2018 was approximately 10,600 ac-ft per year. It would require a recharge capacity of approximately 1,100 cfs to provide for a 10,600 ac-ft storage deficit as shown in Figure 4-11. A recharge project of that size would require approximately 38,000 acres. Since there is not a stream gage on Thomes Creek, it is also assumed the streamflow in Thomes Creek is always approximately 2.5 times the streamflow in Elder Creek.

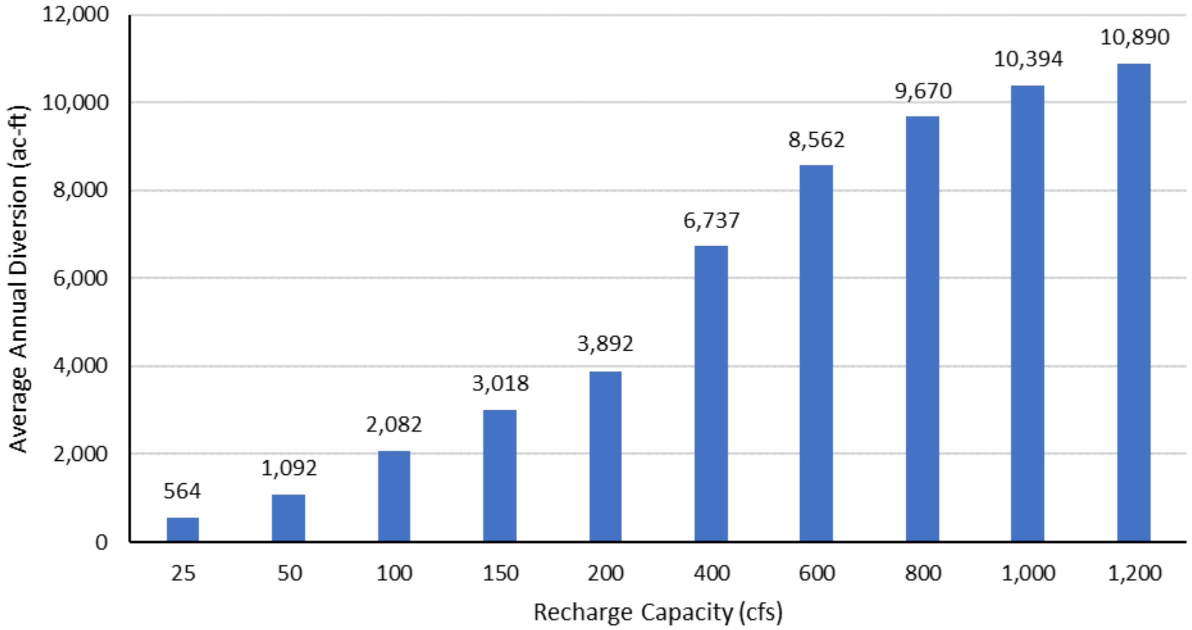

Figure 4-10. Average Annual Potential Diversion for Thomes Creek under Streamlined Permit with varying Recharge Capacity

A combination of recharge projects on Thomes and Elder creeks could also provide for the projected storage deficit in Red Bluff. A diversion and recharge capacity of 50 cfs on both Elder and Thomes Creek would provide for the projected storage deficit under current land use (1,800 ac-ft/yr). A diversion and recharge capacity of 100 cfs Elder Creek and 150 cfs on Thomes Creek would provide for the projected storage deficit under future land use (2,900 ac-ft/year). The water budget deficit for the Red Bluff Subbasin was 10,600 ac-ft for the historical period from 1990 to 2018, requiring a recharge capacity of 400 cfs on both creeks as shown in **Figure 4-12**. Two recharge projects of that size would require approximately 27,500 acres combined.

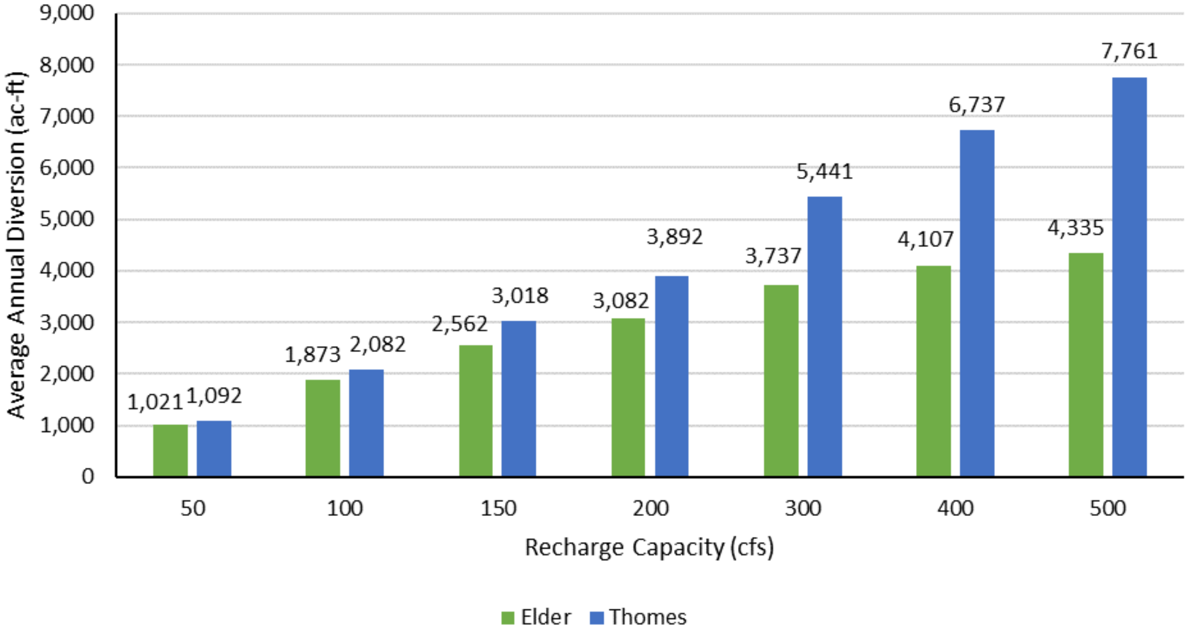

Figure 4-11. Average Annual Potential Diversion for Thomes and Elder Creeks under Streamlined Permit

4.8.5 Sacramento River

The third source of water for potential recharge within the Red Bluff subbasin is the Sacramento River. There are two water districts within the subbasin, Proberta and Thomes Creek water districts, which hold contracts with the U.S. Bureau of Reclamation (Reclamation) for water from the Central Valley Project (CVP). Reclamation allocates water to these water service contracts each year based on the available water supply and obligations of the CVP. Historical allocations range from 0 to 100 percent of the contract total volume. Proberta Water District currently holds a contract for a total of 3,500 ac-ft. Thomes Creek Water District currently holds a contract for a total of 6,400 ac-ft.

Water is diverted under these two contracts from the Sacramento River at the Red Bluff Pumping Plant and conveyed to the districts through the Corning Canal. Water delivered under these two contracts must be used within the areas identified in the contract which are approximately the boundaries of the districts. Proberta Water District is located entirely within the Red Bluff subbasin while only the portion of Thomes Creek Water District located north of Thomes Creek is within the Red Bluff subbasin.

Figure 4-13 shows the locations of these two water districts within the Red Bluff subbasin.

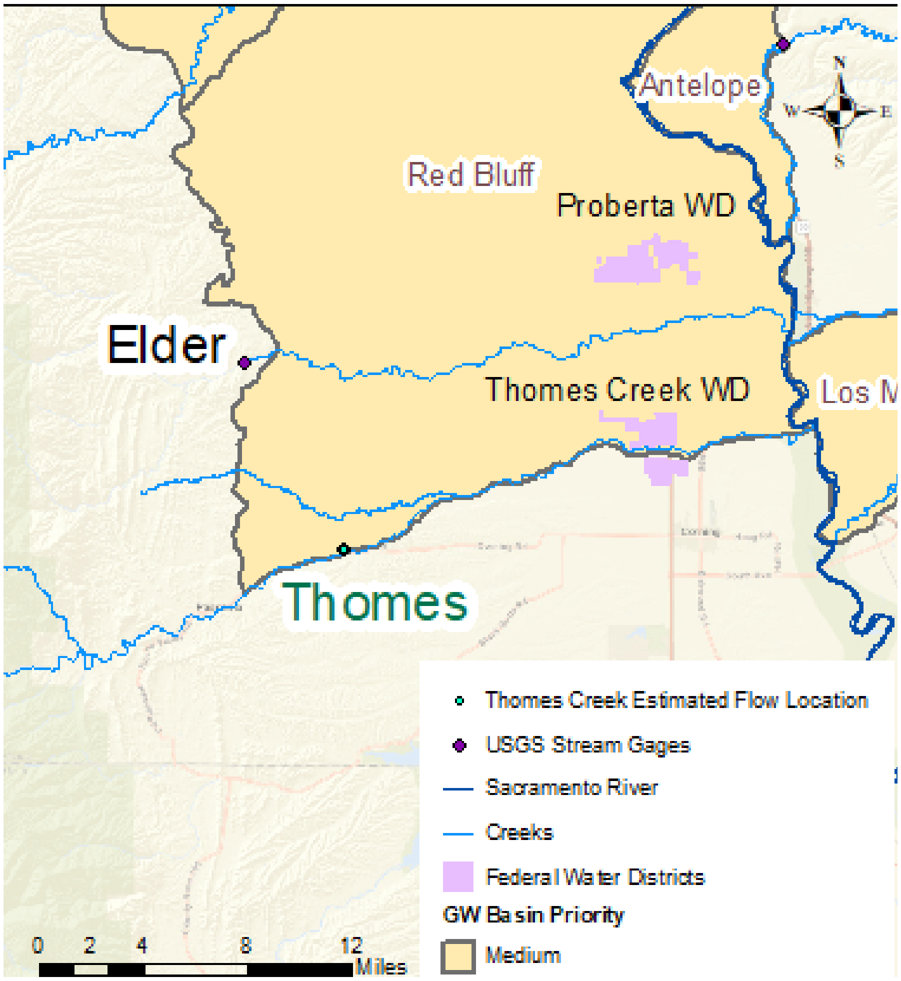

Figure 4-12 Location of Water Districts with CVP Contracts for Surface Water

Historically these two districts have not taken delivery of the full volume of water available under their CVP contracts each year, opting instead to rely on groundwater to meet crop demands. There are several reasons for this including the cost of the CVP water, irrigation methods, and infrastructure within the districts. A management action to incentivize the districts to utilize more surface water available under their CVP contracts would assist in addressing the current and projected storage deficit in the subbasin by reducing groundwater pumping. Alternatively, water available under the CVP contracts could be used to recharge the subbasin within the districts. The use of contract water for groundwater recharge would need to be described in the water conservation plan of each district.

An analysis of the historical water available under the CVP contracts and estimates of deliveries to the districts was performed to quantify the potential reduction in groundwater pumping or increase in recharge. The period of analysis was 28 years from 1992 through 2019. Historical CVP allocations for these contractors were downloaded from Reclamation's website for Central Valley Project Operations[5]. Historical allocations were multiplied by the contract totals for both districts to determine the annual

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[5] Available at https://www.usbr.gov/mp/cvo/vungvari/water_allocations_historical.pdf

volume of water available to the districts. The historical monthly deliveries from the Corning Canal for the same 28-year period were compiled from monthly water delivery tables for Central Valley Project diversions (Table 21)[6]. The monthly deliveries represent the volume for all contractors who take delivery of water from the Corning Canal. The Corning Water District, with a contract for a total of 18,000 ac-ft, also takes delivery from the Corning Canal. The aggregated deliveries for the Corning Canal were assumed to go to each of the three districts based on the percent of contract total for all districts, e.g., Proberta Water District's contract for 3,500 ac-ft is 12.5 percent of the sum of all three district's contracts. A more detailed analysis based on the actual deliveries to each district could be performed based on the annual water account records kept by Reclamation.

Table 4-47 is a summary, by water year type, of the average annual water available to each district under the contract and an estimate of the unused water by each district.

Table 4-47. Annual Water Available and Estimated Unused Water for CVP Water Service Contracts

CLASSIFICATION	ANNUAL WATER AVAILABLE (AC-FT)		ESTIMATED UNUSED WATER (AC-FT)	
	PROBERTA WD	THOMES CREEK WD	PROBERTA WD	THOMES CREEK WD
Wet	3,500	6,400	1,510	2,760
Above Normal	3,500	6,400	900	1,640
Below Normal	3,500	6,400	1,440	2,630
Dry	2,625	4,800	330	600
Critical	735	1,344	180	320
All Years	2,850	5,211	960	1,760

The volumes in Table 4-47 show an annual average of approximately 2,700 ac-ft of unused surface water may be available to these two districts as an alternative supply to groundwater pumping or for recharge. All of the unused water for Proberta Water District could benefit the Red Bluff subbasin. Water available to Thomes Creek Water District may be used within both the Red Bluff and Corning subbasins, both within Tehama County.

In addition to the estimates of unused water quantified above, the two districts with CVP contracts may have received additional supplies under Section 3 (f) of their contracts. The availability of water under Section 3 (f) is determined by Reclamation based on the water supply conditions at the time.

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[6] Available at https://www.usbr.gov/mp/cvo/deliv.html

FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

(Chapter 5 – Plan Implementation)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

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LIST OF ACRONYMS & ABBREVIATIONS

DMS	Data Management System
DWR	Department of Water Resources
FTE	Full Time Equivalent
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
SGMA	Sustainable Groundwater Management Act
SWRCB	State Water Resources Control Board

5. PLAN IMPLEMENTATION (REG. § 354.6)

This chapter describes the approach the GSA will use to implement this GSP. This GSP will be implemented to achieve the Subbasin sustainability goal by 2042 and avoid undesirable results through 2090 as required by SGMA and GSP regulations. Implementation of this GSP includes the projects and management actions described in Chapter 4, in addition to on-going activities that will be completed by the GSA related to monitoring, management, administration, updates, reporting, and public outreach. This chapter describes the tasks necessary for GSP implementation, associated costs, and a description of the implementation schedule and annual and five-year updates to be provided to DWR.

5.1 Estimate of GSP Implementation Costs

GSP implementation costs include both costs specific to projects and management actions and costs for the GSA to administer and operate all other tasks associated with the GSP over the 20-year implementation period. These costs may be subject to change, as they are projections based on the time of development of this report. GSP implementation and GSA support costs are estimated on an annual basis and are described in further detail below.

5.1.1 GSA Administration, Management, Operations, and Other Costs

The GSA will incur costs for administrative tasks including administrative and finance staff, insurance, meetings, reporting, record keeping, bookkeeping, legal advice, outreach, government relations, engineering services, permitting, public outreach, and miscellaneous supplies and materials. This will include continued monitoring of project and management actions for efficacy, economic feasibility, and coordination as necessary if modifications need to be made to projects and management actions. It is anticipated that administrative and management needs will be monitored and updated accordingly throughout GSP implementation, as they may be subject to change based on the implementation schedule and unforeseen needs throughout implementation. This includes:

- **Operation and Maintenance:** Purchase, maintenance, and repairs to monitoring equipment such as transducers, dataloggers, meters, etc. will occur as needed.
- **Project Management and Coordination:** Coordination between the GSA and GSAs of adjacent subbasins, stakeholders, consultants, and other interested parties will be ongoing.
- **Administrative Personnel:** One (1) full time equivalent (FTE) employee. Professionals trained in the Data Management System (DMS) will collect and process monitoring data for input into the DMS. Personnel will also complete outreach and accounting system support.
- **Engineering and Consulting:** Consulting from outside technical services will be used as needed for data management, analysis, and reporting.
- **Legal Expense:** Legal expenses may be incurred for water rights or water transfer programs and legal review.
- **Public Outreach:** The GSA will continue outreach to encourage public participation throughout GSP implementation. This will include Groundwater Commission, GSA board meetings, updating the GSA website, and public meetings.

It is expected that GSA administration costs will include efforts for administering all five (5) GSPs managed by the GSA: Antelope, Bowman, Los Molinos, Red Bluff, and Corning. Therefore, administration costs are reflective of the total cost for administering all five GSPs. The estimated annual cost for GSA administration, management, and operations is $470,000. Costs associated with these individual tasks are included in **Table 5-1** below:

Table 5-1. Estimated GSA Administration, Management, and Operations Costs

DESCRIPTION	ESTIMATED ANNUAL COST
Operation and Maintenance	$45,000
Project Management and Coordination	$100,000
Administrative Personnel	$240,000
Engineering and Consulting	$20,000
Legal Expense	$50,000
Public Outreach	$15,000
Total	**$470,000**

5.1.2 Monitoring

The GSA will oversee the implementation of the monitoring programs described in Chapter 3. This includes monitoring groundwater and surface water levels, groundwater storage, water quality, and land subsidence to evaluate the progress of the Subbasin in reaching the sustainability goal. Related tasks include data review and analysis, data management, maintenance of monitoring wells and monitoring equipment, deploying any necessary technology, updates to the groundwater model, and development of annual reports. The GSA will routinely monitor data to track Subbasin conditions and sustainability indicators to ensure progress is being made towards sustainability in the Subbasin. Each monitoring task can be further described as follows:

- **Groundwater and Surface Water Level Monitoring:** Groundwater level data will be collected from the monitoring network as described in Chapter 3. Bi-annual measurements will be collected by trained professionals via depth to groundwater measurements manually or by transducers. Surface water will also be monitored through the monitoring network described in Chapter 3. Data will be collected to correlate groundwater and surface water to monitor interconnected surface and groundwater. All data will be managed in the DMS, and the analysis will be included in the annual report submitted to DWR.
- **Groundwater Quality Monitoring:** Groundwater quality data will be collected from the monitoring network as described in Chapter 3. Trained professionals will collect samples on a biannual basis. Samples will be sent to a certified laboratory for analysis, and results will be reviewed, managed, and reported in the annual report submitted to DWR.
- **Land Subsidence Monitoring:** Land subsidence data will be collected from the monitoring network in accordance with Chapter 3. This data will be reviewed and included in the annual report submitted to DWR.

- **Annual Report:** An annual report will be developed and submitted to DWR per Section 5.3 below.

The total estimated cost for monitoring in the Red Bluff Subbasin is $104,000 as displayed by **Table 5-2** below.

Table 5-2. Estimated Annual Monitoring Costs

MONITORING TASK	ESTIMATED ANNUAL COST
Groundwater and Surface Water Level Monitoring	$20,000
Water Quality Monitoring	$20,000
Land Subsidence Monitoring	$14,000
Annual Report	$50,000
Total	**$104,000**

5.1.3 GSP Implementation and Updates

Implementation of this GSP requires development and submittal of annual and periodic updates to DWR. Costs associated with the preparation of annual reports includes data and technical analyses, summary material, and evaluation of sustainability objectives. Costs and efforts associated with periodic evaluations includes information developed for the annual reports, in addition to evaluation of sustainability conditions, objectives, monitoring, and documentation of new information available since the last update to the GSP. Annual and periodic reports are described in further detail in Sections 5.3 and 5.4, respectively. It is anticipated that these reports will be prepared by technical consultants in coordination with GSA staff and in coordination with other GSAs and stakeholders. A breakdown of estimated plan update costs is provided in **Table 5-3** below.

Table 5-3. Estimated Plan Update Costs

DESCRIPTION	ESTIMATED ANNUAL COST
Updates to Water Budget and Groundwater Model, Analyze Effectiveness of Projects and Management Actions, Revise Sustainable Management Criteria	$240,000
Updates to Management Strategies	$18,000
Public Outreach	$10,000
5-Year Periodic Updates	$32,000
Total	**$300,000**

5.1.4 Project and Management Actions Development and Implementation Costs

Projects and Management Actions are described in Chapter 4. Estimated costs for development and implementation of these plans and programs are included in Chapter 4. The GSA will also incur costs for project planning as new information is obtained on Subbasin conditions and project and management actions are implemented and observed. It is anticipated that the GSA will evaluate new and existing projects for improvement based on Subbasin conditions as needed. This includes evaluation of potential impacts on sustainability indicators and development of related technical studies and planning efforts such as feasibility assessments, environmental studies, water rights evaluations, coordination with outside agencies, land evaluations, grant applications, and other applicable efforts depending on the scope of the project. Project and management actions related planning, coordination, and studies are expected to be ongoing.

5.1.5 Total Costs

Annual implementation costs of this GSP are expected to vary by year based on implementation schedules for projects and management actions, necessary updates to data management and modeling systems, and other maintenance and management needs. Costs will be updated during the 5-year milestone review period. Inflation and contingency are also included for planning purposes. Contingency includes potential actions needed to respond to critically dry years or trends toward minimum thresholds or undesirable results, and inflation reflects a 3% assumed annual value, included each year, for planning and budgeting purposes. The total estimated GSP implementation cost is $19.8 million as displayed in **Table 5-4** below.

Table 5-4. Estimated GSP Implementation Costs through 2042

FISCAL YEAR	GSA ADMINISTRATION	MONITORING	5-YEAR UPDATES	10% CONTINGENCY	TOTAL
2022	$470,000	$104,000	$0	$57,000	$631,000
2023	$484,000	$107,000	$0	$59,000	$650,000
2024	$499,000	$110,000	$0	$61,000	$670,000
2025	$514,000	$114,000	$0	$63,000	$690,000
2026	$529,000	$117,000	$150,000	$80,000	$876,000
2027	$545,000	$121,000	$150,000	$82,000	$897,000
2028	$561,000	$124,000	$0	$69,000	$754,000
2029	$578,000	$128,000	$0	$71,000	$777,000
2030	$595,000	$132,000	$0	$73,000	$800,000
2031	$613,000	$136,000	$169,000	$92,000	$1,010,000
2032	$632,000	$140,000	$174,000	$95,000	$1,040,000
2033	$651,000	$144,000	$0	$79,000	$874,000
2034	$670,000	$148,000	$0	$82,000	$900,000
2035	$690,000	$153,000	$0	$84,000	$927,000
2036	$711,000	$157,000	$196,000	$106,000	$1,170,000
2037	$732,000	$162,000	$202,000	$110,000	$1,205,000
2038	$754,000	$167,000	$0	$92,000	$1,013,000
2039	$777,000	$172,000	$0	$95,000	$1,044,000
2040	$800,000	$177,000	$0	$98,000	$1,075,000
2041	$824,000	$182,000	$227,000	$123,000	$1,357,000
2042	$849,000	$188,000	$234,000	$127,000	$1,397,000
Total	**$13,478,000**	**$2,983,000**	**$1,502,000**	**$1,798,000**	**$19,757,000**

5.1.6 Funding Sources

Development of this GSP was funded through Proposition 1 and Proposition 68 grant funds awarded by DWR to support the formation of GSAs and adoption of initial GSPs to achieve SGMA compliance within regulatory submittal deadlines. Ongoing implementation, monitoring, and reporting are expected to be funded through local fees and GSP priority projects and actions outlined in Chapter 4 would be funded by outside grants, cost sharing, and other funding sources. The GSA will develop and approve a financing plan with prioritized five year CIP projects and actions to serve as the basis to impose fees to fund groundwater management activities included in the GSP. SGMA gives GSAs the authority to impose these fees (Water Code §§ 10730, 10730.2 (a).) which can cover groundwater management costs such as administration, operations and maintenance, acquisition of property, facilities, and services, supply, production, treatment and/or distribution of water, and other activities necessary to implement the GSP while maintaining SGMA compliance. These fees can be fixed and charged on a parcel or square foot basis or charged on a volumetric basis if actual historic and current water use data is available. The GSA is also granted the authority by SGMA to implement any separate fee authority (Water Code § 10730.8) and/or adopt a charge or assessment under its special district fee authority pursuant to Water Code Section 35470. Fee amount and type will be implemented through a comprehensive fee study and in accordance with legal review and regulatory requirements, SGMA compliance, and California Law. The GSA will seek additional grants and funding sources to assist with implementation costs as well.

GSP priority projects ready for implementation can take advantage of available grants to fund projects on a local or regional scale that are ready for implementation. Projects serving disadvantaged or severely disadvantaged communities may receive a higher priority under some funding programs. The next available project funding opportunity is through the phase 2 $77M Sustainable Groundwater Management Grant Implementation solicitation cycle expected to occur in 2022 with funding applications due to DWR for eligible GSAs/GSPs in Spring or Summer 2022. Certain GSP priority actions may be eligible for other funding sources depending on project characteristics, funding program guidelines, and funding amount requested. If the GSA/GSP pursues this funding source the project should be included in the adopted GSP and be included on the GSP five-year CIP priority list. Project applicants must be in compliance with SGMA regulations and requirements at the time of the funding request.

The GSA will provide planning for funding assistance and ensure maximum outside funding sources can be secured for eligible projects that are a priority to the GSA and GSP project applicants. Some cost sharing and/or upfront costs (such as funding application preparation and submittal costs) may be required for funding success. And future funding sources may include planning or implementation funding only which can be applied as warranted based on how developed priority projects are at the time of the funding program solicitation period.

5.2 Schedule for Implementation

This initial GSP will be adopted and submitted to DWR by January 31, 2022. The implementation timeline will begin thereafter and will allow GSAs to develop and implement projects and management actions to meet sustainability objectives by 2042. GSP implementation also includes annual and periodic evaluations and submittals to DWR. The full schedule for implementation is subject to change and will be evaluated and updated as necessary based on implementation progress, sustainability goals, monitoring, and other factors that could affect overall implementation efforts.

The comprehensive implementation schedule update will be competed every five years as part of the GSP five year update process, which will include the updated GSP five year CIP program with existing project prioritization and/or addition of new projects, to assist the GSA meet SGMA compliance requirements over the planning horizon.

The GSP implementation schedule may be modified periodically as agreed to by the GSA and GSP project partner(s) based on the near-term availability of significant funding opportunities or options. Being flexible with schedule could assist the GSA/GSP maximize outside funding secured when these unique opportunities arise as needed to meet GSP sustainability criteria. An example would be passage of a new State Proposition that includes planning and/or implementation funding for GSAs/GSPs that is not currently available.

5.3 Annual Reporting

Annual reports will be completed and submitted to DWR by April 1 of each year pursuant to GSP Regulation §356.2. Annual reports will include sections on general information, basin conditions, and plan implementation progress for the reporting period. The annual report submitted to DWR will comply with the requirements of §356.2. The outline of subsections to be utilized in the development of the annual report, with a general outline of information to be included under each subsection, are detailed below.

5.3.1 General Information (§356.4(a))

This section will highlight the key content of the annual report. An executive summary will be prepared to describe the Subbasin sustainability goals, progress of projects and management actions of the GSP, any significant findings and/or key recommendations for the reporting period, and an updated basin map.

5.3.2 Subbasin Conditions (§356.4(b))

The subbasin conditions section will provide an update on groundwater and surface water conditions in the Subbasin with respect to the sustainability goals described in the GSP. This will include basic information about the Subbasin and technical information including:

- **Groundwater Elevation Data:** Groundwater elevation data will be collected from the monitoring network on a bi-annual basis as described in Chapter 3. Data will be organized in a data management system, and hydrographs and groundwater elevation contour maps will be generated and included in the annual report, including seasonal high and low conditions in relation to historical data. This section will also include a written interpretation of the data and a description of data gaps and recommendations if necessary.
- **Groundwater Extraction Data**: Groundwater extraction data will be obtained through metering efforts and pumping data or estimated by land use if necessary for the reporting period and presented via tables, maps, and a written description. Data will be presented on maps and by water use sector, with a description of the measurement method and measurement accuracy.
- **Surface Water Supply:** Surface water supply quantities will be presented based on information obtained from annual surface water diversion reporting.

- **Total Water Use:** Total water use within the GSP boundary will be evaluated through information as it is available on production records, delivery records, metered well use, and applicable management plans. Data will be presented in the annual report by water use sector, with a description of the measurement method and measurement accuracy.
- **Change in Groundwater Storage:** The estimated change in groundwater storage will be evaluated for each principal aquifer based on observed changes in groundwater levels over a selected period. Information will be presented in tabular form and as a map for each principal aquifer indicating the water year type (wet, dry, normal), groundwater use, annual change in groundwater storage, and cumulative change in storage based on historical data and new data from the reporting period.

5.3.3 Plan Implementation Progress (§356.4(c))

The Annual Report will include a summary of the progress of the GSP implementation of projects, management actions, and other GSA activities. It will describe the Plan's progress toward achieving interim milestones, the implementation schedule, and discuss significant updates or changes, as necessary.

5.4 Periodic Evaluations and Reporting

The GSA will evaluate the GSP every five years and whenever the plan is amended. The evaluation will be submitted to DWR and include the elements of the Annual Report, a summary of the GSP, project, and management action implementation progress, and progress toward meeting the sustainability goal of the Subbasin. The information that will be provided in these five-year evaluations is captured in the following subsections:

5.4.1 Sustainability Evaluation (§356.4(a) - §356.4(b))

This section will include an evaluation and description of current groundwater conditions for each sustainability indicator and overall progress towards sustainability. A summary of conditions in relation to interim milestones, measurable objectives, and minimum thresholds will be provided. Depictions of groundwater elevations for the evaluation period will be provided as graphs, figures, and a written description. If any minimum threshold exceedances are observed, the GSA will investigate probable causes and implement corrective actions or plans where feasible. However, minimum threshold exceedances may not always result in corrective action due to factors that may be outside of the control of the GSA.

Projects and management actions will also be evaluated to determine their implementation status, success, and progress toward reaching the Subbasin sustainability goal. This will include an assessment of conditions and whether the project or management action is contributing to an improvement in conditions. If it is determined that progress is not being made toward reaching the sustainability goal, the implementation timeline is not being met, or the project or management action is not performing as expected, the project or management action will be re-evaluated and revised or accelerated path. Similarly, if an improvement in conditions is exhibited faster than projected, the scale or timeline of projects and management actions may be re-evaluated and revised if necessary. The evaluation will describe any changes to the project and management action implementation schedule and the steps the GSA will take to revise or add to projects and management actions if necessary.

Other elements of the plan such as the basin setting, management areas, and sustainability indicators will be evaluated for any significant or unanticipated changes that may have developed during the evaluation period. The sustainability indicators will be evaluated for undesirable results, and minimum thresholds and measurable objectives will be reconsidered if necessary. This will include review of any significant changes in water use to determine if potential overdraft conditions exist and proposed mitigation measures if such conditions exist or are anticipated. Any proposed revisions will be documented in the periodic evaluation.

5.4.2 Monitoring Network (§356.4(e))

The GSP monitoring network is detailed in Chapter 3 and will be evaluated during the periodic review. This will include a review of data collected, potential data gaps, and an assessment of the functionality of the monitoring network. If data gaps are identified, the evaluation will include a plan to improve the monitoring network to acquire additional data sources. A description of how new information will be incorporated into future GSP updates will be included if necessary. Installation of new data collection facilities and analysis of new data will be prioritized in the GSP.

5.4.3 New Information (§356.4(f))

It is assumed that new information on groundwater conditions, projects and management actions, and sustainability objectives will become available over time to be incorporated into the GSP. Significant, new information that becomes available following plan adoption or prior periodic evaluations will be discussed, and an adaptive management approach will be applied to identify, review, and incorporate all new information into the GSP. The periodic evaluations will indicate whether new information warrants changes to any aspect of the GSP.

5.4.4 GSA Actions (§356.4(g))

The GSA will complete ongoing monitoring, management, and collaboration to meet the sustainability goal specified in the GSP. The periodic evaluation will include a description of any changes in regulations or ordinances. This includes state laws and regulations or local ordinances that have been implemented since the previous periodic evaluation. The effect on elements of the GSP and any necessary updates to the GSP including the basin setting, measurable objectives, minimum thresholds, and undesirable results will be described. Furthermore, relevant or enforcement actions taken by the GSA will be described along with how such actions support sustainability in the Subbasin.

5.4.5 Plan Amendments, Coordination, and Other Information (§356.4(i) - (§356.4(k))

Any completed or proposed amendments to the plan will be described in the periodic evaluation. This includes changes to the basin setting, measurable objectives, minimum thresholds, and undesirable results. A description of coordination between GSAs within the basin, between hydrologically connected basins, and land use agencies will be presented. The GSA will summarize any other information deemed appropriate to support the GSP and will provide associated required information to DWR.

The implementation schedule for the 20-year implementation period is presented in **Figure 5-1** below:

Figure 5-1. GSP Implementation Schedule

TASK NAME	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Plan Implementation																					
GSP Submittal to DWR	x																				
Outreach and Communication	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
Monitoring and DMS	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
GSP Reporting																					
Annual Reports	x	x	x	x	x		x	x	x	x		x	x	x	x		x	x	x	x	
5-year GSP Evaluation Reports						x					x					x					x

x Indicates a submittal.
🟦 Indicates ongoing event.

FINAL REPORT

Red Bluff Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan (Chapter 6 References)

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini

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Appendix 1-A

Tehama County Flood Control and Water Conservation District Act of Formation and Resolution No. 7-2021 to Adopt the GSP for Antelope Subbasin

located within the district, of the percentage of costs to be split among the zones created, and that no general law contains provisions for the issuance of bonds and for the purpose of raising funds to assist in such work. The cost of adequate flood control and water conservation is beyond the means of the property owners and taxpayers of the district, and it is necessary to negotiate to obtain financial aid from the United States Government. It is recommended by the United States Government and it is desirable to immediately form a political entity to satisfactorily deal with the agency of the United States Government.

Investigation having shown conditions in the County of Sonoma to be peculiar to that county, it is hereby declared that a general law cannot be made applicable thereto and that the enactment of this special law is necessary for the conservation, development, control and use of said waters for the protection of life and property therein and for the public good. [Amended by Stats 1951 ch 1344 § 28 p 3244; Stats 1957 ch 1515 § 6 p 2863.]

ACT 8510

Tehama County Flood Control and Water Conservation District Act

[Stats 1957 ch 1280 p 2581, effective July 4, 1957; Amended by Stats 1959 ch 940 p 2968; Stats 1961 ch 631 p 1802, ch 1493 p 3338, ch 2213 p 4559; Stats 1963 ch 332 p 1116; Stats 1967 ch 219 p 1351; Stats 1969 ch 27; Stats 1970 ch 190, effective June 9, 1970.]

AN ACT to create a flood control district to be called Tehama County Flood Control and Water Conservation District; to provide for the control and conservation of flood and storm waters and the protection of watercourses, watersheds, public highways, life and property from damage or destruction from such waters; to provide for the acquisition, retention, and reclaiming of drainage, storm, flood, and other waters and to save, conserve, and distribute such waters for beneficial use in said district; to authorize the incurring of indebtedness, the issuance and sale of bonds, and the levying and collection of taxes and assessments on property within said district and in the respective zones thereof; to define the powers of said district; to provide for the government, management, and operation of said district and for the acquisition and construction of property and works to carry out the purposes of the district, declaring the urgency thereof, to take effect immediately.

Note—Stats 1961 ch 1292, effective July 10, 1961, authorized a grant to the Tehama County Flood Control and Water Conservation District for fish and wildlife enhancement and recreation in connection with the Paskenta Dam and Reservoir.

§ 1. District created: Territory

A flood control and water conservation district is hereby created, to be known and designated as "Tehama County Flood Control and Water Conservation District," and the boundary and territory of said district are as follows: all that territory of the County of Tehama lying within the exterior boundaries thereof.

§ 2. Definitions

"District" means Tehama County Flood Control and Water Conservation District.

"Board" means the board of directors of the district.

"County" means the County of Tehama.

"Counties" means the several counties of the State of California.

"State" means the State of California.

"Subterranean supply of waters" means (a) that amount of water percolated into natural underground reservoirs, from surface reservoirs owned or controlled by the district, to replenish and augment the supply therein, (b) that amount of the underflow water of a surface watercourse to the extent augmented by the release of water from a surface reservoir owned or controlled by the district, and (c) any underflow of a surface watercourse being put to beneficial use within the district on the effective date of this act.

§ 3. Objects and purposes of act: Powers of district

The objects and purposes of this act are to provide, to the extent that the board may deem expedient or economical, for the control and disposition of the storm and flood waters of said district and to that end the district is hereby created to be a body corporate and politic and as such shall have power:

(a) To have perpetual succession.

(b) To sue and be sued in the name of the district in all actions and proceedings in all courts and tribunals of competent jurisdiction.

(c) To adopt a seal and alter it at pleasure.

(d) To take by grant, purchase, gift, devise or lease; to hold, use, enjoy, sell, and contract to sell, lease, or dispose of real, personal and mixed property of every kind within or without the district necessary, expedient or advantageous to the full exercise and economic enjoyment of its purposes.

(e) To acquire and contract to acquire by purchase, donation or other lawful means in the name of the district from private persons, public and private corporations, associations, agencies or districts, lands, rights-of-way, easements, privileges, material, and property of every kind within or without the district, to do all work and to acquire, construct, maintain and operate any and all works and improvements within or without the district, and to make, execute, carry out and enforce all contracts of every character, necessary, convenient, incidental, useful or proper to carry out any of the provisions, objects or purposes of this act, and to complete, extend, add to, repair, or otherwise improve any works or improvements acquired by it as herein authorized.

(f) To have and exercise the right of eminent domain, and in the manner provided by law for the condemnation of private property for public use by the State, any political subdivision or district thereof, except that such right shall be exercised only as against property located within the county.

In condemnation proceedings, the district shall proceed under the provisions of Title 7 (commencing at Section 1237) of Part 3 of the Code of Civil Procedure, which said provisions are hereby made applicable for that purpose: and it is hereby declared that the use of the property, lands, rights-of-way, easements or materials which may be condemned, taken or appropriated under the provisions of this act is a public use, and the board is granted the same powers and rights with respect to the taking of property for public uses of said district as are now or may hereafter be conferred by general law on the legislative body of a county, city and county, incorporated city or town, municipal water district or irrigation or reclamation district; provided, however, that no property shall be taken unless it is taken upon a finding of a court of competent jurisdiction that the taking is for a more necessary public use than that to which it has already been appropriated.

(g) To compel by injunction or other lawful means the owner or owners of any bridge, trestle, wire line, viaduct, embankment or other structure which shall be intersected, traversed, or crossed by any channel, ditch, bed of any stream, waterway, conduit or canal so to contruct or alter the same as to offer a minimum of obstruction to the free flow of water through or along such channel, ditch, bed of any stream, waterway, conduit or canal, and whenever necessary in the case of existing works or structures, to compel the removal or alteration thereof for such purpose or purposes. All costs of relocating or altering or otherwise changing existing works or structures shall be paid by the district: provided, however, that all costs of relocating or otherwise changing any portion of a state highway shall be paid for from funds available for rights-of-way for flood control purposes and not from funds appropriated for state highway purposes.

(h) To construct, maintain, repair and operate all levees, bulkheads, walls of rock or other material, pumps, dams, channels, conduits, pipes, ditches, canals, reservoirs, drains, tunnels, poles, posts, wires, lamps, powerplants, railroads, dredgers and all other auxiliary, incidental, necessary or convenient agencies, work or improvements that may be required to carry out, facilitate, repair, maintain and complete the same.

(i) To incur indebtedness, and to issue bonds in the manner herein provided and to provide for the issuance of warrants of the district in payment of district obligations and the registration of any warrants not paid for want of funds and the rate of interest such warrants shall bear after registration and until such payment.

(j) To cause assessments to be levied and collected for the purpose of paying any obligations of the district in the manner hereinafter provided.

(k) To appoint and employ such engineers, attorneys, assistants and other employees as may be necessary and fix their compensation, including, if it deem advisable, a clerk, superintendent of work, assessor, treasurer and tax collector, and define their powers and duties, and fix and determine the amount of bond required of each employee and pay the premium on each such bond; which said officers and employees and each of them shall serve at the pleasure of the board.

The board shall have the power to combine any two or more offices in its discretion.

(*l*) To establish and fix the boundaries of zones, or abolish the same, in the district as provided in this act; to make transfers of money from the general fund of the district to any special fund and to create and administer such special funds as in their discretion may seem advisable, and to abolish the same; to create and administer revolving funds to facilitate and assist in the carrying on and completing of such acquisitions, works, and improvements provided for herein, and to abolish same; and to do any and all things necessary or incidental to the accomplishment of the things which are permitted to be done under this act.

(m) To make and enter into contracts with the United States, the State of California, any political subdivision, county, municipality, district, agency or mandatory of the State of California or of the United States and any department, board, bureau or commission of the State of California or the United States, or any person, firm, association or corporation, jointly or severally, for the acquisition of property rights or the construction, maintenance and operation in whole or in part of any or all works and improvements provided in this act.

(n) To lease or rent to or from any of the parties named in subdivision (m) of this section any property or rights necessary, in the opinion of the board, to accomplish or carry out any of the work or improvement or the maintenance thereof and under such terms and conditions as may be agreed upon between the parties.

(o) To receive and accept any and all contributions in labor, material or money from any of the parties named in subdivision (m) of this section, to be applied to the work or improvement herein provided for.

(p) To construct, purchase, lease or otherwise acquire works, and to purchase, lease, appropriate, or otherwise acquire surface water and water rights, useful or necessary to make use of water for any of the purposes authorized by this act.

(q) To do any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of lands or inhabitants within the district, including but not limited to, the acquisition, storage, and distribution for irrigation, domestic, fire protection, municipal, commercial, industrial, recreational and all other beneficial uses.

(r) To control flood and storm waters within the district and the flood and storm waters or streams outside the district, which flow into the district; to conserve such waters by storage in surface reservoirs, to divert and transport such waters for beneficial uses within the district; to release such waters from surface reservoirs to replenish and augment the supply of water in natural underground reservoirs and otherwise to reduce the waste of water and to protect life and property from floods within the district; to commence, maintain, intervene in, defend or compromise, in the name of the district, on behalf of the landowners therein, or otherwise to assume the cost and expenses of any action or proceeding involving or affecting the ownership or use of waters or water rights within or without the district, used or useful for any purpose of the district or of the common benefit of any land situated therein, or involving the wasteful use of water therein; to commence, maintain, intervene in, defend and compromise and to assume the cost and expenses of any and all actions or proceedings now or hereafter begun; to prevent interference with or diminution of, or to declare the rights in natural flow of any stream or surface or subterranean supply of waters used or useful for any purpose of the district or of common benefit to the lands within the district or to its inhabitants; to prevent unlawful exportation of water from said district; to prevent contamination, pollution or otherwise rendering unfit for beneficial use, the surface or subsurface water used or useful in said district, and to commence, maintain and defend actions and proceedings to prevent any such interference with the aforesaid waters as may endanger or damage the inhabitants, lands, or use of water in, or flowing into, the district; provided, however, that said district shall not have power to intervene or take part in, or to pay the costs or expenses of actions or controversies between the owners of lands or water rights which do not affect the interests of the district.

(s) To co-operate and act in conjunction with the United States or with the State of California, or any of its engineers, officers, boards, commissions, departments or agencies, or with any public or private corporation, or with the County of Tehama, in the construction of any work for the controlling of flood or storm waters of or flowing into said district, or for the protection of life or property therein, or for the purpose of conserving said waters for beneficial use within said district, or in any other works, acts, or purposes provided for herein, and to adopt and carry out any definite plan or system of work for any such purpose.

(t) To enter upon any land, to make surveys and locate the necessary works of improvement and the lines for channels, conduits, canals, pipelines, roadways and other rights-of-way; to acquire by purchase, lease, contract, gift, devise or other legal means all lands and water and water rights and other property necessary or convenient for the construction, use, supply, maintenance, repair and improvement of said works, including works constructed and being constructed by private owners, lands for reservoirs for storage of necessary water, and all necessary appurtenances, and also where necessary or convenient to said end, and for said purposes and uses, to acquire and to hold the capital stock of any mutual water company or corporation, domestic or foreign, owning water or water rights, canals, waterworks, franchises, concessions, or rights, when the ownership of such stock is necessary to secure a water supply required by the district or any part thereof, upon the condition that when holding such stock, the district shall be entitled to all the rights, powers and privileges, and shall be subject to all the obligations and liabilities conferred or imposed by law upon other holders of such stock in the same company; to enter into and do any acts necessary or proper for the performance of any agreement with the United States, or any state, county, district of any kind, public or private corporation, association, firm or individual, or any number of them, for the joint acquisition, construction, leasing, ownership, disposition, use, management, maintenance, repair or operation of any rights, works or other property of a kind which might be lawfully acquired or owned by said Tehama County Flood Control and Water Conservation District; to acquire by negotiation only the right to store water in any reservoirs, or to carry water through any canal, ditch or conduit not owned or controlled by the district; to grant to any owner or lessee the right to the use of any water owned or controlled by the district or right to store such water in any reservoir of the district, or to carry such water through any tunnels, canal, ditch, or conduit owned and controlled by the district; to enter into and do any acts necessary or proper for the performance of any agreement with any district of any kind, public or private corporation, association, firm or individual, or any number of them for the transfer or delivery to any such district, corporation, association, firm or individual or any water right or water pumped, stored, appropriated or otherwise acquired or secured, for the use of the Tehama County Flood Control and Water Conservation District, or for the purpose of exchanging the same for other water, water right or water supply in exchange for water, water right or water supply to be delivered to said district by the other party to said agreement.

(u) To co-operate and contract with the United States under the Federal Reclamation Act of June 17, 1902, and all acts amendatory thereof or supplementary thereto or any other act of Congress heretofore or hereafter enacted permitting co-operation or contract for the purposes of construction of works, whether for irrigation, drainage, or flood control, or for the acquisition, purchase, extension, operation or maintenance of such works, or for a water supply for any purposes, or for the assumption as principal or guarantor of indebtedness to the United States, or for carrying out any of the purposes of the district, and to carry out and perform the terms of any contract so made; and for said purposes the district shall have in addition to the powers specifically set forth in this act, all powers, rights and privileges possessed by irrigation districts as set out in Chapter 2 (commencing at Section 23175) of Part 6 of Division 11 of the Water Code, not inconsistent with the provisions of this act.

(v) Nothing herein contained shall be deemed to permit the district or its board of directors to acquire or interfere in existing water rights and water uses and facilities for distribution of the same on an involuntary basis, but nothing herein shall be deemed to prohibit negotiating and acquisition of existing rights, uses, and privileges in water by negotiation. [Amended by Stats 1961 ch 631 § 1 p 1802.]

§ 3.1. Power to co-operate and contract with United States or this State: Incurrence of indebtedness: When consent of voters necessary: Election procedure

The power of the district to co-operate and contract with the United States or the State of California pursuant to Section 3 shall include the power to incur an indebtedness or liability under any such contract, but no such contract under which the district incurs an indebtedness or liability exceeding the income or revenue for the year in which the contract is proposed to be executed shall be executed without the consent of two-thirds of the votes cast at a special election to be held for that purpose, such election to be called and held, so far as practicable, in the same manner as bond elections for the district. [Added by Stats 1959 ch 940 § 1 p 2968: Amended by Stats 1963 ch 332 § 1 p 1116.]

§ 3.2. Additional powers

In addition to its other powers, the district has all of the powers granted to public agencies by the Davis-Grunsky Act (Chapter 5 (commencing with Section 12880) Part 6, Division 6, of the Water Code). [Added by Stats 1961 ch 2213 § 1 p 4559: Amended by Stats 1967 ch 219 § 1 p 1351.]

§ 4. Establishment of zones: Amending boundaries: Proceedings: Prohibitions

The board of directors of the district created by this act, by resolutions thereof adopted from time to time, may establish zones within the district without reference to the boundaries of other zones, setting forth in such resolutions, descriptions thereof by metes and bounds and entitling each of such zones by a zone number, and institute zone projects for the specific benefit of such zones. The board may, by resolution, amend the boundaries by annexing property to or by withdrawing property from the zones or may divide existing zones into two or more zones or may superimpose a new or amended zone on zones already in existence, setting forth in such resolutions descriptions of the amended, divided or superimposed zones by metes and bounds and entitling each of such zones by a zone number. The board may not form a zone covering areas of land situated both inside and outside the corporate limits of a municipality.

The board, at any regular or special meeting, may adopt a notice of intention to create a zone (or zones). Said notice shall state the reason for the formation of said zone (or zones), the area to be included in each proposed zone, the date, place and time of the meeting of the board at which it is proposed to pass the resolution to form a zone (or zones). The notices of intention to form a zone (or zones) must be posted in at least five public places in each proposed zone, at least 15 days prior to the proposed formation date. Proof of the posting of said notices shall be filed with the clerk, showing the locations in the proposed zone where said notices were posted, together with the date of posting, and signed by the person who did the posting. The clerk shall mail a copy of said notices of intention to form a zone (or zones) to the county assessor and such other parties as ordered by the board. The notice must also state that any interested person may appear before the board at the time when it is proposed to pass the resolution forming the zone (or zones), and urge the formation or protest the formation thereof. At the time set by the board in its notice of intention to form a zone (or zones), or at any time at which the hearing may be continued, the board shall consider all proposals for or against the formation of the zone (or zones). If it appears to the majority of the board that the formation of a zone (or zones) would be beneficial to the area, they may adopt a resolution forming said zone (or zones), and assign each zone a zone number. The clerk shall file a certified copy of the resolution with the county recorder, and one copy each with the county assessor, the Secretary of State, and the State Board of Equalization.

Proceedings for the establishment of such zones may be conducted concurrently with and as a part of the proceedings for the instituting of projects relating to such zones, which proceedings shall be instituted in the manner prescribed in Section 5 of this act. [Amended by Stats 1961 ch 631 § 2 p 1807.]

§ 4.1. Abolishment of zone: Resolution and contents: Notice and hearing: Recording and filing

When the board finds that a zone within the district no longer serves a useful purpose and is not required for the proper functioning of the district, the board may by resolution abolish the zone, if there is no bonded or contractual indebtedness representing a lien on land in the zone. The board shall give the same notice and hearing in the same manner as was given when the zone was formed.

The resolution abolishing the zone shall contain a metes and bounds description of the zone and a map or plat showing the boundaries of the zone. The resolution abolishing the zone shall be recorded in the office of the recorder of the county. A certified copy of the resolution abolishing the zone shall be filed with the assessor of the county and the State Board of Equalization. [Added by Stats 1961 ch 631 § 3 p 1808.]

§ 4.2. Countywide zone for flood control and bank protection projects or for channel clearance: Notice of intention to create: Posting: Mailing: Hearing: Resolution: Filing

Notwithstanding the provisions of Sections 4 and 19.5 of this act, the board of directors of the district by resolution may establish a countywide zone for the purpose of maintaining flood control projects and bank protection projects, including those constructed by federal agencies, including but not limited to, the United States Army, Corps of Engineers, or pursuant to the Watershed Protection and Flood Prevention Act (Public Law 566, Chapter 656, 83d Congress, Second Session), and for channel clearance when, in the judgment of the board, the channels of any stream are in such condition as to impede the flow of flood water.

The board, at any regular or special meeting, may adopt a notice of intention to create a countywide zone. The notice shall state the reason for the formation of the countywide zone, that the zone shall embrace all that territory of the County of Tehama lying within the exterior boundaries of the county, and the date, place and time of the meeting of the board at which it is proposed to pass the resolution to form a countywide zone. The notices of intention to form a countywide zone must be posted in at least five public places in the county, at least 15 days prior to the proposed formation date. Proof of the posting of the notices shall be filed with the clerk, showing the locations in the county where the notices were posted, together with the date of posting, and signed by the person who did the posting. The clerk shall mail a copy of the notices of intention to form a countywide zone to the county assessor and such other parties as ordered by the board. The notice must also state that any interested person may appear before the board at the time when it is proposed to pass the resolution forming the countywide zone, and urge the formation or protest the formation thereof. At the time set by the board in its notice of intention to form a countywide zone, or at any time at which the hearing may be continued, the board shall consider all proposals for or against the formation of the countywide zone

If it appears to the majority of the board that the formation of a countywide zone would be beneficial to all the territory within the district, they may adopt a resolution forming the countywide zone. The clerk shall file a certified copy of the resolution with the county recorder, and one copy each with the county assessor, the Secretary of State, and the State Board of Equalization. [Added by Stats 1963 ch 332 § 2 p 1117.]

§ 4.3. Abolition of countywide zone

A countywide zone may be abolished pursuant to the provisions of Section 4.1, except that the resolution abolishing the countywide zone need not contain a metes and bounds description of such zone nor a map or plat showing the boundaries of such zone. [Added by Stats 1963 ch 332 § 3 p 1117.]

§ 5. Institution of projects for single zones or joint projects for two or more zones: Adoption of resolution: Hearing: Publication of notice: Decision of board

The board may institute projects for single zones and joint projects for two or more zones, for the financing, constructing, maintaining, operating, extending, repairing or otherwise improving any work or improvement for the common benefit of such zone or participating zones. For the purpose of acquiring authority to proceed with any project, the board shall adopt a resolution specifying its intention to undertake such project, together with the engineering estimate or the cost of same to be borne by the particular zones or participating zones and fixing a time and place for public hearing of the resolution and which shall refer to a map showing the general location and general construction of the project.

Notice of such hearing shall be given by publication once a week for two consecutive weeks prior to the hearing. The last publication of the notice shall be a least seven days before the hearing in a newspaper of general circulation designated by the board, circulated in such zone or each of the participating zones, if there by such a newspaper. If there is no such newspaper, then by posting notice for two consecutive weeks prior to the hearing in five public places designated by the board, in such zone or in each of the participating zones. The notice must designate a public place in such zone or in each of the participating zones where a copy or copies of the map or maps of the joint project may be seen by any interested person; such map must be posted in each of the public places so designated in the notice at least two weeks prior to the hearing.

At the time and place fixed for the hearing, or at any time to which the hearing may be continued, the board shall consider all written and oral objections to the proposed project. Upon the conclusion of the hearing the board may abandon the proposed project or proceed with the same, unless prior to 30 days after the conclusion of the hearing written protests against the proposed project, signed by either a majority in number of the registered voters or freeholders residing within such zone or participating zones, are filed with the board. In that event, further proceedings relating to such project must be suspended for not less than six months following the date of the conclusion of the hearing, or the proceeding may be abandoned in the discretion of the board.

§ 6. Same: Appointment of advisory committee for each zone: Members: Qualification: Right to attend board meetings: Terms: Vacancies

Within 90 days after a zone has been established the board shall appoint, for each zone, an advisory committee of three persons who own real property within the zone for which they are appointed and whose names appear on the last Great Register of Tehama County, to represent before the board the residents and property owners of that zone. Each person so appointed shall be entitled to participate and be heard at every meeting of the board in which any matter affecting his zone is discussed or considered. The board shall not discuss or consider any matter which affects any zone unless each member of the advisory committee for that zone has been notified in writing as to the time and place of meeting at least five days before the meeting. The board shall take no affirmative action on any matter pertaining to a zone, unless and until said action is approved by a two-thirds majority of the advisory committee in writing and such written consent is filed with the board. After being notified as required by this section, should any member or members of the advisory committee fail to file a written consent, the said failure of said member or members to act shall be deemed as an approval of the act being considered by the board. The members of the first advisory committee appointed for a zone shall be appointed by the board for the following terms: one member for one year, one member for two years and one member for three years. Thereafter each member shall be appointed for a term of three years, and shall hold office until their successors are appointed and qualified. Vacancies on the advisory committee shall be filled by the board for the unexpired term. Nothing in this act shall be construed to require the appointment of a zone committee for a countywide zone. [Amended by Stats 1961 ch 631 § 4 p 1808; Stats 1970 ch 190 § 1, effective June 9, 1970.]

§ 6.1. Same: Appointment of members of first advisory committee: Existing operating advisory committees

On the effective date of this section, or as soon thereafter as practicable, the board shall reappoint the members of any advisory committee, existing prior to the effective date of this section, for the terms specified in Section 6 of this act for the first advisory committee. Thereafter, the appointment of members of all advisory committees shall be governed by Section 6 of this act.

Any operating advisory committees existing on the effective date of this section are continued in existence, with the existing committee members, as advisory committees under Section 6 of this act. [Added by Stats 1961 ch 631 § 5 p 1808.]

§ 7. Dissolution of district: Procedure

Upon the petition of 200 qualified electors of the district, the district may be dissolved in the manner provided for the dissolution of districts by Article 10 (commencing at Section 58300) of Chapter 1 of Title 6 of the Government Code, except for the number of petitioners required, and the district shall be considered a district within the meaning of all the provisions of such article.

§ 8. Board of directors: Members: Qualifications: Terms: Vacancies: Compensation: Election of chairman: Quorum: Powers and duties

The Board of Supervisors of the County of Tehama shall act as the ex officio Board of Directors of the Tehama County Flood Control and Water Conservation District and shall exercise all the powers enumerated in this act except as otherwise provided and shall perform all other acts necessary or proper in their discretion to accomplish the purpose of this act.

The board of directors may adopt and enforce reasonable rules and regulations for the administration and government of the district and facilitate the exercise of its powers and duties herein set forth, and may employ and fix the compensation of all necessary agents and employees to look after the performance of any work or improvements provided in this act. Each member of the board of directors shall receive twenty-five dollars ($25) for each day he is in attendance at official meetings of the board and shall be allowed his actual, necessary, and reasonable expenses incurred in carrying out his duties under this act. The chairman of the board of supervisors shall be the chairman of the board of directors, who shall preside at all meetings of the board and in case of his absence or inability to act, the members present shall, by an order entered in their minutes, select one of their number to act as chairman temporarily. Any member of the board may administer oaths when necessary in the performance of his official duties. A majority of the members of the board shall constitute a quorum for the transaction of business, and no act of the board shall be valid or binding unless a majority of the board concur therein. [Amended by Stats 1969 ch 27 § 1; Stats 1970 ch 190 § 2, effective June 9, 1970.]

§ 9. Interest by directors in contracts awarded by board prohibited: Exceptions: Punishment on violation

No director of the district shall in any manner be interested directly or indirectly, in any contract awarded or to be awarded by the board, or in the profits to be derived therefrom. For any violation of this provision, such person shall be guilty of a misdemeanor, and upon conviction thereof shall forfeit his office. This section shall not be construed to apply to any contract made with a corporation for its general benefit where such a director is a minority stockholder therein.

§ 10. Performance of duties by county officers

The board of directors may appoint the county clerk, county assessor and tax collector, county auditor, county treasurer, district attorney, their assistants, deputies, clerks and employees to be ex officio officers, assistants, deputies, clerks and employees respectively of the district. Upon appointment, the board of directors by board order shall determine the amount of compensation paid each officer for the ex officio duties required under this act. [Amended by Stats 1970 ch 190 § 3, effective June 9, 1970.]

§ 11. Adoption, certification, recording and publication of ordinances, resolutions and other legislative acts: Initiative and referendum powers of electors

All ordinances, resolutions and other legislative acts for the district shall be adopted by the board, and certified to, recorded and published in the same manner, except as herein otherwise expressly provided, as are ordinances, resolutions or other legislative acts for the county.

The initiative and referendum powers are hereby granted to the electors of the district to be exercised in relation to the enactment or rejectment of district ordinances in accordance with the procedure established by the laws of the State of California for the exercise of such powers in relation to counties.

§ 12. Claims against district: Preparation, presentment, auditing and allowance or disallowance: Manner

Claims against the district shall be prepared, presented, audited and allowed or disallowed in the same manner and within the periods of time specified in the laws of the State of California, now or hereafter enacted, for the preparing, presenting, auditing, and allowance or disallowance of claims against the county.

§ 13. Title to property: Authority of board

The legal title to all property acquired under the provisions of this act shall immediately and by operation of law vest in the district, and shall be held by the district, in trust for, and is hereby dedicated and set apart to, the uses and purposes set forth in this act and all such property is exempt from taxation or assessment by the State, any county, city, or district. The board is authorized to hold, use, acquire, manage, occupy and possess said property, as provided herein if the board determines by resolution duly passed and entered in their minutes, that any district property, real or personal, is no longer necessary to be retained for the uses and purposes of the district, it may thereafter sell or otherwise dispose of said property, or lease the same, in the manner provided by law for the disposition and sale of property of counties, except that the title to real property, water rights or waterworks shall not be conveyed or alienated except by a vote of the electors at an election held for that purpose.

§ 14. Grant of right of way for location, etc., of flood control works across public lands of State: Procedure when power exercised

There is granted to the district the right of way for the location, construction and maintenance of flood control channels, ditches, waterways, conduits, canals, storm dikes, embankments, and protective works in, over and across public lands of the State of California, not otherwise disposed of or in use, not in any case exceeding in length or width that which is necessary for the construction of such works and adjuncts or for the protection thereof. Whenever any selection of a right of way for such works or adjuncts thereto is made by the district the board must transmit to the State Lands Commission, the Controller of the State and the recorder of the county in which the selected lands are situated, a plat of the lands so selected, giving the extent thereof and the uses for which the same is claimed or desired, duly verified to be correct. If the State Lands Commission shall approve the selections so made it shall endorse its approval upon the plat and issue to the district a permit to use such right of way and lands.

§ 15. Contracts exceeding $2,000: Letting to lowest bidder: Call for bids: Bonds: Rejection of bids: Doing work by force account: Purchase of materials and supplies: Limitations: Application of section

All contracts for the construction of any unit of work, except as hereinafter provided, estimated to cost in excess of three thousand five hundred dollars ($3,500) shall be let to the lowest responsible bidder in the manner hereinafter provided. The board shall advertise by three insertions in a daily newspaper of general circulation or two insertions in a weekly newspaper of general circulation published in the district inviting sealed proposals for the construction of the work before any contract shall be made therefor, and may let by contract separately any part of said work. The board shall require the successful bidder to file with the board good and sufficient bonds to be approved by the board conditioned upon the faithful performance of the contract and upon the payment of all claims for labor and material in connection therewith, such bonds to contain the terms and conditions set forth in Chapter 3 (commencing at Section 4200) of Division 5 of Title 1 of the Government Code, and to be subject to the provisions of that chapter. The board shall also have the right to reject any and all bids, in which case the board may advertise for new bids. In the event no proposals are received pursuant to advertisement therefor, where the estimated cost of such work does not exceed the sum of five thousand dollars ($5,000) or where the work consists of emergency work necessary in order to protect life and property, the board of directors, by unanimous vote of all members present, may without advertising for bids therefor have said work done by force account. The district shall have the power to purchase in the open market without advertisement for bids therefor, materials and supplies for use in any work therewith either under contract or by force account; provided, however, that material and supplies for use in any new construction work or improvement, except work referred to in the preceding sentence, may not be purchased if the cost thereof exceeds five thousand dollars ($5,000), without advertising for bids and awarding the contract therefor to the lowest responsible bidder.

The provisions of this section shall have no application to a contract entered into with the United States under the authority of Section 3 of this act, or to a contract authorized by a vote of the electorate of the district. [Amended by Stats 1970 ch 190 § 4, effective June 9, 1970.]

§ 16. Limitations on indebtedness or liability to be incurred

The district shall not incur any indebtedness or liability in any manner or for any purposes exceeding in any year the income and revenue provided for such year, and any indebtedness or liability incurred in violation of this section shall be absolutely void and unenforceable.

This section shall have no application to debts or liabilities incurred pursuant to the provisions of this act, authorizing the issuance of bonds, the levying of special assessments, the execution of contracts with the United States nor to the incurring of any indebtedness or liability authorized by a vote of the electors of the district at an election held for such purpose.

§ 17. General tax levy for district: Manner and time: Amount: Limitations: Increase of tax levied

The board in any year shall have the power to levy a tax, which shall be in addition to taxes for the payment of and interest on any bonded indebtedness, or any other indebtedness to the United States, upon the taxable property in said district. Said tax shall be levied and collected at the same time and in the same manner, together with county taxes and not to exceed, however, the sum of seven cents ($0.07) on each one hundred dollars ($100) of the assessed valuation of all property within the district, measured by the county assessment roll last equalized prior to the levying of said tax, to pay the costs and expenses of surveys, of zoning, compensation for clerical, engineering, legal, printing and advertising of all resolutions, notices, and other matter required to be printed, posted or published, all costs and expenses of legal actions or proceedings, and also the rental or purchase of real or personal property used in connection with such work and surveys, or any other of its purposes and to repay the county any and all moneys loaned to the district for the purposes herein stated and prior to the receipt of taxes.

The board may condition any increase in the tax levied pursuant to this section above the sum of three cents ($0.03) on each one hundred dollars ($100) of the assessed valuation of all property within the district upon the approval of a majority of the registered voters within the district voting at an election called for that purpose and held within the district.

The tax levied pursuant to this section shall be known as the general tax levy for the district. [Amended by Stats 1961 ch 631 § 6 p 1809; Stats 1970 ch 190 § 5, effective June 9, 1970.]

§ 18. Power of board to cause taxes to be levied within any zone: Purposes

The board shall have the power, as provided for in this act, to cause taxes to be levied within any zone for the purpose of paying any obligation of the district created for the district and to accomplish the purpose of the district and of this act.

§ 19. Estimation and determination of amount of money necessary for projects: Procedure: Division of district into zones

The board may estimate and determine the amount of money necessary to be raised to construct or purchase necessary works and acquire the necessary property and rights therefor and otherwise carry out the provisions of this act.

For the purpose of ascertaining the amount of money necessary to be raised for such purposes, or any of them, the board may cause such surveys, examinations, drawings and plans to be made as shall furnish the proper basis for said estimate.

In the estimate of the amount necessary to be raised, the board may include a sum sufficient to pay the interest on the bonds to be issued for a period of three years or less. All such surveys, examinations, drawings, and plans shall be made under the direction of the engineer of the district and shall be certified by him. After receiving such report the board may determine and declare by resolution whether or not the proposed plan of work is satisfactory and whether or not the project, as set forth in the report, is feasible, and if so, may make an order determining the amount of bonds that should be issued in order to raise the amount of money necessary therefor, and in determining the amount, sufficient shall be included to cover the cost of inspection of works in course of construction.

Prior to the calling of the bond election hereinafter referred to, the board shall cause the entire district, or any portion thereof, to be divided into a zone or zones, if in its opinion such division is necessary because of the varying benefits to the property within the district, together with a statement as to the amount of the sum to be raised from each of such zone or zones for the payment of principal and interest of the bonds of the zone or zones. The district may be divided into as many zones as may be deemed necessary and each zone shall be composed of and include any of the lands in the district which in the opinion of the board will be benefited in substantially the same manner. Each zone shall be designated on a map or plat of the district filed in the office of the board and shall show the separate boundaries of each zone and a statement of the amount to be raised from each zone.

§ 19.5. Areas exempt from inclusion in zones except upon written application to be included

The following areas are exempted from inclusion in any zone within the district except upon written application to be included in all or part of any proposed zone:

(a) Existing irrigation districts.

(b) The operating areas of any existing mutual water companies.

§ 20. Election in connection with zone projects

If after the hearing provided for in Section 5 of this act, the board determines to proceed with any project, the board shall call a special election and submit to the qualified voters of said zone or zones, the following propositions:

1. Shall the report adopted by the board be ratified?
2. Shall the district incur a bonded indebtedness for the purpose of providing for the control and disposition of flood and storm waters of the zone and to protect from damage from such storm and flood waters, the waterways, property, public highways, and public places in the district, and for any other purpose set forth in Section 3 hereof?
3. If a contract with the United States or the State of California is required to be submitted to the voters pursuant to Section 3.1 hereof, shall the district execute such contract?

The resolution calling the special election shall state the estimated cost of the proposed work and improvements, the amount of the principal of the indebtedness to be incurred therefor and shall fix the maximum rate of interest to be paid on said indebtedness which shall not exceed 5 percent per annum, and shall fix the date on which the special election shall be held and the manner of voting for and against the ratification of the report adopted by the board, and for and against the incurring of such indebtedness.

If a contract with the United States or the State of California is submitted for approval of the voters, the resolution shall state the purpose of the contract and the amount of the indebtedness or liability to be incurred thereunder, and shall fix the manner of voting for and against such contract.

For the purpose of the election, the board shall, in its resolution, establish election precincts within the boundaries of the zones affected, and may form election precincts by consolidating the precincts established for general election purposes in the zones, and shall designate a polling place and appoint one inspector, two judges and two clerks for each of such precincts.

In all particulars not recited in such resolution, the election shall be held as nearly as practicable in conformity with the general election laws of the State.

At such election all persons whose names appear on the last Great Register of Tehama County and who own real property within the zone or zones involved shall be entitled to vote as hereinafter provided. The number of votes shall be governed by the assessed value of all real and personal property owned by the elector within the zone involved. Every landowner shall be entitled to one vote for the first one thousand dollars ($1,000) of assessed value or fraction thereof and an additional vote for each additional one thousand dollars ($1,000) of assessed value or fraction thereof.

In the case of land owned by a copartnership or a corporation the method of voting shall be as follows:

Copartners whose names appear on the last Great Register of Tehama County and who own land in the zone or zones affected shall be eligible to vote. In the case of a corporation owning land in the zone or zones affected and who has a stockholder or stockholders whose name or names appear on the last Great Register of Tehama County said stockholder or stockholders shall be eligible electors. A copartnership or corporation may designate which partner or partners and stockholder or stockholders is to represent the owners of land at any election and the percentage to be voted by each copartner or stockholder. The designation is to be made in writing and in the case of a copartnership the document shall be signed by the partners and in the case of a corporation the document shall be signed by the officers and bear the corporate seal and said document shall be delivered to the election board at the time of voting. If the voter is not a resident of the zone or zones affected, his voting precinct shall be the precinct in which his land, or the land he represents, is situated.

Such resolution calling such election shall be published once a day for at least seven days, in some newspaper published at least five days a week in the district, or once a week for two weeks in some newspaper published less than five days a week in such district, and one insertion each week for two succeeding weeks shall be sufficient publication in such newspaper published less than five days a week. No further notice of such election need be given.

Any defect or irregularity in the proceedings prior to the election shall not affect the validity of the bonds or of any contract submitted for approval.

If at such election two-thirds or more of the votes are cast in favor of ratifying the adoption of the report by the board and the incurring of such bonded indebtedness, then the bonds of the district, for the amounts stated in such proceedings, shall be issued and sold as provided in this act.

If at such election two-thirds or more of the votes are cast in favor of executing a contract submitted for approval, then the contract shall be executed by the district. [Amended by Stats 1959 ch 940 § 2 p 2969.]

§ 21. Period during which another election prohibited where proposition fails to receive required number of votes

Should the proposition be submitted to the electorate as provided in Section 20 fail to receive the requisite number of votes of the qualified electors voting at such election for the purposes specified, the board shall not for one year after such election call or order another election in the district for the same purposes.

§ 22. Contract by municipal corporation or political subdivision within district to pay to district amount assessed against zones within municipality or political subdivision: Effect: Optional procedure:

Notwithstanding any other provision in this act, the governing body of any municipal corporation or political subdivision at any time after the location and extent of zones within the district and the amount to be raised therefrom in each of such zones for the purpose of assessment have been finally fixed and determined by the board as provided in Section 19, but before the calling of the bond election as provided in Section 20 may, with the consent of the board, enter into a contract with the district to pay to the district for the benefit of the bond fund thereof, if a bond issue be authorized and bonds be issued, an amount which shall be equal to the total amount assessed against all zones situated entirely within the corporate limits of the municipality or political subdivision. Thereupon the charges against the zone or zones shall be canceled to the extent of the amount so agreed to be paid, and thereafter the electors residing within the zone or zones shall not be entitled to vote at such bond election. Such contract shall contain such other and additional provisions as the board deems necessary or advisable in order to to protect the interests of the district and to substitute the contract in lieu and instead of the assessments within the zone or zones so assumed by the municipality or other political subdivision.

It shall be wholly optional with the board whether or not to proceed as provided in this section.

§ 23. Form of bonds: Maturity: Times and place of payment: General obligation bonds: Prohibitions and limitations

Subject to the provisions of this act, the board shall prescribe by resolution the form of the bonds and of the interest coupons attached thereto and shall fix the rate of interest said bonds shall bear, not to exceed 5 percent per annum. The bonds shall mature serially in amounts to be fixed by the board, payment of the bonds commencing not later than five years from the date thereof and being completed in not more than 50 years from said date. The board shall fix the place or places (which may be within or without the State of California and which shall be designated in the bonds) where the bonds, together with the interest thereon, shall be payable. The district or the board of directors thereof are not by this act authorized to issue general obligation bonds for the purpose of conserving or distributing water to be used for agricultural irrigation purposes. The principal amount of general obligation bonds issued shall not exceed in the aggregate that amount allowed by the California Districts Securities Commission but in no event to exceed 15 percent of the assessed value of all the real and personal property of the zone or zones involved.

§ 24. Same: Denominations: Payment: Signatures and countersignatures: Interest coupons: Signatures by officers ceasing to be such

The bonds shall be issued in such denominations as the board may determine, except that no bonds shall be of a less denomination than one hundred dollars ($100) nor of a greater denomination than one thousand dollars ($1,000). The bonds shall be payable on the day and at the place or places fixed therein, and with interest specified therein, which interest shall be payable semiannually, except the interest for the first year which may be paid in one installment. The bonds shall be signed by the chairman of the board or such other member of the board as the board may, by resolution, designate, and countersigned by the treasurer of the district and the seal of said district shall be affixed thereto. The interest coupons of the bonds shall be numbered consecutively and signed by the treasurer of said district by his engraved or lithographed signature. In case any officer whose signature or countersignature appears on the bonds or coupons shall cease to be such officer before the delivery of such bonds to the purchaser the signature or countersignature shall nevertheless be valid and sufficient for all purposes the same as if such officer had remained in office until the delivery of the bonds.

§ 25. Action to determine validity of bonds: Procedure

An action to determine the validity of bonds may be brought pursuant to Chapter 9 (commencing with Section 860) of Title 10 of Part 2 of the Code of Civil Procedure. [Amended by Stats 1961 ch 1493 § 1 p 3338.]

§ 26. Issuance and sale of bonds: Manner: Price: Publication of notice of sale: Rejection of bids: Registration: Payment to registered owner

The board shall issue and sell the whole or any part of the bonds to the highest bidder or bidders for cash at the best price obtainable therefor, but in no event for less than the par value of such bonds and the accrued interest thereon. Before making a sale of any of the bonds, notice of the sale shall be given by publication in at least one newspaper of general circulation, published in the district by two insertions therein; and no sale shall be had prior to the expiration of 15 days from the first publication of the notice. The board shall have the right to reject any and all bids when in its discretion it appears to the best interest of the district to do so, and may thereafter readvertise as provided in this section for original sale. The bonds may be registered with the treasurer in accordance with the provisions of any law applicable to the registration of municipal bonds, and thereafter the principal and interest thereon shall be paid to the proper registered owner thereof.

§ 27. Investments of surplus money in sinking fund authorized: Sale of securities: Cancellation of district bonds purchased

Whenever the district shall have any moneys in any sinking fund established for the purpose of providing for the payment of the principal or interest of any bonded indebtedness, which money is not immediately required for the purpose of making such payment, the same or any part thereof may be invested temporarily in any bonds already issued by such district or in any bonds of the United States of America or the State of California. Such investment may be made by direct purchase of any issue of bonds of the district or any part thereof at the original sale of such bonds or by the purchase of such bonds after they have been so issued. Any bonds so purchased and held in any such sinking fund may from time to time be sold and the proceeds temporarily reinvested in bonds as above provided. Sales of any bonds so purchased and held in the sinking fund shall, from time to time, be made in season so that the proceeds may apply to the purpose for which the sinking fund was created except that if such moneys shall not be required for the purpose of paying the interest or any part of the principal of the outstanding bonds, the bonds of the district purchased from such moneys may be canceled by the treasurer of said district upon order by the board. After such cancellation such bonds shall cease to be an obligation of the district for any purpose whatsoever.

§ 28. Bonds as evidence of regularity, etc., of proceedings: Effect of irregularity, etc., in proceedings: Payment of bonds by revenue derived from taxation

Bonds issued under this act shall be, by their issuance, conclusive evidence of the regularity, validity and legal sufficiency of all proceedings, acts and determinations had or made under this act. No error, defect, irregularity, informality and no neglect or omission of any officer of the district in any procedure, taken hereunder, which does not affect the jurisdiction of the board to order the doing of the thing or things proposed to be done, shall void or invalidate such proceedings or any bonds issued thereunder. The bonds and the interest thereon shall be paid by revenue derived from an annual tax upon the taxable property within the district, and all the taxable property in the district shall be and remain liable to be assessed for such payments as hereinafter provided.

§ 29. Bonds as legal investments

Any bonds which shall be issued under the provisions of this act shall be legal investments for all trust funds, and for the funds of insurance companies, banks, both commercial and savings, and trust companies, and for state school funds. Whenever any money or funds may be, by any law now or hereafter enacted, invested in bonds of cities, cities and counties, counties, school districts or irrigation districts, within the State of California, such money or funds may be invested in the bonds issued under this act. Whenever bonds of cities, cities and counties, counties, school districts or irrigation districts within this State may be, by any law now or hereafter enacted, used as security for the performance of any act or the deposit of any public moneys, the bonds issued under this act may be so used.

§ 30. Proceeds of bonds: Deposit and payments: Uses authorized

All proceeds received from the sale of the bonds hereunder shall be deposited with the County Treasurer of the County of Tehama, and be paid out by him upon authority of the board and by proper warrant. All proceeds in excess of the actual cost of all work and improvement and proceedings thereunder may be used for any lawful purposes for which the district was created as in this act provided. [Amended by Stats 1959 ch 940 § 3 p 2970.]

§ 31. Annual tax levy for bond interest and principal: Amount: Levy and collection: Procedure: Laws applicable: Basis for taxes: Liens: Compensation to county: Disposition of amount collected

The board shall at the time for fixing the general tax levy for district purposes pursuant to Section 17 and in the manner of such general tax levy provided, levy and collect annually each year until the bonds are paid or until there shall be a sum in the treasury of such district set apart for that purpose to meet all sums coming due for principal and interest on said bonds, a tax sufficient to pay the annual interest on said bonds and also such part of the principal thereof as shall become due before the time for fixing the next general tax levy. There may be included in such tax a sum sufficient, in the judgment of the board to take care of anticipated delinquencies, except that if the maturity of the indebtedness created by the issuance of bonds be made to begin more than one year after the date of the issuance thereof, tax shall be levied and collected annually at the time and in the aforesaid manner, in an amount sufficient to pay the interest on said indebtedness as it falls due and also to constitute a sinking fund for the redemption thereof on or before maturity. The tax herein required to be levied and collected shall be in addition to all other taxes levied for district purposes and shall be collected at the time and in the same manner as other district taxes are collected, and be used for no other purpose than the payment of said bonds and accruing interest.

Such tax shall be levied upon all taxable property within the benefiting zones excluding any property belonging to any county, municipality, or political subdivision within the district, or property belonging to the State of California or the United States.

If the district has been divided into zones and the amount to be raised for the redemption of principal and interest of the bonds from each such zone has been determined as provided in this act, the amount of the tax levied shall be divided according to the amount, and the amount to be raised from the taxable property within each zone shall be levied upon and against the property in such zone as hereinbefore provided.

The provisions of law of this state prescribing the time and manner of levying, assessing, equalizing and collecting county property taxes including the sale of property for delinquency, and for redemption from such sale, and the duties of the several county officers with respect thereto, so far as they are applicable, and not in conflict with the specific provisions of this act, are hereby adopted and made a part hereof. Such officers shall be liable upon their several official bonds for the faithful discharge of the duties imposed upon them by this act.

The board shall take the assessment on the equalized roll of the County of Tehama as the basis for district taxes and for its taxes collected by the county officials of said county. On or before the first of August the board shall file with the auditor a certified copy of the map or plat showing the zones and the amount to be raised from each zone. The auditor of such county must, on or before the second Monday of August of each year, transmit to the board a statement in writing showing the total value of all property within the district, which value shall be ascertained from the equalized roll of such county for that year. Said statement shall also show the total value of all property in each of said zones respectively.

The board shall, on or before the first weekday in September, or if such weekday falls upon a holiday, then upon the first business day thereafter, fix the rate of tax for each zone, and designate the number of cents upon each one hundred dollars ($100) on the equalized roll, which rate of taxation shall be sufficient to raise the amount previously fixed by the board as hereinabove prescribed. Such acts by the board shall constitute a valid assessment of the property and a valid levy of the tax so fixed. The board must immediately thereafter transmit to the county auditor a statement of the rate of taxes so fixed by said board for each zone into which the district may be divided and the county auditor shall enter such rate upon the county tax roll. Such taxes so levied shall be collected at the same time and in the same manner as county taxes and when collected the net amount ascertained as hereinafter provided shall be paid to the treasurer of the district under the general requirements and penalties provided by law for the settlement of other taxes.

All taxes levied under the provisions of this act shall be a lien upon the property on which they are levied and unless the board has by resolution otherwise provided the enforcement of the collection of such taxes shall be had in the same manner and by the same means as provided by law for the enforcement of the liens for state and county taxes, all provisions of law relating to the enforcement of the latter being hereby made a part of this act. [Amended by Stats 1961 ch 631 § 7 p 1809; Stats 1970 ch 190 § 6, effective June 9, 1970.]

§ 31.5. Levy of tax on zone: Expenditure of revenues: Tax as additional

After the formation of a zone pursuant to the provisions of Section 4, the board shall have power, in any year, to levy a tax upon the taxable property in any such zone as provided in Section 31 at the time and in the manner set forth therein, to carry out any of the obligations specified in this act and to pay any contractual indebtedness incurred for such zone in accordance with the provisions of Section 3.1. The board shall have power to control and order the expenditures for such purposes of all revenue derived. The tax authorized by this section shall be in addition to any tax levied to meet the bonded indebtedness of the district and all interest thereon. [Added by Stats 1963 ch 332 § 4 p 1118.]

§ 32. Power of board to levy taxes and to control and order expenditures of revenue derived: Tax rate in accordance with resolution: Special election: Apportionment in accordance with zones

After the formation of a zone in the district, the board shall have power, in any year, to levy a tax upon the taxable property in the benefiting countywide or intracounty zones as provided in Section 31 at the time and in the manner set forth therein, to carry out any of the objects or purposes of this act, and to pay the costs and expenses of maintaining, operating, extending and repairing any work or improvement of such zones for the ensuing fiscal year. The board shall have power to control and order the expenditures for said purposes of all revenue so derived, except that taxes levied under this section for any one year shall not exceed the rates specified in this section on each one hundred dollars ($100) of the assessed valuation of the property in such zones as said assessed valuation is shown on the last preceding assessment records for state and county purposes.

The board on its own motion may set a tax rate not exceeding five cents ($0.05) on each one hundred dollars ($100) of the assessed valuation of such property. Upon the filing with the board of the unanimous written consent of the advisory committee, if there be a committee, the board may by majority vote set a tax rate not exceeding fifteen cents ($0.15) on each one hundred dollars ($100) of the assessed valuation of such property. The board may call a special election for the purpose of submitting to the voters of the zone a resolution to authorize the board to set a tax rate not exceeding fifty cents ($0.50) on each one hundred dollars ($100) of the assessed valuation of such property during the years specified in the resolution. If a majority of the votes cast at the special election approve the resolution, the board is authorized to set the tax rate in accordance with the resolution.

Such tax shall be in addition to any tax levied to meet the bonded indebtedness of said district and all interest thereon. If the district has been divided into zones, the taxes to be levied as provided in this section shall be apportioned in accordance with the zones established for the levying and collection of taxes to pay the principal and interest of the bonds of the district. [Amended by Stats 1961 ch 631 § 8 p 1811; Stats 1970 ch 190 § 7, effective June 9, 1970.]

§ 33. Exemption of bonds from taxation

Bonds issued by the district and property of the district shall be exempt from taxation as provided by Sections 1 and 1 3/4 of Article XIII of the State Constitution.

§ 34. Provisions relative to performance of official duties, etc., to be deemed directory: Effect of error in computation of amount due on bonds, coupons, assessments, etc.

The provisions of this act relative to the performance of official duty as to any time or place, the form of any resolution, notice, order, list, certificate of sale, deed or other instrument shall be deemed directory. No bond, coupon, assessment, or installment thereof, or of the interest or penalties thereon, or certificate of sale or deed shall be held invalid for error in the computation of the proper amount due on the same; provided, the error be found to be comparatively negligible or be found to be one in favor of the owner of the property affected thereby.

§ 35. Construction of act: Effect of errors, irregularities, etc.

This act shall be liberally construed to the end that the purposes may be effective. No error, irregularity, informality and no neglect or omission of any officer of the district in any procedure taken hereunder which does not directly affect the jurisdiction of the board to order the work done or improvement to be made shall void or invalidate such proceedings or any assessment for the cost of work or improvement done thereunder.

§ 36. Separability provision

If any provision of this act, or the application thereof to any person or circumstance, is held invalid, the remainder of this act, or the application of such provision to other persons or circumstances, shall not be affected thereby.

§ 37. Emergency clause

This act is hereby declared to be an urgency measure necessary for the immediate preservation of the public peace, health or safety within the meaning of Section 1 of Article IV of the Constitution and shall therefore go into immediate effect. A statement of the facts constituting such necessity is as follows:

The effective culmination of planning and application and operation of engineering and fiscal data developed for use in this project requires the development of an immediate and expedient program prior to the flood season. In order to accomplish this purpose and to effect operation at the earliest possible moment under favorable conditions, it is necessary that this act take effect immediately.

§ 38. District as validly created: Necessity that statement and map or plat required by Gov C Tit 5 Div 2 Pt 1 be filed before creation of zones effective: Manner of levying taxes: Assessments as liens: Presumption that assessments are correct assessments: Equalizing assessments: Changing assessments: Prescription by board of necessary ordinances: Application of Gov C Tit 5 Div 2 Pt 1 Ch 8

Notwithstanding Chapter 8 (commencing at Section 54900) of Part 1 of Division 2 of Title 5 of the Government Code, the district is validly created for the purposes of assessment and taxation. The creation of any zone in the district shall not be effective for purposes of assessment or taxation for the fiscal year 1957-58 and shall not be effective for such purposes for any fiscal year thereafter unless the statement and map or plat required by Chapter 8 (commencing at Section 54900) of Part 1 of Division 2 of Title 5 of the Government Code are filed with the county assessor and the State Board of Equalization on or before the first of February of the year in which the assessments or taxes are to be levied. Until such time as the creation of any zone shall be effective for purposes of assessment or taxation, any tax or assessment levied by the board shall be levied at a uniform rate on all property in the district.

For the fiscal year 1957-58, but for no other fiscal year, the assessment and equalization of property for the purpose of district taxation shall be effected as provided in this section.

Assessments of this district for the fiscal year 1957-58 are liens on the property the same as if they were county taxes, except that the district assessment liens attach as of noon on the day after this act becomes effective.

It is presumed that the assessments of property made by the county assessor and by the State Board of Equalization for county taxation purposes for the fiscal year 1957-58 are the correct assessments for purposes of assessment by the district and the rolls prepared by the county assessor and the State Board of Equalization shall be used for purposes of levying and collecting the assessments for the district. If the ownership or taxable situs or value of any property changes between noon on the first Monday in March, 1957, and the date on which attaches the lien for assessments of the district for the fiscal year 1957-58, then, on petition of the taxpayer affected to the assessing authority, suitable entry shall be made on the assessment roll, in the manner prescribed by the State Board of Equalization, to indicate such change in the ownership or taxability or value of the property for purposes of assessment by the district.

In equalizing the assessments made by the county assessor, the Tehama County Board of Equalization, in addition to its regular equalization duties shall also, in the same manner and under the same rules, equalize the valuation of property for purposes of assessment by the district in accordance with the requirements of this section and any such changes made by the county board of equalization in the assessment roll shall be entered in the manner prescribed by the State Board of Equalization.

If, for purposes of assessments by the district, a change in the assessment for county taxation purposes is not sought under this section before the end of the period during which such assessment may be equalized, or corrected on a petition for reassessment, such assessment, if valid for county taxation purposes, is conclusively presumed to be the correct assessment for assessment purposes of the district.

The board may prescribe by ordinance any necessary procedure, in accordance with the policy of this act, for the purpose of assessing, equalizing, levying, and collecting taxes or assessments for the district for the fiscal year 1957-58.

Chapter 8 (commencing with Section 54900) of Part 1 of Division 2 of Title 5 of the Government Code does not apply to the district with respect to any tax or assessment levied by the district for the fiscal year 1957-58. [Amended by Stats 1970 ch 190 § 8, effective June 9, 1970.]

§ 39. Designation of act

This act shall be known as the "Tehama County Flood Control and Water Conservation District Act."

RESOLUTION NO. 6-2021

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ADOPTING THE GROUNDWATER SUSTAINABILITY PLAN FOR THE RED BLUFF SUBBASIN AND AUTHORIZING AND DIRECTING ITS FILING WITH THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

WHEREAS, in 2014 the California legislature adopted, and the Governor signed into law, Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act (SGMA) of 2014 that initially became effective on January 1, 2015, and that has been amended from time-to-time thereafter; and

WHEREAS, the stated purpose of SGMA, as set forth in California Water Code section 10720.1 is to provide for the sustainable management of groundwater basins at a local level by providing local groundwater agencies with the authority, and technical and financial assistance necessary to sustainably manage groundwater; and,

WHEREAS, SGMA requires the designation of Groundwater Sustainability Agencies (GSAs) for the purpose of achieving groundwater sustainability through the adoption and implementation of regulatory programs known as Groundwater Sustainability Plans (GSPs) or an alternative plan for all medium and high priority subbasins within Tehama County; and,

WHEREAS, in November 2015 the Tehama County Flood Control and Water Conservation District Board of Directors adopted Resolution No. 5-2015 electing to be the GSA for all portions of the Rosewood, Bowman, South Battle Creek, Red Bluff, Bend, Antelope, Dye Creek, Los Molinos, Corning, Vina, and Colusa Subbasins located within Tehama County; and

WHEREAS, the Red Bluff Subbasin of the Sacramento Groundwater Basin was classified as a medium priority during the DWR 2018 Basin Reprioritization, and

WHEREAS, the Tehama County Flood Control and Water Conservation District has undertaken the process to prepare a GSP for the Red Bluff Subbasin; and

WHEREAS, the Tehama County Flood Control and Water Conservation District provided the notices required by Water Code section 10727.8, and formed the Tehama County Groundwater Commission, consisting of a diverse group of stakeholders which has reviewed and provided input into the Red Bluff Subbasin GSP, and

WHEREAS, the Tehama County Flood Control and Water Conservation District Board of Directors and Tehama County Groundwater Commission have held numerous public meetings where elements of the Red Bluff Subbasin GSP have been presented and discussed, and where the general public has been provided the opportunity to comment on the various elements of the Red Bluff Subbasin GSP, and

WHEREAS, the Tehama County Flood Control and Water Conservation District has received public comments on the various elements of the GSP, which have been reviewed; and

WHEREAS, the Tehama County Flood Control and Water Conservation District has noticed a public hearing for December 20, 2021, as required by Water Code section 10728.4 for the purpose of considering adoption of the Red Bluff Subbasin GSP

NOW, THEREFORE, BE IT RESOLVED, the Board of Directors of the Tehama County Flood Control and Water Conservation District finds as follows:

1. Tehama County Flood Control and Water Conservation District Board of Directors hereby approves and adopts the draft Red Bluff Subbasin GSP and directs staff to make editorial and non-substantial changes to the final version that will be provided to DWR; and
2. Tehama County Flood Control and Water Conservation District Board of Directors authorizes staff to take such other actions as may be reasonably necessary to submit the Red Bluff Subbasin GSP to DWR by January 31, 2022 and implement the purpose of this Resolution.

The foregoing resolution was offered on a motion by Director Williams, seconded by Director Carlson, and carried by the following vote of the Board:

AYES: Directors Carlson, Garton, Leach, Moule, Williams

NOES: None

ABSENT OR NOT VOTING: None

STATE OF CALIFORNIA)
) ss
COUNTY OF TEHAMA)

I, JENNIFER VISE, County Clerk and ex-officio Clerk of the Board of Directors of the Tehama County Flood Control and Water Conservation District, State of California, hereby certify the above and foregoing to be a full, true, and correct copy of an order adopted by said Board of Directors on this 20th day of December 2021.

DATED: This 21st day of December 2021

JENNIFER A. VISE, County Clerk and ex-officio
Clerk of the Board of Directors of the Tehama
County Flood Control and Water Conservation District,
State of California

By: ____________________ Deputy

Appendix 1-B

GSA Formation Documents

- Notice of Intent to establish a Groundwater Sustainability Agency
- Resolution No. 05-2015 to establish a Groundwater Sustainability Agency
- November 3, 2015 Public Hearing Notice
- June 2, 2015 Public Hearing Notice
- Ordinance No. 2016-1 to establish the Tehama County Groundwater Commission
- Letters of Support

COUNTY OF TEHAMA
DEPARTMENT OF PUBLIC WORKS
9380 San Benito Avenue
Gerber, CA 96035-9701
(530) 385-1462
(530) 385-1189 Fax

Road Commissioner
Surveyor
Engineer
Public Transit
Flood Control & Water
Conservation District
Sanitation District No. 1

November 4, 2015

F-15-032

Mark Nordberg, GSA Project Manager
Sustainable Groundwater Management Section
California Department of Water Resources
P.O. Box 942836
Sacramento, California 94236-0001

Re: Notice of Intent to Become a Groundwater Sustainability Agency for all eleven (11) Groundwater Subbasins located within Tehama County.

Dear Mr. Nordberg,

Pursuant to Water Code Section 10723.8, the Tehama County Flood Control and Water Conservation District (DISTRICT), hereby notifies the California Department of Water Resources (DWR) of its intent to become the Groundwater Sustainability Agency (GSA) for all portions of the eleven Groundwater Subbasins located within Tehama County (See Exhibit A). All applicable information in Water Code Section 10723.8(a) is provided in this notification. The DISTRICT intends to manage the following subbasins or portions of those subbasins located within the County:

- Rosewood (Subbasin number 5-6.02)
- Bowman (Subbasin number 5-6.01)
- South Battle Creek (Subbasin number 5-6.06)
- Red Bluff (Subbasin number 5-21.50)
- Bend (Subbasin number 5-21.53)
- Antelope (Subbasin number 5-21.54)
- Dye Creek (Subbasin number 5-21.55)
- Los Molinos (Subbasin number 5-21.56)
- Corning (Subbasin number 5-21.51)
- Vina (Subbasin number 5-21.57)
- Colusa(Subbasin number 5-21.52)

The Boundaries of the subbasins are as identified in Bulletin 118, Update 2003. Tehama County currently has 1 high priority subbasin: Vina; 7 medium priority subbasins: Bowman, Red Bluff, Antelope, Dye Creek, Los Molinos, Corning, and Colusa; and 3 low priority subbasins: Rosewood, South Battle Creek, and Bend. Although not required by the Sustainable Groundwater Management Act of 2014 (SGMA), the DISTRICT also proposes to become the GSA and complete a Groundwater

Sustainability Plan (GSP) for the 3 low priority subbasins in order to facilitate a holistic approach to managing groundwater in Tehama County. The DISTRICT is not aware of any other GSAs operating within the groundwater basins listed above.

The DISTRICT boundary is identified as the area included within the exterior boundary of the County of Tehama and further identified in the California Water Code Appendix 82-1. The DISTRICT was enacted in 1957 to provide for the control and conservation of flood and storm waters and the protection of watercourses, watersheds, public highways, life and property from damage or destruction from such waters; to provide for the acquisition, retention, and reclaiming of drainage, storm, flood, and other waters and to save, conserve, and distribute such waters for beneficial use in said DISTRICT; to authorize the incurring of indebtedness, the issuance of sale of bonds, and the levying and collection of tax assessments on property within said DISTRICT and in the respective zones thereof; to define the powers of said DISTRICT; to provide for the government , management, and operation of said DISTRICT and for the acquisition and construction of property and works to carry out the purposes of the DISTRICT. The DISTRICT Board of Directors is composed of members of the County Board of Supervisors, which are elected by Supervisorial District. The DISTRICT operates under authority of the Board of Directors with management and oversight delegated to the Tehama County Department of Public Works. The Public Works Director serves as the Executive Director of the DISTRICT. Additionally, no new bylaws, ordinances, or other authorities were adopted in conjunction with the establishment of the GSA.

The DISTRICT has been actively managing groundwater throughout the County for the past 20 years. The County first adopted a Groundwater Management Plan in 1996 and has recently updated this plan in 2012. This plan has been supported extensively throughout the County and will serve as the foundation for the GSP. The DISTRICT has also completed Technical Memorandums that include Basin Management Objectives, such as Groundwater Trigger Levels and Awareness Actions for each of the subbasins located within the County (2008); Countywide Water Inventory & Analysis (2003); Small Water Systems Drought Vulnerability Assessment (2005); Summary Report for Groundwater Recharge Area Location Study (2011), and participated in the California Statewide Groundwater Elevation Monitoring (CASGEM) program since 2010. The DISTRICT installed its first two multi-completion groundwater monitoring wells with assistance from DWR in 2004, and has since installed an additional six wells. The DISTRICT continues to monitor these wells several times a year uploading the data to the CASGEM database. These documents can be located on the DISTRICT website http://www.tehamacountypublic works.ca.gov/Flood/. The DISTRICT also has an active Technical Advisory Committee (TAC) that reports to the DISTRICT Board which is comprised of representatives from Agriculture, Domestic/Industrial Water Providers, Natural Resources, and representatives from the cities of Corning, Red Bluff, and Tehama. This TAC meets at least quarterly and has helped review and provided comment on the previously mentioned documents.

The DISTRICT held a public hearing concerning the formation of the GSA on June 2, 2015. During this meeting several agencies expressed an interest in participating in the GSA governance structure. The DISTRICT developed a governance proposal (See Exhibit C) which included an eleven member Groundwater Commission (Commission) comprised of city and District representatives and other stakeholders. The commission will have broad responsibility for all aspects of GSP development and implementation, and will have decision-making authority regarding permits and enforcement matters. Letters of support (See Exhibit D) for the proposed Governance Proposal have been received from the City of Corning, City of Red Bluff, City of Tehama, El Camino Irrigation District, and the Rio Alto Water District. These agencies which represent some of the larger groundwater pumpers within the County will have an established seat on the Commission along with the Los Molinos Community Services District. The additional 5 members of the Commission will represent each of the five County Supervisorial Districts, these representatives will be nominated by the seated Commission members and confirmed by the DISTRICT Board of Directors.

The DISTRICT caused notice of its election to serve as a GSA to be published in the Red Bluff *Daily News* on October 21 and 31 (See Exhibit E), as provided by Water Code Section 10723(b) and Government Code Section 6066. Courtesy copies of the notice were also emailed or mailed to:

- City of Red Bluff
- City of Corning
- City of Tehama
- Anderson Cottonwood Irrigation District
- Rio Alto Water District
- Thomes Creek Water District
- Corning Water District
- Deer Creek Irrigation District
- El Camino Irrigation District
- Gerber Las Flores Community Services District (CSD)
- Glenn-Colusa Irrigation District
- Los Molinos Mutual Water Company
- Proberta Water District
- Stanford Vina Ranch Irrigation District
- Paskenta CSD
- Kirkwood Water District
- Orland Unit Water Users Association
- Rancho Tehama Association
- Lake California Property Owners Association
- Mineral Water Company
- Red Bluff Tree Farm
- Golden Meadows Estates CSD
- Los Molinos CSD
- Reeds Creek Estates CSD
- Rio Ranch Estates CSD
- Paskenta Band of Nomlaki Indians
- Tehama Colusa Canal Authority
- Resource Conservation District of Tehama County
- Cattlemen's Association
- Cattlewomen's Association
- Shasta-Tehama Watershed Education Coalition
- Deer Creek Watershed Conservancy
- Mill Creek Watershed Conservancy
- Natural Resources Conservation Service
- California Department of Forestry and Fire Protection
- California Department Of Water Resources
- University of California Cooperative Extension
- Tehama County AB3030 Technical Advisory Committee Members
- Tehama County Board of Supervisors
- Tehama County Administration
- Tehama County, County Counsel
- Tehama County Public Works
- Tehama County Farm Bureau
- Tehama County Environmental health
- Tehama County Planning Department
- Tehama County Sherriff's Office
- Butte County
- Glenn County
- Shasta County

On November 3, 2015, the DISTRICT Board held a second public hearing concerning the formation of the GSA and unanimously approved Resolution No. 05-2015 (See Exhibit B), which directed DISTRICT Staff to complete and submit this Notice of Intent.

Pursuant to Water Code Section 10723.8(a)(4) the DISTRICT will consider the interest of all beneficial uses and users of groundwater, as well as those responsible for implementing GSPs. The Groundwater Commission described in Exhibit C, which the DISTRICT has committed to promptly establish, was carefully designed with stakeholder input to ensure that those parties listed in section 10723.2 have an active, long-term role in developing and implementing the GSP and GSA rules and regulations. In addition, the DISTRICT has communicated with parties interested in the sustainable management of groundwater in the subbasins, and will continue to solicit feedback from those parties as the plan is developed. These interests include, but are not limited to all of the following:

- **Holders of overlying groundwater rights:**
    - Agricultural users: The proposed GSA area contains a significant amount of agricultural users of groundwater. Some of the agricultural users get their water from the water/irrigation districts listed above, but a large portion of the independent pumpers do not have an organized association that represents them. The DISTRICT will perform outreach during GSP development with the assistance of the Tehama County Farm Bureau, the University of California Cooperative Extension, and the Resource Conservation District of Tehama County to reach this group.
    - Domestic well owners: A majority of the residents living within the proposed GSA area use groundwater to fulfill their domestic water needs. The DISTRICT will hold public meetings in several locations throughout the county during the GSP development process to gather input from this demographic. The DISTRICT will work with the Tehama County Environmental Health Department and the Community Action Partnership to assist with outreach to this group.
- **Municipal well operators:** The Cities of Corning, Red Bluff, and Tehama will have representatives on both the Groundwater Commission and the TAC. These three cities and their constituents are also directly represented by their Board of Directors members whose Supervisorial Districts overlay each city's jurisdictions. All three cities will have the opportunity to participate in the GSP development and in future actions taken by the Groundwater Commission.
- **Public water systems:** The DISTRICT provided courtesy notice of their intention to serve as the GSA to the Public Water Systems listed above, and will continue to communicate with and solicit feedback from these agencies as the GSP is developed.
- **Local land use planning agencies:**
    - Butte County: The proposed GSA boundary would split the Vina Subbasin which extends into Butte County. The DISTRICT has met with the Butte County Department of Water and Resource Conservation (BCDWRC), which is the agency most likely to become the GSA for the portion of the Vina Subbasin which lies outside Tehama County. The DISTRICT has coordinated with BCDWRC on

  groundwater monitoring activities in the Vina Subbasin over the past 2 decades. Staff from both agencies have agreed to coordinate our efforts on managing the Vina Subbasin through a Memorandum of Understanding (MOU), Coordination Agreement, or similar type document, while each becoming a GSA and submitting a GSP for the portions of the subbasin located within their respective Counties. The District may submit for a Basin Boundary Adjustment to split the subbasin at the county line once DWR releases the regulations on Basin Boundary Adjustments in January 2016.
  - Glenn County: The proposed GSA boundary would split both the Colusa and Corning Subbasins which extend into Glenn County. The DISTRICT is planning to submit a Boundary Basin Adjustment to incorporate the small segment of the Colusa Subbasin that lies within Tehama County, into the Corning Subbasin. This 1,300 acre area with 10 individual landowners would get better representation by their local elected officials on the DISTRICT Board, then to be grouped into the large 918,380 acre Colusa Subbasin that spans four counties. The DISTRICT will coordinate with the GSA responsible for the portion of the Colusa subbasin that borders Tehama County. The DISTRICT has met with the Glenn County Department of Agriculture, which is the agency most likely to become the GSA for the portion of the Corning Subbasin which lies outside Tehama County. Staff from both agencies have agreed to coordinate our efforts on managing the Corning Subbasin through a MOU, Coordination Agreement, or similar type document, while each becoming a GSA and submitting a GSP for the portions of the subbasin located within their respective Counties. The DISTRICT may submit for a Basin Boundary Adjustment to split the Corning subbasin at the county line once DWR releases the regulations on Basin Boundary Adjustments in January 2016.
  - Shasta County: While Shasta and Tehama Counties do not share any subbasins, the three northern subbasins in Tehama County are part of the Redding Groundwater Basin. The DISTRICT will continue to monitor the GSA development process in Shasta County, and will coordinate with the Groundwater Sustainability Agency(s) that form in subbasins adjacent to Tehama County.
  - Other Water and Irrigation Districts outside the GSA boundaries: The DISTRICT provided courtesy notice of their intention to serve as the GSA to the Anderson-Cottonwood Irrigation District and the Glenn-Colusa Irrigation District, and will continue to communicate with and solicit feedback from these neighboring agencies as the GSP is developed.
- **Environmental users of groundwater:** N/A
- **Surface water users, if there is a hydrologic connection between surface and groundwater bodies:** The surface water users listed above were provided courtesy notice of the DISTRICT's intention to serve as the GSA and will be included in the GSP planning process.
- **The federal government, including, but not limited to, the military and managers of federal lands:** NRCS and the Bureau of Land Management (BLM) will be coordinated with during the GSP development process. The BLM owns land in the Northern portion of the County that offers multi-use recreational opportunities. The NRCS works with landowners

throughout the County and helps to implement on farm conservation practices.

- **California Native American Tribes:** The Paskenta Band of Nomlaki Indians have a Reservation located in the Corning Subbasin and were provided a courtesy notice of the DISTRICT's intention to serve as the GSA. They will also be included in the GSP planning process.
- **Disadvantaged communities, including, but not limited to, those served by private domestic wells or small community water systems:** A majority of the communities located within the proposed GSA Boundary are classified as Disadvantaged Communities and a majority of them are served by private domestic wells or small community water systems. The DISTRICT will work with the Tehama County Environmental Health Department and the Community Action Partnership to perform outreach and gather information from these communities to incorporate into the GSP.

The DISTRICT and other interested stakeholders roles and responsibilities will be further defined in the GSP. The DISTRICT welcomes feedback during this process from the state and any of the agencies or organizations listed herein. If the Department of Water Resources requires anything further prior to the acceptance of this notification of the DISTRICT's election to serve as the GSA for the eleven subbasins or portions of those subbasins located within Tehama County, please contact Ryan Teubert, the Flood Control/Water Resources Manager at (530)-385-1462 x3020 or rteubert@tcpw.ca.gov.

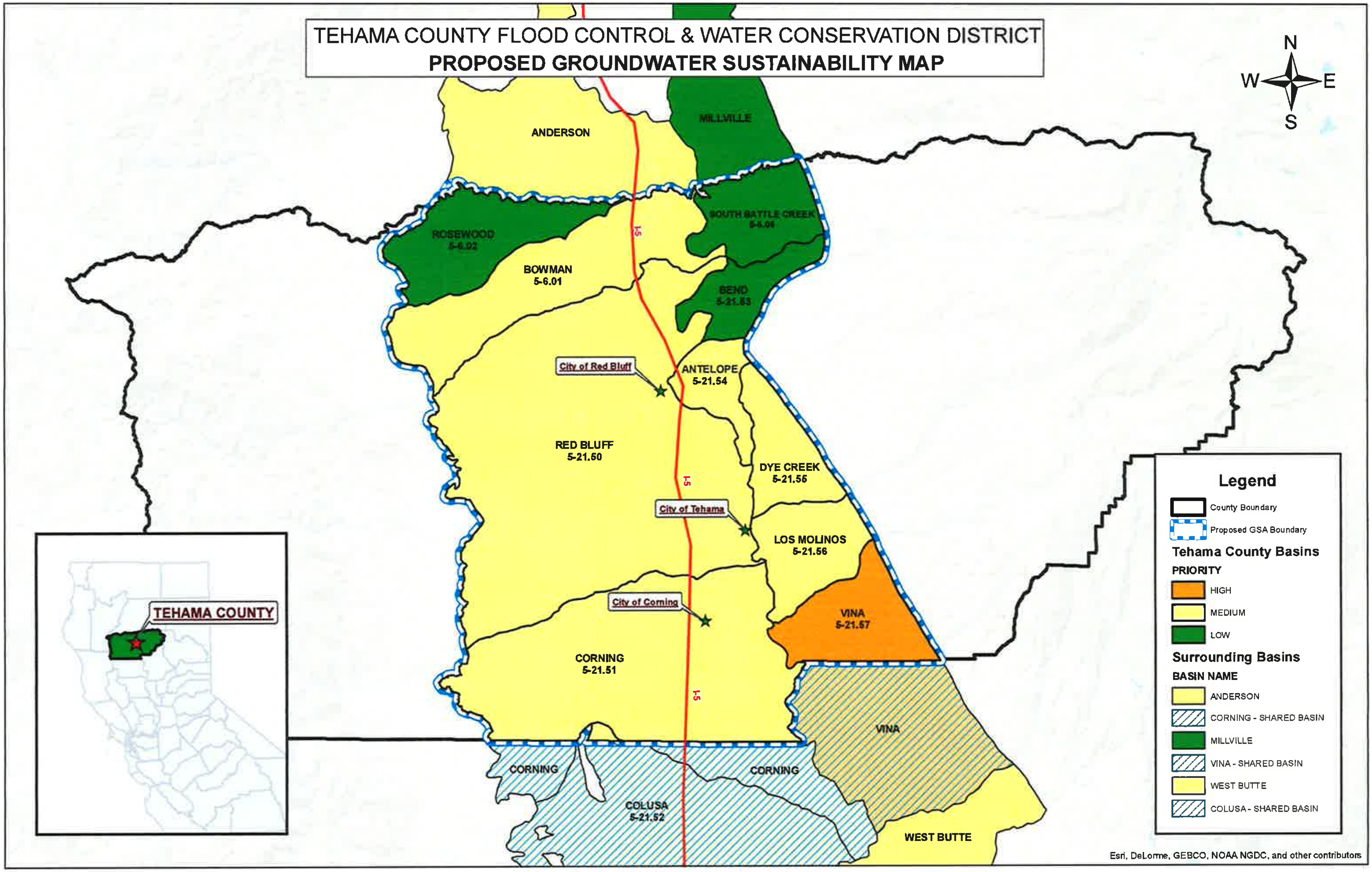
Sincerely,

Gary Antone, Executive Director
Tehama County Flood Control and
Water Conservation District

By____
Ryan Teubert, Flood Control/Water Resources Manager
Tehama County Flood Control and
Water Conservation District

EXHIBIT A

TEHAMA COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
PROPOSED GROUNDWATER SUSTAINABILITY MAP



Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

EXHIBIT B

RESOLUTION NO. 05-2015

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ELECTING TO BE THE GROUNDWATER SUSTAINABILITY AGENCY FOR ALL THOSE PORTIONS OF THE ROSEWOOD, BOWMAN, SOUTH BATTLE CREEK, RED BLUFF, BEND, ANTELOPE, DYE CREEK, LOS MOLINOS, CORNING, VINA, AND COLUSA SUBBASINS LOCATED WITHIN TEHAMA COUNTY

WHEREAS, the Legislature has adopted, and the Governor has signed into law, Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act of 2014; and

WHEREAS, the Sustainable Groundwater Management Act of 2014 went into effect on January 1, 2015; and

WHEREAS, the Sustainable Groundwater Management Act of 2014 enables the State Water Resources Control Board to intervene in groundwater basins unless a local public agency or combination of local public agencies form a Groundwater Sustainability Agency or Agencies (GSA) by June 30, 2017; and

WHEREAS, retaining local jurisdiction over water management and land use is essential to sustainably manage groundwater and to the vitality of Tehama County's economy, communities and environment, and

WHEREAS, any local public agency that has water supply, water management or land use responsibilities within a groundwater basin may elect to be the Groundwater Sustainability Agency for that basin; and

WHEREAS, the Tehama County Flood Control and Water Conservation District is a local public agency organized and existing under the Tehama County Flood Control and Water Conservation District Act (Statutes 1957, Chapter 1280; Water Code Appx., ch. 82); and

WHEREAS, under Section 3, subdivision (q) of said Act, the District is responsible for undertaking "any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of lands or inhabitants within the district, including, but not limited to, the acquisition, storage, and distribution for irrigation, domestic, fire protection, municipal, commercial, industrial, recreational, and all other beneficial uses"; and

WHEREAS, under Section 3, subdivision (r) of said Act, the District is further authorized "to prevent interference with or diminution of, or to declare the rights in natural flow of any stream or surface or subterranean supply of waters used or useful for any purpose of the district or of common benefit to the lands within the district or to its inhabitants," and "to prevent unlawful exportation of water from the district," and "to prevent contamination, pollution, or otherwise rendering unfit for beneficial use, the surface or subsurface water used or useful in the district"; and

WHEREAS, the boundary and territory of the District are coextensive with the exterior boundaries of the County of Tehama; and

WHEREAS, the District overlies all those portions of the Rosewood, Bowman, South Battle Creek, Red Bluff, Bend, Antelope, Dye Creek, Los Molinos, Corning, Vina, and Colusa subbasins located within Tehama County; and

WHEREAS, Section 10723.2 of the Sustainable Groundwater Management Act of 2014 requires that a GSA consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans; and

WHEREAS, Section 10723.8 of the Sustainable Groundwater Management Act of 2014 requires that a local agency electing to be a GSA notify the Department of Water Resources of its election and its intent to undertake sustainable groundwater management within a basin; and

WHEREAS, the District held a public hearing on this date after publication of notice pursuant to Government Code section 6066 to consider adoption of this Resolution; and

WHEREAS, it would be in the public interest of the people of Tehama County for the District to become the groundwater sustainability agency for all those portions of the Rosewood, Bowman, South Battle Creek, Red Bluff, Bend, Antelope, Dye Creek, Los Molinos, Corning, Vina, and Colusa subbasins located within Tehama County; and

WHEREAS, the District and other local public agencies have a long history of coordination and cooperation on water management; and

WHEREAS, it is the intent of the District to work cooperatively with other local agencies to manage the aforementioned groundwater basins in a sustainable fashion;

NOW, THEREFORE, BE IT RESOLVED, that the Tehama County Flood Control and Water Conservation District hereby elects to become the Groundwater Sustainability Agency for all those portions of the Rosewood (5-06.02), Bowman (5-06.01), South Battle Creek (5-06.06), Red Bluff (5-21.50), Bend (5-21.53), Antelope (5-21.54), Dye Creek (5-21.55), Los Molinos (5-21.56), Corning (5-21.51), Vina (5-21.57), and Colusa (5-21.52) subbasins located within Tehama County.

BE IT FURTHER RESOLVED that the proposed boundaries of the basins that the District intends to manage under the Sustainable Groundwater Management Act of 2014 shall be the entirety of the boundaries for the aforementioned subbasins, as set forth in California Department of Water Resources Bulletin 118 (updated in 2003), that lie within the County of Tehama; provided that the Executive Director is authorized and directed to evaluate whether basin boundaries should be adjusted in a manner that will improve the likelihood of achieving sustainable groundwater management, and communicate the results of that evaluation to the Board of Directors and the Department of Water Resources; and improve the likelihood of achieving sustainable groundwater management, and communicate the results of that evaluation to the Board of Directors and the Department of Water Resources; and

BE IT FURTHER RESOLVED that within thirty days of the date of this Resolution, the Executive Director is directed to provide notice of this election to the California Department of Water Resources in the manner required by law. Such notification shall include a map of the basins that the District intends to manage under the Sustainable Groundwater Management Act of 2014, a copy of this resolution, a list of interested parties developed pursuant to Section 10723.2 of the Act, and an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's groundwater sustainability plan.

BE IT FURTHER RESOLVED that the Executive Director and District legal counsel are hereby directed to promptly prepare the appropriate instruments establishing a Groundwater Commission, as set forth in Attachment "1", and present such documents to the Board for adoption.

BE IT FURTHER RESOLVED that the Executive Director shall begin discussions with other local agencies in these basins in order to begin the process of developing groundwater sustainability plans for the basins, or a joint plan with other groundwater sustainability agencies in which the District might join, in consultation and close coordination with other local agencies, as contemplated by the Act.

BE IT FURTHER RESOLVED that the Executive Director directed to report back to the Groundwater Commission and the Board at least quarterly on the progress toward developing the groundwater sustainability plans.

The foregoing resolution was offered on a motion by Director Garton, seconded by Director Williams, and carried by the following vote of the Board:

AYES: Directors Bundy, Carlson, Chamblin, Garton, Williams,

NOES: None

ABSENT OR NOT VOTING: None

CHAIRMAN, Board of Directors

STATE OF CALIFORNIA)
) ss
COUNTY OF TEHAMA)

DATED: This 3rd day of November, 2015.

JENNIFER A. VISE, County Clerk and ex-officio Clerk of the Board of Directors of the Tehama County Flood Control and Water Conservation District, State of California.

By______________________________

Deputy

EXHIBIT C

Tehama County Groundwater Sustainability Agency (GSA)

GSA Governing Body - Tehama County Flood Control and Water Conservation District (FCWCD) Board of Directors

1. Final approval authority for GSP and any future amendments, and all GSA ordinances, rules, regulations, and fees.
2. Primary responsibility for funding, resources, and staffing. (Cities/Districts will not be requested to provide or commit funding in order to participate in the Groundwater Commission.)
   - FCWCD will provide staff assistance to Groundwater Commission and Board of Directors throughout the GSP development and implementation process.
   - Where necessary, the Board of Directors will provide additional resources from FCWCD's existing funding or grant opportunities pursued by FCWCD.
   - The Board of Directors will apply for and receive grants to fund GSA activities (with the Commission's recommendation), including responsibility for executing and implementing grant contracts and associated requirements.
   - Further revenue measures, if any, would be reviewed by the Commission prior to adoption by the Board of Directors (and will not be based on GSA participation).
3. Hear and decide appeals (if any) from decisions of the Groundwater Commission on permits, similar entitlements, and enforcement matters.
4. Confirm appointments of the five "Supervisorial District" members of the Groundwater Commission (upon recommendation of the Commission).

Groundwater Commission (Similar to Planning Commission)

1. Develop GSP and any future amendments, and all GSA ordinances, rules, and regulations, including holding public hearings and making final recommendations to Board of Directors.
2. Conduct investigations to determine the need for groundwater management, monitor compliance and enforcement, propose and update fees and making final recommendations to Board of Directors.
3. Review all proposed grant applications, and advise Board of Directors regarding grant funding opportunities.
4. Decision-making authority for permits or similar entitlements issued by the GSA, e.g., well spacing (with appeal).
5. Make quasi-judicial decisions in GSA enforcement matters (with appeal).
6. Membership:
   a. 1- City of Corning (Appointed by City)
   b. 1- City of Red Bluff (Appointed by City)
   c. 1- City of Tehama (Appointed by City)
   d. 1- El Camino Irrigation District (Appointed by District)
   e. 1- Los Molinos Community Services District (Appointed by District)
   f. 1- Rio Alto Water District (Appointed by District)
   g. 5- 1 Representative from each County Supervisorial District
      i. Recommendations to be made by the seated Groundwater Commission members and confirmed by the FCWCD Board of Directors.
      ii. Appointees will be expected to meet certain qualifications:
         - 2 members should represent the interests of surface water agencies or districts;
         - 2 members should represent the interests of private pumpers;
         - 1 member will be an "at large" representative;
         - No agency or district shall be represented by more than 1 member on the Groundwater Commission.

AB3030 Technical Advisory Committee - Provides technical assistance as needed.

EXHIBIT D

City of Corning

794 Third St. Corning, CA 96021 (530) 824-7020 Fax (530) 824-2489

RECEIVED
AUG 17 2015

Ryan Teubert, CFM
Tehama County Flood Control &Water Resource District
9380 San Benito Ave.
Gerber, CA 96035

August 14, 2015

Re: Groundwater Sustainability Agency Governance Structure

Dear Mr. Teubert,

Thank you for appearing at the August 11, 2015 City Council meeting and presenting the information regarding the Sustainability Groundwater Management Act. Your presentation was very well done and informative.

As you know, after your presentation, the consensus of the Corning City Council was to concur with the Governance structure that you had proposed where the Flood and Water Conservation District Board would serve as the Groundwater Sustainability Agency and the cities, including the City of Corning would have seats on the Groundwater Commission.

Please call me if you have any additional questions regarding this matter.

John L. Brewer, AICP
City Manager

BUILDING **824-7027** • PLANNING **824-7036** • CITY MANAGER **824-7034** • CITY CLERK **824-7033** • FINANCE **824-7020**
PUBLIC WORKS **824-7025** • POLICE DEPARTMENT **824-7000** • FIRE DEPARTMENT **824-7044**
"THE CITY OF CORNING IS AN AFFIRMATIVE ACTION-EQUAL OPPORTUNITY EMPLOYER"

EXHIBIT D

CITY OF RED BLUFF

555 Washington Street Red Bluff, California 96080 (530) 527-2605 Fax (530) 529-6878 www.cityofredbluff.org

RECEIVED
OCT 9 2015
TEHAMA COUNTY
PUBLIC WORKS

October 7, 2015

Tehama County Public Works
Attention: Gary Antone
9380 San Benito Avenue
Gerber, CA 96035-9701

RE: County GSA Proposal

Dear Gary:

At its meeting of October 6, 2015, the Red Bluff City Council voted to support designation of the Tehama County Flood Control and Water Conservation District (FCWCD) as the Groundwater Sustainability Agency (GSA) for Tehama County. "Funding, resources, and staffing will be the primary responsibility of FCWCD" as the GSA is created and a Groundwater Sustainability Plan (GSP) is drafted and implemented. (See, 9-29-2015 FCWCD presentation to Red Bluff City Council). Nevertheless, the City will remain actively engaged on this issue to assure that the City's needs and concerns are carefully considered by the FCWCD moving forward. Please provide the undersigned with written advance notice of all meetings of the FCWCD Board, as well as copies of all agendas and back up materials.

Background

The City of Red Bluff is the largest supplier of domestic groundwater in Tehama County. The City supplies water to 4,756 different metered water connections, serving a population of 15,000 residents. The City operates a network of 13 municipal water wells.

The City Water Department was established in 1921 and employs 7 full-time employees (not including management and administrative staff). The Water Department's operating budget for 2015/2016 is approximately $2.1 million. The City extracts, pumps and delivers 1,178,953,000 gallons of groundwater per year.

The City routinely collects data regarding all aspects of the City's water supply and use thereof including water quality monitoring. The City brings the resources of the largest domestic water supplier in the County to the table as an active, participating member of the GSA.

GSA Requirements

"Any local agency or combination of local agencies overlying a groundwater basin may elect to be a groundwater sustainability agency for that basin." (Water Code § 10723(a).) A GSA "*shall* consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans. These interests include [ ] all of the following: [ ] (b) Municipal well operators. (c) Public water systems. (d) Local land use planning agencies. [ ]" (§10723.2)

A notification of intent to form a GSA must include a list of interested parties including municipal well operators, public water systems and local land use planning agencies and "an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's sustainability plan." (§10723.8(a)(4).) A combination of local agencies may form a groundwater sustainability agency through use of a joint powers agreement or other legal agreement. (§10723.6(a))

The statutory mandate makes clear that the City's interests as the largest supplier of domestic groundwater in the County must be considered. In fact, the notice of intent to form a GSA must explain how the City's interests will be considered in the development and operation of the GSA.

Conclusion

The City looks forward to working cooperatively with the FCWCD to implement the requirements of the Groundwater Sustainability Act.

If you have any comments or questions, please contact me or Bruce Henz.

Very truly yours,

Richard L. Crabtree

cc: City Council
Board of Supervisors
County Counsel

EXHIBIT D

City of Tehama

Incorporated 1906

Post Office Box 70
Tehama, CA 96090
Phone: (530)384-1501
Fax: (530)384-1625

September 10, 2015

Ryan Teubert, CFM
Tehama Co. Flood Control &
Water Resource Manager
9380 San Benito Ave.

At its meeting on September 8, 2015, the Tehama City Council voted to accept the proposal received from you for the Tehama County Groundwater Sustainability Agency (GSA). We appreciate your leadership in bring the various organizations together for this important effort.

Sincerely,

CSteffan

Carolyn Steffan
City Clerk/Administrator

RECEIVED
SEP 14 2015
TEHAMA COUNTY
PUBLIC WORKS

EXHIBIT D

El Camino Irrigation District
8451 Hwy. 99-W
Gerber, CA 96035
530-385-1559
530-385-1503 Fax
ecid1559@att.net

Ryan Teubert, CFM
Tehama County Flood Control & Water Resource Manager

We have read and discussed the Tehama County Groundwater Sustainability Agency proposal.

As the Board for El Camino Irrigation District we are approving the proposal as written and appointing District Manager Mark Weber to the Groundwater Commission.

Mike Gividen-District 1

Kris Lamkin-District 2

Rich Sol
Rich Sol-Director 3

Leland Hogan-District 4-Chairman

RECEIVED
SEP 14 2015
TEHAMA COUNTY
PUBLIC WORKS

EXHIBIT D

Rio Alto Water District

22099 River View Drive, Cottonwood, California 96022
Telephone 530-347-3835 • Fax 530-347-1007

RECEIVED
OCT 27 2015
[illegible]

October 22, 2015

Ryan Teubert, CFM
Tehama County Flood Control & Water Conservation District
9380 San Benito Ave.
Gerber, CA 96035

Re: Letter of Support

Dear Ryan:

The Board of Directors of the Rio Alto Water District is in support of Tehama Flood Control & Water Conservation District forming and acting as the Groundwater Sustainability Agency(GSA) for the groundwater basins within Tehama County.

We approve of the proposed governance structure and look forward to participating in the Groundwater Commission. The Board acknowledges that Tehama County Flood Control and Water Conservation District was instrumental in developing a Groundwater Management Plan in compliance with AB3030, and as such are the most qualified candidate to form and act as the GSA. Thank you for taking the lead in this task.

Sincerely,

Martha Slack

Martha Slack
General Manager

EXHIBIT E

NOTICE OF PUBLIC HEARING

NOTICE IS HERBY GIVEN that on November 3, 2015, at 1:30 PM, or soon thereafter as may be heard, in the Board of Supervisors Chambers located at 727 Oak St., Red Bluff, California, the Tehama County Flood Control and Water Conservation District (District) Board of Directors will conduct a public hearing to determine whether to adopt a resolution directing the District to submit a Notice of Intent to the California Department of Water Resources stating that the District will be the Groundwater Sustainability Agency (Agency) for all portions of the eleven (11) Groundwater Subbasins located within Tehama County.

The Sustainable Groundwater Management Act (SGMA) became effective on January 1, 2015 and established a new structure for managing California's groundwater resources at a local level. SGMA mandates that all groundwater basins identified in Bulletin 118 must be managed by a Groundwater Sustainability Agency by June 30, 2017. Each Agency will then develop a Groundwater Sustainability Plan (Plan) by January 30, 2022, which will include measurable objectives and milestones that assist the Agencies in achieving groundwater sustainability within 20 years of Plan adoption.

The District is uniquely qualified to become the Agency for all eleven (11) groundwater basins located within the County due to its current jurisdiction which extends throughout the County, its background in groundwater monitoring and water conservation issues, a Board of Directors which is comprised of elected officials representing the entire County, and additional representation from a technical advisory committee to the Board which is comprised of representatives from Agriculture, Domestic/Industrial Water Providers, Natural Resources, and representatives from the cities of Corning, Red Bluff, and Tehama.

During the June 2, 2015 Public Hearing, staff was directed to work with interested water agencies and incorporate them into the governance structure. As a result, an eleven member groundwater commission comprised of city and district representatives and other stakeholders was proposed. To date, letters of support have been received from City of Corning, City of Red Bluff, City of Tehama and El Camino Irrigation District.

The District will be submitting a Notice of Intent at the November 3, 2015 Public Hearing for the following subbasins or the portions of those subbasins located within the County: Rosewood, Bowman, Red Bluff, Corning, Colusa, Vina, Los Molinos, Dye Creek, Antelope, Bend, and South Battle Creek. For questions or additional information on the Sustainable Groundwater Management Act please contact Ryan Teubert, Tehama County Flood Control/Water Resources Manager, 530-385-1462, ext. 3020 or refer to http://www.water.ca.gov/cagroundwater/.

EXHIBIT B

RESOLUTION NO. 05-2015

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ELECTING TO BE THE GROUNDWATER SUSTAINABILITY AGENCY FOR ALL THOSE PORTIONS OF THE ROSEWOOD, BOWMAN, SOUTH BATTLE CREEK, RED BLUFF, BEND, ANTELOPE, DYE CREEK, LOS MOLINOS, CORNING, VINA, AND COLUSA SUBBASINS LOCATED WITHIN TEHAMA COUNTY

WHEREAS, the Legislature has adopted, and the Governor has signed into law, Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act of 2014; and

WHEREAS, the Sustainable Groundwater Management Act of 2014 went into effect on January 1, 2015; and

WHEREAS, the Sustainable Groundwater Management Act of 2014 enables the State Water Resources Control Board to intervene in groundwater basins unless a local public agency or combination of local public agencies form a Groundwater Sustainability Agency or Agencies (GSA) by June 30, 2017; and

WHEREAS, retaining local jurisdiction over water management and land use is essential to sustainably manage groundwater and to the vitality of Tehama County's economy, communities and environment, and

WHEREAS, any local public agency that has water supply, water management or land use responsibilities within a groundwater basin may elect to be the Groundwater Sustainability Agency for that basin; and

WHEREAS, the Tehama County Flood Control and Water Conservation District is a local public agency organized and existing under the Tehama County Flood Control and Water Conservation District Act (Statutes 1957, Chapter 1280; Water Code Appx., ch. 82); and

WHEREAS, under Section 3, subdivision (q) of said Act, the District is responsible for undertaking "any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of lands or inhabitants within the district, including, but not limited to, the acquisition, storage, and distribution for irrigation, domestic, fire protection, municipal, commercial, industrial, recreational, and all other beneficial uses"; and

WHEREAS, under Section 3, subdivision (r) of said Act, the District is further authorized "to prevent interference with or diminution of, or to declare the rights in natural flow of any stream or surface or subterranean supply of waters used or useful for any purpose of the district or of common benefit to the lands within the district or to its inhabitants," and "to prevent unlawful exportation of water from the district," and "to prevent contamination, pollution, or otherwise rendering unfit for beneficial use, the surface or subsurface water used or useful in the district"; and

WHEREAS, the boundary and territory of the District are coextensive with the exterior boundaries of the County of Tehama; and

WHEREAS, the District overlies all those portions of the Rosewood, Bowman, South Battle Creek, Red Bluff, Bend, Antelope, Dye Creek, Los Molinos, Corning, Vina, and Colusa subbasins located within Tehama County; and

WHEREAS, Section 10723.2 of the Sustainable Groundwater Management Act of 2014 requires that a GSA consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans; and

WHEREAS, Section 10723.8 of the Sustainable Groundwater Management Act of 2014 requires that a local agency electing to be a GSA notify the Department of Water Resources of its election and its intent to undertake sustainable groundwater management within a basin; and

WHEREAS, the District held a public hearing on this date after publication of notice pursuant to Government Code section 6066 to consider adoption of this Resolution; and

WHEREAS, it would be in the public interest of the people of Tehama County for the District to become the groundwater sustainability agency for all those portions of the Rosewood, Bowman, South Battle Creek, Red Bluff, Bend, Antelope, Dye Creek, Los Molinos, Corning, Vina, and Colusa subbasins located within Tehama County; and

WHEREAS, the District and other local public agencies have a long history of coordination and cooperation on water management; and

WHEREAS, it is the intent of the District to work cooperatively with other local agencies to manage the aforementioned groundwater basins in a sustainable fashion;

NOW, THEREFORE, BE IT RESOLVED, that the Tehama County Flood Control and Water Conservation District hereby elects to become the Groundwater Sustainability Agency for all those portions of the Rosewood (5-06.02), Bowman (5-06.01), South Battle Creek (5-06.06), Red Bluff (5-21.50), Bend (5-21.53), Antelope (5-21.54), Dye Creek (5-21.55), Los Molinos (5-21.56), Corning (5-21.51), Vina (5-21.57), and Colusa (5-21.52) subbasins located within Tehama County.

BE IT FURTHER RESOLVED that the proposed boundaries of the basins that the District intends to manage under the Sustainable Groundwater Management Act of 2014 shall be the entirety of the boundaries for the aforementioned subbasins, as set forth in California Department of Water Resources Bulletin 118 (updated in 2003), that lie within the County of Tehama; provided that the Executive Director is authorized and directed to evaluate whether basin boundaries should be adjusted in a manner that will improve the likelihood of achieving sustainable groundwater management, and communicate the results of that evaluation to the Board of Directors and the Department of Water Resources; and improve the likelihood of achieving sustainable groundwater management, and communicate the results of that evaluation to the Board of Directors and the Department of Water Resources; and

BE IT FURTHER RESOLVED that within thirty days of the date of this Resolution, the Executive Director is directed to provide notice of this election to the California Department of Water Resources in the manner required by law. Such notification shall include a map of the basins that the District intends to manage under the Sustainable Groundwater Management Act of 2014, a copy of this resolution, a list of interested parties developed pursuant to Section 10723.2 of the Act, and an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's groundwater sustainability plan.

BE IT FURTHER RESOLVED that the Executive Director and District legal counsel are hereby directed to promptly prepare the appropriate instruments establishing a Groundwater Commission, as set forth in Attachment "1", and present such documents to the Board for adoption.

BE IT FURTHER RESOLVED that the Executive Director shall begin discussions with other local agencies in these basins in order to begin the process of developing groundwater sustainability plans for the basins, or a joint plan with other groundwater sustainability agencies in which the District might join, in consultation and close coordination with other local agencies, as contemplated by the Act.

BE IT FURTHER RESOLVED that the Executive Director directed to report back to the Groundwater Commission and the Board at least quarterly on the progress toward developing the groundwater sustainability plans.

The foregoing resolution was offered on a motion by Director Garton, seconded by Director Williams, and carried by the following vote of the Board:

AYES: Directors Bundy, Carlson, Chamblin, Garton, Williams,

NOES: None

ABSENT OR NOT VOTING: None

CHAIRMAN, Board of Directors

STATE OF CALIFORNIA)
) ss
COUNTY OF TEHAMA)

DATED: This 3rd day of November, 2015.

JENNIFER A. VISE, County Clerk and ex-officio Clerk of the Board of Directors of the Tehama County Flood Control and Water Conservation District, State of California.

By____________________
Deputy

NOTICE OF PUBLIC HEARING

NOTICE IS HERBY GIVEN that on June 2 2015, at 1:30 PM, or soon thereafter as may be heard, in the Board of Supervisors Chambers located at 727 Oak St., Red Bluff, California, the Tehama County Flood Control and Water Conservation District (District) Board of Directors will conduct a public hearing to determine whether to adopt a resolution directing the District to submit a Notice of Intent to the California Department of Water Resources stating that the District will be the Groundwater Sustainability Agency (Agency) for all portions of the eleven (11) Groundwater Subbasins located within Tehama County.

The Sustainable Groundwater Management Act (SGMA) became effective on January 1, 2015 and established a new structure for managing California's groundwater resources at a local level. SGMA mandates that all groundwater basins identified in Bulletin 118 must be managed by a Groundwater Sustainability Agency by June 30, 2017. Each Agency will then develop a Groundwater Sustainability Plan (Plan) by January 30, 2022, which will include measurable objectives and milestones that assist the Agencies in achieving groundwater sustainability within 20 years of Plan adoption.

The District is uniquely qualified to become the Agency for all eleven (11) groundwater basins located within the County due to its current jurisdiction which extends throughout the County, its background in groundwater monitoring and water conservation issues, a Board of Directors which is comprised of elected officials representing the entire County, and additional representation from a technical advisory committee to the Board which is comprised of representatives from Agriculture, Domestic/Industrial Water Providers, Natural Resources, and representatives from the cities of Corning, Red Bluff, and Tehama.

The District will be submitting a Notice of Intent at the June 2, 2015 Public Hearing for the following subbasins or the portions of those subbasins located within the County: Rosewood, Bowman, Red Bluff, Corning, Colusa, Vina, Los Molinos, Dye Creek, Antelope, Bend, and South Battle Creek. For questions or additional information on the Sustainable Groundwater Management Act please contact Ryan Teubert, Tehama County Flood Control/Water Resources Manager, 530-385-1462, ext. 3020 or refer to http://www.water.ca.gov/cagroundwater/.

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NOTICE IS HERBY GIVEN that on November 3, 2015, at 1:30 PM, or soon thereafter as may be heard, in the Board of Supervisors Chambers located at 727 Oak St., Red Bluff, California, the Tehama County Flood Control and Water Conservation District (District) Board of Directors will conduct a public hearing to determine whether to adopt a resolution directing the District to submit a Notice of Intent to the California Department of Water Resources stating that the District will be the Groundwater Sustainability Agency (Agency) for all portions of the eleven (11) Groundwater Subbasins located within Tehama County.

The Sustainable Groundwater Management Act (SGMA) became effective on January 1, 2015 and established a new structure for managing California's groundwater resources at a local level. SGMA mandates that all groundwater basins identified in Bulletin 118 must be managed by a Groundwater Sustainability Agency by June 30, 2017. Each Agency will then develop a Groundwater Sustainability Plan (Plan) by January 30, 2022, which will include measurable objectives and milestones that assist the Agencies in achieving groundwater sustainability within 20 years of Plan adoption.

The District is uniquely qualified to become the Agency for all eleven (11) groundwater basins located within the County due to its current jurisdiction which extends throughout the County, its background in groundwater monitoring and water conservation issues, a Board of Directors which is comprised of elected officials representing the entire County, and additional representation from a technical advisory committee to the Board which is comprised of representatives from Agriculture, Domestic/Industrial Water Providers, Natural Resources, and representatives from the cities of Corning, Red Bluff, and Tehama.

During the June 2, 2015 Public Hearing, staff was directed to work with interested water agencies and incorporate them into the governance structure. As a result, an eleven member groundwater commission comprised of city and district representatives and other stakeholders was proposed. To date, letters of support have been received from City of Corning, City of Red Bluff, City of Tehama and El Camino Irrigation District.

The District will be submitting a Notice of Intent at the November 3, 2015 Public Hearing for the following subbasins or the portions of those subbasins located within the County: Rosewood, Bowman, Red Bluff, Corning, Colusa, Vina, Los Molinos, Dye Creek, Antelope, Bend, and South Battle Creek. For questions or additional information on the Sustainable Groundwater Management Act please contact Ryan Teubert, Tehama County Flood Control/Water Resources Manager, 530-385-1462, ext. 3020 or refer to http://www.water.ca.gov/cagroundwater/.

ORDINANCE NO. 2016-1

AN ORDINANCE OF THE TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT BOARD OF DIRECTORS ESTABLISHING THE TEHAMA COUNTY GROUNDWATER COMMISSION

THE BOARD OF DIRECTORS OF THE TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ORDAINS AS FOLLOWS:

SECTION 1. Purpose and Authority. The purpose of this ordinance is to establish a broadly representative Commission with both decision-making and advisory responsibilities pertaining to groundwater management in the eleven subbasins or portions thereof for which the Tehama County Flood Control and Water Conservation District has been designated as the Groundwater Sustainability Agency under the Sustainable Groundwater Management Act. This ordinance is enacted pursuant to Water Code section 10752.2 and Sections 3, 8, and 11 of the Tehama County Flood Control and Water Conservation District Act (Statutes 1957, Chapter 1280; Water Code Appx., ch. 82).

SECTION 2. Creation. There is hereby created the Tehama County Groundwater Commission, which shall have the powers and duties set forth in this ordinance relating to groundwater management in every subbasin or portion thereof for which the Tehama County Flood Control and Water Conservation District has been designated as the Groundwater Sustainability Agency under the Sustainable Groundwater Management Act.

SECTION 3. Membership. The Commission shall consist of eleven members as set forth in this Section.

(a) The following members shall serve at the pleasure of their respective appointing authority:

(1) One member appointed by the City Council of the City of Red Bluff.

(2) One member appointed by the City Council of the City of Corning.

(3) One member appointed by the City Council of the City of Tehama.

(4) One member appointed by the Board of Directors of the El Camino Irrigation District.

(5) One member appointed by the Board of Directors of the Los Molinos Community Services District.

(6) One member appointed by the Board of Directors of the Rio Alto Water District.

(b) Five members shall be appointed by the Board of Directors of the Tehama County Flood Control and Water Conservation District, upon recommendation of the majority of the members of the Commission then appointed and serving. The term of office of such Commissioners shall be four years, except that the initial members appointed under this subdivision shall classify themselves by lot, with one member serving a term of one year, one member serving a term of two years, one member serving a term of three years, and two members serving a term of four years, so that the Commissioners' terms are evenly staggered. Thereafter all members shall be appointed for the full term of four years. Notwithstanding the foregoing, any member appointed under this subdivision may be removed by a four-fifths vote of the Board of Directors after consultation with the Commission.

(c) The Commission and Board of Directors shall take into consideration all of the following criteria when recommending and appointing members under subdivision (b). These criteria are neither exclusive nor mandatory, and the Board of Directors may deviate from these criteria upon recommendation of the Commission for good cause.

(1) One member should be a resident, property owner, or groundwater user within Tehama County Supervisorial District One.

(2) One member should be a resident, property owner, or groundwater user within Tehama County Supervisorial District Two.

(3) One member should be a resident, property owner, or groundwater user within Tehama County Supervisorial District Three.

(4) One member should be a resident, property owner, or groundwater user within Tehama County Supervisorial District Four.

(5) One member should be a resident, property owner, or groundwater user within Tehama County Supervisorial District Five.

(6) Two members should represent the interests of agencies or districts that supply surface water.

(7) Two members should represent the interests of private groundwater pumpers.

(8) One member should represent the interests of the general public.

(9) No two members should be officers, employees, or agents of the same agency, district, or public or private corporation.

(d) All Commission members shall exercise their independent judgment on behalf of the interests of the residents, property owners, and the public as a whole in furthering the purposes and intent of this ordinance.

SECTION 4. Powers and Duties of the Commission. The Commission shall have the following powers and duties relating to sustainable groundwater management:

(a) Groundwater Sustainability Plan and Regulations. The Commission shall oversee the development of a Groundwater Sustainability Plan pursuant to Water Code sections 10727 et seq., and any amendments thereto, and any implementing rules and regulations of the District. The Commission shall make a written recommendation to the Board of Directors on the adoption or amendment of a Groundwater Sustainability Plan or any implementing rule or regulation of the District. A recommendation for approval shall be made by the affirmative vote of not less than a majority of the total membership of the Commission. The Commission shall hold at least one public hearing before approving a recommendation on the adoption or amendment of a Groundwater Sustainability Plan or any implementing rule or regulation of the District.

(b) Investigations. The Commission shall conduct investigations to determine the need for groundwater management, monitor compliance and enforcement, or propose or update fees or other revenue measures, and make recommendations to Board of Directors thereon.

(c) Grants. The Commission shall review all proposed District grant applications relating to groundwater management, and advise the Board of Directors regarding grant funding opportunities.

(d) Legislative Intent – Permits. In the event that the District establishes any discretionary permitting or similar regulations relating to sustainable groundwater management, it is the intent of the Board of Directors to provide for such permits to be issued by the Commission, subject to appeal to the Board of Directors.

(e) Legislative Intent – Enforcement. In the event that the District establishes an administrative enforcement hearing process pursuant to Water Code section 10732, subdivision (b)(2), it is the intent of the Board of Directors to provide for such enforcement hearings to be conducted and decisions rendered by the Commission, subject to appeal to the Board of Directors.

(f) Ongoing Advisory Functions. The Commission shall provide ongoing advice to Board of Directors regarding any other matters relevant to the management in groundwater in Tehama County.

SECTION 5. Meetings. The Commission shall establish a regular meeting schedule in accordance with the Ralph M. Brown Act, which shall provide for at least one meeting in every ninety-day period.

SECTION 6. Bylaws. The Commission shall, subject to the approval of the Board of Directors, adopt their own bylaws and rules of order, and shall select their own officers.

SECTION 7. Compensation and Travel Expenses. The members of the Commission shall receive as compensation the sum of twenty-five dollars each for their attendance at each meeting or special meeting, not to exceed fifty dollars each per month. In addition thereto, each member shall be allowed reasonable travel expenses as provided by the Tehama County Travel Policy for official travel approved by the Commission, provided that appropriations therefor have been included in the District budget.

SECTION 8. This ordinance shall take effect thirty (30) days from the date of its adoption, and prior to the expiration of fifteen (15) days from the adoption thereof shall be published at least one time in the *Red Bluff Daily News*, a newspaper of general circulation in Tehama County.

The foregoing ordinance was duly passed and adopted by the Board of Directors of the Tehama County Flood Control and Water Conservation District, State of California, at a regular meeting of the Board of Directors on the 7th day of June, 2016 by the following vote:

AYES: Directors Burt Bundy, Dennis Garton, Candy Carlson, Steve Chamblin and Robert Williams

NOES: None

ABSENT OR NOT VOTING: None

CHAIRMAN, Board of Directors

STATE OF CALIFORNIA)
) ss
COUNTY OF TEHAMA)

I, JENNIFER A. VISE, County Clerk and ex-officio Clerk of the Board of Directors of the Tehama County Flood Control and Water Conservation District, State of California, hereby certify the above and foregoing to be a full, true and correct copy of an ordinance adopted by said Board of Directors on the 7th day of June, 2016.

DATED: This 9th day of June, 2016.

JENNIFER A. VISE, County Clerk and ex-officio Clerk of the Board of Directors of the Tehama County Flood Control and Water Conservation District, State of California.

By______________________________
Deputy

CITY OF CORNING
HOME OF THE QUEEN OLIVE

City of Corning

794 Third St. Corning, CA 96021 (530) 824-7020 Fax (530) 824-2489

RECEIVED
AUG 17 2015
[illegible]

Ryan Teubert, CFM
Tehama County Flood Control &Water Resource District
9380 San Benito Ave.
Gerber, CA 96035

August 14, 2015

Re: Groundwater Sustainability Agency Governance Structure

Dear Mr. Teubert,

Thank you for appearing at the August 11, 2015 City Council meeting and presenting the information regarding the Sustainability Groundwater Management Act. Your presentation was very well done and informative.

As you know, after your presentation, the consensus of the Corning City Council was to concur with the Governance structure that you had proposed where the Flood and Water Conservation District Board would serve as the Groundwater Sustainability Agency and the cities, including the City of Corning would have seats on the Groundwater Commission.

Please call me if you have any additional questions regarding this matter.

John L. Brewer, AICP
City Manager

BUILDING **824-7027** • PLANNING **824-7036** • CITY MANAGER **824-7034** • CITY CLERK **824-7033** • FINANCE **824-7020**
PUBLIC WORKS **824-7025** • POLICE DEPARTMENT **824-7000** • FIRE DEPARTMENT **824-7044**
"THE CITY OF CORNING IS AN AFFIRMATIVE ACTION-EQUAL OPPORTUNITY EMPLOYER"

CITY OF RED BLUFF

555 Washington Street Red Bluff, California 96080 (530) 527-2605 Fax (530) 529-6878 www.cityofredbluff.org

RECEIVED
OCT 9 2015
TEHAMA COUNTY
PUBLIC WORKS

October 7, 2015

Tehama County Public Works
Attention: Gary Antone
9380 San Benito Avenue
Gerber, CA 96035-9701

RE: County GSA Proposal

Dear Gary:

At its meeting of October 6, 2015, the Red Bluff City Council voted to support designation of the Tehama County Flood Control and Water Conservation District (FCWCD) as the Groundwater Sustainability Agency (GSA) for Tehama County. "Funding, resources, and staffing will be the primary responsibility of FCWCD" as the GSA is created and a Groundwater Sustainability Plan (GSP) is drafted and implemented. (See, 9-29-2015 FCWCD presentation to Red Bluff City Council). Nevertheless, the City will remain actively engaged on this issue to assure that the City's needs and concerns are carefully considered by the FCWCD moving forward. Please provide the undersigned with written advance notice of all meetings of the FCWCD Board, as well as copies of all agendas and back up materials.

Background

The City of Red Bluff is the largest supplier of domestic groundwater in Tehama County. The City supplies water to 4,756 different metered water connections, serving a population of 15,000 residents. The City operates a network of 13 municipal water wells.

The City Water Department was established in 1921 and employs 7 full-time employees (not including management and administrative staff). The Water Department's operating budget for 2015/2016 is approximately $2.1 million. The City extracts, pumps and delivers 1,178,953,000 gallons of groundwater per year.

The City routinely collects data regarding all aspects of the City's water supply and use thereof including water quality monitoring. The City brings the resources of the largest domestic water supplier in the County to the table as an active, participating member of the GSA.

GSA Requirements

"Any local agency or combination of local agencies overlying a groundwater basin may elect to be a groundwater sustainability agency for that basin." (Water Code § 10723(a).) A GSA "*shall* consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans. These interests include [ ] all of the following: [ ] (b) Municipal well operators. (c) Public water systems. (d) Local land use planning agencies. [ ]" (§10723.2)

A notification of intent to form a GSA must include a list of interested parties including municipal well operators, public water systems and local land use planning agencies and "an explanation of how their interests will be considered in the development and operation of the groundwater sustainability agency and the development and implementation of the agency's sustainability plan." (§10723.8(a)(4).) A combination of local agencies may form a groundwater sustainability agency through use of a joint powers agreement or other legal agreement. (§10723.6(a))

The statutory mandate makes clear that the City's interests as the largest supplier of domestic groundwater in the County must be considered. In fact, the notice of intent to form a GSA must explain how the City's interests will be considered in the development and operation of the GSA.

Conclusion

The City looks forward to working cooperatively with the FCWCD to implement the requirements of the Groundwater Sustainability Act.

If you have any comments or questions, please contact me or Bruce Henz.

Very truly yours,

Richard L. Crabtree

cc: City Council
Board of Supervisors
County Counsel

City of Tehama

Incorporated 1906

Post Office Box 70
Tehama, CA 96090
Phone: (530)384-1501
Fax: (530)384-1625

September 10, 2015

Ryan Teubert, CFM
Tehama Co. Flood Control &
Water Resource Manager
9380 San Benito Ave.

At its meeting on September 8, 2015, the Tehama City Council voted to accept the proposal received from you for the Tehama County Groundwater Sustainability Agency (GSA). We appreciate your leadership in bring the various organizations together for this important effort.

Sincerely,

C Steffan

Carolyn Steffan
City Clerk/Administrator

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SEP 14 2015
TEHAMA COUNTY
PUBLIC WORKS

El Camino Irrigation District
8451 Hwy. 99-W
Gerber, CA 96035
530-385-1559
530-385-1503 Fax
ecid1559@att.net

Ryan Teubert, CFM
Tehama County Flood Control & Water Resource Manager

We have read and discussed the Tehama County Groundwater Sustainability Agency proposal.

As the Board for El Camino Irrigation District we are approving the proposal as written and appointing District Manager Mark Weber to the Groundwater Commission.

Mike Gividen-District 1

Kris Lamkin-District 2

Rich Sol
Rich Sol-Director 3

Leland Hogan-District 4-Chairman

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SEP 14 2015
TEHAMA COUNTY
PUBLIC WORKS

GERBER LAS FLORES Community Services District

Mike Murphy –General Manager
331 San Benito Avenue
Gerber, CA 96035

Telephone (530) 385-1904
FAX (530) 385-2763

October 1, 2015

Mr. Burt Bundy

727 Oak Street, Red Bluff, CA 96080

RE: Groundwater Sustainability Agency

Burt,

As chairman of the Gerber/Las Flores Community Service District, it has come to my attention our Community Service District shall be represented by you and not an appointed GSA individual from the Gerber District. In order to keep us informed over the next few years of the GSA's plan, and the impact it may have on our community, I am inviting you to attend some of our future board meetings as the GSA commission moves forward. .

Please let myself or Mike Murphy (General Manager) know when you are available to attend our public meetings and provide our members with periodic updates. Our regular board meetings are scheduled on the third Thursday of each month beginning at 5:30 pm. We look forward to staying aligned with Tehama County's GSA's plan, since the North State's critical groundwater levels should be everyone's concern.

Sincerely,

Shan

Shannon O. Patterson, Chairman GLFCSD

Cc: Mike Murphy, Gen. Manager GLFCSD

RECEIVED
OCT 13 2015
TEHAMA COUNTY
PUBLIC WORKS

LOS MOLINOS COMMUNITY SERVICES DISTRCT

December 18, 2015

Ryan Teubert, CFM
Tehama County Flood Control & Water Conservation District
9380 San Benito Ave.
Gerber, CA 96035

RECEIVED
DEC 22 2015
TEHAMA COUNTY
PUBLIC WORKS

Re: Letter of Support

Dear Ryan:

The Board of Directors of the Los Molinos Community Services District is in support of the Tehama County Flood Control and Water Conservation District forming and acting as the Groundwater Sustainability Agency (GSA) for the groundwater basins located within Tehama County.

We approve of the proposed governance structure and look forward to participating in the Groundwater Commission. Having served several terms on the AB3030 Technical Advisory Committee I am aware of and acknowledge that the Tehama County Flood Control and Water Conservation District was instrumental in developing and implementing a Groundwater Management Plan in compliance with AB3030, and as such are the most qualified candidate to form and act as the GSA.

Sincerely,

James G Lowden

James G. Lowden
General Manager

P.O. Box 9, Los Molinos, CA 96055
530-384-2737 FAX 530-384-9835

Rio Alto Water District

22099 River View Drive, Cottonwood, California 96022
Telephone 530-347-3835 • Fax 530-347-1007

RECEIVED
OCT 27 2015
TEHAMA COUNTY
PUBLIC WORKS

October 22, 2015

Ryan Teubert, CFM
Tehama County Flood Control & Water Conservation District
9380 San Benito Ave.
Gerber, CA 96035

Re: Letter of Support

Dear Ryan:

The Board of Directors of the Rio Alto Water District is in support of Tehama Flood Control & Water Conservation District forming and acting as the Groundwater Sustainability Agency(GSA) for the groundwater basins within Tehama County.

We approve of the proposed governance structure and look forward to participating in the Groundwater Commission. The Board acknowledges that Tehama County Flood Control and Water Conservation District was instrumental in developing a Groundwater Management Plan in compliance with AB3030, and as such are the most qualified candidate to form and act as the GSA. Thank you for taking the lead in this task.

Sincerely,

Martha Slack

Martha Slack
General Manager

Appendix 1-C

SGMA Glossary

GLOSSARY

This Glossary includes terms from a variety of legal and administrative sources relevant to SGMA and GSP development. These sources include:

- California Water Code Section 10721, Sustainable Groundwater Management Definitions **(CWC Section 10721)**
- California Code of Regulations Title 23 Section 341, Groundwater Basin Boundaries Definitions **(23 CCR Section 341)**
- California Code of Regulations Title 23 Section 351, Groundwater Sustainability Plan Definitions **(23 CCR Section 351)**
- DWR Bulletin 118 Definitions, updated 2003 **(B118, 2003)**
- Locally defined terms used in the GSP

The source of each term is provided in the citation following that term. Page numbers are included when a definition is not found in the referenced document's definitions or glossary. Additional information regarding each source are summarized at the end of this glossary.

Adjudication Action. The action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin. **(CWC Section 10721)**

***Administrative Adjustment*.** The basin or subbasin boundary adjustment by the Department that either (1) amends existing basin or subbasin boundary data files to accurately reflect an unambiguous written basin or subbasin boundary description as defined in Bulletin 118 or amended pursuant to this Part, or (2) restates the description of a basin or subbasin boundary to more precisely reflect a mapped basin or subbasin boundary consistent with the original description. **(B118, 2003)**

***Agency*.** The groundwater sustainability agency as defined in the Act. **(23 CCR Section 351)**

Agricultural Water Management Plan*.* The plan adopted pursuant to the Agricultural Water Management Planning Act as described in Part 2.8 of Division 6 of the Water Code, commencing with Section 10800 et seq. **(23 CCR Section 351)**

***Alternative*.** The alternative to a Plan described in Water Code Section 10733.6. **(23 CCR Section 351)**

Annual Report. The report required by Water Code §10728. **(23 CCR Section 351)**

Aquifer*.* The three-dimensional body of porous and permeable sediment or sedimentary rock that contains sufficient saturated material to yield significant quantities of groundwater to wells and springs, as further defined or characterized in Bulletin 118. **(B118, 2003)**

Baseline or Baseline Conditions. The historical information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin. **(23 CCR Section 351)**

Basin Setting. The information about the physical setting, characteristics, and current conditions of the basin as described by the Agency in the hydrogeologic conceptual model, the groundwater conditions, and the water budget, pursuant to Sub article 2 of Article 5. **(23 CCR Section 351)**

Basin. Defined in the Sustainable Groundwater Management Act as a groundwater basin or subbasin identified and defined in Bulletin 118. Unless the context indicates otherwise, those terms are further defined as follows: (1) The term ***basin*** shall refer to an area specifically defined as a basin or ***groundwater basin*** in Bulletin 118, and shall refer generally to an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom, as further defined or characterized in Bulletin 118. (2) The term ***subbasin*** shall refer to an area specifically defined as a subbasin or ***groundwater subbasin*** in Bulletin 118 and shall refer generally to any subdivision of a basin based on geologic and hydrologic barriers or institutional boundaries, as further described or defined in Bulletin 118. **(B118, 2003)**

Basin. The groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Water Code 10722 et seq. **(23 CCR Section 351)**

Beneficial Use. Water in Bulletin 118 references 23 categories of water uses identified by the State Water Resource Control Board. **(B118, 2003)**

Best Available Science*.* The use of sufficient and credible information and data, specific to the decision being made and the time frame available for making that decision, that is consistent with scientific and engineering professional standards of practice. **(23 CCR Section 351)**

Best Management Practice*.* The practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science. §351. **(23 CCR Section 351)**

Board**.** The State Water Resources Control Board. **(23 CCR Section 351)**

Bulletin 118*.* The department’s report entitled “California’s Groundwater: Bulletin 118” updated in 2003, as it may be subsequently updated or revised in accordance with § 12924. **(CWC Section 10721)**

CASGEM. The California Statewide Groundwater Elevation Monitoring Program developed by the Department pursuant to Water Code Section 10920 et seq., or as amended. **(23 CCR Section 351)**

Condition of Long-Term Overdraft*.* The condition of a groundwater basin where the average annual amount of water extracted for a long-term period, generally 10 years or more, exceeds the long-term average annual supply of water to the basin, plus any temporary surplus. Overdraft during a period of drought is not sufficient to establish a condition of long-term overdraft if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods. **(CWC Section 10721)**

Coordination Agreement. The legal agreement adopted between two or more groundwater sustainability agencies that provides the basis for coordinating multiple agencies or groundwater sustainability plans within a basin pursuant to this part. **(CWC Section 10721)**

Data Gap*.* The lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation and could limit the ability to assess whether a basin is being sustainably managed. **(23 CCR Section 351)**

Existing Stored Groundwater. Groundwater that is already underground from centuries of accumulated native groundwater. Historic pumping has been diminishing the existing stored groundwater at rates greater than the native groundwater can sustain, causing overdraft and unsustainable conditions. If more water is pumped from a basin than what is added from Native Groundwater and Introduced Groundwater, this water comes from the Existing Stored Groundwater. Continuing to use this previously stored groundwater will continue to exacerbate overdraft conditions. Temporarily using some of this water during the transition to sustainability will likely continue to cause lowering of groundwater levels.

Groundwater Dependent Ecosystem**.** The ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. **(23 CCR Section 351)**

Groundwater Flow. The volume and direction of groundwater movement into, out of, or throughout a basin. **(23 CCR Section 351)**

Groundwater in Storage*.* The quantity of water in the zone of saturation. **(B118, 2003)**

Groundwater Overdraft. The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions. **(B118, 2003)**

Groundwater Recharge or Recharge. The augmentation of groundwater by natural or artificial means. **(CWC Section 10721)**

Groundwater Storage Capacity. The volume of void space that can be occupied by water in a given volume of a formation, aquifer, or groundwater basin. **(B118, 2003)**

Groundwater Sustainability Agency**.** One or more local agencies that implement the provisions of this part. For purposes of imposing fees pursuant to Chapter 8 (commencing with Section 10730) or taking action to enforce a groundwater sustainability plan, ***Groundwater Sustainability Agency*** also means each local agency comprising the groundwater sustainability agency if the plan authorizes separate agency action. **(CWC Section 10721)**

Groundwater*.* Water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water but does not include water that flows in known and definite channels. **(CWC Section 10721)**

Hydrogeologic Conceptual Model*.* The description of the geologic and hydrologic framework governing the occurrence of groundwater and its flow through and across the boundaries of a basin and the general groundwater conditions in a basin or subbasin. **(23 CCR Section 341)**

Interconnected Surface Water. The surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. **(23 CCR Section 351)**

Interested Parties**.** The persons and entities on the list of interested persons established by the Agency pursuant to Water Code Section 10723.4. **(23 CCR Section 351)**

Interim Milestone. The target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan. **(23 CCR Section 351)**

Introduced Groundwater. Water that is added to the sustainable yield of groundwater supply derived from percolation of imported surface water. This can be the directly through groundwater replenishment projects or groundwater banking or can be indirectly through percolation from irrigation and unlined canals.
Management Area. The area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors. **(23 CCR Section 351)**

Measurable Objectives. The specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin. **(23 CCR Section 351)**

Minimum Threshold. The numeric value for each sustainability indicator used to define undesirable results. **(23 CCR Section 351)**

Monitoring Protocols**.** Designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management. §10727.2. Required Plan Elements. **(CWC Section 10721)**

NAD83. The North American Datum of 1983 computed by the National Geodetic Survey, or as modified.

Native Groundwater. Water naturally infiltrating into the groundwater from precipitation and runoff. This is the average quantity of water annually added to the groundwater budget from rain, rivers, and streams, and reflects the portion of estimated sustainable yield of the groundwater supply that is not derived from imported surface water.

NAVD88. The North American Vertical Datum of 1988 computed by the National Geodetic Survey, or as modified. **(23 CCR Section 351)**

Plain Language**.** The language that the intended audience can readily understand and use because that language is concise, well-organized, uses simple vocabulary, avoids excessive acronyms and technical language, and follows other best practices of plain language writing. **(23 CCR Section 351)**

Plan Implementation. The Agency's exercise of the powers and authorities described in the Act, which commences after an Agency adopts and submits a Plan or Alternative to the Department and begins exercising such powers and authorities. **(23 CCR Section 351)**

Plan Manager**.** An employee or authorized representative of an Agency, or Agencies, appointed through a coordination agreement or other agreement, who has been delegated management authority for submitting the Plan and serving as the point of contact between the Agency and the Department. **(23 CCR Section 351)**

Plan. The groundwater sustainability plan as defined in the Act. **(23 CCR Section 351)**

Planning and Implementation Horizon. The 50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented in a basin to ensure that the basin is operated within its sustainable yield. **(CWC Section 10721)**

Principal Aquifers. The aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. **(23 CCR Section 351)**

Qualified Map. The geologic map of a scale no smaller than 1:250,000 that is published by the U. S. Geological Survey or the California Geological Survey, or is a map published as part of a geologic investigation conducted by a state or federal agency, or is a geologic map prepared and signed by a Professional Geologist that is acceptable to the Department. **(23 CCR Section 341)**

Recharge Area. The area that supplies water to an aquifer in a groundwater basin. **(CWC Section 10721)**

Reference Point. The permanent, stationary and readily identifiable mark or point on a well, such as the top of casing, from which groundwater level measurements are taken, or other monitoring site. **(23 CCR Section 351)**

Representative Monitoring. The monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin. **(23 CCR Section 351)**

Safe Yield. The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect. **(B118, 2003)**

Saturated Zone. The zone in which all interconnected openings are filled with water, usually underlying the unsaturated zone. **(B118, 2003)**

Seasonal High. The highest annual static groundwater elevation that is typically measured in the Spring and associated with stable aquifer conditions following a period of lowest annual groundwater demand. **(23 CCR Section 351)**

Seasonal Low. The lowest annual static groundwater elevation that is typically measured in the Summer or Fall and associated with a period of stable aquifer conditions following a period of highest annual groundwater demand. **(23 CCR Section 351)**

Seawater Intrusion. The advancement of seawater into a groundwater supply that results in degradation of water quality in the basin and includes seawater from any source. **(23 CCR Section 351)**

Statutory Deadline. The date by which an Agency must be managing a basin pursuant to an adopted Plan, as described in Water Code Sections 10720.7 or 10722.4. **(23 CCR Section 351)**

Sustainability Goal. The existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield. **(CWC Section 10721)**

Sustainability Indicator*.* The effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code §10721(x). **(23 CCR Section 351)**

Sustainable Groundwater Management*.* The management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. **(CWC Section 10721)**

Sustainable Yield. The maximum quantity of water calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result. **(CWC Section 10721)**

Technical Study. The geologic or hydrologic report prepared and published by a state or federal agency, or a study published in a peer-reviewed scientific journal, or a report prepared and signed by a Professional Geologist or by a Professional Engineer. **(23 CCR Section 341)**

Uncertainty. The lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed. **(23 CCR Section 351)**

Undesirable Result*.* One or more of the following effects caused by groundwater conditions occurring throughout the basin: (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods. (2) Significant and unreasonable reduction of groundwater storage. (3) Significant and unreasonable seawater intrusion. (4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies. (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses. (6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water. **(CWC Section 10721)**

Urban Water Management Plan. The plan adopted pursuant to the Urban Water Management Planning Act as described in Part 2.6 of Division 6 of the Water Code, commencing with Section 10610 et seq. **(23 CCR Section 351)**

Water Budget. The accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored. **(CWC Section 10721)**

Water Source Type*.* The source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, local supplies, and local imported supplies. **(23 CCR Section 351)**

Water Use Sector. The categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation. **(23 CCR Section 351)**

Water Year Type. The classification provided by the Department to assess the amount of annual precipitation in a basin. **(23 CCR Section 351)**

Water Year. The period from October 1 through the following September 30, inclusive. **(CWC Section 10721)**

Water Year. The period from October 1 through the following September 30, inclusive, as defined in the Act. **(23 CCR Section 351)**

Wellhead Protection Area. The surface and subsurface area surrounding a water well or well field that supplies a public water system through which contaminants are reasonably likely to migrate toward the water well or well field. **(CWC Section 10721)**

REFERENCES

California Code of Regulations. Title 23, Section 341.
California Code of Regulations. Title 23, Section 351.
California Department of Water Resources (DWR). 2003. Bulletin 118: California’s Groundwater.
California Water Code. Division 6. Part 2.74. Section 10721. Chapter

Appendix 1-D

Elements Guide

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.			**Introduction to Plan Contents**					
			This Article describes the required contents of Plans submitted to the Department for evaluation, including administrative information, a description of the basin setting, sustainable management criteria, description of the monitoring network, and projects and management actions.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
SubArticle 1.			**Administrative Information**					
§ 354.2.			**Introduction to Administrative Information**					
			This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.4.			**General Information**					
			Each Plan shall include the following general information:					
(a)			An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.	24:39	ES 1:ES 6	ES-1:ES-3	ES-1:ES-3	
(b)			A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.	113:114, 201:204, 279, 463:469				Corresponding references are listed at the end of each chapter of the GSP. A comprehensive list of all references cited in the GSP is in Section 6.
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
§ 354.6.			**Agency Information**					
			When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:					
(a)			The name and mailing address of the Agency.	50	1.3.1			
(b)			The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	48:50	1.3.1			
(c)			The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	50	1.3.1			
(d)			The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.	50	1.3.2			
(e)			An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.	52	1.3.3			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.8, 10727.2, and 10733.2, Water Code.					
§ 354.8.			**Description of Plan Area**					
			Each Plan shall include a description of the geographic areas covered, including the following information:					
(a)			One or more maps of the basin that depict the following, as applicable:					
	(1)		The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.	63:64	2.1	2-1		
	(2)		Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.	63:64	2.1	2-1		
	(3)		Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.	63, 65	2.1.1	2-2		
	(4)		Existing land use designations and the identification of water use sector and water source type.	63:71	2.1.1.2	2-3:2-5	2-1, 2-2	
	(5)		The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.	71:74	2.1.1.3	2-6:2-8	2-3	
(b)			A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	63	2.1			
(c)			Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.	75:86, 103:104	2.1.2	2-9, 2-10, 2-12,:2-14	2-4	
(d)			A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.	75:87	2.1.2			
(e)			A description of conjunctive use programs in the basin.	87	2.1.2.11			
(f)			A plain language description of the land use elements or topic categories of applicable general plans that includes the following:					
	(1)		A summary of general plans and other land use plans governing the basin.	89:95	2.1.3			
	(2)		A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects	93:95	2.1.3			
	(3)		A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.	93:95	2.1.3			
	(4)		A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.	95	2.1.4.1			

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(5)		To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.	97	2.1.4.8			
(g)			A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	95:97	2.1.4			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10720.3, 10727.2, 10727.4, 10733, and 10733.2, Water Code.					
§ 354.10.			**Notice and Communication**					
			Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:					
(a)			A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.	99:104	2.1.5.1	2-13, 2-14	2-6	
(b)			A list of public meetings at which the Plan was discussed or considered by the Agency.	105:112	2.1.5.2		2-7	Details in Appendices 2-B and 2-D
(c)			Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.	112	2.1.5.3			Details in Appendix 2-E
(d)			A communication section of the Plan that includes the following:					
	(1)		An explanation of the Agency's decision-making process.	112	2.1.5.4			
	(2)		Identification of opportunities for public engagement and a discussion of how public input and response will be used.	105	2.1.5.2			
	(3)		A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.	99, 105	2.1.5			
	(4)		The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.	99, 105	2.1.5			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code					
SubArticle 2.			**Basin Setting**					
§ 354.12.			**Introduction to Basin Setting**					
			This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.14.			**Hydrogeologic Conceptual Model**					
(a)			Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.	122:165	2.2.1			
(b)			The hydrogeologic conceptual model shall be summarized in a written description that includes the following:					
	(1)		The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.	136:149	2.2.1.3	2-16, 2-17, 2-20	2-8	
	(2)		Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.	122, 123, 148:149	2.2.1.1, 2.2.1.3	2-15		
	(3)		The definable bottom of the basin.	160, 124, 125	2.2.1.6	2-16:2-17		
	(4)		Principal aquifers and aquitards, including the following information:					
		(A)	Formation names, if defined.	132, 145:148	2.2.1.3.2	2-20:2-21		
		(B)	Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.	132, 145:149, 159:160	2.2.1.3:2.2.1.5			
		(C)	Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.	132:149, 159:160	2.2.1.3:2.2.1.5	2-21, 2-23:2-27	2-8	
		(D)	General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.	182:186	2.2.2.3	2-49:2-51		
		(E)	Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.	159:160	2.2.1.5			
	(5)		Identification of data gaps and uncertainty within the hydrogeologic conceptual model	165	2.2.1.8			
(c)			The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.	135:143	2.2.1.3.2	2-22:2-28	2-8	
(d)			Physical characteristics of the basin shall be represented on one or more maps that depict the following:					
	(1)		Topographic information derived from the U.S. Geological Survey or another reliable source.	126, 127,128	2.2.1.2	2-18, 2-19		
	(2)		Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.	129:149	2.2.1.3.1:2.2.1.3.2	2-20, 2-21:2-28		
	(3)		Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.	150:158	2.2.1.4	2-29:2-34		
	(4)		Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.	161:164	2.2.1.7	2-35: 2-37		
	(5)		Surface water bodies that are significant to the management of the basin.	161:162	2.2.1.7	2-35		
	(6)		The source and point of delivery for imported water supplies.	83, 84	2.1.2.8	2-10		

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10733, and 10733.2, Water Code.					
§ 354.16.			**Groundwater Conditions**					
			Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:					
(a)			Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:					
	(1)		Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.	172,173	2.2.2.1.2	2-40, 2-41		
	(2)		Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	167	2.2.2.1.1	2-38		Additional hydrographs in Appendix 2-F
(b)			A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.	237	2.3.5.3	2-66		Annual storage changes are given in Table 2-21. Water budget details are in Appendix 2-K
(c)			Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	185	2.2.2.4			Seawater intrusion is not an applicable sustainability indicator for the Subbasin
(d)			Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.	97, 98, 182:186	2.1.4.6, 2.2.2.3	2-12, 2-49:2-51		Groundwater quality timeseries graphs in Appendix 2-G
(e)			The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	187:191	2.2.2.5	2-52:2-55		
(f)			Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	193:194	2.2.2.6.1	2-56	2-10	
(g)			Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	195:198	2.2.2.7	2-57, 2-58		Details in Appendix 2-I
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, and 10733.2, Water Code.					
§ 354.18.			**Water Budget**					
(a)			Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.	210:279	2.3			
(b)			The water budget shall quantify the following, either through direct measurements or estimates based on data:					
	(1)		Total surface water entering and leaving a basin by water source type.	218:220, 231:234	2.3.3.2, 2.3.5.2	2-64	2-21	
	(2)		Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.	224:225, 235:238	2.3.4.1, 2.3.5.3	2-65, 2-66	2-22	
	(3)		Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.	224:225, 235:238	2.3.4.1, 2.3.5.3	2-65, 2-66	2-22	
	(4)		The change in the annual volume of groundwater in storage between seasonal high conditions.	235:238, 241	2.3.5.3, 2.3.6.2	2-65, 2-66	2-22, 2-24	Storage change values given in the GSP are total changes within a water year (October 01 to September 30). Flow model calculates storage change during each month. Annual storage change is equal to the sum of monthly changes. Additional details are in Appendices 2-J and 2-K
	(5)		If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.	N/A				Overdraft conditions did not occur during the historical baseperiod
	(6)		The water year type associated with the annual supply, demand, and change in groundwater stored.	238	2.3.5.3		2-22	
	(7)		An estimate of sustainable yield for the basin.	270:279	2.3.12	2-75, 2-78	2-36, 2-37	
(c)			Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:					
	(1)		Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.	239:241	2.3.6		2-23, 2-24	
	(2)		Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:					
		(A)	A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.	231:234	2.3.5.2	2-64	2-21	Details in Appendix 2-K
		(B)	A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.	231:238	2.3.5.2, 2.3.5.3	2-64:2-66	2-21:2-22	Details in Appendix 2-K
		(C)	A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.	231, 235	2.3.5.2, 2.3.5.3			

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(3)		Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:					
		(A)	Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.	242:267	2.3.7:2.3.10	2-67:2-74	2-25:2-34	Details in Appendix 2-K
		(B)	Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.	242:267	2.7.3:2.7.10	2-67:2-74	2-25:2-34	Details in Appendix 2-K
		(C)	Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.	242:245, 254:259, 264:265	2.3.7:2.3.9	2-67	2-25	Details in Appendix 2-K
(d)			The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:					
	(1)		Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.	227:238	2.3.5	2-62:2-66	2-19, 2-20	Details in Appendix 2-K
	(2)		Current water budget information for temperature, water year type, evapotranspiration, and land use.	239:241	2.3.6		2-23, 2-24	
	(3)		Projected water budget information for population, population growth, climate change, and sea level rise.	242:267	2.7.3:2.7.10	2-67:2-74	2-25:2-34	Details in Appendix 2-K
(e)			Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.	211:214	2.3.1			Details in Appendices 2-J and 2-K
(f)			The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.	210	2.3			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10727.6, 10729, and 10733.2, Water Code.					
§ 354.20.			**Management Areas**					
(a)			Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.	N/A				Management areas are not defined
(b)			A basin that includes one or more management areas shall describe the following in the Plan:					
	(1)		The reason for the creation of each management area.	N/A				Management areas are not defined
	(2)		The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.	N/A				Management areas are not defined
	(3)		The level of monitoring and analysis appropriate for each management area.	N/A				Management areas are not defined
	(4)		An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.	N/A				Management areas are not defined
(c)			If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.	N/A				Management areas are not defined
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
SubArticle 3.			**Sustainable Management Criteria**					
§ 354.22.			**Introduction to Sustainable Management Criteria**					
			This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.24.			**Sustainability Goal**					

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.	288:302	3.1, 3.2			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10727, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.26.			**Undesirable Results**					
(a)			Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.	313:316	3.4		3-12	Undesirable results are also discussed in sections 3.3.1.4, 3.3.2.4, 3.3.3.4, 3.3.4.4 and 3.3.5.4 under each sustainability indicator.
(b)			The description of undesirable results shall include the following:					
	(1)		The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.	285:286, 288, 311:313	3, 3.3.6, 3.4		3-1	
	(2)		The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.	304:311, 313:316	3.3.1: 3.3.5, 3.4		3-7:3-12	
	(3)		Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.	305, 306,308, 309:310, 311	3.3.1.4, 3.3.2.4, 3.3.3.4, 3.3.4.4 3.3.5.4			
(c)			The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.	302:316	3.3, 3.4	3.3	3-7:3-12	
(d)			An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.	286, 288, 313	3, 3.4		3-1, 3-12	Sustainability indicator for seawater intrusion is not applicable to the Subbasin
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.28.			**Minimum Thresholds**					
(a)			Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.	302:312	3.3		3-7:3-11	
(b)			The description of minimum thresholds shall include the following:					
	(1)		The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.	302:311	3.3.1:3.3.5			
	(2)		The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.	311:312	3.3.6			
	(3)		How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.	312	3.3.7			
	(4)		How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.	305, 306, 308, 310, 311, 312	3.3.1.5, 3.3.2.5, 3.3.3.5, 3.3.4.5, 3.3.5.5, 3.3.8			
	(5)		How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.	305, 306, 308, 309, 311	3.3.1.3, 3.3.2.3, 3.3.3.3, 3.3.4.3, 3.3.5.3			
	(6)		How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.	304, 305:306, 308, 309, 311	3.3.1.2, 3.3.2.2, 3.3.3.2, 3.3.4.2, 3.3.5.2,			
(c)			Minimum thresholds for each sustainability indicator shall be defined as follows:					
	(1)		Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:					
		(A)	The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin.	302:303	3.3.1.1			Water level hydrographs with MOs and MTs are in Appendix 3-B
		(B)	Potential effects on other sustainability indicators.	311:312	3.3.6			

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.	305:306	3.3.2			
	(3)		Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following:					
		(A)	Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer.	N/A				Seawater intrusion is not applicable to the Subbasin
		(B)	A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.	N/A				Seawater intrusion is not applicable to the Subbasin
	(4)		Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.	308:310	3.3.4			
	(5)		Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:					
		(A)	Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency’s rationale for establishing minimum thresholds in light of those effects.	307:308	3.3.3			
		(B)	Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.	187:191, 307	2.2.2.5, 3.3.3	2-53:2-55	3-9	
	(6)		Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:					
		(A)	The location, quantity, and timing of depletions of interconnected surface water.	310:311	3.3.5			
		(B)	A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.	299:300	3.2.5			Reason to use MOs of the chronic lowering of groundwater elevations as a proxy for interconnected surface water is given in Section 3.2.5
(d)			An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.	310:311	3.3.5			Minimum thresholds of the chronic lowering of groundwater elevations is used as a proxy for interconnected surface water
(e)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.	286, 288	3		3-1	Sustainability indicator for seawater intrusion is not applicable to the Subbasin
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10733, 10733.2, and 10733.8, Water Code.					
§ 354.30.			**Measurable Objectives**					
(a)			Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.	290:302	3.2.1:3.2.5	3-2:3-6	3-2:3-6	
(b)			Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.	290:302	3.2.1:3.2.5	3-2:3-6	3-2:3-6	
(c)			Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.	290:302	3.2.1:3.2.5			
(d)			An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.	299:300	3.2.5.1			Measurable objectives of chronic lowering of groundwater elevations were used to establish interim MOs for interconnected surface water
(e)			Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.	289:300	3.1.3, 3.2.1: 3.2.5		3-2:3-6	
(f)			Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.	N/A				Additional plan elements are not included
(g)			An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.	N/A				Measurable objectives do not exceed the reasonable margin of operational flexibility
			Note: Authority cited: Section 10733.2, Water Code.					

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					
SubArticle 4.			**Monitoring Networks**					
§ 354.32.			**Introduction to Monitoring Networks**					
			This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.34.			**Monitoring Network**					
(a)			Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.	317:330	3.6.1:3.6.6		3-13:3.25	
(b)			Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:					
	(1)		Demonstrate progress toward achieving measurable objectives described in the Plan.	316	3.6			
	(2)		Monitor impacts to the beneficial uses or users of groundwater.	316:317	3.6			Monitor impacts are described in detailed in Sections 3.2 and 3.3
	(3)		Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.	320:321, 323, 325,327, 329	3.6.2: 3.6.6			
	(4)		Quantify annual changes in water budget components.	320:321, 323	3.6.2: 3.6.3			Additional data required to develop water budget will be collected from other sources
(c)			Each monitoring network shall be designed to accomplish the following for each sustainability indicator:					
	(1)		Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:	317:322, 331:333	3.6.1, 3.6.2, 3.7.2	3-2, 3-3	3-14:3-16	Maps of representative monitoring sites are in Sections 3.1 and 3.2 (pages 287, 292)
		(A)	A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.	317:322, 331:333	3.6.1, 3.6.2, 3.7.2	3-2, 3-3	3-14:3-16	Maps of representative monitoring sites are in Sections 3.1 and 3.2 (pages 287, 292)
		(B)	Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.	320:322	3.6.2		3-14:3-15	
	(2)		Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.	323:324, 333	3.6.3, 3.7.3		3-17:3-18	
	(3)		Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.	N/A				Seawater intrusion is not applicable to the Subbasin
	(4)		Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.	327:329, 333:334	3.6.5, 3.7.4	3-2, 3-5	3-22, 3-26	Map of representative monitoring sites is in Sections 3.1 and 3.2 (pages 287, 298)
	(5)		Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.	325:326, 335	3.6.4, 3.7.5		3-20, 3-21	
	(6)		Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:					
		(A)	Flow conditions including surface water discharge, surface water head, and baseflow contribution.	329:330, 335, 335:336	3.6.6, 3.7.6, 3.7.8.7		3-24, 3-25	
		(B)	Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.	377	3.7.8.7, 3.7.8.8			
		(C)	Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.	329:330, 335, 335:336	3.6.6, 3.7.6, 3.7.8.7		3-24, 3-25	
		(D)	Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.	329:330, 335, 335:336	3.6.6, 3.7.6, 3.7.8.7		3-24, 3-25	
(d)			The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.	317:319	3.6.1		3-13	Maps of representative monitoring sites are in Sections 3.1 and 3.2 (pages 287, 291, 292)
(e)			A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.	317:330	3.6.1:3.6.6		3-13:3-25	
(f)			The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:					
	(1)		Amount of current and projected groundwater use.	320:321	3.6.2			
	(2)		Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.	320:321	3.6.2			

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(3)		Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.	316	3.6			Impacts to beneficial uses and users of groundwater are also discussed in Sections 3.2 and 3.3
	(4)		Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.	320:330	3.6.2:3.6.6		3-14:3-24	
(g)			Each Plan shall describe the following information about the monitoring network:					
	(1)		Scientific rationale for the monitoring site selection process.	320:330	3.6.2:3.6.6		3-14:3-24	
	(2)		Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.	331:335	3.7.1:3.7.6		3-26	
	(3)		For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.	290:300, 302:311, 331:335	3.2.1: 3.2.5, 3.3.1: 3.3.5, 3.7.1:3.7.6		3-2:3-11, 3-26	Established MOs, MTs and IMs are in Sections 3.2.1:3.2.5. and 3.3.1:3.3.5. Measurement protocols are in Sections 3.7.1:3.7.6
(h)			The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.	287, 291, 292, 296, 298, 301, 318:334		3-1:3-6	3-13:3-26	
(i)			The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.	331:335	3.7.1:3.7.6			
(j)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.	317	3.6.1			No monitoring for seawater intrusion sustainability indicator
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, 10728, 10733, 10733.2, and 10733.8, Water Code					
§ 354.36.			**Representative Monitoring**					
			Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:					
(a)			Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.	335	3.7.7			
(b)			(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:					
	(1)		Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.	299:300	3.2.5.1			Measurable objectives of chronic lowering of groundwater elevations were used to establish interim MOs for interconnected surface water
	(2)		Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.	290, 293	3.2.1			
(c)			The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.	285:286, 335	3, 3.7.7			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2 and 10733.2, Water Code					
§ 354.38.			**Assessment and Improvement of Monitoring Network**					
(a)			Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.		3.7.8	3-7:3-8		
(b)			Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.		3.2.5.1:3.2.5.4, 3.7.8.4:3.7.8.7	3-7:3-8		
(c)			If the monitoring network contains data gaps, the Plan shall include a description of the following:					
	(1)		The location and reason for data gaps in the monitoring network.		3.7.8.4:3.7.8.7	3-7:3-8		
	(2)		Local issues and circumstances that limit or prevent monitoring.	N/A				No known issues or circumstances at present
(d)			Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	335:337	3.7.8.8			
(e)			Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:					
	(1)		Minimum threshold exceedances.	335:337	3.7.8			
	(2)		Highly variable spatial or temporal conditions.	335:337	3.7.8			
	(3)		Adverse impacts to beneficial uses and users of groundwater.	335:337	3.7.8			
	(4)		The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.	335:337	3.7.8			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10728.2, 10733, 10733.2, and 10733.8, Water Code					
§ 354.40.			**Reporting Monitoring Data to the Department**					

				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10728, 10728.2, 10733.2, and 10733.8, Water Code.					
SubArticle 5.			**Projects and Management Actions**					
§ 354.42.			**Introduction to Projects and Management Actions**					
			This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.44.			**Projects and Management Actions**					
(a)			Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.	350:361, 398:435	4.2.1, 4.5		4-3, 4-4, 4-10:4-45	Details in Appendix 4-A
(b)			Each Plan shall include a description of the projects and management actions that include the following:					
	(1)		A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:					
		(A)	A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3		4-10:4-45	
		(B)	The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3		4-10:4-45	"Notice to Public and Other Agencies" is described under each Project/ Management Action
	(2)		If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.	N/A				Subbasinwide overdraft conditions were not identified. Sections 4.1.1 and 4.2.1 provides an overview of subbasin conditions and proposed Projects and Management Actions
	(3)		A summary of the permitting and regulatory process required for each project and management action.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3			"Legal Authority, Permitting Processes, and Regulatory Control" is described under each Project/ Management Action
	(4)		The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3			Status, timeline and expected benefits are described under each Project/ Management Action
	(5)		An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3			Benefits and benefit evaluation methodology are described under each Project/ Management Action
	(6)		An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3			Implementation and reliability of water source if applicable are described under each Project/ Management Action
	(7)		A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3			"Legal Authority, Permitting Processes, and Regulatory Control" is described under each Project/ Management Action
	(8)		A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.	366:434	4.4.1: 4.4.7, 4.5.1:4.5.3			Estimated costs and funding sources are described under each Project/ Management Action
	(9)		A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.	345:350	4.1.1		4-1, 4-2	
(c)			Projects and management actions shall be supported by best available information and best available science.	345:350	4.1.1			
(d)			An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.	345:350	4.1.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					

Appendix 2-A

Domestic Well Inventory

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1 INTRODUCTION

This appendix documents the available data sources for estimating numbers and locations of domestic wells, domestic well construction details, and occurrence of domestic wells in Tehama County. To prepare this domestic well inventory, approximations of the number, depths, and locations of domestic wells were developed from available data sources. The domestic wells indicated to be present according to multiple data sources were reviewed and compared.

2 DOMESTIC WELL INVENTORY DATA SOURCES AND COMPILATION

Data from a variety of public agencies were assembled for consideration in the project. Compiled datasets included the following.

- Well Completion Report (WCR) Database from California Department of Water Resources (CDWR) Online System for WCRs (OSWCR)
- Tehama County well permit database (records since 2013)
- Tehama County assessor's parcel data
- Public Water System (PWS) service area boundaries and PWS well locations from State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW)

Except for the Tehama County well permit database, all the above-listed datasets were available in geospatial (e.g., GIS) formats. The well permit database was provided as tabular data, which was converted to geospatial information as described below.

2.1 DWR WCR Database

The primary source for well construction data in the subbasin is the CDWR WCR database (CDWR, 2020). Well drillers are required to submit a WCR to DWR for all wells drilled and constructed in the State of California. DWR tabulated information from WCRs for the State, including data from WCRs dating as far back as the early 1900s. The tabulated WCR information include well type and construction characteristics such as the intended use of the well, well depths, and screened intervals along with location, construction date, permit information, and other details. Although completed WCRs commonly include additional notes on borehole lithology and a variety of other types of information, lithology and some other well information included on WCRs is not entered or maintained in the DWR WCR database. It is notable that many well attributes in the WCR database are blank or incomplete because of missing or illegible information provided on the WCRs. Additionally, well locations in the WCR database are commonly only provided to the center of the Public Land Survey System (PLSS) section in which it is located, which translates to a locational accuracy of approximately +/- 0.5 mile.

2.1.1 Domestic Well WCRs

As part of the project, initial quality checks were conducted on the WCR database to identify obvious inconsistencies in well data, including conflicting well locations (e.g., latitude, longitude, PLSS coordinates) and construction (e.g., well depths, top and bottom of screens). Such questionable information and records were flagged for additional consideration during subsequent analyses. For this domestic well inventory analysis, only WCRs indicated to be domestic water supply wells were included. To limit potential double counting of domestic wells, only WCRs for new well construction (i.e., not well repairs/modification or destruction) were included in the domestic well inventory.

2.1.2 WCR Dates

The typical lifespan of a small water well is estimated to be about 50 years based on the durability and longevity of typical domestic well materials, which are commonly constructed of PVC casing. Using a conservative estimate of a 40-year lifespan, wells drilled prior to 1980 were considered unlikely to still be in operation or nearing the end of their lifespan.

For these reasons, only WCRs for wells with dates on or after 1980, were included in the domestic well inventory and associated analyses. A total of 5,879 domestic wells constructed since 1980 were considered in the analysis.

2.1.3 WCR Locations

Wells with WCRs marked as domestic were selected and mapped based on one of four geolocation methods, depending on what information was available in the tabulated data. Only wells with installations in 1980 or later were considered. The geolocation methods, in order of priority, are as follows:

1. GPS – 4 wells
2. Address – 85 wells
3. APN – 2,193 wells
4. PLSS – 3,597 wells

A total of 5,879 domestic wells were located within the Tehama Subbasin using these methods (**Figure 1**). Wells located by PLSS are typically placed at the center of the section in which they are located, and thus may be out of position by as much as about 0.5 mile (half the typical width of a section). Initially, 5,790 of the 5,879 domestic well completion reports were located by PLSS. 4,313 of these wells include a partial APN, none of which were formatted consistently with the Tehama County Parcel APNs (e.g., ###-###-###-000).

Potential APNs were generated for the partial APNs by adding zeroes. As an example, partial APN "79-60-3" would become "079-060-003-000" by adding leading zeroes before each 3-digit section and appending "-000" to the end. This assumes partial APNs to be partial only by losing leading zeroes; however, this is not the only possible way to format a potential APN from a partial APN.

Generated APNs were matched to Parcel APNs. Because there is uncertainty in the formatting of the partial APN, only APNs which match parcels located within the same PLSS sections as the WCR were adopted. 2,193 matching APNs were adopted, and the locations of the associated WCRs were updated from section centroids to the centroid of each matching parcel.

Other sources of location error include changes in APNs over time; poorly matched addresses; and incorrect WCR entries for PLSS values, GPS coordinates, or addresses. Since many of the location symbols for domestic wells plot on top of each other in **Figure 1**, the locations of domestic wells in the Subbasin by Township/Range/Section mapping is displayed in **Figure 2**. Domestic well completion reports are summarized by decade and subbasin in **Table 1**.

2.2 Well Permit Records

Under county regulation, a well permit is required prior to drilling and constructing a domestic well. Records of well permits were provided by Tehama County Department of Environmental Health as a tabular dataset (TCDEH, 2021); no GIS data were initially available for the well permits. The period of record for the well permits begins in 2013. The tabulated permit dataset includes permit number, permit date, APN, and well address.

2.2.1 Domestic Well Permits

There are 802 new construction permits for Tehama County. Domestic wells comprise 670 of the 802 new construction wells. Wells with uses other than domestic water supply are denoted with asterisks in the tabulated dataset. Only wells indicated as being sealed were considered.

2.2.2 Locating Well Permits

The 670 domestic well permits in Tehama County were located based on APNs associated with them. Domestic well permits in the County well permit database were located by matching the listed APN with the county parcel data, when possible. For permits with APNs not matching a parcel, the address was used to locate the permit and the APN was updated accordingly. Following this approach, all domestic well permits were matched to unique parcels located within the Tehama County.

A map of the domestic well permits located in the Tehama County is presented in **Figure 3a**. To directly compare well permits to well completion reports over the same period, a map of well completion reports completed 2013 to 2020 is presented in **Figure 3b**. Since many of the location dots for domestic wells plot on top of each other in **Figure 3a**, the count of domestic wells in the County by Township/Range/Section mapping is displayed in **Figure 4a**. Similarly, well completion reports dated 2013 to 2020 are summarized by section in **Figure 4b**.

Well completion reports and permits are additionally compared annually for Antelope, Bowman, Los Molinos, and Red Bluff Subbasins in **Figure 5a**, **Figure 5b**, **Figure 5c**, and **Figure 5d** respectively.

2.3 County Assessor Parcel Data

County Assessor parcel GIS data were provided by Tehama County (Tehama County Assessor's Office, 2021), including land use and other characteristics for each APN. The parcels dataset includes 26,600 unique APNs within the Tehama Subbasin. Of those, 15,959 are inferred as being residential. This includes parcels that are located within a public water system service area. Although the County parcel dataset does not include records related to the presence of domestic wells on parcels, the presence of a resident on a parcel is associated with a drinking water supply and potential for a domestic well. Land use codes used to infer residential parcels and therefore the presence of a domestic well are summarized in **Appendix 1**. Inferred residential parcels are displayed in **Figure 6**. Inferred domestic wells in residential parcel are also summarized by section in **Figure 7**. All known and inferred domestic well locations are combined in **Figure 8**.

2.4 Water System Data

Public Water System (PWS), State Small Water System (SSWS), and Local Small Water System (LSWS) service area boundaries from State and local data sources were used to map and evaluate where and how many inferred well locations occur inside of a water system service area and therefore may not be supplied by a domestic well. Water system boundaries are a key dataset for comparing with potential domestic well locations identified through analysis of WCRs, parcels, and permits. The service area boundaries for water systems and new construction public water supply wells since 1980 identified in the County are presented in **Figure 9**.

2.4.1 State Regulated Systems

The PWS boundaries are part of an archived dataset developed by the California Environmental Health Tracking Program (CEHTP) and now maintained by the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) (SWRCB, 2021). This dataset is a publicly available GIS feature class of system boundaries provided voluntarily by water system operators over the period from 2012 to 2019. Previous assessments of this dataset suggest it includes approximately 85 percent of community water systems, although this can vary by region within the state. Of the state regulated PWS boundaries, 42 were identified to have service areas within Tehama County.

2.4.2 Public Water System Wells

PWS well locations were downloaded from the WCR dataset and used to check for any water system wells in areas not covered by the water systems service area boundaries data. Several wells with public water supply planned used are located outside of CEHTP PWS boundaries (**Figure 9a**). These wells are considered in analyses as possibly providing water to nearby users.

3 ANALYSIS AND RESULTS

Estimates of domestic wells were developed through analysis and comparison of the data sources discussed above. Estimates of the number and locations of domestic wells in Tehama County were made using three sources of data and approaches: from WCRs, well permits, and parcels with residents. Domestic well WCRs and well permits provide a more direct indication of the existence (past or present) of a domestic well whereas the parcel data provide a basis for inferring the existence of domestic wells. The County well permit database is believed to provide the most accurate estimate of the numbers and locations of domestic wells constructed during the available data record (since 2013). However, only the WCR data have information on well depths and construction. Additionally, while WCRs and well permits generally have a date associated with each record indicating the approximate date of well construction, the parcel data do not. However, estimates of well counts based on parcel data do provide an estimate of the maximum possible number of domestic wells, and a reference on the relative spatial density of domestic wells in the County.

Water system service area boundaries were used to refine domestic well estimates derived from parcel counts, with the expectation that parcels and households within a water system boundary are served water by the water system and therefore do not have a domestic well. The number of inferred parcels, well completion reports, and unique well permits (i.e., not collocated with a WCR) are summarized for the entire County, and within two subsets of water system service areas in **Table 2**. One subset includes the number of domestic wells within the community water system boundaries and within a half-mile of other PWS wells, while the other subset includes only community water system wells. It is assumed these public water supply wells supply water in their vicinity despite being located outside of water system boundaries; however, the area served by each PWS well is unknown so this is only an estimate of how these wells might impact domestic well counts. Many wells inferred to be in a parcel located within a community water service area were likely not installed, while wells known to be installed in these areas may no longer be used for domestic water supply. Results of the well location and counts analyses are described below.

3.1 Analysis of Domestic Well Locations and Counts

3.1.1 Domestic Well WCRs

The domestic well WCRs since 1980 were compared with water system boundaries in the two methods described above (**Figure 9b**, **Figure 9c**). Because the WCRs are records of actual wells that were constructed, those located within a water system service area are assumed to be correctly located. It is possible that wells that pre-existed the establishment of a water system in an area may remain in use after the water system is operational; however, whether this occurs, and how often, is unknown.

Of the 5,879 domestic wells represented by WCRs in the County, 260 are located within the known water system boundaries (**Figure 9b**). This represents approximately four (4) % of the domestic well WCRs in the County. However, when considering the half-mile radius around public water supply wells, 1,090 wells (19% of total) are captured.

3.1.2 Domestic Well Permits

Permits are expected to accurately identify well locations, but domestic well permits may exist for wells drilled and constructed prior to the operation of a water system in an area. As shown in annual comparisons for 2020 (**Figures 5a, 5b, 5c, 5d**), permits may be processed before well completion reports and supplement recent domestic well counts.

In contrast to the WCR dataset, which relies on submittal and entry of a WCR in DWR's database, the County well permit dataset is expected to be a more comprehensive representation of the wells drilled in the County for the period over which it spans (2013 to present). Over the same period, there are 670 well permits compared to 567 WCRs.

Of the 670 well permits, 338 domestic well permits in the County are not collocated with a WCR. There are 17 of these unique permits located within known water system boundaries (**Figure 9b**). Like the domestic WCRs in water system boundaries, this represents only five (5) % of the permit dataset. When additionally considering permits located withina 0.5 mile radius around other public supply wells, 71 well permits are represented (**Figure 9c**).

3.1.3 Parcels with Residents

For assessing the maximum possible number of domestic wells in the County, all parcels inferred to be residential were counted. Parcels were inferred as residential based on land use codes listed in **Appendix 1**. Parcels within service areas were also counted but removed from the total inferred count. In this approach, a parcel is considered within a water system service area if its centroid is within the service area.

Based on these criteria, within Tehama County there are a total of 15,959 residential parcels (**Figure 6**) with residents, 8,744 of which are outside of the service area boundaries of all 42 Public Water Systems serving residential parcels. There are only 6,725 inferred parcels outside of the potential radius of influence of other public water supply wells.

3.1.4 Comparisons of Domestic Well Location Information Sources

3.1.4.1 Domestic Wells Within PWS Service Areas

While most residences within a PWS service area are supplied with drinking water by that PWS, it is not unusual for wells that were drilled prior to the creation of the PWS to be retained and used for part, or all, of a residence's use, including for drinking water or landscape irrigation.

Of the 5,879 WCRs located in Tehama County, 260 are located within a water system service area. Of the 338 unique permits located within the Tehama Subbasin, 17 were located within a water system service area.

Of the 15,959 parcels with dwellings noted in the APN dataset, 7,215 are within a water system boundary. This represents a much larger portion of the total inferred dataset (45%) compared to WCRs and permits, suggesting most of those inferred parcels do not have domestic wells.

3.1.4.2 Comparing WCR Locations to Well Permits

The Tehama County well permits dataset, by count, is more complete in representing wells drilled in the County, but it only extends back to 2013. There is no direct linkage between WCRs and well permits on record (i.e., WCRs commonly do not indicate well permit numbers) for majority of the wells, and the available method for geolocating records for a given well present in both datasets may differ. However, it was determined that 332 of the parcels associated with permit locations coincided with WCR locations for domestic wells. Many WCRs are located by the center of section and therefore may not be placed in the correct parcel. This likely explains the low rate of coincidence of well permits and WCRs within parcels.

Consequently, in attempting to tally the permits and WCRs representing known domestic well locations, unique permits may be double counted as WCRs located by TRS. Because there are more permits over the permit's period of record than WCRs, it is assumed that not all WCRs located by TRS are associated with a permit.

3.1.5 Final Domestic Well Count and Location Estimates

The County permit database includes 670 domestic wells installed since 2013. Although over the same period, there are more permits than WCRs (567 domestic WCRs), the WCRs data back further than 1950 and are the more complete dataset. Although there are only 16% more permits than WCRs, 50% of the permits appear to be uniquely located. Given available WCR and well permit data, there are 5,781 uniquely located domestic wells (WCRs and permits) outside of community water systems. Because it appears permits supplement the WCR dataset to some extent, domestic well permit totals were estimated with projected complete 1980-2020 datasets.

A possible total number of domestic wells was estimated assuming that roughly 50% of permits are uniquely located as indicated by the best available location methods for all wells. Permit counts were projected for 1980-2013 given the same distribution as in 2013-2020. The inferred unique permits for 1980-2020 in **Table 2** estimate the maximum possible number of permits to be supplementary to the WCR dataset. There is a total of 8,948 WCRs and estimated unique permits (or wells otherwise not captured by the WCR dataset) outside community water systems, compared to the inferred 8,744 residential parcels outside water system boundaries. This estimated total drops to 6,673 total WCRs and estimated unique permits when assuming there are consistently 16% more permits than WCRs as indicated by the 2013-2020 totals, and that those permits are unique.

The current dataset of permits and WCRs outside community water systems at 5,781 domestic wells represents 68% of the inferred residential parcels. Dependent on the accuracy of extrapolation techniques, the total may represent 76 – 100% of the inferred parcels with a complete dataset.

Well permits generally provide a more complete representation of wells constructed in the County, but these permit records do not contain information on well perforations and depths. An analysis of well construction information was therefore performed on the WCR data only.

3.1.6 WCR Domestic Well Construction Information

Of the 5,879 domestic well WCRs in the Tehama Subbasin, 5,860 included some information on perforated interval (top of bottom of perforations) or total depth. Only WCR records determined to have sufficiently reliable well construction information (i.e., lack of obviously conflicting information on the well construction) were included in the summary and analyses relating to domestic well construction in the County. In analyses using well perforations (screens), where data for bottom of perforations was not available, the reported total well depth was used. A total of 1,070 WCRs included top of screened interval information. Average total depths of WCRs in each section were calculated and are displayed in **Figure 10**. Additionally, to evaluate changes in well depths over time, scatterplots of completed depth over time in Antelope, Bowman, Los Molinos, and Red Bluff Subbasin were plotted in **Figure 11a**, **Figure 11b**, **Figure 11c**, and **Figure 11d**, respectively. Minimum installed depths appear to be increasing with time in all Subbasins, and depths are much more variable within Bowman and Red Bluff Subbasins.

3.2 Public Water System Wells

PWS wells data are maintained by the State Water Resources Control Board Division of Drinking Water in the Safe Drinking Water Information System (SDWIS); however, these data are incomplete at this time. The WCR database was queried for PWS wells, and there were 59 wells drilled in 1980 or later with Public Water Supply as the planned use. Of these, only 16 fall within community water system boundaries. Depth to the bottom of perforated interval ranged from 100 to 840 feet below ground surface in these wells. The wells identified here are shown in **Figure 9a**.

4 REFERENCES

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SWRCB. 2021. Water System Boundaries. Retrieved from https://www.waterboards.ca.gov/resources/data_databases/ on 01/15/2021.

SWRCB. 2021. Public Water System Wells. Retrieved from https://www.waterboards.ca.gov/gama/ on 1/15/2021.

TABLES

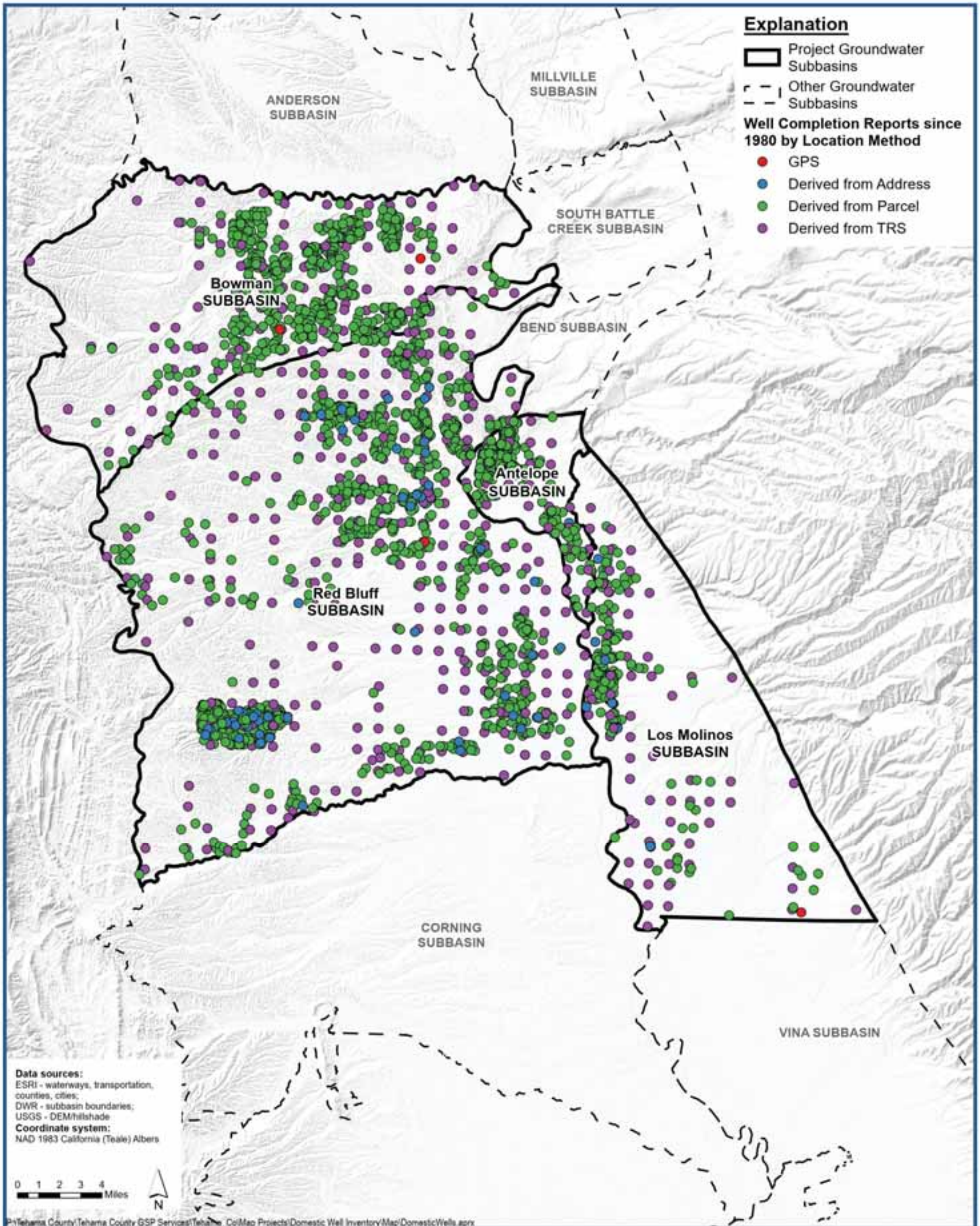
Table 1. Summary of domestic well WCRs by decade and subbasin.

WCR Date Range	Antelope WCRs in Date Range	Bowman WCRs in Date Range	Los Molinos WCRs in Date Range	Red Bluff WCRs in Date Range	Tehama WCRs in Date Range	Cumulative WCRs Since Beginning (Since 1980)
Pre-1950	16	1	9	22	48	48
1950-1959	40	14	21	77	152	200
1960-1969	123	70	47	267	507	707
1970-1979	207	411	187	812	1617	2324
1980-1989	196	421	252	853	1722	4046 (1722)
1990-1999	162	328	205	1080	1775	5801 (3497)
2000-2009	165	393	139	973	1670	7471 (5167)
2010-2019	149	122	57	374	702	8173 (5869)
Since 2020	1	4	0	5	10	8183 (**5879**)
Unknown	18	13	12	33	76	8259

Table 2. Summary of inferred and known domestic wells

Number of Inferred and Known Domestic Wells	Entire Region	Within Community Water System	Within Community Water System or near (within 0.5 mi) Public Water Supply wells
Number of Parcels with Inferred Domestic Wells	15,959	9,234	7,215
Number of Domestic Wells from WCRs 1980-2020	5,879	1,090	260
Number of Domestic Well Permits (unique; not matching WCRs) 2013-2020	338	71	17
Number of Inferred Unique Domestic Well Permits 1980-2020	3,505	736	176
Number of Domestic Wells + Unique (inferred) Permits 1980-2020	9,384	1,826	436

APPENDIX 2-A FIGURES



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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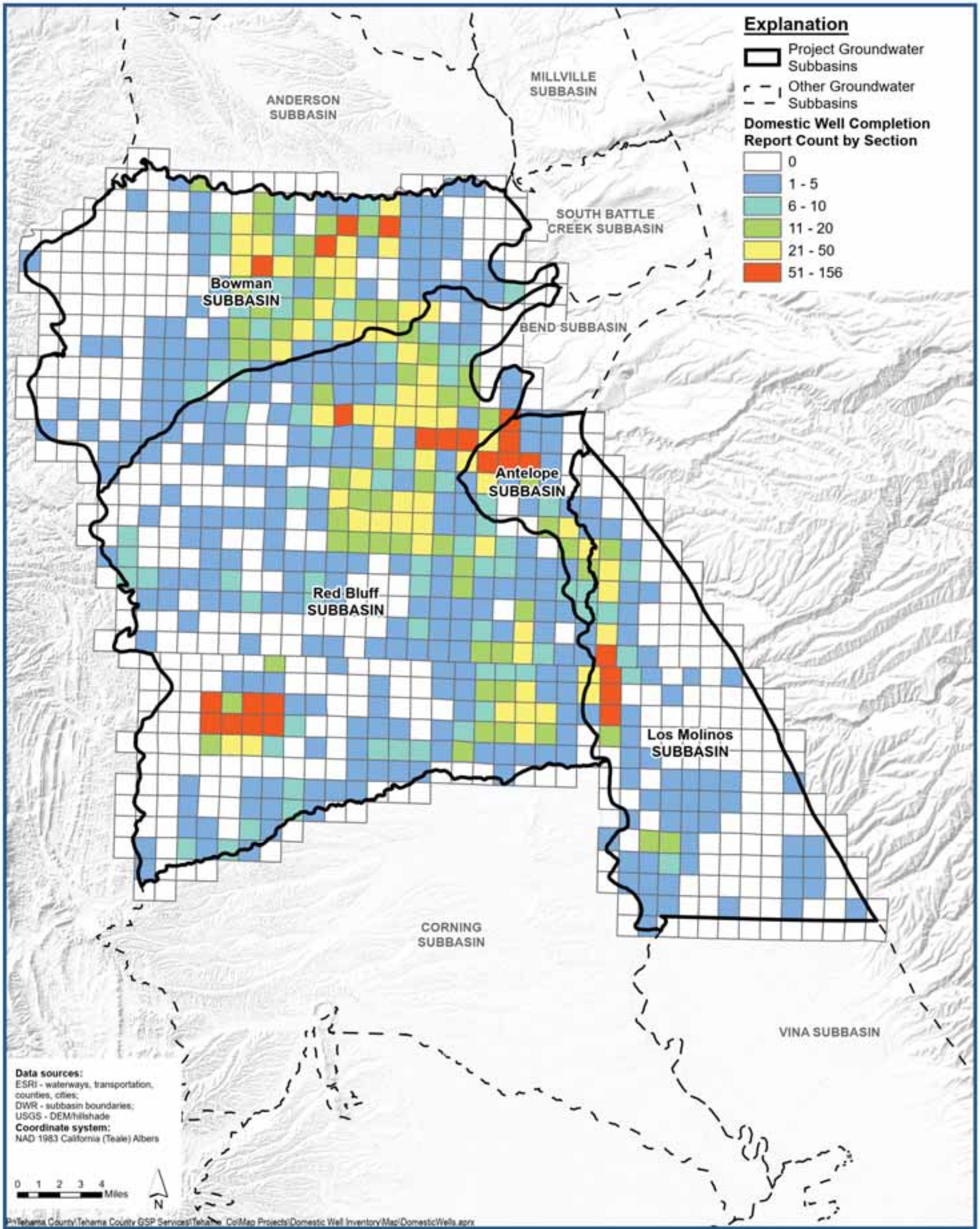
Consulting Engineers

Domestic Wells from Well Completion Reports
All New Construction Wells from 1980-2020

Tehama County Groundwater Sustainability Plan
Tehama County, California

Figure 1



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ESRI - waterways, transportation, counties, cities;
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Coordinate system:
NAD 1983 California (Teale) Albers

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Summary by Section of Domestic Well Completion Reports
All New Construction Wells from 1980-2020

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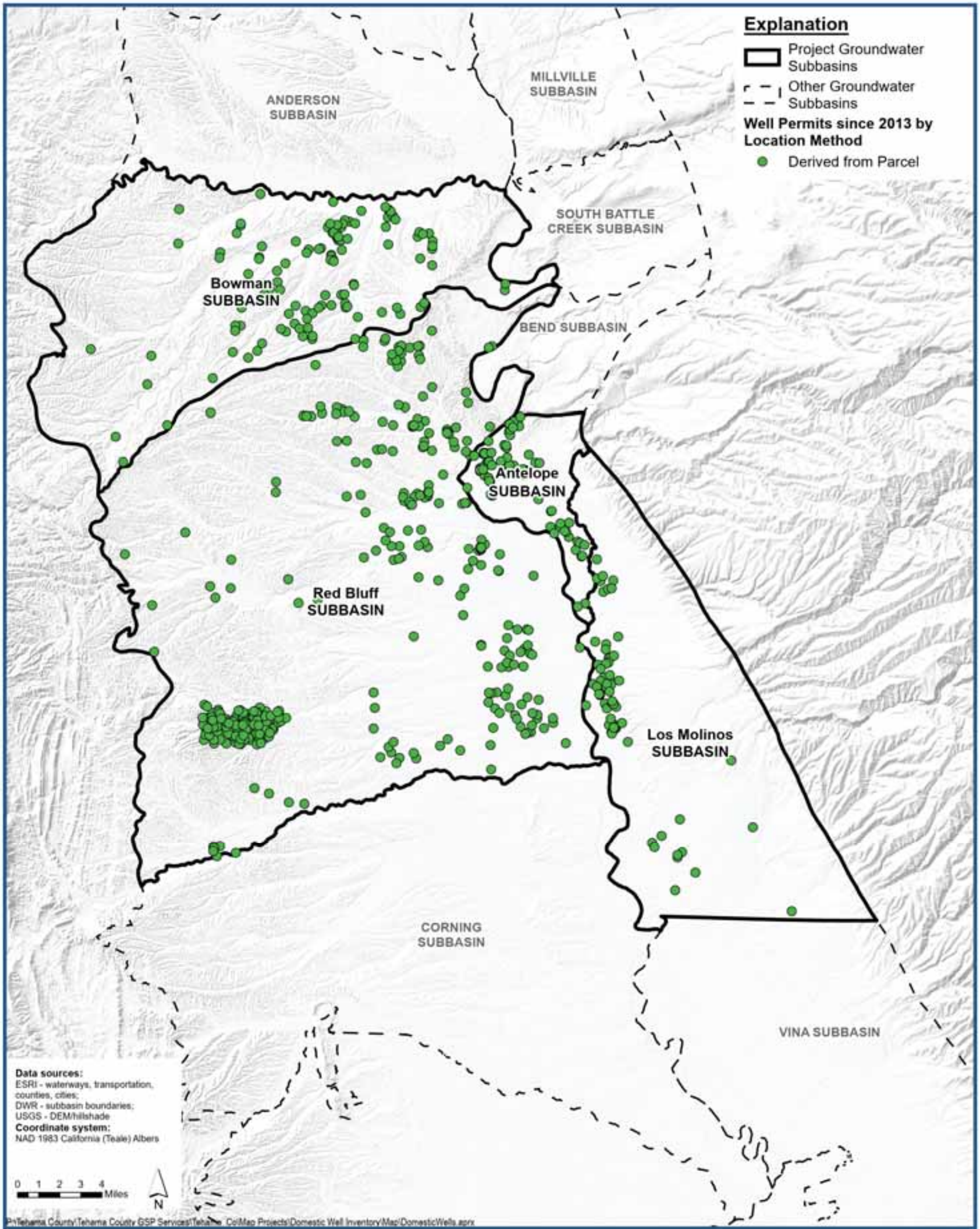
Figure 2



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Domestic Wells from Well Permits
All New Construction Wells from 2013-2020

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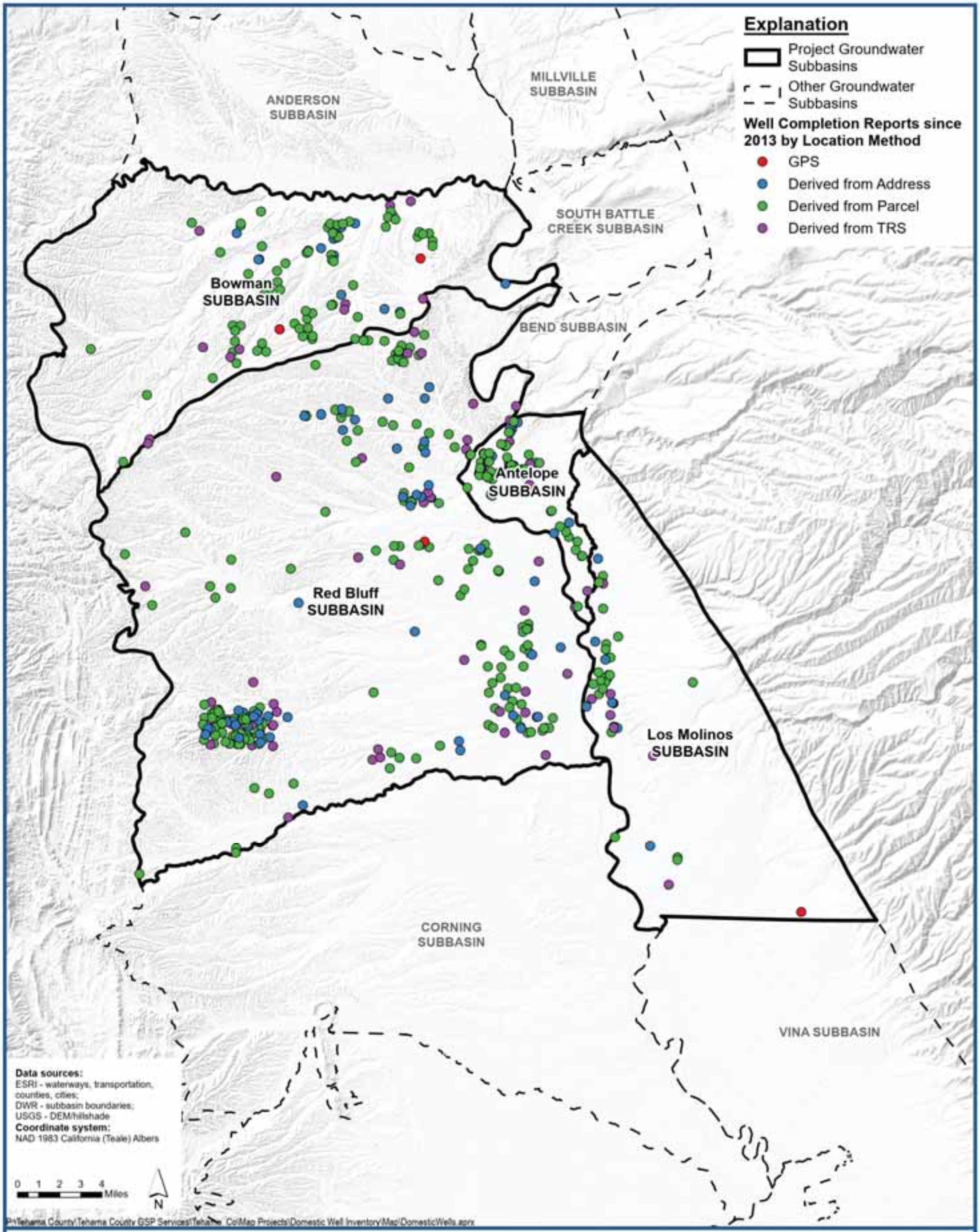
Figure 3a



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Domestic Wells from Well Completion Reports
All New Construction Wells from 2013-2020

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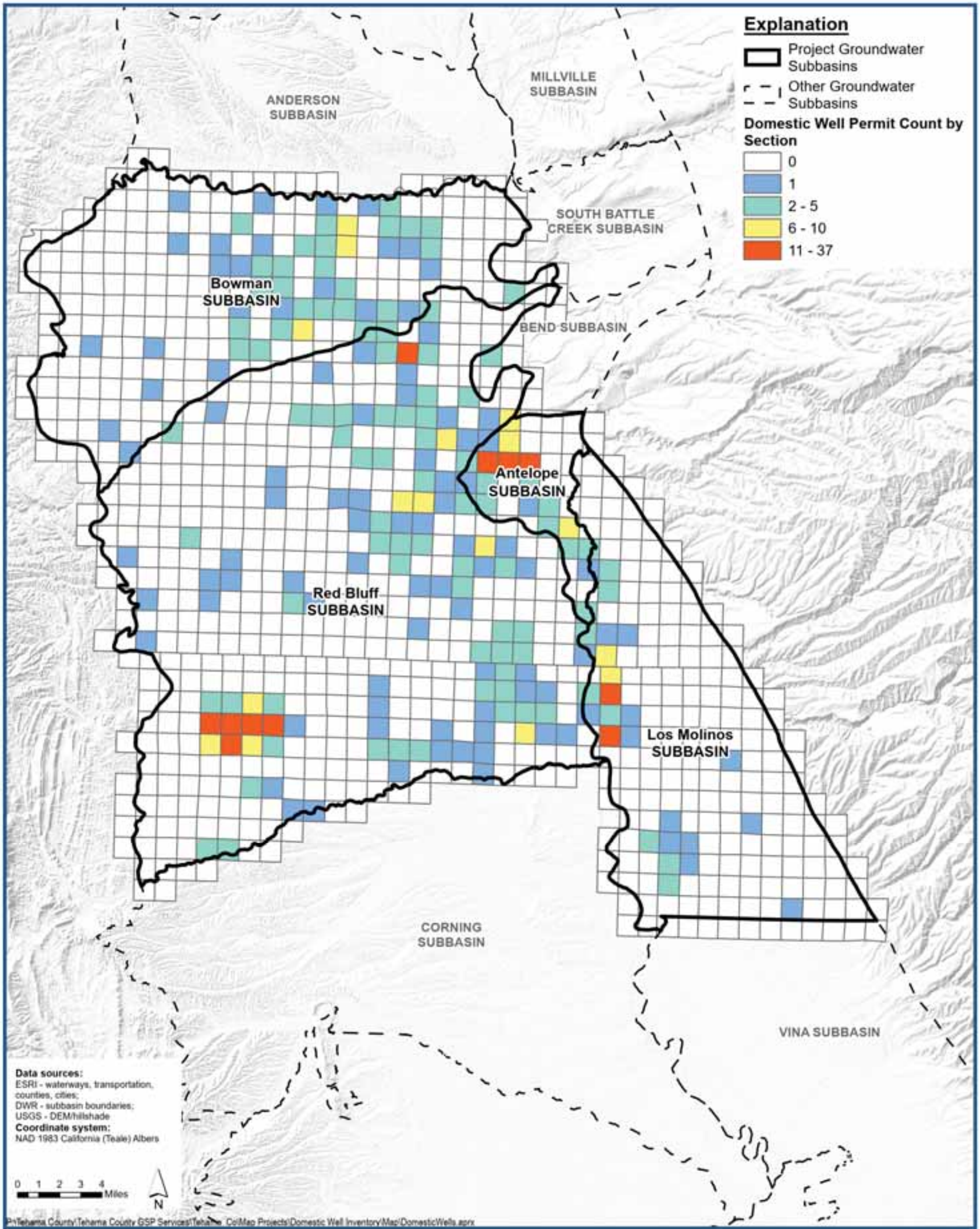
Figure 3b



Data sources:
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Summary by Section of Domestic Well Permits
All New Construction Wells from 2013-2020

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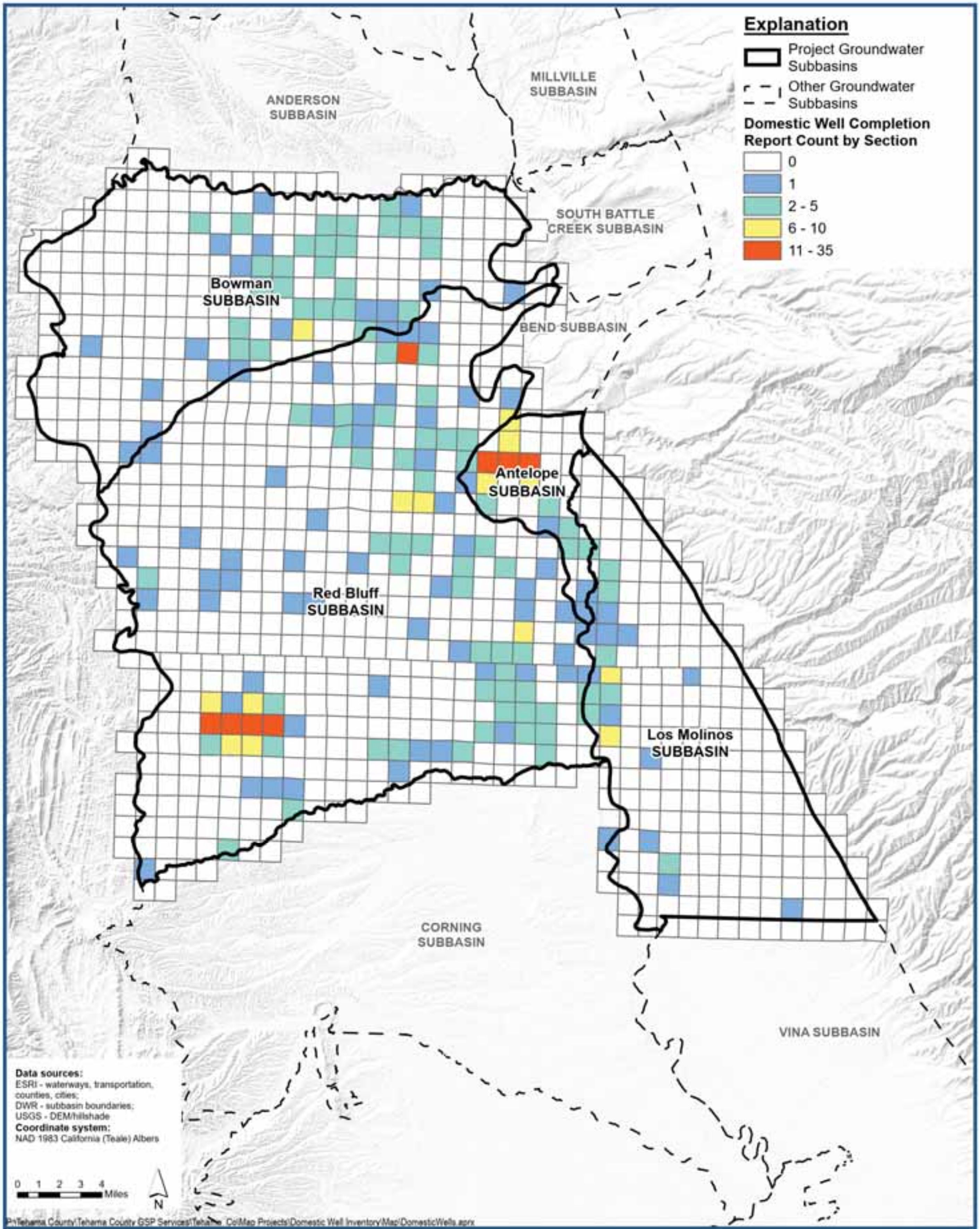
Figure 4a



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Summary by Section of Domestic Well Completion Reports
All New Construction Wells from 2013-2020

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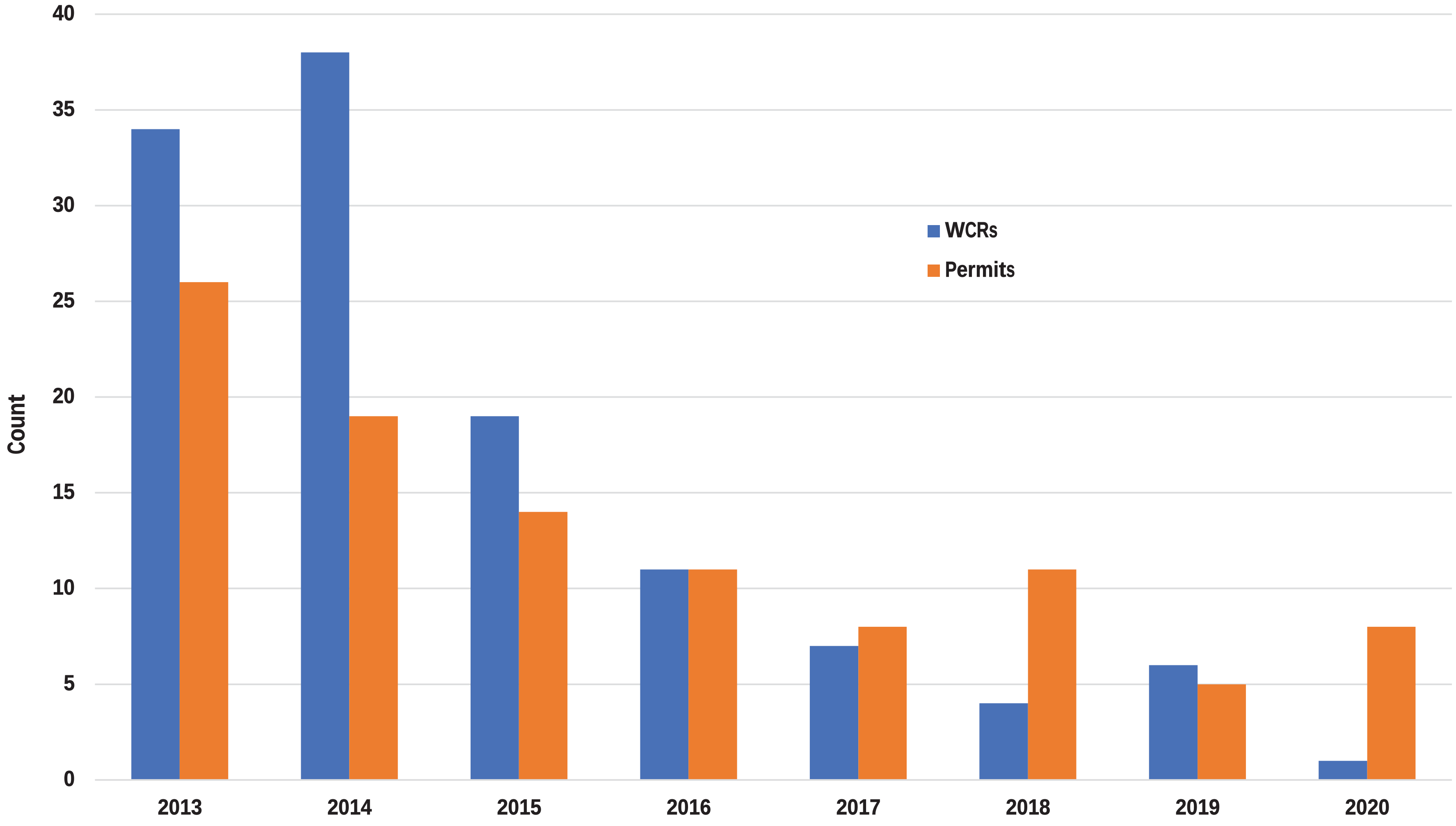
Tehama County, California

Figure 4b



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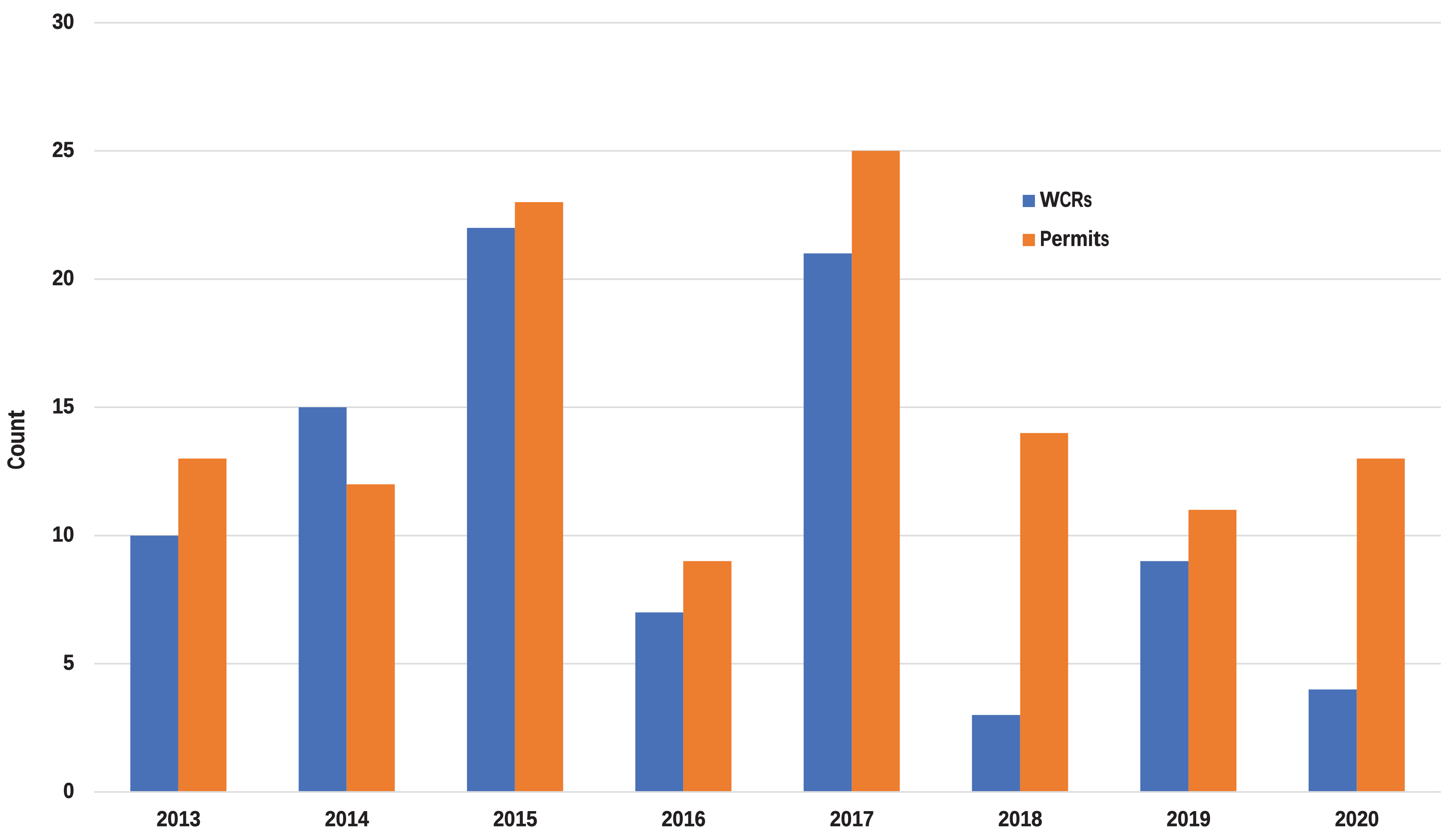
Total Annual Number of WCRs and Well Permits in Antelope Subbasin
All New Construction Wells 2013-2020

Tehama County Groundwater Sustainability Plan
Tehama County, California

Figure 5a



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Total Annual Number of WCRs and Well Permits in Bowman Subbasin
All New Construction Wells 2013-2020

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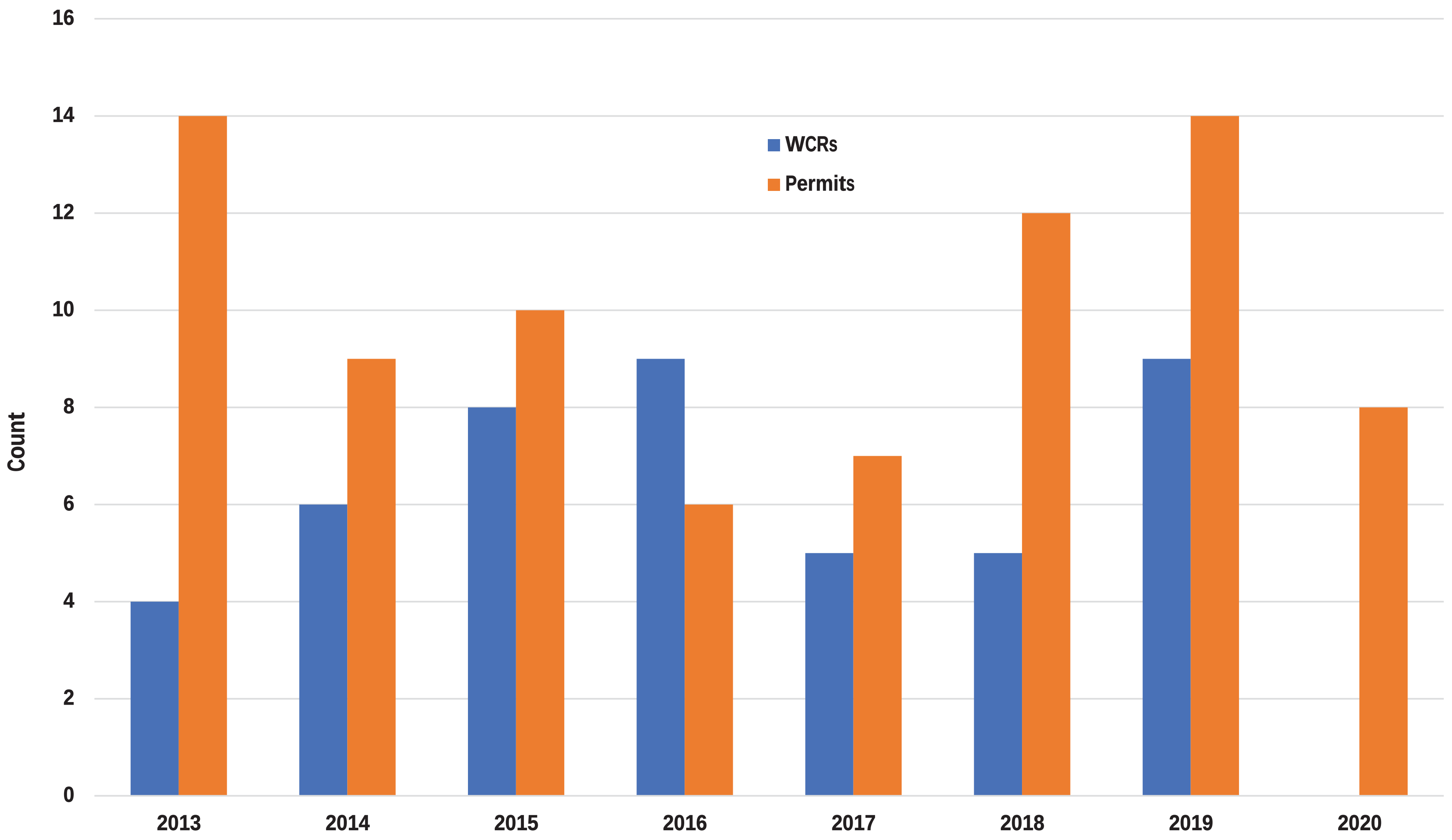
Tehama County, California

Figure 5b



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Total Annual Number of WCRs and Well Permits in Los Molinos Subbasin
All New Construction Wells 2013-2020

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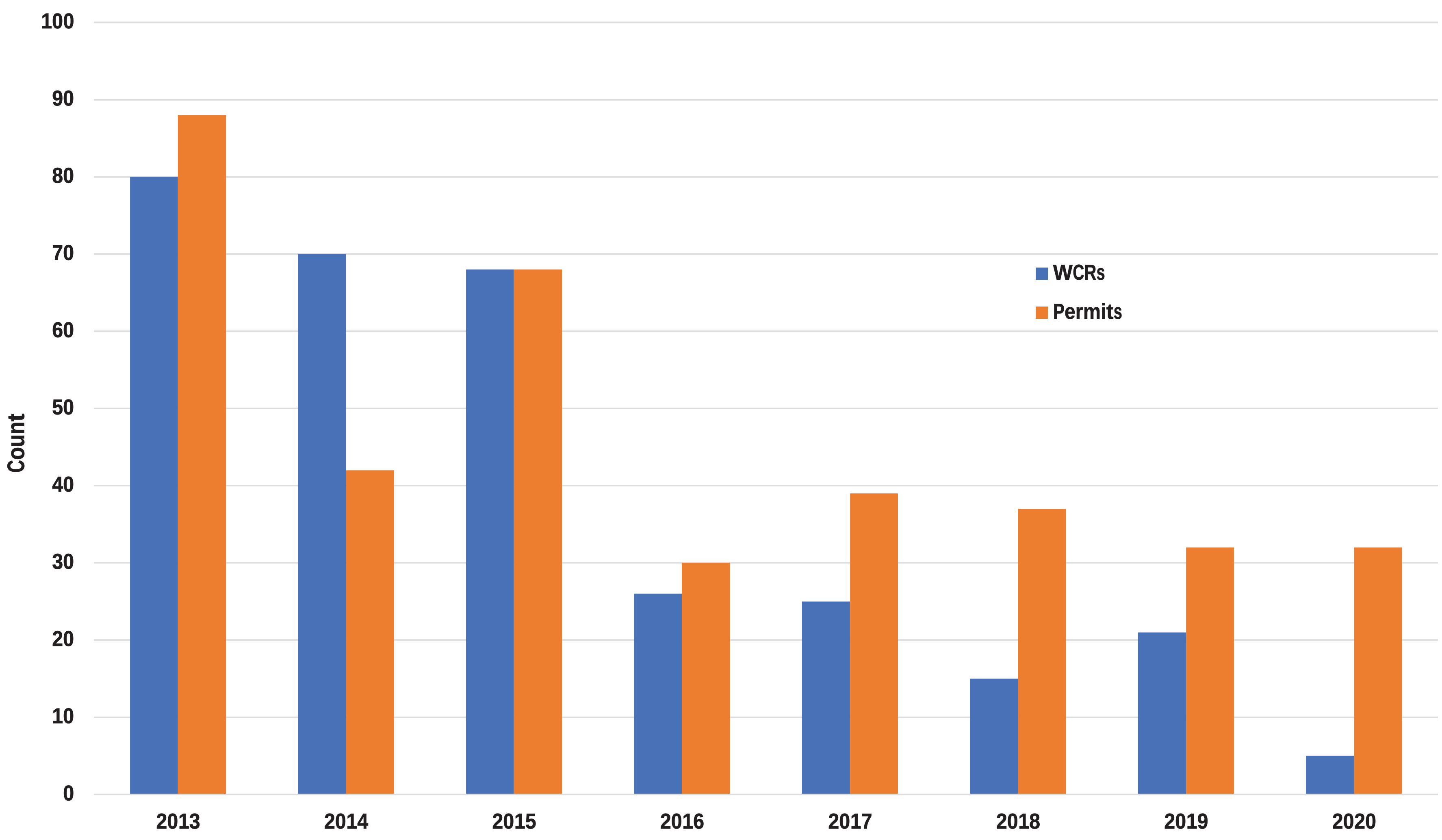
Figure 5c



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Total Annual Number of WCRs and Well Permits in Red Bluff Subbasin
All New Construction Wells 2013-2020

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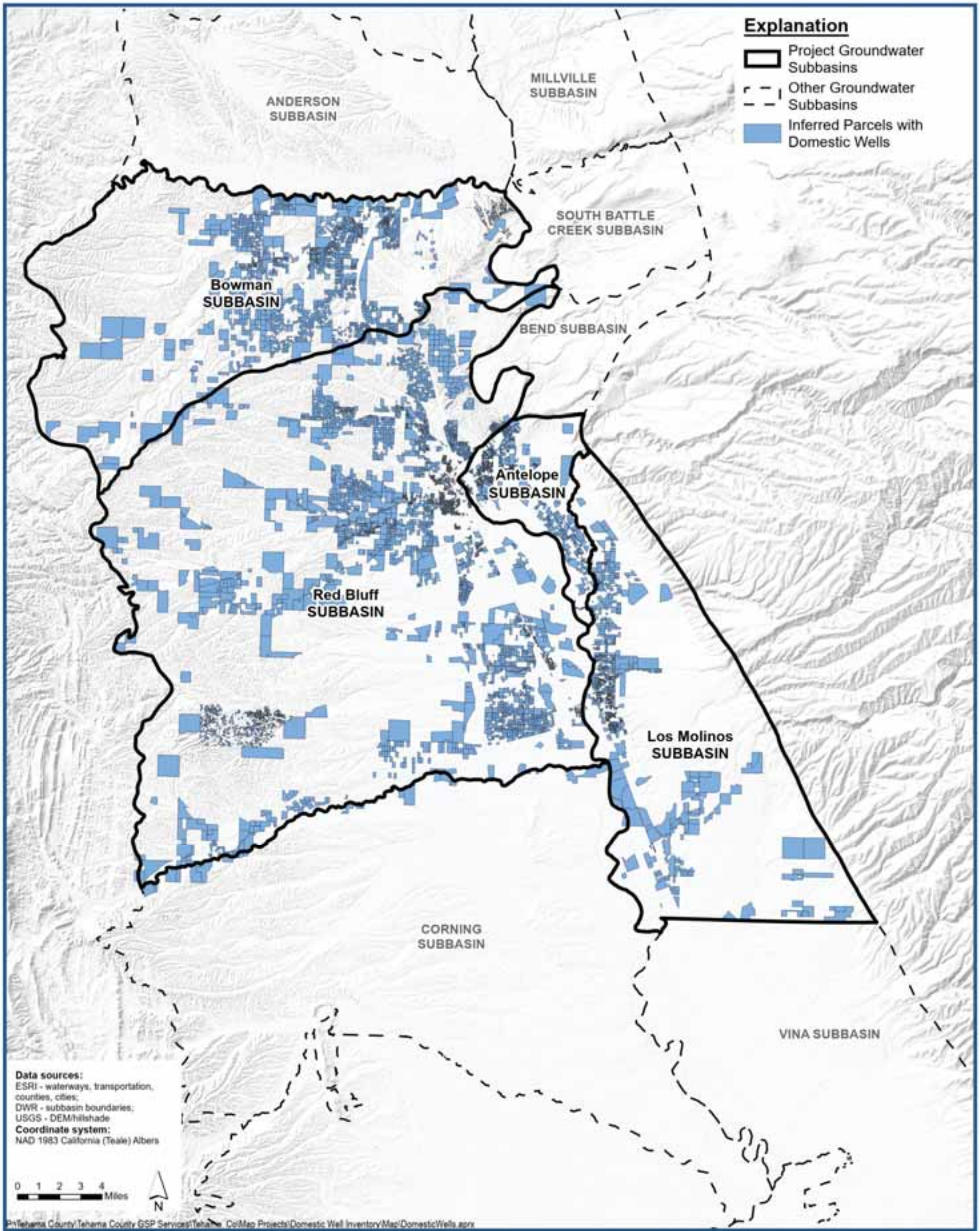
Tehama County, California

Figure 5d



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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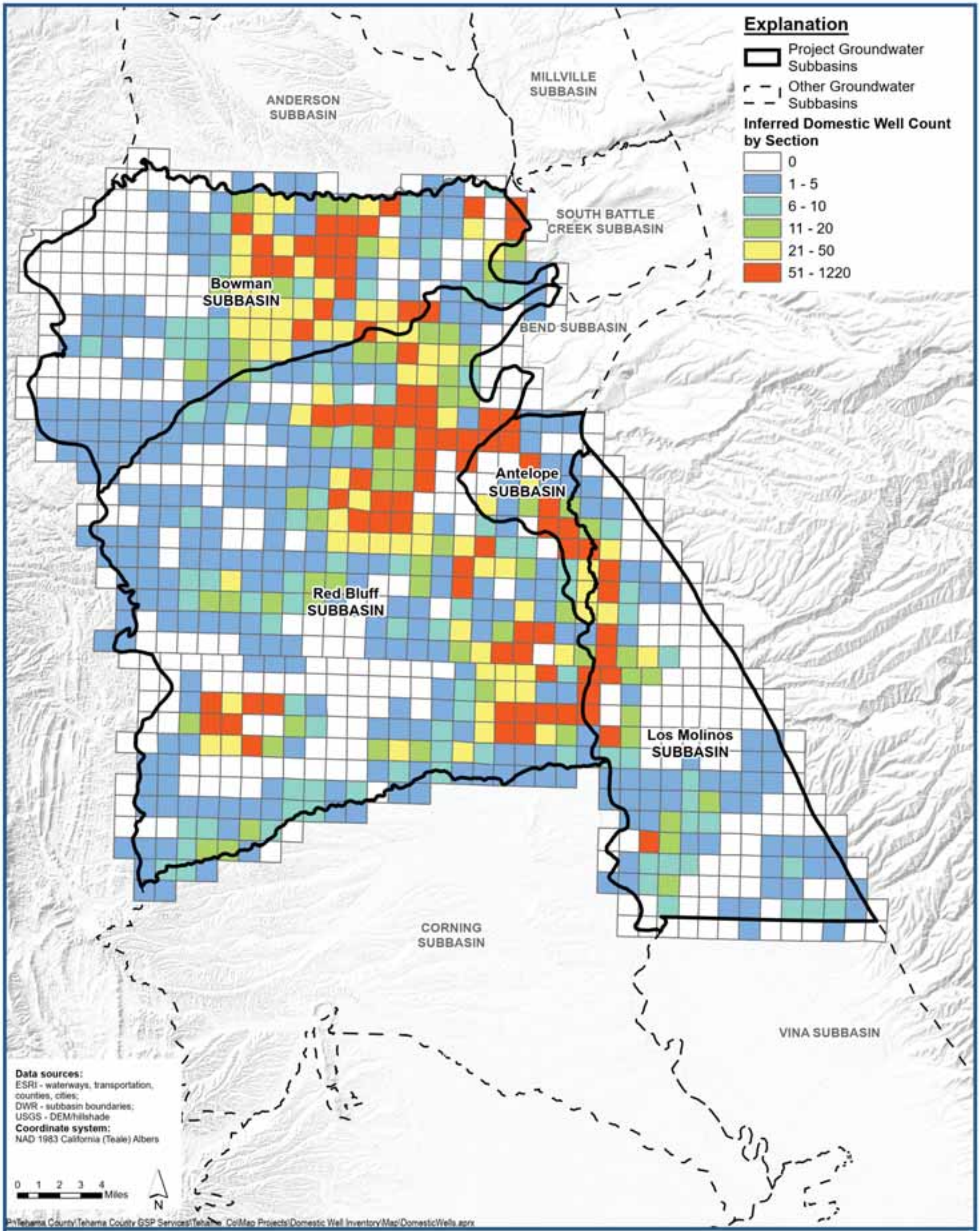
Parcels with Domestic Wells
Inferred from Land Use Codes

Figure 6

Tehama County Groundwater Sustainability Plan
Tehama County, California



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Summary by Section of Inferred Domestic Wells
Well Locations Inferred by Parcel Land Use Codes

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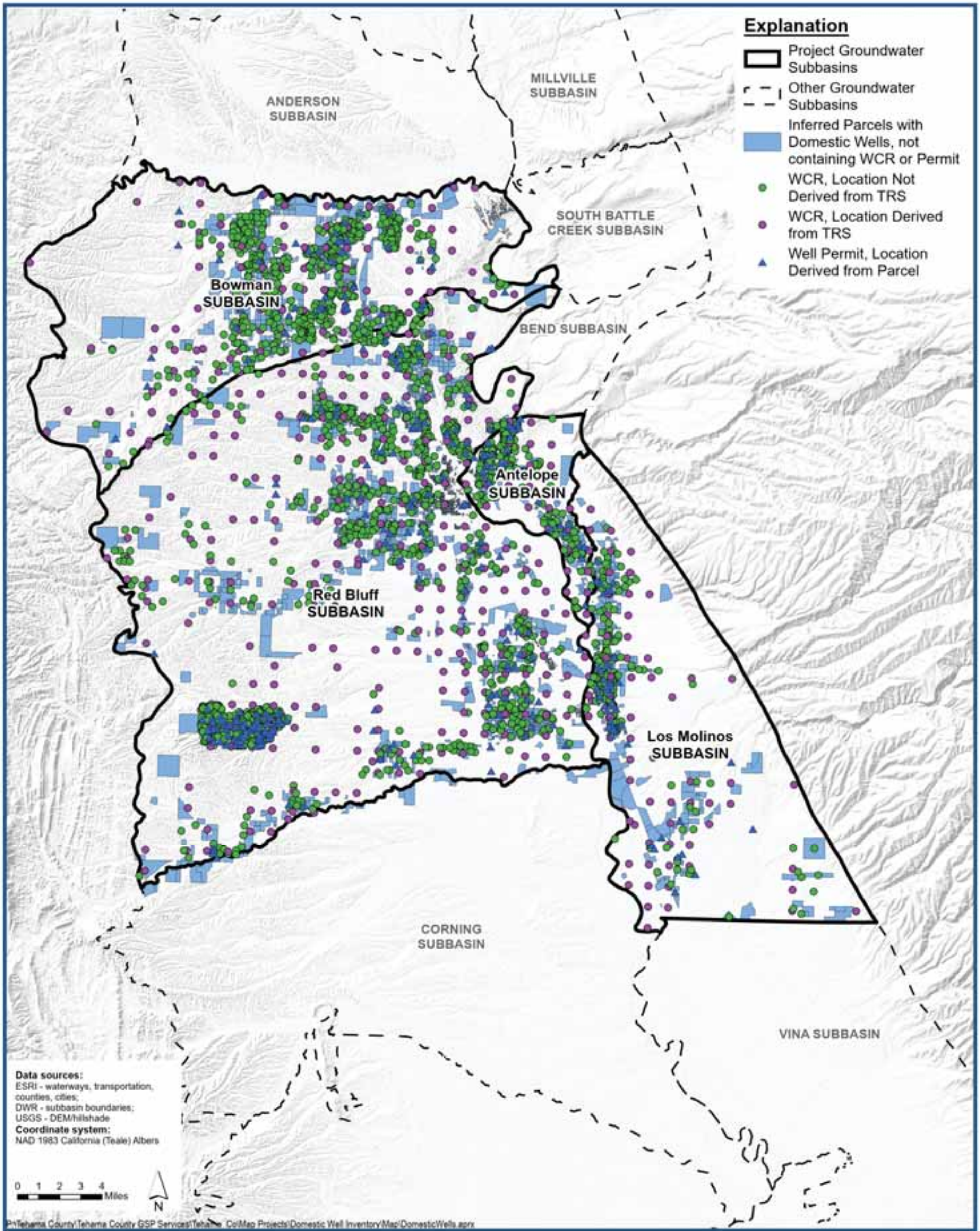
Tehama County, California

Figure 7



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USGS - DEM/hillshade
Coordinate system:
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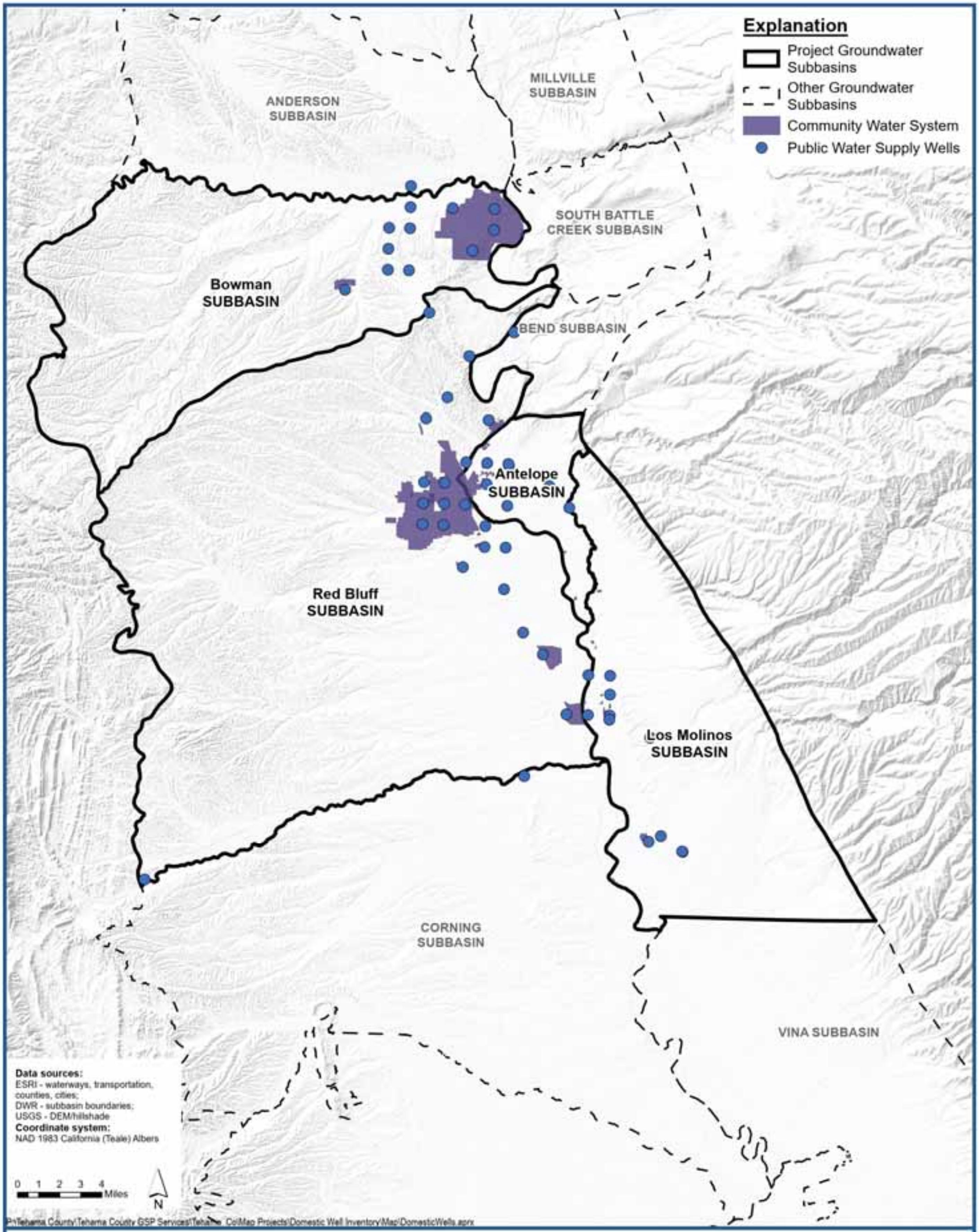
Summary of Known and Inferred Domestic Well Locations
Data from Well Completion Reports, Permits, and Parcels

Figure 8

Tehama County Groundwater Sustainability Plan
Tehama County, California



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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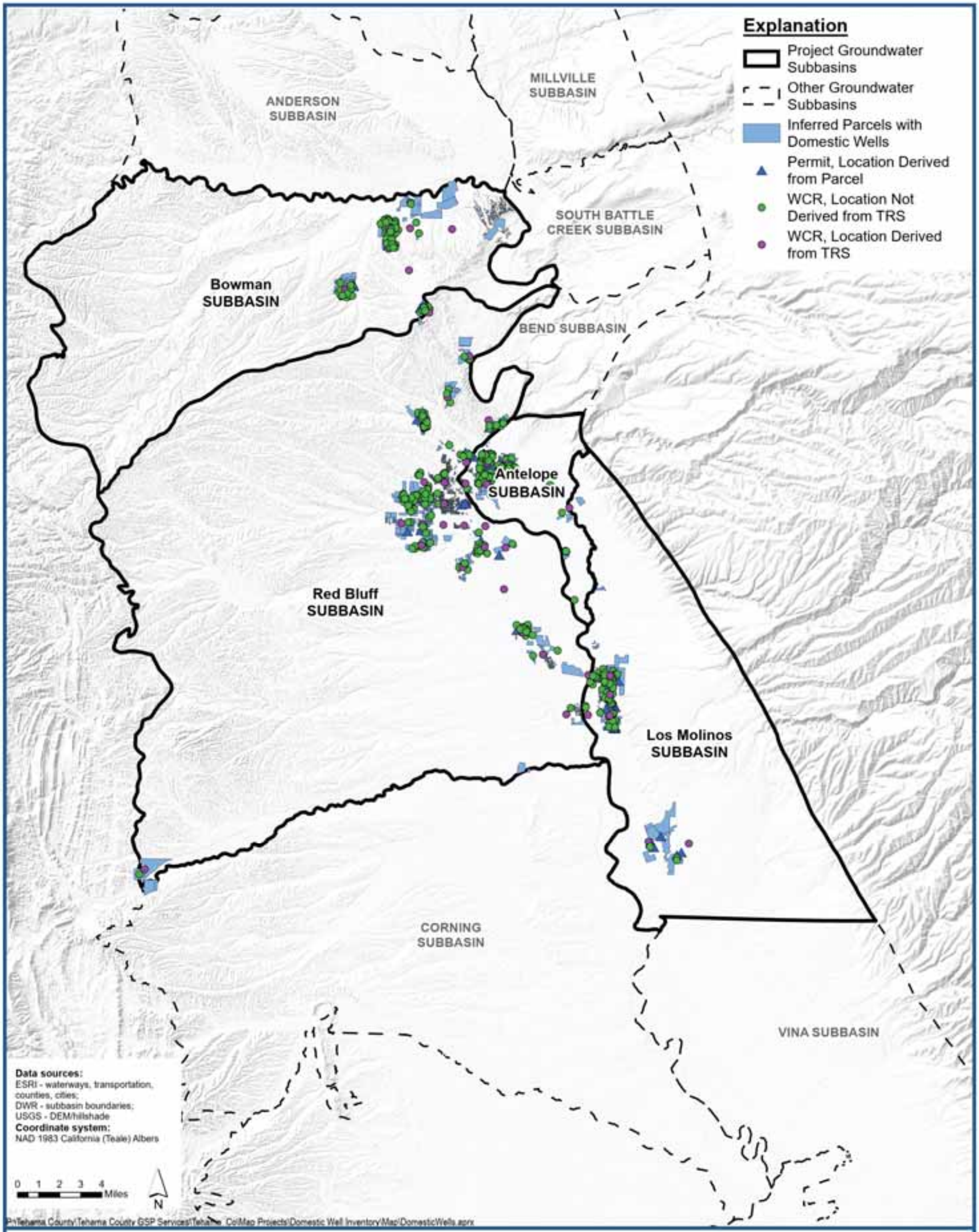
Luhdorff & Scalmanini
Consulting Engineers

Community Water Systems and Public Supply Well Locations

Figure 9a

Tehama County Groundwater Sustainability Plan
Tehama County, California



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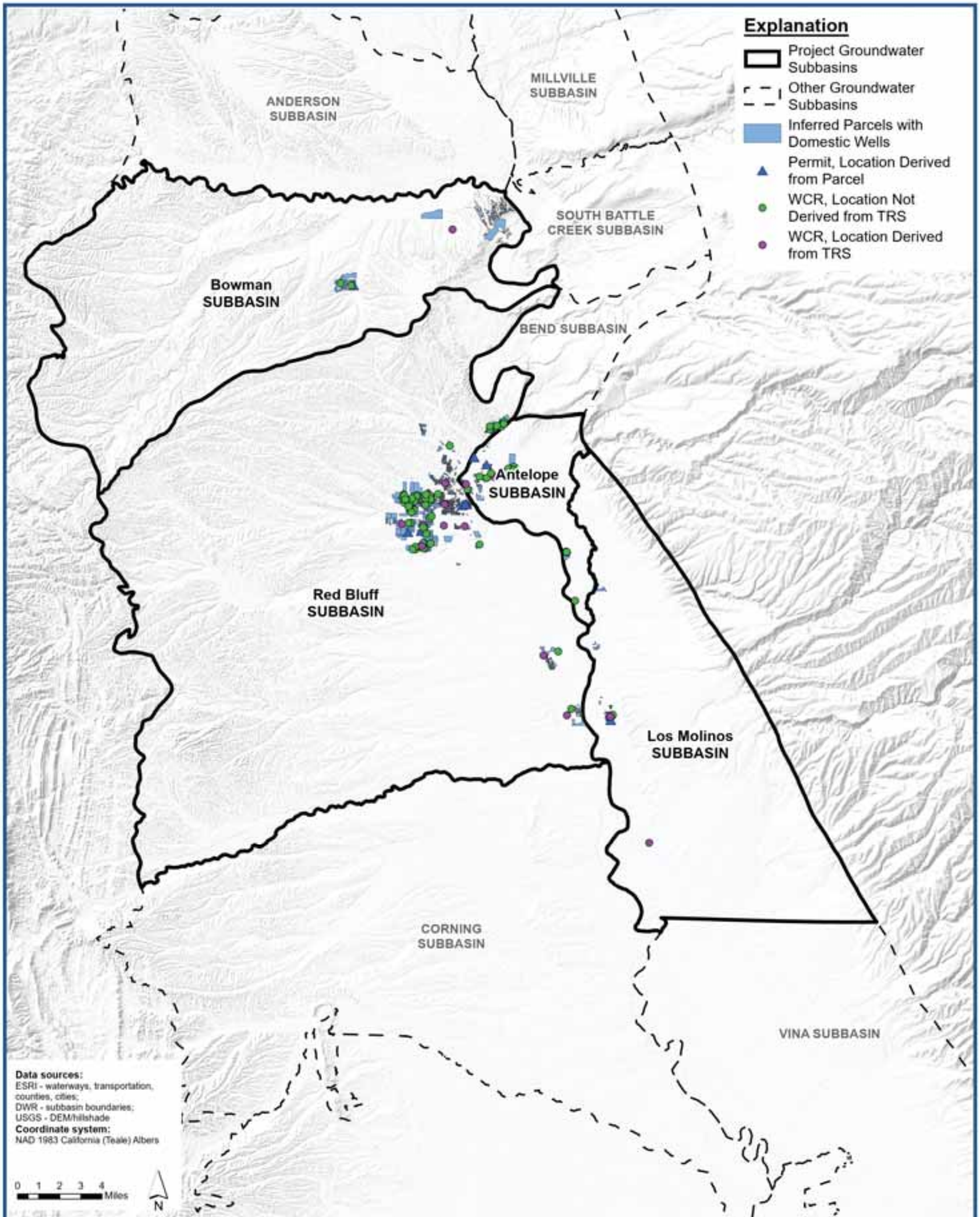
Luhdorff & Scalmanini
Consulting Engineers

Known and Inferred Domestic Well Locations within Community Water Systems or near Public Supply Wells

Figure 9b

Tehama County Groundwater Sustainability Plan
Tehama County, California



Data sources:
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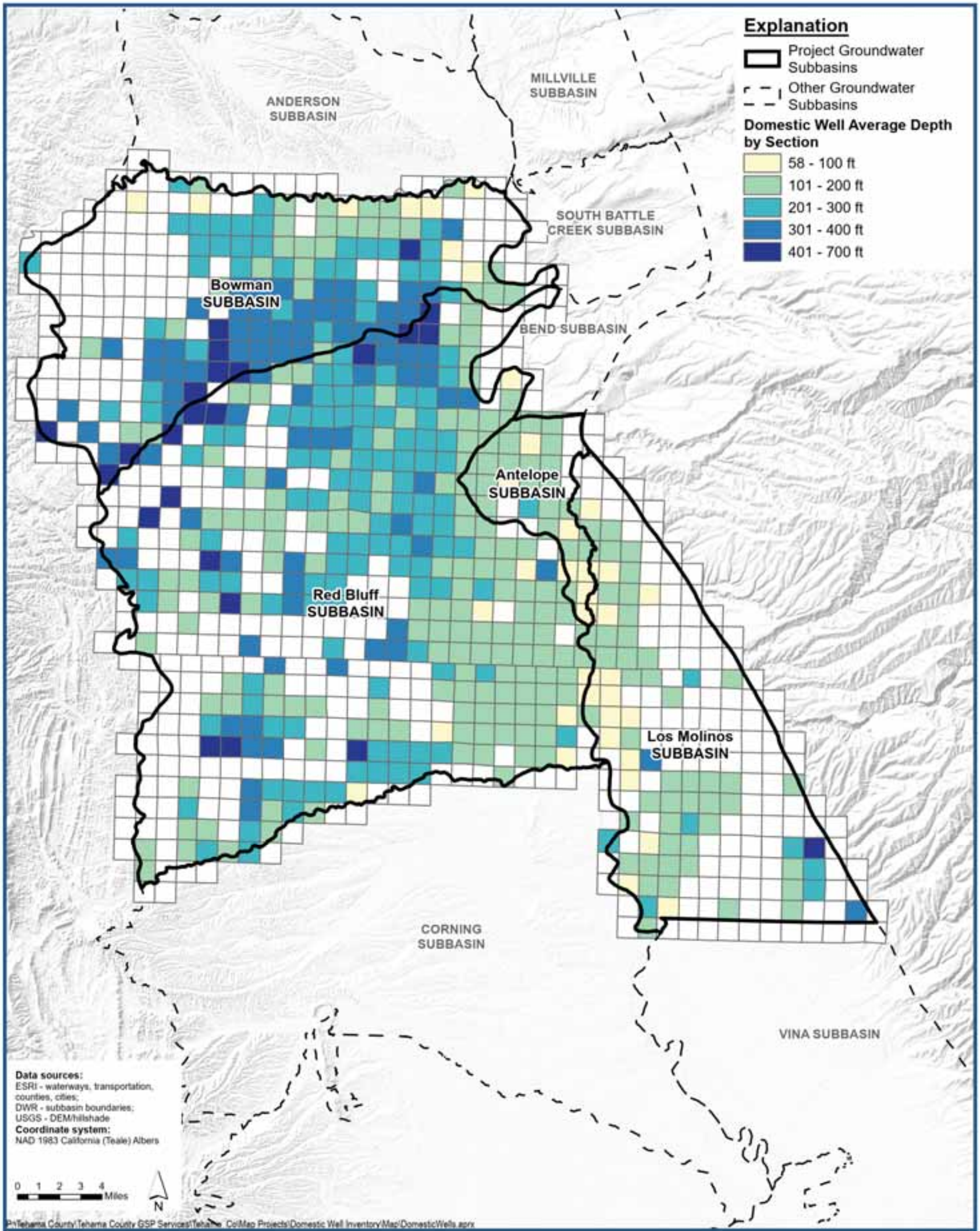
Luhdorff & Scalmanini
Consulting Engineers

Known and Inferred Domestic Well Locations Within Community Water Systems

Figure 9c

Tehama County Groundwater Sustainability Plan
Tehama County, California



Data sources:
ESRI - waterways, transportation, counties, cities;
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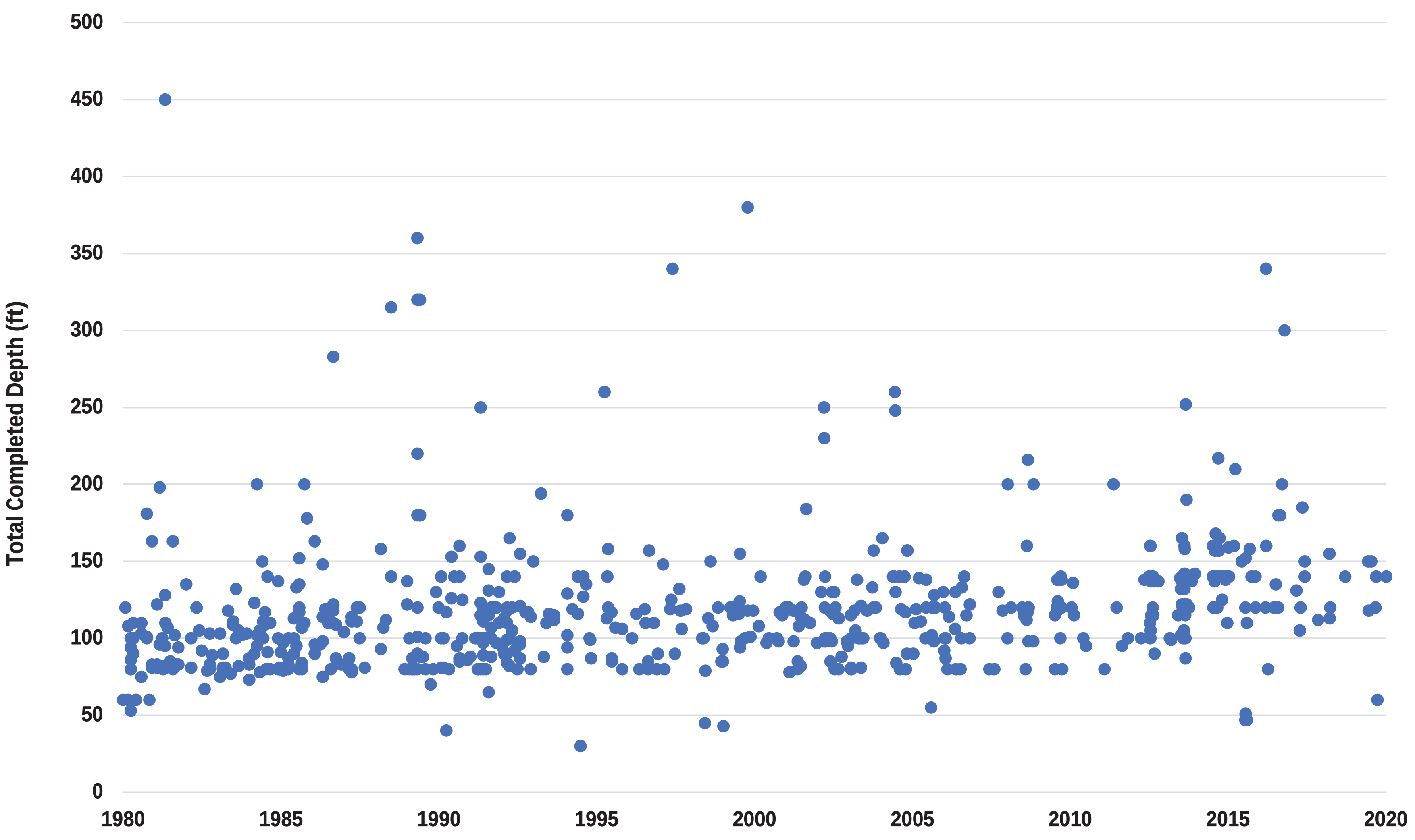
Luhdorff & Scalmanini
Consulting Engineers

Average Domestic Well Depth by Section

Tehama County Groundwater Sustainability Plan
Tehama County, California

Figure 10

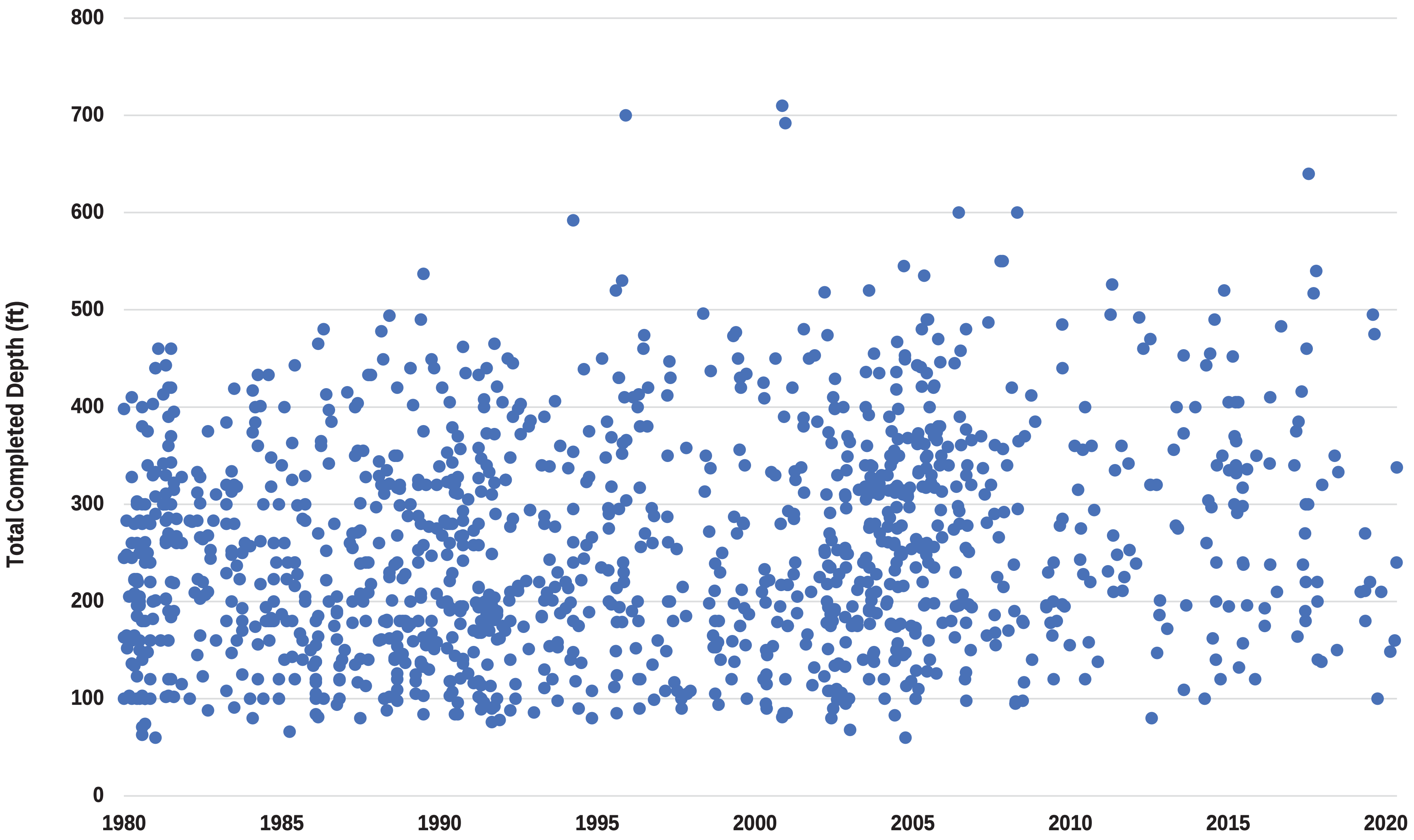


Luhdorff & Scalmanini
Consulting Engineers

Well Depths by Year in Antelope Subbasin
Well Completion Reports from 1980-2020

Tehama County Groundwater Sustainability Plan
Tehama County, California

Figure 11a

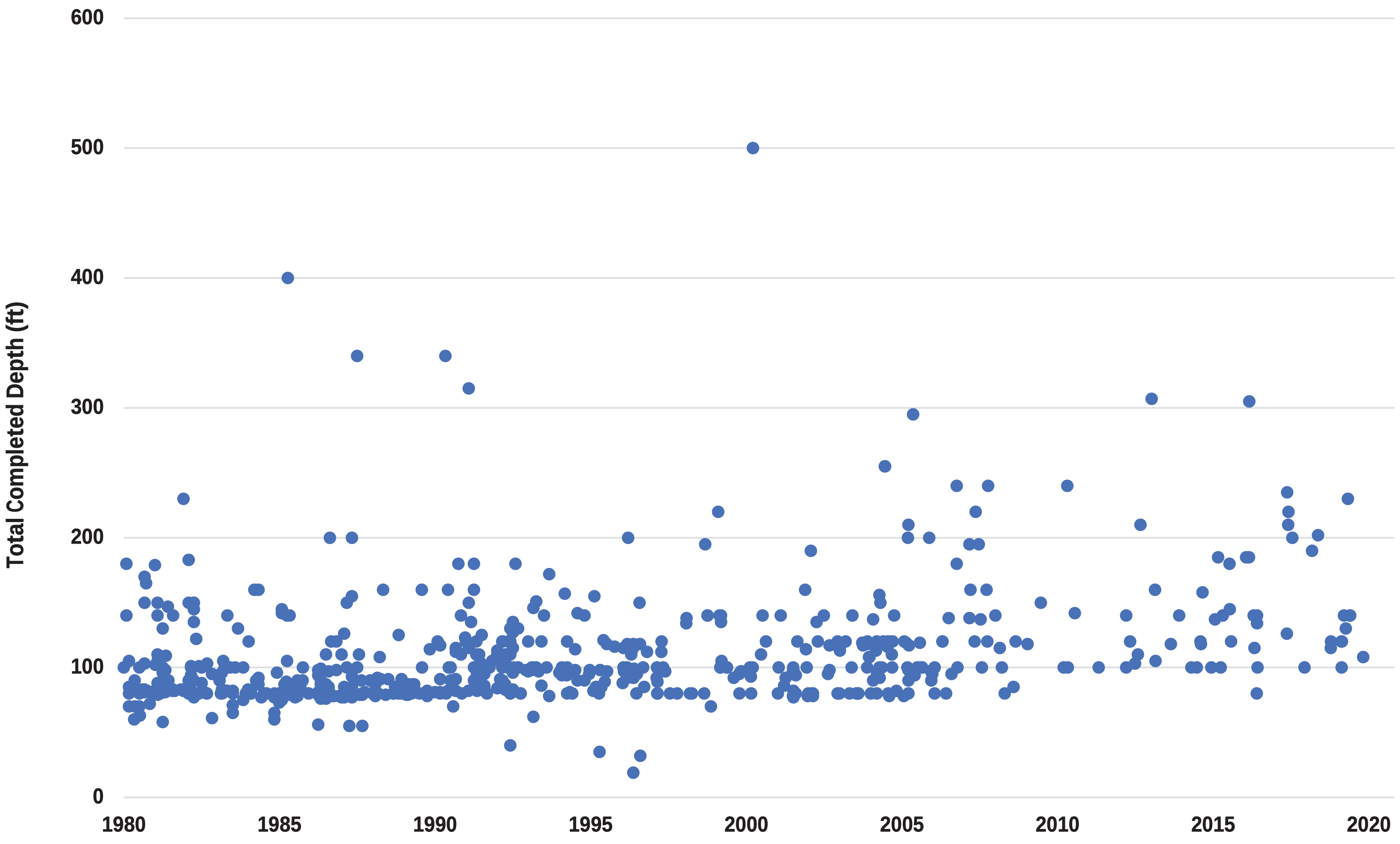


Luhdorff & Scalmanini
Consulting Engineers

Well Depths by Year in Bowman Subbasin
Well Completion Reports from 1980-2020

Tehama County Groundwater Sustainability Plan
Tehama County, California

Figure 11b

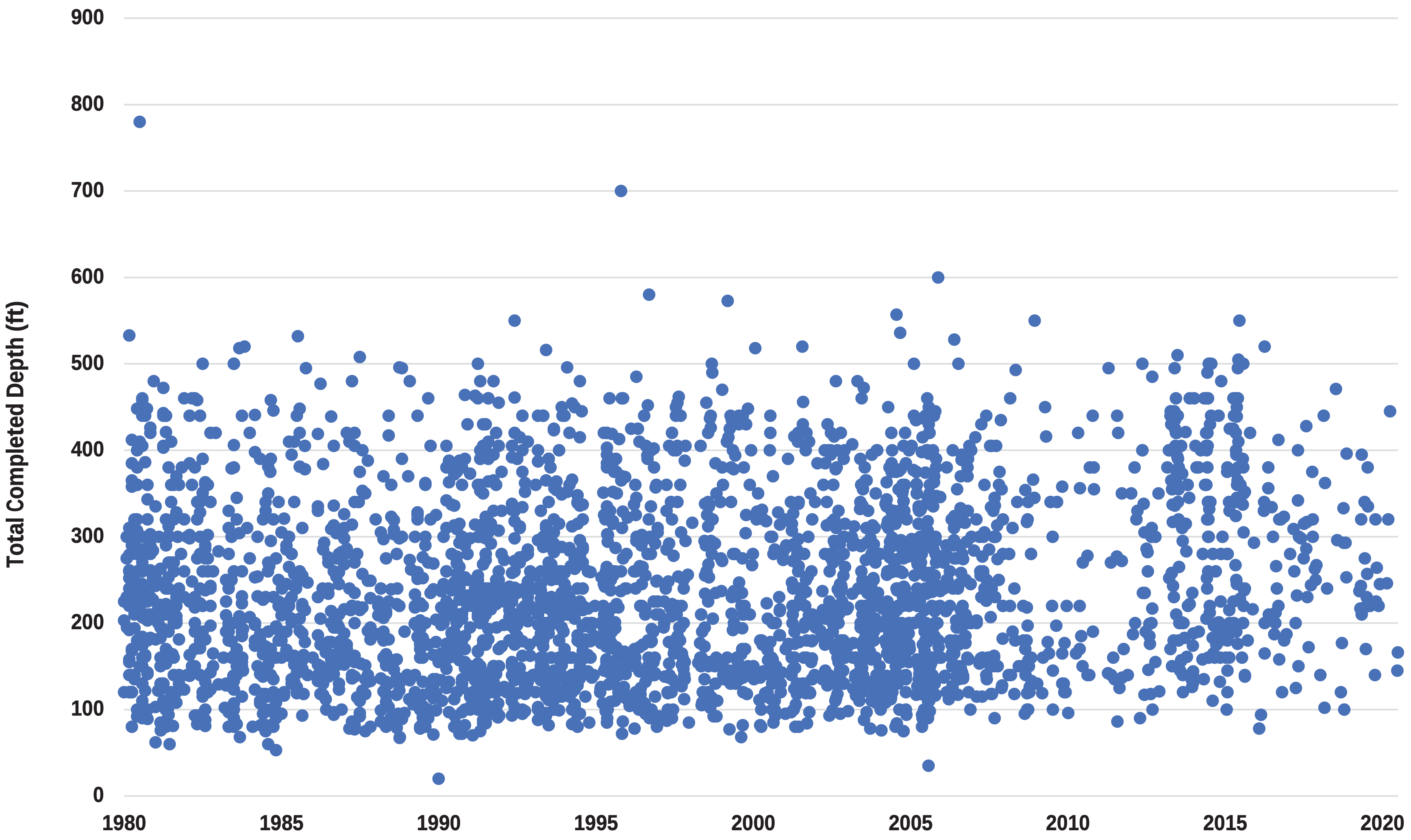


Luhdorff & Scalmanini
Consulting Engineers

Well Depths by Year in Los Molinos Subbasin
Well Completion Reports from 1980-2020

Tehama County Groundwater Sustainability Plan
Tehama County, California

Figure 11c



Luhdorff & Scalmanini
Consulting Engineers

Well Depths by Year in Red Bluff Subbasin
Well Completion Reports from 1980-2020

Tehama County Groundwater Sustainability Plan
Tehama County, California

Figure 11d

APPENDIX 1

List of Land Use Codes Appendix 1. List of Land Use Codes of Parcels with Inferred Domestic Wells

APPENDICES

Appendix 1. List of Land Use Codes of Parcels with Inferred Domestic Wells

010	Single Family Dwellings
011	Condominium Units
013	SFD – Non-Conforming Use
014	SFD w/ Secondary Use
015	Living Unit in Planned Unit Dev
016	Mobile Home
017	SFD w/ Mobile Home
021	One Duplex – One Bldg
022	Two or more SFD on Single Parcel
024	2 MH/more on Single Parcel
031	Single Triplex
032	Three Units
033	Single Fourplex
034	Four Units
041	5-10 Res Units – Single Building
042	5-10 Units (2/more Bldg)
043	11-20 Res Units – Single Bldg
044	11-20 Units (2/more Bldg)
045	21-40 Units
046	41-100 Units
047	Over 100 Units
051	Rural Res – 1 Res
052	Rural Res – 2 or more REs
055	Rural Res – w/ Mobile Home
056	Rural Res – w/MH & Res
057	Rural Res – w/2 or more MH
058	Rural Res – w/Travel Trailer
060	Motels less than 25 Units
061	Motels over 25 Units
063	Over 25 Units
065	Motels over 25 Units w/ Shops
301	Irrig Prune Orchard – w/Res
302	Irrig Prune Orchard – w/MH
303	Irrig Prune Orchard – w/Res & MH
305	Irrig Prune Orchard – w/2 or More Res
306	Irrig Prune Orchard – w/2 or more MH
311	Irrig Walnut Orchard – w/Res
312	Irrig Walnut Orchard – w/MH
313	Irrig Walnut Orchard – w/Res & MH
315	Irrig Walnut Orchard – w/2 or More Res
316	Irrig Walnut Orchard – w/2 or More MH
321	Irrig Almond Orchard – w/Res
322	Irrig Almond Orchard – w/MH
323	Irrig Almond Orchard – w/Res & MH
325	Irrig Almond Orchard – w/2 or More Res
326	Irrig Almond Orchard – w/2 or More MH
331	Irrig Olive Orchard w/Res
332	Irrig Olive Orchard w/MH
333	Irrig Olive Orchard w/Res & MH
335	Irrig Olive Orchard w/2 or more Res

336	Irrig Olive Orchard w/2 or more MH
341	Irrig Misc Orchard w/ Res
342	Irrig Misc Orchard w/MH
343	Irrig Misc Orchard w/Res & MH
346	Irrig Misc Orchard w/ 2 or more MH
351	Irrig Vines & Bush w/Res
352	Irrig Vines & Bush w/MH
361	Irrig Row Crops w/Res
365	Irrig Row Crops w/2 or More Res
371	Irrig Field Crops w/Res
372	Irrig Field Crops w/MH
373	Irrig Field Crops w/Res & MH
375	Irrig Field Crops w/2 or more Res
401	Irrig Pasture w/Res
402	Irrig Pasture w/MH
403	Irrig Pasture w/Res & MH
405	Irrig Pasture w/2 or more Res
408	Irrig Pasture w/2 or more MH
411	Dairies w/Res
413	Dairies w/MH
415	Dairies w/2 or more Res
432	Feed Lots w/ MH
521	Field Crops w/Res
522	Field Crops w/MH
523	Field Crops w/Res & MH
525	Field Crops w/2 or more Res
526	Field Crops w/2 or more MH
531	Pasture w/Res
532	Pasture w/MH
533	Pasture w/Res & MH
535	Pasture w/2 or more Res
536	Pasture w/2 or more MH
551	Specialty Farms w/Res
552	Specialty Farms w/ MH
553	Specialty Farms w/Res & MH
555	Specialty Farms w/2 or more Res
556	Specialty Farms w/2 or more MH

Appendix 2-B

Communication and Engagement Plan

TEHAMA COUNTY FLOOD CONTROL AND WATER
CONSERVATION DISTRICT
GROUNDWATER SUSTAINABILITY AGENCY

STAKEHOLDER COMMUNICATIONS AND ENGAGEMENT PLAN

Sustainable Groundwater Management Act (SGMA) Implementation (2021-2023)

Prepared by the Consensus Building Institute

Version 12.15.2021

Table of Contents

SECTION 1 | DISTRICT-WIDE COMMUNICATION & ENGAGEMENT

SECTION 2 | SUBBASIN COMMUNICATION & ENGAGEMENT

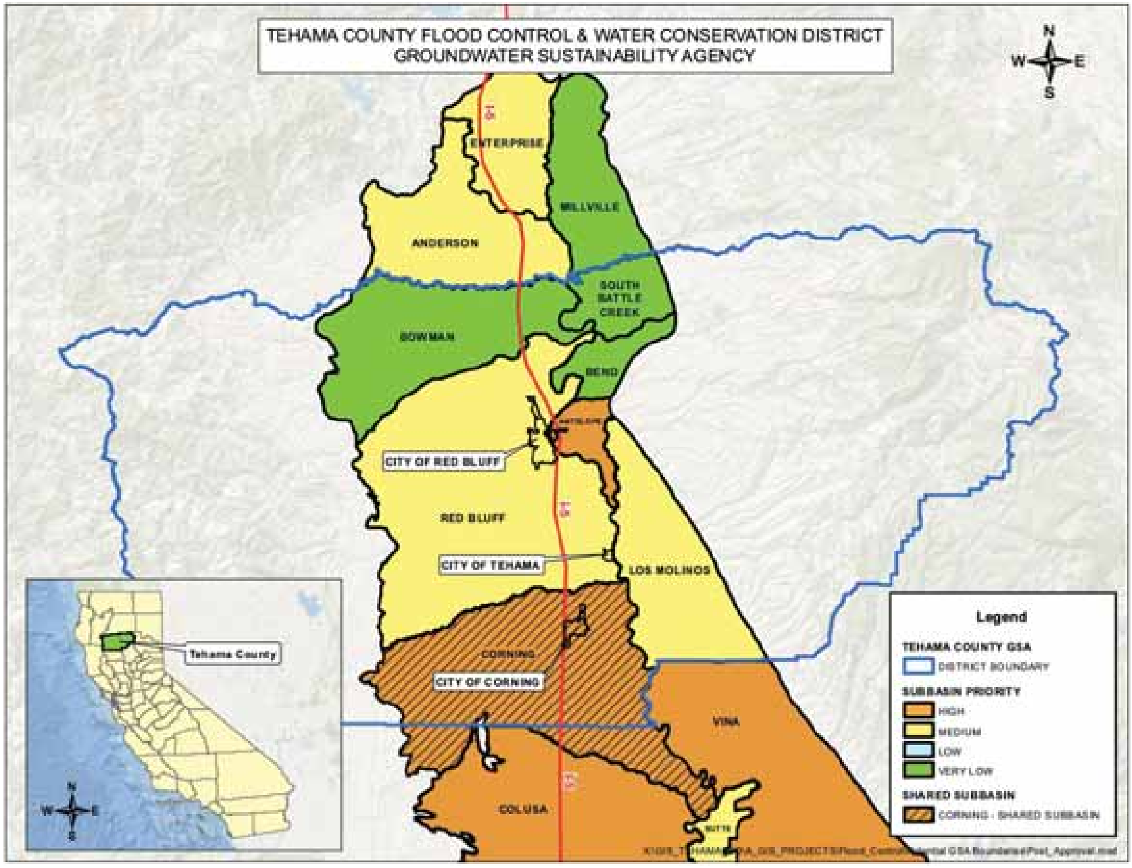
SECTION 3 | APPENDICES

SECTION 1 | DISTRICT-WIDE COMMUNICATION & ENGAGEMENT

Background

The purpose of the Sustainable Groundwater Management Act (SGMA), signed by Governor Brown in 2014, is to ensure local sustainable groundwater management in medium- and high- priority groundwater basins statewide. California's Department of Water Resources (DWR) has determined that, in Tehama County, the Antelope Subbasin is high priority, while Los Molinos and Red Bluff are medium priority; these three subbasins are subject to SGMA. Low to very low priority subbasins in Tehama County are Bowman, South Battle Creek, and Bend, which are not subject to SGMA. The Corning Subbasin (high priority; subject to SGMA) is partially within Tehama County and extends into Glenn County. [Refer to map below.]

SGMA requires that a Groundwater Sustainability Agency (GSA) (which can be a single local water authority or cooperating collection of local authorities) develops and executes a Groundwater Sustainability Plan (GSP) to manage a basin's shared resources. The **Tehama County Flood Control & Water Conservation District** (District)[1] serves as the exclusive GSA within Tehama County. The District is responsible for managing the portions of the seven subbasins located within Tehama County. The



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[1] The Tehama County Flood Control & Water Conservation District was originally established in 1957 by the Tehama County Flood Control and Water Conservation District Act. This Act defined the boundary and territory of the District as: "all that territory of the County of Tehama lying within the exterior boundaries thereof."

District is one of two GSAs coordinating within the Corning Subbasin[2] to develop a single GSP; outreach for this subbasin is being covered under a separate Communications and Engagement Plan. The District is also coordinating with multiple agencies developing GSPs that border the District.

SGMA Milestones

GSA Formation and GSP Development. There is one exclusive GSA in Tehama County – the District. The GSA formed by the state-mandated deadline of June 30, 2017, constituting SGMA's first major milestone. The District operates as the GSA governing all portions of the subbasins within the exterior boundary of Tehama County; and will develop individual GSPs for four subbasins located entirely within the District (Antelope, Los Molinos, Red Bluff, and Bowman[3]). While the four GSPs and this Communication and Engagement Plan are specific to the Red Bluff, Antelope, Los Molinos, and Bowman Subbasins, the District is still responsible for the other remaining subbasins. The Tehama GSA (District) has agreed to coordinate with the Corning Subbasin GSA via a Memorandum of Understanding (MOU) to develop a single GSP for the Corning Subbasin.

GSP Adoption. The second major milestone in SGMA is the adoption of GSPs by January 31, 2022. GSPs are prescribed by SGMA and contain required elements not specified in this Communications & Engagement Plan.

Groundwater Sustainability. The third milestone is achieving sustainability by 2042.

Figure 1. SGMA Milestones

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[2] Information on the Corning Subbasin can be found at CorningSubbasinGSP.org.

[3] Bowman Subbasin changed from a medium priority subbasin to a very low priority subbasin in 2018, and the District was able to secure funding under Proposition 1 to develop a GSP even though it is now a very low priority subbasin. Also, the District sees this as an area that may experience growth in the future and would like to manage the subbasin under a GSP.

Desired Goals and Outcomes of the Plan

Goals

SGMA requires the GSA to consider the interests of beneficial uses and users of groundwater, and encourages involvement of diverse social, cultural, and economic elements of the population within the subbasins during preparation and implementation of GSPs (Water Code Sections 10723.8(a)(4) and 10723.2).

The goals of the Stakeholder Communications & Engagement Plan are to:

1. Enhance understanding and inform the public about water and groundwater resources in the District subbasins, the purpose and need for sustainable groundwater management, the benefits of sustainable groundwater management, and the need for the GSPs.
2. Engage a diverse group of interested parties and stakeholders and promote informed feedback from stakeholders, the community, and groundwater-dependent users throughout the preparation and implementation process of the GSPs.
3. Coordinate communication and involvement between the subbasins and other local agencies, elected and appointed officials, and the general public.
4. Utilize the District Board and Groundwater Commission meetings to facilitate a public engagement process.
5. Employ a variety of outreach methods that make public participation accessible and that encourages broad participation.
6. Respond to public concerns and provide accurate and up-to-date information.
7. Manage communications and engagement in a manner that provides maximum value to the public and constitutes an efficient use of the GSA's resources.

Outcomes

The desired outcome of this Communication & Engagement Plan is to achieve understanding and support for adoption of the GSPs and implementation in consideration of the people, economy, and environment within the subbasins and in coordination with adjacent subbasins.

In practical terms, the GSP regulations require a communications section of the GSP that must include the following:

- Explanation of the GSA's decision-making process.
- Identification of opportunities for public engagement and involvement.
- Description of GSA's encouragement of active involvement of diverse elements of the population within each basin.
- Methods the GSA shall follow to inform the public about GSP progress.

This Communication & Engagement Plan forms the basis for the communications section of the GSPs.

Time Period

The Communication & Engagement Plan is intended to cover communications and engagement for August 2021 through December 2023.

In late September, the District will release the Draft GSPs (Bowman, Red Bluff, Antelope and Los Molinos subbasins) publicly for at least 45 days for public review and comment (public comment period expected: September 24 – November 19).

As required and planned, before the end of December 2021, the GSA will hold a formal public hearing on the Draft GSPs and then consider adopting the GSPs for submittal to the California Department of Water Resources in January 2022 as the law requires.

This Communication & Engagement Plan will also support the first two years of implementation. Since this is a multi-year effort, the key activities needed to achieve these goals will likely be broken down into annual work plans, and may be amended, as needed.

Refer to Table 1 for a summary of engagement progress to date and Appendix A and Appendix B for examples of outreach resources and coordination.

Interested Parties and Other Stakeholders

SGMA identifies interested parties that the GSA must consider when developing and implementing the GSPs, including:

- Agricultural users of water
- Domestic well owners
- Municipal well operators
- Public water systems
- Land use planning agencies
- Environmental users of groundwater
- Surface water users
- The federal government
- California Native American Tribes (see **Appendix C** for Tribal Outreach Guidance Document)
- Disadvantaged communities (including those served by private domestic wells or small community water systems) (see **Appendix D** for DAC Guidance Document)

Outreach Roles

[Refer to the District's GSA governance structure][4]

The **District Board** of Directors (District Board) are elected officials and serve as the GSA Governing Body that has final approval authority for the GSPs and GSA. The District's five Board Members are comprised of the five County Board of Supervisors, which allows for additional collaboration within subbasins. In regard to outreach, the District Board is responsible for:

- Adopting and overseeing implementation of the Communication & Engagement Plan.
- Entering into MOUs with other public agencies to codify agency-to-agency engagement activities for the development and implementation of GSPs.

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[4] http://www.tehamacountypublicworks.ca.gov/flood/sgma/governanace%20structure.pdf

- Considering the recommendations of the Groundwater Commission.
- Receiving public comments made verbally and in writing.

The **Groundwater Commission** is comprised of eleven (11) members representing the three incorporated Cities within Tehama County, private pumpers, and surface water agencies or districts.

Groundwater Commission Representation:
(1) City of Corning
(1) City of Red Bluff
(1) City of Tehama,
(1) El Camino Irrigation District
(1) Los Molinos Community Services District
(1) Rio Alto Water District
(5) County Supervisorial District representatives (one representative per district)

In regard to outreach, the Groundwater Commission is responsible for:

- Developing and implementing, with oversight from the District Board of Directors, the Communication & Engagement Plan.
- Receiving public comments made verbally and in writing.
- Considering and incorporating public and key stakeholder input during GSPs' development/implementation and making recommendations to the District Board.
- Offering the public an opportunity to be educated and to participate in the GSPs' development/implementation process through the Groundwater Commission meetings.

The District Board and Groundwater Commission are committed to keeping the **public informed**, providing the public with **balanced and objective information** to assist the public in understanding SGMA and **creating an open process** for public involvement on the development and implementation of GSPs.

Communications & Engagement for GSP Elements

To truly engage the public in development and implementation of GSPs that are science-based, complex, technical, and include achievable outcomes, the GSA will strive to meet these overall objectives:

- Educate the public in meaningful ways. Communicate what may often be complex concepts in straightforward, comprehensible ways.
- Offer the public and stakeholders a meaningful way to participate during the GSPs' development, adoption, and implementation process.
- Encourage members of the public and stakeholders to share historic data and to also help collect data to gain an improved understanding of the subbasins.
- To facilitate improved coordination amongst the seven subbasins within Tehama County, along with neighboring GSAs.
- Show how input received has been considered and incorporated as appropriate into the GSPs or planning process.
- Remain focused on results.

The GSA carried out community engagement activities during development of the GSPs. The GSPs were prepared iteratively and in a logical progression, building on previously developed technical and policy information. Throughout the process of preparing the GSPs, background materials along with draft text, figures and tables for each section were provided to the public, including other interested parties, in advance of meetings for input and comment. Received input were then incorporated as appropriate into the Draft GSPs. Draft GSPs will be available for public review and comment in Fall 2021; public workshops will be held during the public comment period. The GSA will hold a formal public hearing and consider adopting the GSPs in December 2021 for a January 2022 submittal.

Implementing the GSPs will begin at the end of January 2022. Implementation will involve advancing projects, establish funding mechanisms, addressing data gaps, monitoring, and developing additional needed projects as part of adaptive management. The GSA will need to prepare annual reports and five-year updates to demonstrate progress toward sustainability. Public outreach will inform each of these activities.

Communication & Engagement Forum

Public Meetings/Hearing

Public meetings or hearings are formal opportunities for people to provide official comments on programs, plans and proposals. The District Board of Directors meetings and the Groundwater Commission meetings[5] constitute regular public meetings that will be noticed and conducted in accordance with the Ralph M. Brown Act. SGMA requires that a public meeting be held prior to the adoption of a fee and that public hearings are held for the adoption of GSP elements and the final GSPs. There are also constitutional requirements for public hearings for some fee/rate options. Public meetings and hearings are an important forum for people to share viewpoints and concerns, but often occur at the end of a process, when only one option is under consideration. The GSA will hold required public meetings and hearings but will also use less formal public workshops to solicit feedback and information early in the process.

Stakeholder Briefings

Groundwater Commission members will meet with and communicate regularly with organizations comprised of the stakeholder groups they represent. District staff will be available to assist with presenting any information upon request.

Public Workshops

Public educational workshops provide less formal opportunities for people to learn about groundwater, SGMA, and GSP elements. Workshops can be organized in a variety of ways, including open houses, “stations” where people can ask questions one-on-one, and traditional presentations with facilitated question and answer sessions. In order to solicit feedback from people who may not be comfortable speaking in public, workshops can include small group breakout discussions, comment cards and other techniques. Whatever format is used, workshops will be designed to maximize opportunities for public input.

Public Notices

Public notices, often required by law, aim to notify agencies and the public about activities that may affect the public. As outlined in this Communications and Engagement Plan, the GSA will sponsor a variety of opportunities for people to participate in the development and implementation of the GSPs, including workshops, public hearings, providing comments at District Board meetings and Groundwater

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[5] Visit www.tehamacountywater.ca.gov for meeting information.

Commission meetings and through written comments. And, the GSA will comply with public noticing requirements.

Prior to adoption of or amendment(s) to GSPs, SGMA requires that GSA:

- Provides notice to cities and counties within Plan area
- Considers comments provided by the cities and counties
- Accommodates requests for consultation received from the cities and counties within 30 days
- No sooner than 90 days following public notice, holds public hearings

In addition, when a GSA considers any fees to support the work of sustainability, the GSA will provide public notice and other engagement activities.

Communication & Engagement Tools

The GSA will use a variety of communications and engagement tools to keep the public informed, including the following.

Interested Parties List

SGMA mandates the creation of an interested parties list. SGMA does not specify the type of list (email versus hard copy). The first preference is an email list, to get information out quickly and to reduce costs. A secondary list may be developed for people who don't use email. District Board of Directors and Groundwater Commissioners (and the agencies they represent) and District staff can contribute names of organizations, agencies, and individuals to the list. Individuals may also contact the GSA to be added to the interested parties list via the District website and public meetings or workshops.

The list is broad and includes anyone who would like to stay informed about SGMA activities and anyone the District Board and Groundwater Commission think should be informed about the SGMA process and the outcomes of the planning / management effort. The Groundwater Commission will coordinate the distribution of periodic updates to the interested parties list. This list will also be used for dissemination of information about public workshops, public meetings, etc. Additionally, interested parties can sign up to receive noticed agendas for the District Board meetings and Groundwater Commission meetings.

Informational Materials

Developing a variety of informational materials is critical to successful education and necessary to circulate consistent, accurate information. The District Board with input from the Groundwater Commission may develop / update a range of materials, which may include:

- **Talking Points:** Clear, concise messages that can be used by District Board and Groundwater Commission when communicating with stakeholders, organizations, and the media.
- **Fact Sheets:** For initiating the GSPs and /or implementing elements of the GSPs.
- **Periodic Updates:** As stated above, the District staff with assistance from their consultants will coordinate on the distribution of periodic updates that can then be used by the District Board, Groundwater Commission, and participating agencies for distribution to the groups and organizations they represent using existing communications tools, such as websites, newsletters, social media, list serves, utility bills, etc.

- **Newspaper public service announcements & editorials:** The District staff, with assistance from their consultants will coordinate on information and updates for submittal to local news sources.
- **Briefing Packets:** For milestone briefings to the public and stakeholders, briefing packets may be developed. Packets may include standard talking points, and other materials to assist in educational outreach and for soliciting feedback.

Website

www.tehamacountywater.org

The District website is a tool for distributing and archiving meeting and communication materials as well as a repository for any studies, informative, and educational materials. District staff coordinates to ensure that the website is updated on a consistent basis to ensure up to date, timely information. The website includes, but is not limited to, the following information:

- Home page: example content may include an overview, calendar of meetings and events, highlighted topics, etc.
- Groundwater basics, SGMA background including links to existing sources of relevant information
- Subbasin-specific information
- District Board information: members, agendas, and meeting materials
- Groundwater Commission information: members, agendas, and meeting materials

Mailings Utility Bill Notifications

District staff may coordinate with participating agencies to utilize postcards and include updates and relevant SGMA implementation information in utility bills.

Social Media

Existing Facebook, Twitter, and other emerging social media technologies may be leveraged to provide updates on milestone progress to interested parties.

Surveys

Online tools may be used periodically to gather stakeholder ideas and to provide feedback on key issues.

Media Plan

District staff will develop press releases and Public Service Announcements (if appropriate) at each milestone and for meetings and workshops. The press releases will be distributed to local and regional media and elected officials. See **Appendix E** for a media contact list that will be updated on a periodic basis.

Outreach Partners

In addition to the communication tools listed above, other organizations can also partner to assist the GSA reach its communications and engagement goals including, but not limited to:

Countywide

- ✓ Northern Sacramento Valley (NSV) Integrated Regional Water Management (IRWM) group
- ✓ Shasta-Tehama Watershed Education Coalition

- ✓ Tehama County Farm Bureau
- ✓ Resource Conservation District of Tehama County
- ✓ Rural Community Associates Corporation
- ✓ UC Cooperative Extension
- ✓ Tehama County Cattleman’s Association
- ✓ Tehama County Cattlewomen’s Association

Subbasin-Specific

Antelope

- ✓ City of Red Bluff

Los Molinos

- ✓ Los Molinos Mutual Water Company
- ✓ Los Molinos Community Services District
- ✓ Stanford Vina Ranch Irrigation Company
- ✓ Deer Creek Irrigation District
- ✓ Los Molinos Chamber of Commerce

Red Bluff

- ✓ Tehama Colusa Canal Authority
- ✓ Proberta Water District
- ✓ Rawson Water District
- ✓ Elder Creek Water District
- ✓ Gerber-Las Flores CSD
- ✓ Thomes Creek Irrigation District
- ✓ Rancho Tehama Association
- ✓ El Camino Irrigation District
- ✓ City of Red Bluff
- ✓ City of Tehama
- ✓ HOAs (e.g., Surrey Village)

Bowman

- ✓ Anderson-Cottonwood Irrigation District
- ✓ Lake California Property Owners Association
- ✓ Rio Alto Water District
- ✓ Large ranches (e.g., Bengard Ranch)

Intra-Basin and Inter-Basin Coordination

The term “**basin**” under SGMA refers to a groundwater basin, or subbasin, identified and defined under the groundwater inventory Bulletin 118, which is produced by the California Department of Water Resources (DWR) (California Water Code Section 10721). Coordination within (intra-basin) and across (inter-basin) basin/subbasin boundaries is important to coordinate management actions and share information.

- **Intra-basin coordination** – coordination between two or more GSAs with jurisdiction within the same basin/subbasin (as is the case within the Corning Subbasin).
- **Inter-basin coordination** – coordination across basin/subbasin boundaries.

Intra-Basin Coordination

The Corning Subbasin GSA has jurisdiction for the portion of the Corning Subbasin overlying Glenn County. The District works with the Corning Subbasin GSA to develop and implement a single GSP for the Corning Subbasin. The primary venue for their collaboration will occur at the Corning Subbasin Advisory Board (CSAB) meetings, which are a Brown Act compliant venue for collaboration on the GSP.

Inter-Basin Coordination

Subbasins within Tehama County boundaries. Inter-basin coordination across the subbasins within Tehama County is facilitated by the District serving as the single GSA for these subbasins. For instance, regularly occurring District Board and Groundwater Commission meetings provides a standard and open forum for sharing information with all subbasins within the County.

Subbasins outside of Tehama County boundaries. While inter-basin agreements are optional under SGMA, the District intends to coordinate with adjacent GSAs to share technical information and to ensure that the implementation of the GSPs in adjacent basins are compatible and will not cause any adverse effects in the District subbasins or any other adjacent basins.

Regional coordination. GSAs in the Northern Sacramento Valley (NSV) are building on the 10+ years of NSV Integrated Regional Water Management (IRWM) collaboration. GSA representatives from the Vina, Butte, Wyandotte Creek, Corning, Colusa, Bowman, Red Bluff, Antelope and Los Molinos subbasins are meeting to consider how to share information and strategically coordinate regional water management.

Refer to the table below for subbasins within the NSV as well as **Appendix B** on NSV Inter-basin coordination.

Basin Coordination Summary

Coordination	Subbasin	SGMA Priority	GSA(s)	County(ies)	Nearest Tehama County Subbasins
Inter-basin	Anderson	Medium	Enterprise Anderson	Shasta	Bowman
Intra-basin & Regional	Corning	High	Tehama County FCWCD; Corning Subbasin GSA	Glenn; Tehama	Corning portion within County; Red Bluff
Inter-basin & Regional	Colusa	High	Glenn Groundwater Authority; Colusa Groundwater Authority	Glenn; Colusa; Yolo	Corning
Inter-basin & Regional	Vina	High	Vina; Rock Creek Reclamation District	Butte	Corning; Los Molinos
Regional	Butte	Medium	Butte County Dept of Water and Resource Conservation	Butte	Corning; Los Molinos
Regional	Wyandotte Creek	Medium	Wyandotte Creek	Butte	Corning; Los Molinos

Evaluation and Assessment

Any communication strategy should include opportunities to check in at various points during implementation to ensure that it is meeting the communication and engagement goals and complying with SGMA. These check-ins should occur at least on an annual basis.

Table 1. Summary of Engagement Opportunities, Milestones, and Progress to Date

Timeframe	Milestone or Stage	Required Community Engagement Under SGMA	Communication Strategies	Status (as of August 2021)
Pre-SGMA (before 2015)	Voluntary groundwater management efforts (IRWM and AB3030)	N/A	Volunteer collaboratives and advisory committees engage subject-matter experts and stakeholders	• NSV IRWM group and AB 3030 Technical Advisory Committee (TAC) • Outreach for AB 3030 Groundwater Management Plan (1996 and 2012 update)
GSA Formation (2015-2017)	During GSA governance development	Notice of Intent (NOI) of GSA Formation	• Provide notice of GSA outreach resources: website, email listserv, calendar of District Board and Groundwater Commission meetings • Develop and continue to update list of interested parties	• District Board public meetings on GSA formation • NOI for the District to be the GSA (11/4/15) • Groundwater Commission established (6/7/16) • Website and initial interested parties list established
Shortly after GSA formation	After identification of outreach responsibilities among GSA entities	Notification of GSA formation	• District Board and Groundwater Commission meetings • Email notices and updates Newspaper notice of public workshop(s)	
Before GSP Planning Activities	Prior to beginning GSP development	Provide to the public and State, notice of intent to begin GSP planning and description of opportunities for interested parties to participate in GSP development and implementation	• Public workshop(s) • District Board and Groundwater Commission meetings • Email notices and updates • Newspaper notice of public workshop(s)	• NOI for development of GSPs submitted to DWR on 6/27/18 (Bowman, Antelope, Los Molinos, and Red Bluff) and 9/19/18 (Corning)
Between Notice of GSP Planning and January 31, 2022	During GSP development	Public workshops, public meetings, District Board meetings, Groundwater Commission meetings and other opportunities providing stakeholder avenues to participate in GSP development	• Public workshops and/or public meetings on GSP development. • District Board and Groundwater Commission meetings • Email notice of public workshops / meetings • Newspaper notices of public workshops / meetings • Updates and information on GSP development at standing meetings • Disseminate updates via interested parties list, websites social media, outreach partners	• Convened Groundwater Commission Ad Hoc committees • Developed and implemented Stakeholder Communication & Engagement Plan • Professional facilitation services to support outreach and engagement • Developed/updated resources (e.g., new website, factsheet, etc.) • Emailed interested parties list with public meeting notices; notifications when draft GSP chapters were available for comment, and the quarterly eNewsletter.

Timeframe	Milestone or Stage	Required Community Engagement Under SGMA	Communication Strategies	Status (as of August 2021)
				• Regular updates to NSV IRWM TAC and Board, NCWA Groundwater Management Task Force • Groundwater Commissioner briefings to their agencies. • Public meetings Oct and Dec 2020; April, August, September, October, and November 2021
	During GSP development	Active involvement of diverse social, cultural, and economic elements of the population within the subbasins	• Provide email notices and updates • Update website regularly • Convene regular District Board and Groundwater Commission meetings • Identify and communicate opportunities for public engagement on GSP development, (providing clear messages that GSA retains legal responsibility for final GSA and GSP related decisions) • Develop consistent, coordinated messages and talking points • Arrange for technical support to stakeholder groups through presentations or workshops conducted by GSA representatives/staff • Develop content appropriate to the audience and their interests, ensuring information can be easily understood • Conduct legislative briefings at strategic milestones (and any other groups upon request) • Utilize updated interested party stakeholder list, GSA listservs delivered via email and/or U.S. Mail, outreach partners mechanisms for communications and other media outlets such as newspaper and radio to provide notices • Strategically engage local, special SGMA identified groups • Utilize local channels and meetings to identify and communicate opportunities for public engagement and/or public comment during meetings on GSP development • Leverage and support local agencies and community organizations in disseminating information and engaging stakeholders, including through existing community meetings, newsletters, websites, and social media • Organize public meetings around concrete impacts to specific stakeholders • Develop additional, locally-targeted communication strategies to engage difficult-to-reach communities and community members	In addition to the activities listed above: • Briefings upon request (e.g., County Farm Bureau, STWEC Board, Tehama County Tea Party, Board of Supervisor District 2 Town Halls, etc.) • Informal briefing with the Paskenta Tribe (4/6/21) • Online survey focused on domestic well owners • Online survey eliciting ideas for projects and management actions • Framework for receiving public comments on the Draft GSPs via online survey, standard mail, and direct emails

Timeframe	Milestone or Stage	Required Community Engagement Under SGMA	Communication Strategies	Status (as of August 2021)
GSP Adoption or Amendment (initial GSP adoption no later than 1/31/22)	Prior to GSP adoption or amendment	• Provide notice to cities and counties within Plan area • Consider comments provided by the cities and counties • Accommodate requests for consultation received from the cities and counties within 30 days	SEE ABOVE	• Notices sent to cities with the Plan areas in August 2021(See example)
	Prior to GSP adoption or amendment	No sooner than 90 days following public notice, hold public hearing/ public workshop	SEE ABOVE	District Board Public Hearing to consider adopting the final GSPs – Dec 20, 2021

SECTION 2 | SUBBASIN COMMUNICATION & ENGAGEMENT

As previously stated, the GSA must identify and consider stakeholders interests when developing and implementing the GSP, including:

- Agricultural users of water
- Domestic well owners
- Municipal well operators
- Public water systems
- Land use planning agencies
- Environmental users of groundwater
- Surface water users
- The federal government
- California Native American Tribes
- Disadvantaged communities

This section identifies stakeholder groups (both county-wide and subbasin-specific) and the associated anticipated level of engagement. It is not an exhaustive list, but provide sufficient detail to guide more meaningful focused outreach and engagement. The list is also intended to be updated periodically or as needed.

Table 2. Tehama Stakeholder Group Interests & Purpose of Engagement

Category of Interest	District-Wide	Antelope	Los Molinos	Red Bluff	Bowman	Anticipated Level of Engagement
General Public • Citizens groups • Community leaders • Interested individual • Universities/Academia	• Interested Individuals on Interested Parties List maintained by GSA • Tehama County School District[6] • Latino Outreach of Tehama County • University of California Cooperative Extension • Board of Supervisors • Shasta College • Red Bluff-Tehama County Chamber of Commerce	• Red Bluff City Council • Schools (Antelope Elementary School District	• Chamber of Commerce • Lassen View Elementary • Los Molinos Unified School District	• Rancho Tehama Association • City of Tehama • City of Red Bluff • Rancho Tehama Elementary School • Schools (Gerber Union Elementary)Red Bluff Joint Union High School District • Antelope Elementary School District	• Lake California Property Owners Association • Evergreen Union School District • Sunset Hills development	Inform to improve public awareness of sustainable groundwater management
Land Use • Municipalities • Local land use agencies • Regional land use agencies • Community Service Districts	• Tehama County Planning Department • Tehama County Environmental Health • Tehama County Agricultural Department	• City of Red Bluff • Golden Meadows CSD • Tehama County Fairgrounds	• Los Molinos CSD	• City of Red Bluff • City of Tehama • Gerber Las Flores CSD • Paskenta CSD (outside of subbasin) • Reeds Creek CSD	• [County]	Consult and involve to ensure land use policies are supporting GSP and there are no conflicting policies between the GSPs and local government agencies
Urban/ Commercial & Non-Commercial Agricultural Users • Water agencies • Irrigation districts • Municipal water companies • Mutual water companies • Resource	• Farm Bureau • Cattlemen's Association • Cattlewomen's Association • County Agricultural Commissioner • University of California Cooperative Extension • Resource Conservation District	• Rio Ranch Estates CSD • Los Molinos Mutual Water Company • City of Red Bluff	• Los Molinos Mutual Water Company • Deer Creek Irrigation District • Stanford Vina Ranch Irrigation Company • New Clairvaux Monastery	• El Camino ID • Proberta WD • Rancho Tehama Association • Elder Creek WD • Rawson WD • Gerber Las Flores CSD • City of Red Bluff • City of Tehama	• Rio Alto Water District • Anderson Cottonwood Irrigation District (ACID) • Bengard Ranch	Inform and involve to ensure sustainable management of groundwater and consider viability of agricultural economy

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[6] Refer to https://www.tehamaschools.org/Districts--Schools/index.html for additional specific school districts.

Category of Interest	District-Wide	Antelope	Los Molinos	Red Bluff	Bowman	Anticipated Level of Engagement
conservation districts • Farmers/Farm Bureaus • Water Districts • Water-users associations • Irrigated Lands Regulatory Program Coalition	(RCD) of Tehama County • Shasta Tehama Watershed Education Coalition					
Other Commercial Users • Commercial and industrial self-suppliers	• Renewable power companies • Cal Fire stations • Crain processing Plants • Sierra Pacific Industries • Tehama Co.	• Crain Processing Plant	• Norcal Water Works • Anderson & Sons Walnuts • Jones & Son Orchards	• SPI • Pactiv • CAPAX • Wilcox Oaks Golf Club • Oak Creek Golf Club • LA-Pacific Corp. • Walmart Distribution Center		Inform and involve in assessing impacts to users
Environmental and Ecosystem Uses • Federal and State agencies • Wetland managers • Environmental groups	• Audubon Society • The Nature Conservancy • California Dept of Fish & Wildlife • USFWS • BOR • BLM • USFS • NRCS • DWR • CA State Parks • Fire Safe Councils (Tehama Glenn FSC)	• CDFW (Antelope Creek) • USFS (Red Bluff Rec Area) • USFWS • BLM • BOR	• Nature Conservancy • Dye Creek preserve • Mill Creek conservancy • Deer Creek Watershed Conservancy • CDFW big interests in Dye, Mill and Deer Creeks – Salmon • Deer Creek Watershed Conservancy	• CDFW (Butler Slough Eco Reserve, Thomes Creek Preserve) • USFWS • USFS • BLM		Inform and involve to consider/ incorporate potential ecosystem impacts to GSP process
Surface Water Users • Irrigation Districts • Water Districts • Water users associations • Agricultural users	• Mutual Water Co • Water District • Agricultural users • Riparian water right holders	• Edwards Dam Diversions • Los Molinos Mutual Water Company	• Los Molinos Mutual Water Company • Deer Creek Irrigation District • Stanford Vina Ranch Irrigation Company	• Corning Water District • Tehama Colusa Canal Authority • Thomes Creek WD • USFWS	• ACID • Lake California POA to divert water for lake	Inform and involve to collaborate to ensure sustainable water supplies

Category of Interest	District-Wide	Antelope	Los Molinos	Red Bluff	Bowman	Anticipated Level of Engagement
Economic Development • Chambers of commerce • Business groups/associations • Elected officials • State legislature representatives • Economic Development Team	• County Board of Supervisors • James Gallagher (SA) • Jim Neilson (Senator) • Planning Commission • Red Bluff-Tehama County Chamber of Commerce		• Los Molinos Chamber of Commerce	• Red Bluff Tehama County Chamber of Commerce • Red Bluff City Council • City of Tehama City Council		Inform and involve to support a stable economy
Human Right to Water [7] • Disadvantaged communities • Small water systems • Environmental justice groups/community-based organizations • Domestic well owners	• Private well owners • Small Water Systems • Several Disadvantaged Communities	• Unincorporated County (Antelope Area) • Portion of the City of Red Bluff • Dairyville • Riverview MHC • Gurnsey Ave MW • Modern Village MWC • Howell's Lakeside WC • Antoinette MW • Friendly Acres MHP	• Los Molinos Vina • Antelope Creek MHP • Los Molinos CSD • Woodson Bridge • Del Oro Water Co.	• Proberta • Gerber Las Flores CSD • City of Tehama • City of Red Bluff • Rancho Tehama • Mira Monte WC • Surrey Village WC • Golden Meadows CSD	• Lake California • Bowman area, unincorporated County • Rio Alto Water District • Saddleback MWC	Inform and involve to provide safe and secure groundwater supplies to all communities reliant on groundwater
Tribes • Federally Recognized Tribes • Non-Federally Recognized Tribes	• California Tribal Water Commission • Paskenta Band of the Nomlaki (Corning Subbasin) • Greenville Rancheria			• Greenville Rancheria		Inform, involve and consult with tribal government
Integrated Water Management • Regional water management groups (IRWM regions) • Flood agencies	• NSV IRWM • Mid Upper Sacramento Regional Flood Management Group					Inform, involve and collaborate to improve regional sustainability

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[7] This is not an exhaustive list as there are 100+ small water systems across the four subbasins.

SECTION 3 | APPENDICES

Appendix A | Outreach Resources and Materials

Several resources and materials, including those identified below, are available on the website: https://tehamacountywater.org/gsa/library/

(Reminder that all Corning Subbasin resources are available on the Corning GSP website: https://www.corningsubbasingsp.org/. Some Corning resources are listed below for readers' convenience.)

Factsheets & Flyers

- Tehama County SGMA Factsheet – Link
- Corning General SGMA Factsheet - Link
- North Sacramento Valley SGMA Regional Coordination Flyer – Link
- Public Webinar Event flyers – October 2020 | December 2020 | April 2021 | August 2021
- Comment on Draft GSPs & Fall 2021 Public Meetings Flyer – Fall 2021

Quarterly eNewsletter

- Tehama County quarterly eNewsletter – Winter 2020 | Spring 2021 | Summer 2021 | Fall 2021

Online Surveys

Two online surveys launched in 2021. Responses were considered/incorporated into the Draft GSPs.

- Tehama County Subbasins Online Survey | Projects / Management Actions ideas (March - July 2021) – Link
    - 16 total responses.
- Tehama County Subbasins Online Survey | Domestic Well Owners (March 2021 – Present) – Link
    - To date: 17 total responses.

GSA and Advisory Boards Meetings

Updates were regularly shared at Groundwater Commission, District Board, and CSAB meetings. These resources and materials can be found on their respective meetings pages:

- Board of Directors - Link
- Groundwater Commission – Link
- Corning Subbasin Advisory Board - Link

SGMA and Tribal Engagement

- April 6, 2021 webinar presentation - Link

Public Meeting Presentations

Region-wide public meetings

- October 8, 2020 webinar - Video | Slide Deck
- December 9, 2020 webinar - Video (subbasin-specific slide decks provided below)
- September 29, 2021 webinar – Video | Slide Deck
- October 20, 2021 webinar - Video | Slide Deck
- November 15, 2021 in-person workshop – Agenda Handout | Slide Deck

Subbasin-specific public meetings

- **Bowman Subbasin**
  - October 15, 2020 tailgate - Slide Deck
  - December 9, 2020 webinar – Slide Deck
  - April 19, 2021 webinar – Slide Deck | Video
  - August 17, 2021 webinar – Slide Deck | Video
- **Red Bluff Subbasin**
  - October 21, 2020 tailgate – Slide Deck
  - October 6, 2020 Thomes Creek community tailgate – Slide Deck
  - December 9, 2020 webinar – Slide Deck
  - April 20, 2021 webinar – Slide Deck | Video
  - August 19, 2021 webinar – Slide Deck | Video
- **Antelope Subbasin**
  - October 14, 2020 tailgate – Slide Deck
  - December 9 2020 webinar – Slide Deck
  - April 21, 2021 webinar – Slide Deck | Video
  - August 23 webinar – Slide Deck | Video
- **Los Molinos Subbasin**
  - October 22, 2020 tailgate – Slide Deck
  - December 9, 2020 webinar – Slide Deck
  - April 22, 2021 webinar – Slide Deck | Video
  - August 25, 2021 webinar – Slide Deck | Video
- **Corning Subbasin**
  - December 9, 2020 webinar – Slide Deck
  - October 4, 2021 in-person workshop, Corning – Agenda Packet | Slide Deck
  - October 13, 2021 webinar – Agenda Packet | Slide Deck | Video

  (Visit the Corning GSP website for more information specific to the Corning Subbasin – Link)

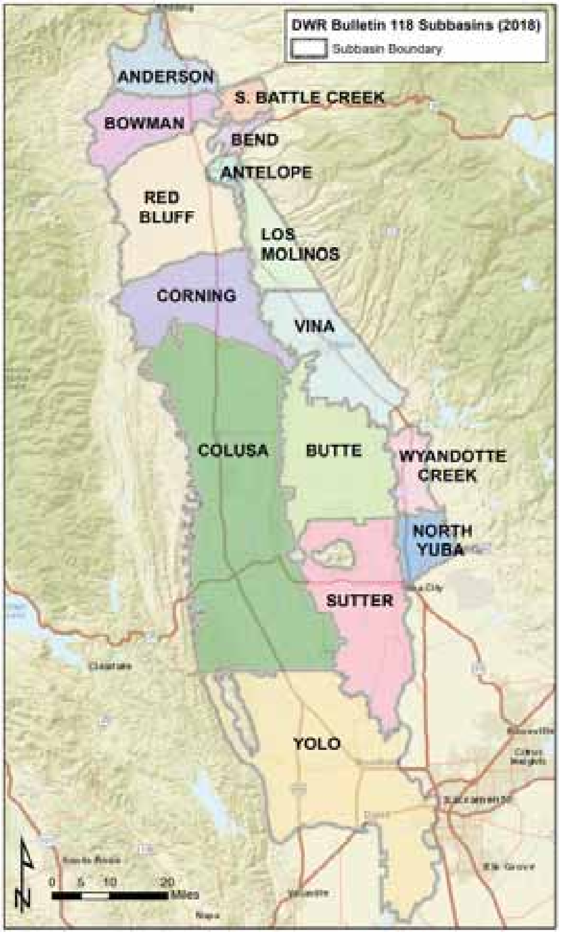
Appendix B | Inter-basin Coordination

In the Sacramento Valley, inter-basin coordination is critical as Groundwater Sustainability Agencies develop their Groundwater Sustainability Plans. We all recognize the interconnectedness of groundwater in the subbasins that together make up the larger Sacramento Valley groundwater basin.

Coordination among GSAs can be formalized through Coordination Agreements. These are voluntary, and the components of such agreements are described in the Groundwater Sustainability Regulations in Article 8.

Informal exchange of information and collaboration has been occurring between staff and consultants working on GSPs in subbasins throughout the region with facilitation support from the Consensus Building Institute. The effort began with conversations between County staff from Tehama, Glenn, Colusa, and Butte to identify priorities and resources available for inter-basin coordination.

These slides provide an overview of the scope and timeline of the Inter-basin Coordination efforts (Flier).



Framework for Inter-basin Coordination

Northern Sacramento Valley Inter-basin Coordination Report-Final

This report outlines a framework for inter-basin coordination for sustainable groundwater management in the Northern Sacramento Valley. It describes a menu of options for ongoing communication and collaboration between and among groundwater subbasins over the twenty-year implementation of the Sustainable Groundwater Management Act (SGMA). This framework can be used by Groundwater Sustainability Agencies (GSAs) to support Groundwater Sustainability Plan (GSP) development and implementation in several ways.

1. This inter-basin coordination report could be included as an appendix to the GSP and could be updated at regular intervals.
2. Individual subbasins could incorporate sections of the report into the body of the GSP, depending upon specific boundary conditions at adjoining subbasins.
3. Subbasins could draw on the inter-basin coordination framework if they would like to consider entering into one or more voluntary inter-basin agreements during GSP implementation (GSP Regulations in Article 8, Sec 357.2.

Staff throughout the region will present the framework as a supporting document to guide and inform discussions with GSA Boards and at other subbasin-specific public venues, such as advisory committees, groundwater commissions, or other relevant venues. These discussions could help determine GSA priorities and the desired approach each GSA would like to take to draw upon the inter-basin coordination framework within their individual GSPs.

Subbasin staff acknowledge that while this report builds upon a long-standing history of regional collaboration, this is just the beginning of inter-basin coordination efforts under SGMA. Therefore, this framework will be continually refined throughout GSP implementation and inter-basin coordination activities will occur on an ongoing basis.

Visit the website for more information:
https://www.buttecounty.net/waterresourceconservation/Sustainable-Groundwater-Management-Act/Inter-basin-Coordination

Appendix C | Tribal Engagement in Tehama County: Guidance Document

Meaningful tribal outreach, dialogue, and consultation is a shared obligation of the GSA in the applicable subbasins where tribal lands exist.

Tribes in Tehama County

There are two[8] federally-recognized Native American Tribes in Tehama County, including:

- Greenville Rancheria of Maidu Indians
- Paskenta Band of Nomlaki Indians

The Native American Heritage Commission (NAHC) identified eight Tribes in Tehama County and Glenn County that may have an interest in groundwater management in the Bowman, Red Bluff, Antelope, Los Molinos, and/or Corning Subbasins:

- Estom Yumeka Maidu Tribe of the Enterprise Rancheria
- Greenville Rancheria of Maidu Indians
- Grindstone Rancheria of Wintun-Wailaki
- Mechoopda Indian Tribe
- Paskenta Band of Nomlaki Indians
- Redding Rancheria
- Shasta Nation
- Wintu Tribe of Northern California

Outreach Steps – Phase I

1. Confirm that the Native American tribes identified above are correctly posed for SGMA outreach.
2. The District will prepare background materials related to Native American tribal outreach and engagement. The material will include a compilation of past Native American tribal outreach methods, goals, and results (including primary points of contact). The materials will include SGMA-related obligations for GSAs pursuant to SGMA, and interests and goals as they relate to tribal outreach and potential participation in sustainable groundwater management planning (see *Relevant DWR Information* below).
3. The District will conduct an initial, informal communication with tribal primary points of contact to clarify interest in communicating formally regarding SGMA and tribal interests; request advice about appropriate avenues for outreach; and identify next steps. In the event a tribal representative cannot be contacted within 45 days, the District will consult with DWR's Office of Tribal Policy Advisor for guidance (Anecita Agustinez, DWR Tribal Policy Advisor - Anecita.Agustinez@water.ca.gov).
4. Following successful initial communication with the Native American tribes, the District will facilitate the implementation of the next steps identified in #3. Actions may include preparation

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[8] Source: https://www.ihs.gov/california/index.cfm/tribal-consultation/resources-for-tribal-leaders/links-and-resources/list-of-federally-recognized-tribes-in-ca/?mobileFormat=0

of a formal letter from the Board to each of the tribes, involvement of other GSAs with the tribes, and/or establishing a consultation framework.

Outreach Steps – Phase II

Refer to Table 1 (Summary of Engagement Opportunities, Milestones, and Progress to Date) and Table 2 (Tehama Stakeholder Group Interests & Purpose of Engagement).

Relevant DWR Information

SGMA Section 10720.3. ...any federally recognized Indian Tribe, appreciating the shared interest in assuring the sustainability of groundwater resources, may voluntarily agree to participate in the preparation or administration of a groundwater sustainability plan or groundwater management plan under this part through a joint powers authority or other agreement with local agencies in the basin. A participating Tribe shall be eligible to participate fully in planning, financing, and management under this part, including eligibility for grants and technical assistance, if any exercise of regulatory authority, enforcement, or imposition and collection of fees is pursuant to the Tribe's independent authority and not pursuant to authority granted to a groundwater sustainability agency under this part.

Guidance Document for Sustainable Management of Groundwater:
Engagement with Tribal Governments [Link]

Discussion Questions Relating to Tribal Governments Engagement with GSAs [Link]

Must a local agency exclude federal and tribal lands from its service area when forming a GSA?
No, federal lands and tribal lands need not be excluded from a local agency's GSA area if a local agency has jurisdiction in those areas; however, those areas are not subject to SGMA. But, a local agency in its GSA formation notice shall explain how it will consider the interests of the federal government and California Native American tribes when forming a GSA and developing a GSP. DWR strongly recommends that local agencies communicate with federal and tribal representatives prior to deciding to become a GSA. As stated in Water Code §10720.3, the federal government or any federally recognized Indian tribe, appreciating the shared interest in assuring the sustainability of groundwater resources, may voluntarily agree to participate in the preparation or administration of a GSP or groundwater management plan through a JPA or other agreement with local agencies in the basin. Water Code References: §10720.3, §10723.2, §10723.8

Tribal Outreach Resources

The follow are links to agency tribal outreach resources and considerations, each of which captures important principles and resources for tribal outreach. A short summary of key outreach principles can be found below.

- CalEPA Tribal Consultation Policy Memo (August 2015)
- DWR Tribal Engagement Policy (May 2016)
- CA Natural Resources Agency Tribal Consultation Policy (November 2012)
- SWRCB Proposed Tribal Beneficial Uses
- CA Court Tribal Outreach and Engagement Strategies
- Traditional Ecological Knowledge resources

- Water Education Foundation Tribal Water Issues

Key Outreach Principles

- Engage early and often
- Consider tribal beneficial uses in decision-making (identified by region here); identify and seek to protect tribal cultural resources
- Share relevant documentation with tribal officials
- Conduct meetings at times convenient for tribal participation with ample notifications
- Request relevant process input/data/information from tribes
- Empower tribes to act as tribal cultural resources caretakers
- Designate a tribal liaison(s) where appropriate
- Share resources for tribal involvement as is feasible
- Develop MOUs where relevant
- Be mindful of the traditions and cultural norms of tribes in your area

Key Outreach Partners/Liaisons

The following are potential partners for Tehama County tribal SGMA outreach:

- SGMA Tribal Advisory Group (TAG): "The Tribal Advisory Group (TAG) includes tribal leadership, subject matter experts, and technical and non-technical members of local, academic, and tribal governments that are actively engaged in local groundwater management and will be key in local implementation of SGMA. TAG members will be responsible for distribution of information and resources to their respective tribes and organizations."
- California Indian Water Commission, Inc.
- DWR Office of Tribal Advisor
- DWR Northern Regional Office Contact
- Central Valley Regional Board Tribal Coordinator

Appendix D | Disadvantaged Communities Engagement in Tehama County – Guidance Document

Important consideration should be given with regard to encouraging community participation in disadvantaged communities (DACs) / severely disadvantaged communities (SDACs) and ensuring accessible and transparent meetings especially in those communities with limited access to digital resources.

Disadvantaged Communities (DACs) in Tehama County Subbasins

DAC and SDAC communities were identified based on data from DWR DAC Mapping too, 2018 Census tract (categorized as "economically distressed areas" Census blockgroup) for the Bowman, Red Bluff, Antelope, Los Molinos, and Corning Subbasins. -- *Refer to the Plan Area chapters of the subbasins' GSPs.*

Outreach Steps

Phase I

1. Use DWR Disadvantaged Communities Mapping Tool or other geographic information system technology to help identify disadvantaged, severely disadvantaged and economically distressed communities within the Cosumnes subbasin.
2. GSAs share insights on engaging with members of these communities from past projects or efforts. Also consider the key outreach principles identified below.
3. Review catalog of existing outreach materials. Modify as necessary to fit the needs of each community. This may include translating select materials into one or more languages. Develop additional materials if advantageous.
4. Identify potential points of contacts / outreach partners for DAC engagement. See preliminary list of partners below. Conduct an initial, informal communication with organizational points of contact to clarify interest in engaging DAC communities on SGMA; request advice about appropriate avenues for outreach; and identify next steps.

Phase II

Refer to Table 1 (Summary of Engagement Opportunities, Milestones, and Progress to Date) and Table 2 (Tehama Stakeholder Group Interests & Purpose of Engagement).

Relevant DWR Information

Guidance on Engaging and Communicating with Underrepresented Groundwater Users
[Link]

DWR recognizes that there are groups or communities of groundwater users that have been historically and frequently left out from decision-making with regard to sustainable groundwater management. These groups include, but are not limited to: disadvantaged communities, private domestic well owners, small growers and farmers, Tribes, and communities on small water systems. All beneficial uses and users of groundwater must be

part of the effort to achieve sustainability, and engagement should occur with all entities that could be affected by the implementation of a GSP.
California Water Code 10723.2 The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans.
23 Cal. Code Regs. §354.10 Notice and Communication. Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following: (a) a description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.

Outreach Resources

Tools for identifying DAC communities include:

- DWR Disadvantaged Community Mapping Tool
- DWR Economically Distressed Areas Mapping Tool
- State Water Board Human Right to Water Portal
- CalEnviroScreen
- US Census Bureau Data Portal

DAC Communications Best Practices and similar reference publications:

- DWR Guidance on Engaging and Communicating with Underrepresented Groundwater Users
- Local Government Commission Best Practices for Virtual Engagement Guide
- Self Help Enterprises webpage on SGMA engagement for DACs
- Self Help Enterprises Technical Assistance Program
- Clean Water Action's Collaborating for Success: Stakeholder Engagement for SGMA Implementation
- Water Education Foundation's Solving Water Challenges in DACs: A Handbook to Understanding the Issues in California and Best Practices for Engagement

Key Outreach and Engagement Principles[9]

- Decisions that impact DACs must be done with their guidance and input, and agencies should ensure that community residents are able to give meaningful input into the process.
- Partner with local community-based organizations as trusted messengers.
- Target outreach materials and approach appropriately by tailoring communications to the community's needs. Be mindful of language and cultural differences.
- Be aware of communities' level of access to computers, internet, and phone connections.
- Engage early and often. Reach out to community-based organizations and other stakeholders who may be in direct communication with residents early to help make sure that residents are informed and notified through multiple channels about options for public meetings.
- Understand who the target audience is (e.g., with whom you will be meeting) to understand where and when to meet (such as during the day vs. evening meetings)

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[9] Principles extracted and summarized from best practices and other outreach sources noted in "Outreach Resources" section above.

- Conduct meetings at times convenient for public participation with ample notifications.
- When possible, travel to the target community to meet them in their locale.
- One-on-one meetings with individual communities and stakeholders may be more appropriate than trying to meet with several entities in one location.
- For virtual meetings, provide multiple options for teleconferencing, with two-way communication options that allows either computer-users or phone-users to engage. Consider using separate teleconference lines or audio channels to meet language access needs.
- Several meetings may be required to engage new communities and involve them in the SGMA process.
- Provide in-meeting translation and translated materials to the maximum extent possible.
- Though there may be commonalities across regions, each community/DAC/tribe/water system/stakeholder has unique and individualized water-related concerns.

Key Outreach Partners/ Liaisons

The following lists potential partners for outreach to DACs:

- Rural Community Assistance Corporation
- Self Help Enterprises
- Leadership Council for Justice and Accountability
- Clean Water Action

Appendix E | Media Contact List

Organization	Name	Email	Phone
The Sacramento Valley Mirror	Tim Crews	vmtim@pulsaroco.com	
	Doug Ross	yfyles@gmail.com	
	general	valleymirror@pulsaro.com	
Appeal Democrat (for Corning Observer)	News Room	adnewsroom@appealdemocrat.com (for paid notices)	530-749-6552
	Julie Johnson	jjohnson@tcnpress.com (for general information/ meeting notices)	
Action News Now		news@actionnewsnow.com	530-343-1212
Red Bluff Daily News	George Johnston	gjohnston@redbluffdailynews.com	
KRCR	News Room	news@krcrtv.com	530-243-7777
Multiple Spanish-speaking media	Armando Jimenez	ajimenez@bustosmedia.com	

Appendix F | Potential Venues List

The COVID-19 pandemic frequently caused the District and Groundwater Commission to meet virtually during development of the GSPs. As in-person meeting options became available, there was general interest to explore supporting virtual participation options during certain meetings such as public workshops. The following table summarizes potential venues in Tehama County subbasins for various meetings / workshops and identify key logistical amenities, particularly audio-visual capabilities that support virtual and in-person participation.

Subbasin	Name	Address	Capacity	Contact	Amenities	Notes
Red Bluff	County Board Chambers	727 Oak Street, Red Bluff		Denise Ranberg 530-527-4655	Projector & Screen, wired mics, wi-fi, teleconference; chamber is fixed seating; adjacent room is unfixed seating	GW Commission meeting location
Red Bluff	Red Bluff Community Senior Center	1500 South Jackson Street, Red Bluff	Varies, up to 120	Karen Shaffer Phone: 530-527-8181 kshaffer@cityofredbluff.org	Projector (additional fee)/Screen, microphone, wifi	
Red Bluff	County Dept. of Education	1135 Lincoln State., Red Bluff	Varies, 30-80	Melanie Lee mlee@tehamaschools.org	Projector and screen, mics, wi-fi,seating is not fixed	
Bowman	TBD					
Los Molinos	TBD					
Antelope	TBD					
Corning	Rolling Hills Casino	2655 Everett Freeman Way, Corning, California 96021	Varies	Karen Hiton eventsales@rollinghillscasino.com	Projector and screen, mics, wi-fi, Indoor and outdoor space, unfixed seating, room partitioning options	

Appendix G | Potential GSA Outreach Tasks

This appendix is intended to help identify and map out specific issues and strategies that the District, advisory groups, and/or partners may consider during implementation of the GSPs. This does not commit any entity to specific tasks nor preclude them from pursuing other strategies aligned with the subbasin GSPs, related governance documents, and the Communication & Engagement Plan.

Methods

The following are methods that have emerged as highly effective and/or strongly recommended by District Board members, Groundwater Commissioners, District staff, consultants, and/or other subject-matter experts, partners, stakeholders, and the public. As mentioned above, the list does not commit any entity to specific tasks nor preclude them from pursuing other strategies.

- Outreach/project partners and collaborative forums (mailing list networks, newsletters, events, etc.)
- Briefings upon request (communities, organizations, etc.)
- One-on-one communication with GSA representatives and staff
- District Board and Groundwater Commission meetings
- Recorded presentations (e.g., public webinars)
- District website
- Print-friendly handouts (factsheets, event flyers, etc.)
- Quarterly eNewsletter (including print-friendly format)
- Established popular physical locations to access materials (e.g., District office, library, etc.)
- Popular social media platforms / accounts
- Briefings with regulators and land managers (can inform funding and collaborative project opportunities)

Additional methods to consider during implementation of the GSPs
The following methods were not as widely used or perceived as substantially effective during development of the GSPs development, but these may be viewed as more feasible or effective going forward during implementation of the GSPs. Factors to that may influence selecting particular methods include: topic is of high interest to stakeholders / public, key milestones during SGMA implementation, available capacity and funding, etc.)

- Individual calls, texts, mailings
- Surveys
- News articles / op-eds
- Radio (e.g, 97.3, 91.7, and 88.9) / TV PSAs
- Kiosks, marquis, sign postings on community bulletin boards
- Expanding outreach partners (e.g., schools, faith-based groups, etc.)

Issues

The following are topics that have emerged as prominent issues of interest based on discussions among the District Board members, Groundwater Commissioners, District staff, consultants and other experts, partners, stakeholders, the public, etc. As mentioned above, the list does not commit any entity to specific tasks nor preclude them from pursuing other topics or strategies. Note that not all items listed below are within the groundwater management authorities granted under SGMA; however, are still of interest to those who use groundwater and/or are interested in successful long-term management of groundwater in Tehama County's subbasins.

- Funding options and fees
- Areas with particular groundwater concerns
- Major data gaps (e.g., interconnected surface waters and groundwater dependent ecosystems) -- Refer to GSPs for more details
- Regional / watershed planning (e.g., inter-basin coordination)
- Well permitting process
- Coordination with land-use planning and development entities
- Groundwater vs. surface water use
- Impacts to shallow wells
- Socioeconomic impacts
- Affordable and reliable drinking water
- Public input opportunities (confirming interests are being conveyed and considered during SGMA implementation)
- Underrepresented and hard-to-reach communities (DACs, Tribes, etc.), particularly those with limited access to reliable internet or limited familiarity/comfort with virtual participation options.
- Expanding monitoring network
- Future conditions (e.g., drought trends)
- Project feasibility

Appendix 2-C

Northern Sacramento Valley Inter-basin Coordination Report

Northern Sacramento Valley
Inter-basin Coordination Report

Antelope | Bowman | Butte | Colusa | Corning | Los Molinos | Red Bluff | Sutter | Vina | Wyandotte Creek | Yolo

Table of Contents

Glossary of Acronyms

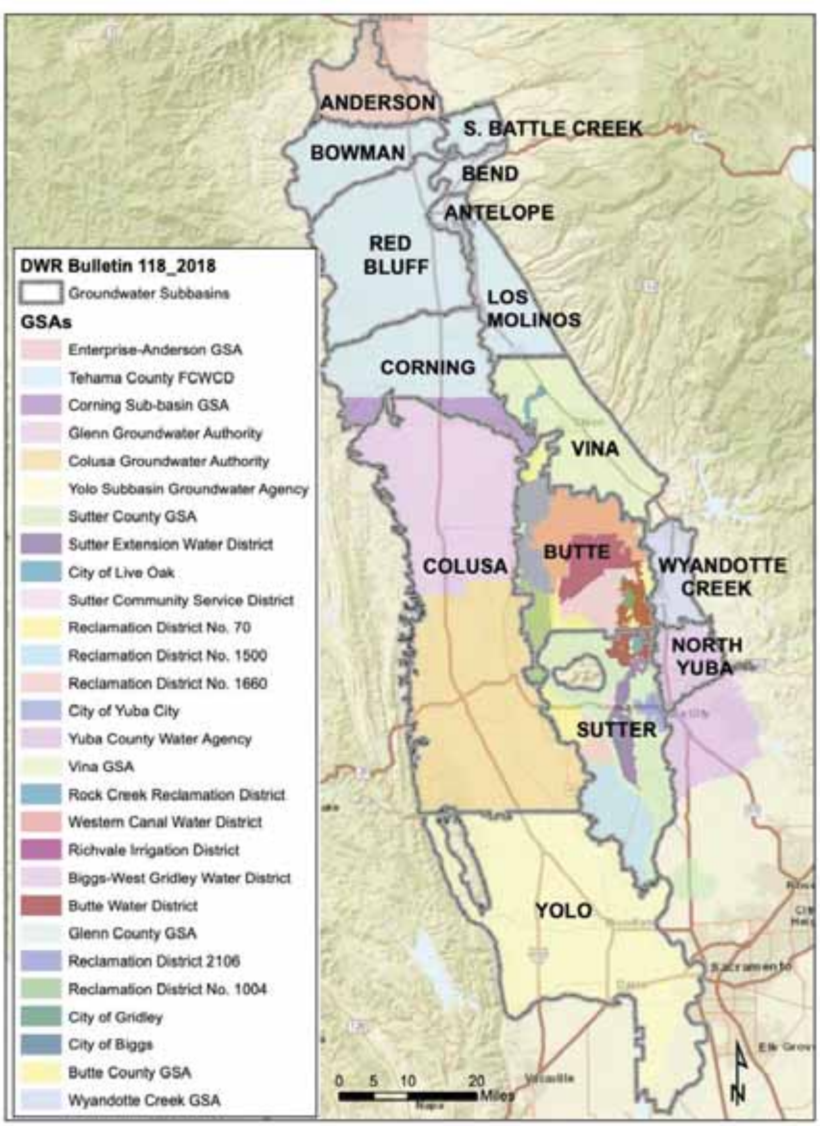
- ***CBI*** *– Consensus Building Institute [link]*
- ***DWR*** *– California Department of Water Resources*
- ***GSA*** *– Groundwater Sustainability Agency*
- ***GSP*** *– Groundwater Sustainability Plan*
- ***MOU*** *– Memorandum of Understanding*
- ***NCWA*** *– Northern California Water Association*
- ***NSV IRWM****– Northern Sacramento Valley Integrated Regional Water Management*
- ***PMAs*** *– Projects and Management Actions*
- ***SGMA*** *– Sustainable Groundwater Management Act*
- ***SMC*** *– Sustainable Management Criteria*

1. Introduction & Background

The content of the report is the result of staff recommendations resulting from regional inter-basin coordination staff meetings in the Northern Sacramento Valley (2020-2021). The content will be presented to inform discussions among Groundwater Sustainability Agencies (GSAs) and gather public input through existing public venues, such as advisory committees, groundwater commissions, and GSA Board meetings.

Inter-basin coordination is critical in the Northern Sacramento Valley as GSAs develop and implement Groundwater Sustainability Plans (GSPs). Since groundwater subbasins in the Northern Sacramento Valley are hydrologically interconnected, water management decisions and actions in subbasins (i.e., groundwater pumping and processes affecting recharge, water demand, and supply including climate change) could change aquifer conditions. Understanding and accounting for these processes is important towards achieving sustainability in all subbasins.

Figure 1. Map of the Northern Sacramento Valley



Inter-basin coordination is described in the GSP Regulations in Article 8. Under the regulations, GSAs must describe how they coordinate with adjoining subbasins to demonstrate implementation will not adversely affect adjoining subbasins. The Department of Water Resources (DWR) is required to evaluate whether a GSP adversely affects the ability of an adjacent basin to implement their GSP or impedes achievement of sustainability goals in an adjacent basin (Water Code 17033(c)). Coordination among GSAs can be formalized in different ways and inter-basin agreements are voluntary. Appendix A describes components of Sec 357.2.

Inter-basin coordination discussions among staff representatives from 11 subbasins (Antelope, Bowman, Butte, Colusa, Corning, Los Molinos, Red Bluff, Sutter, Vina, Wyandotte Creek, and Yolo), with facilitation support from the Consensus Building Institute (CBI) began during the summer of 2020. While efforts have focused on these subbasins, coordination will occur, as warranted, with other neighboring subbasins (Anderson and North Yuba).

Initial stages of inter-basin coordination efforts (May-December 2020) were closely aligned with the GSP Regulations in Article 8 components and delineated in Section 3 *Evolution of Inter-basin Coordination Efforts*. After an initial attempt to compile technical information to better understand basin conditions at respective boundaries, staff realized differing timelines for the completion of Basin Setting content in each subbasin meant there would not be sufficient time during initial GSP development to fully characterize or address major inconsistencies. Therefore, the goal for regional inter-basin coordination shifted towards establishing a framework for long-term inter-basin coordination and dialogue (post GSP submittal in 2022). Informal coordination discussions among staff and consultants between neighboring subbasins continued during the GSP development process.

This report outlines the intent and purpose of inter-basin coordination in the Northern Sacramento Valley. It describes the process followed and materials developed throughout the process. It also outlines foundational elements, referred to as "key pillars," of a framework for sustained coordination through GSP implementation.

2. Intent & Purpose

Inter-basin coordination efforts in the Northern Sacramento Valley are focused on establishing a foundation and guidelines for sustained inter-basin coordination through GSP implementation, following the initial submittal of GSPs by January 31, 2022. GSAs intend to:

1. *Establish a framework allowing for continued dialogue and a venue to address issues and discrepancies during the implementation of the GSPs;*
2. *Coordinate on consistent messaging and communicate shared expectations at a regional level;*
3. *Demonstrate regional coordination efforts and outcomes; and*
4. *Leverage existing agreements and arrangements in the region (e.g., Northern Sacramento Valley Integrated Regional Water Management (NSV IRWM), the Six County Memorandum of Understanding among Butte, Colusa, Glenn, Tehama, Shasta, and Sutter).*

The proposed deliverable from this effort is the development of a common approach and draft language for incorporation into each subbasin's GSP. This narrative describes the facilitated effort as well as the framework and scope for long-term coordination during plan implementation. The public will have opportunities to weigh in and provide input on the proposed framework through each subbasin's existing public venues, such as advisory committees, groundwater commissions, and GSA board meetings.

3. Evolution of Inter-basin Coordination Efforts

Inter-basin coordination efforts, facilitated by the Consensus Building Institute (CBI) began in summer 2020 among Subbasin staff from Antelope, Bowman, Butte, Colusa, Corning, Los Molinos, Red Bluff, Vina, and Wyandotte Creek subbasins to identify priorities and resources available for inter-basin coordination. Soon after, staff representatives from the Sutter and Yolo subbasins joined the meetings. To date, CBI has facilitated nine inter-basin coordination meetings with staff and periodically with technical consultants from the subbasins. Subbasin staff and/or CBI communicated regular updates to GSA Boards and advisory committees in each of the subbasins regarding the status of inter-basin coordination activities [Access Webpage Here].

Initial stages of inter-basin coordination efforts were closely aligned with the GSP Regulations in Article 8:

1. ***General information*** *of subbasins, plans and agencies participating in the coordination agreement,*
2. ***Technical information*** *including consistent and coordinated data or methodology for inter-basin boundary flows and stream-groundwater interactions at basin boundaries, and information on sustainable management criteria and monitoring that would confirm that no adverse impacts of implementing the GSPs would result to any party to the agreement,*
3. *A description of the* ***process for identifying and resolving conflicts*** *between Agencies that are parties to an inter-basin coordination agreement.*

   Reference: *Sections 10727.2, 10733, and 10733.2, Water Code.*

The goal at the initial stage was to compile general and technical information identified by DWR in a consistent manner to establish an accurate basis of comparison and to identify any significant inconsistencies that may need to be addressed or resolved. This included developing a series of information-sharing documents and outreach materials, summarized below.

1. ***Inter-basin Coordination Directory–*** *This document provides an updated and centralized directory with contact information for GSA managers, technical consultants, and facilitators in the various subbasins. This document seeks to facilitate communication among the various representatives leading GSP development [Access Here].*
2. ***Technical Information-Sharing Template–*** *This template was developed among the managers and technical consulting teams to compile and compare information on modeling tools and water budget results for inter-basin flows, stream-aquifer interactions, and hydro-geologic conditions in the subbasins. Potentially, this document could be used to compile information about Sustainable Management Criteria and Monitoring Networks [Access Draft Template Here]. The first output from the technical information-sharing template summarizes the highlights of compiled model information across the subbasins [Access Here].*
3. ***Outreach Presentation****–This PowerPoint presentation provides updates on inter-basin coordination activities to the various SGMA public venues (GSA boards, advisory committees, etc.) and an overview of the scope and timeline of inter-basin coordination efforts. This presentation is continuously updated*

after each inter-basin coordination staff meeting for use in consistently communicating with GSA Boards/advisory committees and the public throughout the region [Access Here].

4. ***Outreach Factsheet–*** *The inter-basin coordination factsheet aims to support public outreach and information sharing in the various subbasins. This two-page flier or factsheet summarizes why regional coordination is important under SGMA, who is involved in ongoing efforts, what the coordination priorities are, and includes a table with links to each subbasin's website for additional subbasins' specific information [Access Here].*
5. ***Inter-basin Coordination Webpage****– Butte County hosts a webpage to provide the most up-to-date information on inter-basin coordination efforts in the Northern Sacramento Valley. The webpage provides an overview of the scope and makes available documentation and results of the inter-basin coordination work, including meeting agendas, summaries, and outputs [Access Here].*
6. ***Meeting Summaries****–CBI develops meeting summaries after each regional inter-basin coordination staff meeting to summarize key discussion themes, action items, and next steps. These summaries are publicly available on the inter-basin coordination webpage [Access Here].*

After an initial attempt to compile technical information, staff realized the broad aspirations were not feasible during the initial stages of GSP development. The process of compiling and comparing modeling outputs from the diverse regional hydrological models required a significant amount of time, resources, and varying levels of data. Further, subbasins were at different stages of GSP development and GSAs were facing tight timelines, competing priorities, and capacity limitations to meet the regulatory deadline. While communication on a neighbor-to-neighbor basis on technical components was encouraged through GSP development, subbasin staff representatives realized more robust technical analysis and coordination between and among subbasins was not possible until initial plans (including water budgets) were more fully developed or after adoption of the initial GSPs.

Following reflection from the separate inter-basin efforts and priorities moving forward, subbasin staff recommended shifting the focus of regional coordination meetings to establishing a framework for long-term inter-basin coordination and dialogue following GSP submission in January 2022. To do so, subbasin staff identified desired outcomes in the short-term (during initial GSP development), mid-term (first 5-year update), and long-term (GSP Implementation through 2042) [Access Here]. This approach recognizes adoption of the 2022 GSPs as an initial step in sustainable groundwater management, not the final step. Subbasin staff acknowledged while model outputs may not match perfectly, the main objective is to identify and acknowledge significant discrepancies, understand why those differences exist, and evaluate to the extent they need to be reconciled. Inter-basin coordination has been characterized as "a marathon not a sprint," and current efforts will serve to pave the path for long-term collaboration. Further, GSAs can take advantage of annual reporting and five-year GSP updates to identify and address discrepancies. Lastly, subbasin staff representatives acknowledge public participants are interested in inter-basin coordination efforts and concerns from some subbasins can easily affect others. Subbasin staff understand the need to share and educate the public on what is in the various GSPs, and the SGMA requirements for inter-basin coordination. Staff will continue to provide updates and gather GSA Board and public input related to the direction of current efforts and desired priorities, shared concerns, and possible ideas for inter-basin coordination during GSP implementation.

4. Inter-basin Coordination Framework

This section outlines the foundational pillars that comprise the framework for inter-basin coordination under SGMA between and among subbasins in the Northern Sacramento Valley. These pillars build upon a long-standing history of regional collaboration and embody a commitment for continued coordination, collaboration, and communication for successful groundwater management in the region. Honoring the individual authorities of the GSAs, these pillars represent a menu of options neighboring subbasins can draw upon, based on individual or neighboring subbasins' needs and challenges. GSA Boards can decide which of these options they would like to support and implement, acknowledging circumstances may change over time.

Pillars	Scale(s)	Timing
1. Information-sharing a. Inform each other on changing conditions (i.e., surface water cutbacks, land use changes, policy changes that inform groundwater management) b. Share annual reports and interim progress reports c. Share data and technical information and work towards building shared data across and/or along basin boundaries (e.g., monitoring data, water budgets, modeling inputs and outputs, and Groundwater Dependent Ecosystems)	• Neighbor-to-neighbor • Coordination groups [Refer to section 4.1 below]	• *Ongoing (GSP Development)* • *Near-term (5-year update)* • *Long-term (GSP implementation)*
2. Joint analysis & evaluation a. Evaluate and compare contents of GSPs with a focus on establishing a common understanding of basin conditions at boundaries b. Identify significant differences, uncertainties, and potential issues of concern related to groundwater interaction at the boundaries c. Engage in analysis and evaluation of SMCs between GSPs to assess impacts and identify significant differences and possible impacts between subbasins that could potentially lead to undesirable results	• Neighbor-to-neighbor • Coordination groups [Refer to section 4.1 below]	• *Near-term (5-year update)* • *Long-term (GSP implementation)*
3. Coordination on mutually beneficial activities a. Communicate, coordinate, and collaborate on mutually beneficial activities, which could include joint monitoring, joint reporting, regional modeling, and other efforts to address data gaps at subbasin boundaries b. Collectively pursue funding and collaborate on mutually agreed upon projects and management actions that provide benefits across boundaries c. Leverage existing collaboratives (NSV IRWM, NCWA etc.)	• Neighbor-to-neighbor • Coordination groups • Regional: NSV IRWM, NCWA Groundwater Task Force	• *Ongoing (GSP Development)* • *Near-term (5-year update)* • *Long-term (GSP implementation).*
4. Coordinated communication and outreach a. Coordinate and collaborate on regional-scale public engagement and communication strategies that promote awareness on groundwater sustainability, enhance public trust, and maintain institutional knowledge b. Maintain list of GSP/subbasin staff contacts and websites	• Regional: NSV IRWM and NCWA Groundwater Task Force	• *Ongoing (GSP Development)* • *Near-term (5-year update)* • *Long-term (GSP implementation)*
5. Issue-resolution process a. Establish and follow an agreed-upon process for identifying and resolving conflicts between GSAs by the first five-year update [Refer to Appendix D for more details and discussion prompts on issue resolution processes]	• Neighbor-to-neighbor • Coordination groups	• *Near-term (5-year update)* • *Long-term (GSP implementation).*

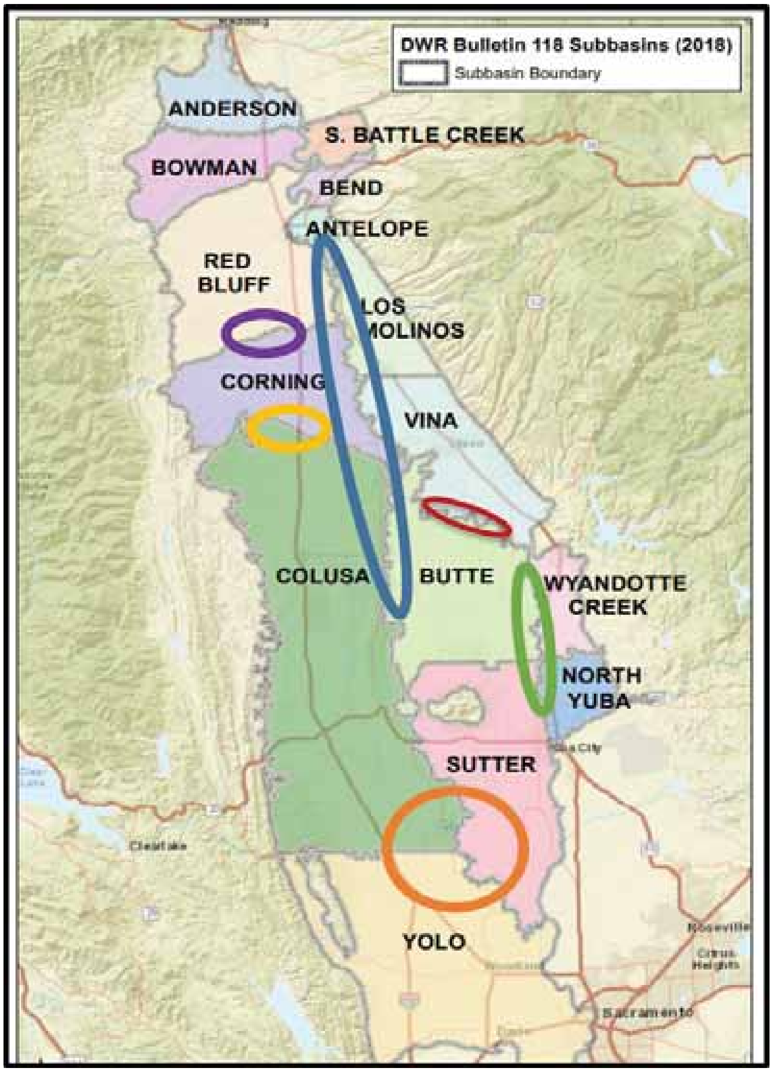
4.1. Inter-basin Coordination Groups

Inter-basin coordination efforts, as outlined in the pillars above, would require resources and technical support. Subbasin staff recommend organizing inter-basin coordination priorities by specific subbasin boundaries. One suggested approach identifies specific “Coordination Groups” (see Figure 3 and list below). Some of these groups are pairs and others include multiple subbasins around a river boundary.

1. ***Feather River Corridor***- *Butte, Wyandotte Creek, North Yuba, Sutter*
2. ***North Sacramento River Corridor***- *Antelope, Los Molinos, Red Bluff, Corning, Vina, Butte, Colusa*
3. ***South Sacramento Corridor***- *Colusa, Sutter, Yolo*

Neighbor to Neighbor, examples:

4. ***Stony Creek***- *Corning, Colusa*
5. ***Thomes Creek***- *Red Bluff, Corning*
6. ***Butte/Vina***- *Vina, Butte*



5. Conclusion and Next Steps

In sum, this report outlines a framework for inter-basin coordination for sustainable groundwater management in the Northern Sacramento Valley. The inter-basin coordination framework describes a menu of options for ongoing communication and collaboration around substantive issues over the twenty-year implementation of SGMA.

The pillars and other content from this report could be used by GSAs to support GSP development and implementation in a number of ways. This inter-basin coordination report could be included as an Appendix to the GSP and could be updated on a yearly basis. Individual subbasins can incorporate sections of the report into the body of the GSP, depending upon specific boundary conditions at adjoining subbasins. Finally, subbasins could draw on the inter-basin coordination framework if they would like to consider entering into one or more voluntary inter-basin agreements during GSP implementation.

The content of the report is the result of staff recommendations resulting from regional inter-basin coordination staff meetings. Staff will present the framework as a supporting document to guide and inform discussions with the GSA Boards and other existing public venues, such as advisory committees or groundwater commissions. GSAs in turn will discuss the menu of options for inter-basin coordination outlined in this report to determine their priorities and desired approach to draw on the inter-basin coordination framework in their individual GSPs. Lastly, Subbasin staff will come together to share input received and determinations from their respective GSAs.

Subbasin staff acknowledge that while this report builds upon a long-standing history of regional collaboration, this is just the beginning of inter-basin coordination efforts under SGMA. Therefore, this framework and inter-basin coordination activities will be continually refined throughout GSP implementation.

Appendices

Appendix A: GSP Emergency Regulations, Article 8: Interagency Agreements §357.2

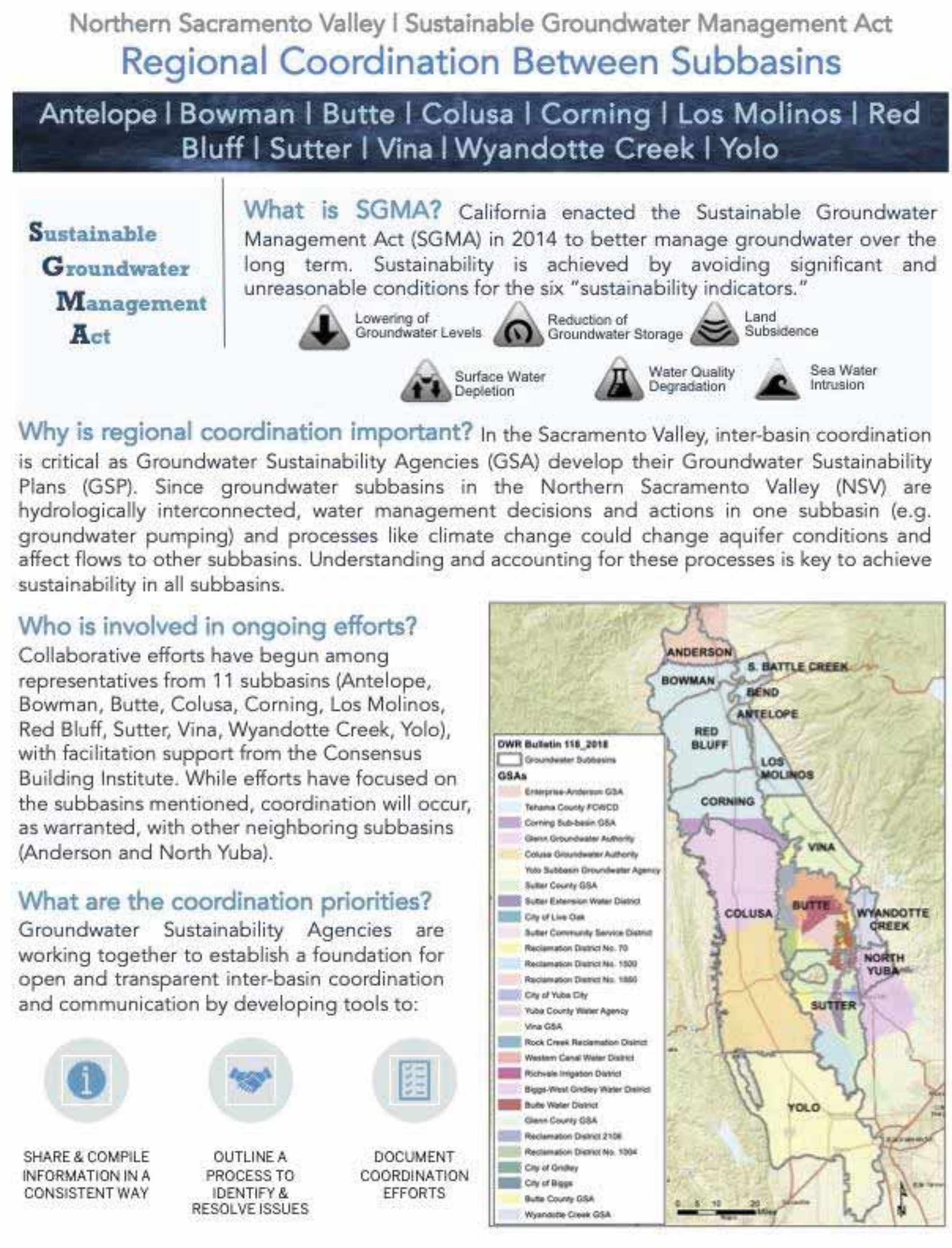
§ 357.2. Inter-basin Agreements (access here)

Two or more Agencies may enter into an agreement to establish compatible sustainability goals and understanding regarding fundamental elements of the Plans of each Agency as they relate to sustainable groundwater management. Inter-basin agreements may be included in the Plan to support a finding that implementation of the Plan will not adversely affect an adjacent basin's ability to implement its Plan or impede the ability to achieve its sustainability goal. Inter-basin agreements should facilitate the exchange of technical information between Agencies and include a process to resolve disputes concerning the interpretation of that information. Inter-basin agreements may include any information the participating Agencies deem appropriate, such as the following:

(a) General information:
  (1) Identity of each basin participating in and covered by the terms of the agreement.
  (2) A list of the Agencies or other public agencies or other entities with groundwater management responsibilities in each basin.
  (3) A list of the Plans, Alternatives, or adjudicated areas in each basin.
(b) Technical information:
  (1) An estimate of **groundwater flow across basin boundaries**, including consistent and coordinated data, methods, and assumptions.
  (2) An estimate of **stream-aquifer interactions** at boundaries.
  (3) A **common understanding of the geology and hydrology** of the basins **and the hydraulic connectivity** as it applies to the Agency's determination of groundwater flow across basin boundaries and description of the different assumptions utilized by different Plans and how the Agencies reconciled those differences.
  (4) **Sustainable management criteria and a monitoring network** that would confirm that no adverse impacts result from the implementation of the Plans of any party to the agreement. If minimum thresholds or measurable objectives differ substantially between basins, the agreement should specify how the Agencies will reconcile those differences and manage the basins to avoid undesirable results. The Agreement should identify the differences that the parties consider significant and include a plan and schedule to reduce uncertainties to collectively resolve those uncertainties and differences.
(c) A description of the **process for identifying and resolving conflicts** between Agencies that are parties to the agreement.
(d) Inter-basin agreements submitted to the Department shall be posted on the Department's website.

Note: Authority cited: Section 10733.2, Water Code.
Reference: Sections 10727.2, 10733, and 10733.2, Water Code.

Appendix B: Inter-basin Coordination Fact Sheet



Northern Sacramento Valley | Sustainable Groundwater Management Act

Regional Coordination Between Subbasins

Antelope | Bowman | Butte | Colusa | Corning | Los Molinos | Red Bluff | Sutter | Vina | Wyandotte Creek | Yolo

Sustainable Groundwater Management Act

What is SGMA? California enacted the Sustainable Groundwater Management Act (SGMA) in 2014 to better manage groundwater over the long term. Sustainability is achieved by avoiding significant and unreasonable conditions for the six "sustainability indicators."

- Lowering of Groundwater Levels
- Reduction of Groundwater Storage
- Land Subsidence
- Surface Water Depletion
- Water Quality Degradation
- Sea Water Intrusion

Why is regional coordination important? In the Sacramento Valley, inter-basin coordination is critical as Groundwater Sustainability Agencies (GSA) develop their Groundwater Sustainability Plans (GSP). Since groundwater subbasins in the Northern Sacramento Valley (NSV) are hydrologically interconnected, water management decisions and actions in one subbasin (e.g. groundwater pumping) and processes like climate change could change aquifer conditions and affect flows to other subbasins. Understanding and accounting for these processes is key to achieve sustainability in all subbasins.

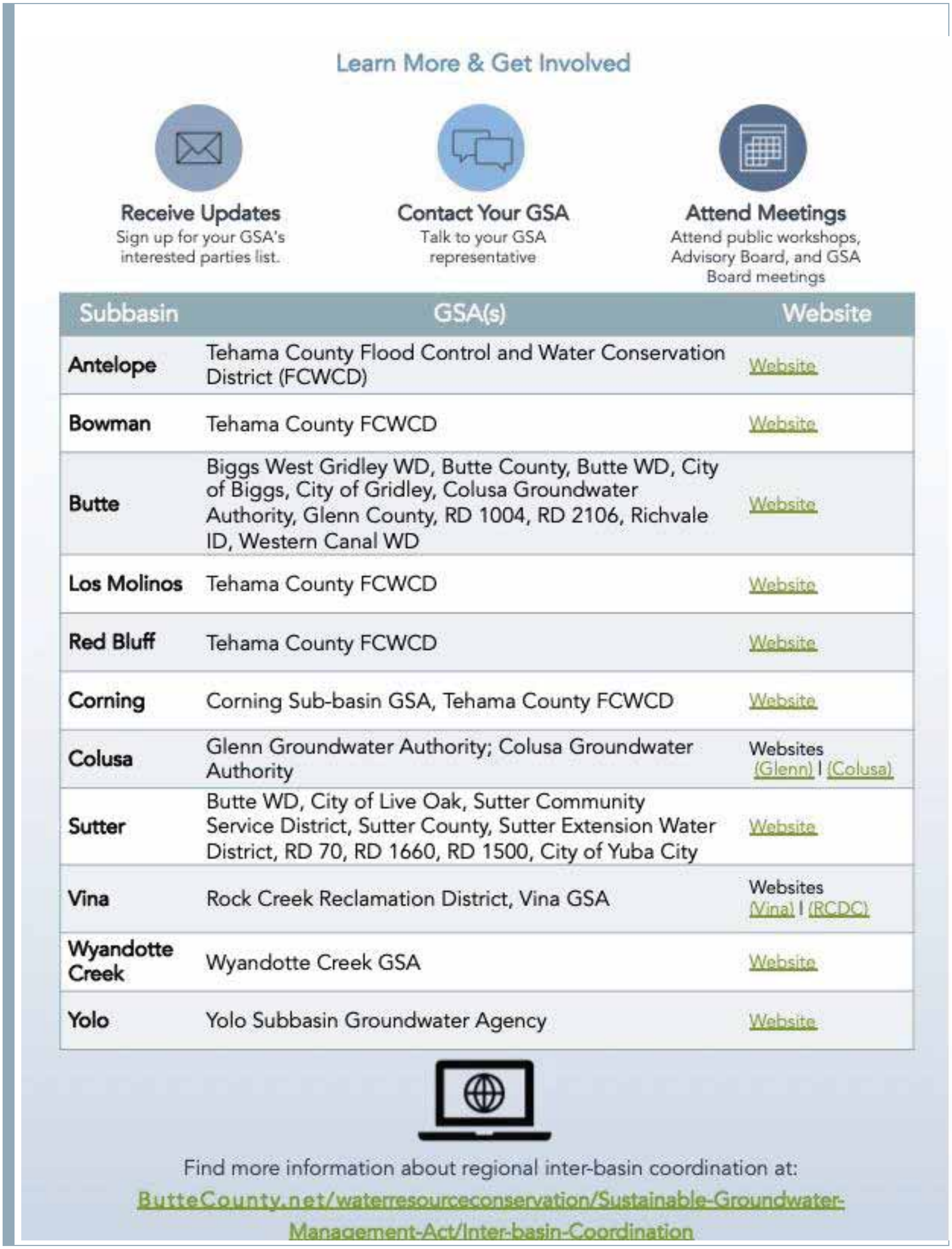
Who is involved in ongoing efforts?

Collaborative efforts have begun among representatives from 11 subbasins (Antelope, Bowman, Butte, Colusa, Corning, Los Molinos, Red Bluff, Sutter, Vina, Wyandotte Creek, Yolo), with facilitation support from the Consensus Building Institute. While efforts have focused on the subbasins mentioned, coordination will occur, as warranted, with other neighboring subbasins (Anderson and North Yuba).

What are the coordination priorities?

Groundwater Sustainability Agencies are working together to establish a foundation for open and transparent inter-basin coordination and communication by developing tools to:

- SHARE & COMPILE INFORMATION IN A CONSISTENT WAY
- OUTLINE A PROCESS TO IDENTIFY & RESOLVE ISSUES
- DOCUMENT COORDINATION EFFORTS



Learn More & Get Involved

Receive Updates
Sign up for your GSA's interested parties list.

Contact Your GSA
Talk to your GSA representative

Attend Meetings
Attend public workshops, Advisory Board, and GSA Board meetings

Subbasin	GSA(s)	Website
Antelope	Tehama County Flood Control and Water Conservation District (FCWCD)	Website
Bowman	Tehama County FCWCD	Website
Butte	Biggs West Gridley WD, Butte County, Butte WD, City of Biggs, City of Gridley, Colusa Groundwater Authority, Glenn County, RD 1004, RD 2106, Richvale ID, Western Canal WD	Website
Los Molinos	Tehama County FCWCD	Website
Red Bluff	Tehama County FCWCD	Website
Corning	Corning Sub-basin GSA, Tehama County FCWCD	Website
Colusa	Glenn Groundwater Authority; Colusa Groundwater Authority	Websites (Glenn) I (Colusa)
Sutter	Butte WD, City of Live Oak, Sutter Community Service District, Sutter County, Sutter Extension Water District, RD 70, RD 1660, RD 1500, City of Yuba City	Website
Vina	Rock Creek Reclamation District, Vina GSA	Websites (Vina) I (RCDC)
Wyandotte Creek	Wyandotte Creek GSA	Website
Yolo	Yolo Subbasin Groundwater Agency	Website

Find more information about regional inter-basin coordination at:
ButteCounty.net/waterresourceconservation/Sustainable-Groundwater-Management-Act/Inter-basin-Coordination

APPENDIX C

Memorandum of Understanding
Four County (Butte, Colusa, Glenn, and Tehama Counties)
Regional Water Resource Coordination, Collaboration, and Communication

Memorandum of Understanding
Four County (Butte, Colusa, Glenn, and Tehama Counties) Regional Water Resource Coordination, Collaboration, and Communication

1. BACKGROUND

The counties of Butte, Colusa, Glenn, and Tehama share common surface water and groundwater resources. Based on these common resources, local water resource managers understand that regular coordination, collaboration, and communication can result in an improved water resource understanding at both the county and regional level.

2. PURPOSE

The purpose of this document is to establish the mutual understandings of the four counties with respect to their voluntary joint efforts toward regional coordination, collaboration, and communication.

3. GOALS

The goals of the Four County Memorandum of Understanding (MOU) are:

2.1. To foster coordination, collaboration and communication between the four counties on water-related issues, to achieve greater efficiencies, and enhance public services.

2.2. To provide a framework for the management and disbursement of funding associated with activities pursued jointly under this MOU.

2.3. To improve competitiveness for State and Federal grant funding.

4. DEFINITIONS

4.1. Four County. Participants including the counties of Butte, Colusa, Glenn, and Tehama, with representation by the following:

- Butte County: Department of Water and Resource Conservation
- Colusa County: Department of Planning and Building
- Glenn County: Department of Agriculture
- Tehama County: Flood Control and Water Conservation District

4.2. Project Manager. A project manager will be determined by the Counties signatory to this MOU for any given project regardless of funding source to meet the goals set forth in this MOU.

5. MUTUAL UNDERSTANDINGS

5.1. Participation. Signatories to this MOU constitute the current participants. Participation is strictly on a voluntary basis and may be terminated at any time without recourse. Neighboring counties who share water resources common to the participating counties and who are engaged in similar activities will be invited to be signatory to this MOU. Signatories aspire to work collaboratively with other regional programs and technical outreach efforts.

5.2. Activities. Efforts pursued under this agreement will remain consistent with and will not exceed the current authority for any individual participating county. Efforts will include the study and investigation of water resources common to participants, monitoring and reporting, information dissemination and sharing between counties and with other county departments, public outreach and education, and other activities at the agreement and direction of individual county governing bodies.

5.3. County Funding. Counties are not required to commit funding associated with activities completed under this MOU. It is understood that activities under this MOU may result in the more efficient use of existing and future department funding resulting from improved collaboration and coordination.

5.4. External Funding. Signatories will work collaboratively in pursuit of external funding associated with common interest activities based on voluntary participation and agreement. When required, a mutually agreed upon County representative will serve as the Project Manager for activities completed under a contract with an external funding source. Existing county contracting mechanisms will be utilized where available for contractual and invoicing purposes between participating counties. Nothing in this MOU precludes individual counties from the individual pursuit, contracting and completion of work from an externally funded source regardless of a real or perceived regional interest.

5.5. Decision-making. Consensus will be sought when the need for a decision arises.

5.6. Non-binding nature. This document and participation under this MOU are nonbinding, and in no way suggest that a county may not continue its own activities as each county is expected to continue its own policies and procedures and undertake efforts to secure project funding from any source. A county may withdraw from participation at any time.

5.7. Termination. Because the MOU will require periodic review and updating for use into the future, it is envisioned that the joint efforts of those involved will be ongoing in maintaining a living document. Thus this document will remain as a reflection of the understandings of the participants. Individual signatories of this MOU may terminate their involvement at any time with no recourse.

6. SIGNATORIES TO THE MEMORANDUM OF UNDERSTANDING

We, the undersigned representatives of our respective counties, acknowledge the above as our understanding of how the Four County Coordination, Collaboration, and Communication MOU will be implemented.

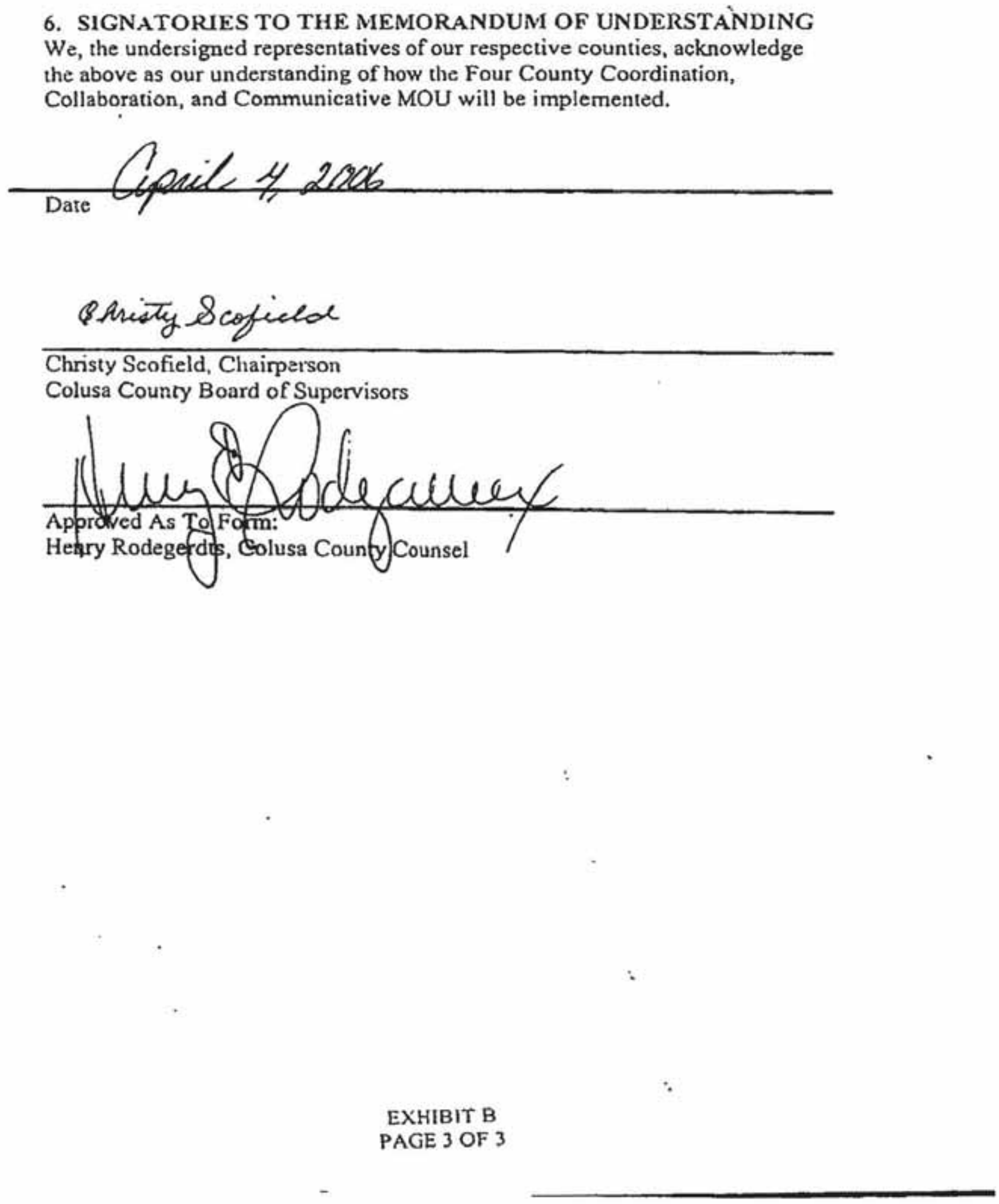
MAR 14 2006 APPROVED JAN 24 2006

Date

Curt Josiassen, Chairman
Butte County Board of Supervisors

2/28/06

Approved As To Form:
Bruce Alpert, Butte County Counsel



6. SIGNATORIES TO THE MEMORANDUM OF UNDERSTANDING

We, the undersigned representatives of our respective counties, acknowledge the above as our understanding of how the Four County Coordination, Collaboration, and Communicative MOU will be implemented.

Date April 4, 2006

Christy Scofield

Christy Scofield, Chairperson
Colusa County Board of Supervisors

Approved As To Form:
Henry Rodegerdts, Colusa County Counsel

EXHIBIT B
PAGE 3 OF 3

6. SIGNATORIES TO THE MEMORANDUM OF UNDERSTANDING

We, the undersigned representatives of our respective counties, acknowledge the above as our understanding of how the Four County Coordination, Collaboration, and Communication MOU will be implemented.

12-13-05

Date

Vice Chairman, Tehama County Flood Control
And Water Conservation District

Approved As To Form:

by

County Counsel, Tehama County

Date

By Board Chair

County
Approved As To Form:

County Counsel

Date

By Board Chair

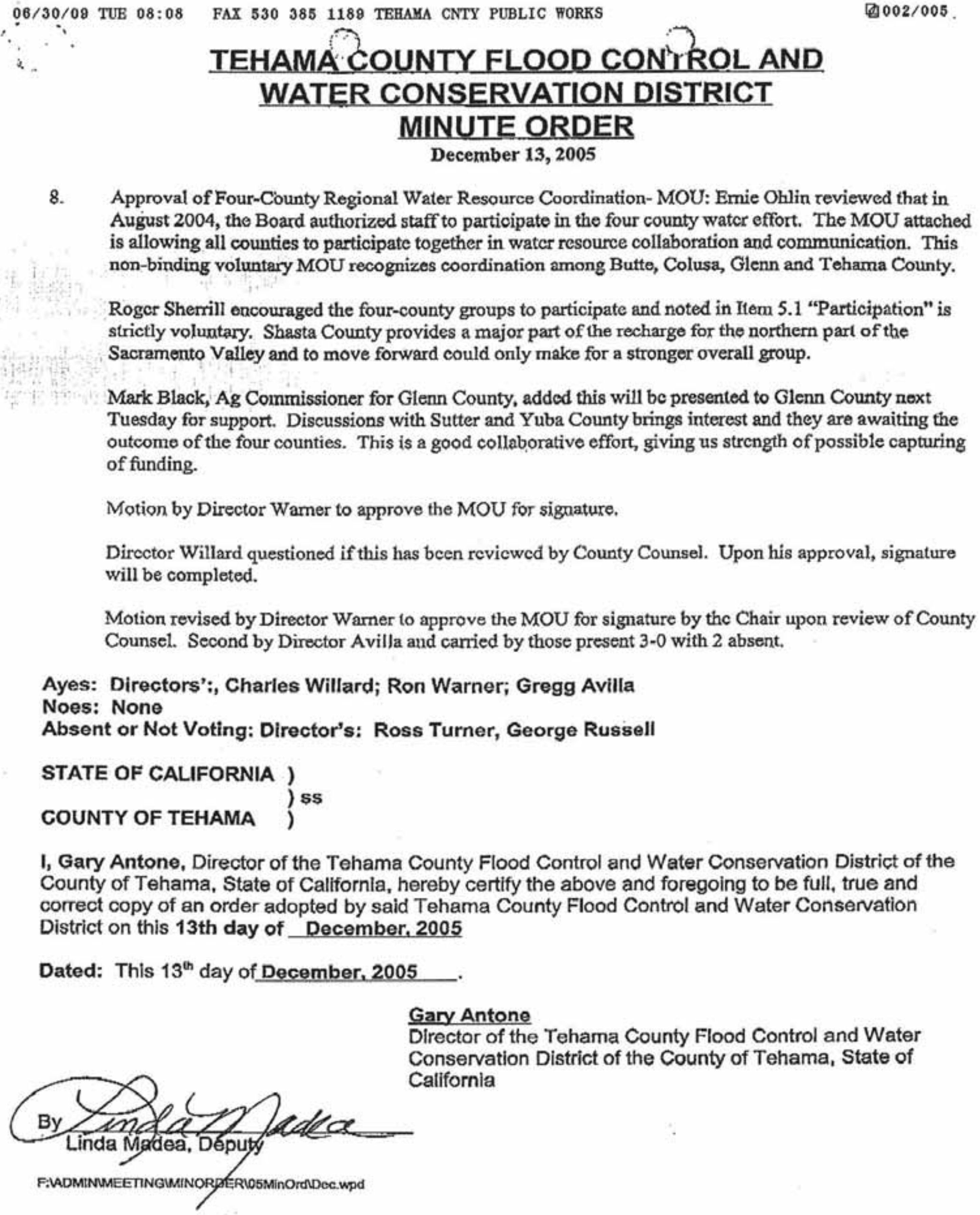
County
Approved As To Form:

County Counsel

Date

By Board Chair

County
Approved As To Form:



06/30/09 TUE 08:08 FAX 530 385 1189 TEHAMA CNTY PUBLIC WORKS 002/005

TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT MINUTE ORDER

December 13, 2005

8. Approval of Four-County Regional Water Resource Coordination- MOU: Ernie Ohlin reviewed that in August 2004, the Board authorized staff to participate in the four county water effort. The MOU attached is allowing all counties to participate together in water resource collaboration and communication. This non-binding voluntary MOU recognizes coordination among Butte, Colusa, Glenn and Tehama County.

Roger Sherrill encouraged the four-county groups to participate and noted in Item 5.1 "Participation" is strictly voluntary. Shasta County provides a major part of the recharge for the northern part of the Sacramento Valley and to move forward could only make for a stronger overall group.

Mark Black, Ag Commissioner for Glenn County, added this will be presented to Glenn County next Tuesday for support. Discussions with Sutter and Yuba County brings interest and they are awaiting the outcome of the four counties. This is a good collaborative effort, giving us strength of possible capturing of funding.

Motion by Director Warner to approve the MOU for signature.

Director Willard questioned if this has been reviewed by County Counsel. Upon his approval, signature will be completed.

Motion revised by Director Warner to approve the MOU for signature by the Chair upon review of County Counsel. Second by Director Avilla and carried by those present 3-0 with 2 absent.

Ayes: Directors':, Charles Willard; Ron Warner; Gregg Avilla
Noes: None
Absent or Not Voting: Director's: Ross Turner, George Russell

STATE OF CALIFORNIA)
) ss
COUNTY OF TEHAMA)

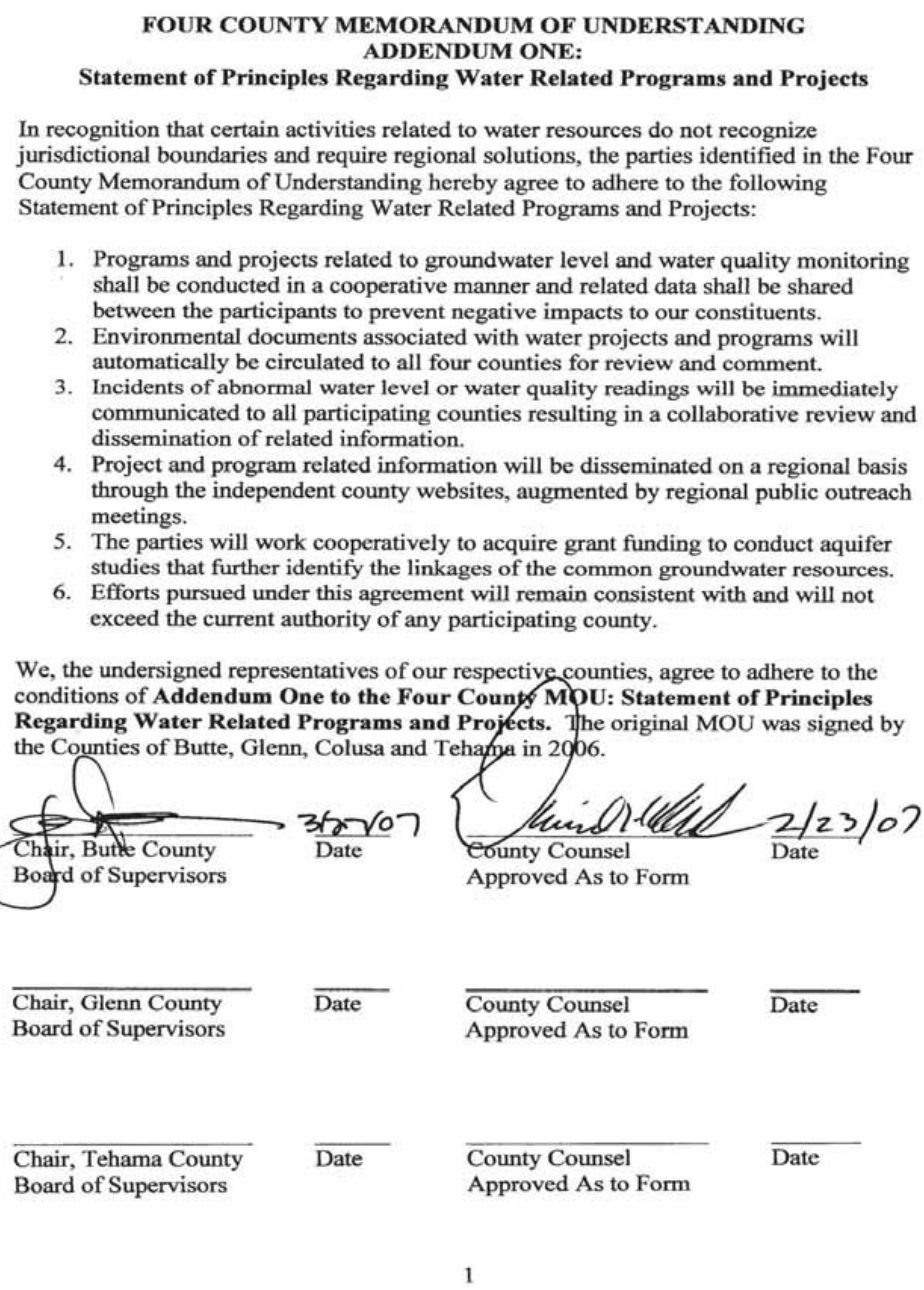
I, Gary Antone, Director of the Tehama County Flood Control and Water Conservation District of the County of Tehama, State of California, hereby certify the above and foregoing to be full, true and correct copy of an order adopted by said Tehama County Flood Control and Water Conservation District on this **13th day of December, 2005**

Dated: This 13th day of **December, 2005**.

Gary Antone
Director of the Tehama County Flood Control and Water Conservation District of the County of Tehama, State of California

By Linda Madea
Linda Madea, Deputy

F:\ADMIN\MEETING\MINORDER\05MinOrd\Dec.wpd



FOUR COUNTY MEMORANDUM OF UNDERSTANDING
ADDENDUM ONE:
Statement of Principles Regarding Water Related Programs and Projects

In recognition that certain activities related to water resources do not recognize jurisdictional boundaries and require regional solutions, the parties identified in the Four County Memorandum of Understanding hereby agree to adhere to the following Statement of Principles Regarding Water Related Programs and Projects:

1. Programs and projects related to groundwater level and water quality monitoring shall be conducted in a cooperative manner and related data shall be shared between the participants to prevent negative impacts to our constituents.
2. Environmental documents associated with water projects and programs will automatically be circulated to all four counties for review and comment.
3. Incidents of abnormal water level or water quality readings will be immediately communicated to all participating counties resulting in a collaborative review and dissemination of related information.
4. Project and program related information will be disseminated on a regional basis through the independent county websites, augmented by regional public outreach meetings.
5. The parties will work cooperatively to acquire grant funding to conduct aquifer studies that further identify the linkages of the common groundwater resources.
6. Efforts pursued under this agreement will remain consistent with and will not exceed the current authority of any participating county.

We, the undersigned representatives of our respective counties, agree to adhere to the conditions of **Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects.** The original MOU was signed by the Counties of Butte, Glenn, Colusa and Tehama in 2006.

	3/27/07		2/23/07
Chair, Butte County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Glenn County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date

Vice-Chair, Colusa County
Board of Supervisors

4-17-07
Date

County Counsel
Approved As to Form

Date

EXHIBIT A
PAGE 2 OF 2

COUNTY CONTRACT
\# 1788

FOUR COUNTY MEMORANDUM OF UNDERSTANDING
ADDENDUM ONE:
Statement of Principles Regarding Water Related Programs and Projects

In recognition that certain activities related to water resources do not recognize jurisdictional boundaries and require regional solutions, the parties identified in the Four County Memorandum of Understanding hereby agree to adhere to the following Statement of Principles Regarding Water Related Programs and Projects:

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4. Project and program related information will be disseminated on a regional basis through the independent county websites, augmented by regional public outreach meetings.
5. The parties will work cooperatively to acquire grant funding to conduct aquifer studies that further identify the linkages of the common groundwater resources.
6. Efforts pursued under this agreement will remain consistent with and will not exceed the current authority of any participating county.

We, the undersigned representatives of our respective counties, agree to adhere to the conditions of **Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects.** The original MOU was signed by the Counties of Butte, Glenn, Colusa and Tehama in 2006.

Chair, Butte County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Tom McGowan	4/3/2007	Carroll Copeland, Deputy	3/26/07
Chair, Glenn County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date

FOUR COUNTY MEMORANDUM OF UNDERSTANDING
ADDENDUM TWO:
Adding Sutter County to the Four County MOU

In recognition that certain activities related to water resources do not recognize jurisdictional boundaries and therefore require regional solutions, the parties identified in the original Four County Memorandum of Understanding: Counties of Butte, Colusa, Glenn and Tehama are hereby joined by Sutter County in the regional efforts discussed in the Four County MOU and the Statement of Principles Regarding Water Related Programs and Projects as discussed in Addendum One to the Four County MOU.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of the **Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects. And Addendum Two: Adding Sutter County to the Four County MOU.**

The original MOU was signed by the Counties of Butte, Glenn, Colusa and Tehama in 2006. Through approval of this addendum, Sutter County makes the same commitment to regional cooperation and coordination that is outlined in the original MOU.

Bill Connelly Chair, Butte County Board of Supervisors	05 MAY 2009 Date	Bruce S. Alpert County Counsel Approved As to Form	Date
Chair, Glenn County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Colusa County Board of Supervisors	Date	County Counsel Approved As to Form	Date

C09-082

FOUR COUNTY MEMORANDUM OF UNDERSTANDING
ADDENDUM TWO:
Adding Sutter County to the Four County MOU

In recognition that certain activities related to water resources do not recognize jurisdictional boundaries and therefore require regional solutions, the parties identified in the original Four County Memorandum of Understanding: Counties of Butte, Colusa, Glenn and Tehama are hereby joined by Sutter County in the regional efforts discussed in the Four County MOU and the Statement of Principles Regarding Water Related Programs and Projects as discussed in Addendum One to the Four County MOU.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of the **Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects. And Addendum Two: Adding Sutter County to the Four County MOU.**

The original MOU was signed by the Counties of Butte, Glenn, Colusa and Tehama in 2006. Through approval of this addendum, Sutter County makes the same commitment to regional cooperation and coordination that is outlined in the original MOU.

Chair, Butte County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Glenn County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Colusa County Board of Supervisors	5/5/09 Date	County Counsel Approved As to Form	Date 5/5/09

C09-082

FOUR COUNTY MEMORANDUM OF UNDERSTANDING
ADDENDUM TWO:
Adding Sutter County to the Four County MOU

In recognition that certain activities related to water resources do not recognize jurisdictional boundaries and therefore require regional solutions, the parties identified in the original Four County Memorandum of Understanding: Counties of Butte, Colusa, Glenn and Tehama are hereby joined by Sutter County in the regional efforts discussed in the Four County MOU and the Statement of Principles Regarding Water Related Programs and Projects as discussed in Addendum One to the Four County MOU.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of the **Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects. And Addendum Two: Adding Sutter County to the Four County MOU.**

The original MOU was signed by the Counties of Butte, Glenn, Colusa and Tehama in 2006. Through approval of this addendum, Sutter County makes the same commitment to regional cooperation and coordination that is outlined in the original MOU.

Chair, Butte County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Glenn County Board of Supervisors	5/21/09 Date	County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Colusa County Board of Supervisors	5/5/09 Date	County Counsel Approved As to Form	5/5/09 Date

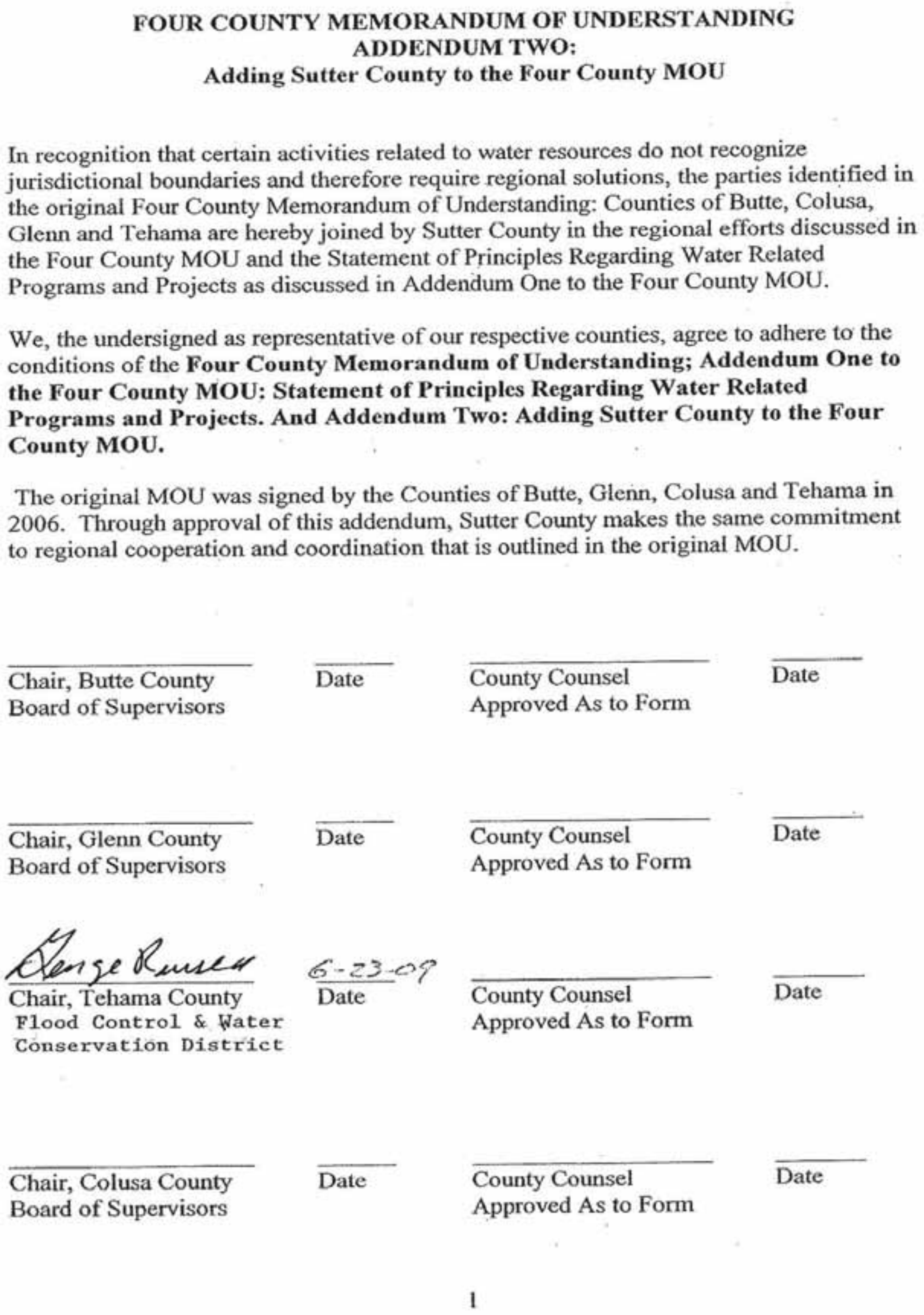
Chair, Sutter County
Board of Supervisors

Date

William J. Vanasek

County Counsel
Approved as to Form

4/14/09
Date



FOUR COUNTY MEMORANDUM OF UNDERSTANDING
ADDENDUM TWO:
Adding Sutter County to the Four County MOU

In recognition that certain activities related to water resources do not recognize jurisdictional boundaries and therefore require regional solutions, the parties identified in the original Four County Memorandum of Understanding: Counties of Butte, Colusa, Glenn and Tehama are hereby joined by Sutter County in the regional efforts discussed in the Four County MOU and the Statement of Principles Regarding Water Related Programs and Projects as discussed in Addendum One to the Four County MOU.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of the **Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects. And Addendum Two: Adding Sutter County to the Four County MOU.**

The original MOU was signed by the Counties of Butte, Glenn, Colusa and Tehama in 2006. Through approval of this addendum, Sutter County makes the same commitment to regional cooperation and coordination that is outlined in the original MOU.

Chair, Butte County Board of Supervisors — Date — County Counsel Approved As to Form — Date

Chair, Glenn County Board of Supervisors — Date — County Counsel Approved As to Form — Date

George Russell — 6-23-09

Chair, Tehama County Flood Control & Water Conservation District — Date — County Counsel Approved As to Form — Date

Chair, Colusa County Board of Supervisors — Date — County Counsel Approved As to Form — Date

FOUR COUNTY MEMORANDUM OF UNDERSTANDING:
ADDENDUM THREE
Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama and Sutter

Through adoption of this addendum, the signatories agree to begin a regional water management planning process pursuant to the Four County MOU, geographically covering the area of Butte, Colusa, Glenn, Tehama and Sutter Counties. The planning process shall utilize and incorporate existing plans and processes. The California legislature has recently adopted new criteria associated with the Integrated Regional Water Management Planning process. This new legislative criteria requires that acceptance and approval of the composition of all Integrated Regional Water Management Planning Areas be completed prior to accepting public funding associated with IRWMP grant funds. All IRWMP planning Regions and Plans must comply with the requirements as set forth in the Final Regional Acceptance Process Program Guidelines.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of **The Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects; Addendum Two: Adding Sutter County to the Four County MOU; Addendum Three: Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama and Sutter.**

Bill Connelly	05 MAY 2009	Bruce S. Alpert	
Chair, Butte County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Glenn County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date

Chair, Colusa County
Board of Supervisors

5/5/09
Date

County Counsel
Approved As to Form

5/5/09
Date

Chair, Sutter County
Board of Supervisors

Date

County Counsel
Approved as to Form

Date

C09-095
5-5-09

FOUR COUNTY MEMORANDUM OF UNDERSTANDING: ADDENDUM THREE

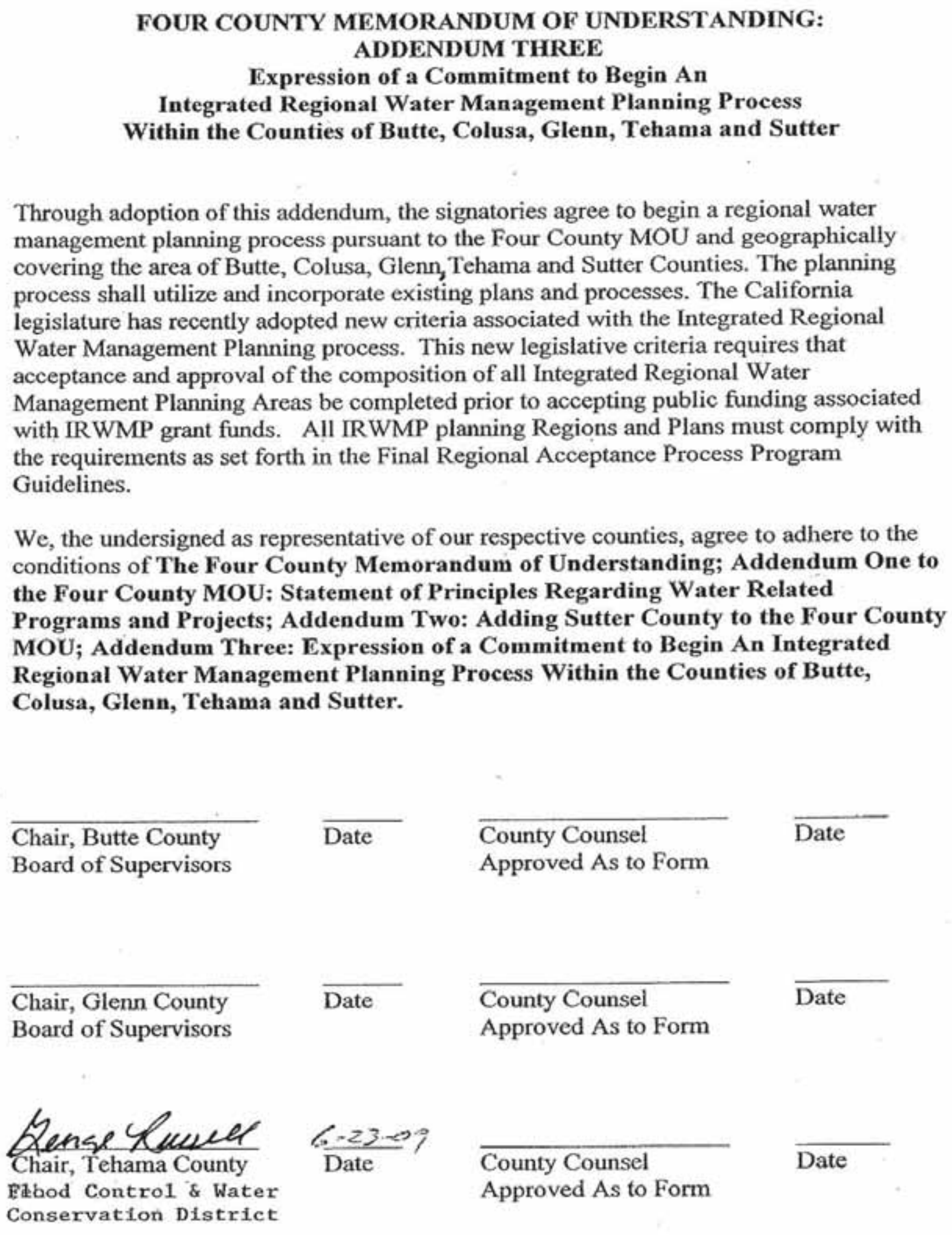
Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama and Sutter

Through adoption of this addendum, the signatories agree to begin a regional water management planning process pursuant to the Four County MOU and geographically covering the area of Butte, Colusa, Glenn Tehama and Sutter Counties. The planning process shall utilize and incorporate existing plans and processes. The California legislature has recently adopted new criteria associated with the Integrated Regional Water Management Planning process. This new legislative criteria requires that acceptance and approval of the composition of all Integrated Regional Water Management Planning Areas be completed prior to accepting public funding associated with IRWMP grant funds. All IRWMP planning Regions and Plans must comply with the requirements as set forth in the Final Regional Acceptance Process Program Guidelines.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of **The Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects; Addendum Two: Adding Sutter County to the Four County MOU; Addendum Three: Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama and Sutter.**

Chair, Butte County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Glenn County Board of Supervisors	5/21/09 Date	Thomas C. Agin County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date

Chair, Colusa County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Sutter County Board of Supervisors	Date	County Counsel Approved as to Form	4/14/09 Date



FOUR COUNTY MEMORANDUM OF UNDERSTANDING: ADDENDUM THREE

Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama and Sutter

Through adoption of this addendum, the signatories agree to begin a regional water management planning process pursuant to the Four County MOU and geographically covering the area of Butte, Colusa, Glenn, Tehama and Sutter Counties. The planning process shall utilize and incorporate existing plans and processes. The California legislature has recently adopted new criteria associated with the Integrated Regional Water Management Planning process. This new legislative criteria requires that acceptance and approval of the composition of all Integrated Regional Water Management Planning Areas be completed prior to accepting public funding associated with IRWMP grant funds. All IRWMP planning Regions and Plans must comply with the requirements as set forth in the Final Regional Acceptance Process Program Guidelines.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of **The Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects; Addendum Two: Adding Sutter County to the Four County MOU; Addendum Three: Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama and Sutter.**

Chair, Butte County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Glenn County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Denise Russell Chair, Tehama County Flood Control & Water Conservation District	6-23-09 Date	County Counsel Approved As to Form	Date

FOUR COUNTY MEMORANDUM OF UNDERSTANDING:
ADDENDUM FOUR
Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama, Sutter and Shasta

Through adoption of this addendum, the signatories agree:

1. Shasta County shall join the parties involved in the original Four County Memorandum of Understanding (MOU) and Addendum Two;
2. Signatories to the MOU and its addenda shall be called the Northern Sacramento Valley Integrated Regional Water Management Planning Group; and,
3. Begin a regional water management planning process pursuant to the Four County MOU, geographically covering the area of Butte, Colusa, Glenn, Tehama, Sutter and Shasta Counties. The planning process shall utilize and incorporate existing plans and processes. The California legislature has recently adopted new criteria associated with the Integrated Regional Water Management Planning process. This new legislative criteria requires that acceptance and approval of the composition of all Integrated Regional Water Management Planning Areas be completed prior to accepting public funding associated with IRWMP grant funds. All IRWMP planning Regions and Plans must comply with the requirements as set forth in the Final Regional Acceptance Process Program Guidelines.
4. The signatories to the MOU and its addenda reaffirm the provisions of section 5.6 of the MOU that the MOU and its addenda and participation under the MOU and its addenda are nonbinding.

We, the undersigned as representative of our respective counties, agree to adhere to the conditions of **The Four County Memorandum of Understanding; Addendum One to the Four County MOU: Statement of Principles Regarding Water Related Programs and Projects; Addendum Two: Adding Sutter County to the Four County MOU; Addendum Three: Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama and Sutter; Addendum Four: Expression of a Commitment to Begin An Integrated Regional Water Management Planning Process Within the Counties of Butte, Colusa, Glenn, Tehama, Sutter and Shasta.**

Bill Connelly Chair, Butte County Board of Supervisors	APR 13 2010 Date	County Counsel Approved As to Form	4.9.10 Date

Chair, Glenn County
Board of Supervisors
Date

County Counsel
Approved As to Form
Date

Chair, Tehama County
Board of Supervisors
Date

County Counsel
Approved As to Form
Date

Chair, Colusa County
Board of Supervisors
Date

County Counsel
Approved As to Form
Date

Chair, Sutter County
Board of Supervisors
Date

County Counsel
Approved as to Form
Date

Chair, Shasta County
Board of Supervisors
4/27/10
Date

County Counsel
Approved as to Form
5/6/10
Date

Chair, Glenn County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Tehama County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Colusa County Board of Supervisors	Date	County Counsel Approved As to Form	Date
Chair, Sutter County Board of Supervisors	4/20/10 Date	Wes Ward County Counsel Approved as to Form	4/13/10 Date
Chair, Shasta County Board of Supervisors	Date	County Counsel Approved as to Form	Date

Appendix D: Issue Resolution Process for Discussion Purposes

This document aims to guide discussions and provide pertinent information as subbasins consider inclusion of an issue resolution process in the Northern Sacramento Valley inter-basin coordination framework. These discussions will take place in the period leading up to the first five-year GSP update.

Discussion Prompts

1. *What are potential benefits/challenges or concerns of including an issue/dispute resolution process in the inter-basin coordination framework?*
2. *What are shared expectations between and among subbasins?*
3. *What are the GSAs preferences for addressing conflicts if/when they arise?*

Background

The Groundwater Sustainability Plan Regulations in Article 8 recommend including a "description of a process for identifying and resolving conflicts between Agencies" as a part of inter-basin coordination (Sections 10727.2, 10733, and 10733.2, Water Code). A recent study by Tara Moran, Janet Martinez, and William Blomquist, part of Stanford University's Water in the West found that the ability of interagency coordination "to solve complex challenges will be contingent on the ability of these organizations to effectively prevent and manage conflicts before they arise and to resolve these conflicts equitably and efficiently when they do." (Moran, Martinez, and Blomquist, 2021). Further, given how likely it is for disagreements at a local level to occur during SGMA implementation, the study suggests investing in establishing issue resolution processes before disagreements arise. Meanwhile, deferring their development could complicate the resolution process in times of conflict. Given these recommendations, consider the following questions for reflection and discussion.

Purposes of issue resolution processes

There are many options to identify and resolve issues that involve different parties, goals/objectives, and resources. Ideally, issue resolution processes are thoughtfully designed and tailored to specific contexts. **The broader goal for such a process can be to meet the agencies' long-term needs, considering local dynamics, desired outcomes, and expected uses**. Goals can include keeping things simple and efficient, maintaining relationships, ensuring quality of the process, fostering participation and community engagement, etc.

The figure below shows different types of dispute resolution processes. In some cases, agencies draft clauses that outline a tiered approach. They often begin with negotiation, which gives the parties control over the process and outcomes. Then, mediation, which brings in a neutral third-party (mediator) to facilitate the discussion and help parties work towards resolving issues. Often, negotiation and mediation lead to "non-binding" outcomes, non-enforceable by courts. Parties could opt to move towards arbitration or litigation, which are controlled by a third party (arbitrator or judge/jury) and can lead to binding and non-binding outcomes (Moran, Martinez, and Blomquist, 2019).

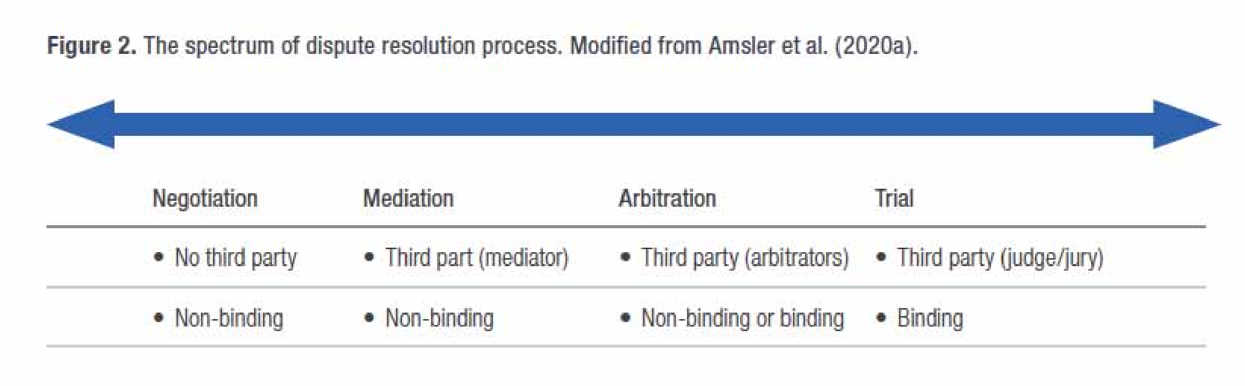


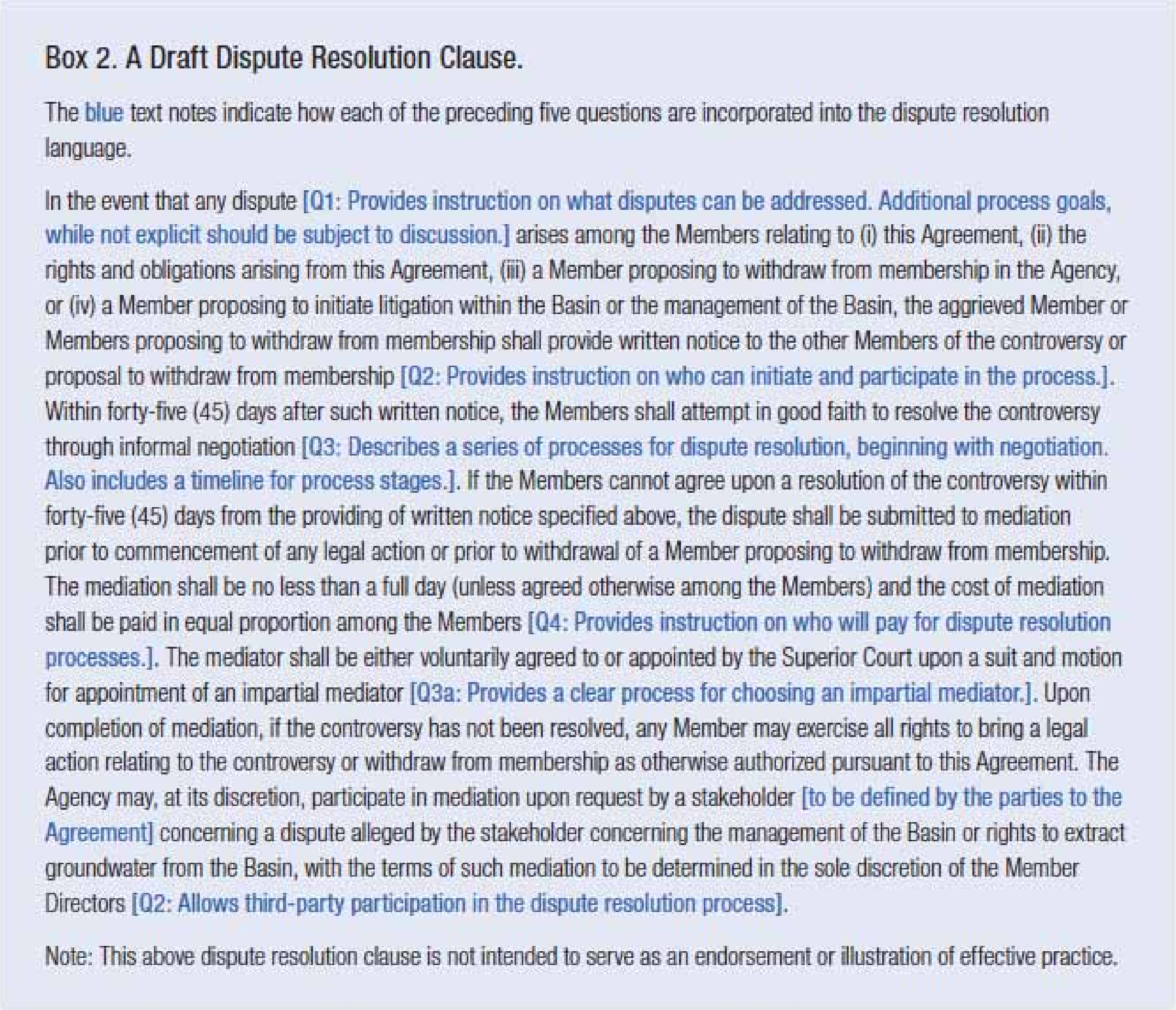
Figure 2. The spectrum of dispute resolution process. Modified from Amsler et al. (2020a).

Negotiation	Mediation	Arbitration	Trial
• No third party	• Third part (mediator)	• Third party (arbitrators)	• Third party (judge/jury)
• Non-binding	• Non-binding	• Non-binding or binding	• Binding

From Moran, Martinez, and Blomquist, 2019

Examples

1. Example from Moran, Martinez, and Blomquist, 2019



Box 2. A Draft Dispute Resolution Clause.

The blue text notes indicate how each of the preceding five questions are incorporated into the dispute resolution language.

In the event that any dispute [Q1: Provides instruction on what disputes can be addressed. Additional process goals, while not explicit should be subject to discussion.] arises among the Members relating to (i) this Agreement, (ii) the rights and obligations arising from this Agreement, (iii) a Member proposing to withdraw from membership in the Agency, or (iv) a Member proposing to initiate litigation within the Basin or the management of the Basin, the aggrieved Member or Members proposing to withdraw from membership shall provide written notice to the other Members of the controversy or proposal to withdraw from membership [Q2: Provides instruction on who can initiate and participate in the process.]. Within forty-five (45) days after such written notice, the Members shall attempt in good faith to resolve the controversy through informal negotiation [Q3: Describes a series of processes for dispute resolution, beginning with negotiation. Also includes a timeline for process stages.]. If the Members cannot agree upon a resolution of the controversy within forty-five (45) days from the providing of written notice specified above, the dispute shall be submitted to mediation prior to commencement of any legal action or prior to withdrawal of a Member proposing to withdraw from membership. The mediation shall be no less than a full day (unless agreed otherwise among the Members) and the cost of mediation shall be paid in equal proportion among the Members [Q4: Provides instruction on who will pay for dispute resolution processes.]. The mediator shall be either voluntarily agreed to or appointed by the Superior Court upon a suit and motion for appointment of an impartial mediator [Q3a: Provides a clear process for choosing an impartial mediator.]. Upon completion of mediation, if the controversy has not been resolved, any Member may exercise all rights to bring a legal action relating to the controversy or withdraw from membership as otherwise authorized pursuant to this Agreement. The Agency may, at its discretion, participate in mediation upon request by a stakeholder [to be defined by the parties to the Agreement] concerning a dispute alleged by the stakeholder concerning the management of the Basin or rights to extract groundwater from the Basin, with the terms of such mediation to be determined in the sole discretion of the Member Directors [Q2: Allows third-party participation in the dispute resolution process].

Note: This above dispute resolution clause is not intended to serve as an endorsement or illustration of effective practice.

2. Example from Butte Subbasin Cooperation Agreement

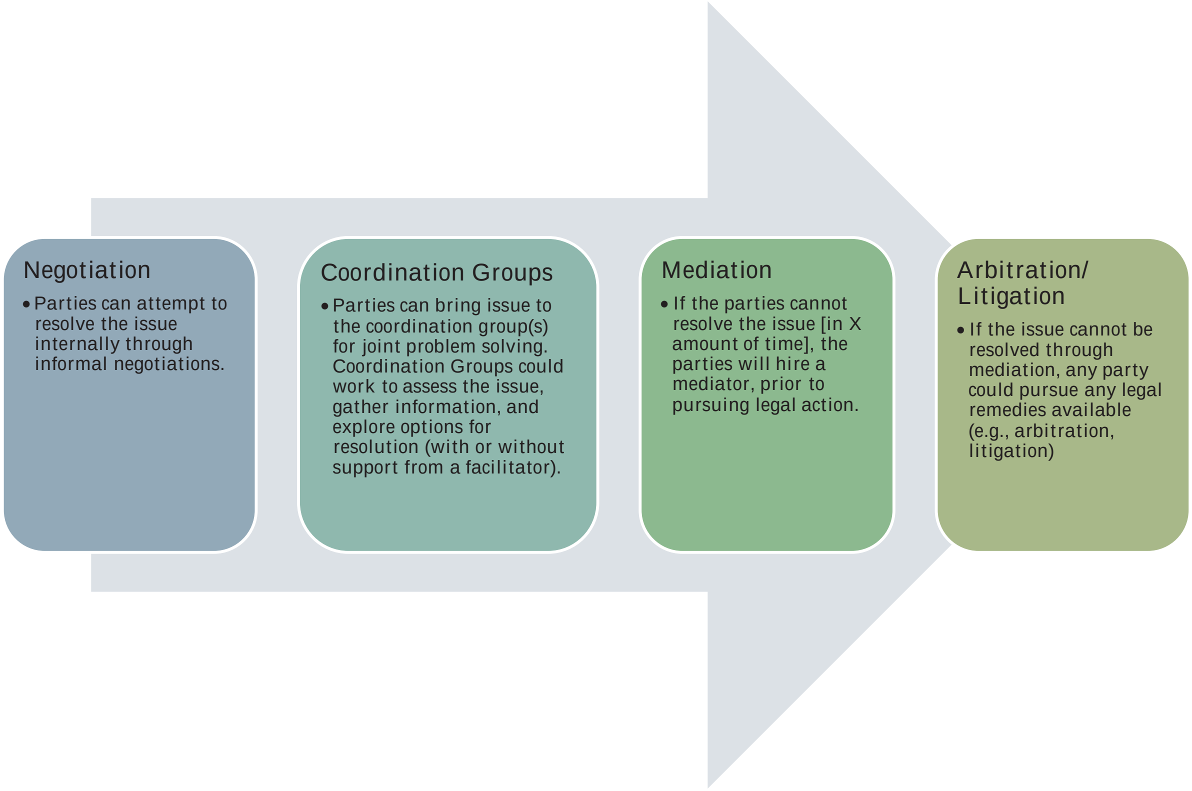
Note: This example doesn't provide much specificity. However, acknowledges shared intent to resolve disputes.

ARTICLE 9. DECISION-MAKING AND DISPUTE RESOLUTION

9.1. Decision-making Authority. Topics where the Members desire coordinated decision-making will be considered by the Advisory Board, and the Member Directors will strive for unanimous recommendations that will be presented to each Member's governing body for consideration. Such topics include, but are not limited to, development and implementation of the GSP, and associated financial arrangements. When unable to reach unanimous recommendations, the Advisory Board will outline the areas in which it does not agree, providing some explanation to inform the respective GSAs' governing bodies. Despite the recommendations of the Advisory Board, ultimate decision-making authority for topics considered by the Advisory Board resides with each Member's governing body.

9.2. Dispute Resolution. It is the desire of Members to informally resolve all disputes and controversies related to this Agreement, whenever possible, at the least possible level of formality and cost. If a dispute occurs, the disputing Members shall meet and confer in an attempt to resolve the matter. If informal resolution cannot be achieved, the matter will be referred to the Advisory Board for resolution. The Advisory Board may engage the services of a trained mediator or resort to all available legal and equitable remedies to resolve disputes.

Possible Process in the Northern Sacramento Valley



Negotiation
- Parties can attempt to resolve the issue internally through informal negotiations.

Coordination Groups
- Parties can bring issue to the coordination group(s) for joint problem solving. Coordination Groups could work to assess the issue, gather information, and explore options for resolution (with or without support from a facilitator).

Mediation
- If the parties cannot resolve the issue [in X amount of time], the parties will hire a mediator, prior to pursuing legal action.

Arbitration/ Litigation
- If the issue cannot be resolved through mediation, any party could pursue any legal remedies available (e.g., arbitration, litigation)

Worksheet: Key Questions and Considerations for Issue Resolution Process

The questions below could be used to guide the development of a specific issue resolution process in the context of inter-basin coordination in the Northern Sacramento Valley by the first 5-year GSP update. These questions could help to clarify the level of specificity that subbasins would find beneficial and mutually agreeable when/if conflict occurs.

Adapted from Moran, Martinez, and Blomquist, 2019

1) What are the process goals? a) Consider what disputes the process aims to address – all disputes arising at basin boundaries or only a subset? b) Consider inclusivity and transparency of the process, cost efficiency for parties and the GSA(s), timeframes, and other factors important to your agency(ies). c) Other potential objectives include dispute prevention, enhanced relationships, procedural and substantive fairness, legal compliance, durability of resolution and organizational improvement.	
2) Who can initiate and participate in the dispute resolution process? a) Consider what parties can initiate the dispute resolution process – is it only parties to the agreement or can external parties invoke it? There are pros and cons to both choices, so discussing this in advance will ensure thoughtful consideration.	
3) What processes are used to make decisions related to dispute resolution and what information is necessary? a) What is the process for selecting a mediator, facilitator, lawyer or other impartial party? b) Consider including a range of processes beginning with internal negotiations and escalating based on clear timelines.	
4) Who pays for the dispute resolution process? a) Consider who will pay for the mediator, facilitator, lawyer or other impartial party. Will it be paid for by the disputing parties, the GSA(s) or through a state-funded program? b) How could you assess whether the outcome of the dispute resolution process was successful?	

Other Resources

- Dutton, A. SGMA Updates, Coordination Considerations, and Potential Next Steps, Cosumnes Subbasin Working Group. February 21, 2018. http://cosumnes.waterforum.org/wp-content/uploads/2018/02/EKI_Cosumnes_TAC_meeting_2018-02-21.pdf
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Appendix 2-D

GSA Outreach Events and Interested Parties List

GSA Outreach Events

General SGMA Updates

4/4/2016	Tehama County Public Meeting	SGMA Overview
5/25/2016	Tehama County Public Meeting	SGMA Overview
6/27/2016	Tehama County Public Meeting	SGMA Overview
5/30/2017	Tehama County Public Meeting	Tehama County GSA and Current GW Conditions
8/9/2017	Tehama County Public Meeting	Tehama Co Reconnaissance Level GW Sustainability Risk Assessment
10/23/2018	Corning City Council Meeting	Tehama County GSA and Current GW Conditions
11/14/2018	Tehama County Farm Bureau Meeting	Tehama County GSA and Current GW Conditions Tehama County GSA and Current GW Conditions
4/5/2019	SGMA in the N. Sacramento Valley Forum	Tehama County GSA and Current GW Conditions
5/8/2019	Shasta Tehama Watershed Education Coalition	Tehama County GSA and Current GW Conditions
1/30/2020	Capay Land Owners Association	Tehama County GSA and Current GW Conditions

General SGMA Presentations to Community Groups

4/14/2016 – Sacramento River Discovery Center (Topic: General SGMA Overview)
9/15/2016 – Sacramento River Discovery Center (Topic: Tehama County GSA)
3/11/2020 – Tehama County Agricultural Realtor Group (Topic: General SGMA and GSA Updates, Corning Subbasin, Update on Groundwater Levels)
10/13/2020 – El Camino Irrigation District Board (Topic: General SGMA, Groundwater Levels)
3/1/2021 – Tehama County Cattlemen's Association (Topic: General SGMA Presentation)
3/17/2021 – Tehama County Farm Bureau (Topic: GSA and GSP Update)
7/13/2021 – Tehama County Board of Supervisors (General SGMA update)
7/14/2021 - Shasta Tehama Watershed Education Coalition (Topic: Current Groundwater Conditions & Progress Update on Development of GSPs)
9/15/2021 – Red Bluff Kiwanis Club Presentation (General SGMA Update)
9/21/2021 – Red Bluff Rotary (General SGMA update and GSP overview)

Tribal Presentations

6/13/2019 – Meeting with Paskenta Tribal Council (Topic: General SGMA, GSA, and GSP overview, Corning Subbasin)
4/6/2021 – Meeting with Paskenta Tribal Council (Topic: SGMA and Tribal Engagement)

Subbasin Specific Outreach Series

Oct 6, 2020 - Thomes Creek Estates Group (Red Bluff Subbasin) – SGMA and GSP Overview, next steps
Oct 14, 2020 – Antelope Subbasin – SGMA and GSP Overview, next steps
Oct 15, 2020 – Bowman Subbasin – SGMA and GSP Overview, next steps
Oct 21, 2020 – Red Bluff Subbasin – SGMA and GSP Overview, next steps
Oct 22, 2020– Los Molinos Subbasin – SGMA and GSP Overview, next steps

December 9, 2020 –All Subbasins - review of recent SGMA activities, overview of management planning areas and basin settings

April 19, 2021 - Bowman Subbasin – Plan Area and Basin Setting, SMC
April 20, 2021 - Red Bluff Subbasin – Plan Area and Basin Setting, SMC
April 21, 2021 - Antelope Subbasin – Plan Area and Basin Setting, SMC
April 22, 2021 - Los Molinos Subbasin – Plan Area and Basin Setting, SMC

Aug 17, 2021 - Bowman Subbasin – SMCs, PMAs, and Public Review Schedule
Aug 19, 2021 - Red Bluff Subbasin – SMCs, PMAs, and Public Review Schedule
Aug 23, 2021 - Antelope Subbasin – SMCs, PMAs, and Public Review Schedule
Aug 25, 2021- Los Molinos Subbasin – SMCs, PMAs, and Public Review Schedule

Quarterly eNewsletters
December 2020
March 2021
July 2021

All announcements are sent to the mailing list of the Tehama County Flood Control and Water Conservation District, Tehama County Groundwater Commission, Tehama County, and the individuals listed below:

Christina	Buck
Sandi	Marsumoto
Taylor	Wetzel
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Dennis	Garton
Trisha	Weber
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Debbie	Tiller
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Sandra	Jorgensen
Mitch	Belter
Bart	Fleharty
Rick	Rogers
Rose	Kemp
Martin	Spannaus
Kristin	Maze
Nichole	Bethurem
Charlie	Fee
Jeff	Hillberg
Richard	Caylor
David	Orth
Arnold	Jimenez
Pam	Farly
Steve	McCarthy
Michelle	Peacher
Michael	Smith
Bill	Borror
Ben	Kermen
Linda	Pitter
Kristina	Miller
Laura	Peters
Jim	Lowden
Dave	Hencratt
Brandon	Davison
Kate	Stockmyer
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Kevin	Davies
Daniele	Eyestone
Shawn	Pike
Steve	Dails
Karen	Bedsaul
Martha	Slack
Courtney	Nichols
Rae	Turnbull
Patrick	Wickham
Jenna	Ganoung
Kris	Deiters
Robin	Kampmann
Jack	Pratt
Elvin	Bentz
Erik	Gustafson
Anna	Kladzyk Constantino
Kathryn	Vogt-Haefelfinger
Jerry	Crow
Thomas	Richardson
Erin	Smith
Mark	Dutro
Lerose	Lane
Scott	Hardage
Alison	Divine
Joni	Maggini
Lisa	Hunter
Tim	Potanovic
Don	George
Bill	Goodwin
Carolyn	Steffan
Jeff	Sutton
Tom	Morrison
Mike	Wallace
Chris	Henderson
Pete	Dennehy
Michael	McFadden
Heather	Austin
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Robin	Imfeld
Doug	McGie
Bert	Owens
Ian	Turnbull
Ron	Worthley
David	Palais
Clay	Parker
Matt	Brady
Dave	Lester

Tim	Mesa
Nichole	Bethurem
Kris	Lamkin
Shanna	Long
John	Leach
Michael	ward
Kris	Lamkin
Mark	Rivera
Jana	Gosselin
Eric	Willard
Earl	Wintle
Jessica	Pecha
Eddy	Baker
Guadalupe	Green
Todd	Hamer
Jeanne	Brantigan
Ted	Crain
Jeff	Rabo
John	Grennan
Brian	Sanders
Tania	Carlone
Donna	Barry
Melissa	Rohde
Nicole	Eddy
Lyle	Dawson
Todd	Turley
D.	Wenz
Jake	Sahl
Jim	Edwards
Ryan	Fulton
Emmy	Westlake
Stacie	Silva
Kari	Dodd
Tyler	Christensen
Ryan	Sale
Claire	Taylor
John	Peterson
Todd	Turley
Gib	Bonner
Brandon	Davison
David	Brown
Armando	Cervantes
Doni	Rulofson
Michael	Bethurem
Robin	Huffman
Sam	Mudd
D.C.	Felciano
John	Garcia
Toni	Jorgenson
Brian	Mori
Greg	Long
Matt	Clifford
John	Hellen
Andrea	Craig
Carrie	Lee
Bob	Williams
Rick	Crabtree
Bridget	Gibbons
John	Leach
Dean	Sherrill
Kristal	Davis-Fadtke
Board	Member
H.D.	Coelho
Brad	Samuelson
Cody	McCoy
Sue	Knox
Paddy	Turnbull
Martha	Kleykamp
Gloria	Moran
John	Currey
Richard	Stout
Joanne	Lourence
Bill	Crain
Tia	Branton
Harley	North
Darrell	Wood
Adam	Englehardt
Andrew	Barron
John	Frehse
Ellen	Jones
Jim	Kerr
Eddy	Teasdale
Taylor	Wetzel
Linda	Solberg
Robert	Rianda
John	Edson
Pat	Vellines
Lisa	Porta
Charleen	Beard
Richa	McBrayer
Christine	Thompson
Fred	Hamilton

John	Veneble
Linda	Tunison
Hylon	Kauffmann
Allan	Fulton
Julie	Kelley
Les	Coke
Hal	Crain
Aimee	Zarzynski
Kim	Azevedo
Steve	Lindeman
Jim	Lowden
ryan	teubert
Bill	Hardwick
Mike	Perry
Matt	Hansen
Tamara	Williams
Aris	Babayan
Mandi	Selvester-Ownens
David	Brower
Harold	Clark
Melissa	Warner
Karin	Knorr
Bobie	Hughes
Linda	Herman
Mike	Murphy
Debi	Barnwell
Franklin	Barnes
Benjamin	Cook
Gary	Taylor
Rita	Hoofard
Melissa	Rohde
chris	payne
Shane	Overton
Codie	McKenzie
Ronald	Humphrey
Vicki	Kretsinger - Grabert
Angie	Rodriguez
Rick	Massa
Vicky	Dawley
Latisha	Miller
Johnn	Jones
Dale	Arthur
Jim	Simon
Michelle	Dooley
Becky	Gruenwald
Brendon	Flynn

John and Mary	Rochfort
Eric and Jenny	Alexander
Larry and Donna	Frew
Danny and Terrie	Rice
John and Linda	Pitter
Dave and Darlene	Yingst
Roberto and Lisa	Cruz
Mike and Patricia	Schager
Anderson	Cottonwood Irrigation District

Appendix 2-E

Comments on the Plan

Red Bluff Subbasin Groundwater Sustainability Plan
Public Draft Comments Received with Responses

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy	Chapter 3 Identification of Key Beneficial Uses and Users			**Disadvantaged Communities, Drinking Water Users, and Tribes** The identification of Disadvantaged Communities (DACs), drinking water users, and tribes is insufficient. We note the following deficiencies with the identification of these key beneficial users. ● The GSP erroneously maps "Economically Disadvantaged Areas" rather than "Disadvantaged Communities" in Figure 2-11. The GSP must map the locations of DACs within the subbasin, identify each DAC by name, and provide the population of each DAC. The GSP also fails to identify the population dependent on groundwater as their source of drinking water in the subbasin. ● The plan identifies the Greenville Rancheria Tribe as a stakeholder within the subbasin, but does not provide a map of the tribal lands or tribal interests in the subbasin. These missing elements are required for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions. **RECOMMENDATIONS** ● Provide a map that identifies each DAC in the subbasin by name and provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). ● Provide a map of tribal lands and describe tribal interests in the subbasin.	LSCE	Comments noted. DACs maps updated with population estimates. People belonging to Greenville Rancheria Tribe live in Tehama County; however, Greenville Rancheria is located in Greenville, CA outside of the subbasin.
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists	Chapter 3 Identification of Key Beneficial Uses and Users			**Interconnected Surface Waters** The identification of Interconnected Surface Waters (ISWs) is insufficient, due to lack of supporting information provided for the ISW analysis. The GSP describes the use of a groundwater model (Tehama Integrated Hydrologic Model) to analyze the interaction between groundwater and surface water within the subbasin. While Appendix 2-J gives a detailed description of the model, the GSP could be improved by including a summary in the main GSP text. This information should include groundwater level monitoring well data and	LSCE	Figure 2-56 symbology updated to show interconnected/disconnected reaches (based on interconnected surface water in the Central Valley dataset developed by TNC), and model outputs of gaining and losing reaches added to Appendix 2-J. Further shallow monitoring is needed to assess groundwater gradients near stream reaches.

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy				stream gauge data that were incorporated into the model, the screening depths of wells used in the groundwater model, and description of the temporal (seasonal and interannual) variability of the data used to calibrate the model. The GSP does not provide any concluding statements in the GSP text about which reaches are considered to be interconnected. Figure 2-56 (Surface Water and Shallow Groundwater Monitoring Stations) presents stream reaches in the subbasin labeled as perennial and intermittent/ephemeral. However, this figure does not label reaches as interconnected, disconnected, or reaches with data gaps. **RECOMMENDATIONS** ● Provide a map showing all the stream reaches in the subbasin, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP. ● In the main text of the GSP, summarize the groundwater elevation data and stream flow data used in the modeling analysis. Discuss temporal (seasonal and interannual) variability of the data used to calibrate the model. ● To confirm and illustrate the results of the groundwater modeling, overlay the subbasin's stream reaches with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis. ● For the depth-to-groundwater contour maps, use the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.		
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists	Chapter 3 Identification of Key Beneficial Uses and Users			**Groundwater Dependent Ecosystems** The identification of Groundwater Dependent Ecosystems (GDEs) is insufficient. The GSP took initial steps to identify and map GDEs using the Natural Communities Commonly Associated with Groundwater dataset (NC dataset). Potential GDEs were identified in areas overlying groundwater within 30 feet of land surface based on Spring 2015 groundwater conditions, but this was the only dataset used to characterize groundwater conditions in the subbasin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater	LSCE	Appendix 2-H Figures 1-4 included in final document. Inventory of flora and fauna added as an addition to Appendix 2-I. Spring 2015 water levels were used because 01/01/2015 is the baseline date for undesirable results. SGMA regulations state that "The plan may, but is not required to, address undesirable results that occurred before, and have not been corrected by, January 1, 2015".

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy				elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in California's Mediterranean climate. The GDE Appendix (Appendix 2-H) refers to Figure 1 through Figure 4 that illustrate the steps of the GDE analysis. These figures appear to be missing from the appendix, however. The GSP does not provide an inventory of flora and fauna in the subbasin, nor is any discussion of threatened or endangered species provided. **RECOMMENDATIONS** ● Include the missing Figures 1-4 in the GDE Appendix 2-H. ● Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. ● Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape. ● Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (Quercus lobata). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources. ● If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network. ● Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the		Depth-to-groundwater contours will not improve GDE identification as wells shallower than 50 feet were not included in contour analysis. As shown in Figure 2-57, availability of water level data from shallow wells (depth < 100 ft) are very limited in the Subbasin. The suggested 80-ft rooting depth for the Valley Oak is from a specific study in a fractured bedrock environment that is not applicable in Tehama County (Howard, 1992)*. *Howard, Janet L. 1992. Quercus lobata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
				subbasin and note any threatened or endangered species (see Attachment C in this letter for a list of freshwater species located in the Red Bluff Subbasin).		
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy	Chapter 3 Identification of Key Beneficial Uses and Users			**Native Vegetation and Managed Wetlands** Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget. The integration of native vegetation into the water budget is sufficient. We commend the GSA for including the groundwater demands of this ecosystem in the historical, current, and projected water budgets. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the subbasin. **RECOMMENDATION** ● State whether or not there are managed wetlands in the subbasin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.	LSCE	Statement added in GSP Chapter 2B on managed wetlands in Red Bluff. Managed wetlands now included in Figure 2-35.
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy	Chapter 3 Engaging Stakeholders			**Stakeholder Engagement During GSP Development** Stakeholder engagement during GSP development is insufficient. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Communications and Engagement Plan (Appendix 2-A). We note the following deficiencies with the overall stakeholder engagement process: ● The GSP identifies the Greenville Rancheria as tribal stakeholders present within the subbasin. Appendix C (of the Communications and Engagement Plan) describes Tribal Engagement in Tehama County. This appendix describes outreach principles, outreach partners, and steps to be taken for tribal engagement. However, the GSP does not state what steps were actually taken or the results of tribal engagement actions. ● The GSP documents opportunities for public involvement and engagement in general terms for listed stakeholders. Public outreach and engagement activities include public meetings, public hearings, workshops, notices to cities and counties within the subbasin, stakeholder briefings, newsletters, and updates to the GSA website. While the GSP provides a guidance document on DAC engagement, its description consists primarily of informing DACs by outreach to DAC-related organizations. The GSP does not state whether DACs and environmental	LSCE	Comments noted. Appendix 2-A updated to include recent outreach and engagement.

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
				stakeholders are represented on a GSA Advisory Committee or Board. ● The plan does not include documentation on how stakeholder input from the above mentioned outreach and engagement was considered and incorporated into the GSP development process. ● We note that Appendix G (of the Communications and Engagement Plan) is still under development and will include more details of outreach to stakeholders during GSP implementation. Ensure that as this section is finalized, it includes a detailed plan for continual opportunities for engagement through the implementation phase of the GSP that is specifically directed to DACs, domestic well owners, and environmental stakeholders. **RECOMMENDATIONS** ● In the Communications and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process. While some of these resources have already been stated in the GSP, we recommend that the GSA should improve utilization of these resources and documentation of the engagement process. ● Provide documentation on how stakeholder input was incorporated into the GSP development process. ● Provide information on whether the GSA has initiated contact with tribal stakeholders in the subbasin during GSP development, and how tribal concerns were considered during the GSP development process. ● Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the subbasin.		
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission	Chapter 3 Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users			The consideration of beneficial uses and users when establishing sustainable management criteria (SMC) is insufficient. The consideration of potential impacts on all beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds. **Disadvantaged Communities and Drinking Water Users** For chronic lowering of groundwater levels, the GSP states (p. 3-23): "The MTs were set to the following: Upper Aquifer: Spring groundwater elevation where less than 10 - 20% (on average) of domestic wells could potentially be impacted." No further details are provided on the minimum threshold impacts to domestic wells, including the methodology used to conduct the assessment. The GSP does not sufficiently describe whether minimum thresholds will avoid significant and unreasonable loss of drinking water to domestic well users that are not protected	LSCE	The GSP documents the number of wells impacted at the MT, some of which may be used by DACs. SMCs are only established for TDS as other COCs are not caused by or related to groundwater depletion. SGMA functions together with existing water quality regulations and programs.

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
o Melissa M. Rohde, The Nature Conservancy				by the minimum threshold. In addition, the GSP does not sufficiently describe or analyze direct or indirect impacts on DACs, drinking water users, or tribes when defining undesirable results, nor does it describe how the groundwater levels minimum thresholds are consistent with the Human Right to Water policy. The undesirable result for chronic lowering of groundwater levels is established as (p. 3-37): "25% of groundwater elevations measured at the same RMS wells exceed the associated MTs for 2 consecutive measurements. If the water year is dry or critically dry, then levels below the MTs are not undesirable if groundwater management allows for recovery in average or wetter years." By only using minimum threshold exceedances during non-drought years to define undesirable results for groundwater levels, significant and unreasonable impacts to beneficial users experienced during dry years or periods of drought will not result in an undesirable result. This is problematic since the GSP is failing to manage the subbasin in such a way that strives to minimize significant adverse impacts to beneficial users, which are often felt greatest in below-average, dry, and drought years. Furthermore, the requirement that 25% of monitoring wells exceed the minimum threshold before triggering an undesirable result means that areas with high concentrations of domestic wells may experience impacts significantly greater than the established minimum threshold because the 25% threshold isn't triggered. For degraded water quality, minimum thresholds are set for total dissolved solids (TDS) to 750 milligrams per liter (mg/L), lower than the upper secondary maximum contaminant level (SMCL) of 1,000 mg/L. This is the only constituent of concern (COC) for which SMC are established. Section 2.1.4.6 (Migration of Contaminated Groundwater) and Section 2.2.2.3 (Groundwater Quality) discuss other COCs, both naturally occurring and those associated with industrial activities, that have exceeded regulatory standards. Significantly, nitrate is an acute contaminant which, at levels above the maximum contaminant level, can affect public health. This is a particular concern for domestic wells, as nitrate exceedances do not affect the taste or smell of the water. SMC should be established for all COCs in the subbasin that may be impacted or exacerbated by groundwater use and/or management, in addition to coordinating with water quality regulatory programs. **RECOMMENDATIONS** **Chronic Lowering of Groundwater Levels**		

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
				● Describe direct and indirect impacts on DACs, domestic well owners, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years. ● Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the subbasin. **Degraded Water Quality** ● Describe direct and indirect impacts on DACs, drinking water users, and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act." ● Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs, drinking water users, and tribes. ● Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that are impacted or exacerbated by groundwater use and/or management.		
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy	Chapter 3 Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users			**Groundwater Dependent Ecosystems and Interconnected Surface Waters** Sustainable management criteria for chronic lowering of groundwater levels provided in the GSP do not consider potential impacts to environmental beneficial users. The GSP neither describes nor analyzes direct or indirect impacts on environmental users of groundwater when defining undesirable results. This is problematic because without identifying potential impacts on GDEs, minimum thresholds may compromise, or even destroy, these environmental beneficial users. Since GDEs are present in the subbasin, they must be considered when developing SMC. Sustainable management criteria for depletion of interconnected surface water are established by proxy using groundwater levels. The GSP states (p. 3-32): "Minimum thresholds are interim and will be the same water levels used in for the chronic lowering of groundwater elevations described in Section 3.3.1.1. Extensive data gaps are discussed in Section 3.7.8.7. The GSA will continue to evaluate new monitoring information and determine these thresholds later." While the GSP clearly recognizes the data gap for depletion of interconnected surface water SMC, we would like to see further discussion of how the interim SMC will affect beneficial users, and more specifically GDEs, or the impact of these minimum thresholds on GDEs in the subbasin. The GSP makes no attempt to evaluate how the proposed minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the	LSCE	Comments noted. Further shallow monitoring will better describe stream-aquifer interaction to determine potential impacts to environmental users associated with groundwater levels. GSP now includes plan for future monitoring to address these data gaps.

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				subbasin (see Attachment C for a list of environmental users in the subbasin), such as increased mortality and inability to perform key life processes (e.g., reproduction, migration). **RECOMMENDATIONS** ● When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin. Defining undesirable results is the crucial first step before the minimum thresholds can be determined. ● When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached. The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law. ● When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."		
E. J. Remson The Nature Conservancy Other contributors to comments include:	Chapter 3 Climate Change			The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures. The effects of climate change will intensify the impacts of water	LSCE	Comments noted. Climate change is incorporated into the water budget projections. The scenarios listed may be added to future modeling for the five-year update.

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o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy				stress on GDEs, making available shallow groundwater resources especially critical to their survival. Condon et al. (2020) shows that GDEs are more likely to succumb to water stress and rely more on groundwater during times of drought. When shallow groundwater is unavailable, riparian forests can die off and key life processes (e.g., migration and spawning) for aquatic organisms, such as steelhead, can be impeded. The integration of climate change into the projected water budget is insufficient. The GSP incorporates climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the subbasin. While these extreme scenarios may have a lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management. The GSP integrates climate change into key inputs (e.g., changes in precipitation, evapotranspiration, and surface water flow) of the projected water budget, and calculates a sustainable yield based on the projected water budget with climate change incorporated. However, if the water budgets are incomplete, including the omission of extremely wet and dry scenarios, then there is increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not adequately include climate change projections may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, tribes, and domestic well owners. **RECOMMENDATIONS** ● Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions. ● Incorporate climate change scenarios into projects and management actions.		
E. J. Remson The Nature Conservancy	Chapter 3 Data Gaps			The consideration of beneficial users when establishing monitoring networks is insufficient, due to lack of specific plans to increase the Representative Monitoring Sites (RMSs) in the	LSCE	TSS well installation is ongoing. Specific plans will be developed over time to fill these identified data gaps.

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Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy				monitoring network that represent water quality conditions and shallow groundwater elevations around DACs, domestic wells, tribes, GDEs, and ISWs in the subbasin. These beneficial users may remain unprotected by the GSP without adequate monitoring and identification of data gaps in the shallow aquifer. The Plan therefore fails to meet SGMA's requirements for the monitoring network. Figure 3-1 (Representative Monitoring Sites) shows insufficient representation of DACs, drinking water users, and tribes for water quality monitoring. Figure 3-2 (Groundwater Level Representative Monitoring Sites – Upper Aquifer) and Figure 3-3 (Groundwater Level Representative Monitoring Sites – Lower Aquifer) show insufficient representation of DACs, drinking water users, tribes, and GDEs for groundwater elevation monitoring. Refer to Attachment E for maps of these monitoring sites in relation to key beneficial users of groundwater. The GSP provides some discussion of data gaps for GDEs in Section 3.7.8.7 (Assessment and Improvement of Monitoring Network - Interconnected Surface Waters), but does not provide specific plans, such as locations or a timeline, to fill the data gaps. The GSP states (p. 3-23): "The GSA will also install three (3) nested monitoring wells (TSS 1-3) in the Subbasin which is included in this monitoring network (Figure 3-7). These wells are designed to monitor both the upper and lower aquifers." Figure 3-7 (Identification of Data Gaps (GDE)) maps high priority GDEs alongside existing shallow monitoring wells, but this figure does not show the additional proposed monitoring well locations. **RECOMMENDATIONS** ● Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, tribes, and GDEs to clearly identify monitored areas. ● Increase the number of RMSs in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater condition indicators across the subbasin and at appropriate depths for all beneficial users. Prioritize proximity to DACs, domestic wells, tribes, GDEs, and ISWs when identifying new RMSs. ● Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for all beneficial users - especially DACs, domestic wells, tribes, and GDEs. ● Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to		

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				GDEs or ISWs due to groundwater conditions in the subbasin. Additional studies of GDEs and groundwater - surface water interactions are briefly discussed in the Projects and Management Actions chapter, but very few details are provided.		
E. J. Remson The Nature Conservancy Other contributors to comments include: o Ngodoo Atume, Clean Water Action/Fund o J.Pablo Ortiz-Partida, Union of Concerned Scientists o Samantha Arthur, Audubon California o Danielle V. Dolan, Local Government Commission o Melissa M. Rohde, The Nature Conservancy	Chapter 3 Addressing Beneficial Users in Projects and Management Actions			The consideration of beneficial users when developing projects and management actions is incomplete. The GSP identifies the benefits or impacts of identified projects and management actions, including water quality impacts, to key beneficial users of groundwater such as GDEs and DACs. However, projects and management actions to improve water supply and GDE habitats (e.g., Invasive Species Plant Control, Levee Setback and Stream Channel Restoration) are described as potential projects without a known timeline for implementation. We commend the GSA for describing the environmental benefits of the Multi-Benefit Recharge Project (Section 4.3.3) in the subbasin, as developed with support and guidelines from The Nature Conservancy. The GSP describes the Tehama County Domestic Well Tracking and Outreach Program (Section 4.5.2.6) and the Well Deepening or Replacement Program (Section 4.5.2.7). However, these programs are described as potential projects to be implemented on an as-needed basis, instead of projects that will be implemented within the GSP planning horizon. We strongly recommend inclusion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. **RECOMMENDATIONS** ● Describe the projected timelines for implementing the Invasive Species Plant Control and Levee Setback and Stream Channel Restoration projects and management actions in Chapter 4 of the GSP. ● For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program. ● Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.	LSCE	Comments noted. Project and management actions will be implemented as needed based on MTs, therefore the timing of those projects is unknow at this time.
Michael Ward	Chapter 3			The Minimum Threshold (MT) is set for the Upper Aquifer based on criteria where 10 to 20 percent of the domestic wells could be impacted. In other words, the GSP finds it acceptable for up	LSCE	We concur with the restating of the MT that potentially 10 to 20 percent of the wells in the upper aquifer may be impacted (run dry). The timing of the measurement is spring since spring water levels are

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				to 20 percent of domestic wells to go dry before any Management Action is considered. Another important aspect of the MT is that the MT threshold is based on the spring measurement. The timing of this measurement is so that any recharge to the basin can be taken into account. If groundwater elevations meet or exceed the MT at the fall measurement, there's a chance that the basin might see enough recharge to be below the MT threshold in the Spring. A scenario where groundwater levels are just below the Spring MT subjects that part of the basin to another full season of irrigation. Theoretically, by reaching the MT, domestic well owners have already been subjected to well losses of 20 percent. Another season of irrigation opens the possibility of further losses. Groundwater elevations for many wells monitored in the Thomes Creek area dropped between 6 and 12 feet during the 2021 water year. Drought has likely been a factor but so has the conversion of grazing land to permanent crops. Basing the MT on the fall measurement would benefit domestic well users.		less susceptible to non-representative static water level measurements. Fall water levels will likely be lower than spring levels. The MTs are set based on definitions of significant and unreasonable conditions and the metrics (where and when and number of measurements exceeding the MT) are part of the complete MT definition.
Michael Ward	Chapter 4			General Comments. Five projects and one management action are proposed. Two projects, if shown to be feasible, will take several years to develop. Project benefits are uncertain given that most ag development is moving towards permanent crops which limit winter flooding and recharge options. Missing from the proposed Projects and Management Actions (PMA) are PMAs that address: • Declining groundwater levels that the basin has been experienced over the last two decades. • De-watering of domestic wells in the region (189 at last count). • Data gaps regarding groundwater conditions and Groundwater Dependent Ecosystems (GDEs). Groundwater Elevation Change Maps produced by DWR illustrate that the current demands on groundwater resources are not sustainable for a significant part of the basin. Downward trends are observed for wells at depths ranging from 100 to 450 feet and intermediate well depths ranging from 200 to 600 feet. These maps also illustrate the need the lack of data and monitoring locations to adequate assess groundwater conditions in the basin.	LSCE	Comments noted. PMAs will be expanded as needed.
Michael Ward	Chapter 4			General Comment. Multi Benefit Recharge Project. This project entails the flooding of agricultural lands with soil properties and cropping conditions conducive to groundwater recharge. Fields will be flooded and maintained at shallow depths to benefit waterbirds. Water will be sourced from existing or new water rights, depending on availability. It should be noted that water supplies from the	LSCE	Comment noted. PMAs are implemented based on conditions to avoid undesirable results. The timing of the PMAs is not known at this time.

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				CVP have historically been unreliable. The project is planned for future implementation pending funding and changes in future groundwater conditions in the Red Bluff Subbasin. So this project is moving forward on a wait and see basis. The feasibility of this project has yet to be determined. The conversion of acceptable "cropping conditions" to permanent crops makes the viability of this project unclear. Because the project is planned for future implementation, it does not address the immediate need to address declining groundwater levels in the basin.		
Michael Ward	Chapter 4			General Comment. Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge. This project would divert flood flows from Thomes Creek and Elder Creek for: 1) Off stream storage 2) Direct groundwater recharge through Flood-Managed Aquifer Recharge (Flood-MAR), dedicated recharge basins, or modified stream beds. This project would require several years for development if feasible. Time for Implementation does not provide any relief to declining groundwater elevations in the near term. Flood-MAR, as it relates to aquifer recharge on agricultural lands, is not a viable alternative given that most agricultural develop is in permanent crops. The acreage requirement discussed in the plan for groundwater recharge to address the basins water budget deficit was 27,500 acres. This might be out of context depending on the goals of the project.	LSCE	Comment noted. We concur that the projects will take years to implement. The PMAs will be implemented when and if conditions approach MTs. The PMAs are intended to avoid conditions with MTs and therefore need to be implemented before those condition occur. The lead time for PMA implementation will be part of the planning process and considered when interpreting trends in water levels.
Michael Ward	Chapter 4			General Comment. Expanded Use of CVP Supplies. This project proposes to use "unused" CVP water within the Thomes Creek WD and Proberta WD. These two districts are the only CVP contractors located within the basin. The benefits of the project may be limited considering the historic allocations of surface water supplies. As the GSP points out, "historically these two districts have not taken delivery of the full volume of water available under their CVP contracts each year, opting instead to rely on groundwater to meet crop demands." One of the reasons that the districts have not taken the full contract amount is that the full CVP allocation has not available – the lack of surface water reliability has forced irrigators to use groundwater. The GSP analysis of the available water versus unused water by the districts seems to assume that the contractual amounts are available each year. Increased usage of surface water would benefit declining groundwater levels in in both areas; however, the benefits of the project may be overestimated.	LSCE	Comment noted. While changes in water availability may impact the extent of project benefits and program participation from year to year, the program is anticipated to continue every year that additional CVP supplies are available. The benefit is assumed to be from long term average recharge.

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Michael Ward	Chapter 4			Should be included as Proposed Management Actions Management Action: Demand Management. Several actions identified under the summary description for Demand Management need to be a priority of the GSA. A priority at this stage of plan development is to address the County's Land Use Element for the General Plan Update (due in 2025). Part of the Corning basin is undergoing this process as part of the Glenn County General Plan Update. Consistency on how the Corning basin is managed should be a priority of the County. This level of consistency should be applied to the entire westside including the Red Bluff basin. The development of guidelines for well permitting and Review of County Well Permitting Ordinances should also be a proposed as part of this MA.	LSCE	Comment noted. We concur that conditions in adjacent subbasins is important for sustainability given that each GSA and county have their own governance. Well permitting ordinances are currently being developed, and they were not finalized in time to be incorporated in the GSP.
Michael Ward	Chapter 4			Should be included as Proposed Management Actions Management Action: Maintain and Expand Groundwater Level Monitoring Network. The GSP does a good job defining the data gaps for groundwater monitoring. This is also reflected in the Groundwater Level Change Maps produced by California DWR each year. These maps illustrate the lack of important data points to adequately assess groundwater conditions in the basin. How can the GSA manage groundwater sustainably without this data? This needs to be a MA.	LSCE	Comment noted. There are data gaps in groundwater monitoring and if funding is available those gaps will be filled, regardless of the action being defined as a management action.
Michael Ward	Chapter 4			Should be included as Proposed Management Actions Management Action: Well Metering. Well metering is a valuable tool if Minimum Thresholds are exceeded. Not having this tool leaves the GSA with limited data to affect a Management Action and remain compliant. Having historical data on local groundwater demands increases management options for the GSA.	LSCE	Comment noted. We agree that well metering will aid in water accounting, however other methods exist to create reliable water budgets.
Michael Ward	Chapter 4			Should be included as Proposed Management Actions Management Action: Tehama County Domestic Well Tracking and Outreach Program. This should be part of GSA efforts to serve domestic well owners. This Action also aids the GSA in quickly identifying the cause of a well going dry and helps to identify localized issues.	LSCE	Comment noted. We agree that this program will be beneficial. The Tehama County Domestic Well Tracking and Outreach Program is one of the management actions.

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Michael Ward	Chapter 4			Should be included as Proposed Management Actions Management Action: Tehama County Well Inventory and Registration Program. This is kind of a no-brainer when it comes to groundwater sustainable management. Knowing how many straws are in the ground, their depth, and capacity are valuable data points needed to manage sustainability. This Action is also proposed for the Corning basin GSP. This effort should be applied consistently Countywide.	LSCE	Comment noted. We agree that this program will be beneficial. Review of County Well Permitting Ordinances is one of the management actions.
Robin Huffman Corning, CA				Public participation has appeared very low overall. Groundwater is as invisible as the greenhouse gasses in the air, measurable only by experts with sufficient equipment. Potable water, like breathable air, is a necessity for life, and we're expecting, even trusting our elected officials and the expert contractors to look out for us, the general public. As the song goes, "You never miss the water, till the well runs dry". In the plan, specify and acknowledge the level of public participation so far, outside of elected officials and their appointees to committees and outside of special interests such as Farm Bureau officials. Somewhere in the GSPs, specify, or estimate, the amount of participation to date by individuals not appointed or paid by any agency to participate	LSCE	Comment noted. Public participation is discussed within Appendix 2-A.
Robin Huffman Corning, CA				The GSP contractors have explained, during public presentations, that the possibility of correct analysis of groundwater is only as good as the available data. The experts acknowledge in meetings that crucial groundwater data is missing. Data is especially missing for the very areas where the growth in agricultural pumping is occurring, and yet there is no stopping growth in these areas, mainly west of I-5. Big ag has discovered Tehama County at the very time that they have developed ways to grow nut trees in the hot and dry grasslands on the west side of I-5. Add to the plan that big ag needs to establish and pay for the monitoring of groundwater data wherever a new orchard of a defined size is established. Define such a size that would require the developer to establish a groundwater monitoring station that provides data available to the public.	LSCE	Comment noted. The GSP recognizes data gaps and future efforts will be made by the GSA to fill those gaps including the installation of multi-completion wells through the TSS program.
Robin Huffman Corning, CA				There is no definition of big ag in the plan. It would be helpful to make the distinction because of the massive size of the industry establishing itself the county, much occurring before this plan is adopted. There is no established precedent in the plan as to the management of overconsumption. The last should be the first to	LSCE	Comment noted. Agriculture users are defined among all the water users. The plan was written to avoid undesirable results and have groundwater sustainability.

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				be asked to stop pumping, but it should apply only to big ag because of the scale of their extraction of groundwater		
Robin Huffman Corning, CA				Add whatever you can to make this plan more sustainable before its adoption, but adopt the GSPs because they are adaptable.	LSCE	Comment noted.
Robin Huffman Corning, CA				I understand the need for GSPs and appreciate the process; however, unless the plan becomes more rigorous than it appears in this first complete draft, big ag will continue to expand and extract more groundwater, getting us all farther from sustainability and costing us each a lot to pay for executing the plan. Additionally, more families will have to pay for new and deeper residential wells because this plan allows big ag to continue to expand for awhile. This allowable decline, negotiated in ad hoc committees, is specified in the plan, and that makes the plan unsustainable as well as expensive. This version of the GSP, therefore, is a GUP, a Groundwater Unsustainability Plan	LSCE	Comment noted.
Robin Huffman Corning, CA				Depending on grants as mitigation for allowing overexploitation of the groundwater is not a plan for sustainability. Even if every family having to dig a deeper well were paid for the cost of that well, whether by big ag or the State of California, that condition would not lead to sustainability. Mitigation is not a plan for sustainability.	LSCE	Comment noted.
Robin Huffman Corning, CA				The baseline established in the GSP is lower than the current groundwater level. To allow the groundwater to continue to decline is not in the direction of sustainability. Sustainability at this point means stopping the decline, at the very least, and not allowing additional decline. Measurement levels are complicated by drought, and drought is given exception for management action. The drought exception is problematic and should be omitted in the GSPs	LSCE	Comment noted. Sustainability is defined in the GSP and measured through different Sustainable Management Criteria (SMC) including groundwater levels.
Robin Huffman Corning, CA				There should be a definition of sustainability in the plan using recent academic sources. The GSP should open with a discussion of what sustainability is. We can hope that future generations can access [groundwater] resources as we can, which is one early definition of sustainability. The concept of sustainability came out of efforts to continue development, to	LSCE	Comment noted. Sustainability is defined on page 1-5.

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				allow continued growth despite increasingly obvious limits to growth. Since then, many scholars recognize the greenwashing that comes with sustainability plans that facilitate growth. This is one such plan. Include a definition of sustainability using recent academic sources. Collaborate with authors and educators with expertise on sustainability, and do not assume sustainability needs little definition or discussion in individual GSPs. Most people have no idea of what sustainability means.		
Robin Huffman Corning, CA				Any process which lets big ag continue to usurp groundwater, allowing the groundwater to continue to decline to some level below the current level and call it sustainable is unsustainable. This seemingly well intended process is unlikely to produce real sustainability in groundwater use because it does not stop the current expansion of big ag wells. The GSP needs to be specifically involved in the county's well permitting process. Add this requirement to the plans	LSCE	Comment noted. Well permitting will be addressed by the Tehama County Water Commission in the future. The GSP only includes information available at the time. Review of County Well Permitting Ordinances is one of the management actions.
Robin Huffman Corning, CA				Knowing that too many current domestic wells went dry recently, knowing the groundwater levels have been declining, drought or not, because of big ag's already drawing the deep aquifer down, the authors of the GSP include more drawing down of the deep aquifer. There are currently over 50 ag well permits approved and not yet built, many likely for new orchards (the department approving the permits does not track the particular use other than "ag"). When the new orchards are established and start pumping, the groundwater will be sucked in mass quantity to water dry rangeland in the hot season, which is most of the year, to water trees which will die without regular and consistent watering. They must be irrigated, so there is no way to pause the pumping without losing the orchard. Big ag will not submit easily to their trees dying when the county gave them permit to draw water for their massive acreage of trees. This plan is not sustainable as it does not stop the expansion of big ag into dry areas of the county. There's no designation of inappropriate land use. There are no ideas specified about zoning changes needed to reach sustainability. Instead, the plan identifies the remaining creek beds and the total acreage which might yet be exploited by big ag. It's like an invitation, with a free study of where the water is, for big ag to buy rangeland and request well permits to grow nut trees. This GSP is literally a publicly funded study by a well drilling corporation seeking out where the groundwater is and how much might remain accessible to big ag. The plan does not define big ag. It does not require monitoring wells before big ag permits are granted in areas with no data. The only thing the GSP does is to establish the term sustainability, under-defined, and cost average	LSCE	Comments noted.

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				residents lots of money while continuing to allow big ag to do whatever they want. If the Farm Bureau does not protest too much about this GSP, then we do not have a plan which could possibly get us to sustainability. The GSP, however well intended, needs to start with recommending the county instating specific restrictions and rules for new development. The plan needs to include the legality of such rules and restrictions. California has planning tools and court rulings which need to be included in the GSPs for reference by the Board of Supervisors as they must implement management actions, according to the GSPs		
Robin Huffman Corning, CA				Sometimes common sense must take over to get to sustainability because by the time that the groundwater is fully understood, it will be too late. What is generally known about the deep aquifers is that they are a gift from the last ice age; this theory, supported by academic sources, should be included in the GSPs. Nature's systems cost us nothing until we take too much. Grants for projects to clean and try to inject water into the ground are funded by debt to which we all have to pay service. There is no such thing as free money for projects. Acknowledge in the GSPs that slowing or stopping growth is the cheapest way in the direction of sustainability, and probably the only way.	LSCE	Comment noted.
Robin Huffman Corning, CA				Management actions should include policies, in addition to any projects. There should be recommended policies since the county's groundwater is already in decline in large areas. We cannot get to sustainability via projects alone, not to mention that projects are expensive, no matter which budget they come from. Rules, such as no more growth in the acreage of orchards, is the way to sustainability, or at least to not crashing quite as soon. Projects, such as injecting water into the ground, if possible, would be expensive, and it would be a public expense unless the agency starts collecting money for the possible projects now. The expense for future projects, needed when the groundwater declines to the unacceptable level specified in the GSPs, should be collected now from companies extracting the groundwater for profit. State that in the GSPs as a recommended management action. Fairness needs to be indicated as a working principle in the GSPs. The companies who profit directly from the mass extraction of groundwater should be the ones who pay for restoring the groundwater to a sustainable level as defined in the GSPs Management Objectives.	LSCE	Comment noted. Management actions are distinct from projects as they are designed to affect water use (behavior) compared to physical projects that require construction. Management actions can be policies.

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Robin Huffman Corning, CA				The commons is a shared resource, such as groundwater. Include a discussion of the tragedy of the commons, since the GSPs are trying to prevent that.	LSCE	Comment noted.
Robin Huffman Corning, CA				Setting the MT so low means many wells will fail, due to a combination of factors, such as extended drought, a general drawdown of the groundwater in most areas over the past few decades, and new ag wells supporting new orchards. Recommended management actions should include compensation for the loss of domestic wells and the cost of digging new or deeper domestic wells, adding individual domestic water tanks, and delivering water to homes in rural areas where wells have gone dry due to unsustainable groundwater pumping.	LSCE	Comments noted. One of the management actions in the GSP is Well Deepening or Replacement Program.
Robin Huffman Corning, CA				Mitigation measures may be used to imitate sustainability, but where they cost residents not profiting from the extraction of mass quantities of groundwater for profit, a policy of fairness should be specified in the GSPs in the Management Objectives and Management Actions. Consistently recognize in specific recommended policies and actions that social equity is a major leg on which sustainability stands.	LSCE	Comments noted.
Robin Huffman Corning, CA				The GSPs plan to continue to draw down the water table. The Minimum Threshold is set lower than the depths of most domestic wells, with no recommendation or policy, save hoping for the drought to end, to restore the groundwater level. State the intention to limit additional industrial agricultural wells because there is no place with consistent extra water that we can afford to pipeline in; that's why we're doing groundwater sustainability planning. We cannot afford expensive projects to deepen domestic wells, build more above ground storage; every project takes money. What doesn't take money is to limit new wells. Keep the range lands for grazing with every policy recommendation and planning tool available in California. State the tools available. Keep orchards where they have surface water availability, using groundwater only during droughts. It's that simple to become more sustainable. Sustainability is about balance; it's not about drawing down the water table until Undesirable Results occur. URs are already occurring. We're at the threshold of what's minimal. Our objective should not be to make domestic wells deeper, as recommended by the Farm Bureau. Digging and pumping from deeper depths is expensive. That's an undesirable result of too much agricultural development coupled with extended drought and overall	LSCE	Comments noted.

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				overgrowth of California. Getting to sustainability starts with no growth in industrial wells. Sustainability is about balance between economic, environmental, and equity - profit, planet, and people. There's an energy component as well, as energy costs money and affects all three Es (or Ps). More engineering is costly, and even with grants, that doesn't get us to sustainability or provide a drop of water that isn't already spoken for. Nature works for free, and she knows what she is doing. We need to get out of the way, and she will replenish our groundwater, our streams and rivers. Regenerative agriculture can help pivot methods so that less water is required. Recommend regenerative agriculture as a management tool.		
Robin Huffman Corning, CA				In the GSPs, define the unacceptable consequences, the indicators of groundwater unsustainability. It is unacceptable to have domestic wells lose water due to groundwater decline from industrial pumping. Recognize that it is nearly impossible to prove that is happening to a specific resident because of a specific ag well, and that the onus currently is on the owner of the domestic well to prove. This is unfair and needs to be addressed in the GSPs. It is unacceptable to deplete the groundwater such that we lose what natural oaks remain. Nature needs more water than it's getting now due to the extensive extraction of groundwater. A sustainable plan would restore water for the ecosystem. Add recommendations for restoring groundwater in areas that are known to be, or are likely to be in decline. It is unacceptable to create losing streams. A sustainable groundwater management plan should restore flows in creeks, not allow continued big ag development alongside creeks. Add policy and management recommendations regarding losing streams. It is acceptable to not allow new industrial scale ag wells for water intensive perennial crops like almonds. Banning that kind of well is a relatively simple and inexpensive step towards managing groundwater that we can take now, so that we can continue living here. No one I know wants to be displaced because of almonds. The system will certainly not recover with additional wounds. Address this issue as a policy and management recommendation in the GSPs.	LSCE	Comments noted.

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
James Strong General Manager Deseret Farms of California	Chapter 3			**The GSA should revise the methodology for determining whether an undesirable result exists for the Sustainable Management Criteria regarding the Chronic Lowering of Groundwater Elevations.** Section 3.3.1.4 of the Sustainability Management Criteria (SMC) Chapter regarding the Chronic Lowering of Groundwater Elevations provides, in relevant part, that: Impacts of declining groundwater levels would be considered undesirable results if 25% or more of the RMS wells are below the MTs for two (2) consecutive measurements. We recommend that the GSA revise this section to clarify the duration between the "two (2) consecutive measurements," as follows: Impacts of declining groundwater levels would be considered undesirable results if 25% or more of the RMS wells are below the MTs for two (2) consecutive *annual Spring* measurements. This suggested language corresponds with the GSA's taking of quantitative measurements for this SMC. Section 3.3.1.2 provides, "the quantitative measurement for chronic lowering of groundwater elevations will be the *annual Spring measurements* taken at the RMS wells." (Emphasis added.) This section goes on to provide that the GSA will use this collected data to append existing data to generate hydrographs for the wells. (Draft GSP, Section 3.3.1.2.) This section makes it clear that the GSA plans to collect annual Spring measurements and put those measurements to good use. Therefore, the suggested language would not place any additional burden on the GSA but would instead provide clarifying language consistent with established ongoing activities. Additionally, this suggested language is similar to the methodology relied on in establishing undesirable results for the degraded water quality SMC. Section 3.3.4.4. provides, in relevant part, that "[u]ndesirable results will have occurred when at least 25% of RMC exceed the MTs for water quality for 2 consecutive years. . .." Here, the effect of this methodology is that the GSA will rely on two consecutive years-worth of data to determine whether an undesirable result exists. The same effect is sought with the language suggested above.	LSCE	Implemented suggested change.

Commenter Name	Section/ Subsection Number	Page Number	Figure/ Table Number (if applicable)	Comment	Name of Consultant Team Comment Responder	Consultant Team Response
James Strong General Manager Deseret Farms of California	Chapter 3			**The GSA should revise the Degraded Water Quality SMC to remove the qualifying language tying degraded water quality to GSP implementation.** Section 3.3.4.4. provides, in relevant part, that "[u]ndesirable results will have occurred when at least 25% of RMC exceed the MTs for water quality for 2 consecutive years at each well *where it can be established that GSP implementation is the cause of the exceedance*." (Emphasis added.) As currently drafted, it is unclear how the GSA will determine whether "GSP implementation is the cause of the exceedance." To avoid any unnecessary ambiguity in the GSP, we recommend that the GSA remove the italicized qualifying language. If, however, the GSA decides to retain this language, we recommend that the GSA include measurable guidelines as to how it will determine whether GSP implementation is the cause of any exceedance of MTs for water quality. Thank you for the opportunity to provide these comments. We appreciate the significance of the considerations and decisions the GSA must undertake, and we look forward to working with you further regarding these matters.	LSCE	Statement updated accordingly.

November 12, 2021

From: Robin Huffman, Corning, California

The following comments are for the Red Bluff GSP, in which I live, and all Tehama County GSPs to which these comments apply. Most of the comments apply to all the GSPs. I submit that most of these comments should be addressed in all of the GSPs. The authors of the GSPs know, or can find, where in the GSPs to address the comments, and so while the following comments are general and not systematic, chapter to chapter, the formal responses should be specific to pages in applicable chapters. I am not paid to look up page numbers, even as I have much experience doing so. I cannot apologize for not putting in more time for free; nevertheless, I am participating for good reason. I look forward to reading the responses.

I am a general member of the public, a resident of Tehama County with a domestic well that is relatively deep and declining to a concerning level. Hundreds of acres of rangeland around me have, in the past two years, been converted to nut trees, and more big acreage orchards are being developed out here on the west side of I-5. I have been following the GSP process for a couple of years, and I have participated in some of the meetings, mostly listening.

Comments for the Tehama County GSPs

1. Public participation has appeared very low overall. Groundwater is as invisible as the greenhouse gasses in the air, measurable only by experts with sufficient equipment. Potable water, like breathable air, is a necessity for life, and we're expecting, even trusting our elected officials and the expert contractors to look out for us, the general public. As the song goes, "You never miss the water, till the well runs dry". In the plan, specify and acknowledge the level of public participation so far, outside of elected officials and their appointees to committees and outside of special interests such as Farm Bureau officials. Somewhere in the GSPs, specify, or estimate, the amount of participation to date by individuals not appointed or paid by any agency to participate.

2. The GSP contractors have explained, during public presentations, that the possibility of correct analysis of groundwater is only as good as the available data. The experts acknowledge in meetings that crucial groundwater data is missing. Data is especially missing for the very areas where the growth in agricultural pumping is occurring, and yet there is no stopping growth in these areas, mainly west of I-5. Big ag has discovered Tehama County at the very time that they have developed ways to grow nut trees in the hot and dry grasslands on the west side of I-5. Add to the plan that big ag needs to establish and pay for the monitoring of groundwater data wherever a new orchard of a defined size is established. Define such a size that would require the developer to establish a groundwater monitoring station that provides data available to the public.

3. There is no definition of big ag in the plan. It would be helpful to make the distinction because of the massive size of the industry establishing itself the county, much occurring before this plan is adopted. There is no established precedent in the plan as to the management of overconsumption. The last should be the first to be asked to stop pumping, but it should apply only to big ag because of the scale of their extraction of groundwater.

4. Add whatever you can to make this plan more sustainable before its adoption, but adopt the GSPs because they are adaptable.

5. I understand the need for GSPs and appreciate the process; however, unless the plan becomes more rigorous than it appears in this first complete draft, big ag will continue to expand and extract more groundwater, getting us all farther from sustainability and costing us each a lot to pay for executing the plan. Additionally, more families will have to pay for new and deeper residential wells because this plan allows big ag to continue to expand for awhile. This allowable decline, negotiated in ad hoc committees, is specified in the plan, and that makes the plan unsustainable as well as expensive. This version of the GSP, therefore, is a GUP, a Groundwater Unsustainability Plan.

6. Depending on grants as mitigation for allowing overexploitation of the groundwater is not a plan for sustainability. Even if every family having to dig a deeper well were paid for the cost of that well, whether by big ag or the State of California, that condition would not lead to sustainability. Mitigation is not a plan for sustainability.

7. The baseline established in the GSP is lower than the current groundwater level. To allow the groundwater to continue to decline is not in the direction of sustainability. Sustainability at this point means stopping the decline, at the very least, and not allowing additional decline. Measurement levels are complicated by drought, and drought is given exception for management action. The drought exception is problematic and should be omitted in the GSPs.

8. There should be a definition of sustainability in the plan using recent academic sources. The GSP should open with a discussion of what sustainability is. We can hope that future generations can access [groundwater] resources as we can, which is one early definition of sustainability. The concept of sustainability came out of efforts to continue development, to allow continued growth despite increasingly obvious limits to growth. Since then, many scholars recognize the greenwashing that comes with sustainability plans that facilitate growth. This is one such plan. Include a definition of sustainability using recent academic sources. Collaborate with authors and educators with expertise on sustainability, and do not assume sustainability needs little definition or discussion in individual GSPs. Most people have no idea of what sustainability means.

9. Any process which lets big ag continue to usurp groundwater, allowing the groundwater to continue to decline to some level below the current level and call it

sustainable is unsustainable. This seemingly well intended process is unlikely to produce real sustainability in groundwater use because it does not stop the current expansion of big ag wells. The GSP needs to be specifically involved in the county's well permitting process. Add this requirement to the plans.

10. Knowing that too many current domestic wells went dry recently, knowing the groundwater levels have been declining, drought or not, because of big ag's already drawing the deep aquifer down, the authors of the GSP include more drawing down of the deep aquifer. There are currently over 50 ag well permits approved and not yet built, many likely for new orchards (the department approving the permits does not track the particular use other than "ag"). When the new orchards are established and start pumping, the groundwater will be sucked in mass quantity to water dry rangeland in the hot season, which is most of the year, to water trees which will die without regular and consistent watering. They must be irrigated, so there is no way to pause the pumping without losing the orchard. Big ag will not submit easily to their trees dying when the county gave them permit to draw water for their massive acreage of trees. This plan is not sustainable as it does not stop the expansion of big ag into dry areas of the county. There's no designation of inappropriate land use. There are no ideas specified about zoning changes needed to reach sustainability. Instead, the plan identifies the remaining creek beds and the total acreage which might yet be exploited by big ag. It's like an invitation, with a free study of where the water is, for big ag to buy rangeland and request well permits to grow nut trees. This GSP is literally a publicly funded study by a well drilling corporation seeking out where the groundwater is and how much might remain accessible to big ag. The plan does not define big ag. It does not require monitoring wells before big ag permits are granted in areas with no data. The only thing the GSP does is to establish the term sustainability, under-defined, and cost average residents lots of money while continuing to allow big ag to do whatever they want. If the Farm Bureau does not protest too much about this GSP, then we do not have a plan which could possibly get us to sustainability. The GSP, however well intended, needs to start with recommending the county instating specific restrictions and rules for new development. The plan needs to include the legality of such rules and restrictions. California has planning tools and court rulings which need to be included in the GSPs for reference by the Board of Supervisors as they must implement management actions, according to the GSPs.

11. Sometimes common sense must take over to get to sustainability because by the time that the groundwater is fully understood, it will be too late. What is generally known about the deep aquifers is that they are a gift from the last ice age; this theory, supported by academic sources, should be included in the GSPs. Nature's systems cost us nothing until we take too much. Grants for projects to clean and try to inject water into the ground are funded by debt to which we all have to pay service. There is no such thing as free money for projects. Acknowledge in the GSPs that slowing or stopping growth is the cheapest way in the direction of sustainability, and probably the only way.

12. Management actions should include policies, in addition to any projects. There should be recommended policies since the county's groundwater is already in decline in large areas. We cannot get to sustainability via projects alone, not to mention that projects are expensive, no matter which budget they come from. Rules, such as no more growth in the acreage of orchards, is the way to sustainability, or at least to not crashing quite as soon. Projects, such as injecting water into the ground, if possible, would be expensive, and it would be a public expense unless the agency starts collecting money for the possible projects now. The expense for future projects, needed when the groundwater declines to the unacceptable level specified in the GSPs, should be collected now from companies extracting the groundwater for profit. State that in the GSPs as a recommended management action. Fairness needs to be indicated as a working principle in the GSPs. The companies who profit directly from the mass extraction of groundwater should be the ones who pay for restoring the groundwater to a sustainable level as defined in the GSPs Management Objectives.

13. The commons is a shared resource, such as groundwater. Include a discussion of the tragedy of the commons, since the GSPs are trying to prevent that.

14. Setting the MT so low means many wells will fail, due to a combination of factors, such as extended drought, a general drawdown of the groundwater in most areas over the past few decades, and new ag wells supporting new orchards. Recommended management actions should include compensation for the loss of domestic wells and the cost of digging new or deeper domestic wells, adding individual domestic water tanks, and delivering water to homes in rural areas where wells have gone dry due to unsustainable groundwater pumping.

15. Mitigation measures may be used to imitate sustainability, but where they cost residents not profiting from the extraction of mass quantities of groundwater for profit, a policy of fairness should be specified in the GSPs in the Management Objectives and Management Actions. Consistently recognize in specific recommended policies and actions that social equity is a major leg on which sustainability stands.

16. The GSPs plan to continue to draw down the water table. The Minimum Threshold is set lower than the depths of most domestic wells, with no recommendation or policy, save hoping for the drought to end, to restore the groundwater level. State the intention to limit additional industrial agricultural wells because there is no place with consistent extra water that we can afford to pipeline in; that's why we're doing groundwater sustainability planning. We cannot afford expensive projects to deepen domestic wells, build more above ground storage; every project takes money. What doesn't take money is to limit new wells. Keep the range lands for grazing with every policy recommendation and planning tool available in California. State the tools available. Keep orchards where they have surface water availability, using groundwater only during droughts. It's that simple to become more sustainable. Sustainability is about balance; it's not about drawing down the water table until

Undesirable Results occur. URs are already occurring. We’re at the threshold of what’s minimal. Our objective should not be to make domestic wells deeper, as recommended by the Farm Bureau. Digging and pumping from deeper depths is expensive. That’s an undesirable result of too much agricultural development coupled with extended drought and overall overgrowth of California. Getting to sustainability starts with no growth in industrial wells. Sustainability is about balance between economic, environmental, and equity - profit, planet, and people. There’s an energy component as well, as energy costs money and affects all three Es (or Ps). More engineering is costly, and even with grants, that doesn’t get us to sustainability or provide a drop of water that isn’t already spoken for. Nature works for free, and she knows what she is doing. We need to get out of the way, and she will replenish our groundwater, our streams and rivers. Regenerative agriculture can help pivot methods so that less water is required. Recommend regenerative agriculture as a management tool.

17. In the GSPs, define the unacceptable consequences, the indicators of groundwater unsustainability.

    - It is unacceptable to have domestic wells lose water due to groundwater decline from industrial pumping. Recognize that it is nearly impossible to prove that is happening to a specific resident because of a specific ag well, and that the onus currently is on the owner of the domestic well to prove. This is unfair and needs to be addressed in the GSPs.

    - It is unacceptable to deplete the groundwater such that we lose what natural oaks remain. Nature needs more water than it’s getting now due to the extensive extraction of groundwater. A sustainable plan would restore water for the ecosystem. Add recommendations for restoring groundwater in areas that are known to be, or are likely to be in decline.

    - It is unacceptable to create losing streams. A sustainable groundwater management plan should restore flows in creeks, not allow continued big ag development alongside creeks. Add policy and management recommendations regarding losing streams.

    - It is acceptable to not allow new industrial scale ag wells for water intensive perennial crops like almonds. Banning that kind of well is a relatively simple and inexpensive step towards managing groundwater that we can take now, so that we can continue living here. No one I know wants to be displaced because of almonds. The system will certainly not recover with additional wounds. Address this issue as a policy and management recommendation in the GSPs.

Thank you in advance for addressing the points made in this comment letter. I look forward to reading the responses.

The Nature Conservancy
Audubon | CALIFORNIA
Local Government Commission
Leaders for Livable Communities
Union of Concerned Scientists
Science for a healthy planet and safer world
CLEAN WATER ACTION | CLEAN WATER FUND

November 19, 2021

Tehama County Flood Control and Water Conservation District GSA
9380 San Benito Ave
Gerber, CA 96035

Submitted via email: *nbethurem@tcpw.ca.gov*

Re: Public Comment Letter for Red Bluff Subbasin Draft GSP

Dear Nichole Bethurem,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the Red Bluff Subbasin being prepared under the Sustainable Groundwater Management Act (SGMA). Our organizations are deeply engaged in and committed to the successful implementation of SGMA because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of changing climate. Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, such as domestic well owners, environmental users, surface water users, federal government, California Native American tribes and disadvantaged communities (Water Code 10723.2).

As stakeholder representatives for beneficial users of groundwater, our GSP review focuses on how well disadvantaged communities, drinking water users, tribes, climate change, and the environment were addressed in the GSP. While we appreciate that some basins have consulted us directly via focus groups, workshops, and working groups, we are providing public comment letters to all GSAs as a means to engage in the development of 2022 GSPs across the state. Recognizing that GSPs are complicated and resource intensive to develop, the intention of this letter is to provide constructive stakeholder feedback that can improve the GSP prior to submission to the State.

Based on our review, we have significant concerns regarding the treatment of key beneficial users in the Draft GSP and consider the GSP to be **insufficient** under SGMA. We highlight the following findings:

1. Beneficial uses and users **are not sufficiently** considered in GSP development.
    a. Human Right to Water considerations **are not sufficiently** incorporated.
    b. Public trust resources **are not sufficiently** considered.
    c. Impacts of Minimum Thresholds, Measurable Objectives and Undesirable Results on beneficial uses and users **are not sufficiently** analyzed.
2. Climate change **is not sufficiently** considered.

3. Data gaps **are not sufficiently** identified and the GSP **needs additional plans** to eliminate them.
4. Projects and Management Actions **do not sufficiently consider** potential impacts or benefits to beneficial uses and users.

Our specific comments related to the deficiencies of the Red Bluff Subbasin Draft GSP along with recommendations on how to reconcile them, are provided in detail in **Attachment A.**

Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A	GSP Specific Comments
Attachment B	SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users
Attachment C	Freshwater species located in the basin
Attachment D	The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset"
Attachment E	Maps of representative monitoring sites in relation to key beneficial users

Thank you for fully considering our comments as you finalize your GSP.

Best Regards,

Ngodoo

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

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The Nature Conservancy

Melissa M. Rohde

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Red Bluff Subbasin Draft Groundwater Sustainability Plan

1. Consideration of Beneficial Uses and Users in GSP development

Consideration of beneficial uses and users in GSP development is contingent upon adequate identification and engagement of the appropriate stakeholders. The (A) identification, (B) engagement, and (C) consideration of disadvantaged communities, drinking water users, tribes,[1] groundwater dependent ecosystems, streams, wetlands, and freshwater species are essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.

A. Identification of Key Beneficial Uses and Users

Disadvantaged Communities, Drinking Water Users, and Tribes
The identification of Disadvantaged Communities (DACs), drinking water users, and tribes is **insufficient**. We note the following deficiencies with the identification of these key beneficial users.

- The GSP erroneously maps "Economically Disadvantaged Areas" rather than "Disadvantaged Communities" in Figure 2-11. The GSP must map the locations of DACs within the subbasin, identify each DAC by name, and provide the population of each DAC. The GSP also fails to identify the population dependent on groundwater as their source of drinking water in the subbasin.
- The plan identifies the Greenville Rancheria Tribe as a stakeholder within the subbasin, but does not provide a map of the tribal lands or tribal interests in the subbasin.

These missing elements are required for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions.

RECOMMENDATIONS

- Provide a map that identifies each DAC in the subbasin by name and provide the population of each identified DAC. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).
- Provide a map of tribal lands and describe tribal interests in the subbasin.

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[1] Our letter provides a review of the identification and consideration of federally recognized tribes (Data source: SGMA Data viewer) within the GSP from non-tribal members and NGOs. Based on the likely incomplete information available to our organizations for this review, we recommend that the GSA utilize the California Department of Water Resources' "Engagement with Tribal Governments" Guidance Document (https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents) to comprehensively address these important beneficial users in their GSP.

Interconnected Surface Waters

The identification of Interconnected Surface Waters (ISWs) is **insufficient**, due to lack of supporting information provided for the ISW analysis. The GSP describes the use of a groundwater model (Tehama Integrated Hydrologic Model) to analyze the interaction between groundwater and surface water within the subbasin. While Appendix 2-J gives a detailed description of the model, the GSP could be improved by including a summary in the main GSP text. This information should include groundwater level monitoring well data and stream gauge data that were incorporated into the model, the screening depths of wells used in the groundwater model, and description of the temporal (seasonal and interannual) variability of the data used to calibrate the model.

The GSP does not provide any concluding statements in the GSP text about which reaches are considered to be interconnected. Figure 2-56 (Surface Water and Shallow Groundwater Monitoring Stations) presents stream reaches in the subbasin labeled as perennial and intermittent/ephemeral. However, this figure does not label reaches as interconnected, disconnected, or reaches with data gaps.

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the subbasin, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.
- In the main text of the GSP, summarize the groundwater elevation data and stream flow data used in the modeling analysis. Discuss temporal (seasonal and interannual) variability of the data used to calibrate the model.
- To confirm and illustrate the results of the groundwater modeling, overlay the subbasin's stream reaches with depth-to-groundwater contour maps to illustrate groundwater depths and the groundwater gradient near the stream reaches. Show the location of groundwater wells used in the analysis.
- For the depth-to-groundwater contour maps, use the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a Digital Elevation Model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.

Groundwater Dependent Ecosystems

The identification of Groundwater Dependent Ecosystems (GDEs) is **insufficient**. The GSP took initial steps to identify and map GDEs using the Natural Communities Commonly Associated with Groundwater dataset (NC dataset). Potential GDEs were identified in areas overlying groundwater within 30 feet of land surface based on Spring 2015 groundwater conditions, but this was the only dataset used to characterize groundwater conditions in the subbasin's GDEs. We recommend using groundwater data from multiple seasons and water year types over the pre-SGMA period (i.e., 2005-2015) to determine the range of depth to groundwater. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying GDEs and is necessary to capture the variability in groundwater conditions inherent in

California’s Mediterranean climate. The GDE Appendix (Appendix 2-H) refers to Figure 1 through Figure 4 that illustrate the steps of the GDE analysis. These figures appear to be missing from the appendix, however.

The GSP does not provide an inventory of flora and fauna in the subbasin, nor is any discussion of threatened or endangered species provided.

RECOMMENDATIONS

- Include the missing Figures 1-4 in the GDE Appendix 2-H.
- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.
- Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.
- Refer to Attachment B for more information on TNC’s plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons from the NC Dataset are connected to groundwater. It is important to emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and proximity to other water sources.
- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as “Potential GDEs” in the GSP until data gaps are reconciled in the monitoring network.
- Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the subbasin and note any threatened or endangered species (see Attachment C in this letter for a list of freshwater species located in the Red Bluff Subbasin).

Native Vegetation and Managed Wetlands

Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget.[2,3] The integration of native vegetation into the water budget is **sufficient**. We commend the GSA for including the groundwater demands of this ecosystem in the historical, current and projected water budgets. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the subbasin.

RECOMMENDATION

- State whether or not there are managed wetlands in the subbasin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

B. Engaging Stakeholders

Stakeholder Engagement During GSP Development

Stakeholder engagement during GSP development is **insufficient**. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Communications and Engagement Plan (Appendix 2-A).[4]

We note the following deficiencies with the overall stakeholder engagement process:

- The GSP identifies the Greenville Rancheria as tribal stakeholders present within the subbasin. Appendix C (of the Communications and Engagement Plan) describes Tribal Engagement in Tehama County. This appendix describes outreach principles, outreach partners, and steps to be taken for tribal engagement. However, the GSP does not state what steps were actually taken or the results of tribal engagement actions.

- The GSP documents opportunities for public involvement and engagement in general terms for listed stakeholders. Public outreach and engagement activities include public meetings, public hearings, workshops, notices to cities and counties within the subbasin, stakeholder briefings, newsletters, and updates to the GSA website. While the GSP provides a guidance document on DAC engagement, its description consists primarily of informing DACs by outreach to DAC-related organizations. The GSP does not state whether DACs and environmental stakeholders are represented on a GSA Advisory Committee or Board.

- The plan does not include documentation on how stakeholder input from the above mentioned outreach and engagement was considered and incorporated into the GSP development process.

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[2] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[3] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

[4] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

- We note that Appendix G (of the Communications and Engagement Plan) is still under development and will include more details of outreach to stakeholders during GSP implementation. Ensure that as this section is finalized, it includes a detailed plan for continual opportunities for engagement through the implementation phase of the GSP that is specifically directed to DACs, domestic well owners, and environmental stakeholders.

RECOMMENDATIONS

- In the Communications and Engagement Plan, describe active and targeted outreach to engage all stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process. While some of these resources have already been stated in the GSP, we recommend that the GSA should improve utilization of these resources and documentation of the engagement process.
- Provide documentation on how stakeholder input was incorporated into the GSP development process.
- Provide information on whether the GSA has initiated contact with tribal stakeholders in the subbasin during GSP development, and how tribal concerns were considered during the GSP development process.
- Utilize DWR's tribal engagement guidance to comprehensively identify, involve, and address all tribes and tribal interests that may be present in the subbasin.[5]

C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users

The consideration of beneficial uses and users when establishing sustainable management criteria (SMC) is **insufficient**. The consideration of potential impacts on all beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[6,7,8]

Disadvantaged Communities and Drinking Water Users

For chronic lowering of groundwater levels, the GSP states (p. 3-23): *"The MTs were set to the following: Upper Aquifer: Spring groundwater elevation where less than 10 - 20% (on average) of domestic wells could potentially be impacted."* No further details are provided on the minimum threshold impacts to domestic wells, including the methodology used to conduct the assessment. The GSP does not sufficiently describe whether minimum thresholds will avoid significant and

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[5] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

[6] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[7] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[8] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

unreasonable loss of drinking water to domestic well users that are not protected by the minimum threshold. In addition, the GSP does not sufficiently describe or analyze direct or indirect impacts on DACs, drinking water users, or tribes when defining undesirable results, nor does it describe how the groundwater levels minimum thresholds are consistent with the Human Right to Water policy.[9]

The undesirable result for chronic lowering of groundwater levels is established as (p. 3-37): *"25% of groundwater elevations measured at the same RMS wells exceed the associated MTs for 2 consecutive measurements. If the water year is dry or critically dry, then levels below the MTs are not undesirable if groundwater management allows for recovery in average or wetter years."* By only using minimum threshold exceedances during non-drought years to define undesirable results for groundwater levels, significant and unreasonable impacts to beneficial users experienced during dry years or periods of drought will not result in an undesirable result. This is problematic since the GSP is failing to manage the subbasin in such a way that strives to minimize significant adverse impacts to beneficial users, which are often felt greatest in below-average, dry, and drought years. Furthermore, the requirement that 25% of monitoring wells exceed the minimum threshold before triggering an undesirable result means that areas with high concentrations of domestic wells may experience impacts significantly greater than the established minimum threshold because the 25% threshold isn't triggered.

For degraded water quality, minimum thresholds are set for total dissolved solids (TDS) to 750 milligrams per liter (mg/L), lower than the upper secondary maximum contaminant level (SMCL) of 1,000 mg/L. This is the only constituent of concern (COC) for which SMC are established. Section 2.1.4.6 (Migration of Contaminated Groundwater) and Section 2.2.2.3 (Groundwater Quality) discuss other COCs, both naturally occurring and those associated with industrial activities, that have exceeded regulatory standards. Significantly, nitrate is an acute contaminant which, at levels above the maximum contaminant level, can affect public health. This is a particular concern for domestic wells, as nitrate exceedances do not affect the taste or smell of the water. SMC should be established for all COCs in the subbasin that may be impacted or exacerbated by groundwater use and/or management, in addition to coordinating with water quality regulatory programs.

RECOMMENDATIONS

Chronic Lowering of Groundwater Levels

- Describe direct and indirect impacts on DACs, domestic well owners, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. Include information on the impacts during prolonged periods of below average water years.

- Consider minimum threshold exceedances during drought years when defining the groundwater level undesirable result across the subbasin.

Degraded Water Quality

- Describe direct and indirect impacts on DACs, drinking water users, and tribes when defining undesirable results for degraded water quality.[10] For specific guidance on how

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[9] California Water Code §106.3. Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=106.3

[10] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[11]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs, drinking water users, and tribes.

- Set minimum thresholds and measurable objectives for all water quality constituents within the subbasin that are impacted or exacerbated by groundwater use and/or management.

Groundwater Dependent Ecosystems and Interconnected Surface Waters

Sustainable management criteria for chronic lowering of groundwater levels provided in the GSP do not consider potential impacts to environmental beneficial users. The GSP neither describes nor analyzes direct or indirect impacts on environmental users of groundwater when defining undesirable results. This is problematic because without identifying potential impacts on GDEs, minimum thresholds may compromise, or even destroy, these environmental beneficial users. Since GDEs are present in the subbasin, they must be considered when developing SMC.

Sustainable management criteria for depletion of interconnected surface water are established by proxy using groundwater levels. The GSP states (p. 3-32): "*Minimum thresholds are interim and will be the same water levels used in for the chronic lowering of groundwater elevations described in Section 3.3.1.1. Extensive data gaps are discussed in Section 3.7.8.7. The GSA will continue to evaluate new monitoring information and determine these thresholds later."* While the GSP clearly recognizes the data gap for depletion of interconnected surface water SMC, we would like to see further discussion of how the interim SMC will affect beneficial users, and more specifically GDEs, or the impact of these minimum thresholds on GDEs in the subbasin. The GSP makes no attempt to evaluate how the proposed minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the subbasin (see Attachment C for a list of environmental users in the subbasin), such as increased mortality and inability to perform key life processes (e.g., reproduction, migration).

RECOMMENDATIONS

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the

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[11] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

subbasin.[12] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[13]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached.[14] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[6,15]
- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems."

2. Climate Change

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[16] The effects of climate change will intensify the impacts of water stress on GDEs, making available shallow groundwater resources especially critical to their survival. Condon *et al.* (2020) shows that GDEs are more likely to succumb to water stress and rely more on groundwater during times of drought.[17] When shallow groundwater is unavailable, riparian forests can die off and key life processes (e.g., migration and spawning) for aquatic organisms, such as steelhead, can be impeded.

The integration of climate change into the projected water budget is **insufficient**. The GSP incorporates climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. The GSP would benefit from clearly and transparently incorporating the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the subbasin. While these extreme scenarios may have a

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[12] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[13] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[14] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[15] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[16] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

[17] Condon et al. 2020. Evapotranspiration depletes groundwater under warming over the contiguous United States. Nature Communications. Available at: https://www.nature.com/articles/s41467-020-14688-0

lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the subbasin's approach to groundwater management.

The GSP integrates climate change into key inputs (e.g., changes in precipitation, evapotranspiration, and surface water flow) of the projected water budget, and calculates a sustainable yield based on the projected water budget with climate change incorporated. However, if the water budgets are incomplete, including the omission of extremely wet and dry scenarios, then there is increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not adequately include climate change projections may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, tribes, and domestic well owners.

RECOMMENDATIONS

- Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change scenarios into projects and management actions.

3. Data Gaps

The consideration of beneficial users when establishing monitoring networks is **insufficient**, due to lack of specific plans to increase the Representative Monitoring Sites (RMSs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around DACs, domestic wells, tribes, GDEs, and ISWs in the subbasin. These beneficial users may remain unprotected by the GSP without adequate monitoring and identification of data gaps in the shallow aquifer. The Plan therefore fails to meet SGMA's requirements for the monitoring network.[18]

Figure 3-1 (Representative Monitoring Sites) shows insufficient representation of DACs, drinking water users, and tribes for water quality monitoring. Figure 3-2 (Groundwater Level Representative Monitoring Sites – Upper Aquifer) and Figure 3-3 (Groundwater Level Representative Monitoring Sites – Lower Aquifer) show insufficient representation of DACs, drinking water users, tribes, and GDEs for groundwater elevation monitoring. Refer to Attachment E for maps of these monitoring sites in relation to key beneficial users of groundwater.

The GSP provides some discussion of data gaps for GDEs in Section 3.7.8.7 (Assessment and Improvement of Monitoring Network - Interconnected Surface Waters), but does not provide specific plans, such as locations or a timeline, to fill the data gaps. The GSP states (p. 3-23): *"The GSA will also install three (3) nested monitoring wells (TSS 1-3) in the Subbasin which is included in this monitoring network (Figure 3-7). These wells are designed to monitor both the upper and lower aquifers."* Figure 3-7 (Identification of Data Gaps (GDE)) maps high priority GDEs alongside existing shallow monitoring wells, but this figure does not show the additional proposed monitoring well locations.

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[18] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, tribes, and GDEs to clearly identify monitored areas.

- Increase the number of RMSs in the shallow aquifer across the subbasin as needed to map ISWs and adequately monitor all groundwater condition indicators across the subbasin and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, tribes, GDEs, and ISWs when identifying new RMSs.

- Ensure groundwater elevation and water quality RMSs are monitoring groundwater conditions spatially and at the correct depth for *all* beneficial users - especially DACs, domestic wells, tribes, and GDEs.

- Further describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin. Additional studies of GDEs and groundwater - surface water interactions are briefly discussed in the Projects and Management Actions chapter, but very few details are provided.

4. Addressing Beneficial Users in Projects and Management Actions

The consideration of beneficial users when developing projects and management actions is **incomplete**. The GSP identifies the benefits or impacts of identified projects and management actions, including water quality impacts, to key beneficial users of groundwater such as GDEs and DACs. However, projects and management actions to improve water supply and GDE habitats (e.g., Invasive Species Plant Control, Levee Setback and Stream Channel Restoration) are described as potential projects without a known timeline for implementation.

We commend the GSA for describing the environmental benefits of the Multi-Benefit Recharge Project (Section 4.3.3) in the subbasin, as developed with support and guidelines from The Nature Conservancy.

The GSP describes the Tehama County Domestic Well Tracking and Outreach Program (Section 4.5.2.6) and the Well Deepening or Replacement Program (Section 4.5.2.7). However, these programs are described as potential projects to be implemented on an as-needed basis, instead of projects that will be implemented within the GSP planning horizon. We strongly recommend inclusion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation.

RECOMMENDATIONS

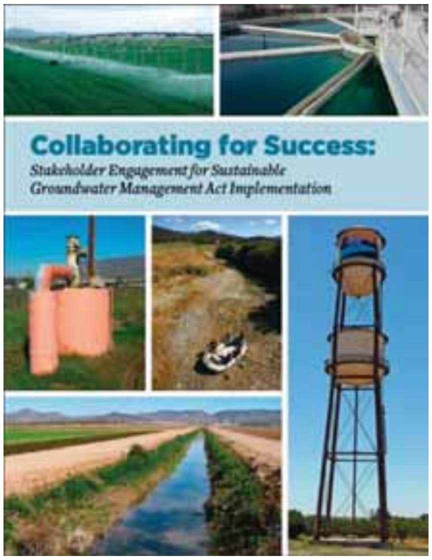
- Describe the projected timelines for implementing the Invasive Species Plant Control and Levee Setback and Stream Channel Restoration projects and management actions in Chapter 4 of the GSP.

- For DACs and domestic well owners, provide specific plans for implementation of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.

- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

Attachment B
SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users

Stakeholder Engagement and Outreach


Collaborating for Success:

Stakeholder Engagement for Sustainable Groundwater Management Act Implementation

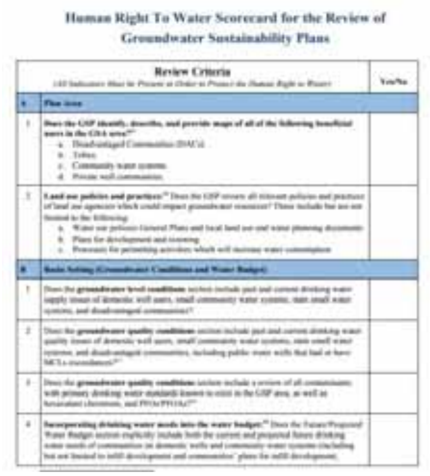
Clean Water Action, Community Water Center and Union of Concerned Scientists developed a guidance document called Collaborating for success: Stakeholder engagement for Sustainable Groundwater Management Act Implementation. It provides details on how to conduct targeted and broad outreach and engagement during Groundwater Sustainability Plan (GSP) development and implementation. Conducting a targeted outreach involves:

- Developing a robust Stakeholder Communication and Engagement plan that includes outreach at frequented locations (schools, farmers markets, religious settings, events) across the plan area to increase the involvement and participation of disadvantaged communities, drinking water users and the environmental stakeholders.

- Providing translation services during meetings and technical assistance to enable easy participation for non-English speaking stakeholders.

- GSP should adequately describe the process for requesting input from beneficial users and provide details on how input is incorporated into the GSP.

The Human Right to Water

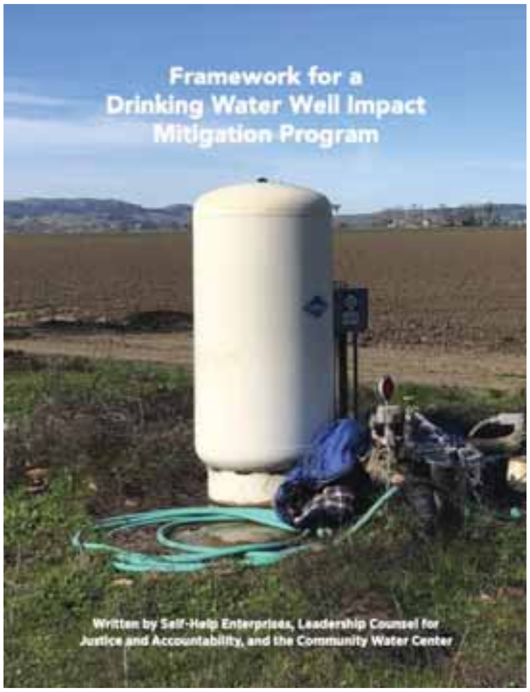


Human Right To Water Scorecard for the Review of
Groundwater Sustainability Plans

Review Criteria

The Human Right to Water Scorecard was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid Groundwater Sustainability Agencies (GSAs) in prioritizing drinking water needs in SGMA. The scorecard identifies elements that must exist in GSPs to adequately protect the Human Right to Drinking water.

Drinking Water Well Impact Mitigation Framework



Framework for a
Drinking Water Well Impact
Mitigation Program

Written by Self-Help Enterprises, Leadership Counsel for
Justice and Accountability, and the Community Water Center

The Drinking Water Well Impact Mitigation Framework was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid GSAs in the development and implementation of their GSPs. The framework provides a clear roadmap for how a GSA can best structure its data gathering, monitoring network and management actions to proactively monitor and protect drinking water wells and mitigate impacts should they occur.

Groundwater Resource Hub

Groundwater Resource Hub
Advancing Sustainable Groundwater Management

How to assess GDEs in a groundwater sustainability plan?
Guidance on how to identify and consider GDEs in a groundwater sustainability plan.

What are Groundwater Dependent Ecosystems and Why are They Important?

The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs. These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Rooting Depth Database

The Plant Rooting Depth Database provides information that can help assess whether groundwater-dependent vegetation are accessing groundwater. Actual rooting depths will depend on the plant species and site-specific conditions, such as soil type and availability of other water sources. Site-specific knowledge of depth to groundwater combined with rooting depths will help provide an understanding of the potential groundwater levels are needed to sustain GDEs.

How to use the database

The maximum rooting depth information in the Plant Rooting Depth Database is useful when verifying whether vegetation in the Natural Communities Commonly Associated with Groundwater (NC Dataset) are connected to groundwater. A 30 ft depth-to-groundwater threshold, which is based on averaged global rooting depth data for phreatophytes[1], is relevant for most plants identified in the NC Dataset since most plants have a max rooting depth of less than 30 feet. However, it is important to note that deeper thresholds are necessary for other plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*), Euphrates poplar (*Populus euphratica*), salt cedar (*Tamarix spp.*), and shadescale (*Atriplex confertifolia*). The Nature Conservancy advises that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to groundwater threshold of 80 feet should be used instead of the 30 ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

The Plant Rooting Depth Database is an Excel workbook composed of four worksheets:

1. California phreatophyte rooting depth data (included in the NC Dataset)
2. Global phreatophyte rooting depth data
3. Metadata
4. References

How the database was compiled

The Plant Rooting Depth Database is a compilation of rooting depth information for the groundwater-dependent plant species identified in the NC Dataset. Rooting depth data were compiled from published scientific literature and expert opinion through a crowdsourcing campaign. As more information becomes available, the database of rooting depths will be updated. Please Contact Us if you have additional rooting depth data for California phreatophytes.

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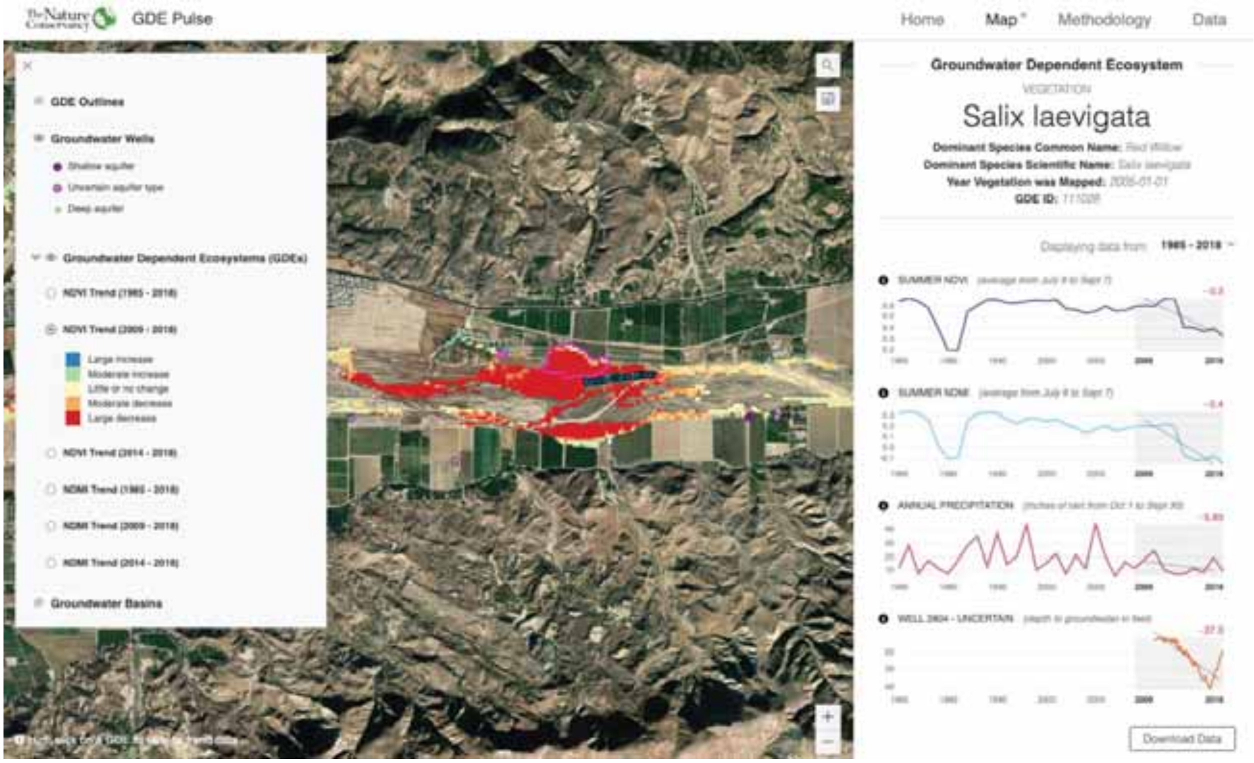
[1] Canadell, J., Jackson, R.B., Ehleringer, J.B. et al. 1996. Maximum rooting depth of vegetation types at the global scale. Oecologia 108, 583–595. https://doi.org/10.1007/BF00329030

GDE Pulse



Groundwater Dependent Ecosystem

VEGETATION

Salix laevigata

Dominant Species Common Name: Red Willow

Dominant Species Scientific Name: Salix laevigata

Year Vegetation was Mapped:

GDE ID:

Displaying data from 1985 - 2018

GDE Pulse is a free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data. Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset. The following datasets are available for downloading:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

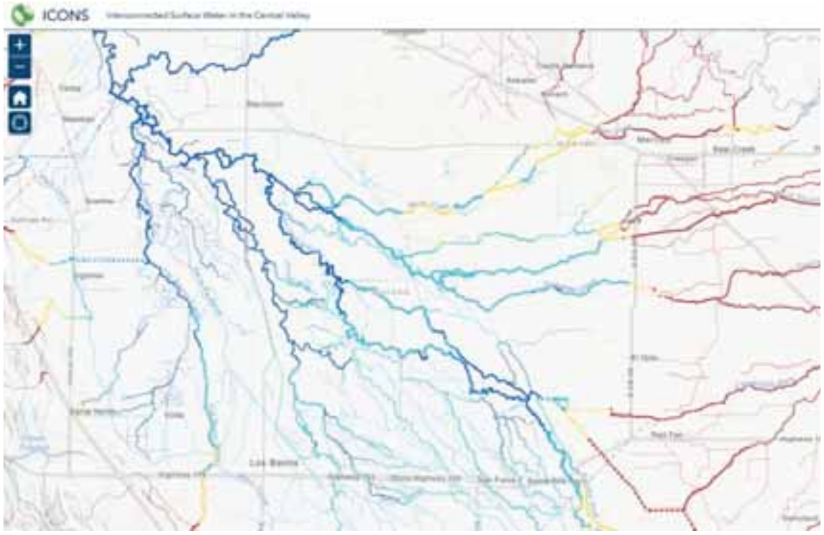
Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

ICONOS Mapper

Interconnected Surface Water in the Central Valley



ICONS maps the likely presence of interconnected surface water (ISW) in the Central Valley using depth to groundwater data. Using data from 2011-2018, the ISW dataset represents the likely connection between surface water and groundwater for rivers and streams in California's Central Valley. It includes information on the mean, maximum, and minimum depth to groundwater for each stream segment over the years with available data, as well as the likely presence of ISW based on the minimum depth to groundwater. The Nature Conservancy developed this database, with guidance and input from expert academics, consultants, and state agencies.

We developed this dataset using groundwater elevation data available online from the California Department of Water Resources (DWR). DWR only provides this data for the Central Valley. For GSAs outside of the valley, who have groundwater well measurements, we recommend following our methods to determine likely ISW in your region. The Nature Conservancy's ISW dataset should be used as a first step in reviewing ISW and should be supplemented with local or more recent groundwater depth data.

Attachment C

Freshwater Species Located in the Red Bluff Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result “depletion of interconnected surface waters”, Attachment C provides a list of freshwater species located in the Red Bluff Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[1]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife’s BIOS[2] as well as on The Nature Conservancy’s science website[3].

Scientific Name	Common Name	Legal Protected Status		
		Federal	State	Other
BIRDS				
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	Candidate - Threatened	Endangered	
Riparia riparia	Bank Swallow		Threatened	
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
Aix sponsa	Wood Duck			
Anas acuta	Northern Pintail			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya americana	Redhead		Special Concern	BSSC - Third priority
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		Special	

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[1] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710

[2] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS

[3] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			
Calidris alpina	Dunlin			
Calidris mauri	Western Sandpiper			
Calidris minutilla	Least Sandpiper			
Chen caerulescens	Snow Goose			
Chen rossii	Ross's Goose			
Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Cygnus columbianus	Tundra Swan			
Egretta thula	Snowy Egret			
Empidonax traillii	Willow Flycatcher	Bird of Conservation Concern	Endangered	
Fulica americana	American Coot			
Gallinago delicata	Wilson's Snipe			
Geothlypis trichas trichas	Common Yellowthroat			
Grus canadensis	Sandhill Crane			
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	
Icteria virens	Yellow-breasted Chat		Special Concern	BSSC - Third priority
Limnodromus scolopaceus	Long-billed Dowitcher			
Lophodytes cucullatus	Hooded Merganser			
Megaceryle alcyon	Belted Kingfisher			
Mergus merganser	Common Merganser			
Mergus serrator	Red-breasted Merganser			
Numenius phaeopus	Whimbrel			
Oxyura jamaicensis	Ruddy Duck			
Pandion haliaetus	Osprey		Watch list	
Pelecanus erythrorhynchos	American White Pelican		Special Concern	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Plegadis chihi	White-faced Ibis		Watch list	
Podilymbus podiceps	Pied-billed Grebe			
Rallus limicola	Virginia Rail			
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	
CRUSTACEANS				

Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable
Lepidurus packardi	Vernal Pool Tadpole Shrimp	Endangered	Special	IUCN - Endangered
Linderiella occidentalis	California Fairy Shrimp		Special	IUCN - Near Threatened
FISH				
Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Acipenser medirostris ssp. 1	Southern green sturgeon	Threatened	Special Concern	Endangered - Moyle 2013
Oncorhynchus mykiss - CV	Central Valley steelhead	Threatened	Special	Vulnerable - Moyle 2013
Oncorhynchus tshawytscha - CV spring	Central Valley spring Chinook salmon	Threatened	Threatened	Vulnerable - Moyle 2013
Oncorhynchus tshawytscha - CV winter	Central Valley winter Chinook salmon	Endangered	Endangered	Vulnerable - Moyle 2013
HERPS				
Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Lithobates pipiens	Northern Leopard Frog		Special Concern	ARSSC
Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC
Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Taricha granulosa	Rough-skinned Newt			
Thamnophis couchii	Sierra Gartersnake			
Thamnophis sirtalis sirtalis	Common Gartersnake			
Pseudacris regilla	Northern Pacific Chorus Frog			
Thamnophis sirtalis fitchi	Valley Gartersnake			Not on any status lists
INSECTS & OTHER INVERTS				
Ambrysus spp.	Ambrysus spp.			
Anax junius	Common Green Darner			
Antocha monticola				Not on any status lists
Argia agrioides	California Dancer			
Baetidae fam.	Baetidae fam.			
Baetis adonis	A Mayfly			
Baetis spp.	Baetis spp.			

Brachycentrus occidentalis				Not on any status lists
Brechmorhoga mendax	Pale-faced Clubskimmer			
Caenis latipennis	A Mayfly			
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus spp.	Chironomus spp.			
Epeorus albertae	A Mayfly			
Epeorus spp.	Epeorus spp.			
Ephemerella aurivillii	A Mayfly			
Fallceon quilleri	A Mayfly			
Glossosoma alascense	A Caddisfly			
Glossosoma spp.	Glossosoma spp.			
Hydropsyche alternans				Not on any status lists
Hydropsyche spp.	Hydropsyche spp.			
Ischnura perparva	Western Forktail			
Lepidostoma acarolum				Not on any status lists
Lepidostoma spp.	Lepidostoma spp.			
Leptophlebia spp.	Leptophlebia spp.			
Lestes congener	Spotted Spreadwing			
Libellula forensis	Eight-spotted Skimmer			
Marilia flexuosa	A Caddisfly			
Mystacides alafimbriatus	A Caddisfly			
Nectopsyche spp.	Nectopsyche spp.			
Nilotanypus spp.	Nilotanypus spp.			
Ophiogomphus occidentis	Sinuous Snaketail			
Optioservus canus	Pinnacles Optioservus Riffle Beetle		Special	
Optioservus quadrimaculatus				Not on any status lists
Optioservus spp.	Optioservus spp.			
Ordobrevia nubifera				Not on any status lists
Pachydiplax longipennis	Blue Dasher			
Polypedilum spp.	Polypedilum spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Reomyia spp.	Reomyia spp.			
Rhionaeschna multicolor	Blue-eyed Darner			
Rhyacophila acuminata	A Caddisfly			Not on any status lists
Simulium spp.	Simulium spp.			
Skwala americana	American Springfly			

Sweltsa adamantea				Not on any status lists
Sweltsa spp.	Sweltsa spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tramea lacerata	Black Saddlebags			
Tricorythodes explicatus	A Mayfly			
Tricorythodes spp.	Tricorythodes spp.			
Zaitzevia parvula				Not on any status lists
Zaitzevia spp.	Zaitzevia spp.			
MAMMALS				
Castor canadensis	American Beaver			Not on any status lists
Lontra canadensis canadensis	North American River Otter			Not on any status lists
Neovison vison	American Mink			Not on any status lists
Ondatra zibethicus	Common Muskrat			Not on any status lists
MOLLUSKS				
Anodonta californiensis	California Floater		Special	
Gonidea angulata	Western Ridged Mussel		Special	
Lymnaea spp.	Lymnaea spp.			
Lymnaea stagnalis	Swamp Lymnaea			Not on any status lists
Margaritifera falcata	Western Pearlshell		Special	
Physa acuta	Pewter Physa			Not on any status lists
Physa spp.	Physa spp.			
Pisidium casertanum				Not on any status lists
Pisidium spp.	Pisidium spp.			
Stagnicola elodes	Marsh Pondsnail			CS
PLANTS				
Downingia pusilla	Dwarf Downingia		Special	CRPR - 2B.2
Legenere limosa	False Venus'-looking-glass		Special	CRPR - 1B.1
Orcuttia tenuis	Slender Orcutt Grass	Threatened	Endangered	CRPR - 1B.1
Alnus rhombifolia	White Alder			
Alopecurus saccatus	Pacific Foxtail			
Callitriche heterophylla bolanderi	Large Water-starwort			
Callitriche longipedunculata	Longstock Water-starwort			
Callitriche marginata	Winged Water-starwort			
Cicendia quadrangularis	Oregon Microcala			
Crassula aquatica	Water Pygmyweed			
Cyperus involucratus	NA			

Downingia bicornuta	NA			
Downingia cuspidata	Toothed Calicoflower			
Downingia ornatissima	NA			
Elatine californica	California Waterwort			
Eleocharis acicularis acicularis	Least Spikerush			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis quadrangulata	NA			
Epilobium cleistogamum	Cleistogamous Spike-primrose			
Eryngium articulatum	Jointed Coyote-thistle			
Eryngium castrense	Great Valley Eryngo			
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle			Not on any status lists
Gratiola ebracteata	Bractless Hedge-hyssop			
Gratiola heterosepala	Boggs Lake Hedge-hyssop		Endangered	CRPR - 1B.2
Heteranthera limosa	NA			
Isoetes howellii	NA			
Isoetes nuttallii	NA			
Isoetes orcuttii	NA			
Juncus uncialis	Inch-high Rush			
Juncus usitatus	NA			Not on any status lists
Lasthenia fremontii	Fremont's Goldfields			
Limnanthes alba alba	White Meadowfoam			
Marsilea vestita vestita	NA			Not on any status lists
Mimulus guttatus	Common Large Monkeyflower			
Mimulus pilosus				Not on any status lists
Myosurus minimus	NA			
Navarretia heterandra	Tehama Navarretia			
Navarretia intertexta	Needleleaf Navarretia			
Navarretia leucocephala leucocephala	White-flower Navarretia			
Panicum dichotomiflorum	NA			
Persicaria hydropiper	NA			Not on any status lists
Persicaria maculosa	NA			Not on any status lists
Pilularia americana	NA			
Plagiobothrys acanthocarpus	Adobe Popcorn-flower			
Plagiobothrys austiniae	Austin's Popcorn-flower			

Plagiobothrys greenei	Greene's Popcorn-flower			
Plagiobothrys leptocladus	Alkali Popcorn-flower			
Plantago elongata elongata	Slender Plantain			
Platanus racemosa	California Sycamore			
Pogogyne zizyphoroides				Not on any status lists
Potamogeton diversifolius	Water-thread Pondweed			
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads			
Psilocarphus oregonus	Oregon Woolly-heads			
Psilocarphus tenellus	NA			
Ranunculus bonariensis	NA			
Sagittaria montevidensis calycina				Not on any status lists
Salix gooddingii	Goodding's Willow			
Salix laevigata	Polished Willow			
Salix lasiolepis lasiolepis	Arroyo Willow			
Schoenoplectus mucronatus	NA			
Sidalcea hirsuta	Hairy Checker-mallow			
Veronica anagallis-aquatica	NA			

Attachment D

July 2019

IDENTIFYING GDEs UNDER SGMA

Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[1] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[2]. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.

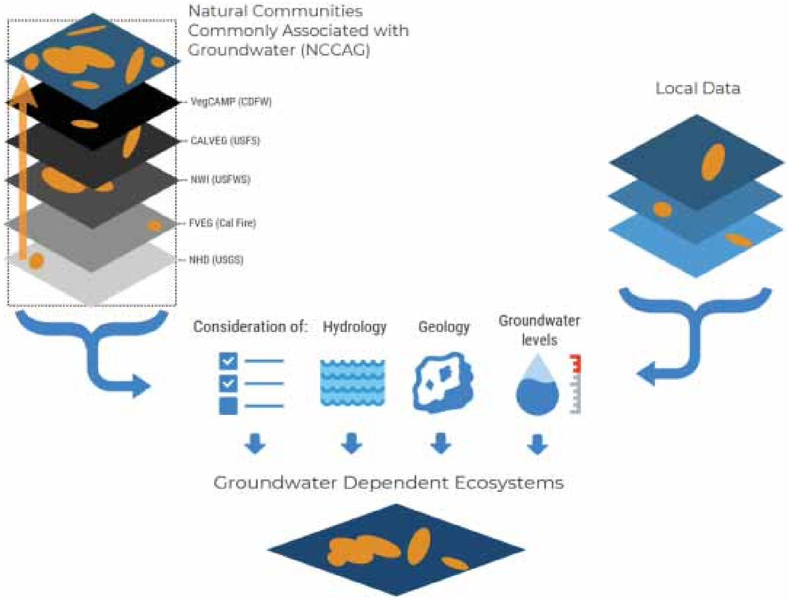

Figure 1. Considerations for GDE identification.
Source: DWR[2]

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[1] NC Dataset Online Viewer: https://gis.water.ca.gov/app/NCDatasetViewer/

[2] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[3]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[4] on the Groundwater Resource Hub[5], a website dedicated to GDEs.

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

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[3] For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf

[4] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/

[5] The Groundwater Resource Hub: www.GroundwaterResourceHub.org

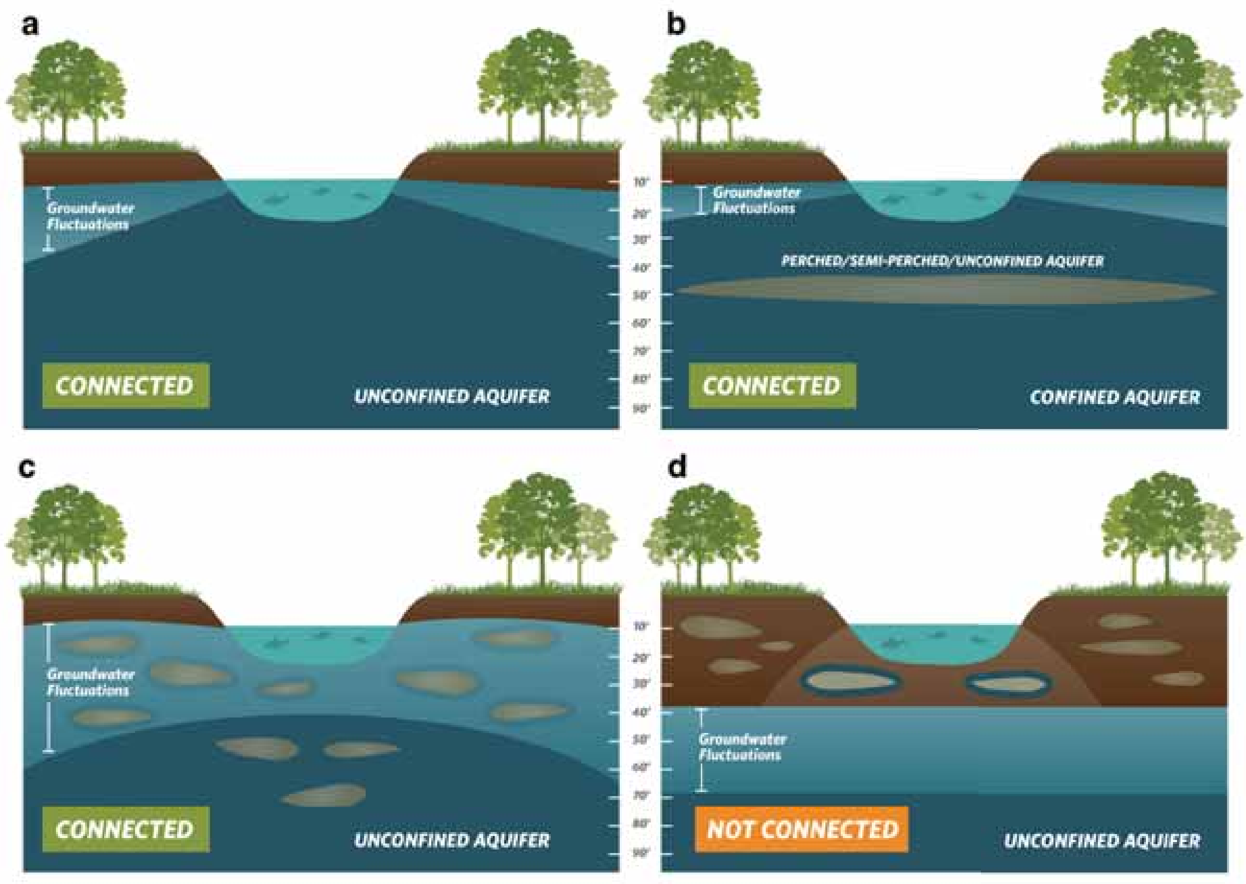

Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (c)** Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(d)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[6] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[7] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[8] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[9]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP <u>until</u> data gaps are reconciled in the monitoring network (see Best Practice #6).

Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[6] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[7] Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

[8] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs[4]).

[9] SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[10], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

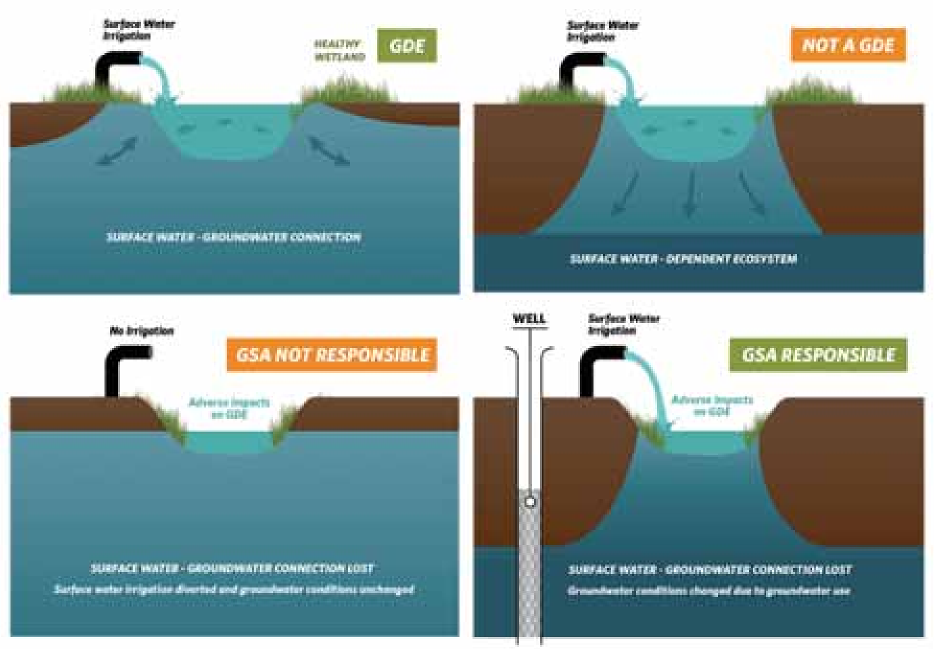

Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

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[10] For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

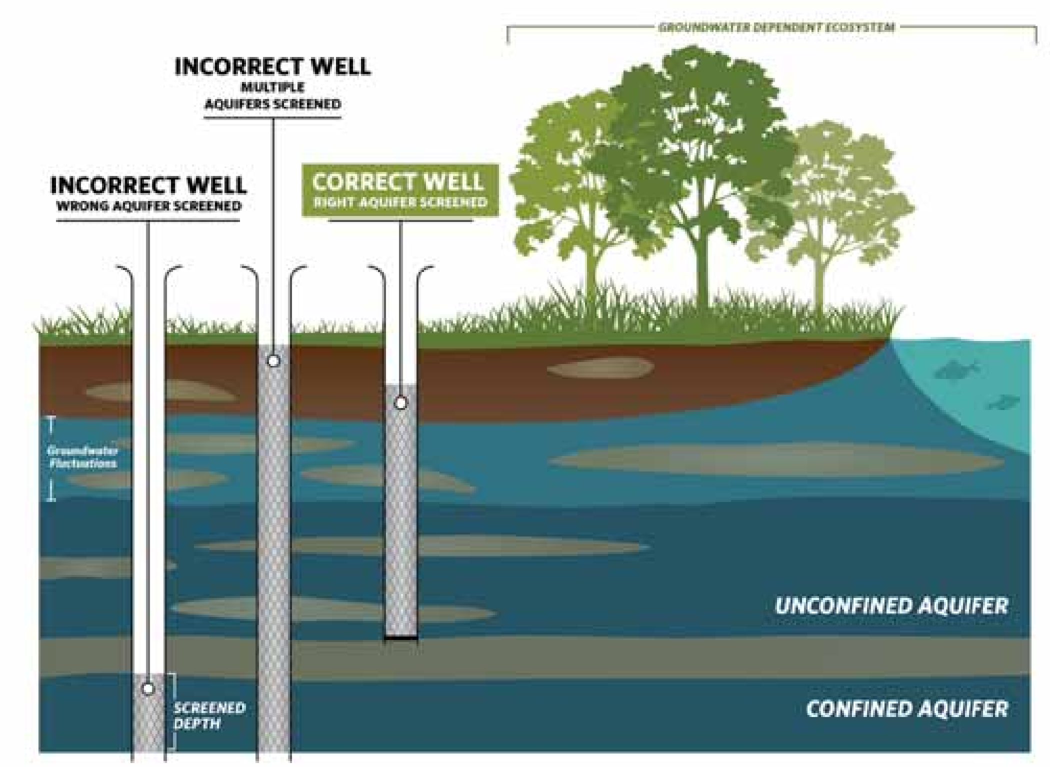

Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)[11] to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

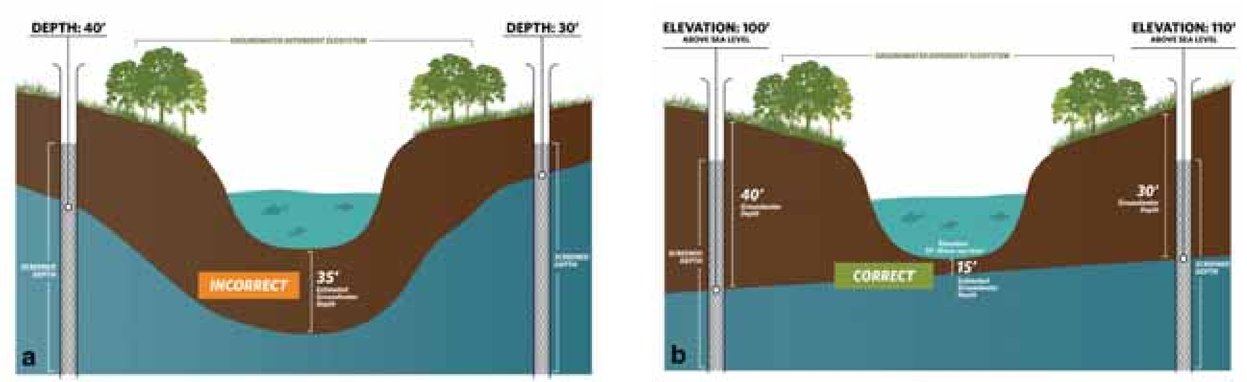

Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

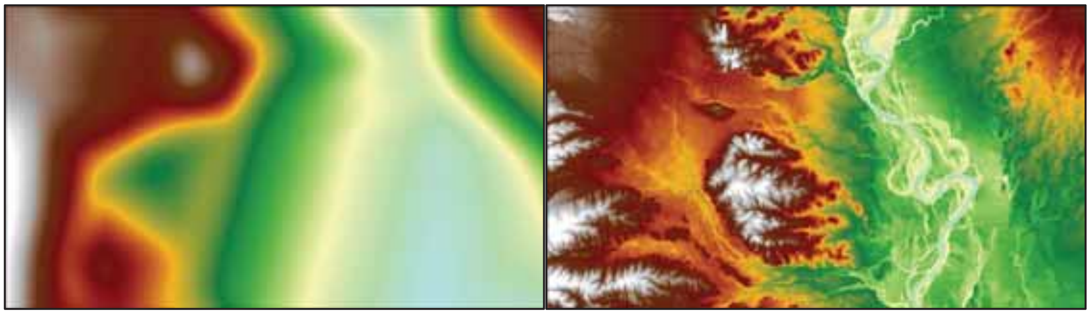

Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

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[11] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://iewer.nationalmap.gov/basic/

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Attachment E

Maps of representative monitoring sites in relation to key beneficial users

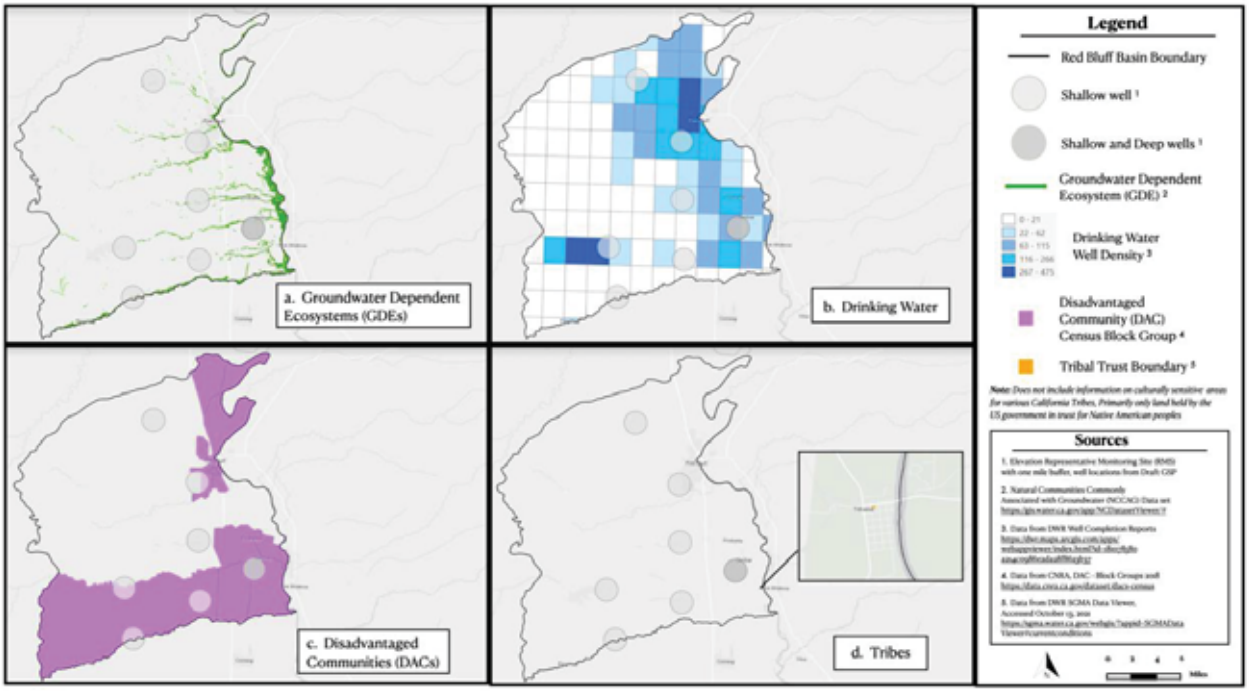


Figure 1. Groundwater elevation representative monitoring sites in relation to key beneficial users: a) Groundwater Dependent Ecosystems (GDEs), b) Drinking Water users, c) Disadvantaged Communities (DACs), and d) Tribes.

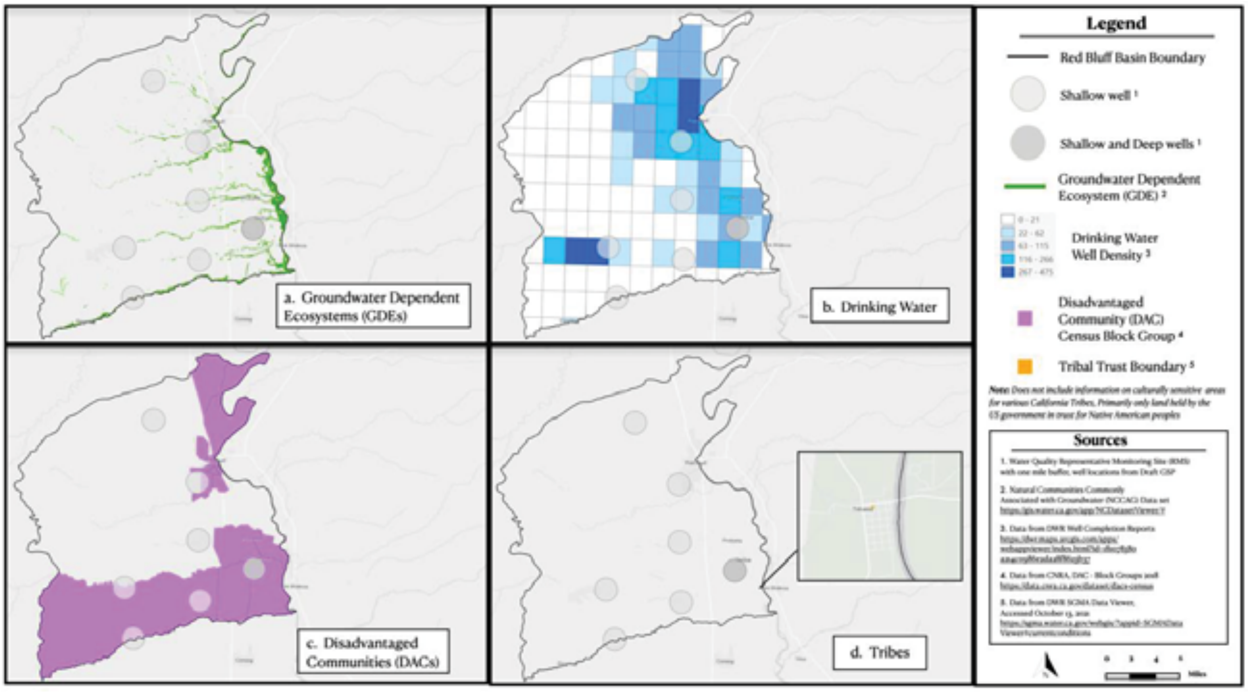


Figure 2. Groundwater quality representative monitoring sites in relation to key beneficial users: a) Groundwater Dependent Ecosystems (GDEs), b) Drinking Water users, c) Disadvantaged Communities (DACs), and d) Tribes.

Deseret Farms of California
6100 Wilson Landing Rd. Chico, CA 95973
Tel (530) 891-4900   Fax (530) 981-8037

Deseret Farms
of California

NOVEMBER 18, 2021

VIA E-MAIL and U.S. MAIL

Tehama Subbasins GSPs
c/o: Nichole Bethurem
9380 San Benito Avenue
Gerber, CA 96035
Email: nbethurem@tcpw.ca.gov

RE: Red Bluff Subbasin GSP Comments

Dear Board Members:

The purpose of this letter is to provide the Tehama County Flood Control & Water Conservation District Groundwater Sustainability Agency (GSA) with the comments of Deseret Farms of California to the GSA's draft groundwater sustainability plan (GSP).

First and foremost, we appreciate the time and effort the GSA's management staff, committees, and consultants have committed to preparing this draft GSP. Further, we appreciate the opportunity to provide comments to the GSA regarding this draft GSP. We hope the GSA will consider the following comments in finalizing this draft GSP for submission to the Department of Water Resources (DWR). In considering the following comments, we recognize that this draft GSP is a "living document," and will undergo updates and modifications as more information is gathered to help the Red Bluff Subbasin reach sustainability by 2042 and beyond.

Our comments are as follows:

1. **The GSA should revise the methodology for determining whether an undesirable result exists for the Sustainable Management Criteria regarding the Chronic Lowering of Groundwater Elevations.**

Section 3.3.1.4 of the Sustainability Management Criteria (SMC) Chapter regarding the Chronic Lowering of Groundwater Elevations provides, in relevant part, that:

> Impacts of declining groundwater levels would be considered undesirable results if 25% or more of the RMS wells are below the MTs for two (2) consecutive measurements.

We recommend that the GSA revise this section to clarify the duration between the "two (2) consecutive measurements," as follows:

> Impacts of declining groundwater levels would be considered undesirable results if 25% or more of the RMS wells are below the MTs for two (2) consecutive *annual Spring* measurements.

This suggested language corresponds with the GSA's taking of quantitative measurements for this SMC. Section 3.3.1.2 provides, "the quantitative measurement for chronic lowering of groundwater elevations will be the *annual Spring measurements* taken at the RMS wells." (Emphasis added.) This section goes on to provide that the GSA will use this collected data to append existing data to generate hydrographs for the wells. (Draft GSP, Section 3.3.1.2.) This section makes it clear that the GSA plans to collect annual Spring measurements and put those measurements to good use. Therefore, the suggested language would not place any additional burden on the GSA but would instead provide clarifying language consistent with established ongoing activities.

Additionally, this suggested language is similar to the methodology relied on in establishing undesirable results for the degraded water quality SMC. Section 3.3.4.4. provides, in relevant part, that "[u]ndesirable results will have occurred when at least 25% of RMC exceed the MTs for water quality for 2 consecutive years. . . ." Here, the effect of this methodology is that the GSA will rely on two consecutive years-worth of data to determine whether an undesirable result exists. The same effect is sought with the language suggested above.

2. **The GSA should revise the Degraded Water Quality SMC to remove the qualifying language tying degraded water quality to GSP implementation.**

Section 3.3.4.4. provides, in relevant part, that "[u]ndesirable results will have occurred when at least 25% of RMC exceed the MTs for water quality for 2 consecutive years at each well *where it can be established that GSP implementation is the cause of the exceedance*." (Emphasis added.)

As currently drafted, it is unclear how the GSA will determine whether "GSP implementation is the cause of the exceedance." To avoid any unnecessary ambiguity in the GSP, we recommend that the GSA remove the italicized qualifying language. If, however, the GSA decides to retain this language, we recommend that the GSA include measurable guidelines as to how it will determine whether GSP implementation is the cause of any exceedance of MTs for water quality.

Thank you for the opportunity to provide these comments. We appreciate the significance of the considerations and decisions the GSA must undertake, and we look forward to working with you further regarding these matters.

Very truly yours,

James Strong

James Strong
General Manager

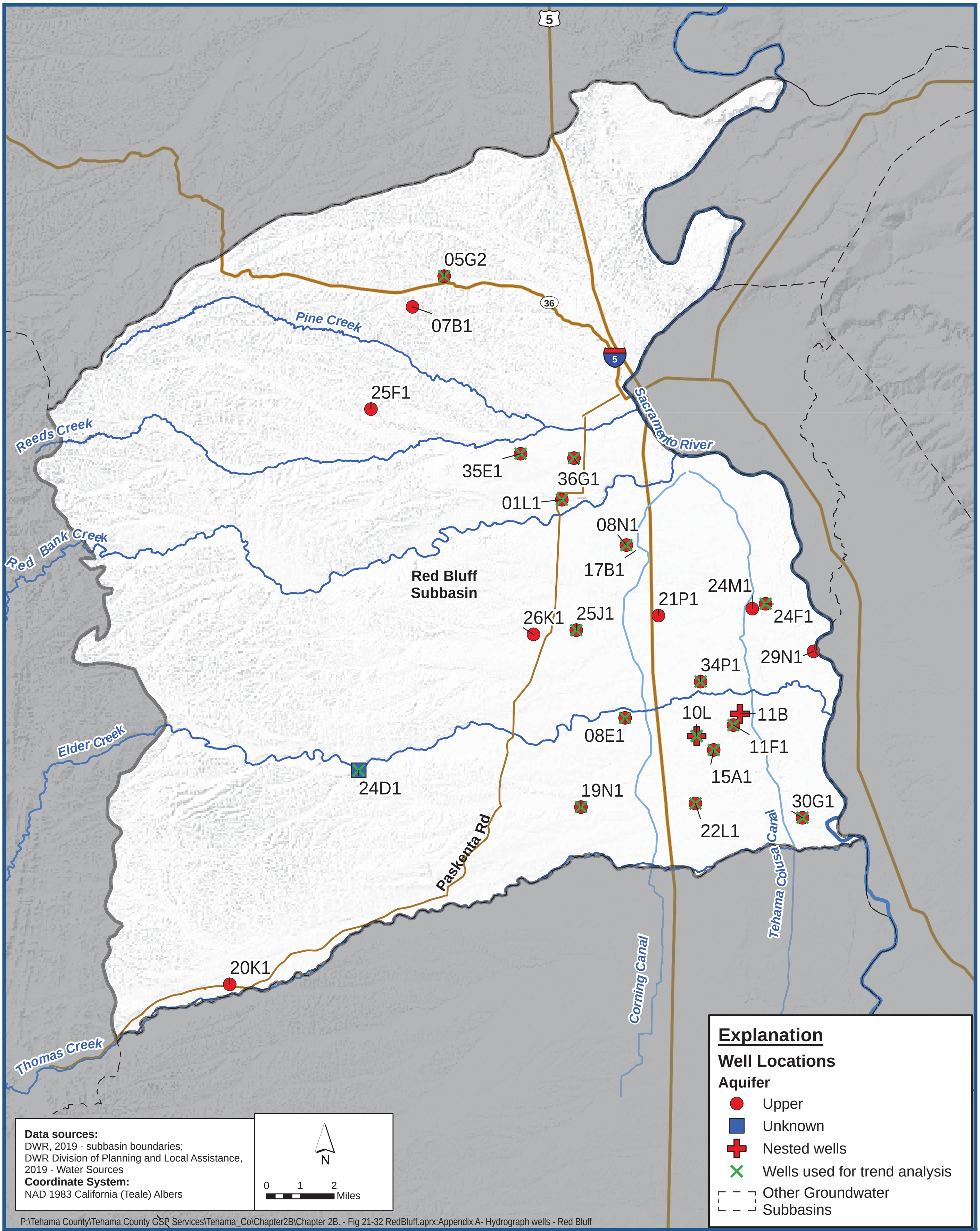
Appendix 2-F

Hydrograph Well Locations, Hydrographs, and Groundwater Level Trend Statistics

Appendix 2-F

Hydrograph Well Locations, Hydrographs, and Groundwater Level Trend Statistics

Red Bluff Subbasin



Data sources:
DWR, 2019 - subbasin boundaries;
DWR Division of Planning and Local Assistance, 2019 - Water Sources
Coordinate System:
NAD 1983 California (Teale) Albers

P:\Tehama County\Tehama County GSP Services\Tehama_Co\Chapter2B\Chapter 2B. - Fig 21-32 RedBluff.aprx:Appendix A- Hydrograph wells - Red Bluff

TEHAMA COUNTY

LSCE Team

Locations of Wells with Long-term Water Level Data

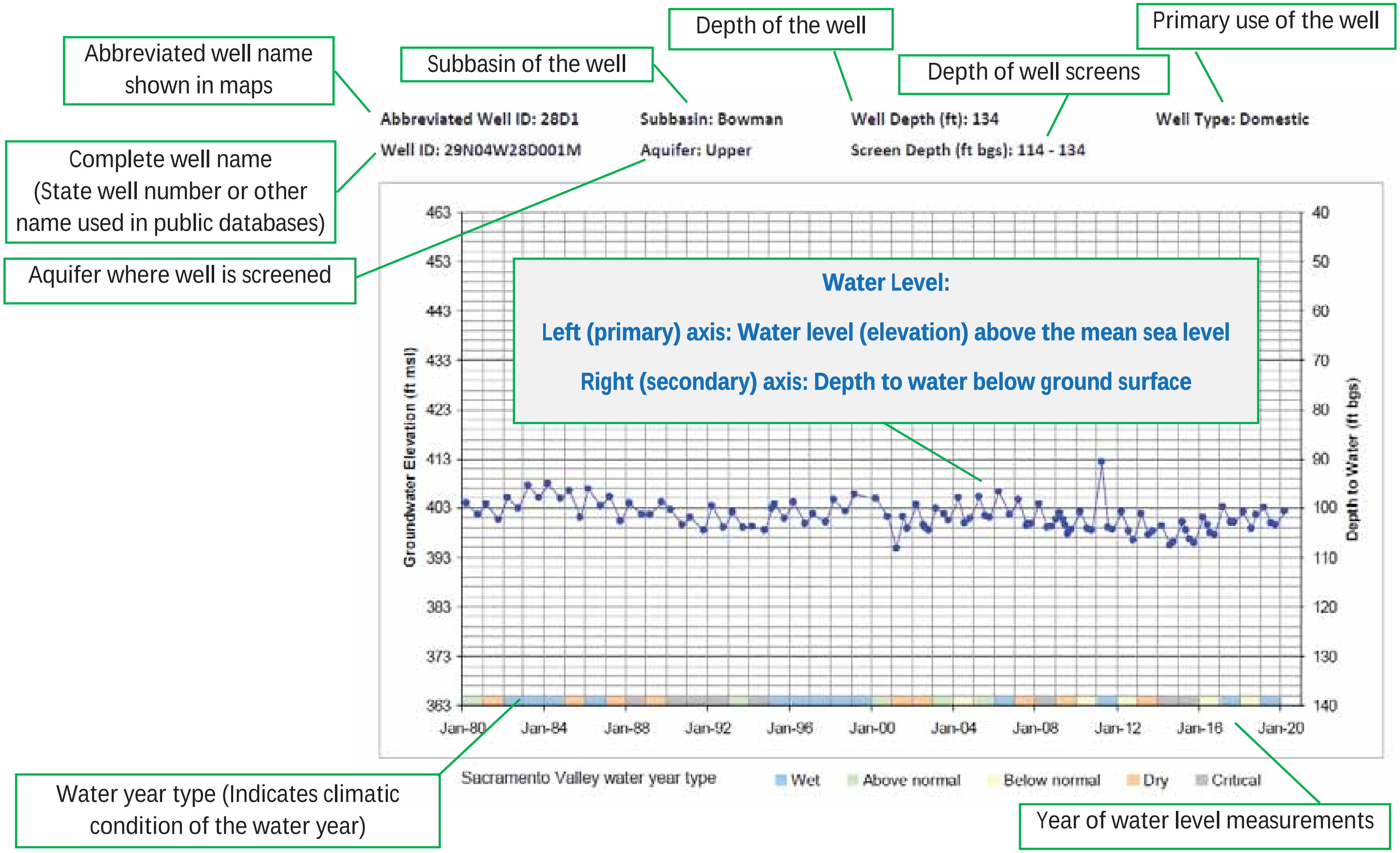
Groundwater Sustainability Plan
Red Bluff Subbasin

Figure A-1

Table A1 - Trends of Groundwater Level Change between 1990 and 2018

						Parametric Method (OLSR)			Non-parametric Methods	
Abbreviated Well Name	**Well Name**	**Well Depth (ft)**	**Screen Interval (ft bgs)**	**Aquifer**	**Number of Seasonal High (Spring) Measurements from 1990 to 2018**	**Regression of Water Level Change (ft/year)**	**R^2**	**p value**	**Mann-Kendall Test**	**Theil-Sen Slope (ft/year)**
01L1	26N04W01L001M	242	134-139	Upper	26	-0.46	0.54	0.00	significant decreasing trend	-0.43
05G2	27N04W05G002M	260	231-251	Upper	25	-0.07	0.07	0.21	Insufficient evidence to identify a significant trend	-0.05
08E1	25N03W08E001M	420	55-420	Upper	21	-0.47	0.50	0.00	significant decreasing trend	-0.52
08N1	26N03W08N001M	300	NA	Upper	27	-0.34	0.58	0.00	significant decreasing trend	-0.32
10L1	25N03W10L001M	400	251-400	Upper	28	-0.49	0.47	0.00	significant decreasing trend	-0.45
10L4	25N03W10L004M	156	150-156	Upper	28	-0.24	0.27	0.00	significant decreasing trend	-0.22
10L5	25N03W10L005M	120	99-105	Upper	28	-0.54	0.58	0.00	significant decreasing trend	-0.62
11F1	25N03W11F001M	452	158-415	Upper	27	-0.38	0.20	0.02	significant decreasing trend	-0.50
15A1	25N03W15A001M	268	32-260	Upper	28	-0.64	0.54	0.00	significant decreasing trend	-0.54
19N1	25N03W19N001M	370	135-358	Upper	28	-0.96	0.76	0.00	significant decreasing trend	-0.80
22L1	25N03W22L001M	323	140-323	Upper	26	-0.60	0.64	0.00	significant decreasing trend	-0.59
24F1	26N03W24F001M	30	NA	Upper	27	-0.07	0.19	0.02	significant decreasing trend	-0.08
25J1	26N04W25J001M	128	116-124	Upper	28	-0.43	0.31	0.00	significant decreasing trend	-0.40
30G1	25N02W30G001M	62	52-62	Upper	27	-0.16	0.23	0.01	significant decreasing trend	-0.17
34P1	26N03W34P001M	315	107-310	Upper	26	-0.52	0.48	0.00	significant decreasing trend	-0.39
35E1	27N04W35E001M	280	NA	Upper	26	-0.34	0.54	0.00	significant decreasing trend	-0.34
36G1	27N04W36G001M	155	135-155	Upper	27	-0.20	0.24	0.01	significant decreasing trend	-0.19
10L3	25N03W10L003M	594	498-504	Lower	28	-0.45	0.48	0.00	significant decreasing trend	-0.40

Water Level Hydrograph: Shows water level change over time



Abbreviated well name shown in maps

Complete well name (State well number or other name used in public databases)

Aquifer where well is screened

Subbasin of the well

Depth of the well

Depth of well screens

Primary use of the well

Abbreviated Well ID: 28D1
Well ID: 29N04W28D001M
Subbasin: Bowman
Aquifer: Upper
Well Depth (ft): 134
Screen Depth (ft bgs): 114 - 134
Well Type: Domestic

Water Level:

Left (primary) axis: Water level (elevation) above the mean sea level

Right (secondary) axis: Depth to water below ground surface

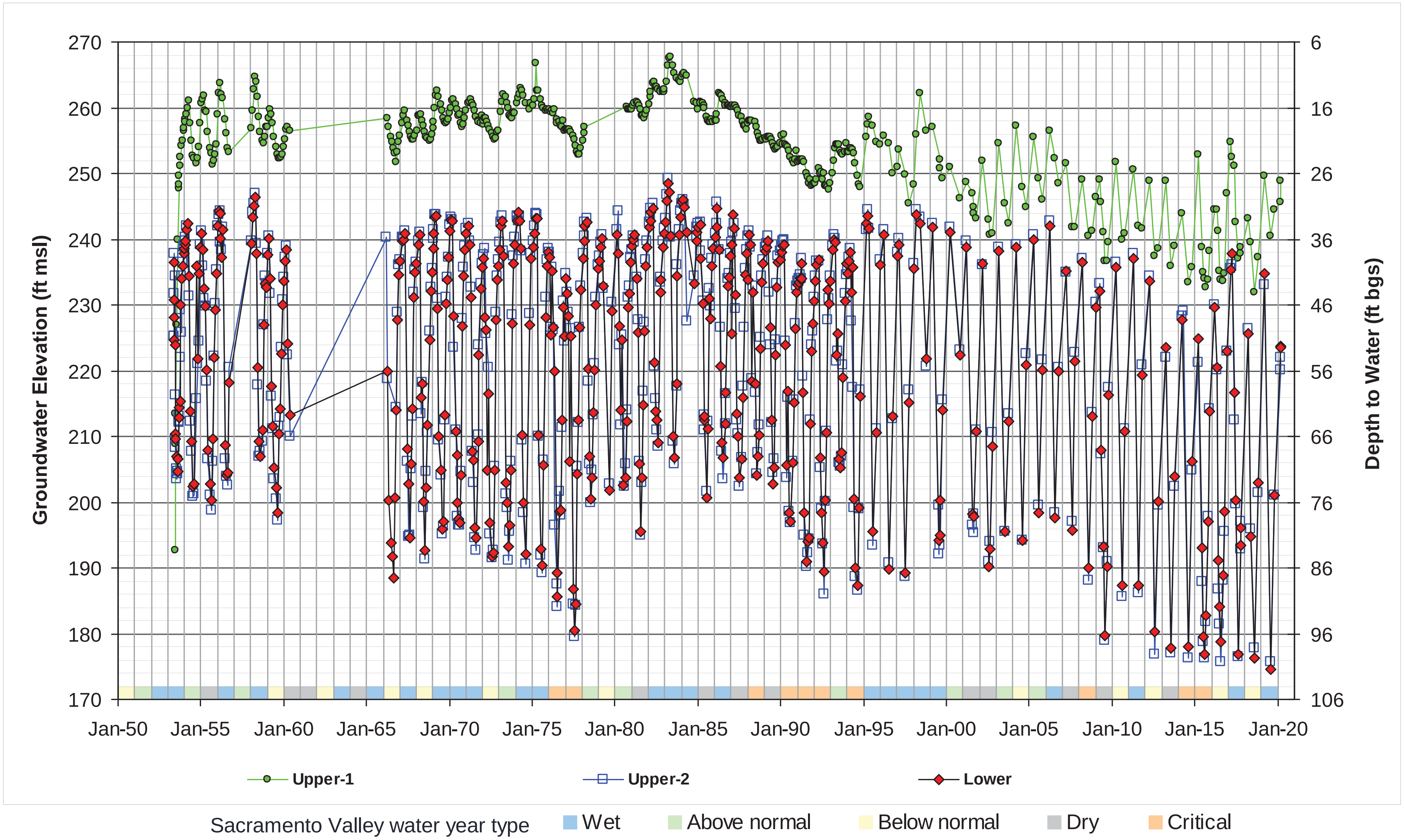
Water year type (Indicates climatic condition of the water year)

Year of water level measurements

Hydrographs of Nested Wells

Well Nest Name: 10L **Well Names: Upper-1: 25N03W10L004M; Upper-2: 25N03W10L001M; Lower: 25N03W10L003M**

Subbasin: Red Bluff **Screens (ft bgs): Upper-1: 150-156; Upper-2: 251-400; Lower: 498-504**



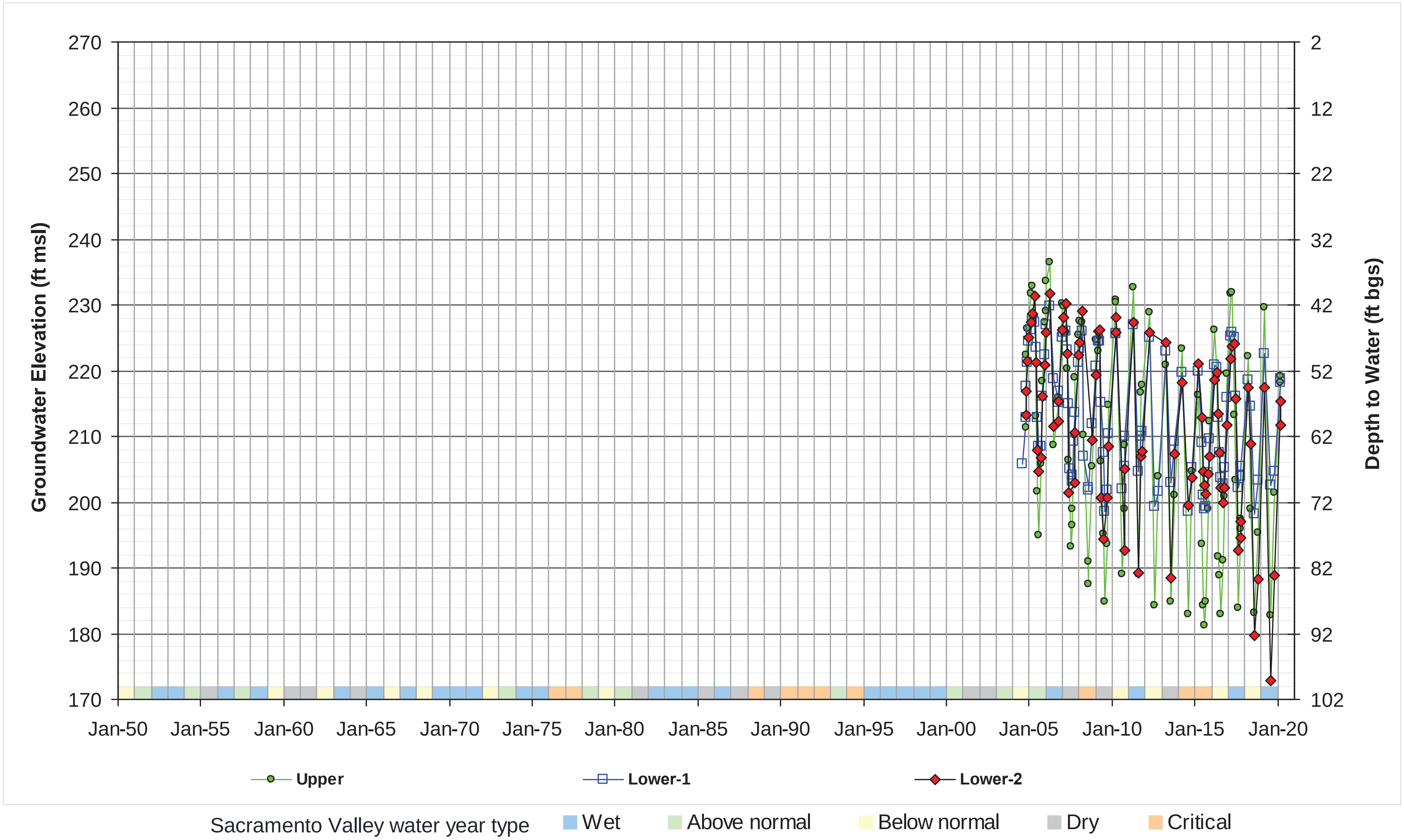
Data from these three wells were used for water level trend analysis

Well Nest Name: 11B

Subbasin: Red Bluff

Well IDs: Upper: 25N03W11B001M; Lower-1: 25N03W11B002M; Lower-2: 25N03W11B003M

Screens (ft bgs): Upper: 150-180; Lower-1: 680-690 & 740-750; Lower-2: 940-960



Data from these three wells were not used for water level trend analysis because of short span of historical records

Hydrographs of individual wells used for groundwater level trend analysis

Appendix E. Tehama IHM Simulated Groundwater Levels

APPENDIX E

Tehama IHM Simulated Groundwater Levels

E-1 Historical Model Results

E-2 Projected (Current Land Use) Model Results

E-3 Projected (Future Land Use) Model Results

E-4 Projected (Current Land Use) with Climate Change (2030) Model Results

E-5 Projected (Current Land Use) with Climate Change (2070) Model Results

E-6 Projected (Future Land Use) with Climate Change (2030) Model Results

E-7 Projected (Future Land Use) with Climate Change (2070) Model Results

E-8 Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

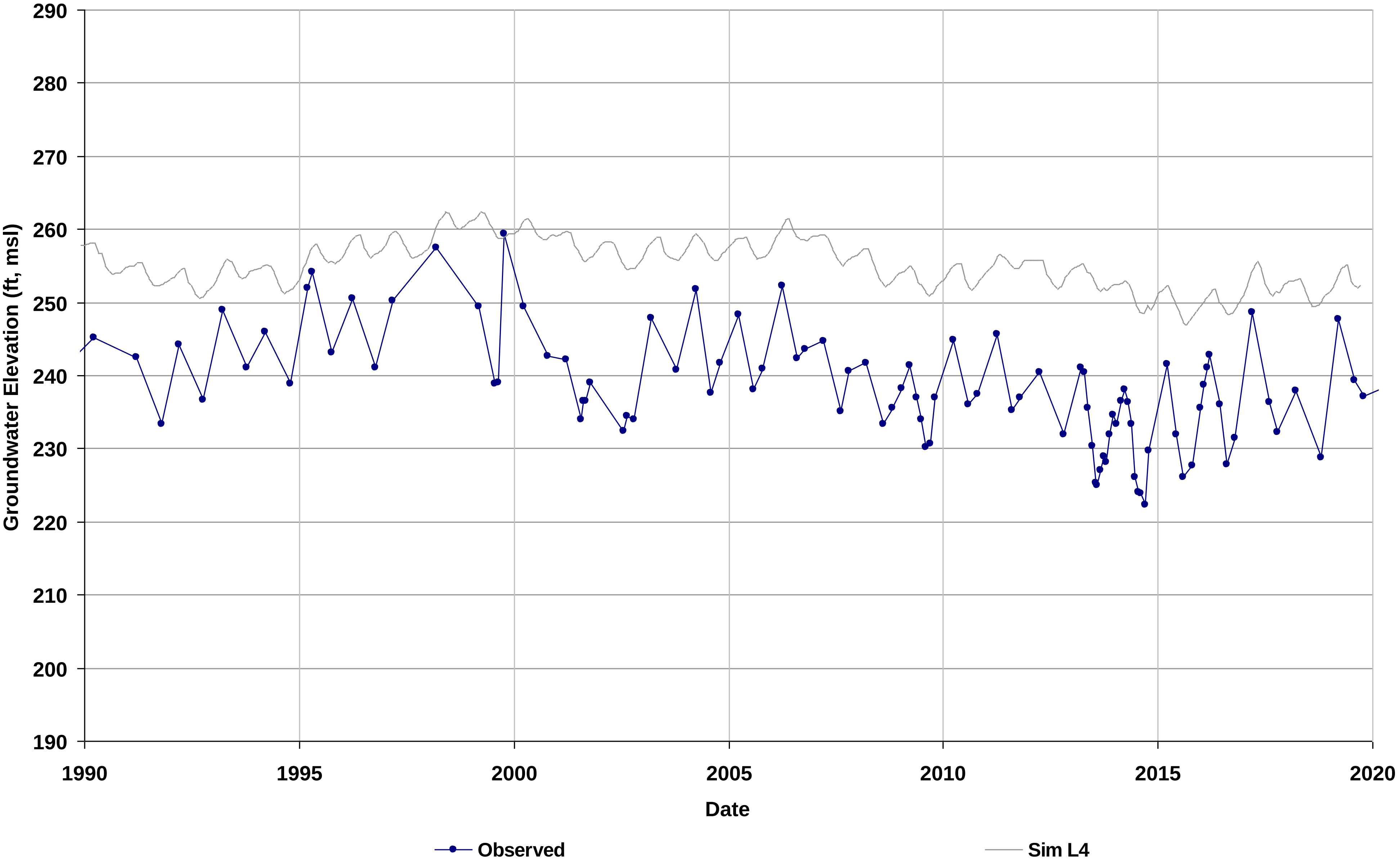
APPENDIX E-1

Tehama IHM Simulated Groundwater Levels:

Historical Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

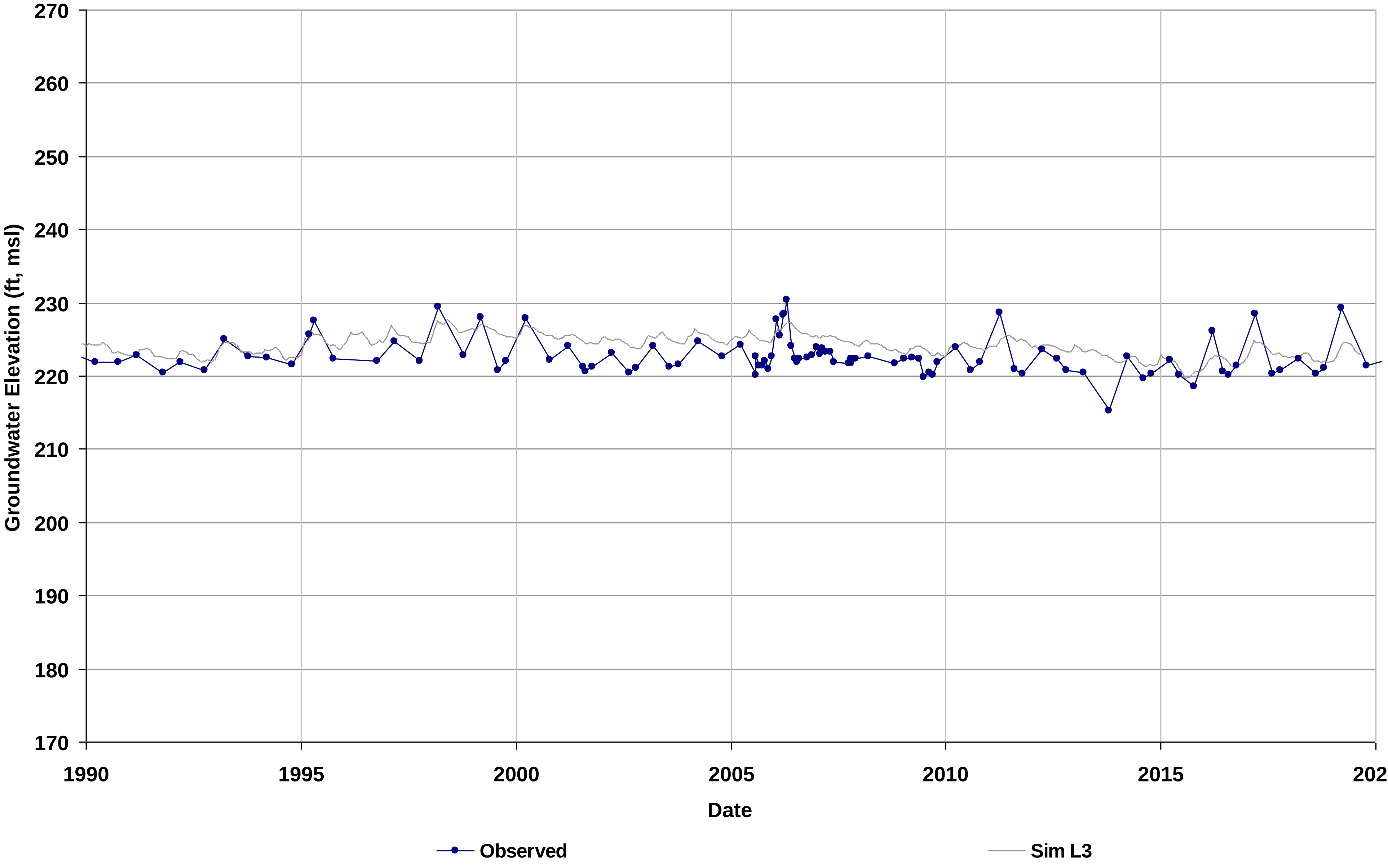
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

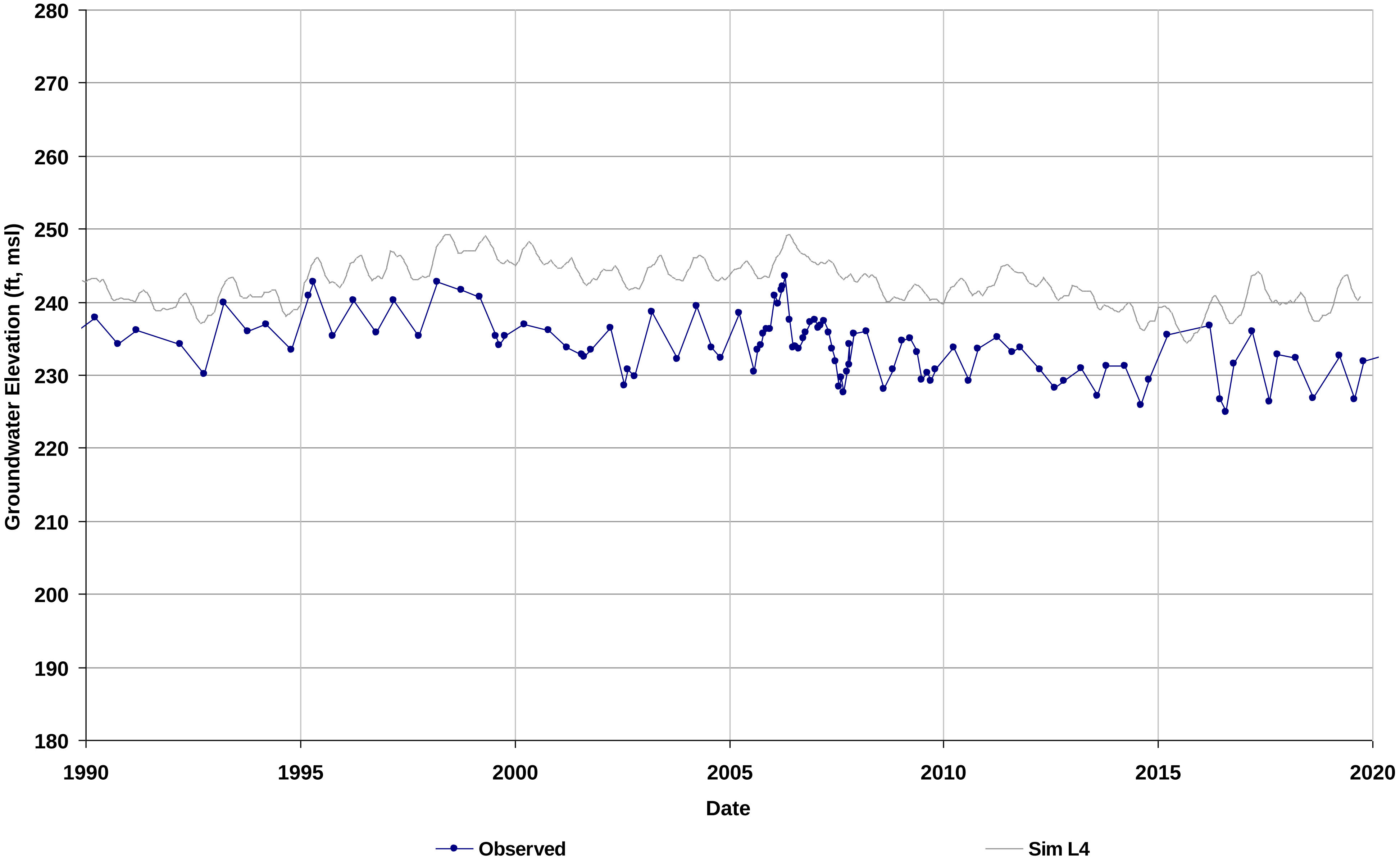
Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

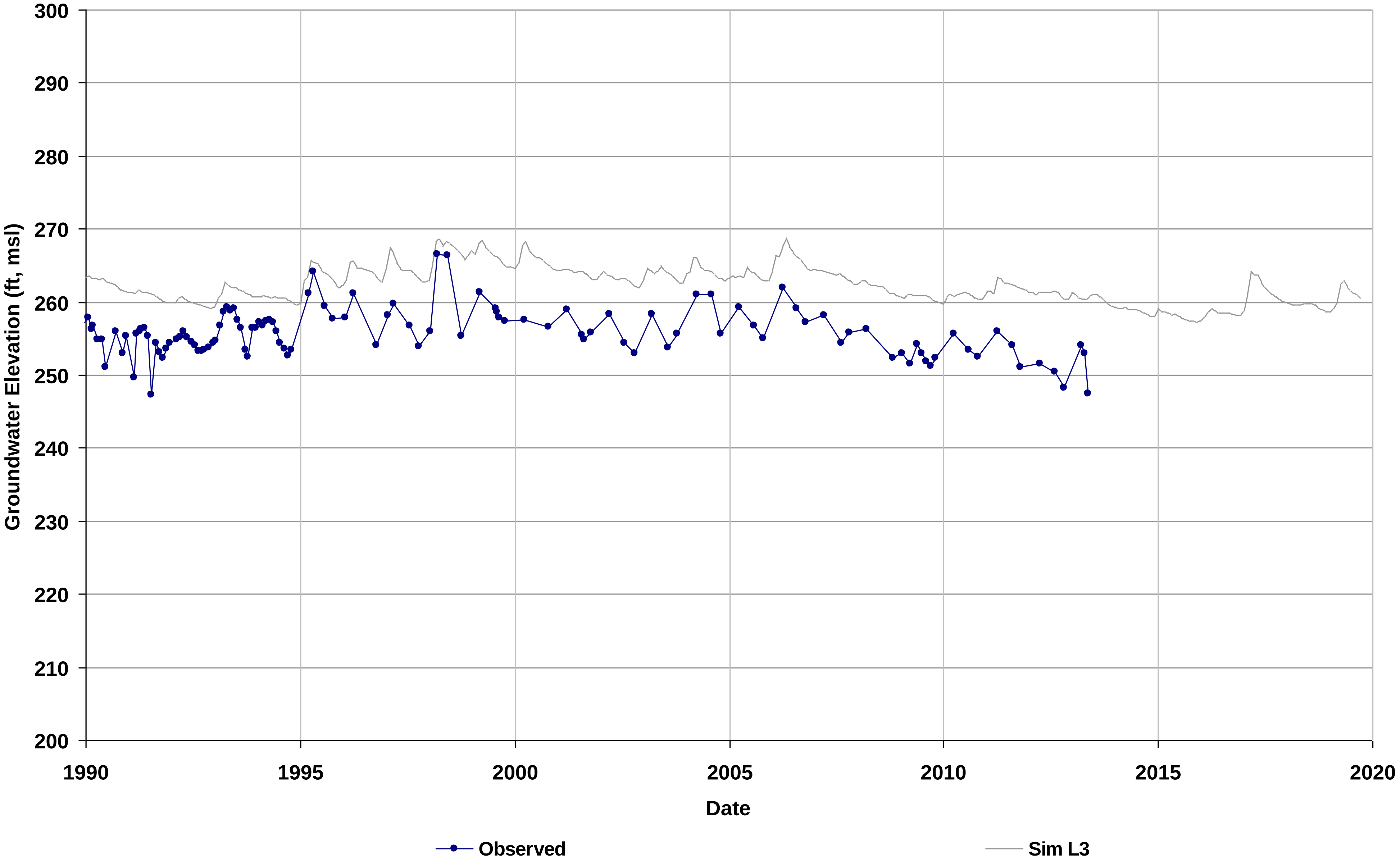
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

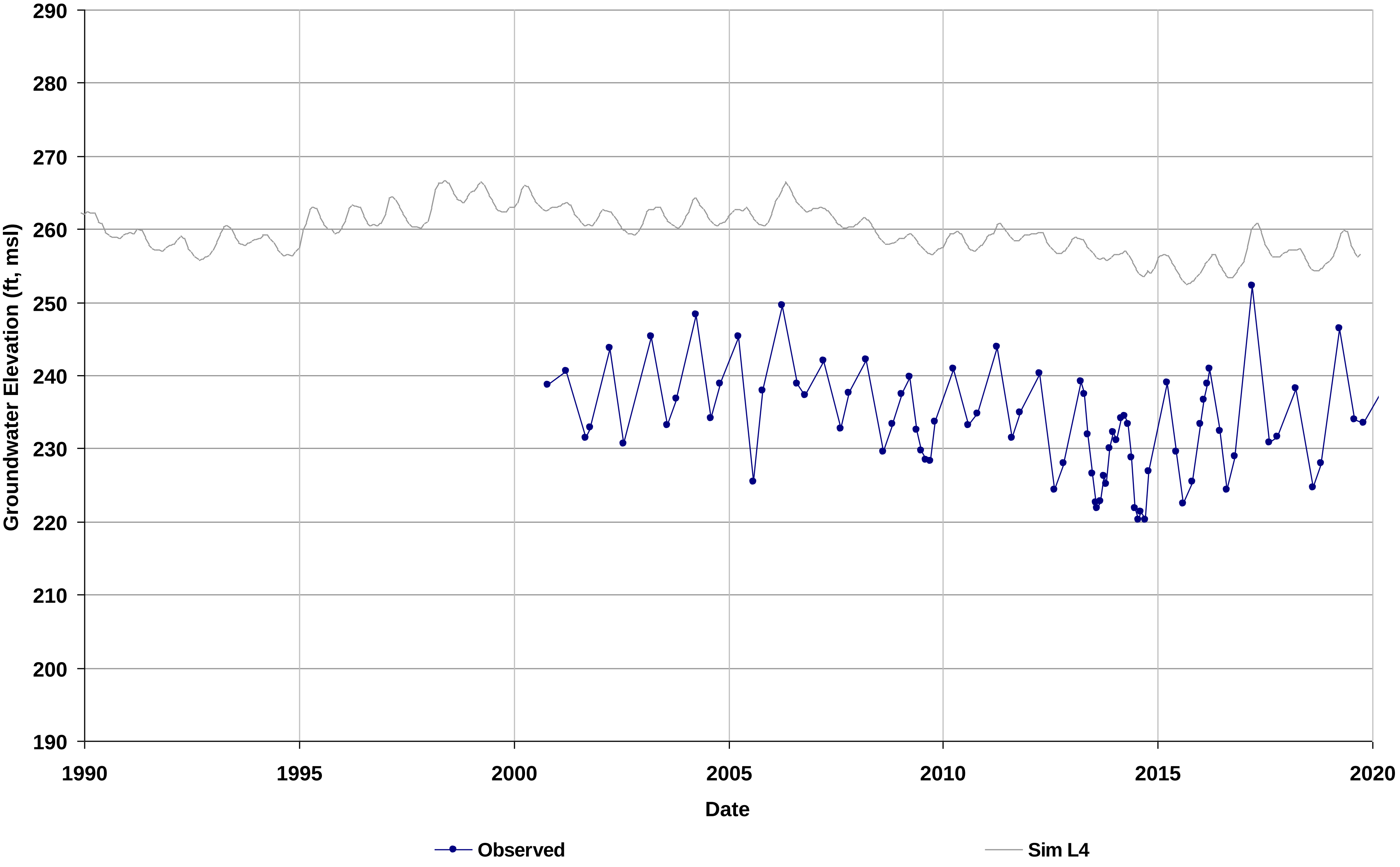
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

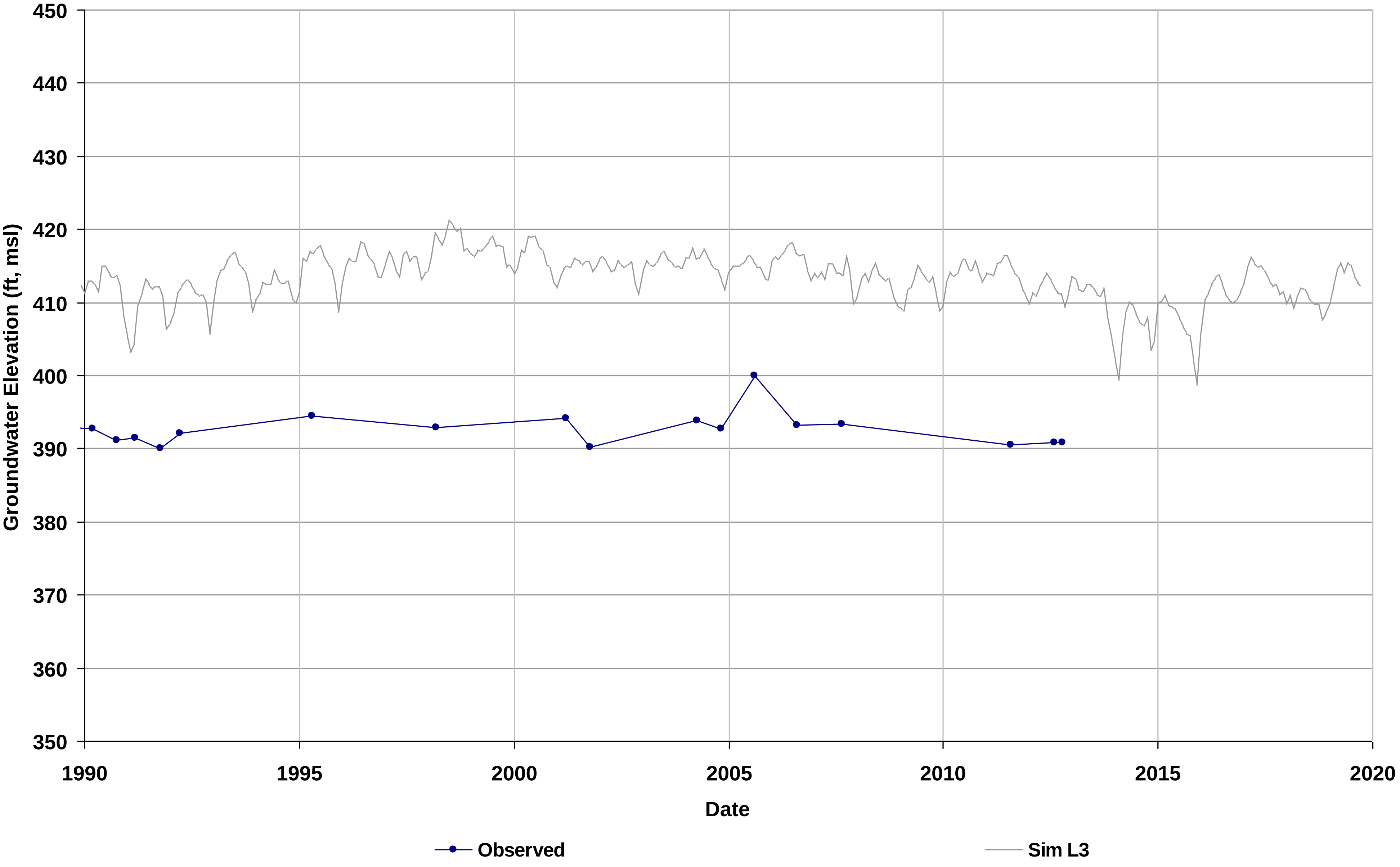
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

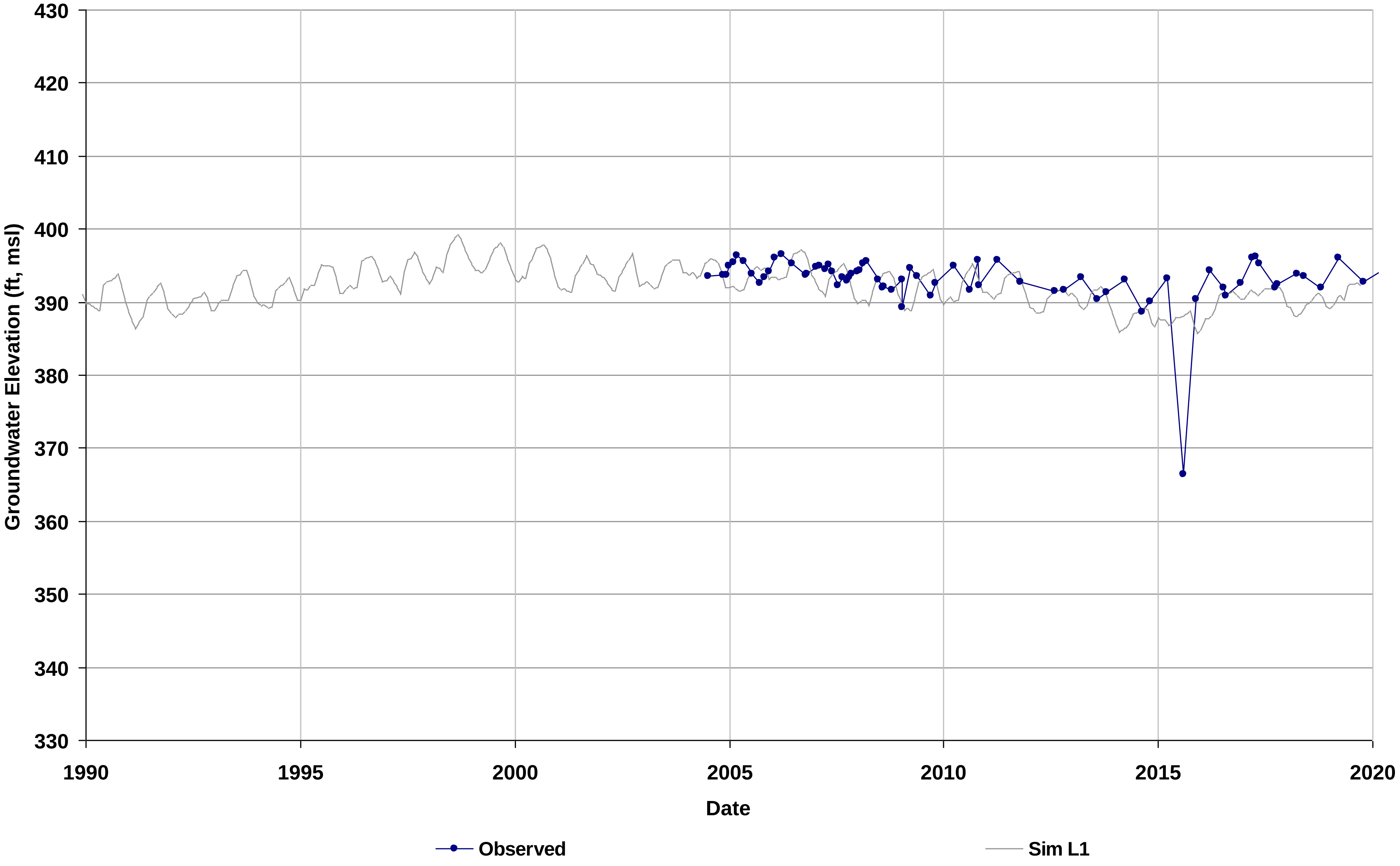
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

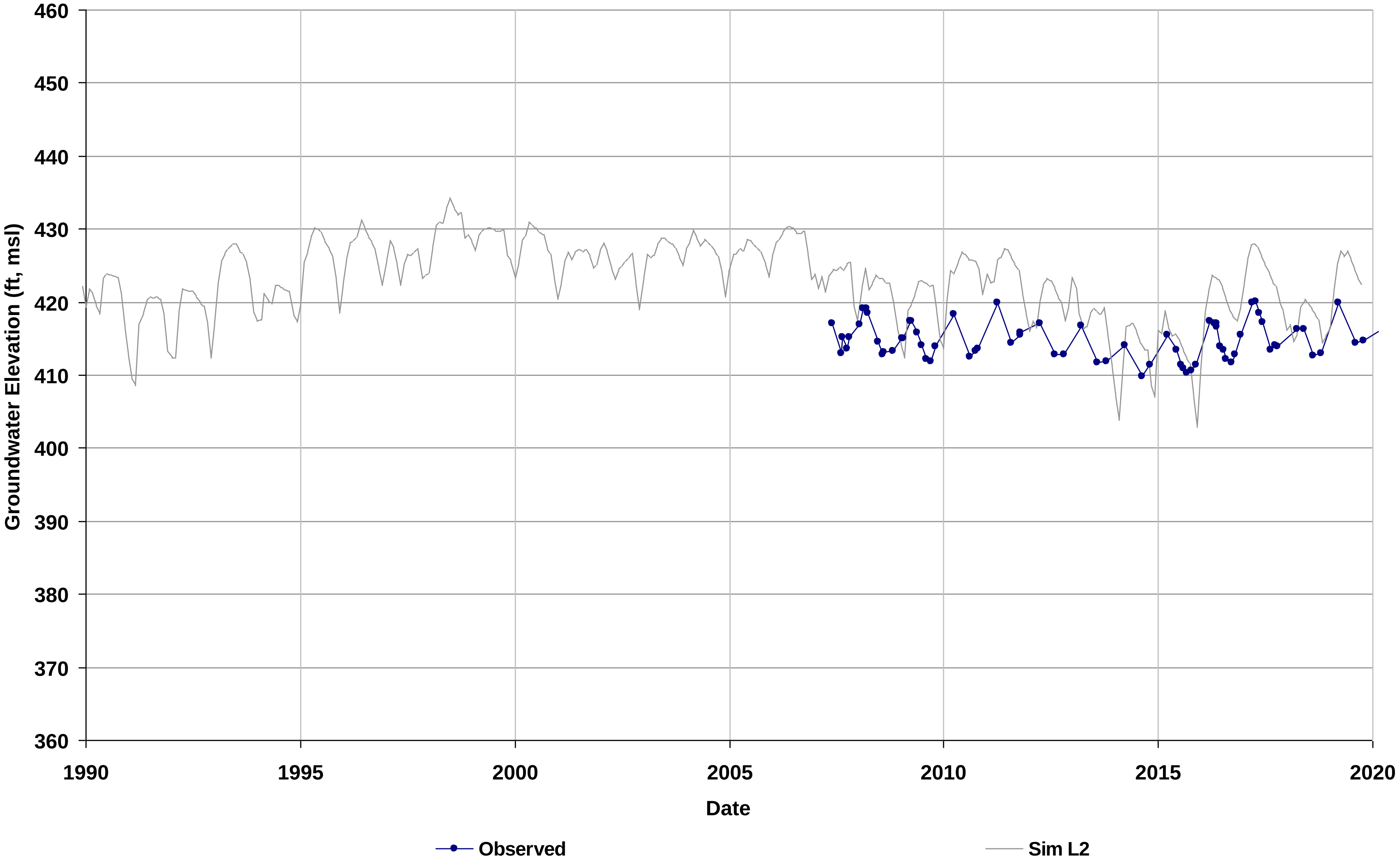
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Historical

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

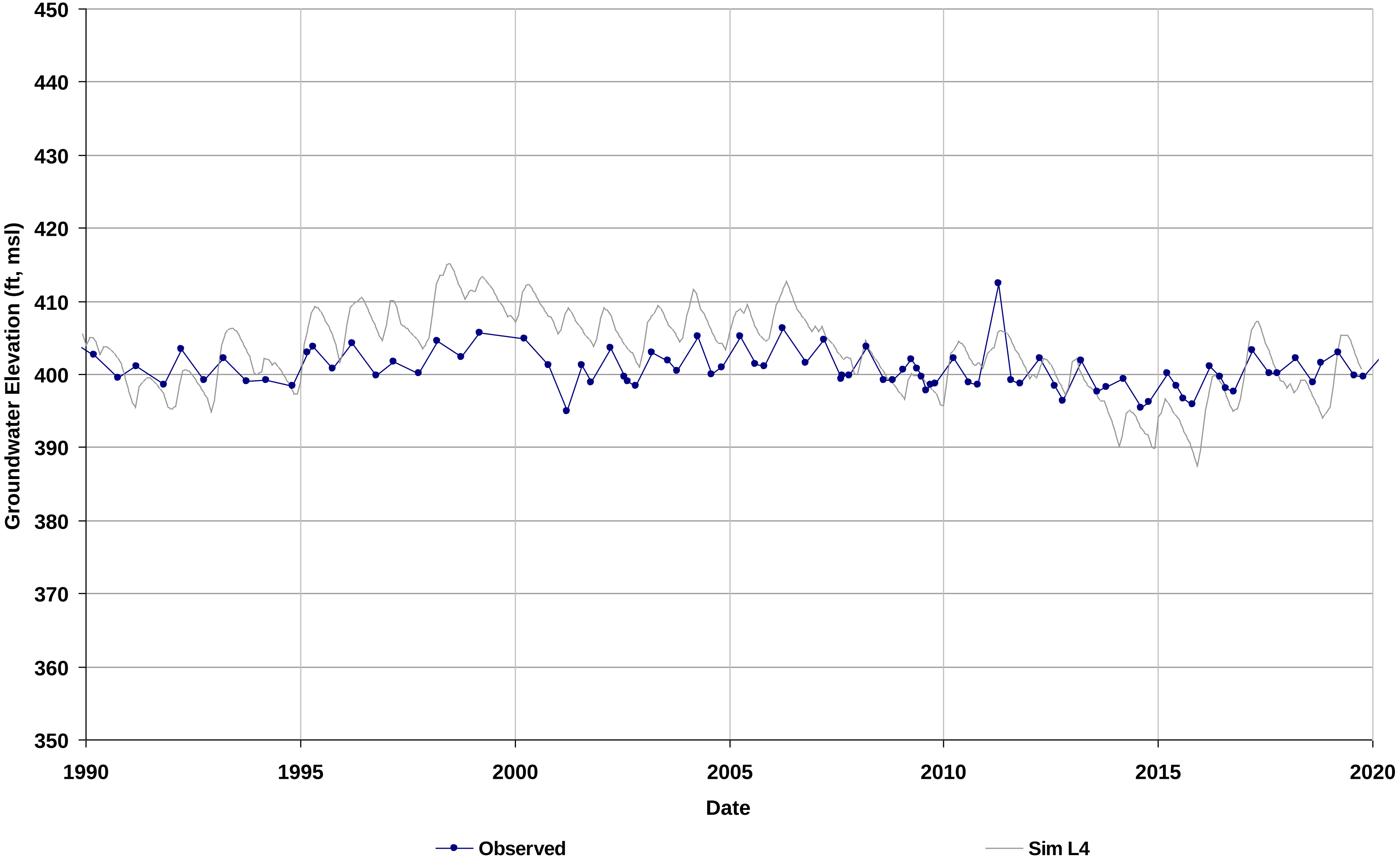
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

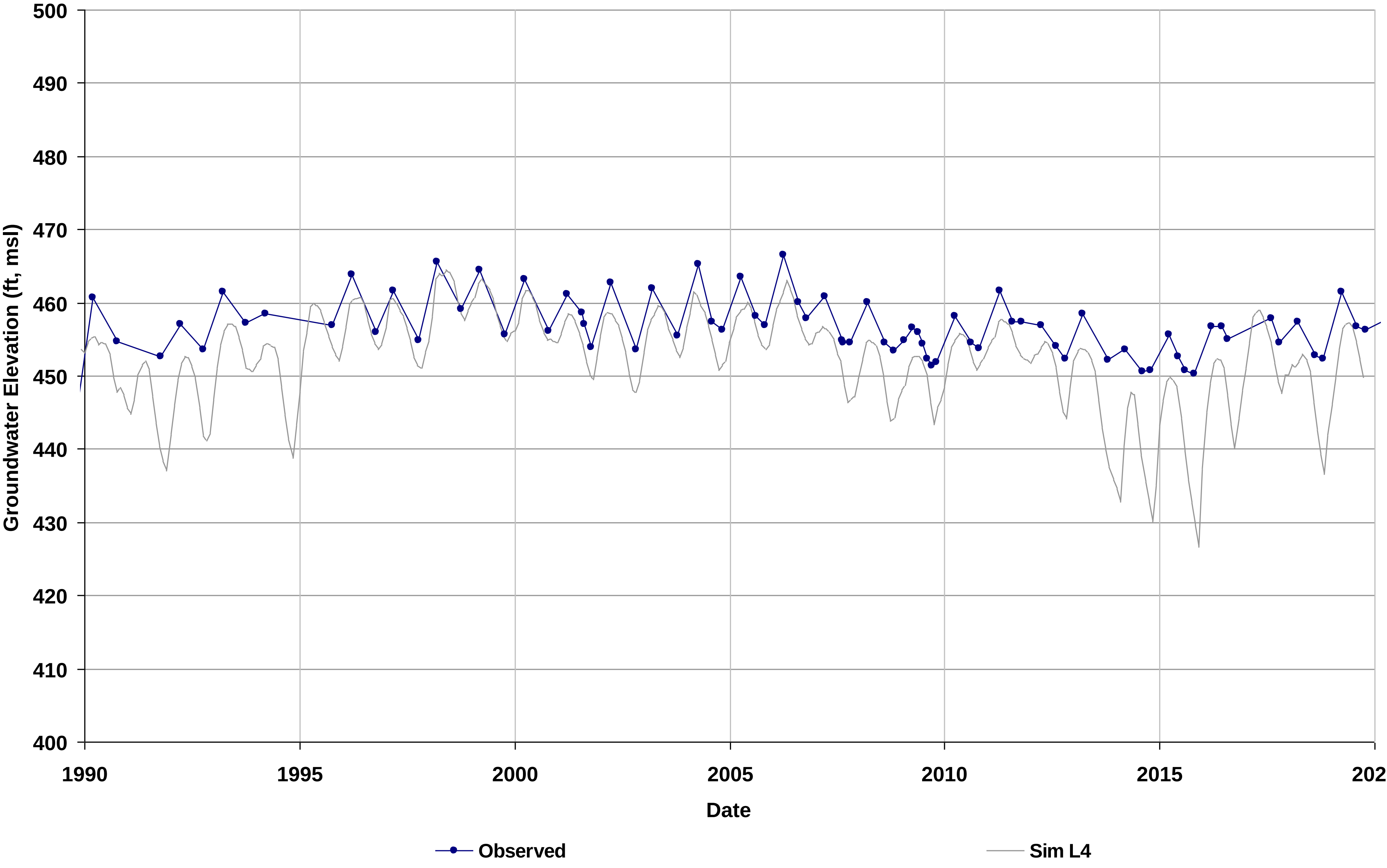
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

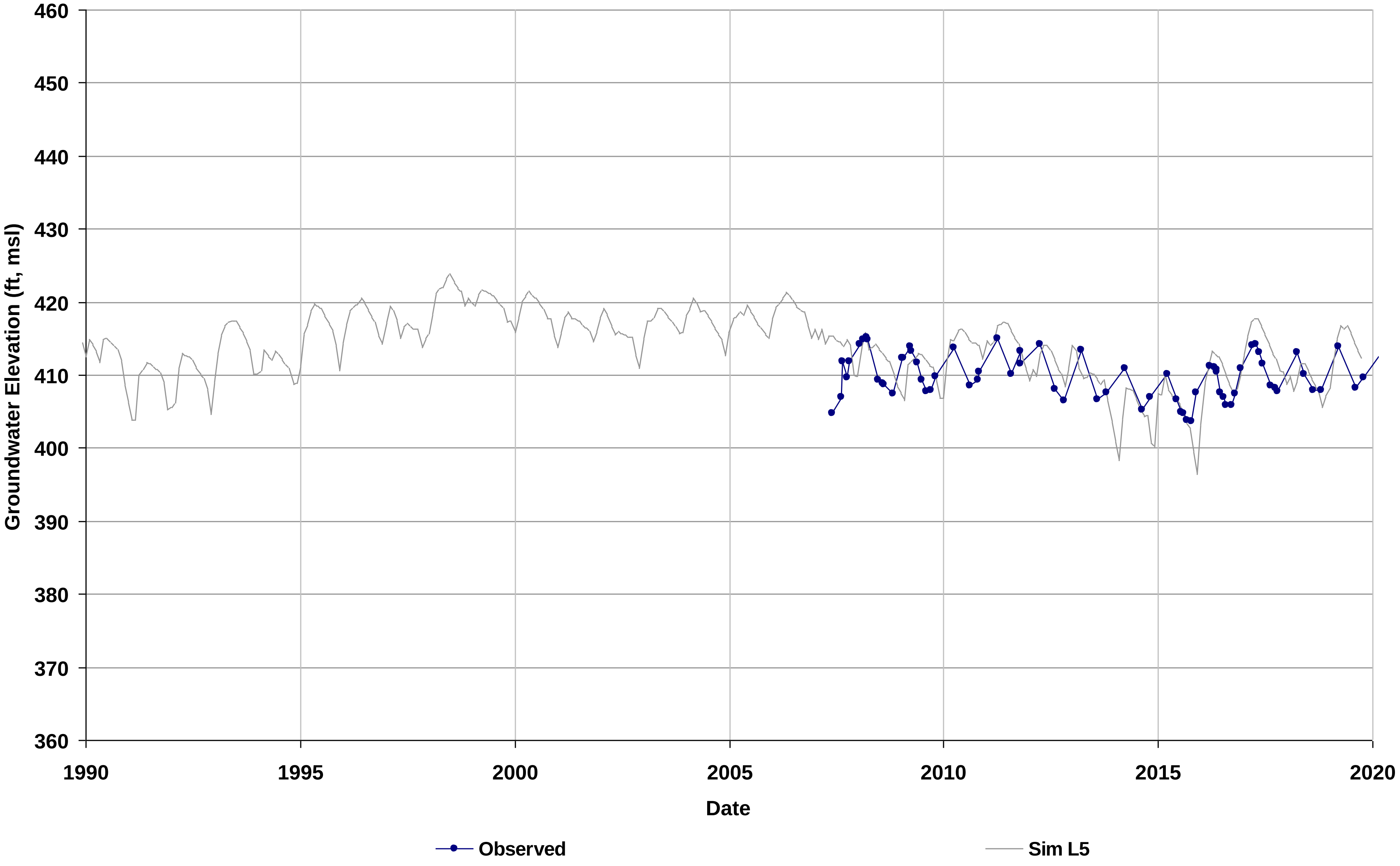
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

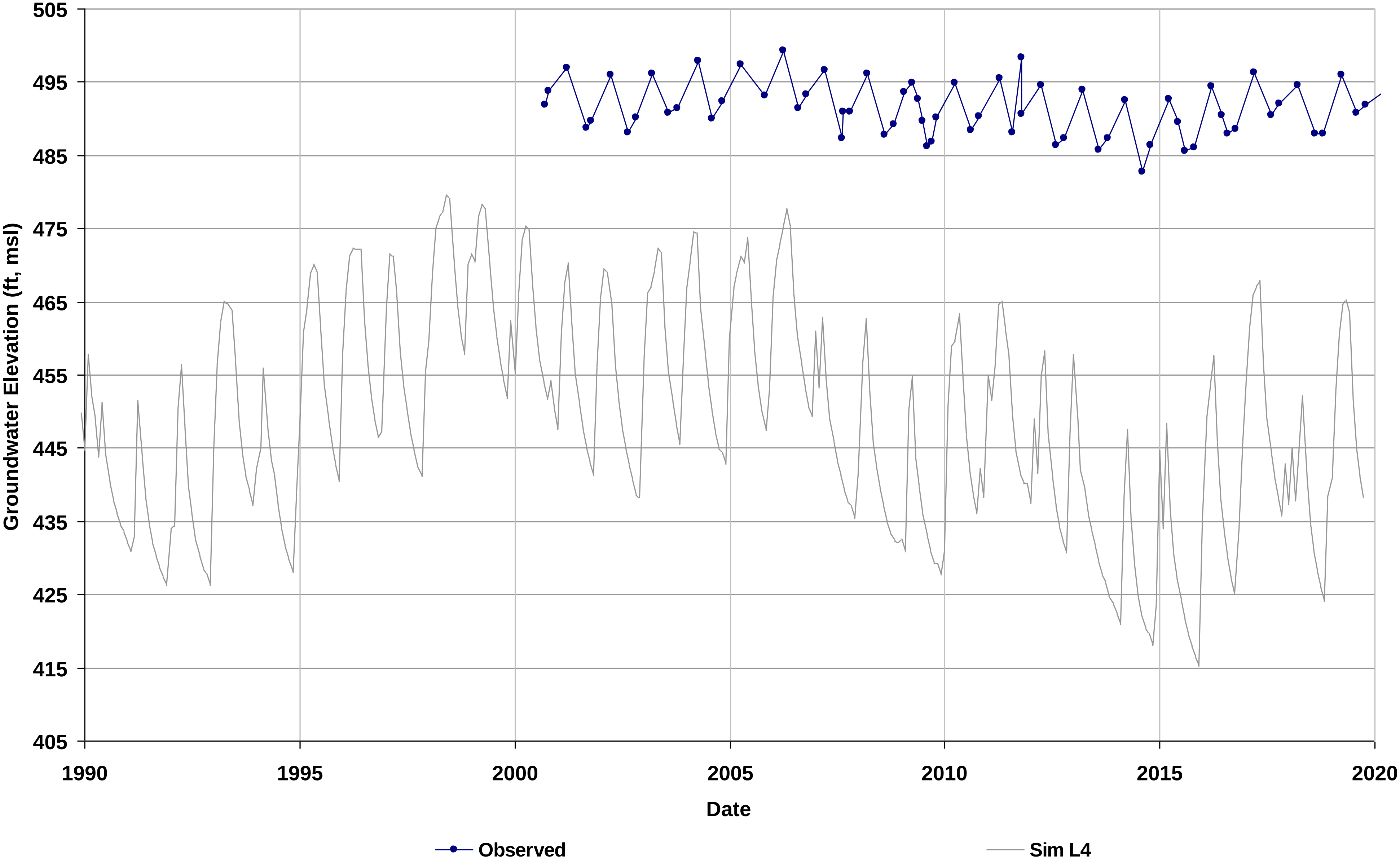
Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

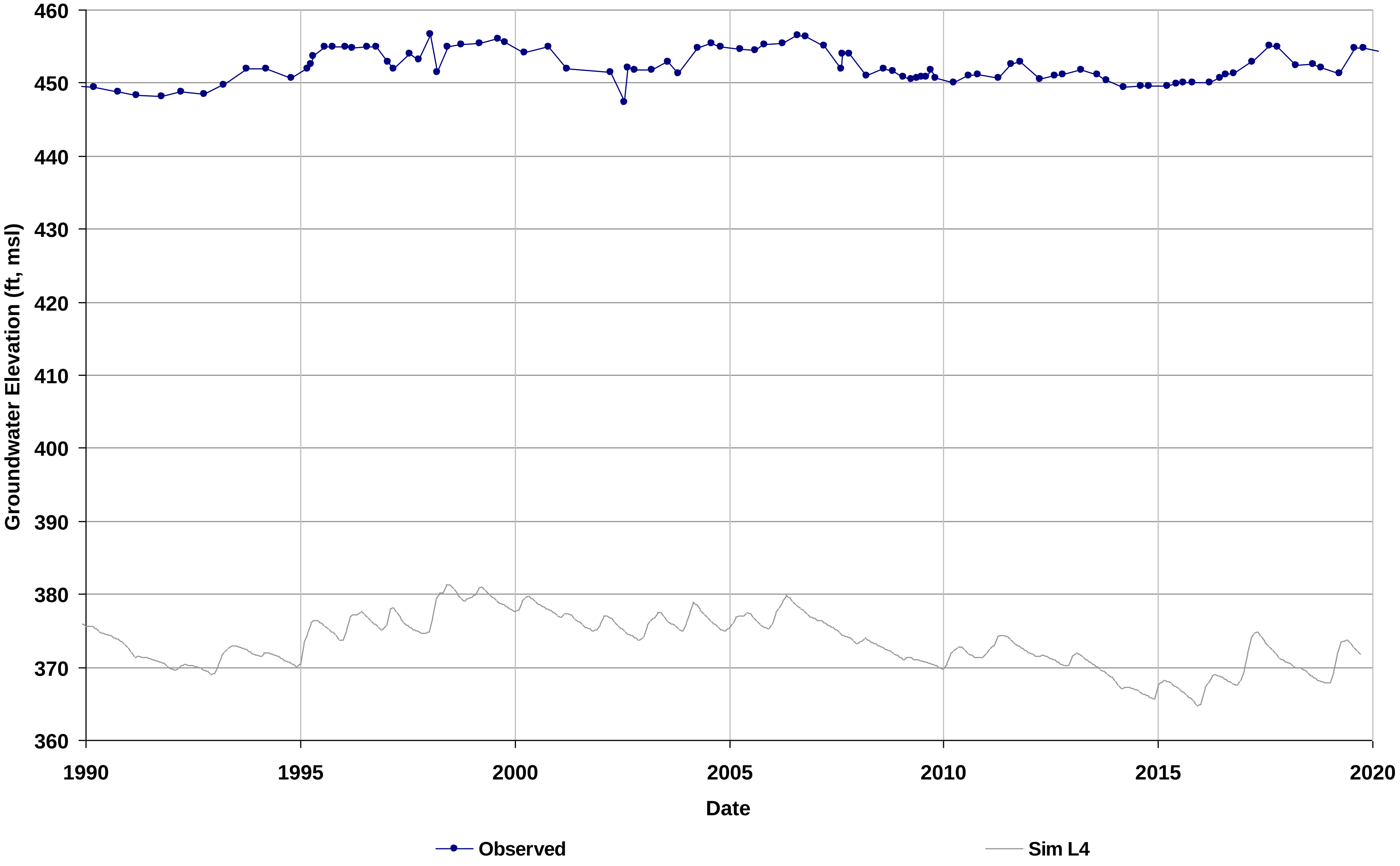
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

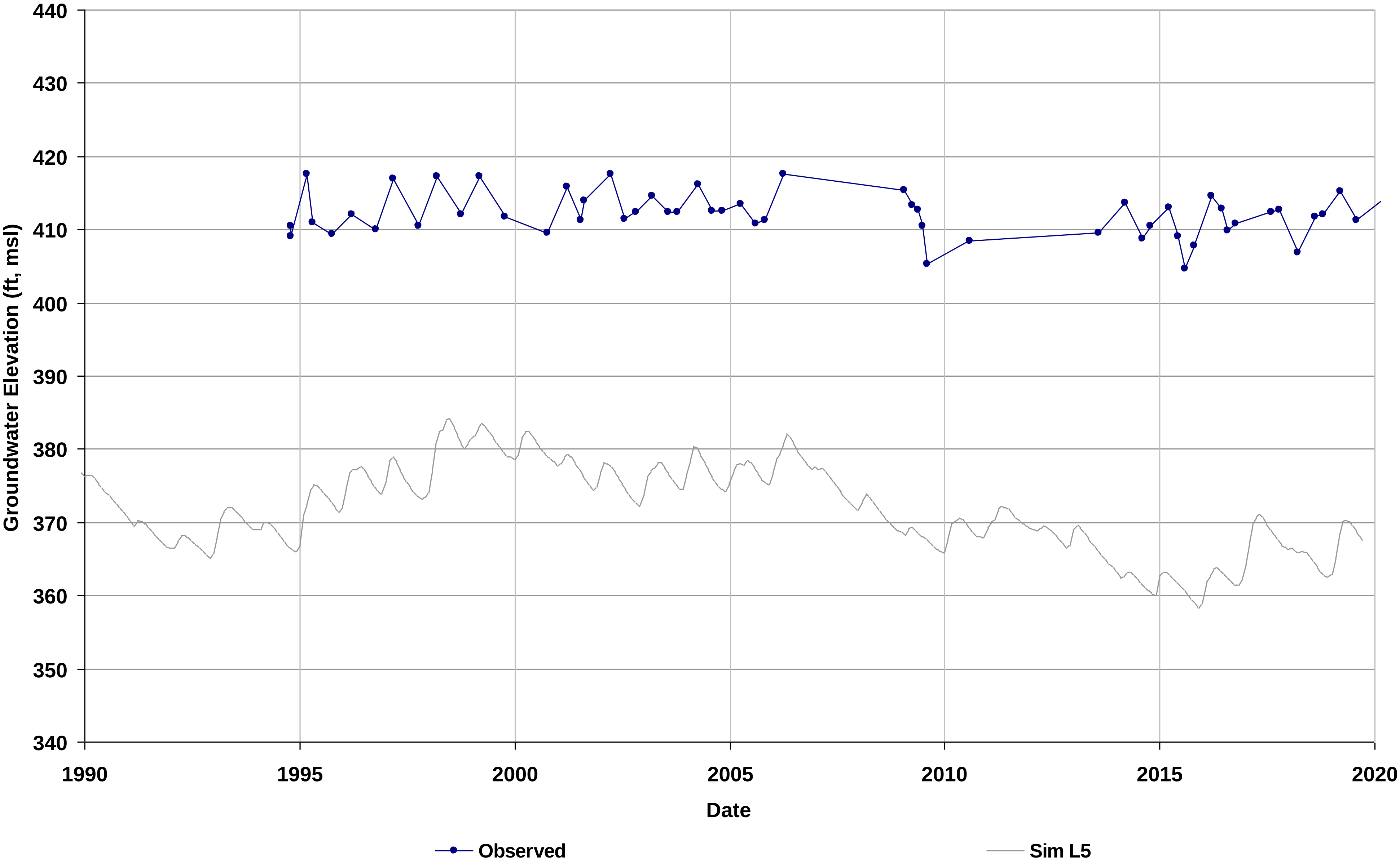
Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

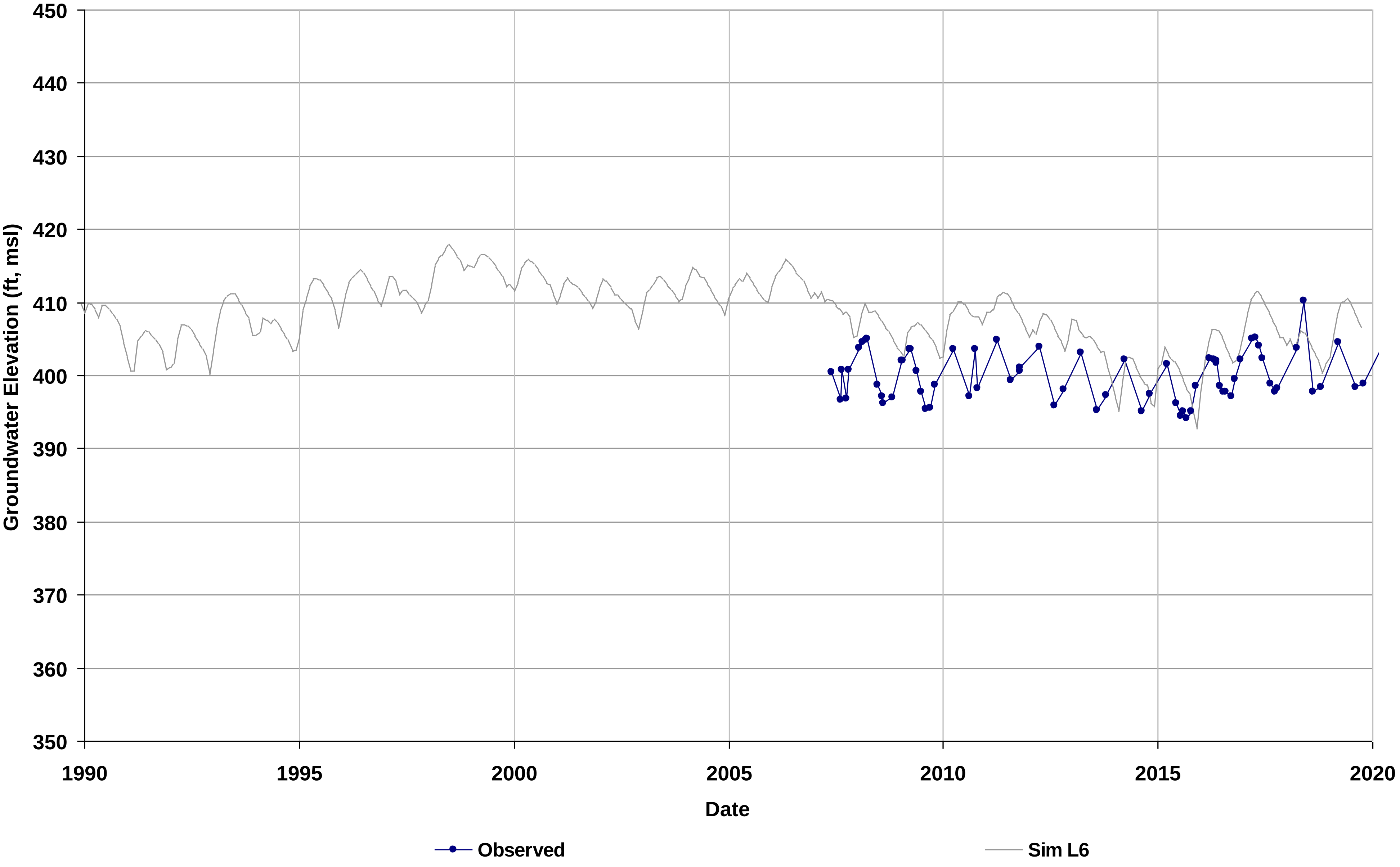
Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

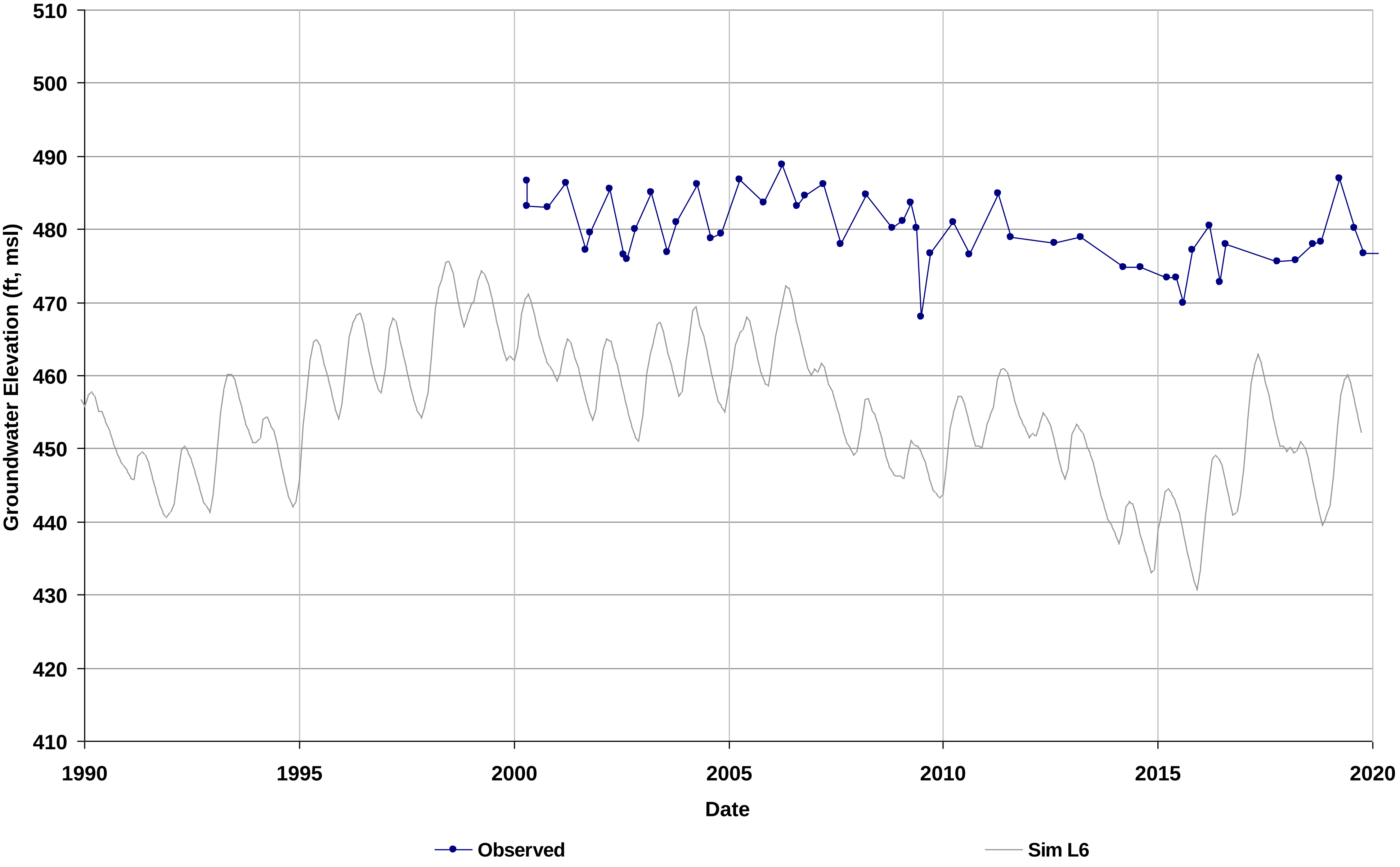
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

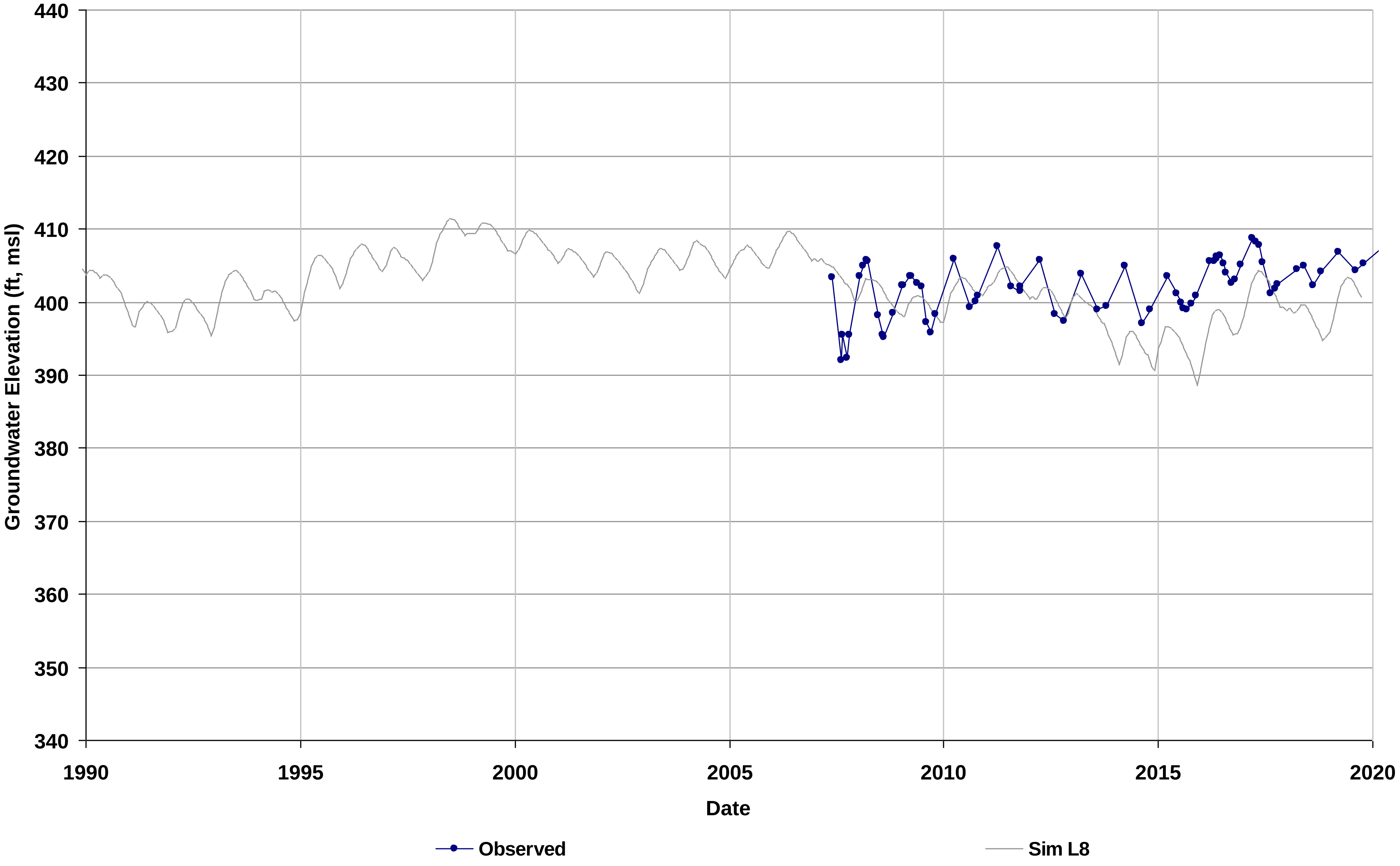
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

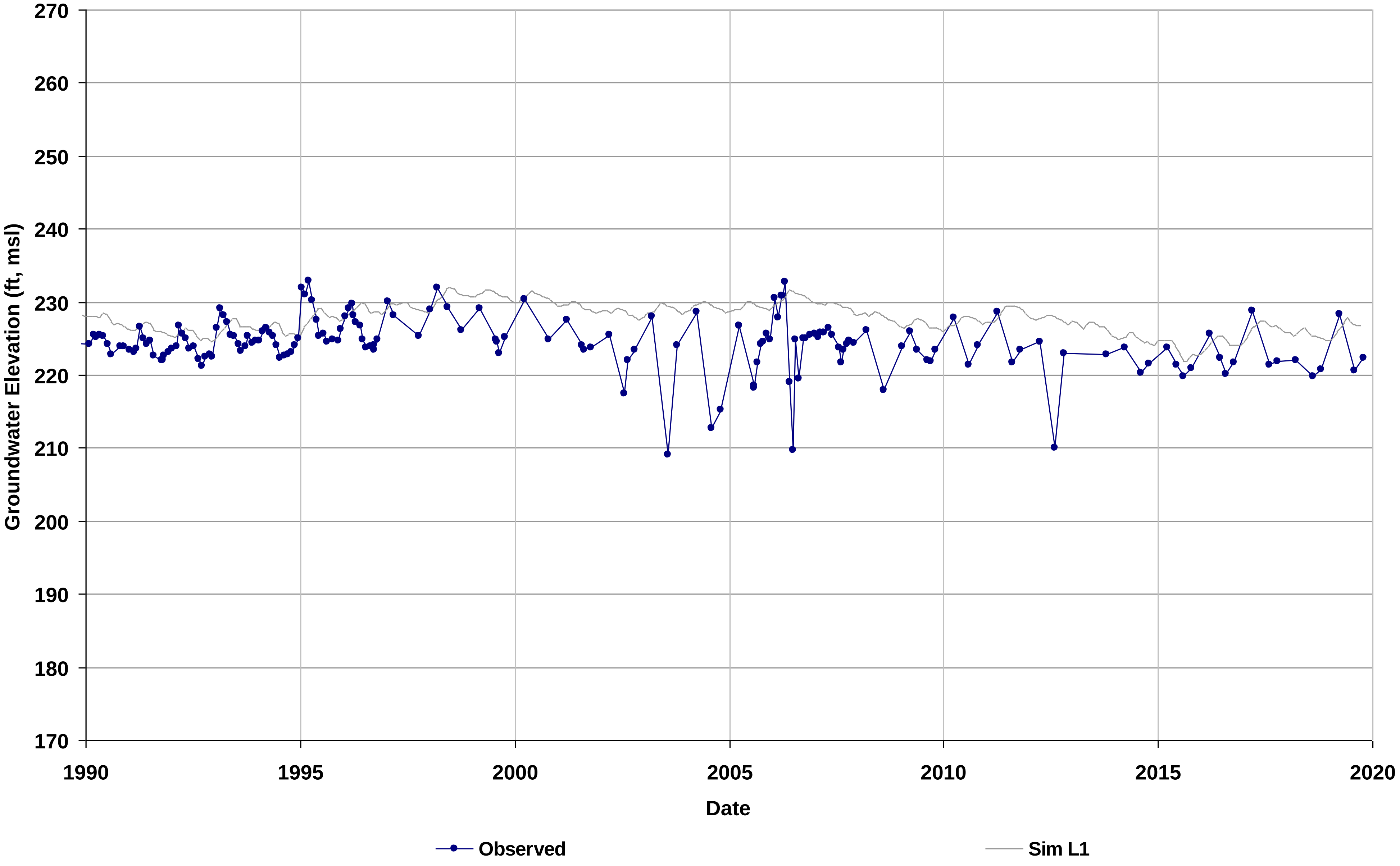
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Historical

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

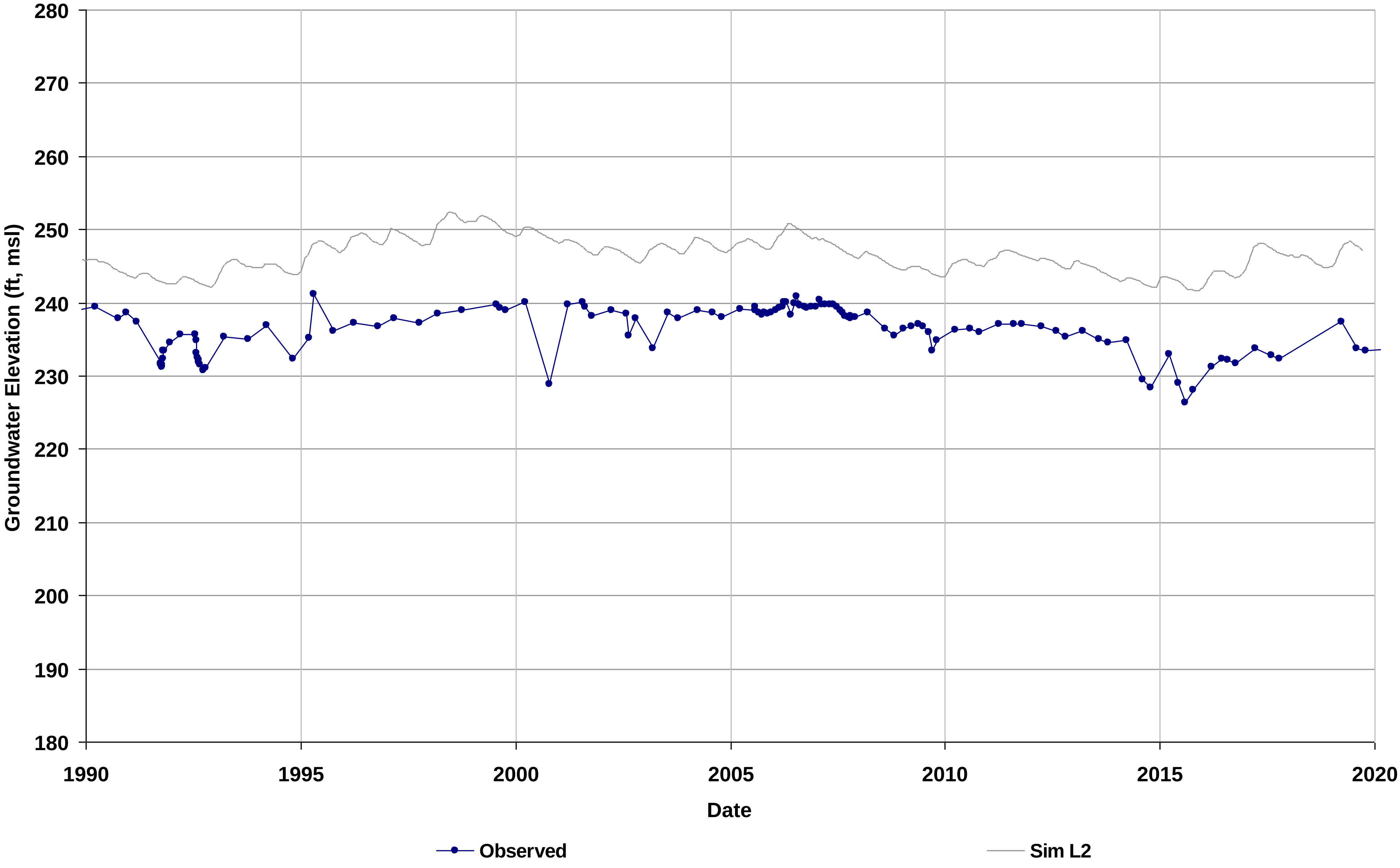
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Historical

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

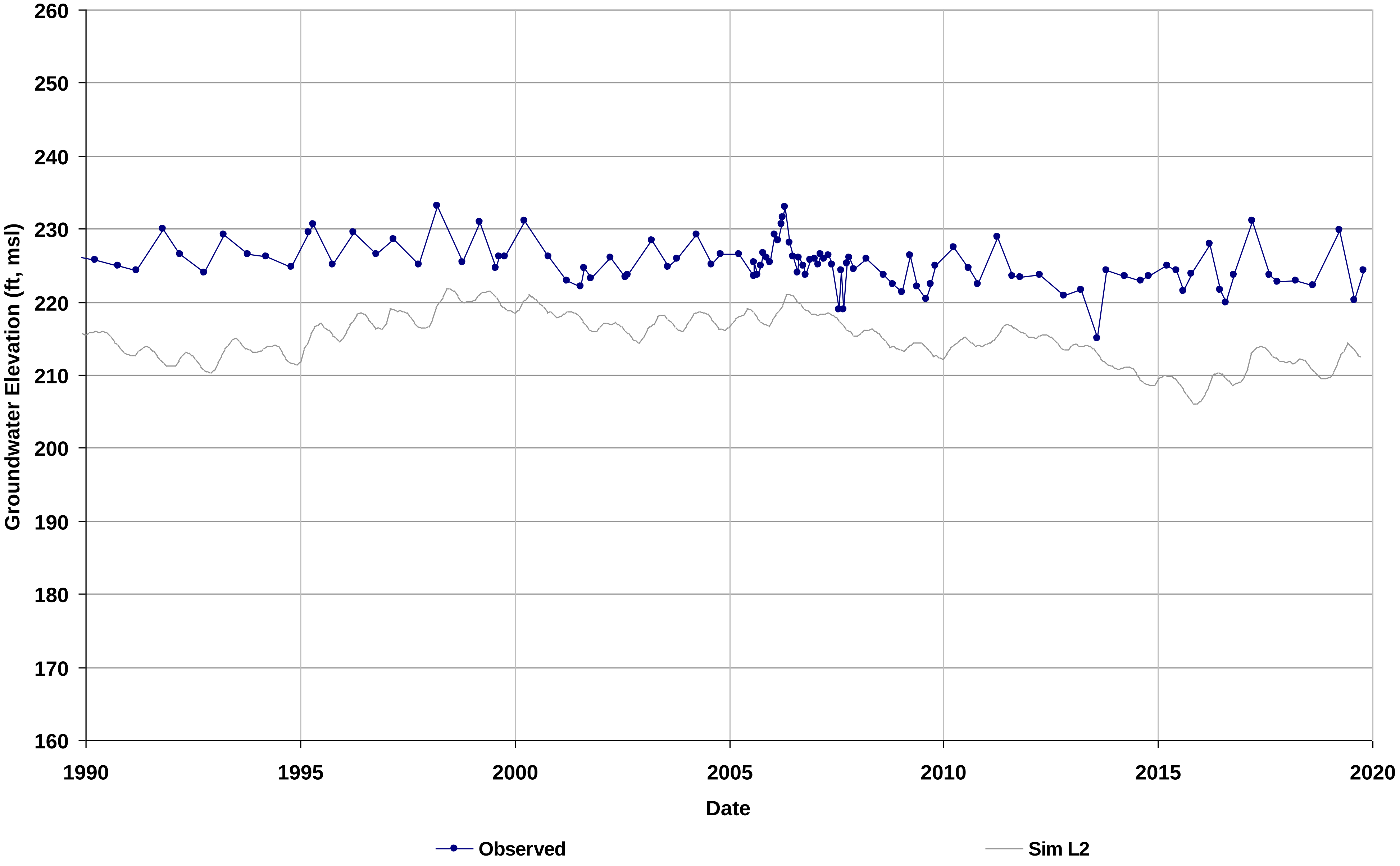
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

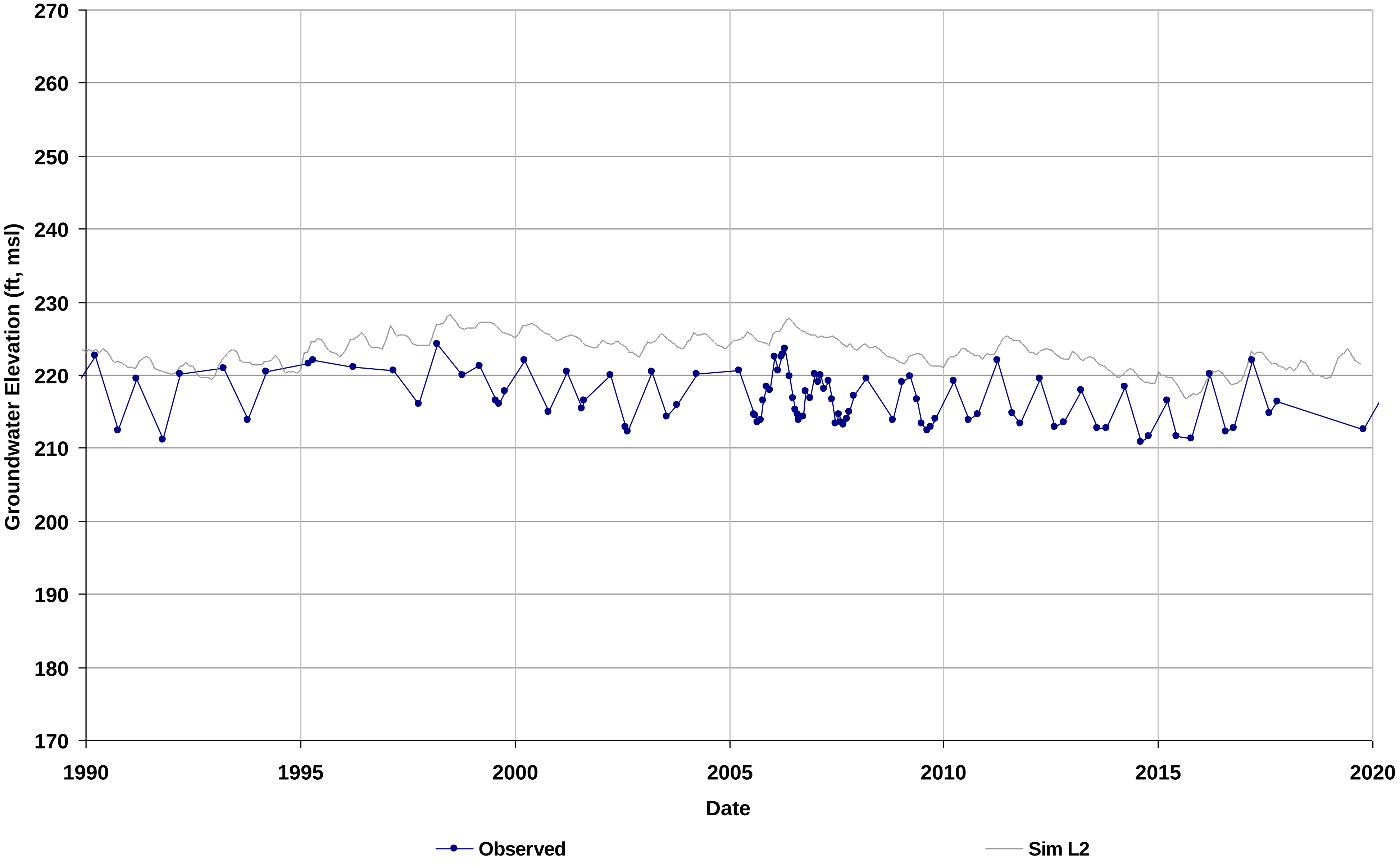
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

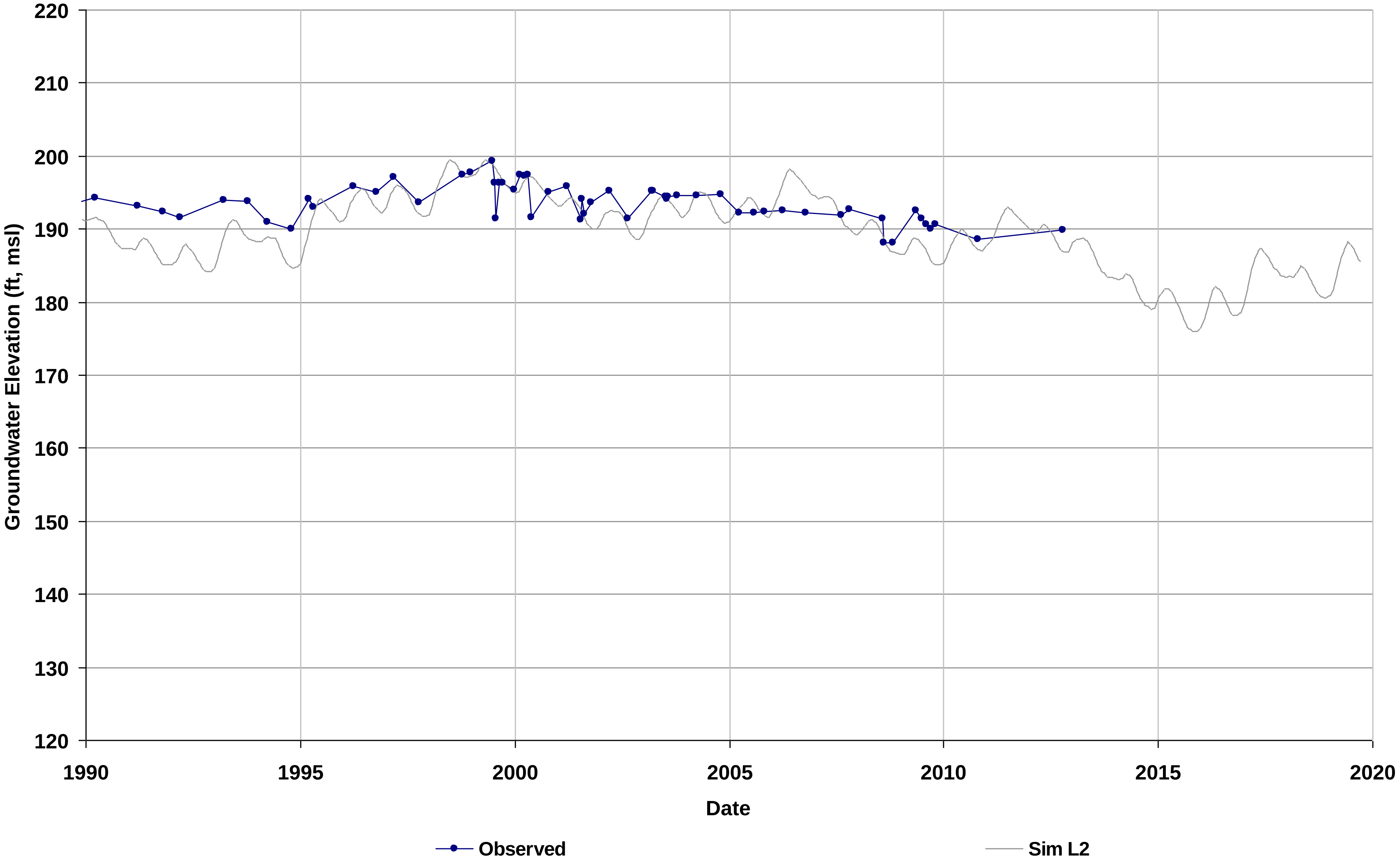
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

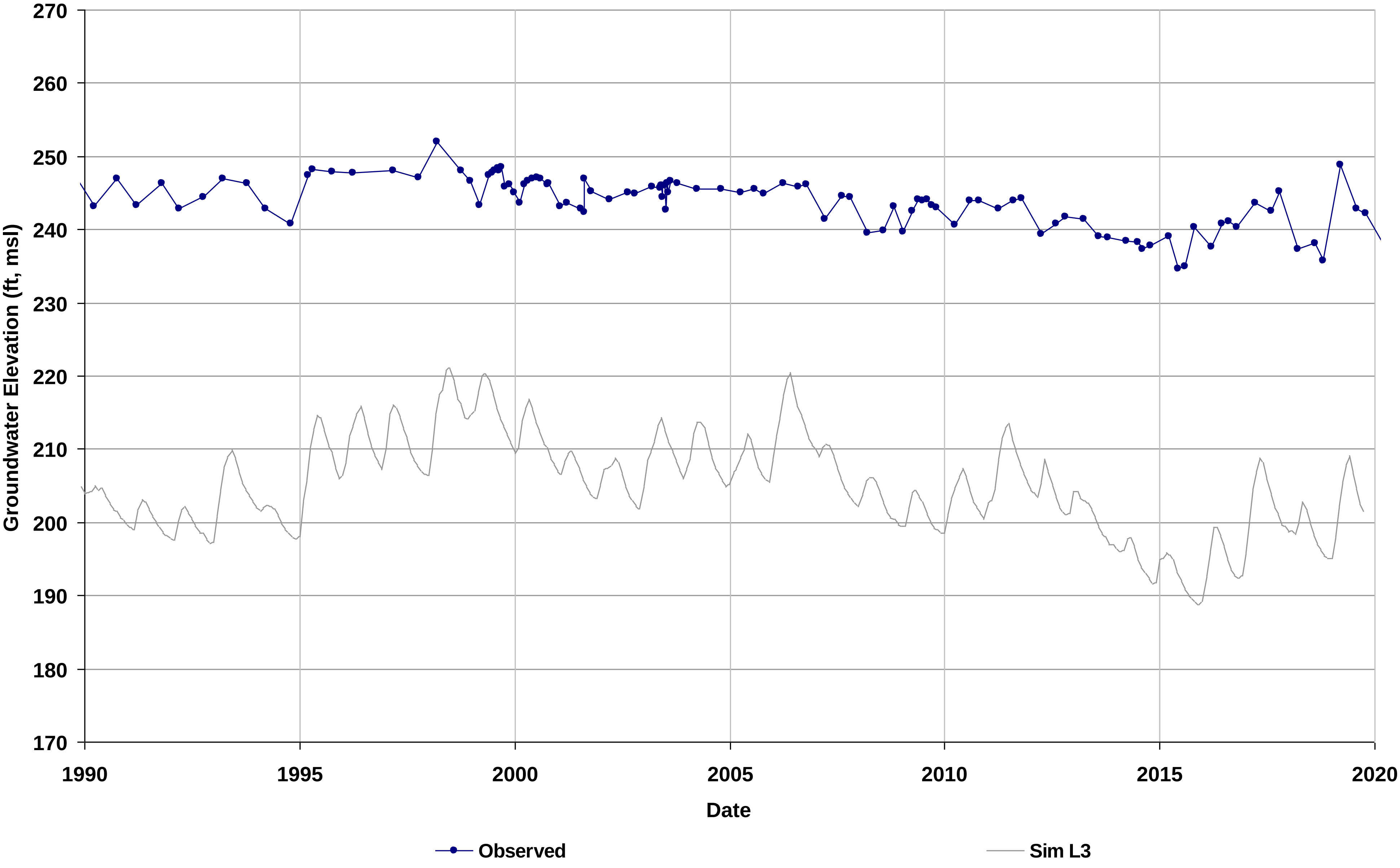
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

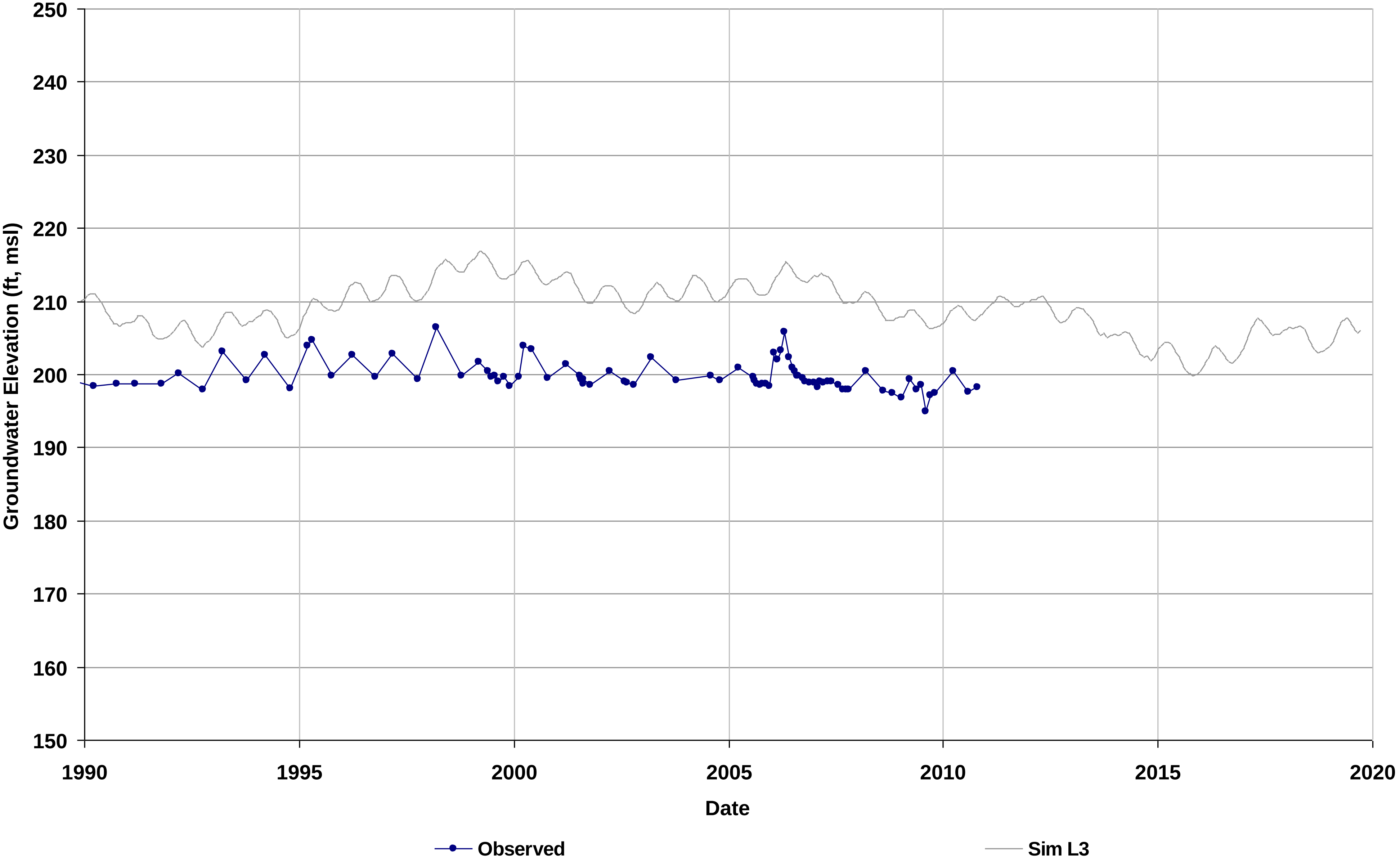
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

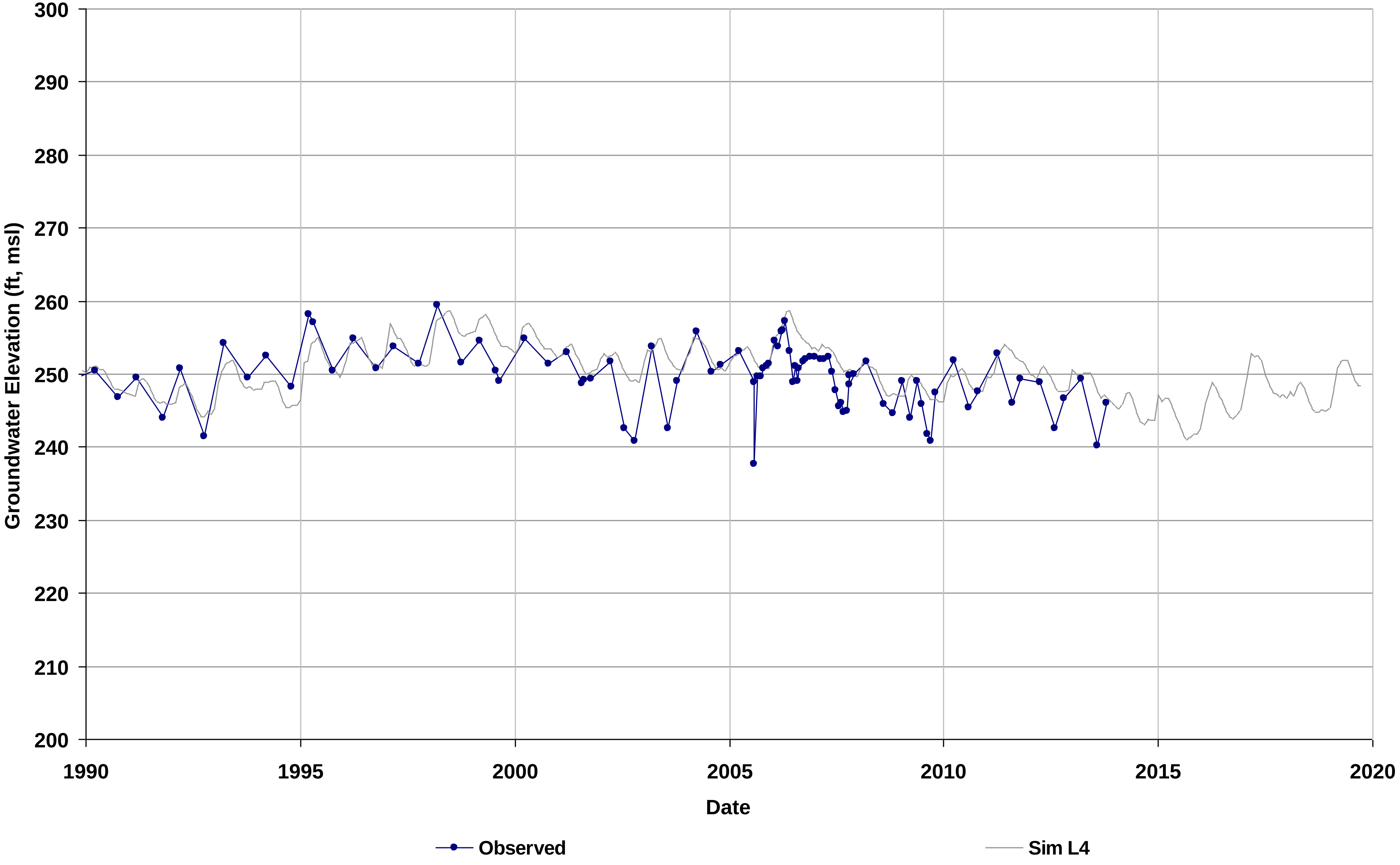
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

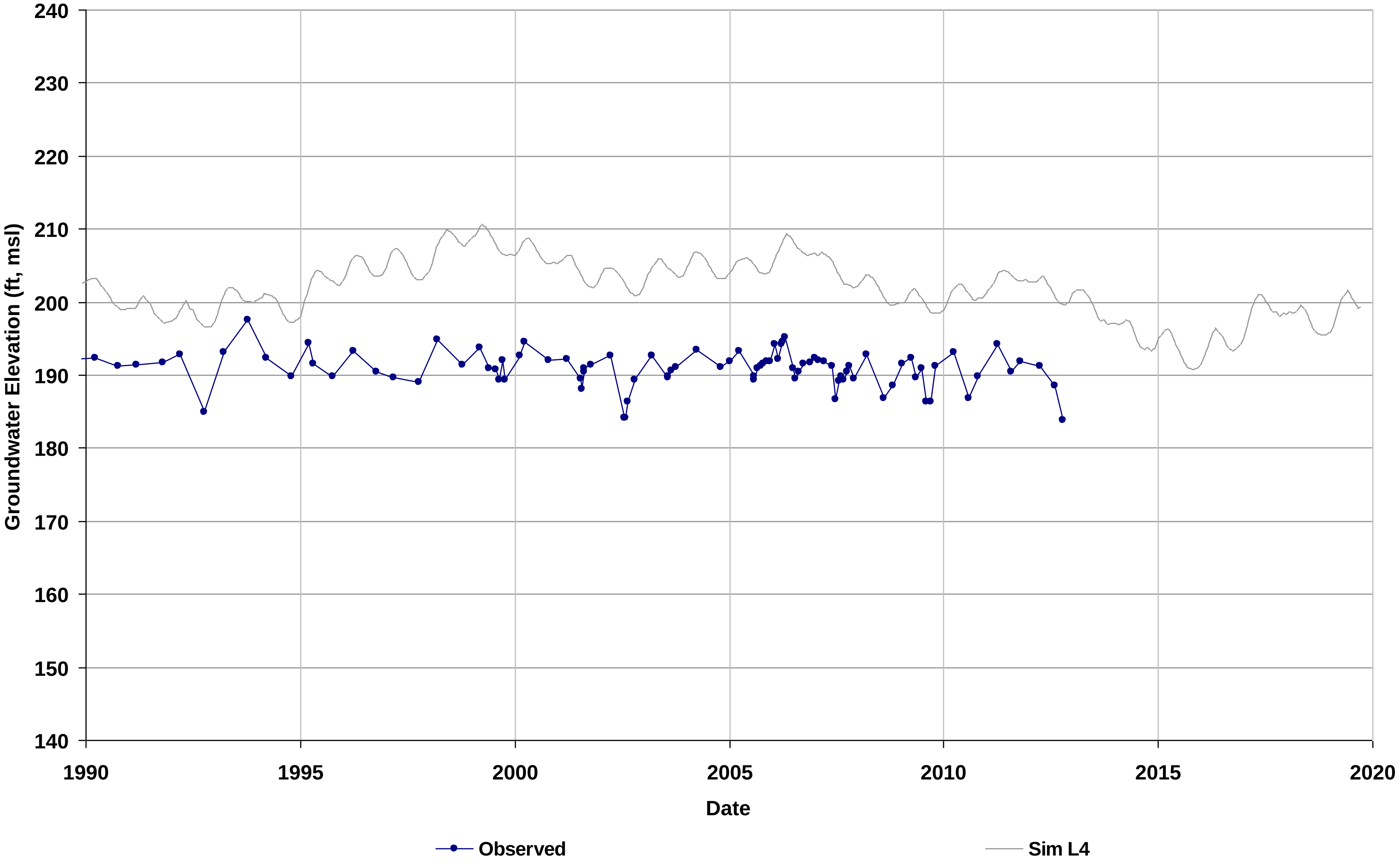
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

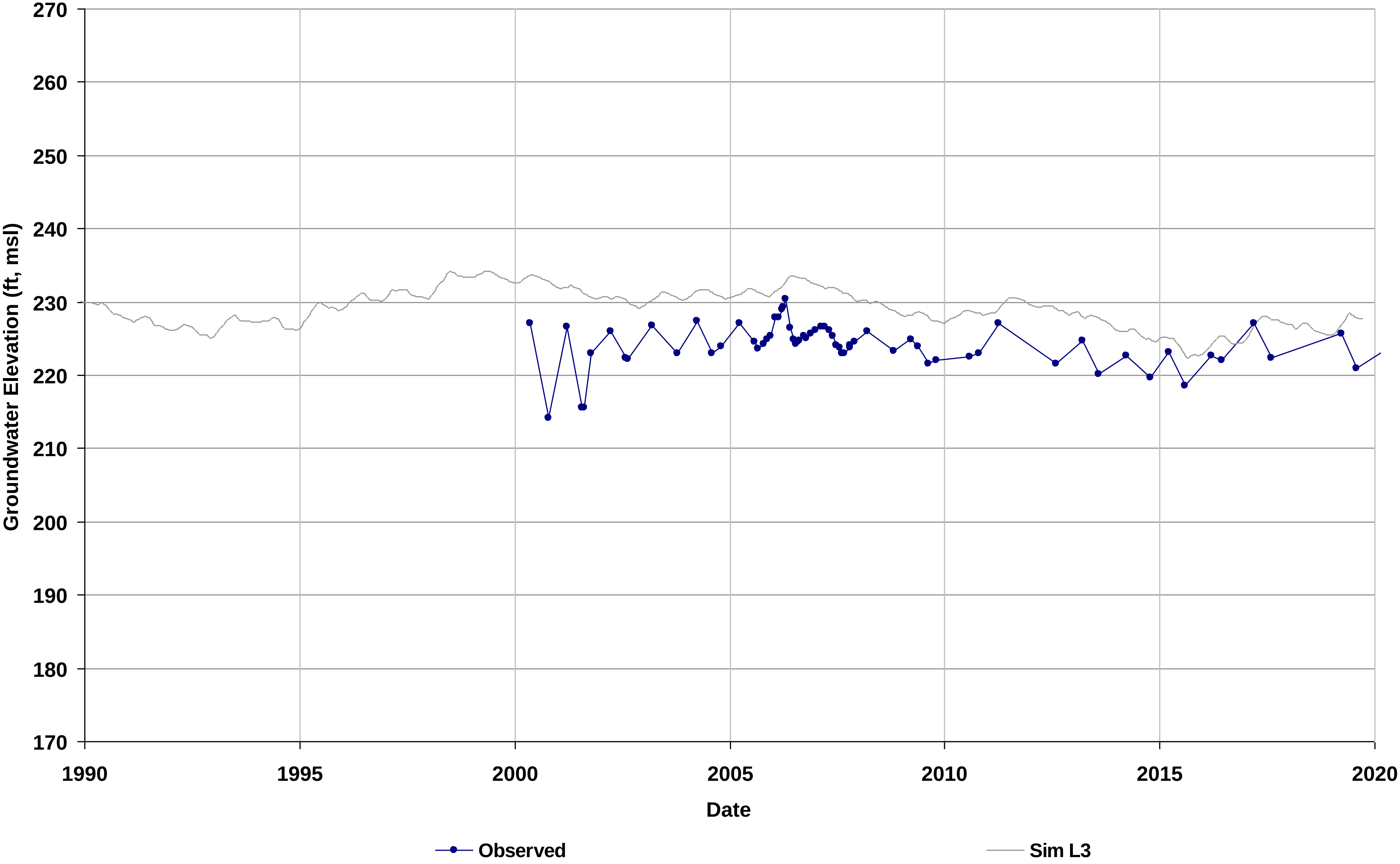
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

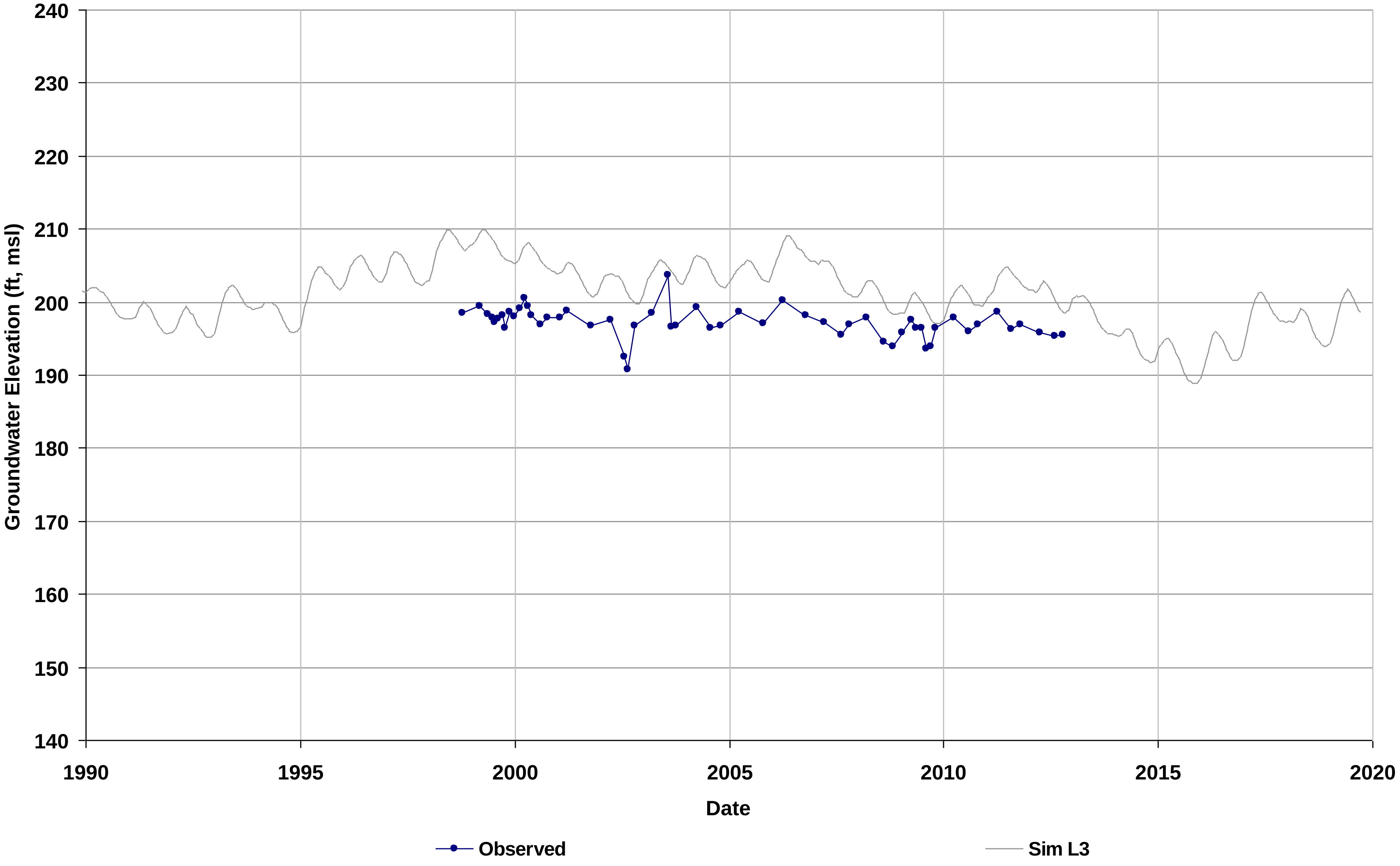
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

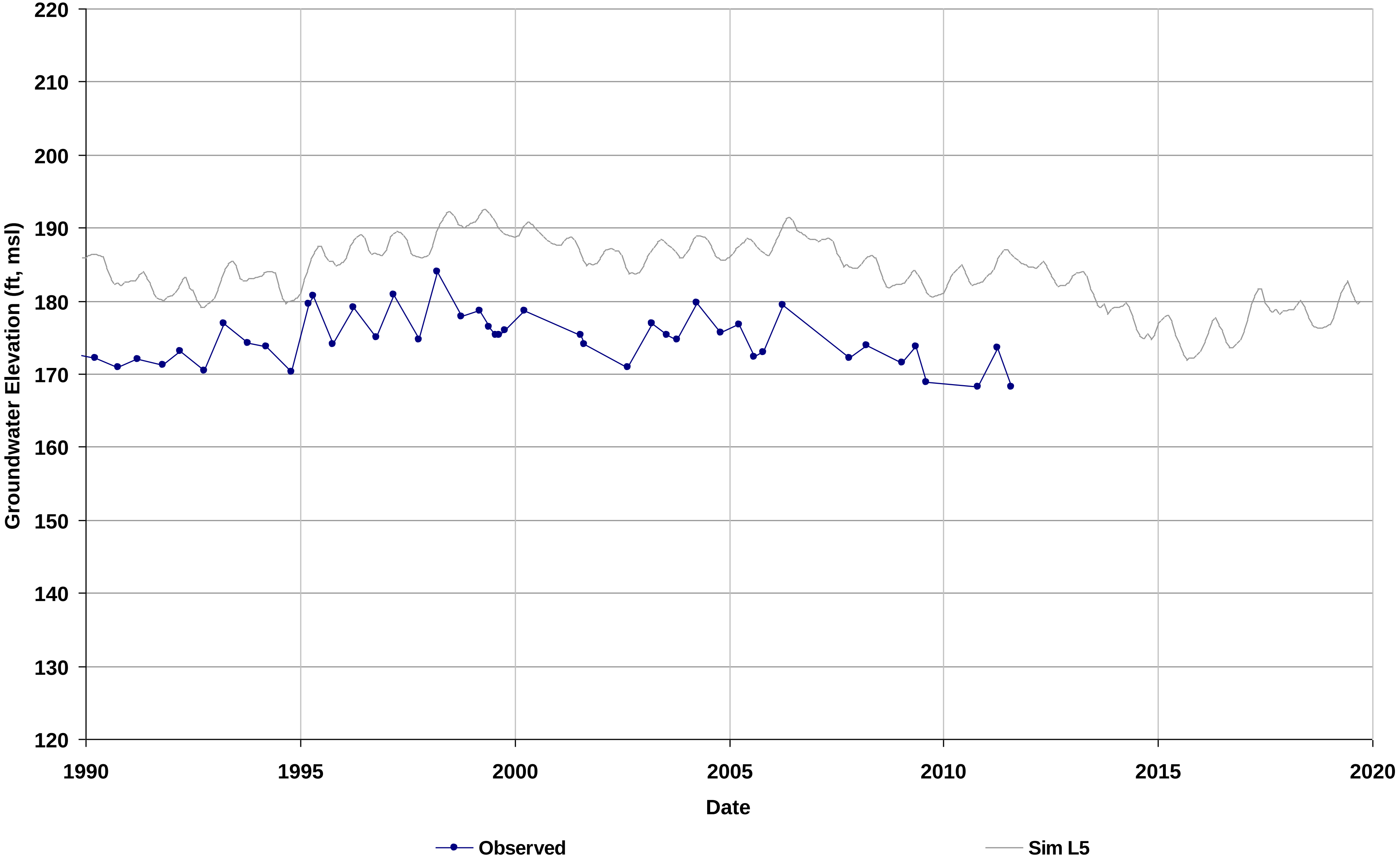
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

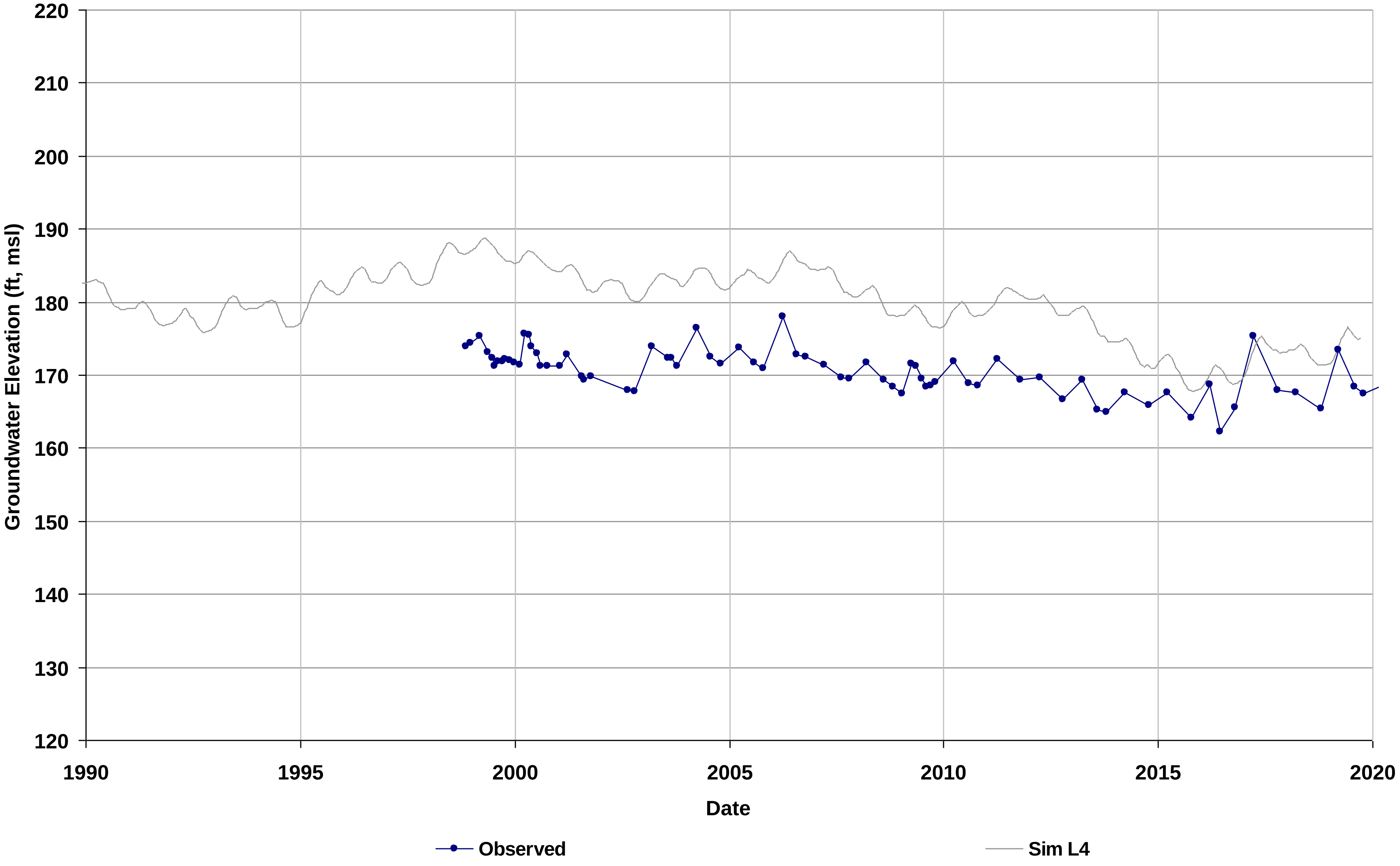
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

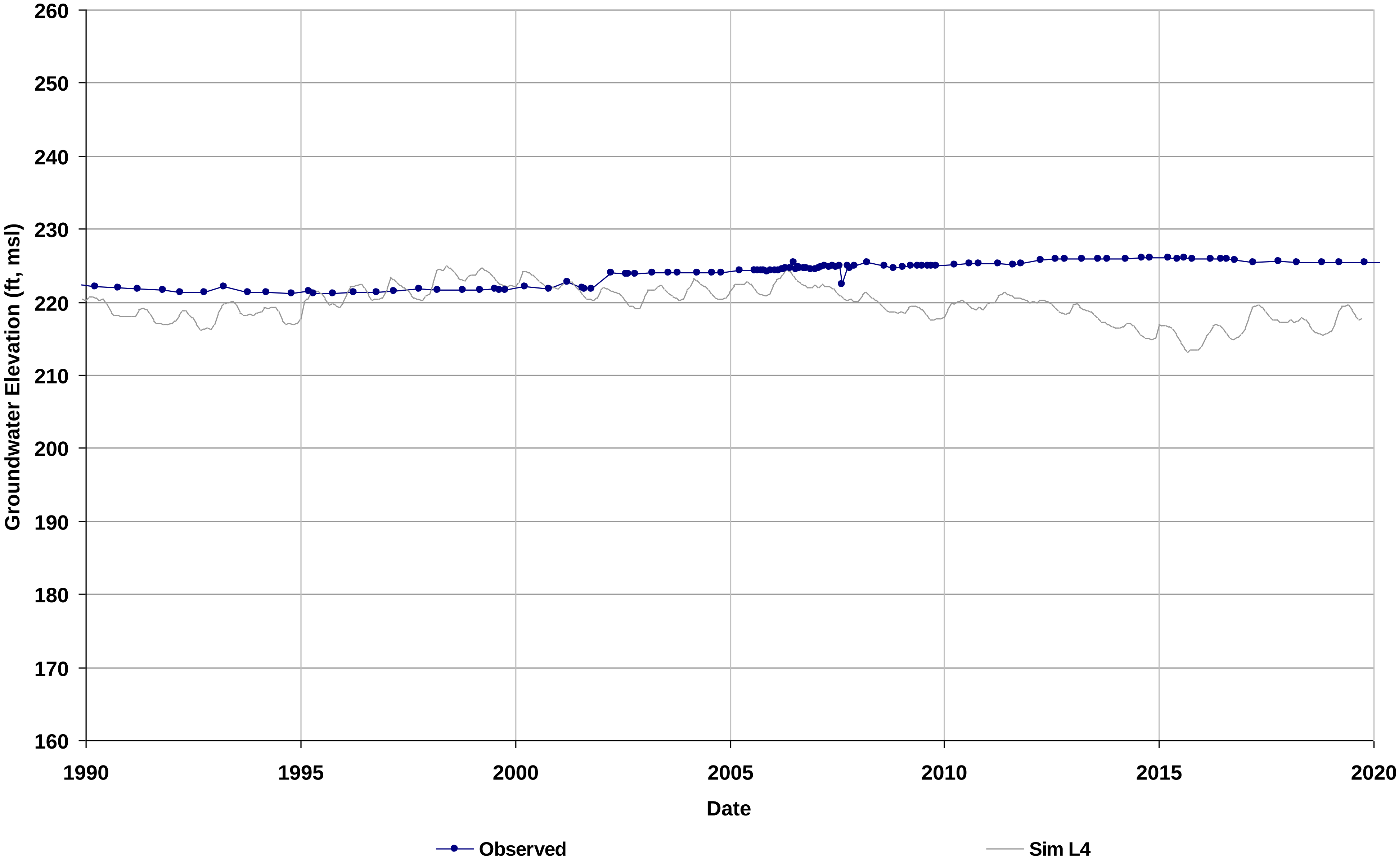
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

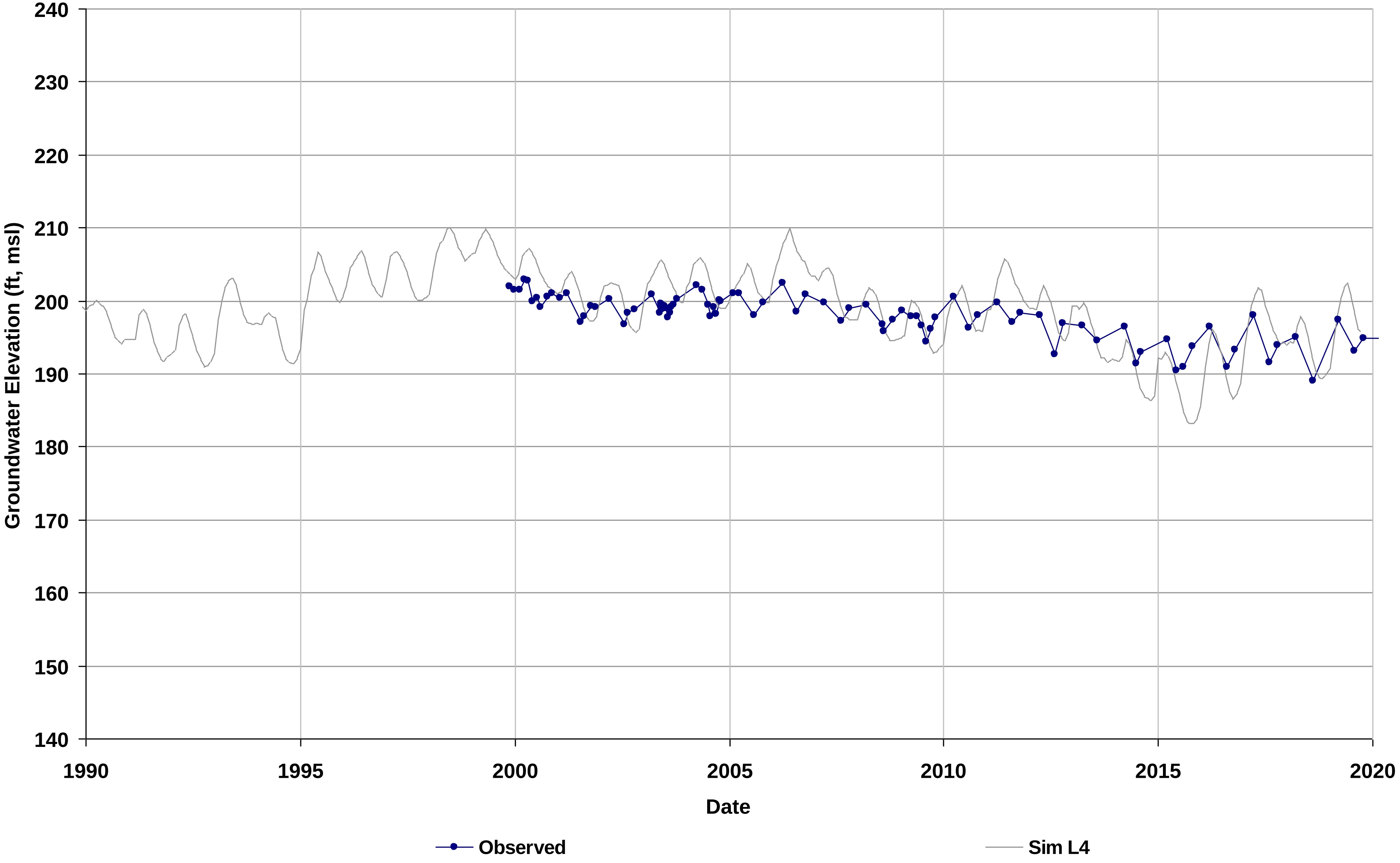
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

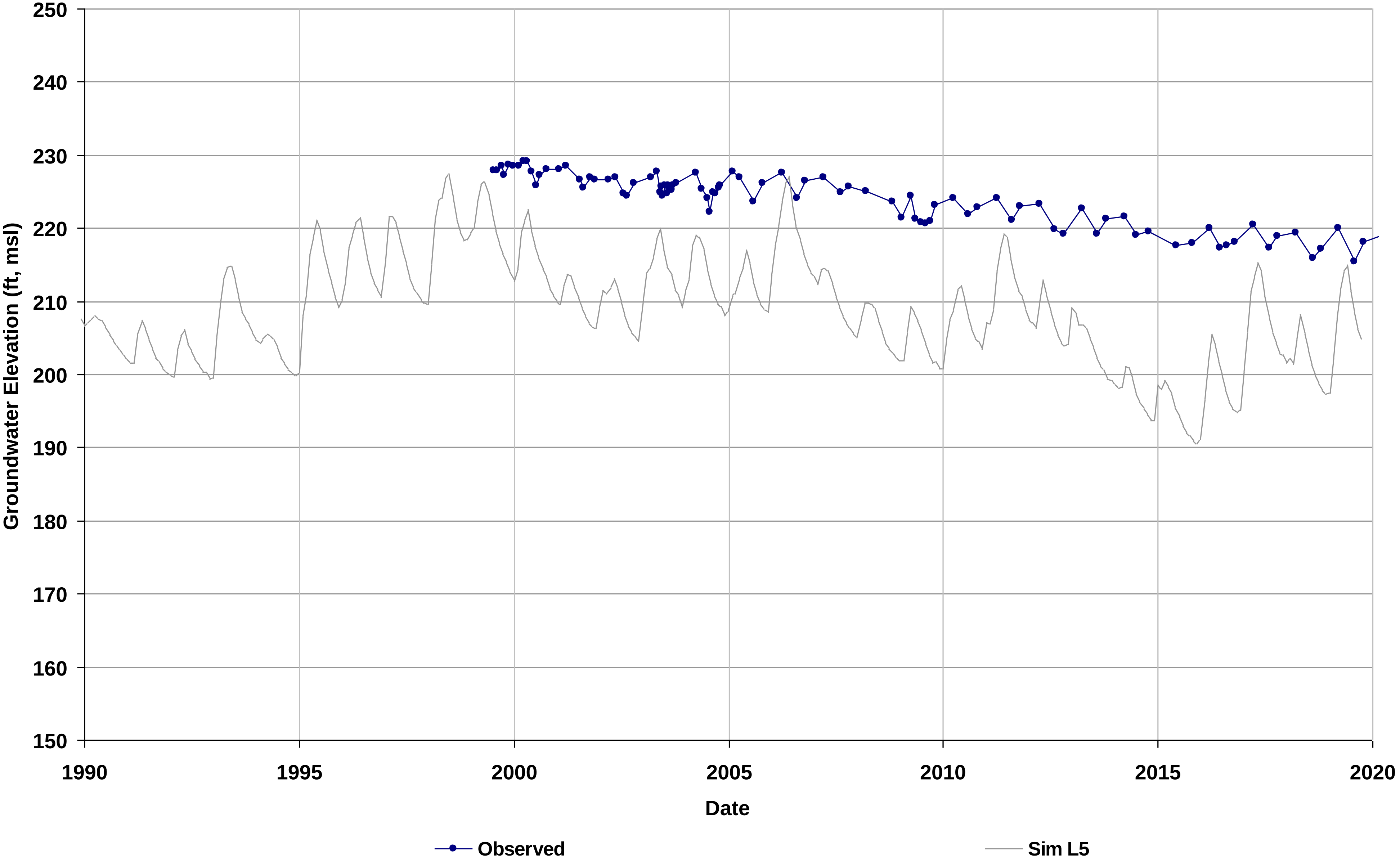
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

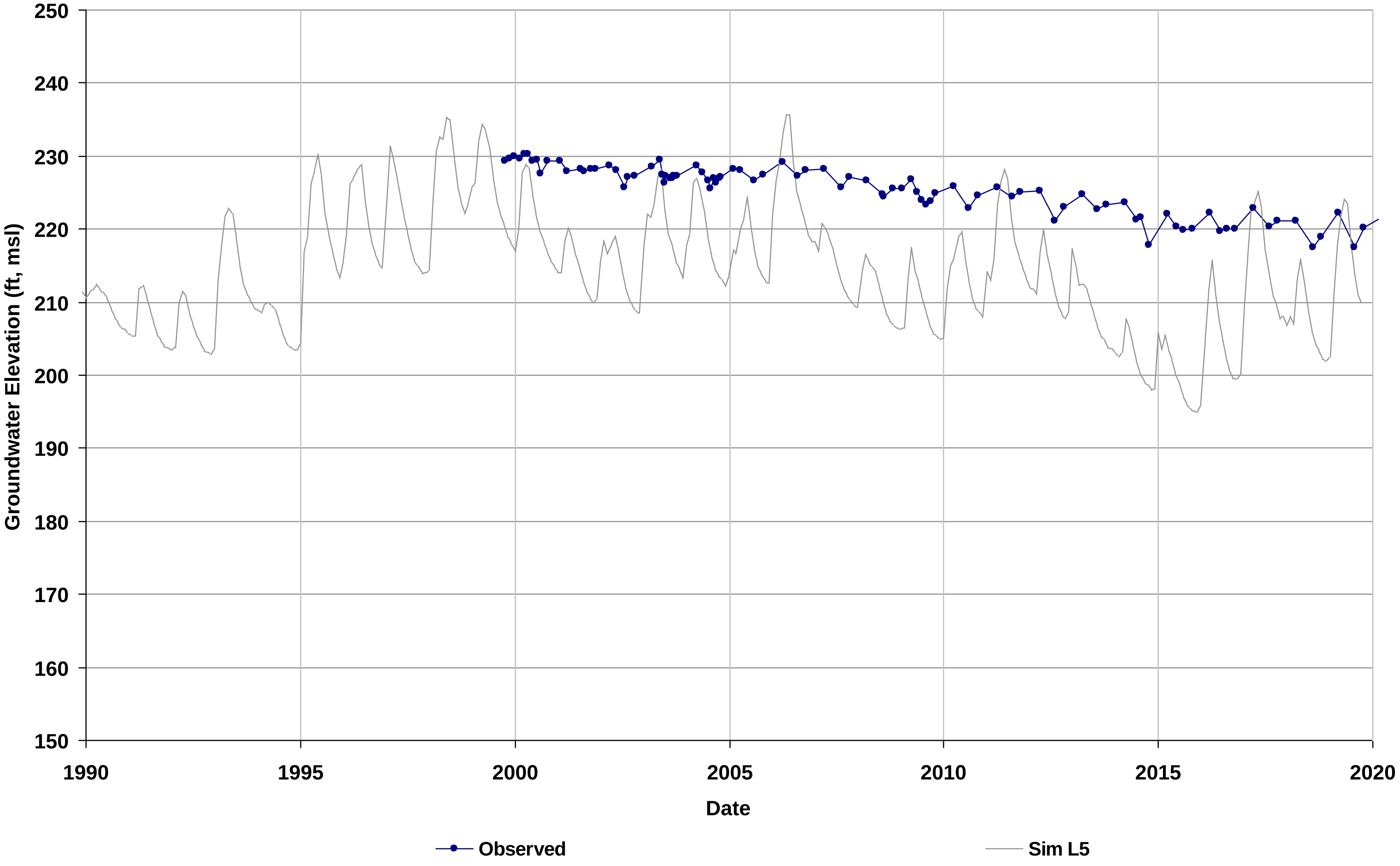
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

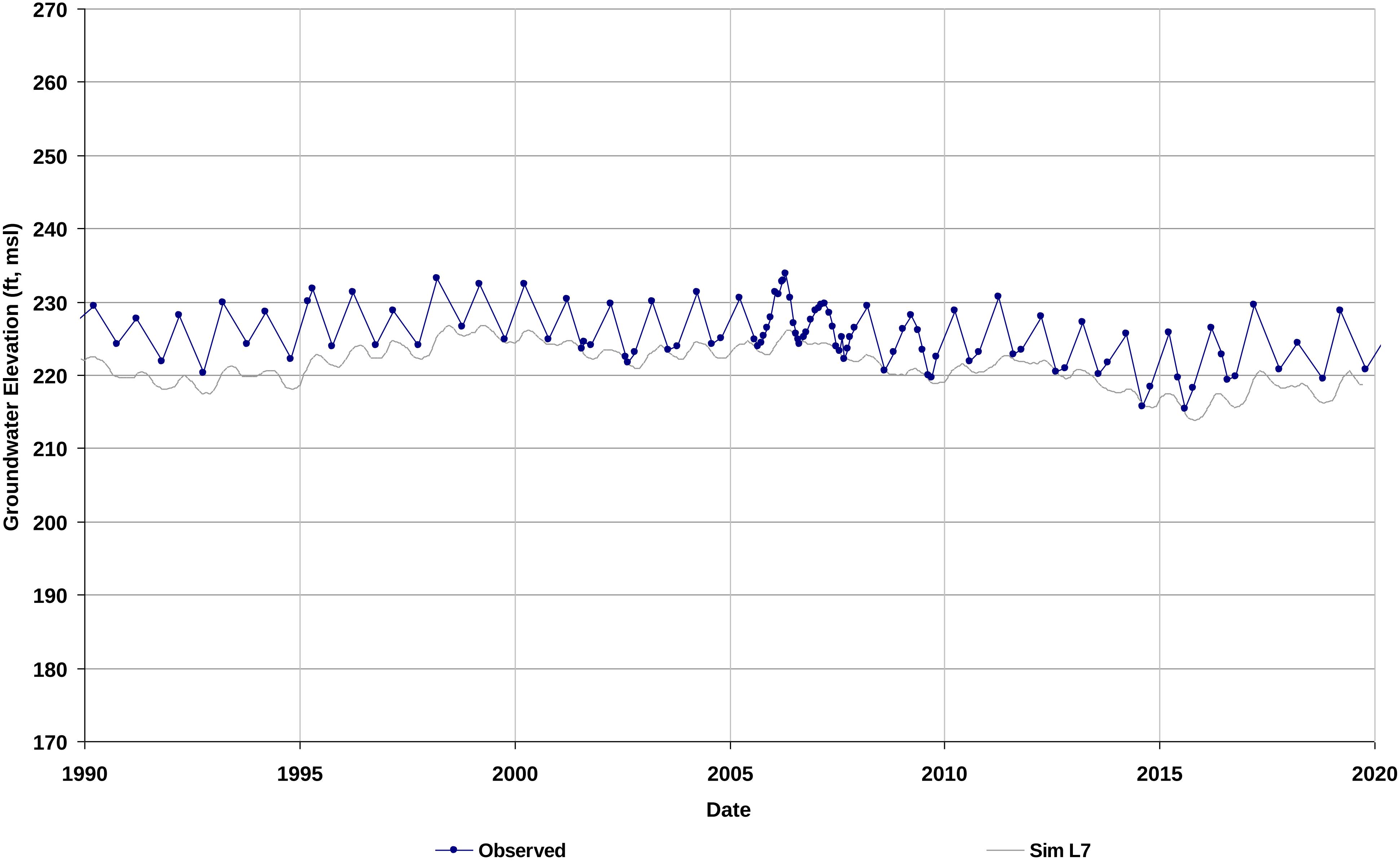
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

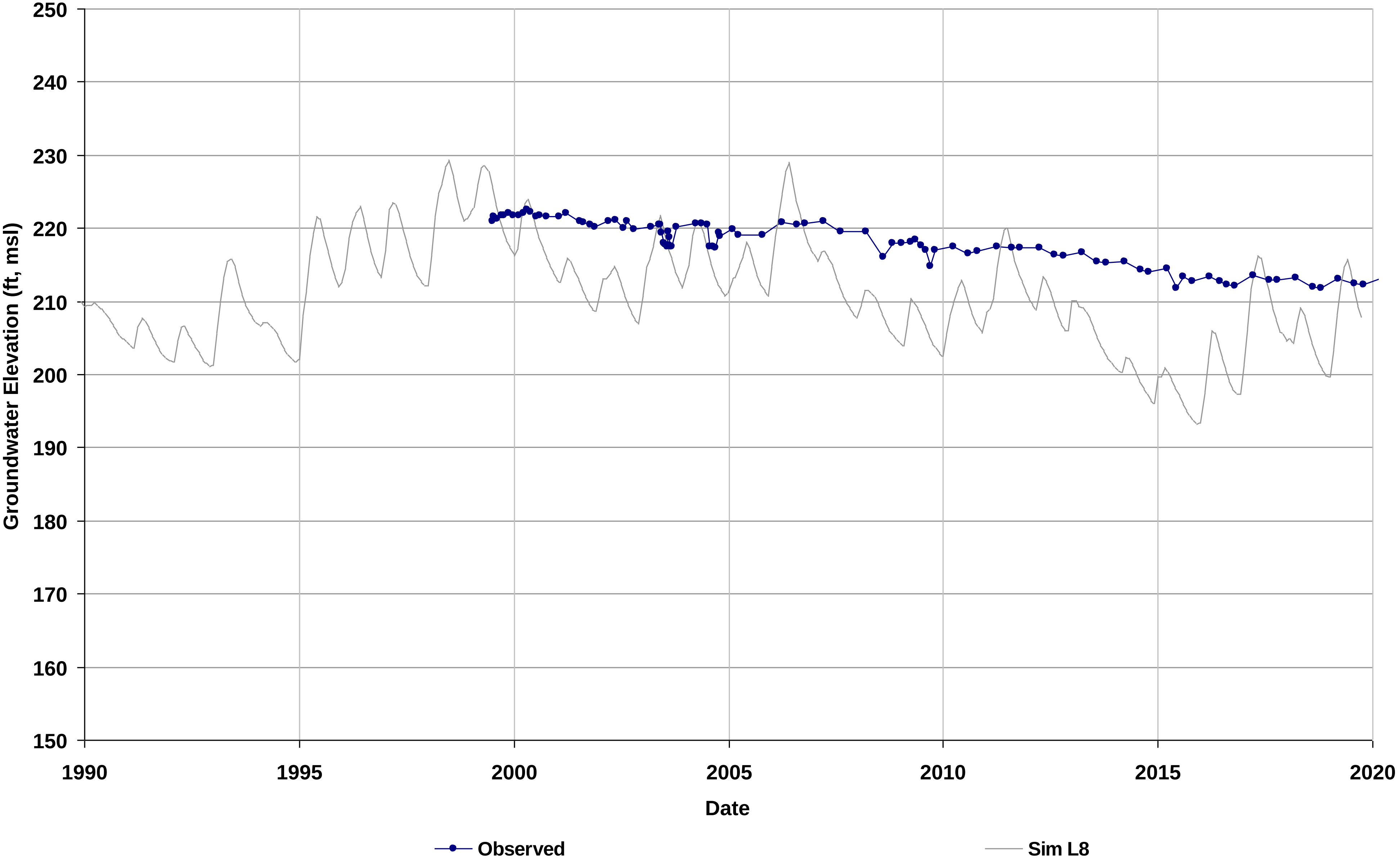
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Historical

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

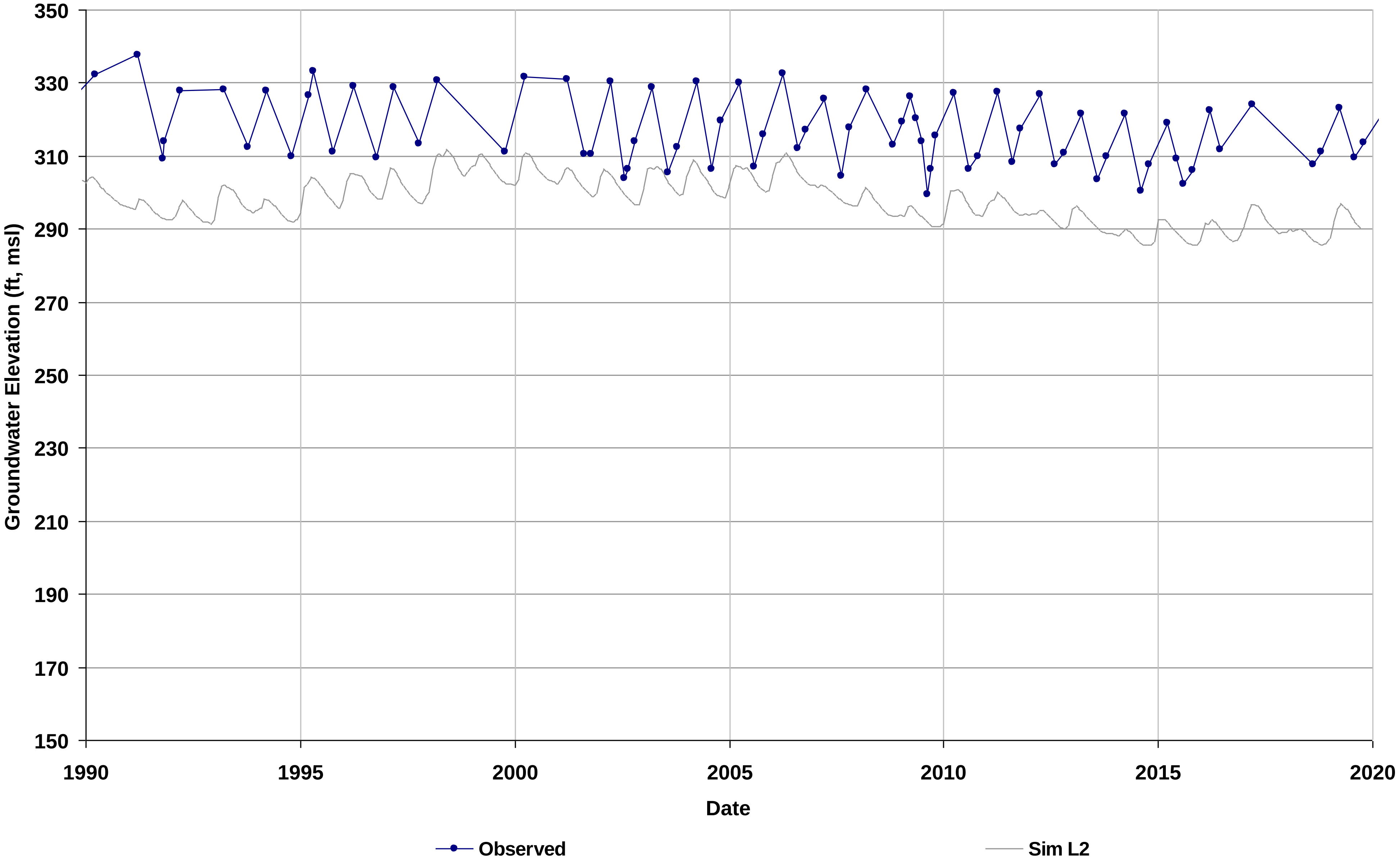
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Historical

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

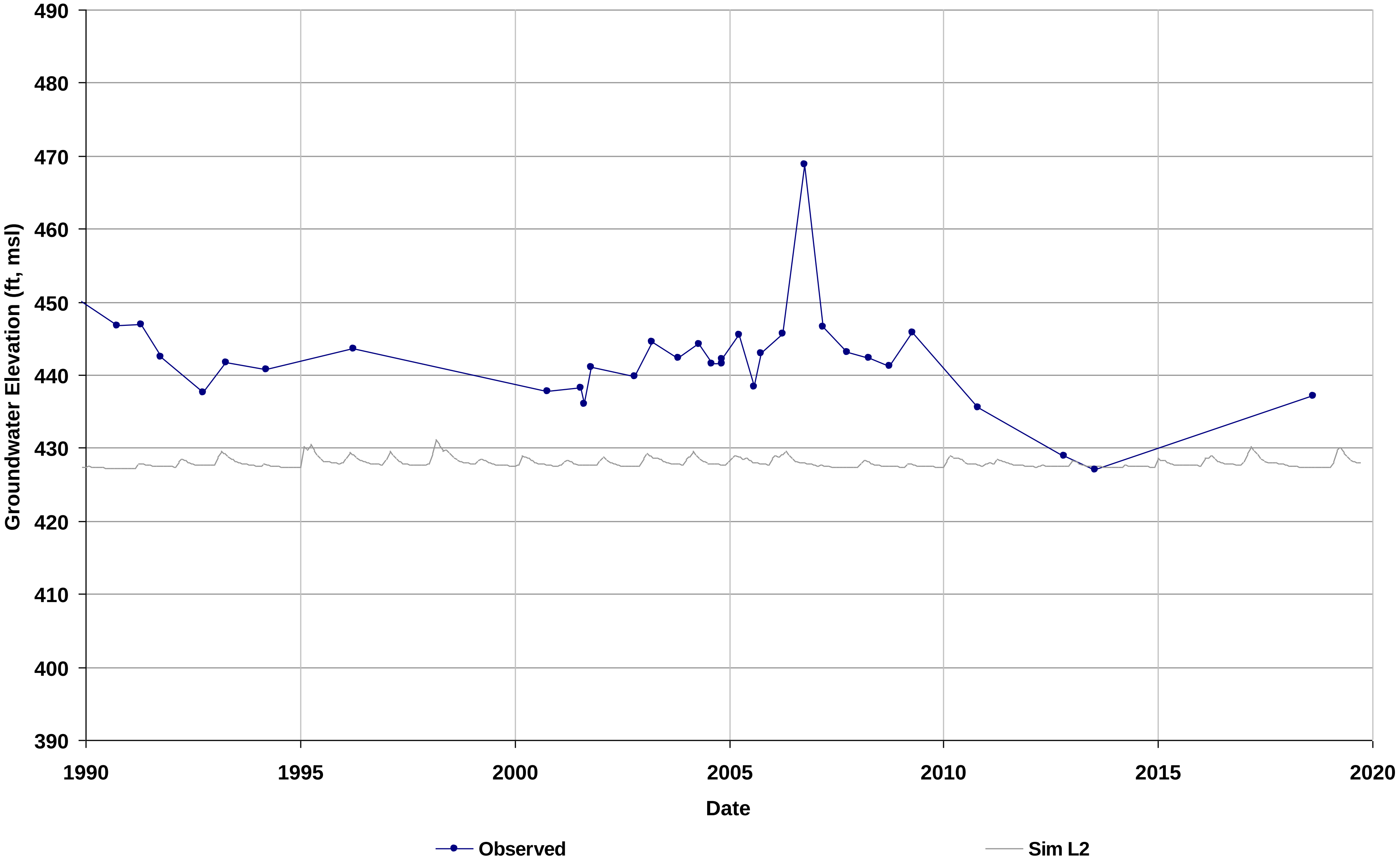
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

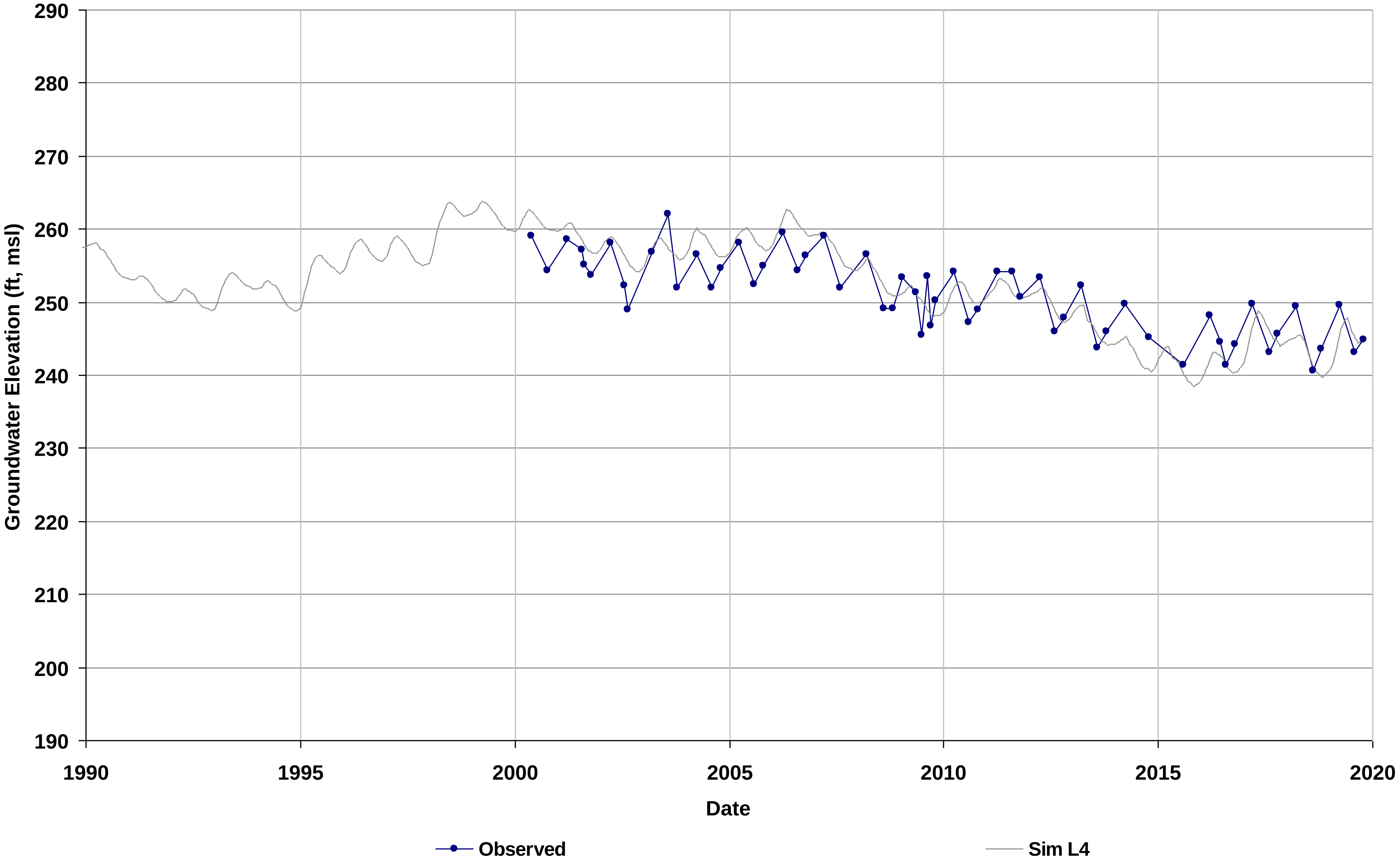
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

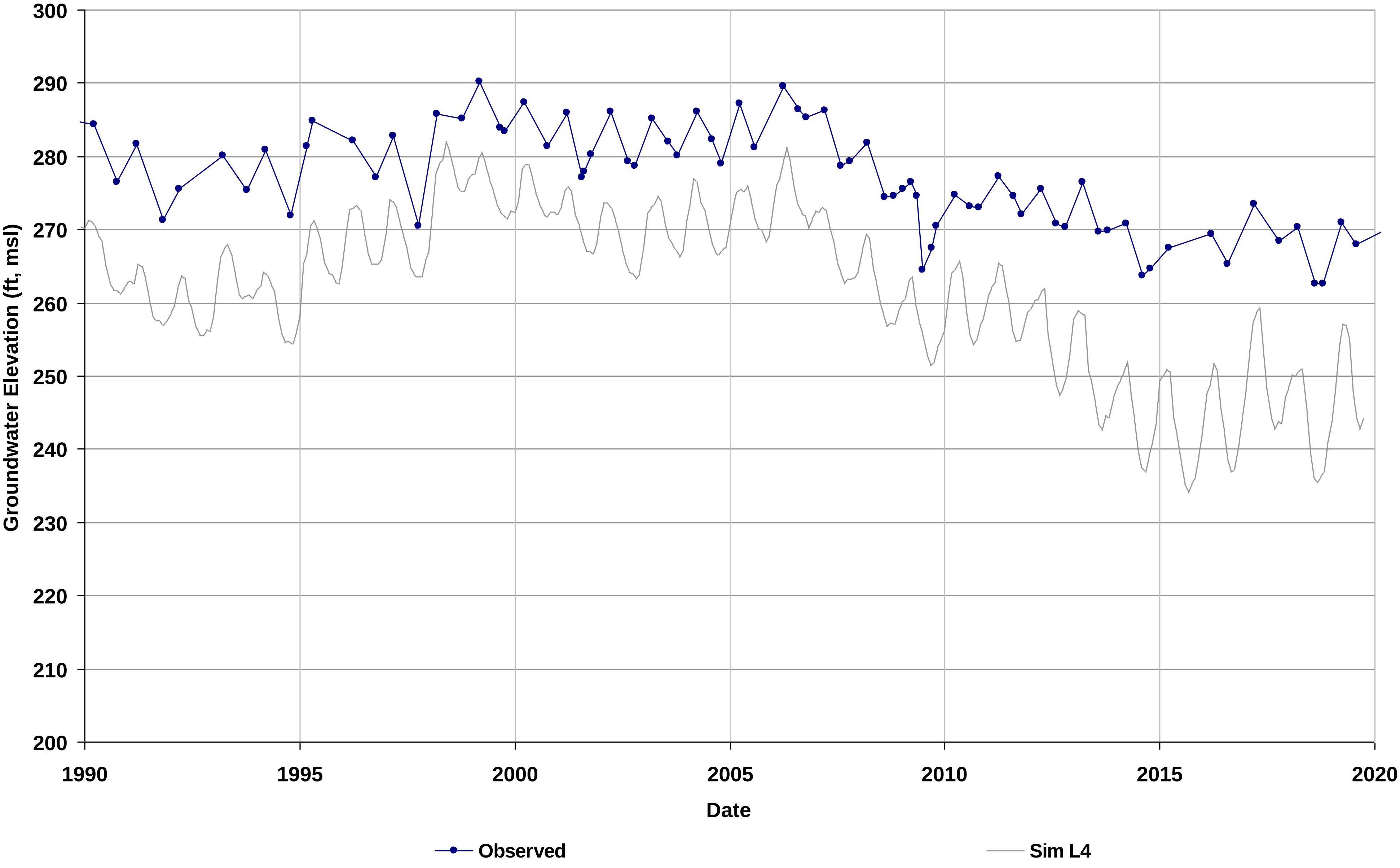
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

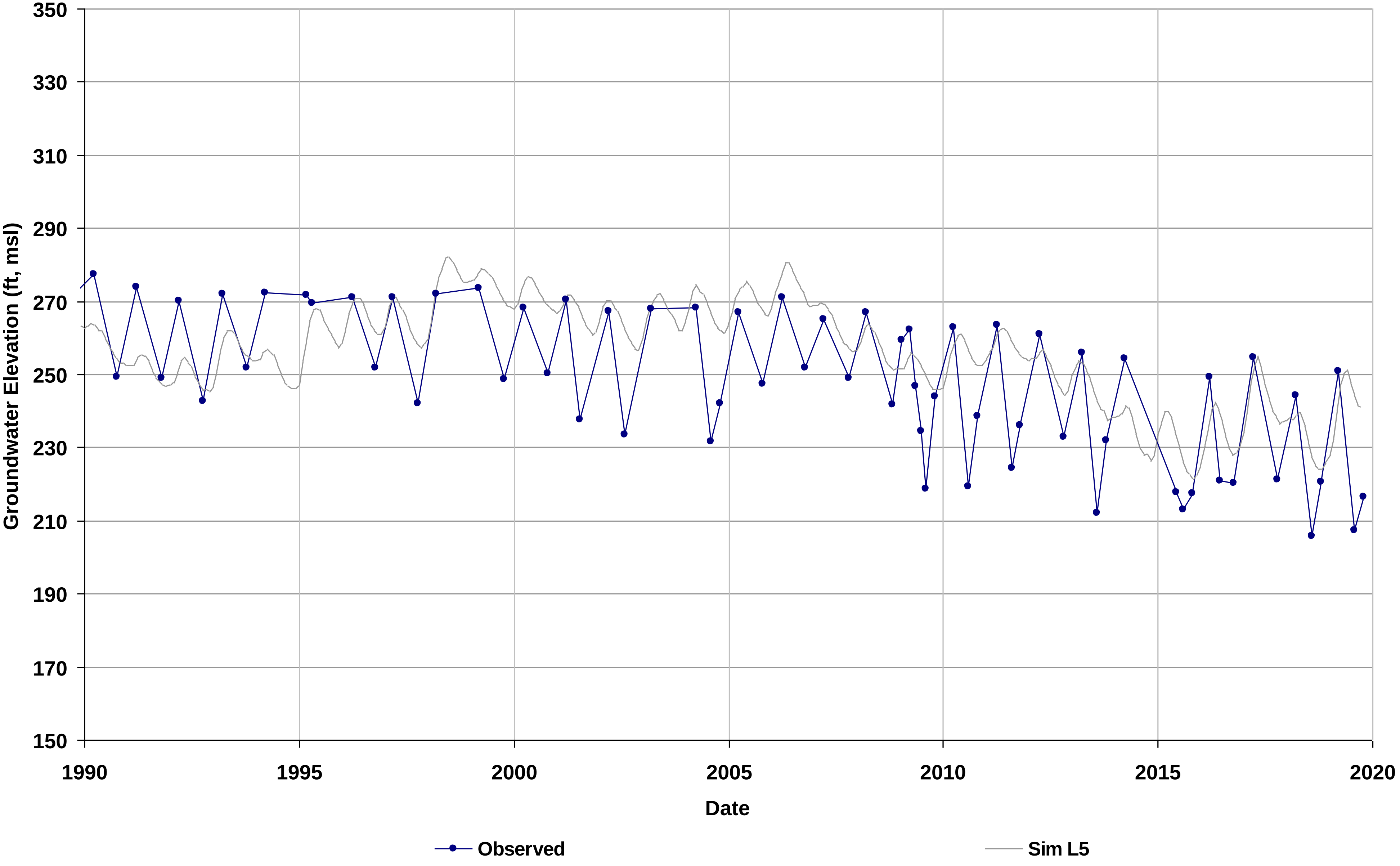
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

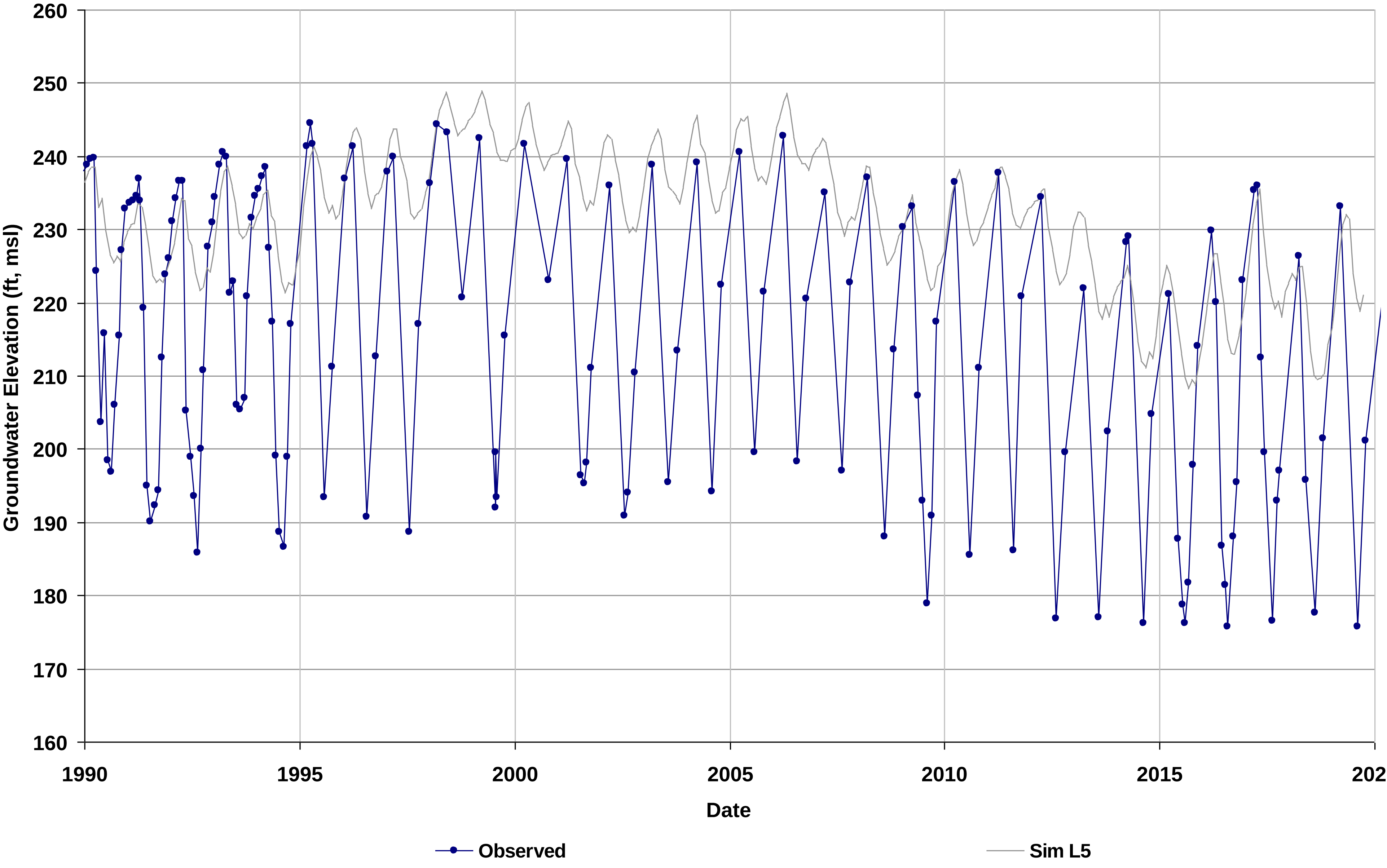
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

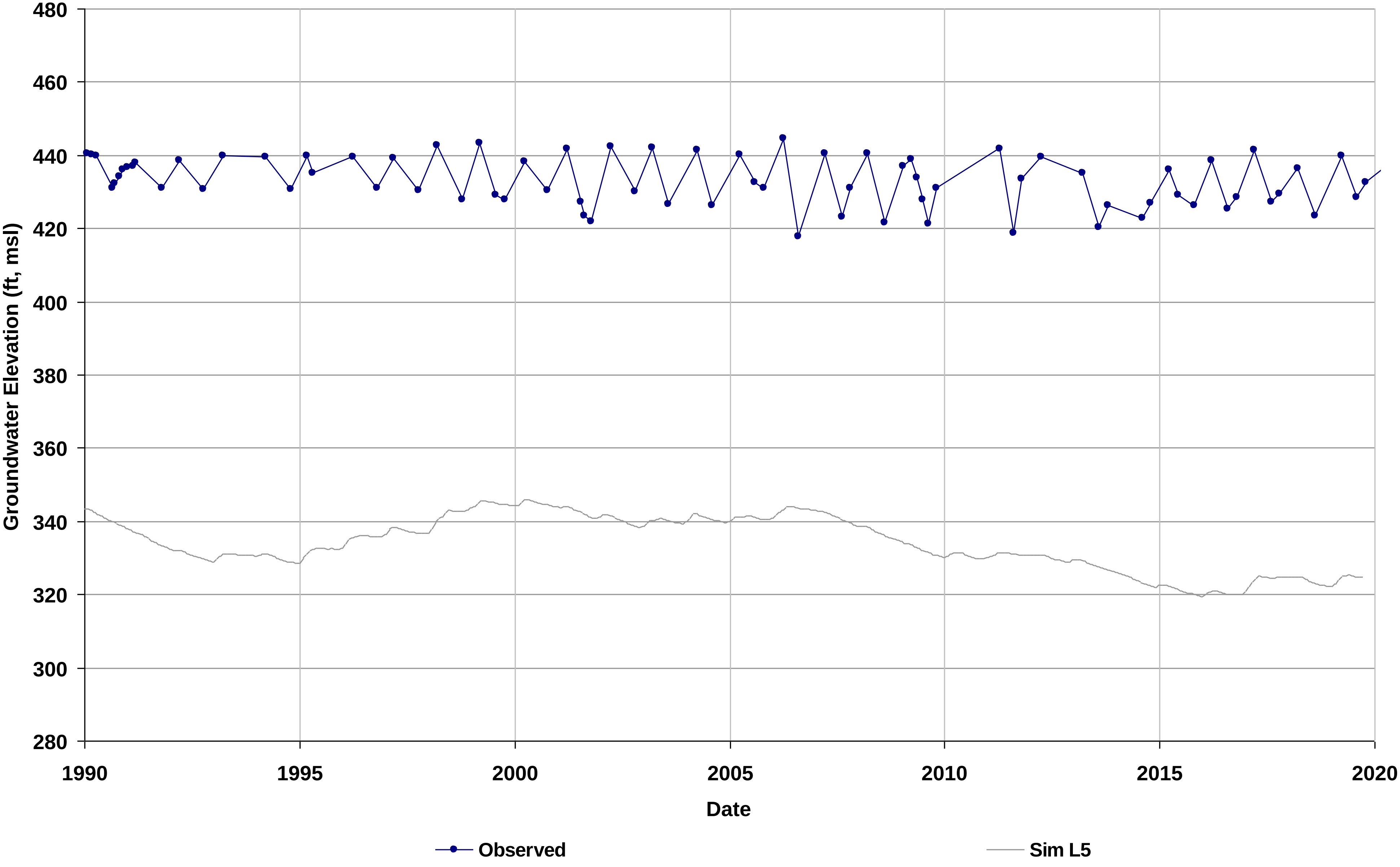
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

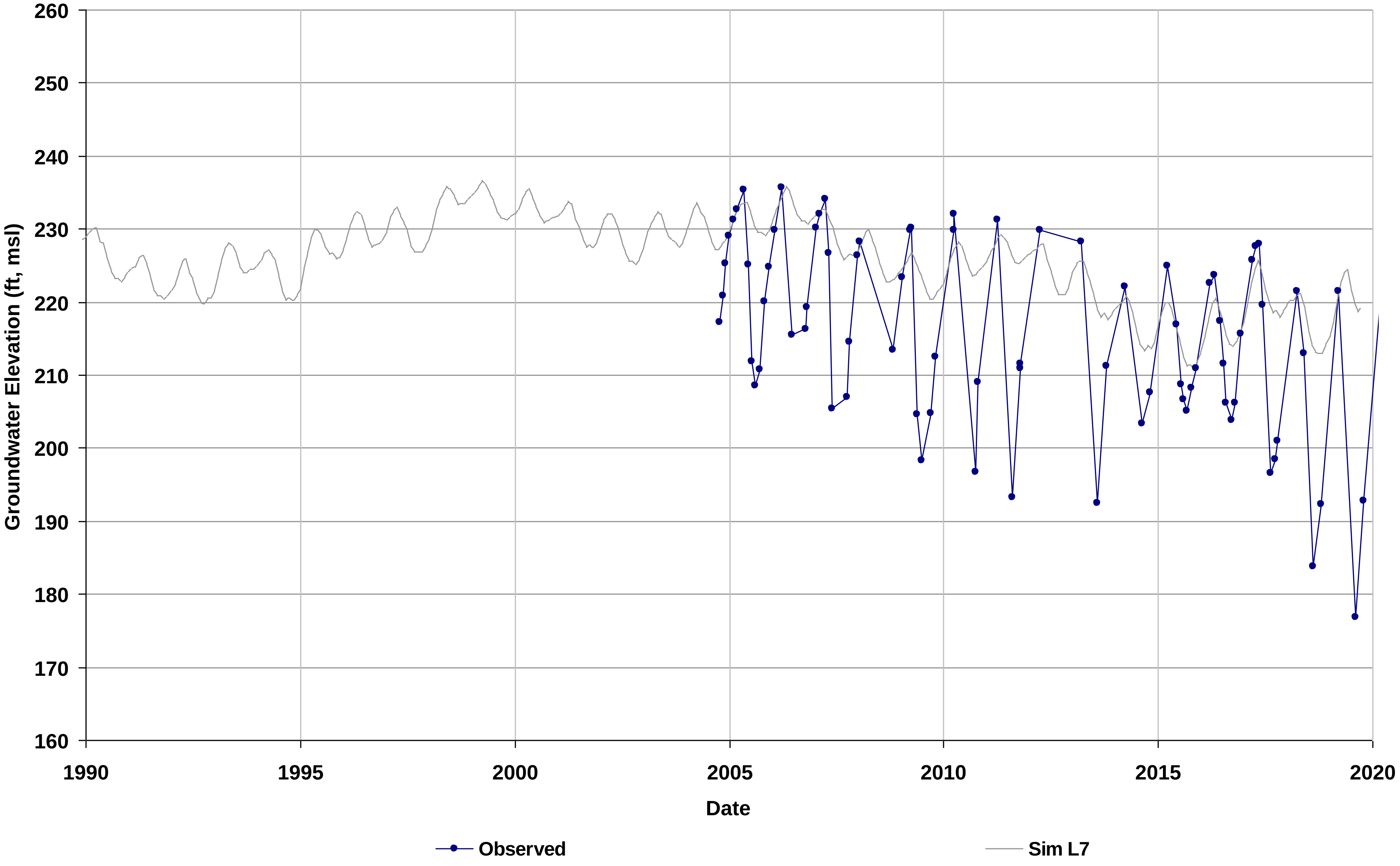
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

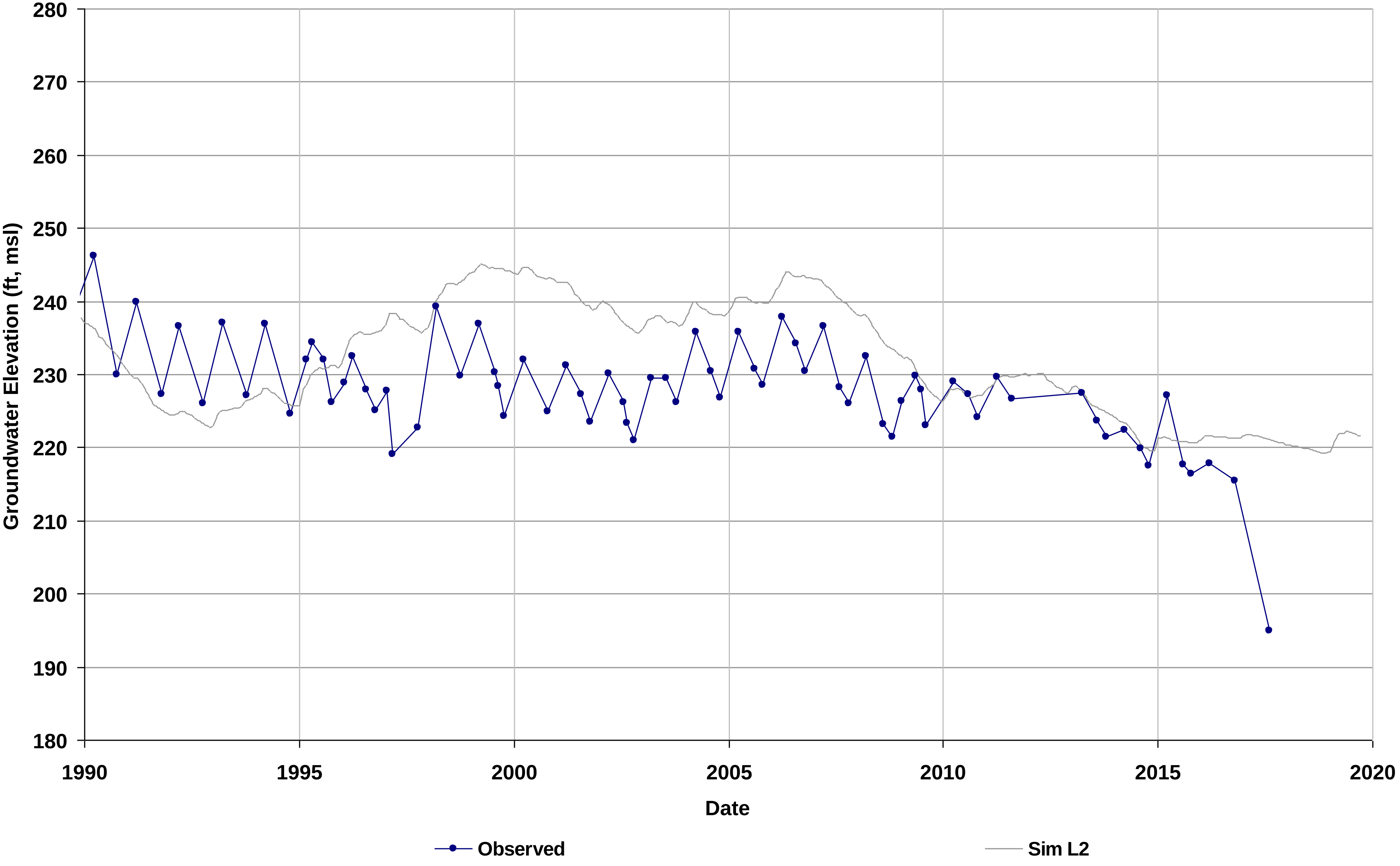
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Historical

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

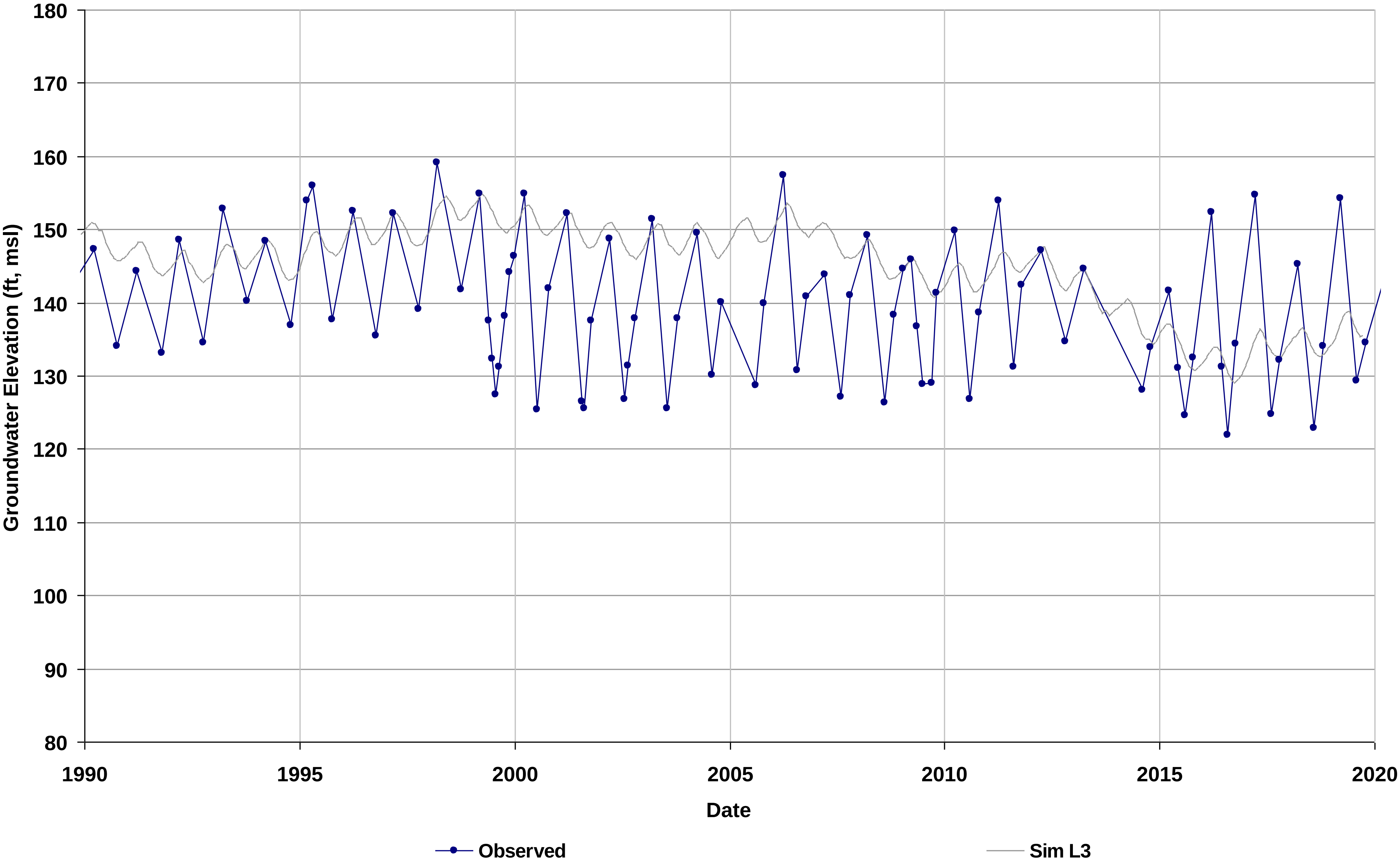
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

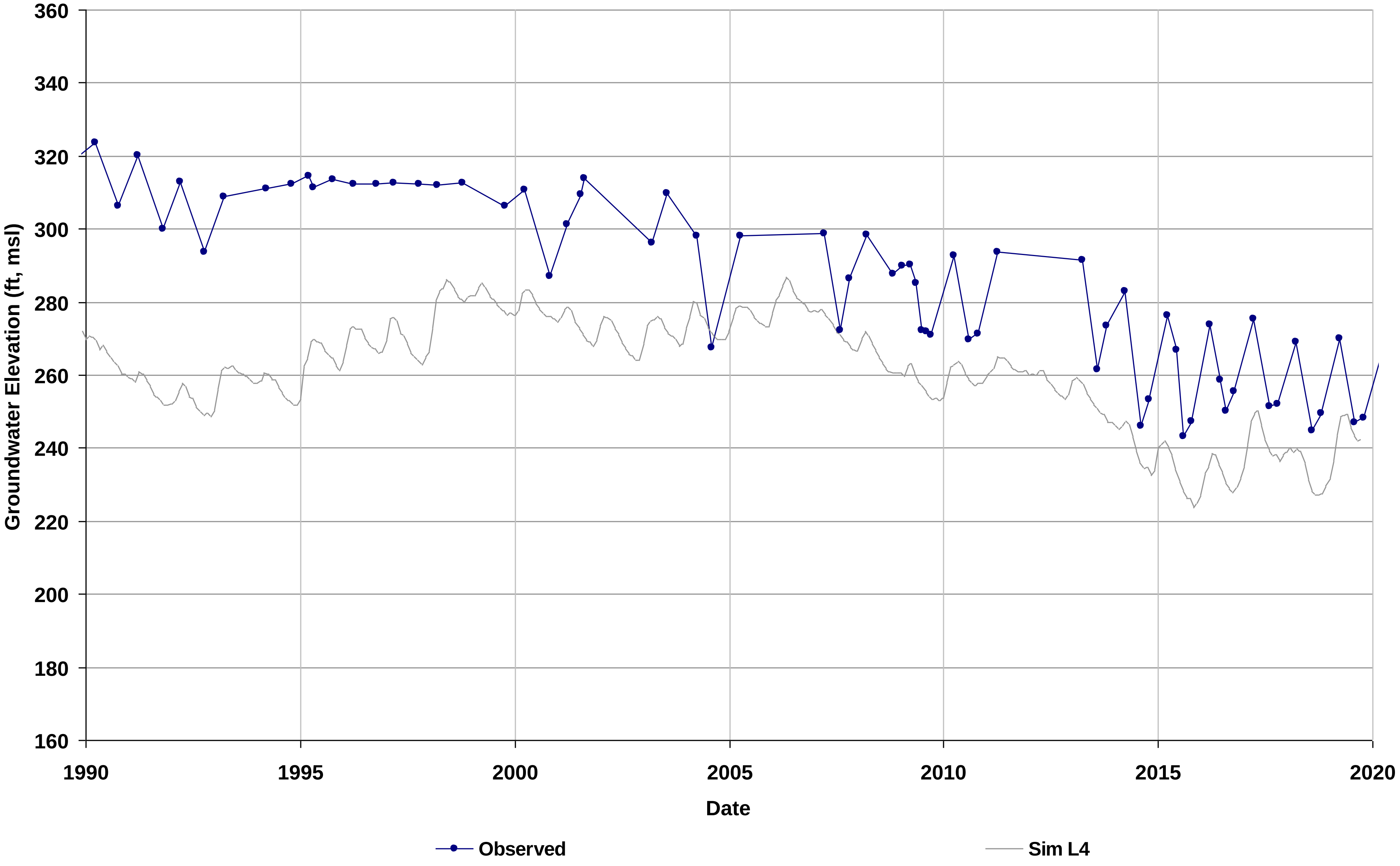
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

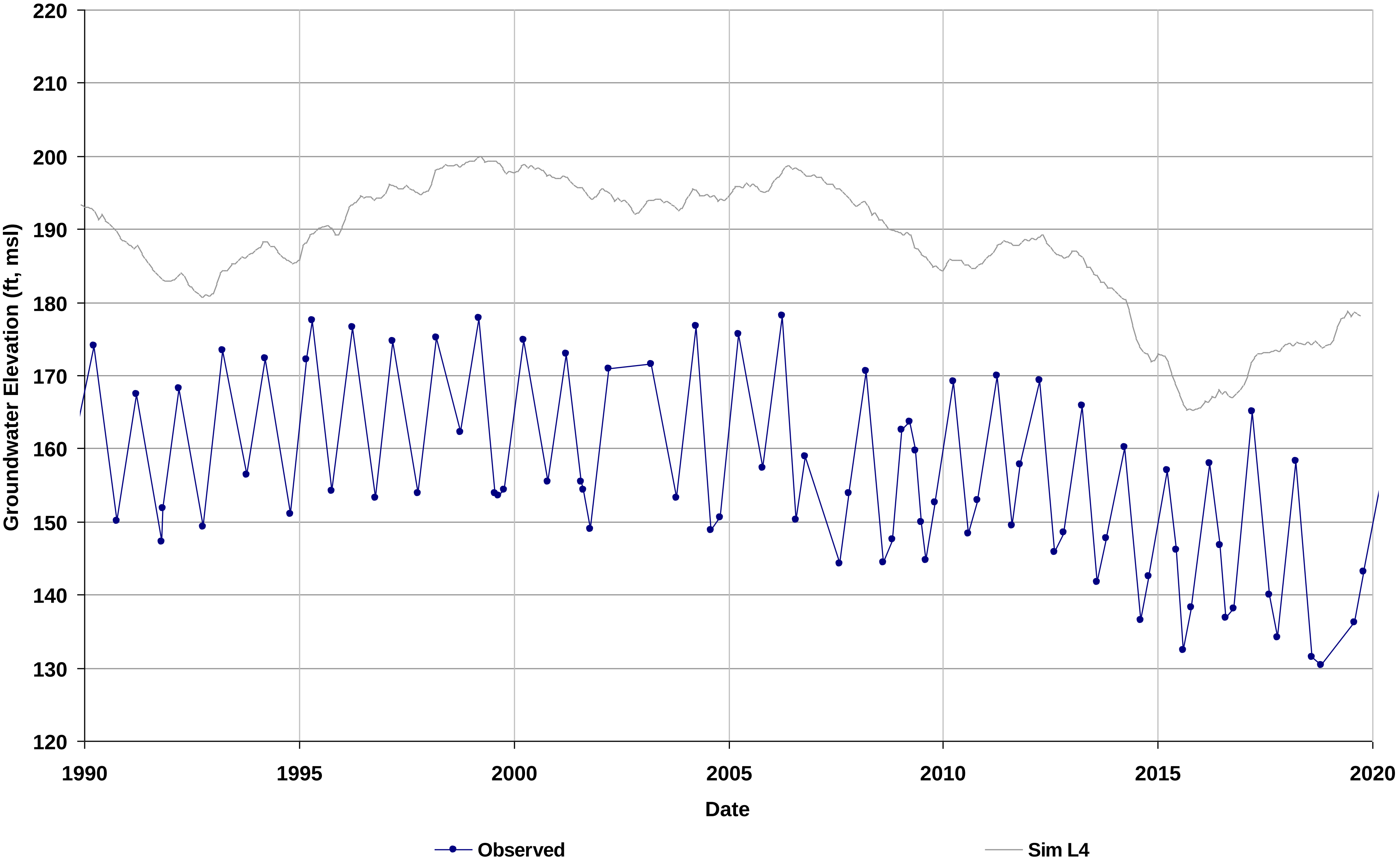
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

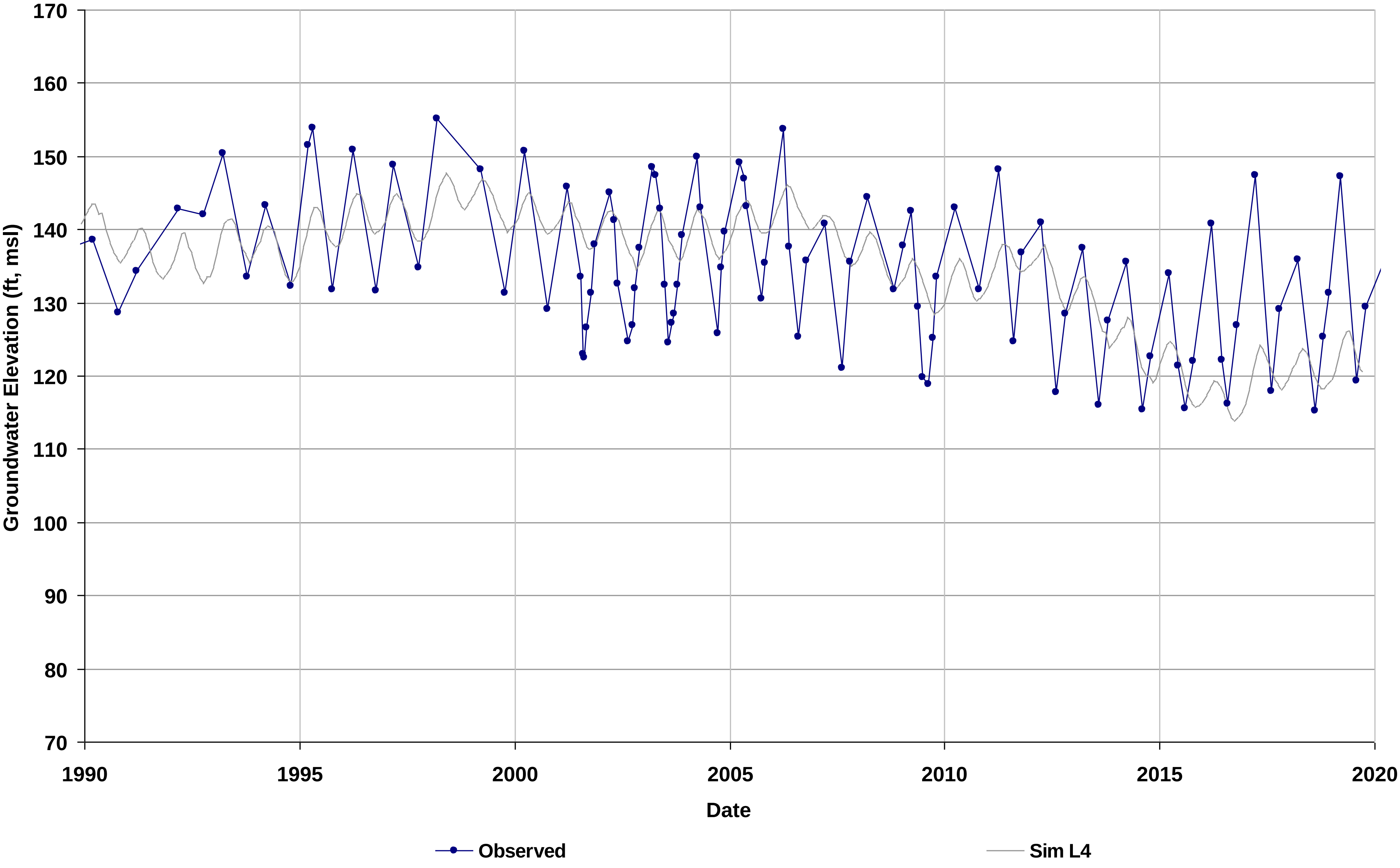
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

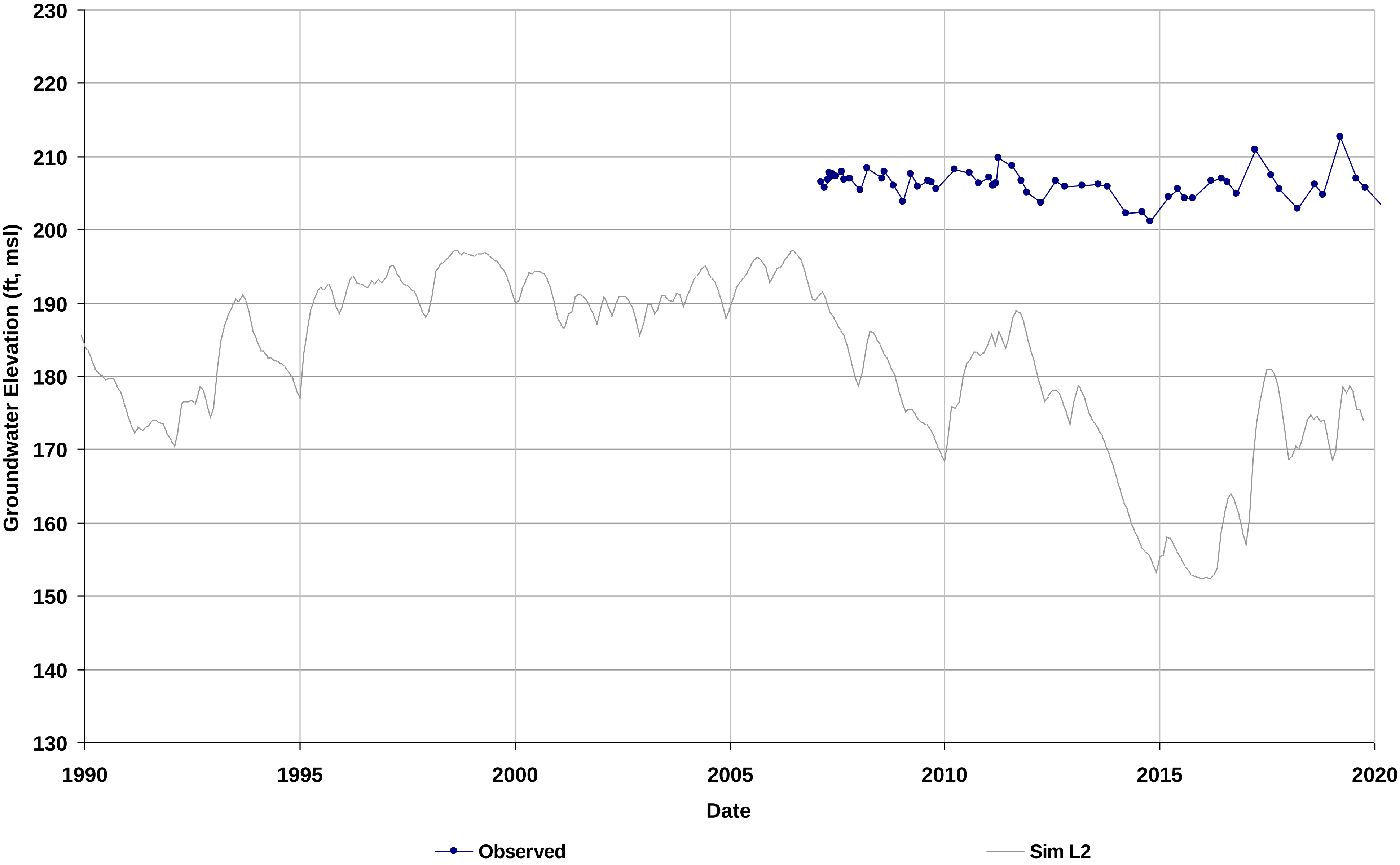
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

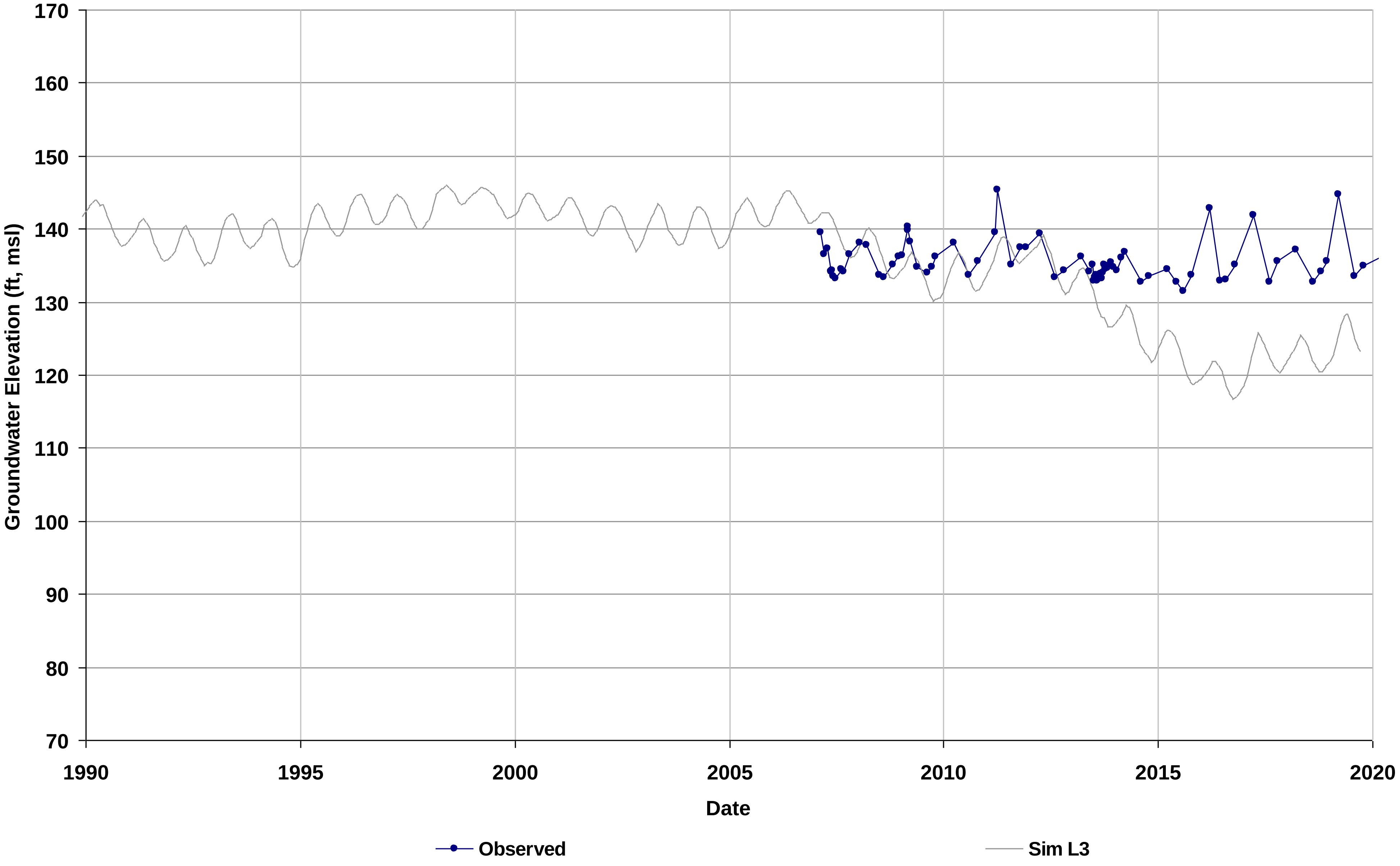
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

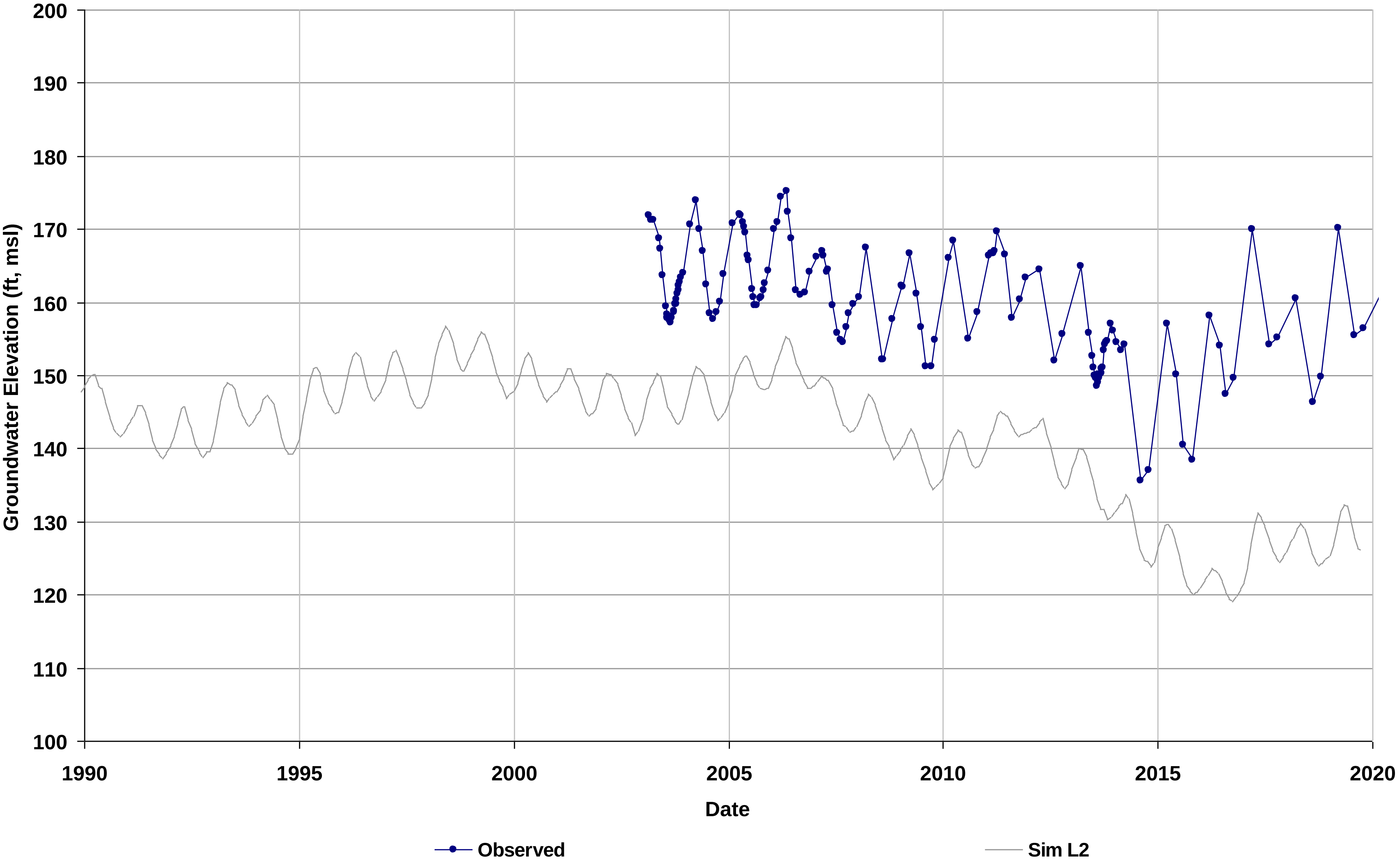
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

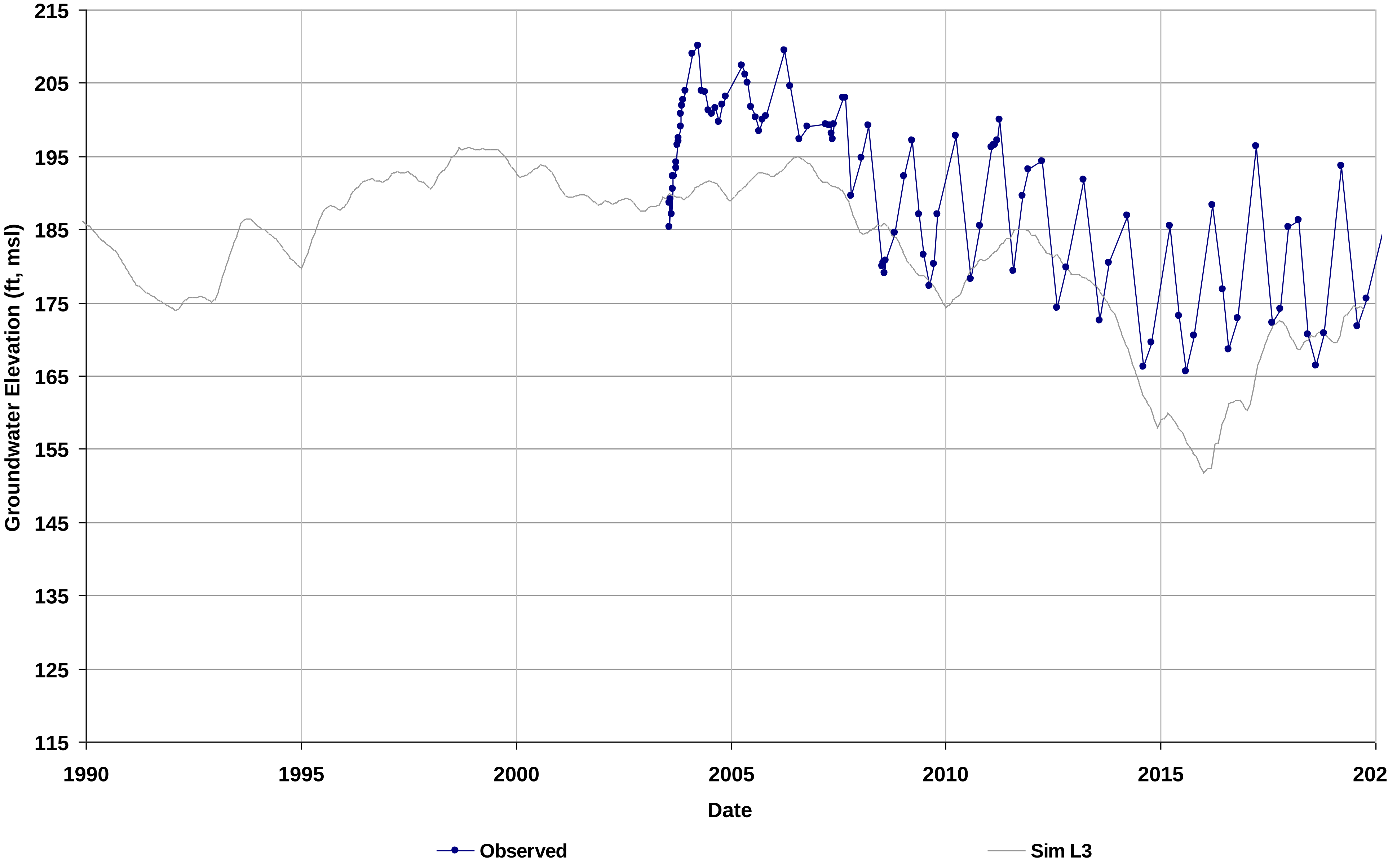
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

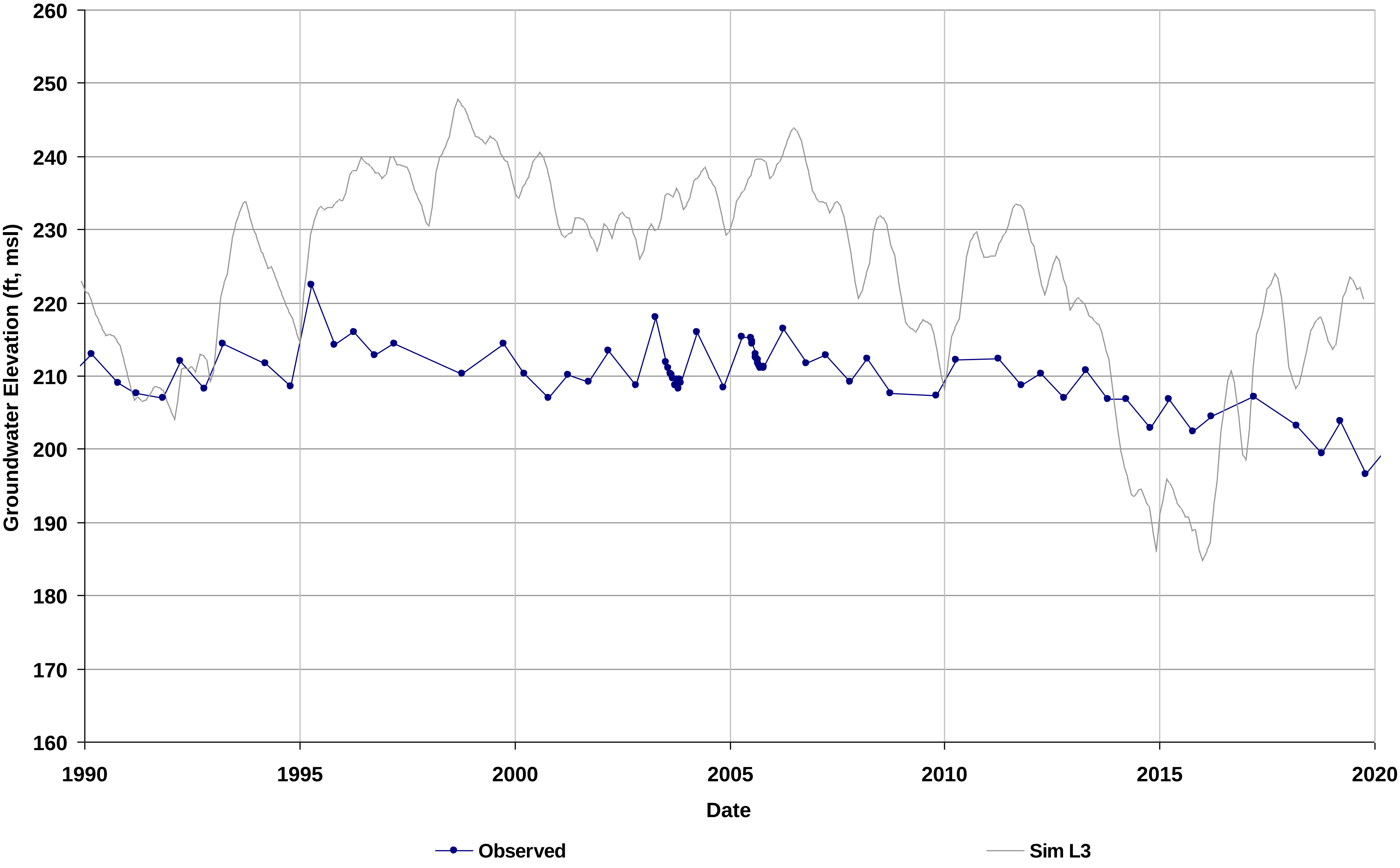
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

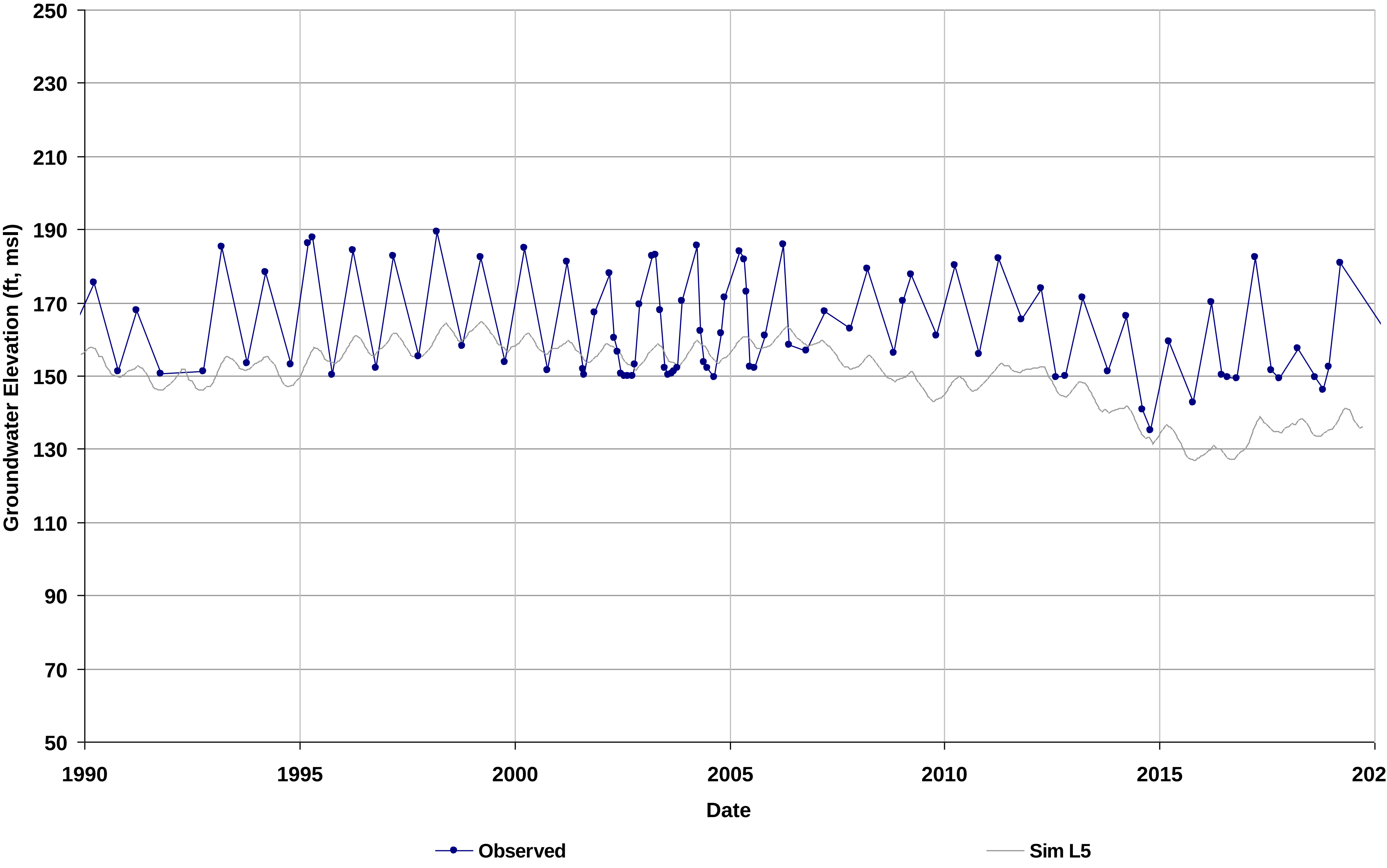
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

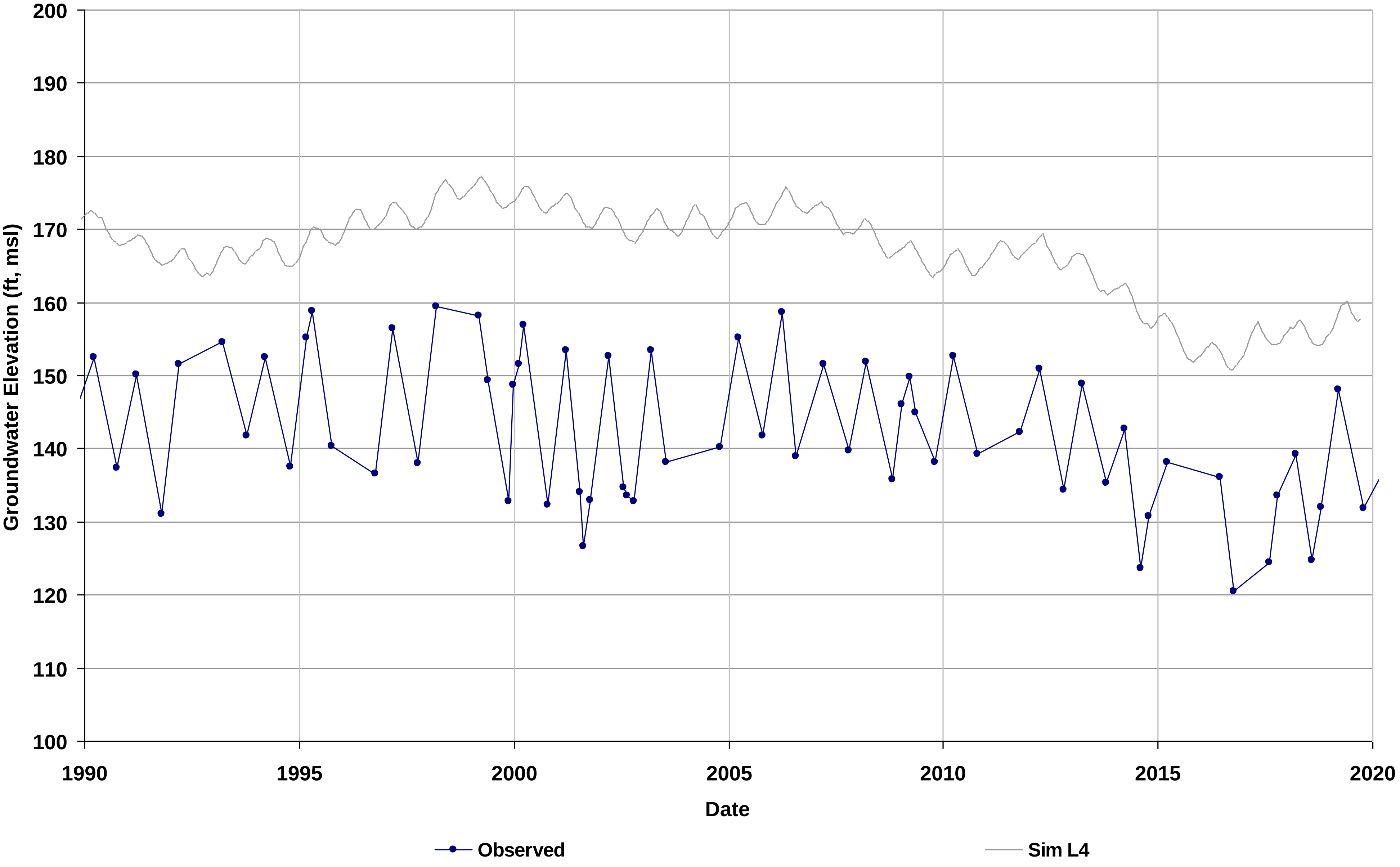
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

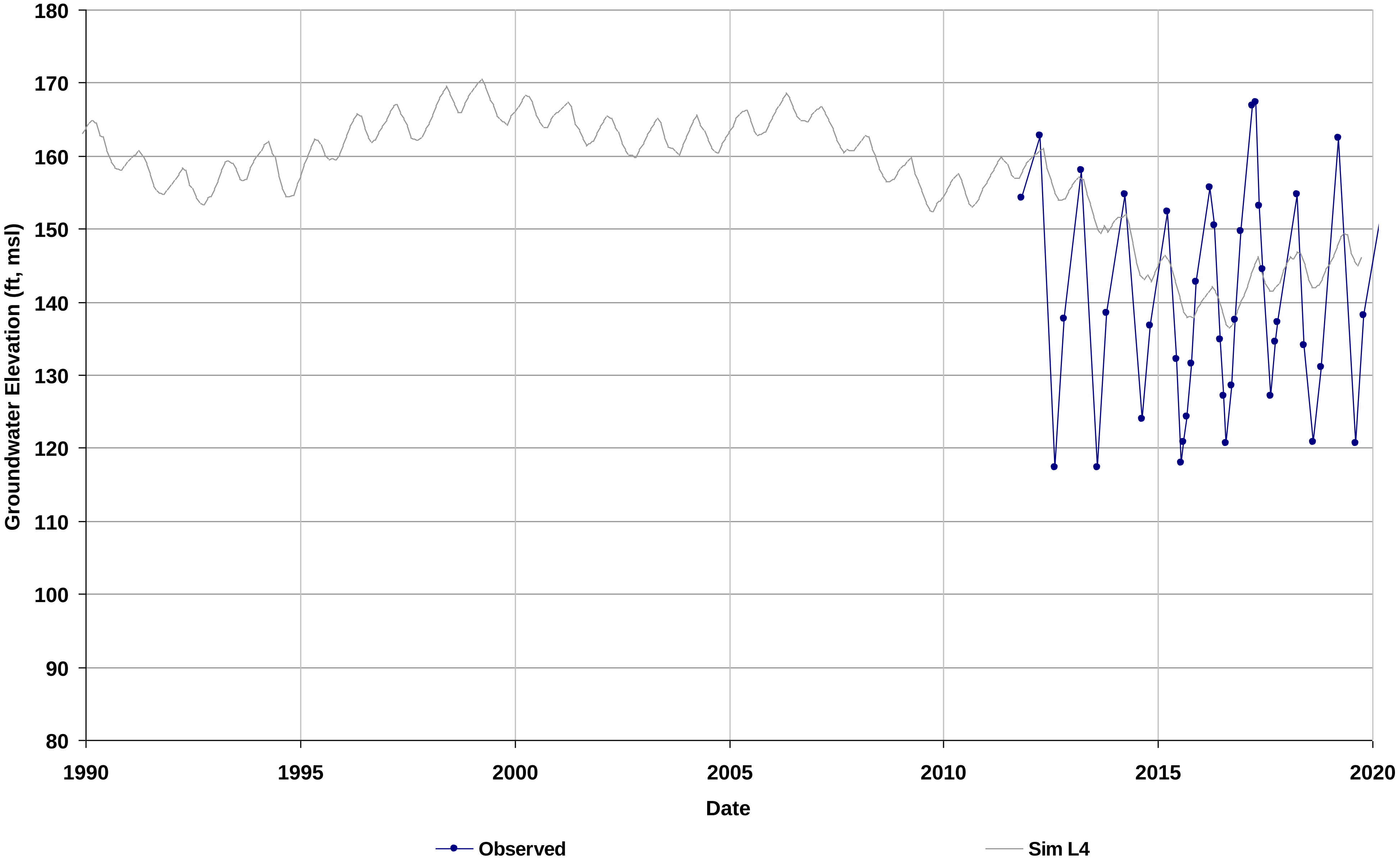
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

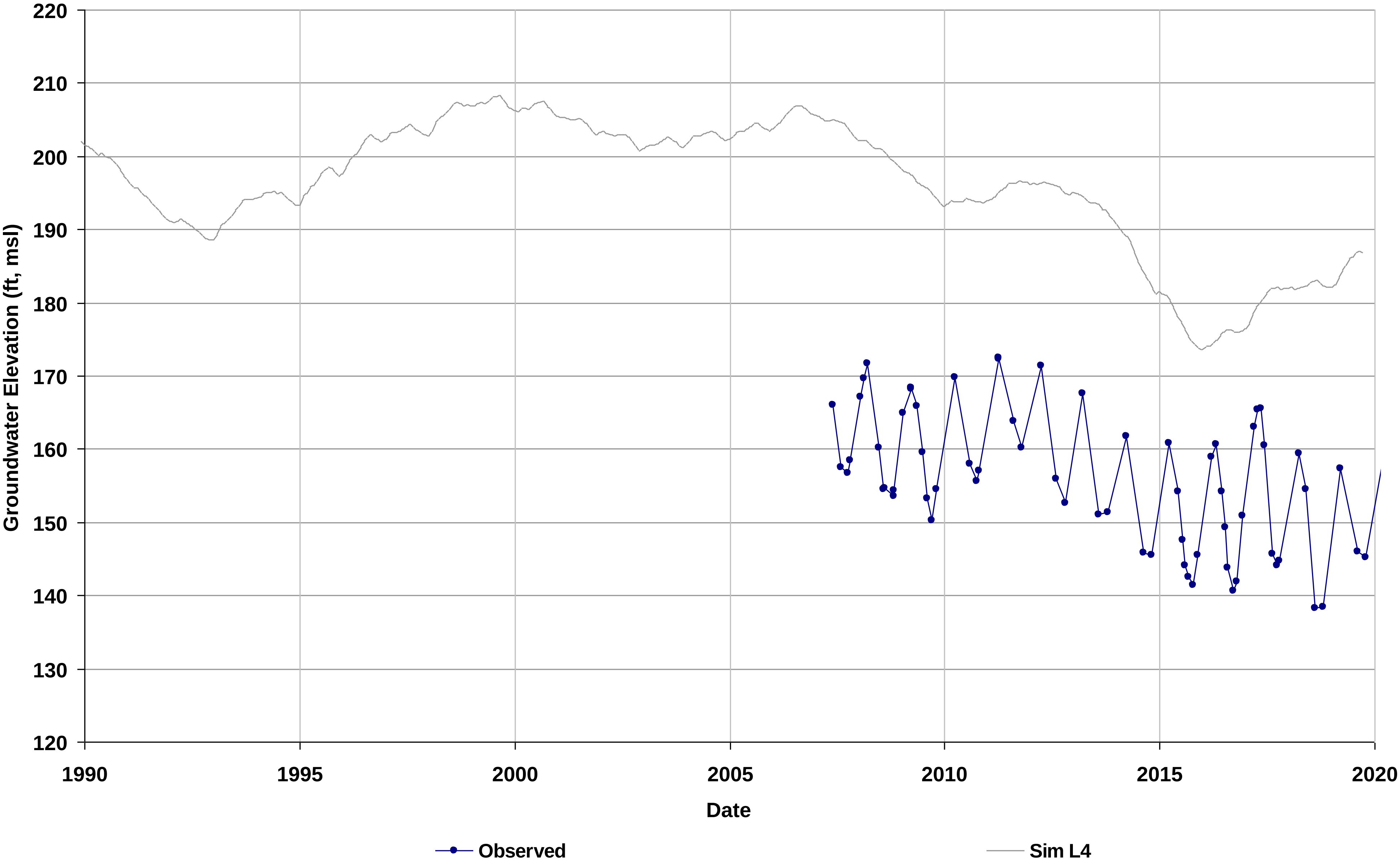
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

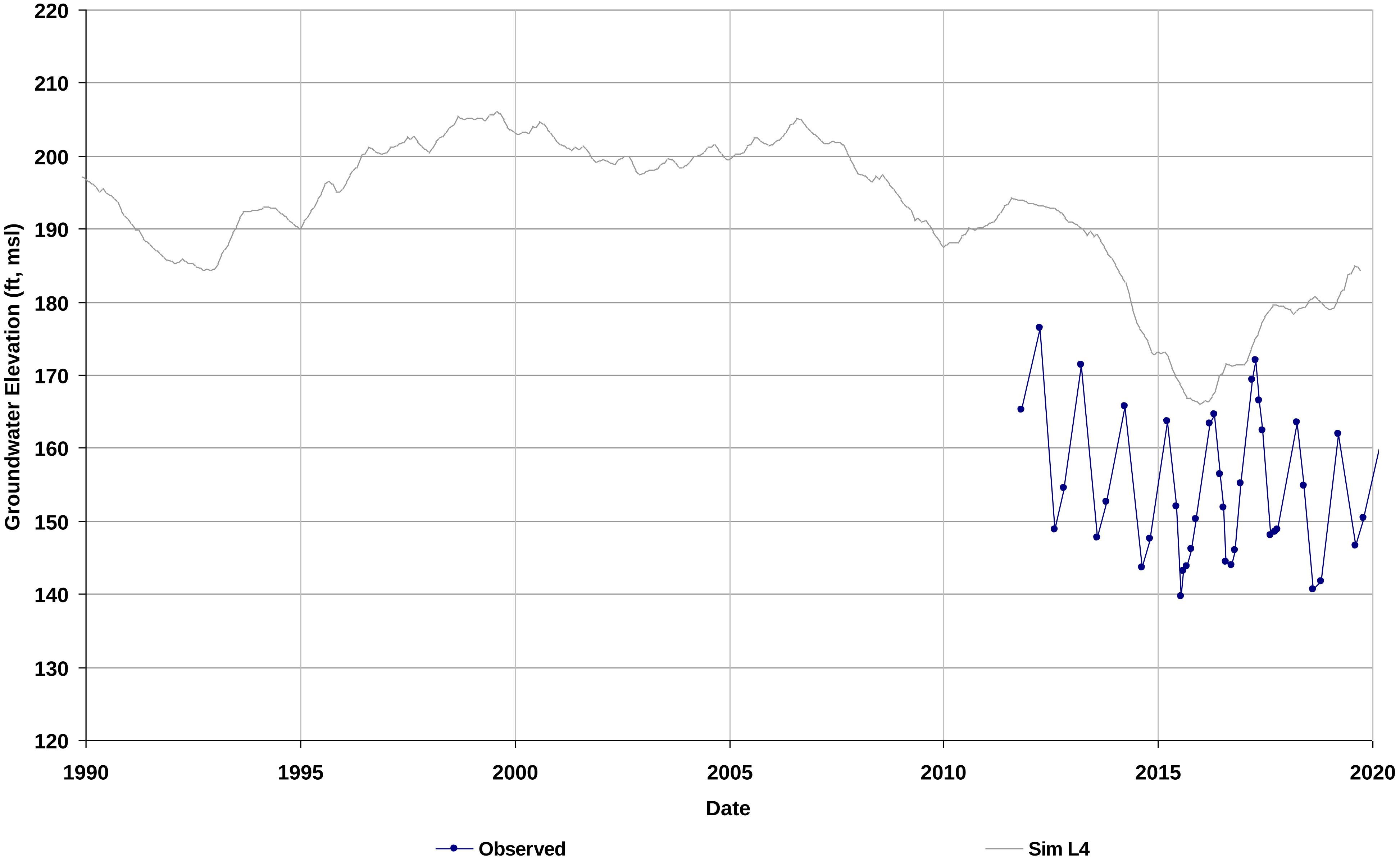
Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

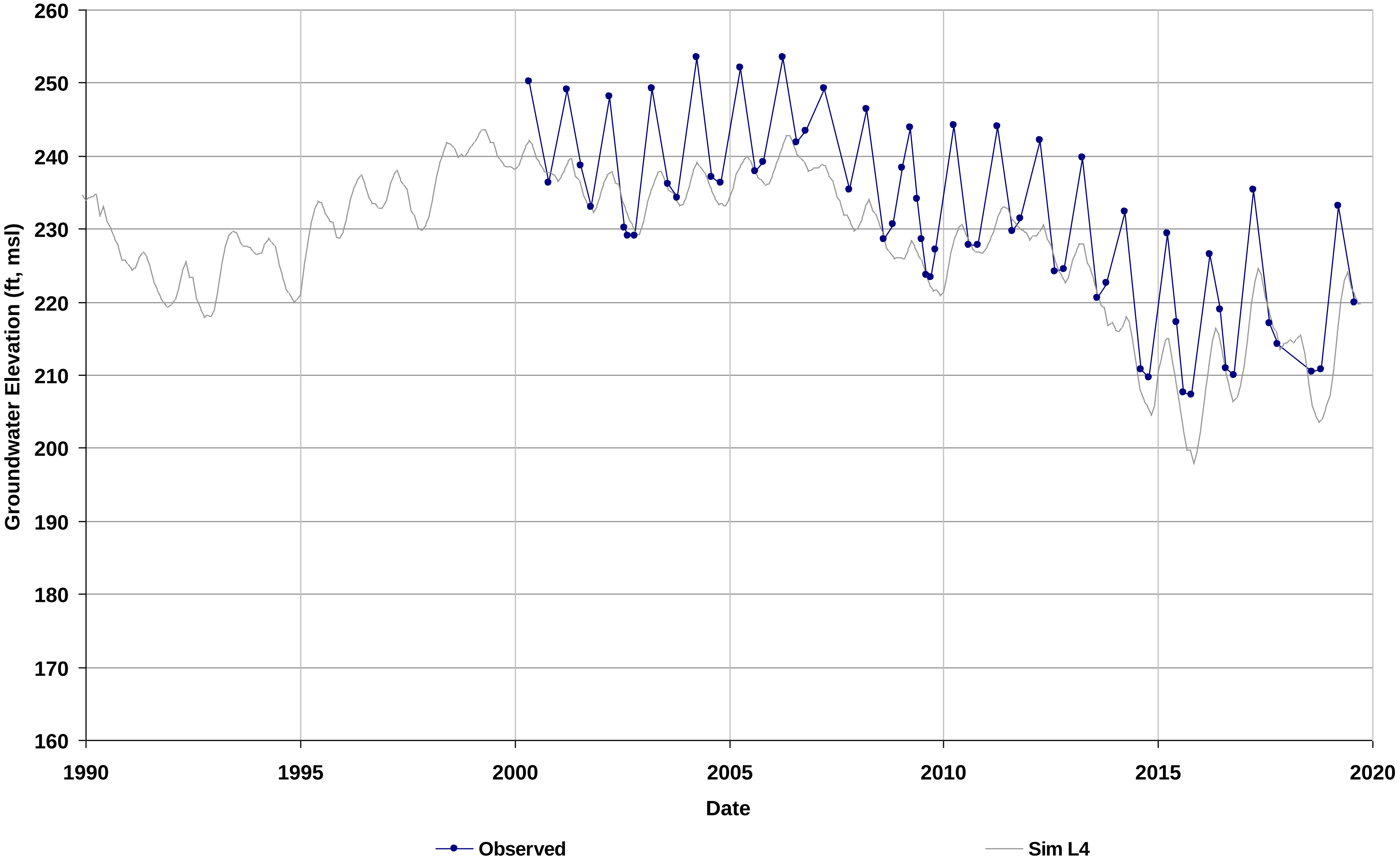
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

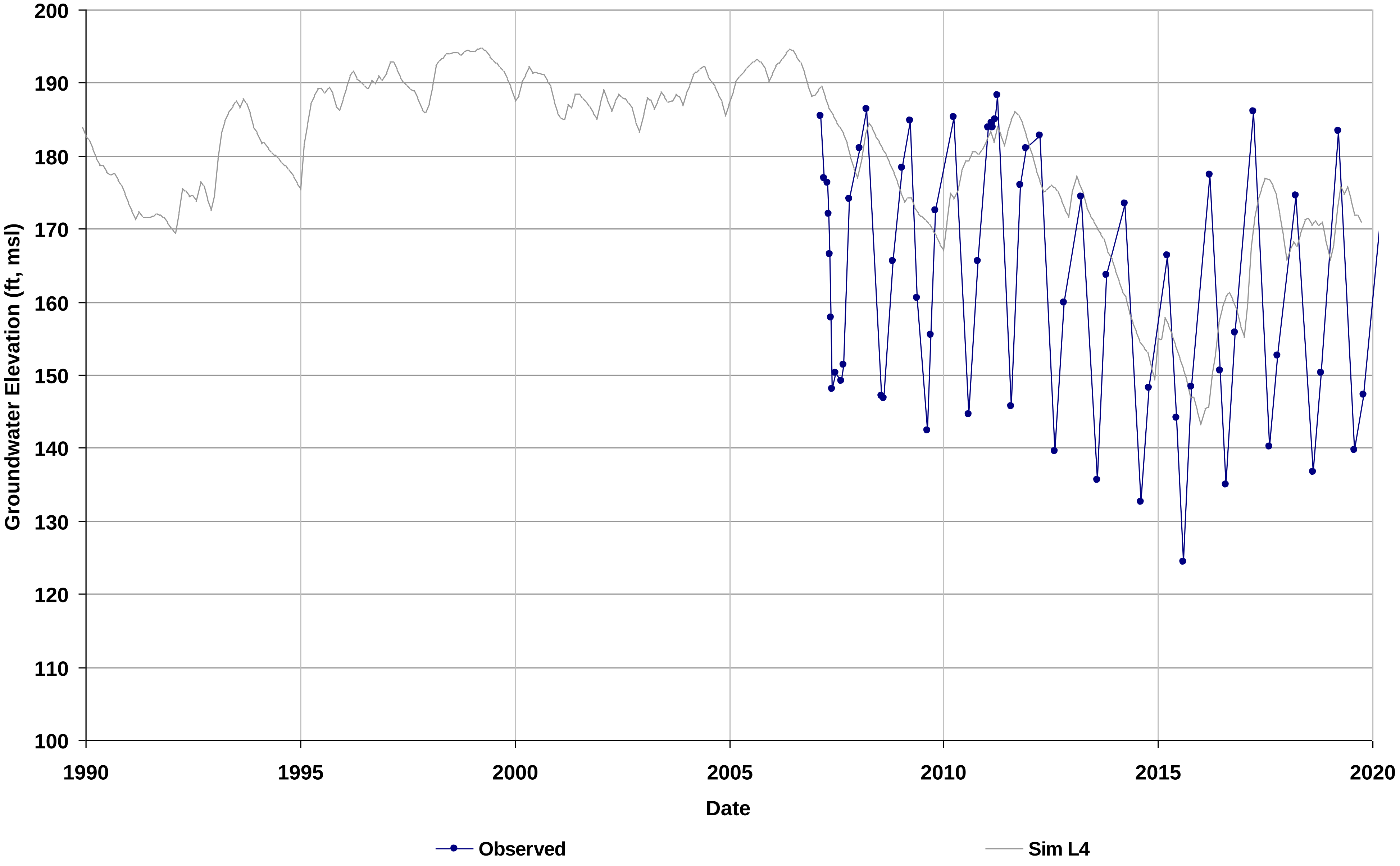
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

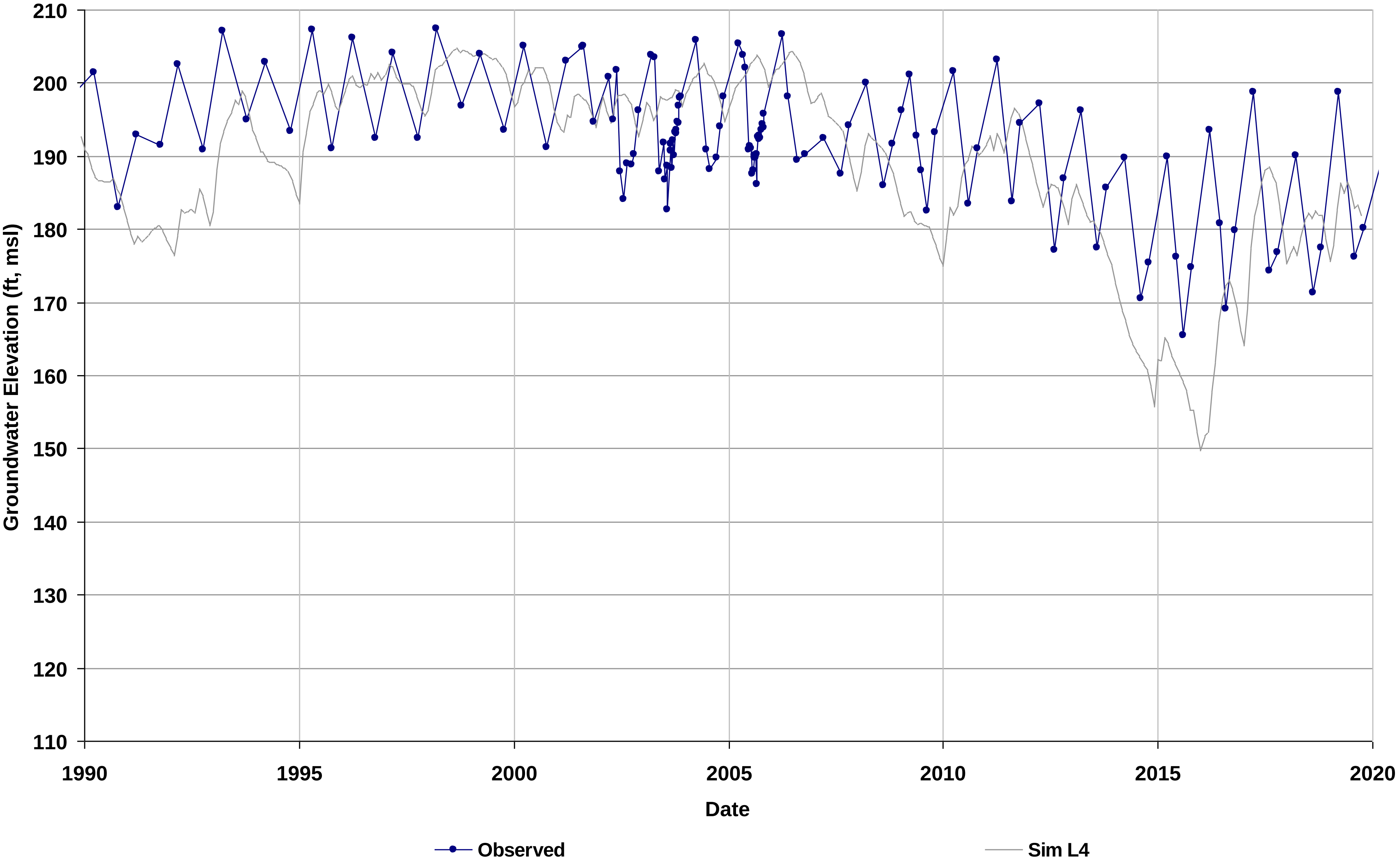
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

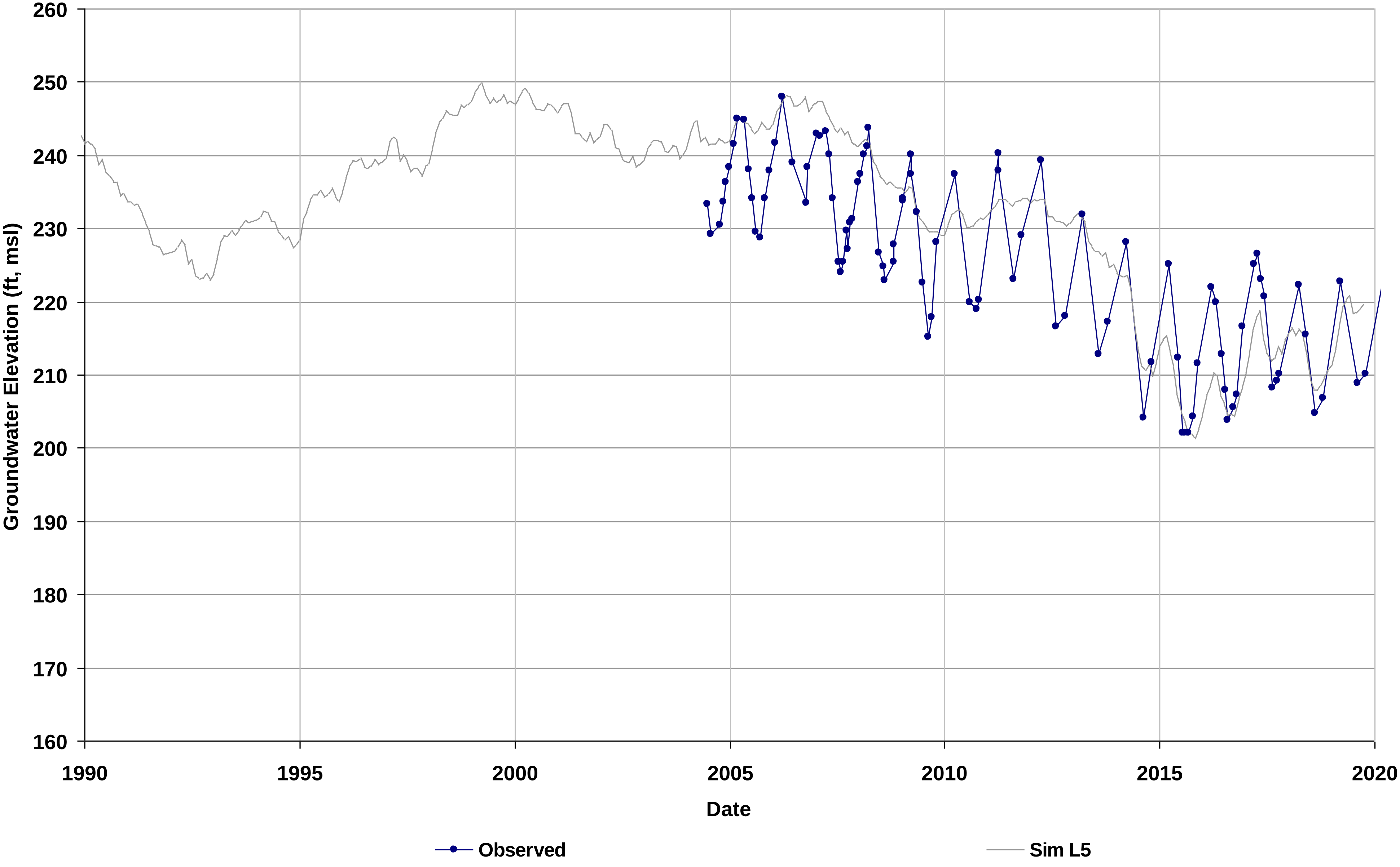
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

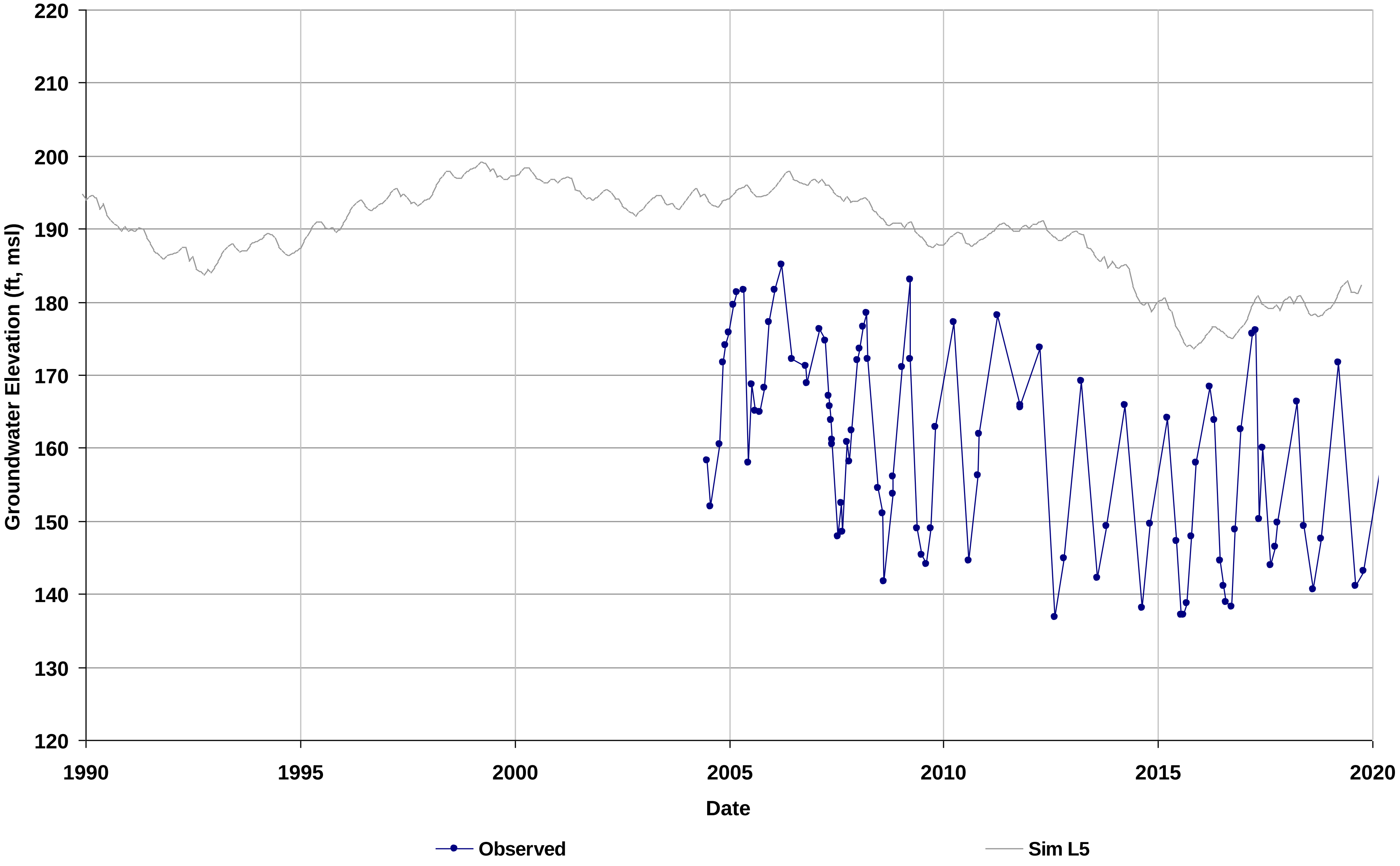
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

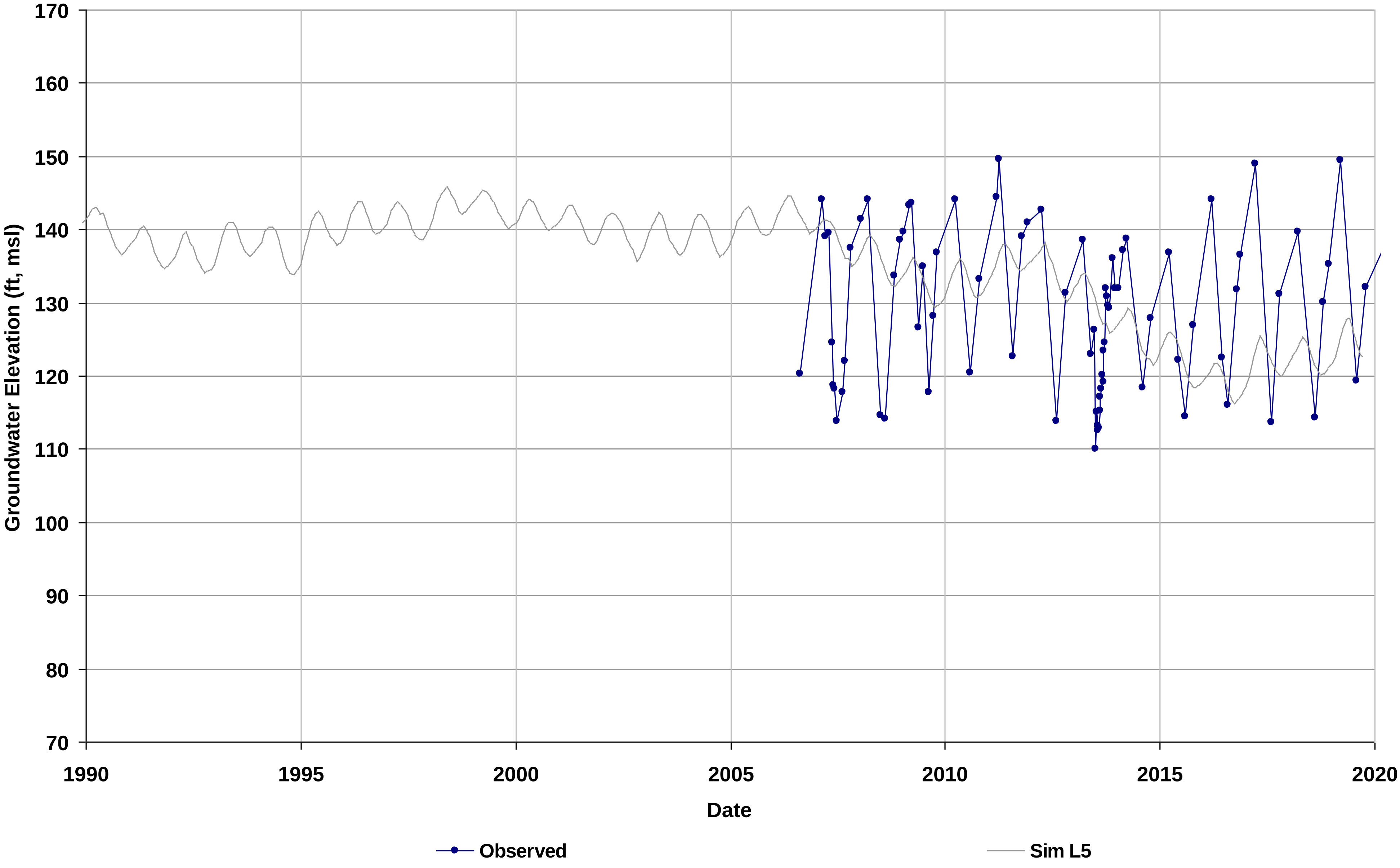
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

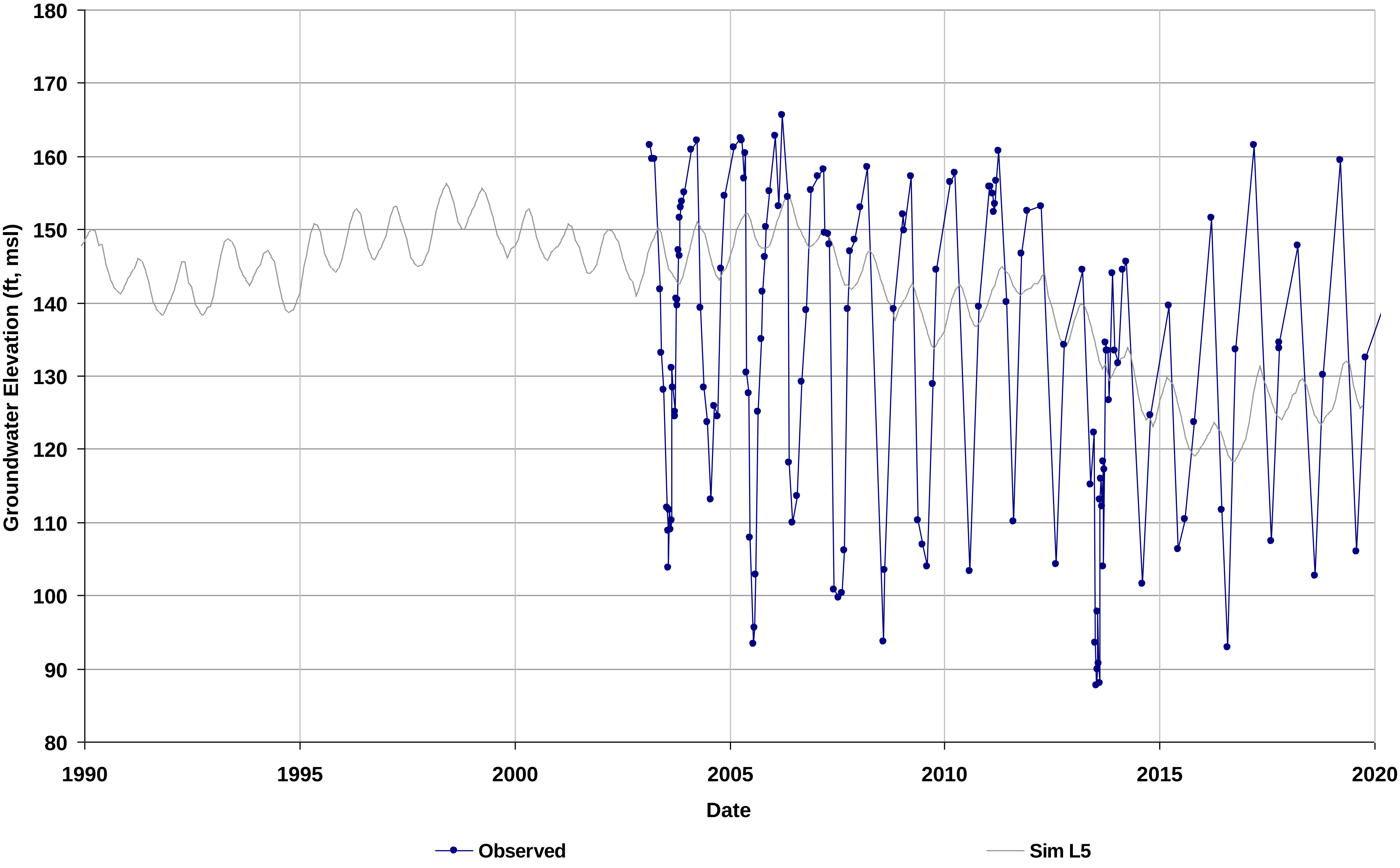
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

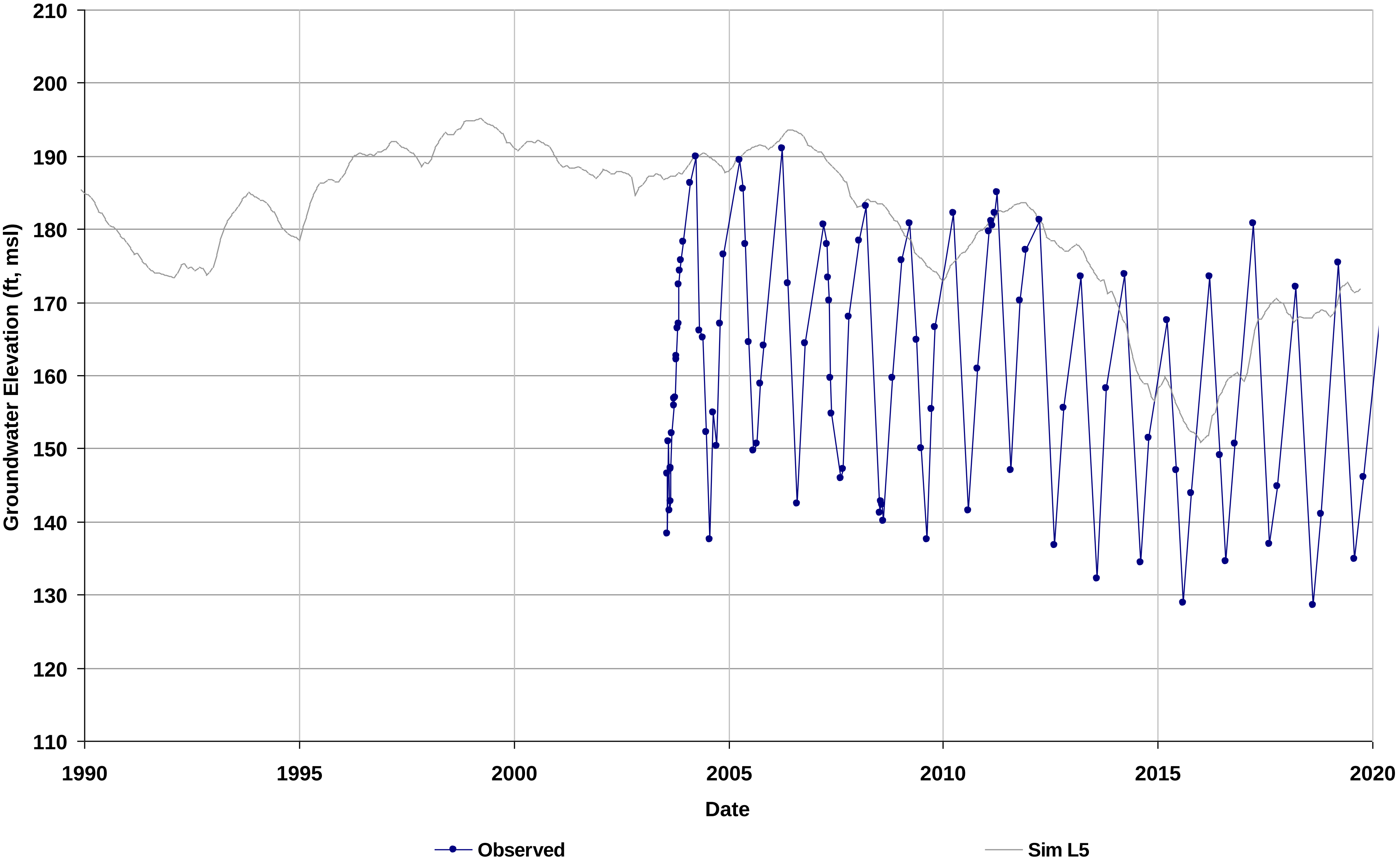
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

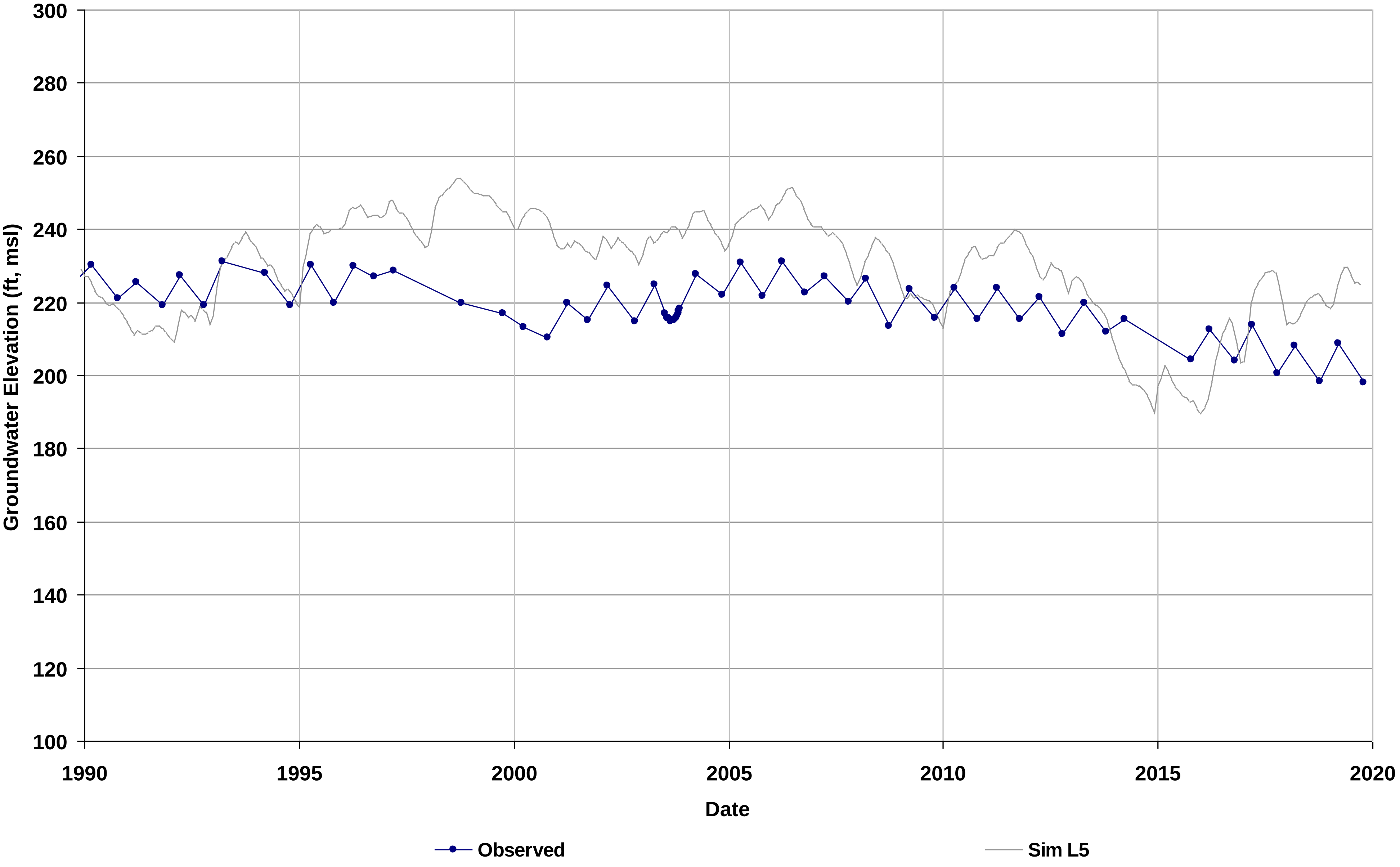
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

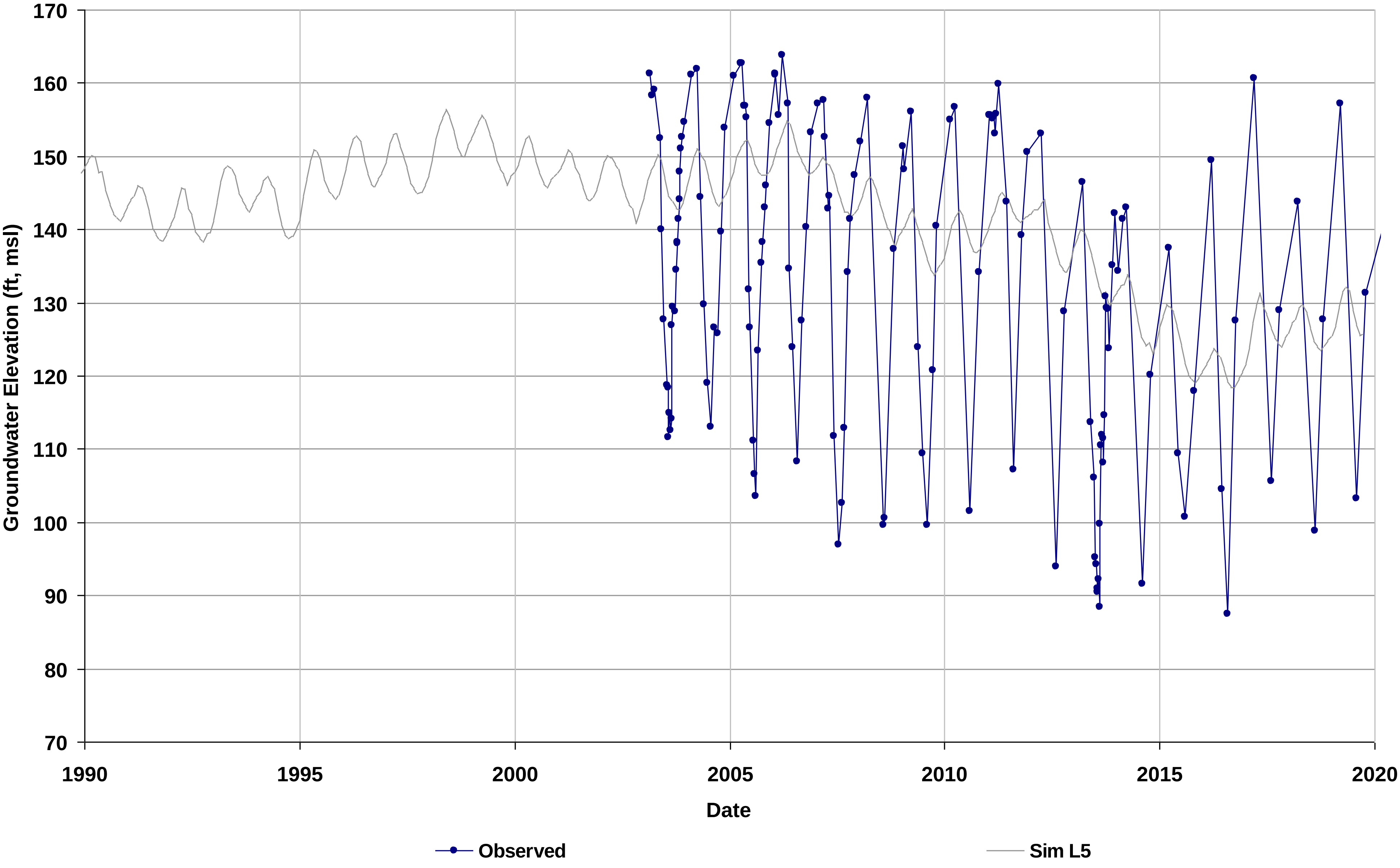
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

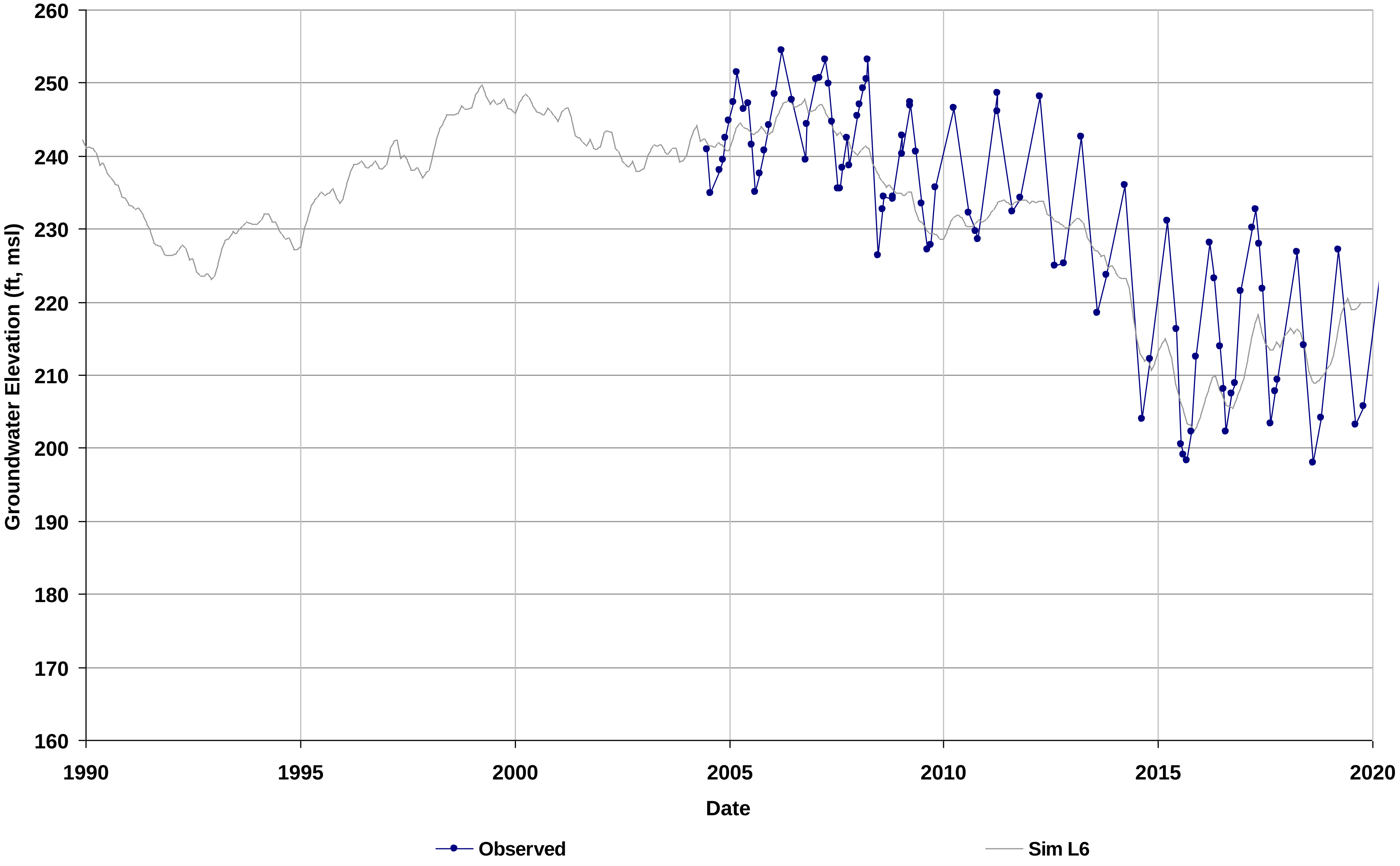
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

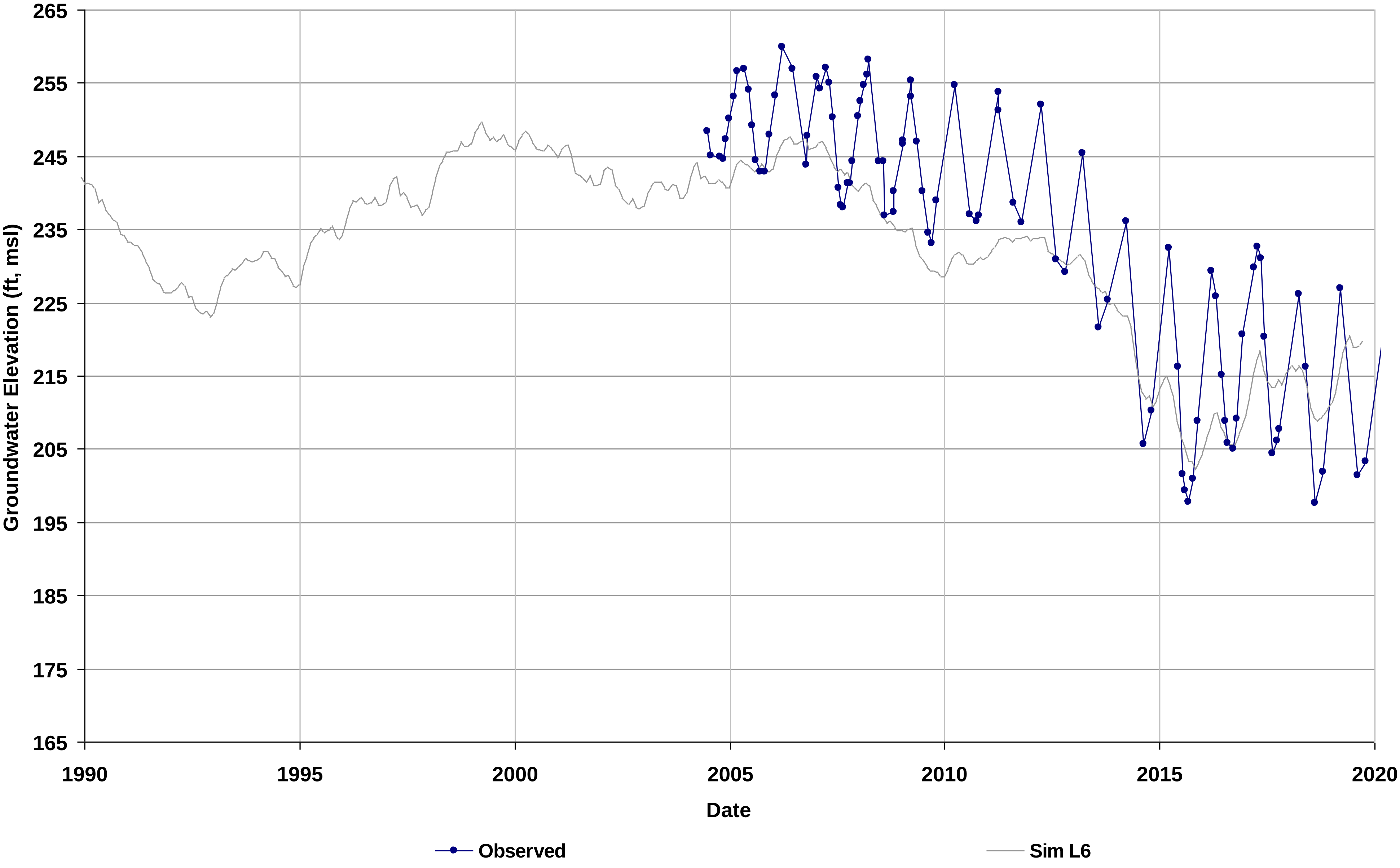
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

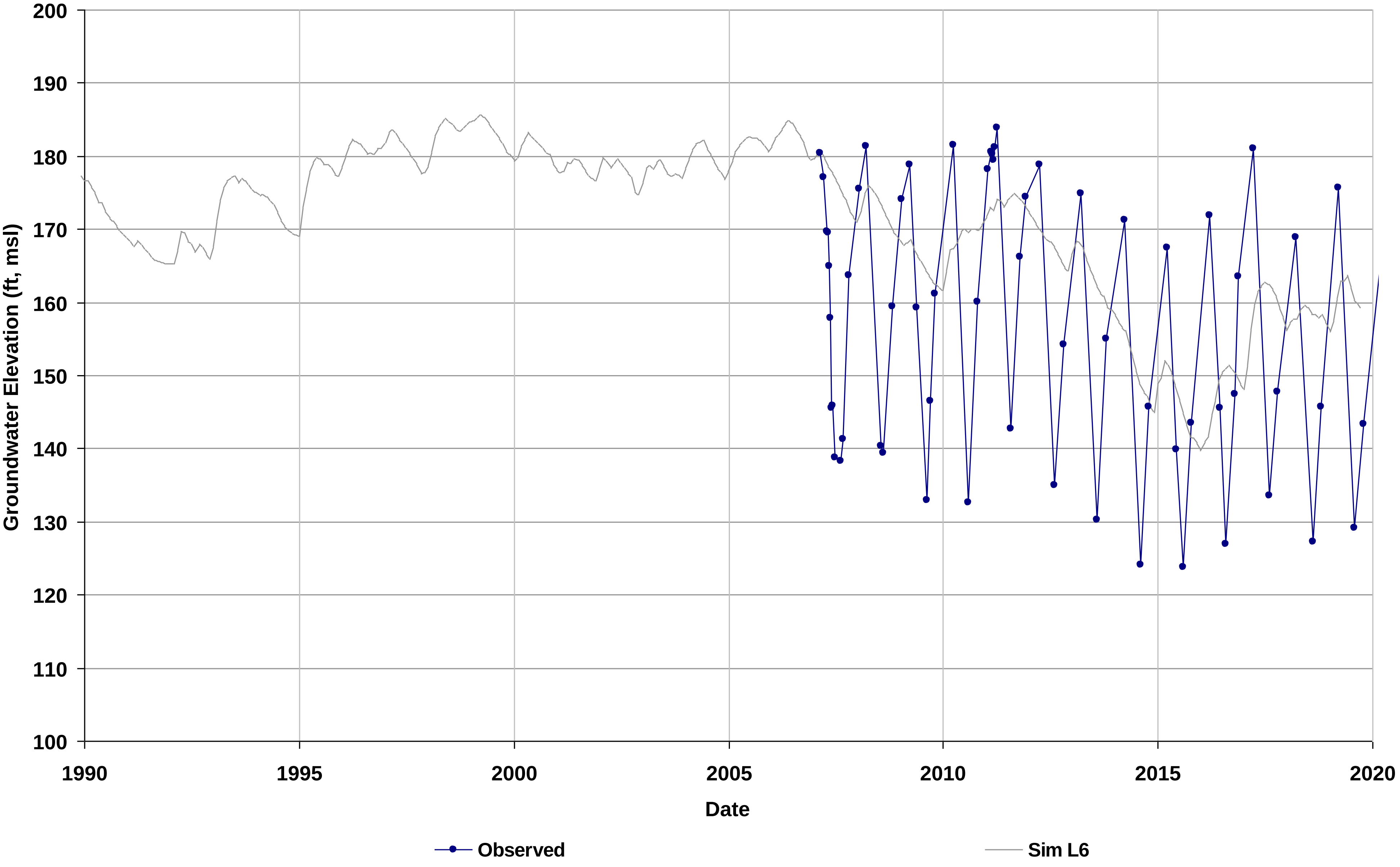
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

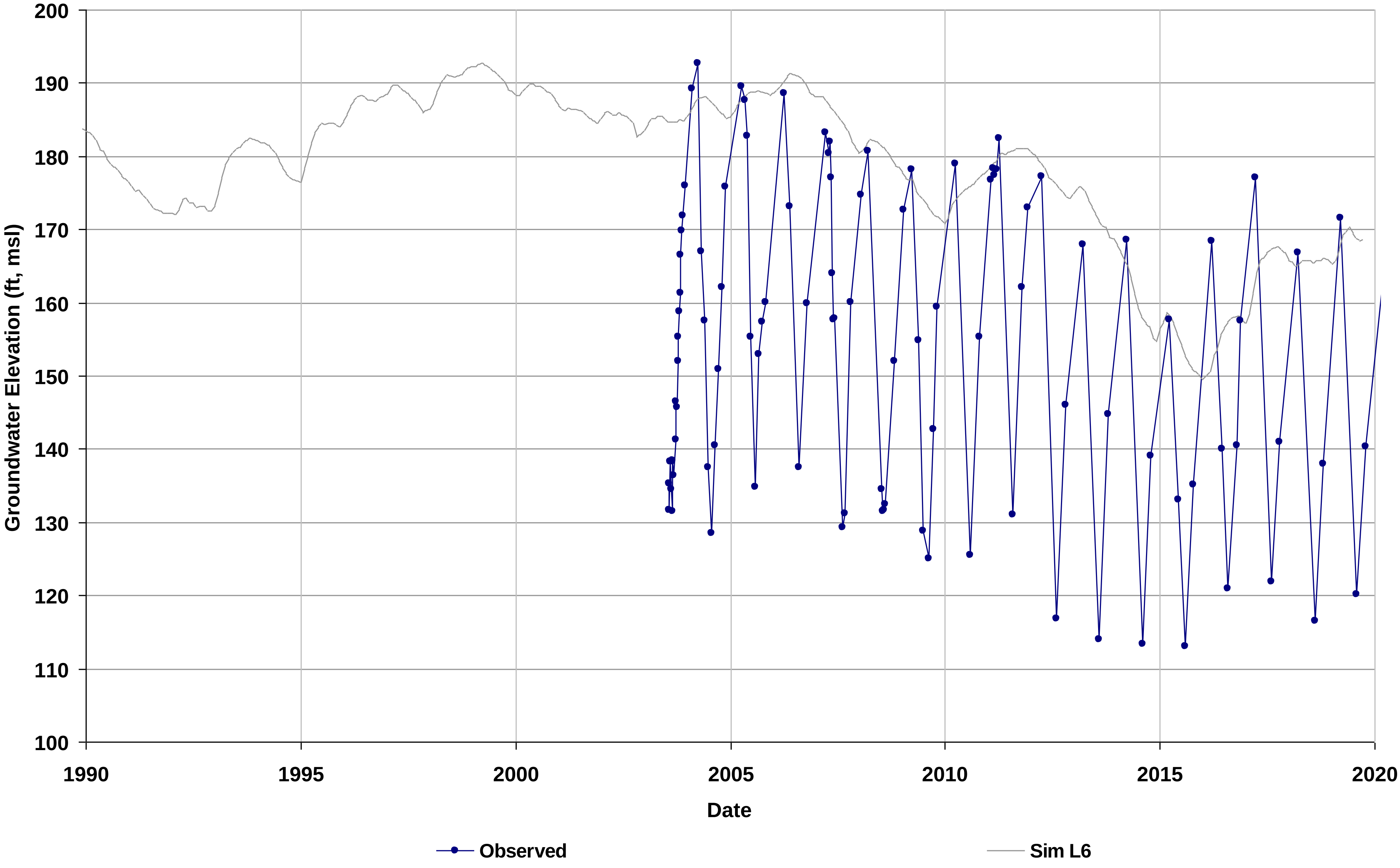
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

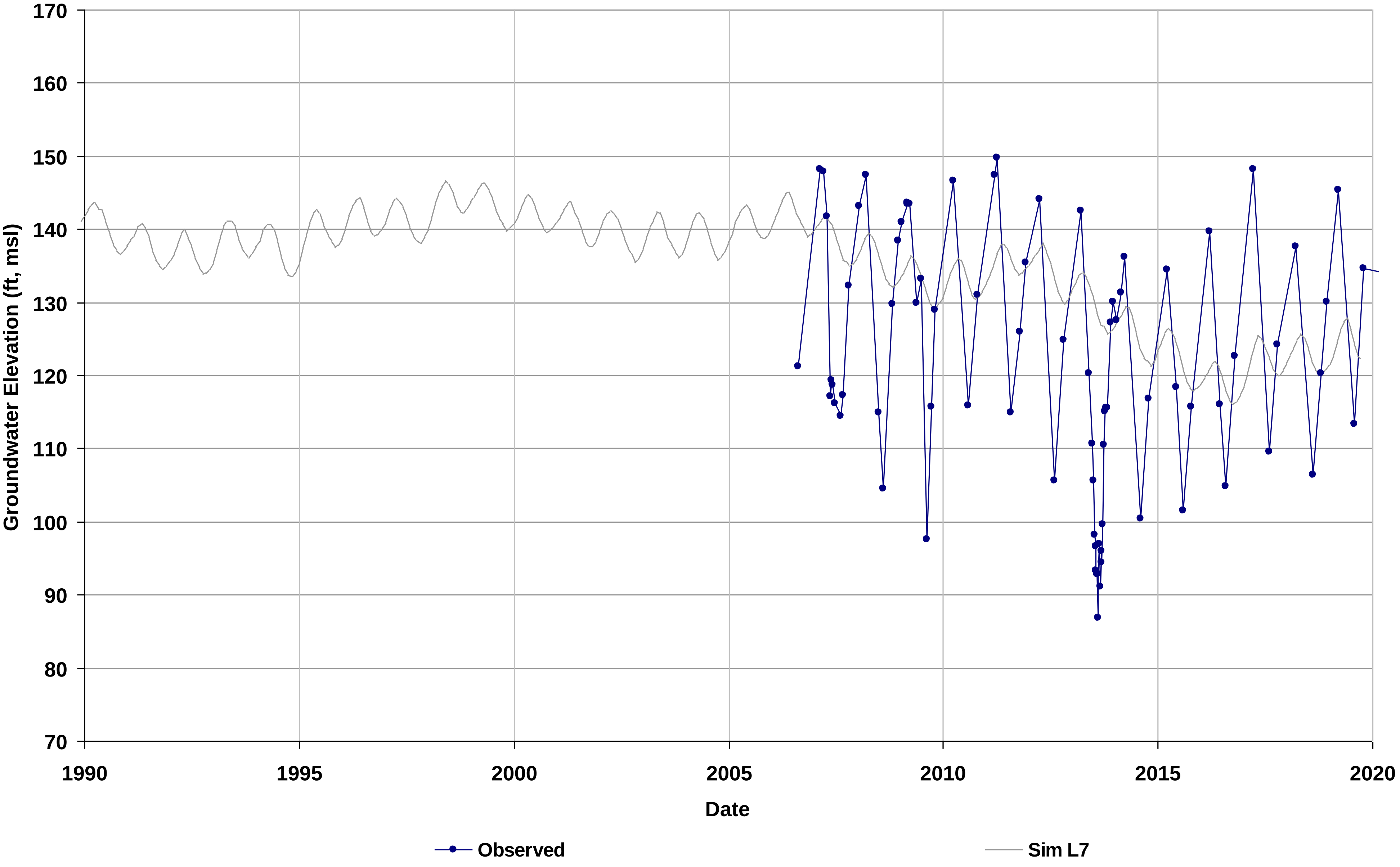
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

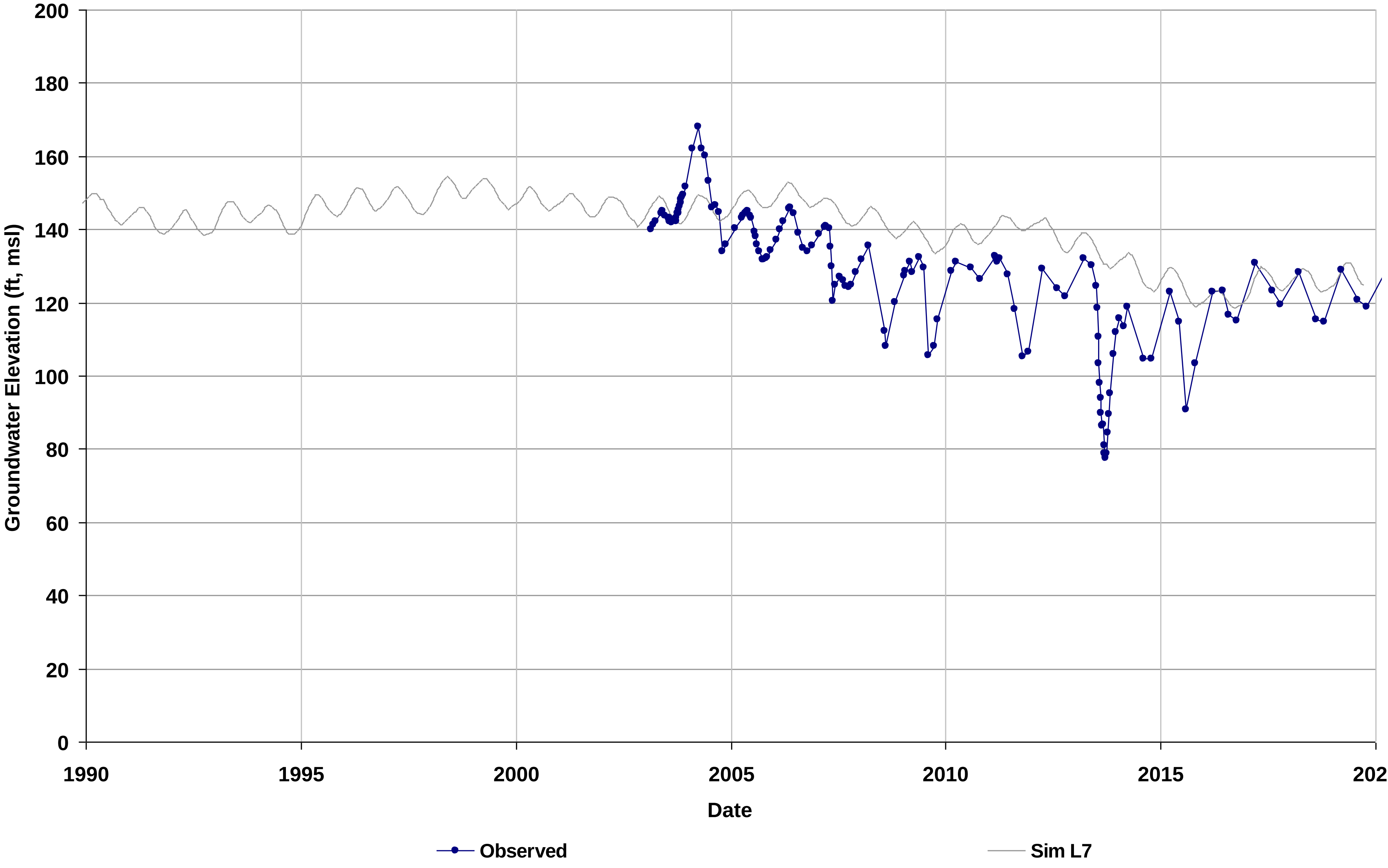
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Historical

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

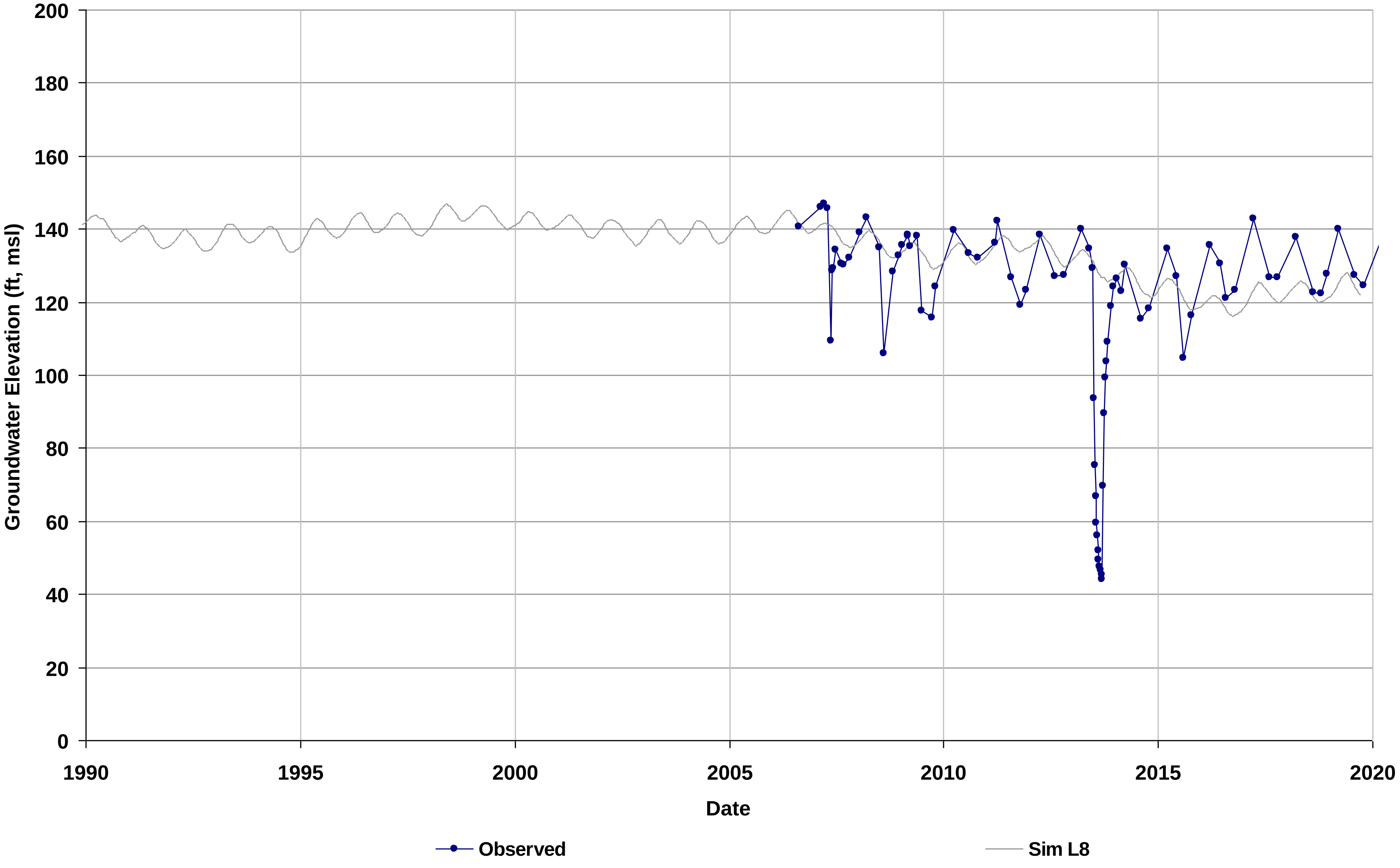
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Historical

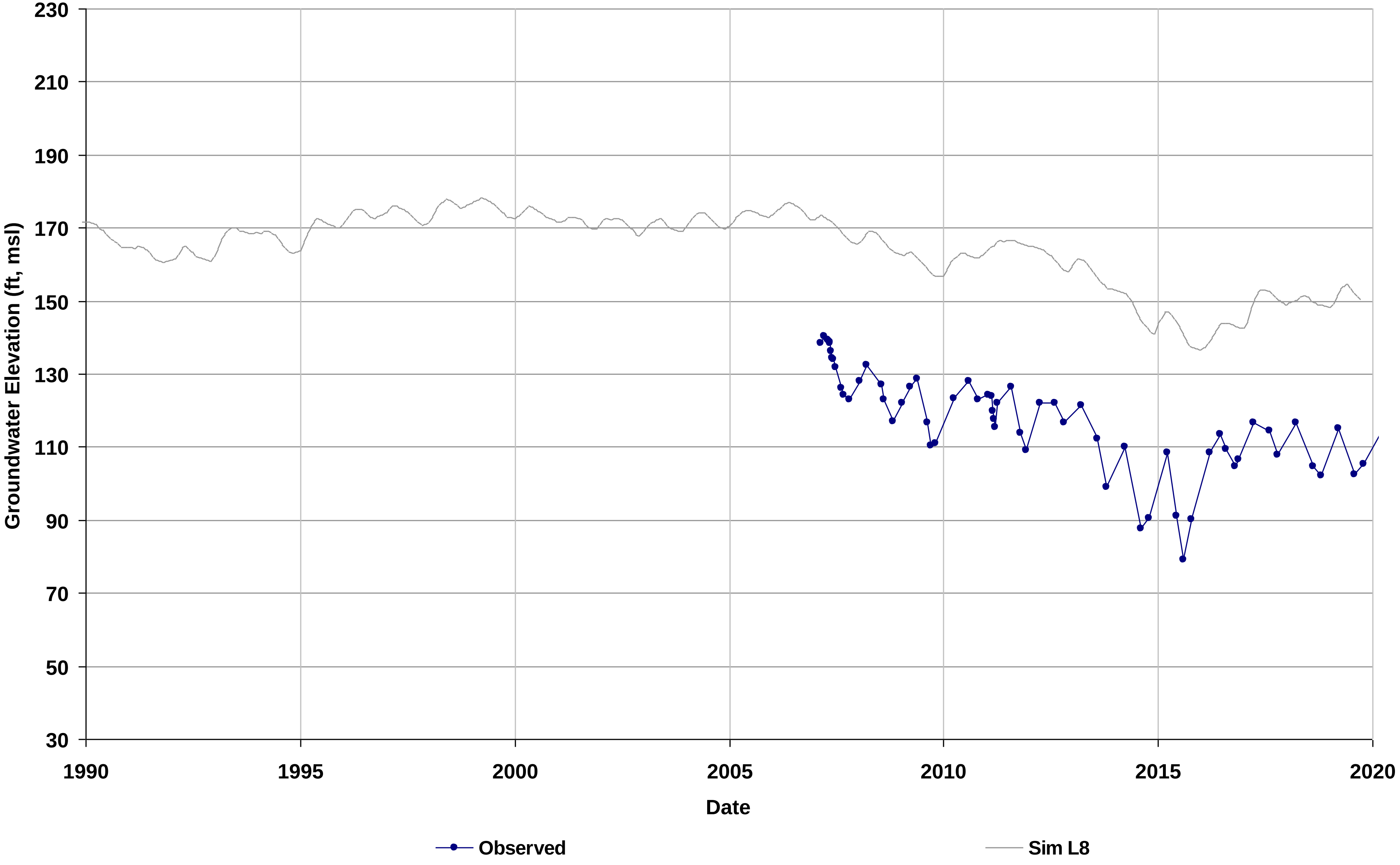
Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

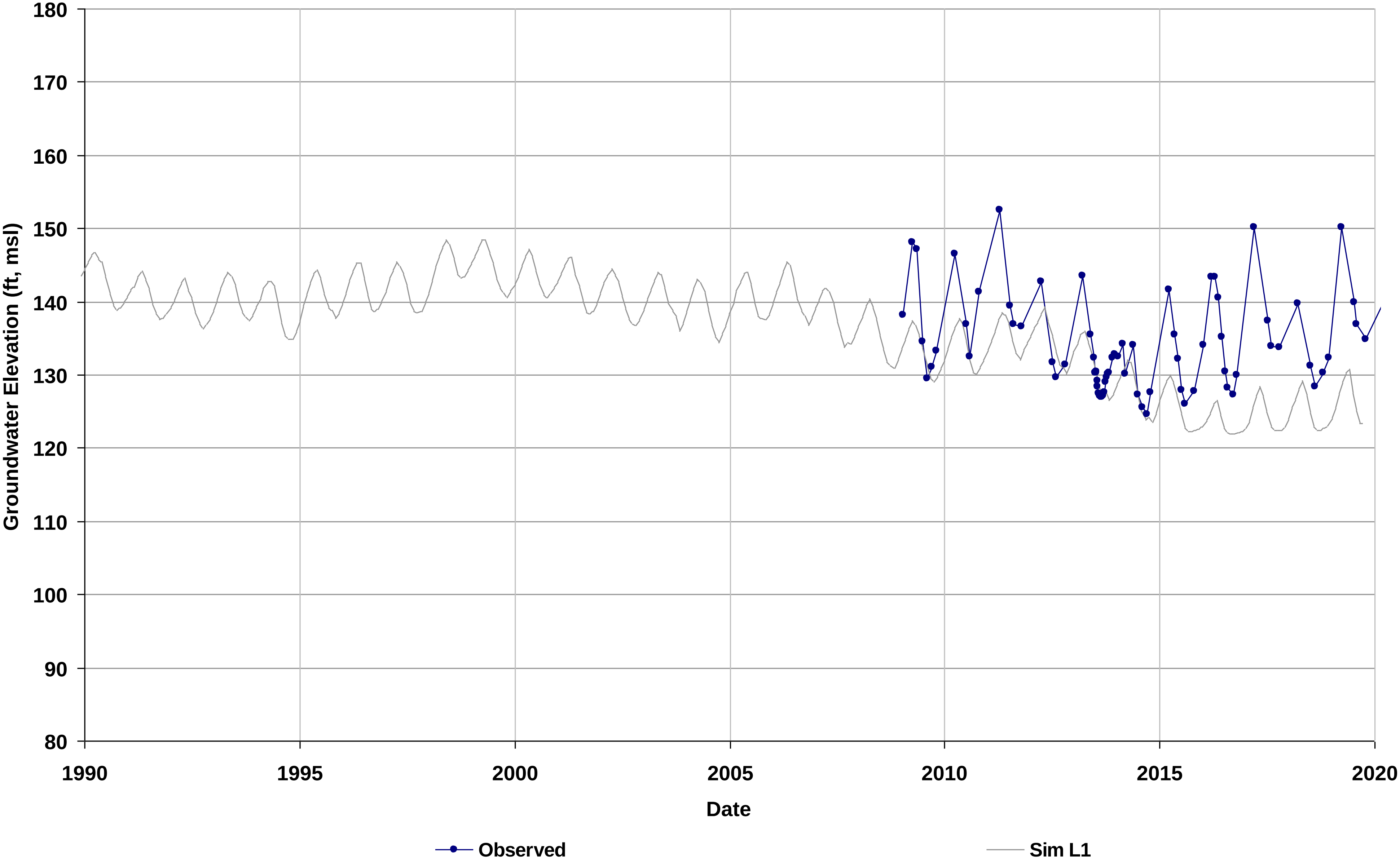
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Historical

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

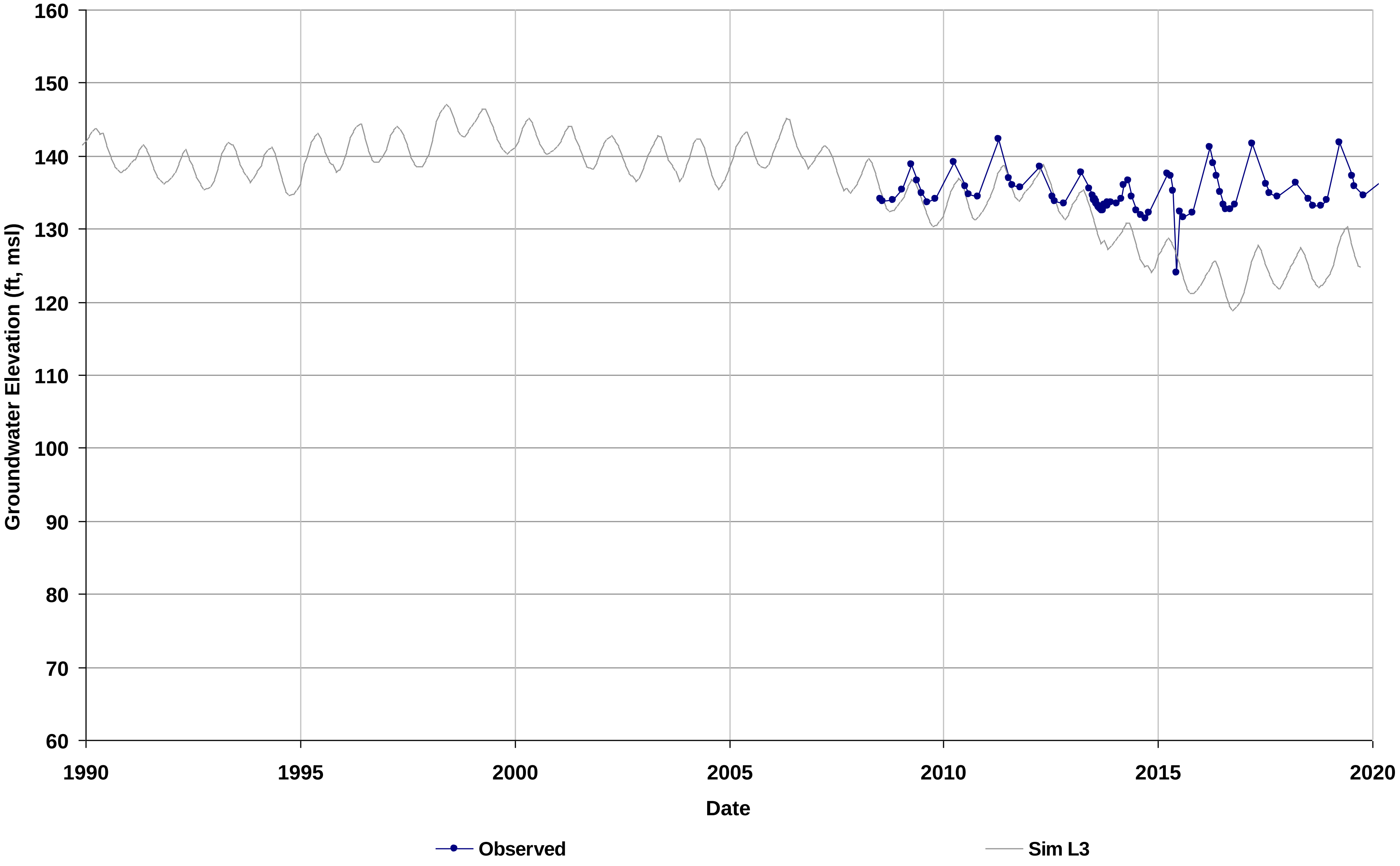
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Historical

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

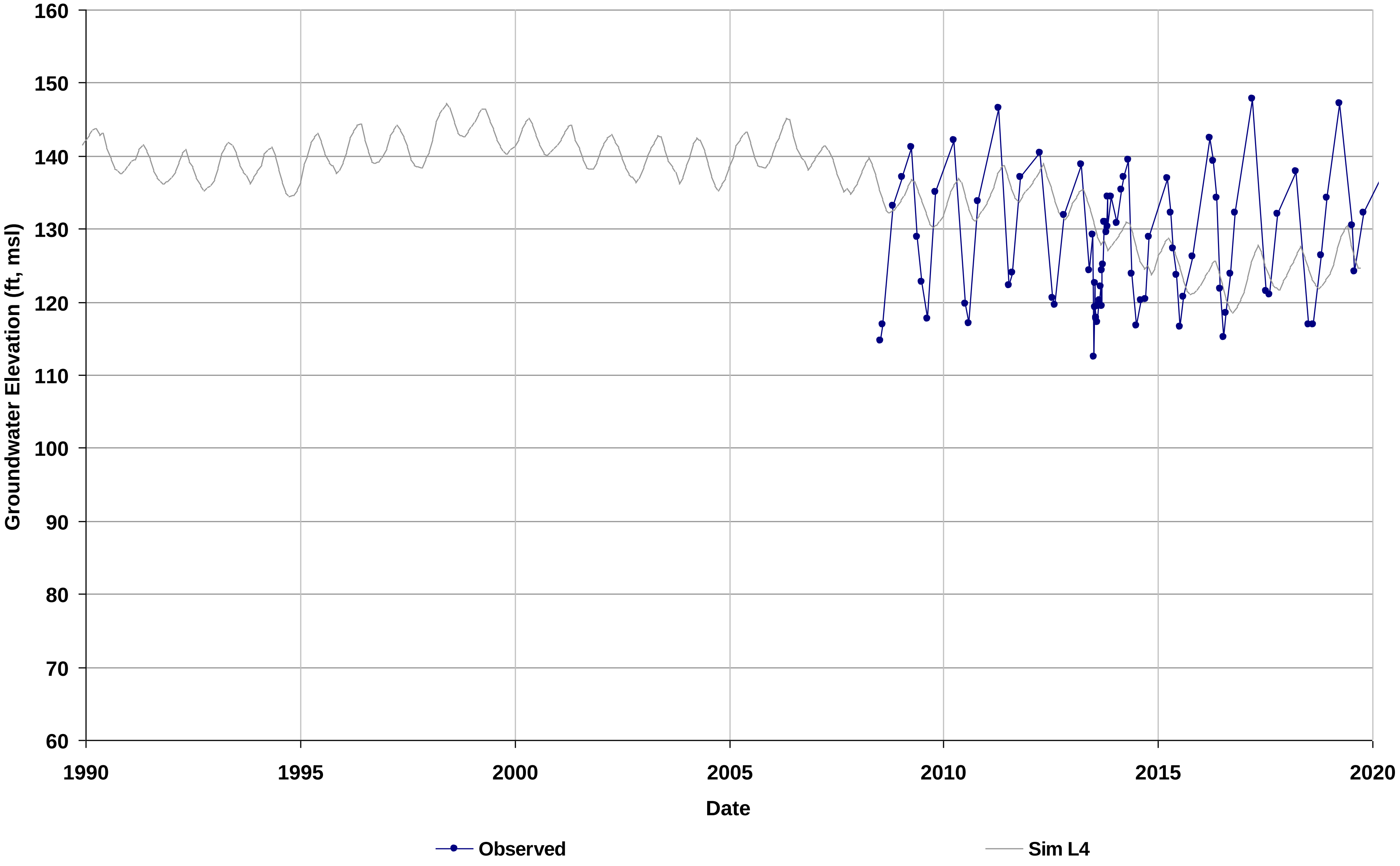
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

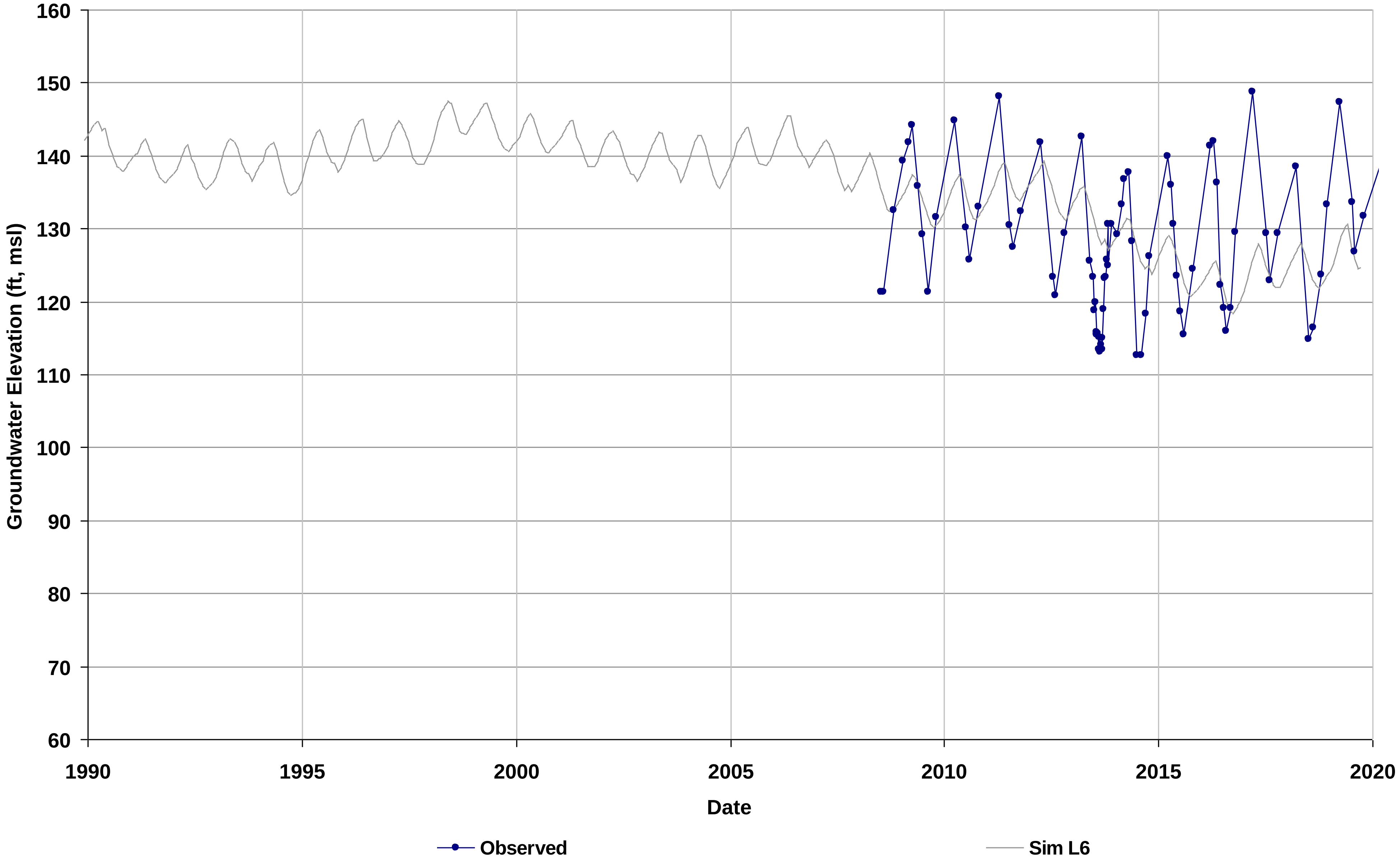
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

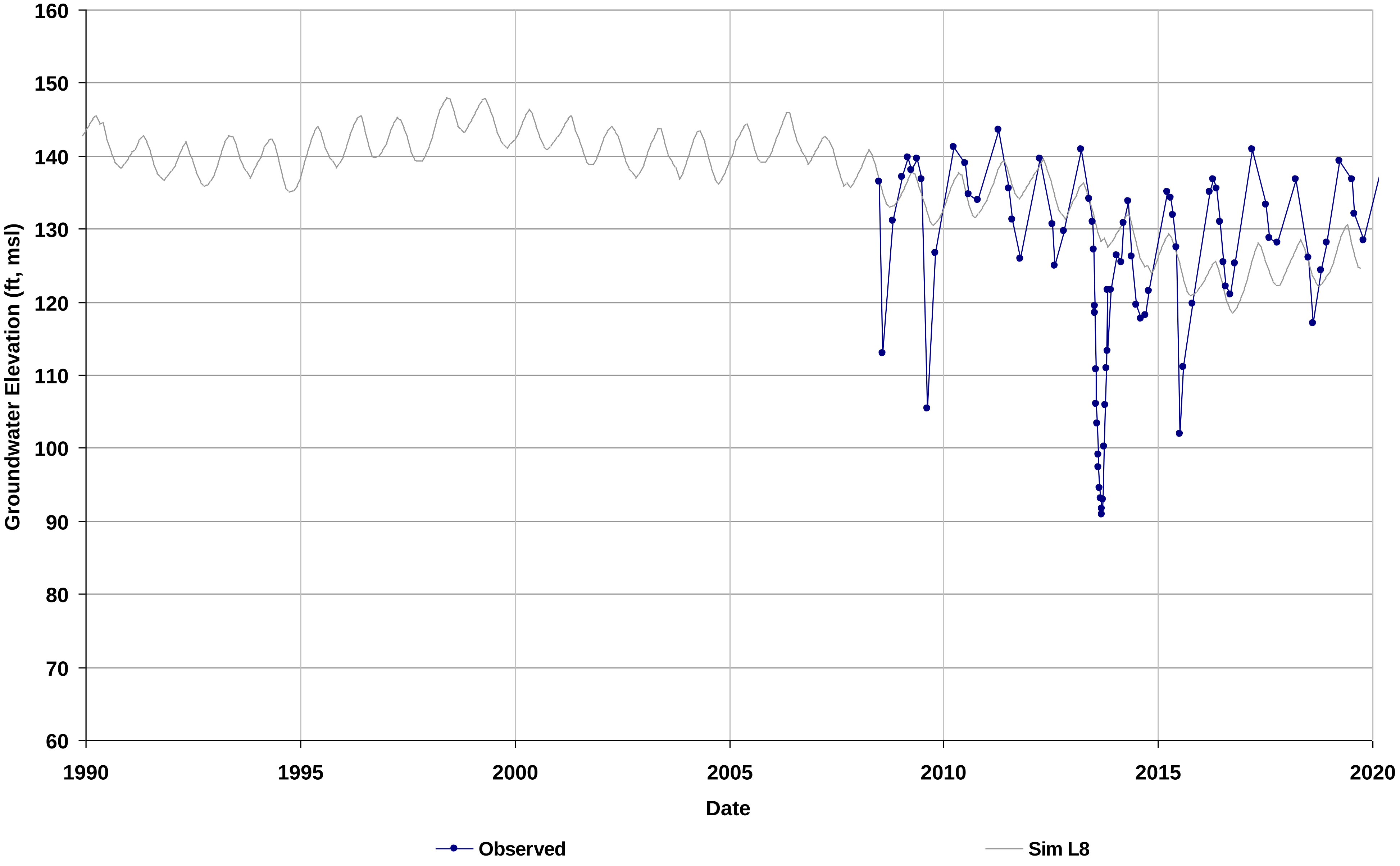
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

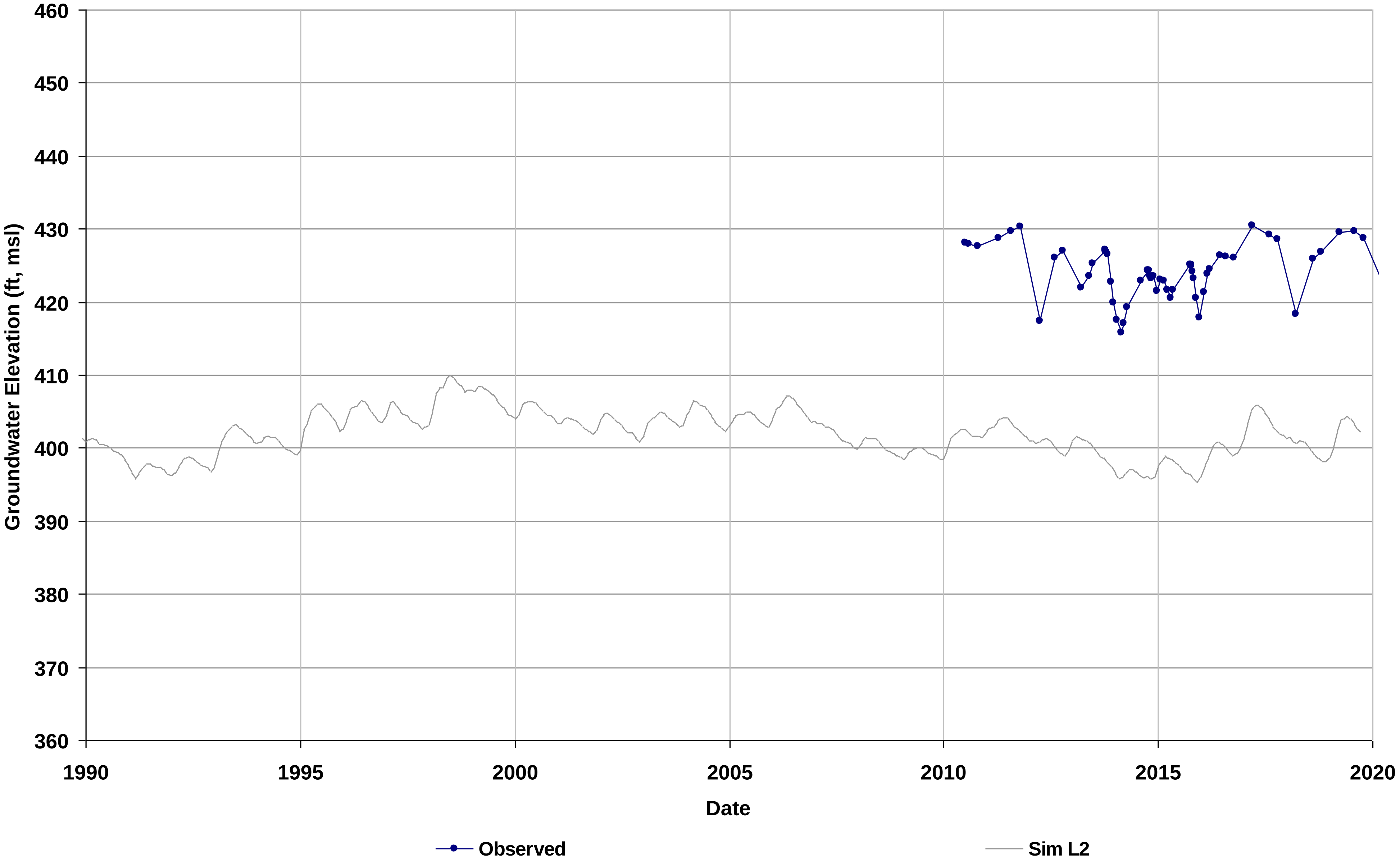
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Historical

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

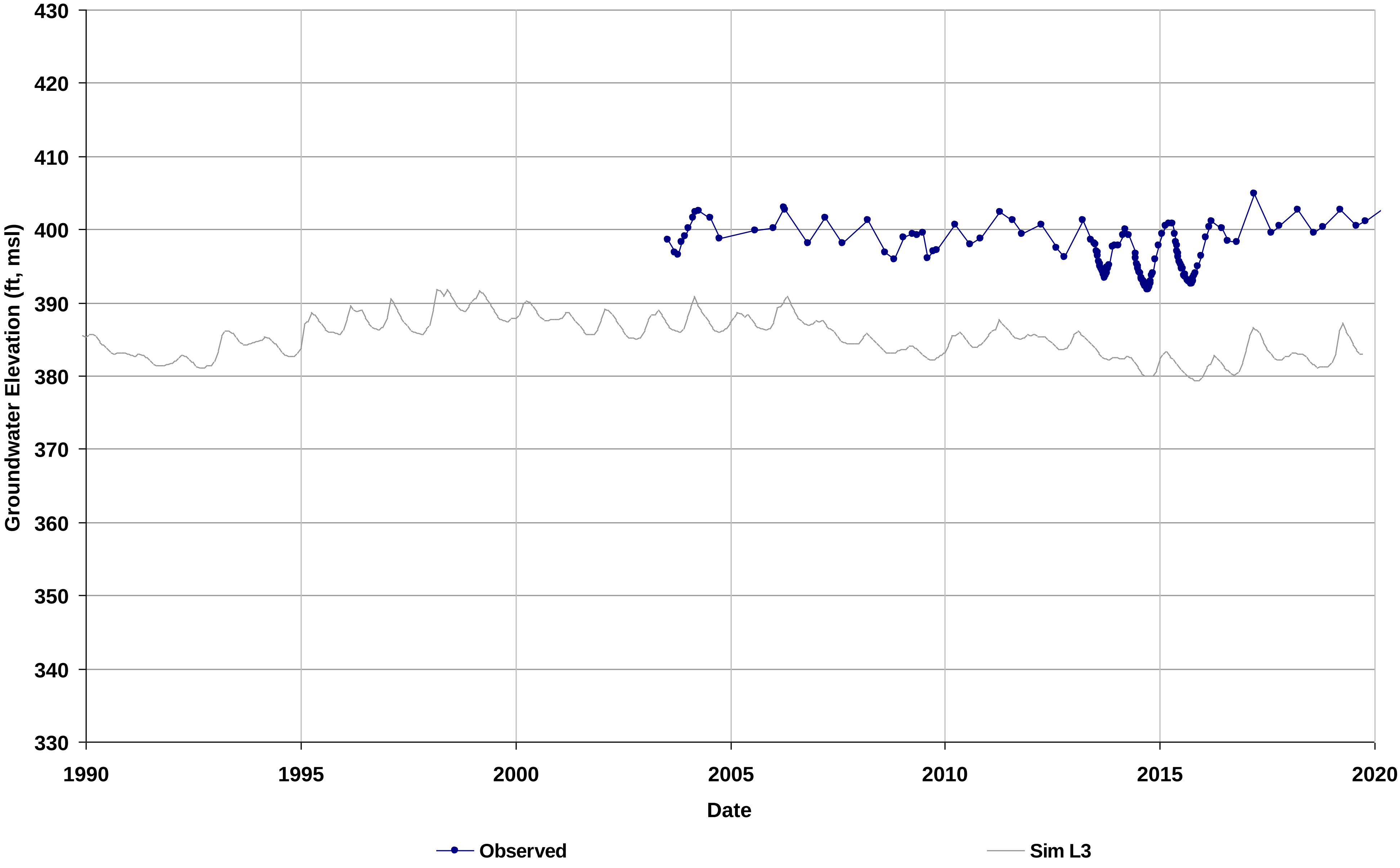
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Historical

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

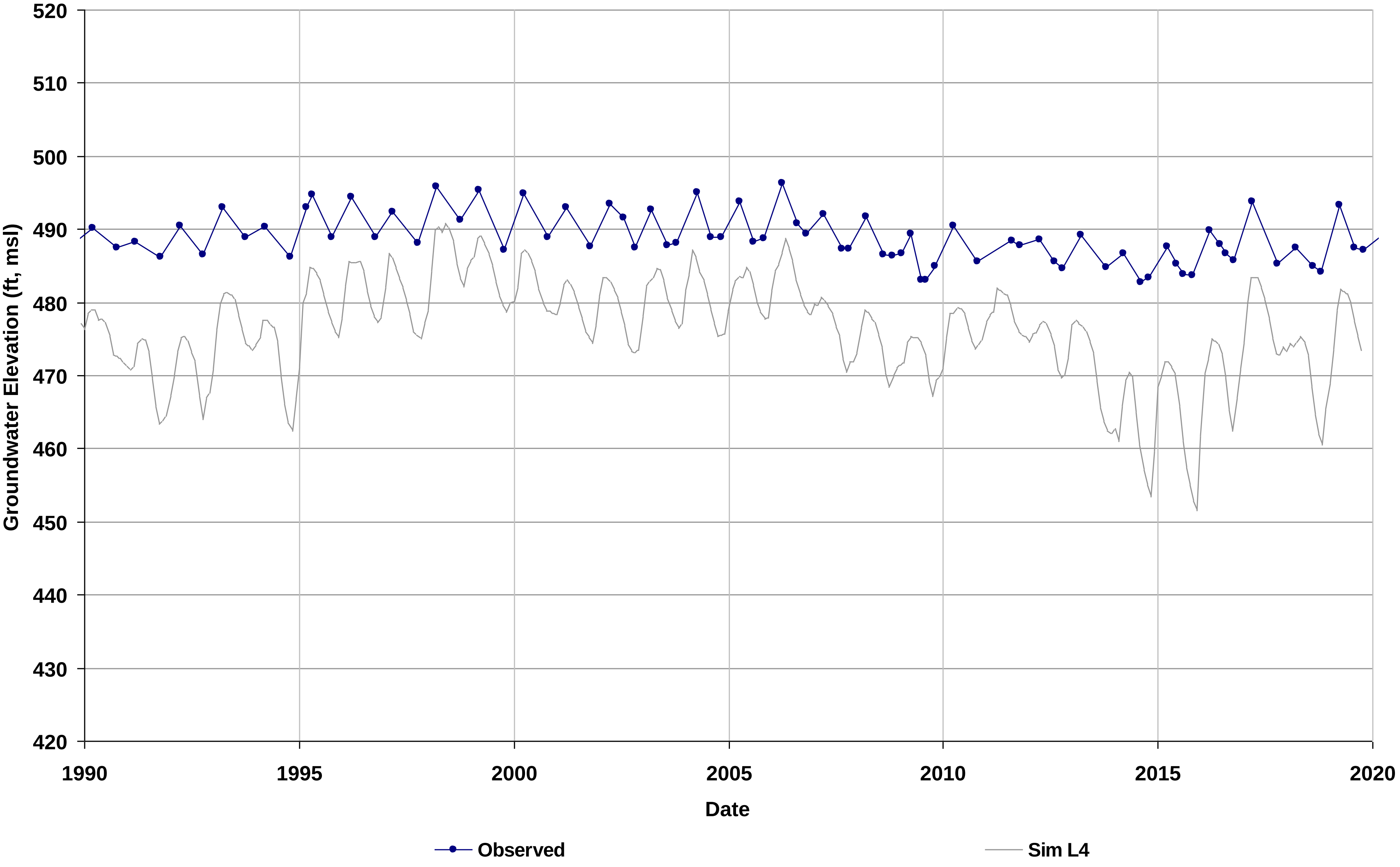
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Historical

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

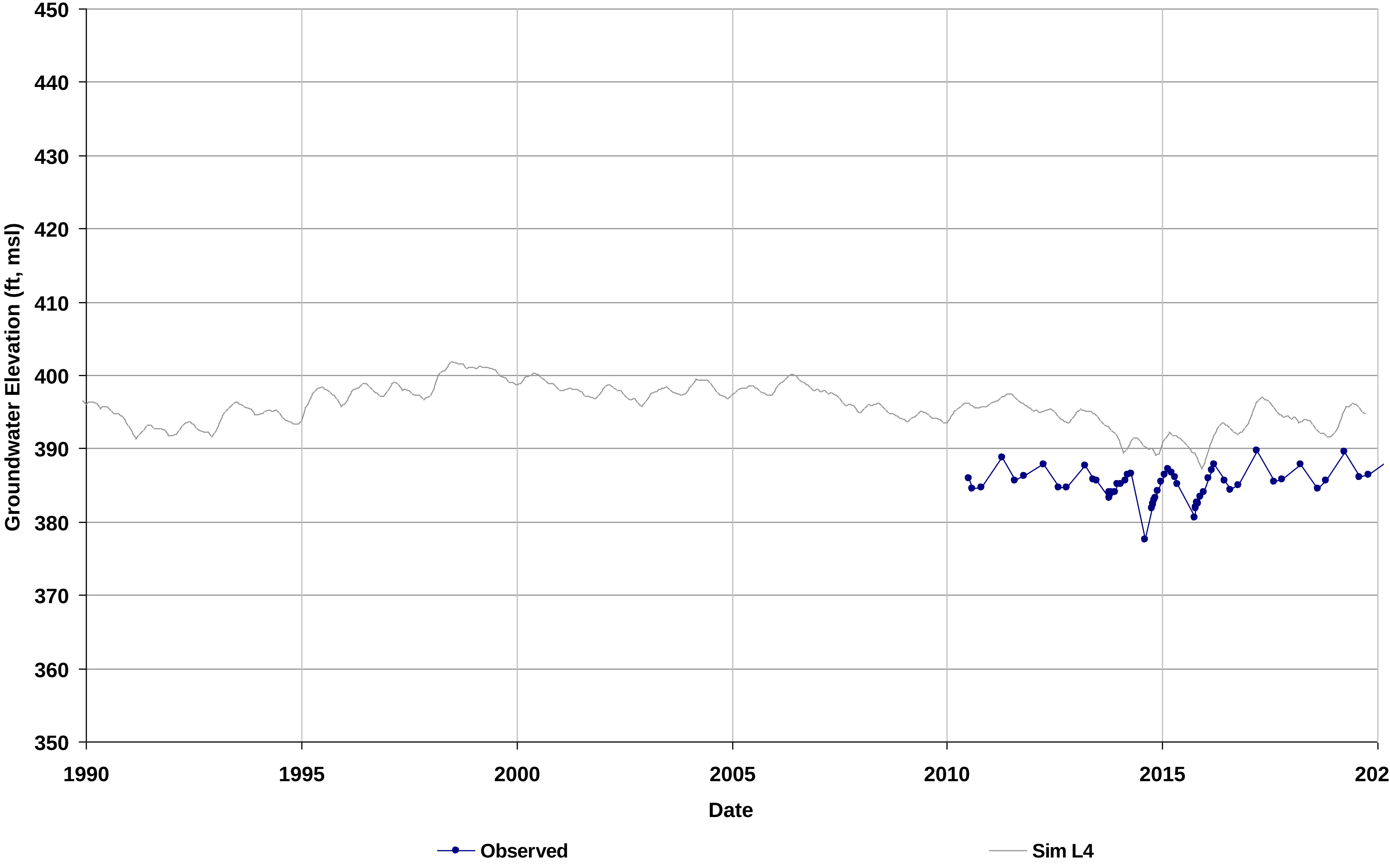
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

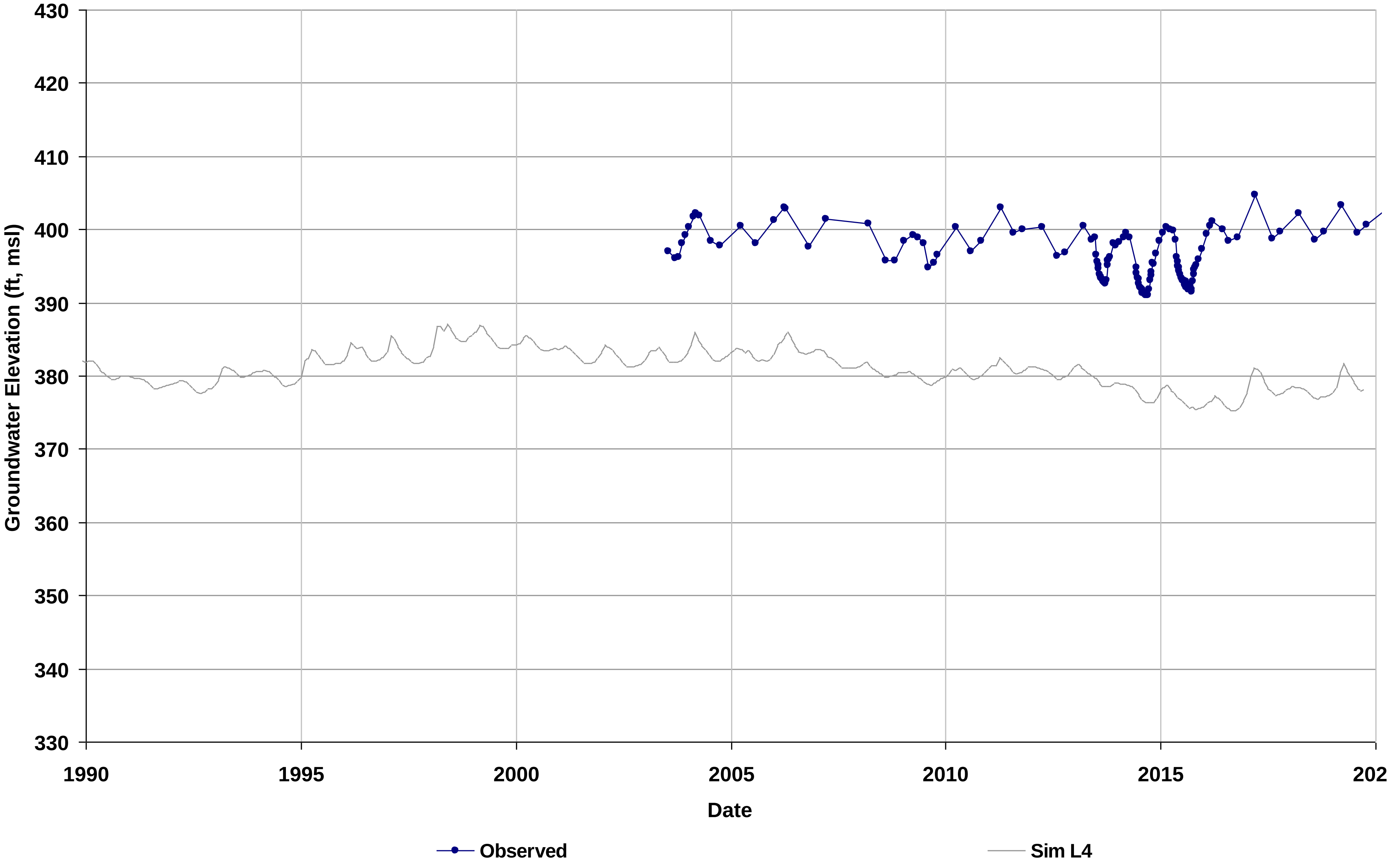
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

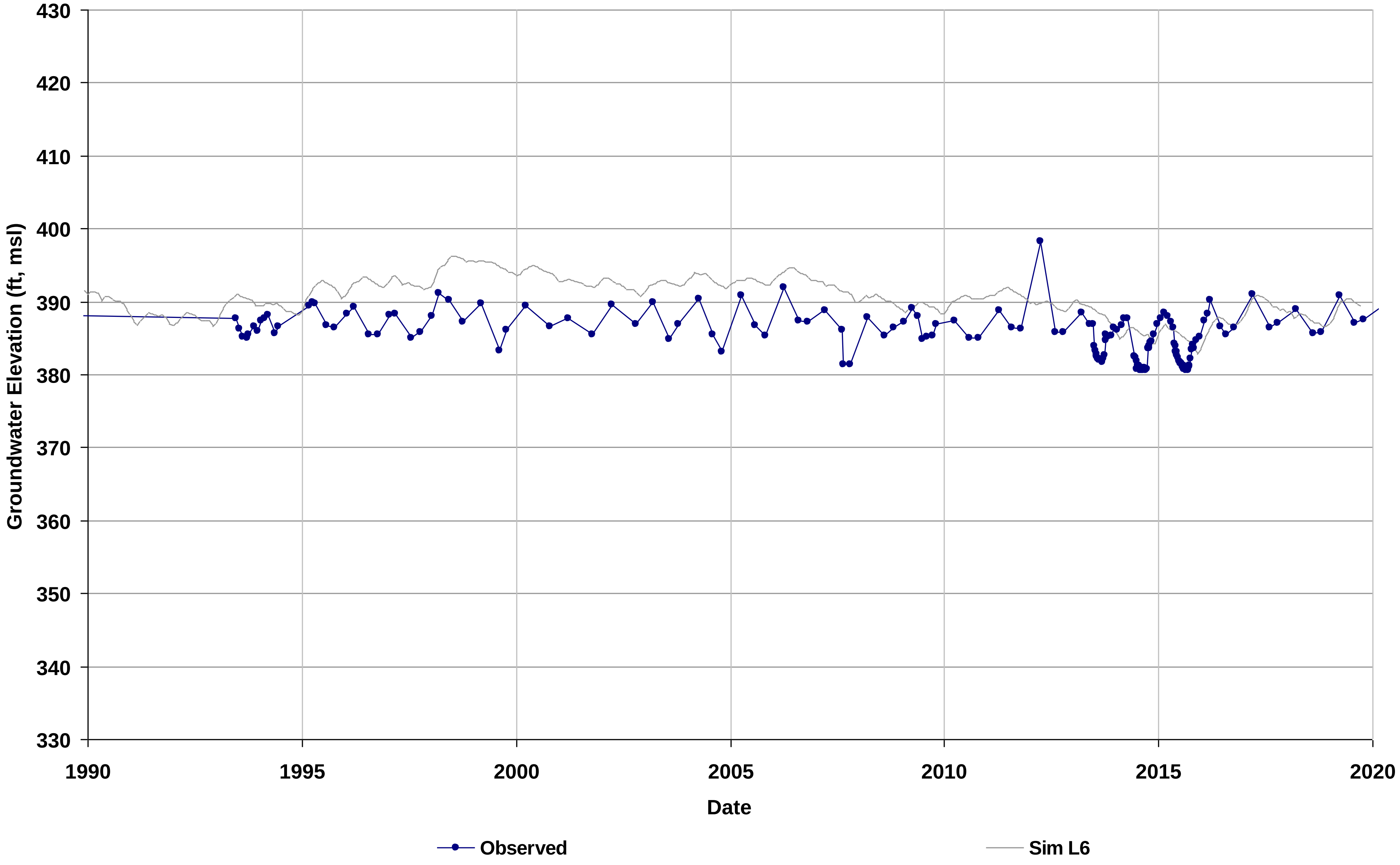
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

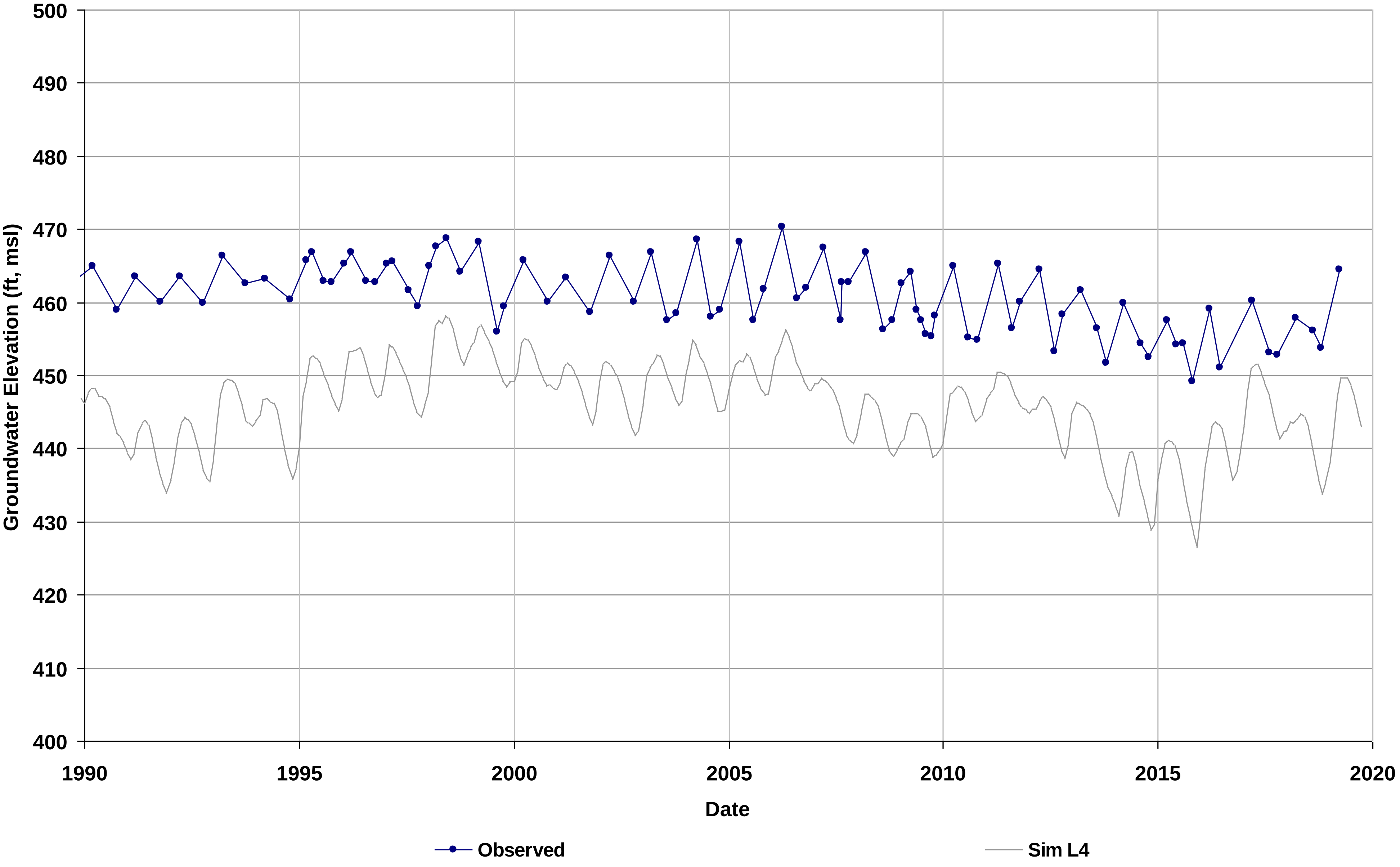
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

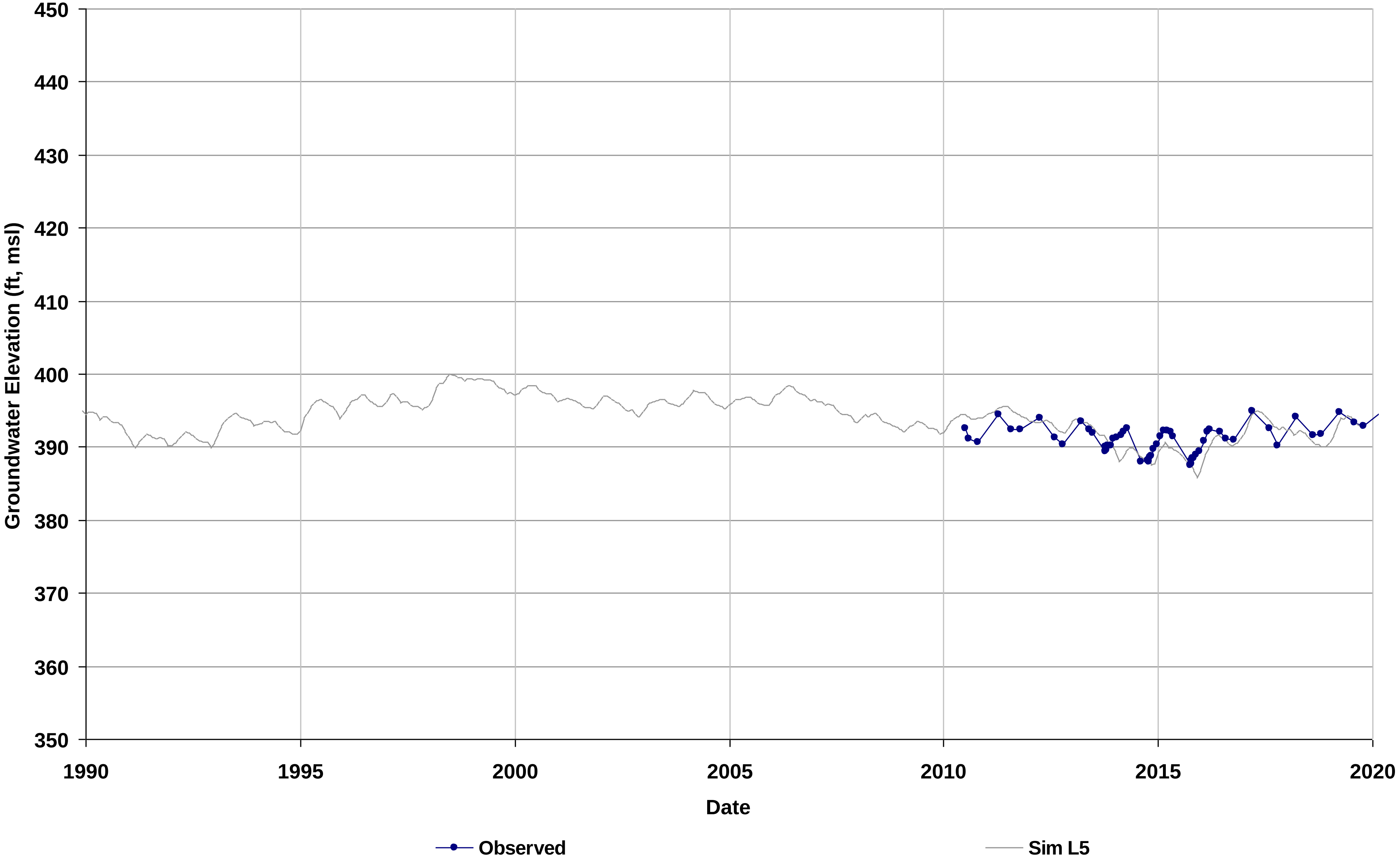
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Historical

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

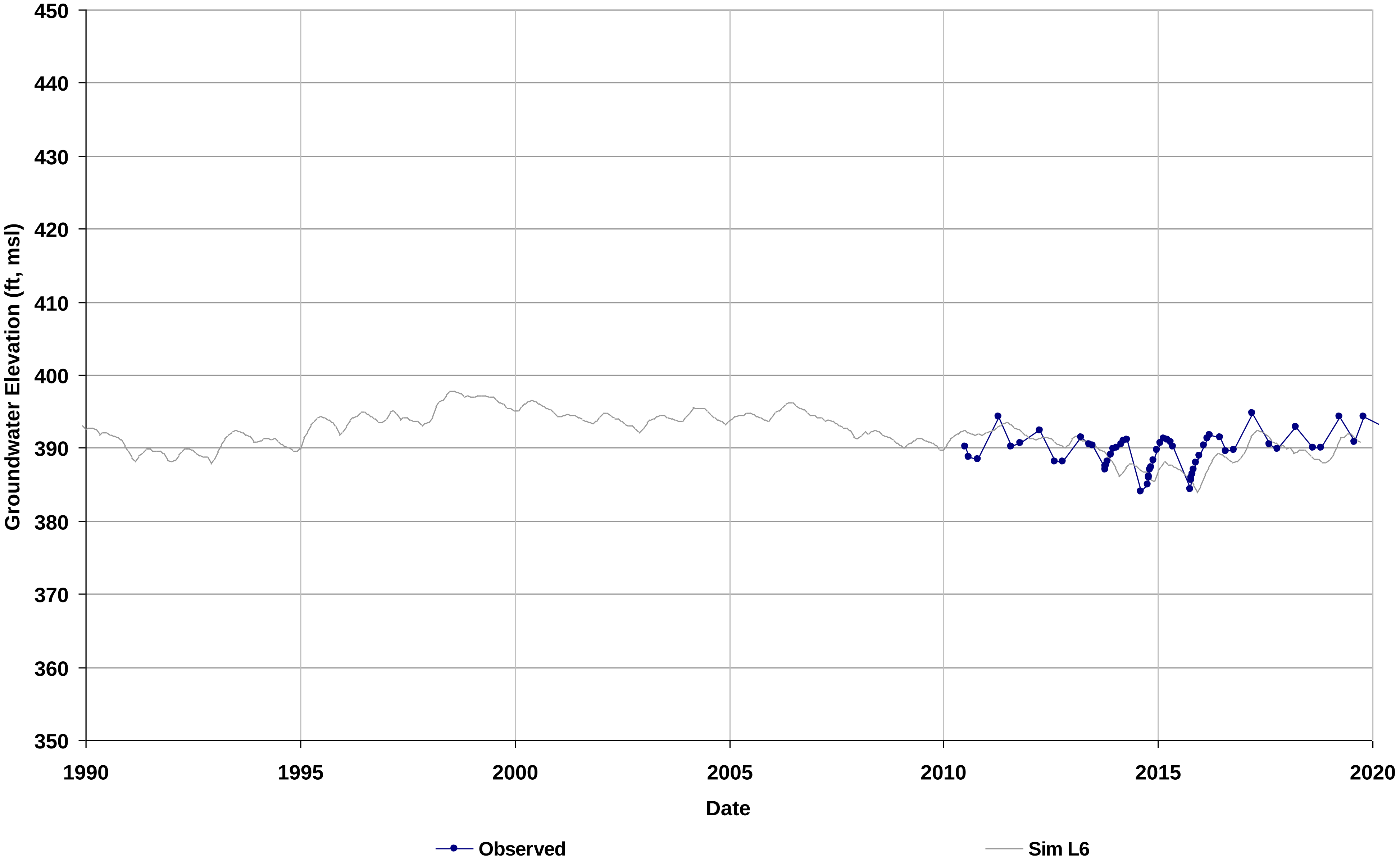
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Historical

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

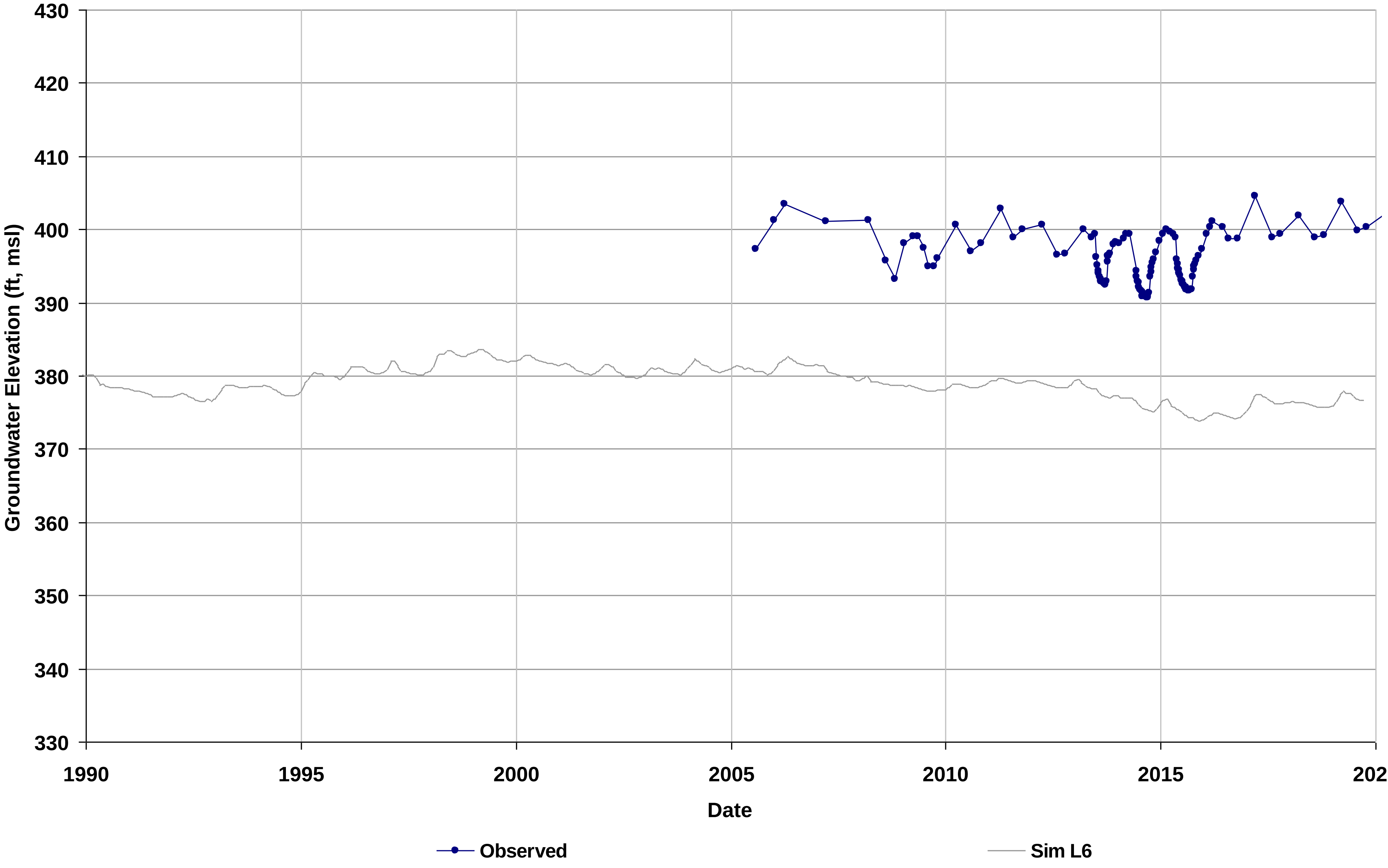
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

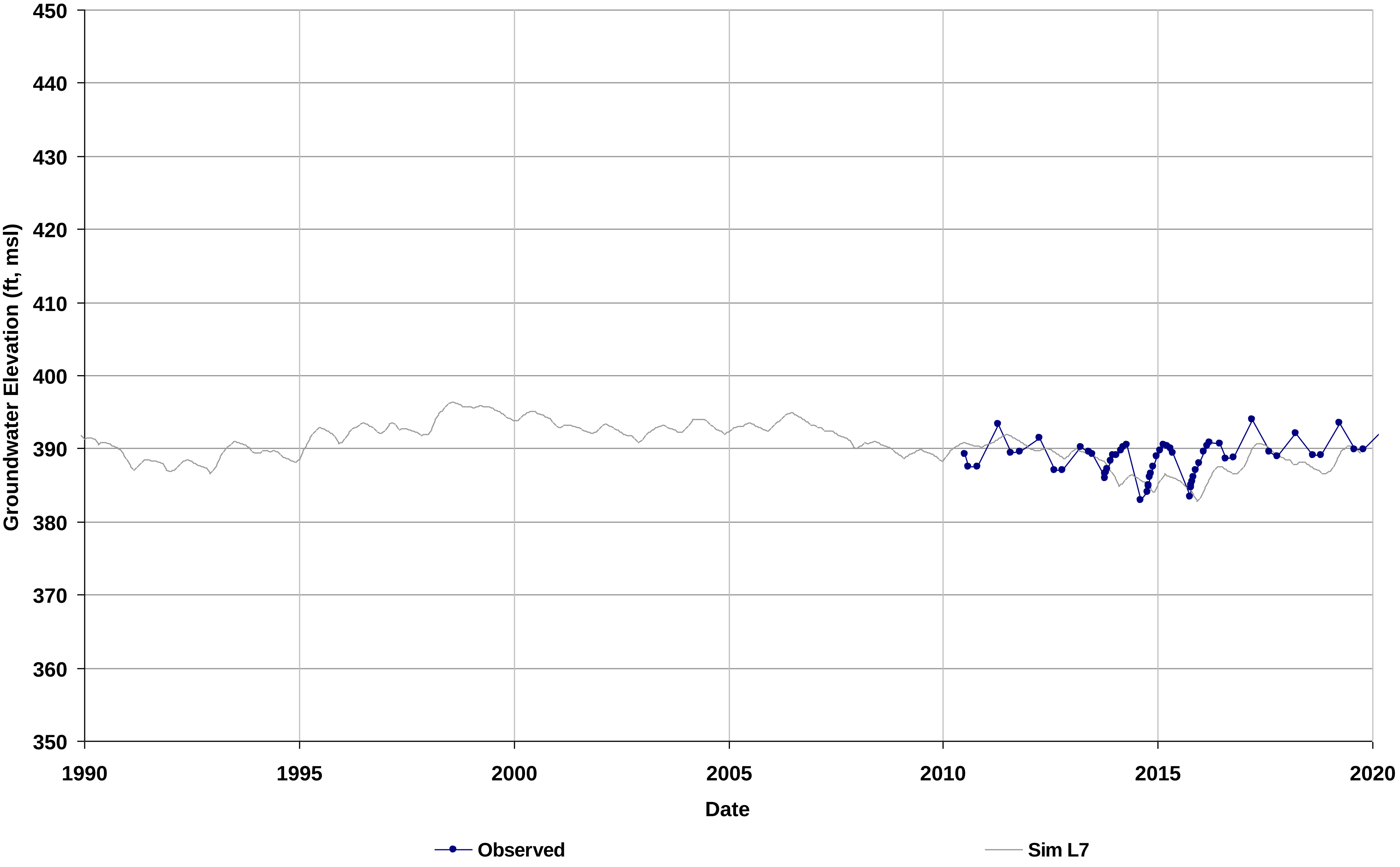
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Historical

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Historical

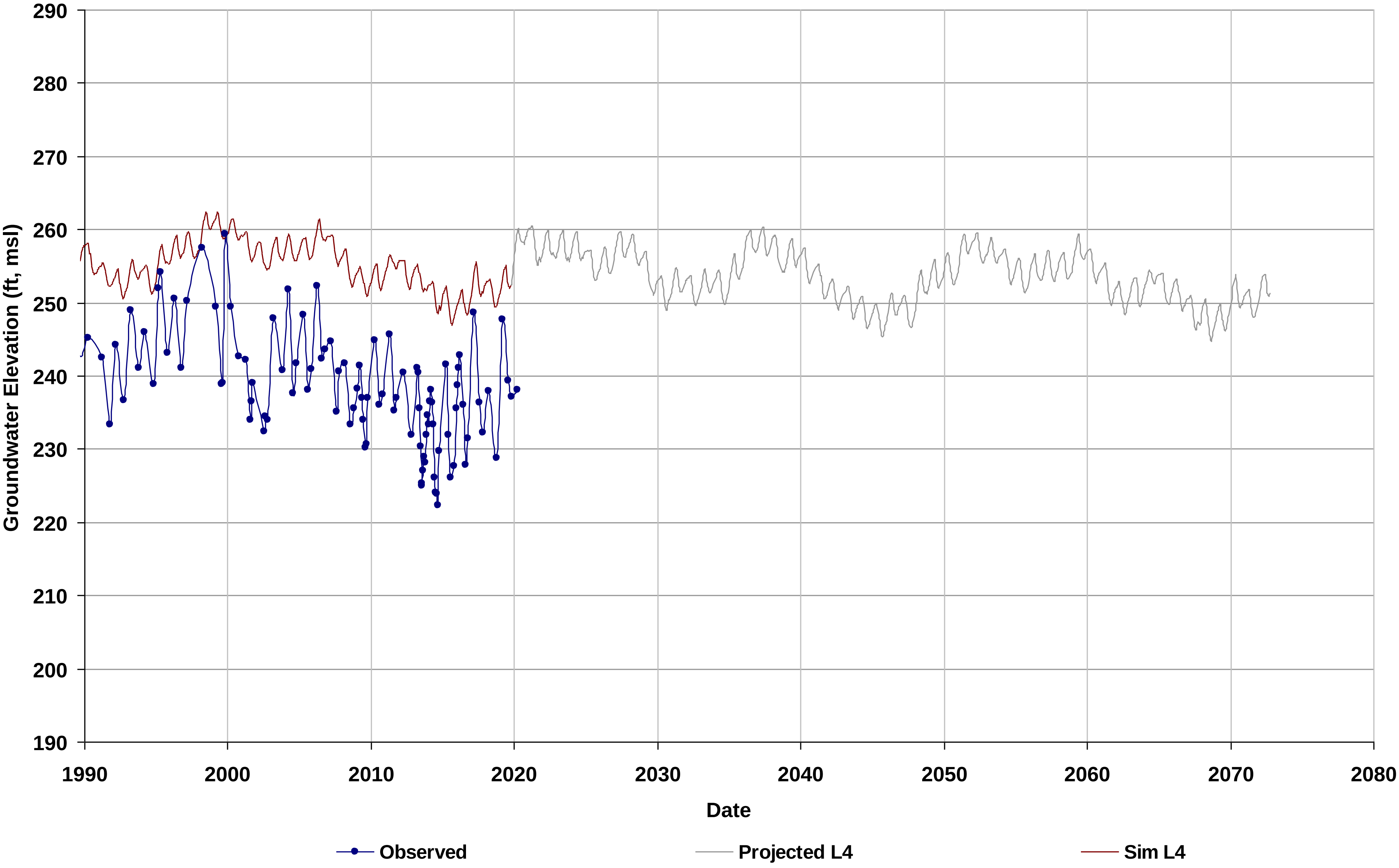
APPENDIX E-2

Tehama IHM Simulated Groundwater Levels:

Projected (Current Land Use) Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

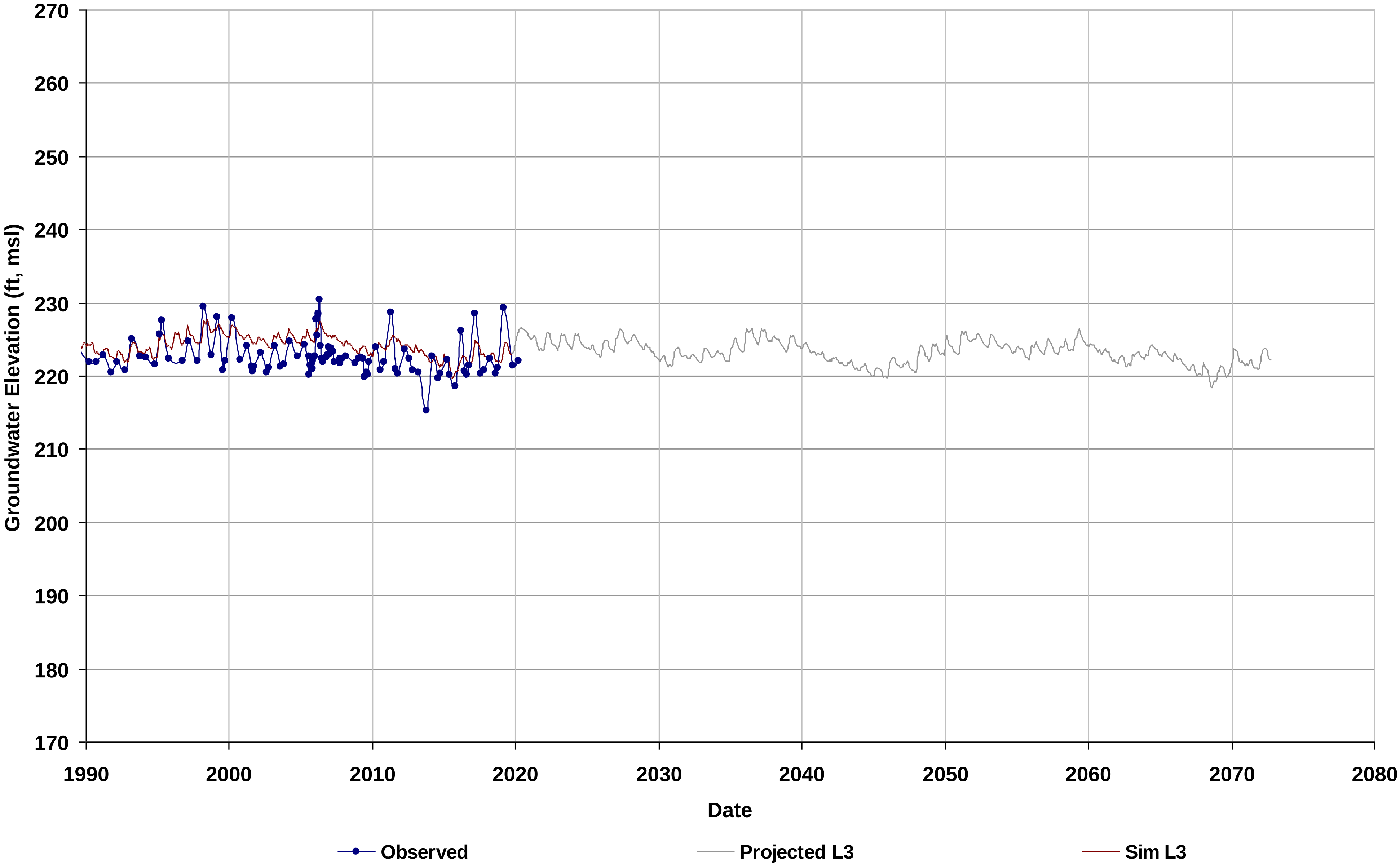
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

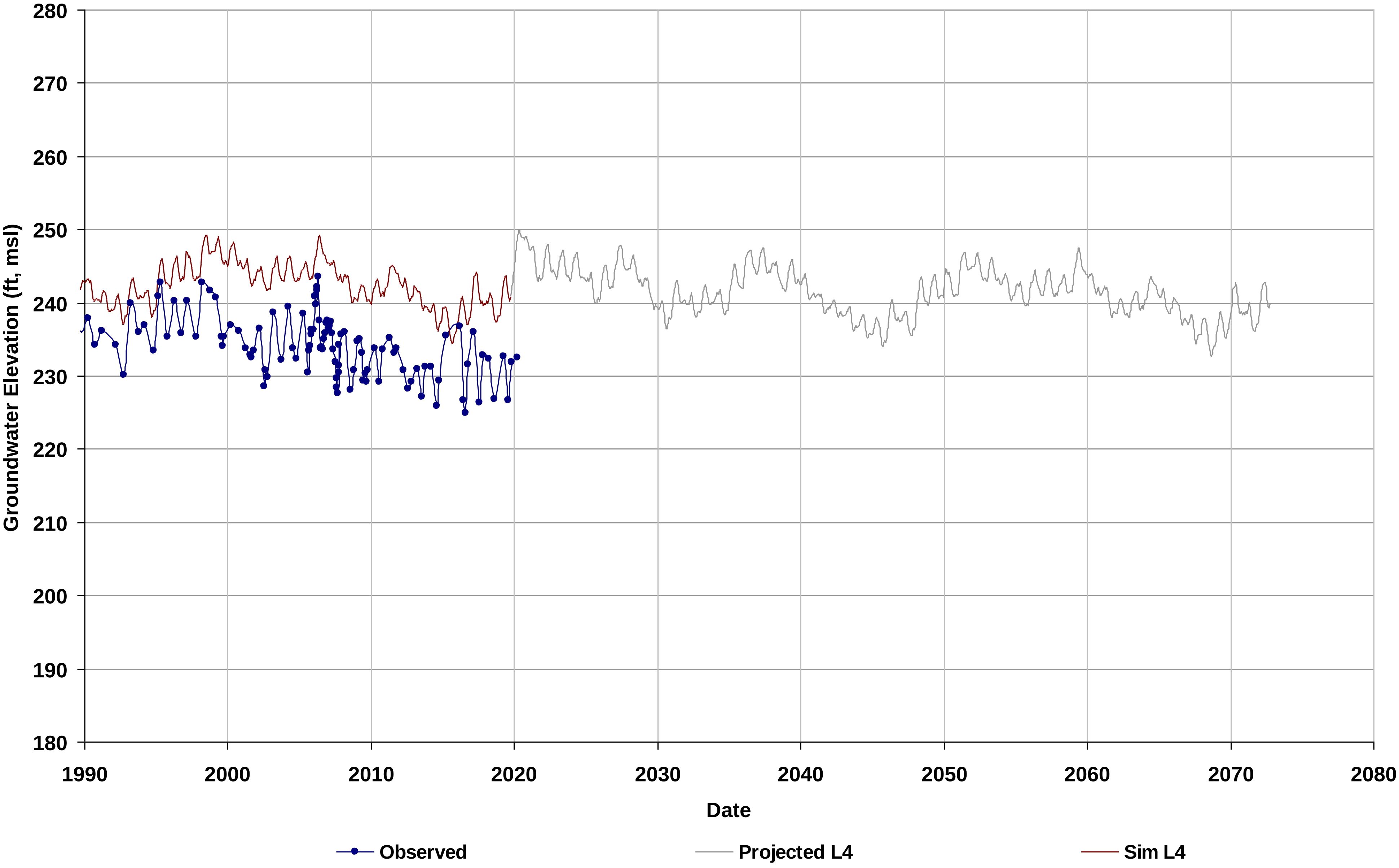
Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

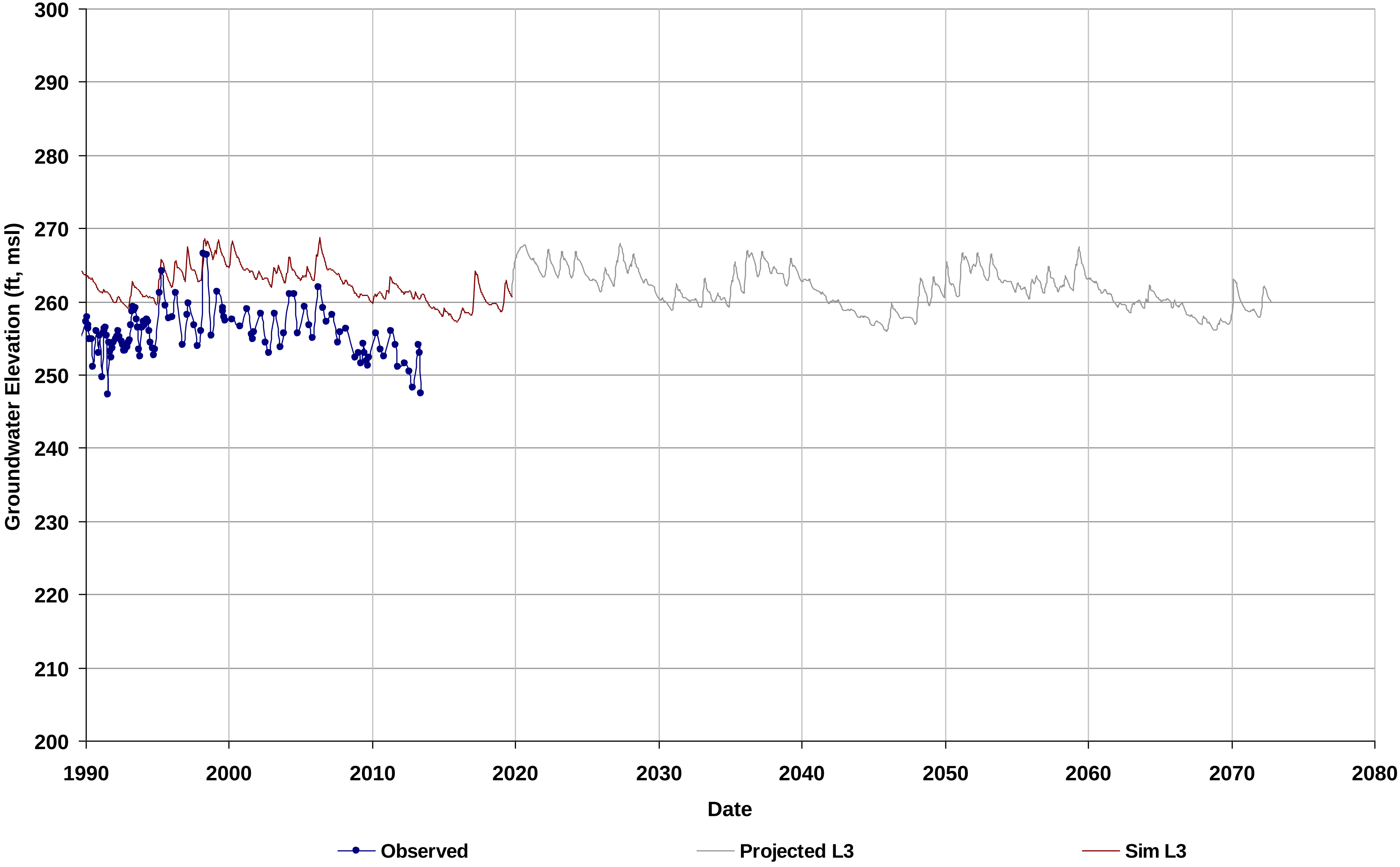
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

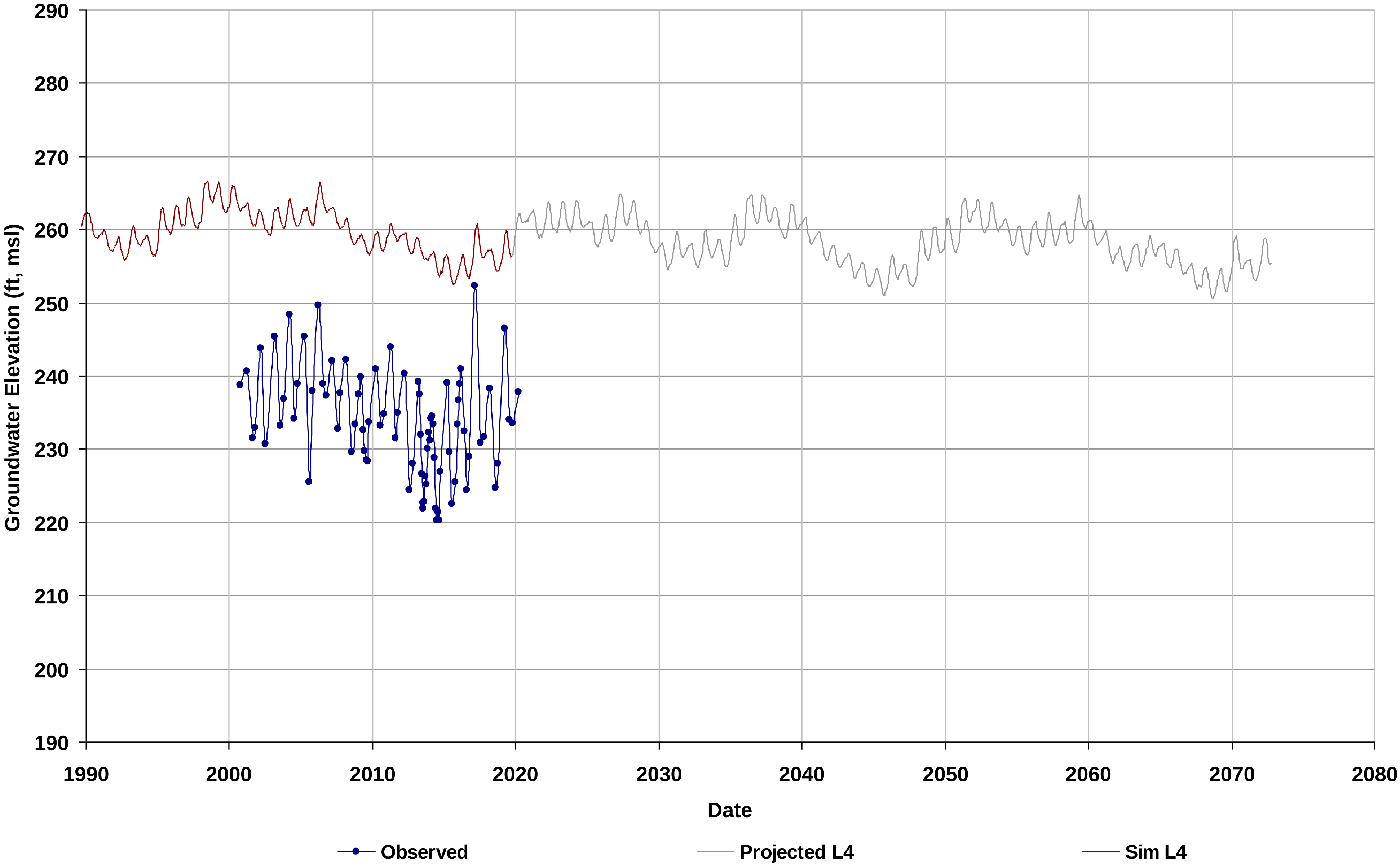
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

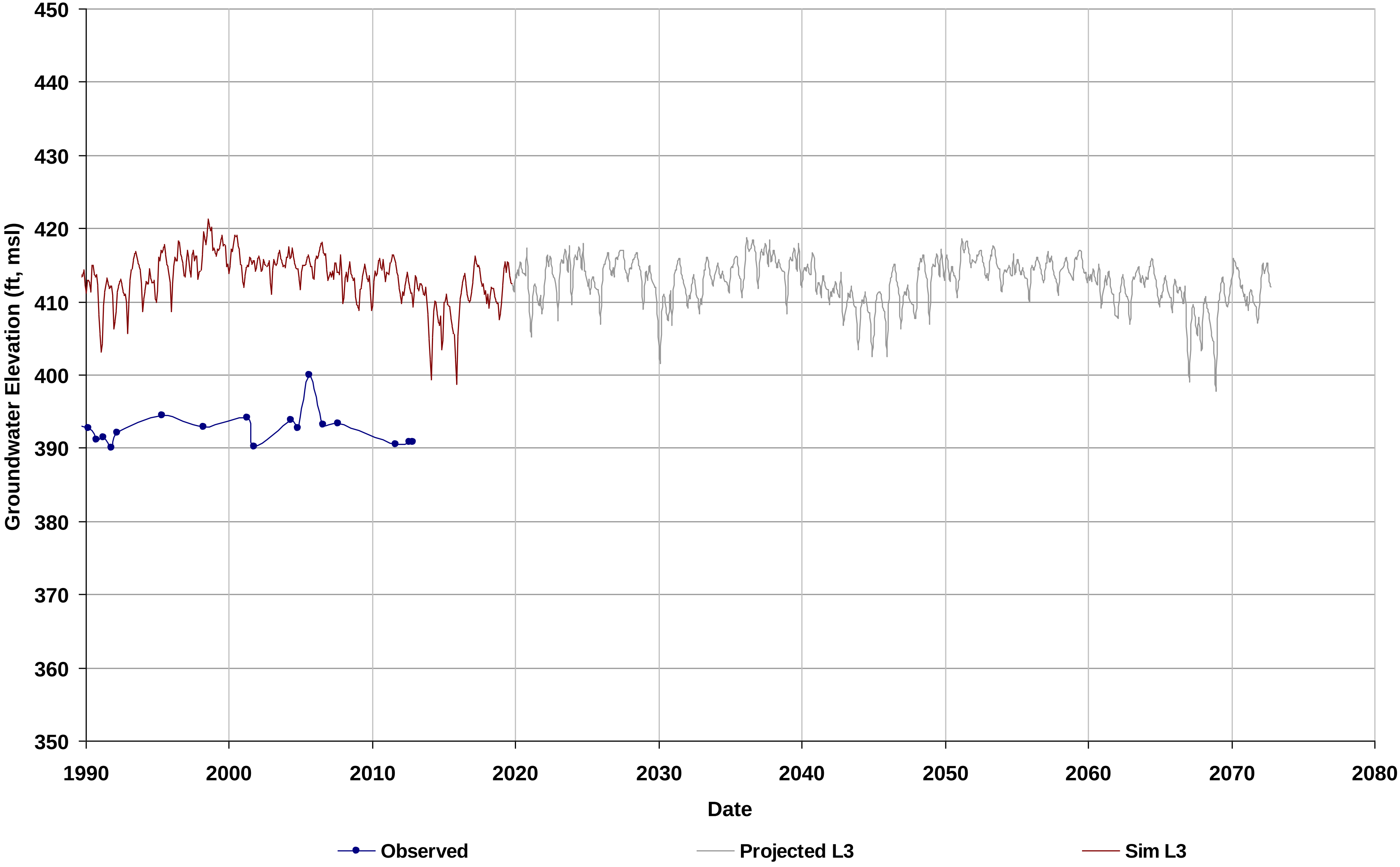
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

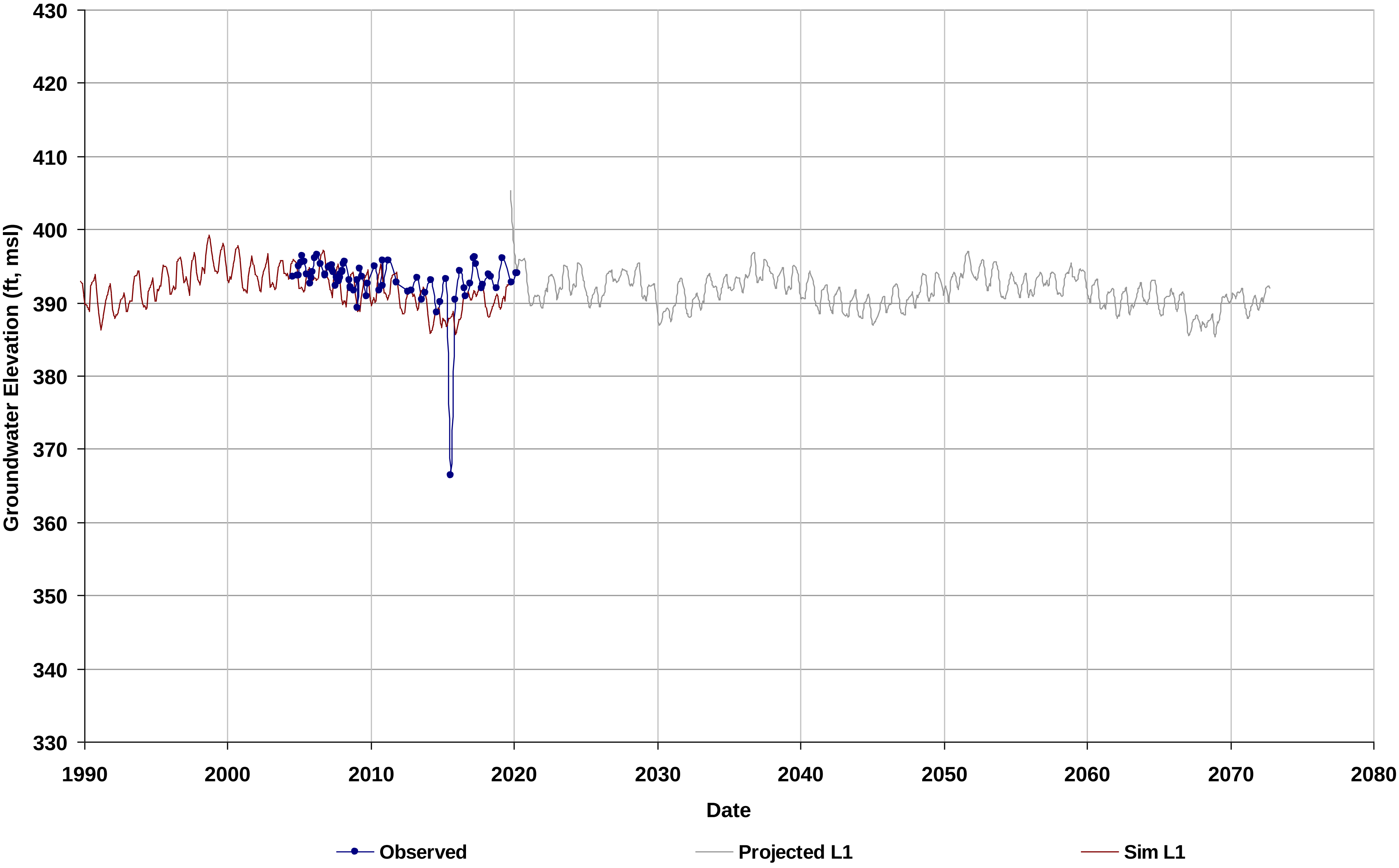
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

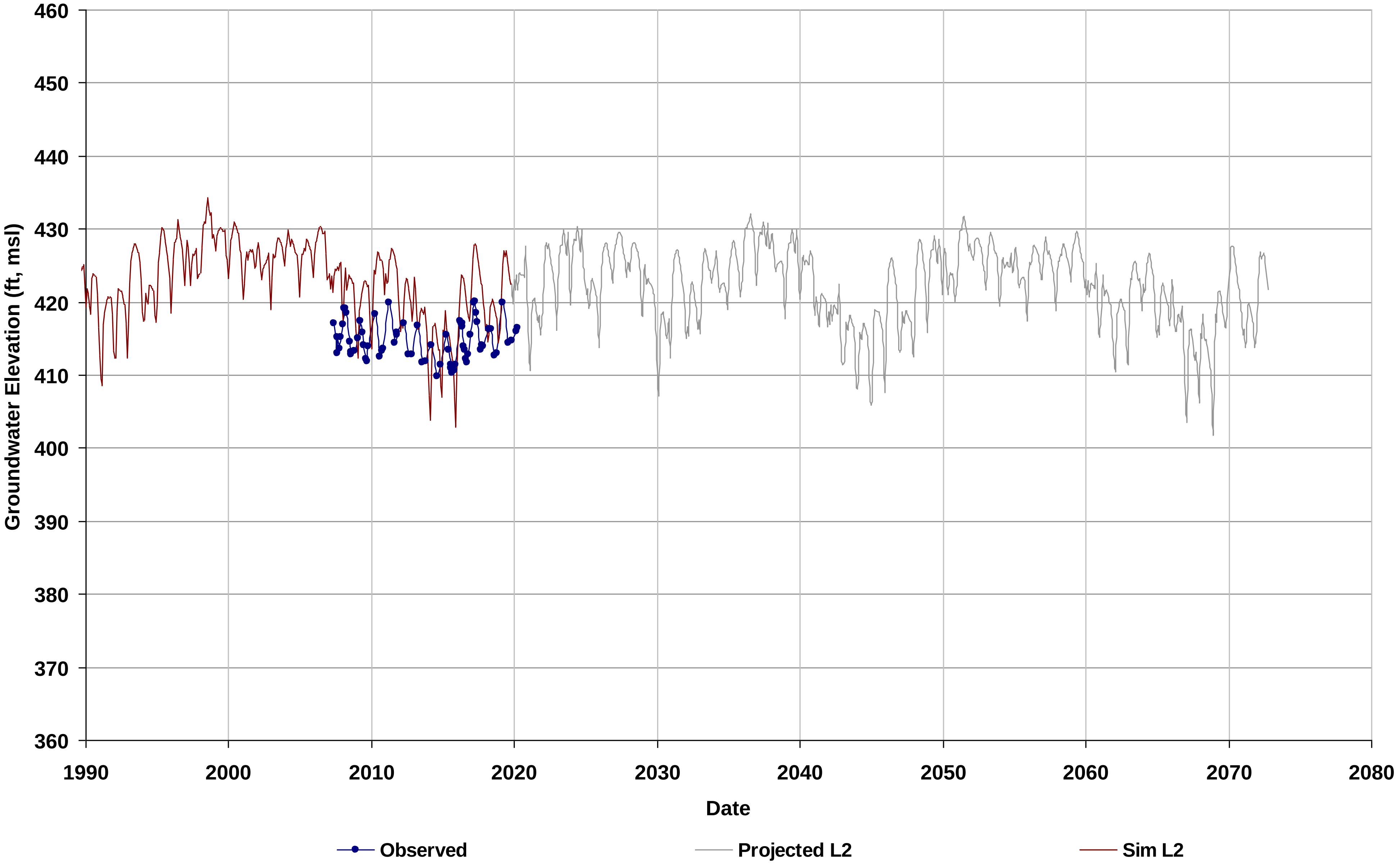
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

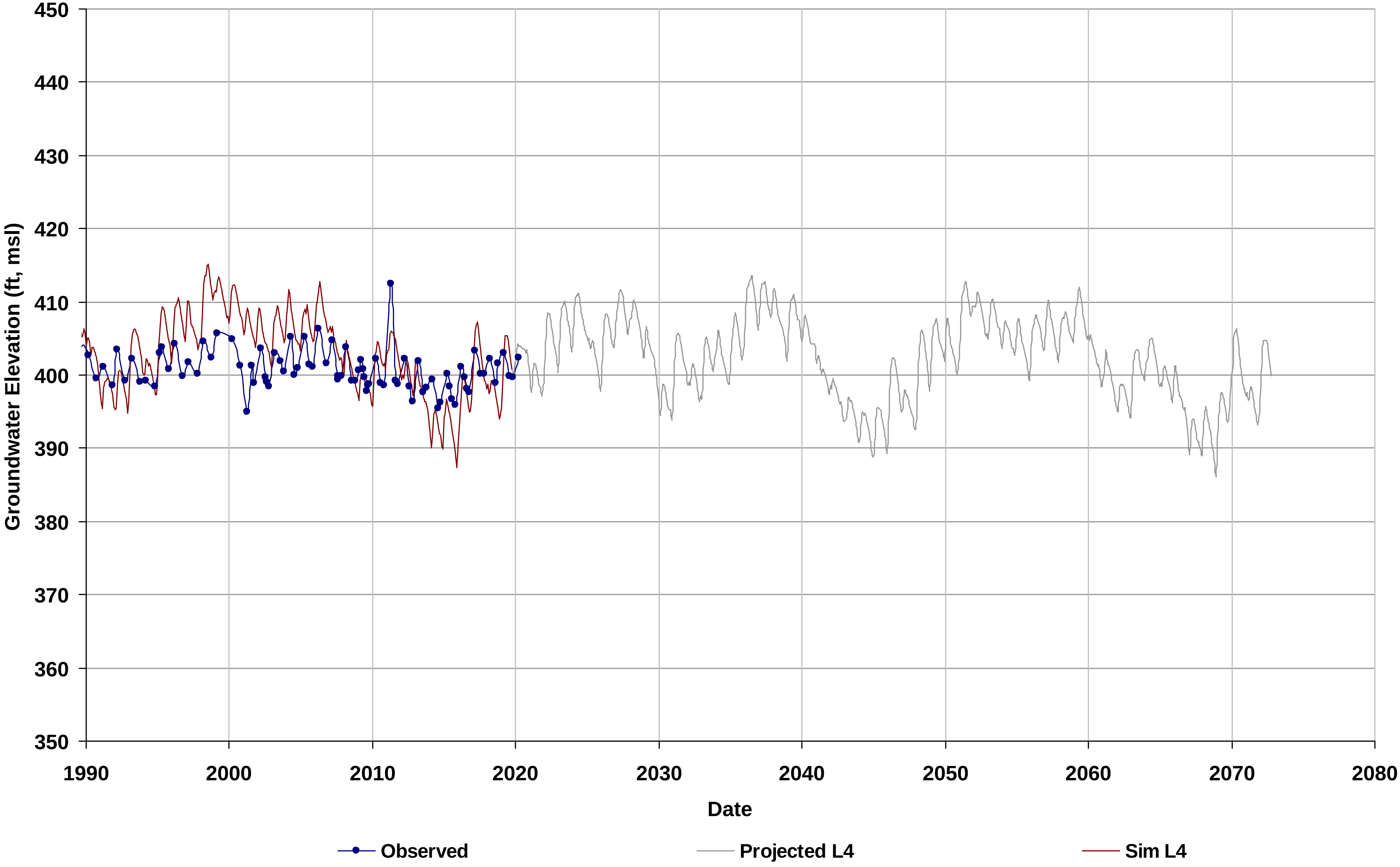
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

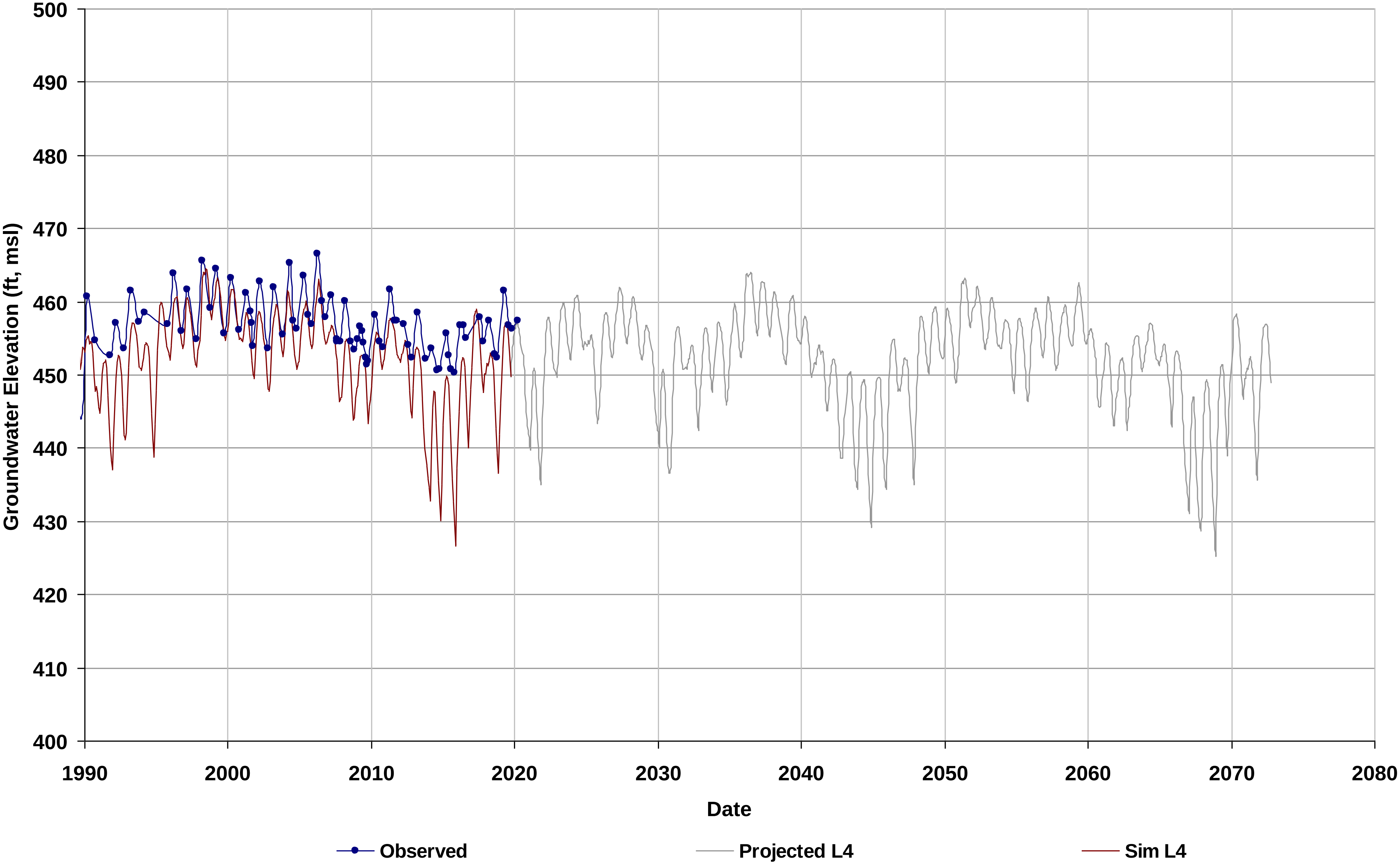
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

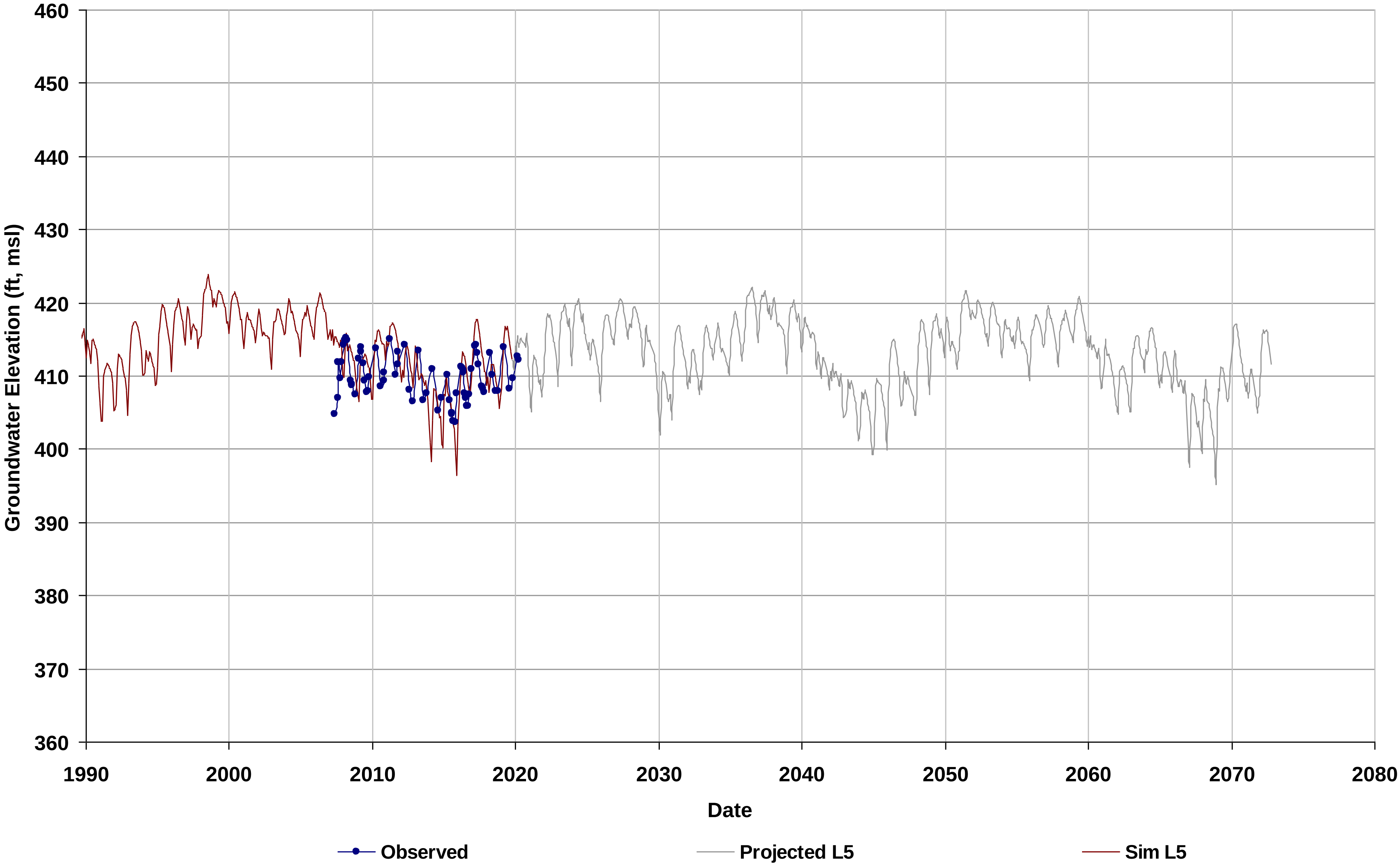
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

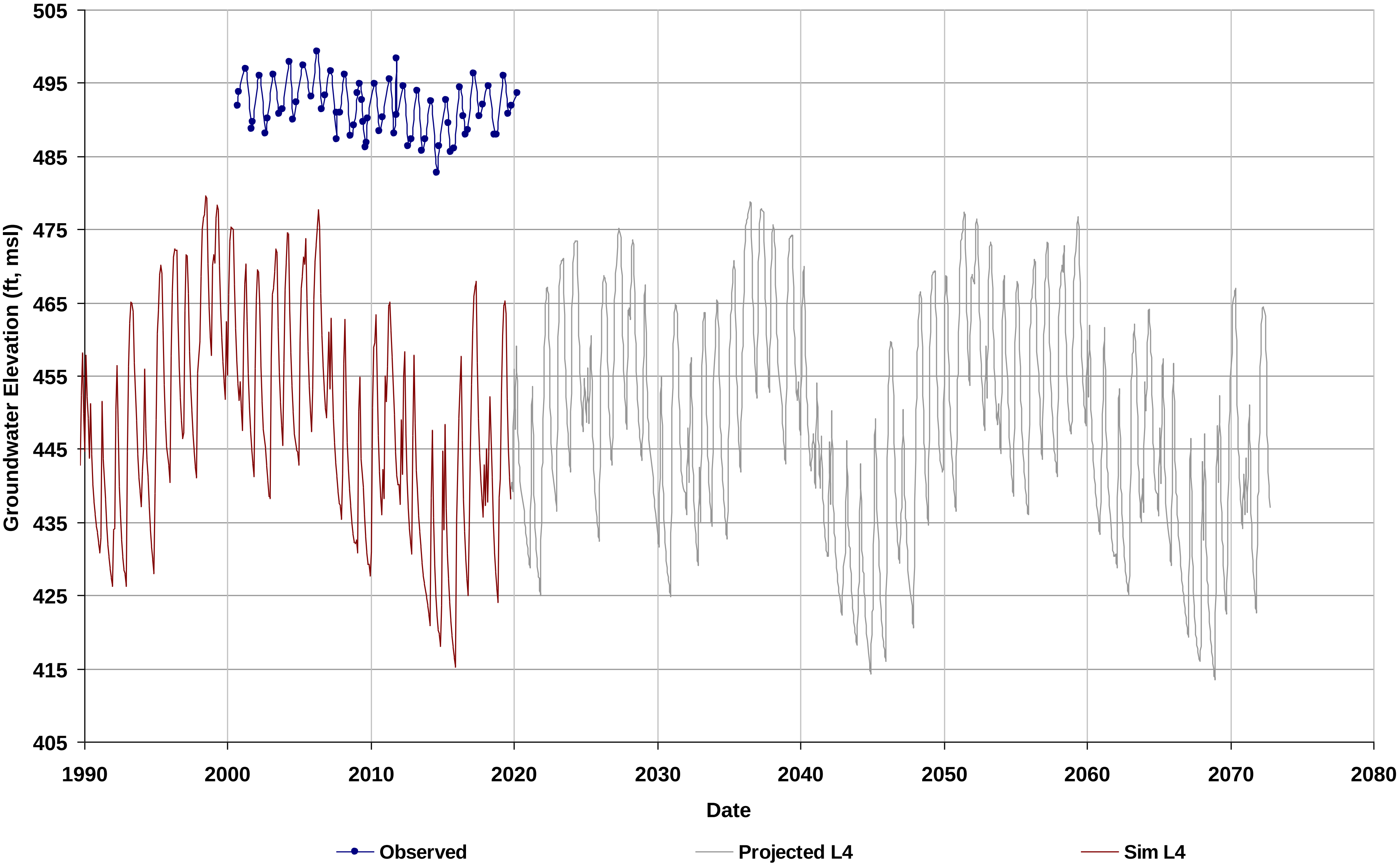
Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

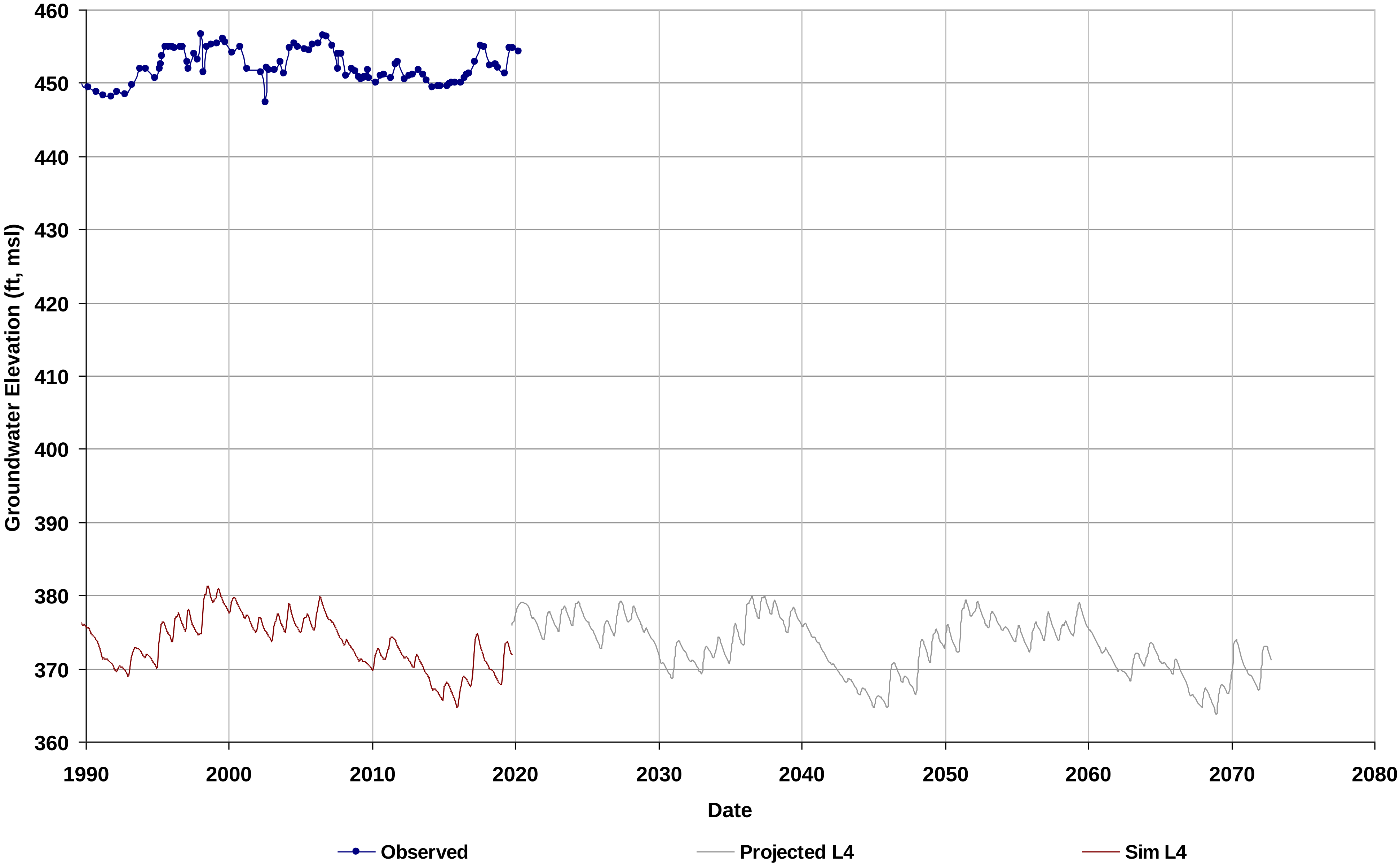
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

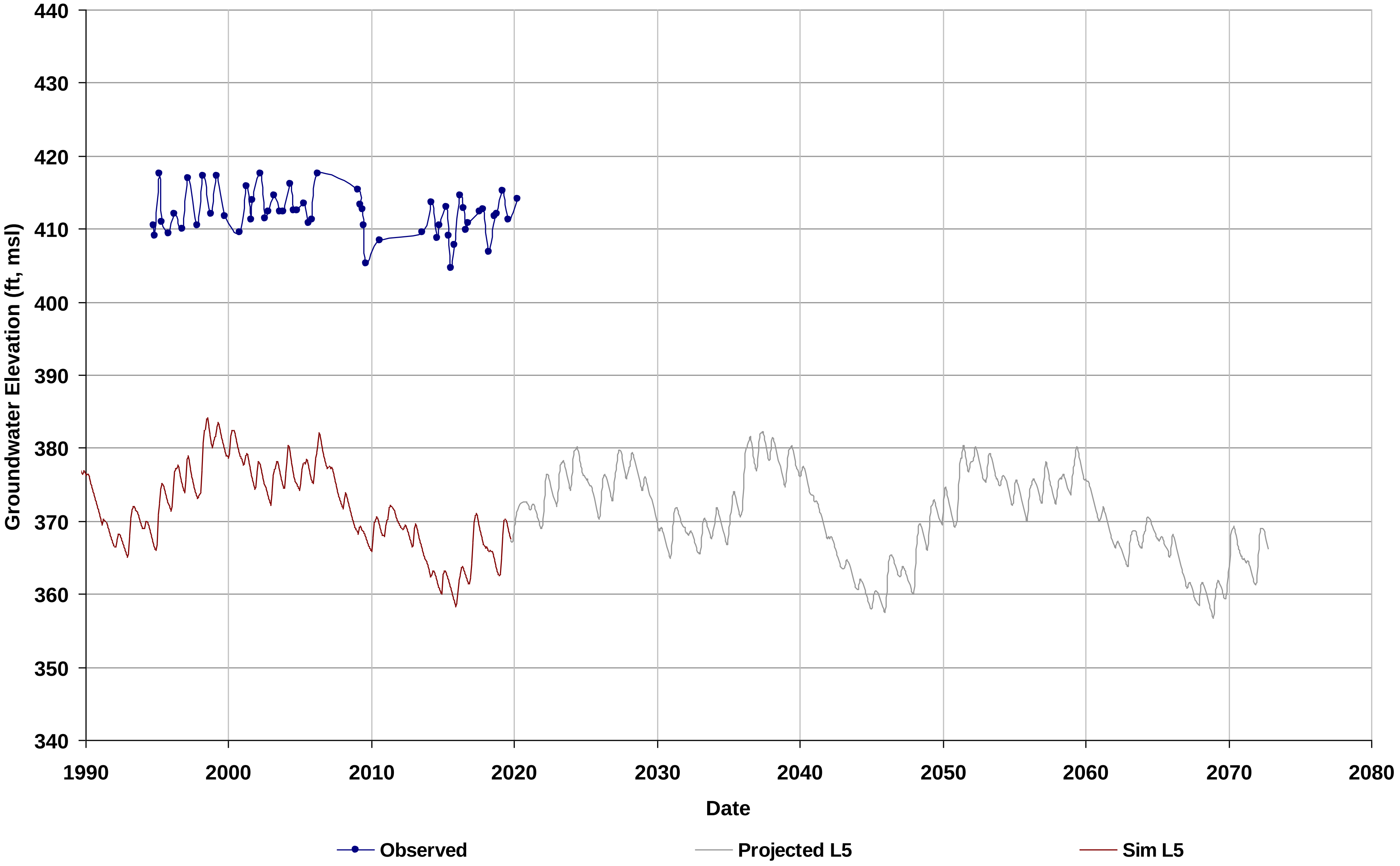
Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

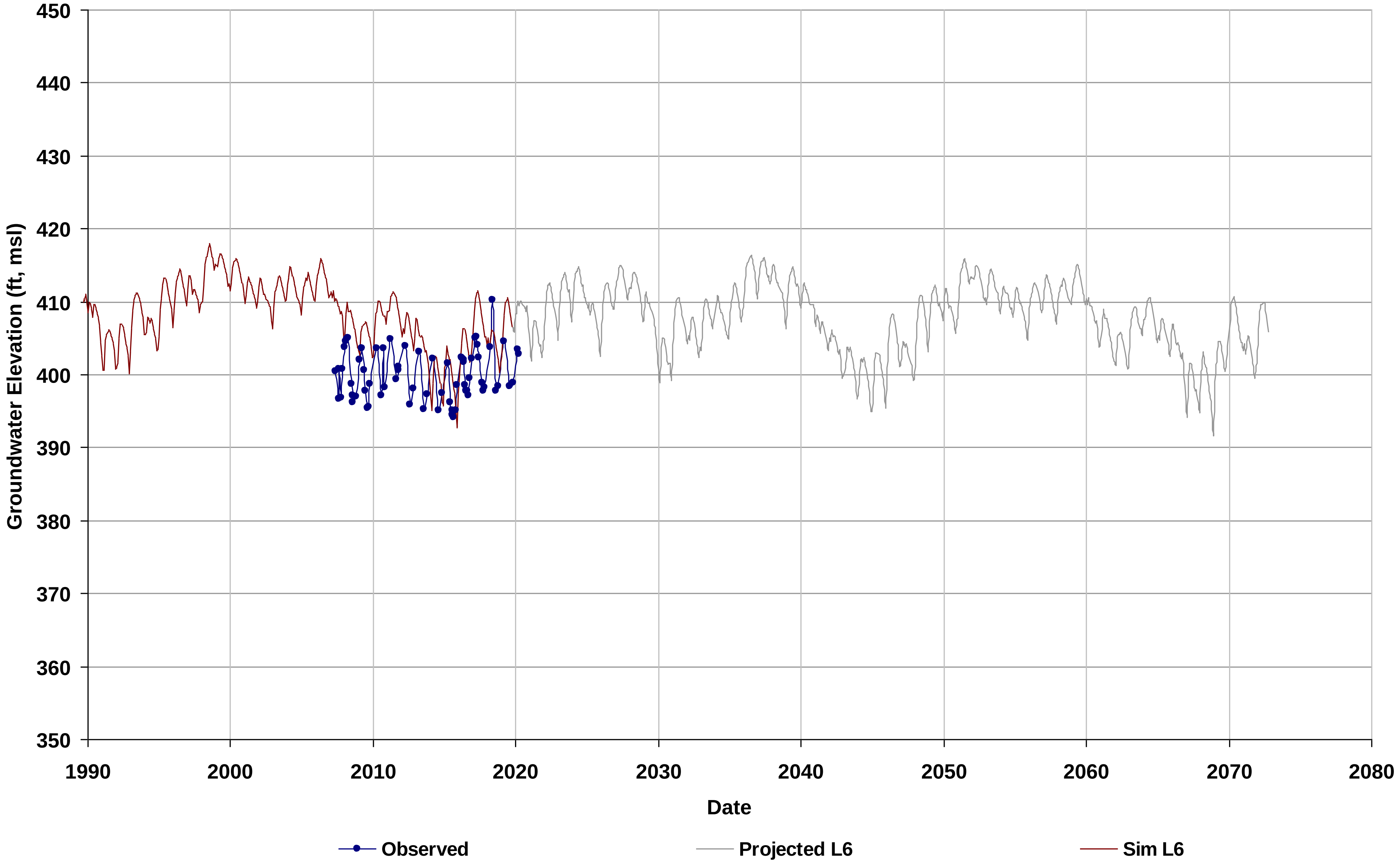
Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

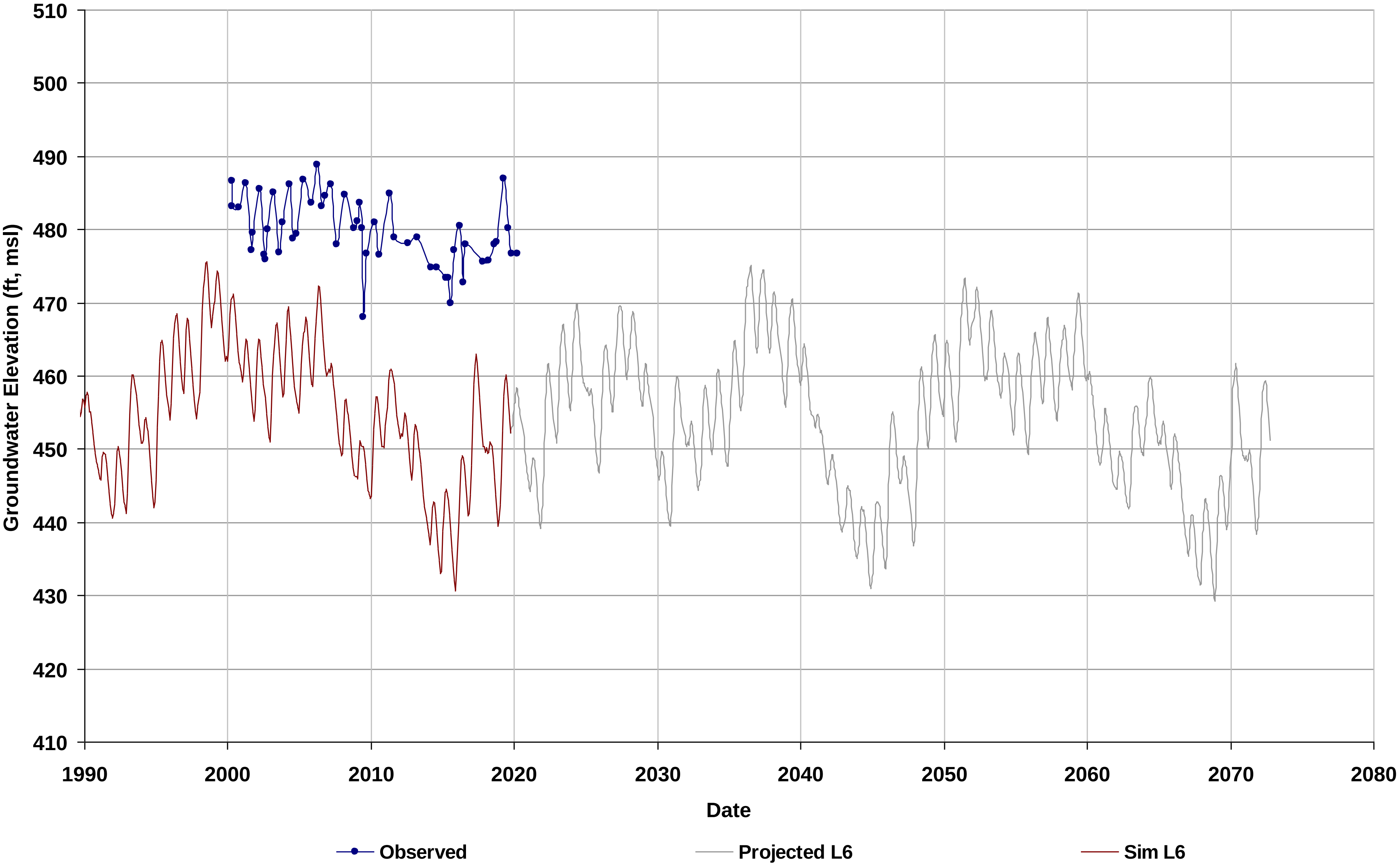
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

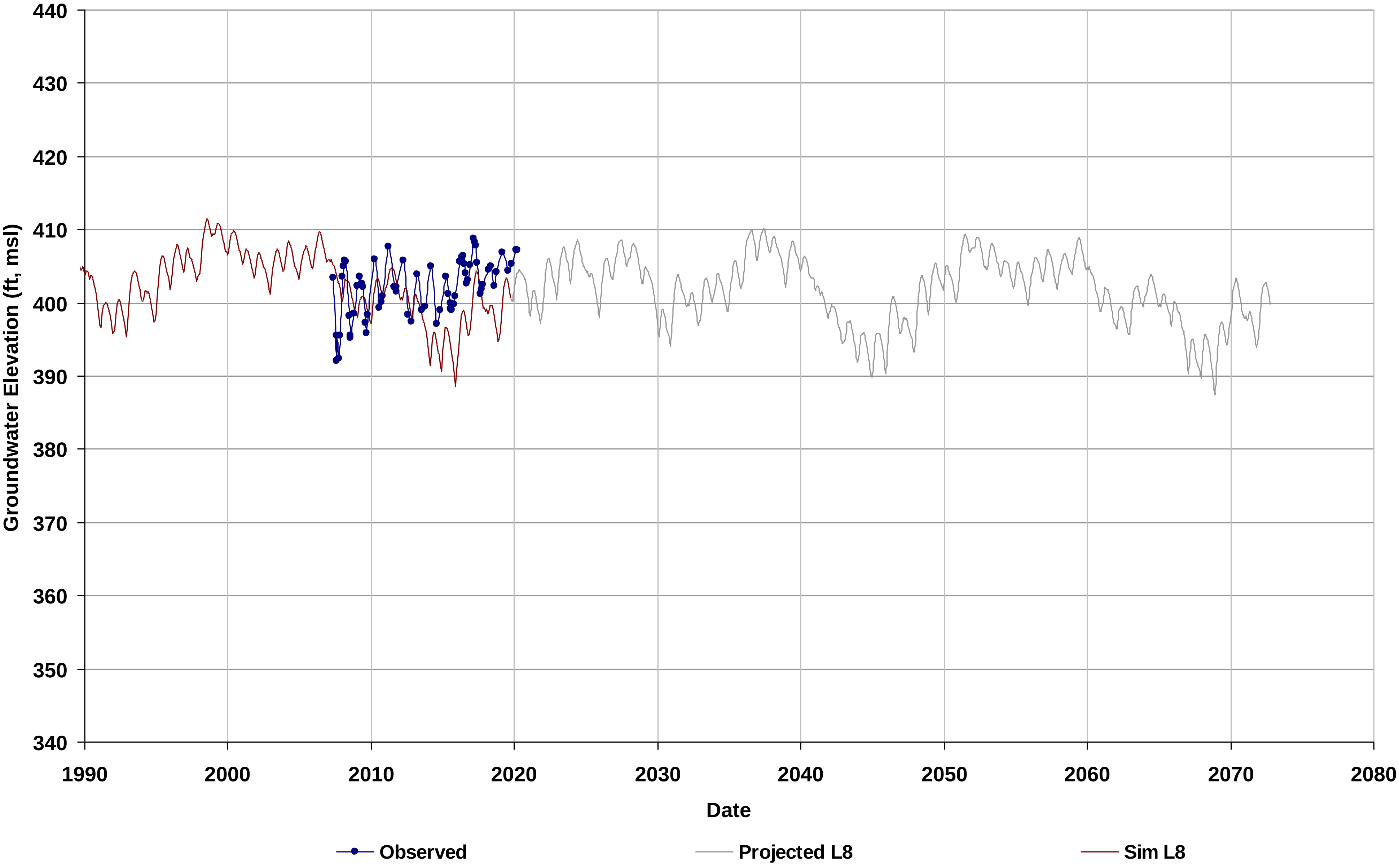
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

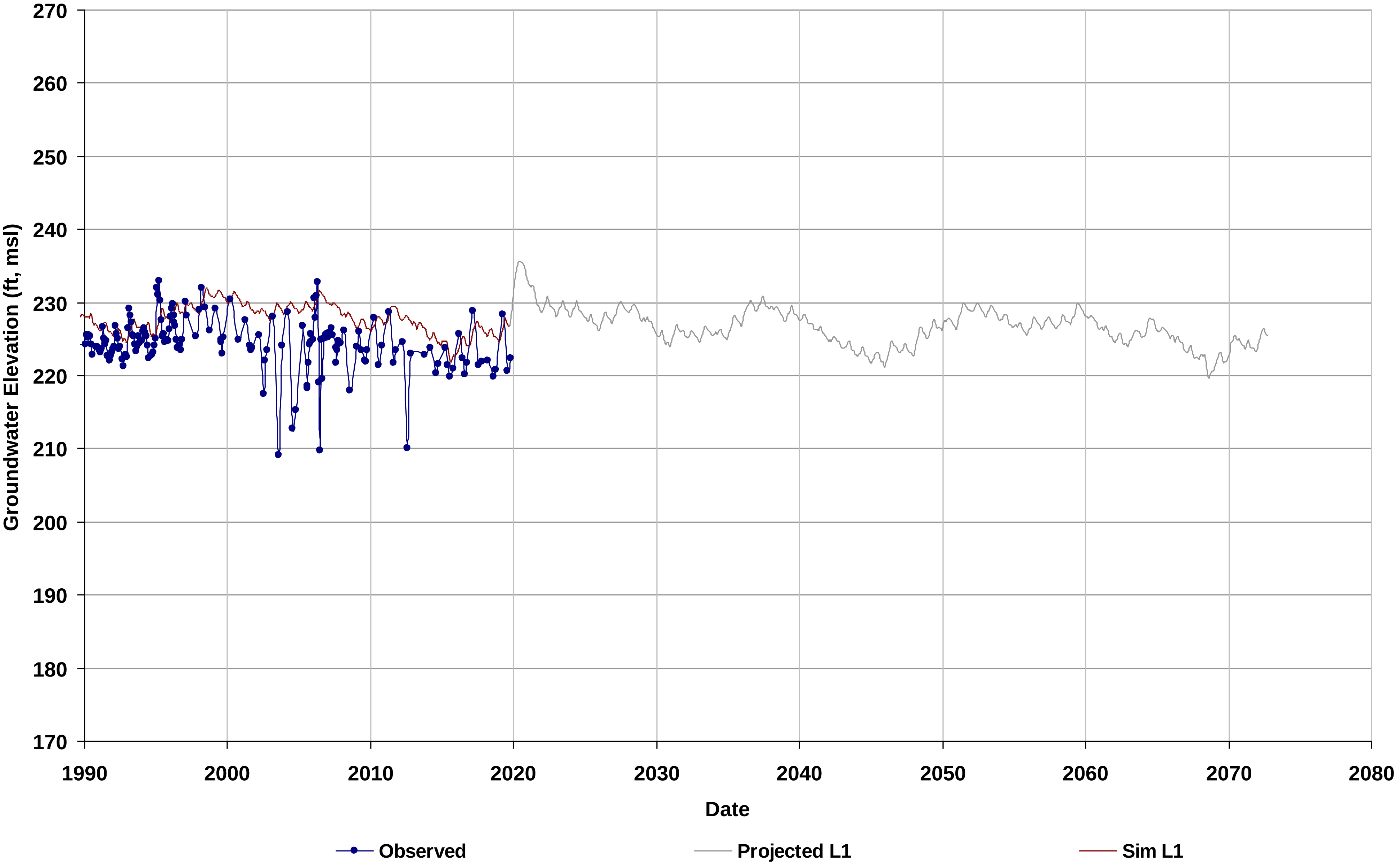
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use)

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

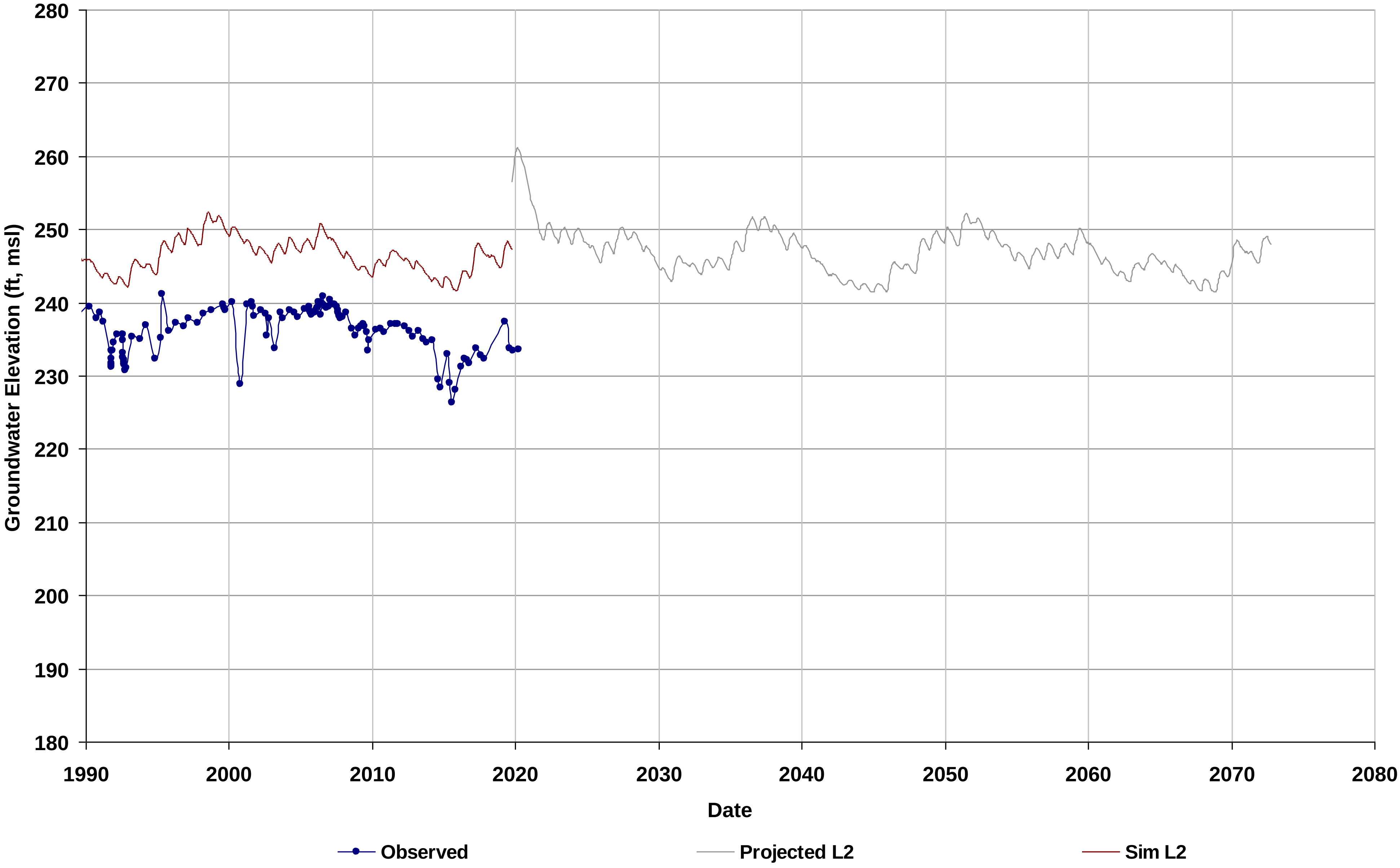
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use)

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

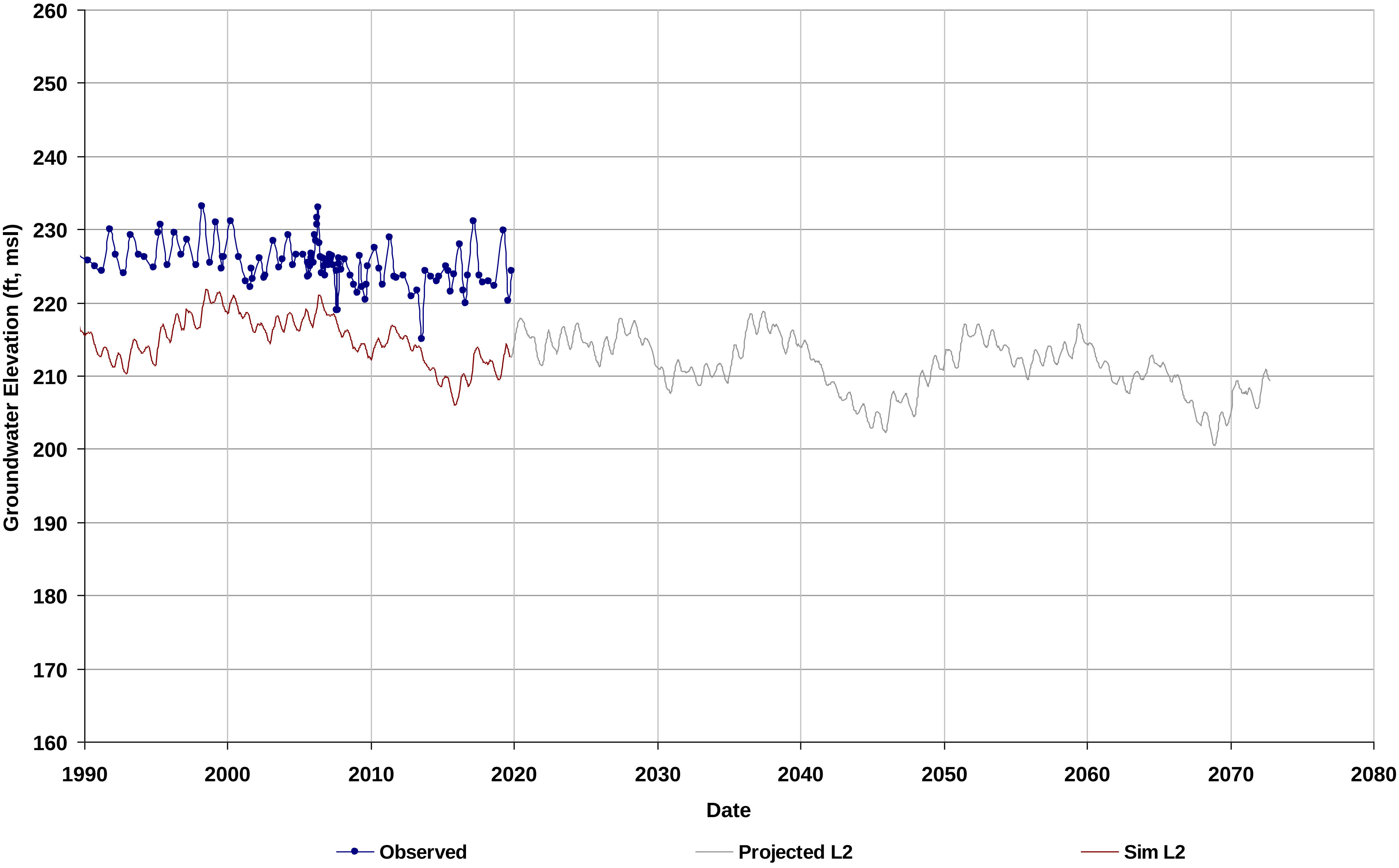
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

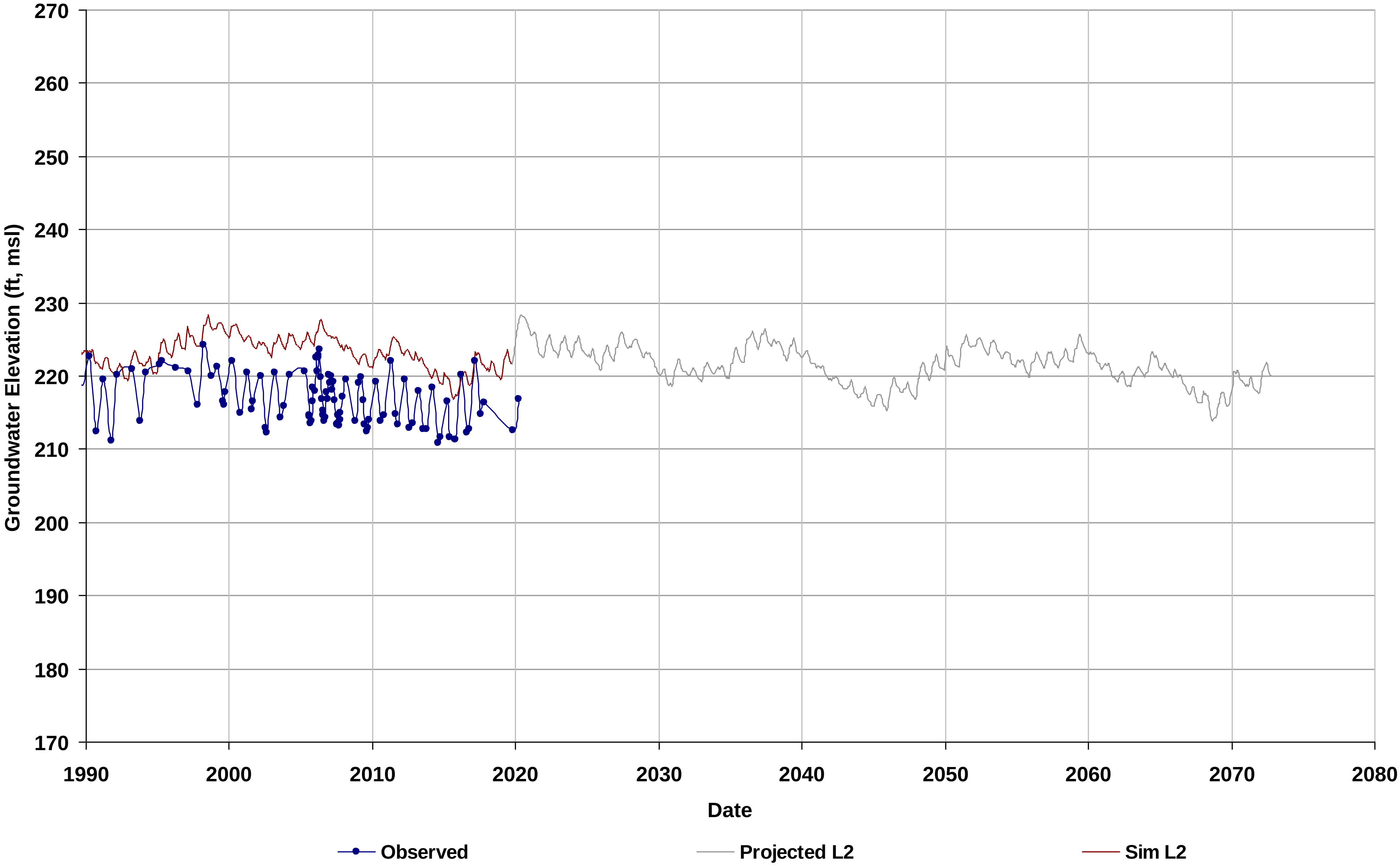
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

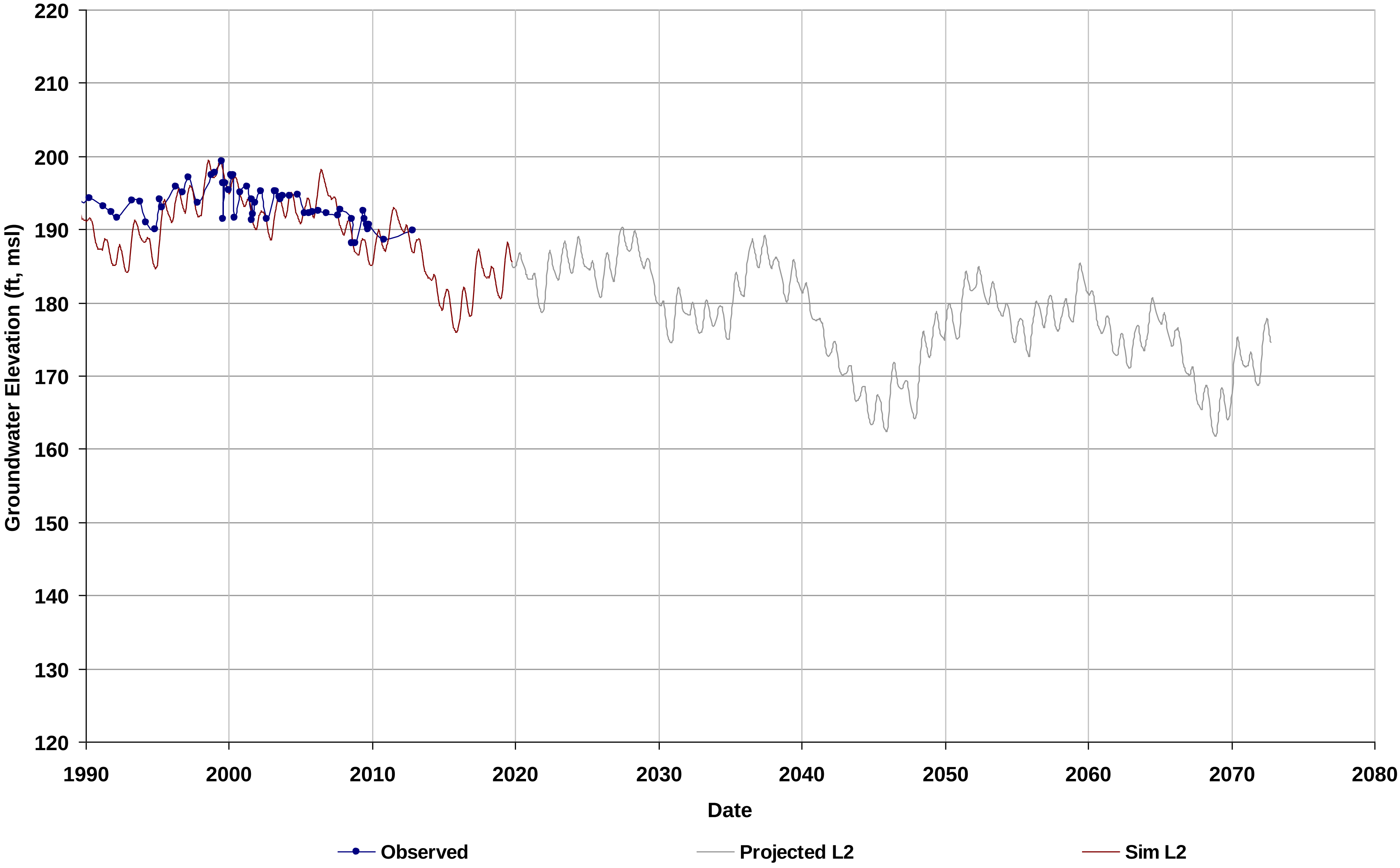
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

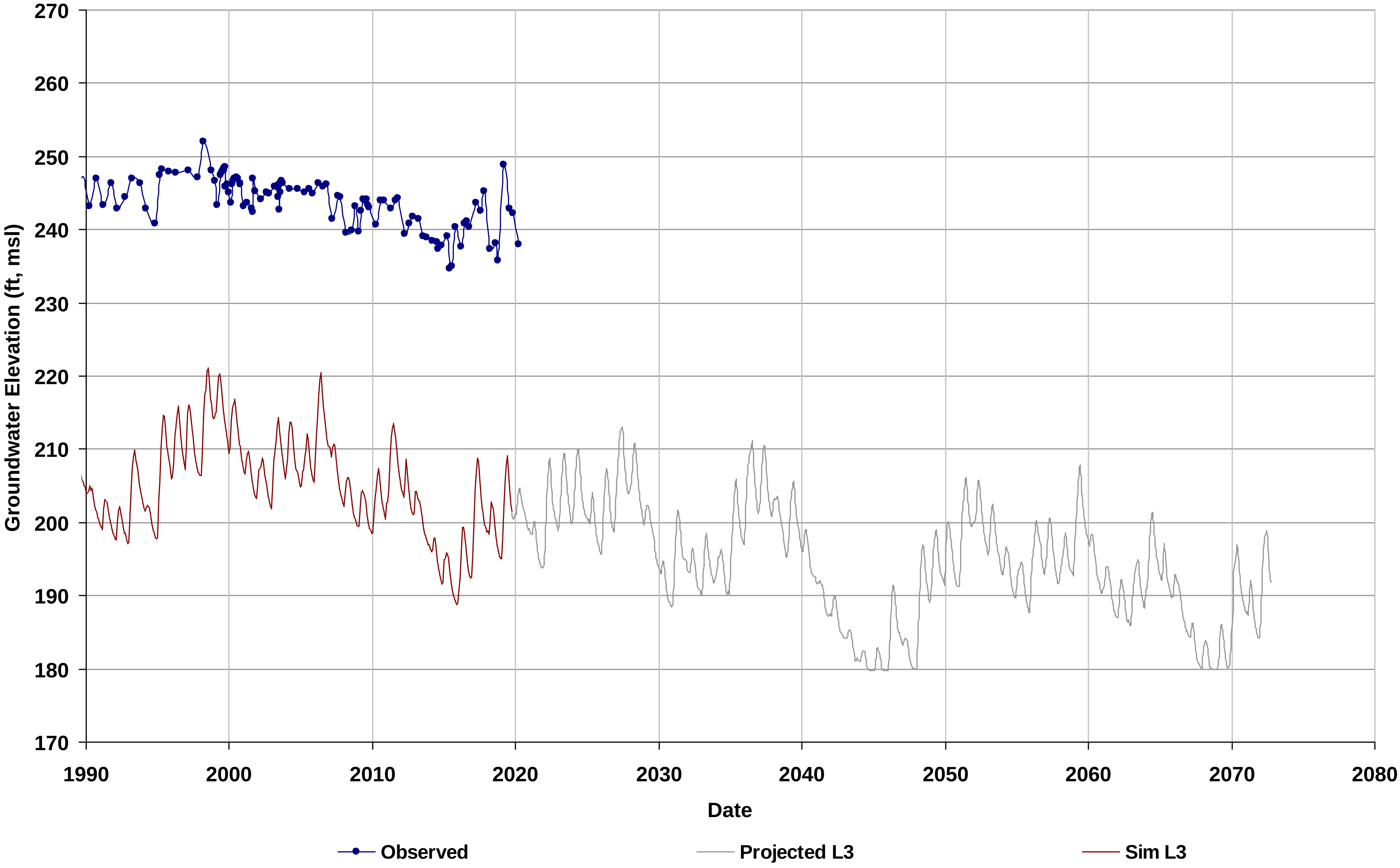
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

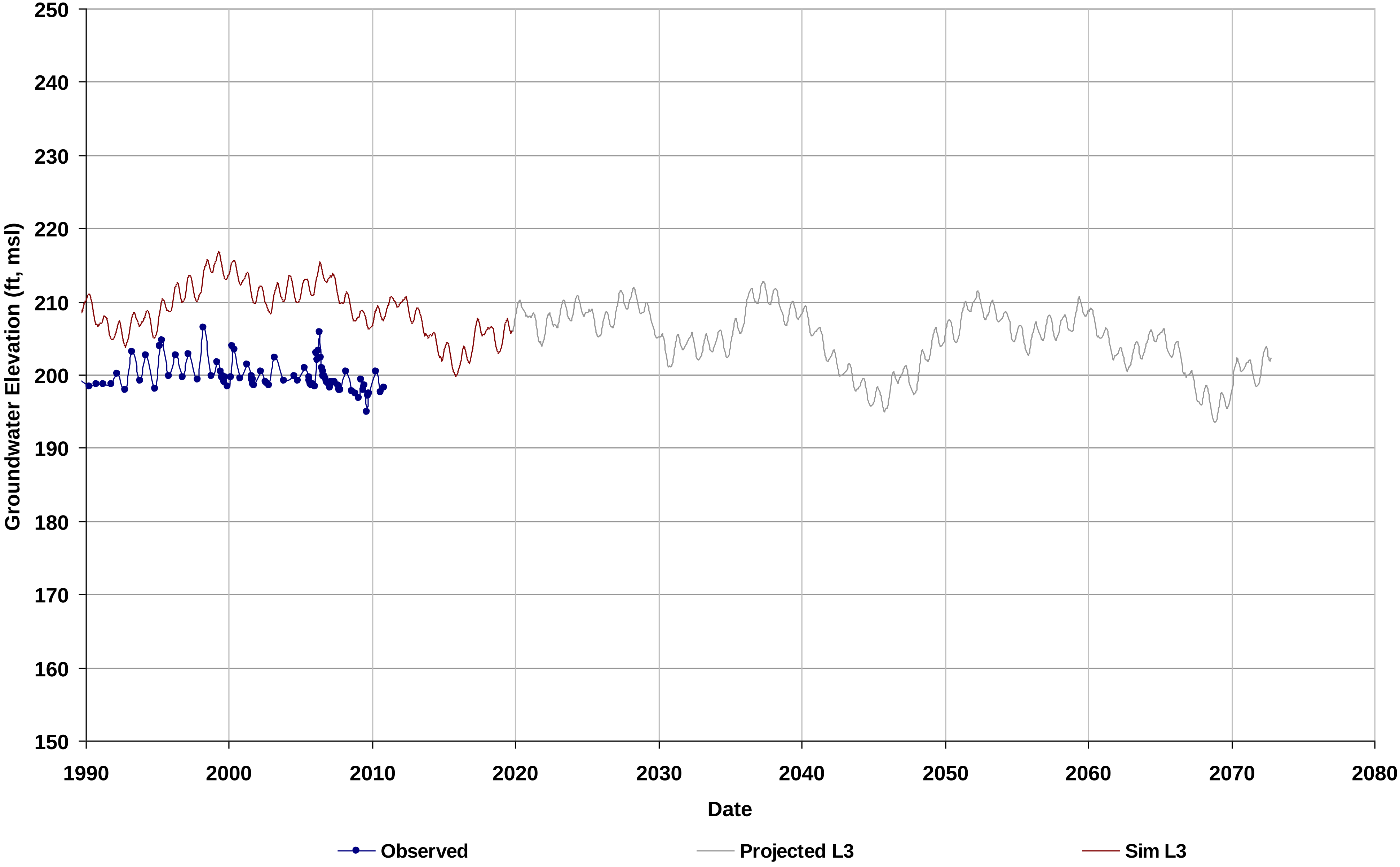
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

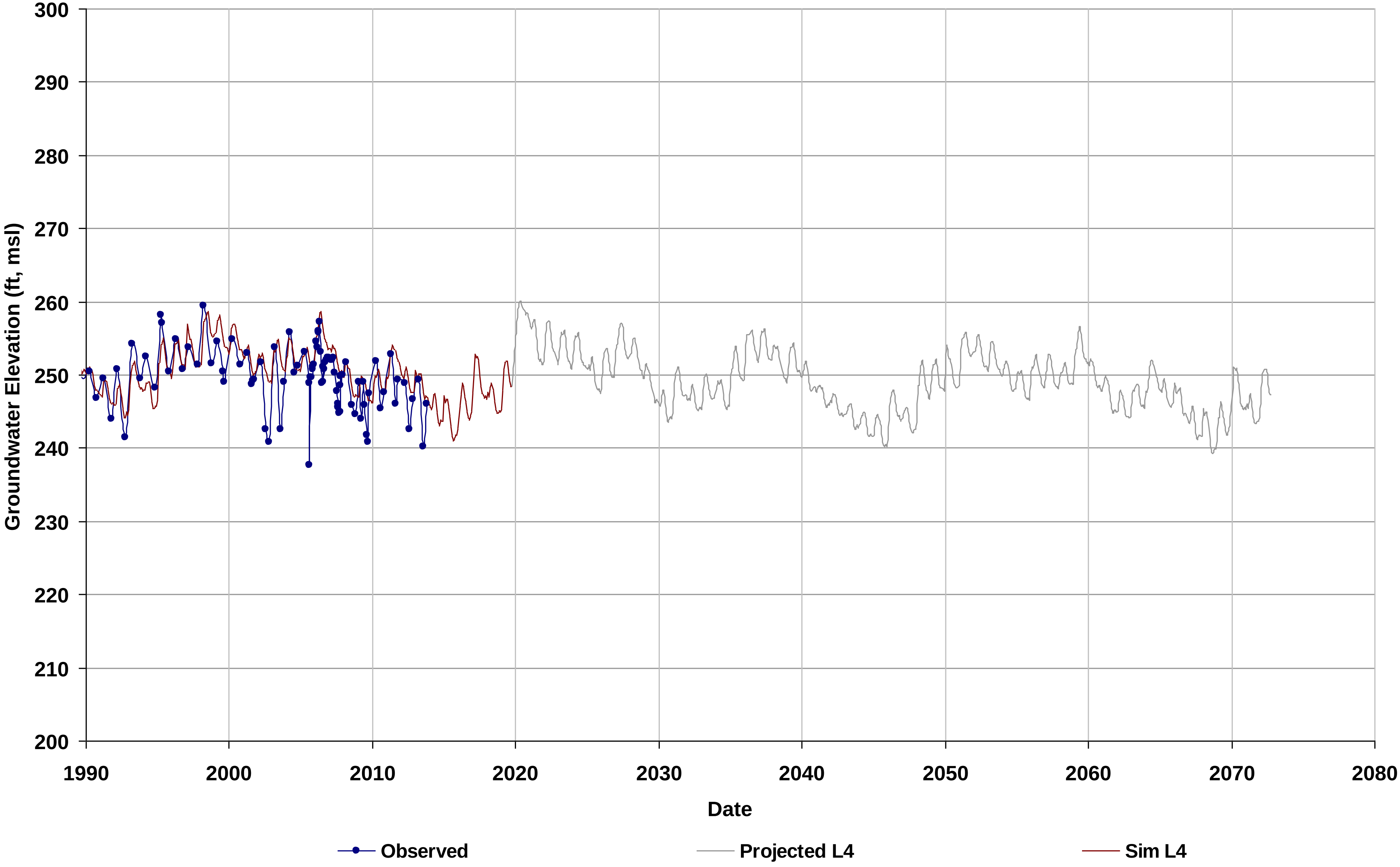
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

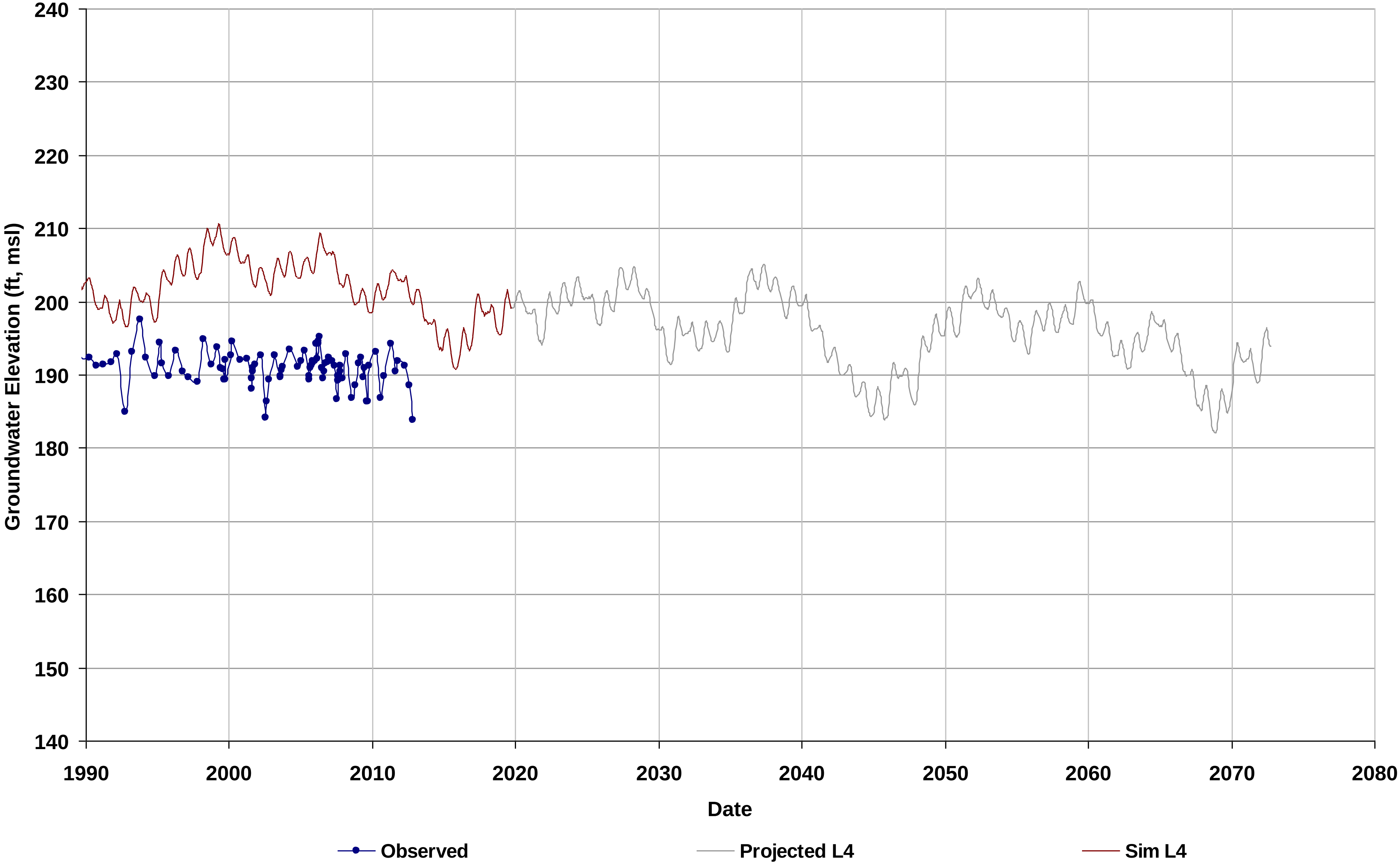
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

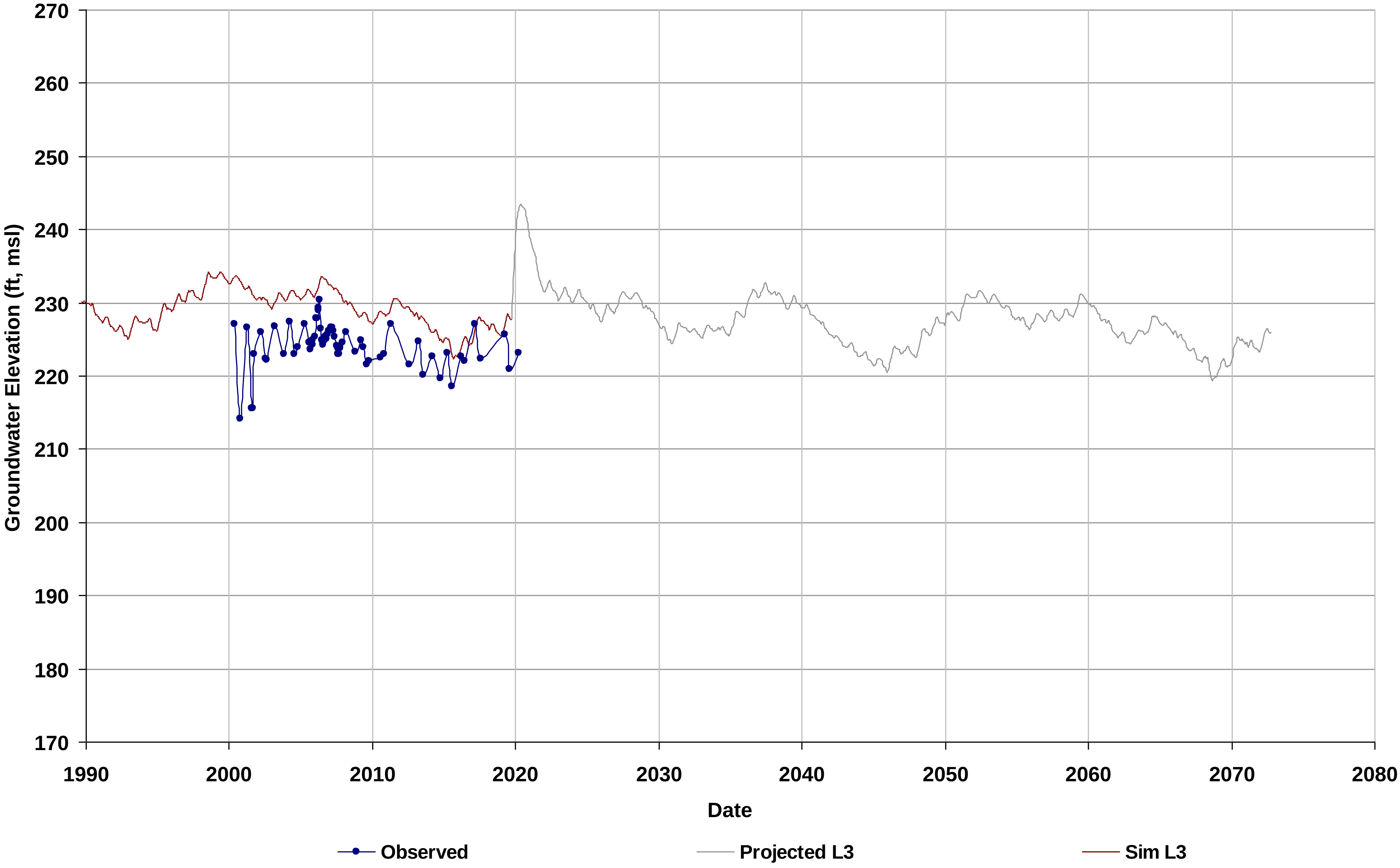
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

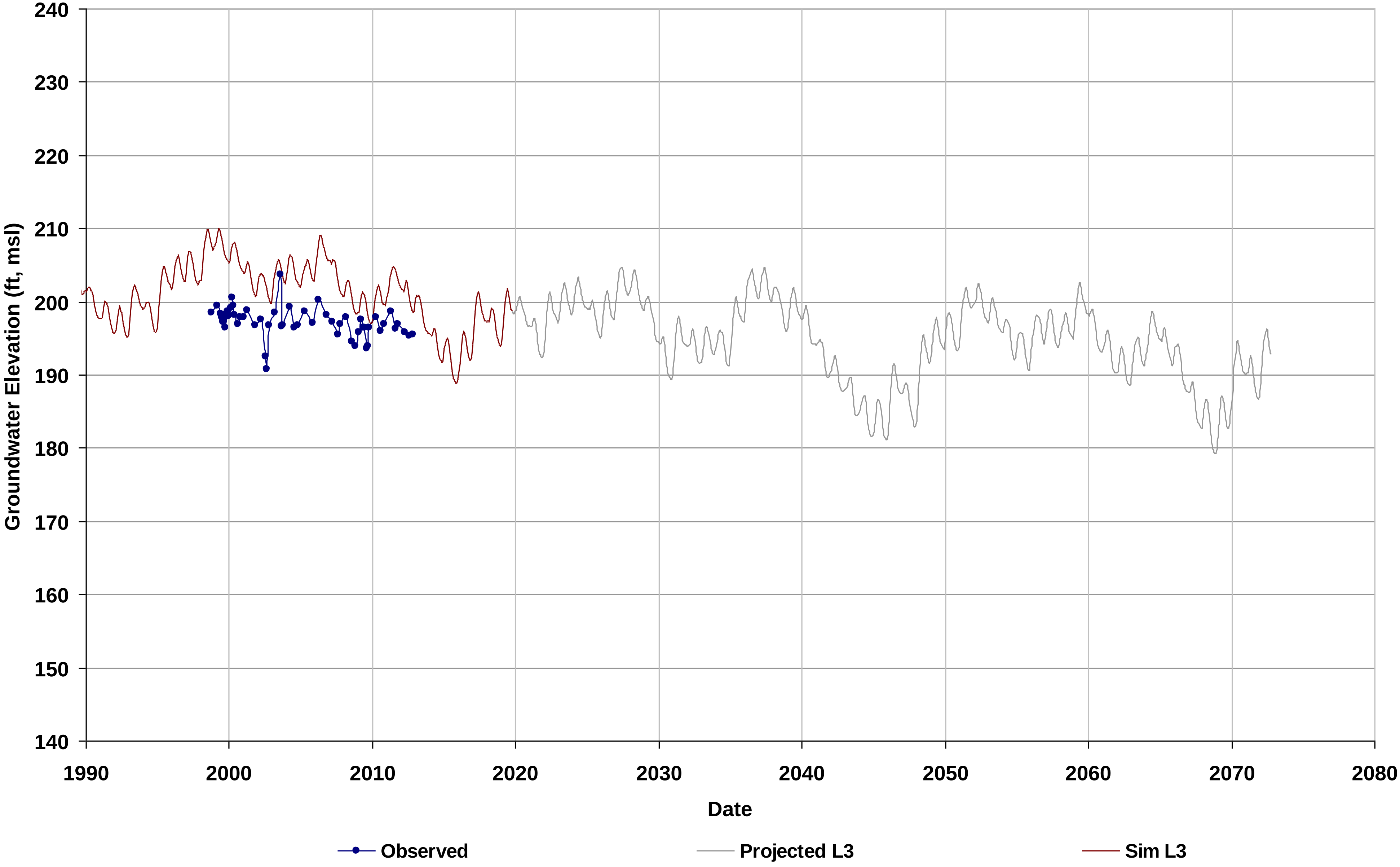
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

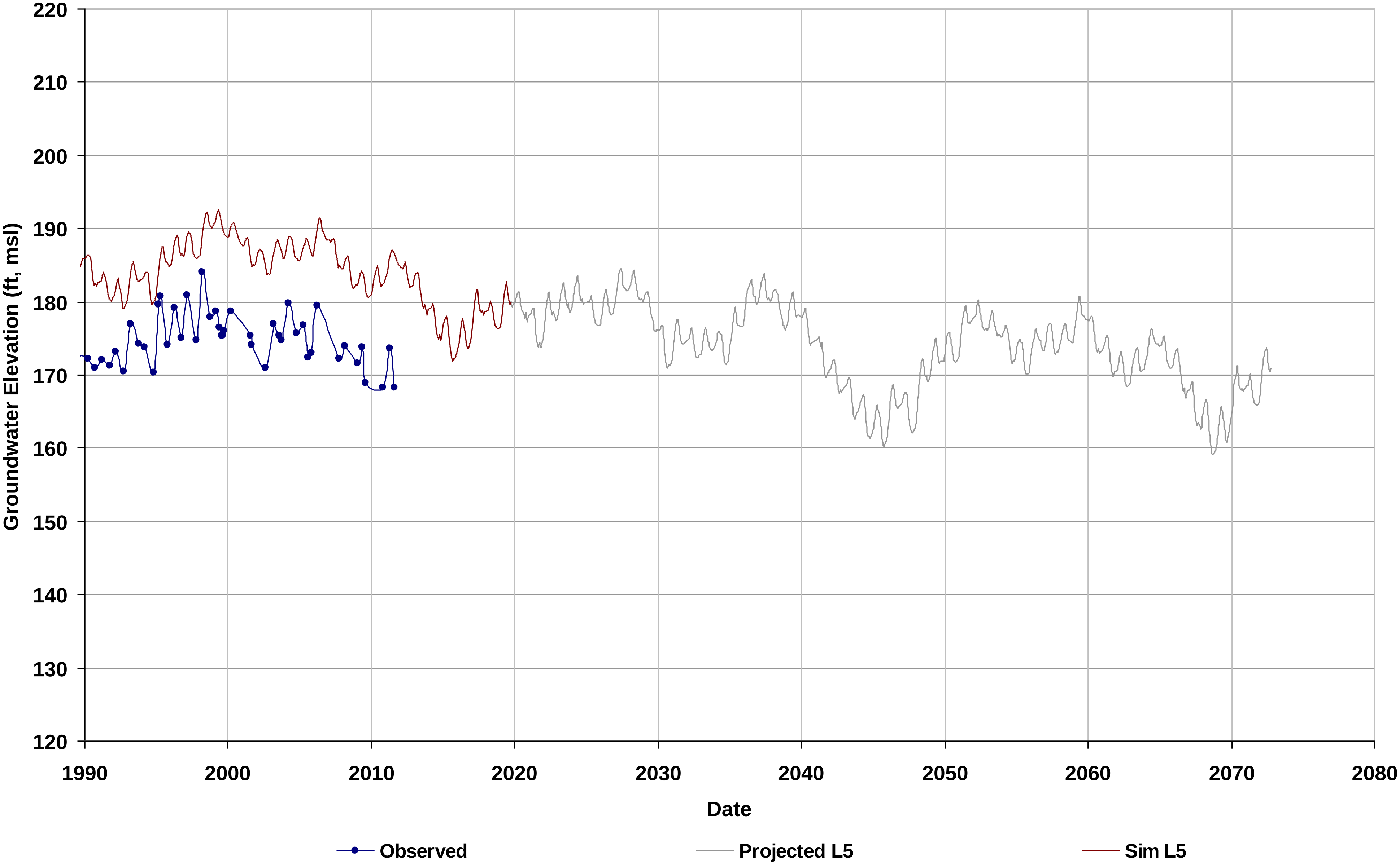
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

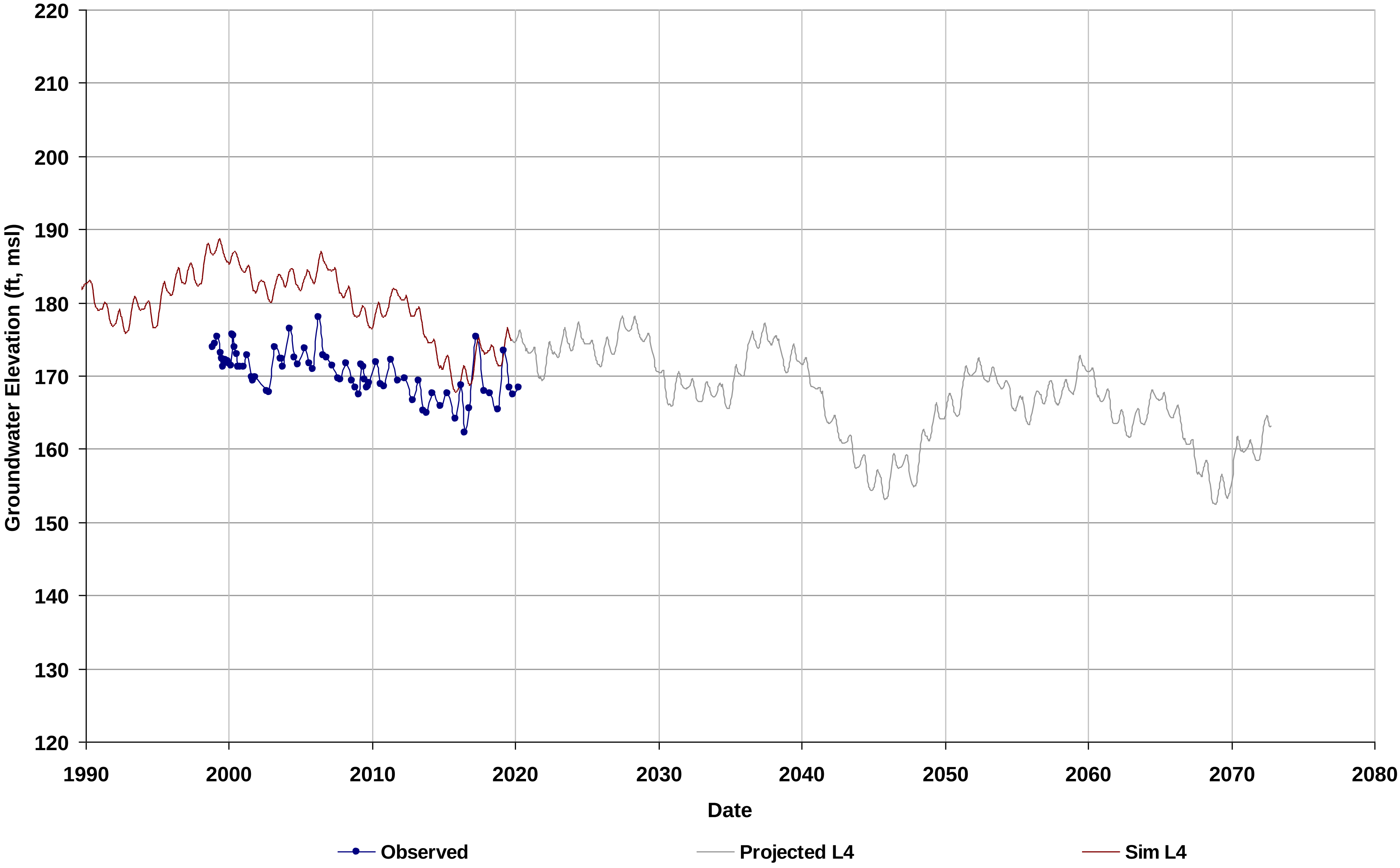
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

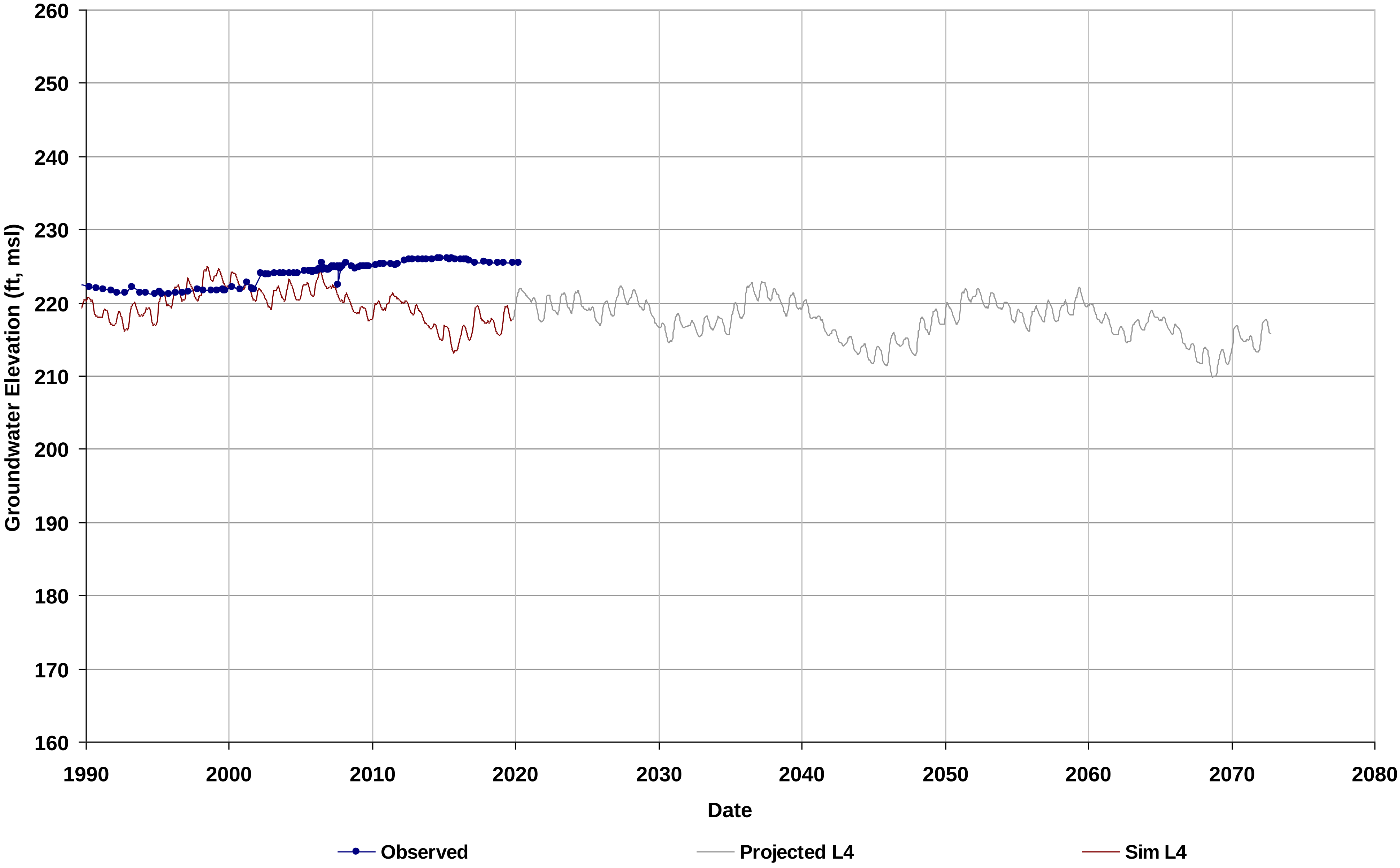
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

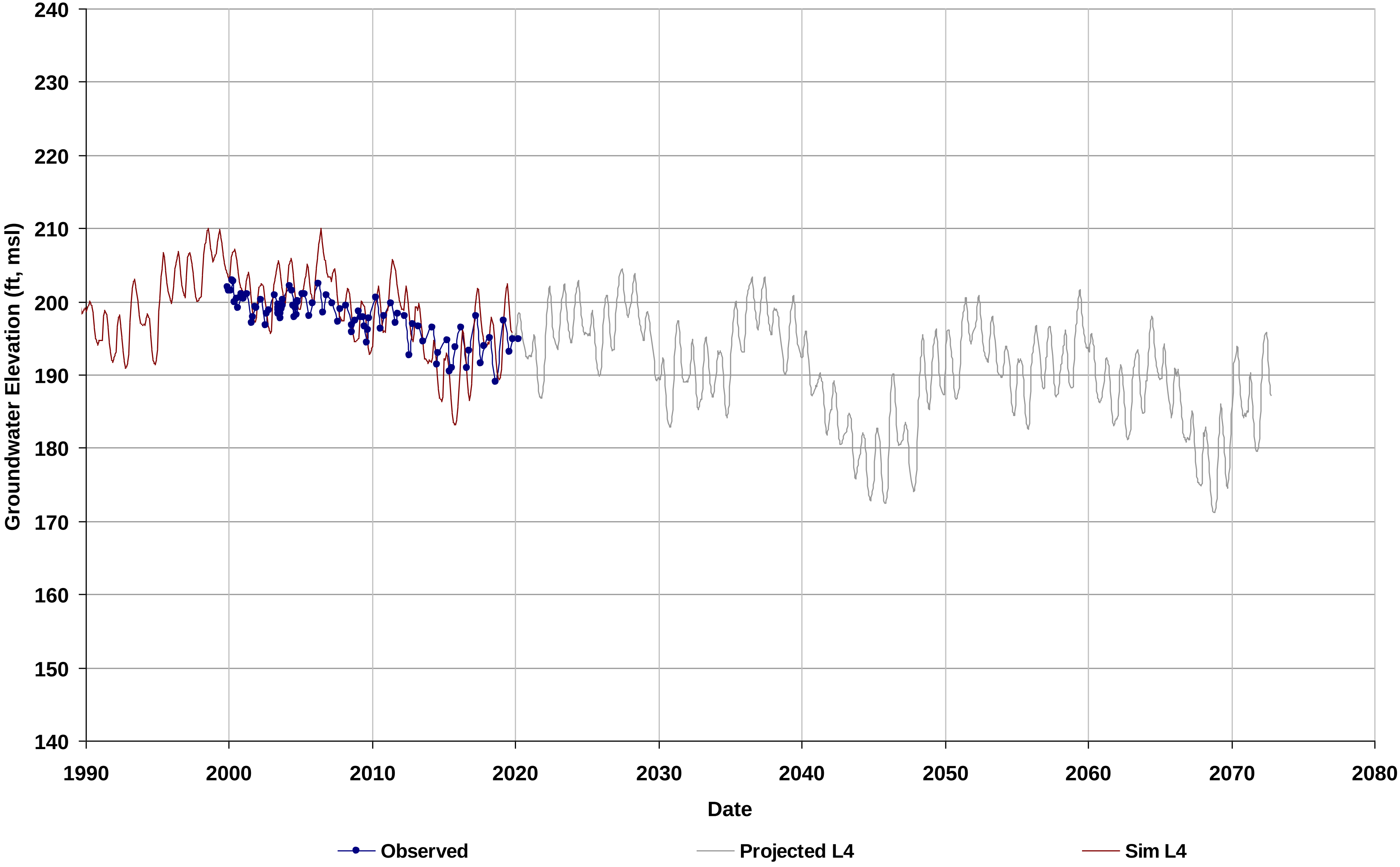
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

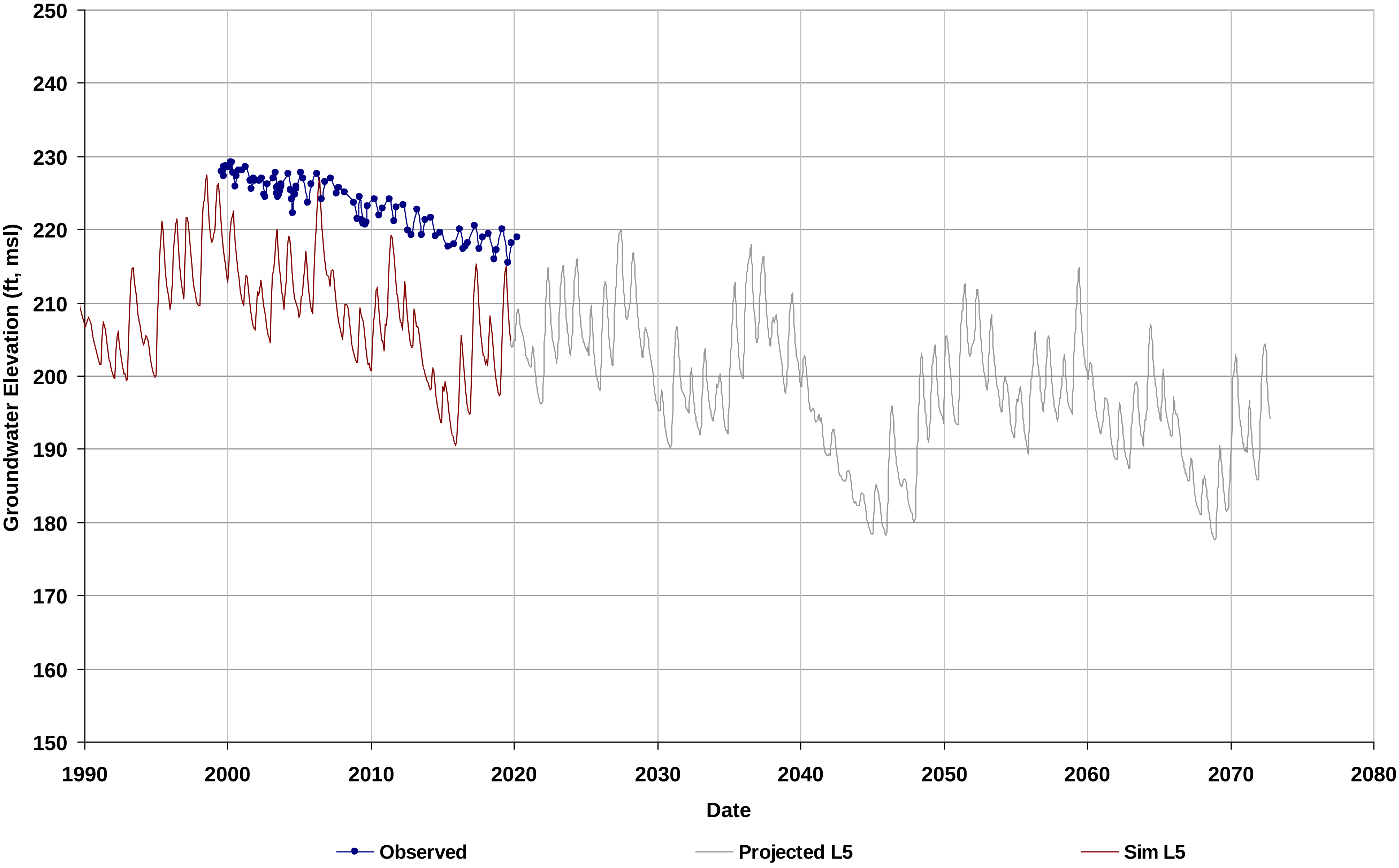
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

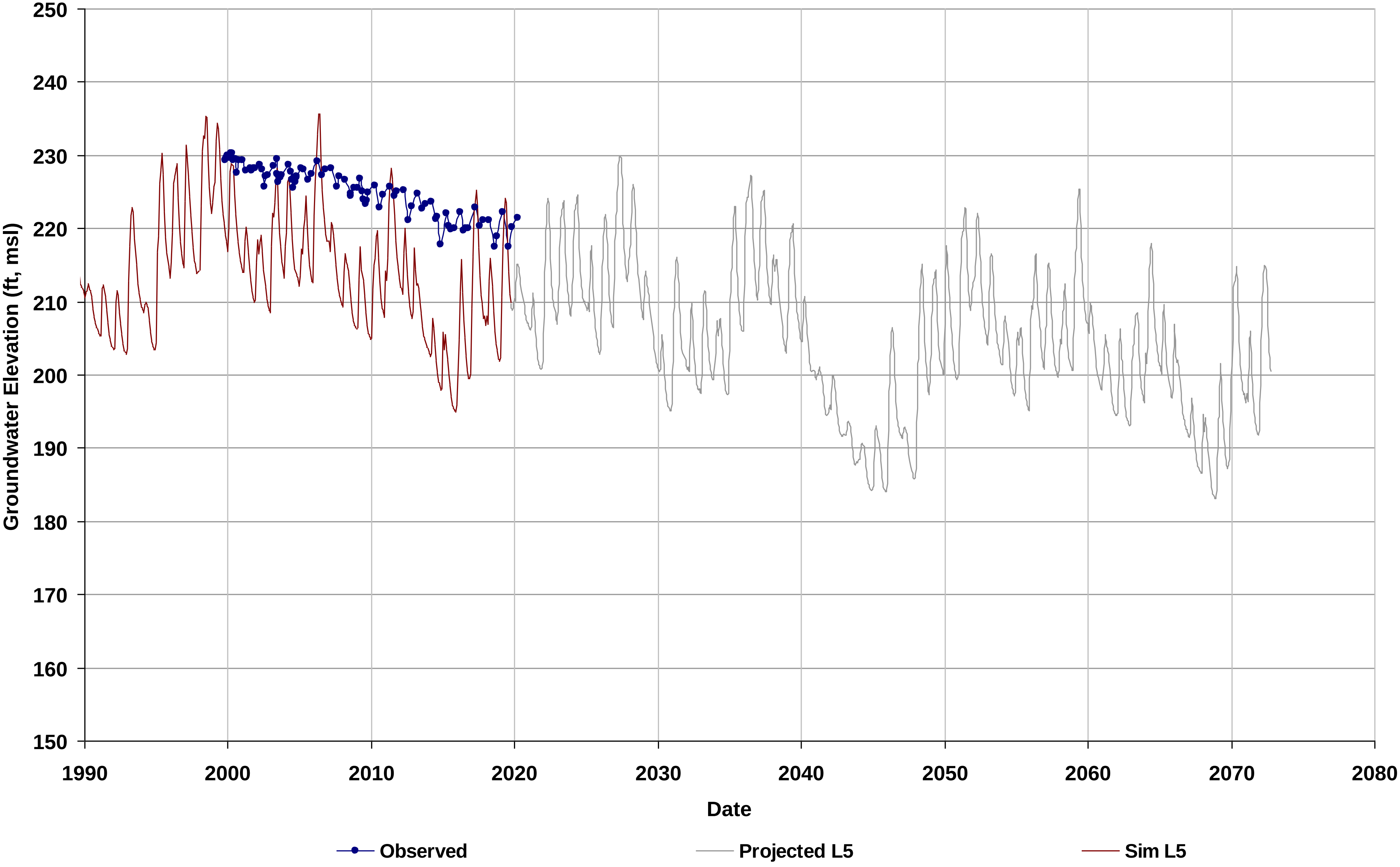
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

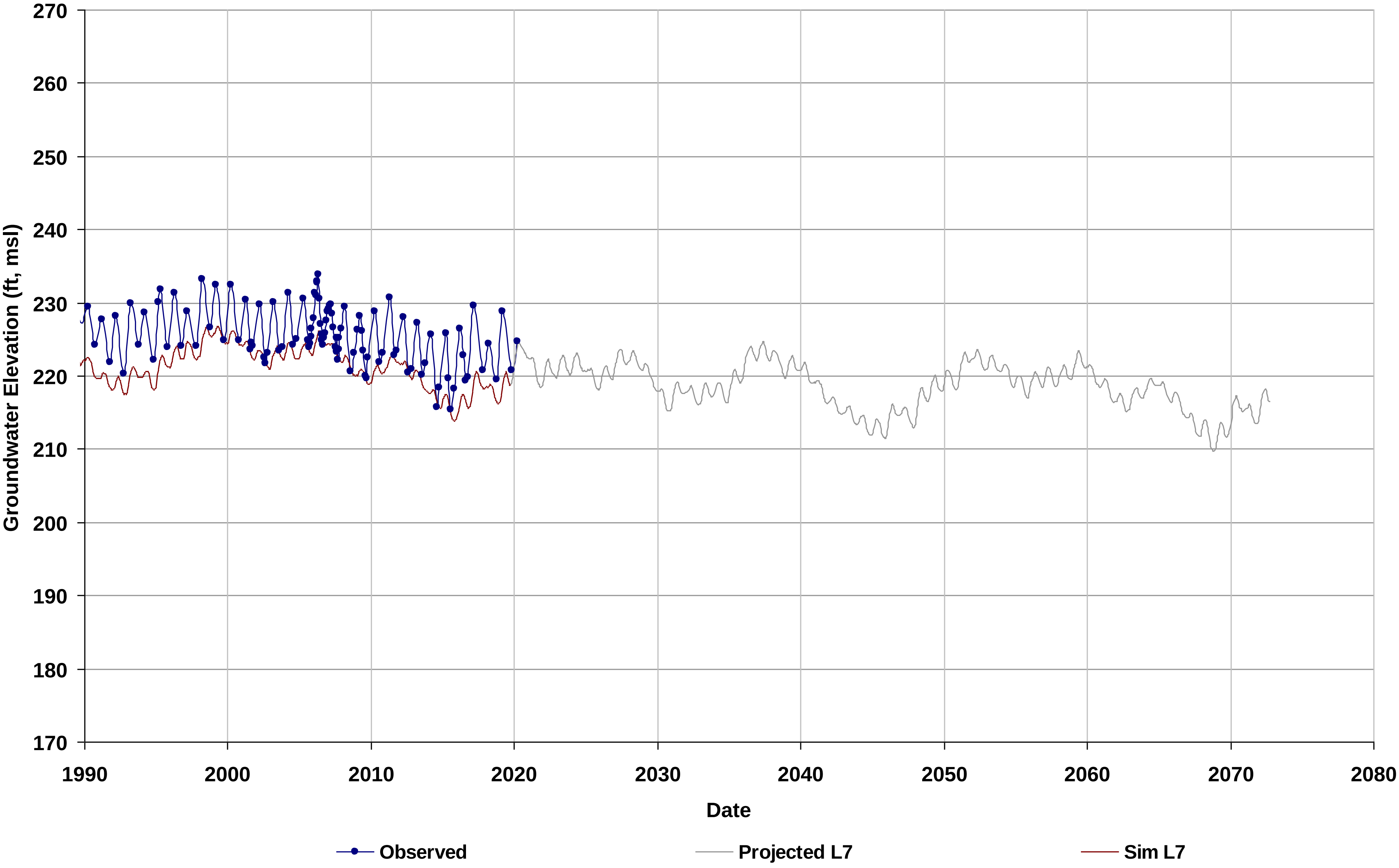
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

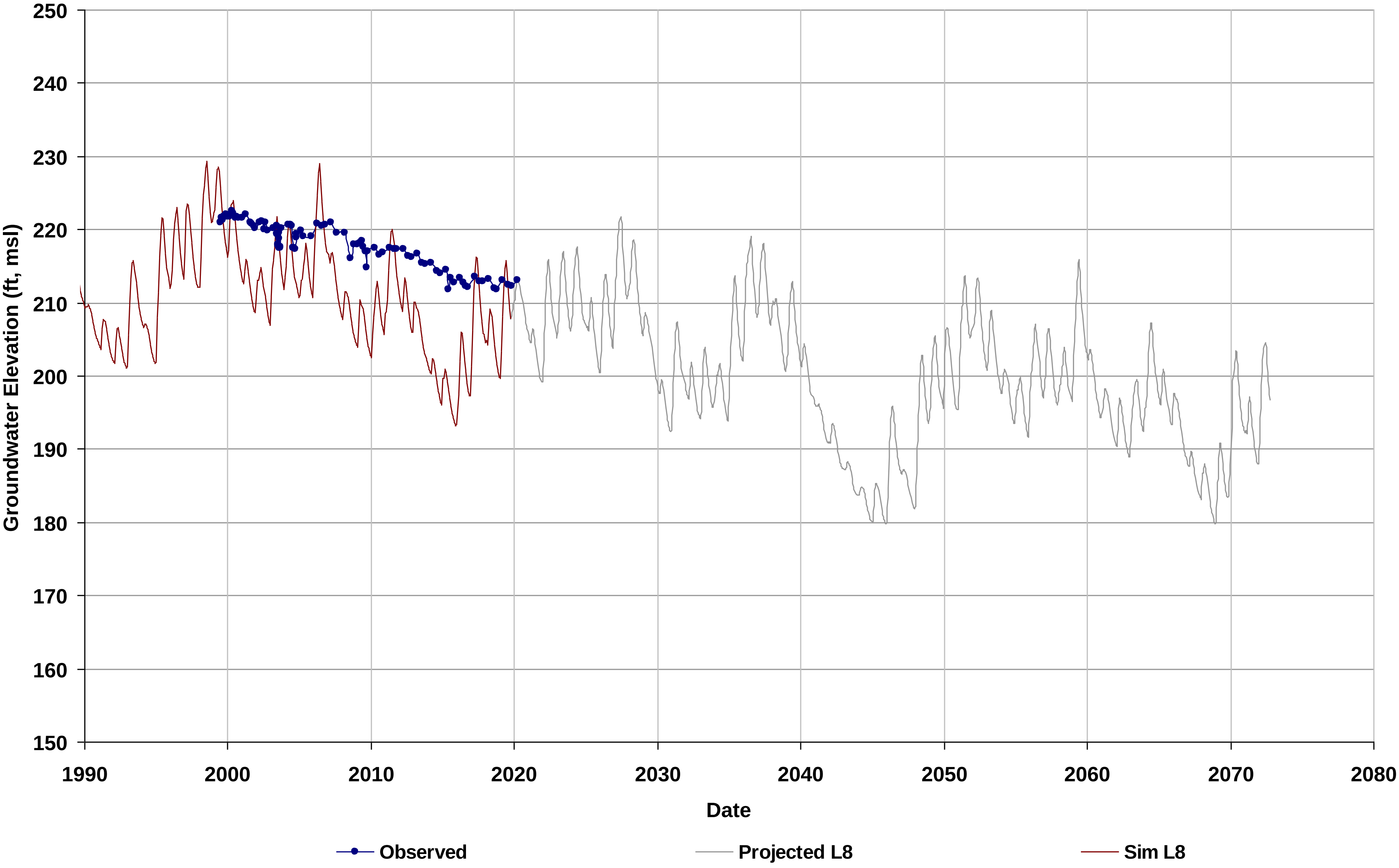
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use)

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

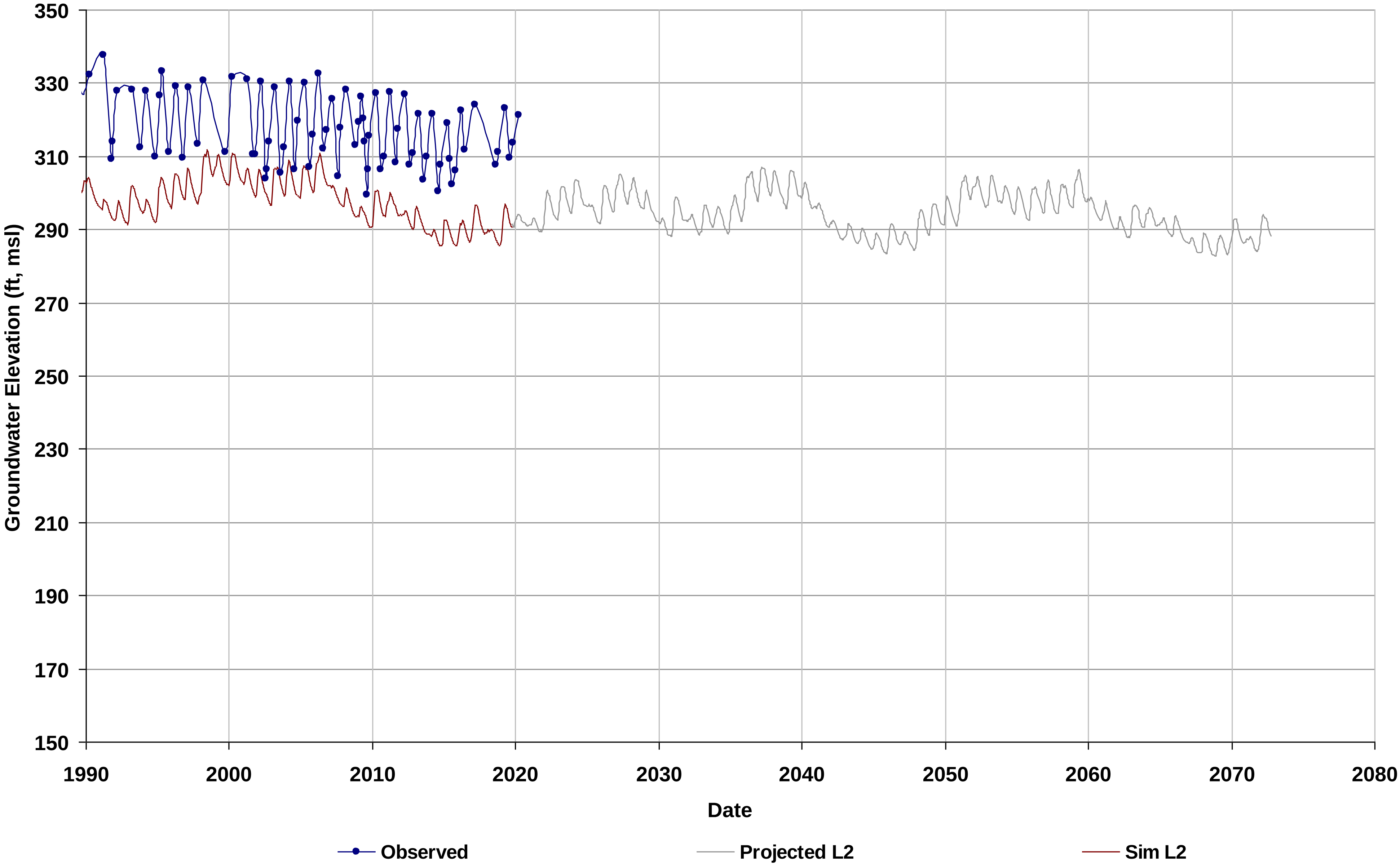
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use)

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

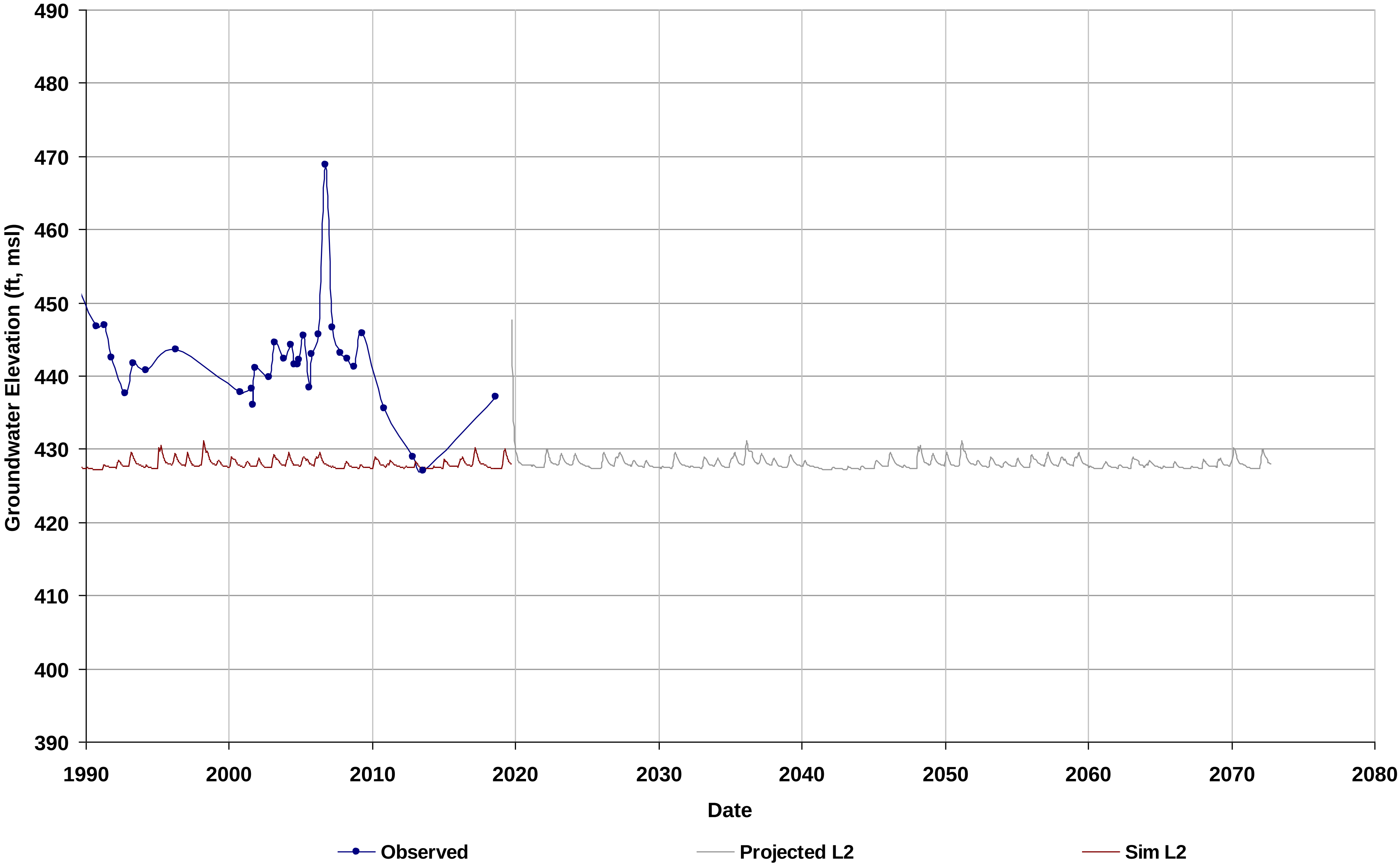
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

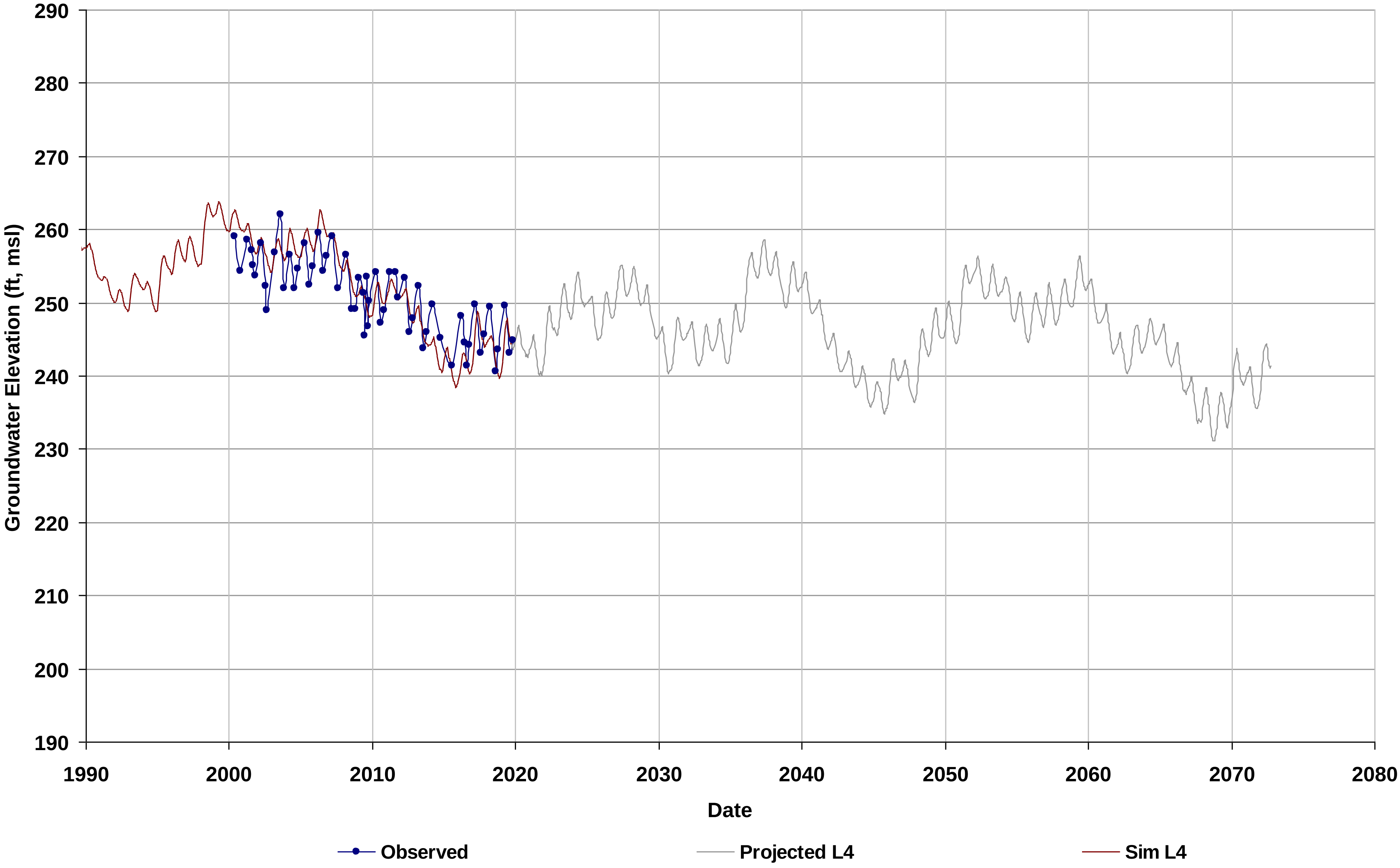
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

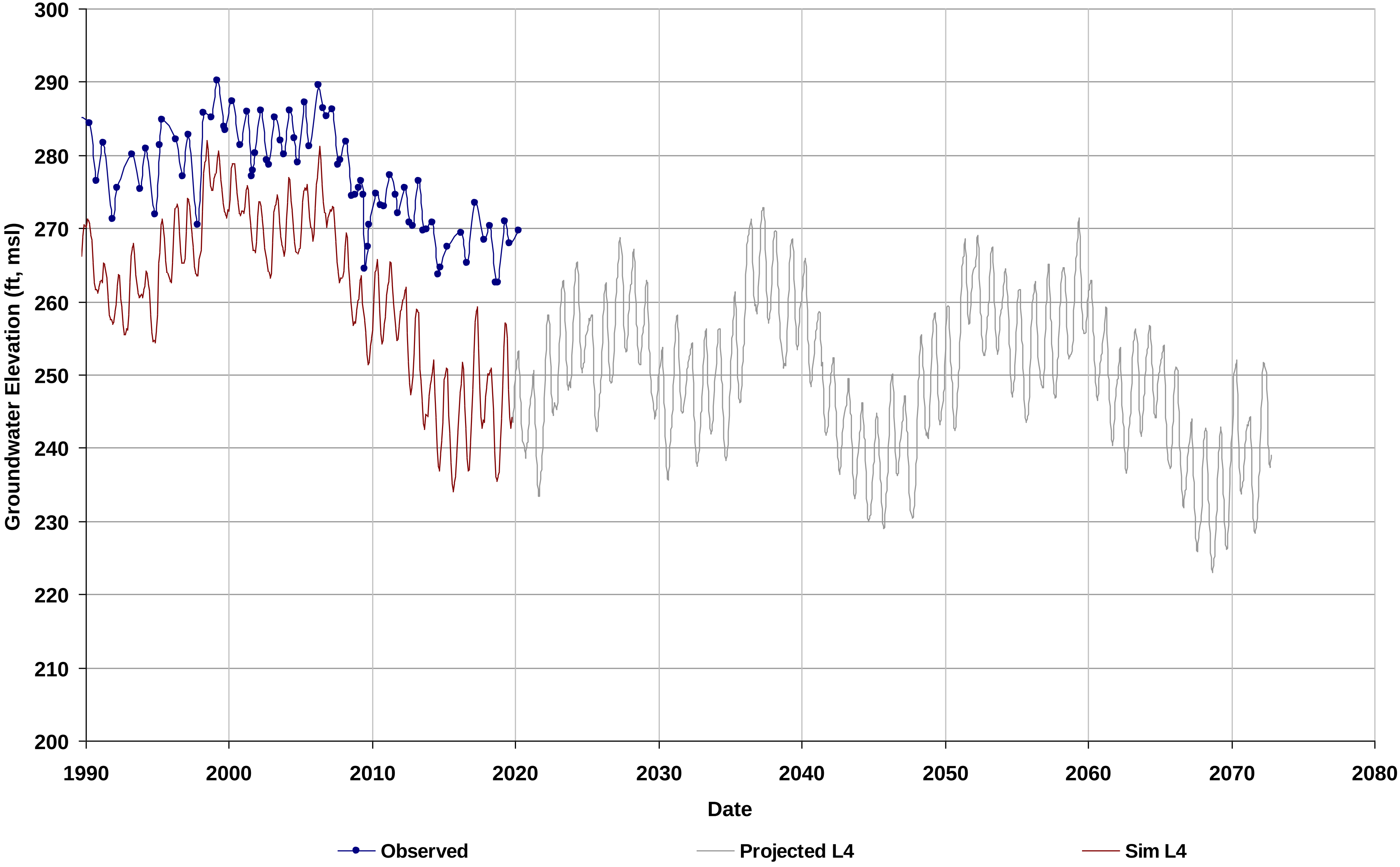
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

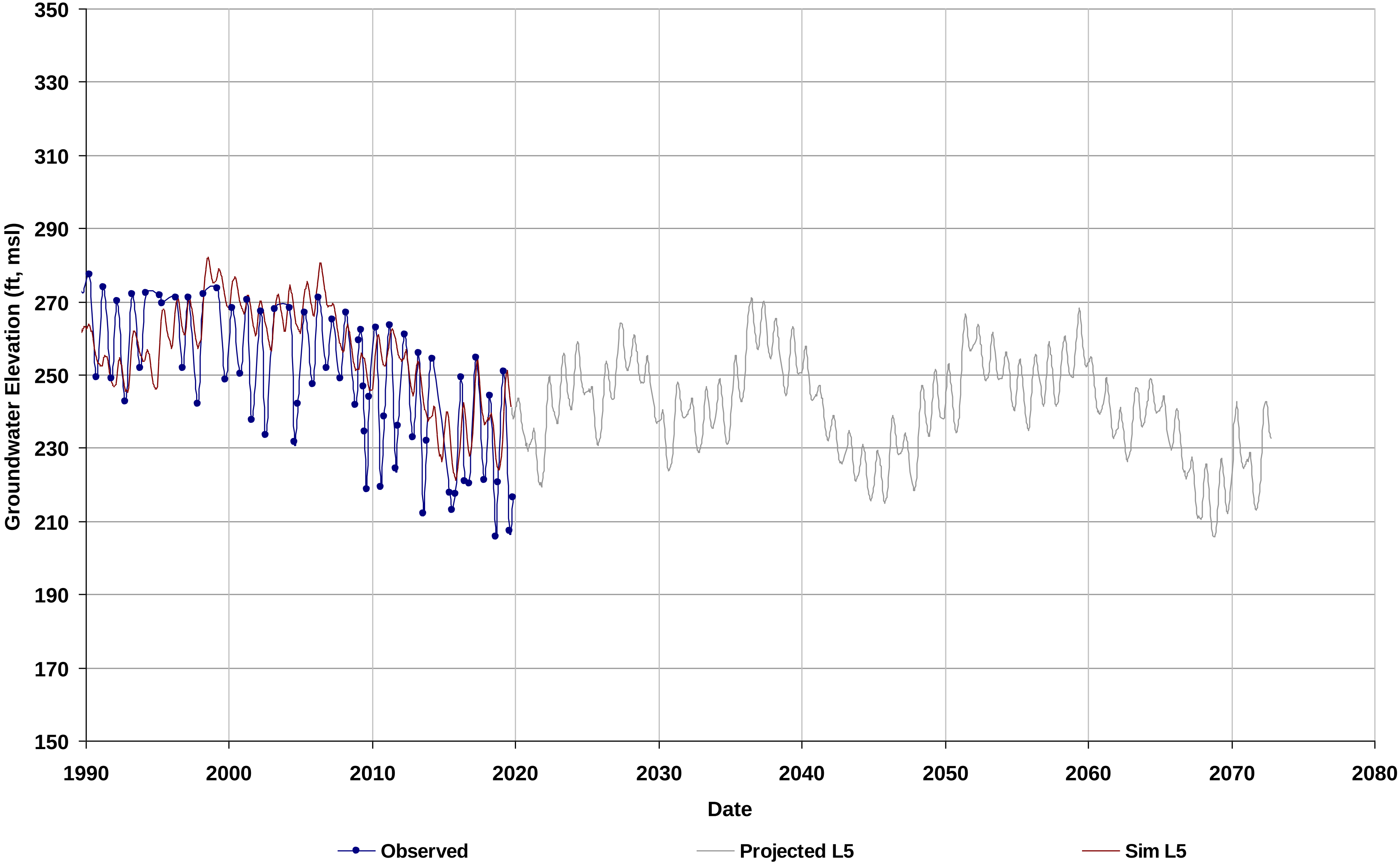
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

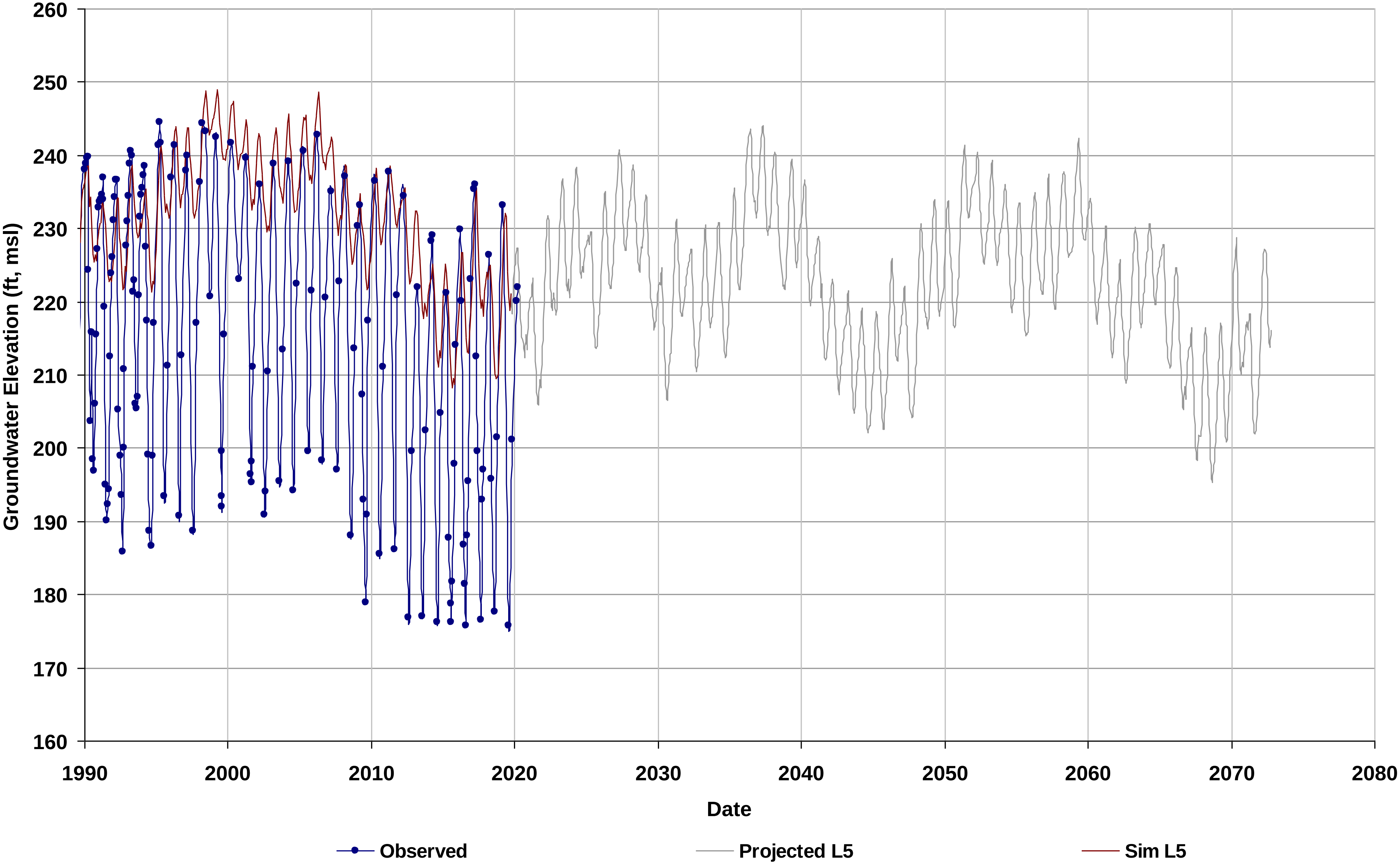
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

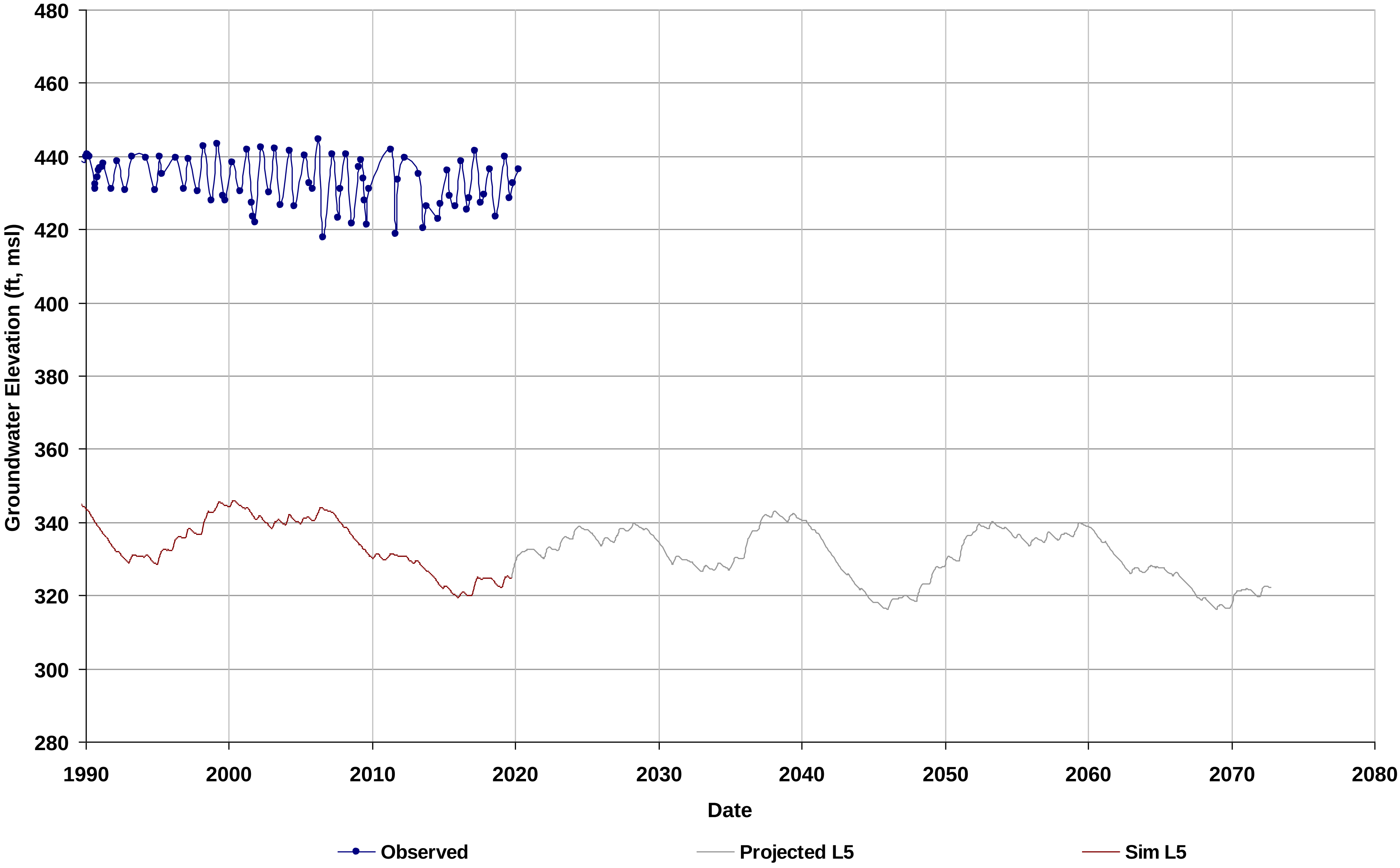
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

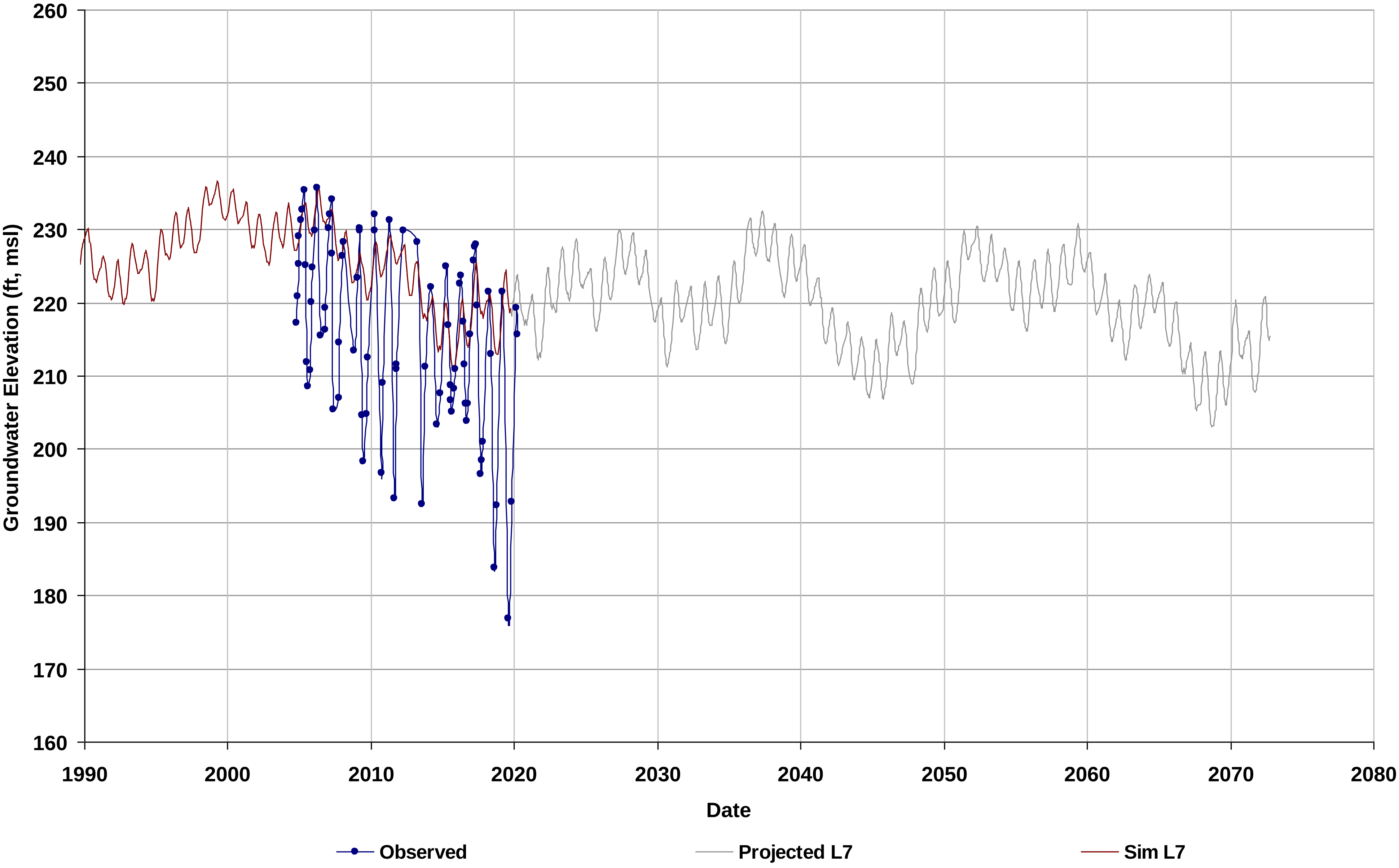
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

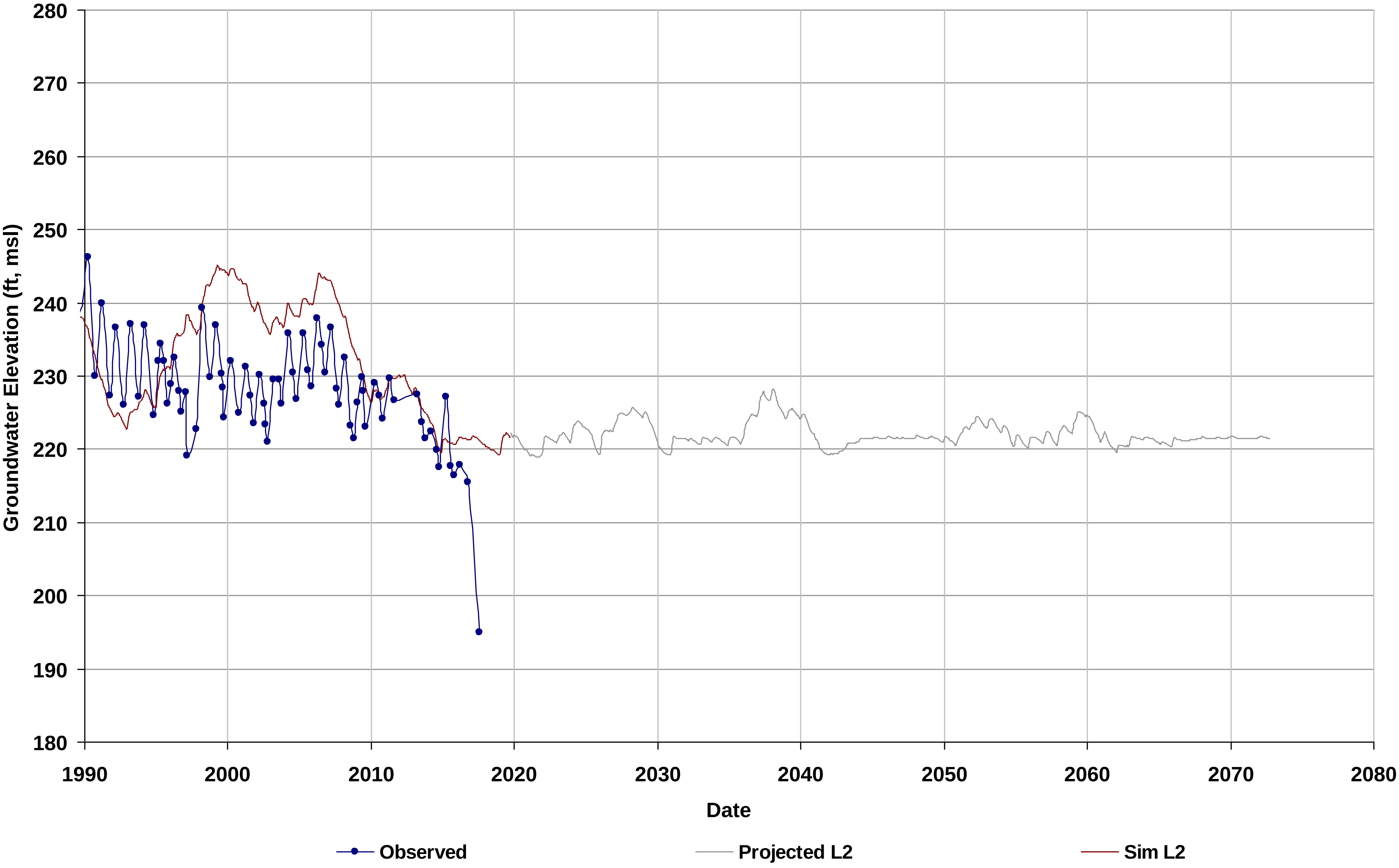
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use)

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

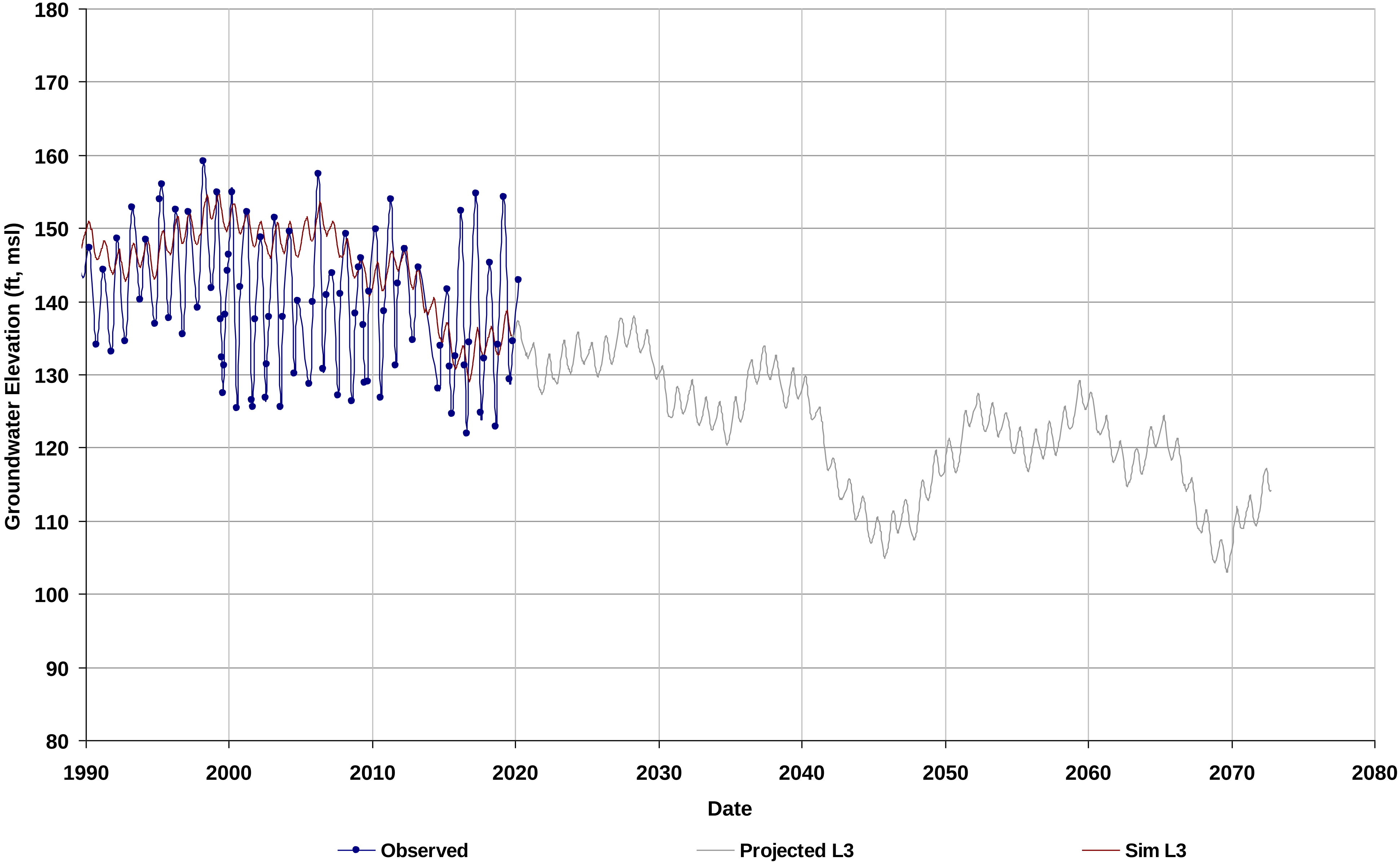
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

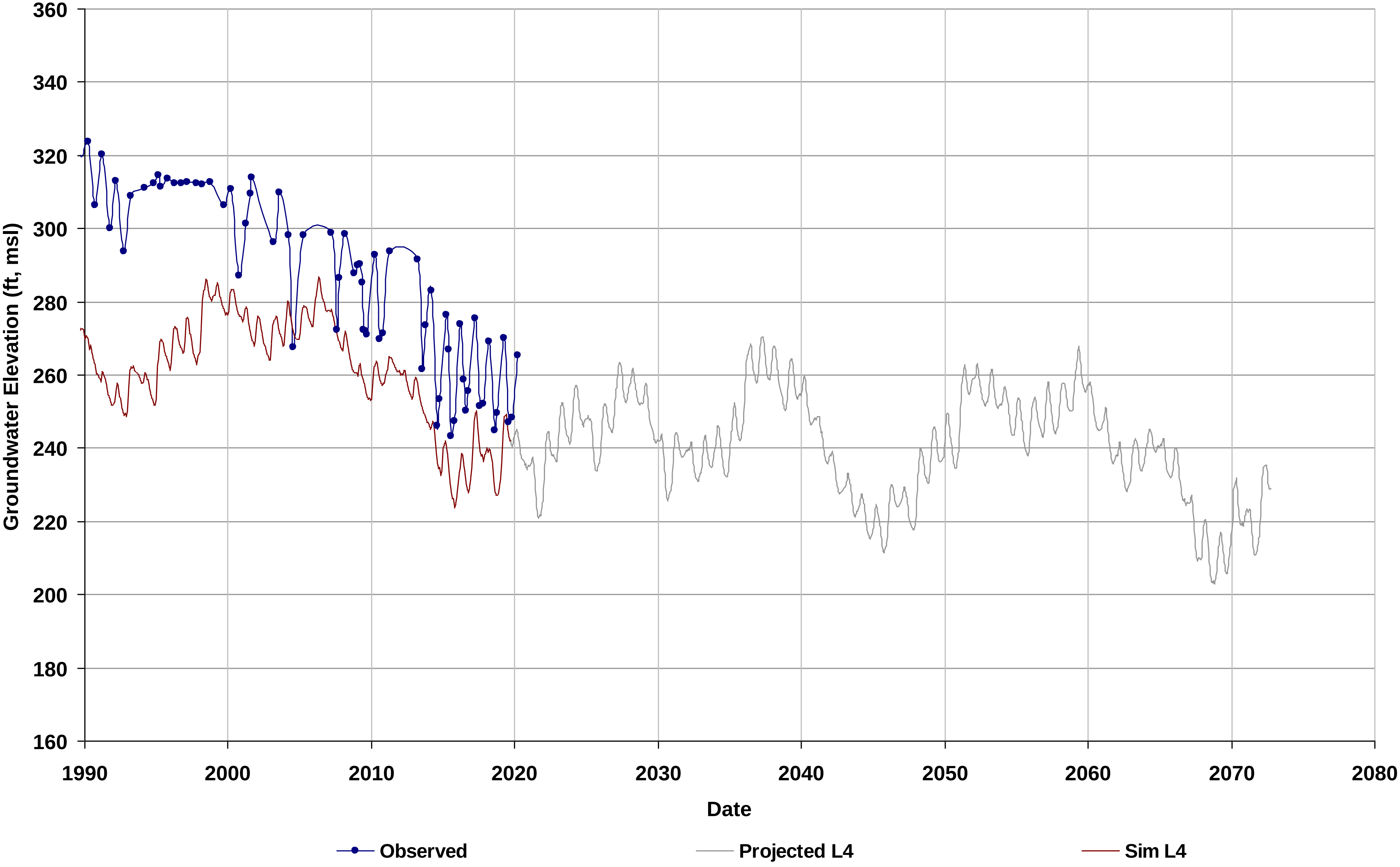
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

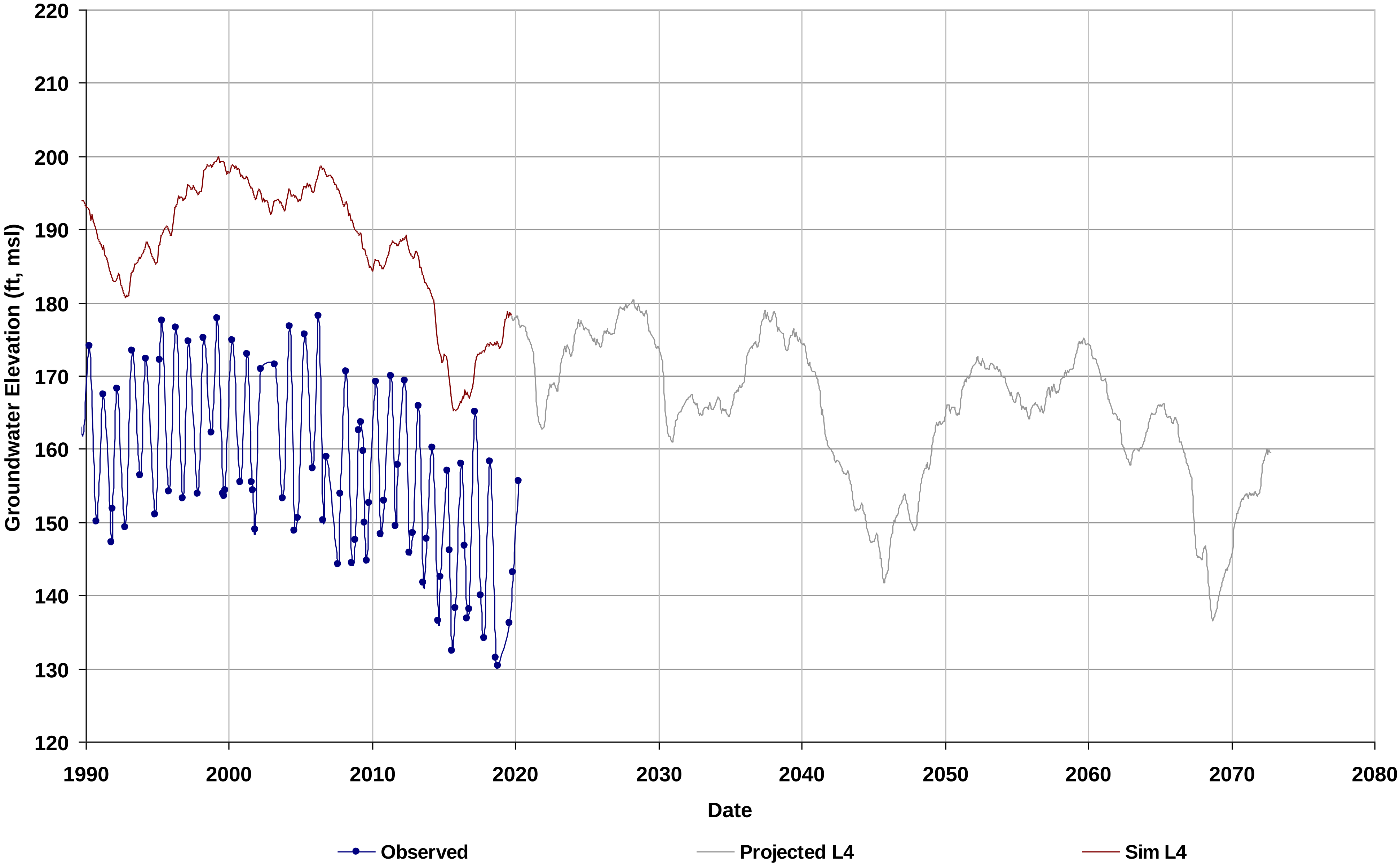
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

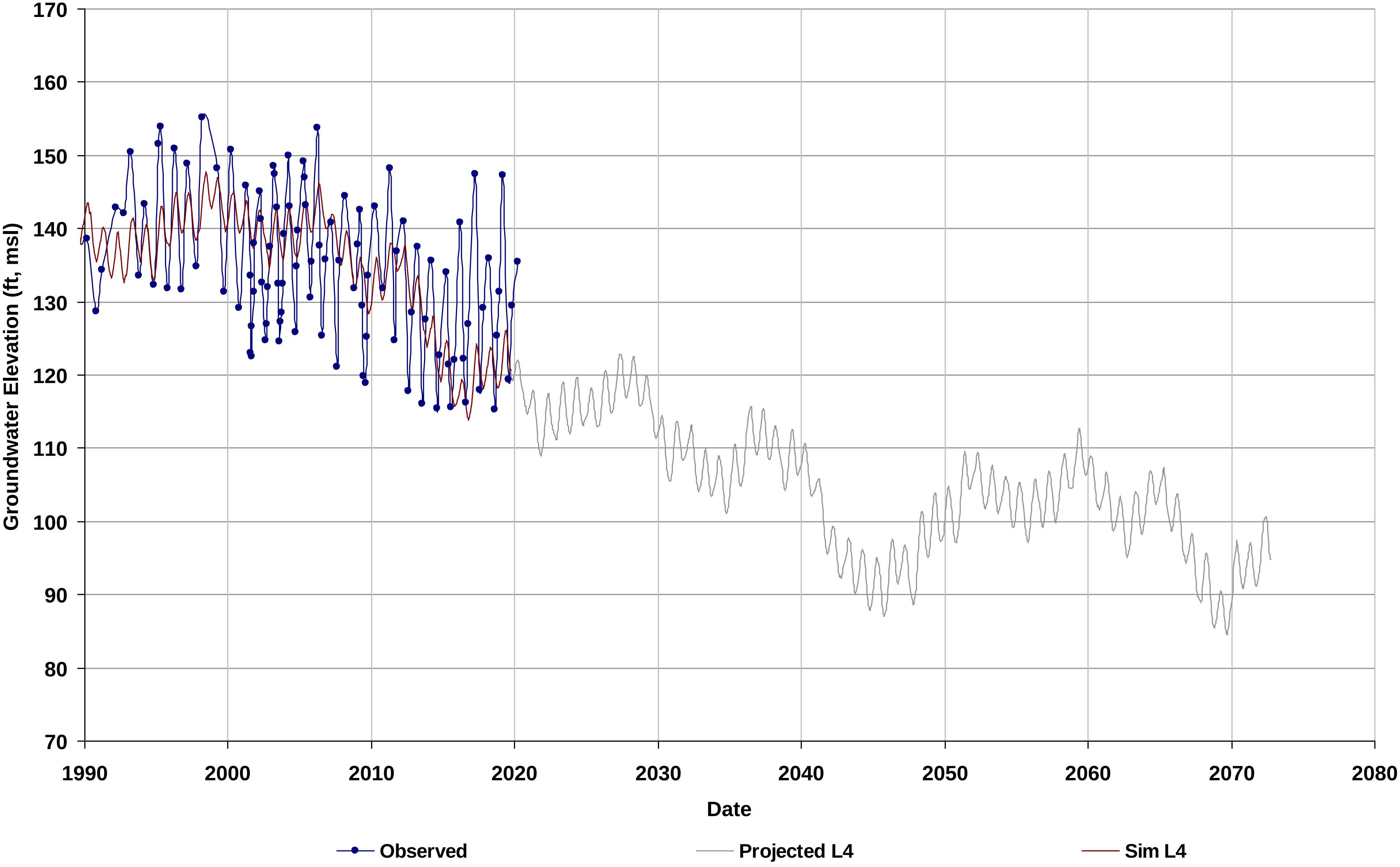
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

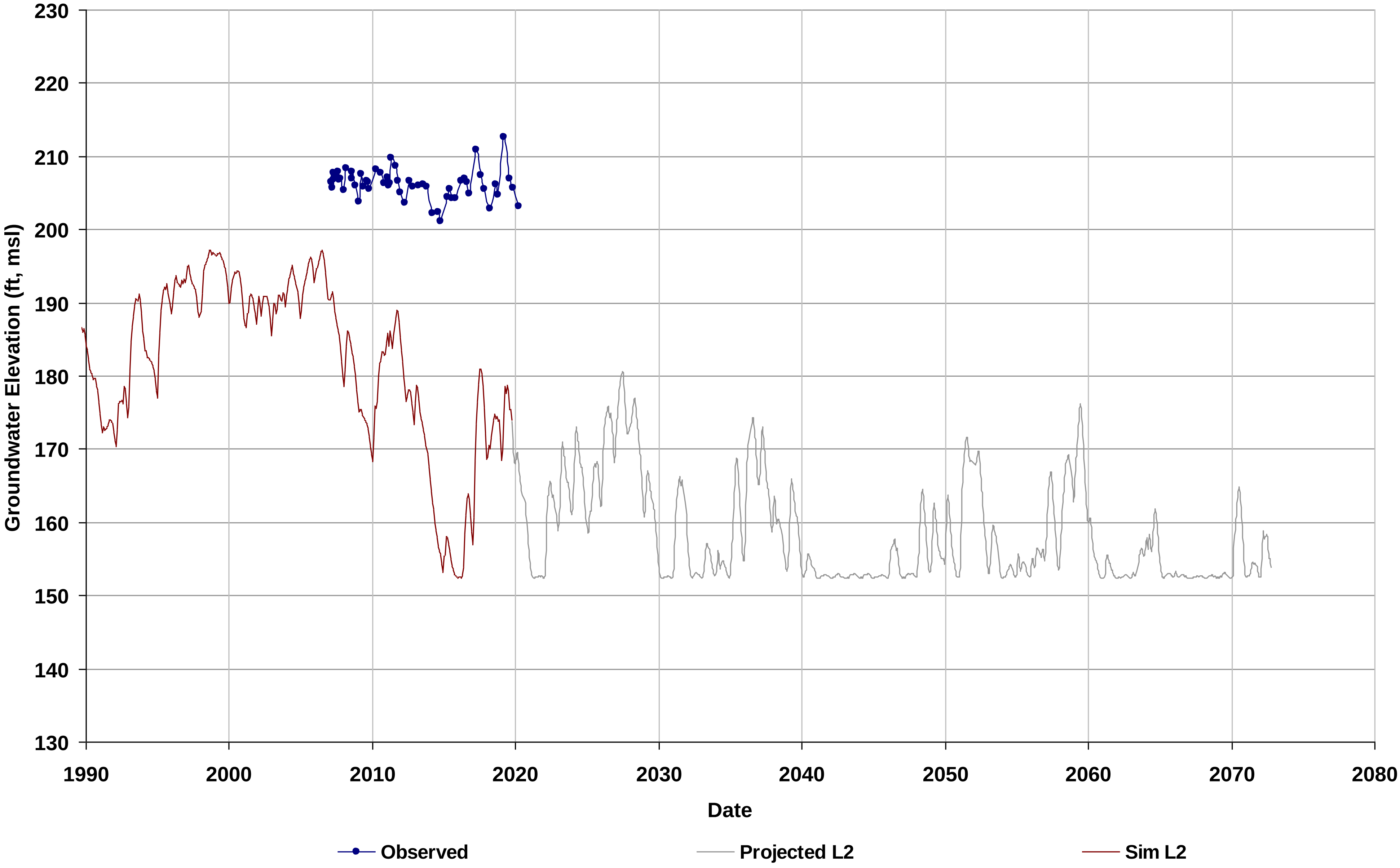
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

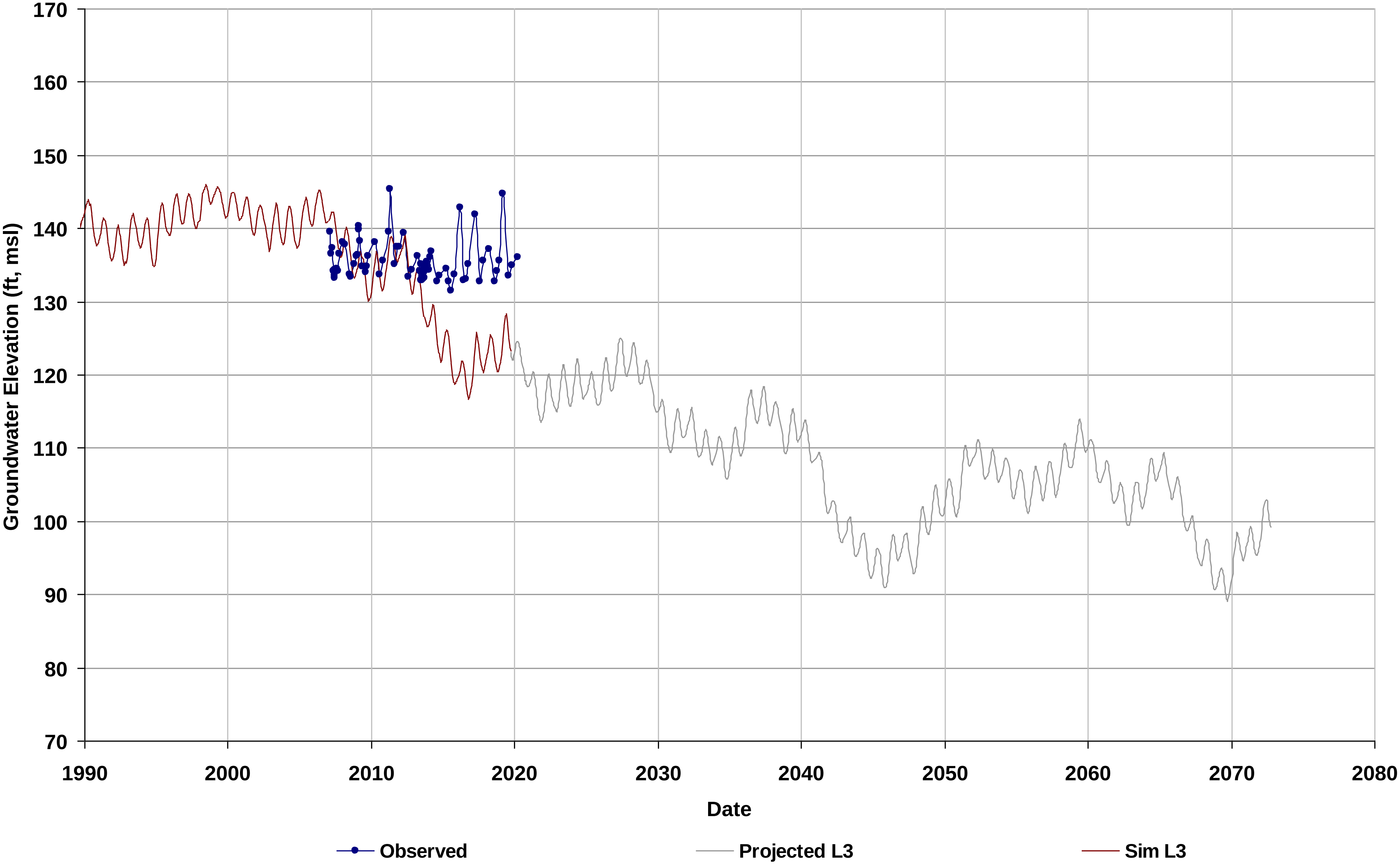
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

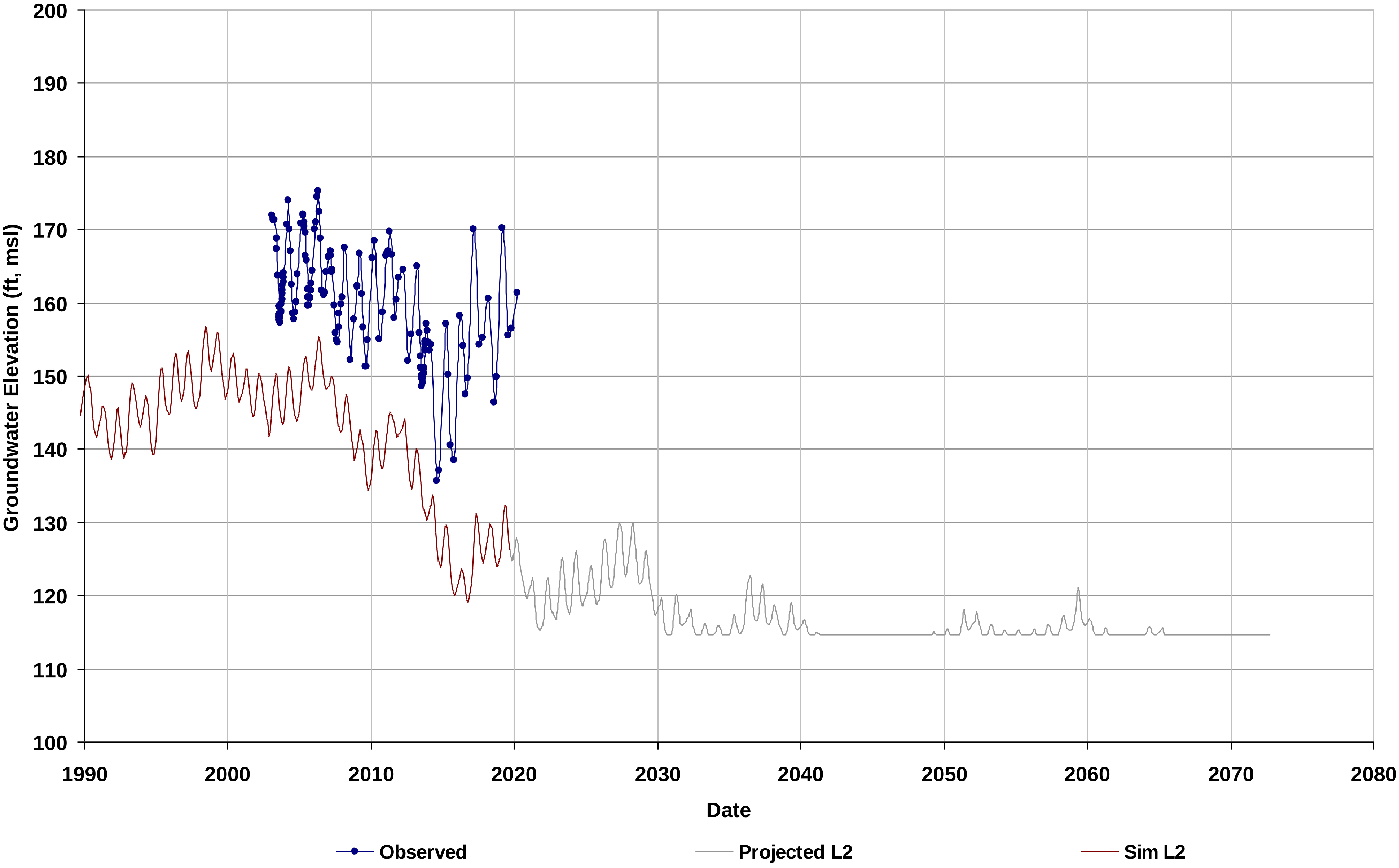
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

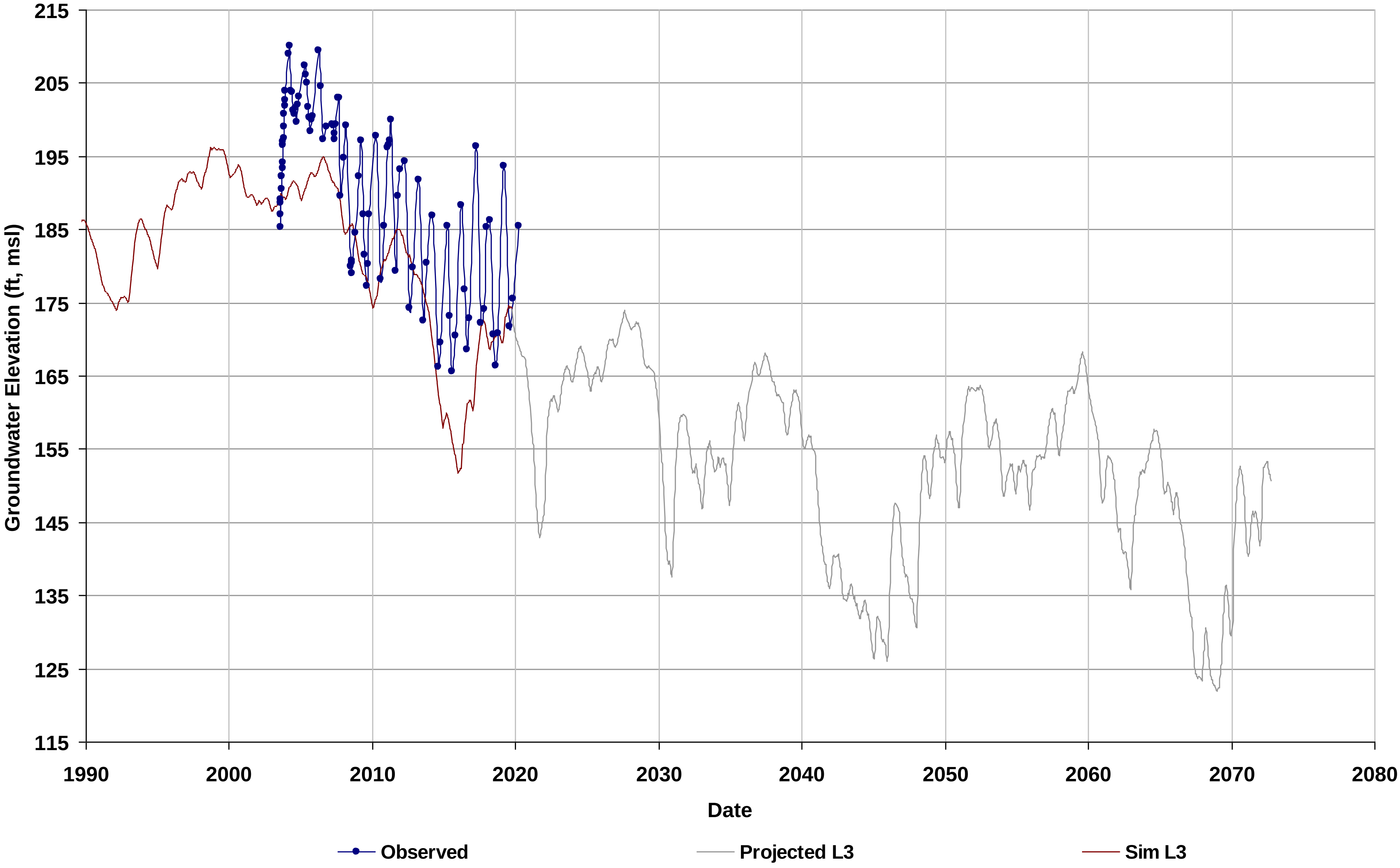
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

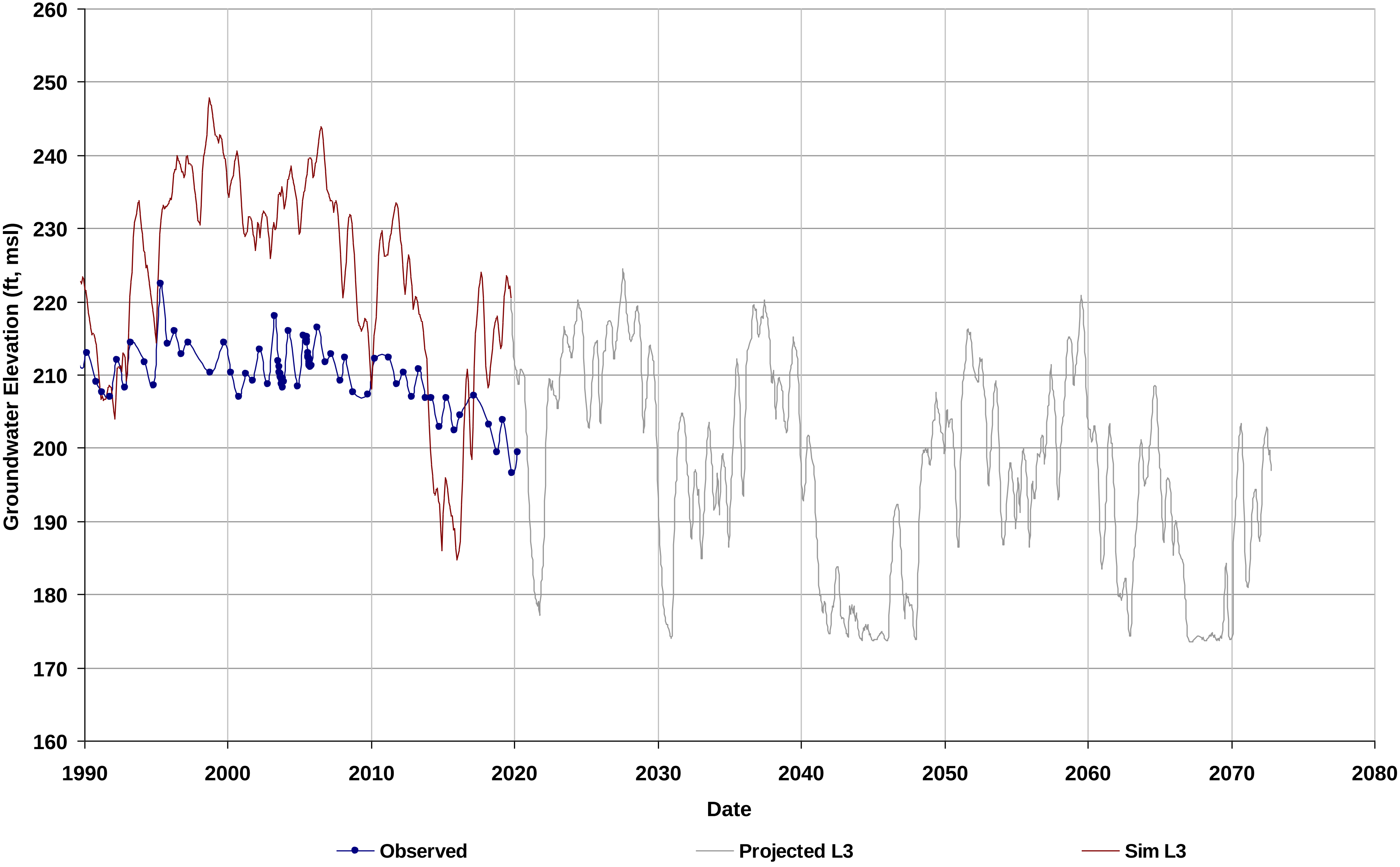
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

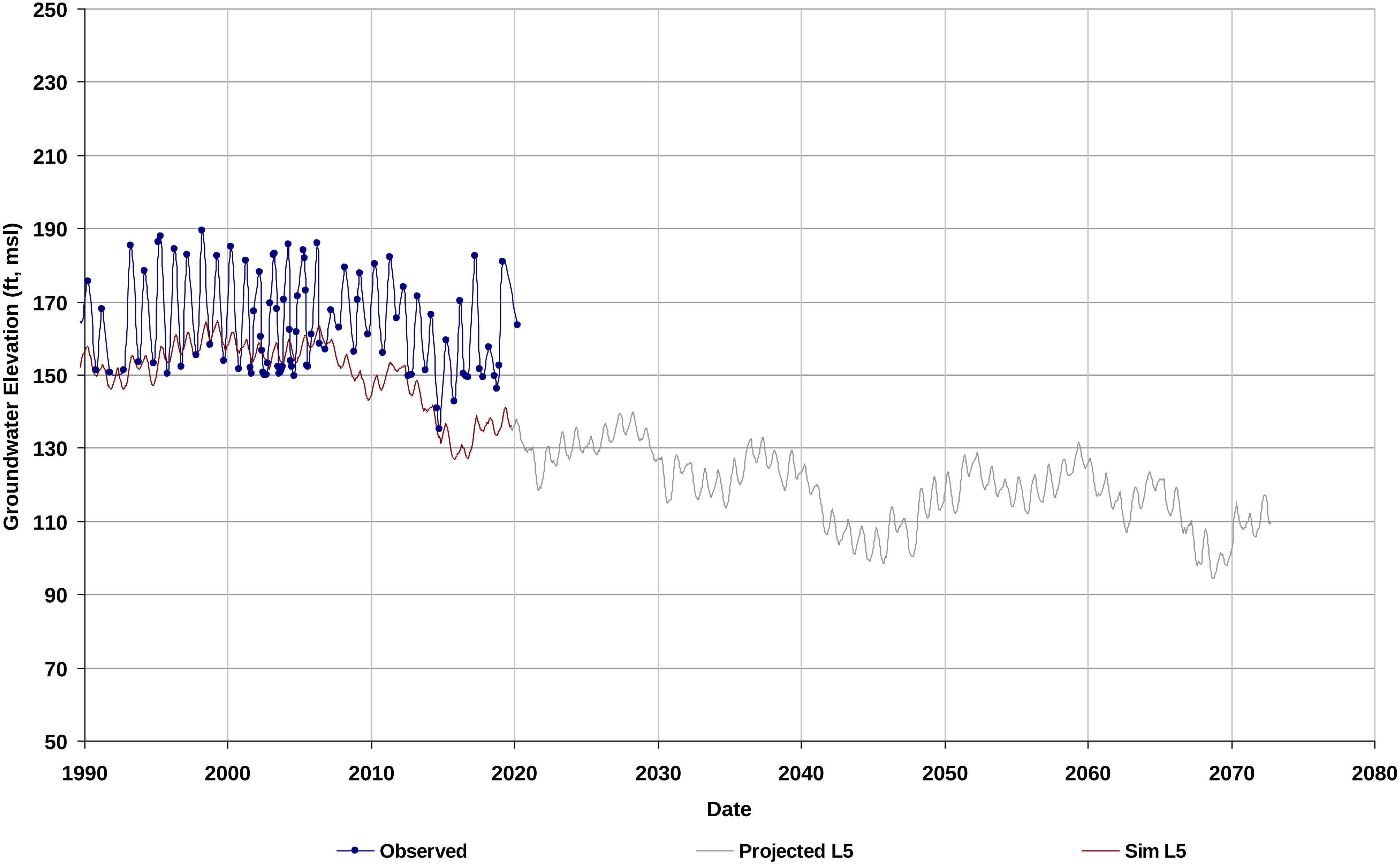
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

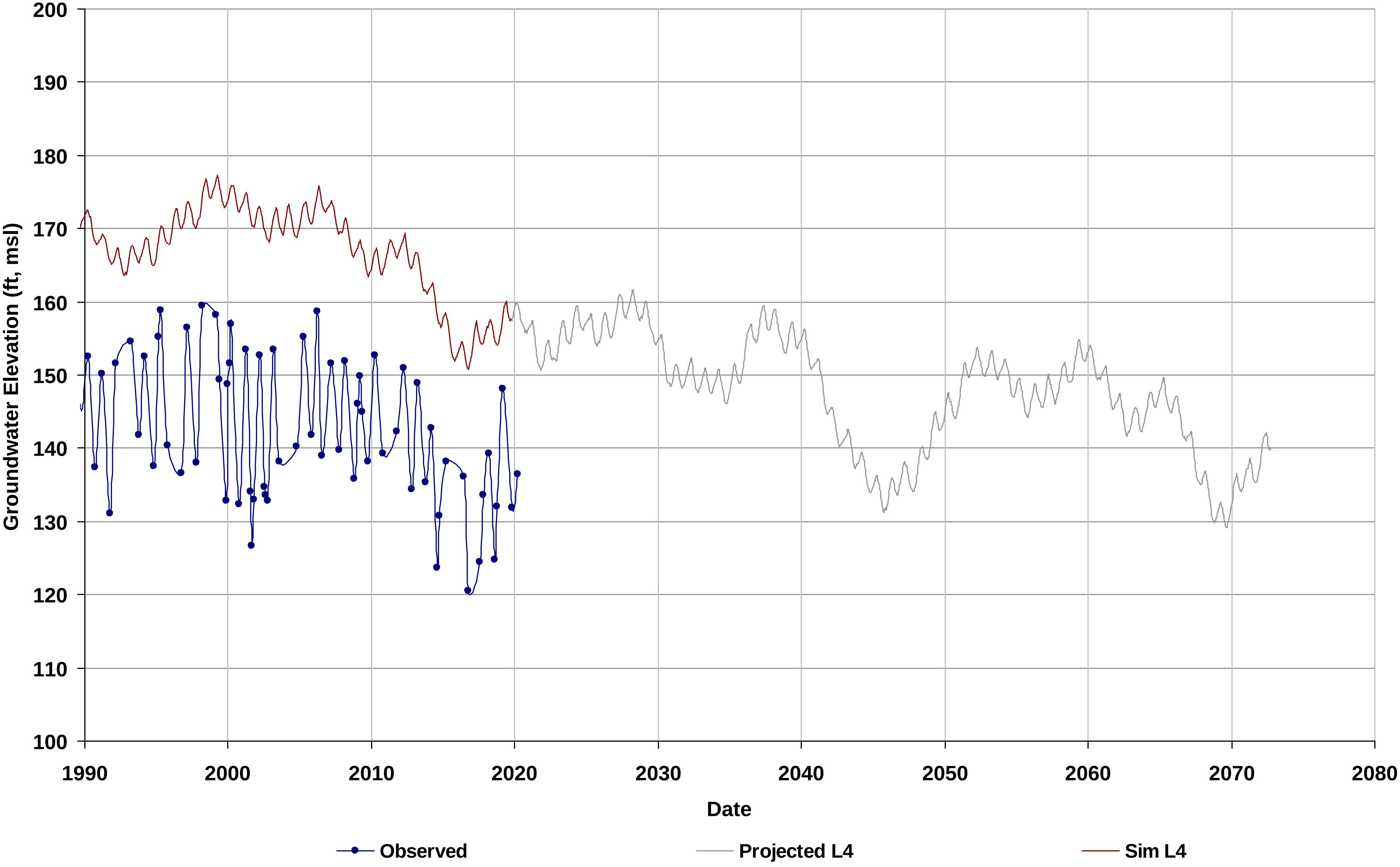
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

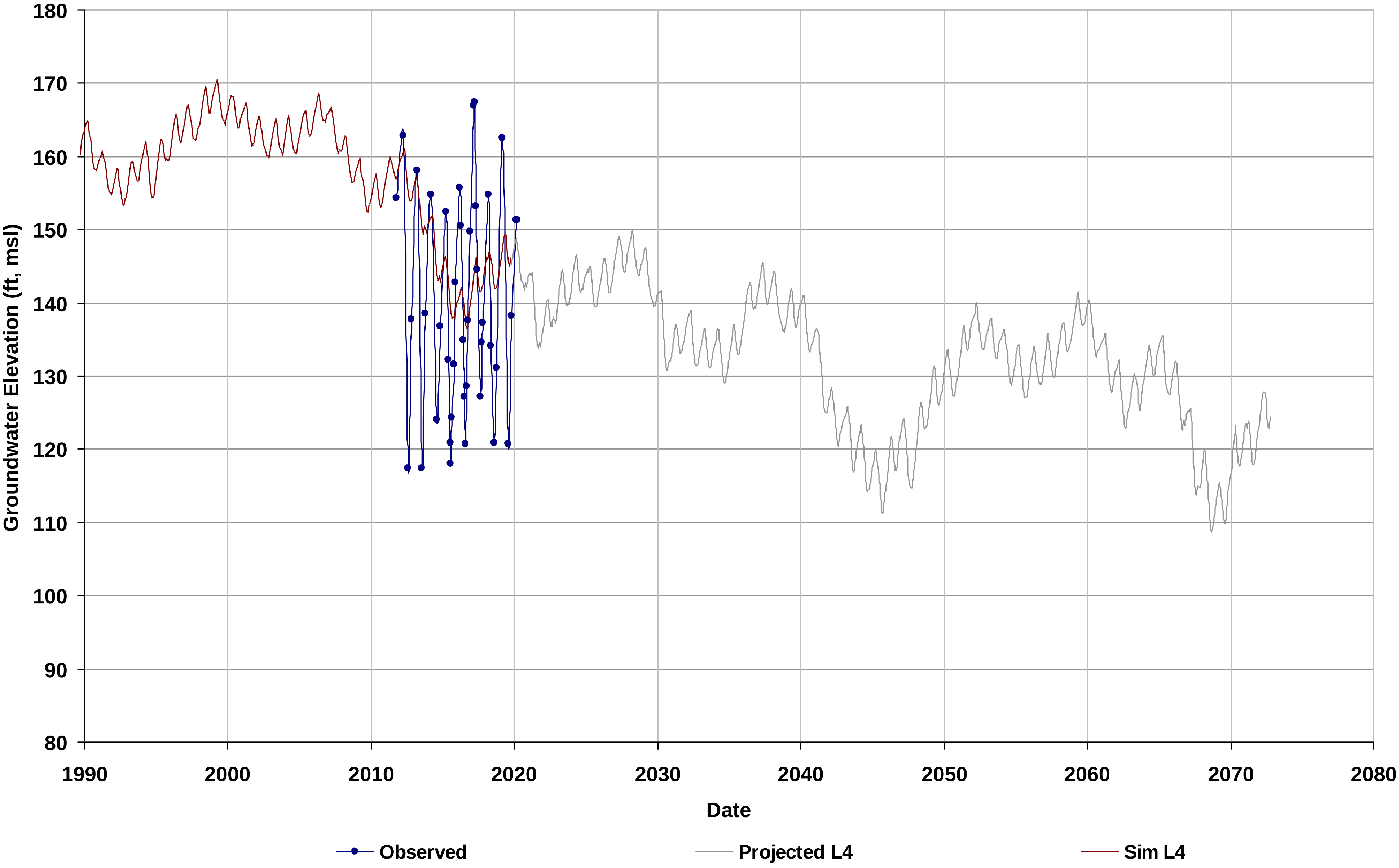
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

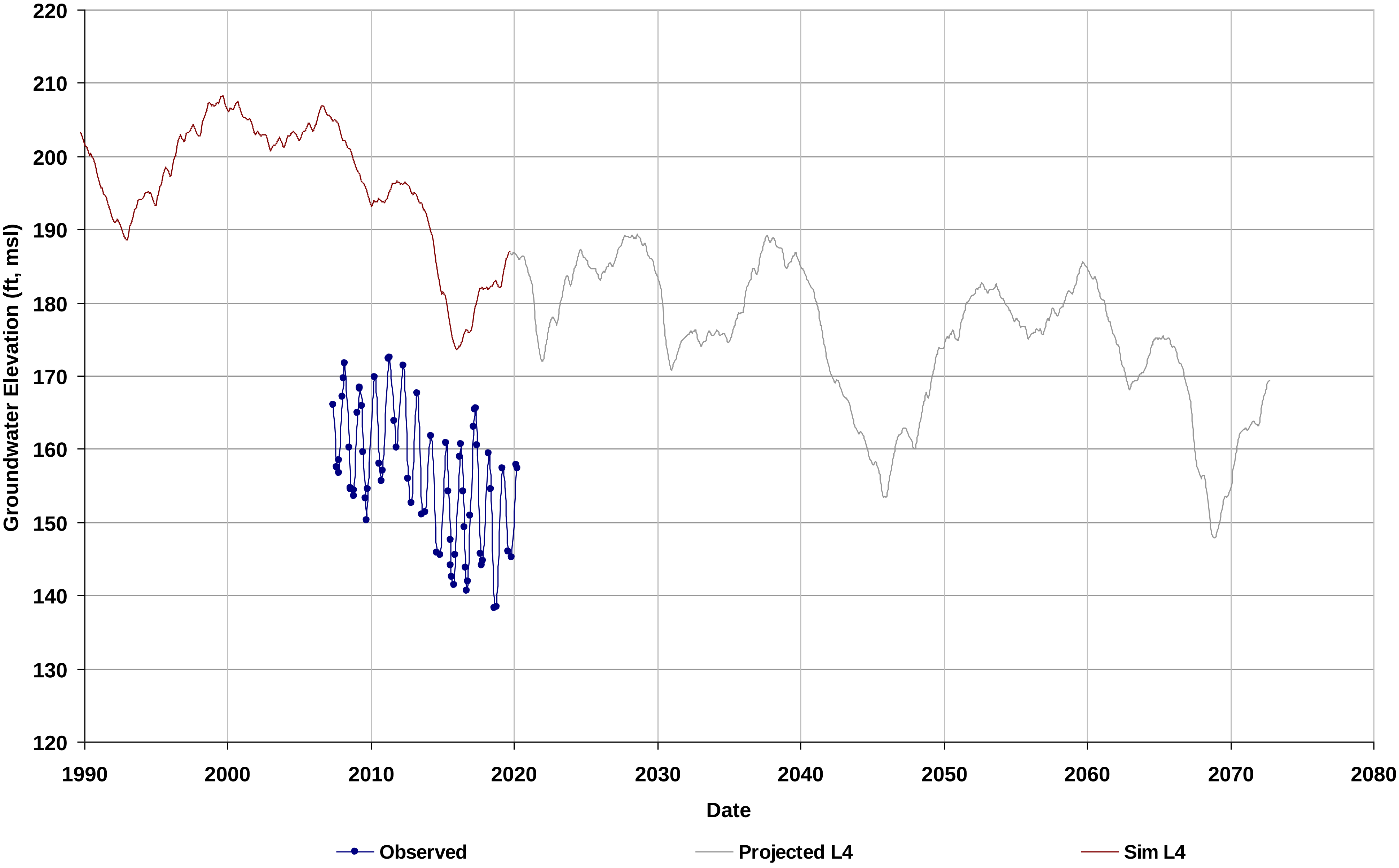
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

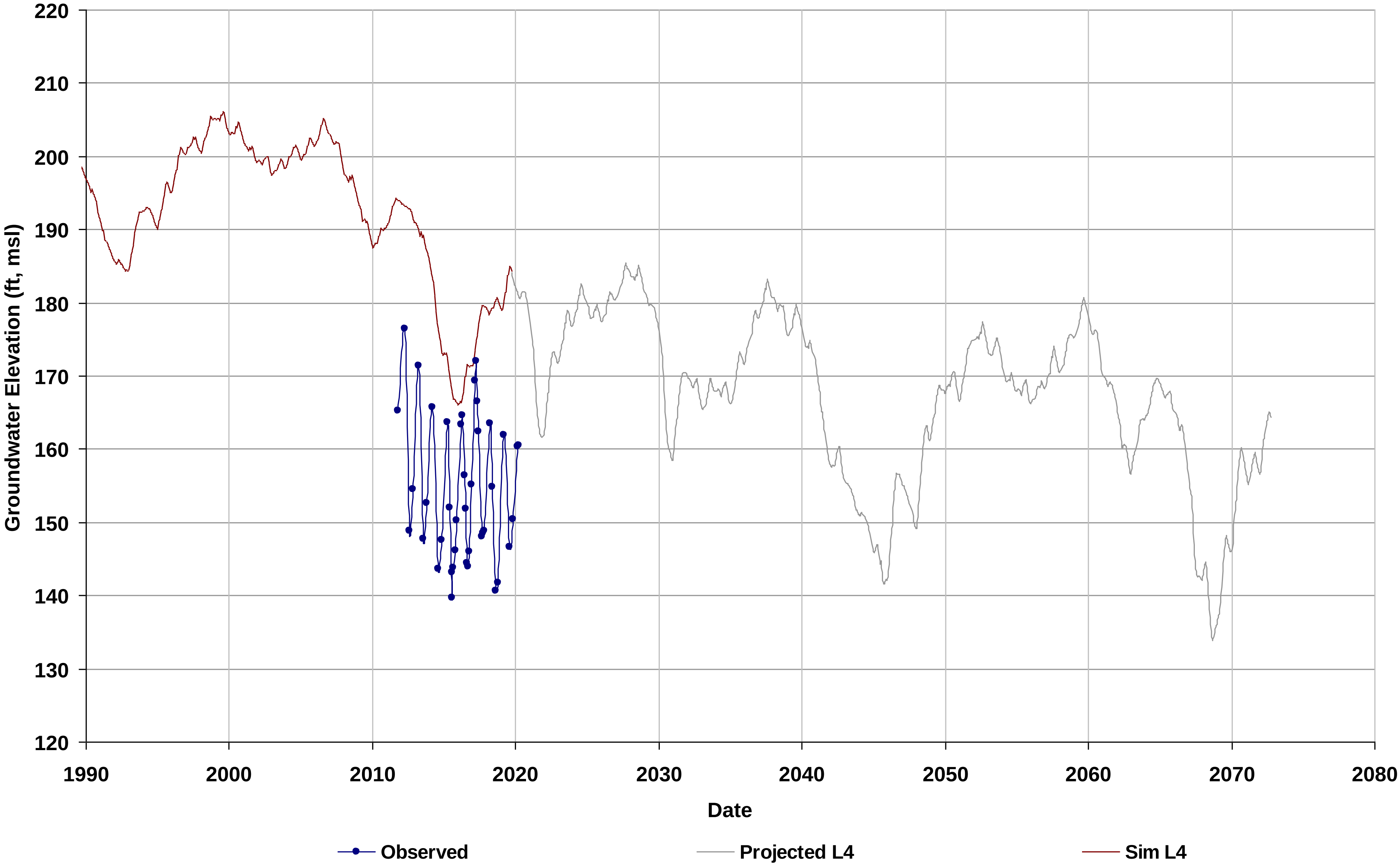
Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

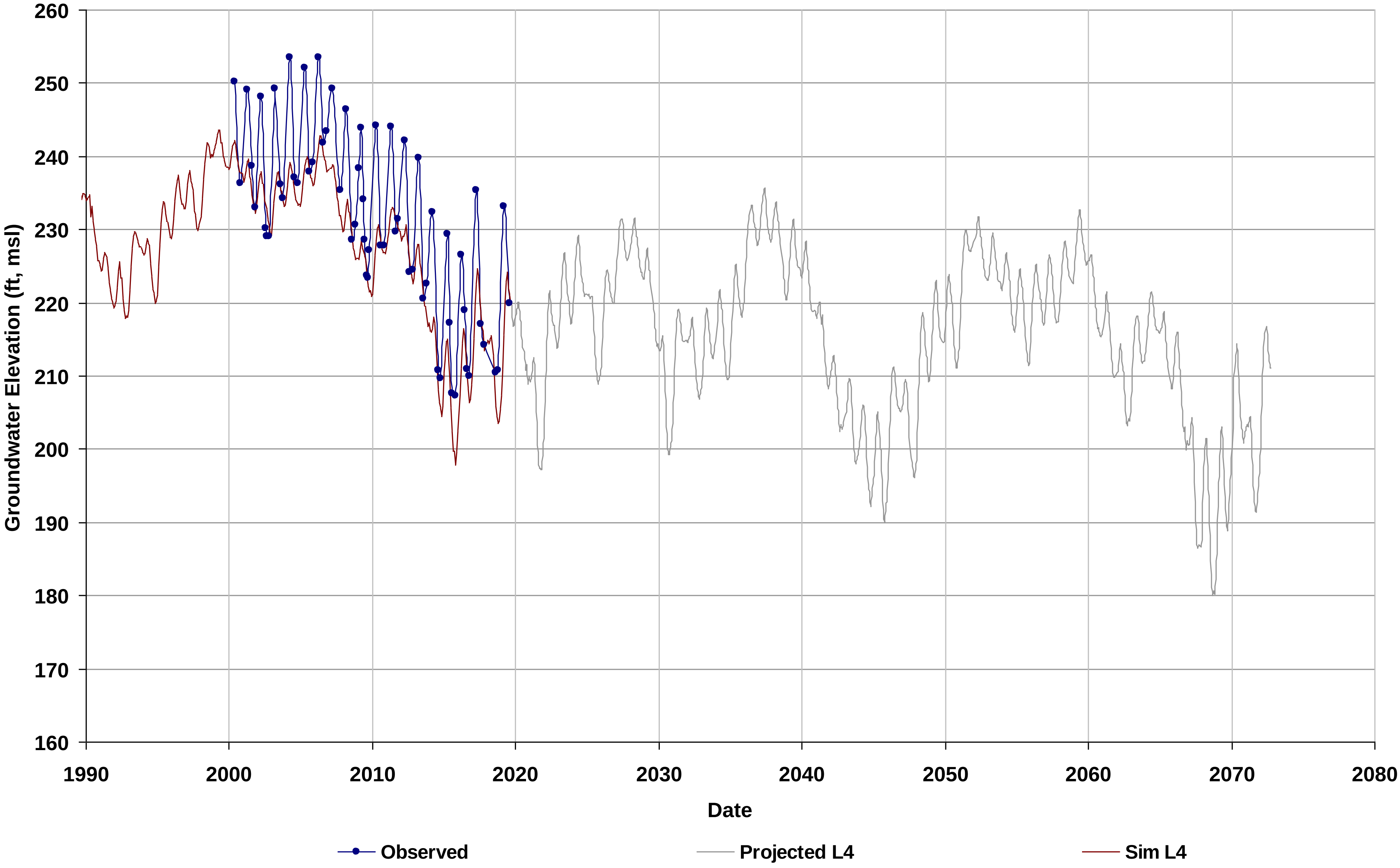
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

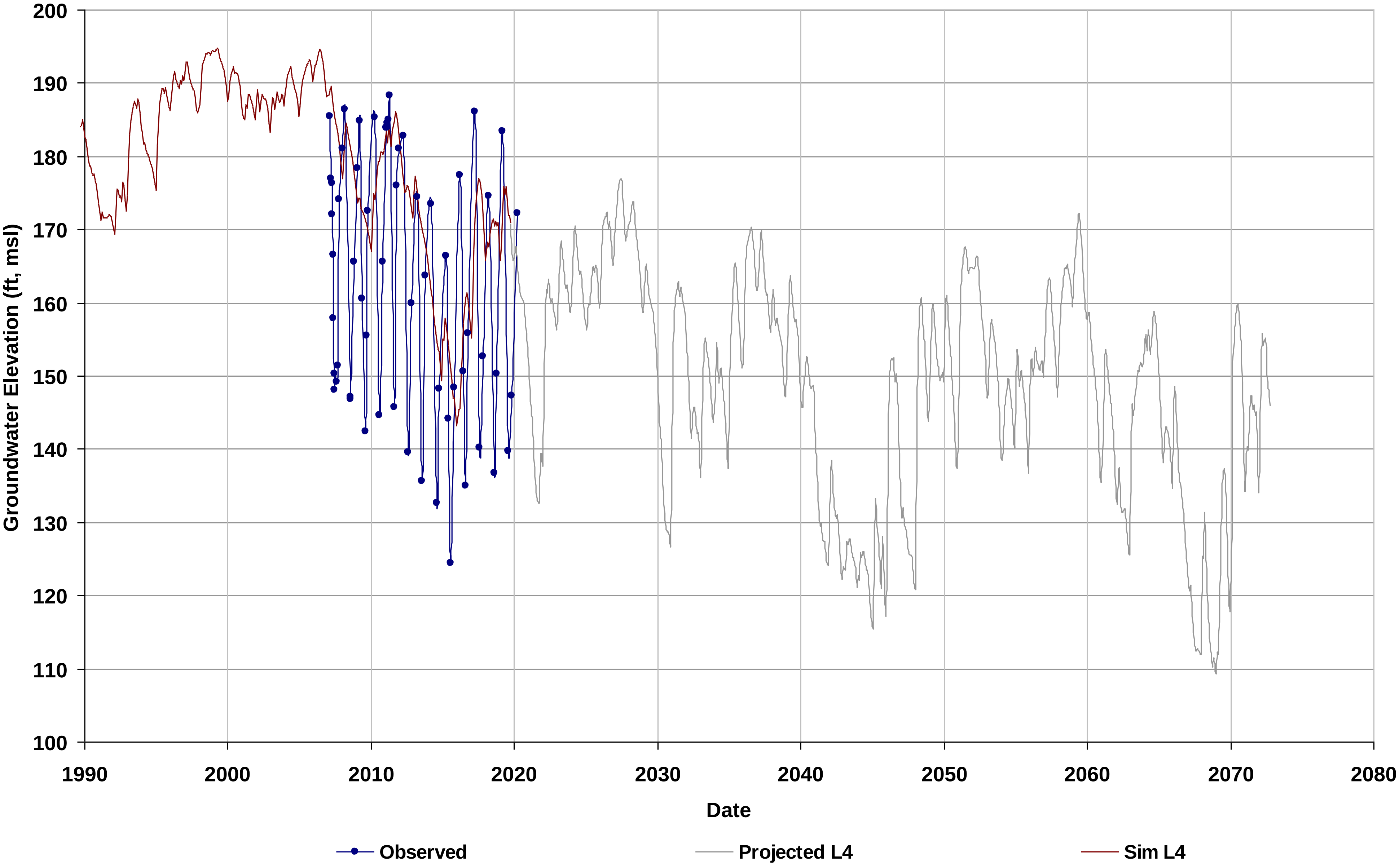
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

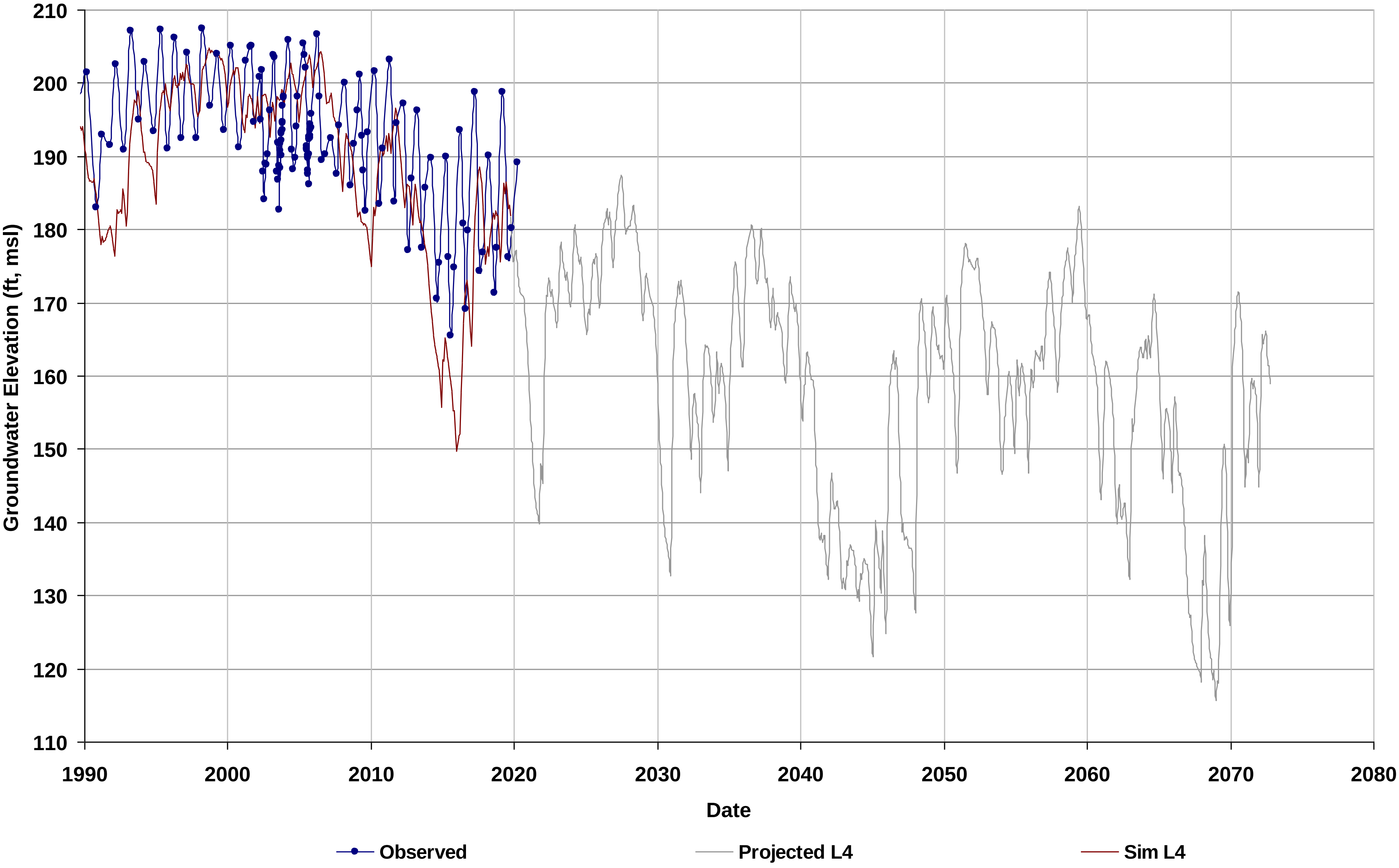
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

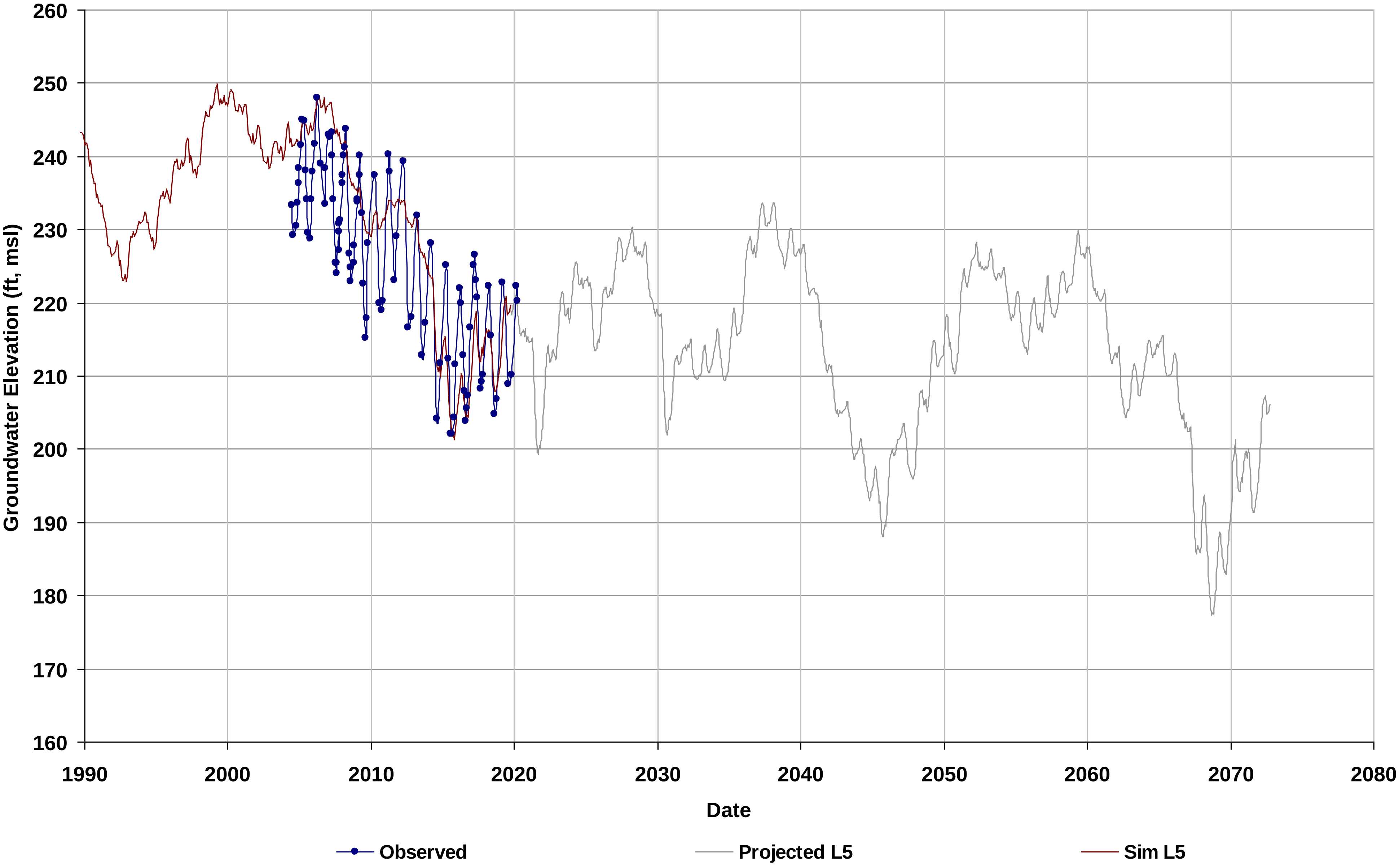
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

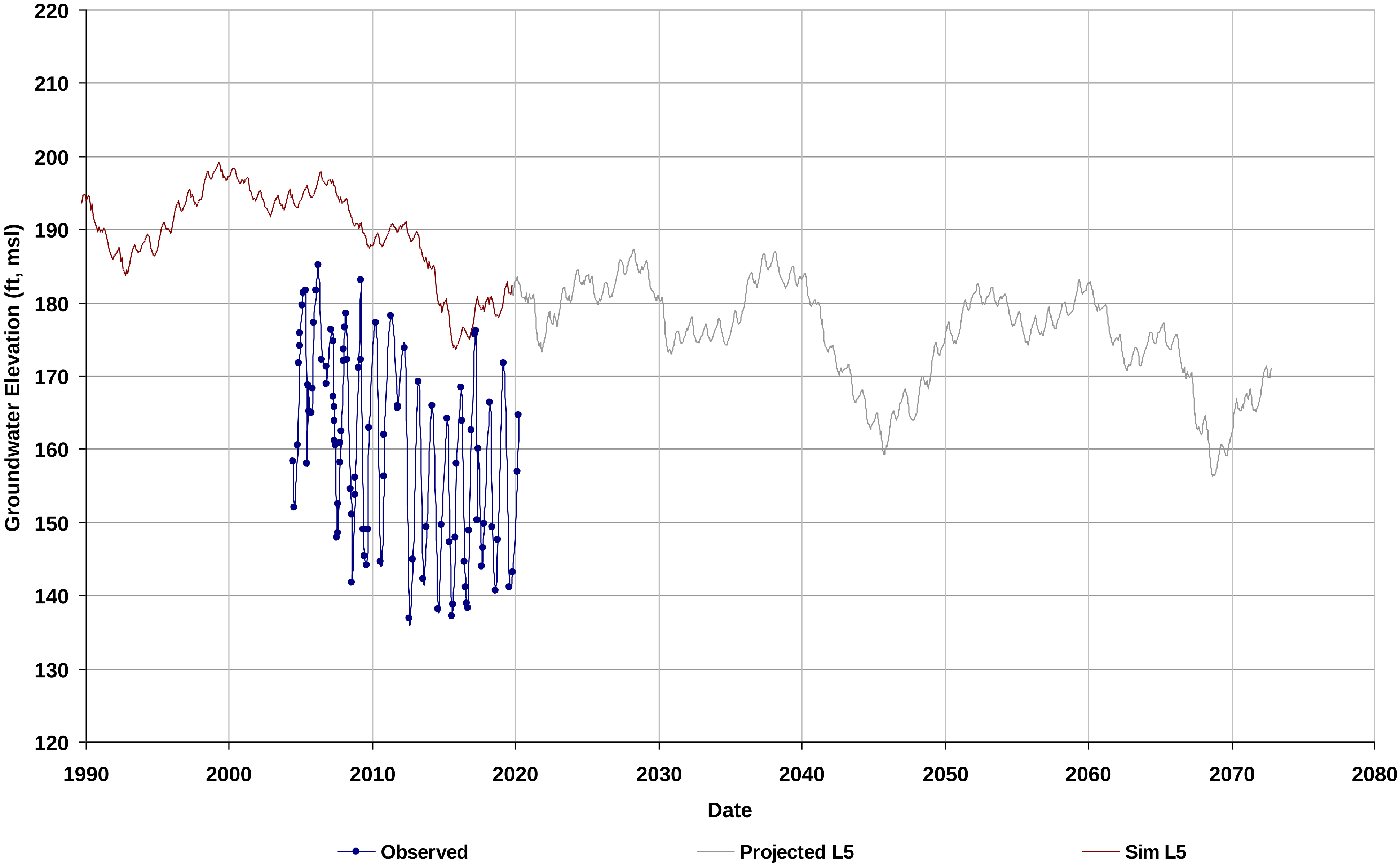
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

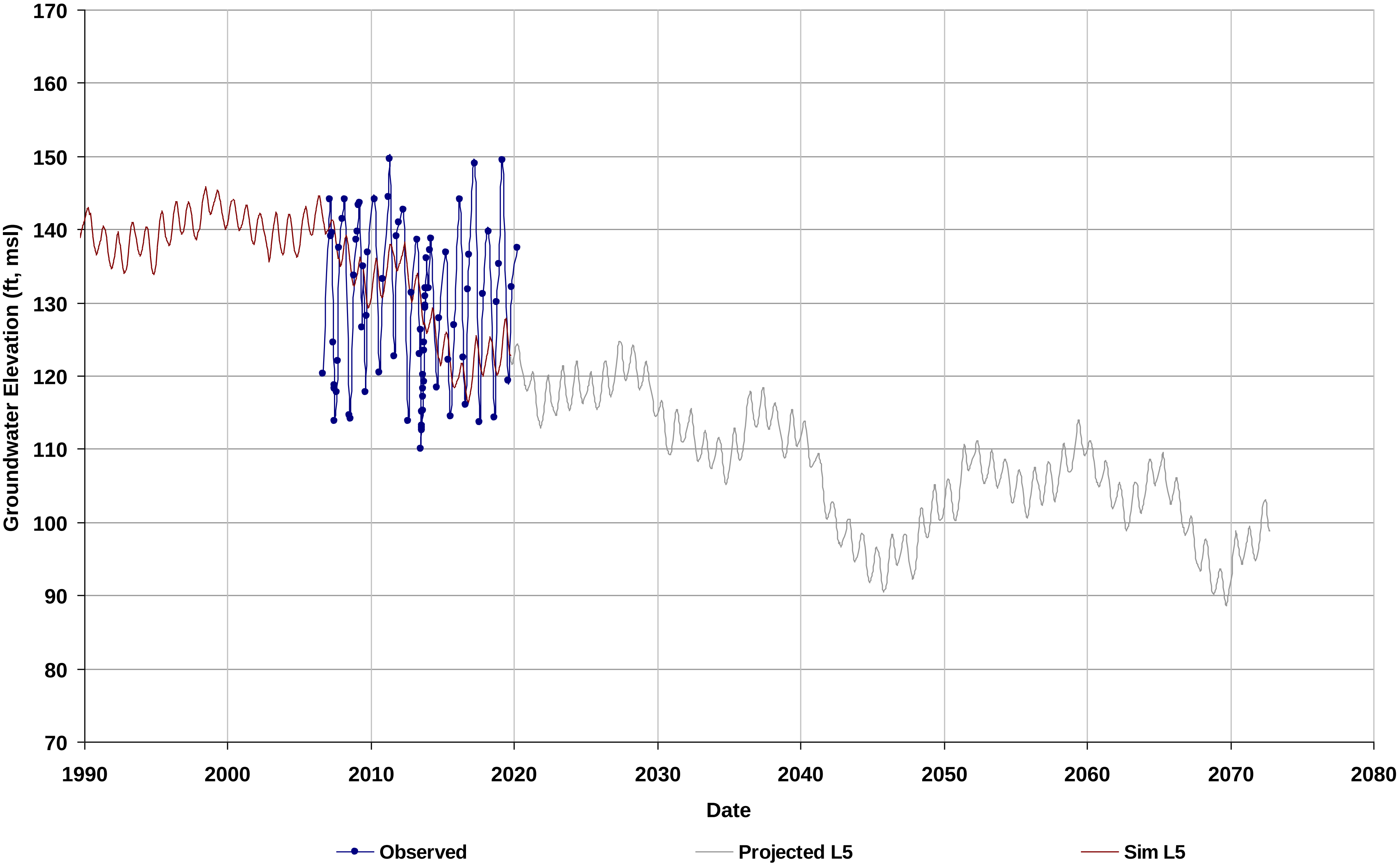
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

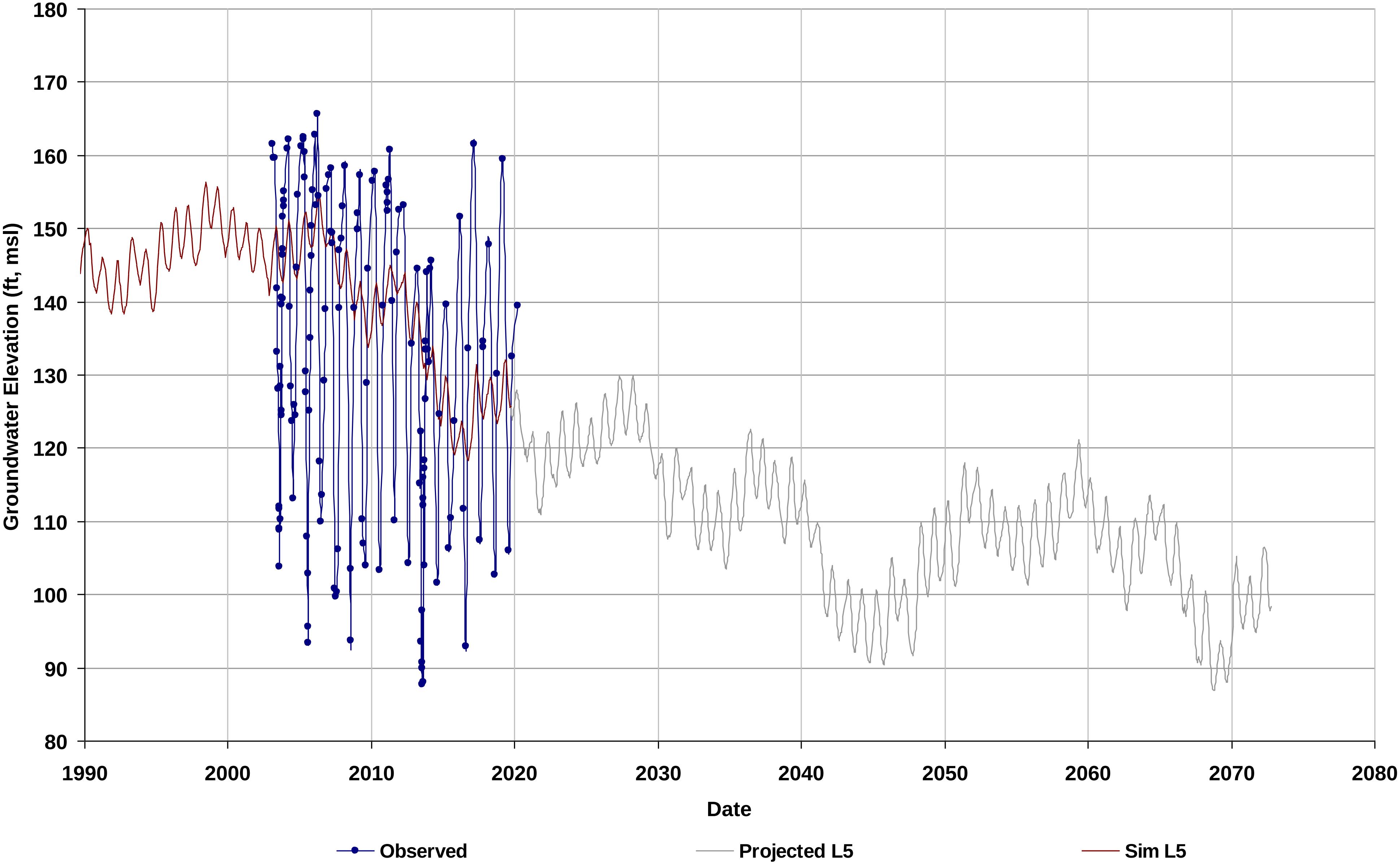
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

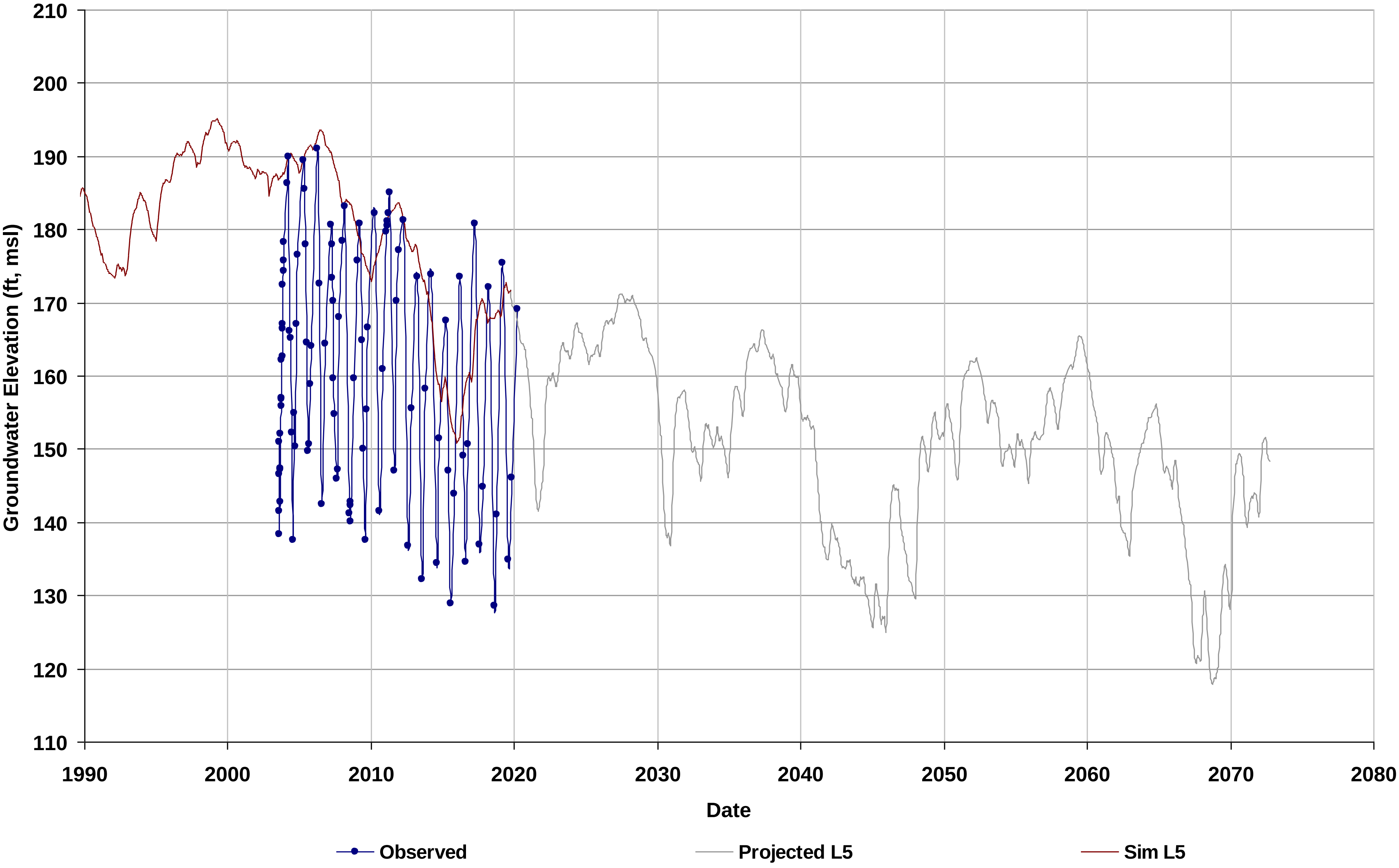
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

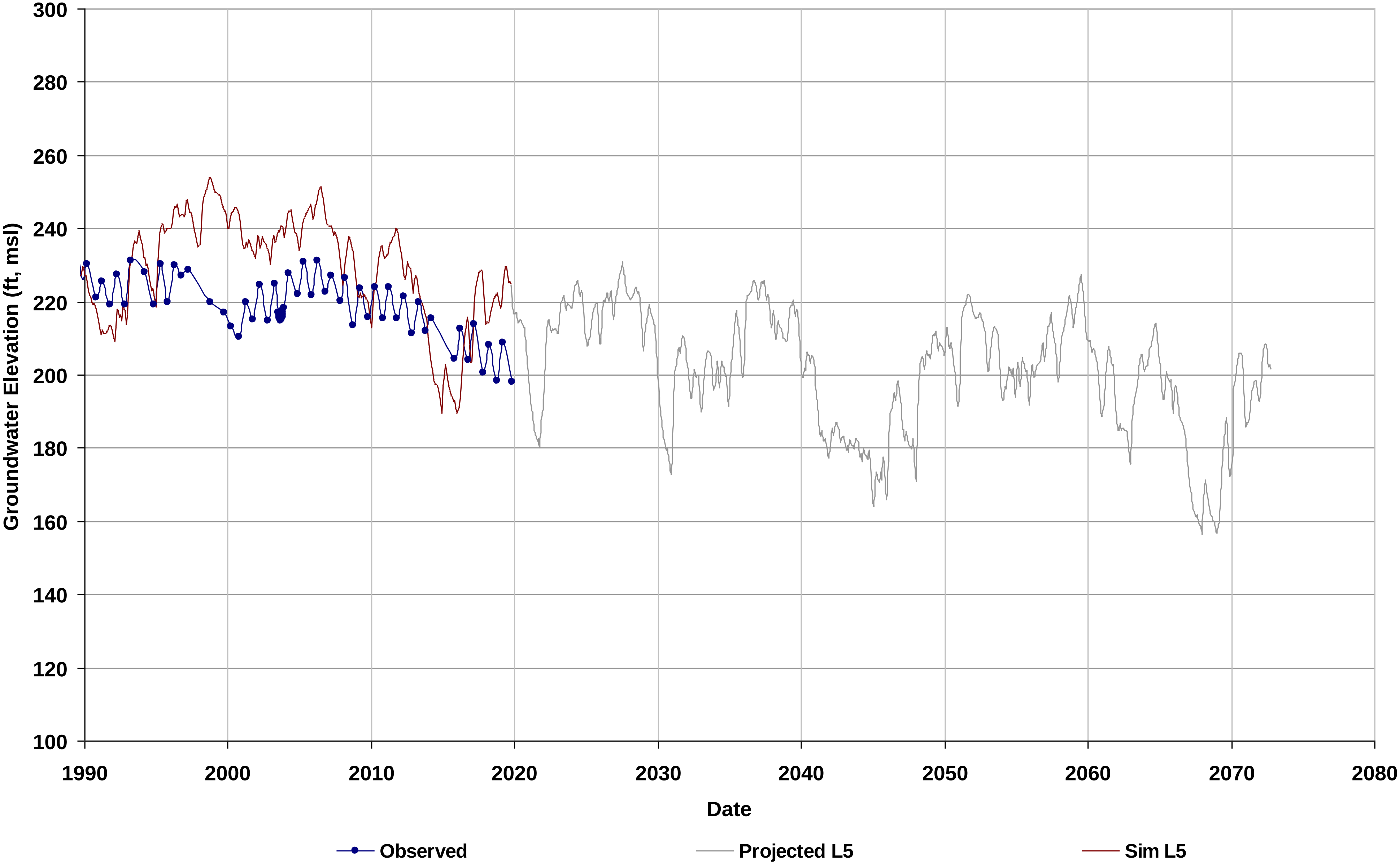
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

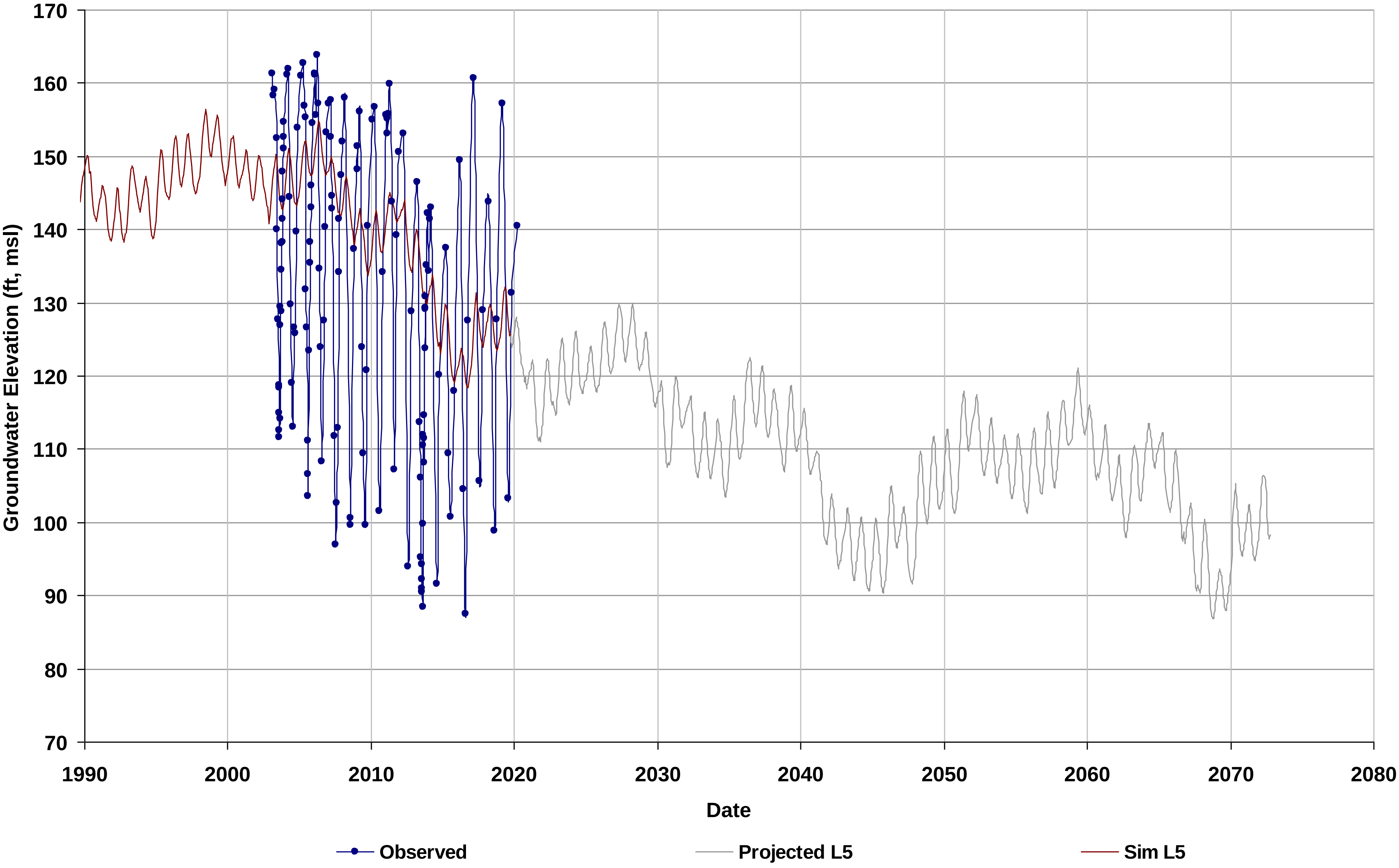
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

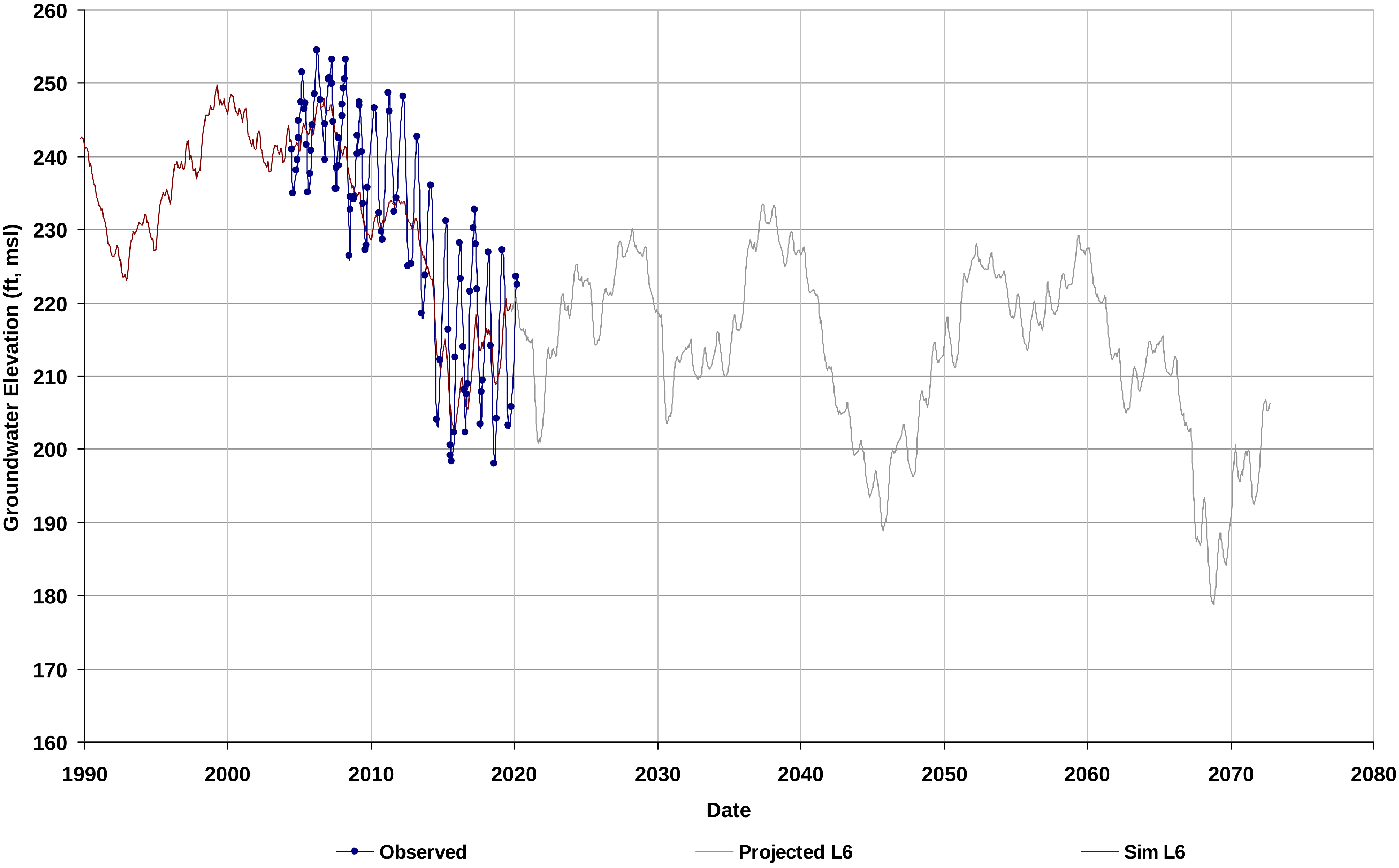
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

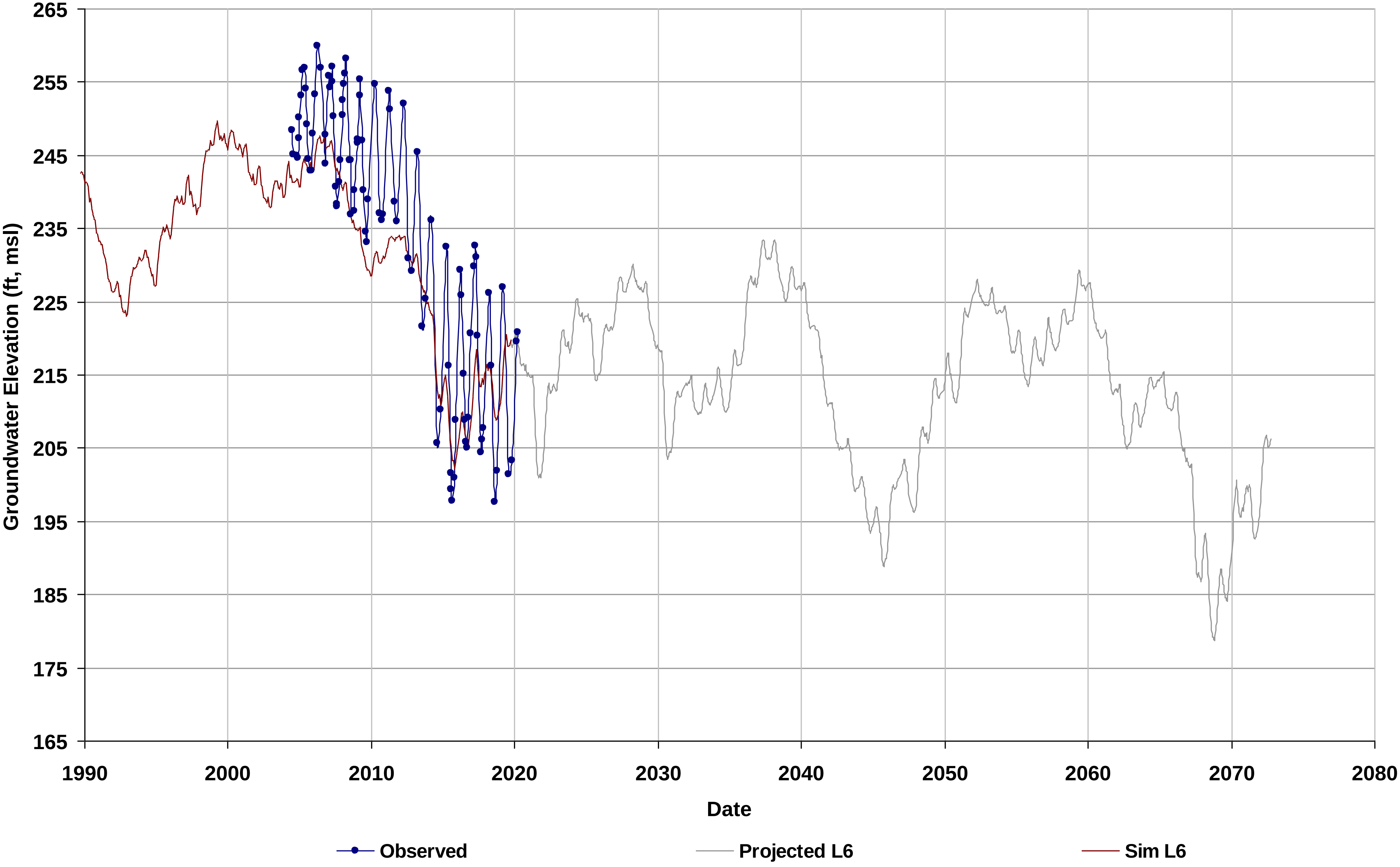
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

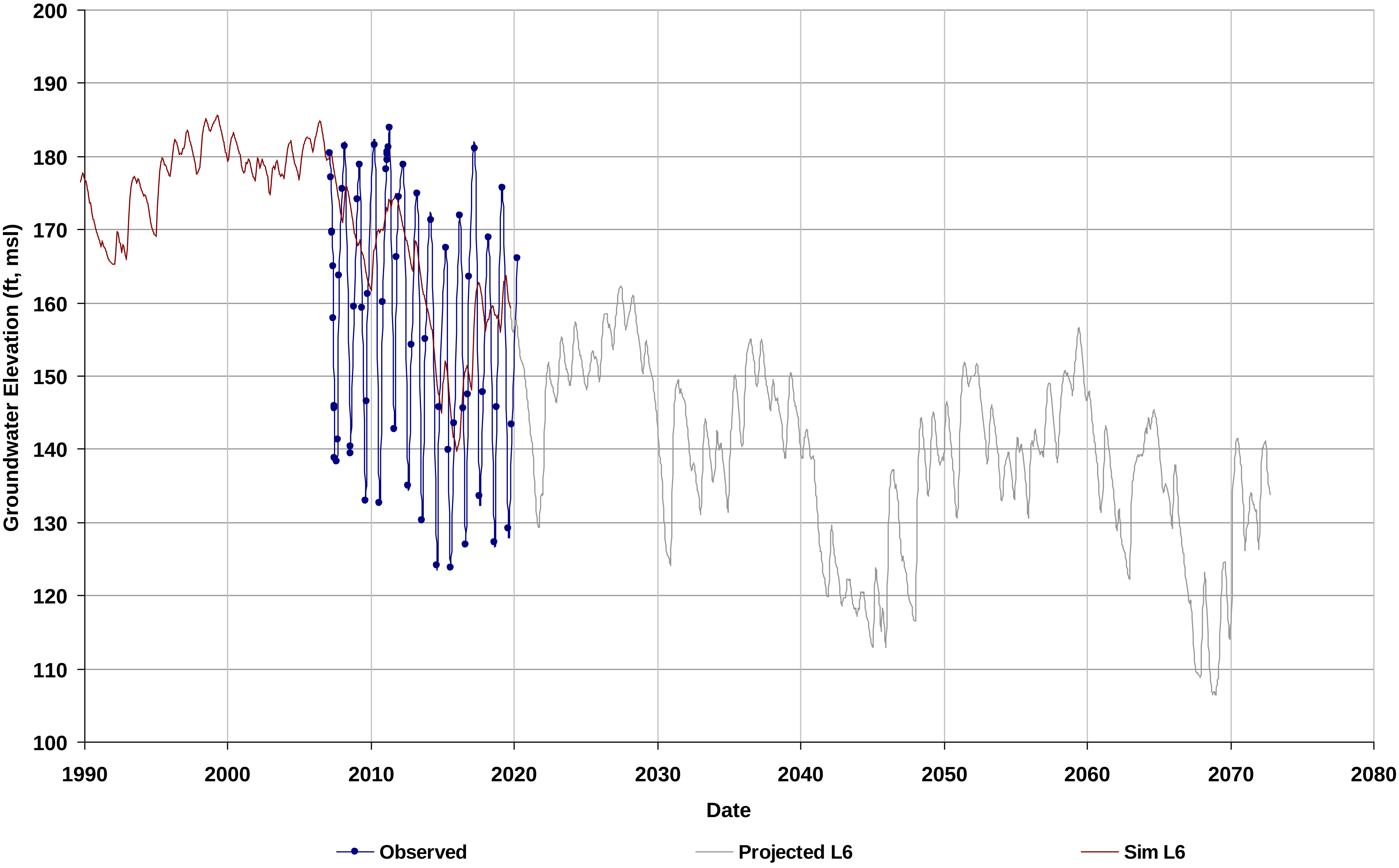
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

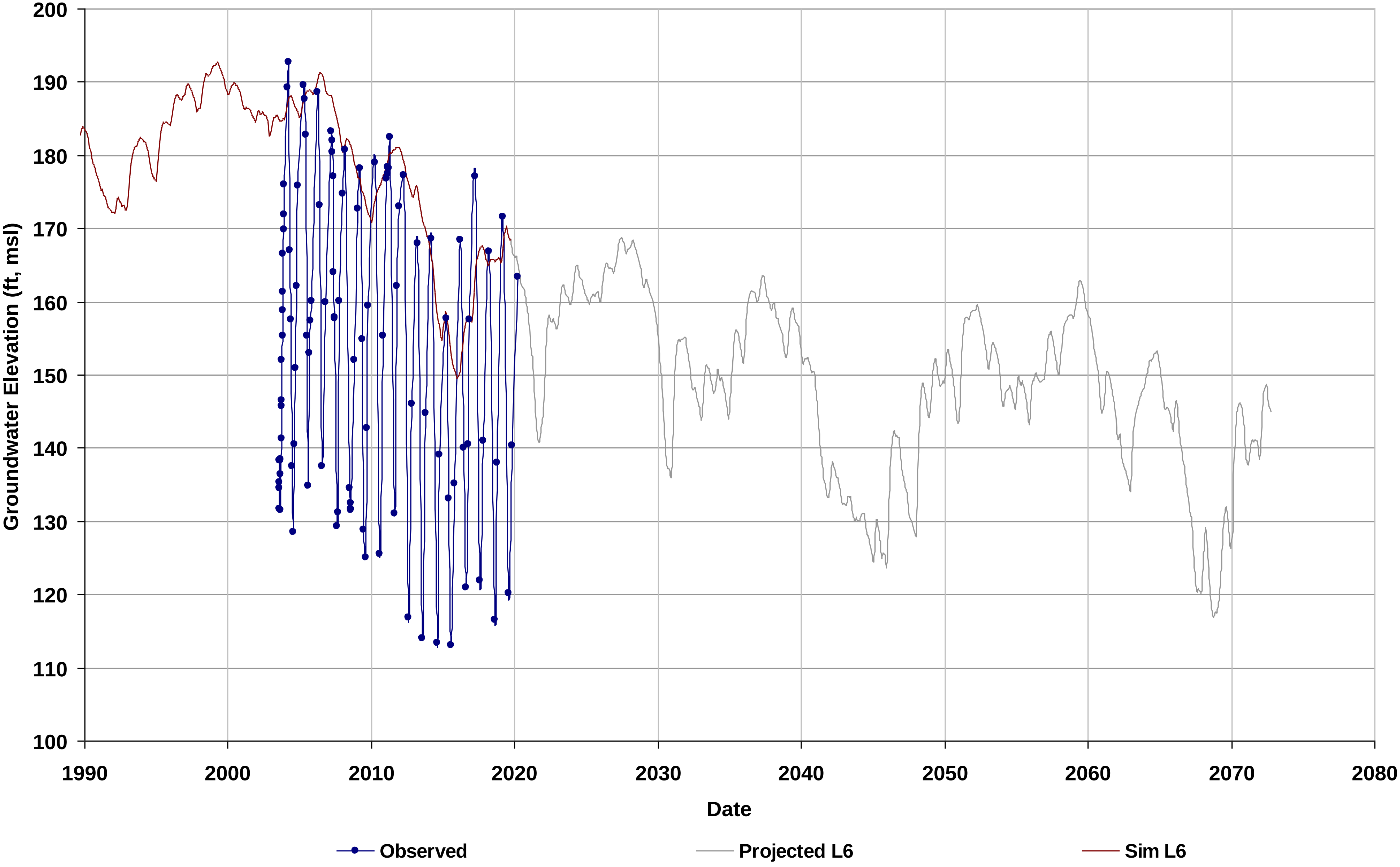
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

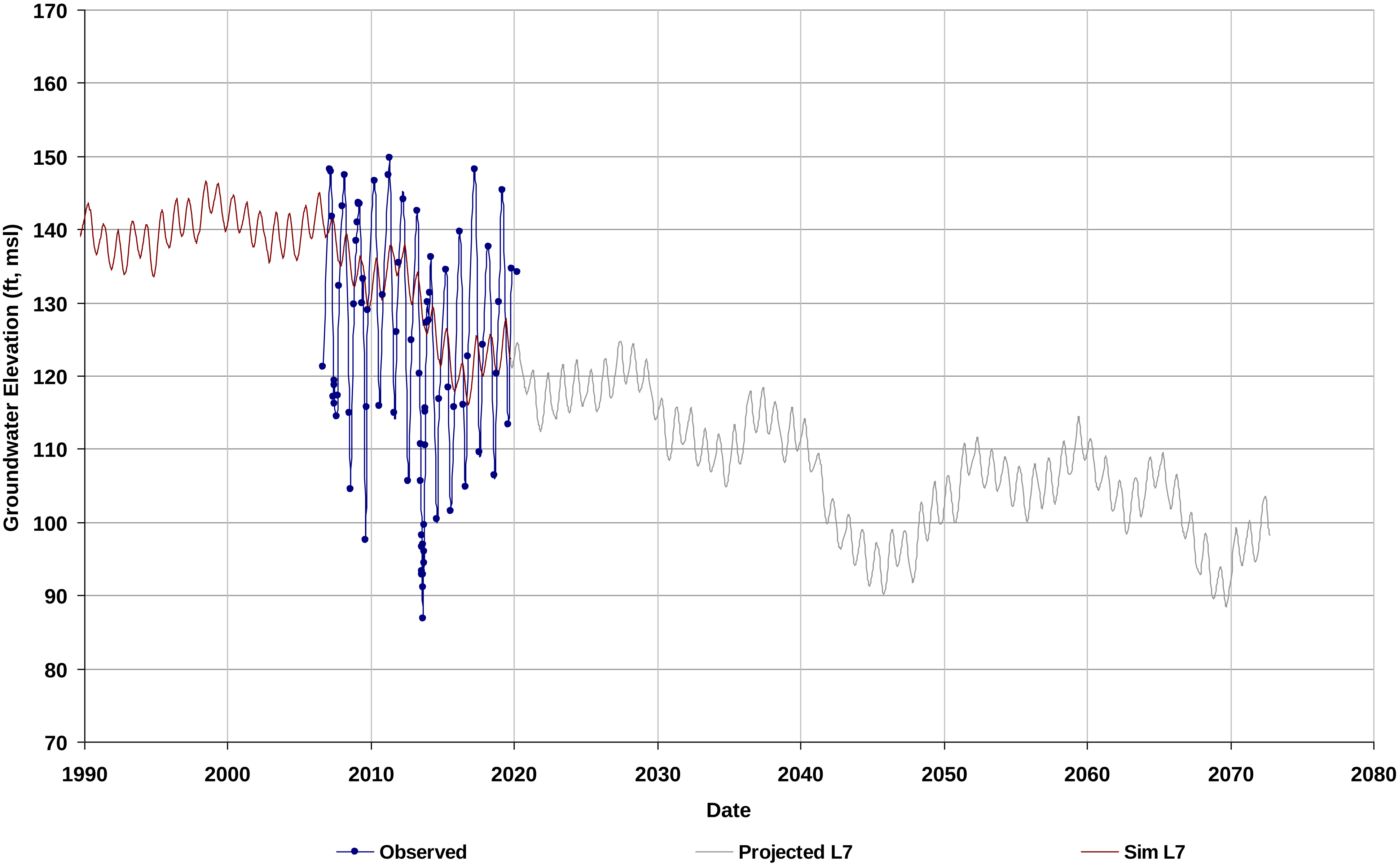
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

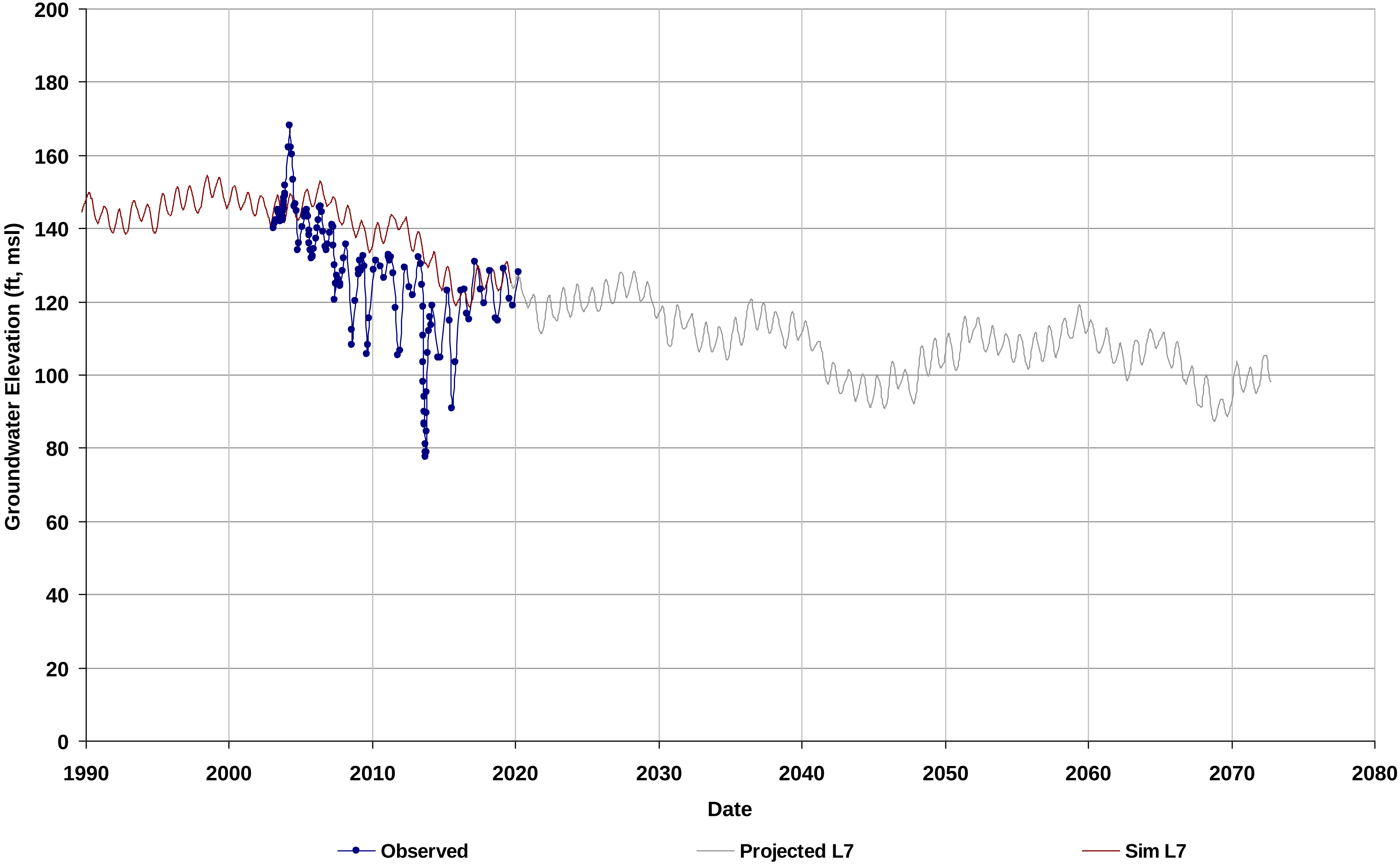
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

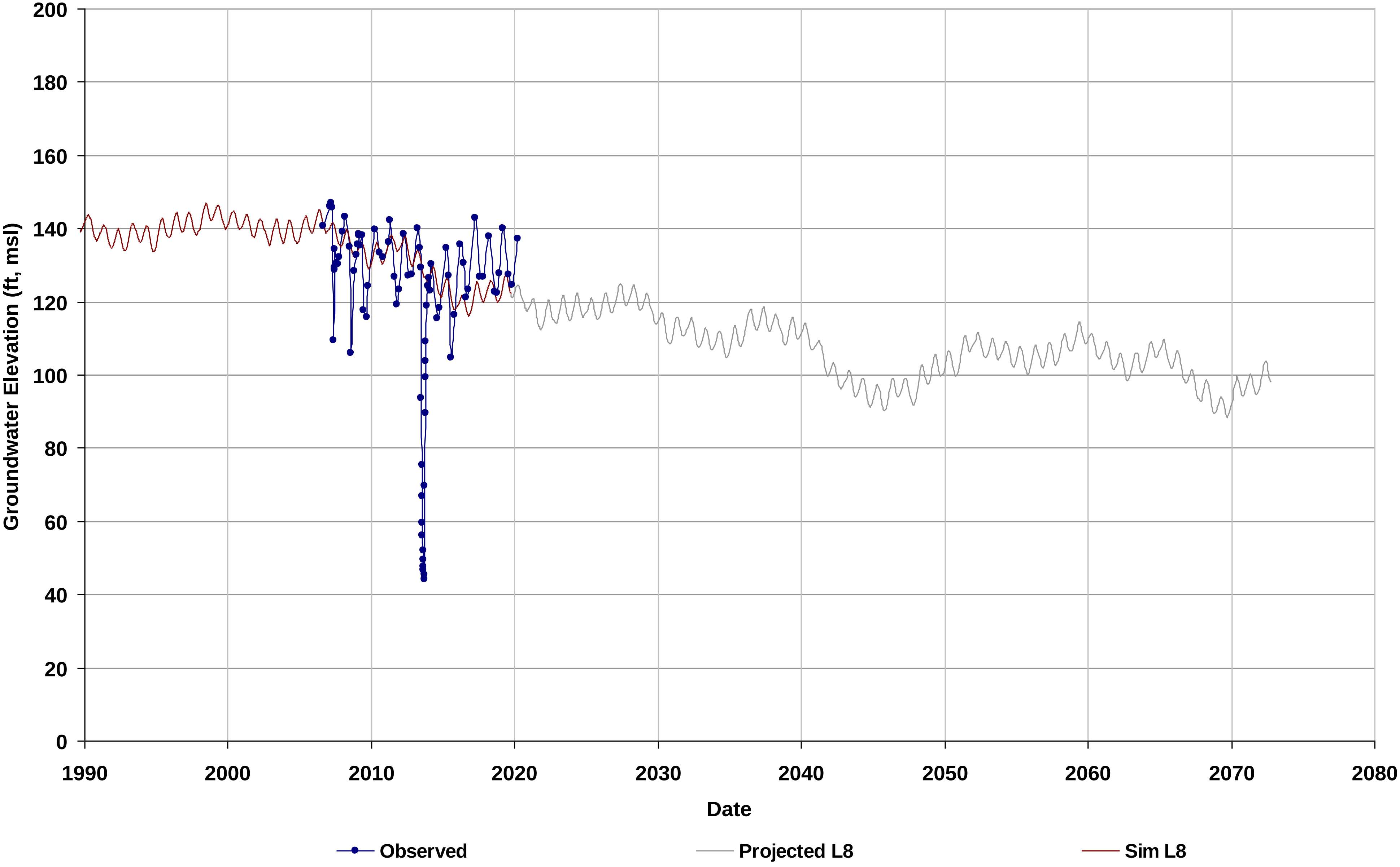
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

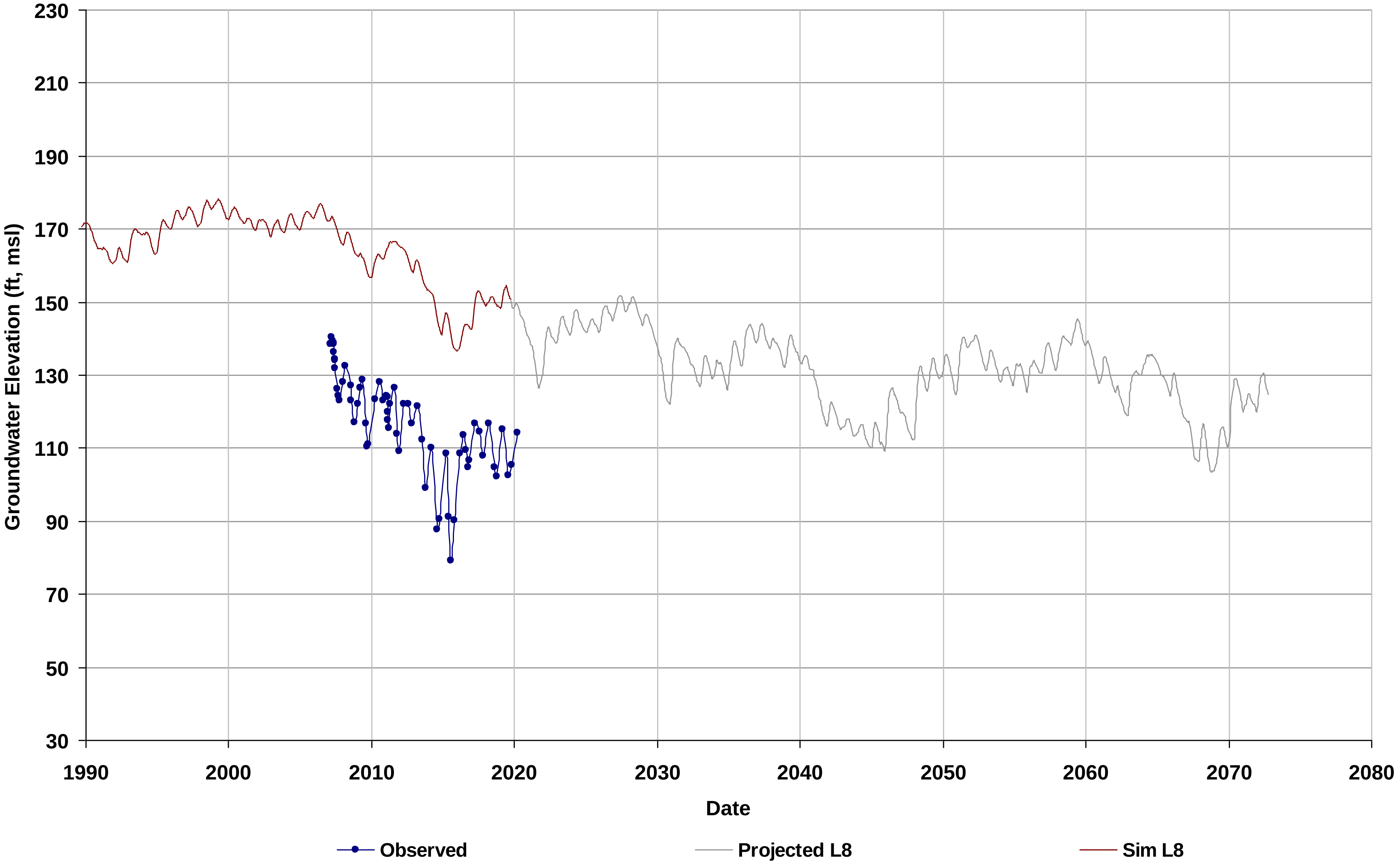
Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use)

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

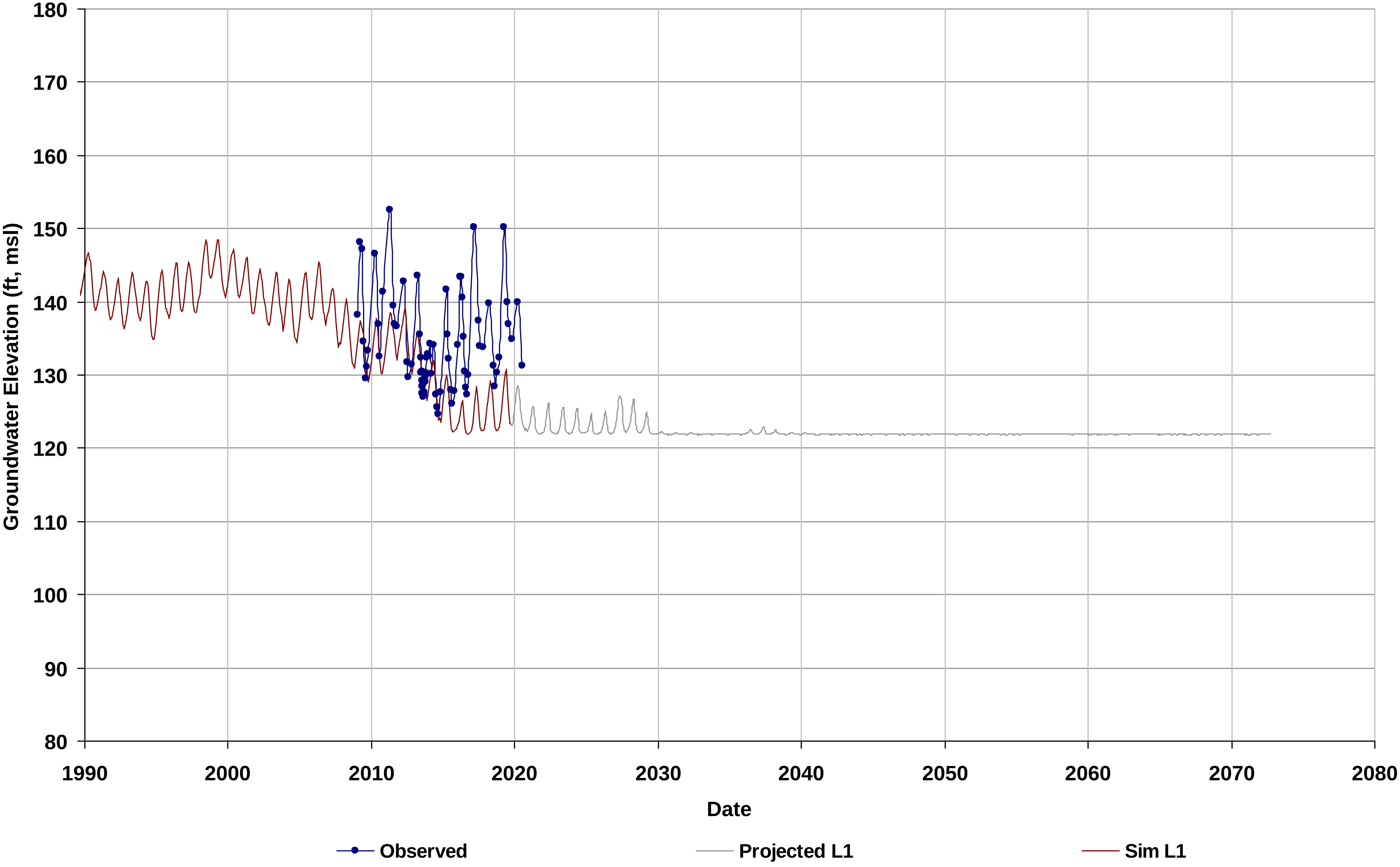
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use)

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

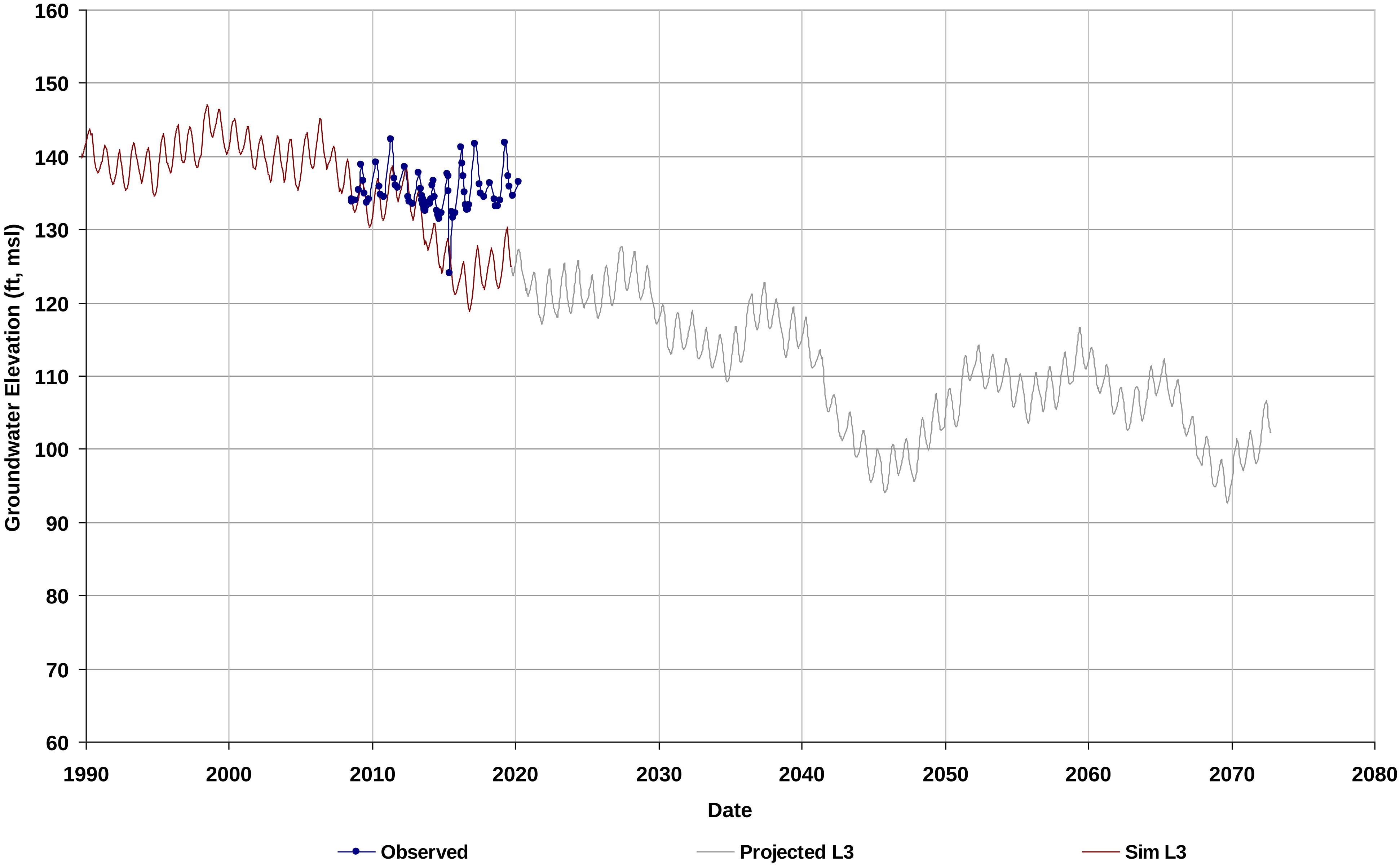
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use)

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

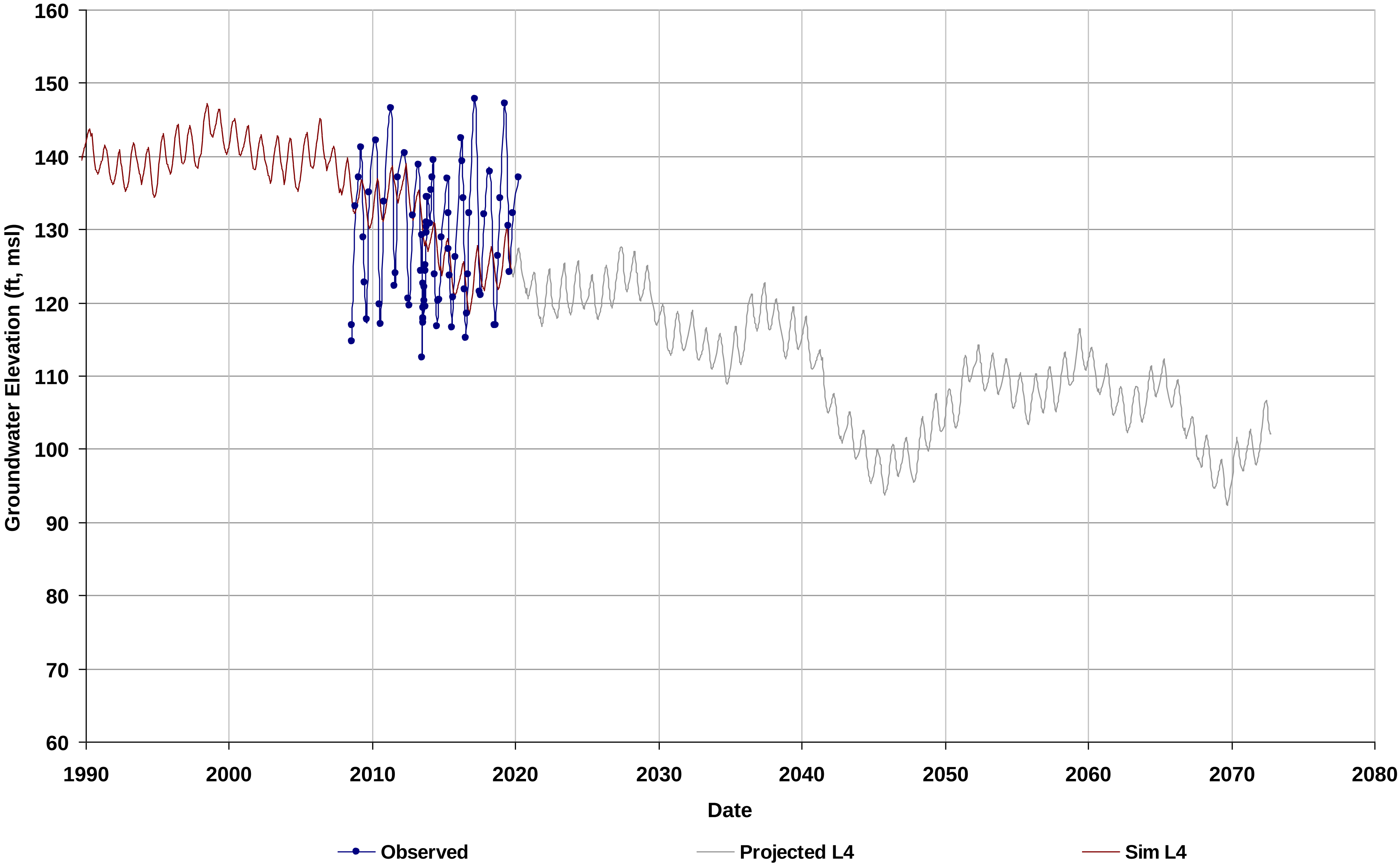
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

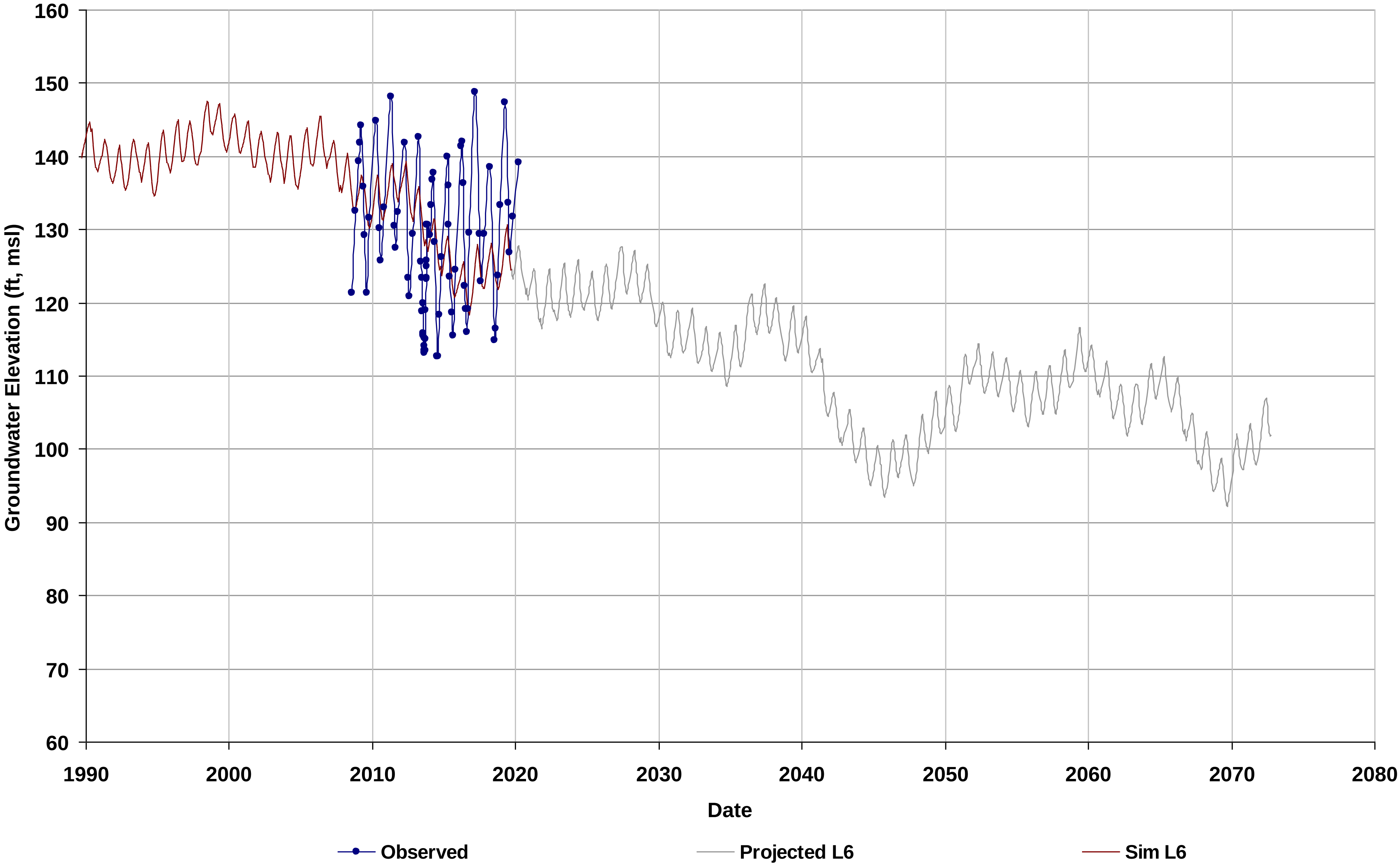
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

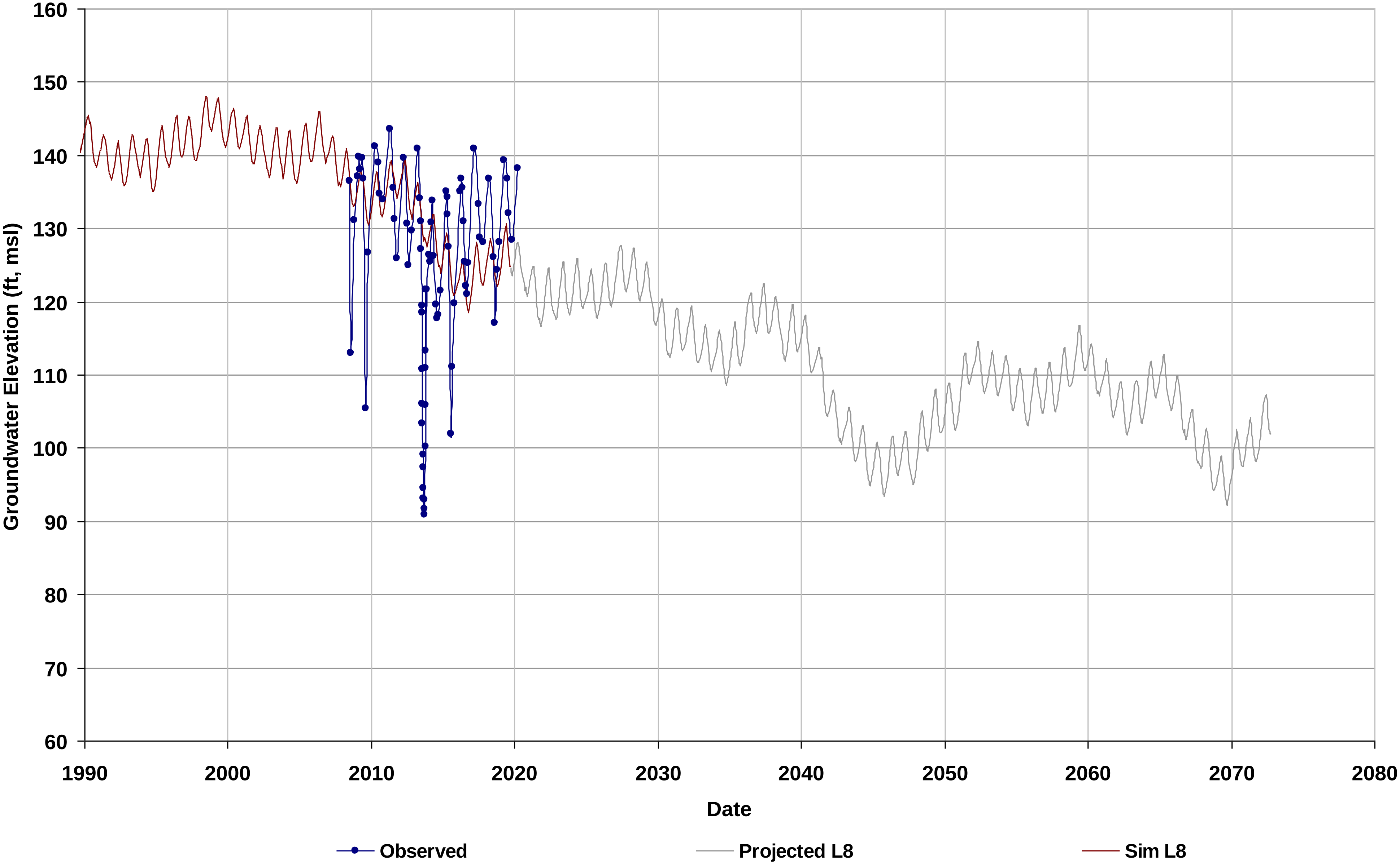
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

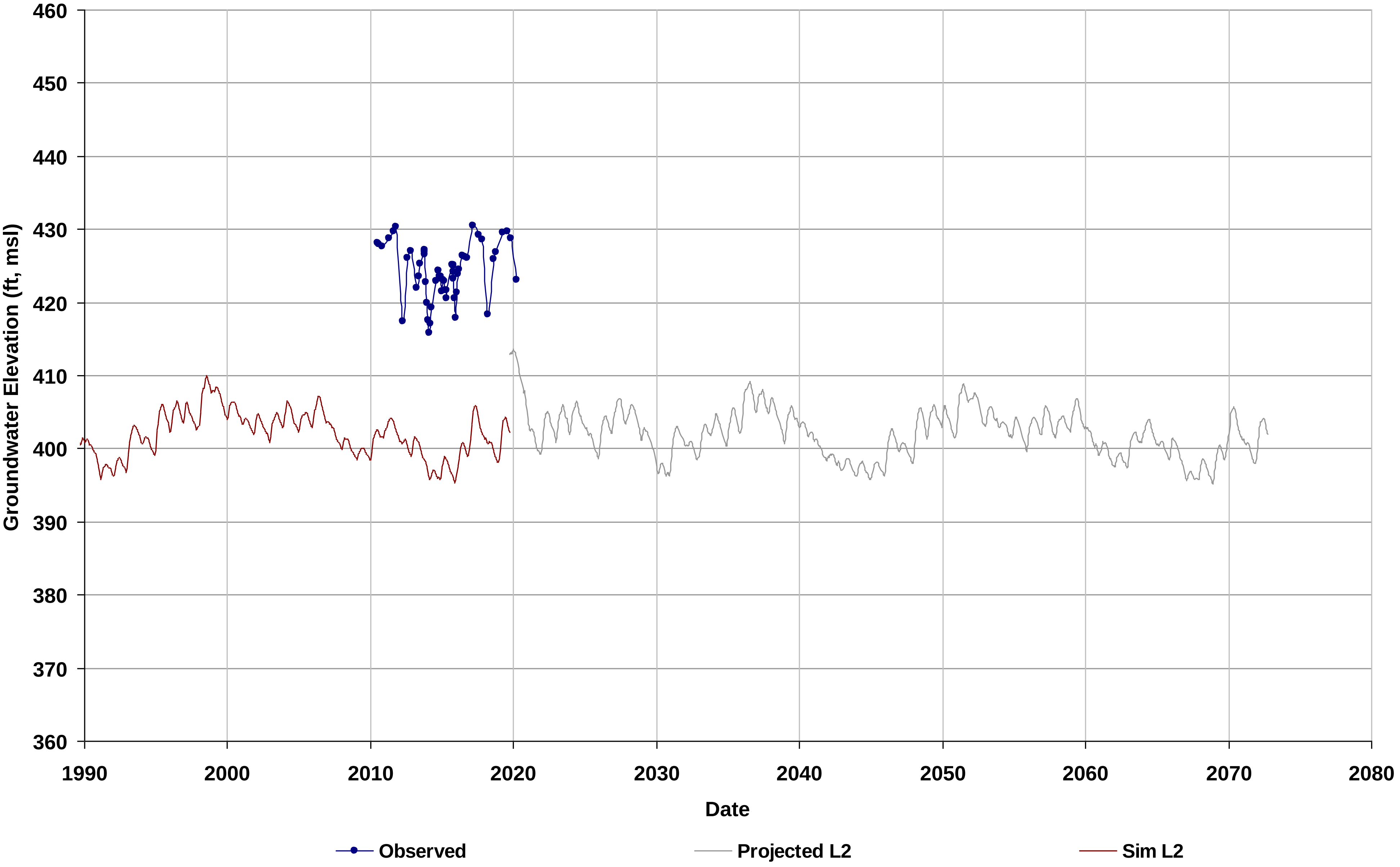
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

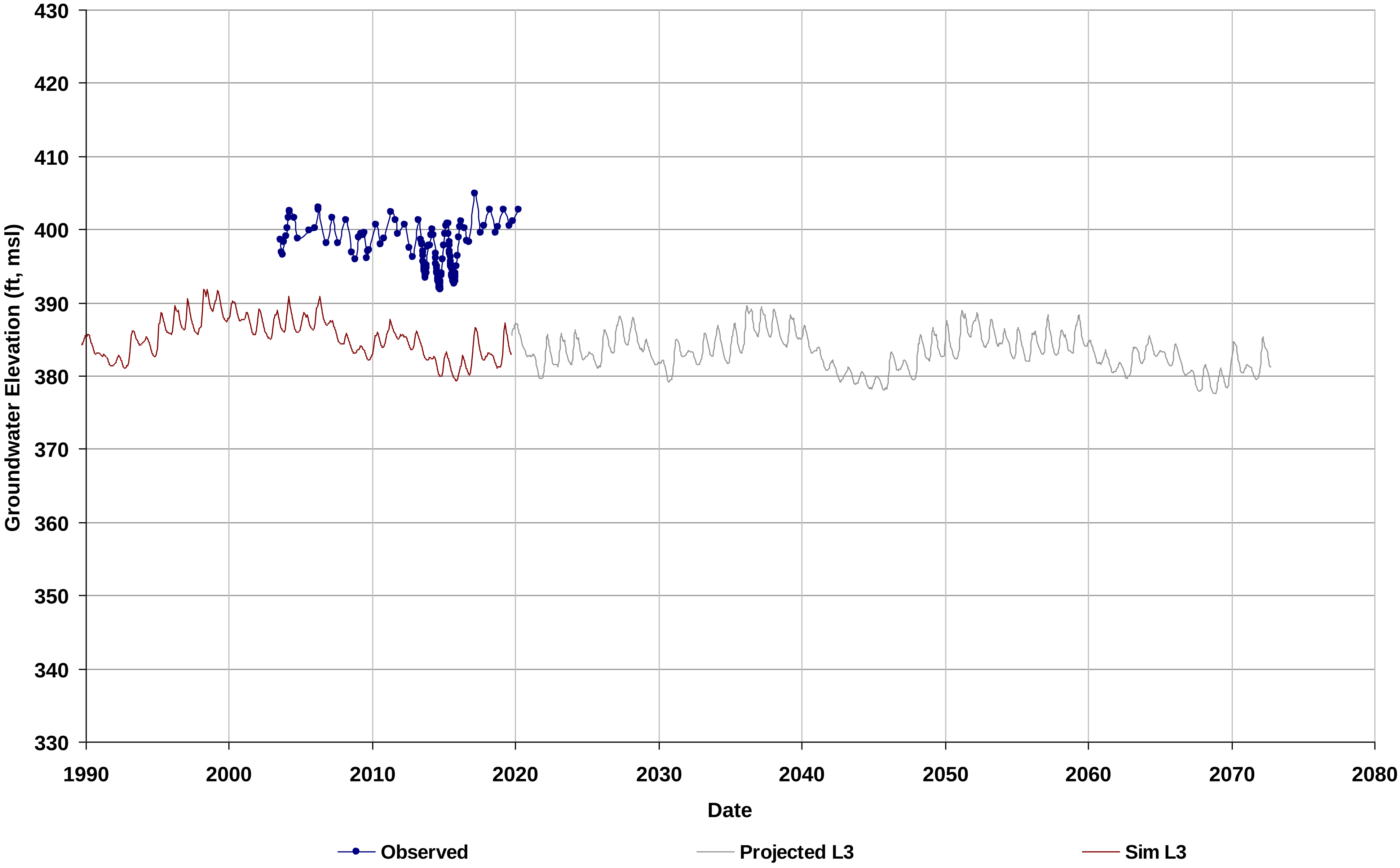
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use)

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

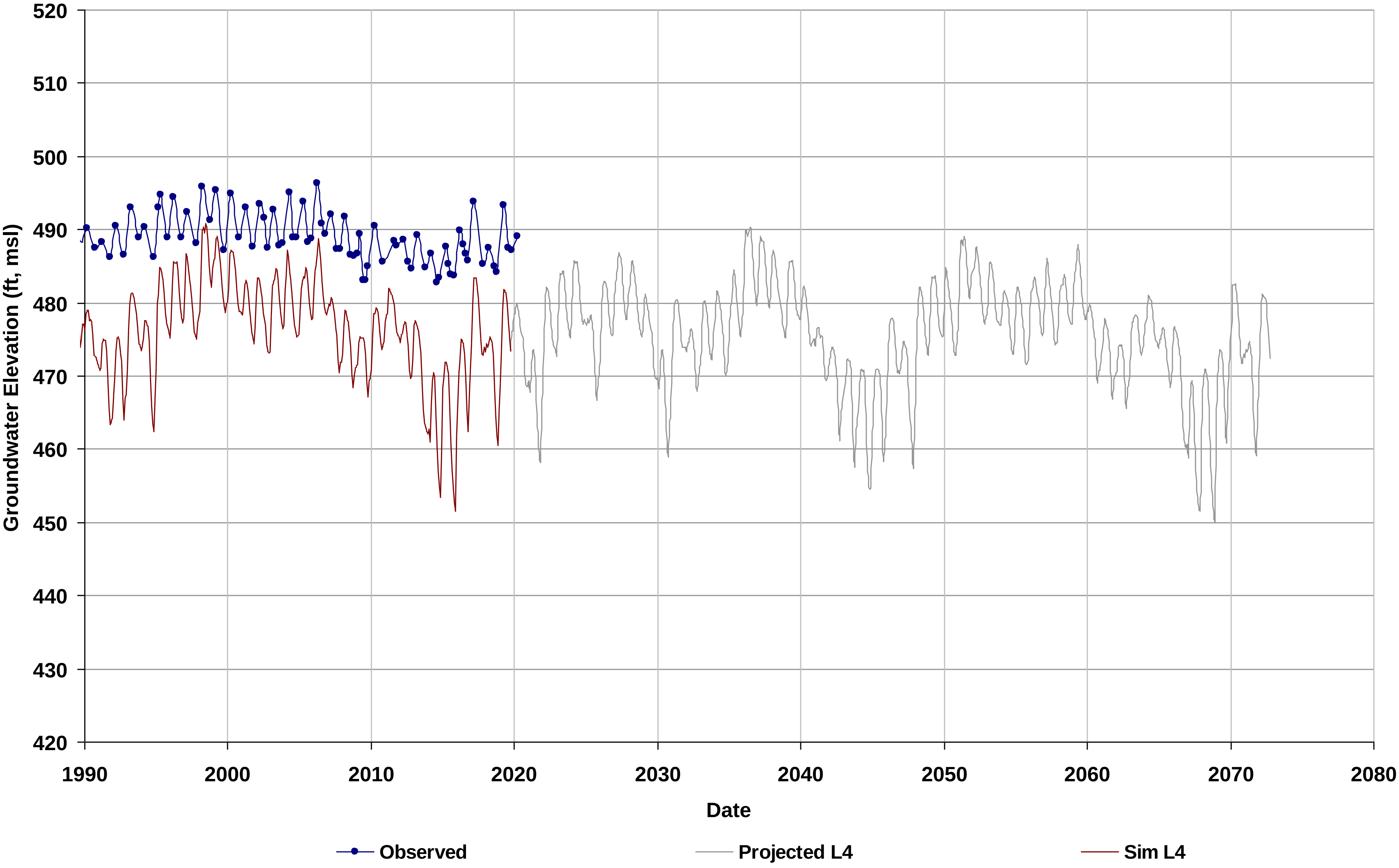
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use)

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

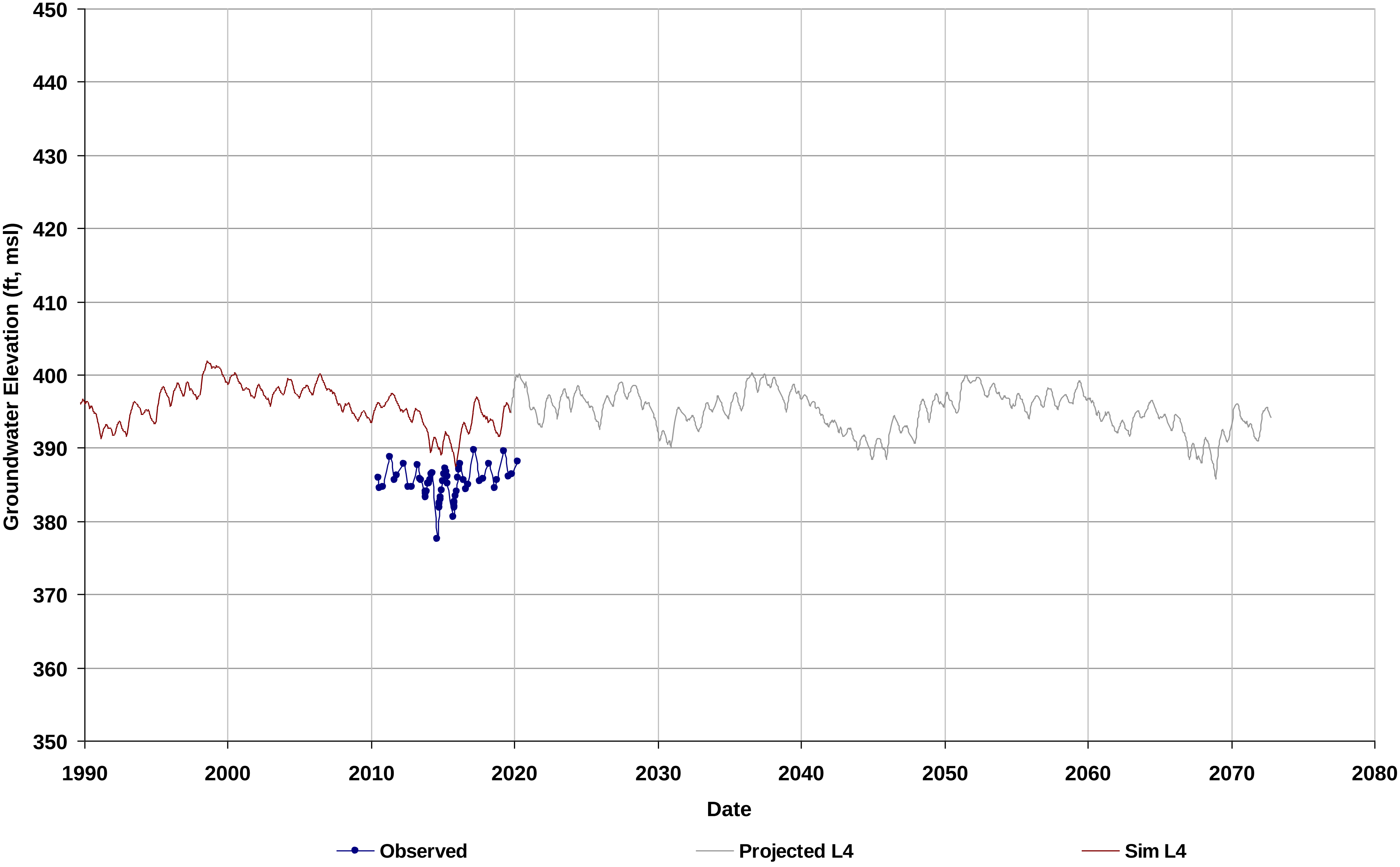
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

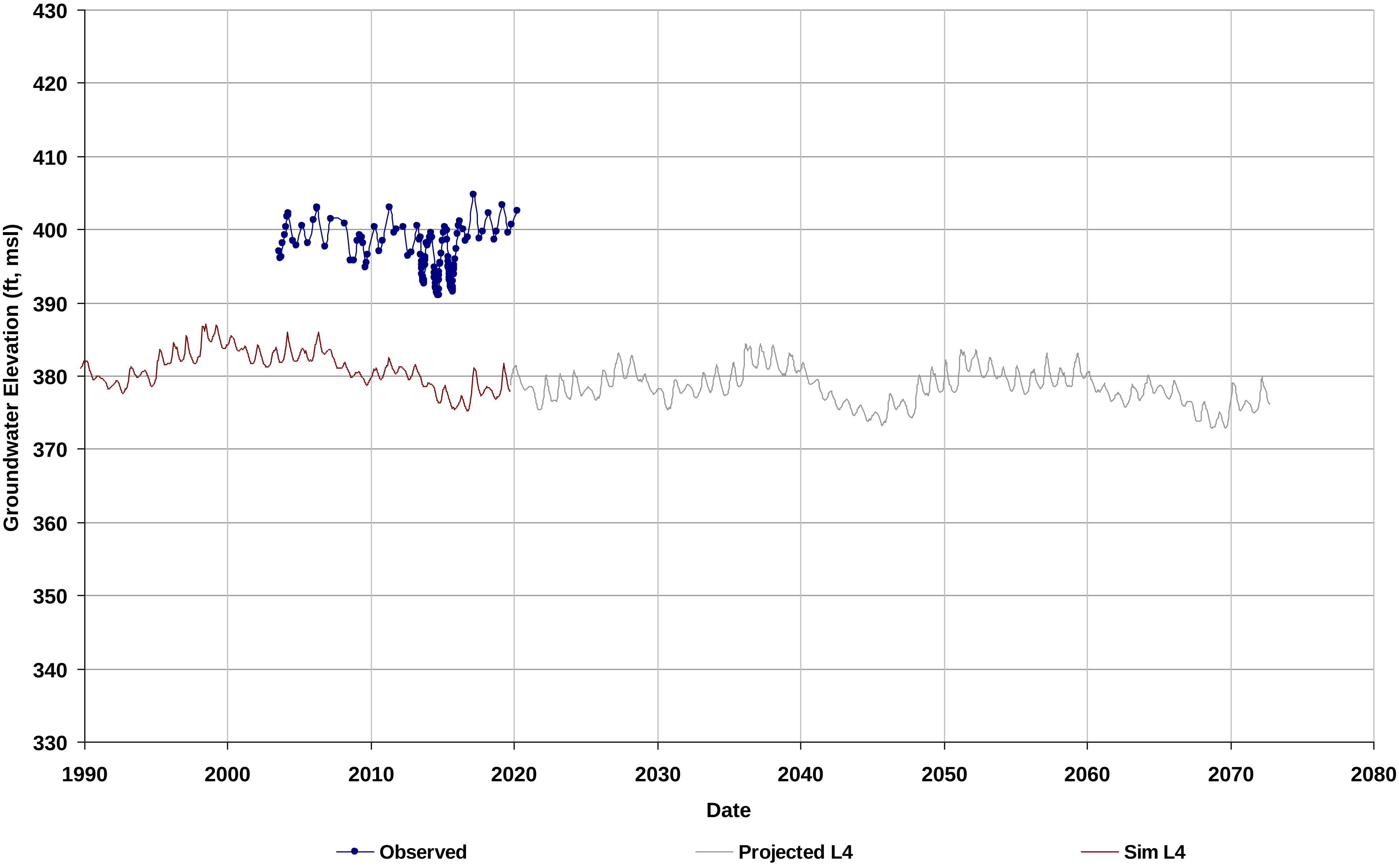
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

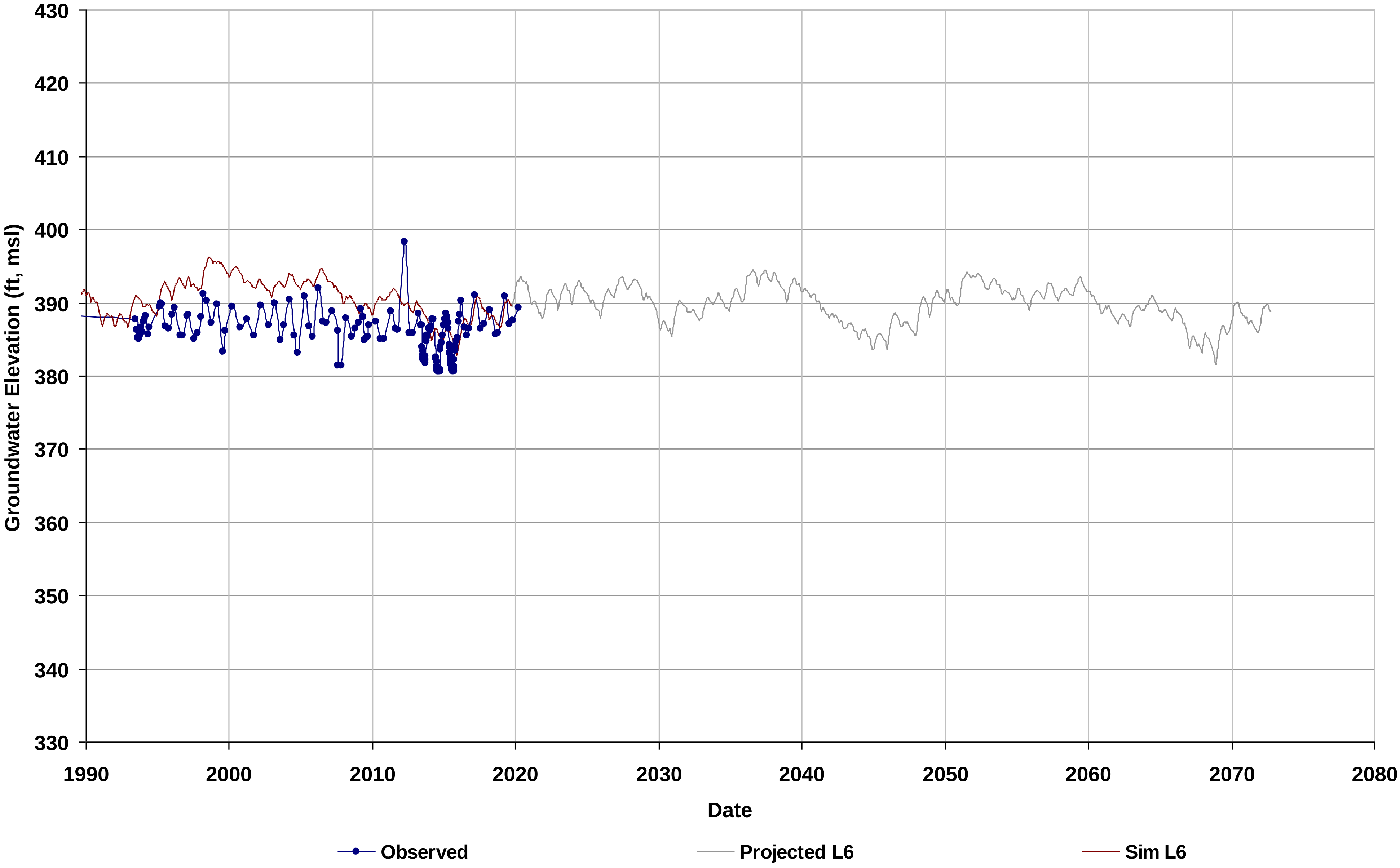
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

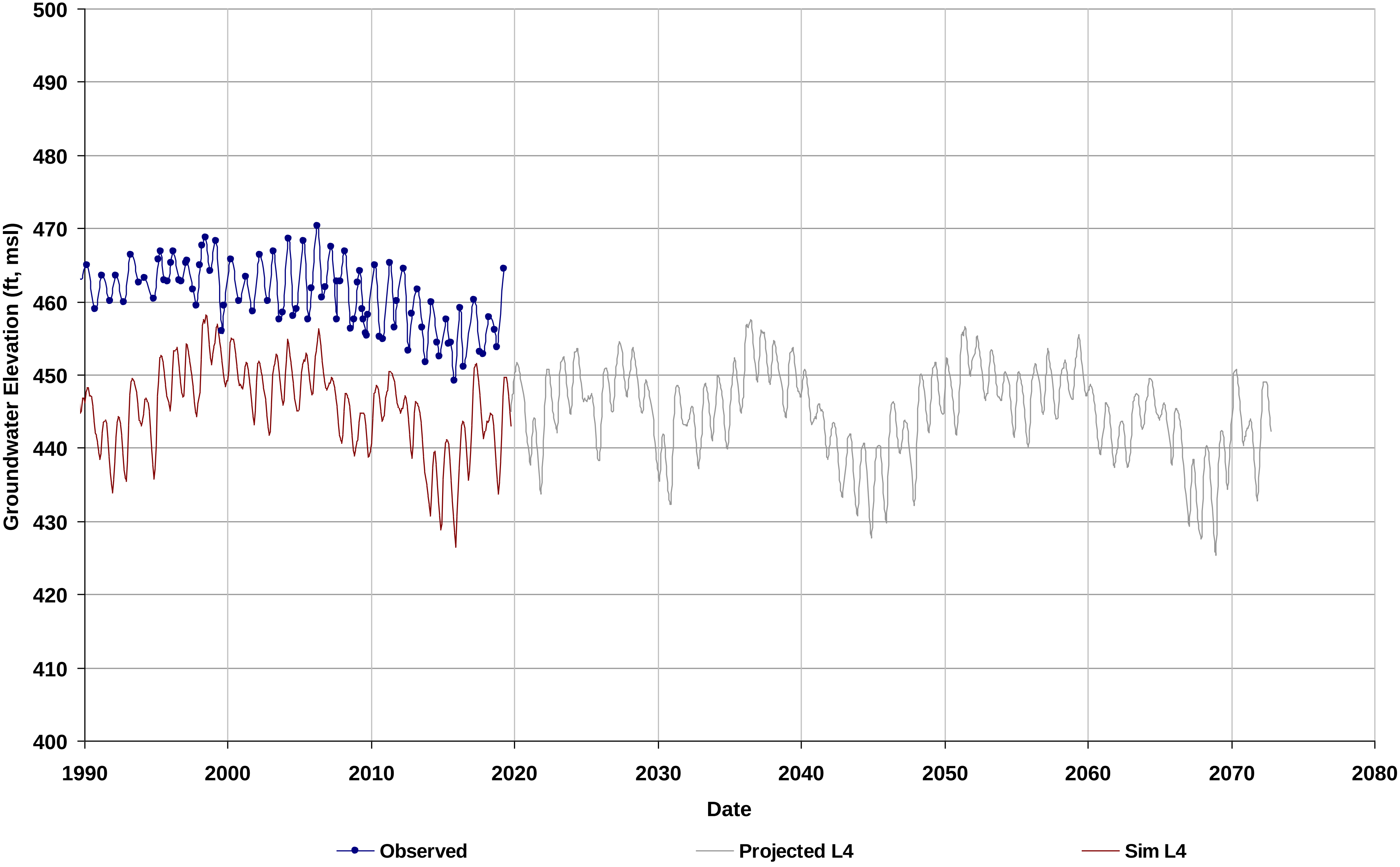
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

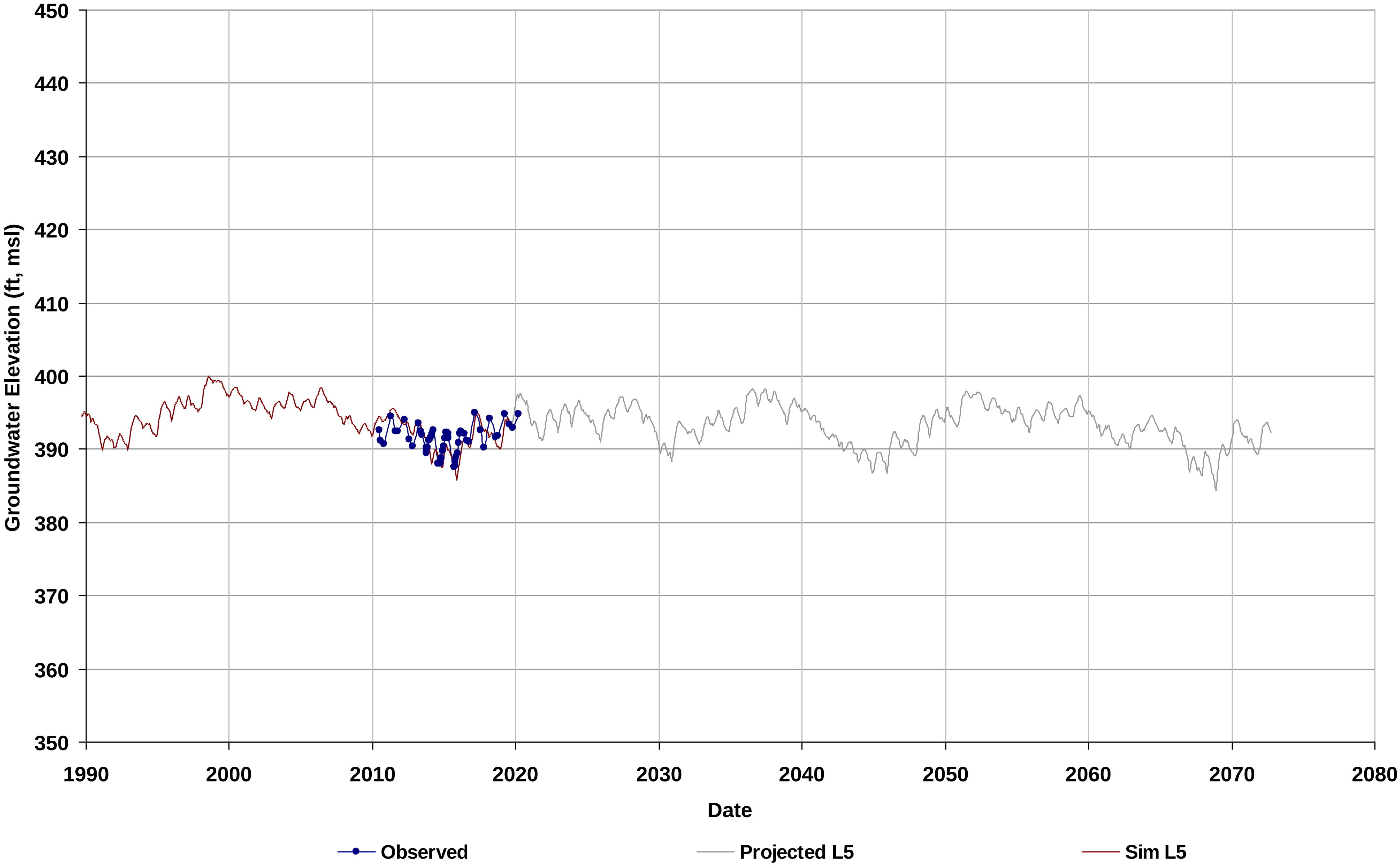
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

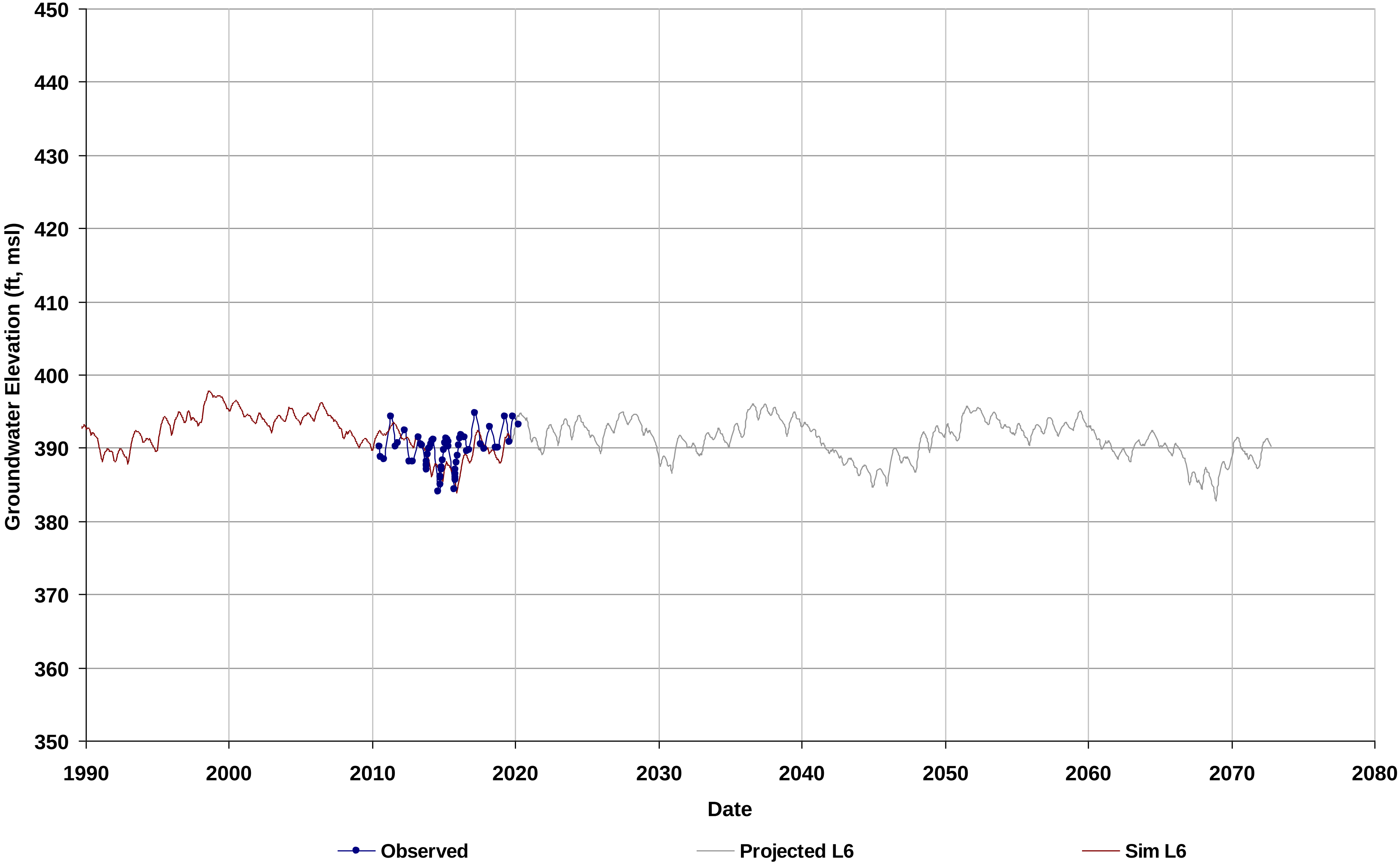
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

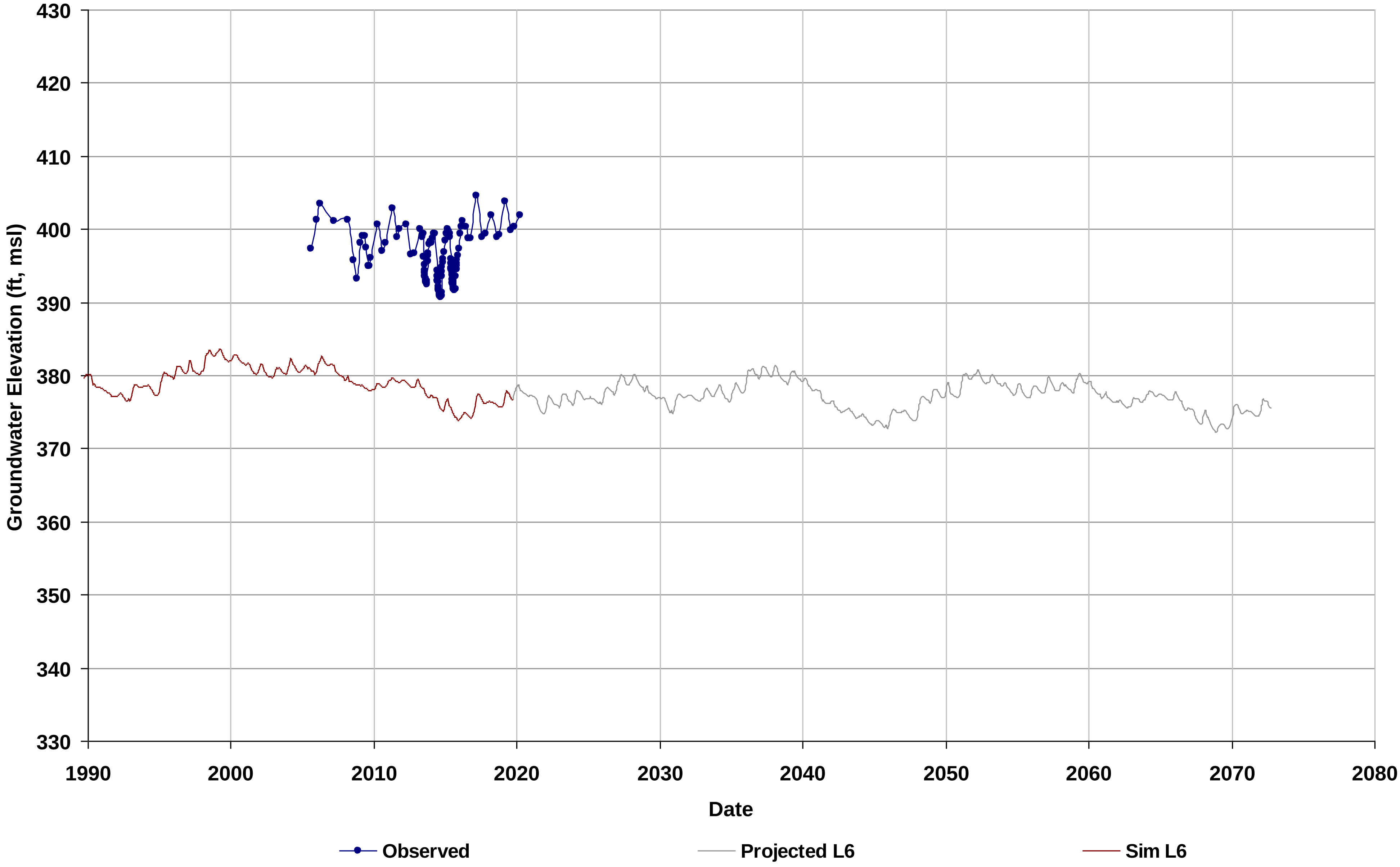
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

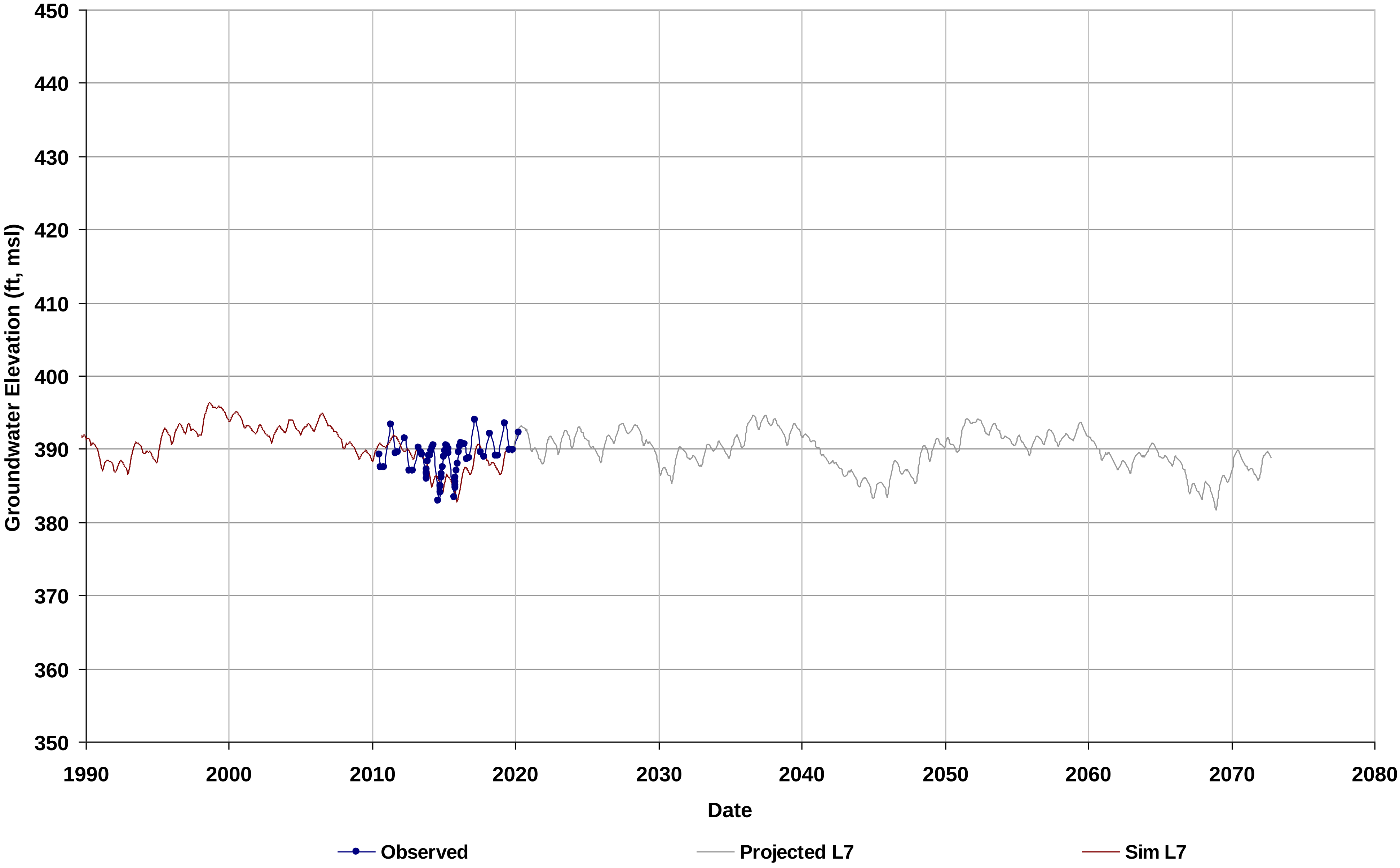
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use)

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use)

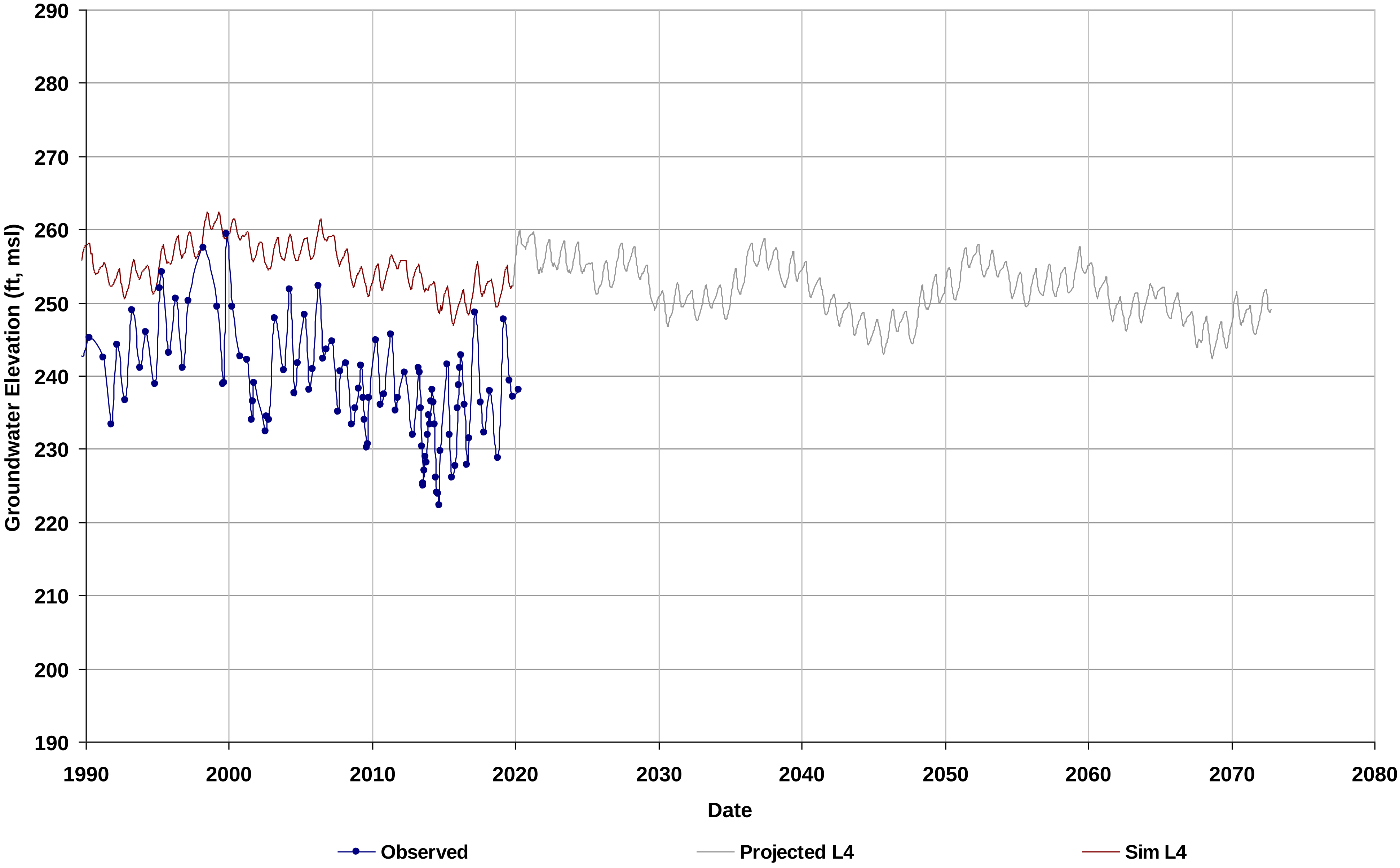
APPENDIX E-3

Tehama IHM Simulated Groundwater Levels:

Projected (Future Land Use) Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

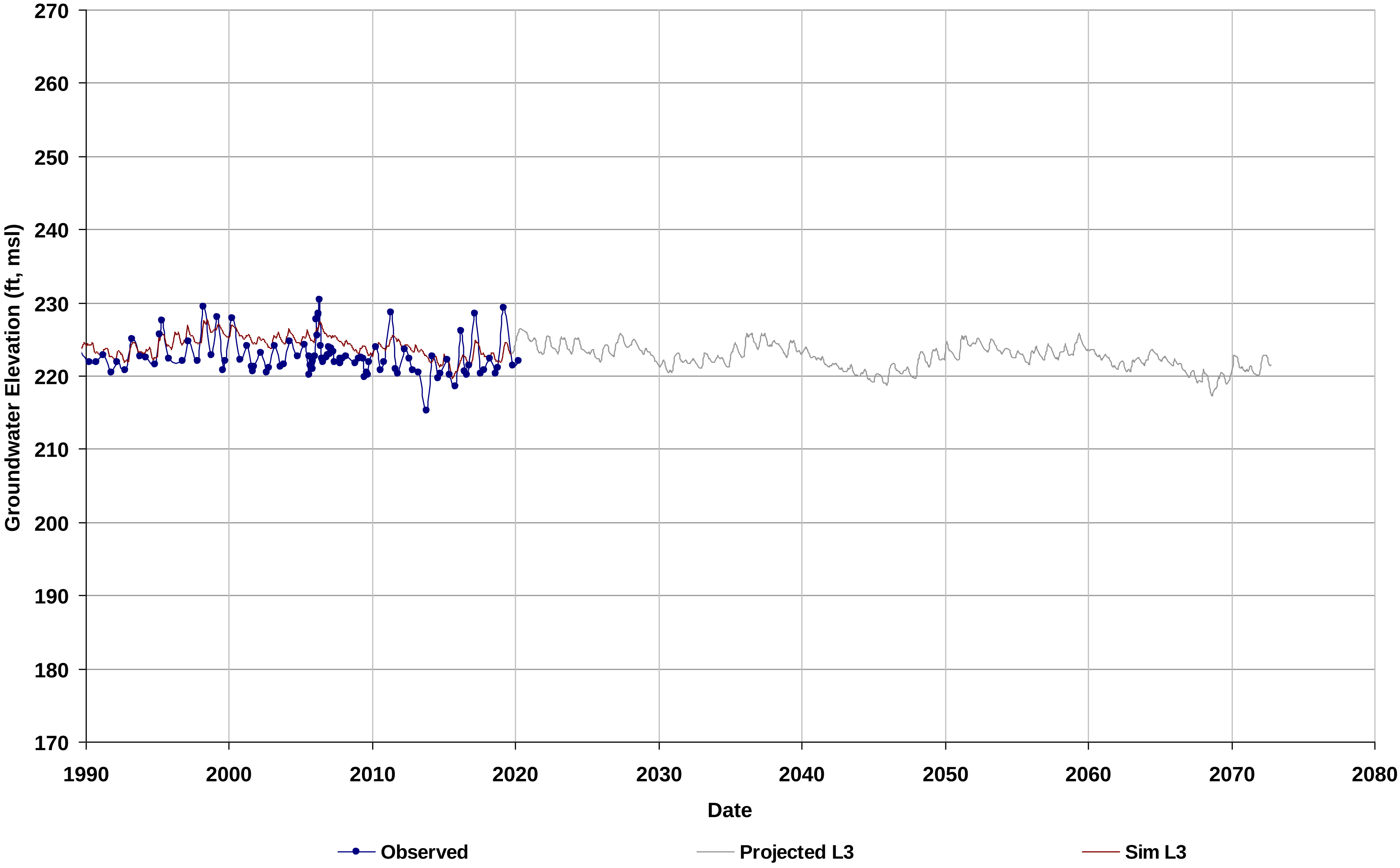
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

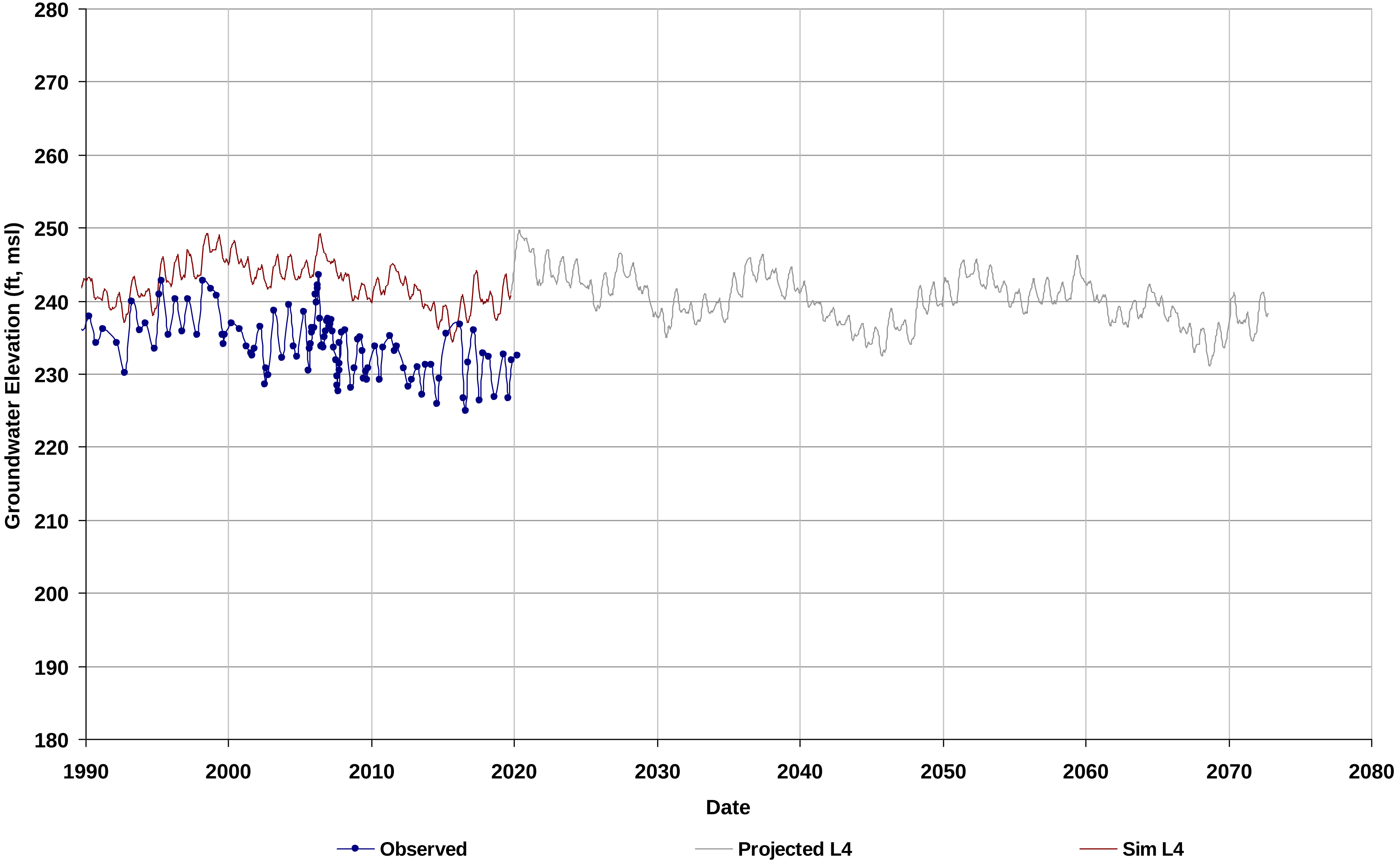
Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

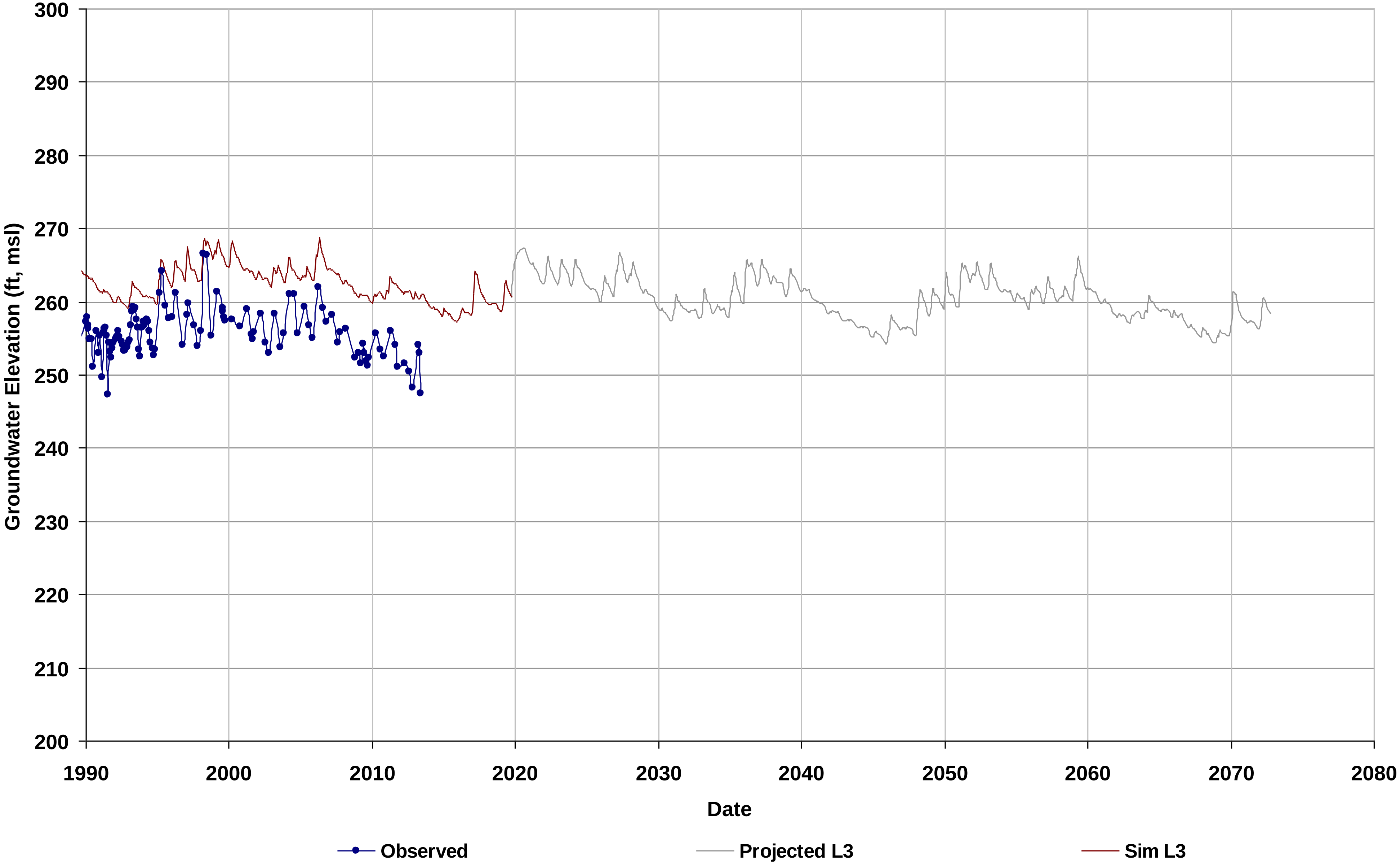
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

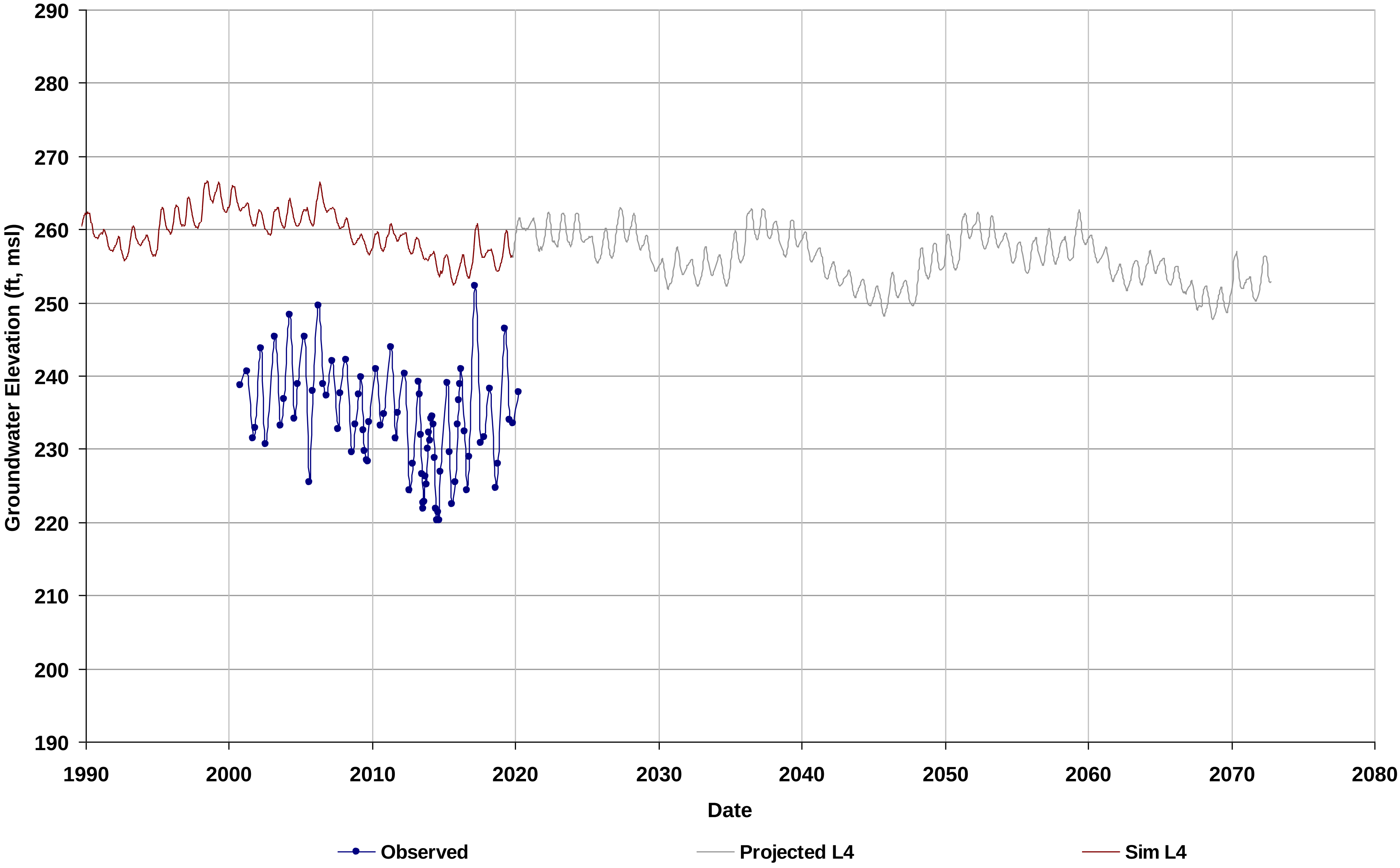
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

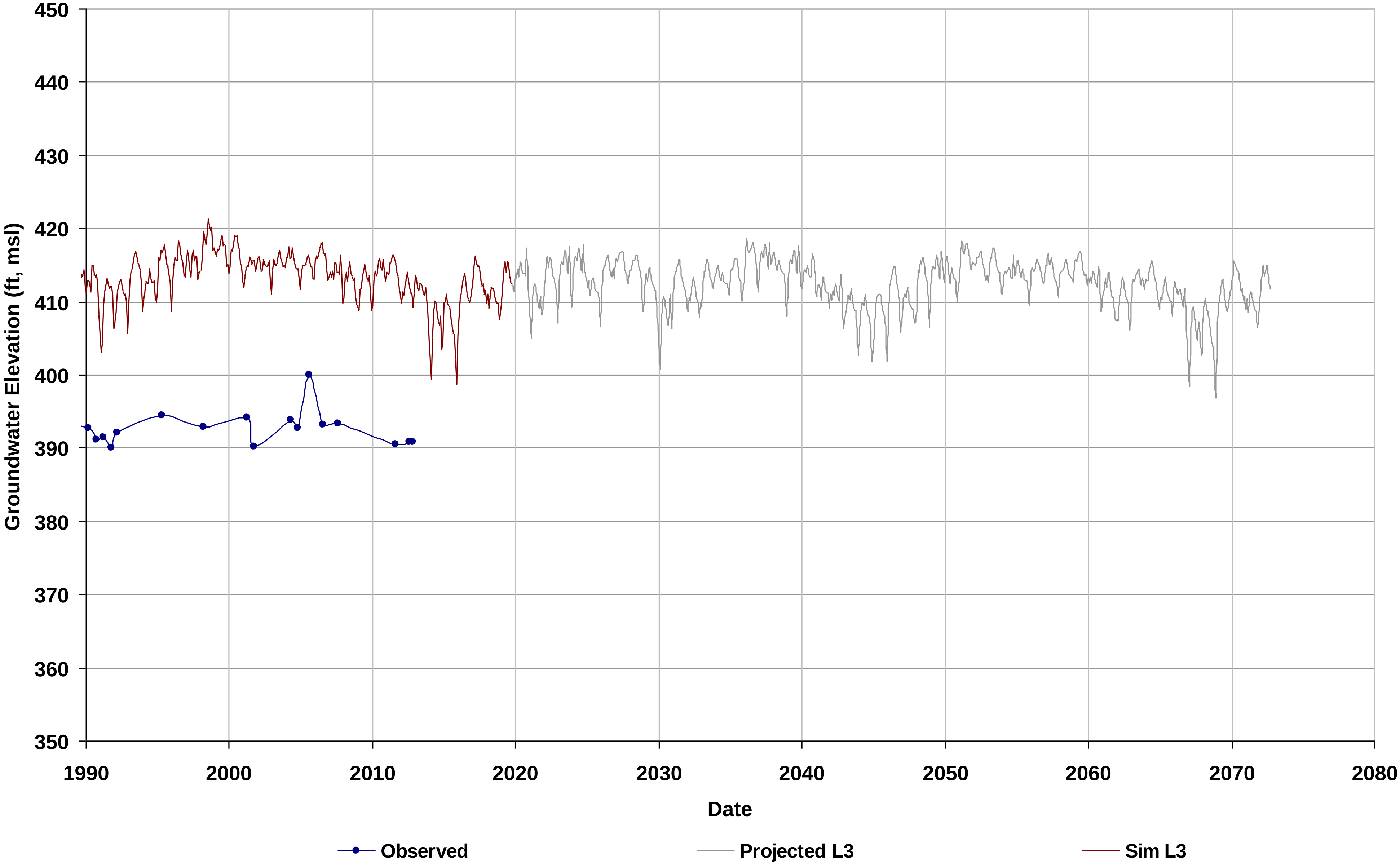
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

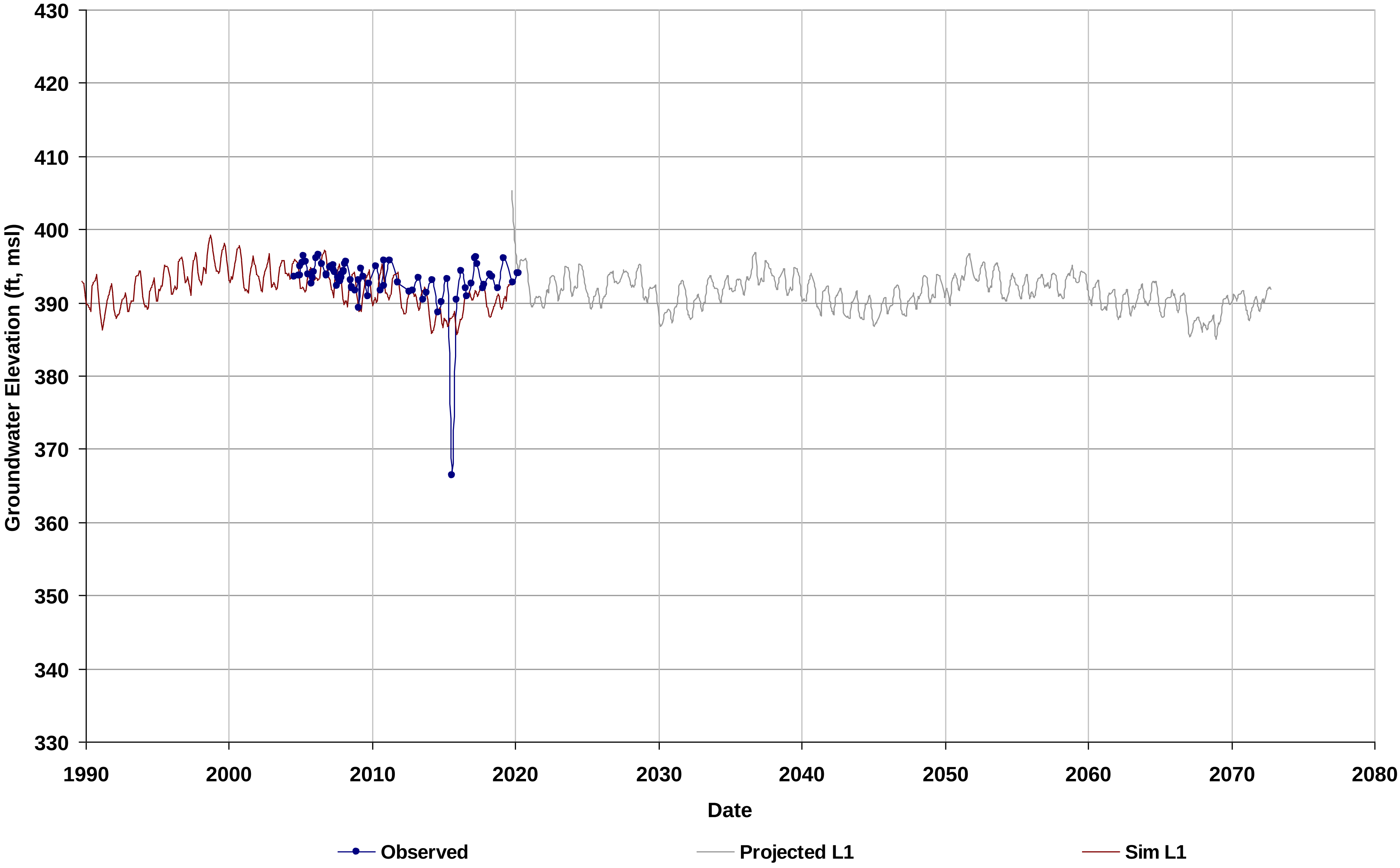
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

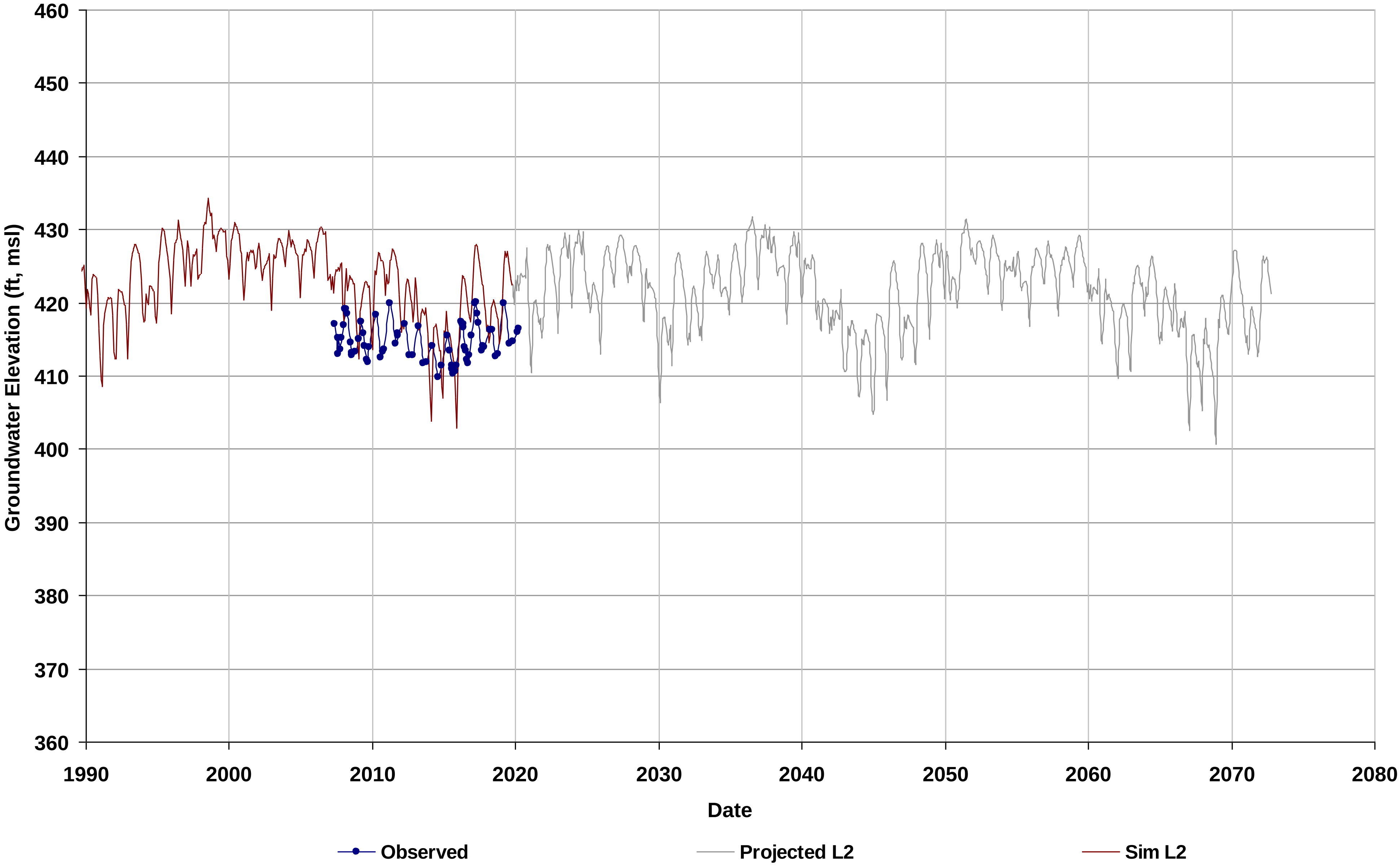
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

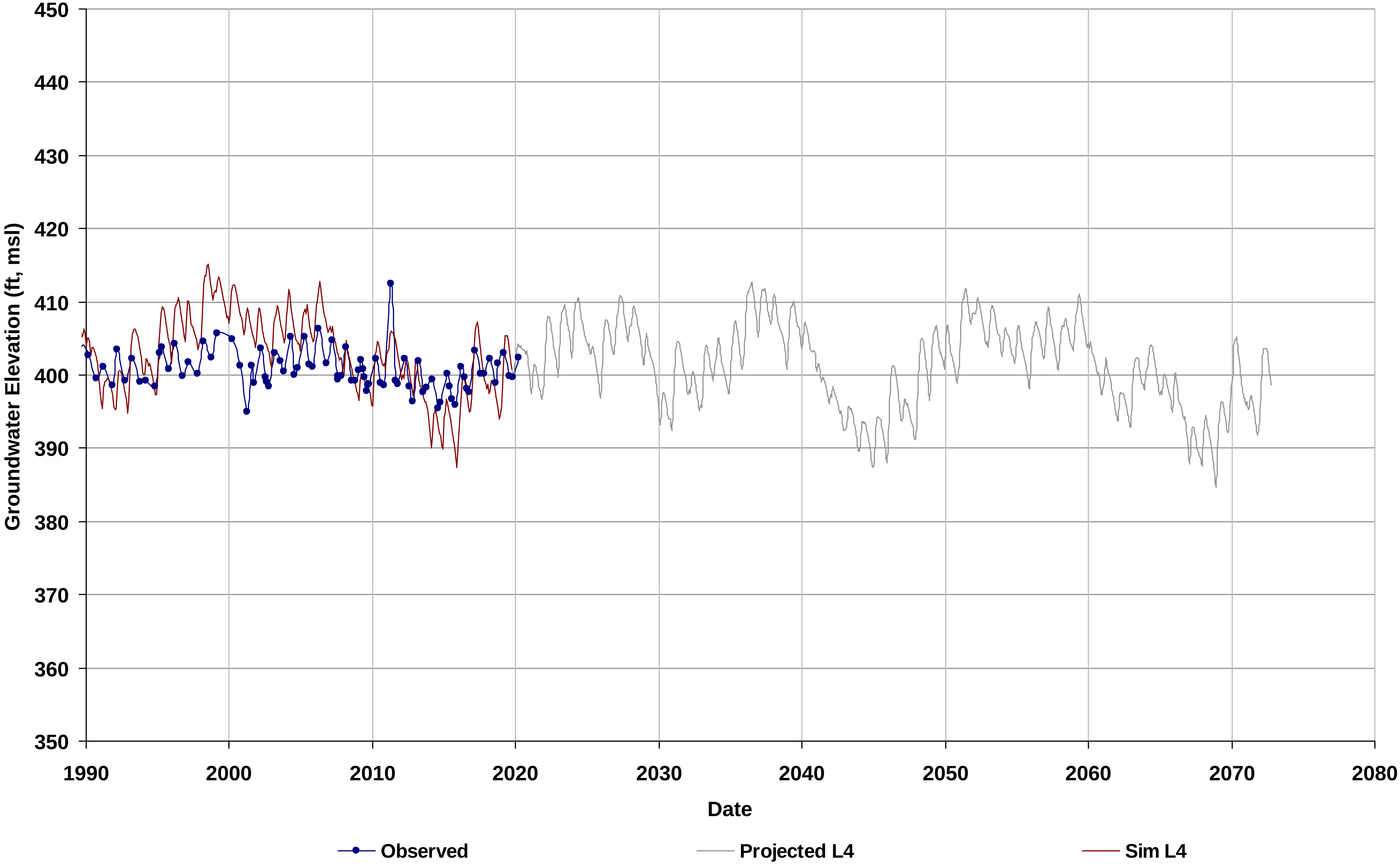
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

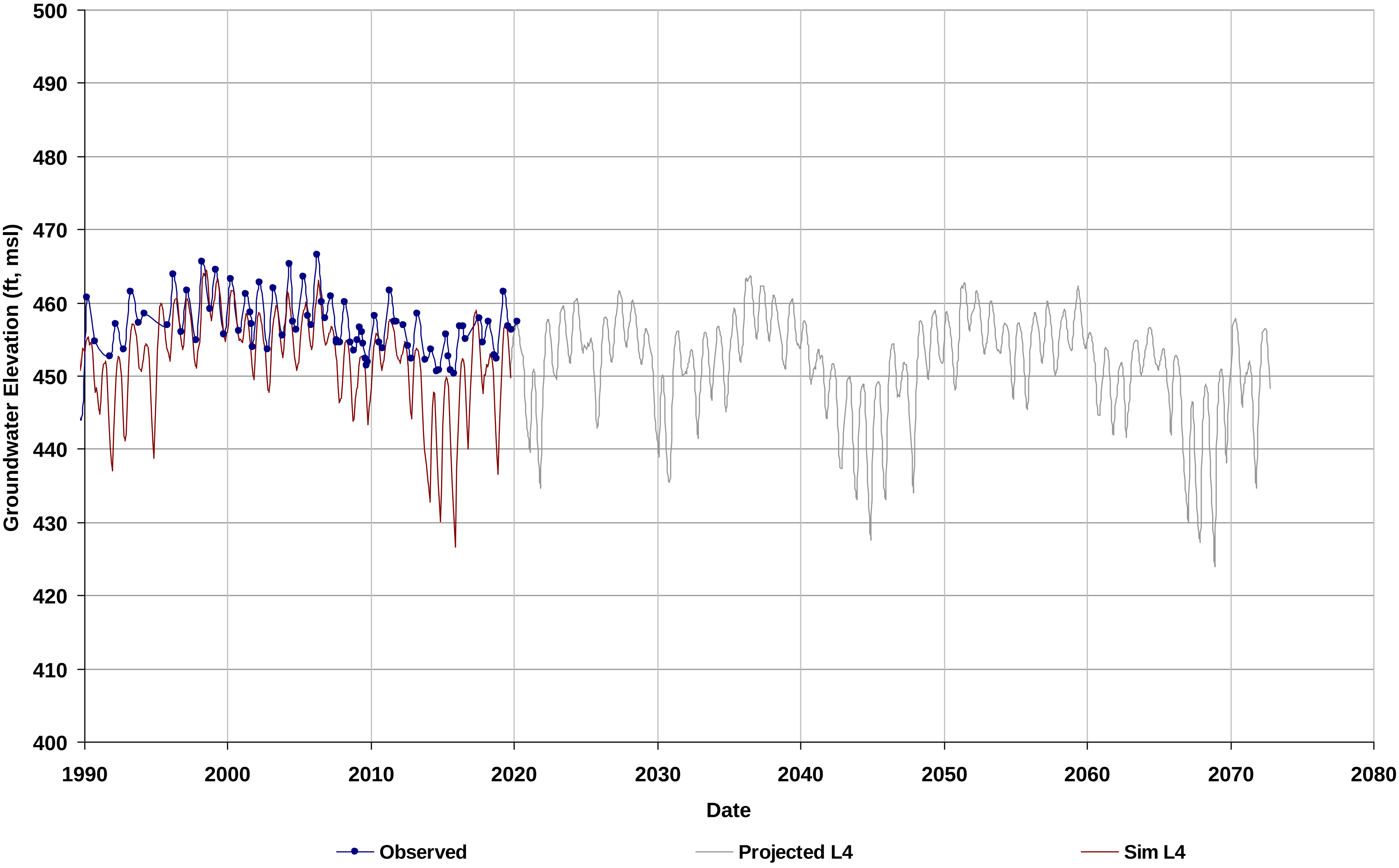
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

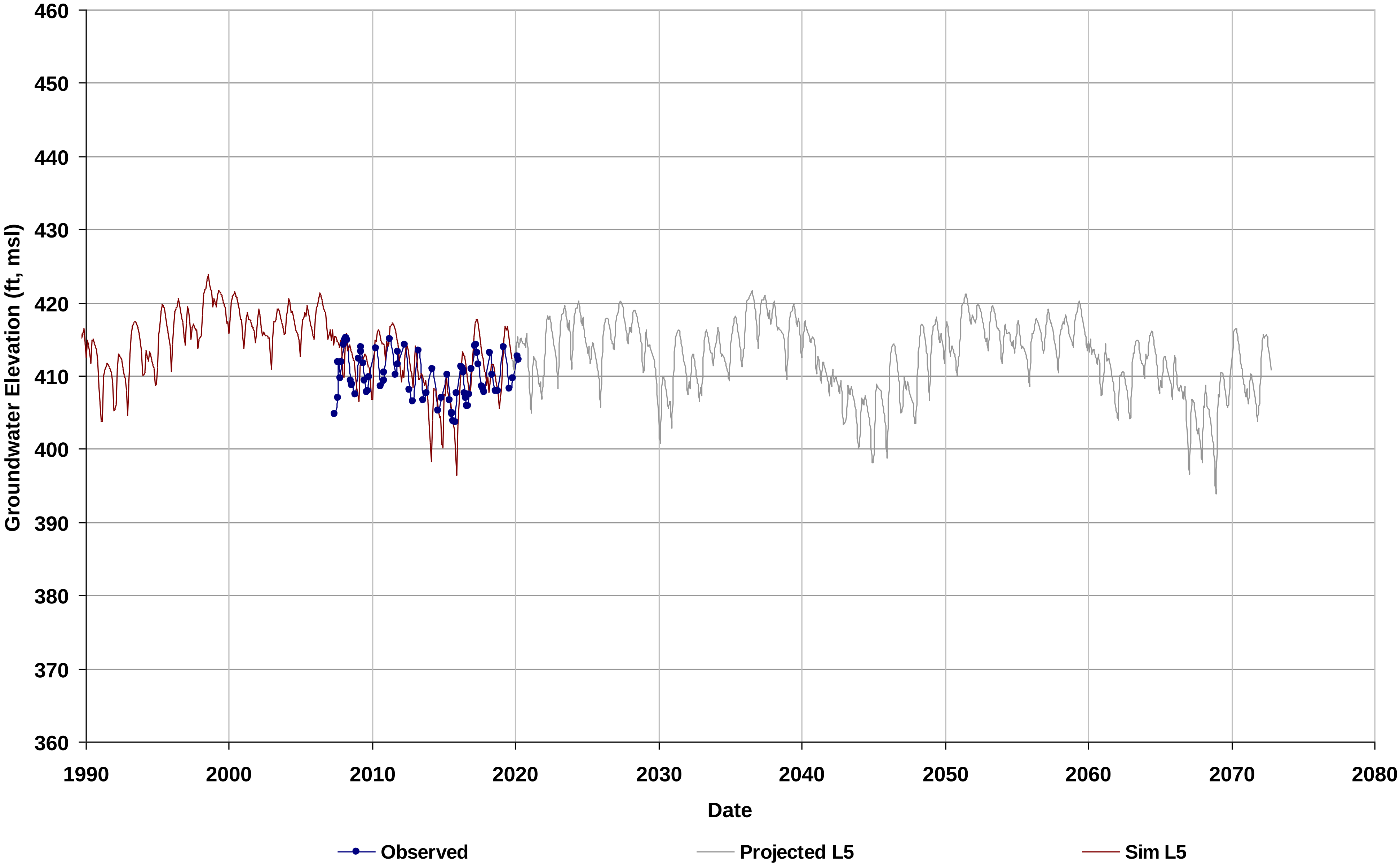
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

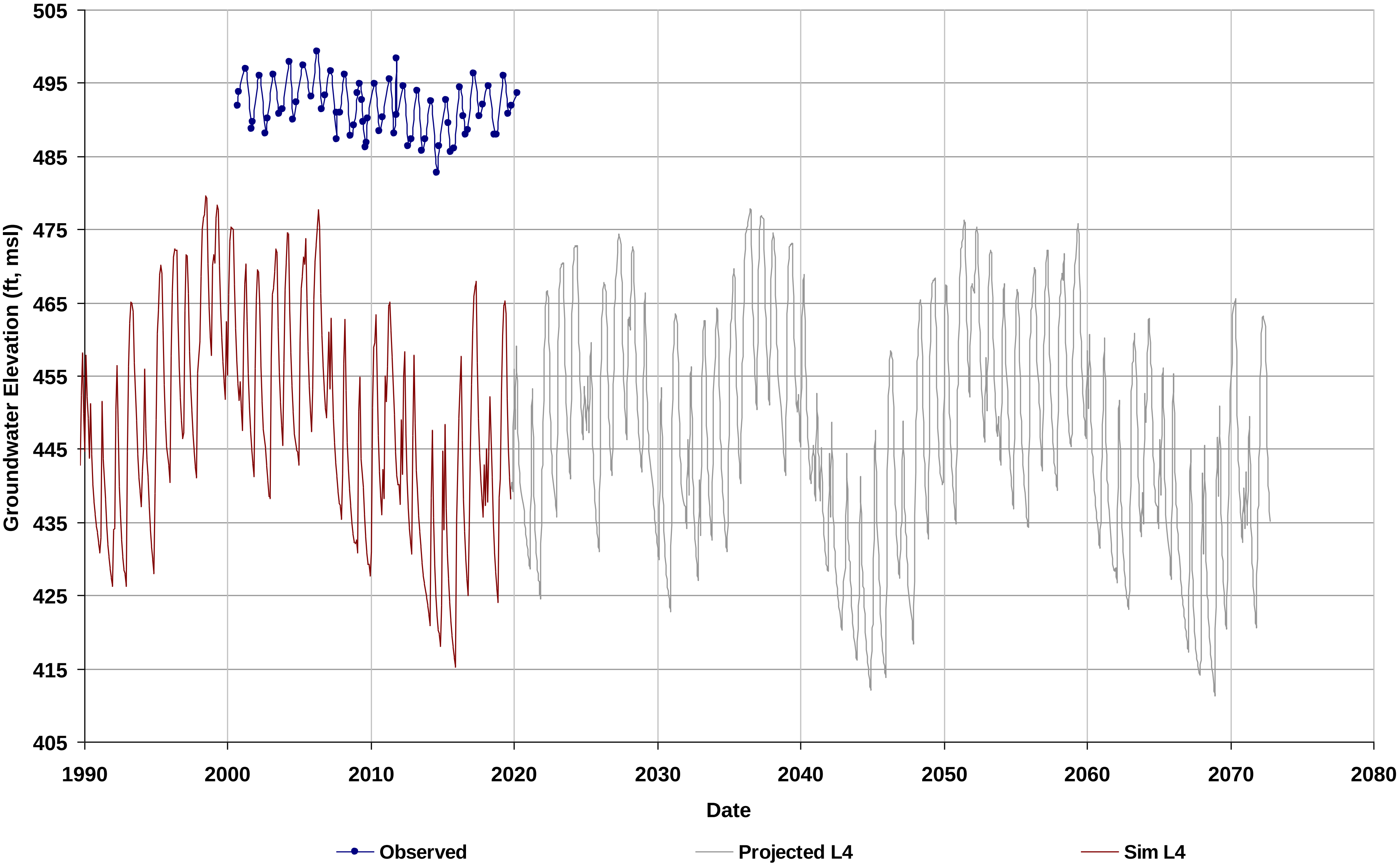
Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

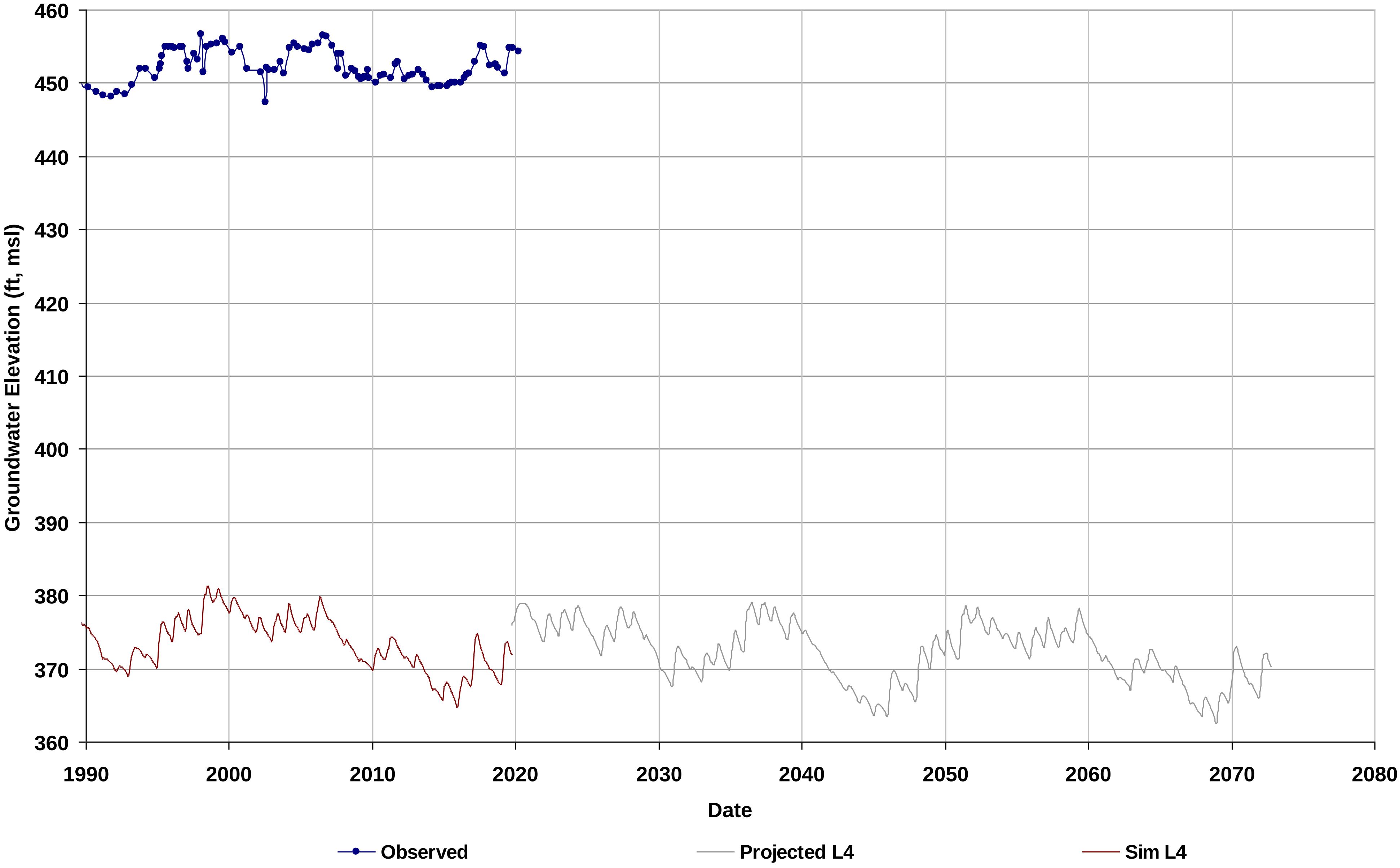
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

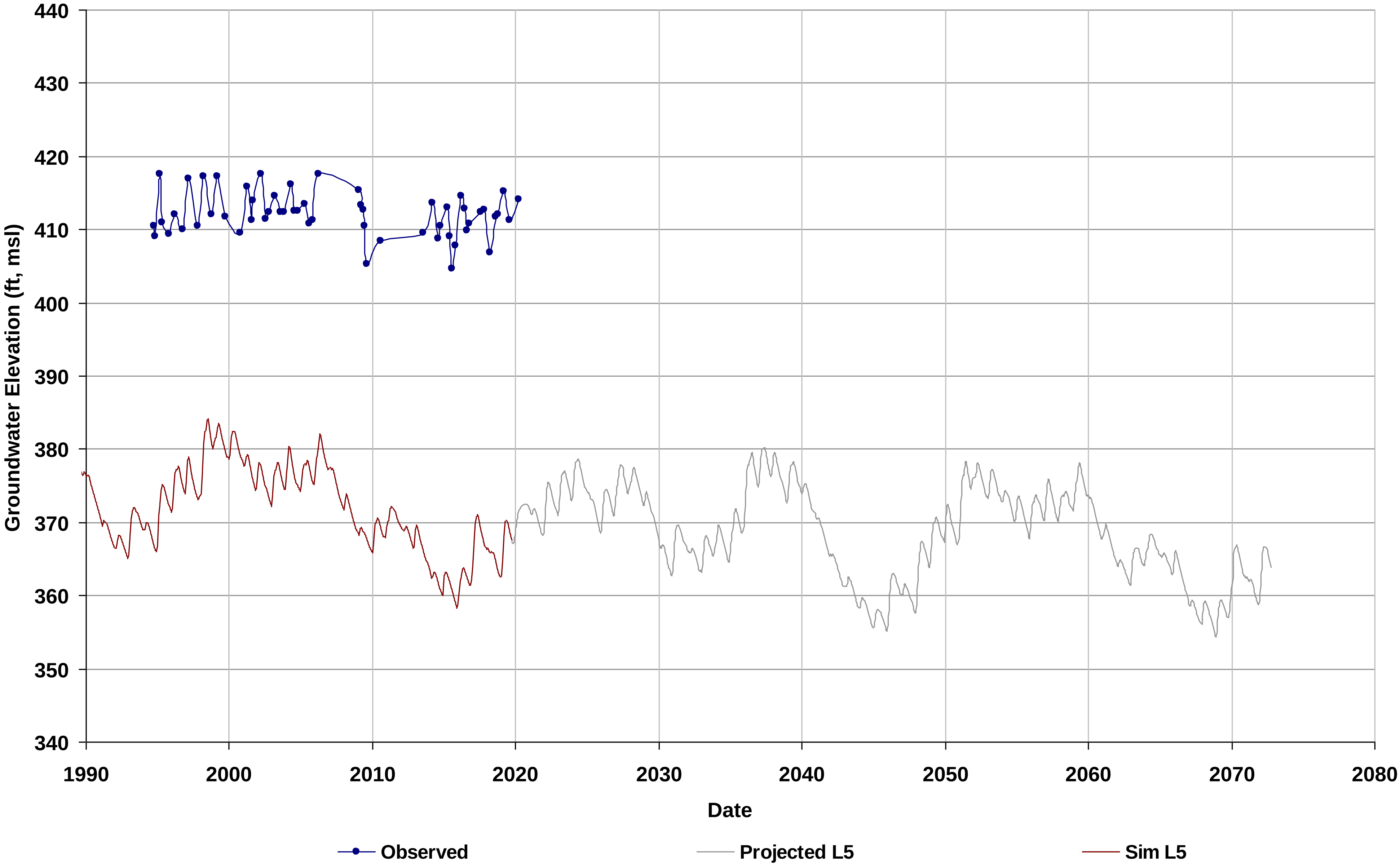
Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

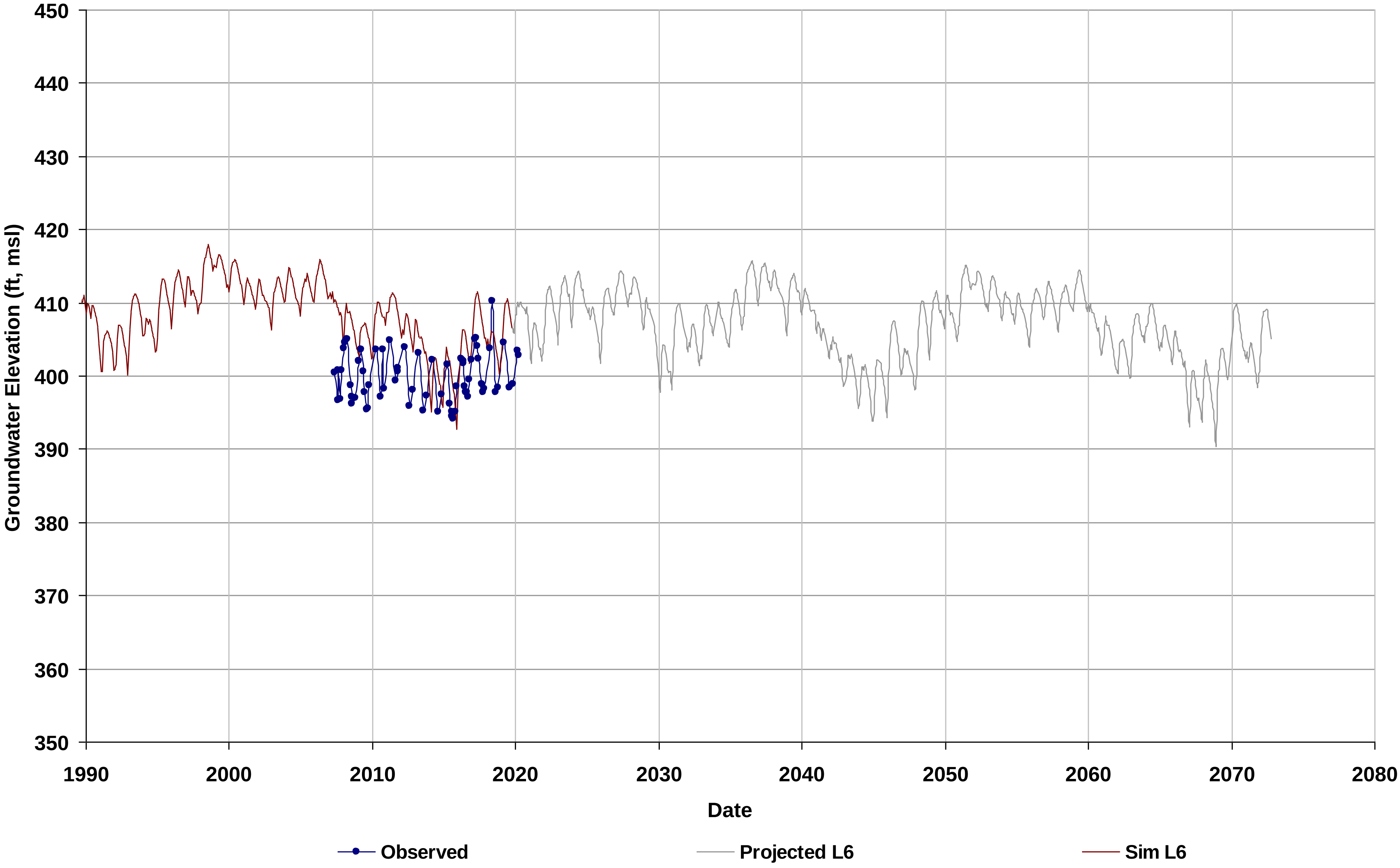
Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

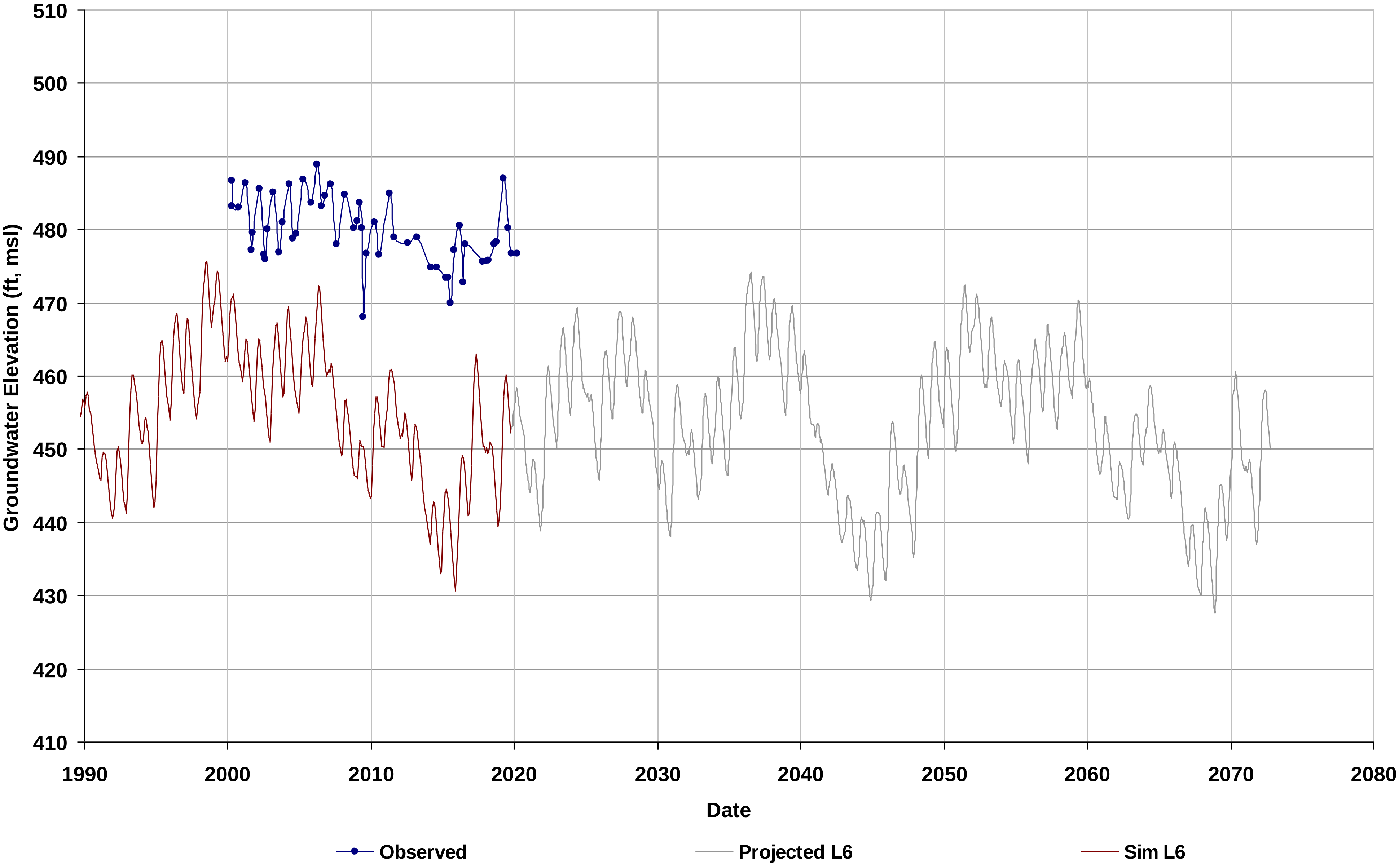
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

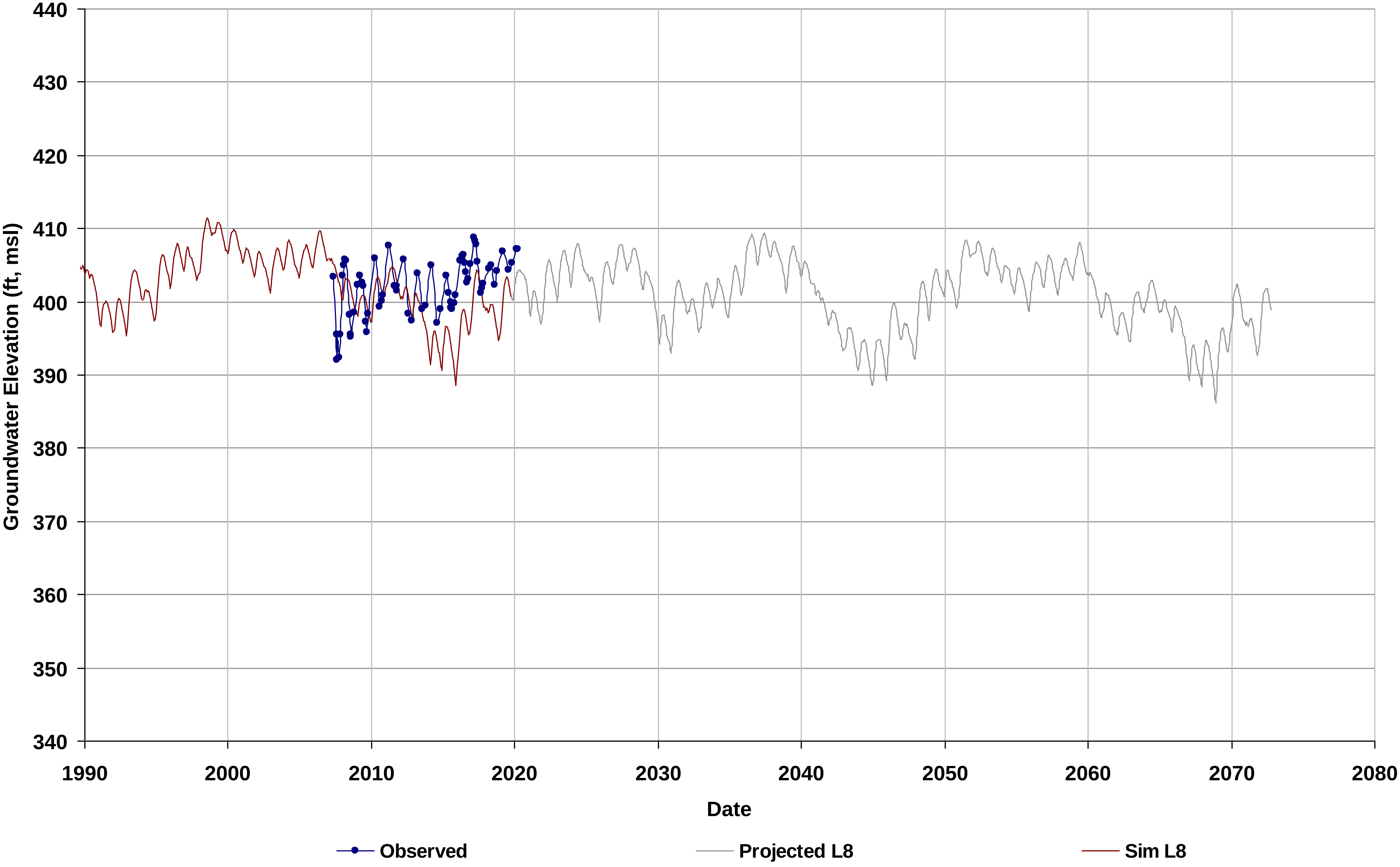
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

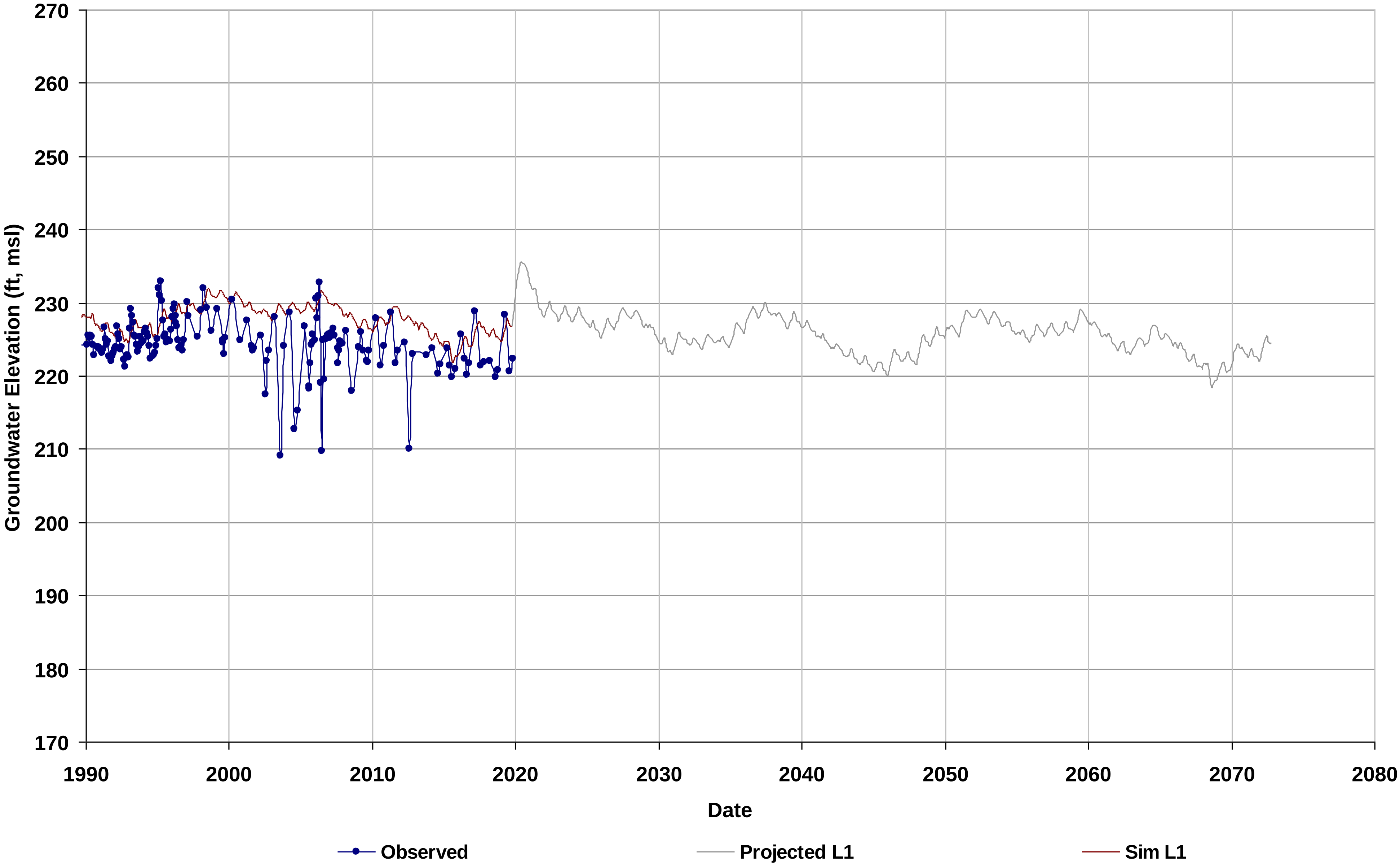
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use)

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

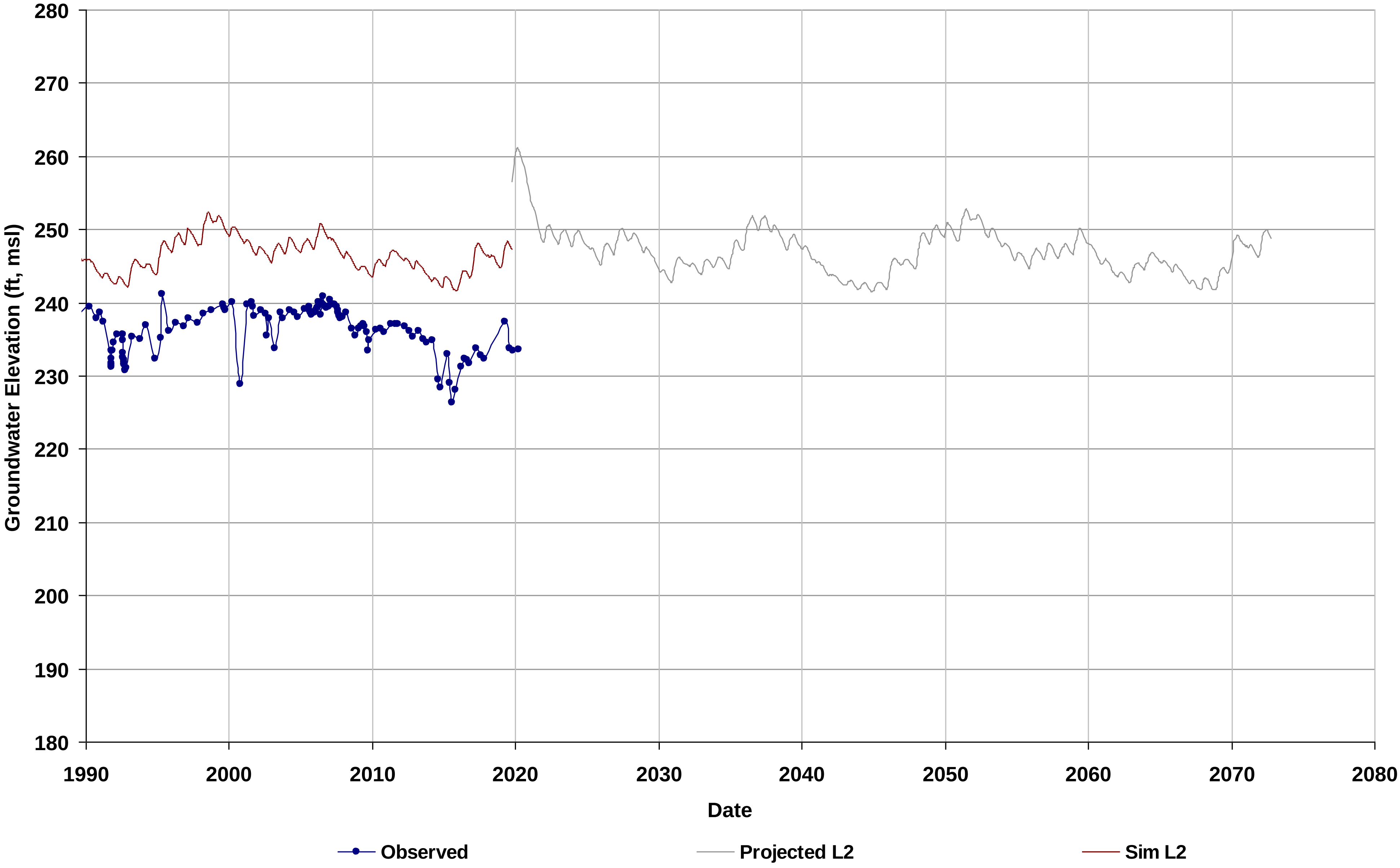
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use)

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

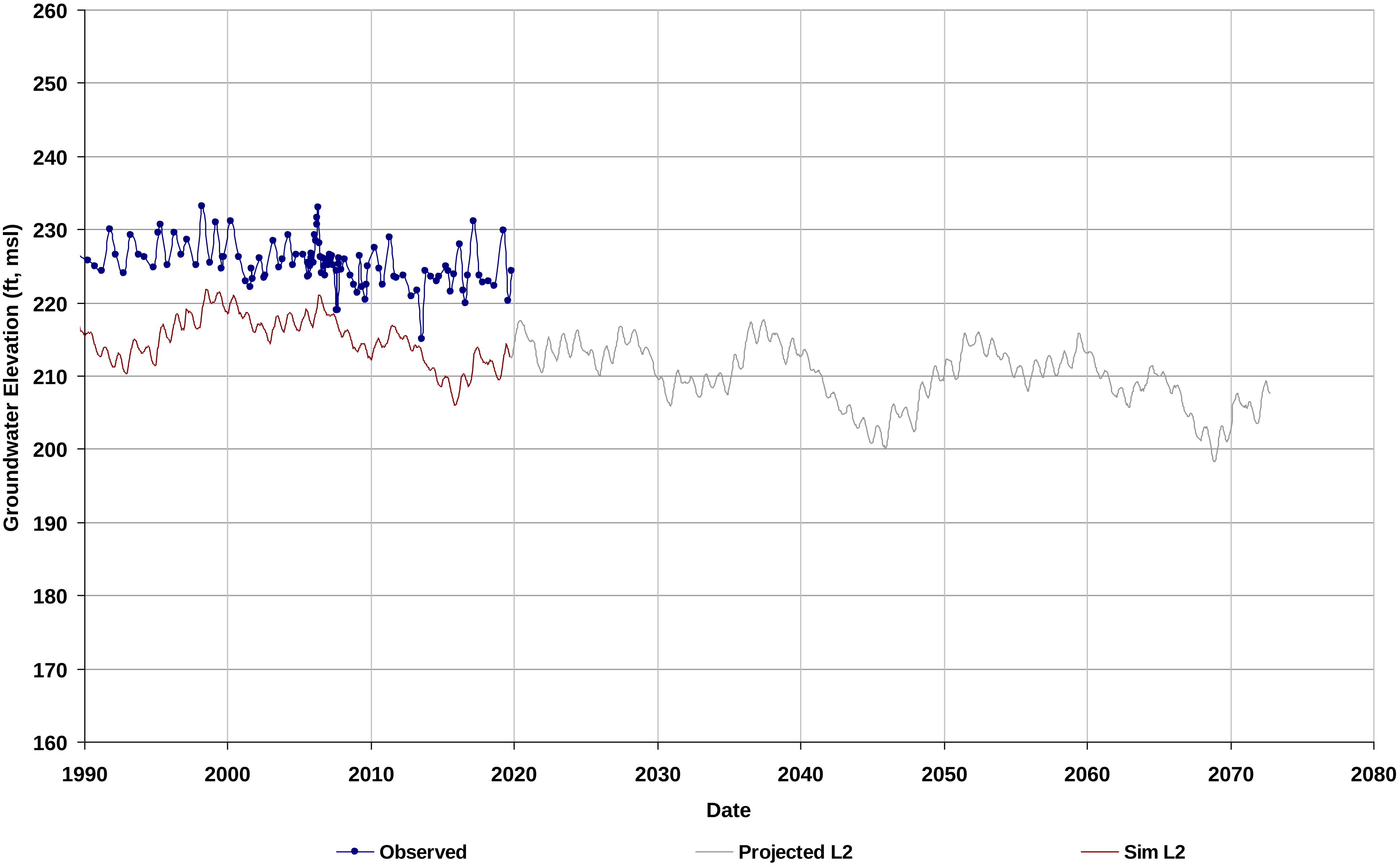
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

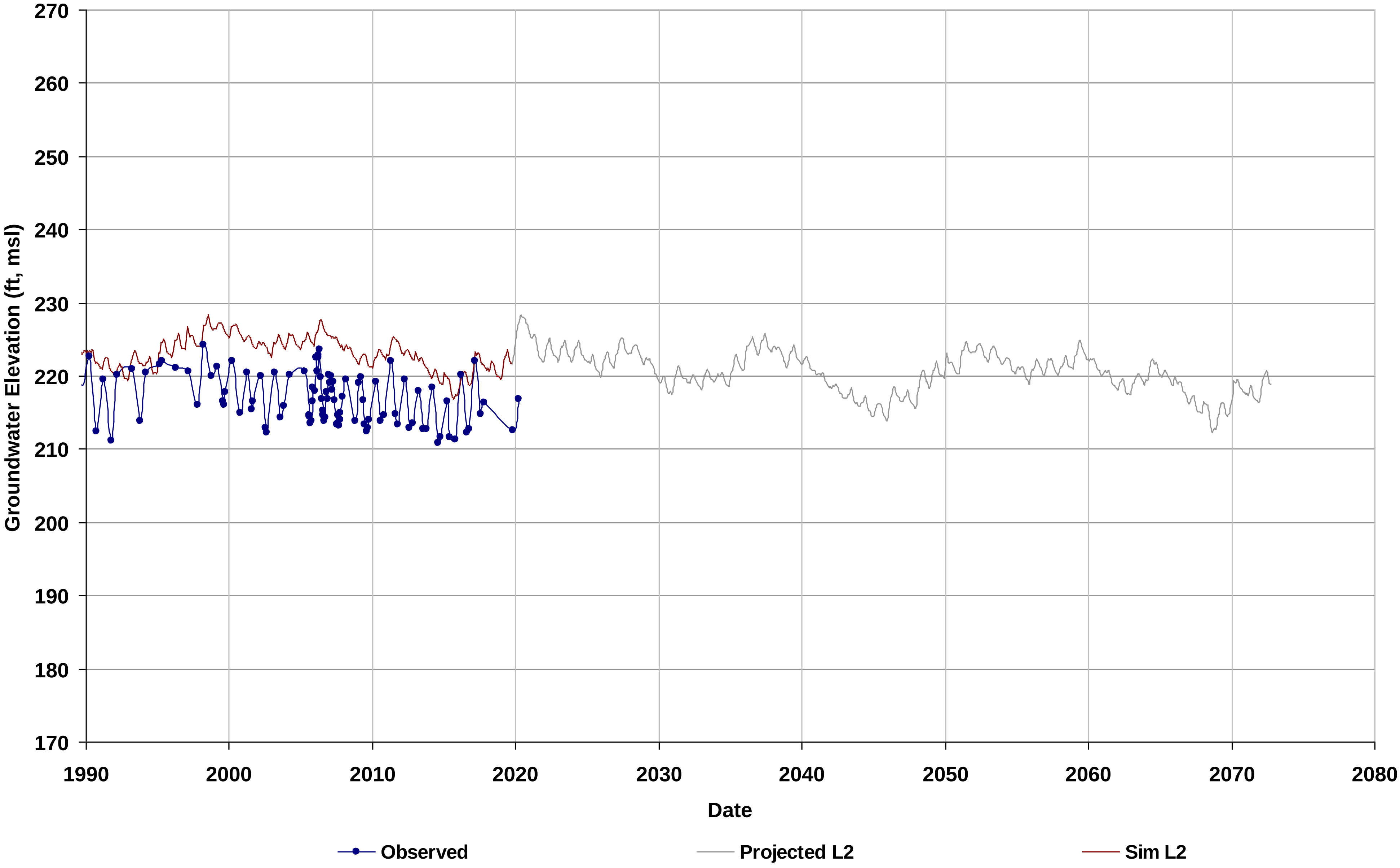
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

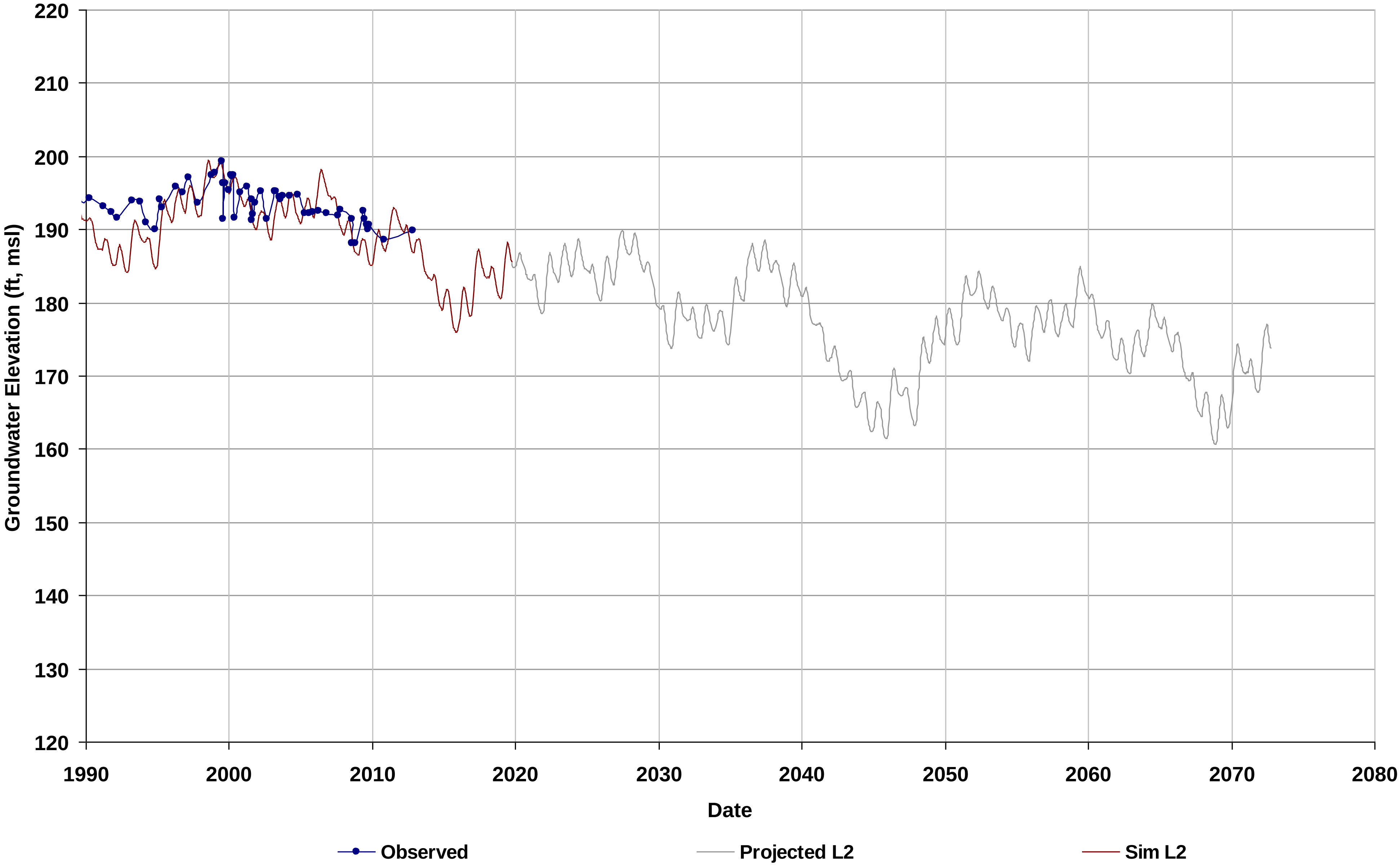
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

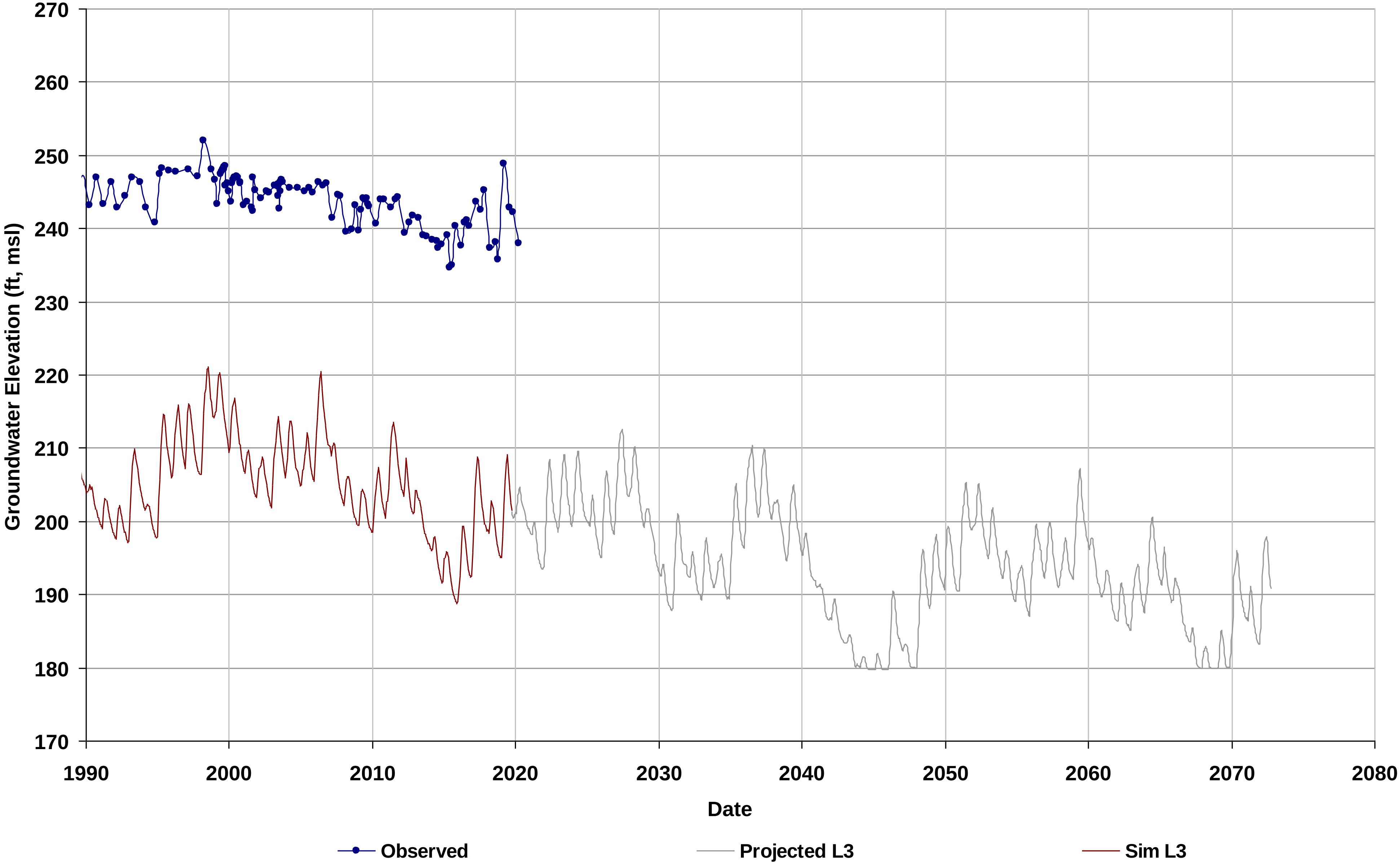
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

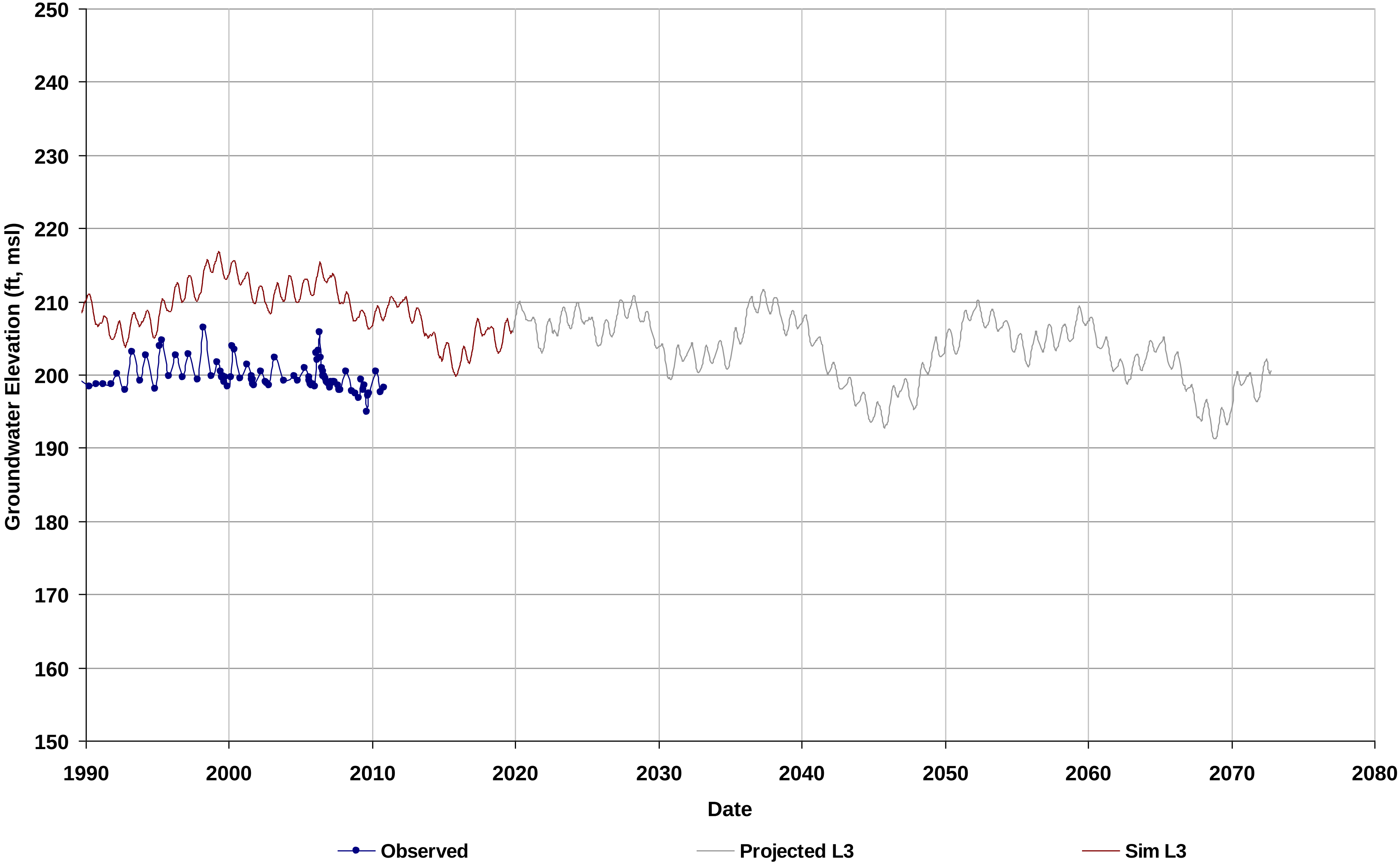
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

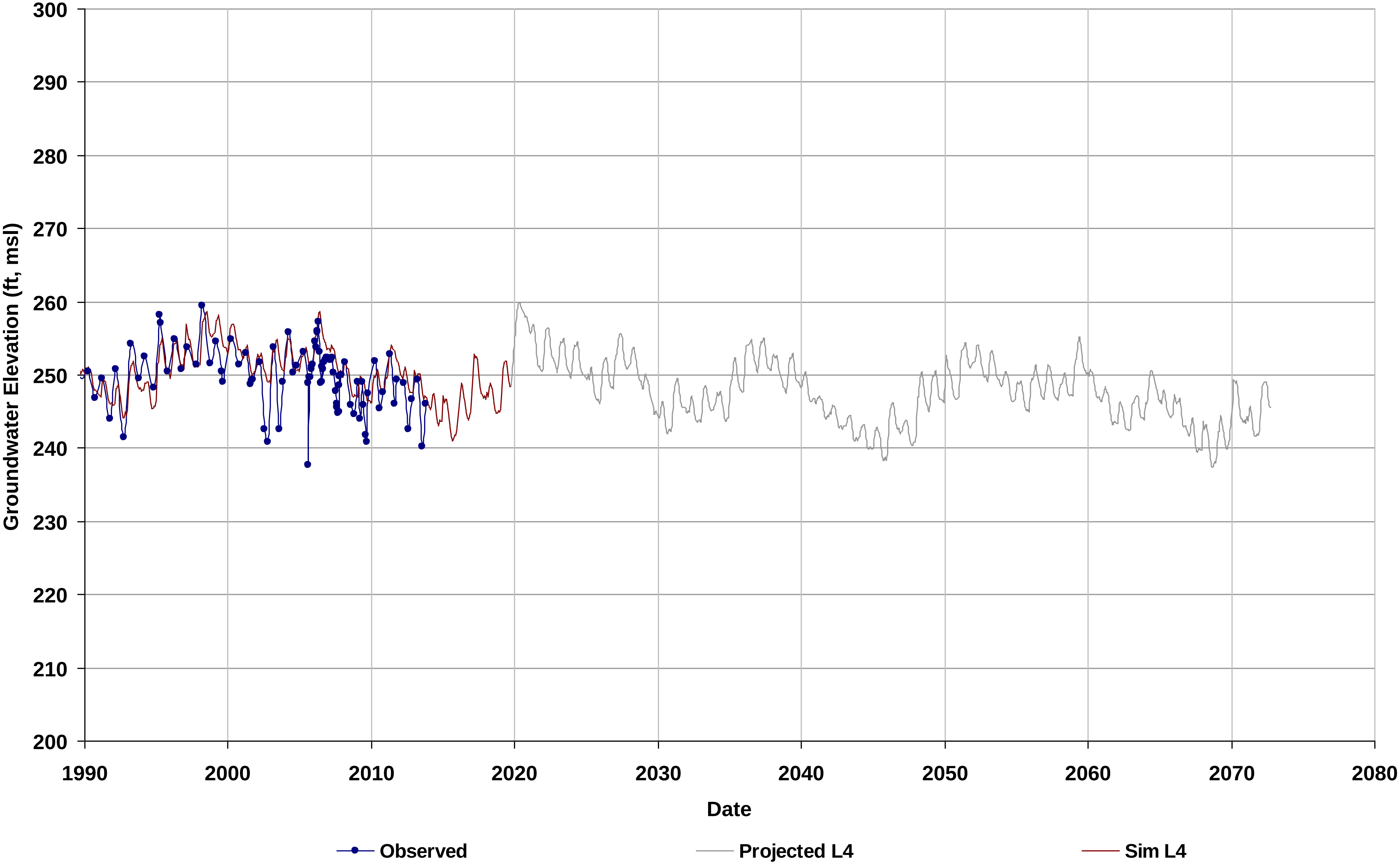
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

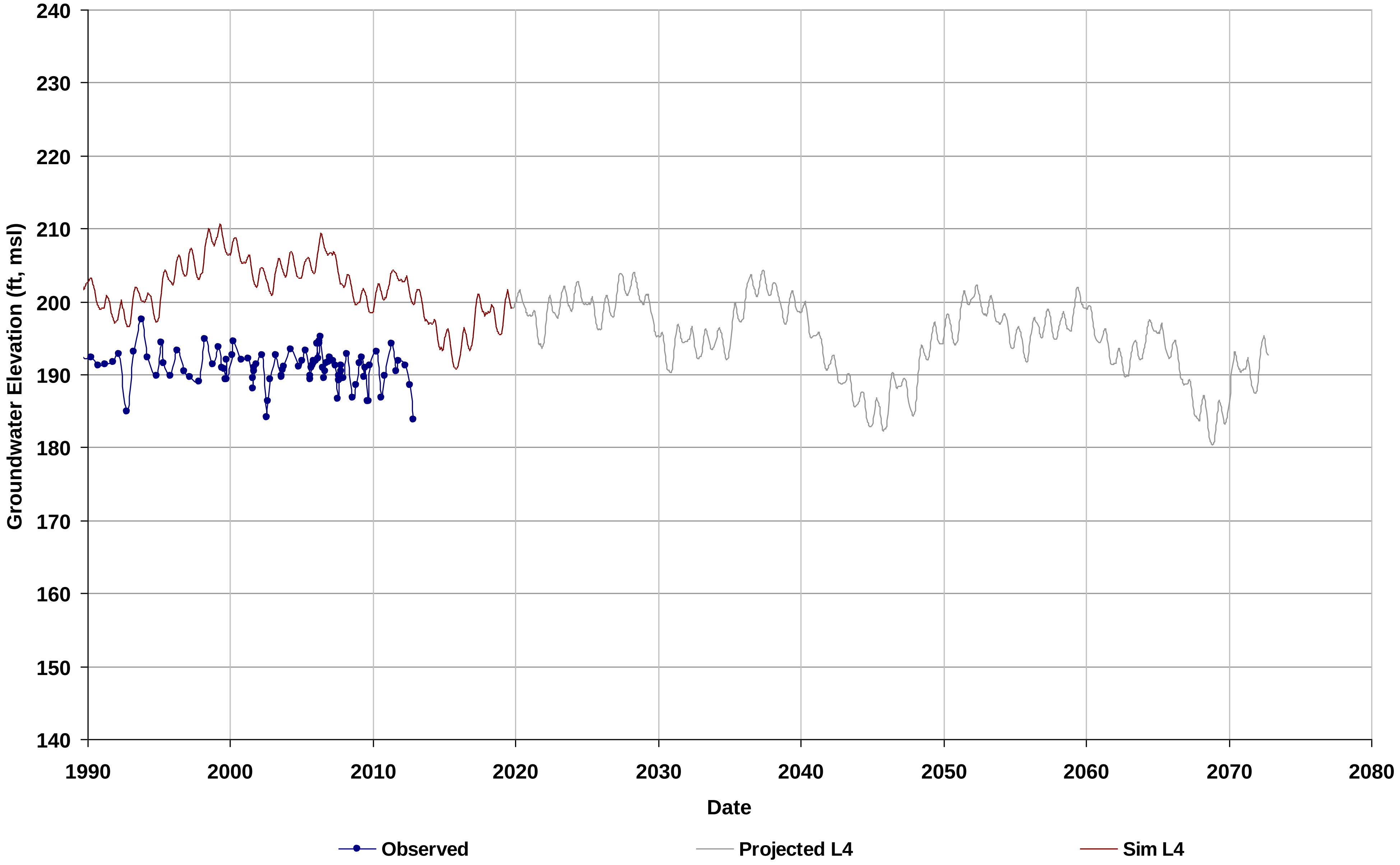
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

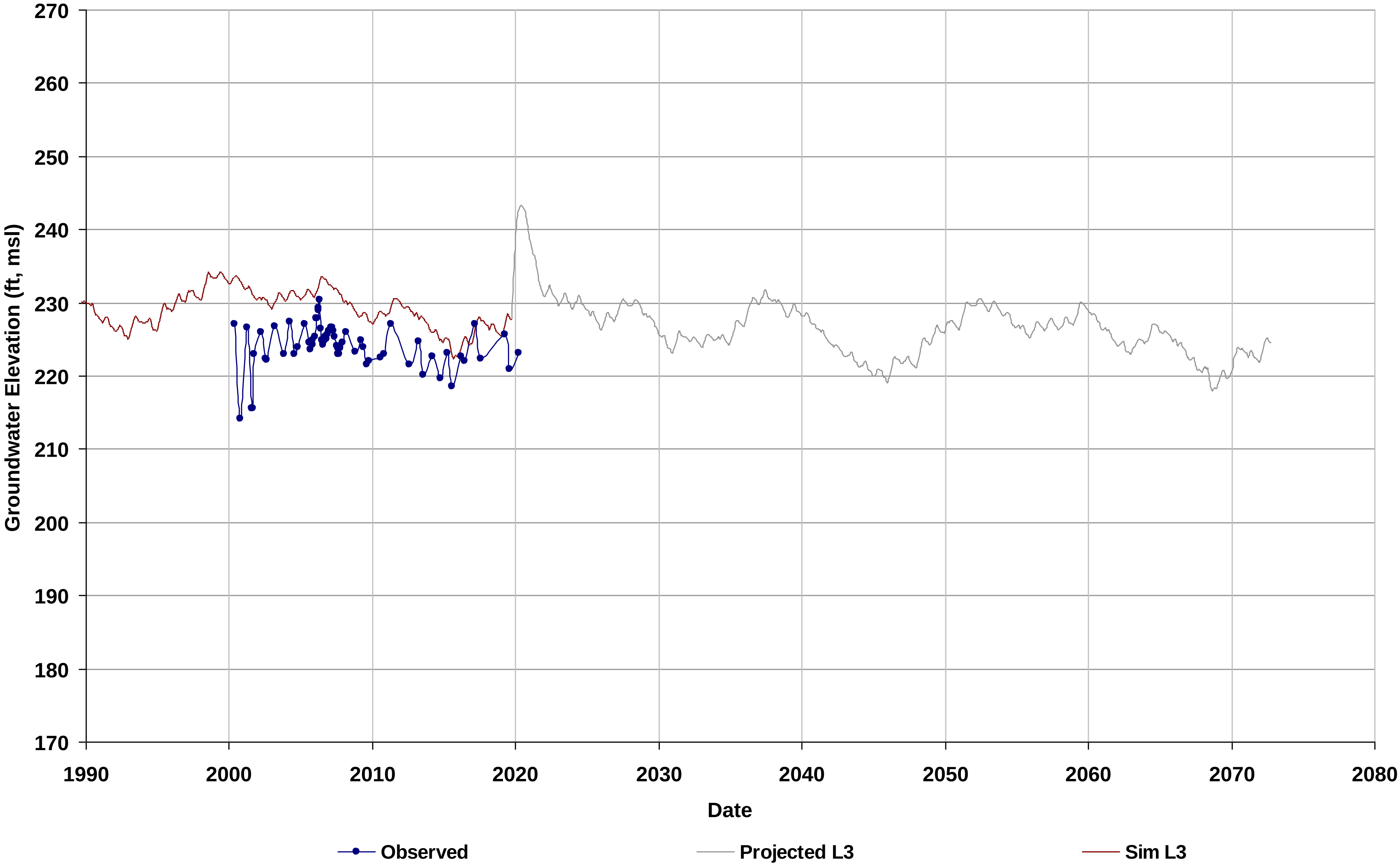
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

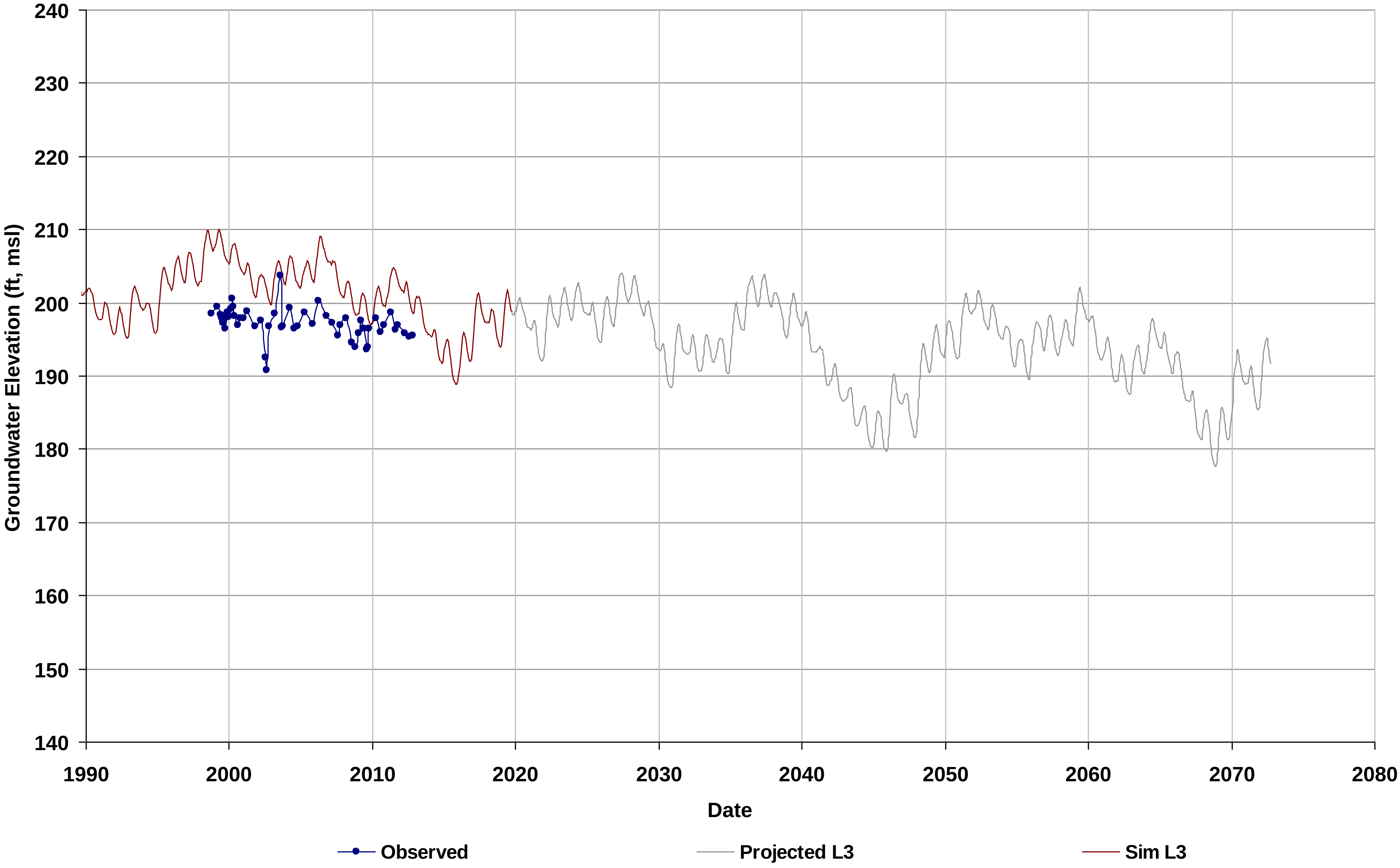
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

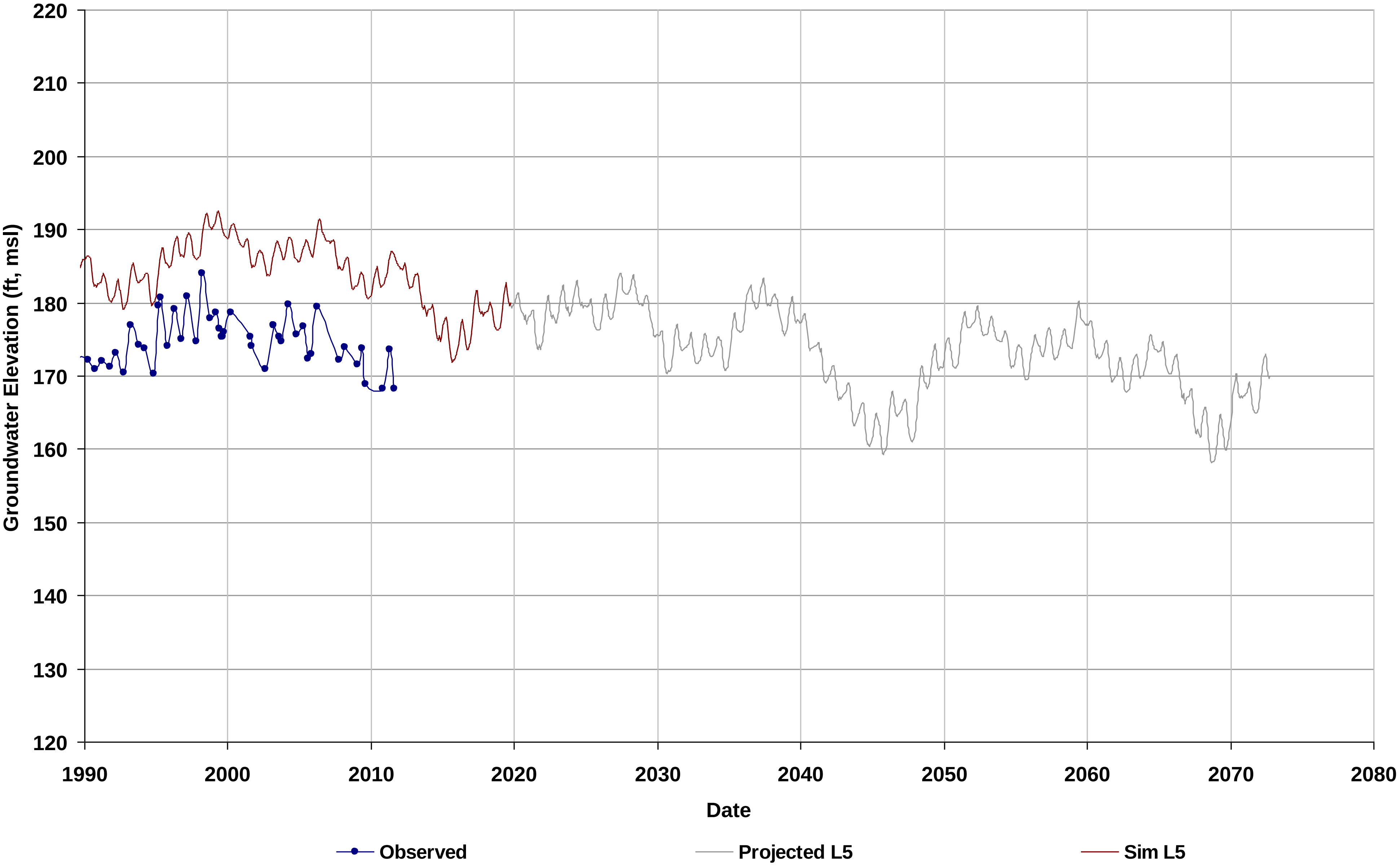
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

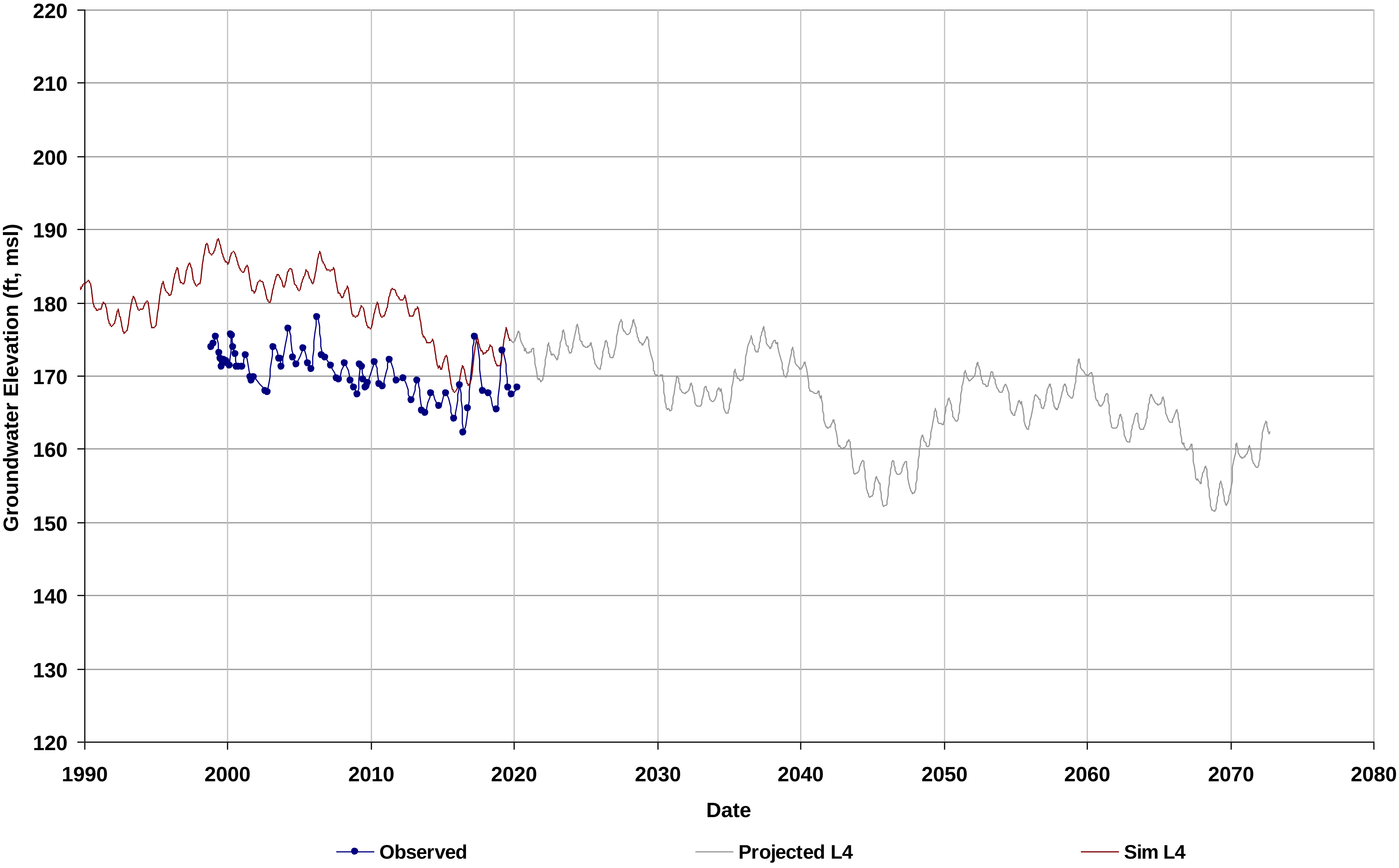
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

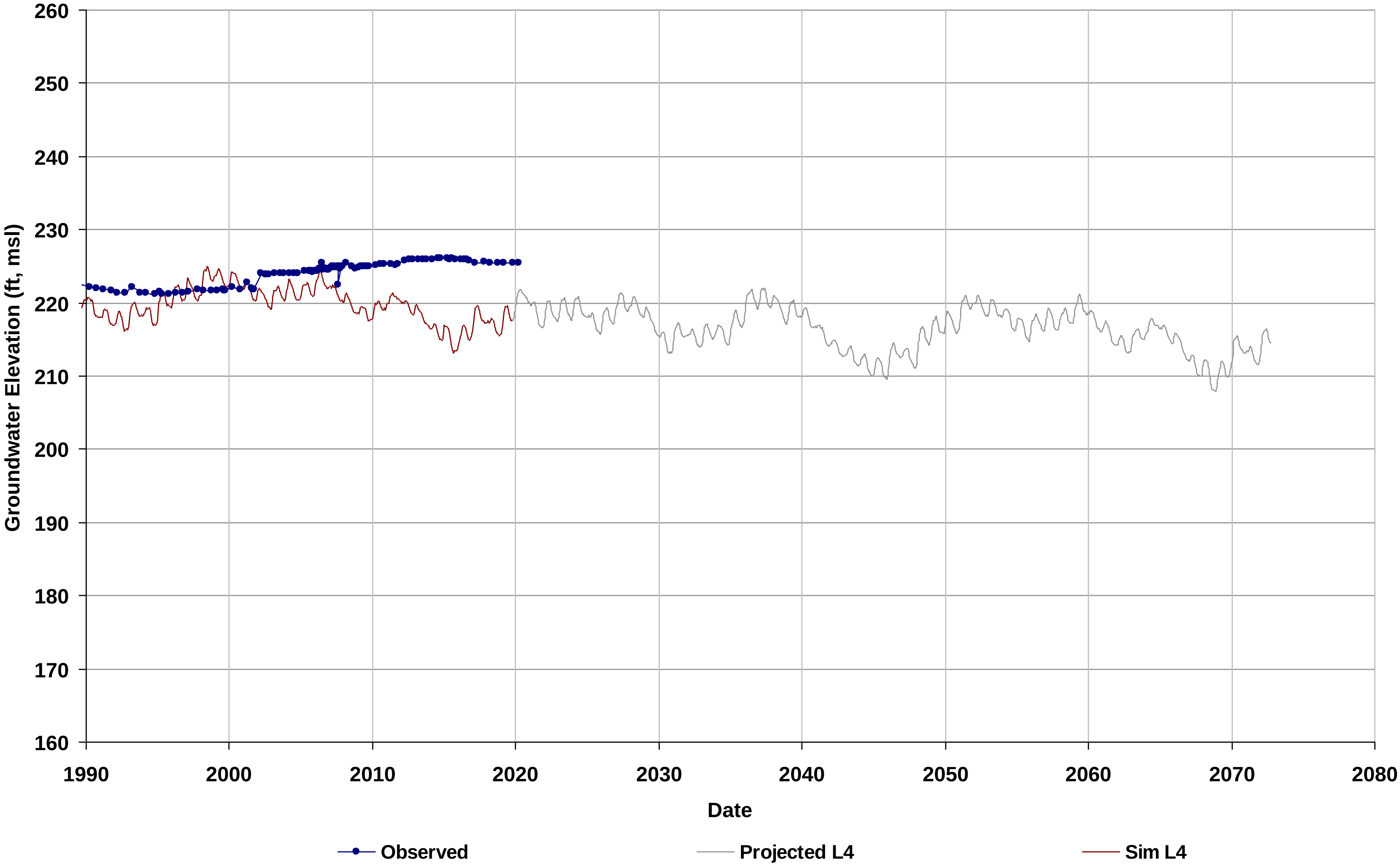
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

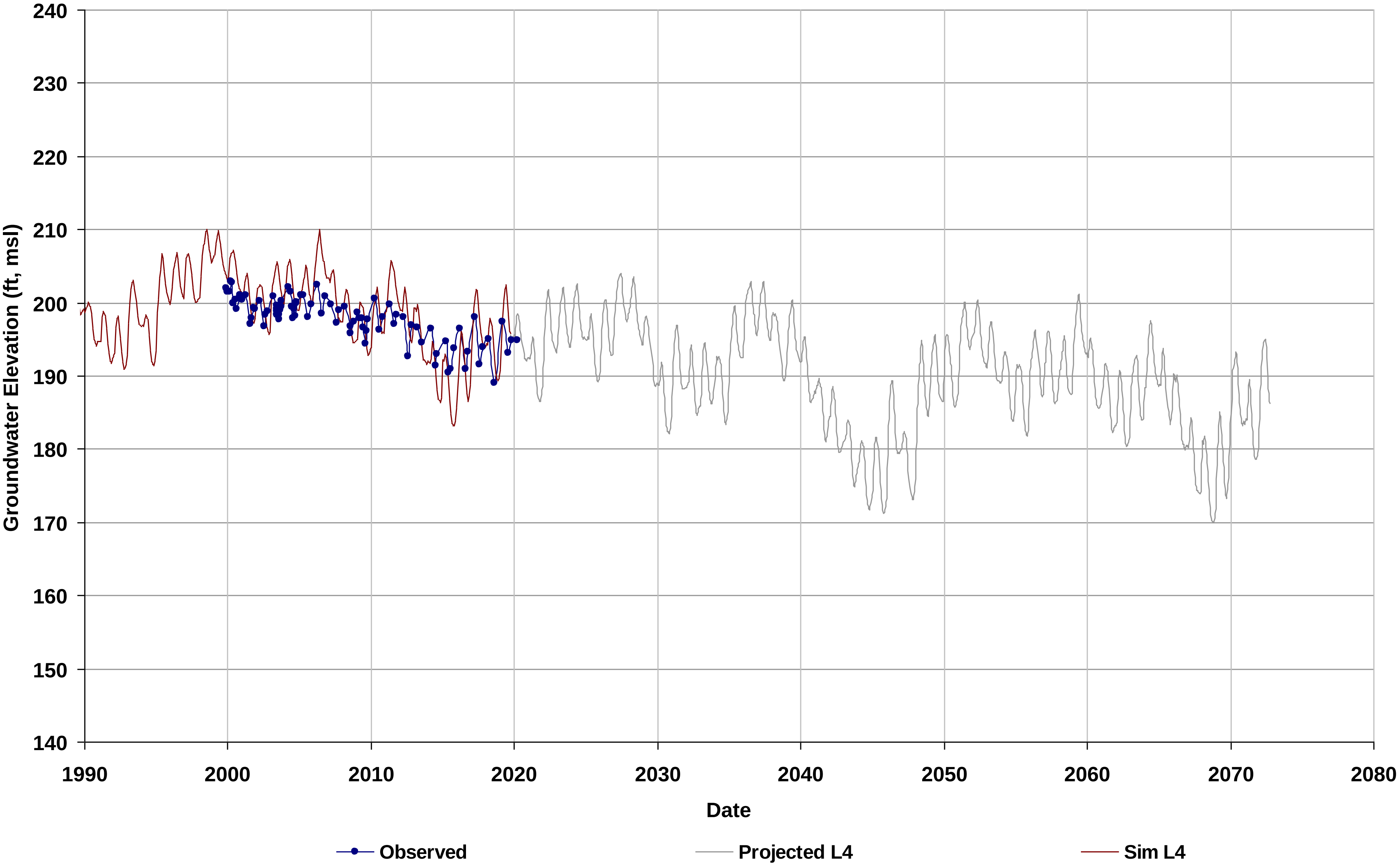
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

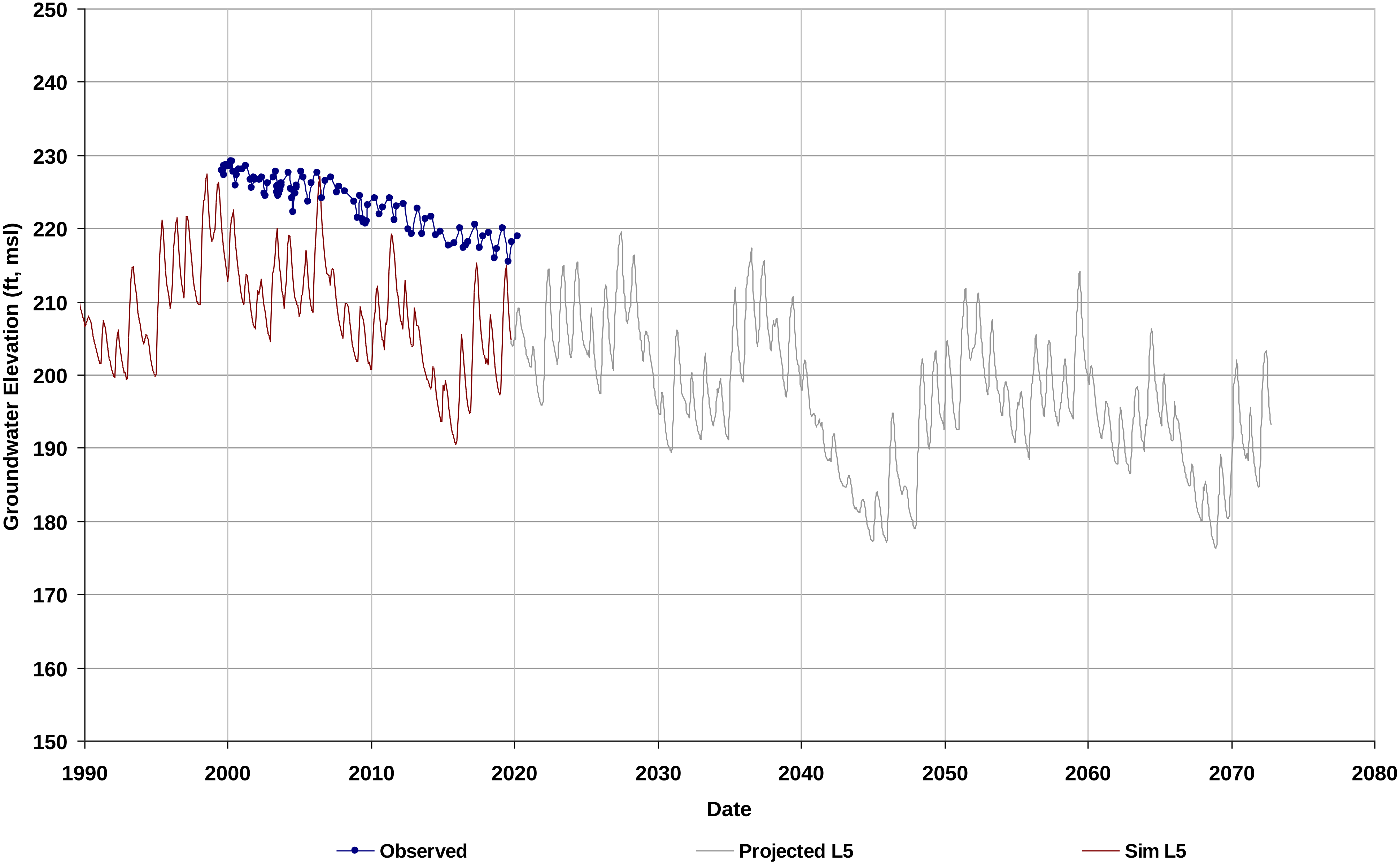
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

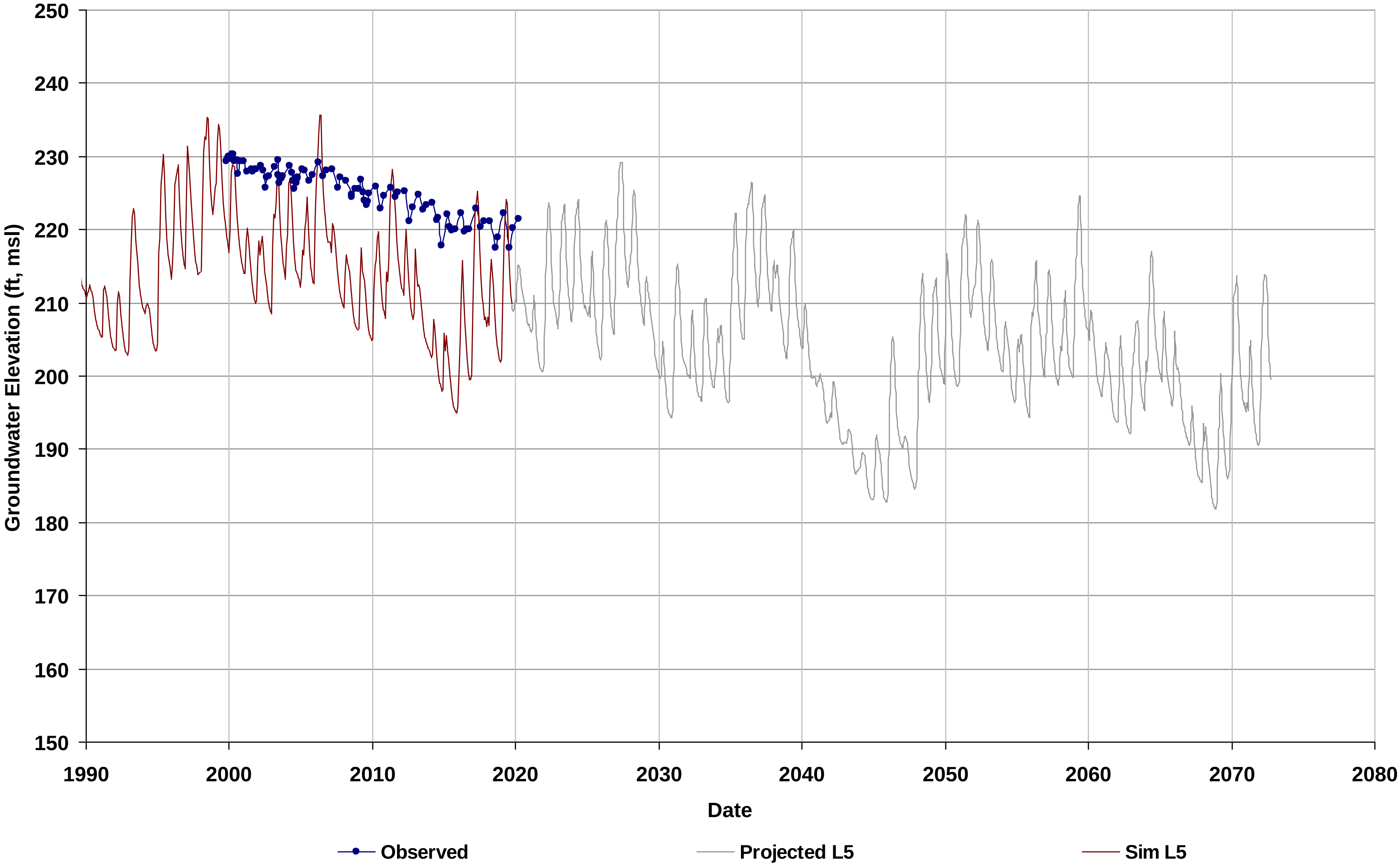
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

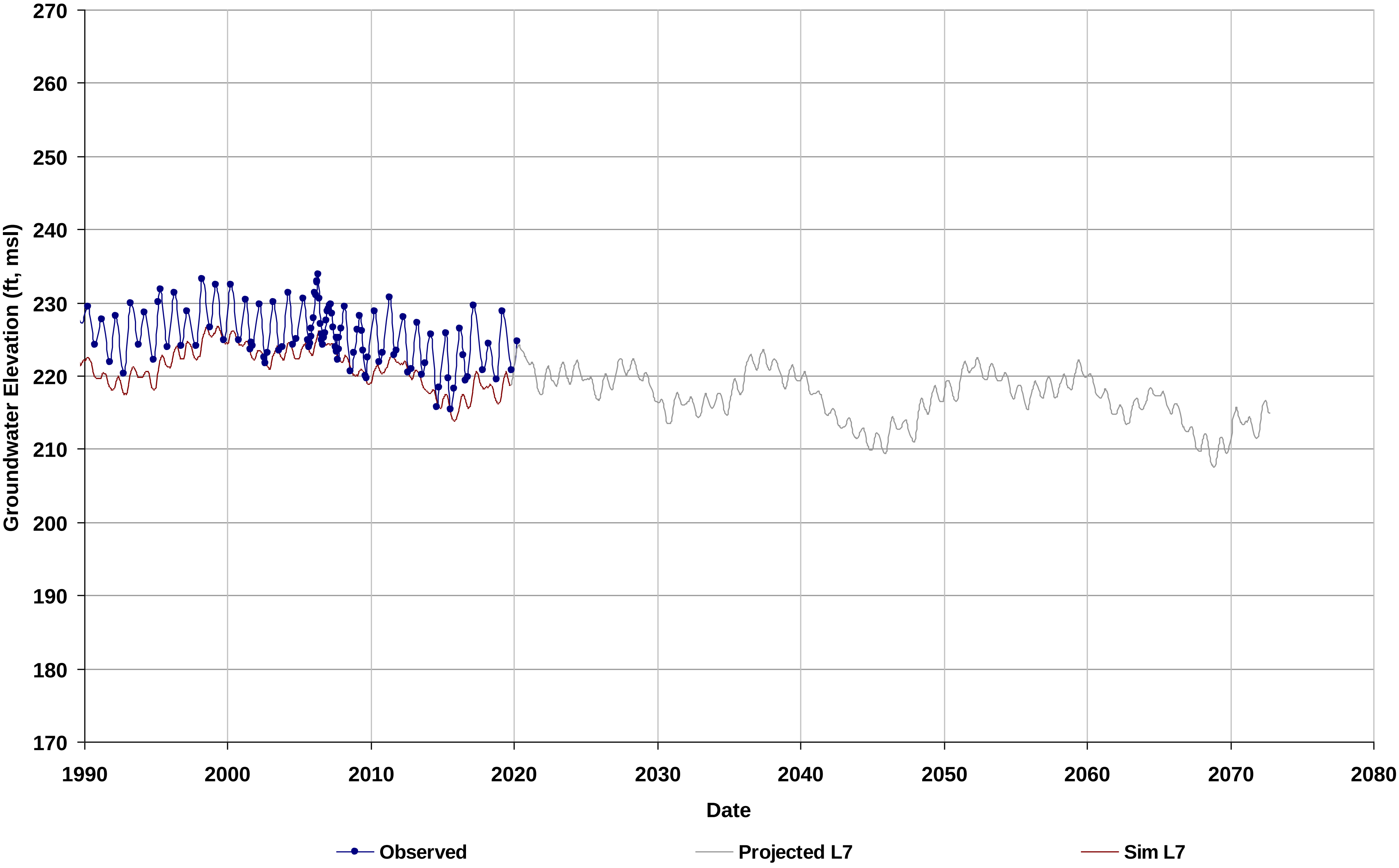
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

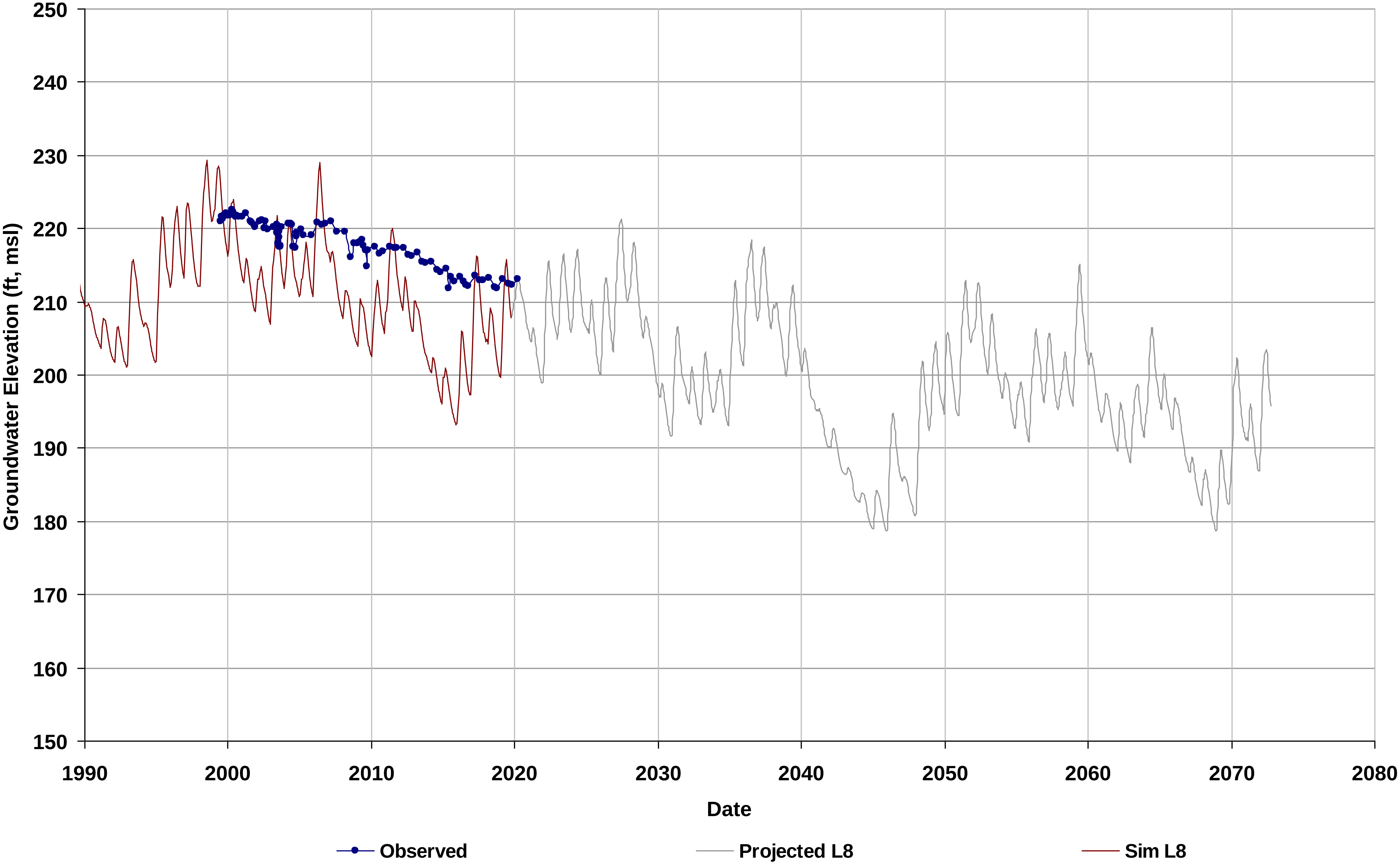
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use)

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

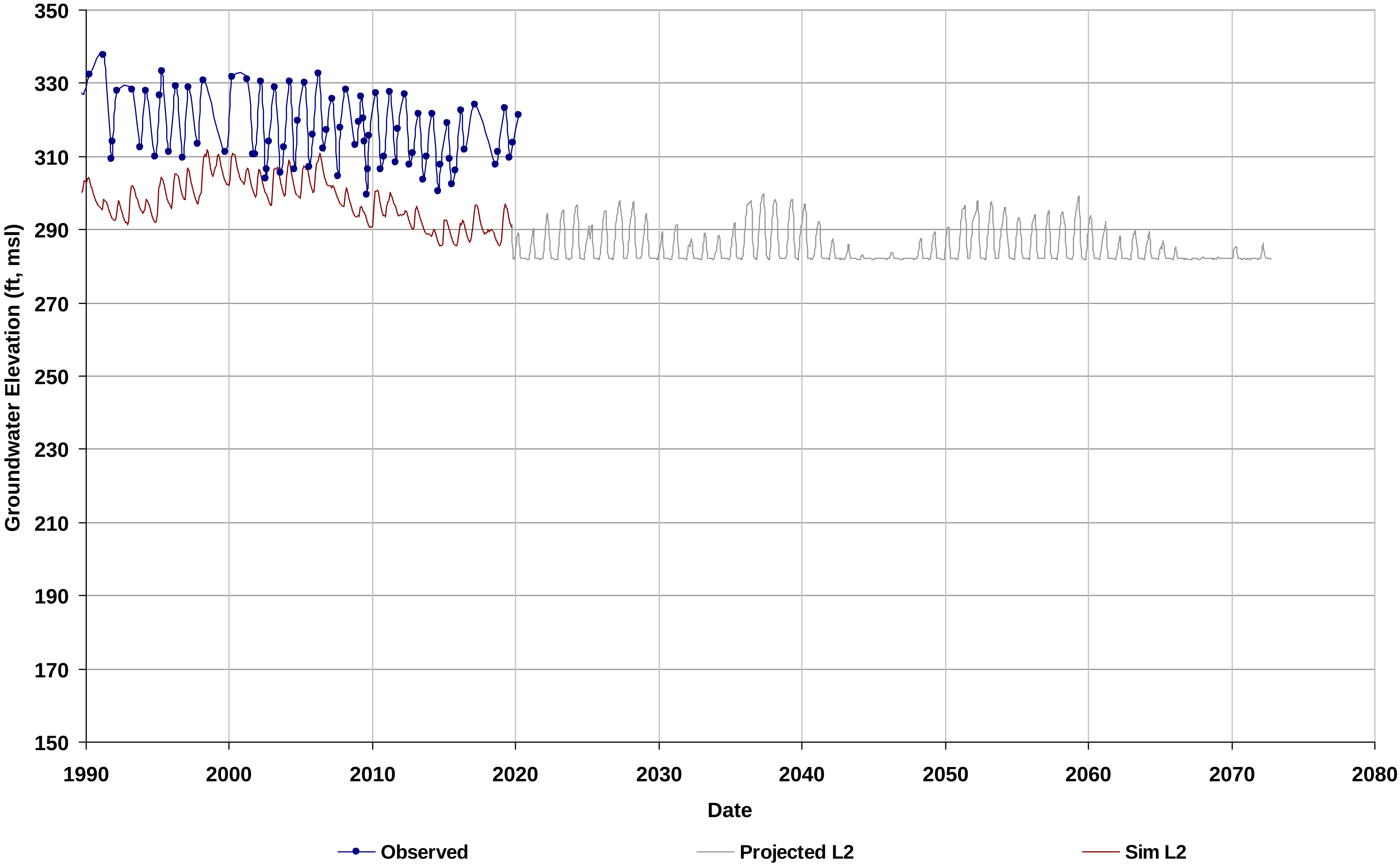
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use)

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

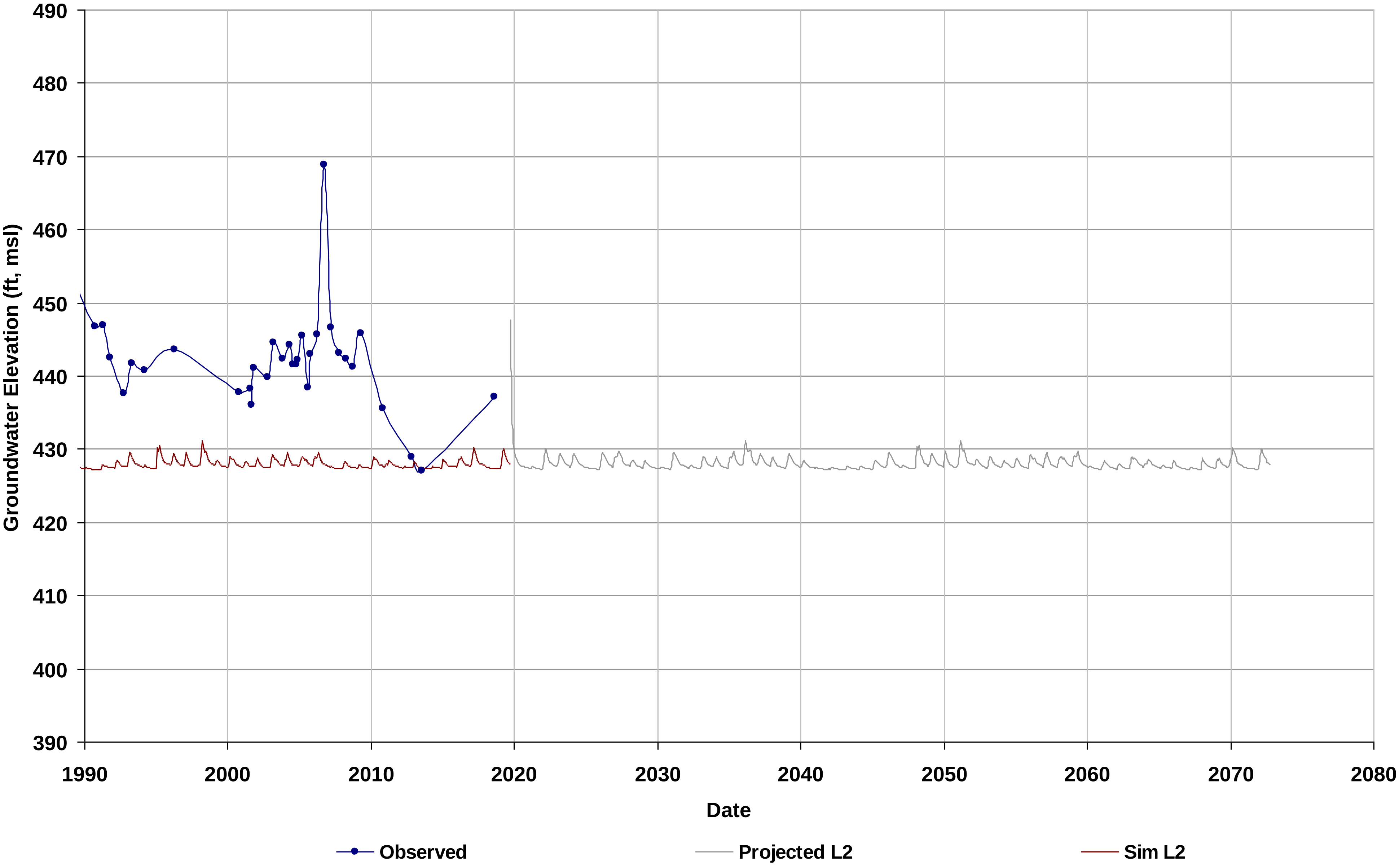
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

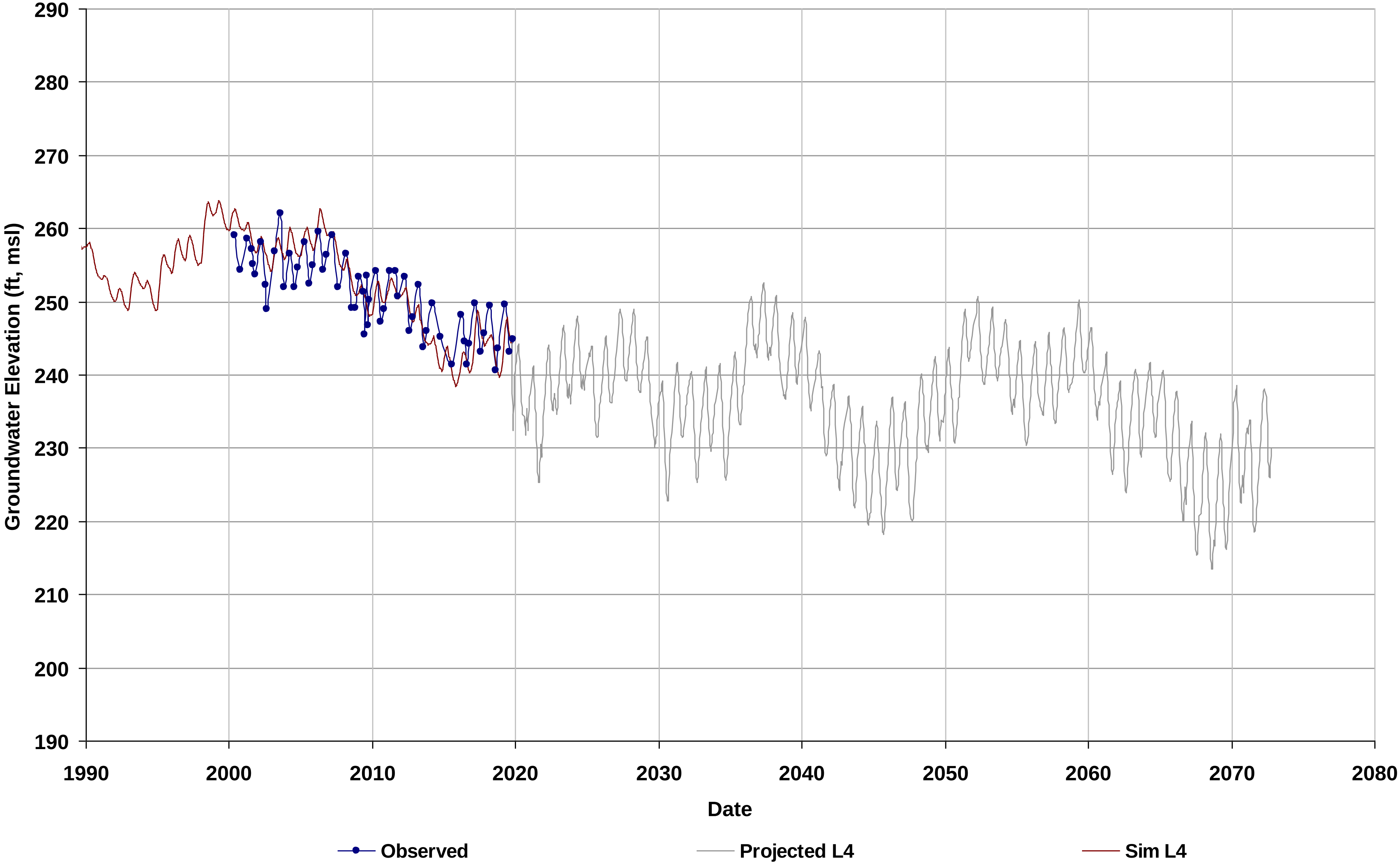
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

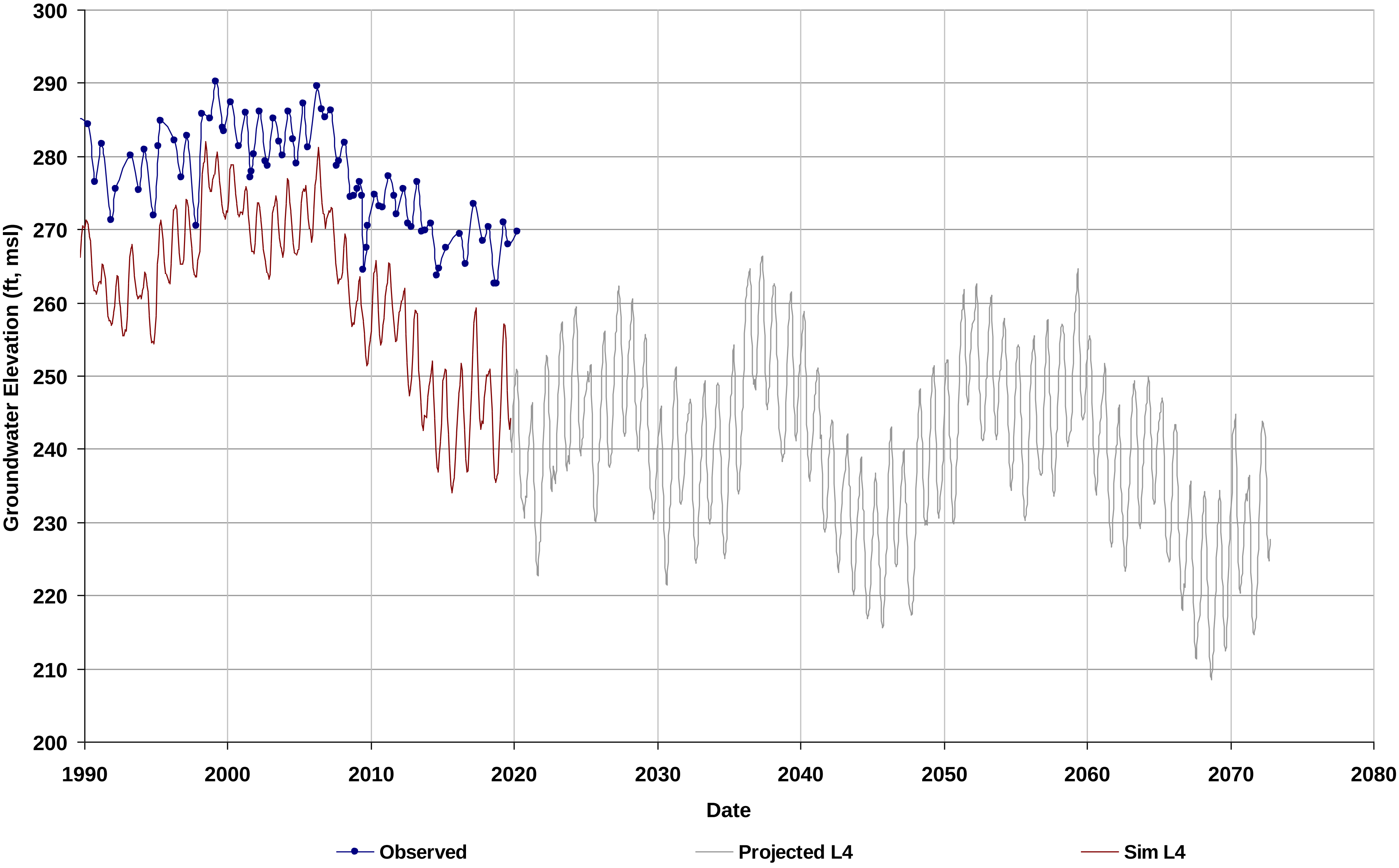
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

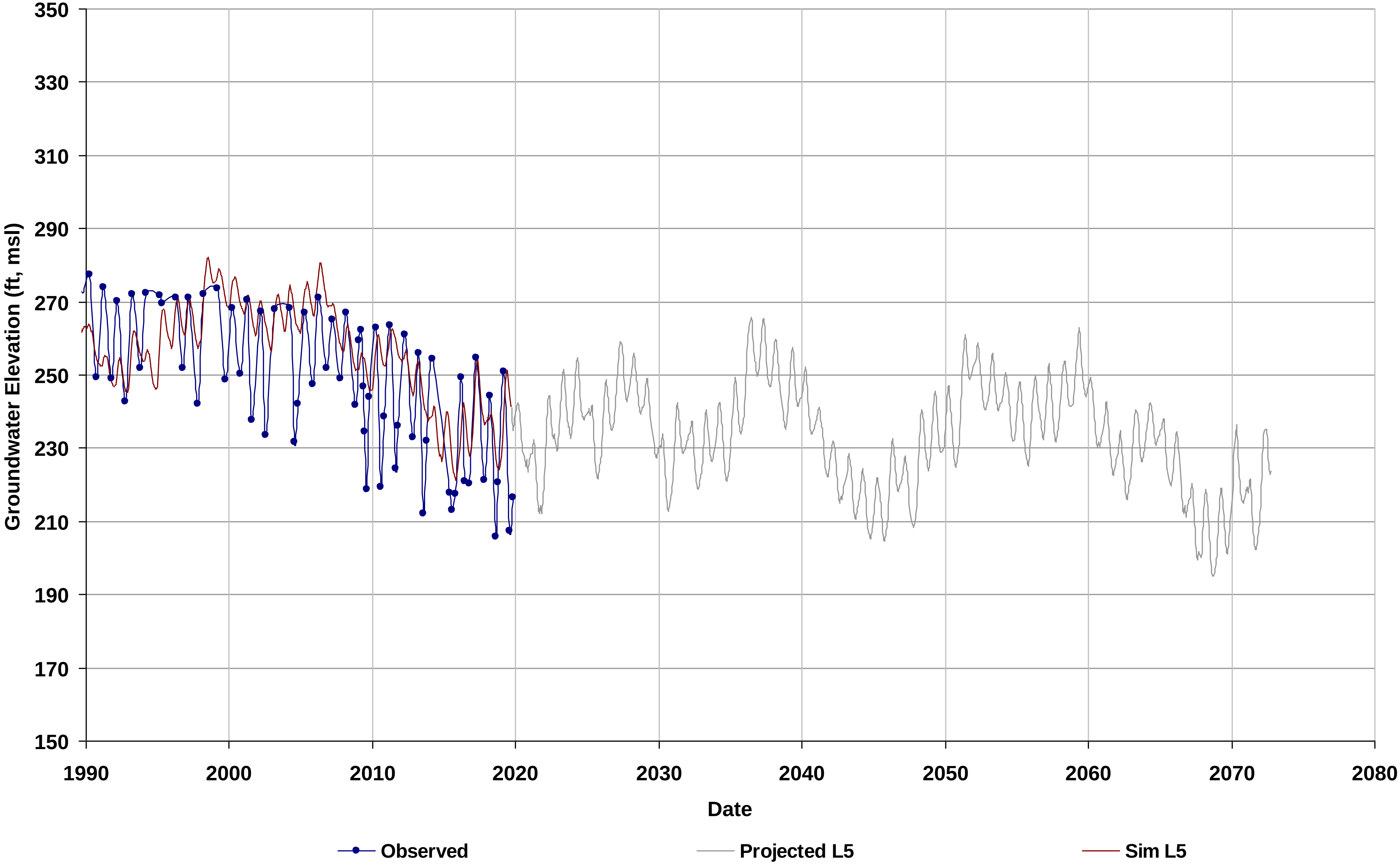
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

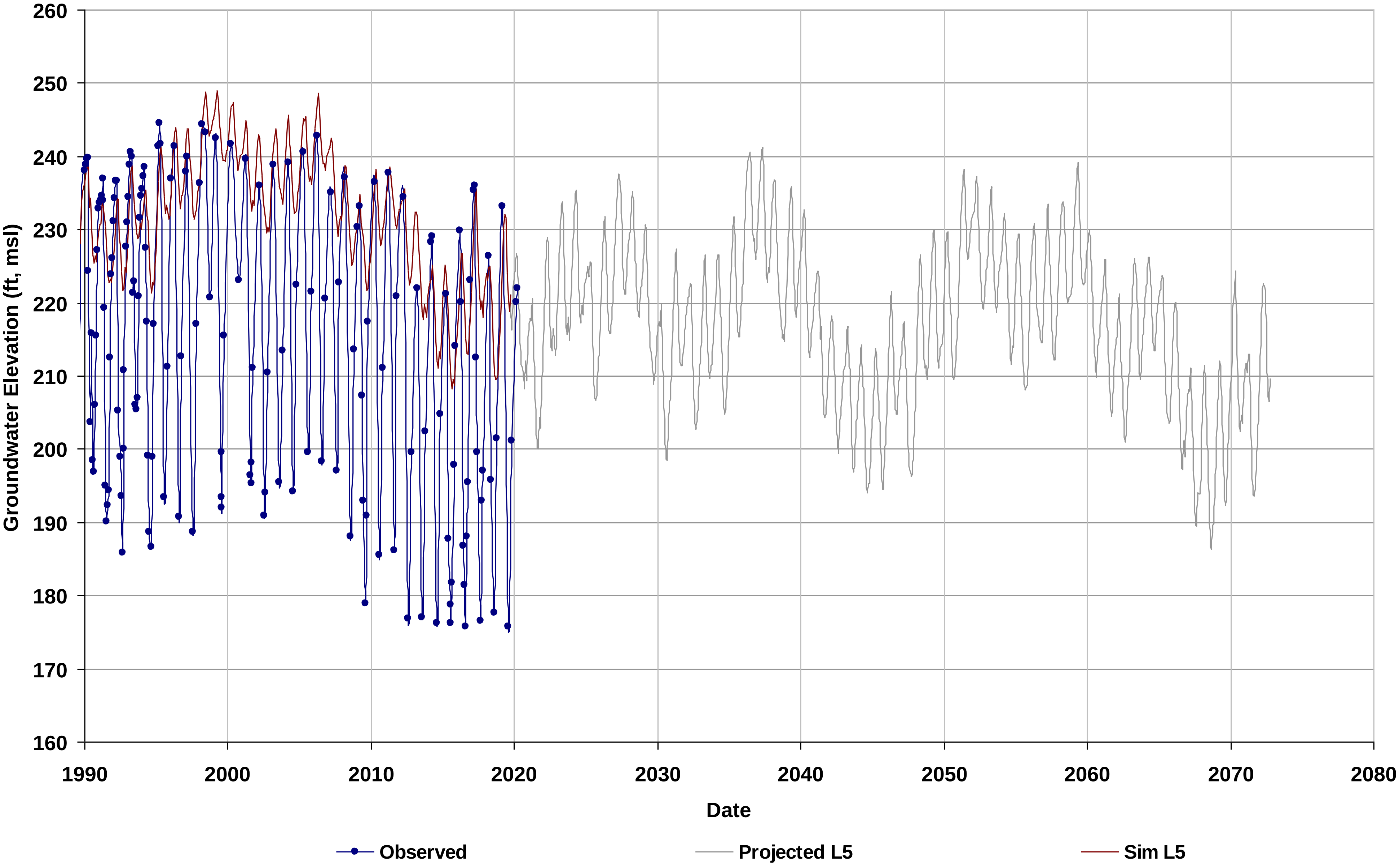
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

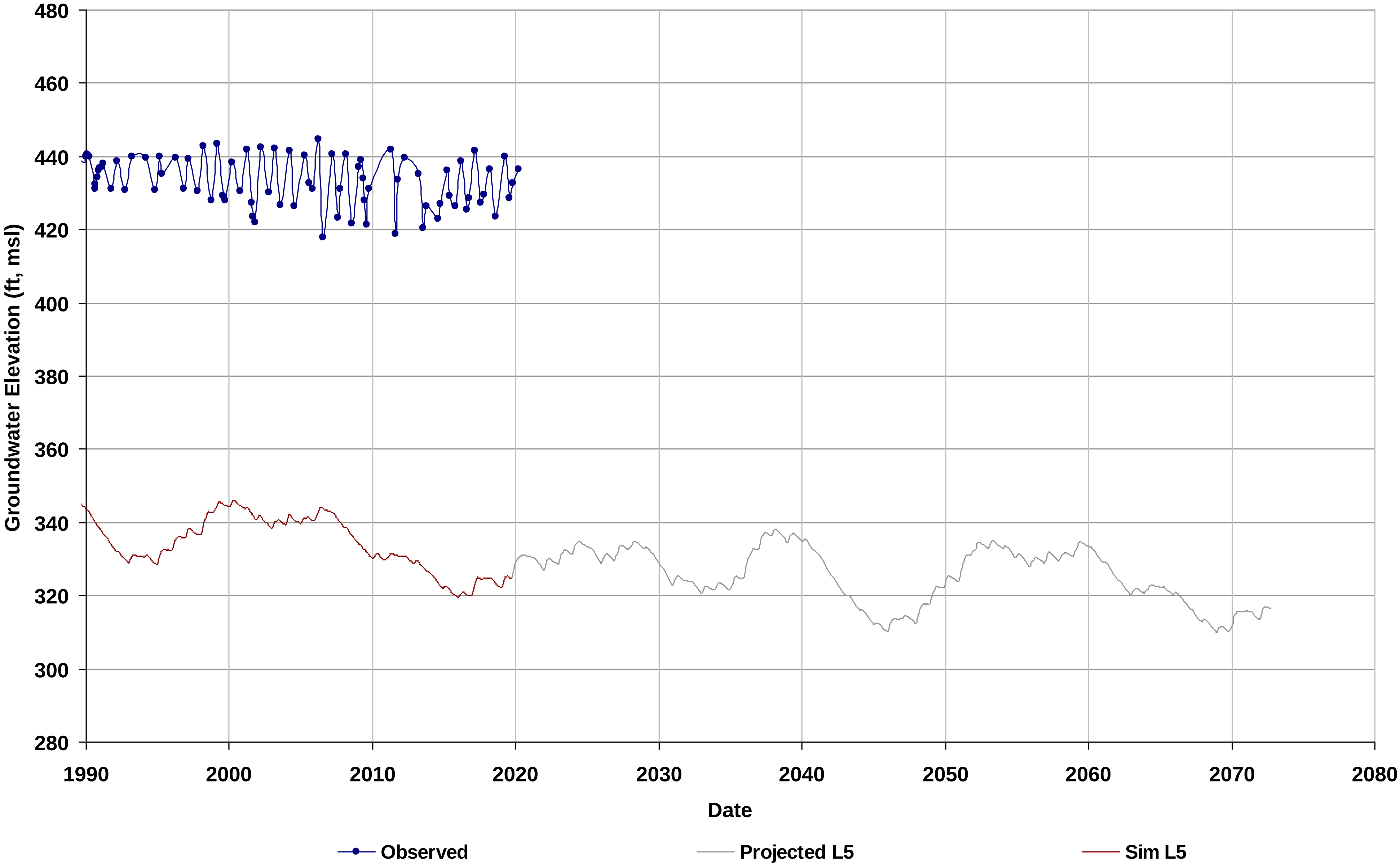
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

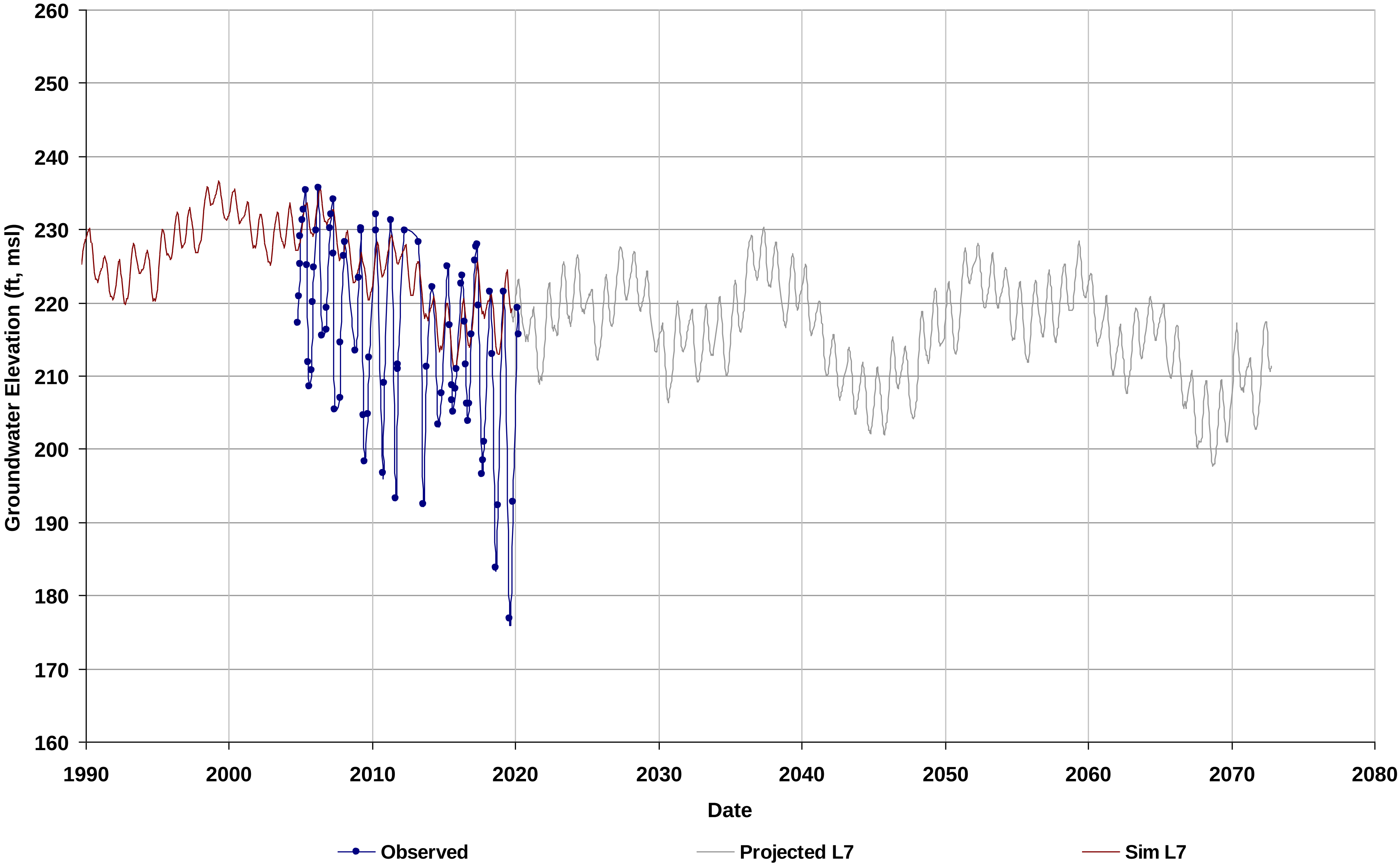
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

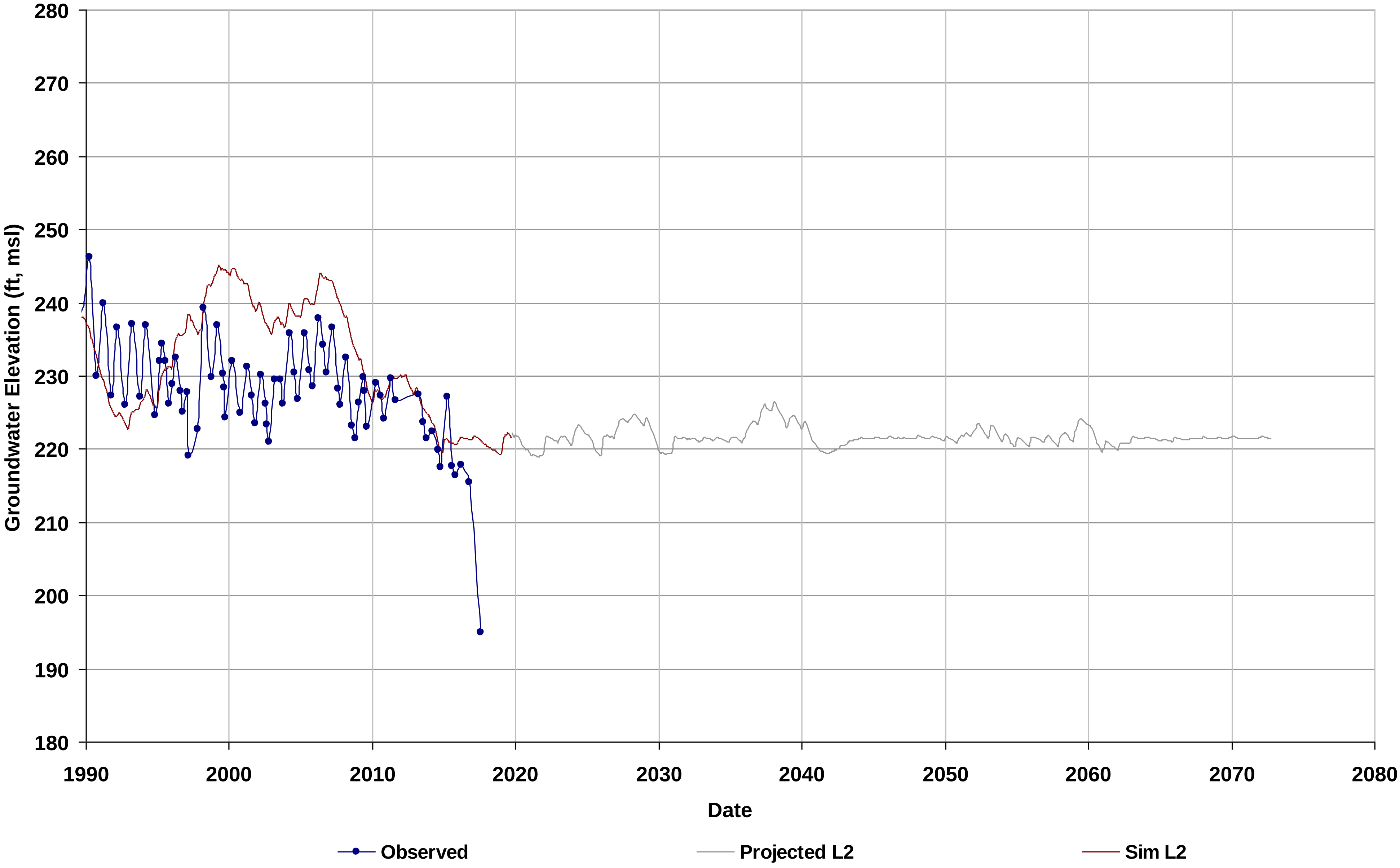
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use)

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

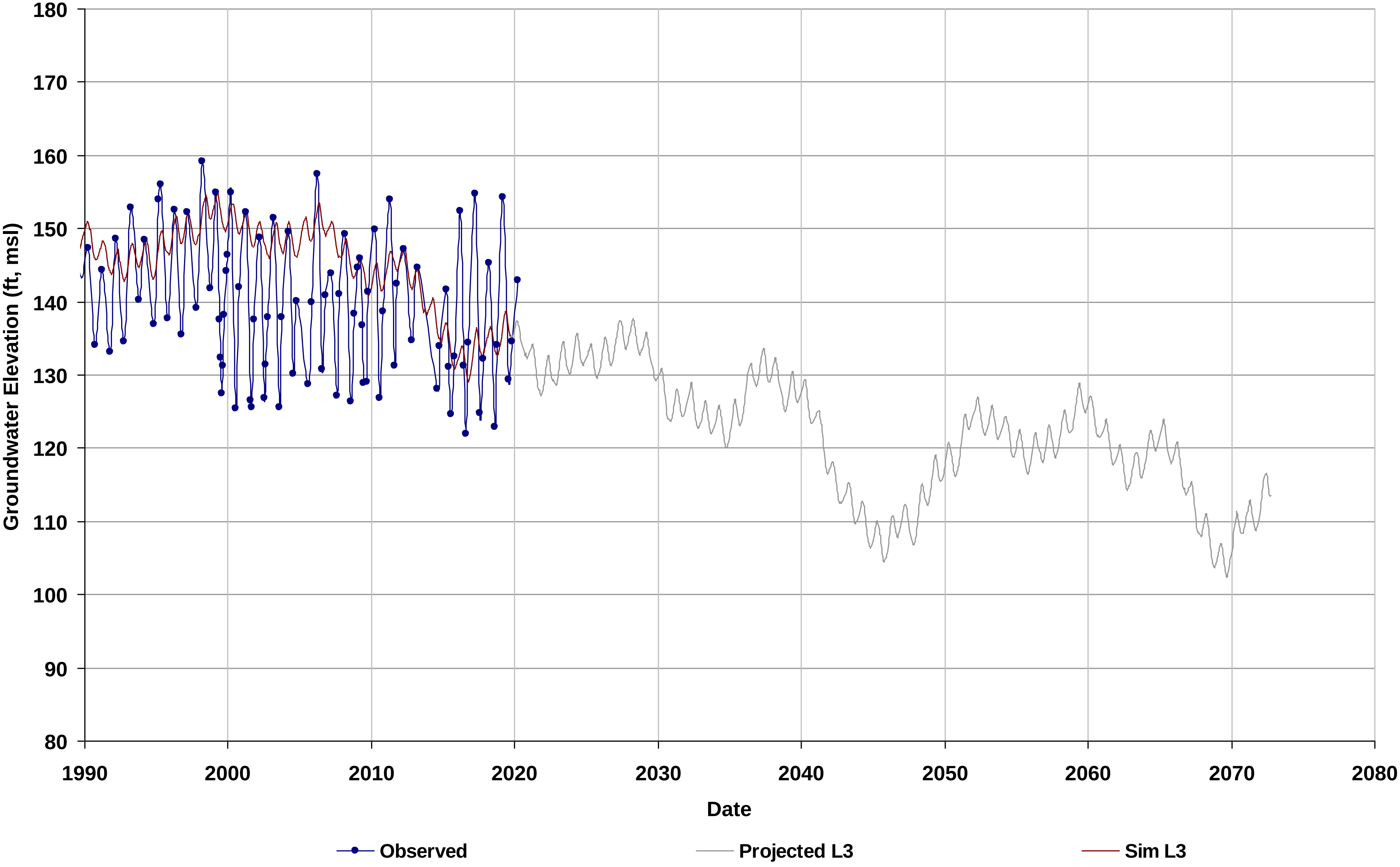
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

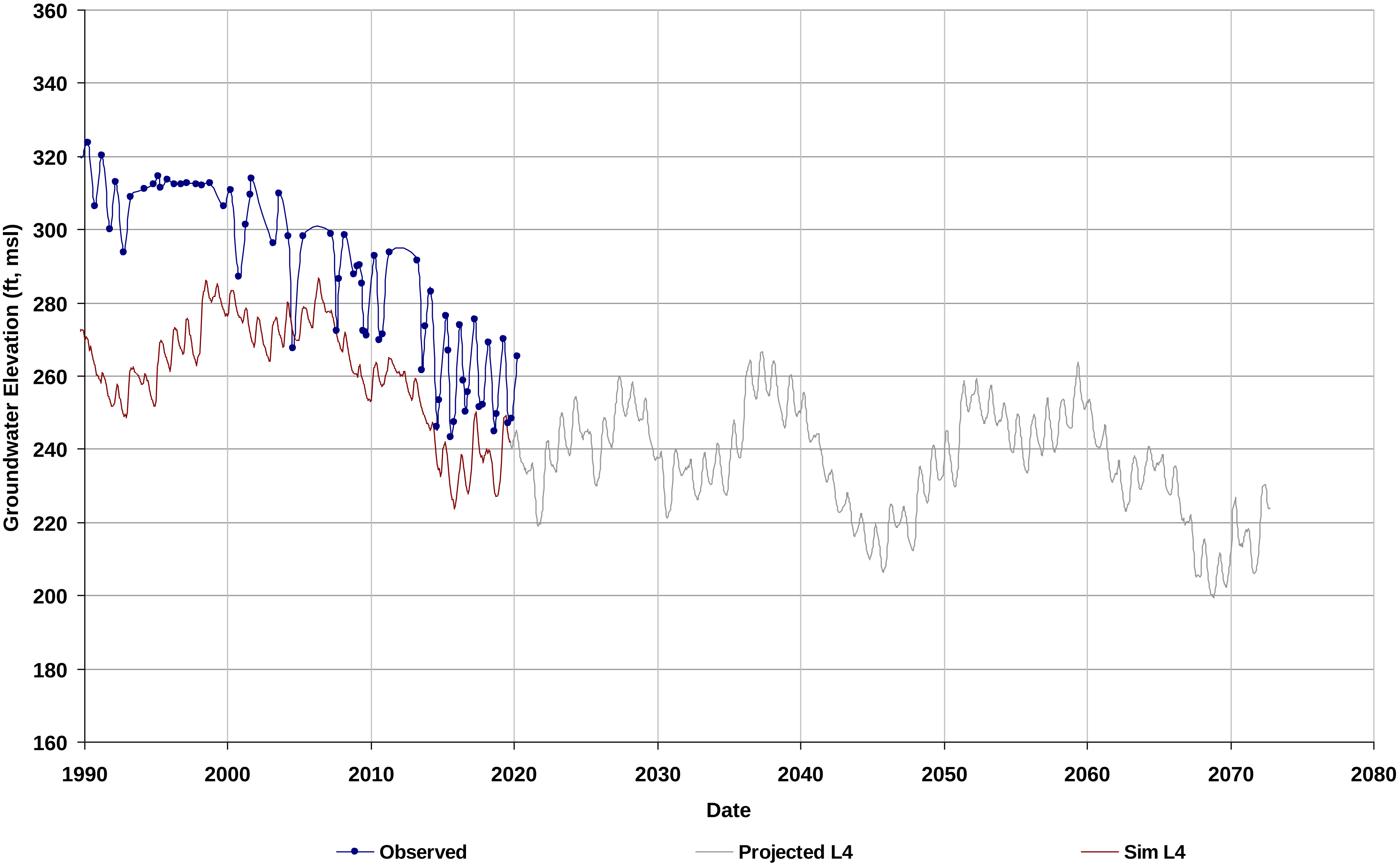
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

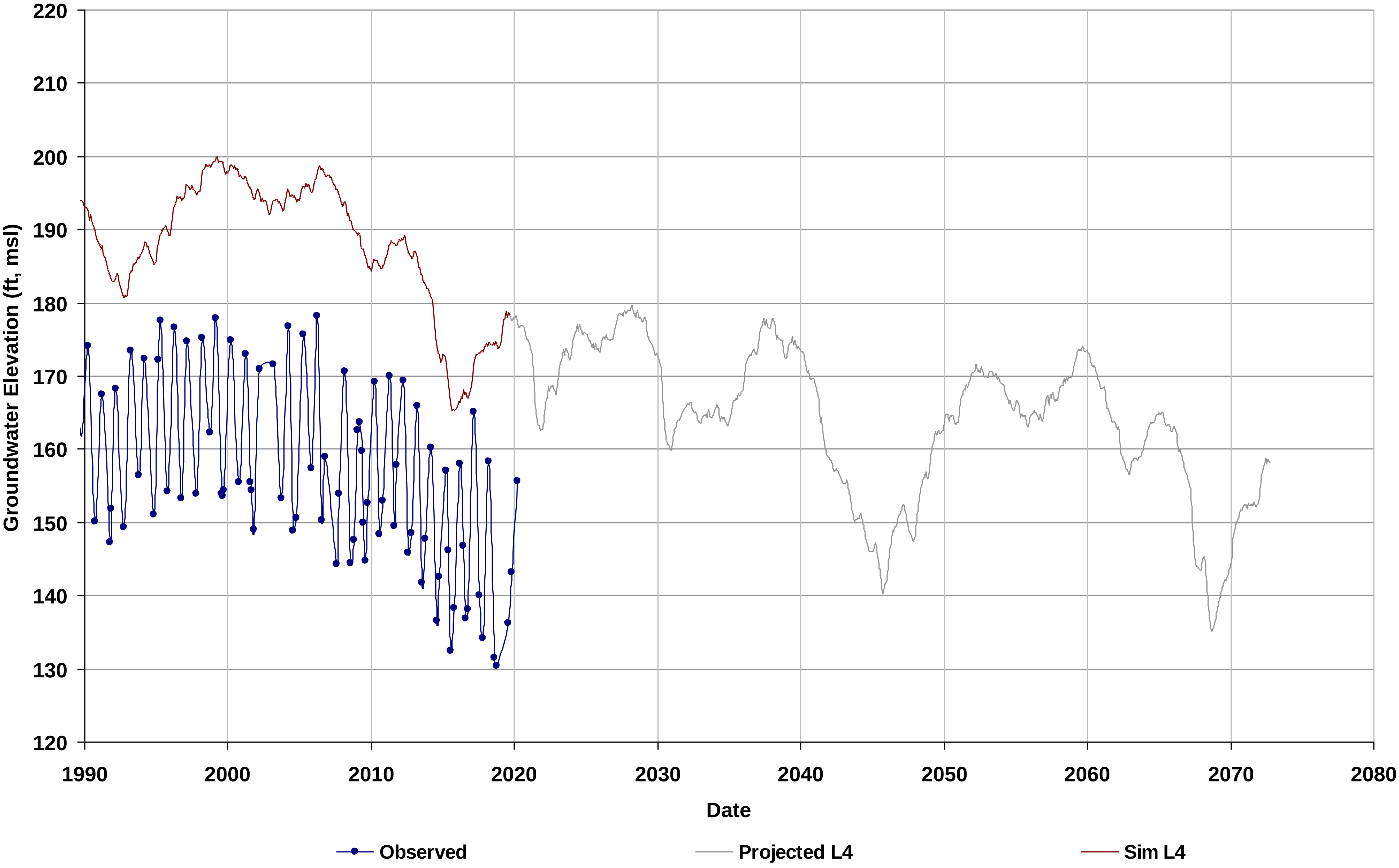
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

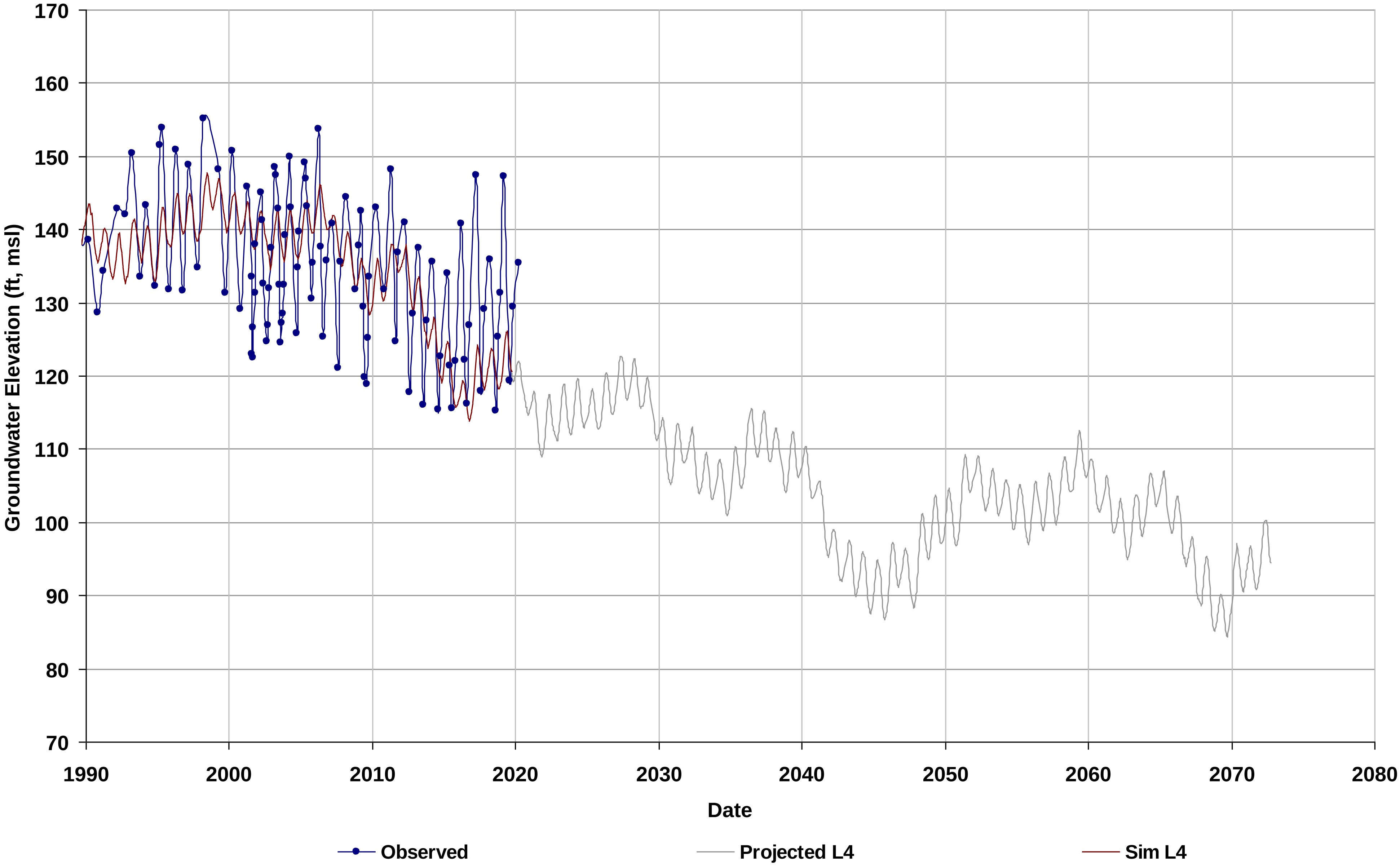
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

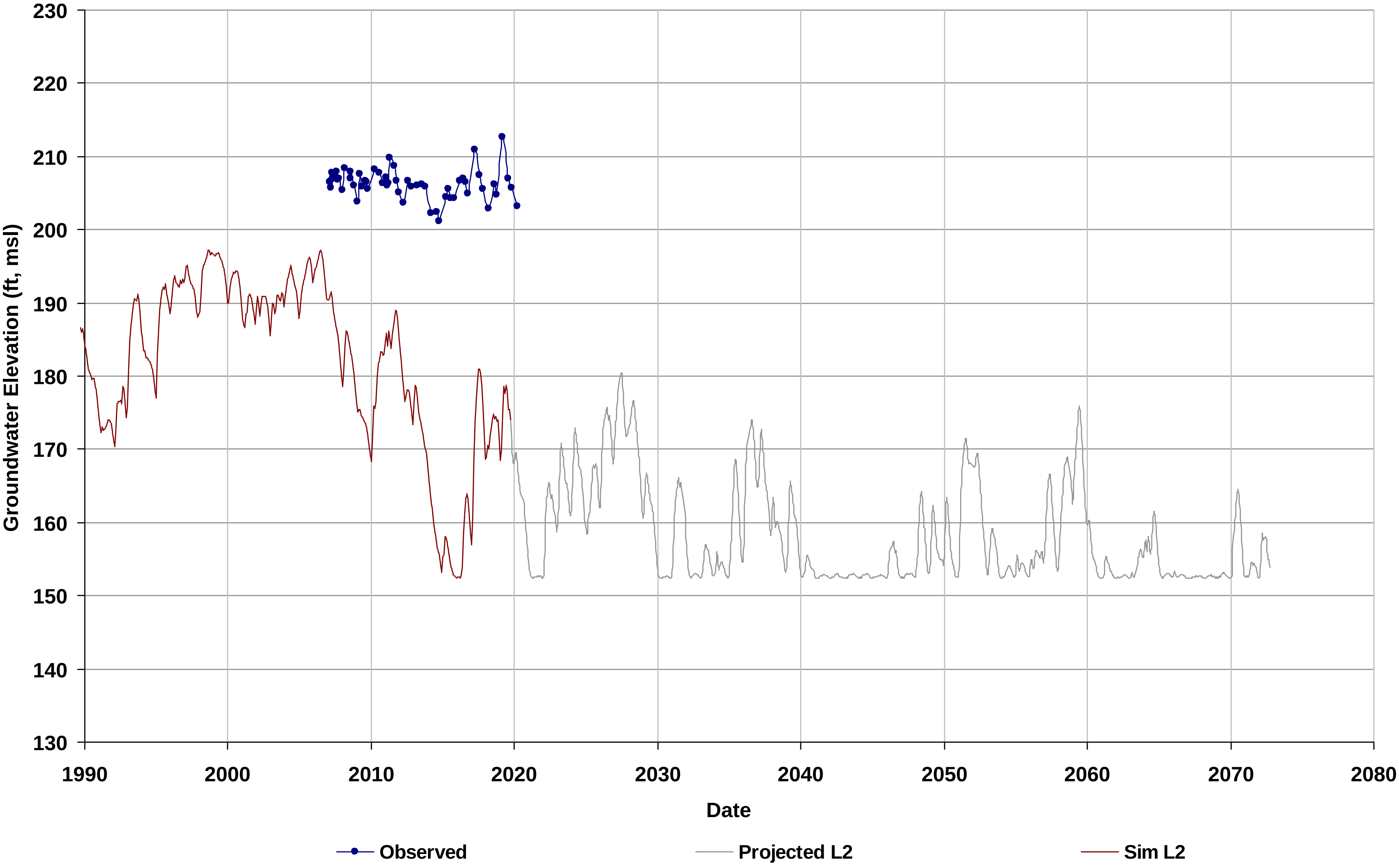
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

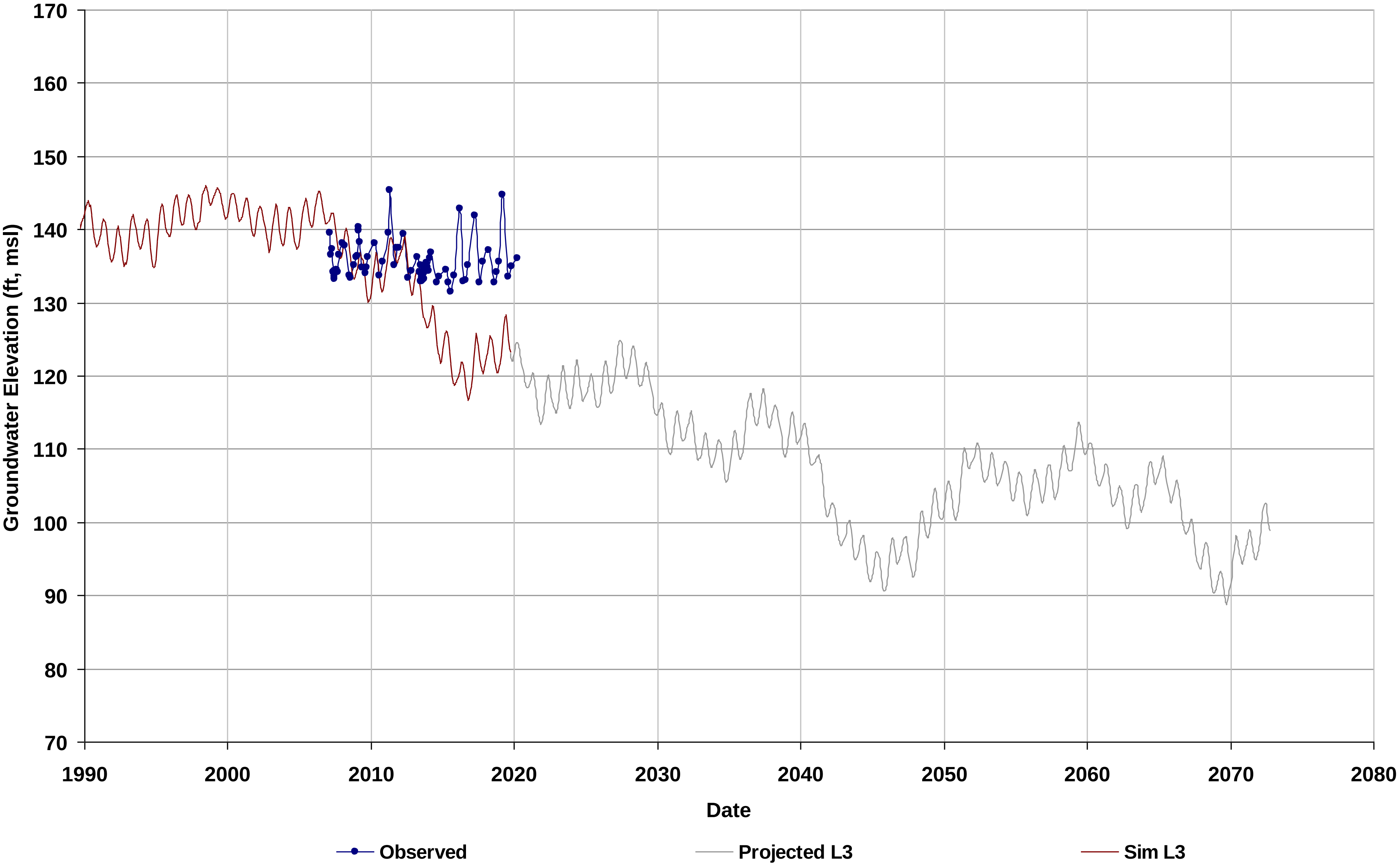
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

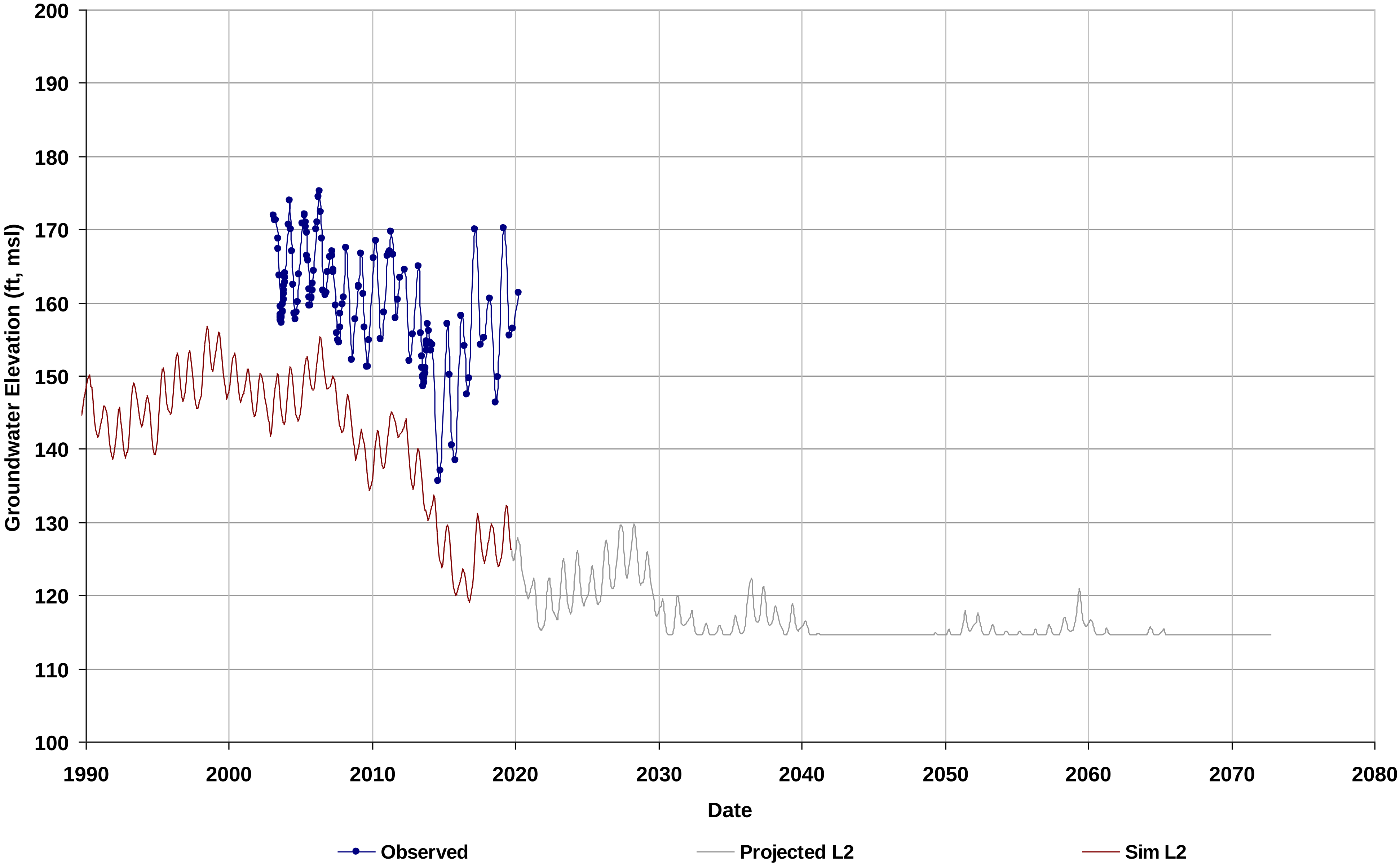
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

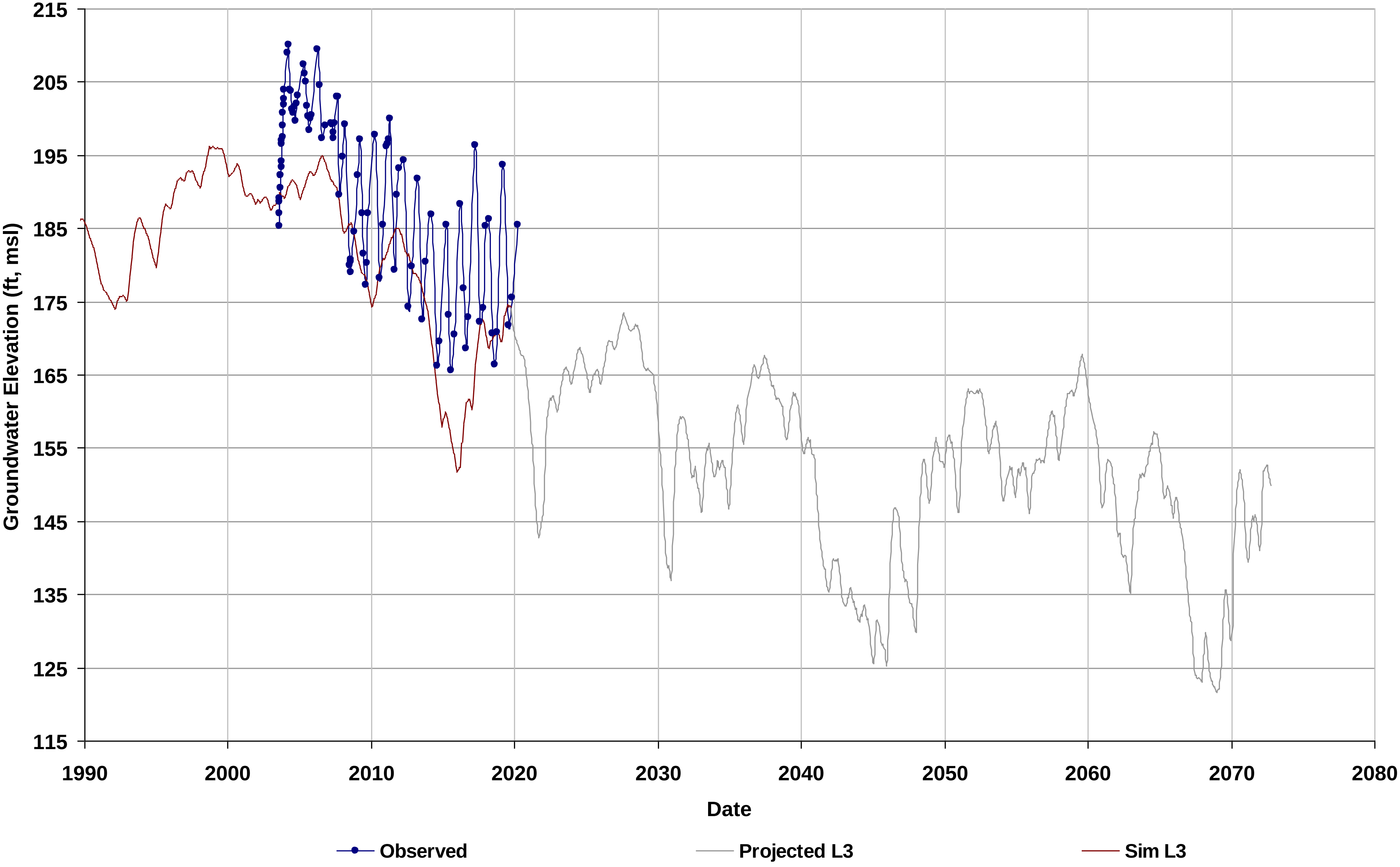
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

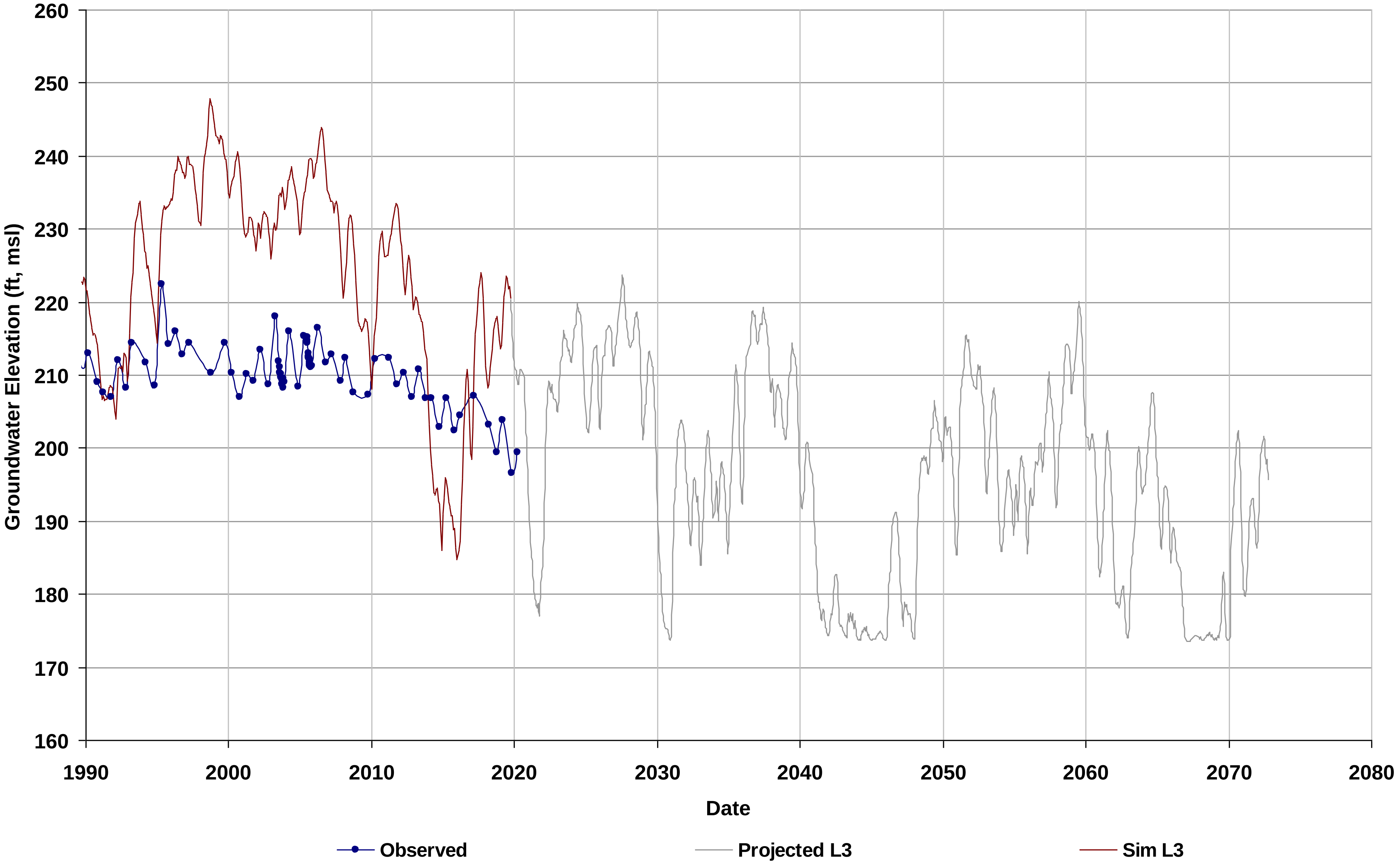
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

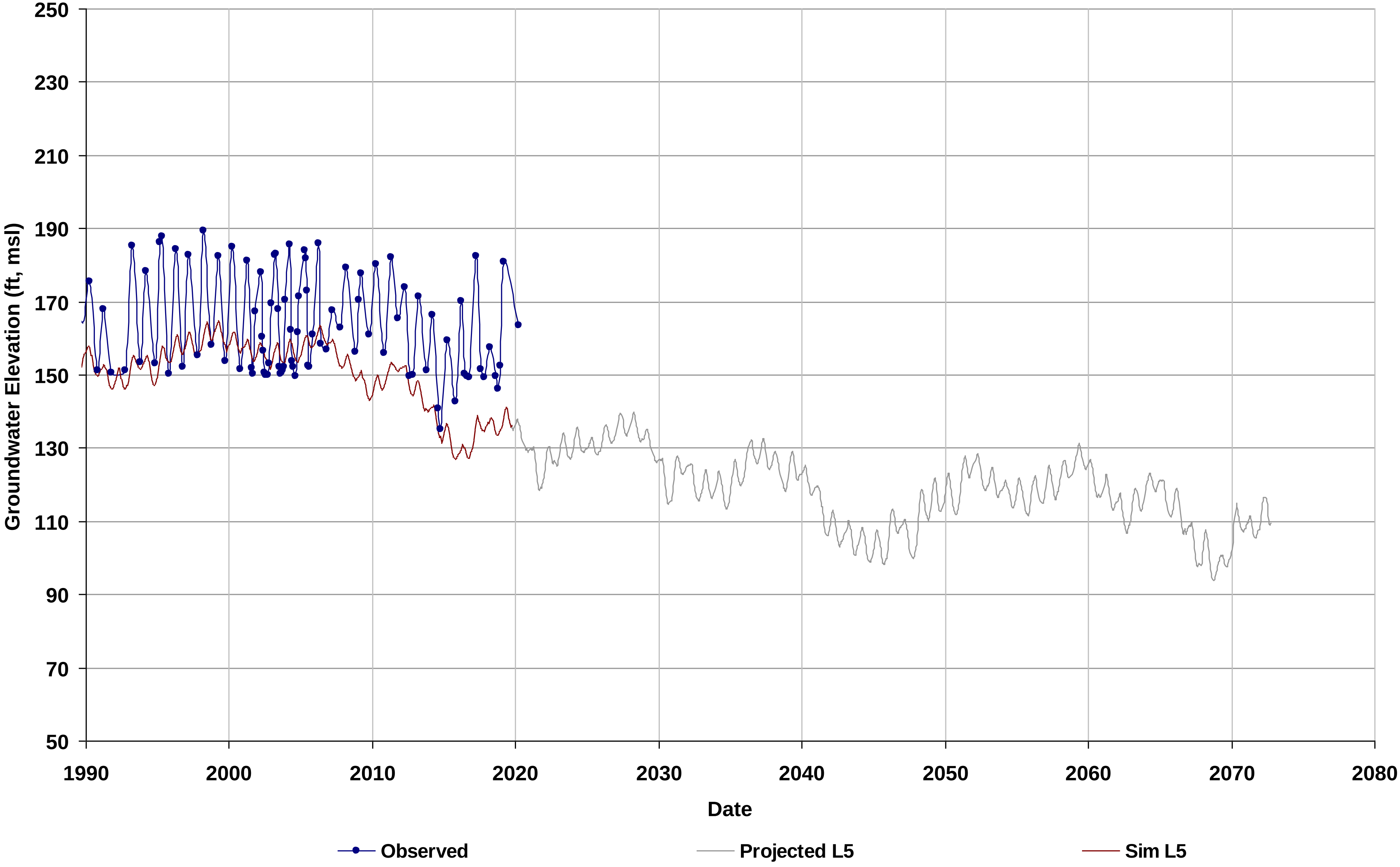
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

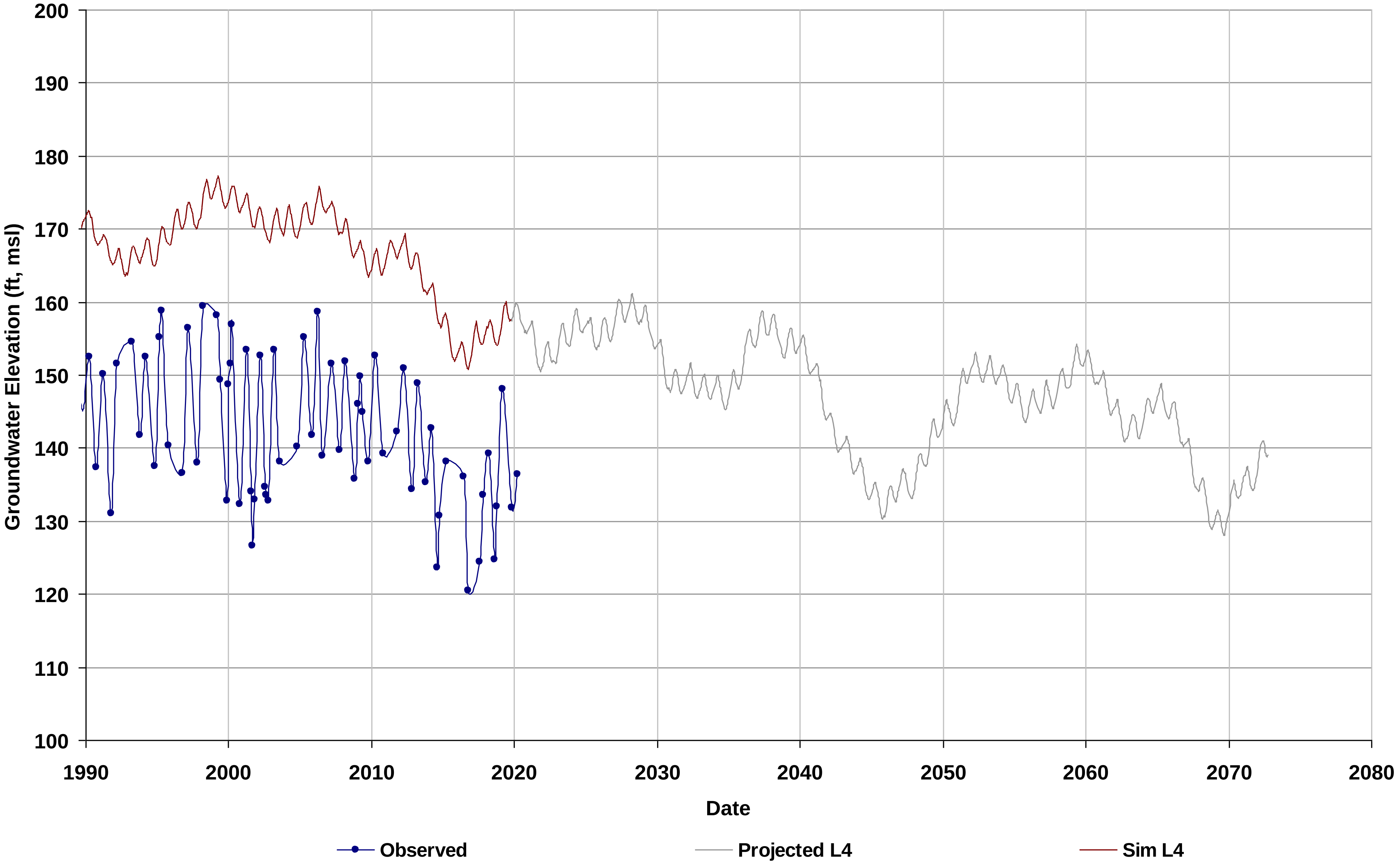
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

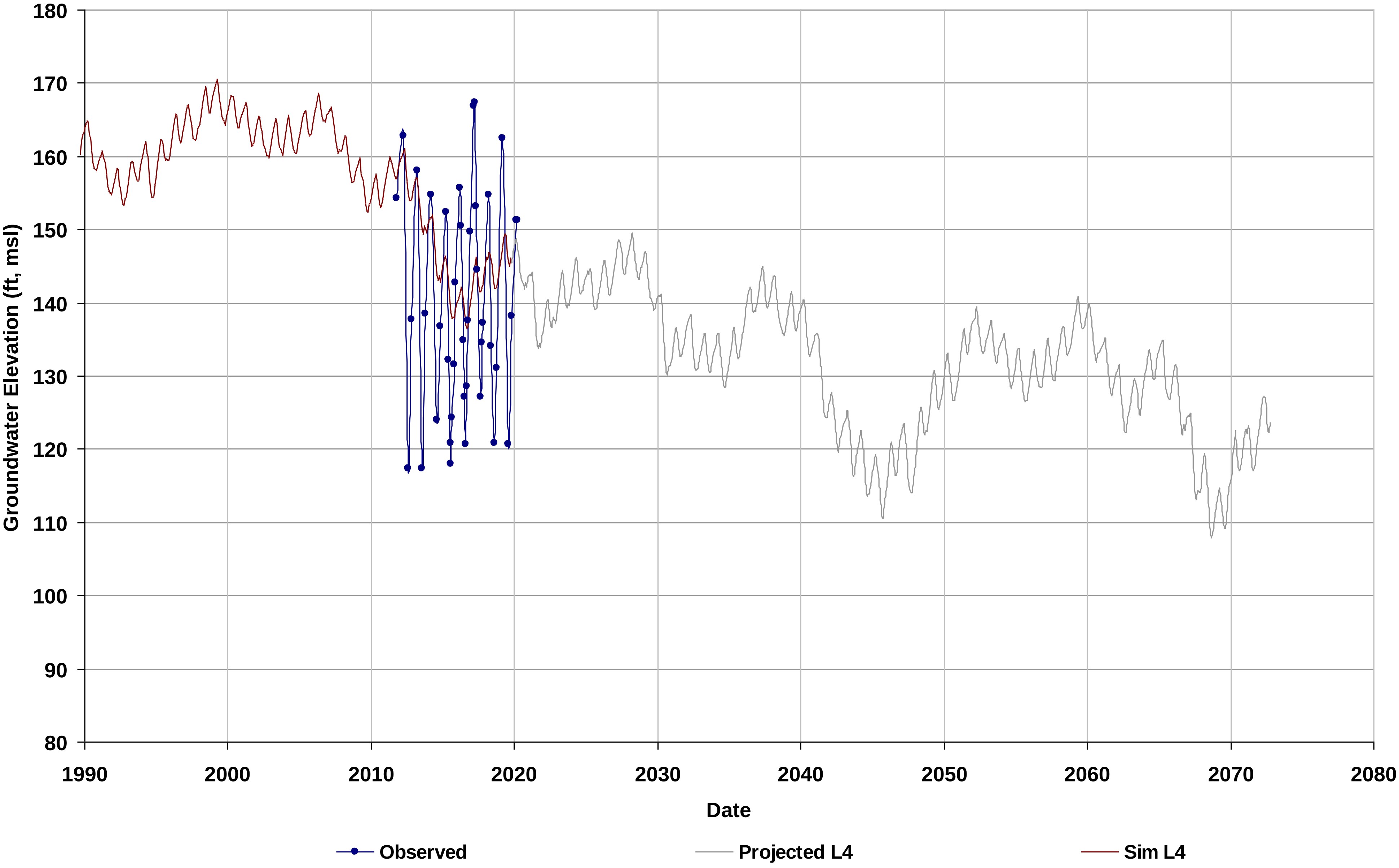
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

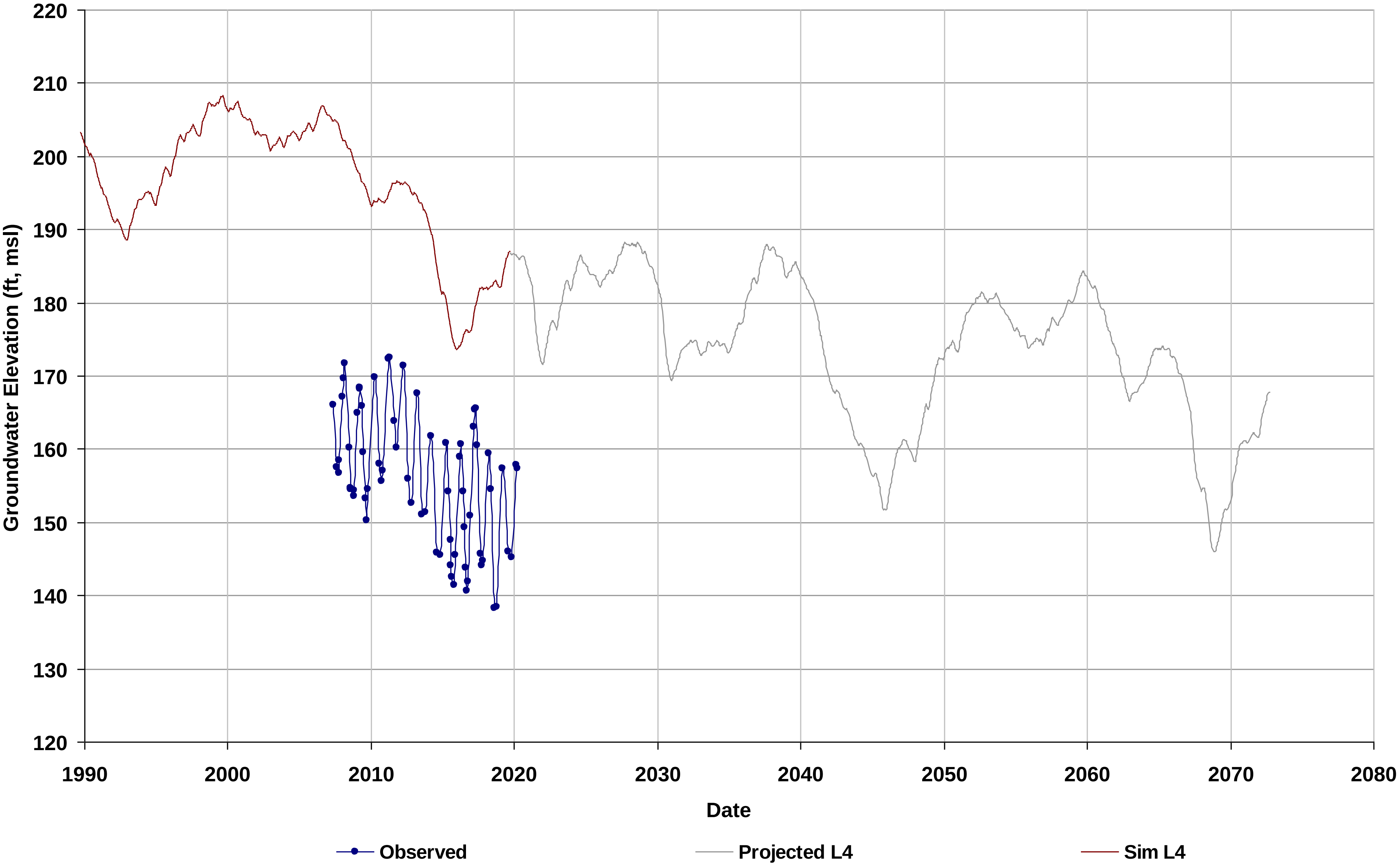
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

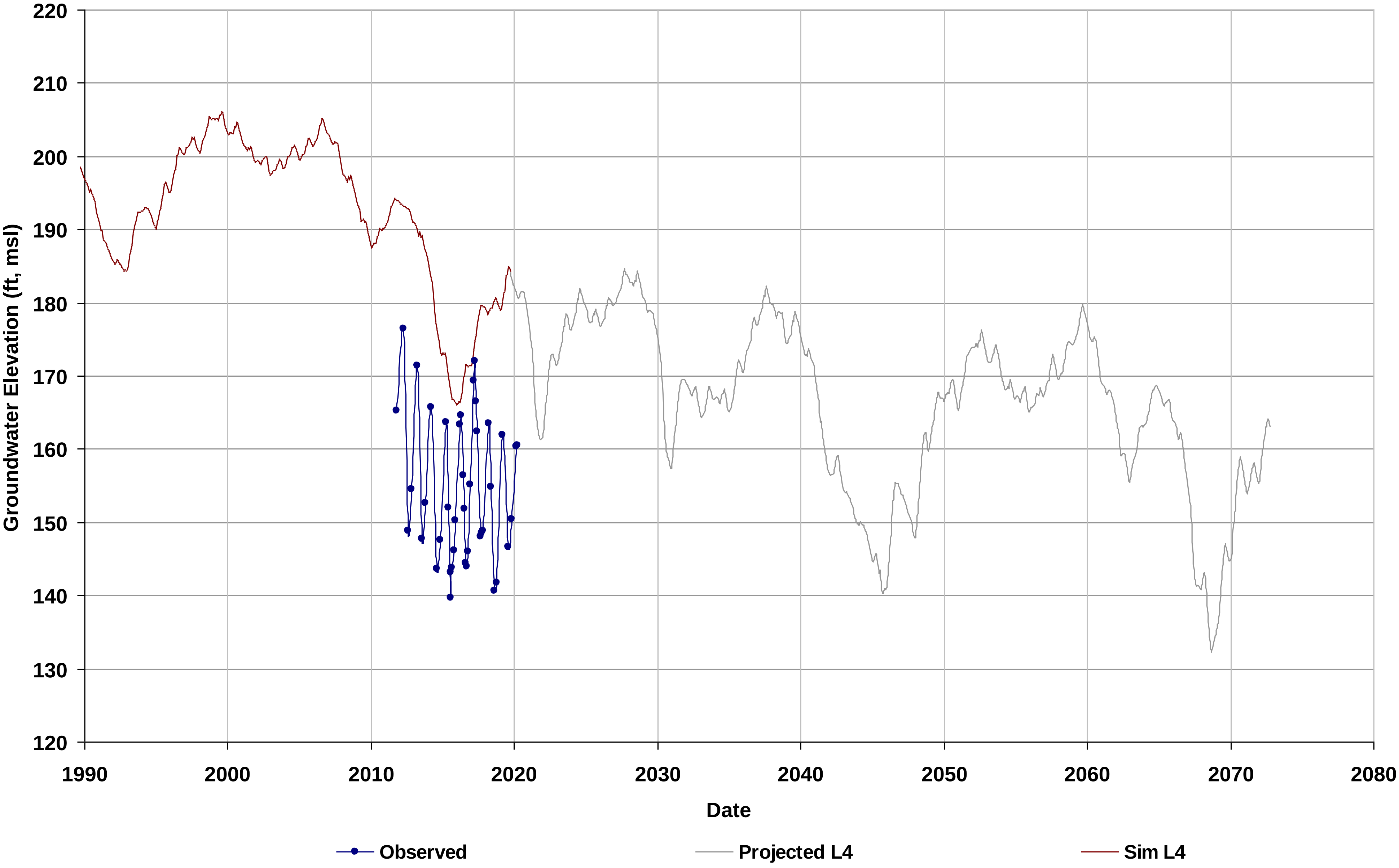
Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

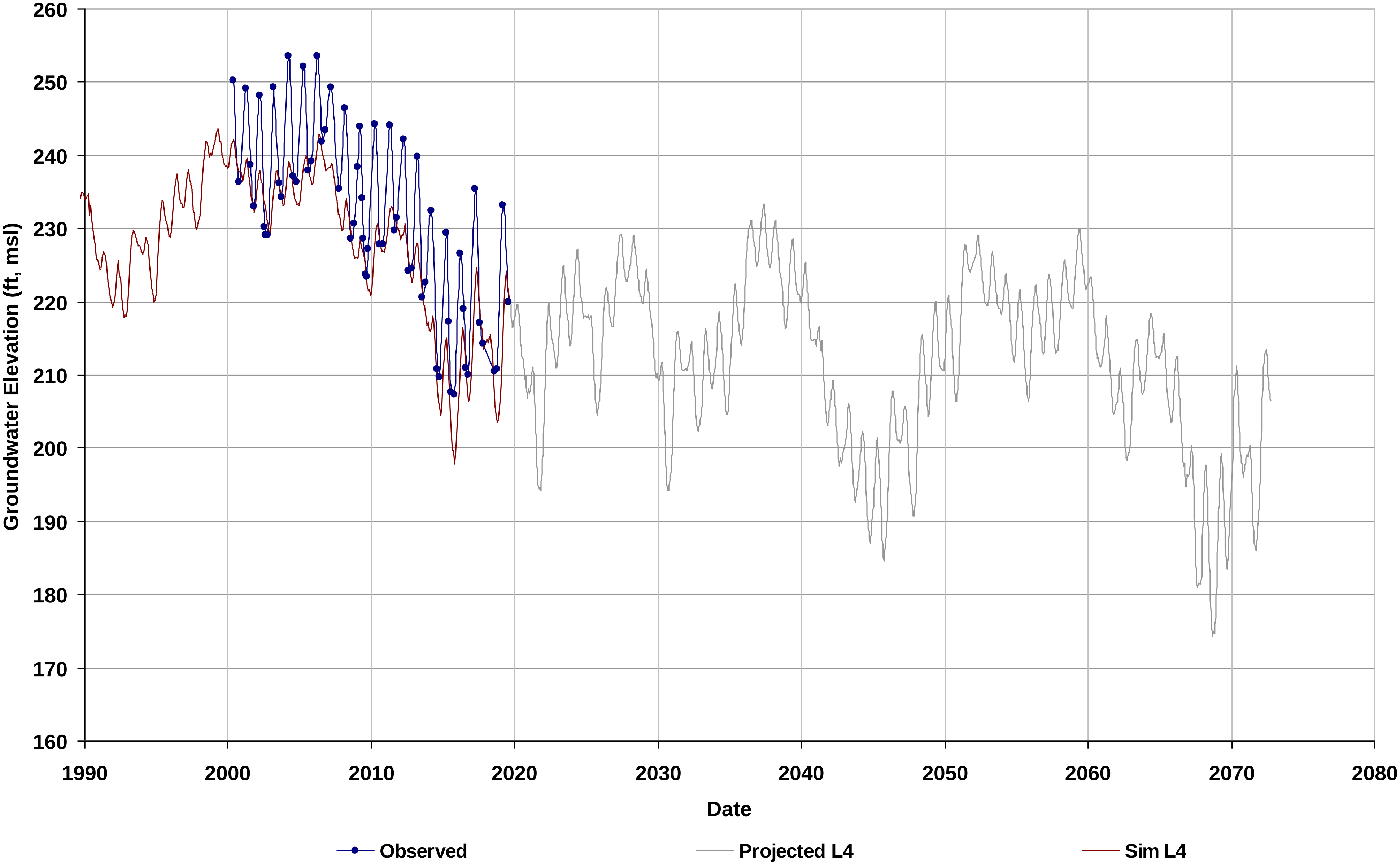
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

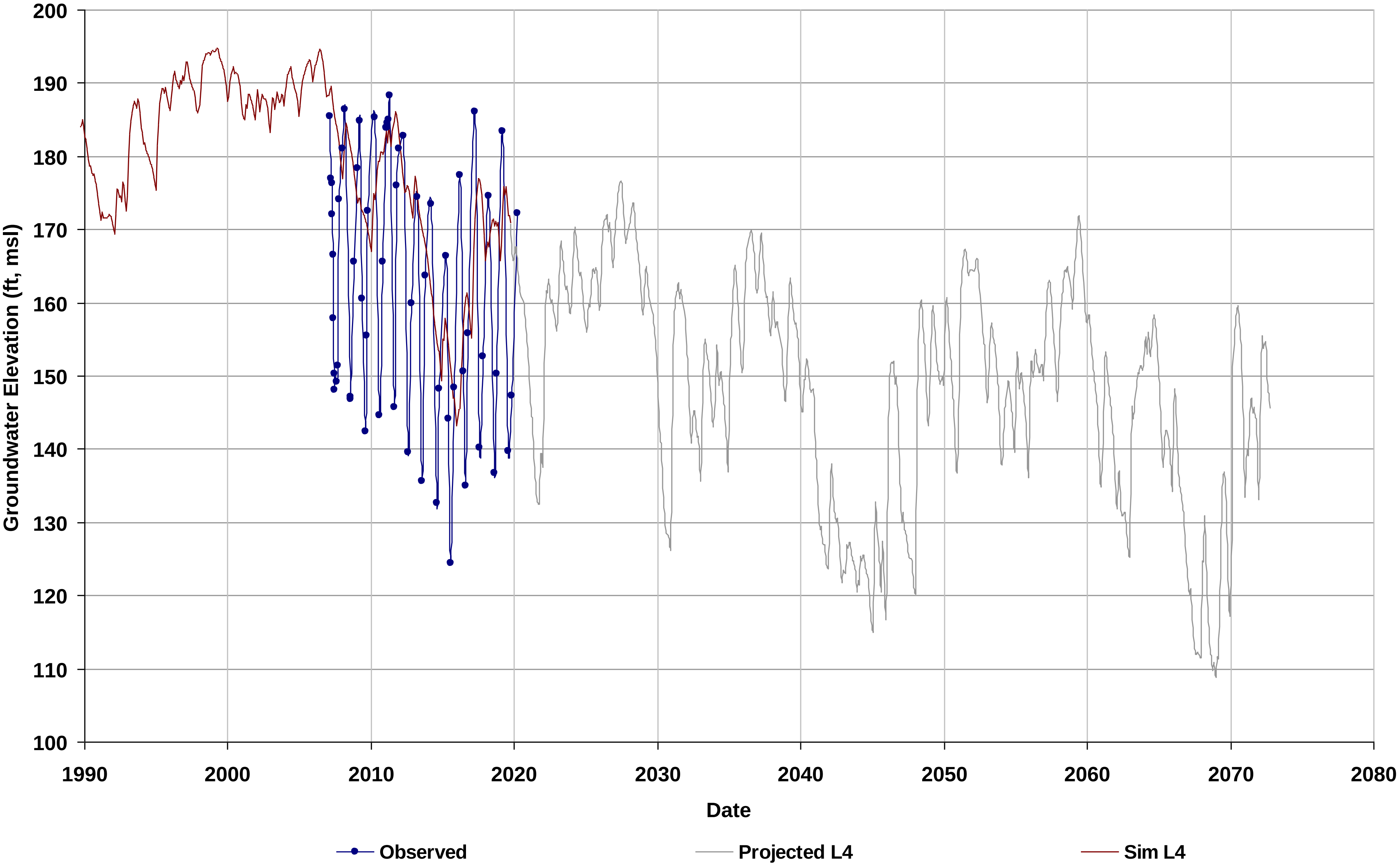
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

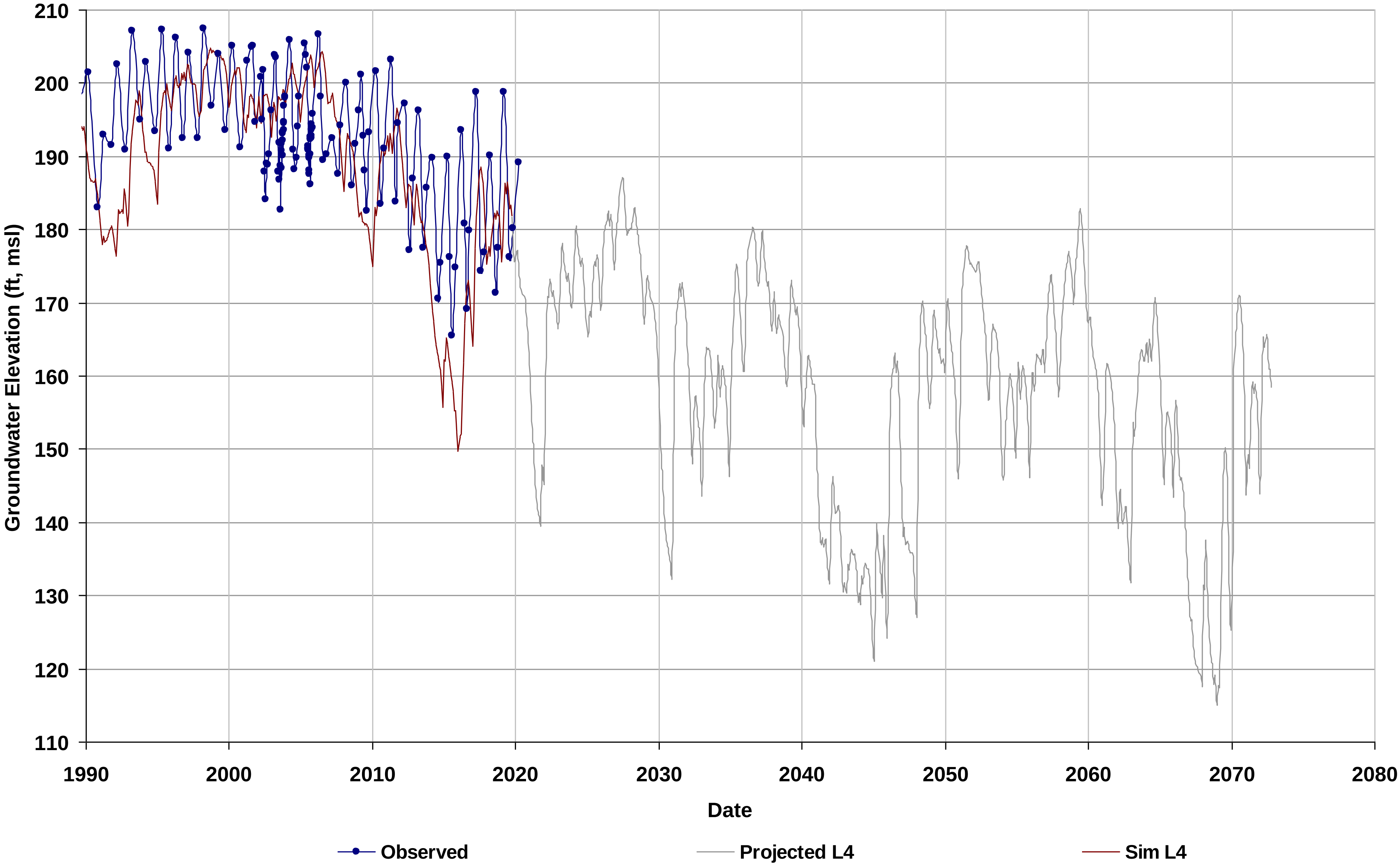
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

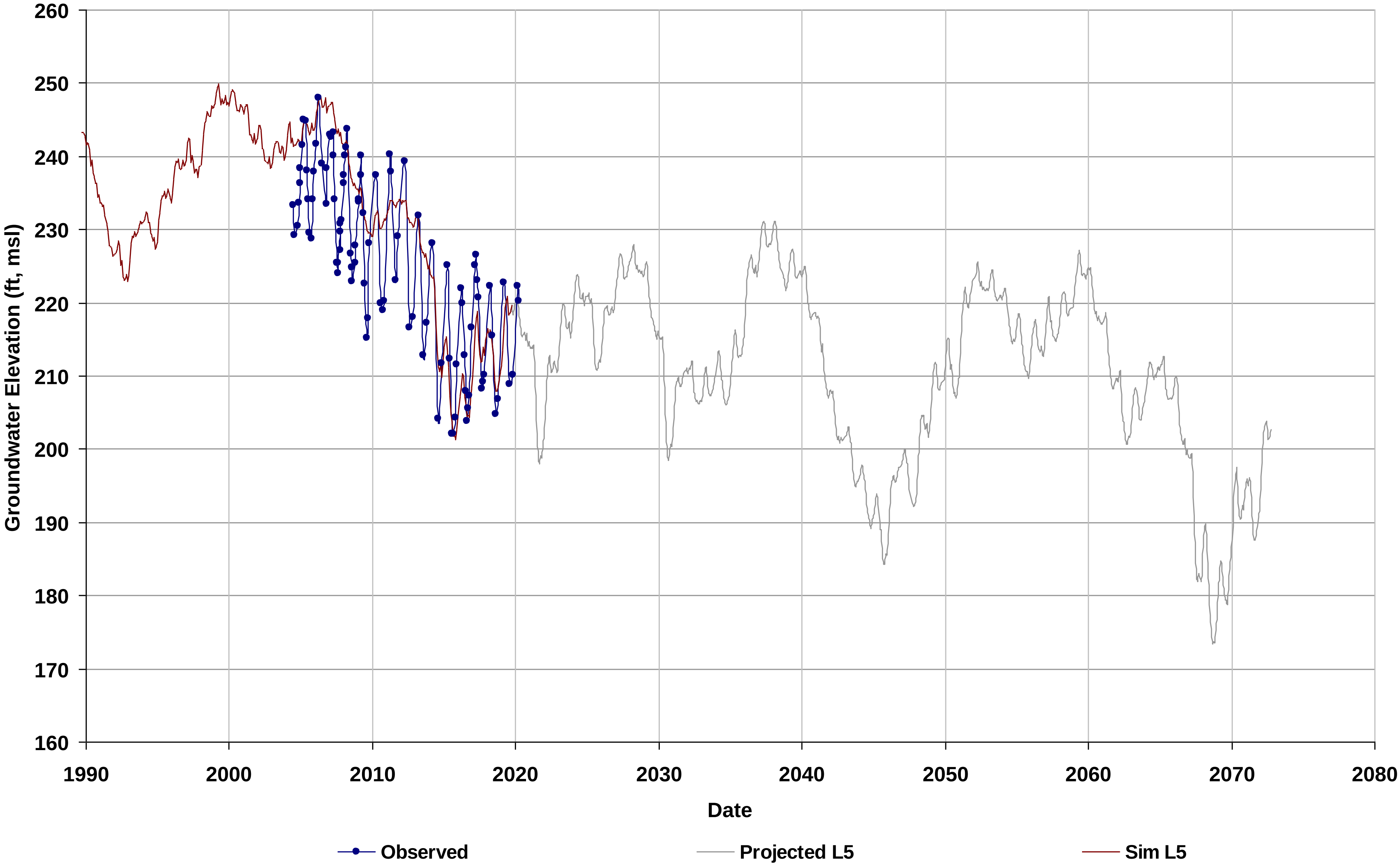
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

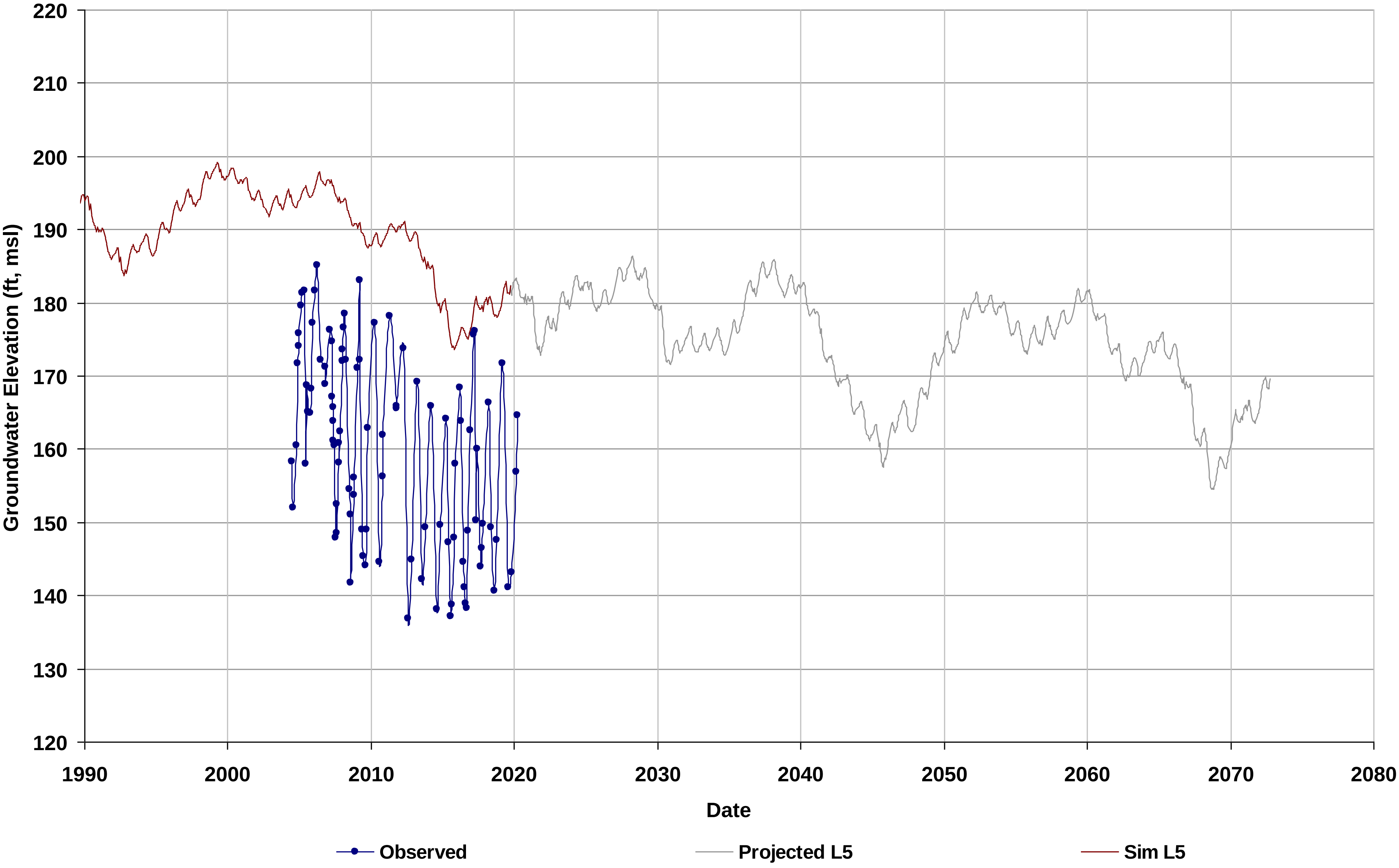
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

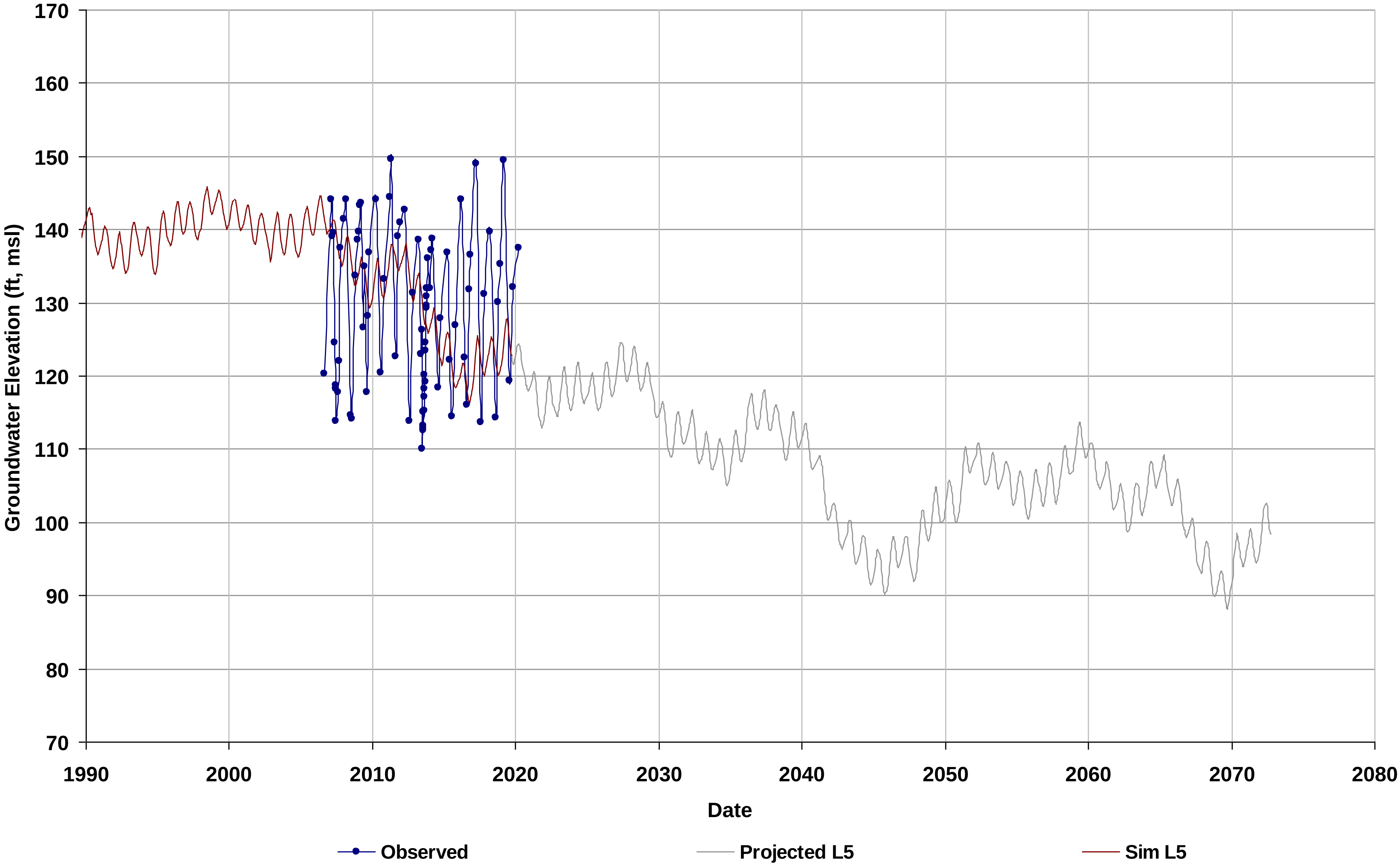
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

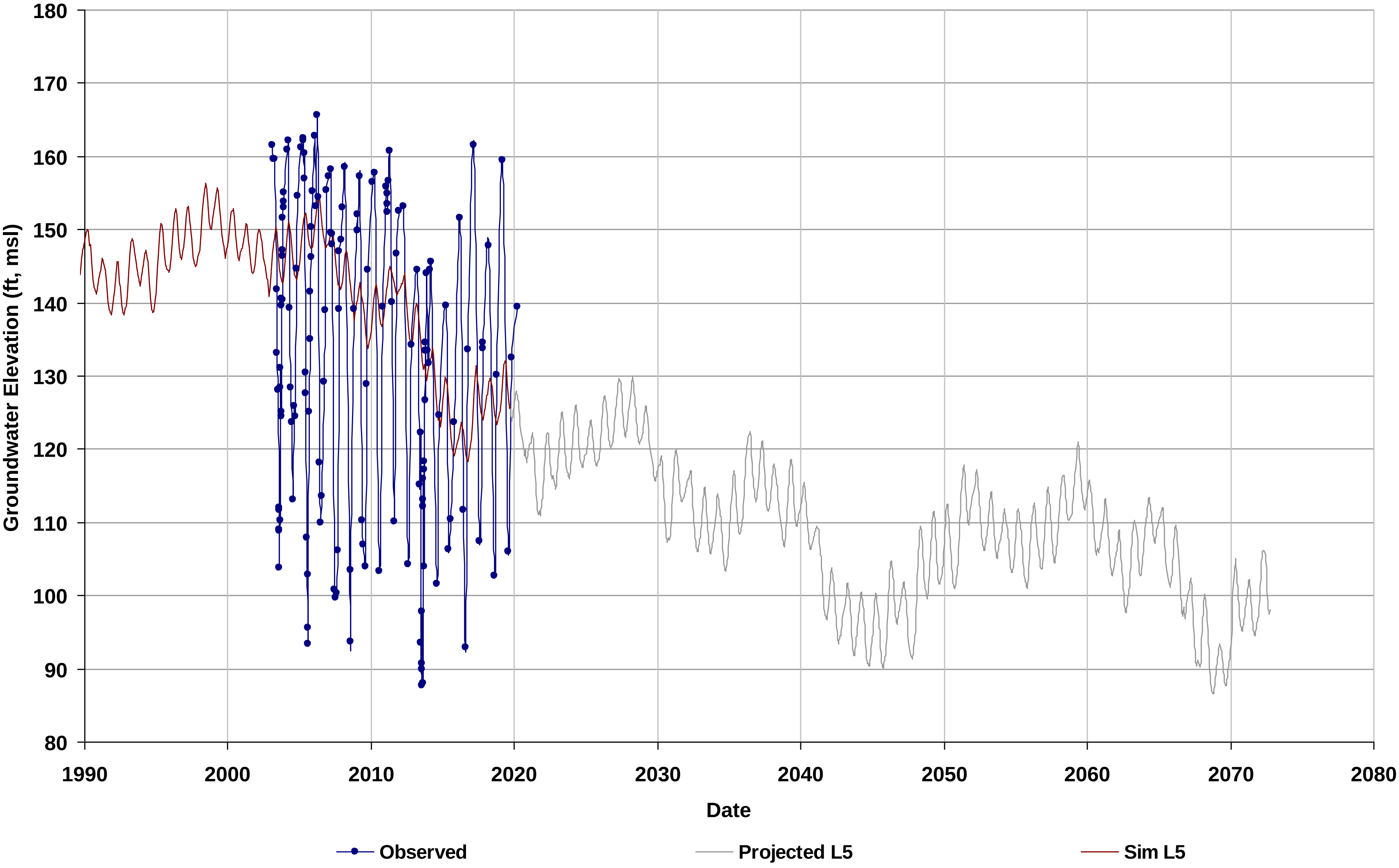
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

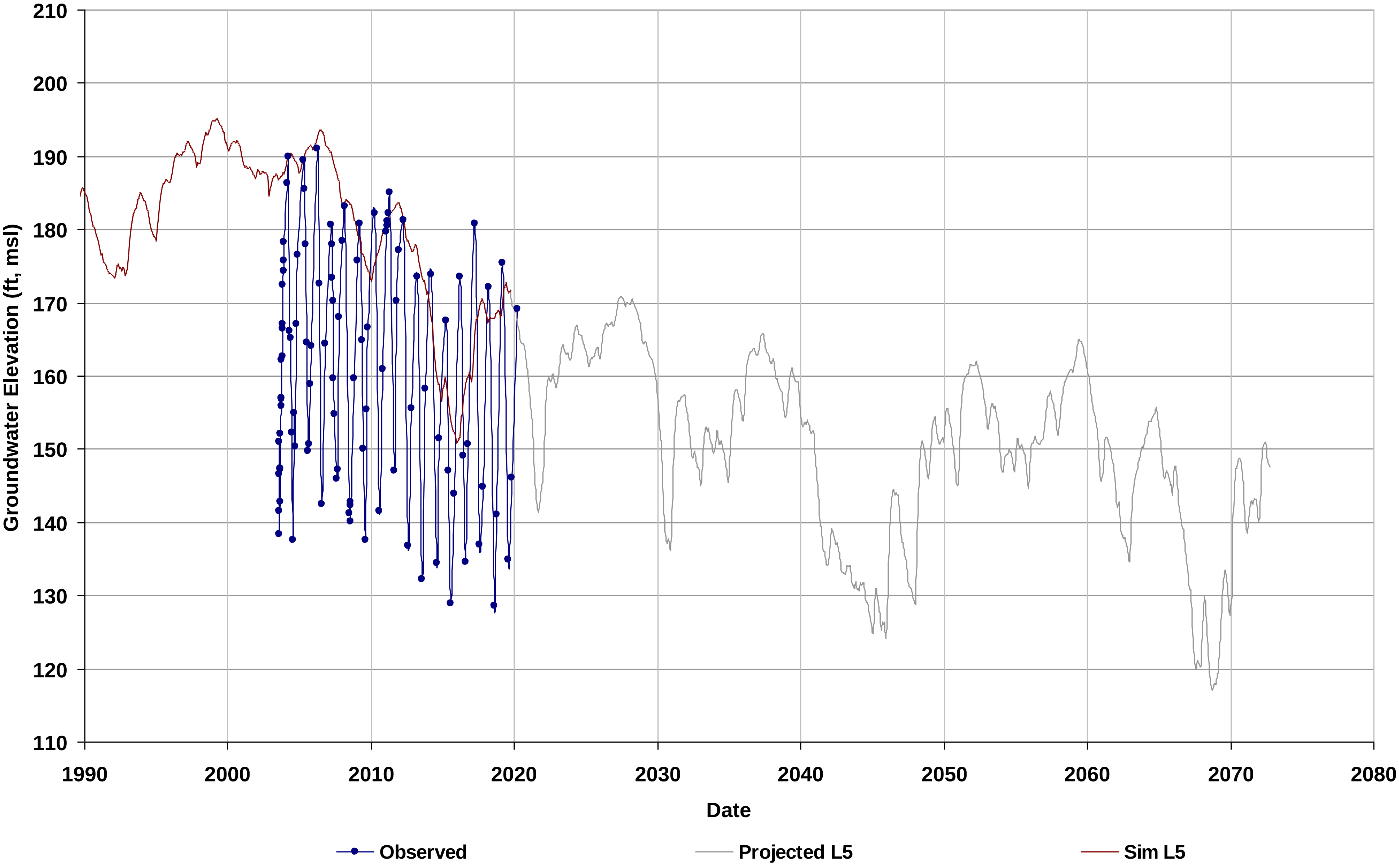
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

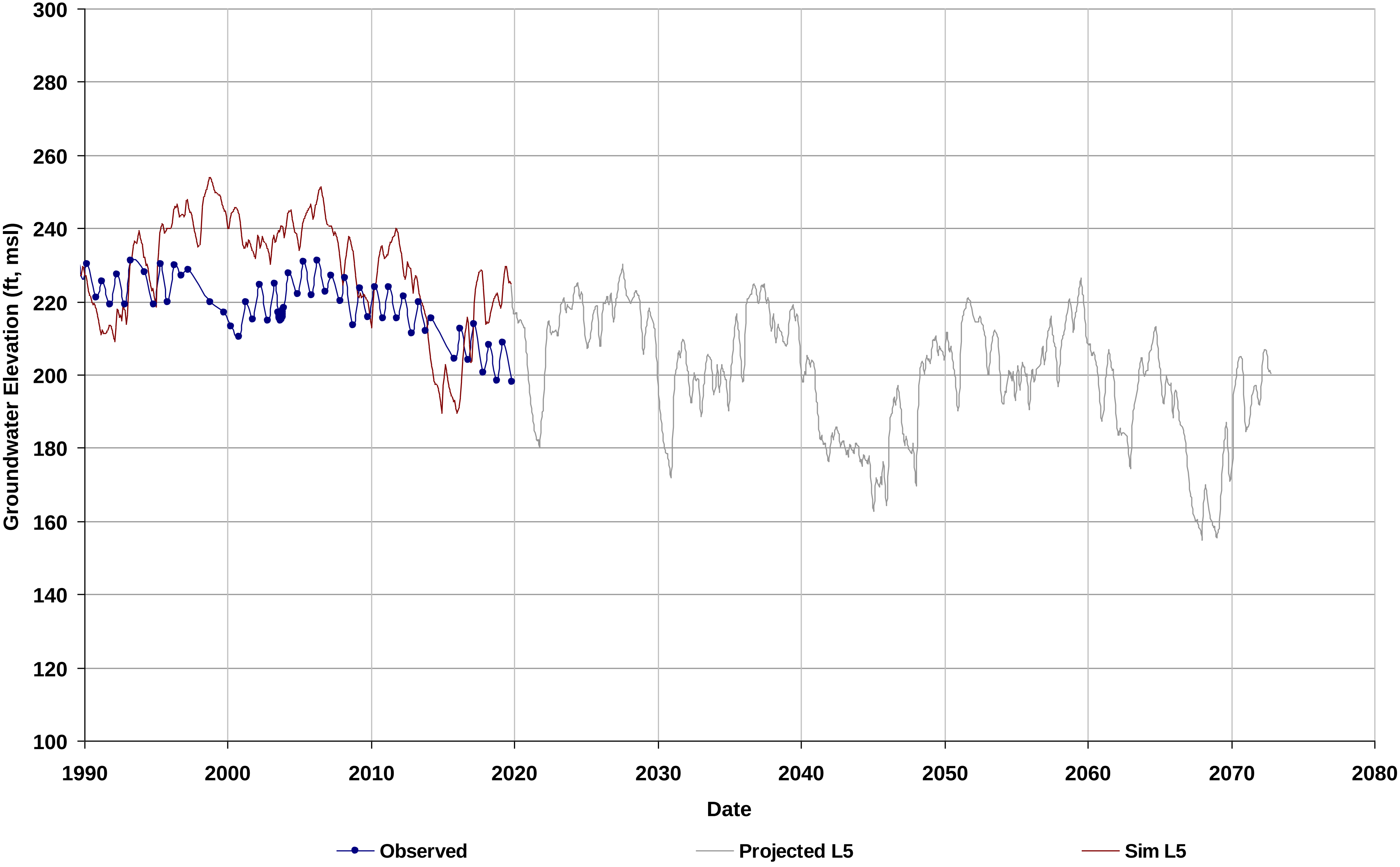
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

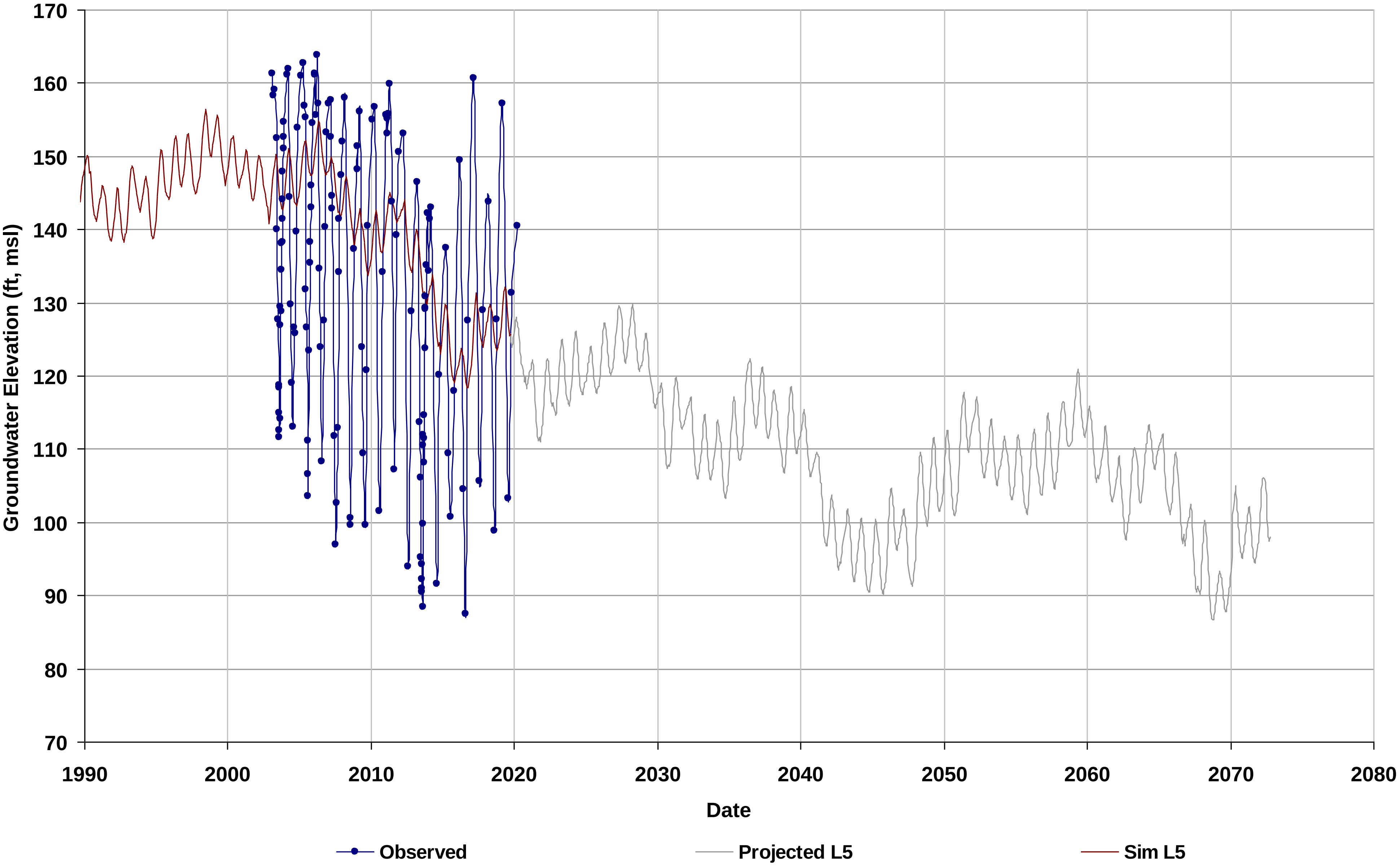
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

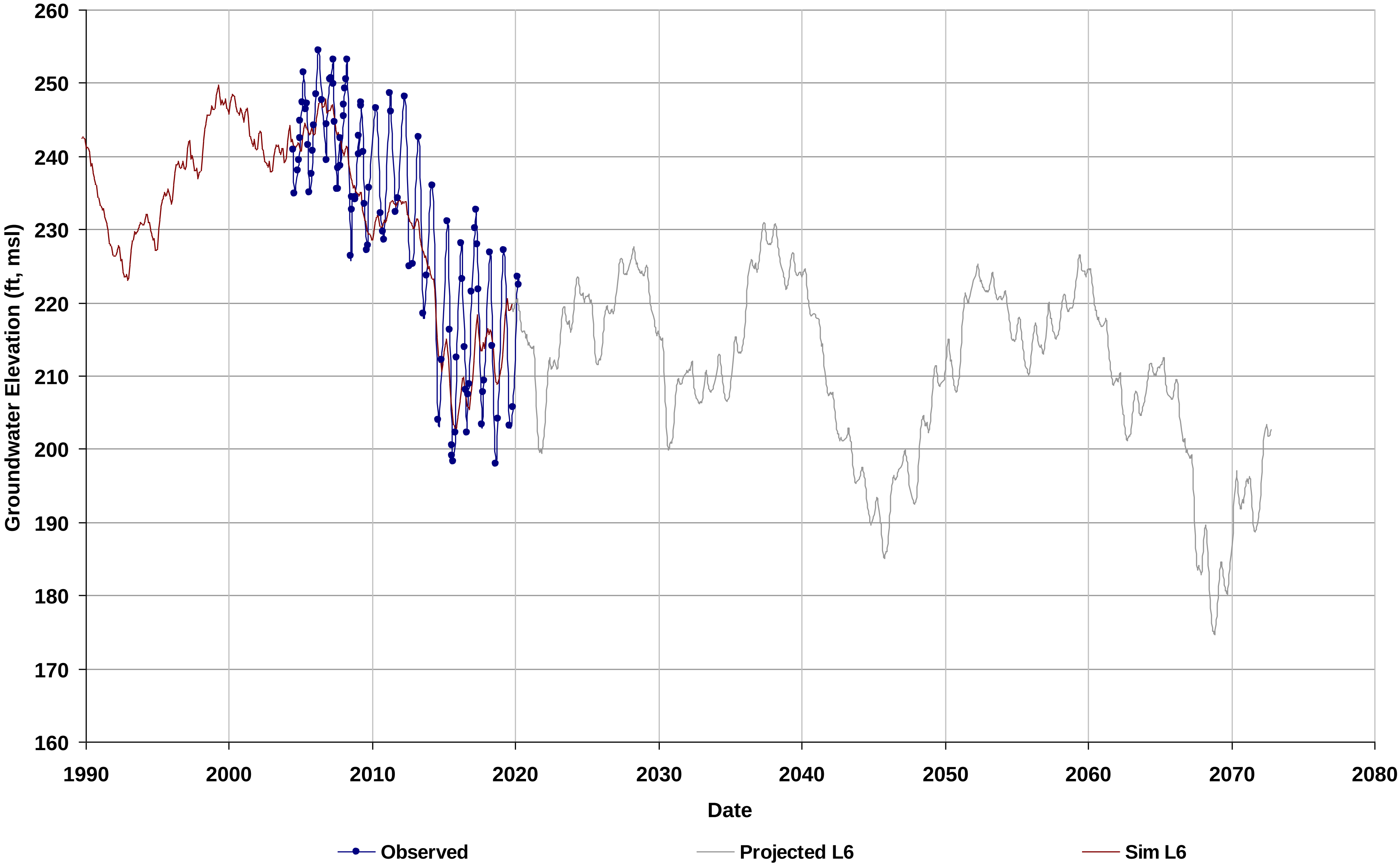
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

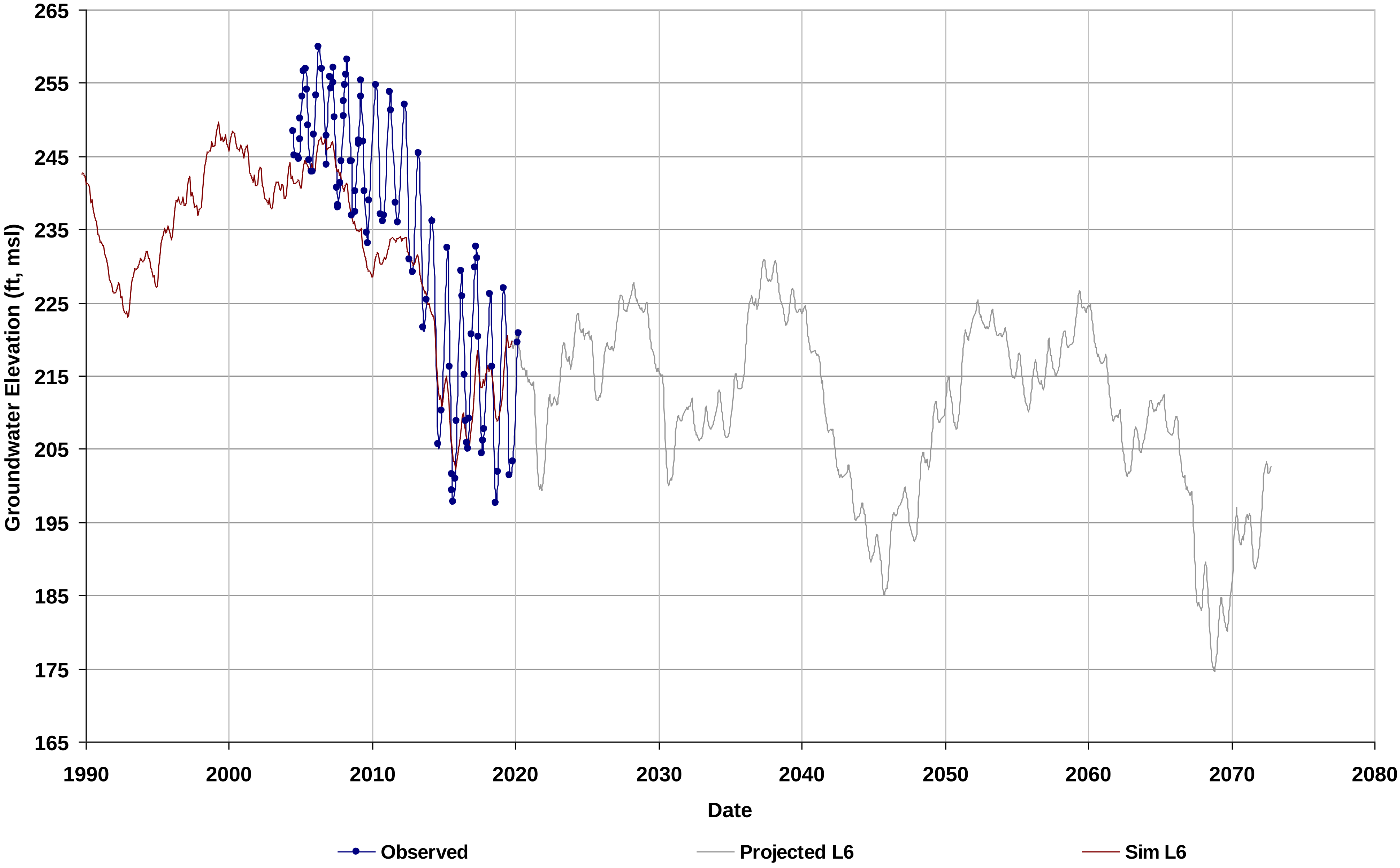
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

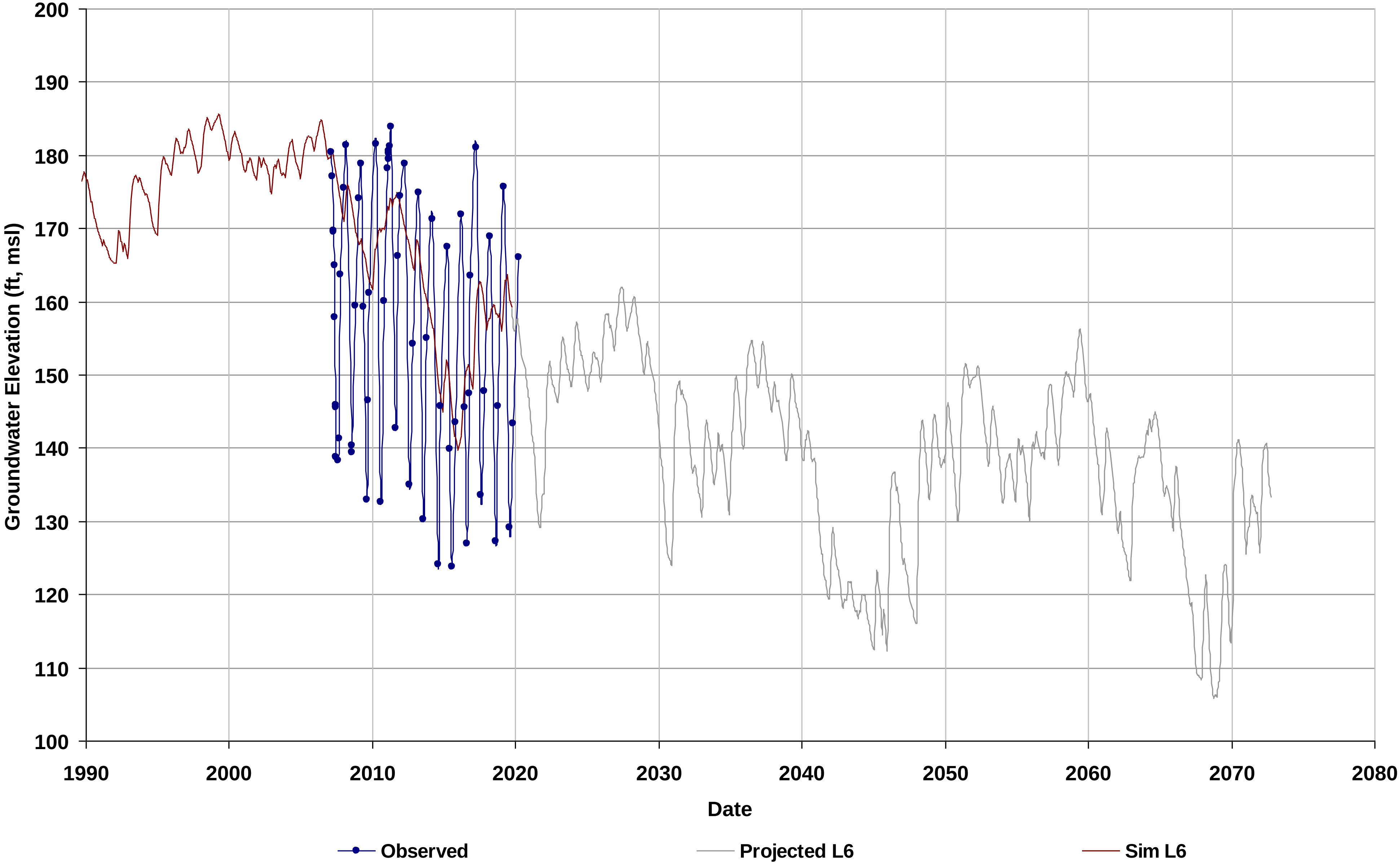
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

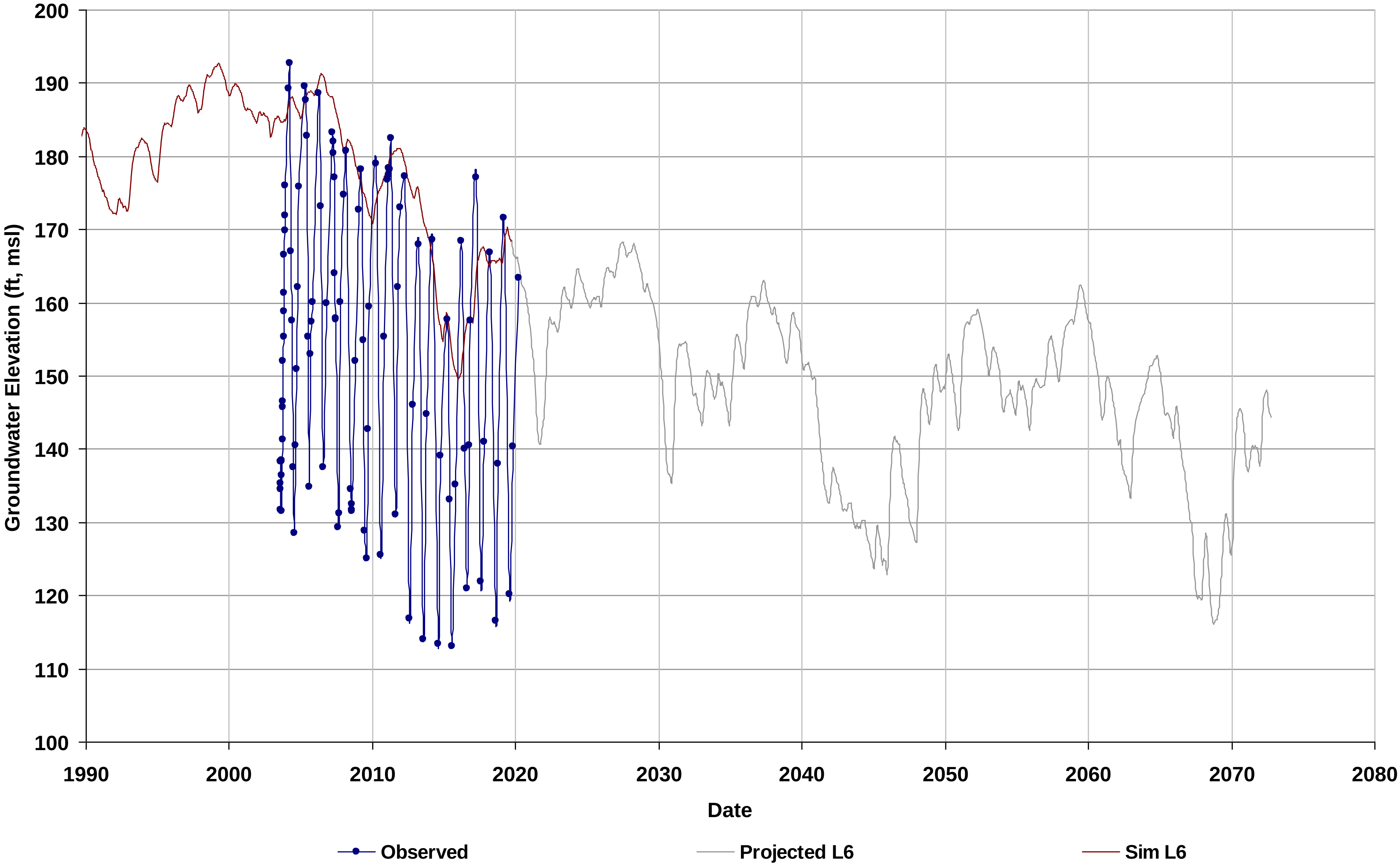
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

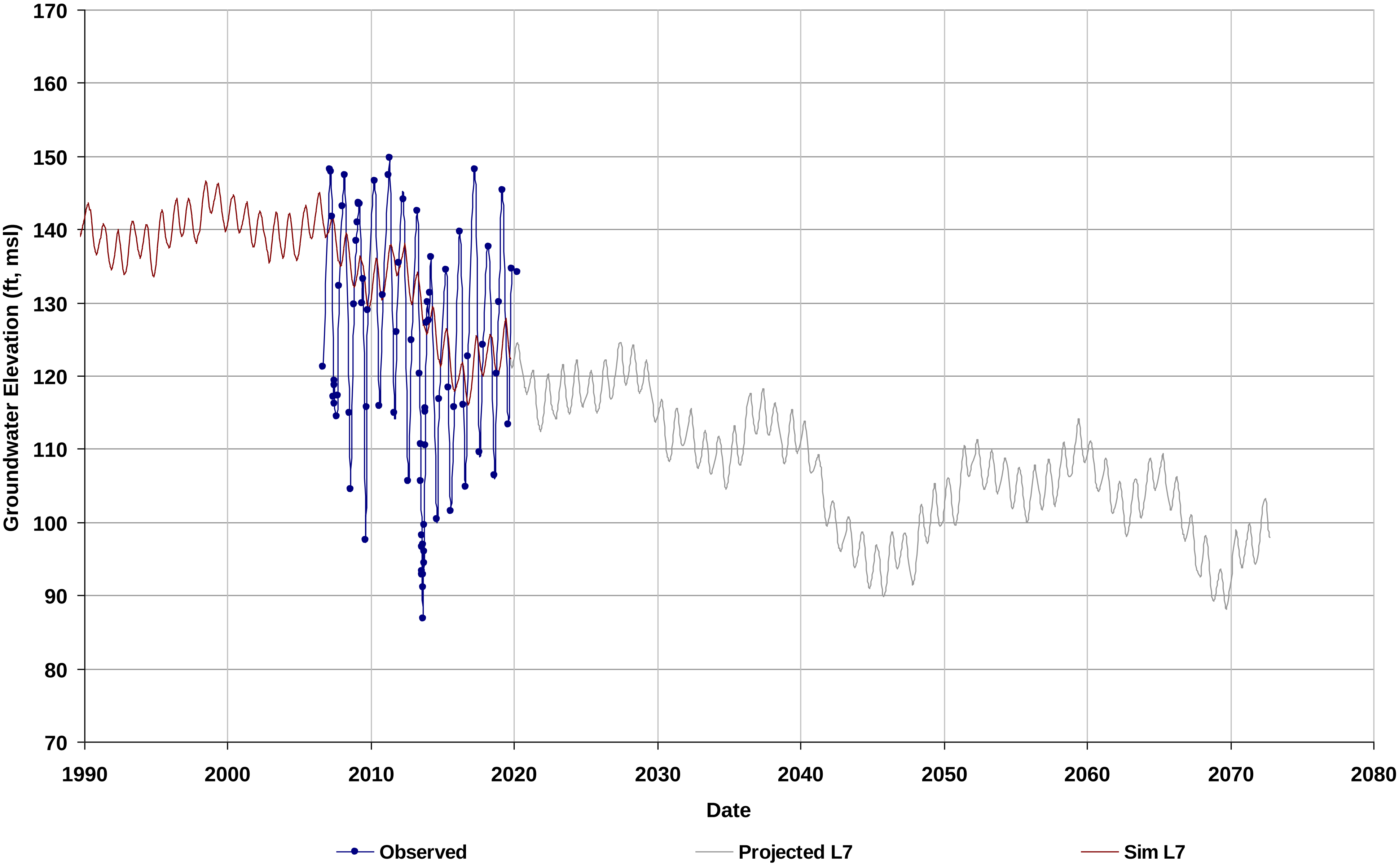
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

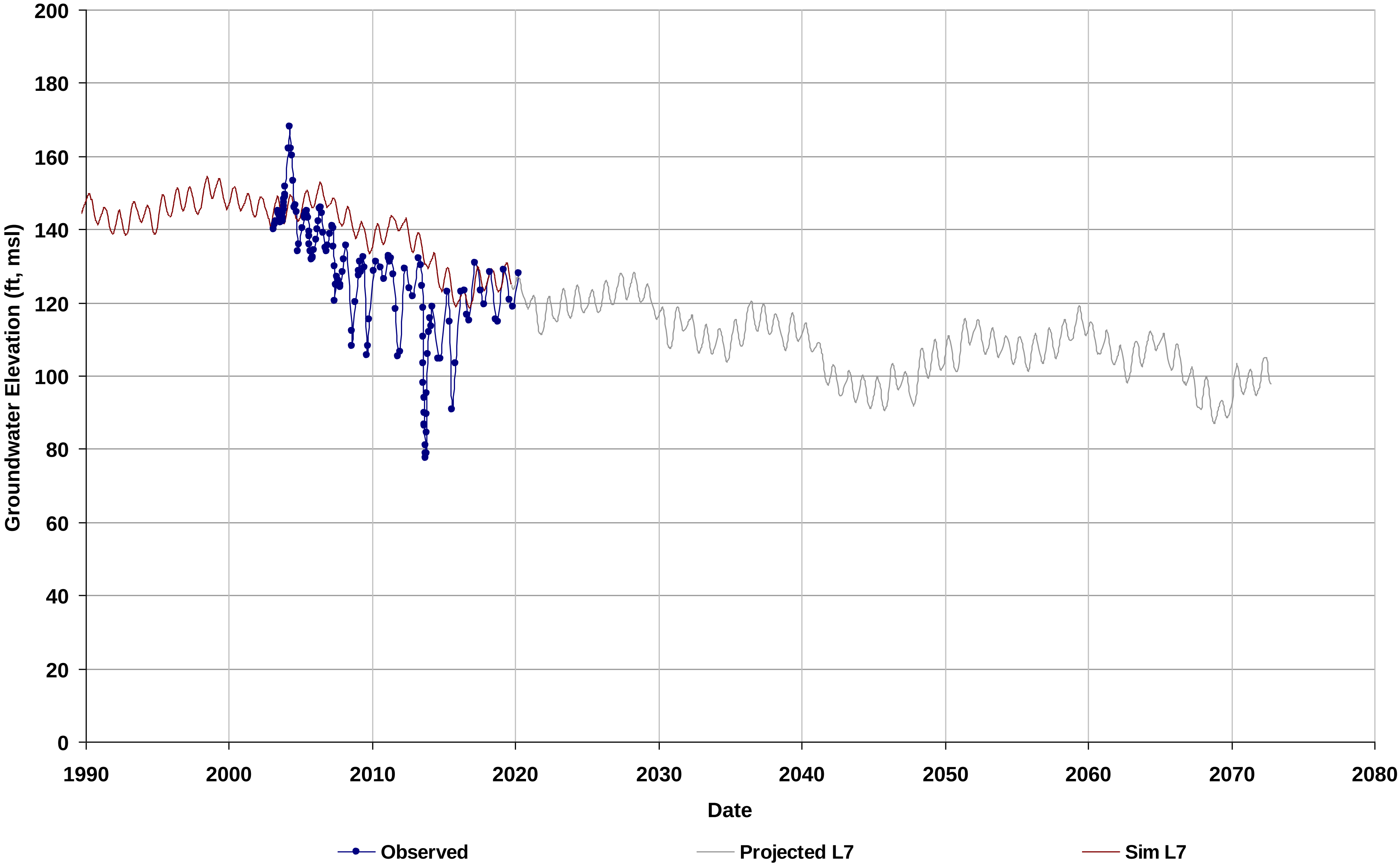
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

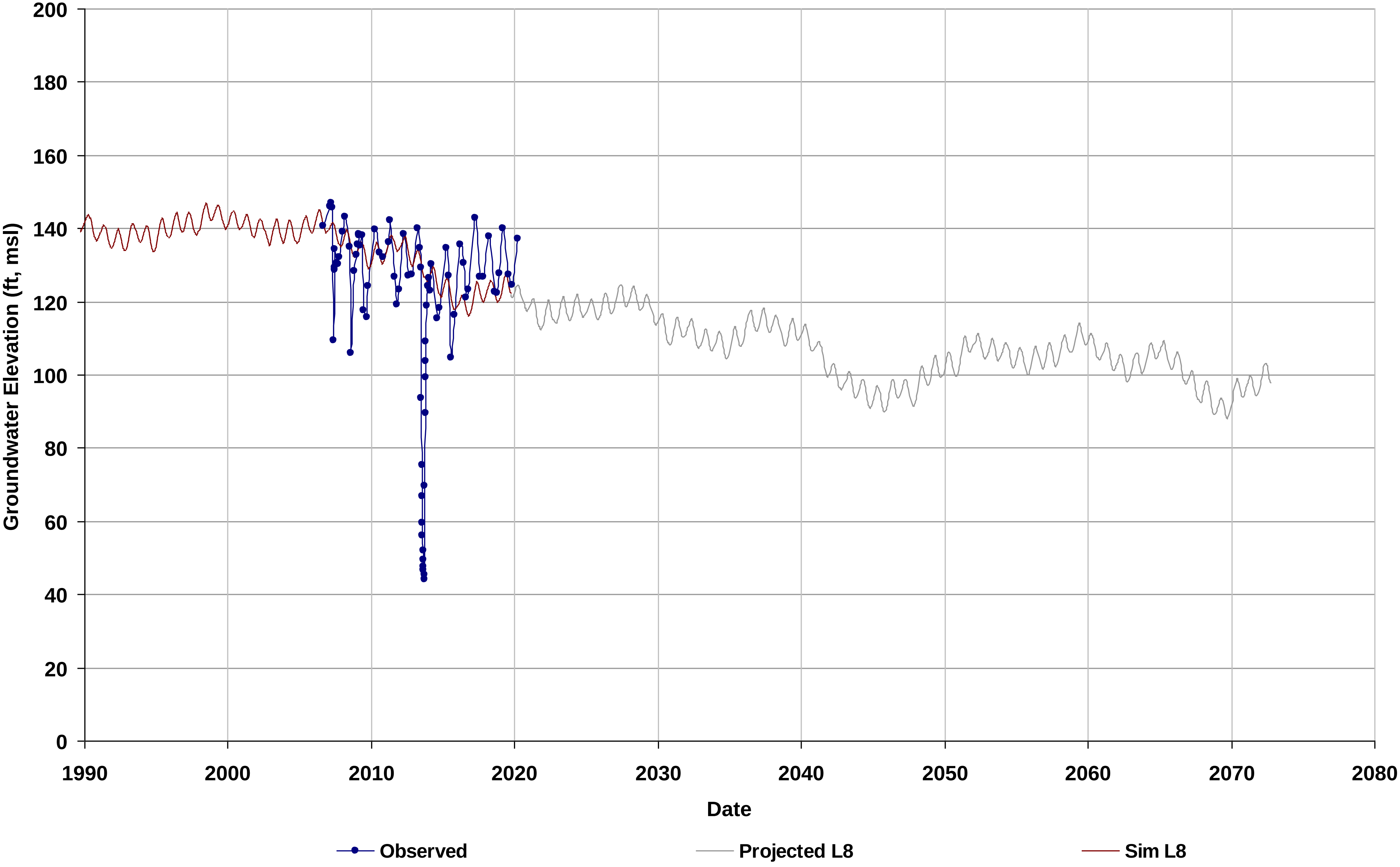
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

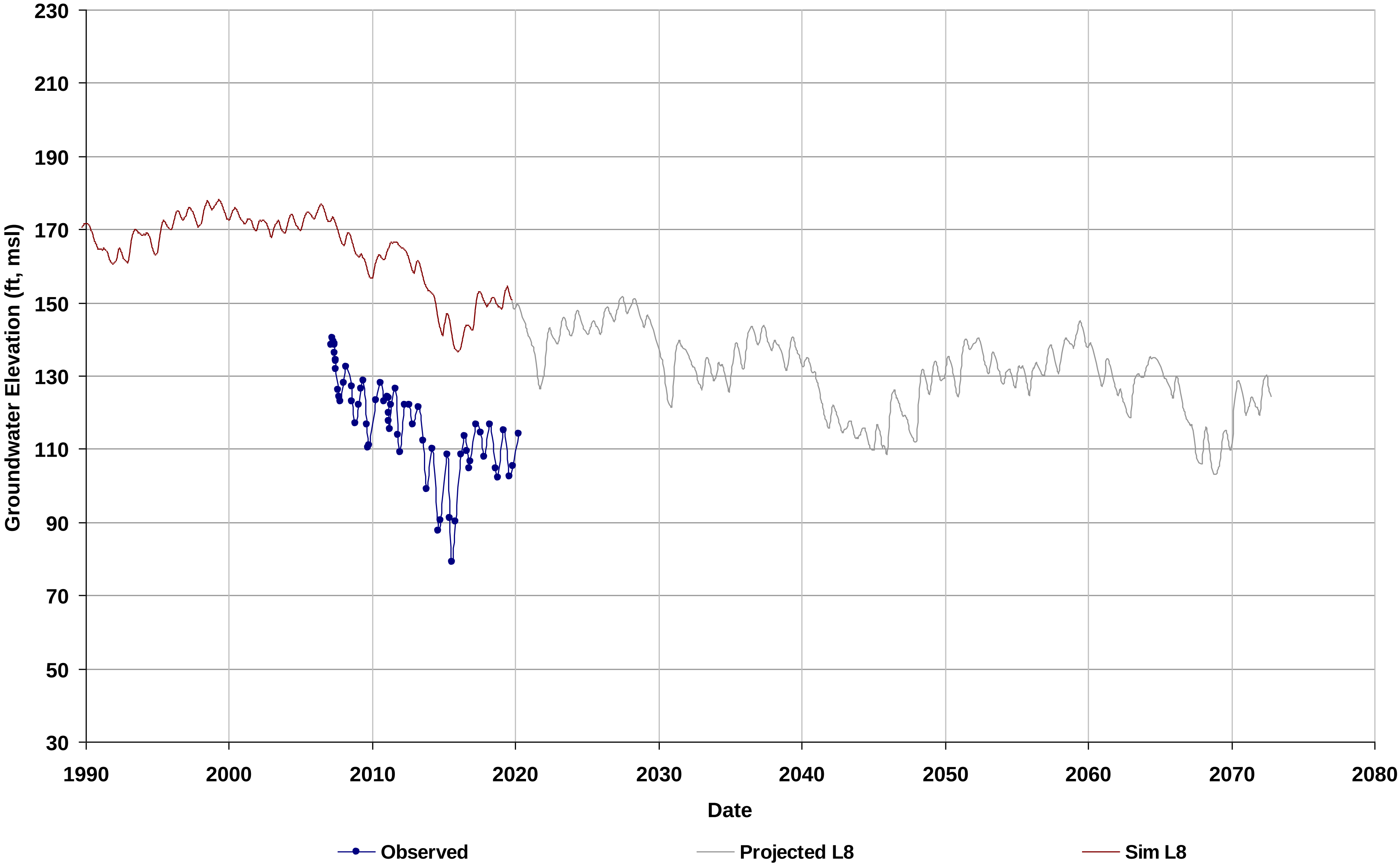
Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use)

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

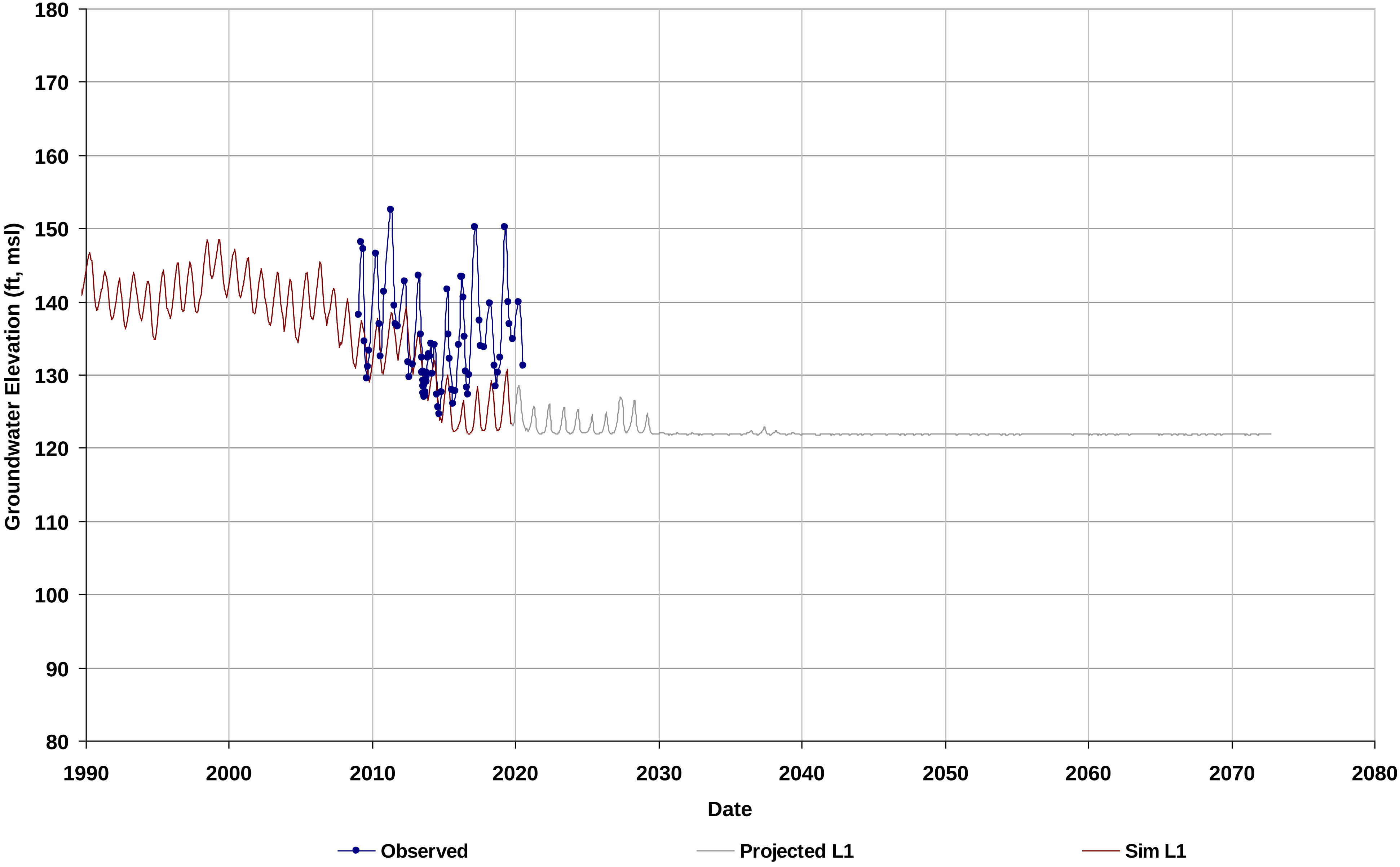
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use)

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

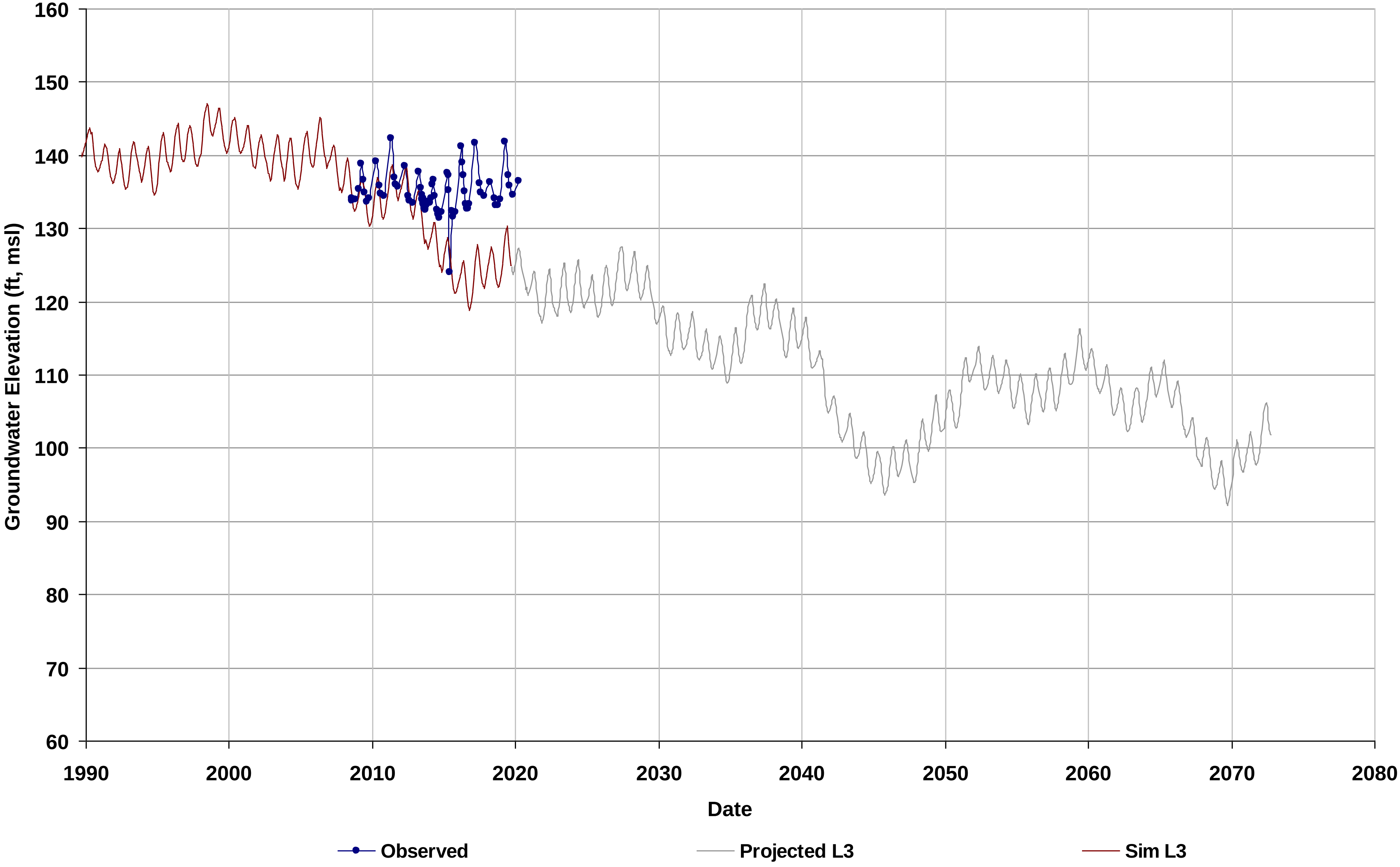
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use)

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

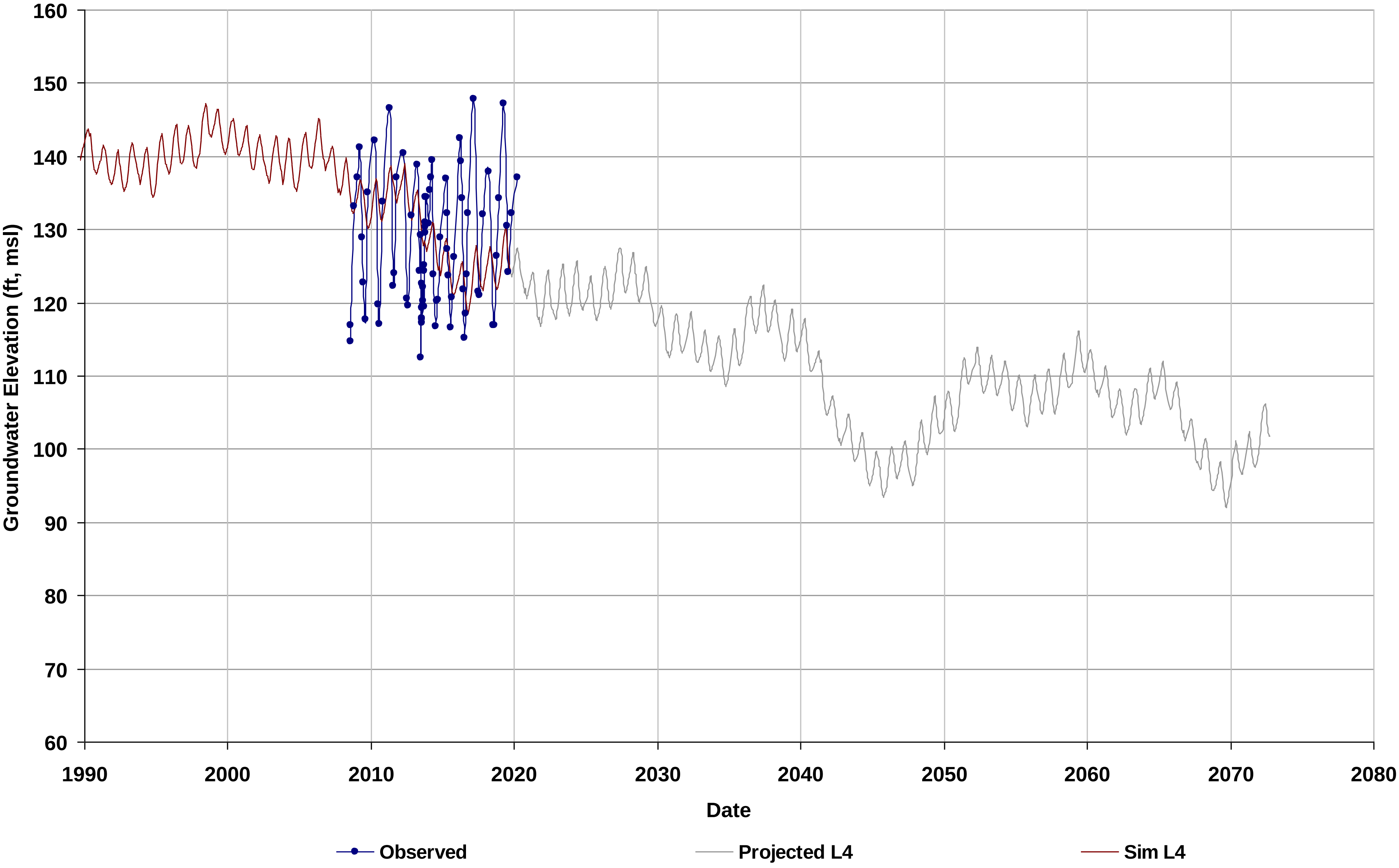
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

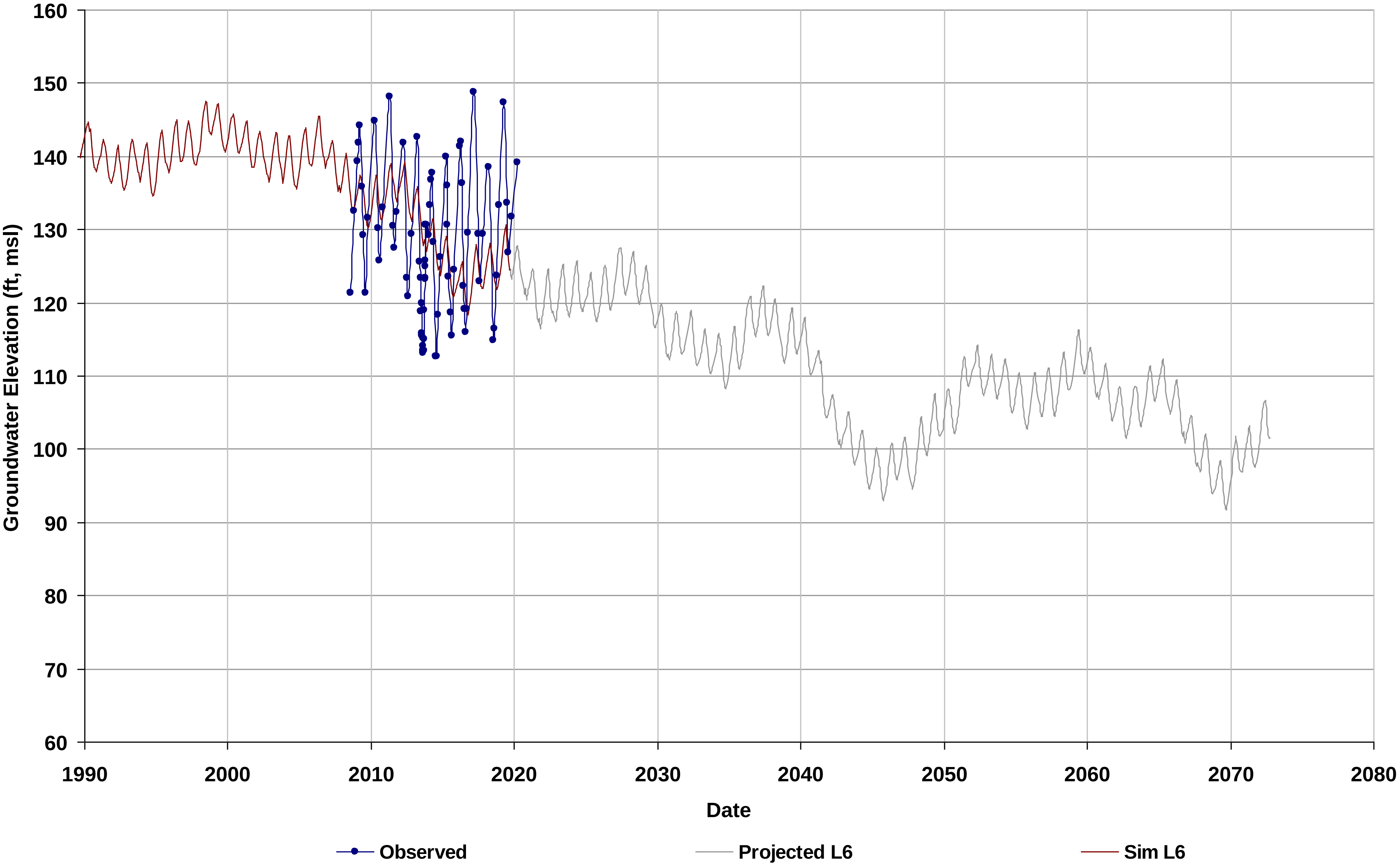
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

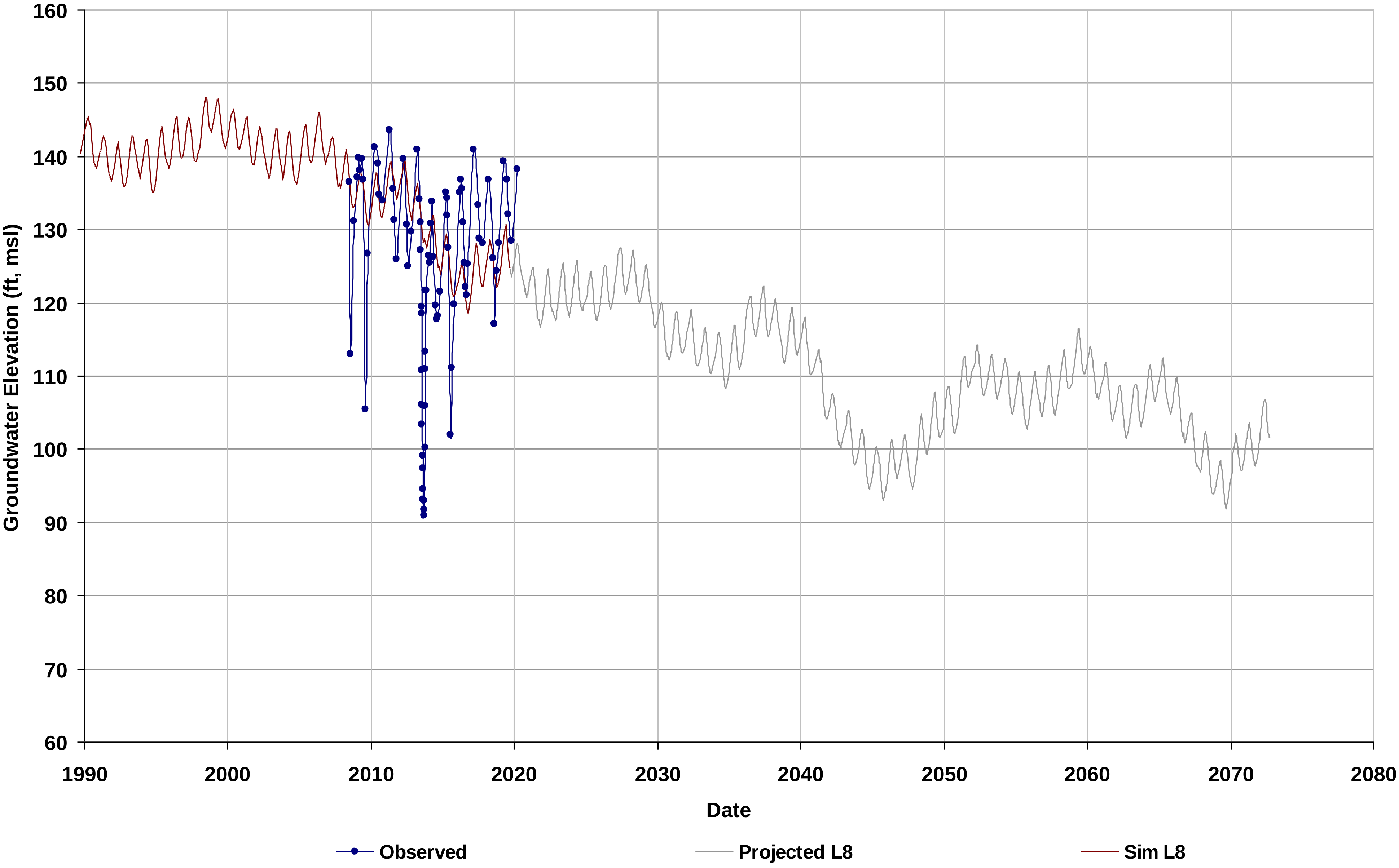
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

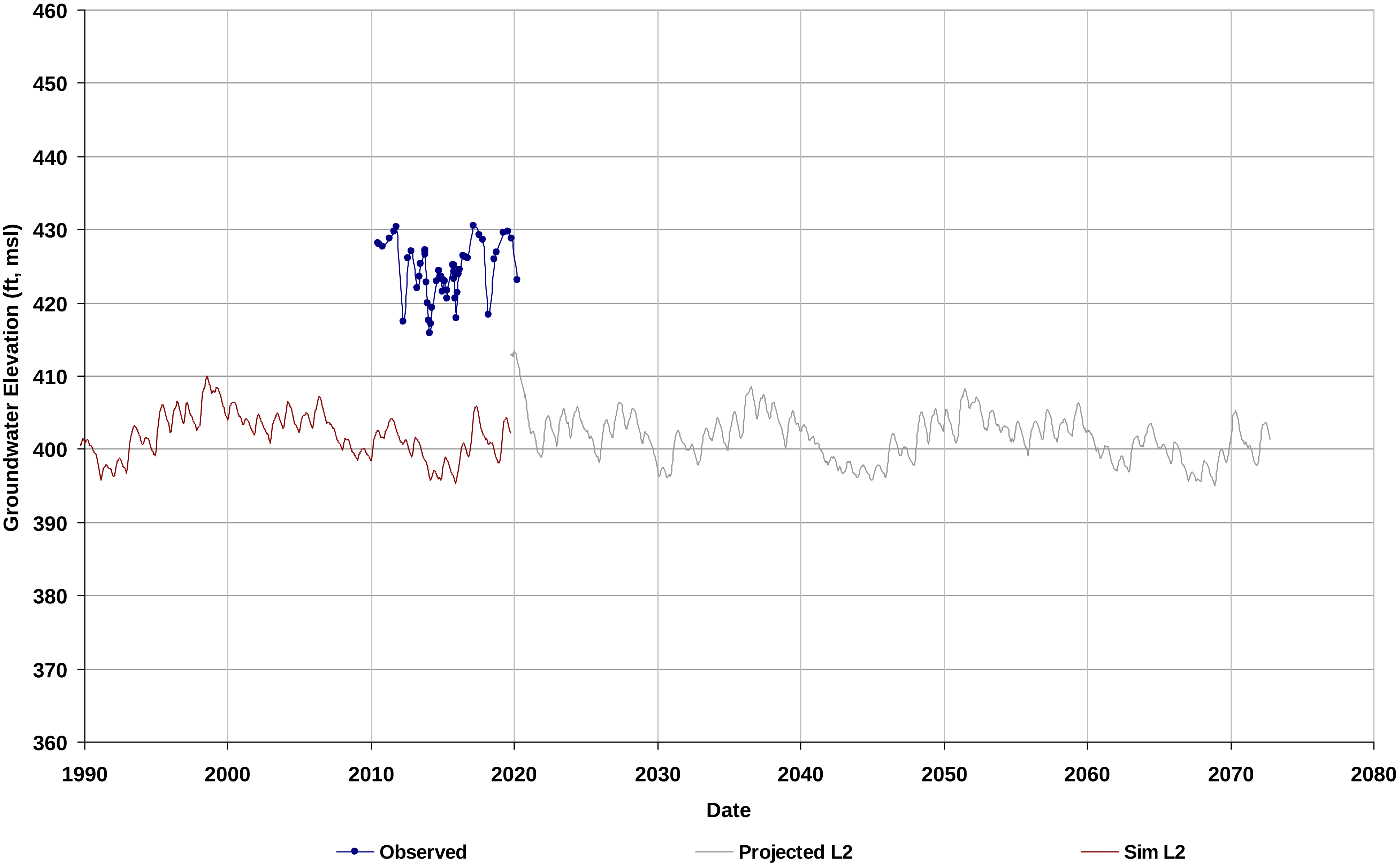
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

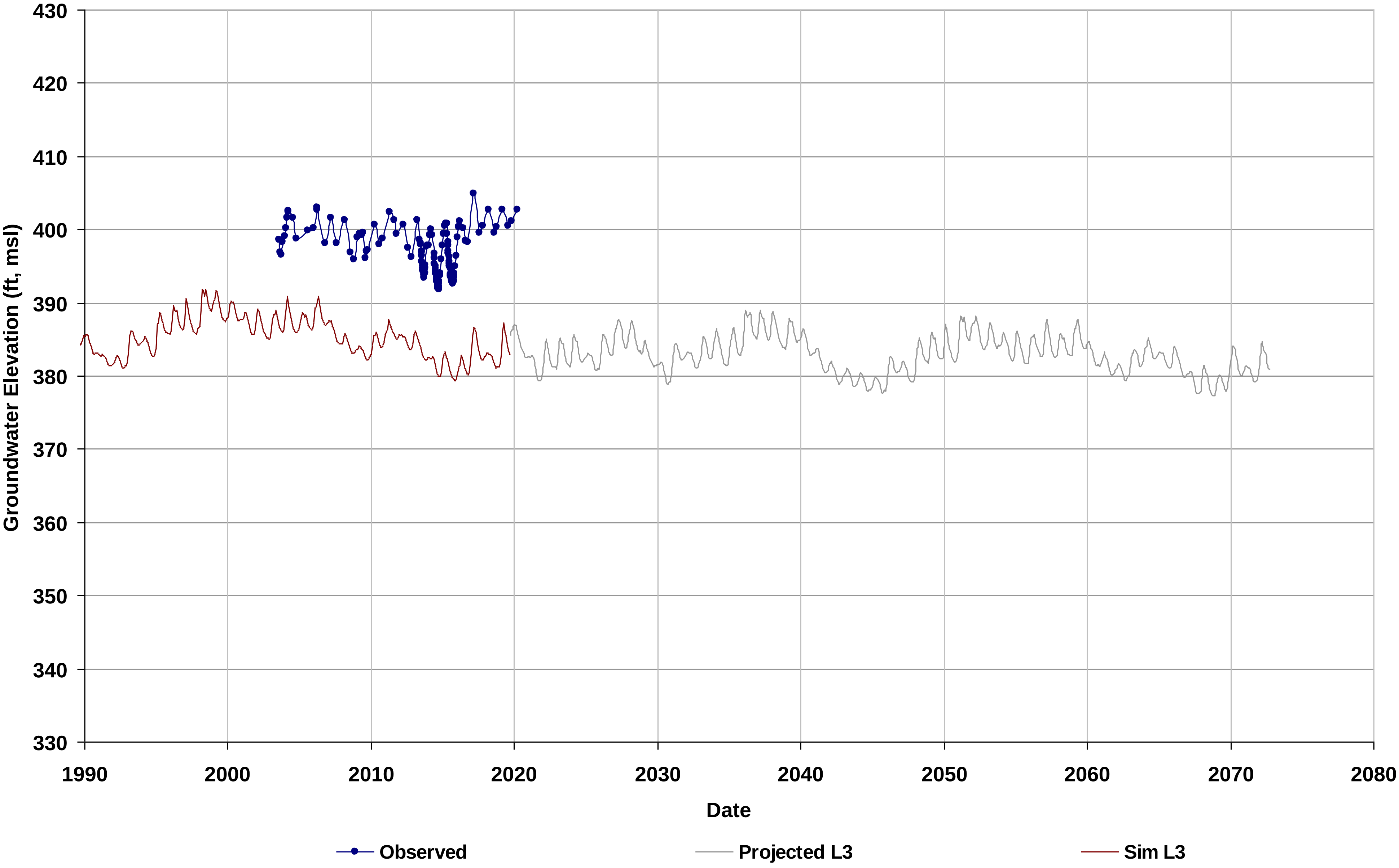
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use)

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

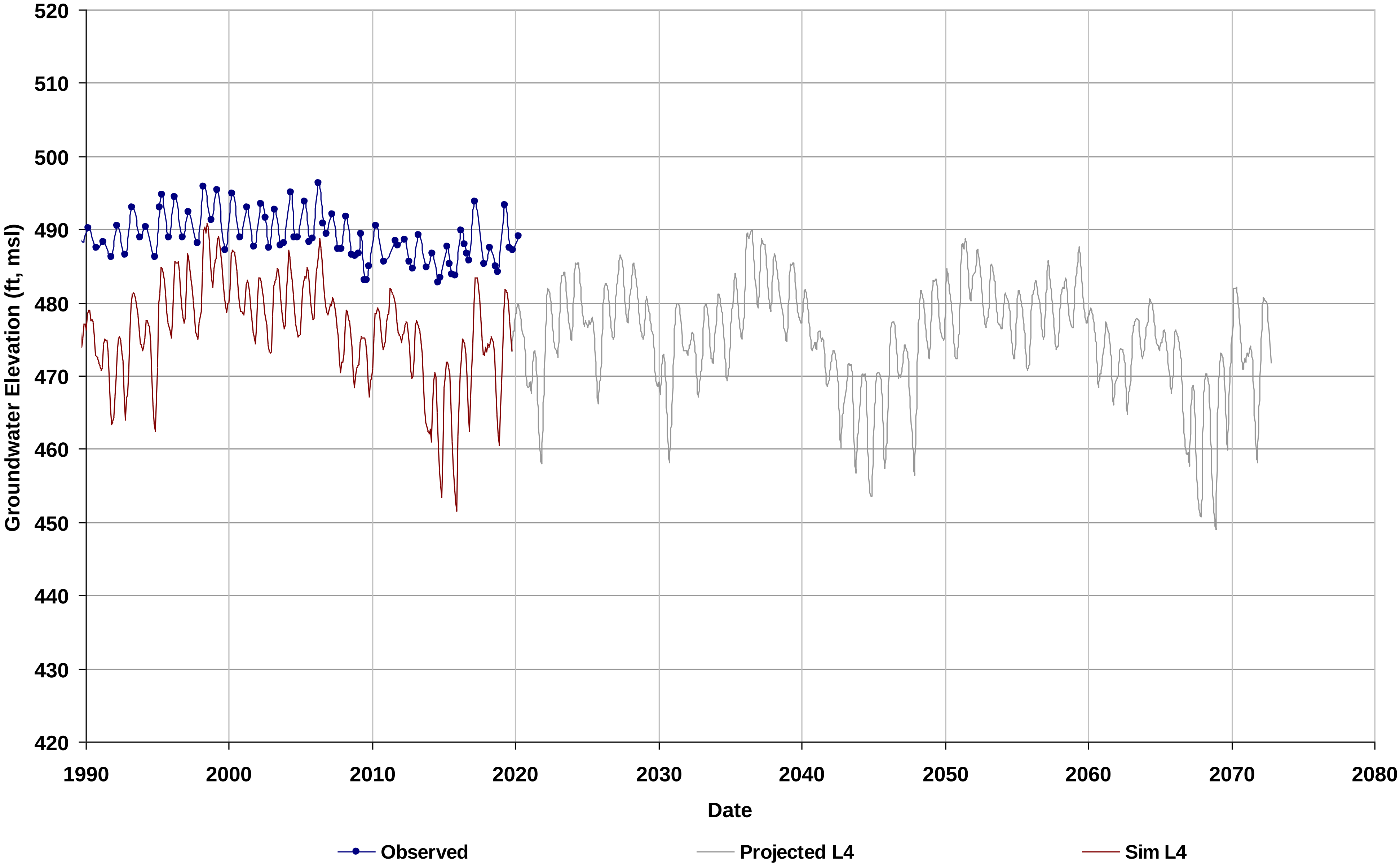
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use)

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

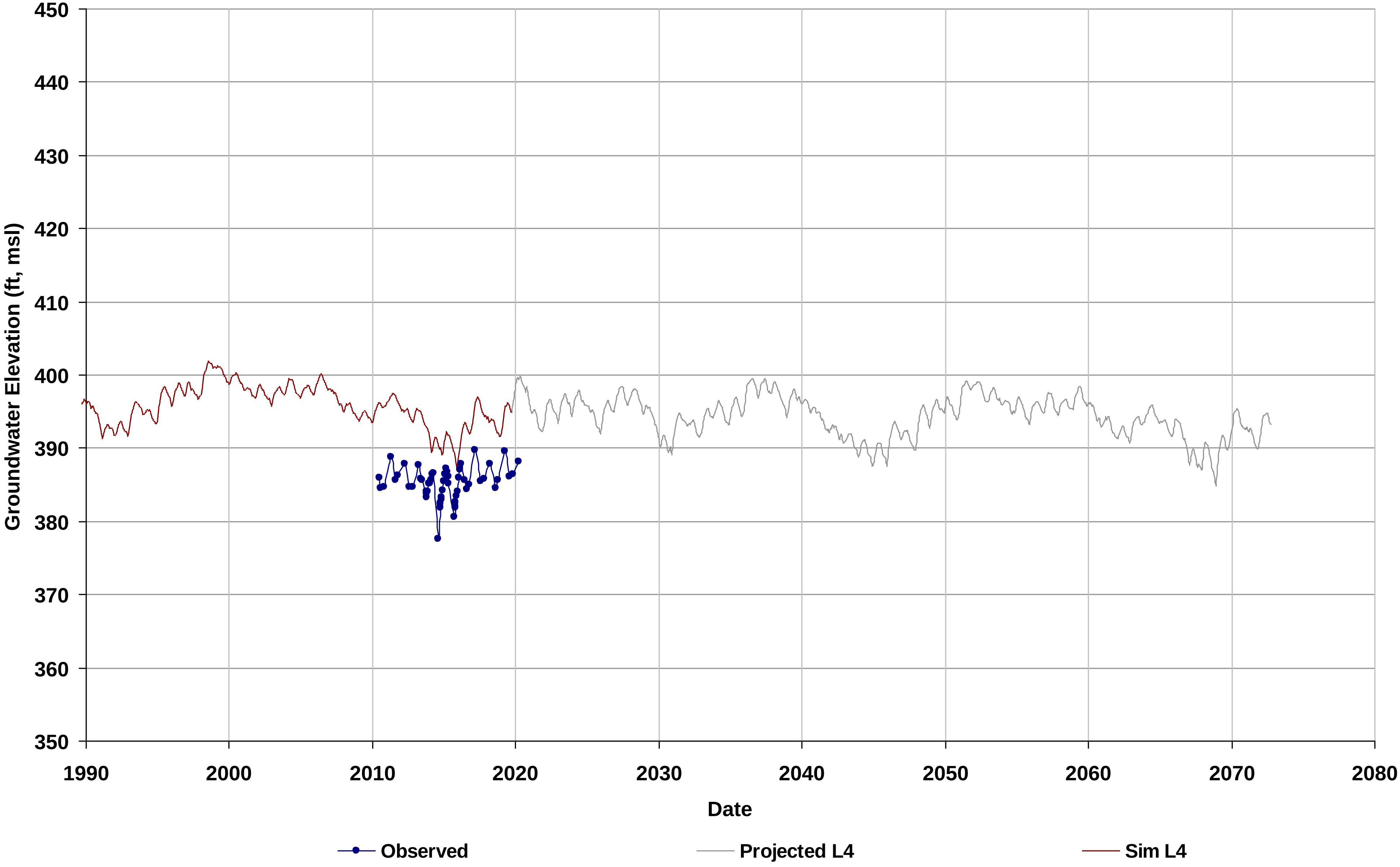
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

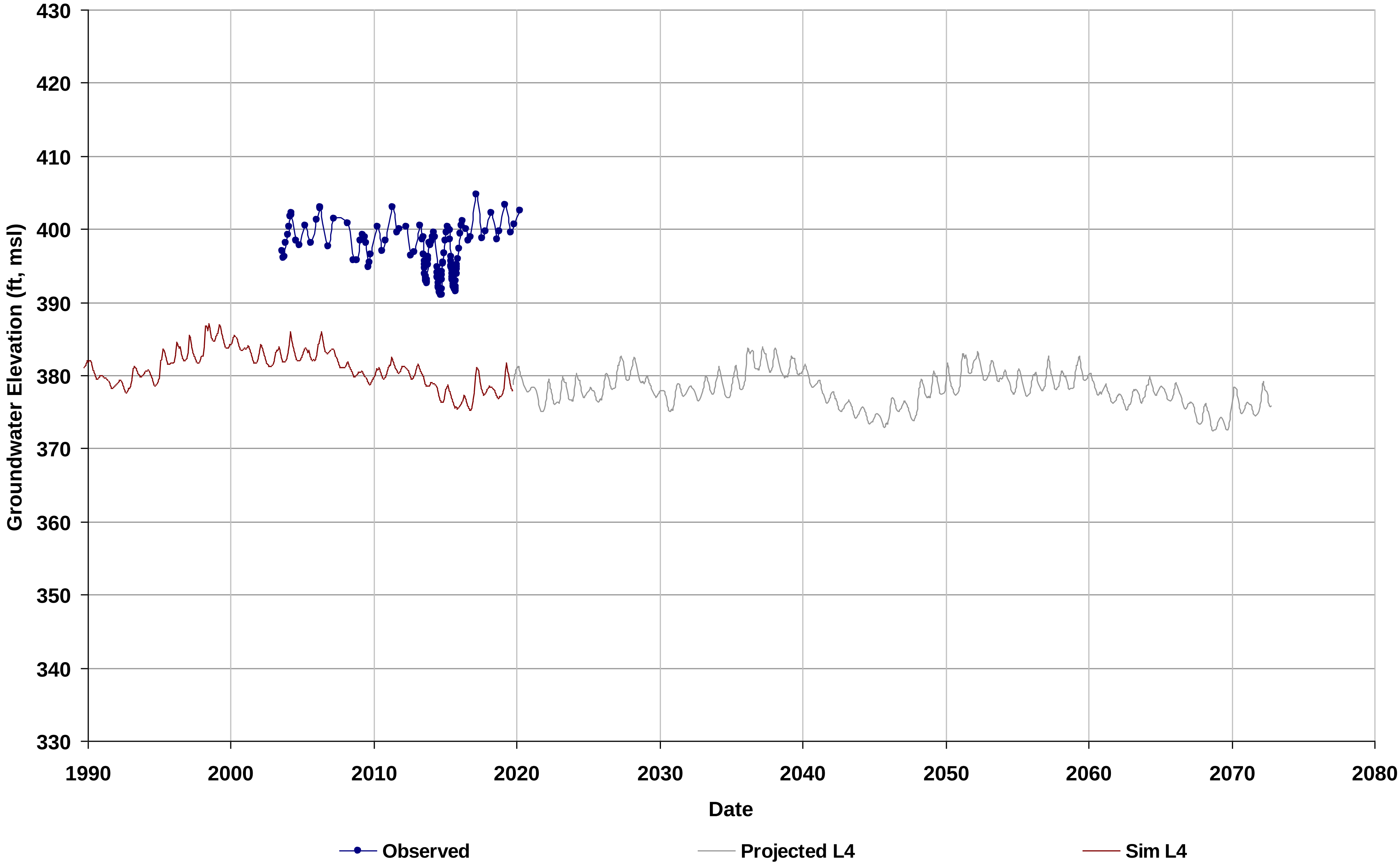
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

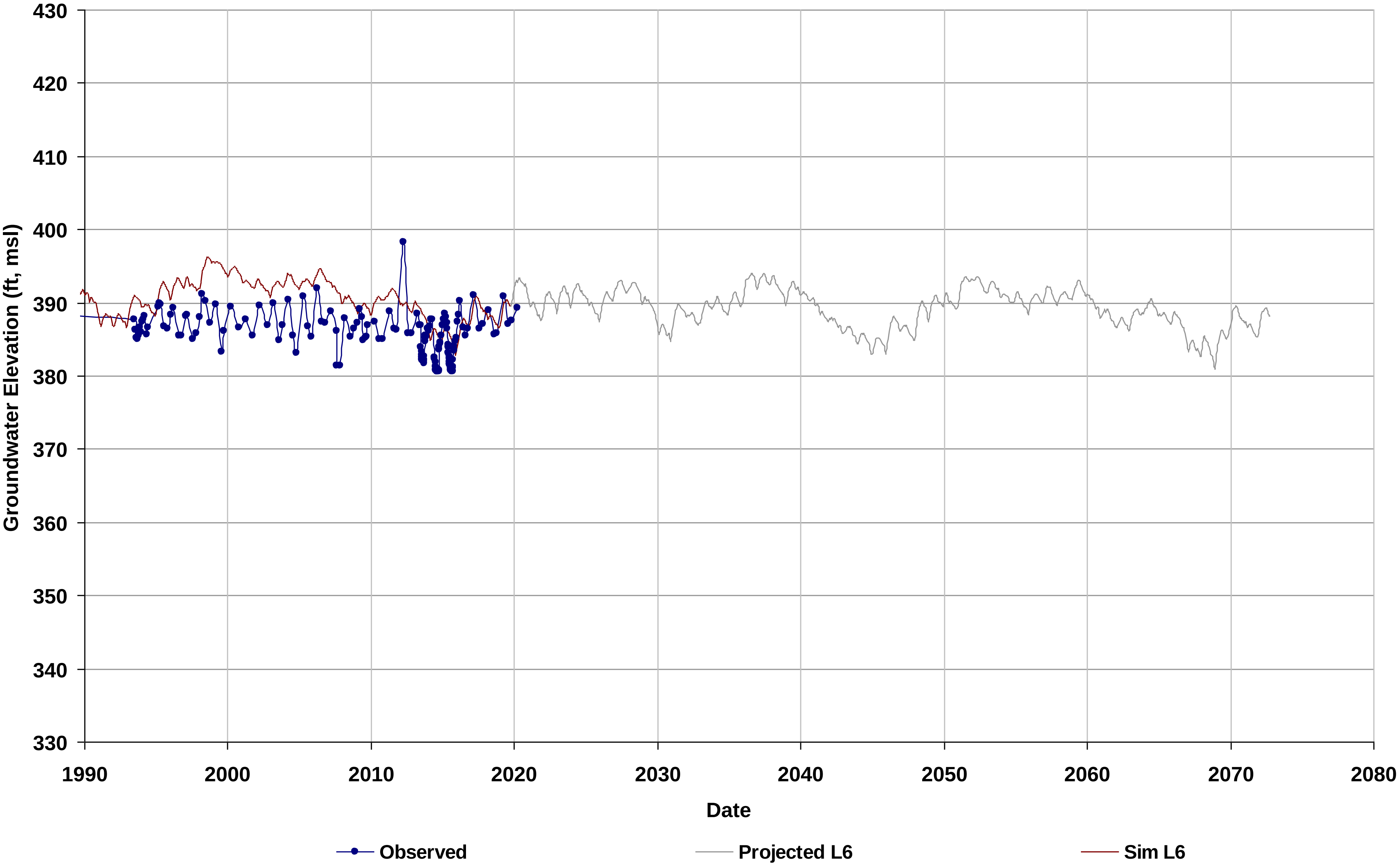
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

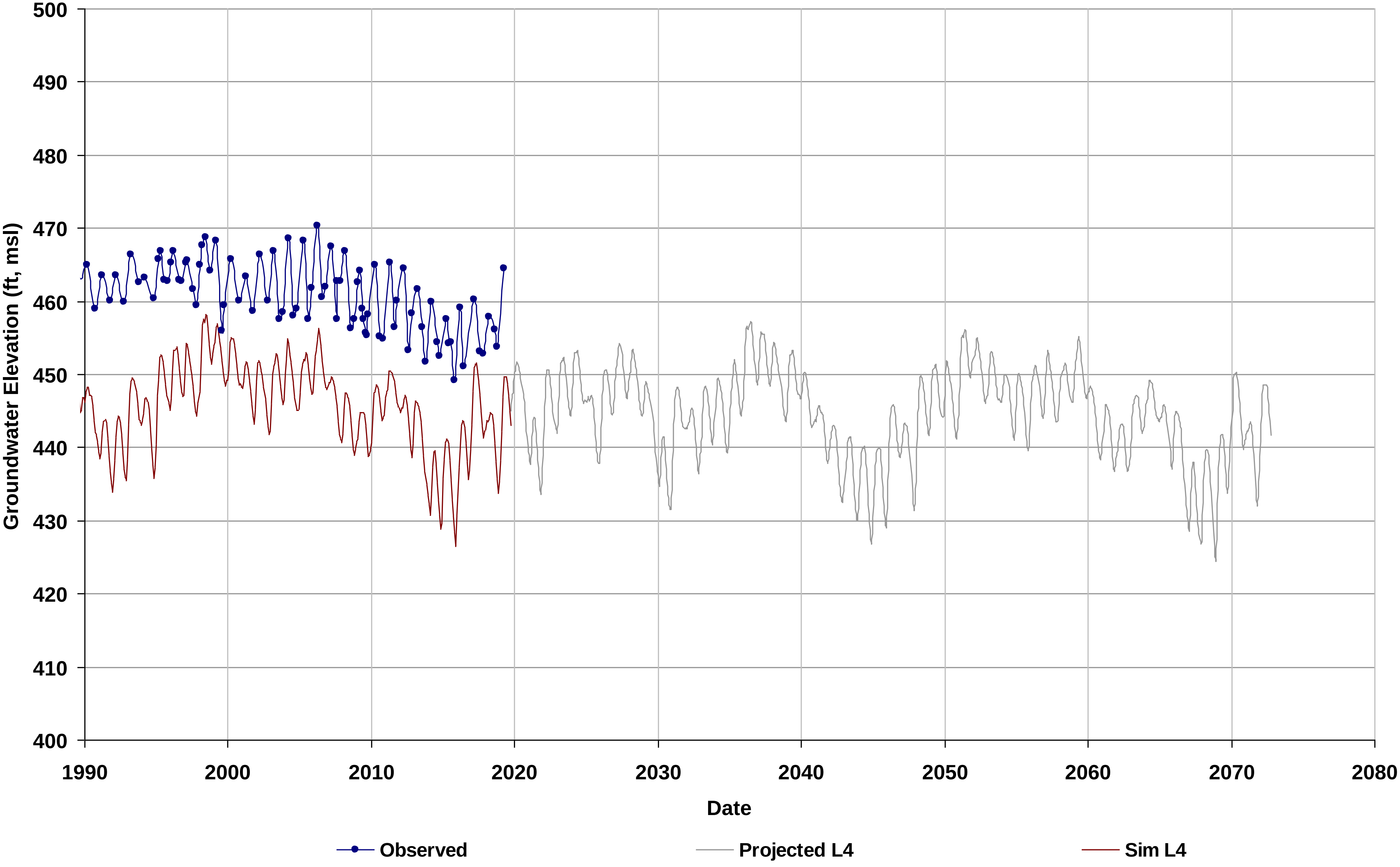
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

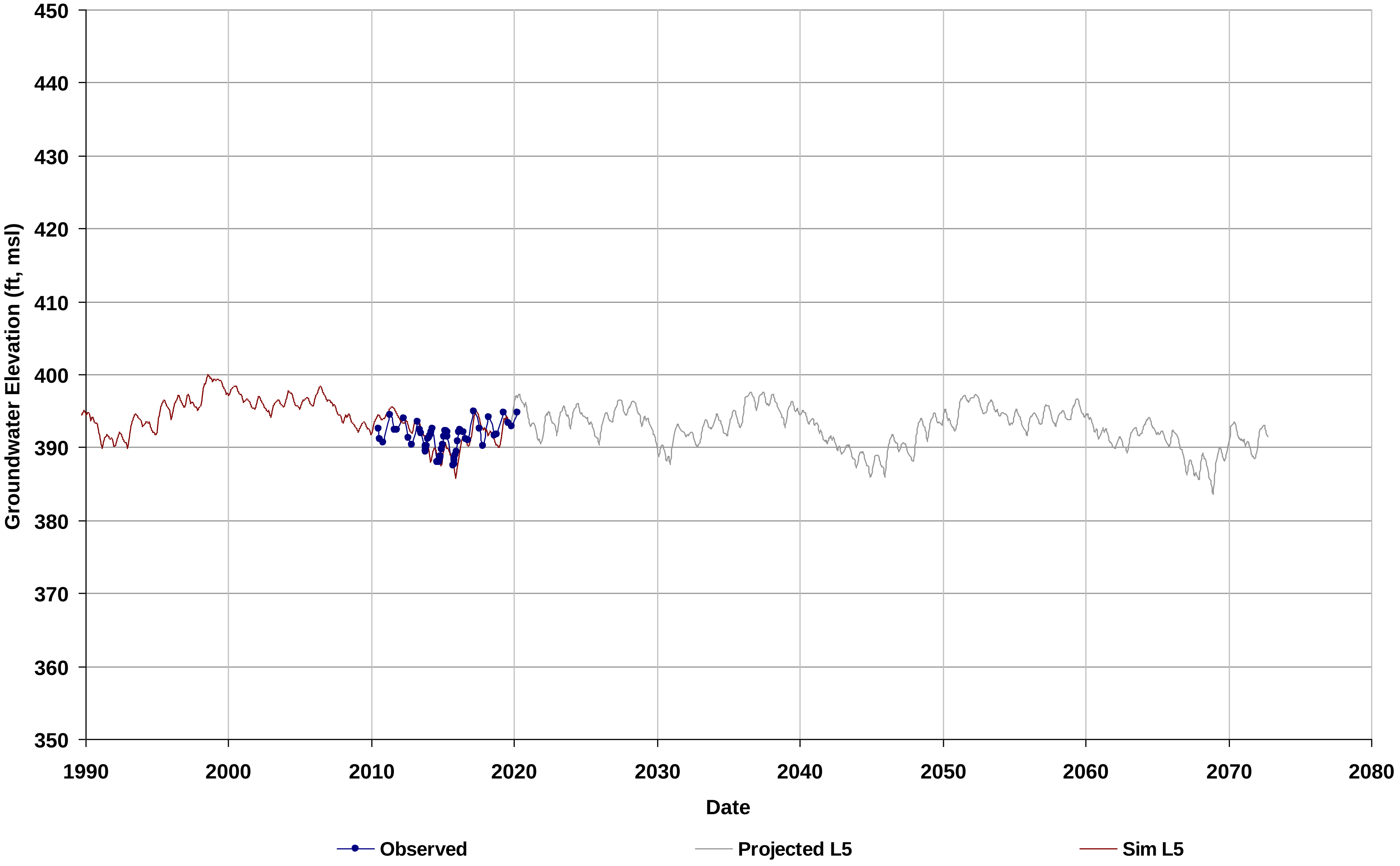
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

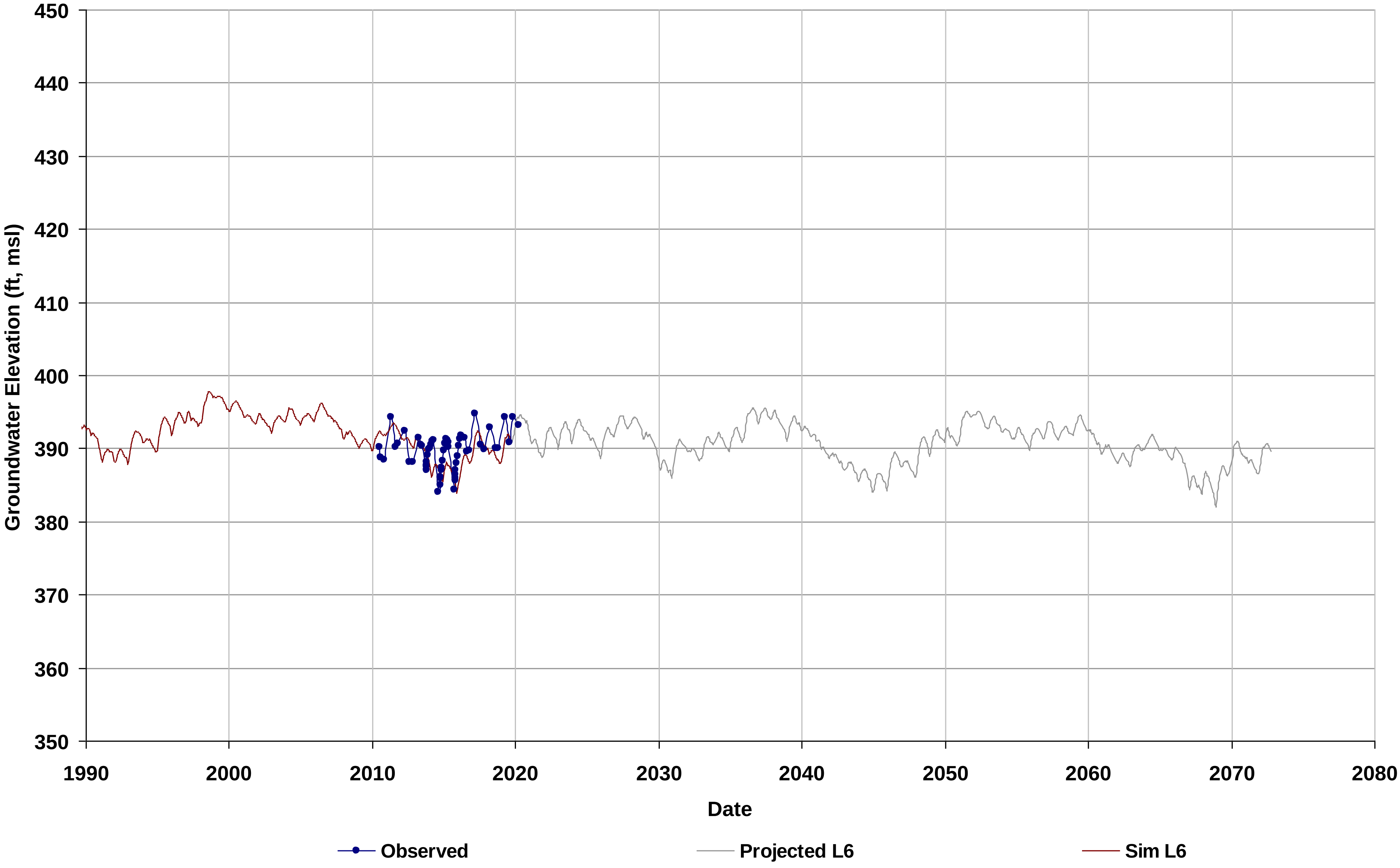
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

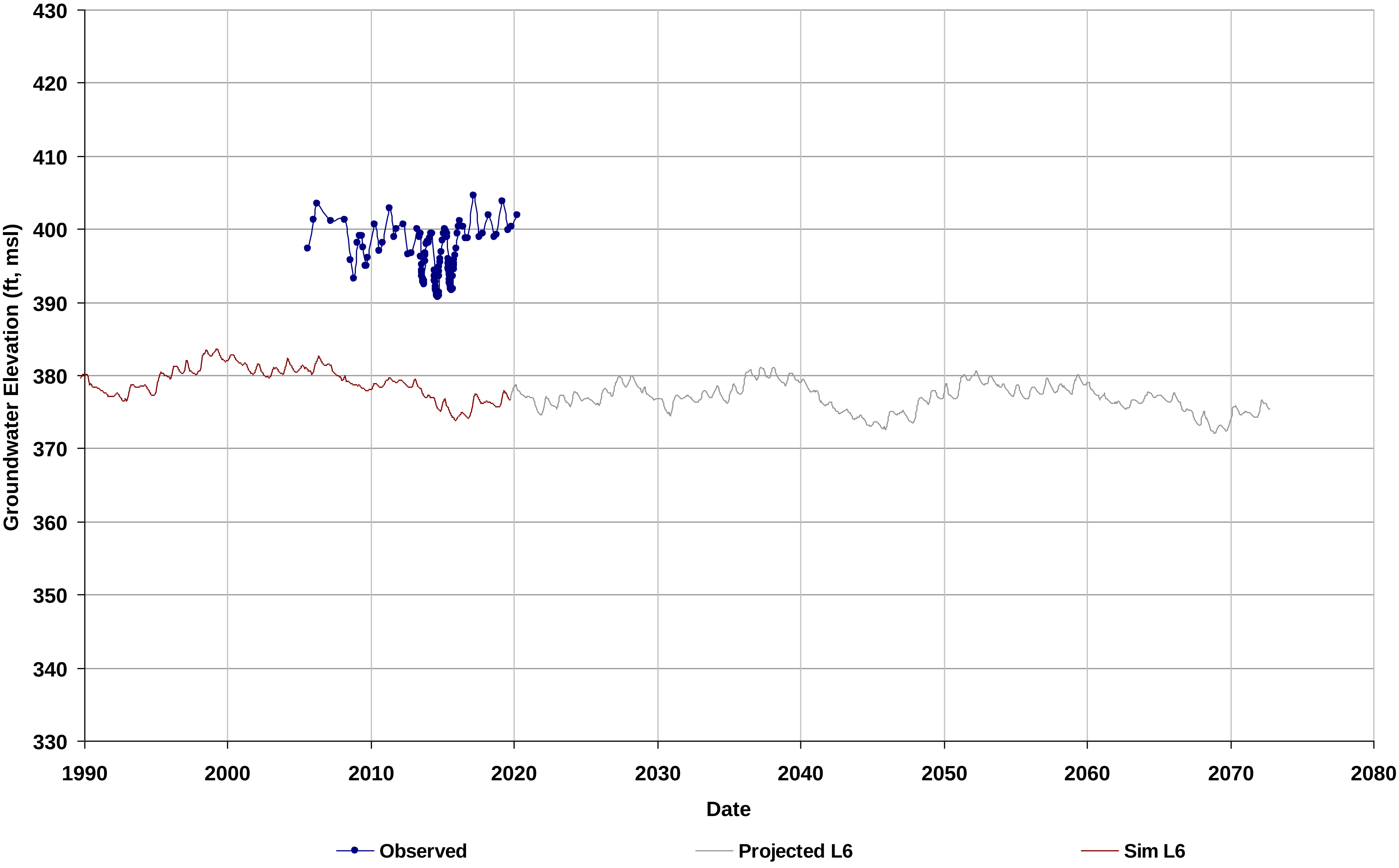
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

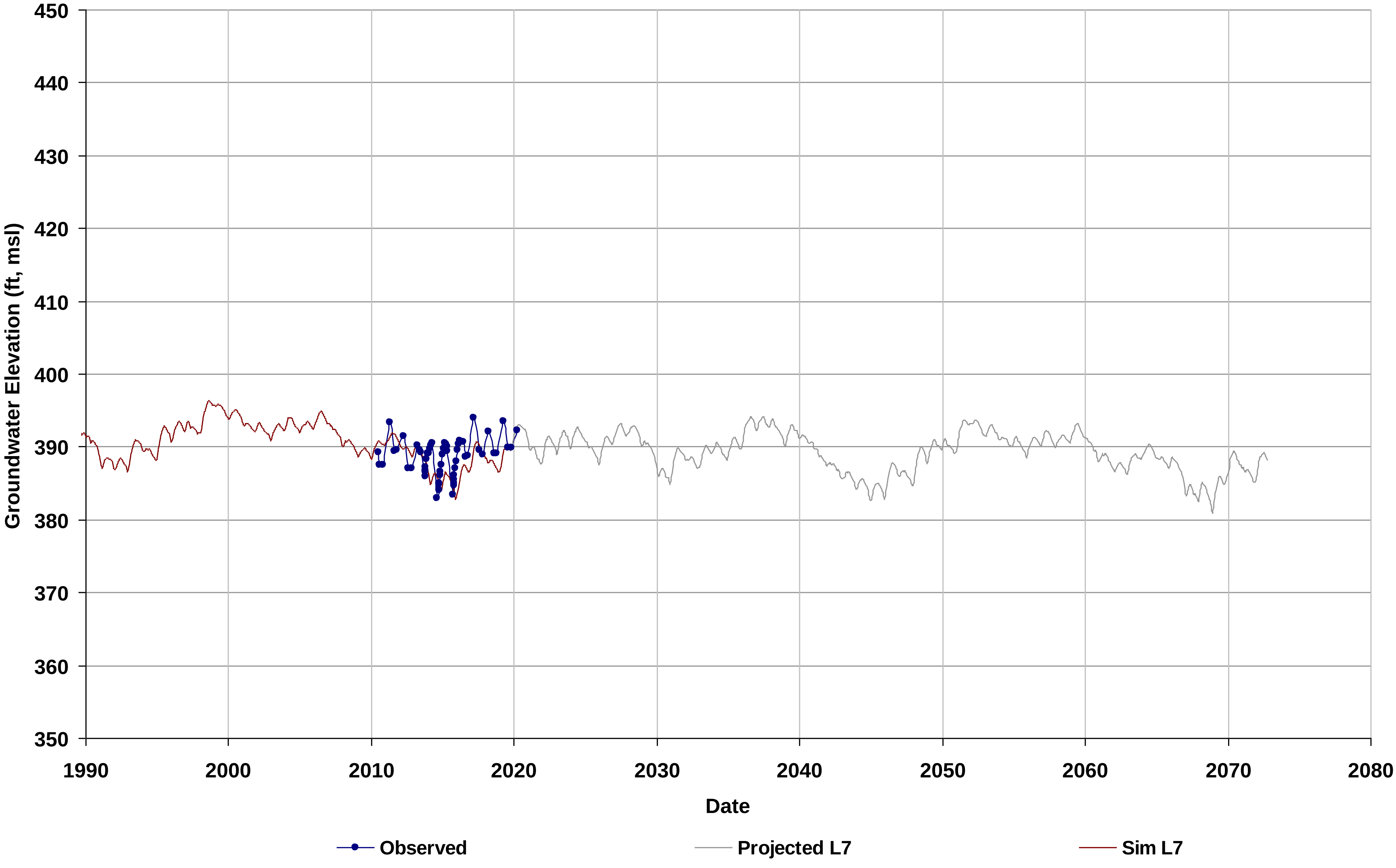
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use)

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use)

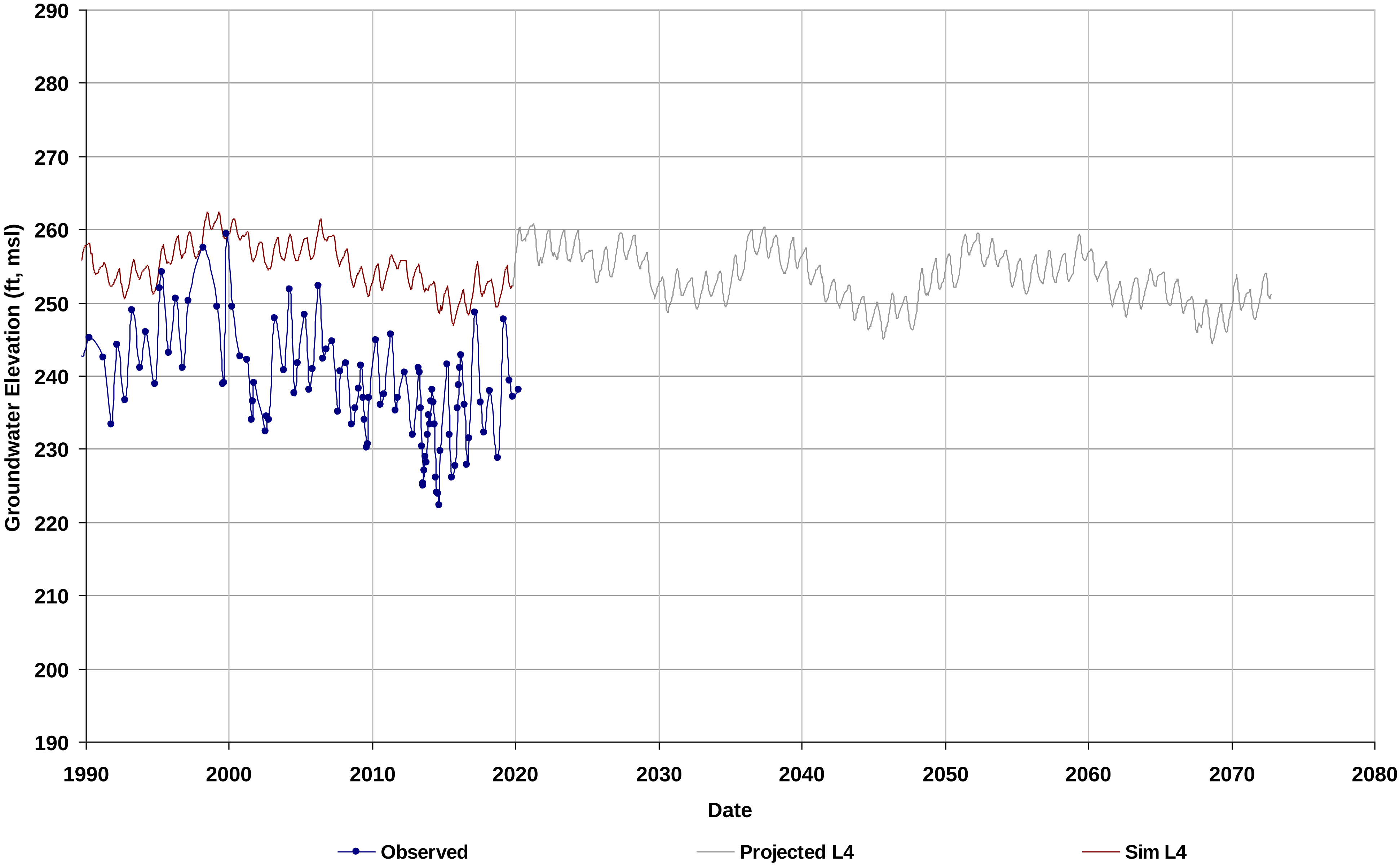
APPENDIX E-4

Tehama IHM Simulated Groundwater Levels:

Projected (Current Land Use) with Climate Change (2030) Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

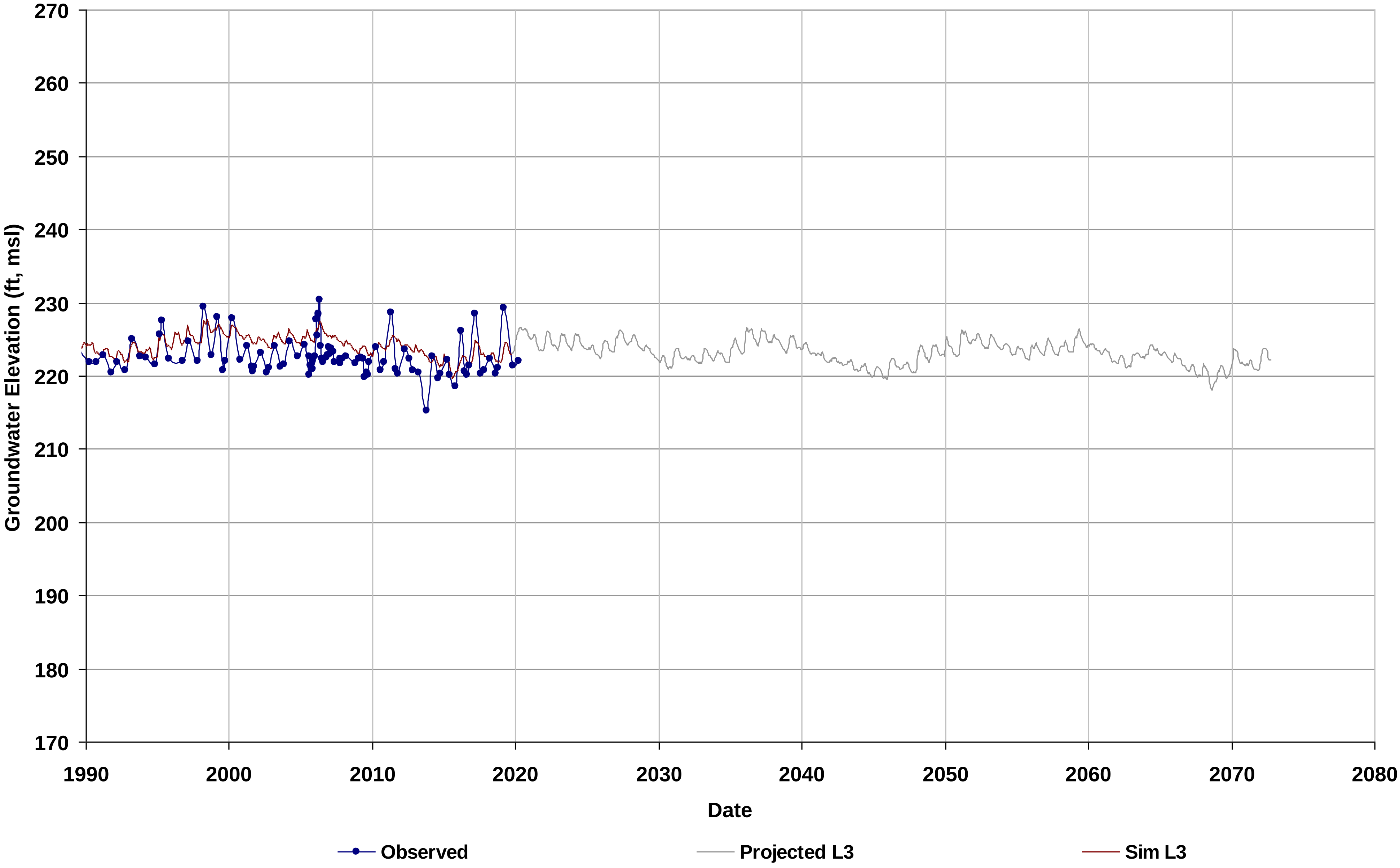
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

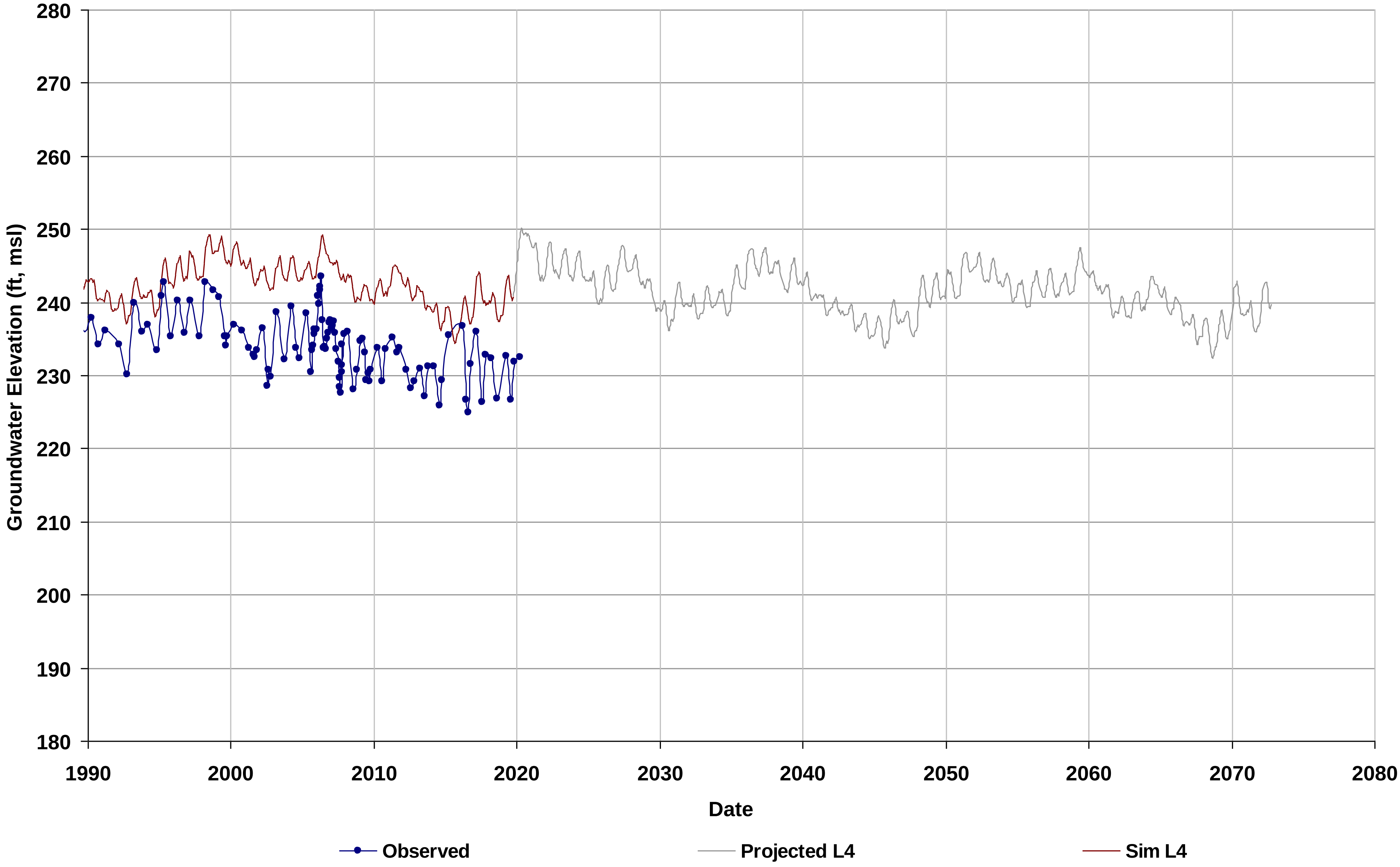
Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

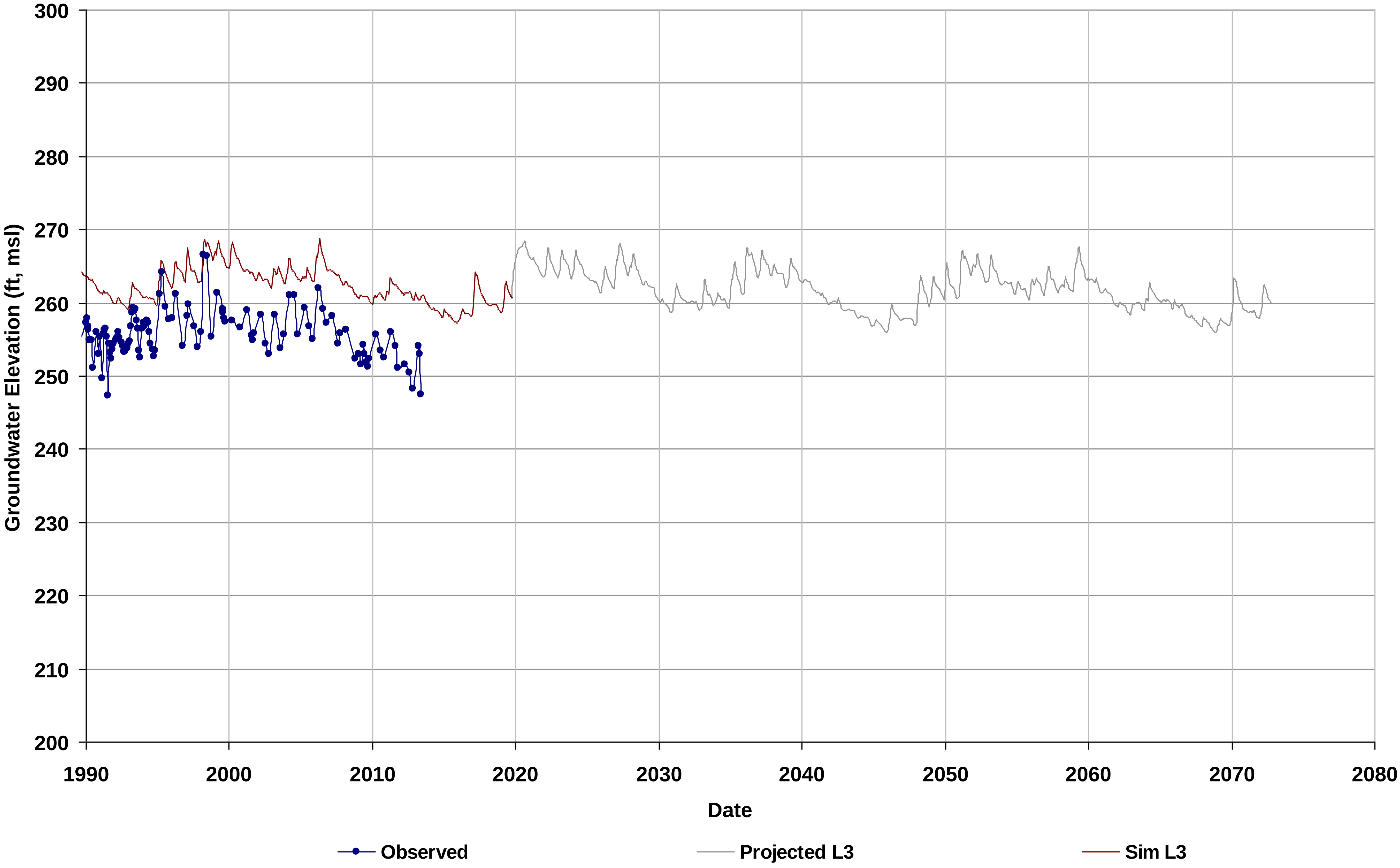
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

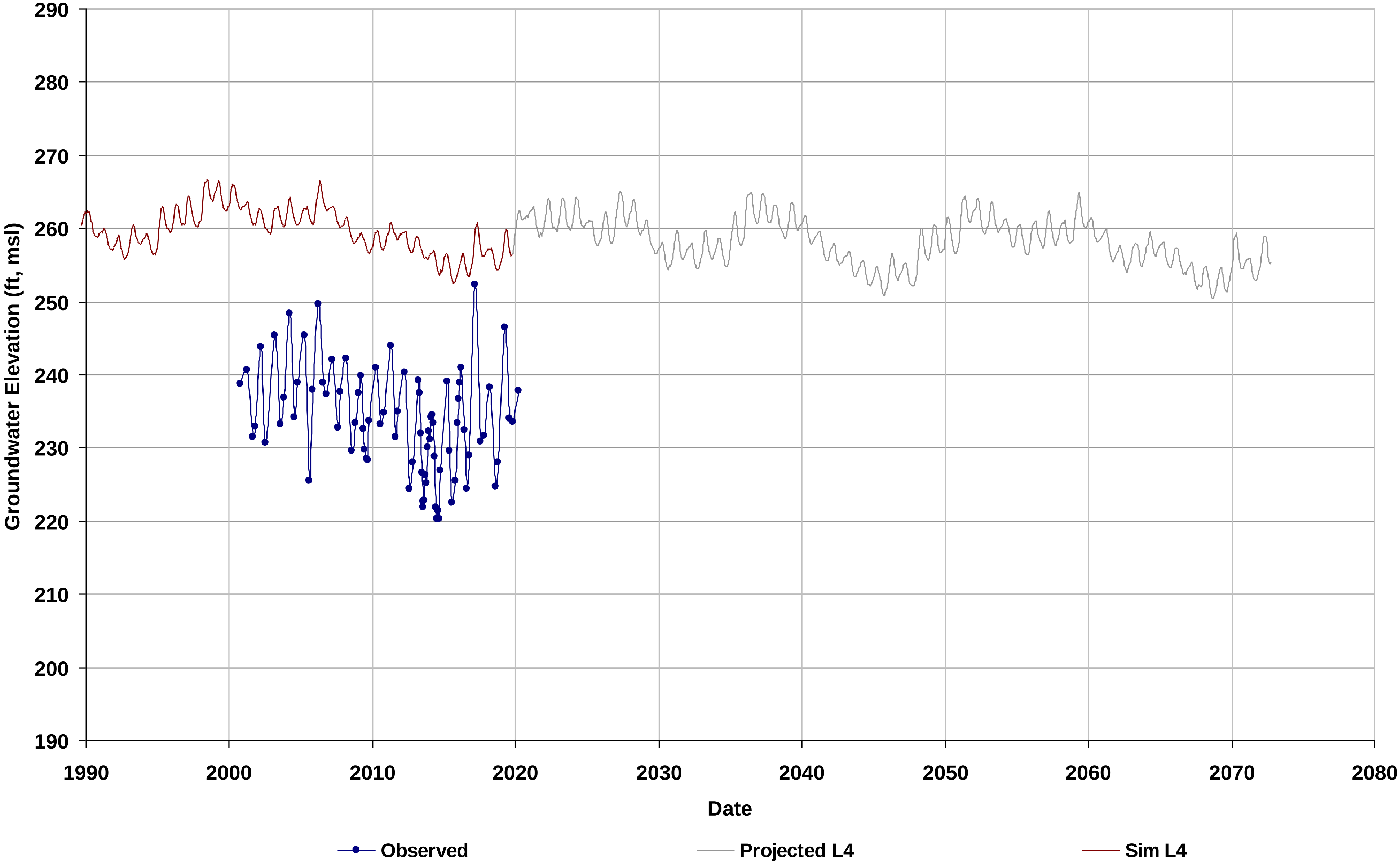
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

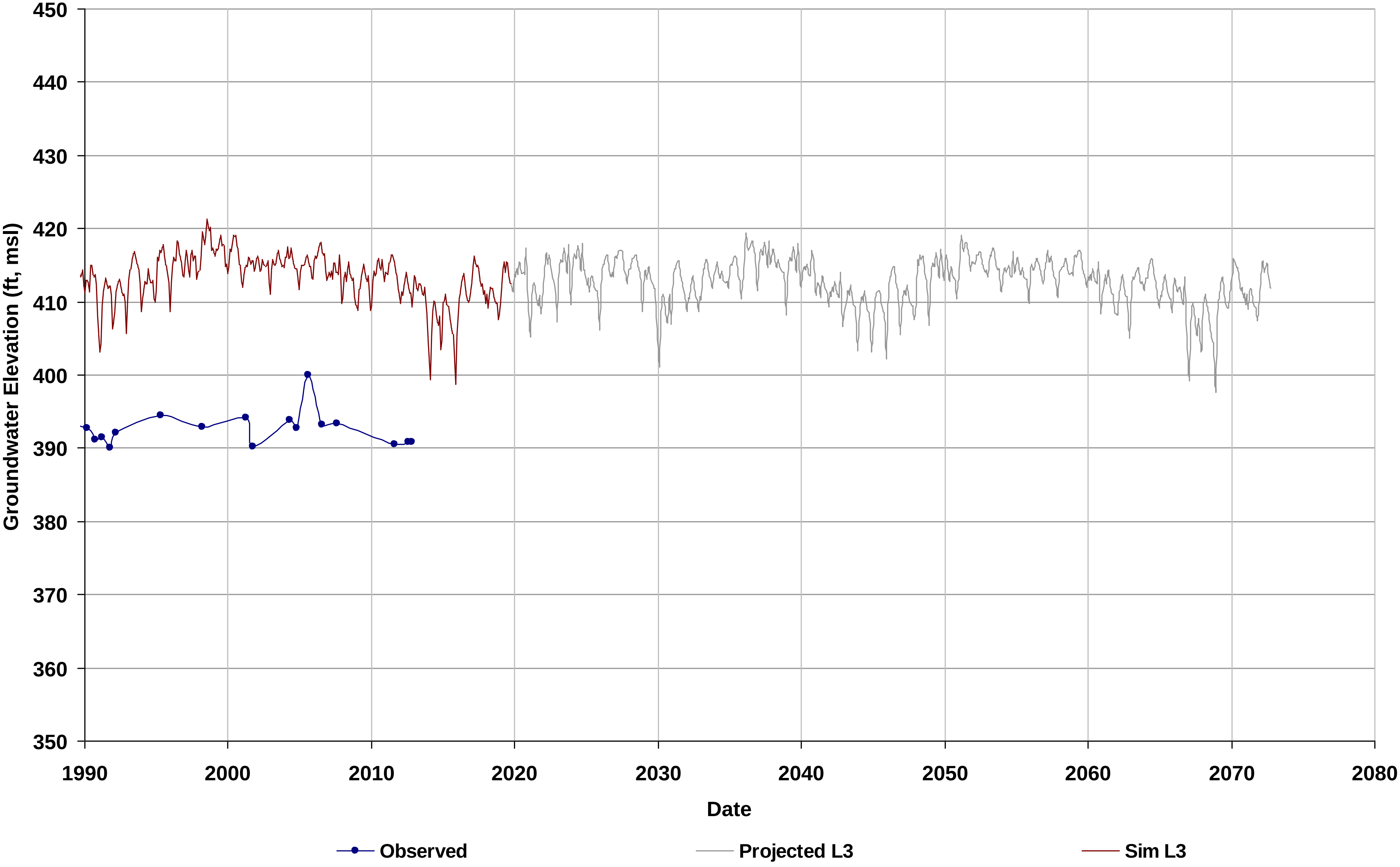
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

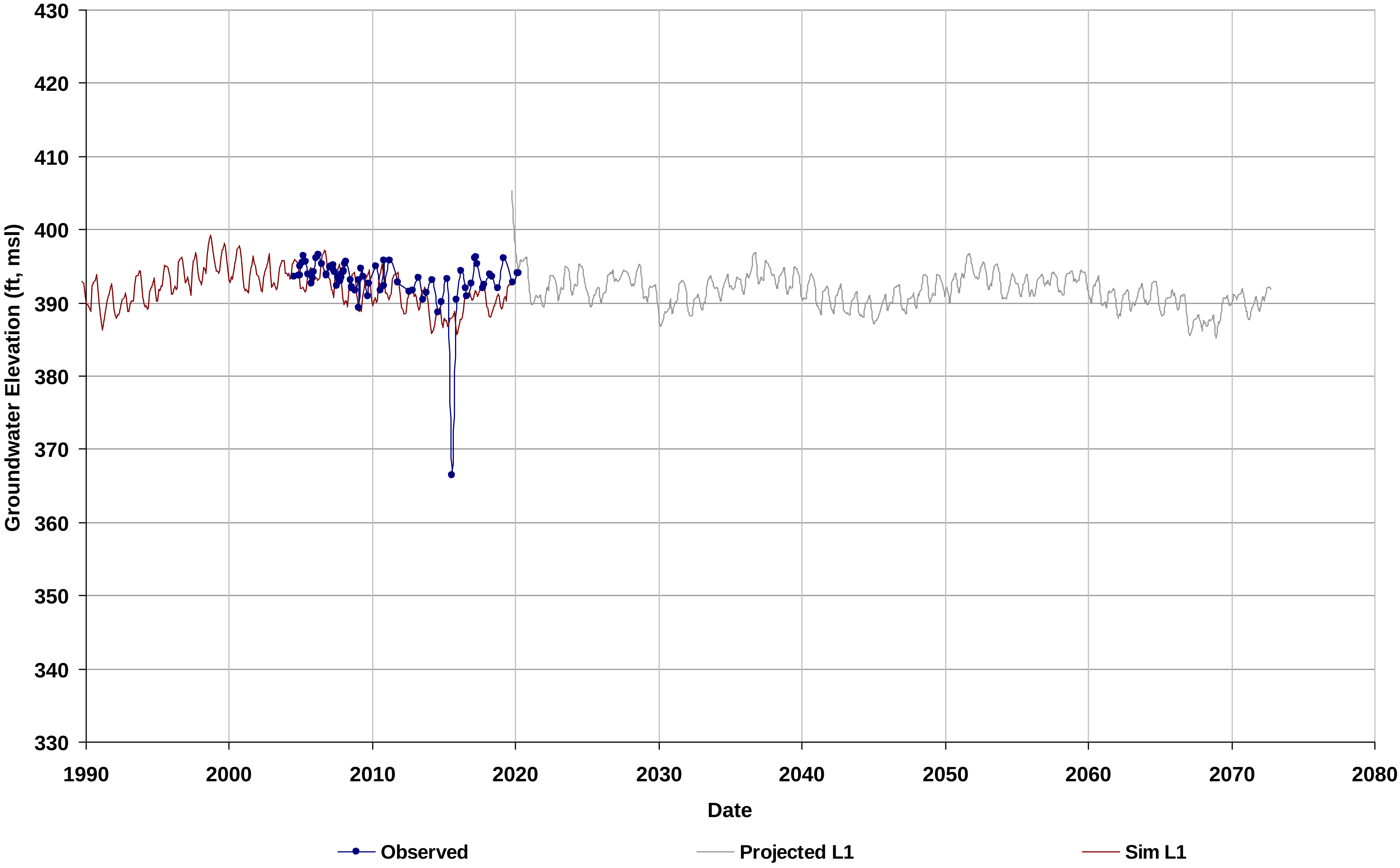
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

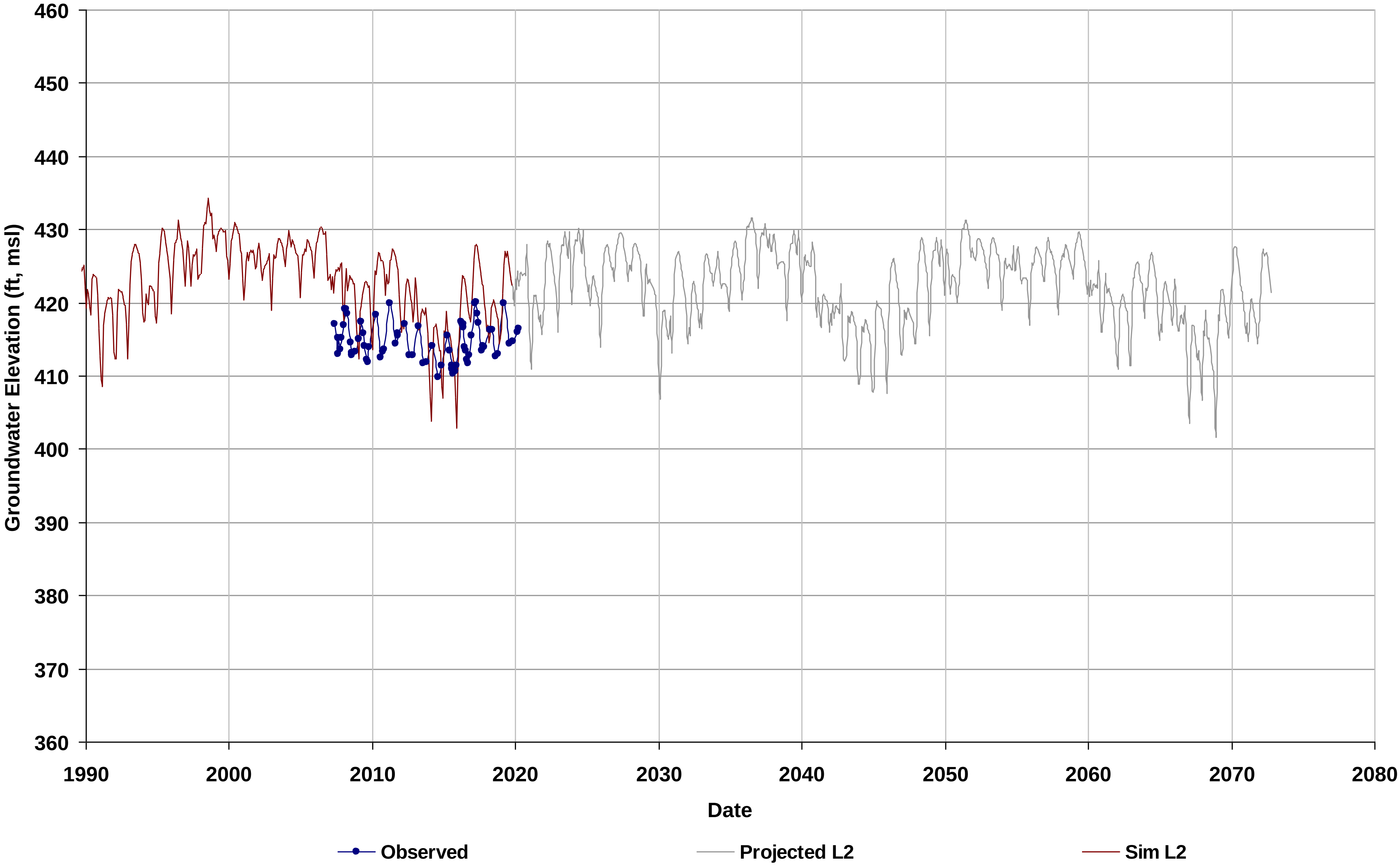
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

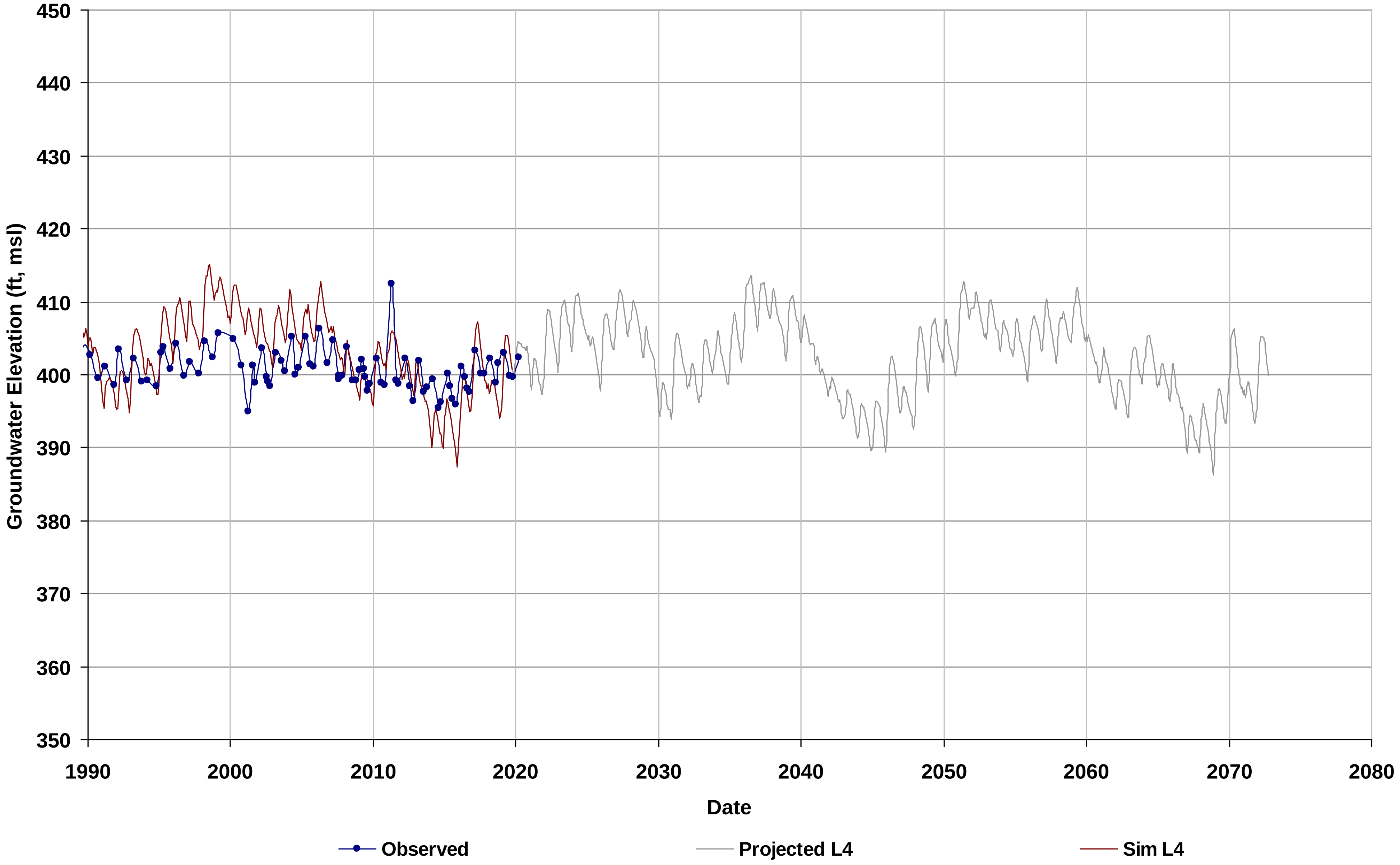
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

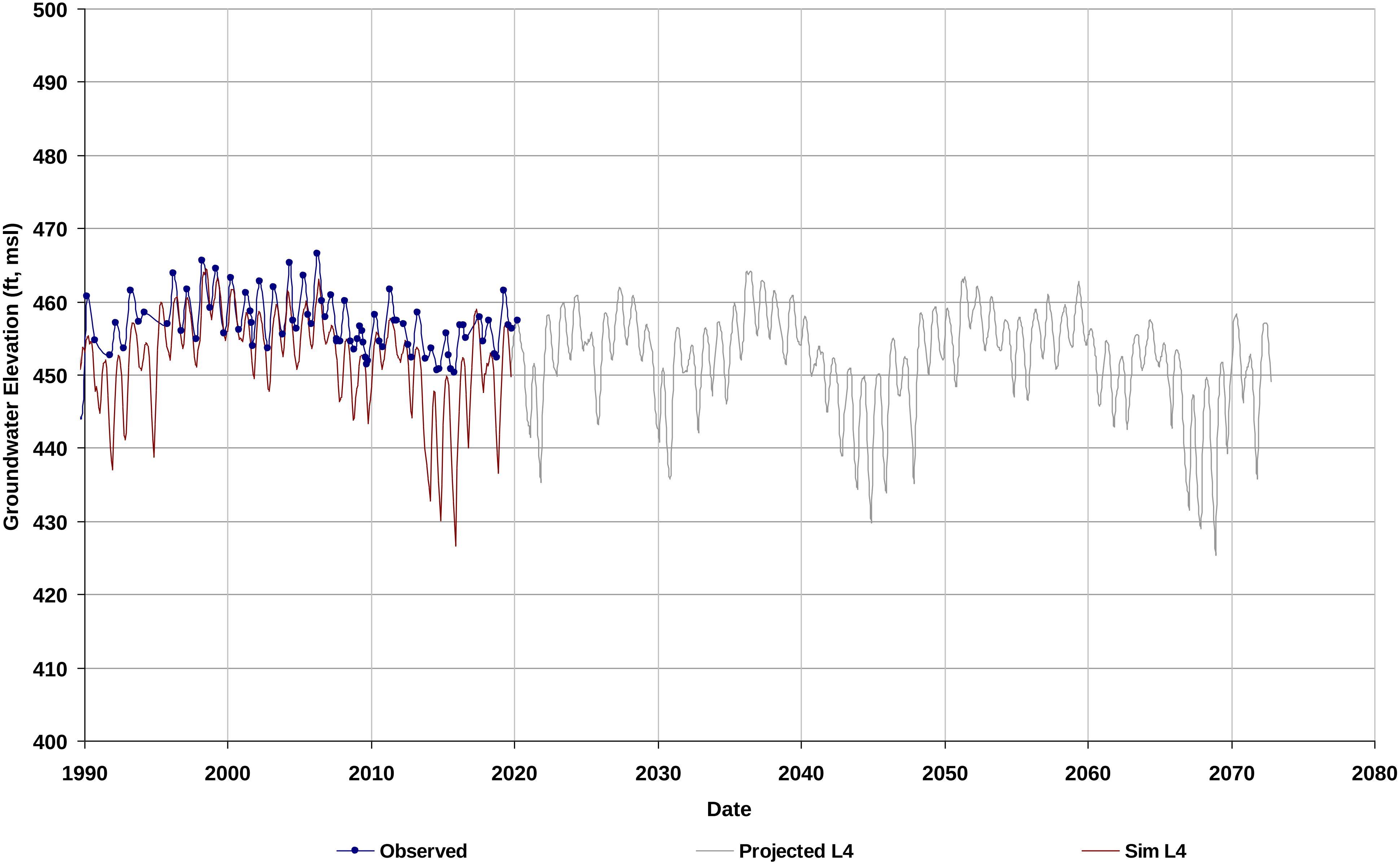
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

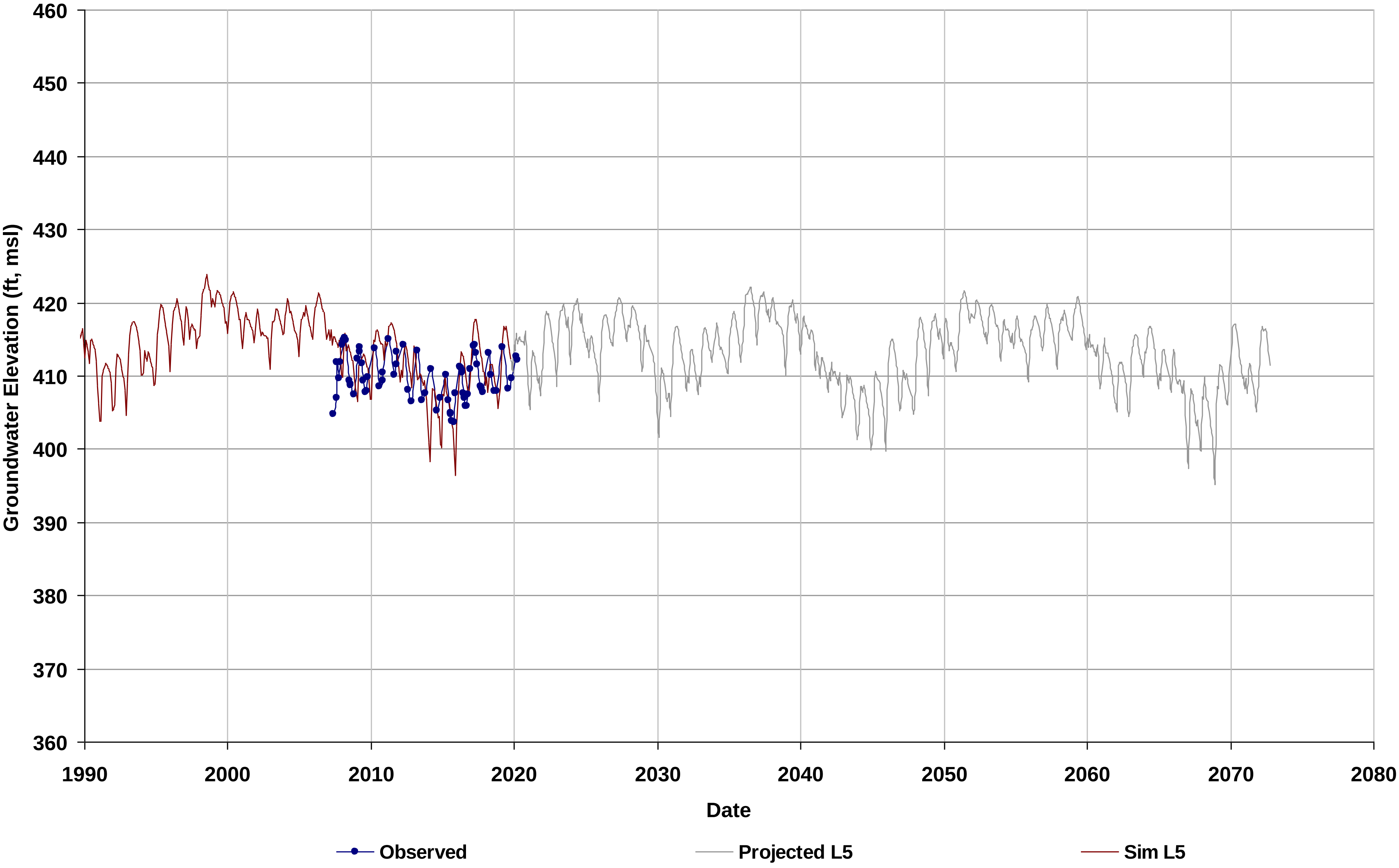
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

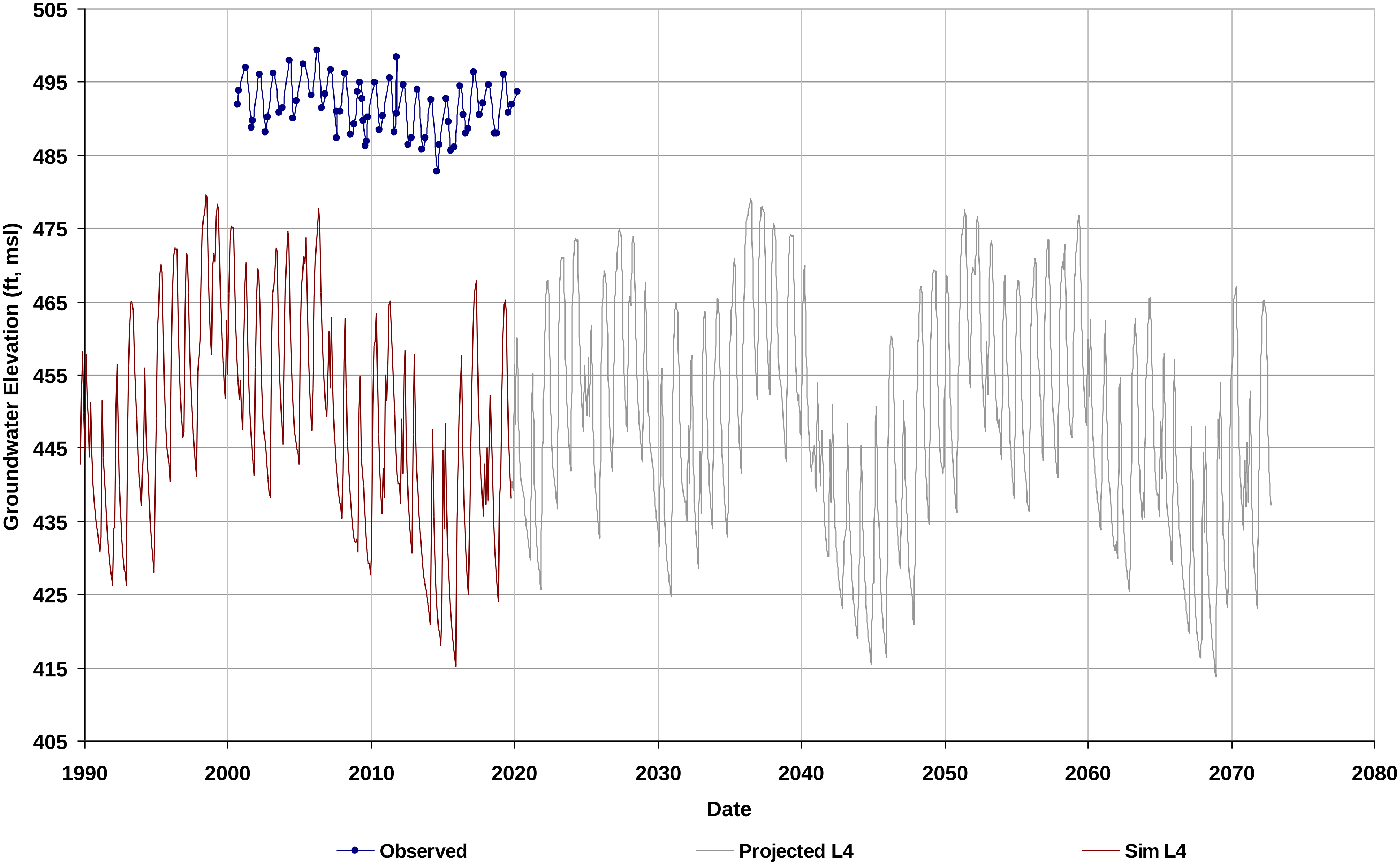
Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

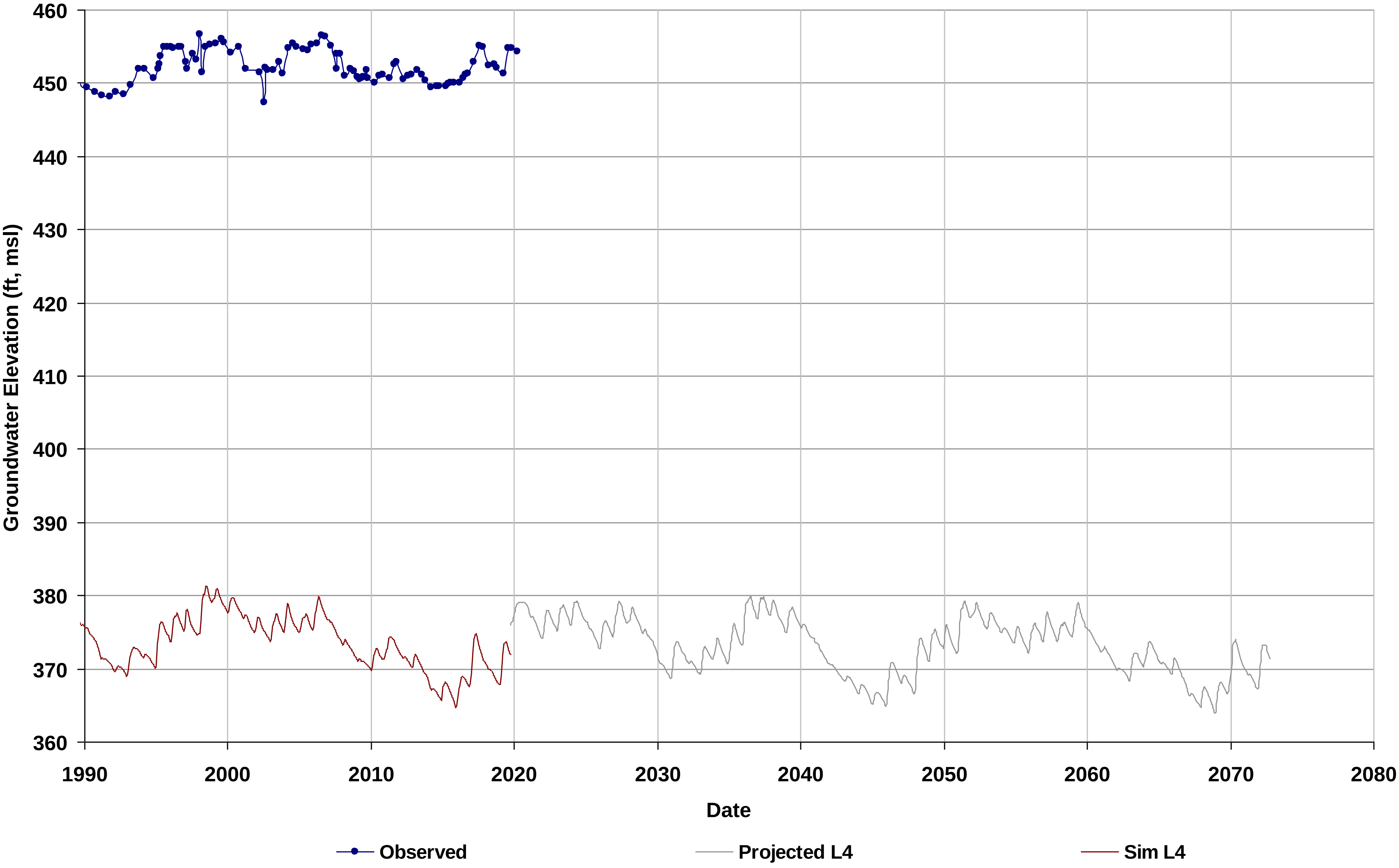
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

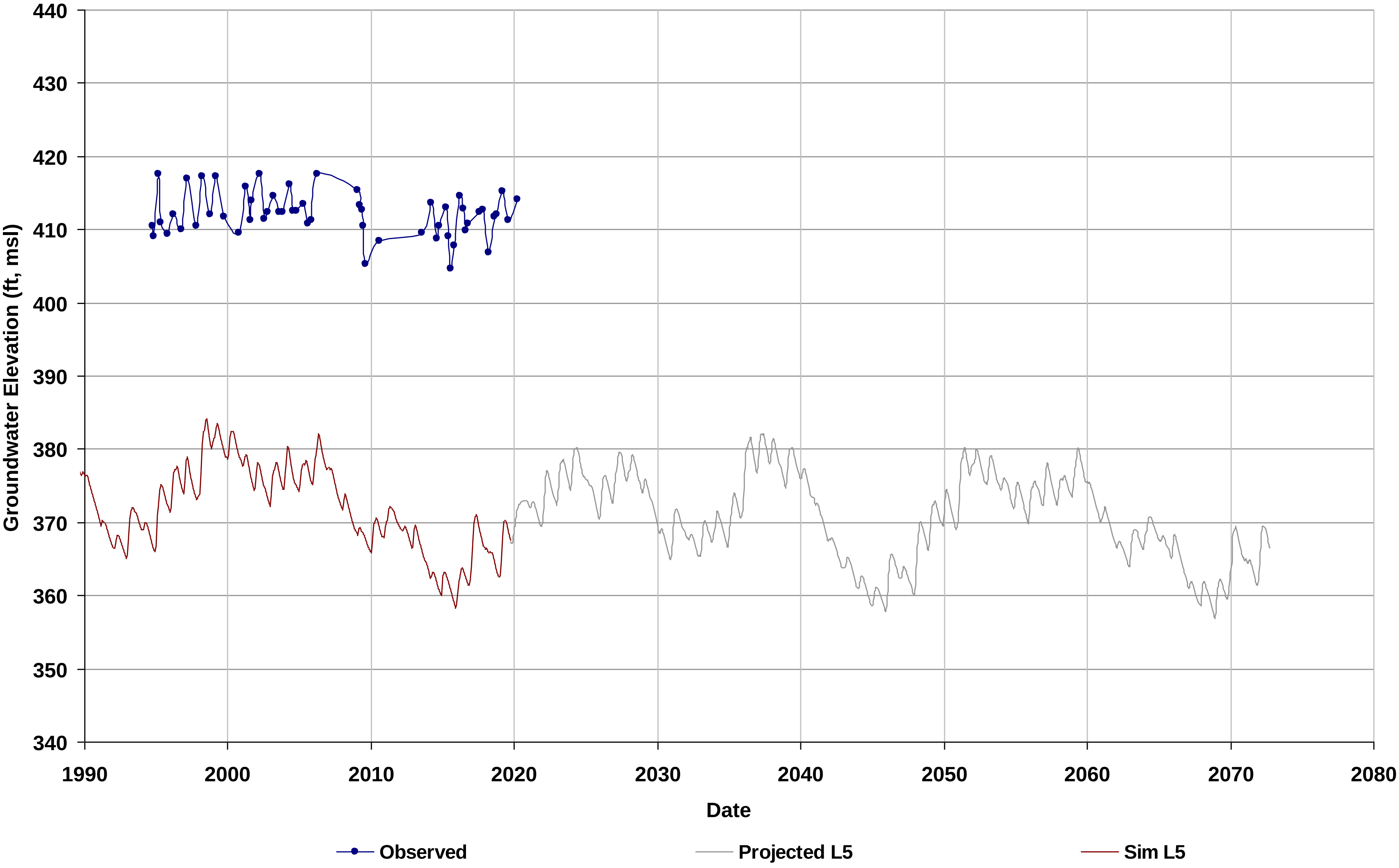
Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

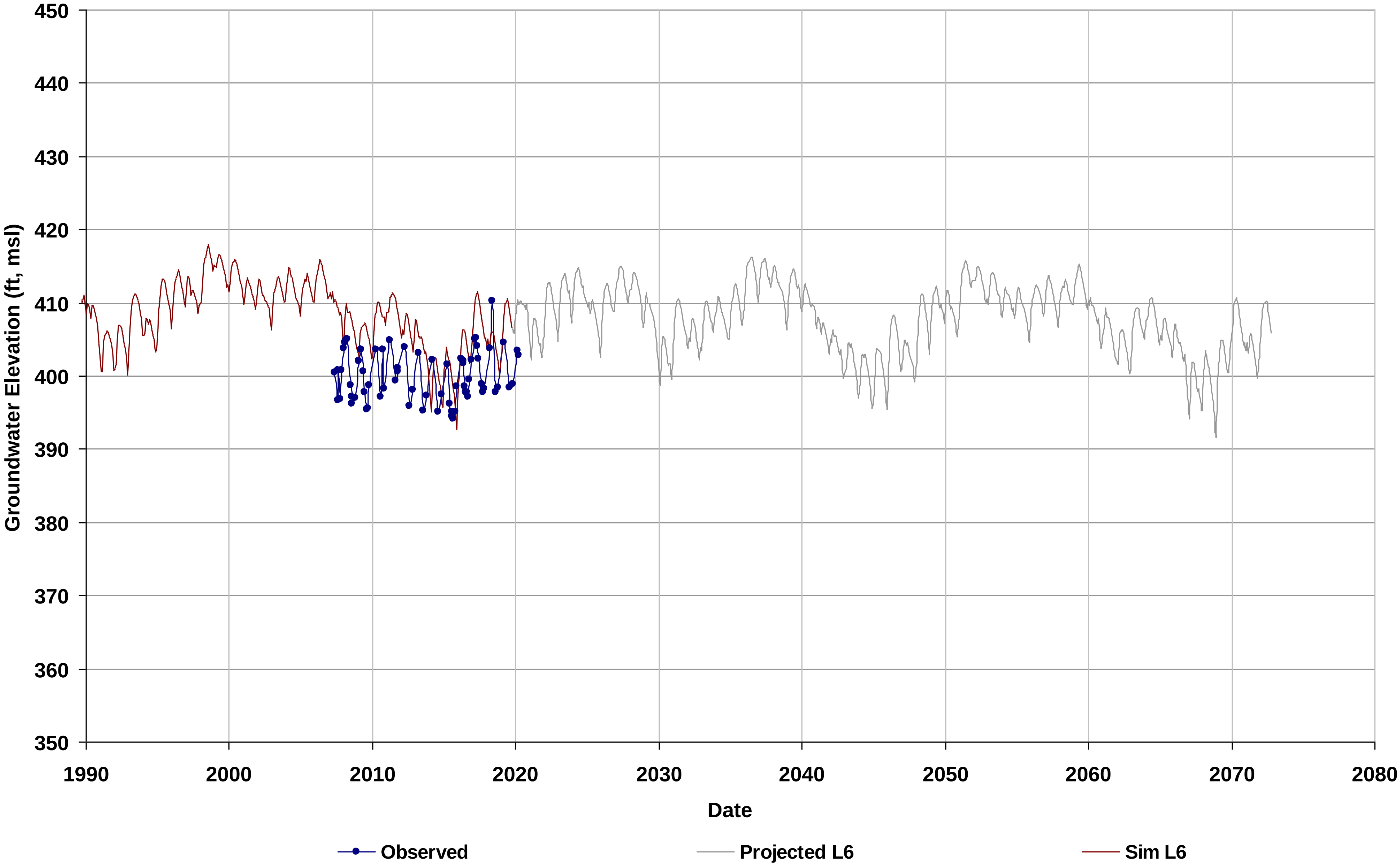
Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

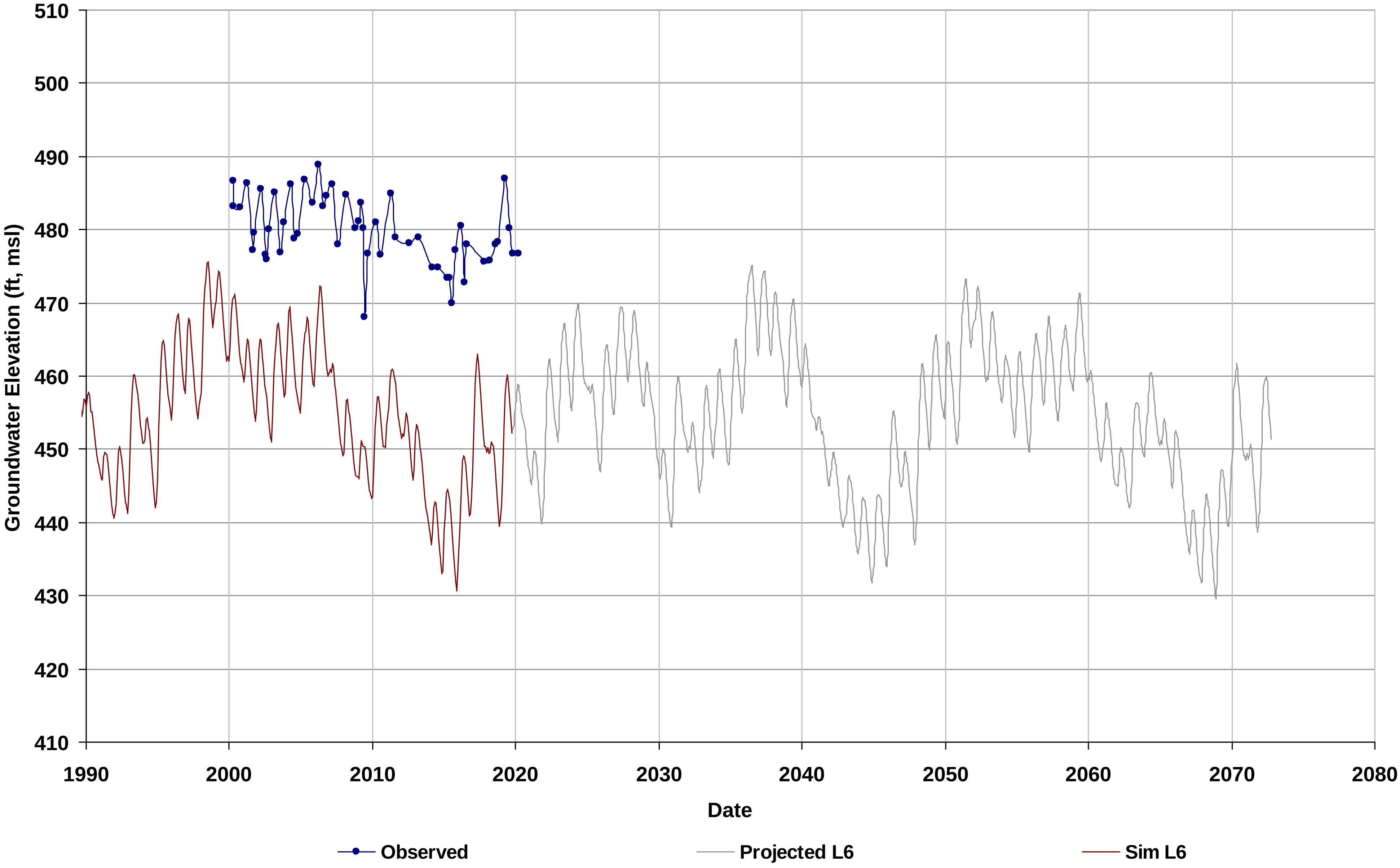
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

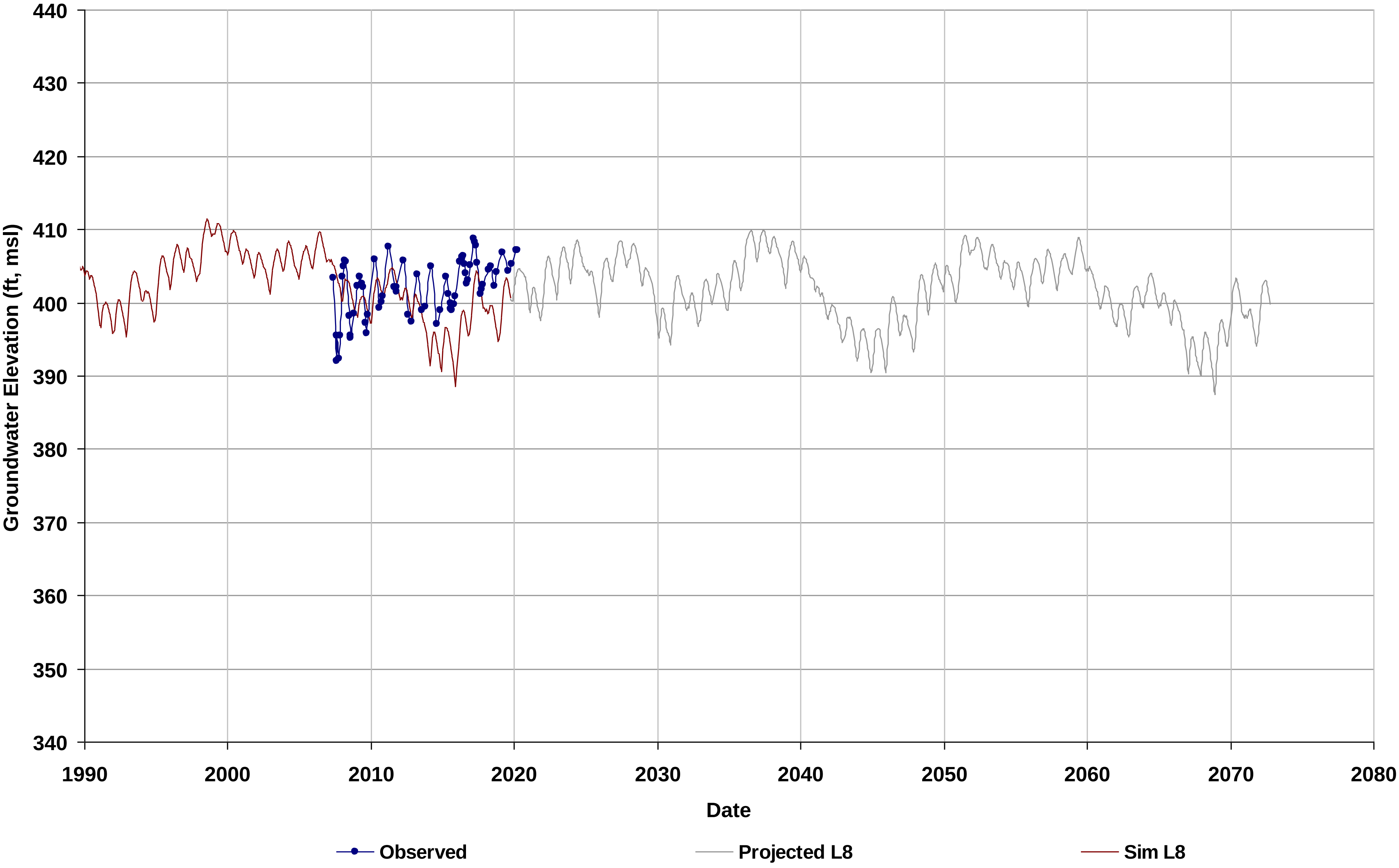
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

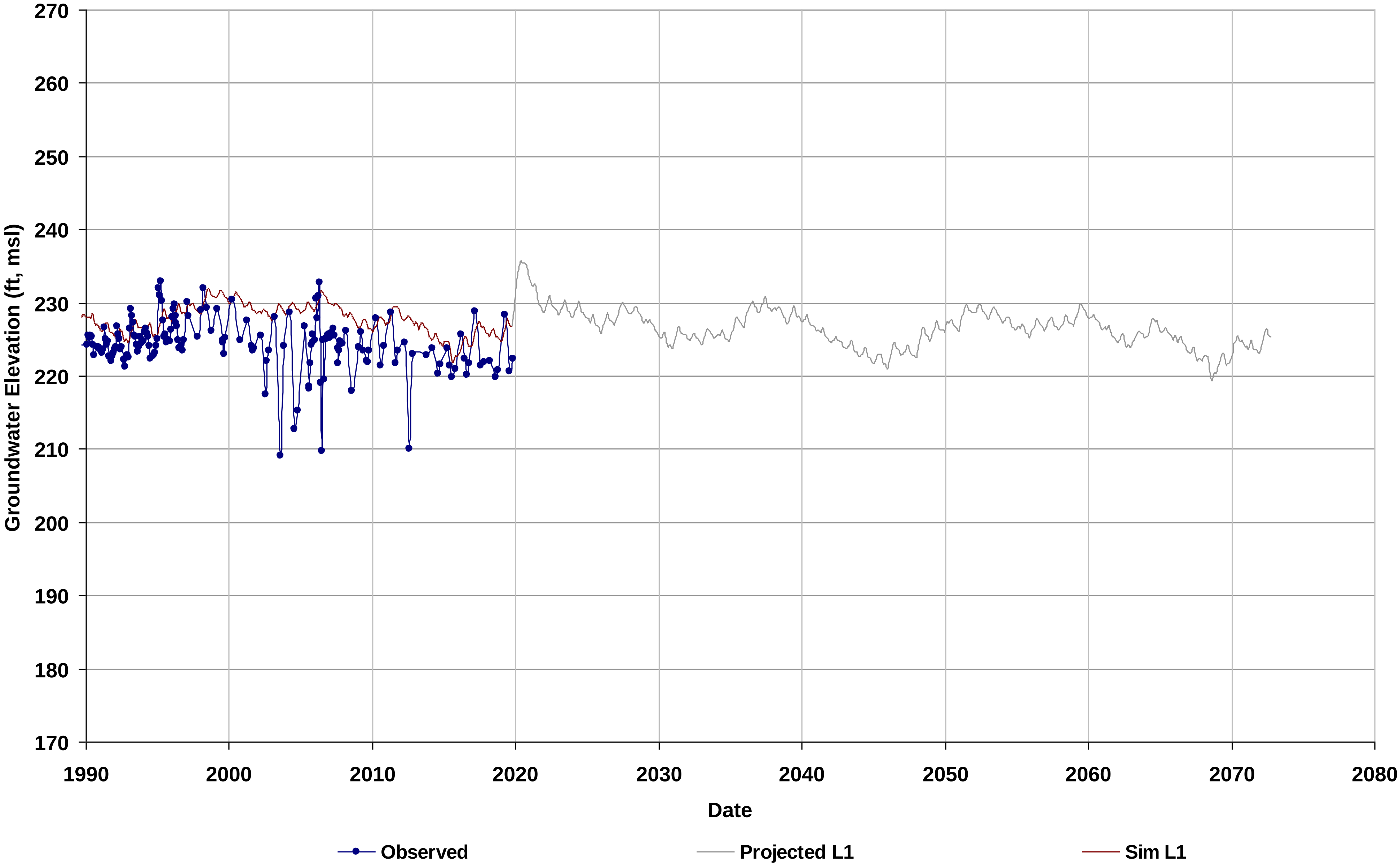
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

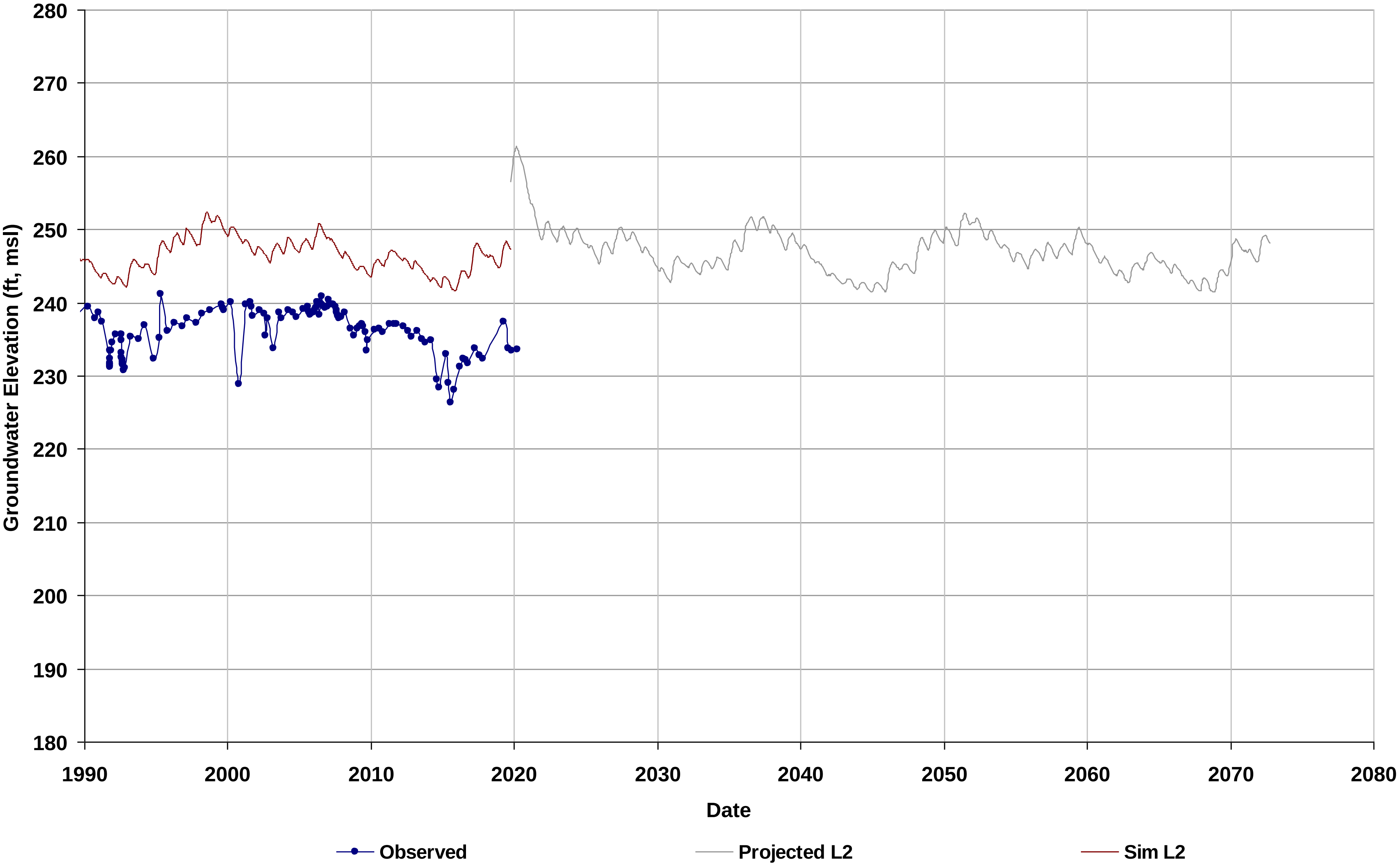
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

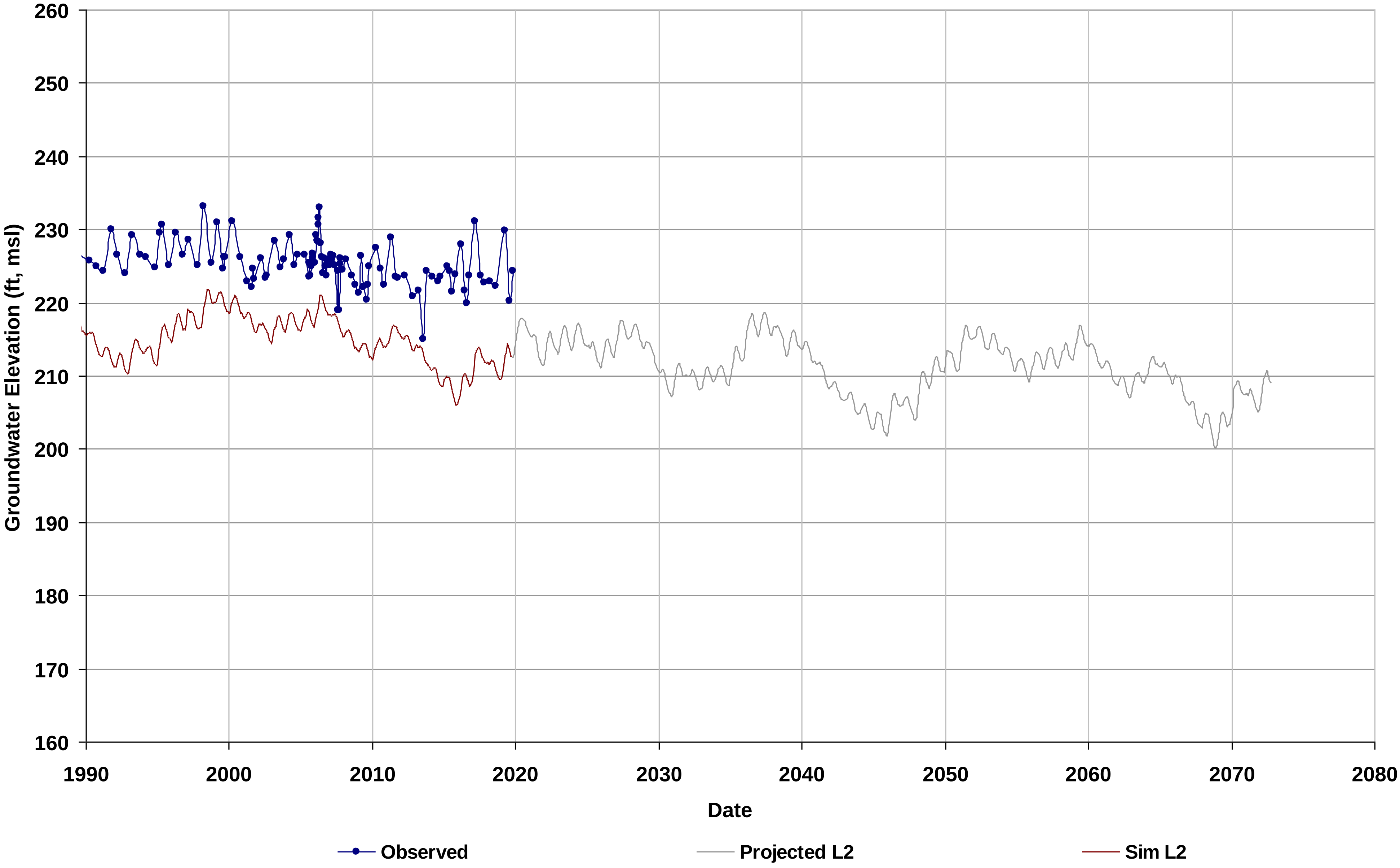
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

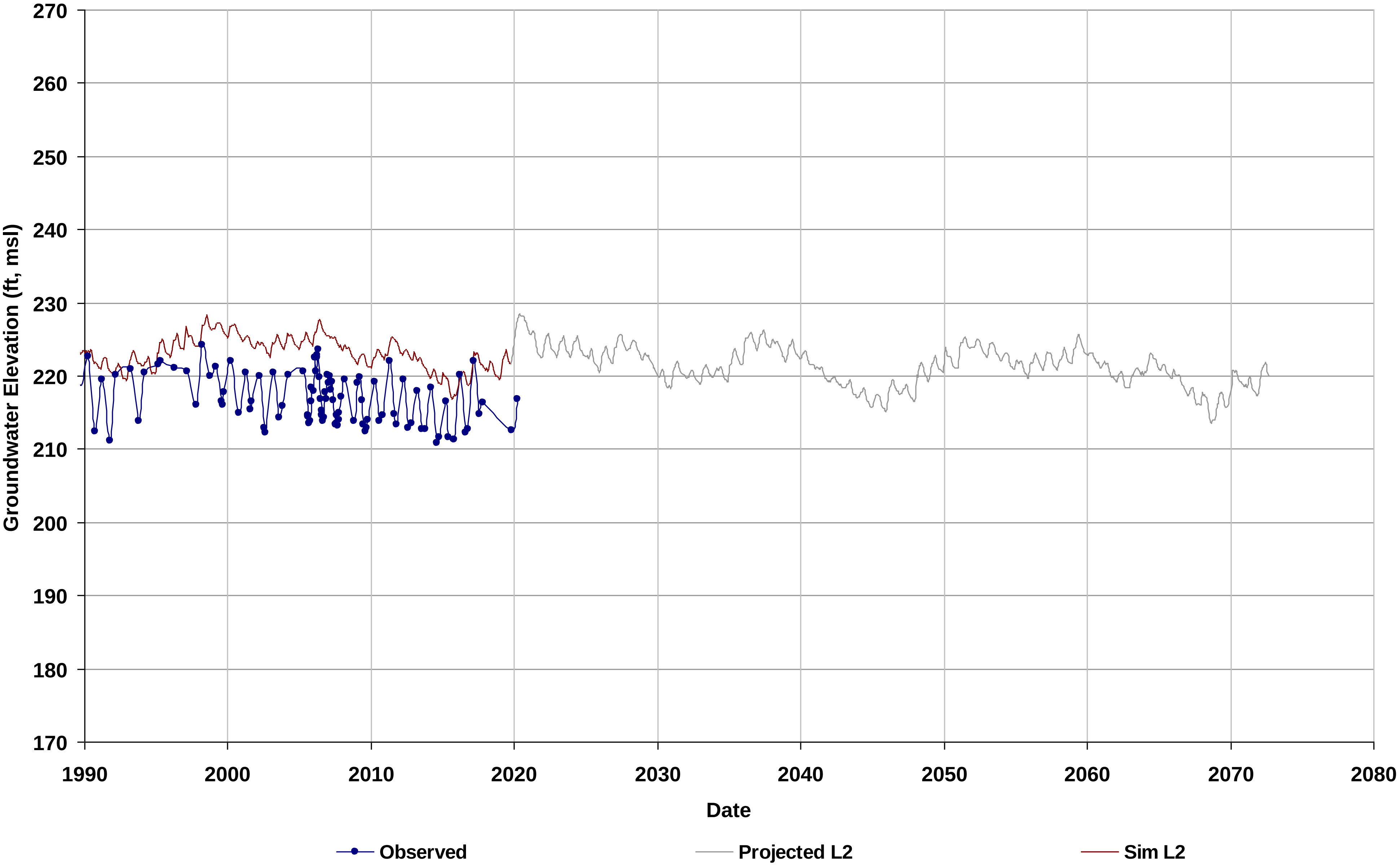
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

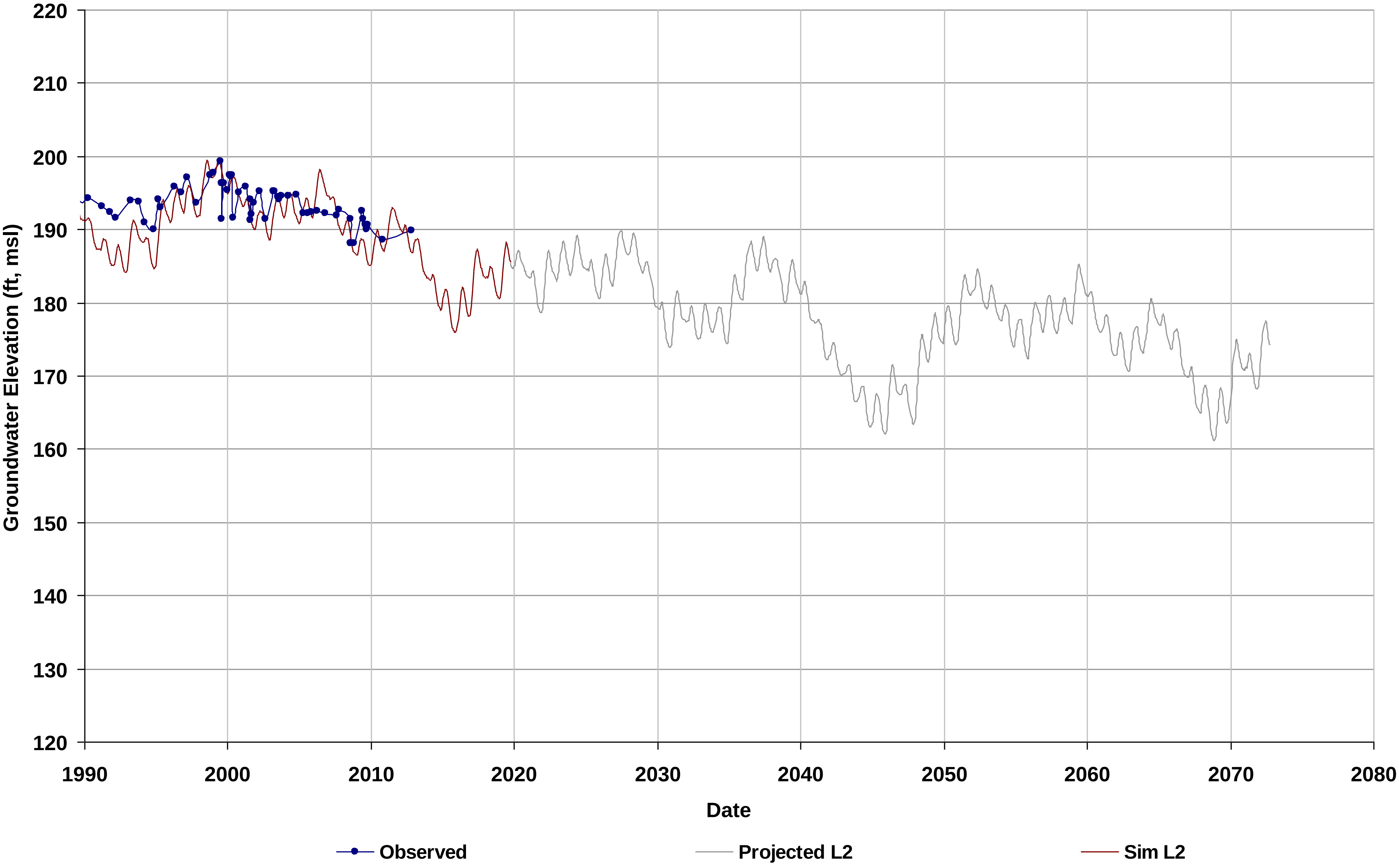
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

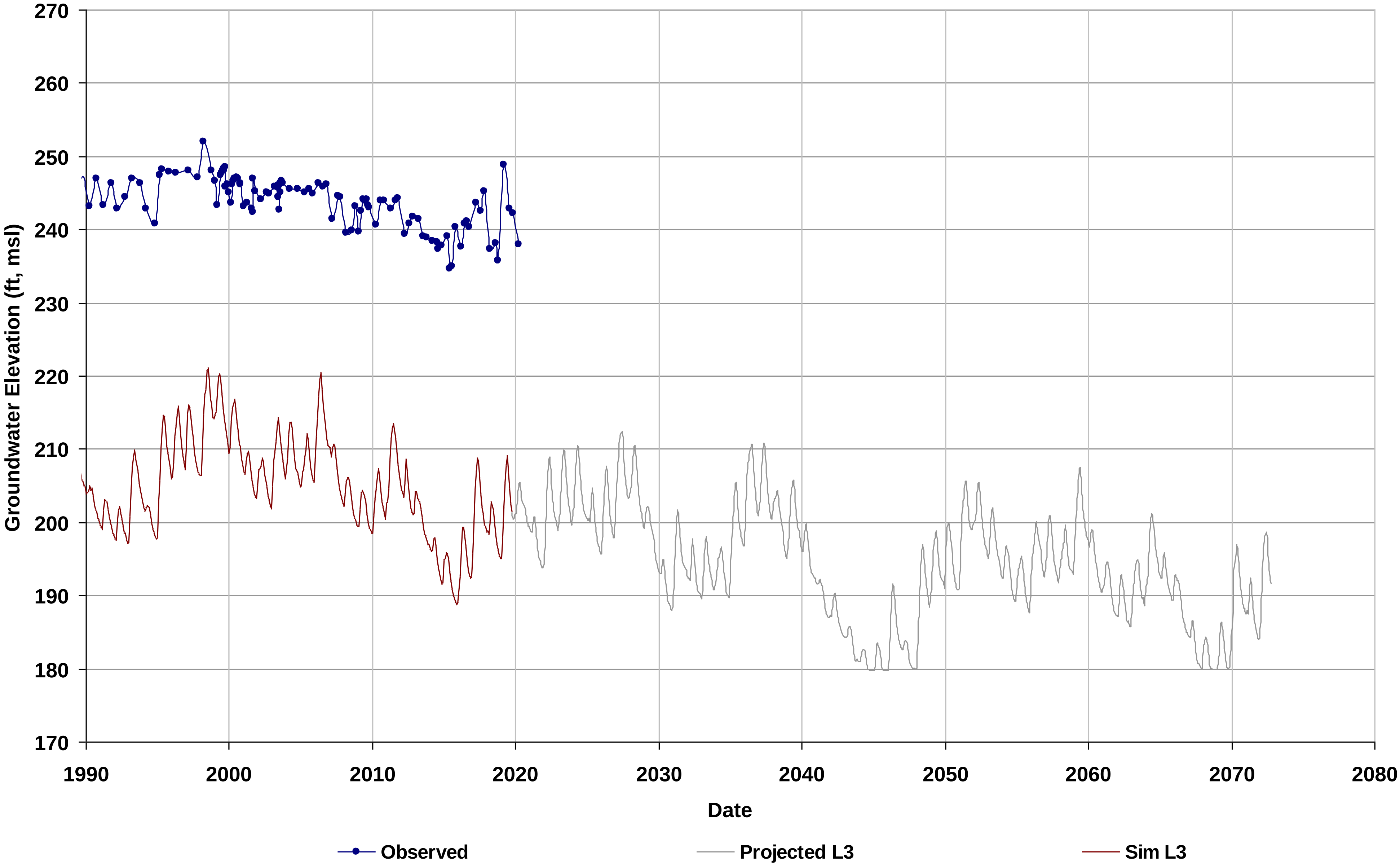
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

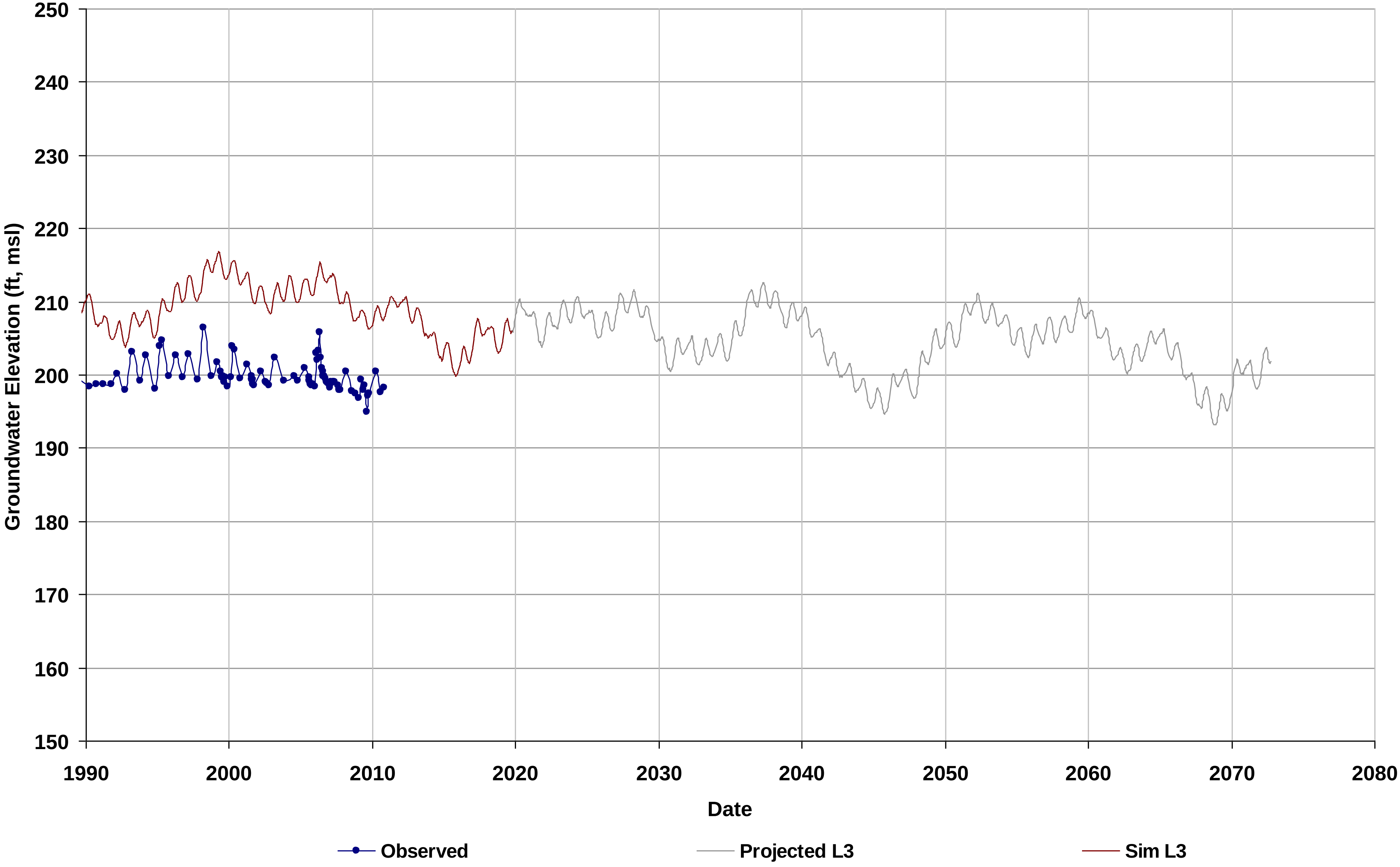
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

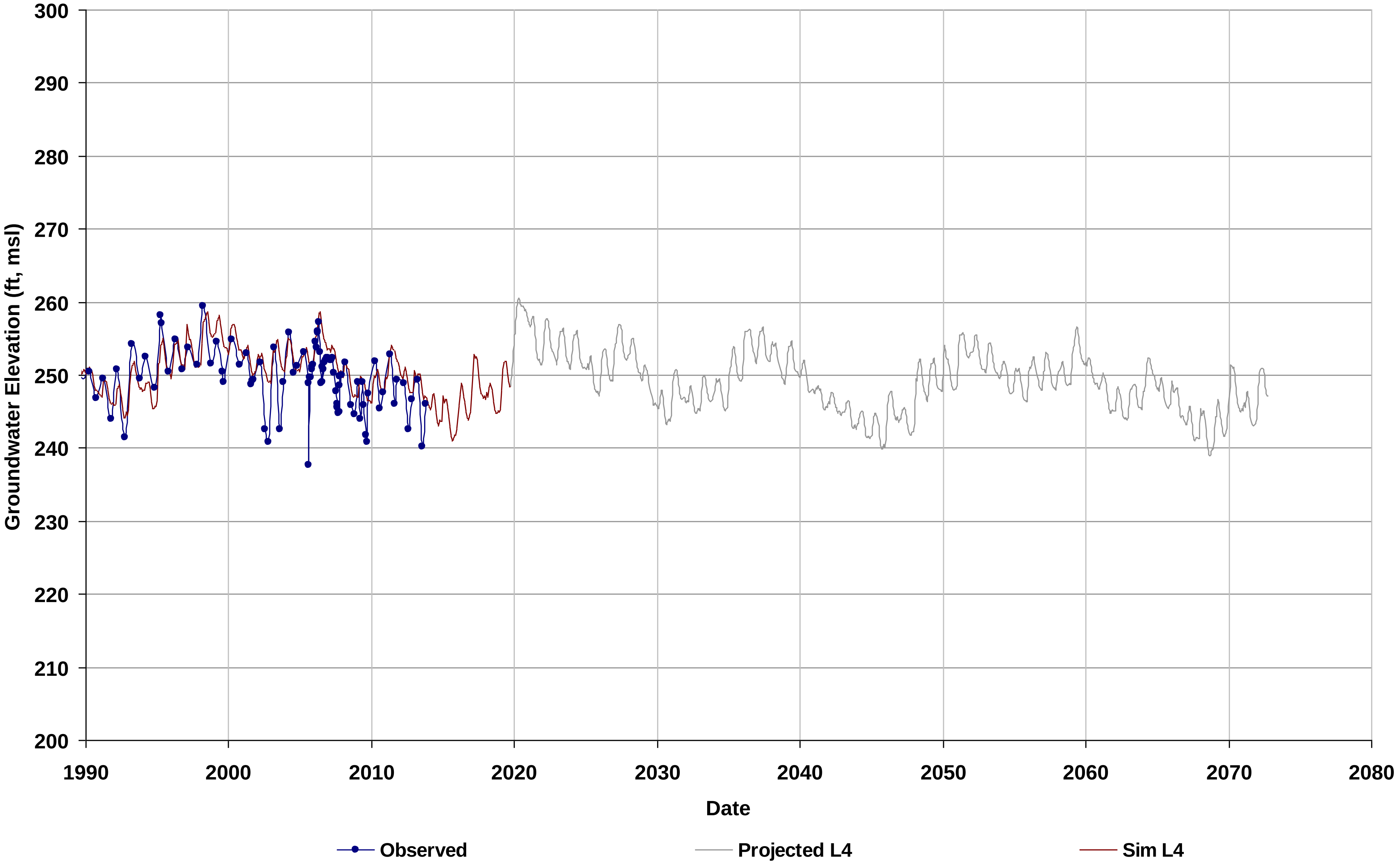
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

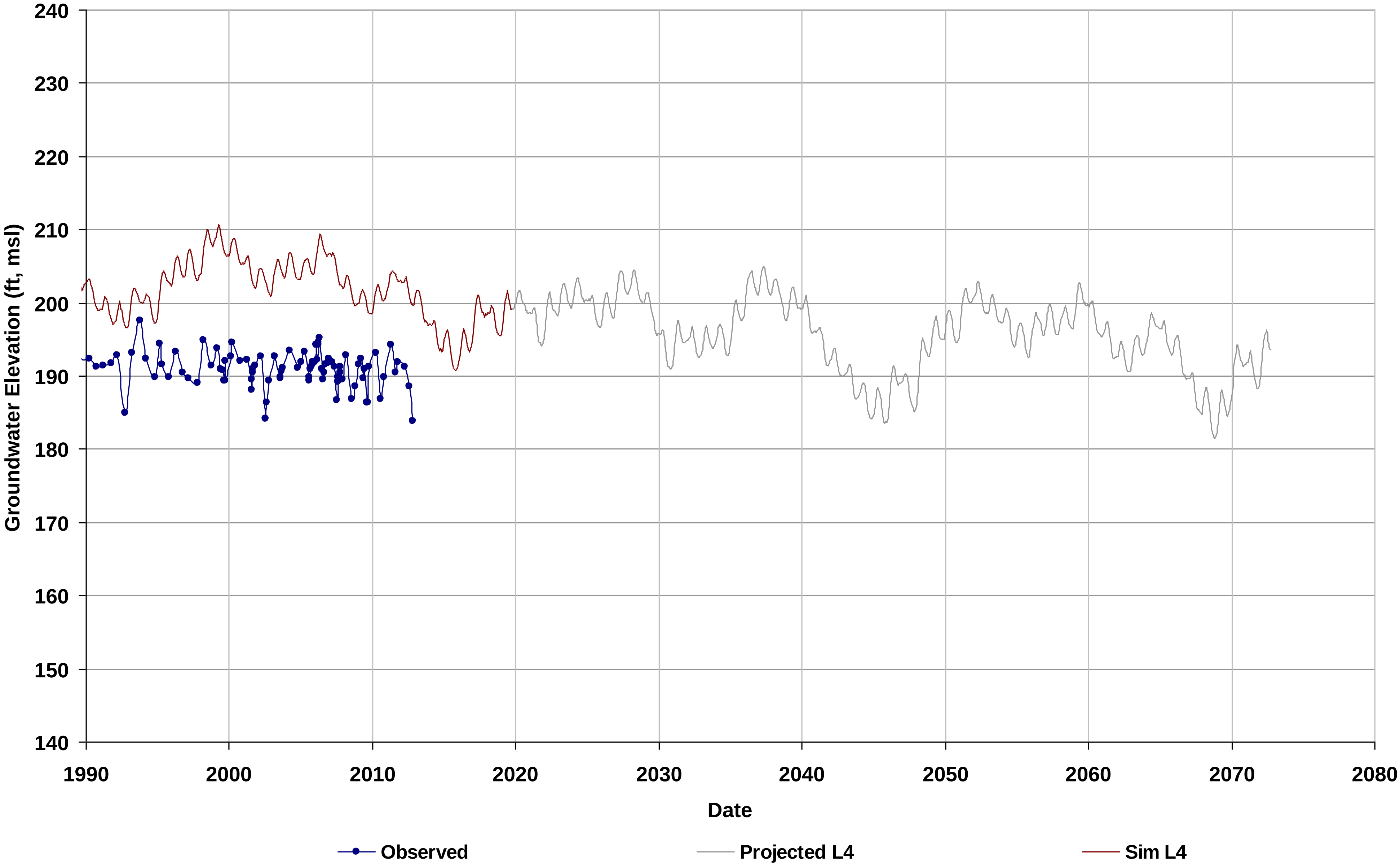
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

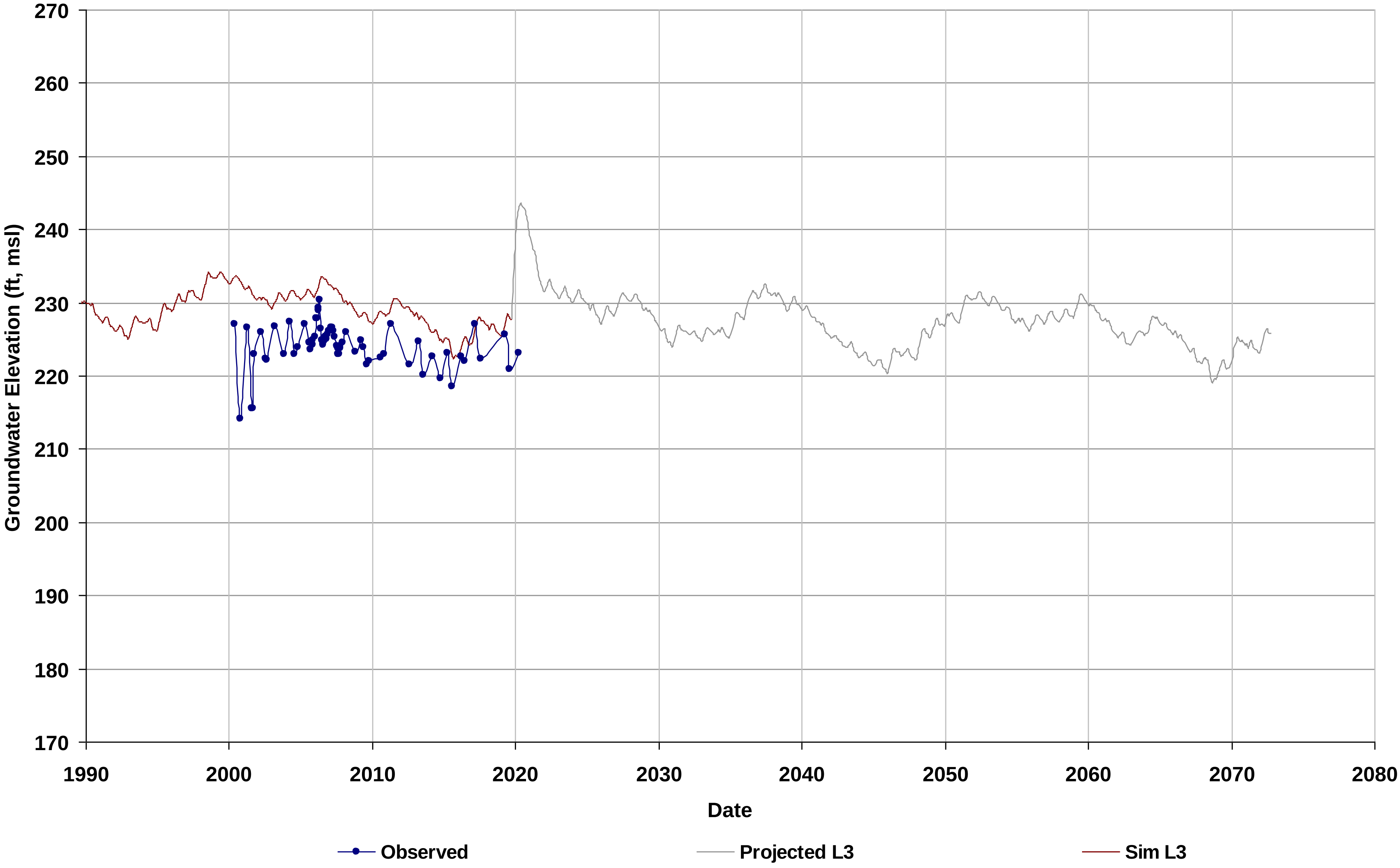
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

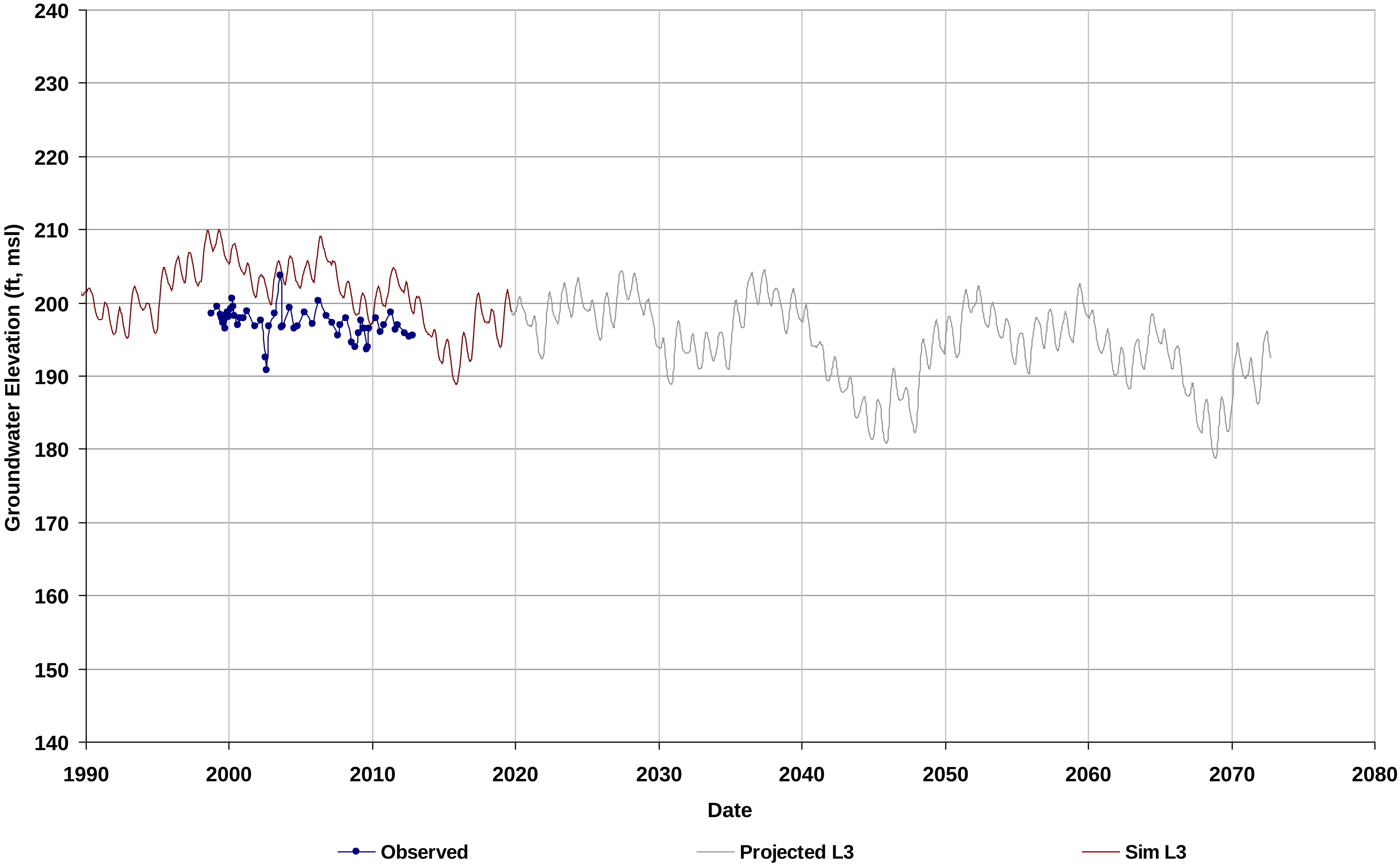
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

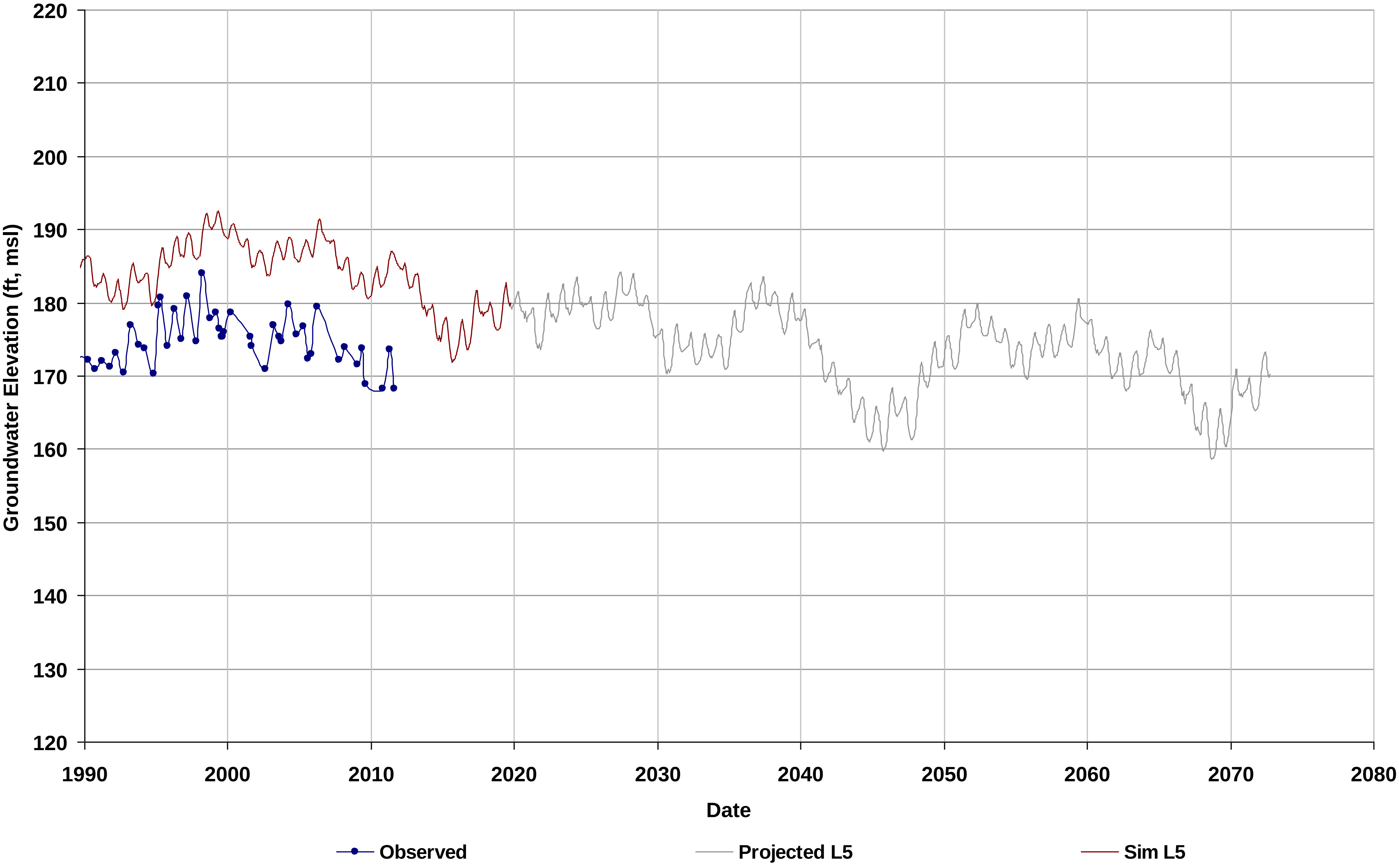
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

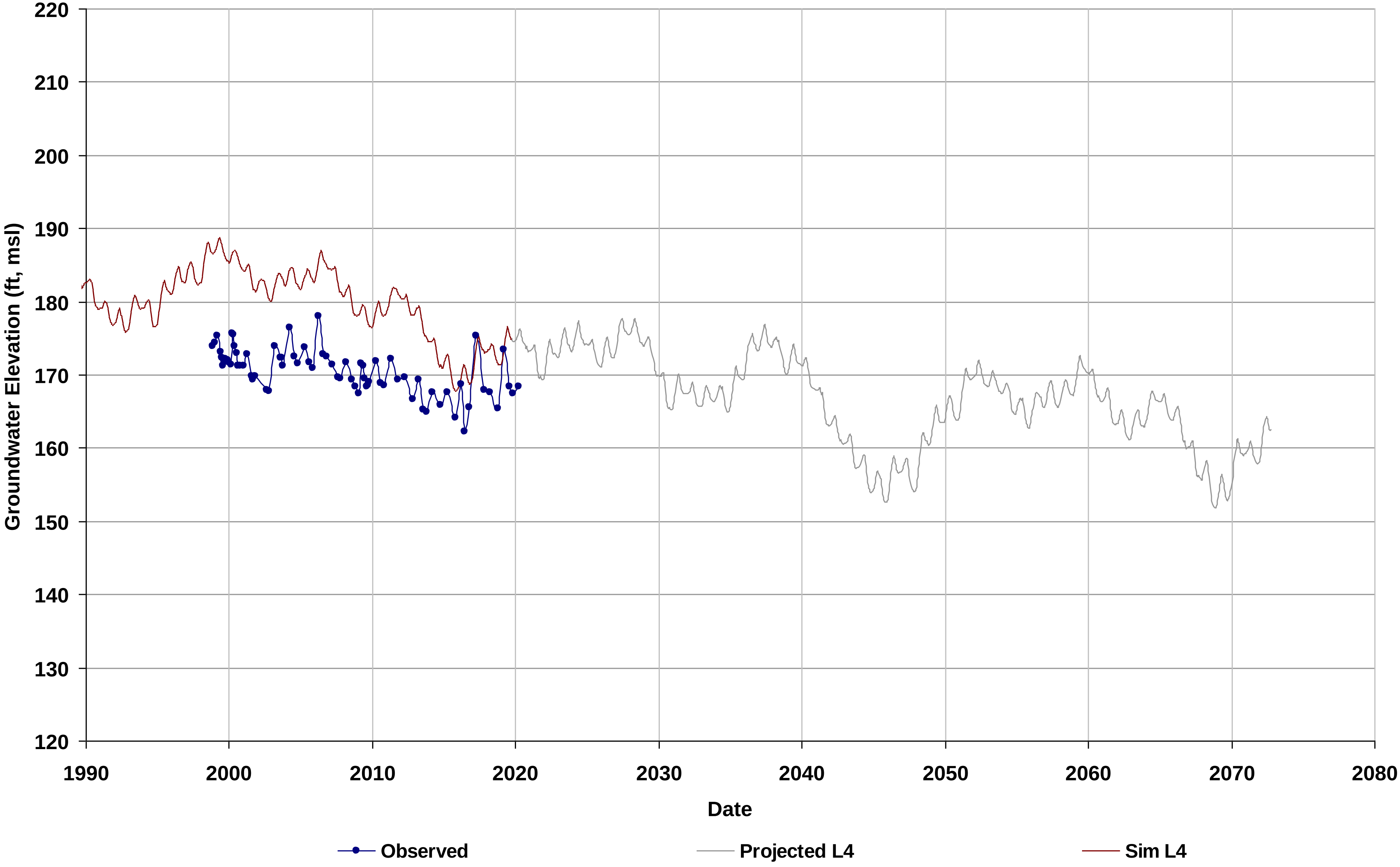
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

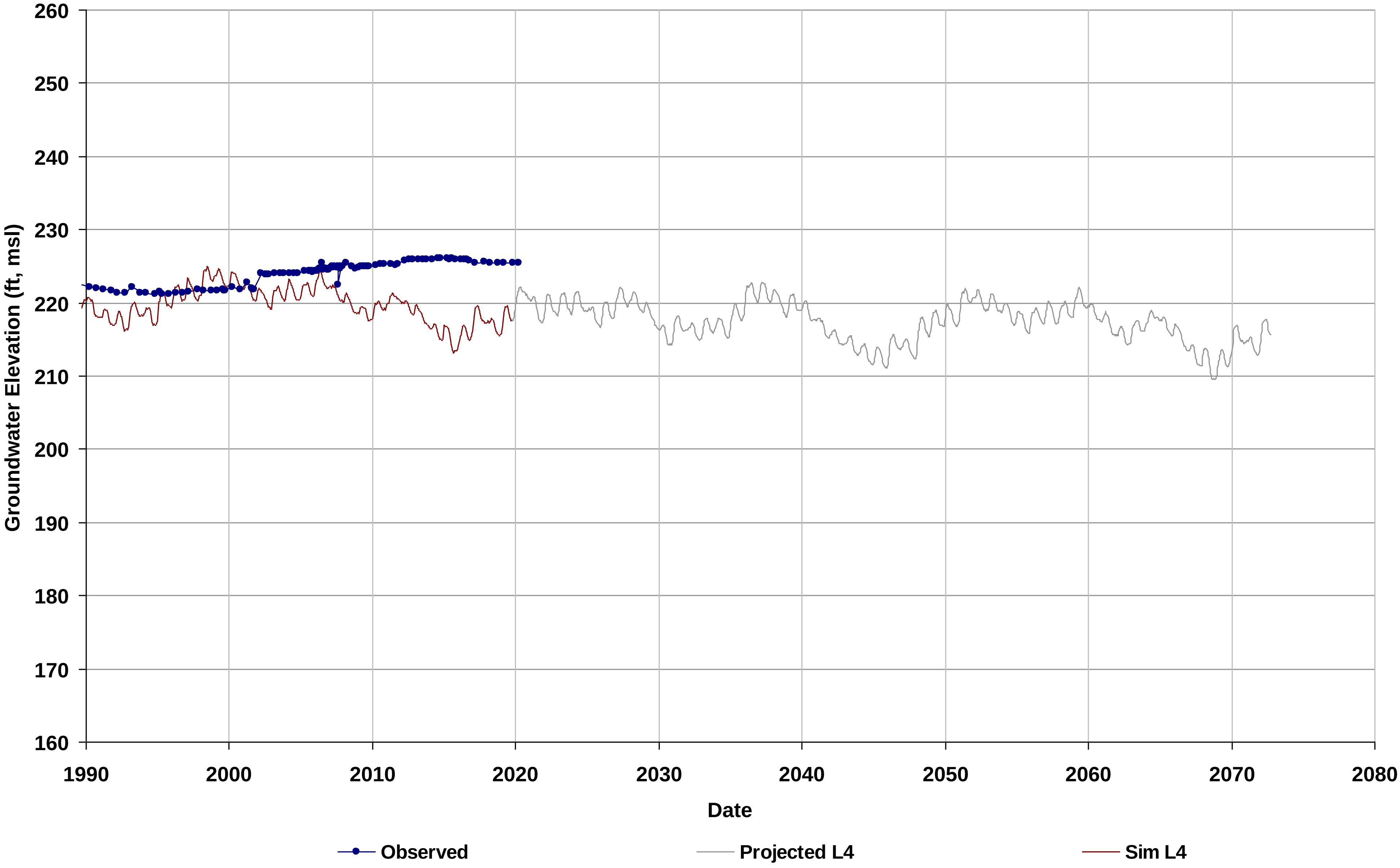
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

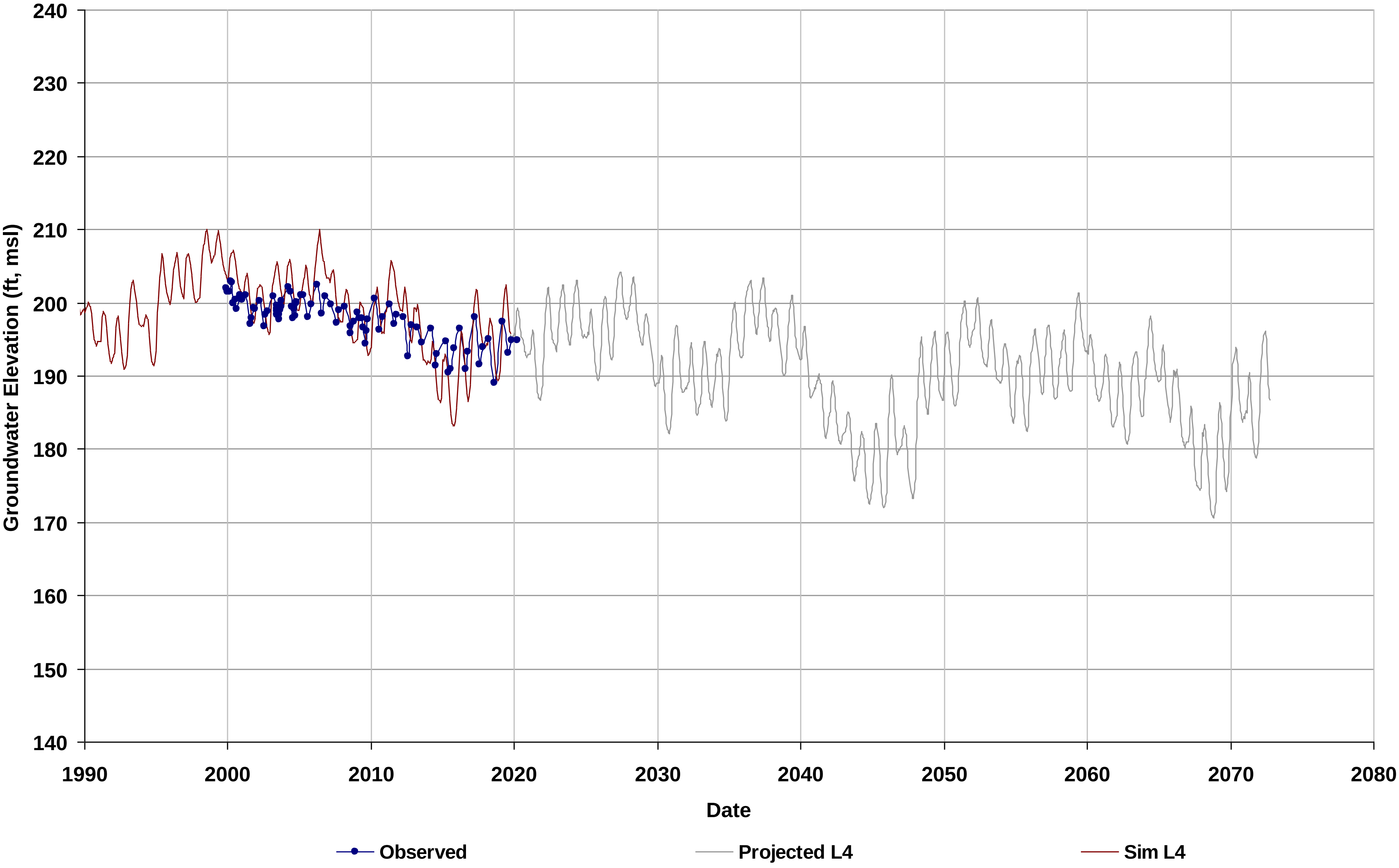
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

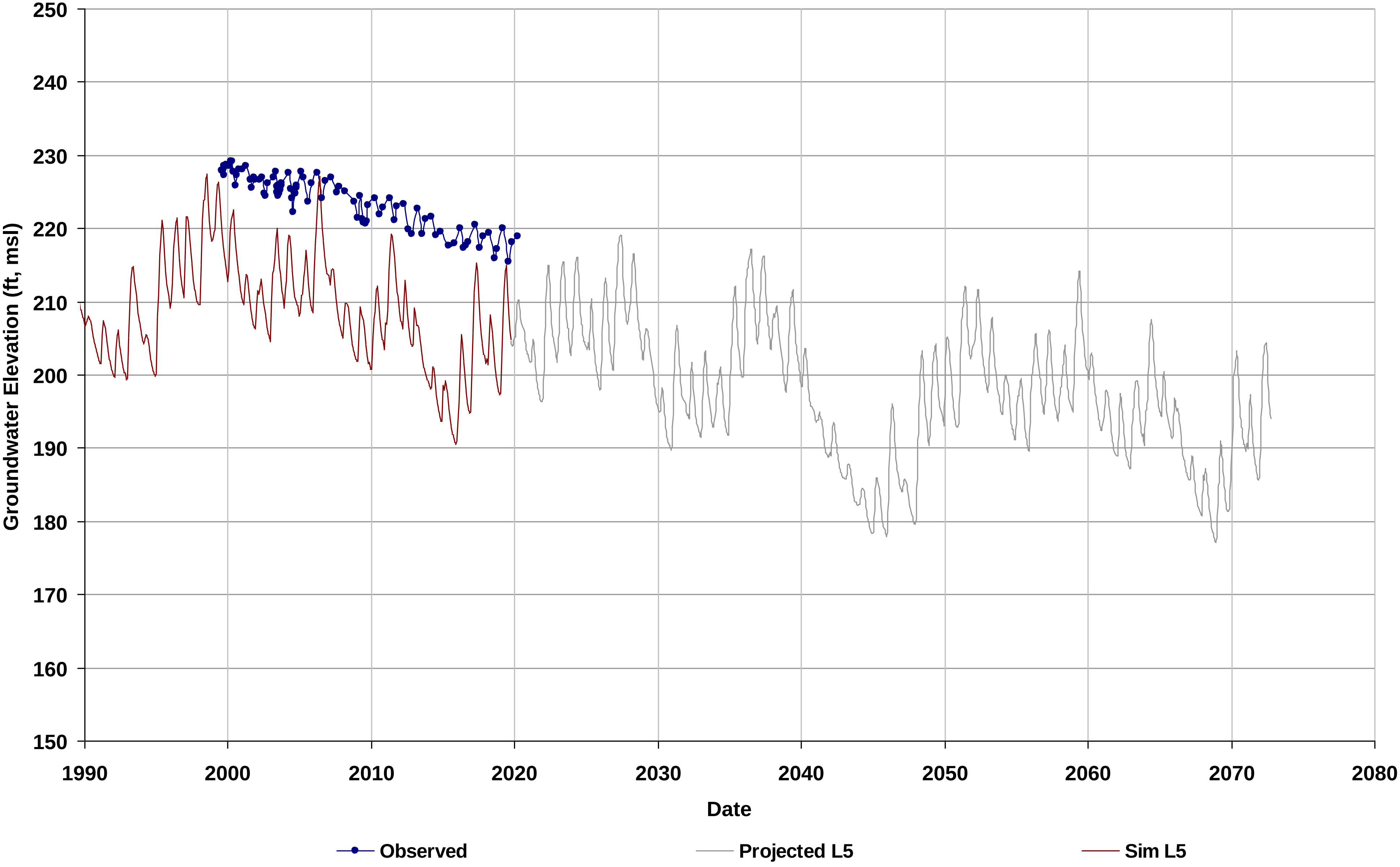
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

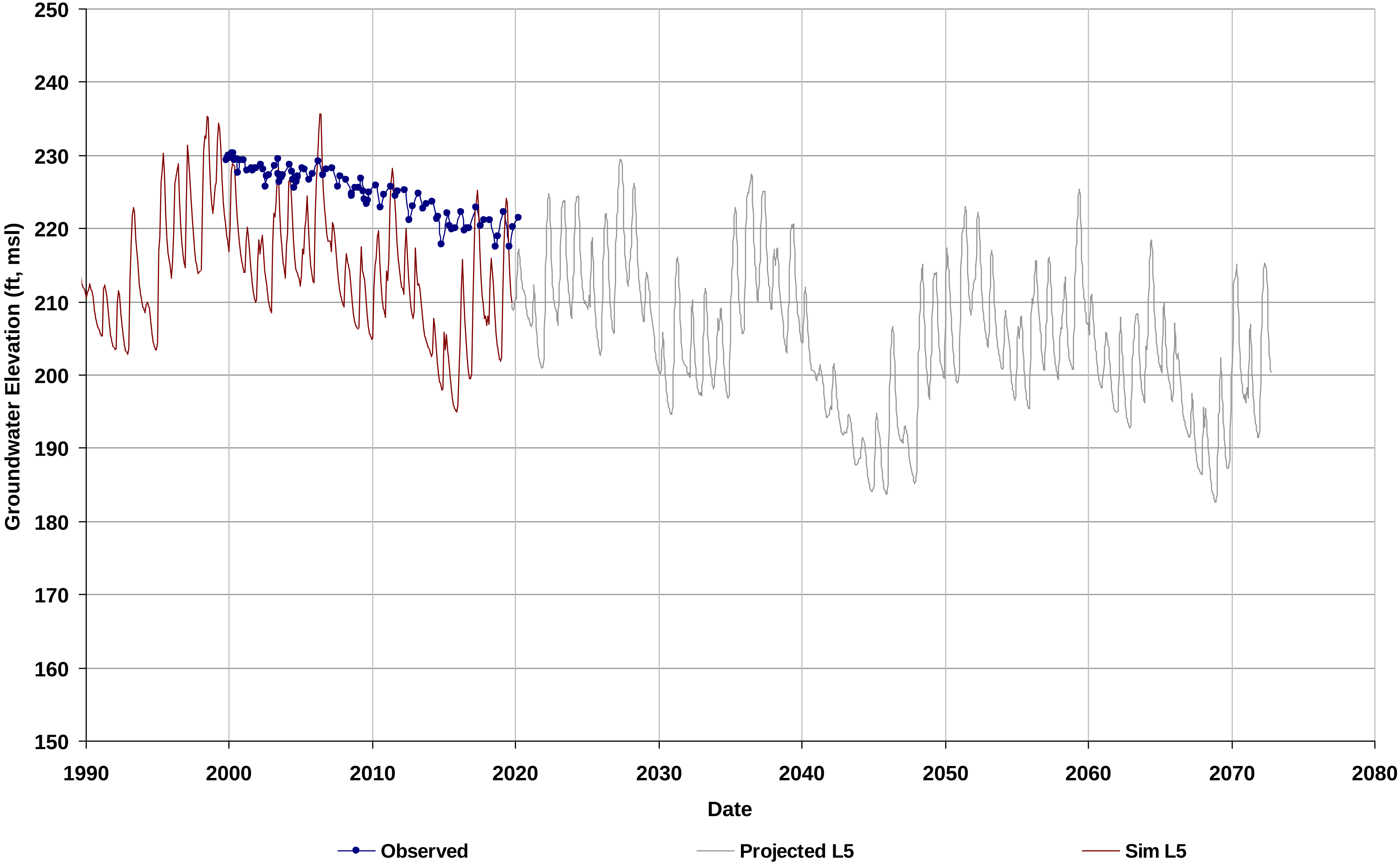
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

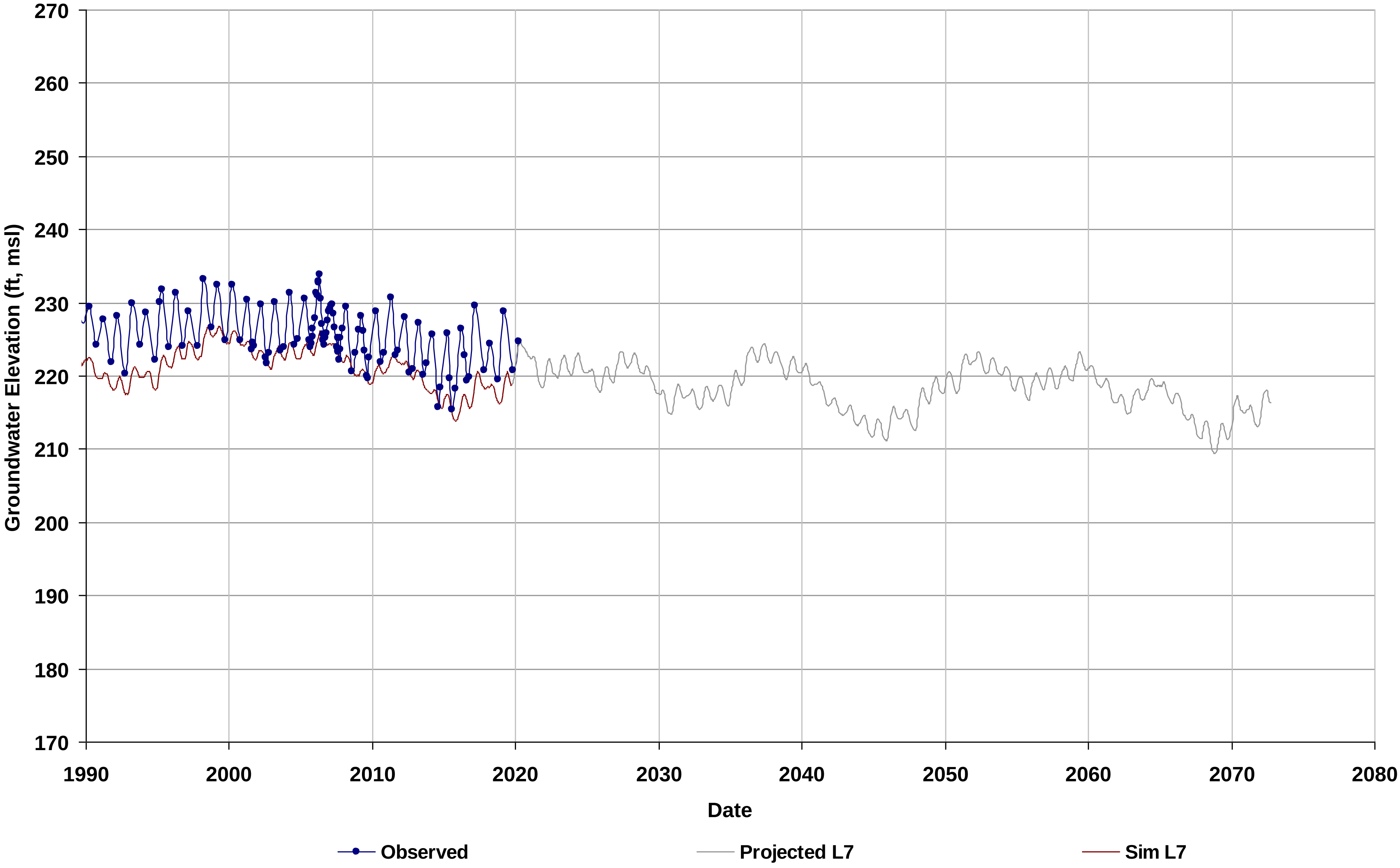
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

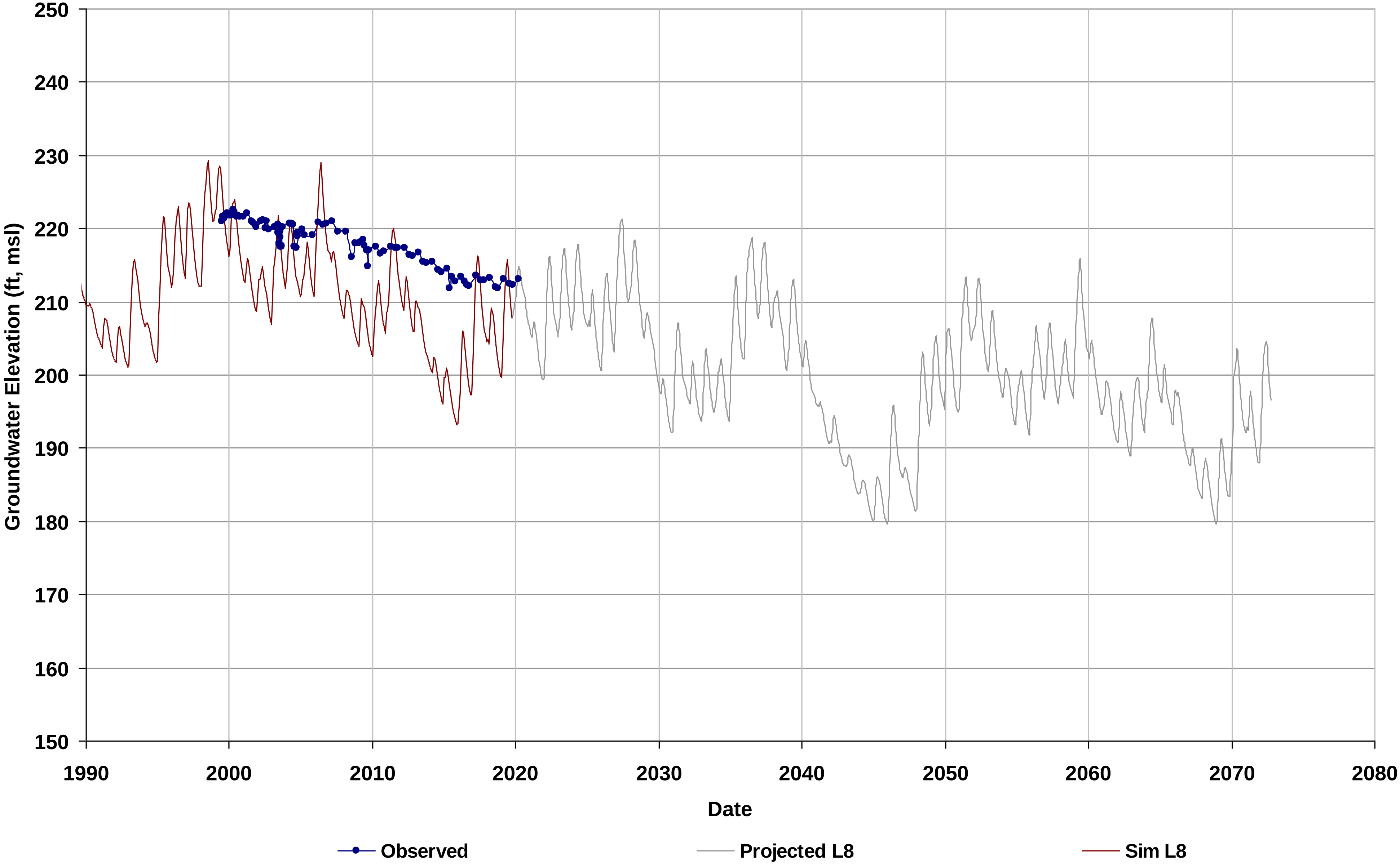
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

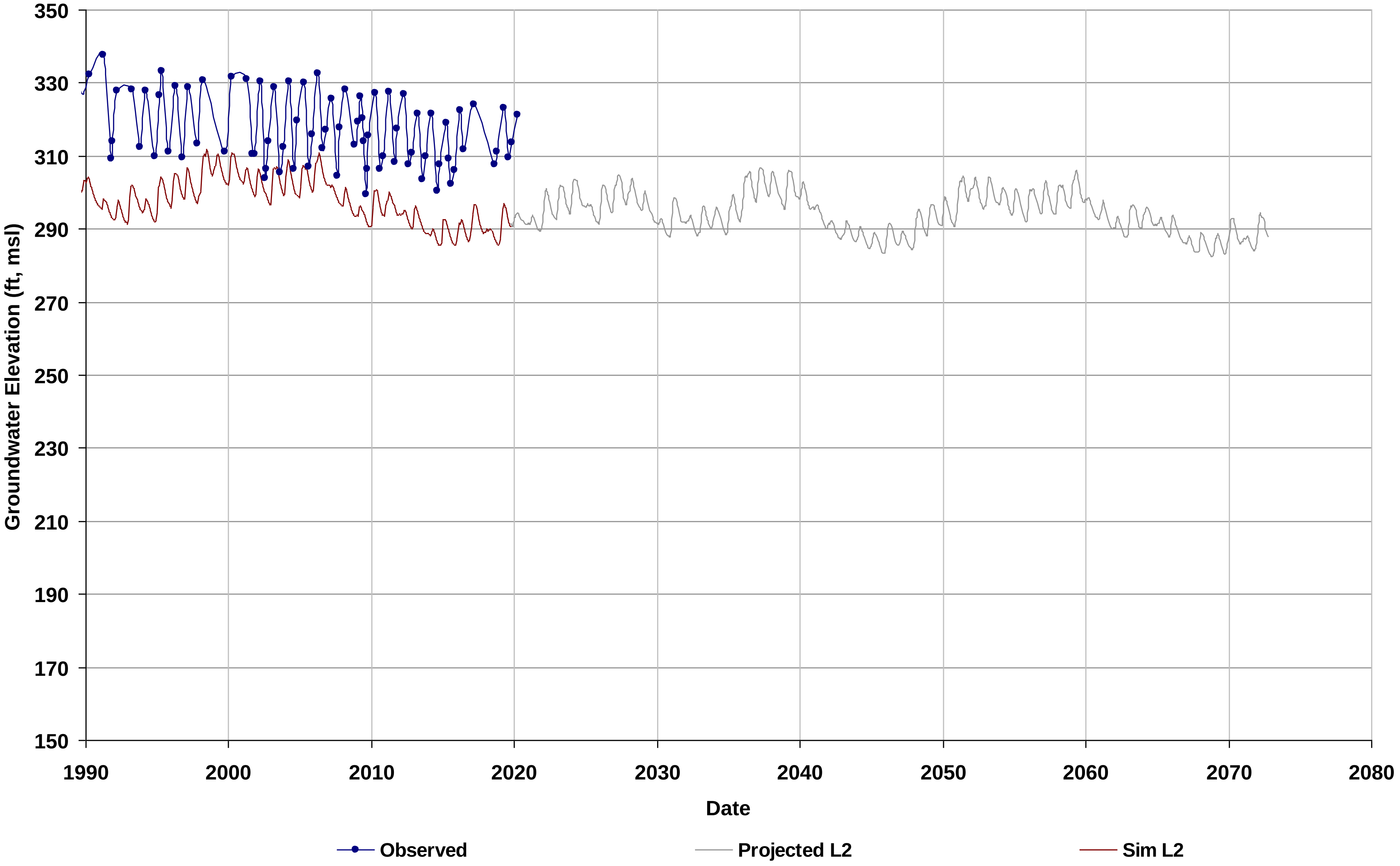
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

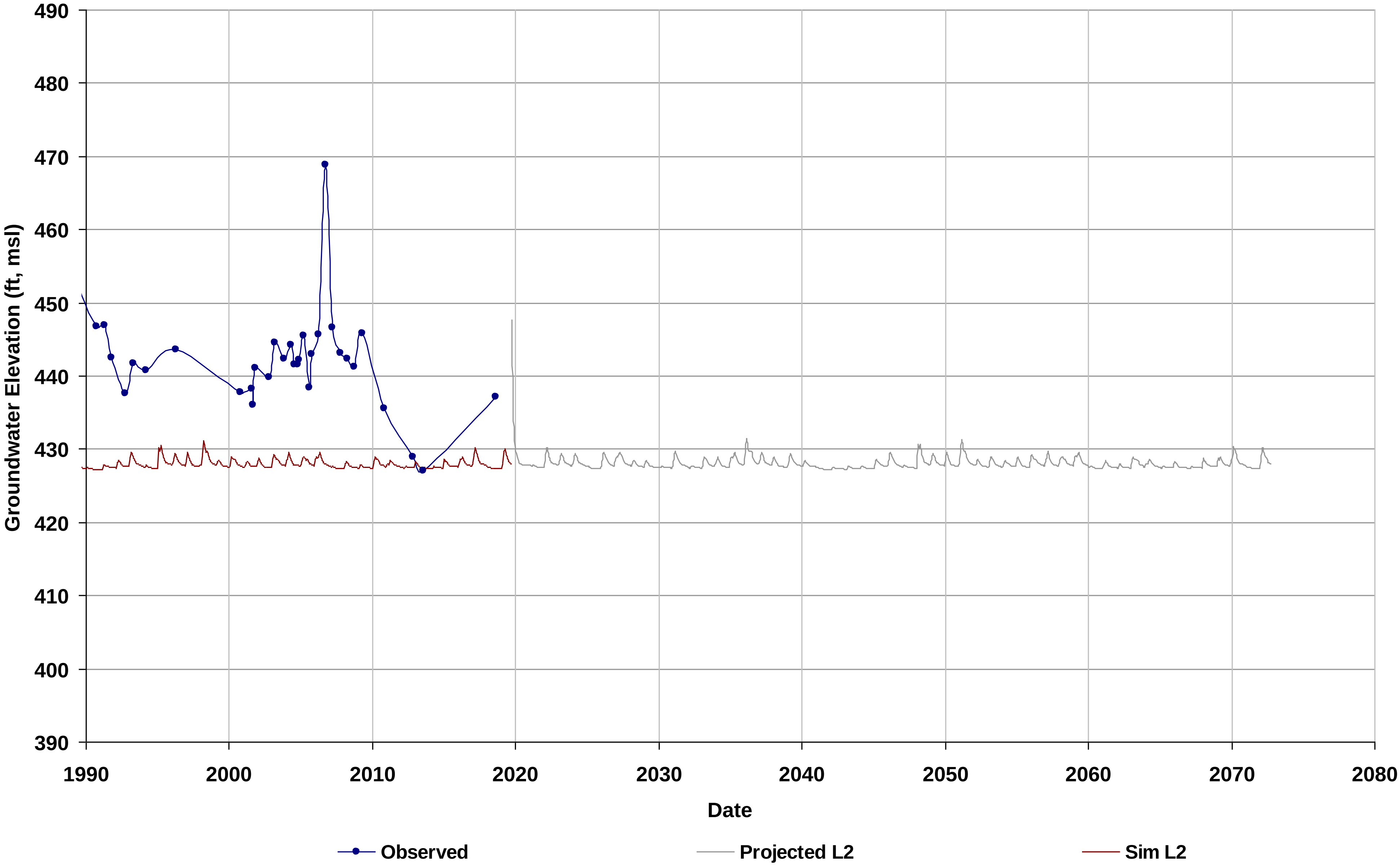
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

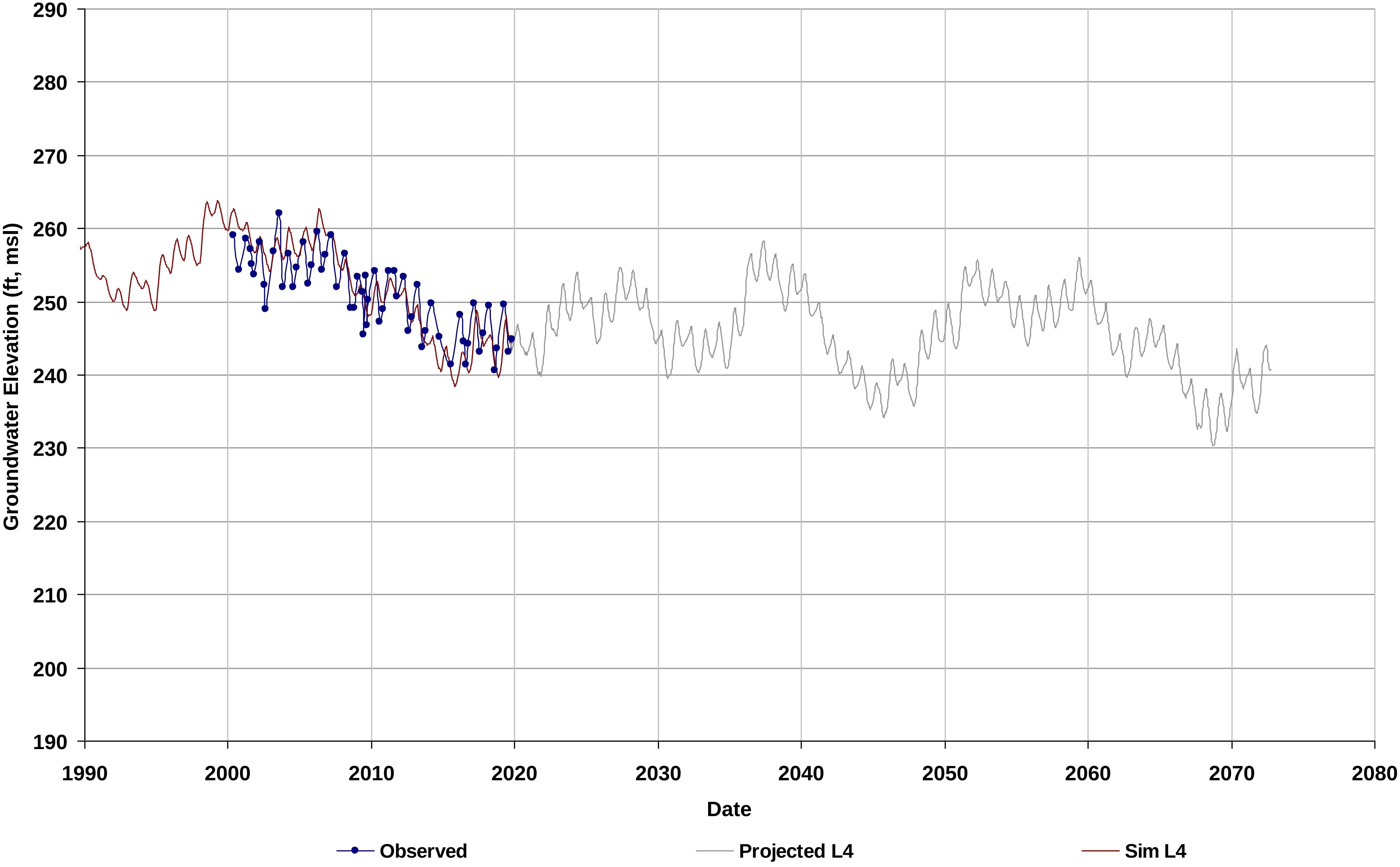
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

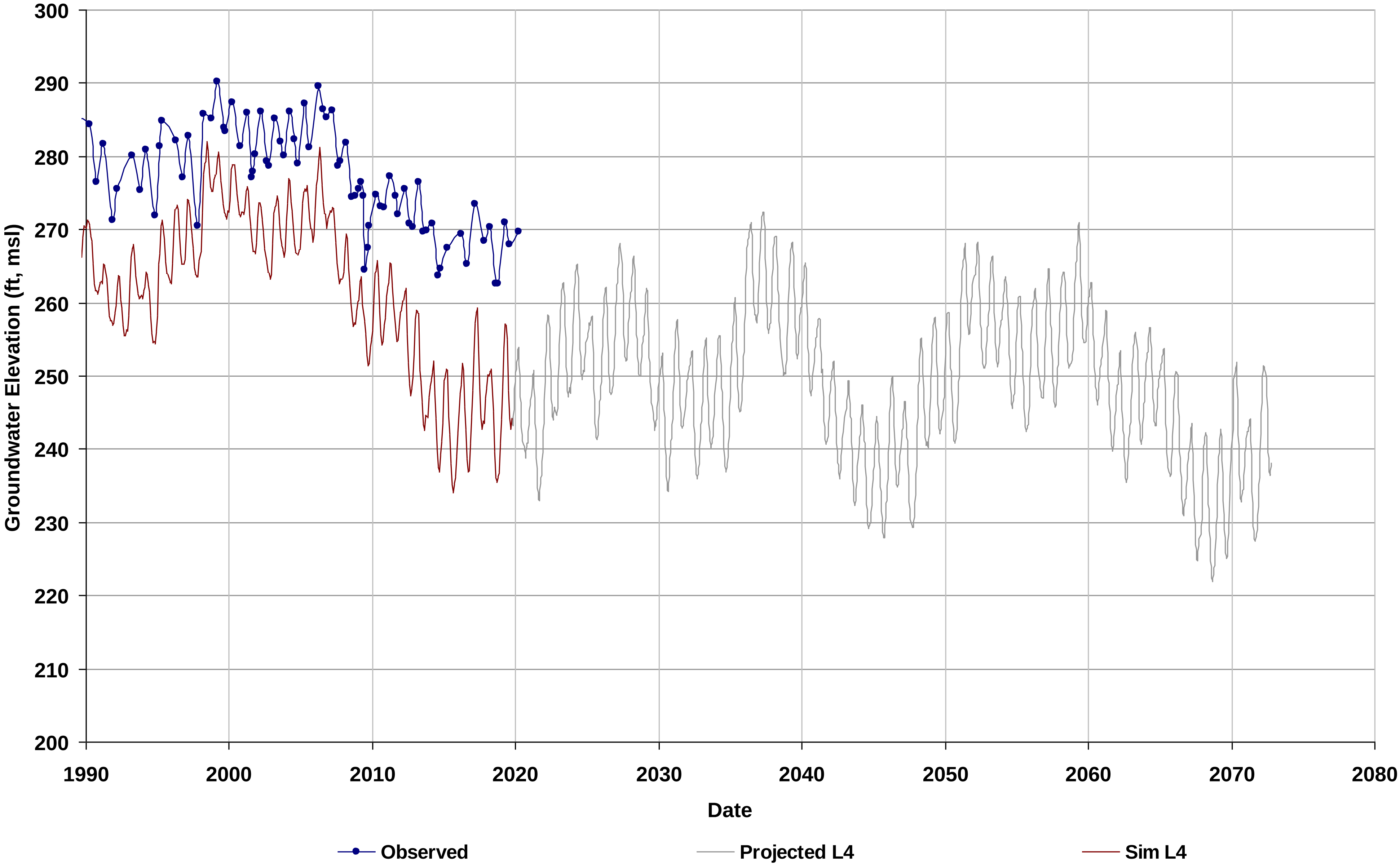
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

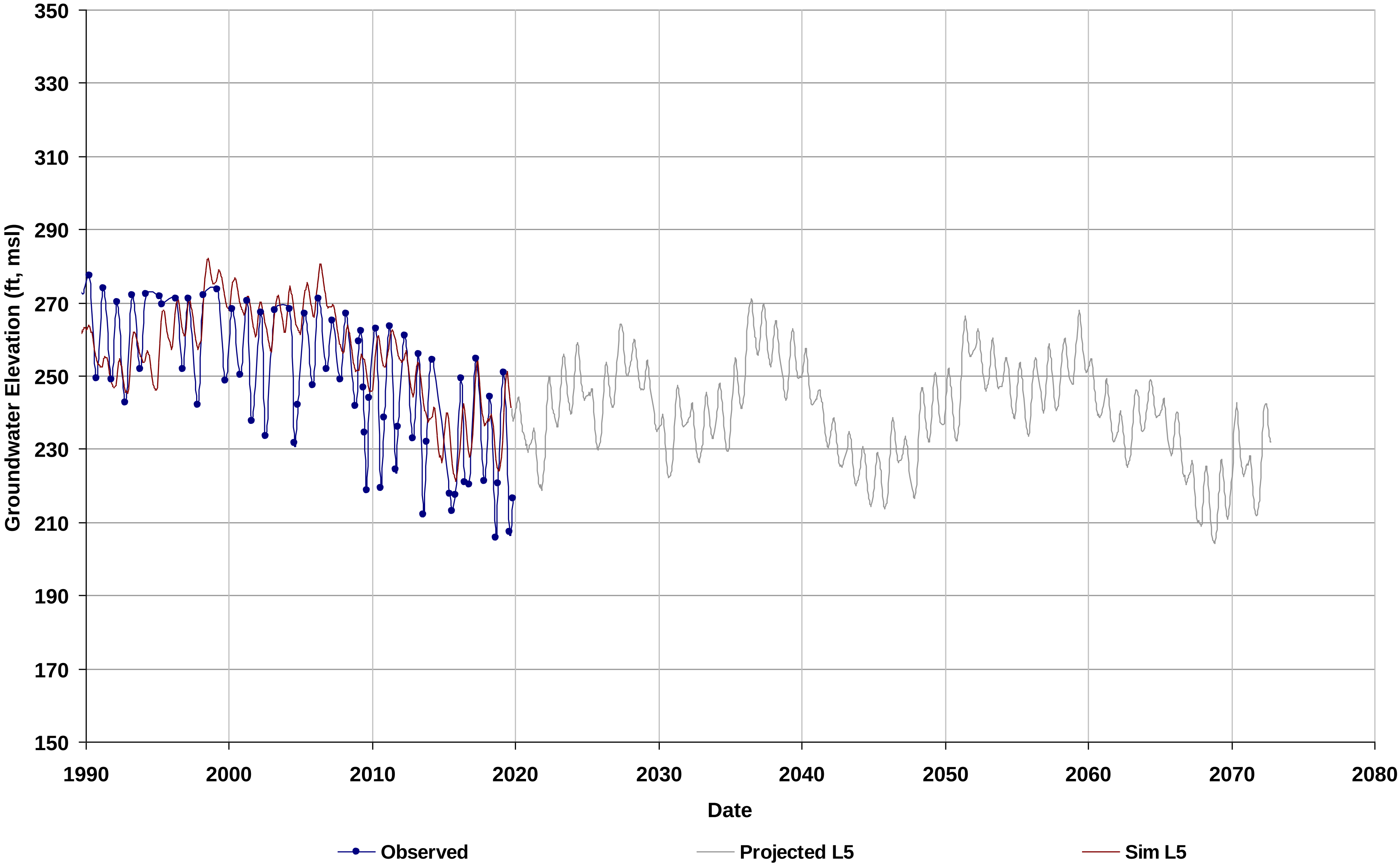
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

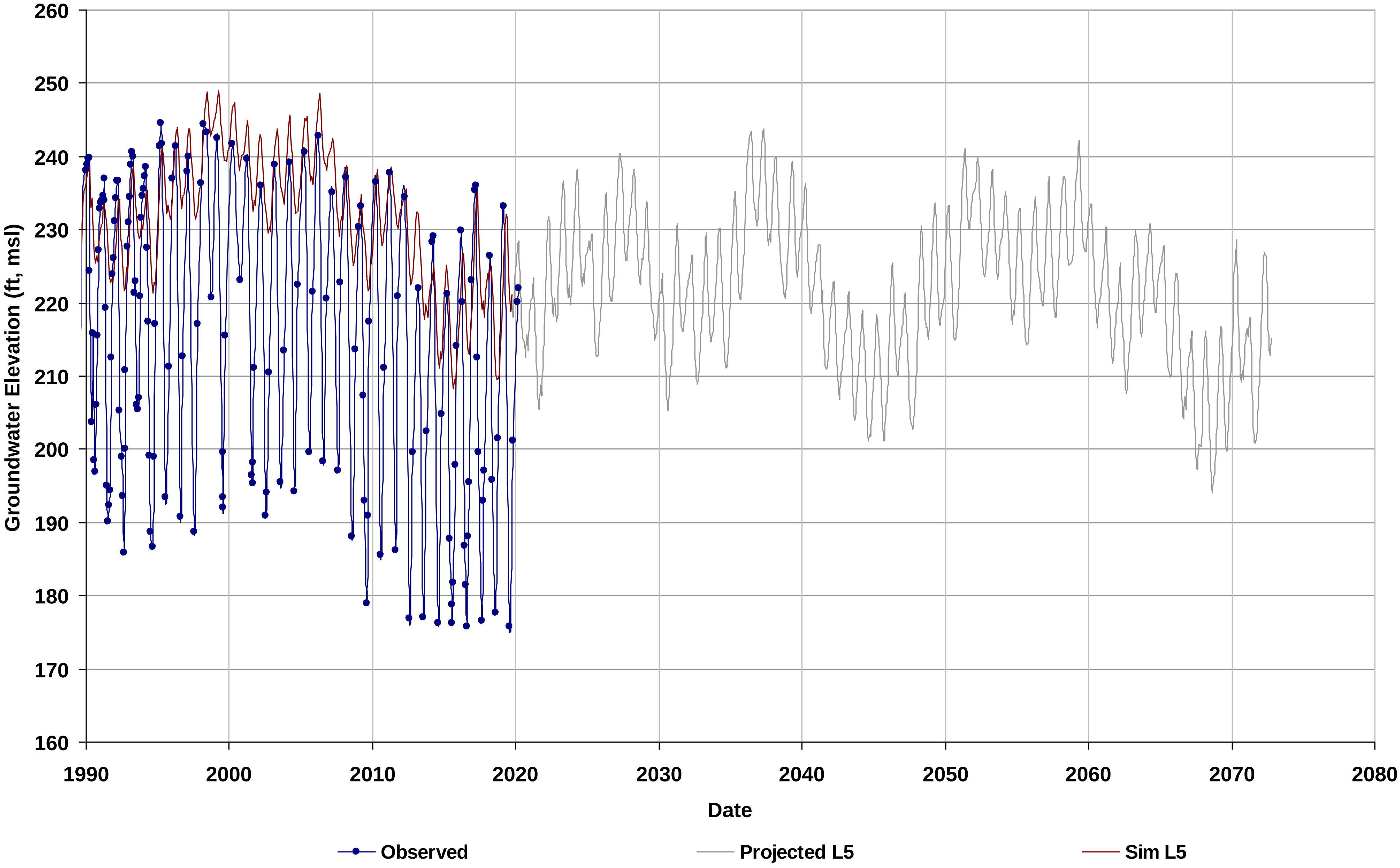
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

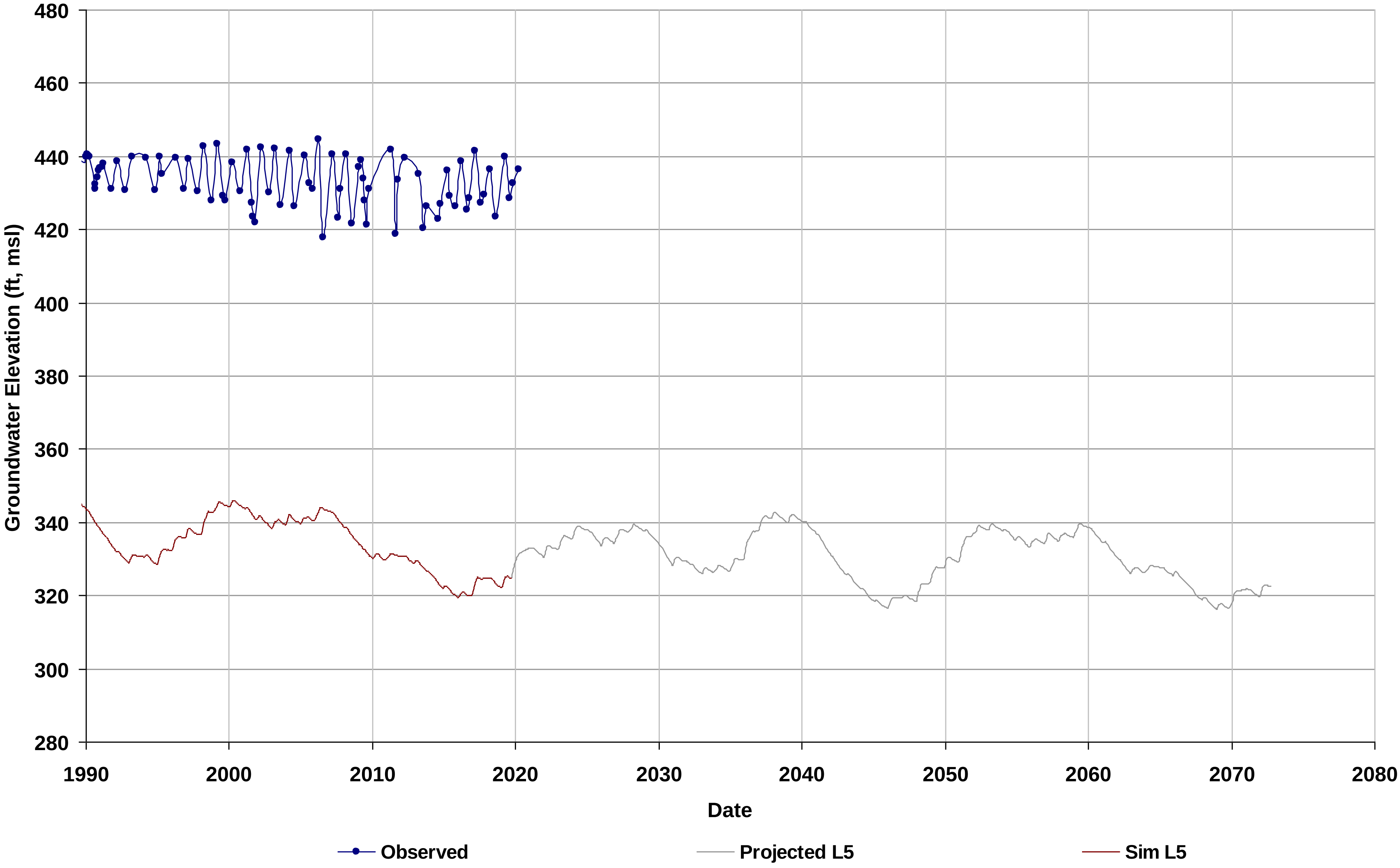
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

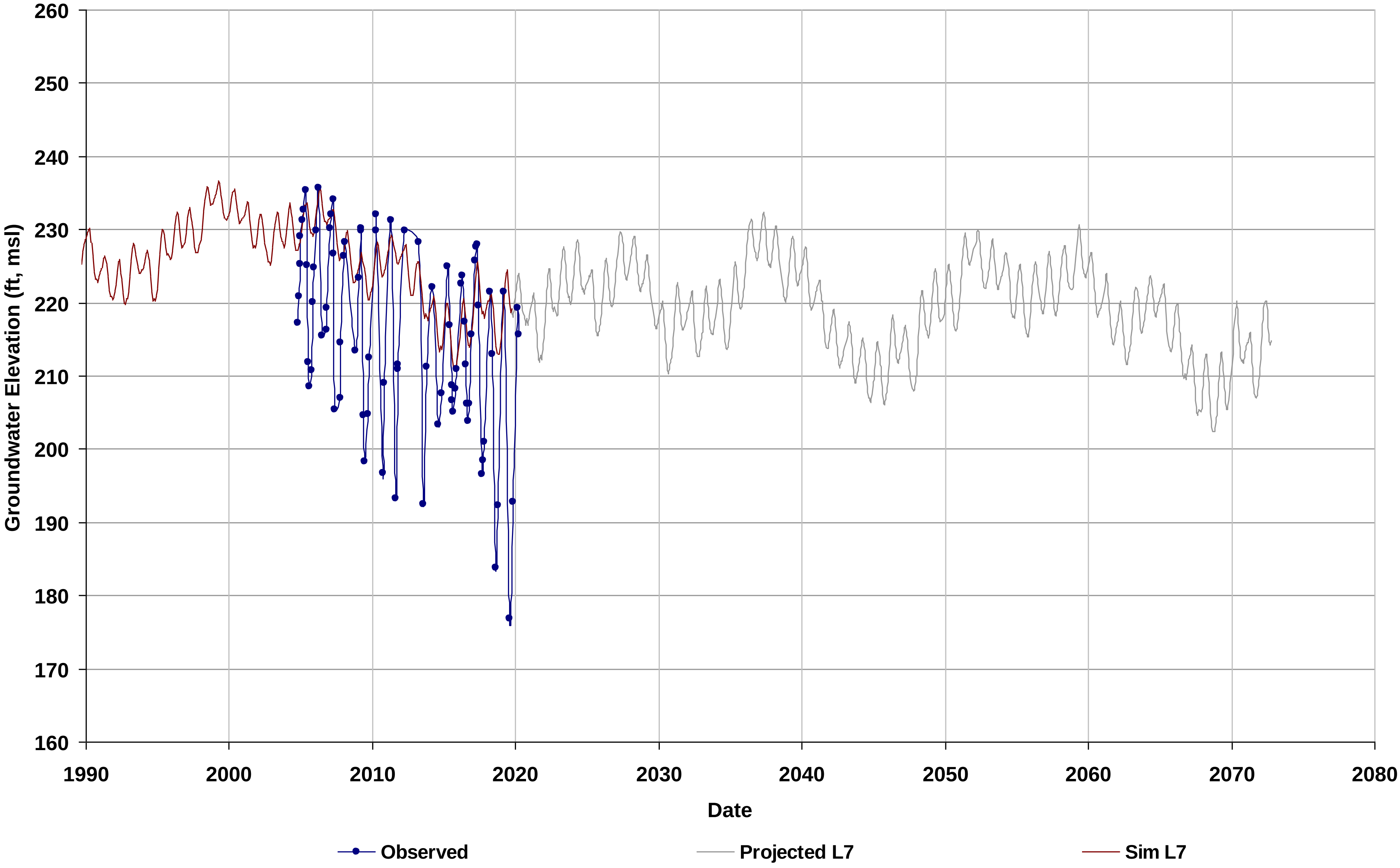
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

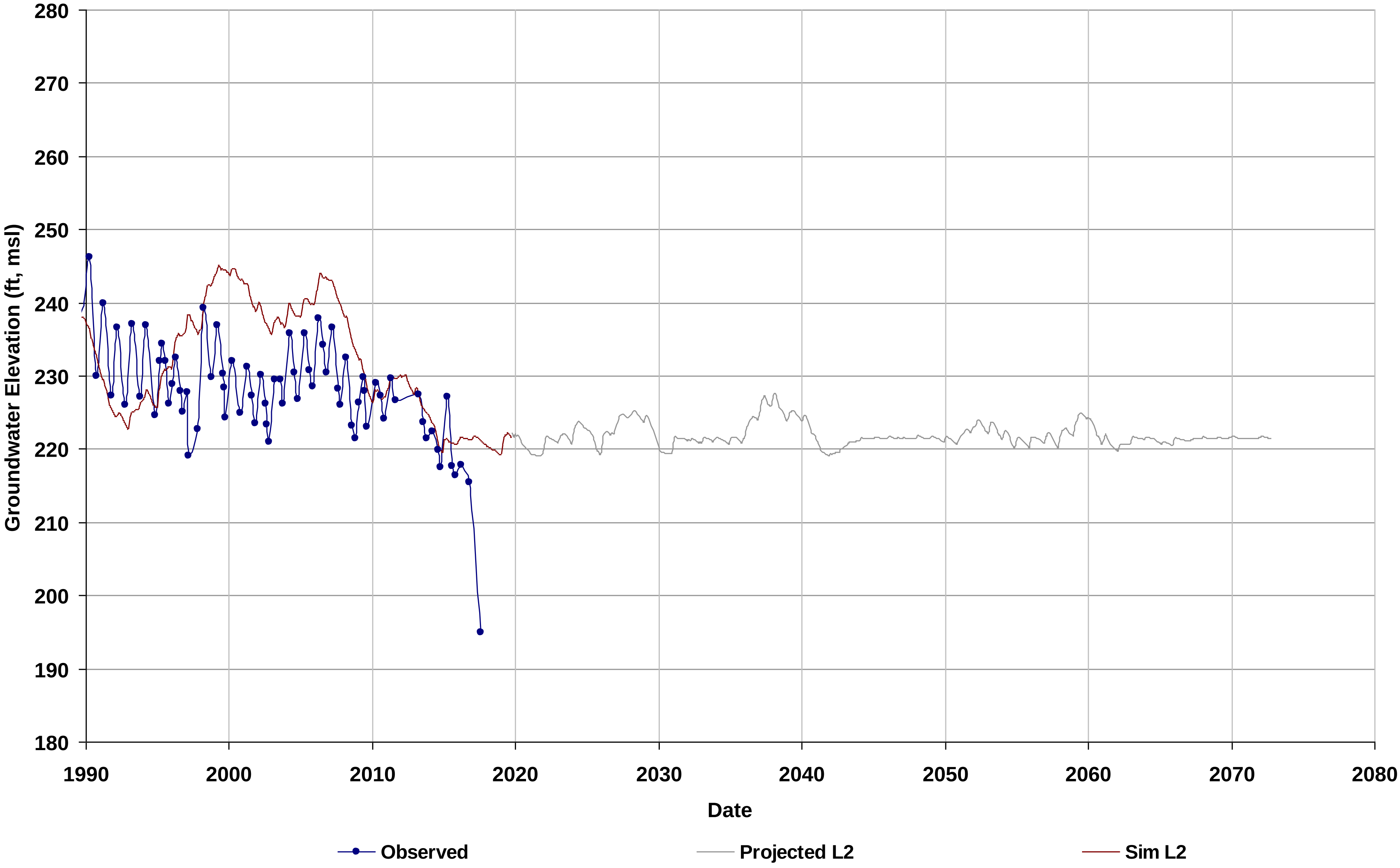
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

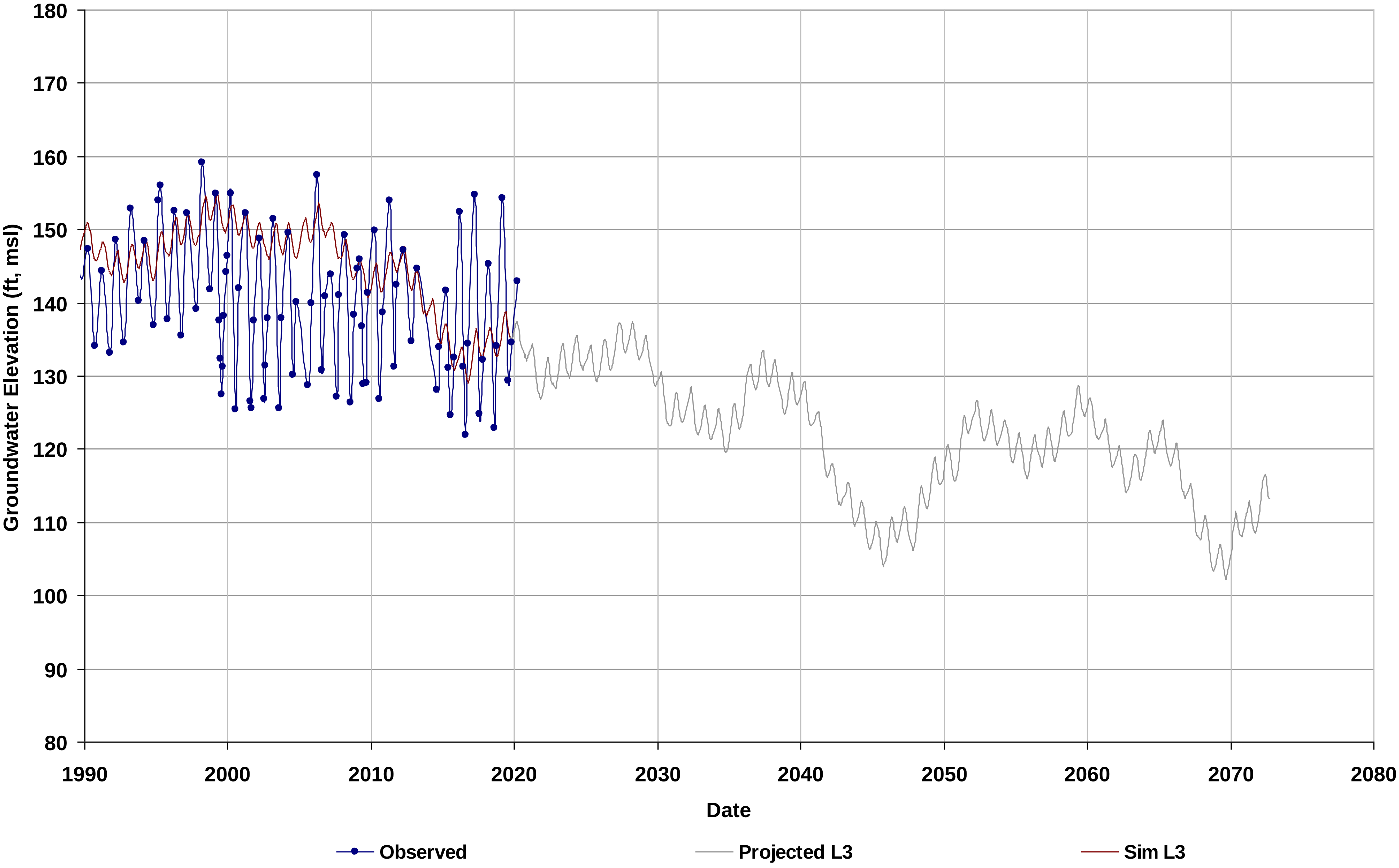
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

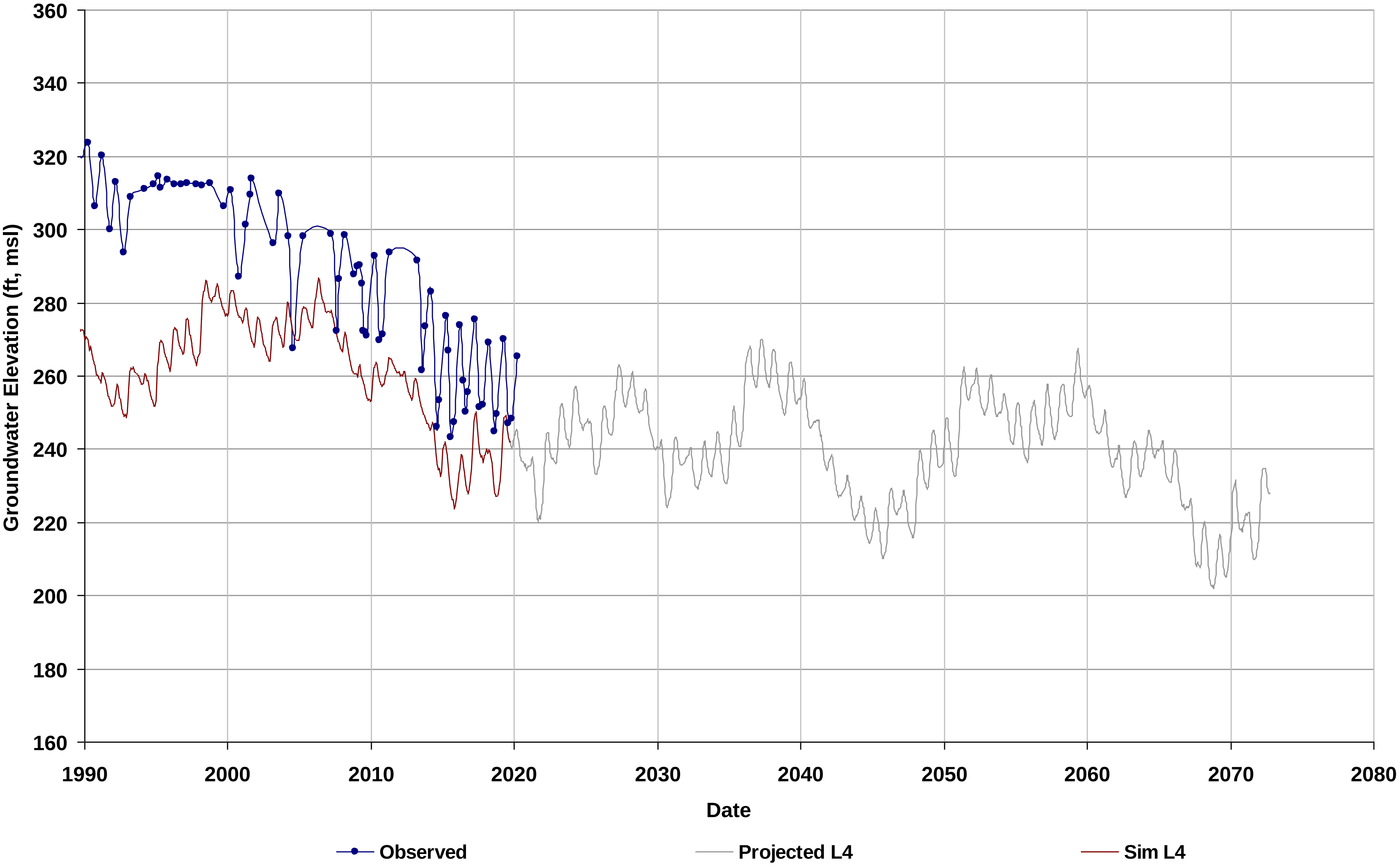
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

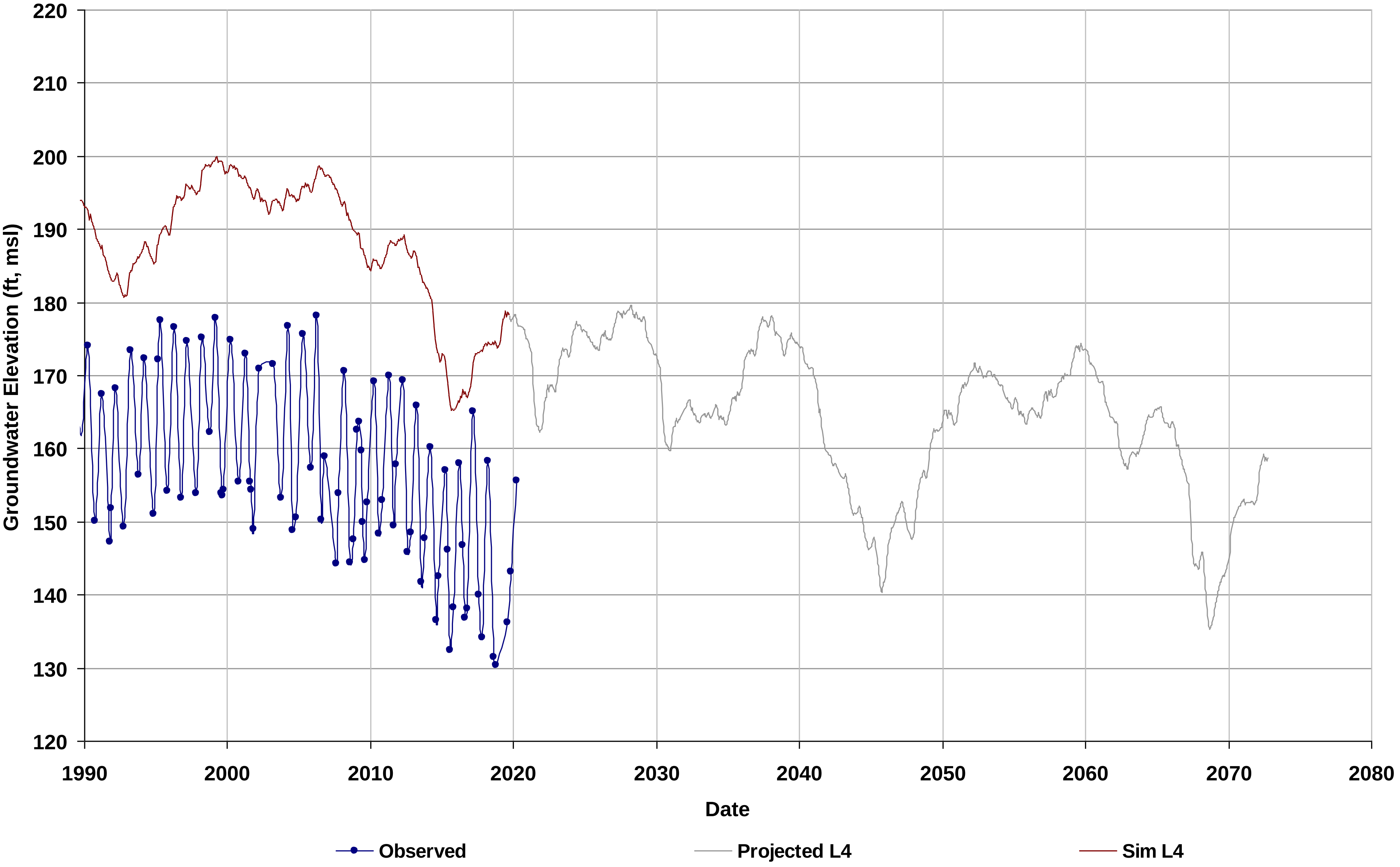
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

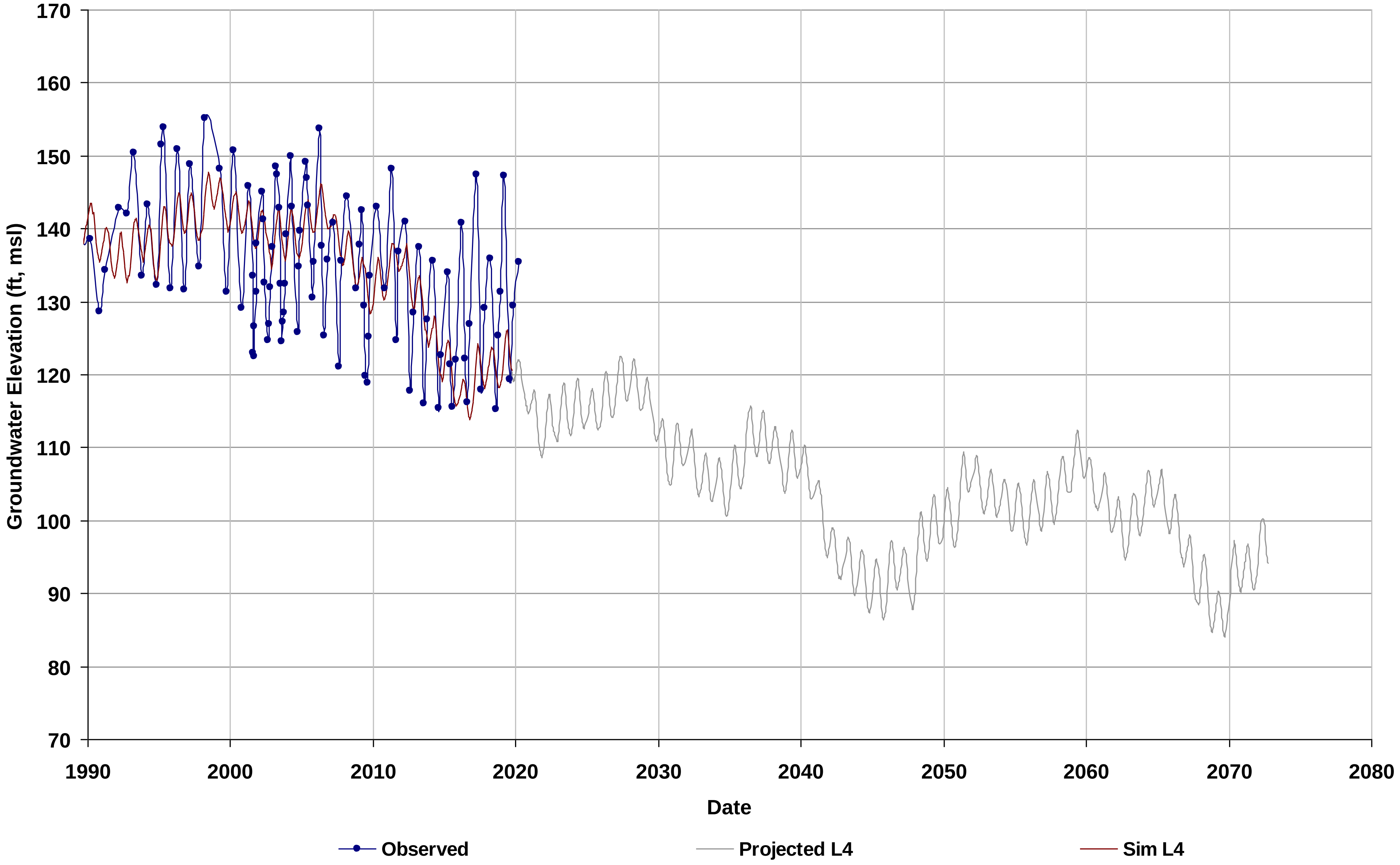
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

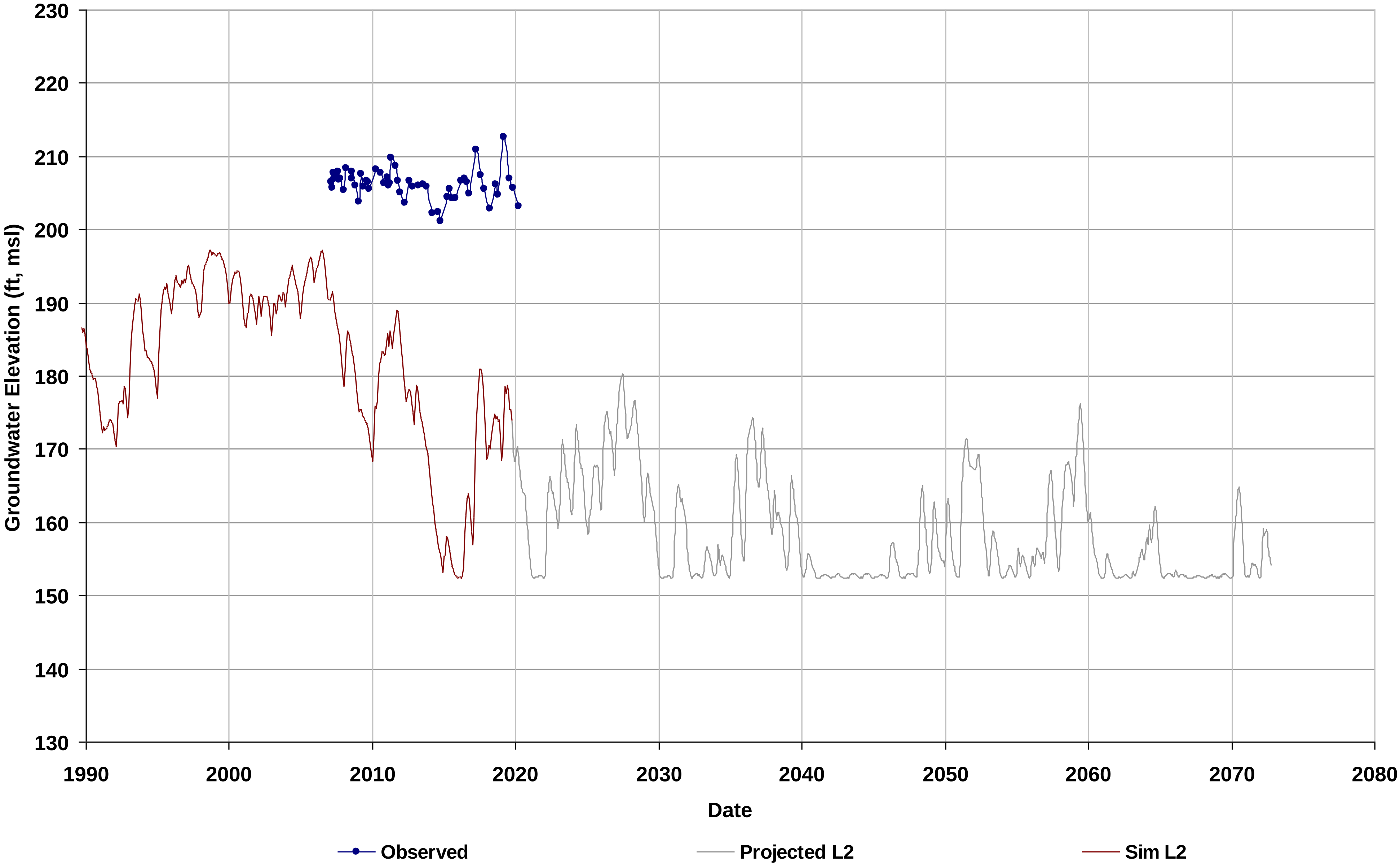
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

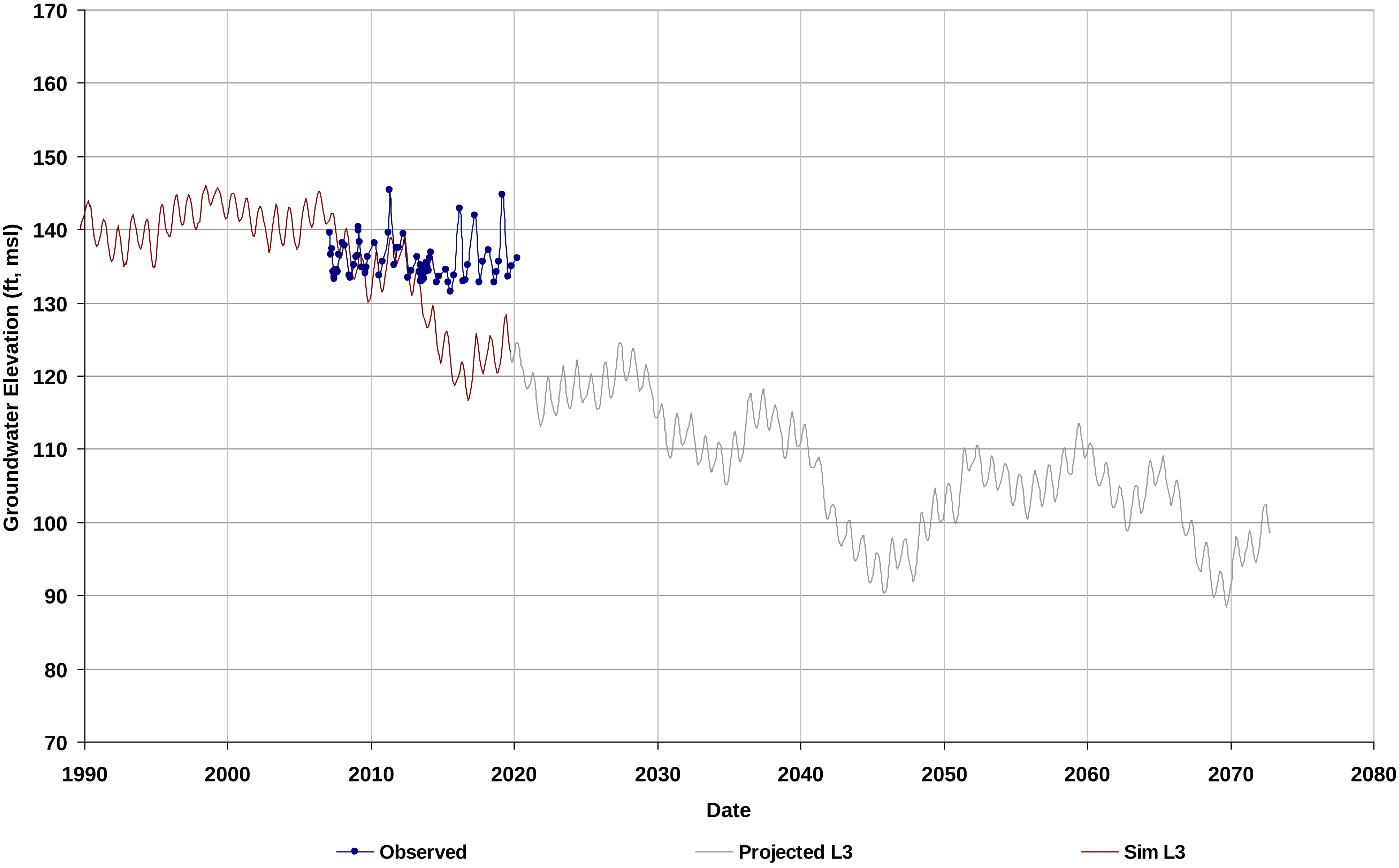
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

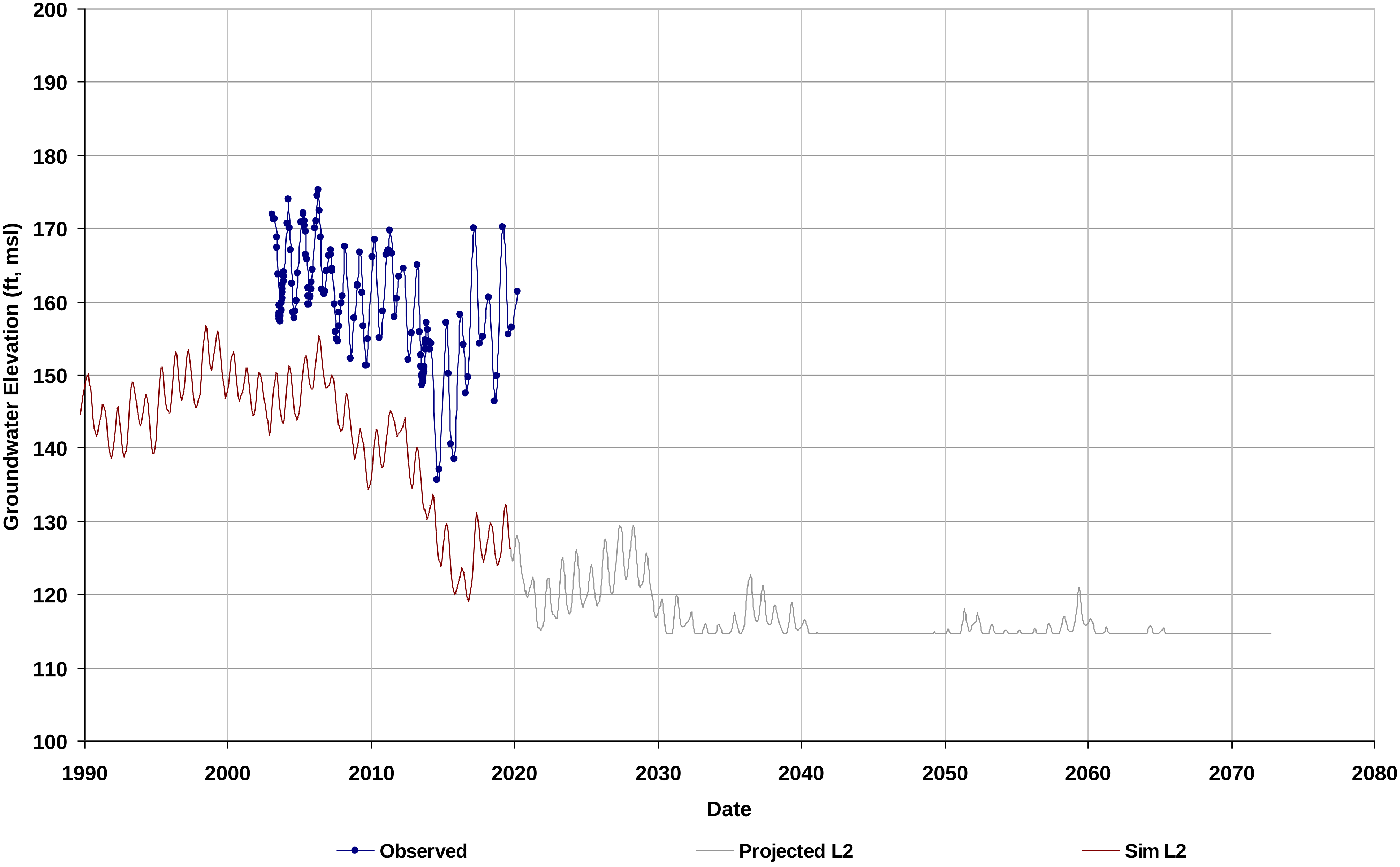
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

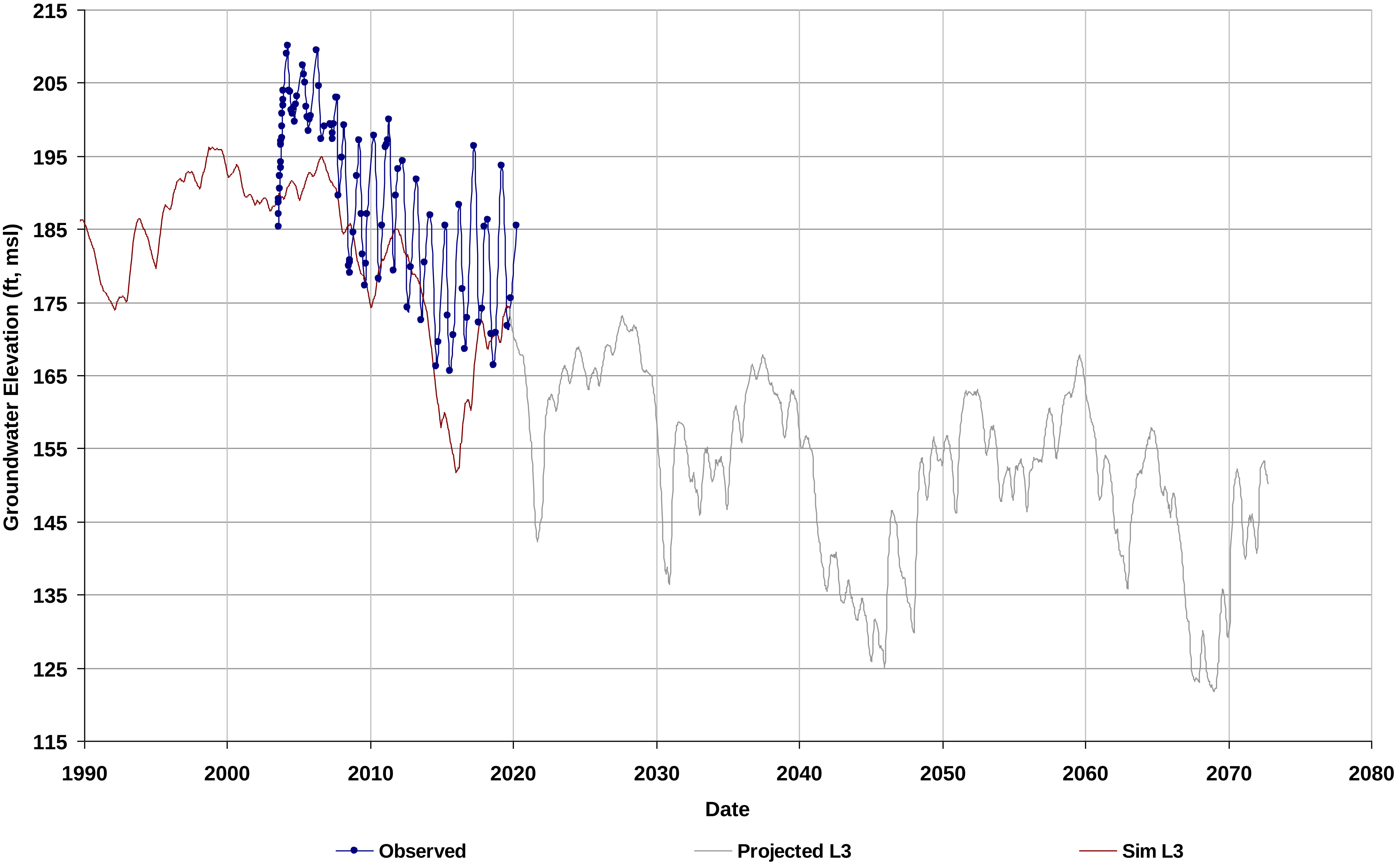
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

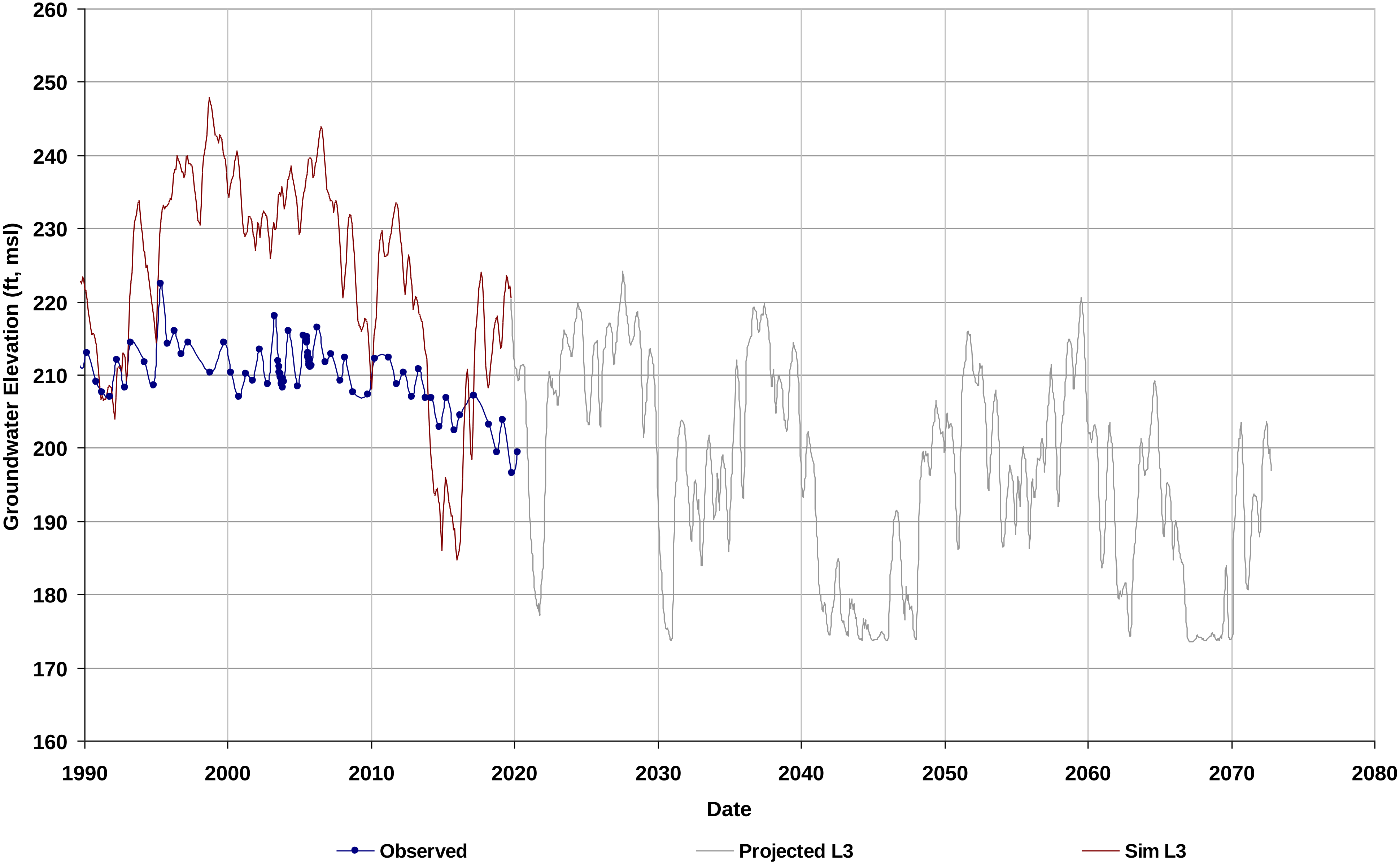
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

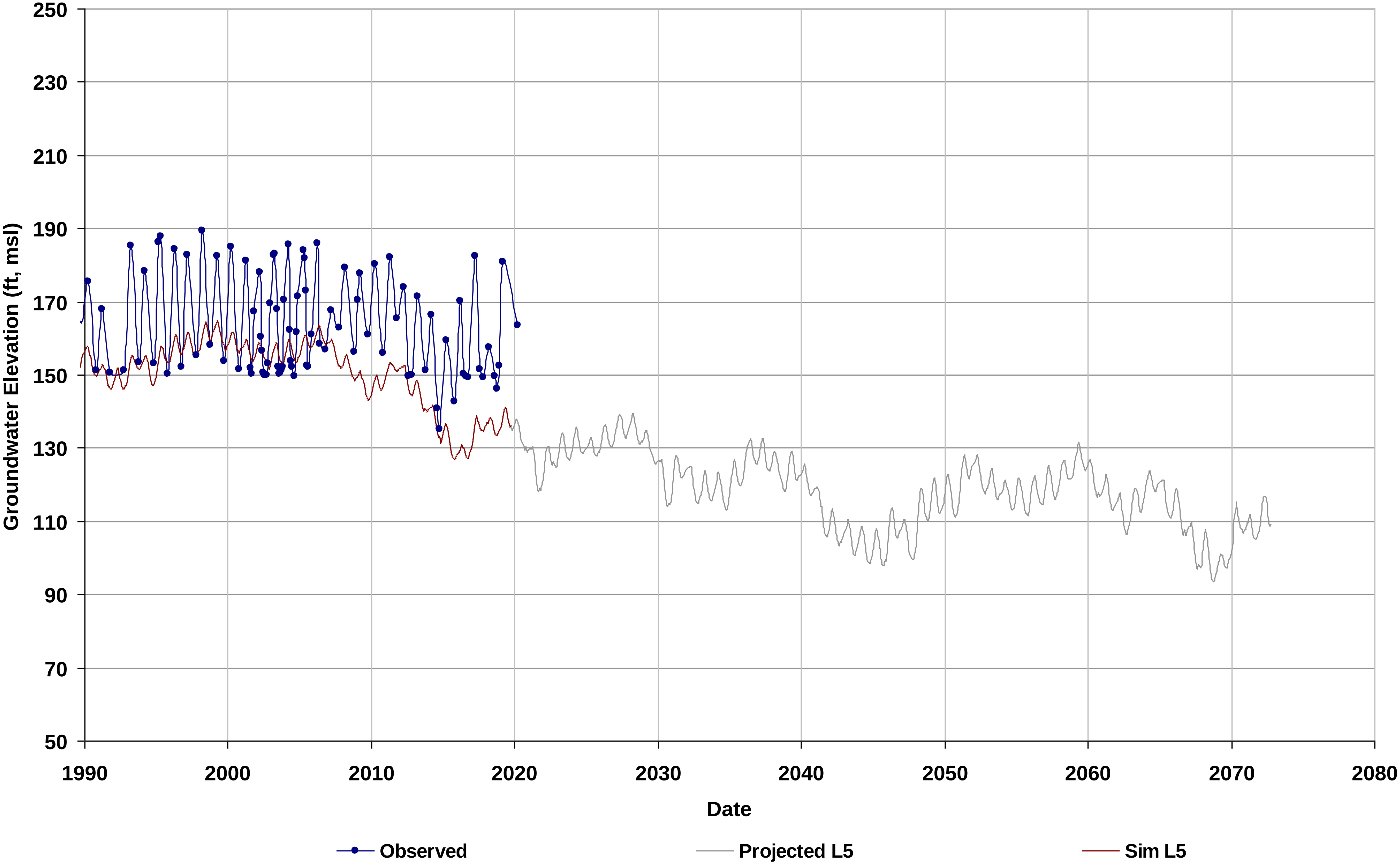
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

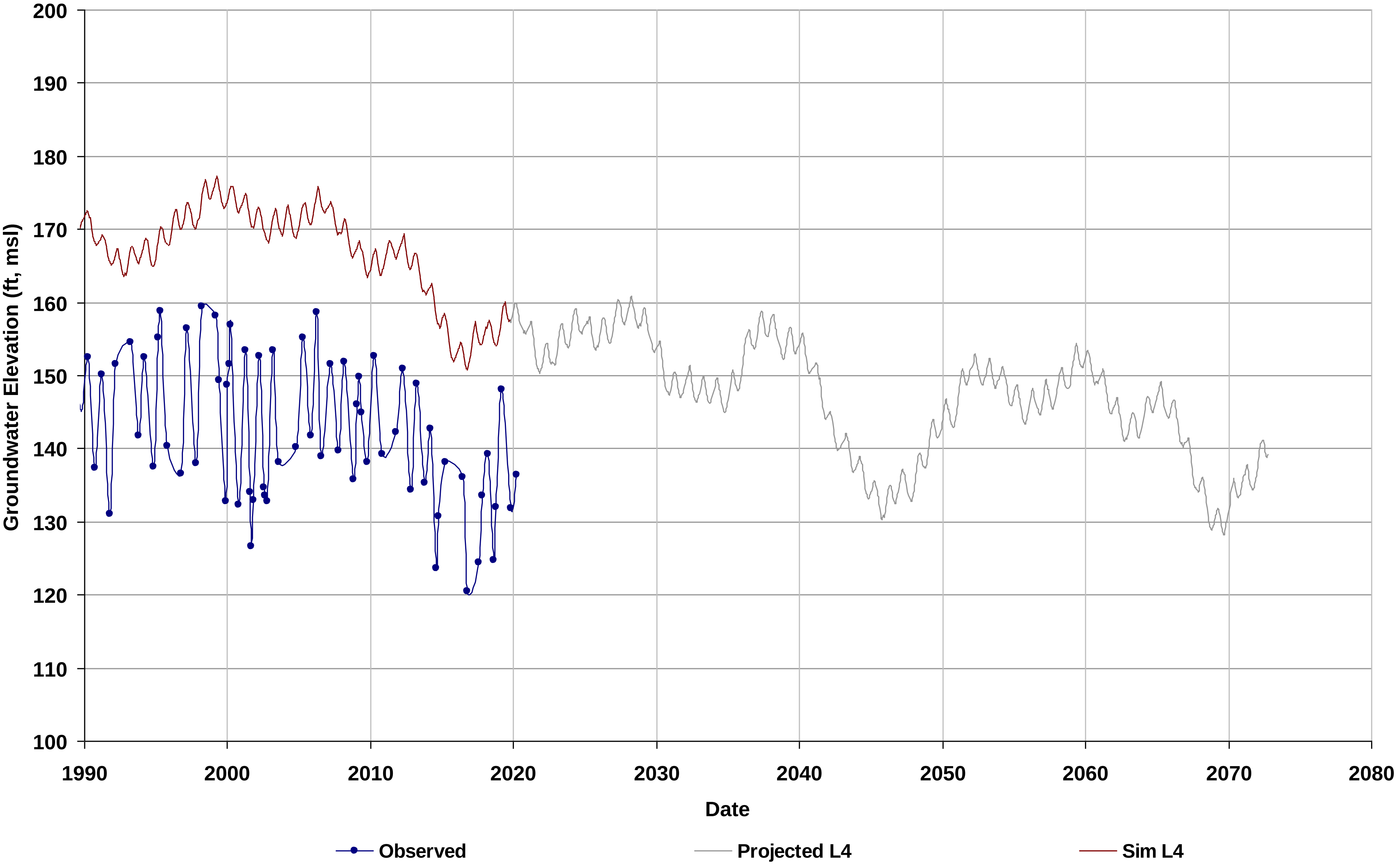
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

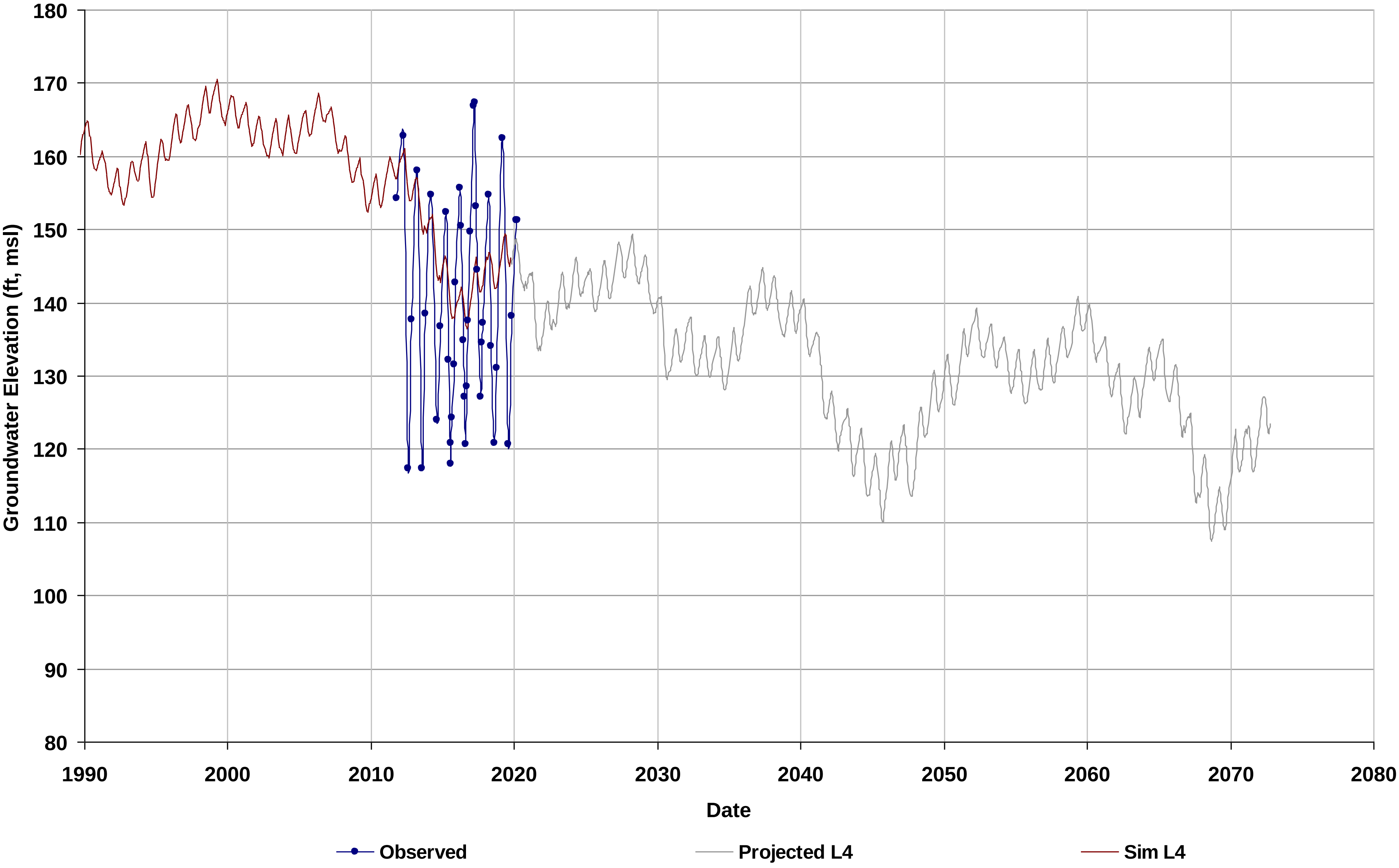
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

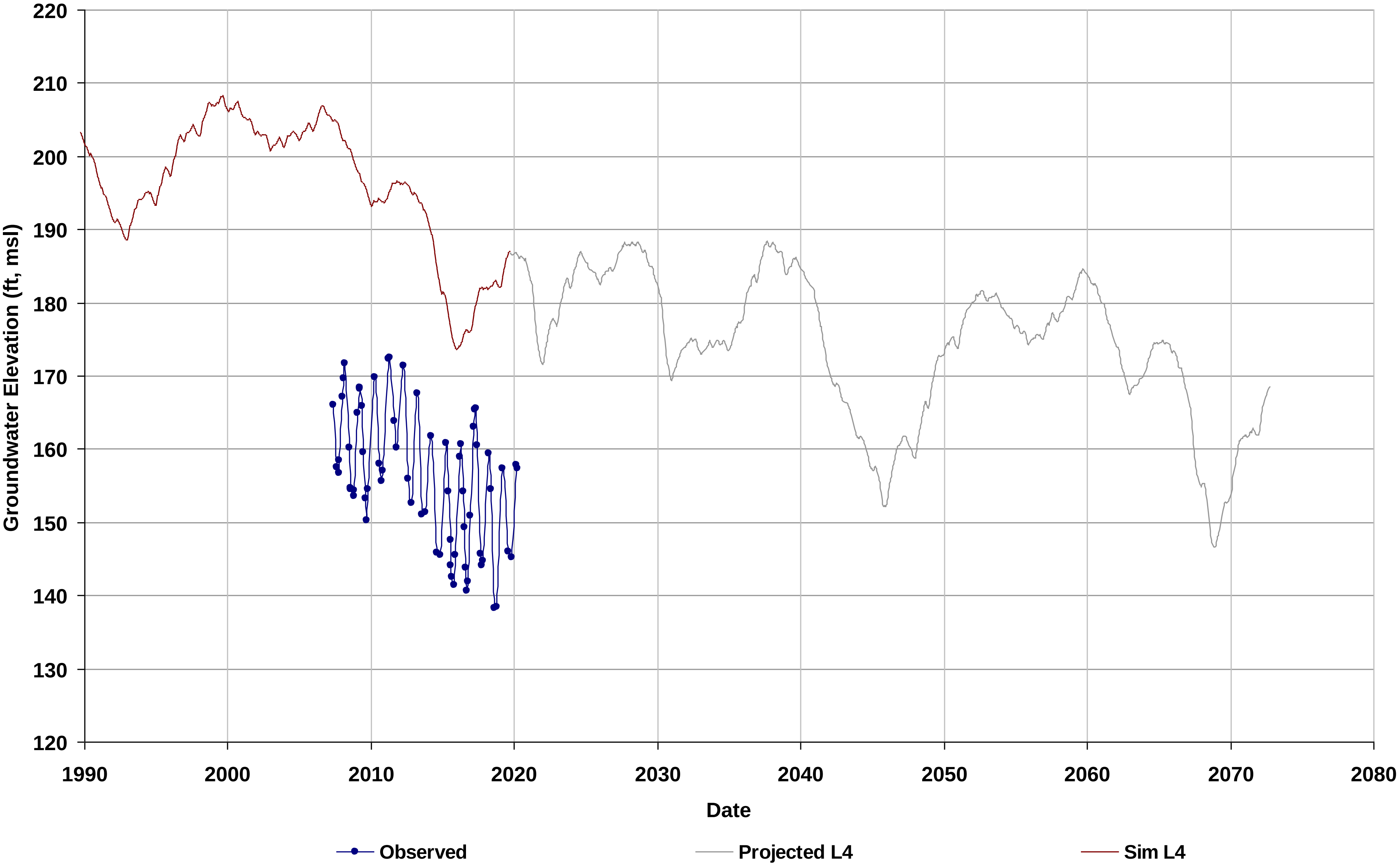
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

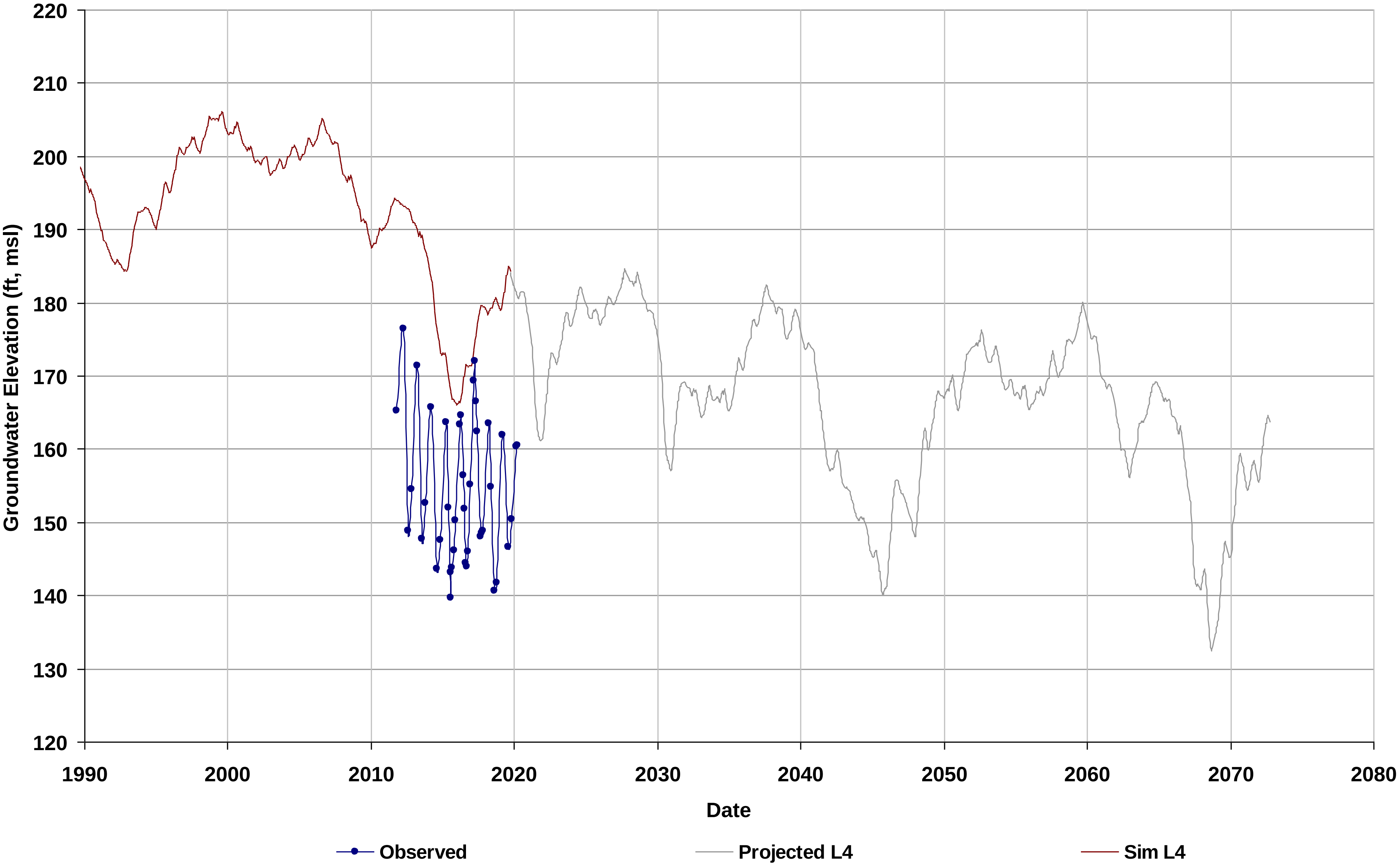
Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

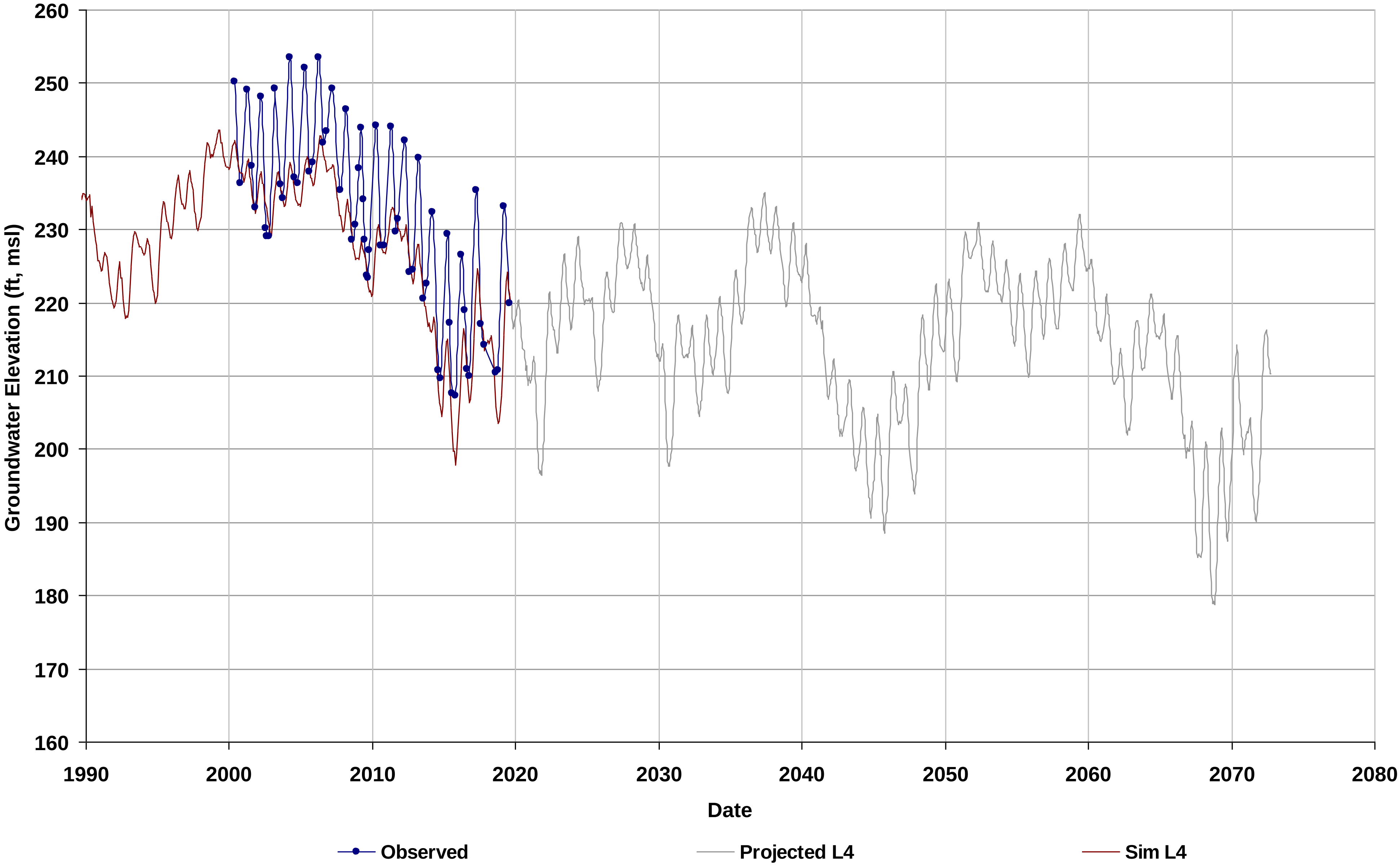
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

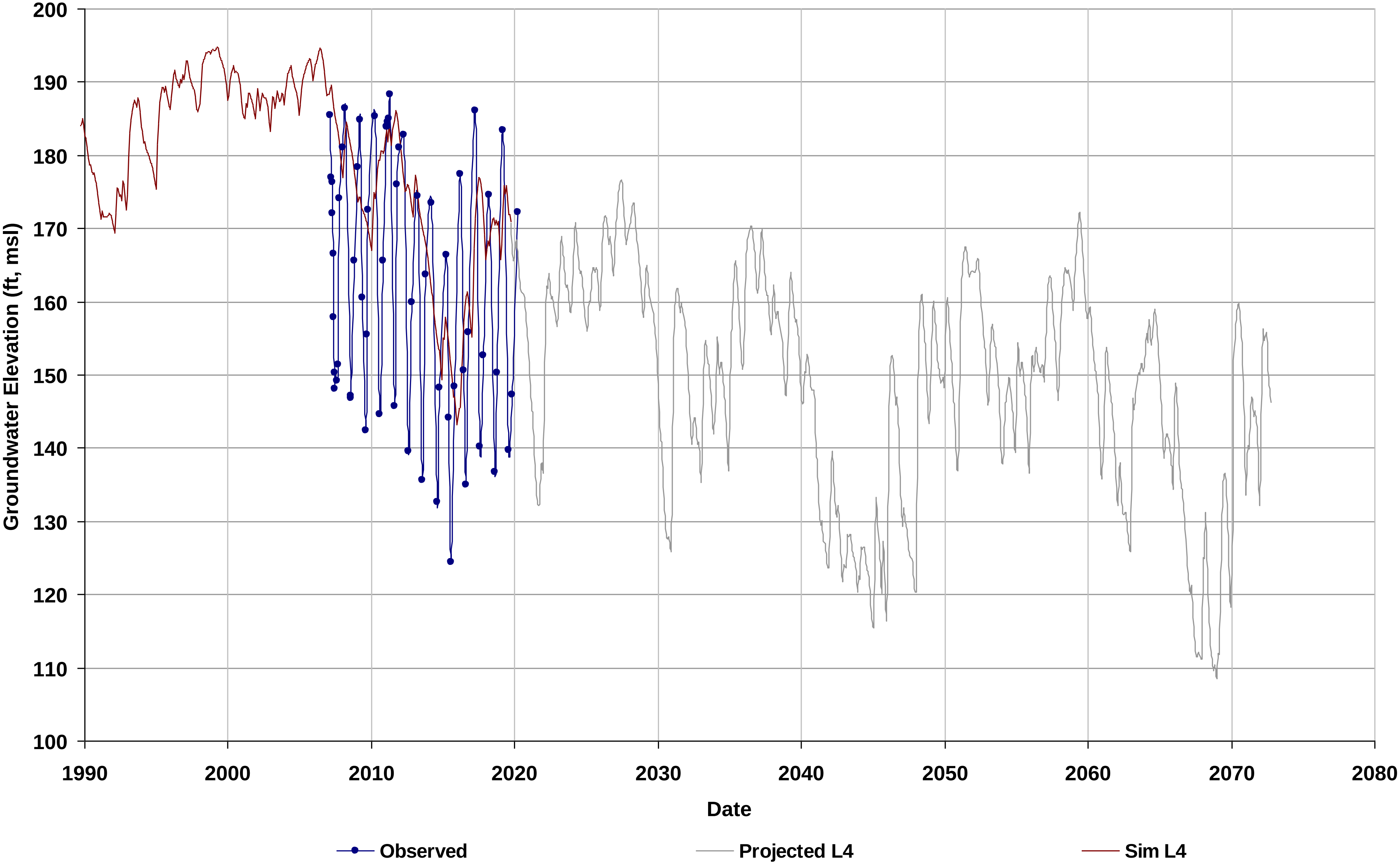
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

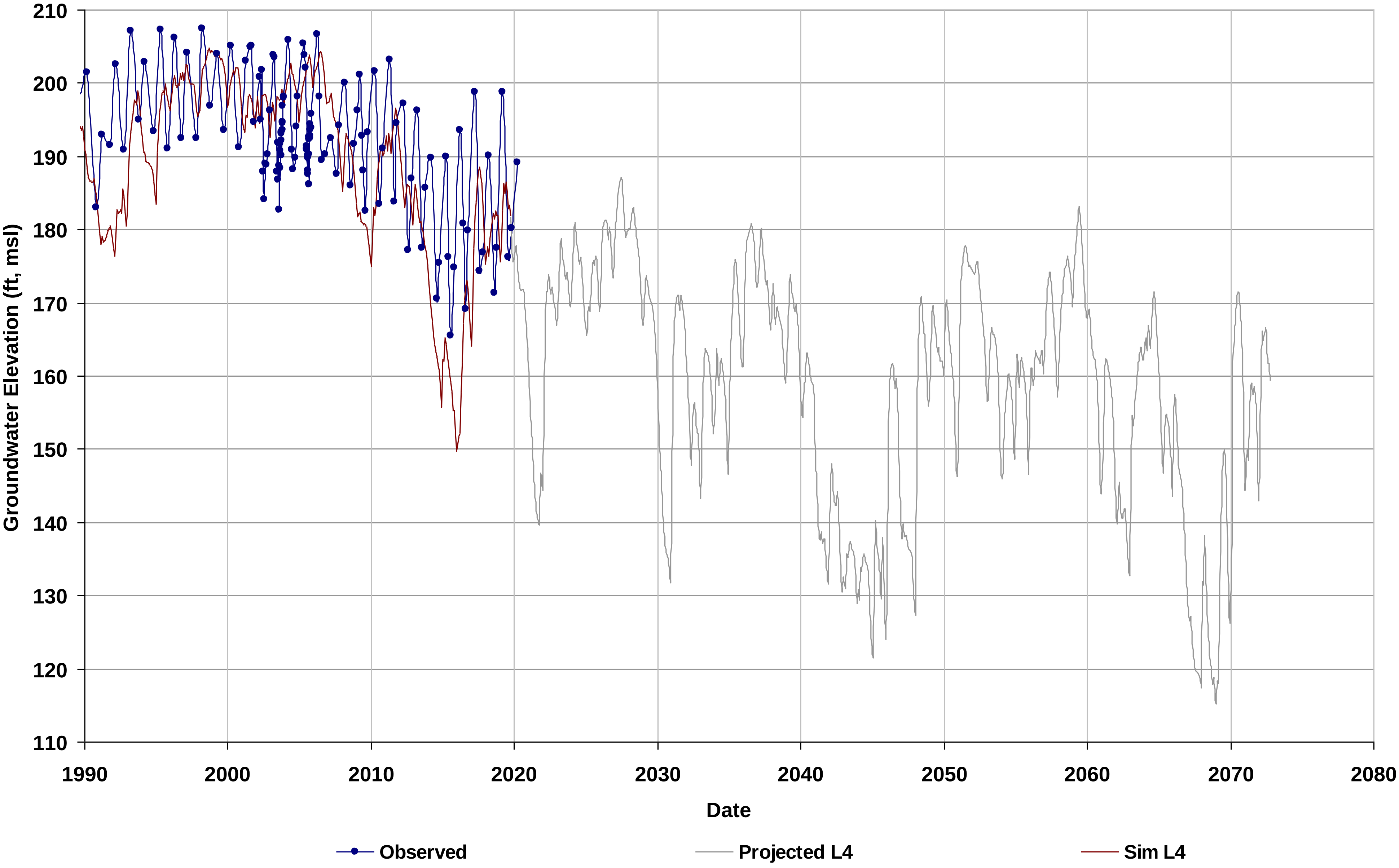
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

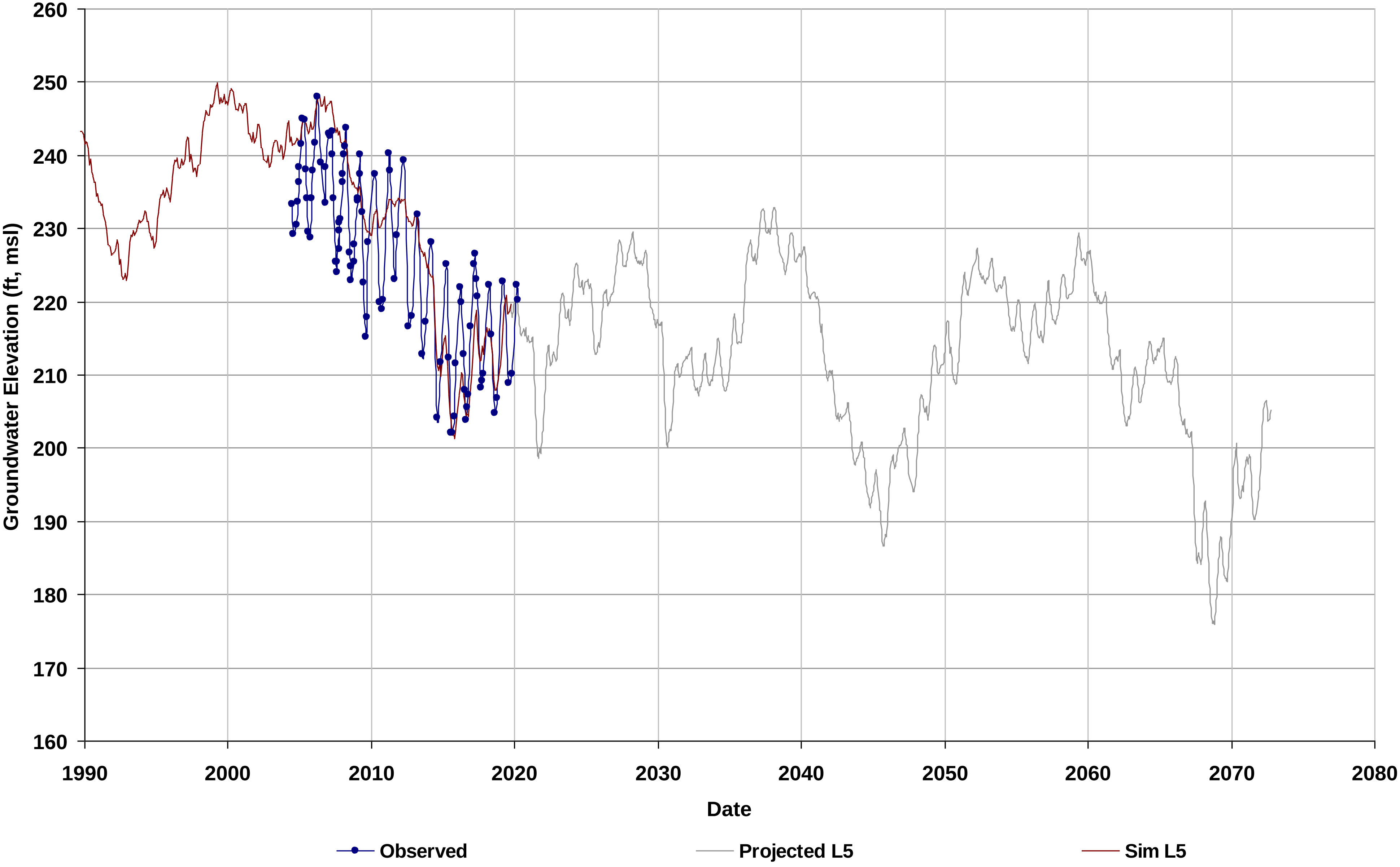
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

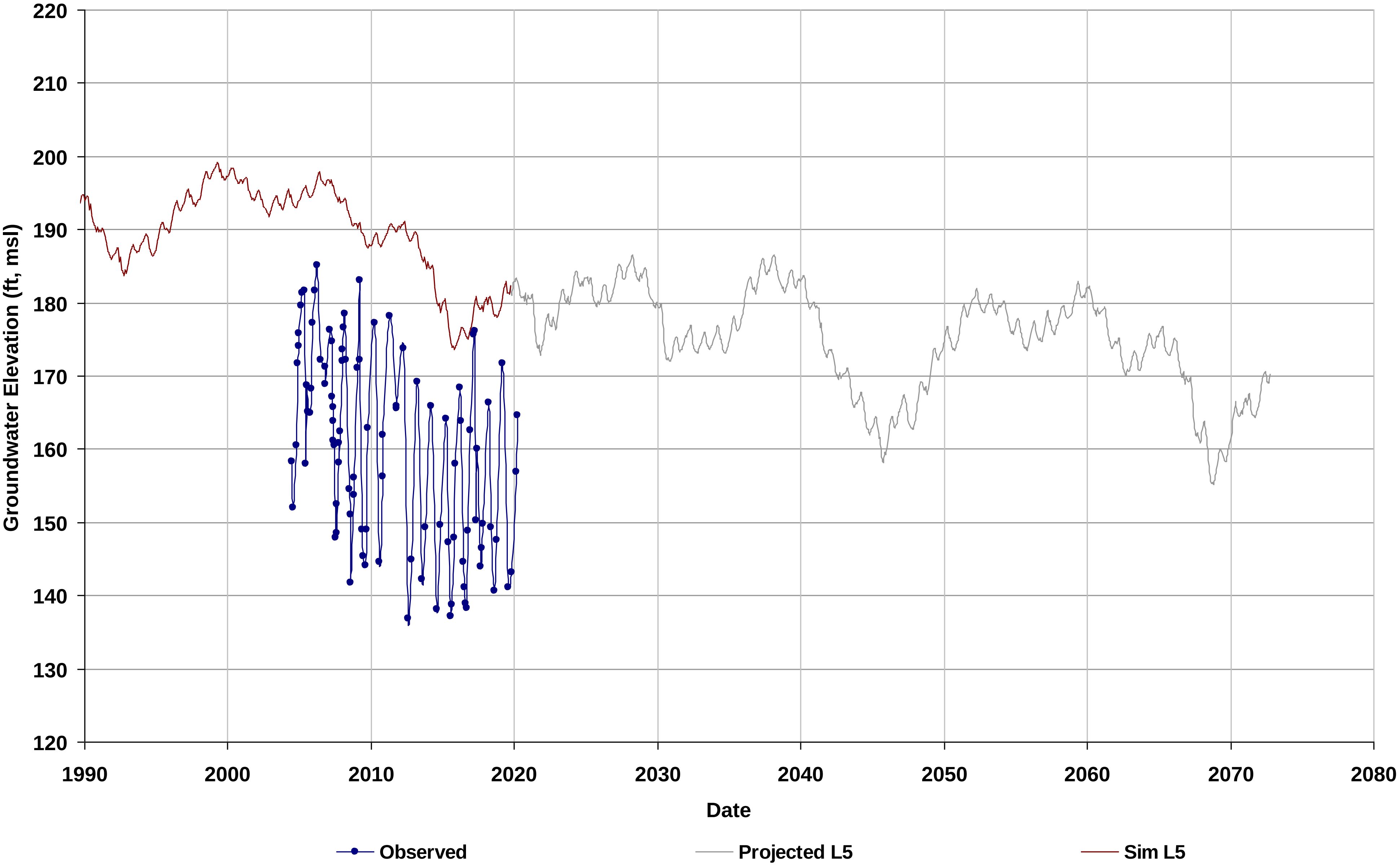
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

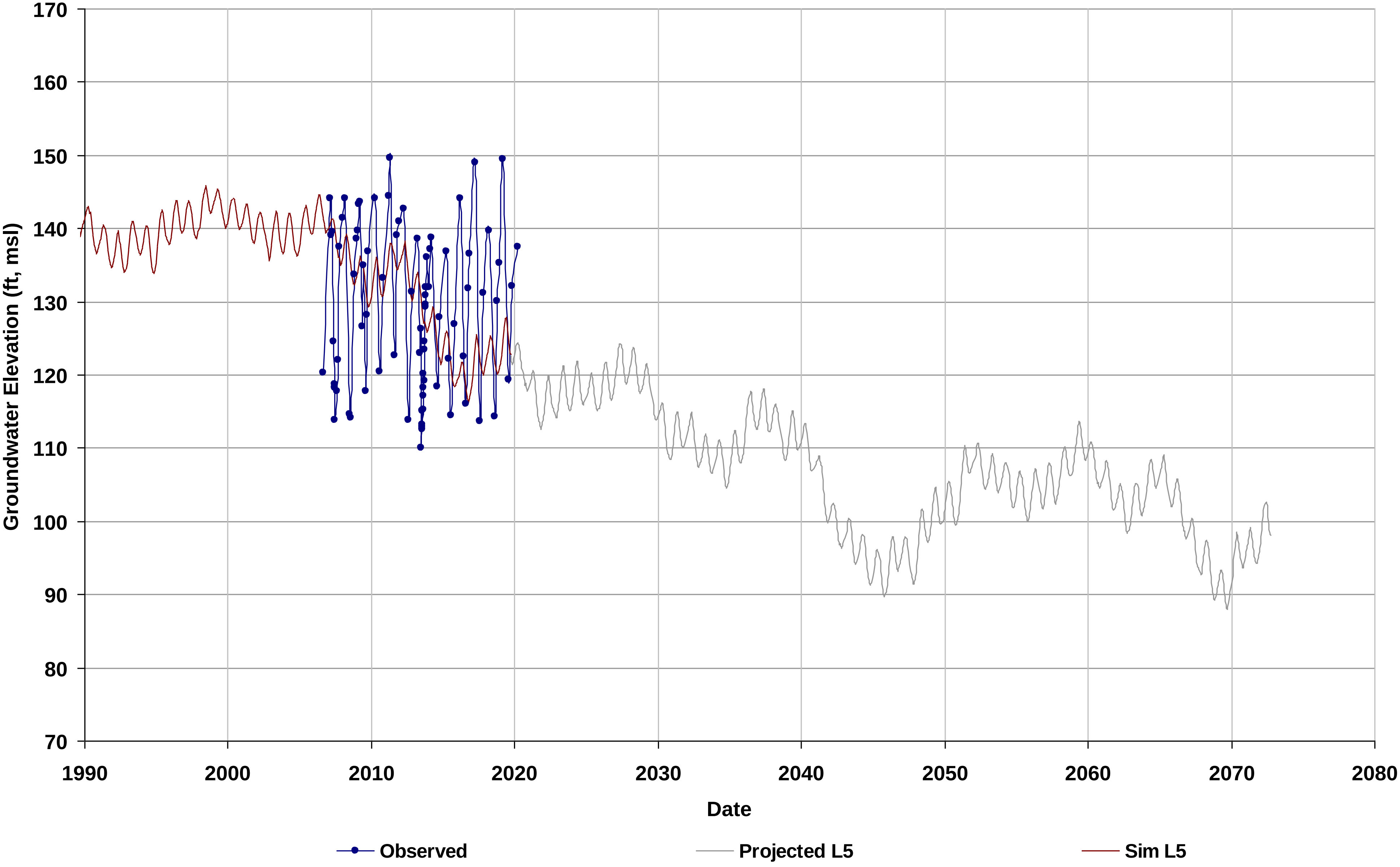
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

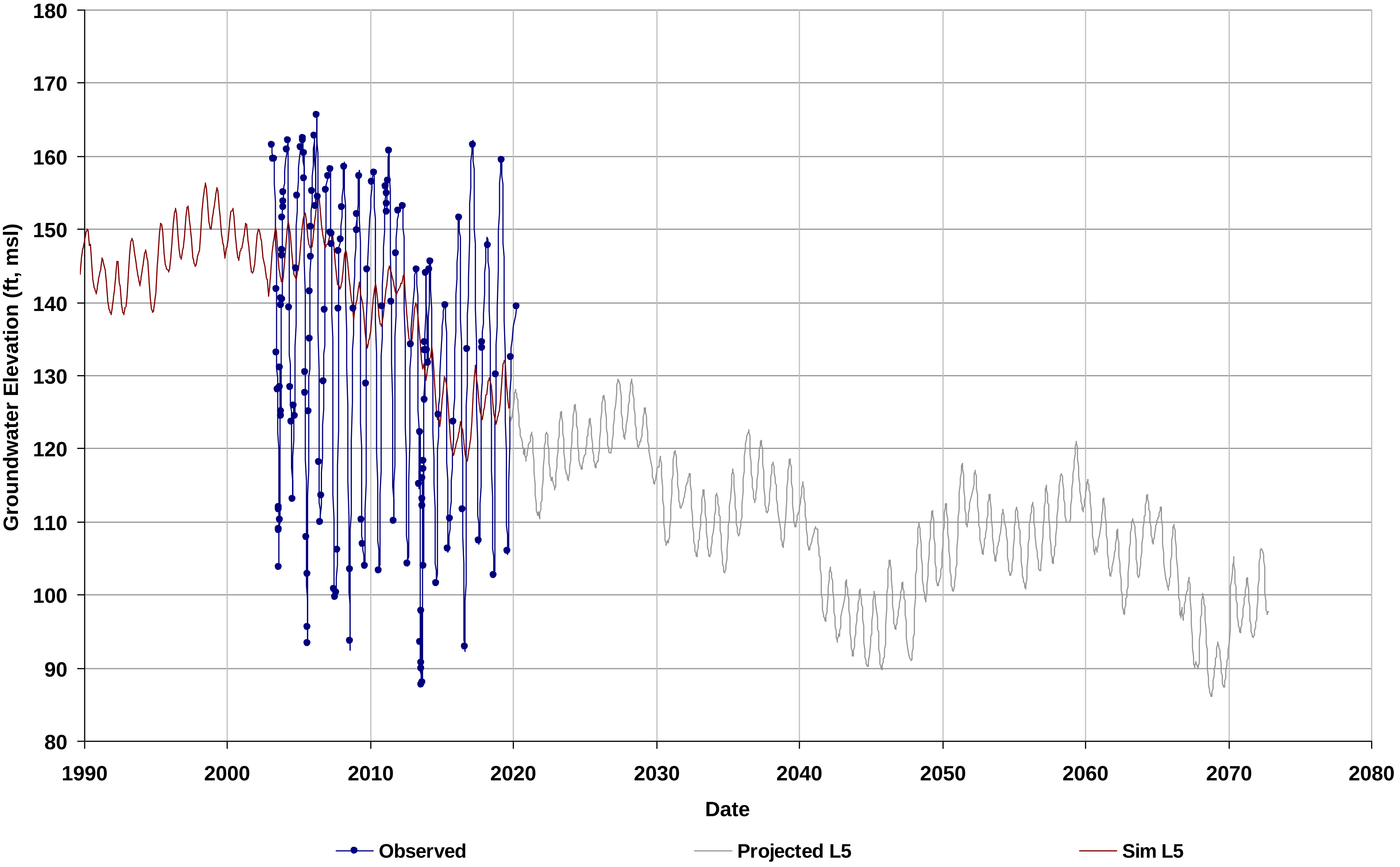
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

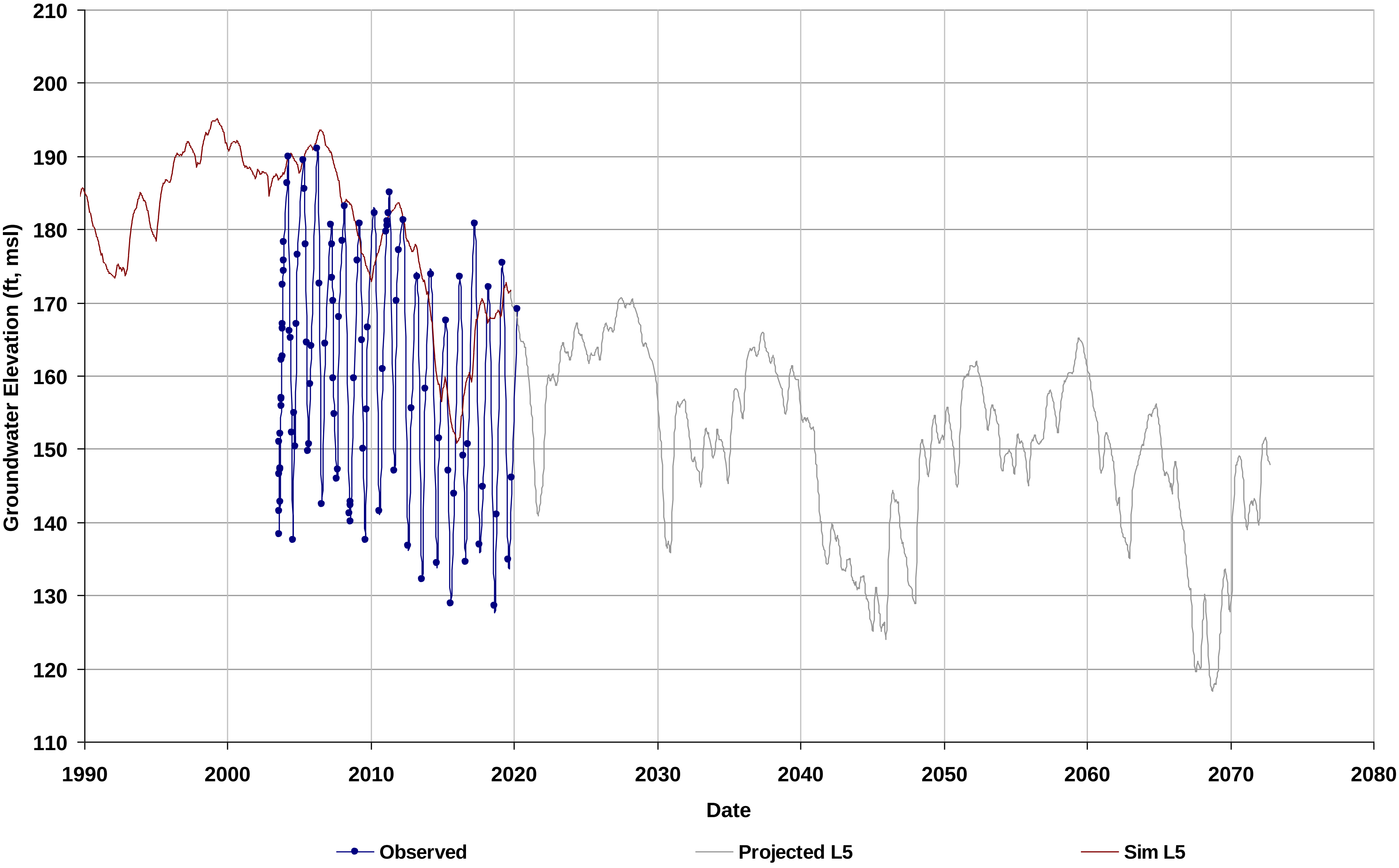
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

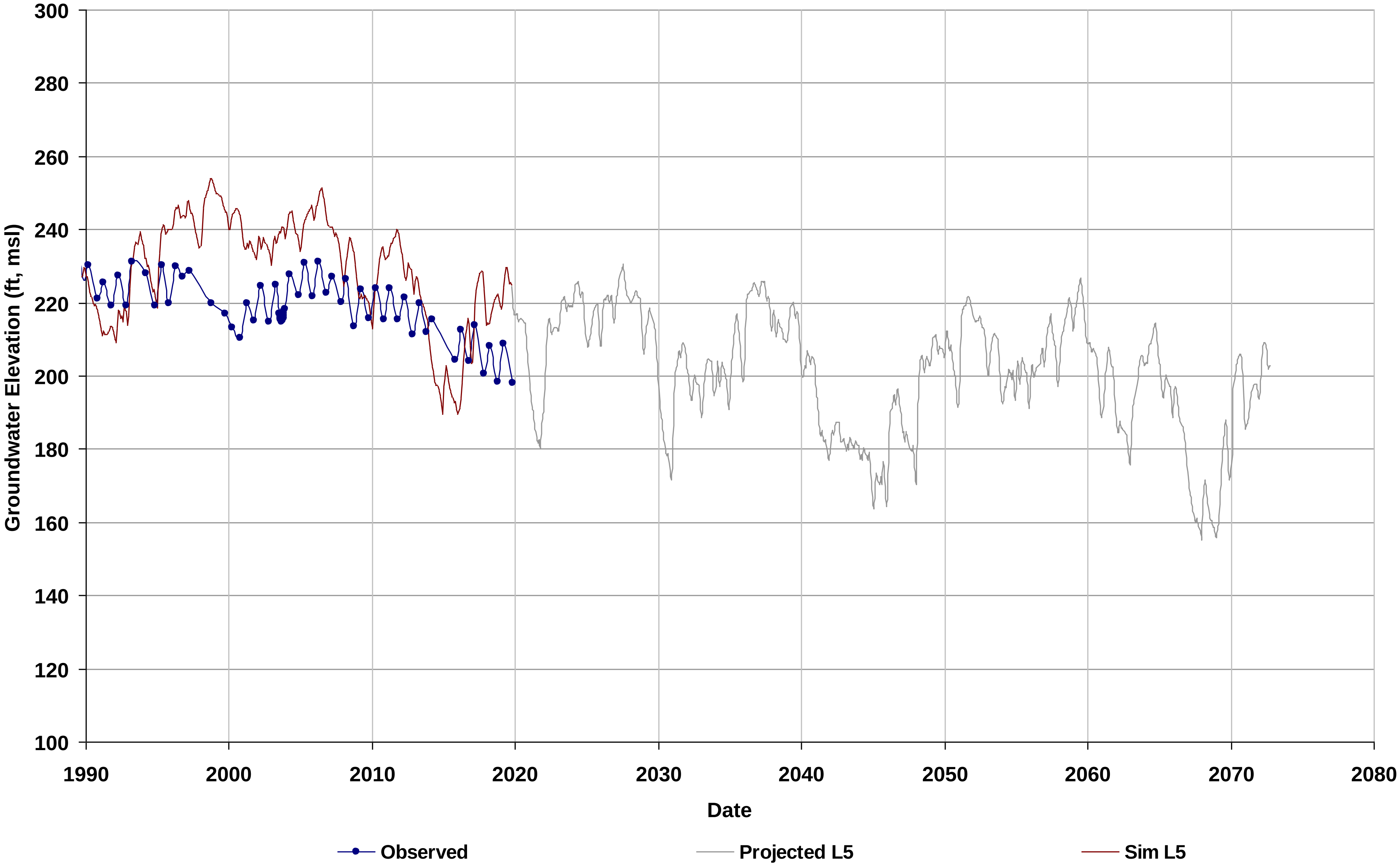
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

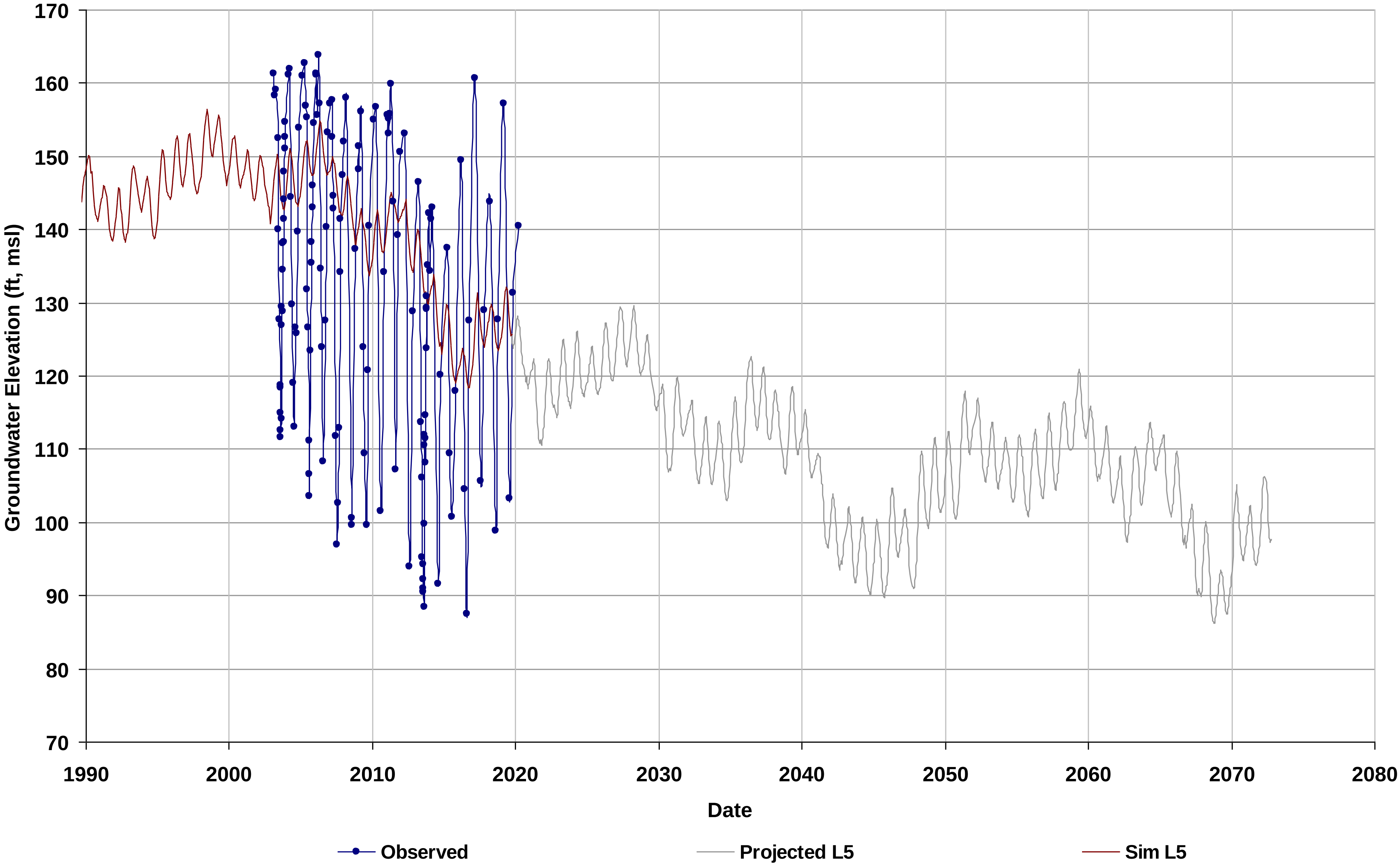
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

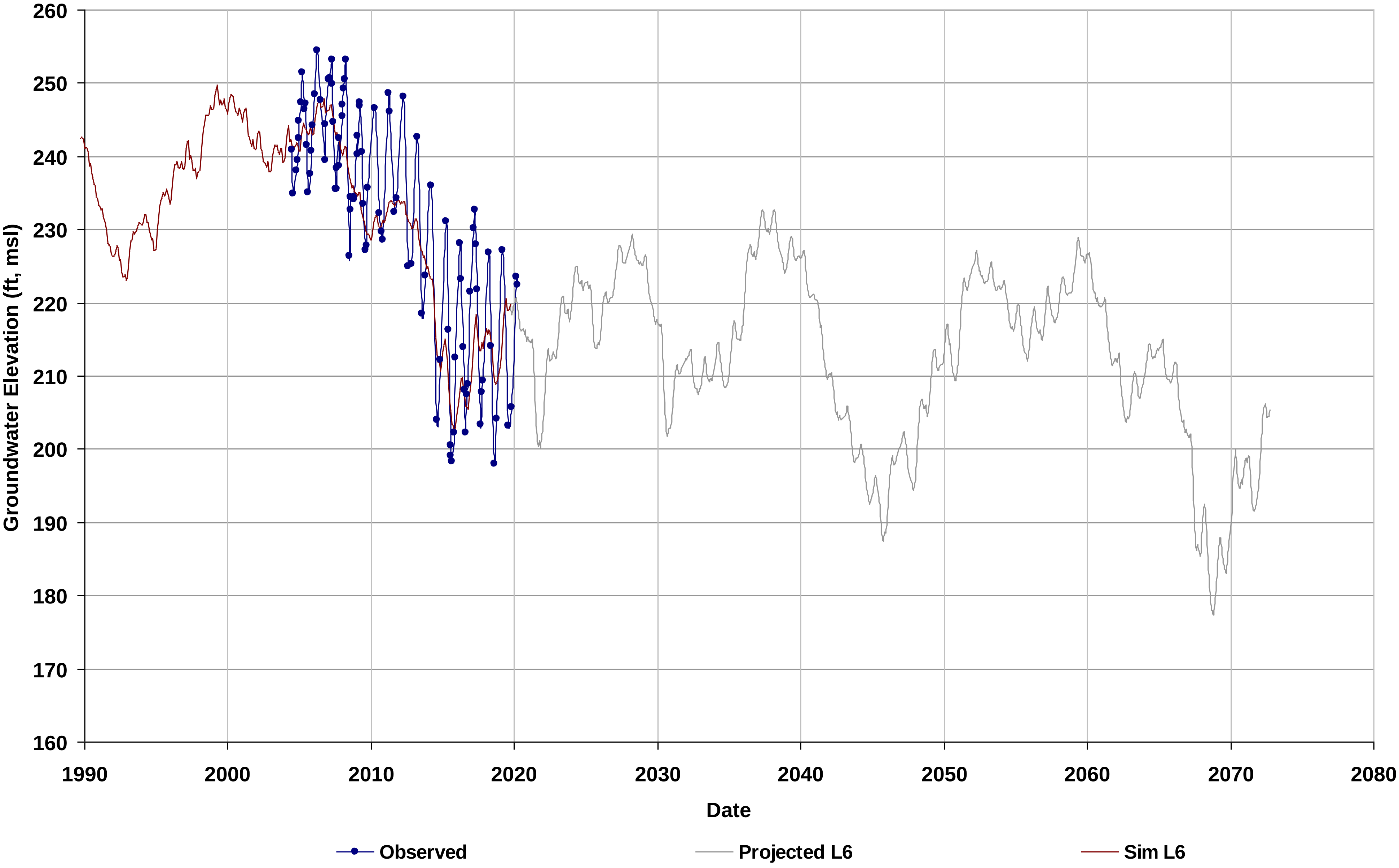
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

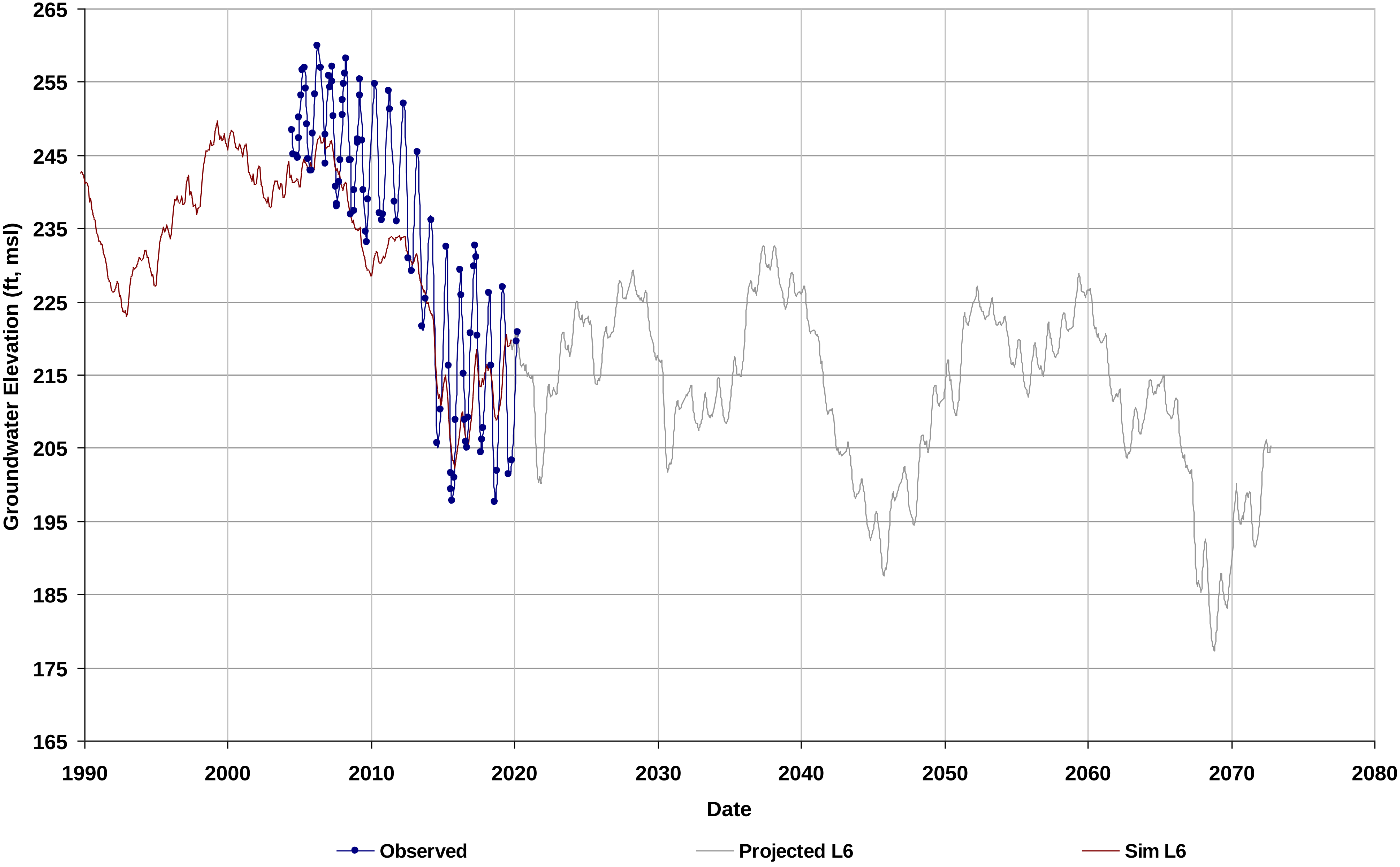
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

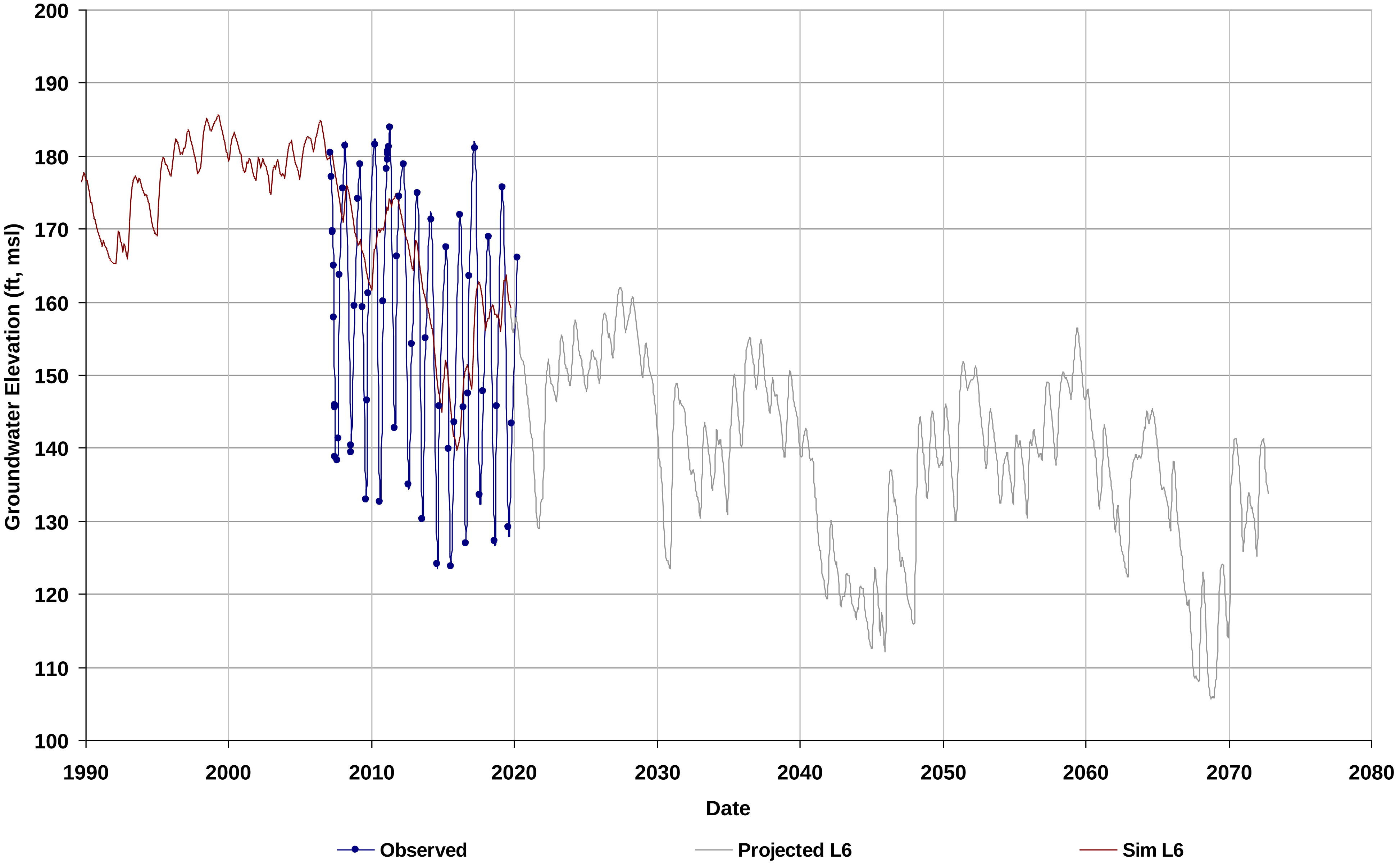
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

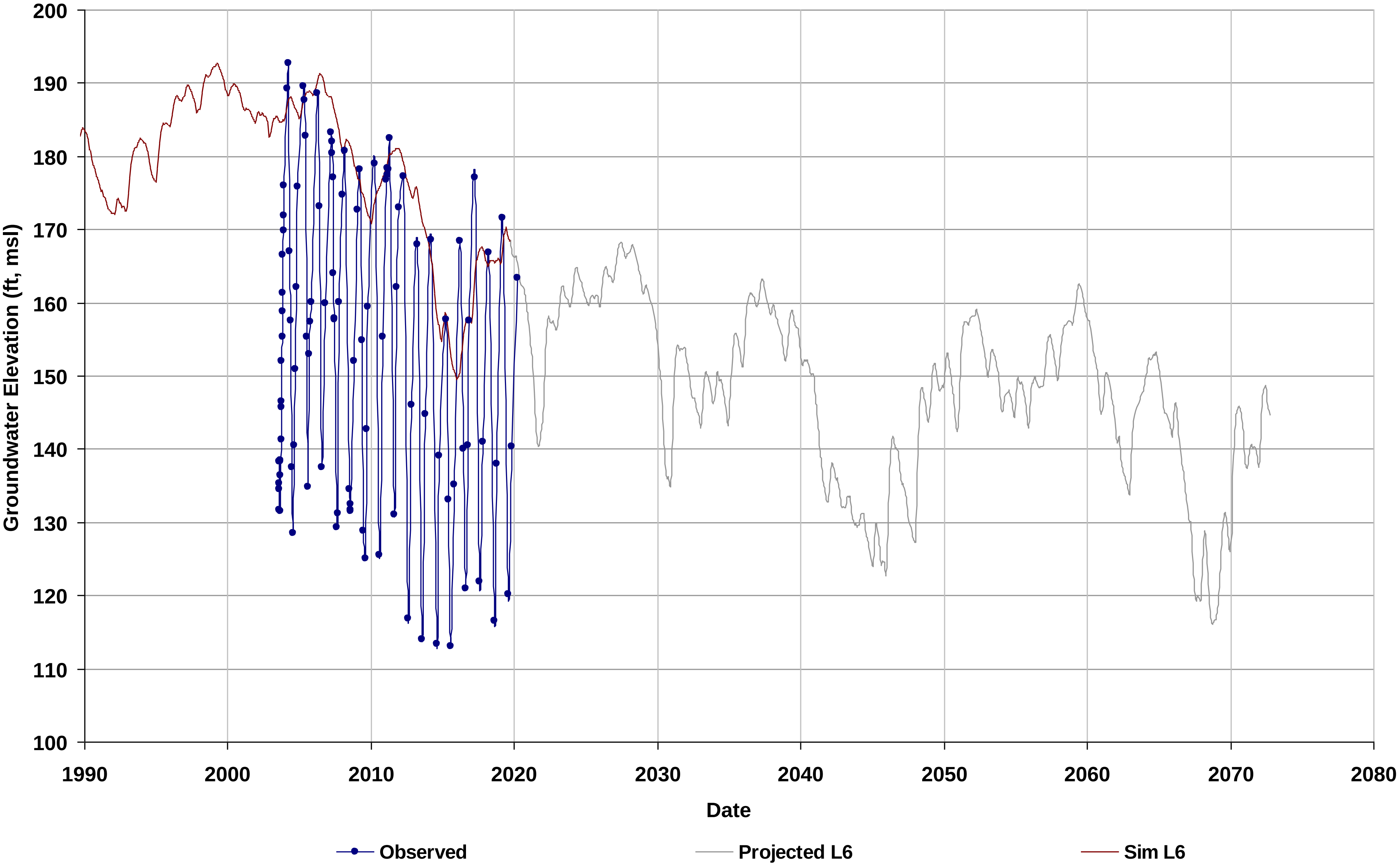
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

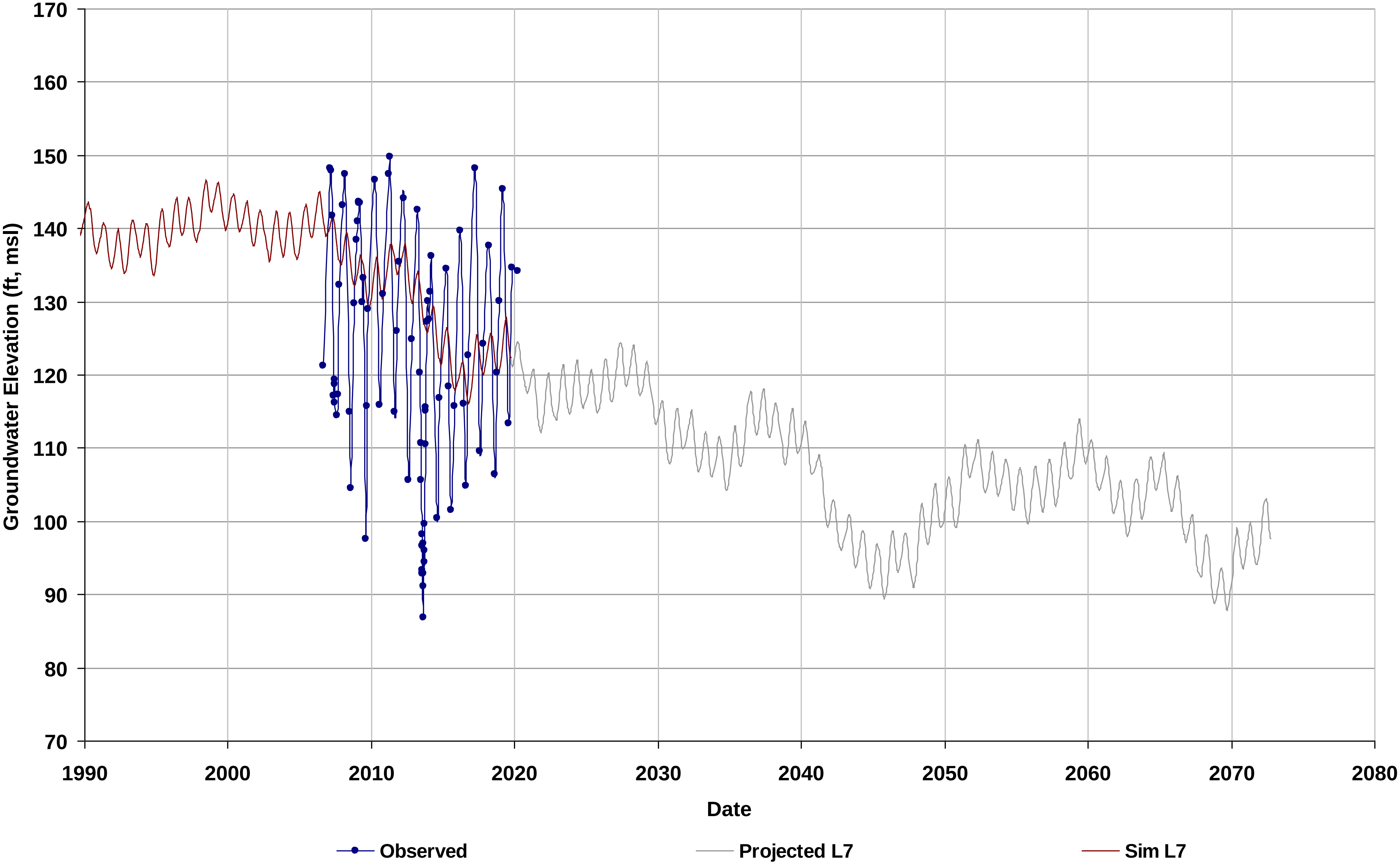
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

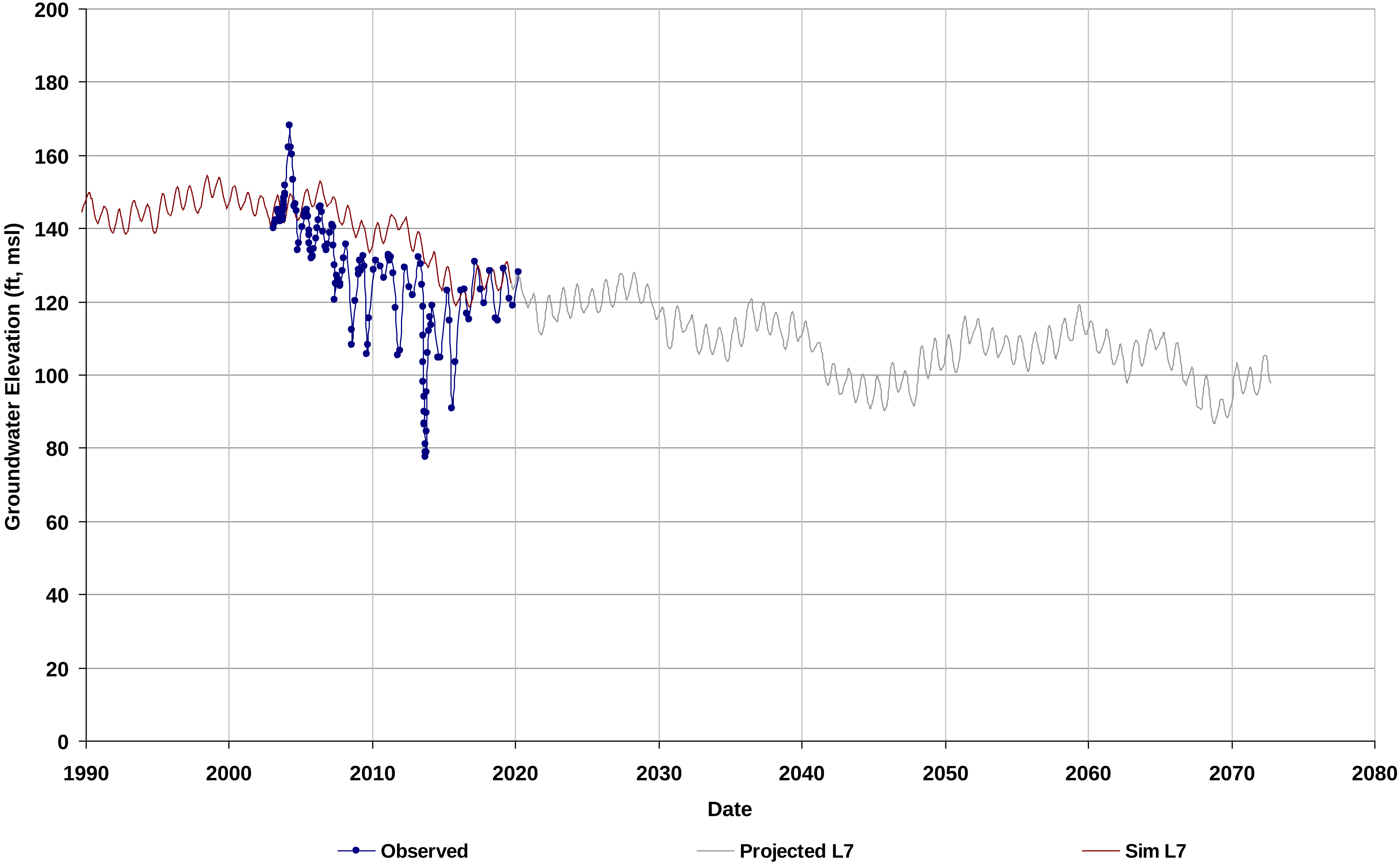
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

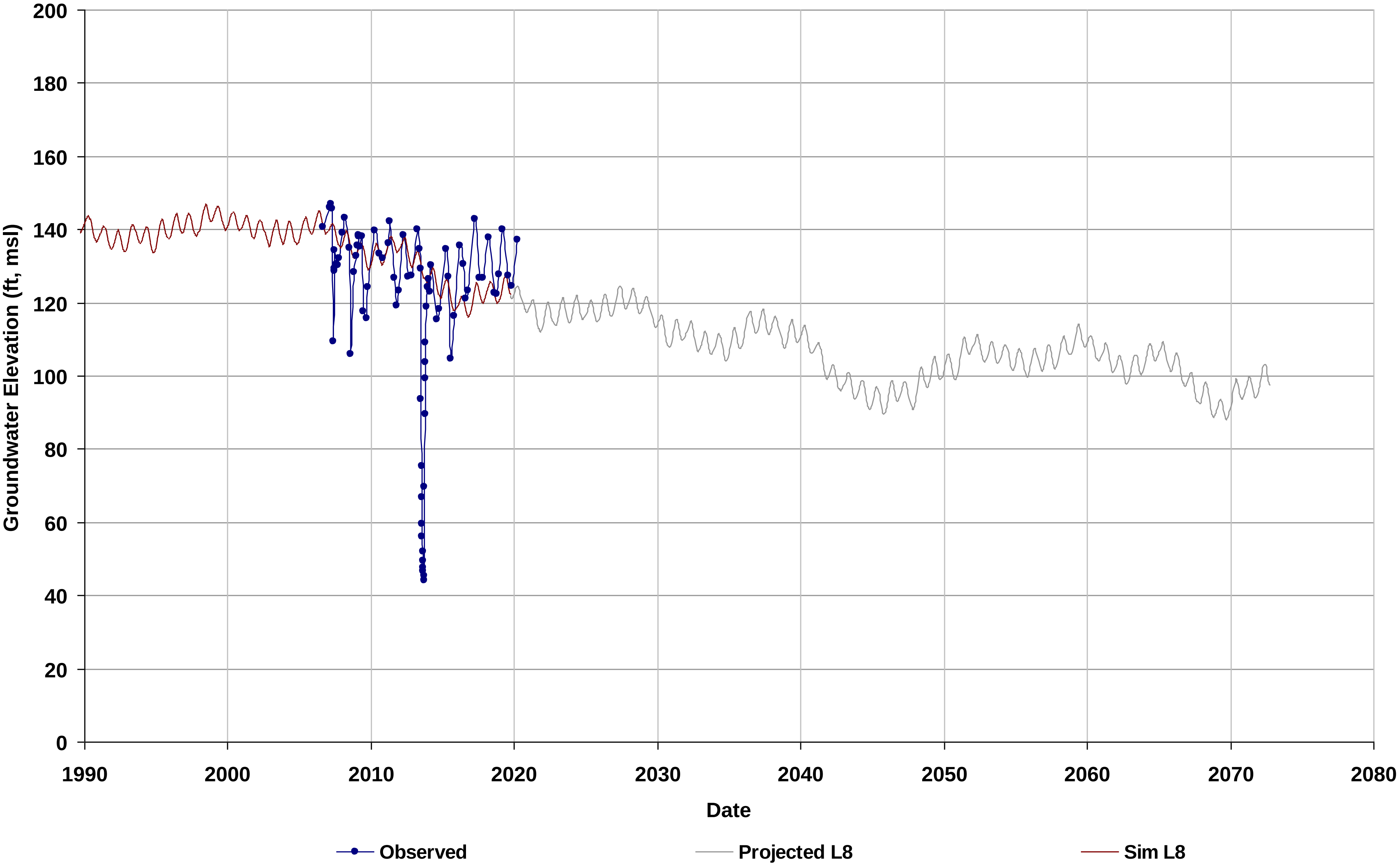
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

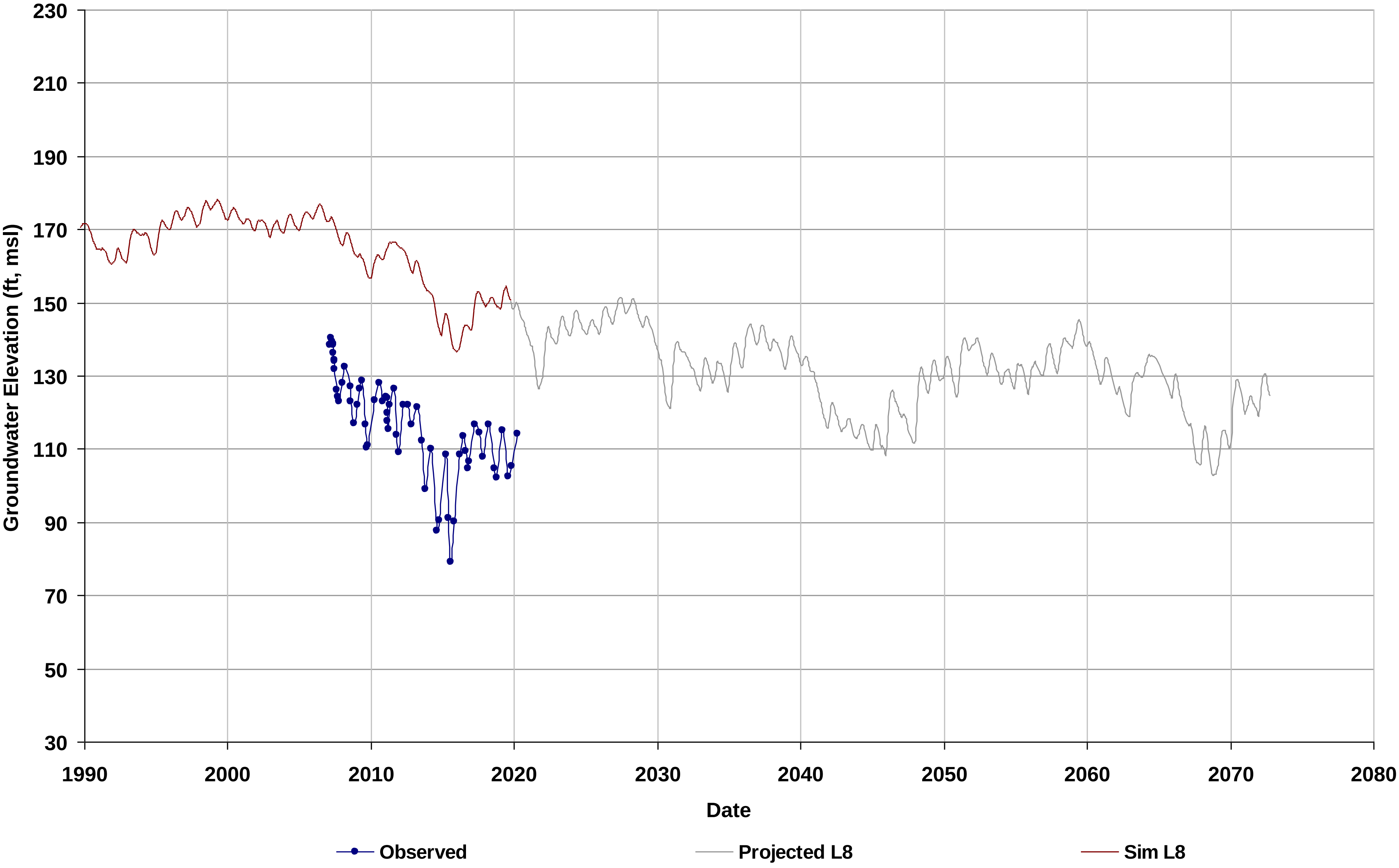
Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

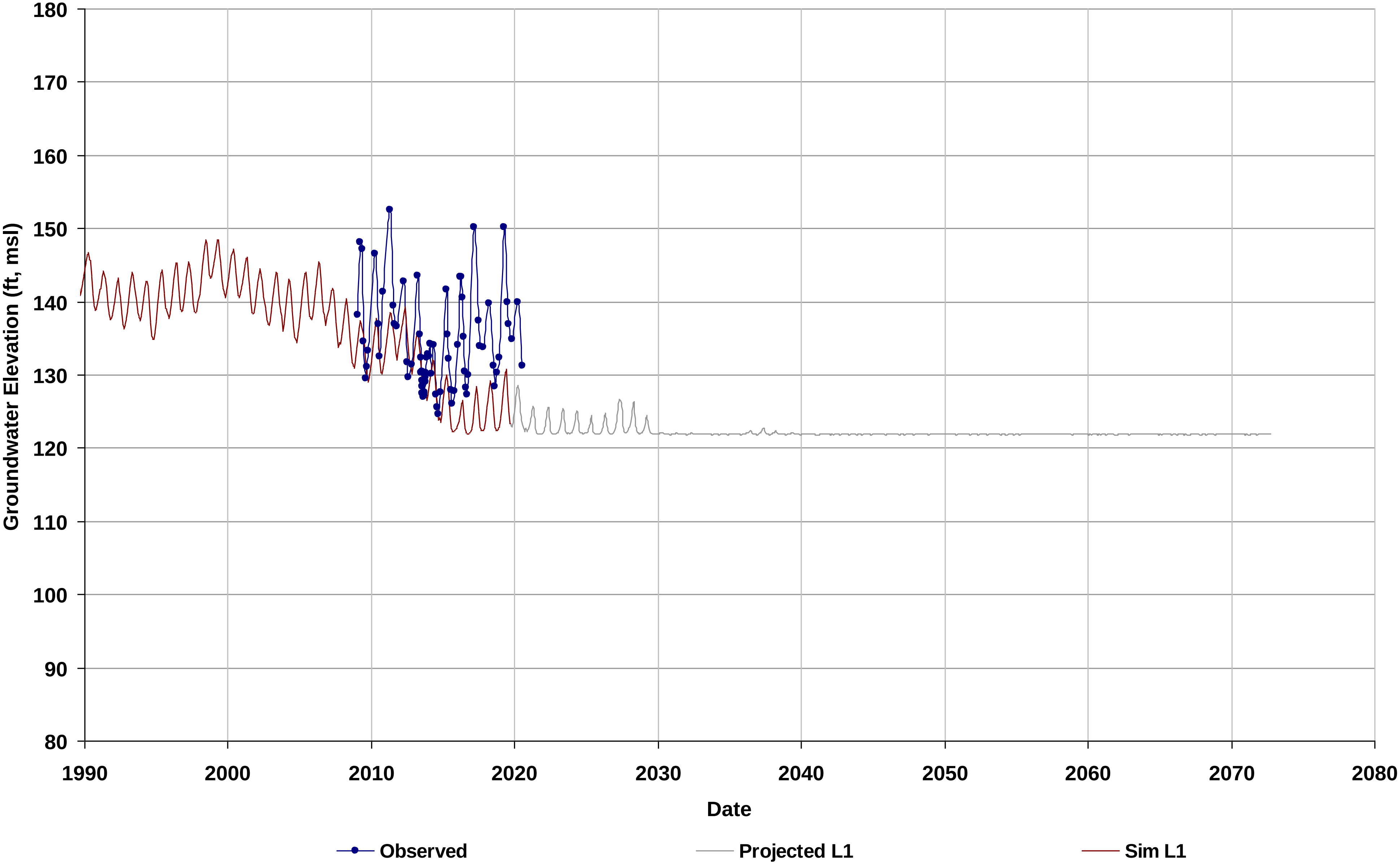
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

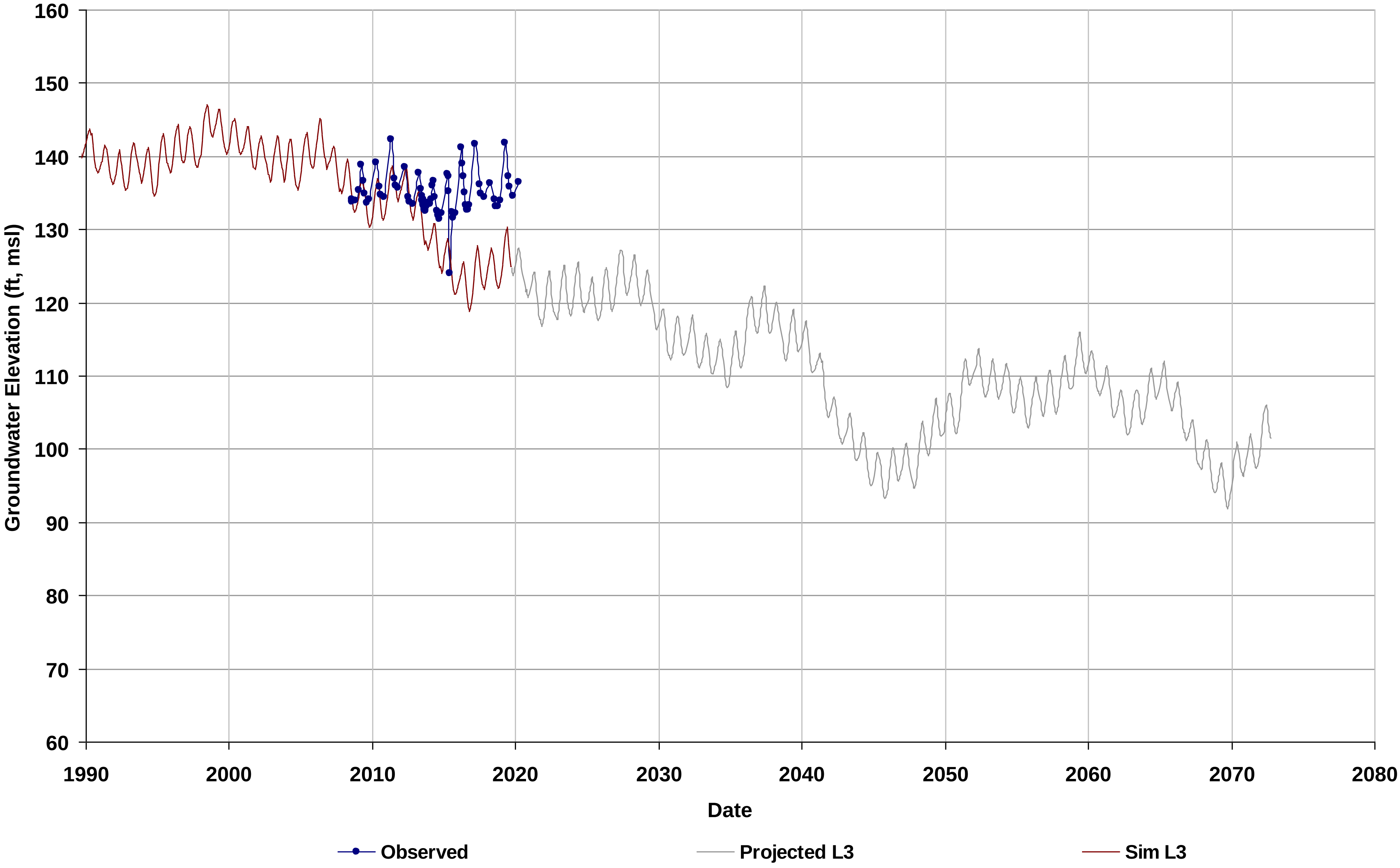
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

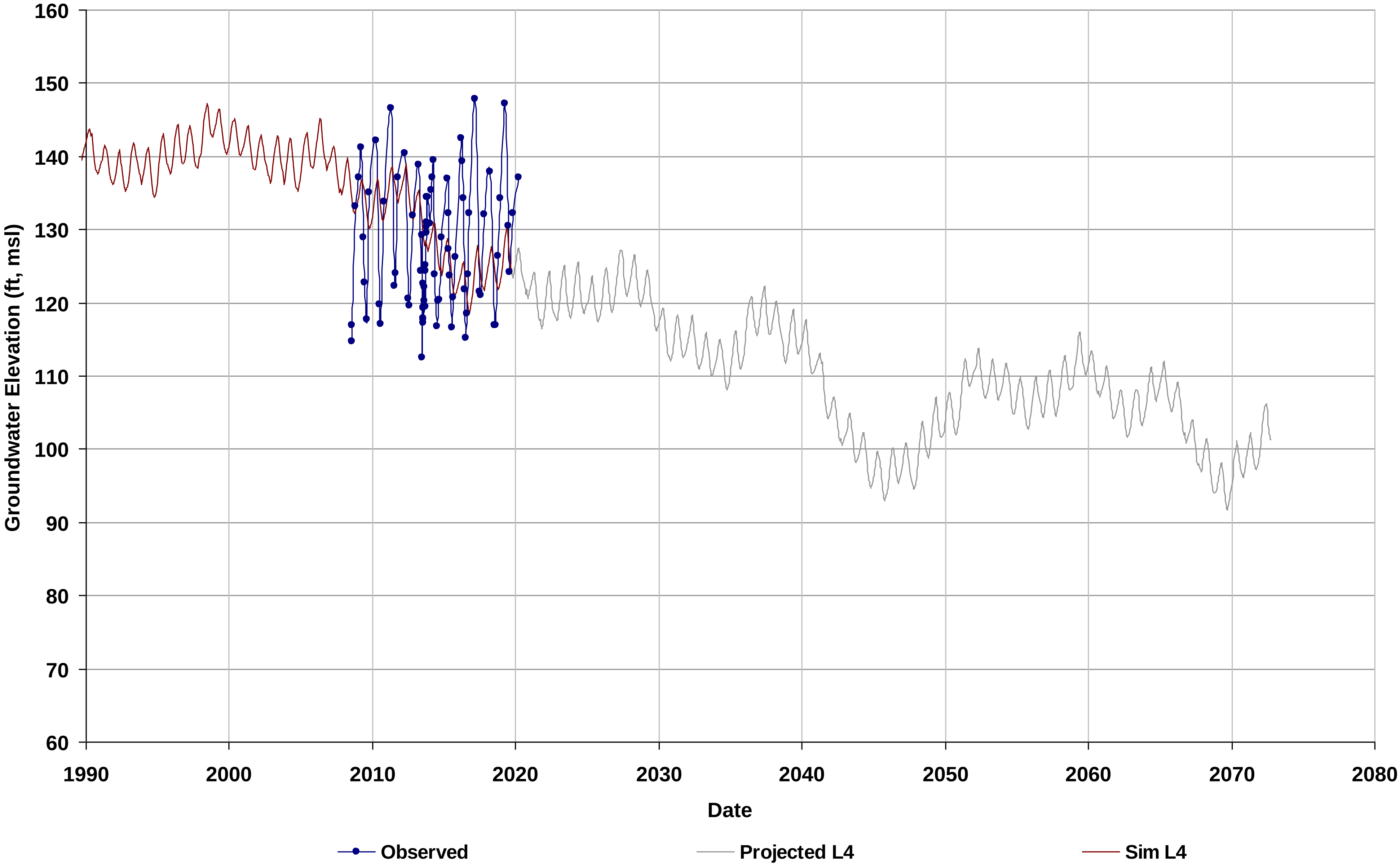
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

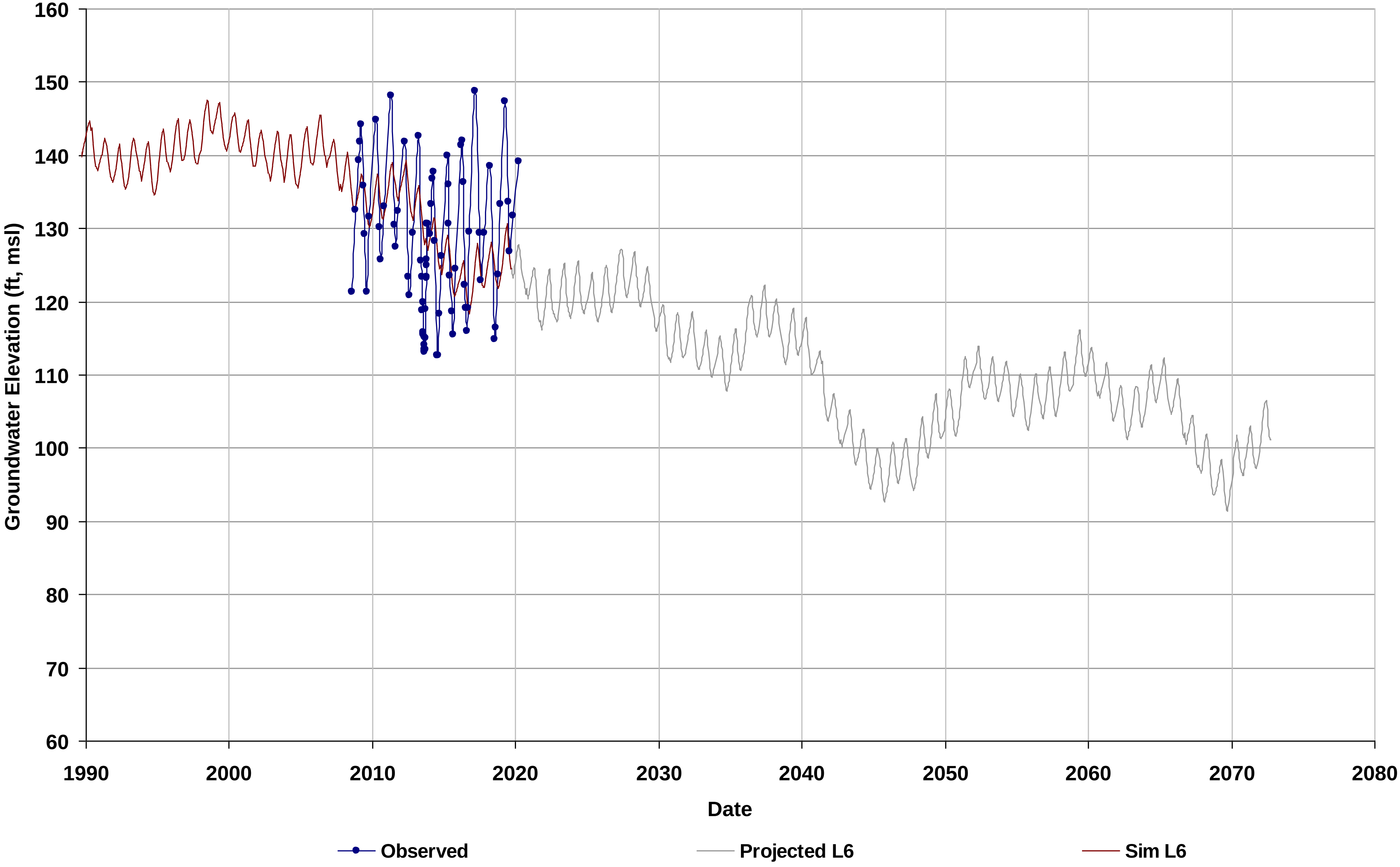
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

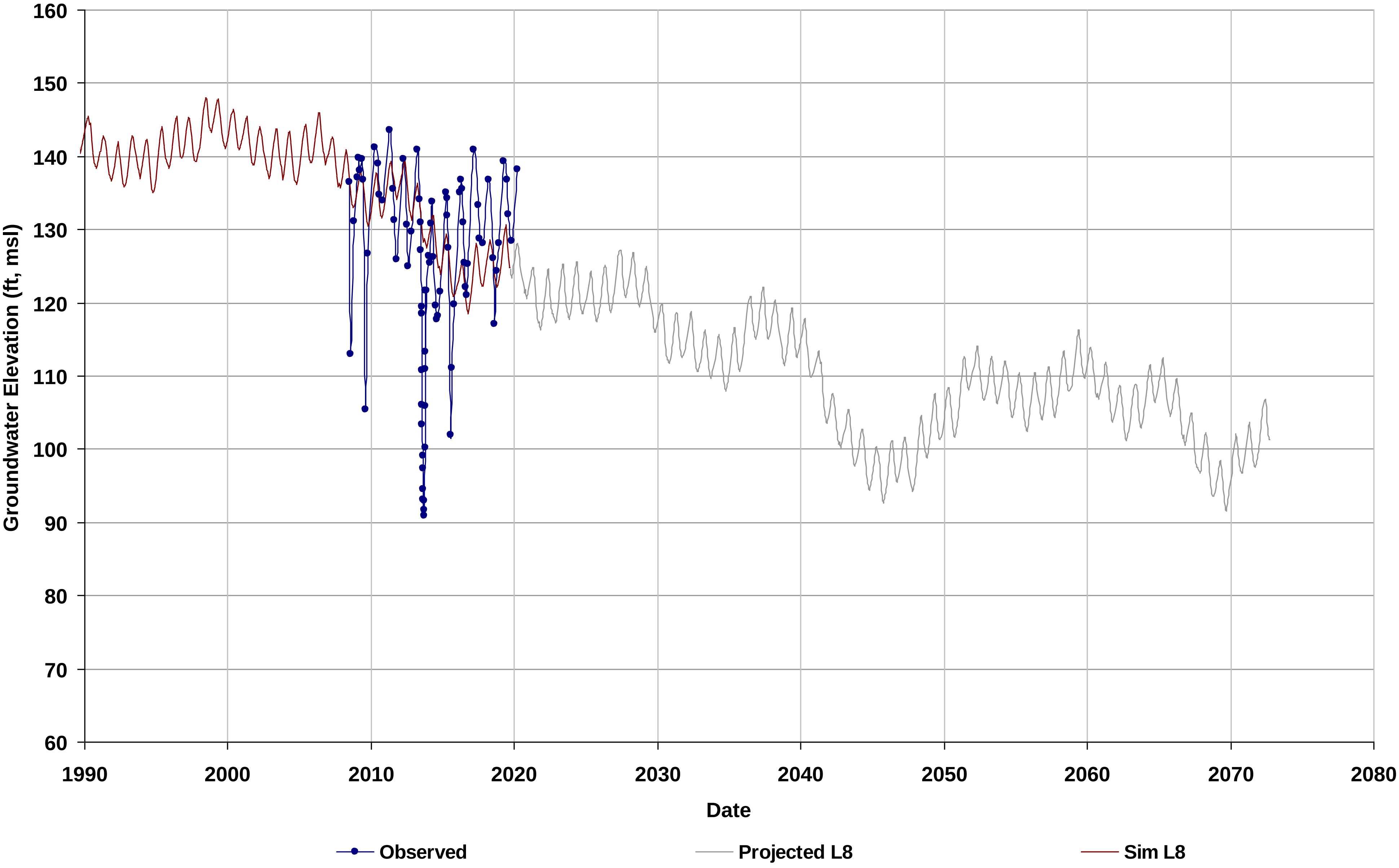
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

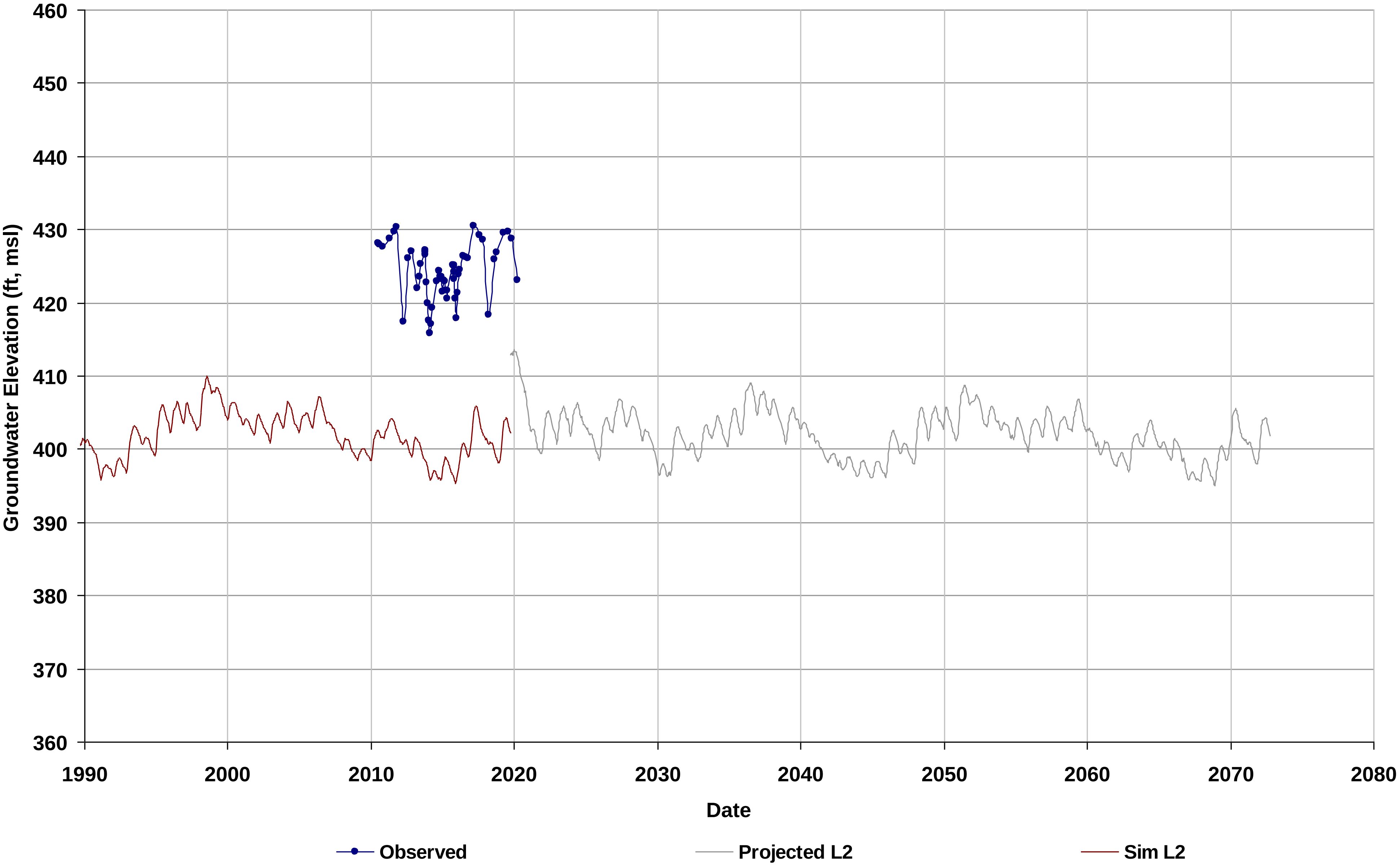
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

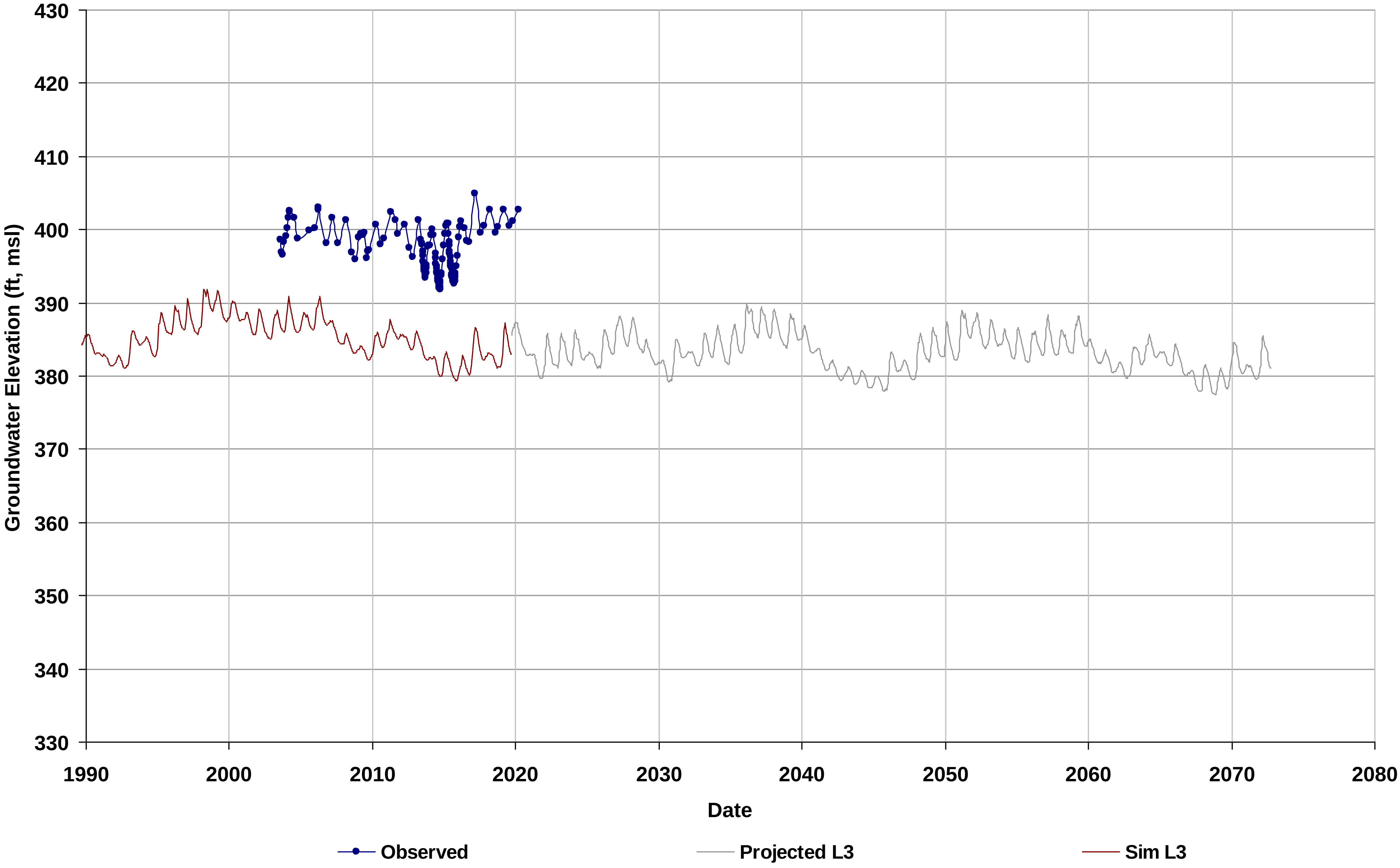
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

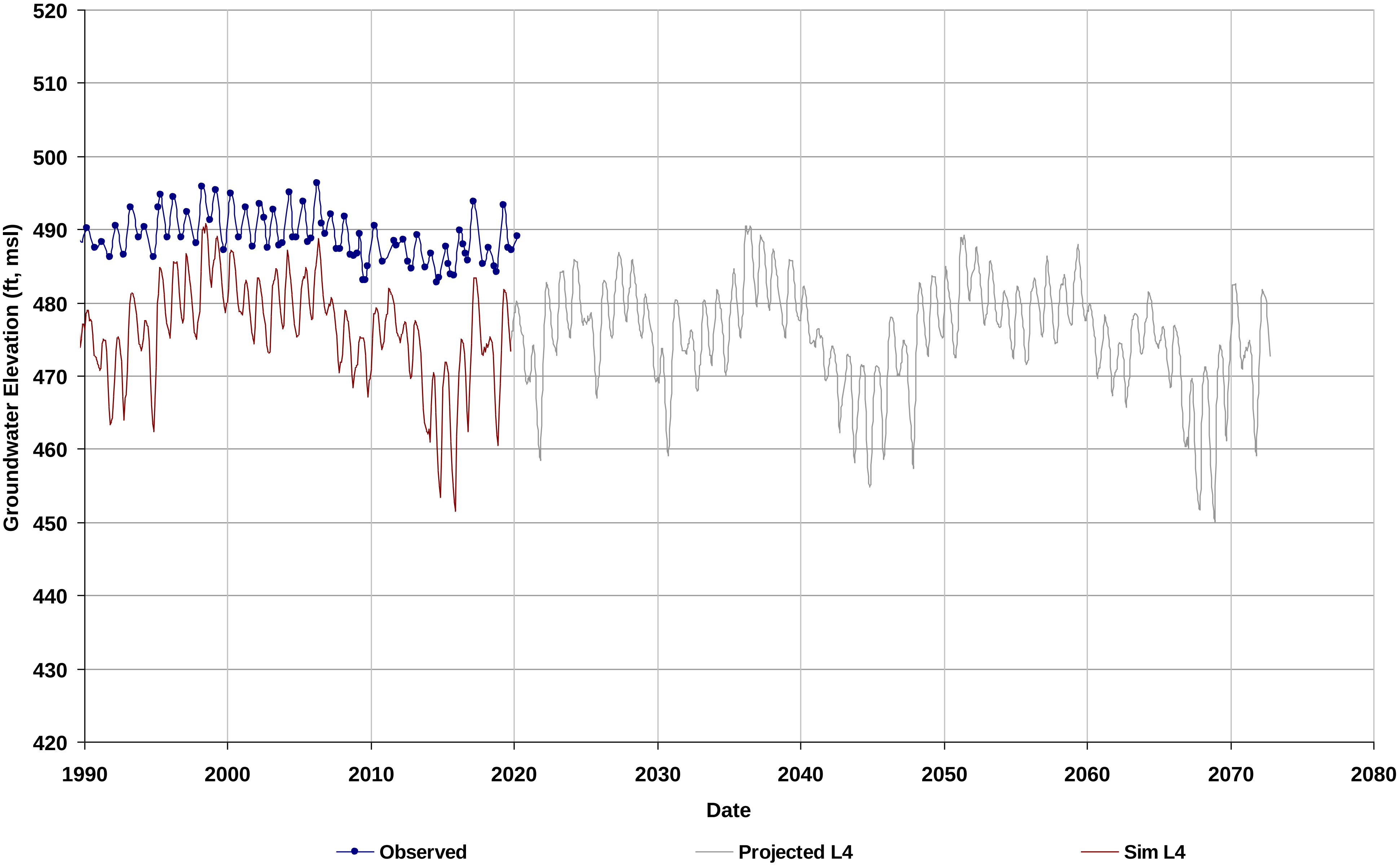
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

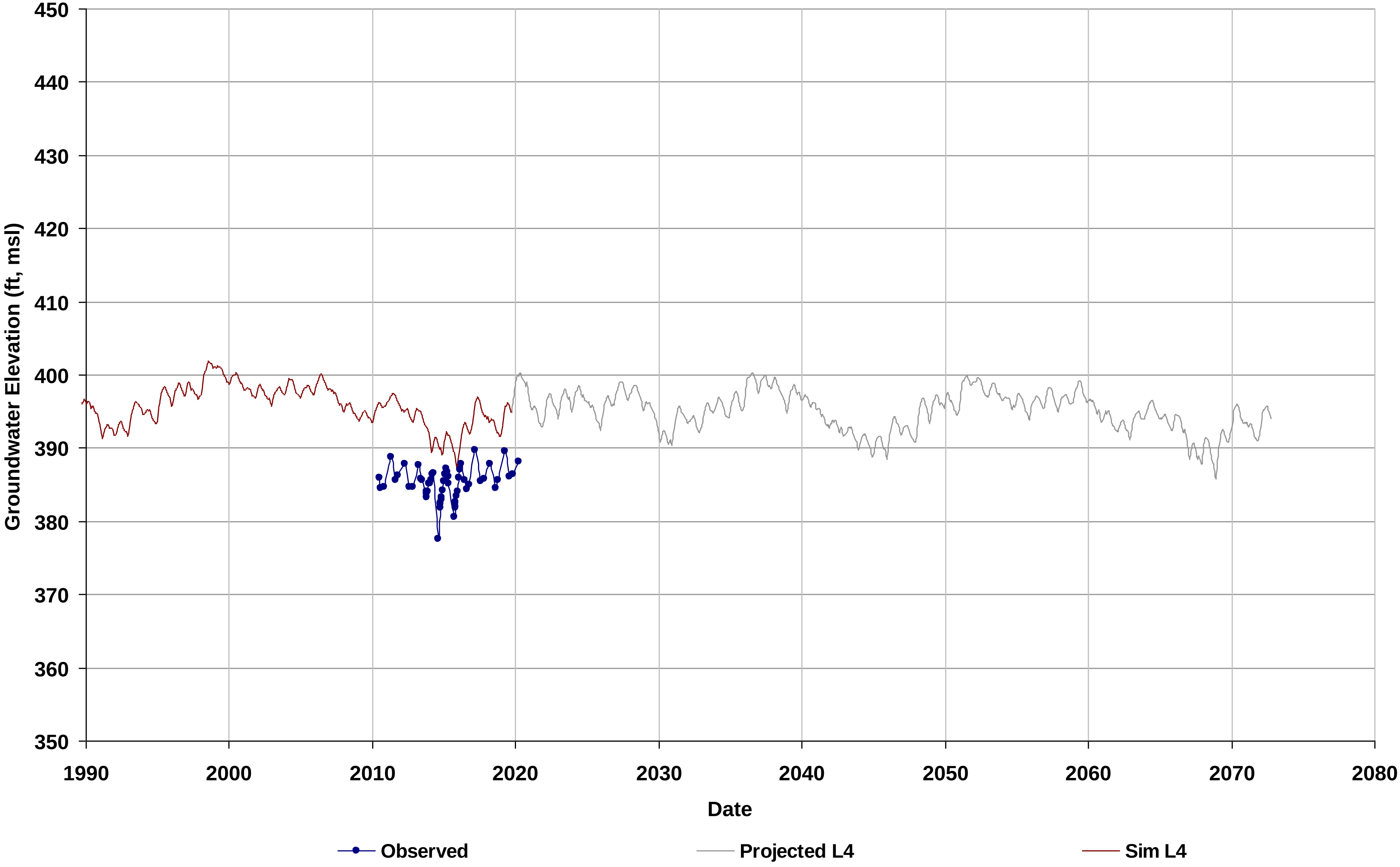
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

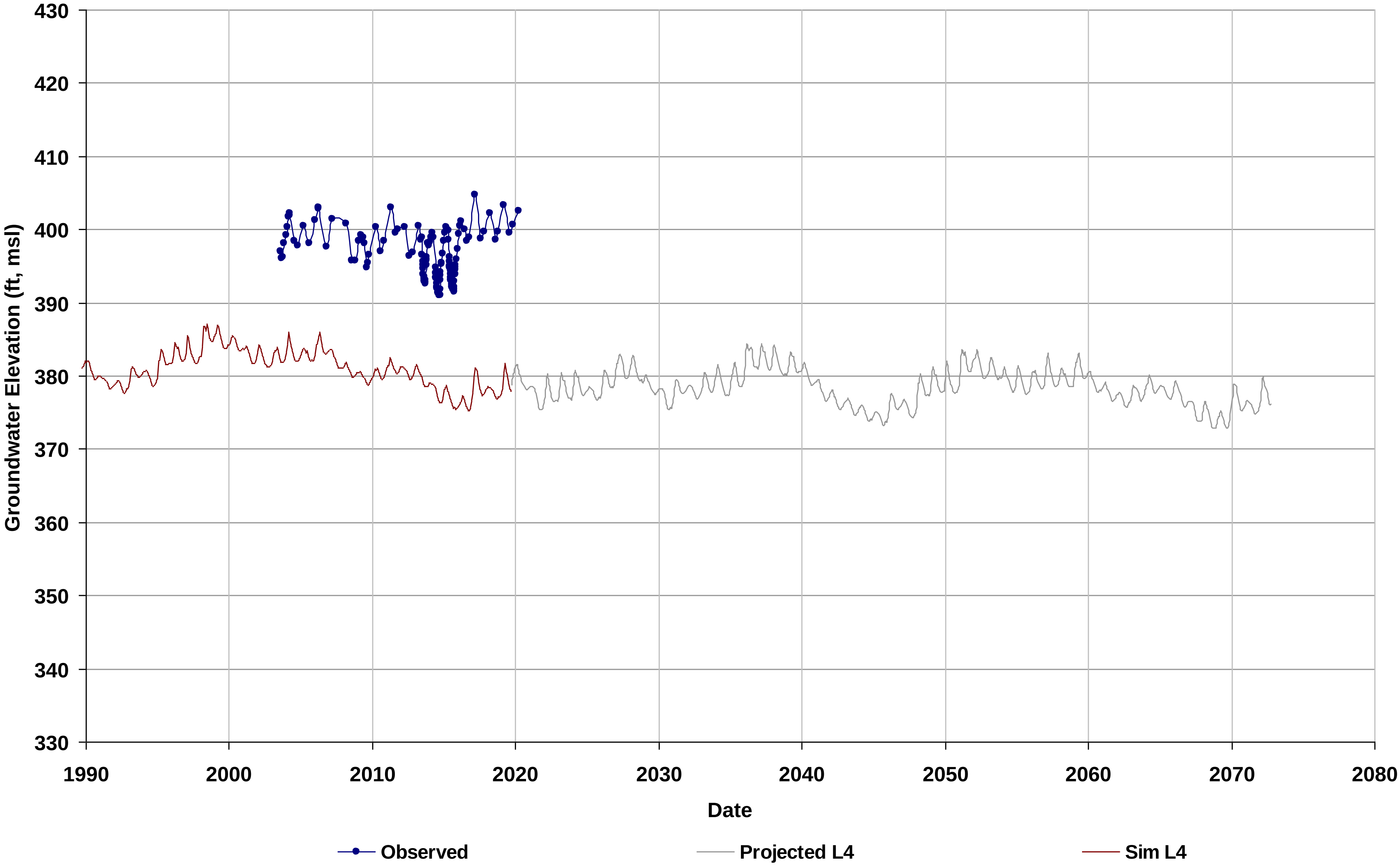
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

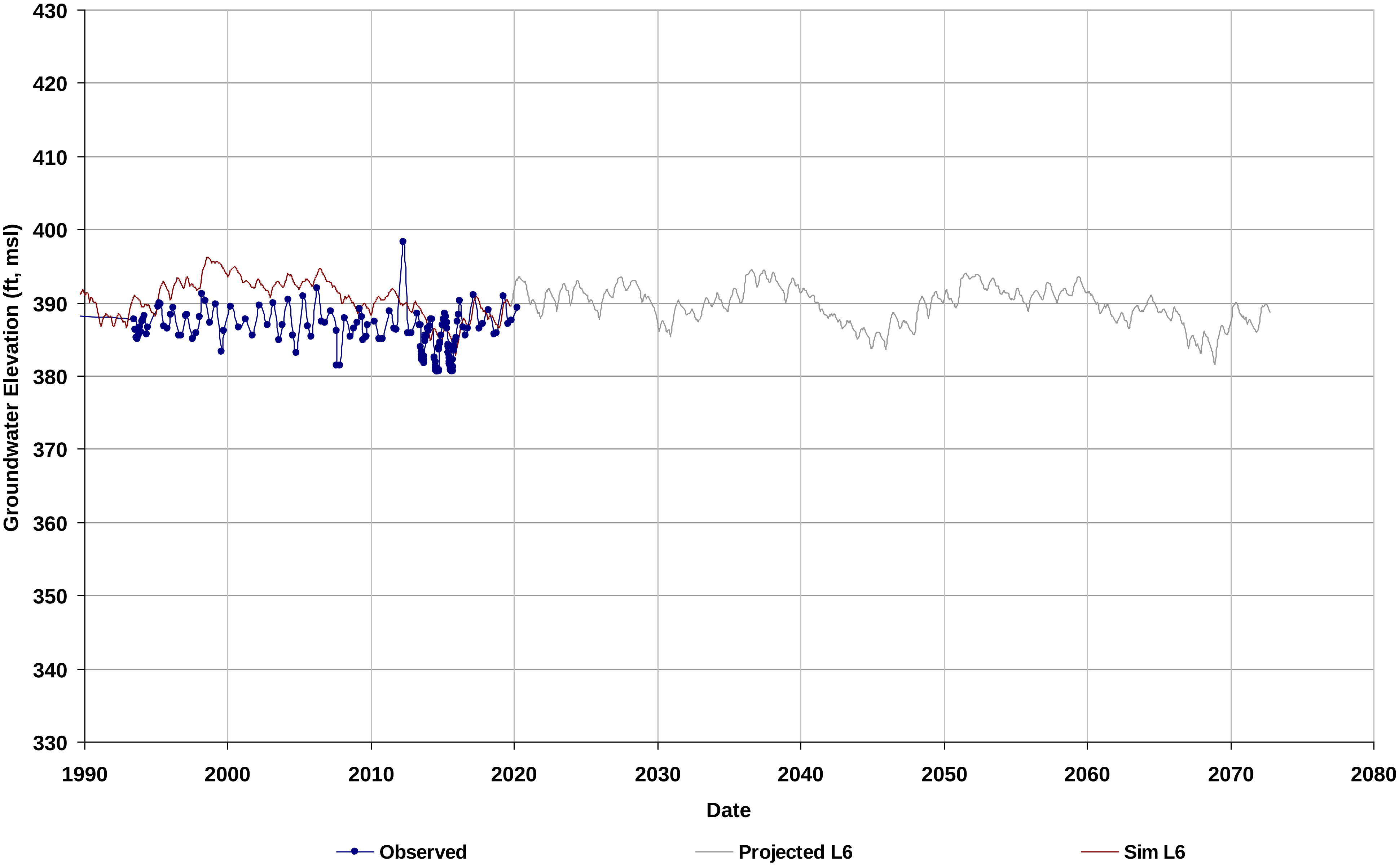
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

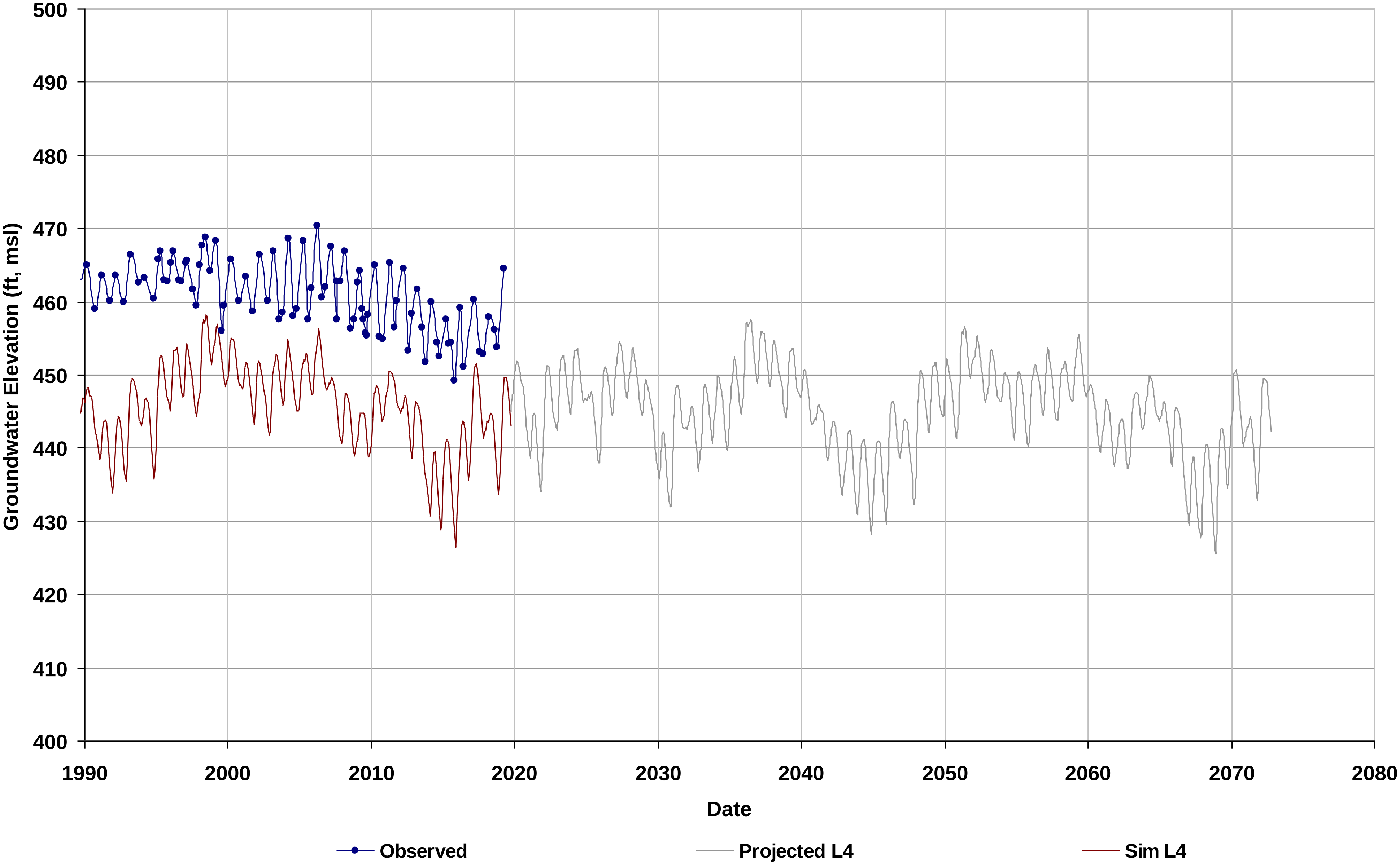
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

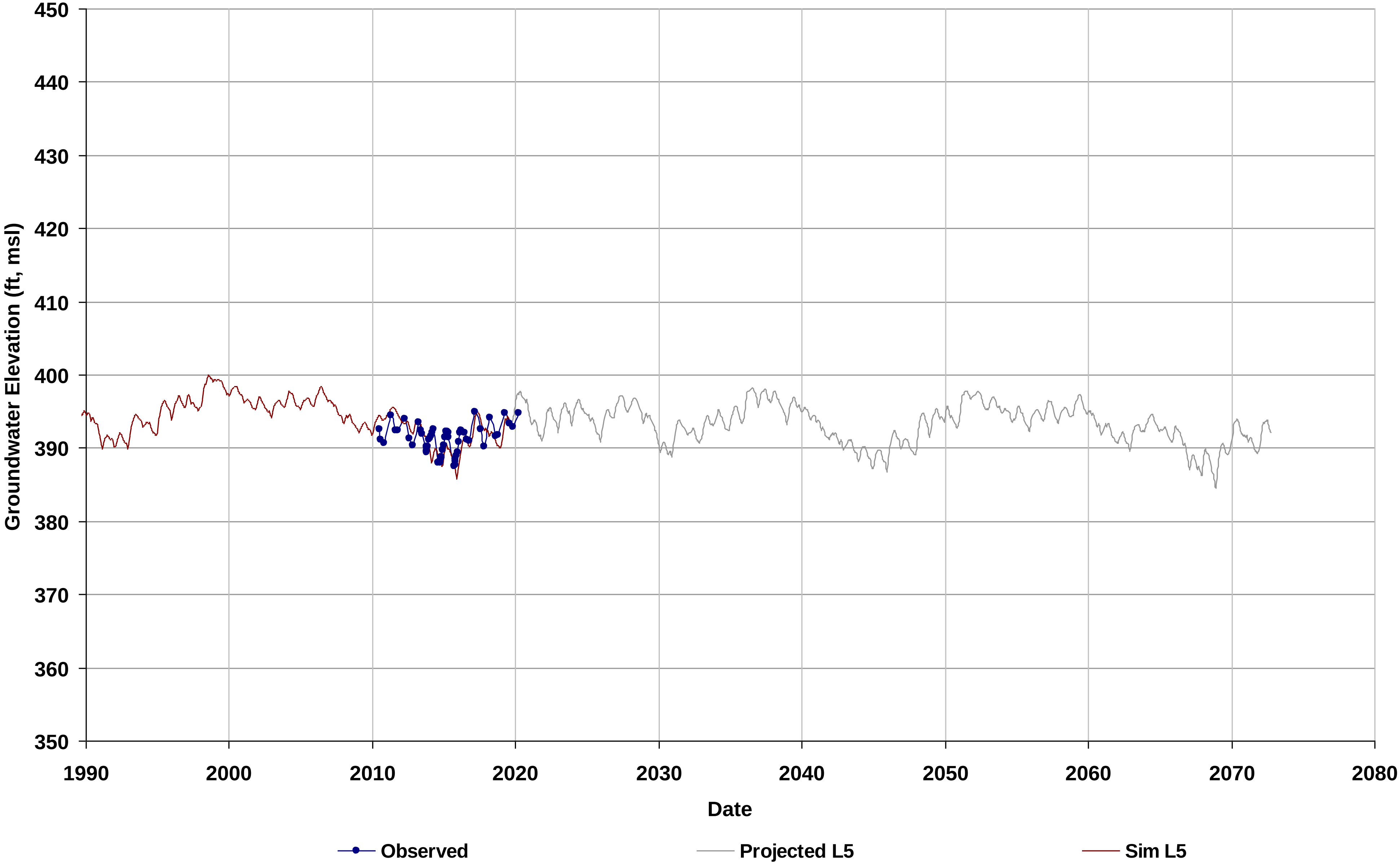
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

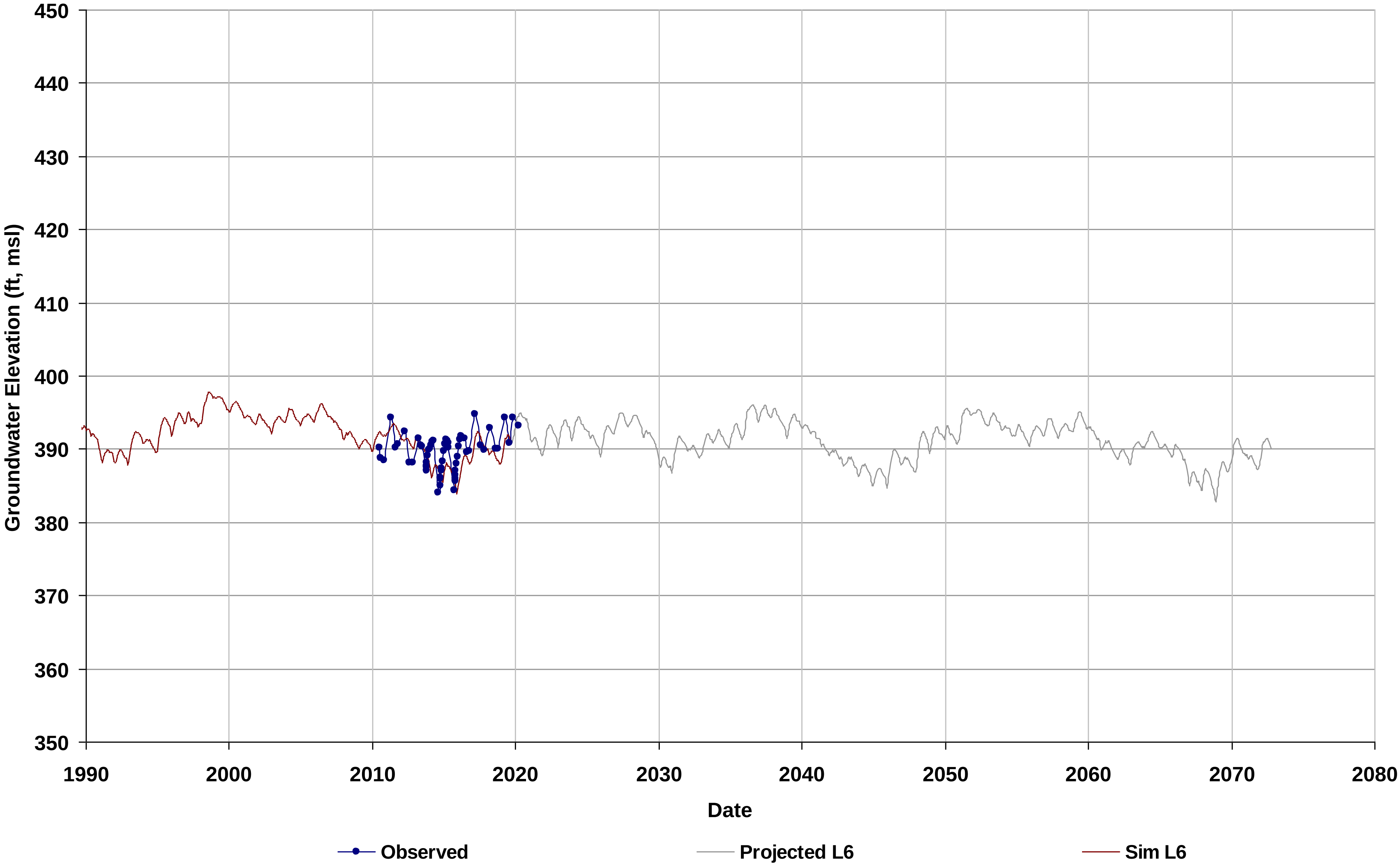
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

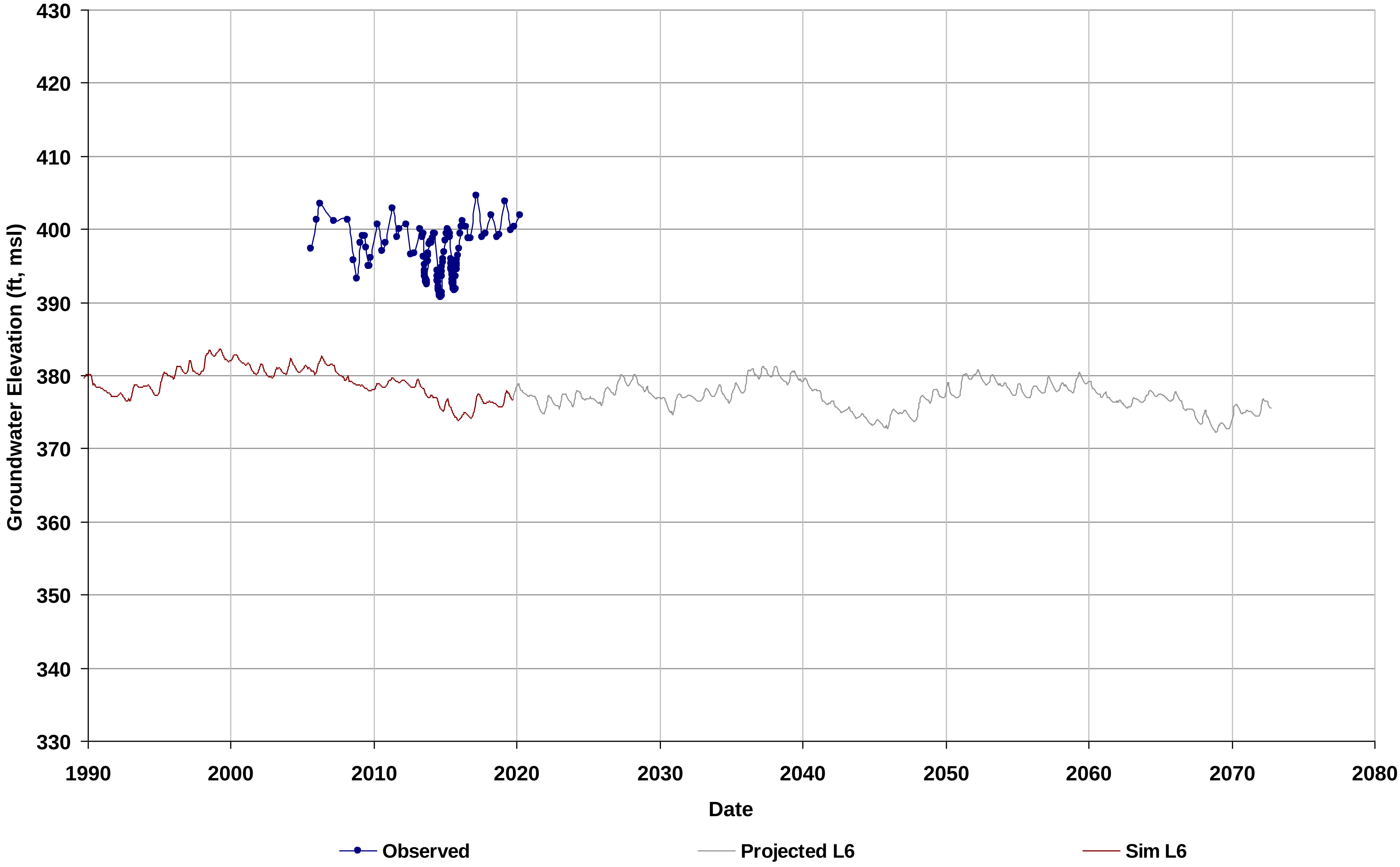
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

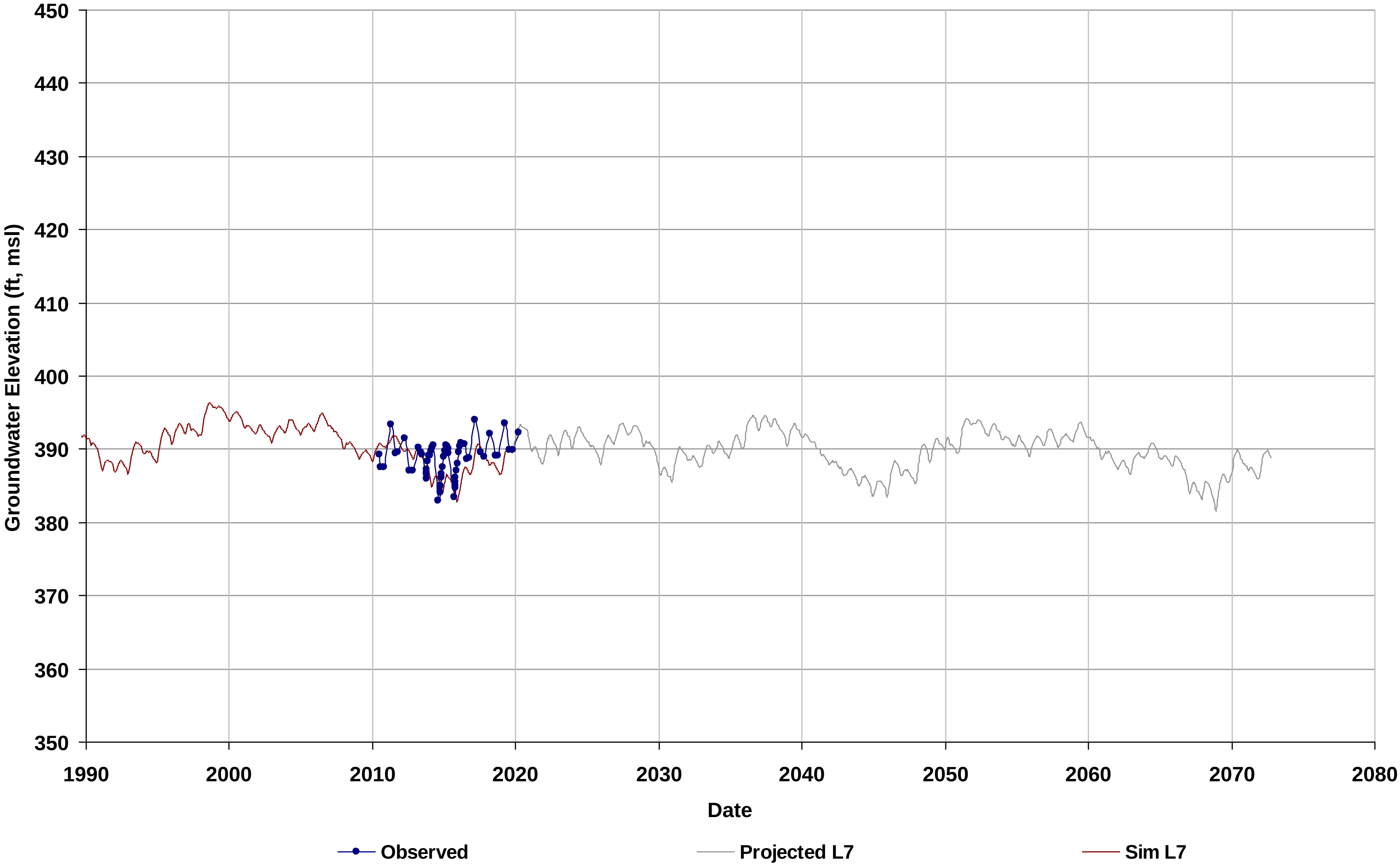
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

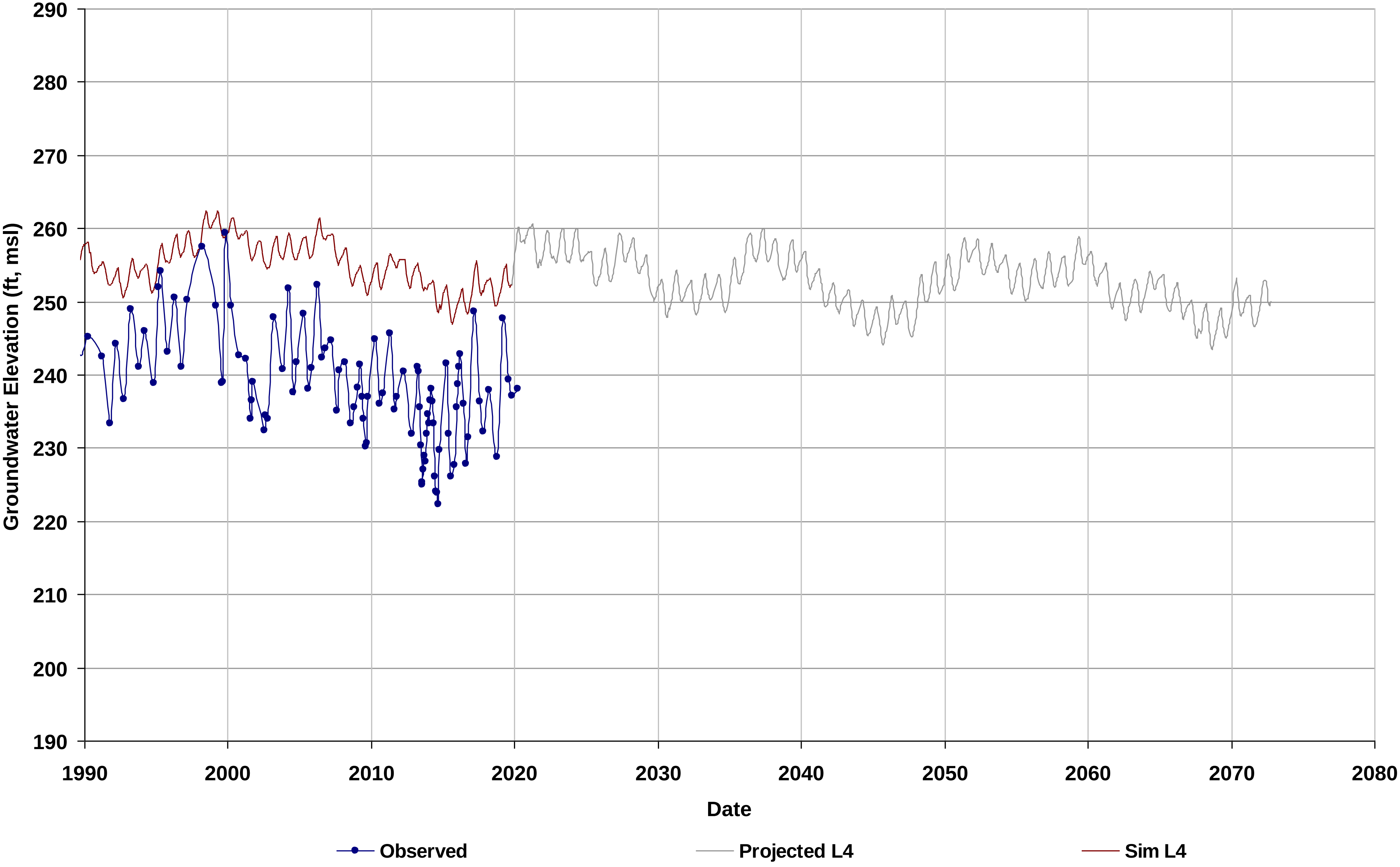
APPENDIX E-5

Tehama IHM Simulated Groundwater Levels:

Projected (Current Land Use) with Climate Change (2070) Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

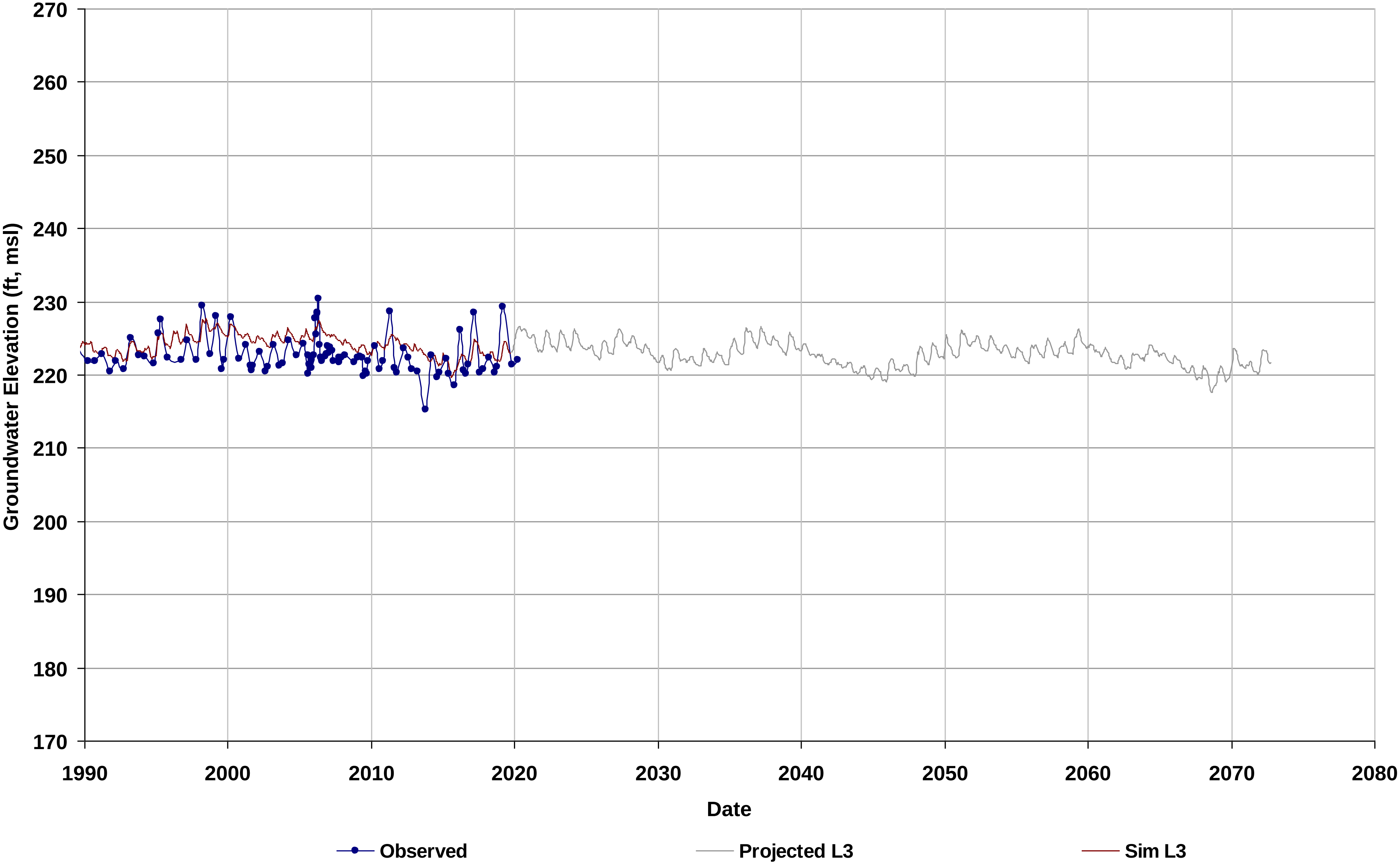
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

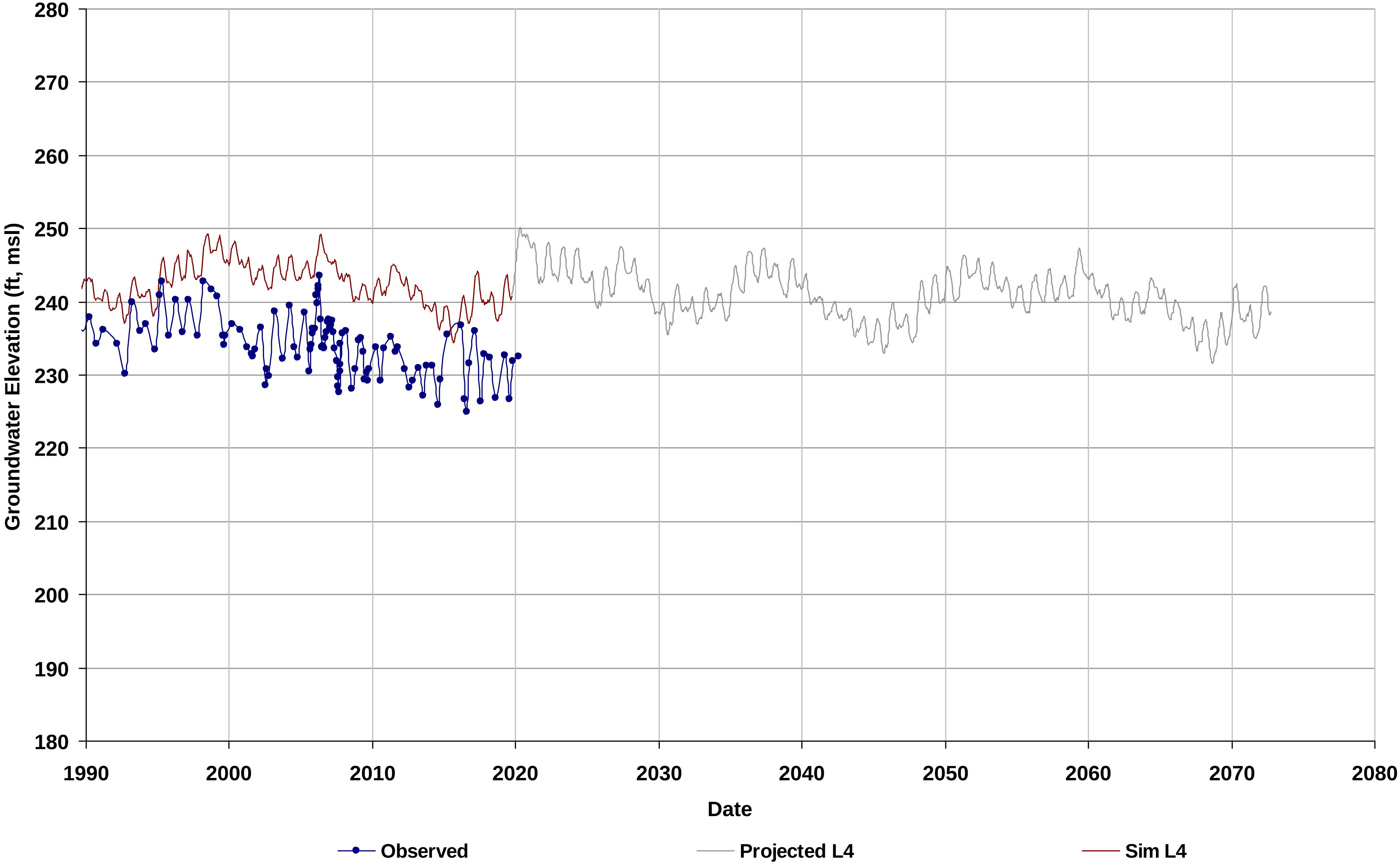
Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

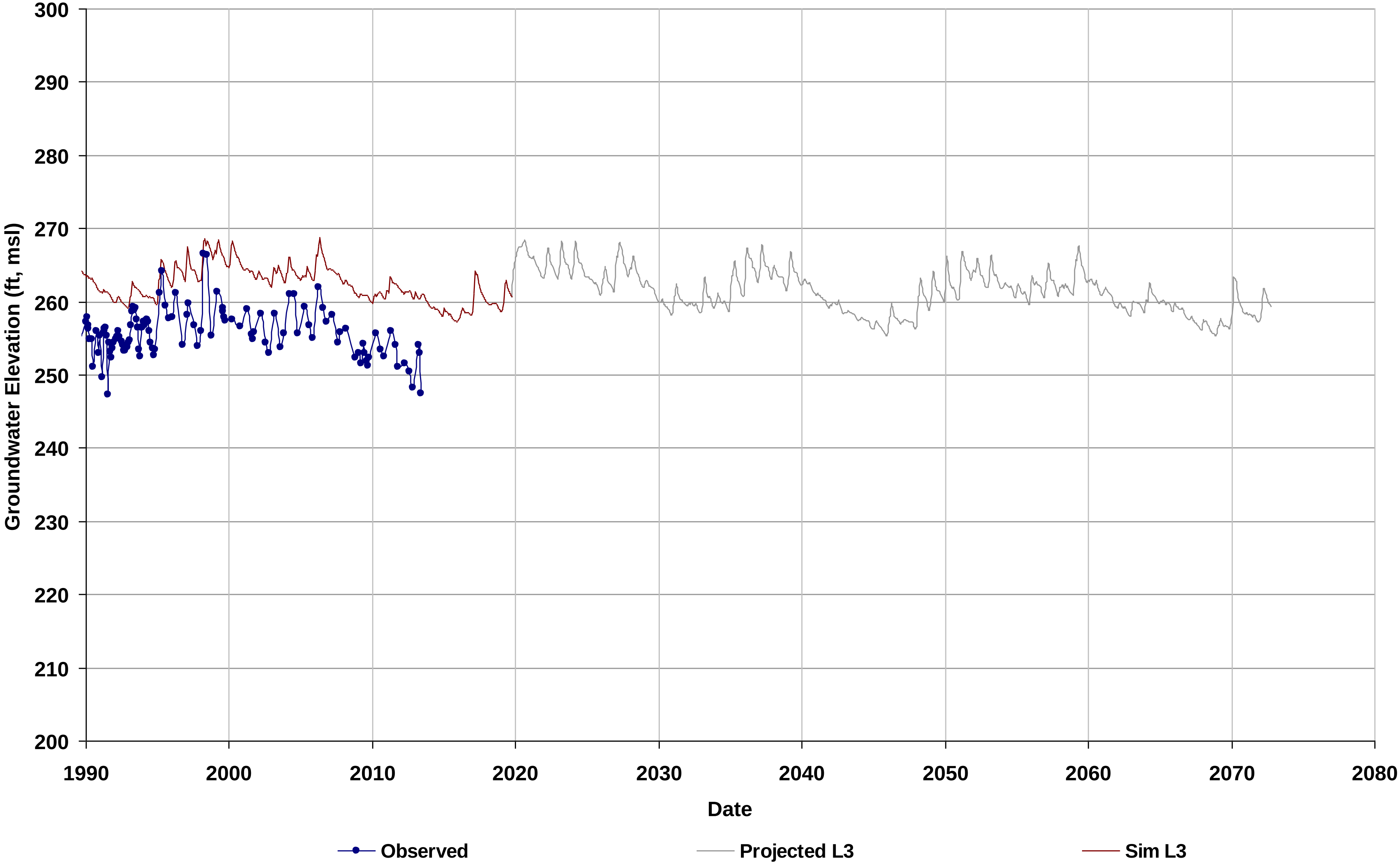
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

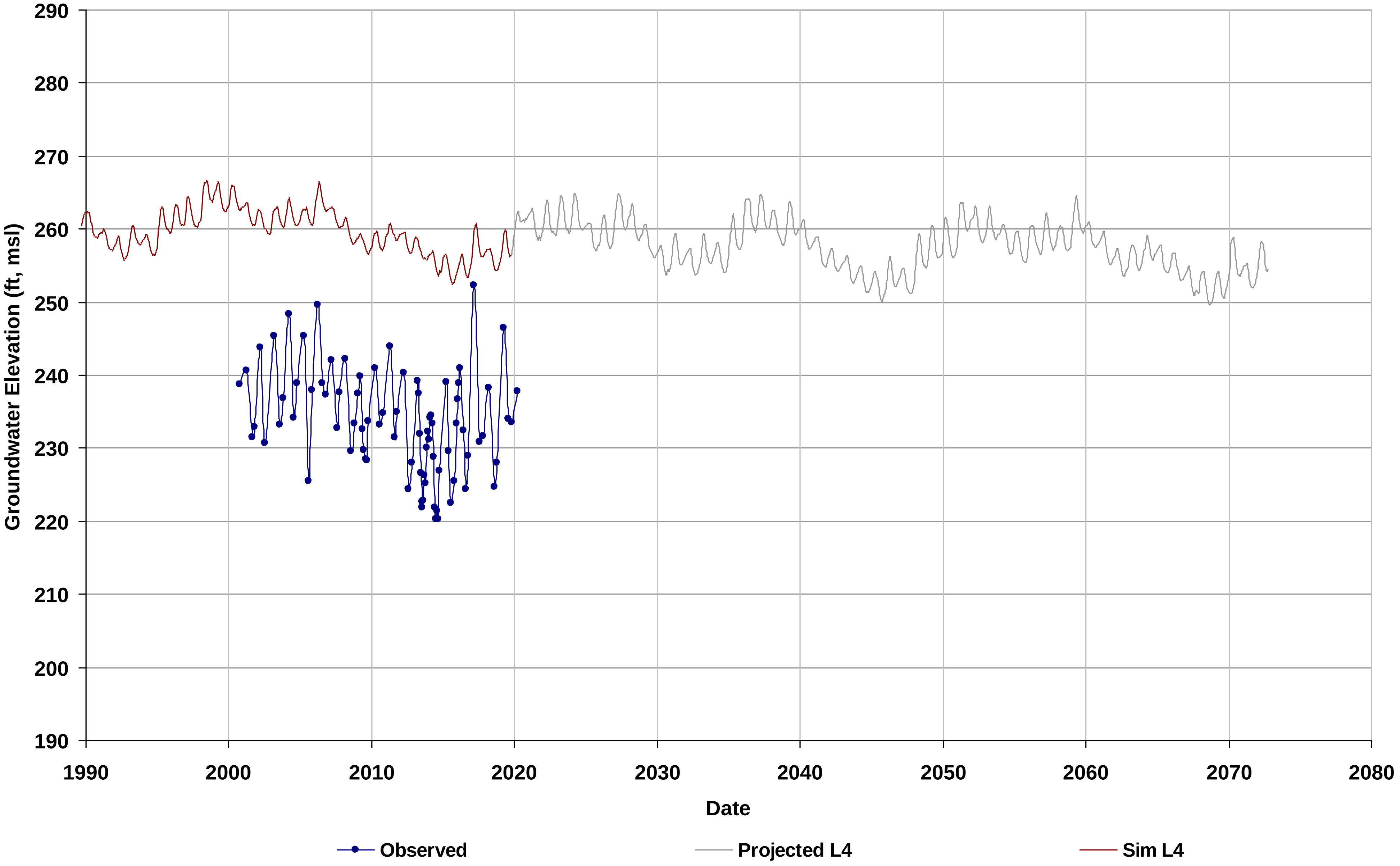
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

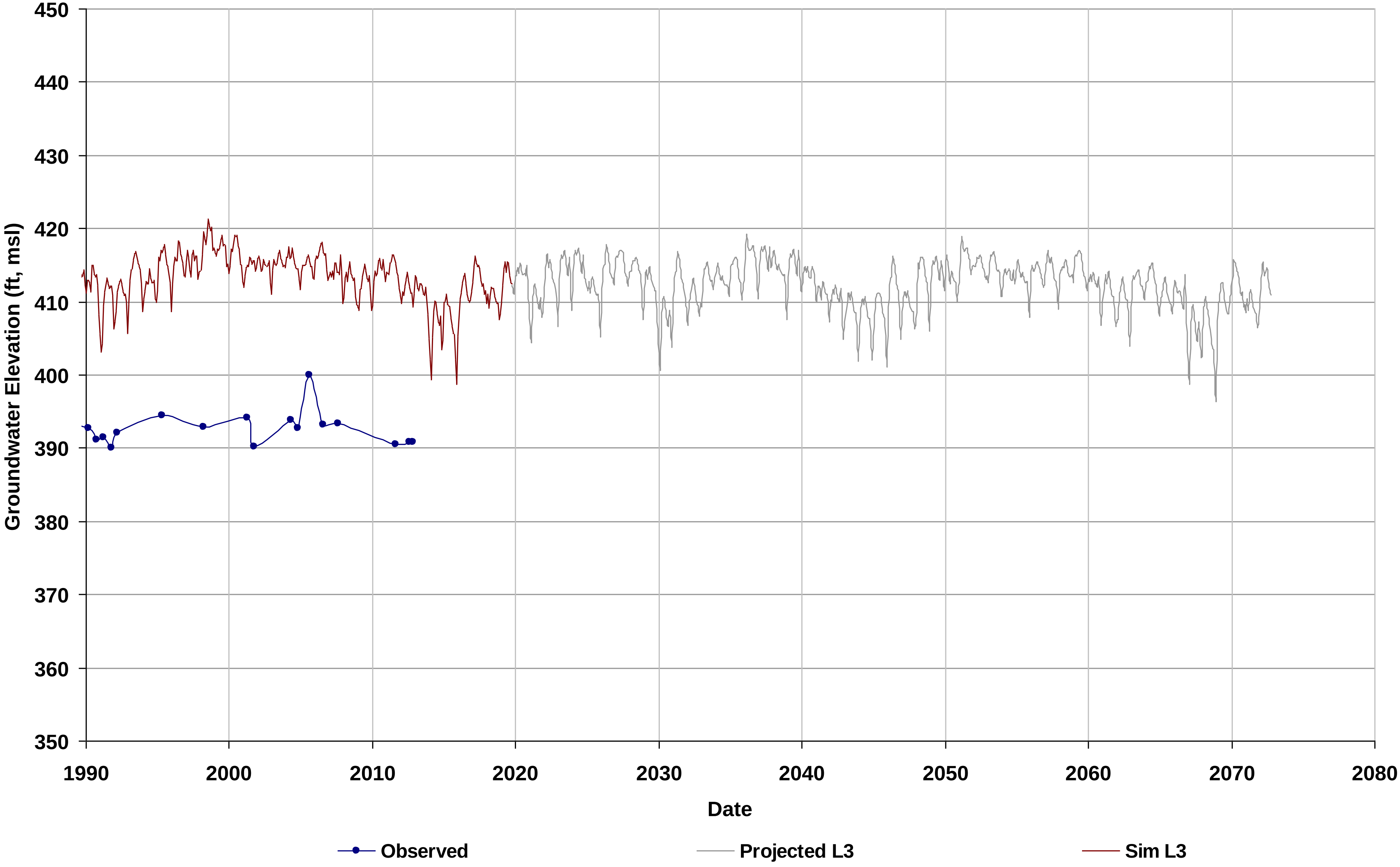
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

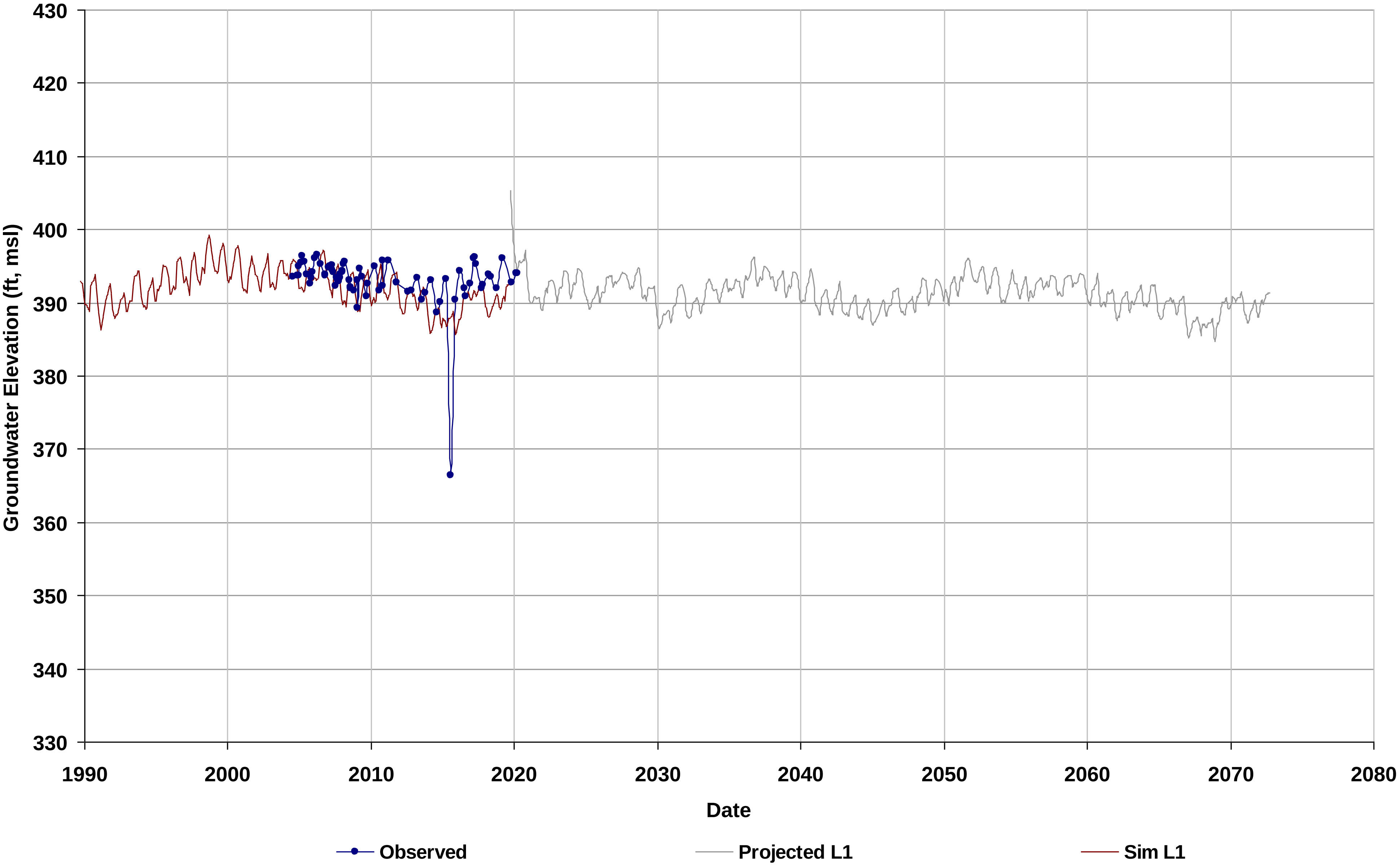
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

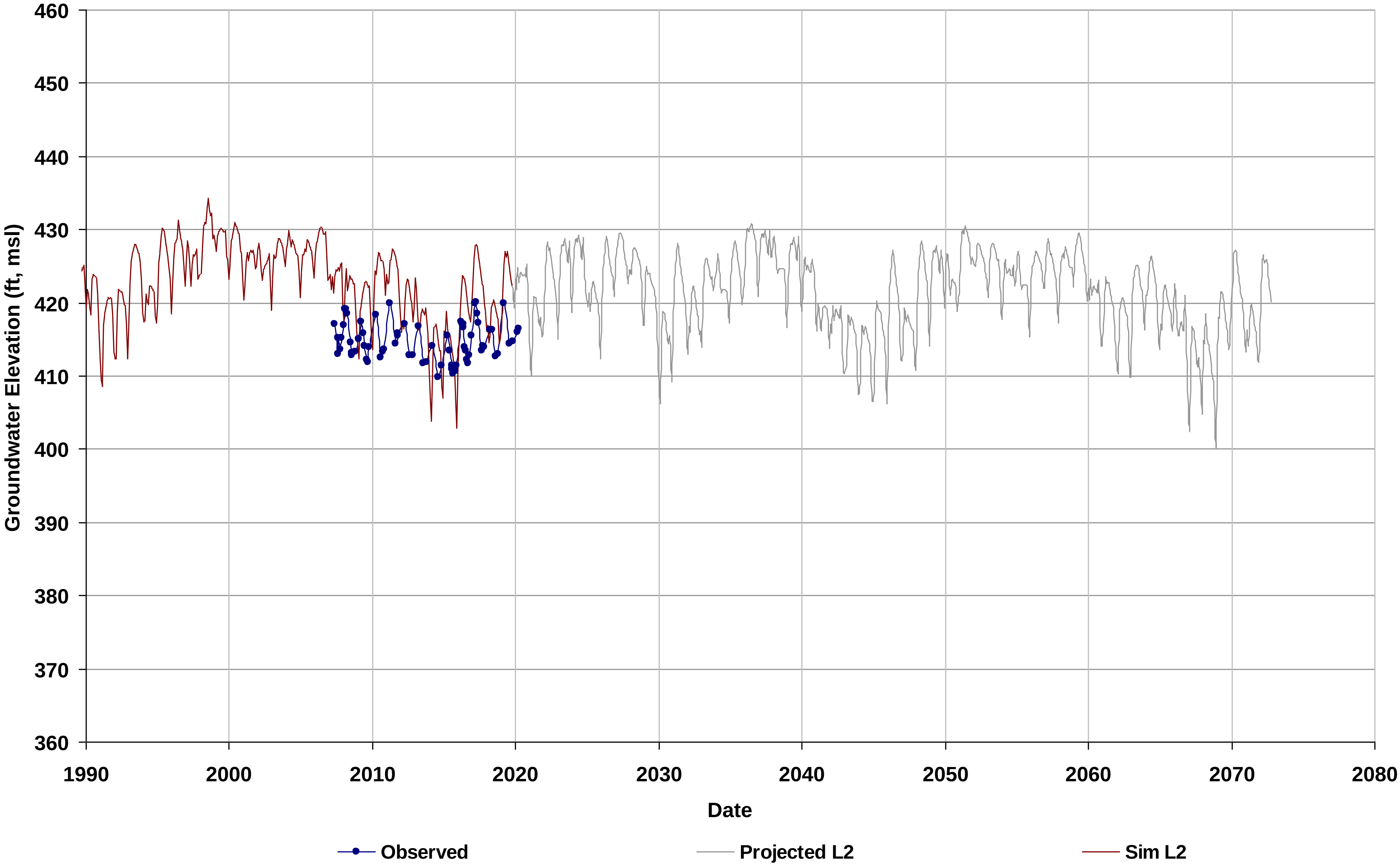
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

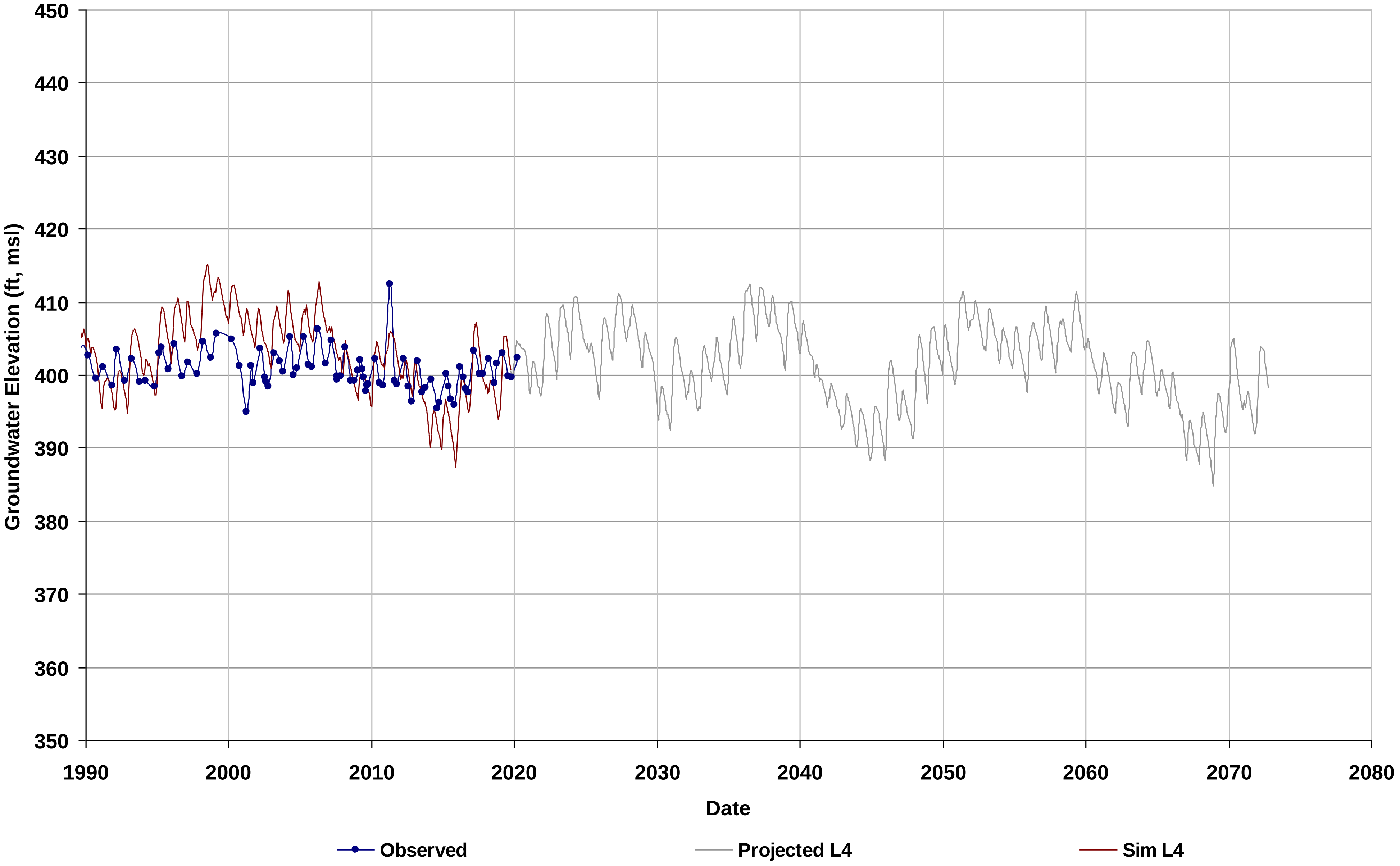
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

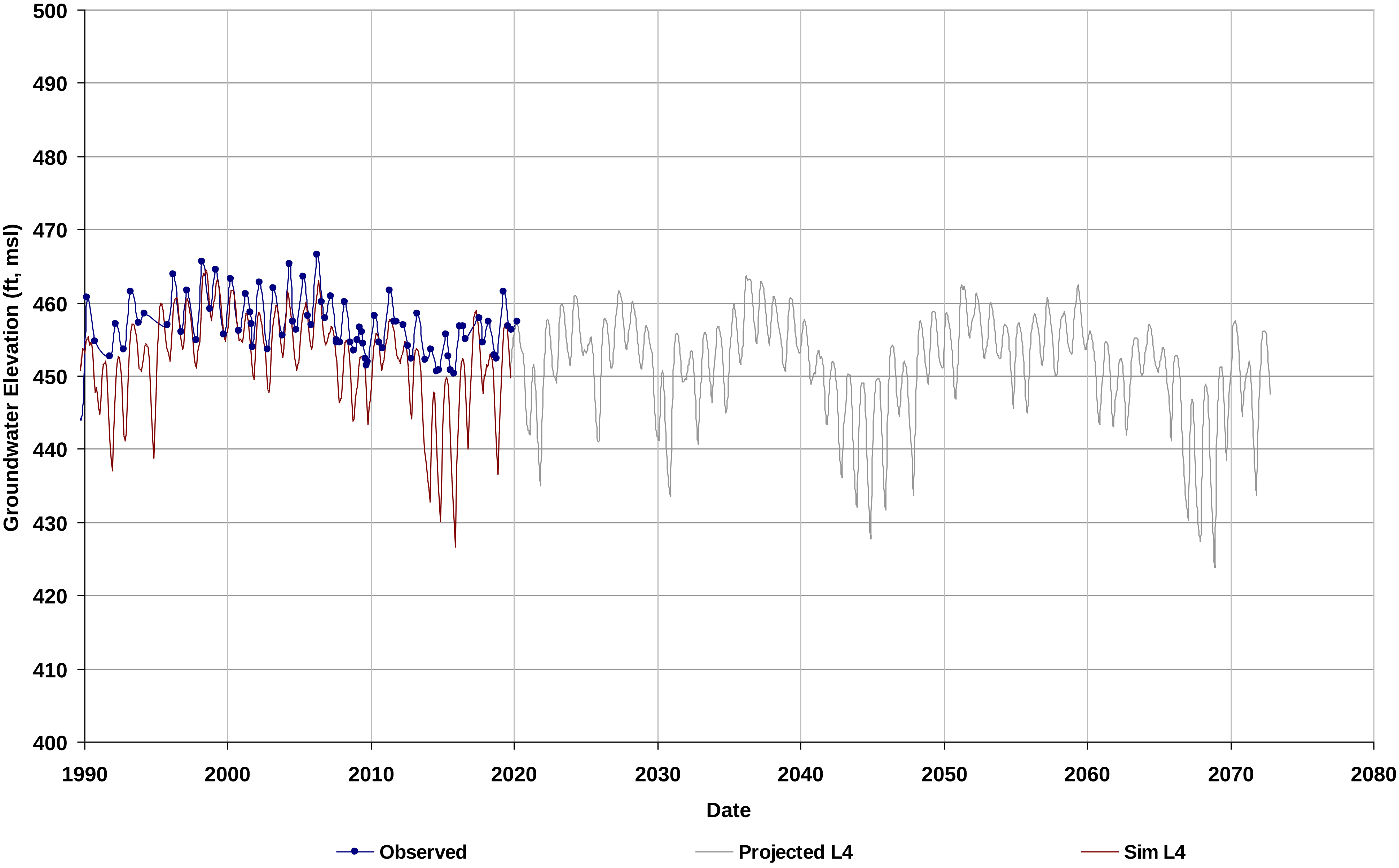
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

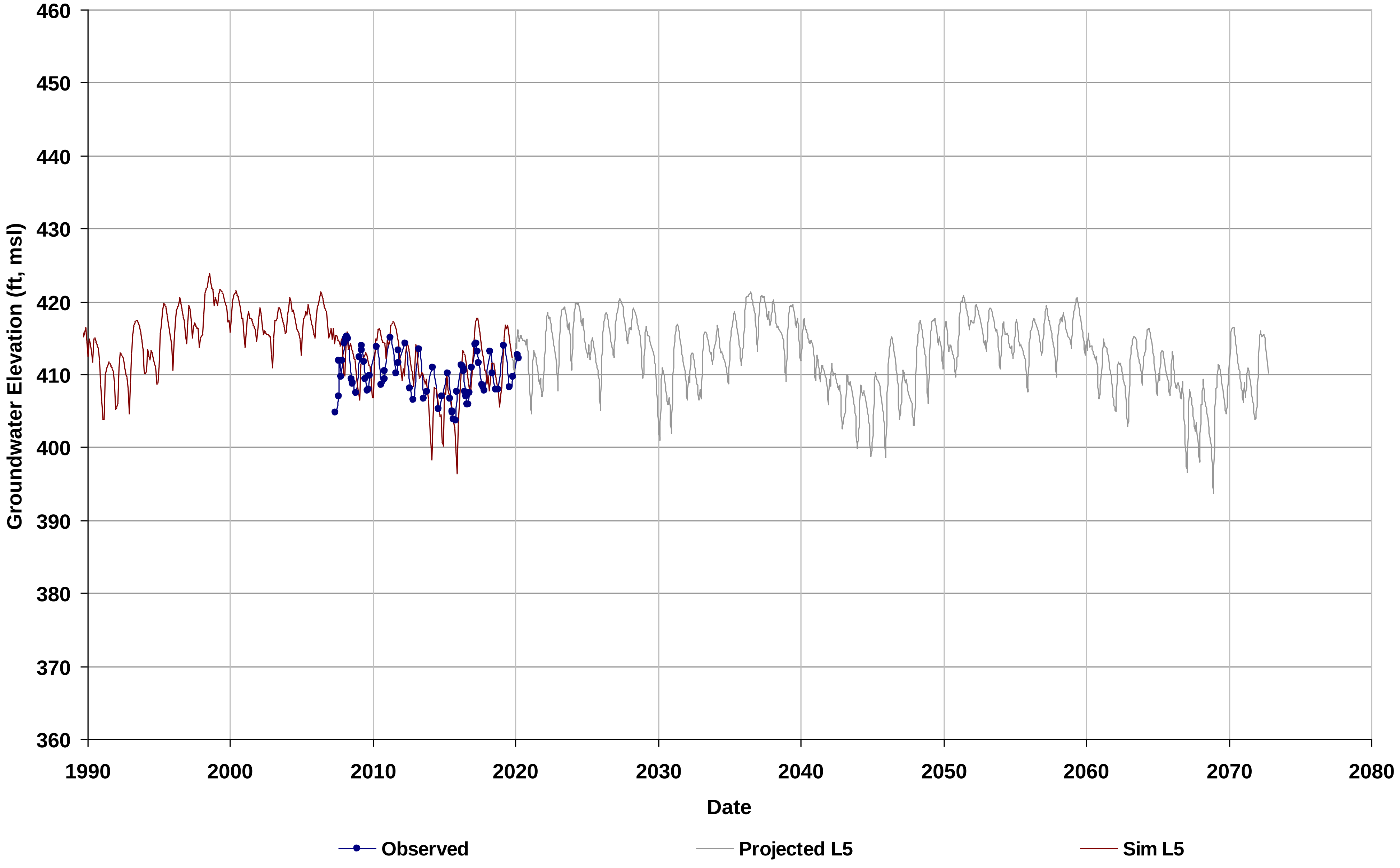
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

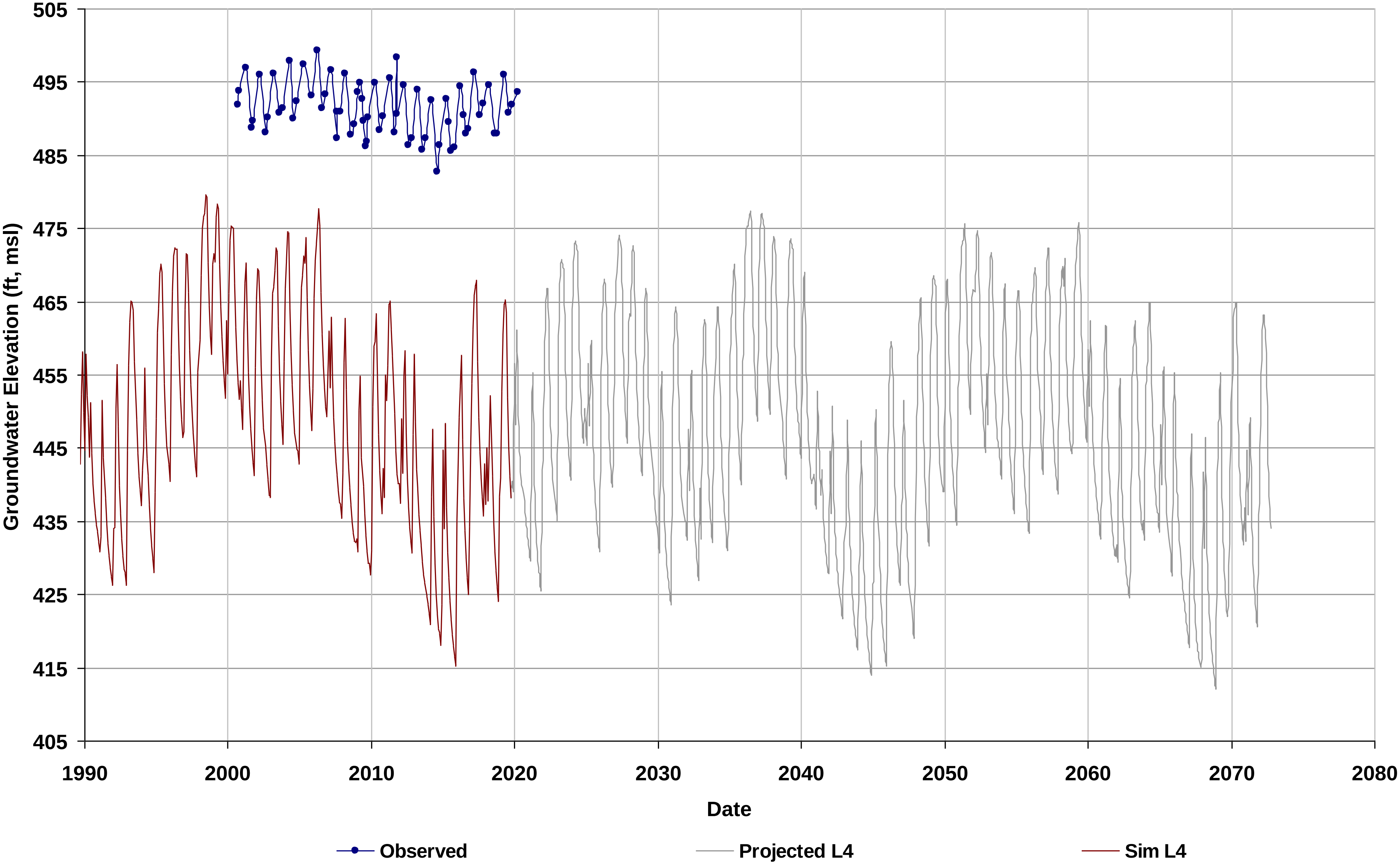
Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

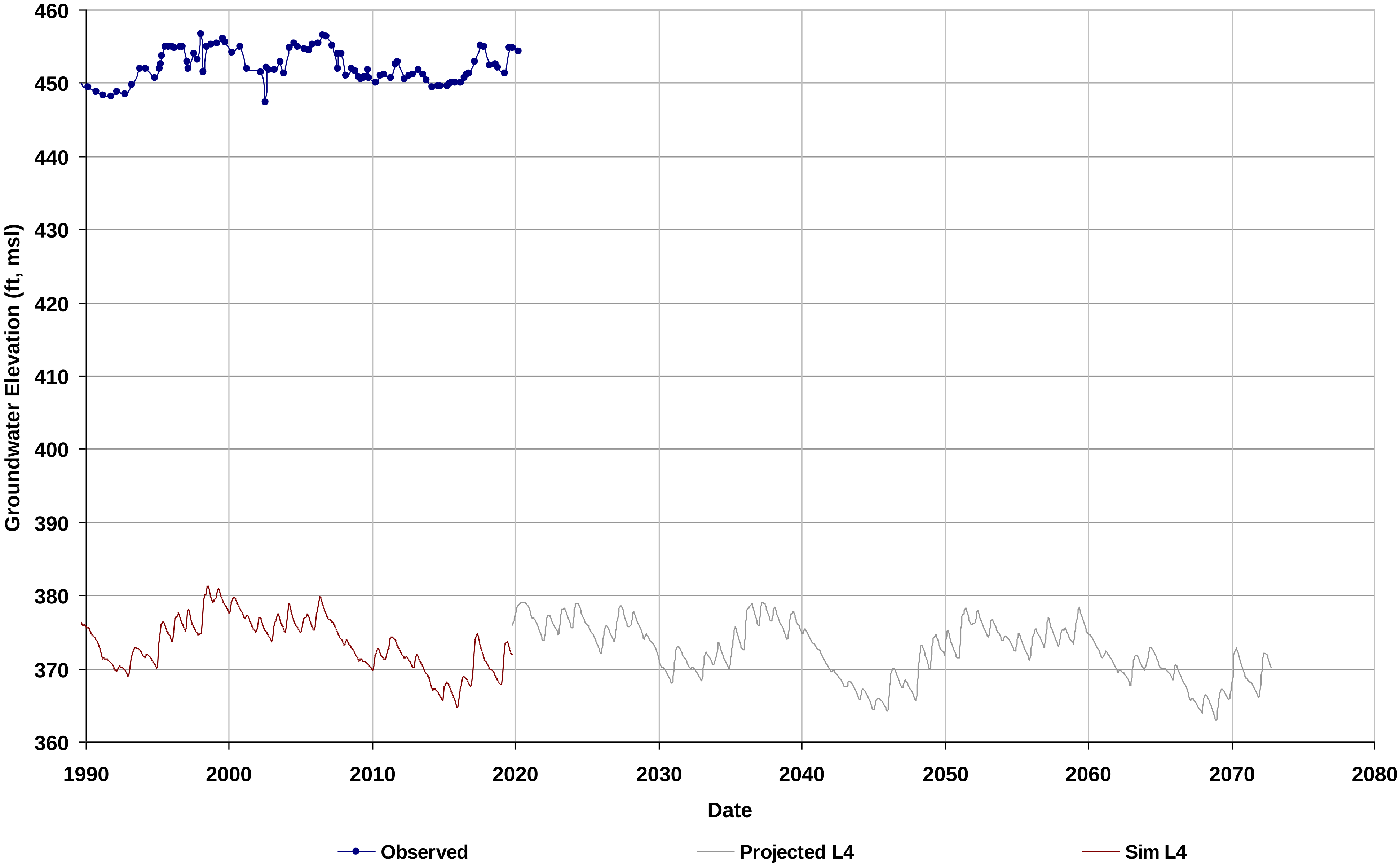
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

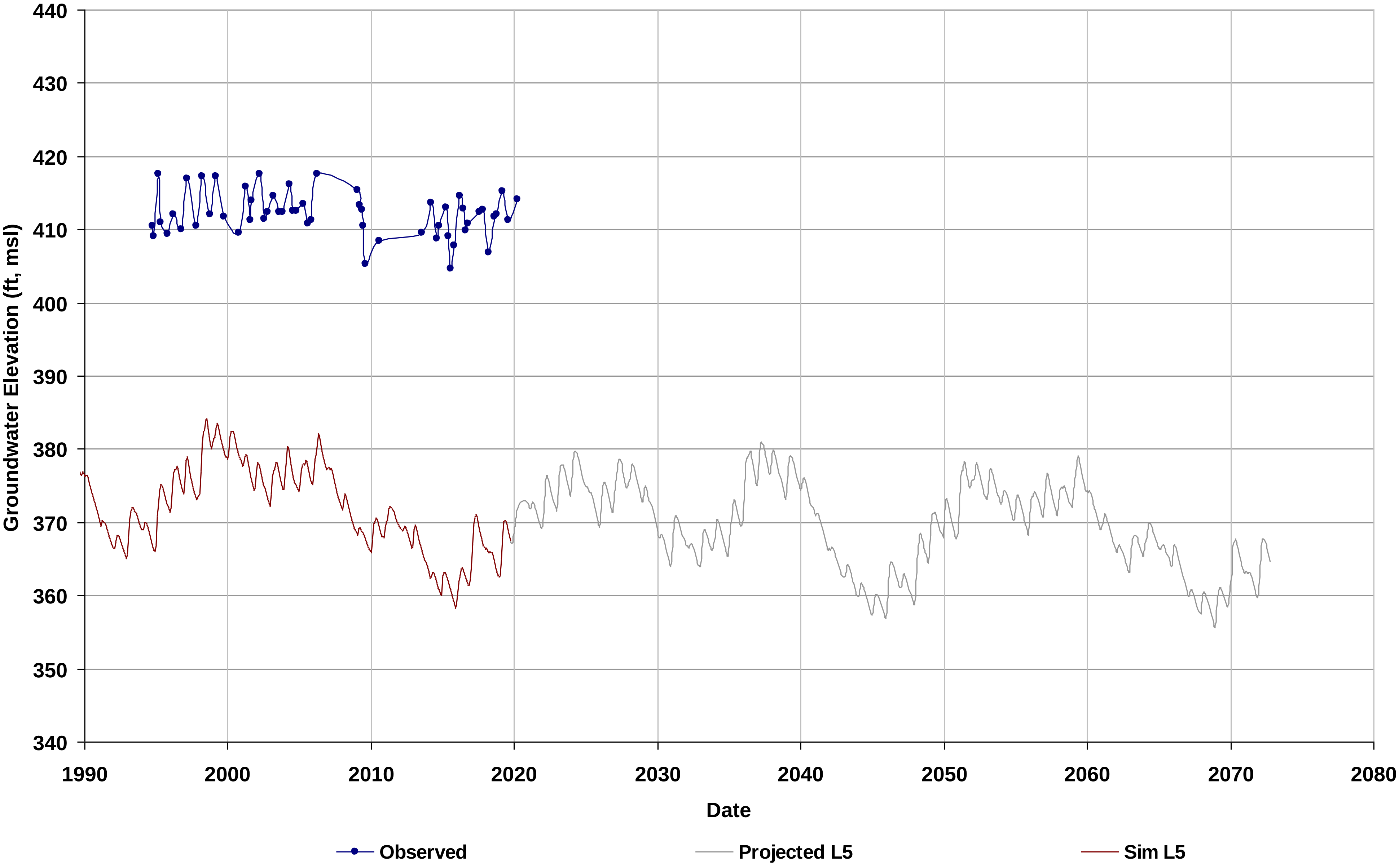
Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

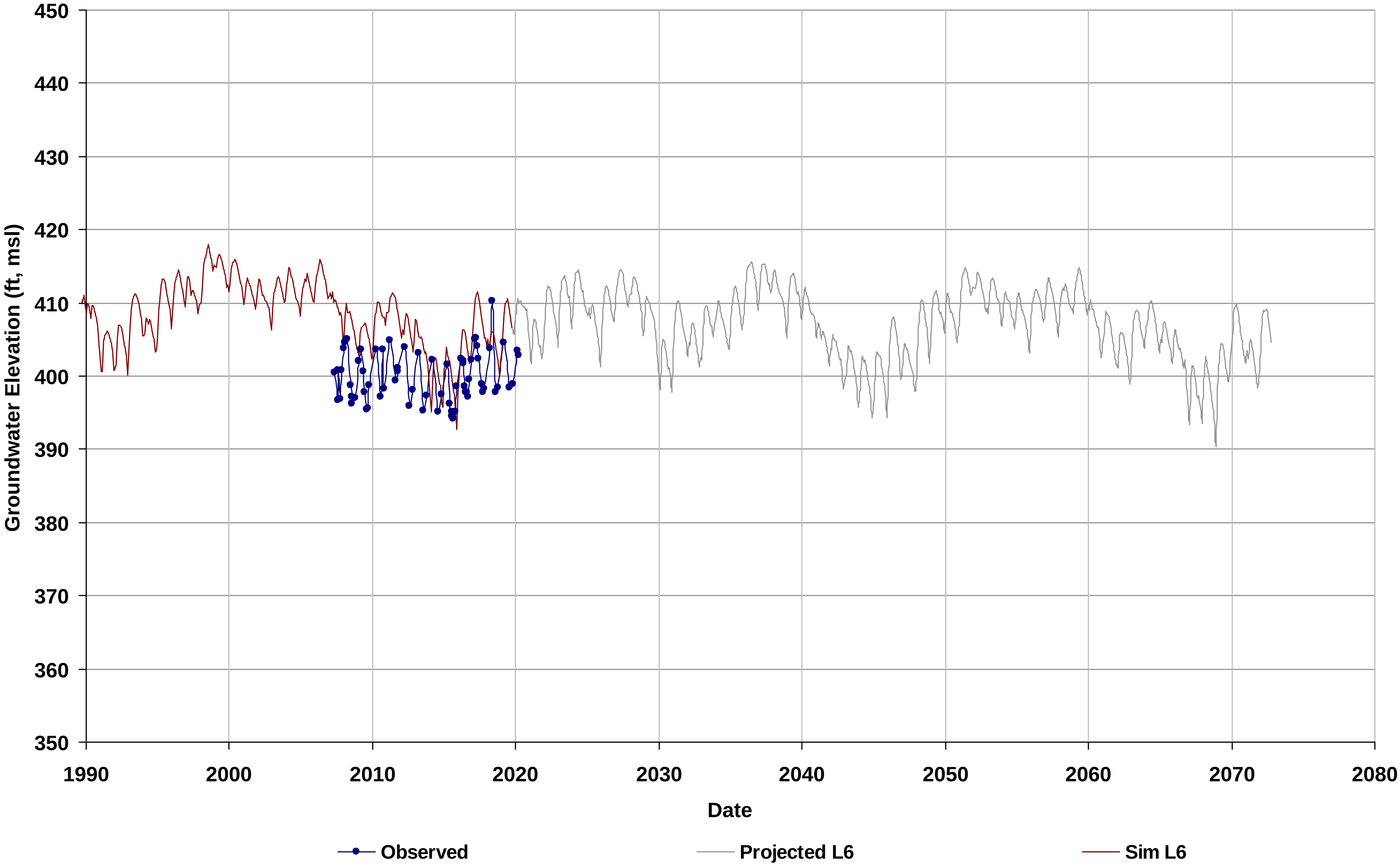
Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

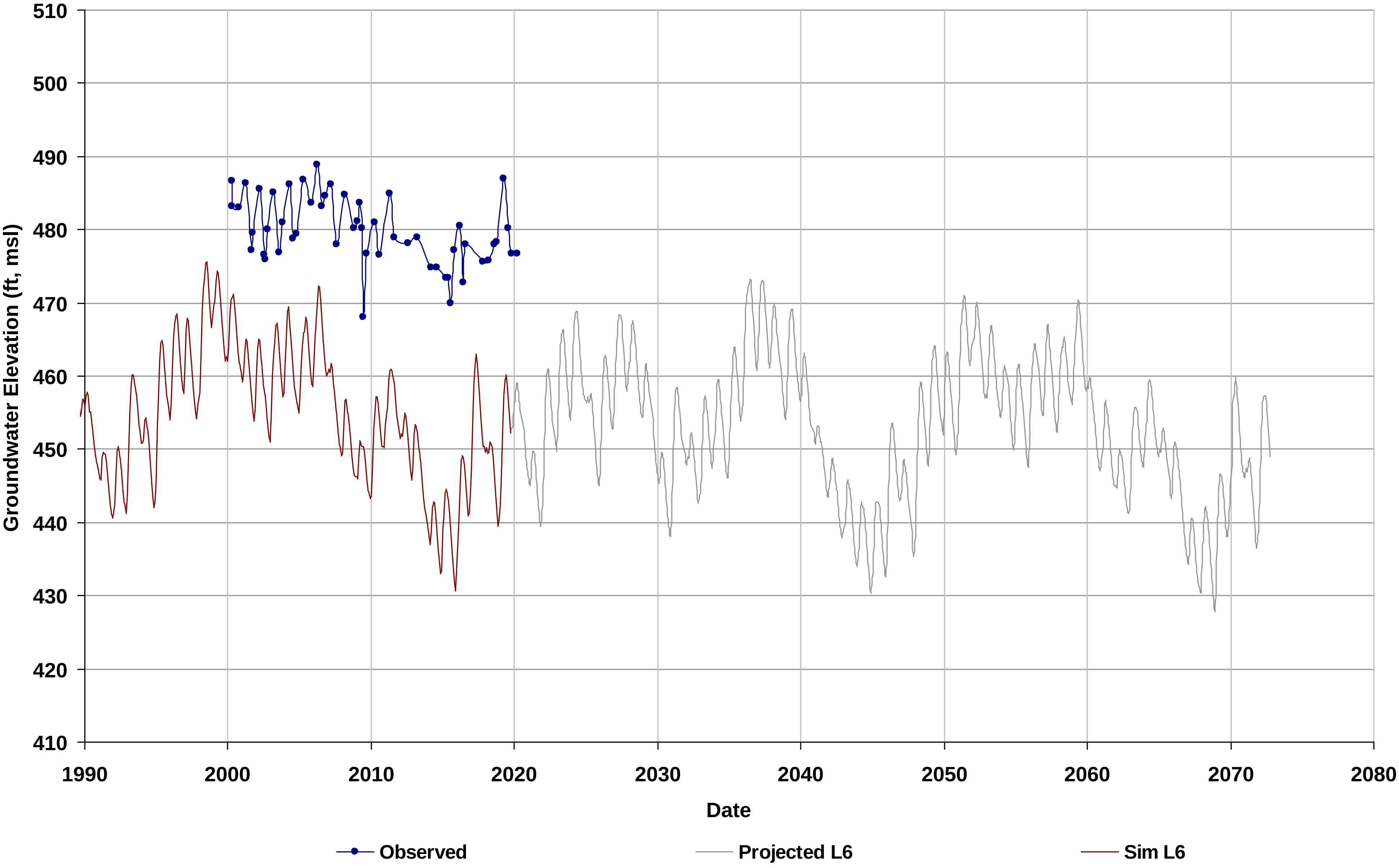
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

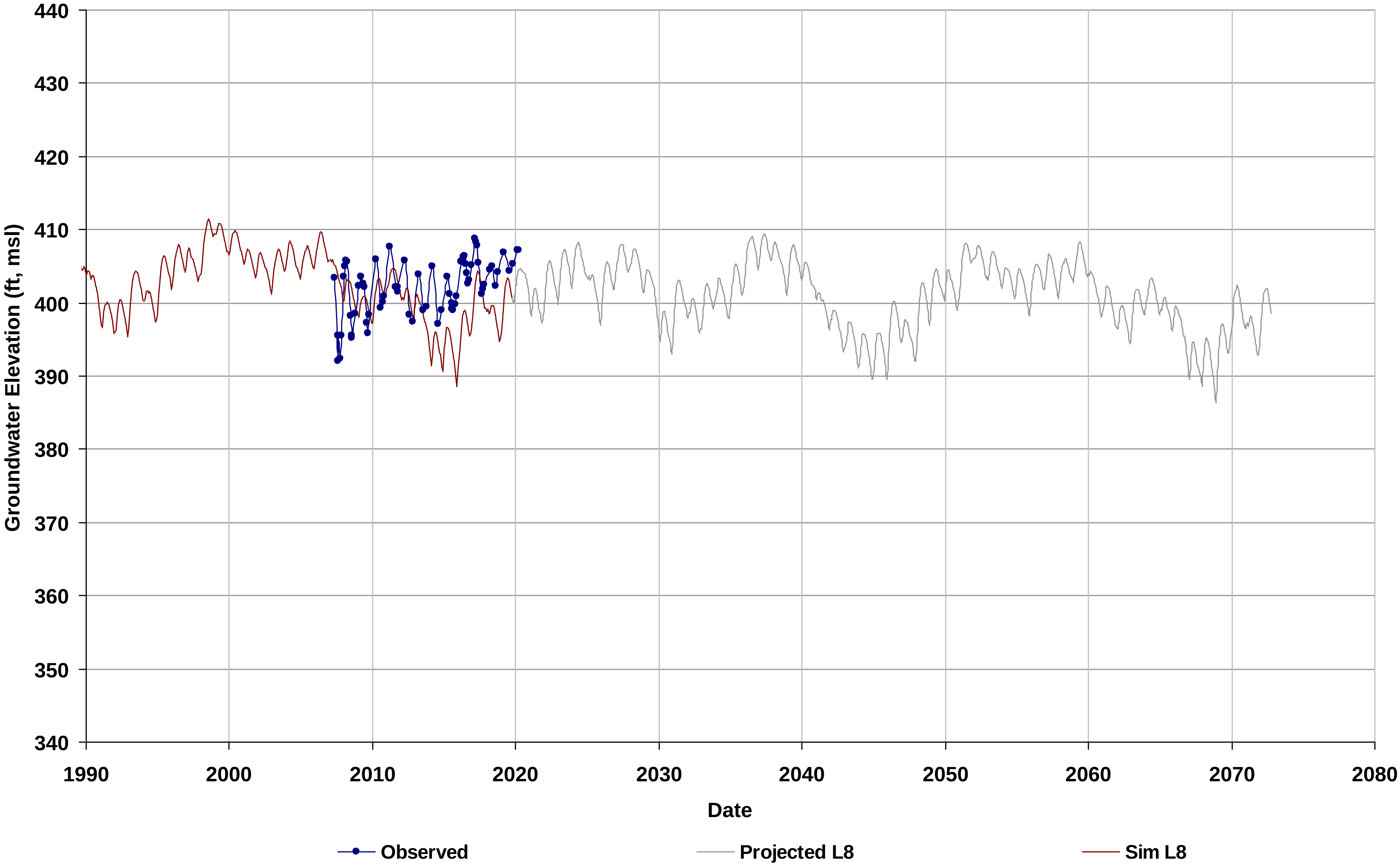
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

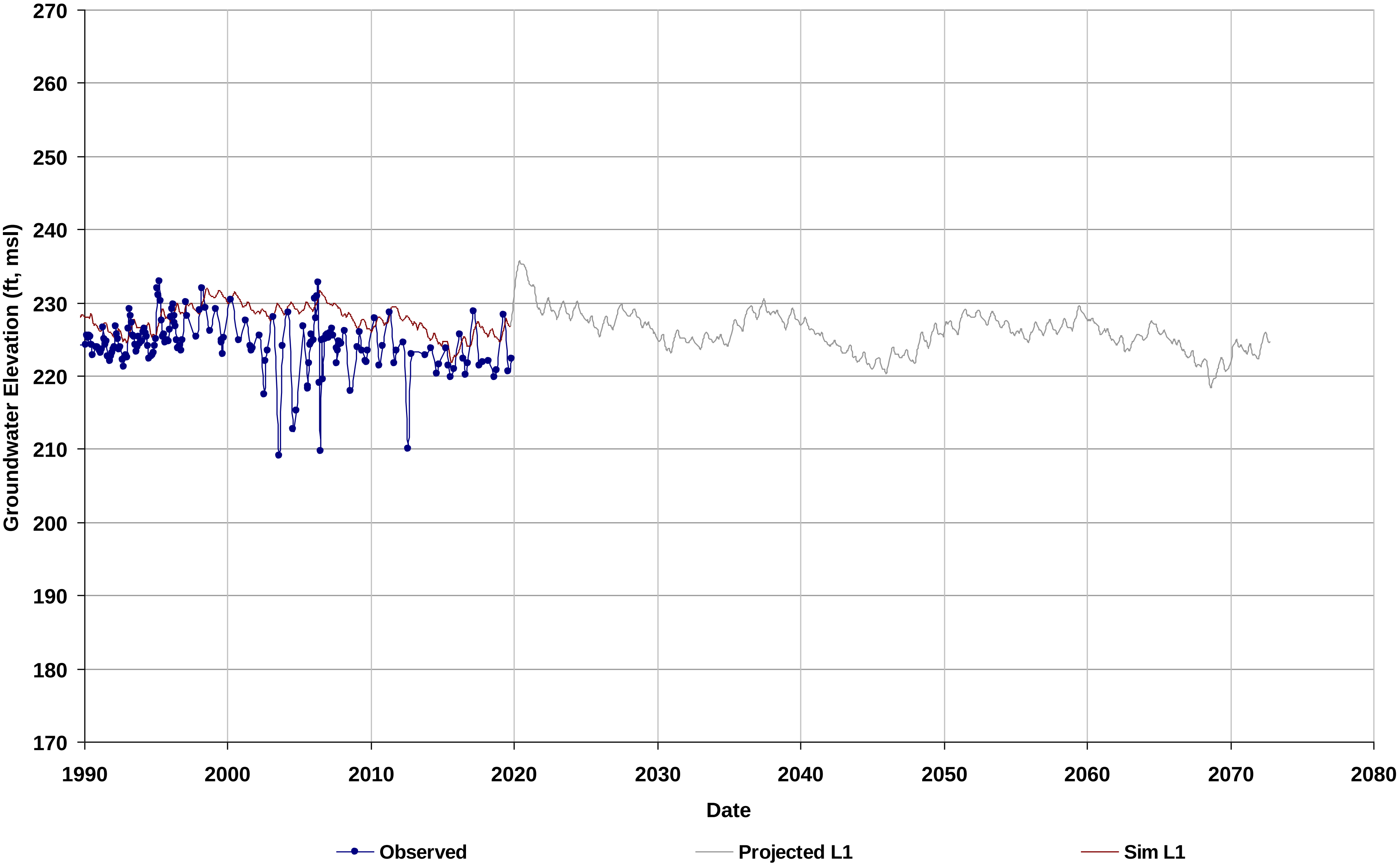
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

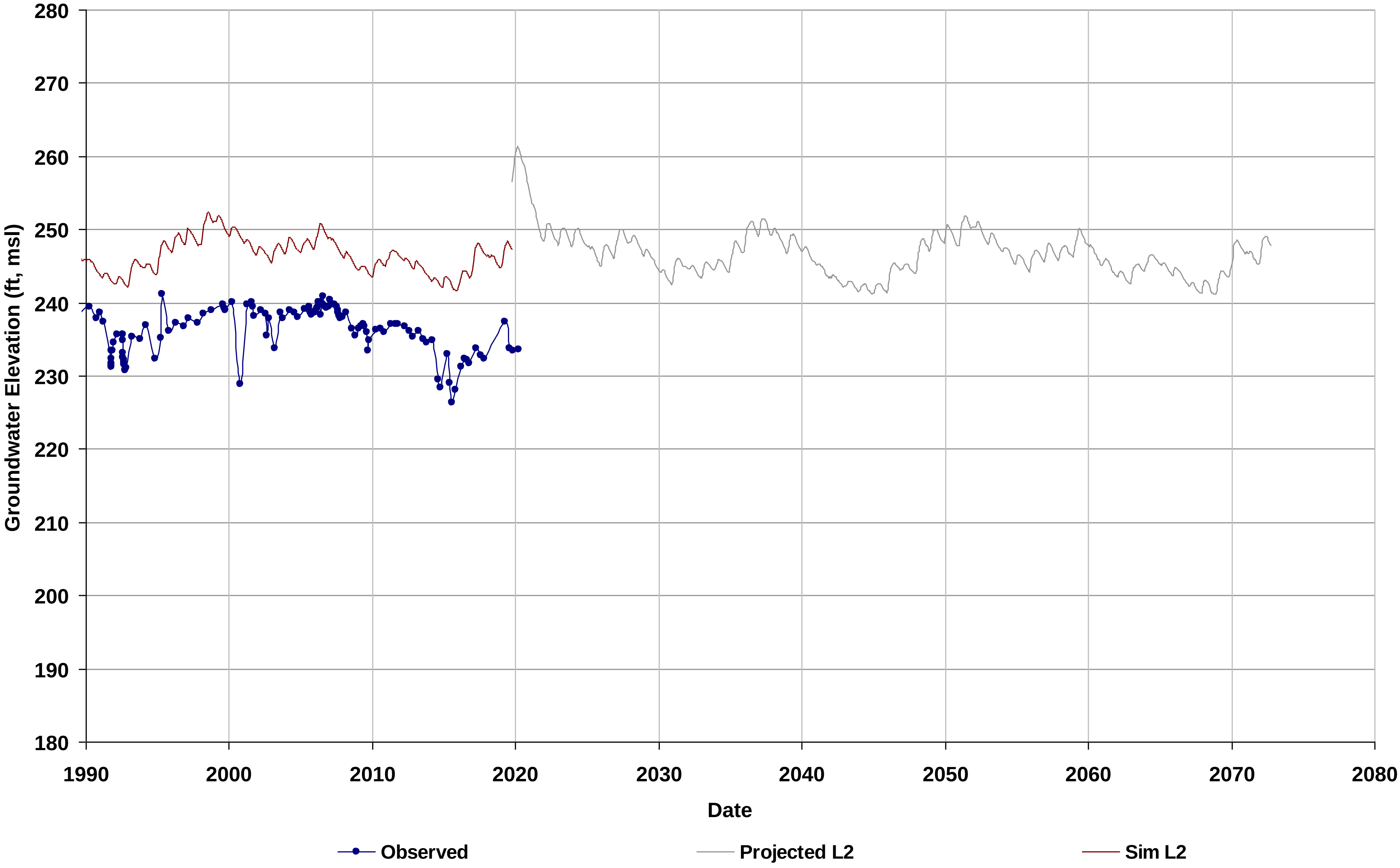
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

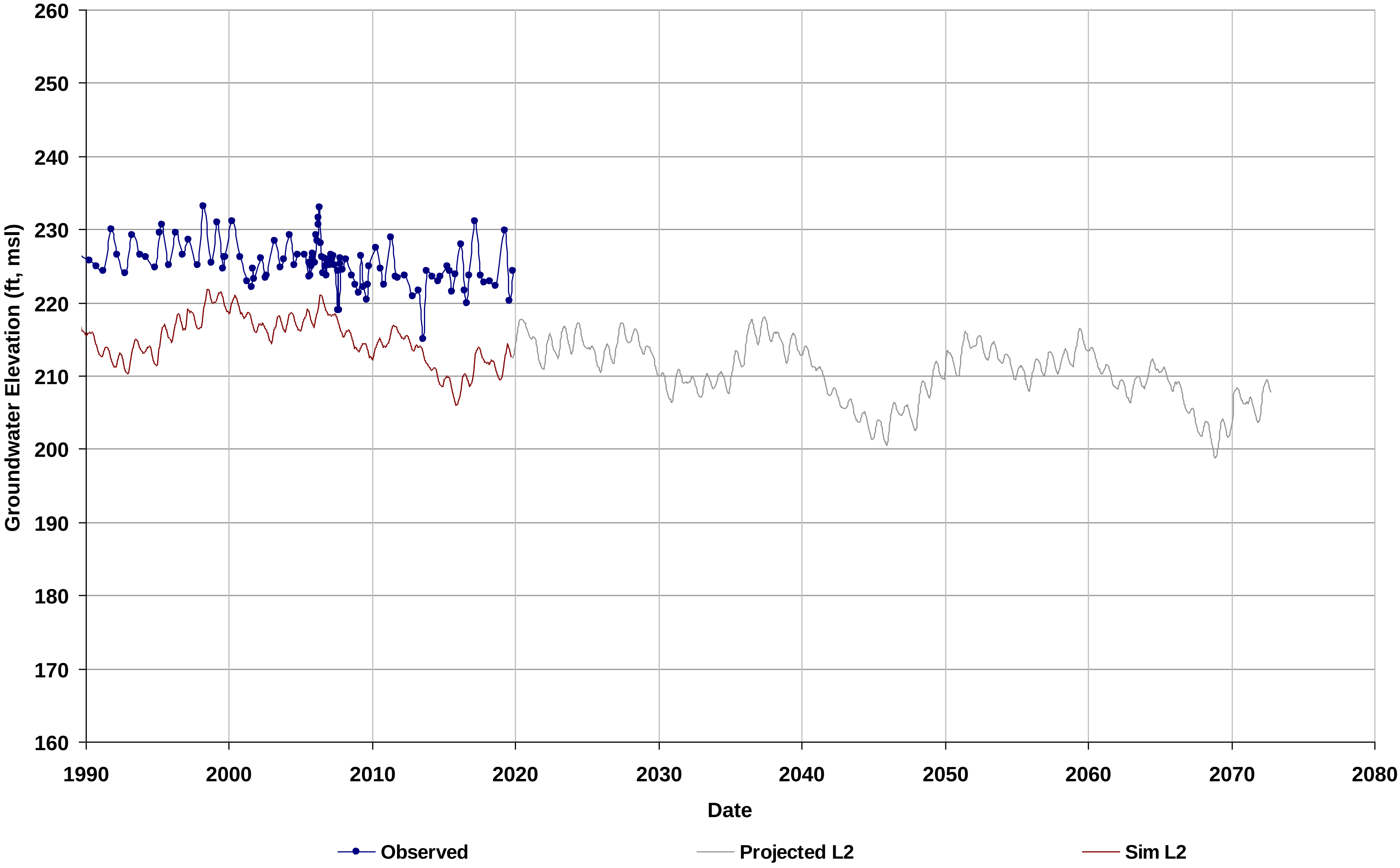
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

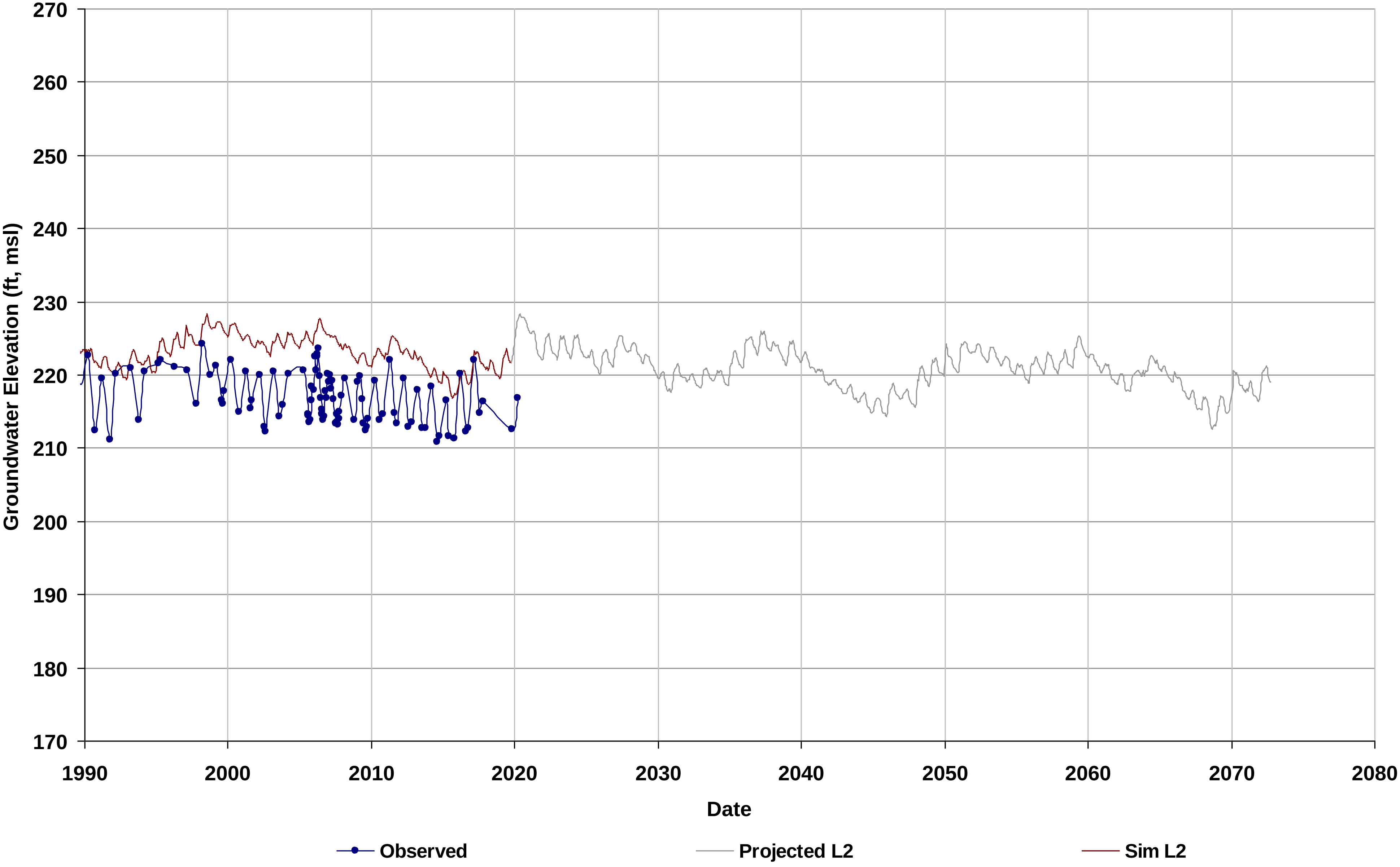
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

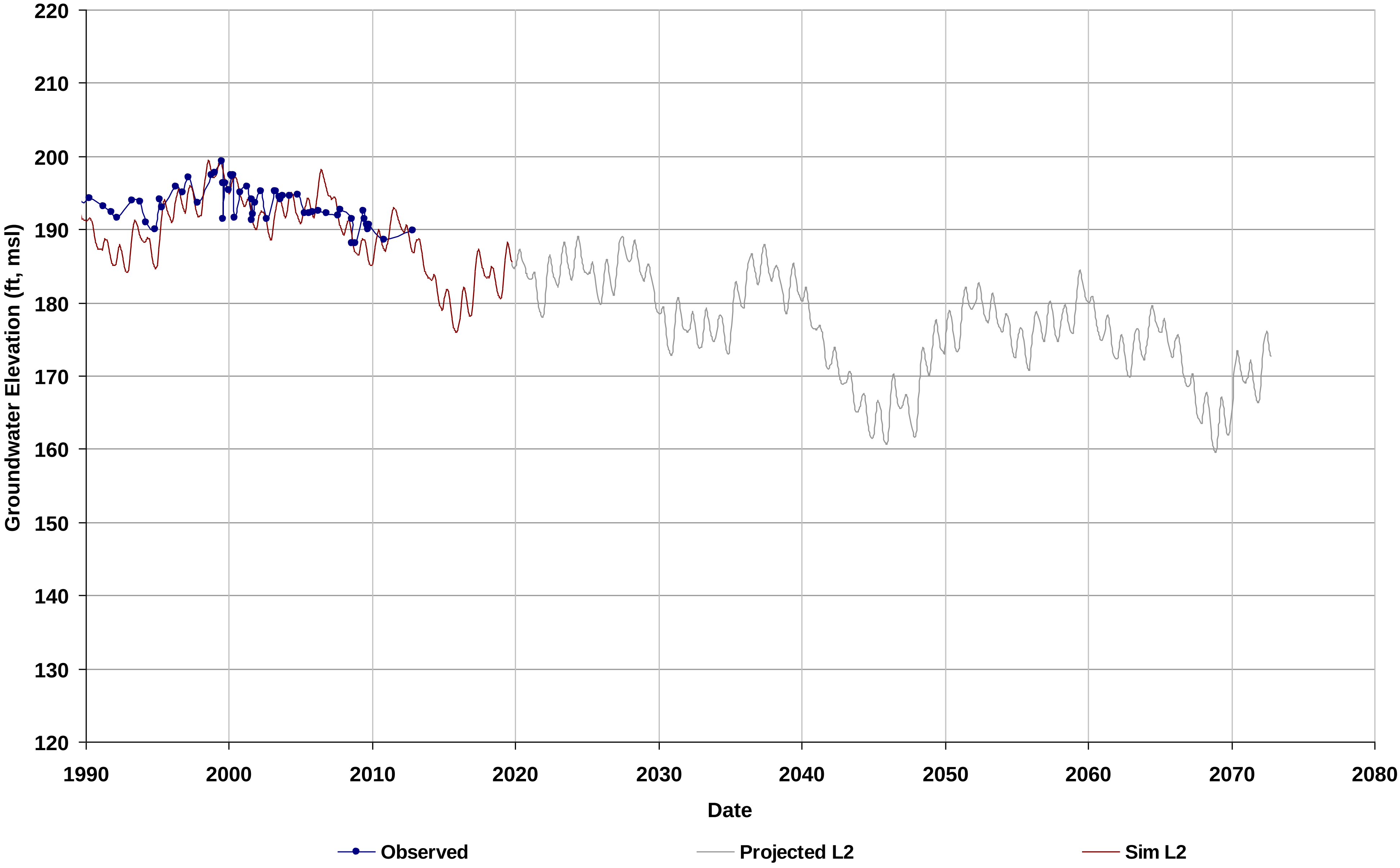
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

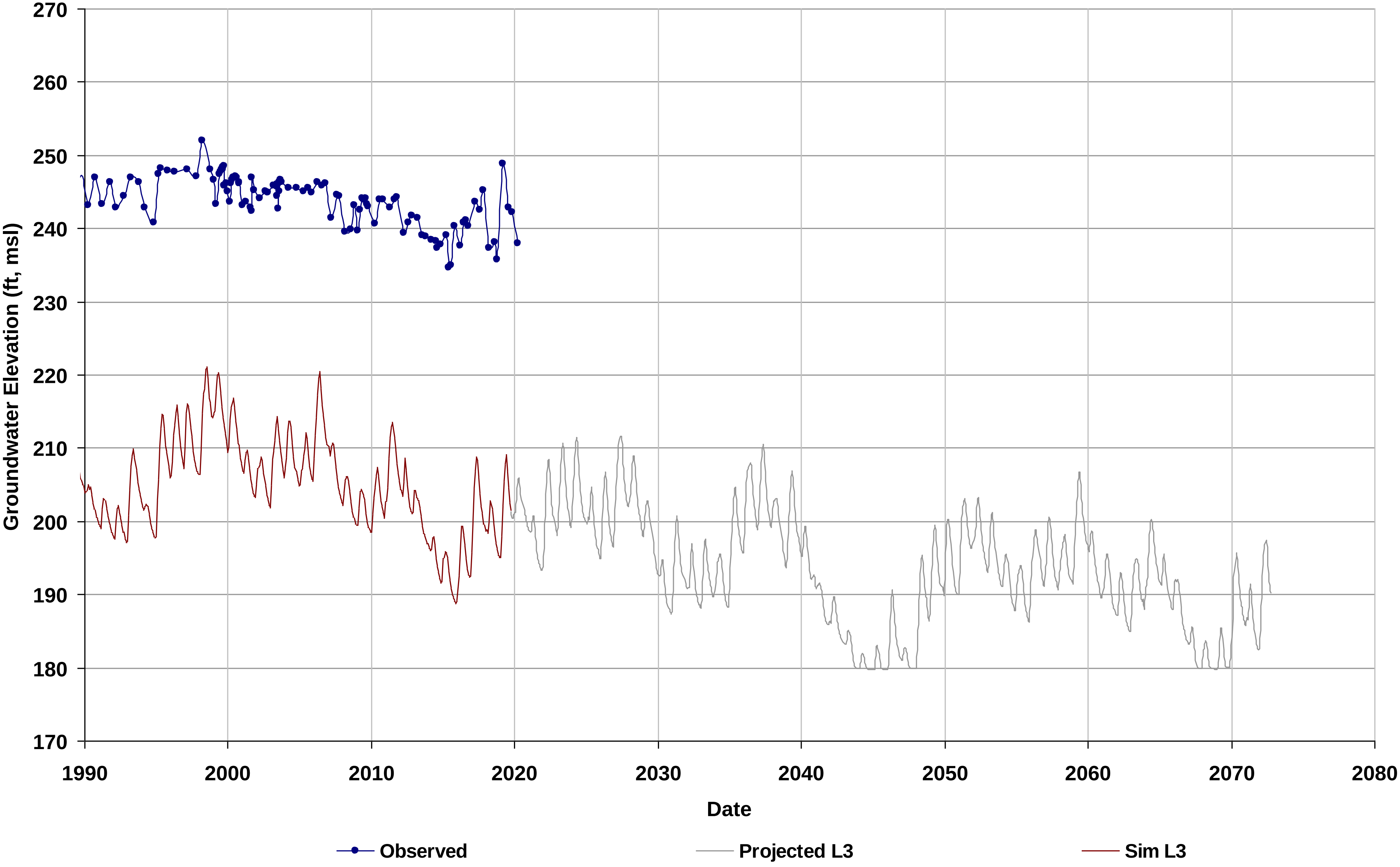
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

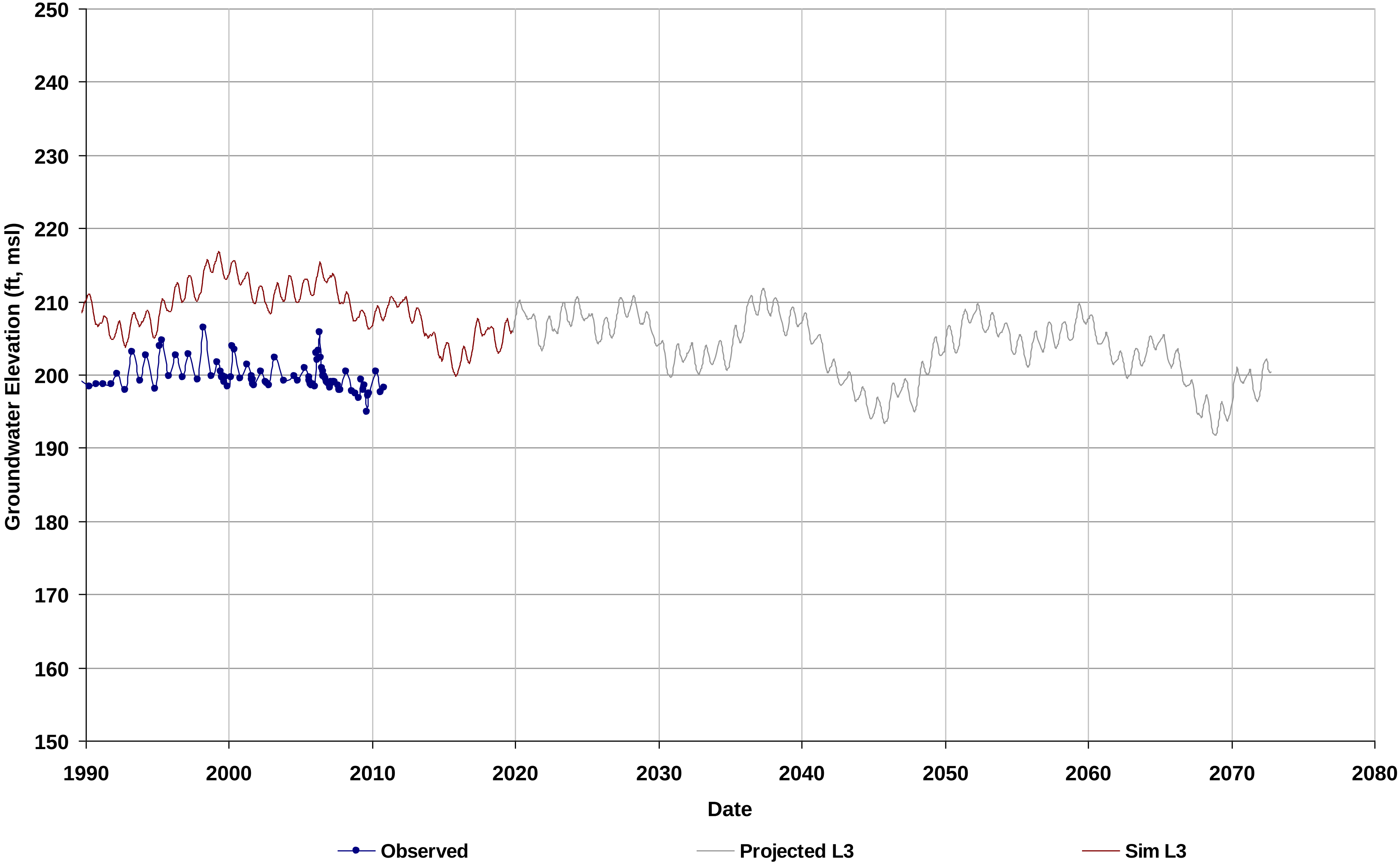
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

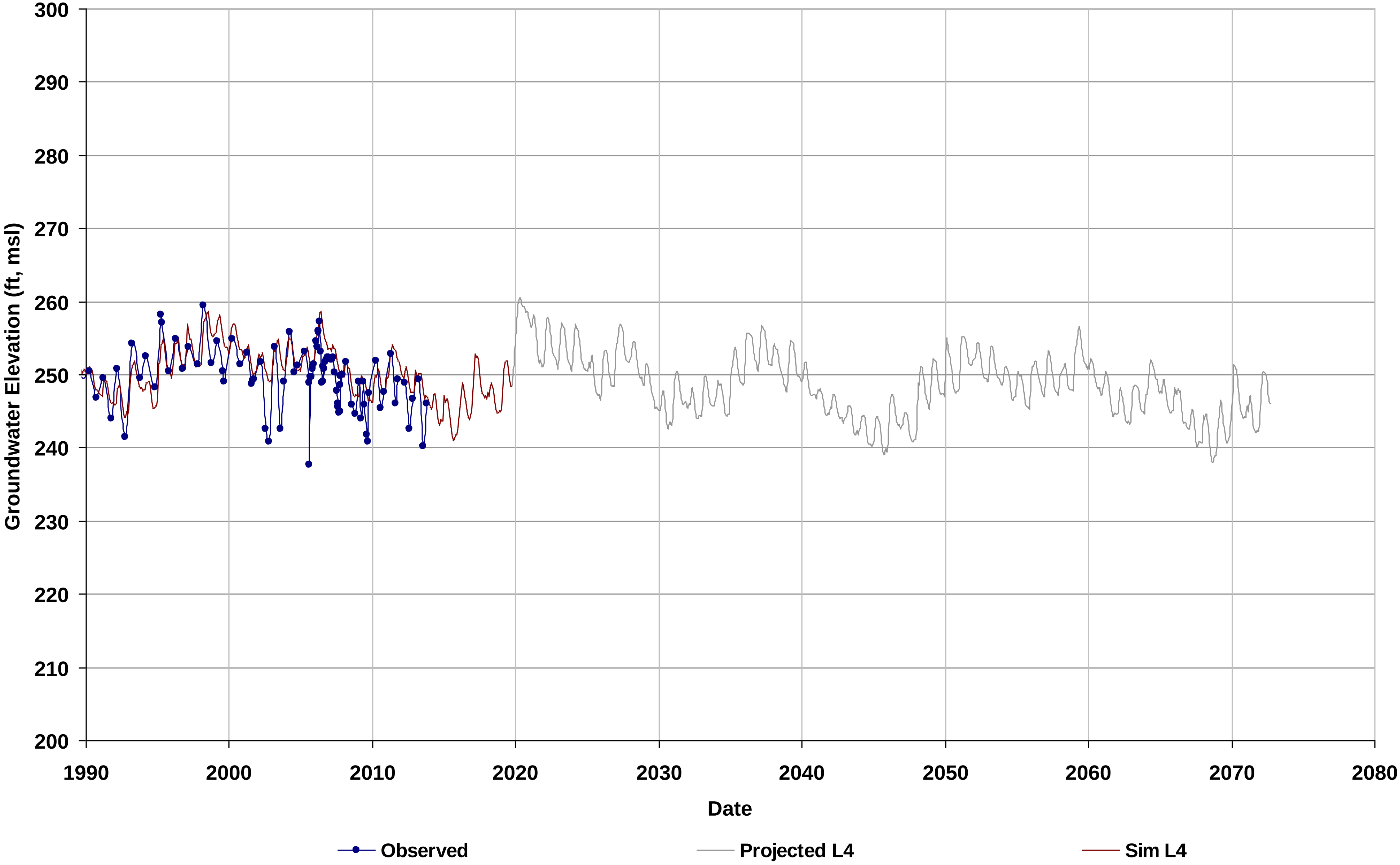
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

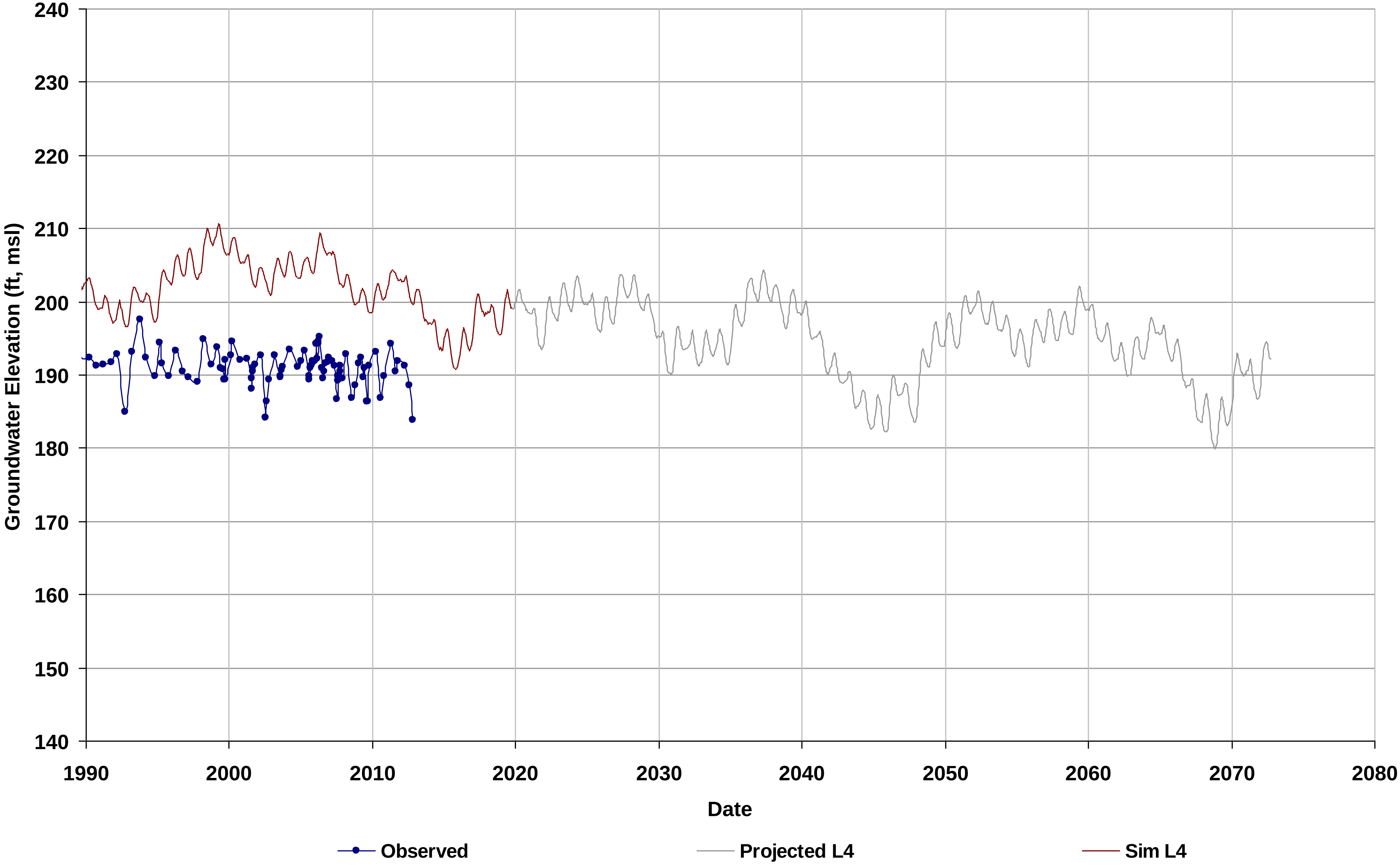
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

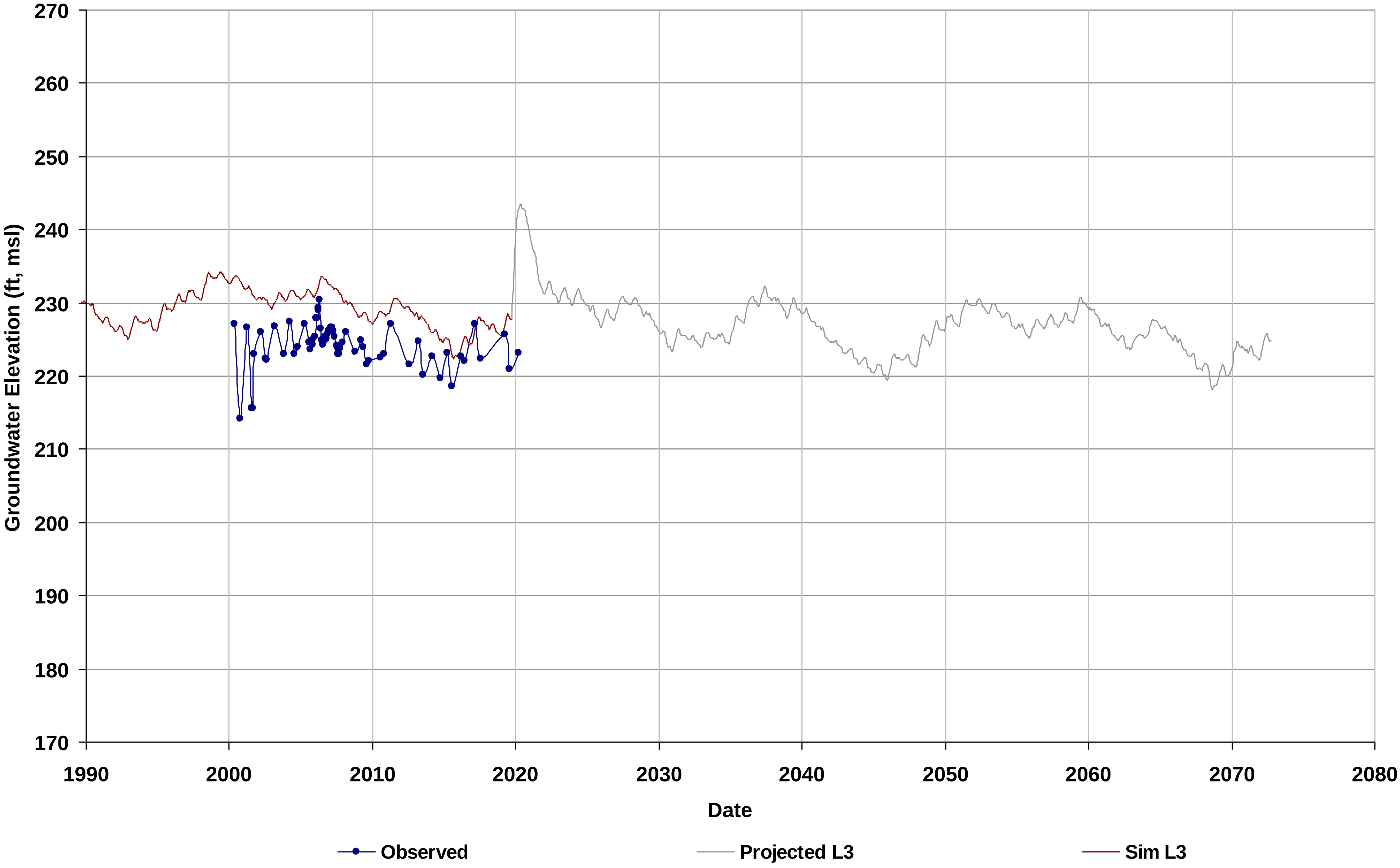
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

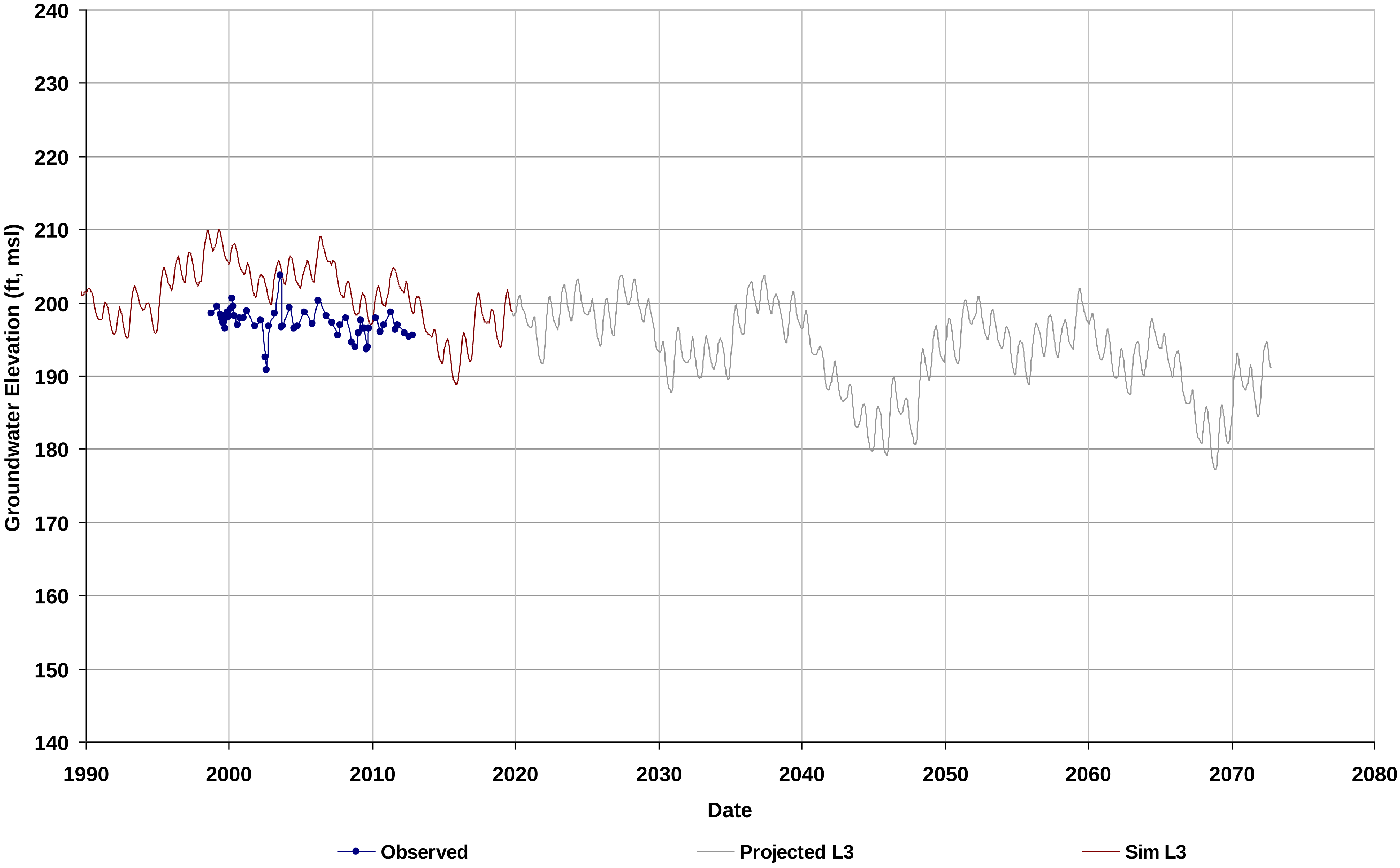
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

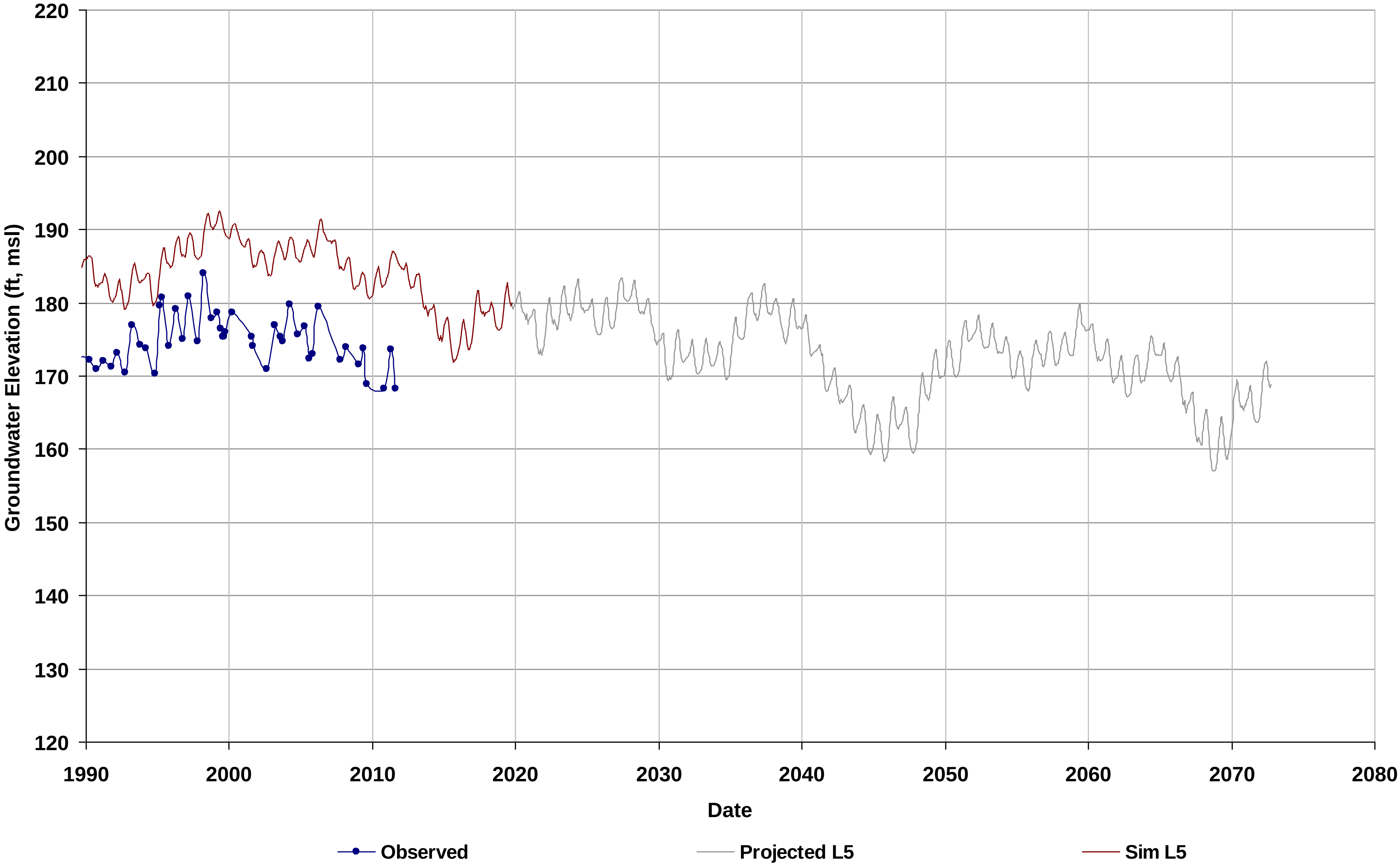
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

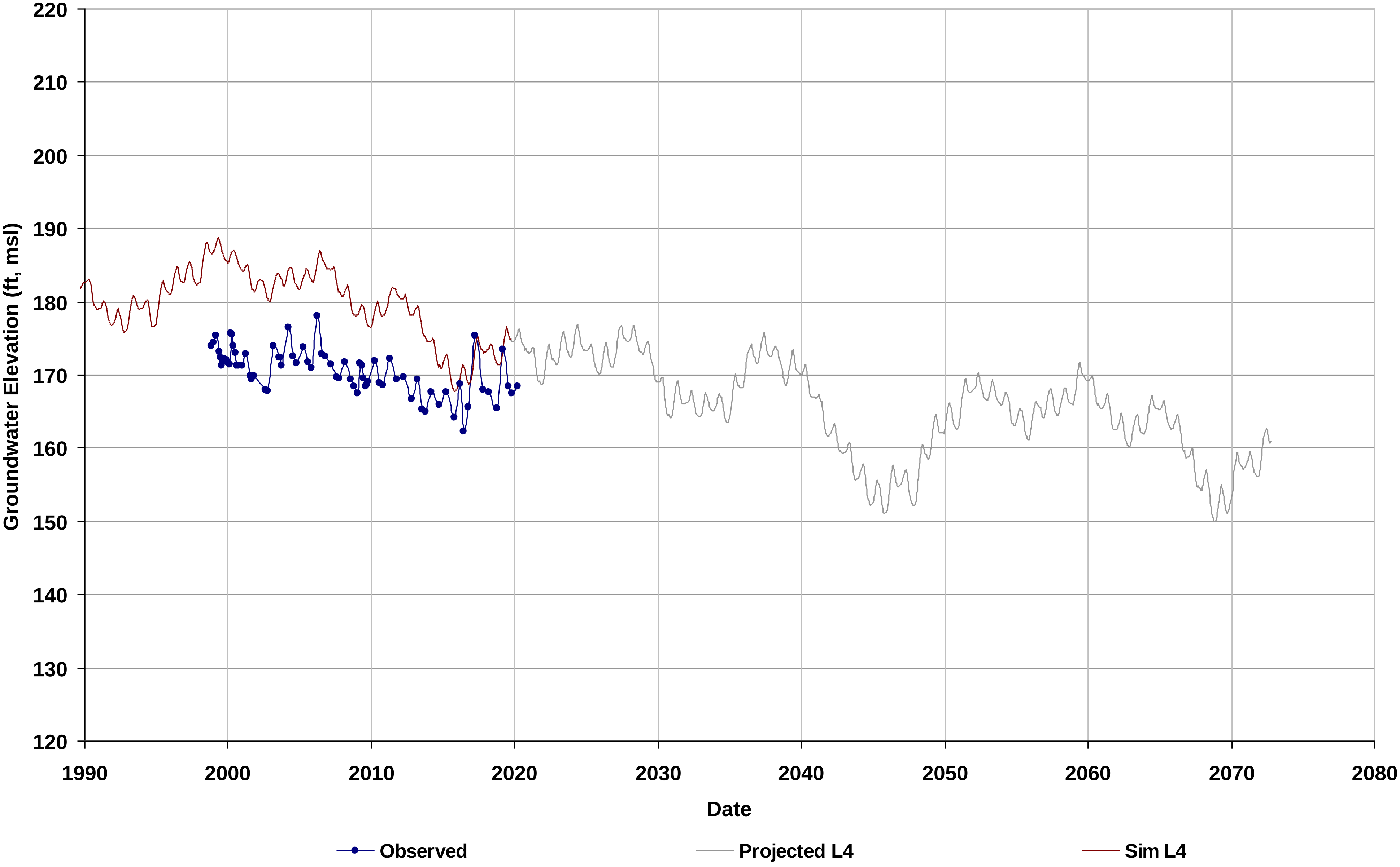
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

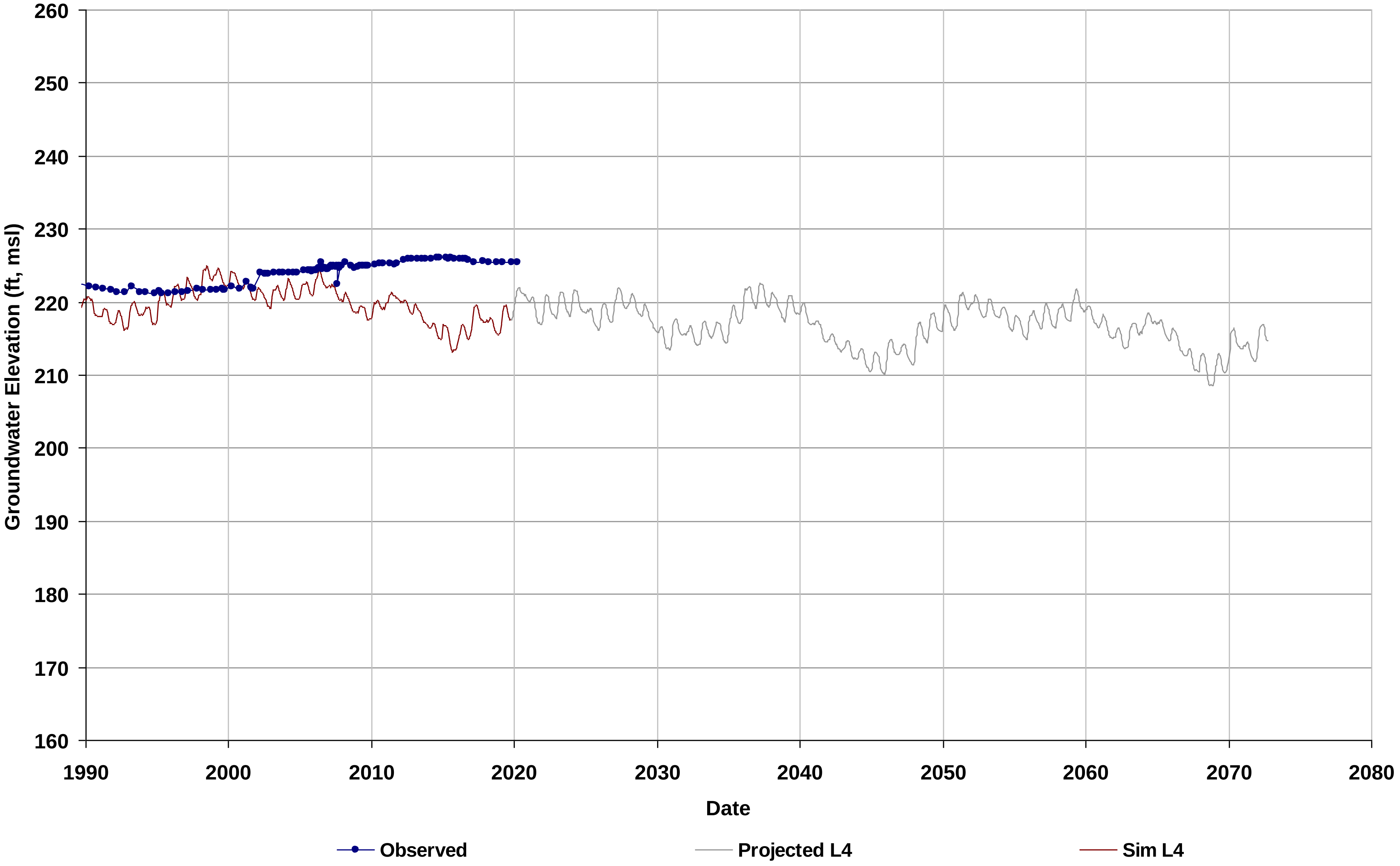
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

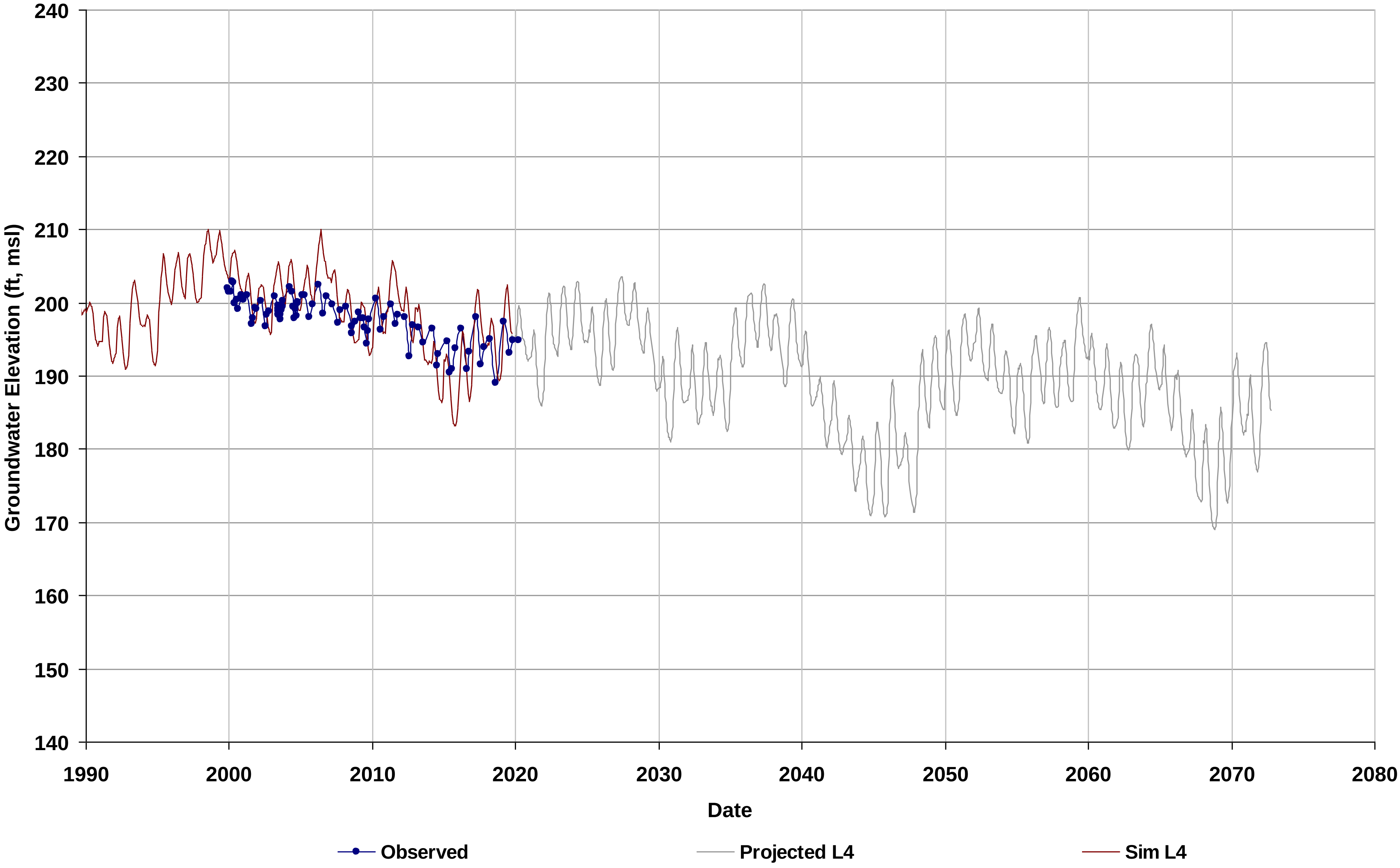
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

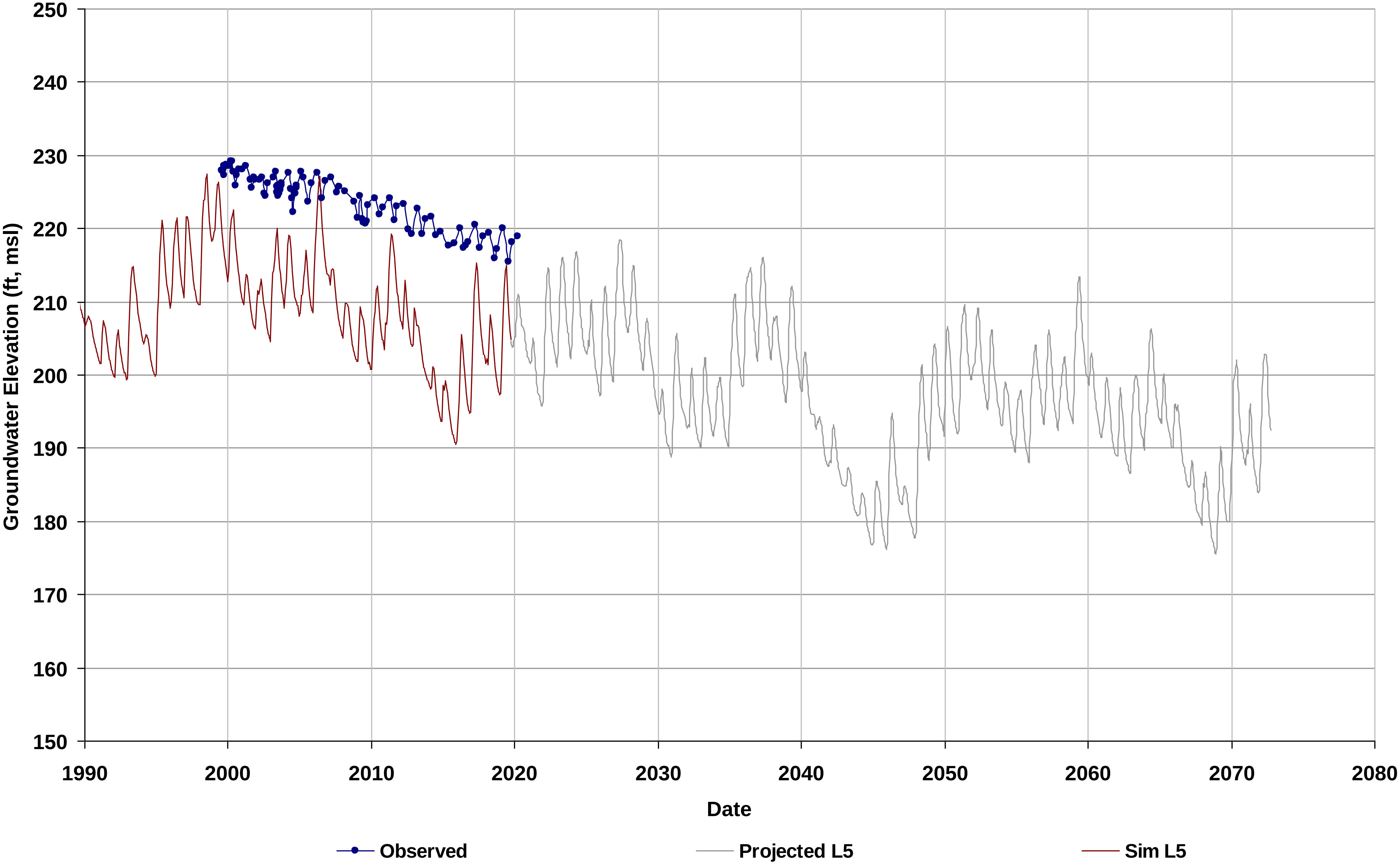
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

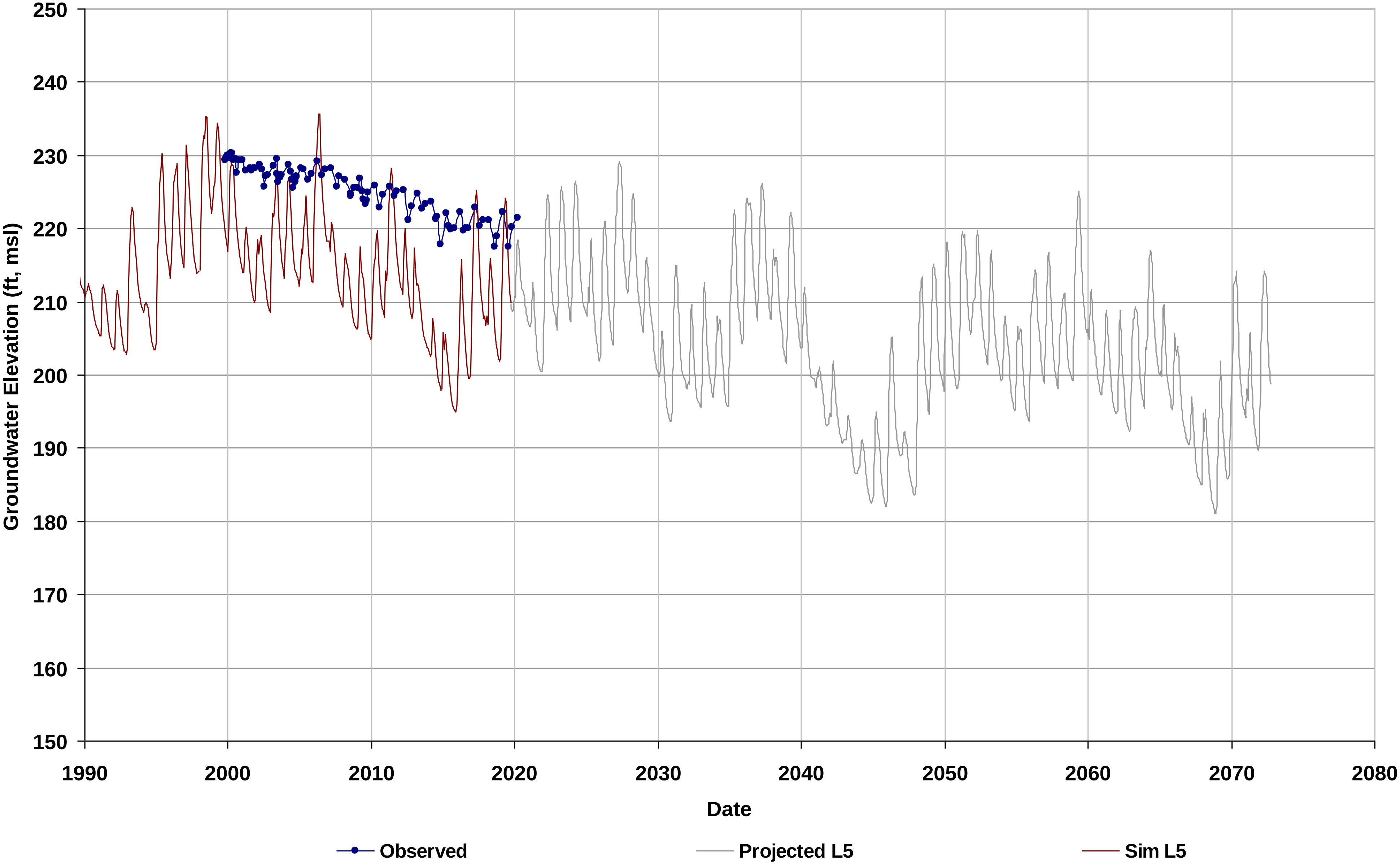
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

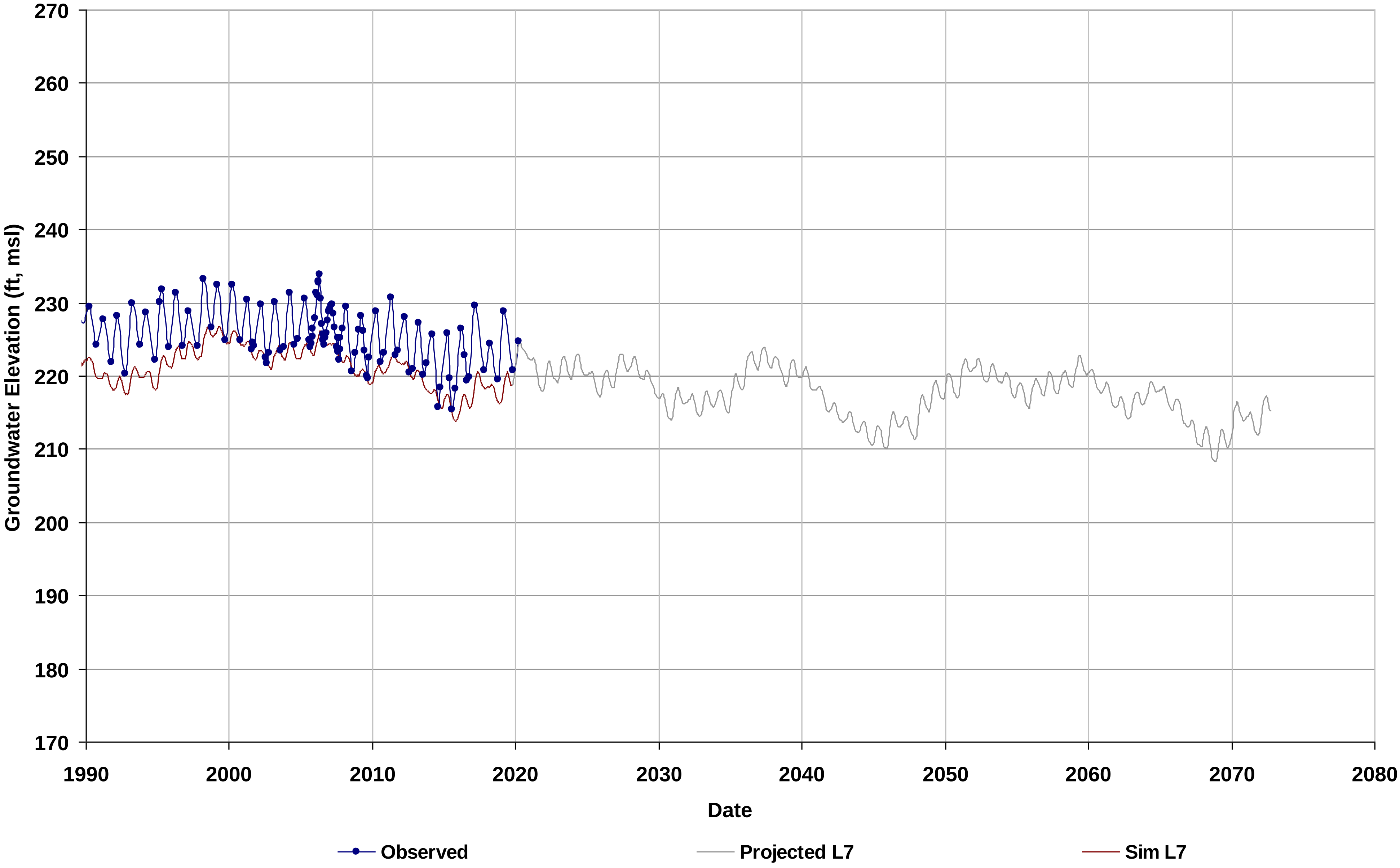
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

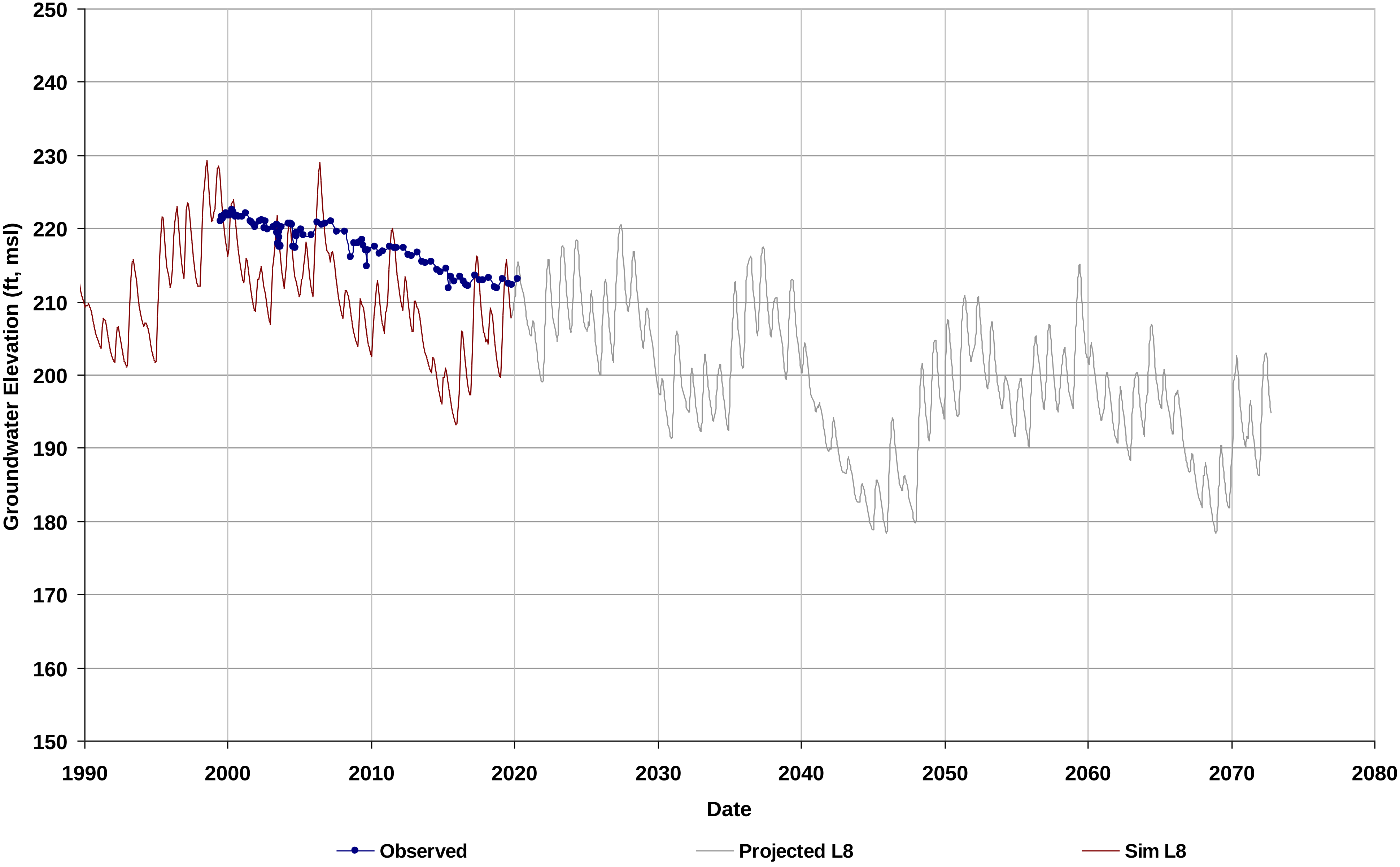
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

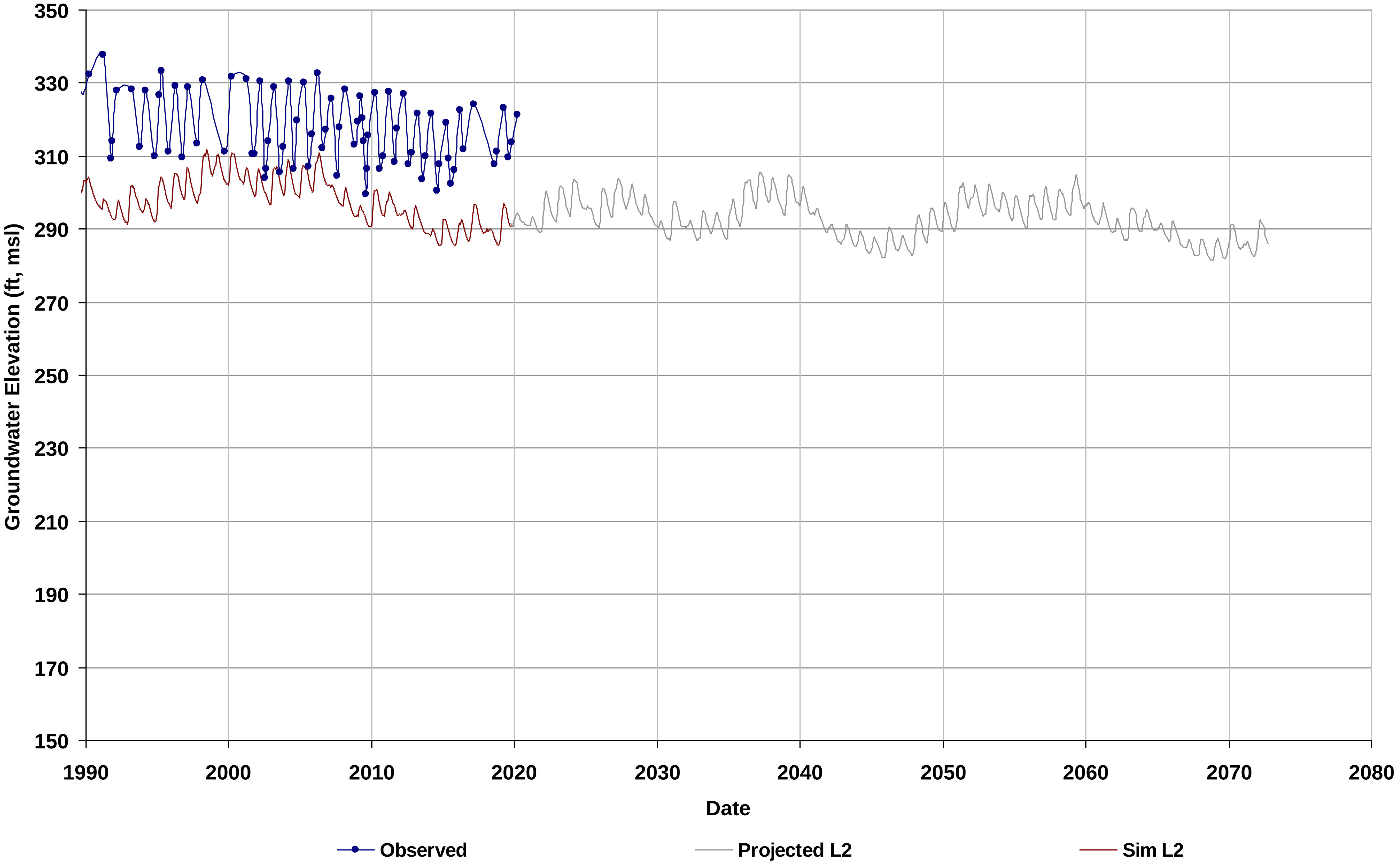
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

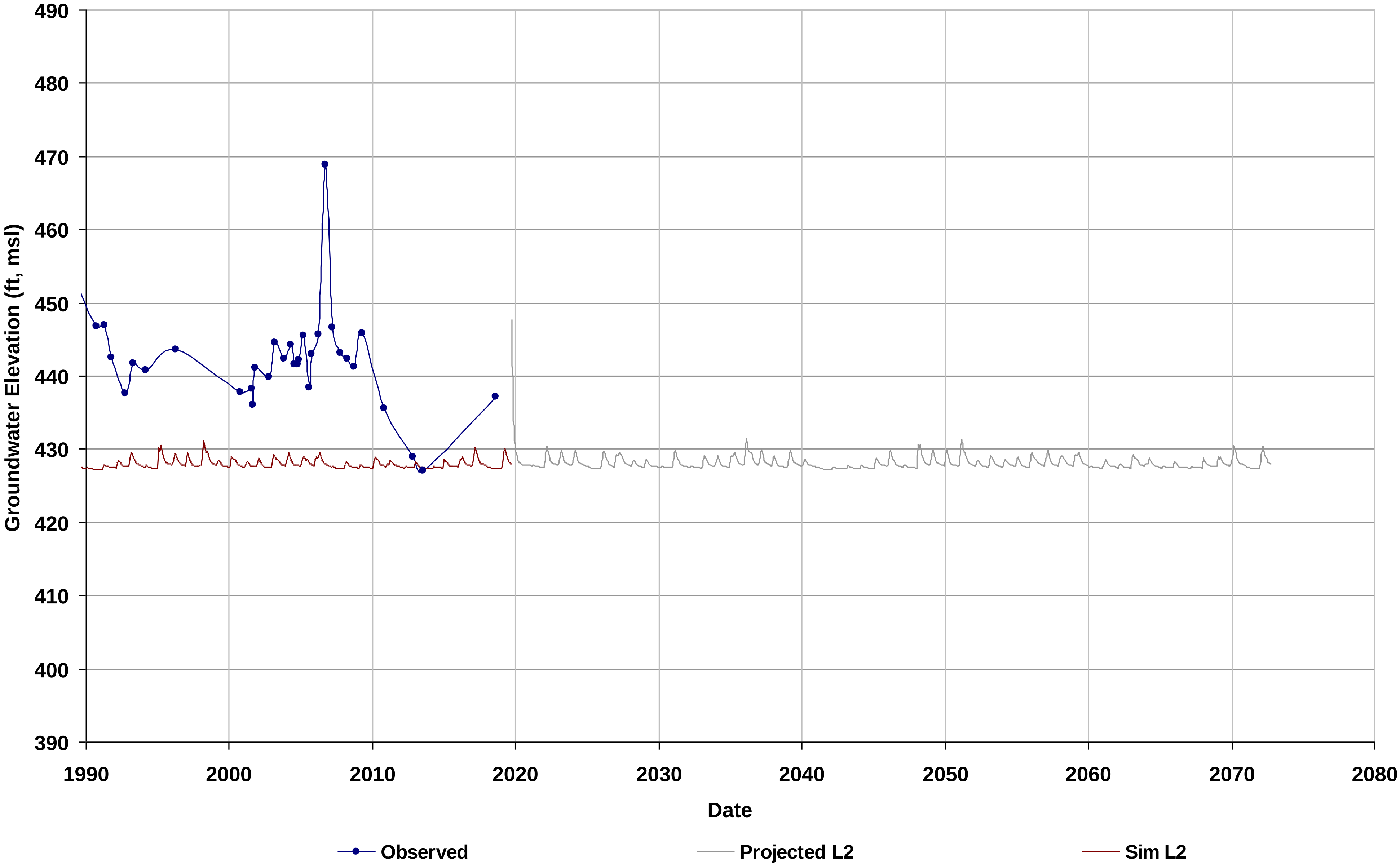
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

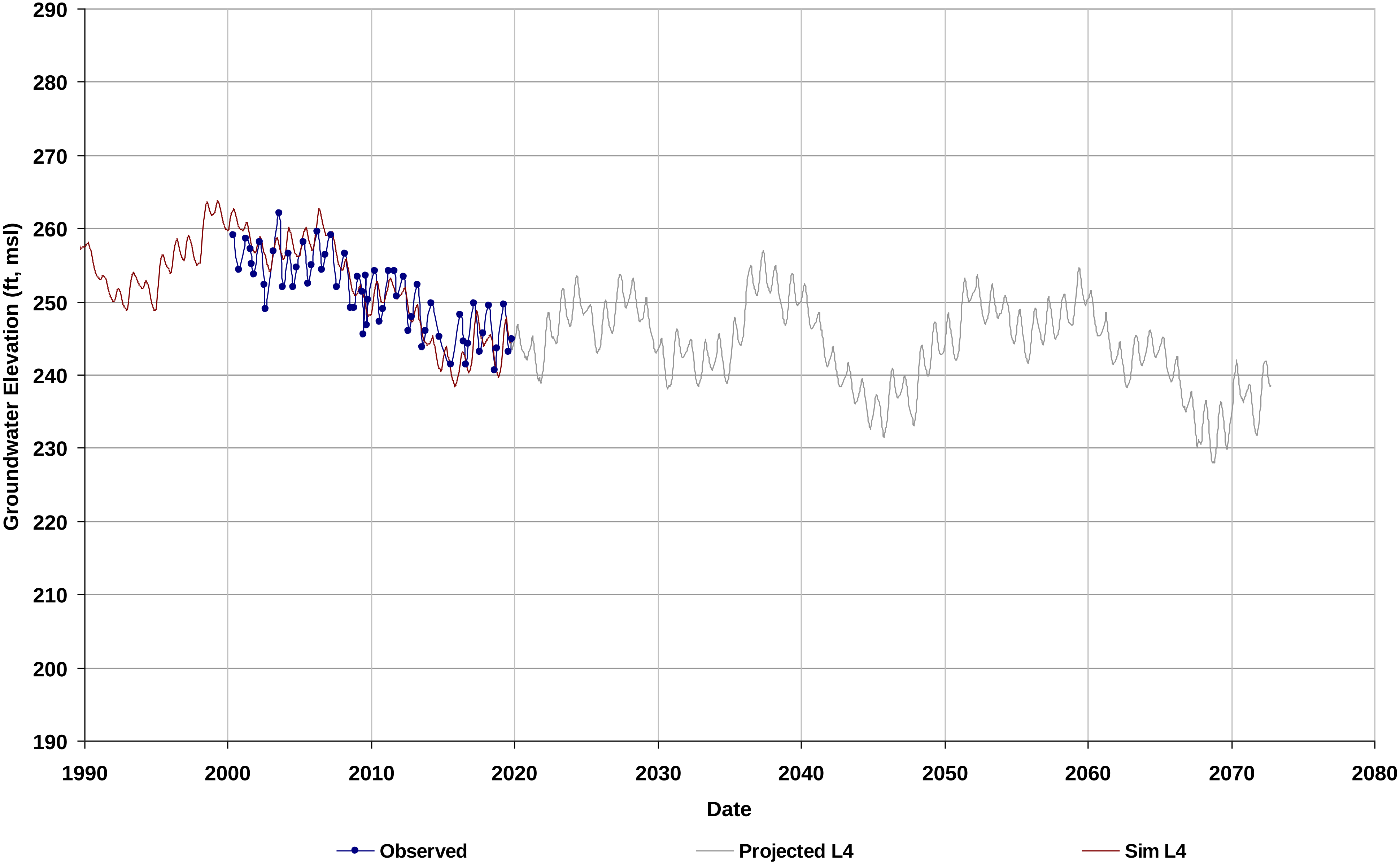
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

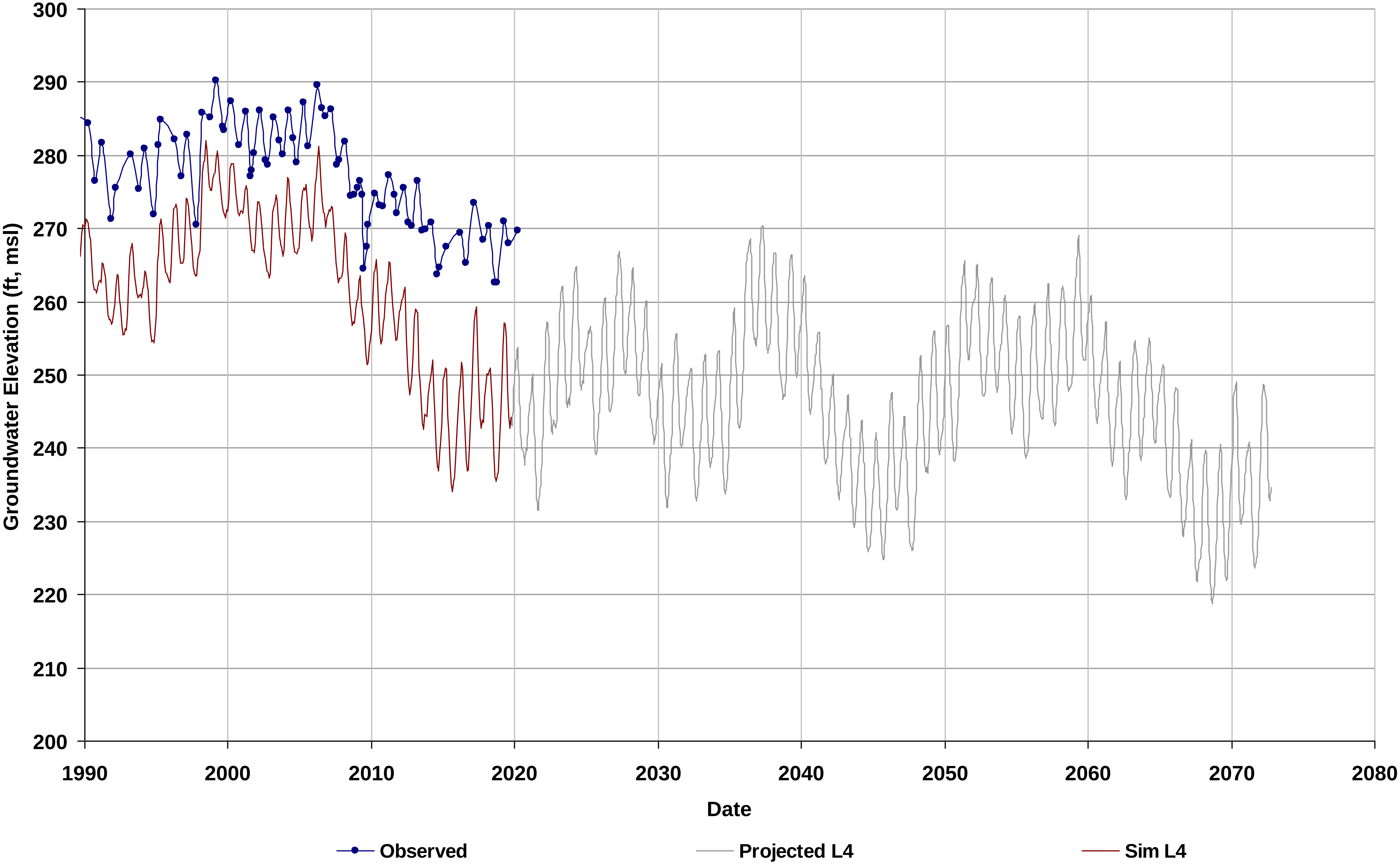
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

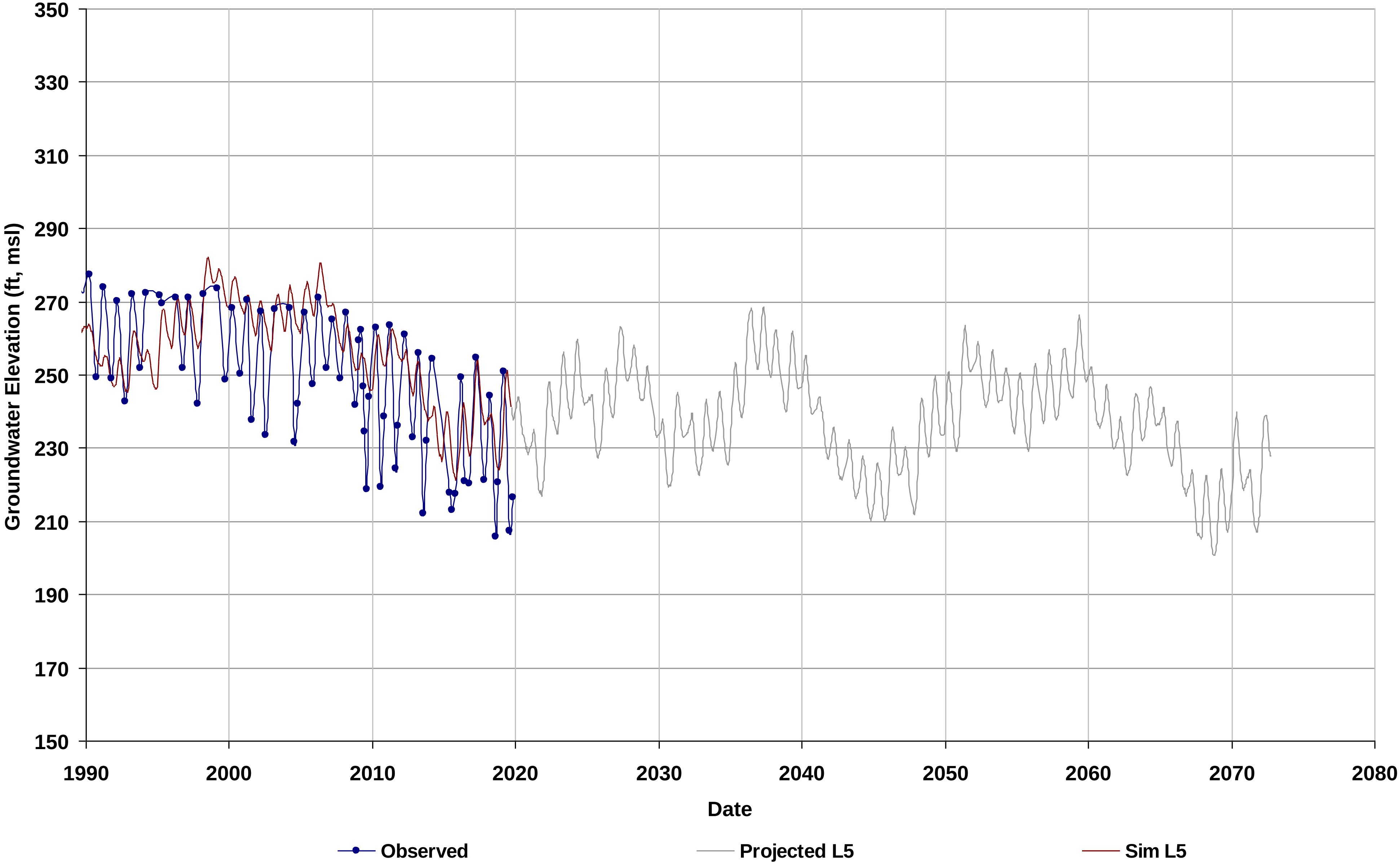
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

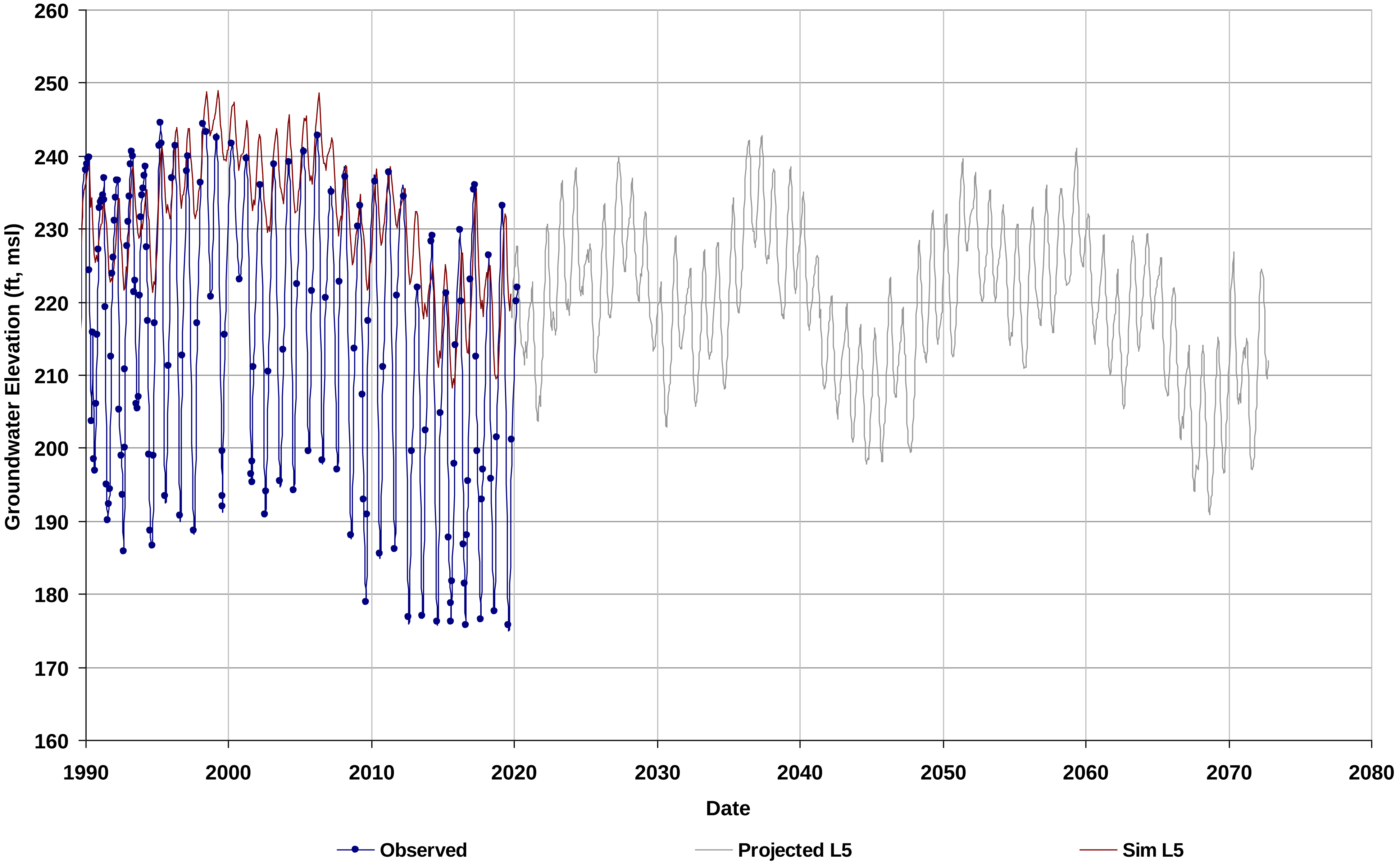
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

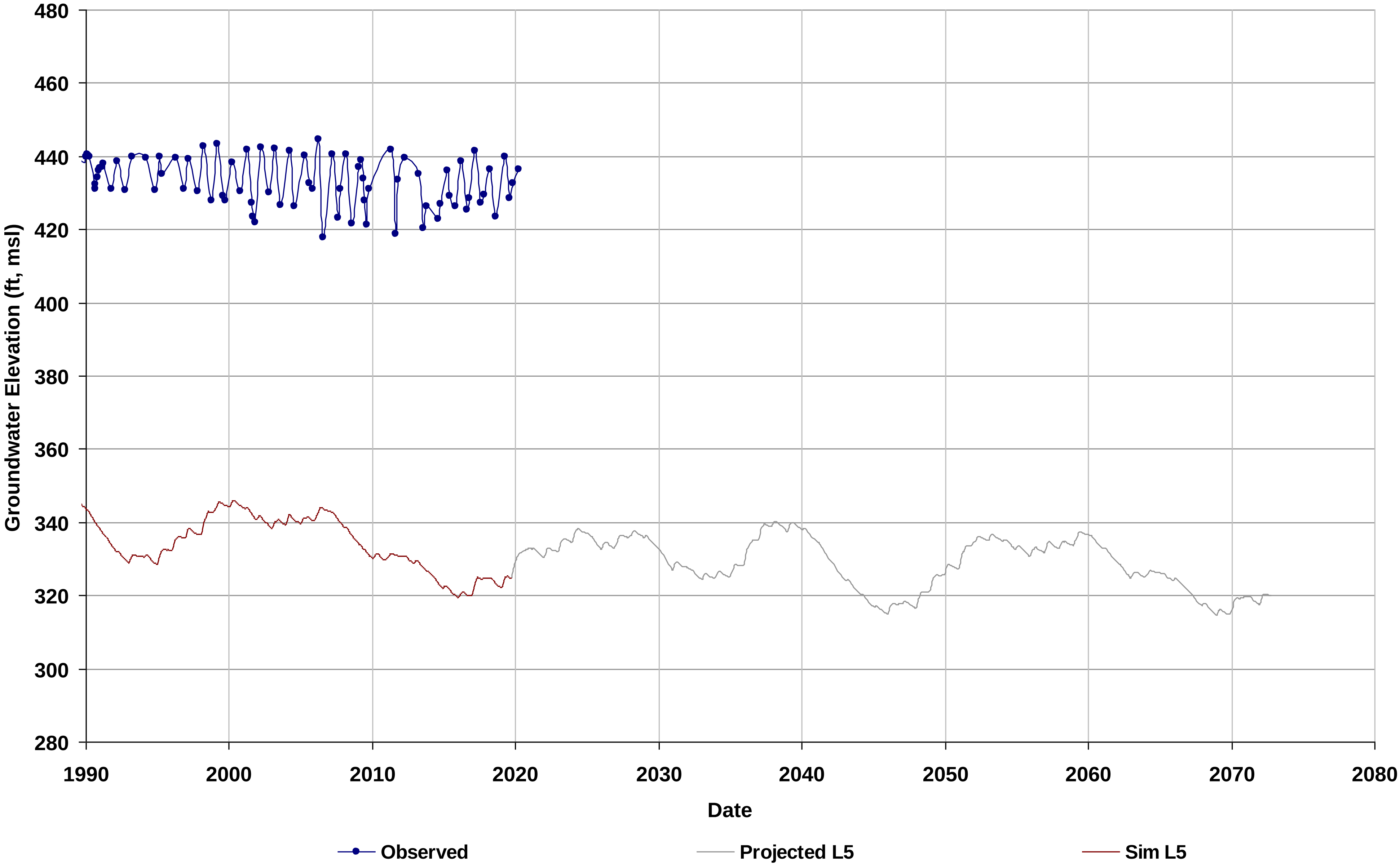
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

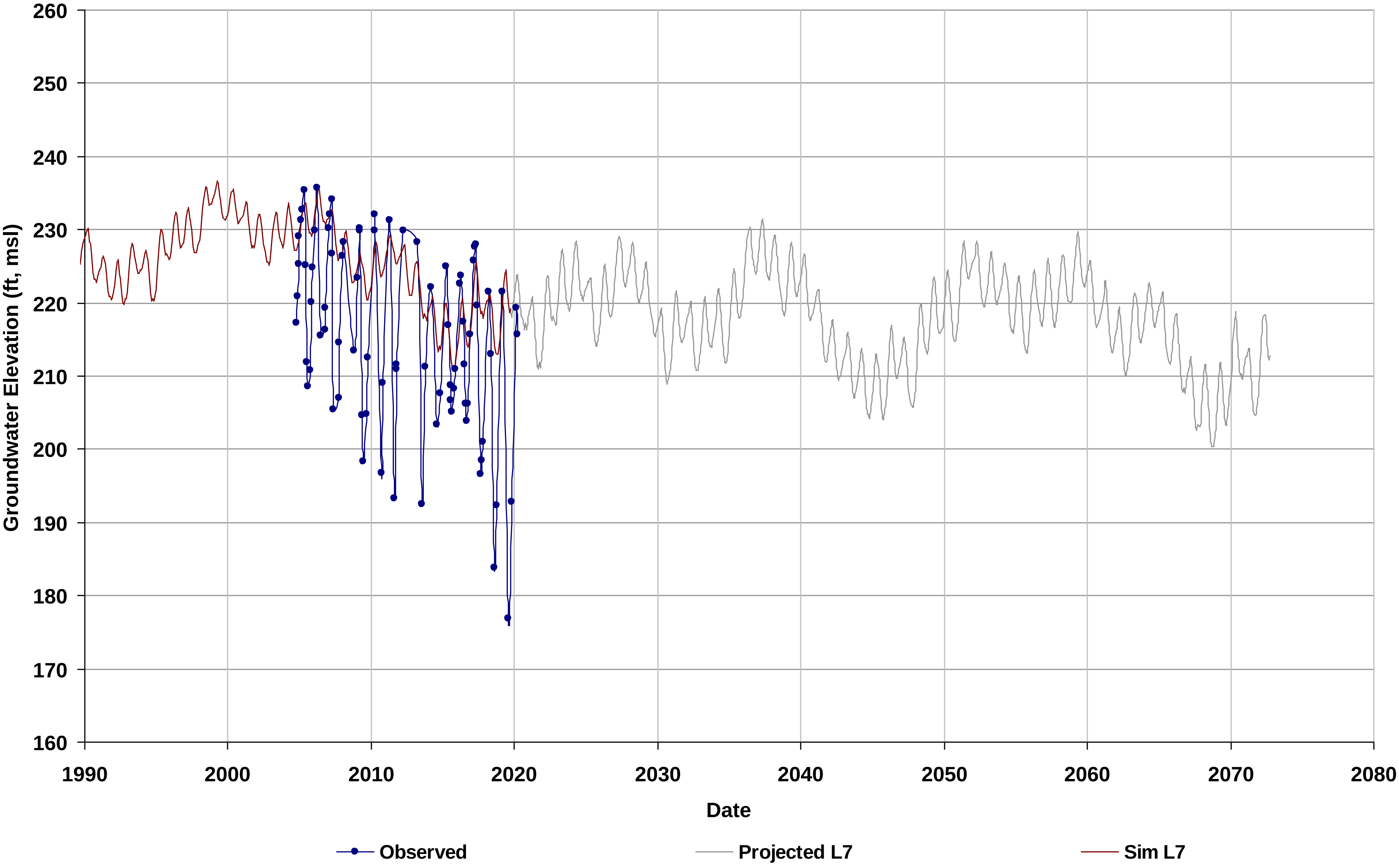
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

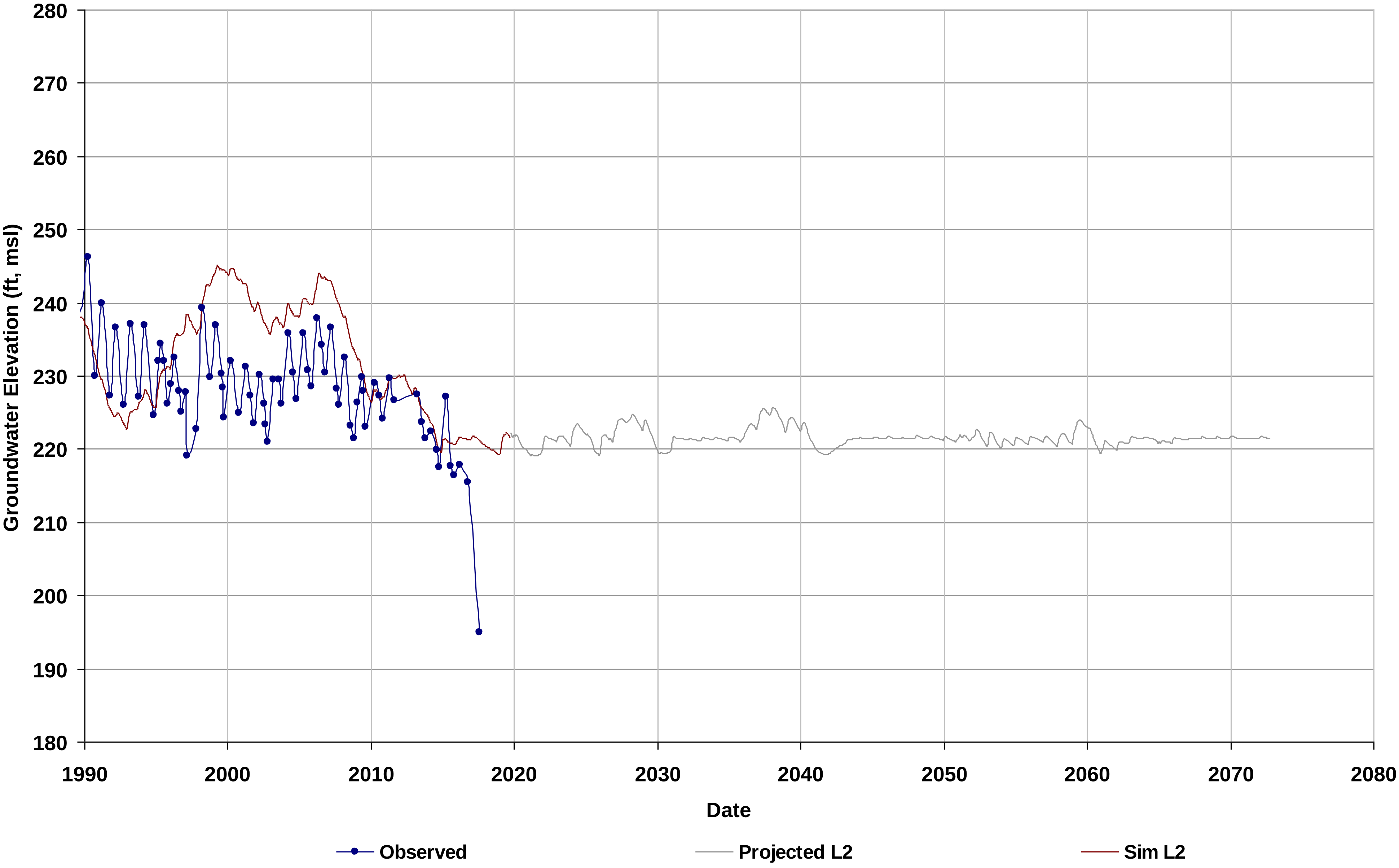
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

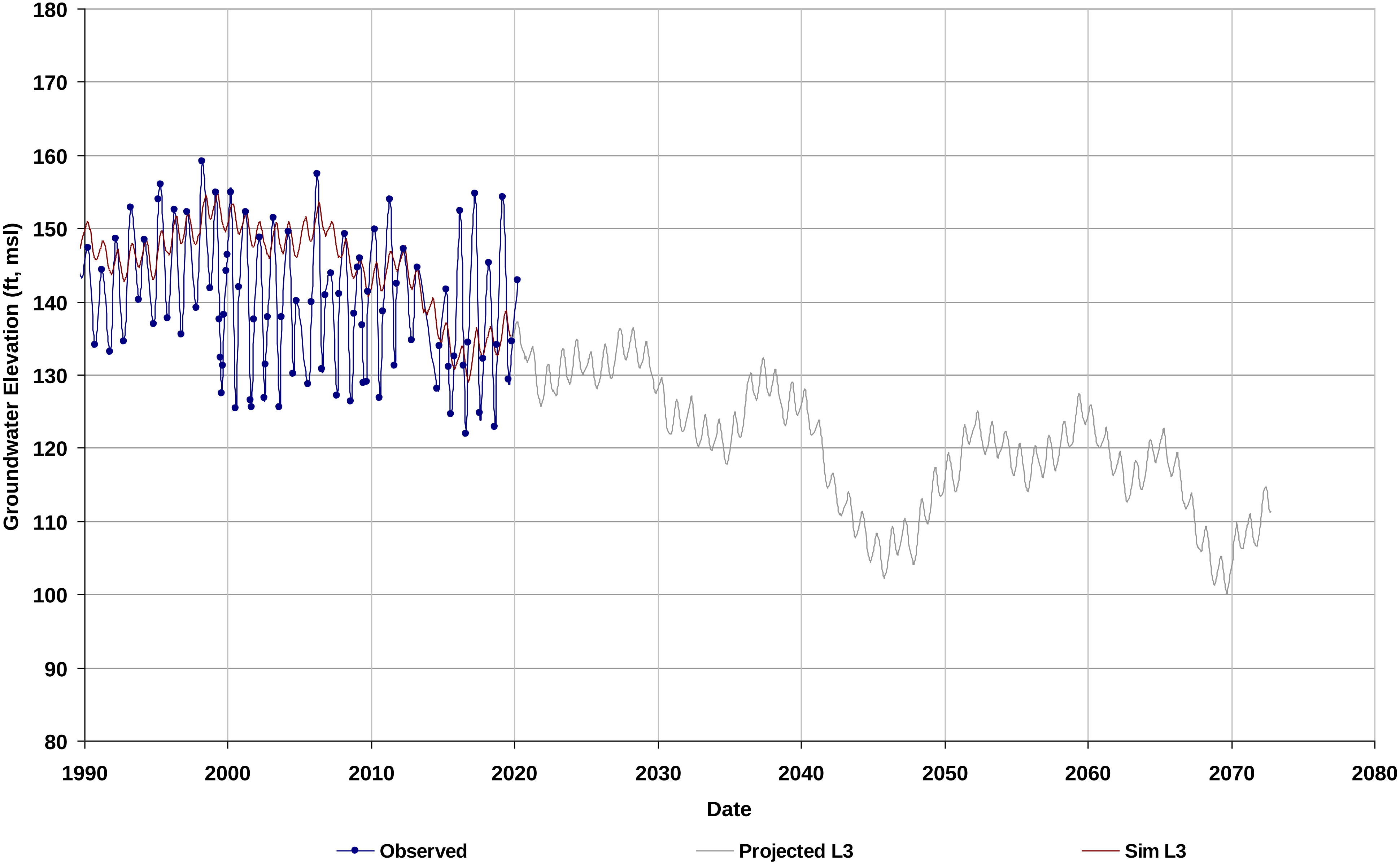
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

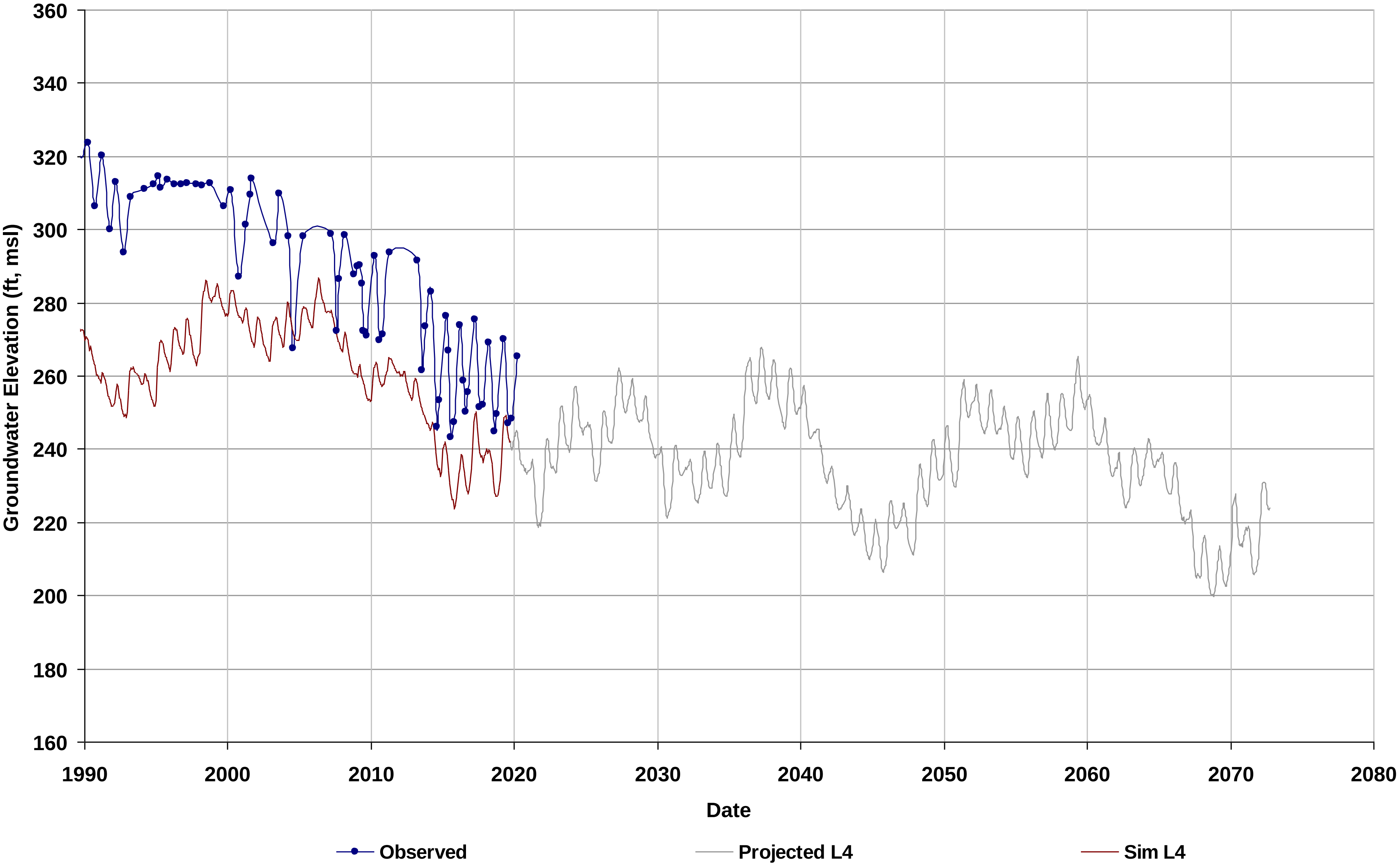
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

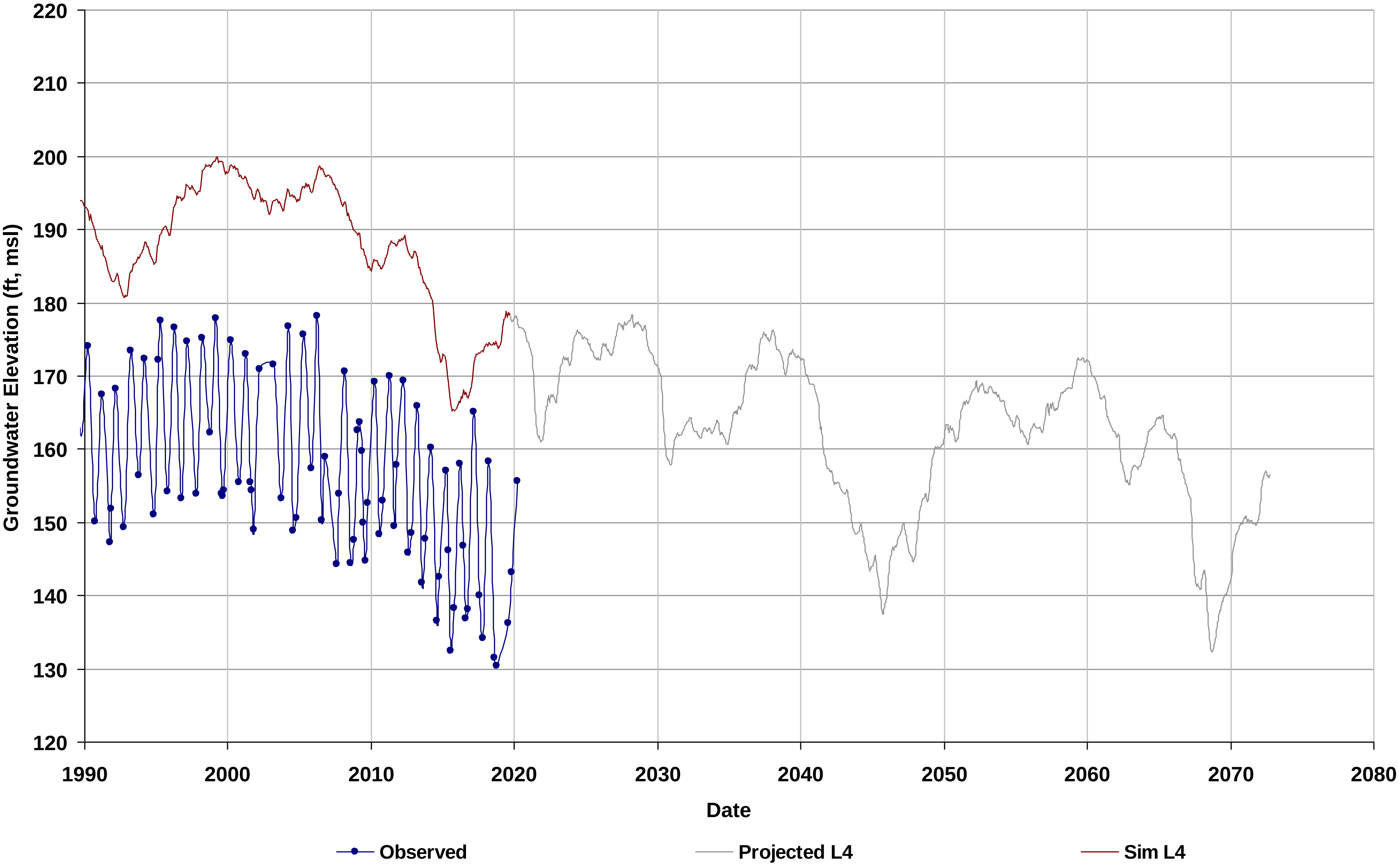
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

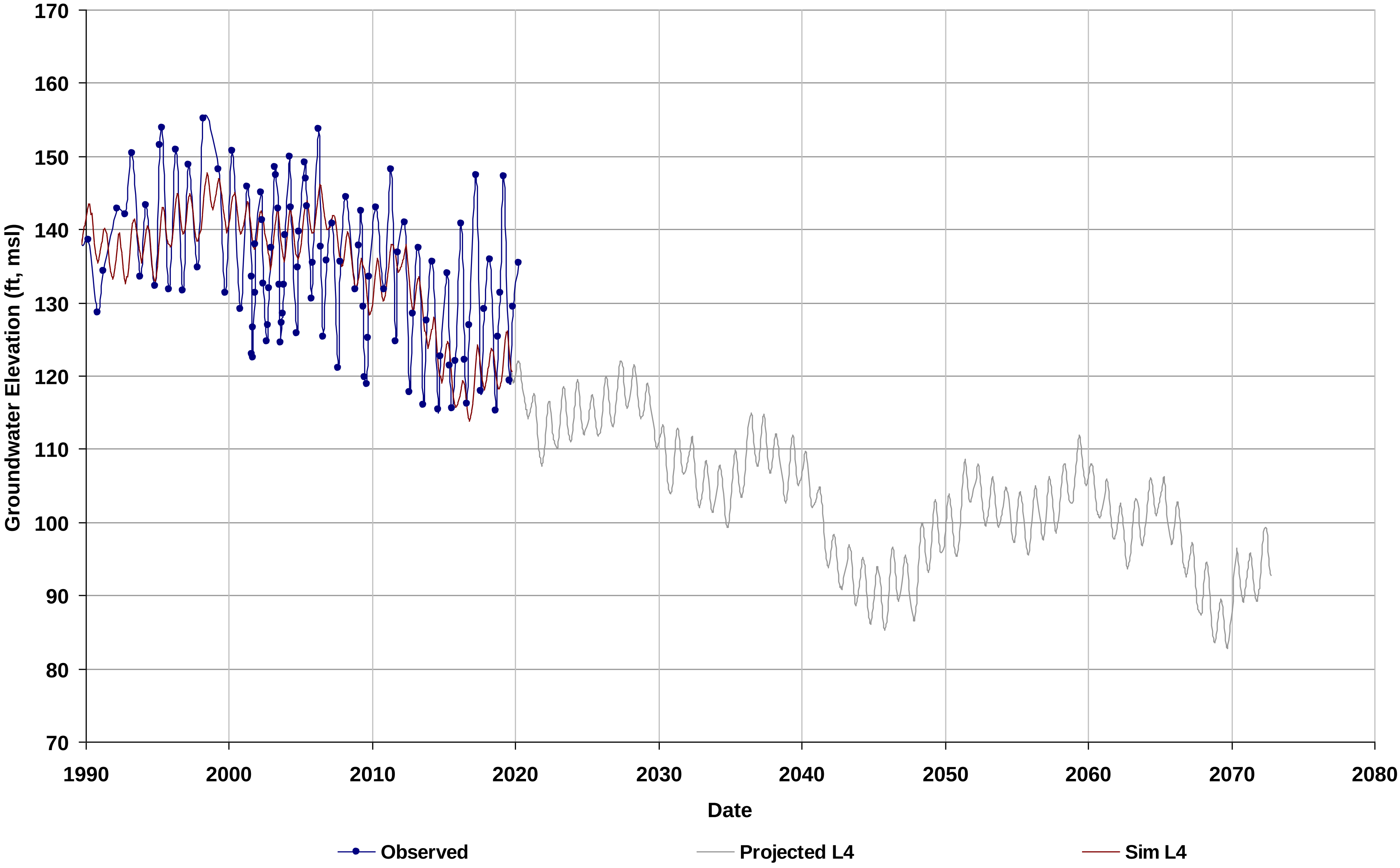
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

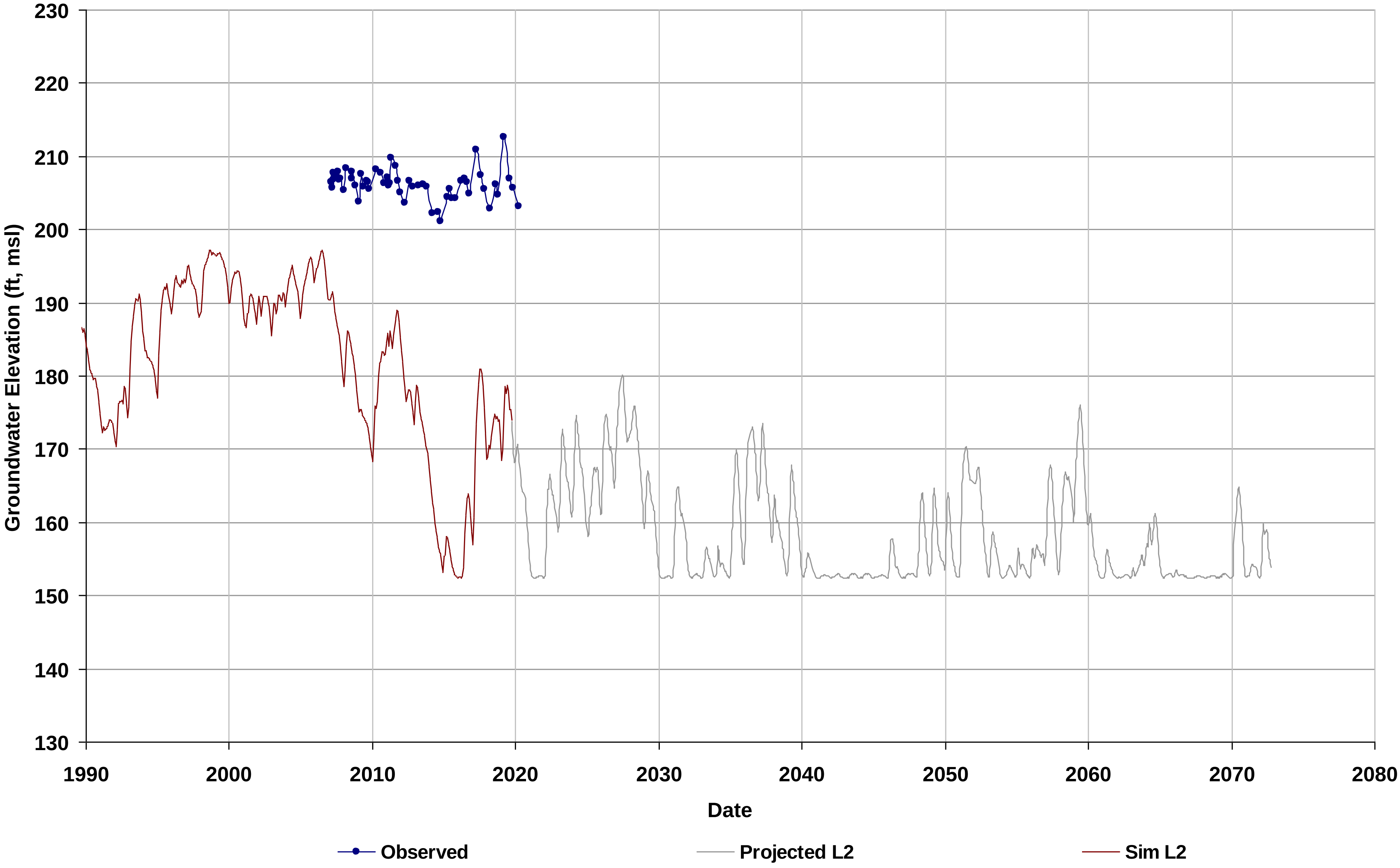
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

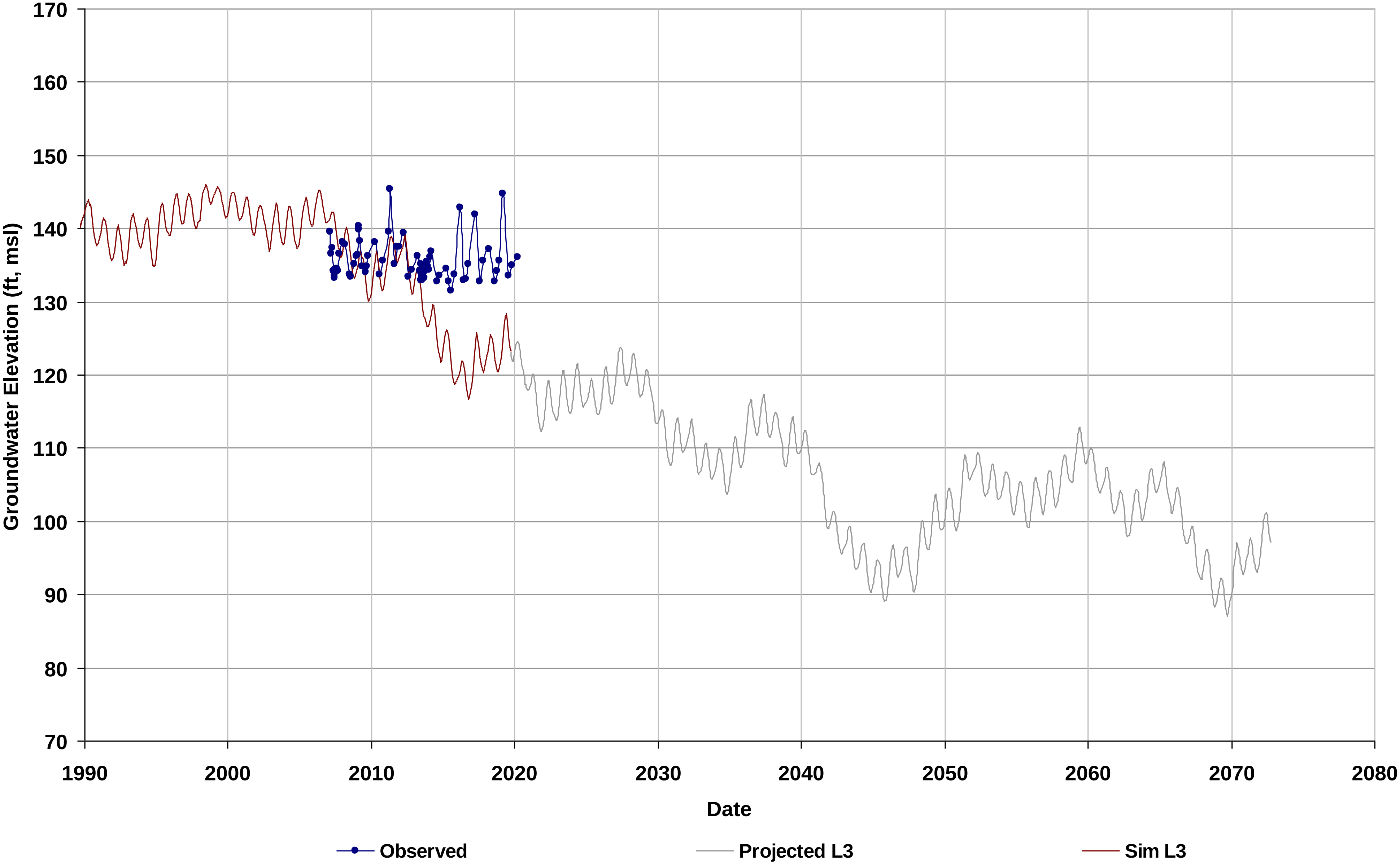
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

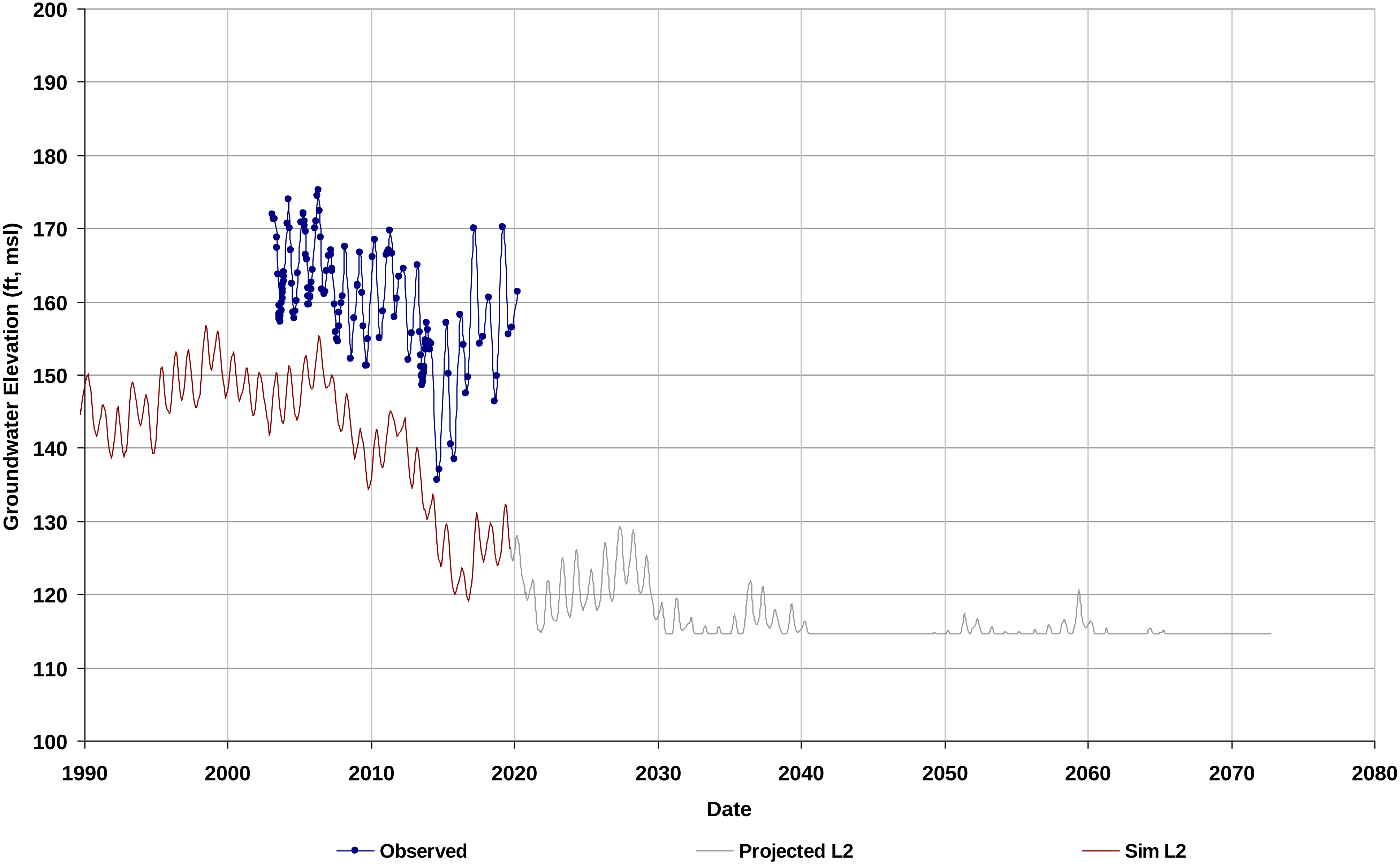
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

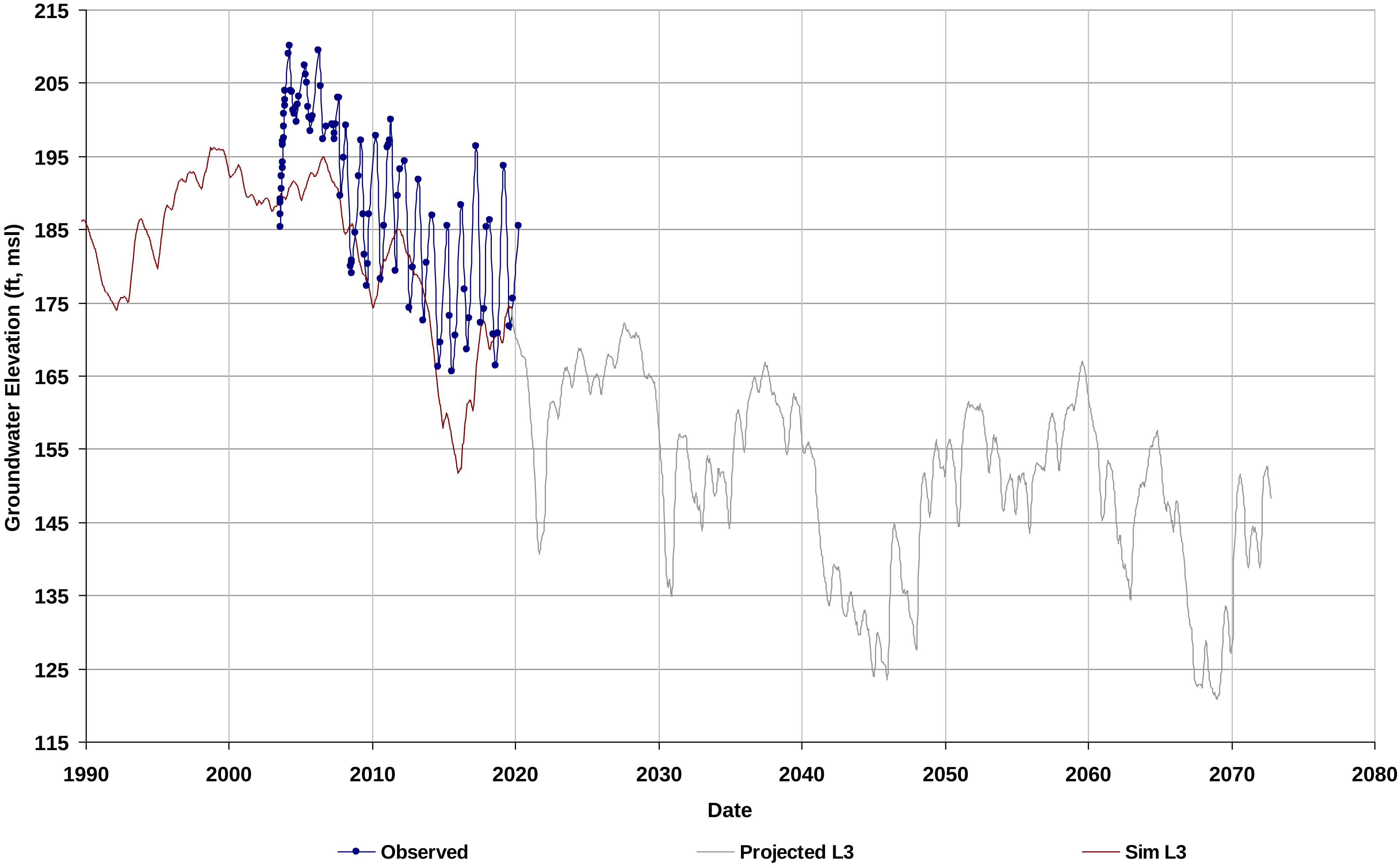
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

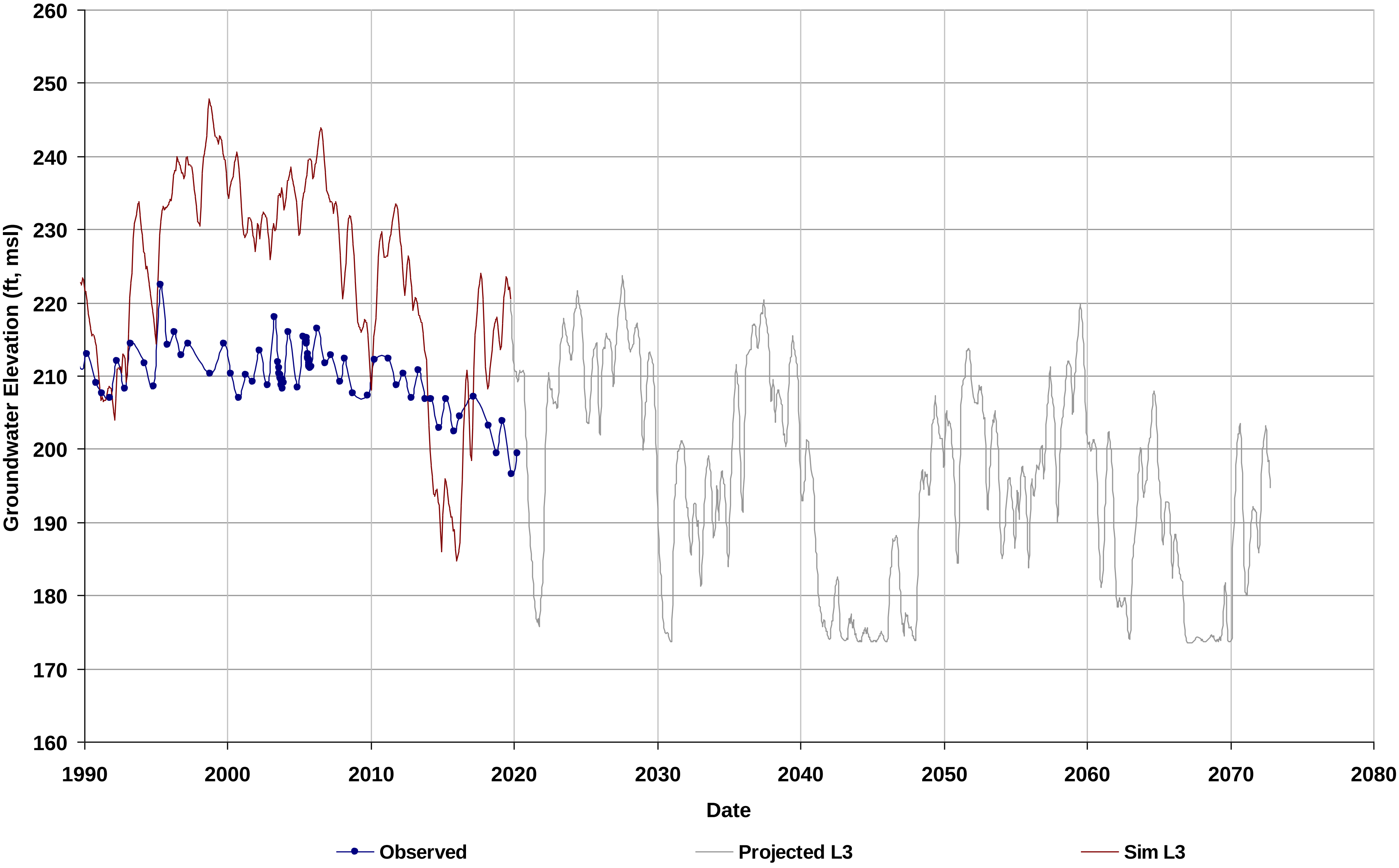
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

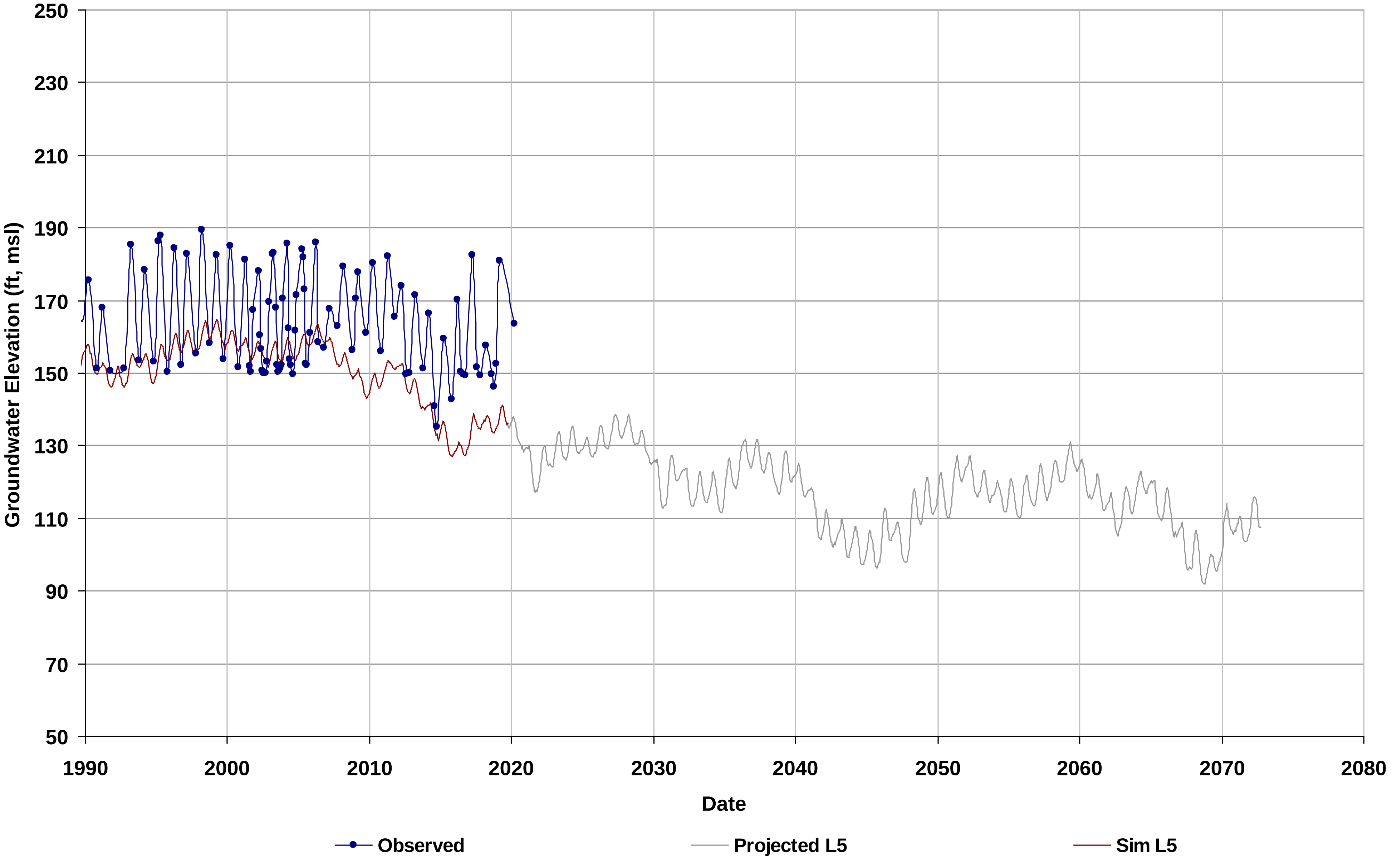
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

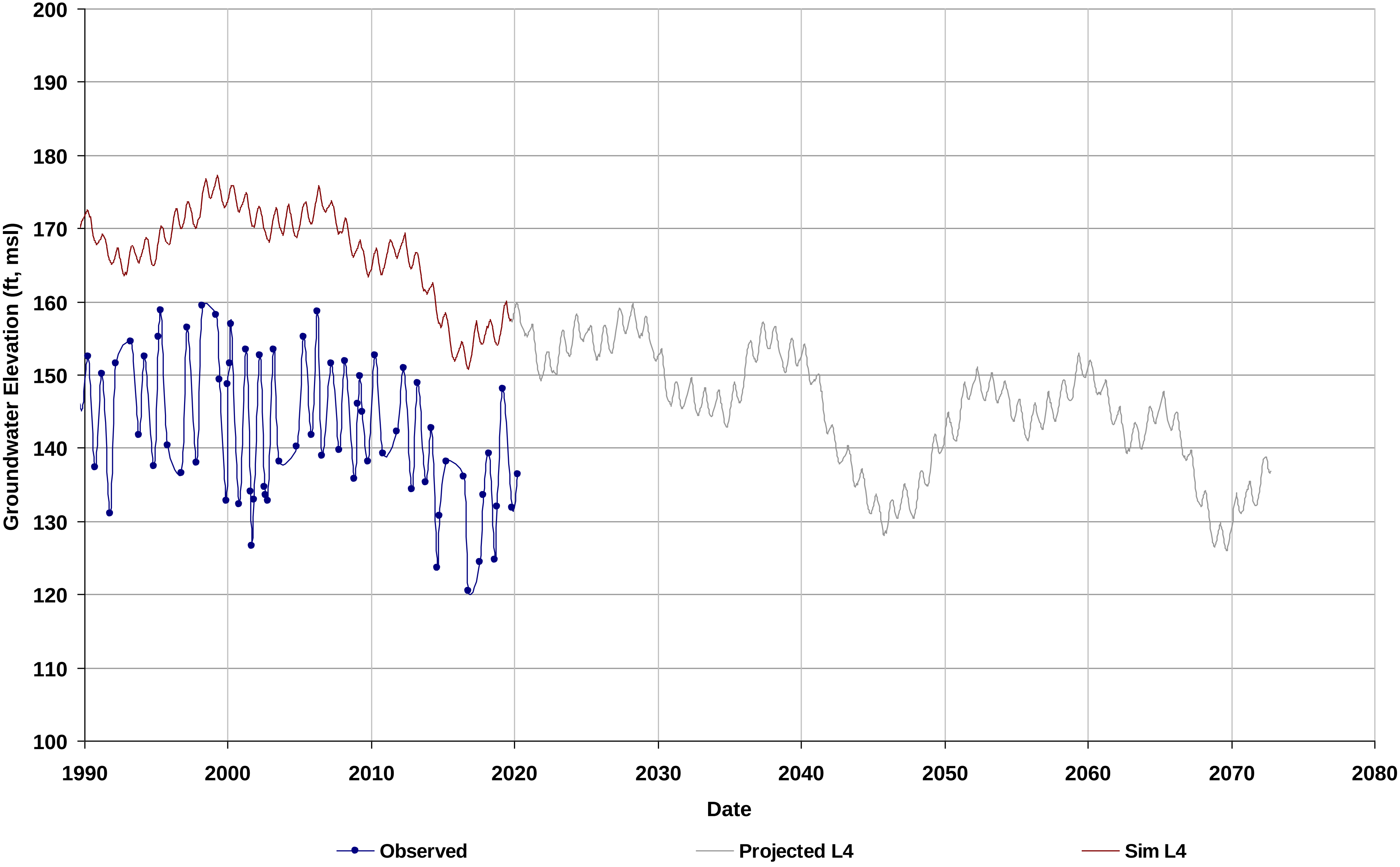
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

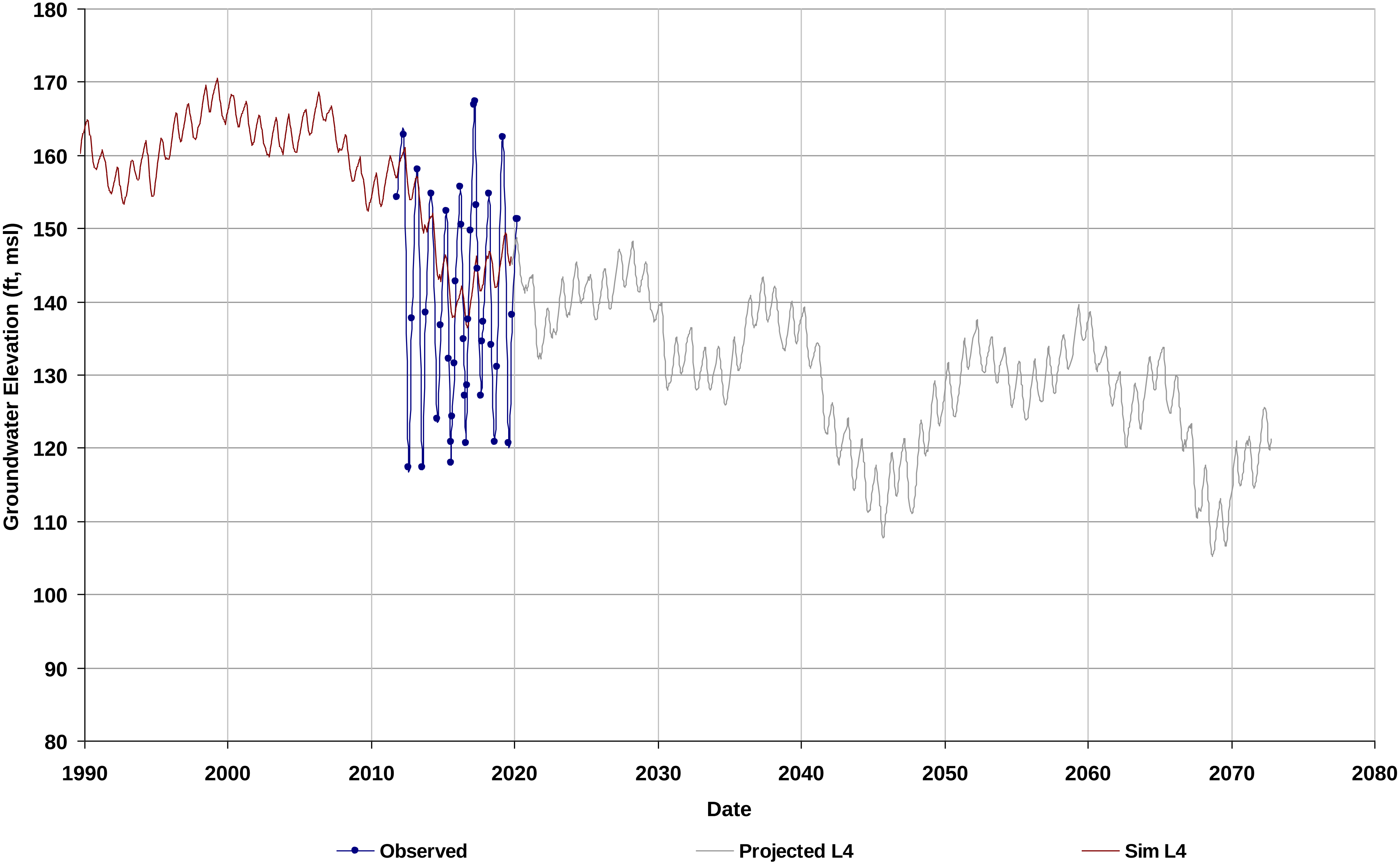
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

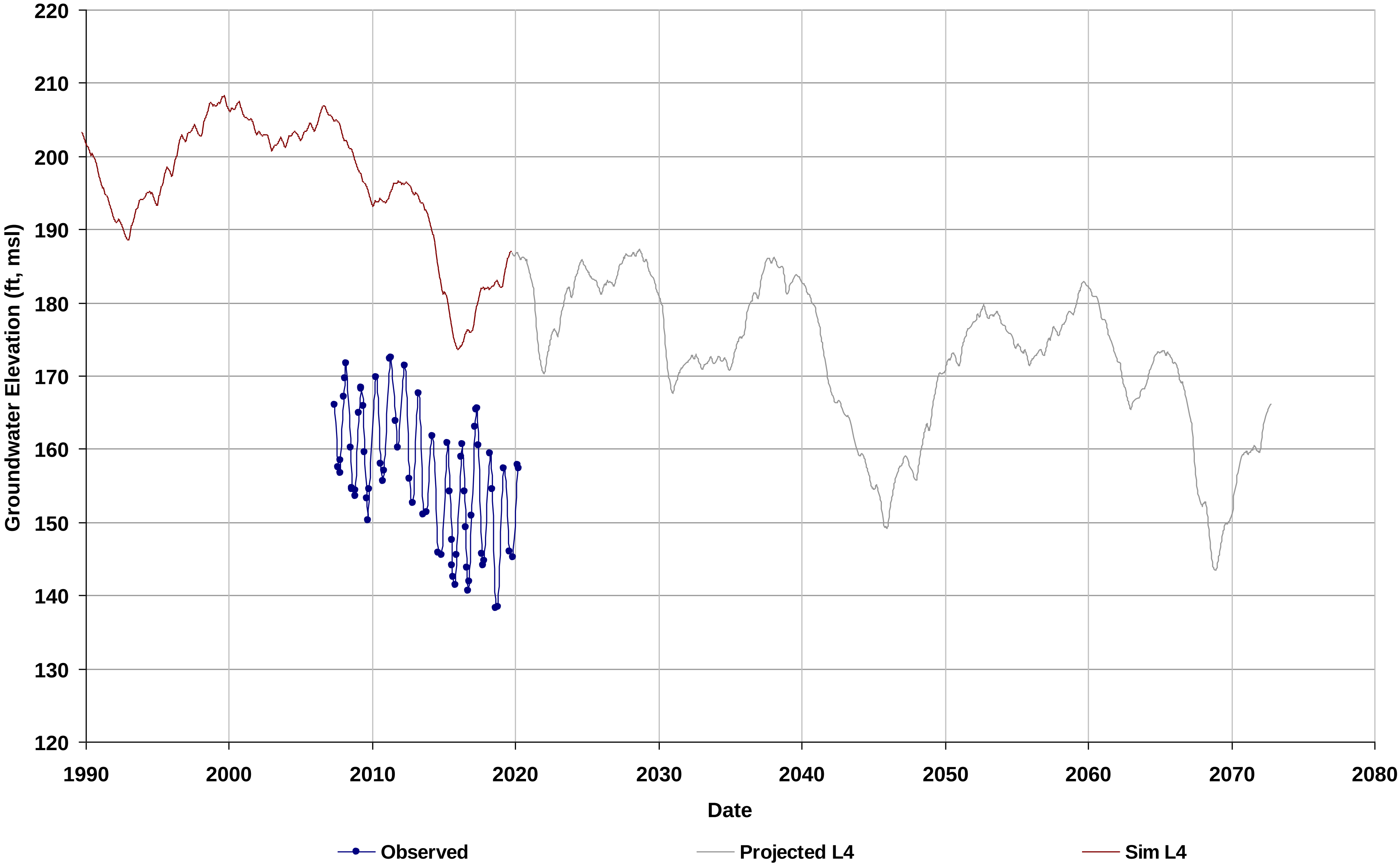
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

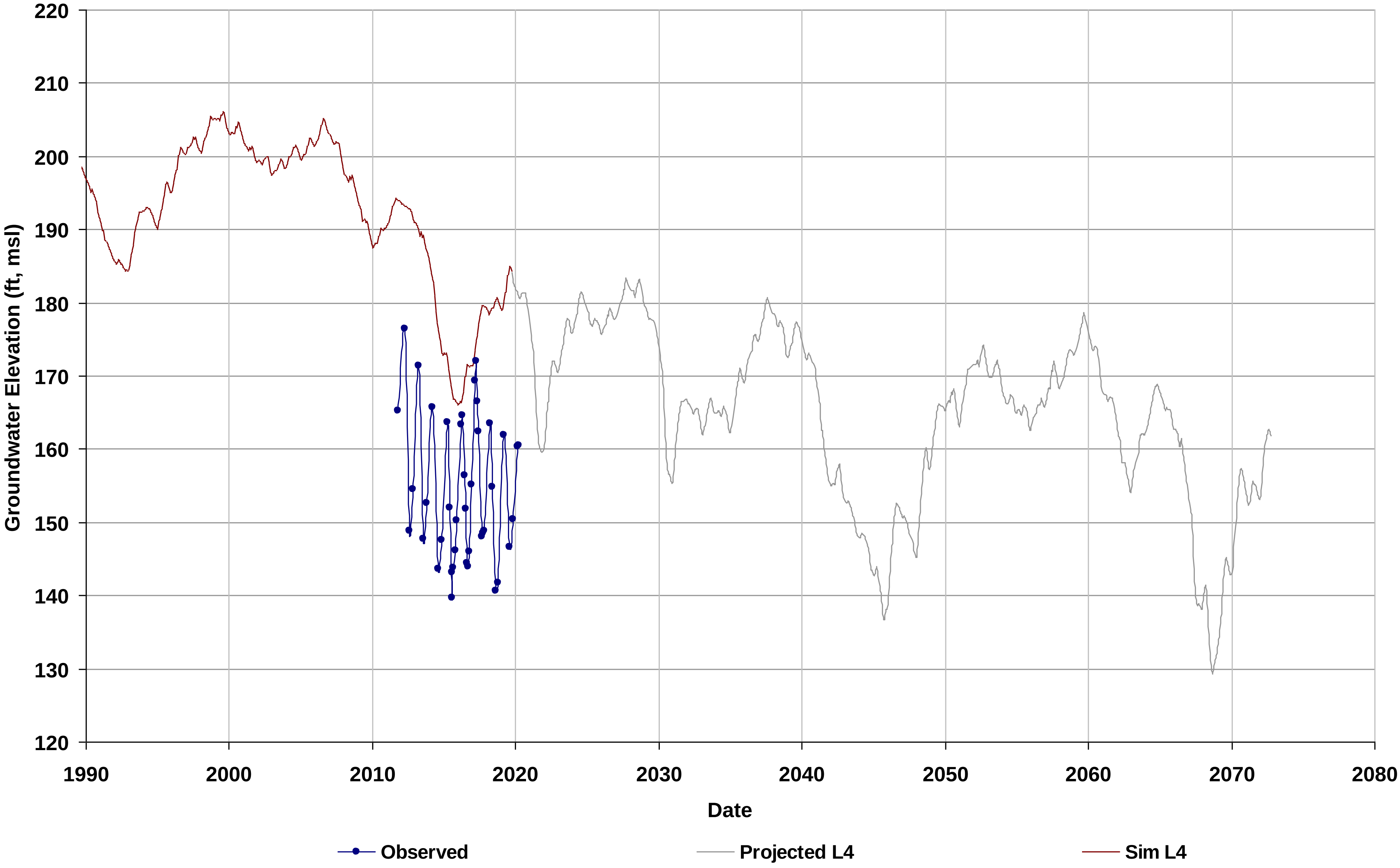
Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

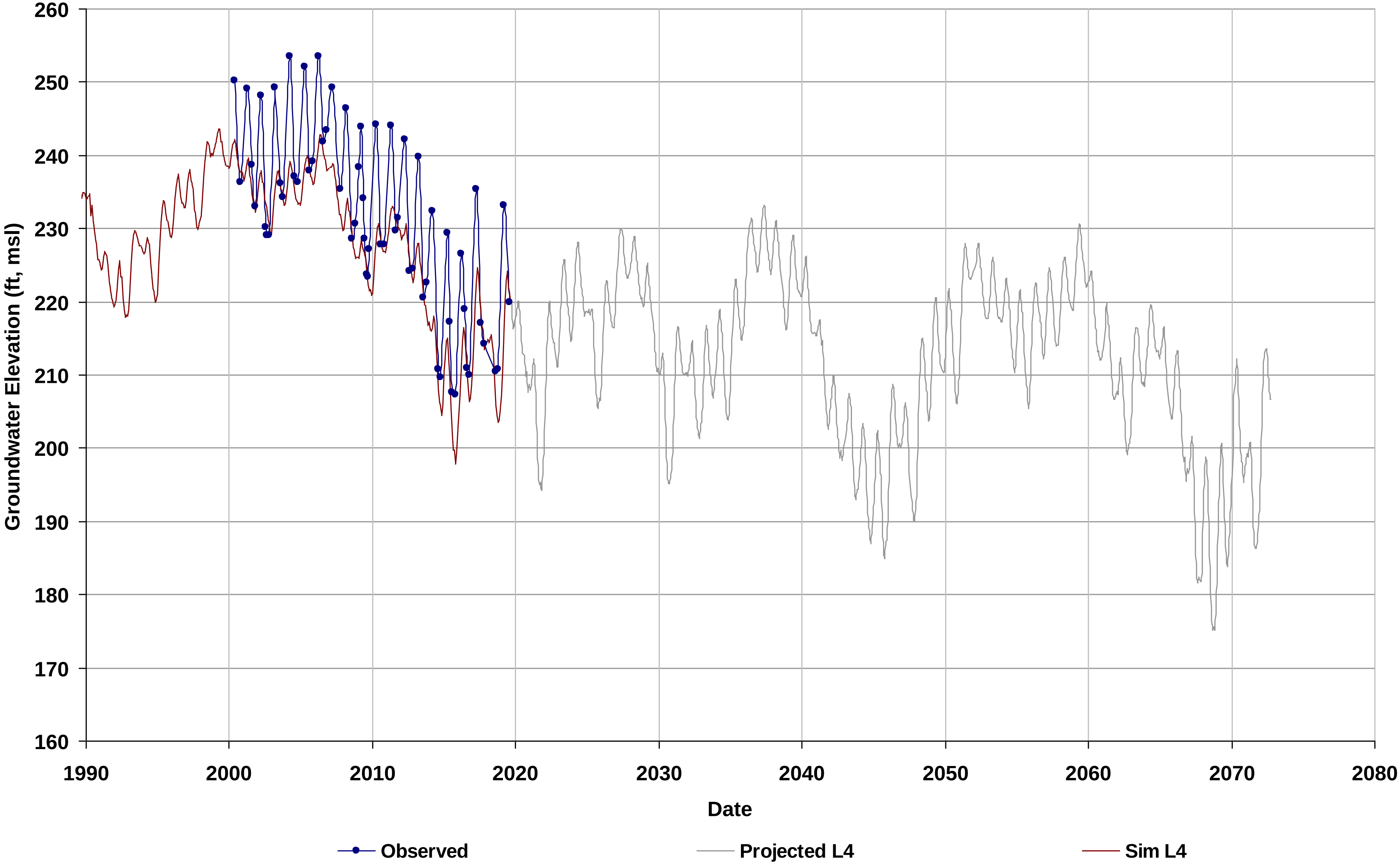
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

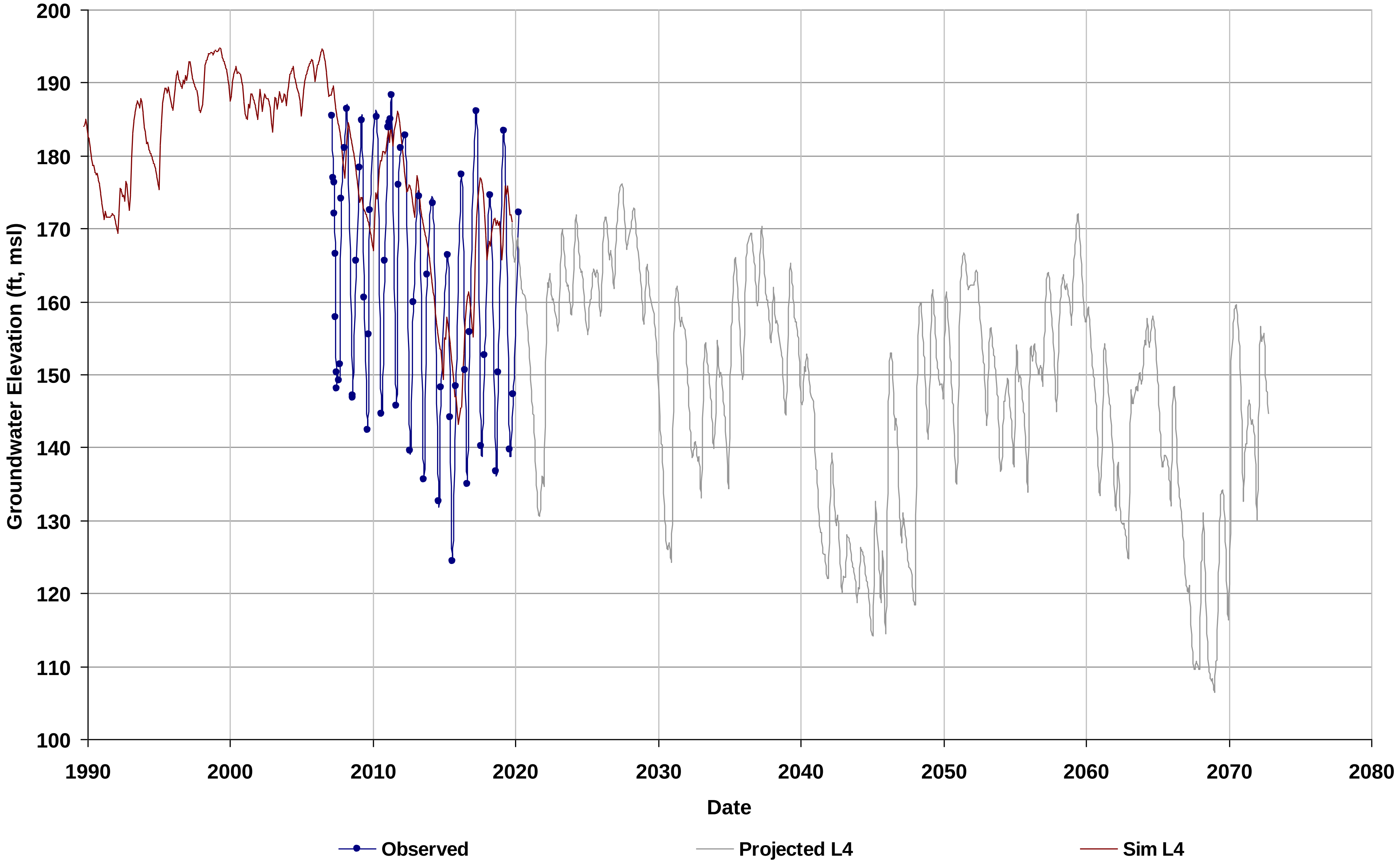
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

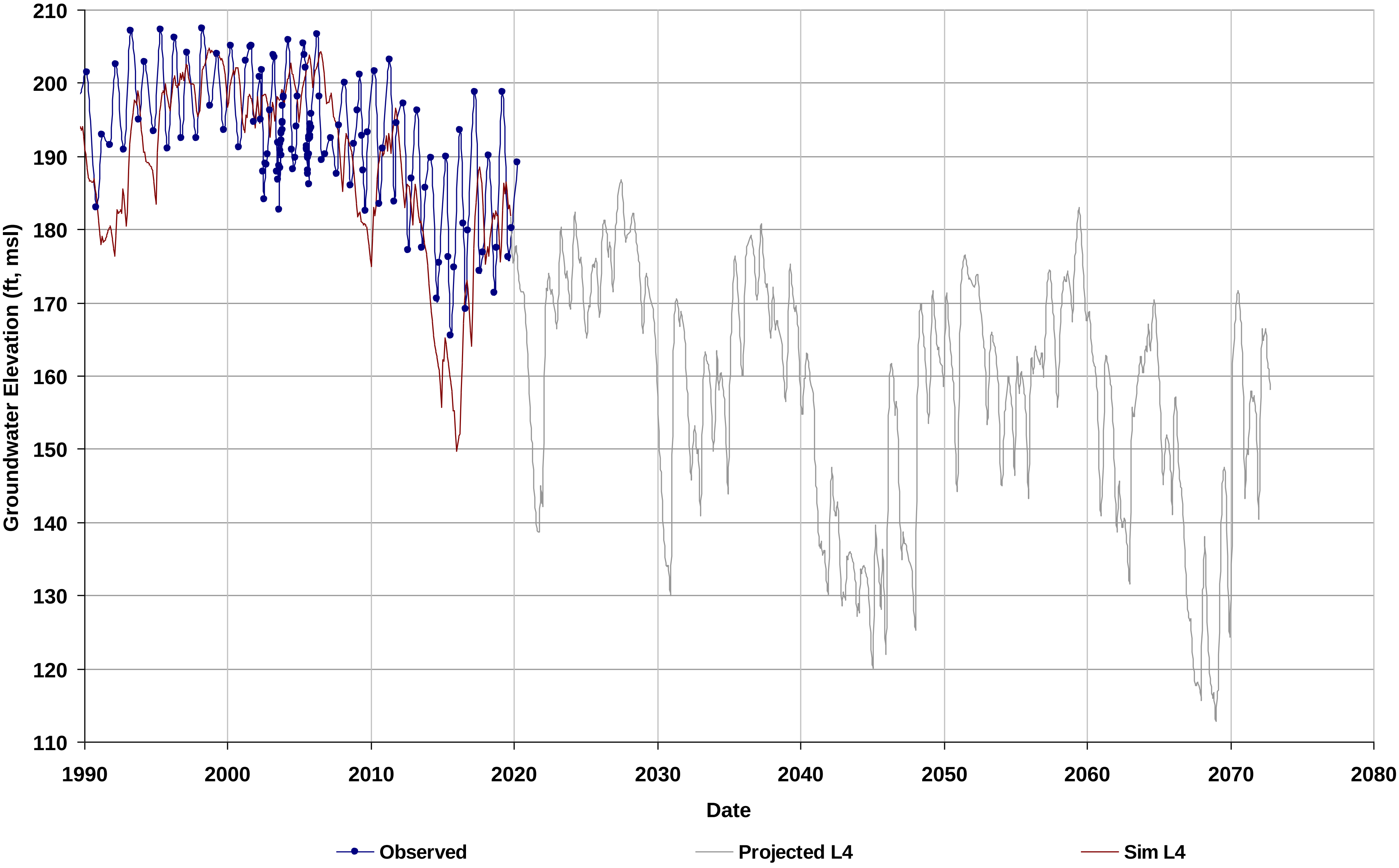
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

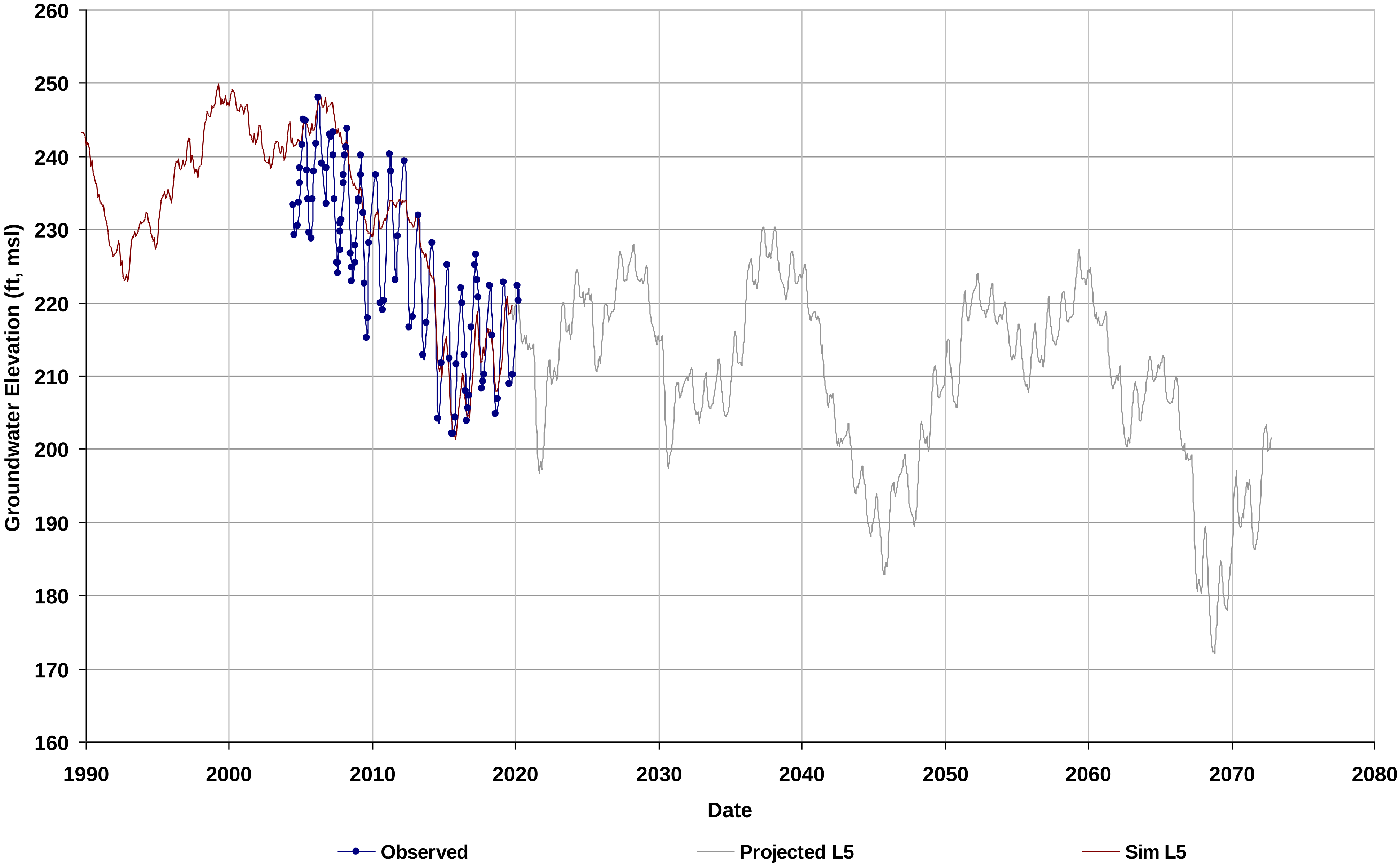
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

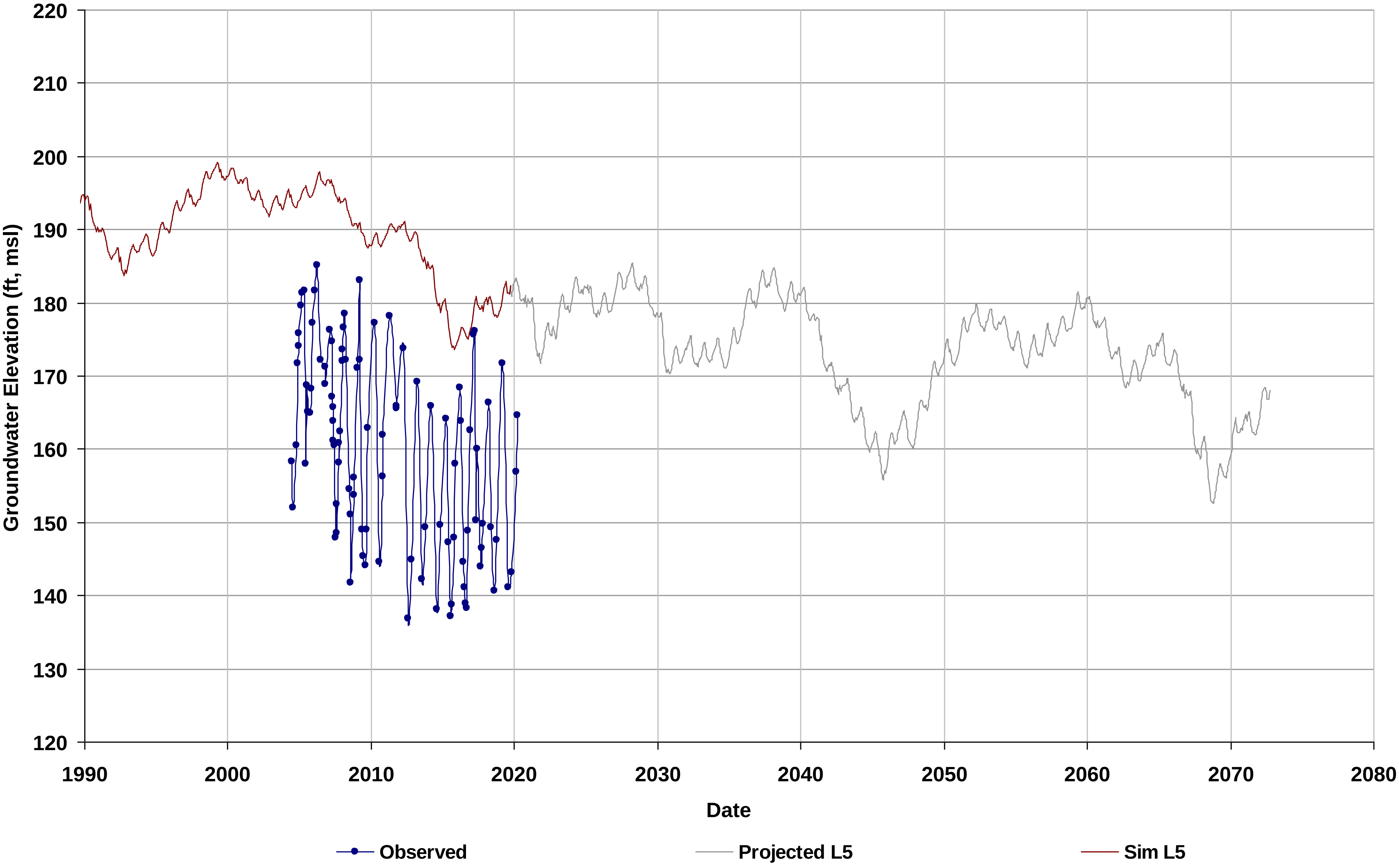
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

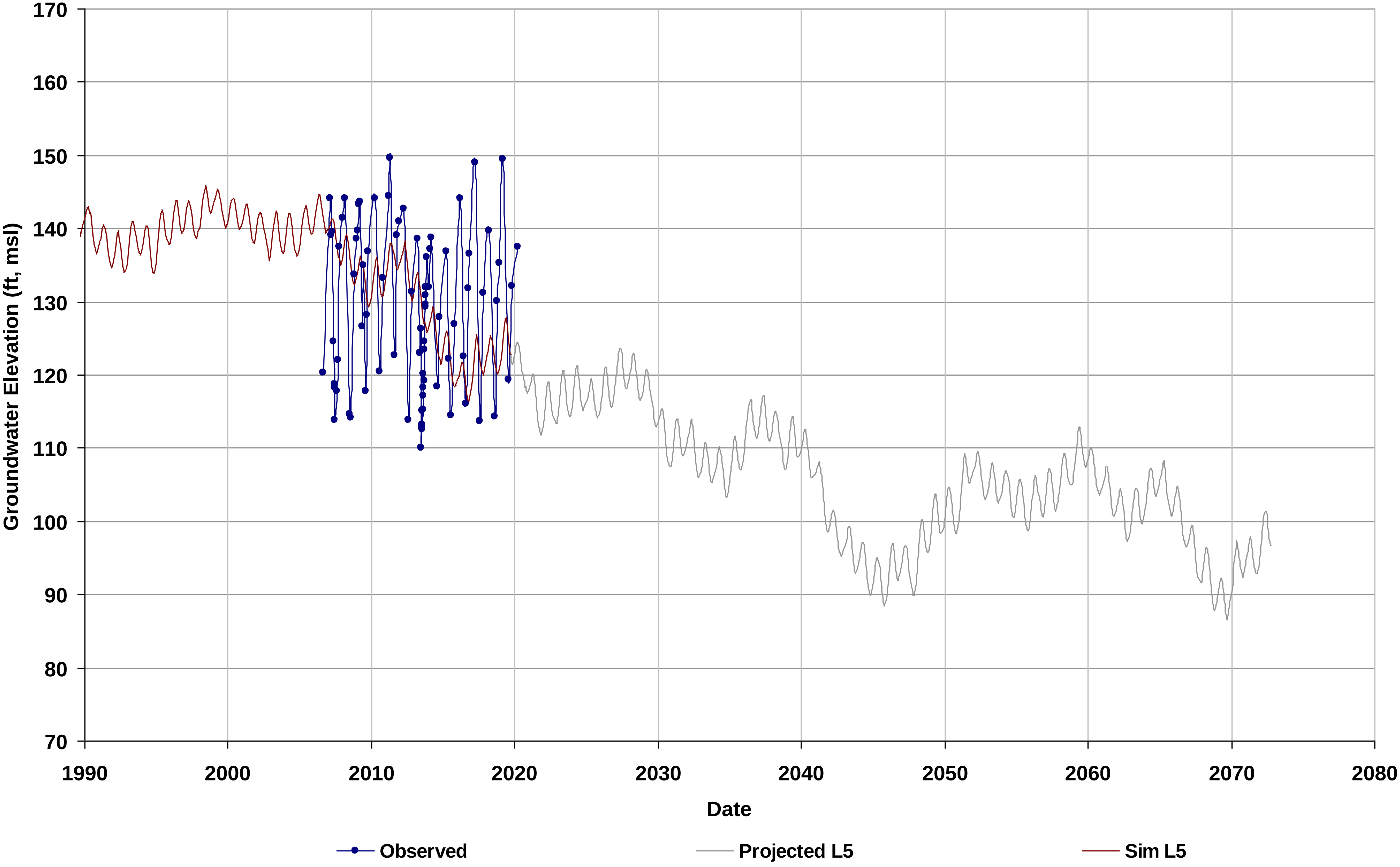
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

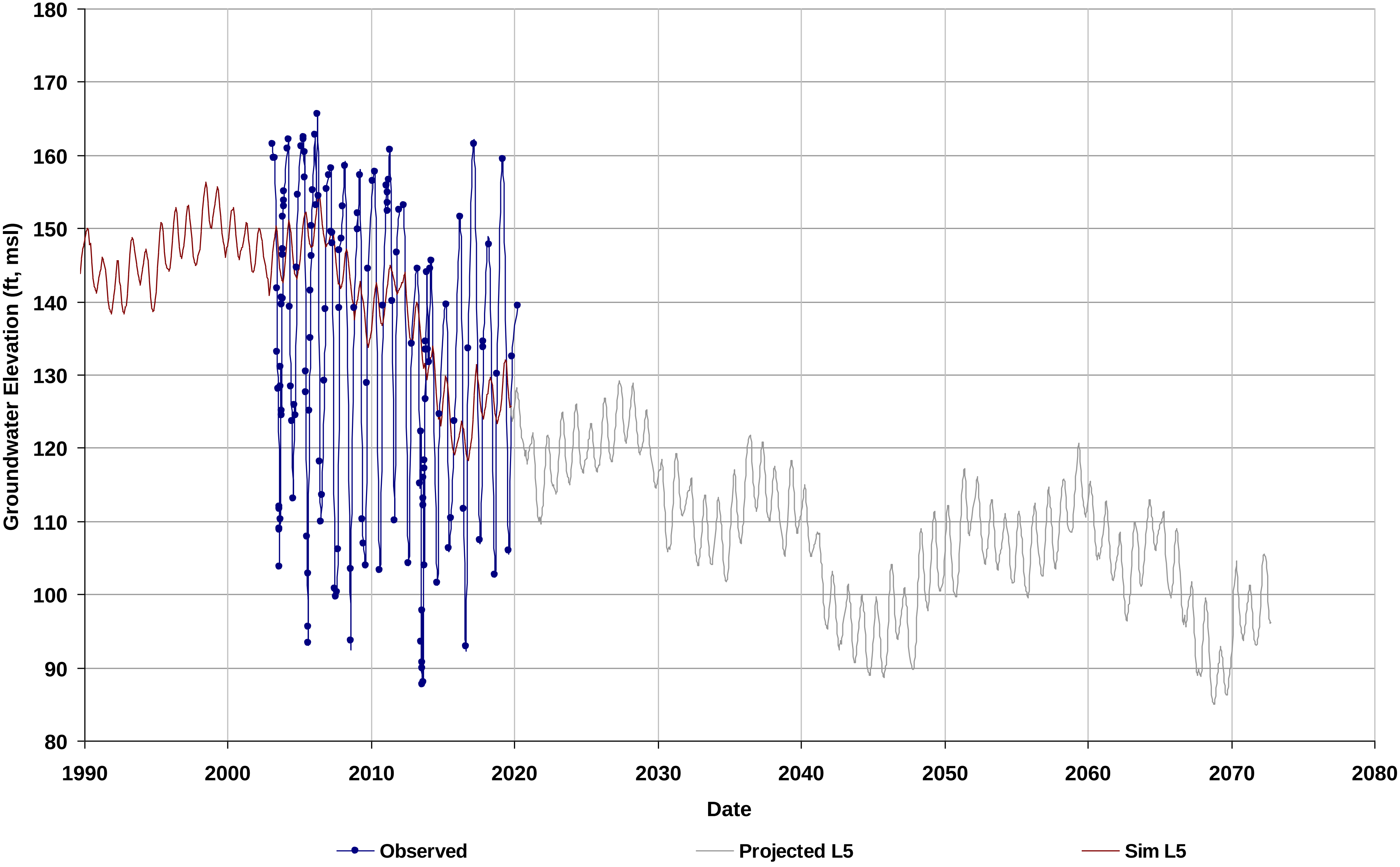
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

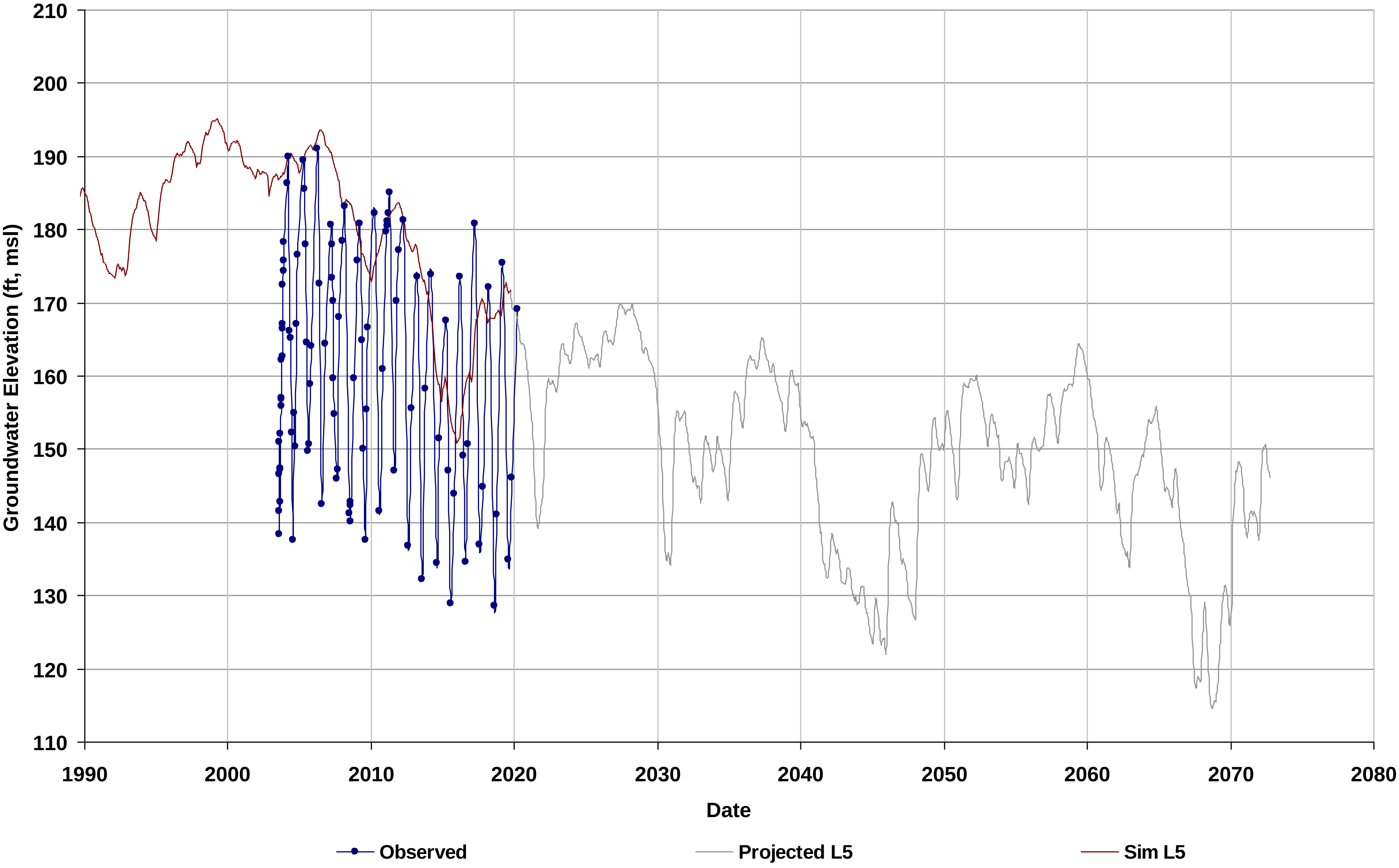
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

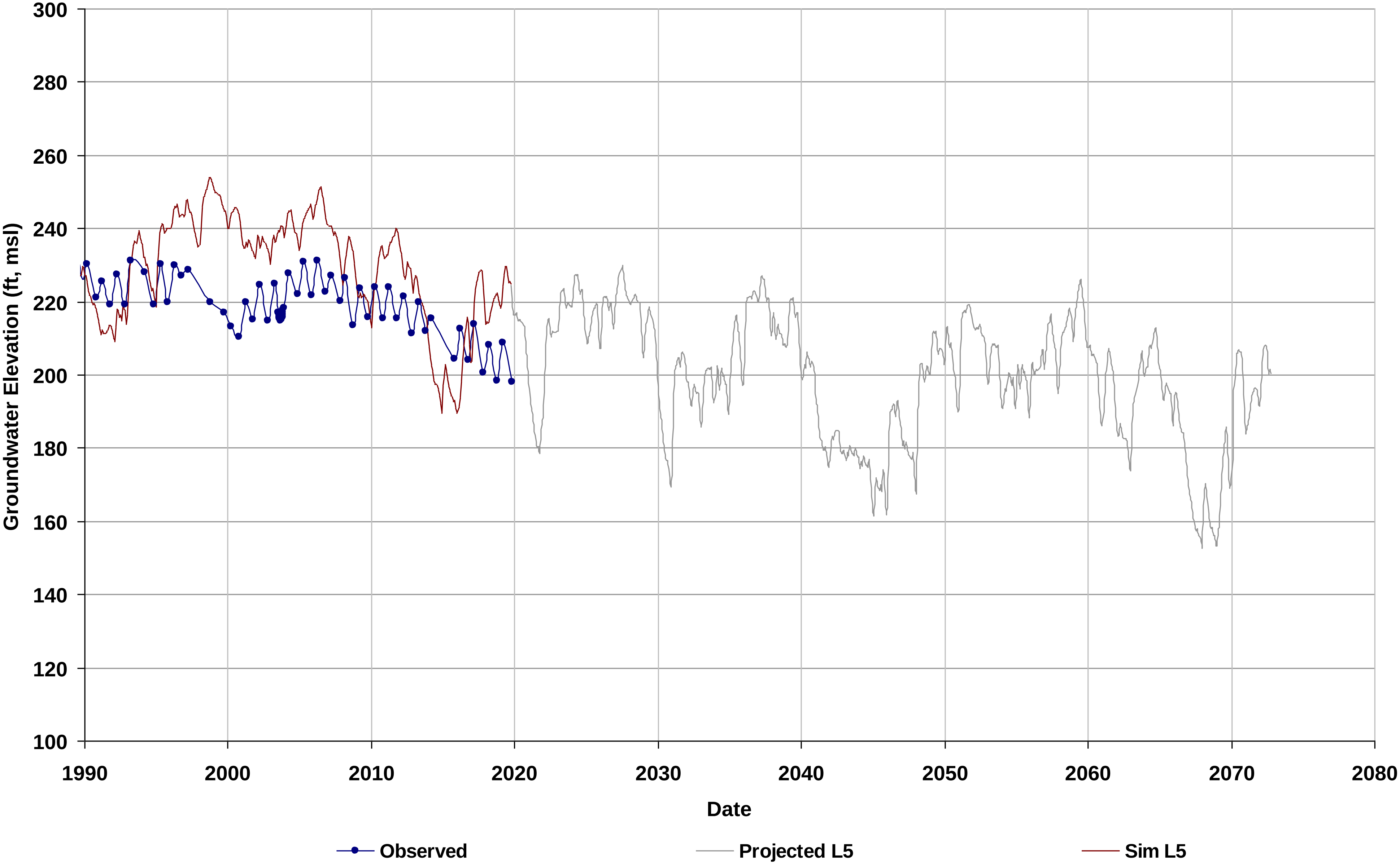
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

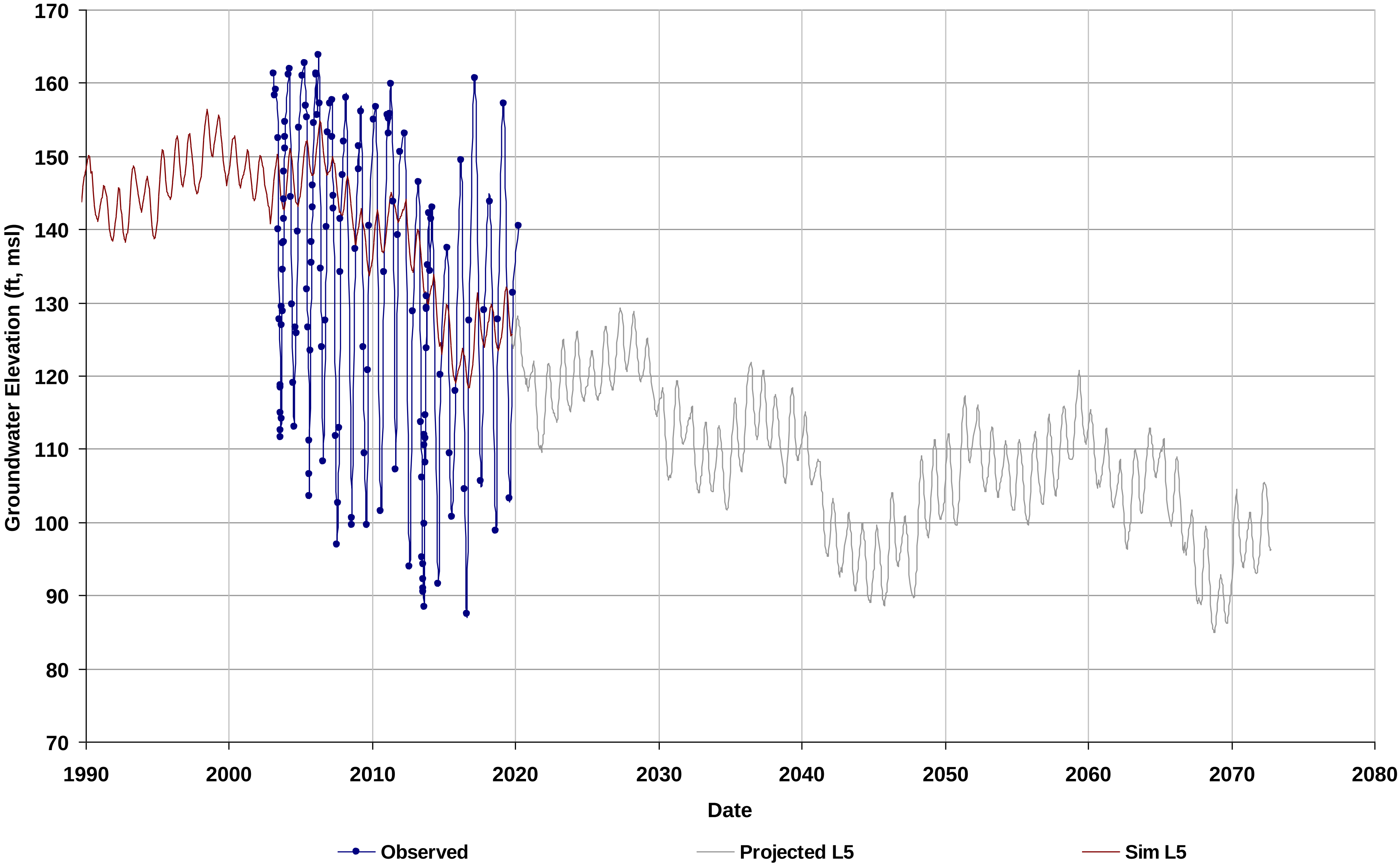
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

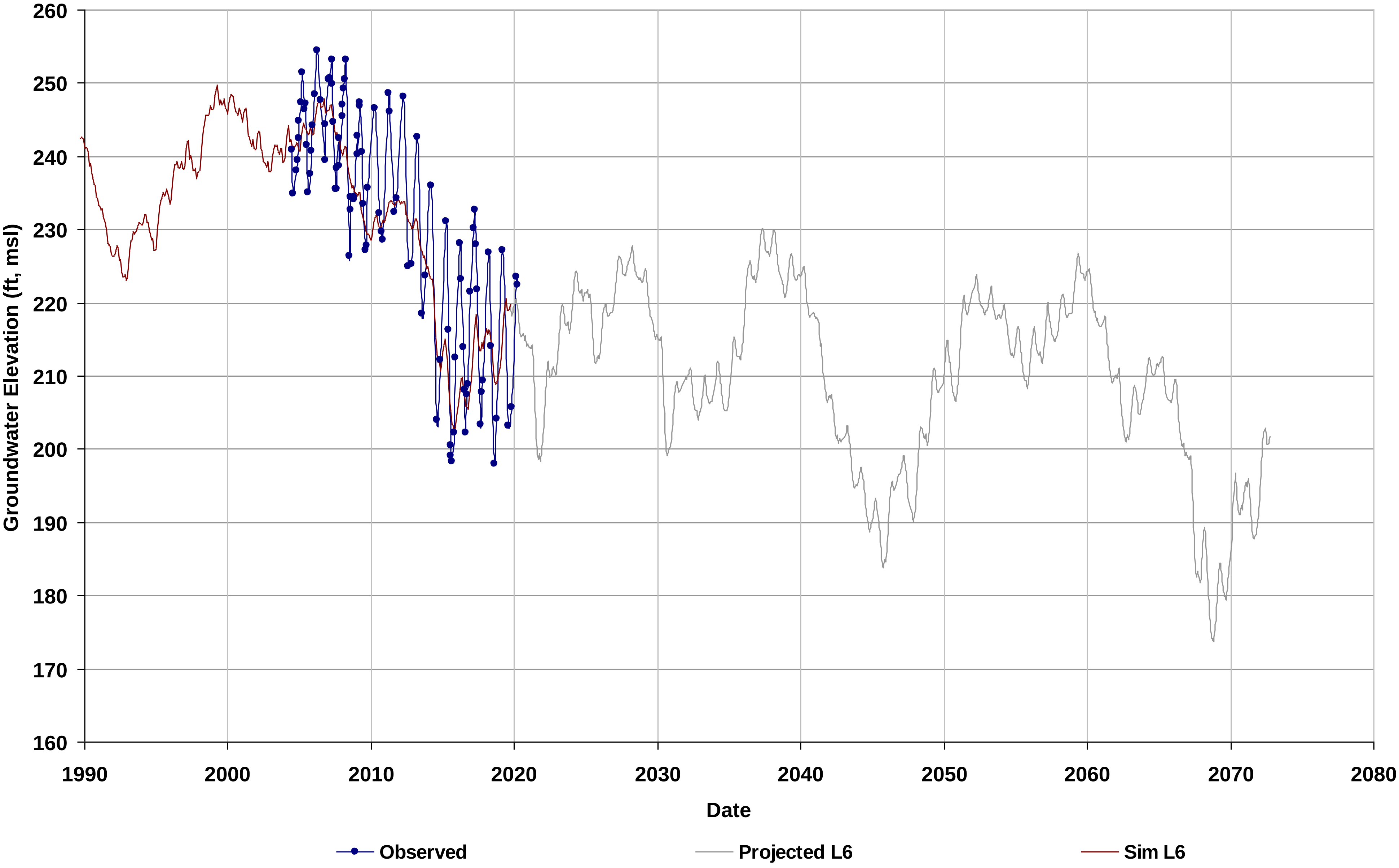
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

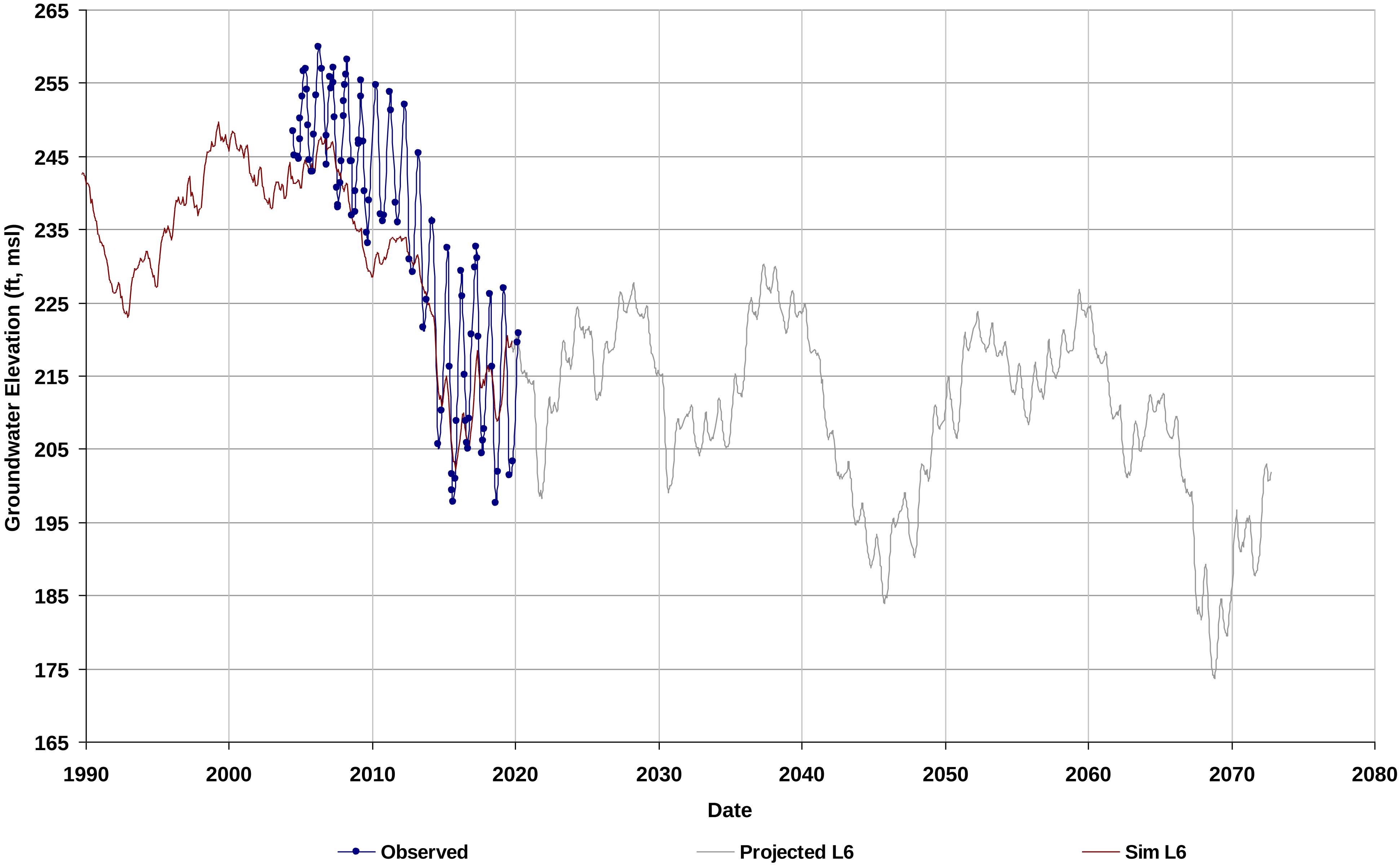
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

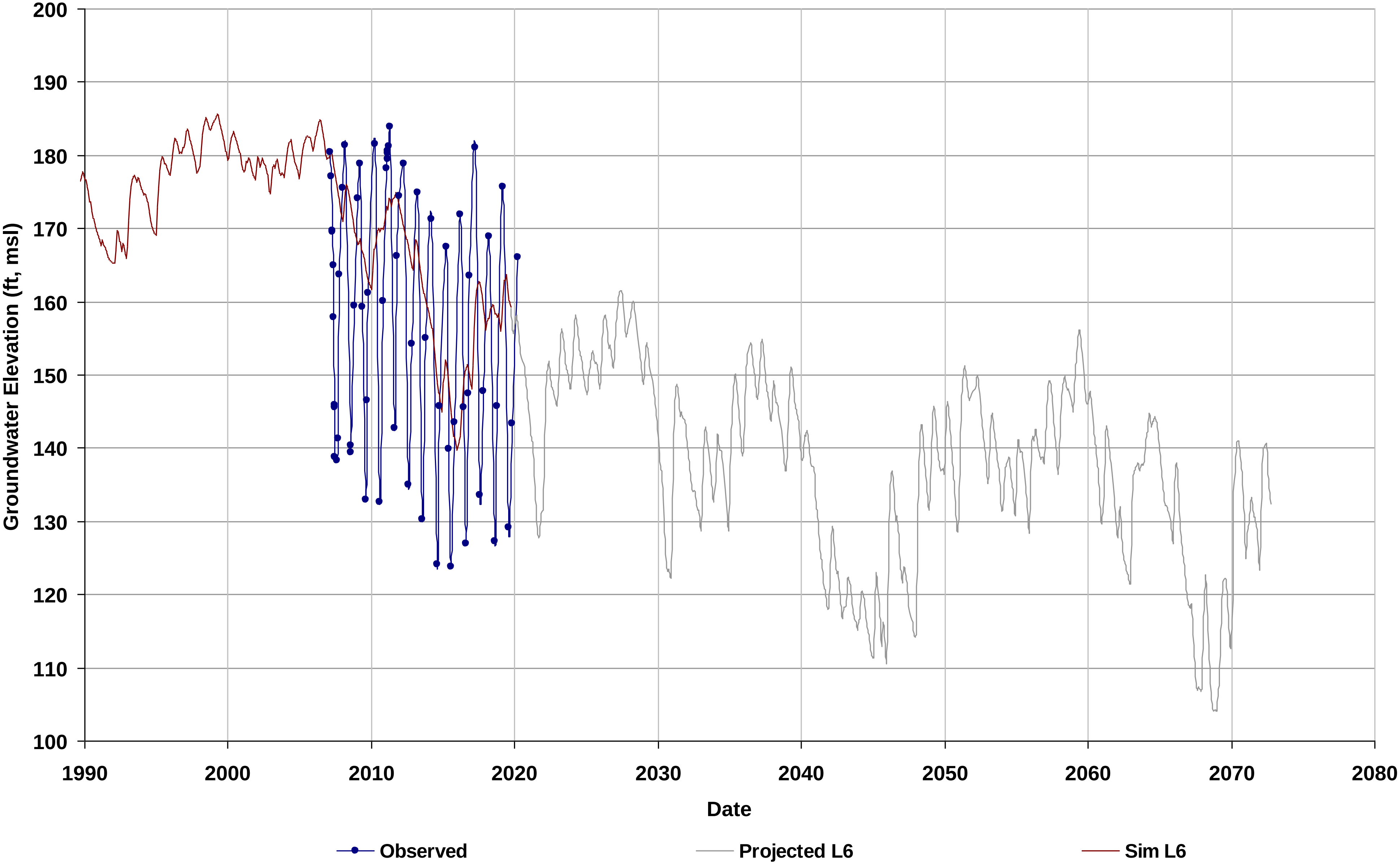
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

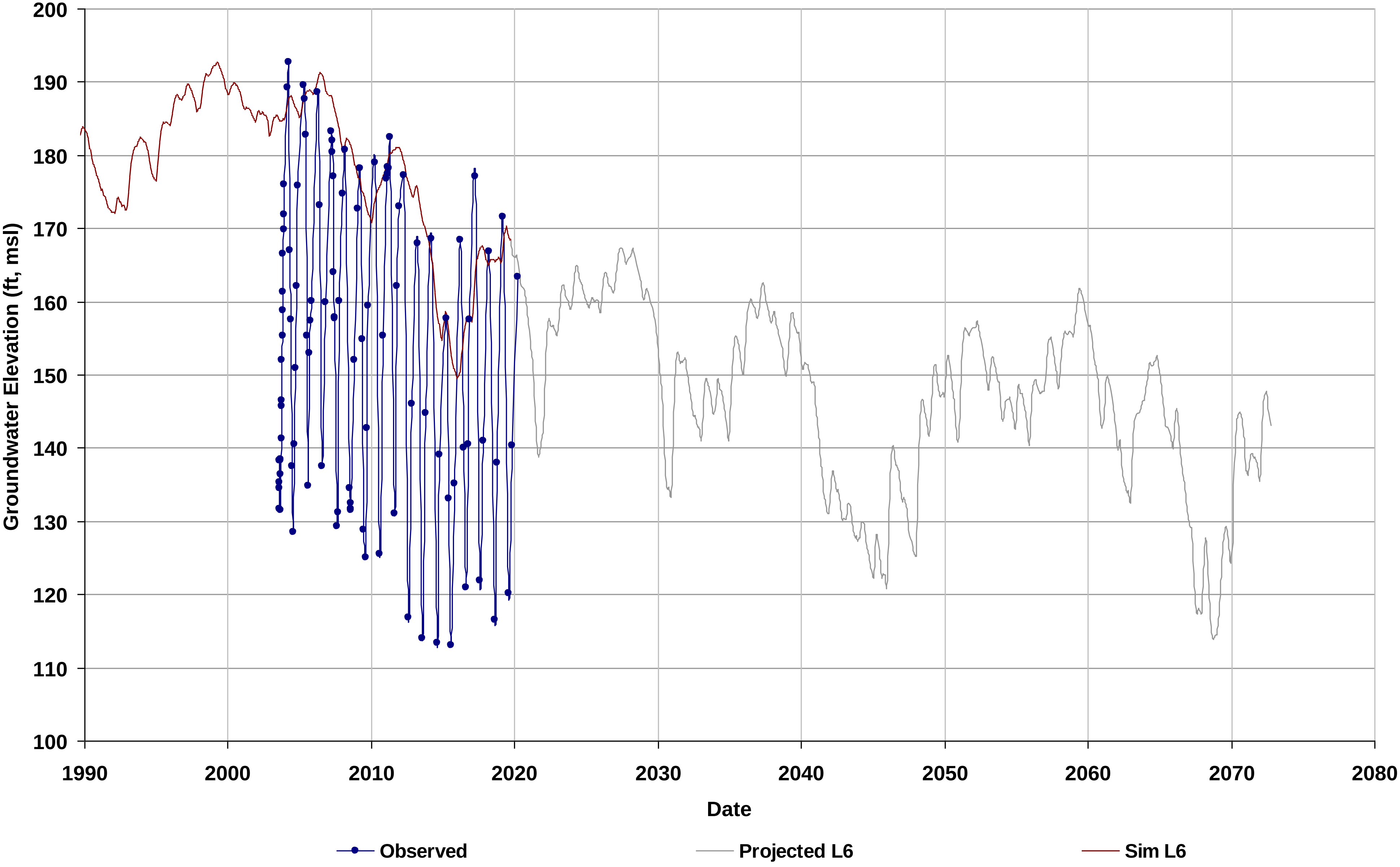
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

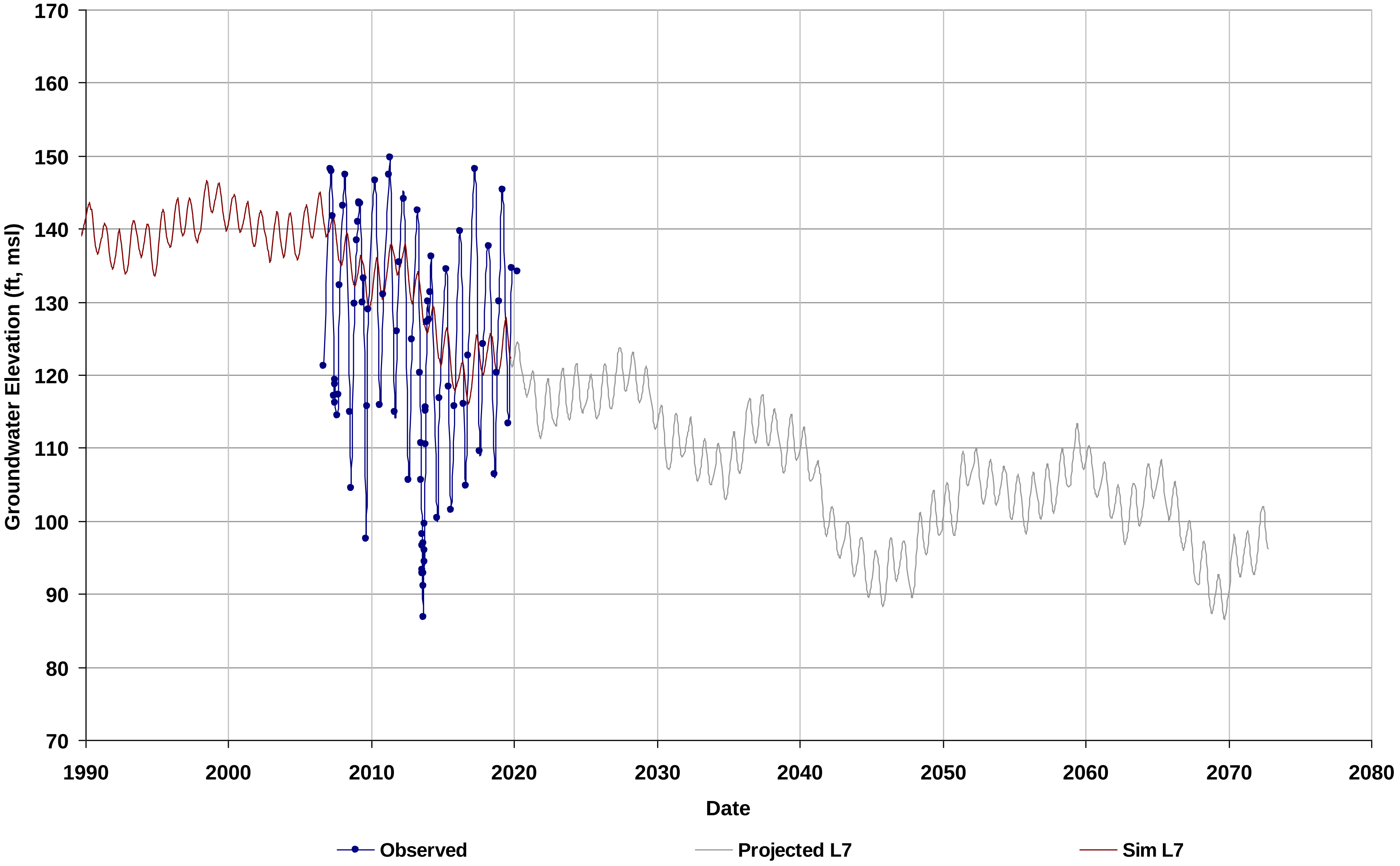
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

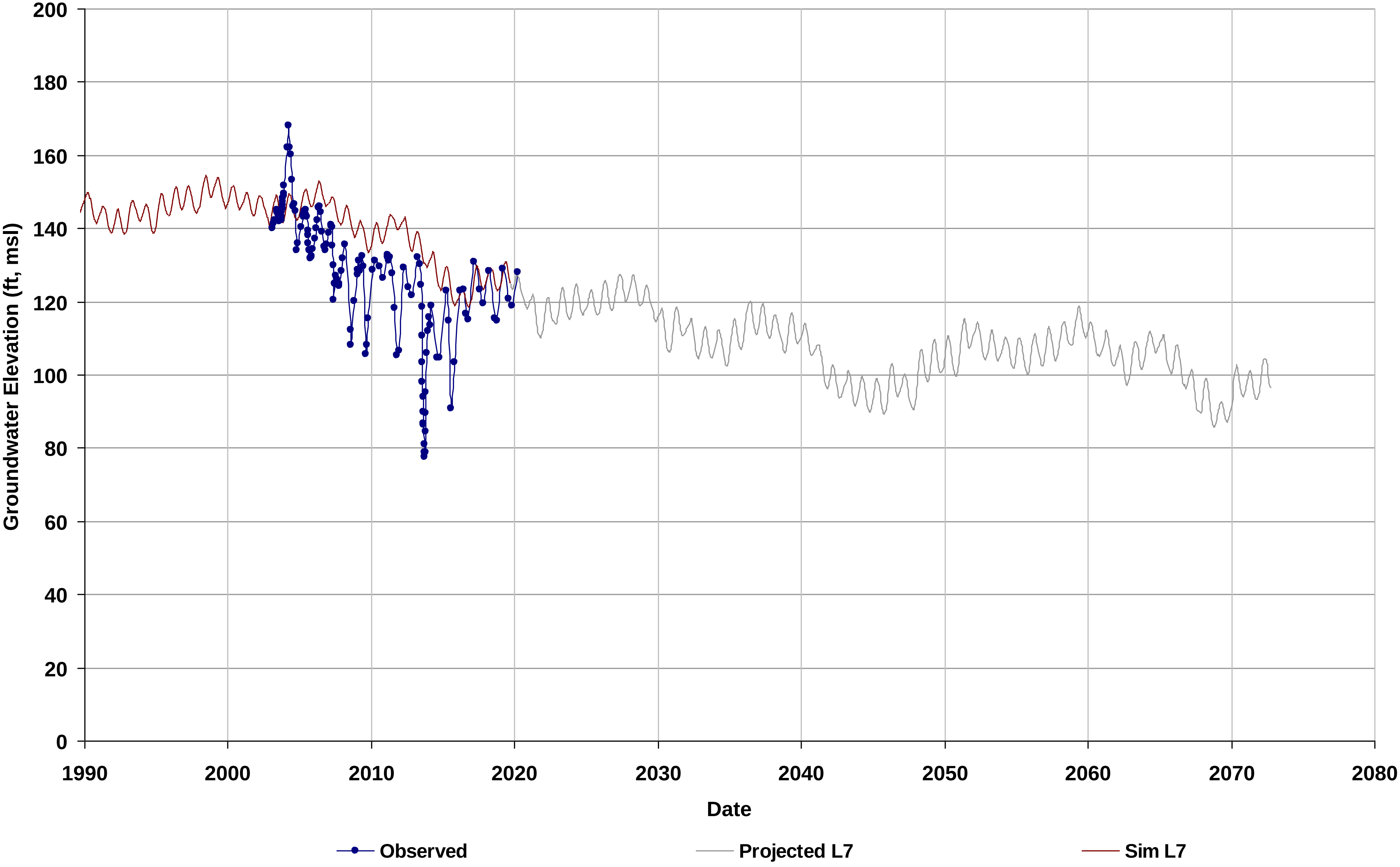
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

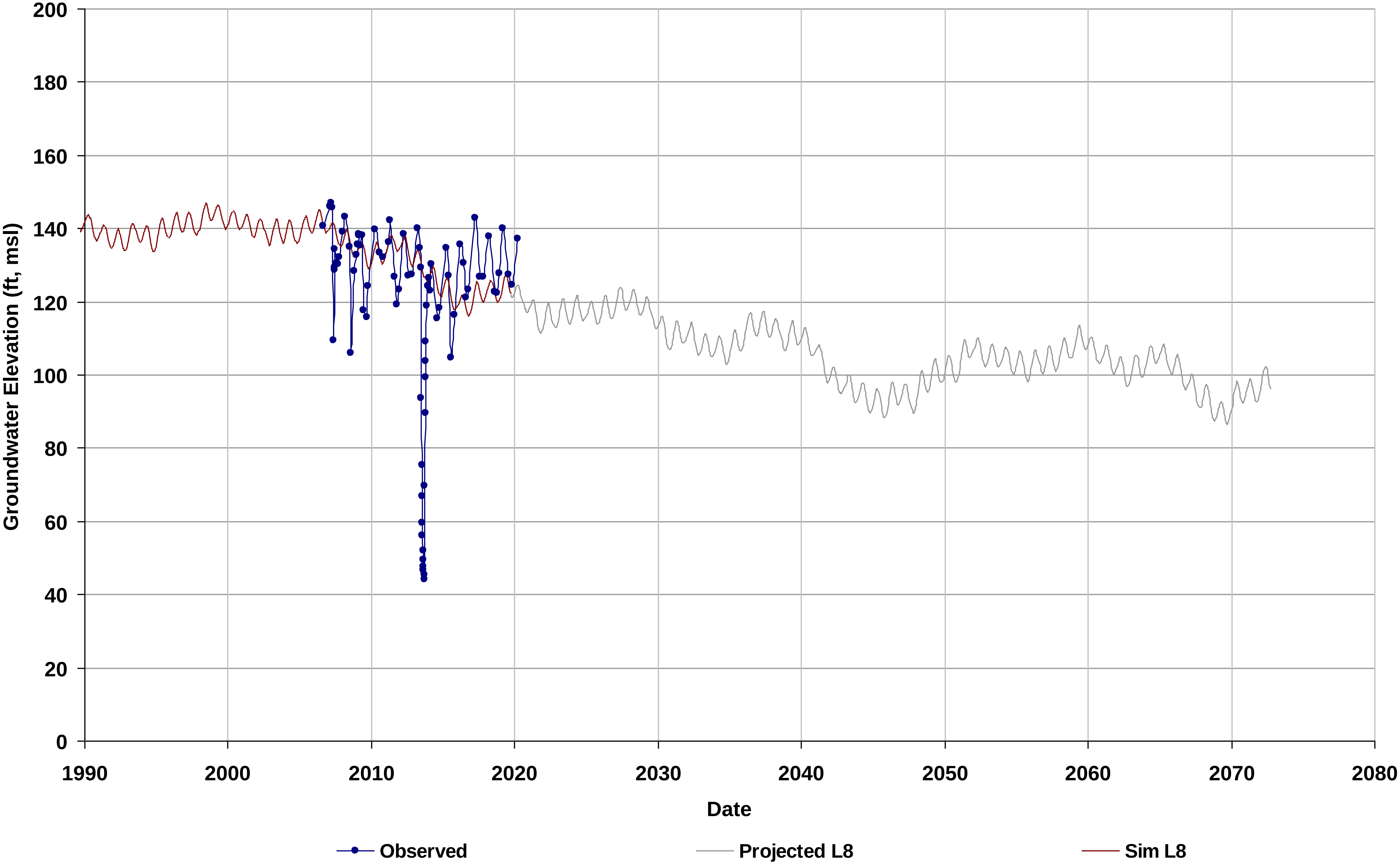
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

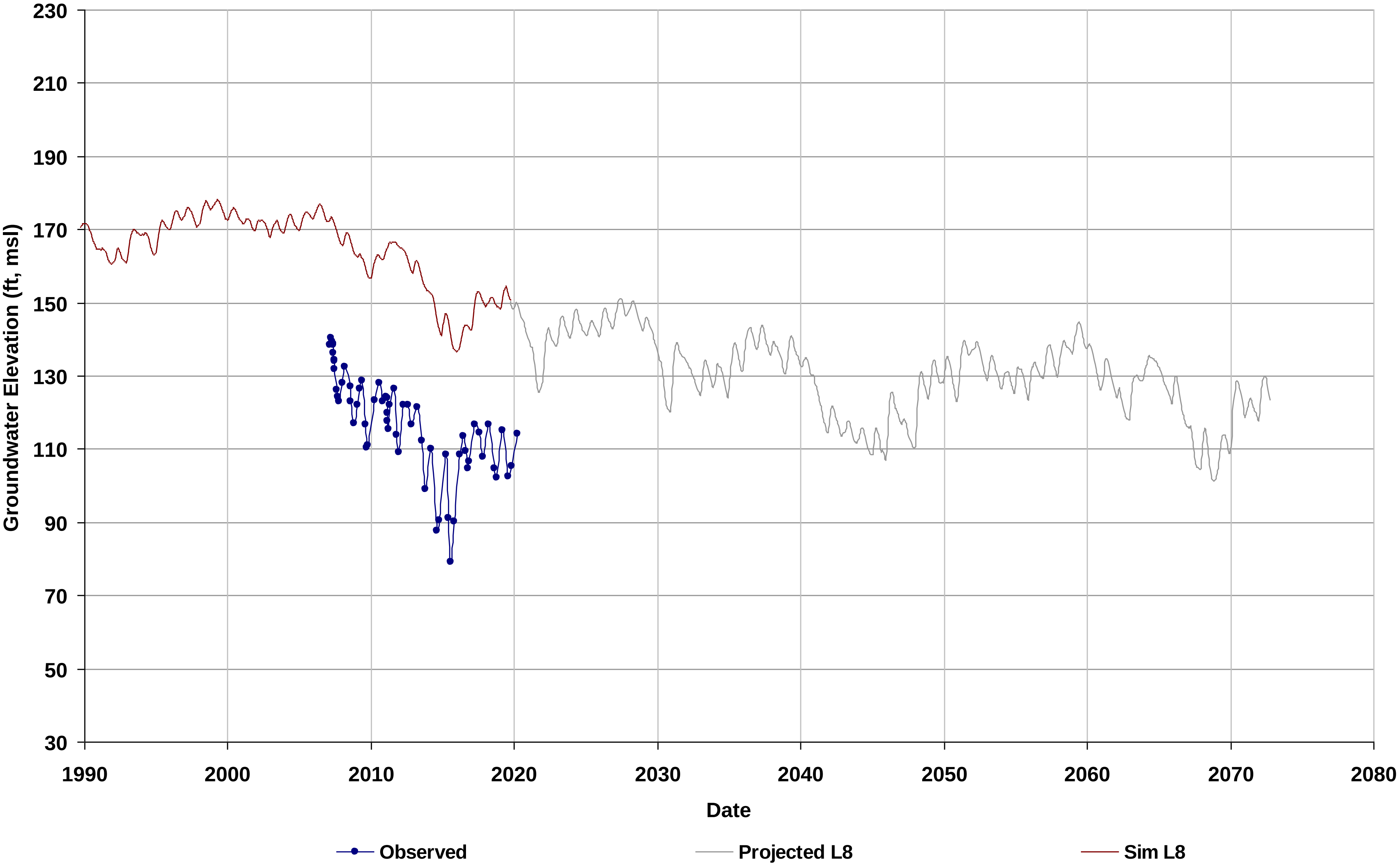
Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

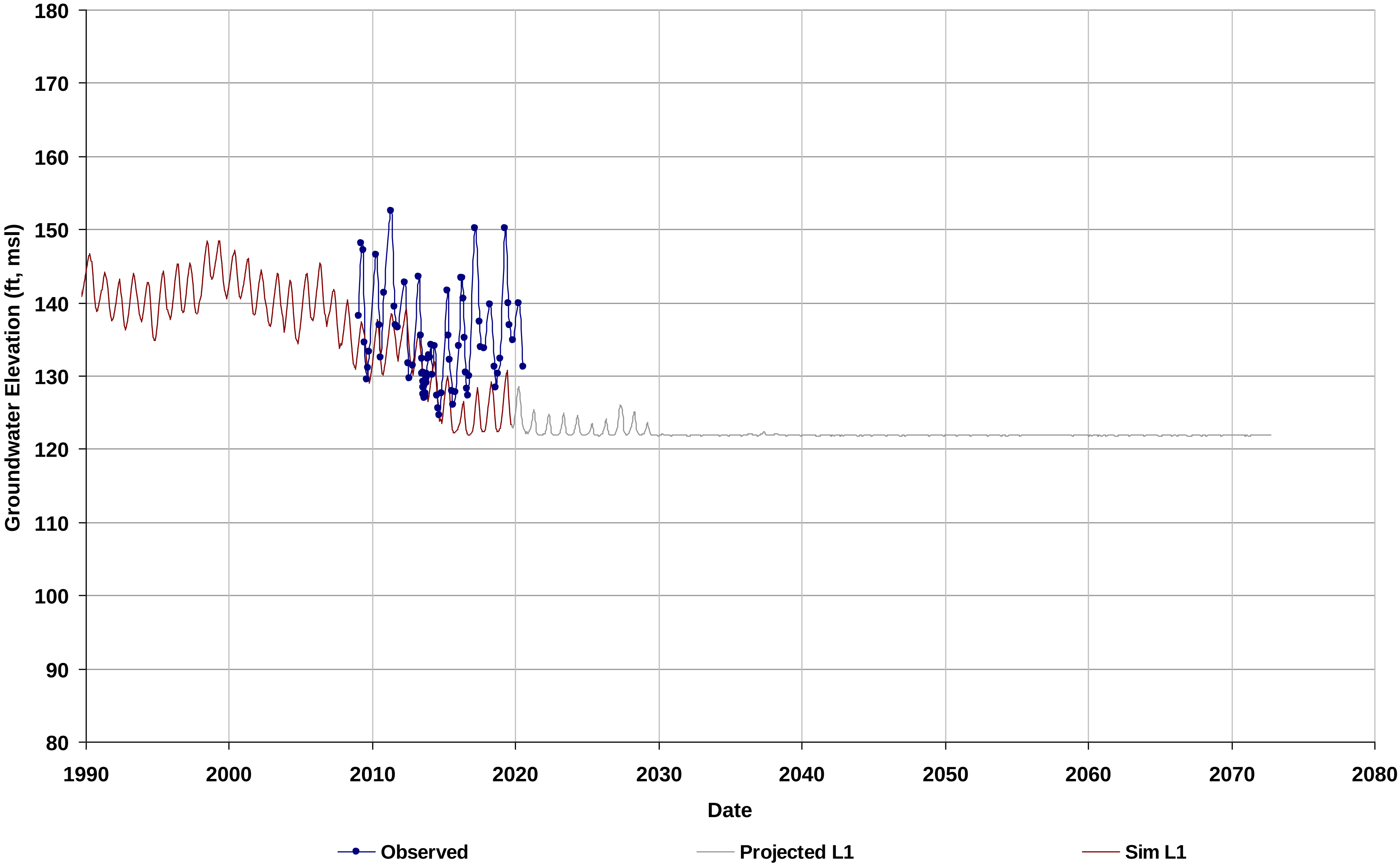
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

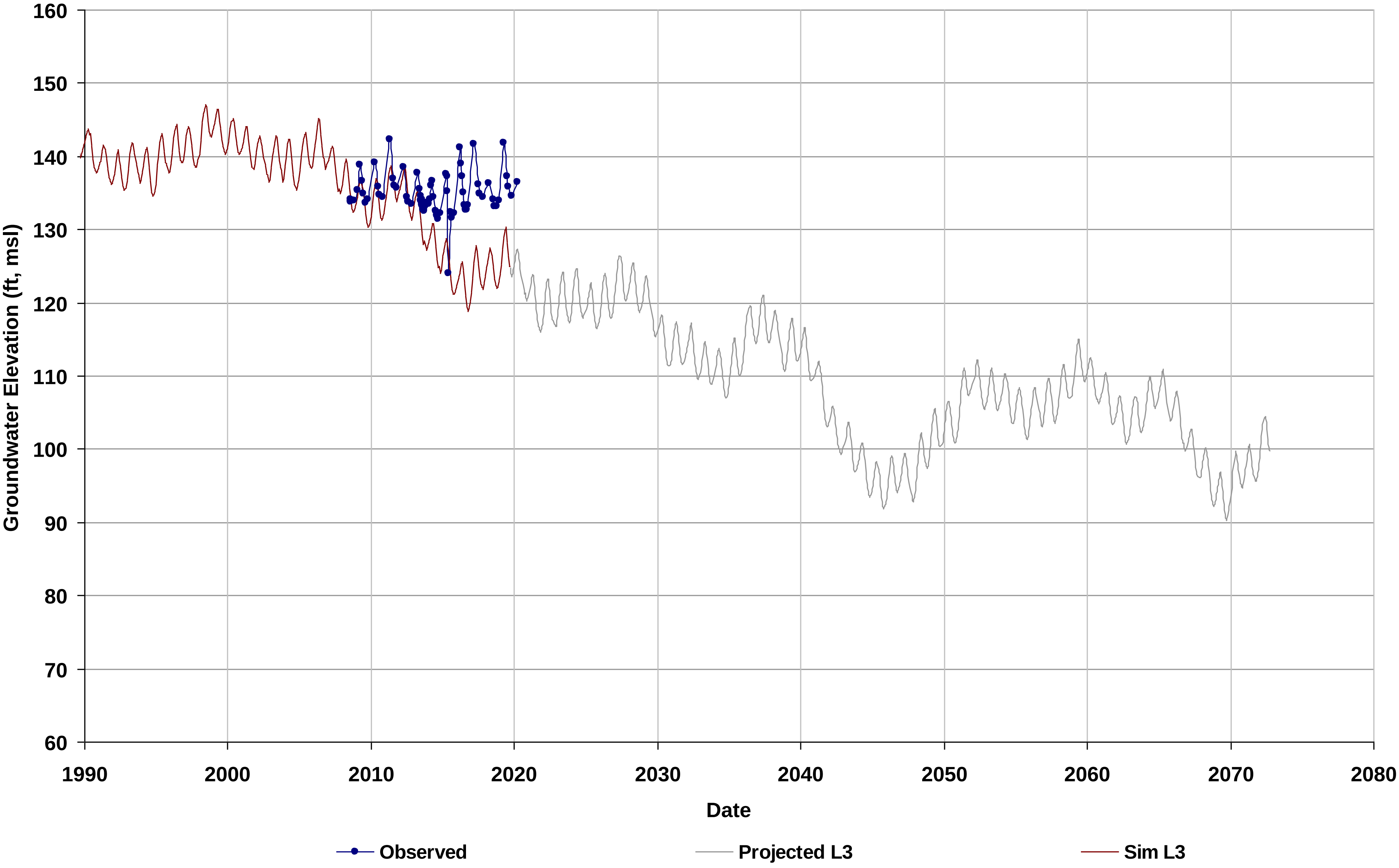
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

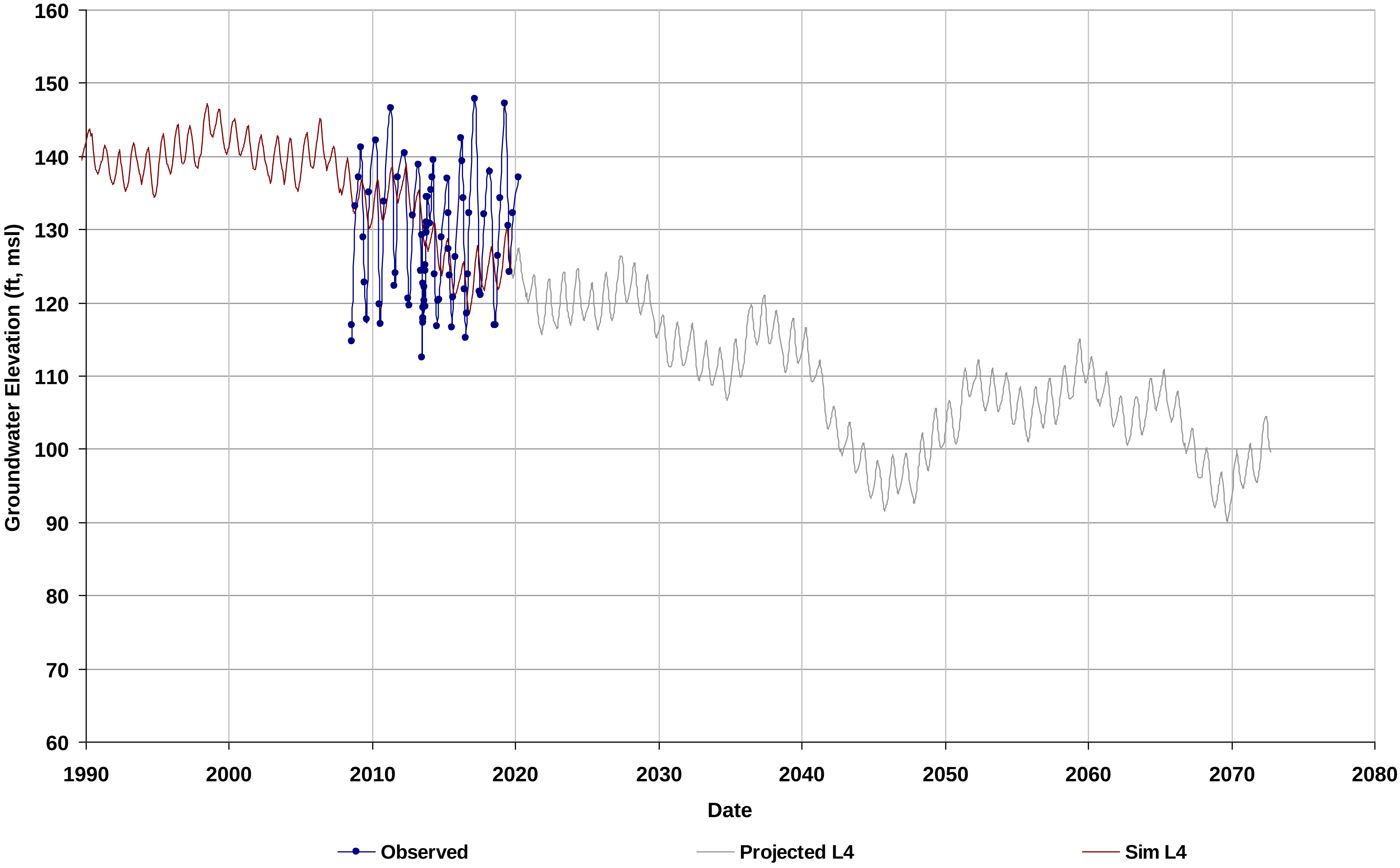
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

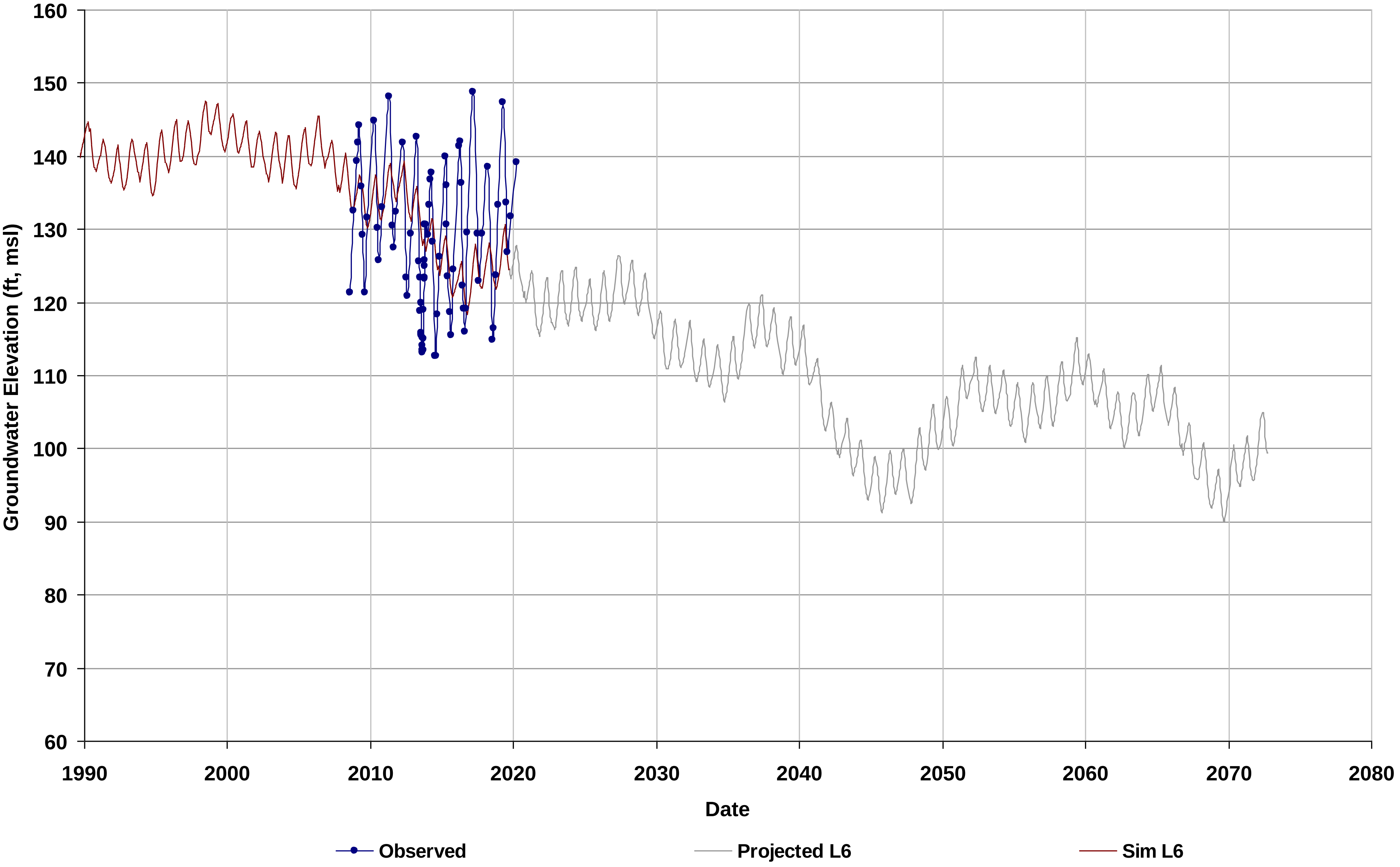
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

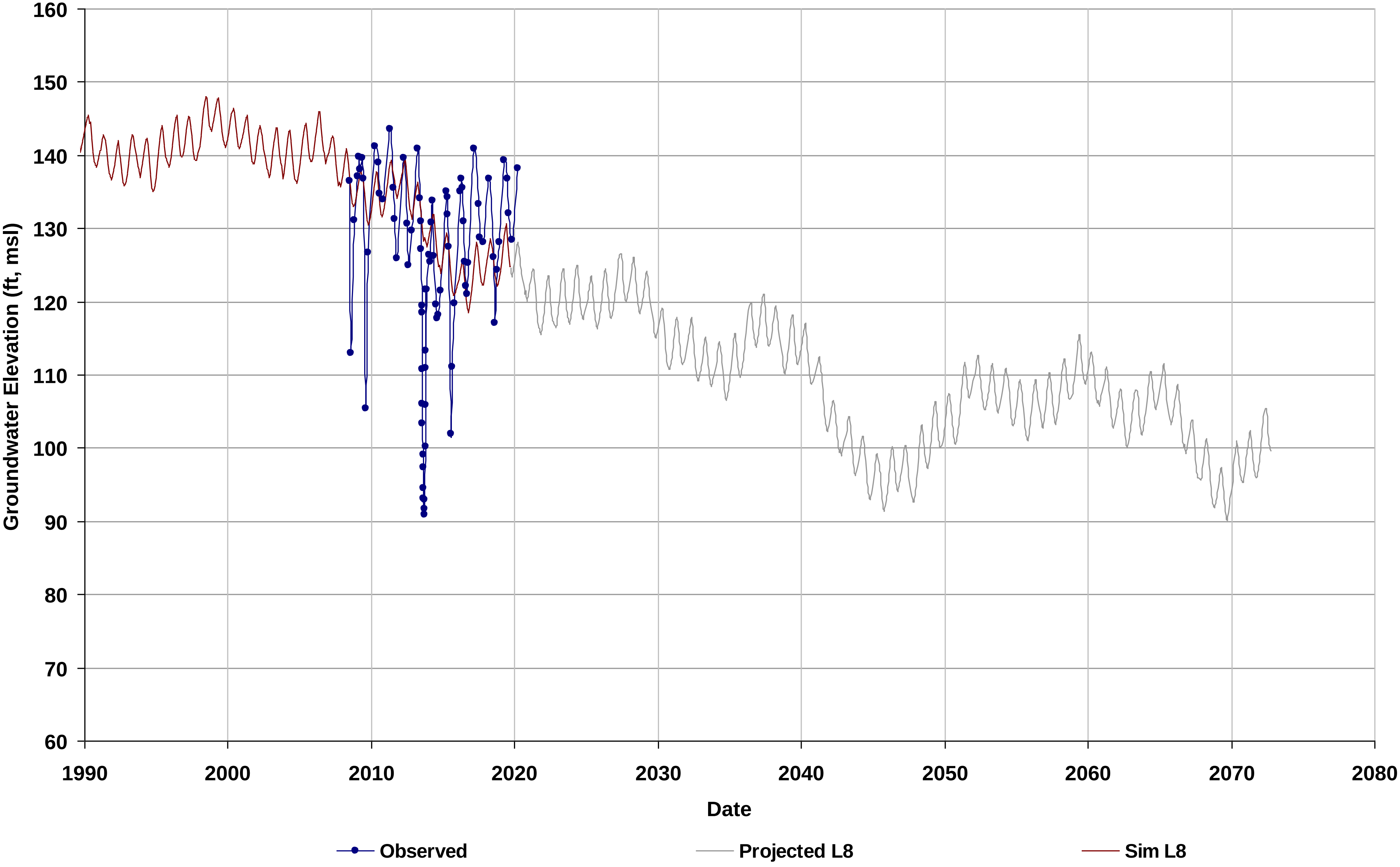
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

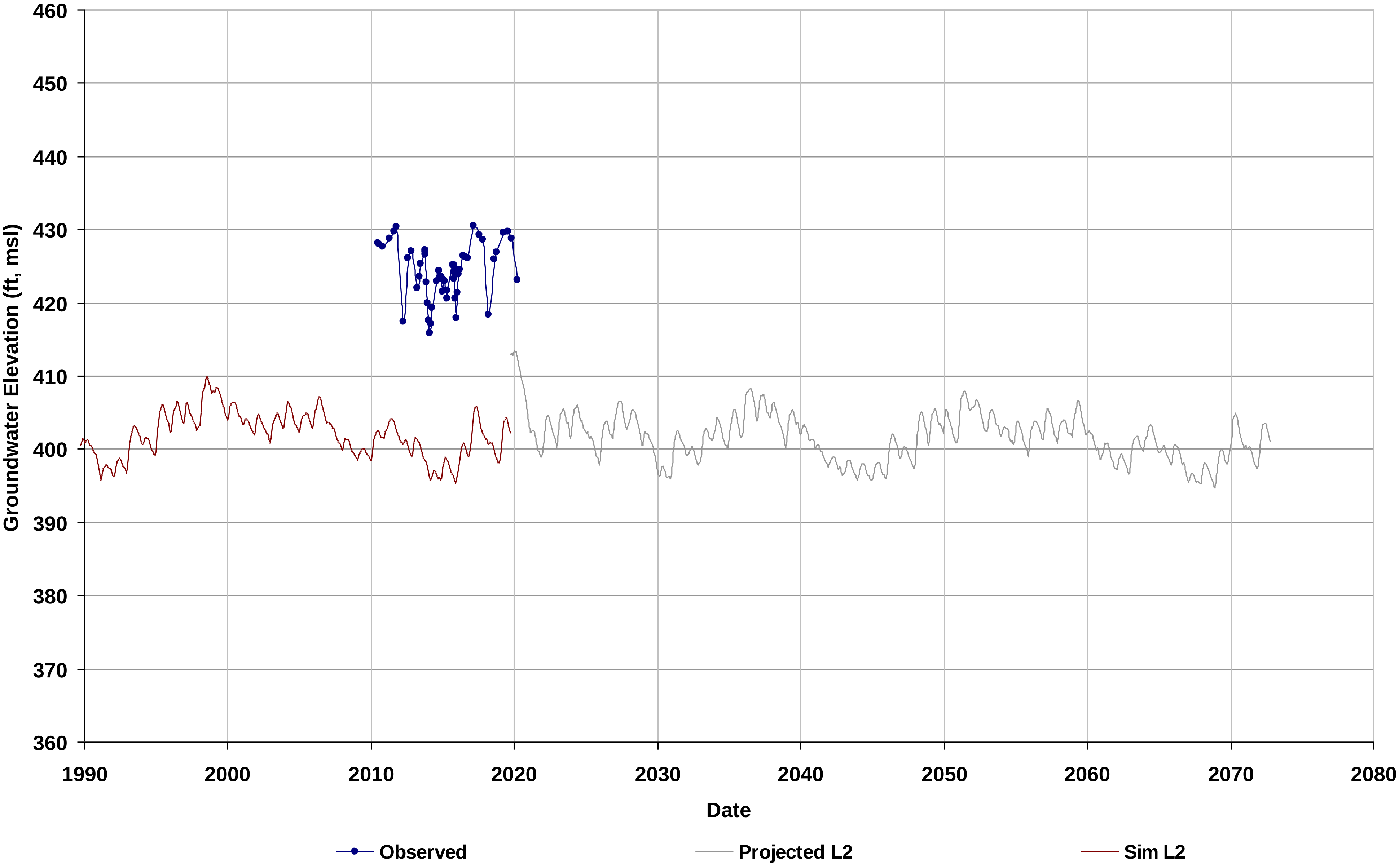
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

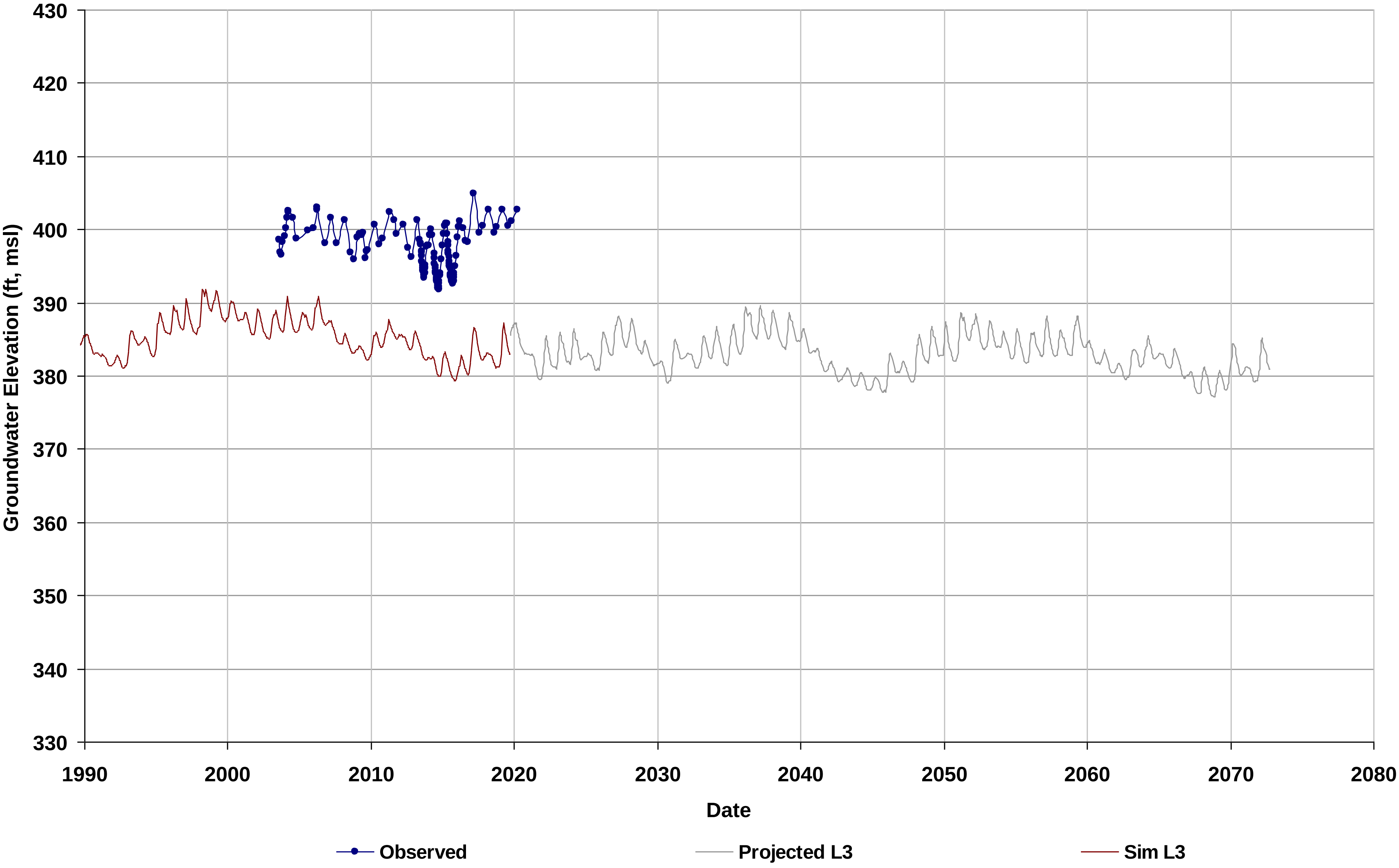
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

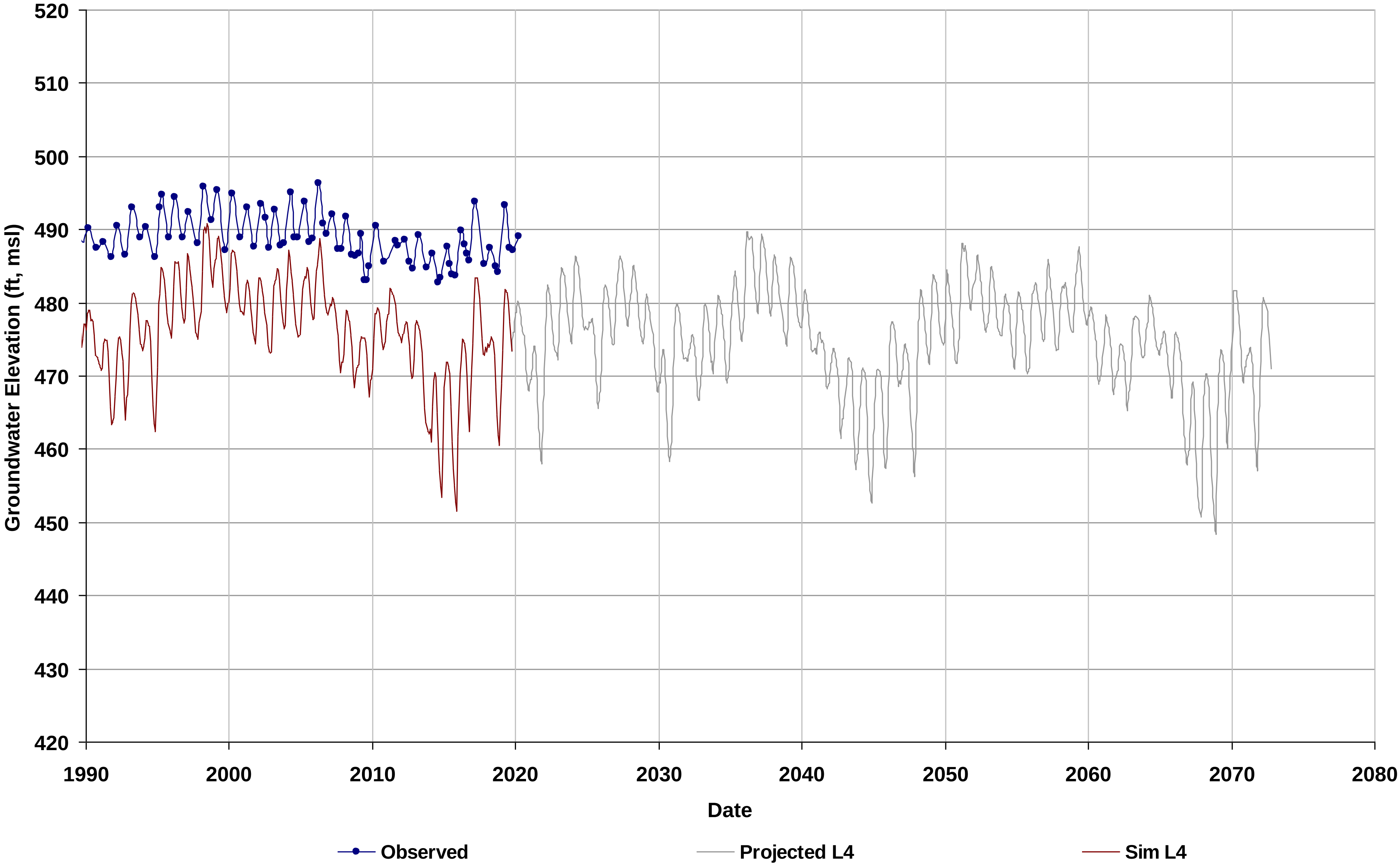
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

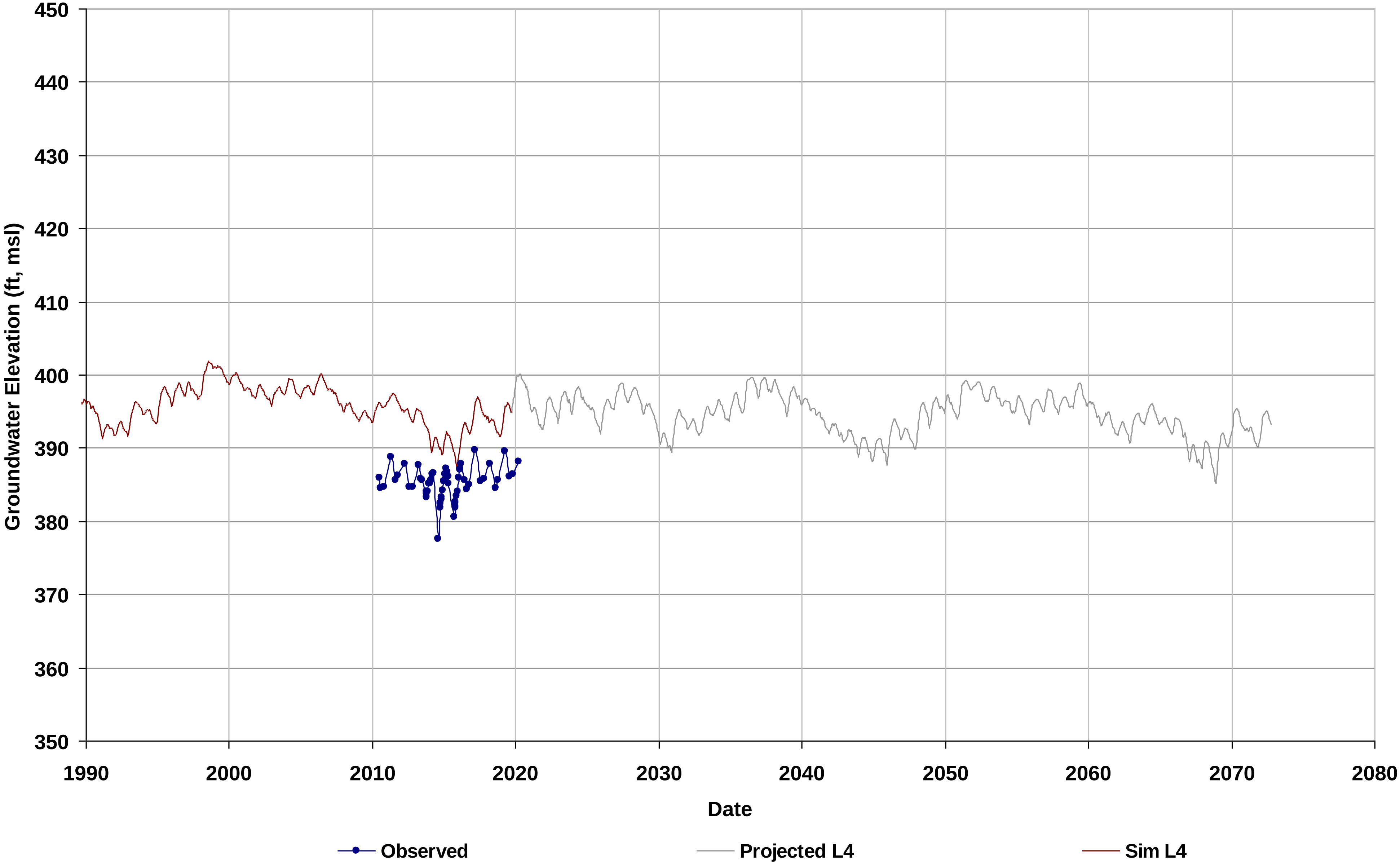
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

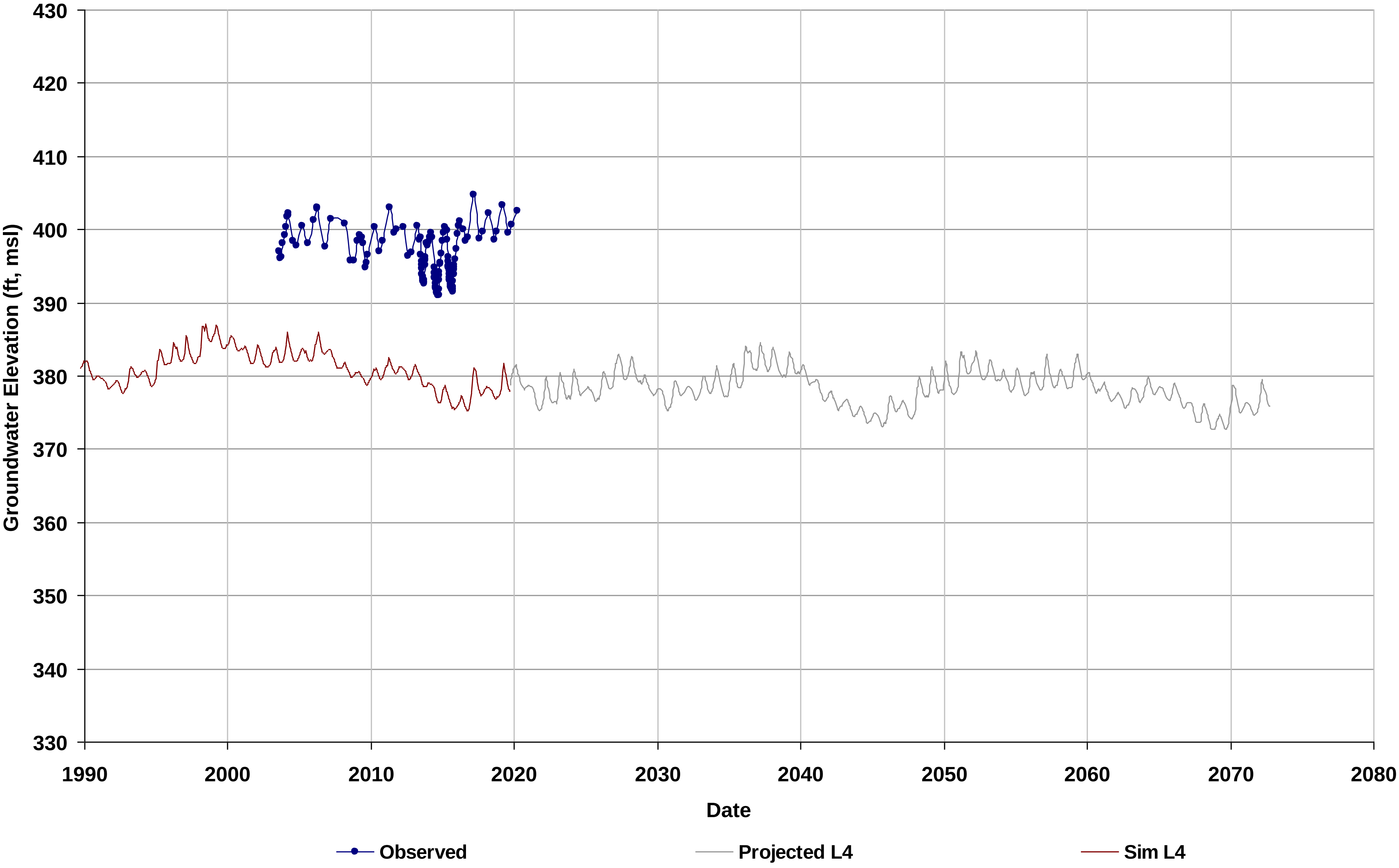
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

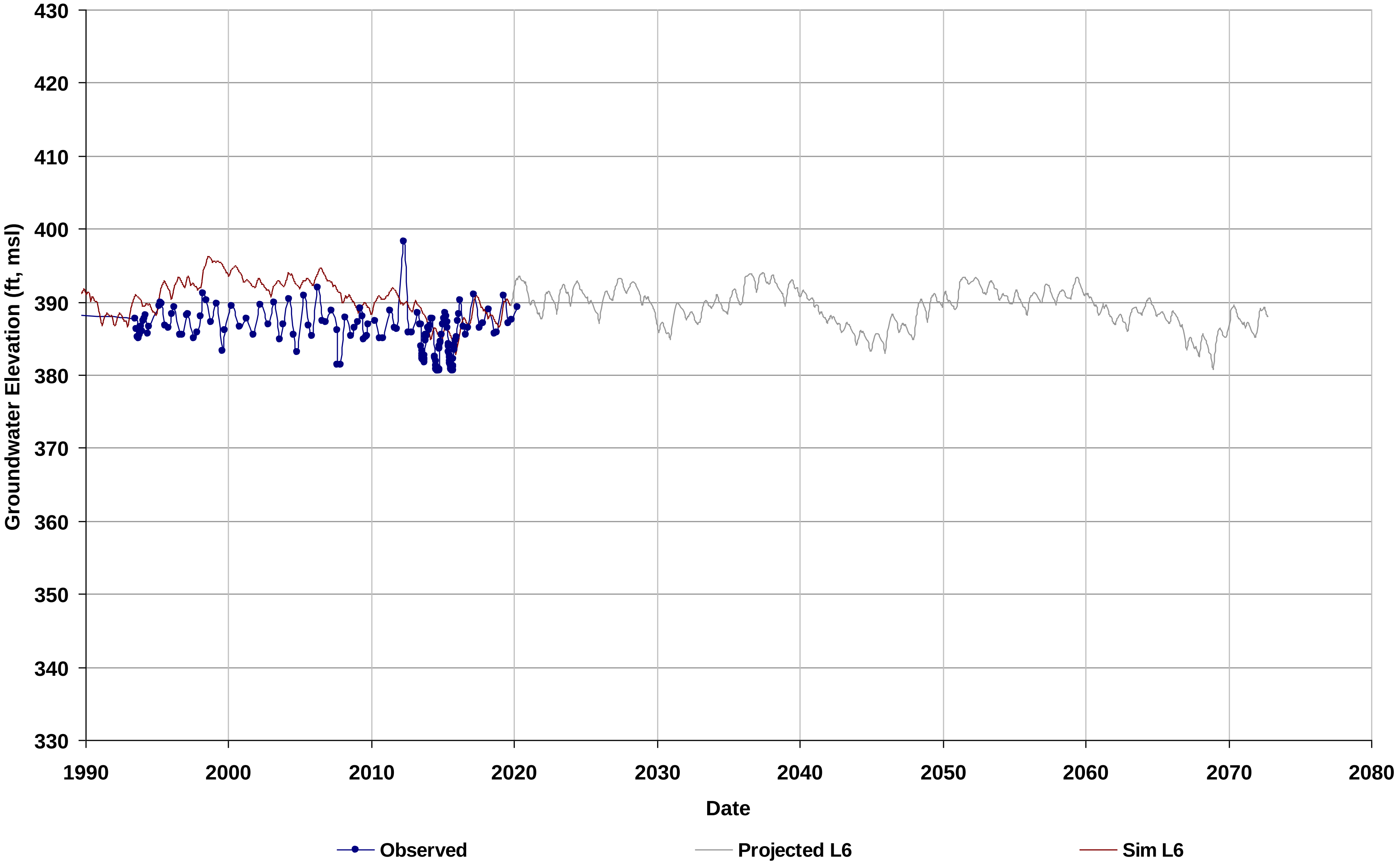
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

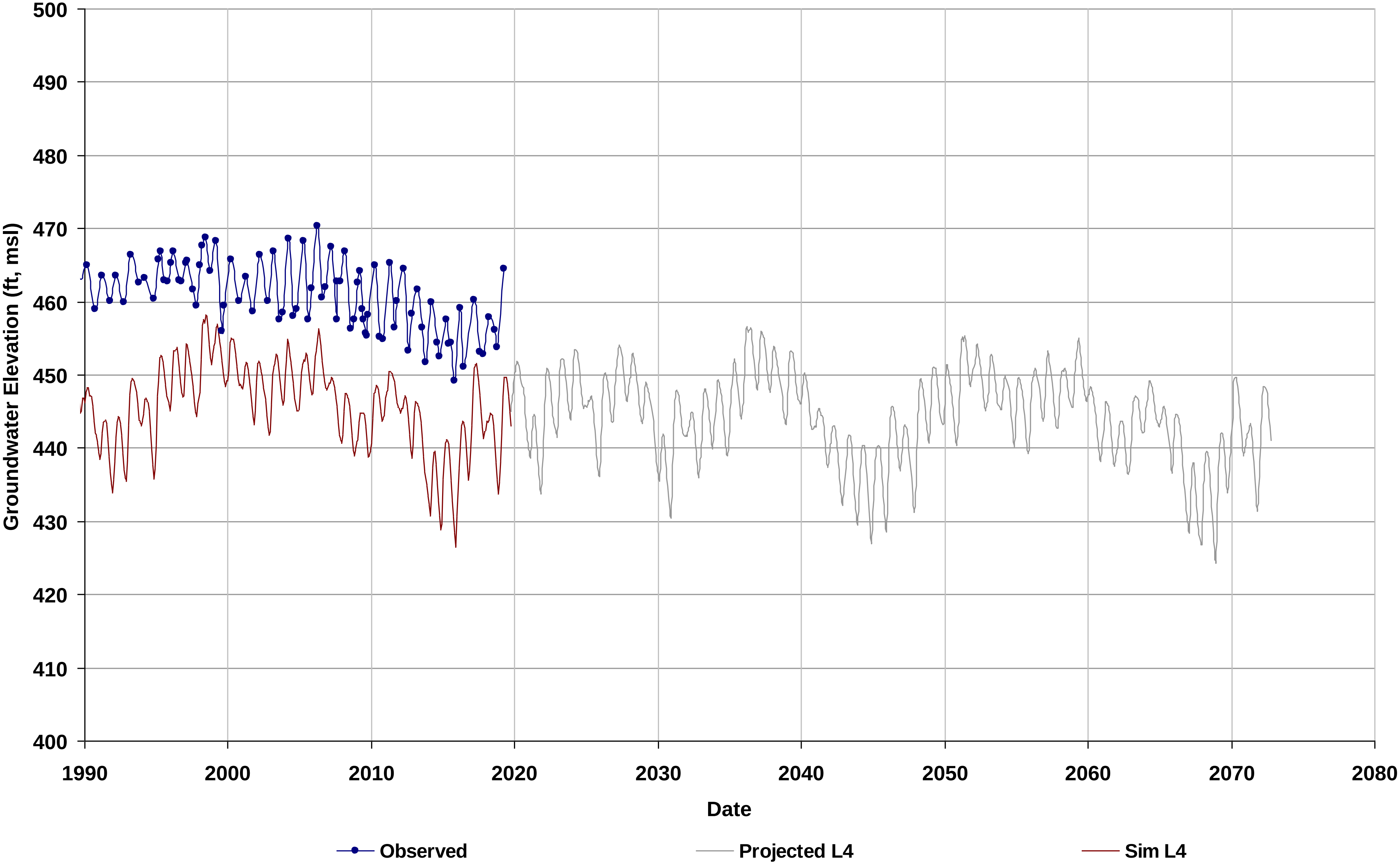
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

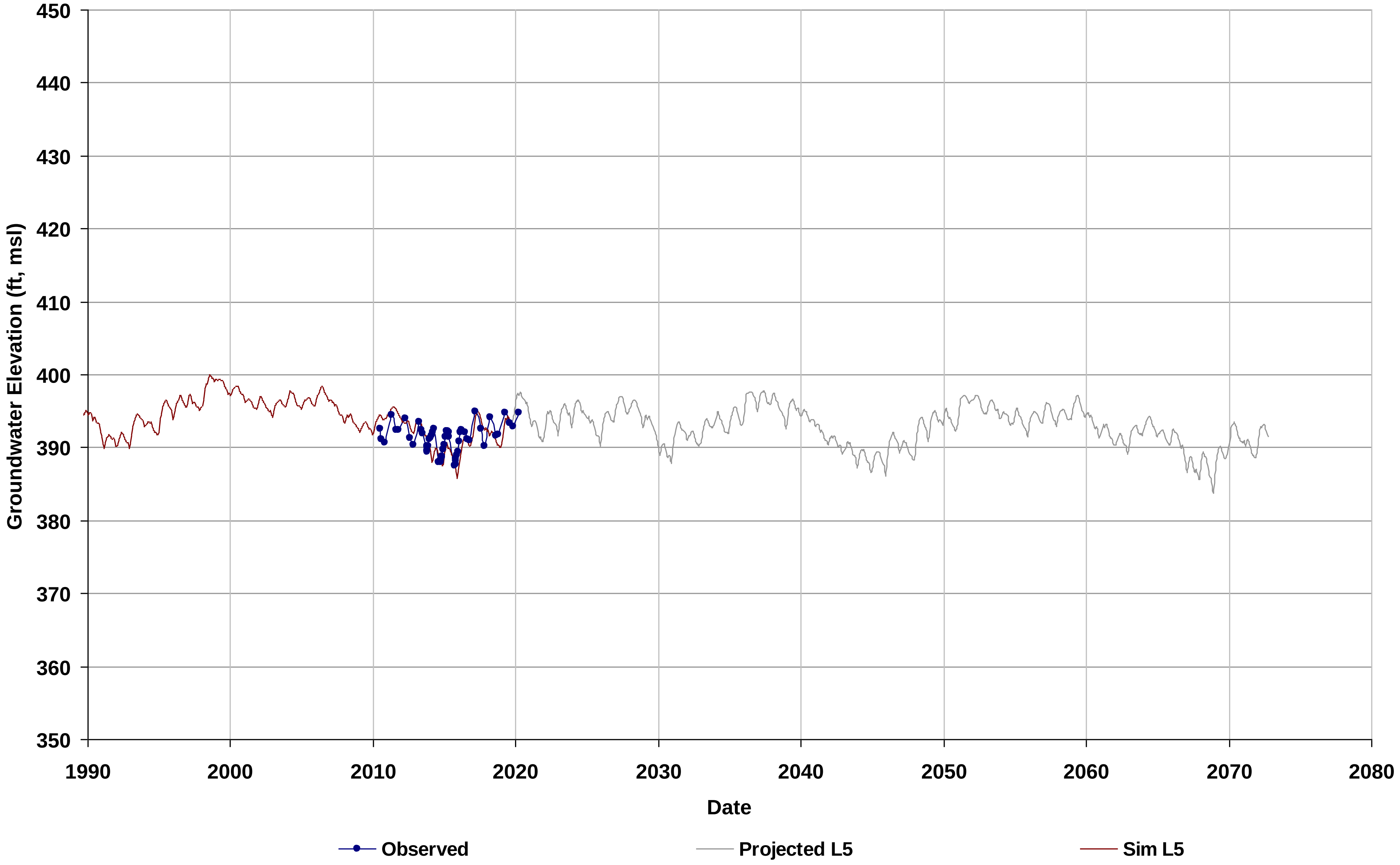
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

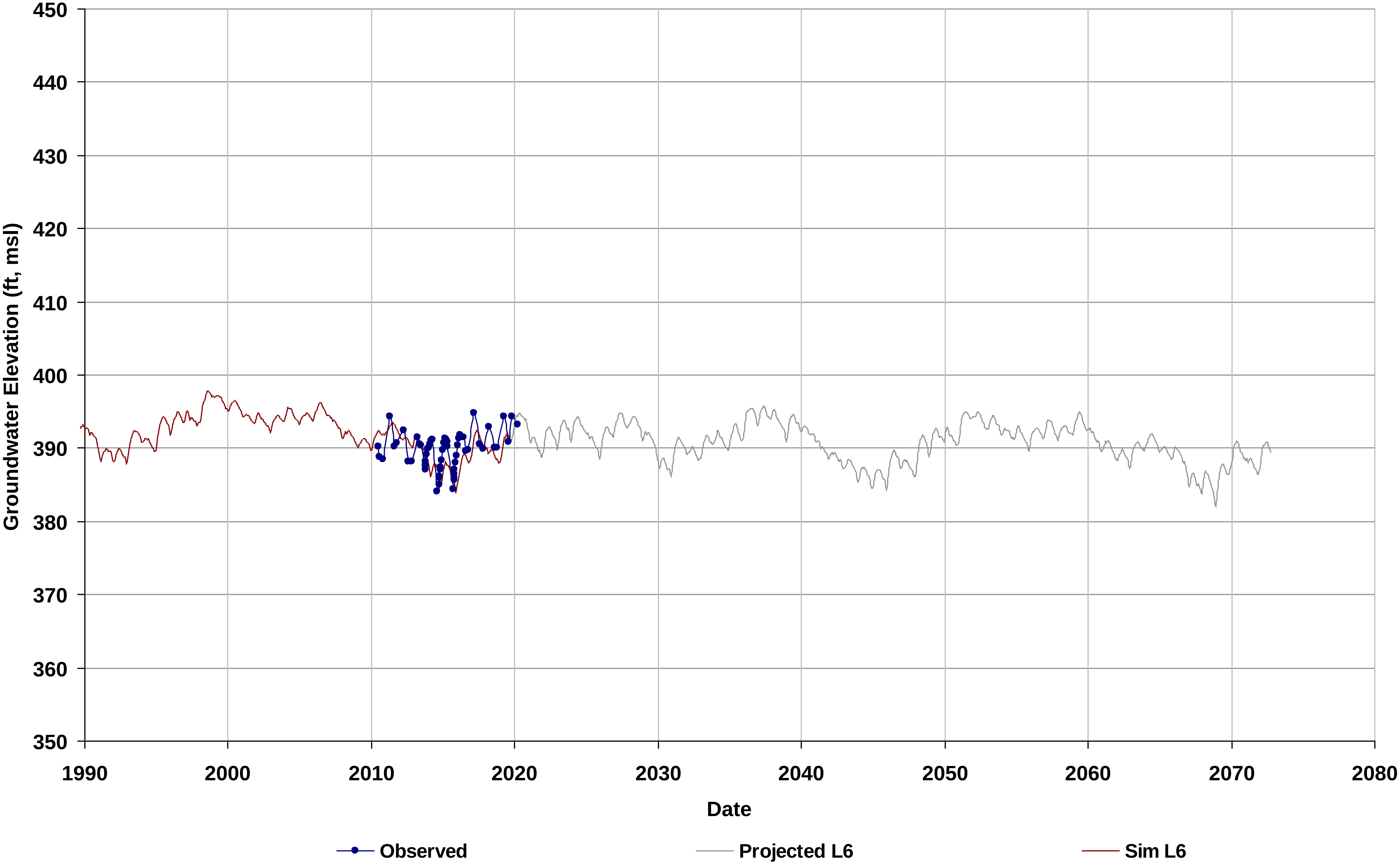
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

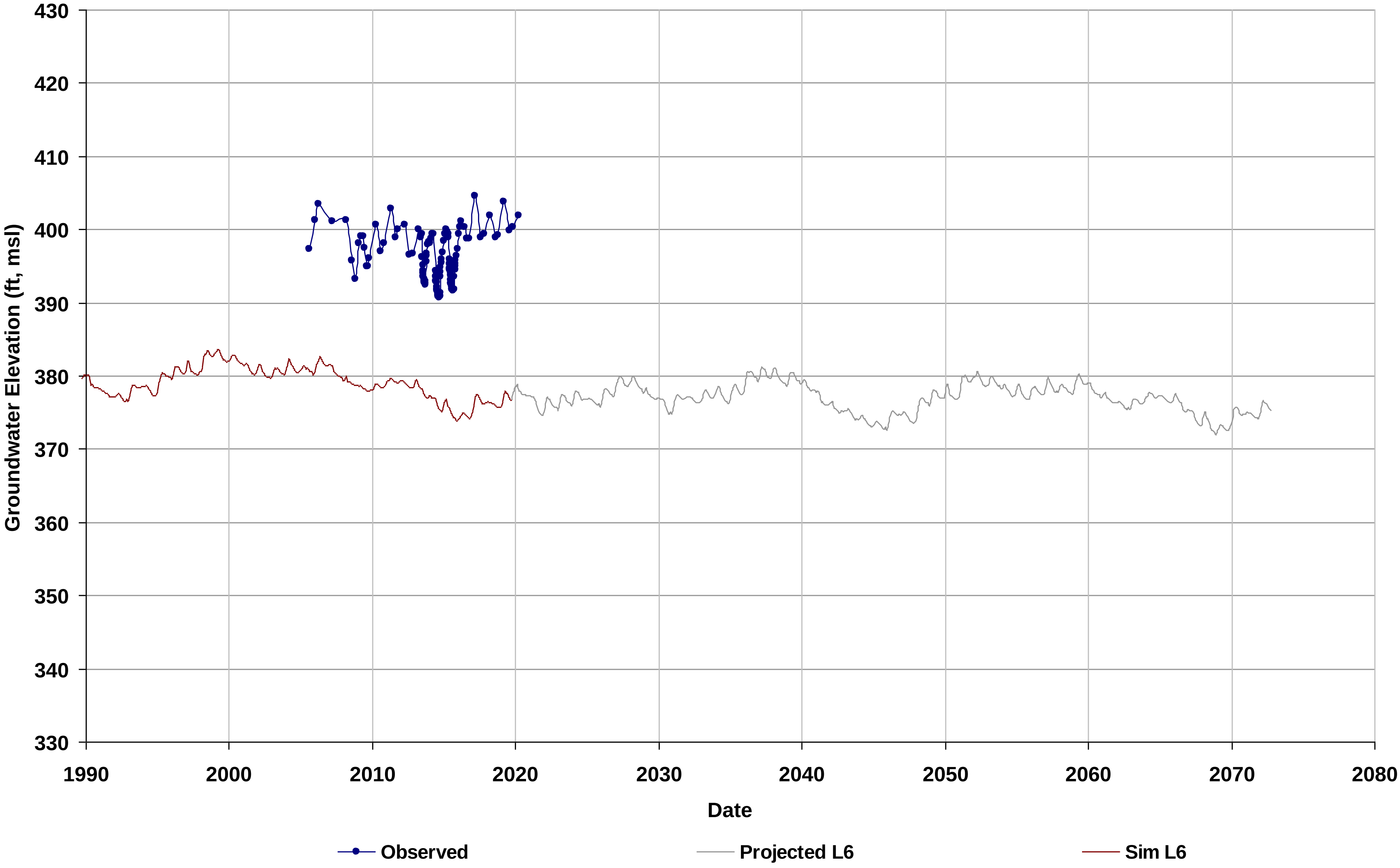
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

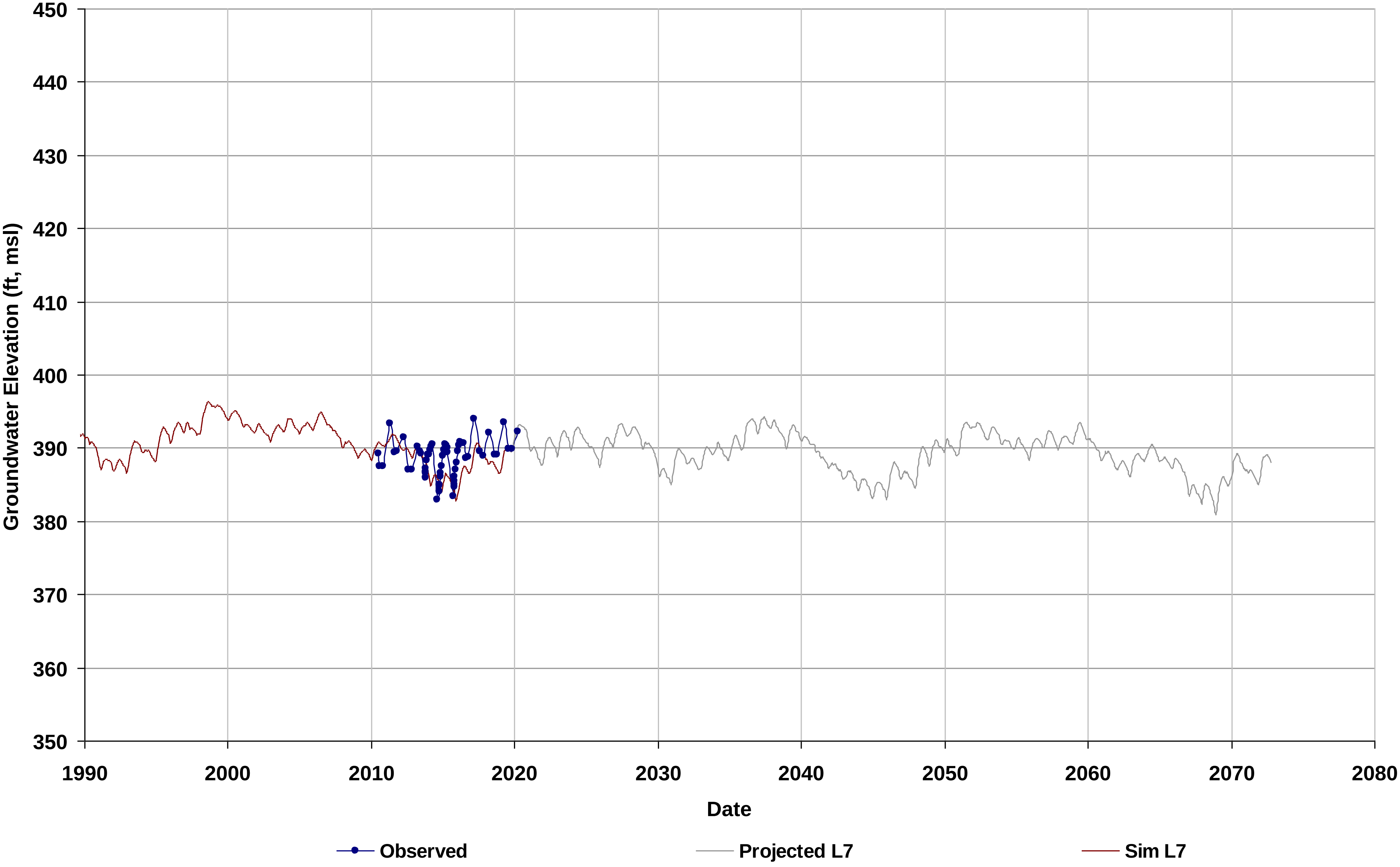
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

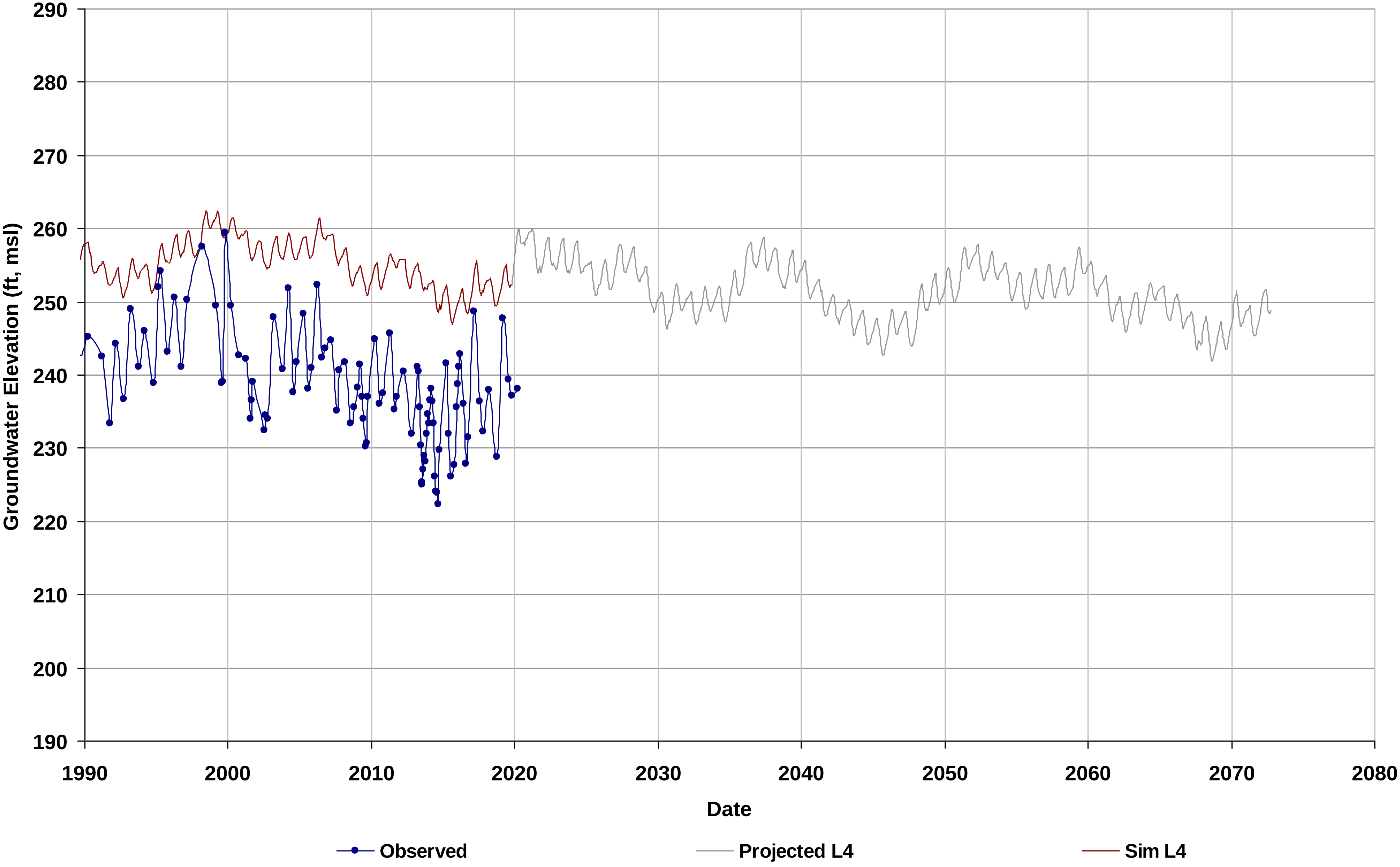
APPENDIX E-6

Tehama IHM Simulated Groundwater Levels:

Projected (Future Land Use) with Climate Change (2030) Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

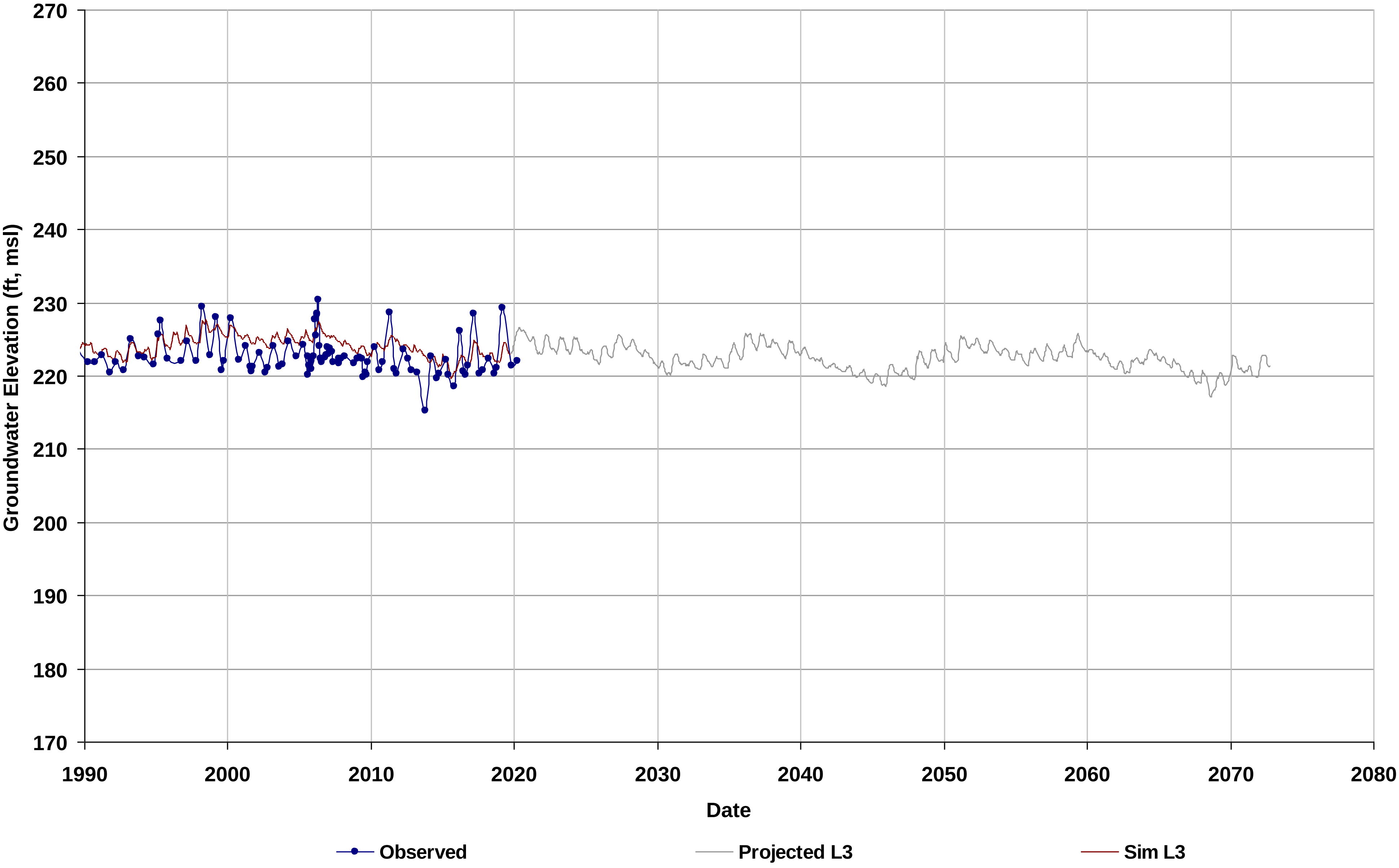
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

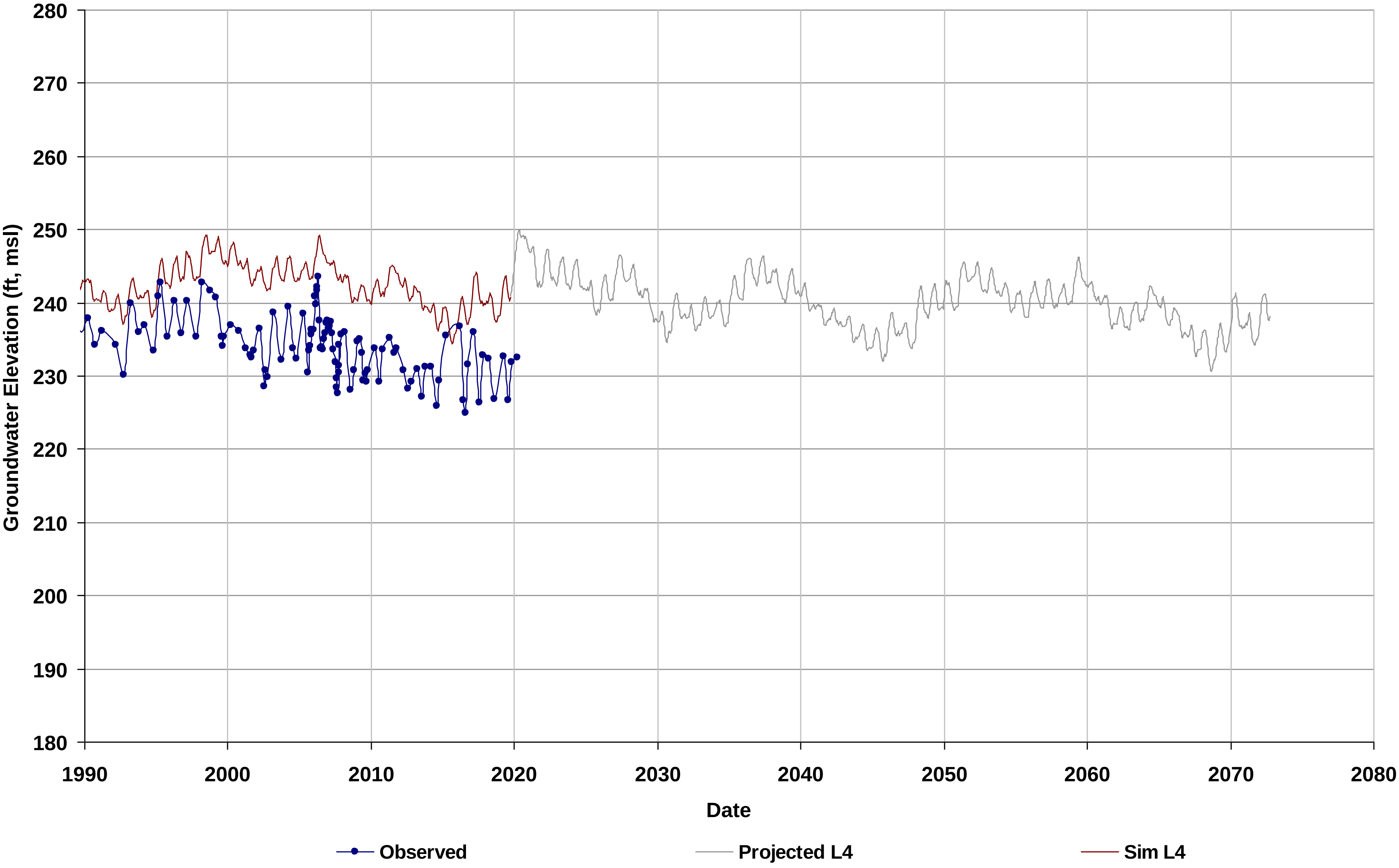
Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

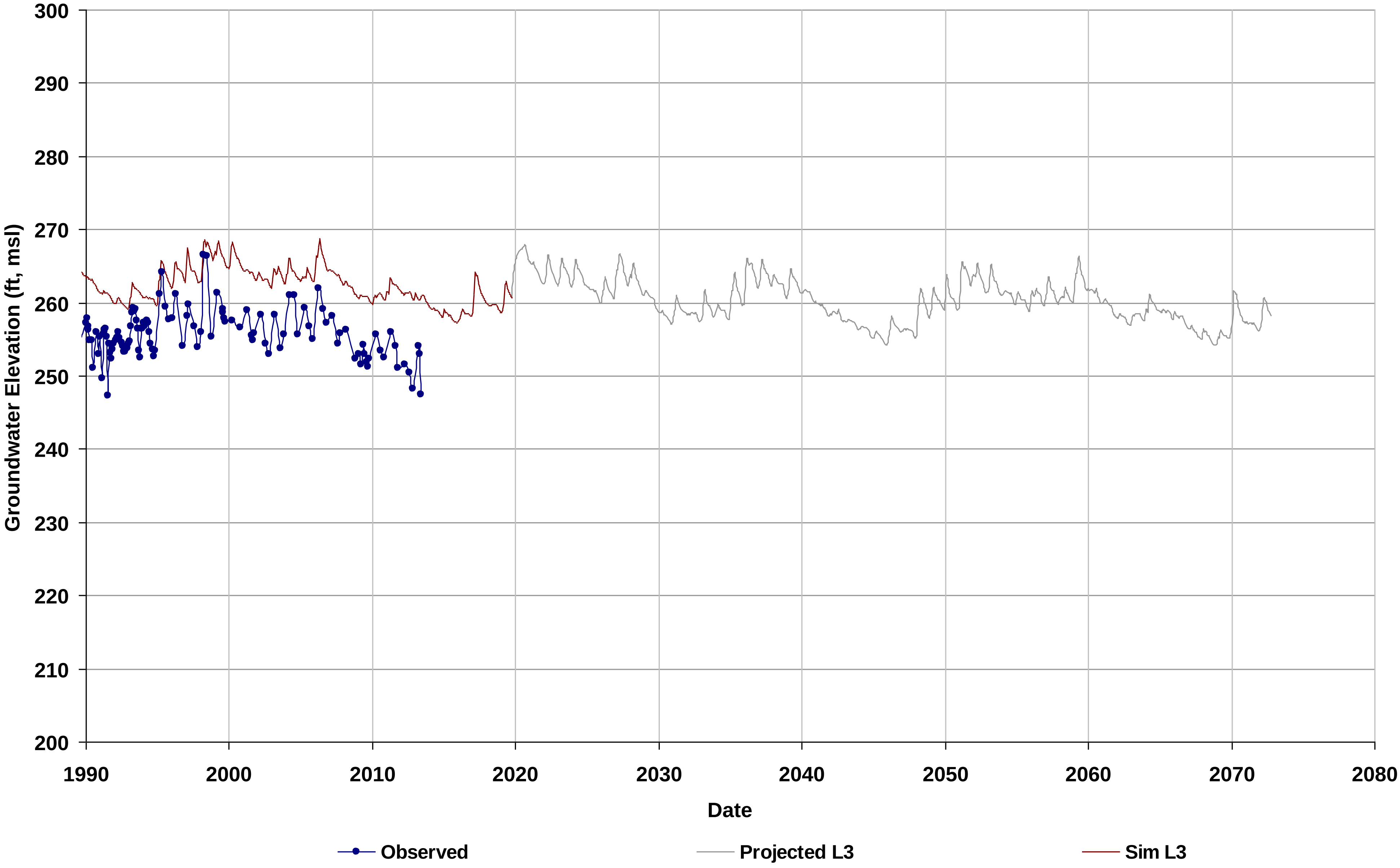
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

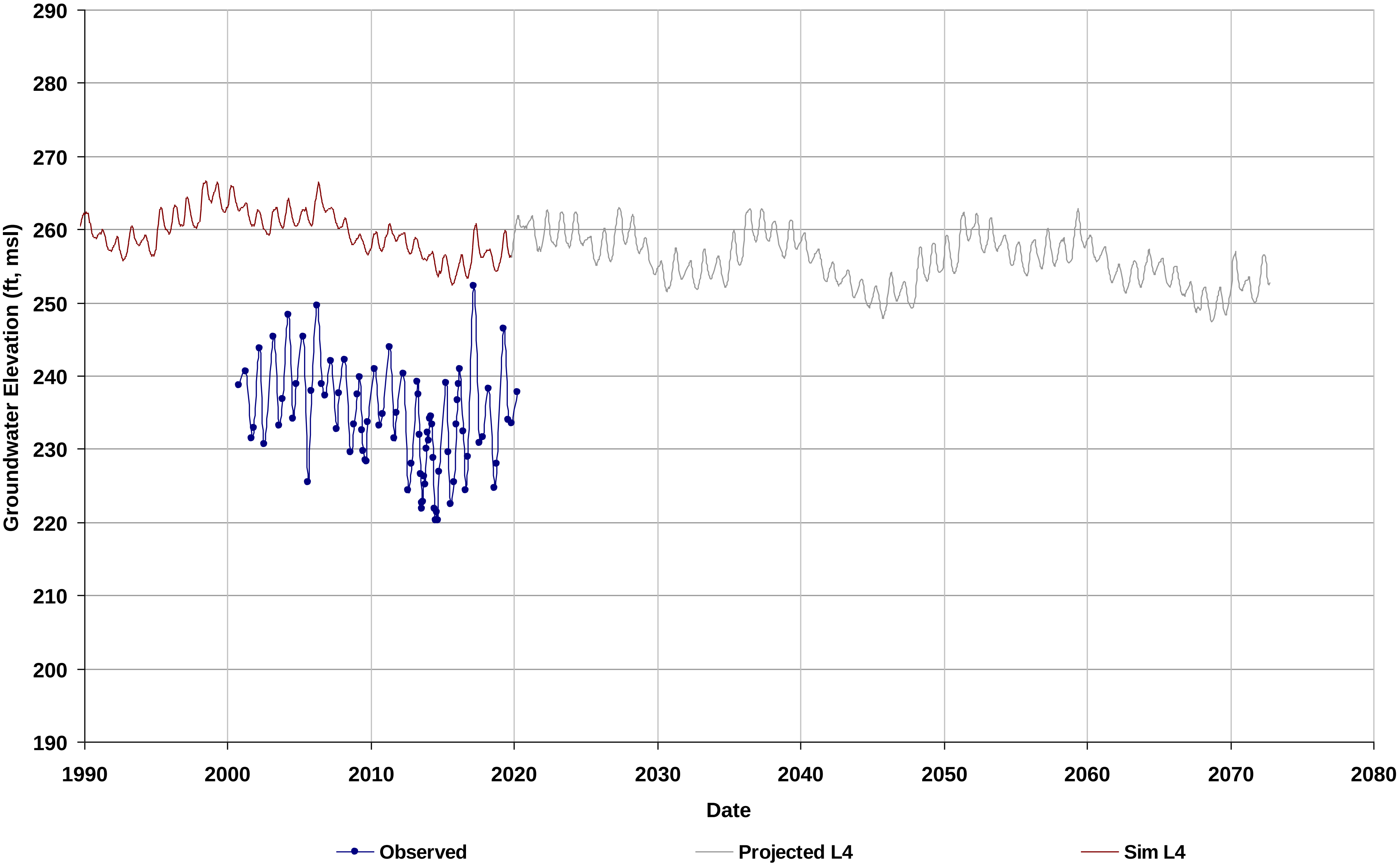
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

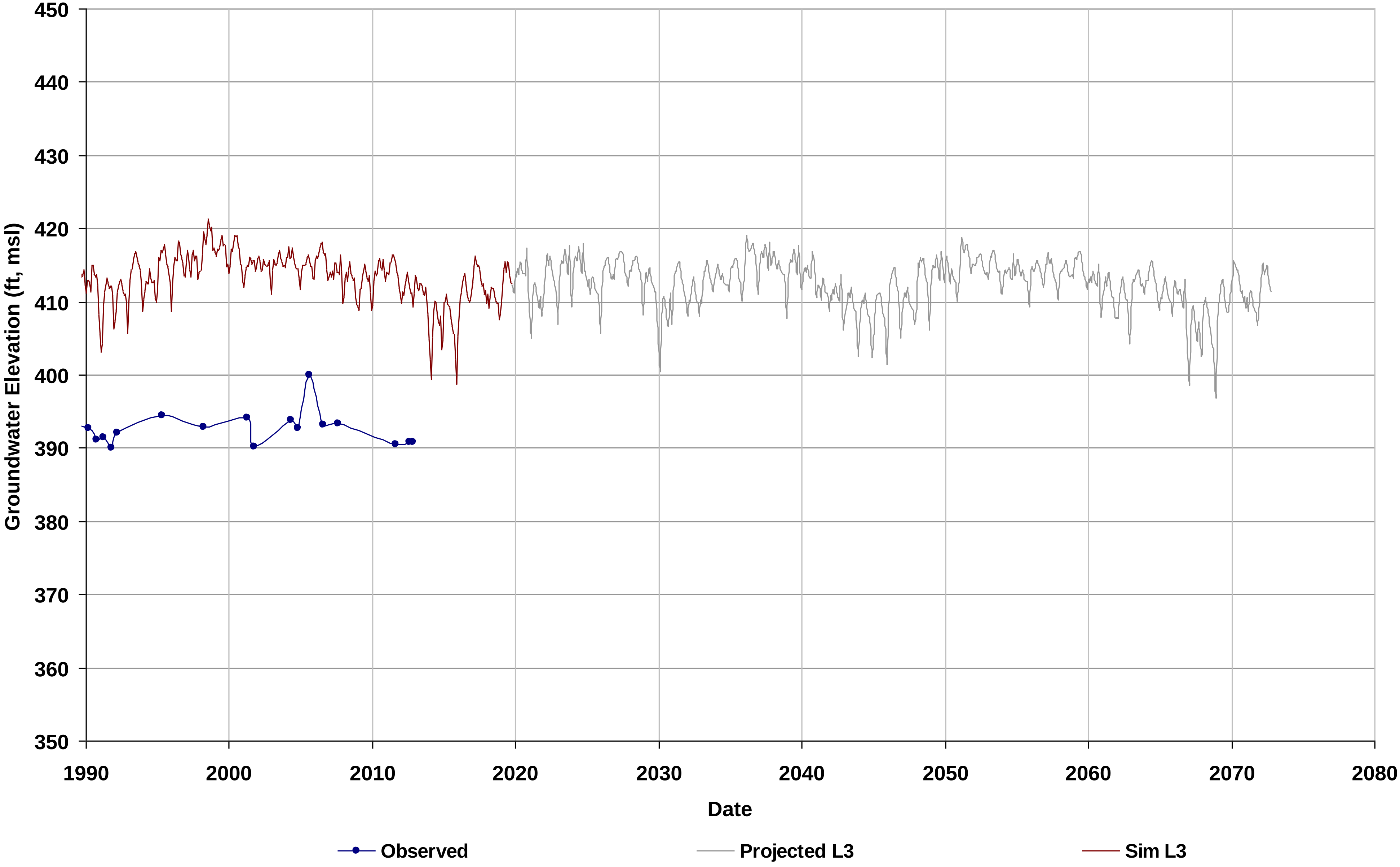
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

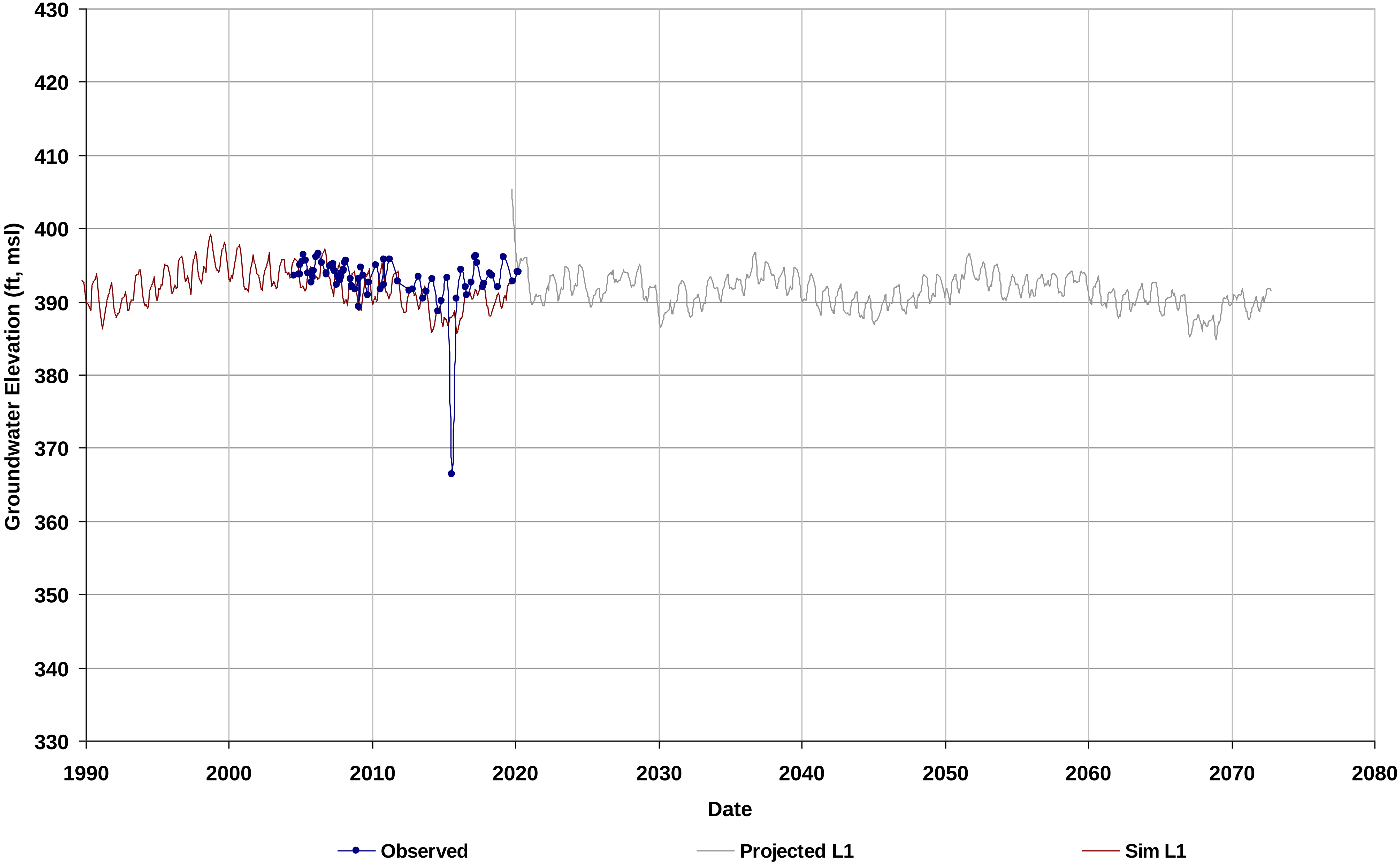
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

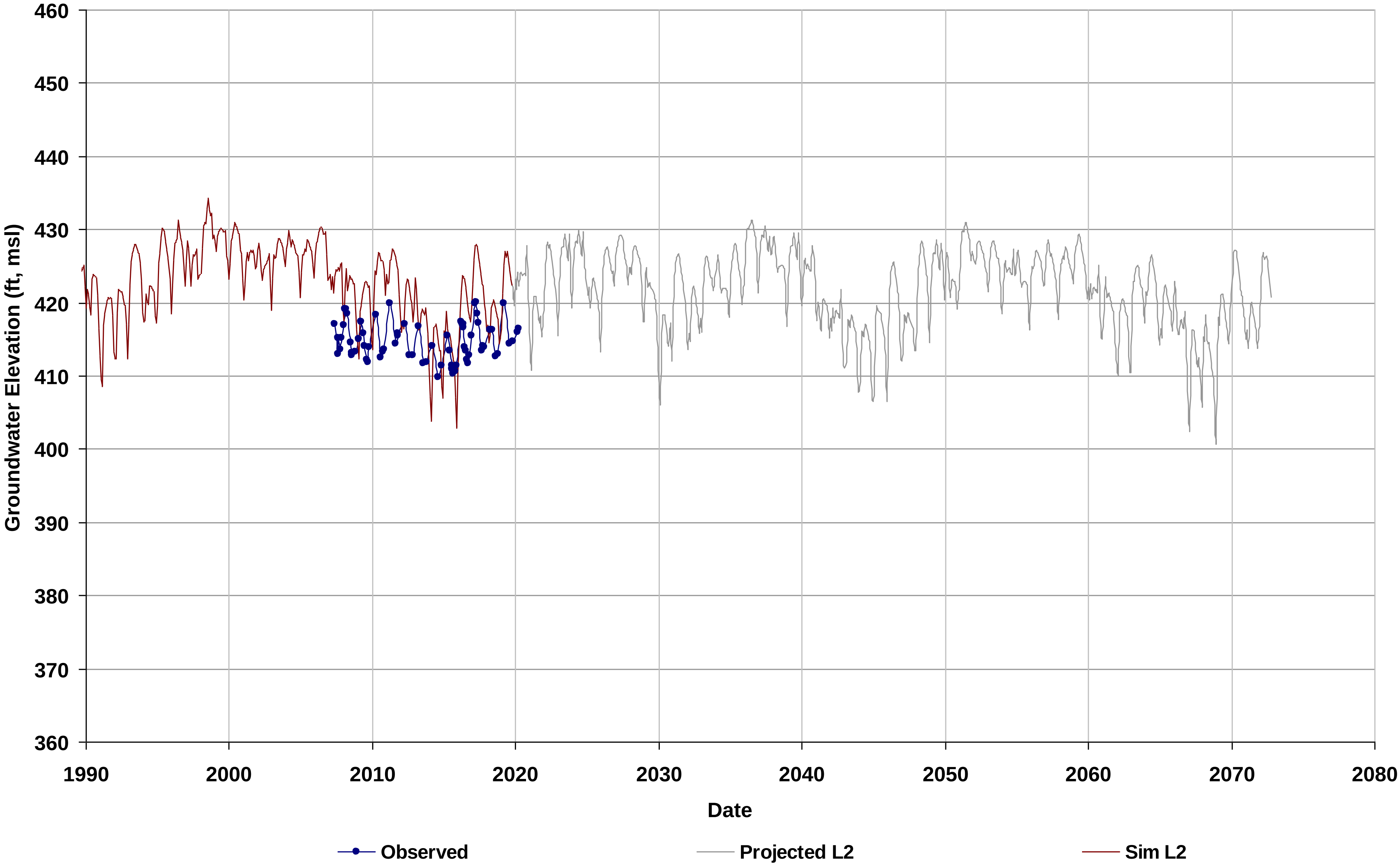
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

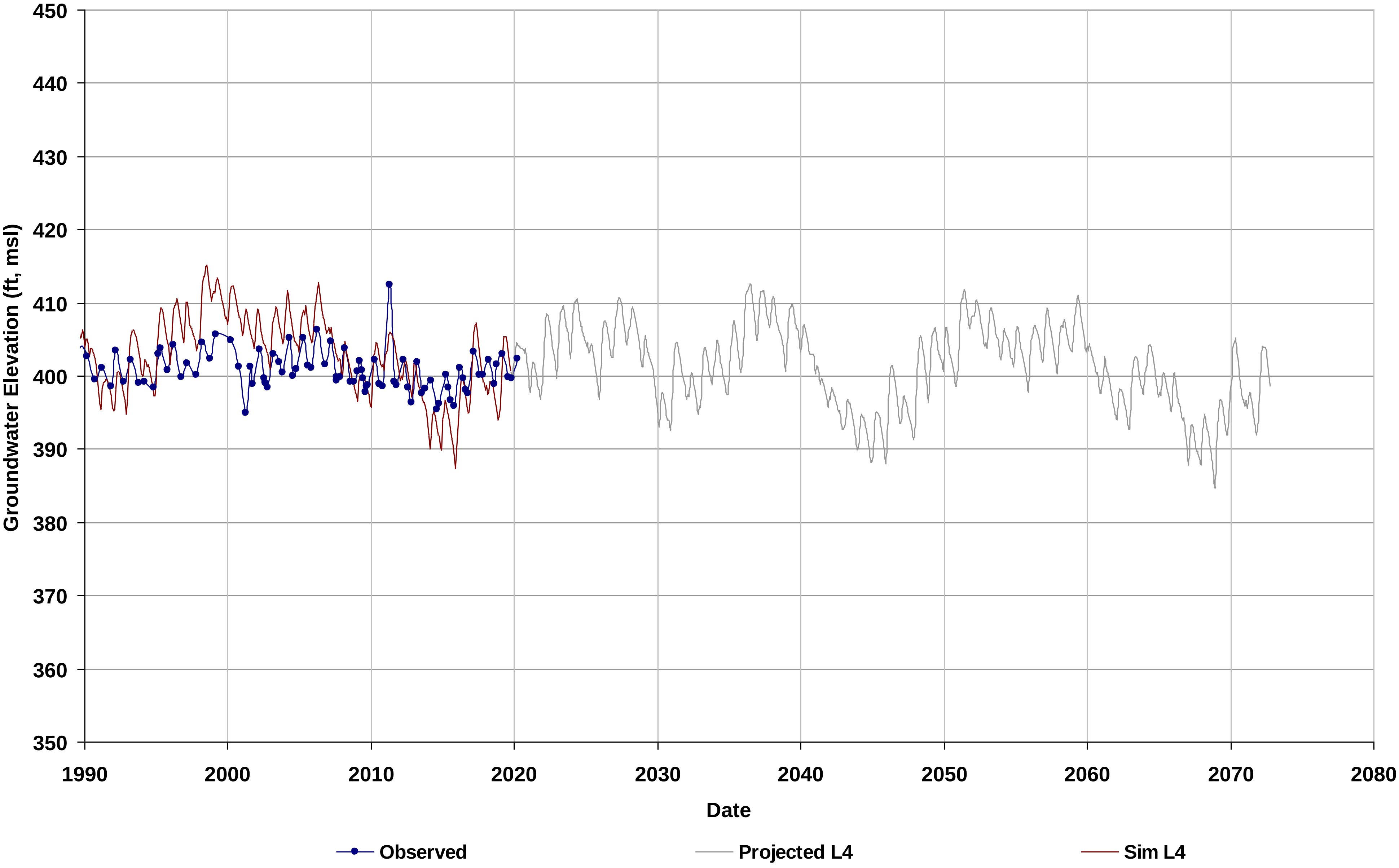
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

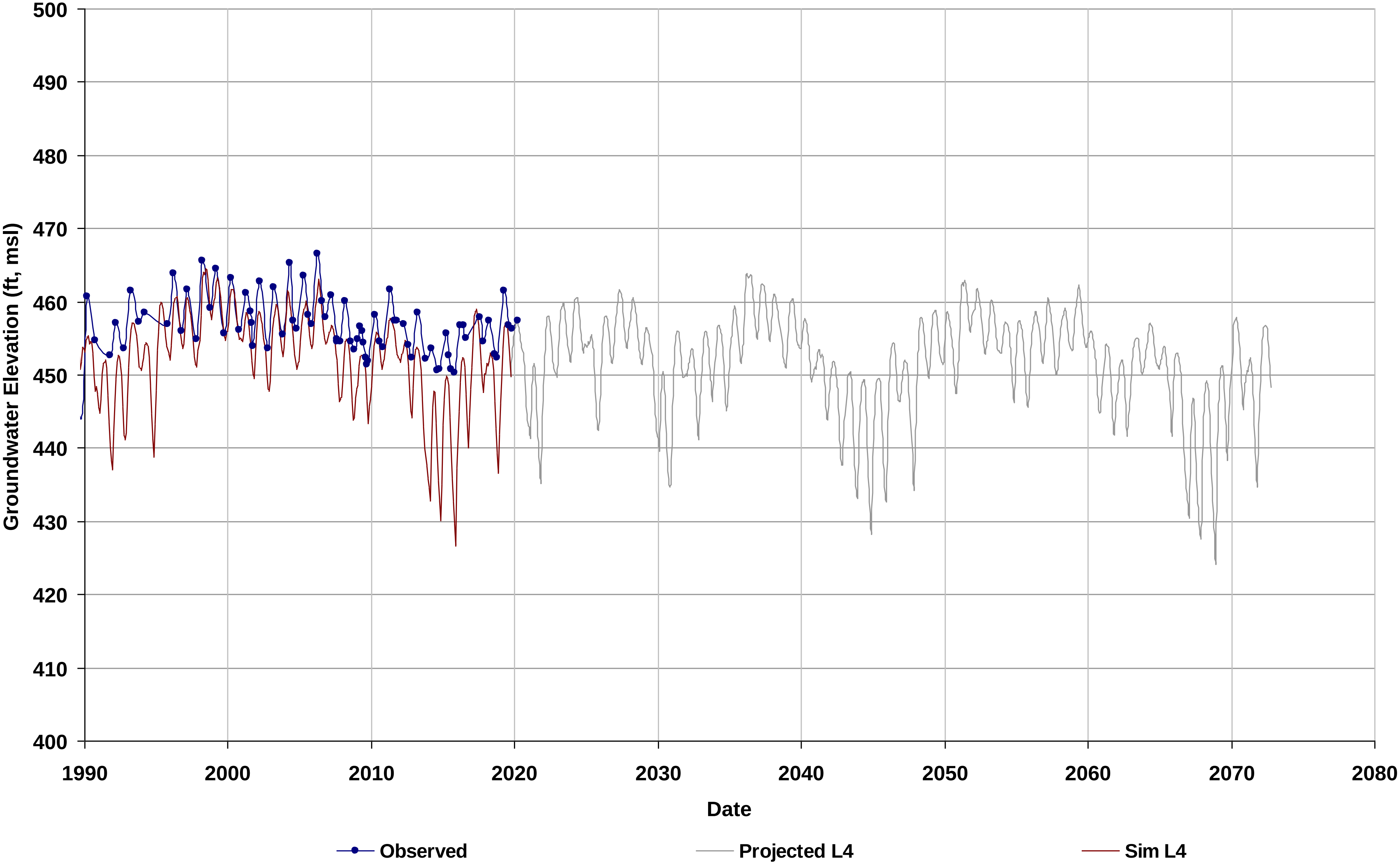
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

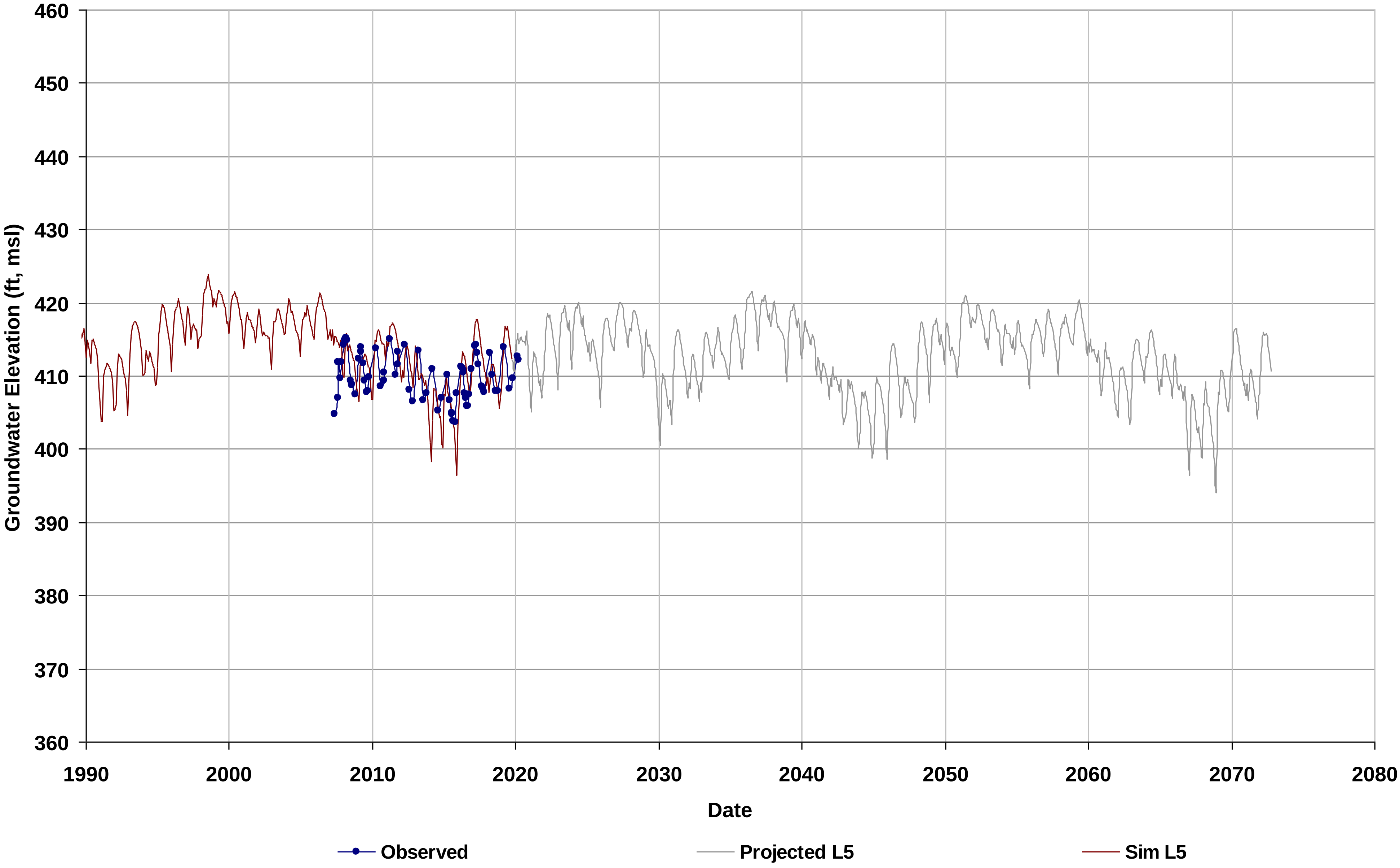
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

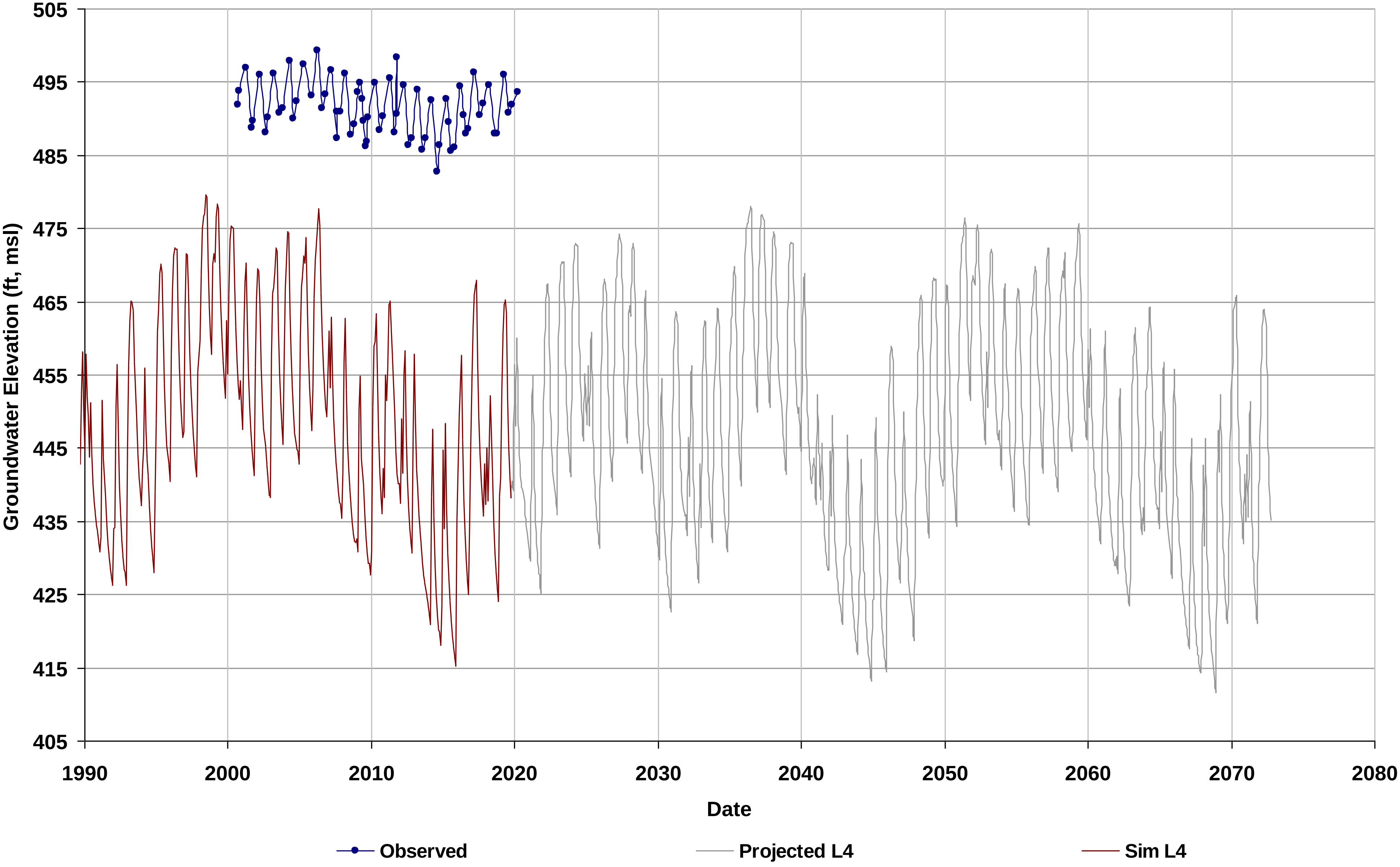
Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

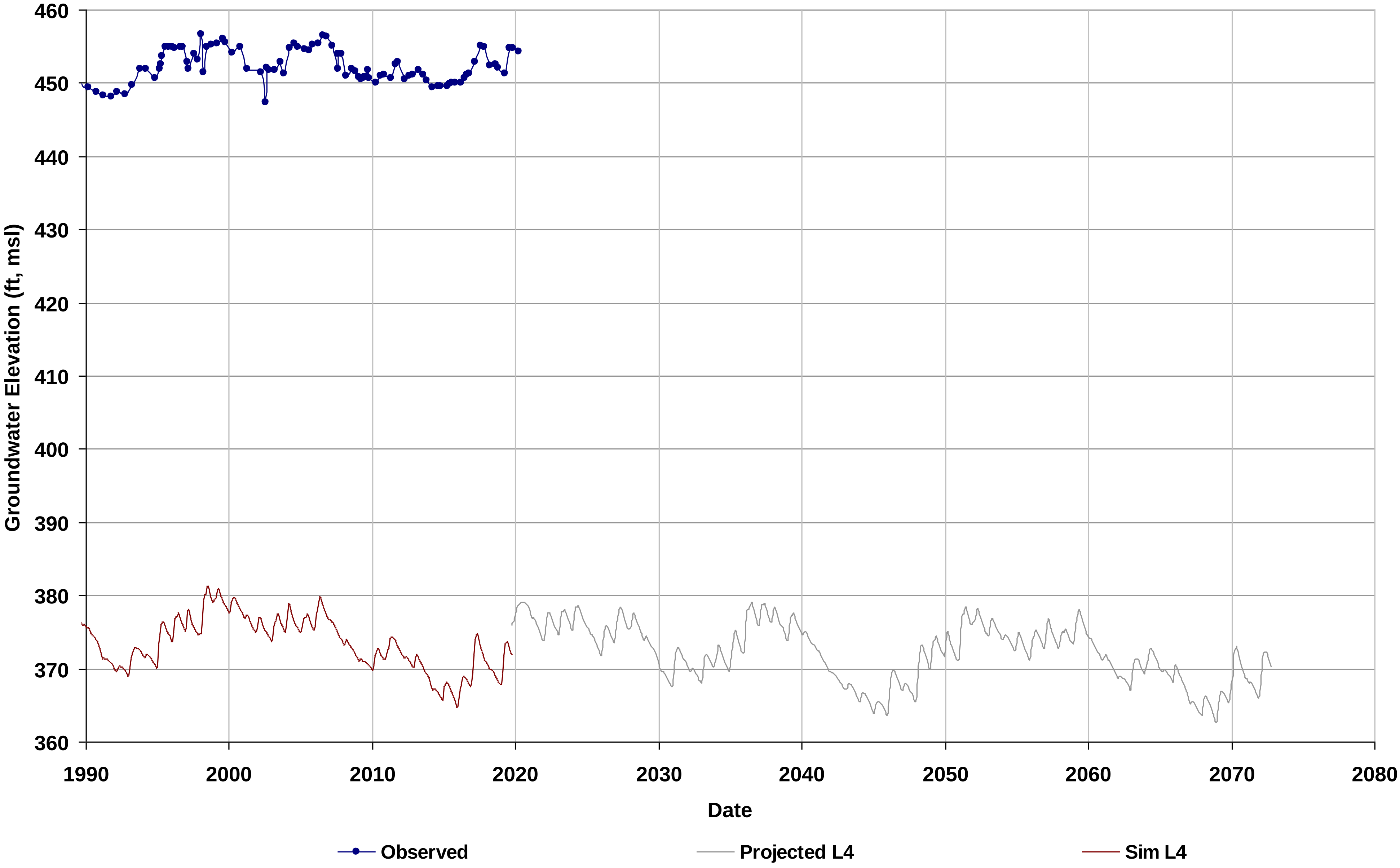
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

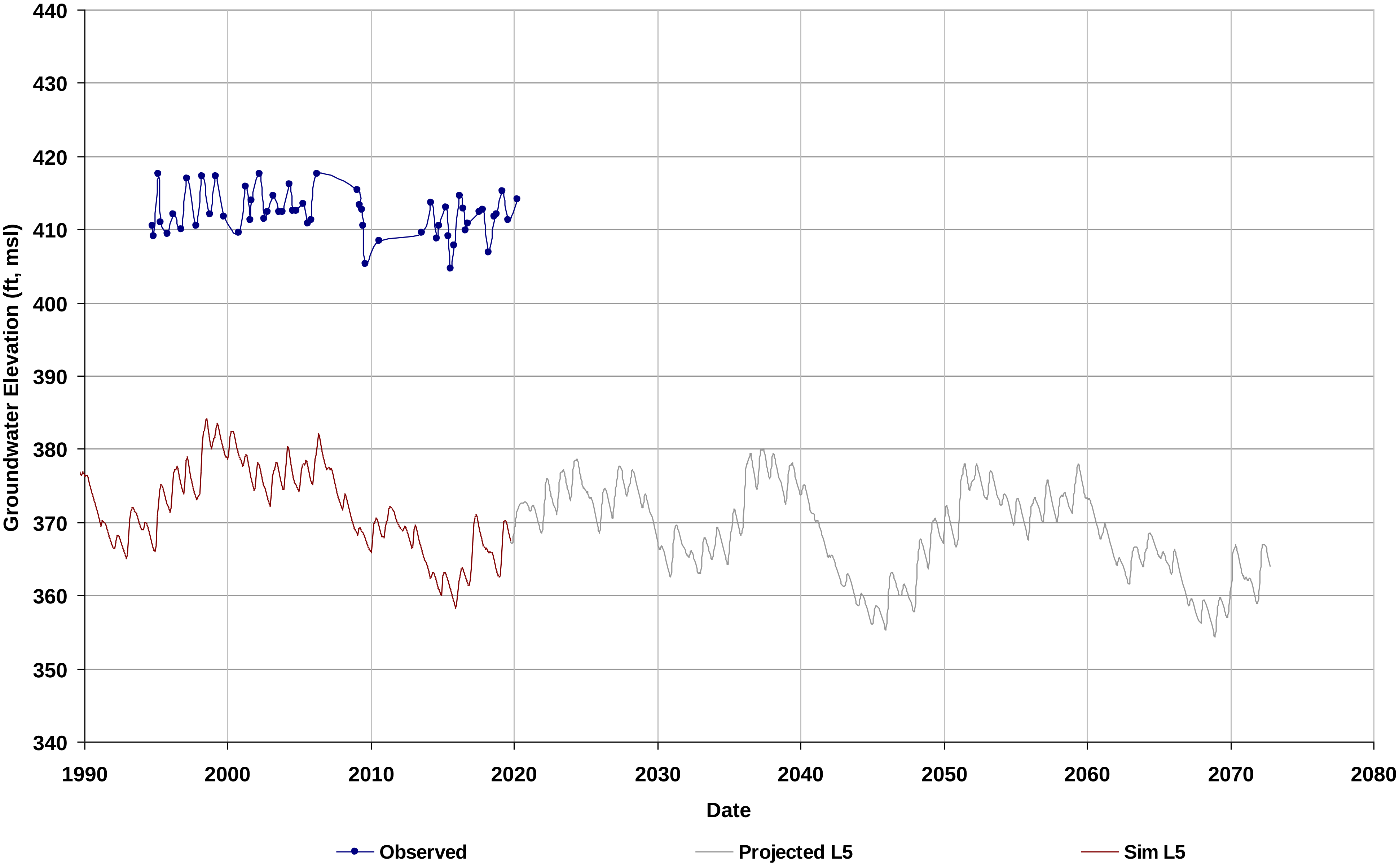
Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

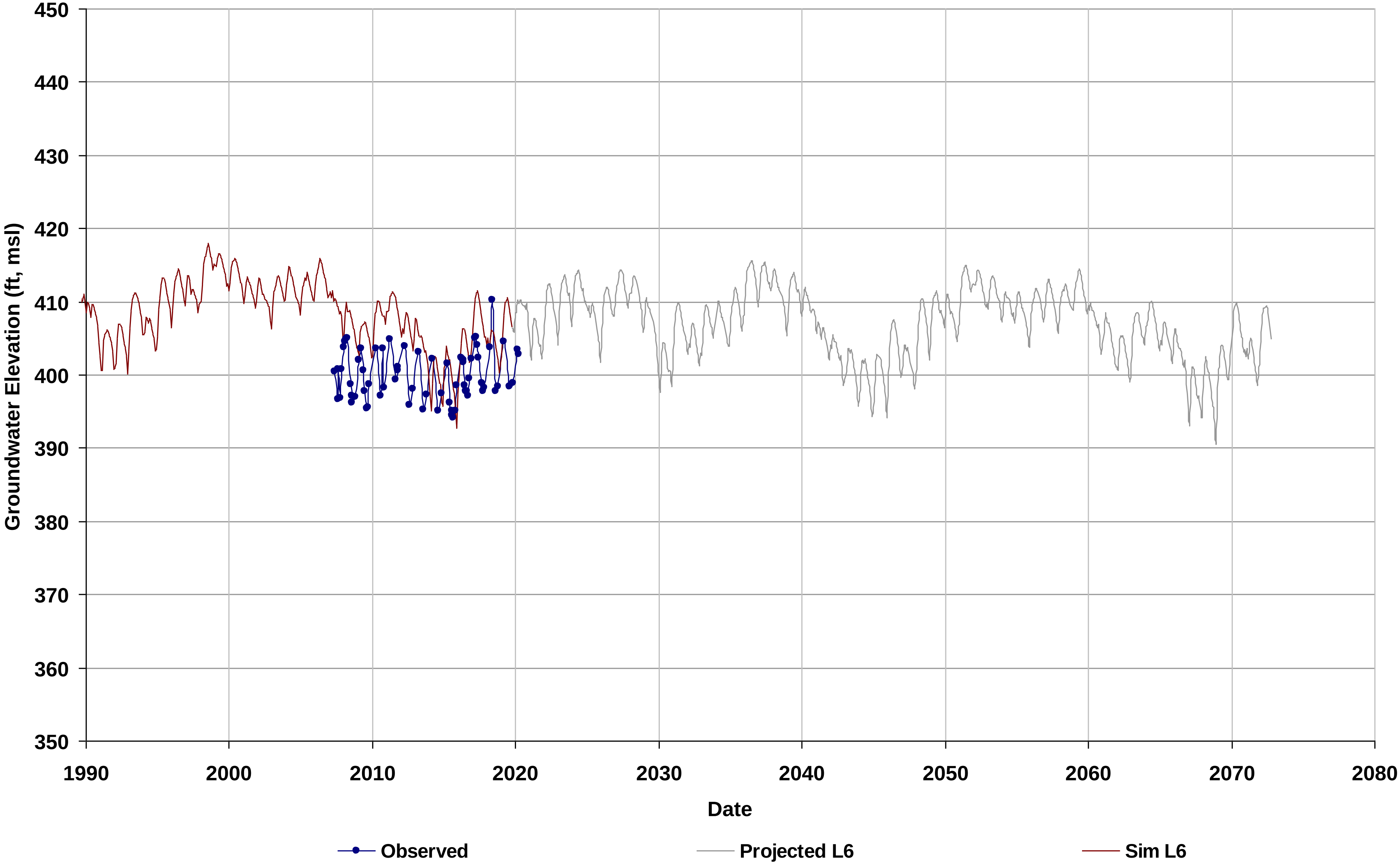
Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

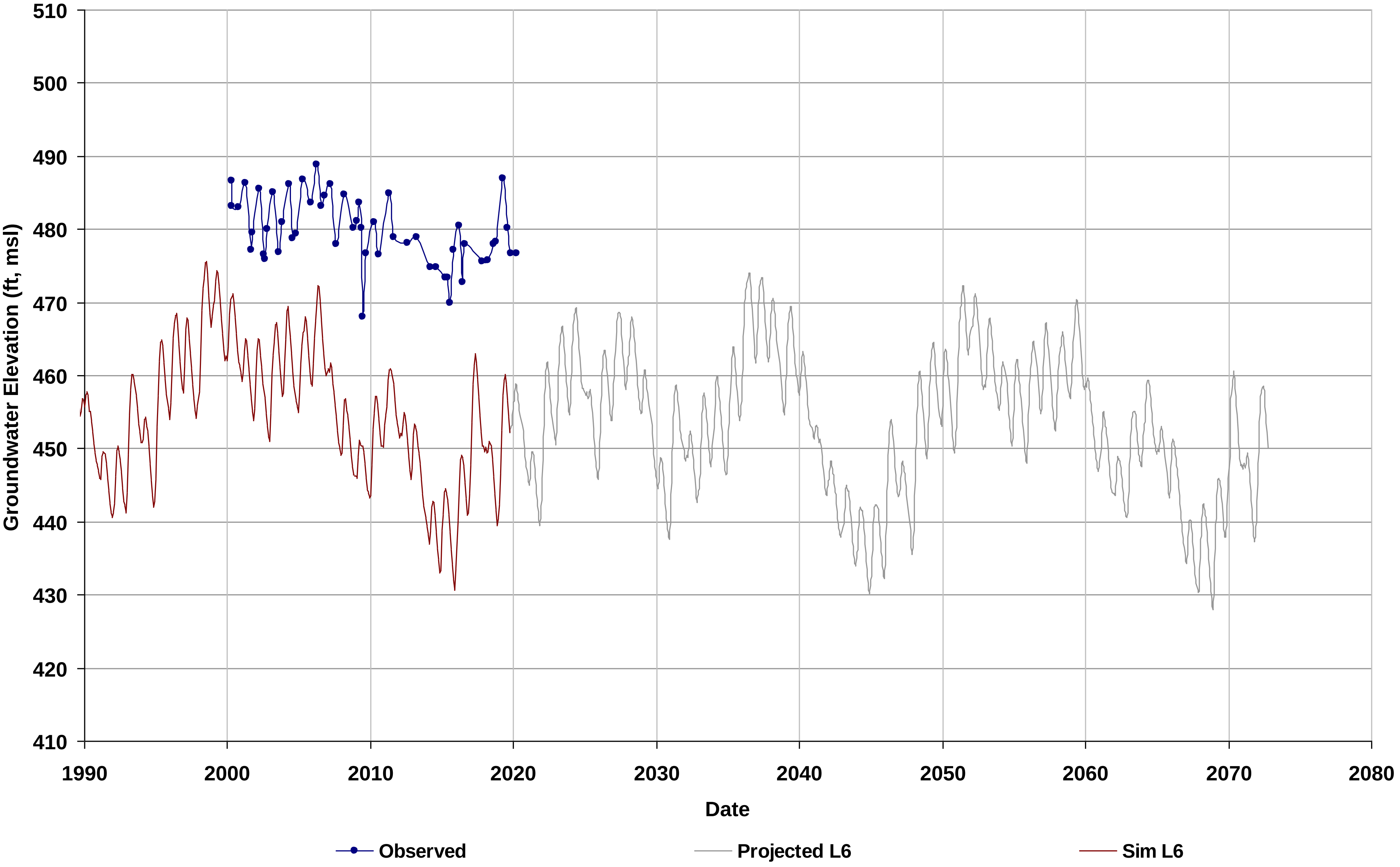
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

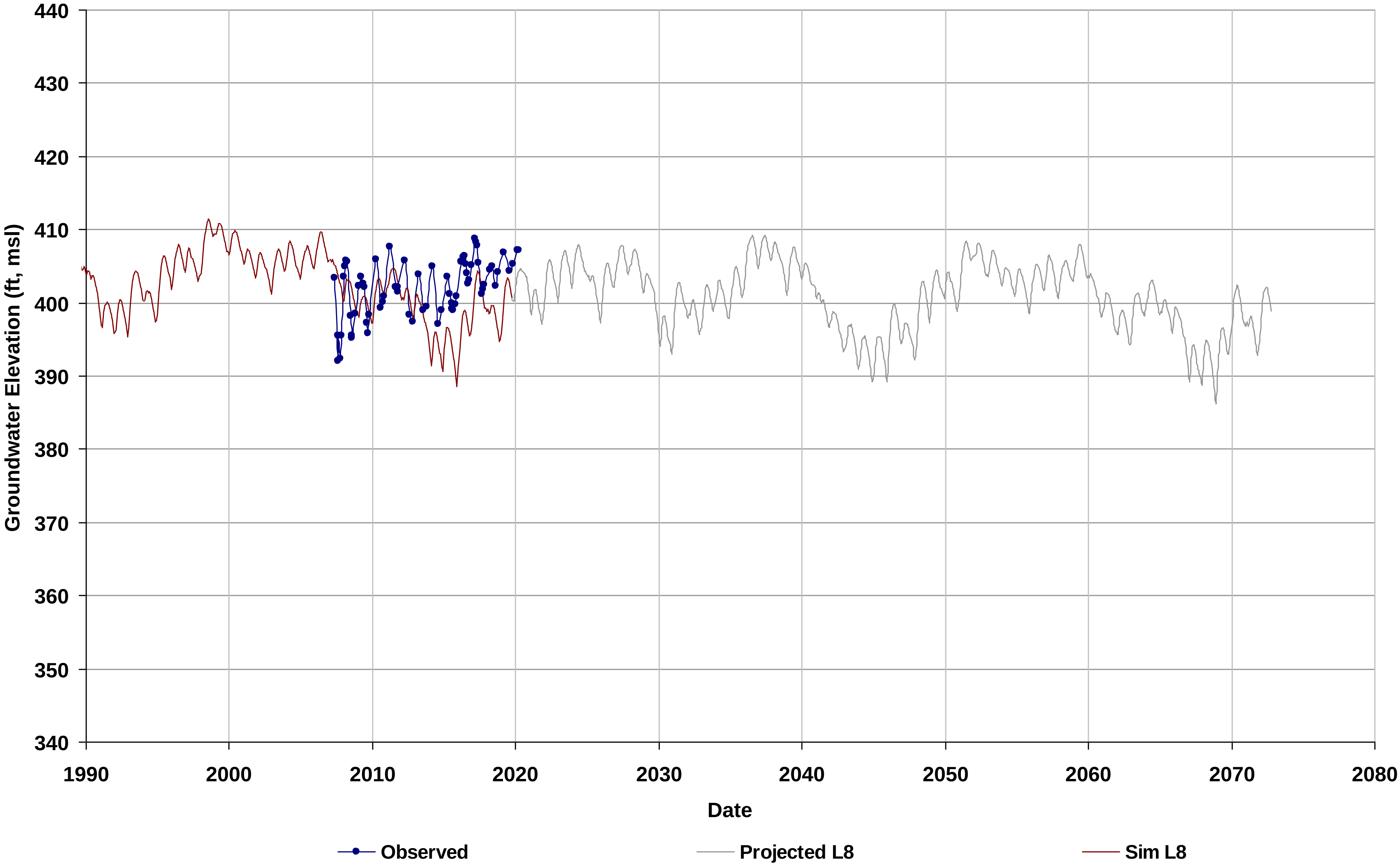
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

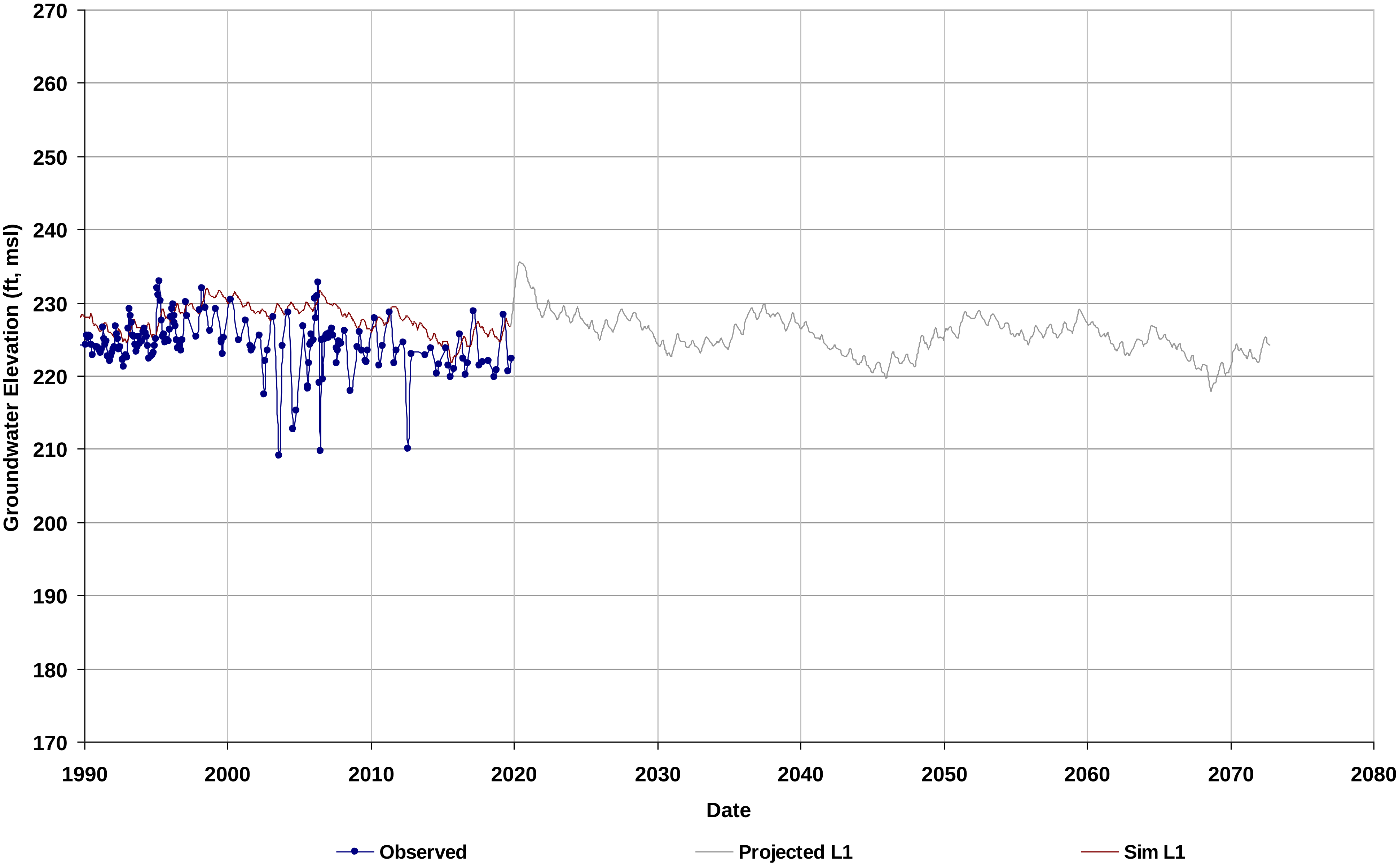
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

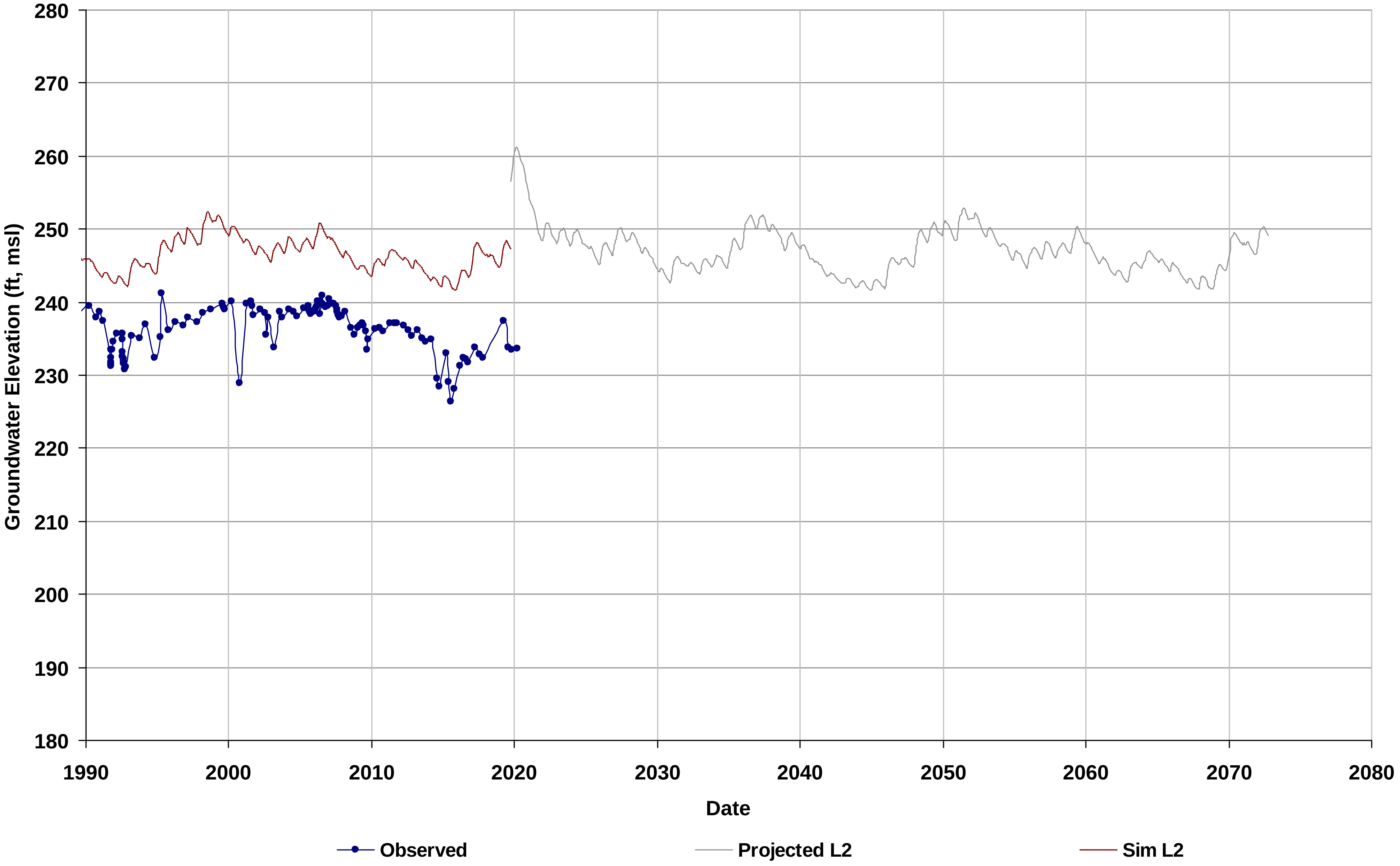
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

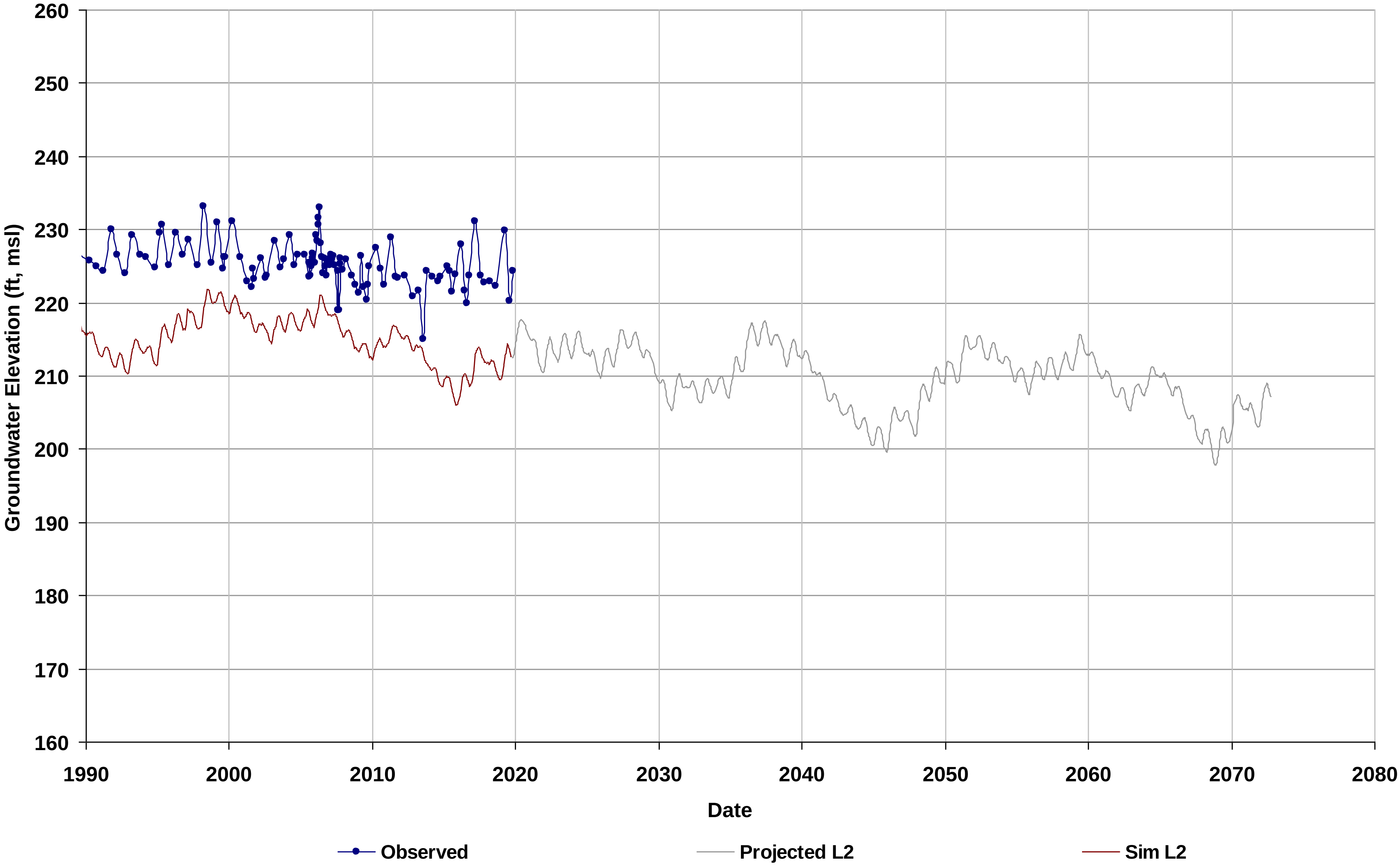
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

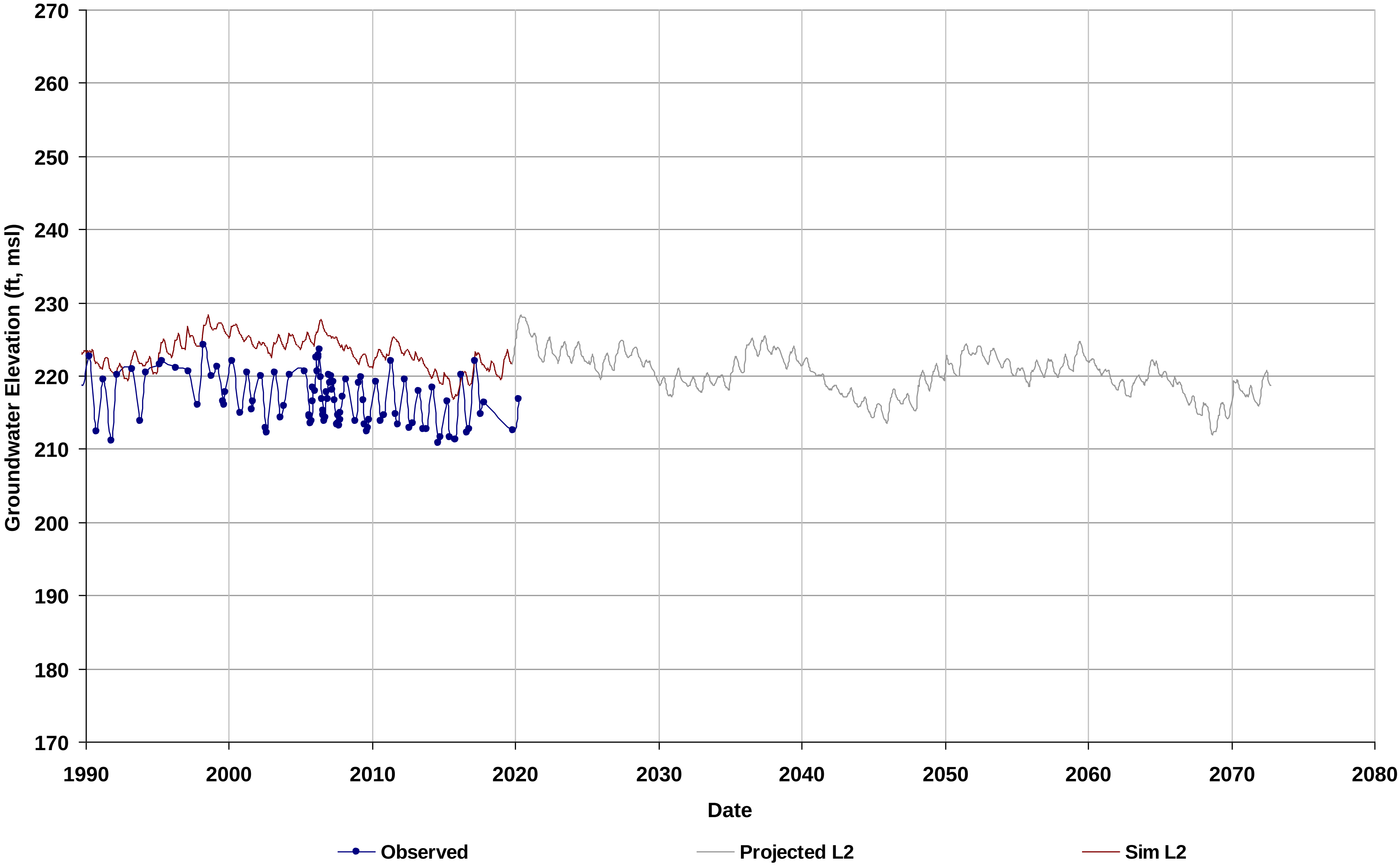
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

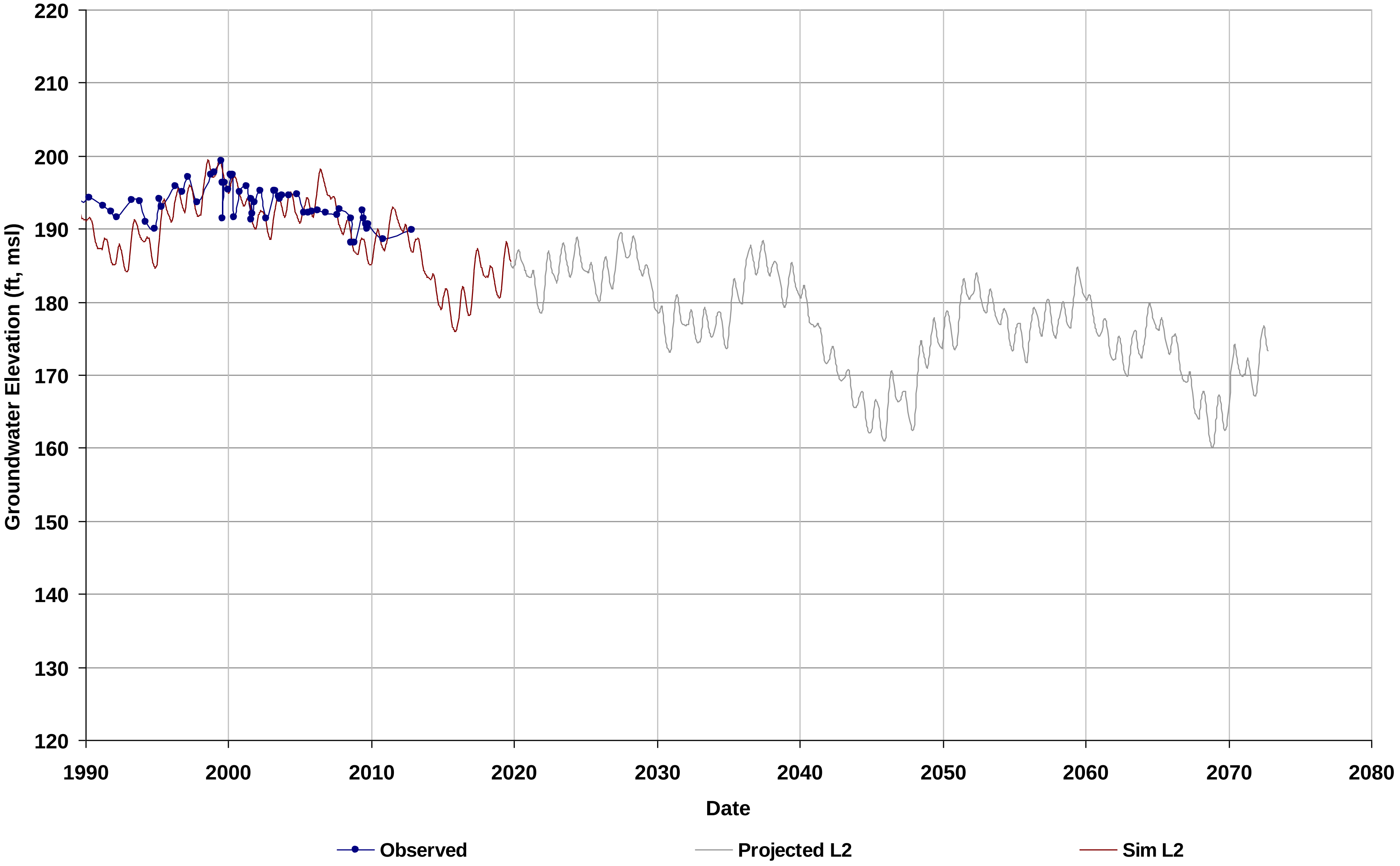
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

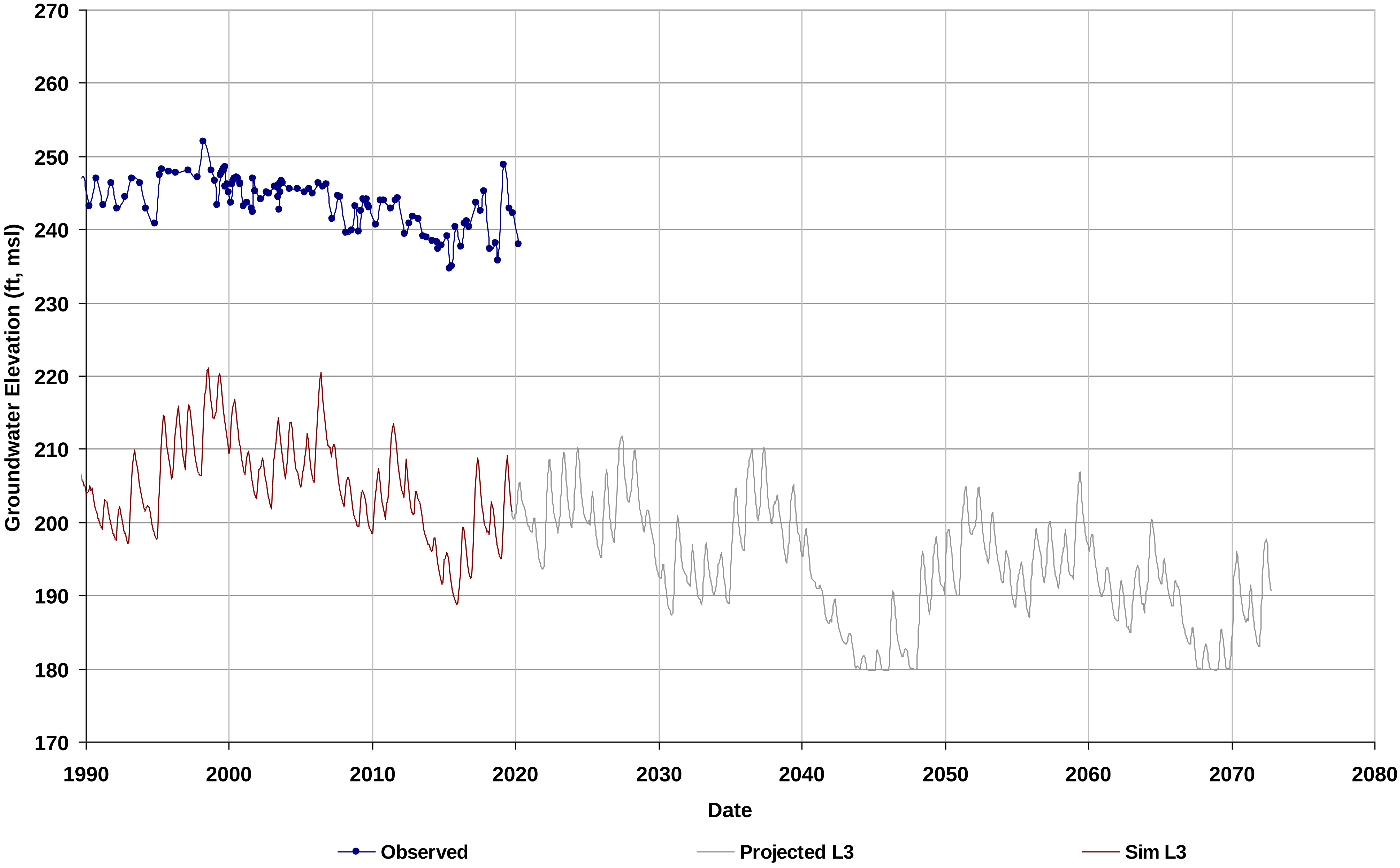
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

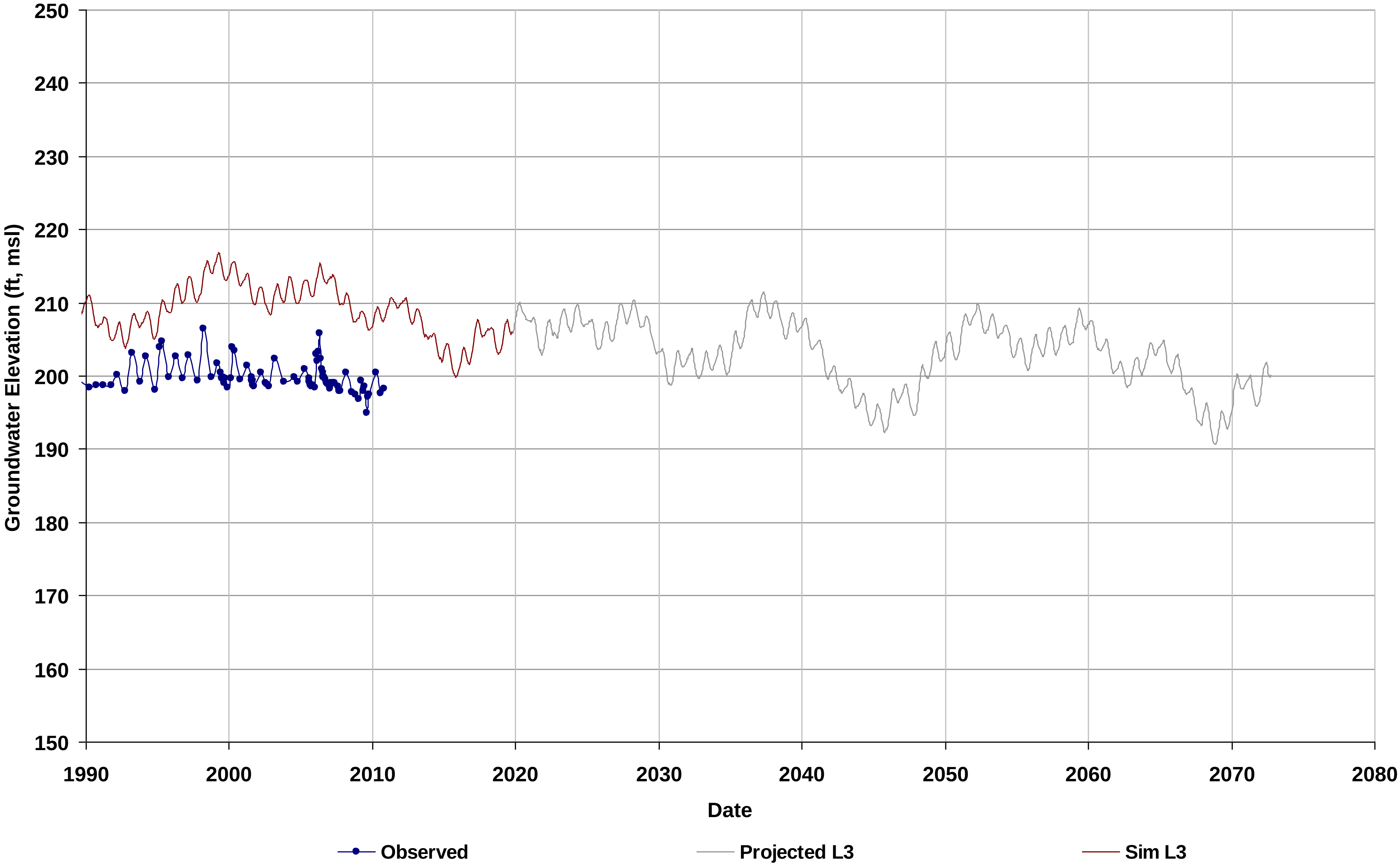
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

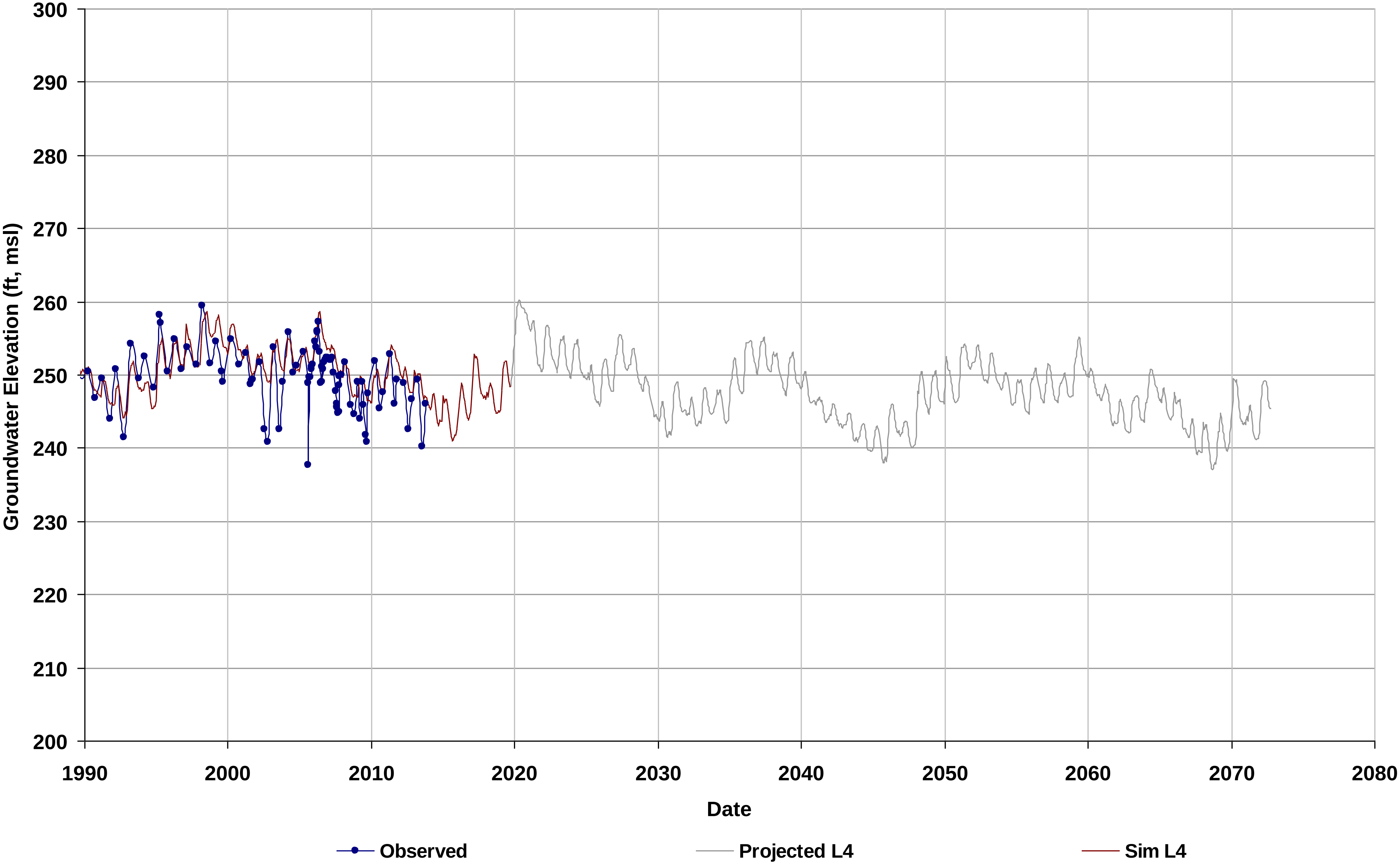
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

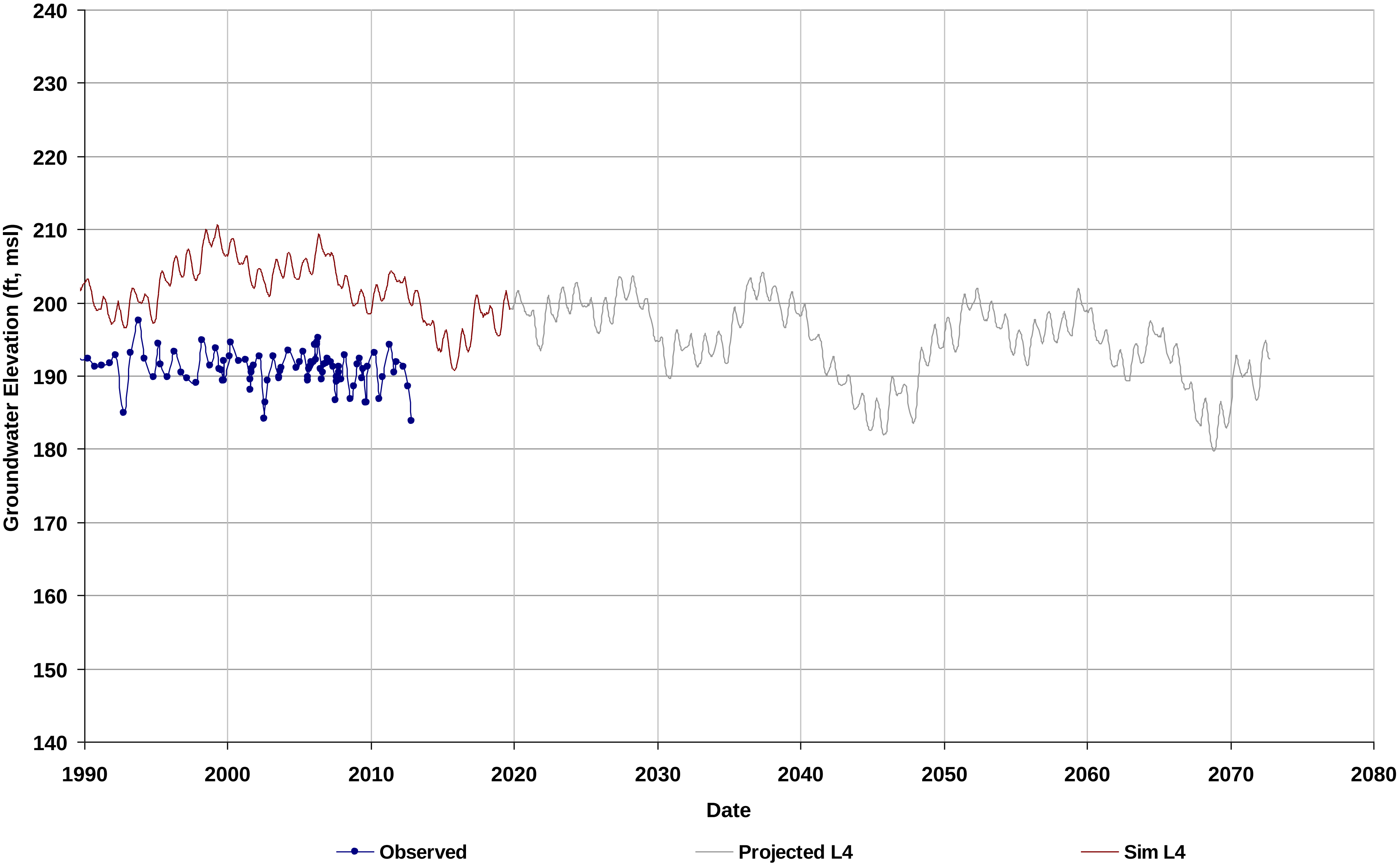
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

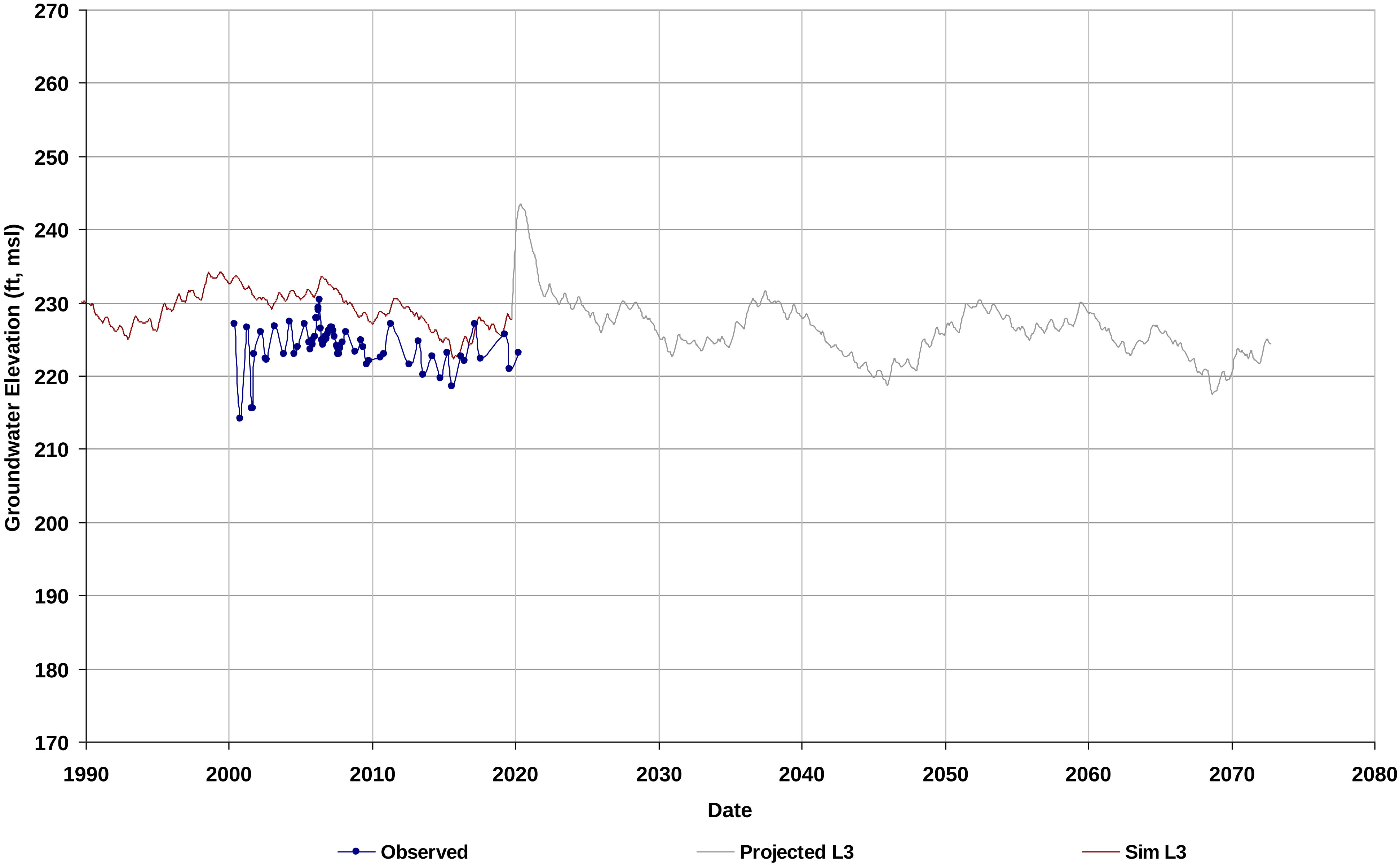
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

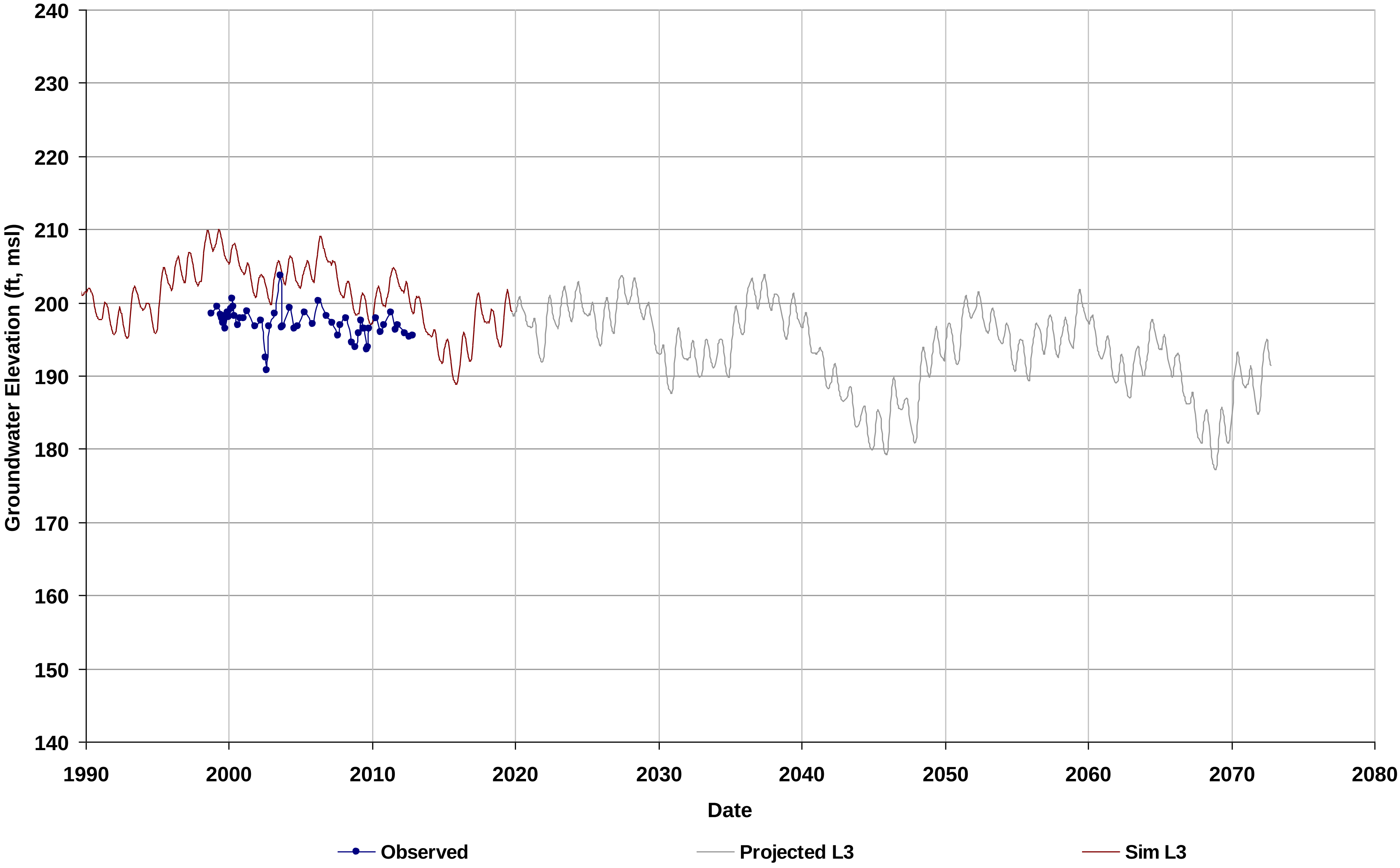
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

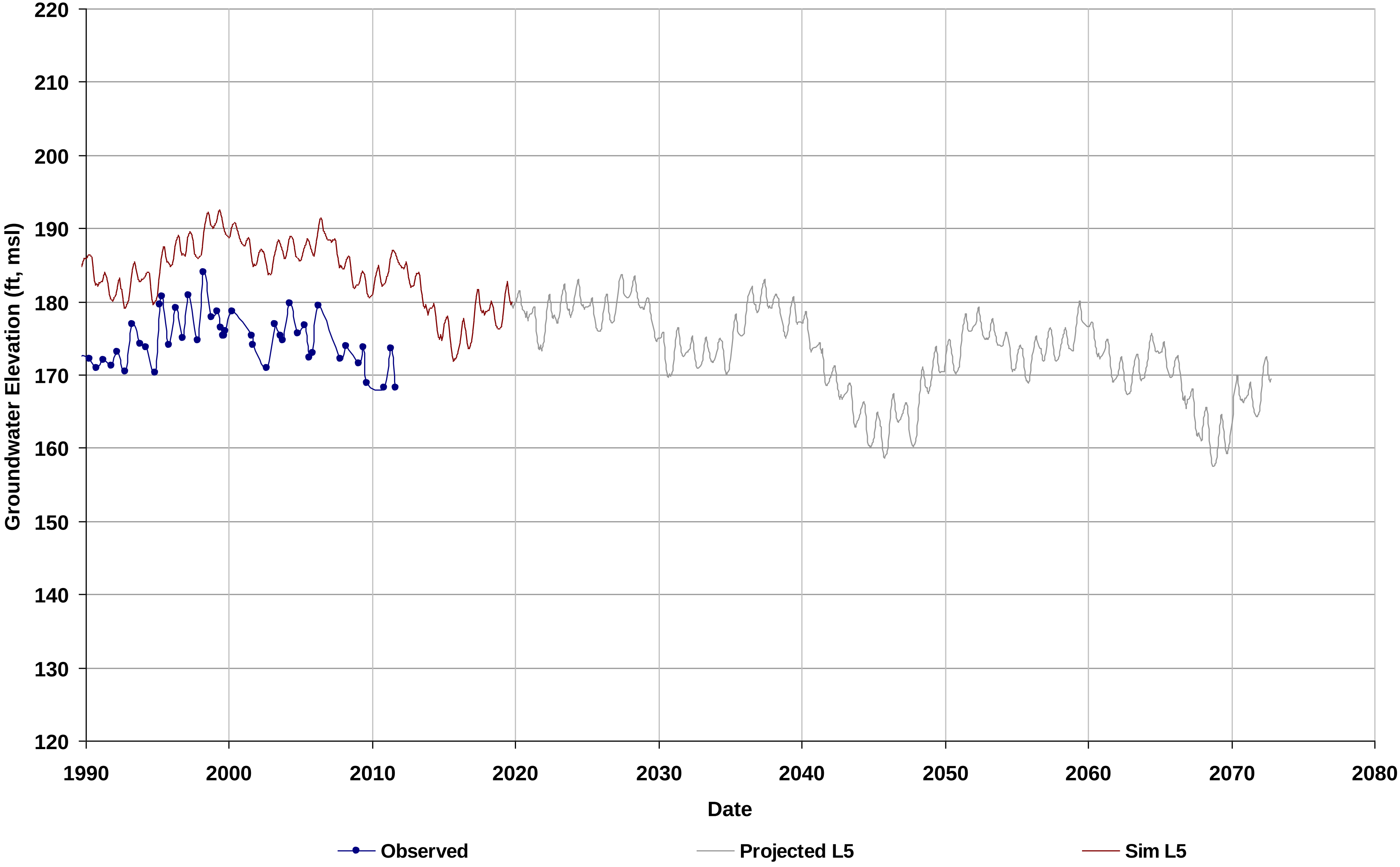
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

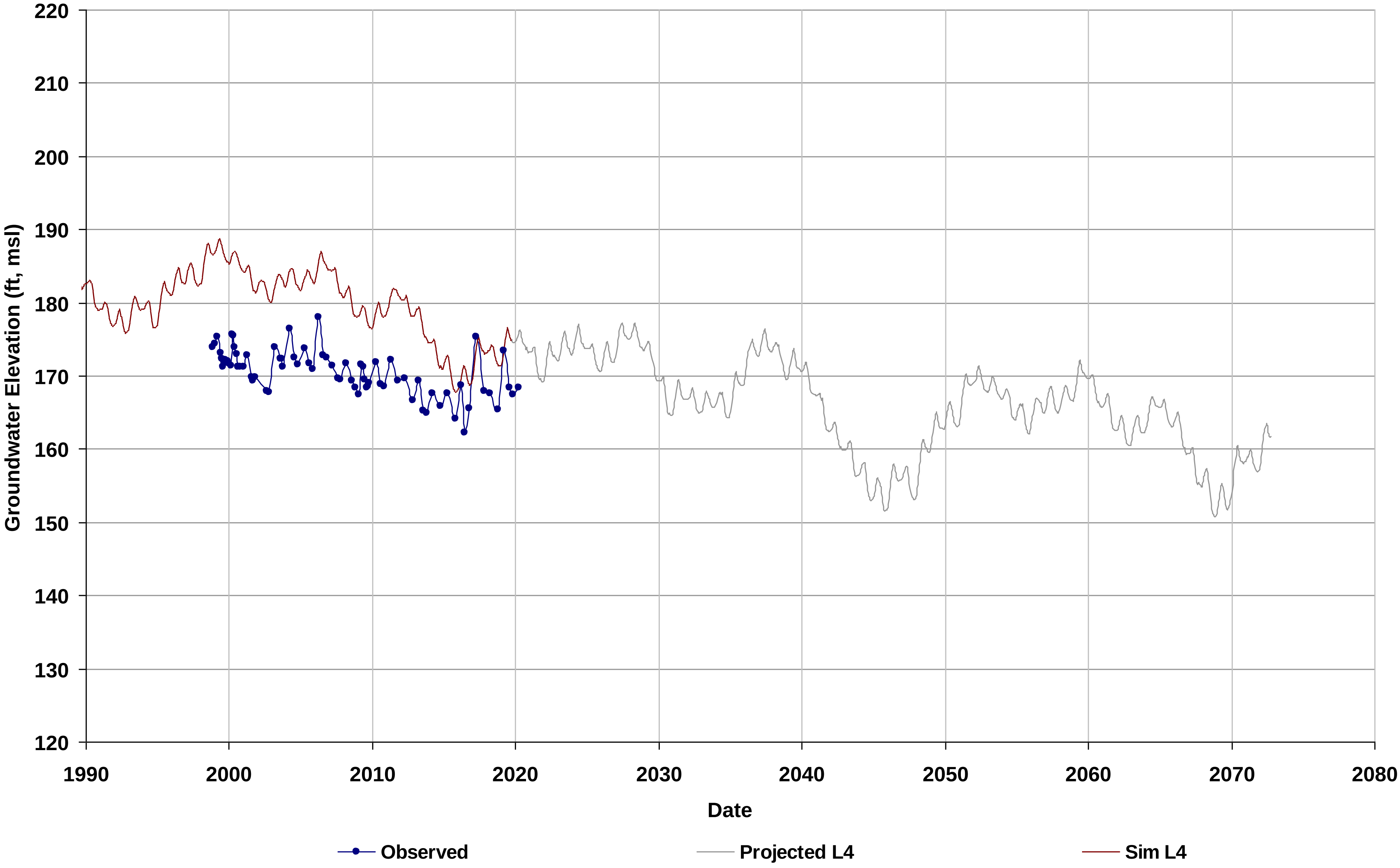
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

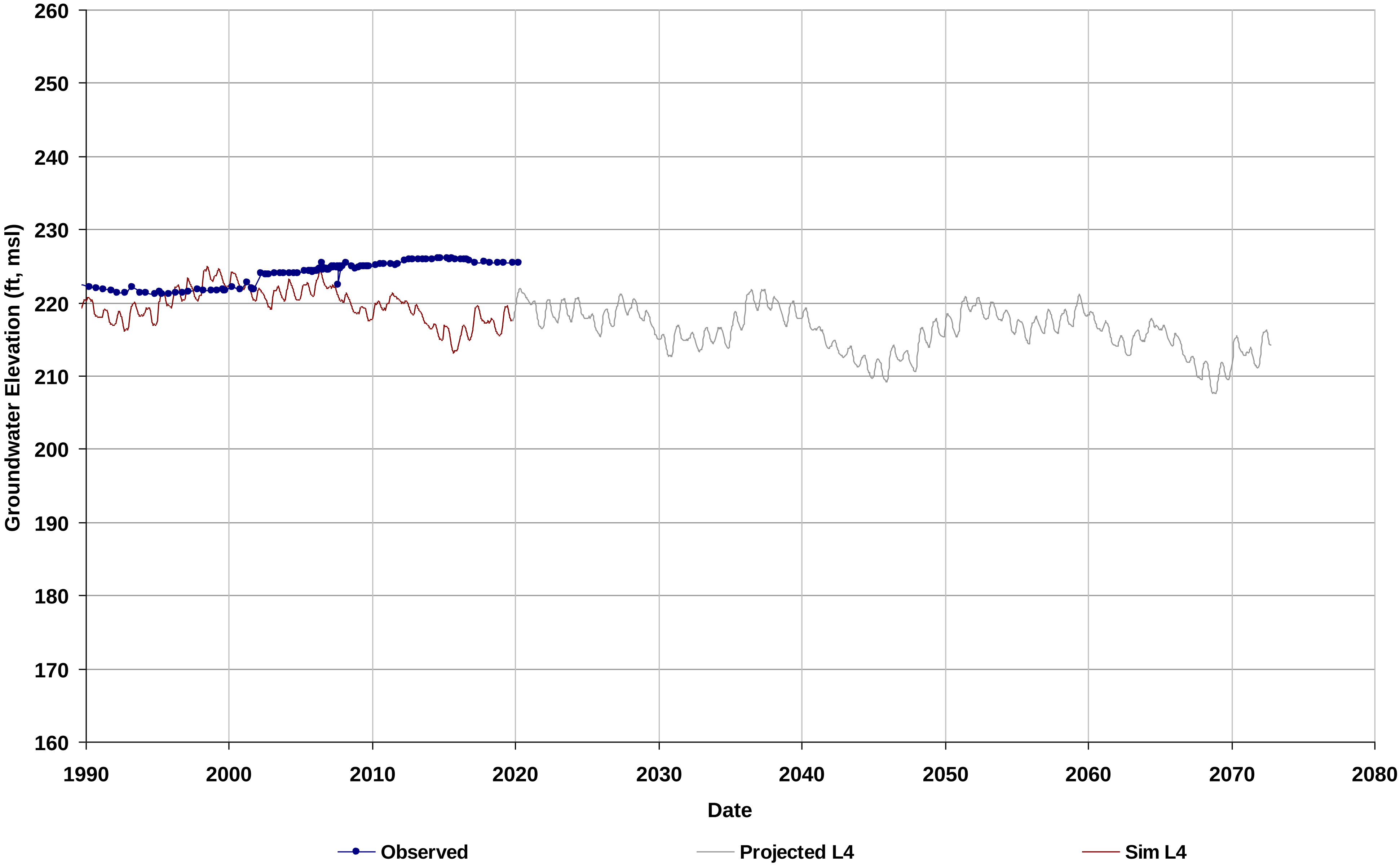
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

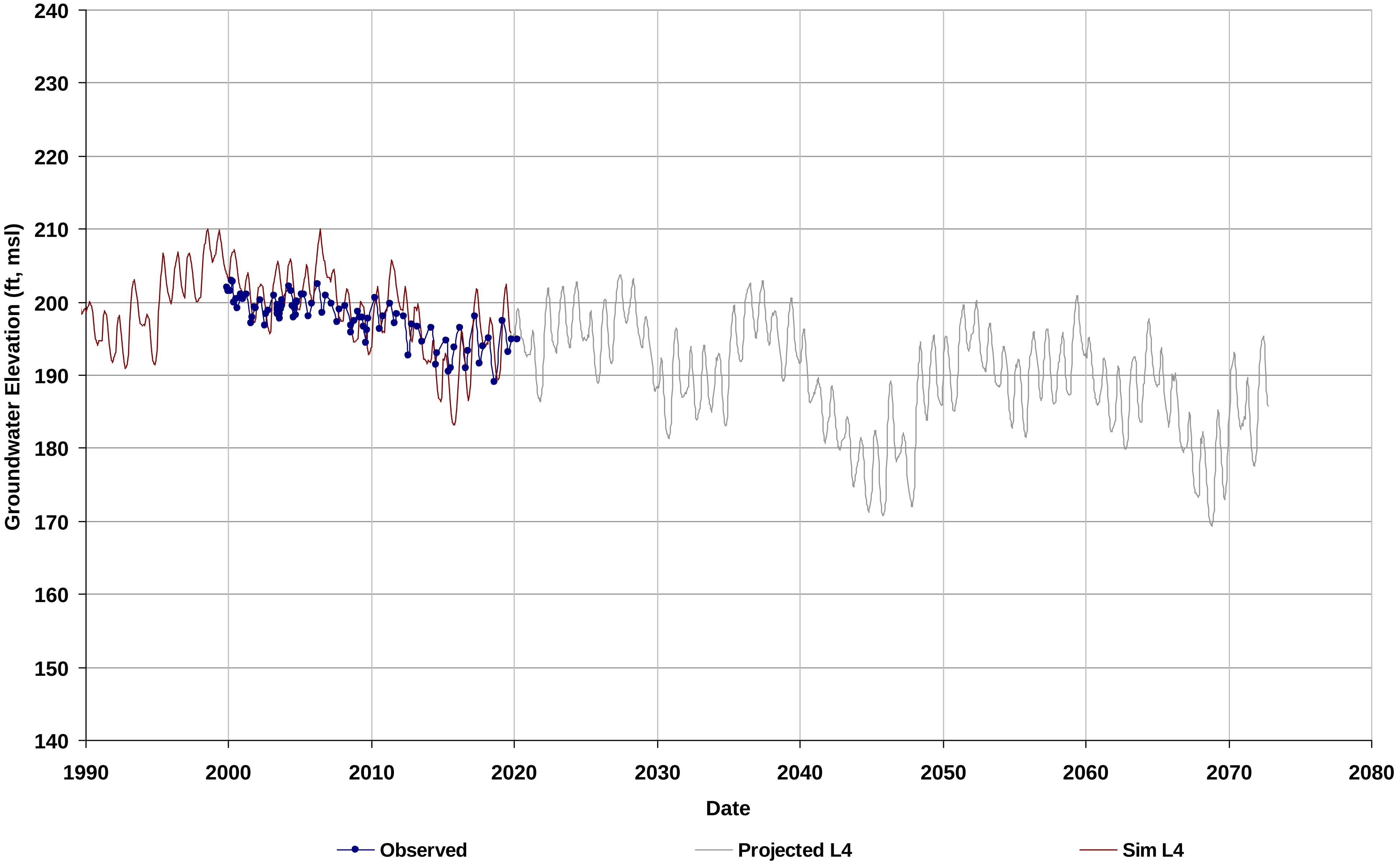
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

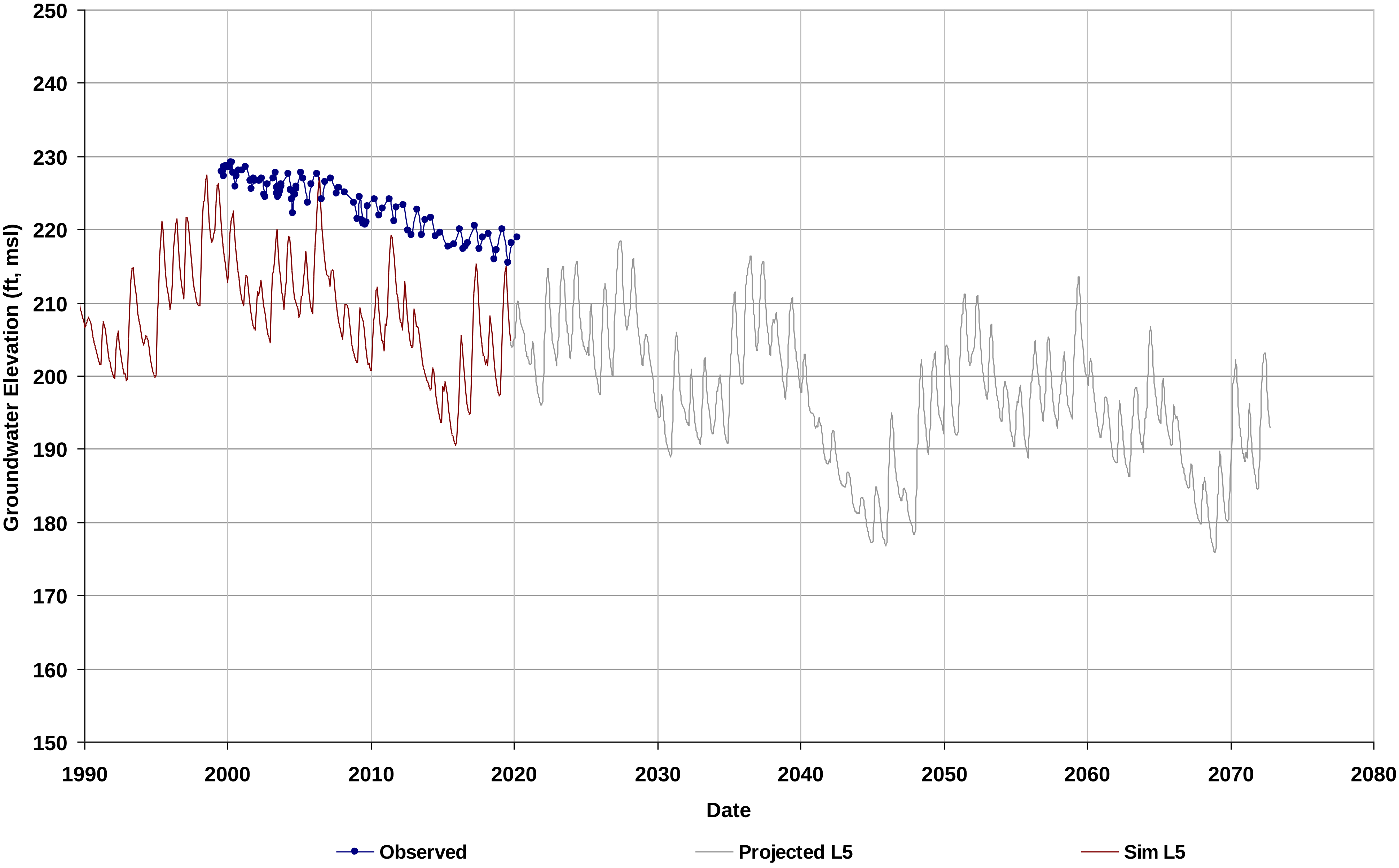
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

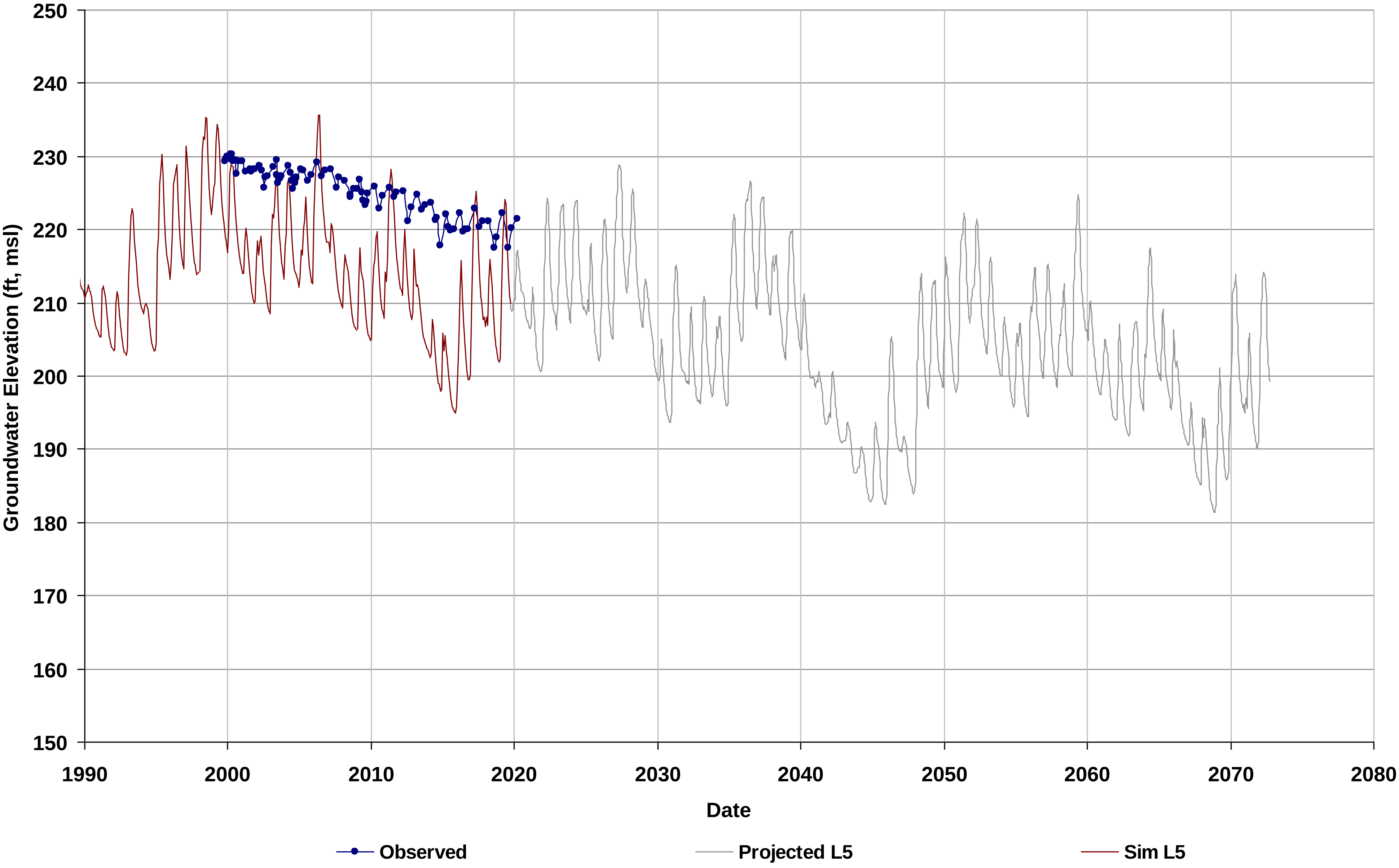
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

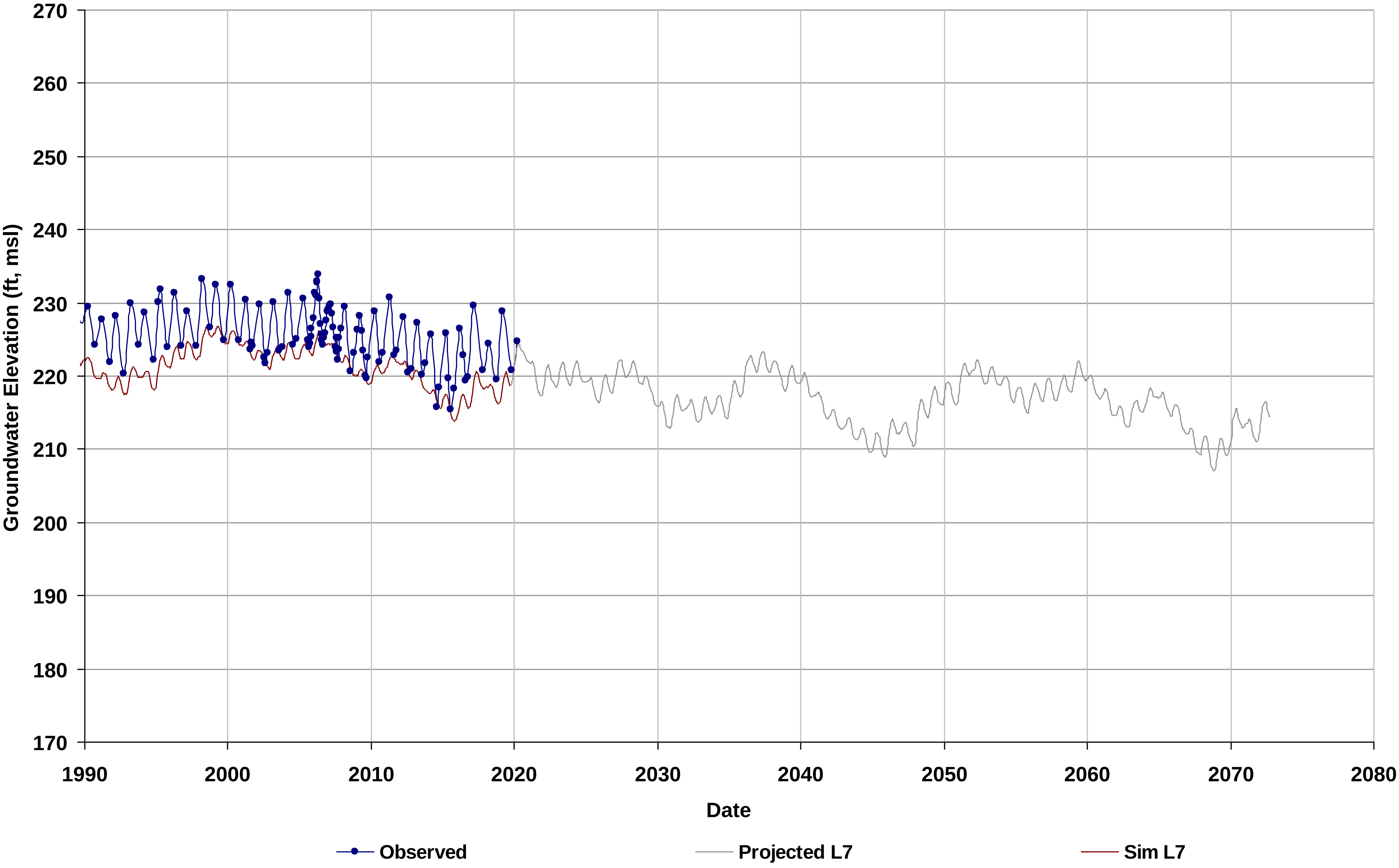
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

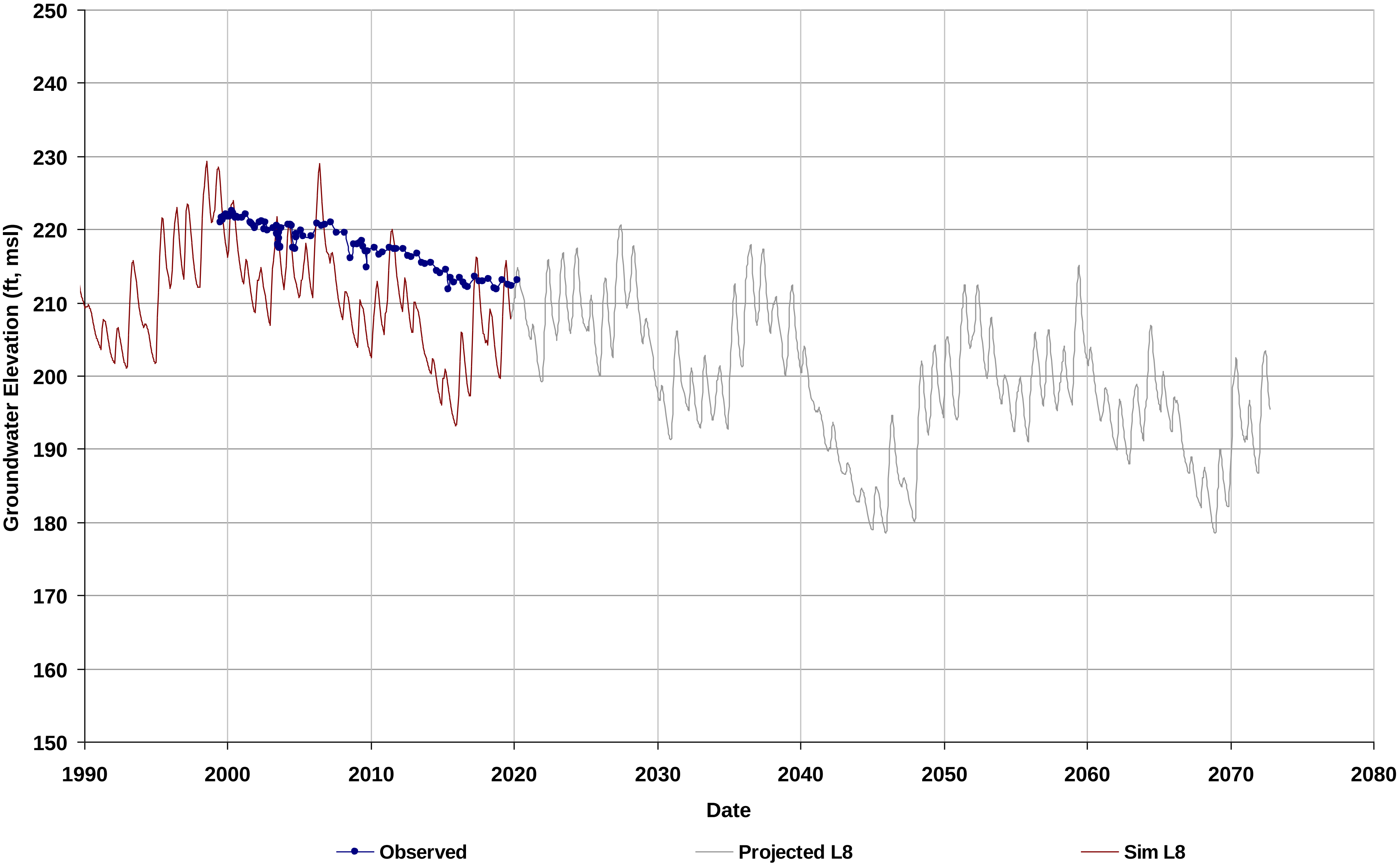
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

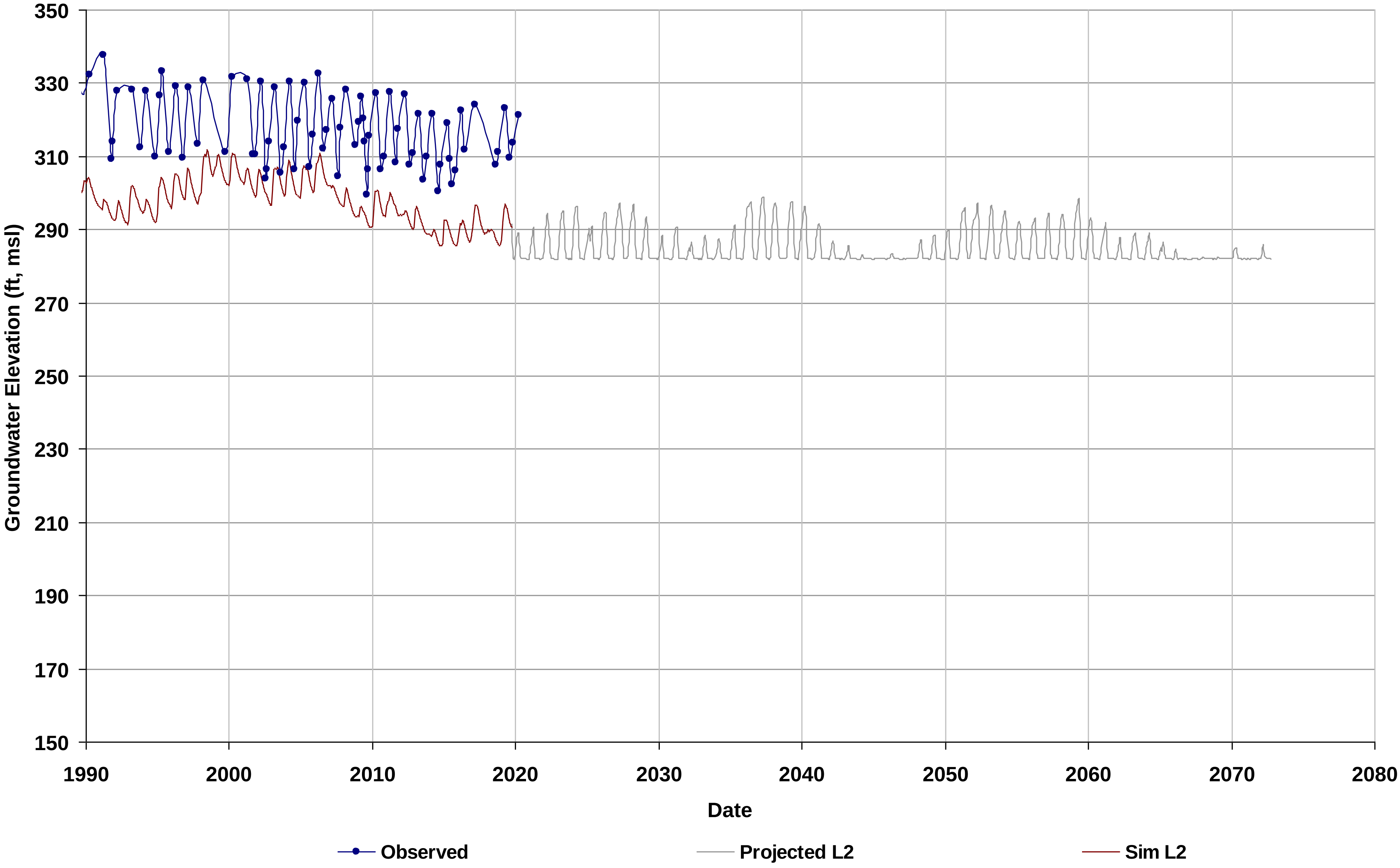
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

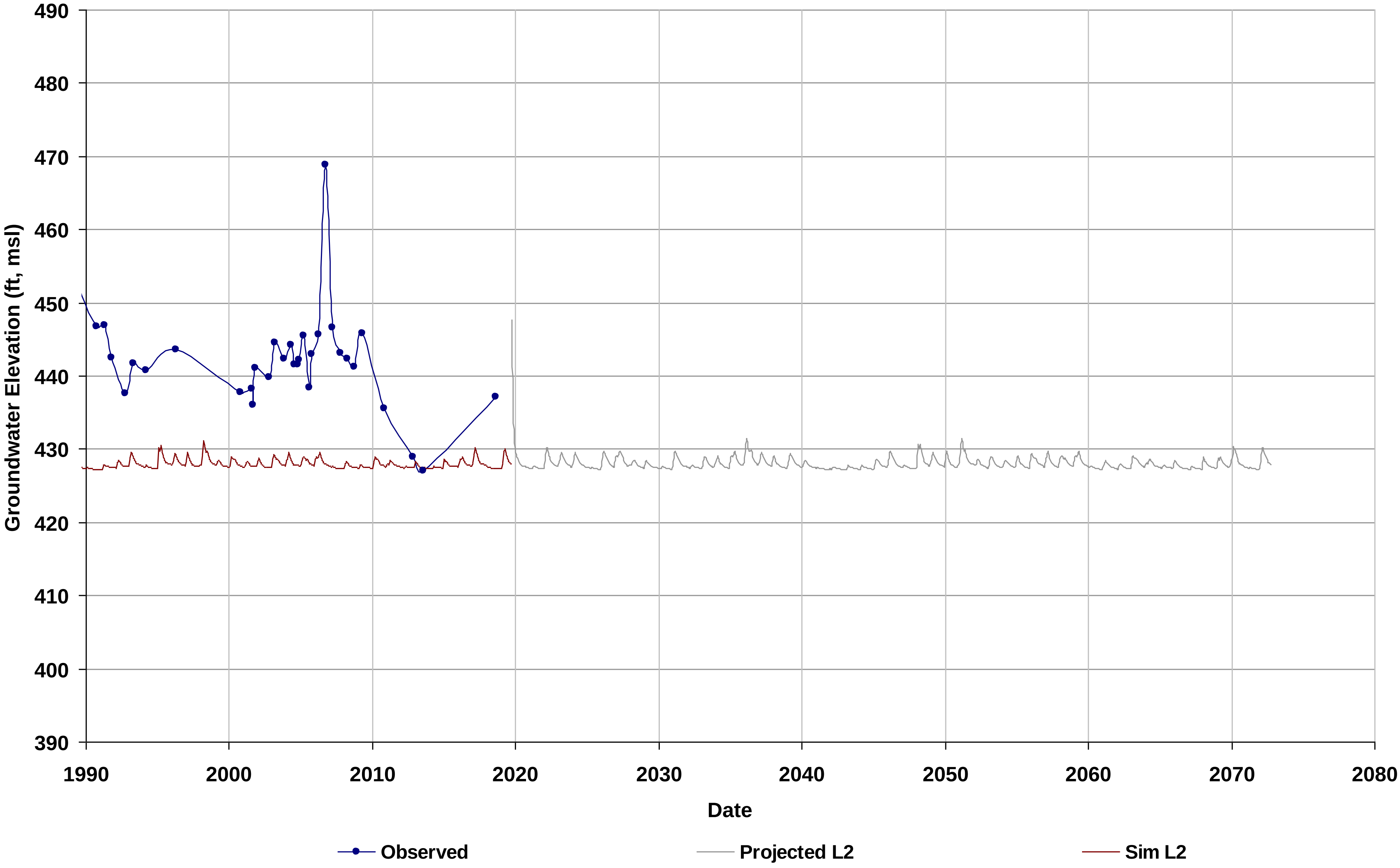
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

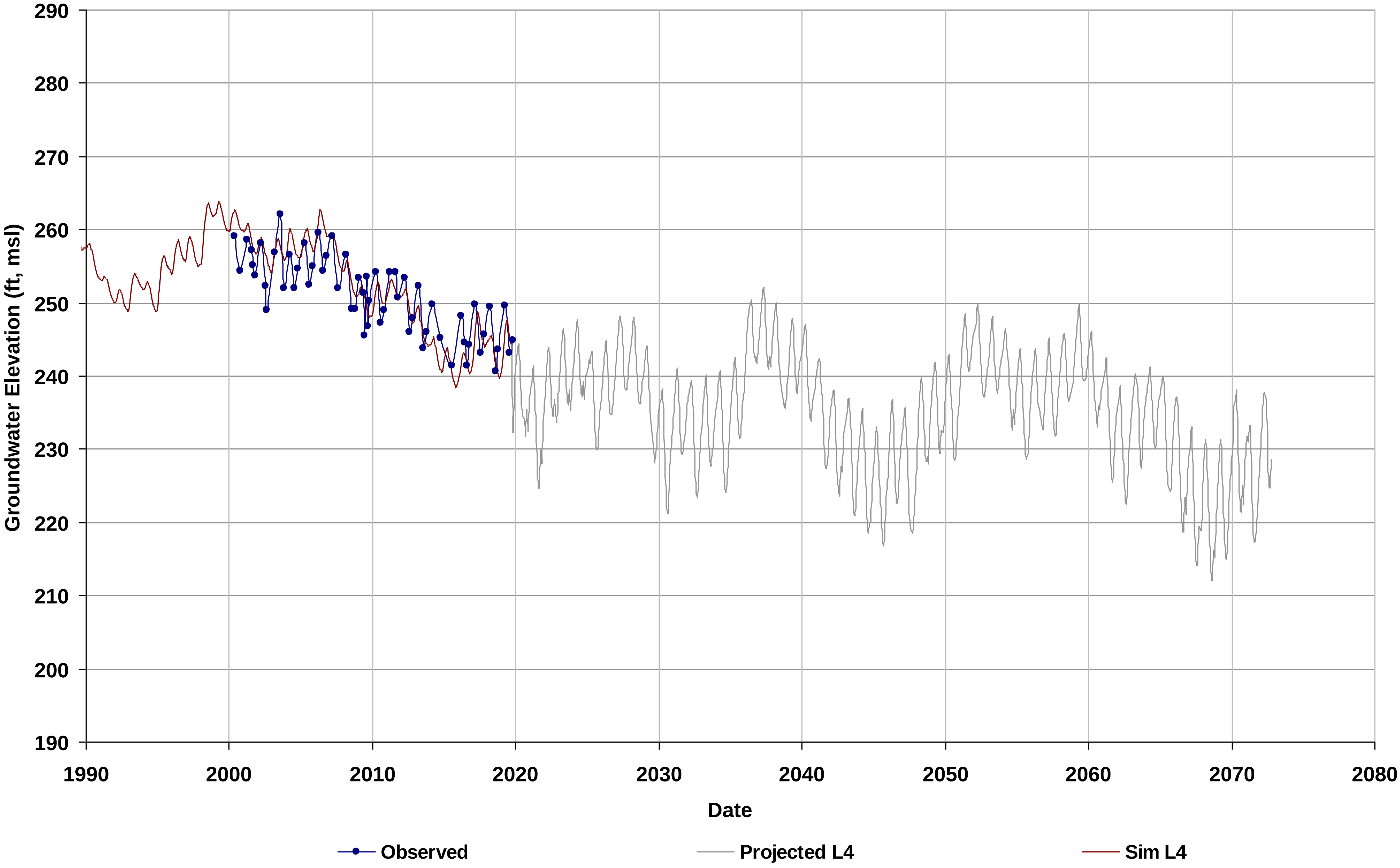
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

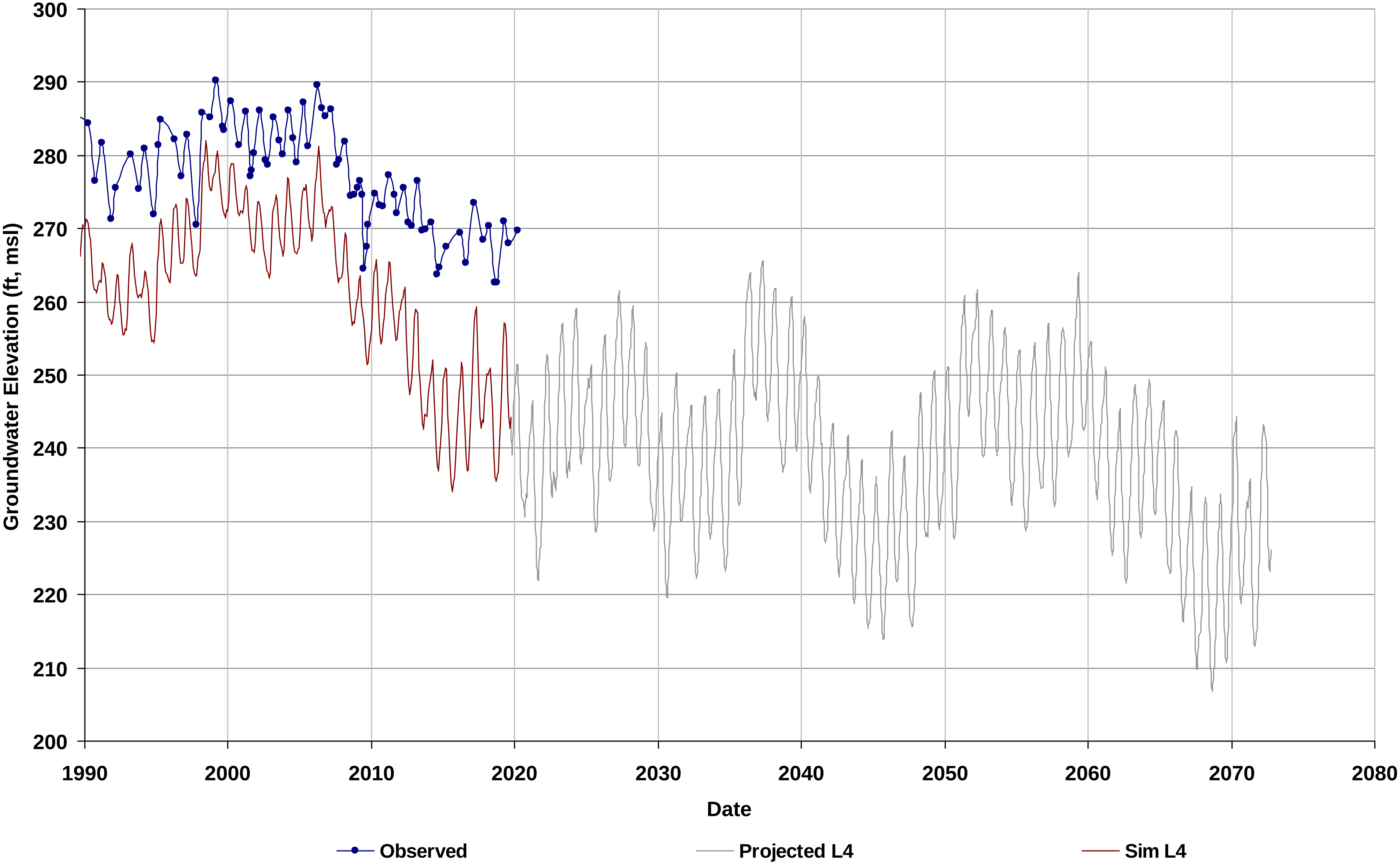
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

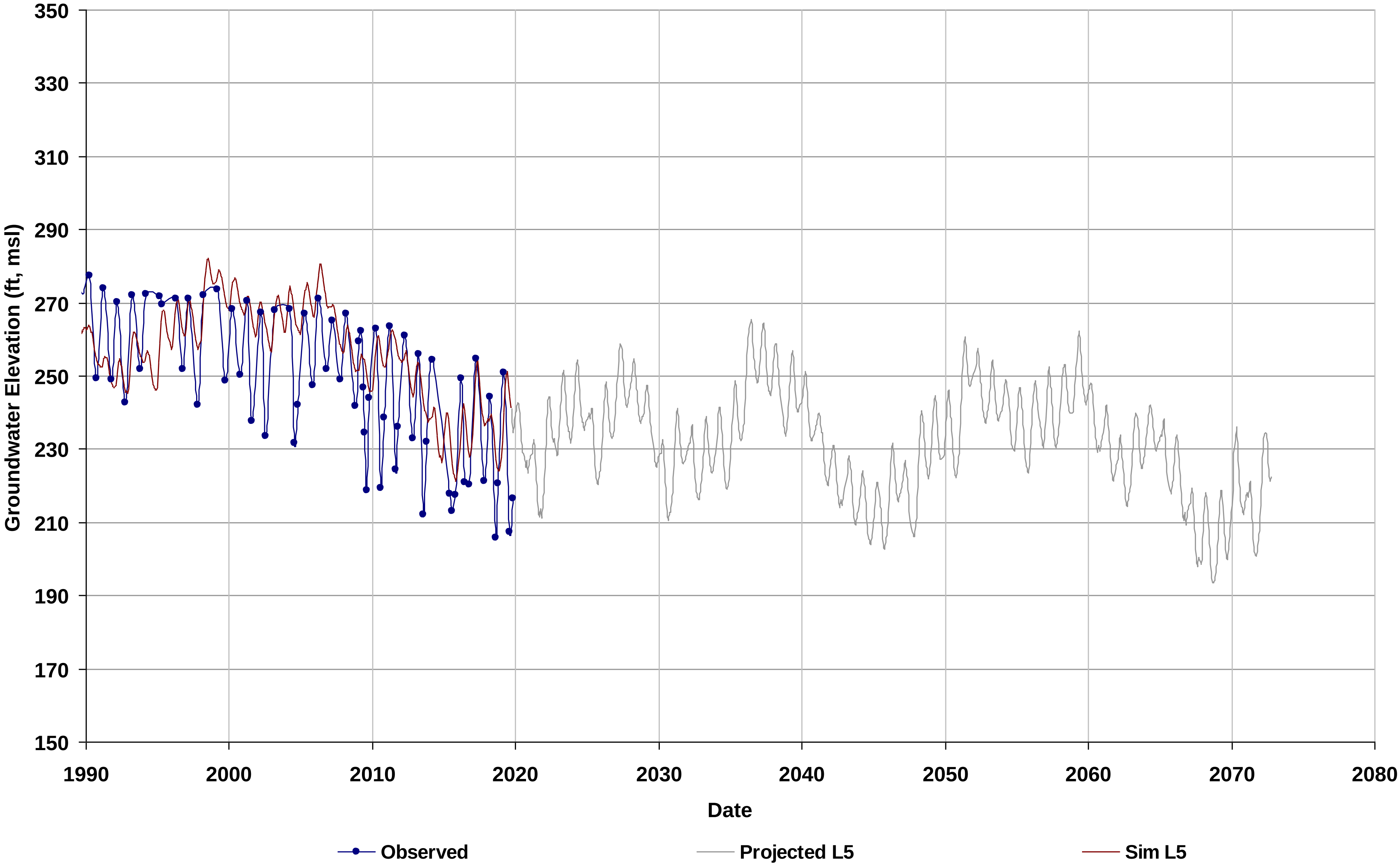
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

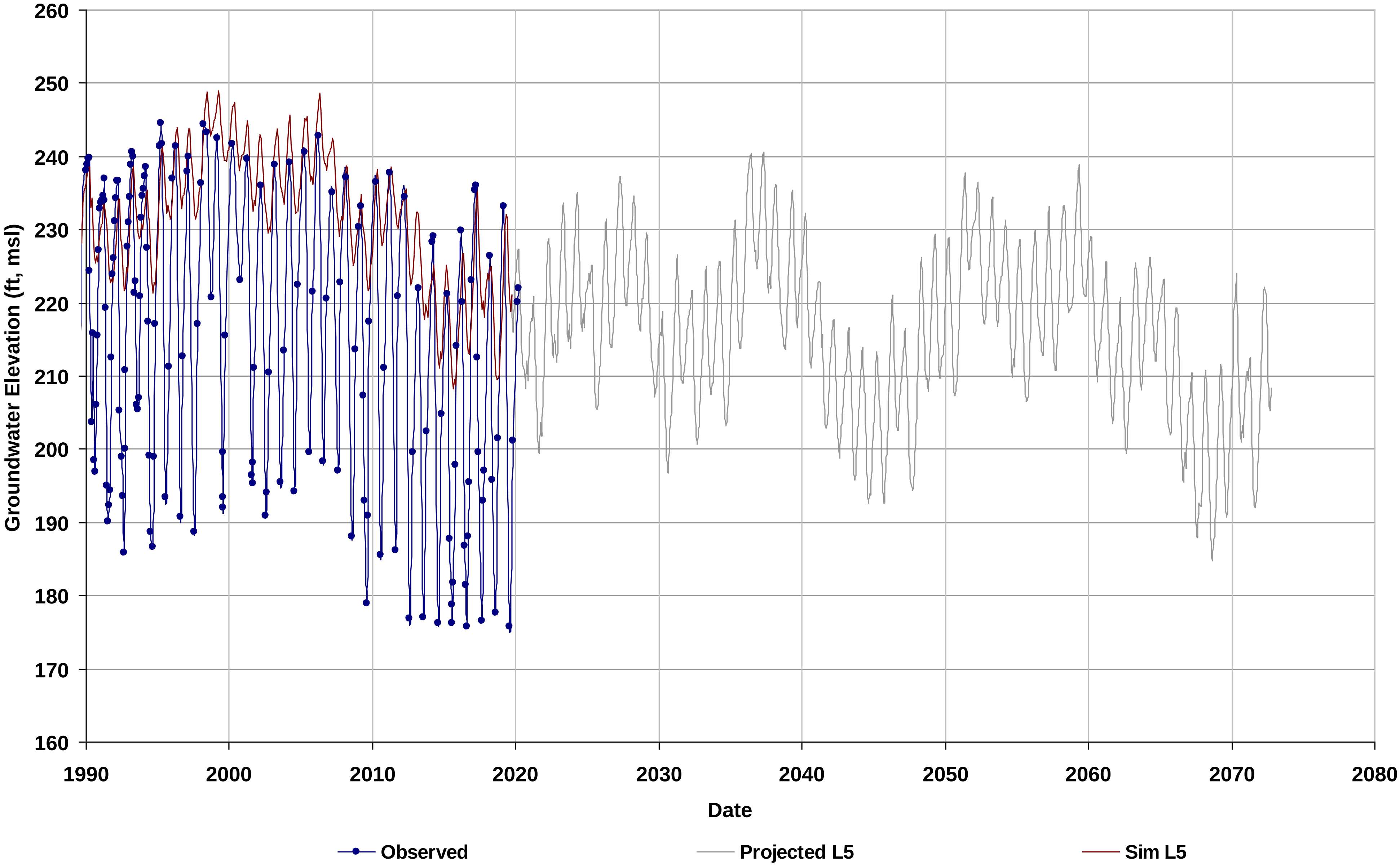
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

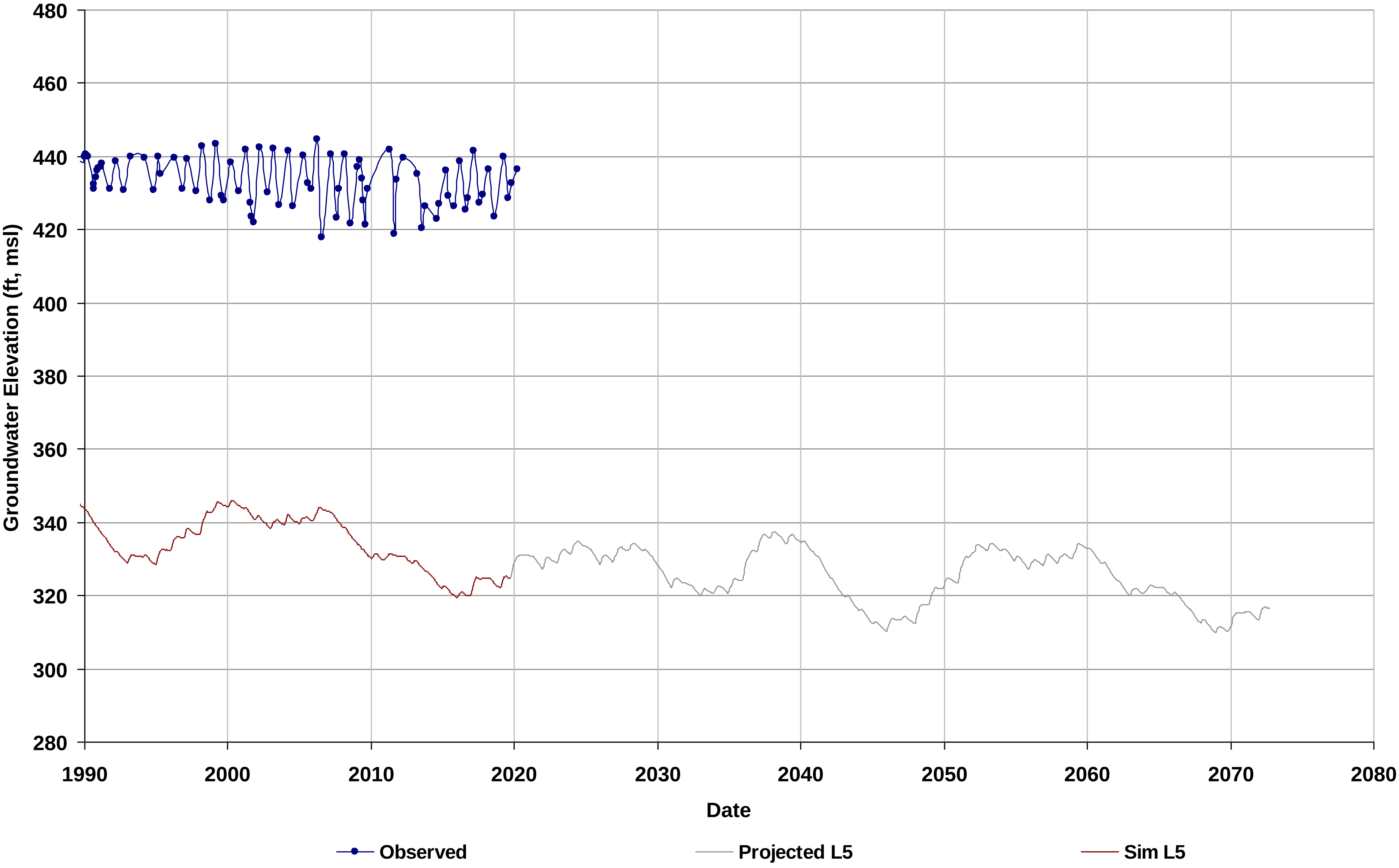
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

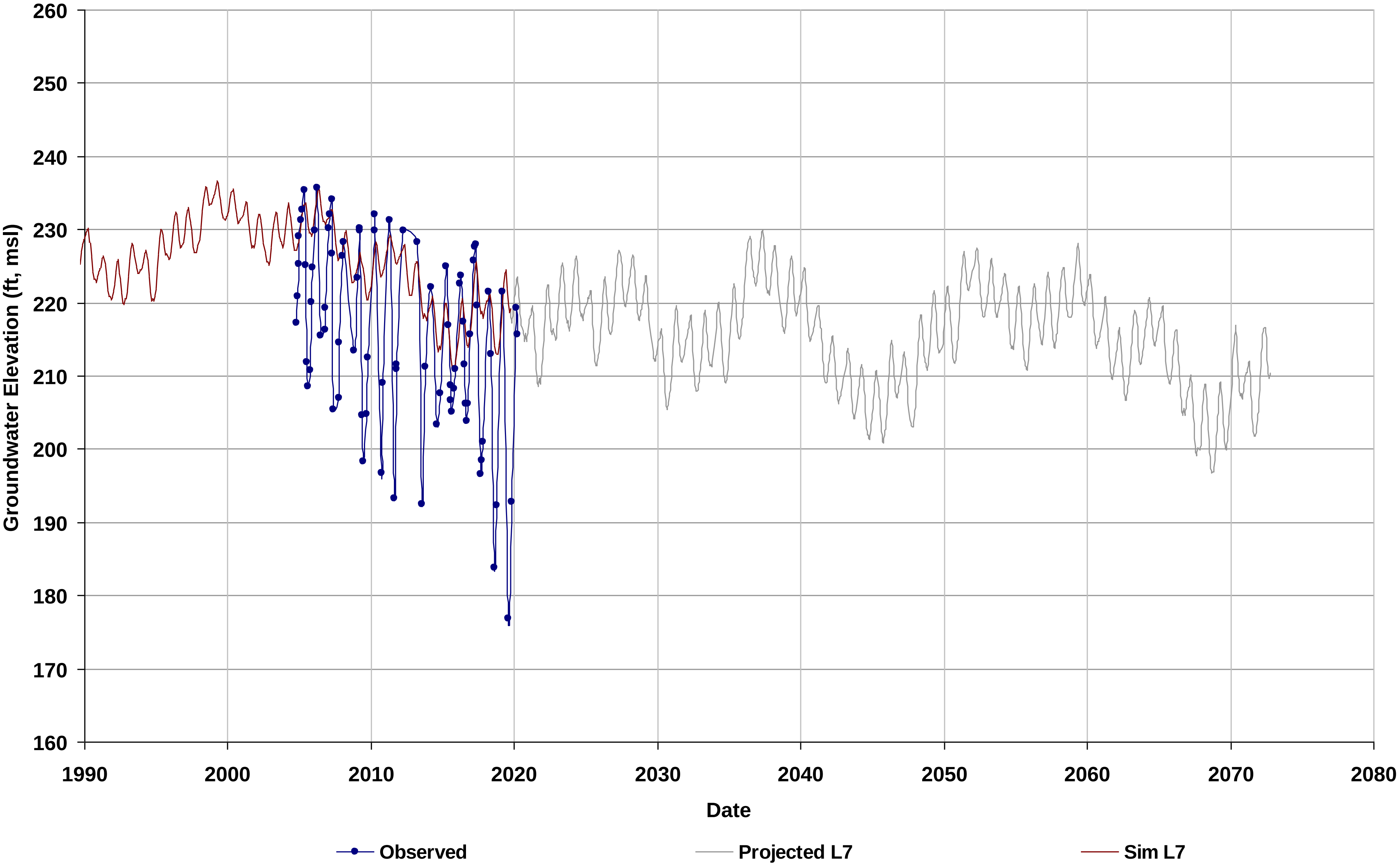
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

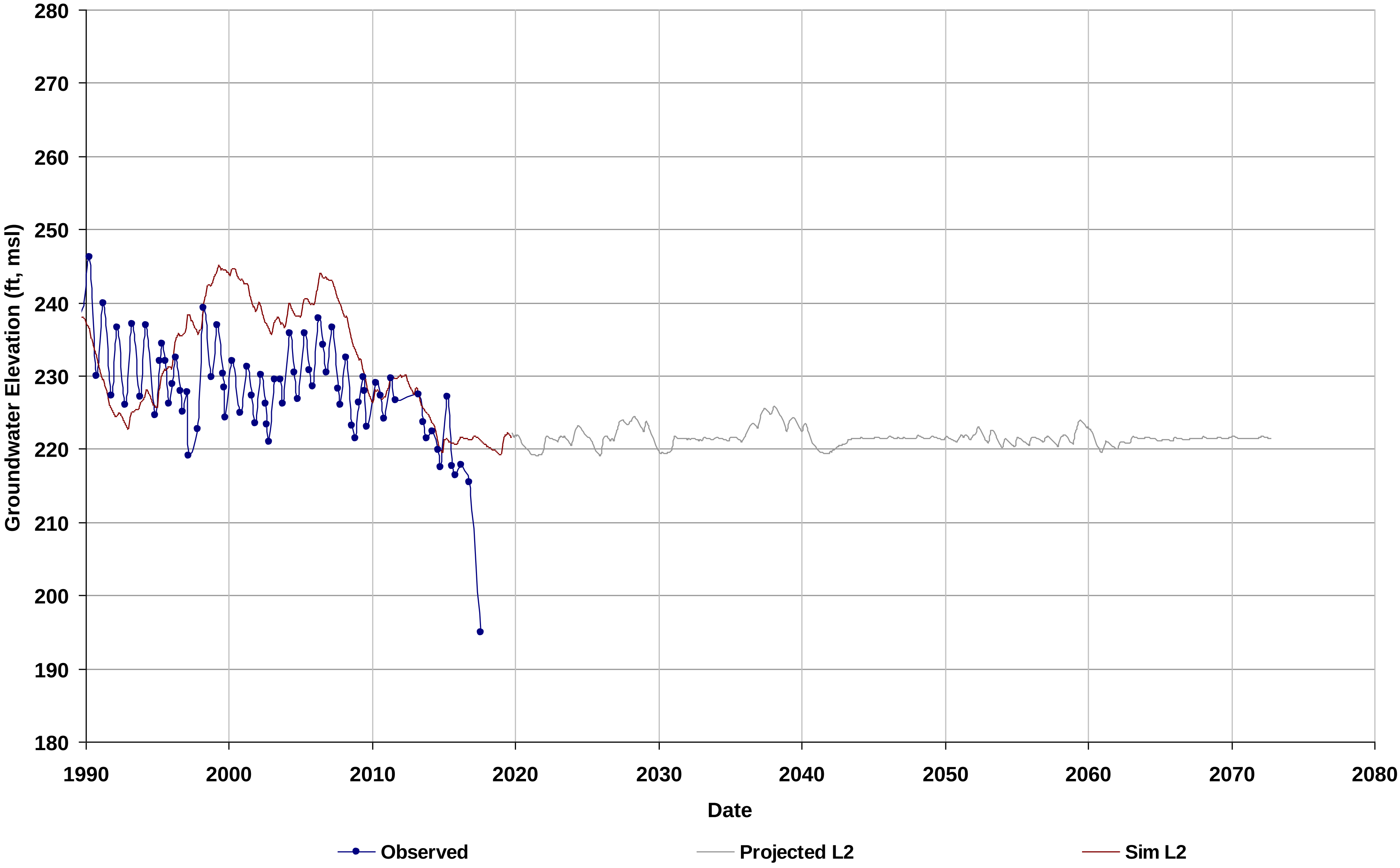
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

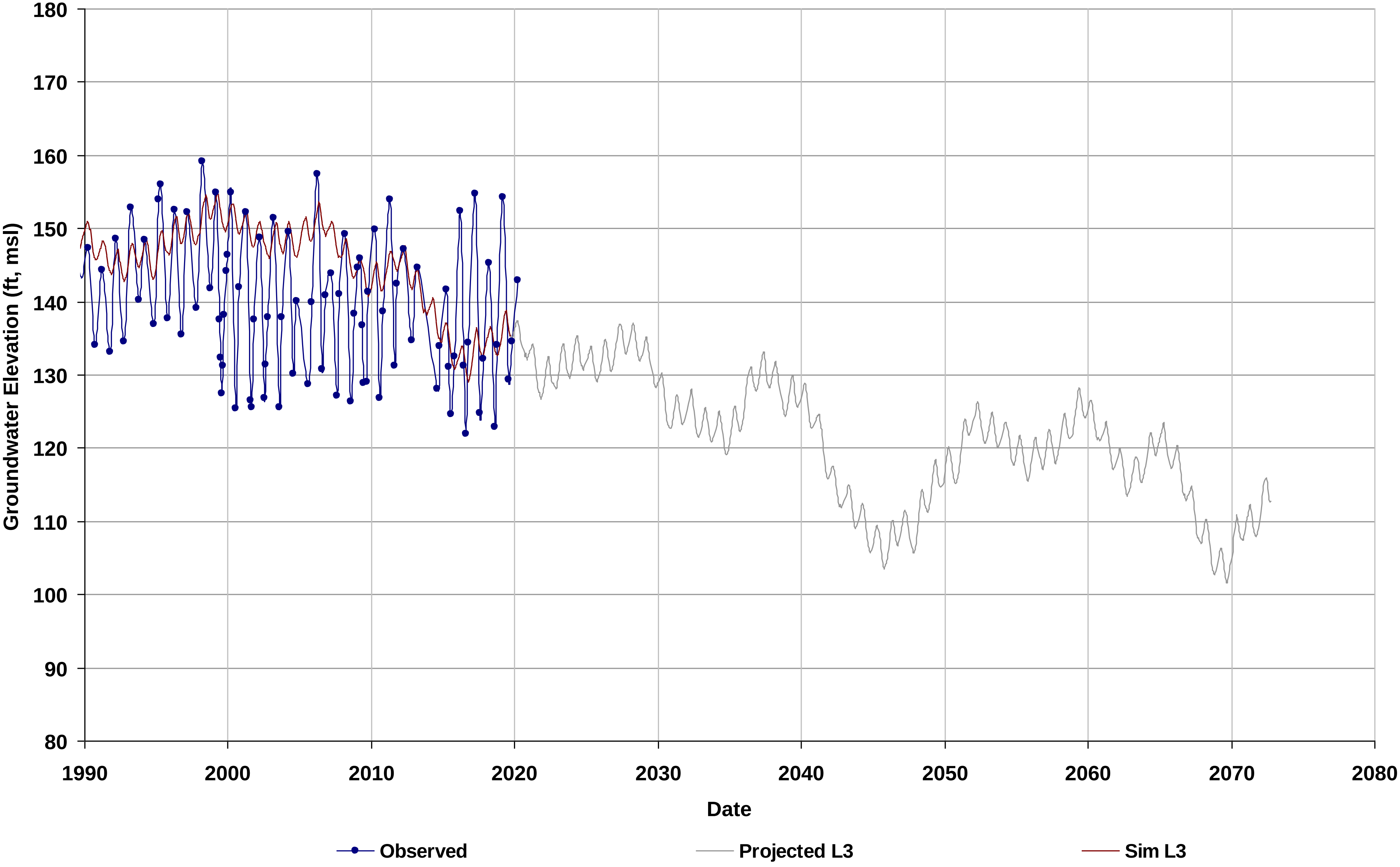
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

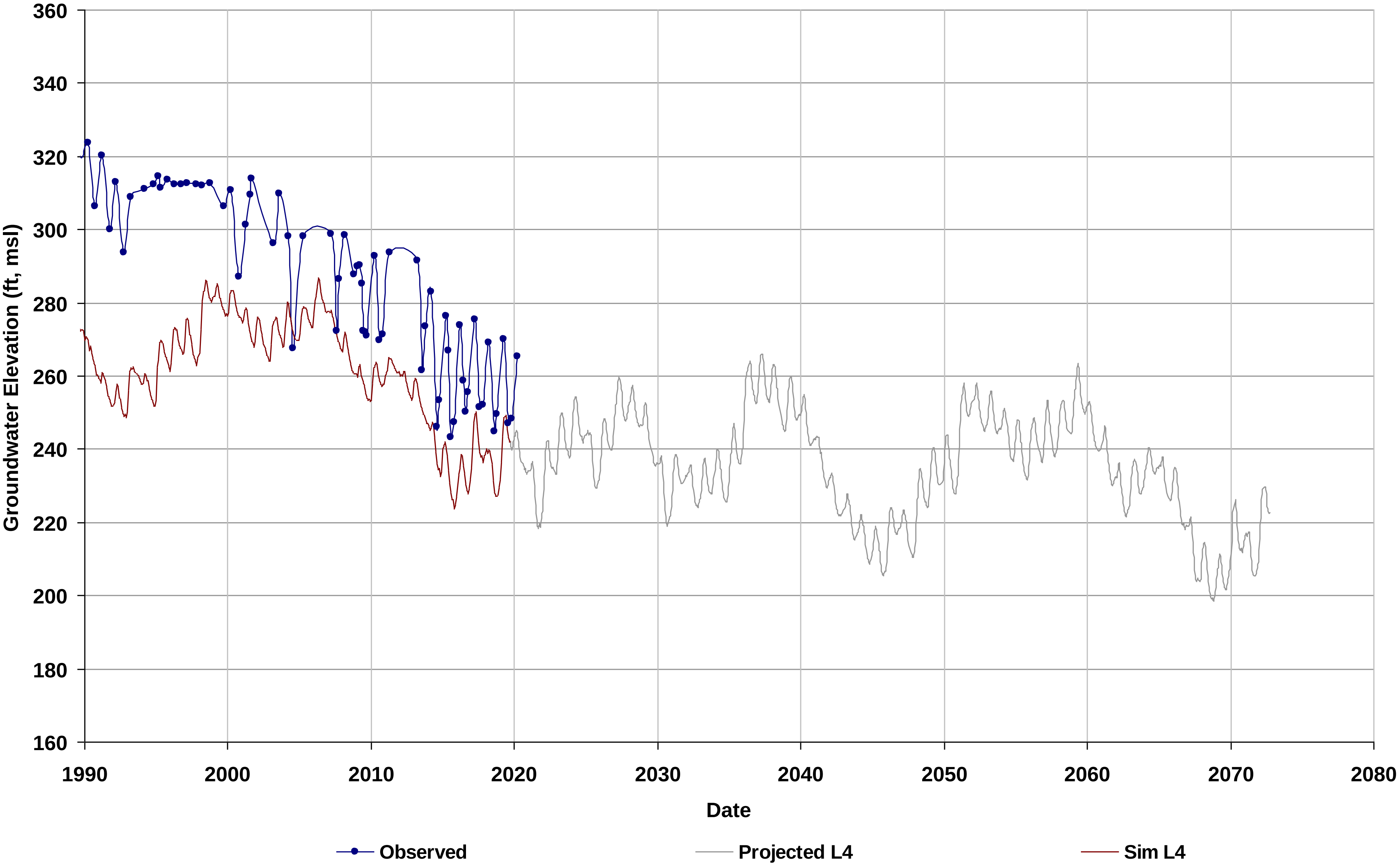
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

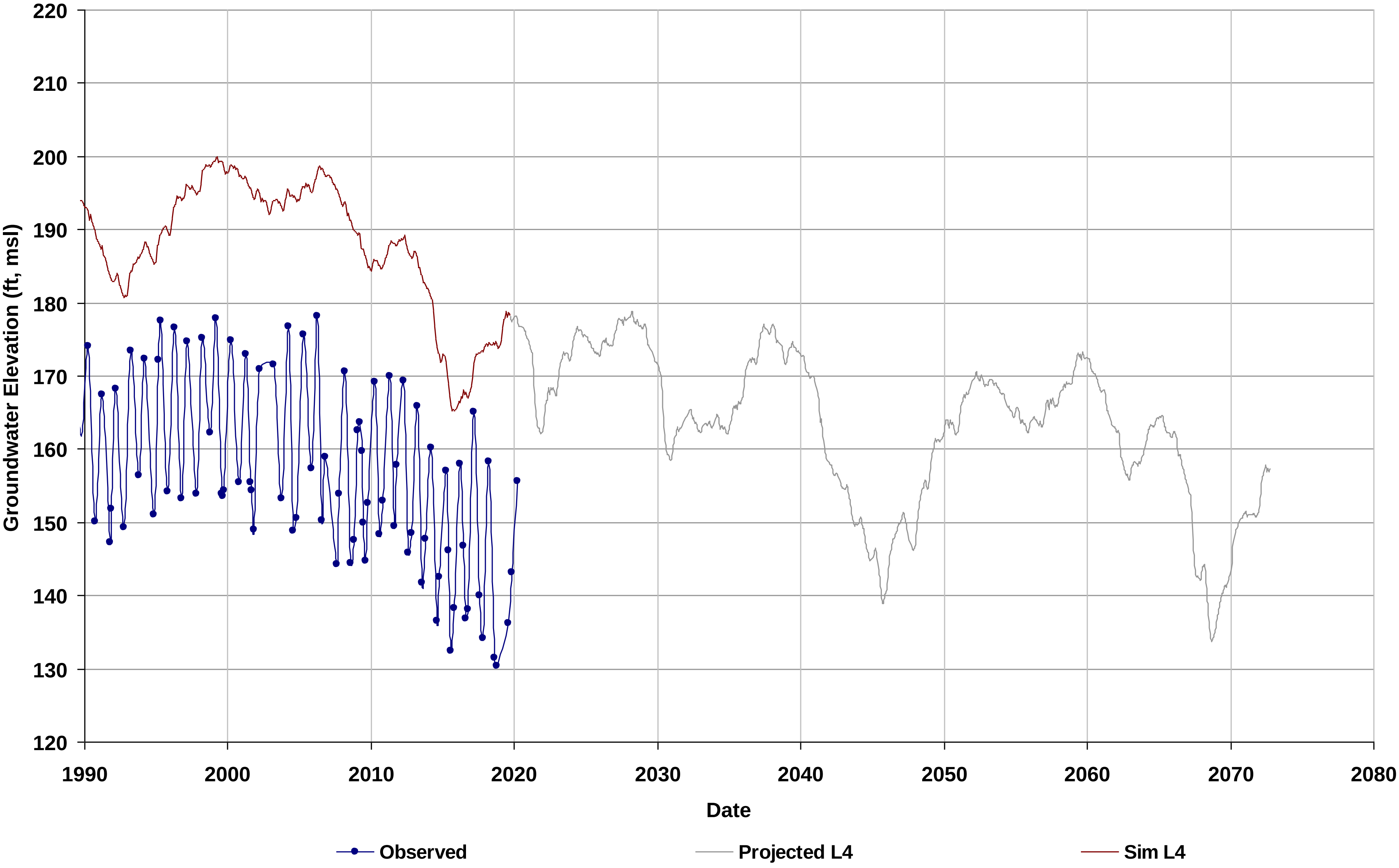
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

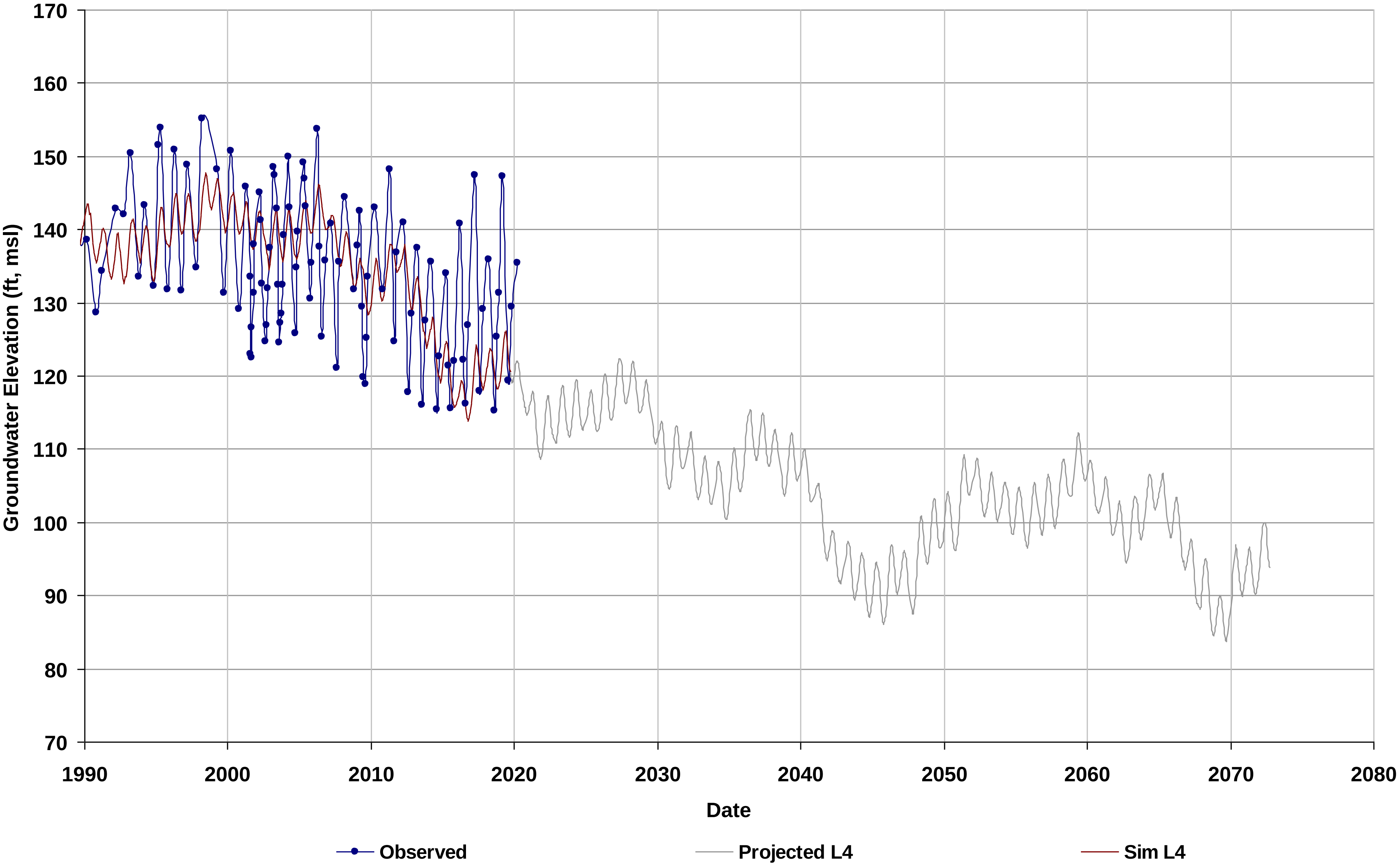
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

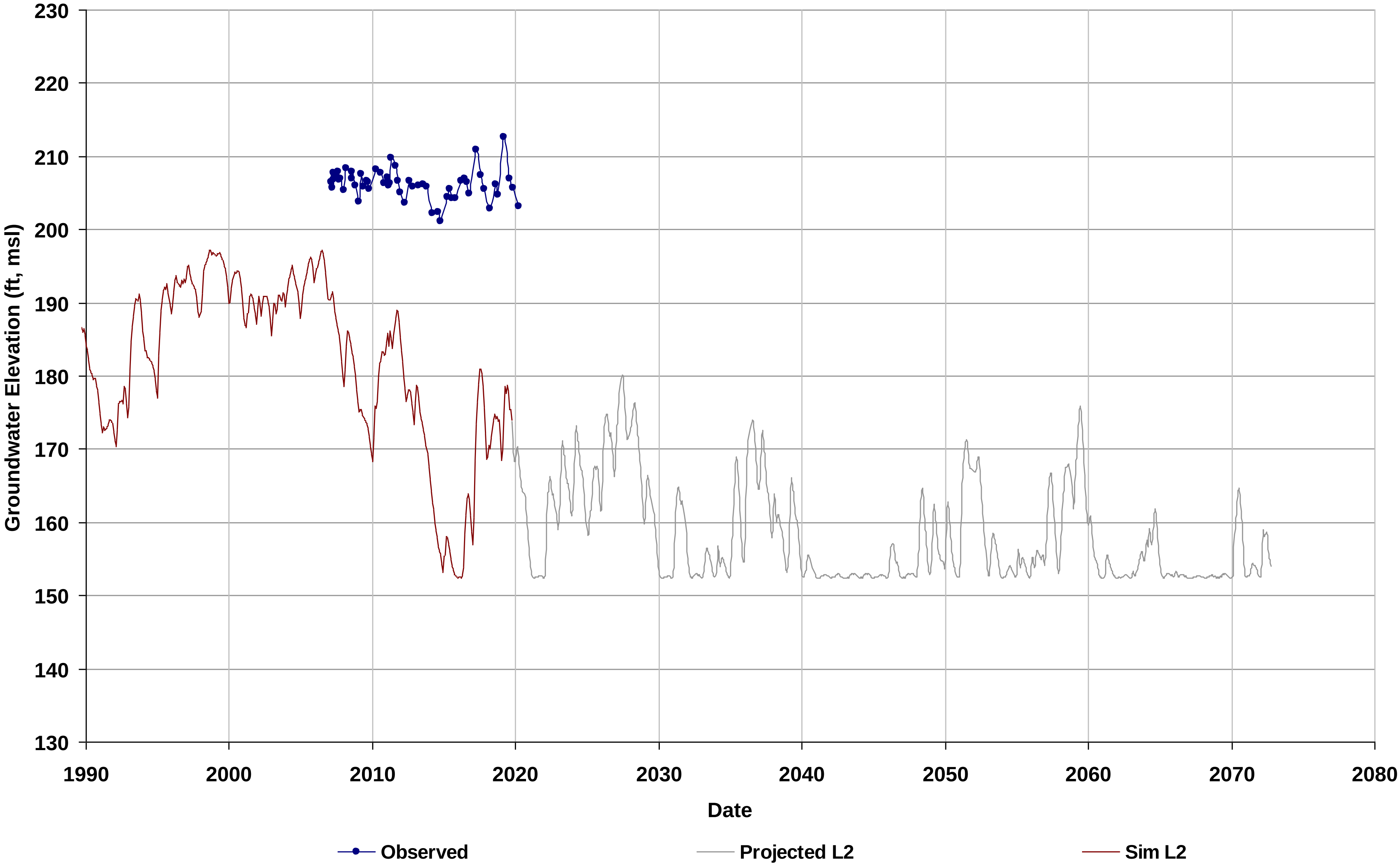
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

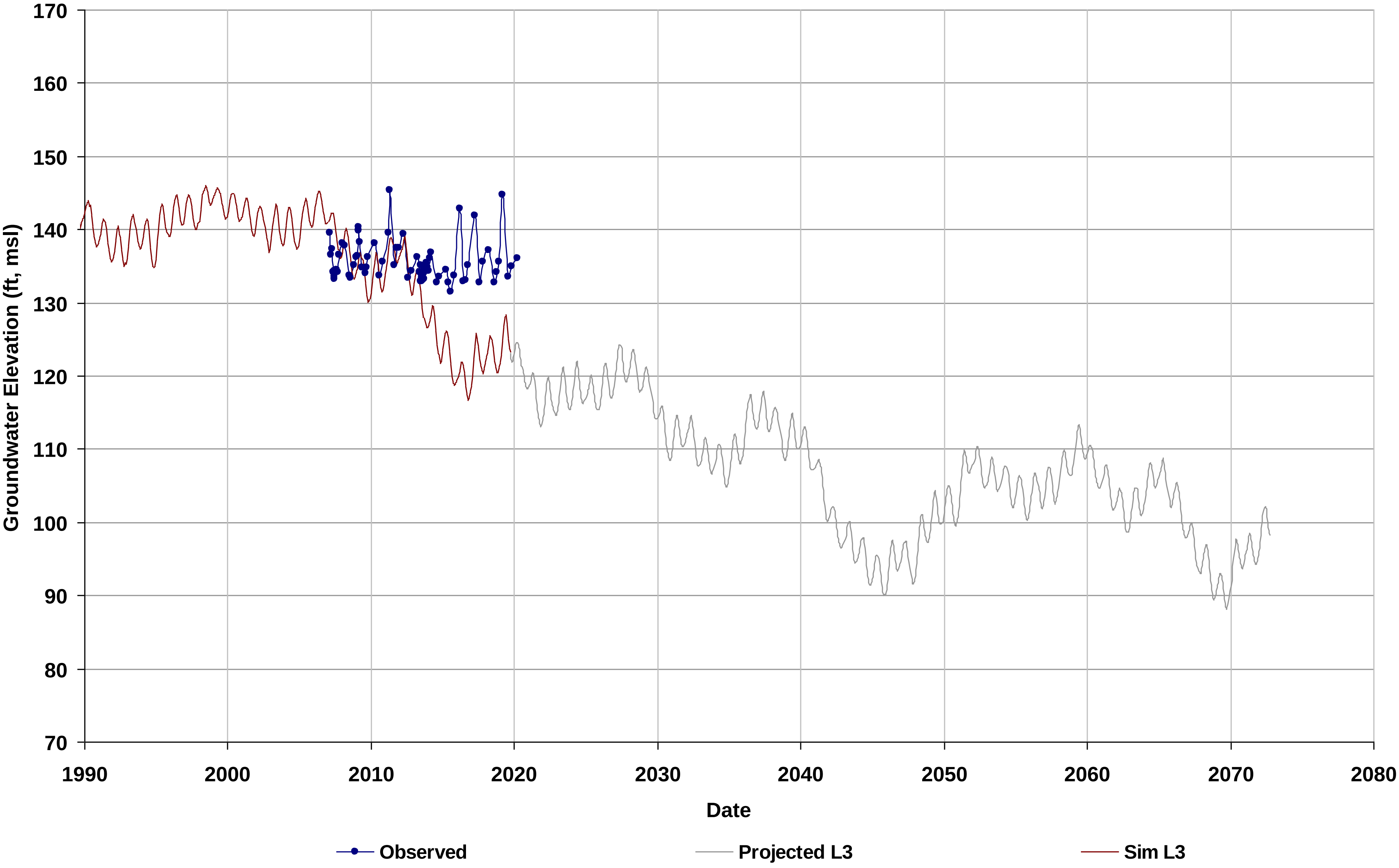
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

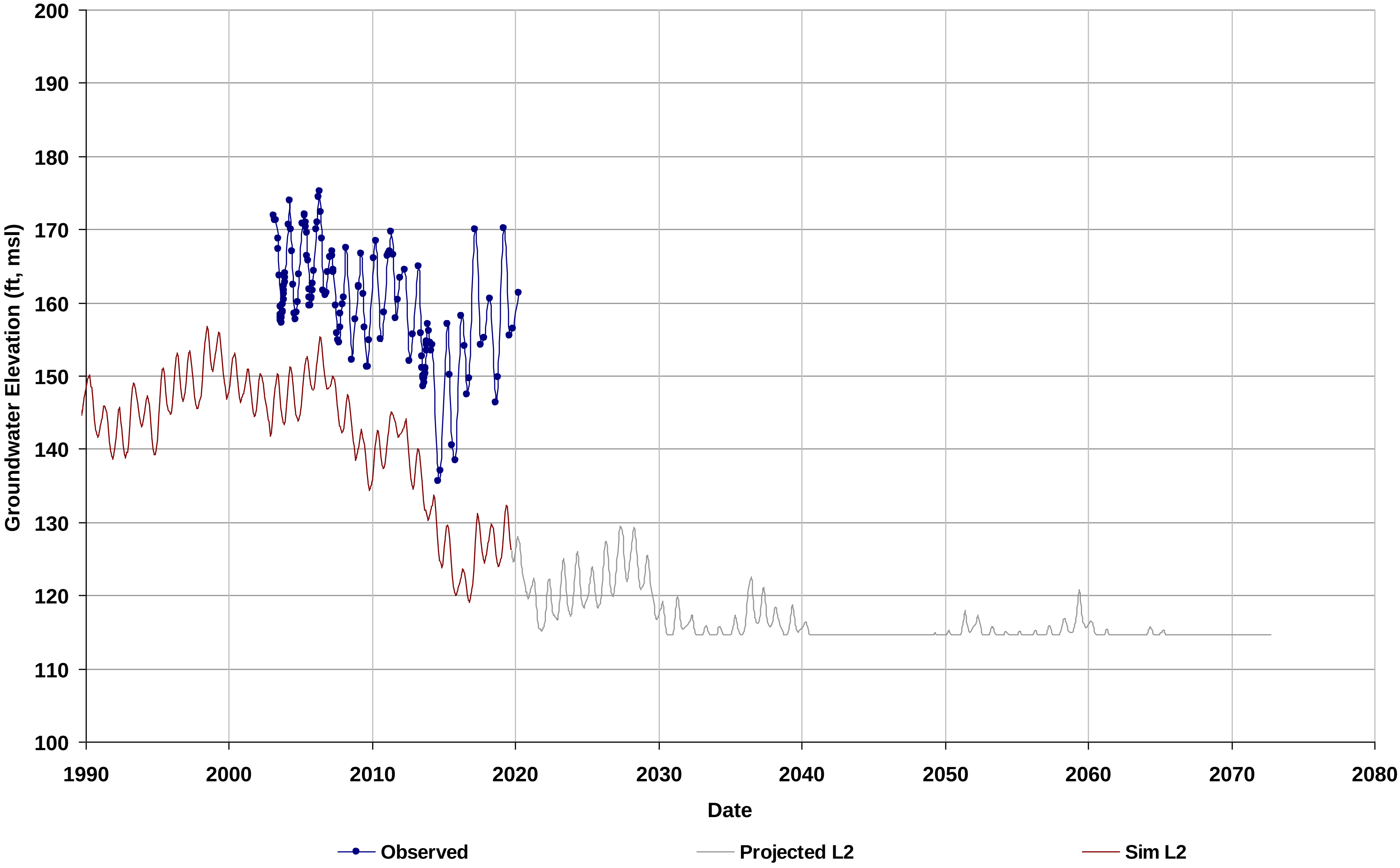
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

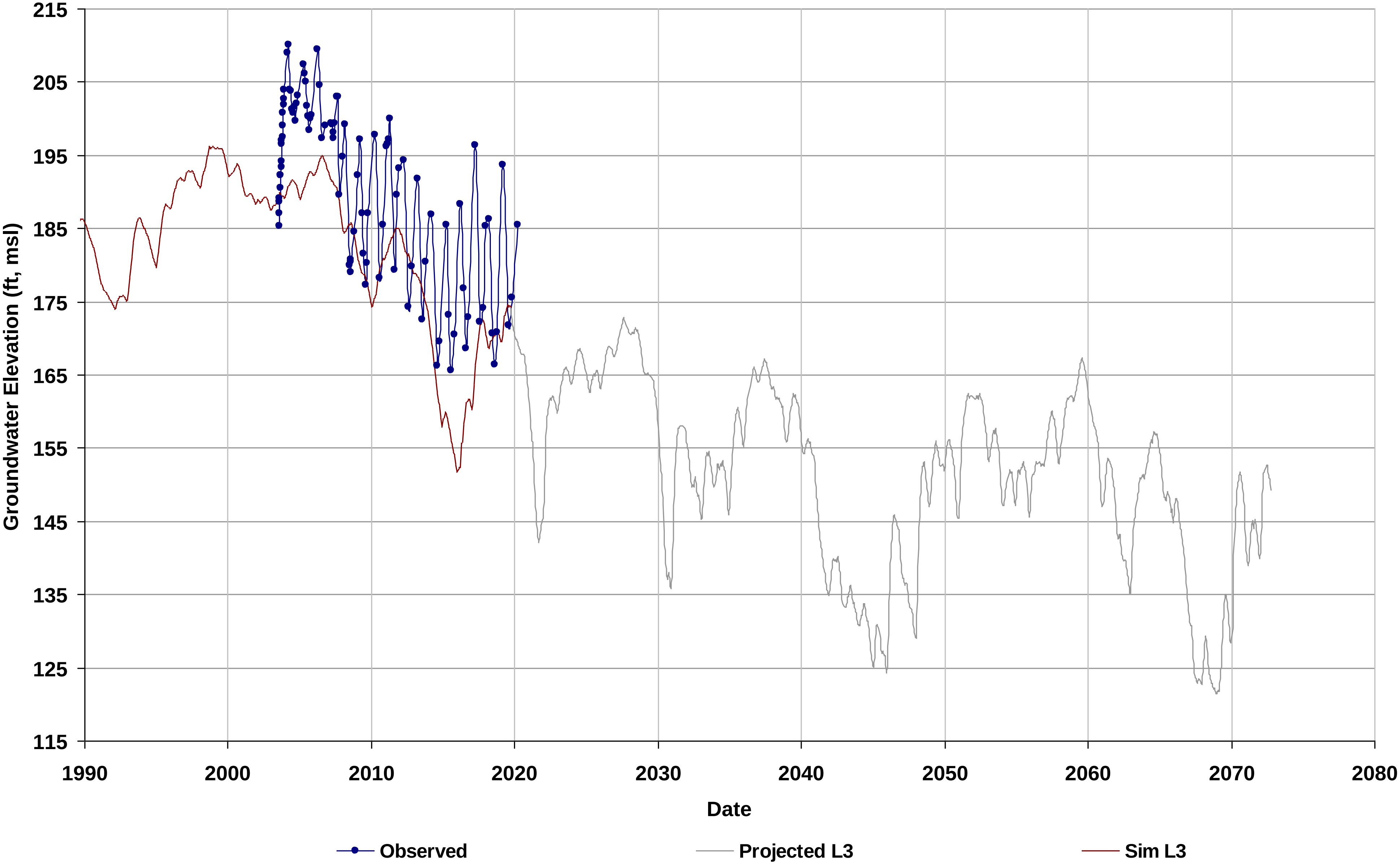
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

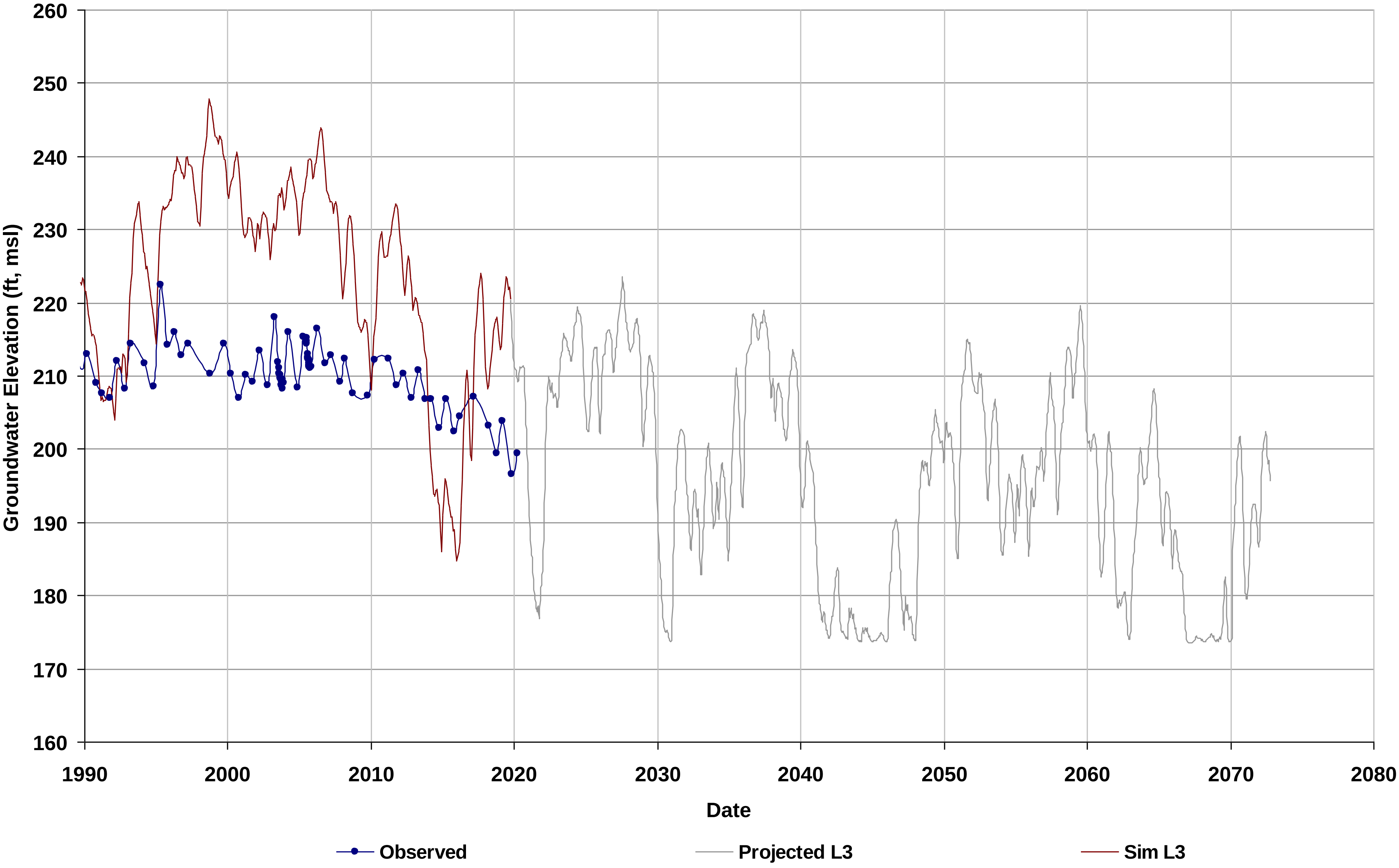
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

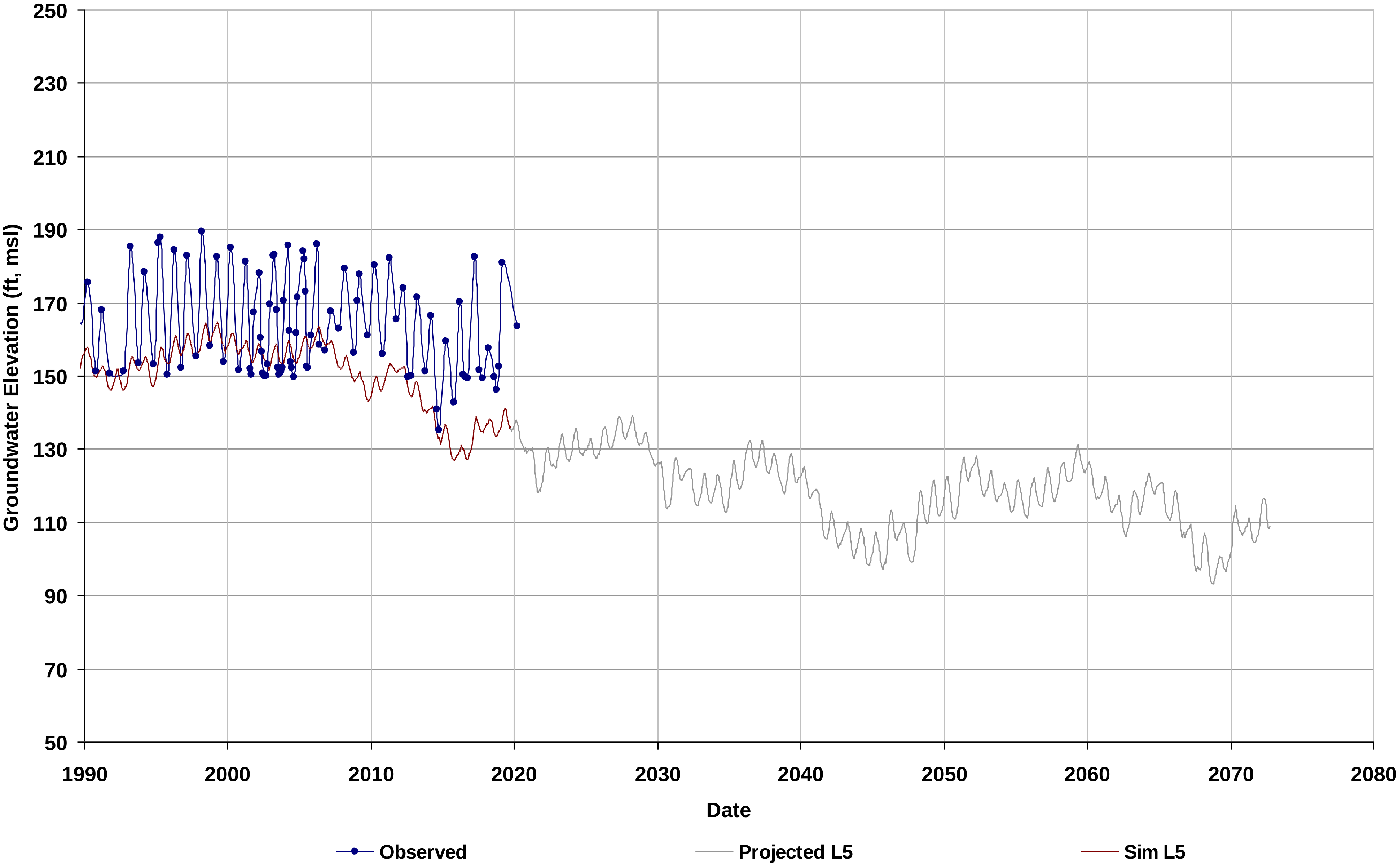
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

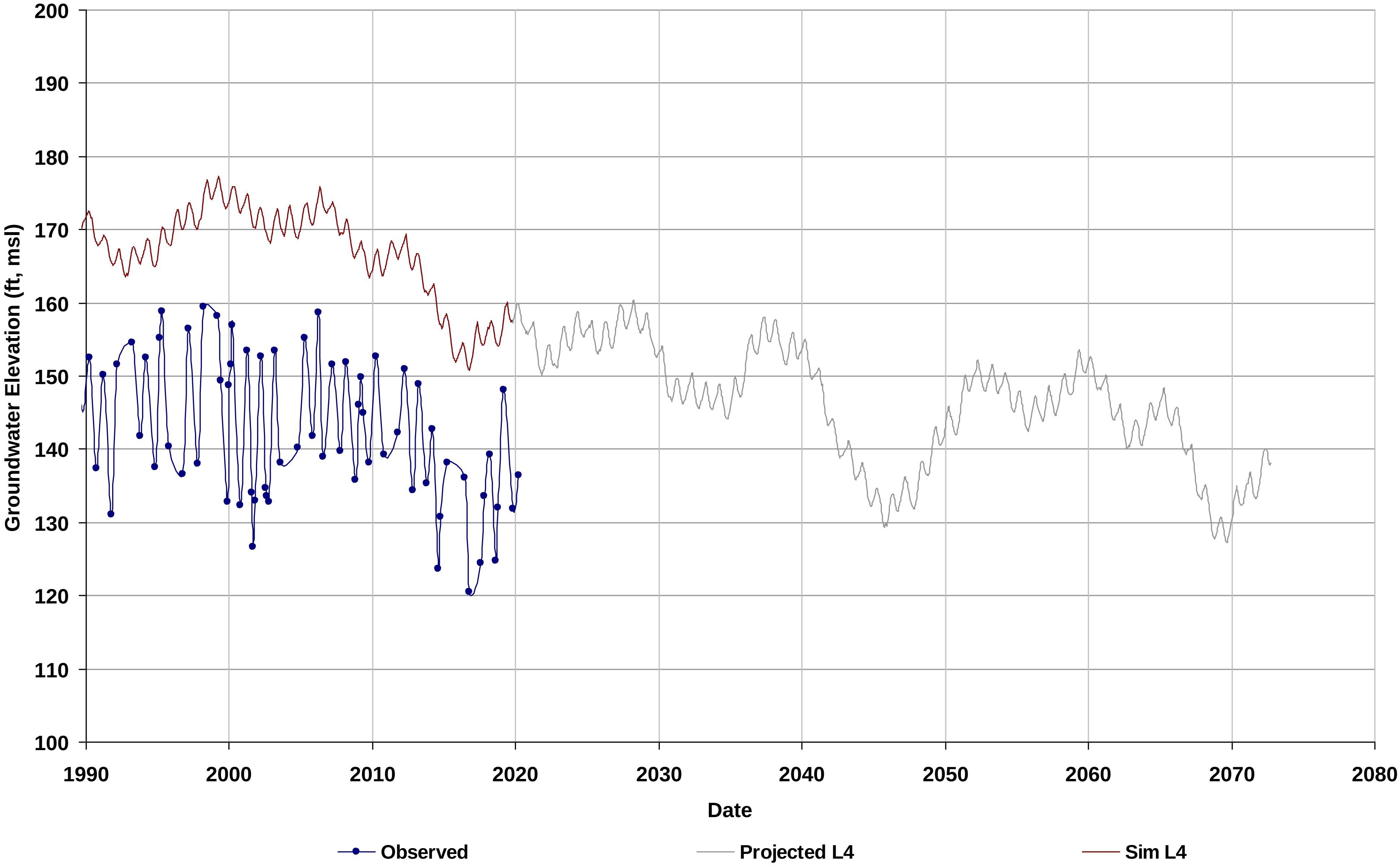
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

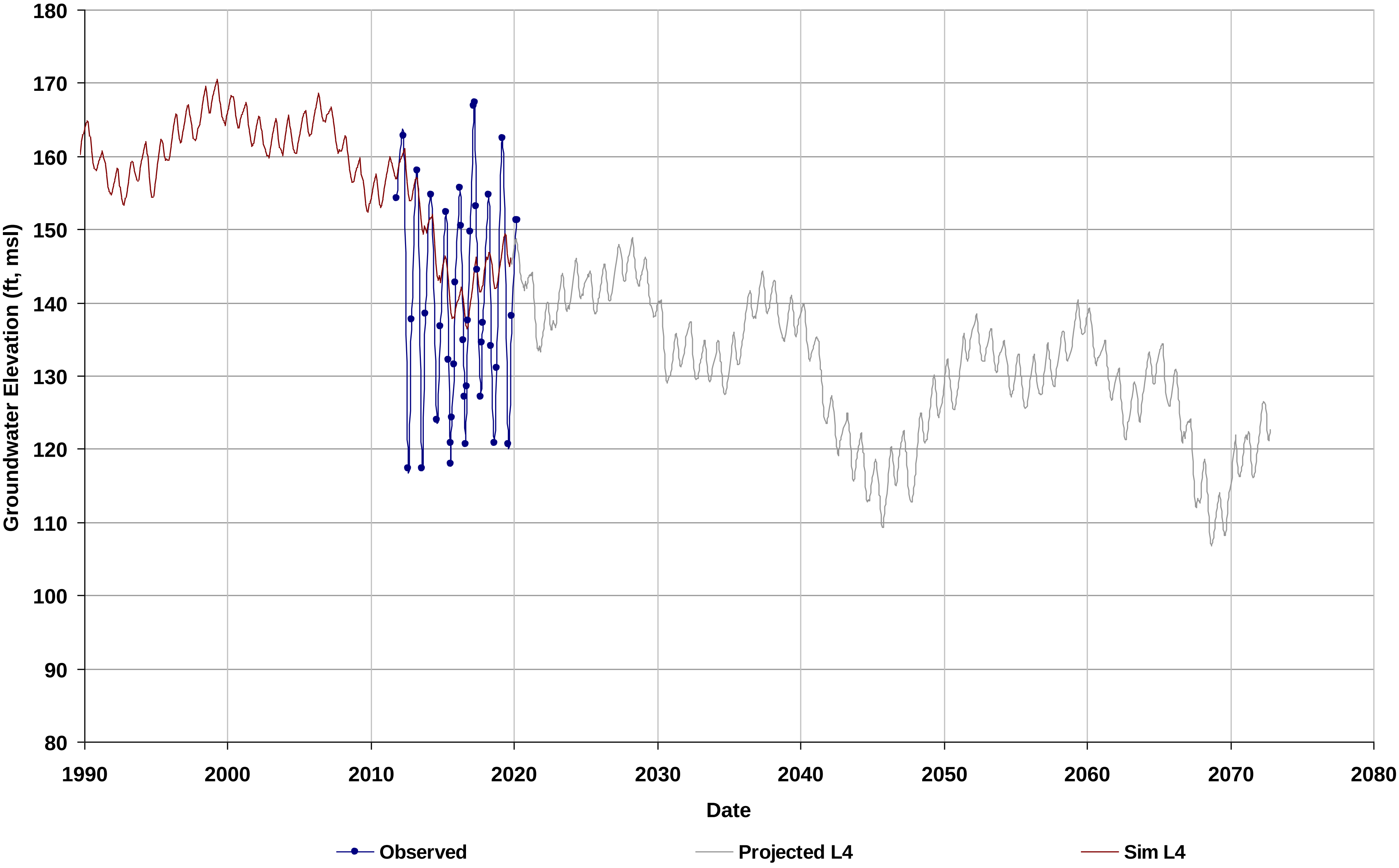
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

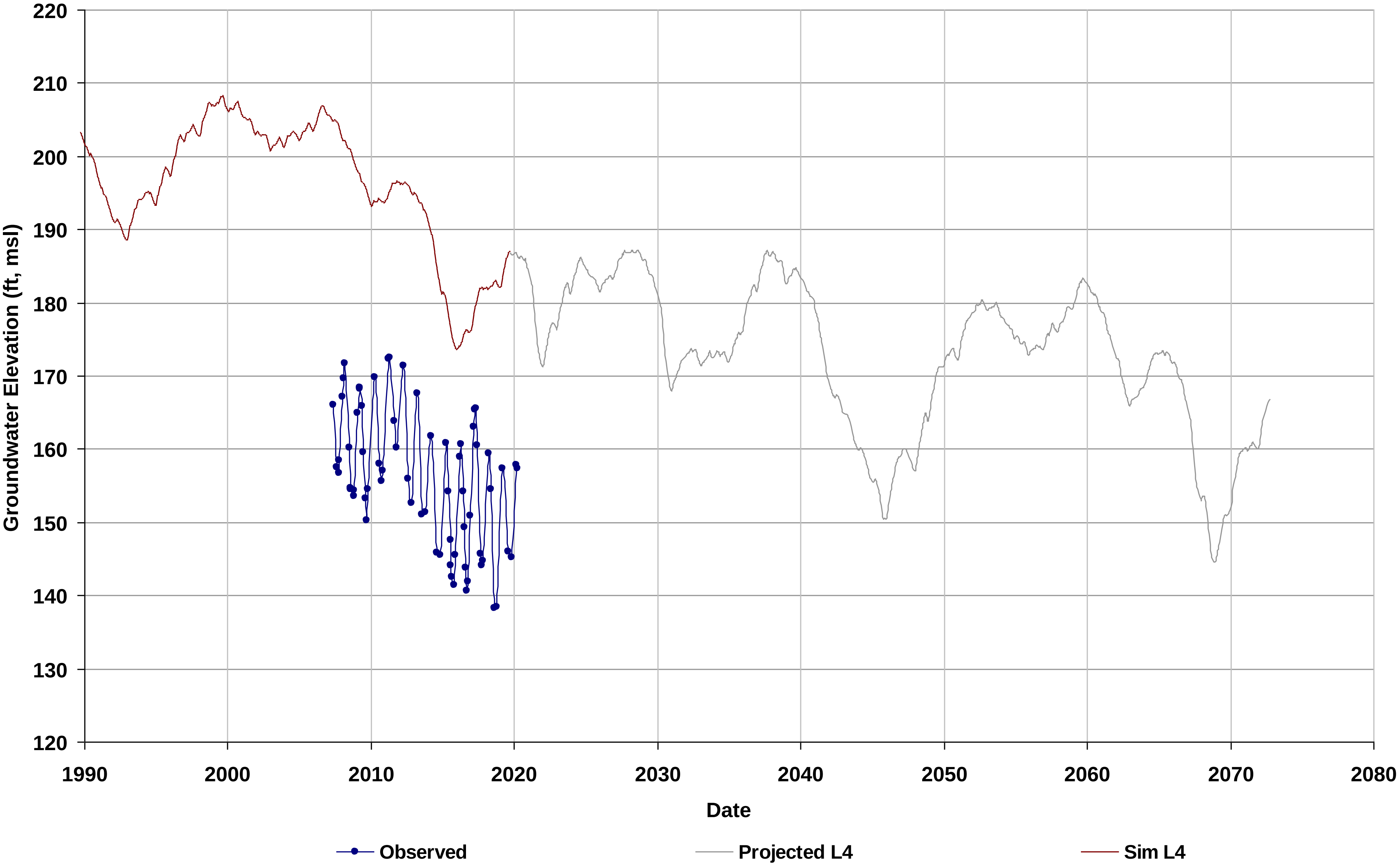
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

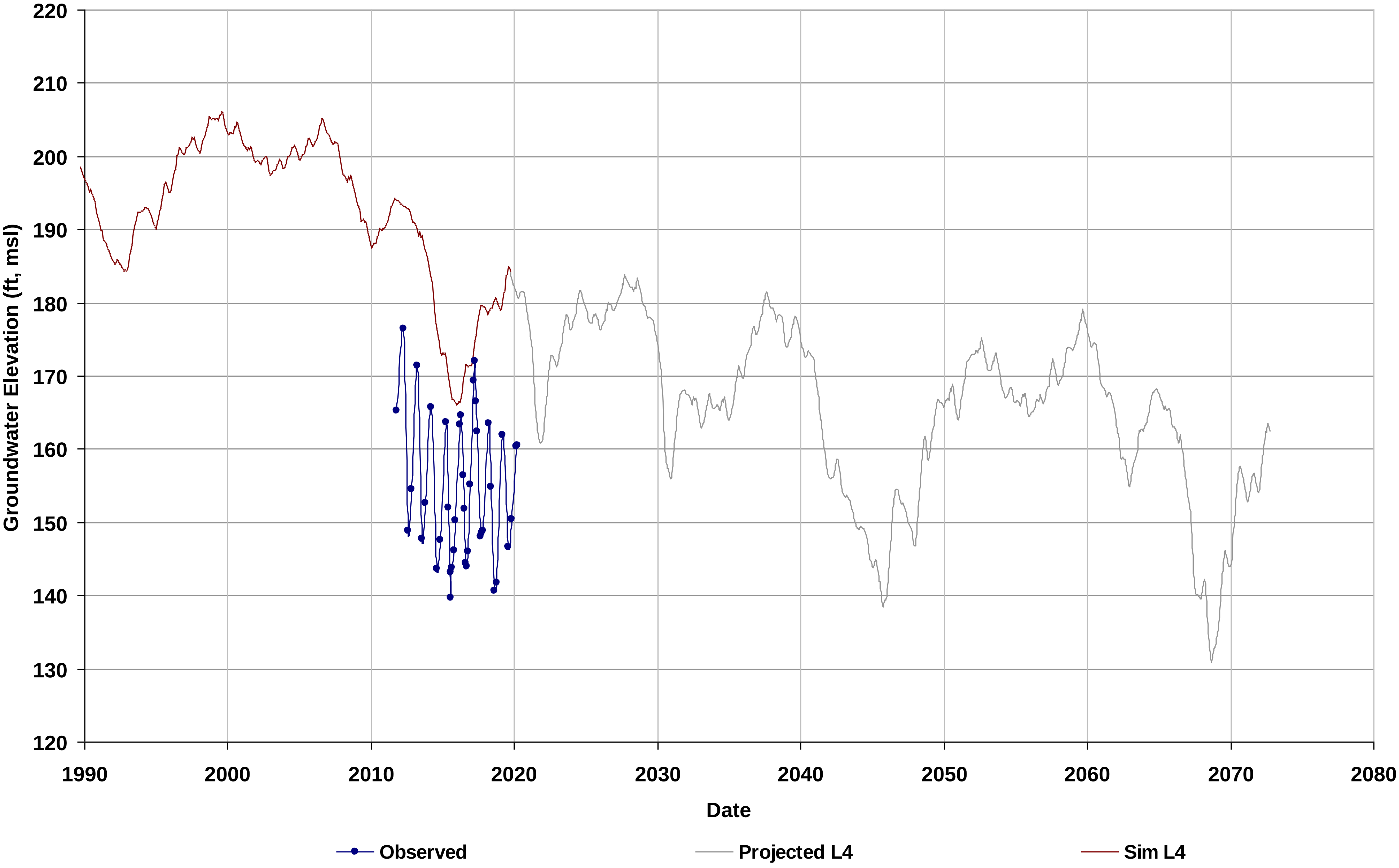
Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

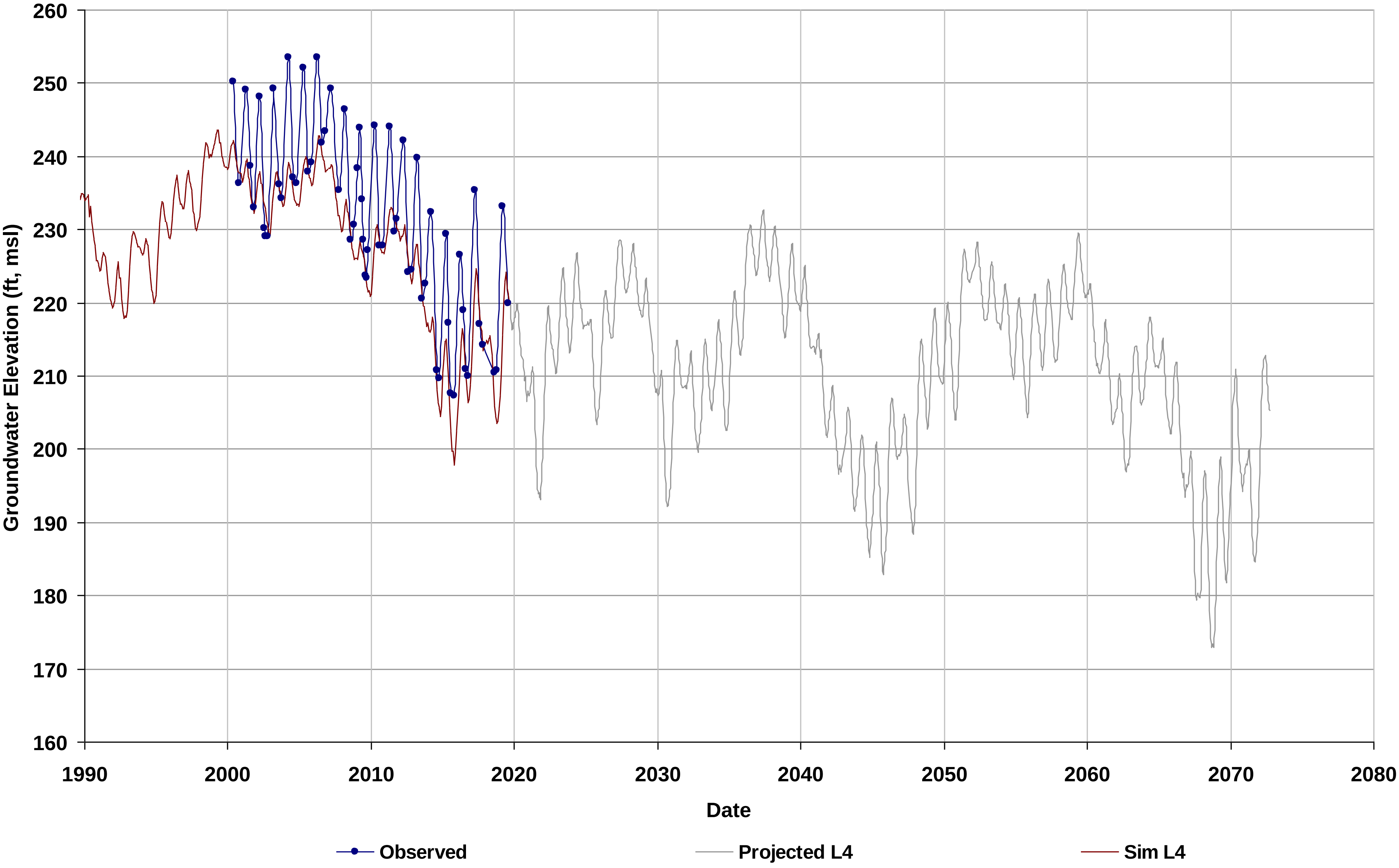
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

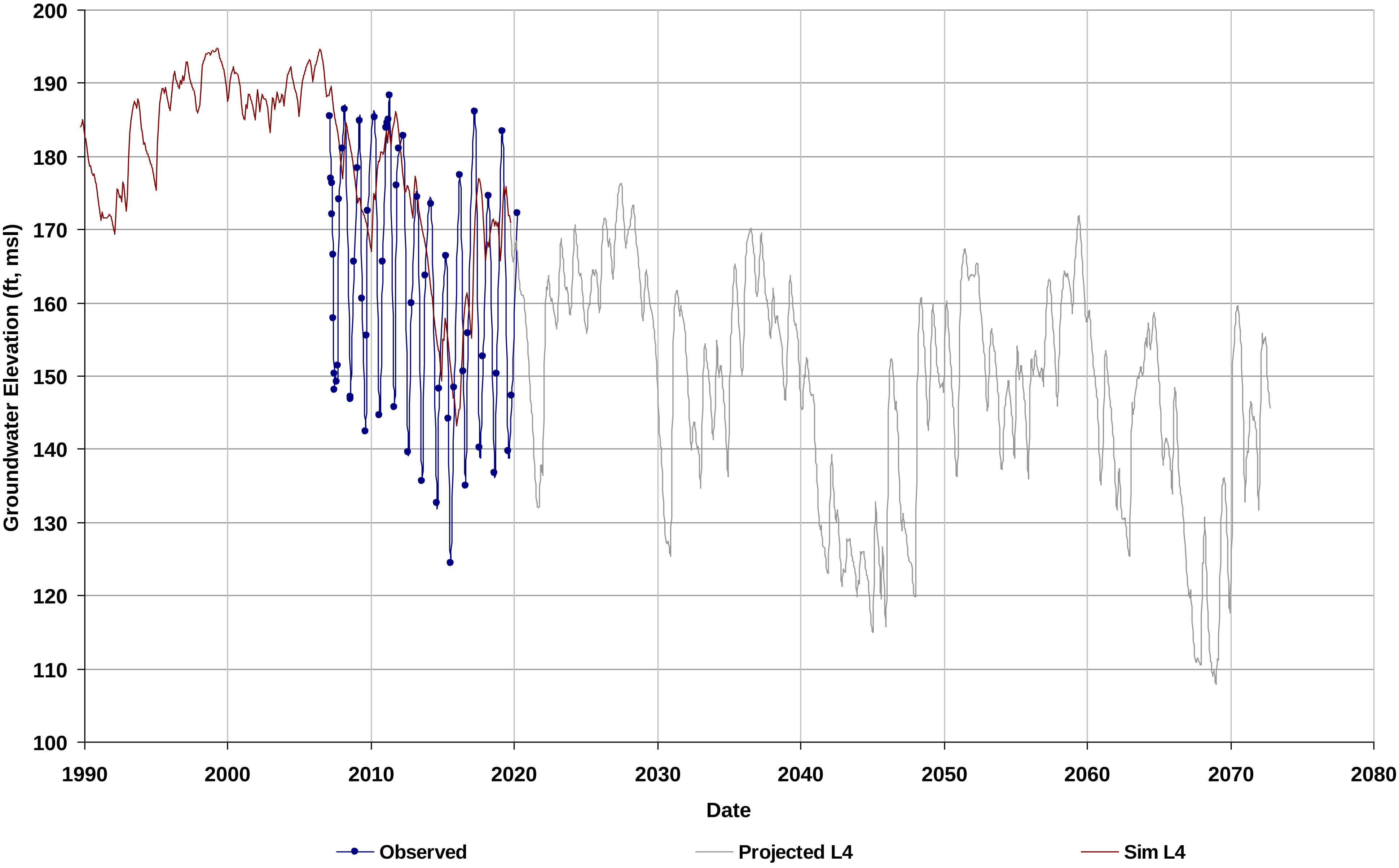
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

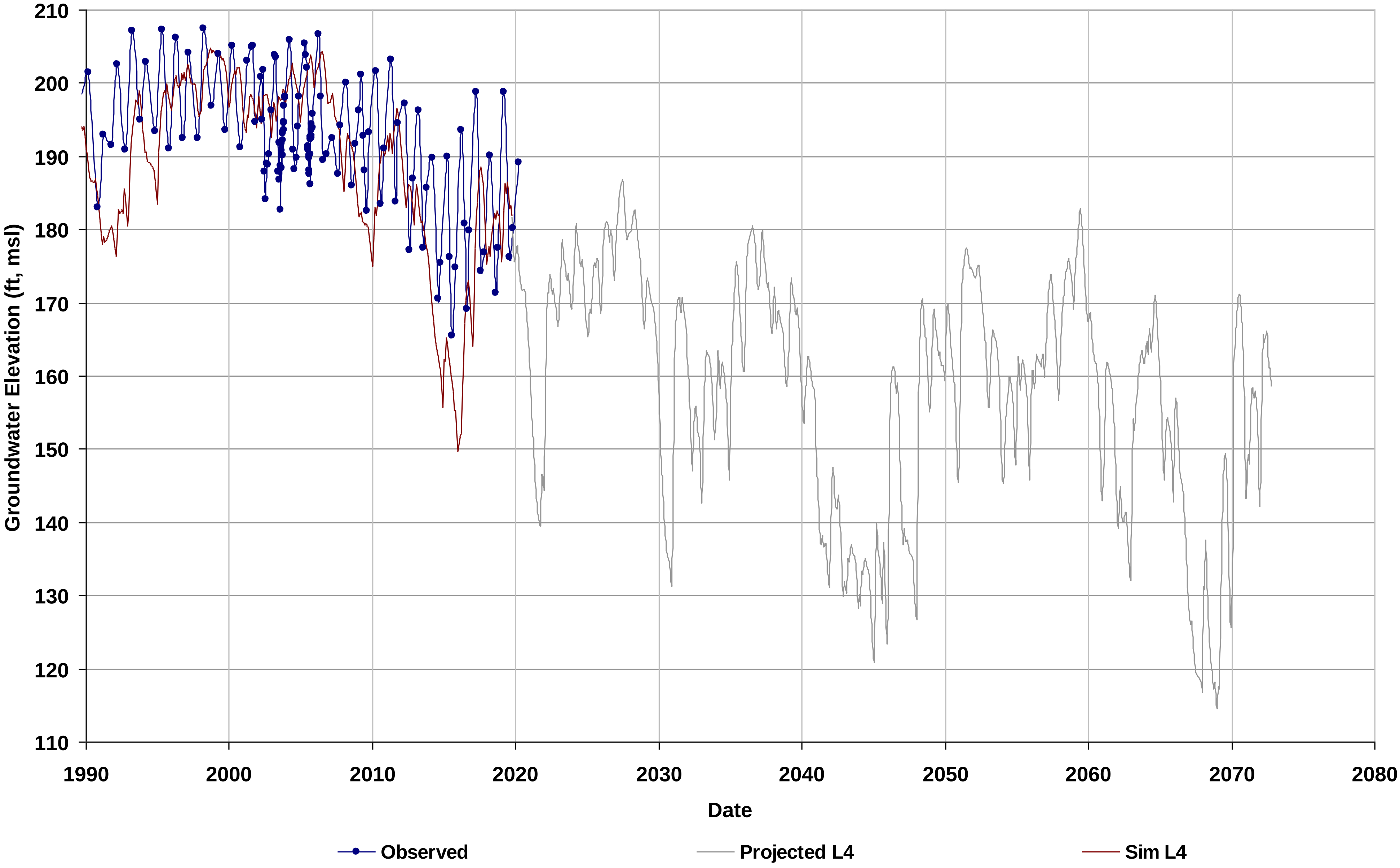
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

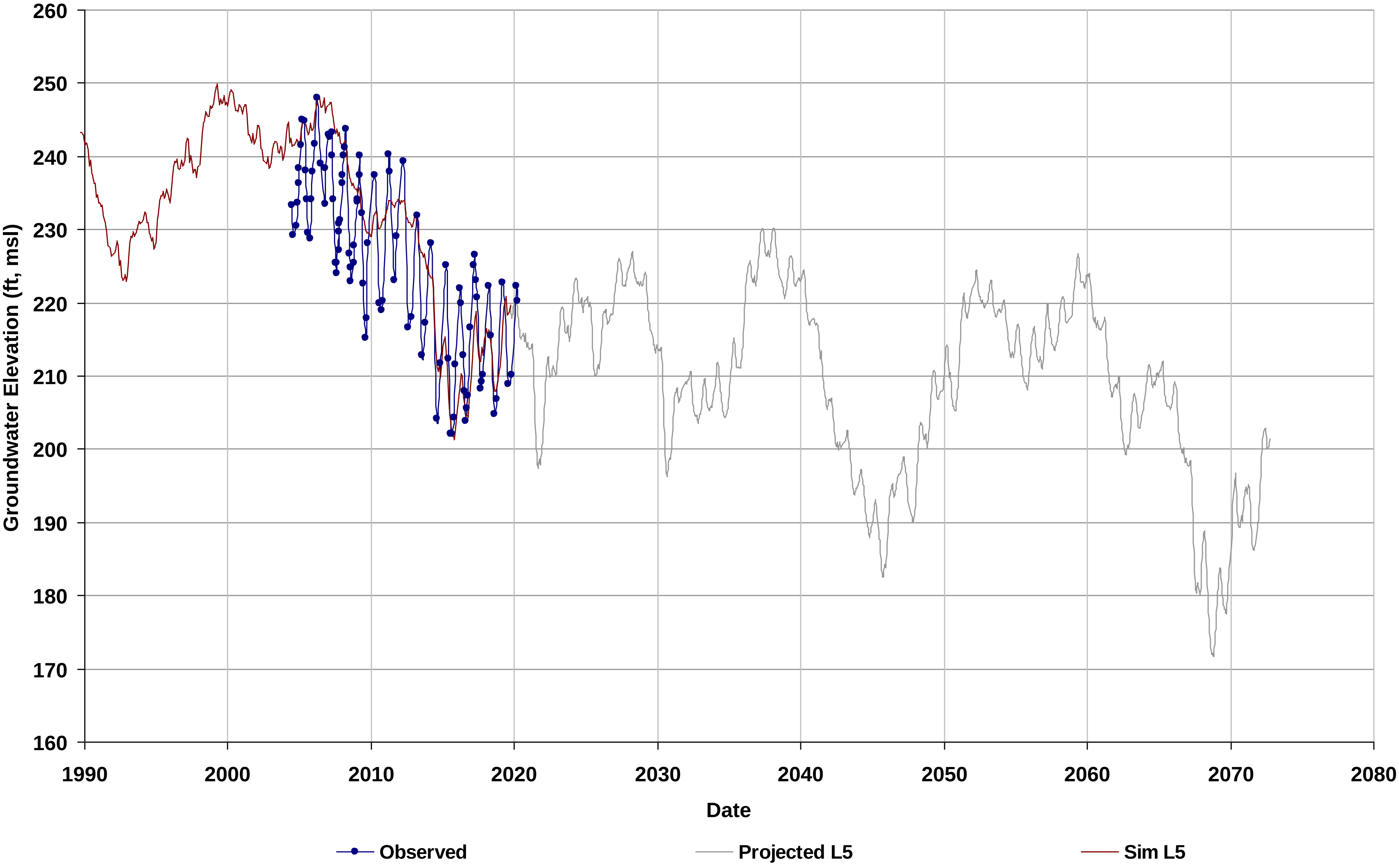
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

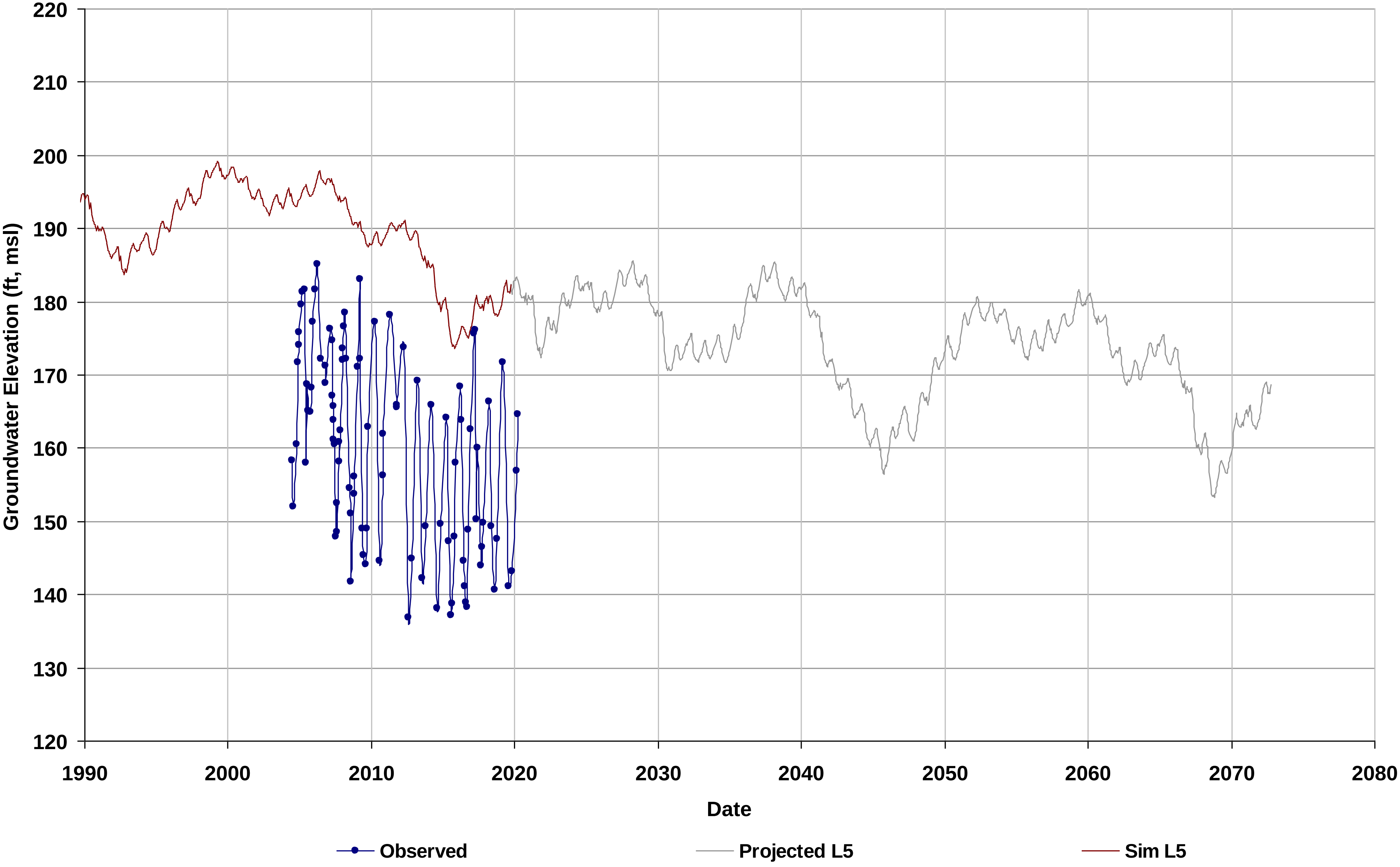
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

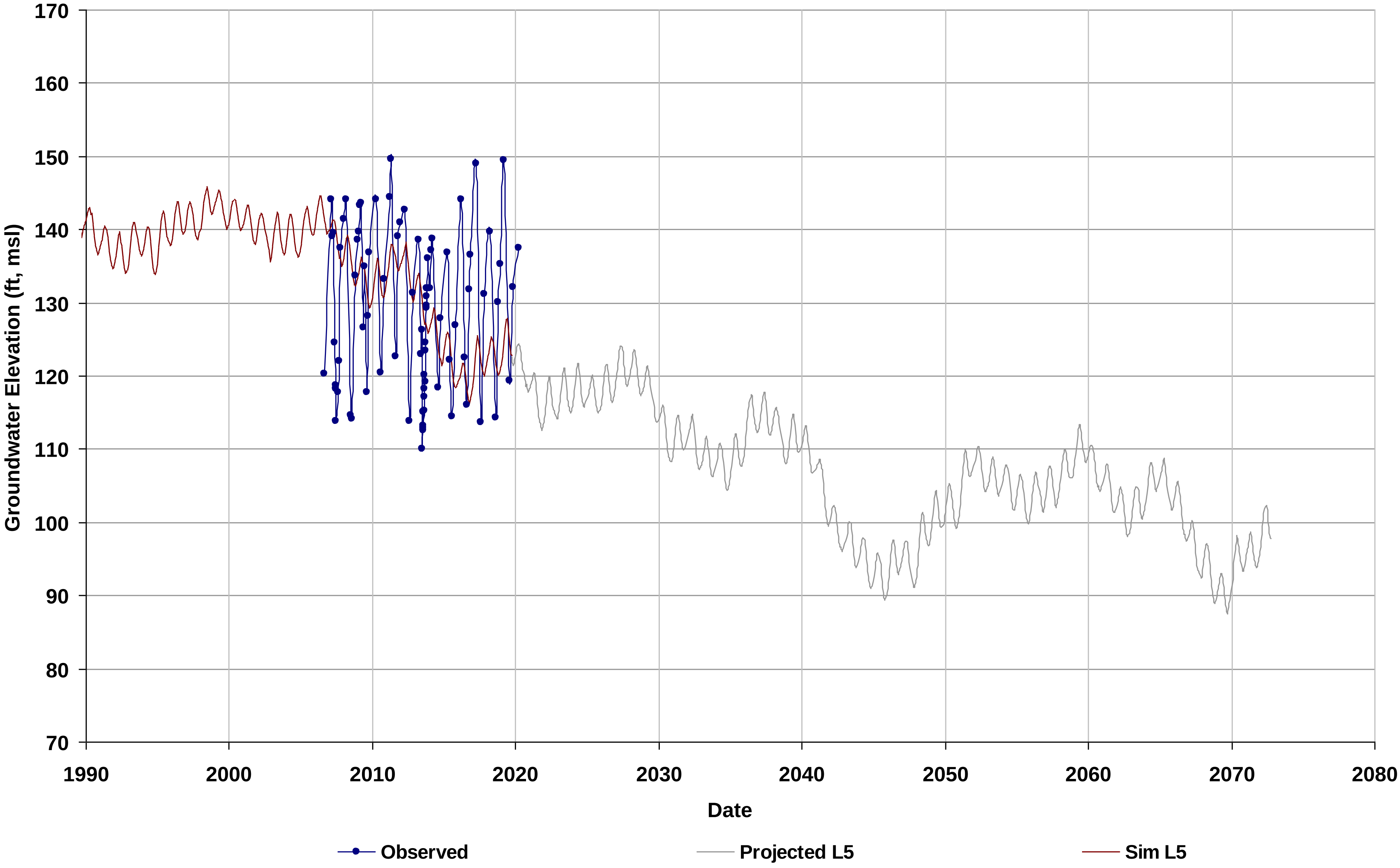
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

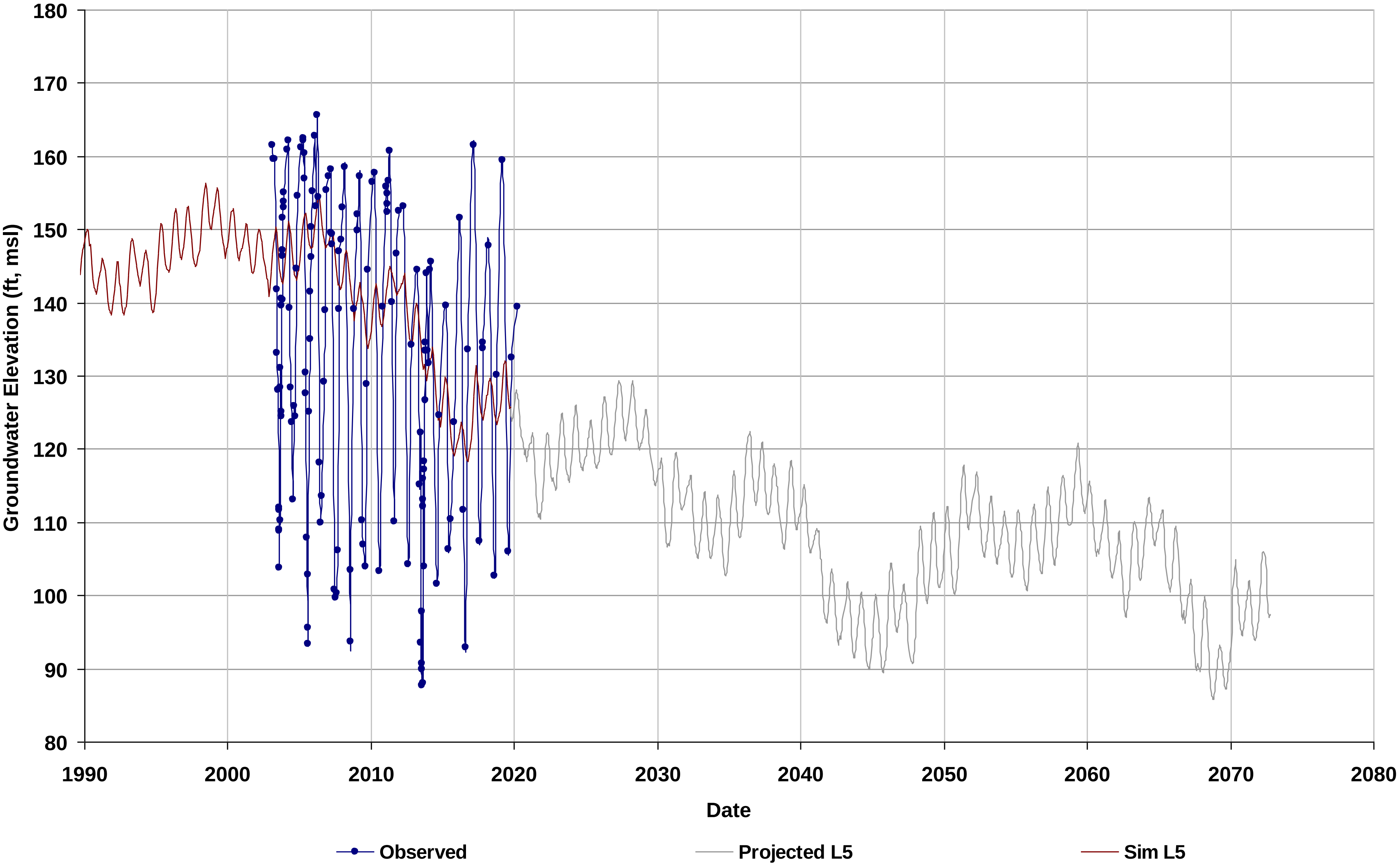
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

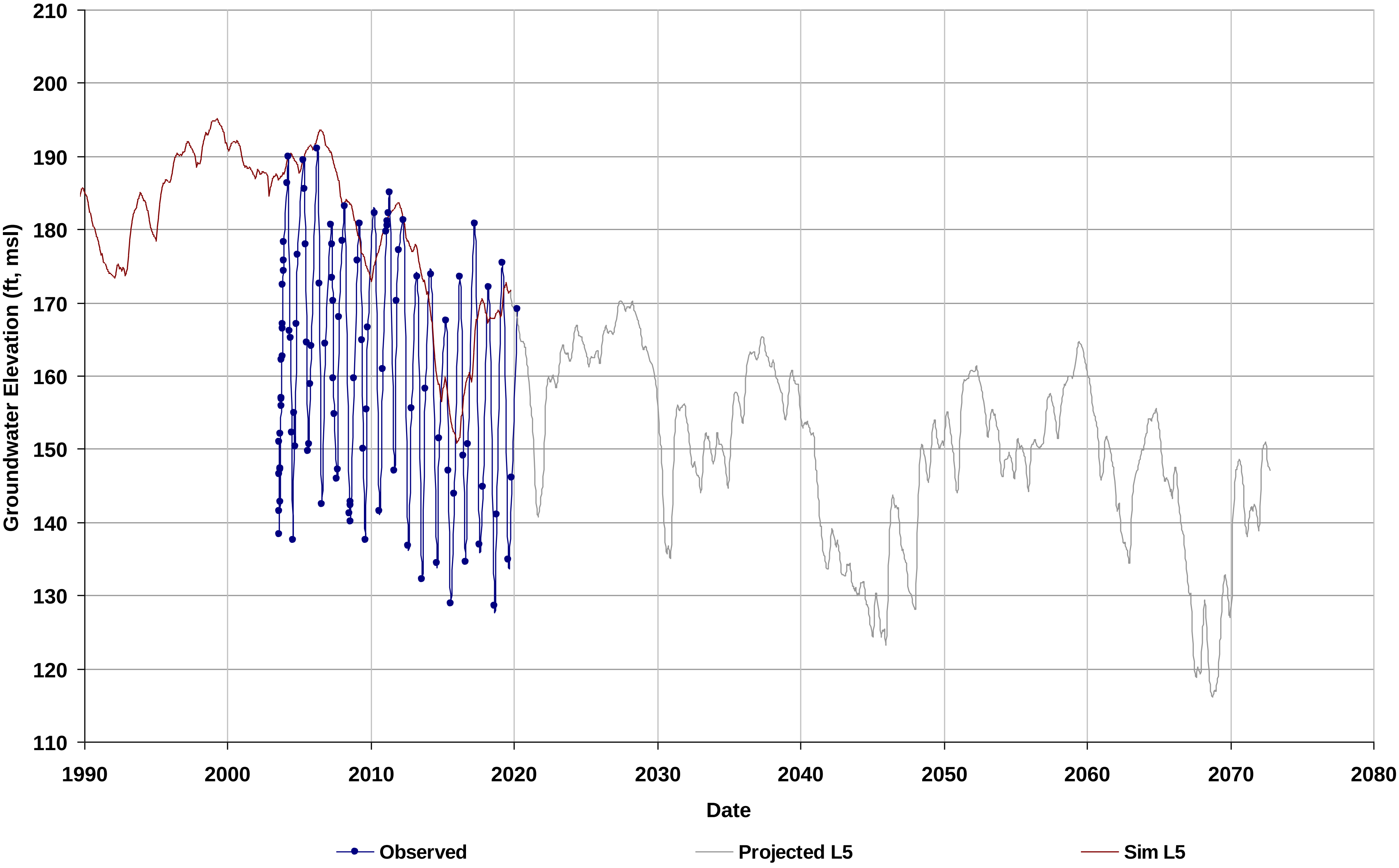
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

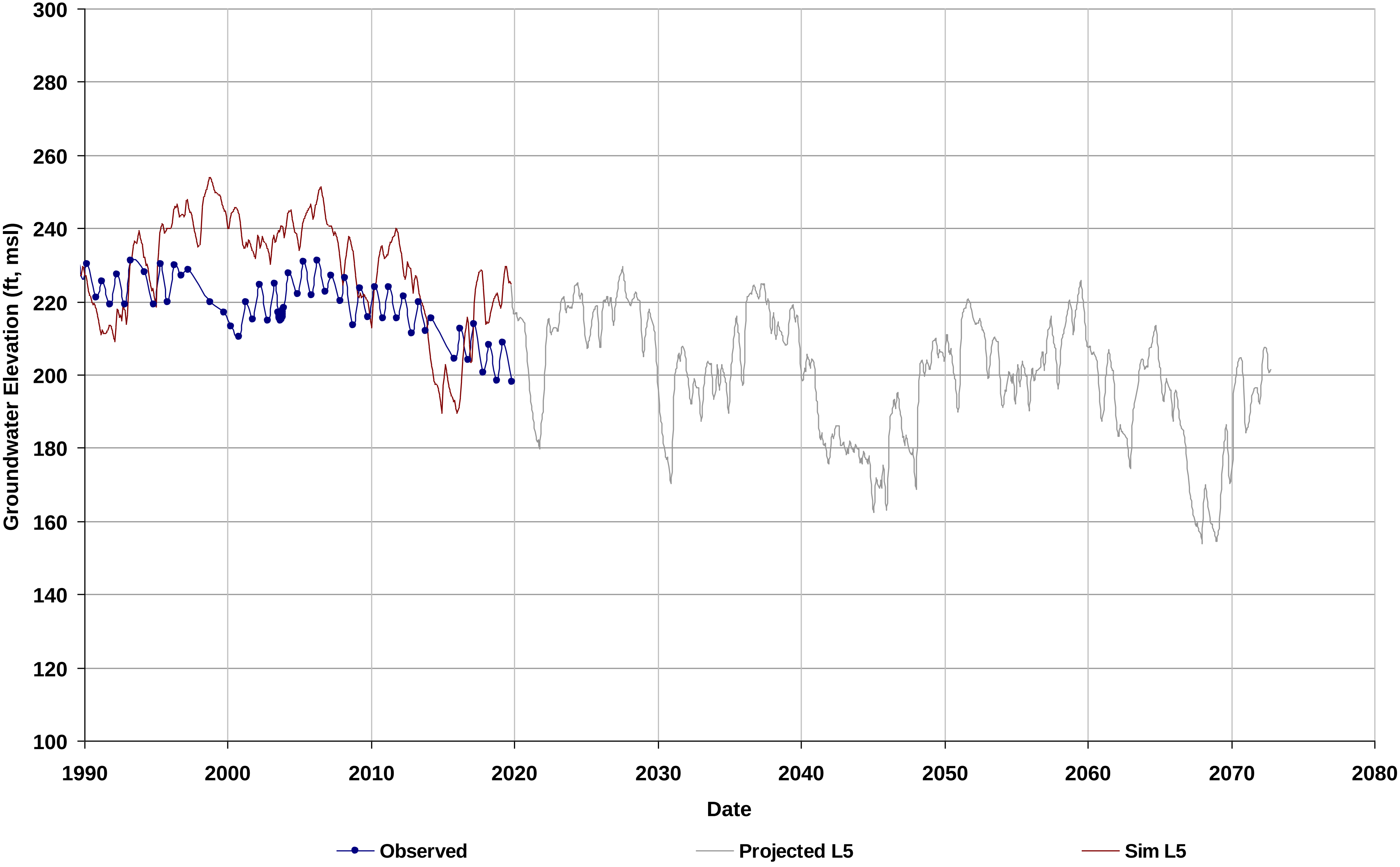
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

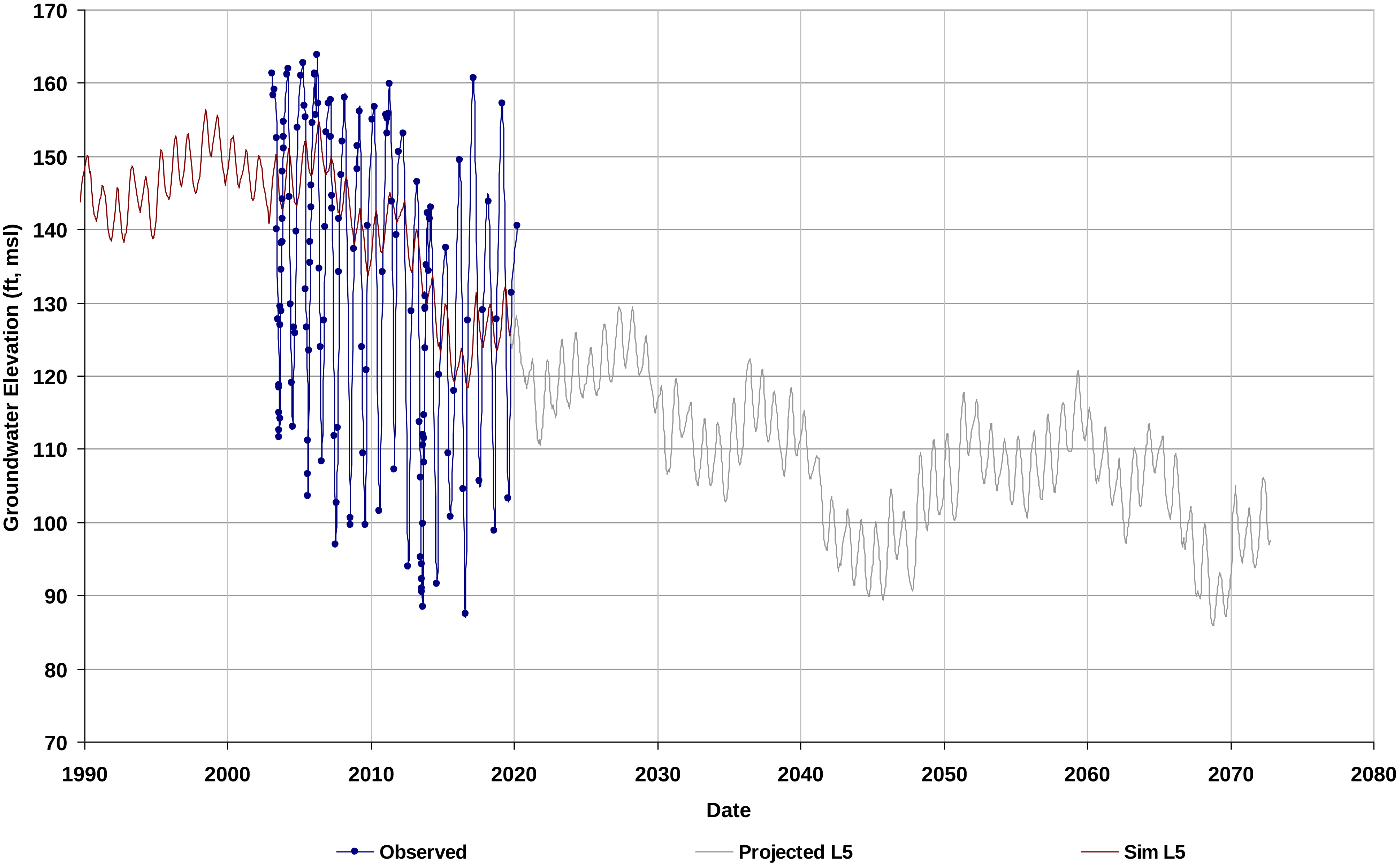
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

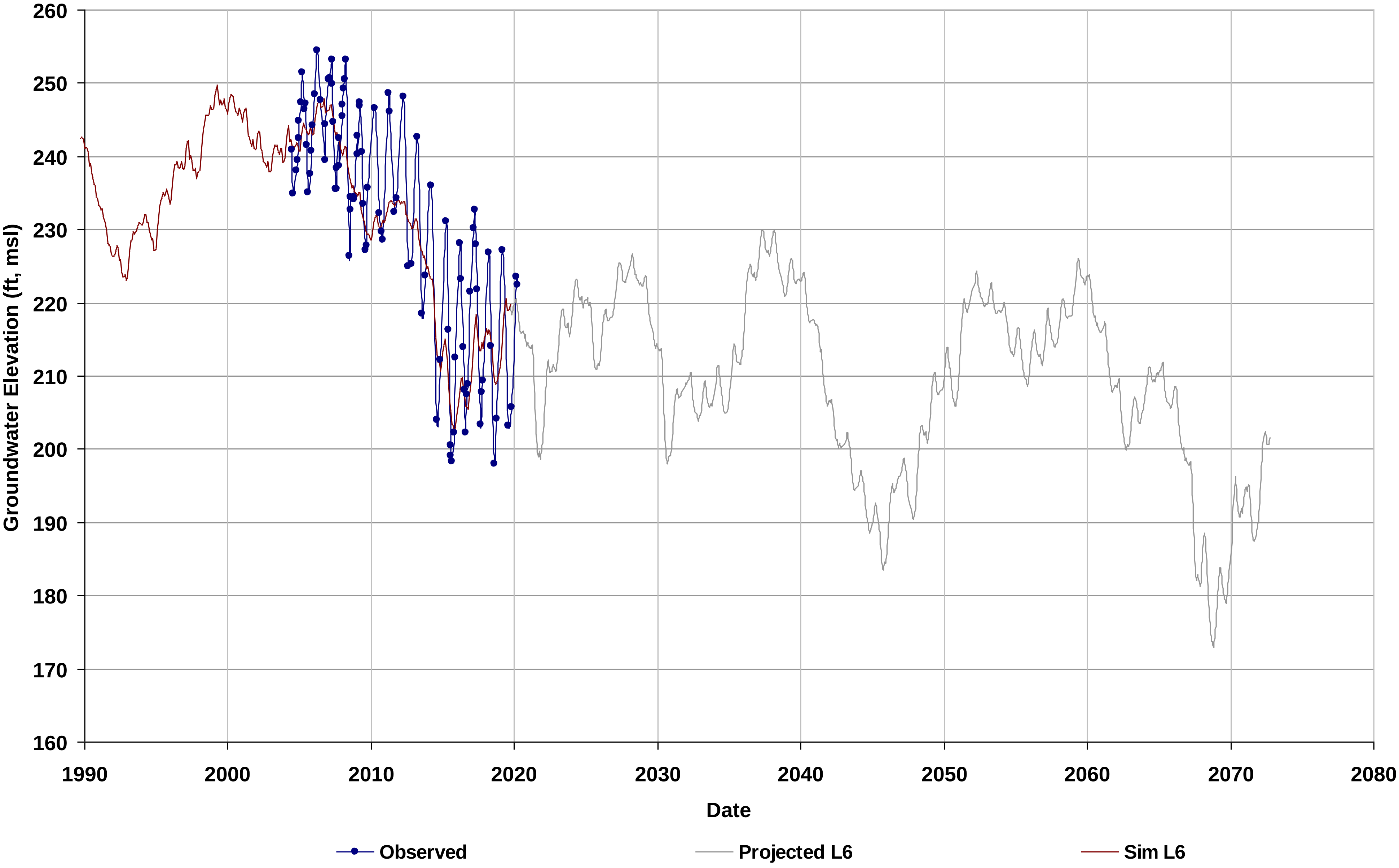
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

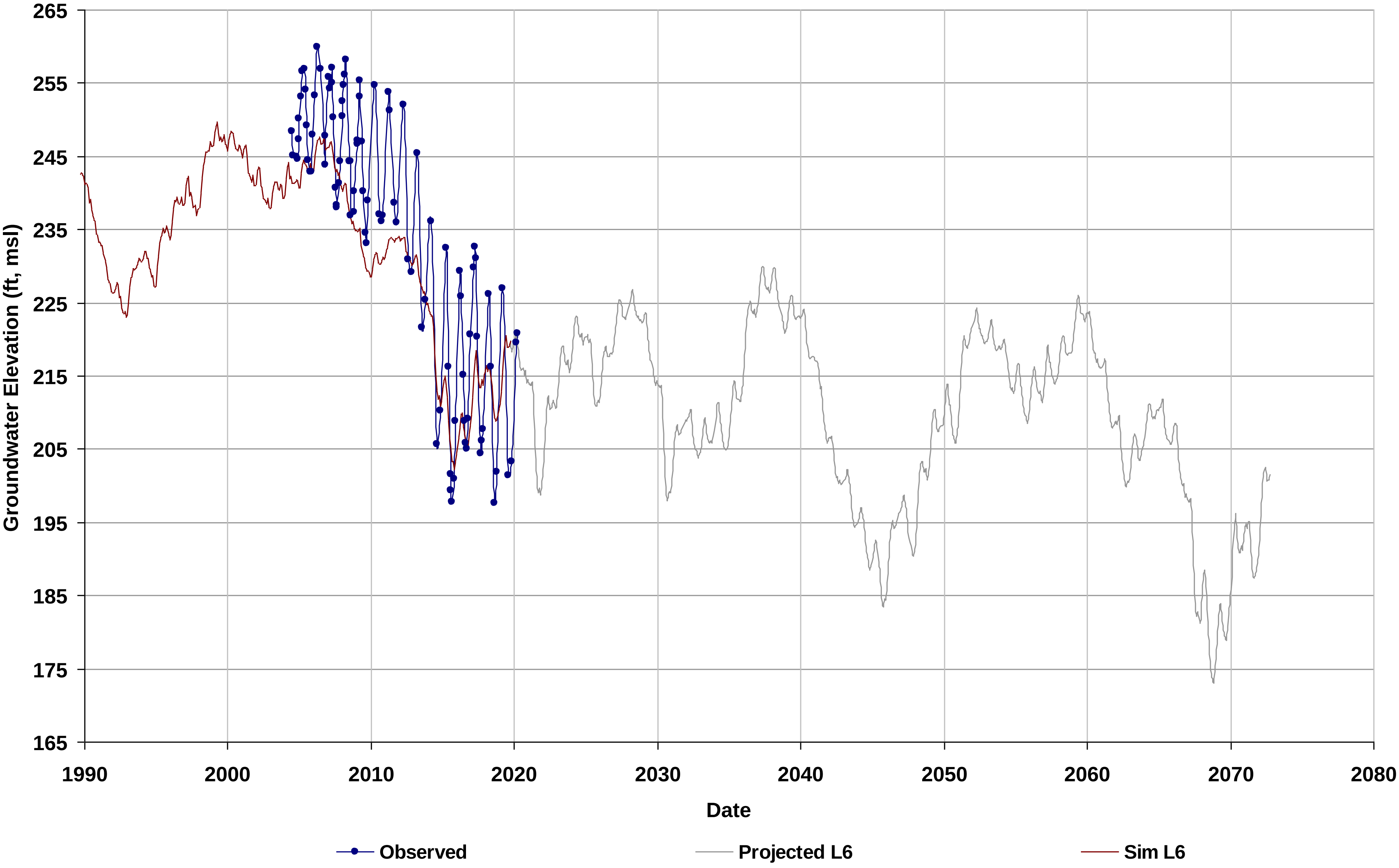
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

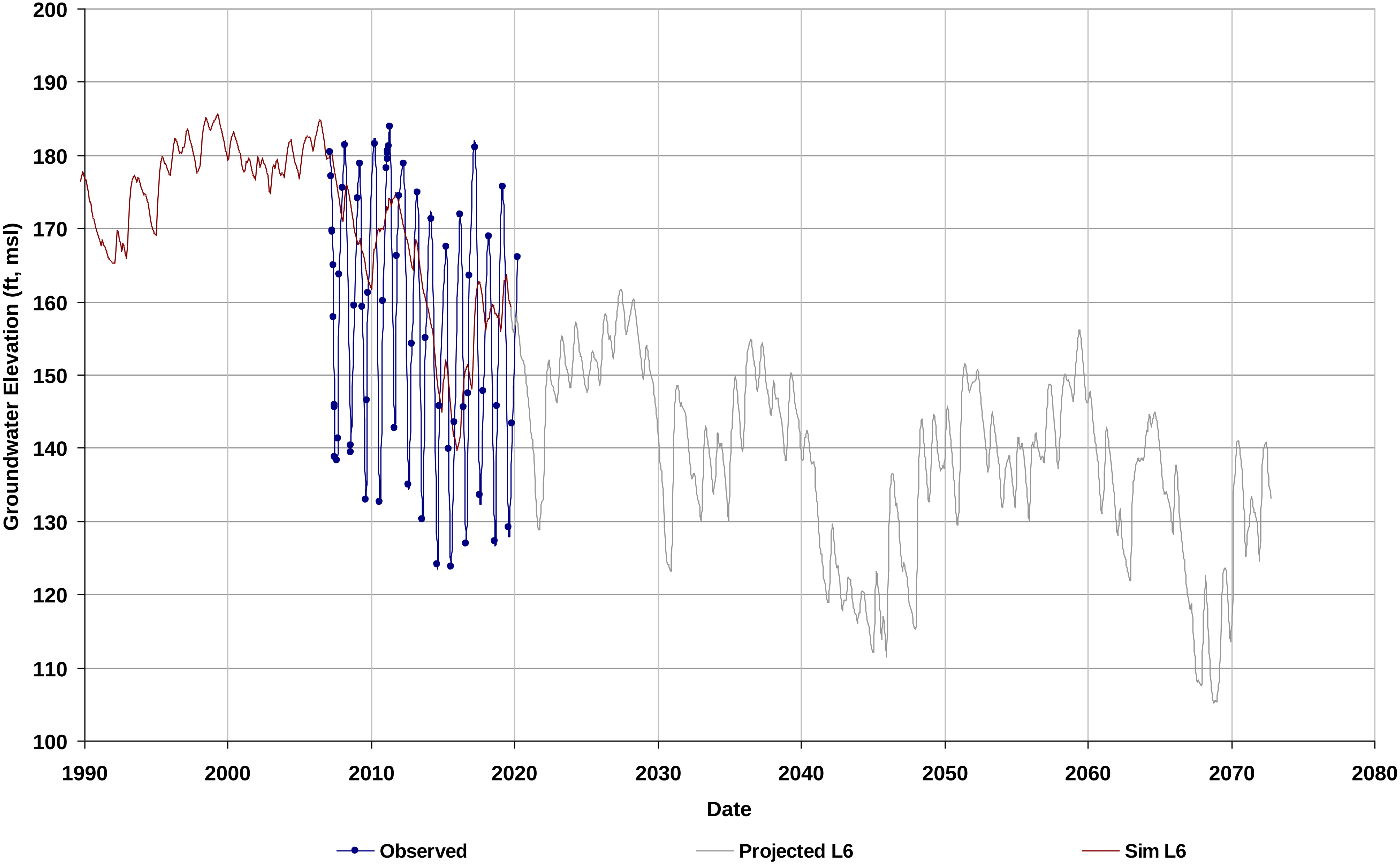
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

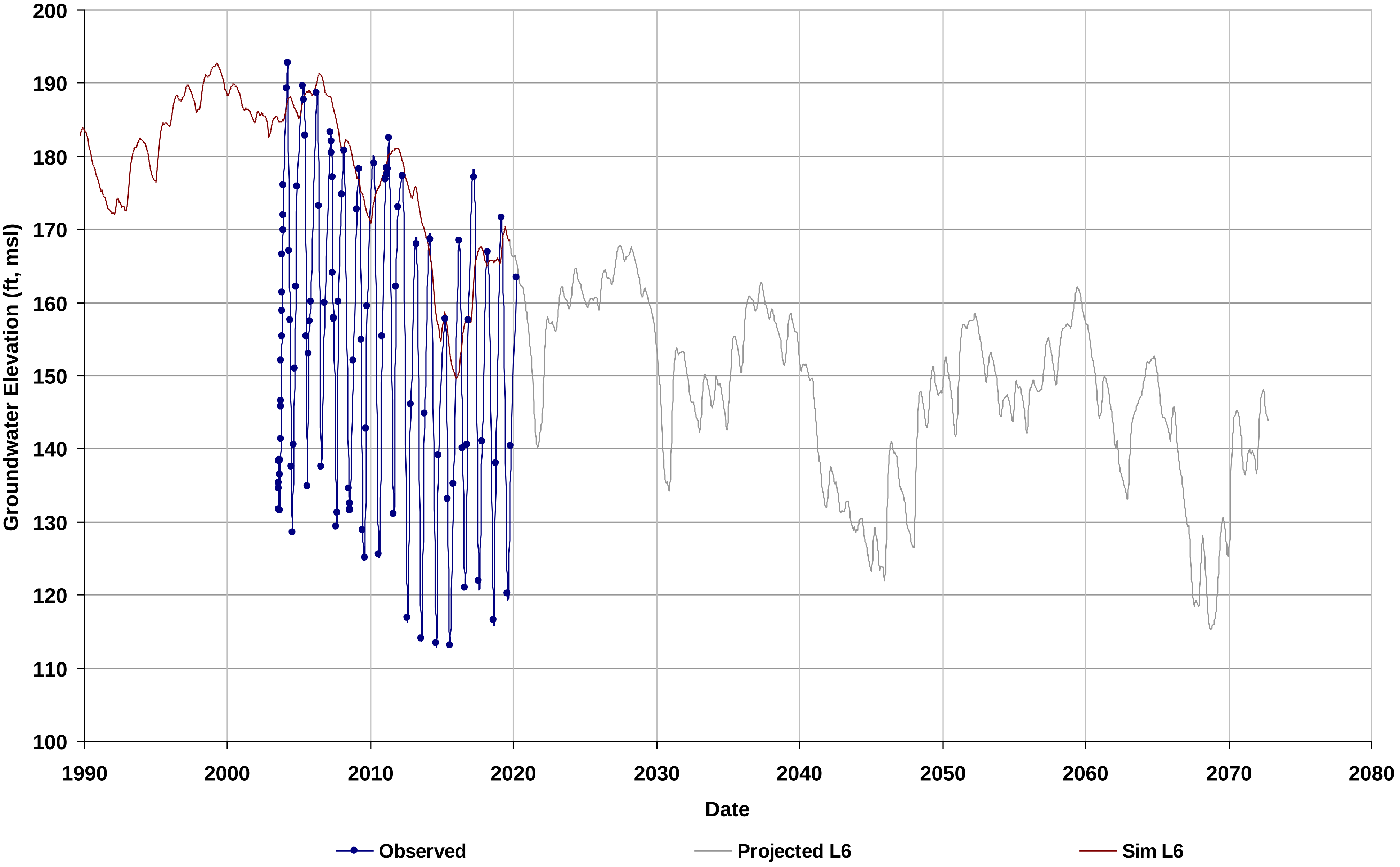
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

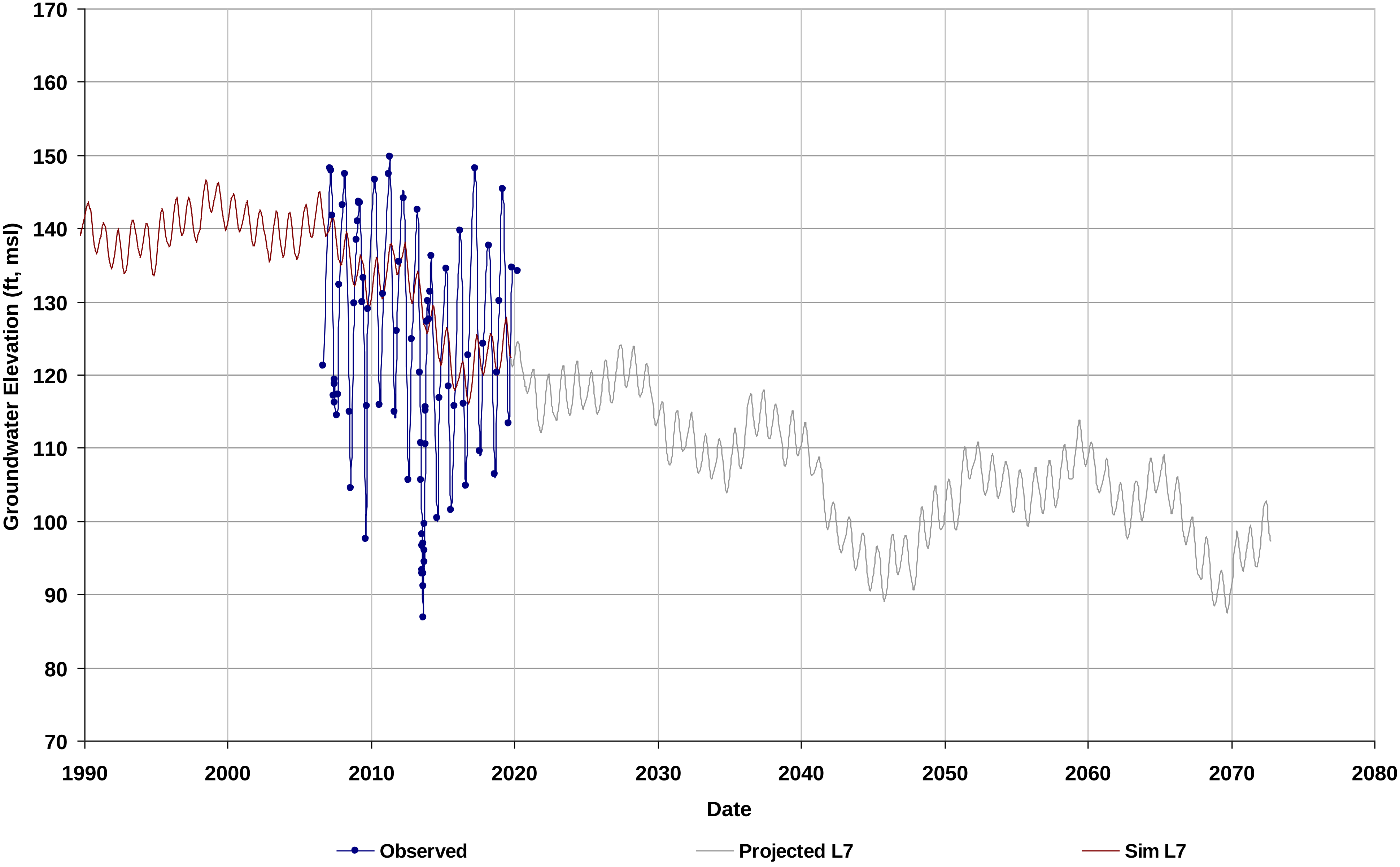
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

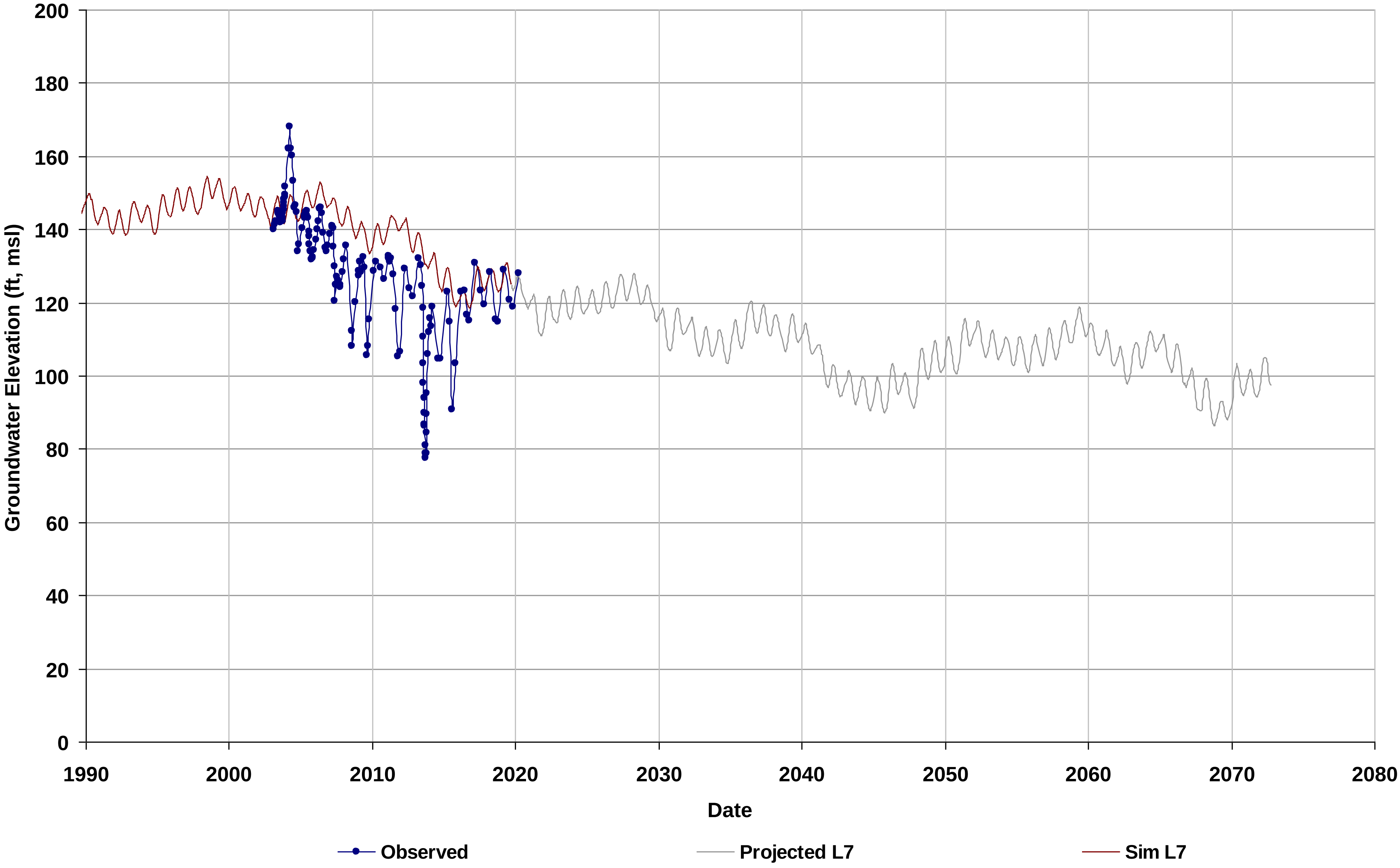
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

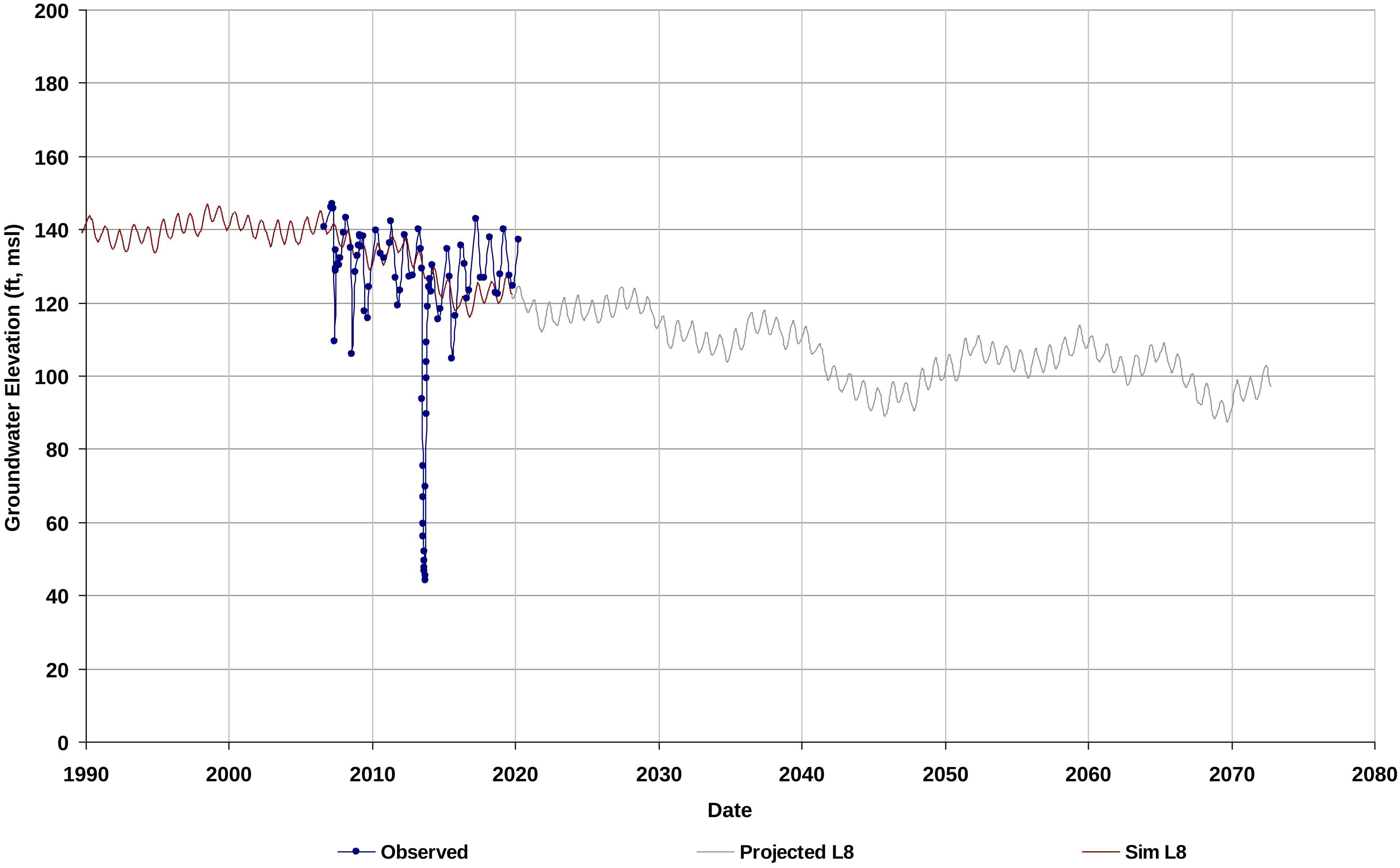
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

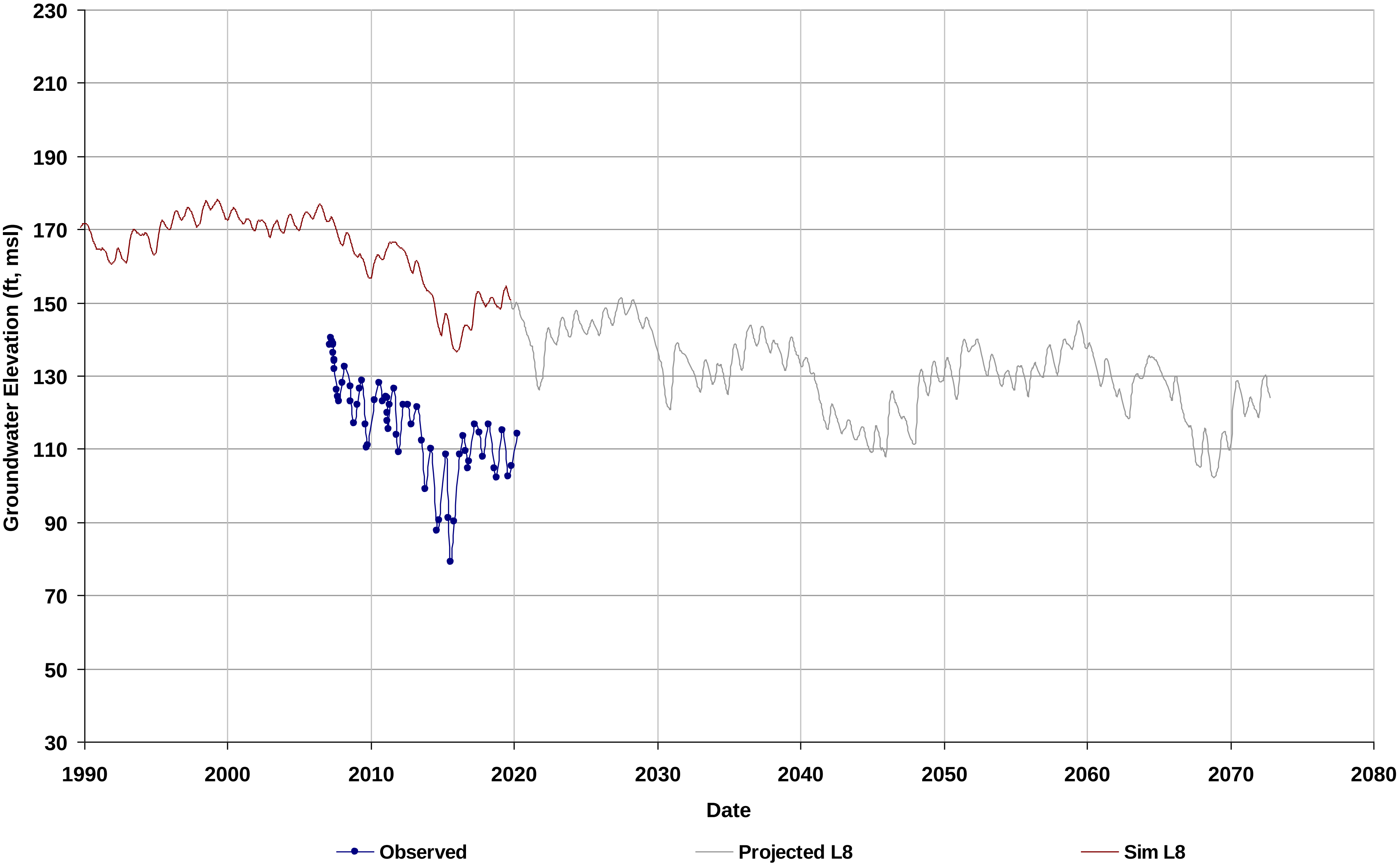
Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

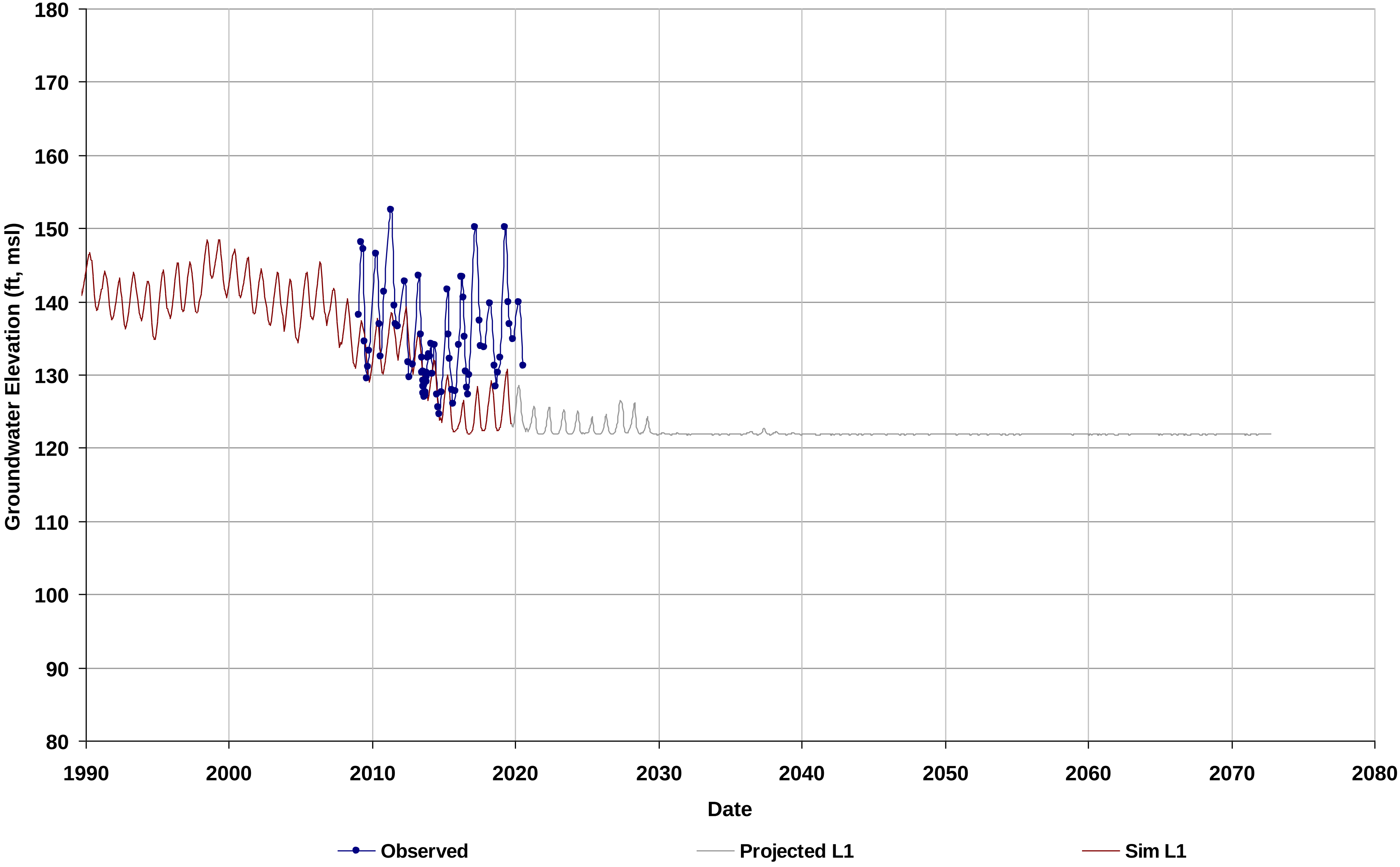
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

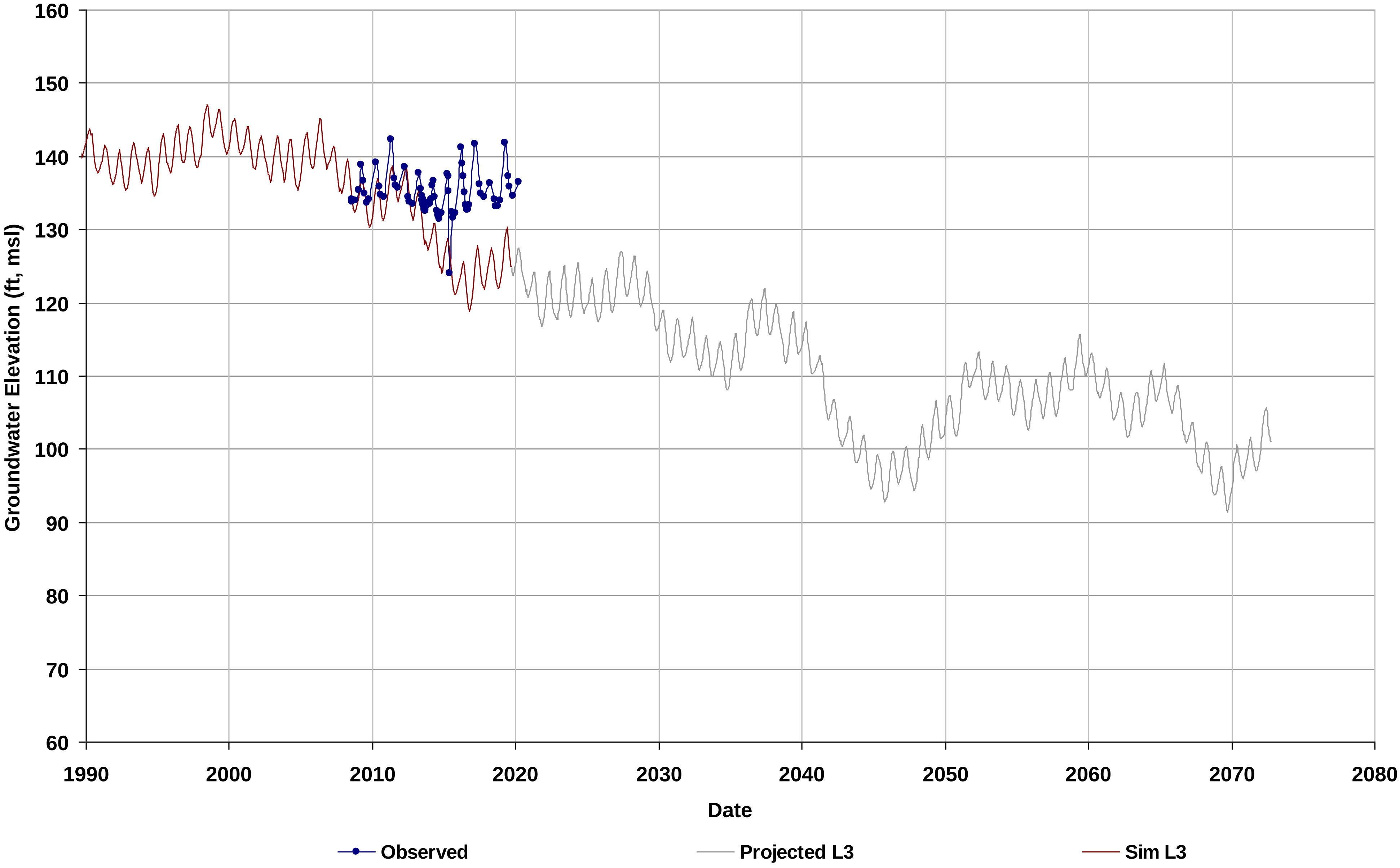
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

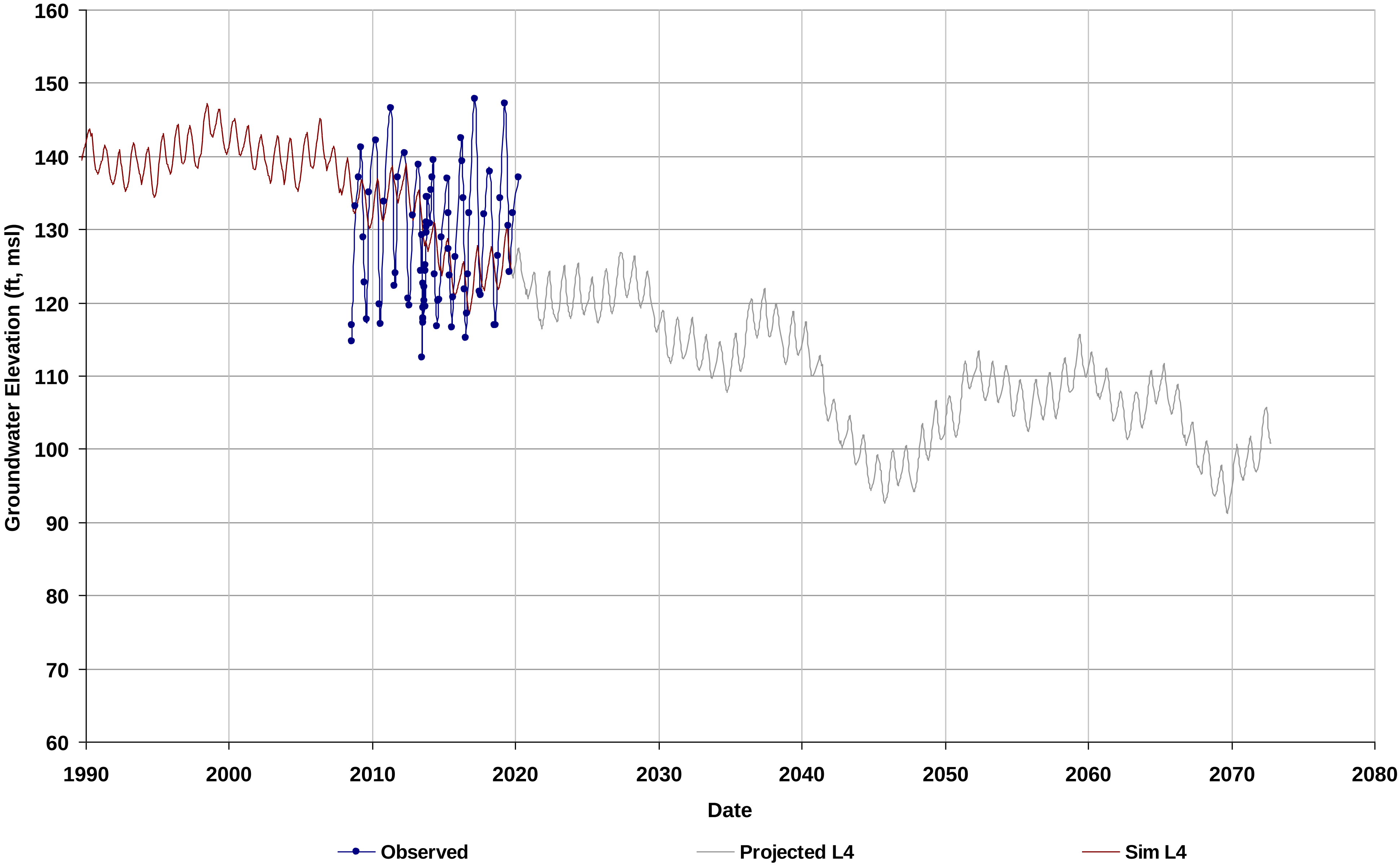
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

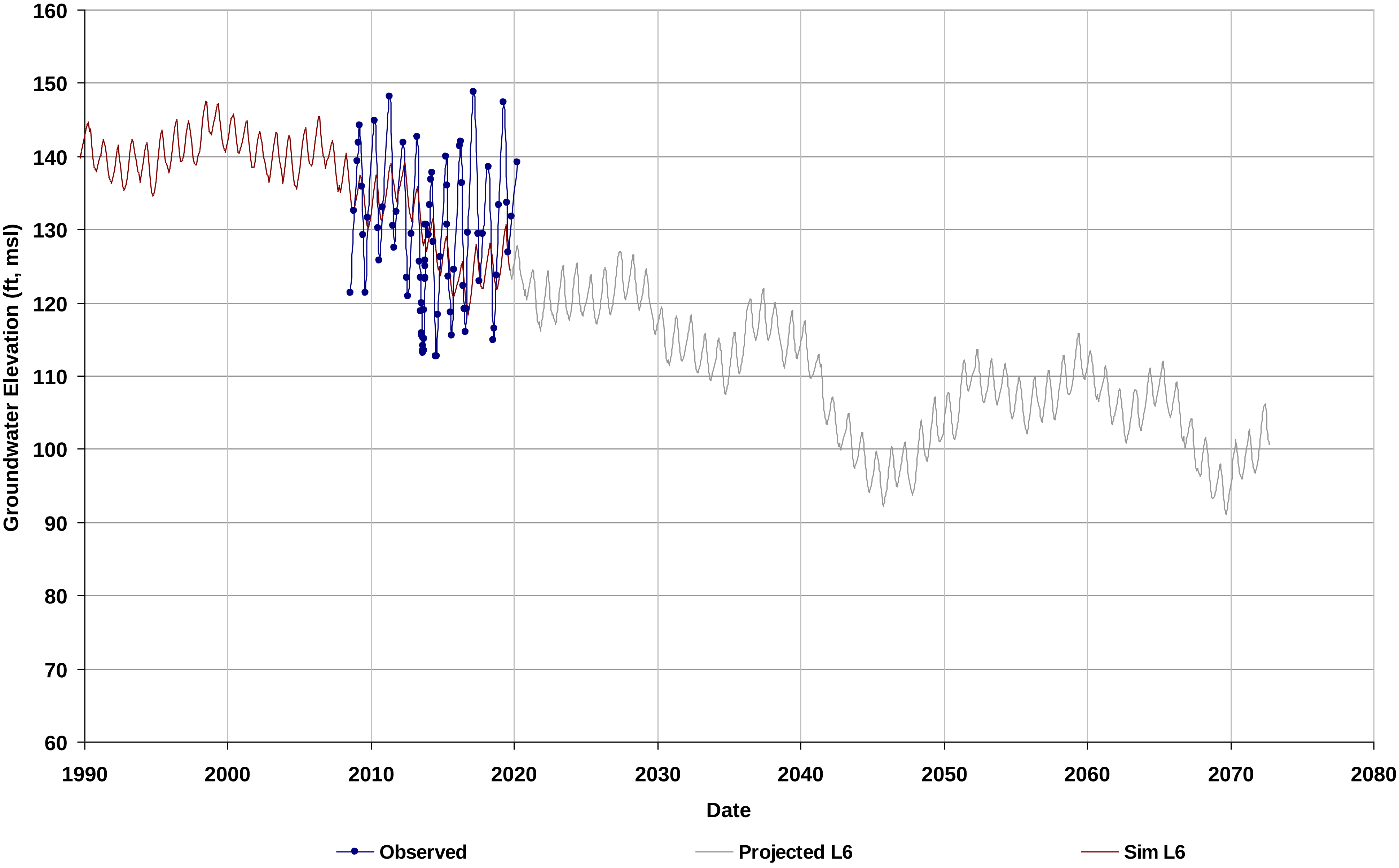
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

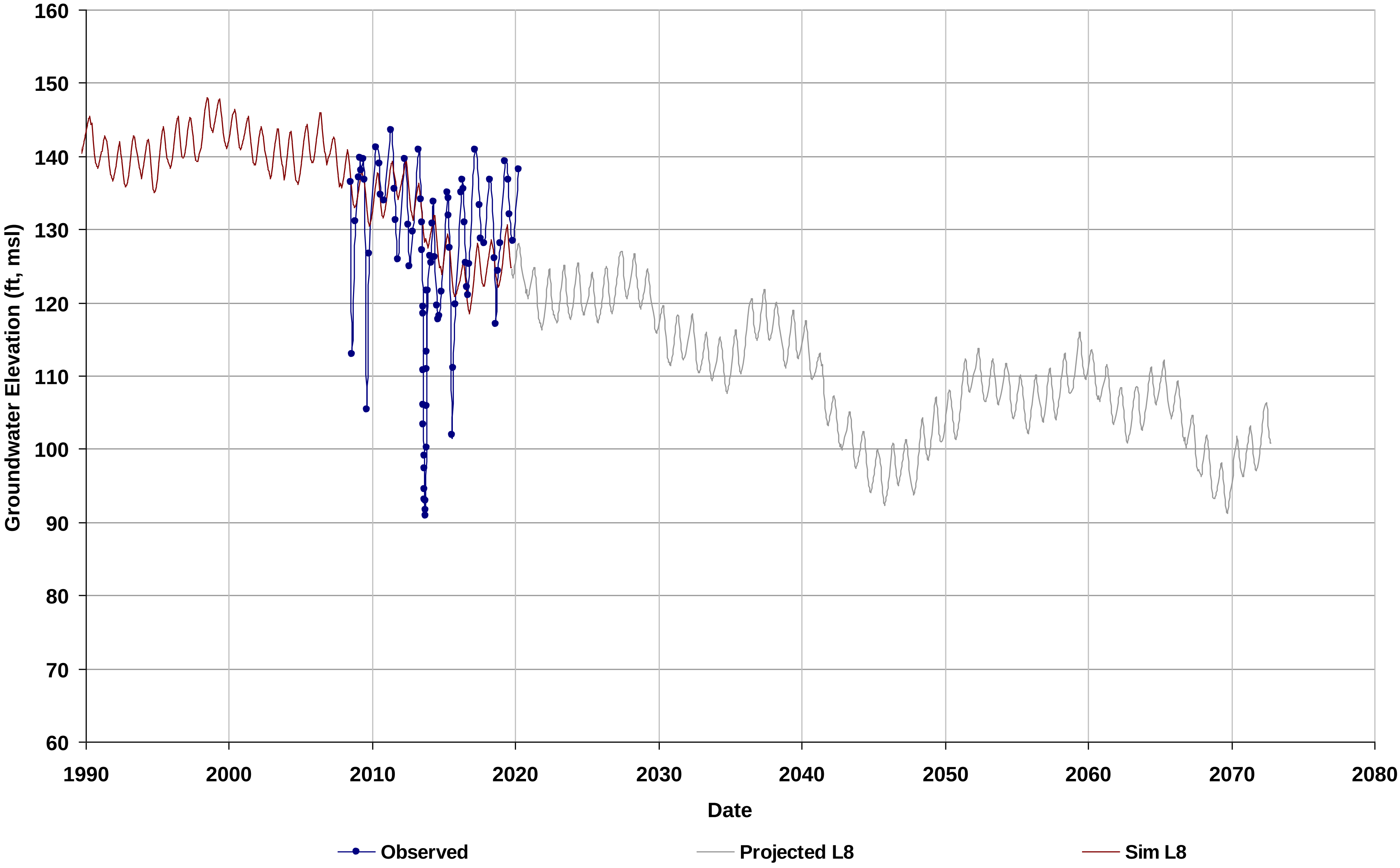
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

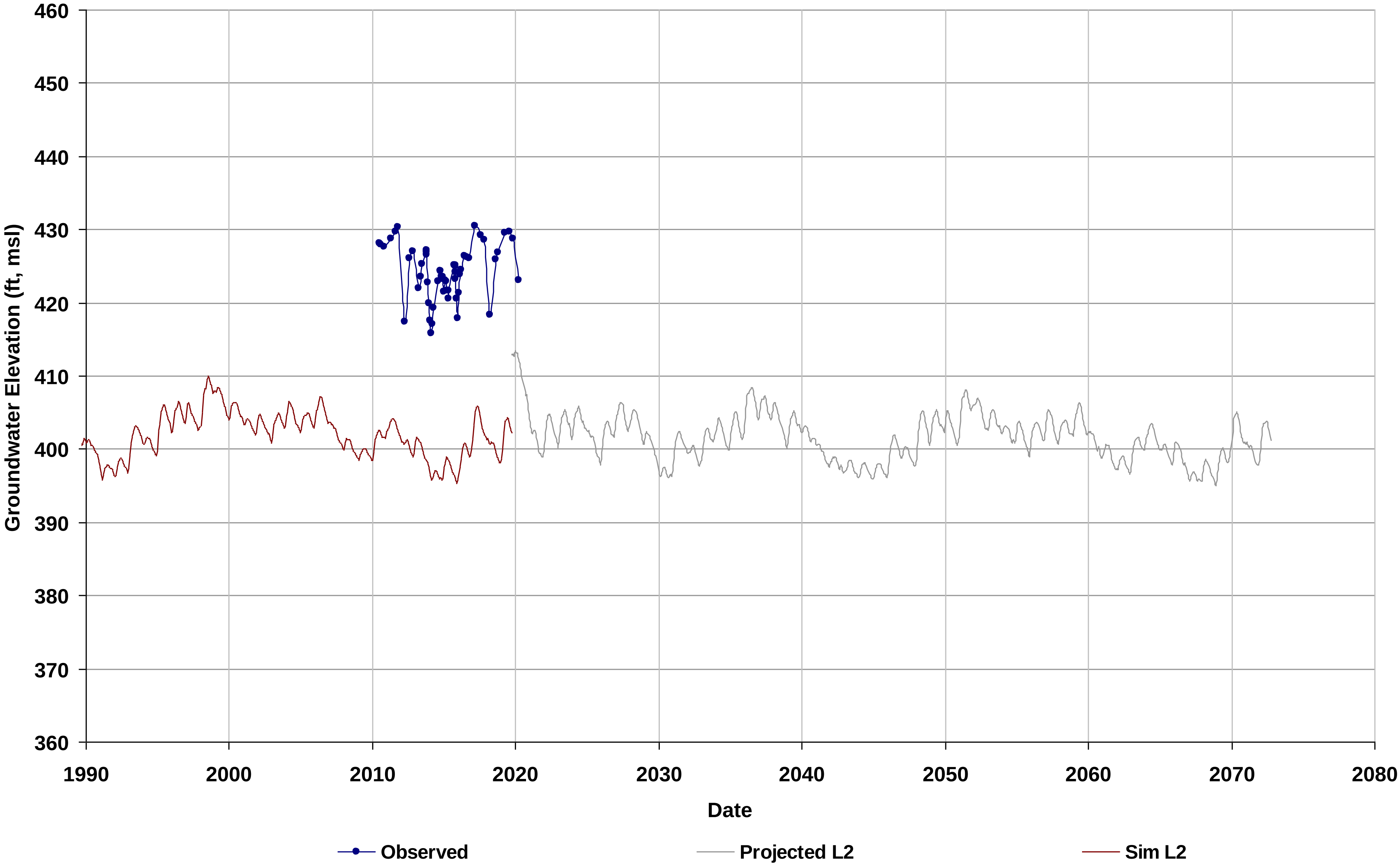
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

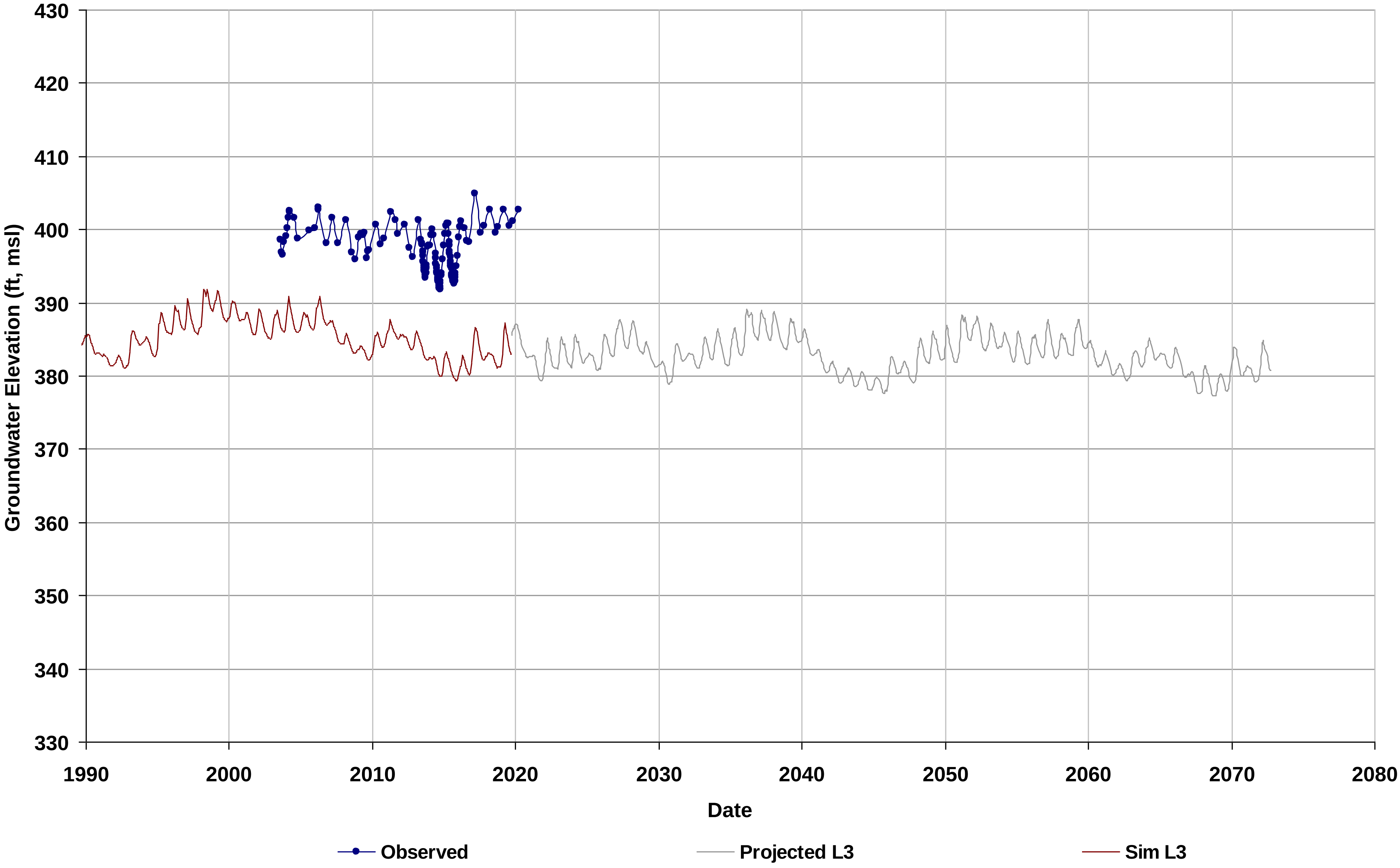
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

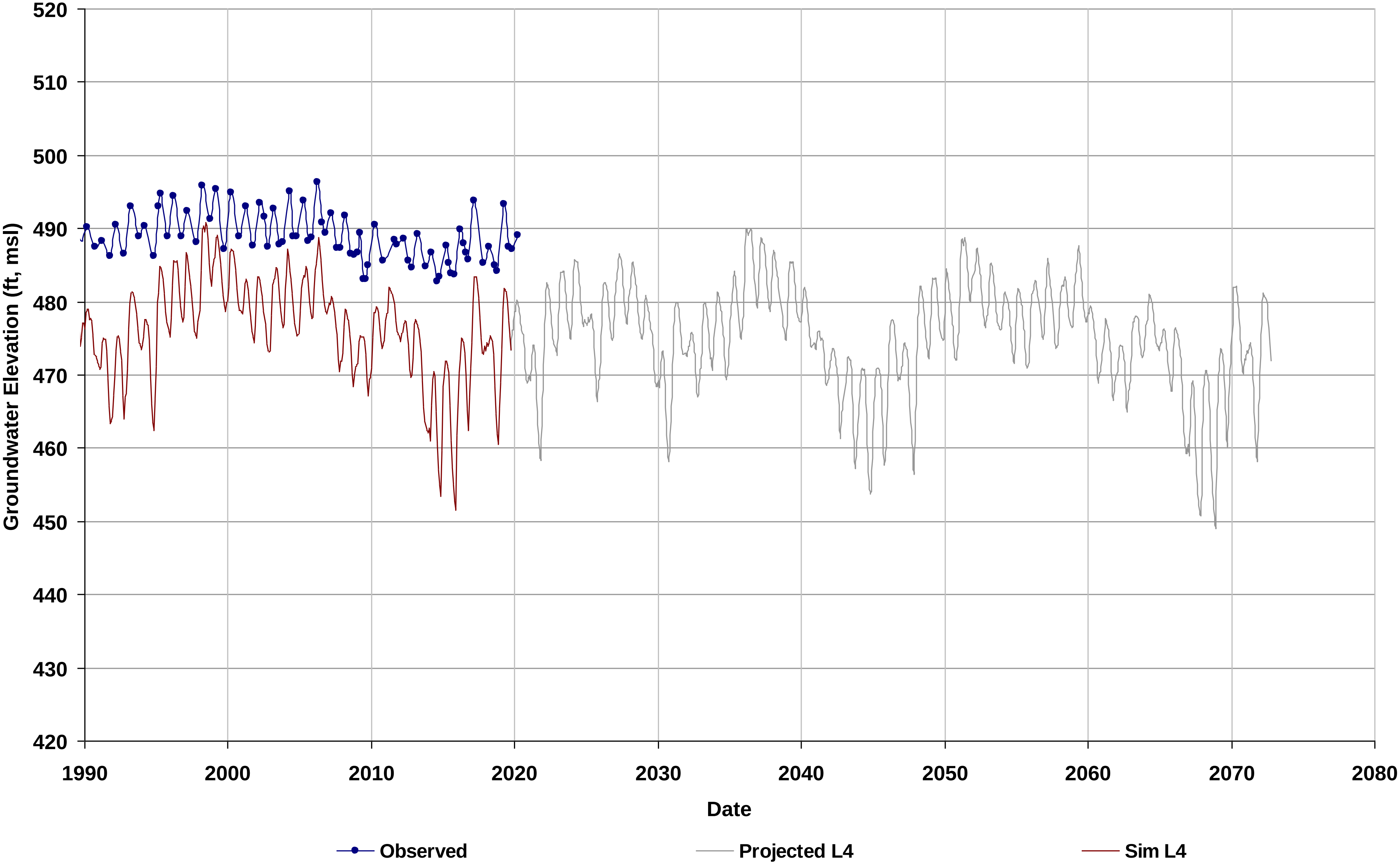
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

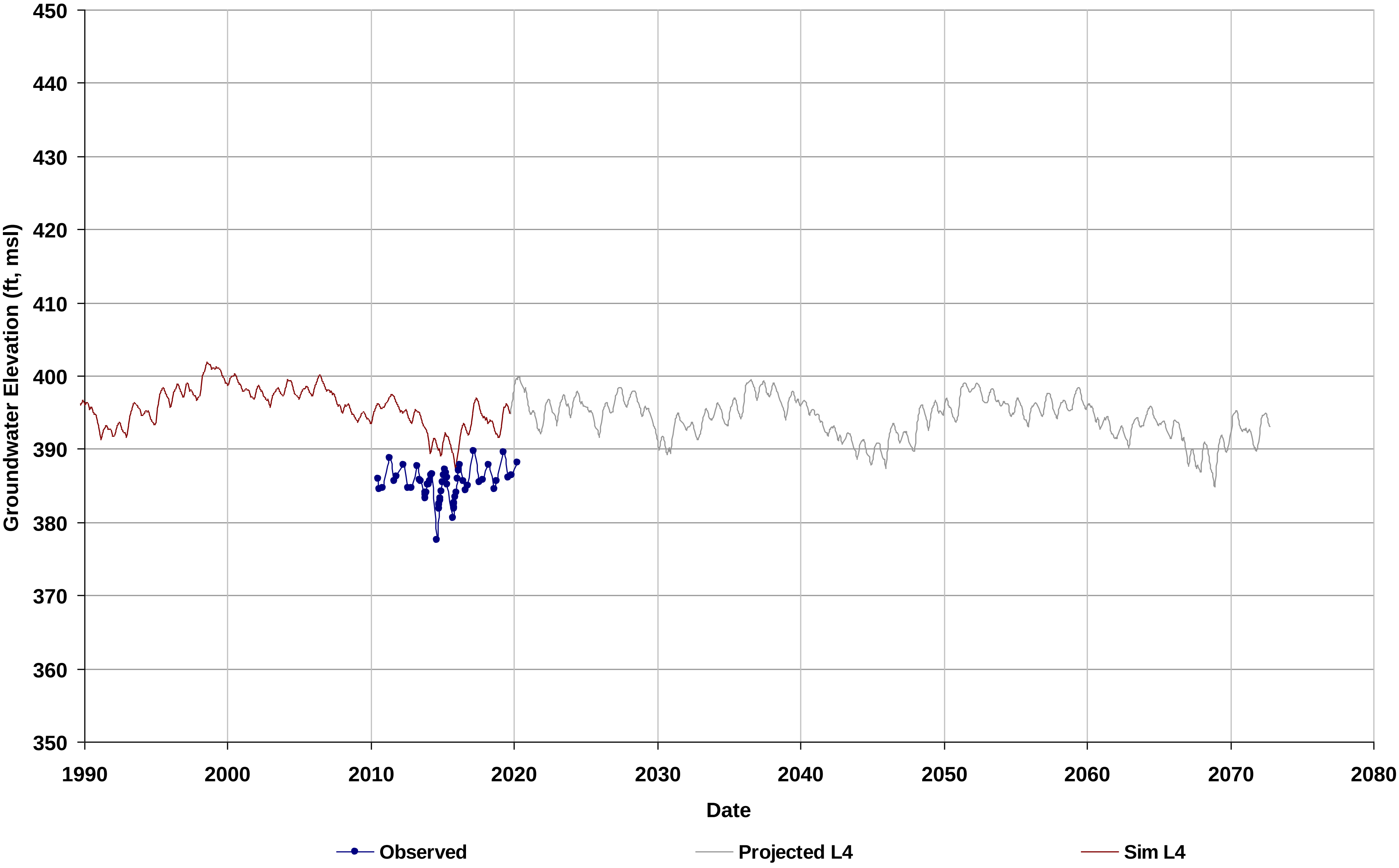
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

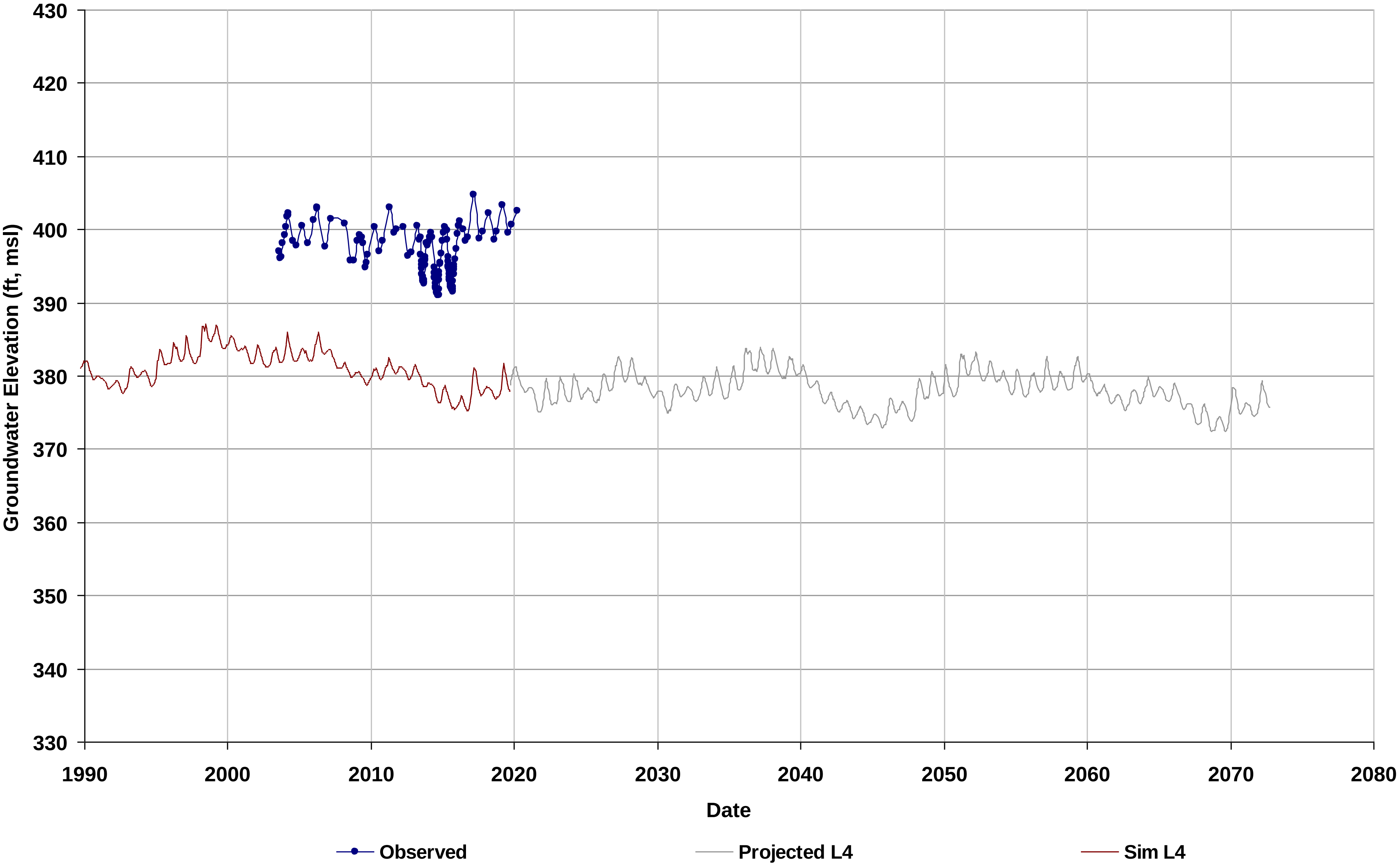
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

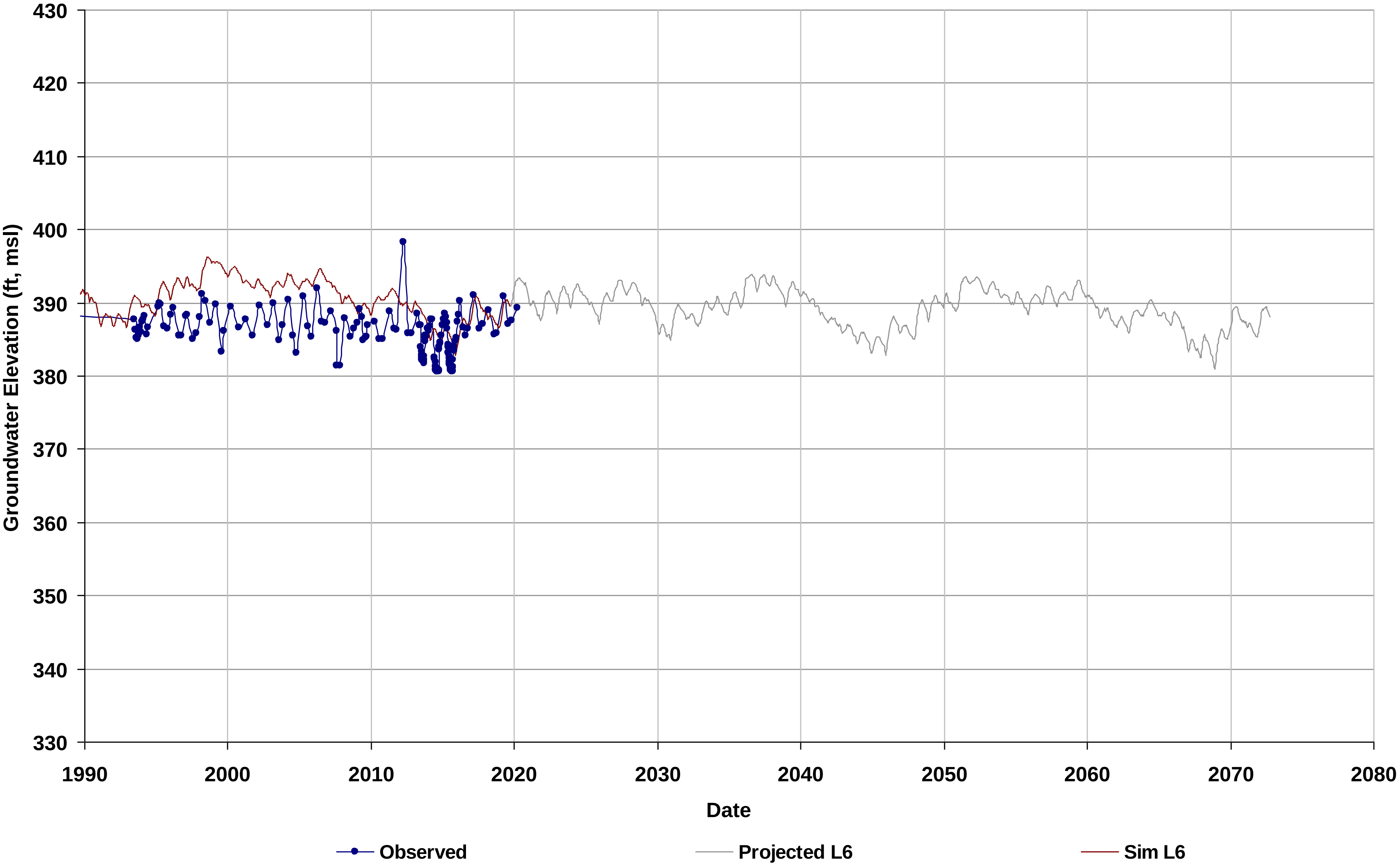
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

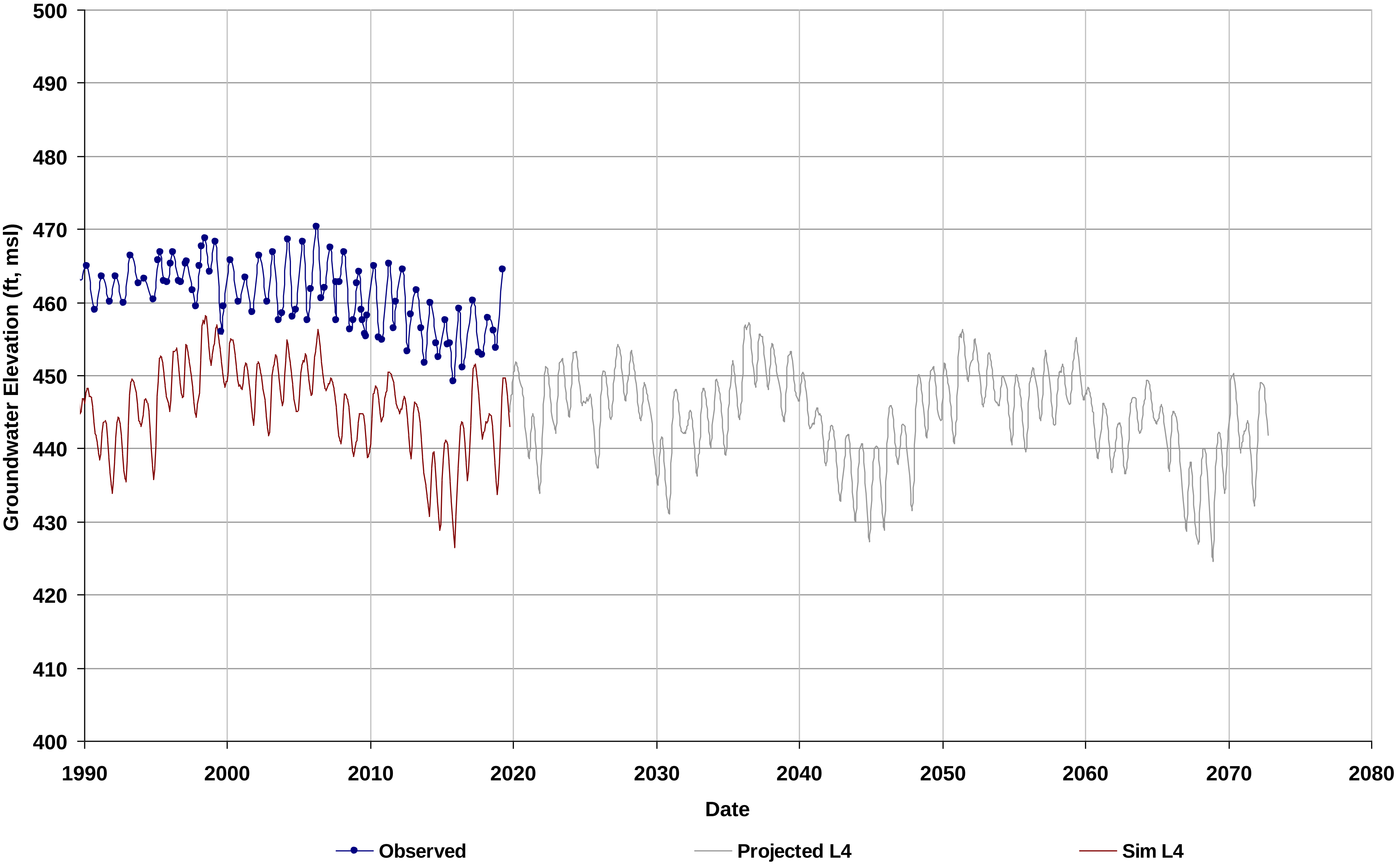
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

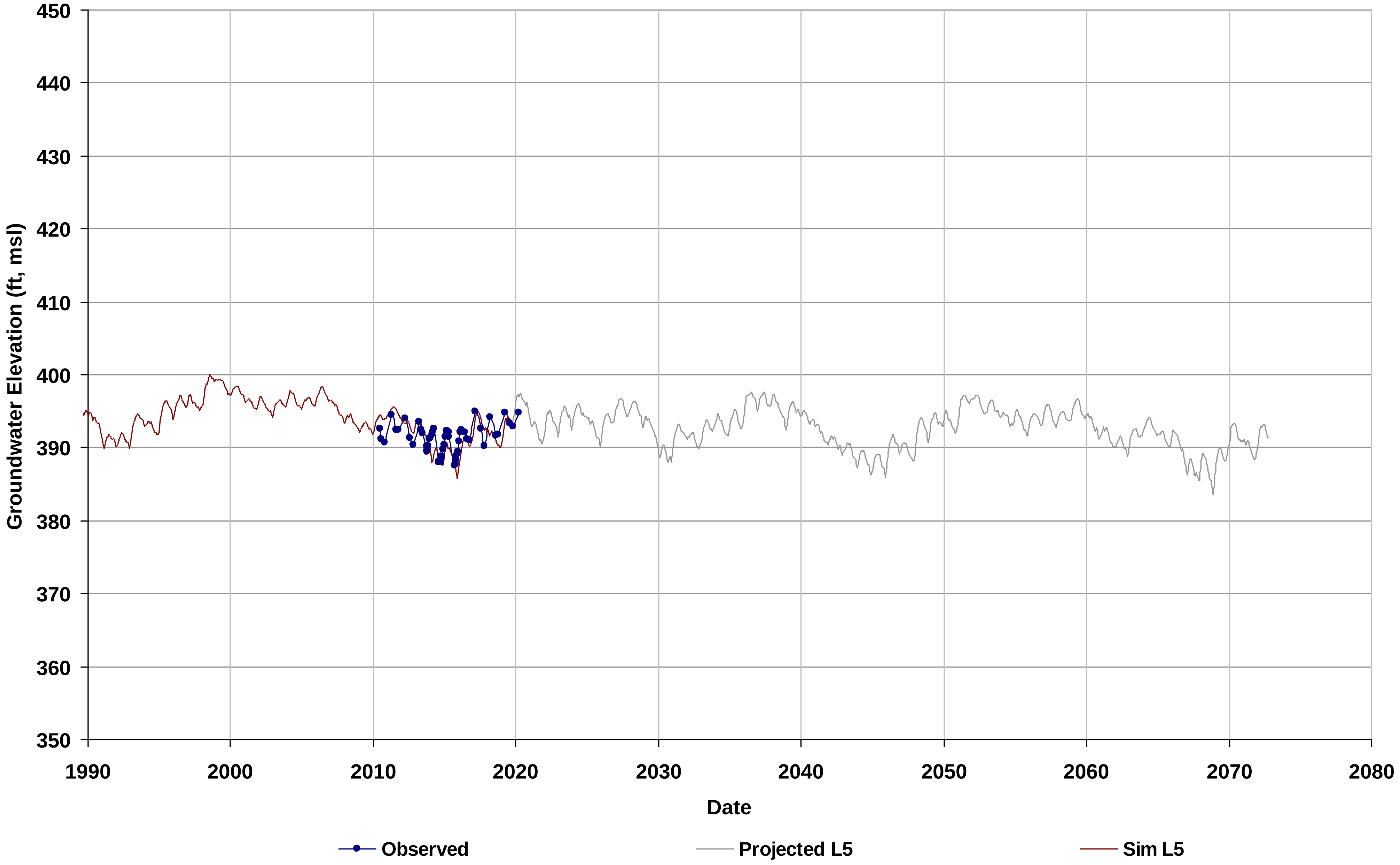
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

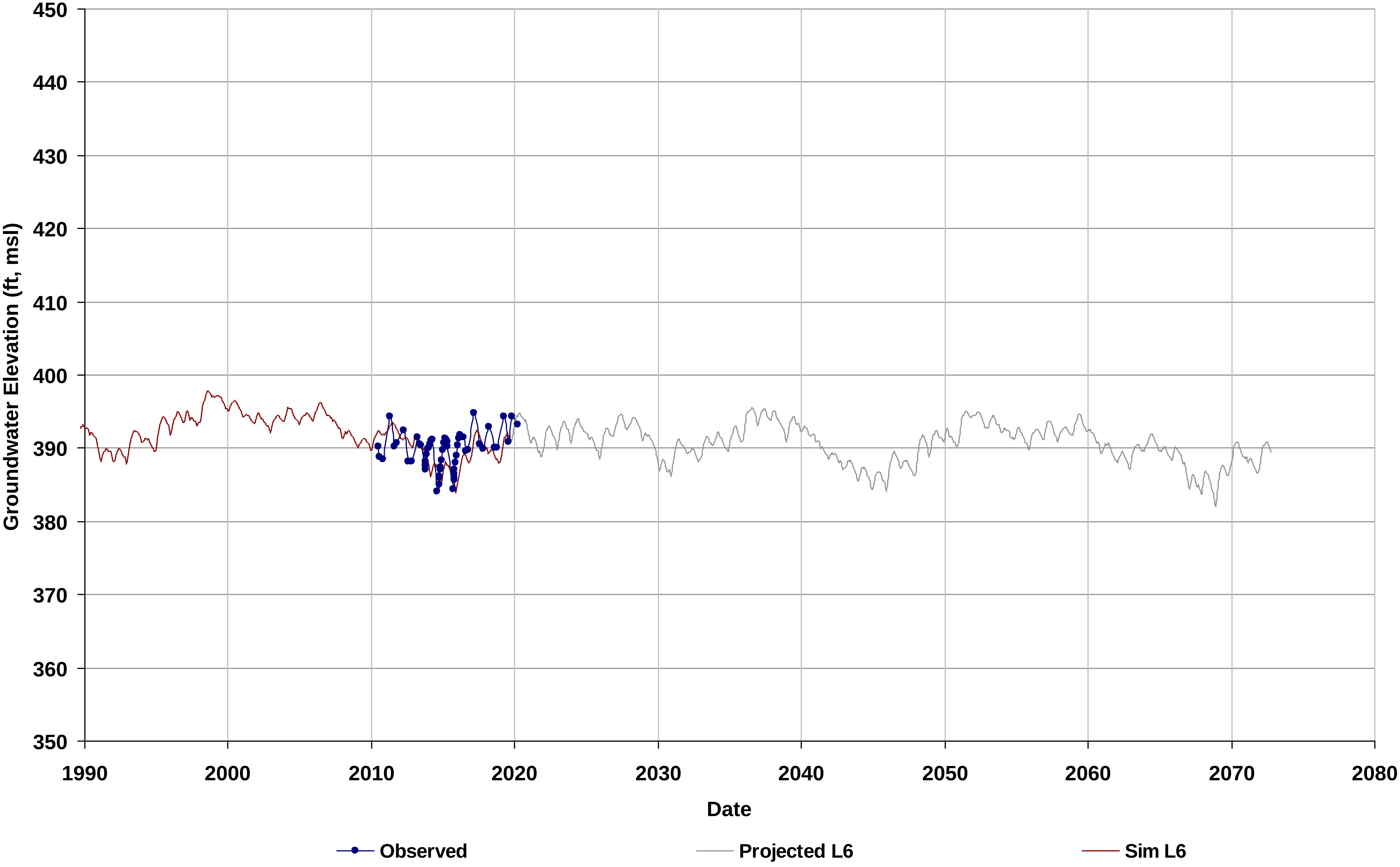
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

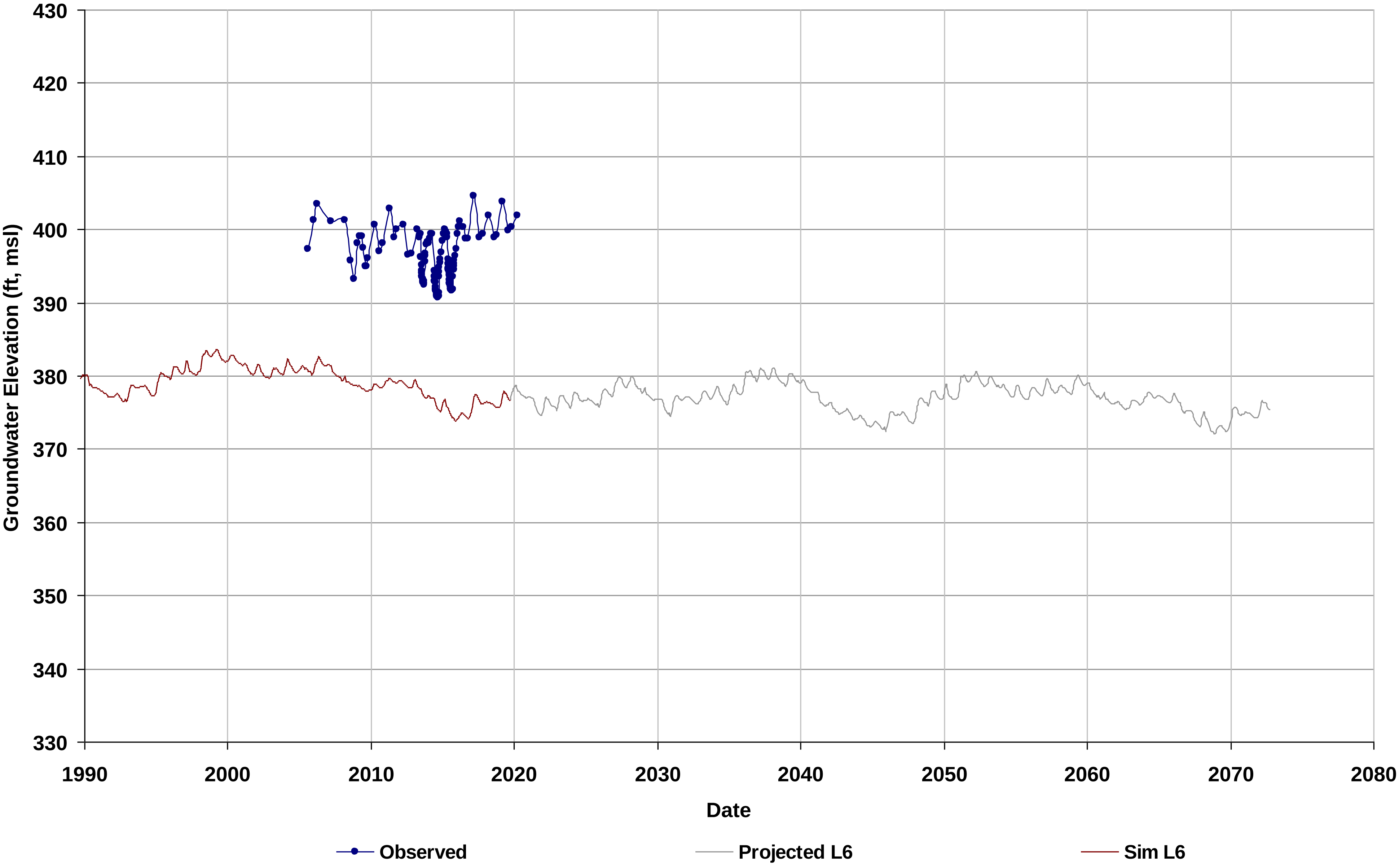
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

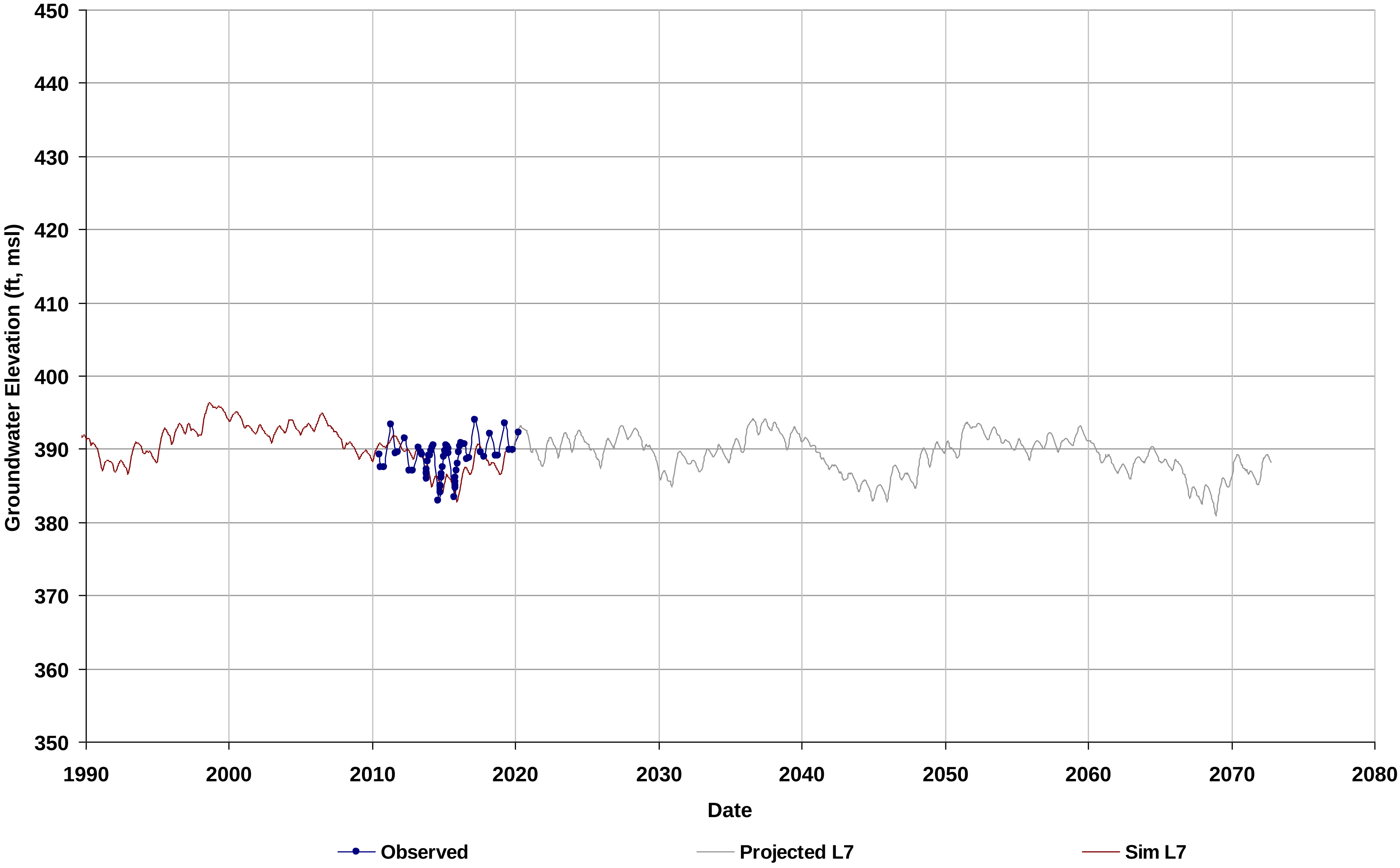
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

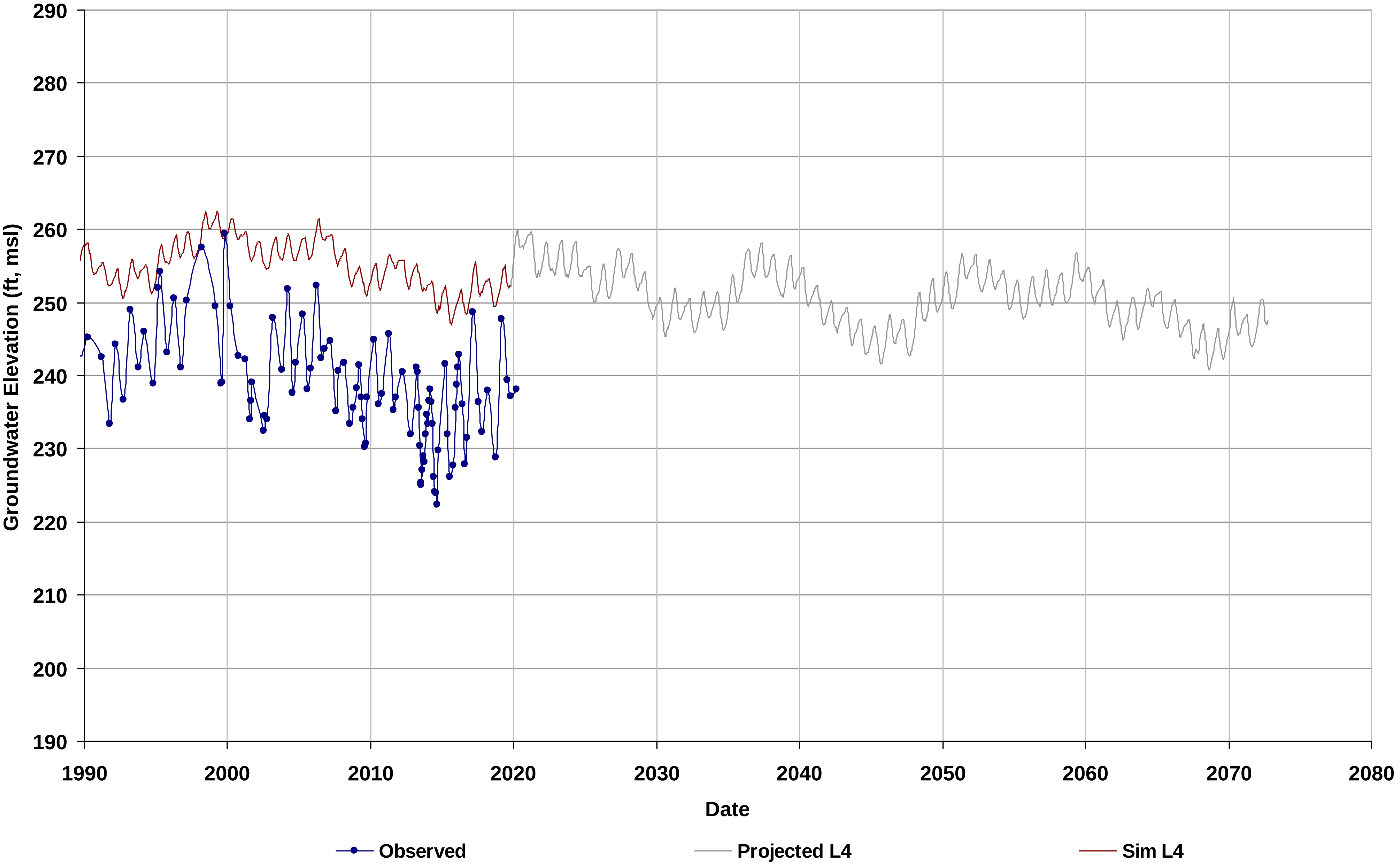
APPENDIX E-7

Tehama IHM Simulated Groundwater Levels:

Projected (Future Land Use) with Climate Change (2070) Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

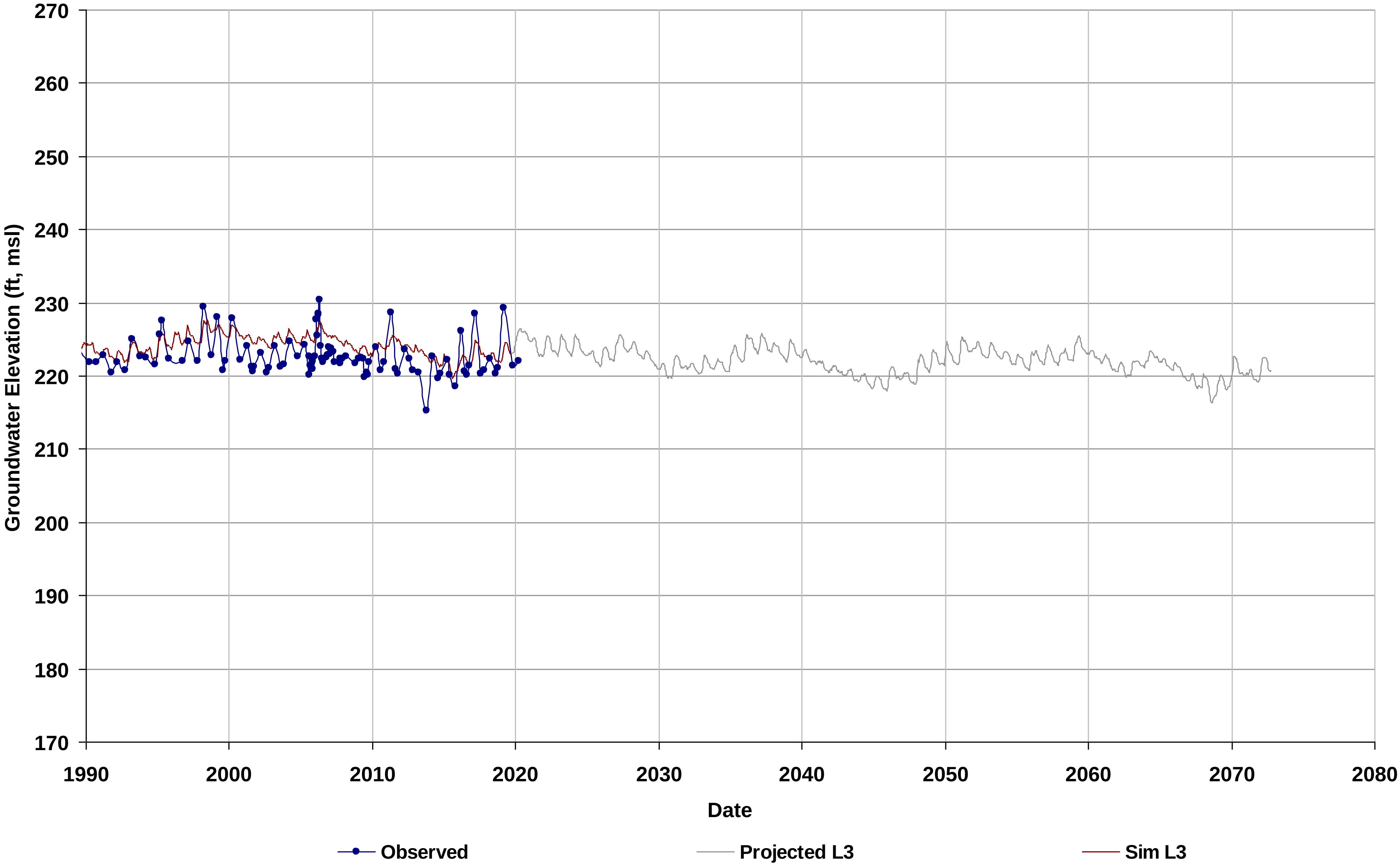
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

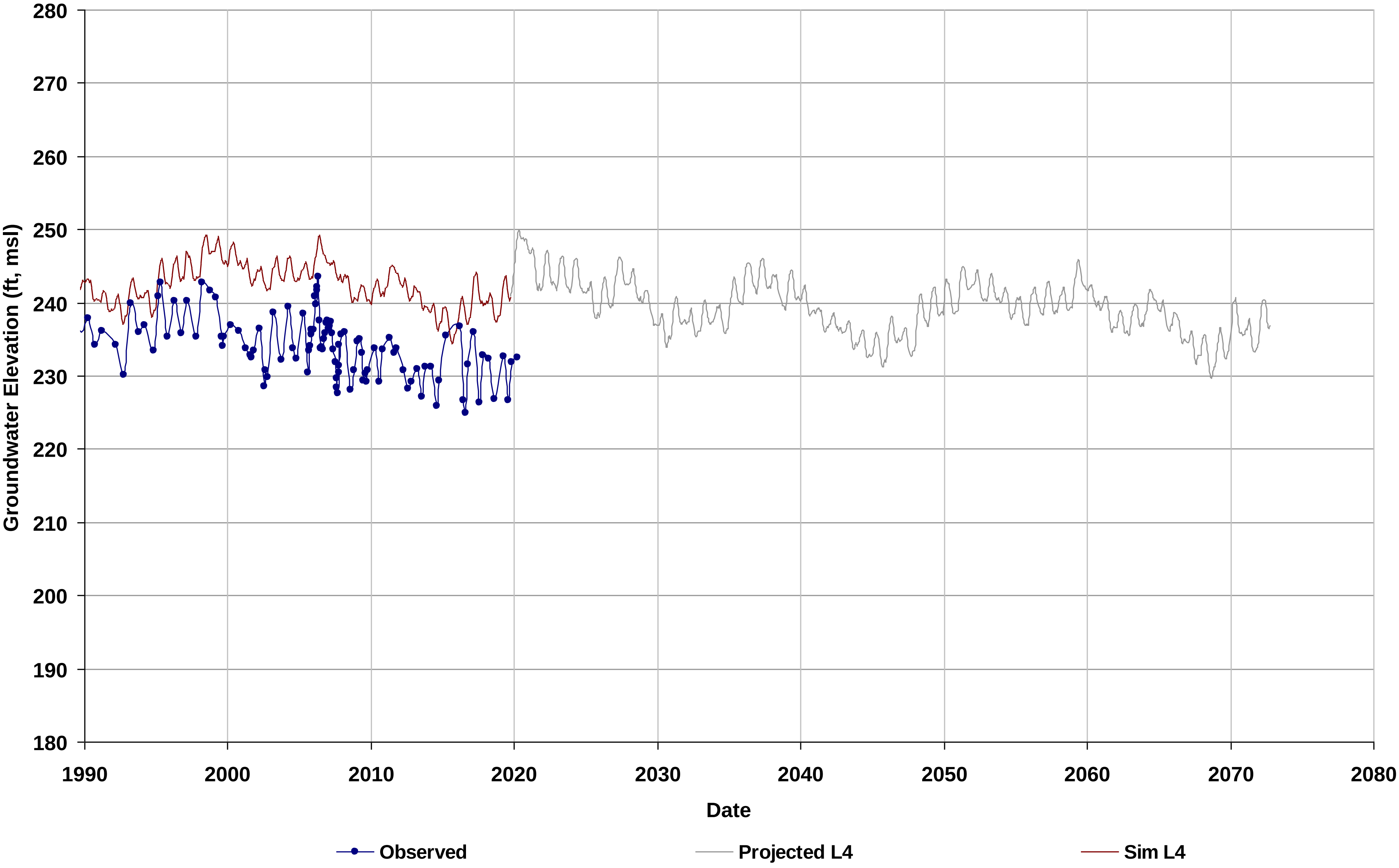
Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

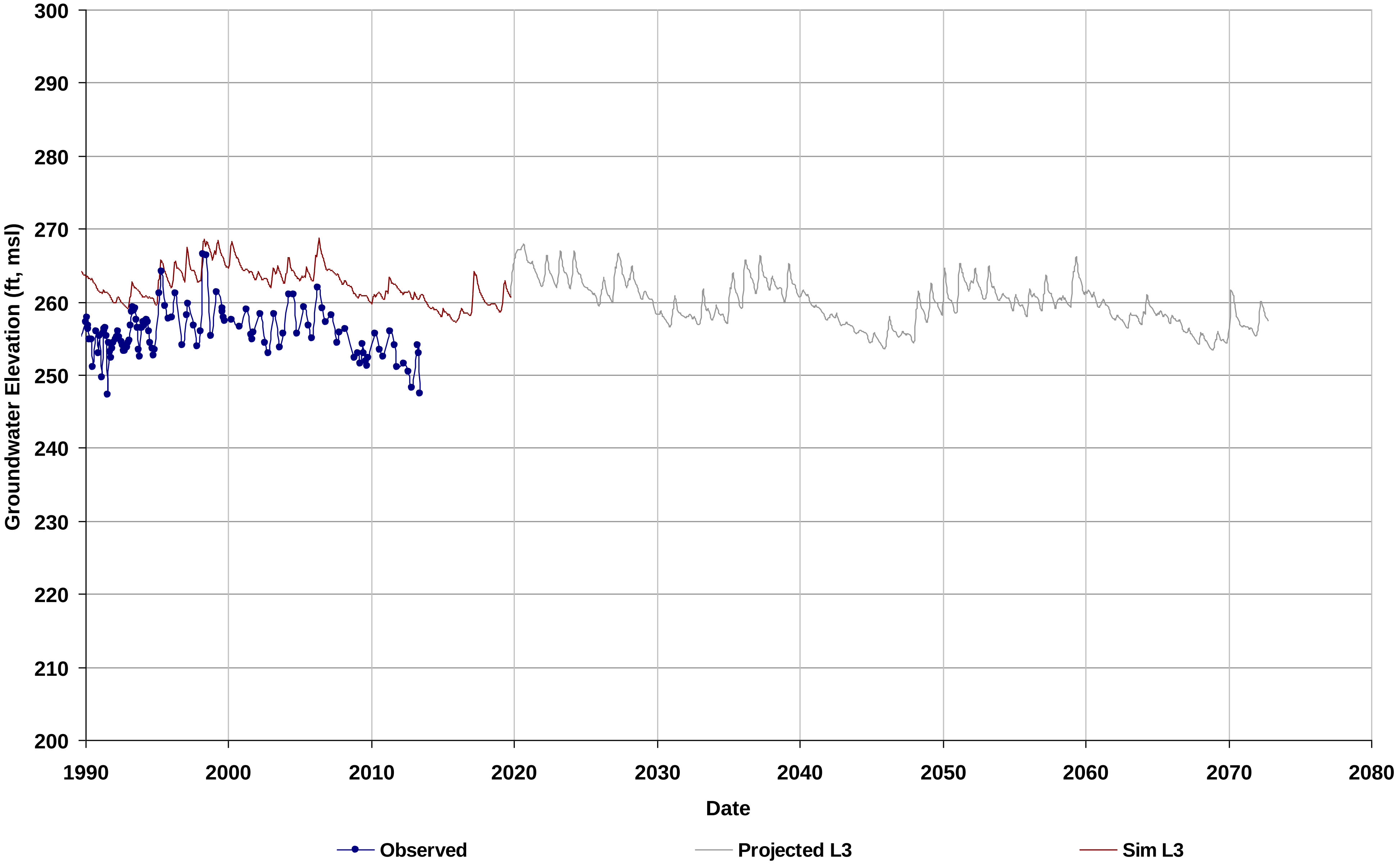
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

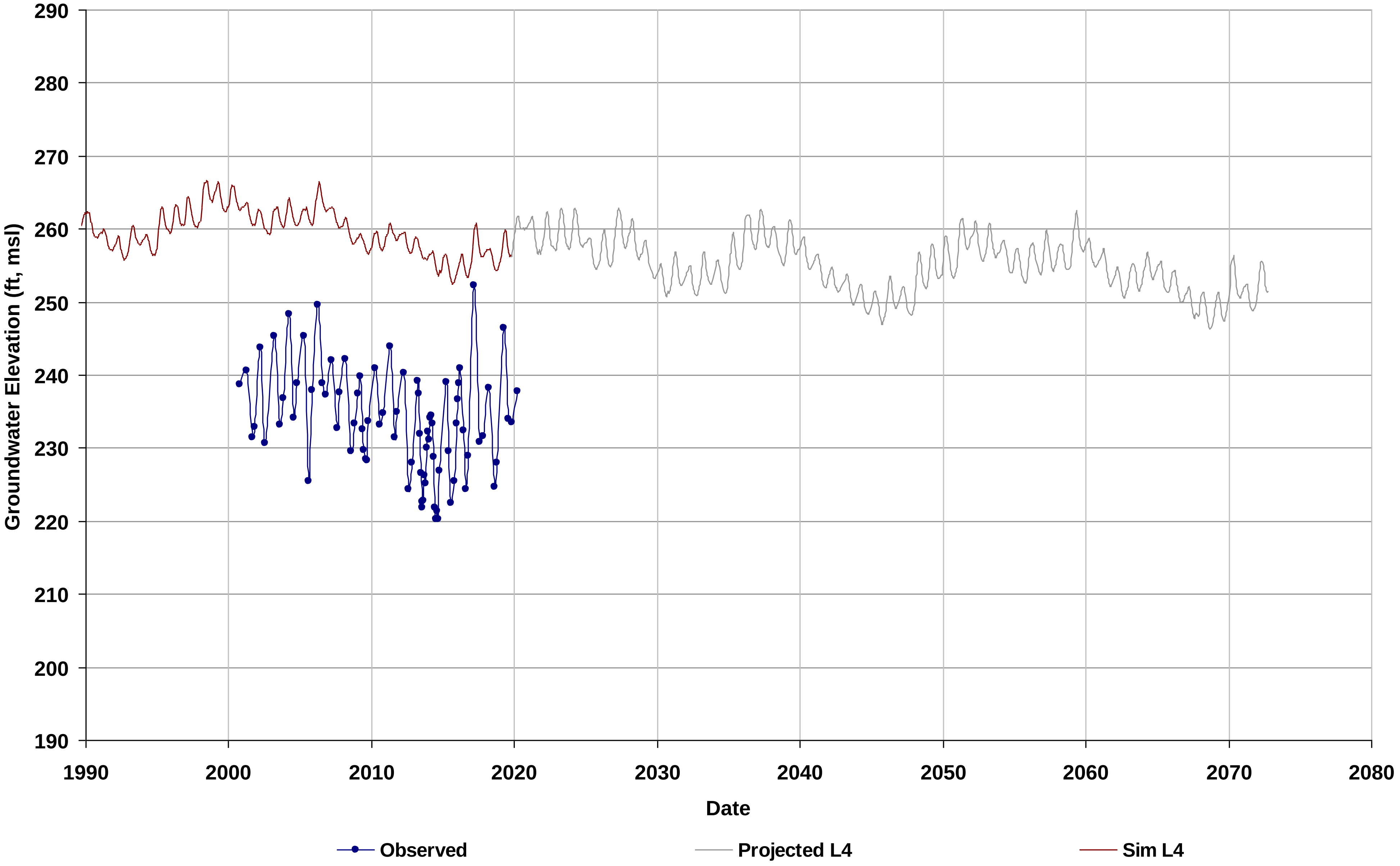
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

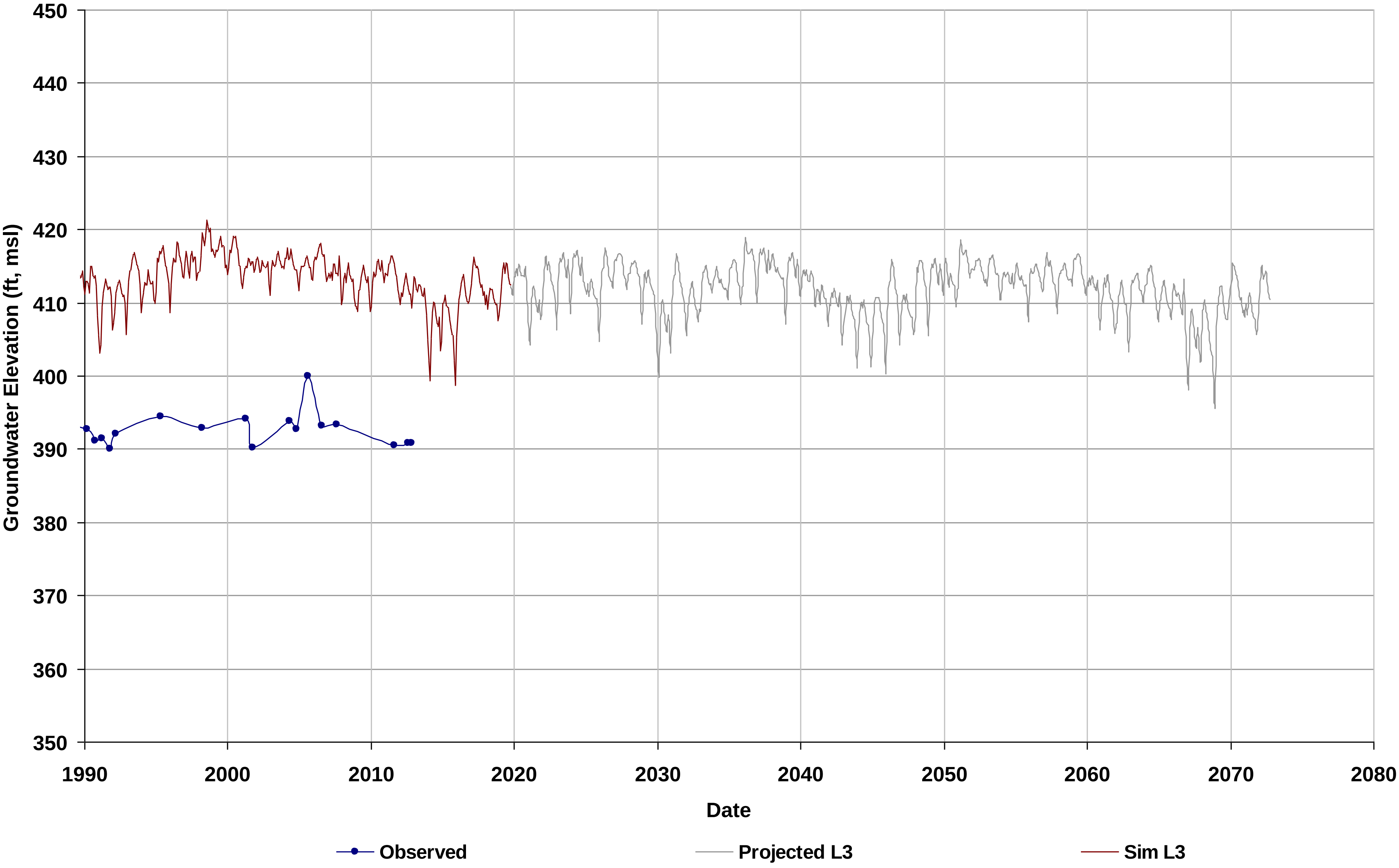
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

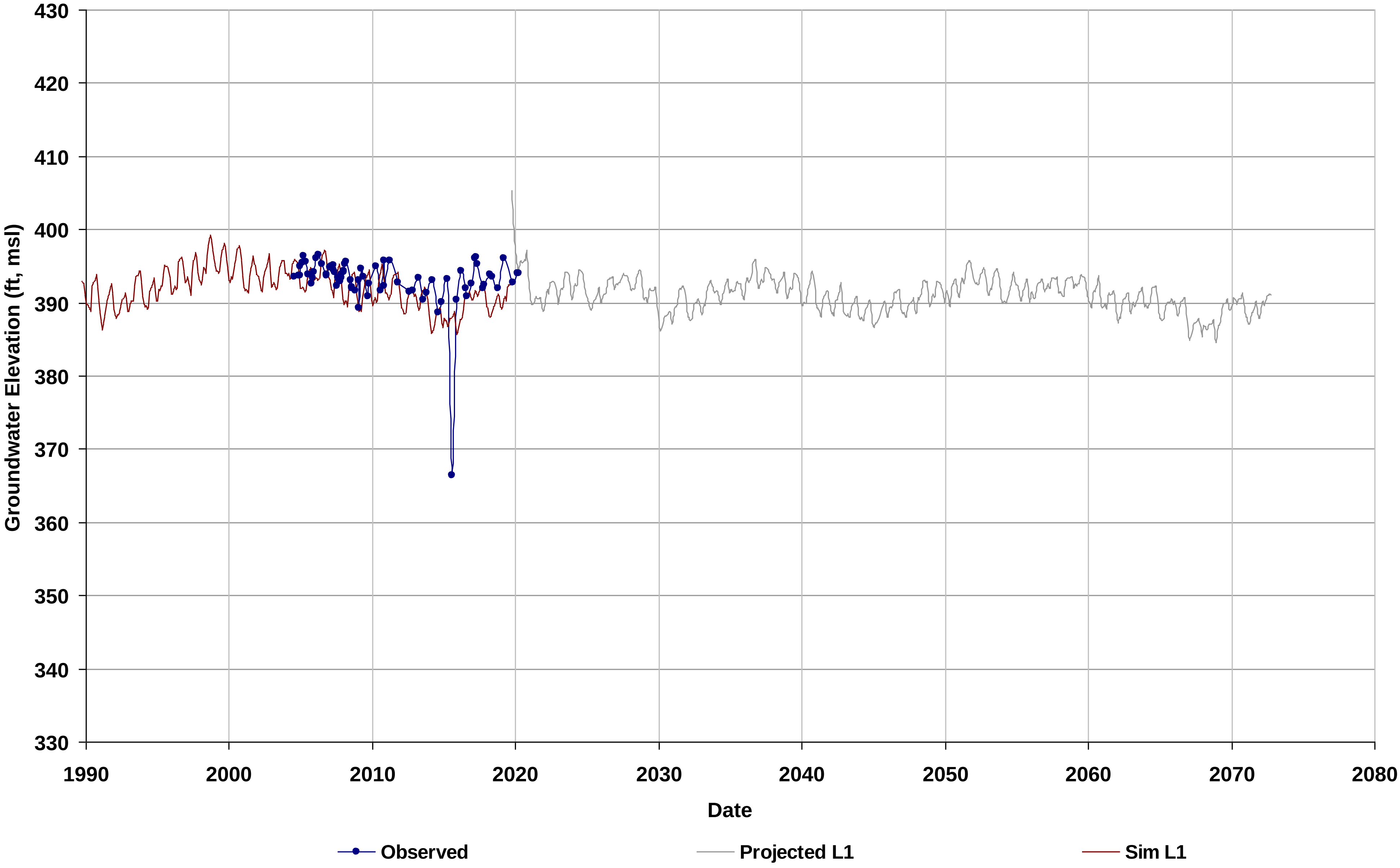
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

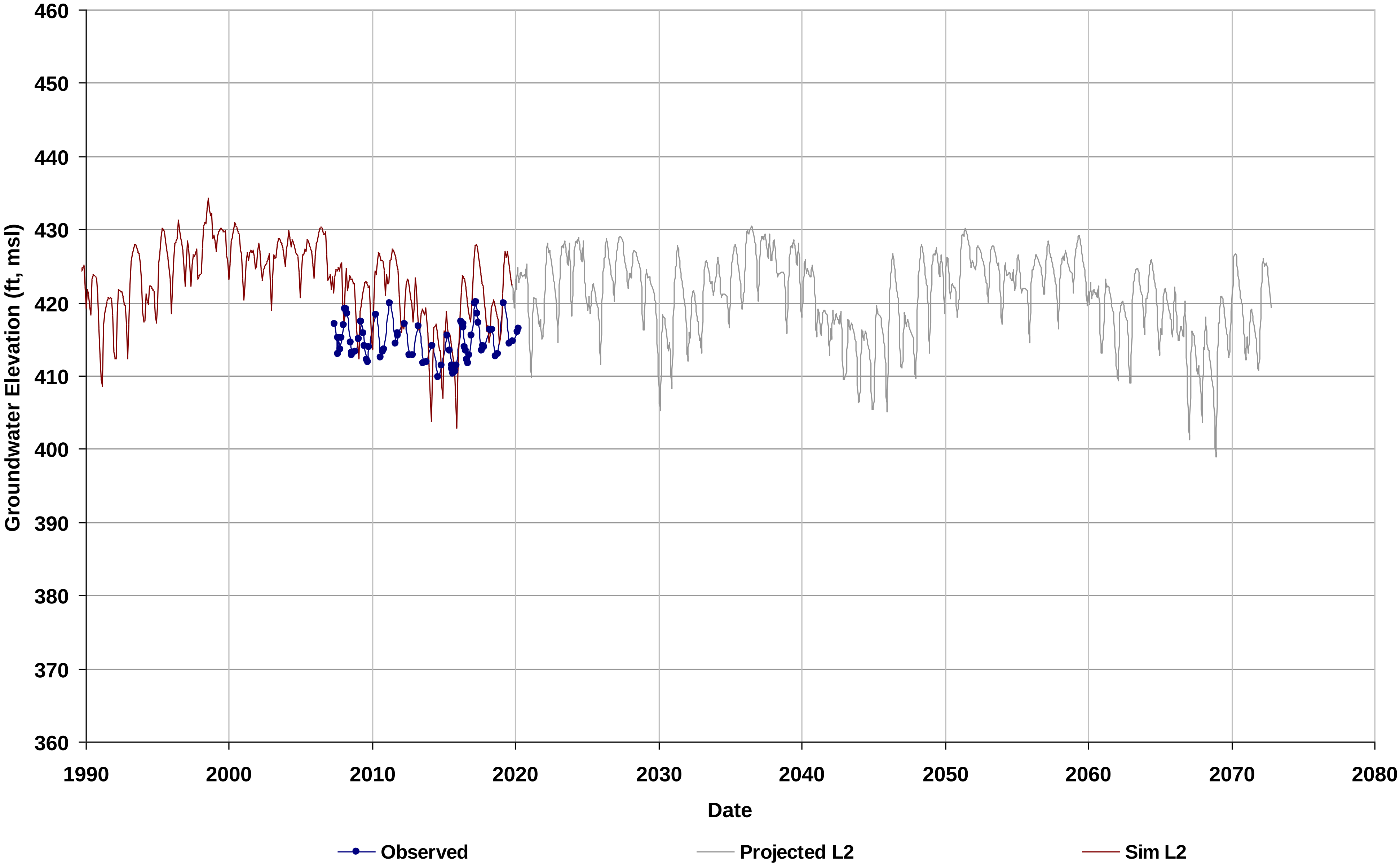
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

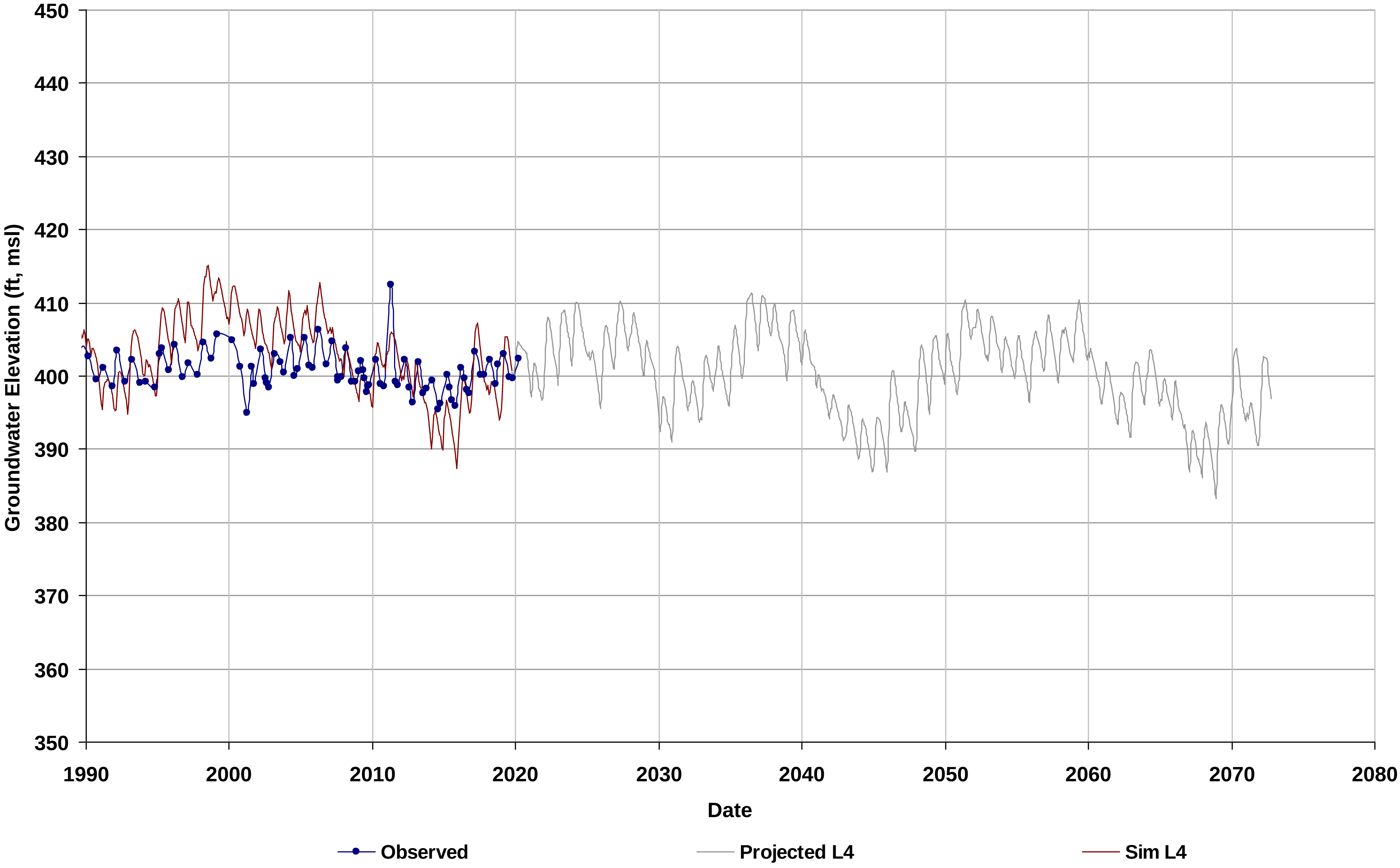
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

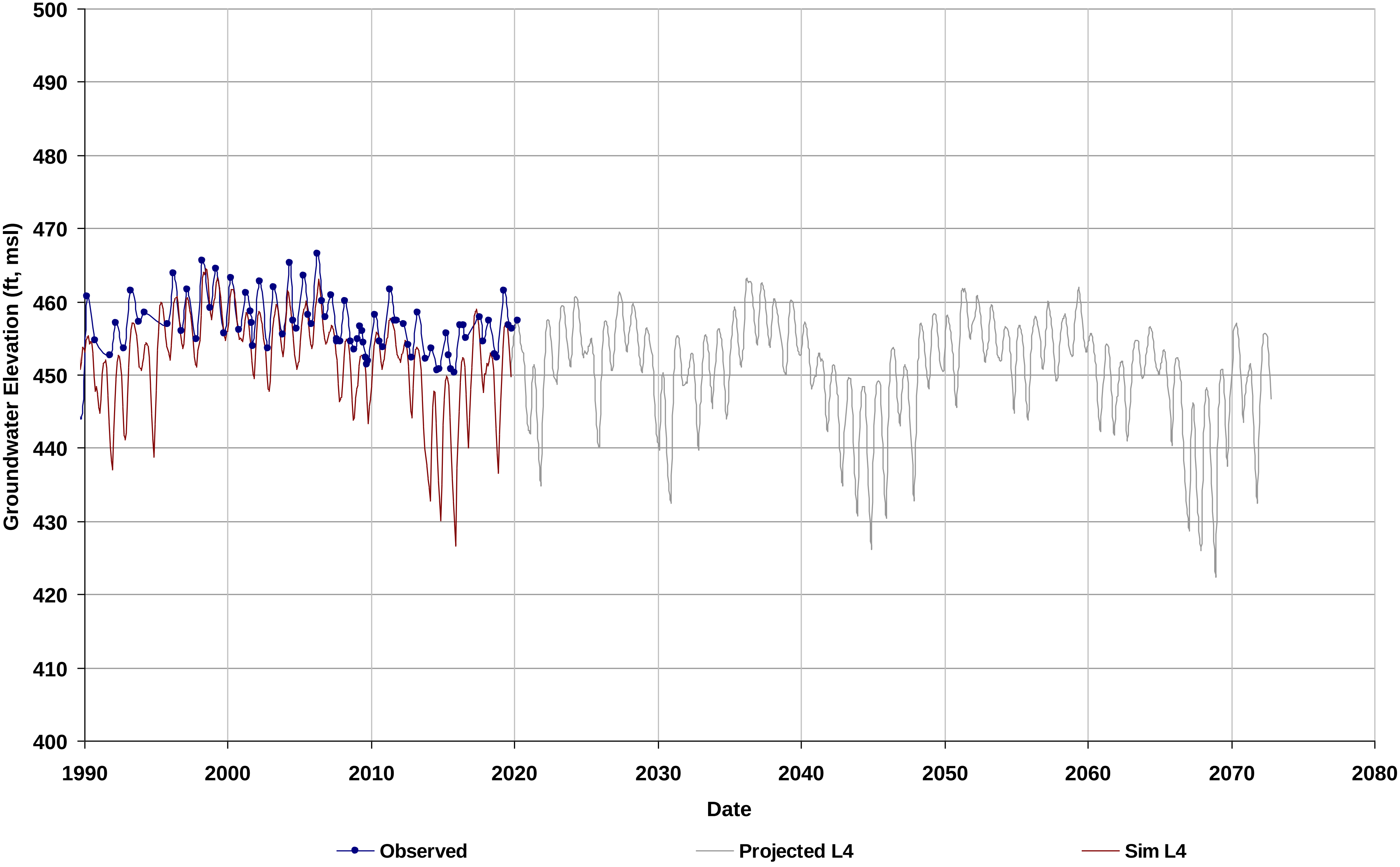
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

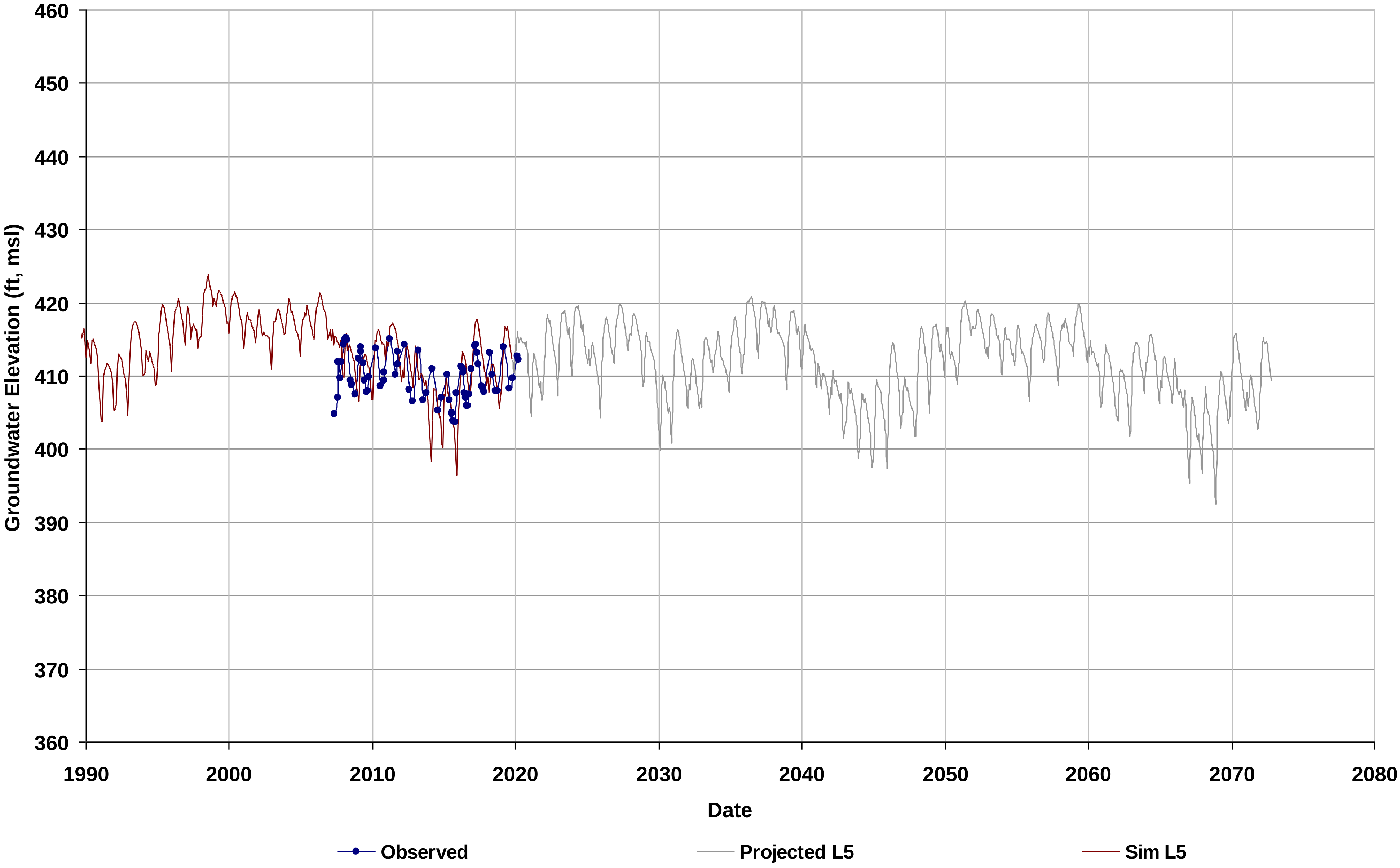
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

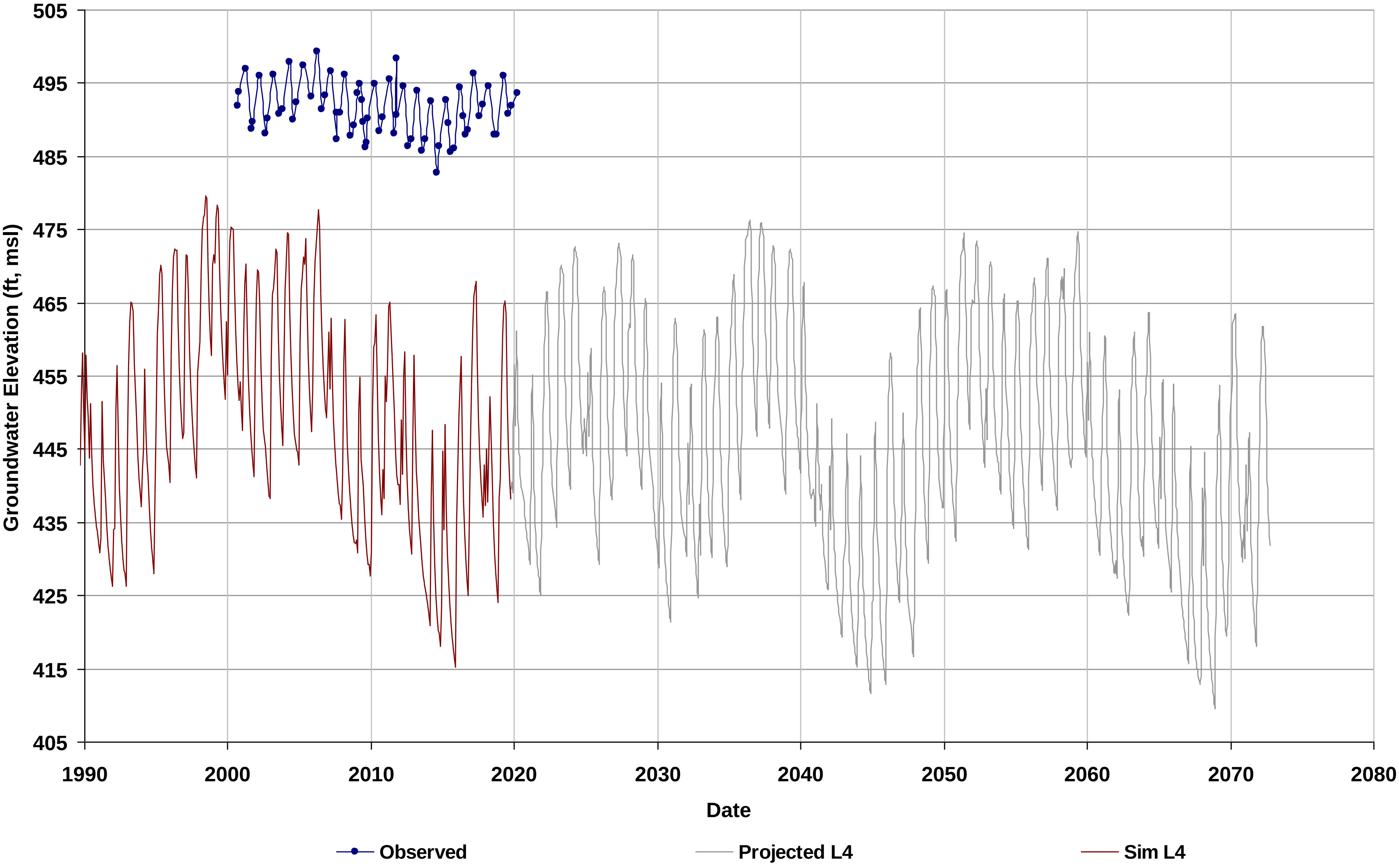
Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

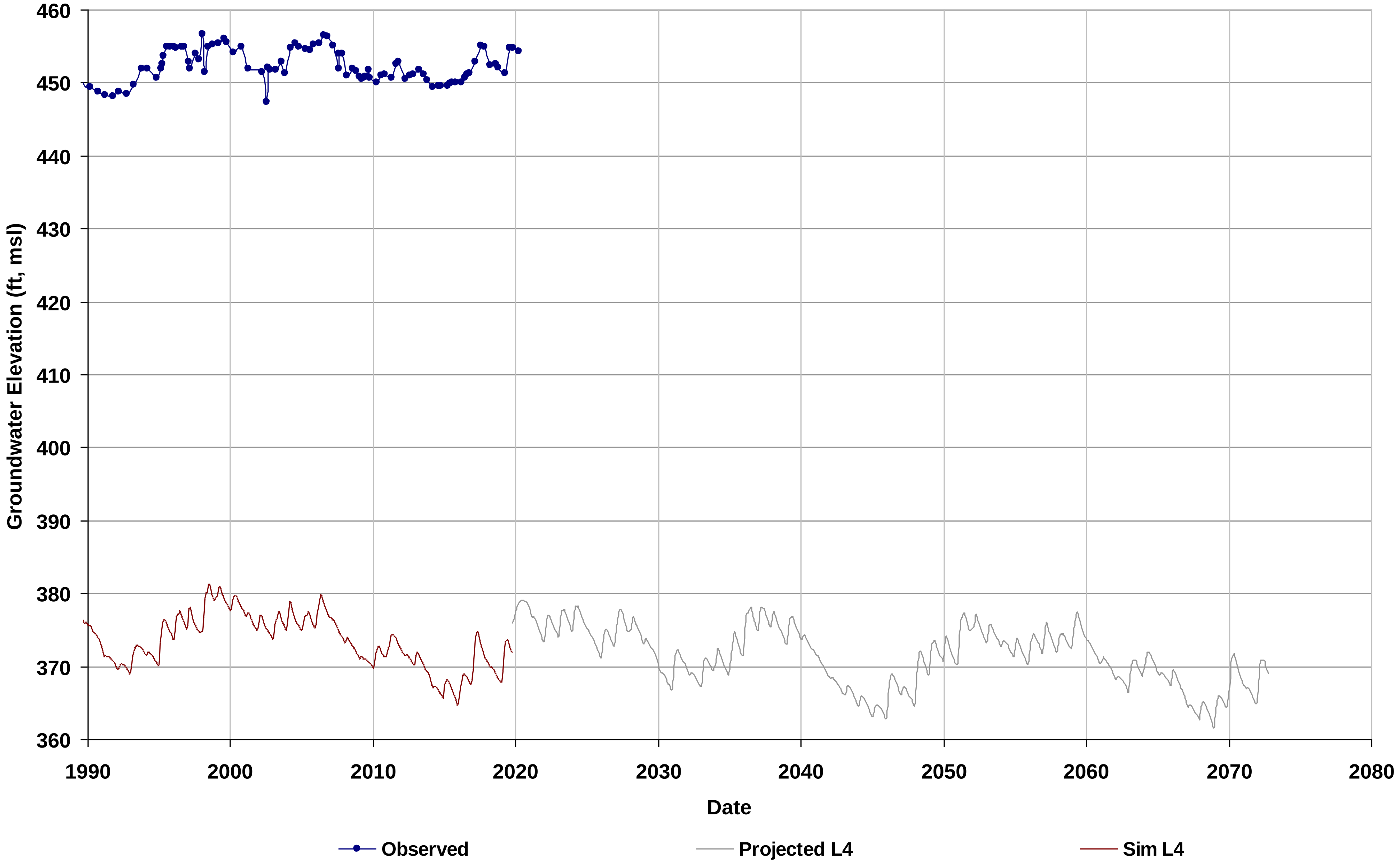
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

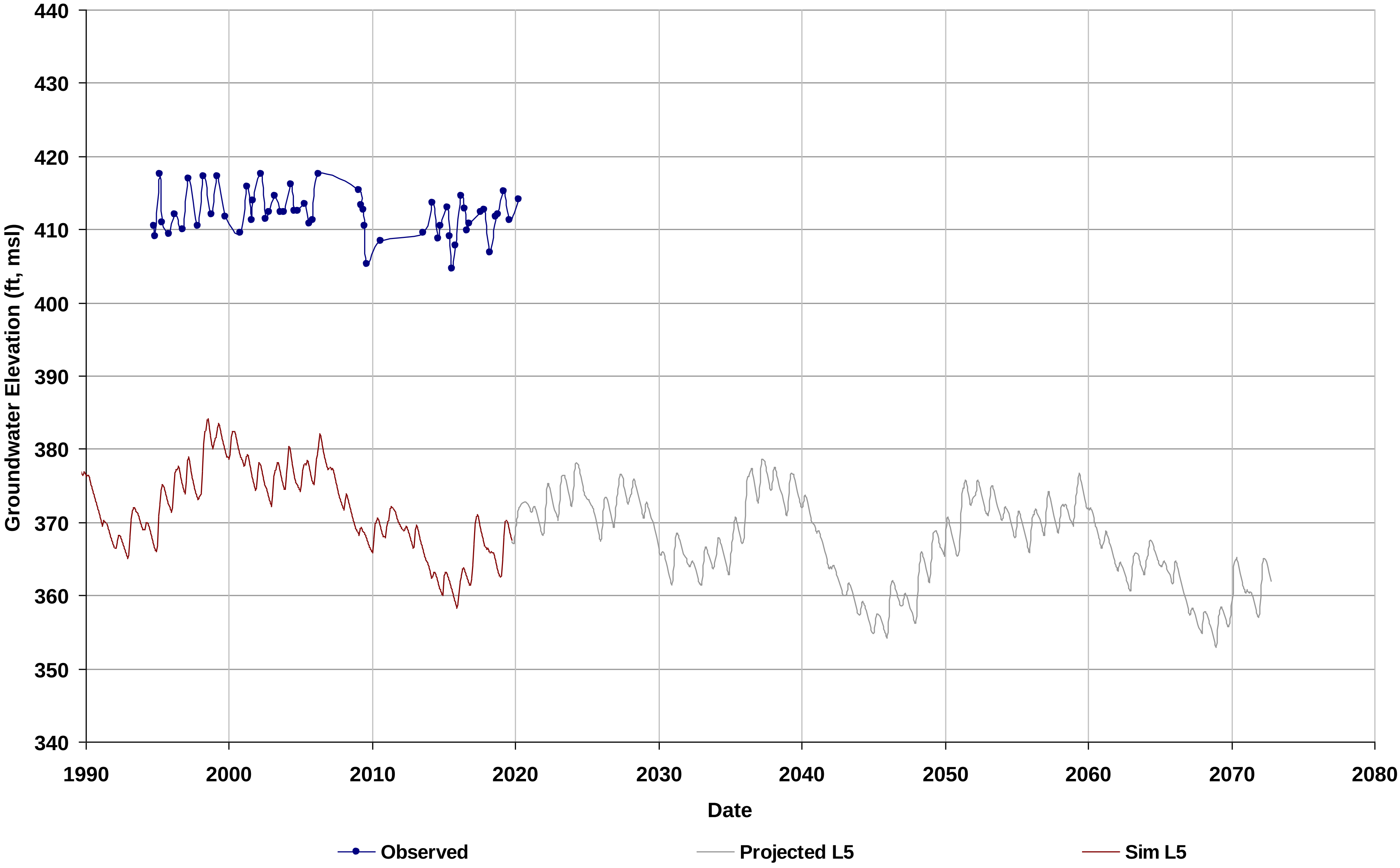
Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

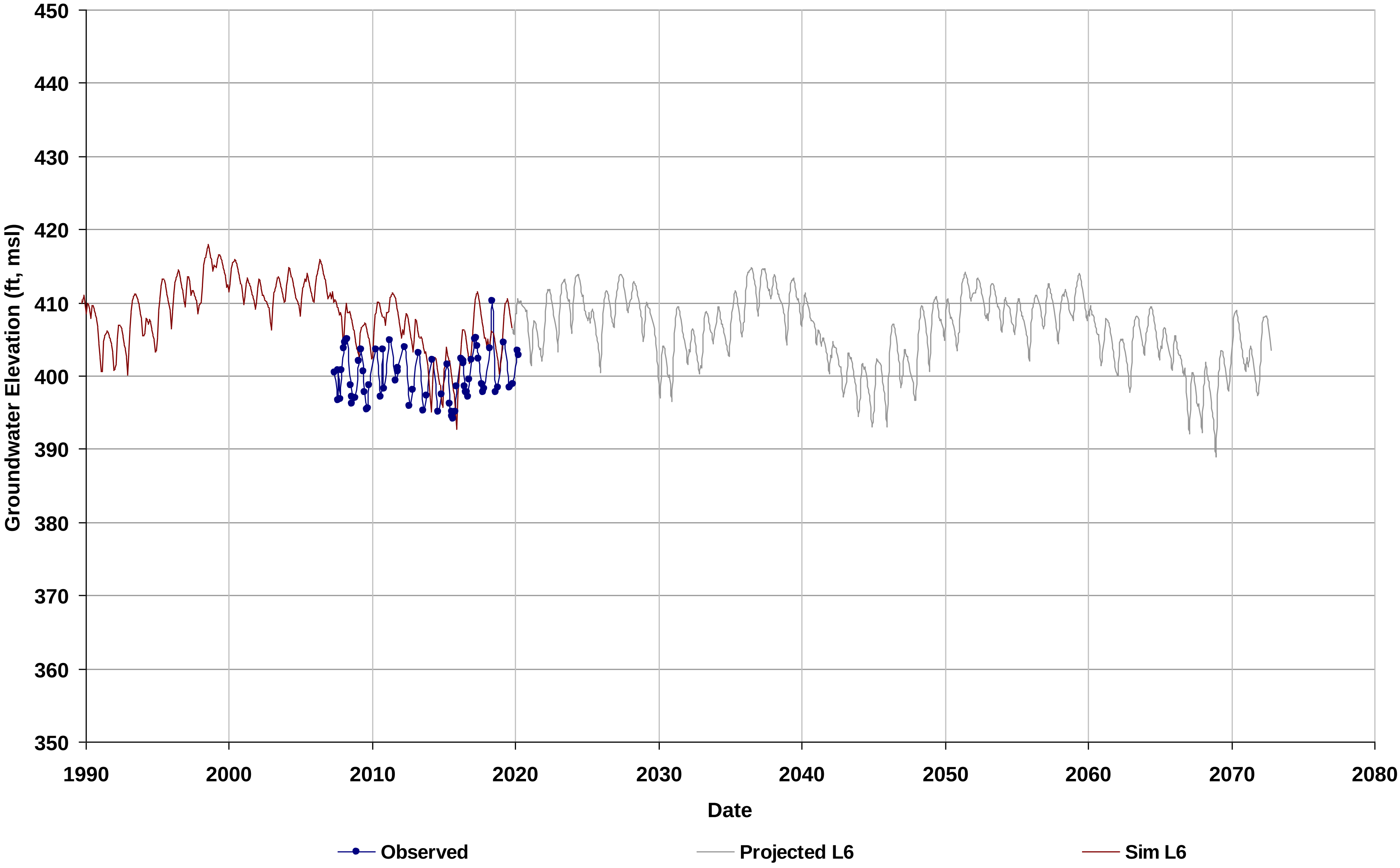
Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

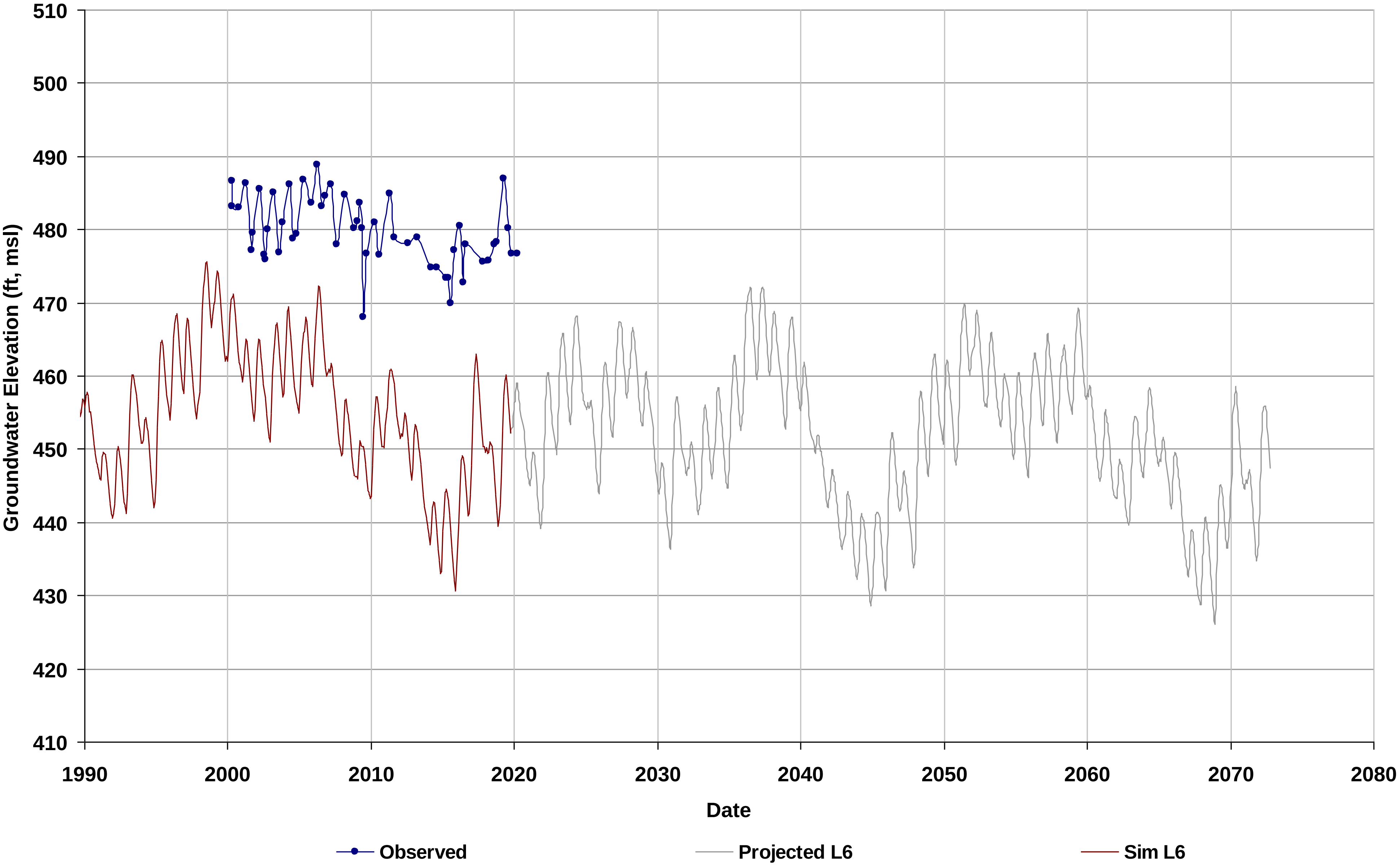
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

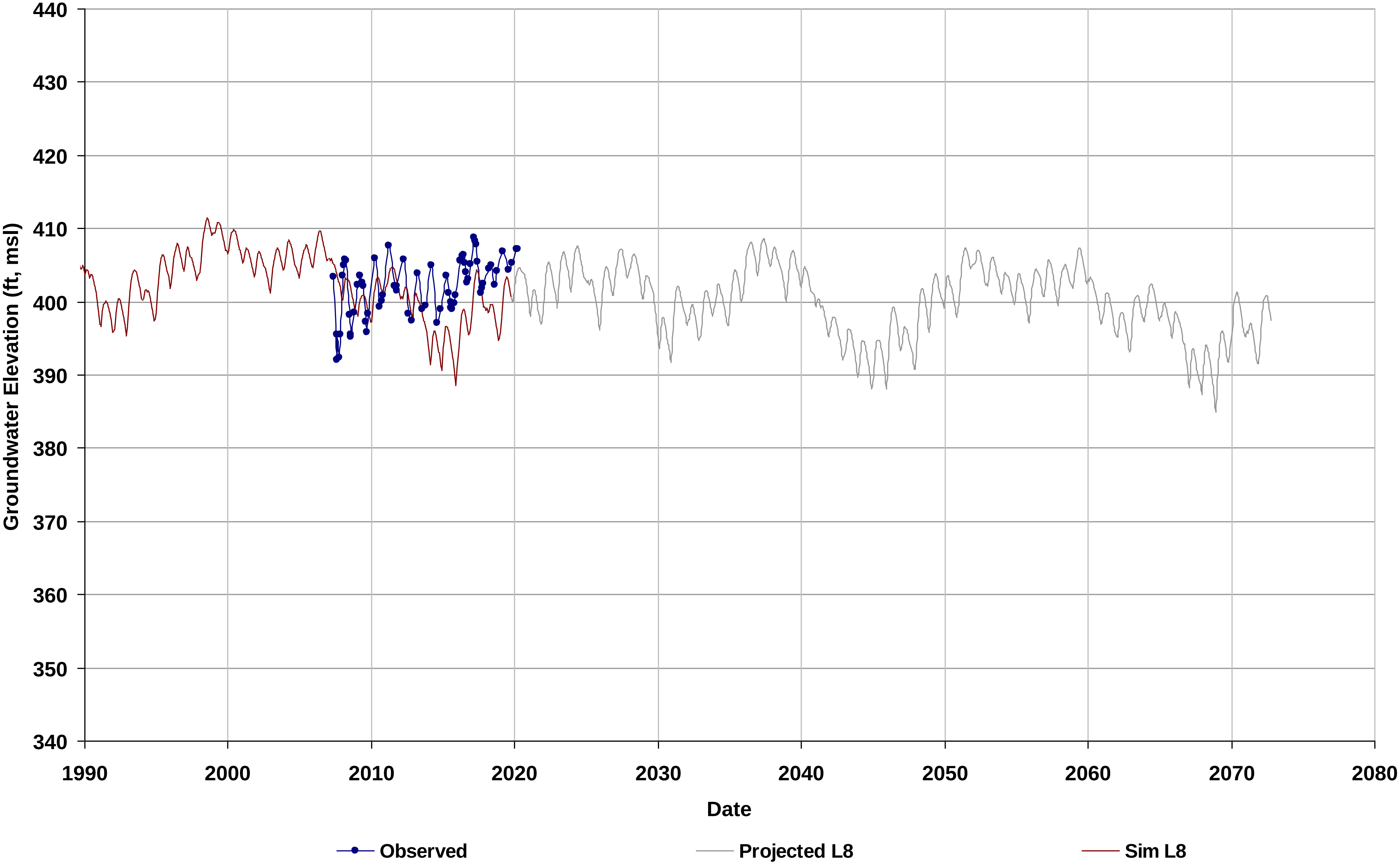
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

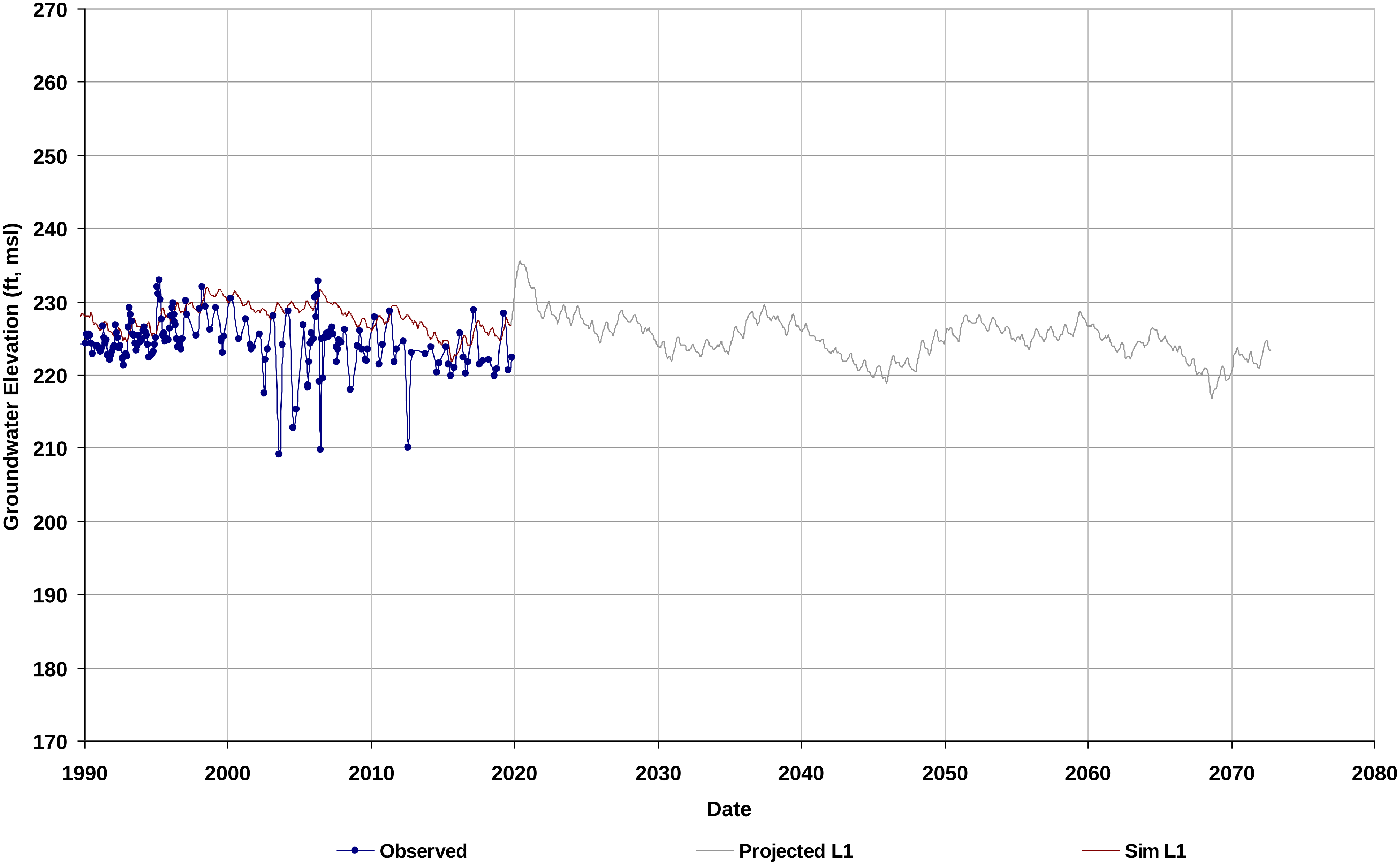
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

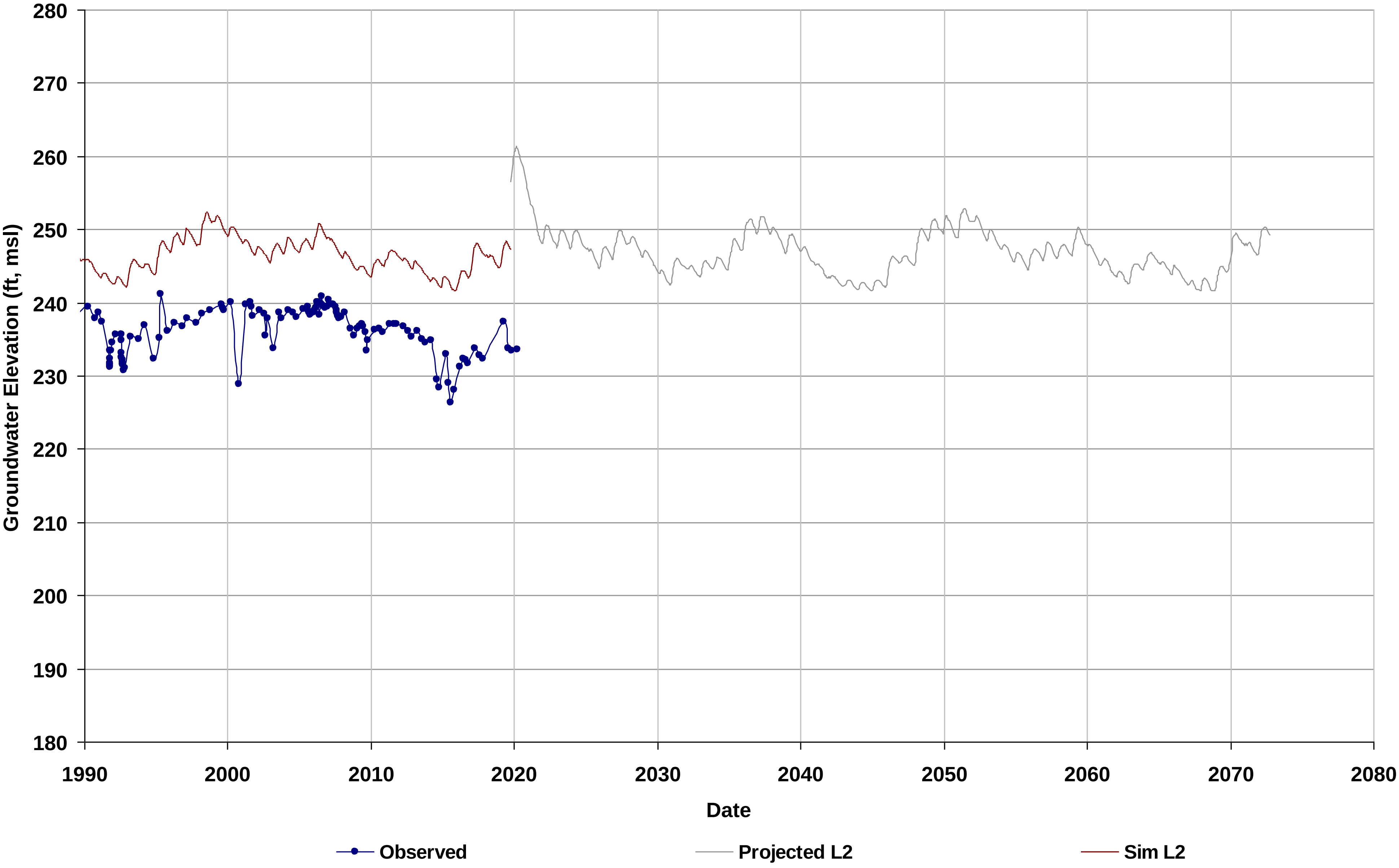
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

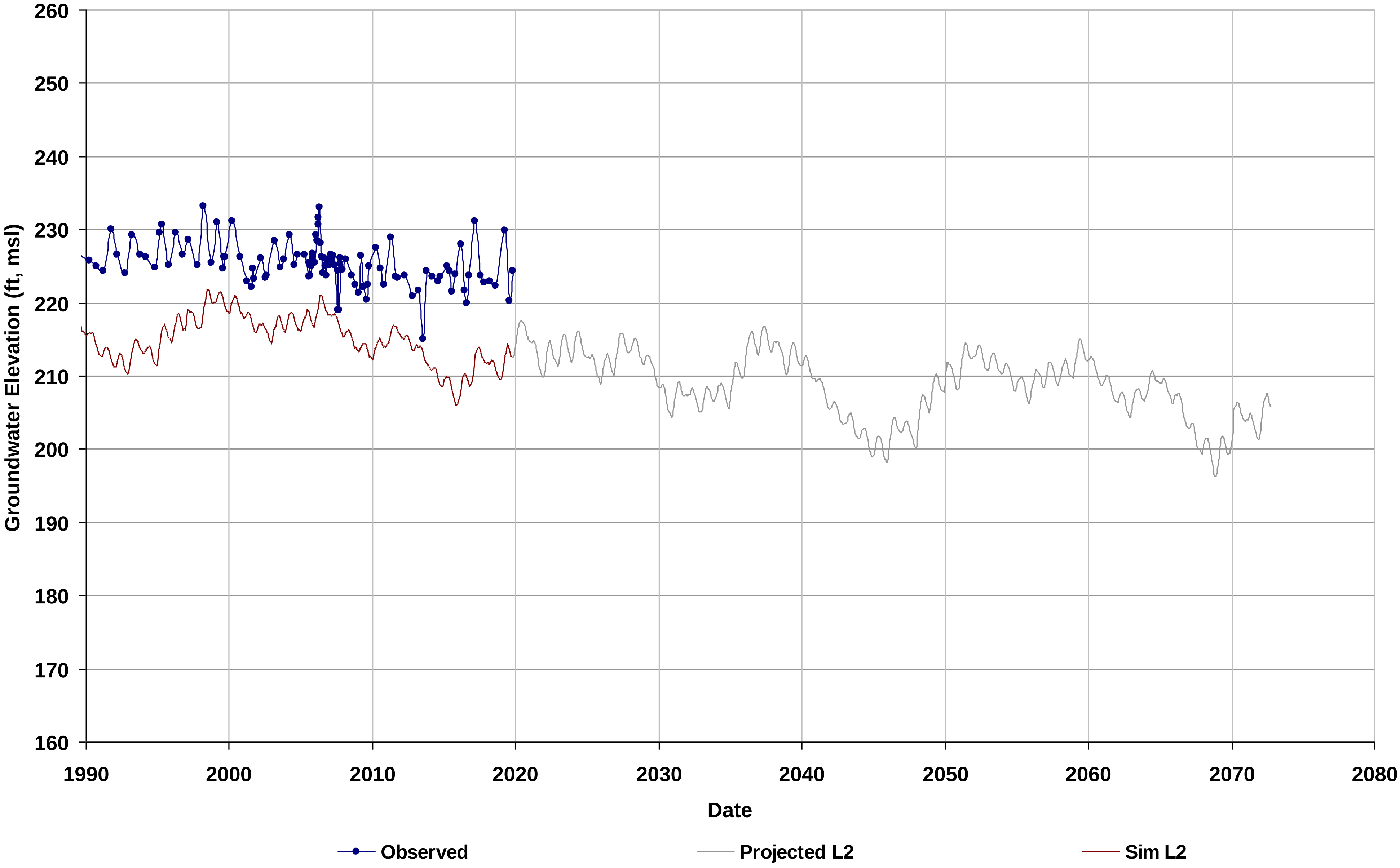
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

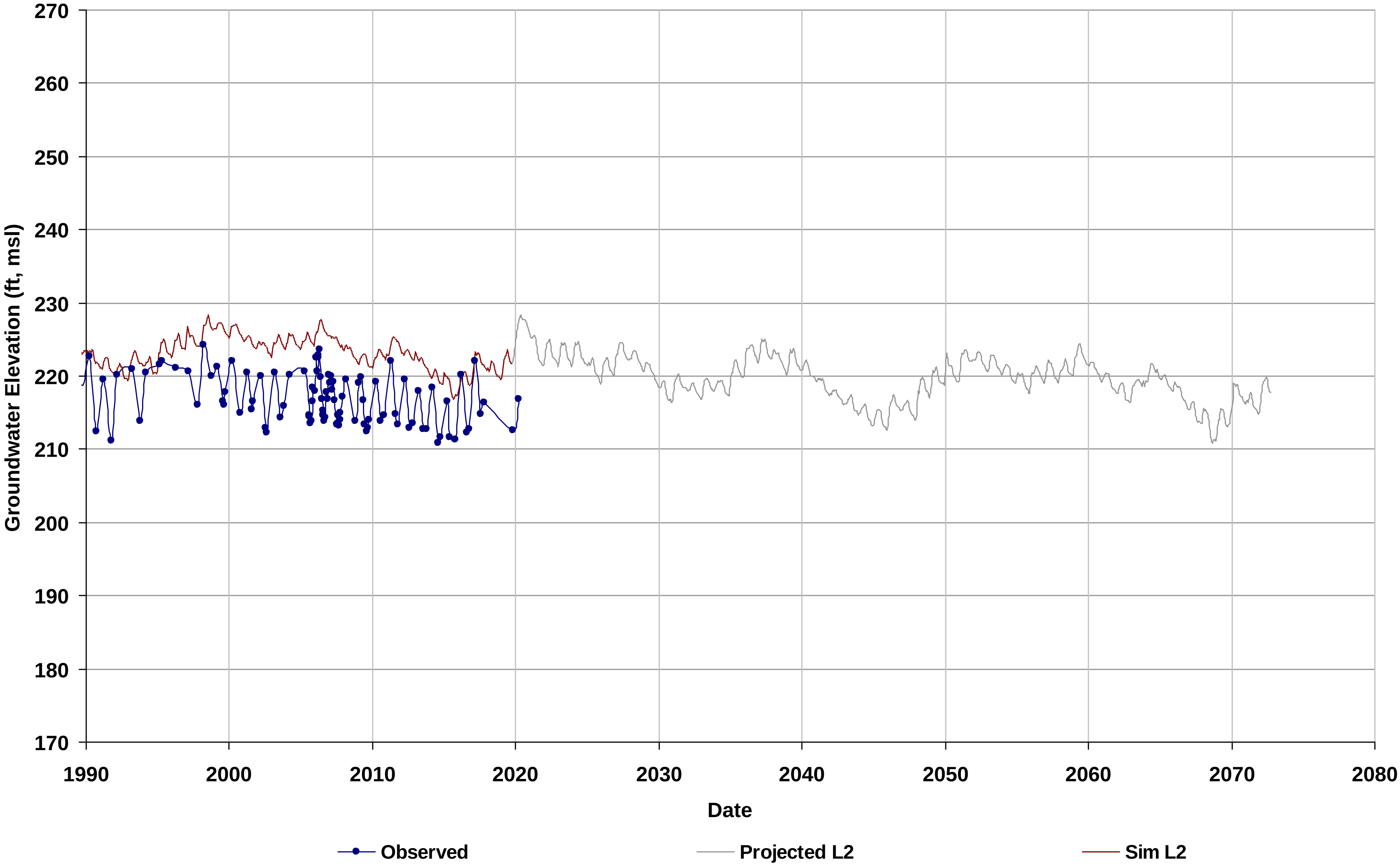
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

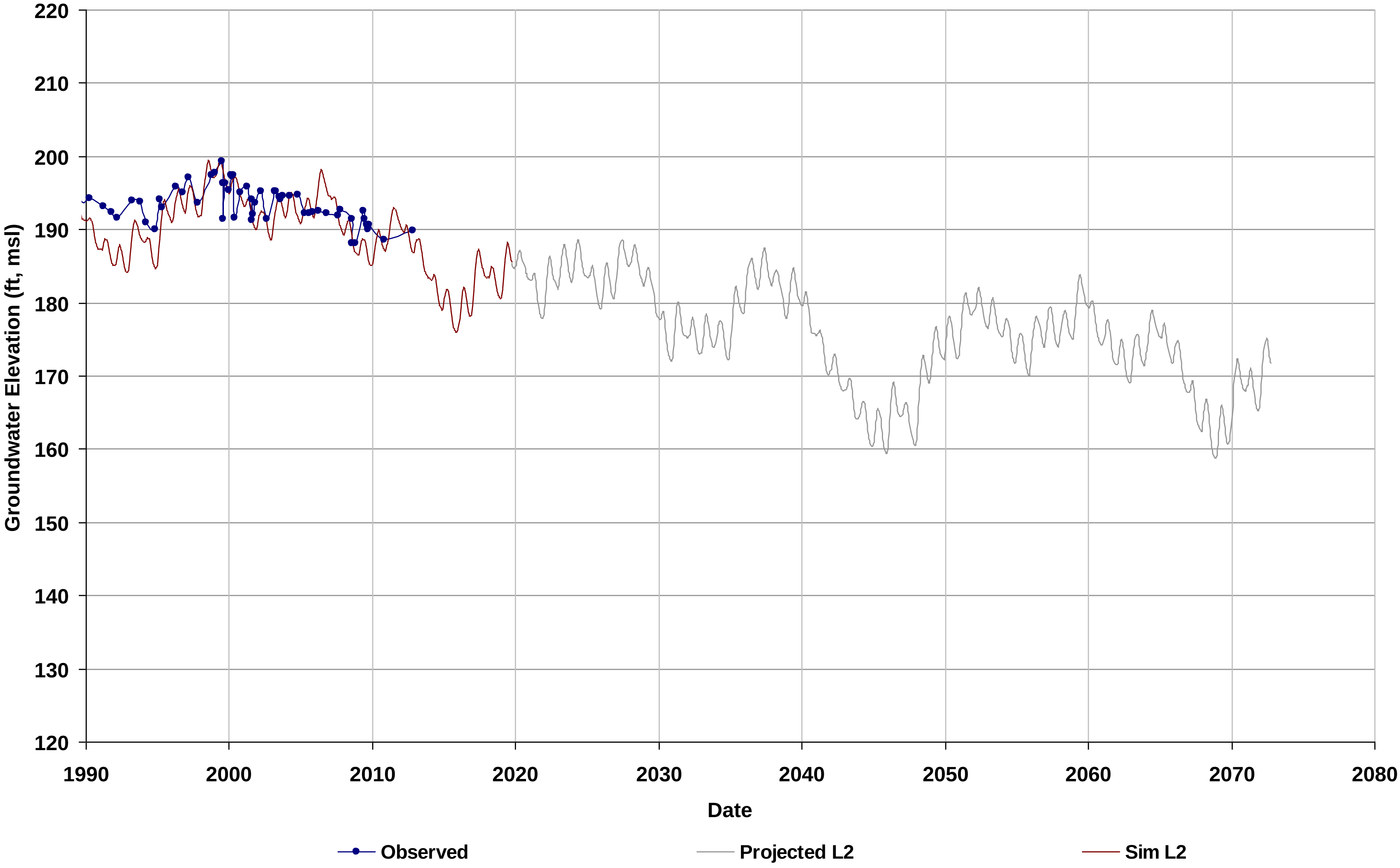
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

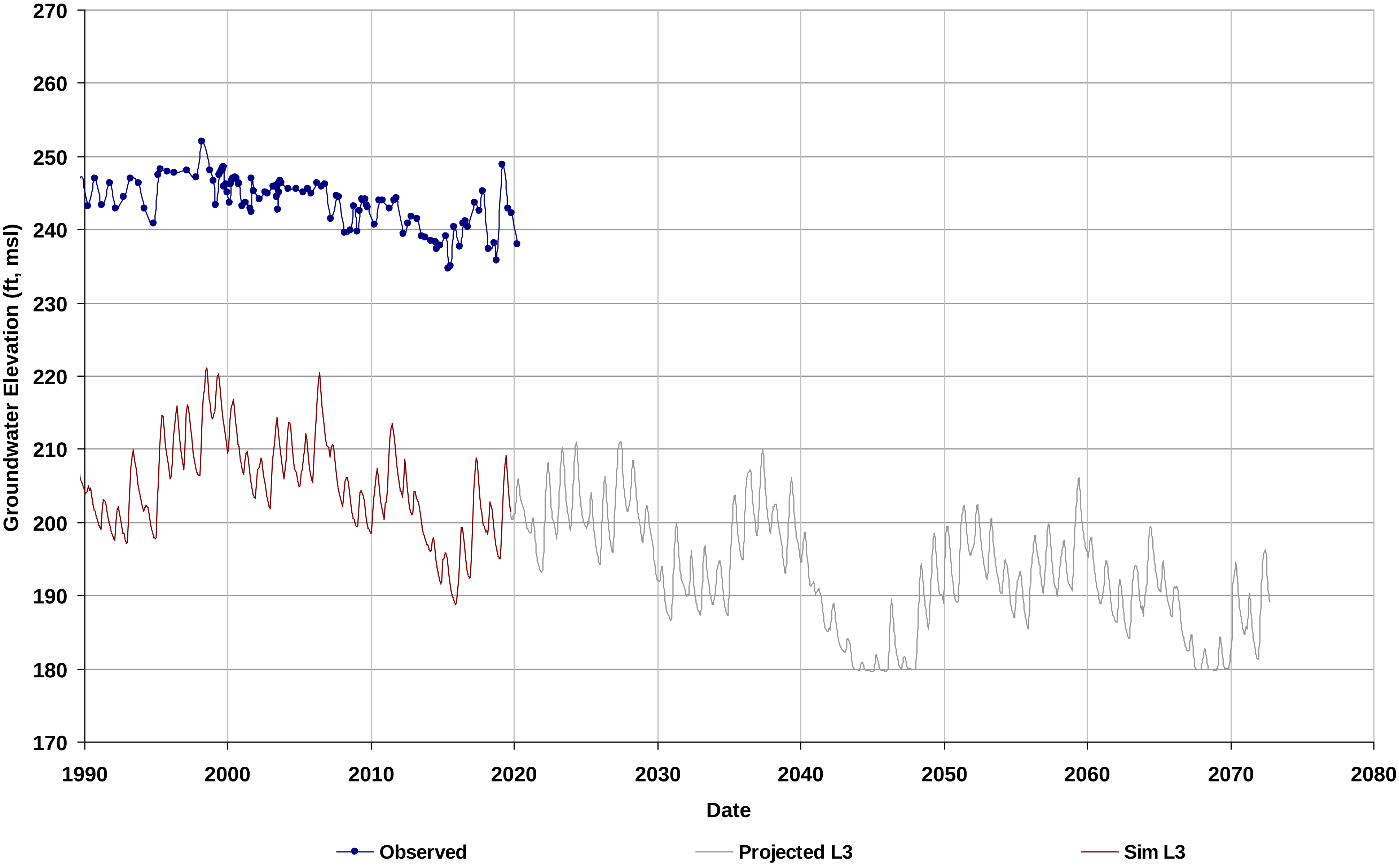
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

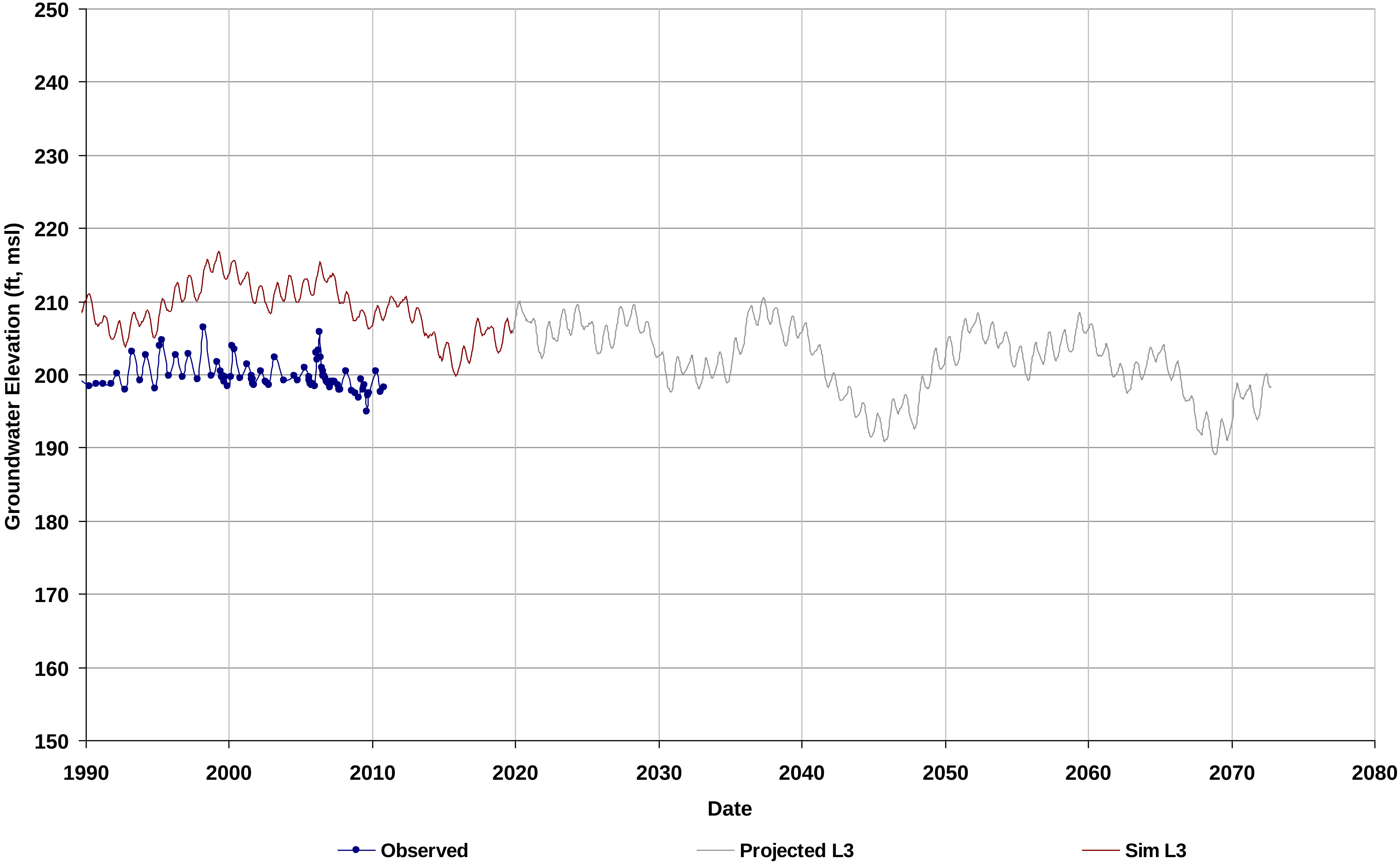
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

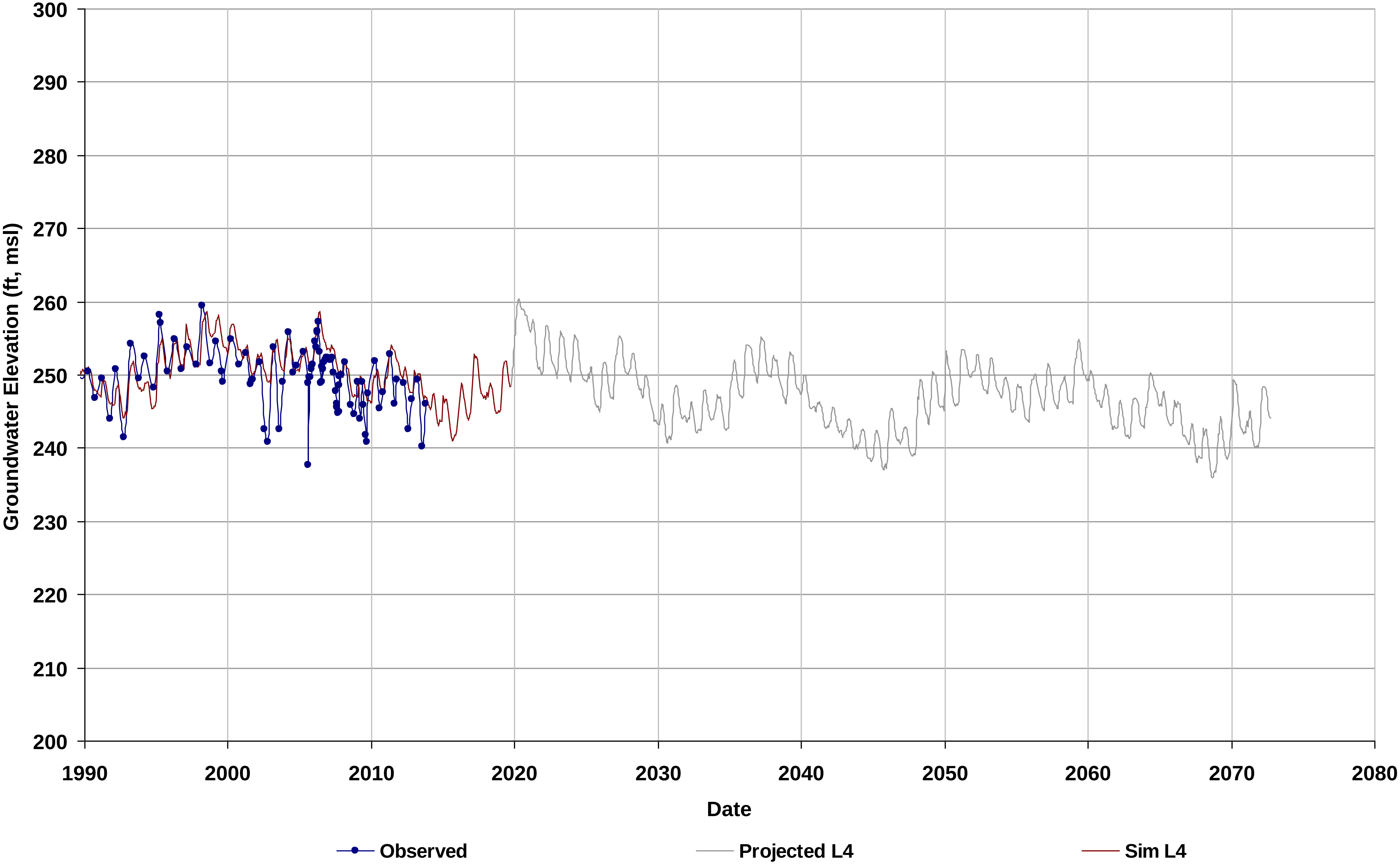
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

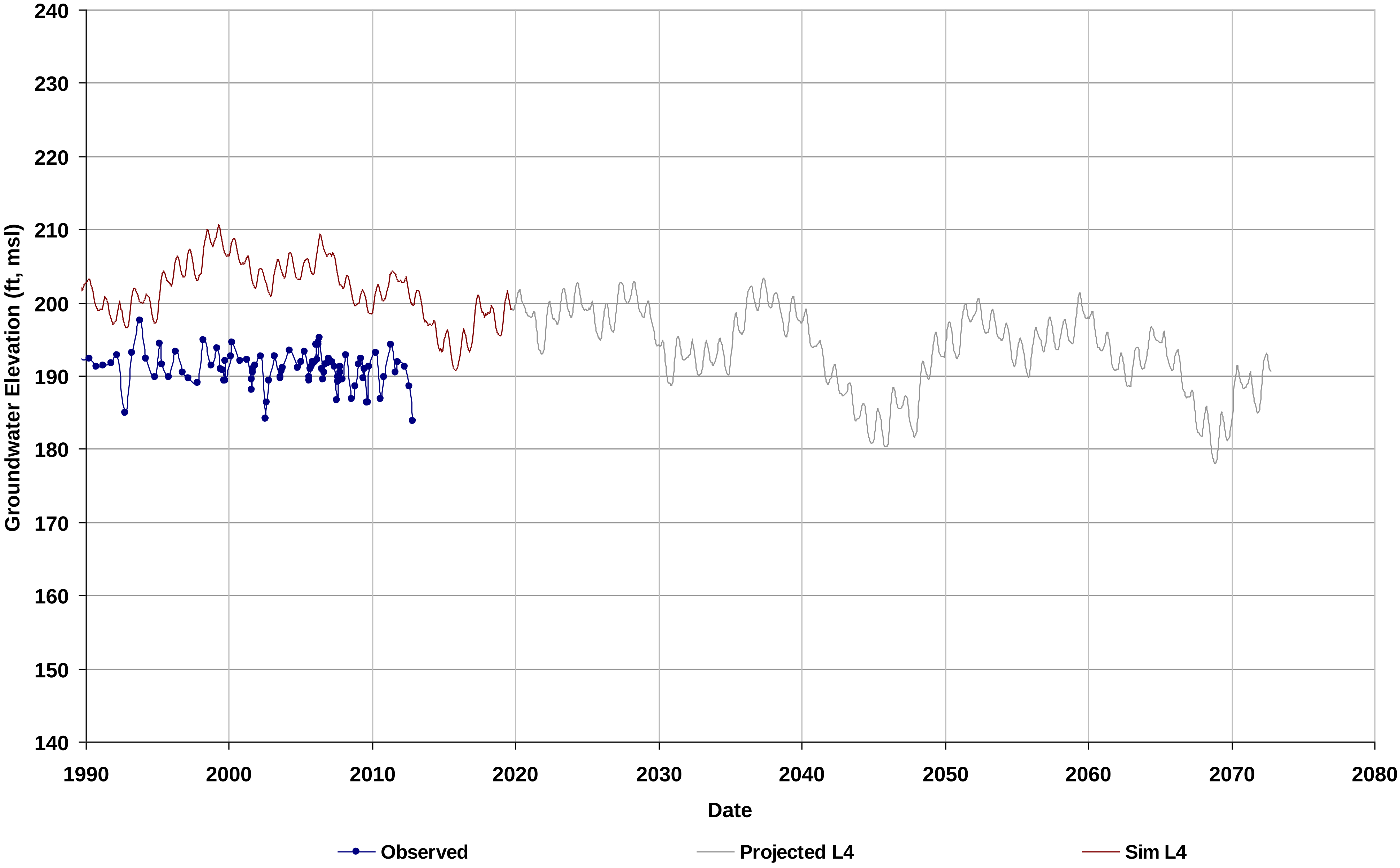
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

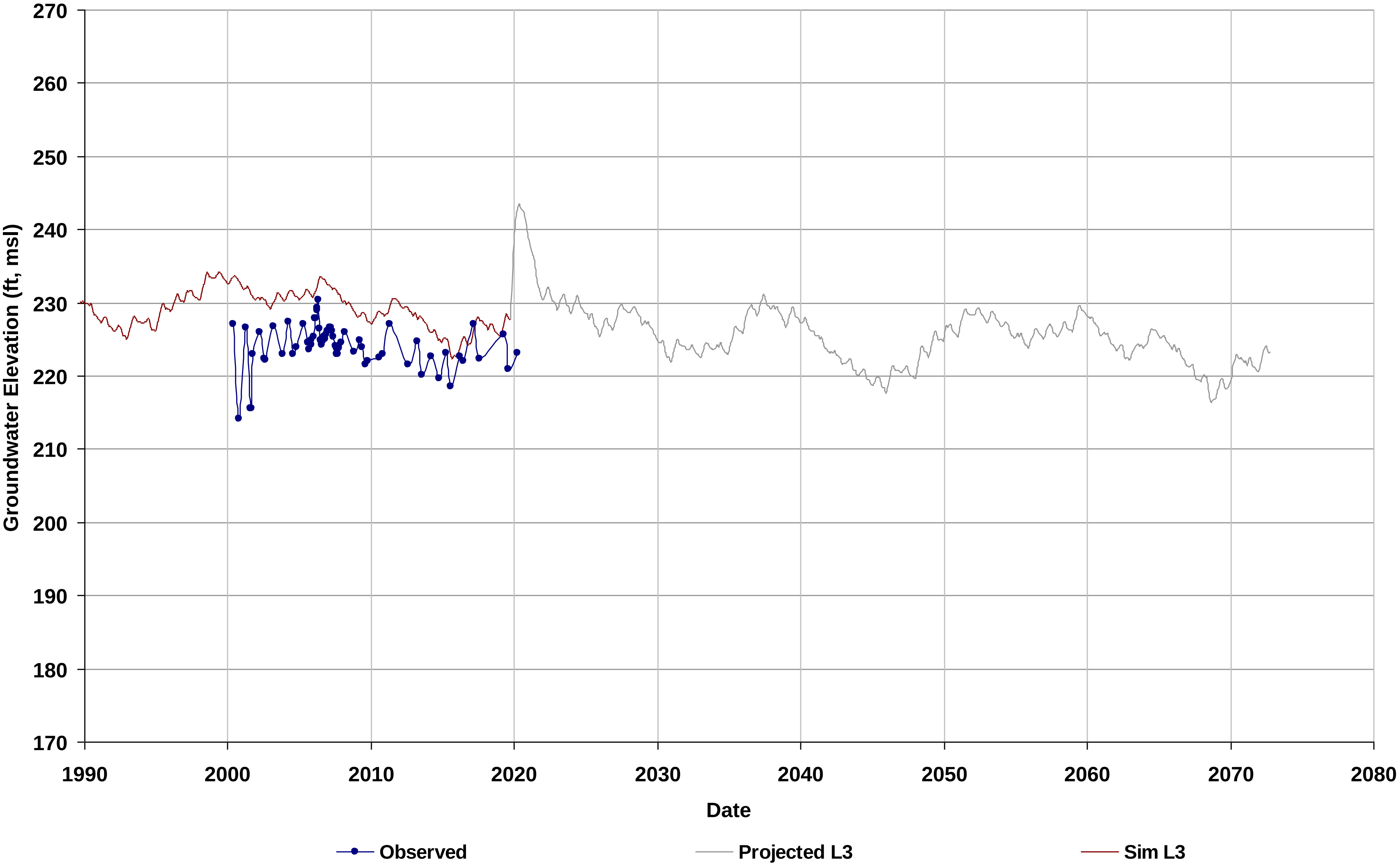
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

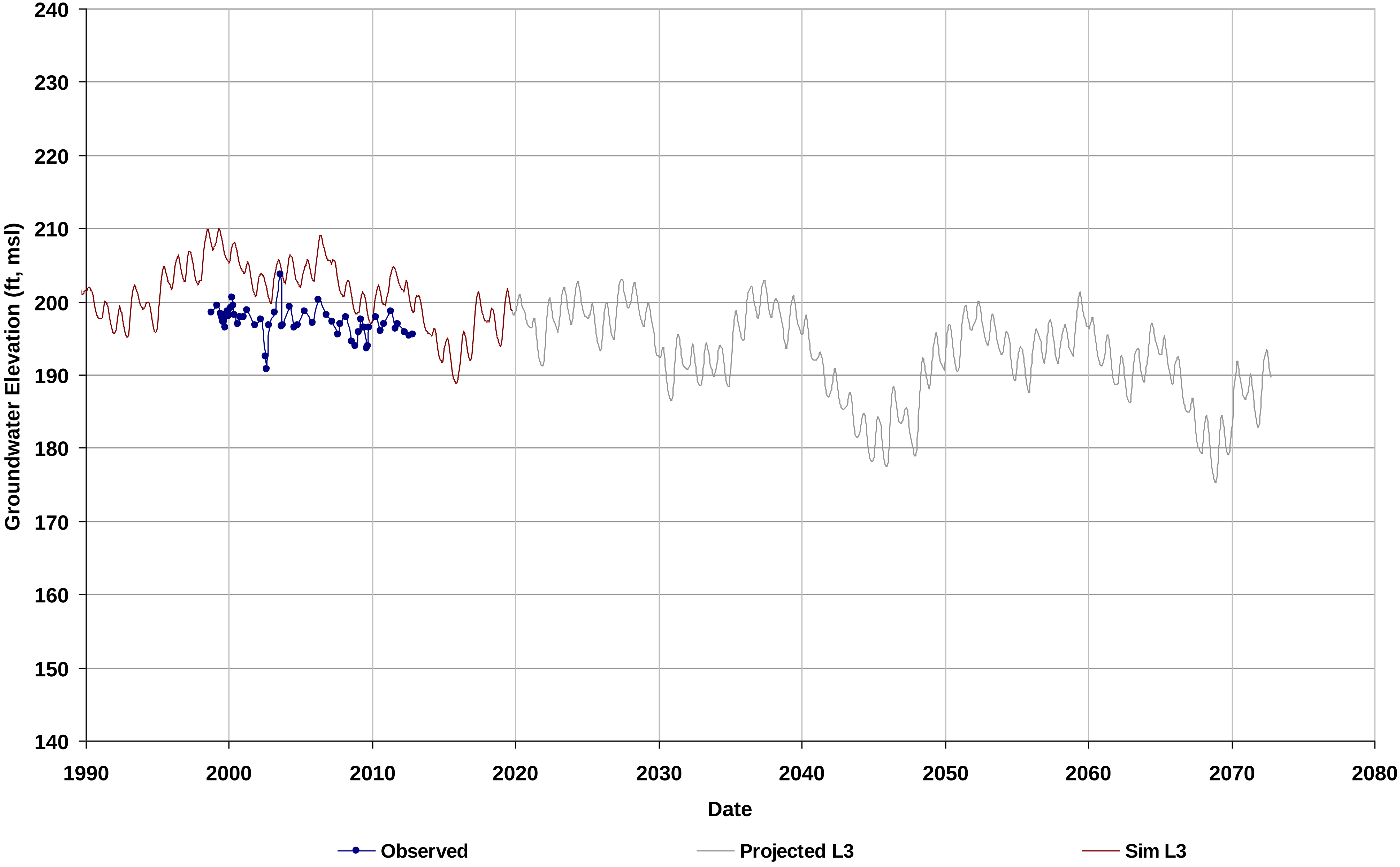
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

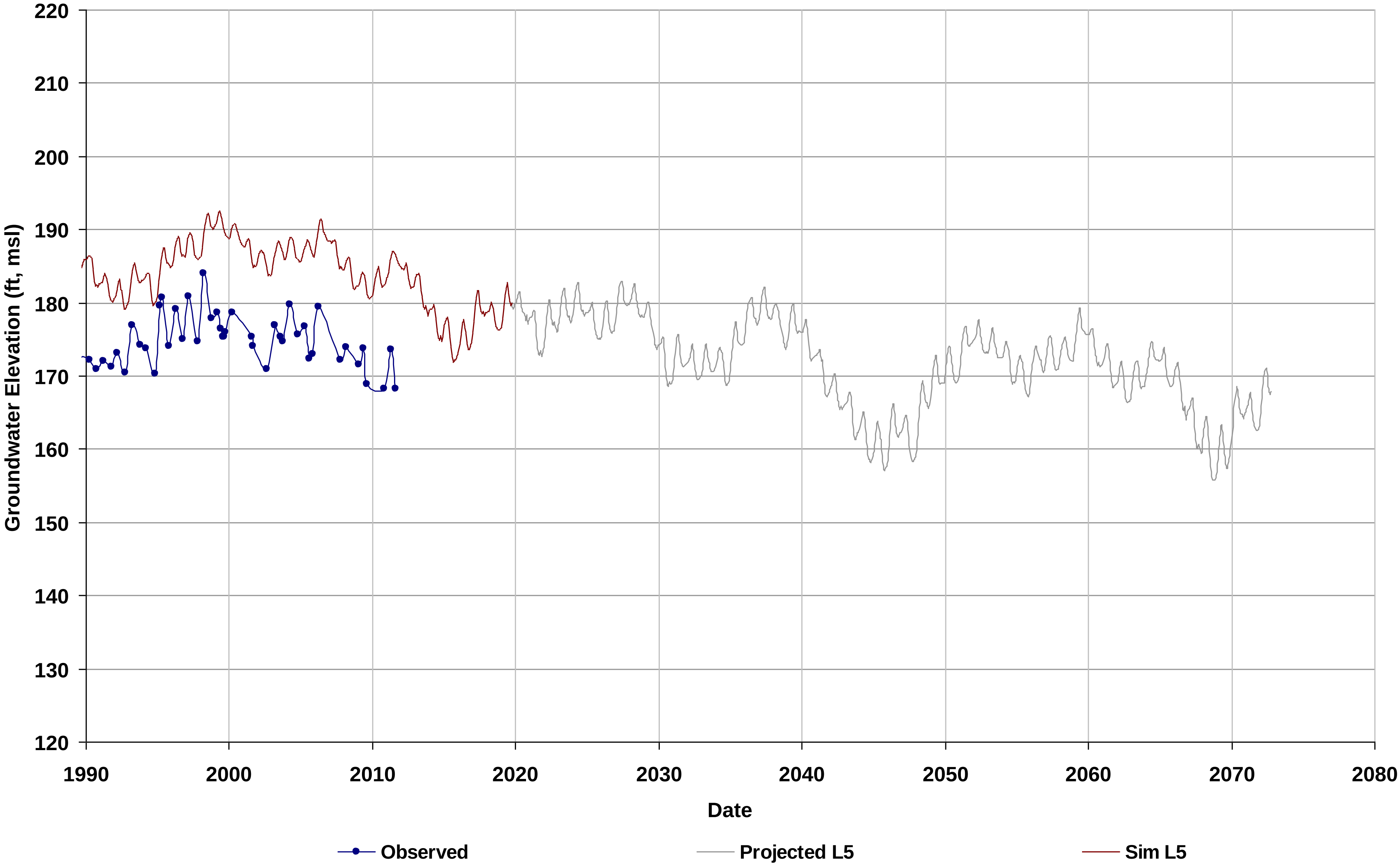
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

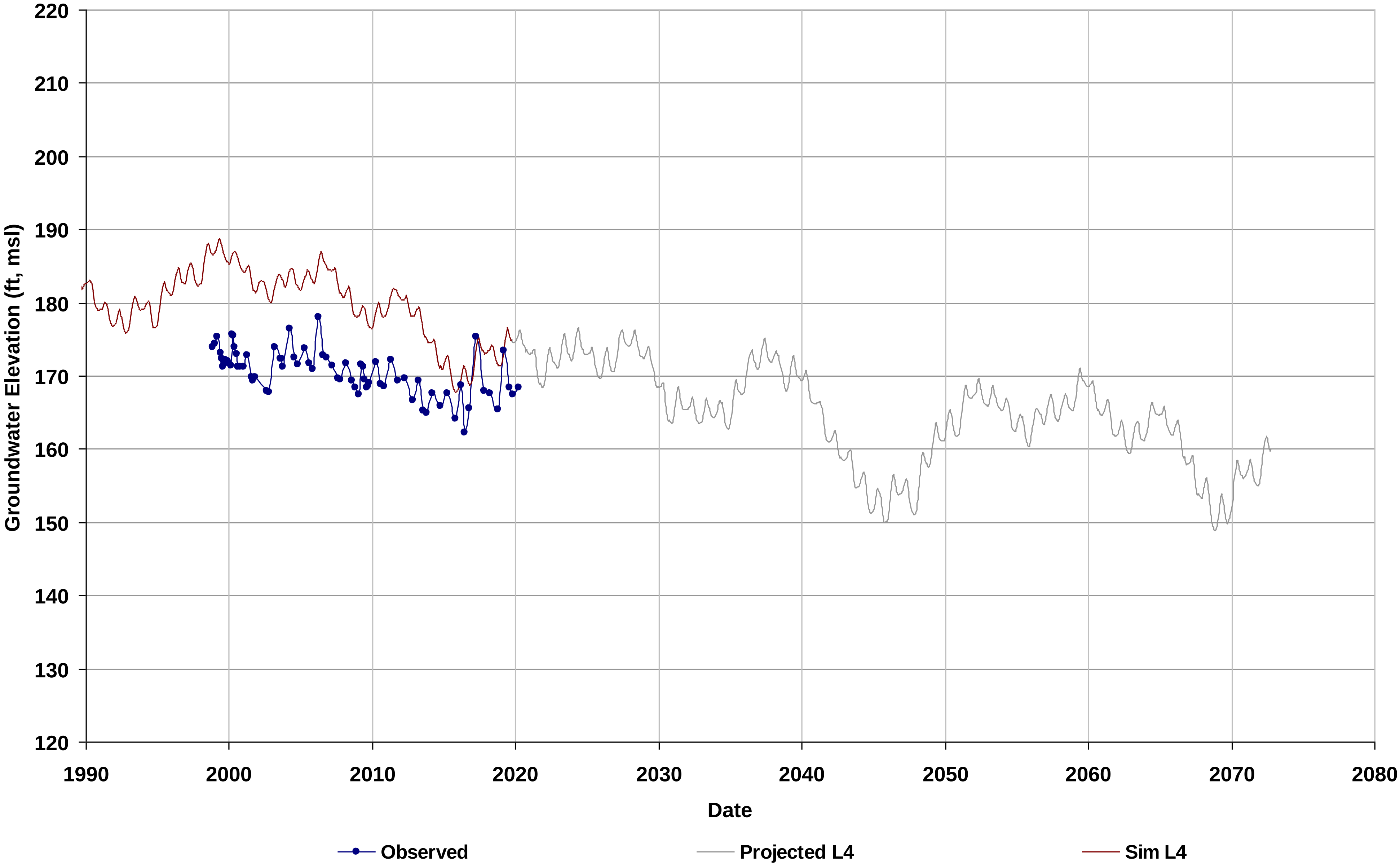
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

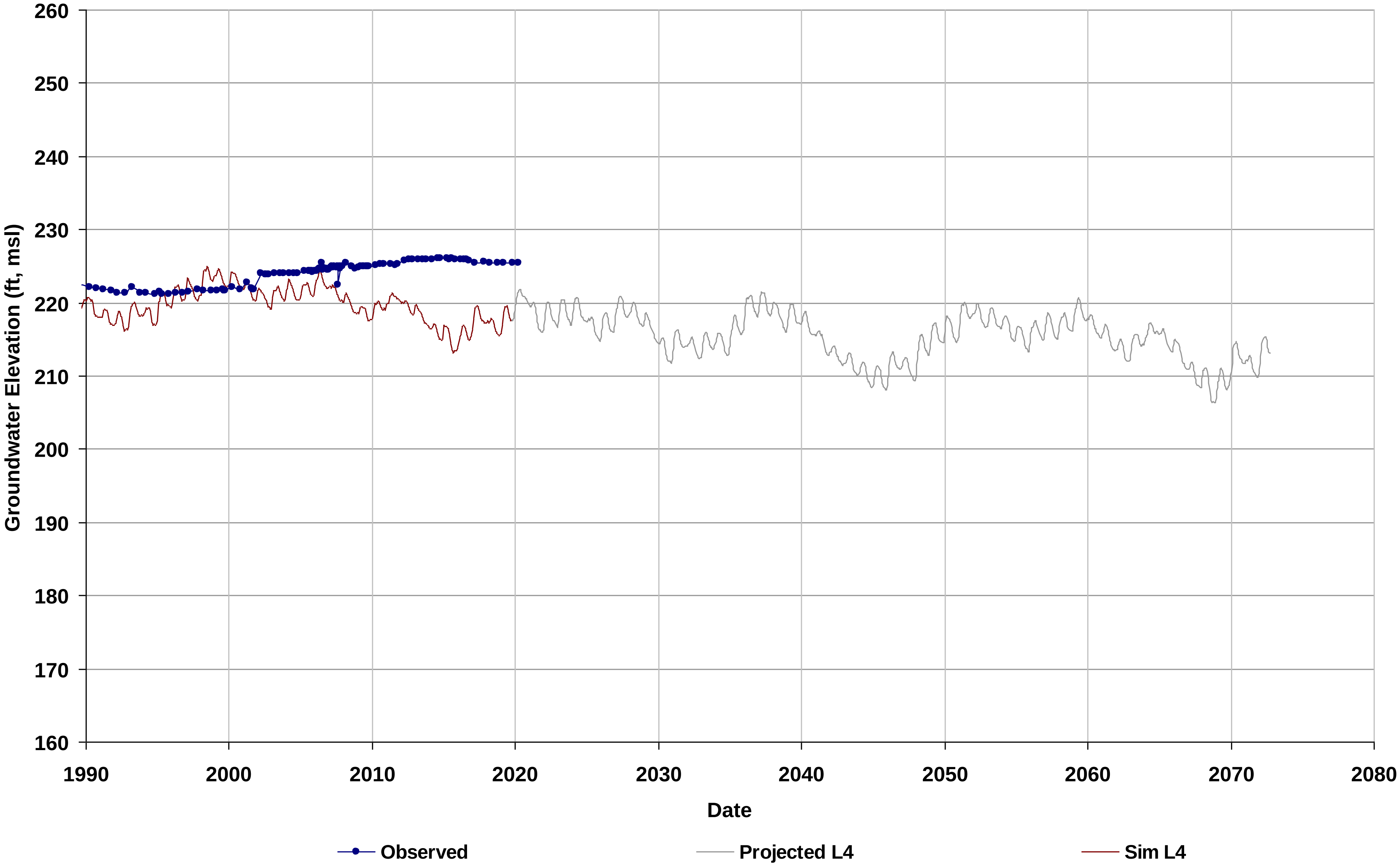
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

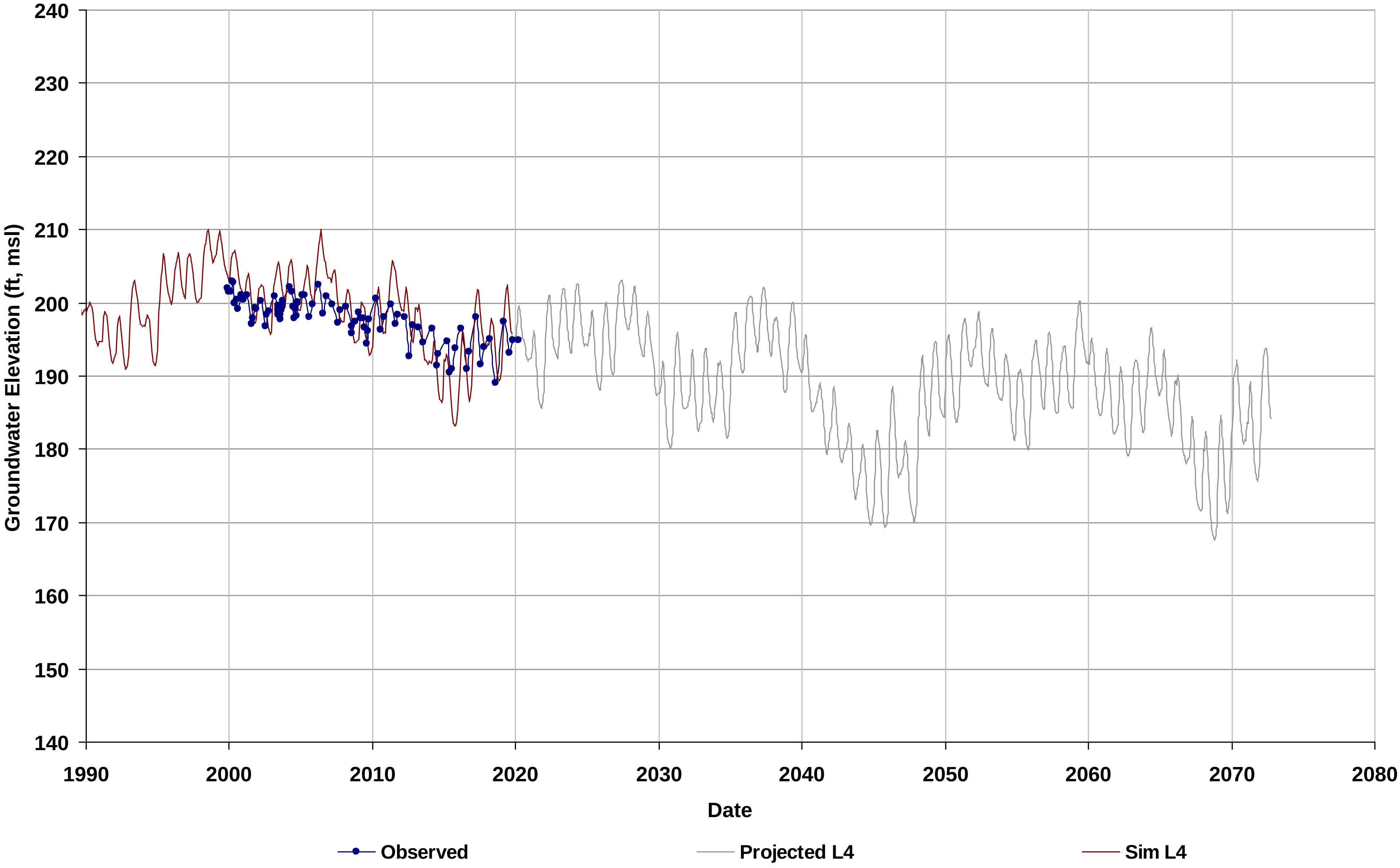
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

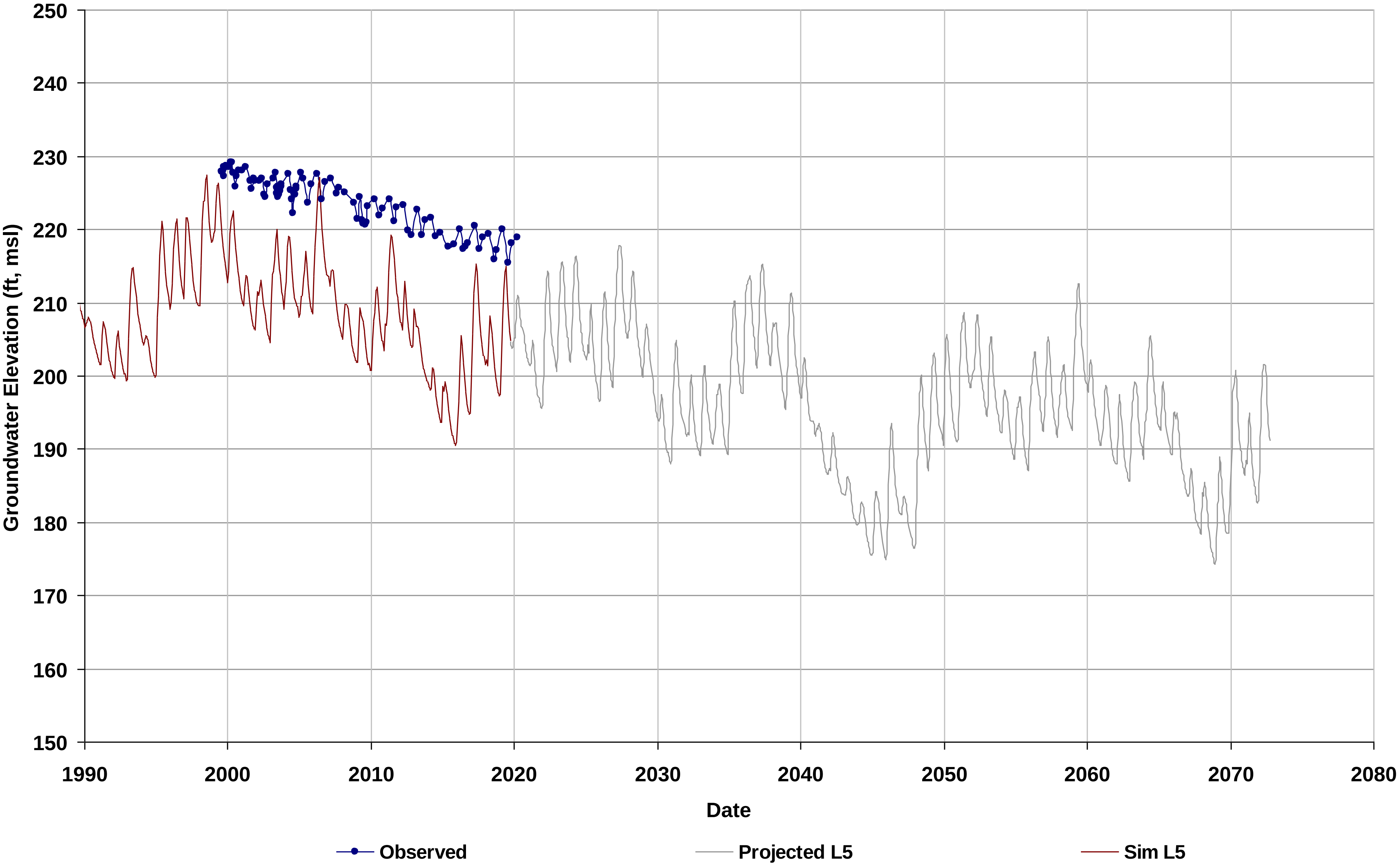
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

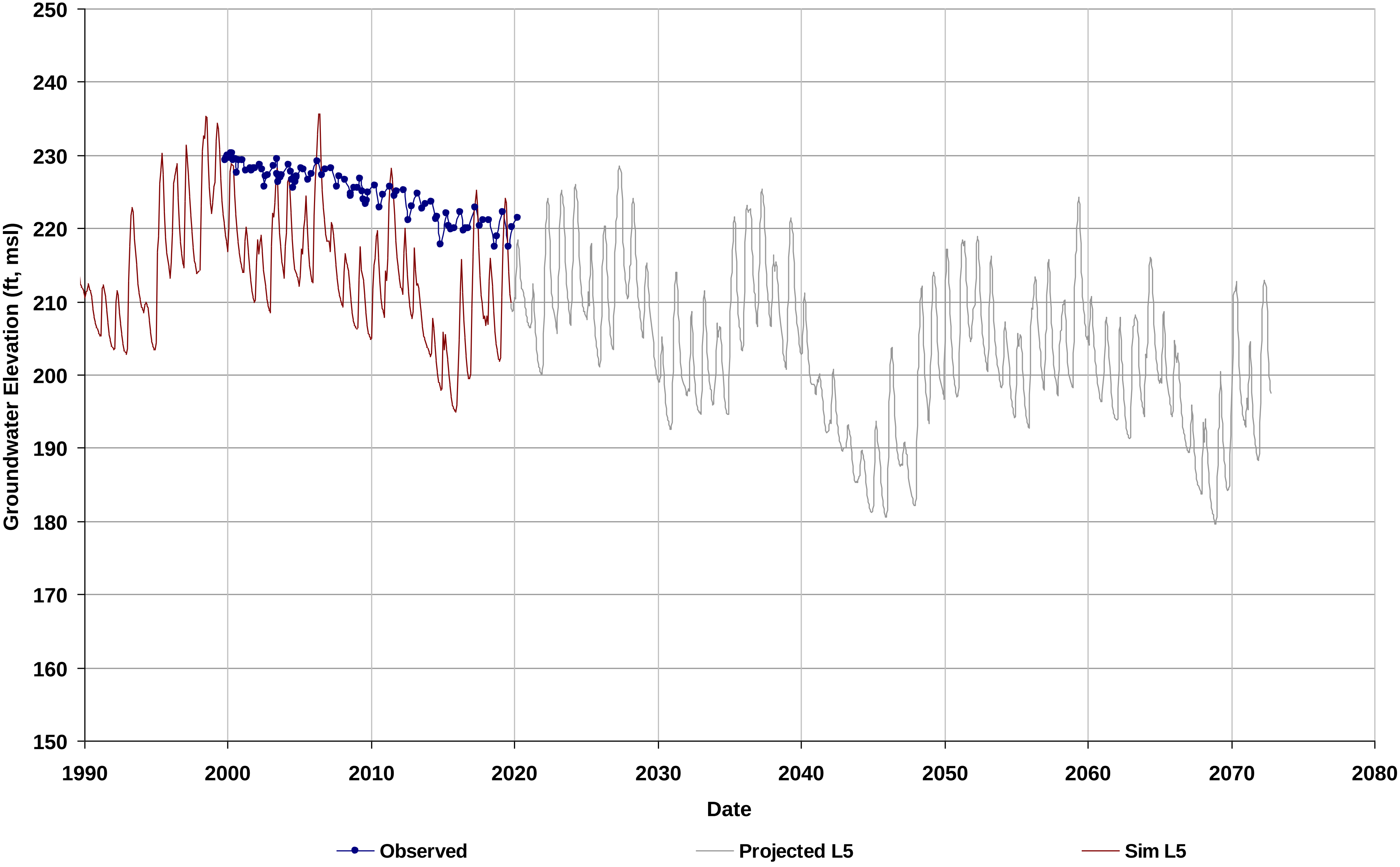
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

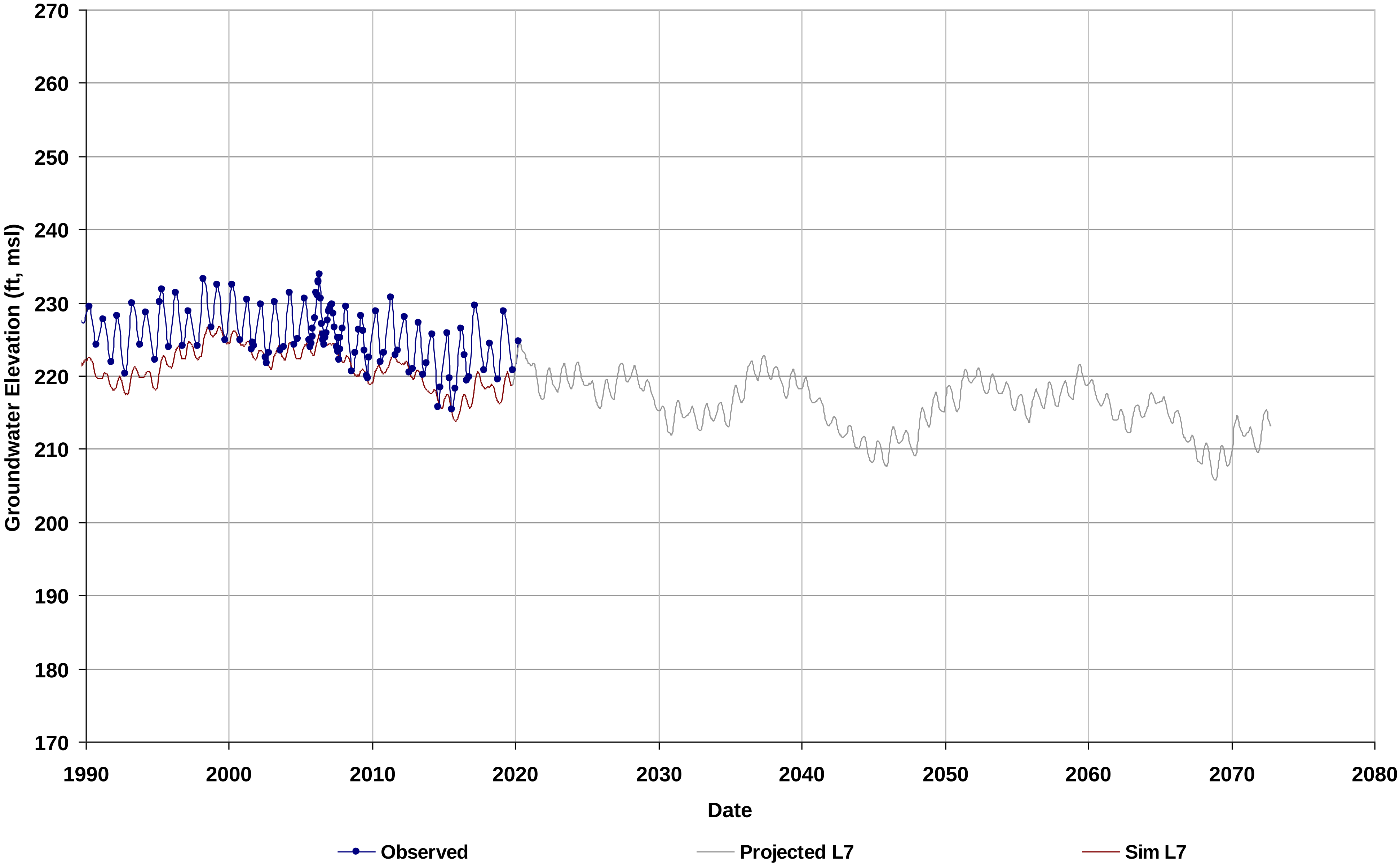
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

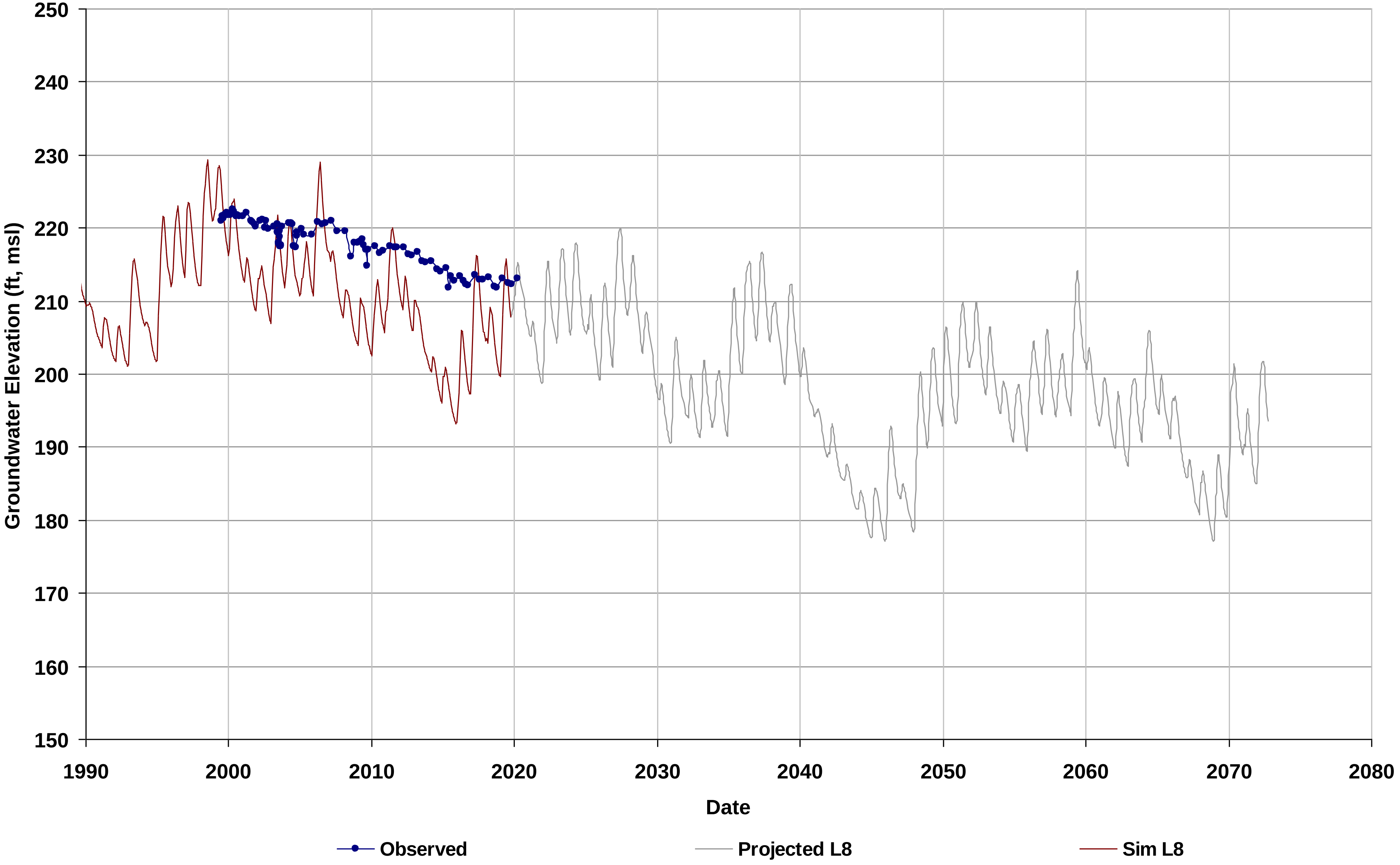
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

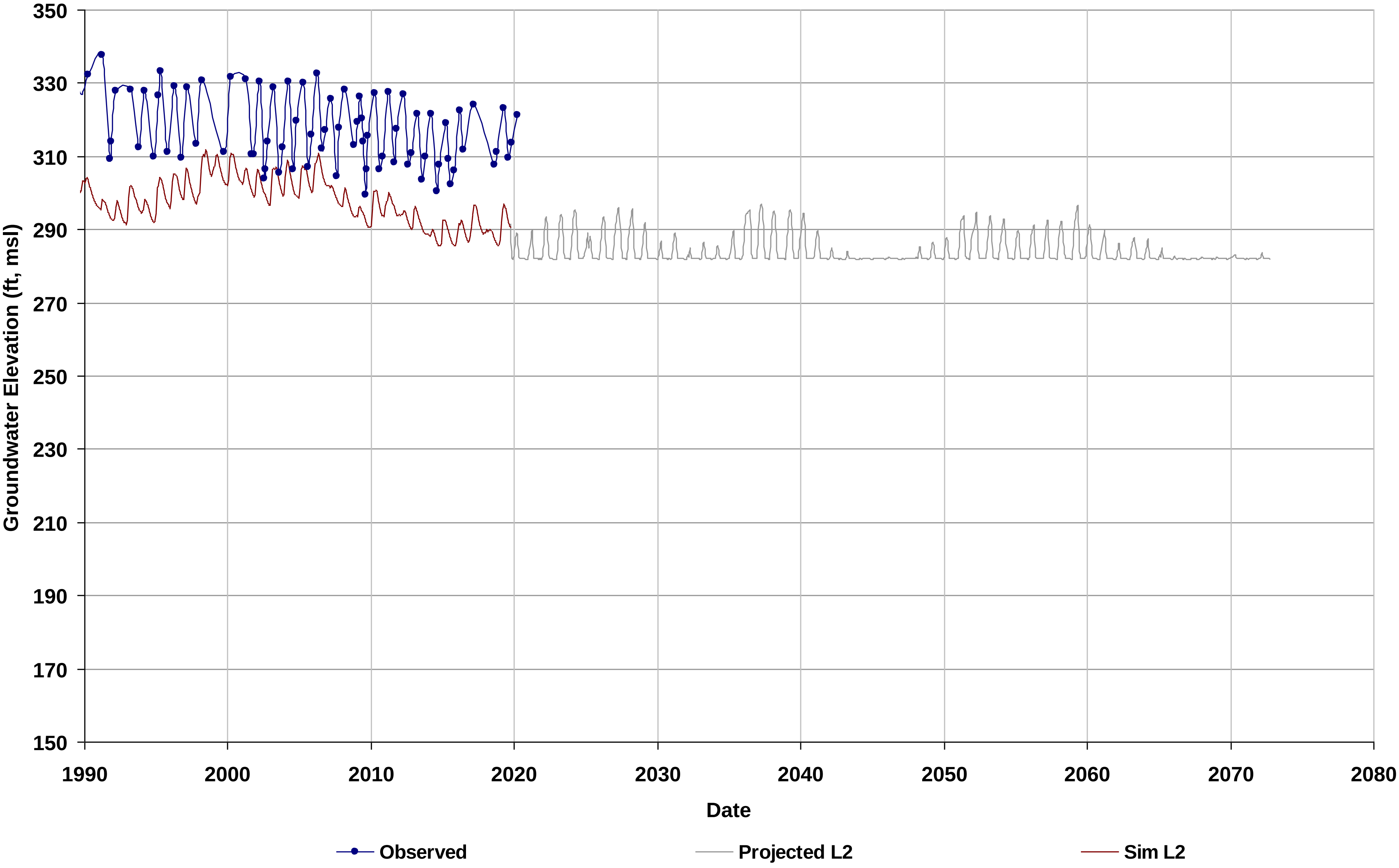
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

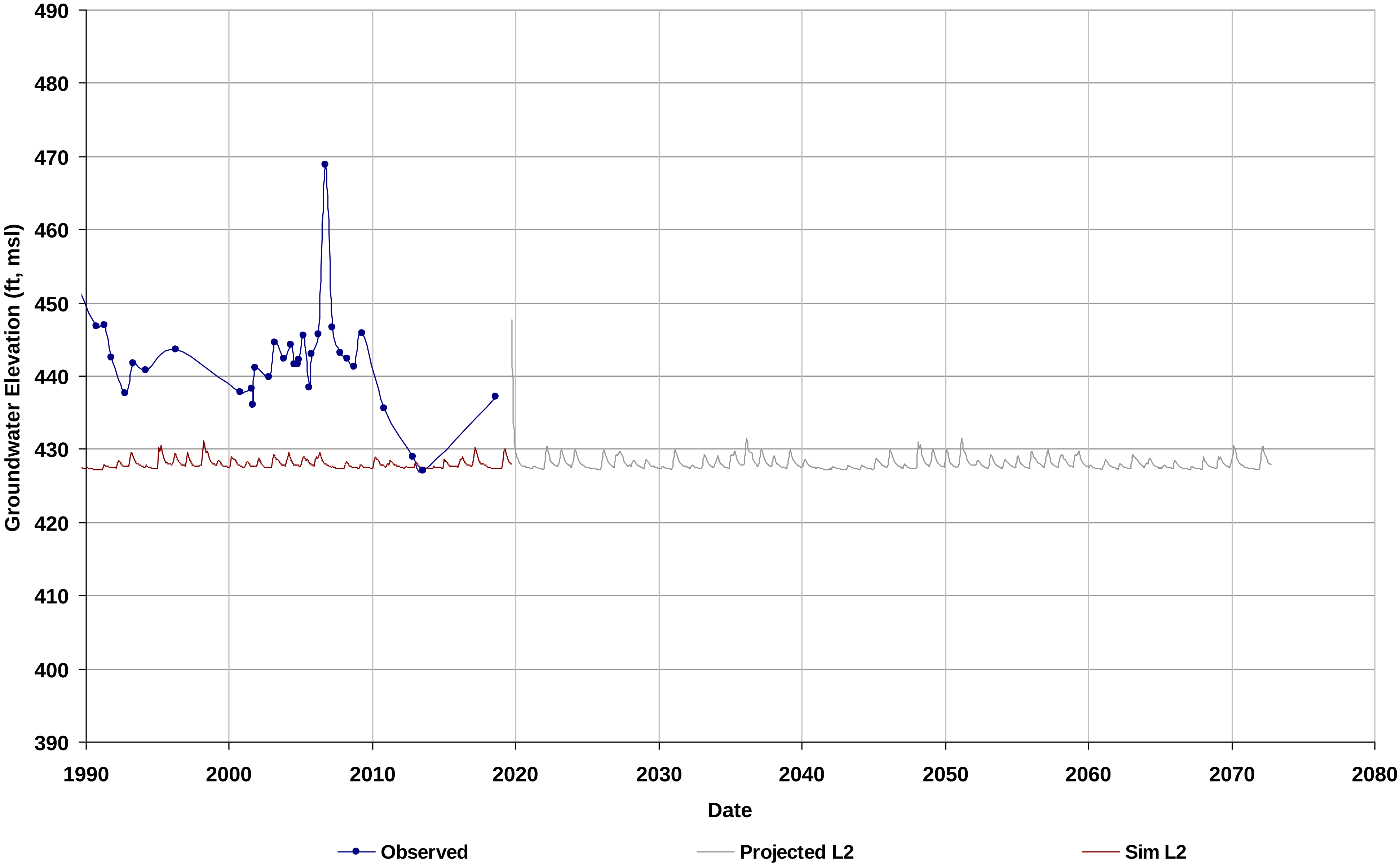
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

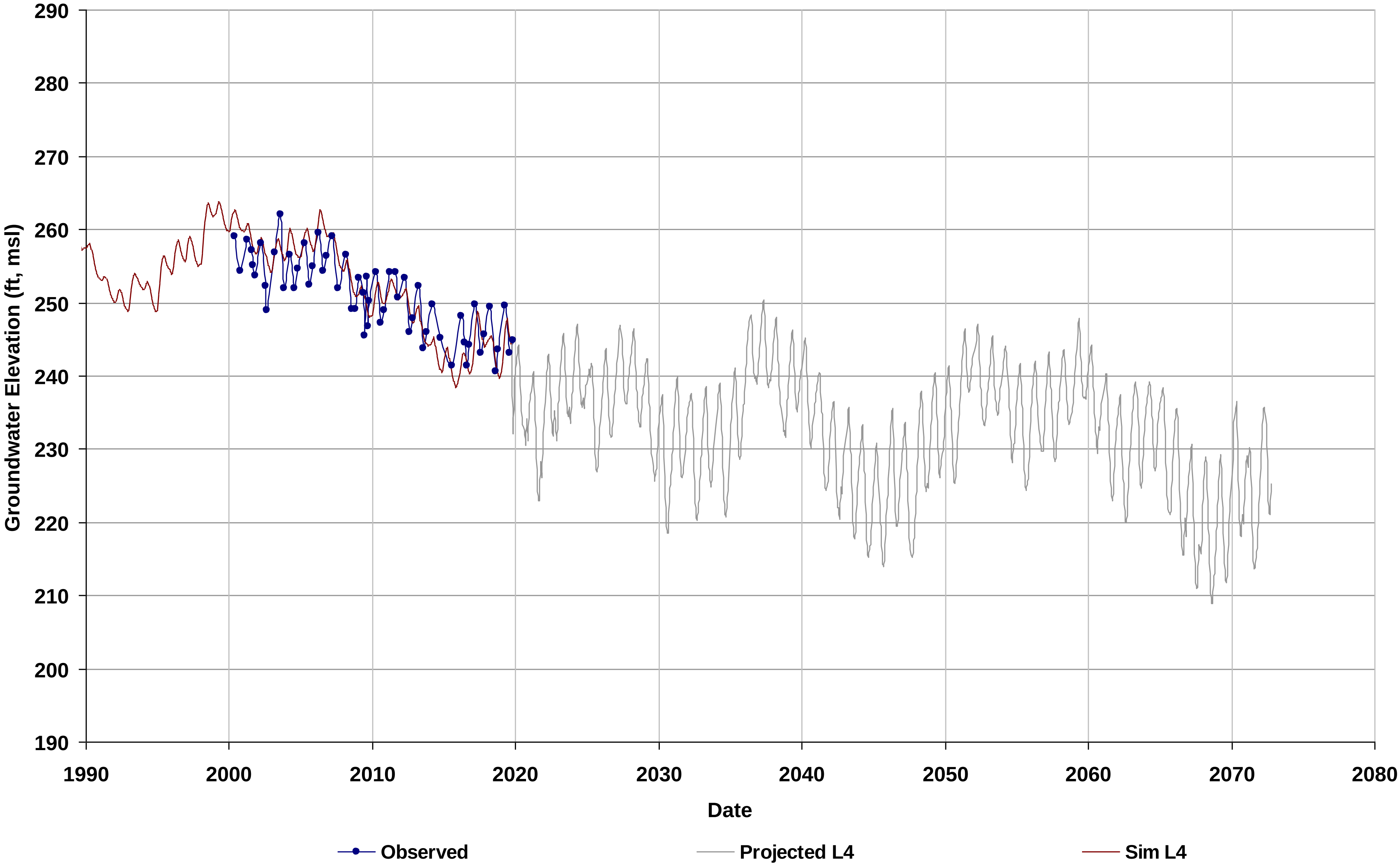
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

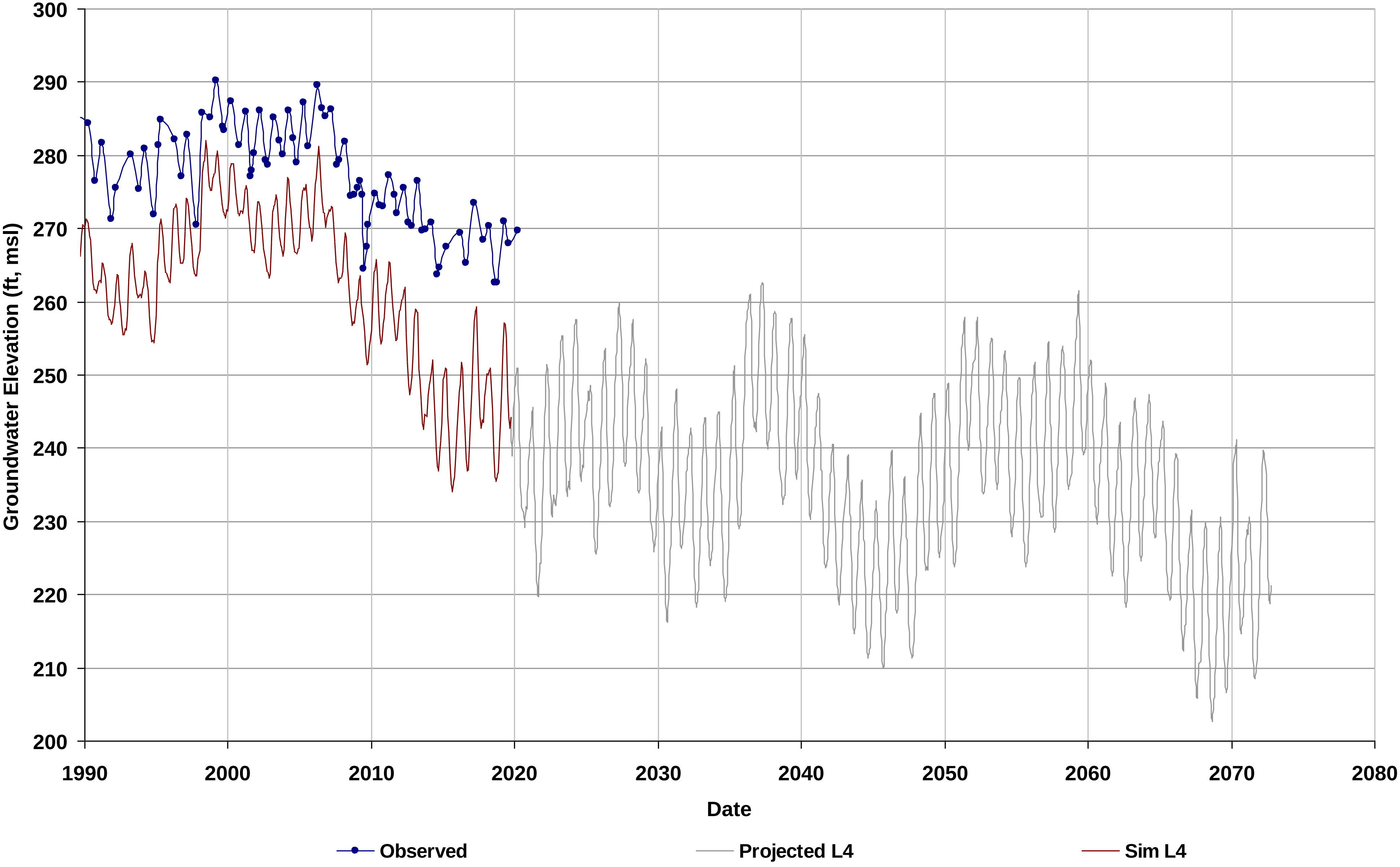
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

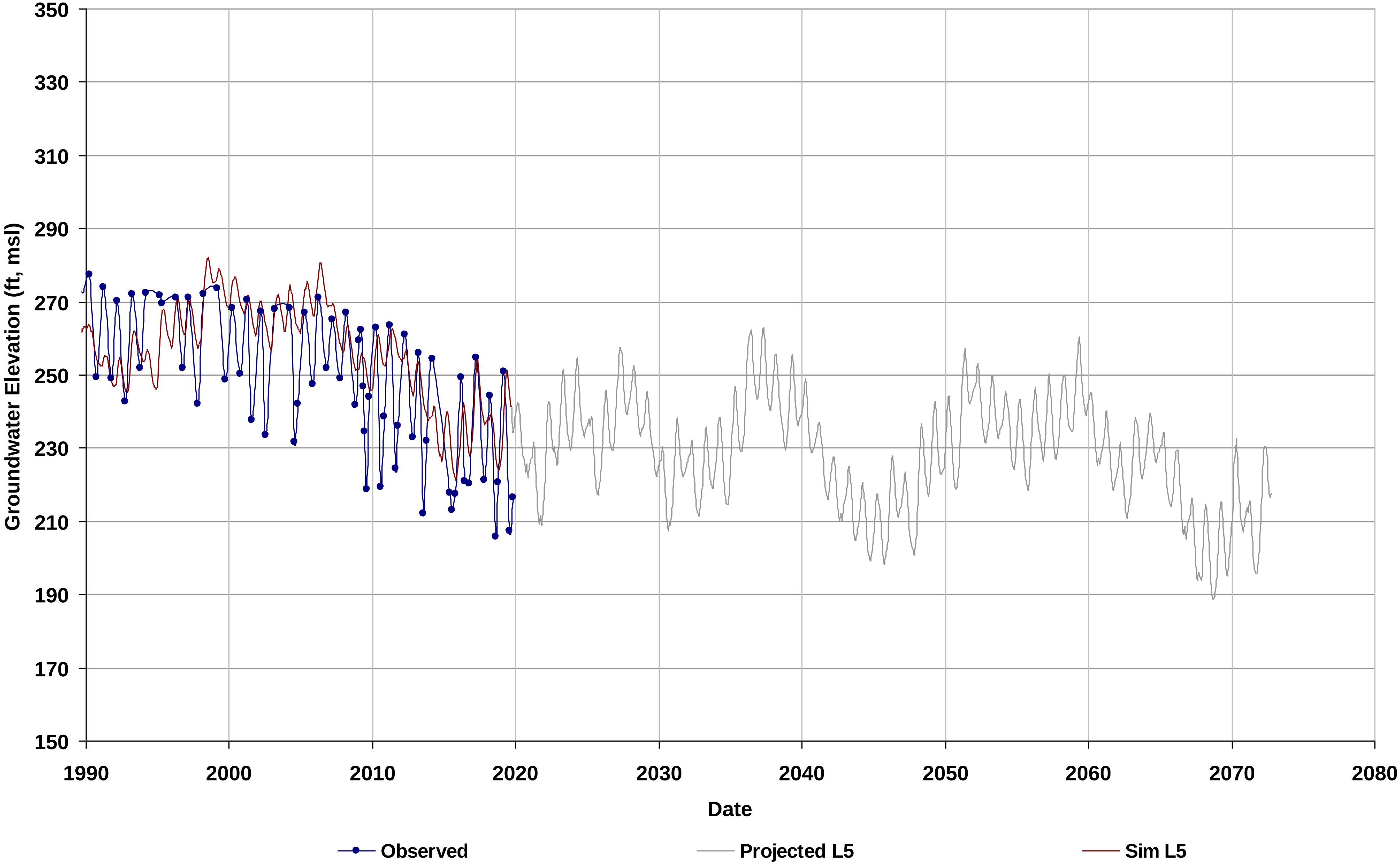
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

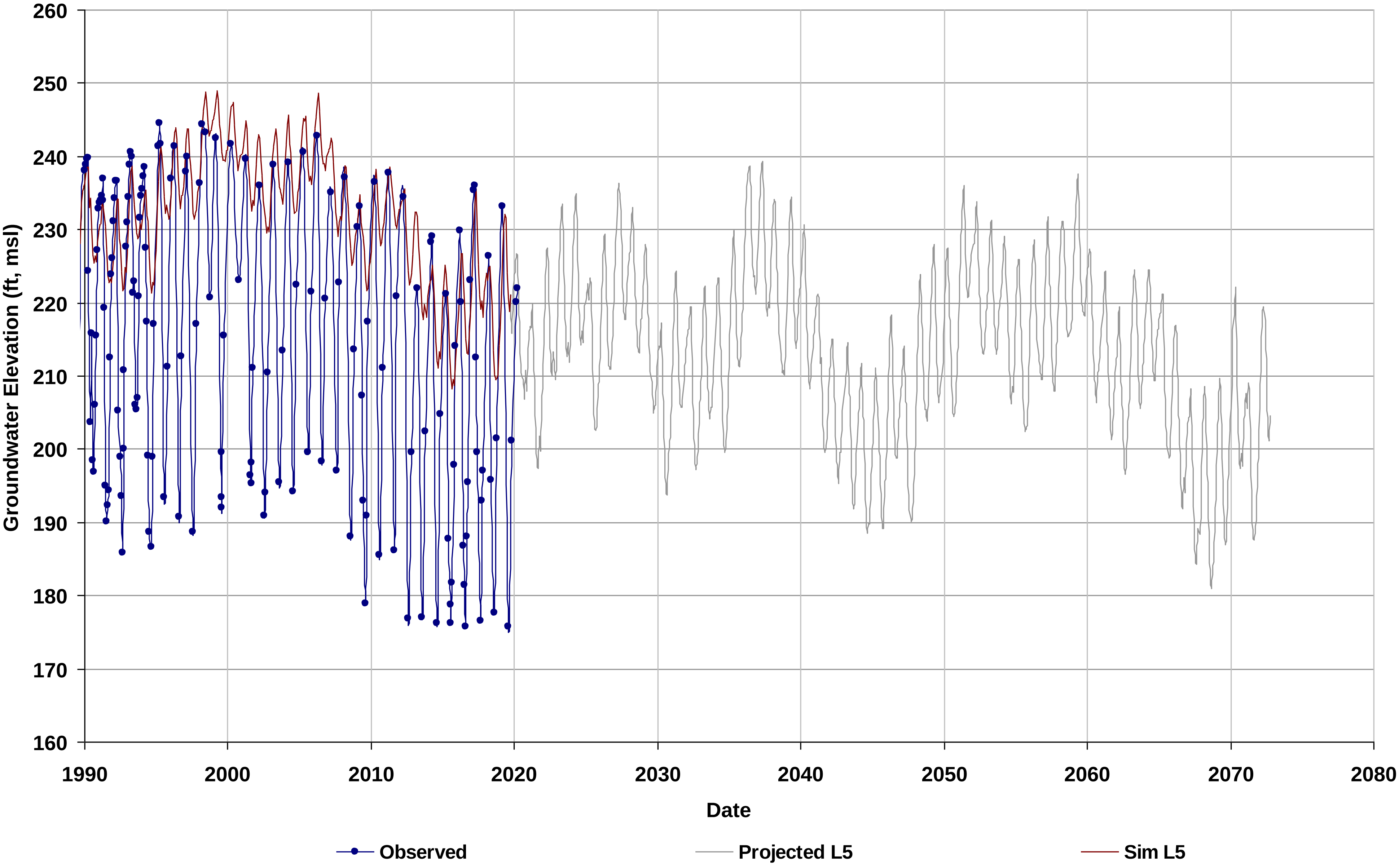
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

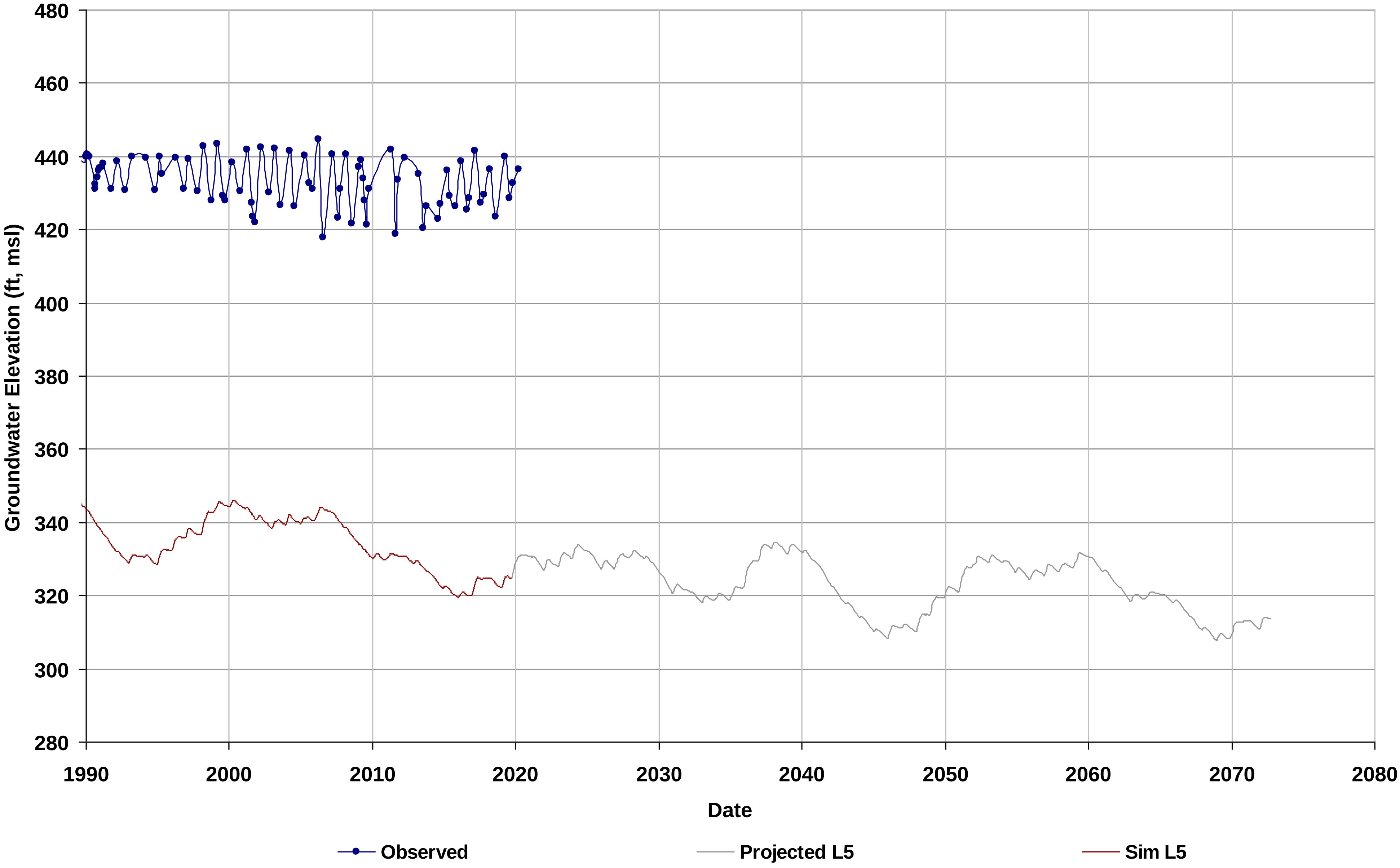
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

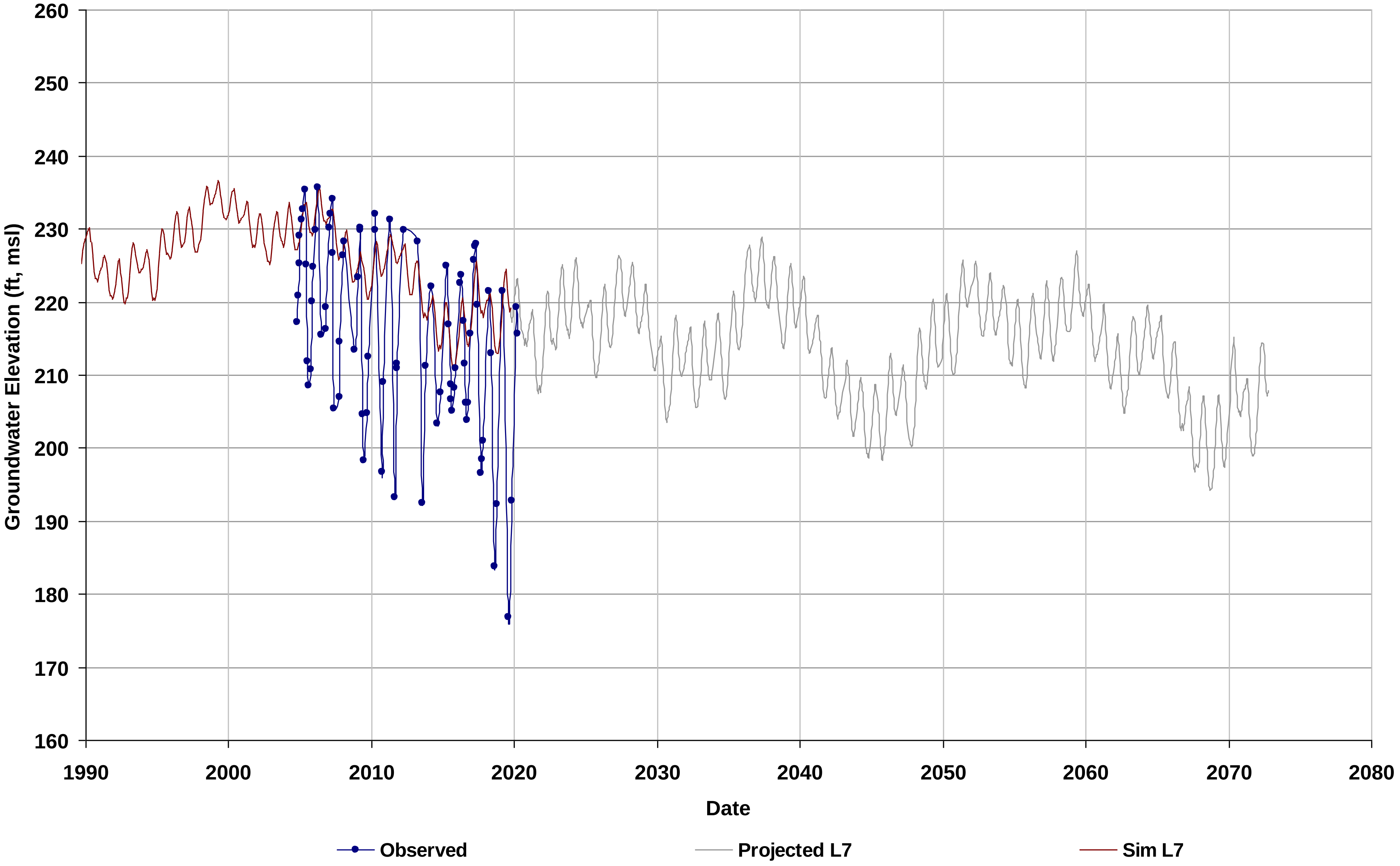
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

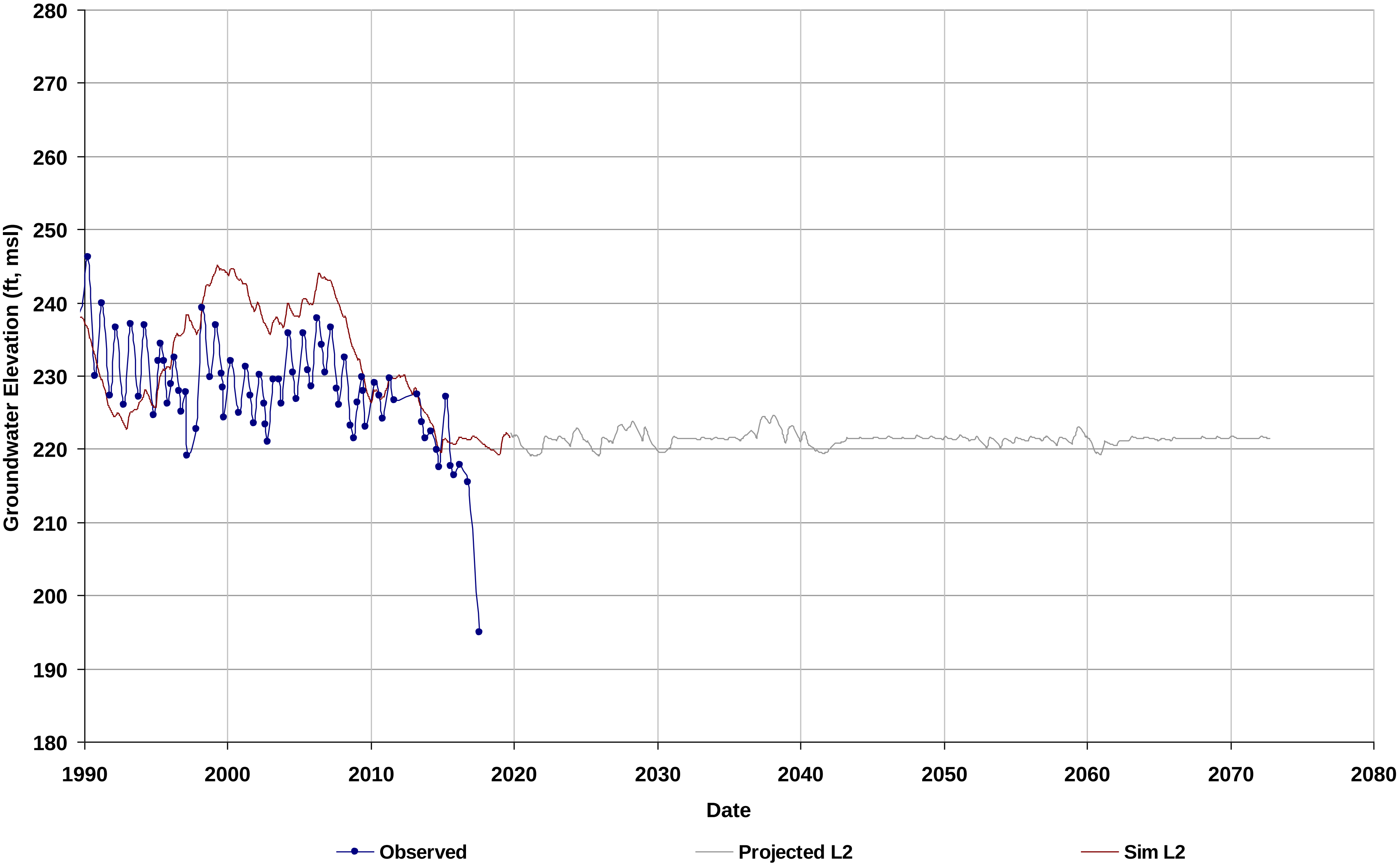
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

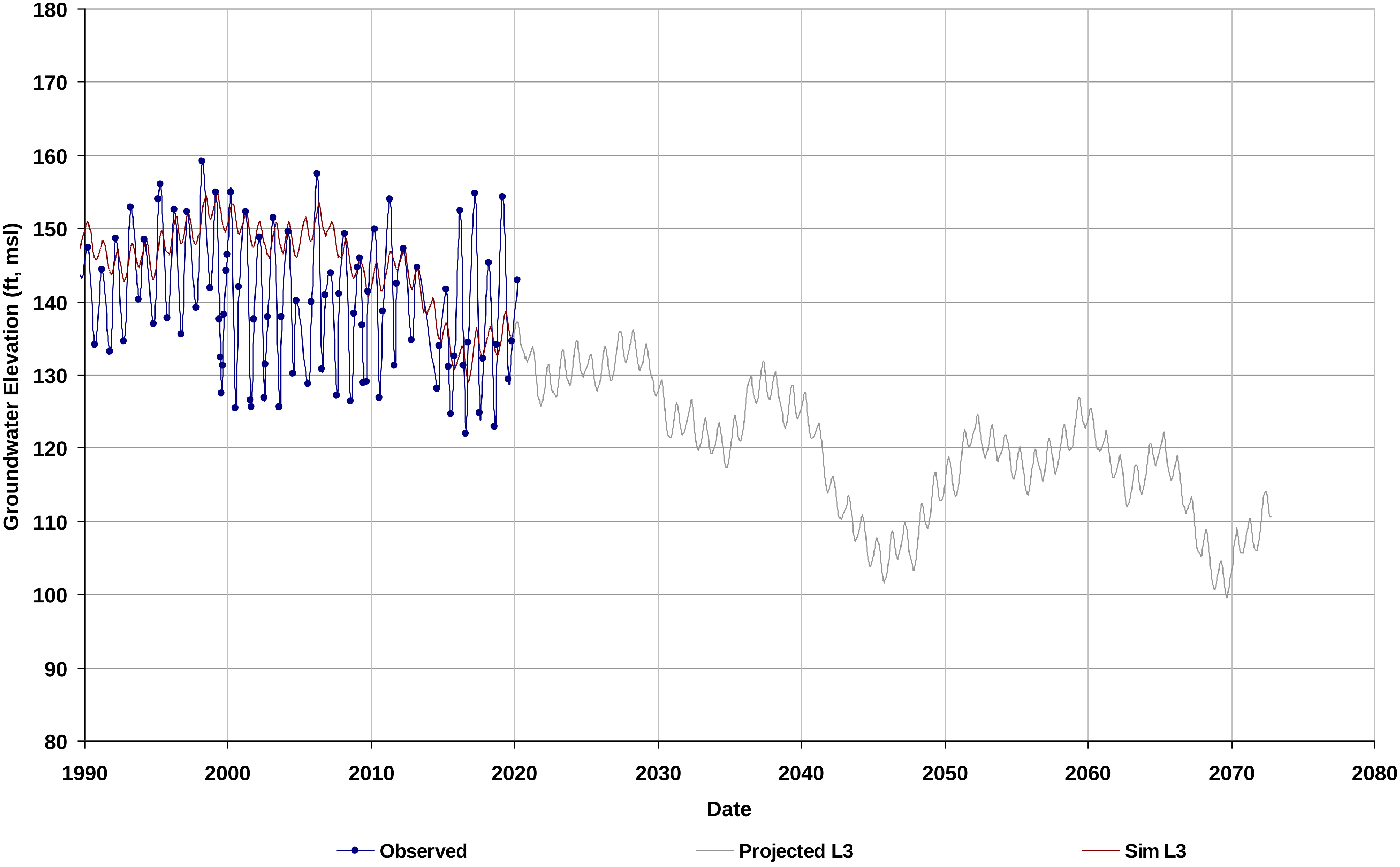
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

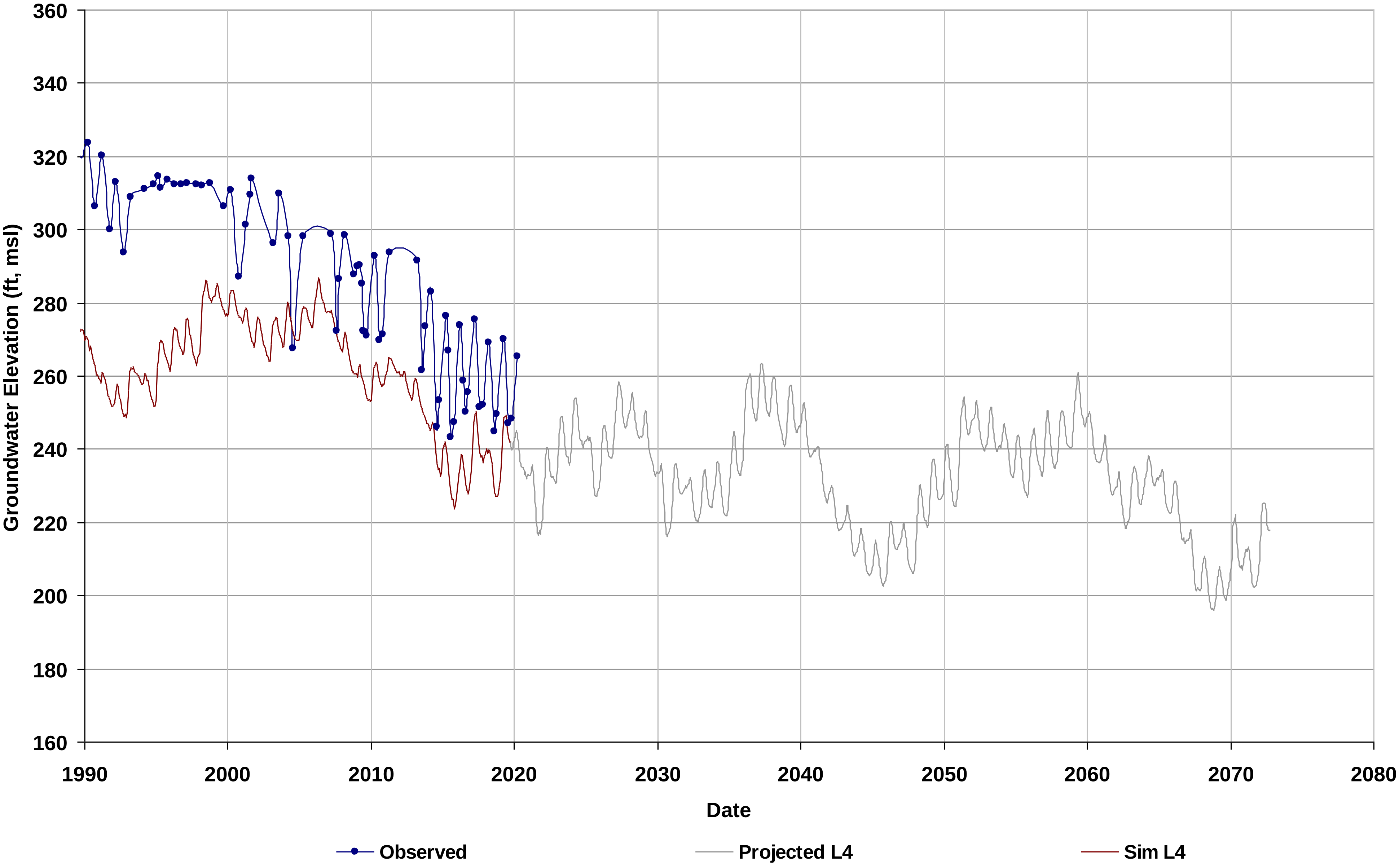
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

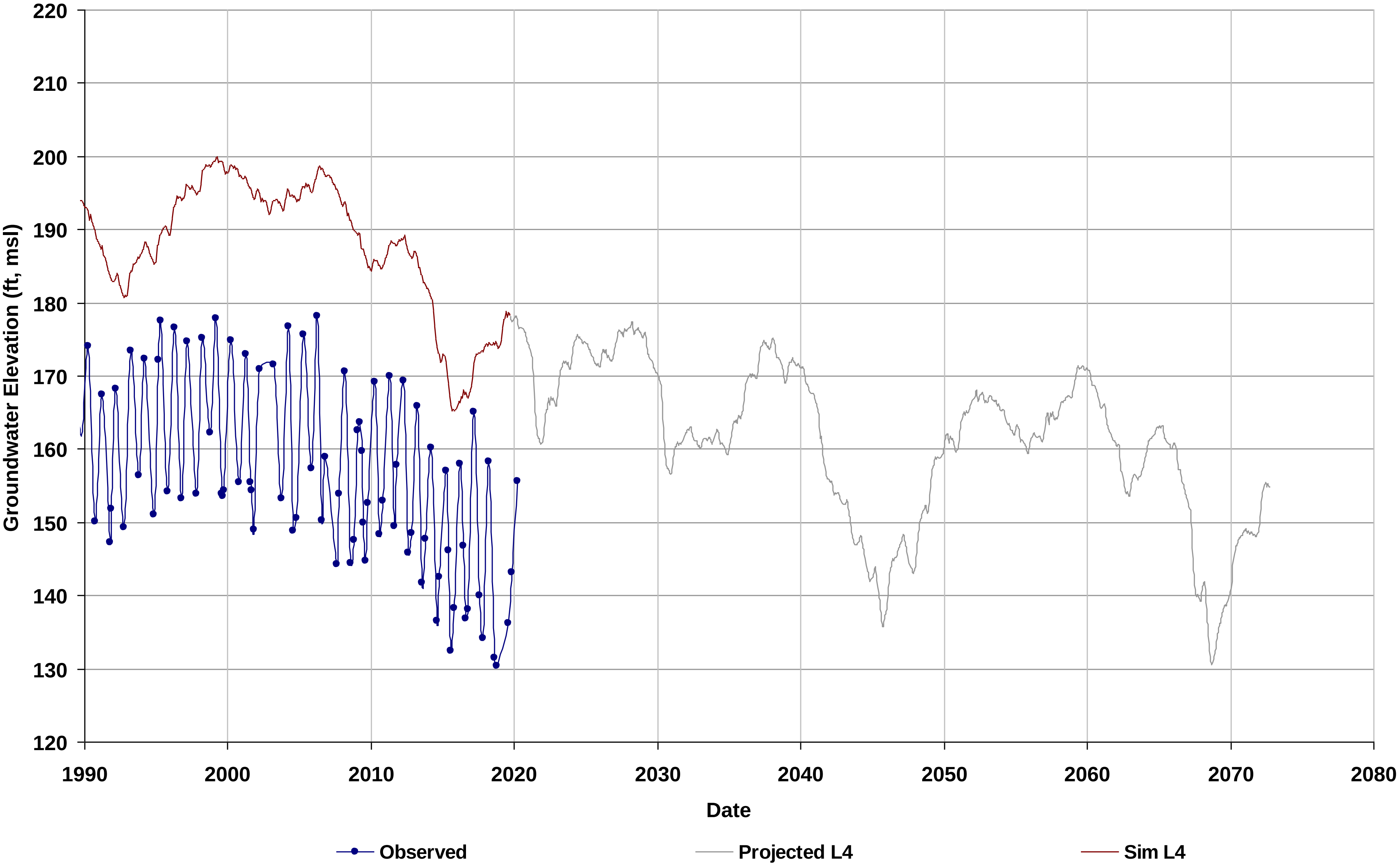
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

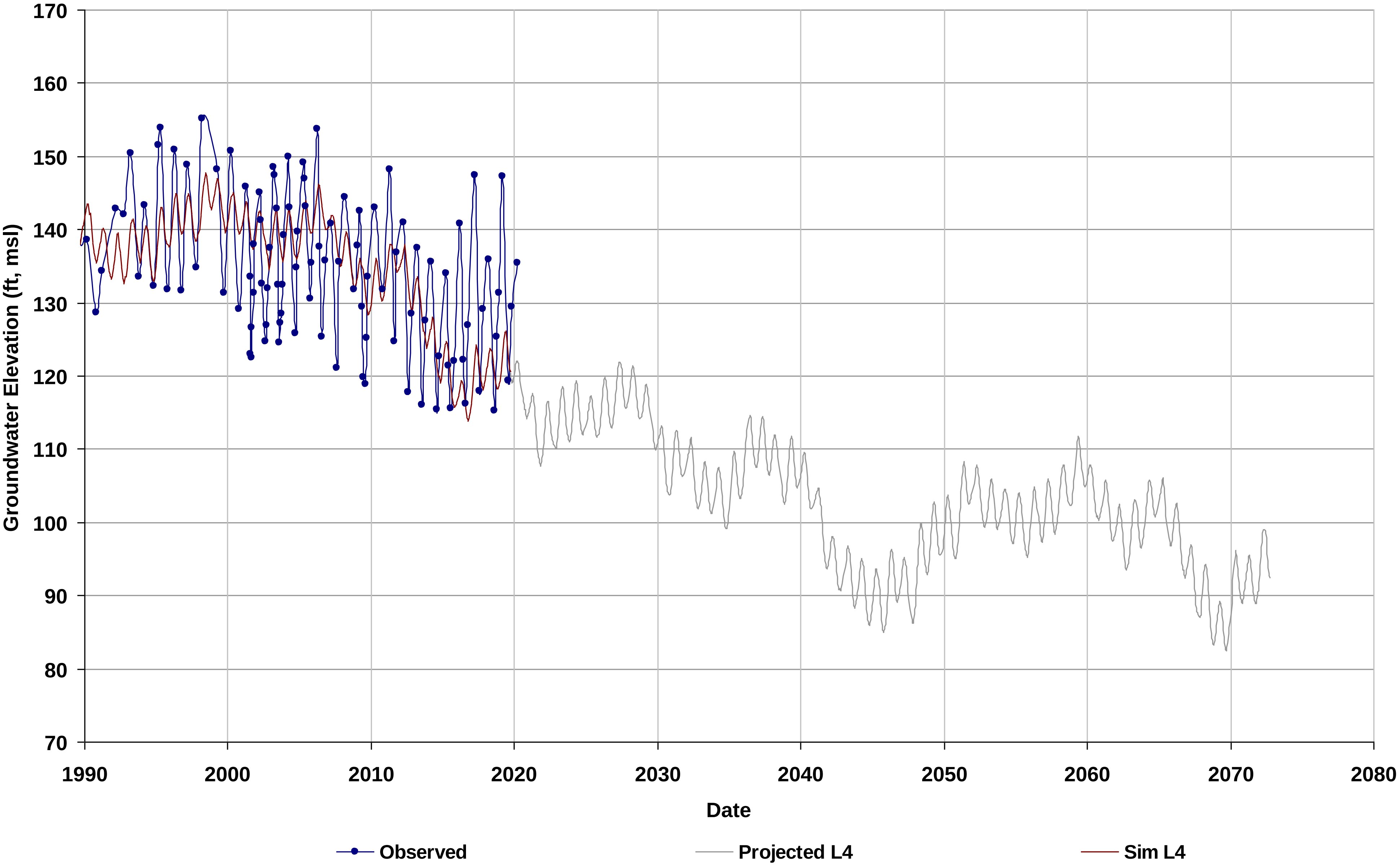
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

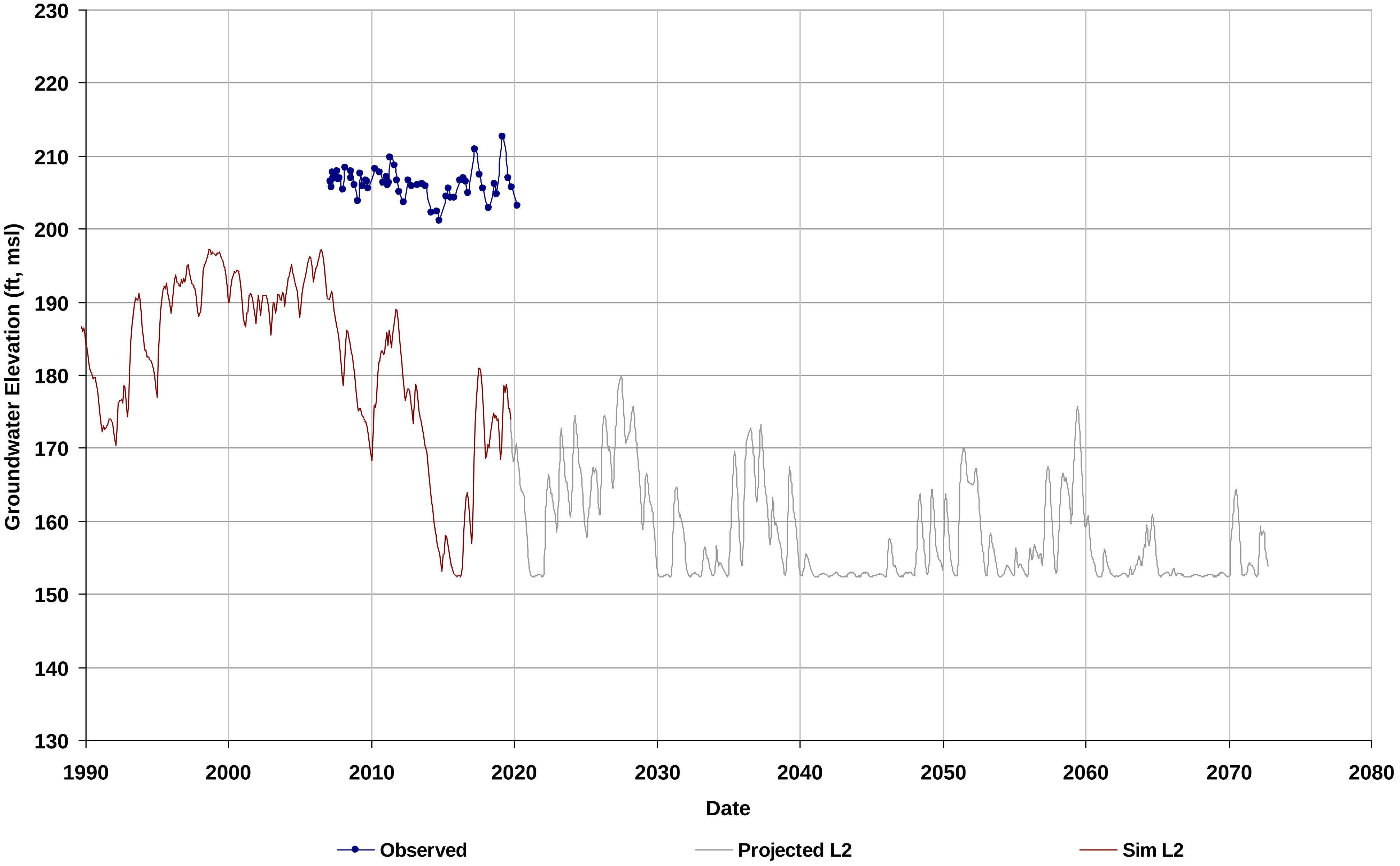
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

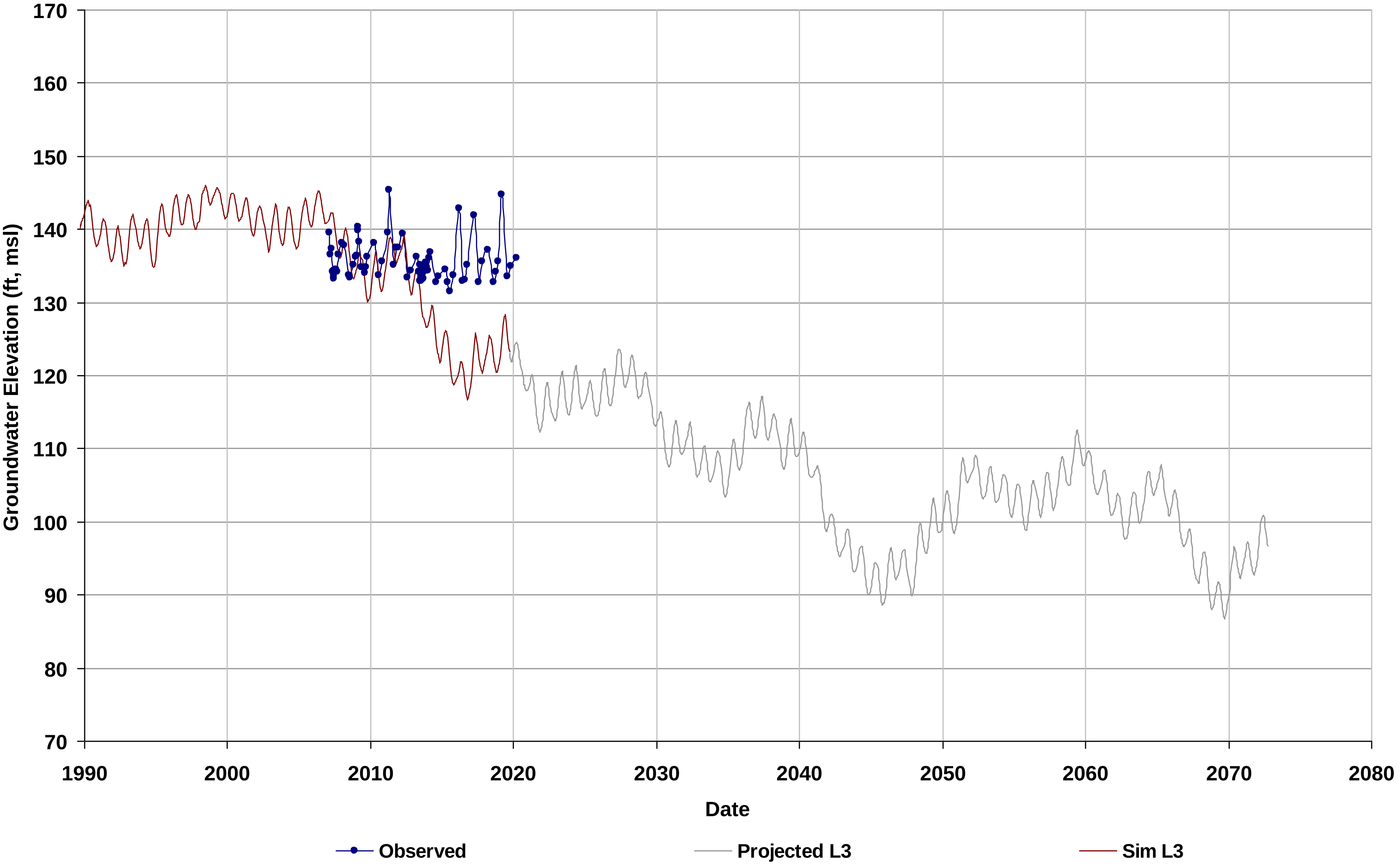
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

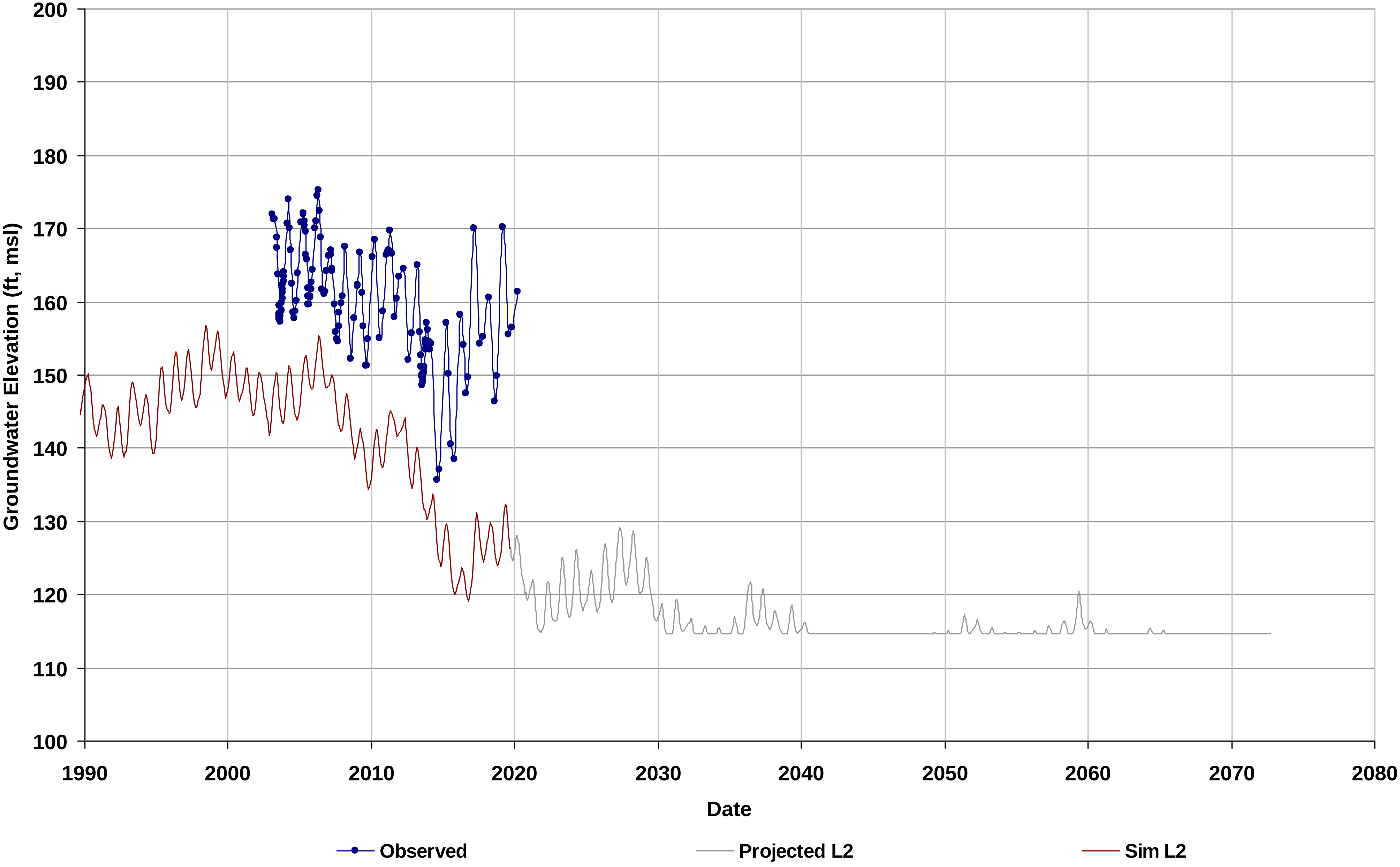
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

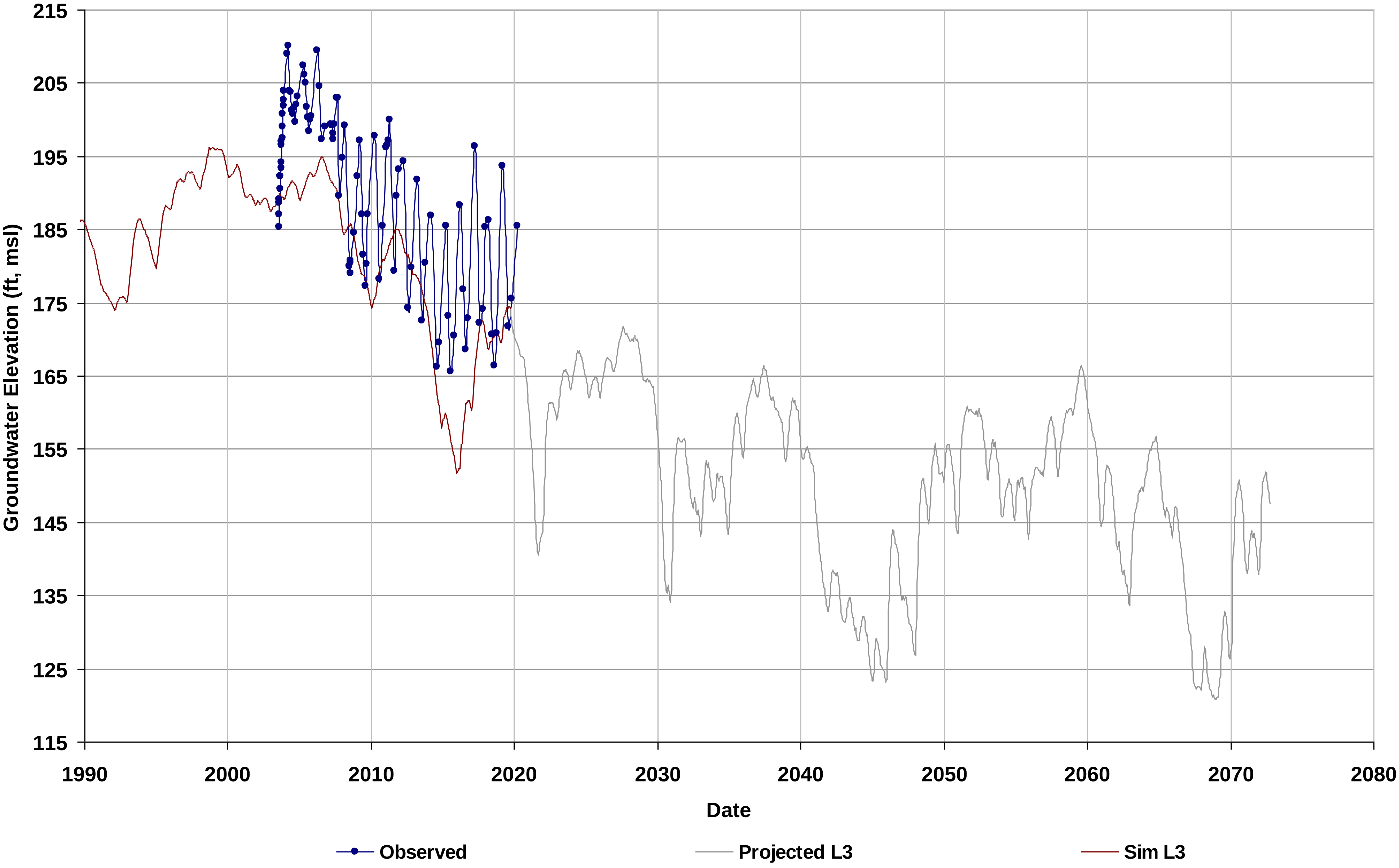
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

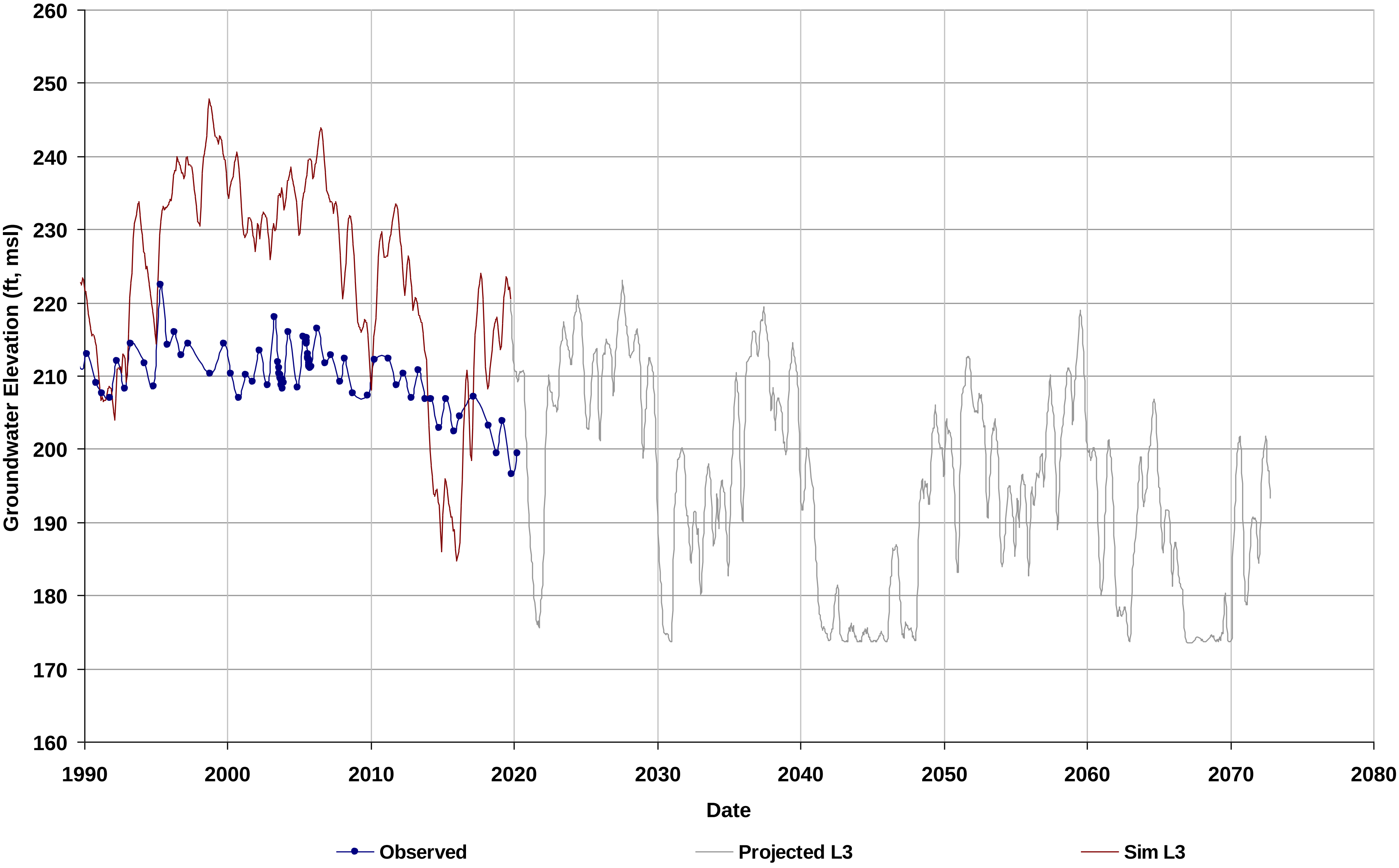
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

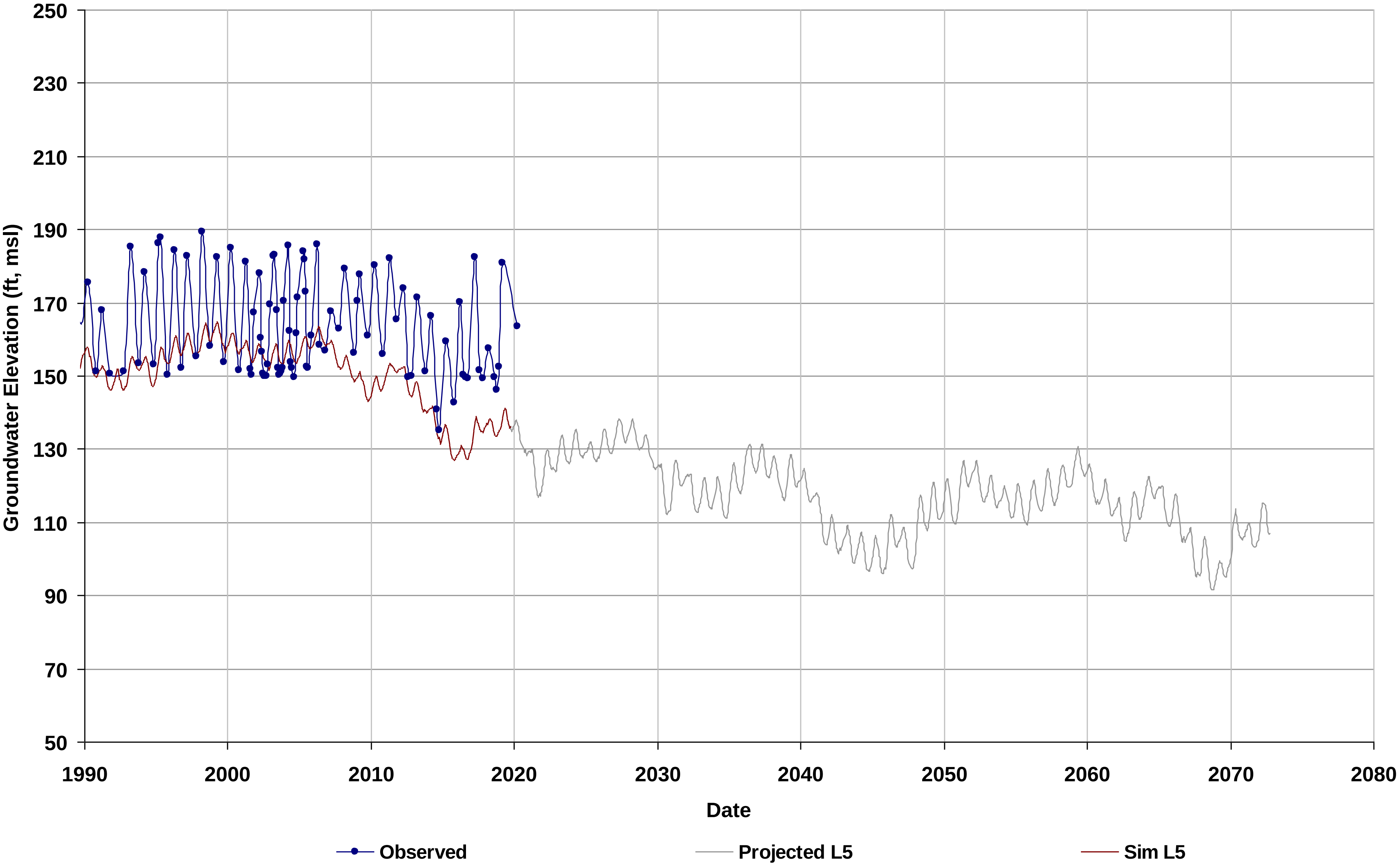
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

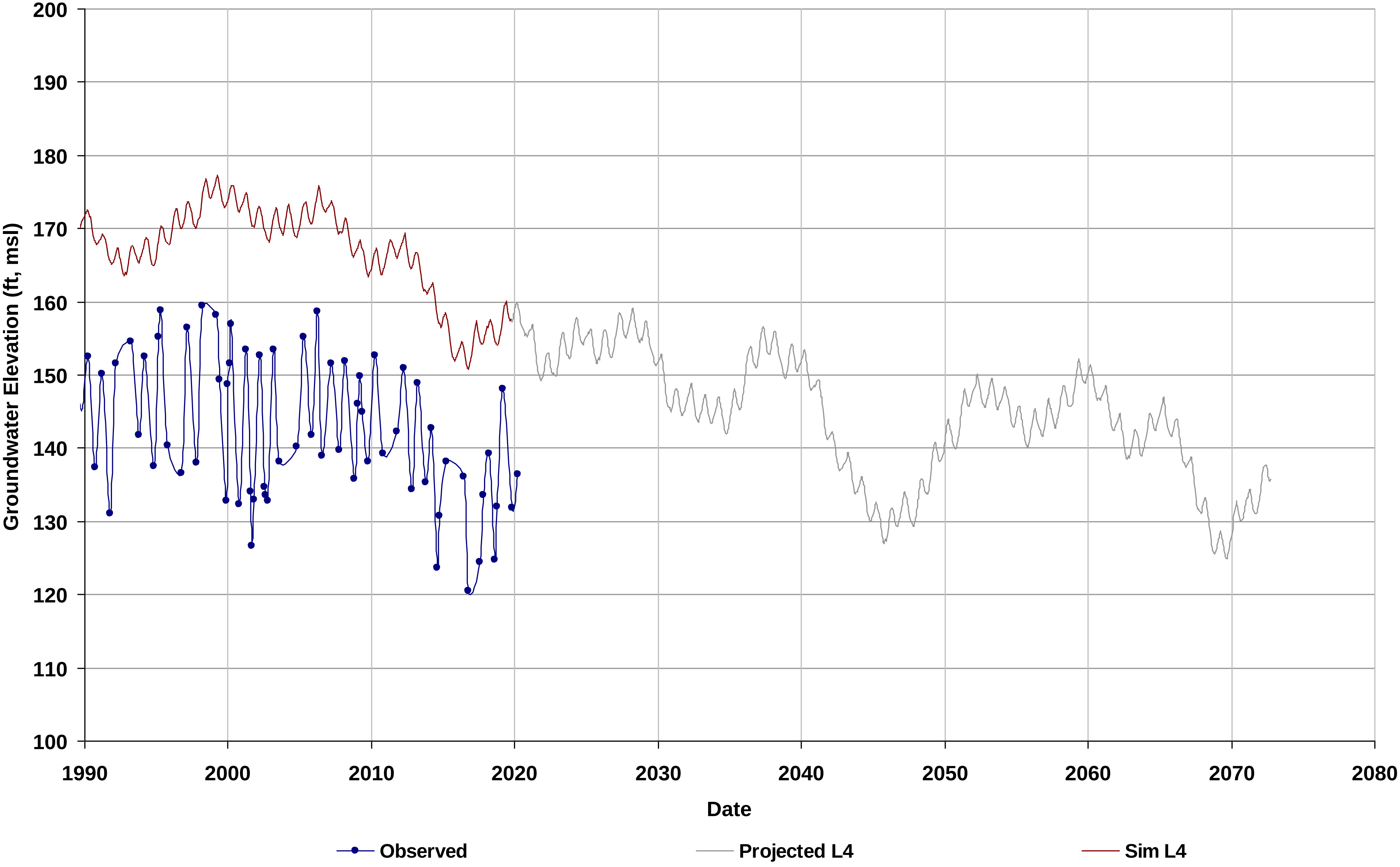
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

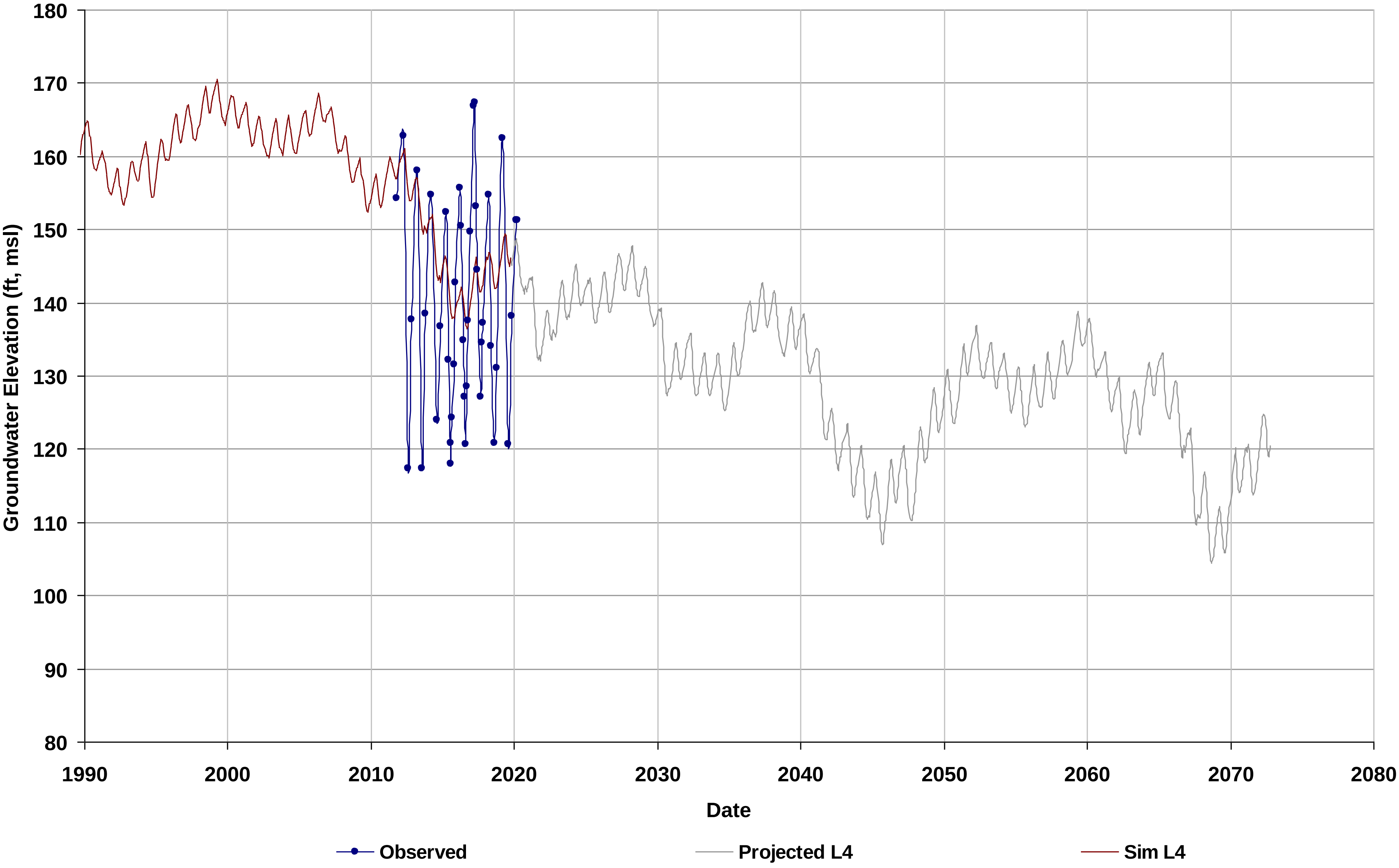
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

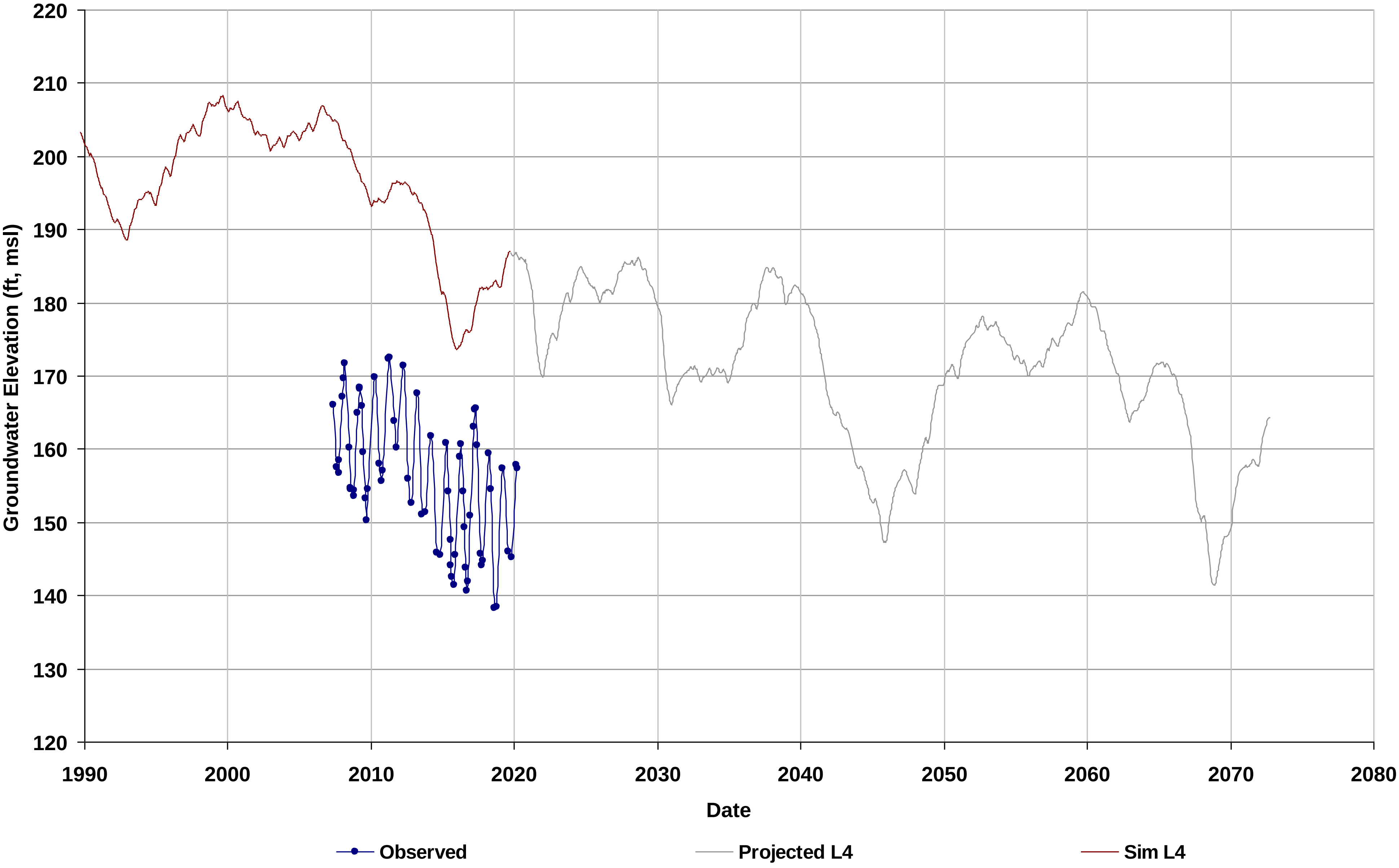
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

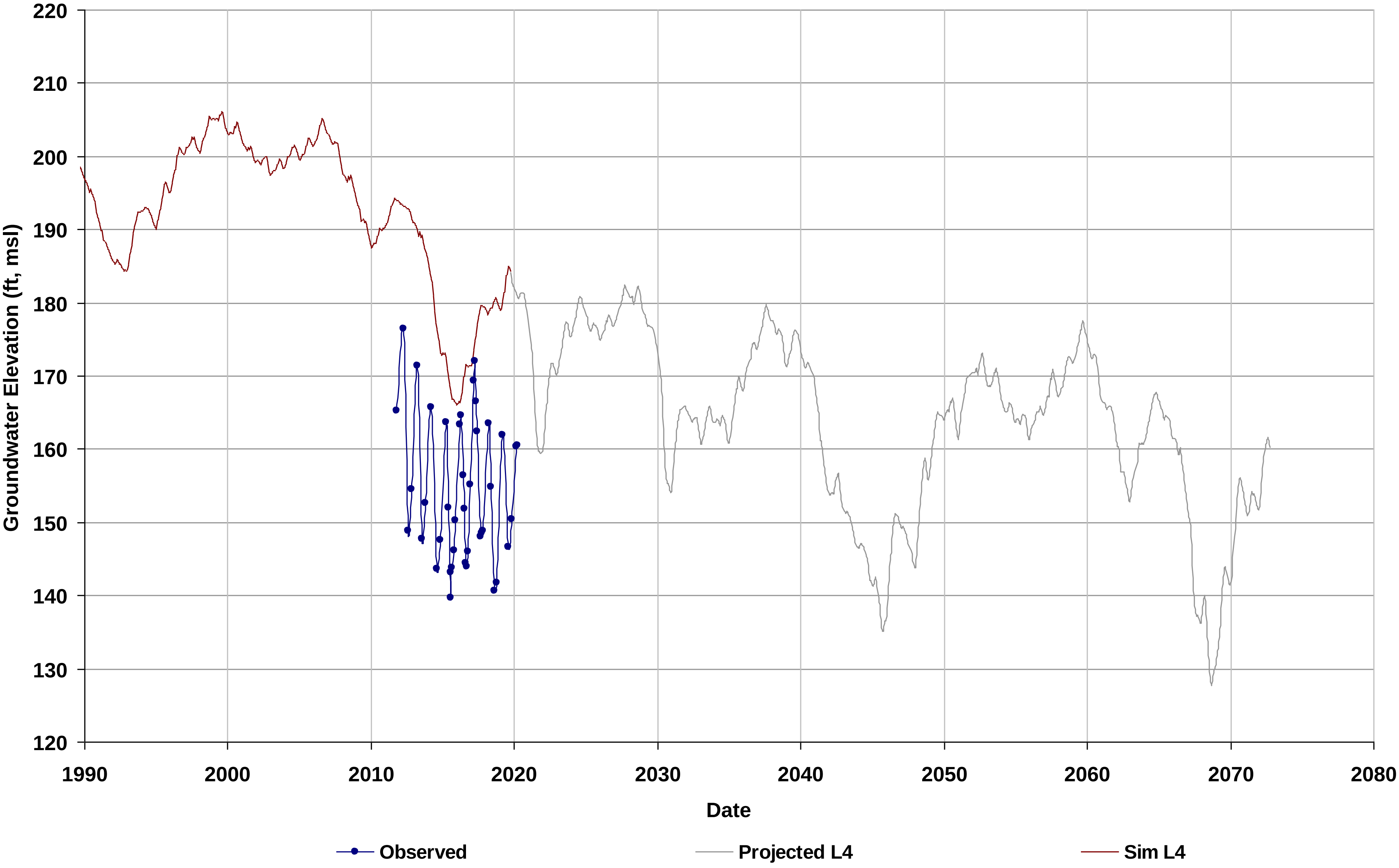
Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

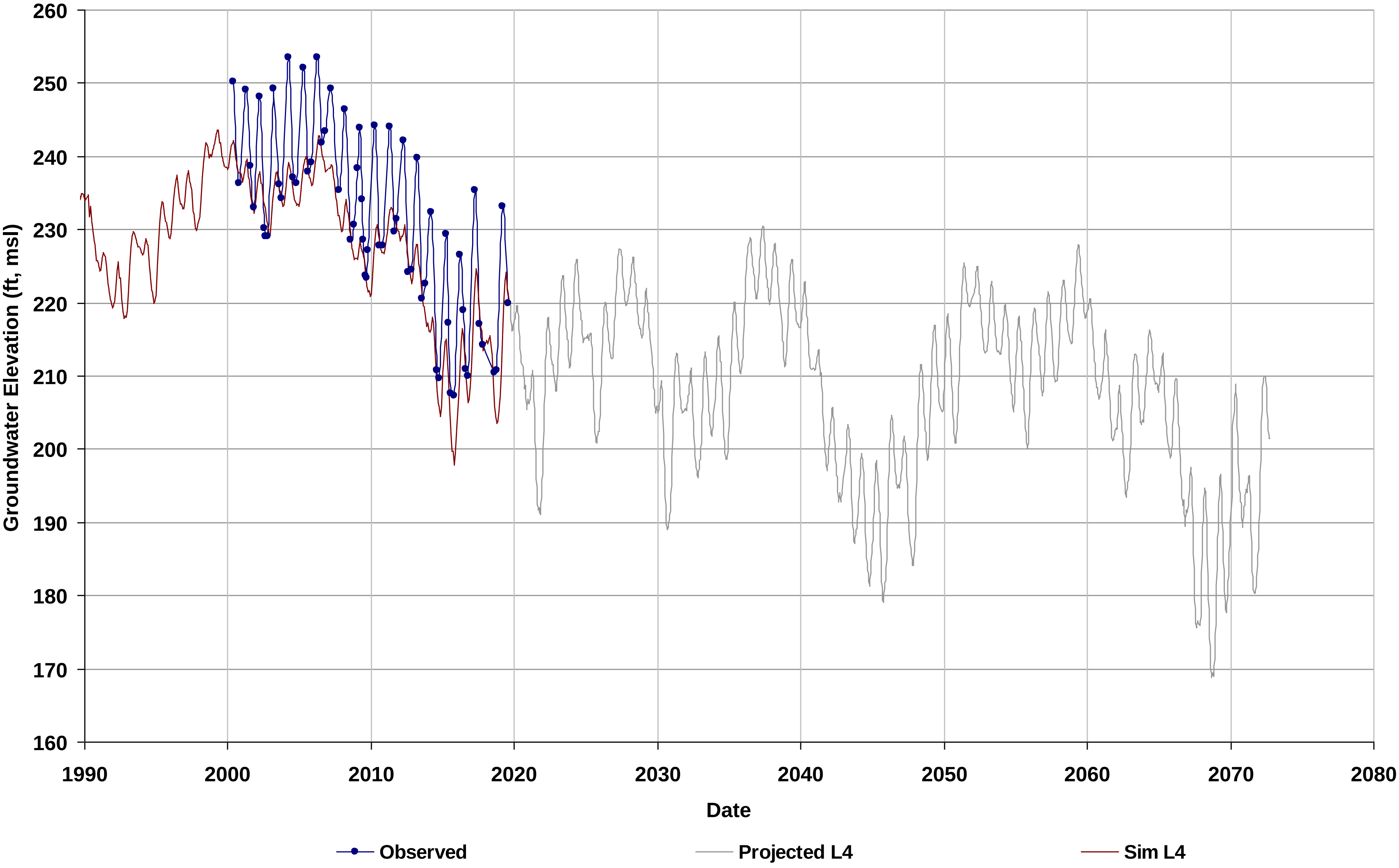
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

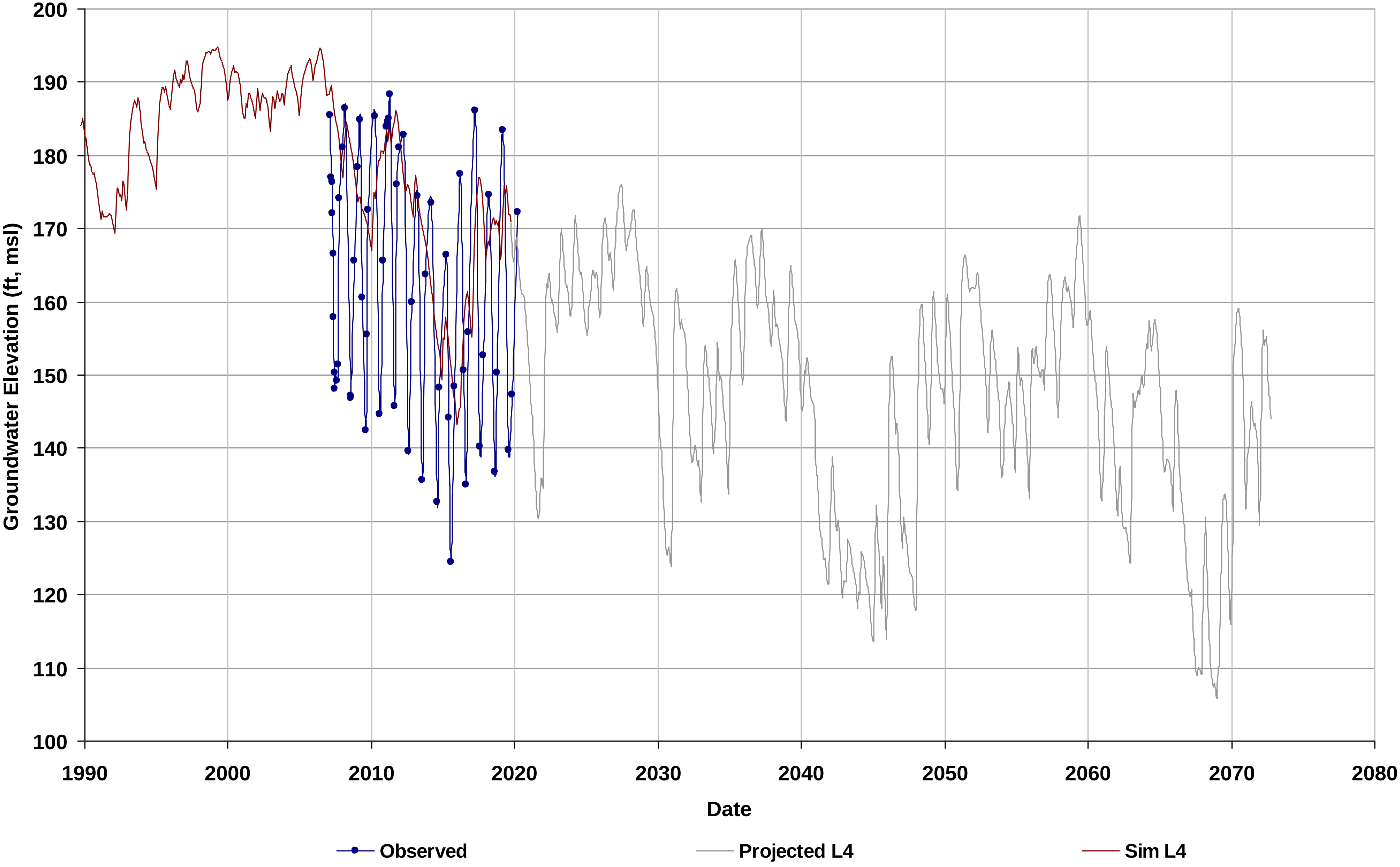
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

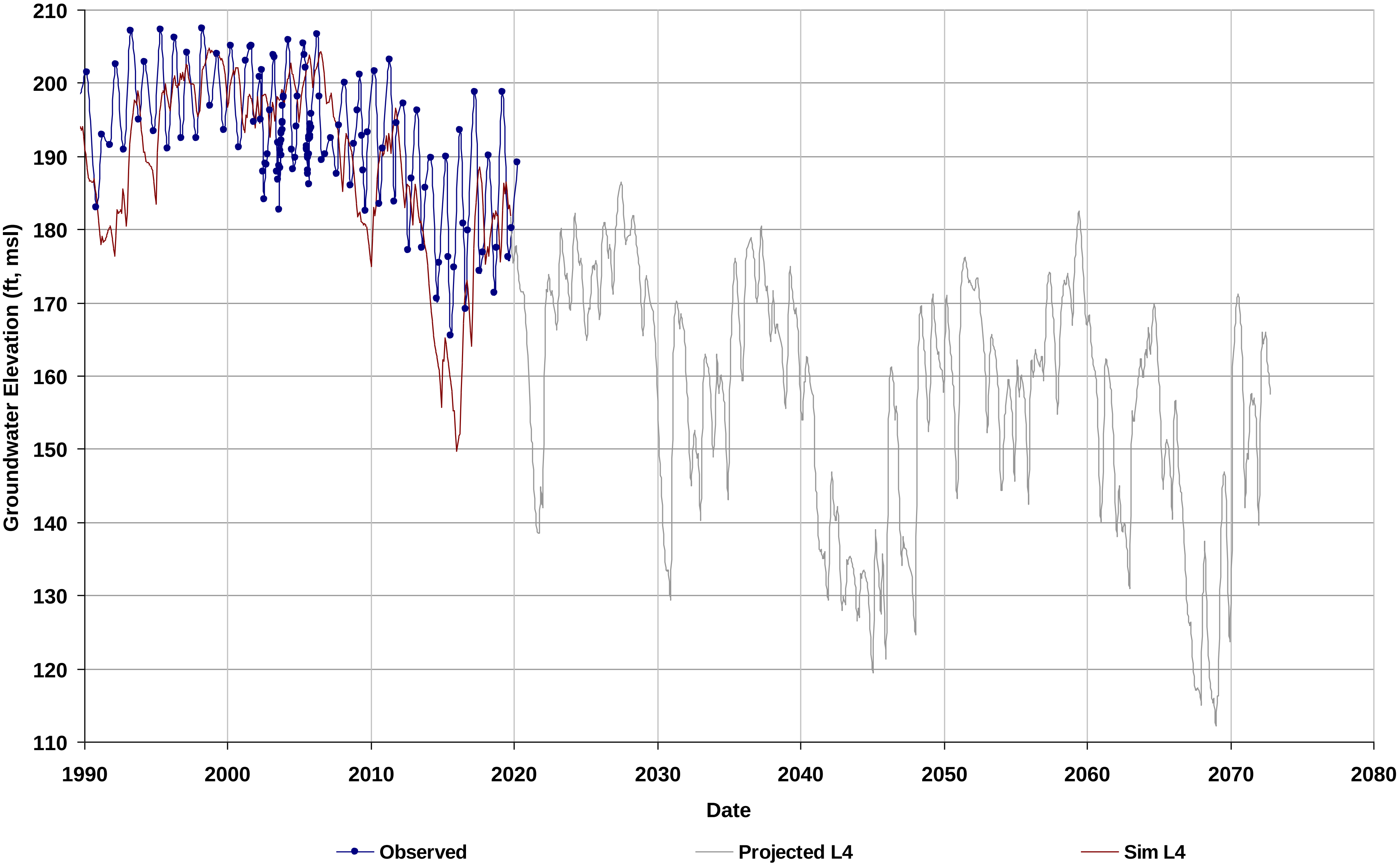
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

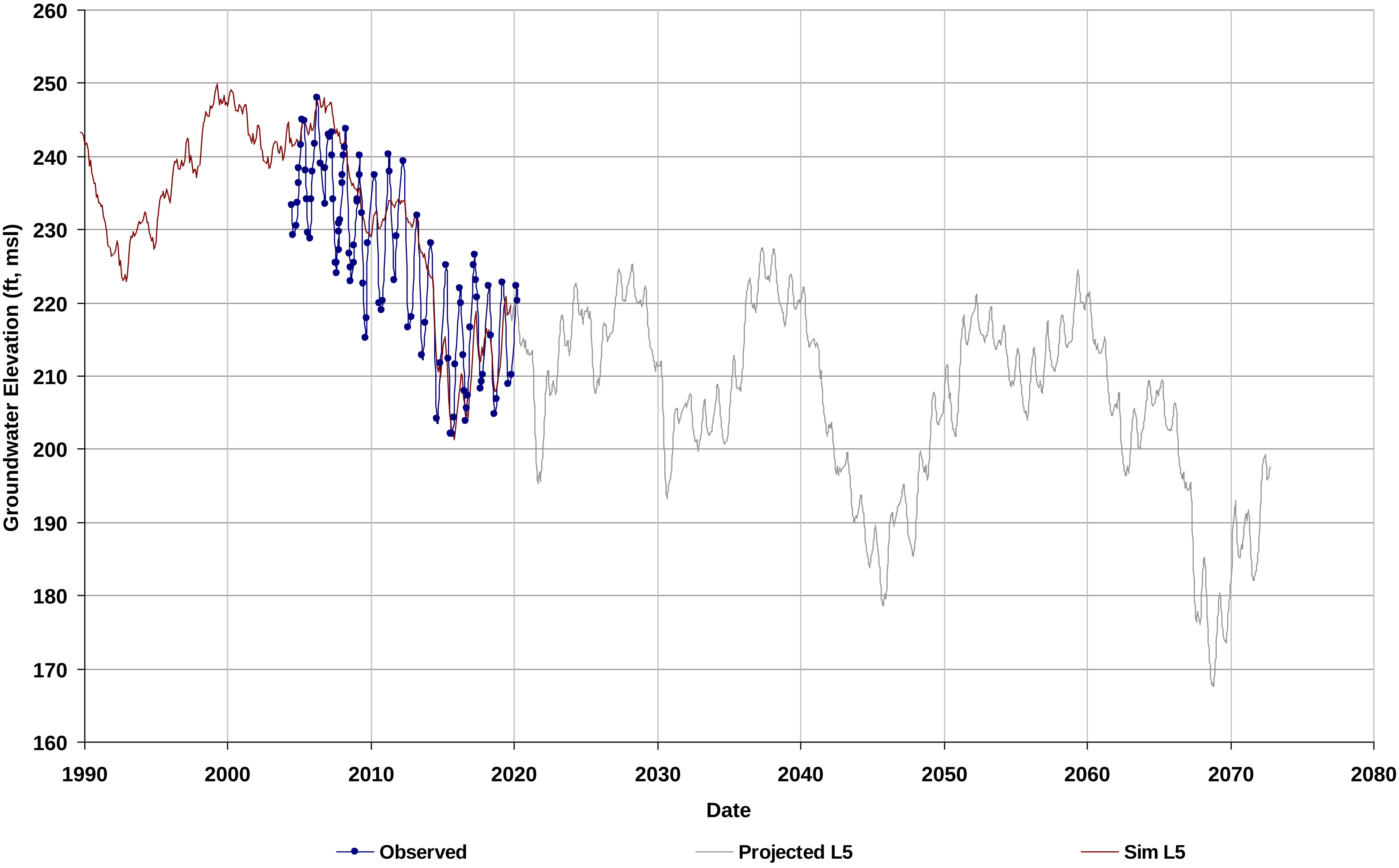
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

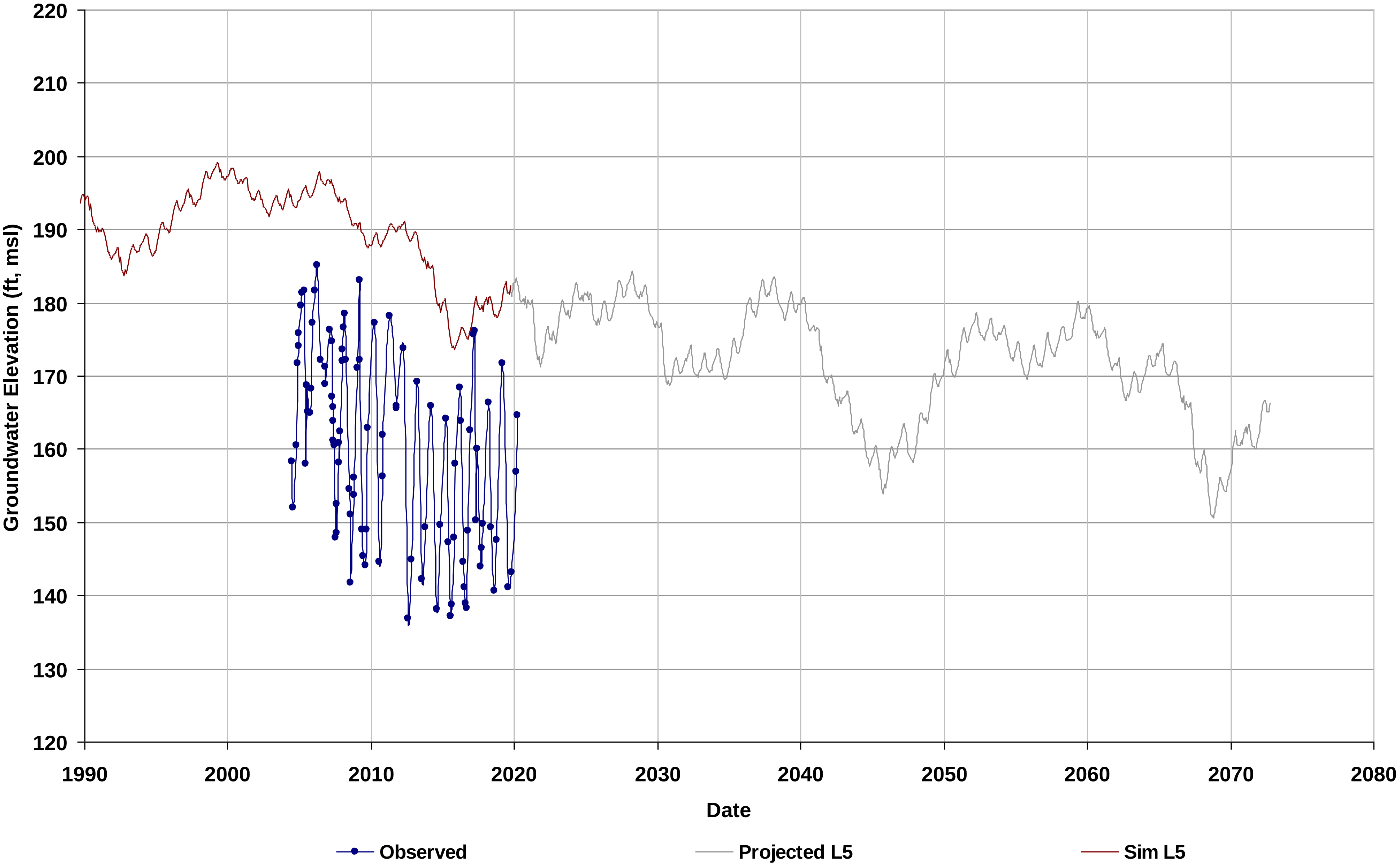
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

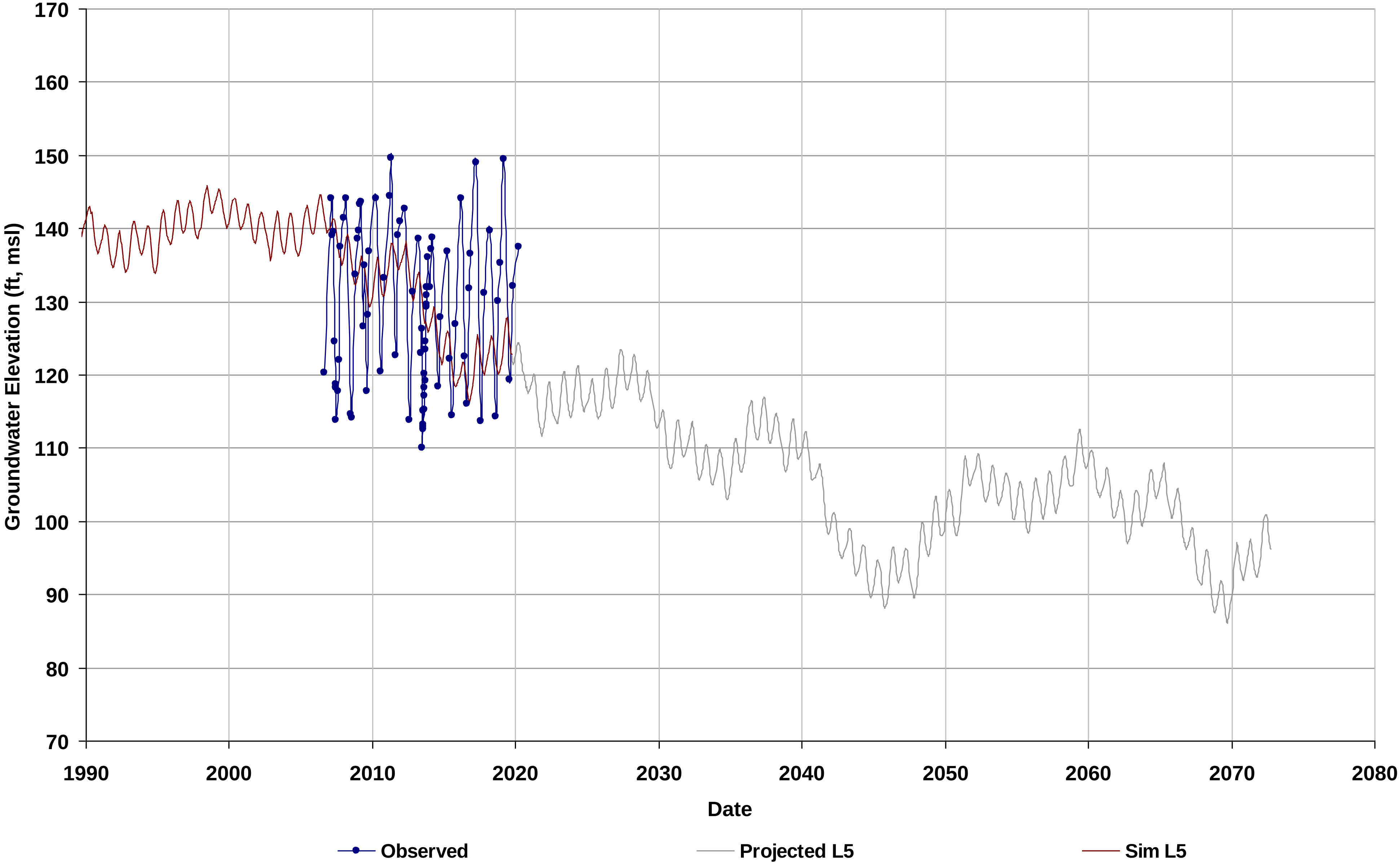
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

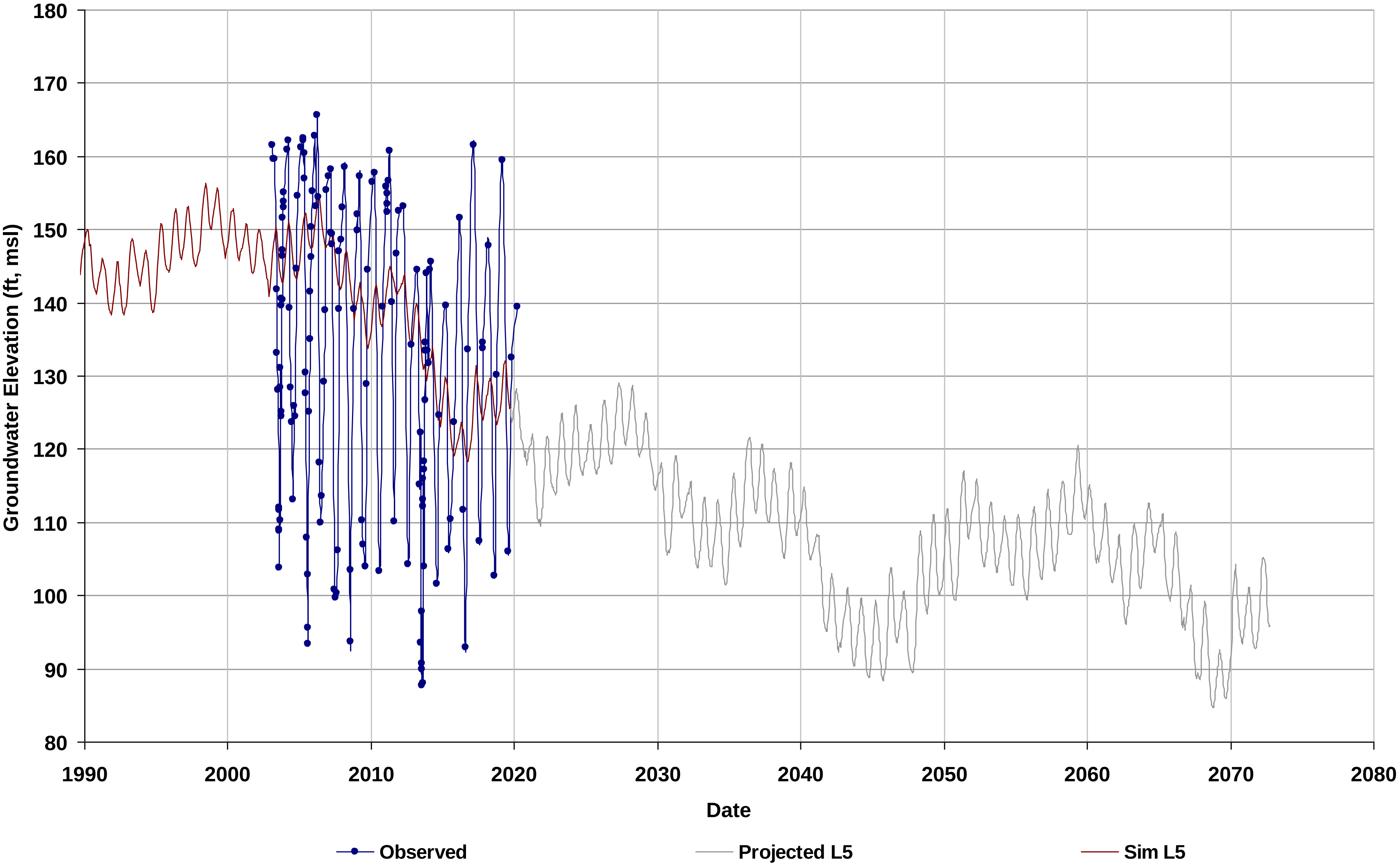
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

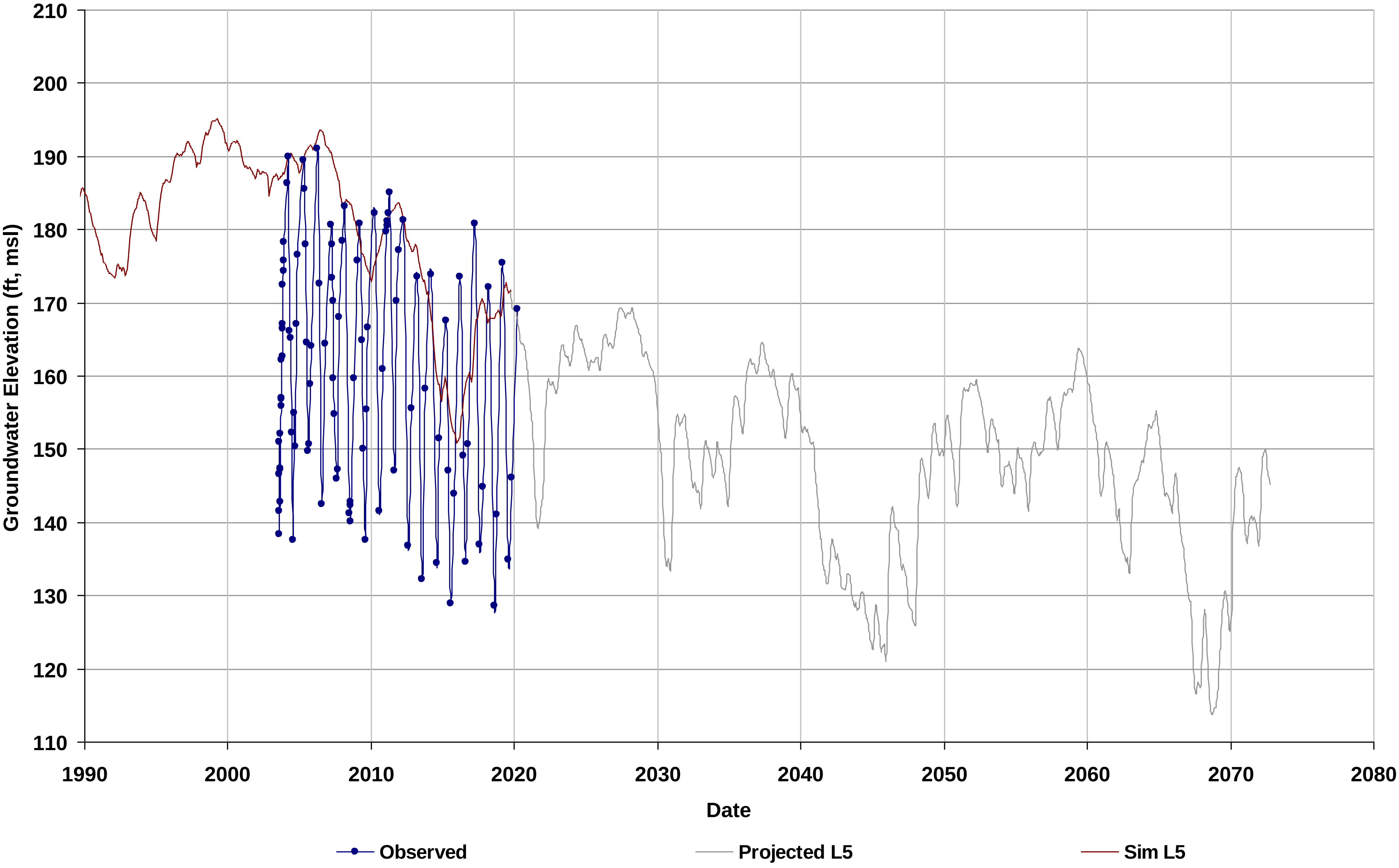
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

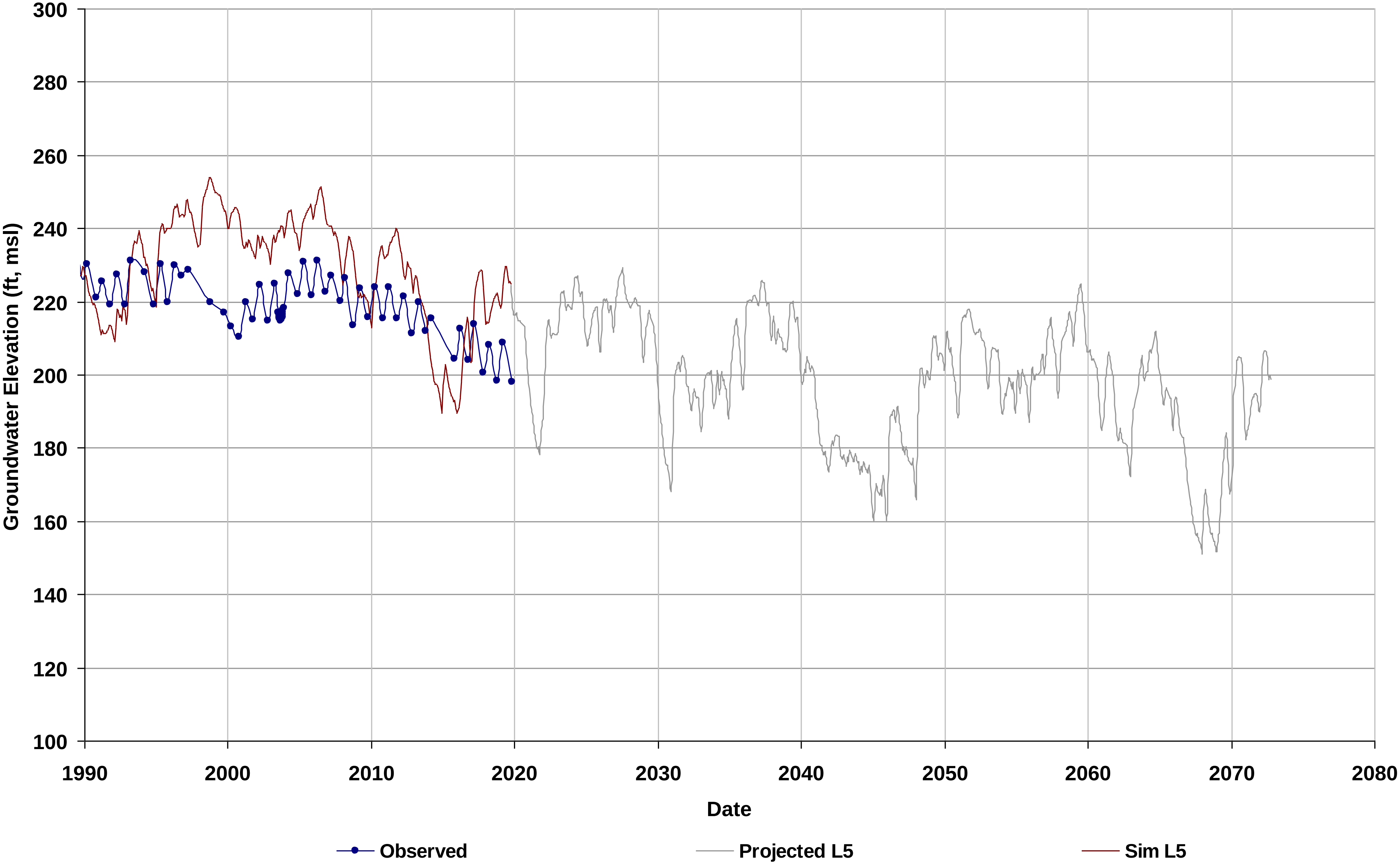
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

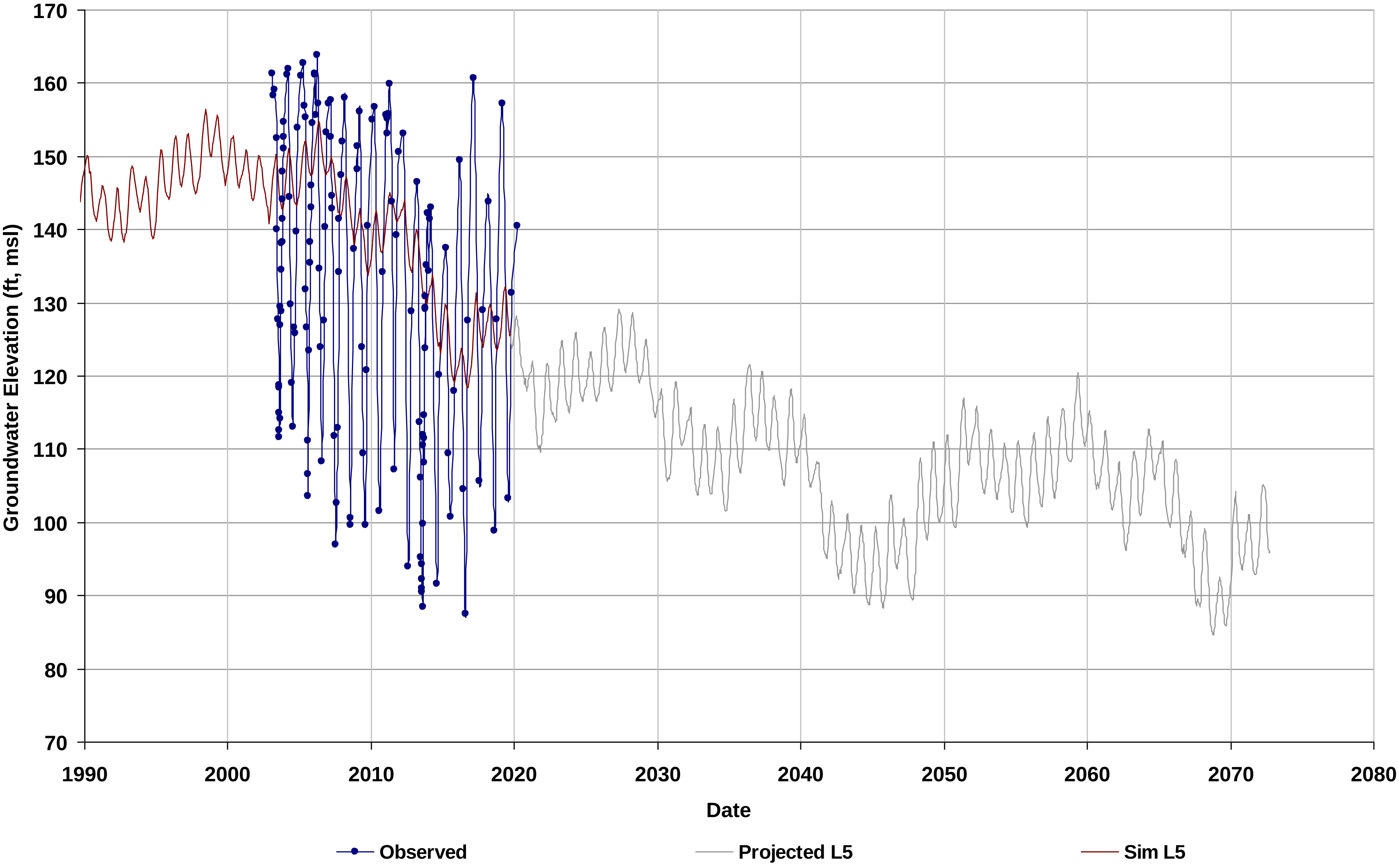
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

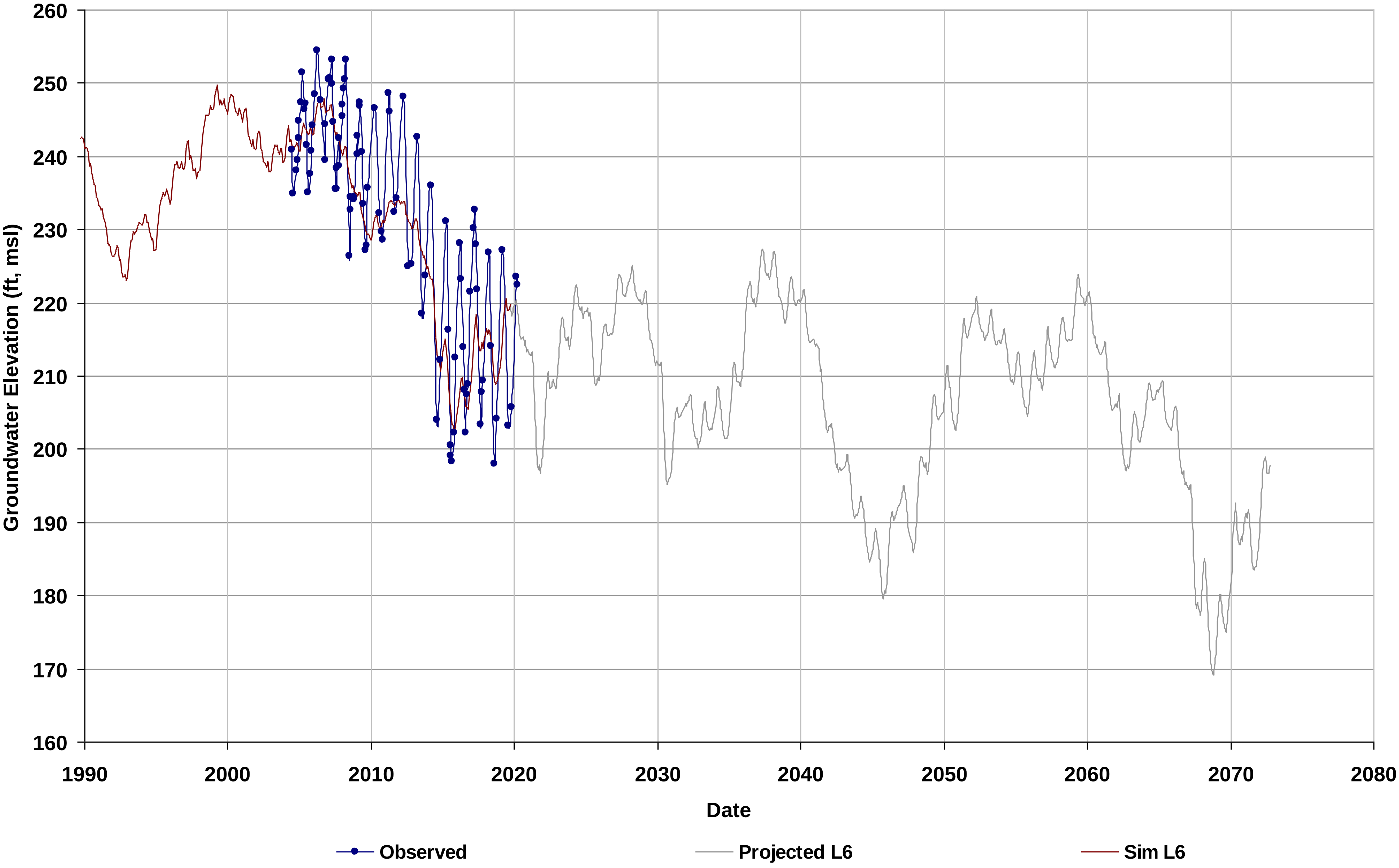
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

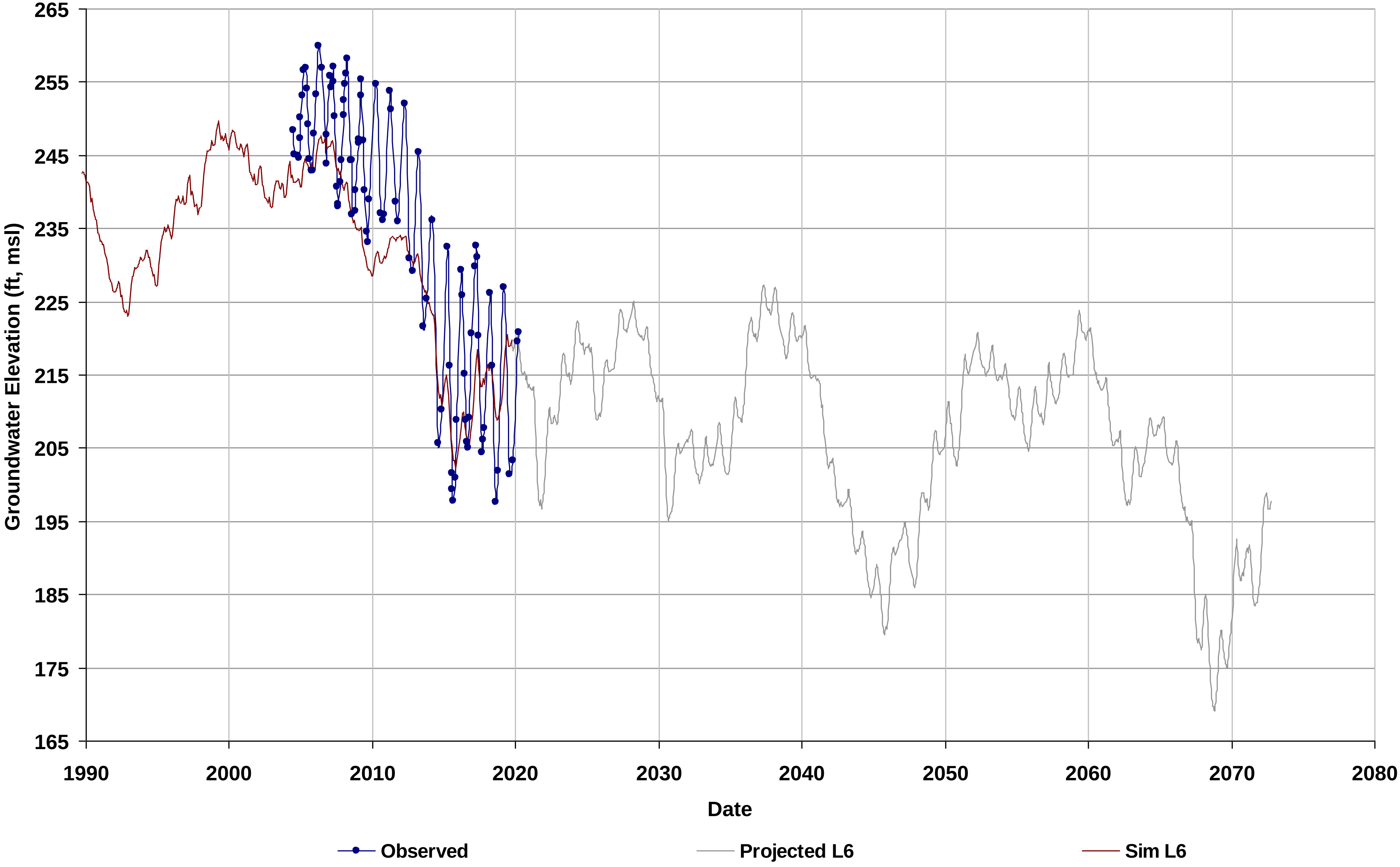
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

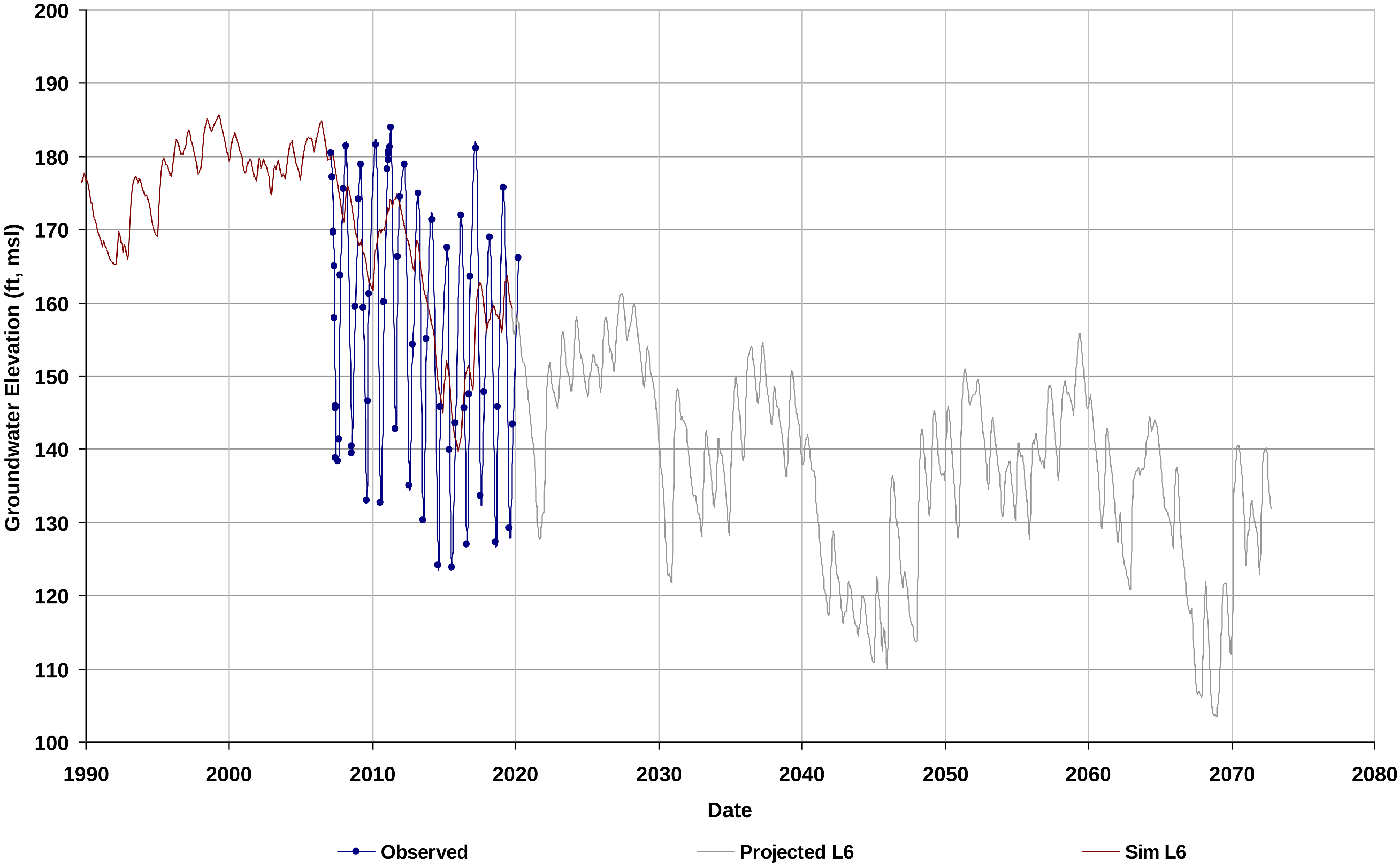
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

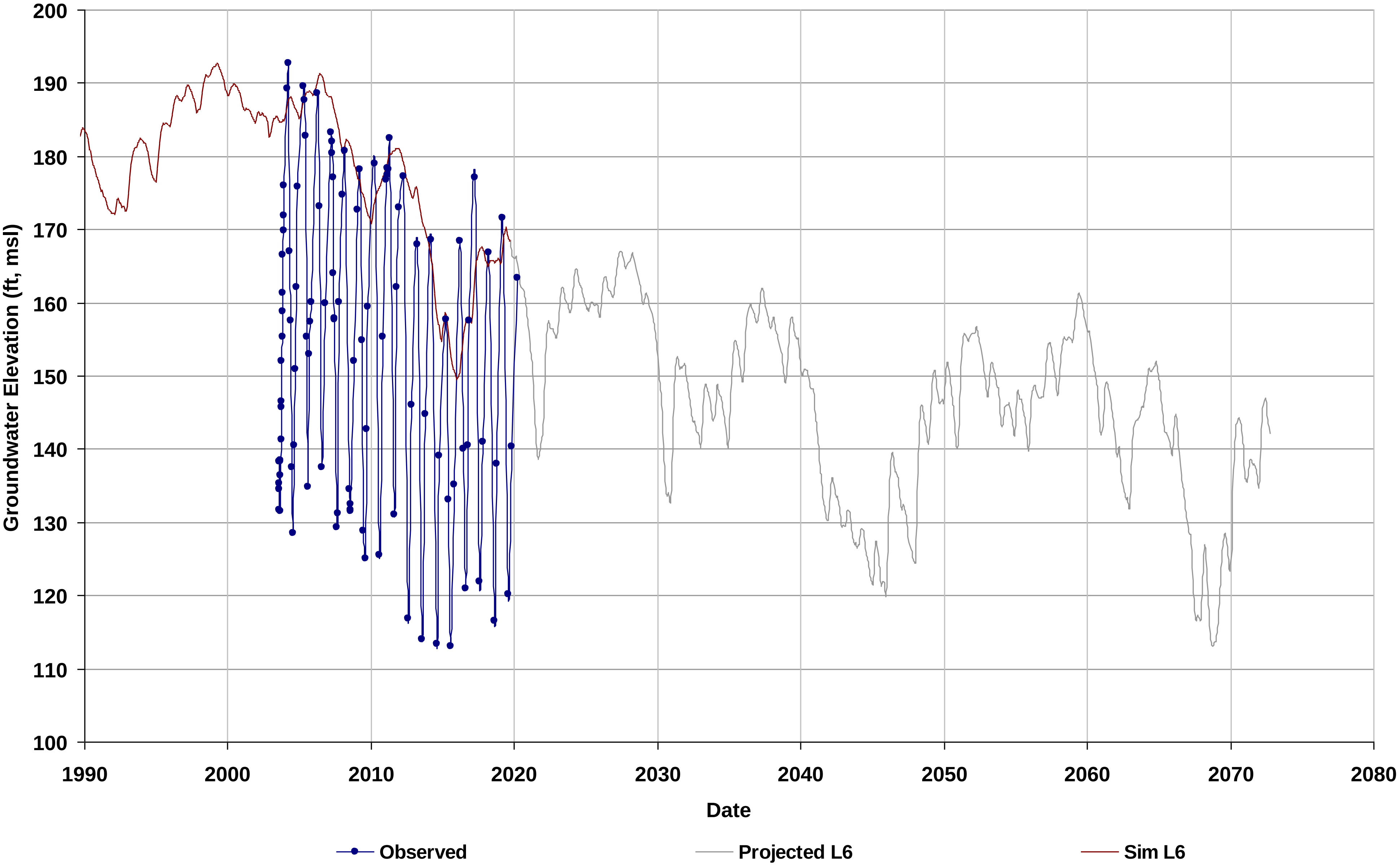
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

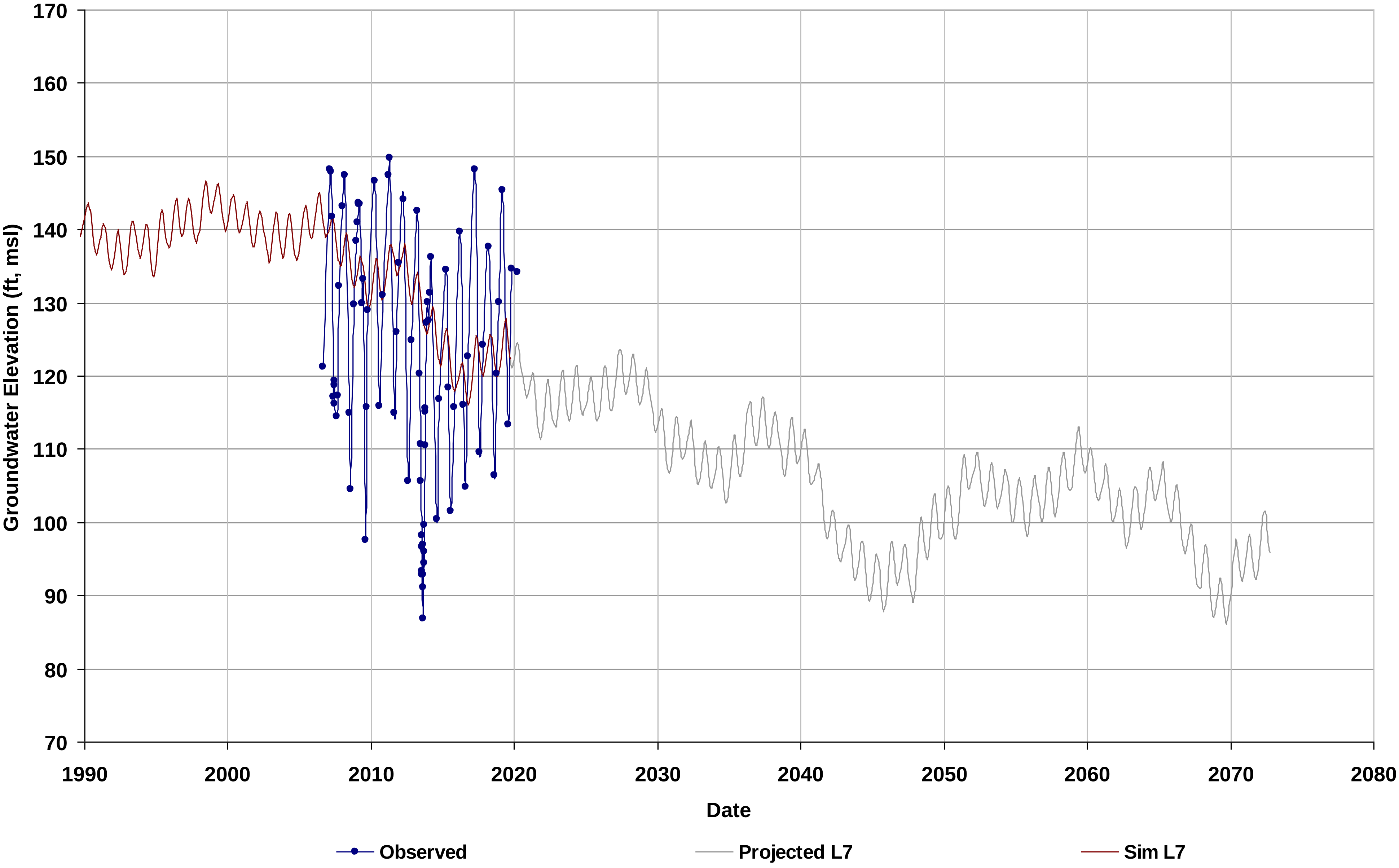
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

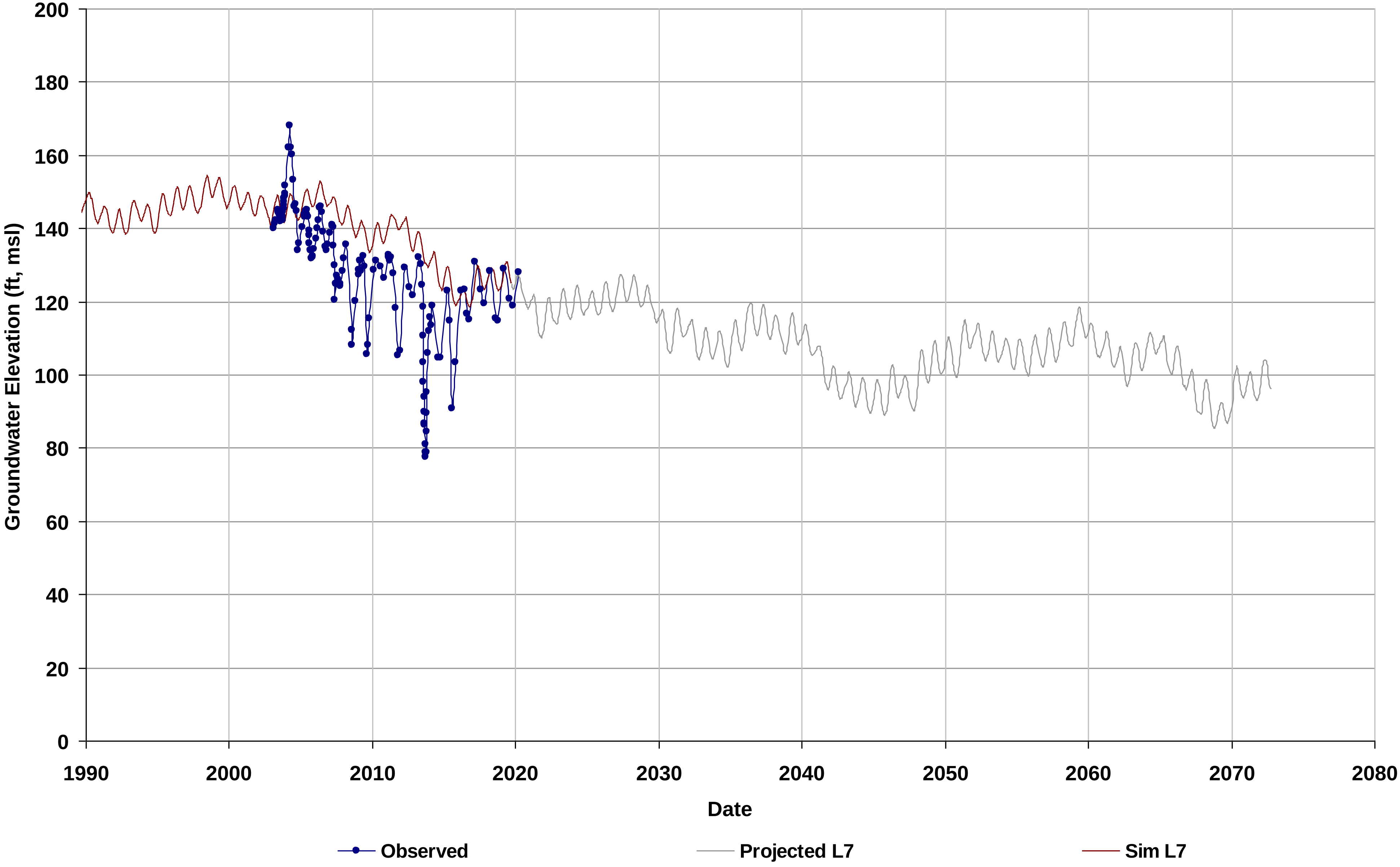
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

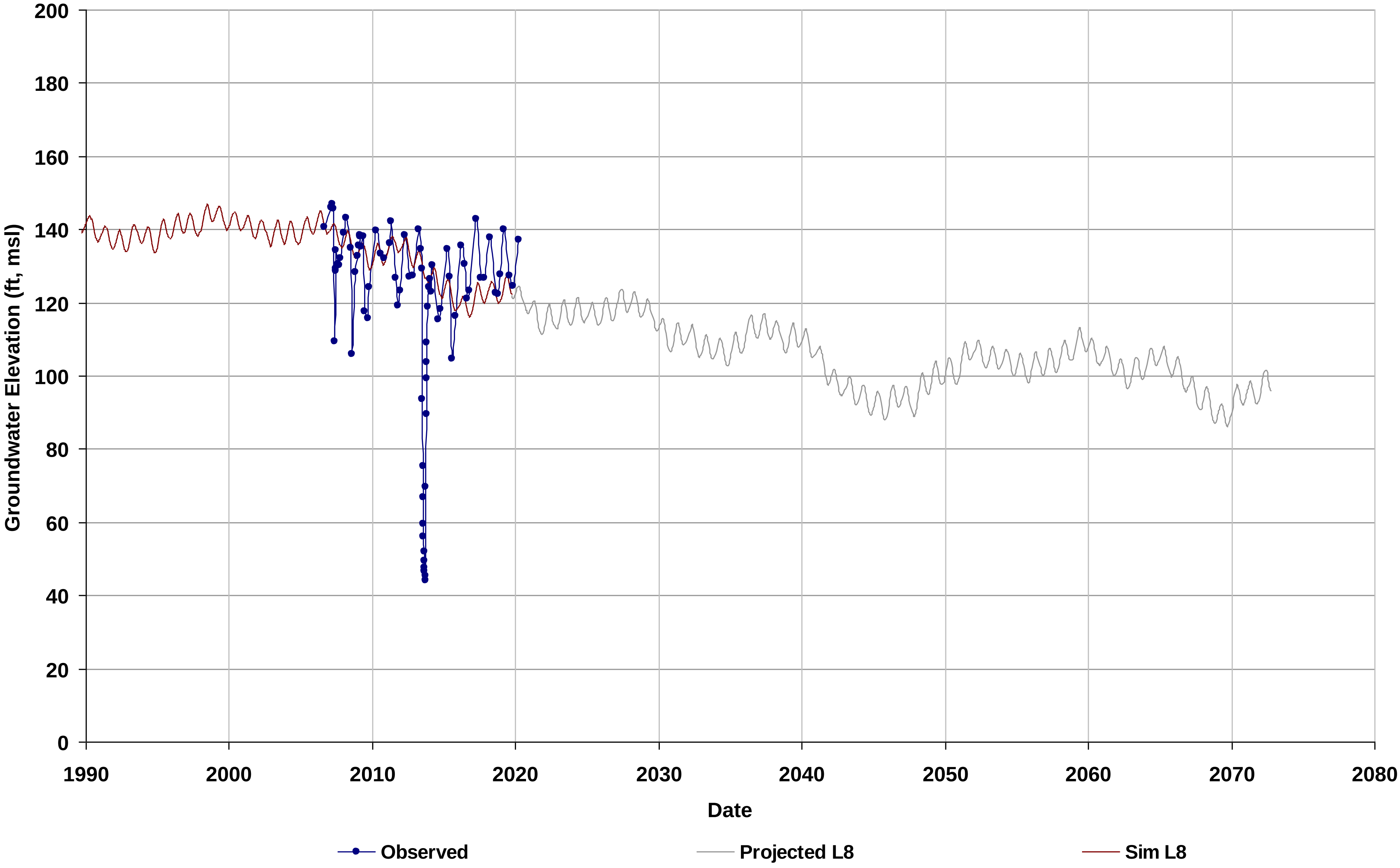
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

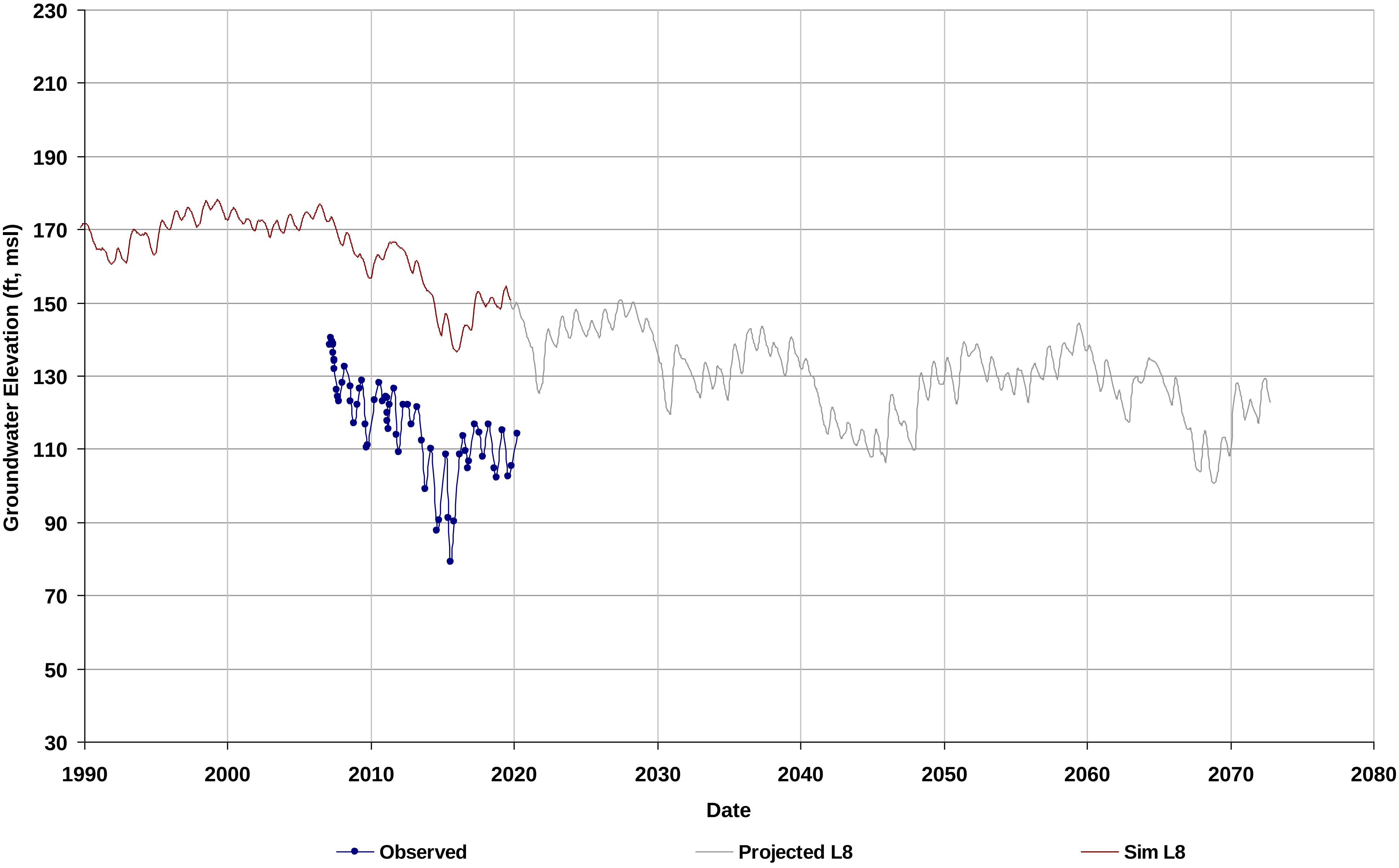
Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

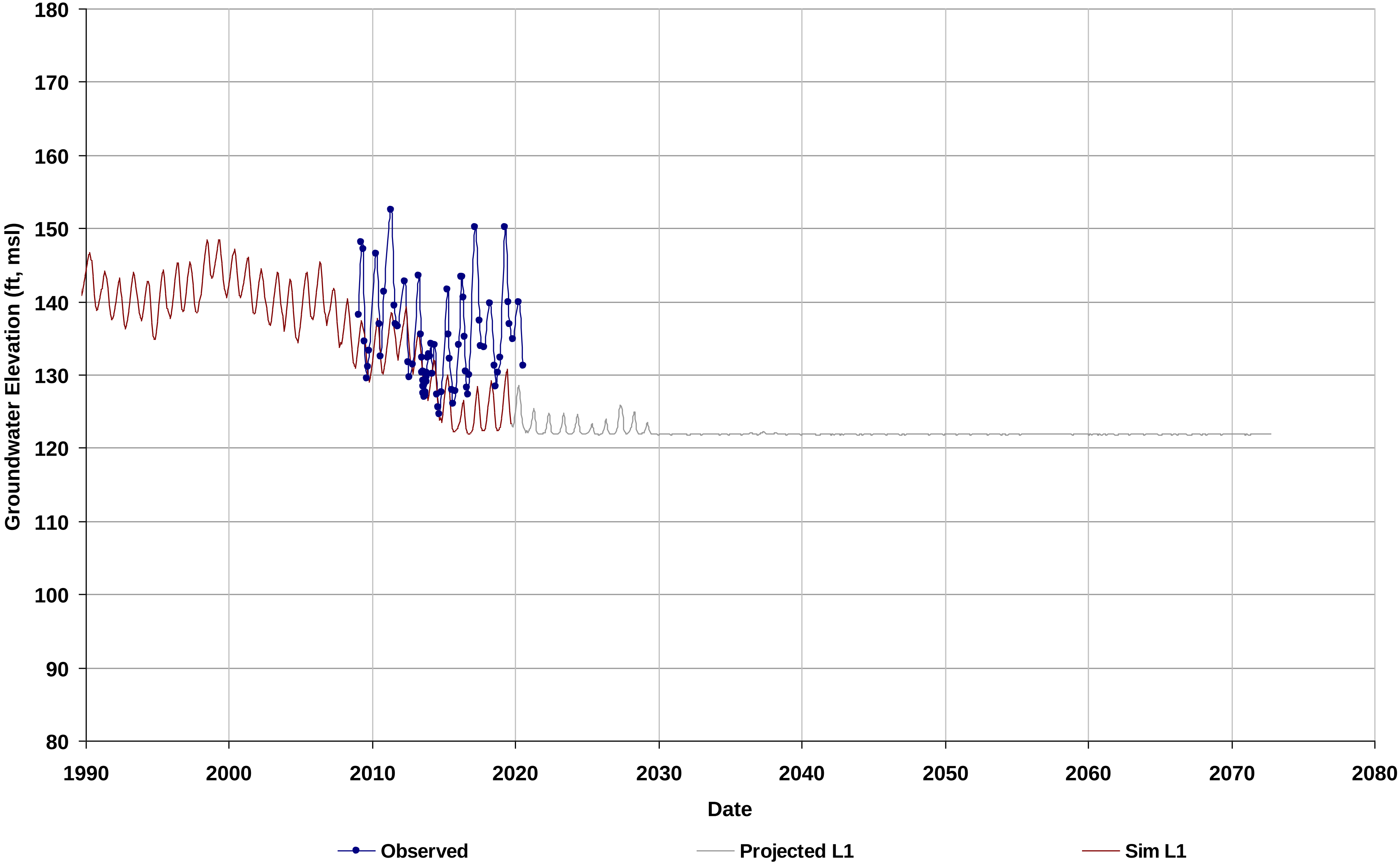
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

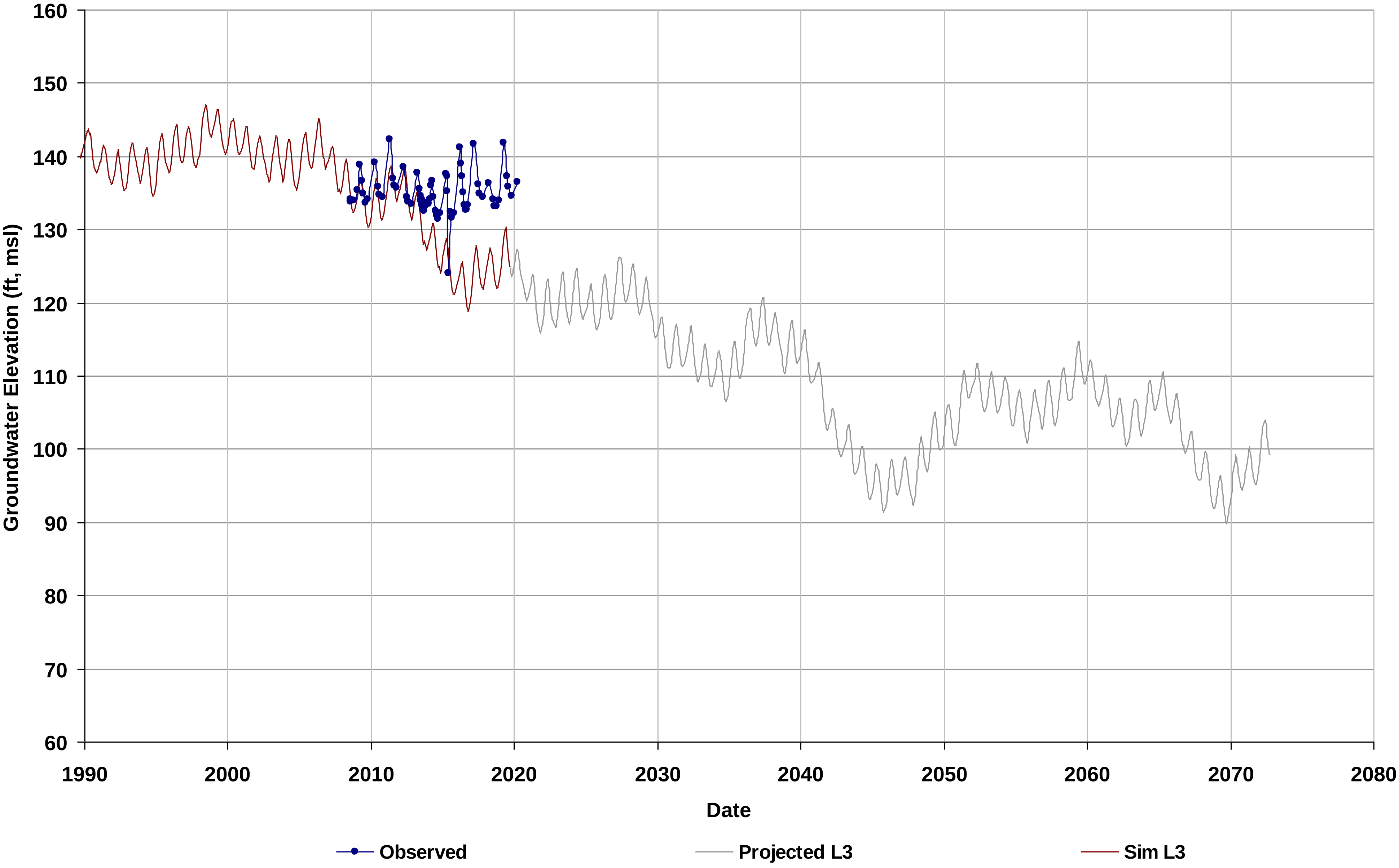
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

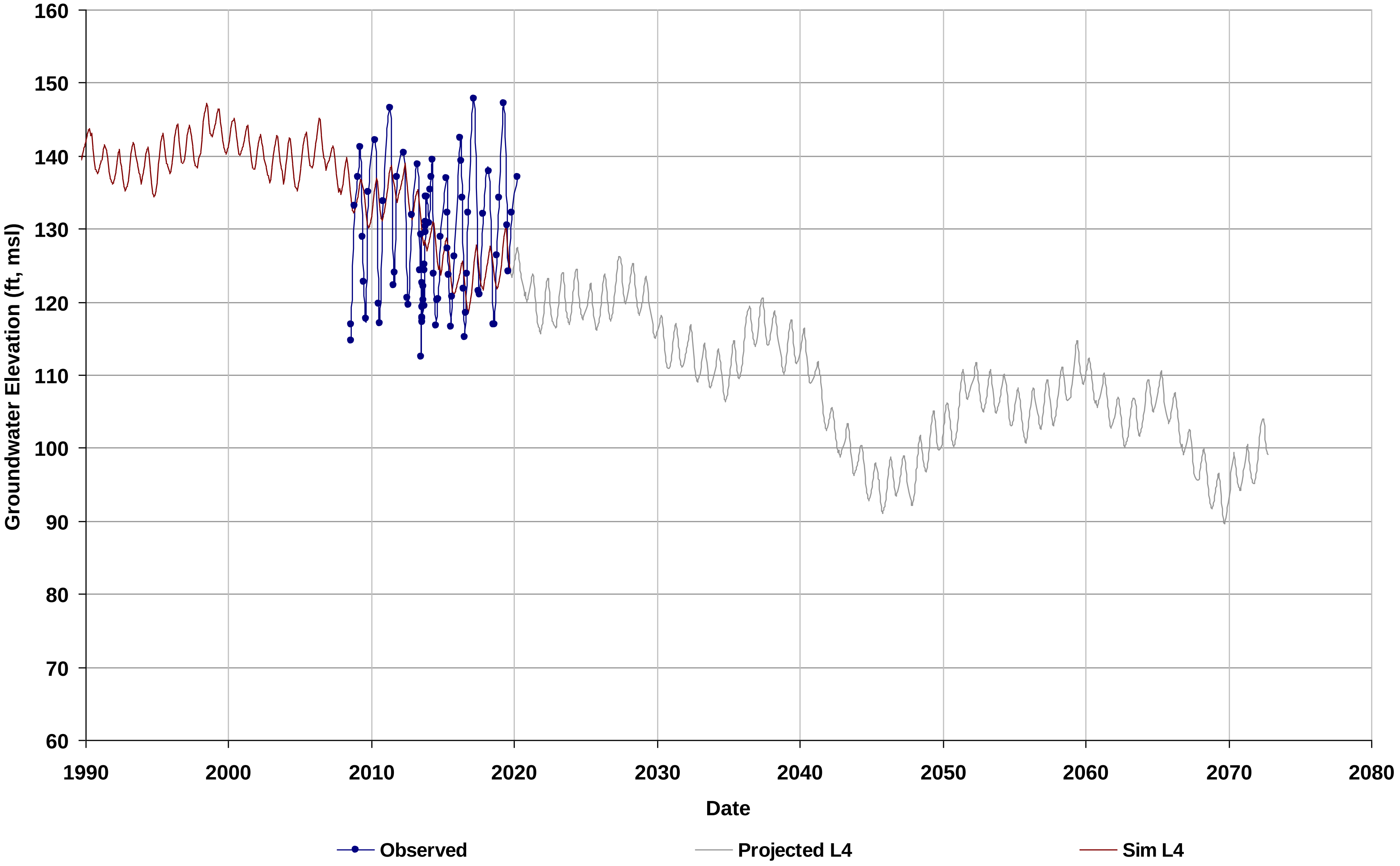
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

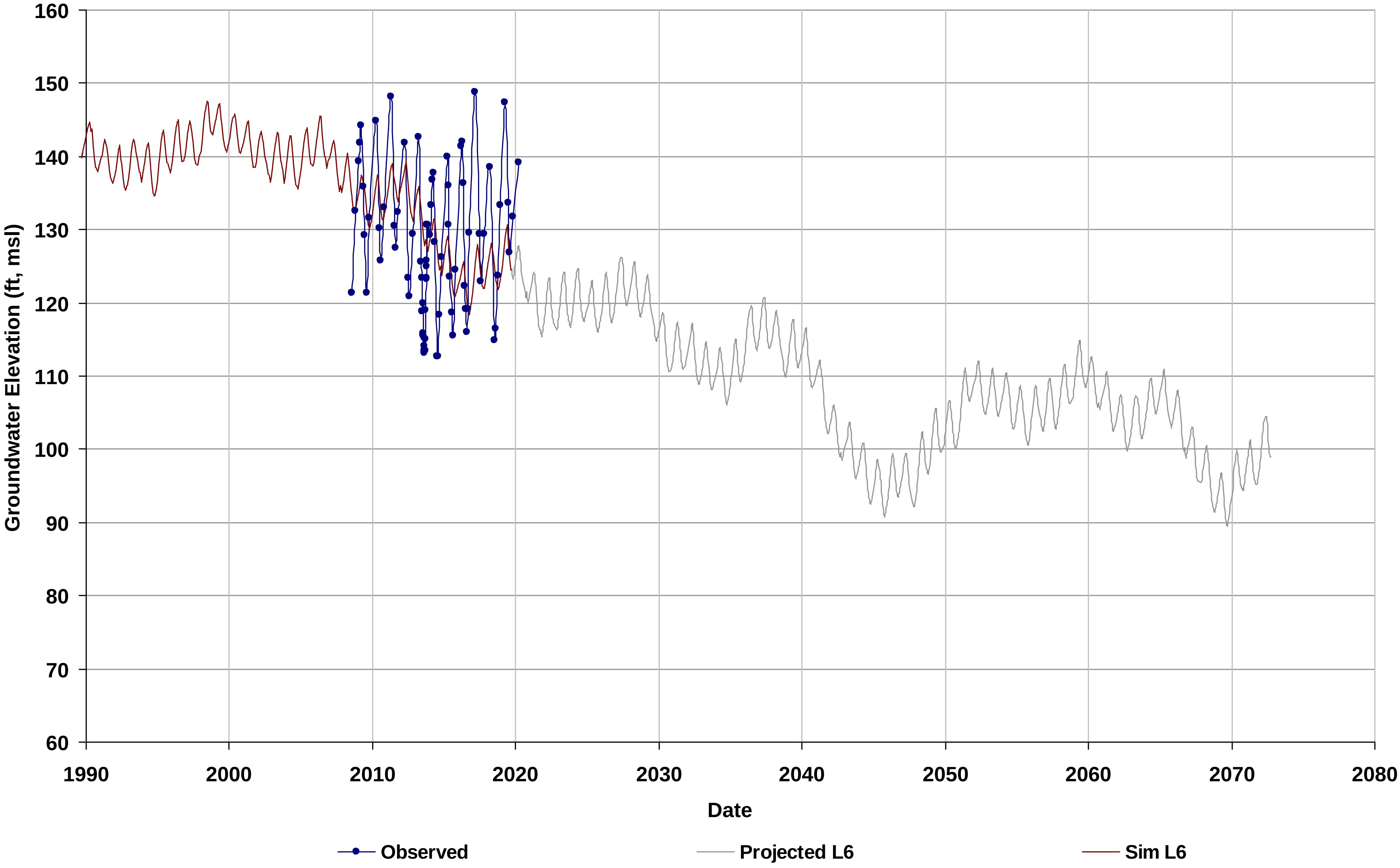
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

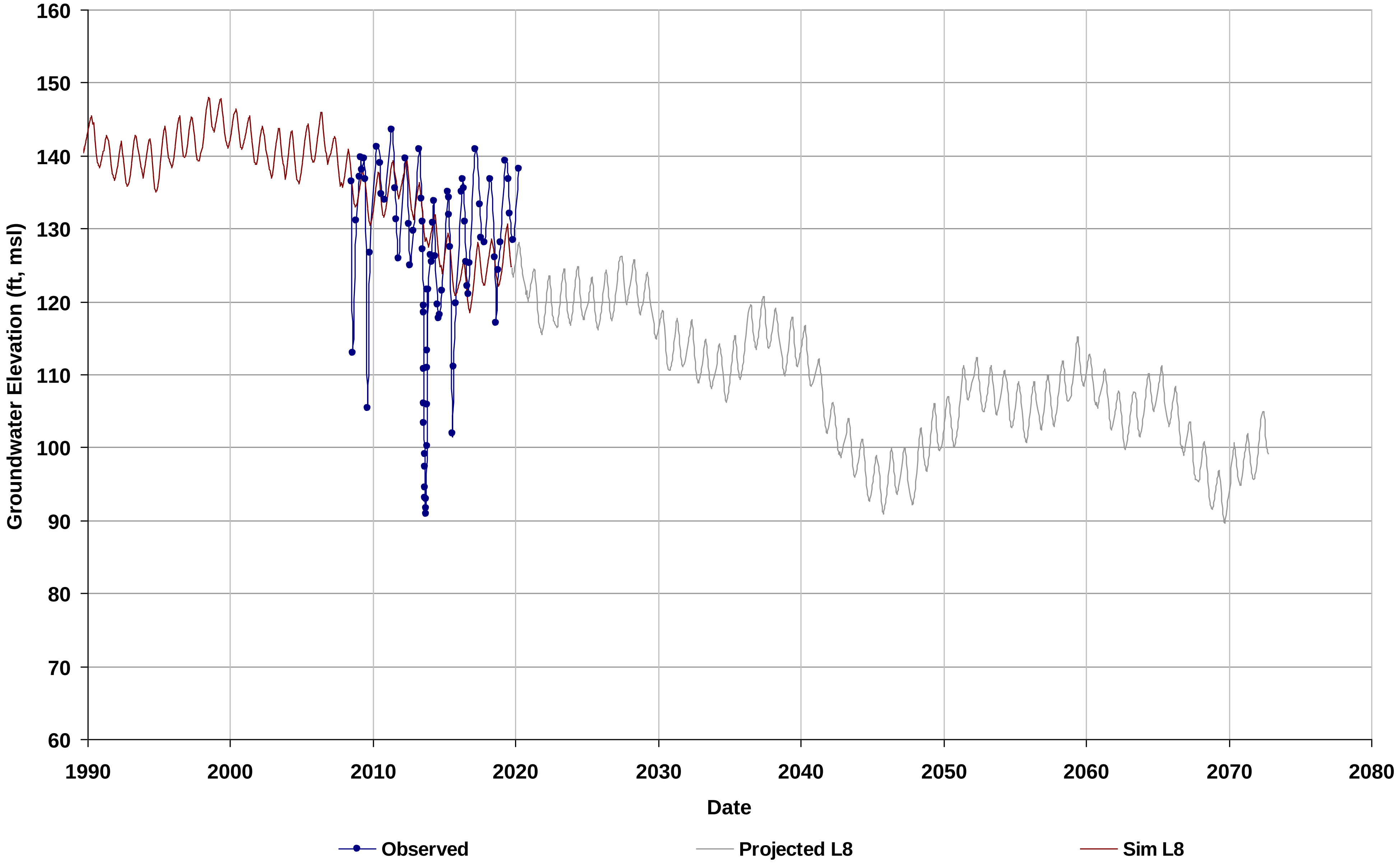
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

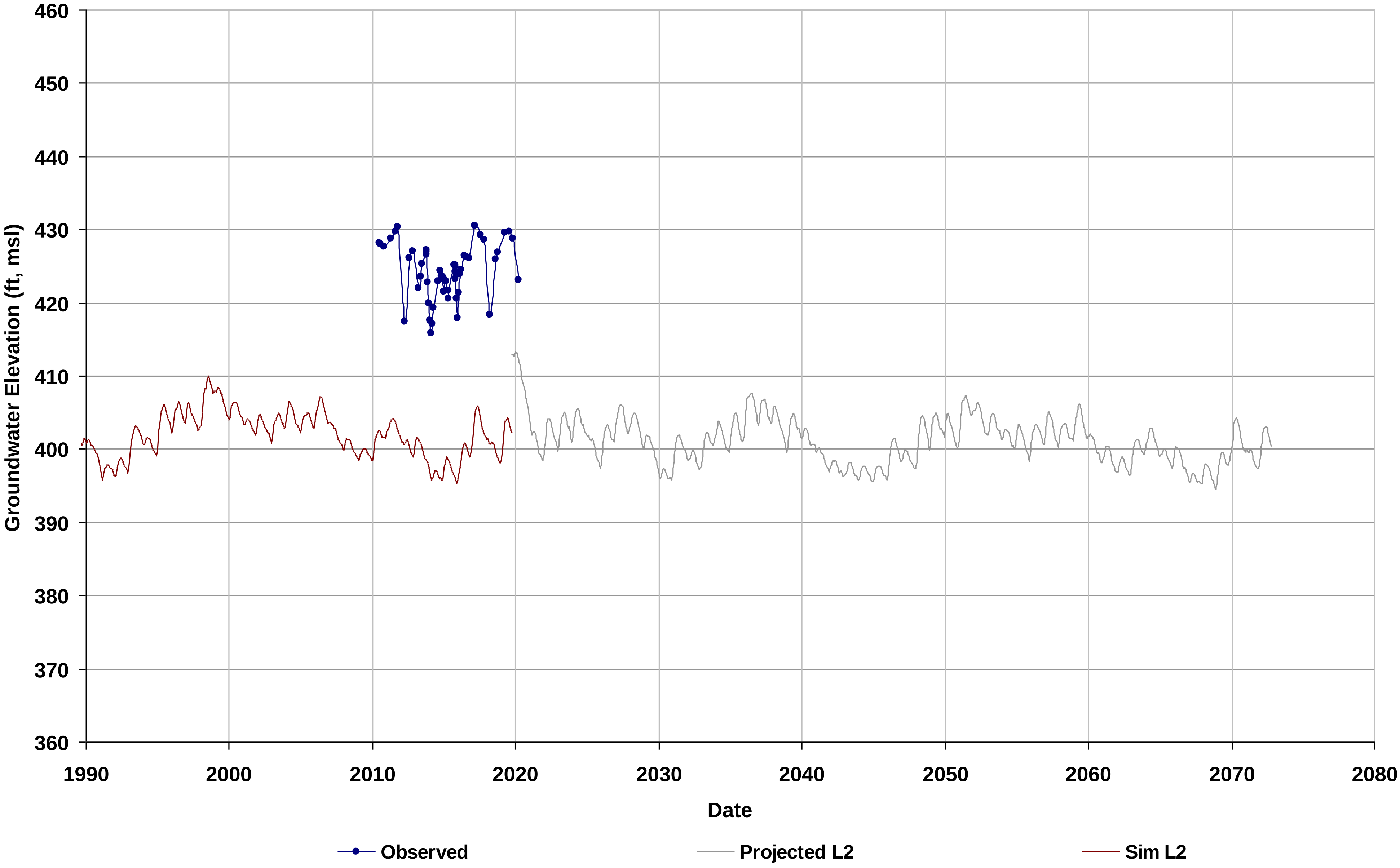
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

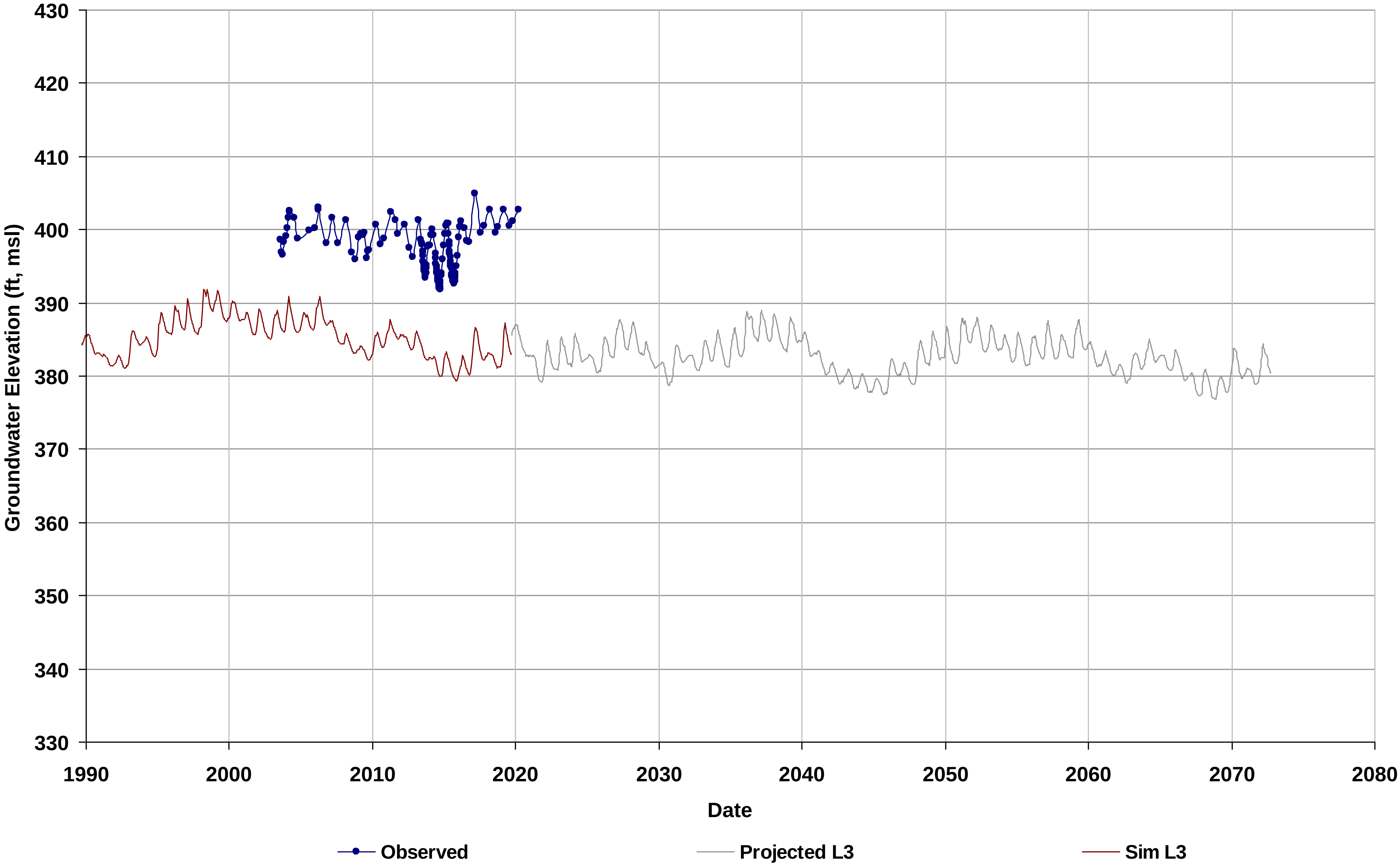
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

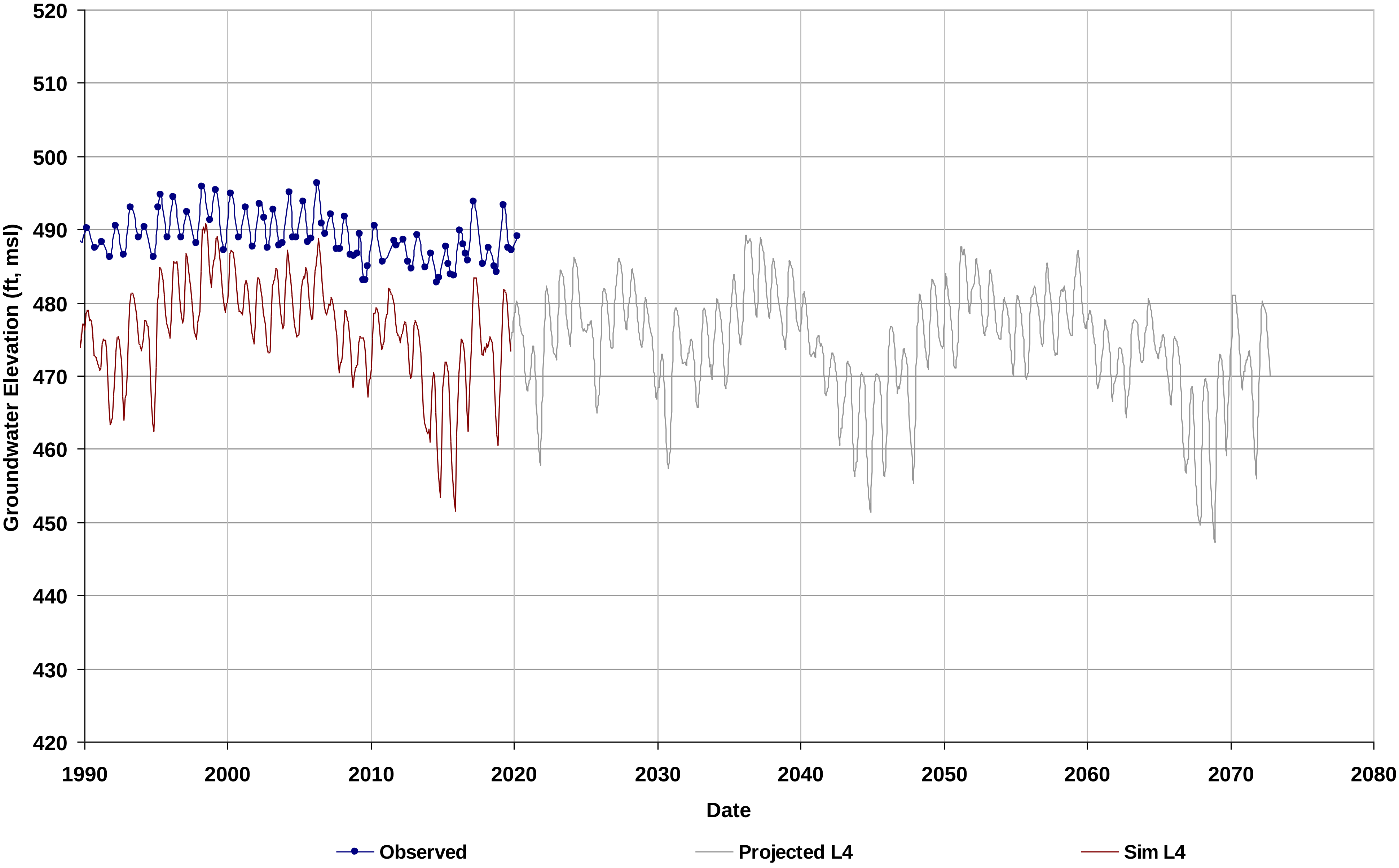
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

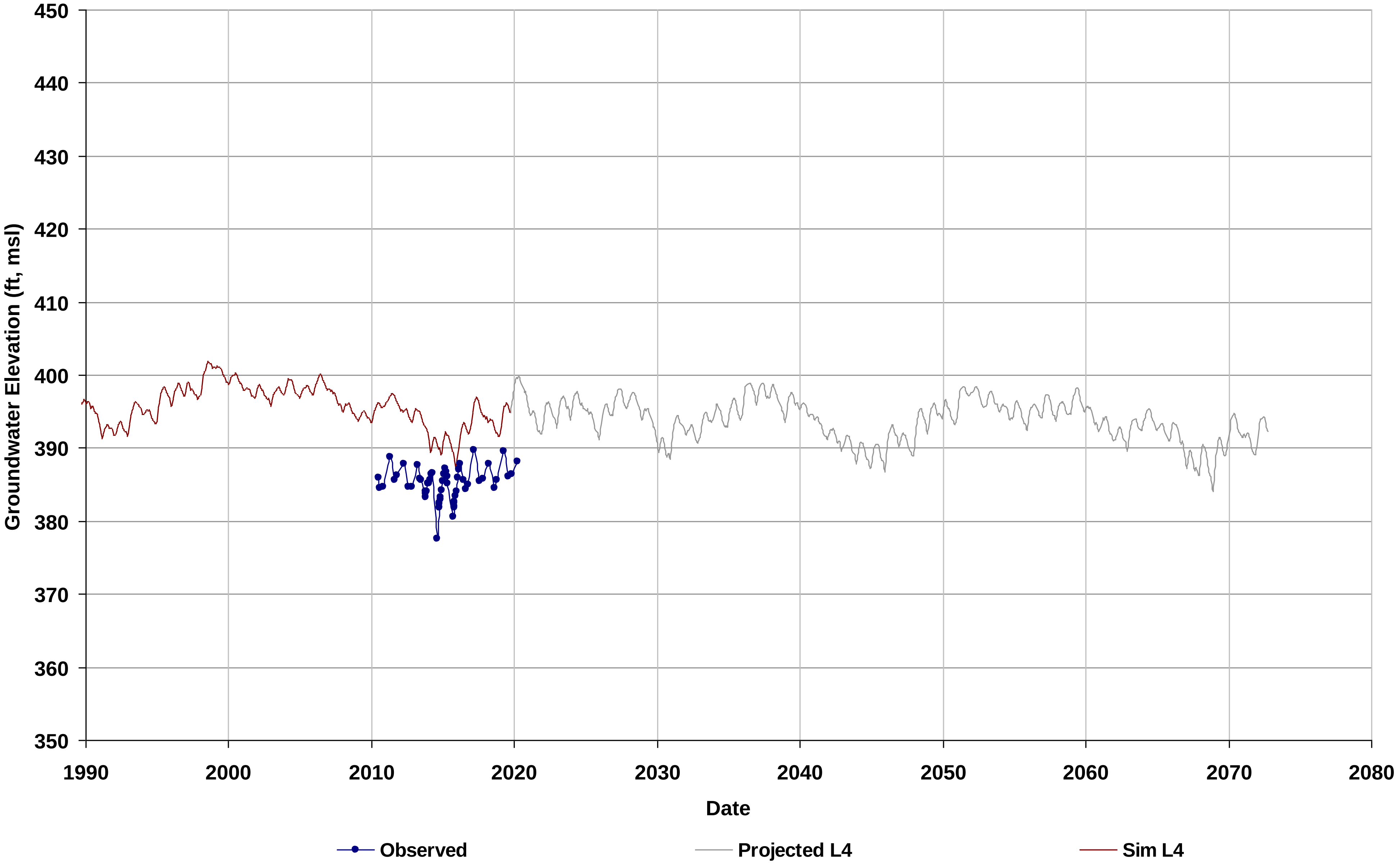
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

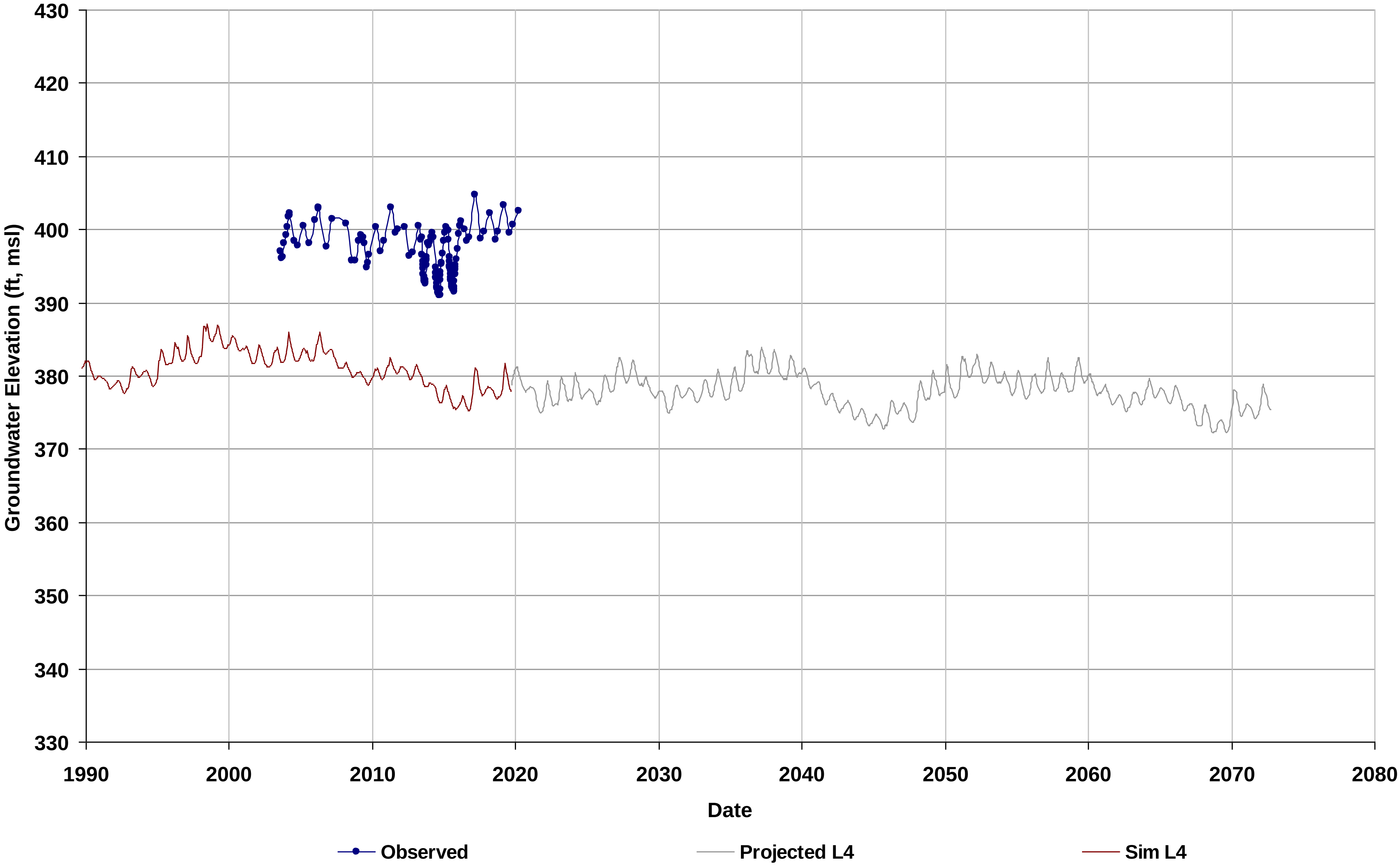
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

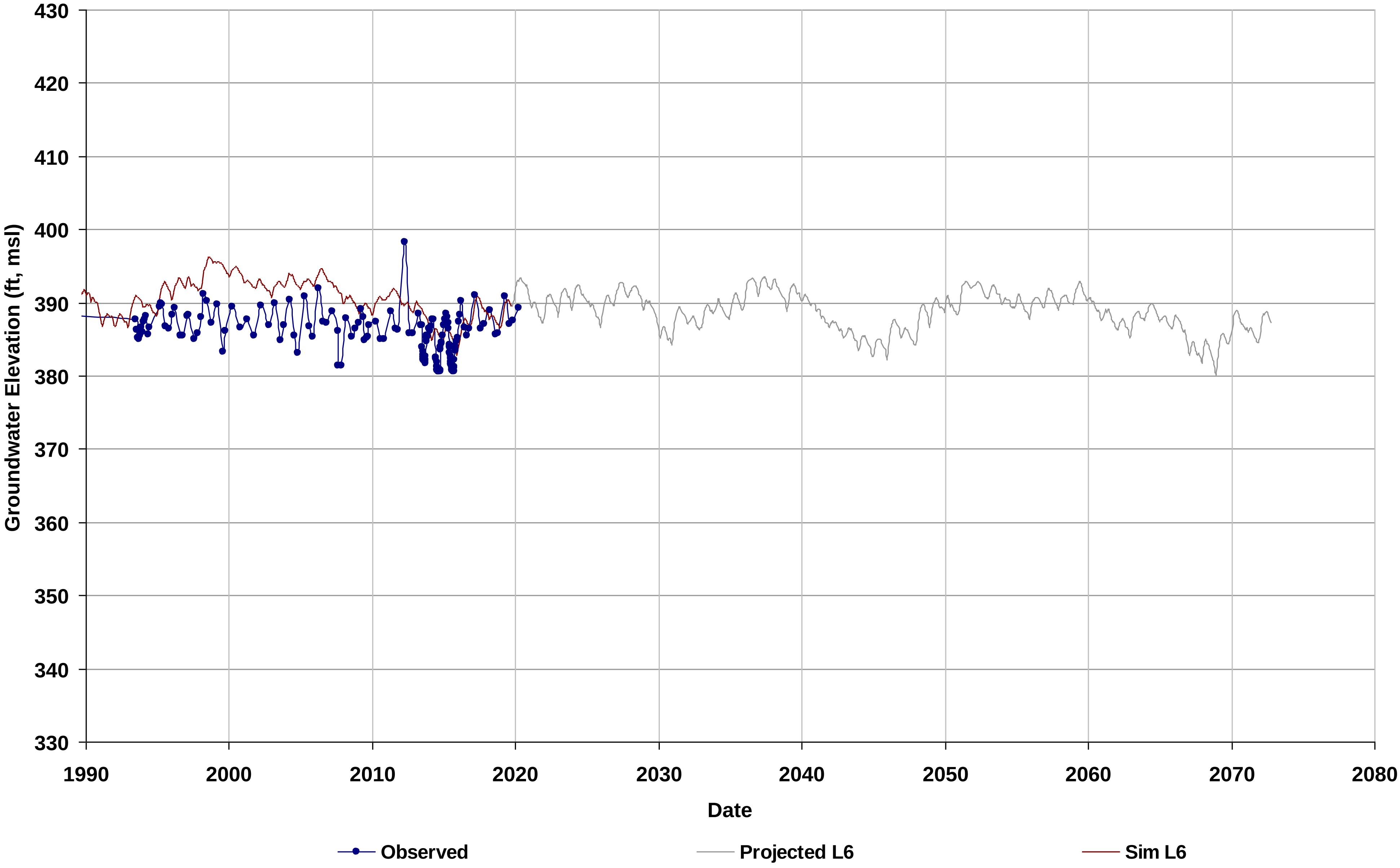
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

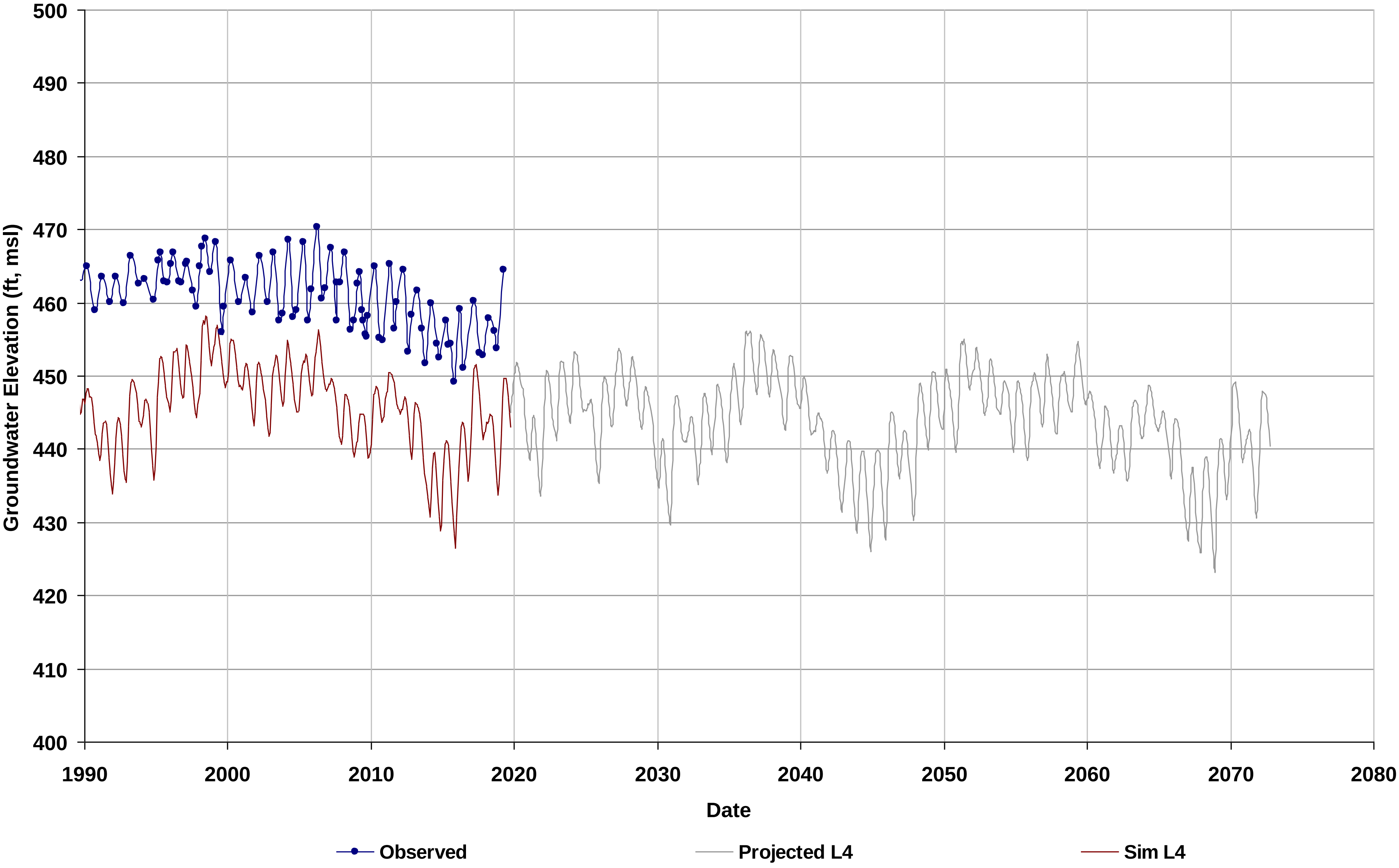
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

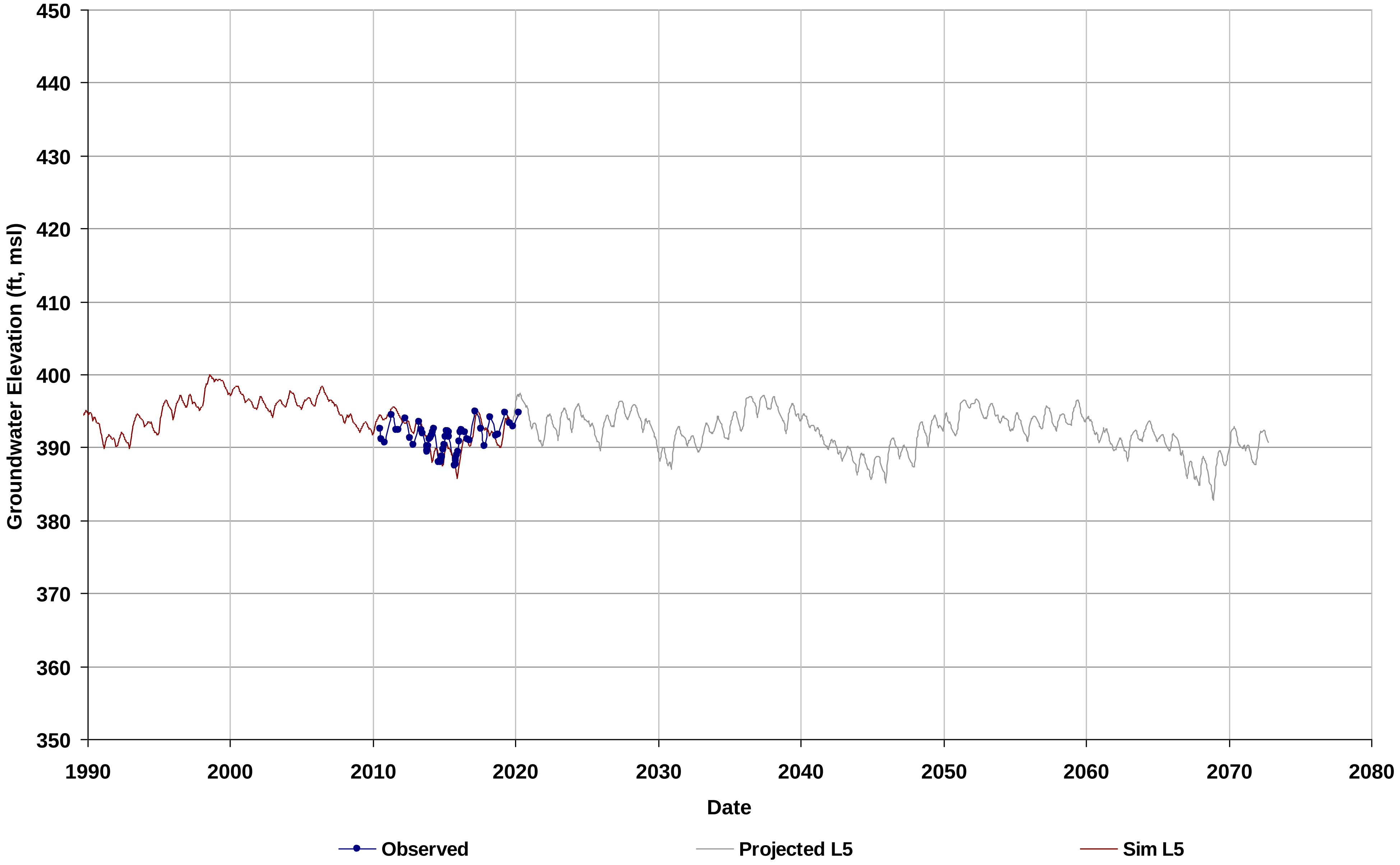
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

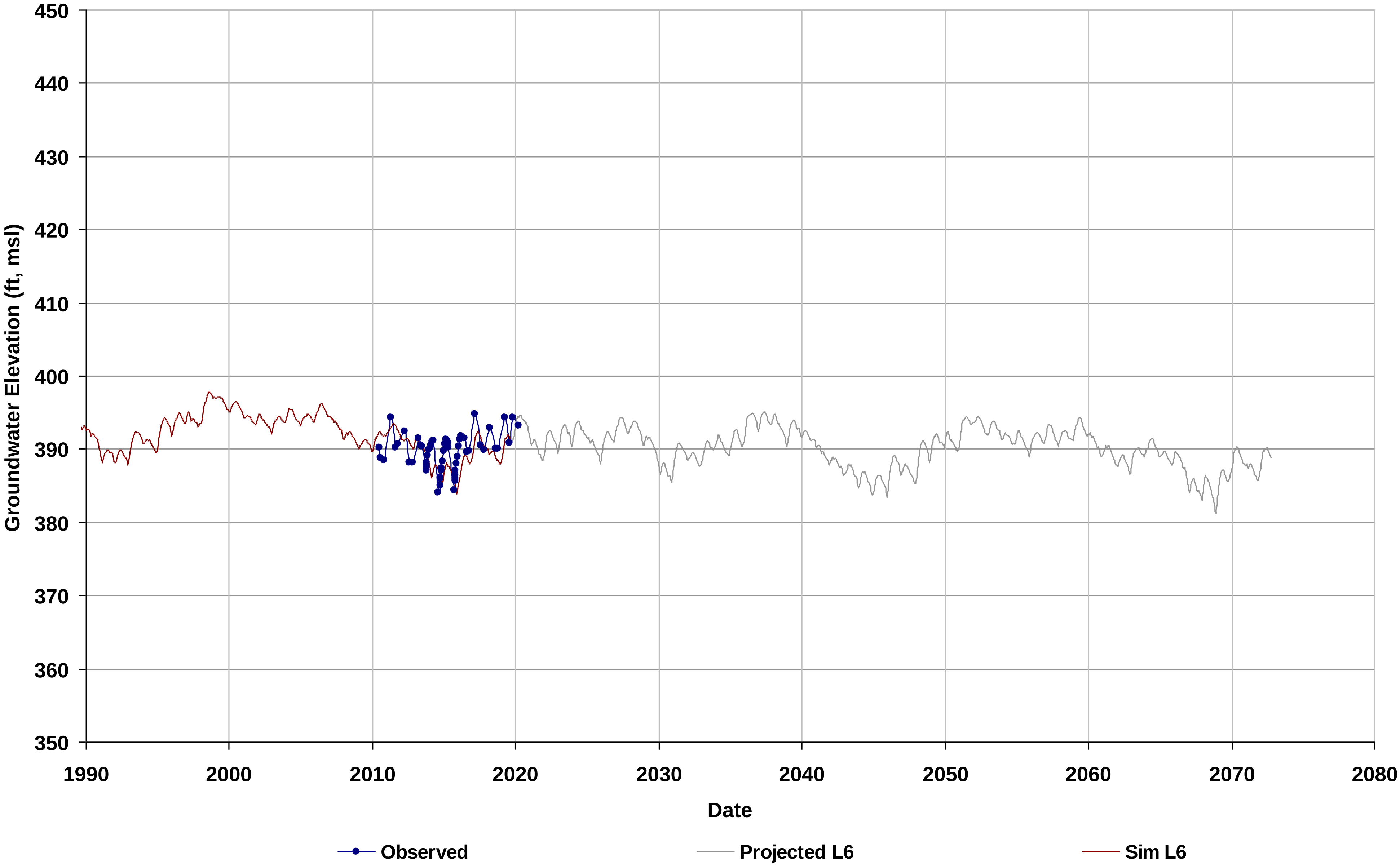
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

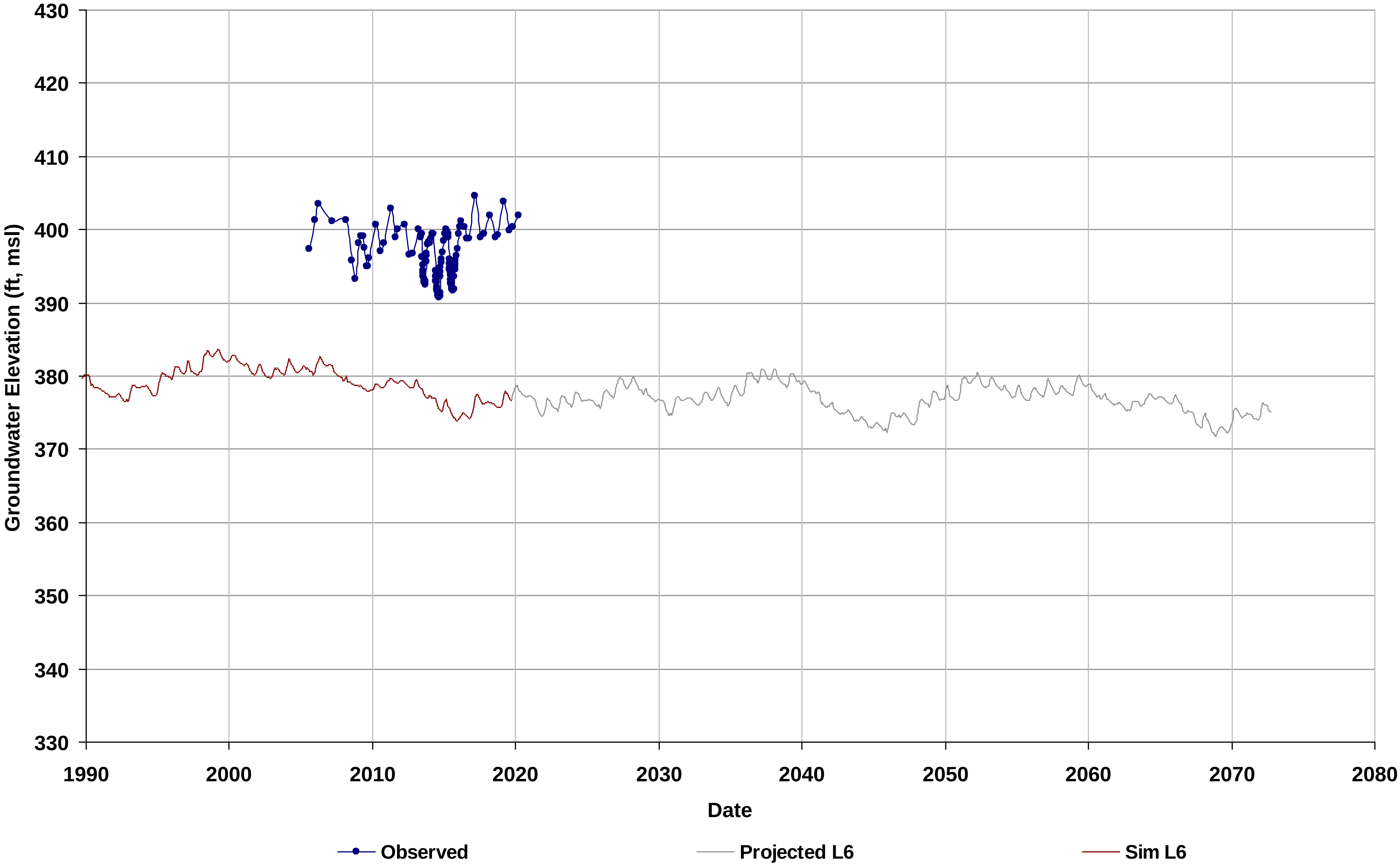
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

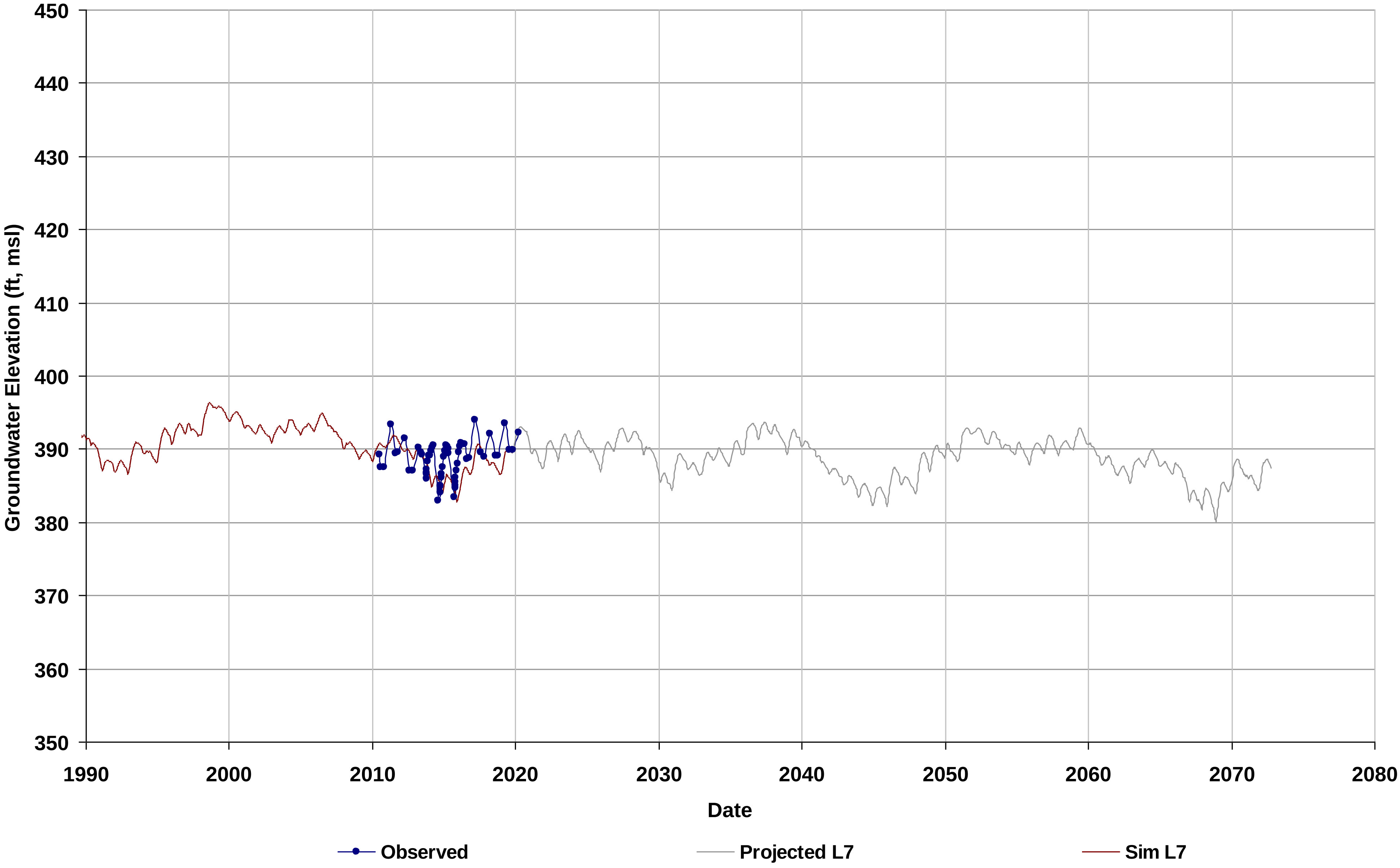
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

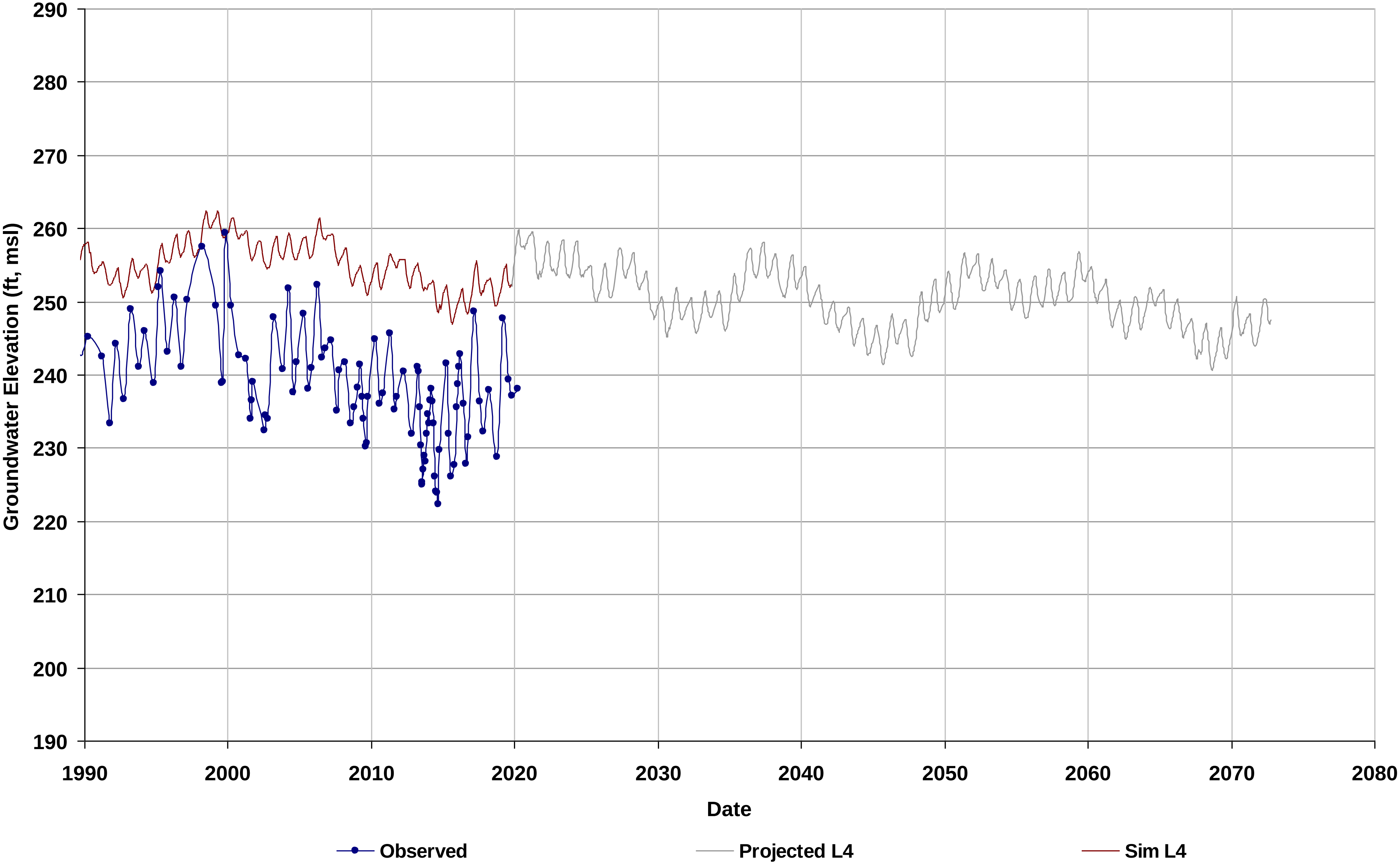
APPENDIX E-8

Tehama IHM Simulated Groundwater Levels:

Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

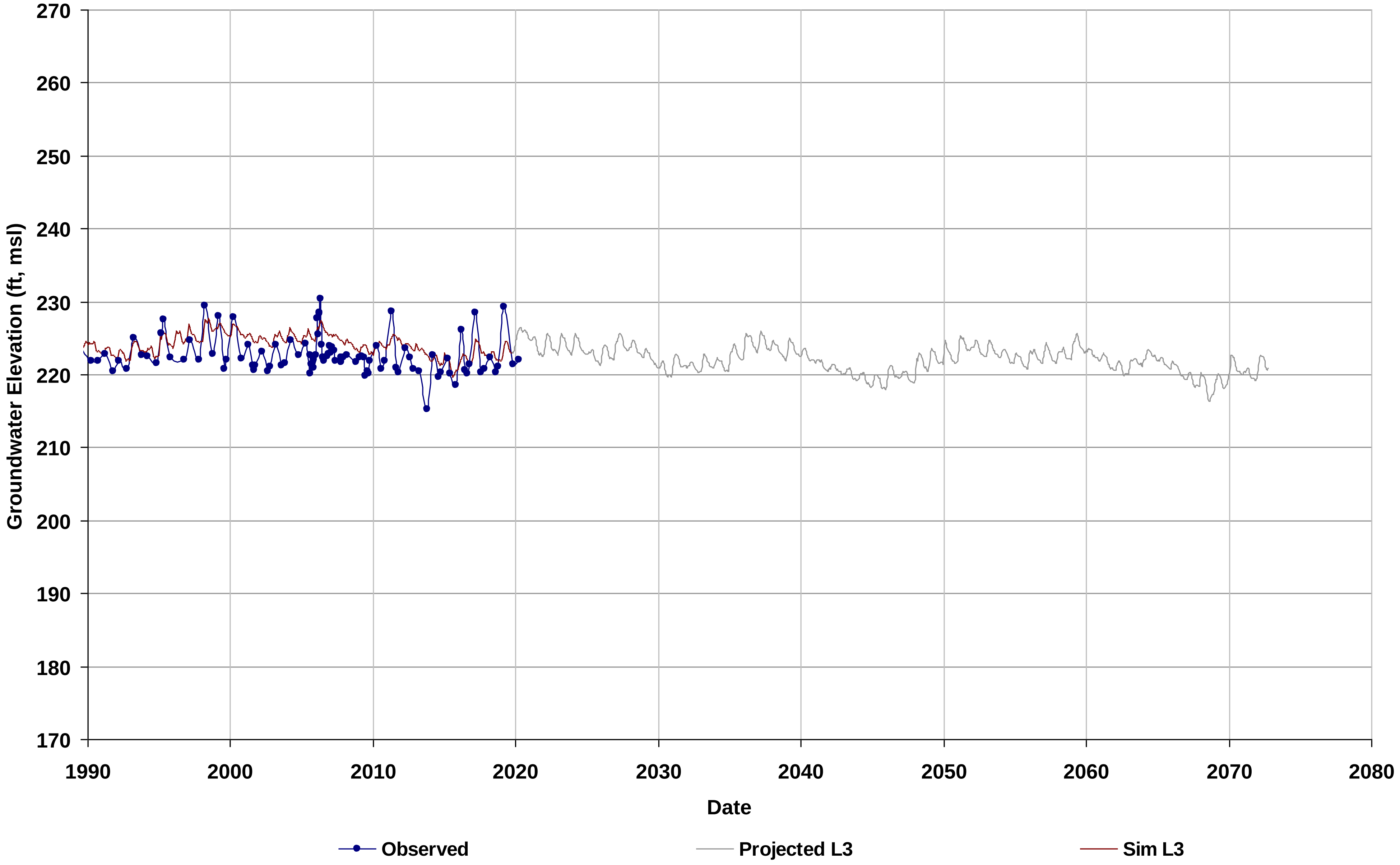
Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

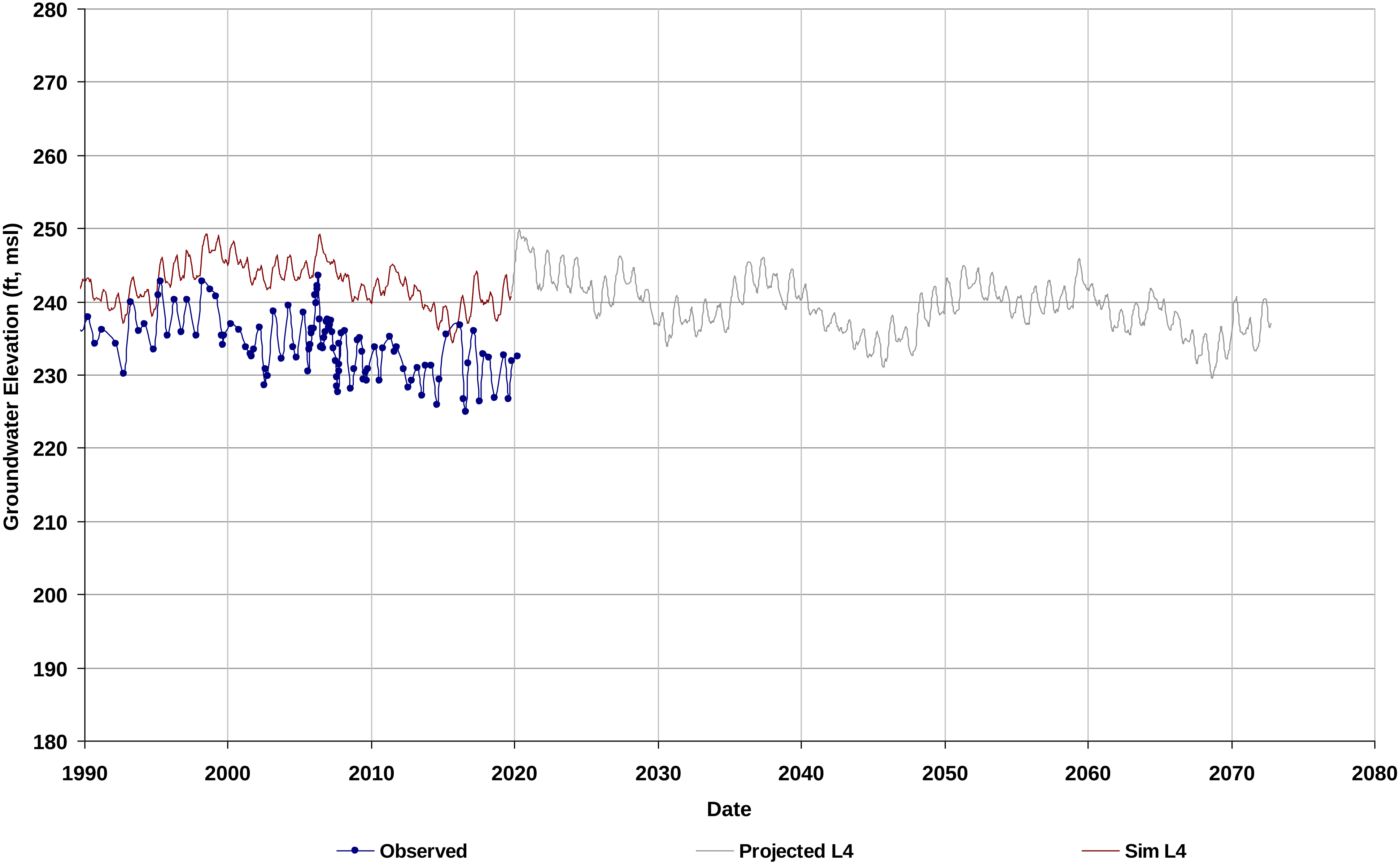
Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

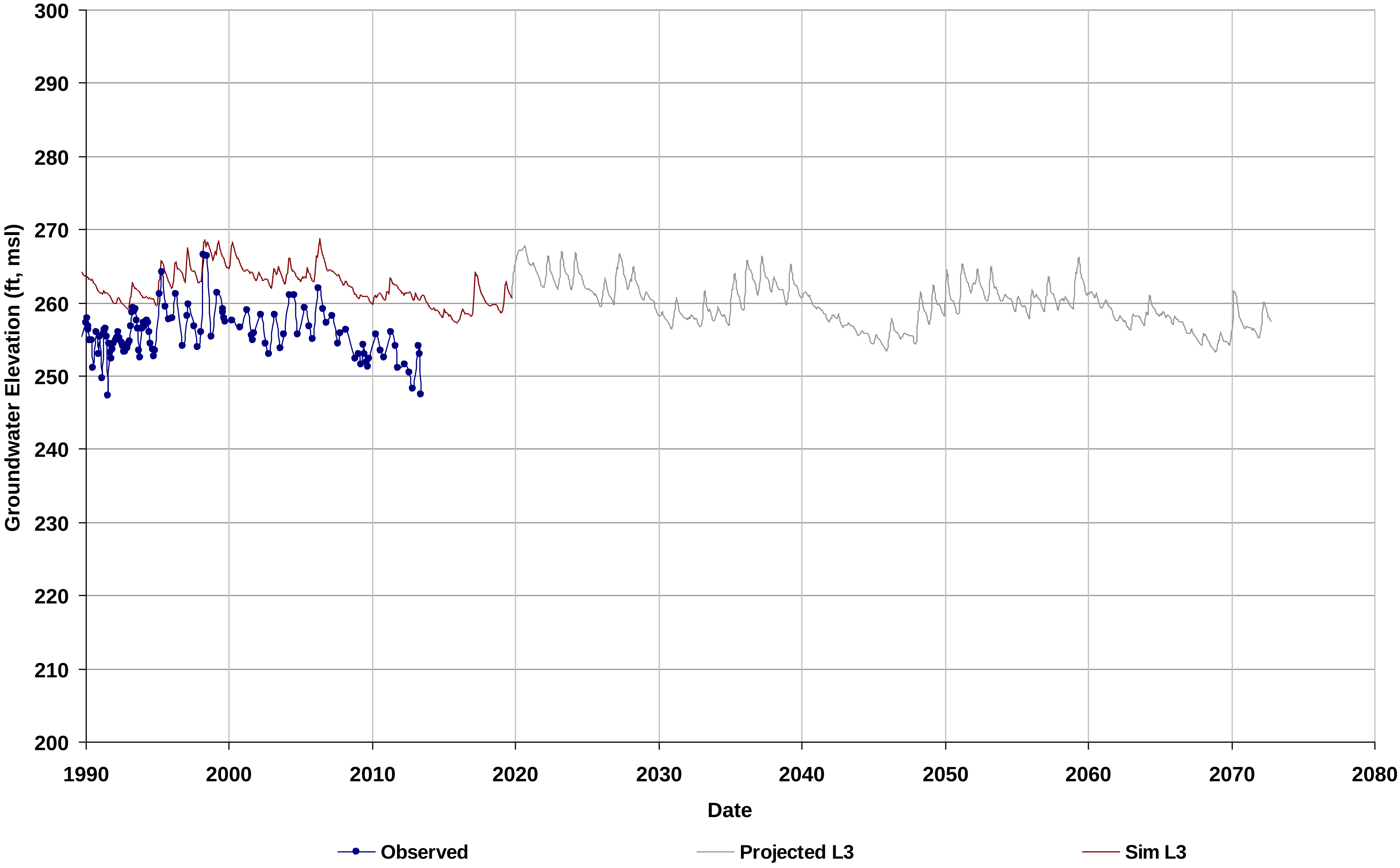
Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

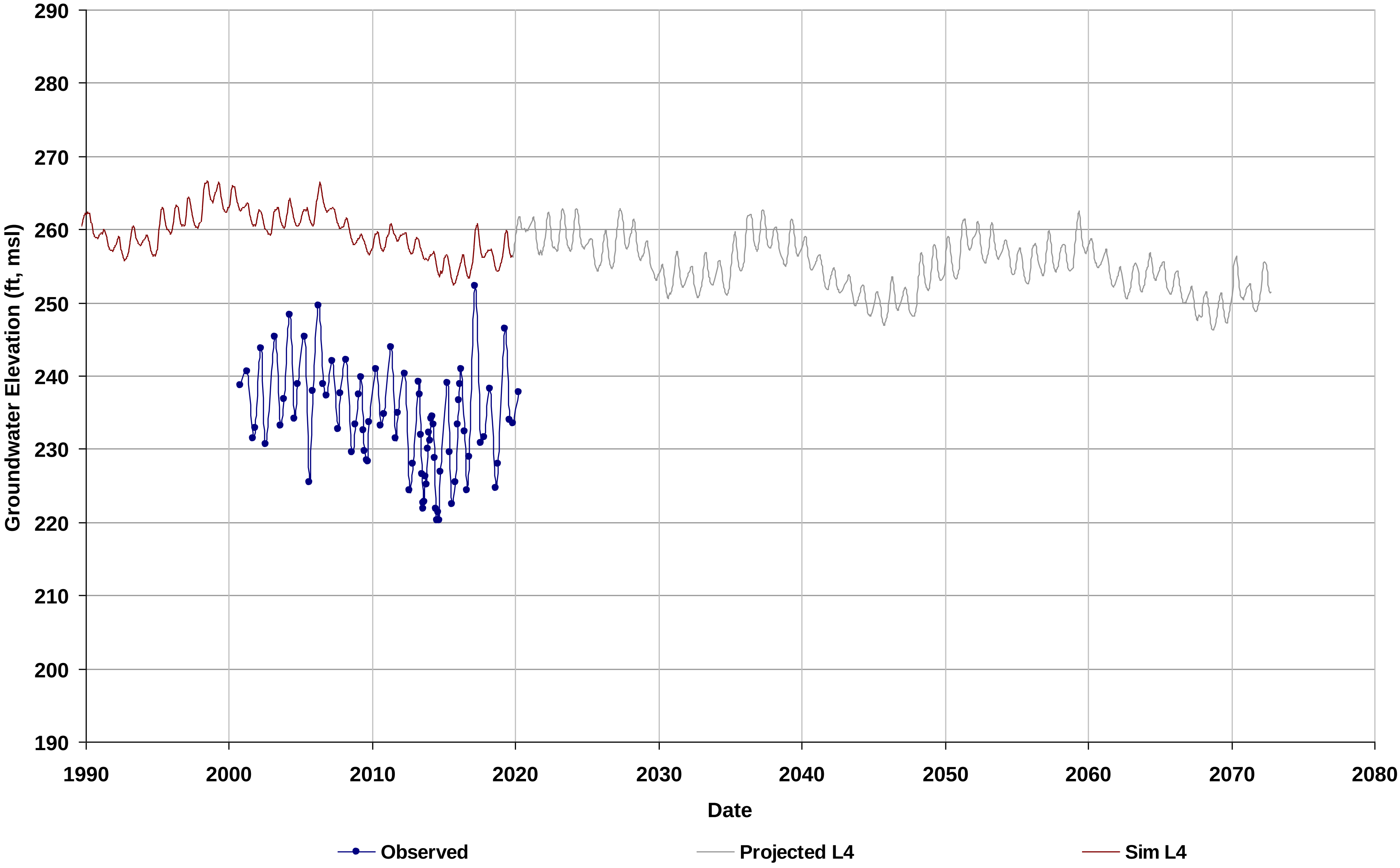
Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

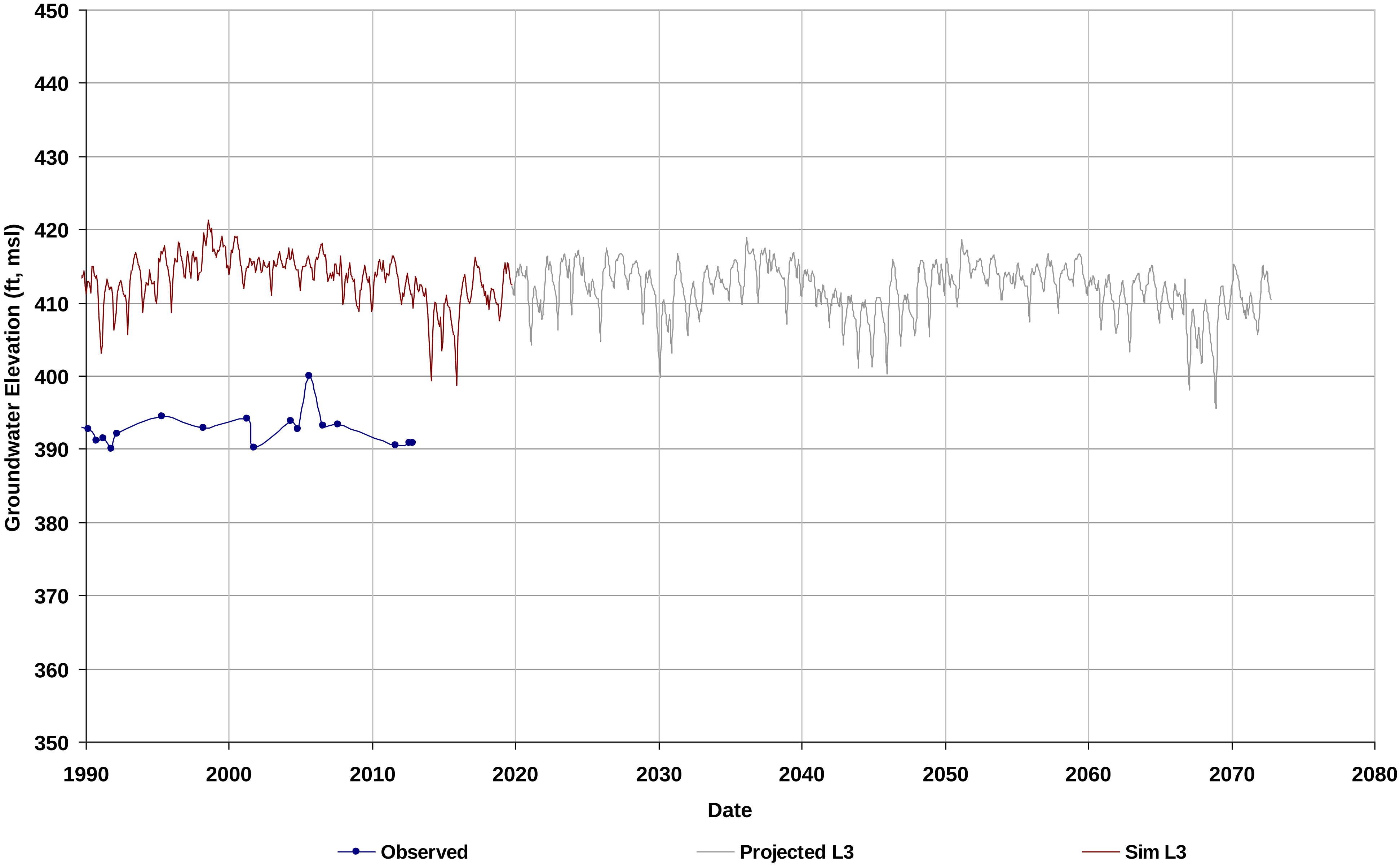
Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

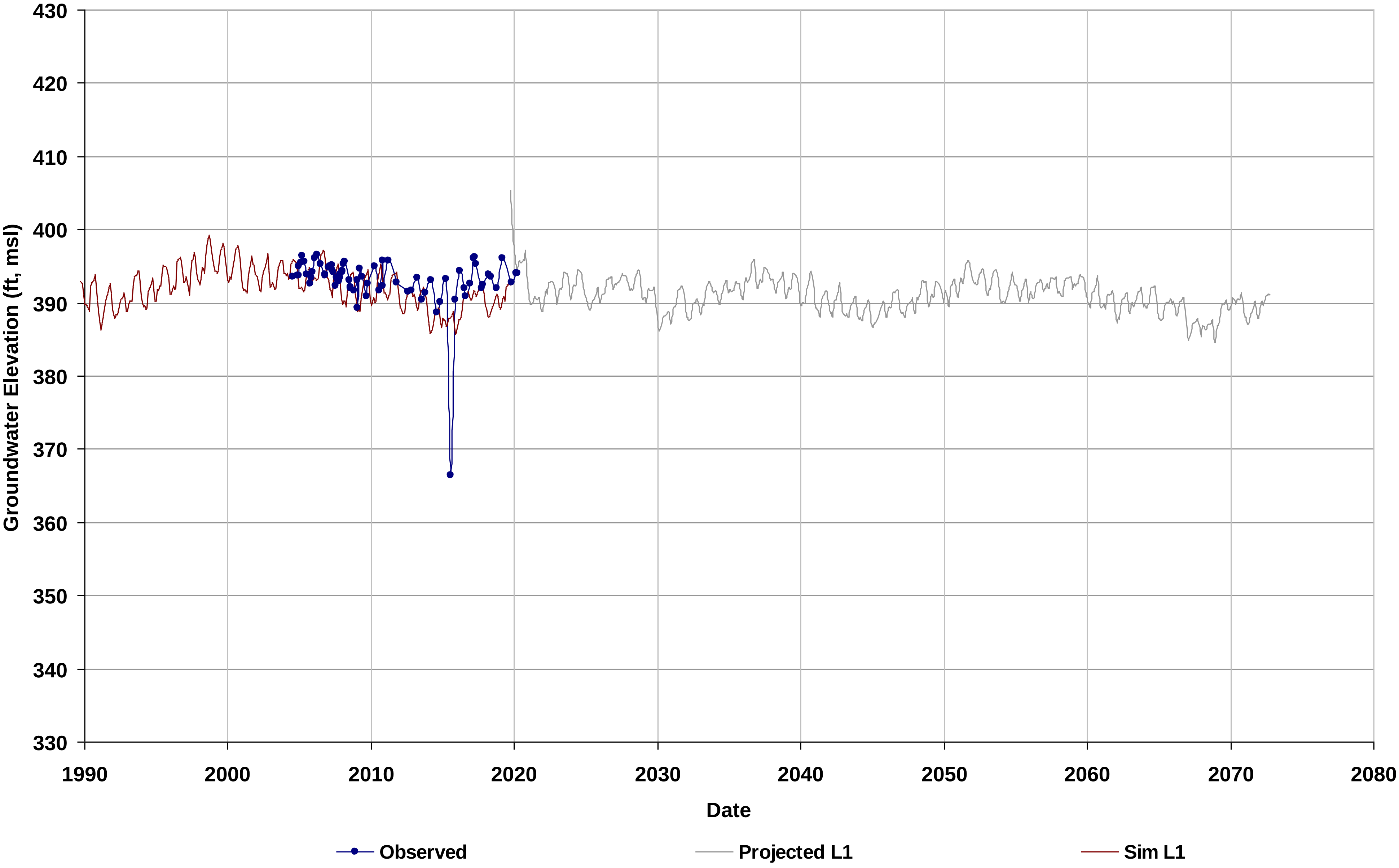
Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

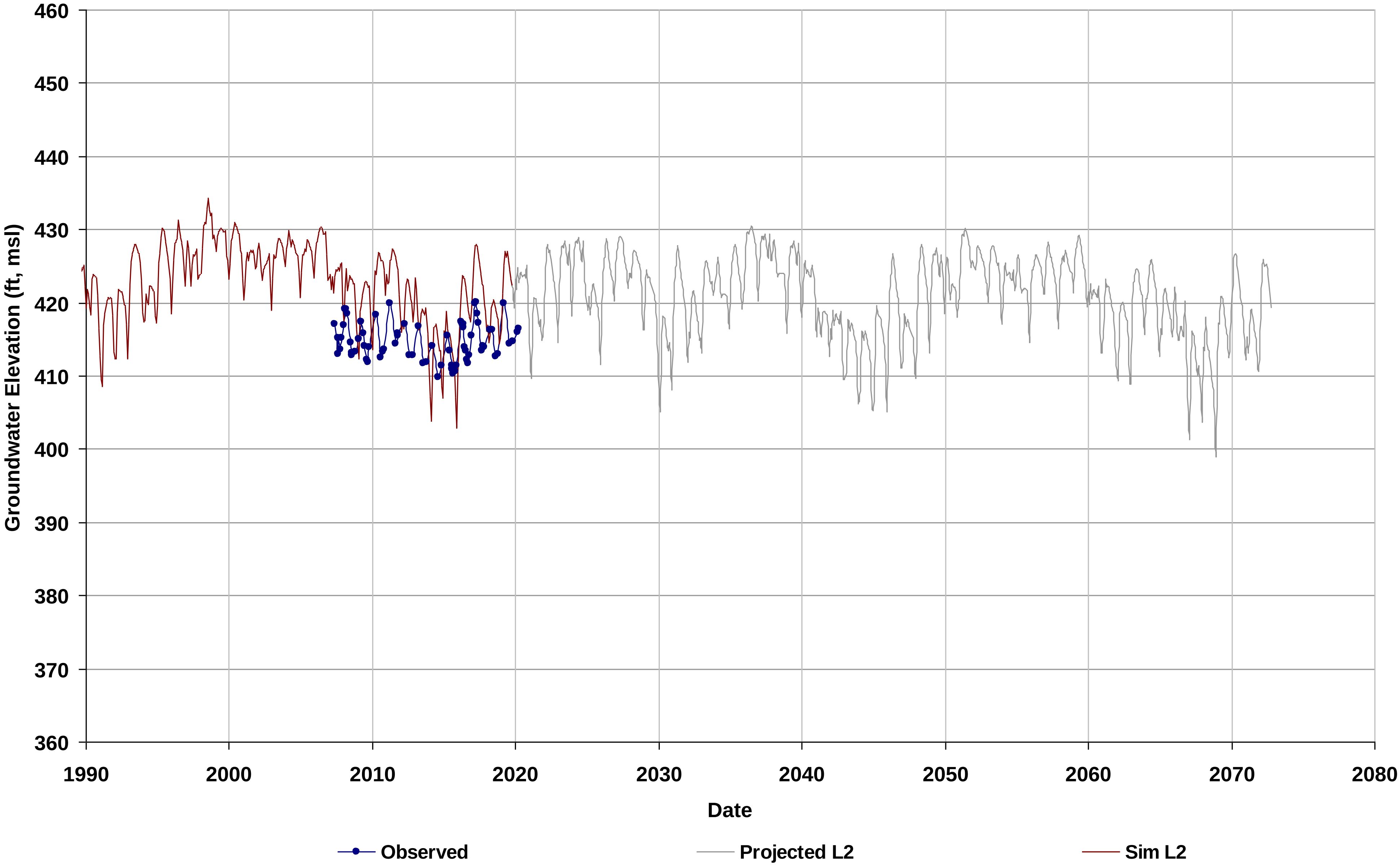
Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

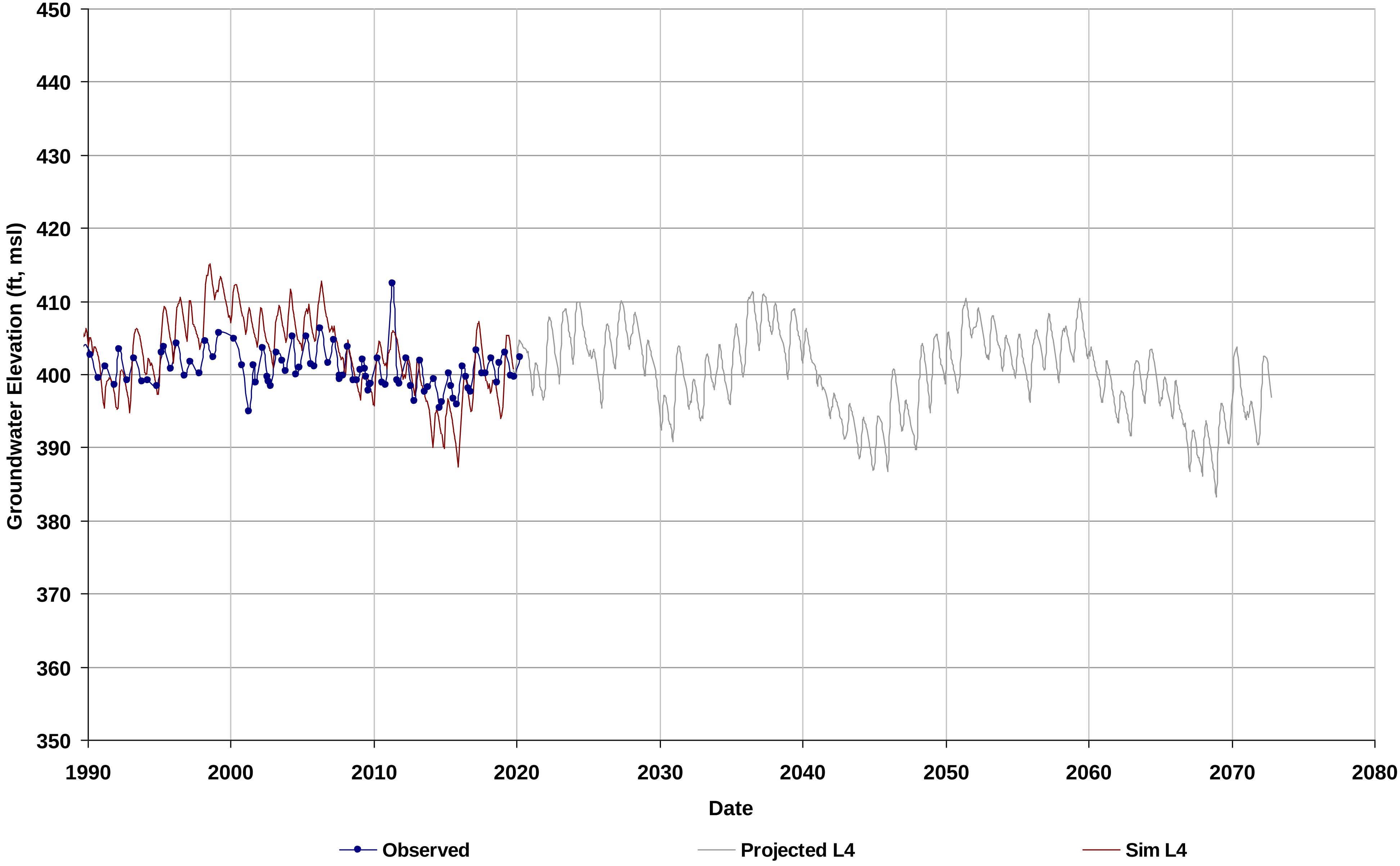
Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

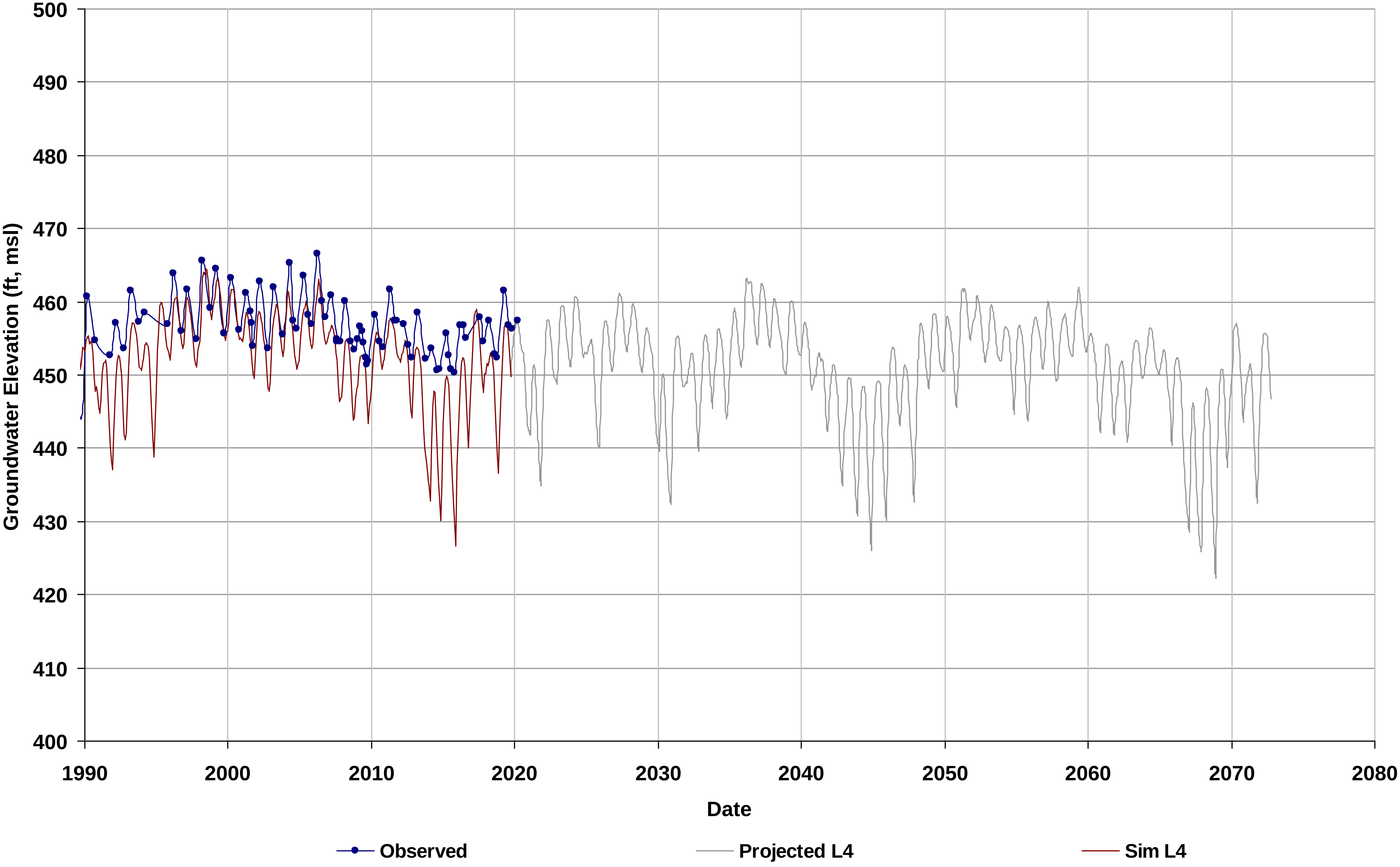
Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

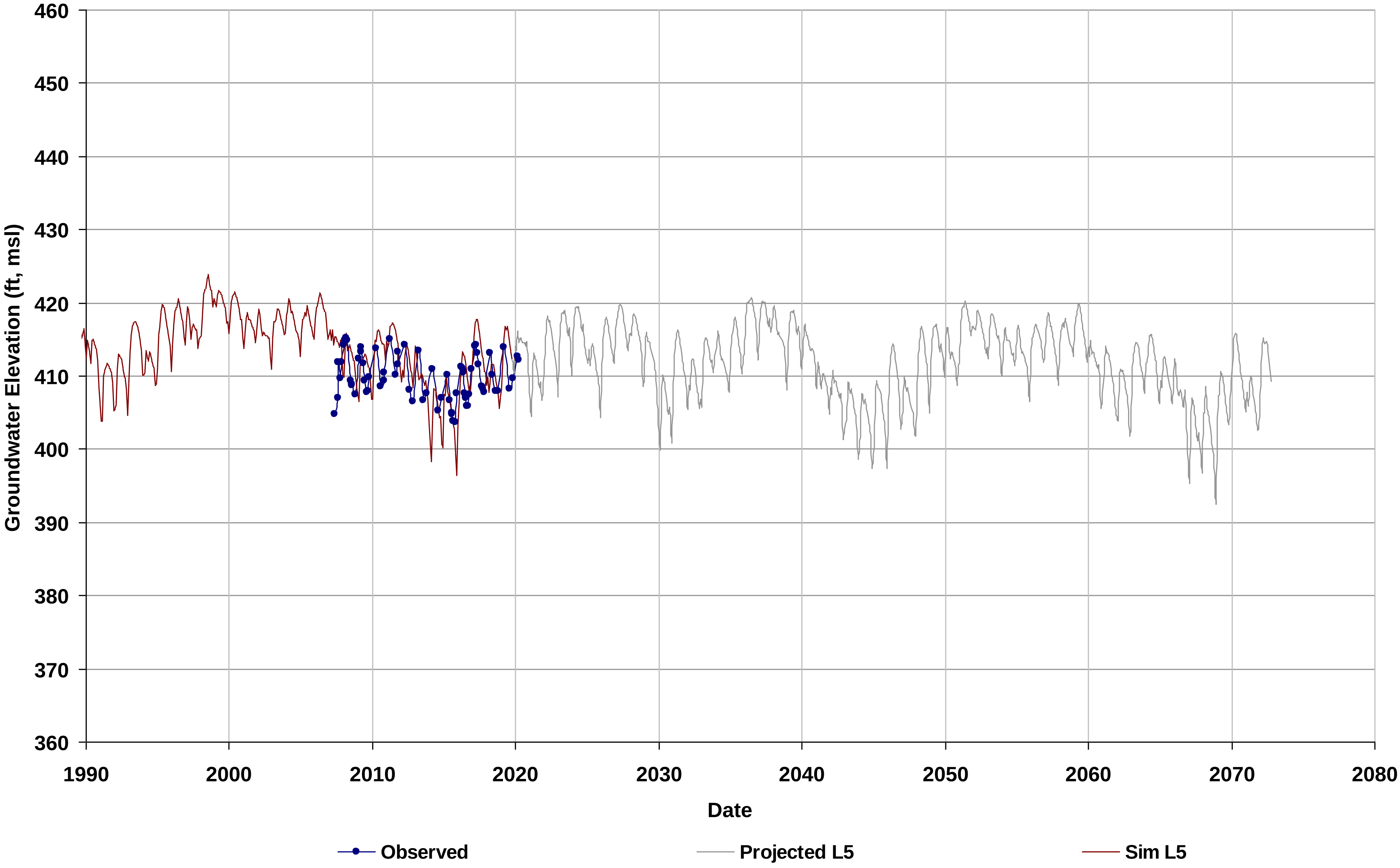
Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

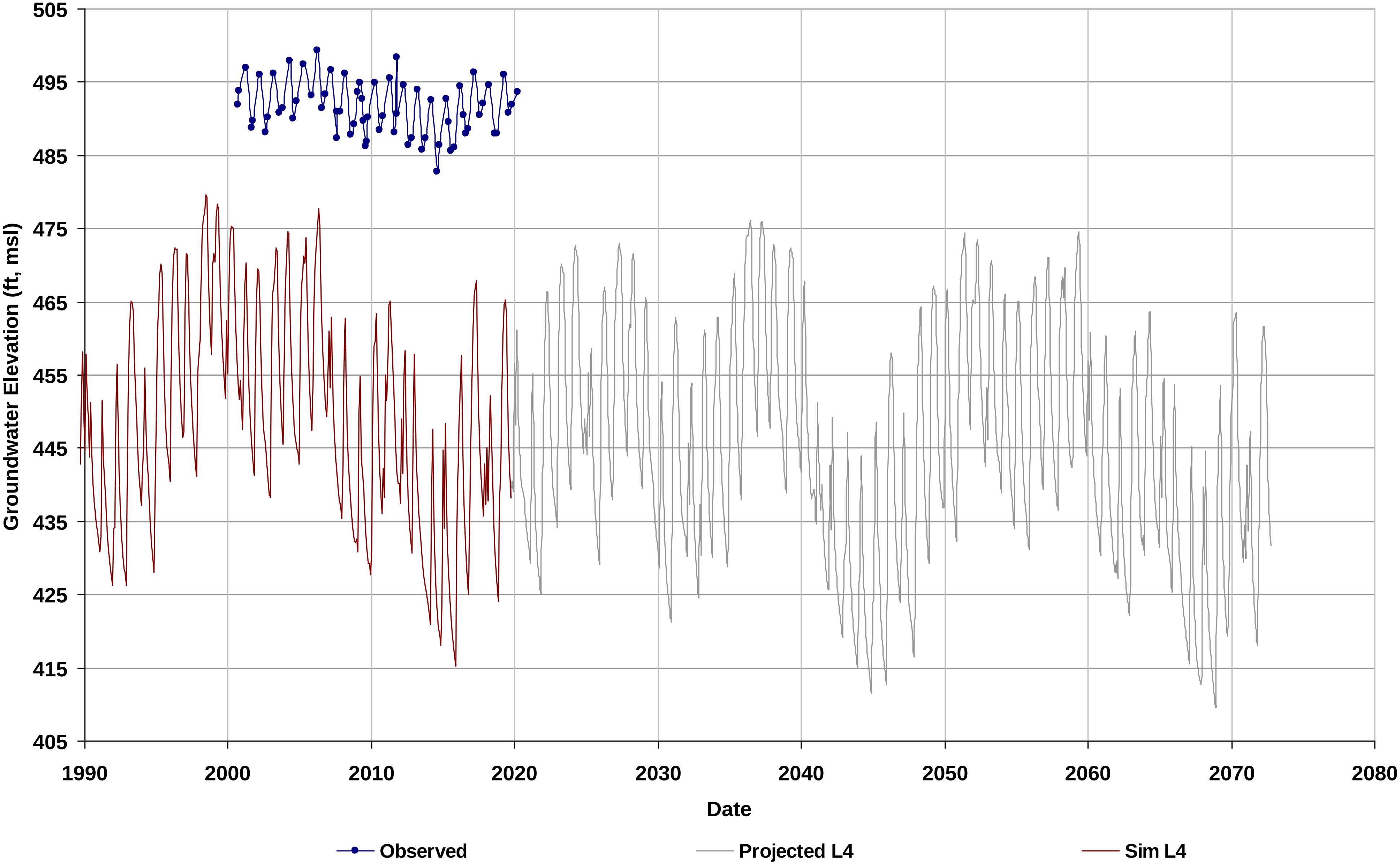
Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

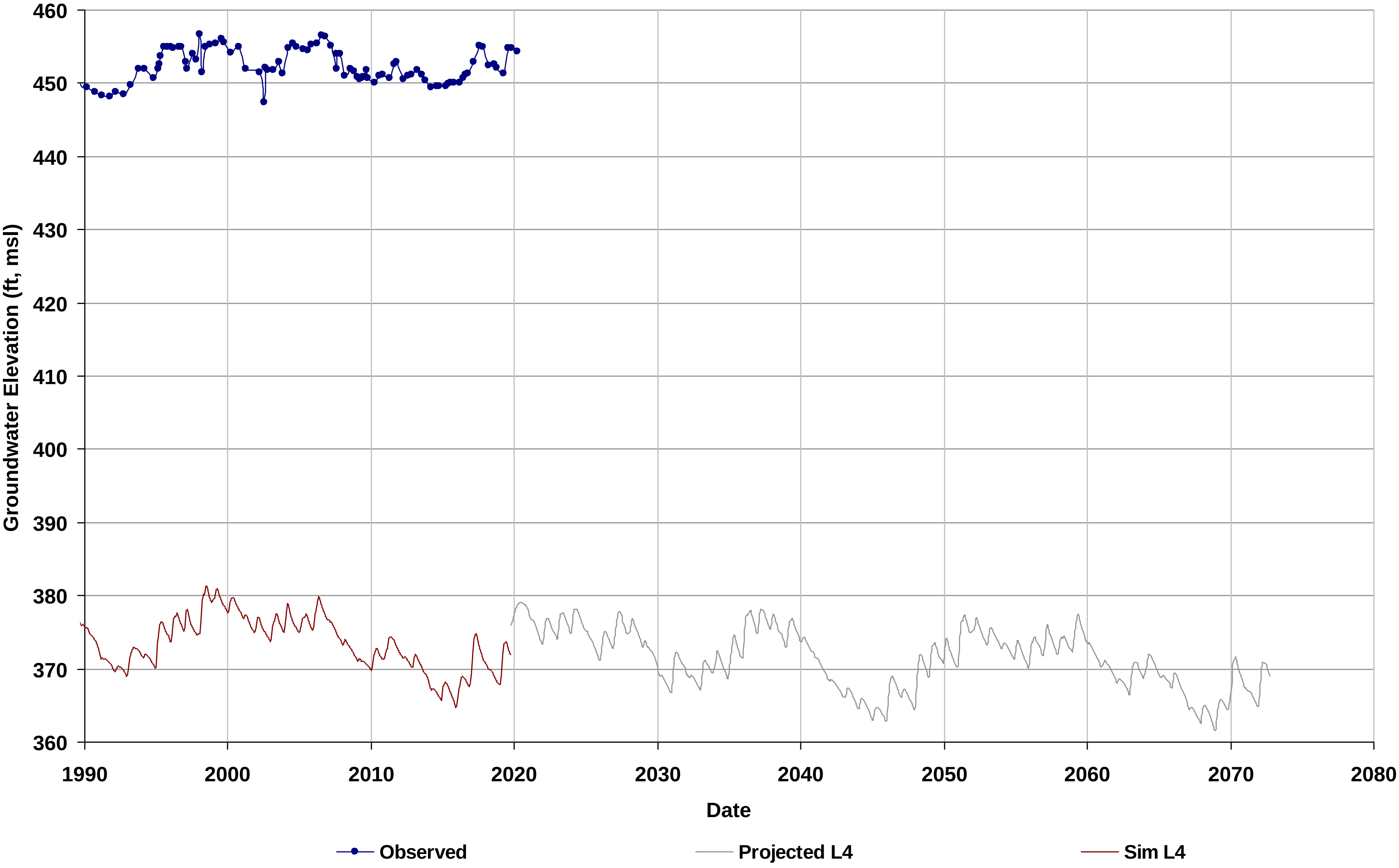
Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

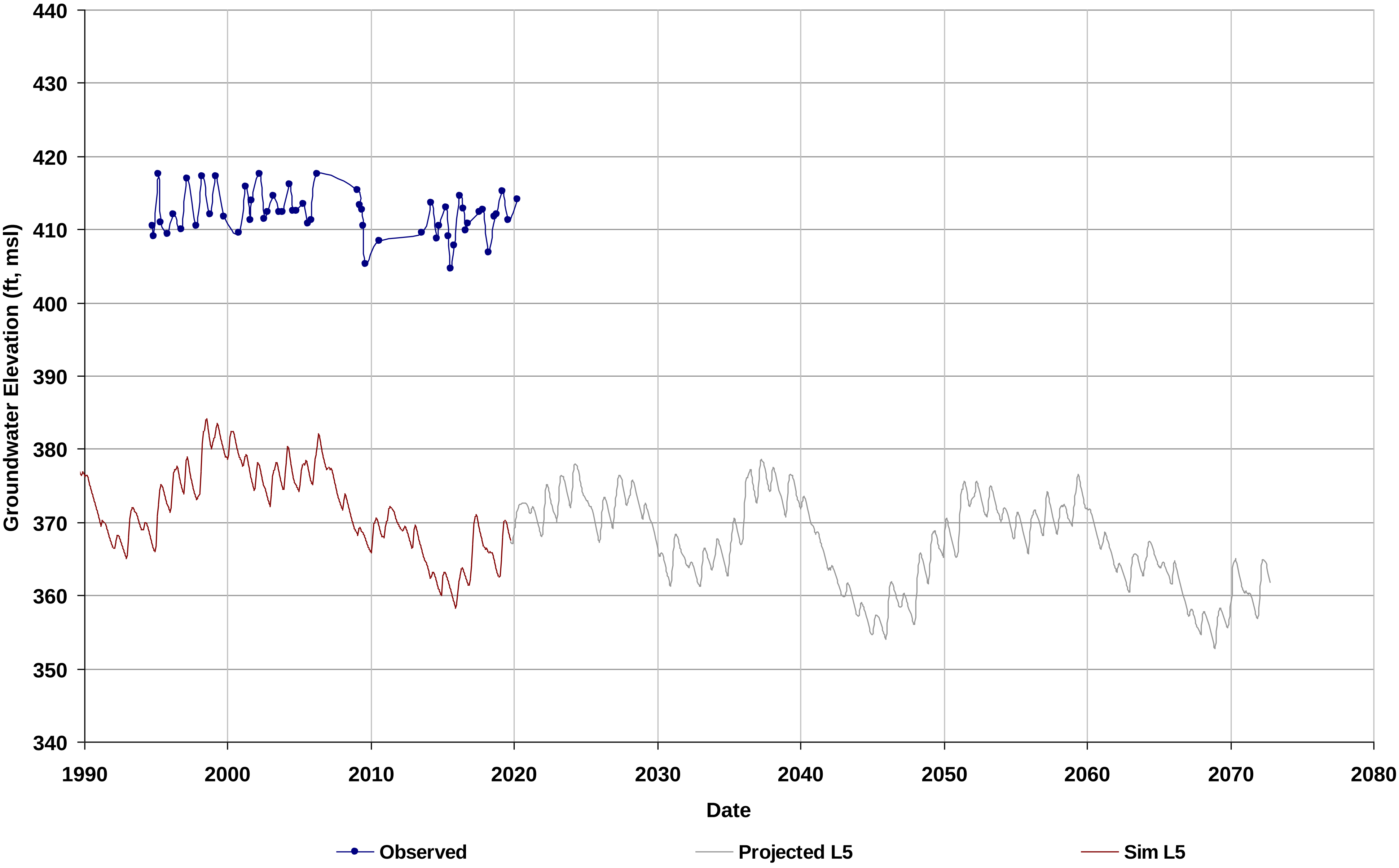
Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

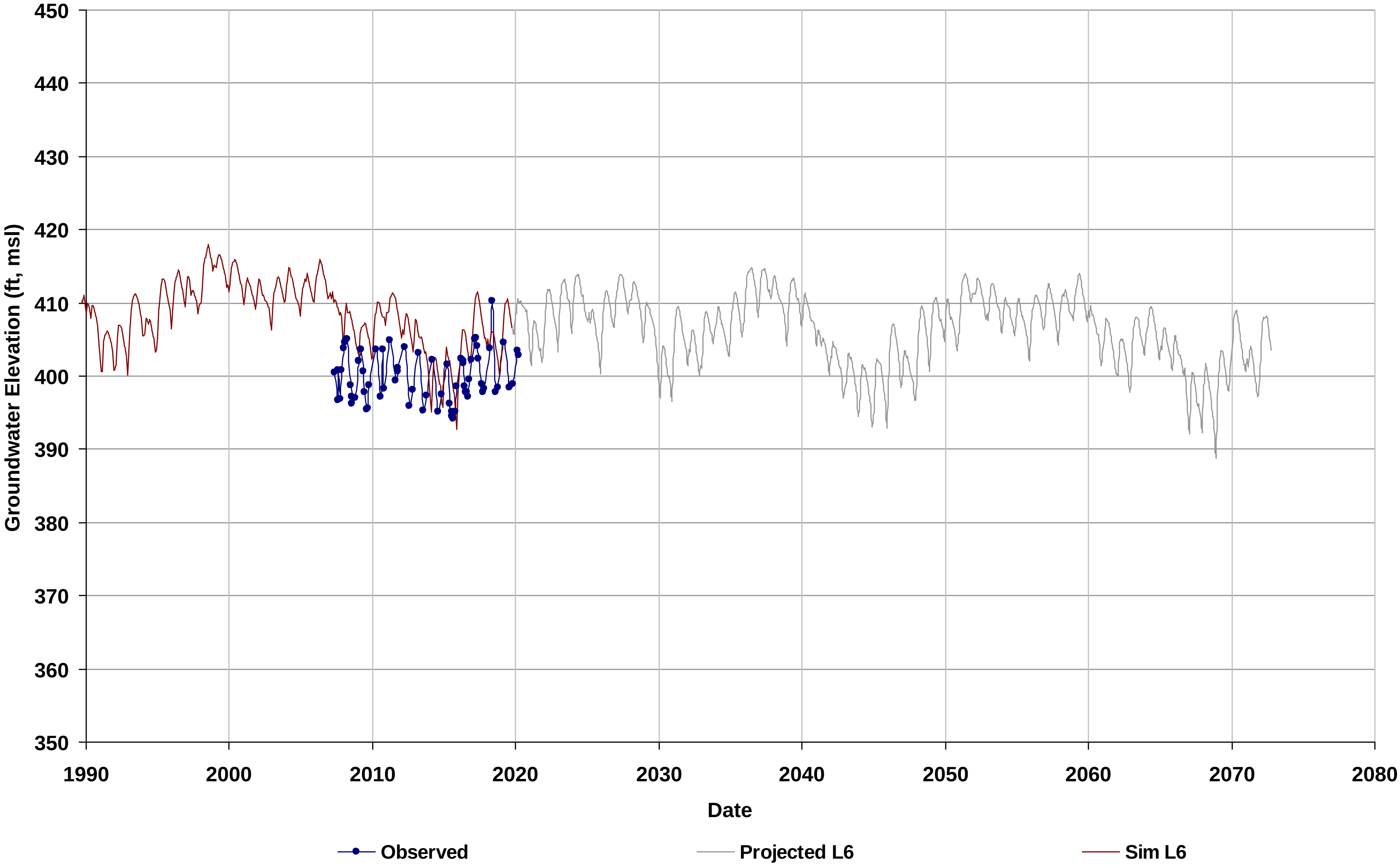
Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

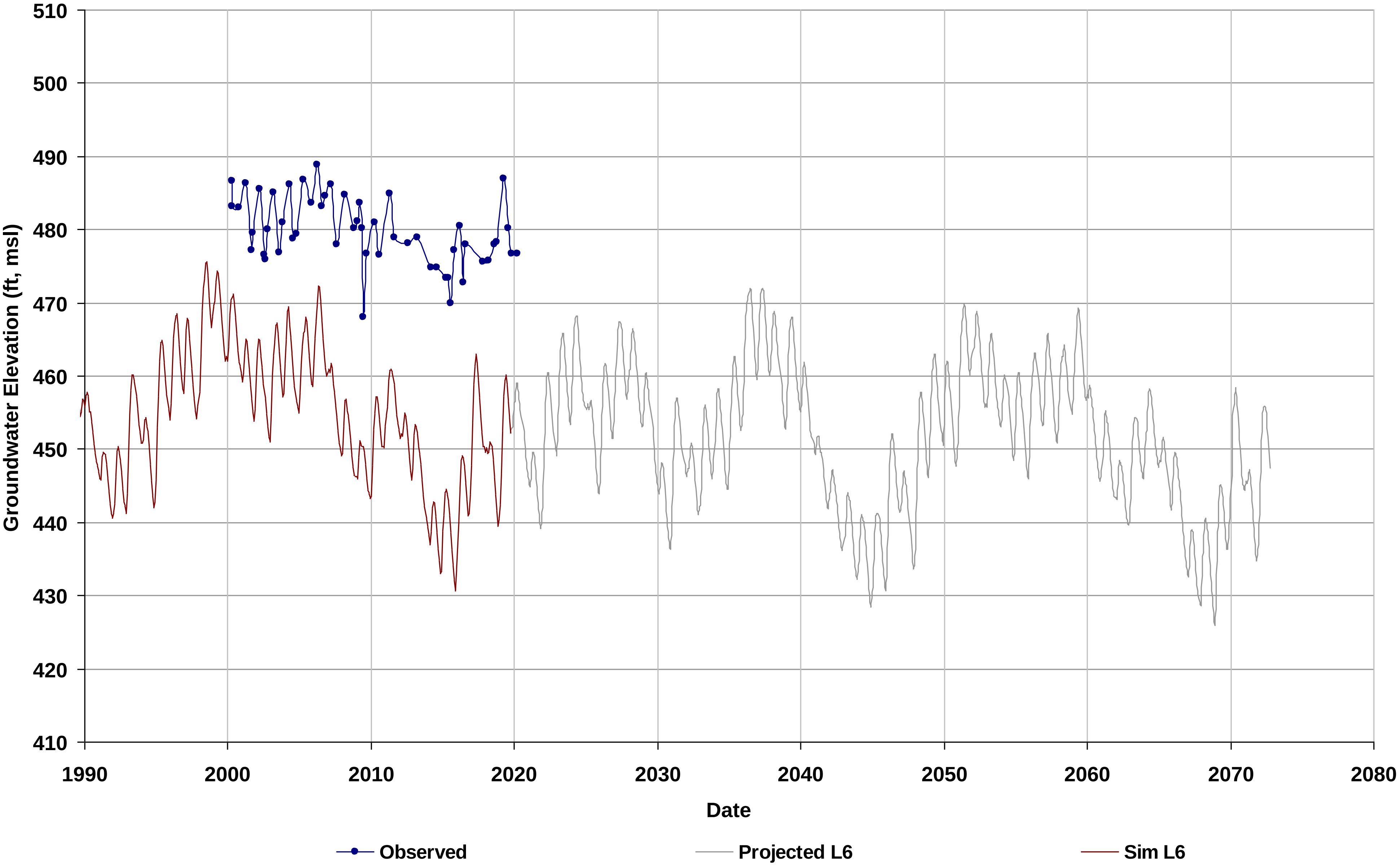
Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

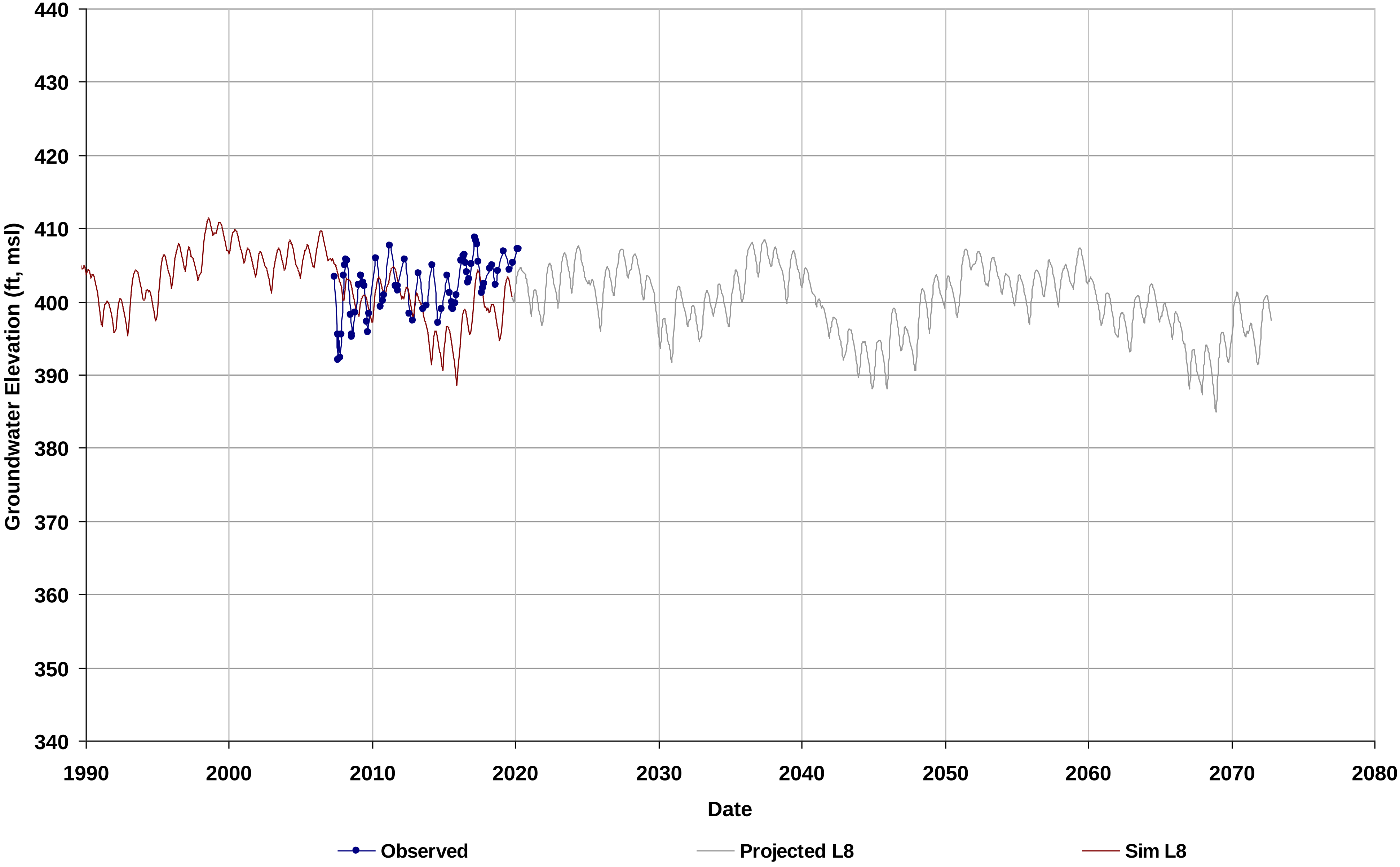
Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

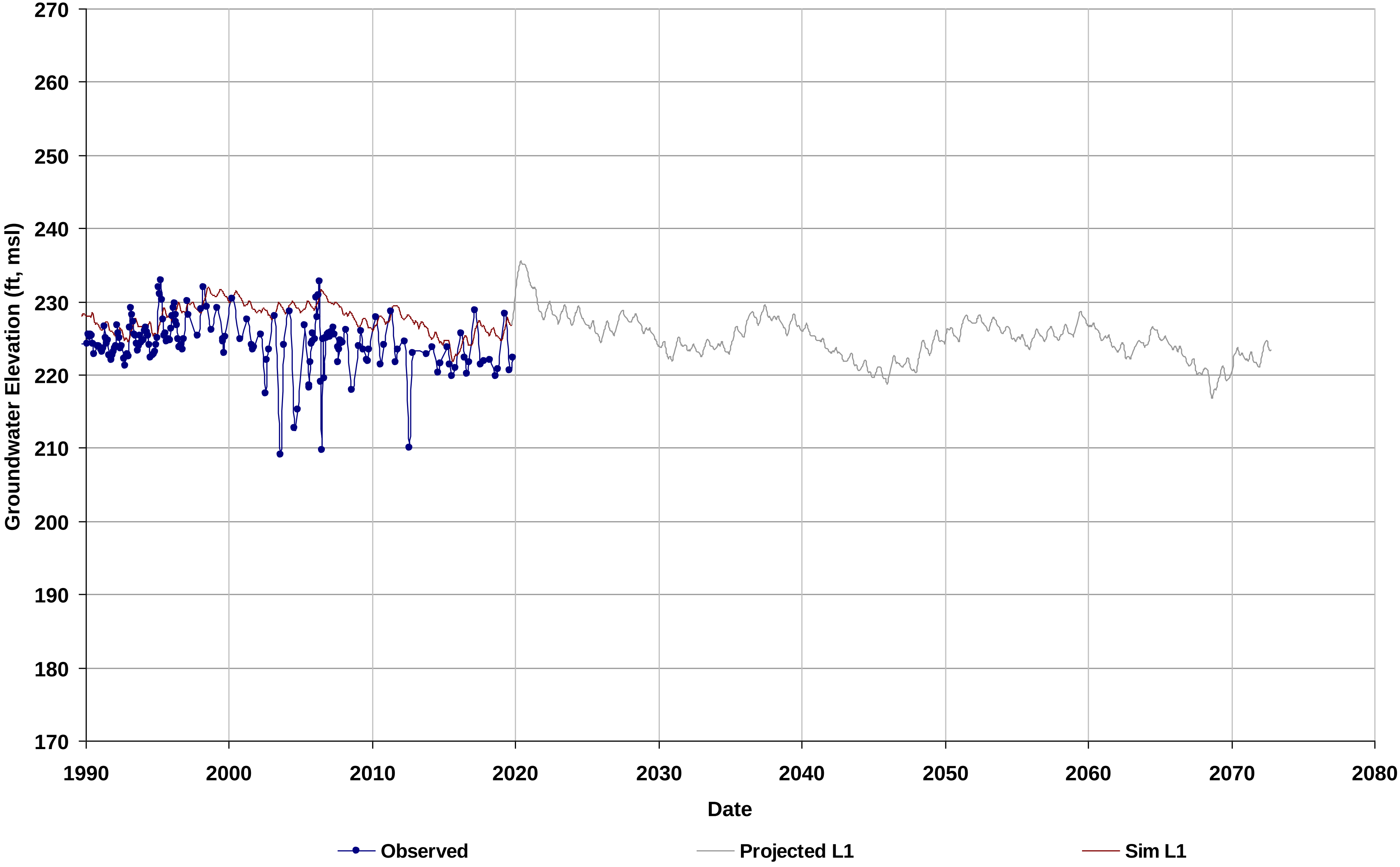
Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

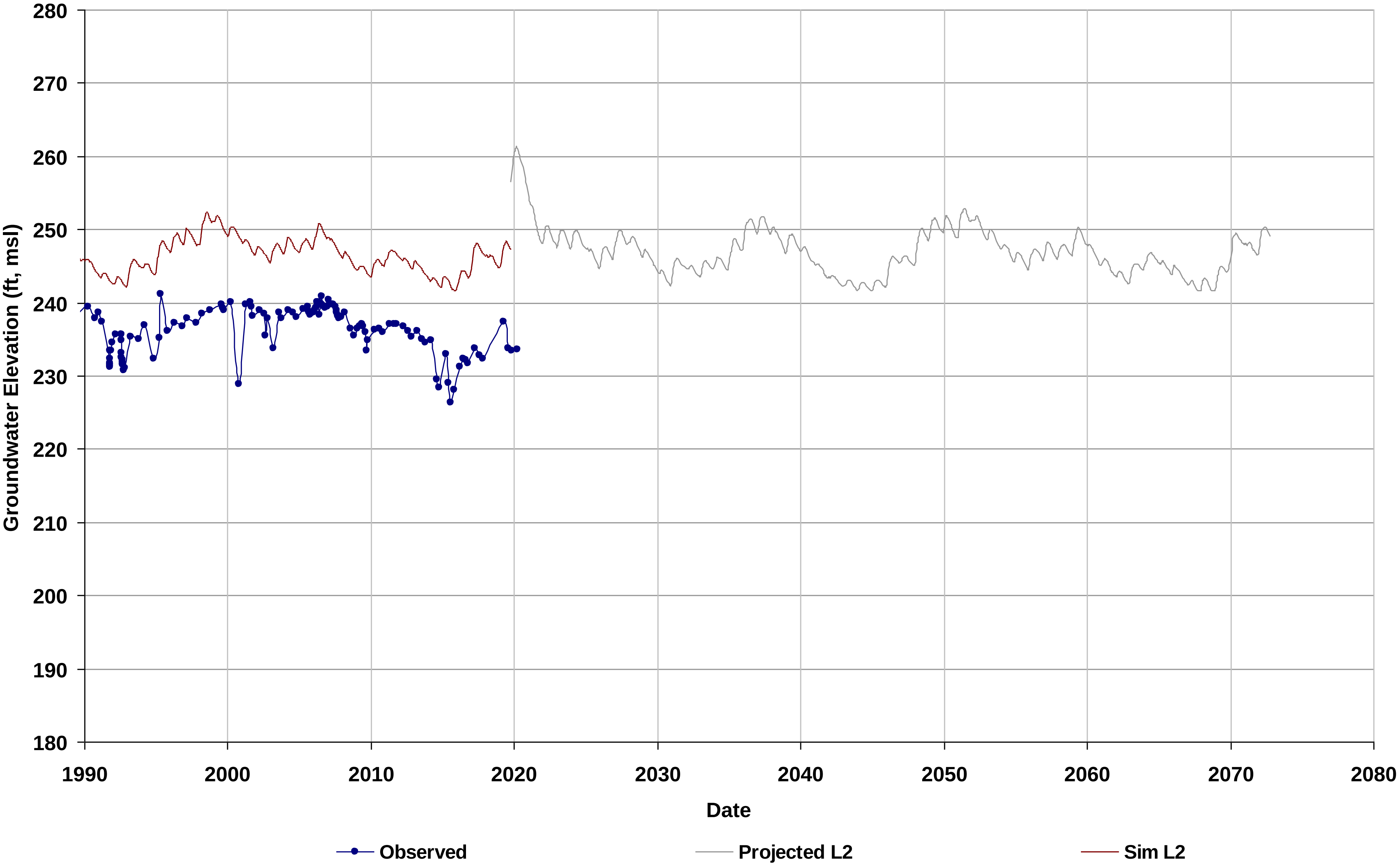
Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

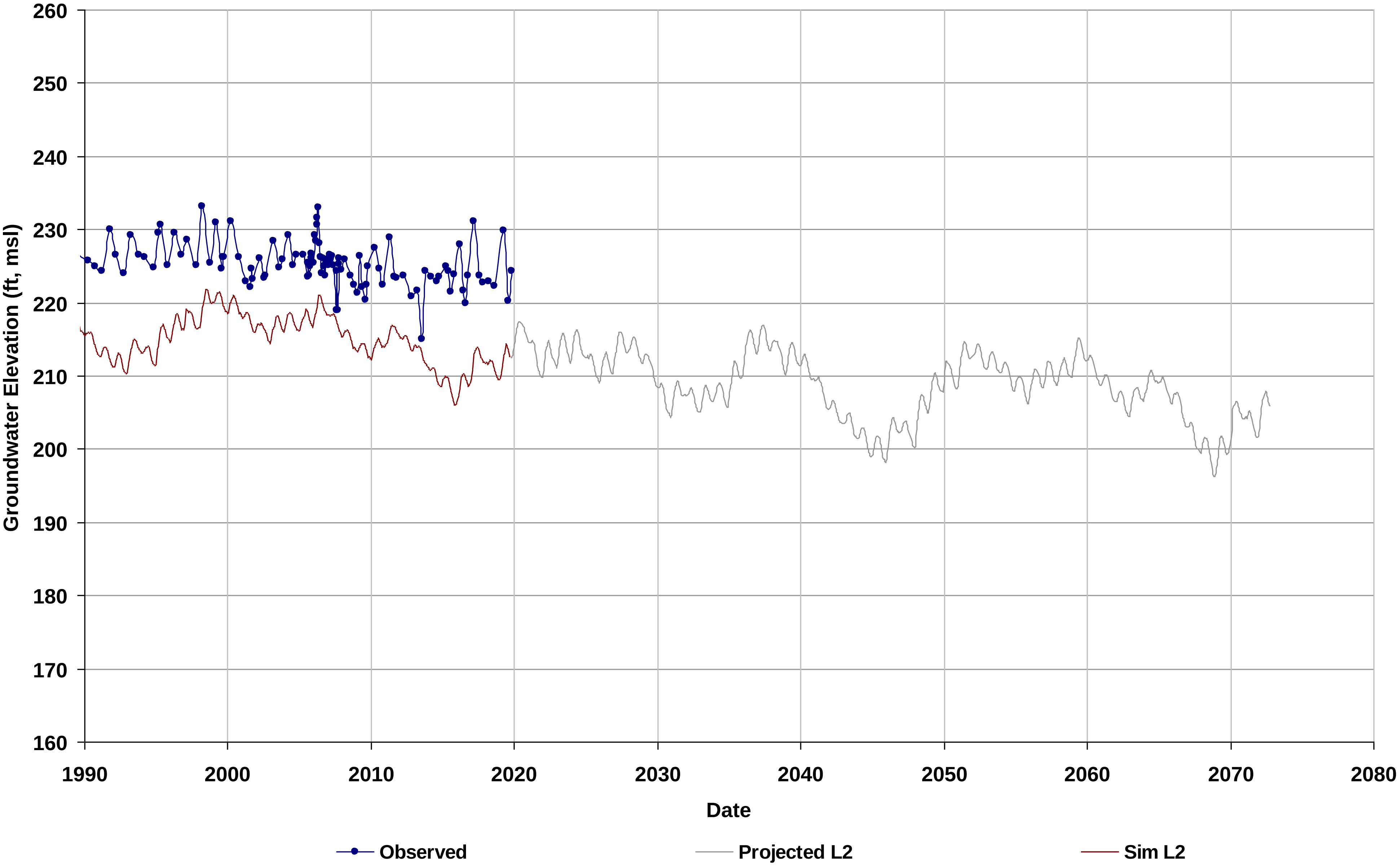
Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

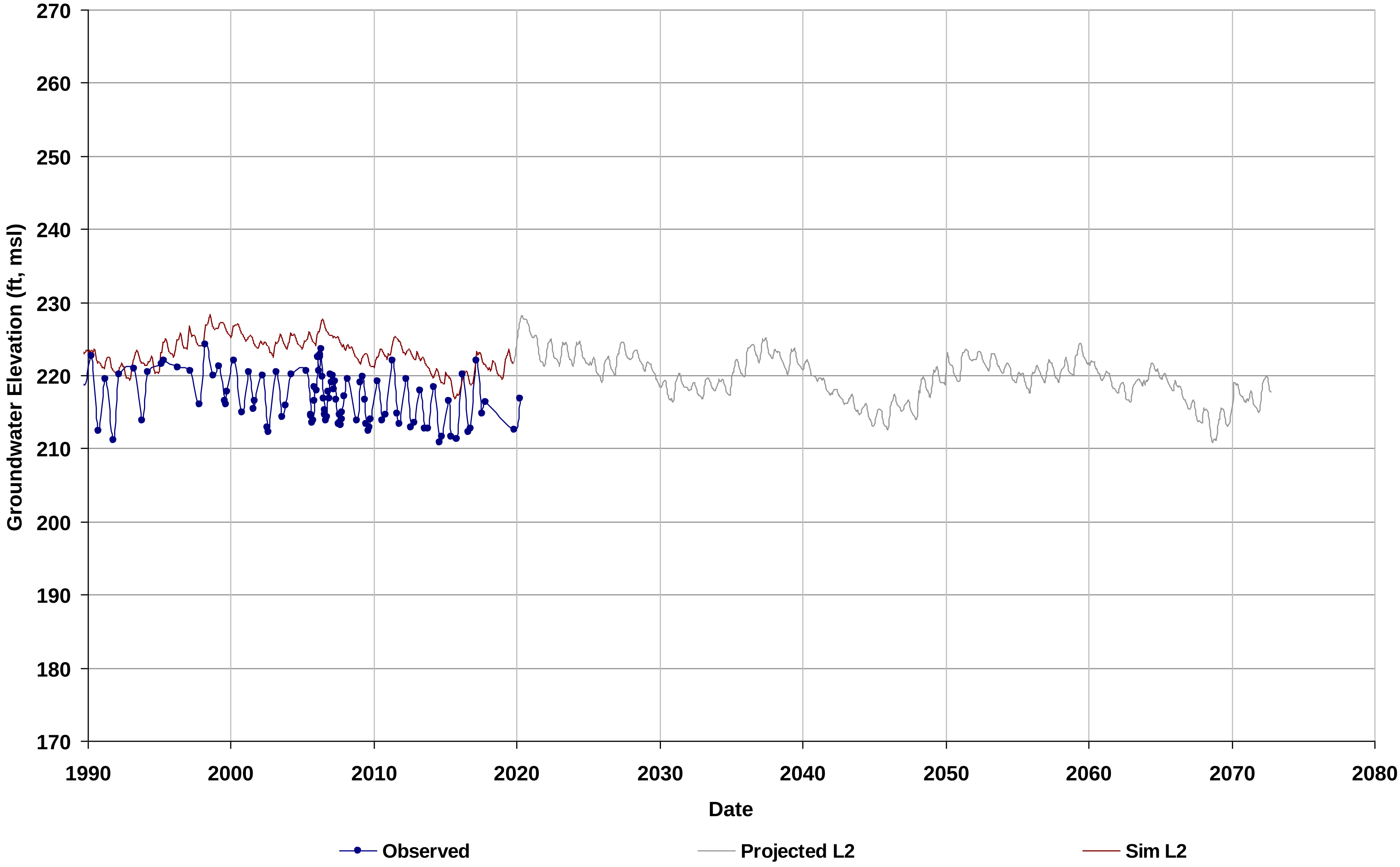
Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

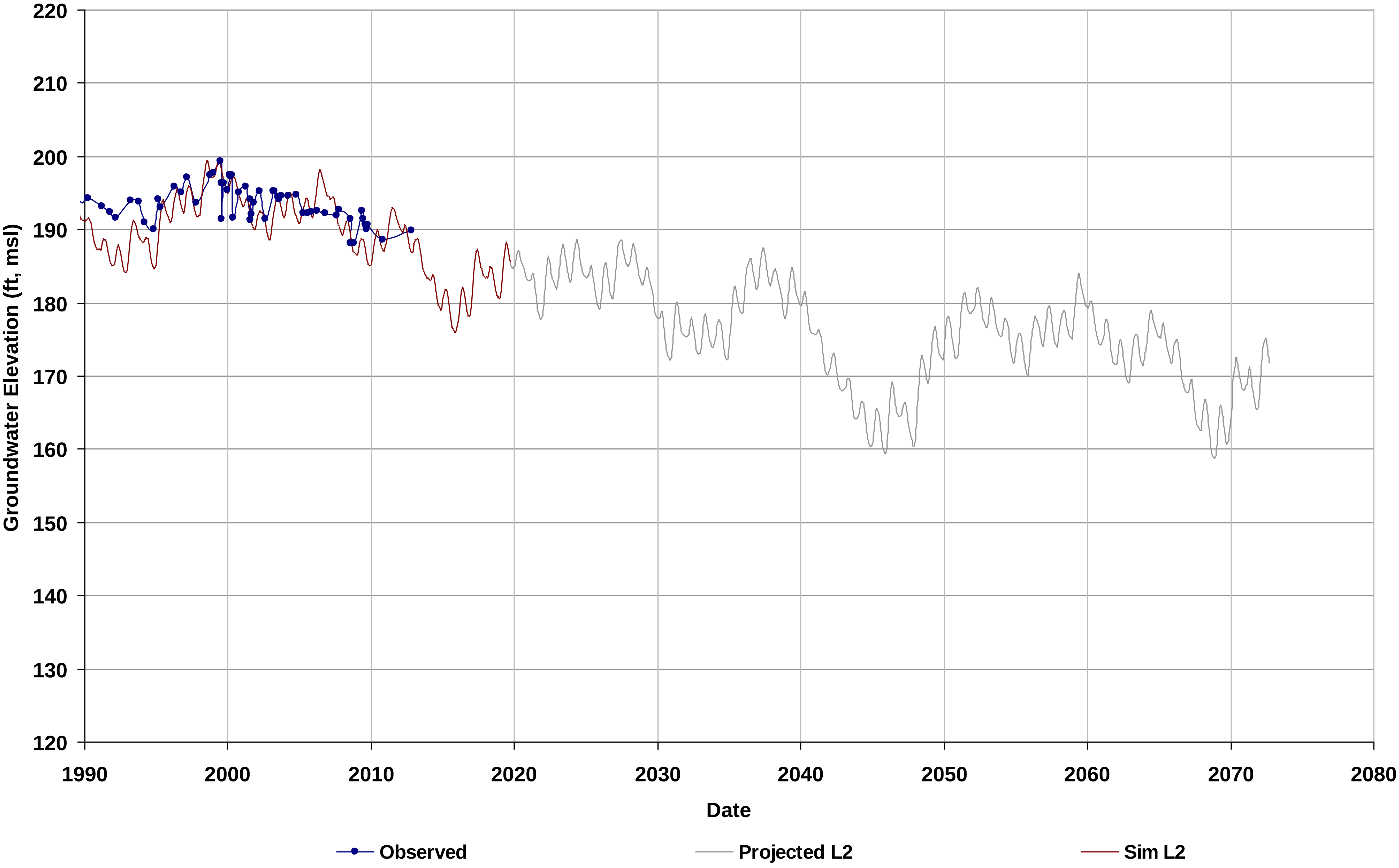
Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

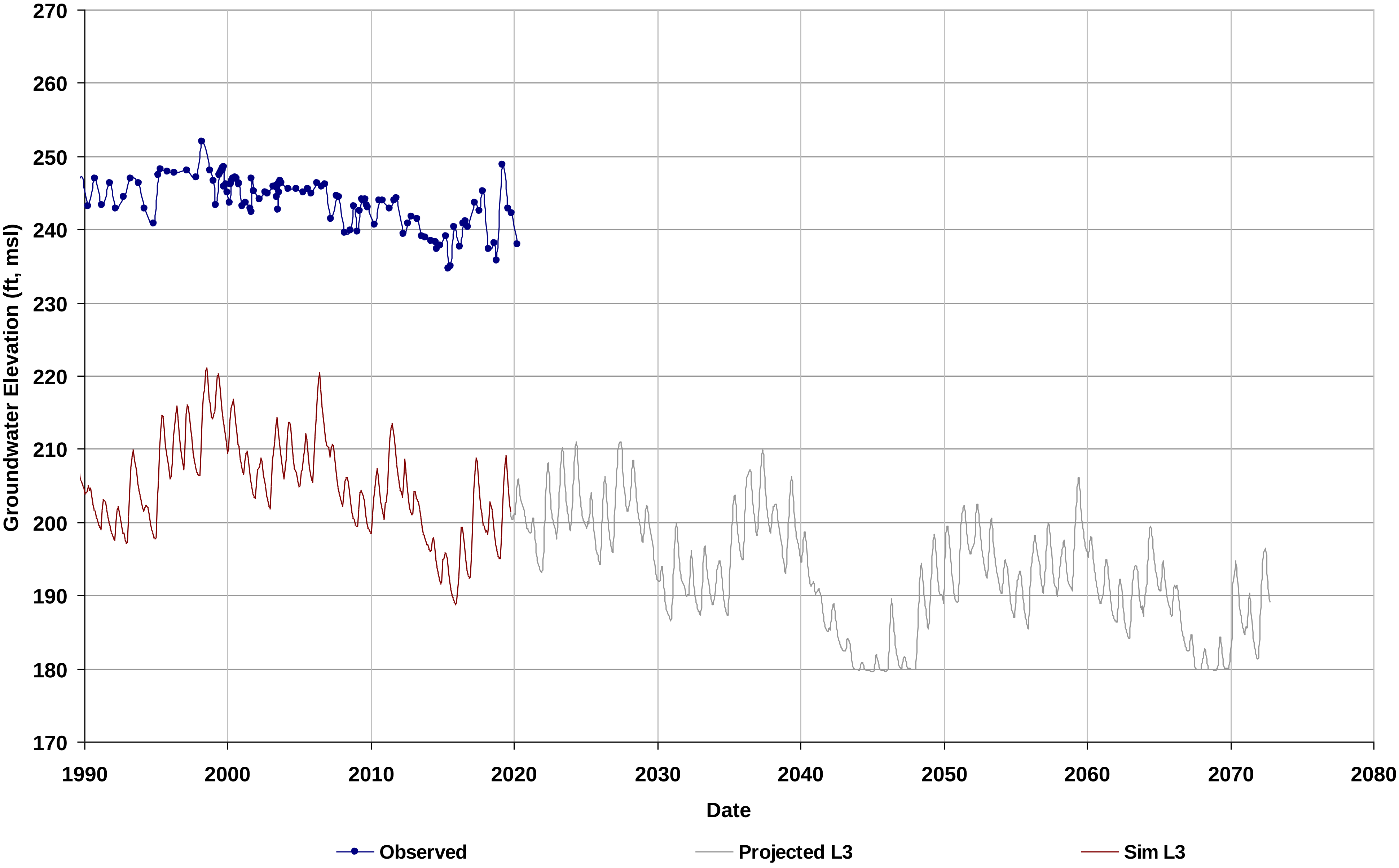
Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

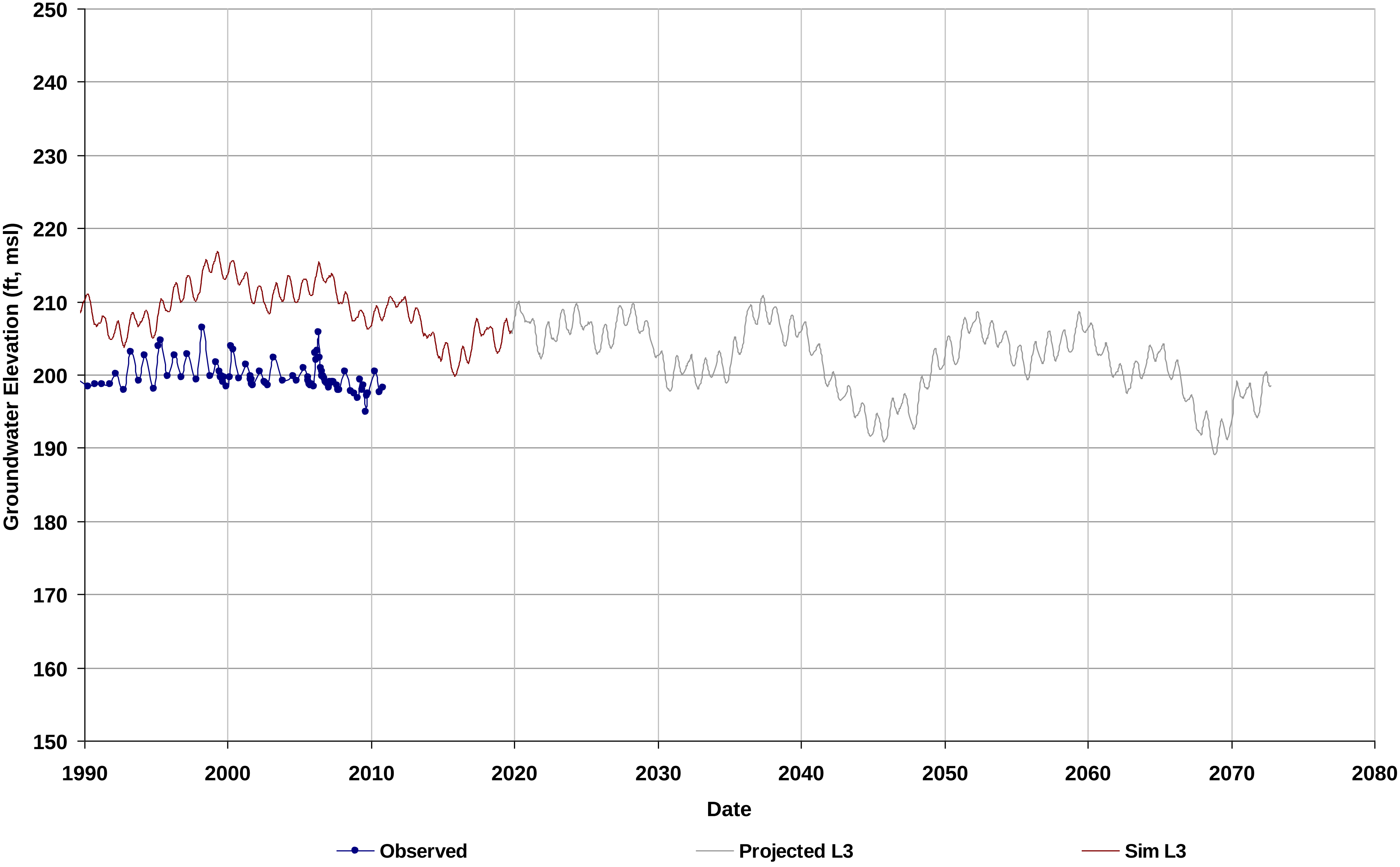
Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

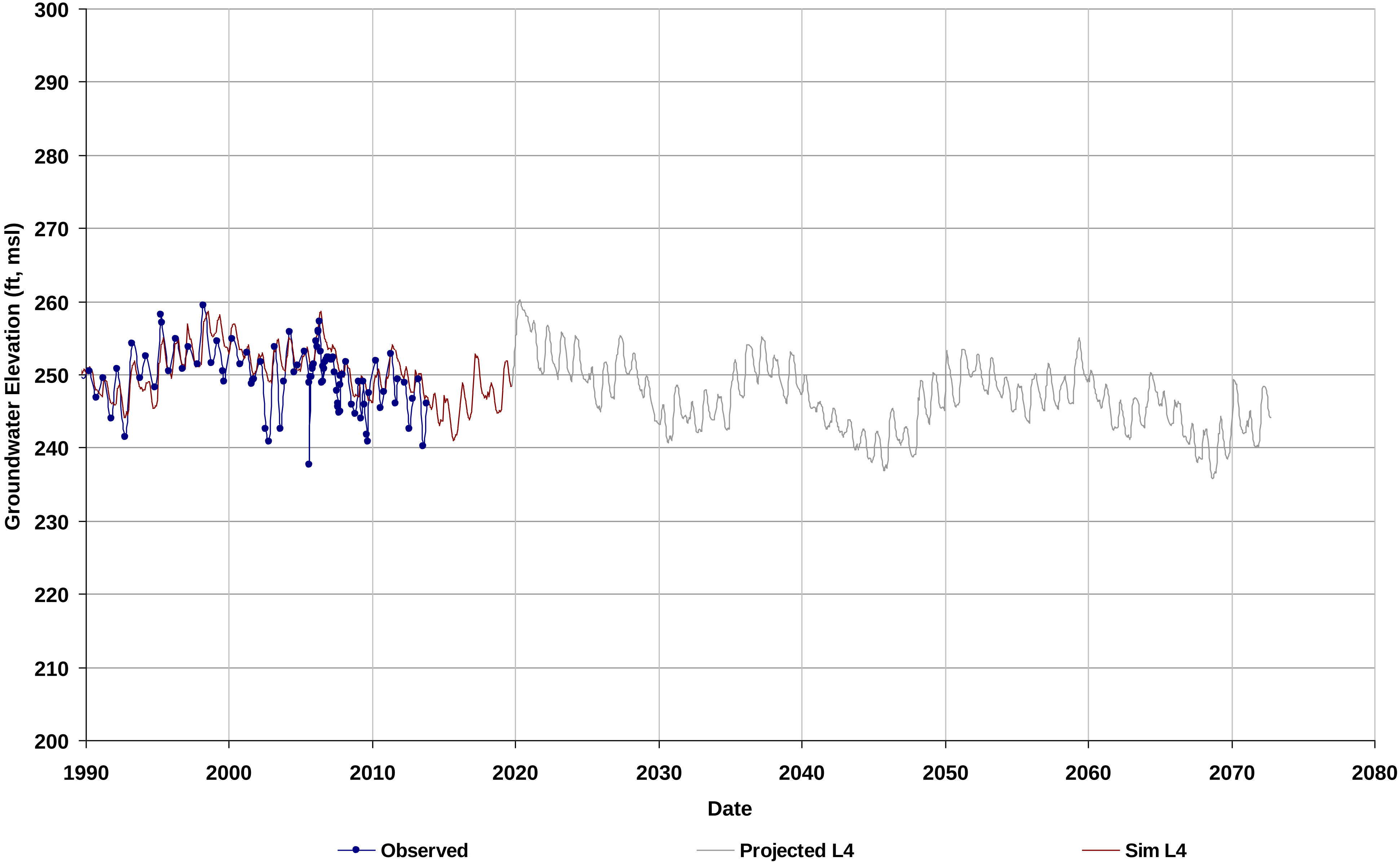
Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

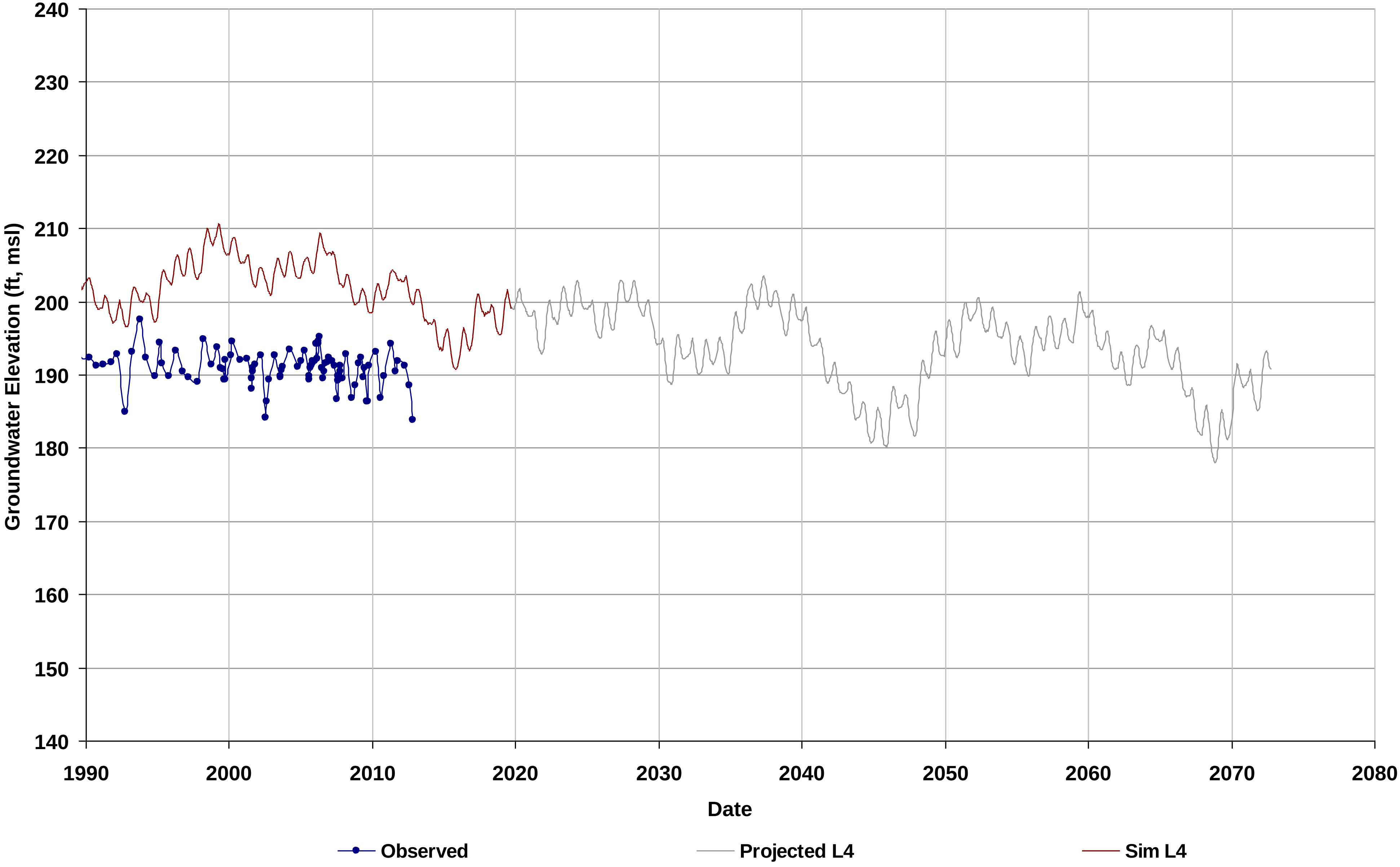
Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

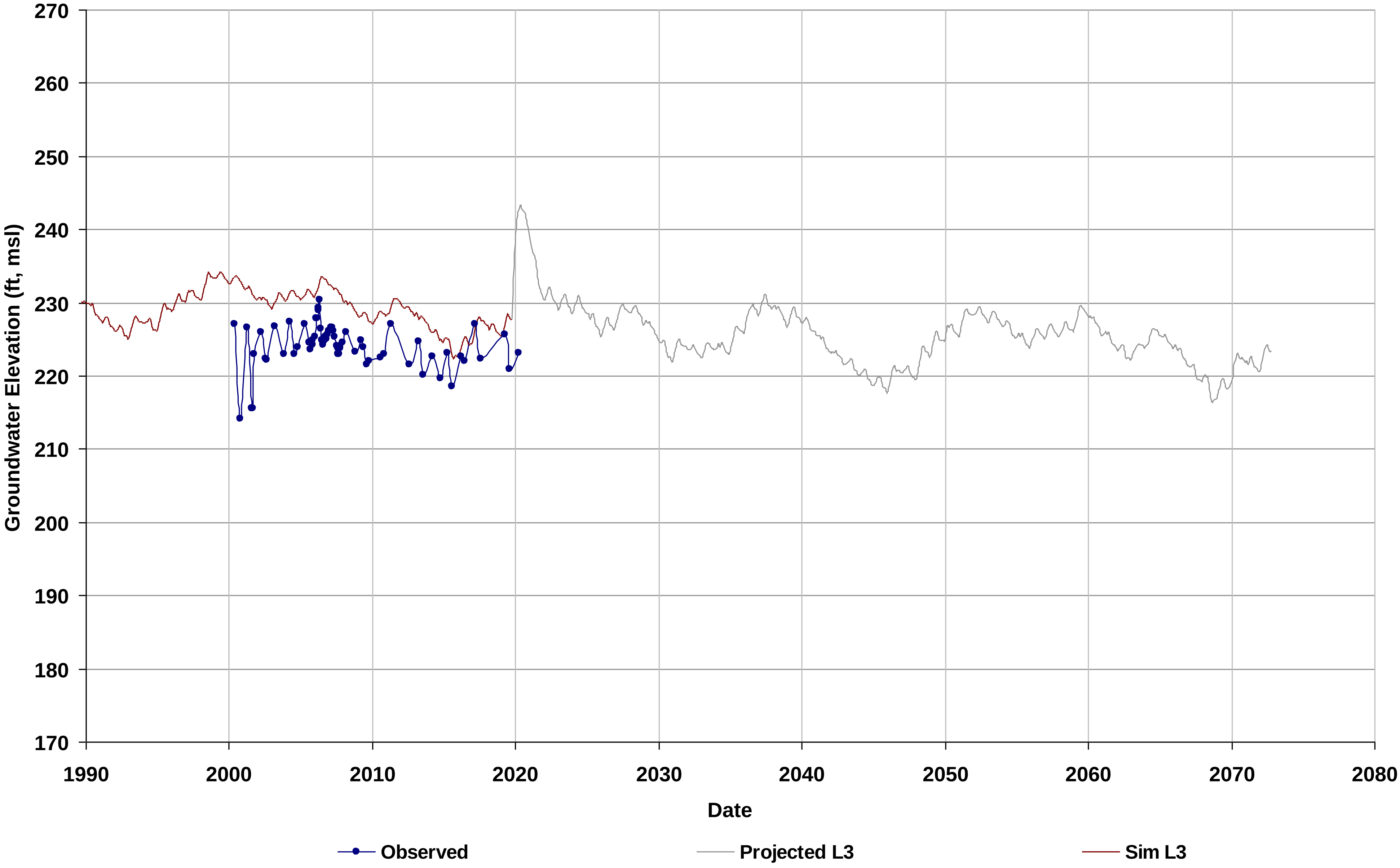
Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

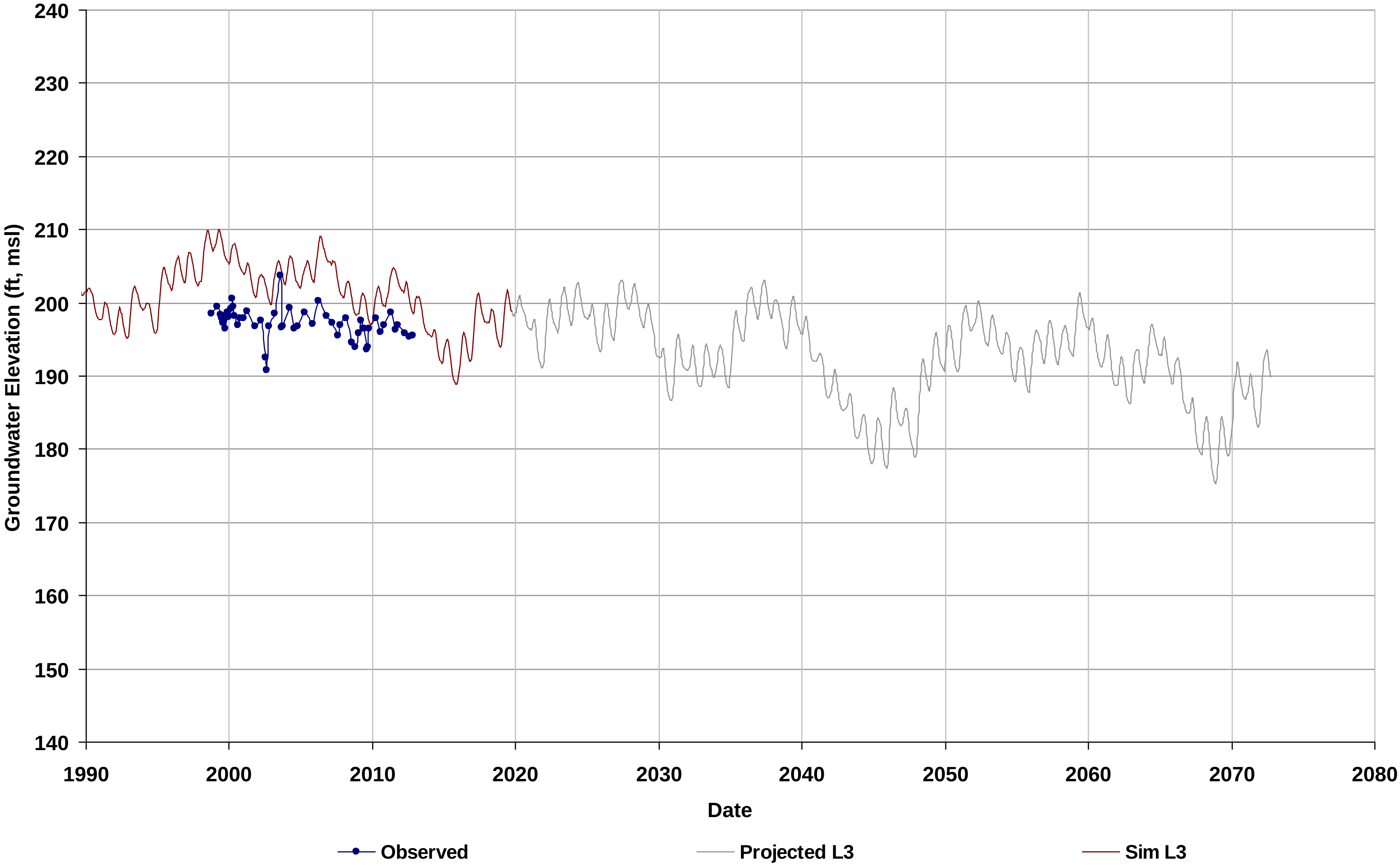
Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

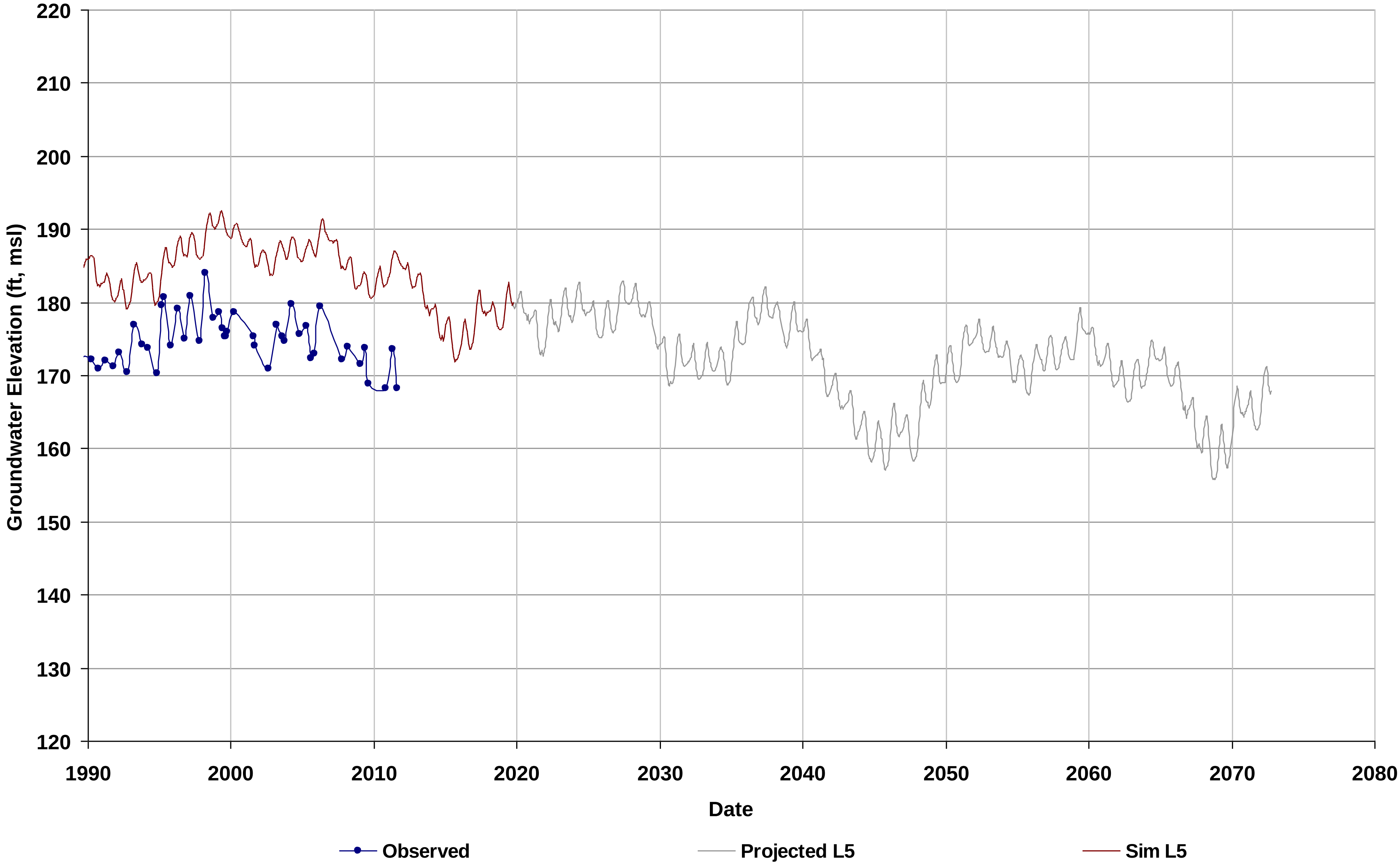
Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

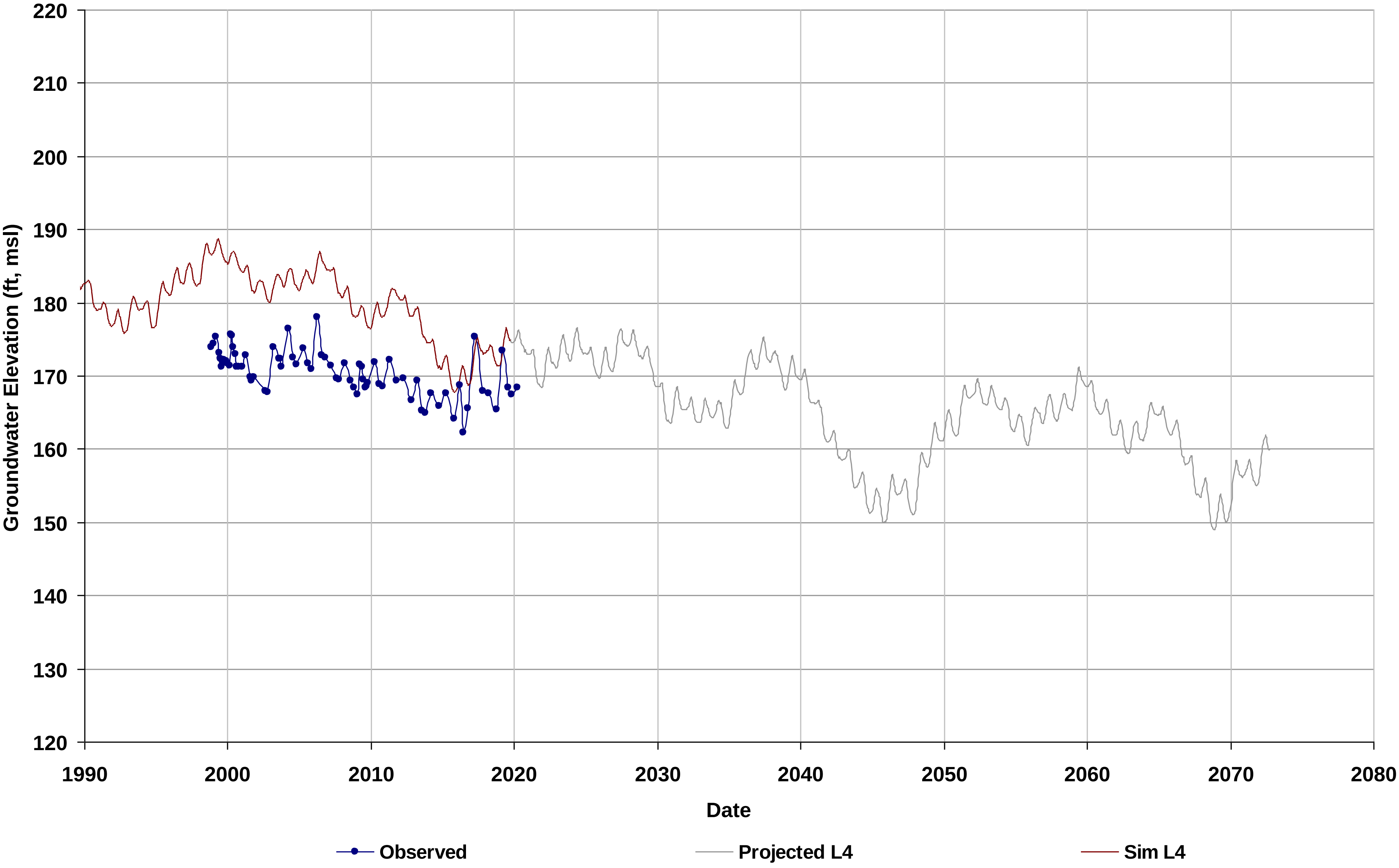
Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

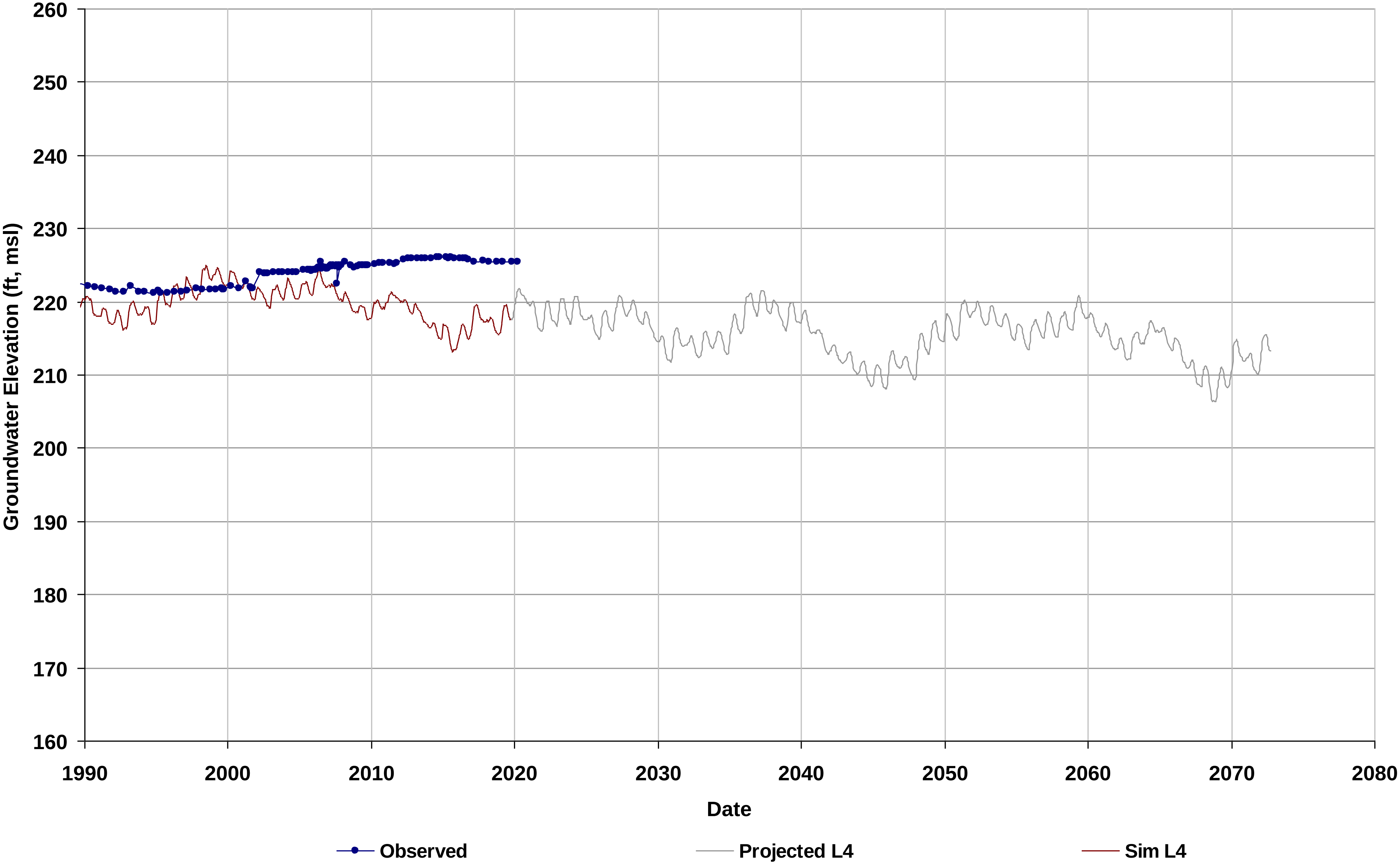
Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

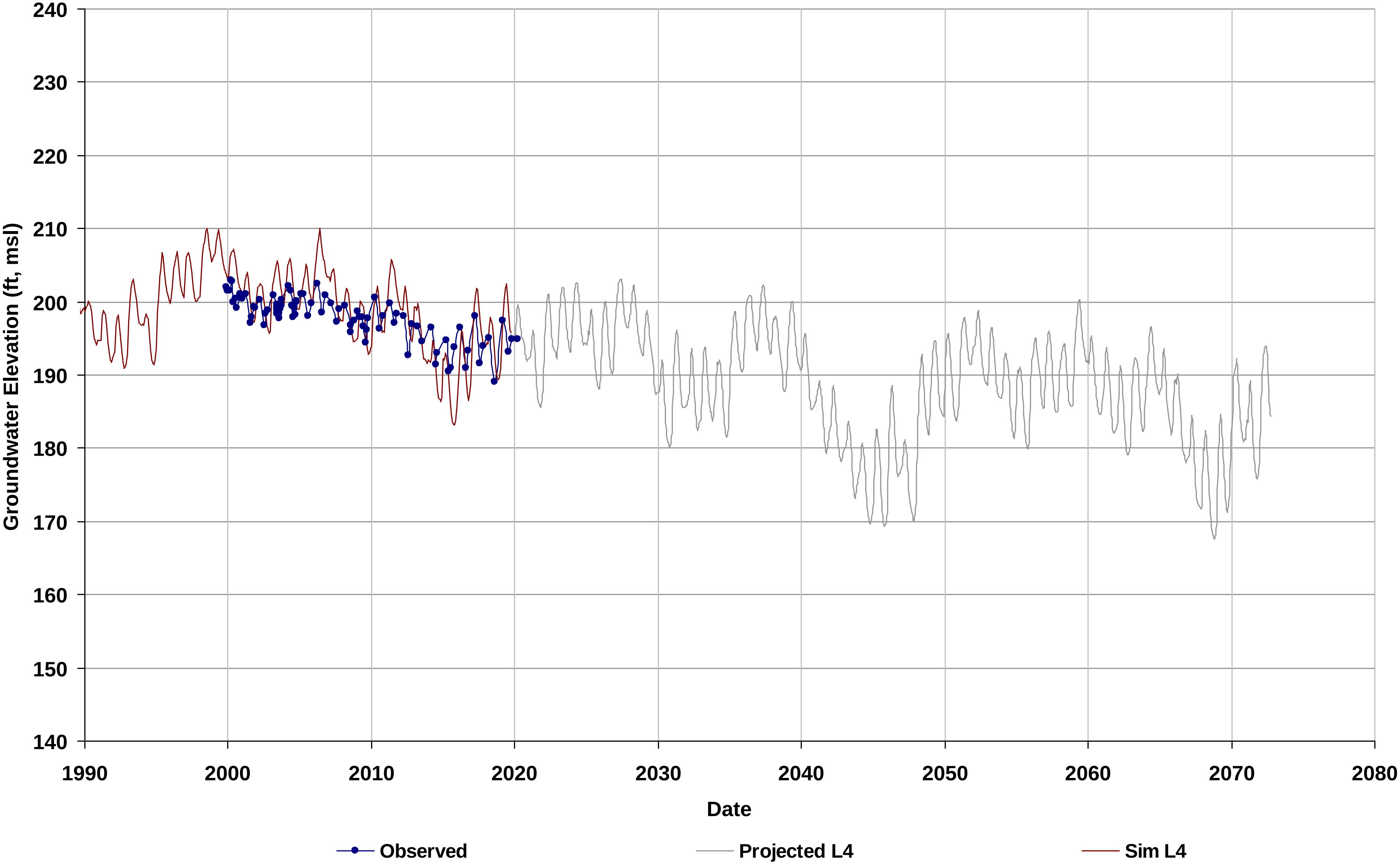
Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

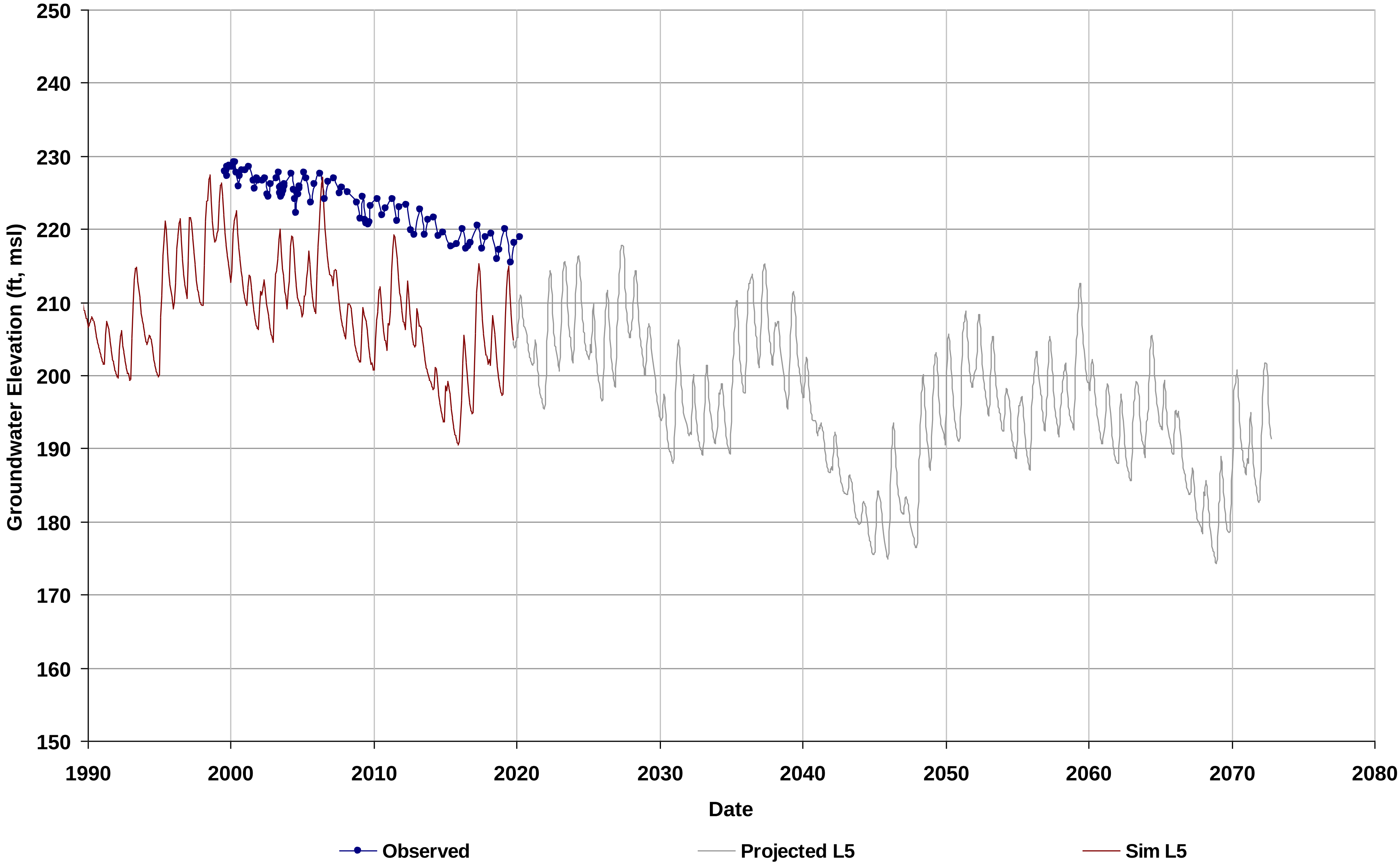
Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

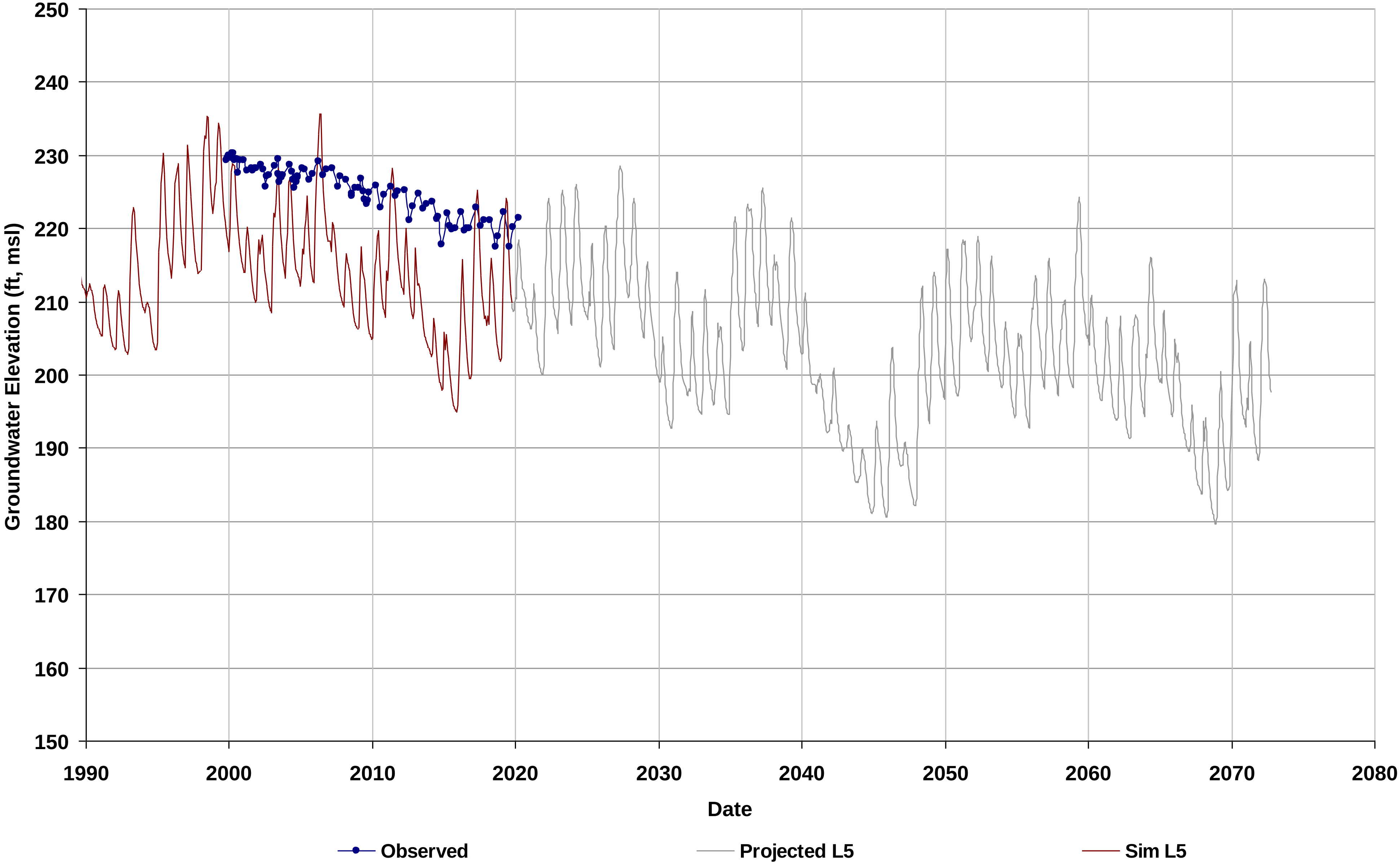
Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

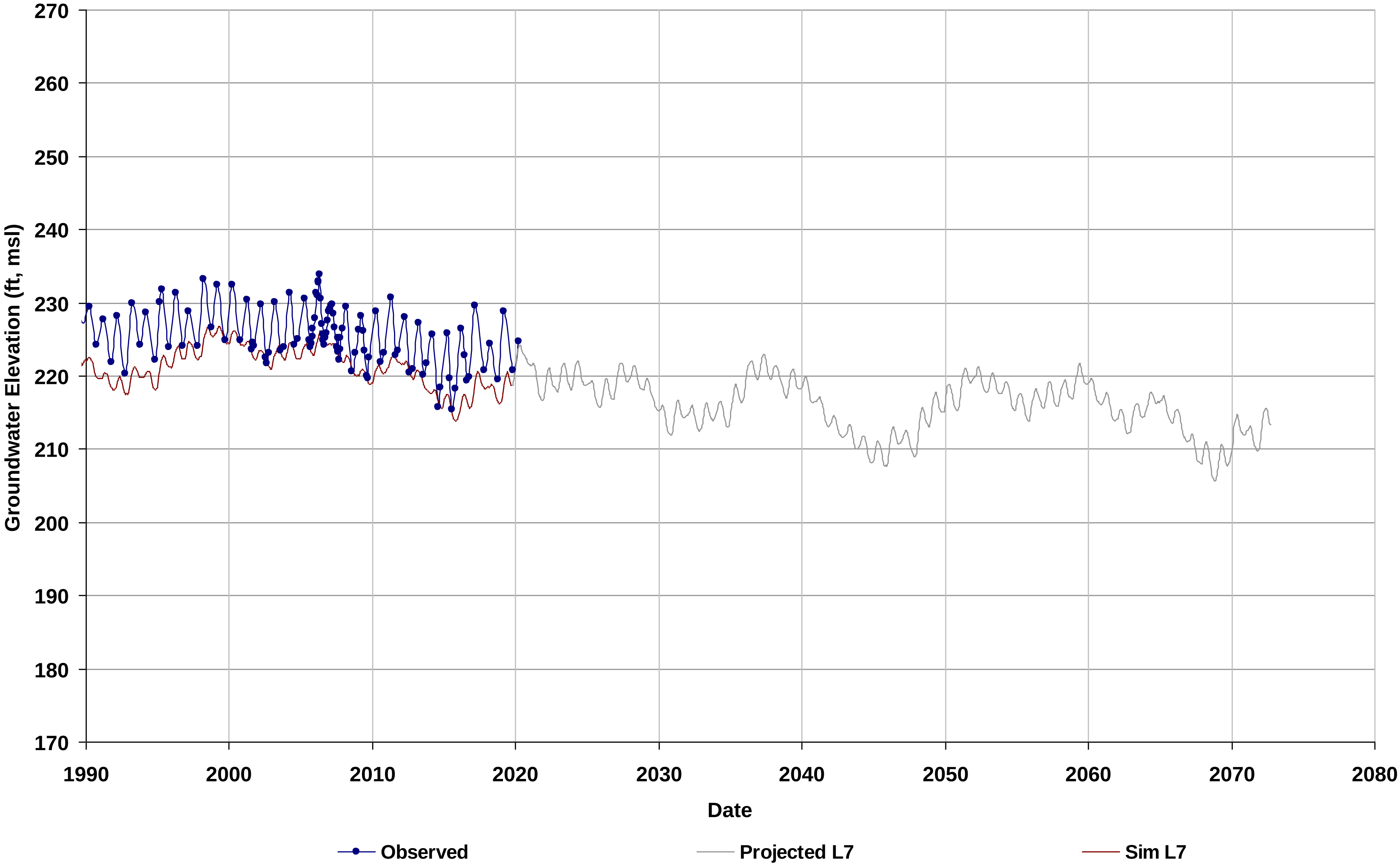
Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

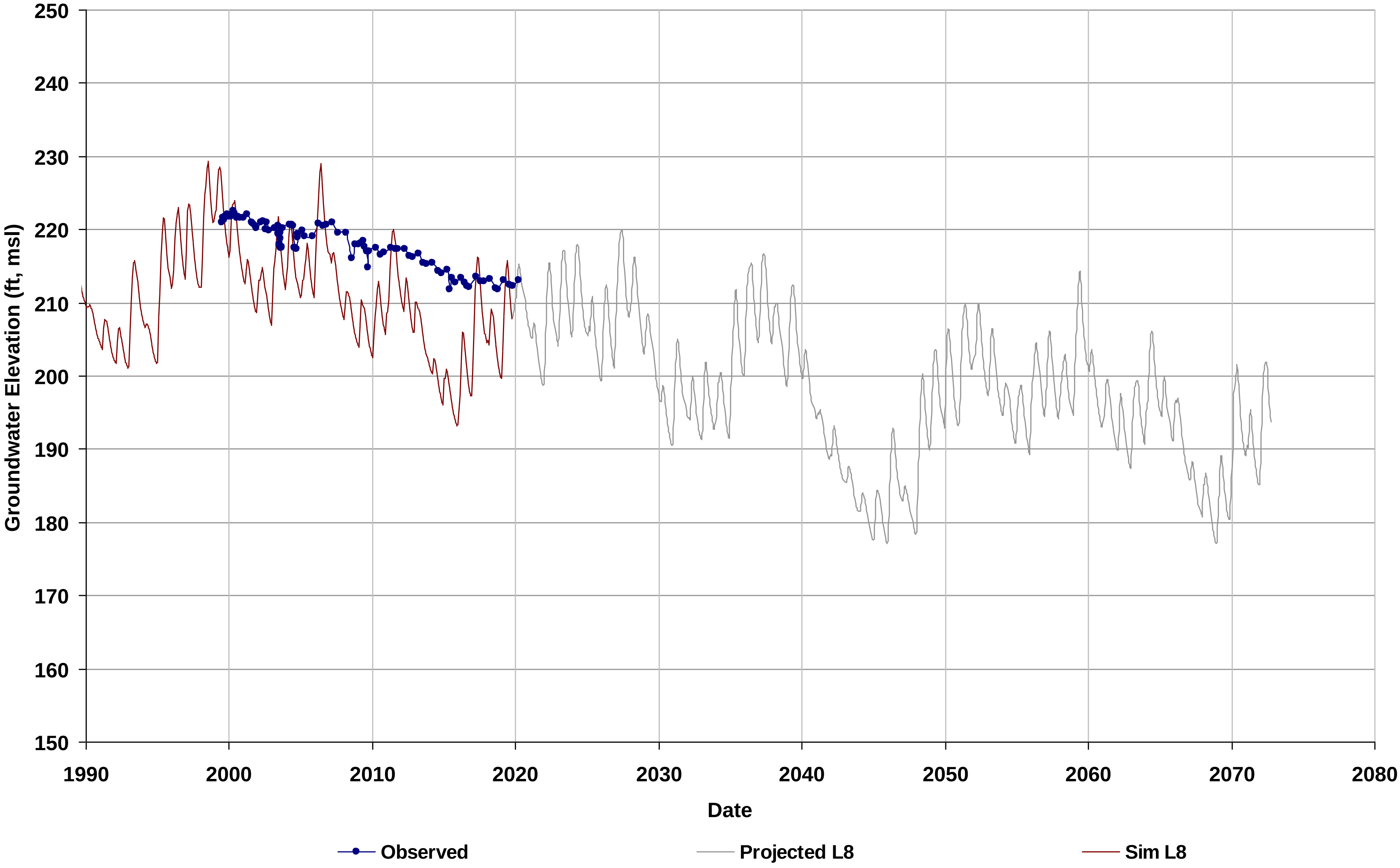
Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

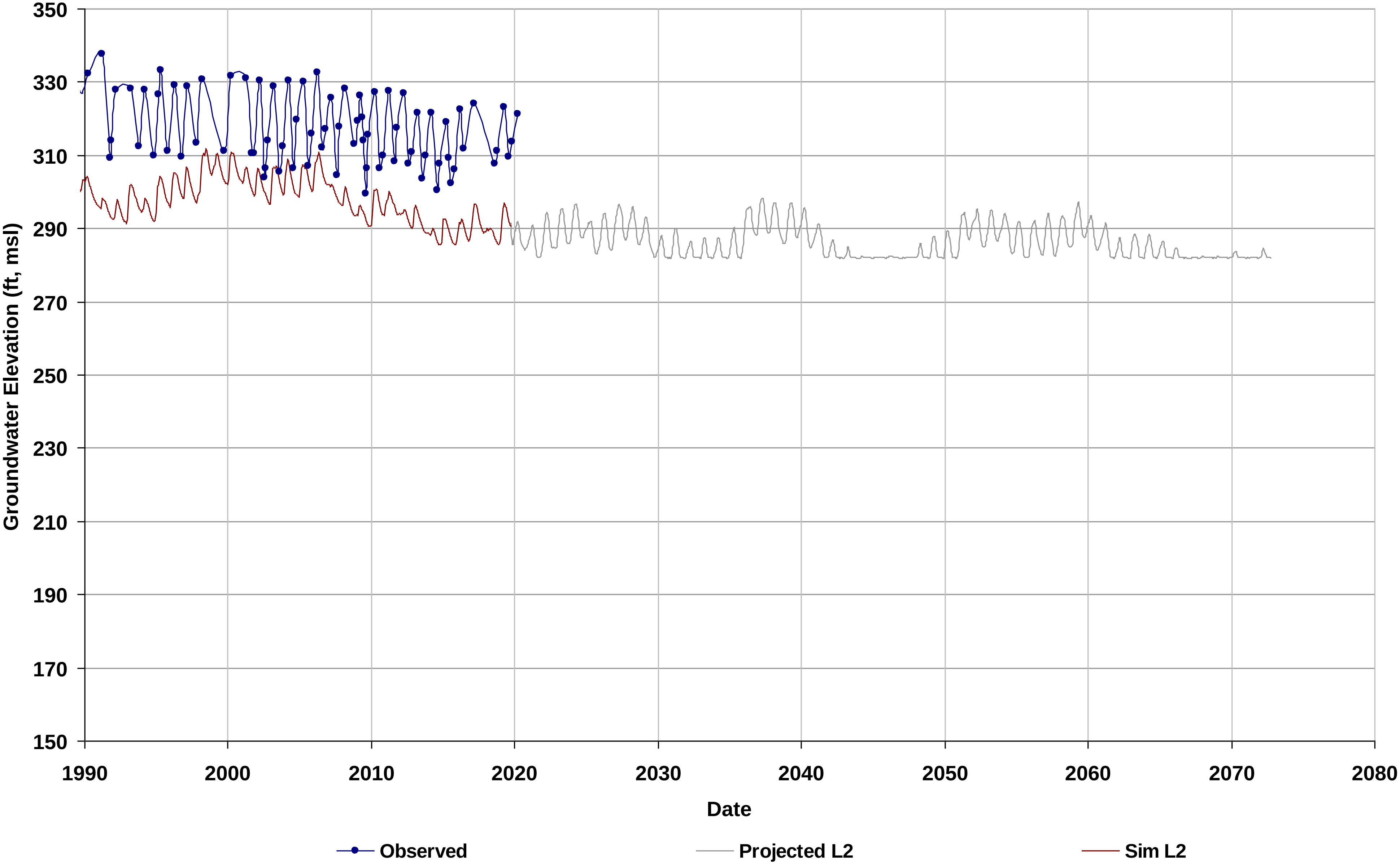
Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

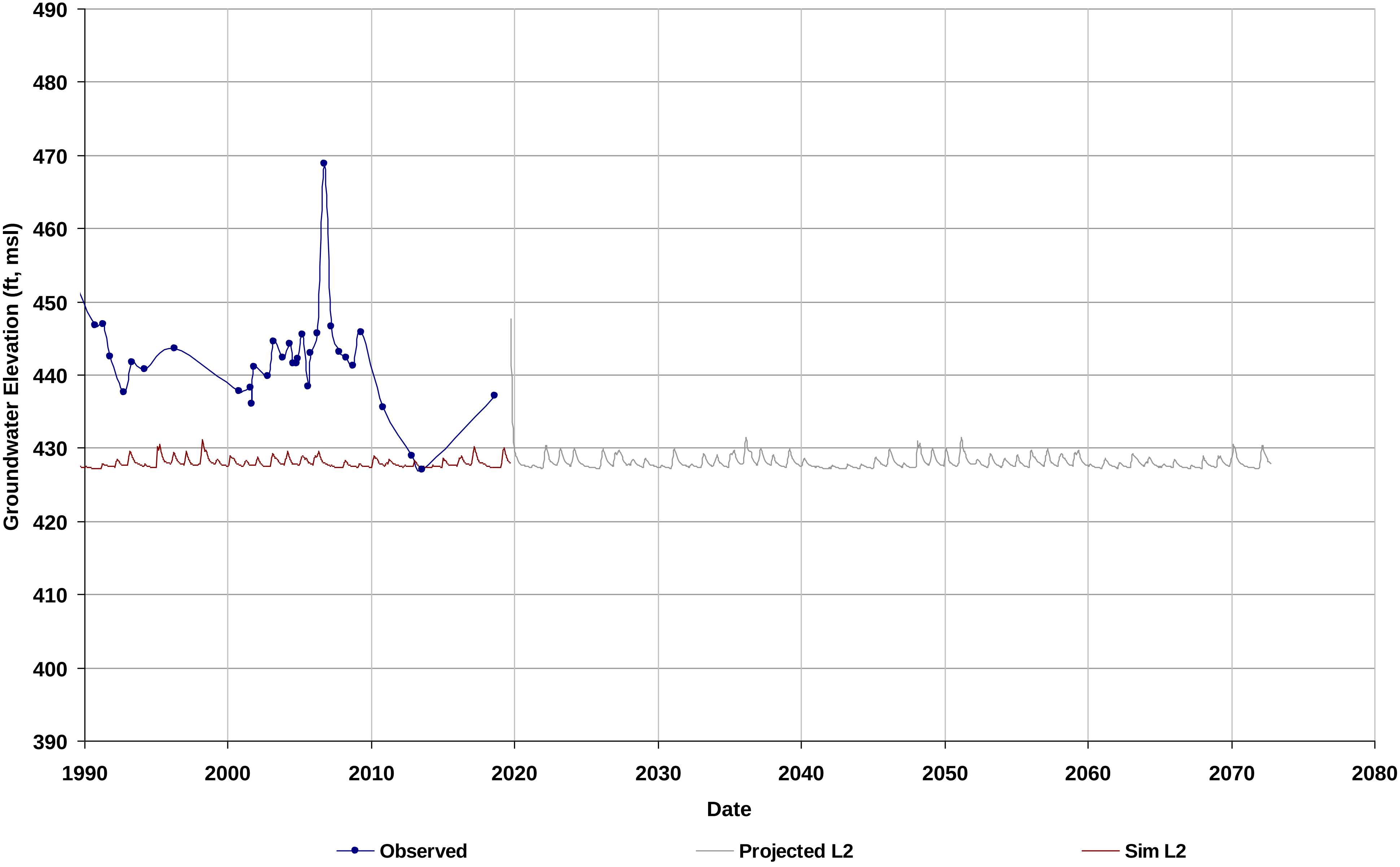
Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

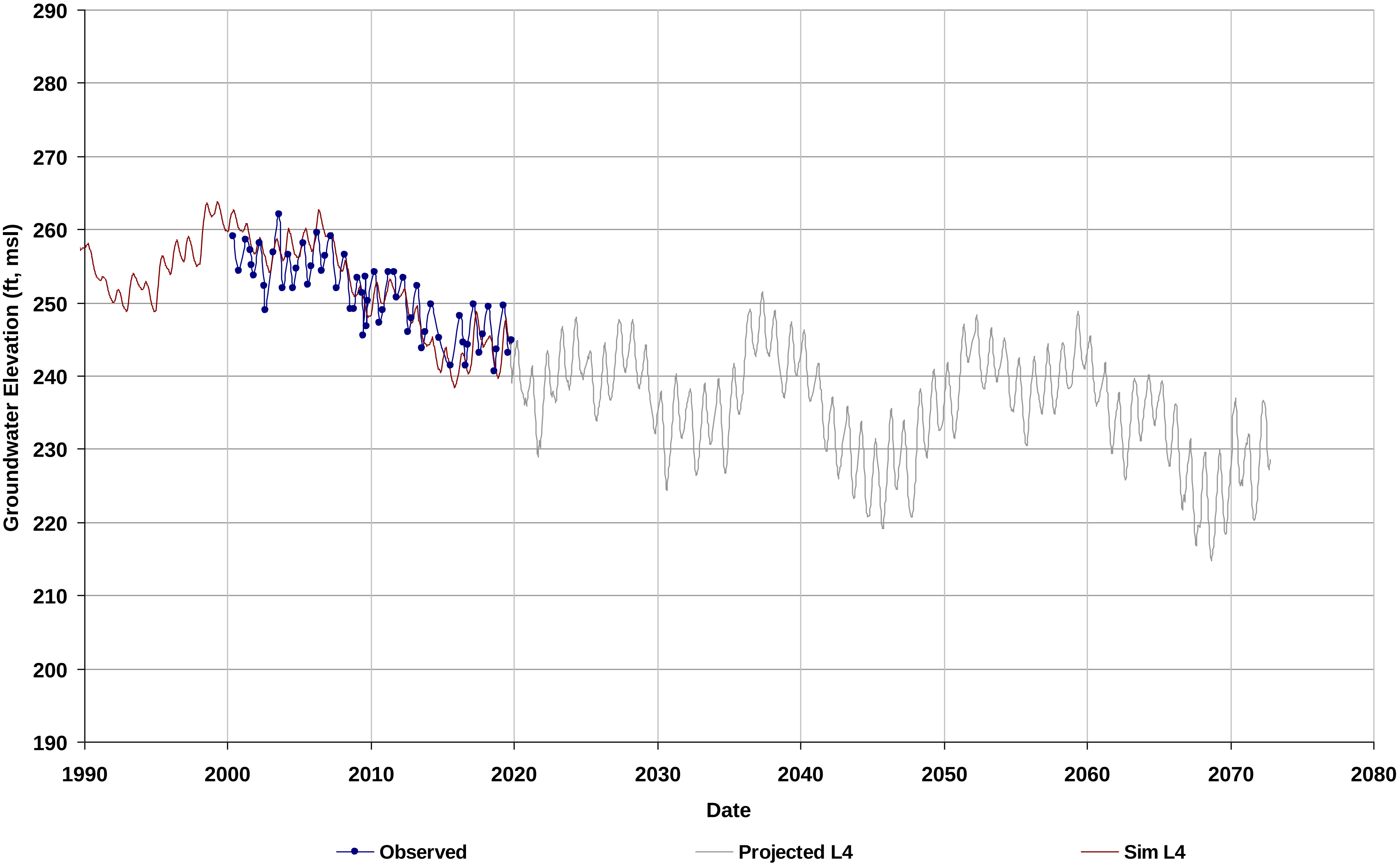
Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

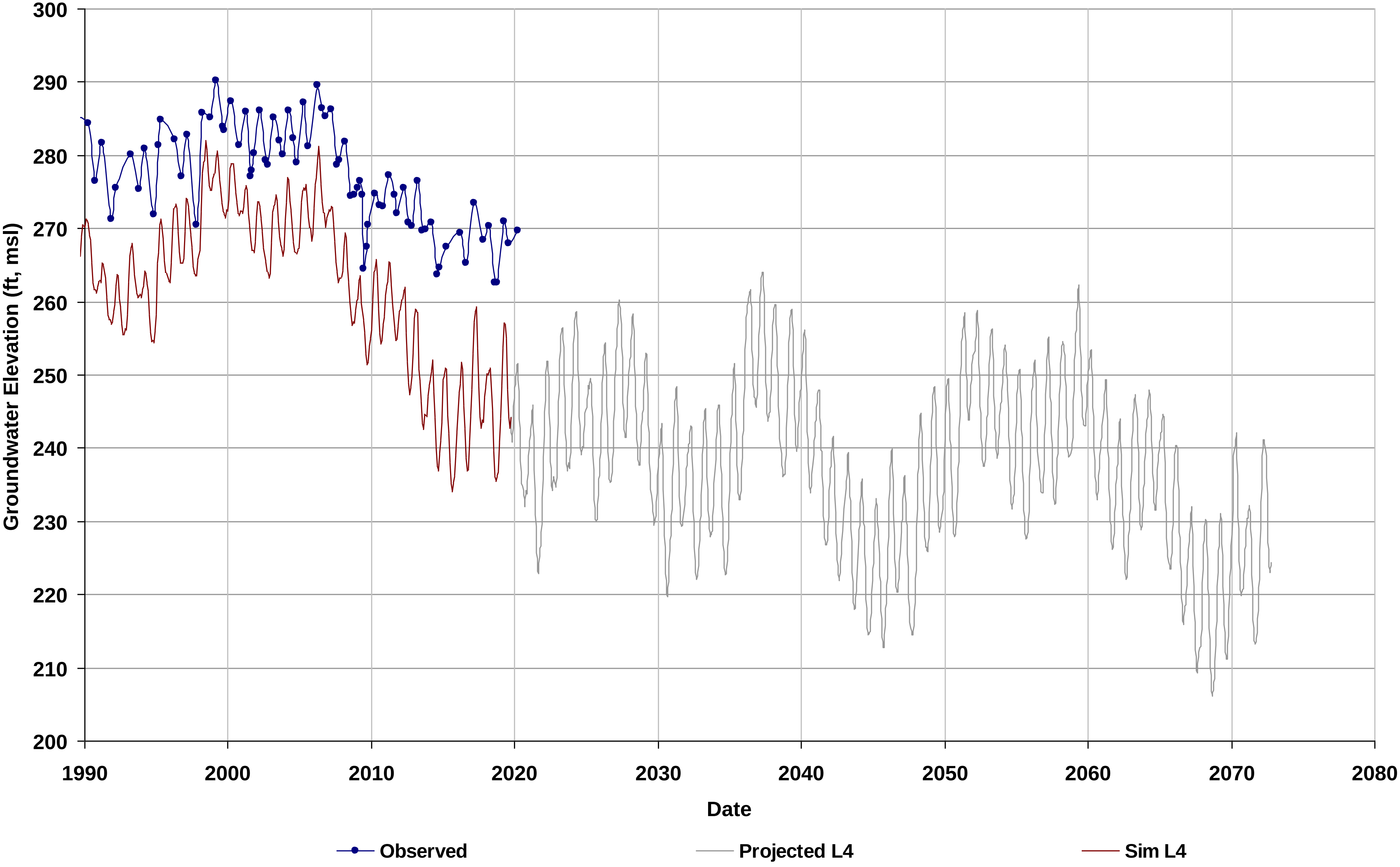
Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

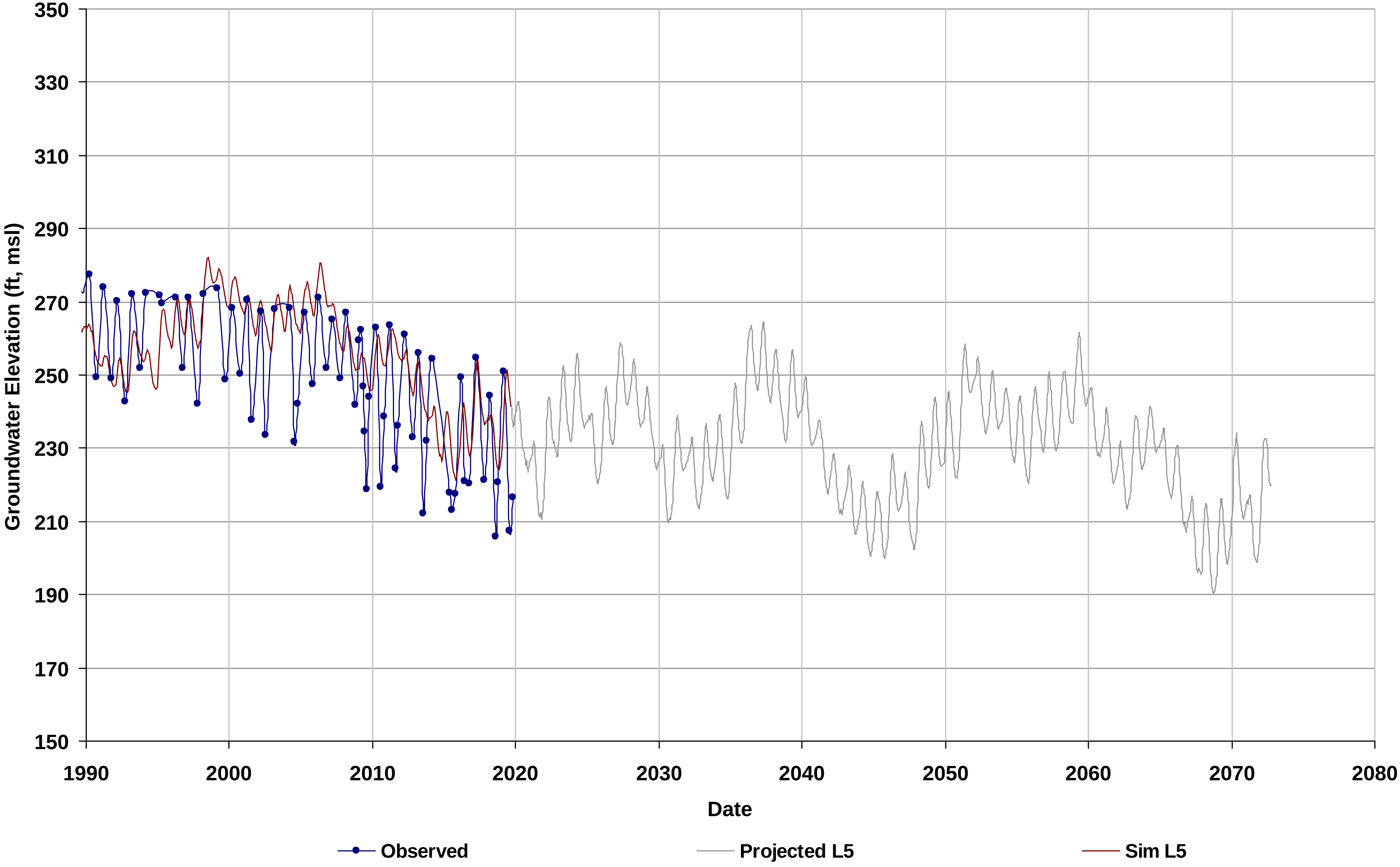
Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

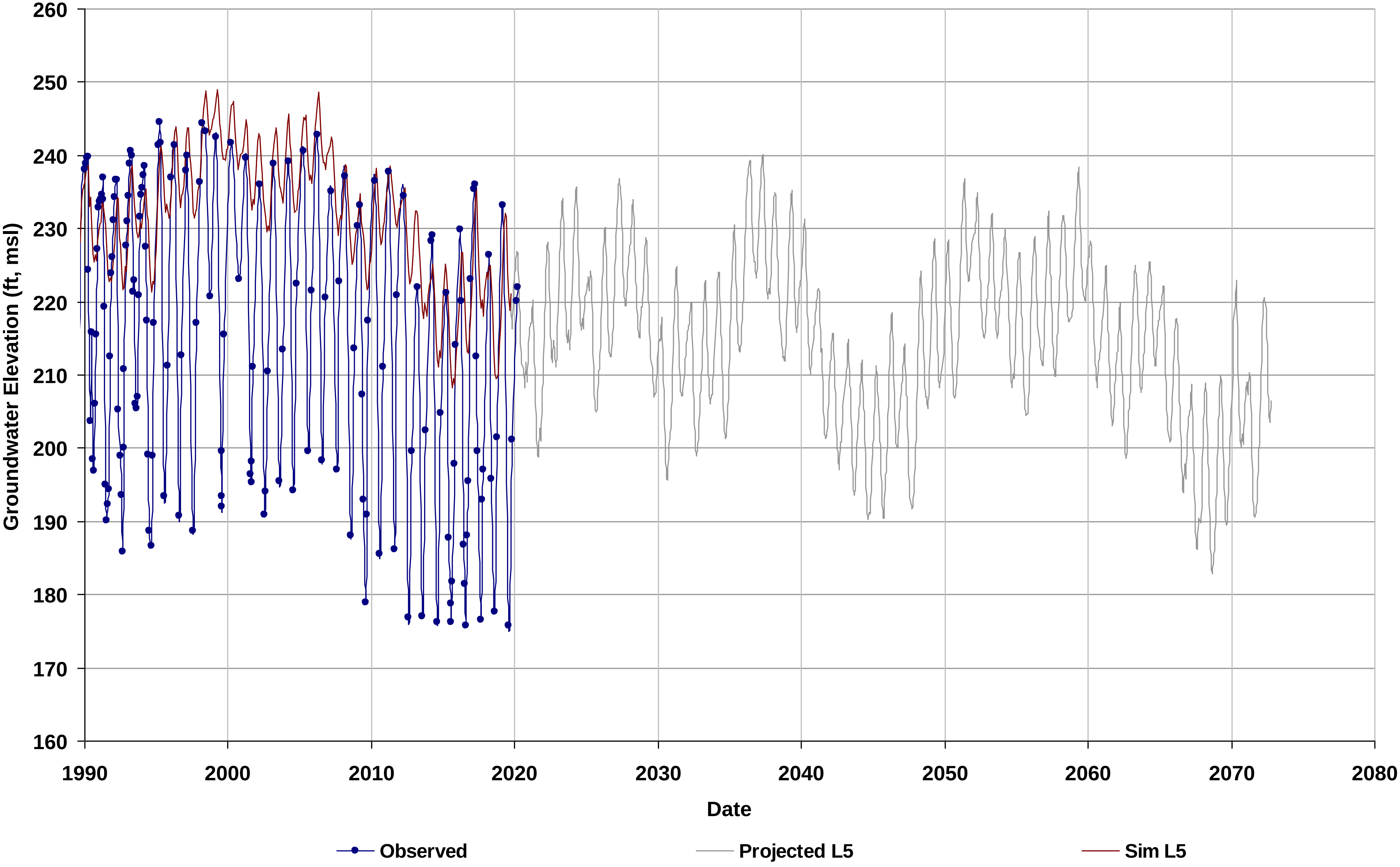
Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

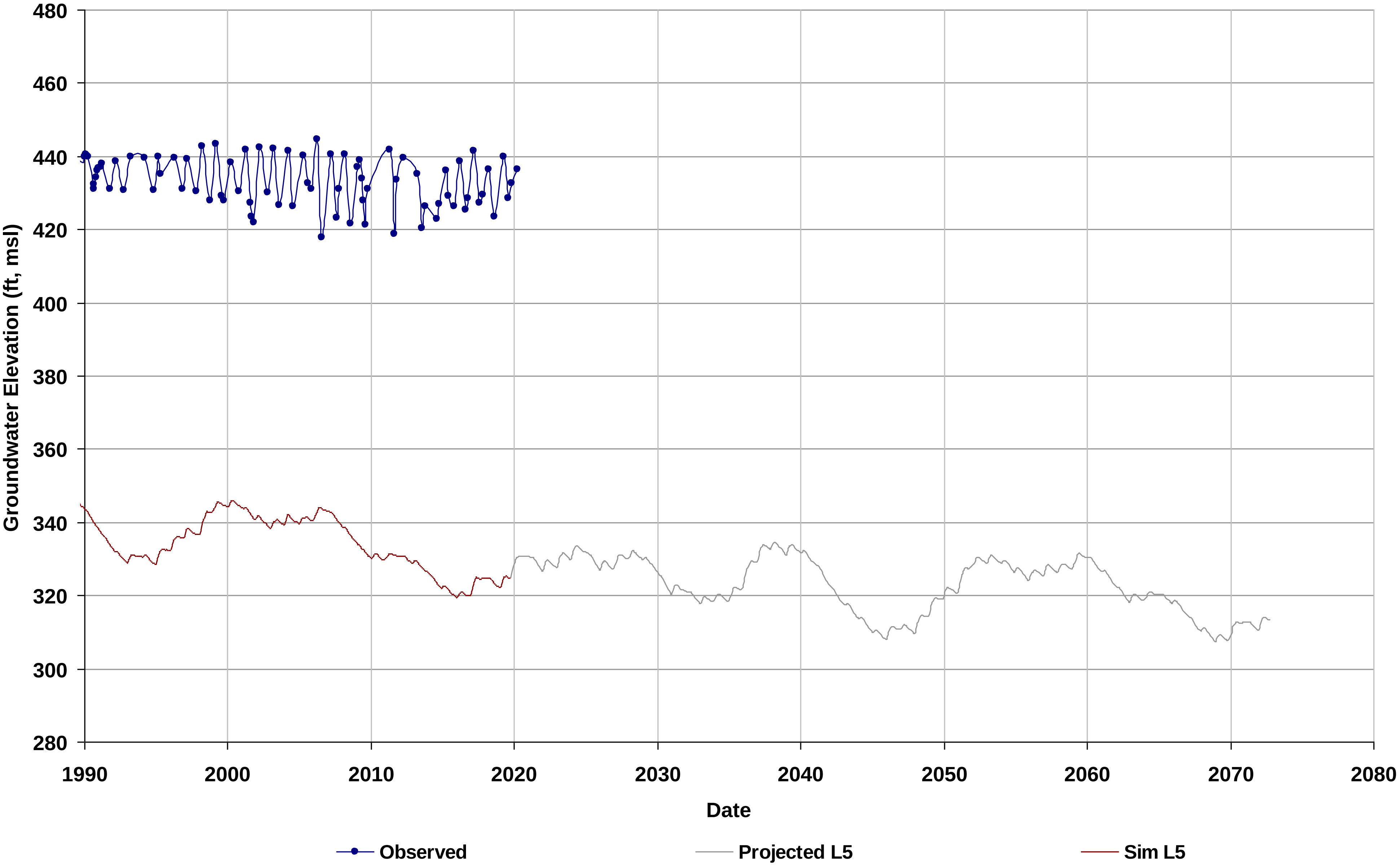
Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

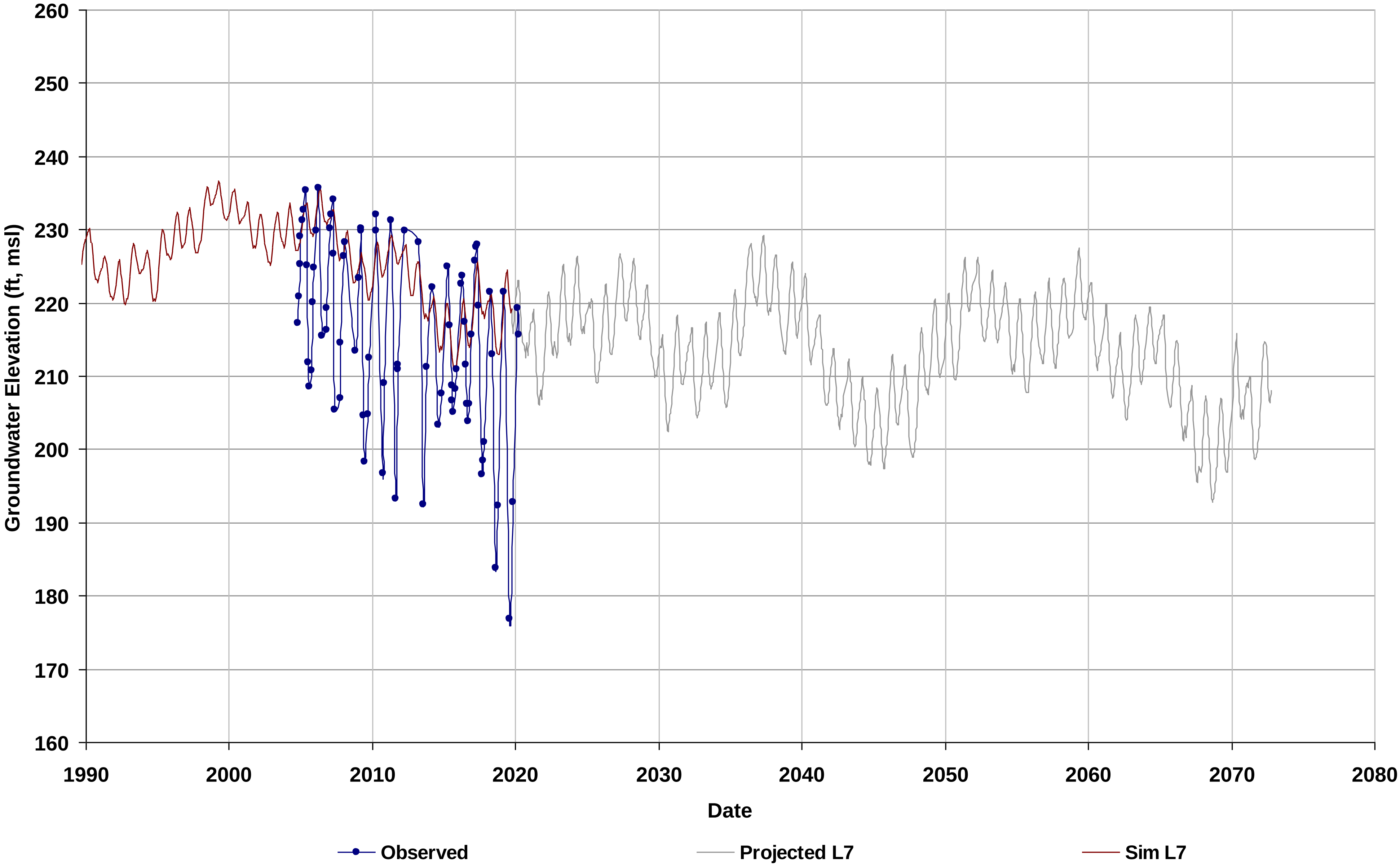
Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

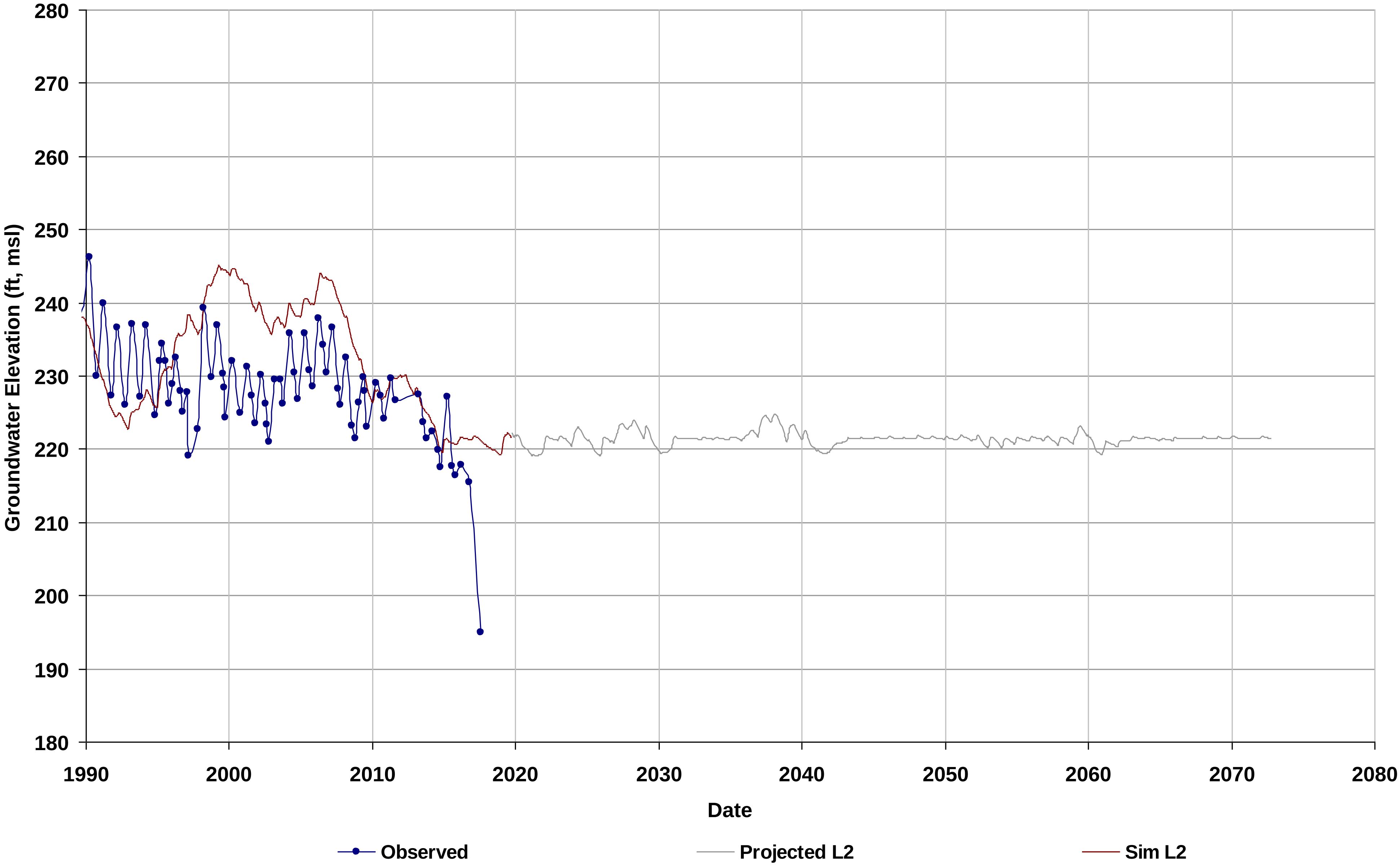
Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

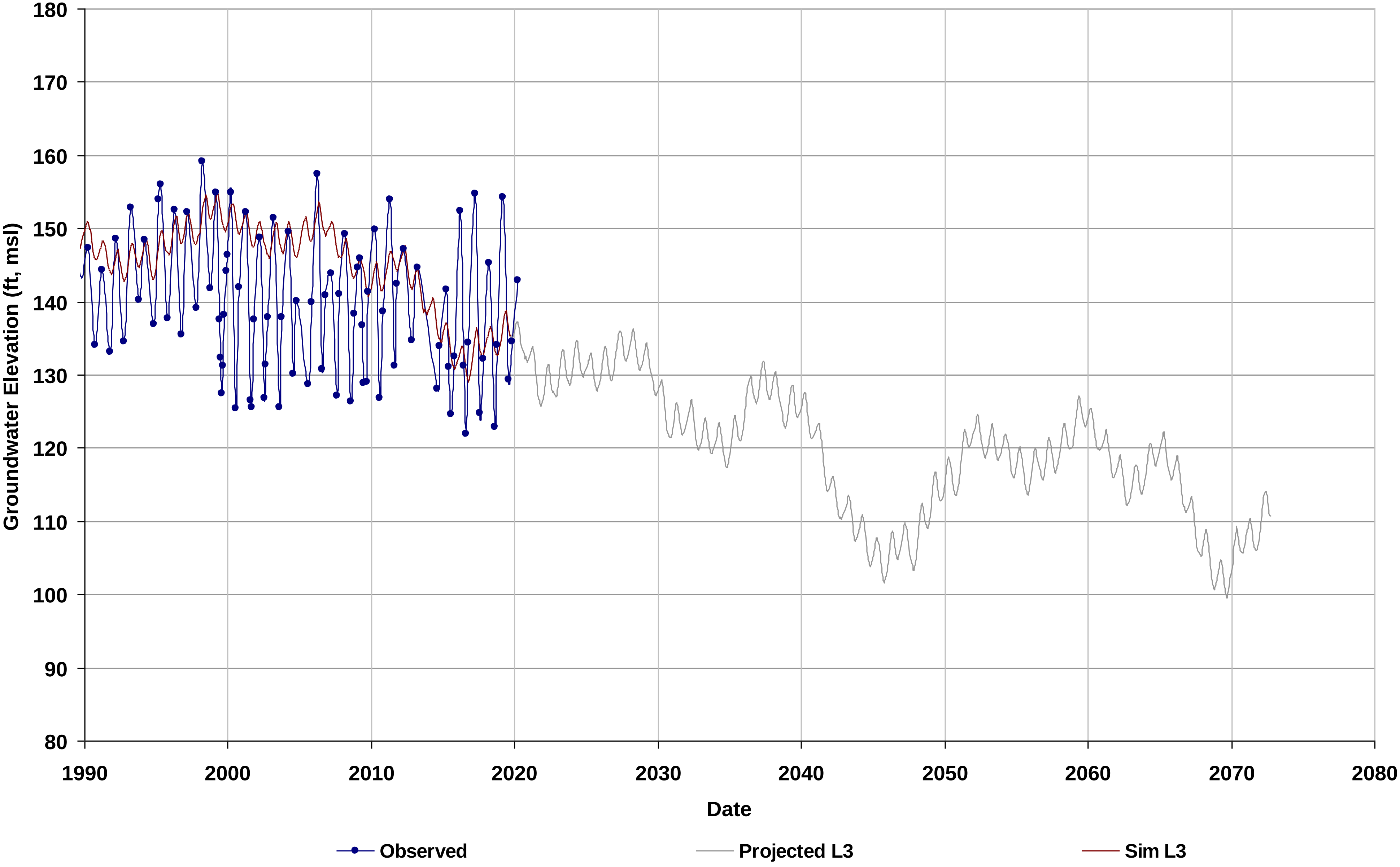
Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

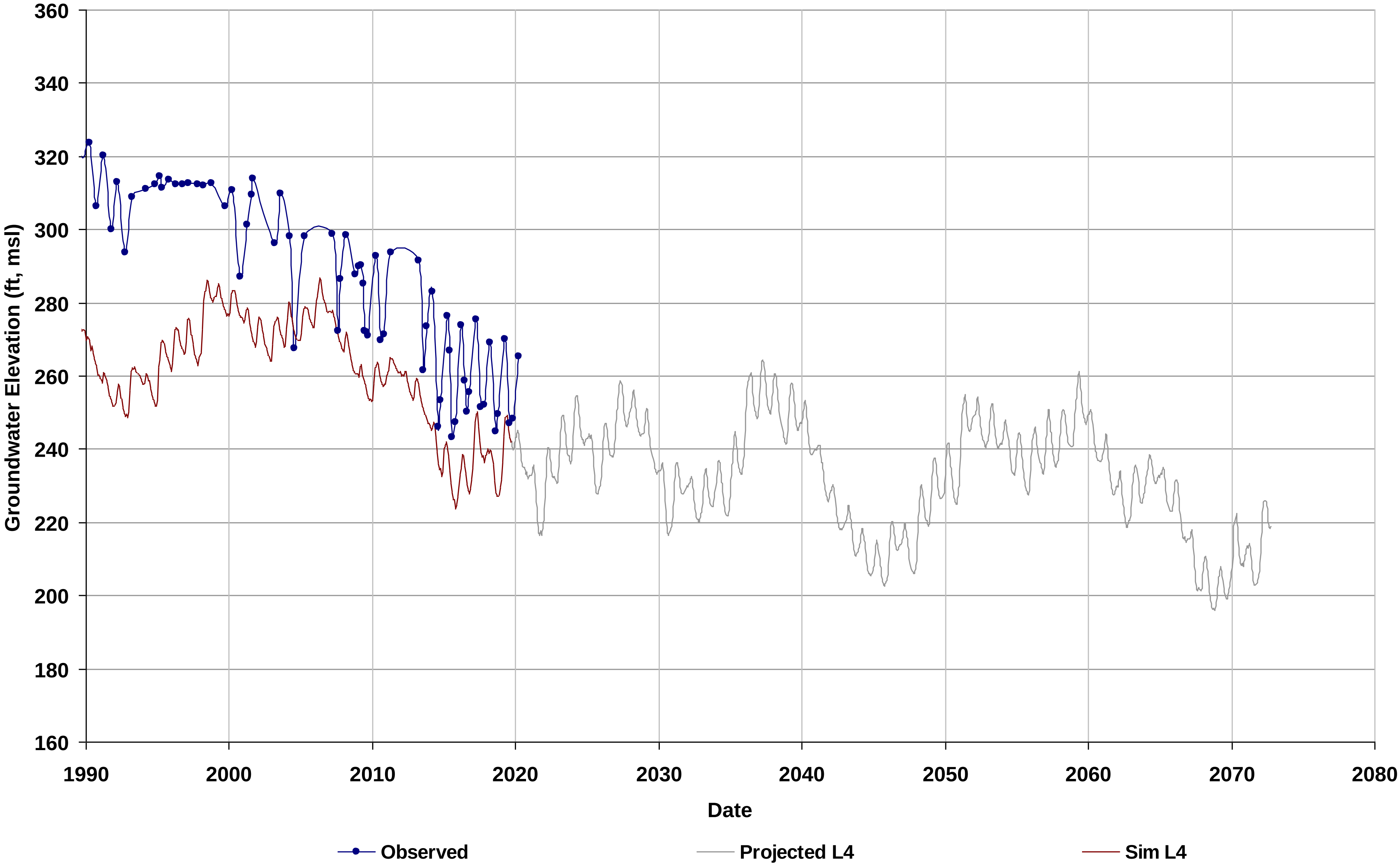
Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

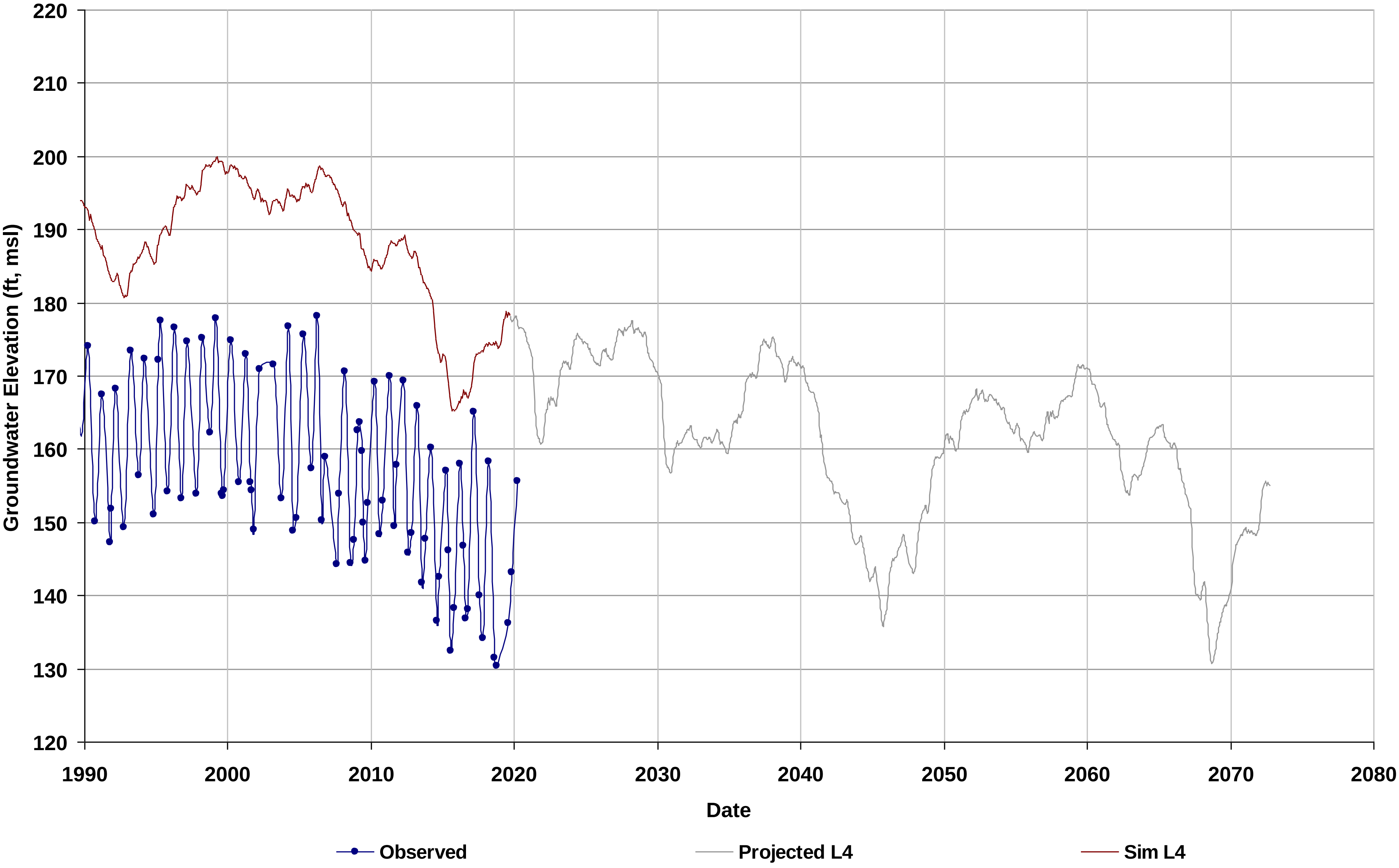
Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

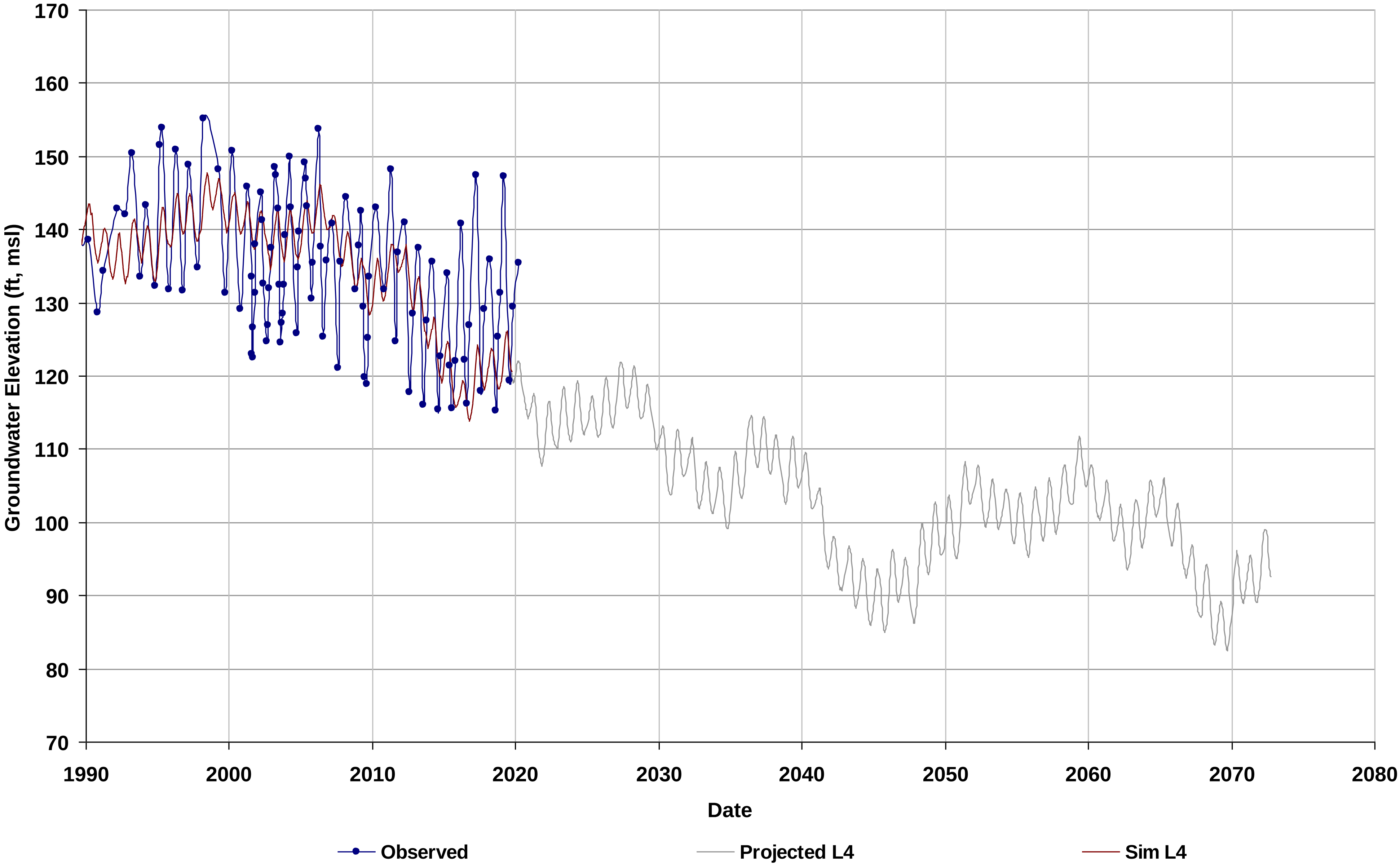
Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

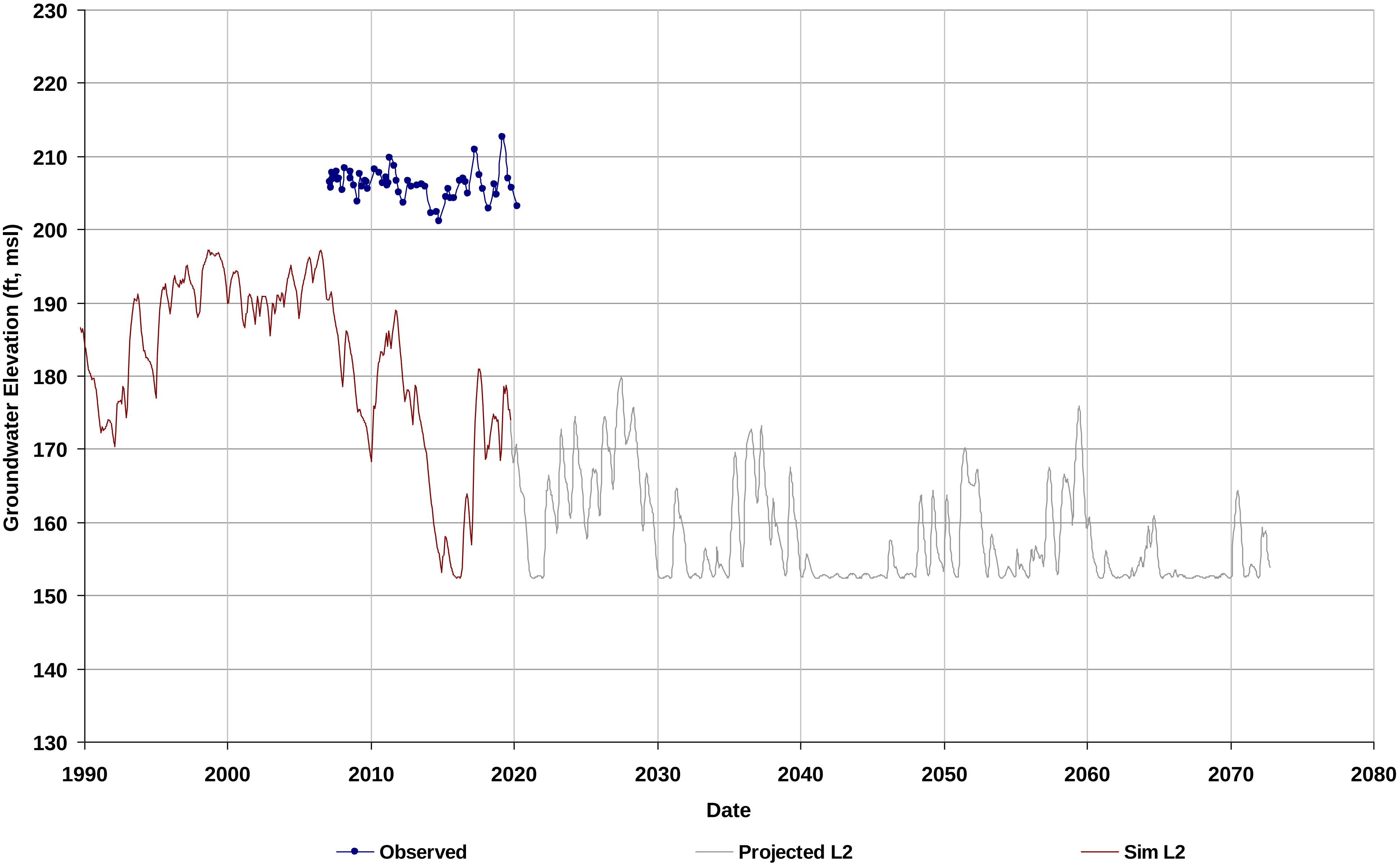
Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

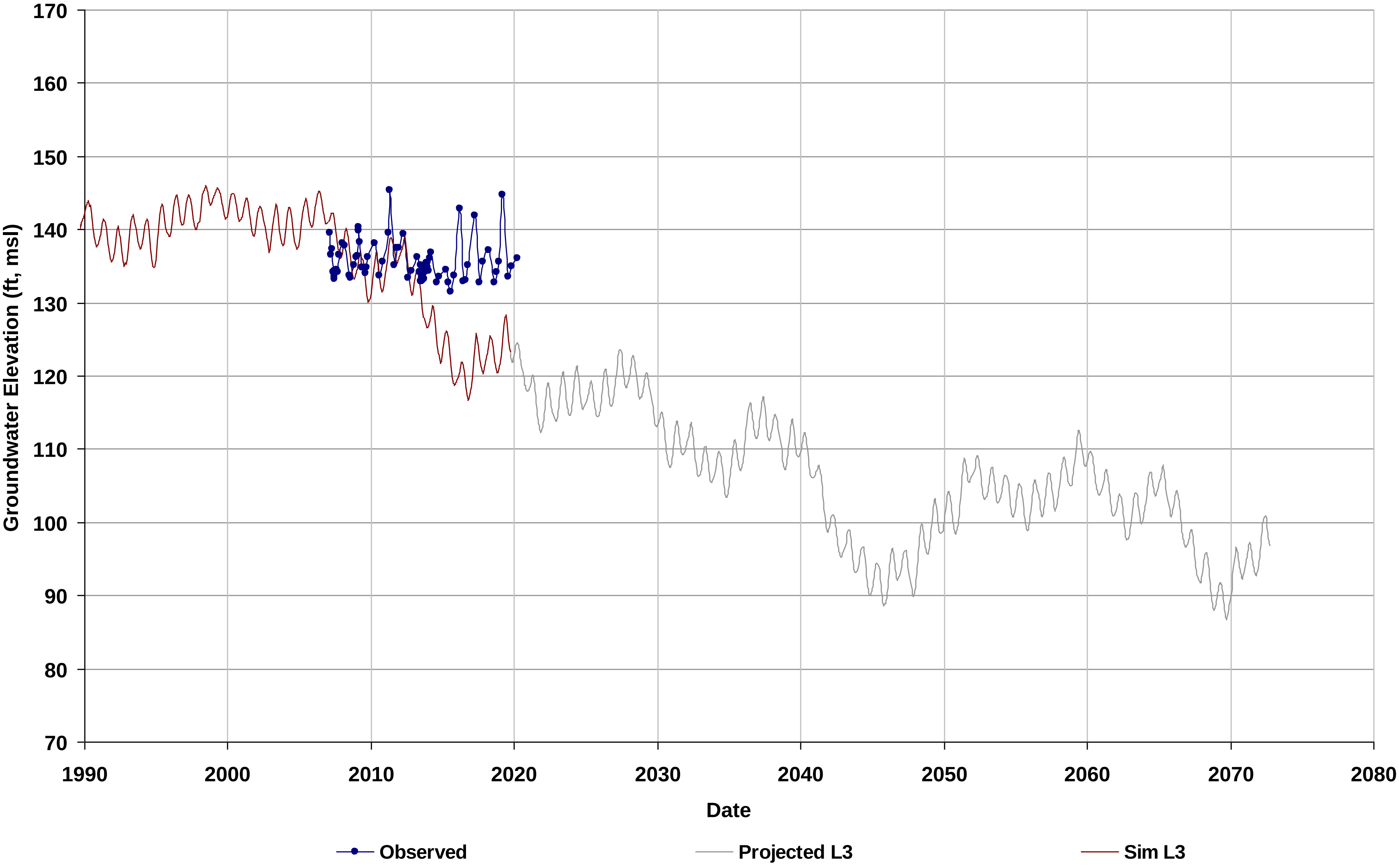
Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

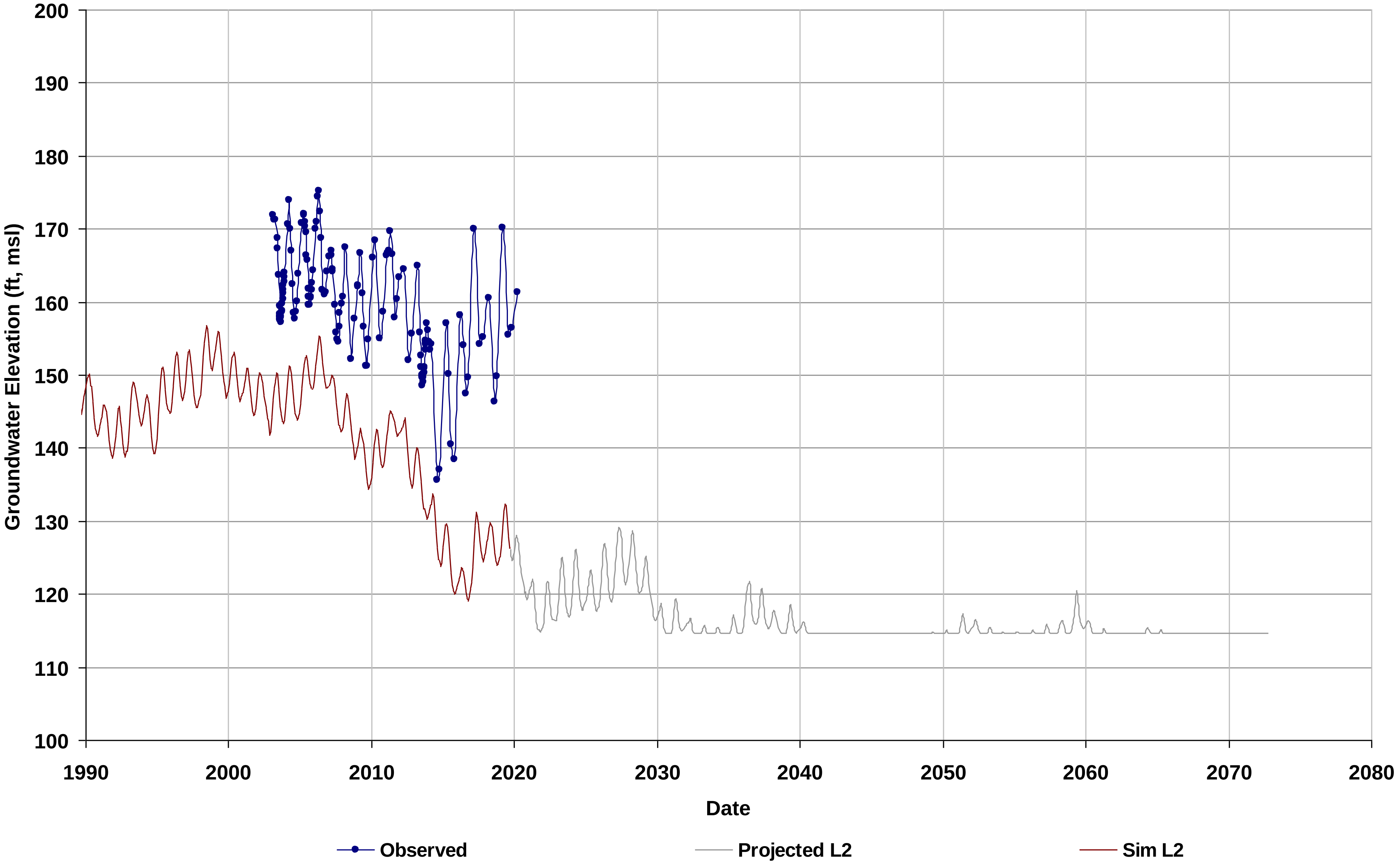
Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

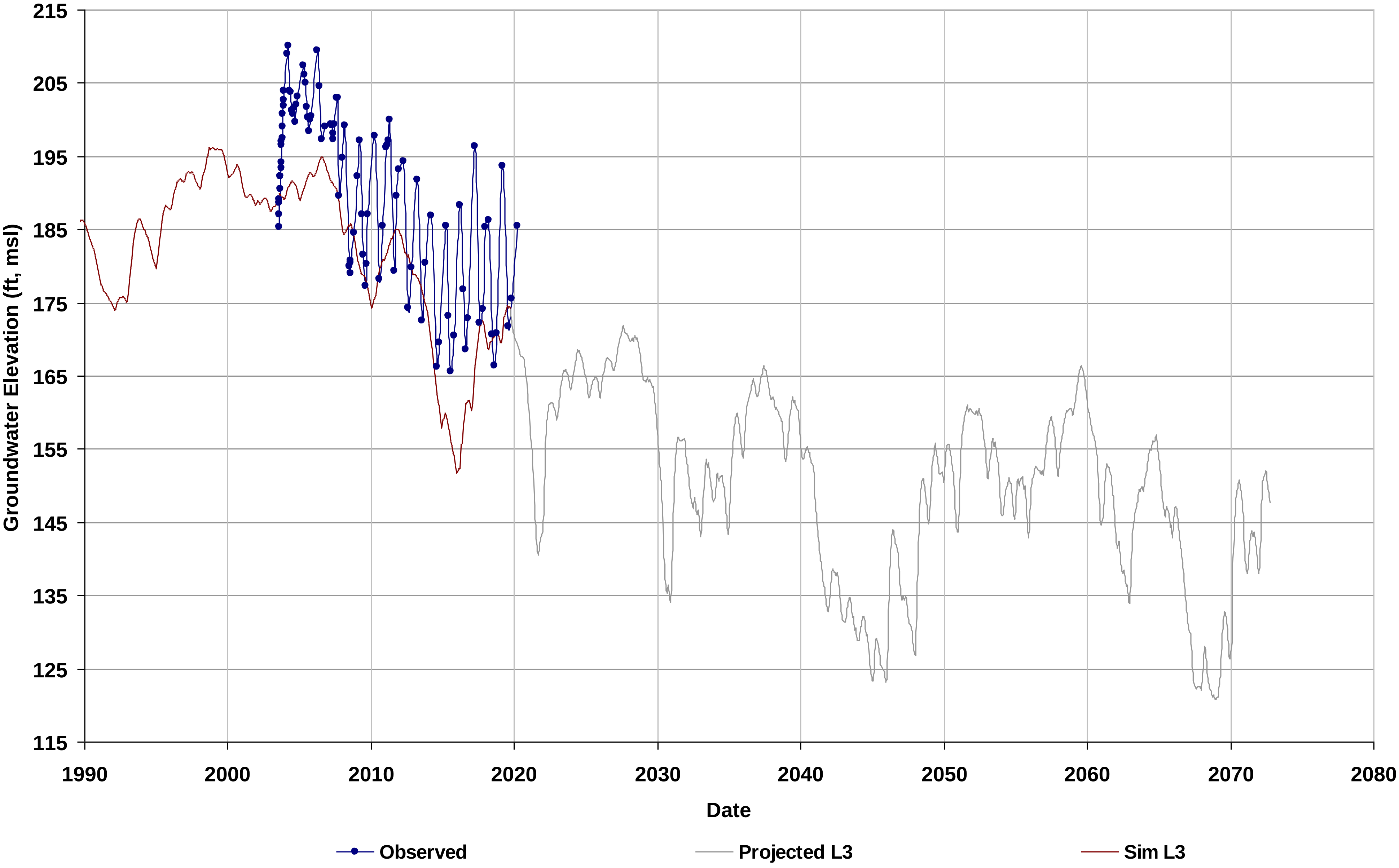
Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

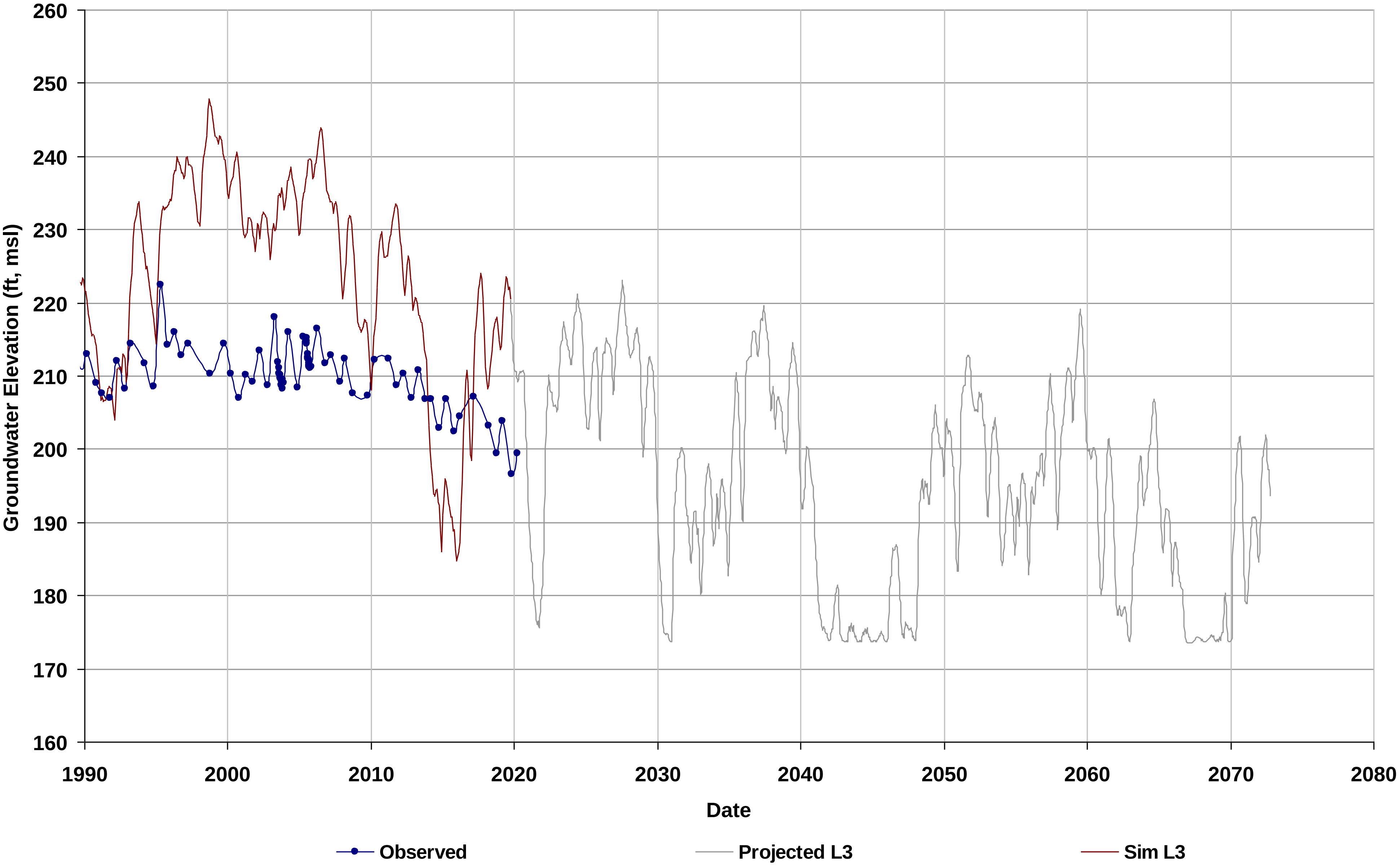
Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

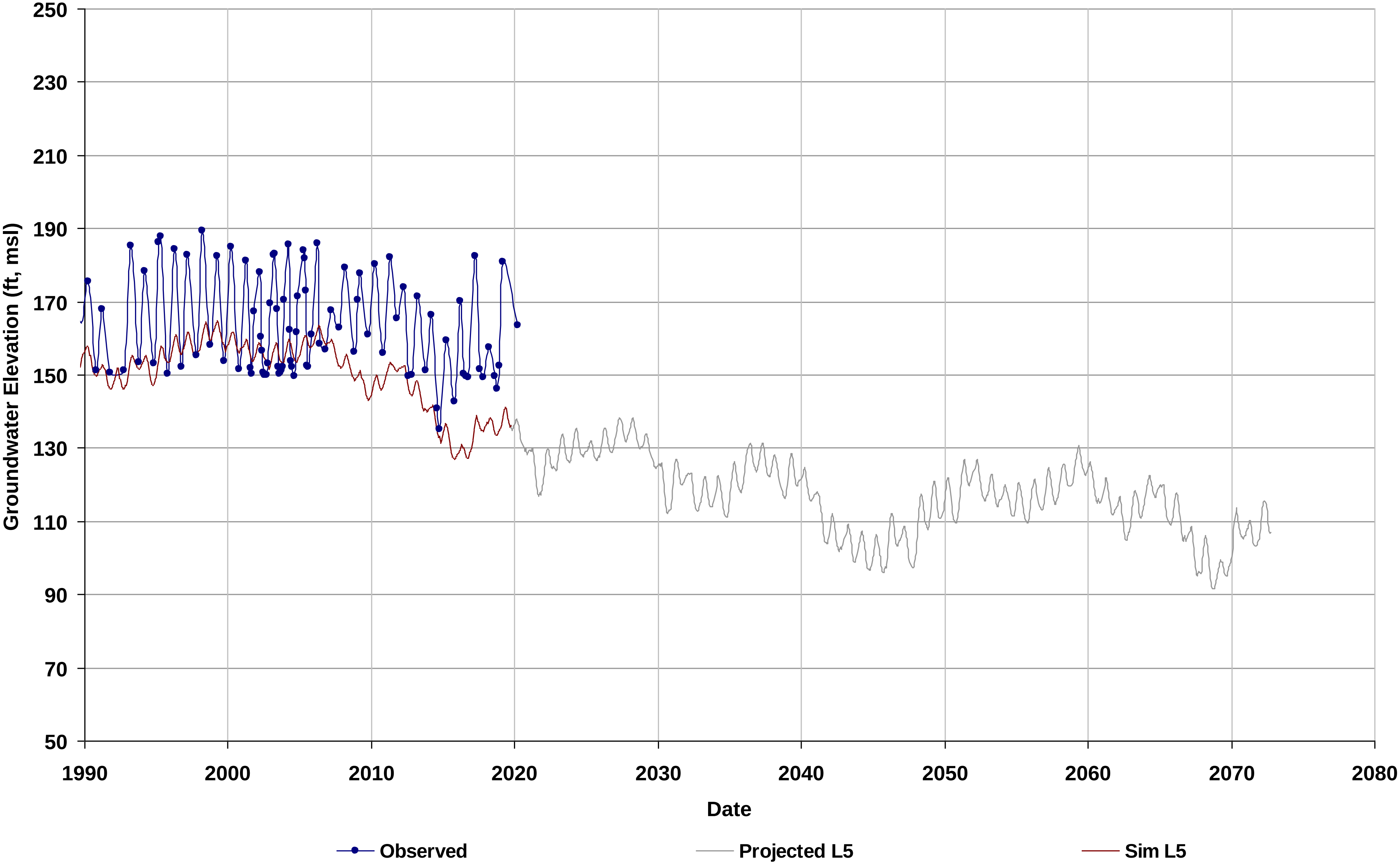
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

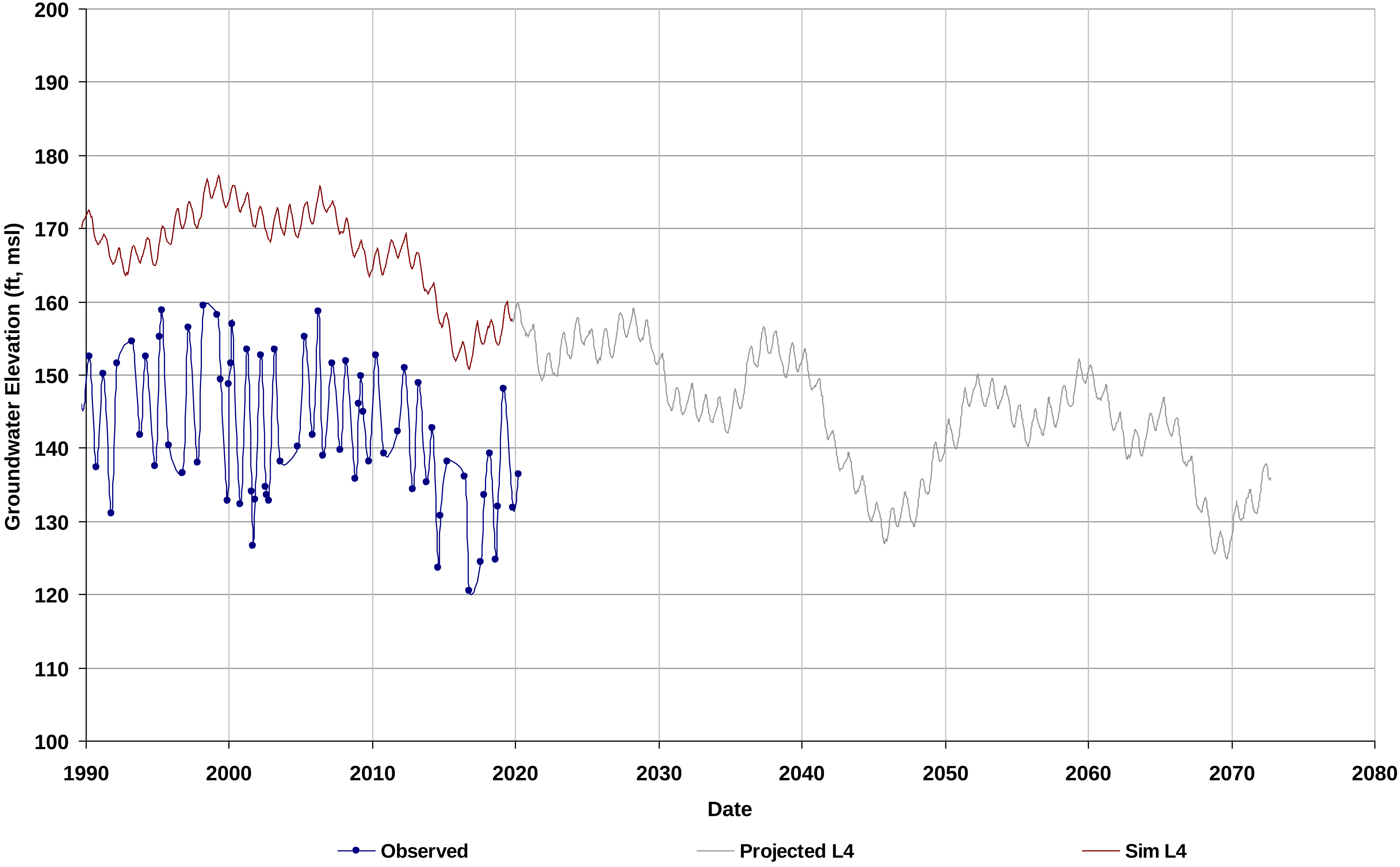
Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

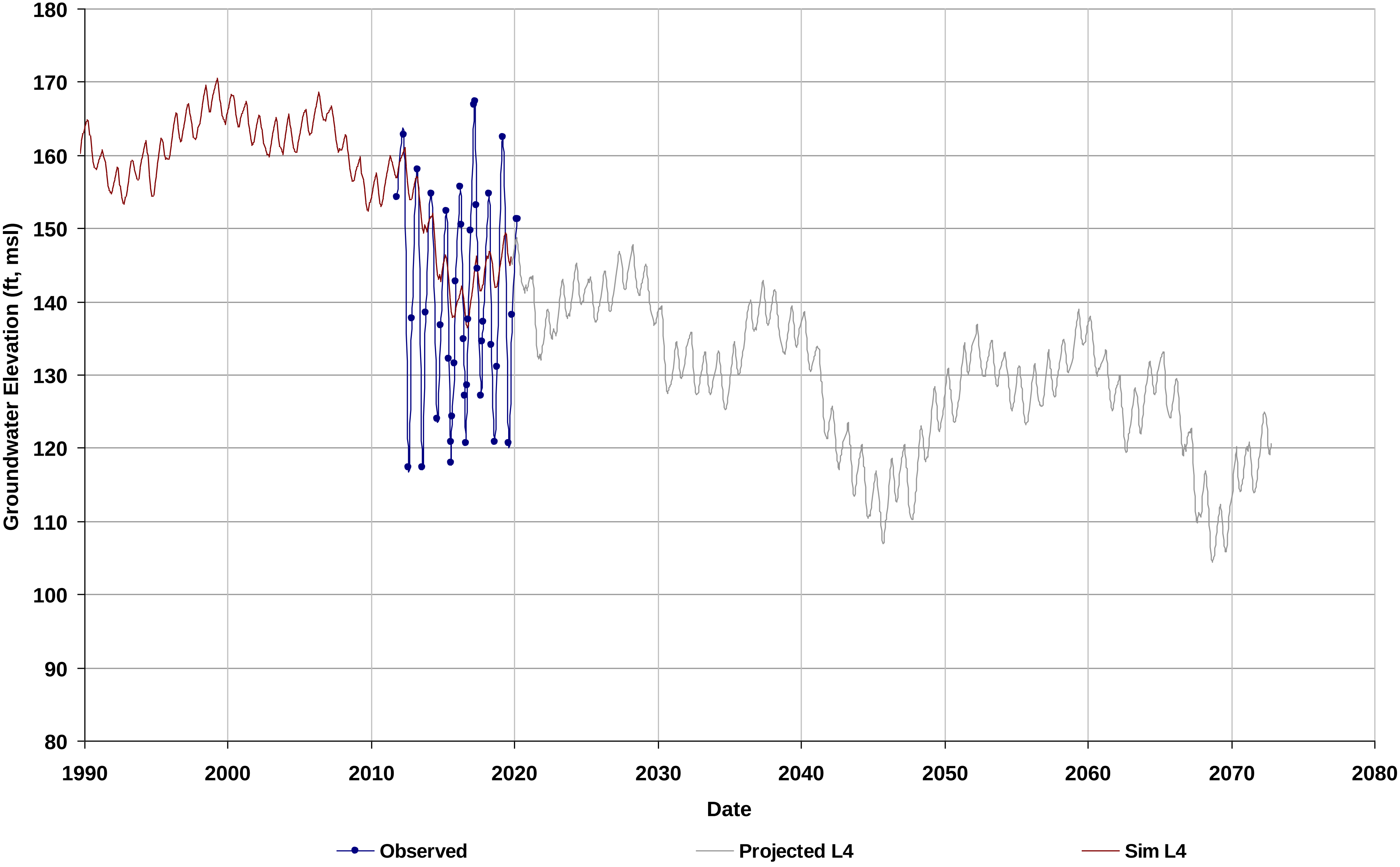
Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

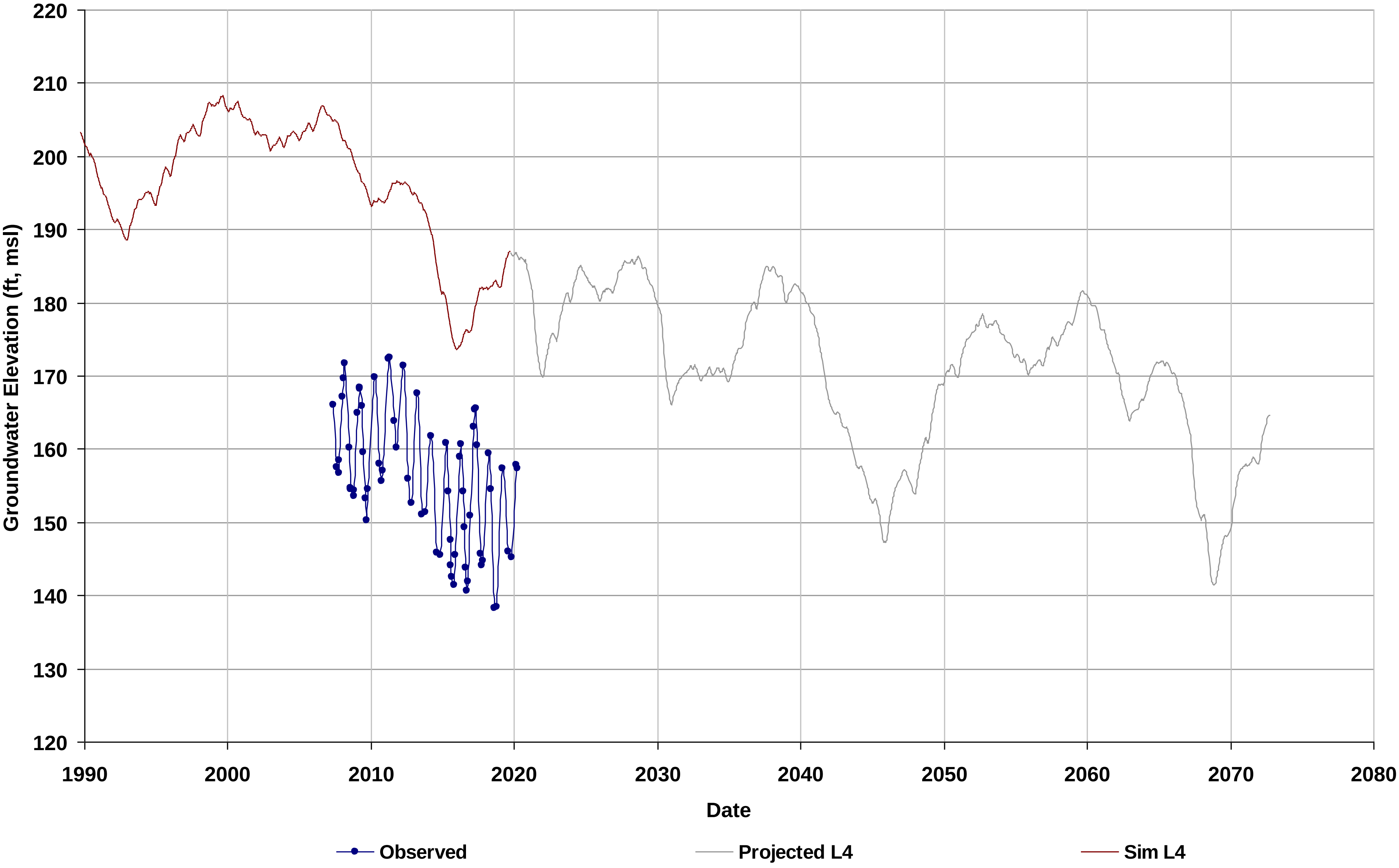
Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

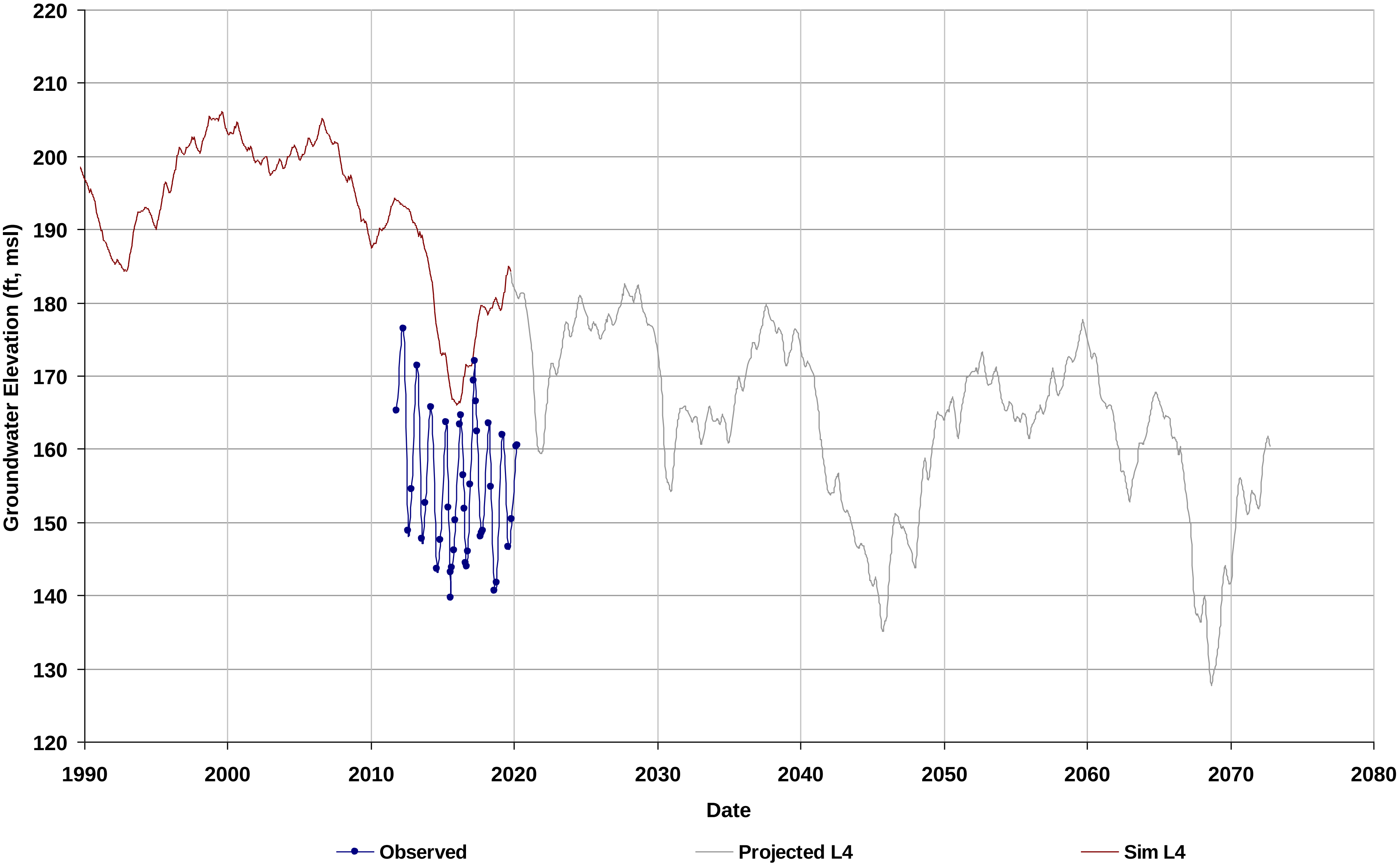
Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

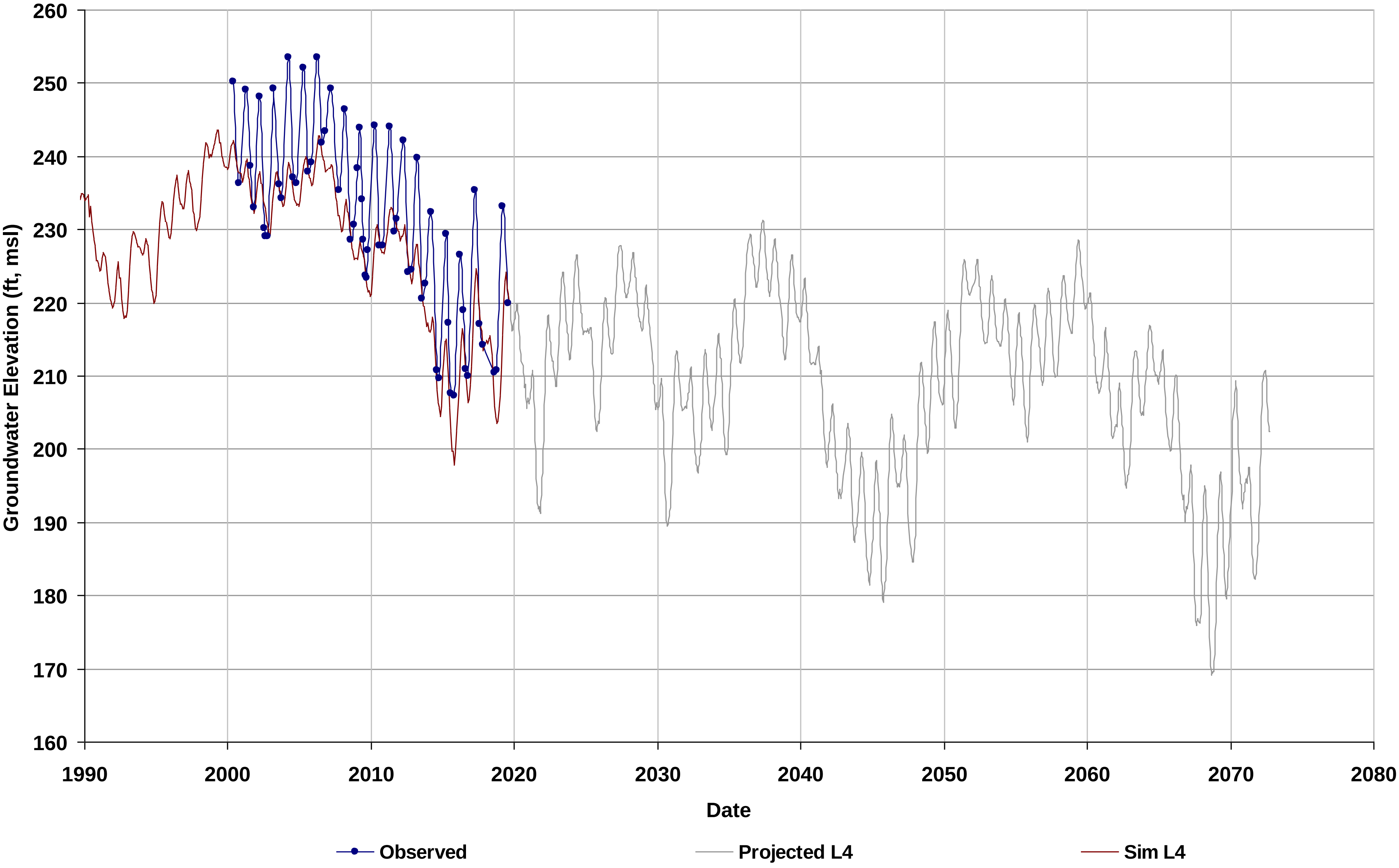
Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

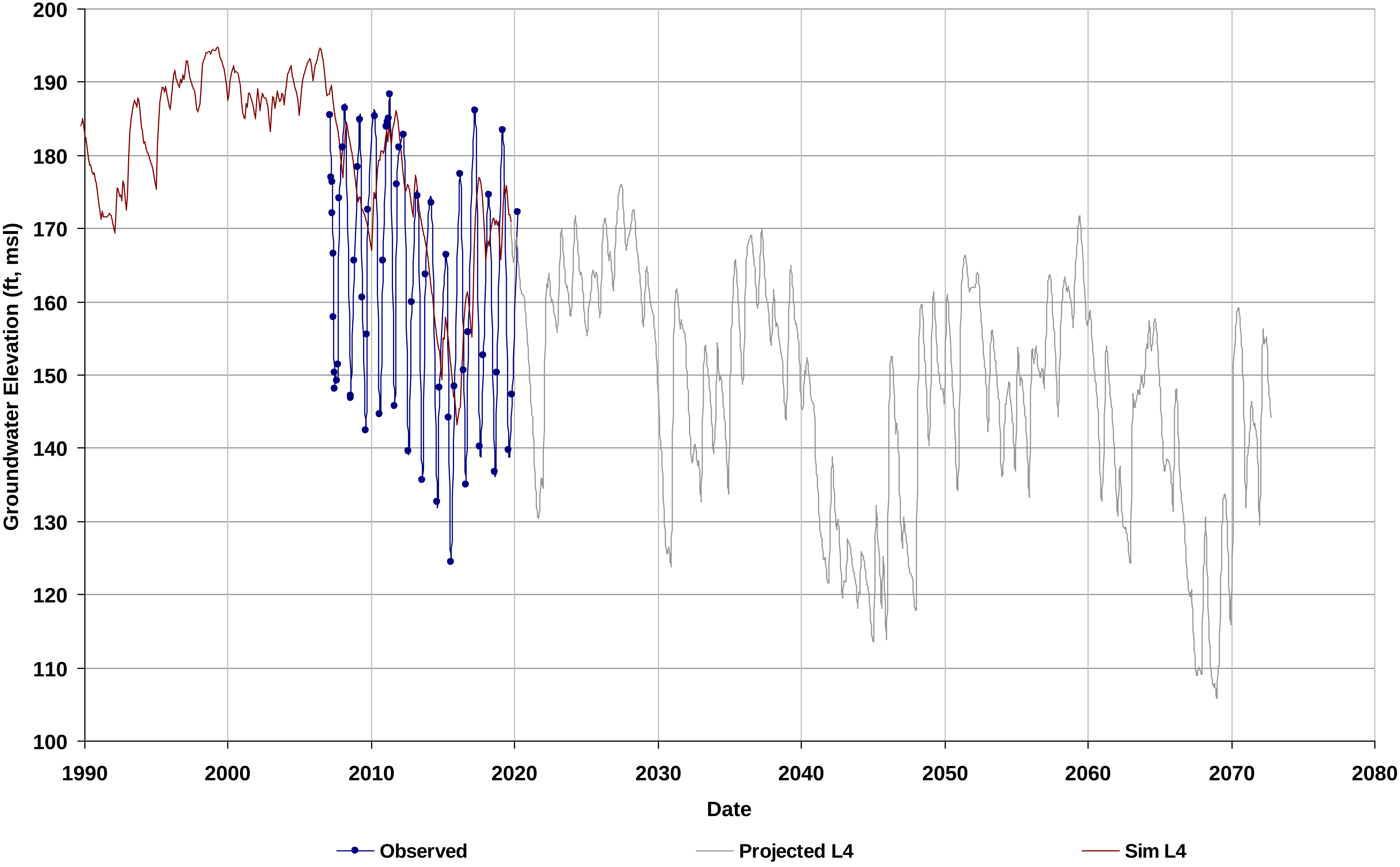
Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

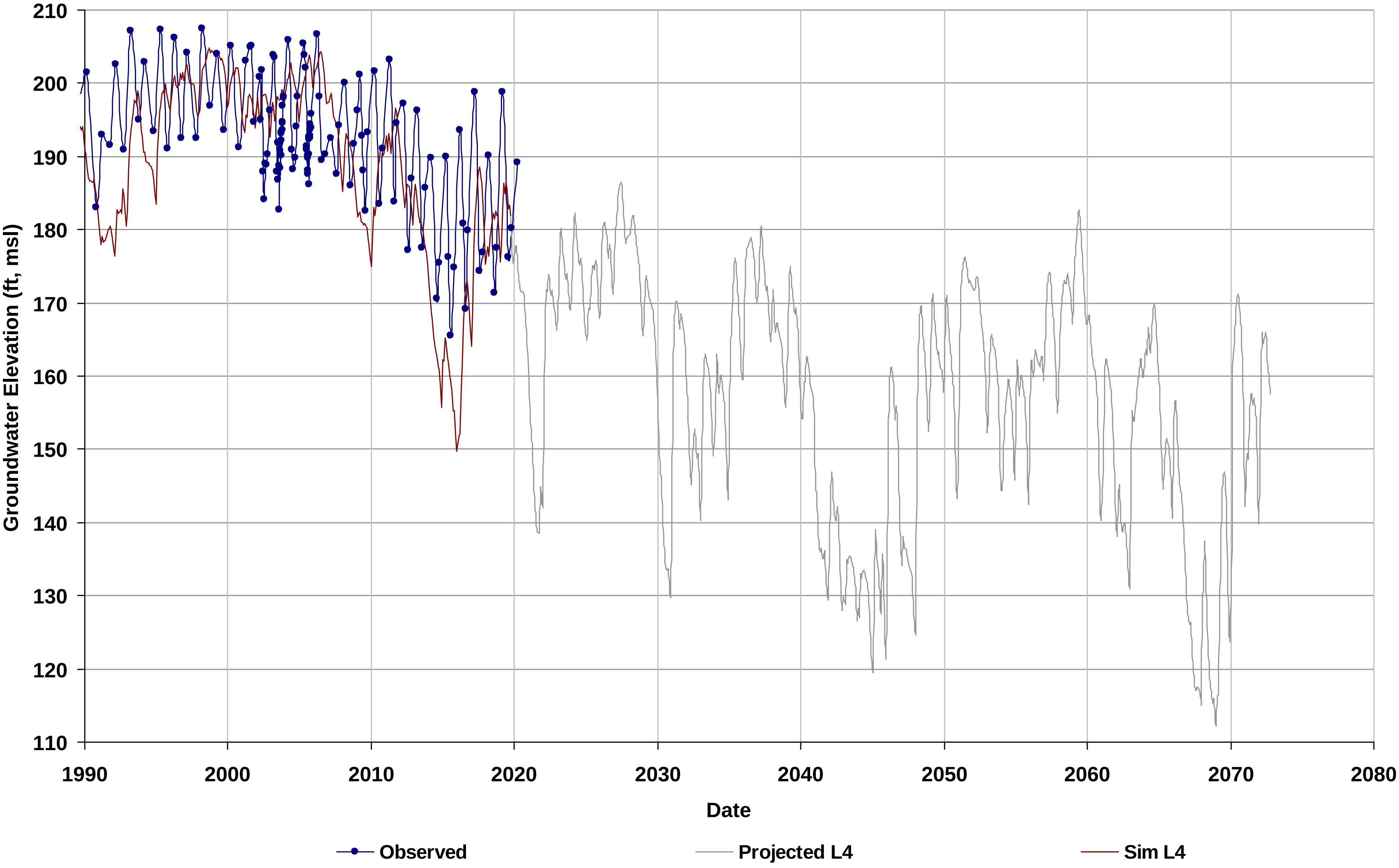
Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

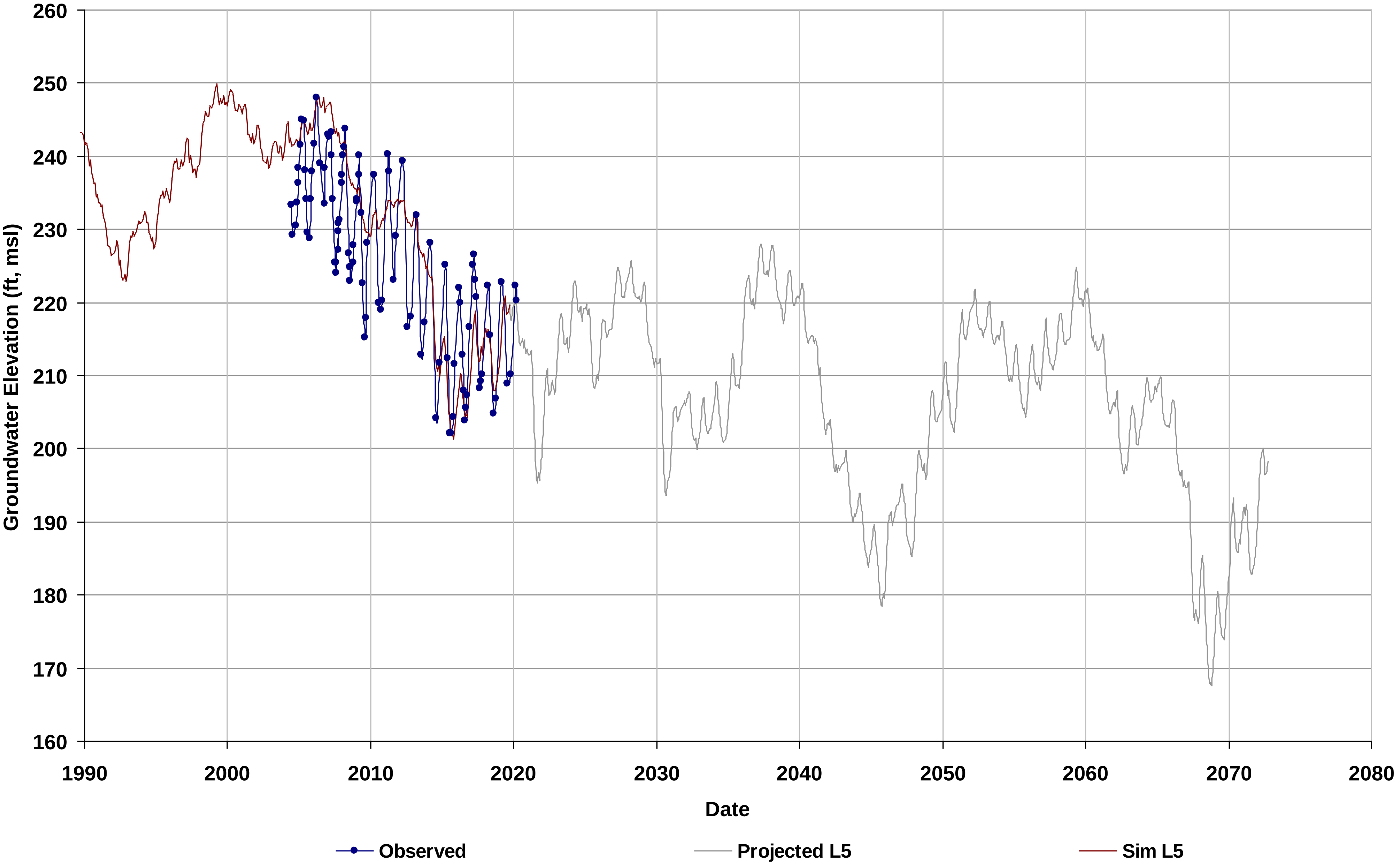
Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

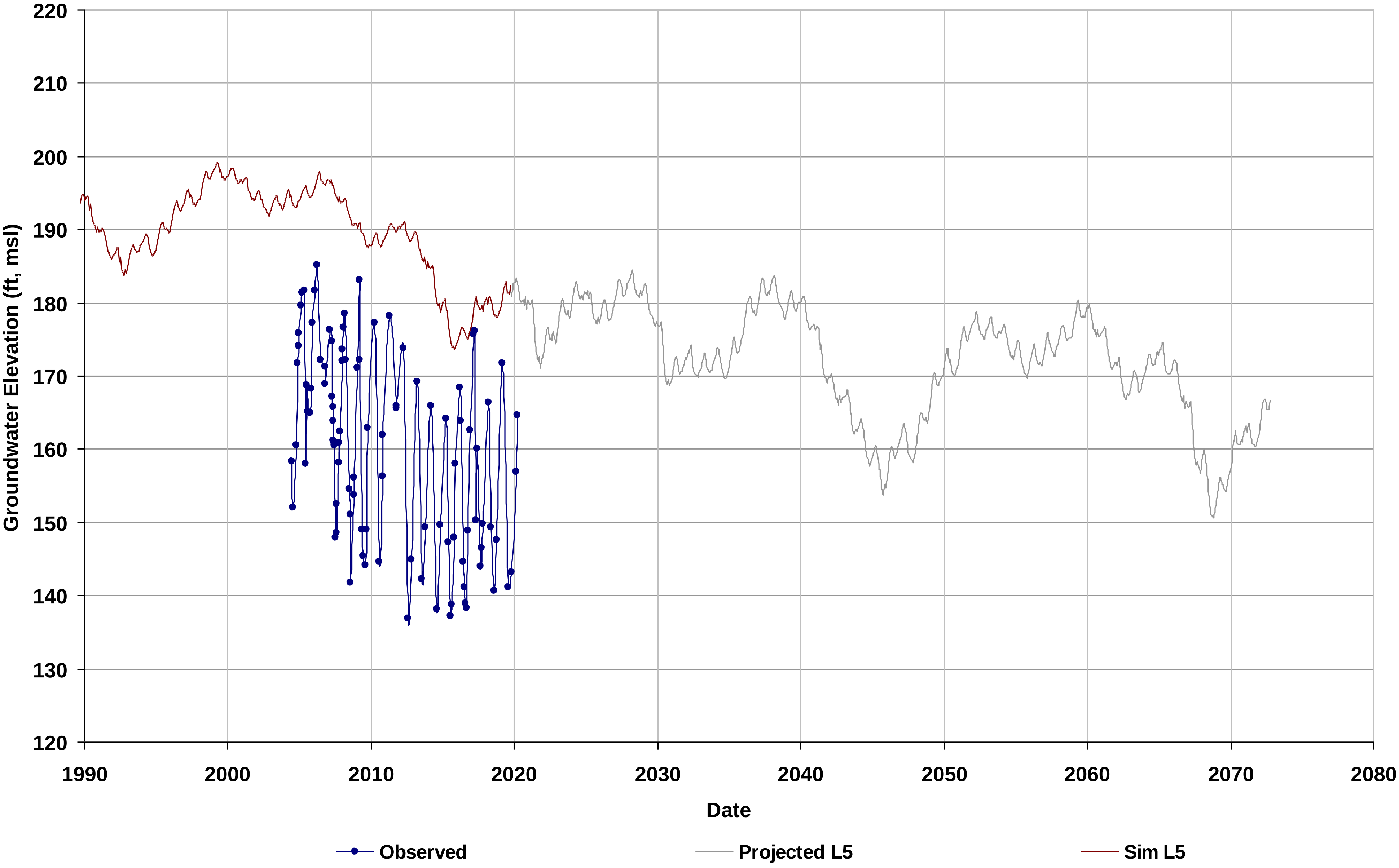
Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

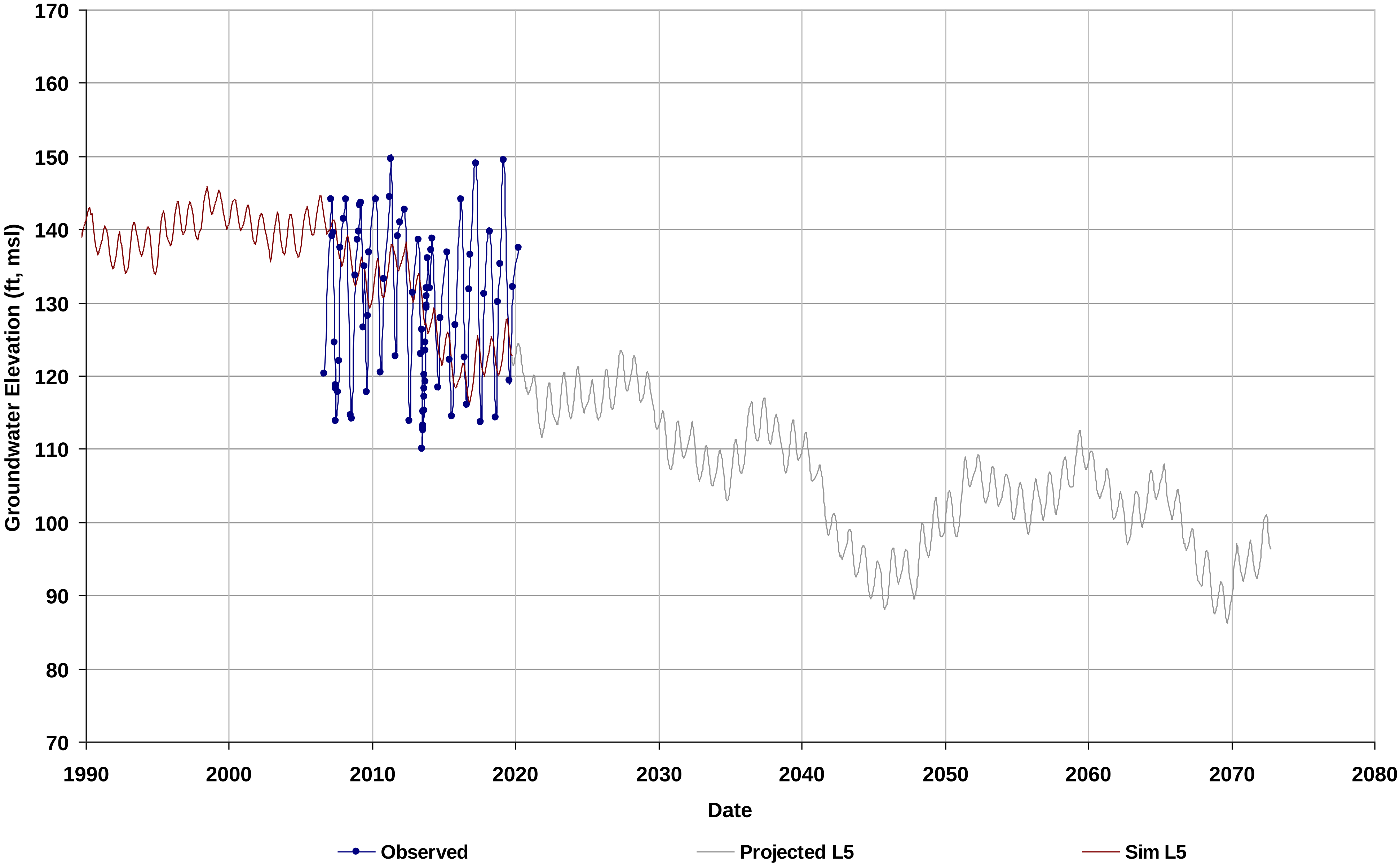
Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

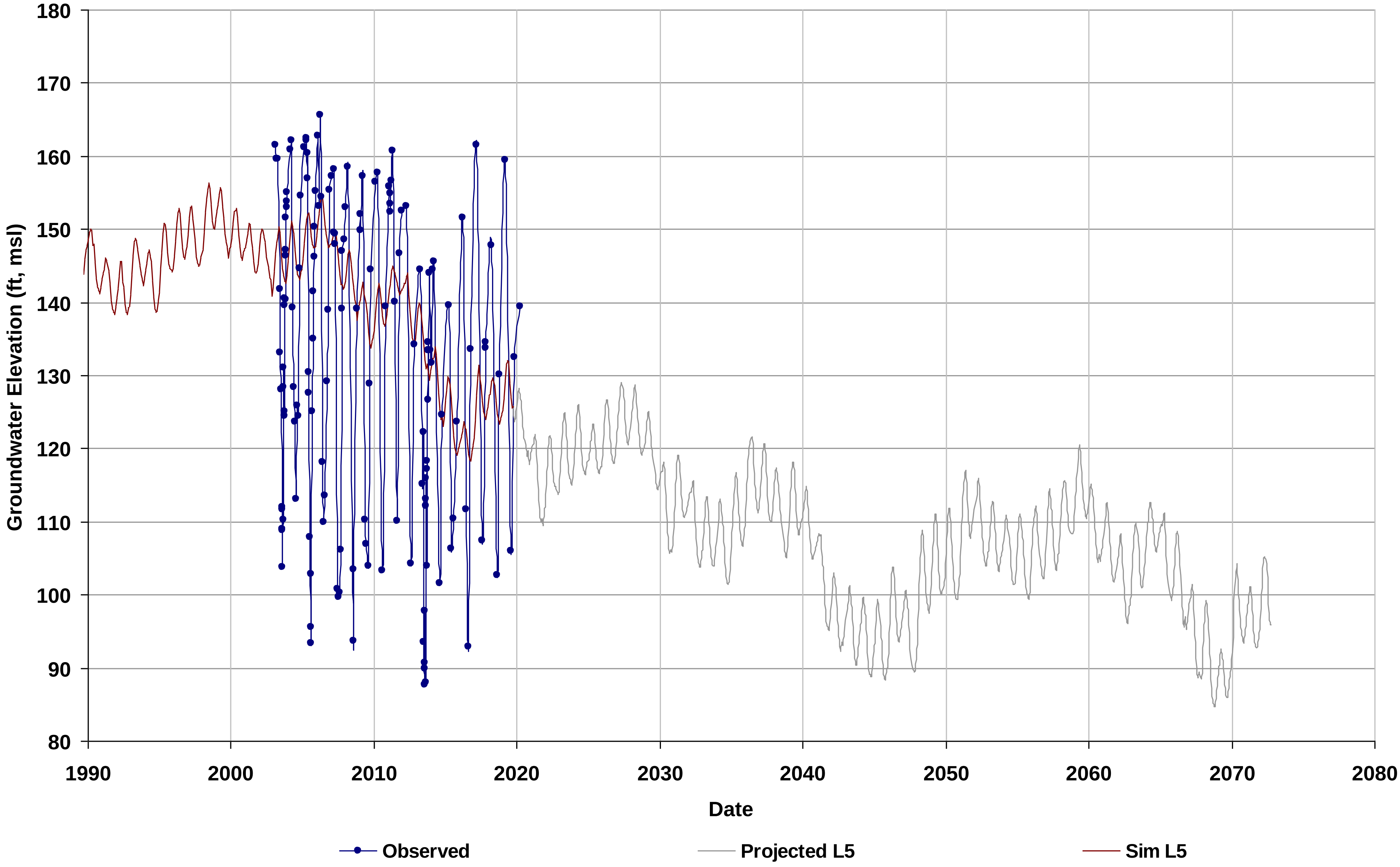
Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

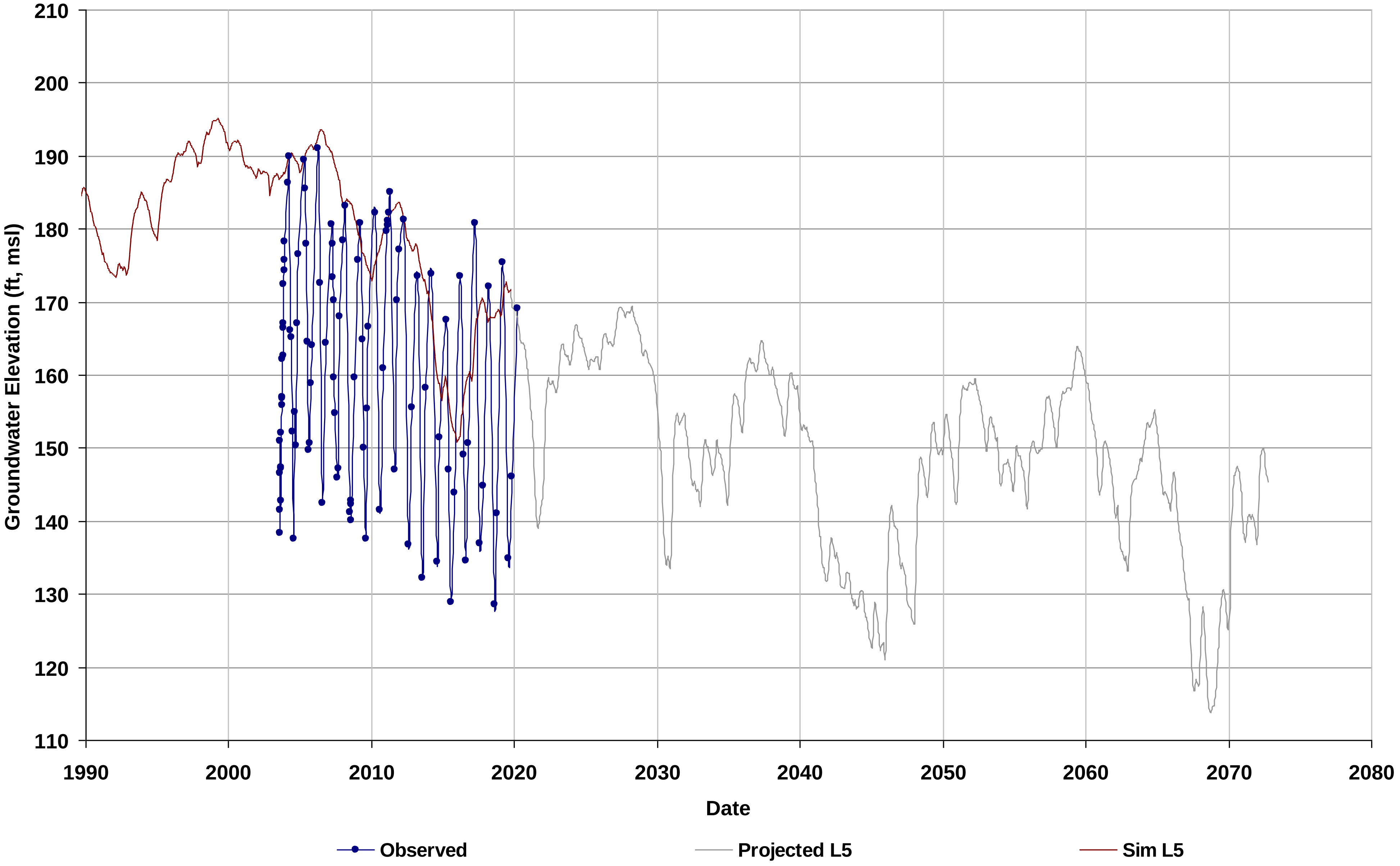
Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

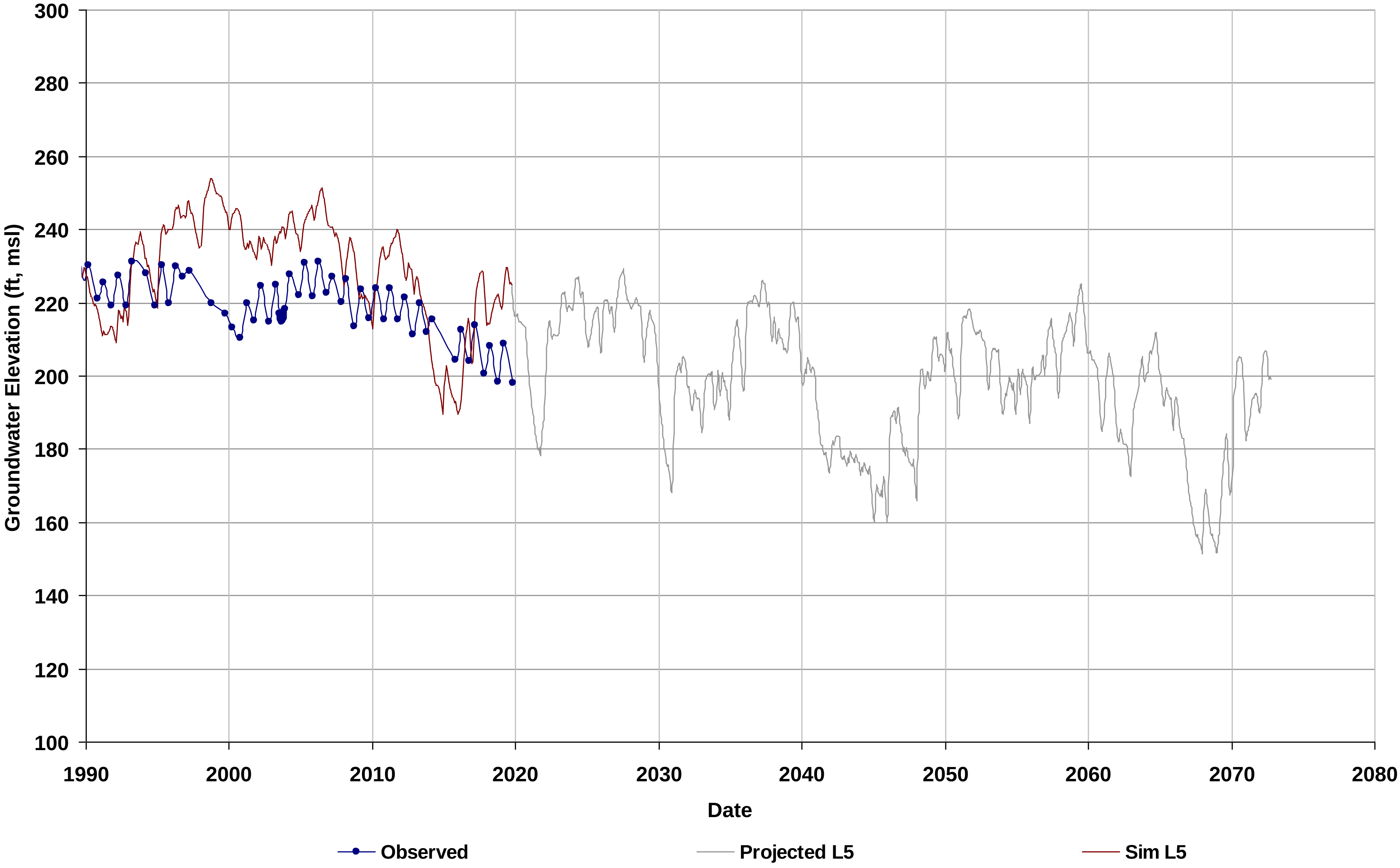
Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

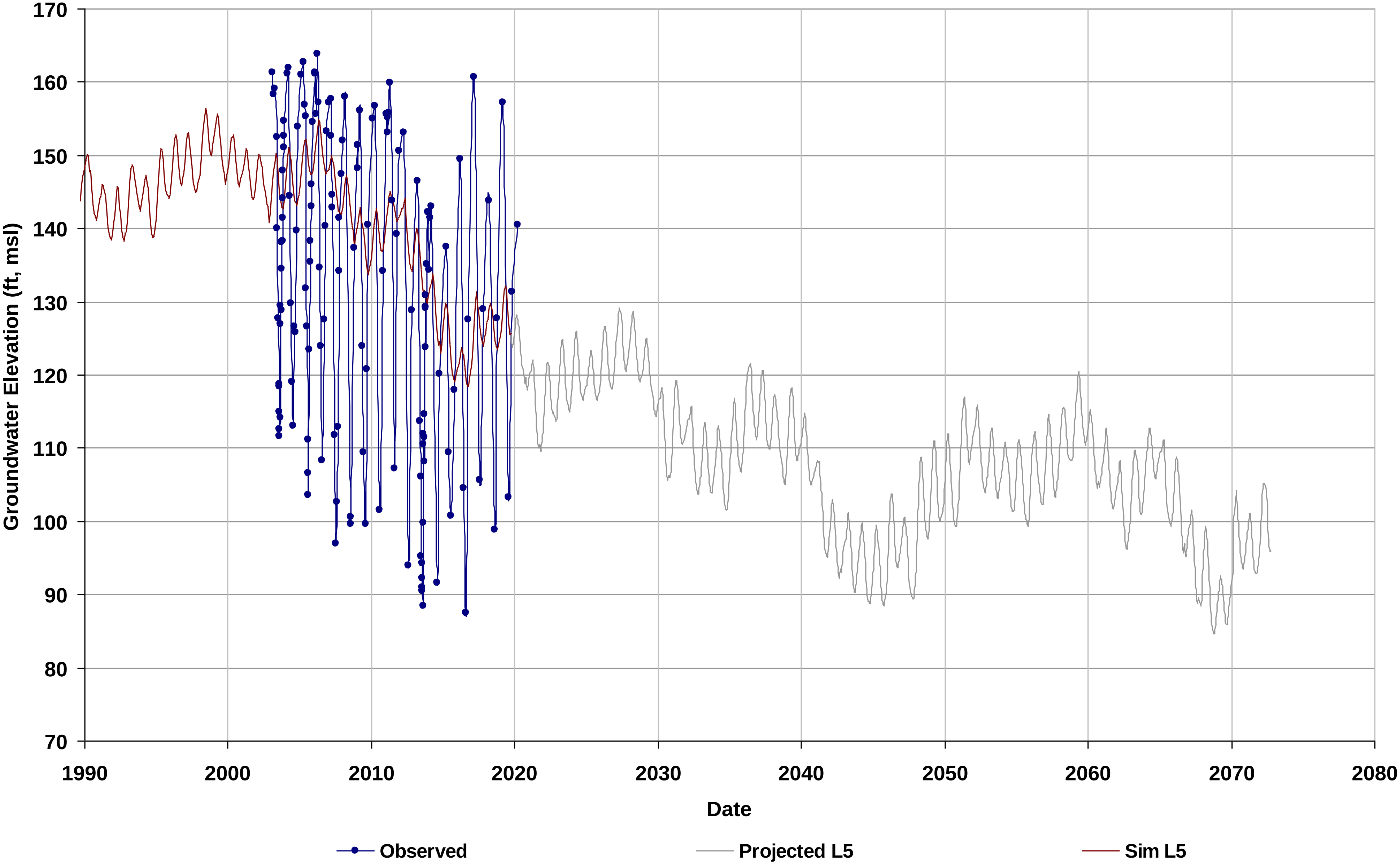
Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

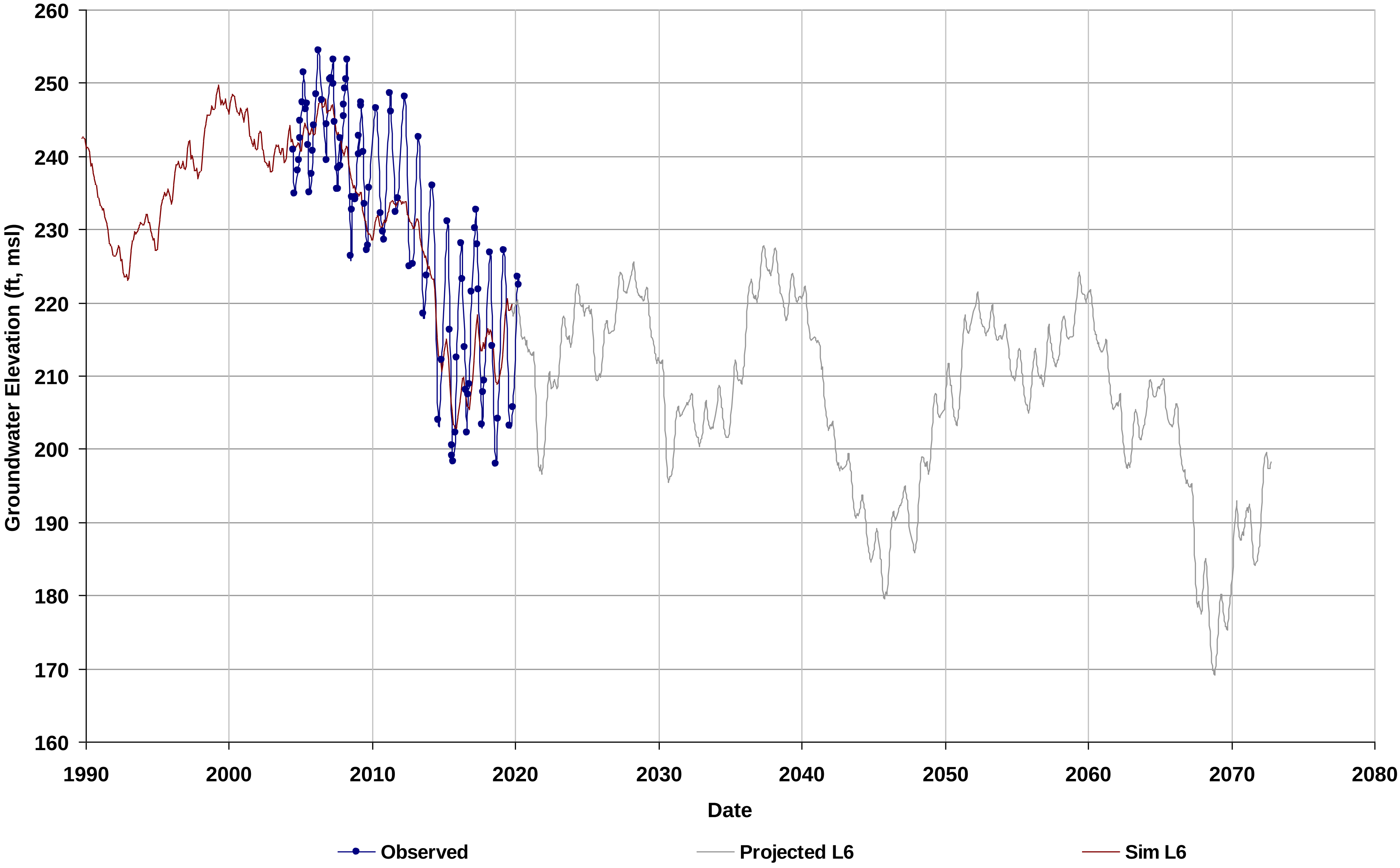
Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

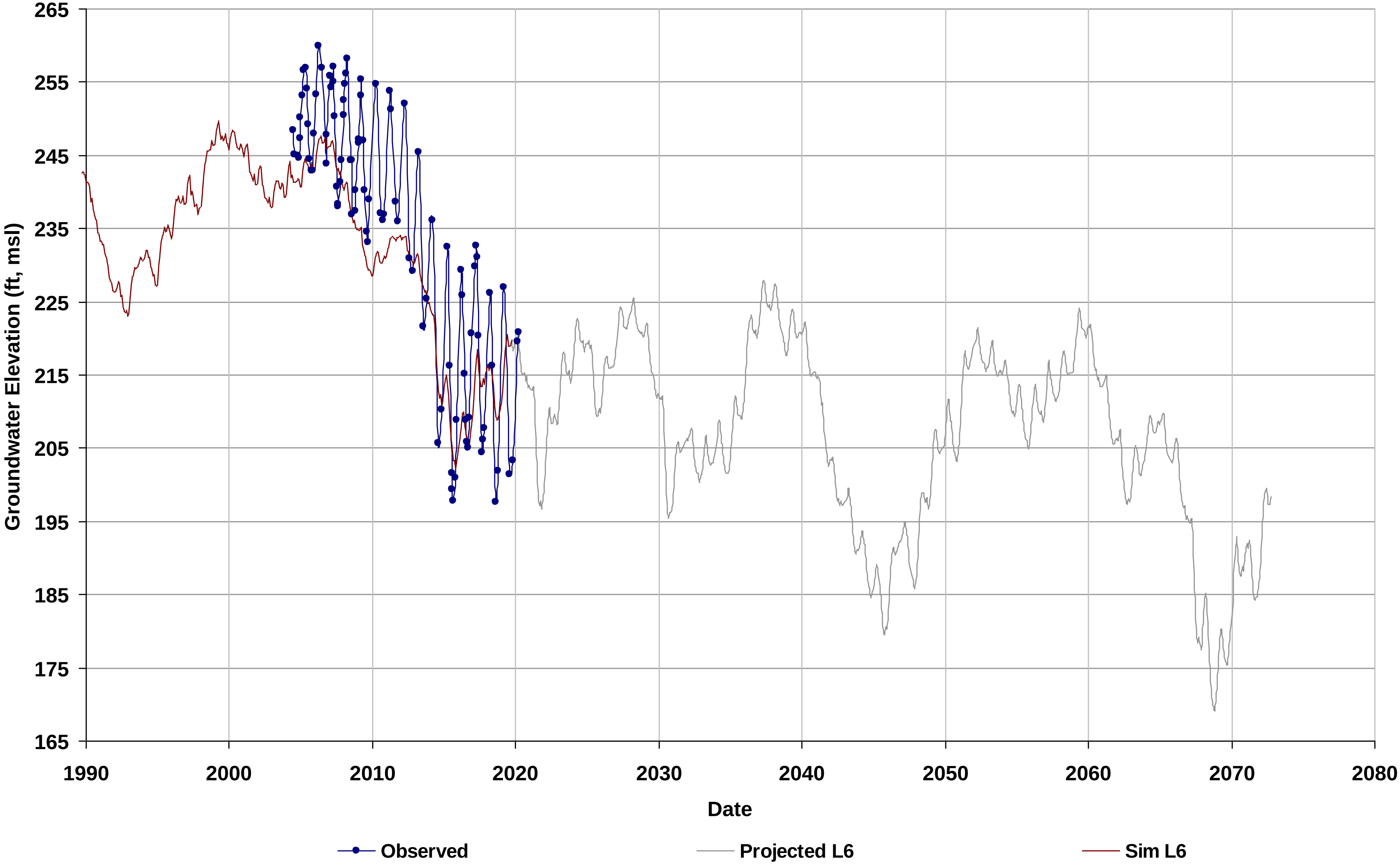
Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

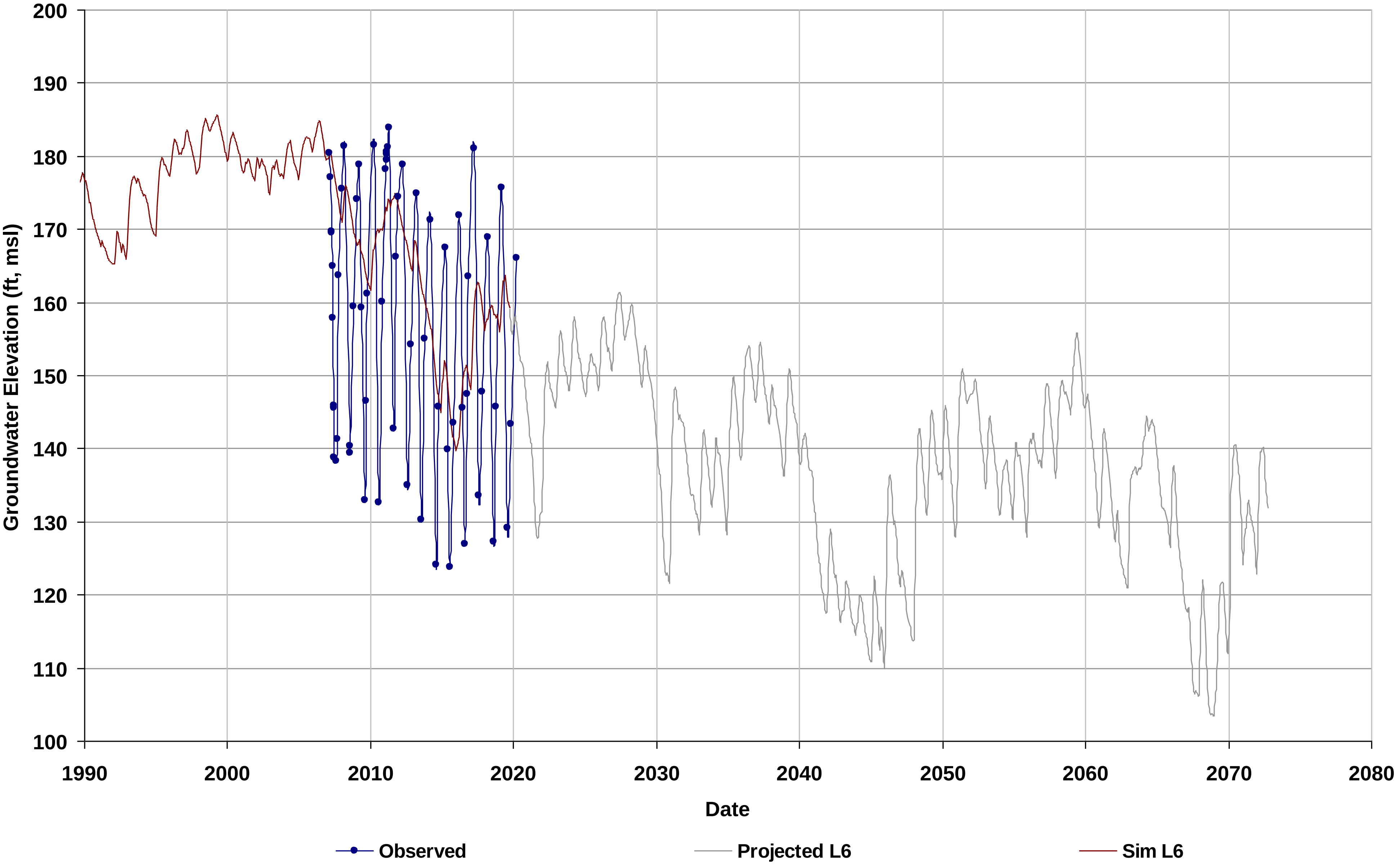
Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

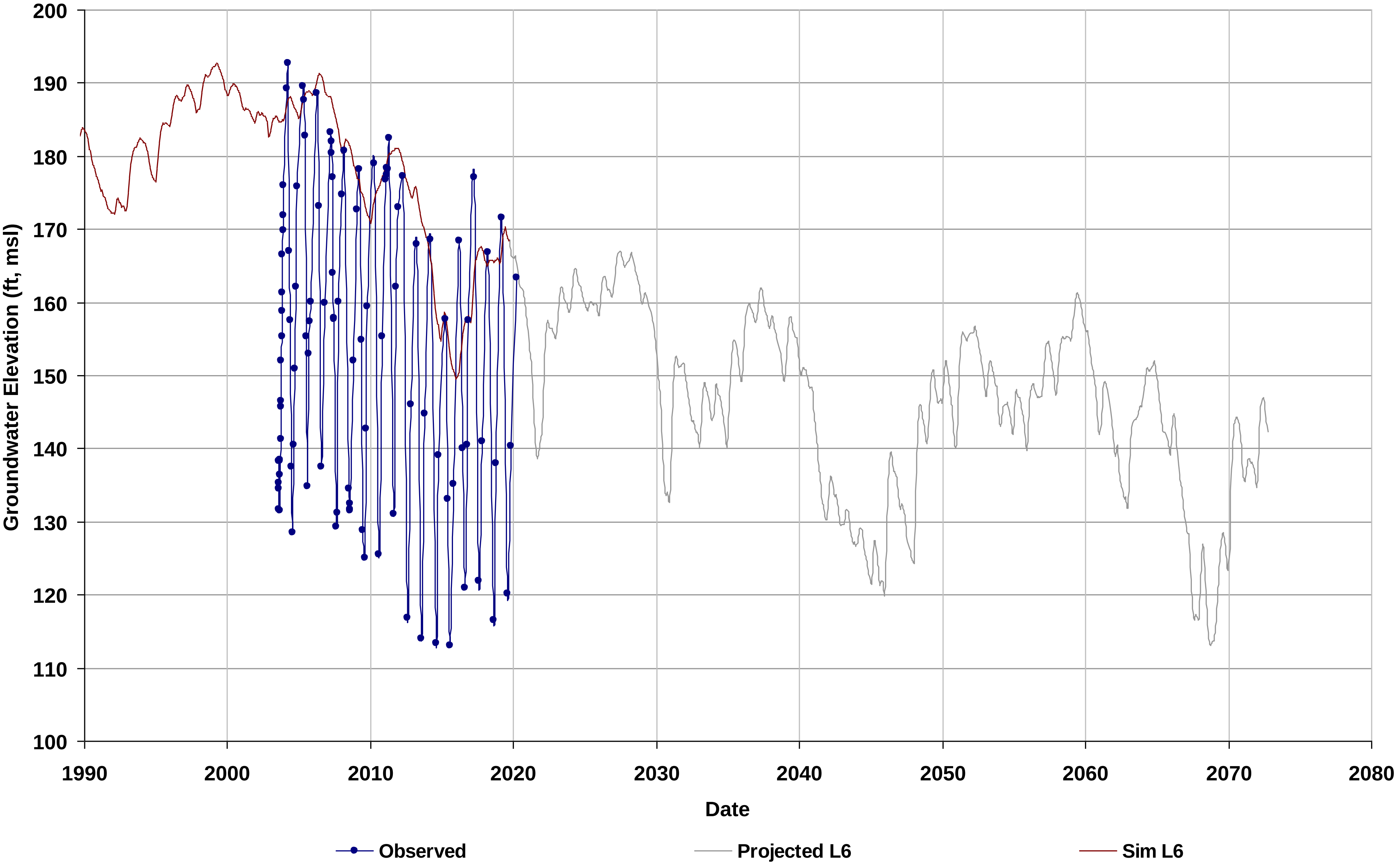
Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

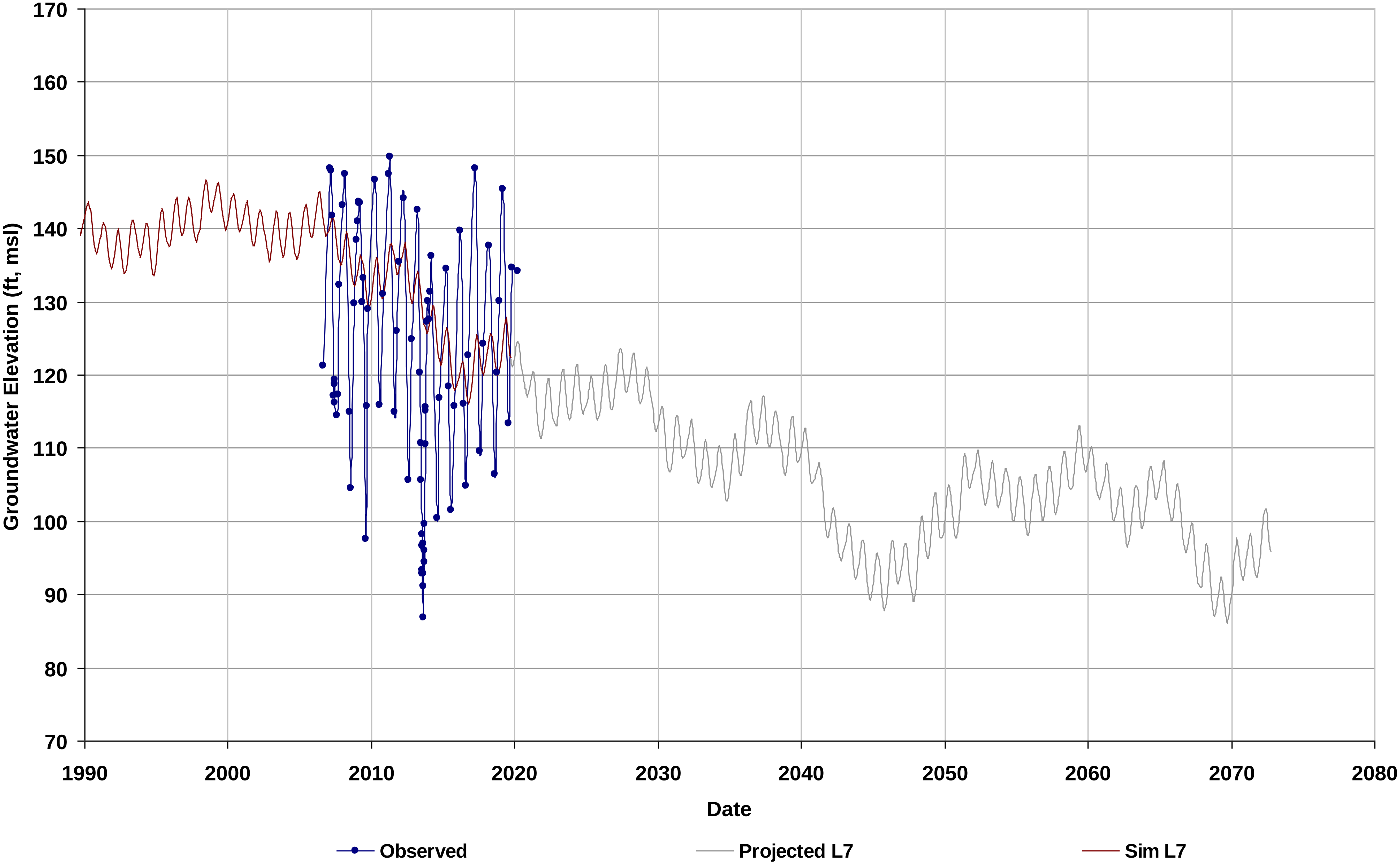
Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

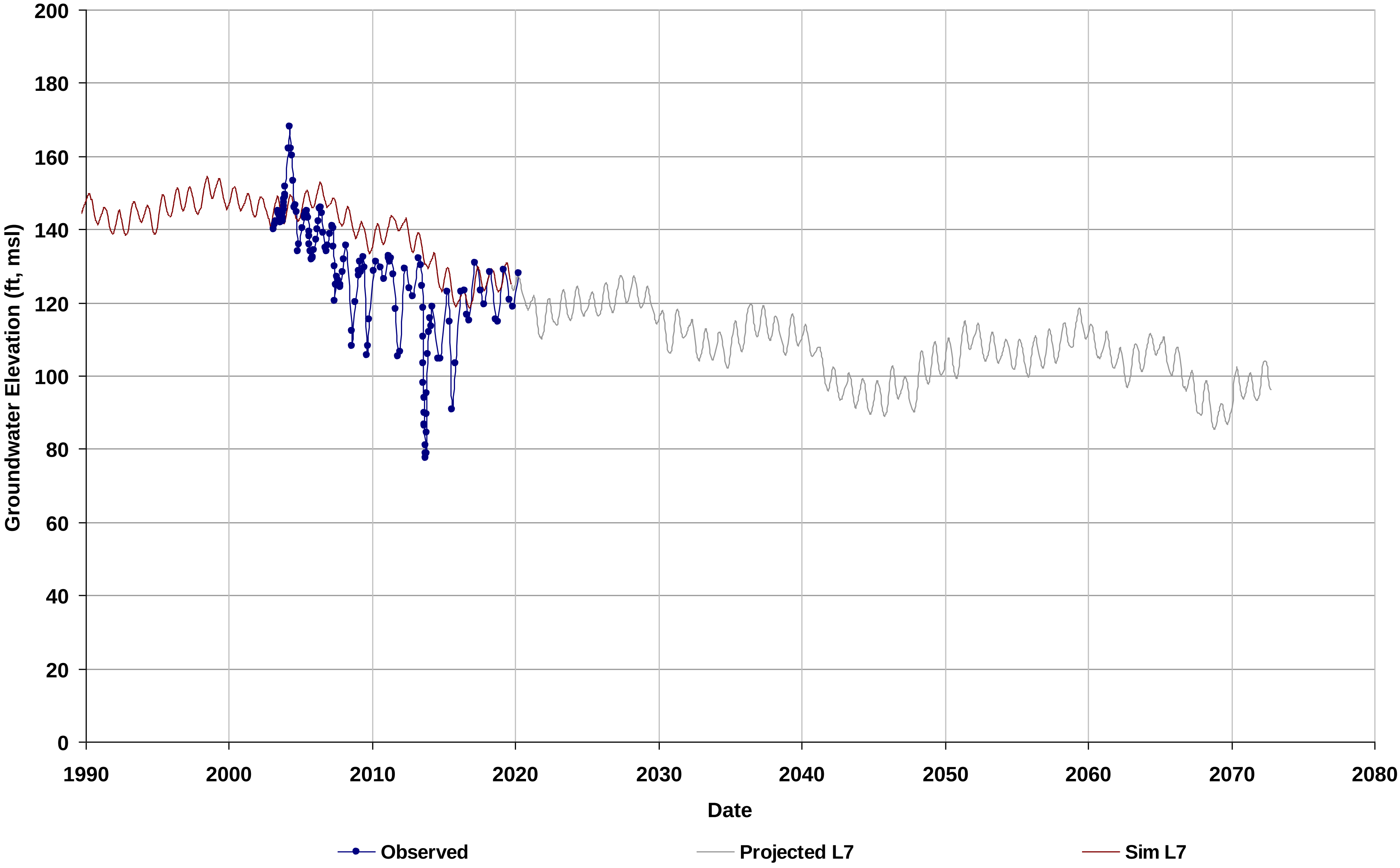
Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

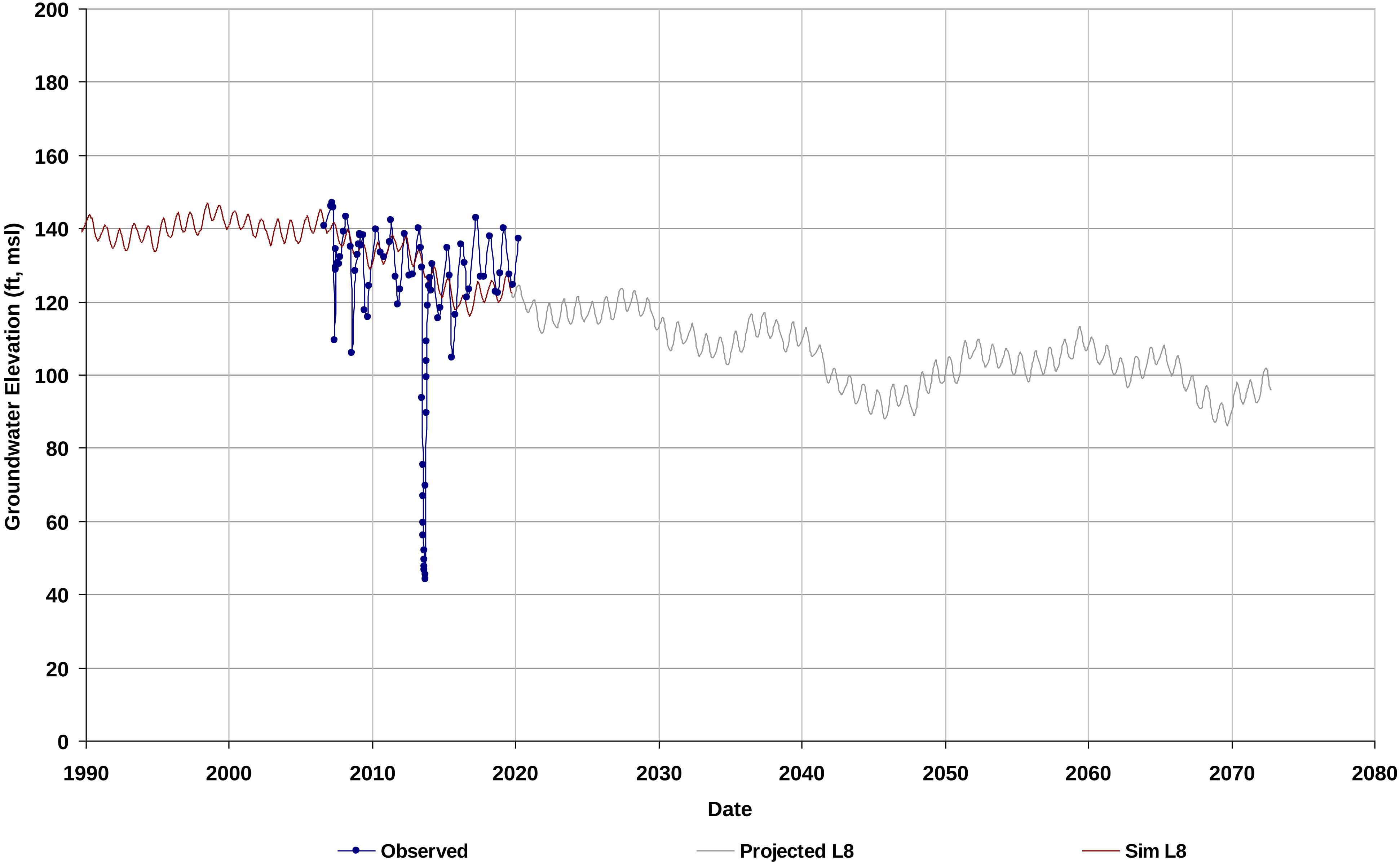
Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

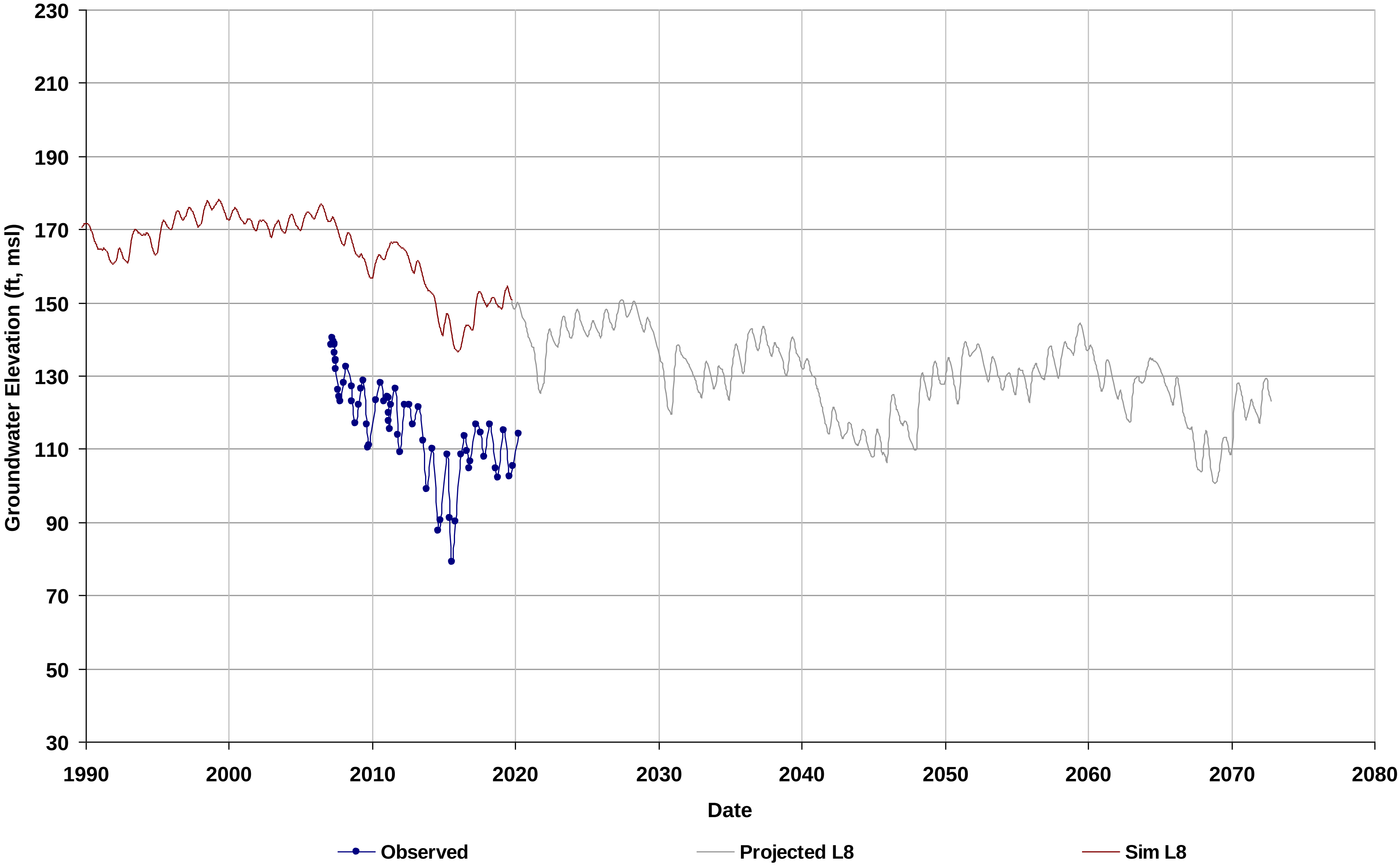
Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

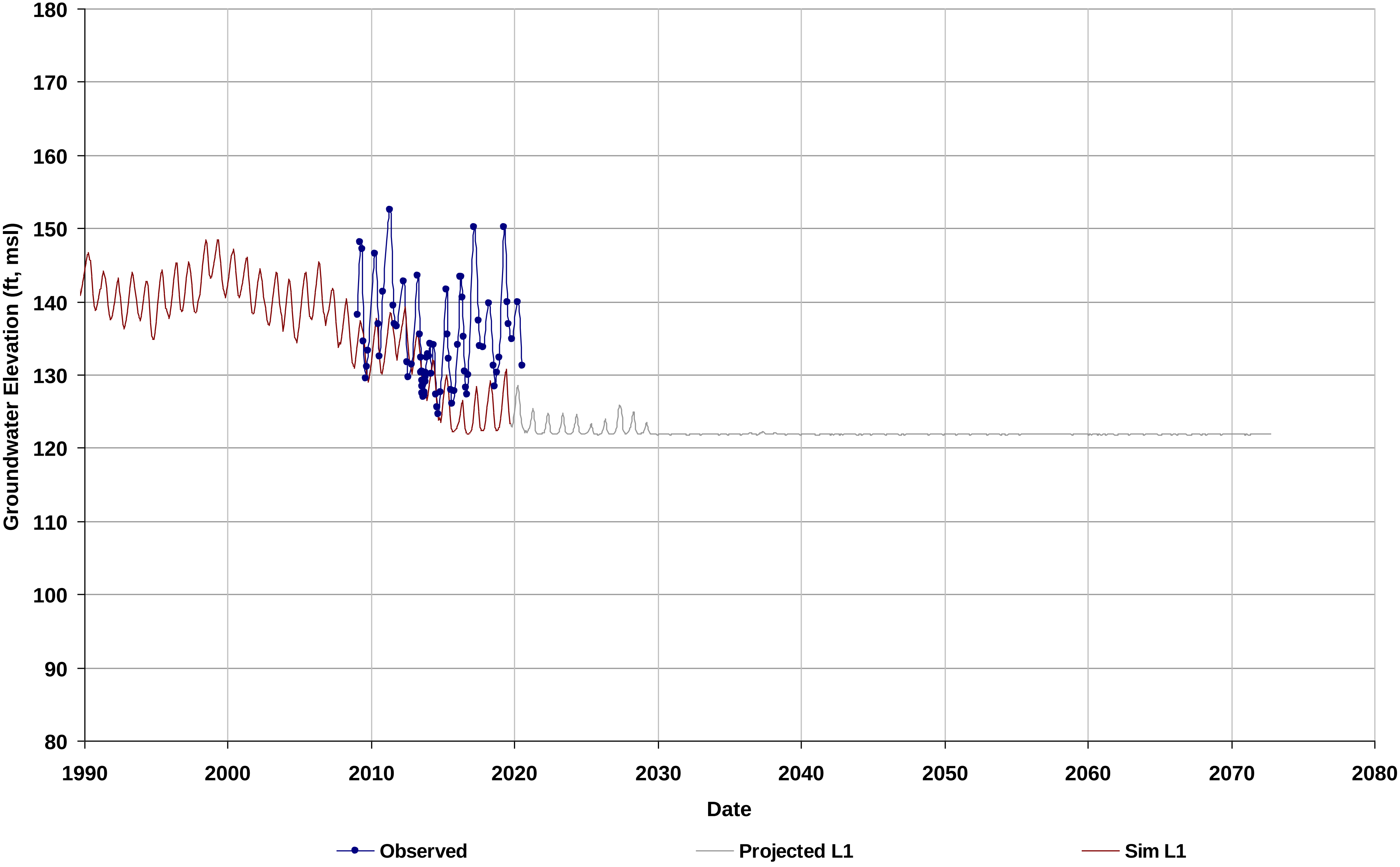
Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

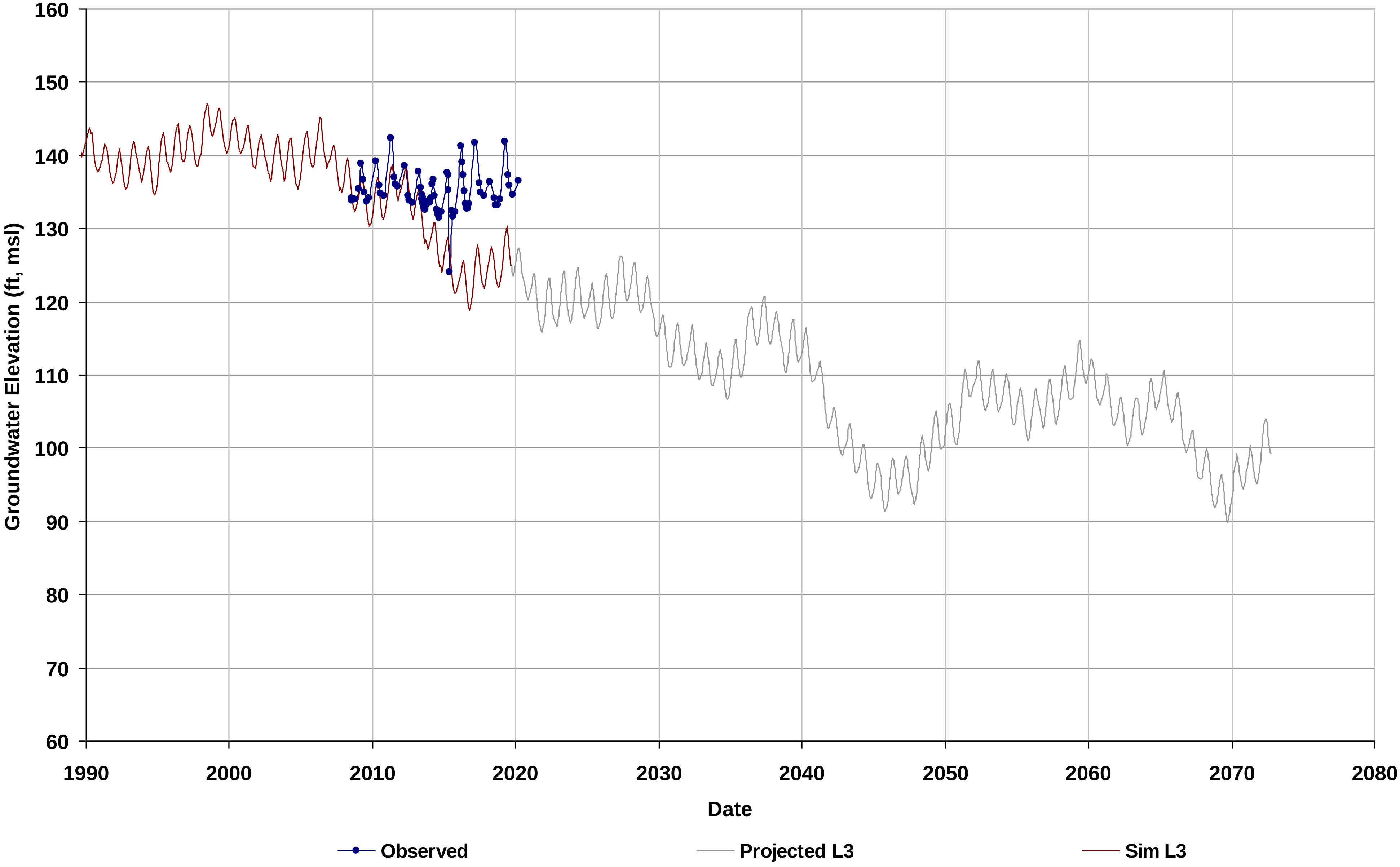
Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

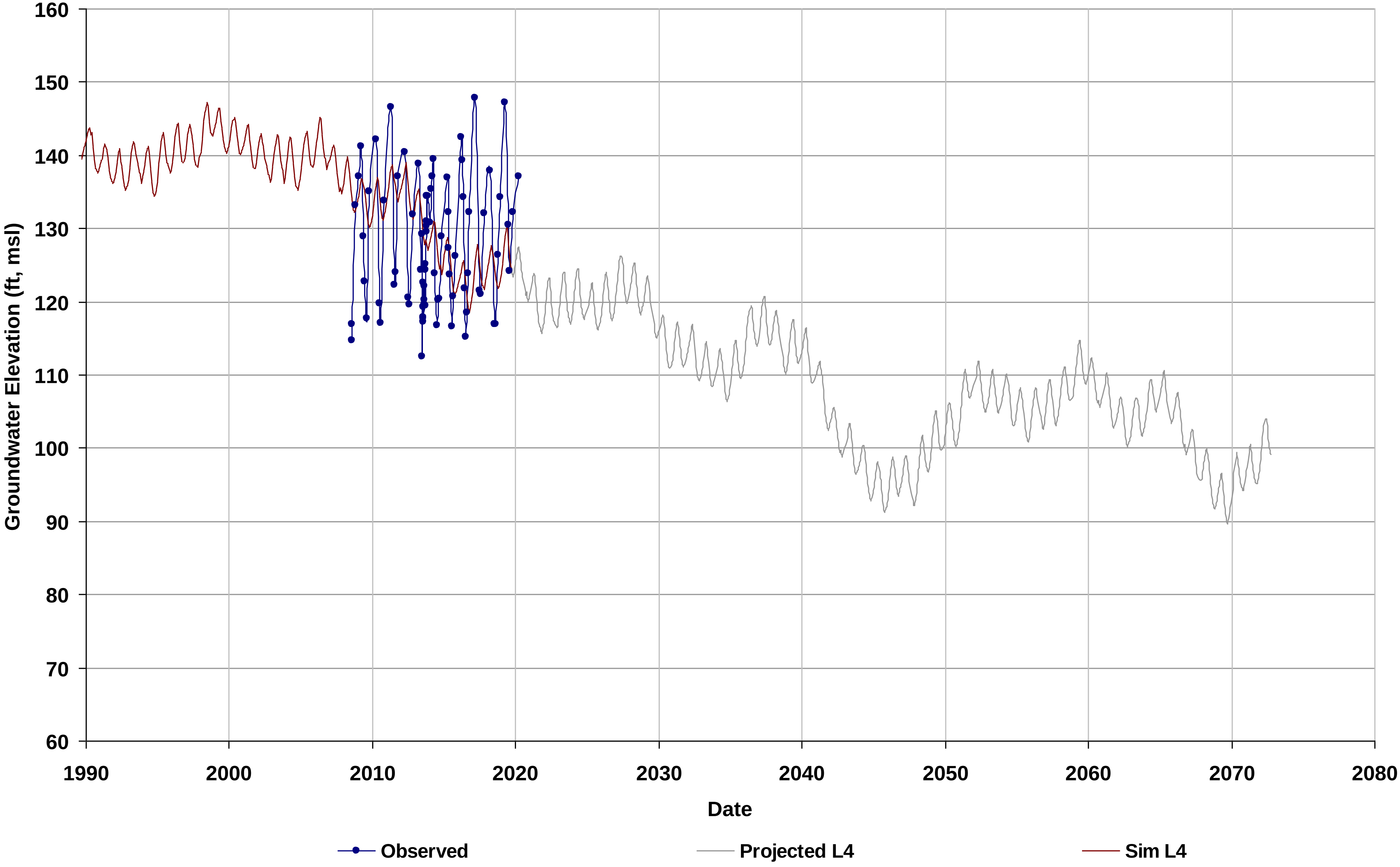
Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

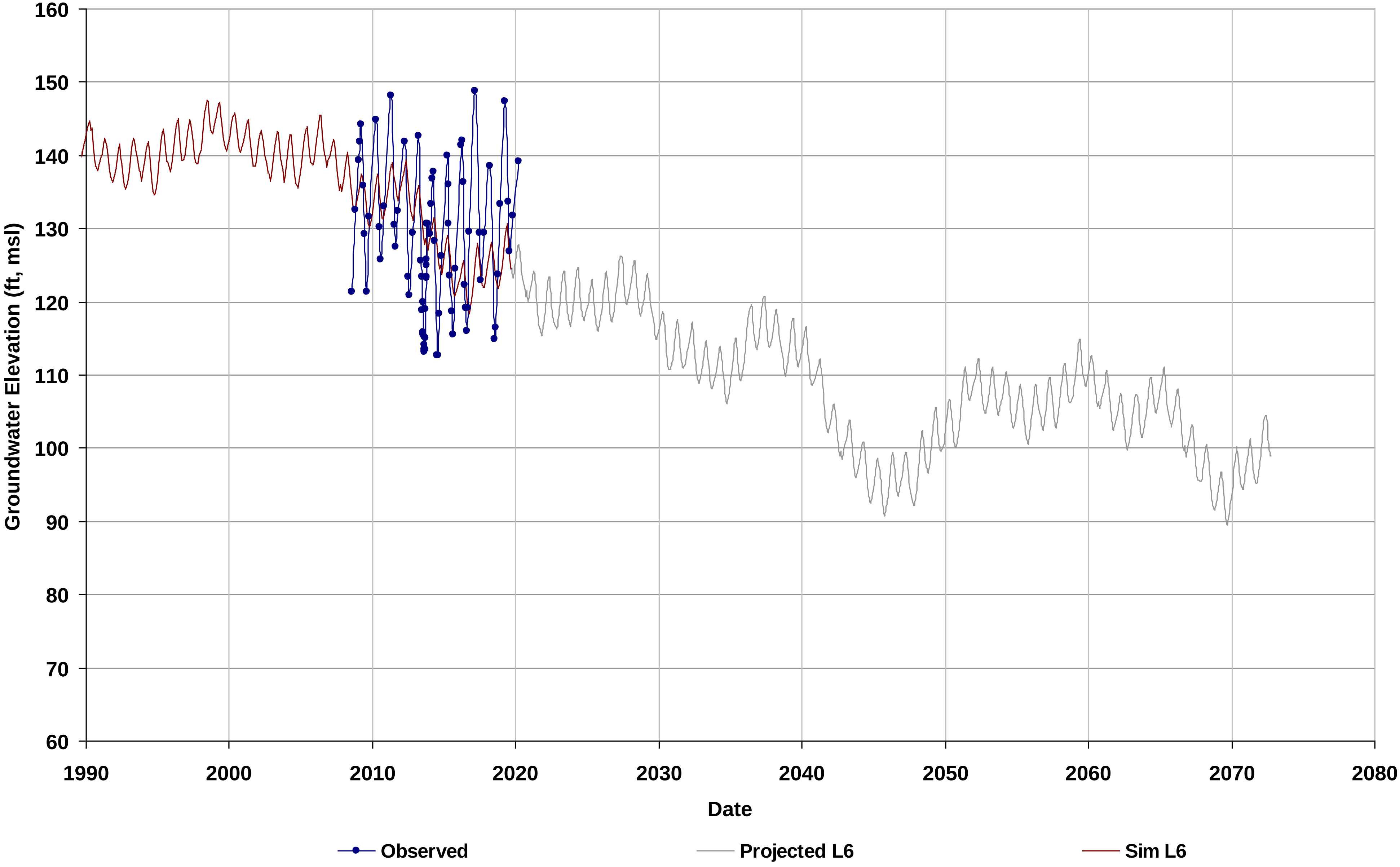
Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

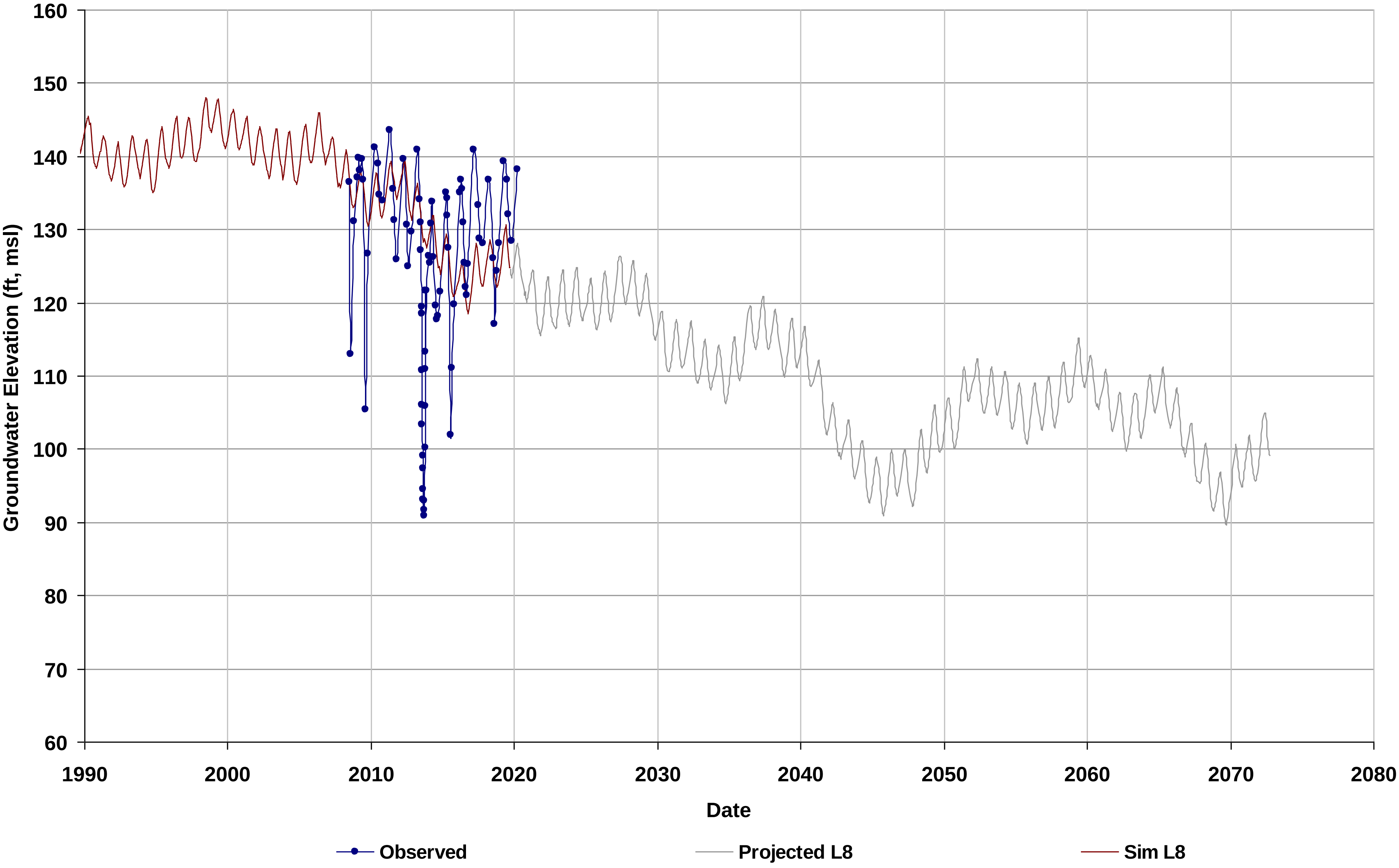
Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

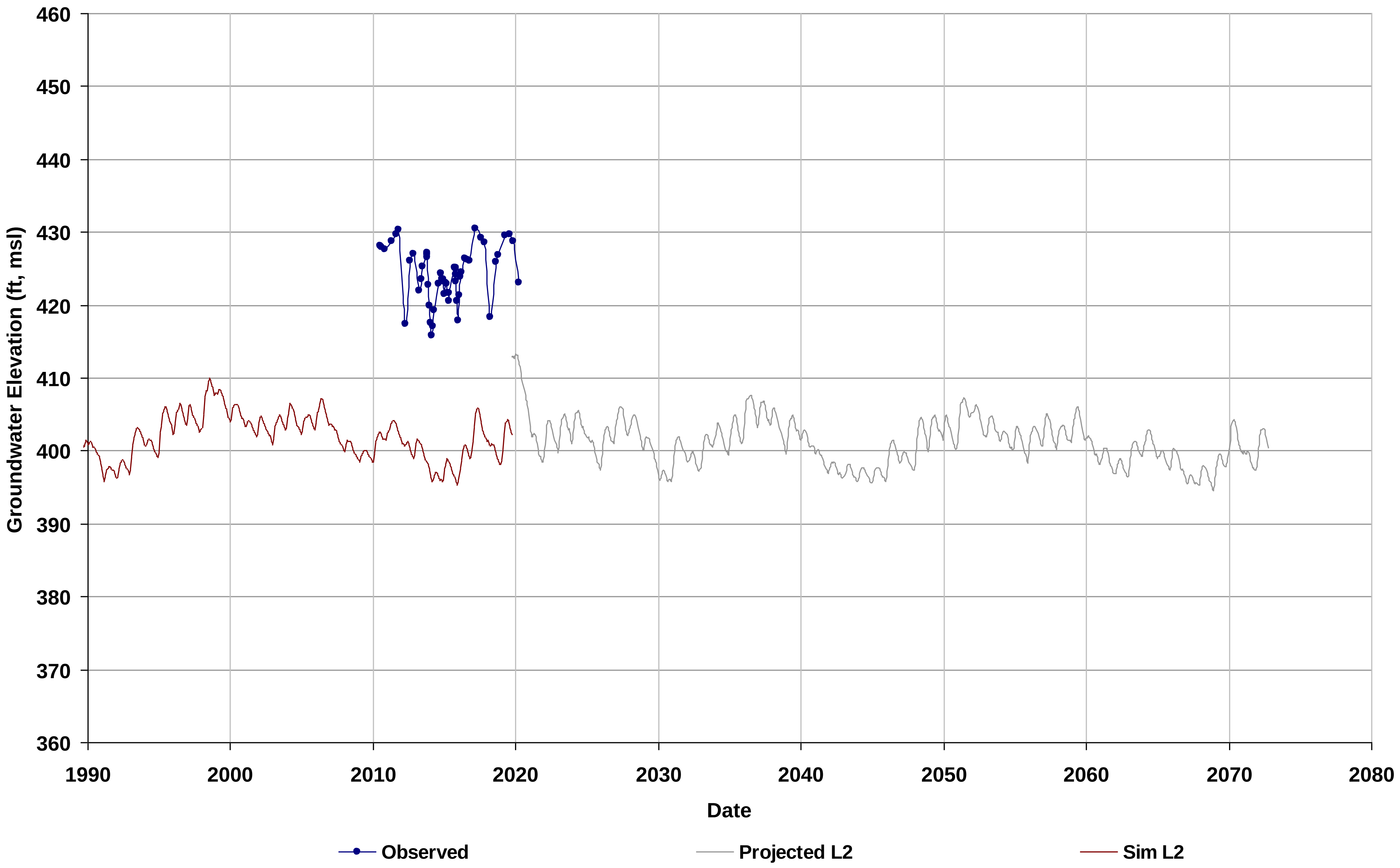
Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

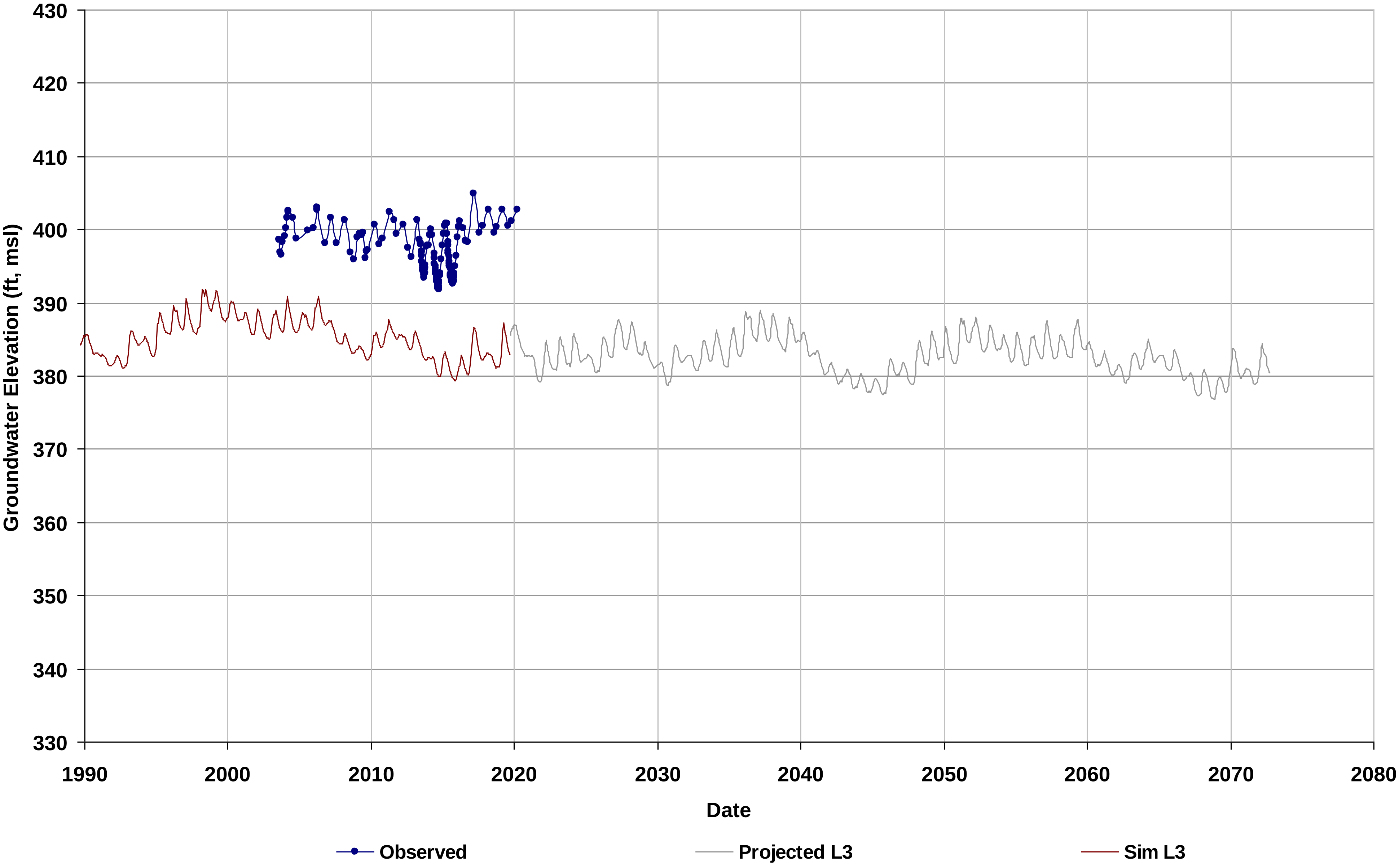
Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

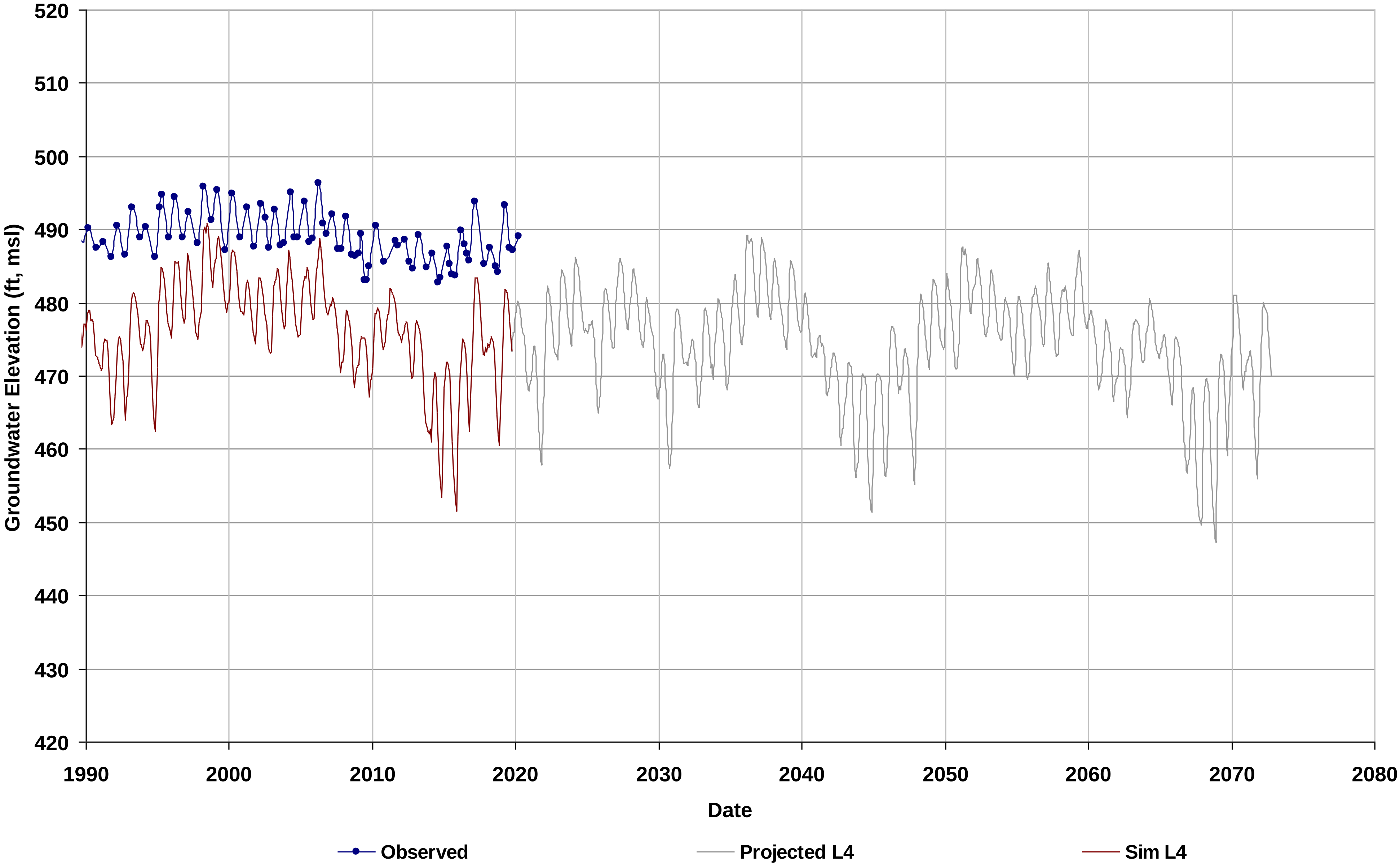
Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

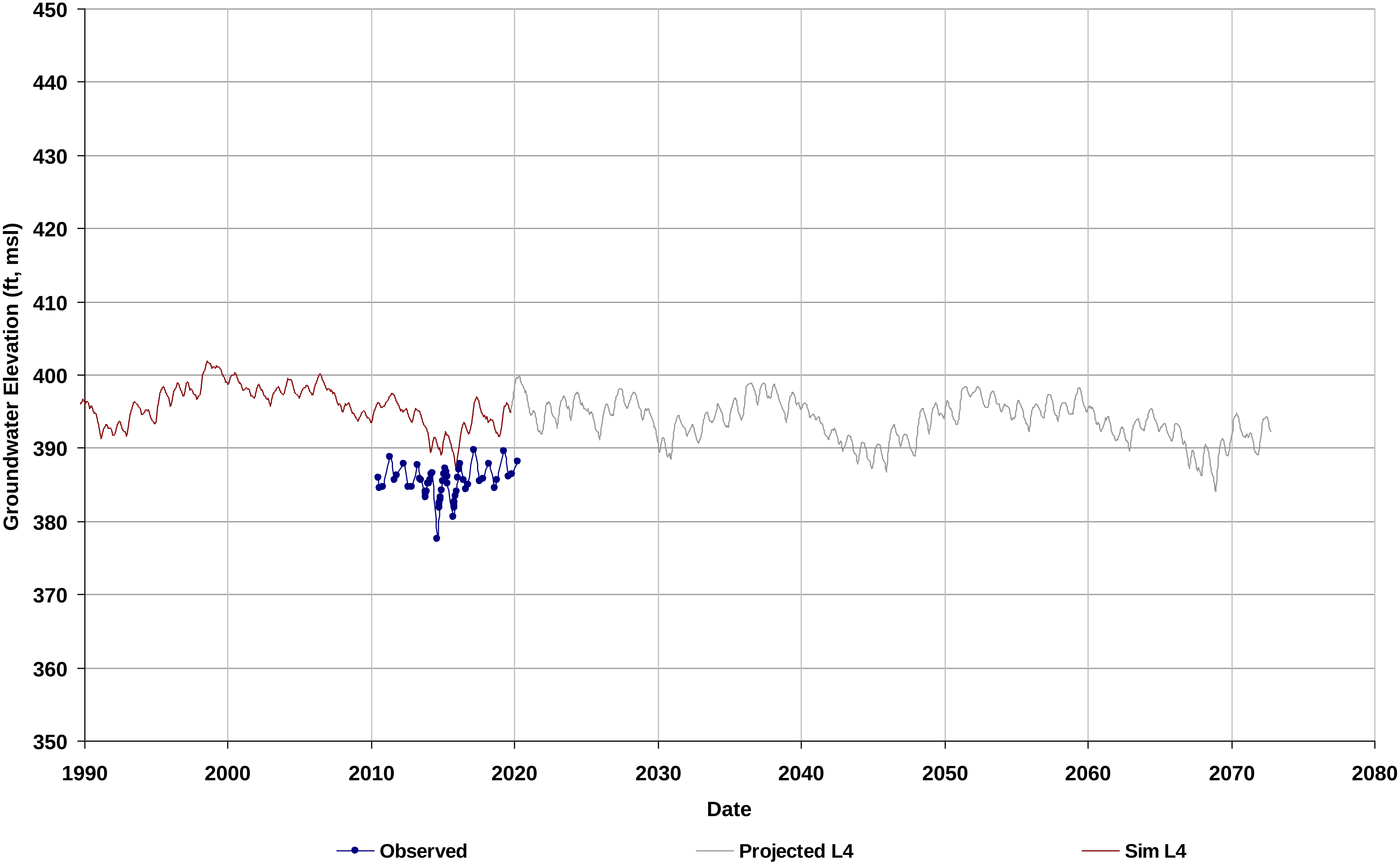
Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

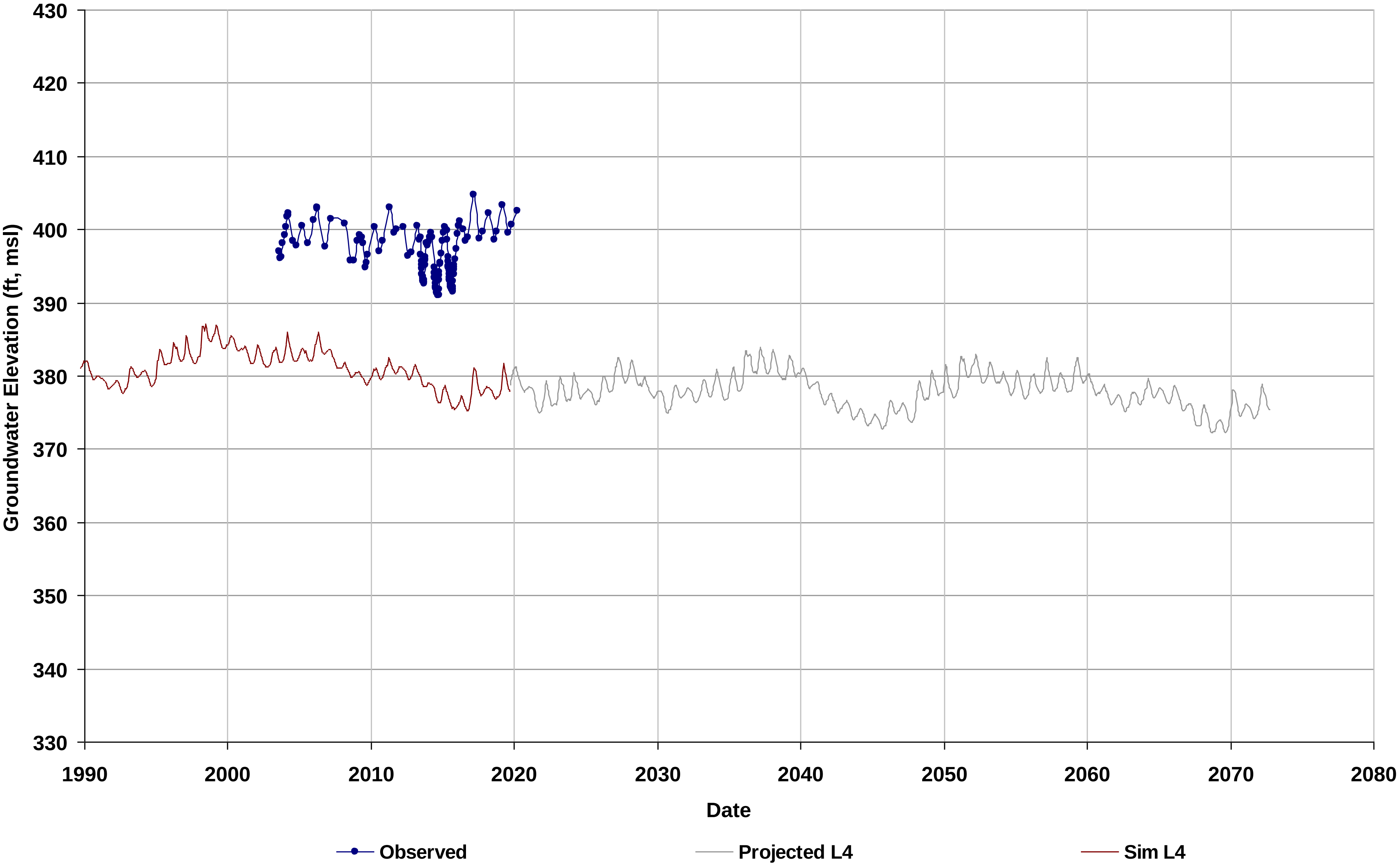
Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

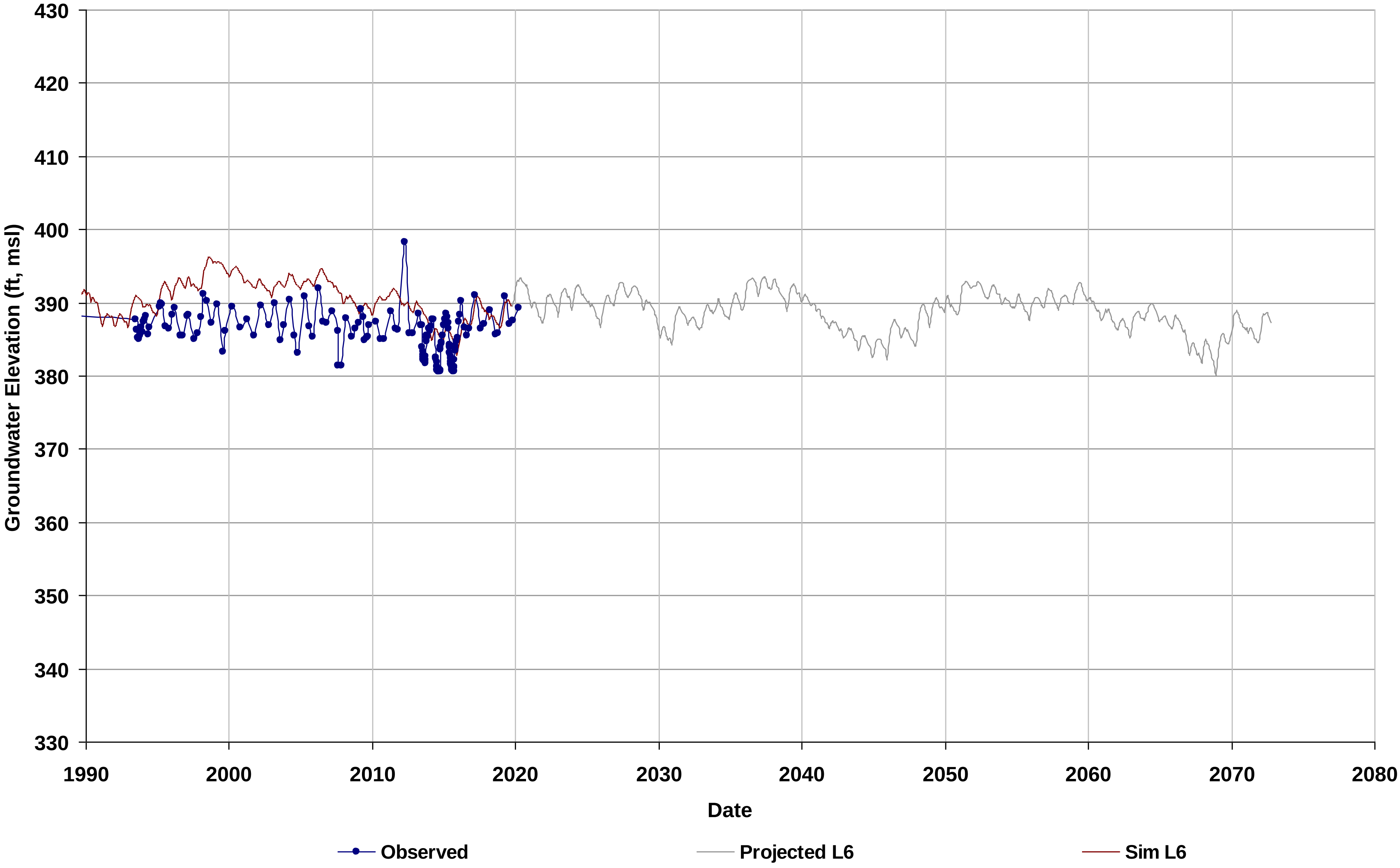
Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

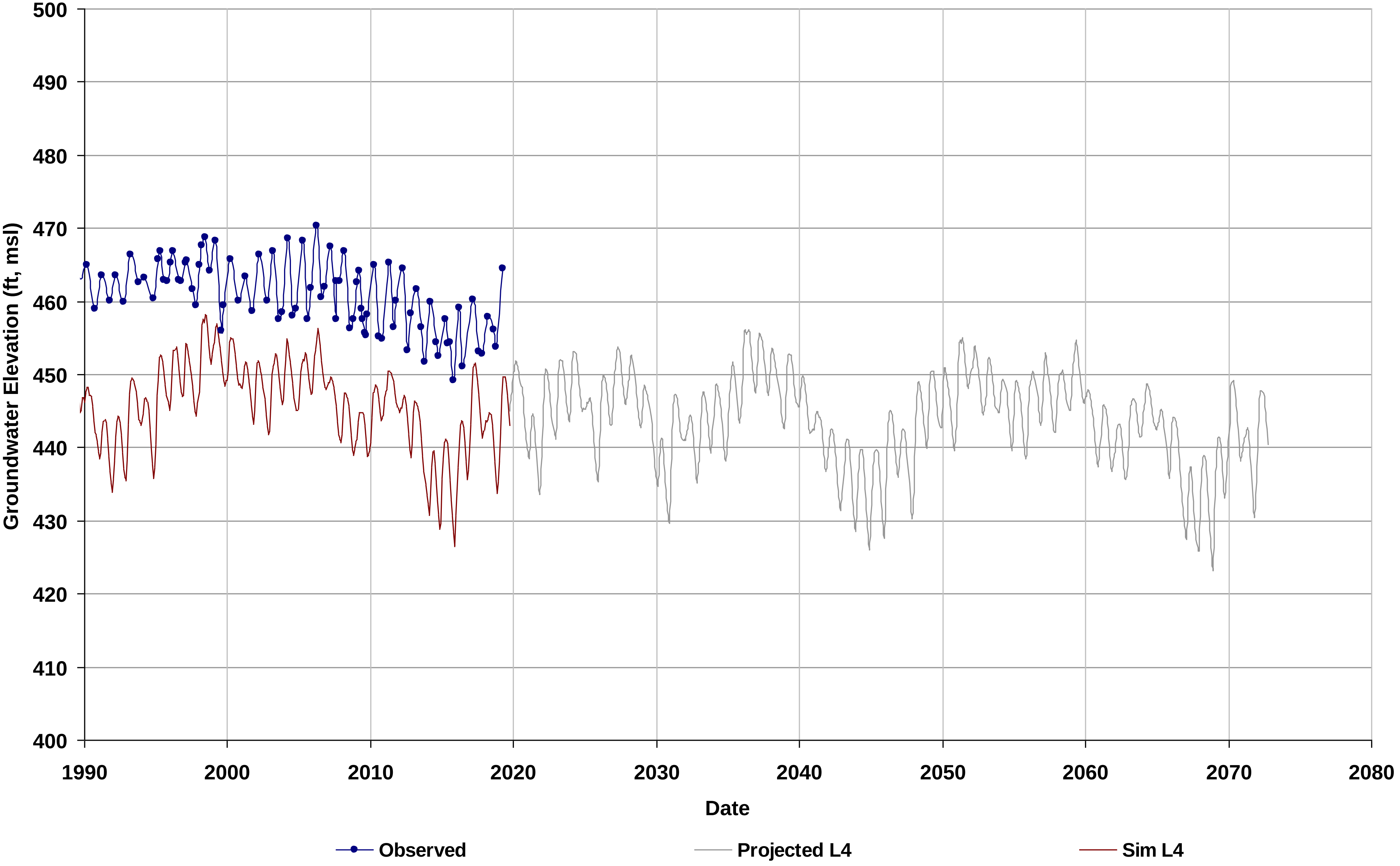
Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

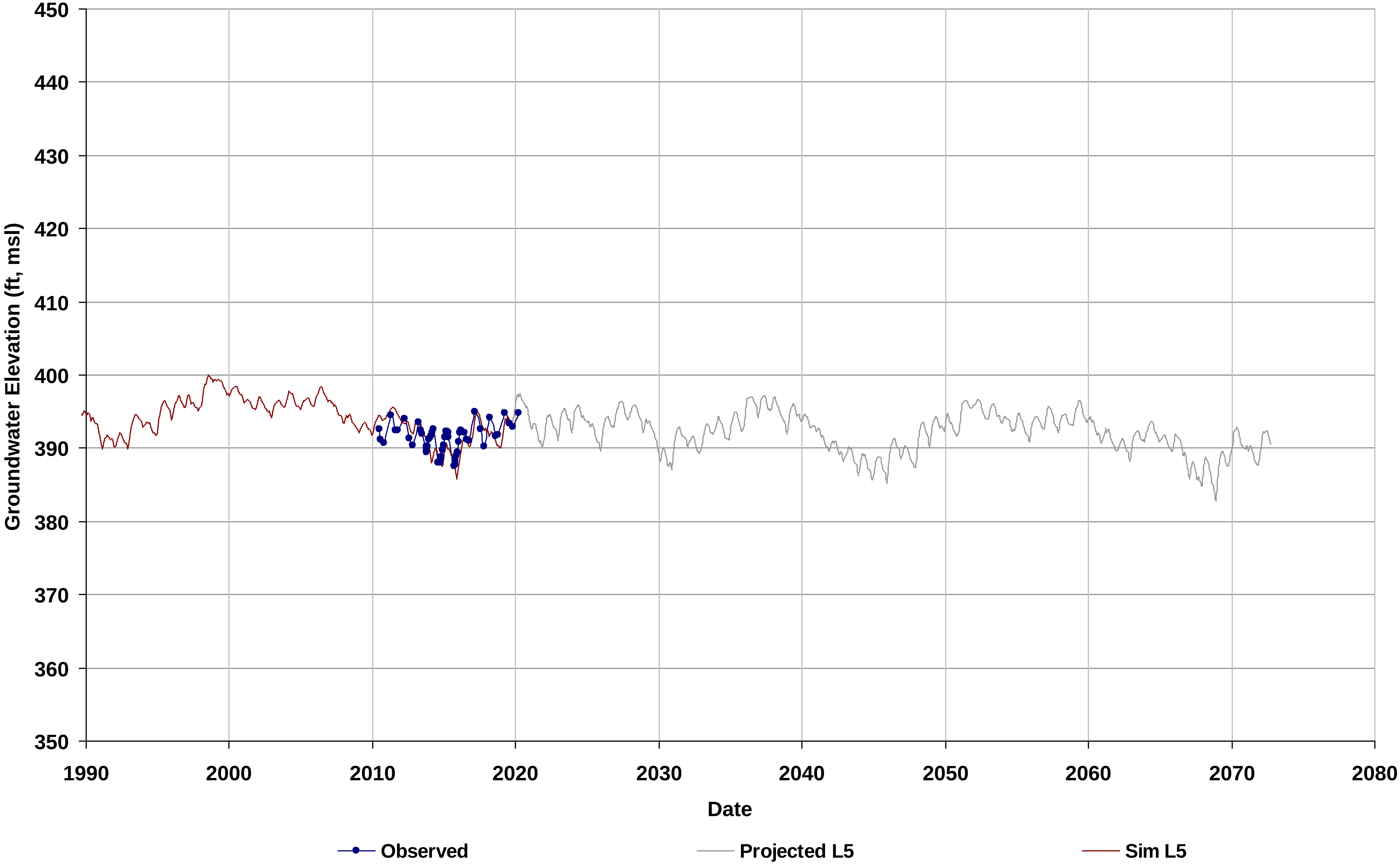
Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

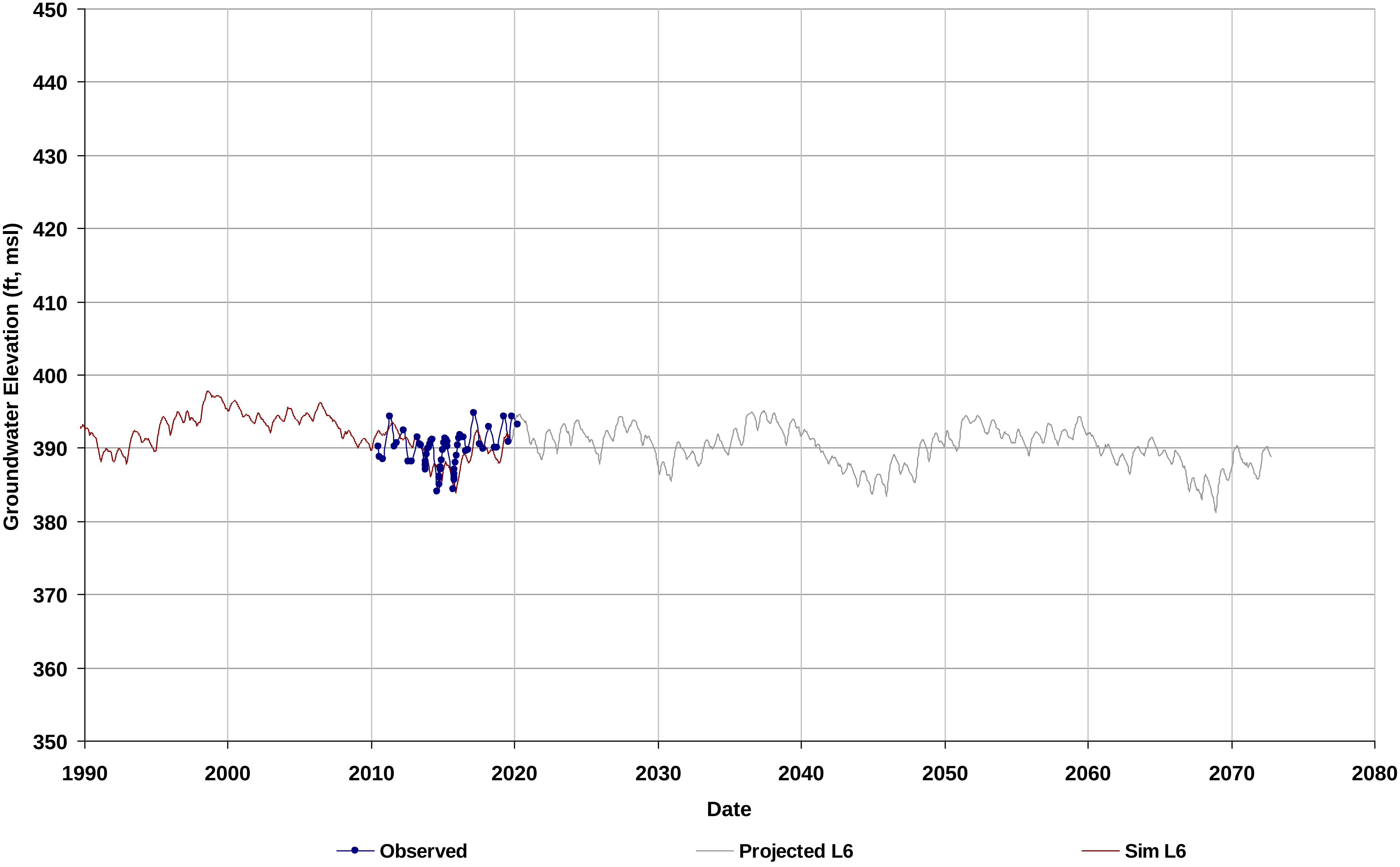
Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

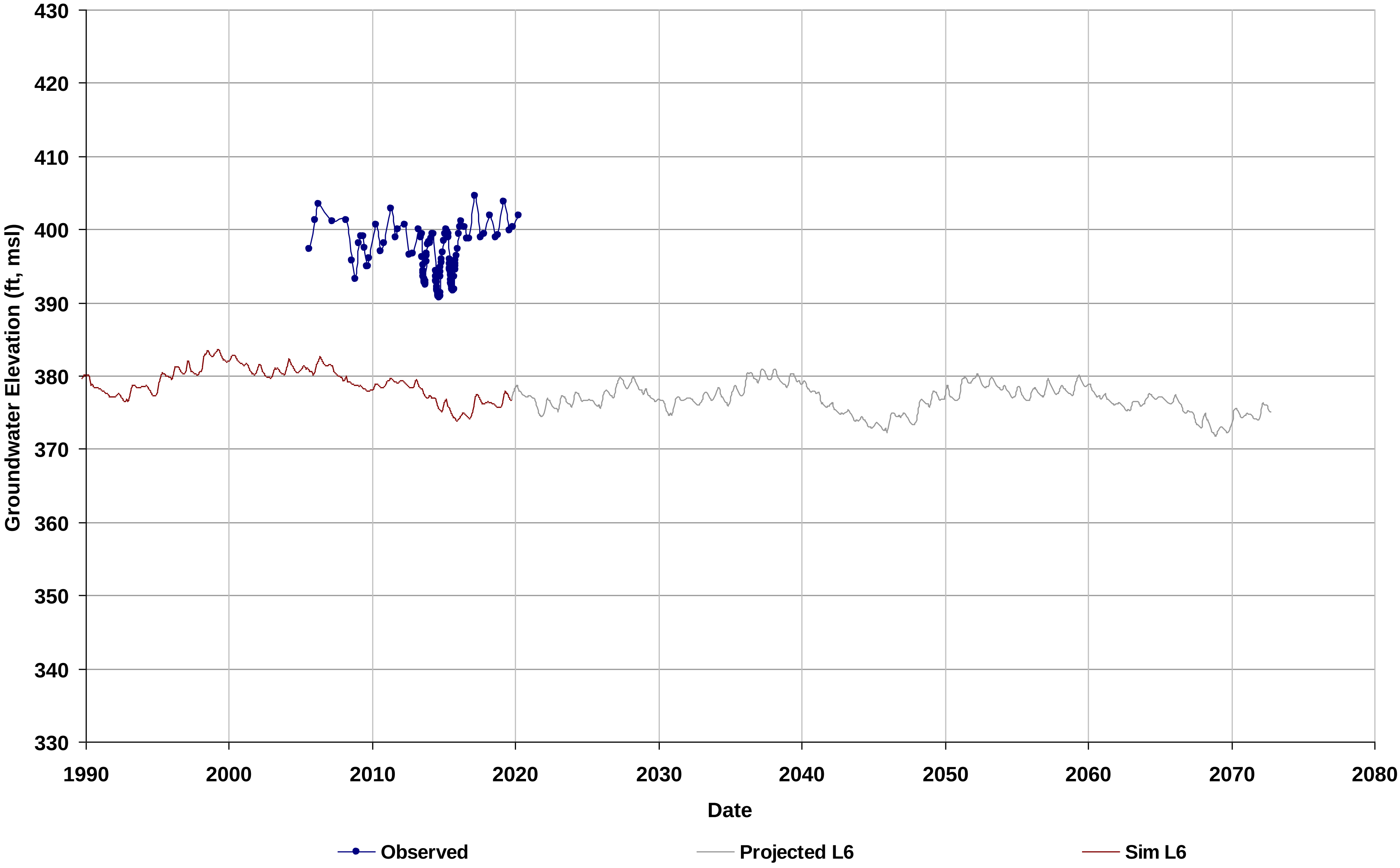
Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

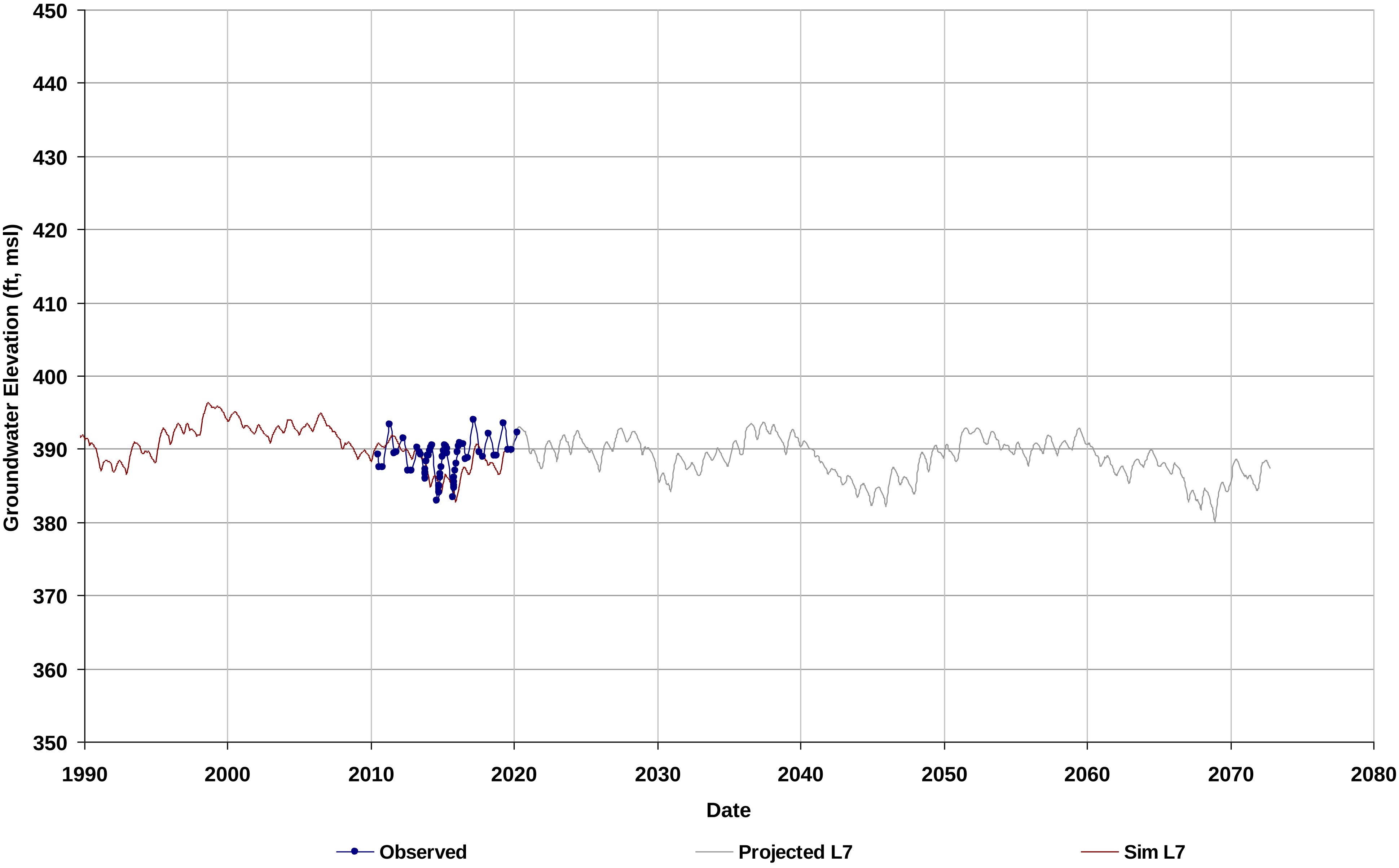
Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7

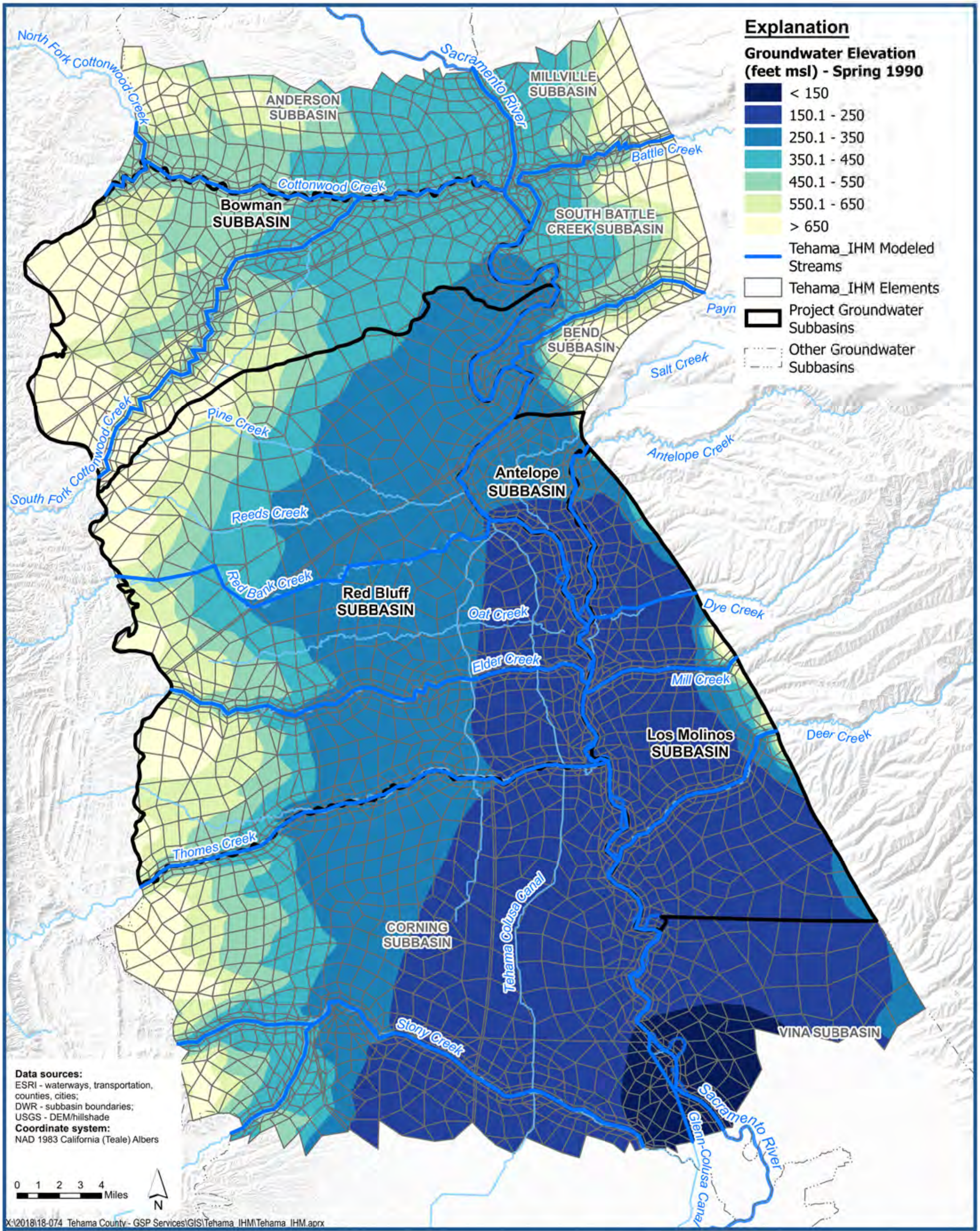


Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Appendix F. Tehama IHM Simulated Groundwater Elevation Maps

APPENDIX F

Tehama IHM Simulated Groundwater Elevation Maps



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

X:\2018\18-074_Tehama County - GSP Services\GIS\Tehama_IHM\Tehama_IHM.aprx

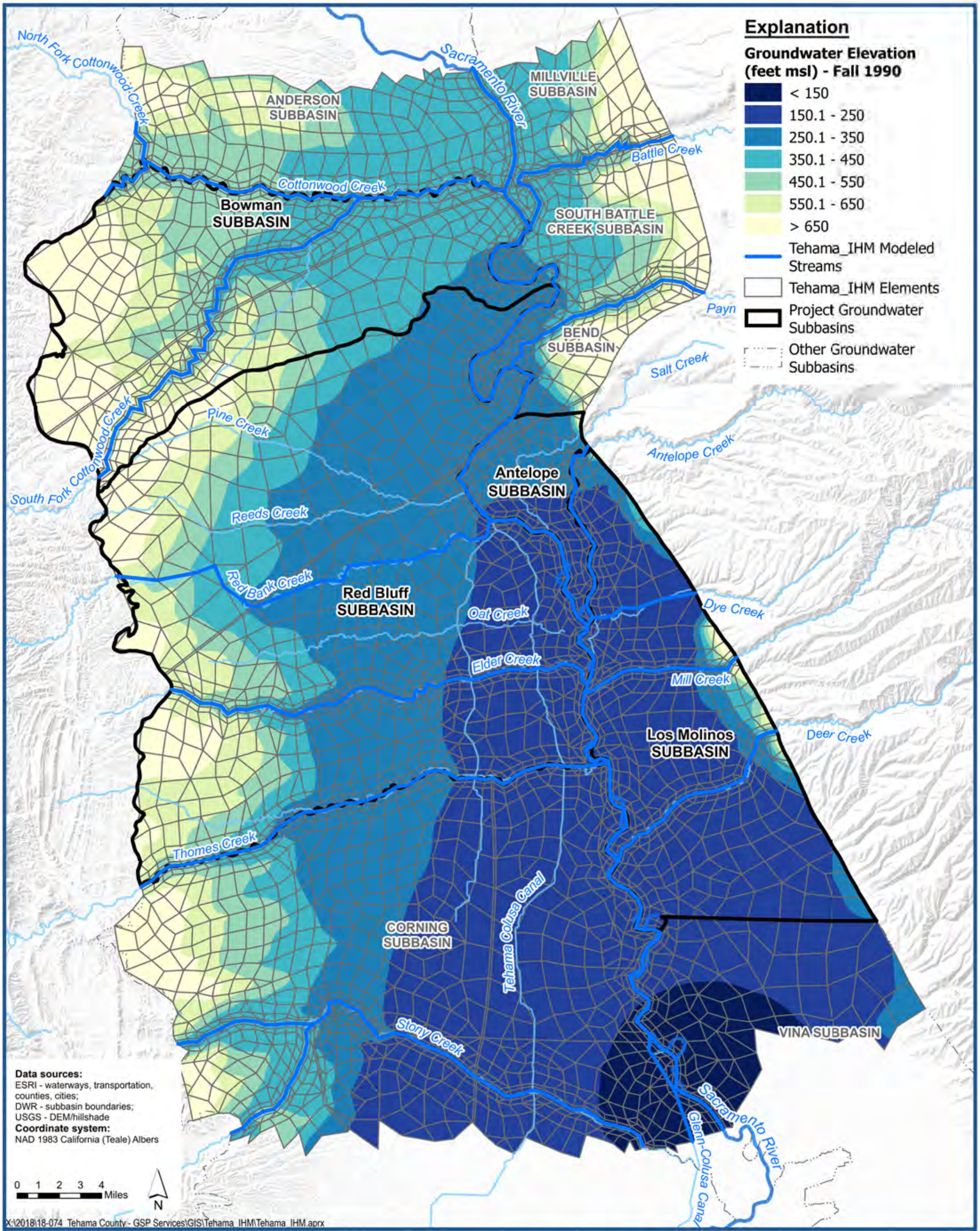
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 1990 Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-1



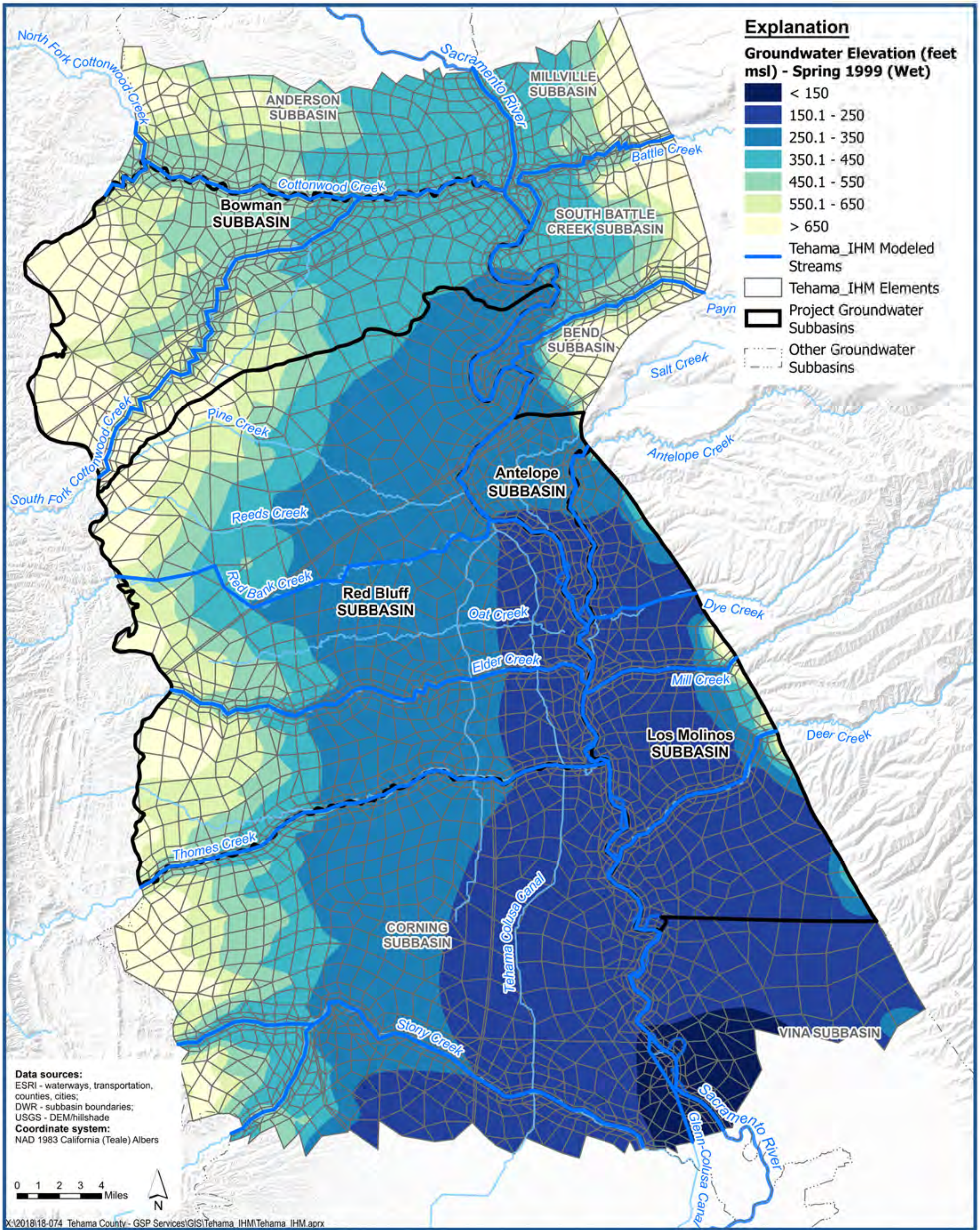
Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

X:\2018\18-074_Tehama County - GSP Services\GIS\Tehama_IHM\Tehama_IHM.aprx

Groundwater Surface Elevation: Fall 1990
Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-2



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

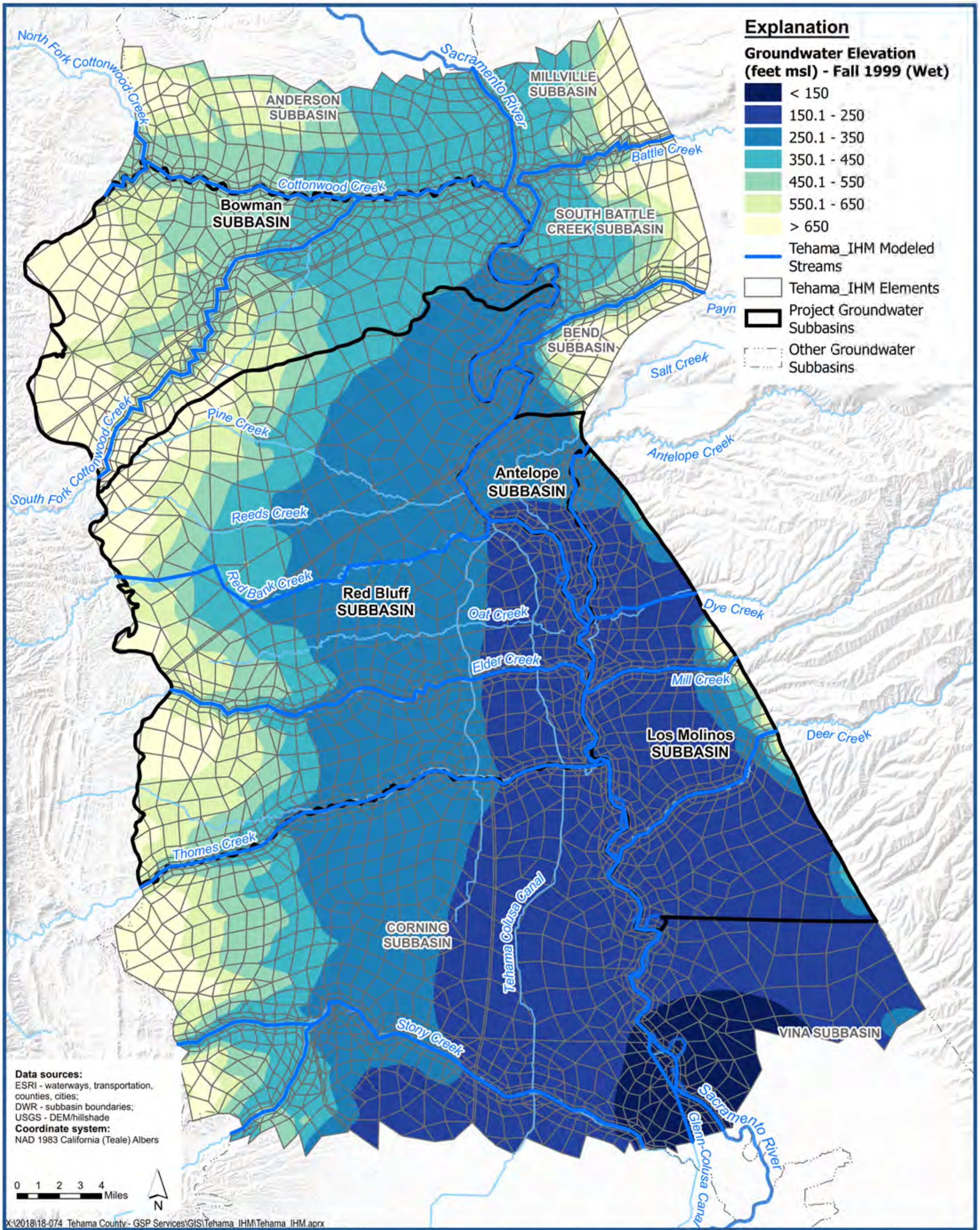
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 1999 Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-3



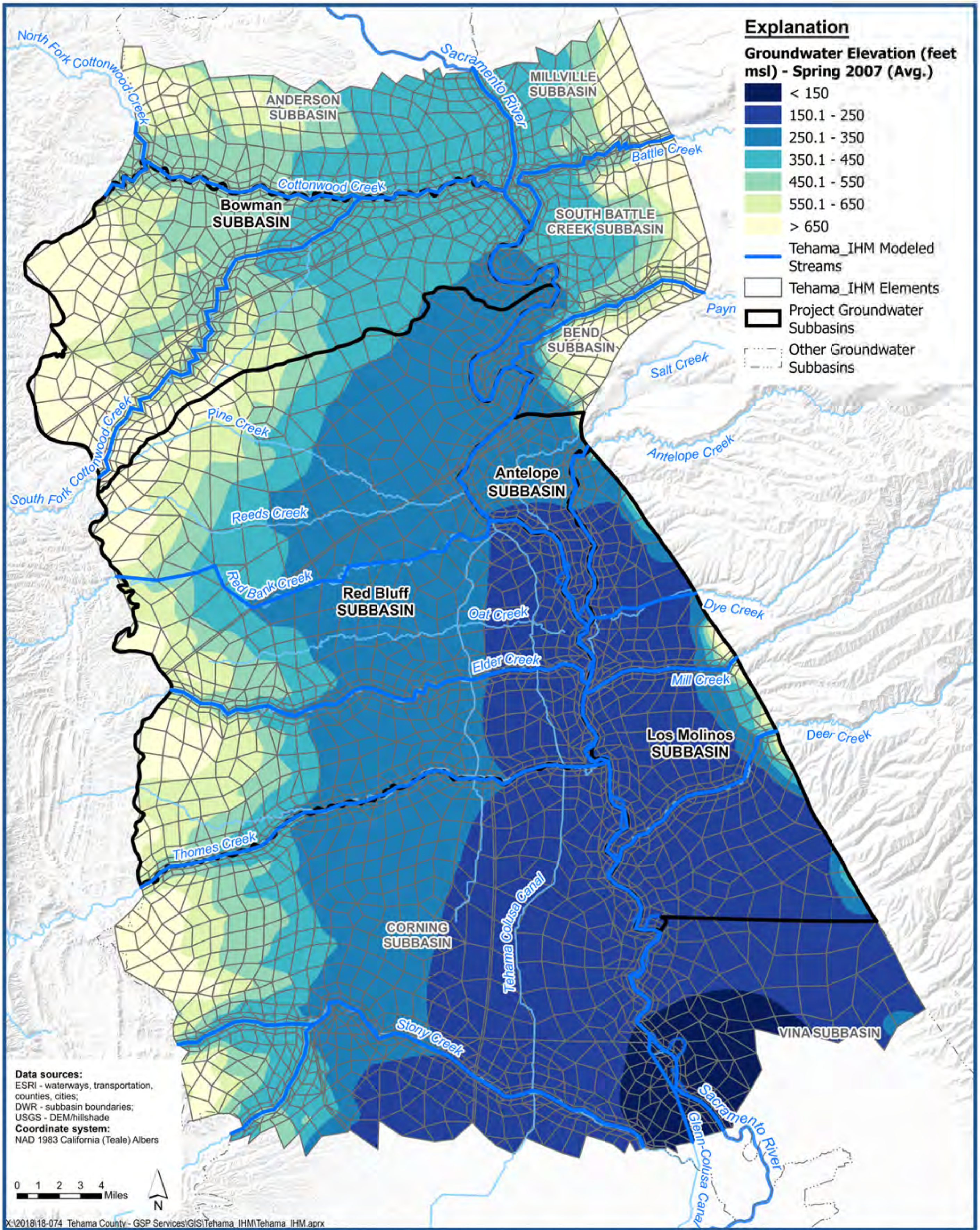
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 1999 Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-4



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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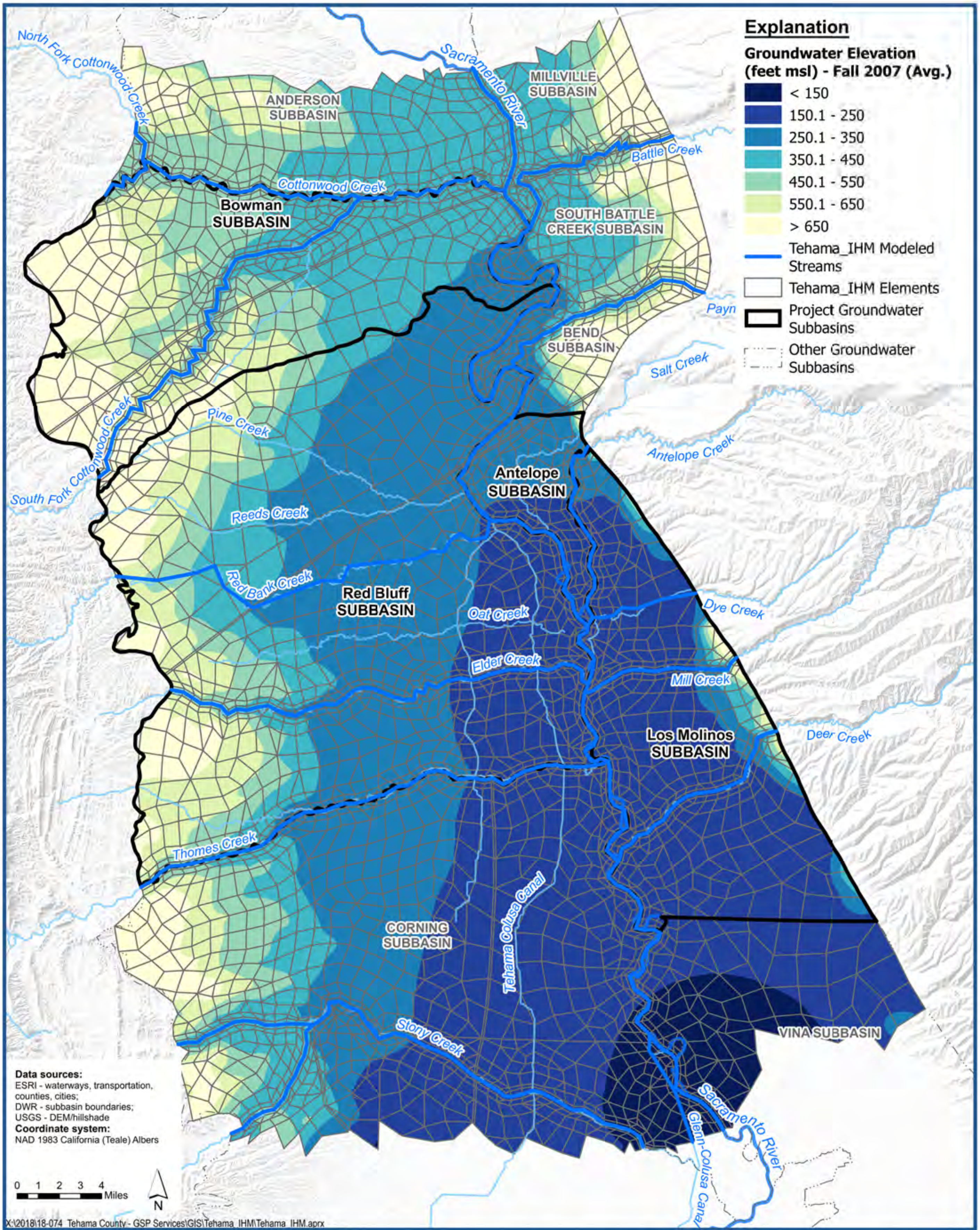
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 2007 Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-5



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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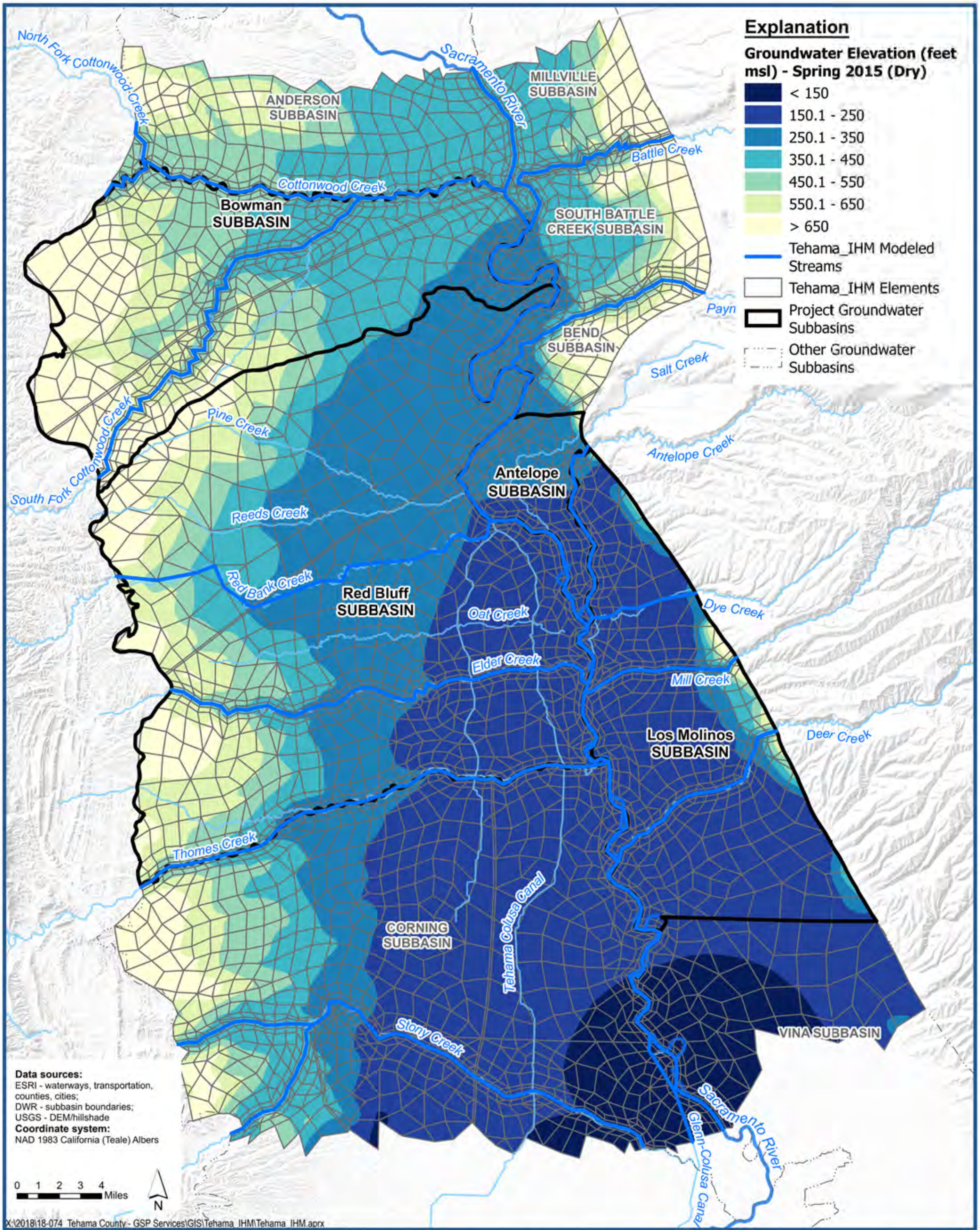
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 2007 Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-6



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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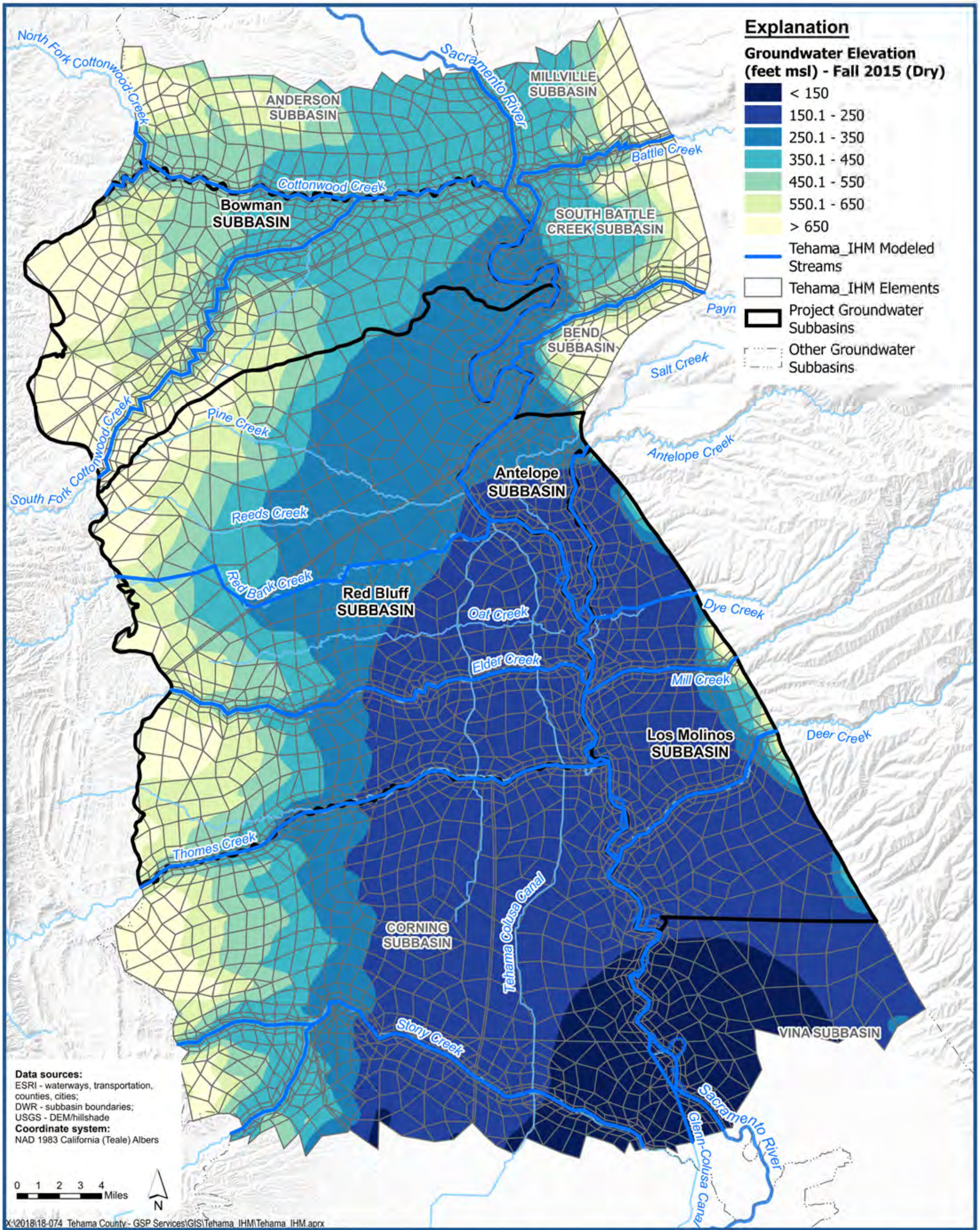
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 2015 Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-7



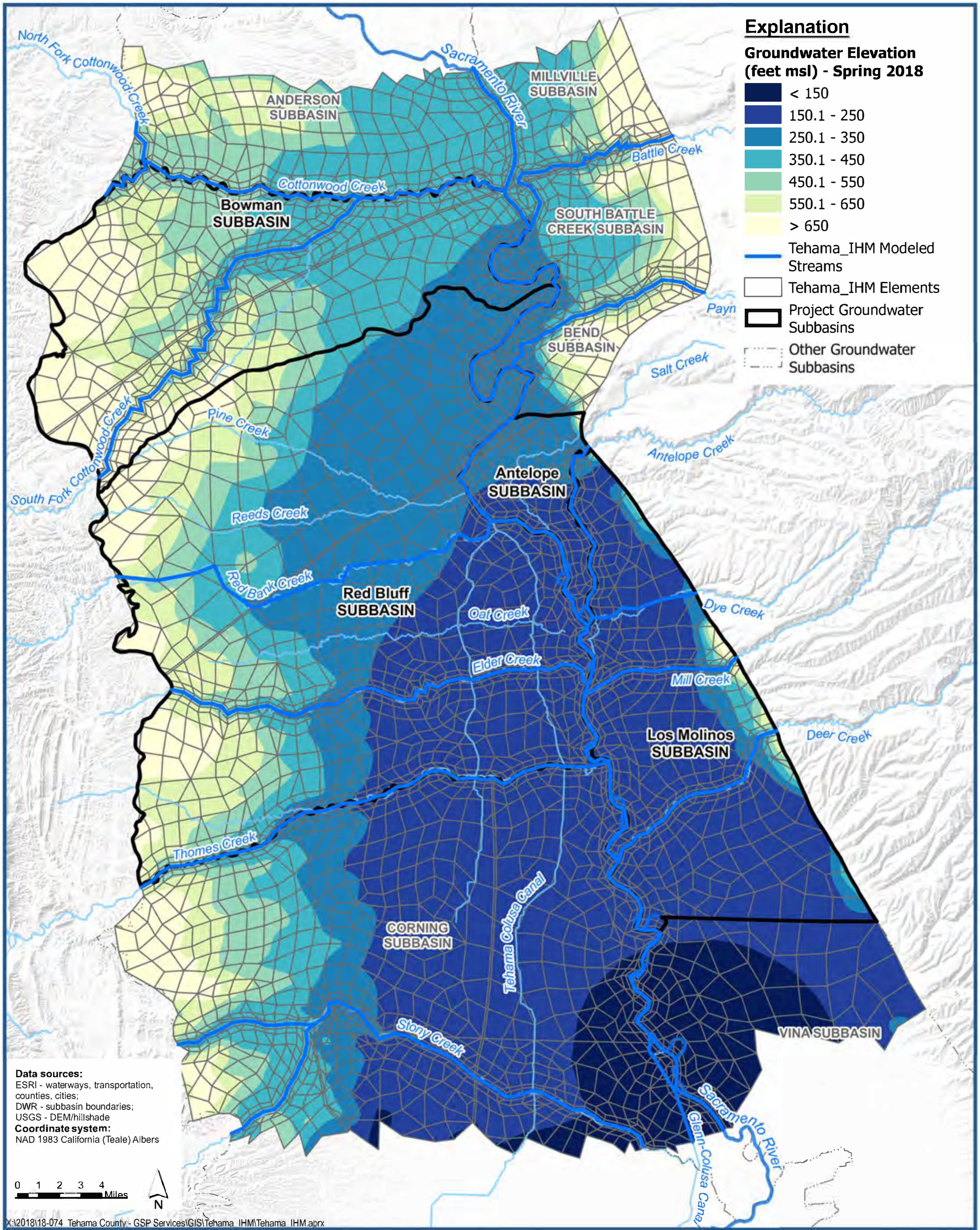
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 2015 Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-8



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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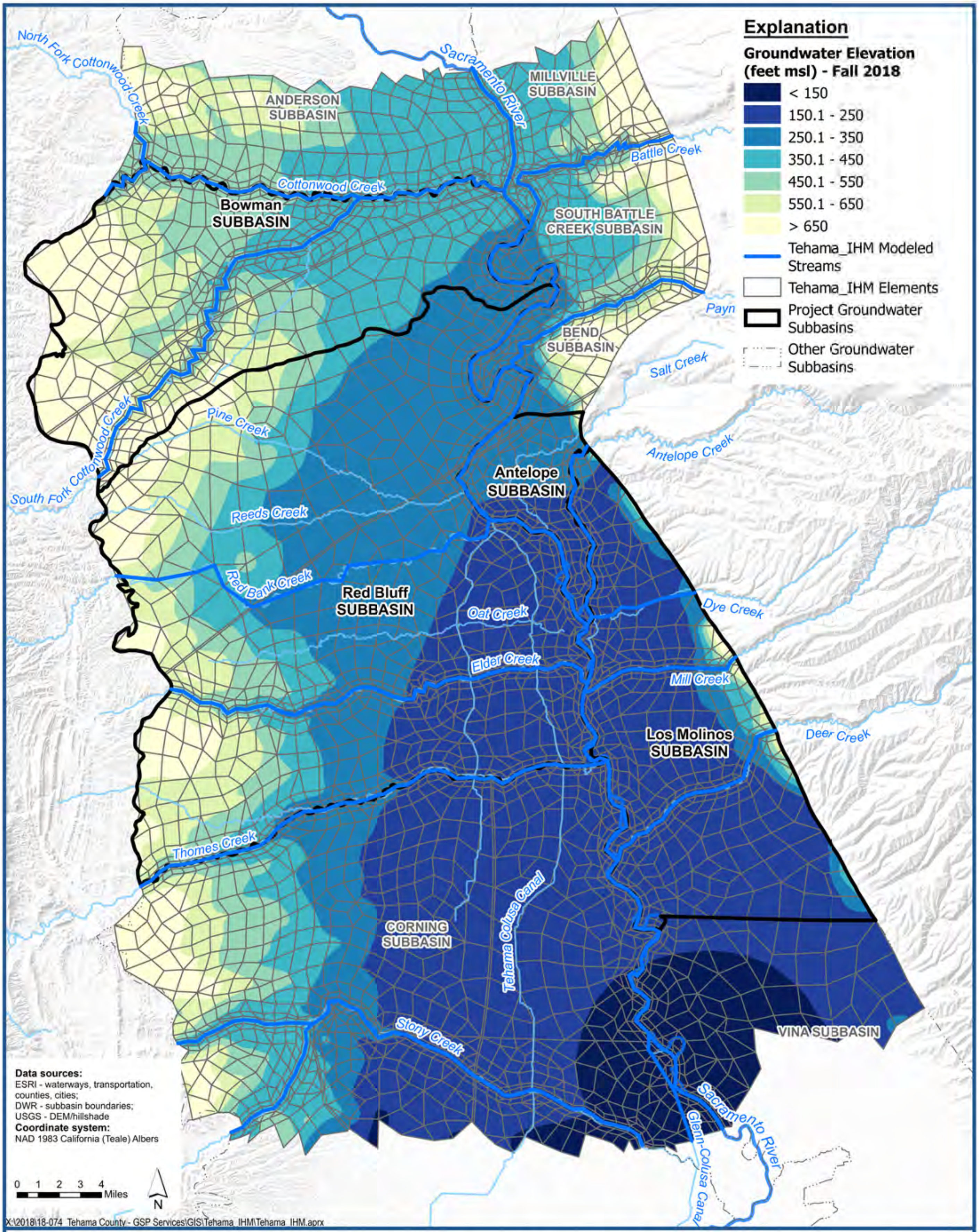
TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Groundwater Surface Elevation: Spring 2018
Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-9



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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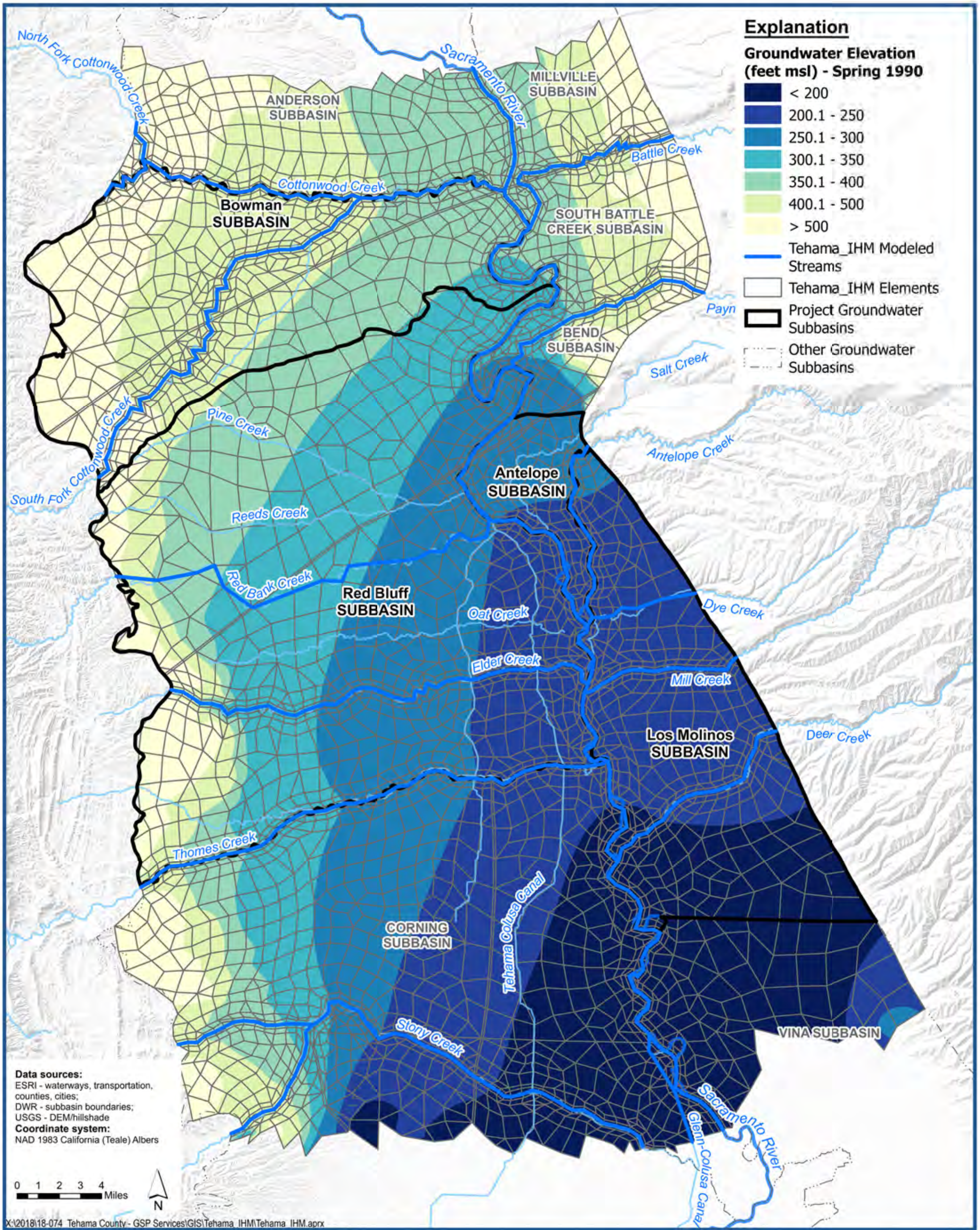
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 2018
Upper Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-10



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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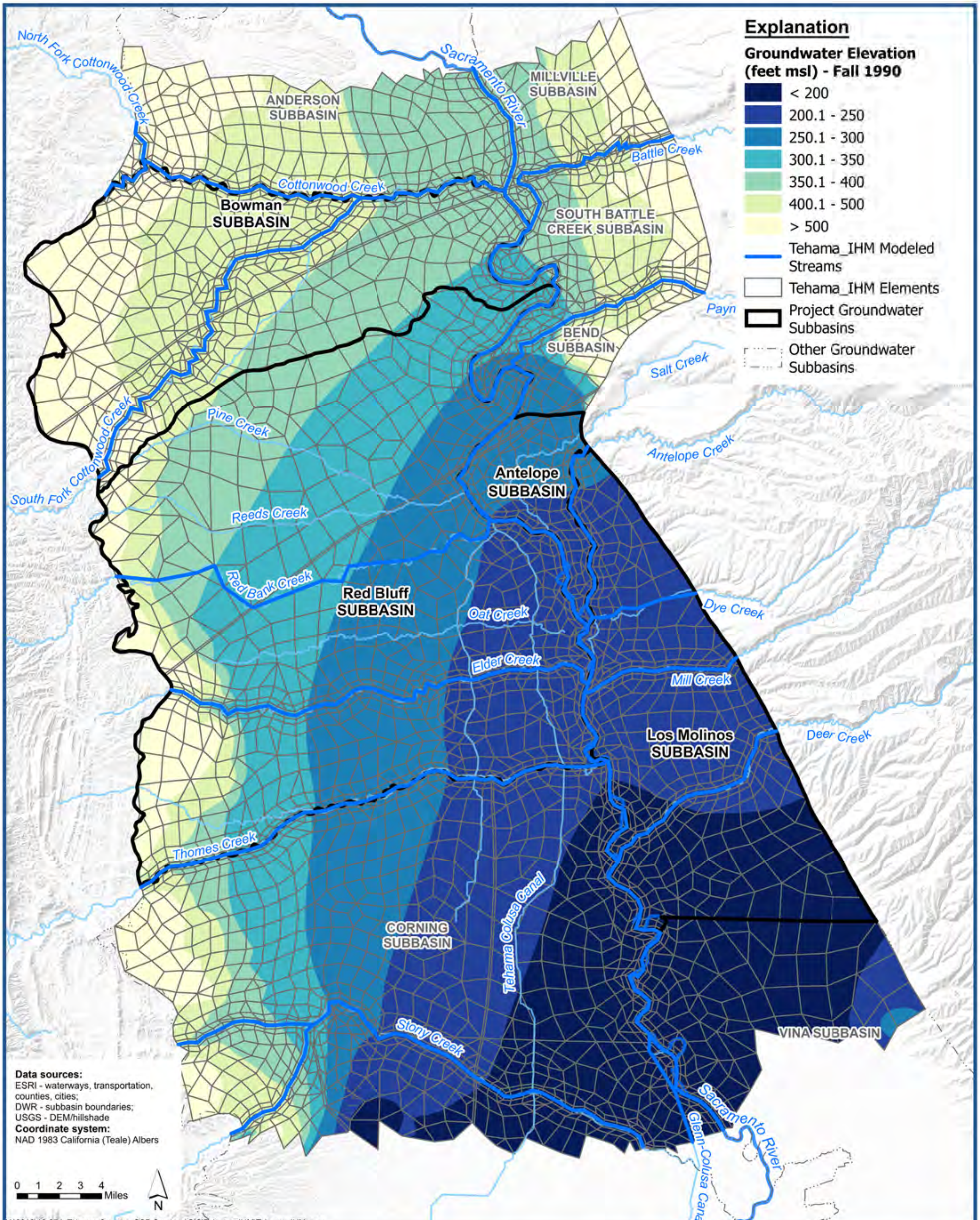
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 1990 Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-11



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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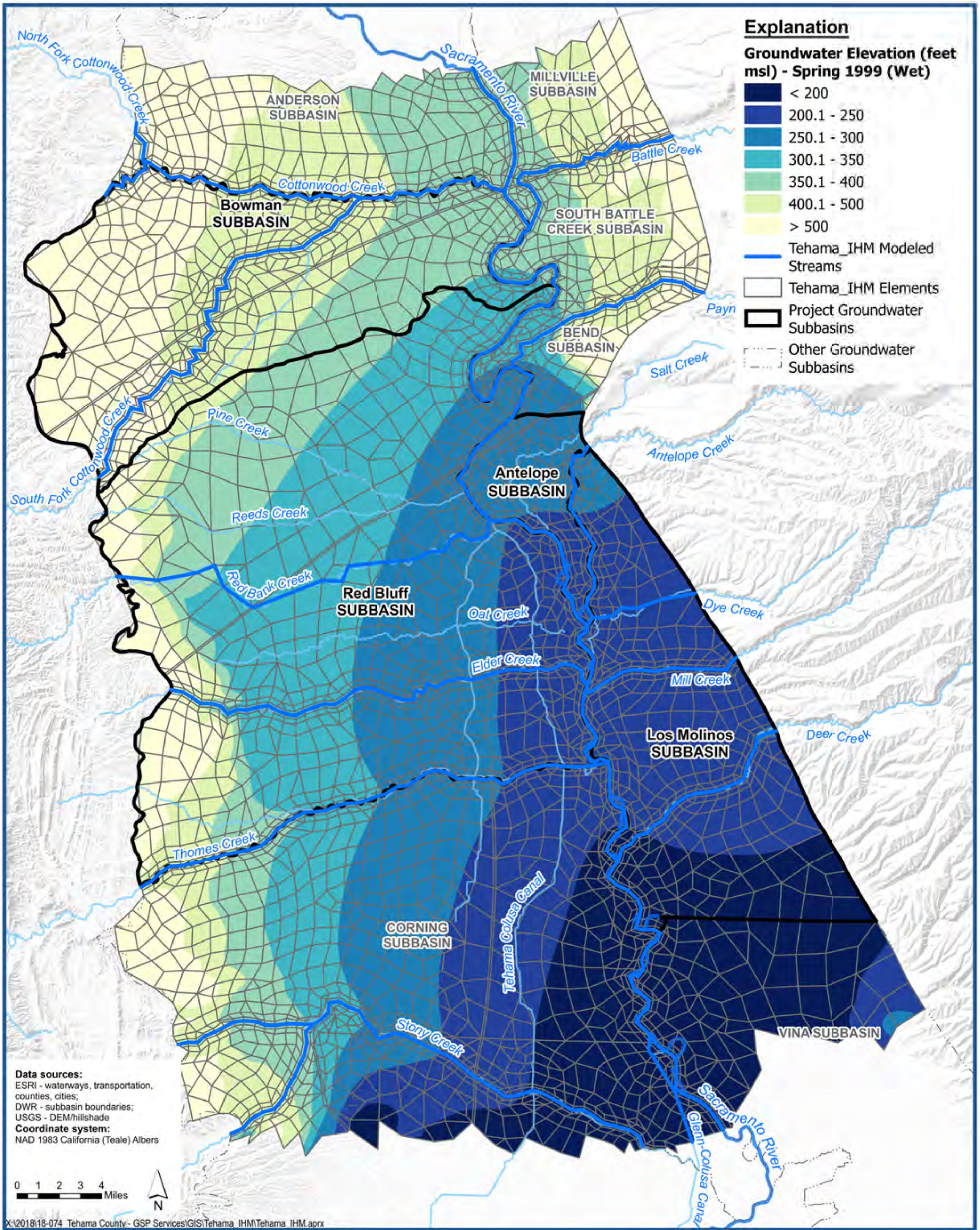
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 1990
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-12



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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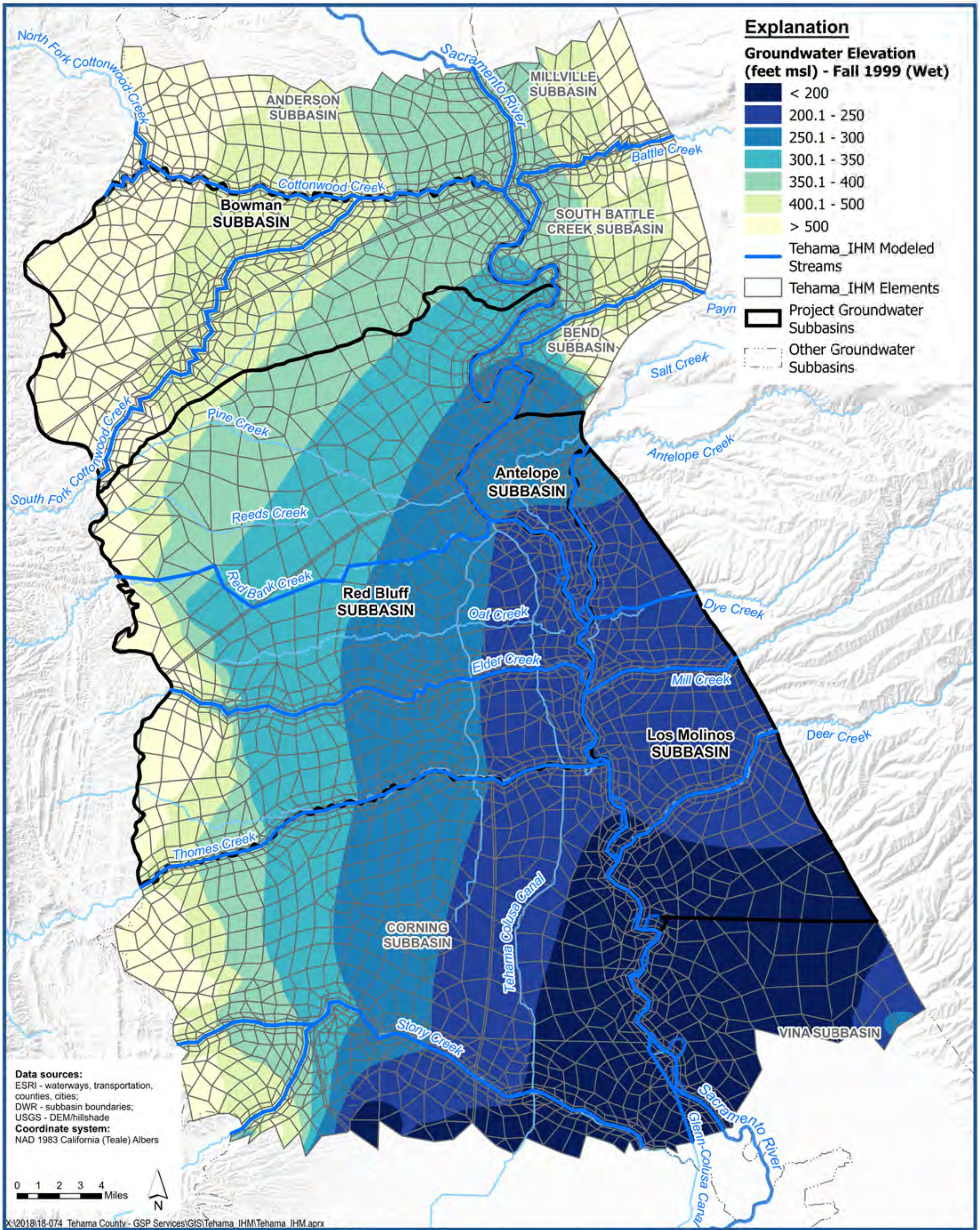
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 1999 Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-13



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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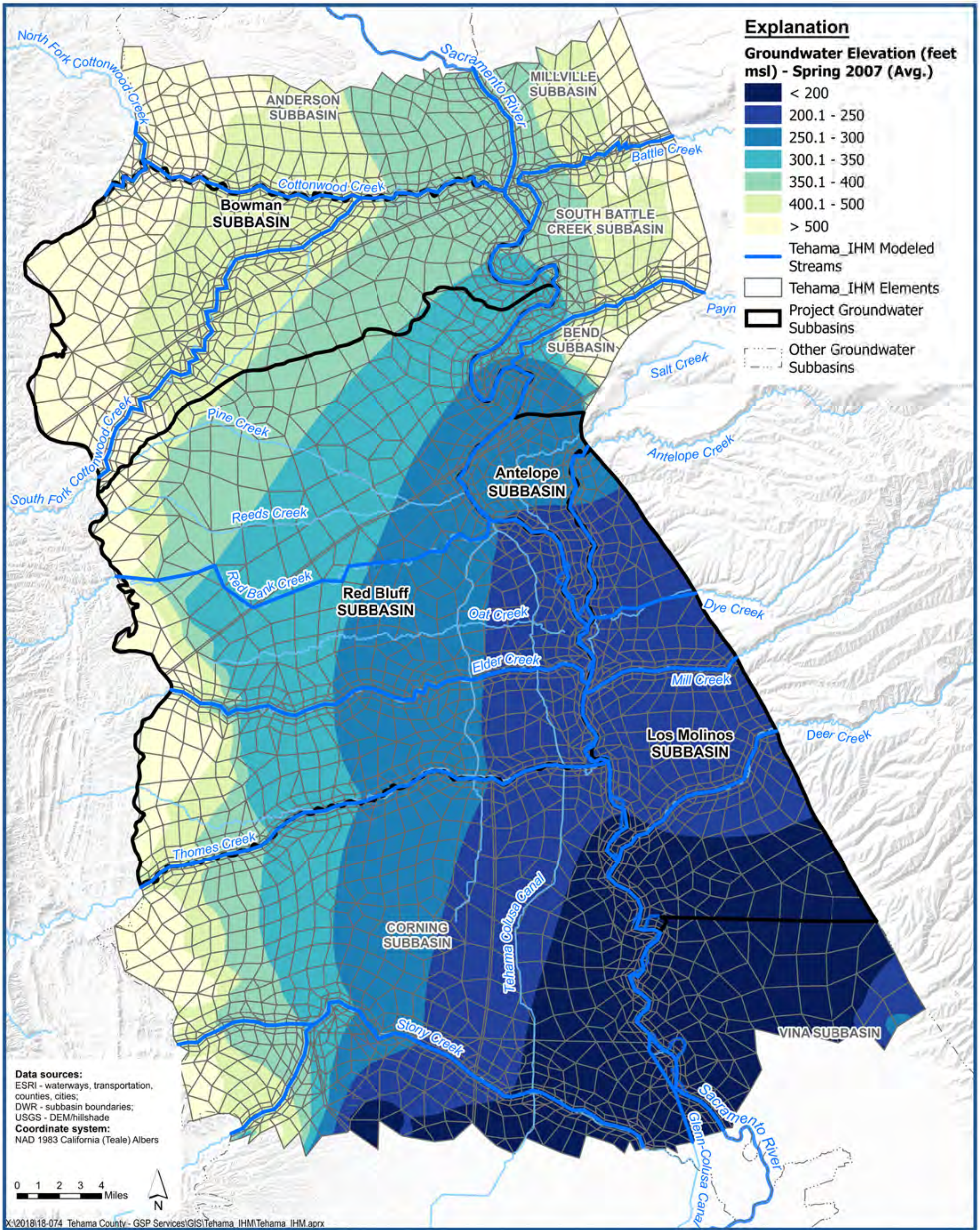
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 1999
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-14



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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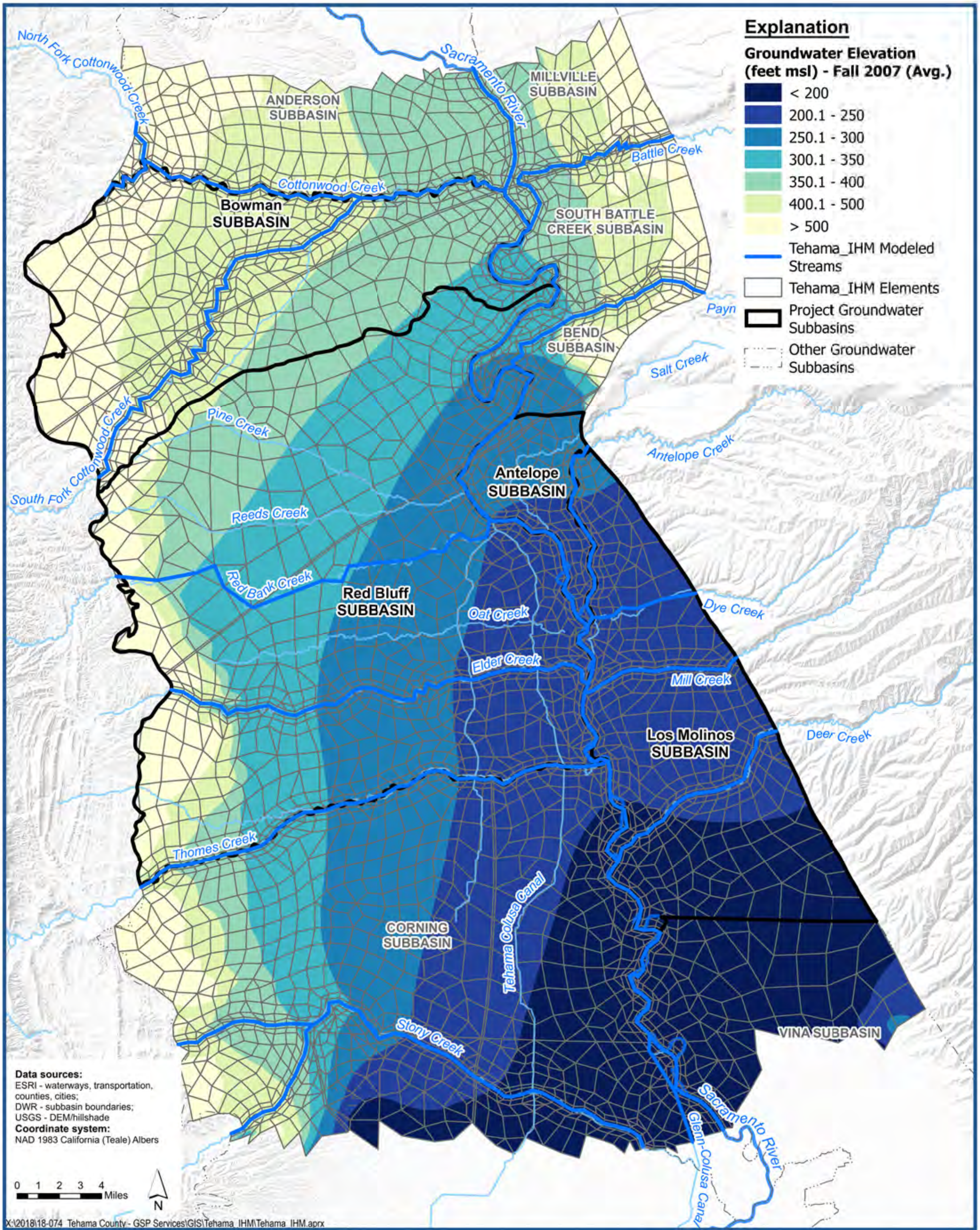
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 2007
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-15



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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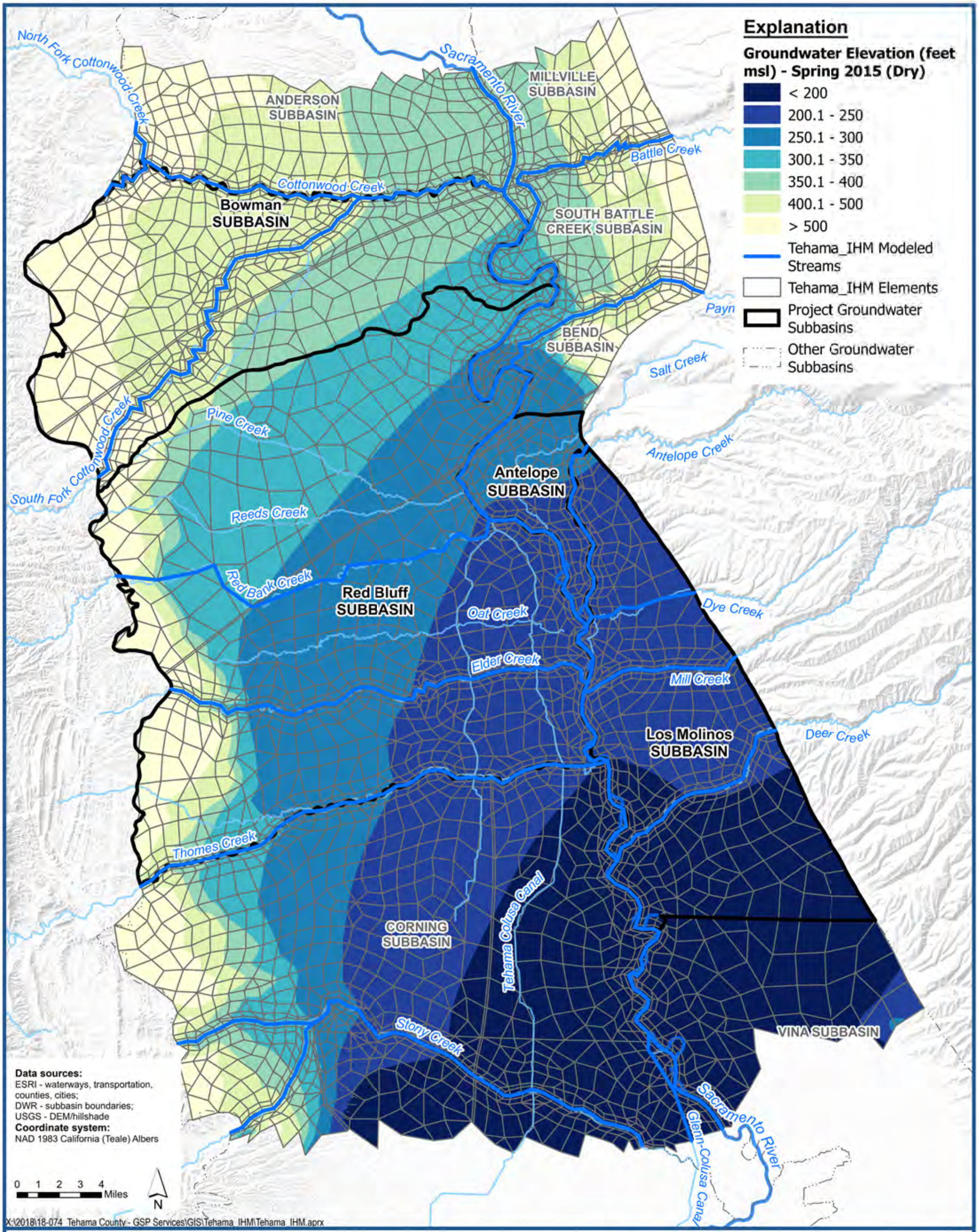
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 2007
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-16



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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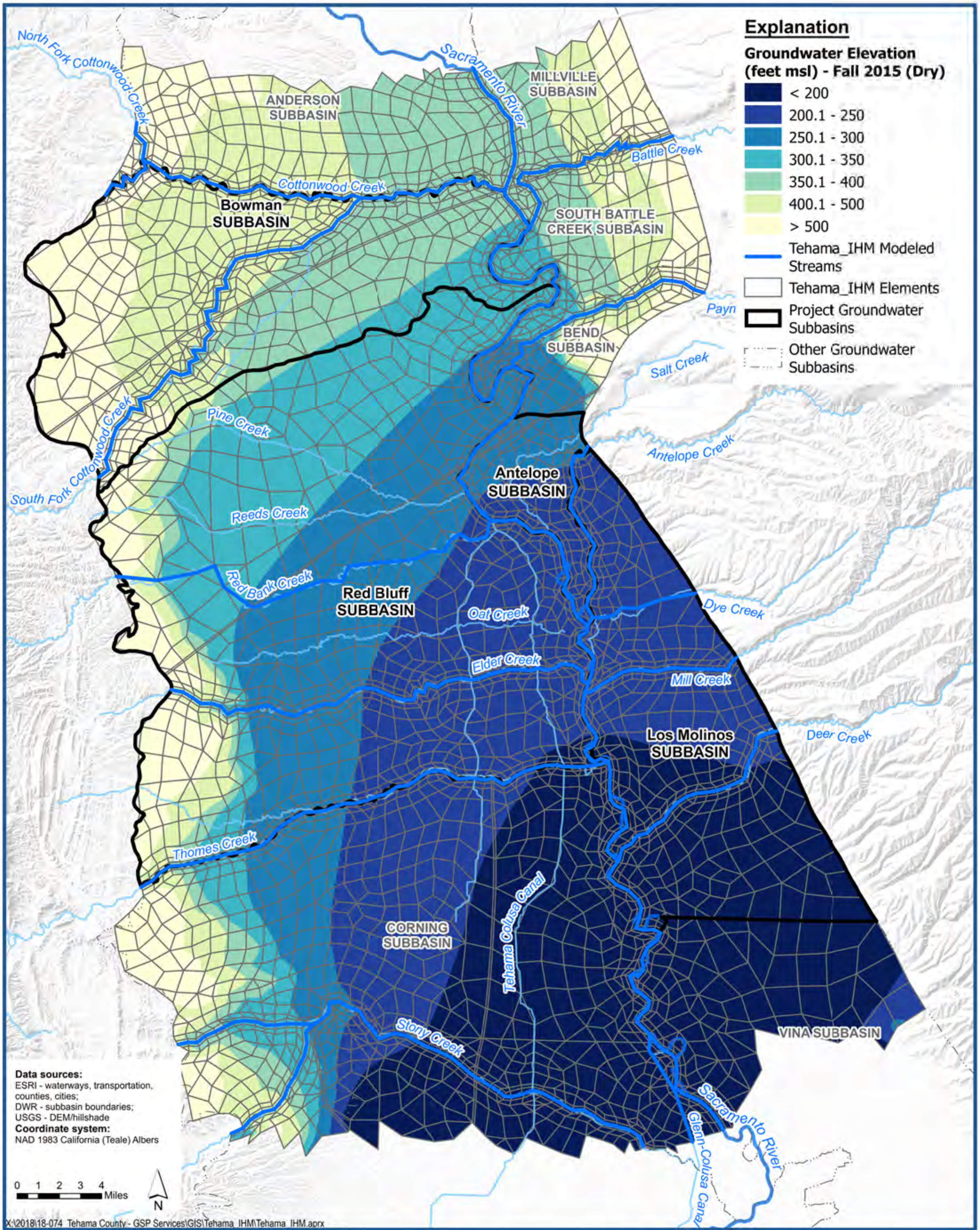
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 2015
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-17



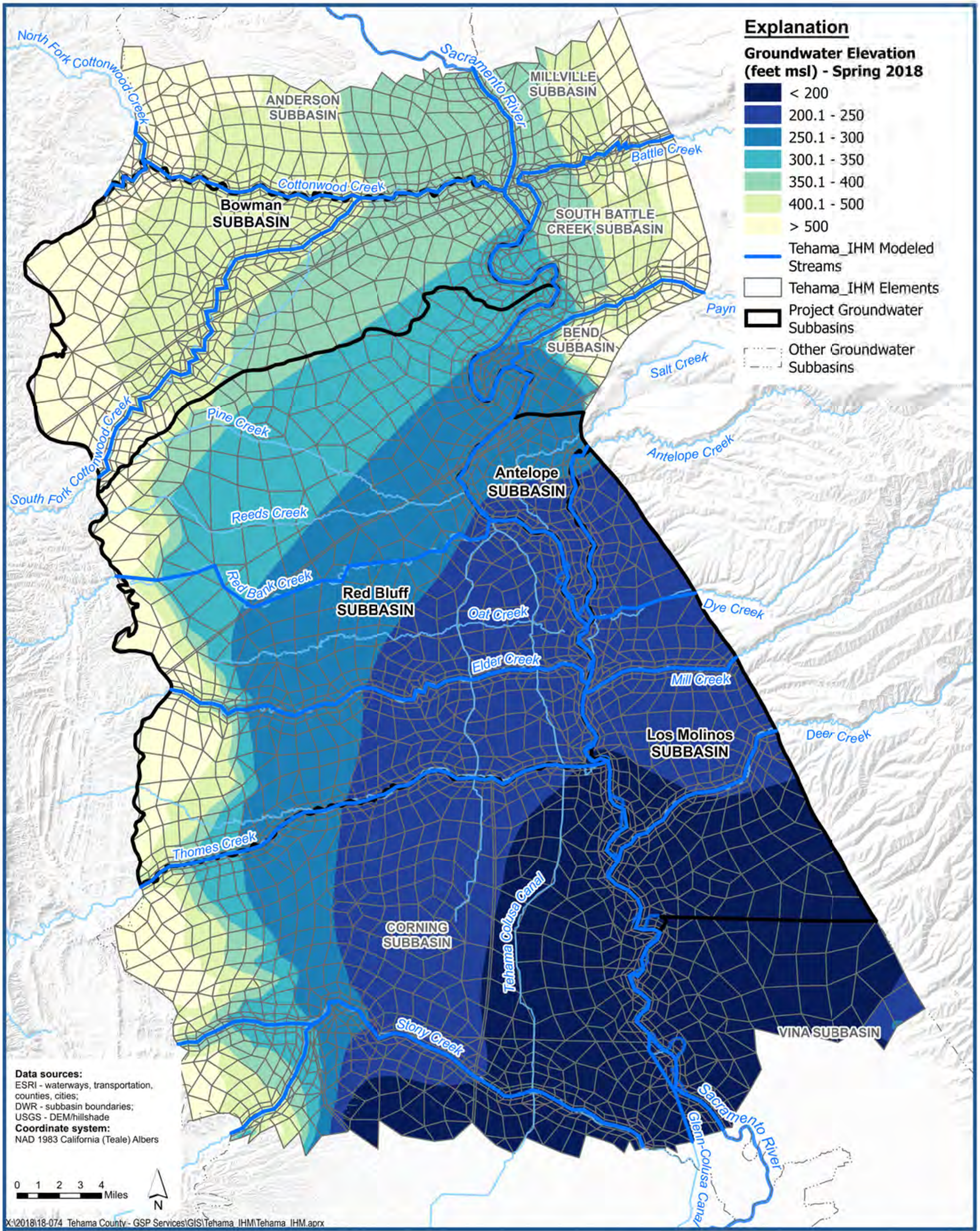
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 2015
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-18



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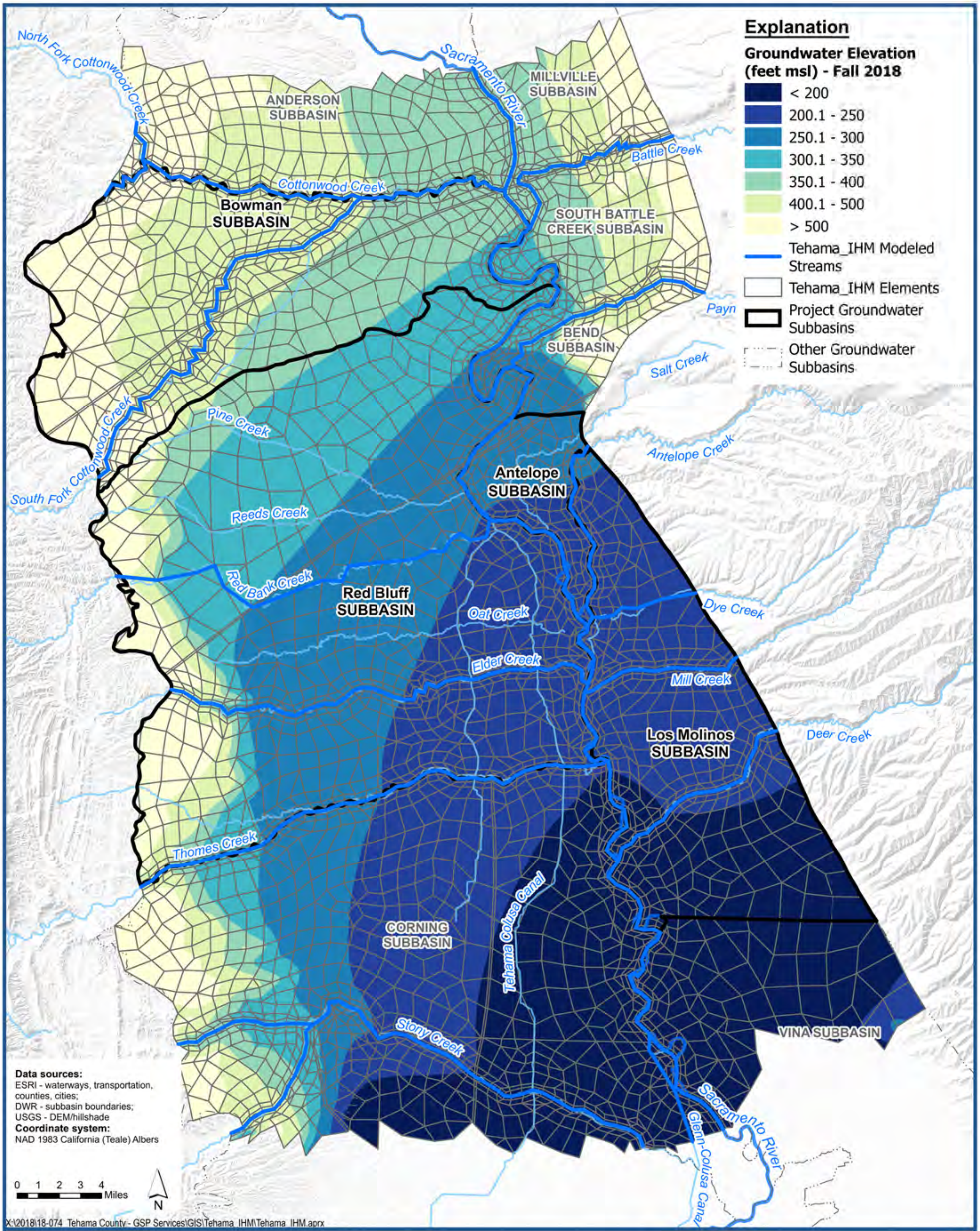
TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Spring 2018
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

Figure F-19



Explanation

Groundwater Elevation (feet msl) - Fall 2018

- ■ < 200
- ■ 200.1 - 250
- ■ 250.1 - 300
- ■ 300.1 - 350
- ■ 350.1 - 400
- ■ 400.1 - 500
- ■ > 500
- ━ Tehama_IHM Modeled Streams
- ☐ Tehama_IHM Elements
- ▭ Project Groundwater Subbasins
- ⬚ Other Groundwater Subbasins

Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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TEHAMA COUNTY

LSCE Team

Groundwater Surface Elevation: Fall 2018
Lower Aquifer

Groundwater Sustainability Plan
Tehama County, California

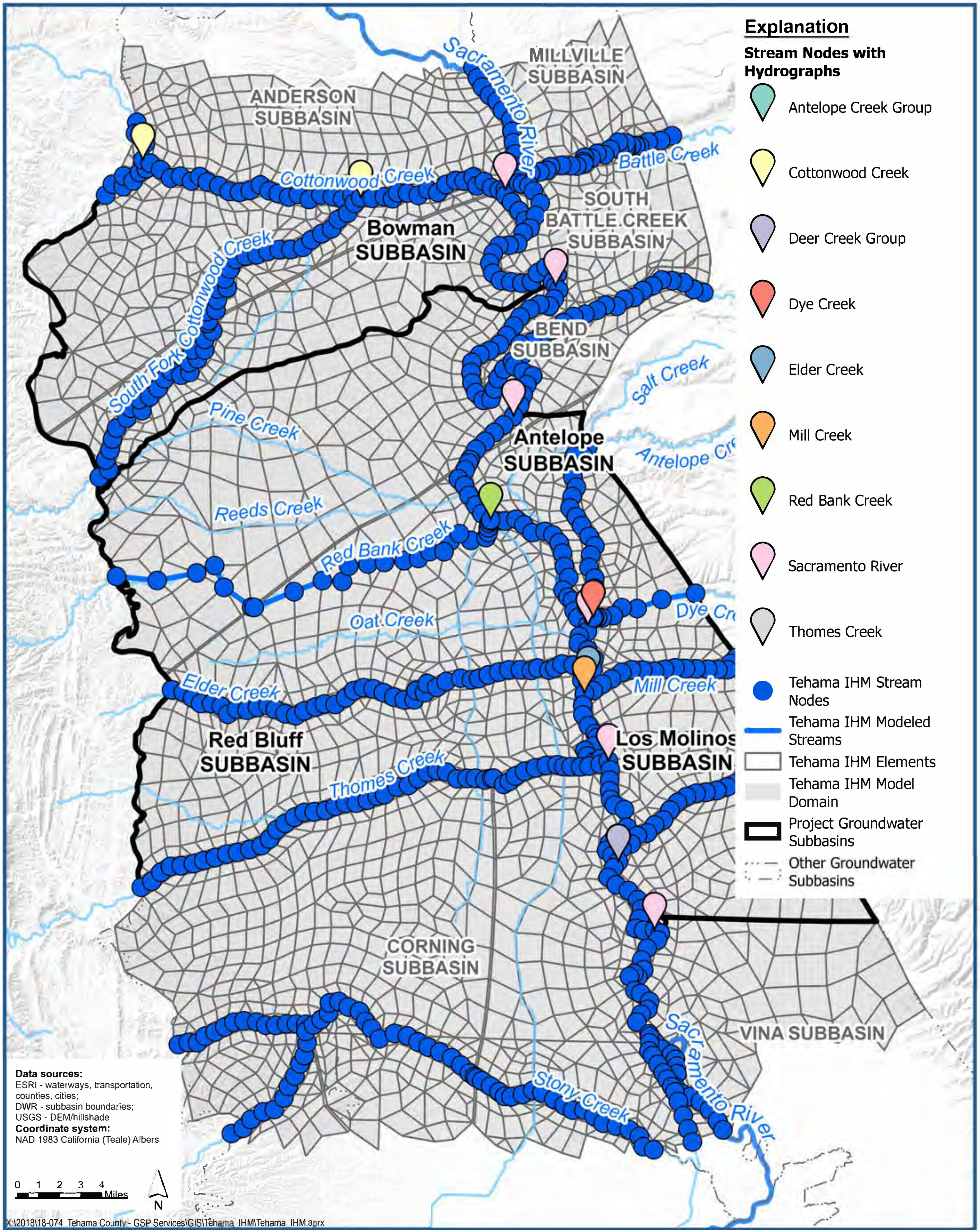
Figure F-20

Appendix G. Tehama IHM Simulated Streamflows

APPENDIX G

Tehama IHM Simulated Streamflows

G-1	Historical Model Results
G-2	Projected (Current Land Use) Model Results
G-3	Projected (Future Land Use) Model Results
G-4	Projected (Current Land Use) with Climate Change (2030) Model Results
G-5	Projected (Current Land Use) with Climate Change (2070) Model Results
G-6	Projected (Future Land Use) with Climate Change (2030) Model Results
G-7	Projected (Future Land Use) with Climate Change (2070) Model Results
G-8	Projected (Future Land Use) with Projects and Climate Change (2070) Model Results
G-9	Comparison of Model Scenarios
G-10	Historical Losing/Gaining Streams Maps



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Map of Stream Nodes with Hydrographs

Groundwater Sustainability Planning
Tehama County, California

Figure G-1

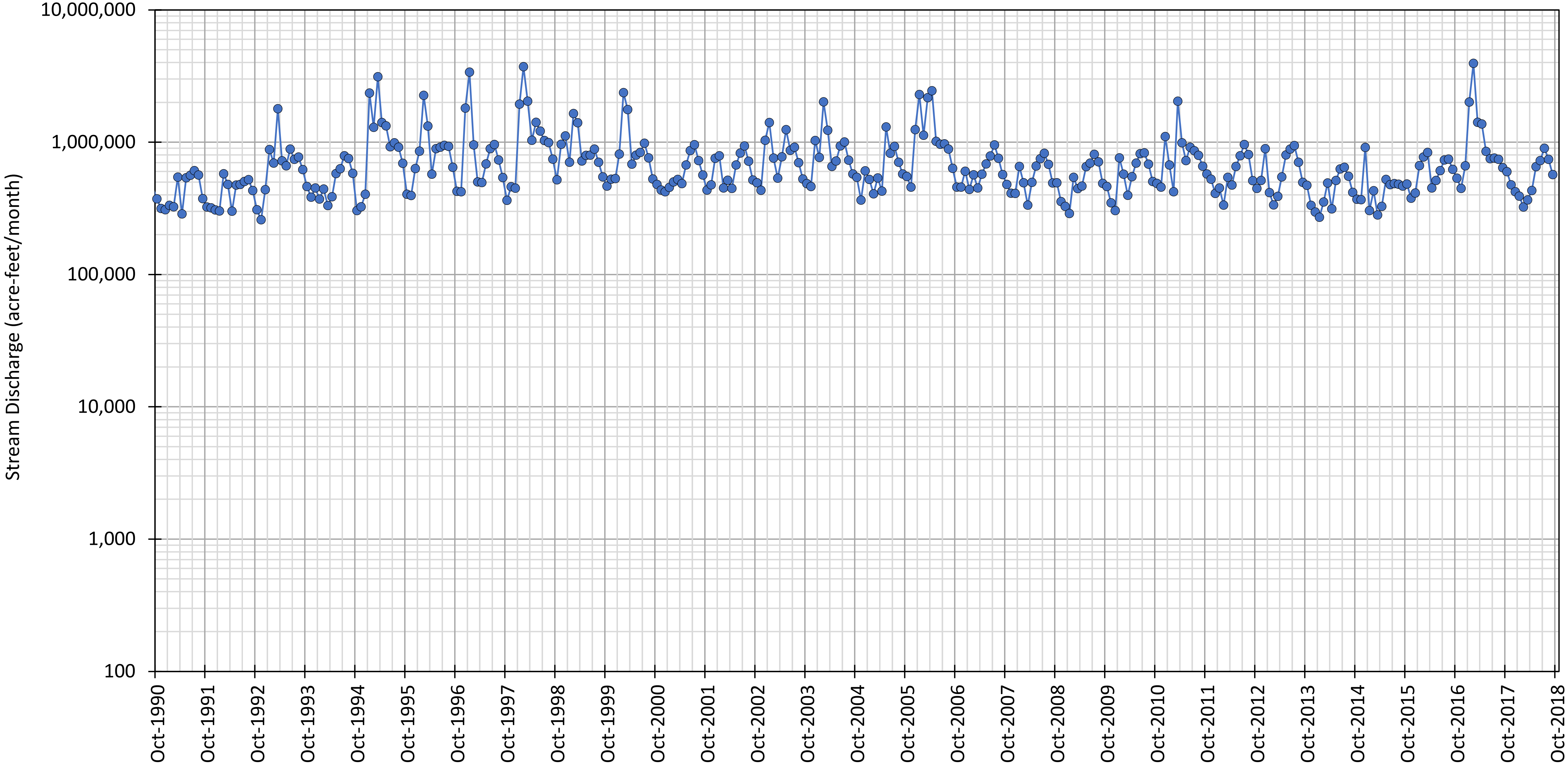
APPENDIX G-1

Tehama IHM Simulated Streamflows:

Historical Model Results

Inflow from Sacramento River at Antelope Subbasin Boundary

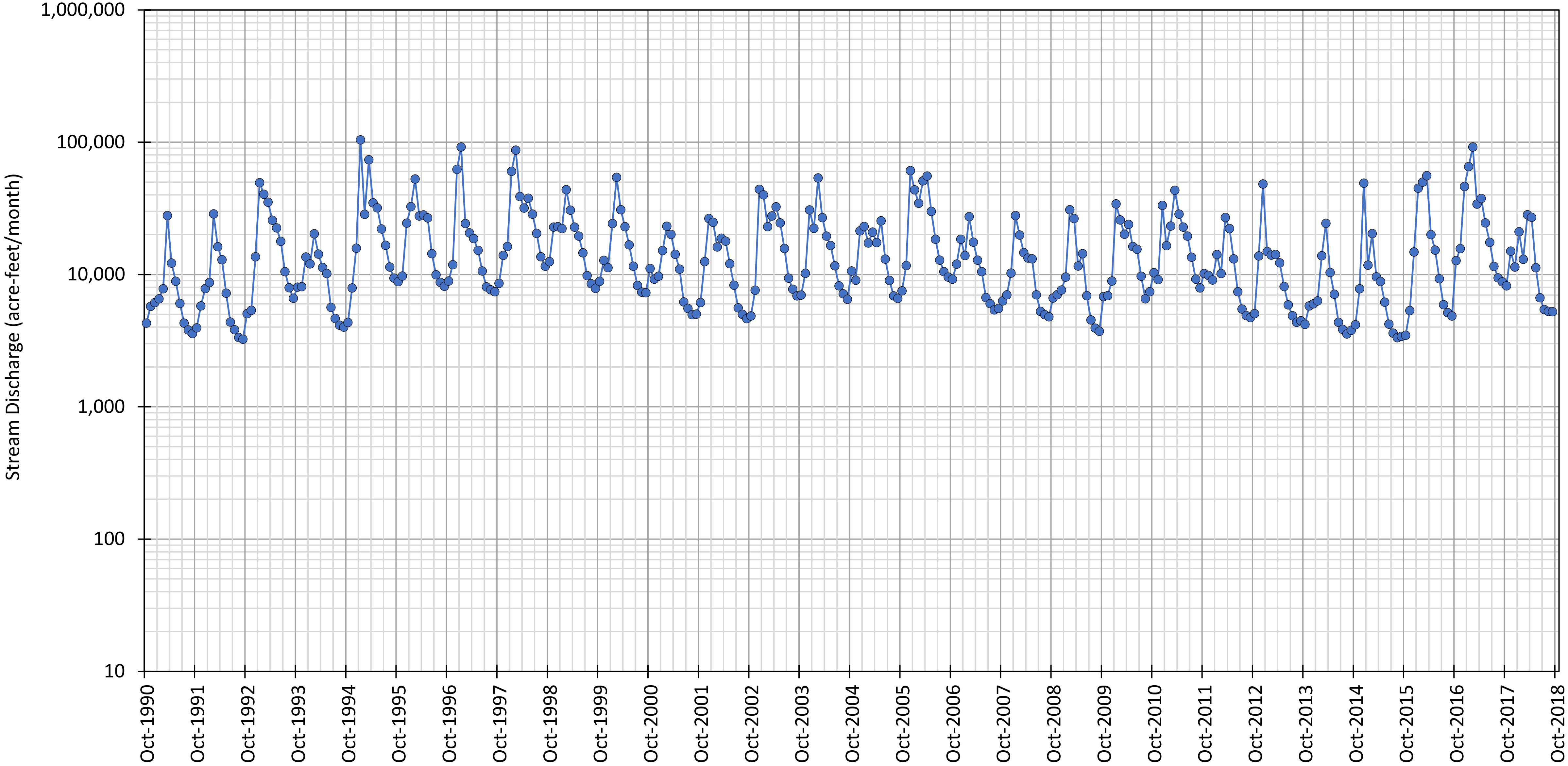
Antelope Subbasin



Tehama IHM - Historical

Outflow from Antelope Creek Group to Sacramento River

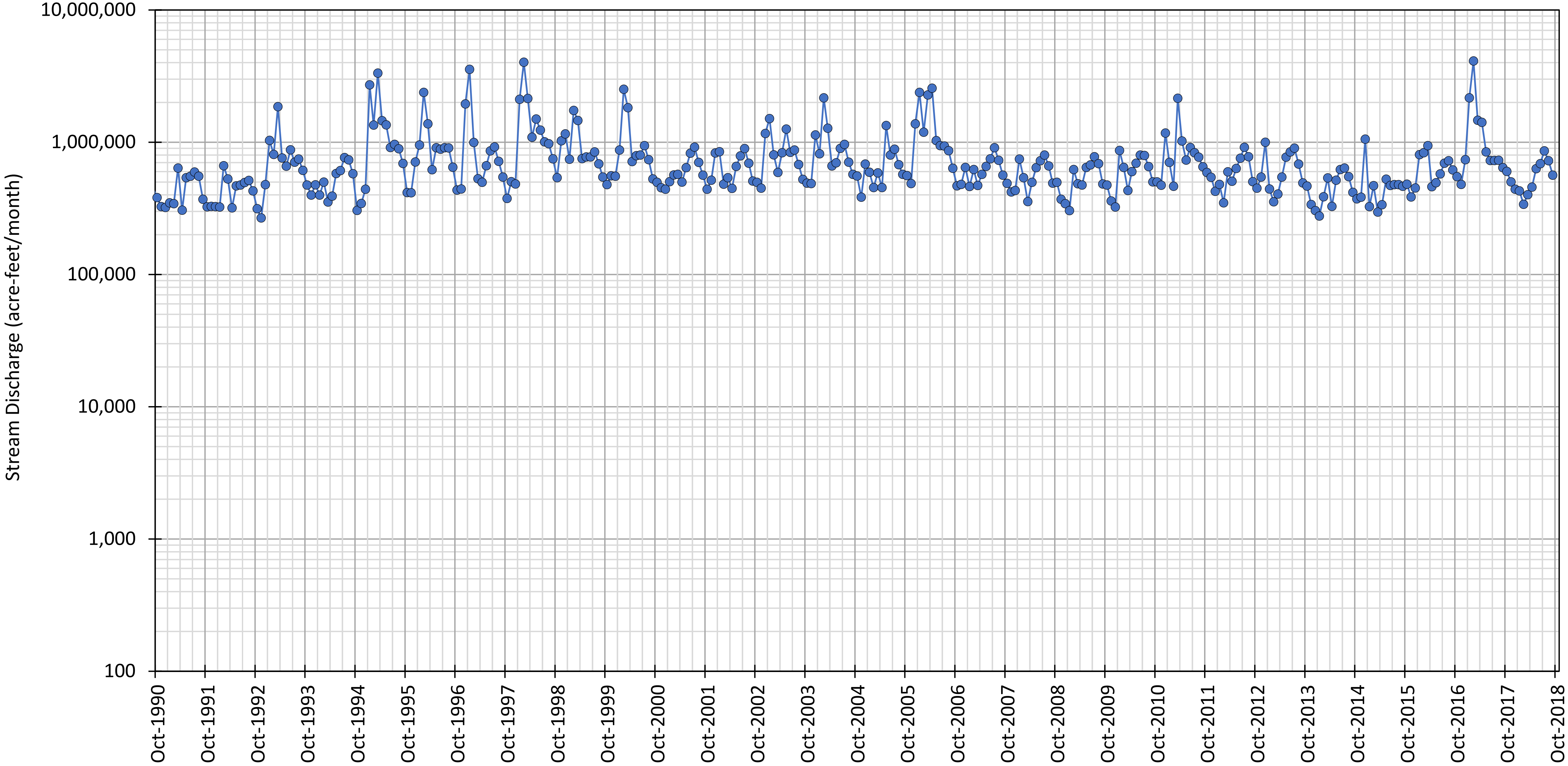
Antelope Subbasin



Tehama IHM - Historical

Outflow from Sacramento River at Antelope Subbasin Boundary

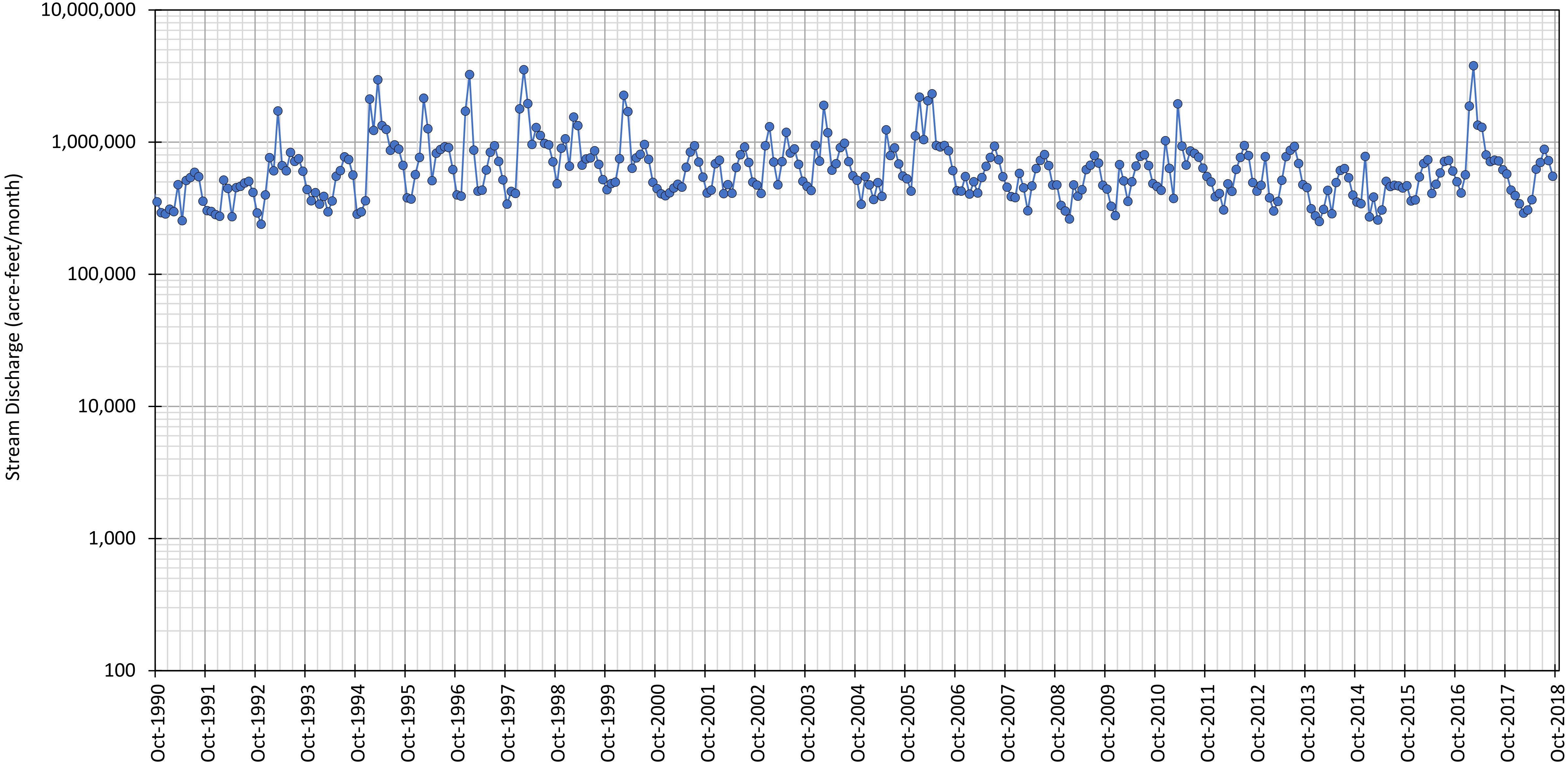
Antelope Subbasin



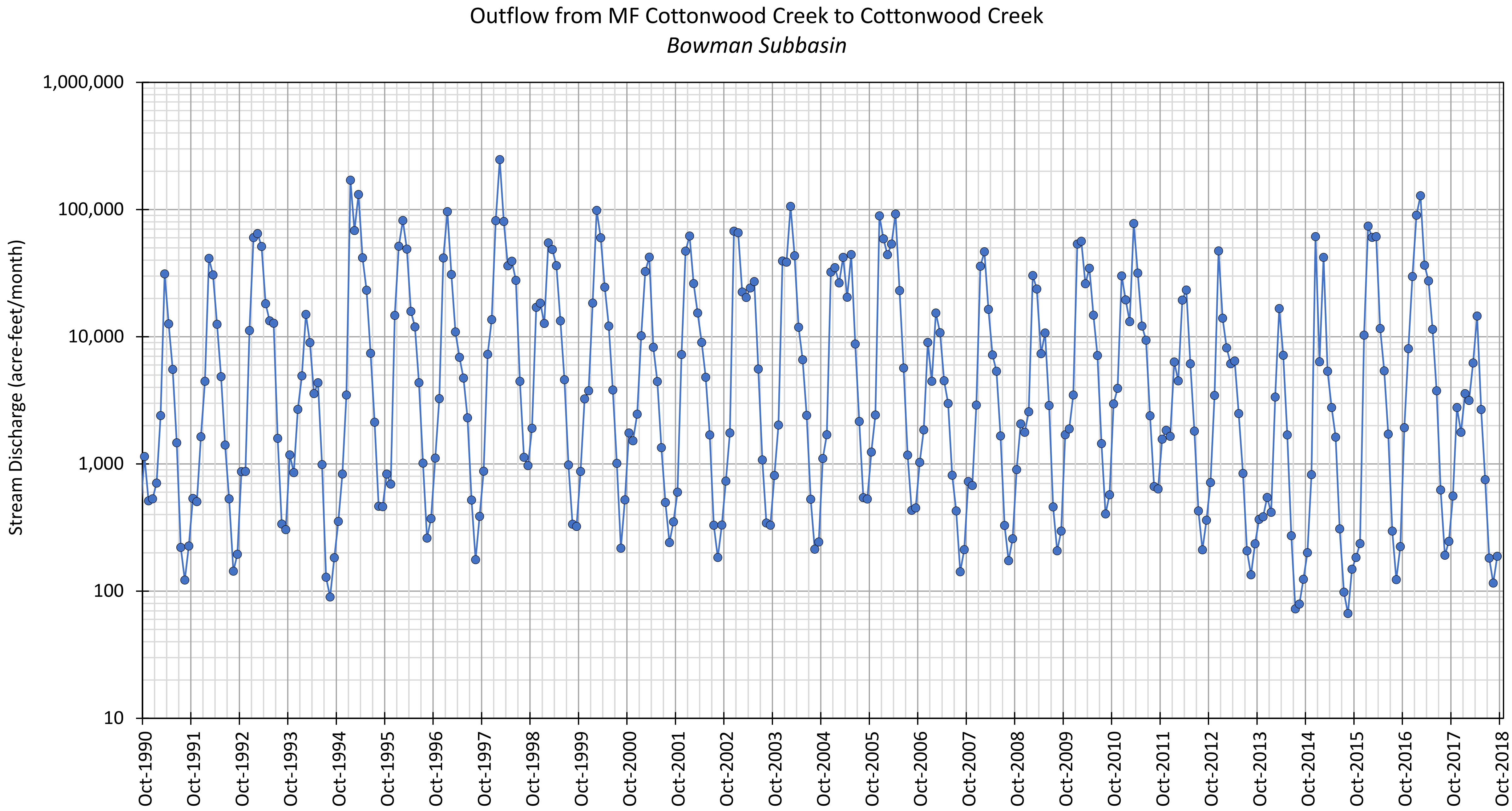
Tehama IHM - Historical

Inflow from Sacramento River at Bowman Subbasin Boundary

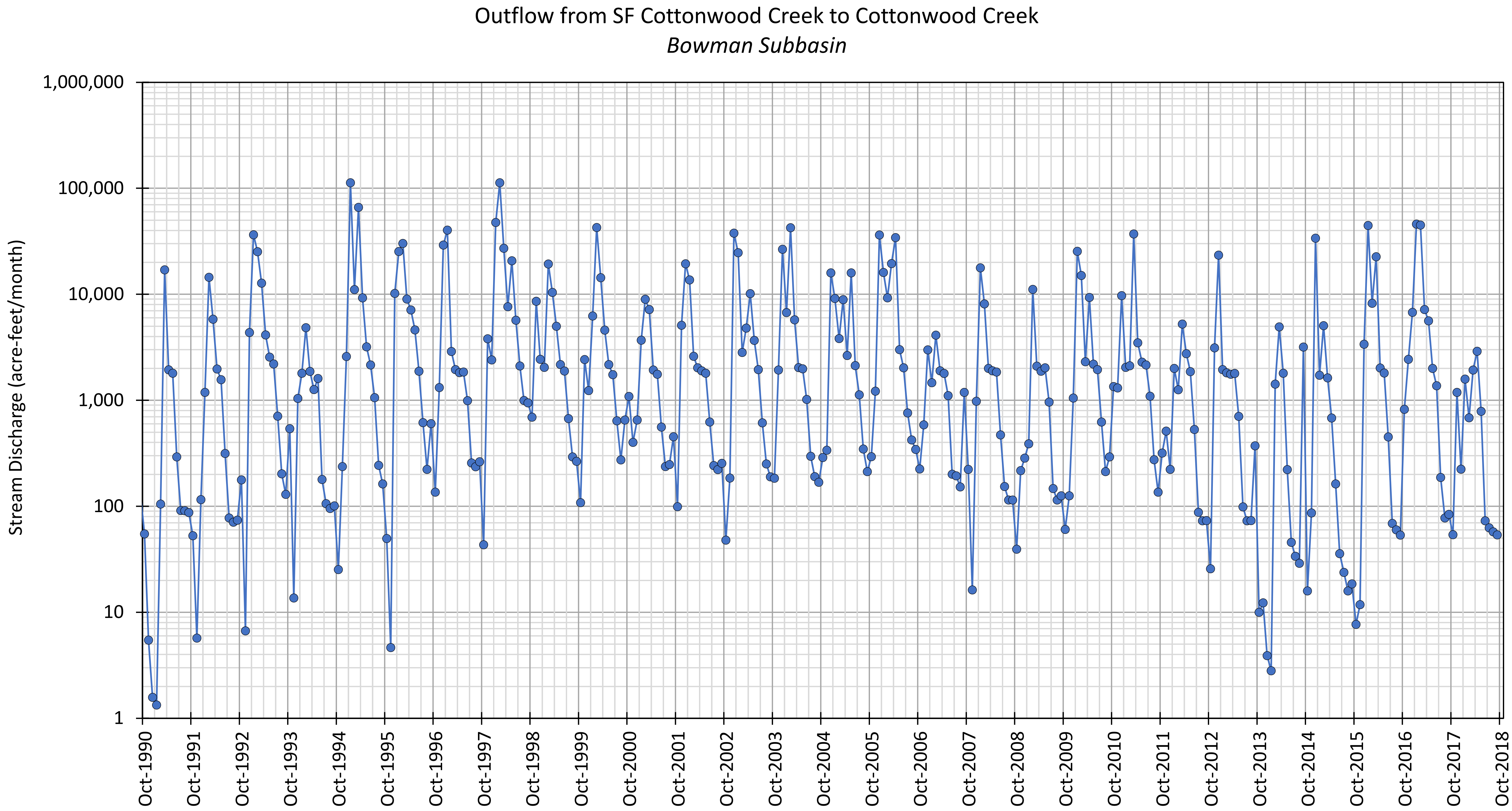
Bowman Subbasin



Tehama IHM - Historical



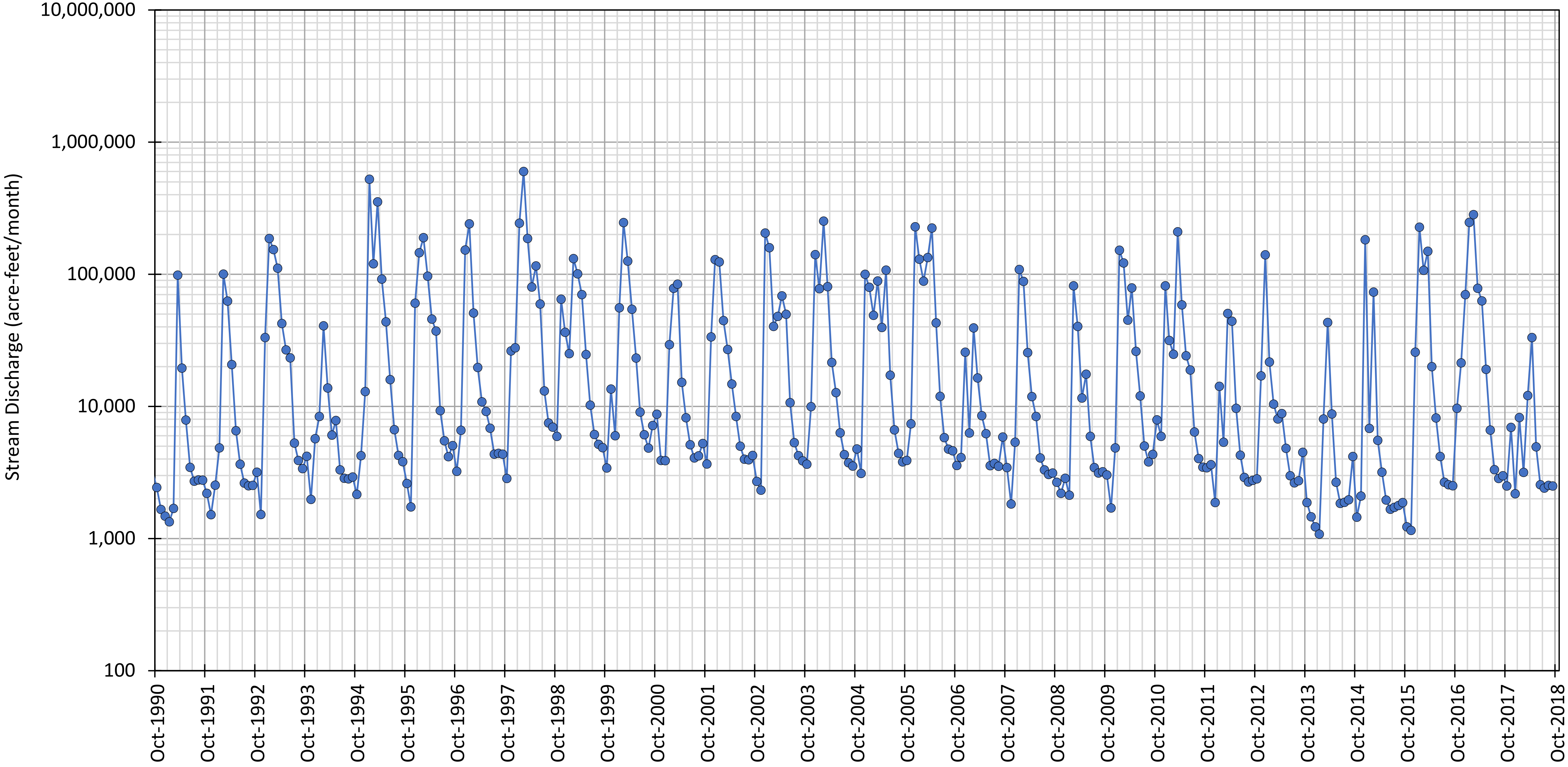
Tehama IHM - Historical



Tehama IHM - Historical

Outflow from Cottonwood Creek to Sacramento River

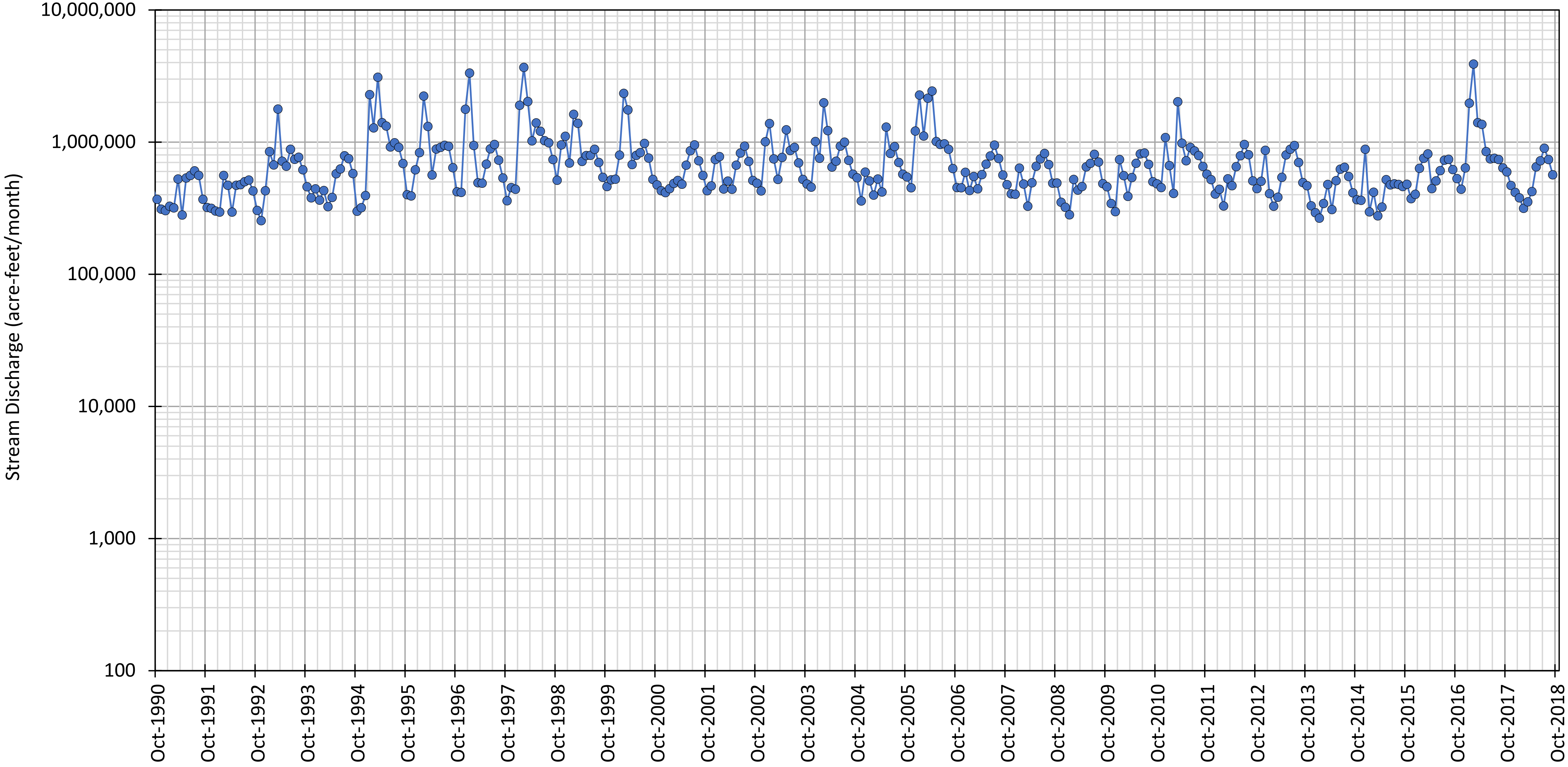
Bowman Subbasin



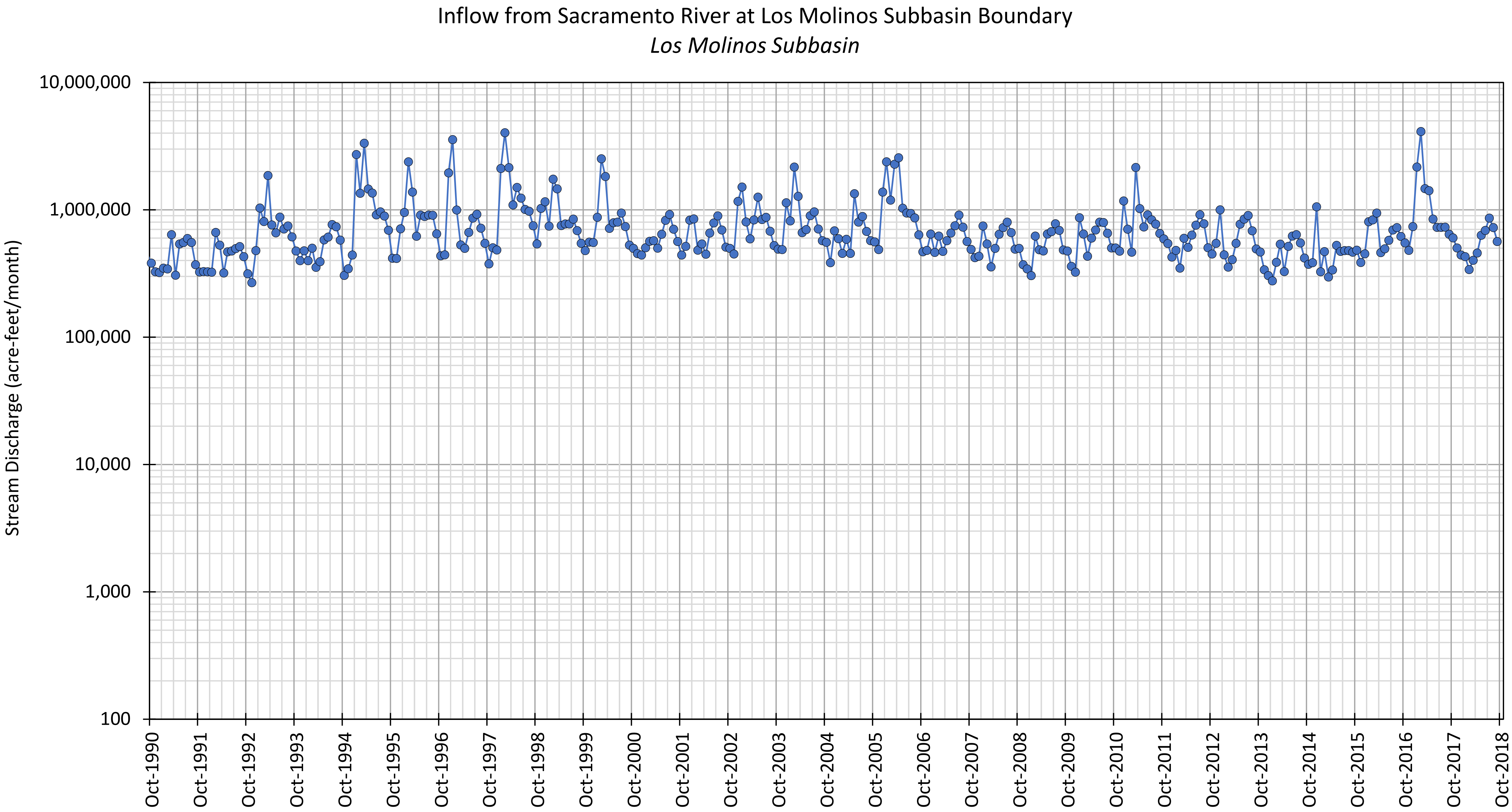
Tehama IHM - Historical

Outflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin



Tehama IHM - Historical



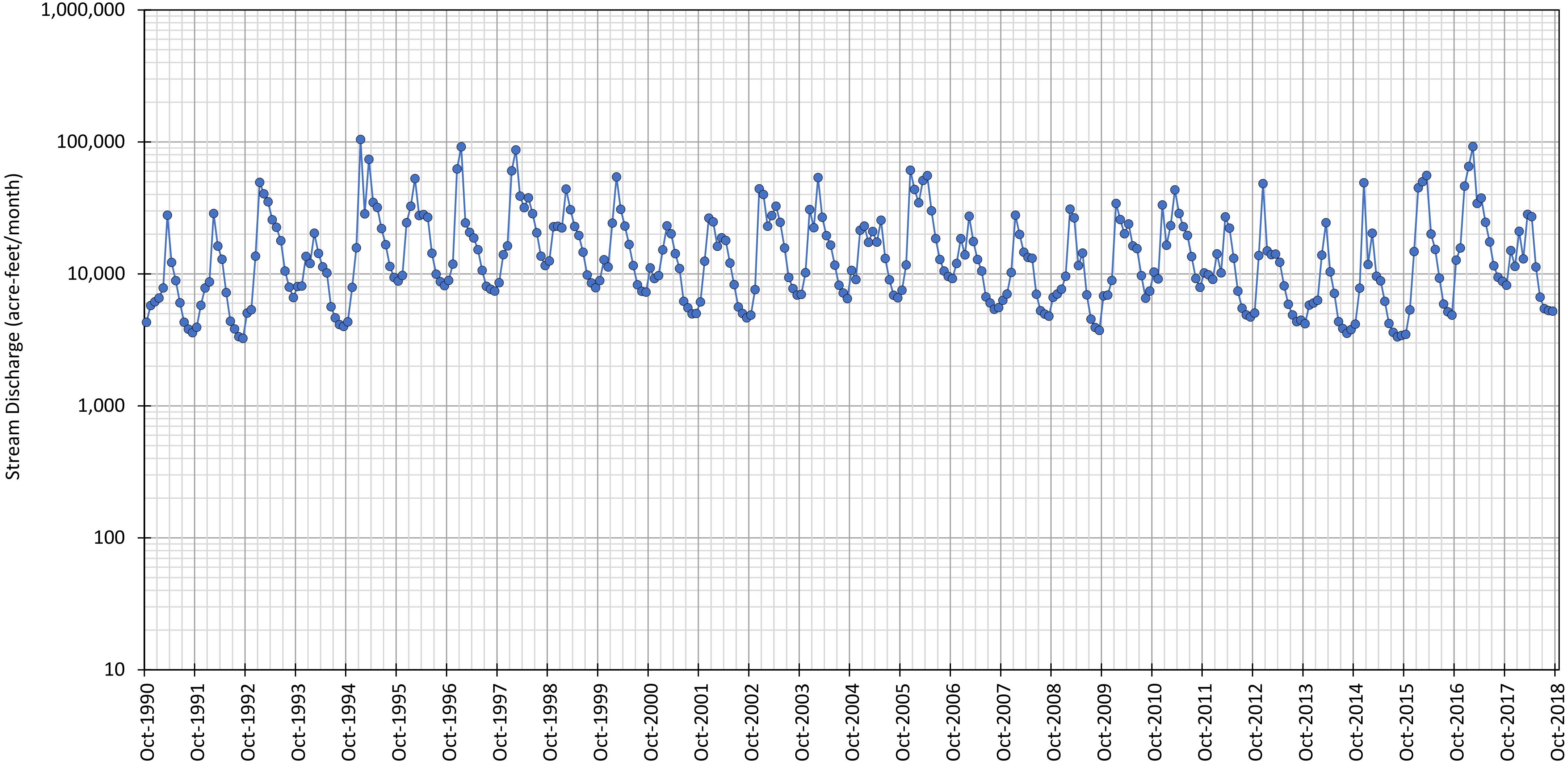
Inflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin

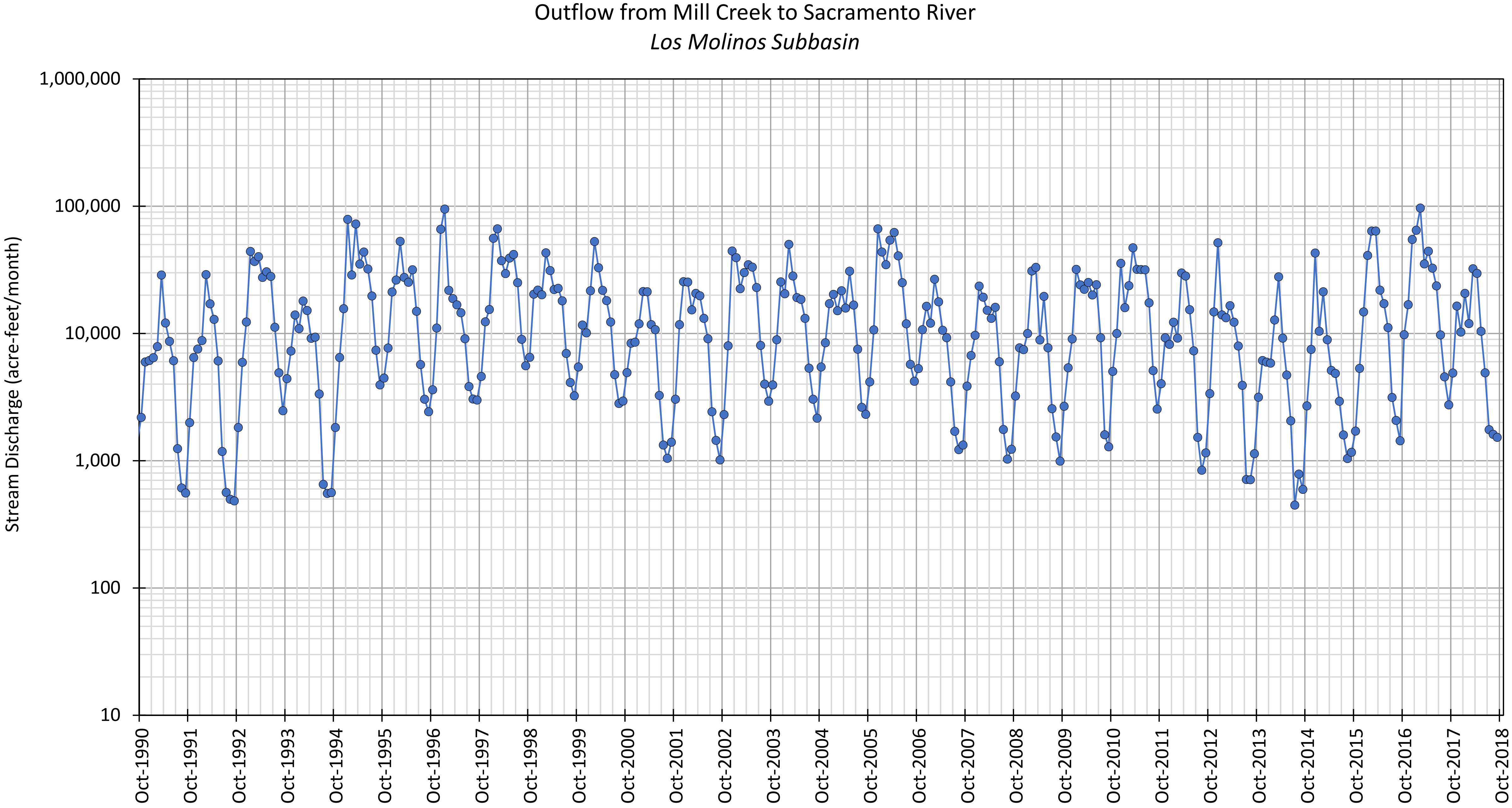
Tehama IHM - Historical

Outflow from Antelope Creek Group to Sacramento River

Los Molinos Subbasin



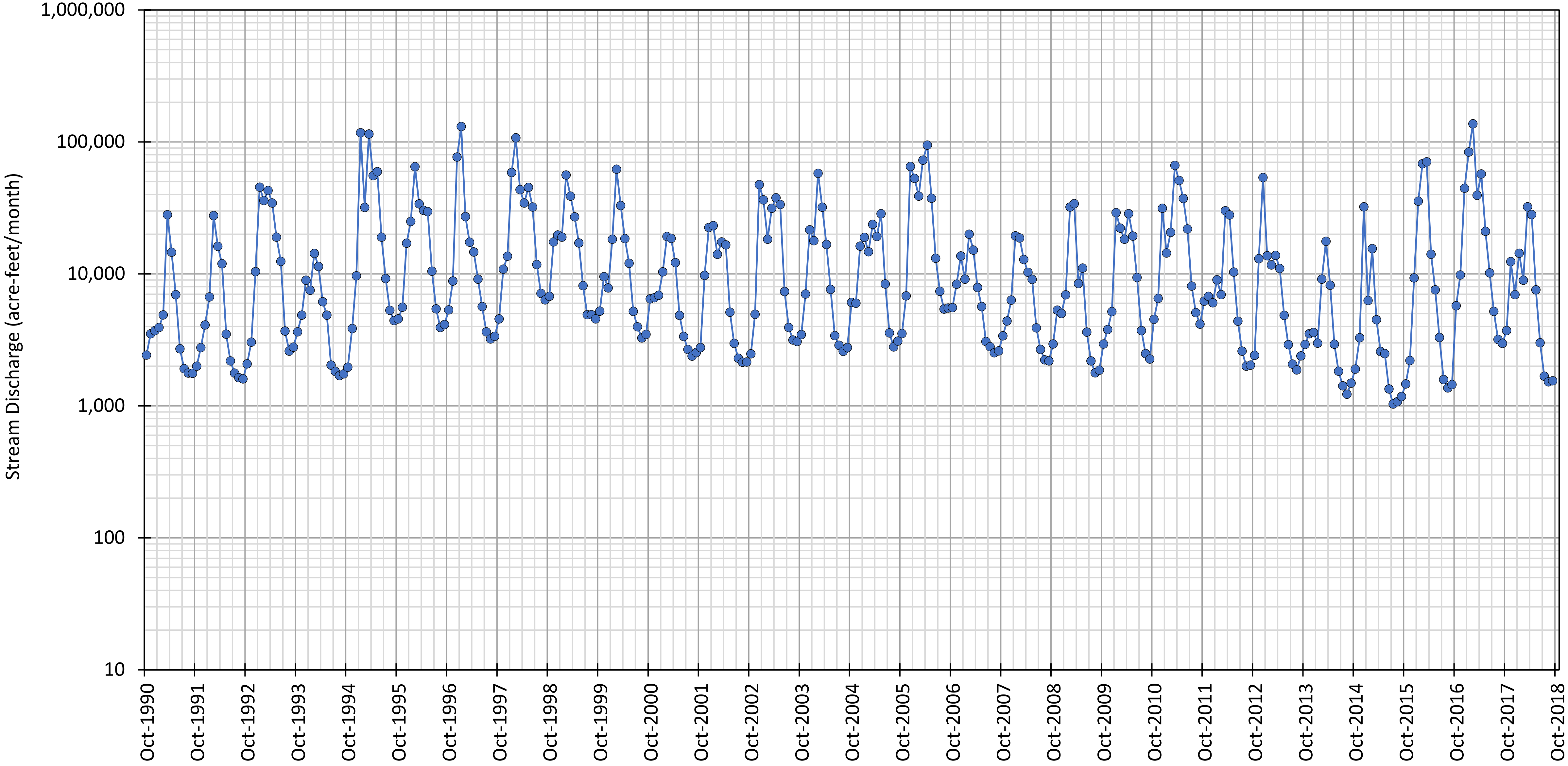
Tehama IHM - Historical



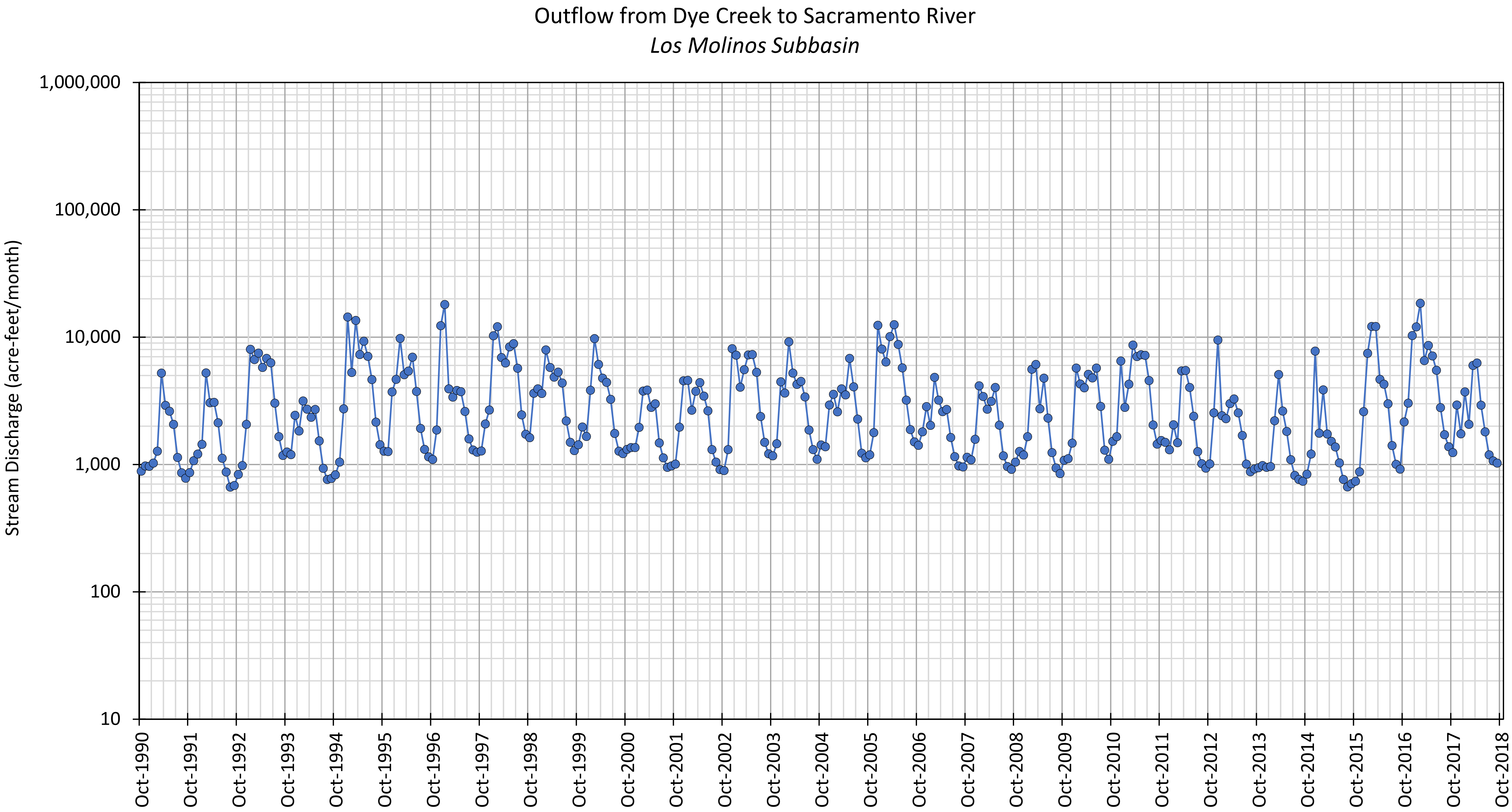
Tehama IHM - Historical

Outflow from Deer Creek Group to Sacramento River

Los Molinos Subbasin



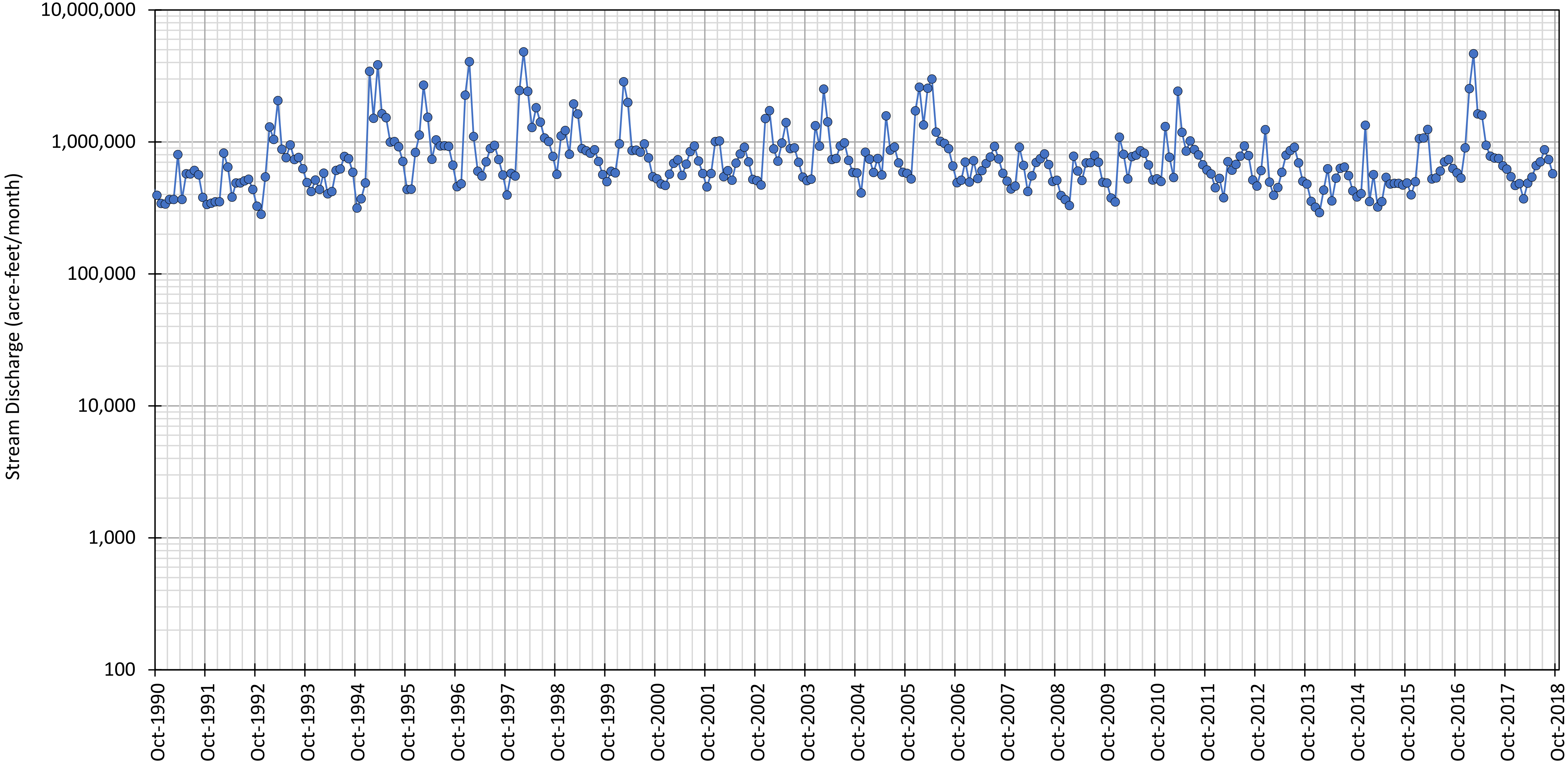
Tehama IHM - Historical



Tehama IHM - Historical

Outflow from Sacramento River at Los Molinos Subbasin Boundary

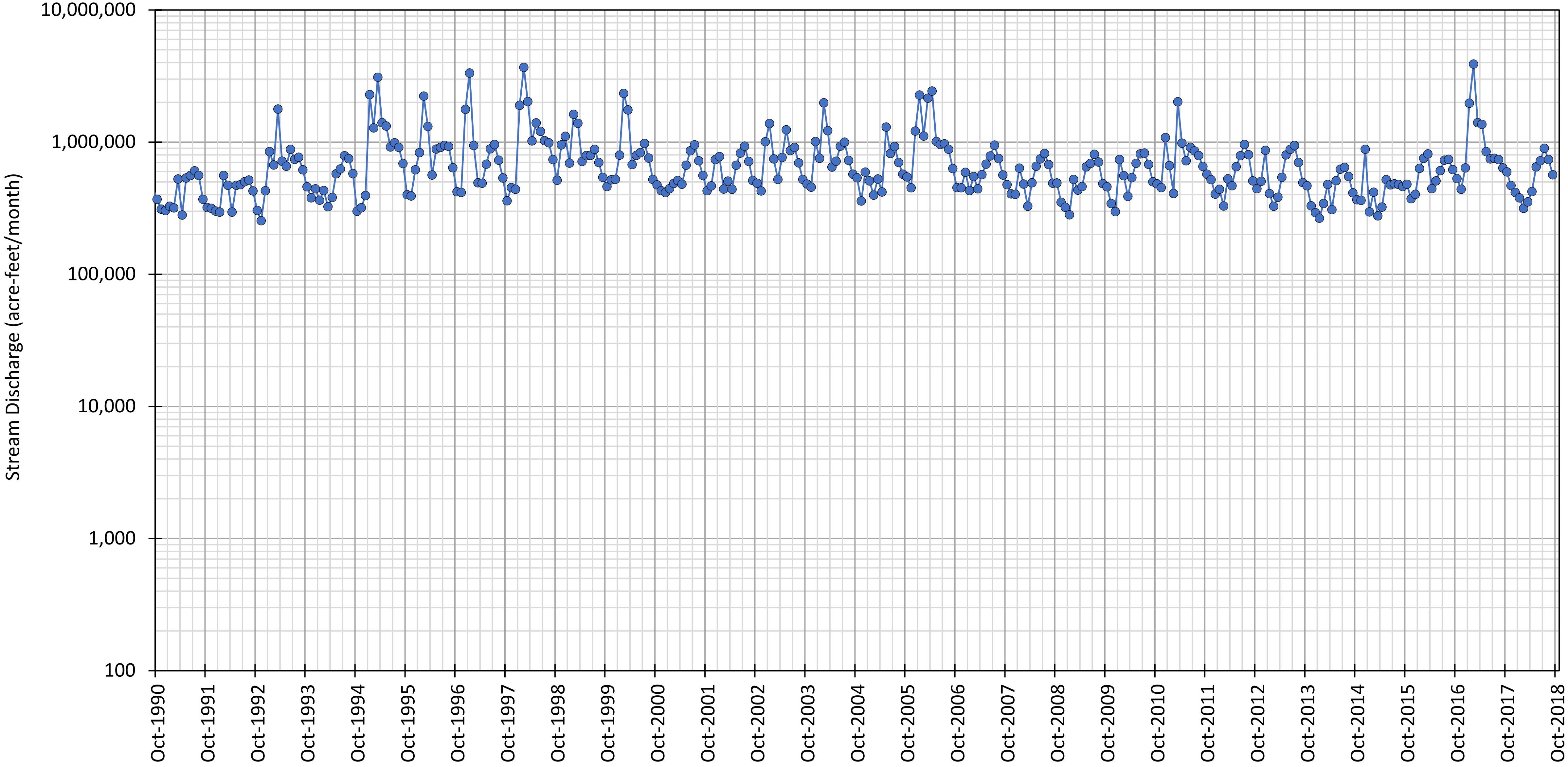
Los Molinos Subbasin



Tehama IHM - Historical

Inflow from Sacramento River at Red Bluff Subbasin Boundary

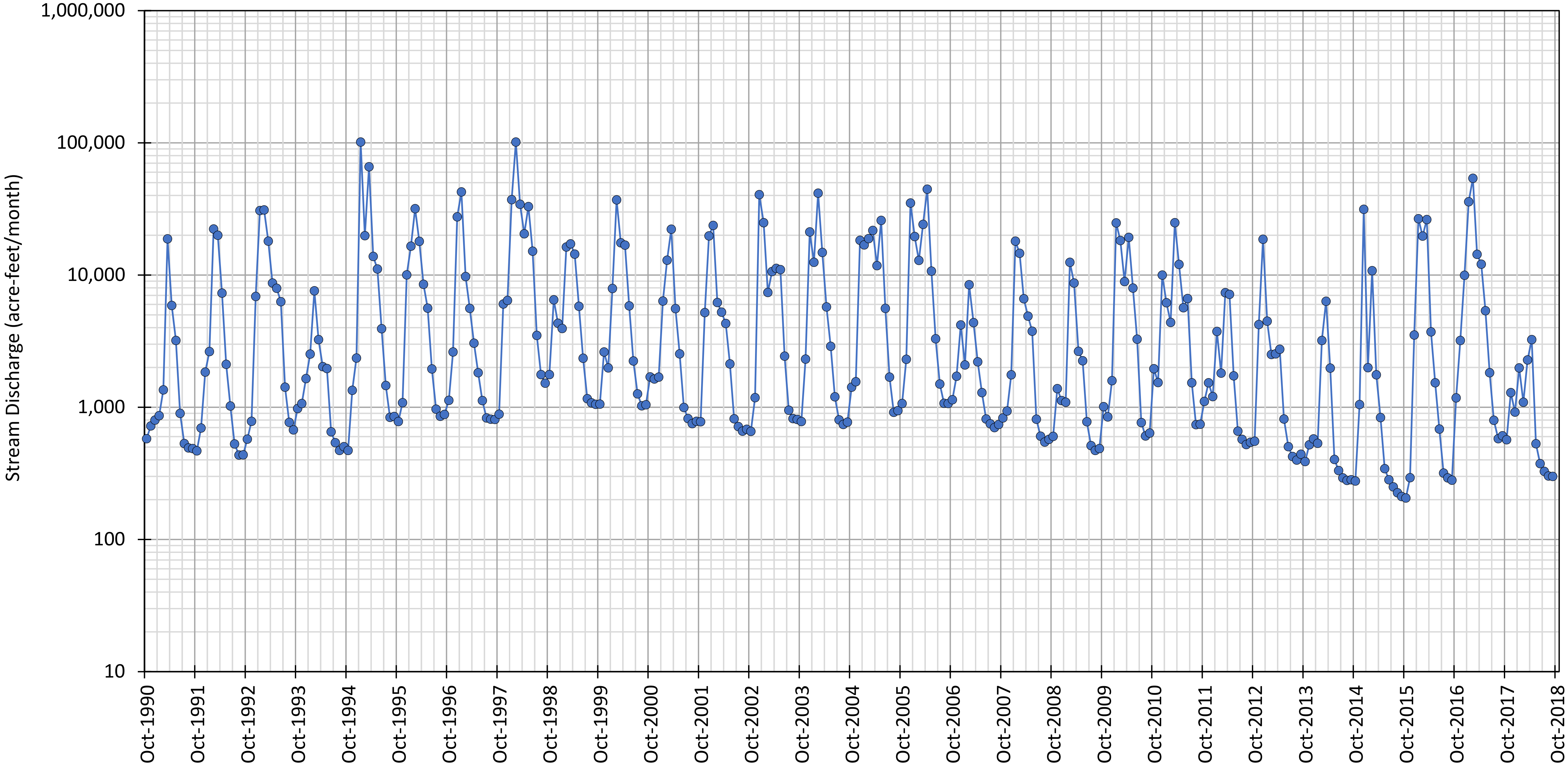
Red Bluff Subbasin



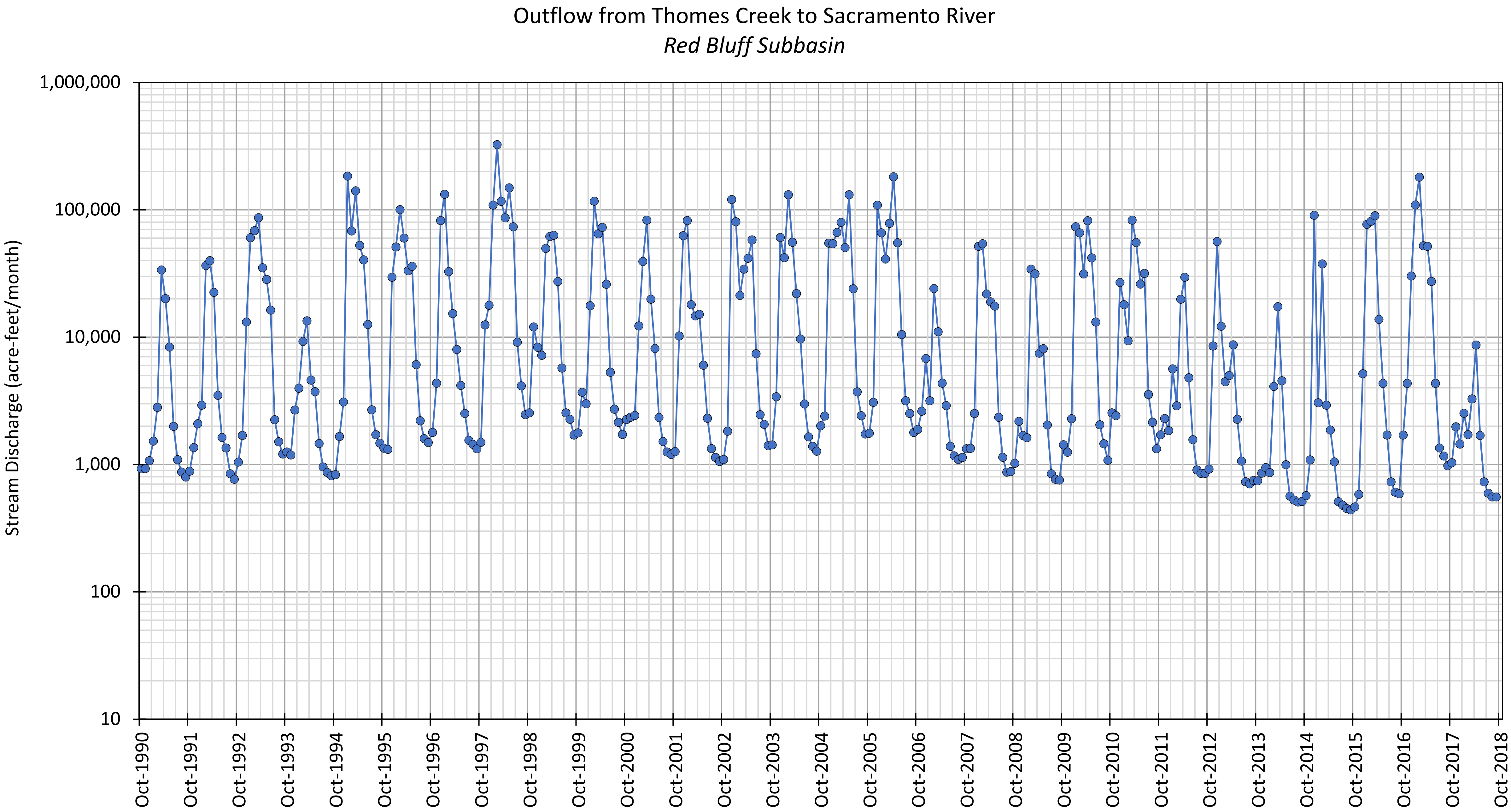
Tehama IHM - Historical

Outflow from Elder Creek to Sacramento River

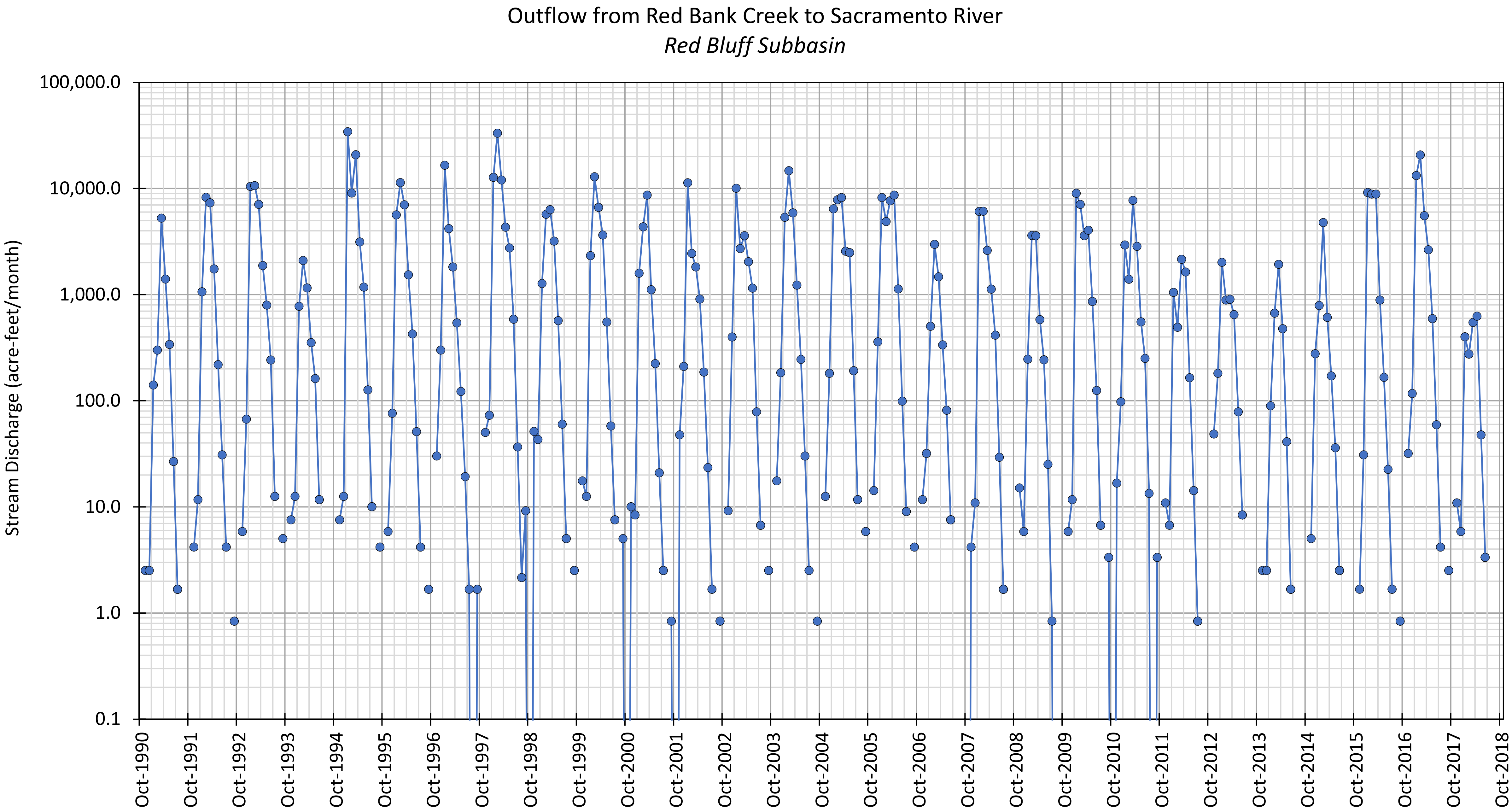
Red Bluff Subbasin



Tehama IHM - Historical



Tehama IHM - Historical



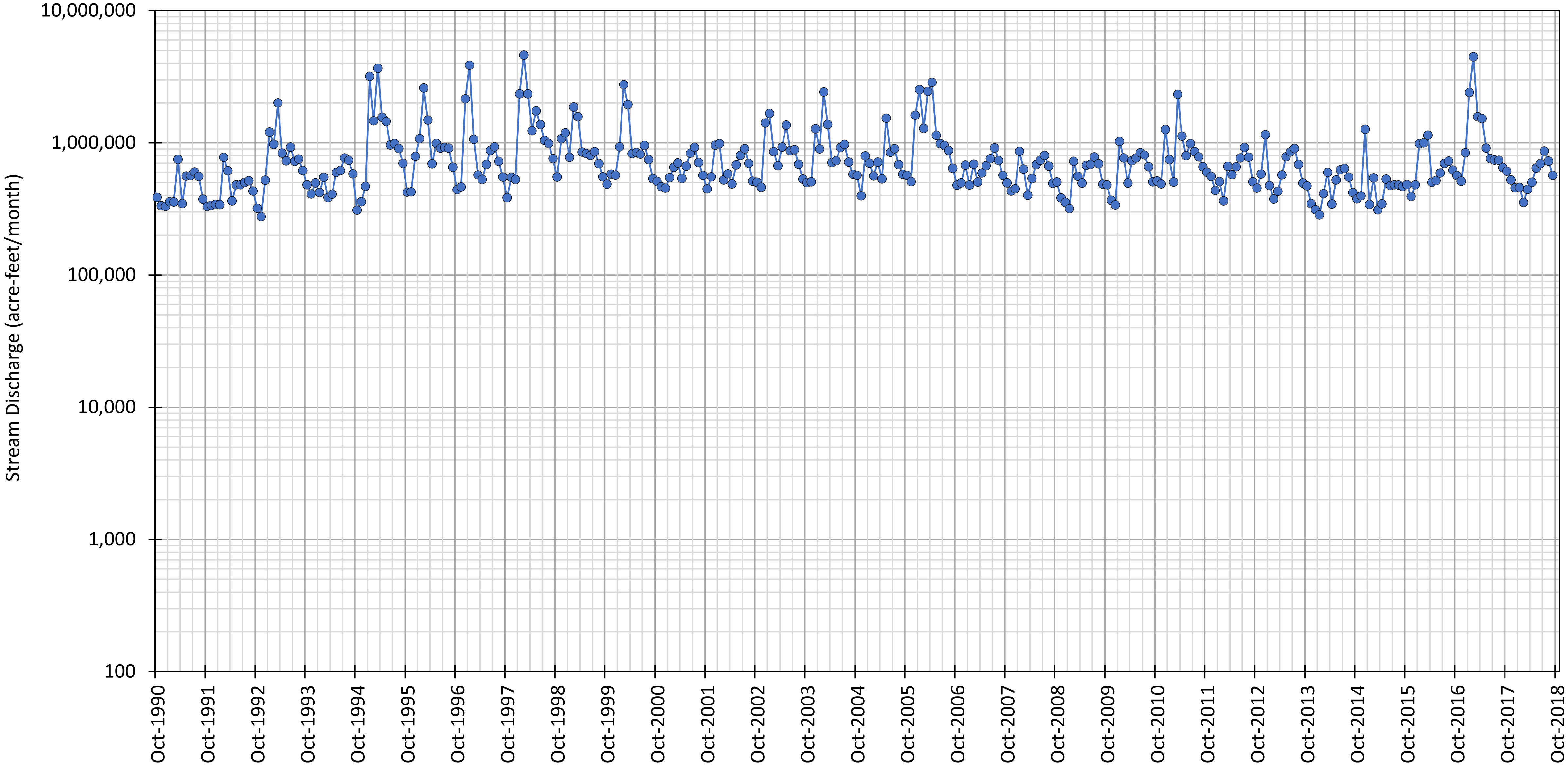
Outflow from Red Bank Creek to Sacramento River

Red Bluff Subbasin

Tehama IHM - Historical

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin

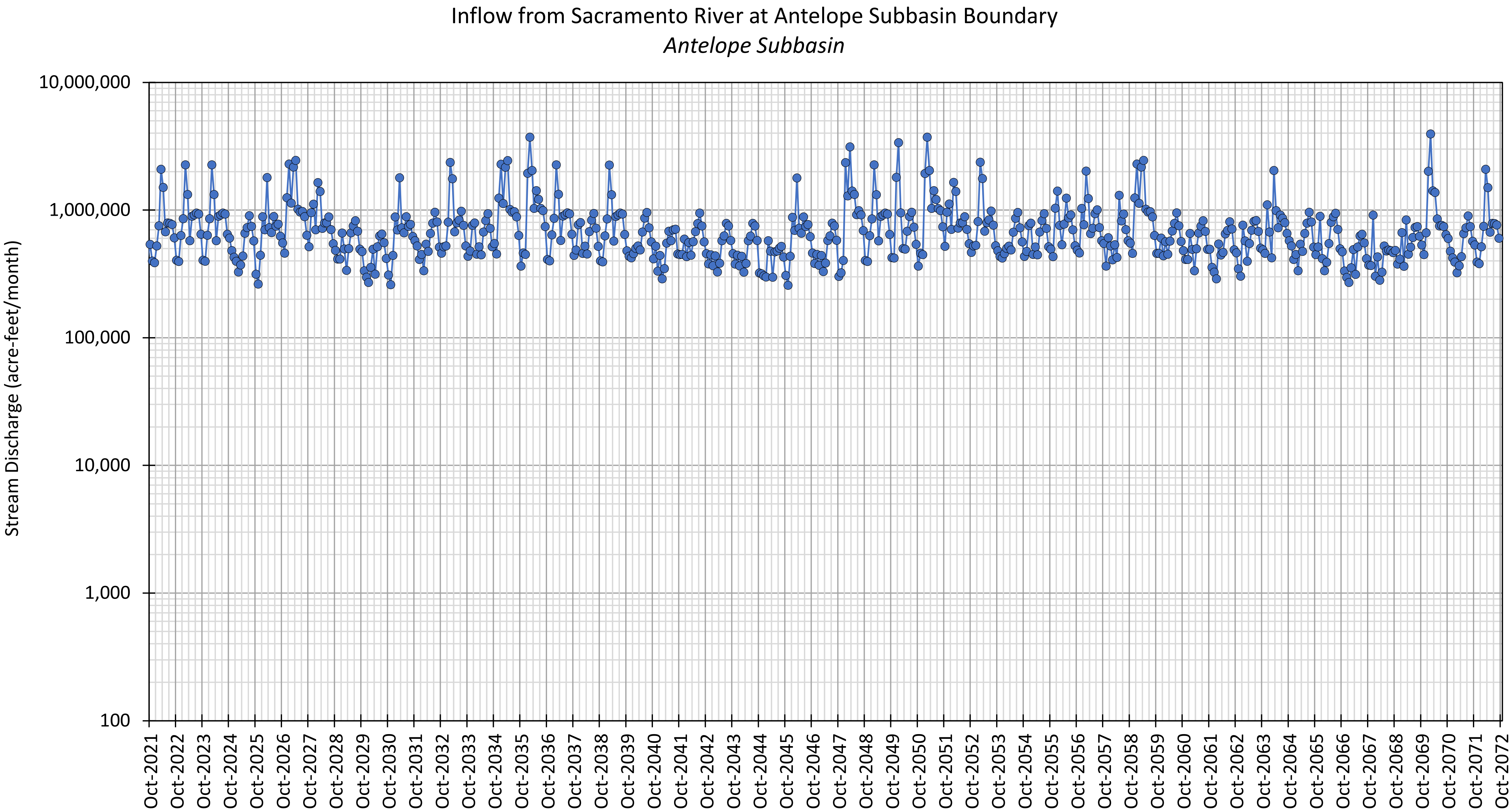


Tehama IHM - Historical

APPENDIX G-2

Tehama IHM Simulated Streamflows:

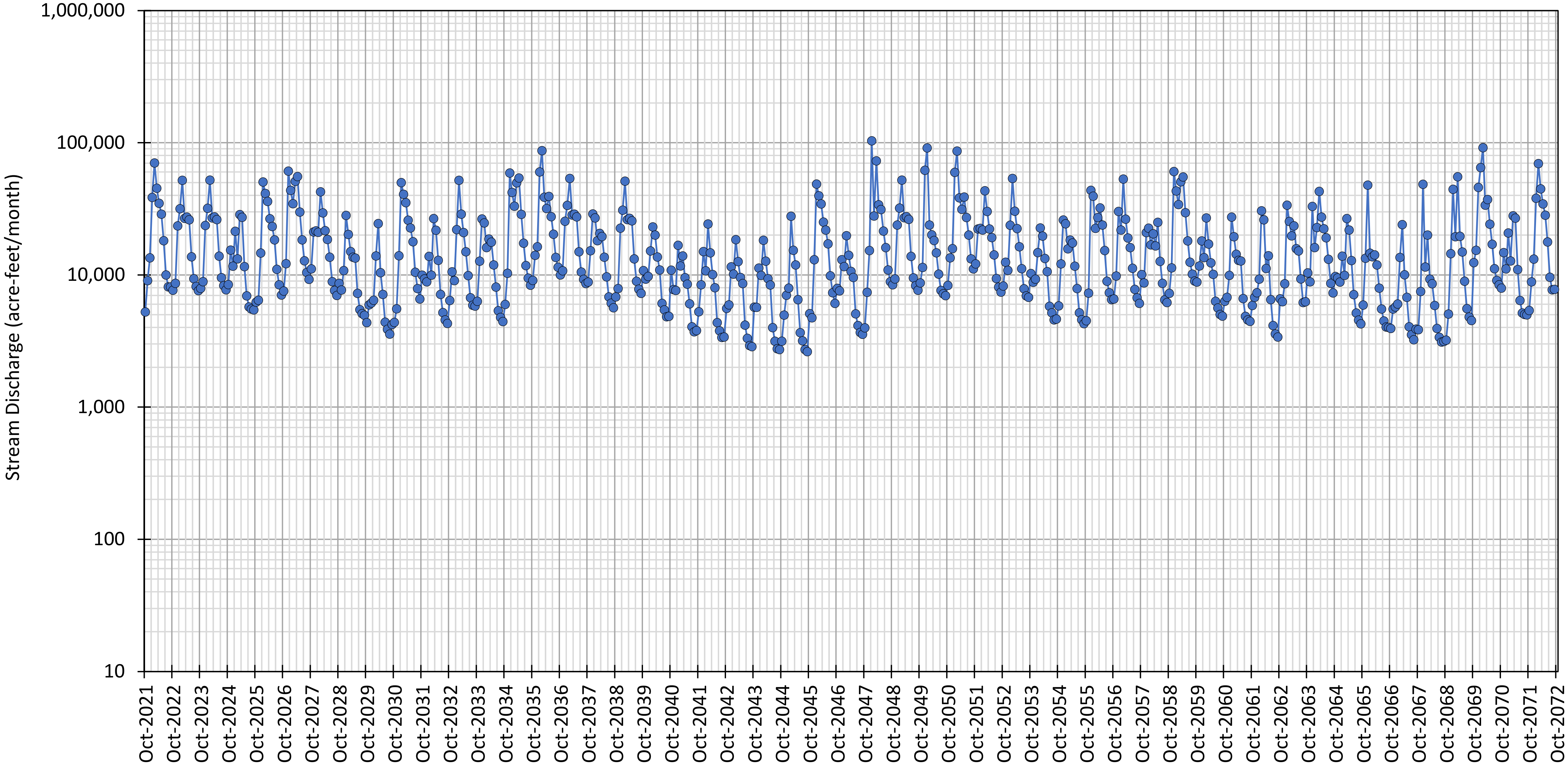
Projected (Current Land Use) Model Results



Tehama IHM - Projected (Current Land Use)

Outflow from Antelope Creek Group to Sacramento River

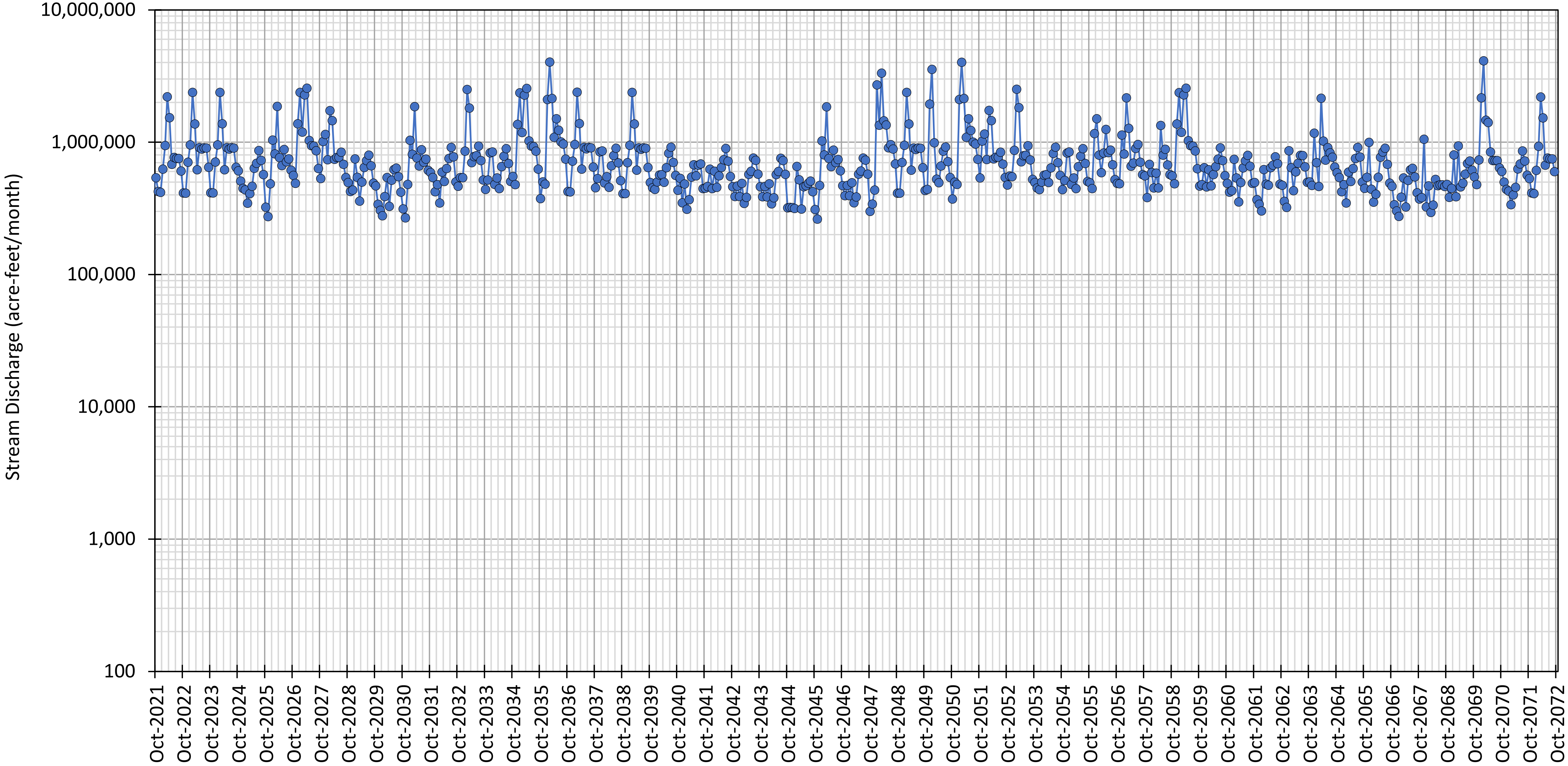
Antelope Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Sacramento River at Antelope Subbasin Boundary

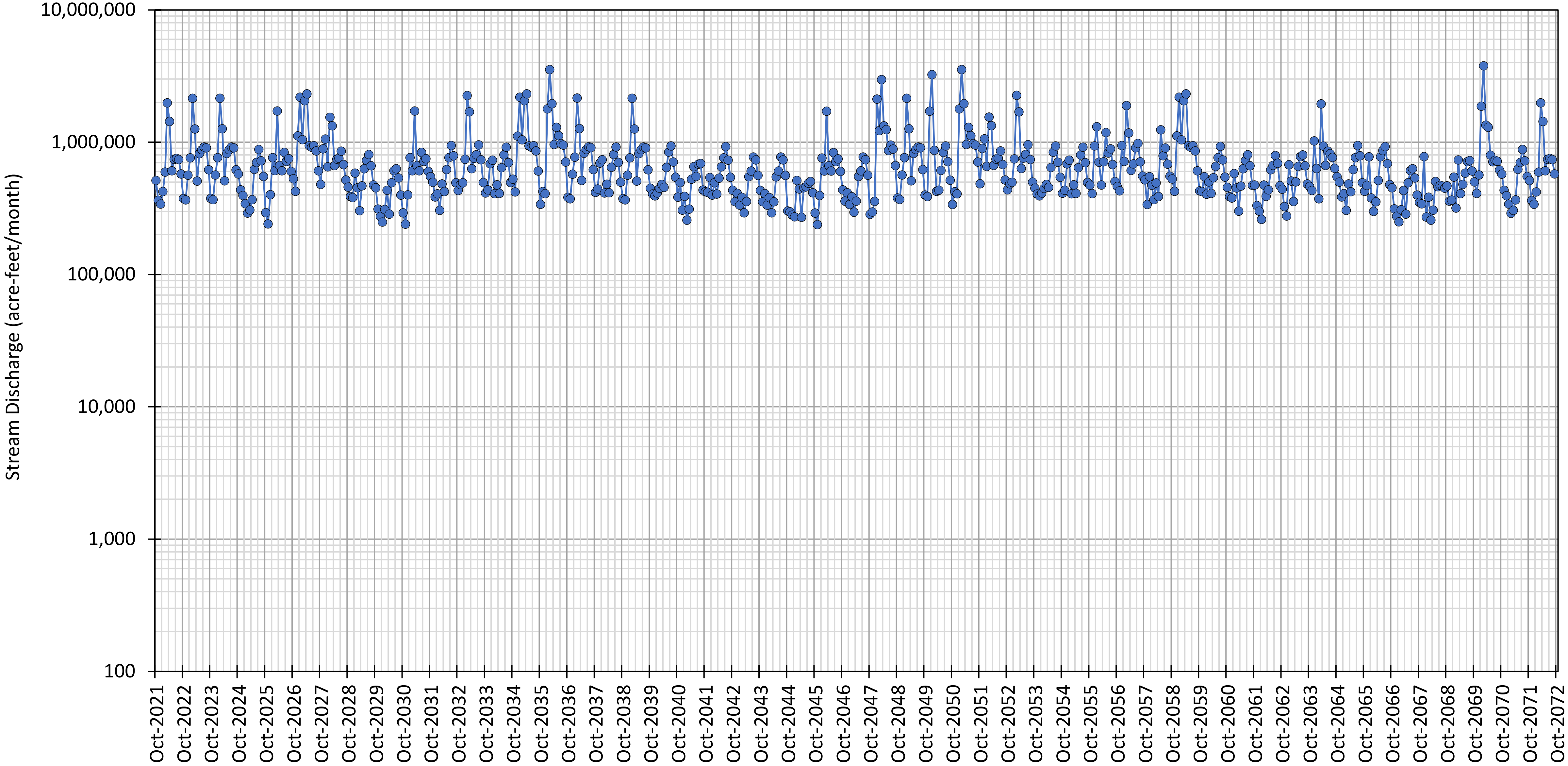
Antelope Subbasin



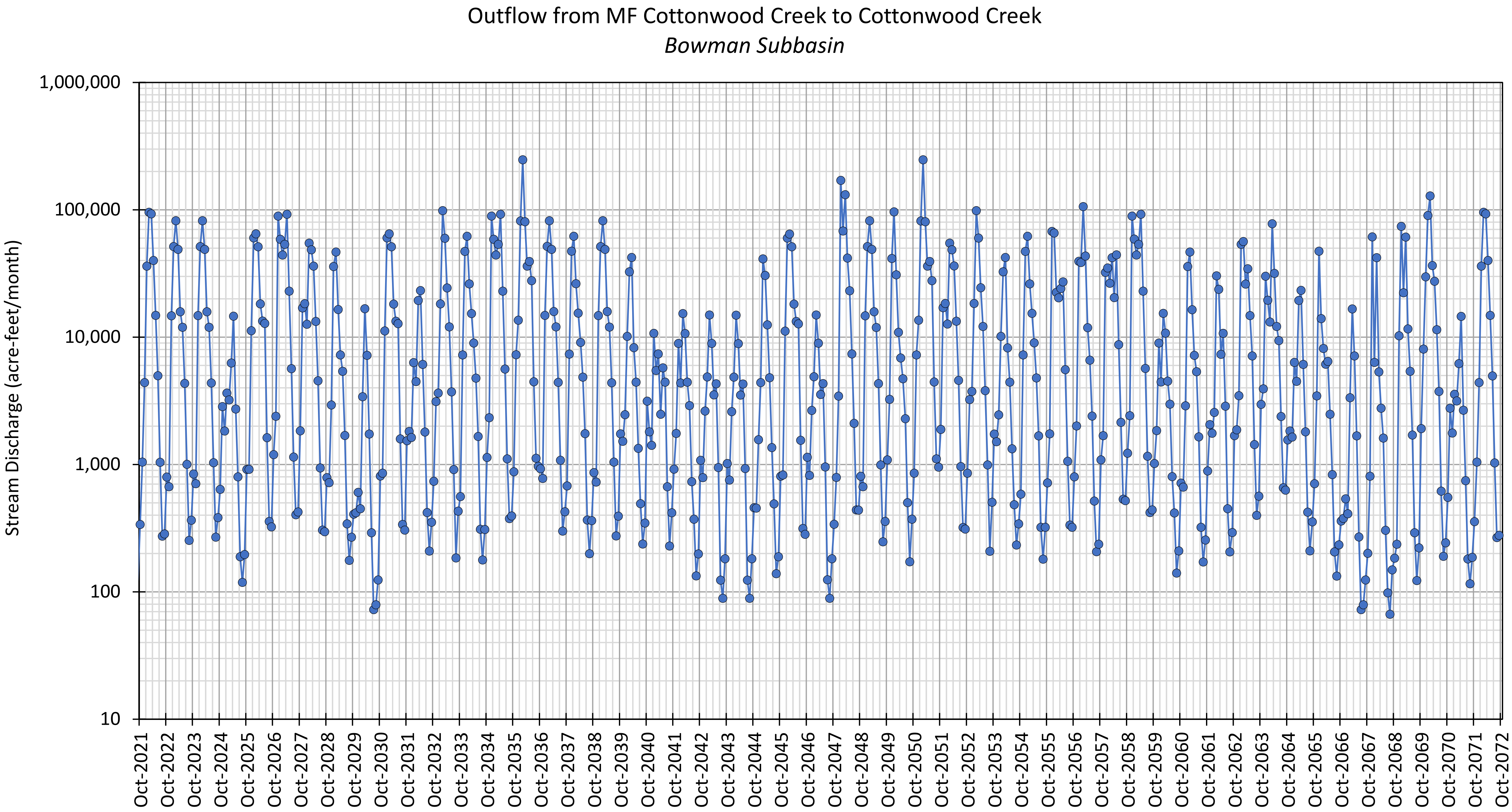
Tehama IHM - Projected (Current Land Use)

Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin



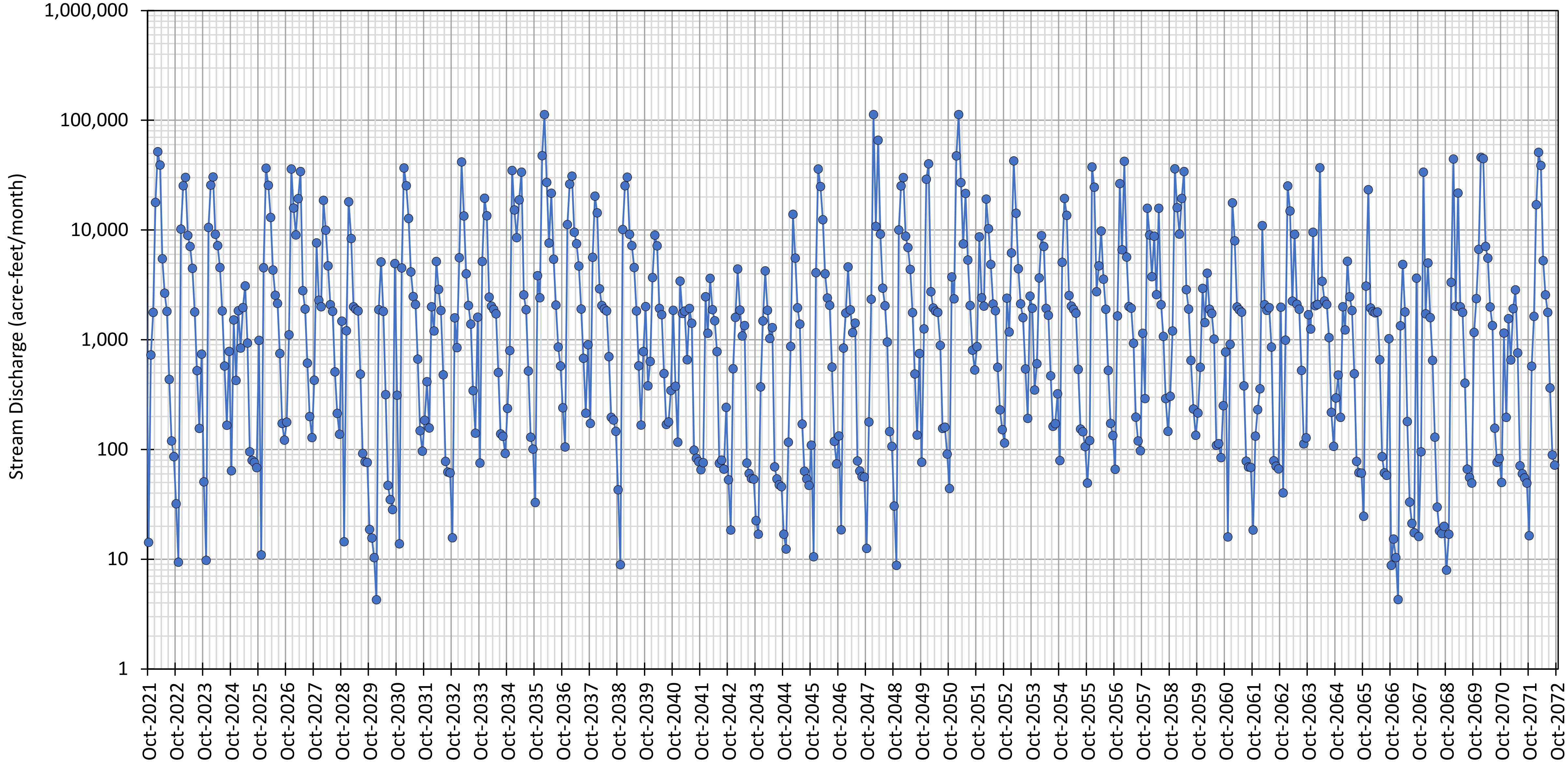
Tehama IHM - Projected (Current Land Use)



Tehama IHM - Projected (Current Land Use)

Outflow from SF Cottonwood Creek to Cottonwood Creek

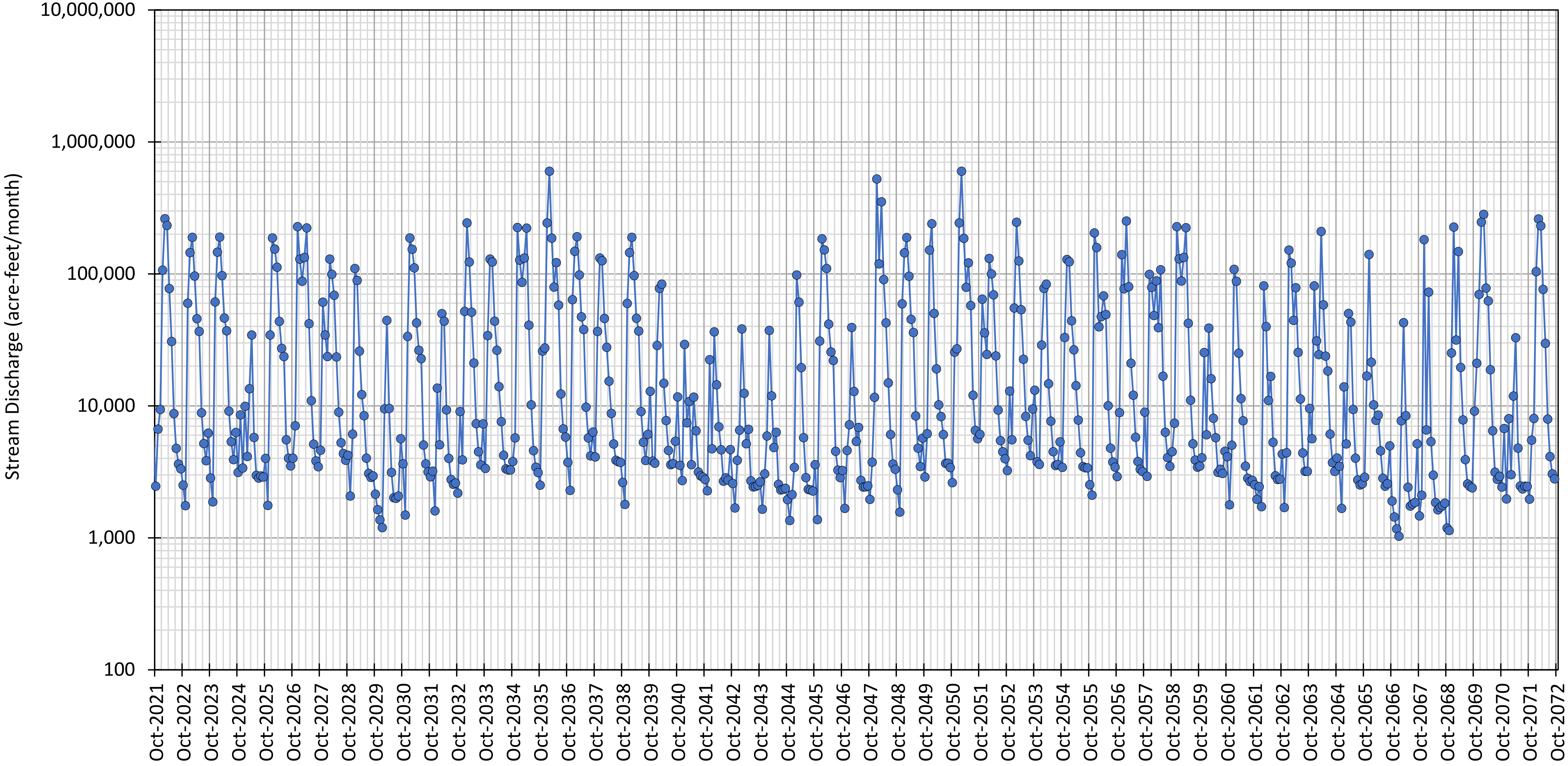
Bowman Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Cottonwood Creek to Sacramento River

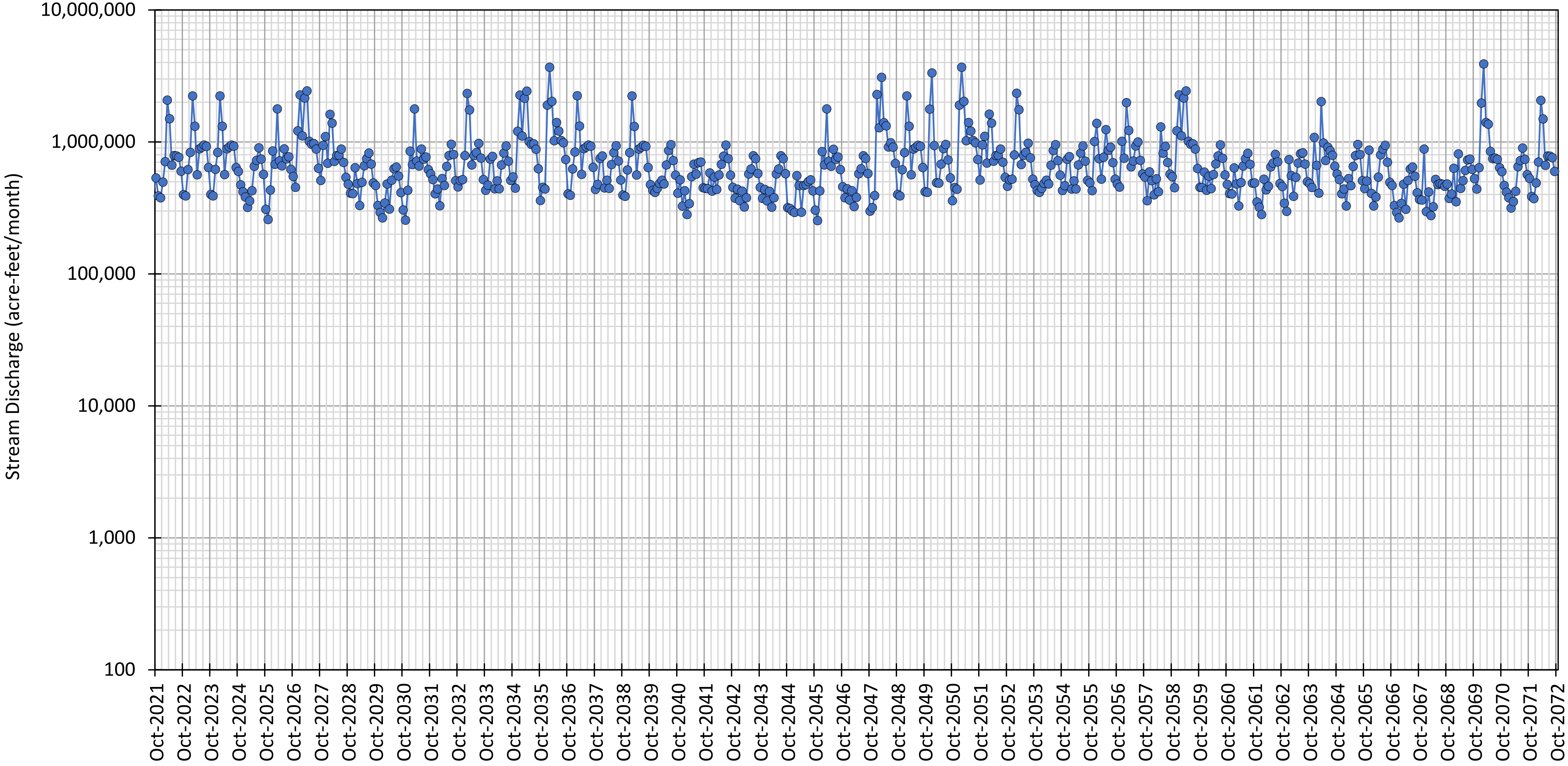
Bowman Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Sacramento River at Bowman Subbasin Boundary

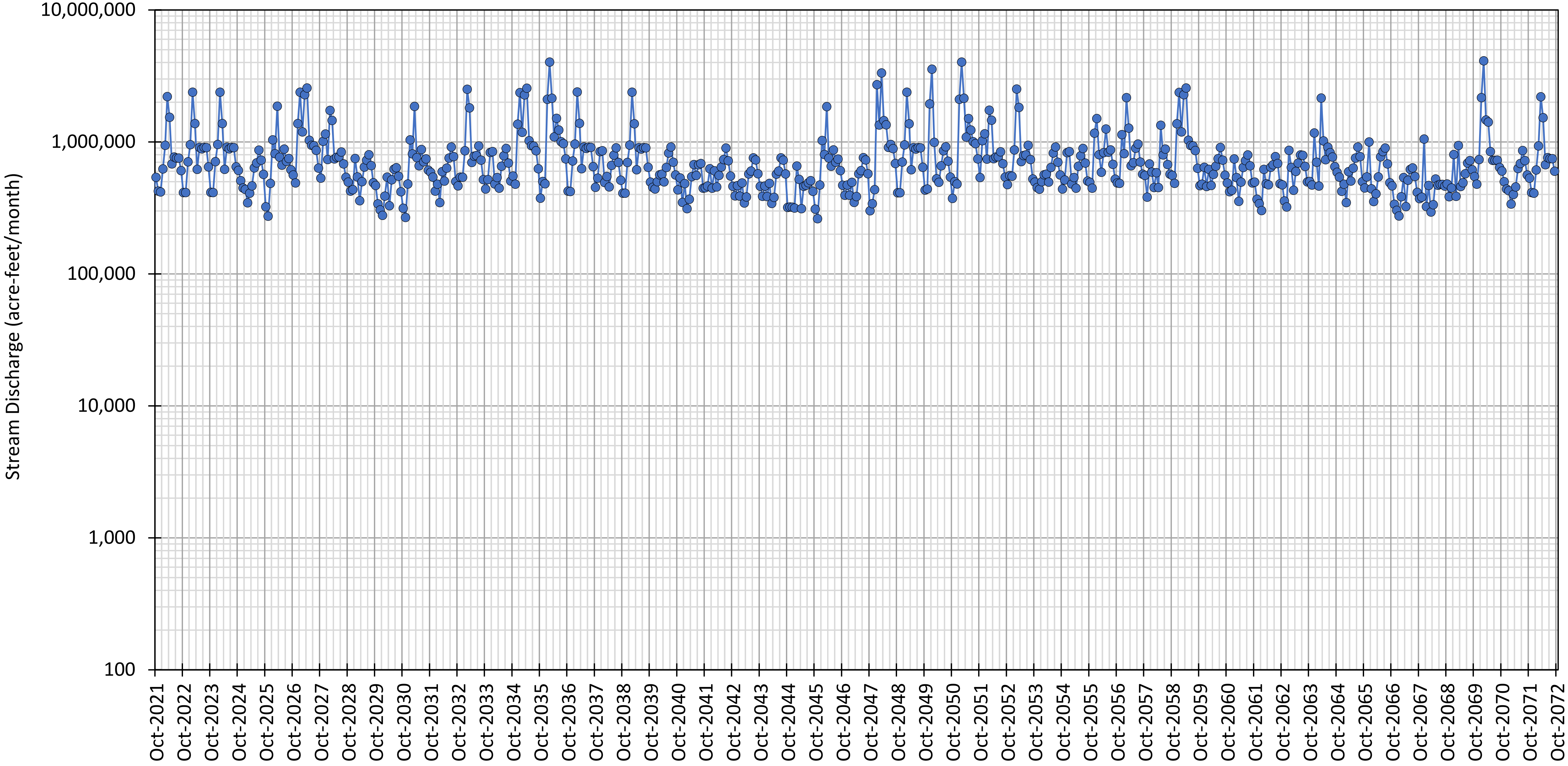
Bowman Subbasin



Tehama IHM - Projected (Current Land Use)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

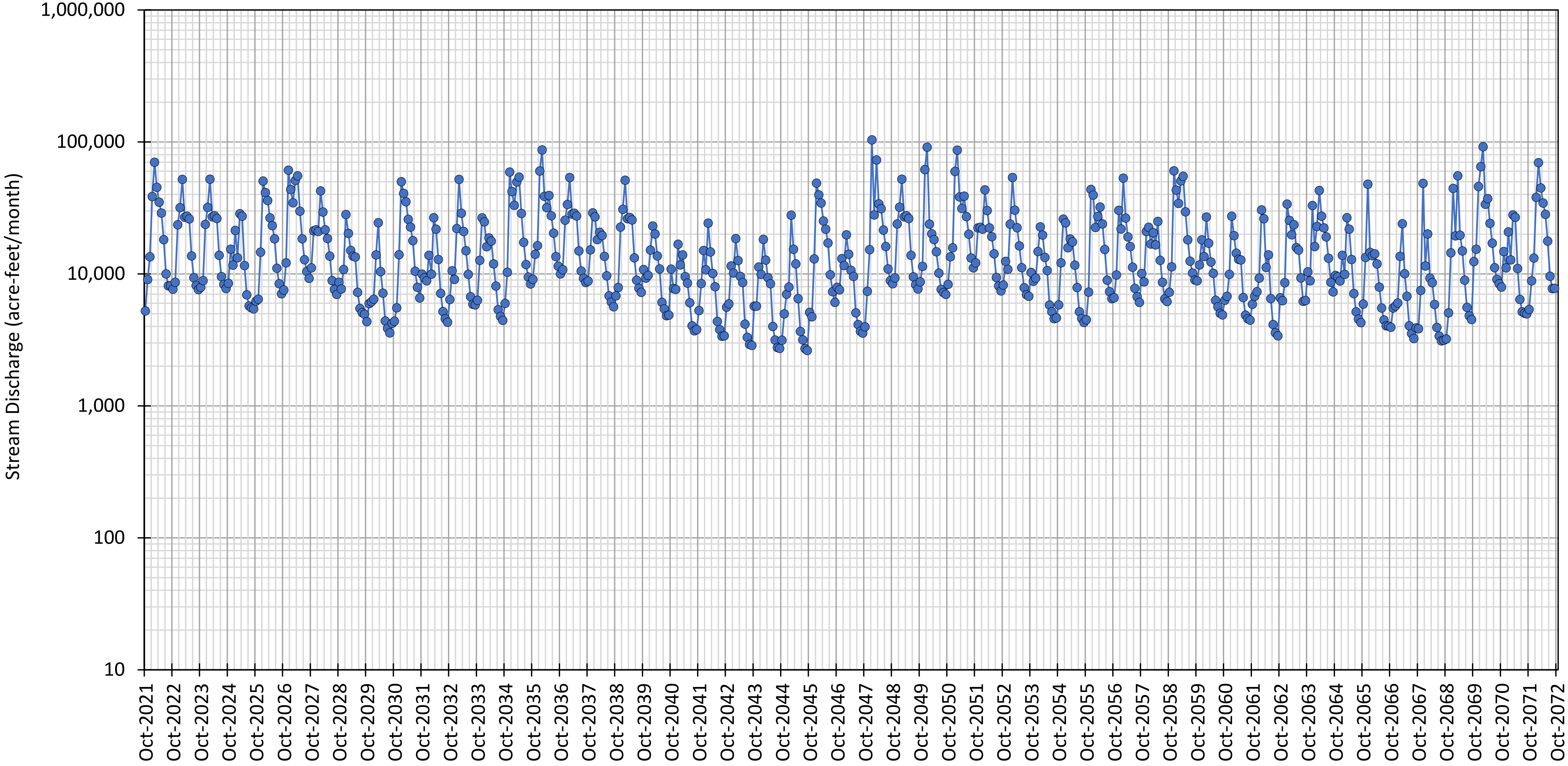
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Antelope Creek Group to Sacramento River

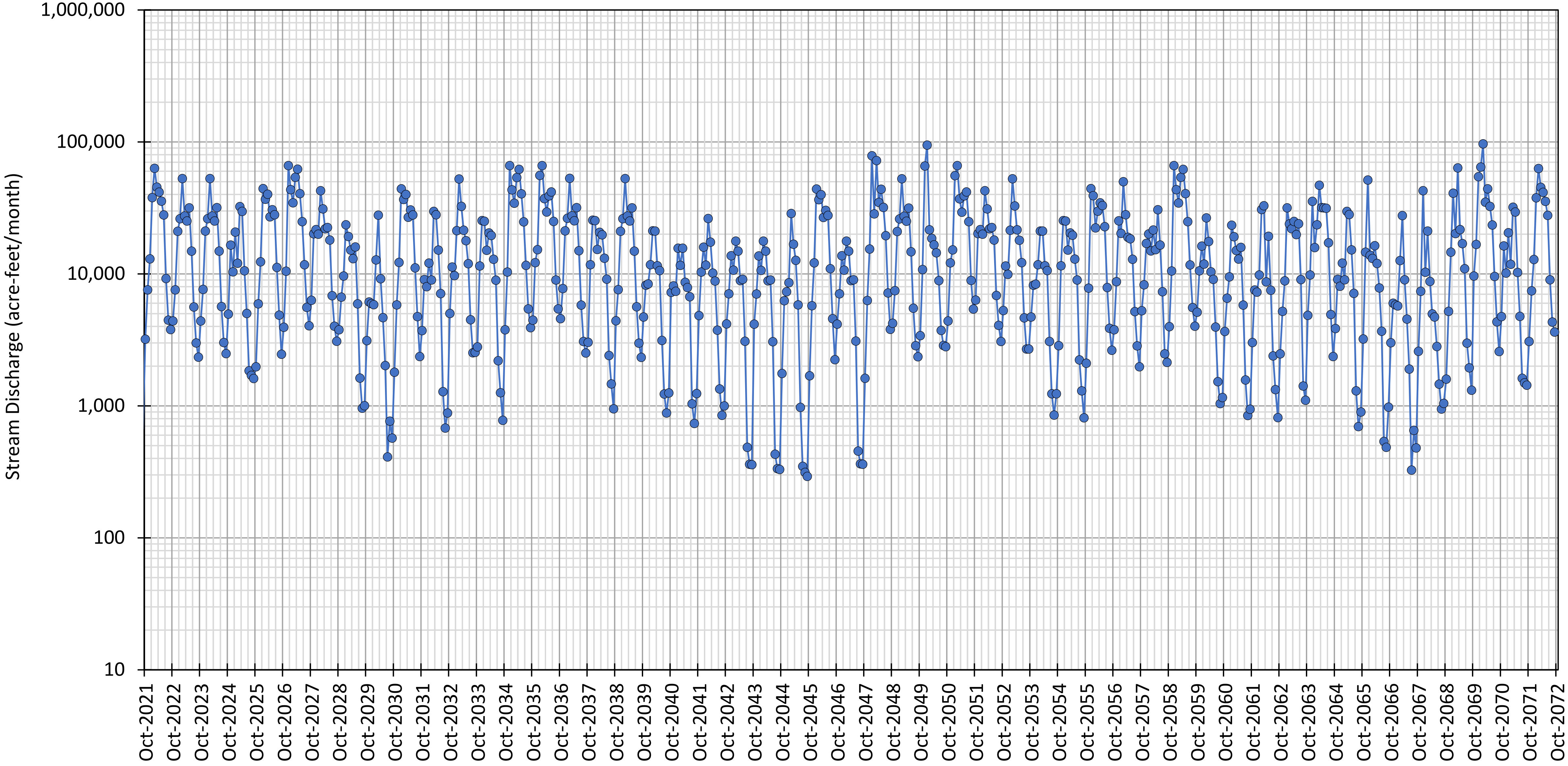
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Mill Creek to Sacramento River

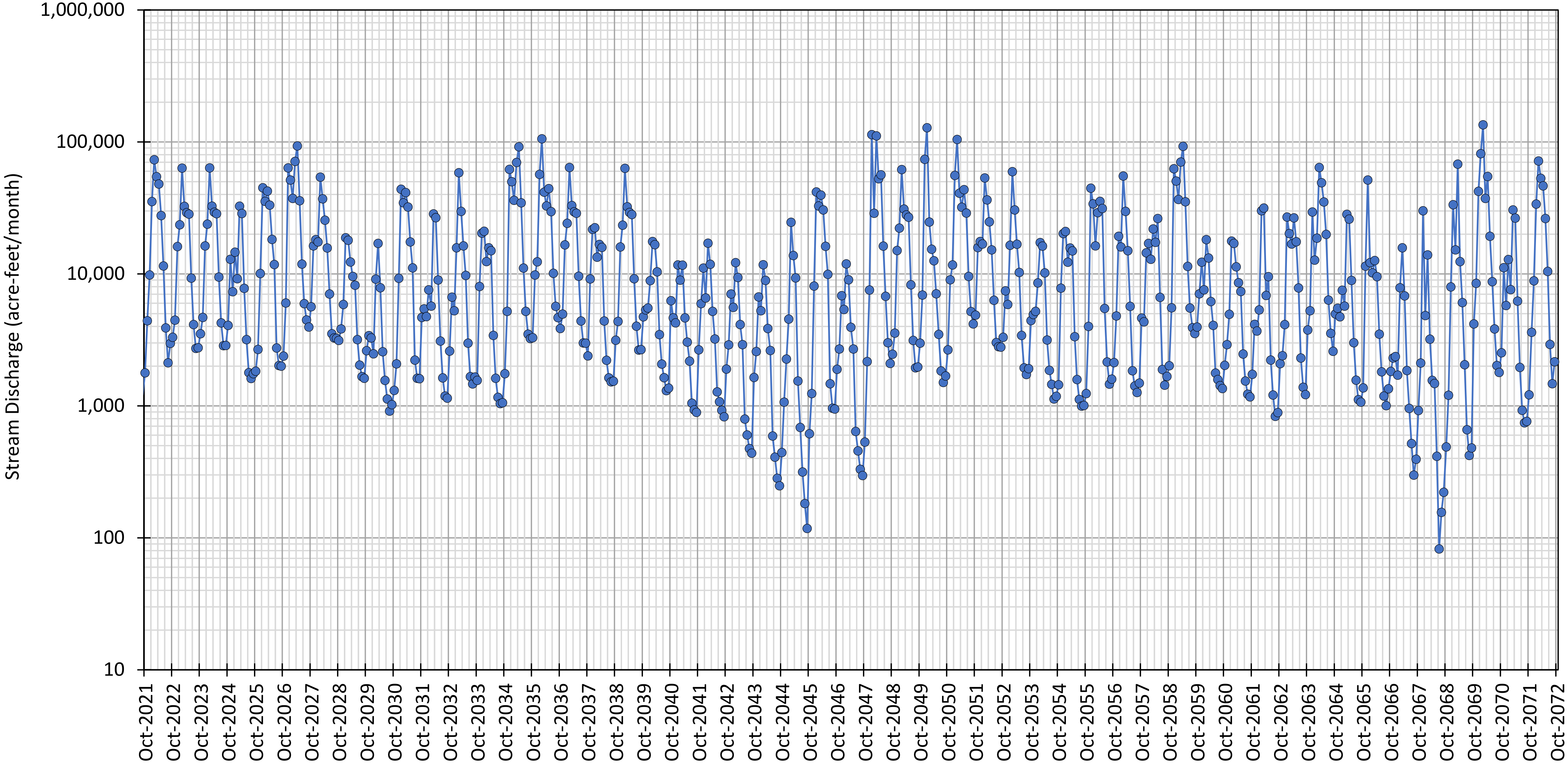
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Deer Creek Group to Sacramento River

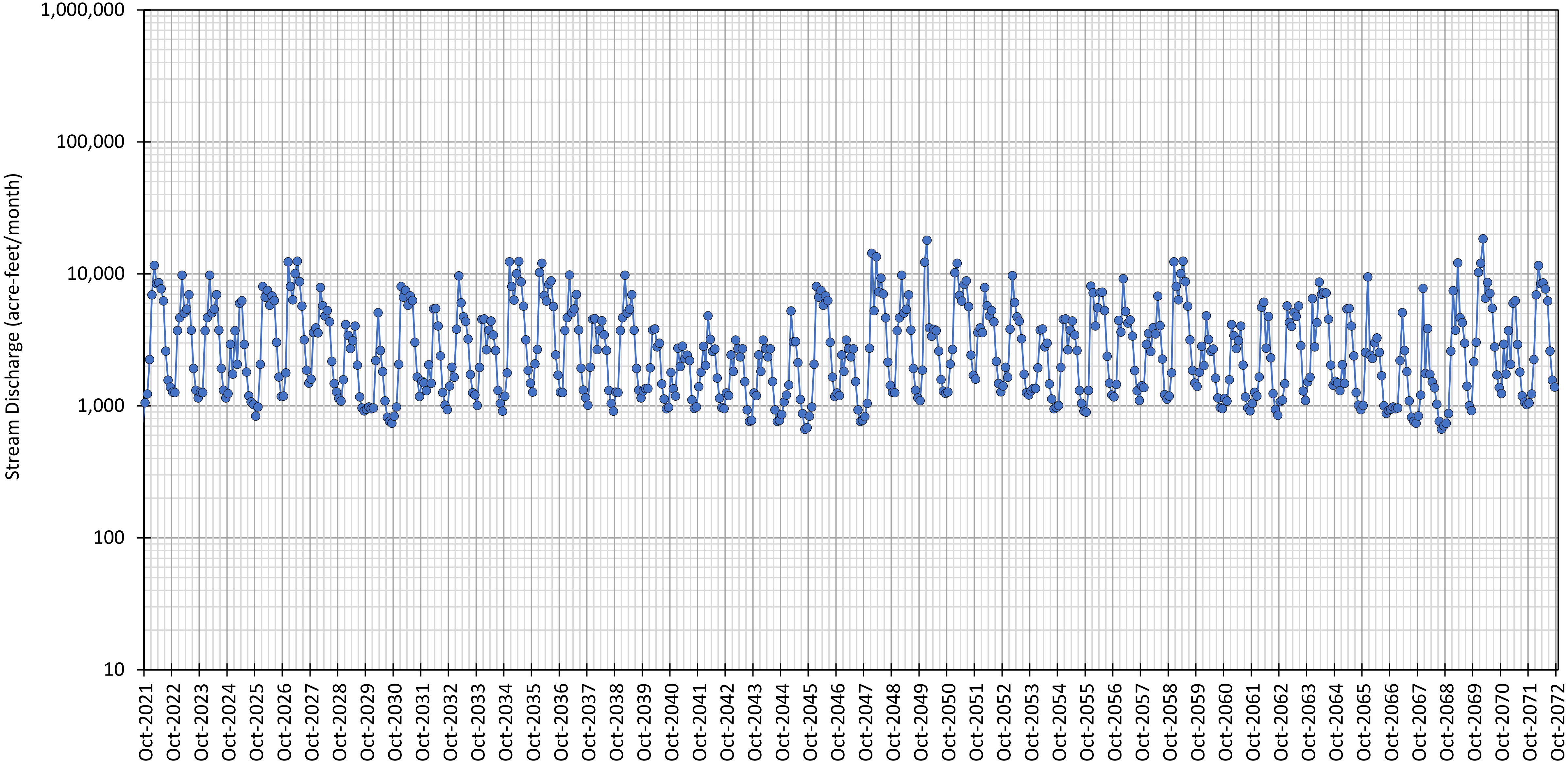
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Dye Creek to Sacramento River

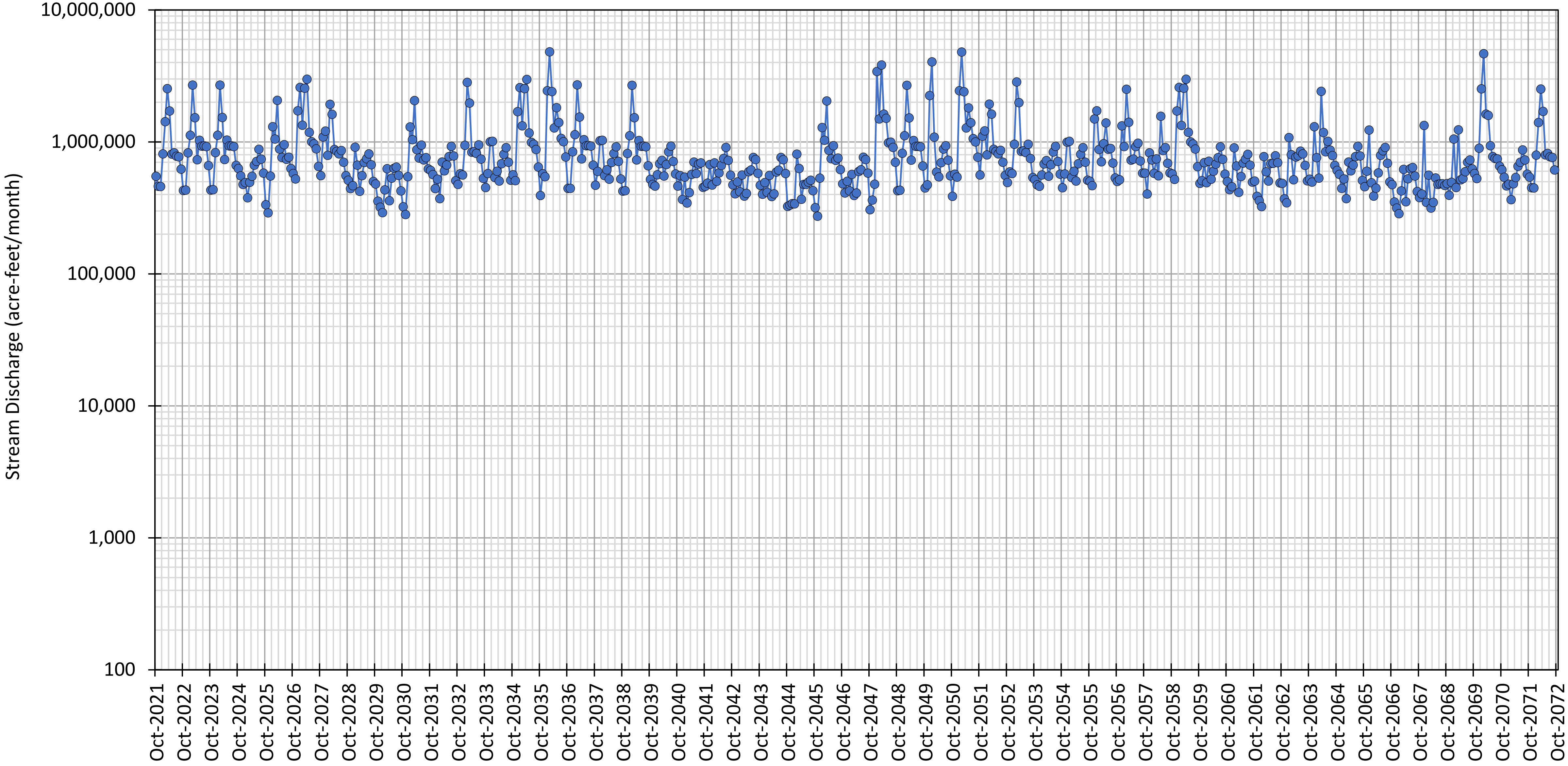
Los Molinos Subbasin



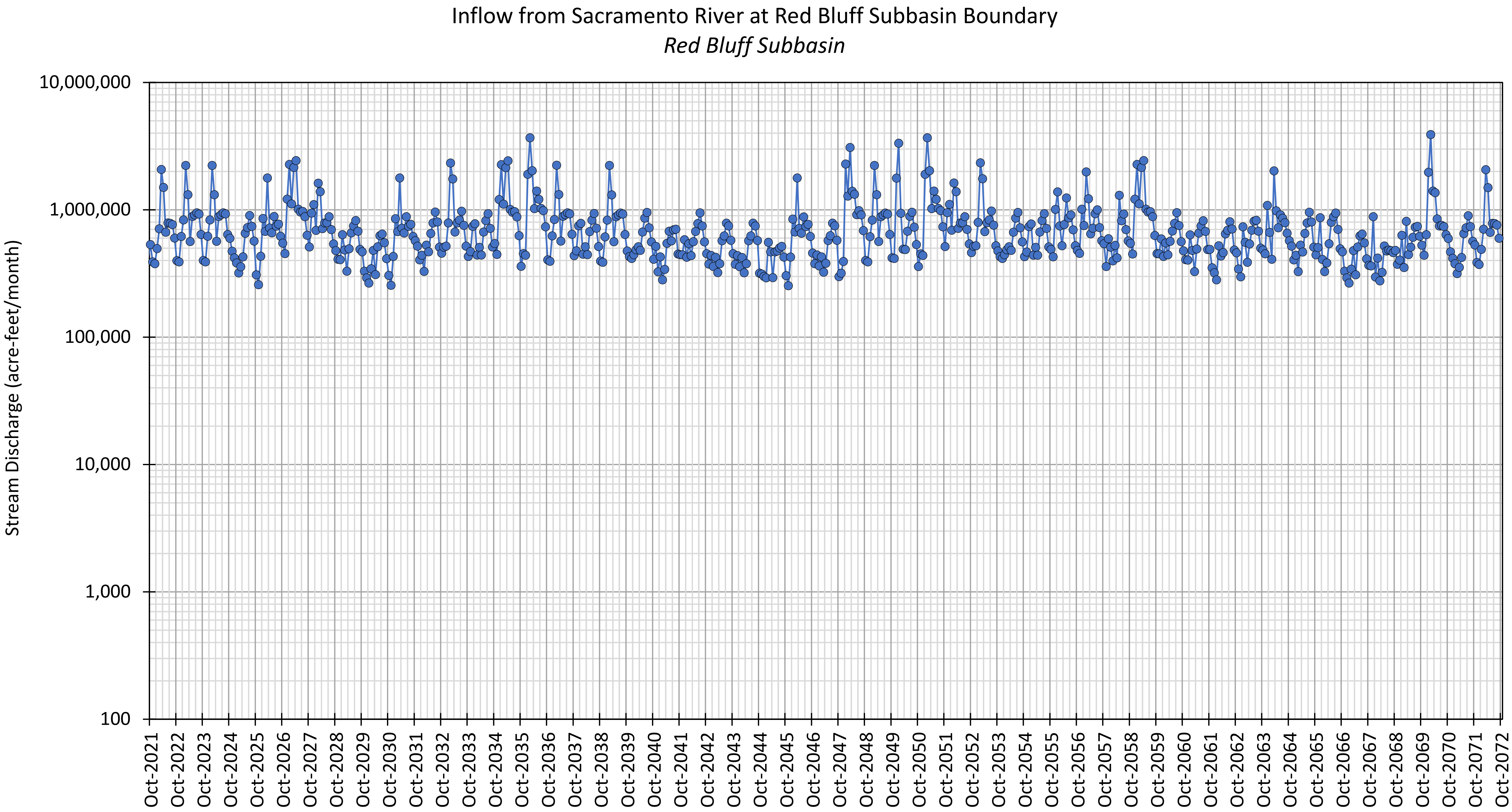
Tehama IHM - Projected (Current Land Use)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin



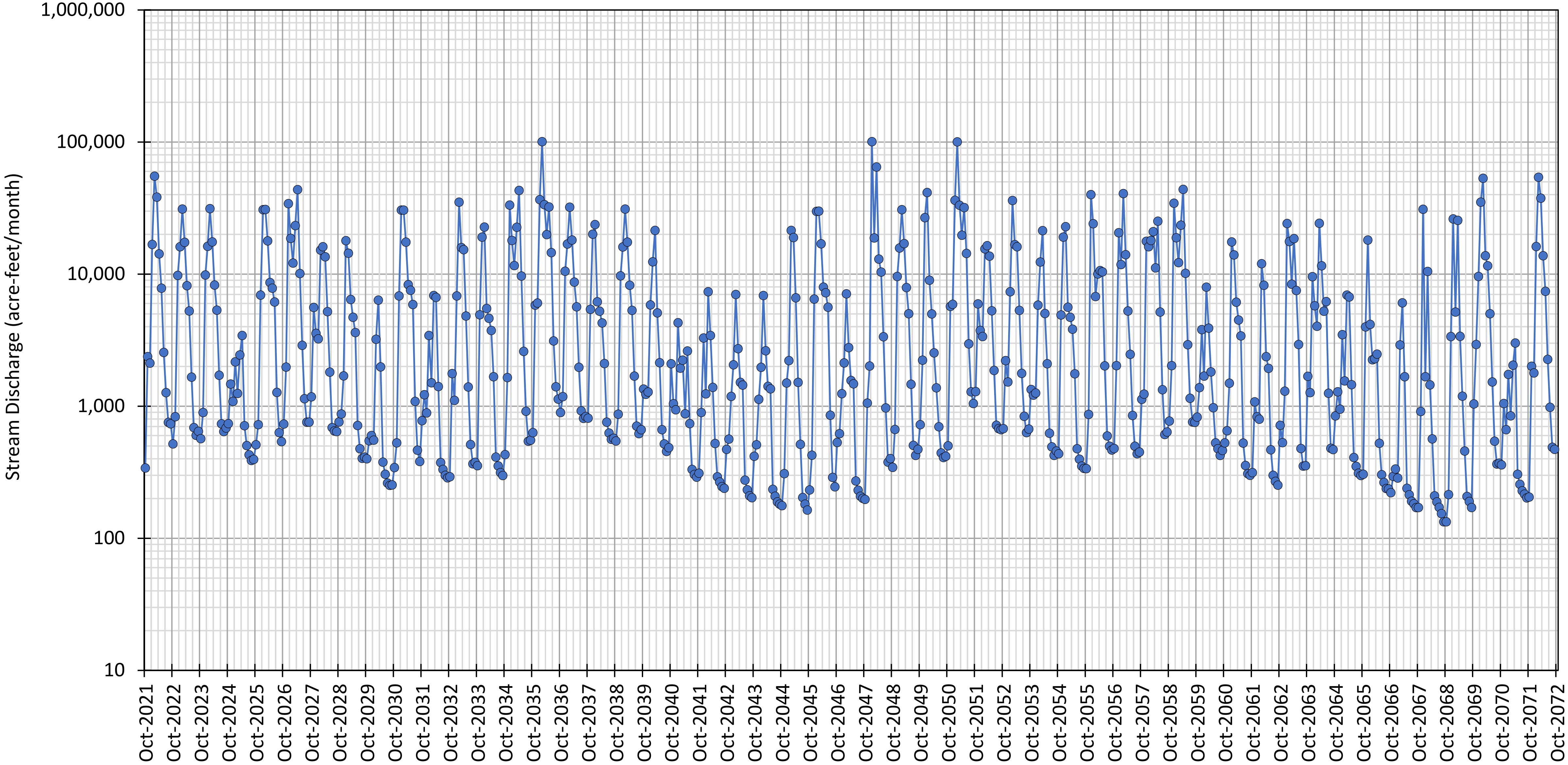
Tehama IHM - Projected (Current Land Use)



Tehama IHM - Projected (Current Land Use)

Outflow from Elder Creek to Sacramento River

Red Bluff Subbasin



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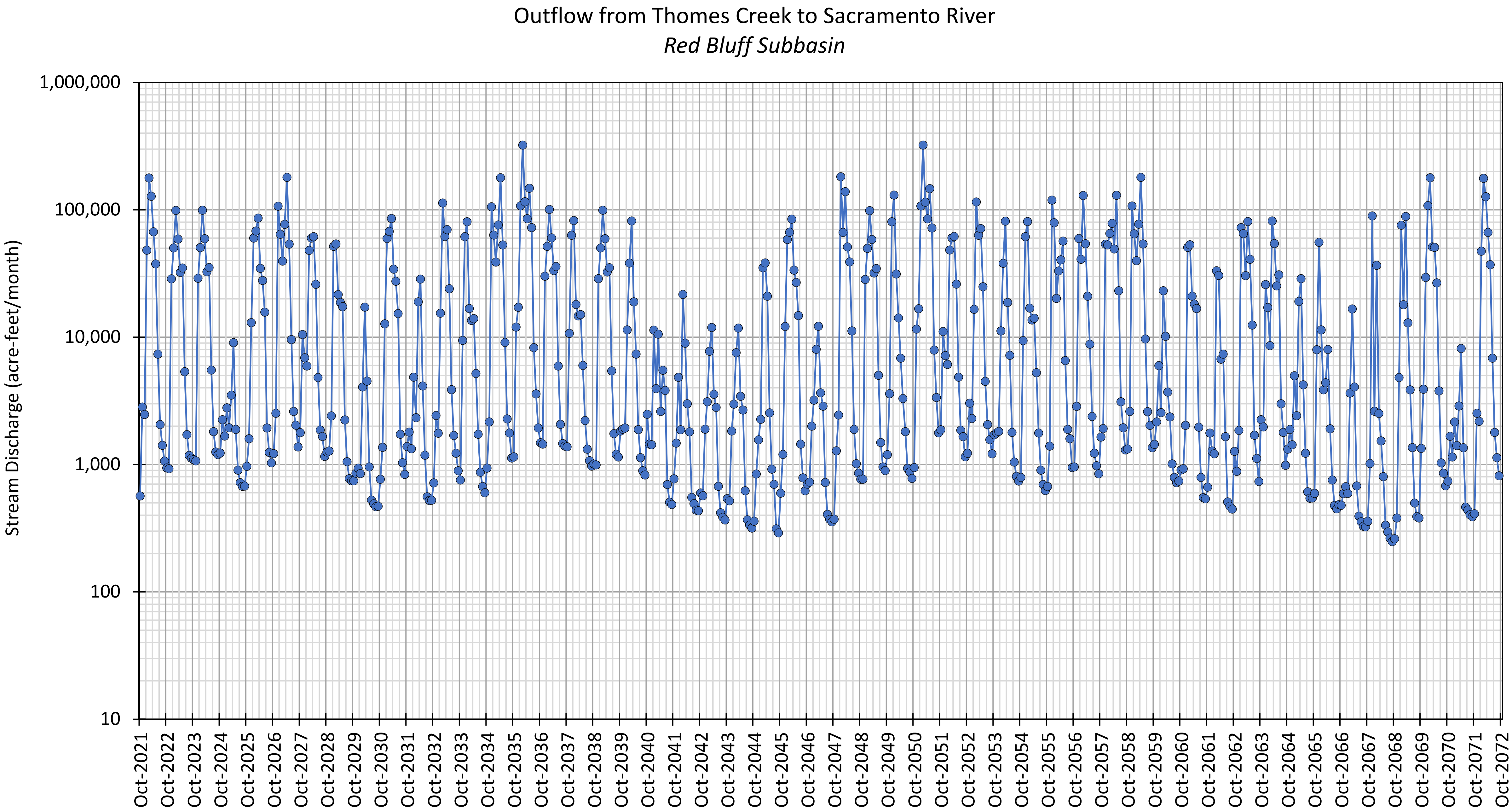

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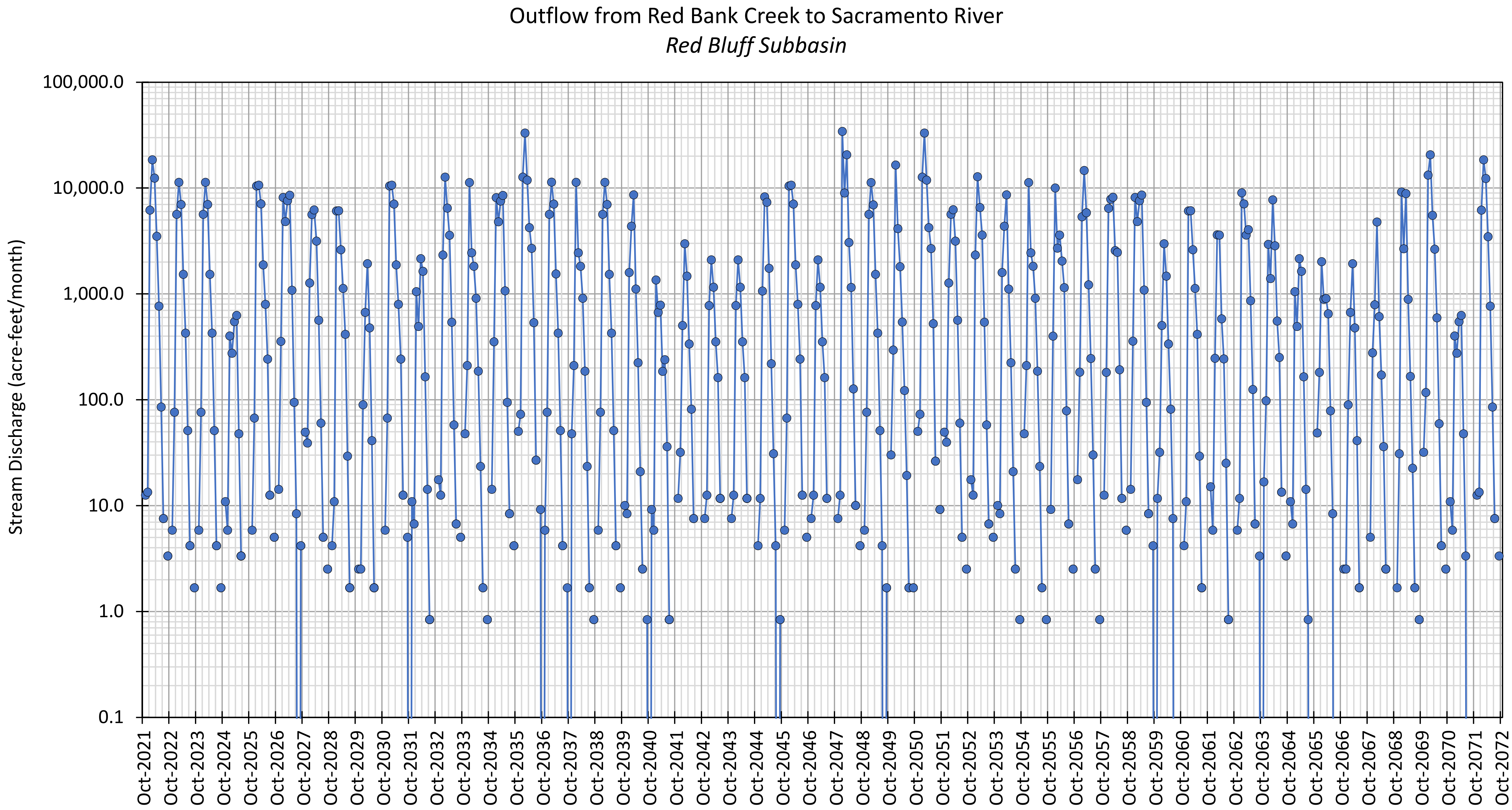
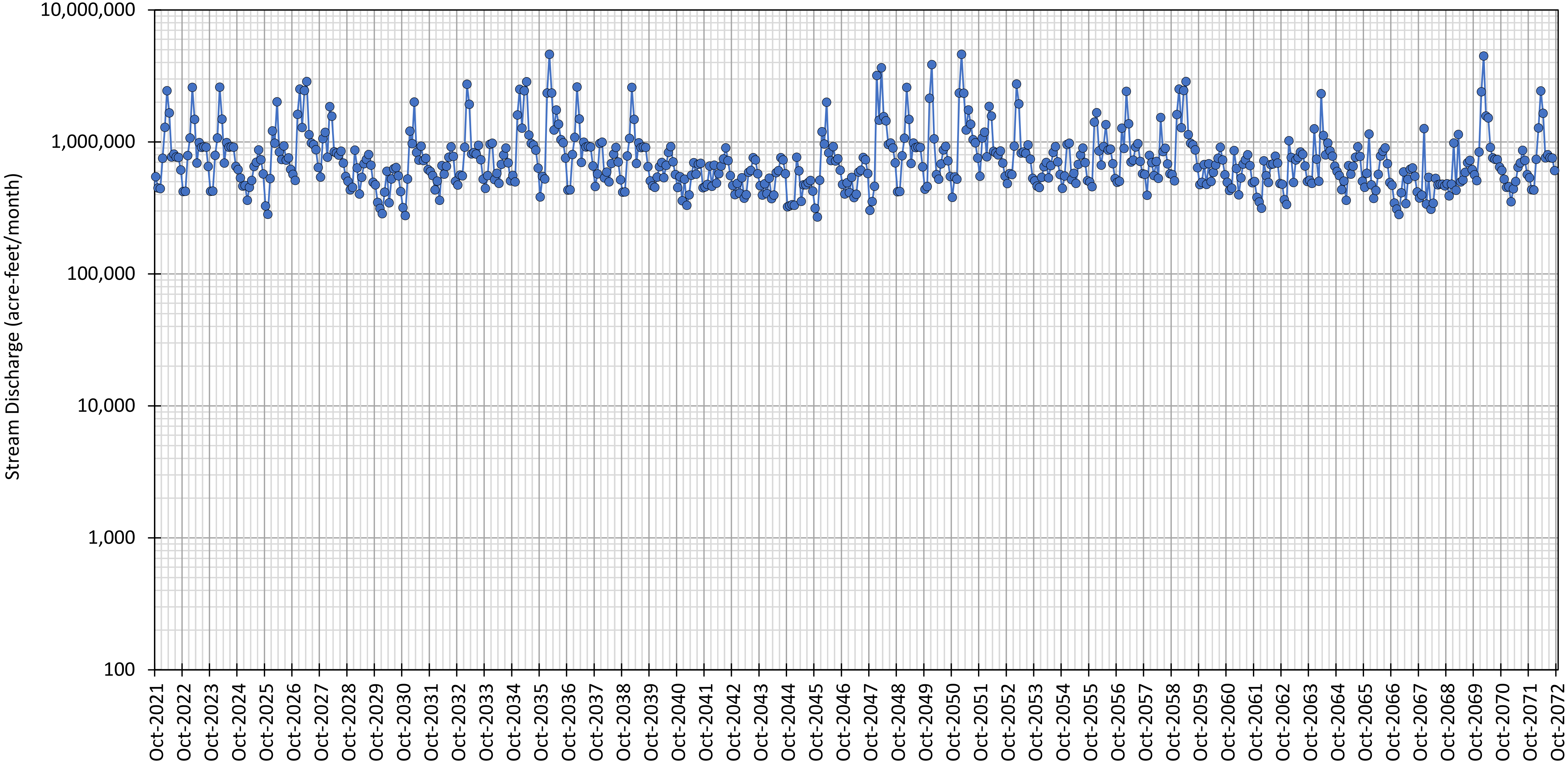


Tehama IHM - Projected (Current Land Use)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



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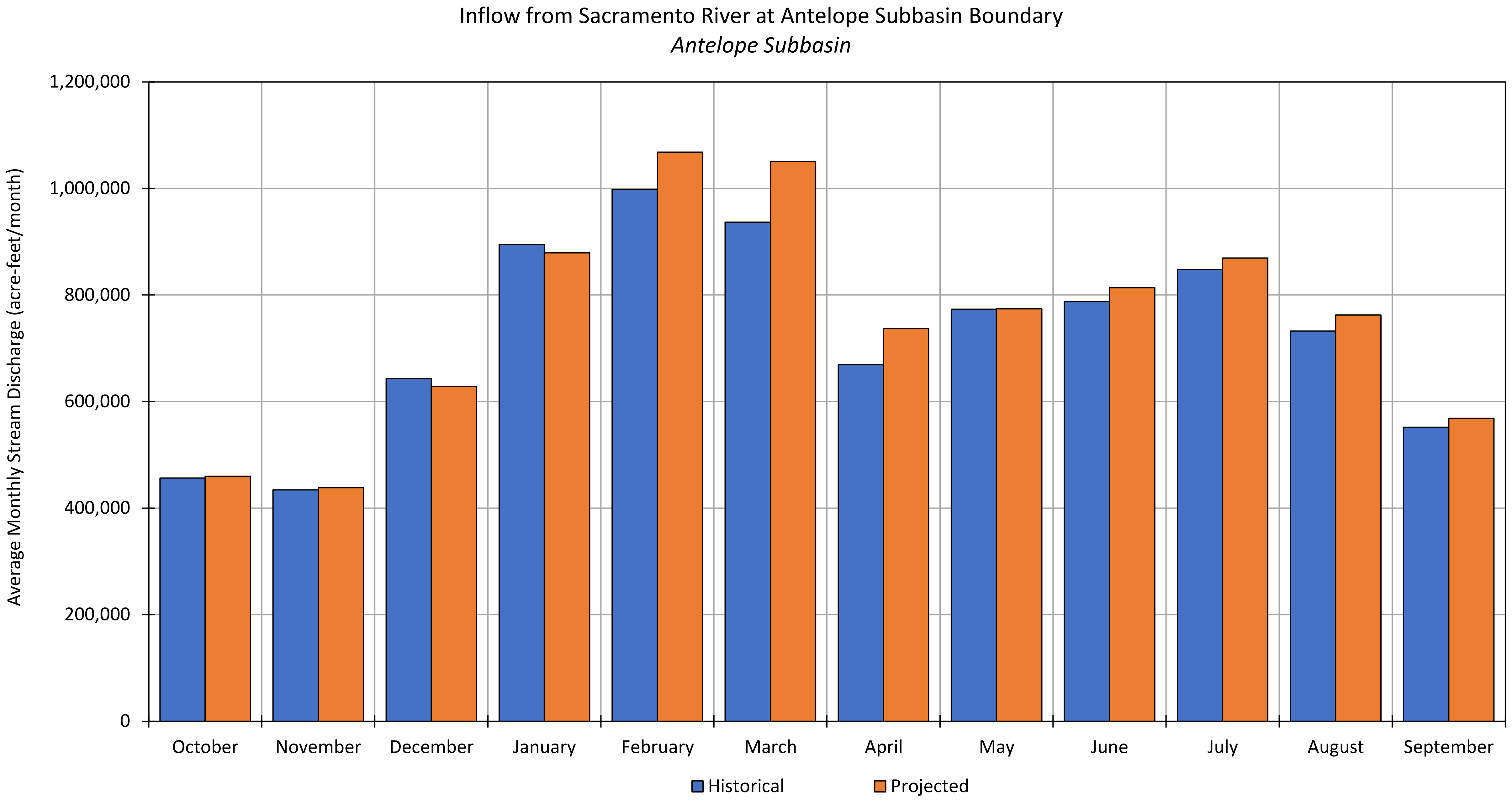

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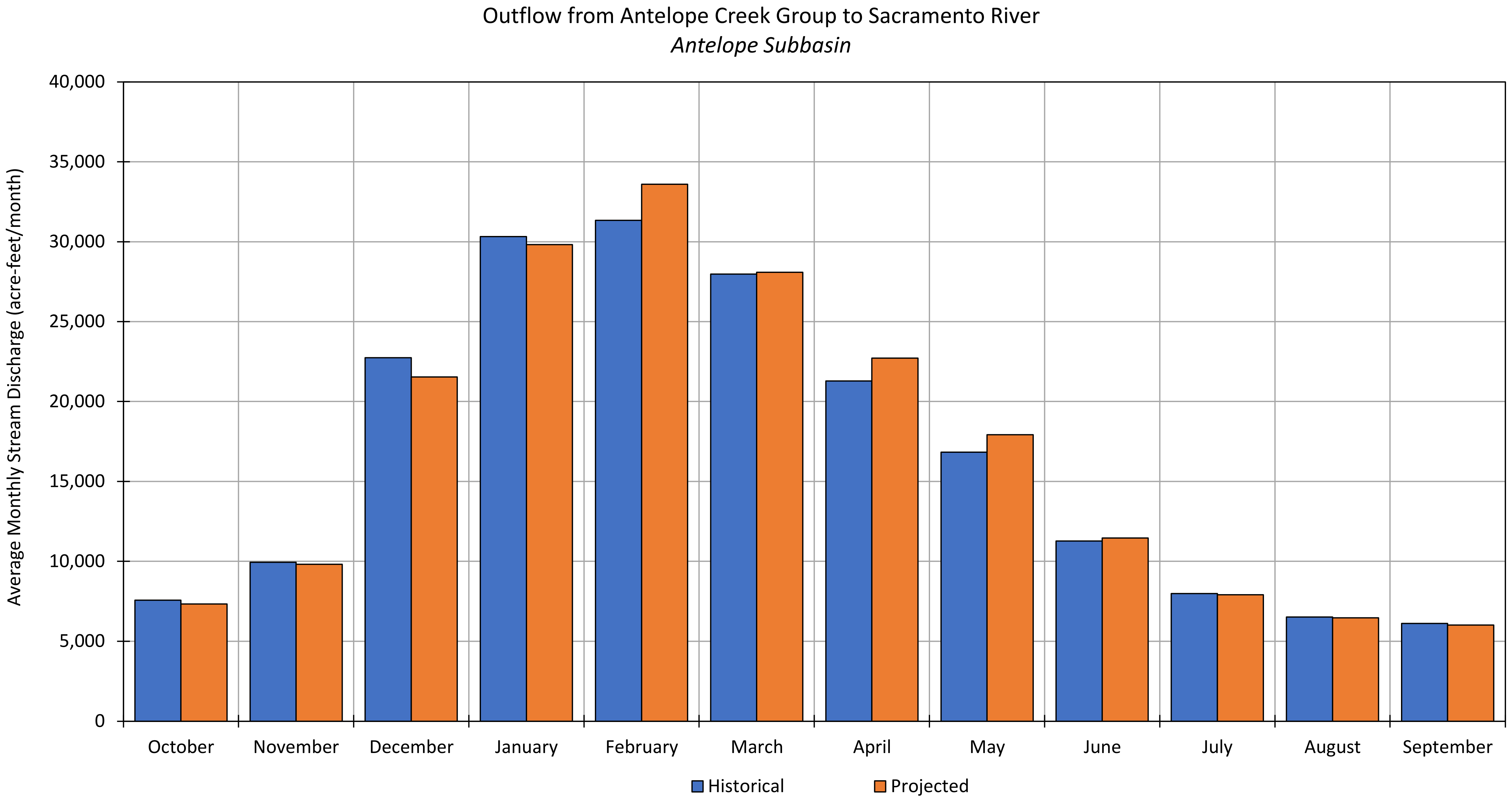

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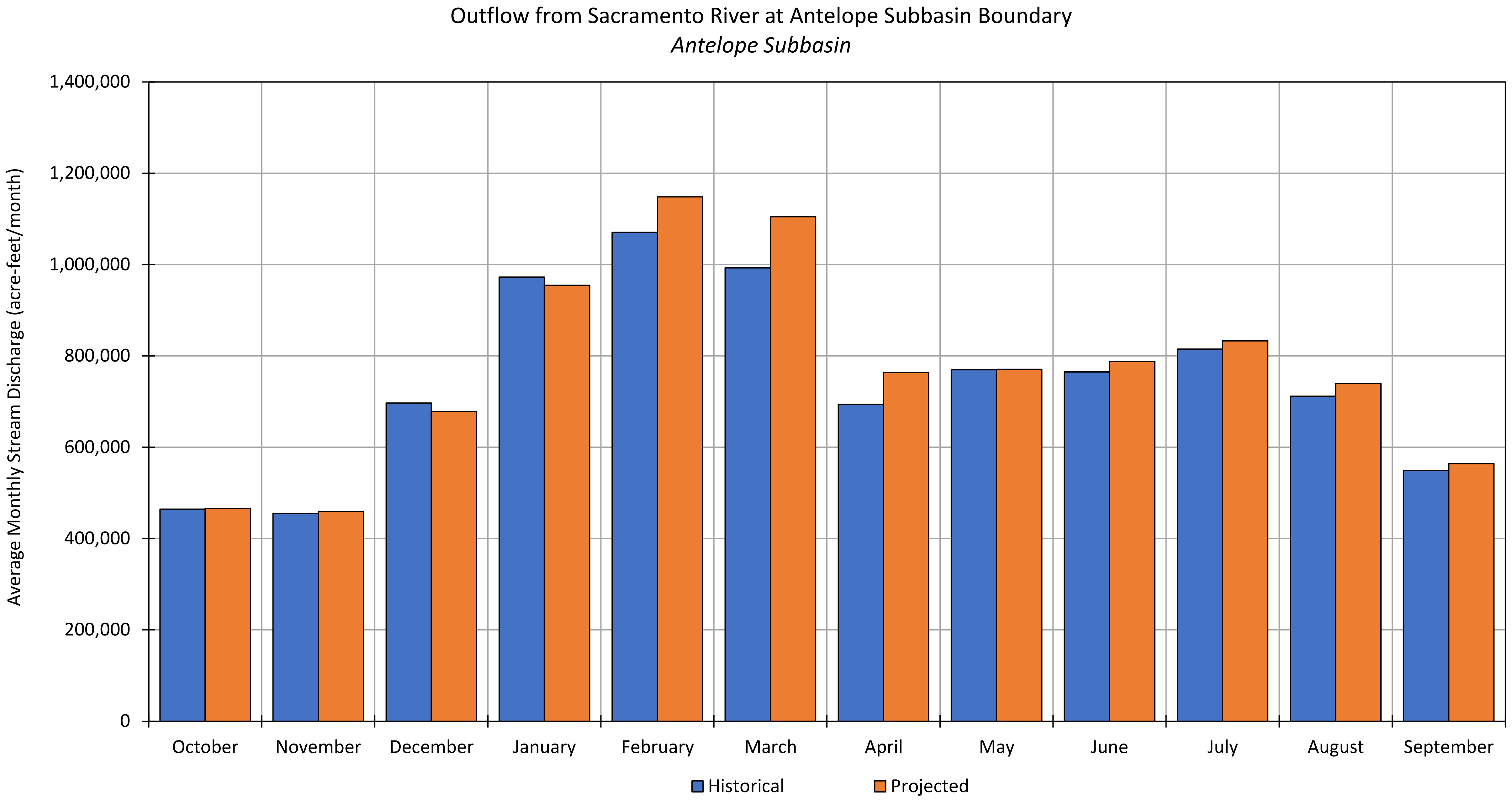

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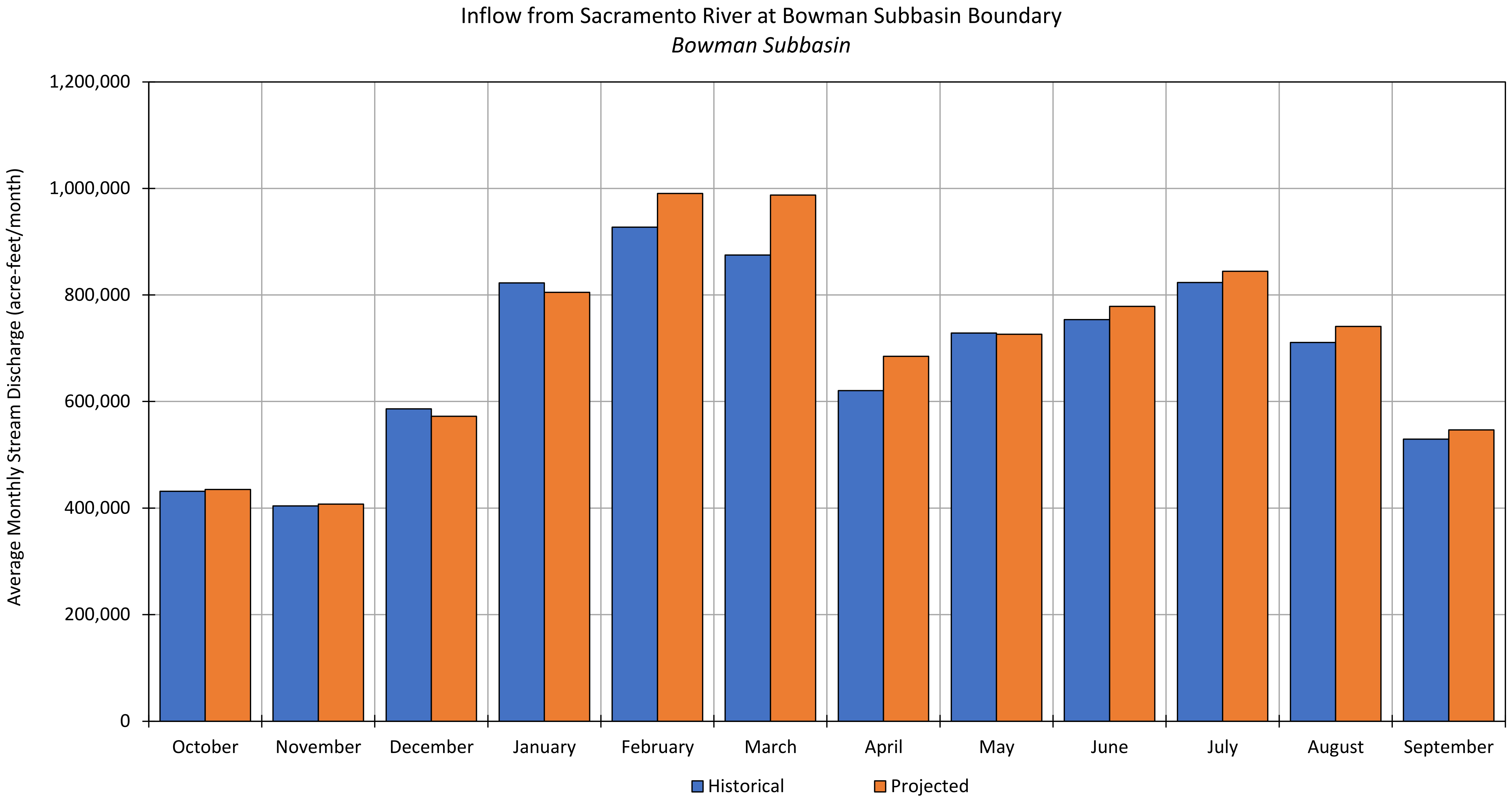

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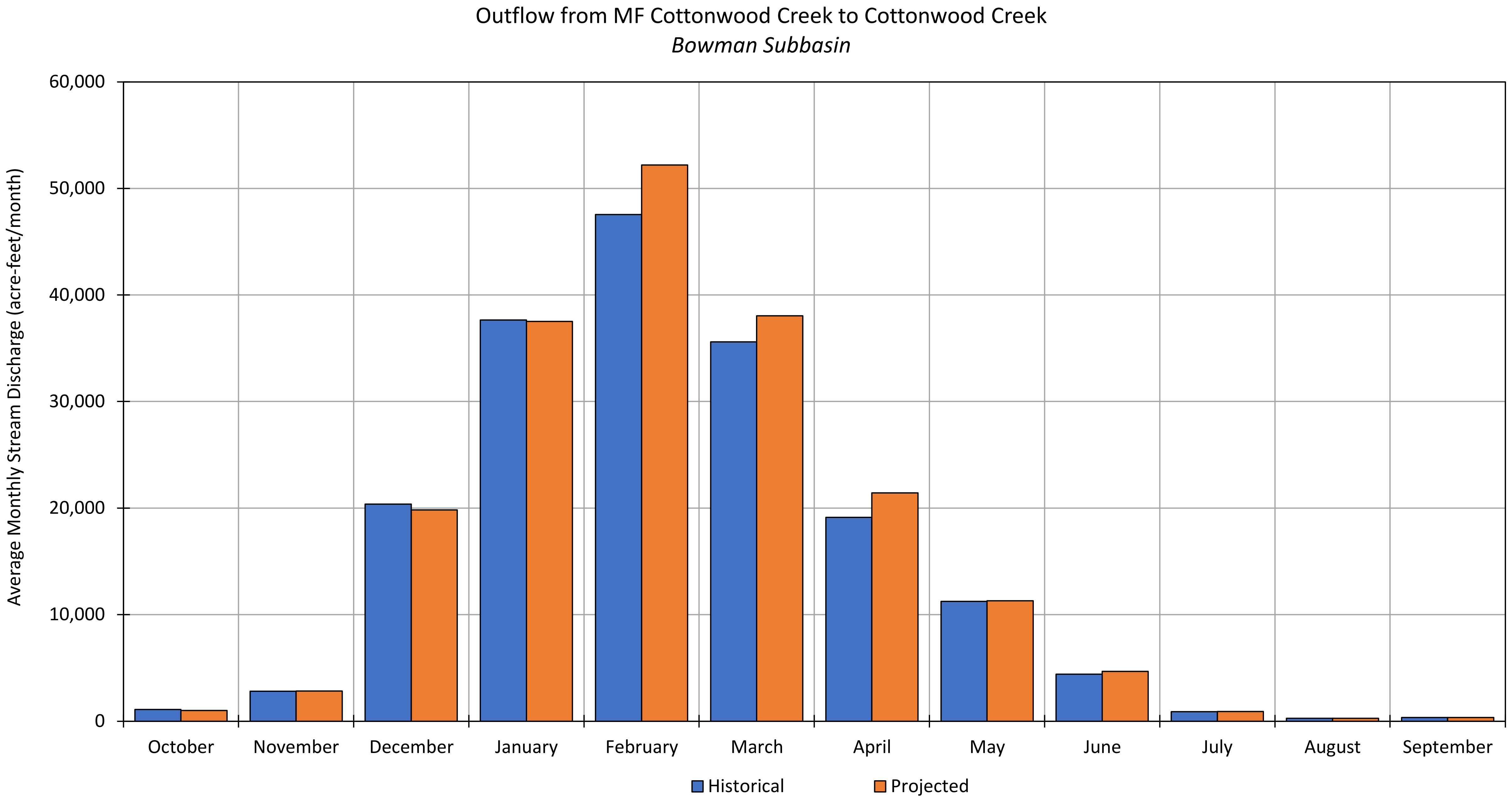

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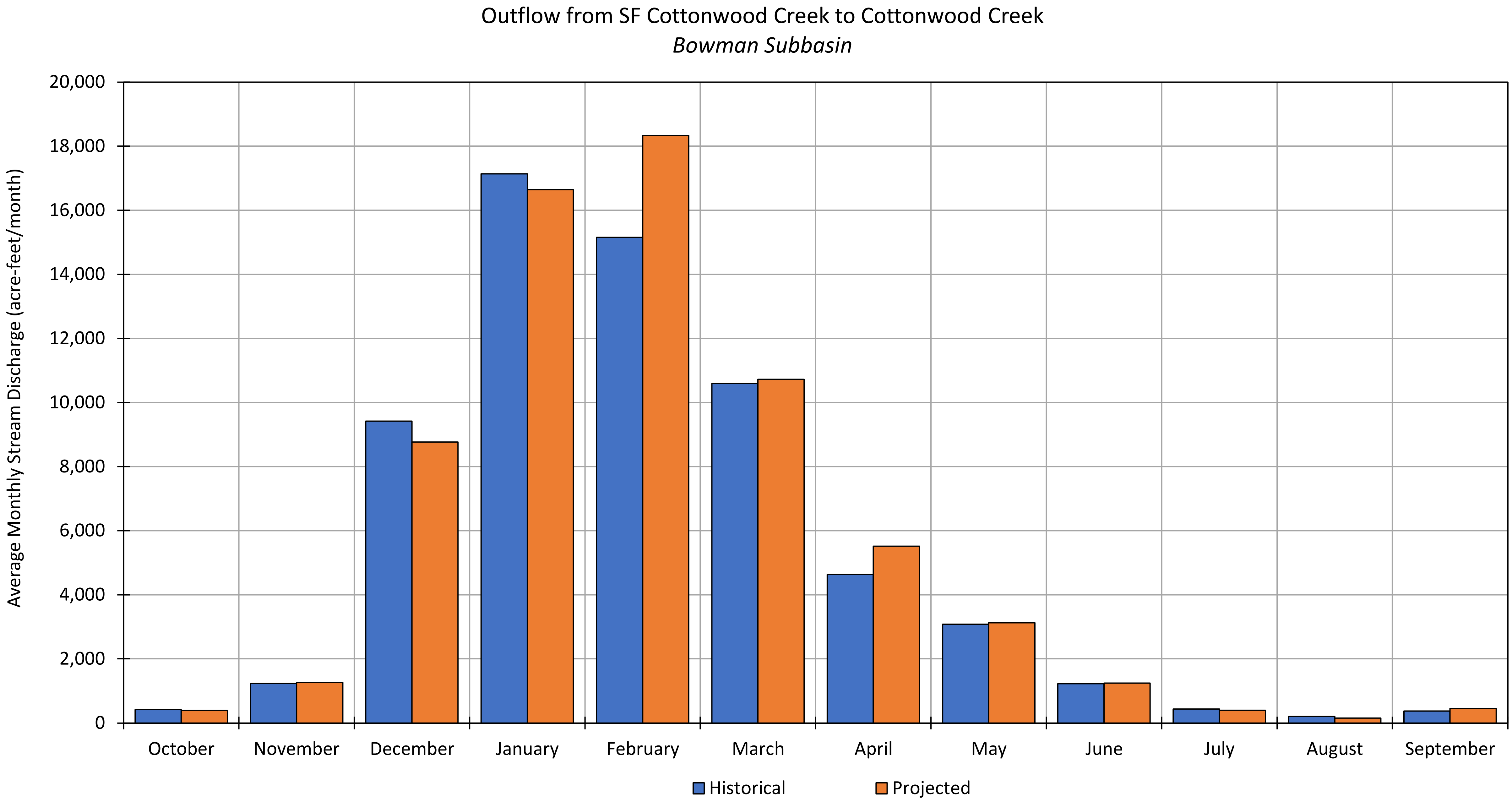
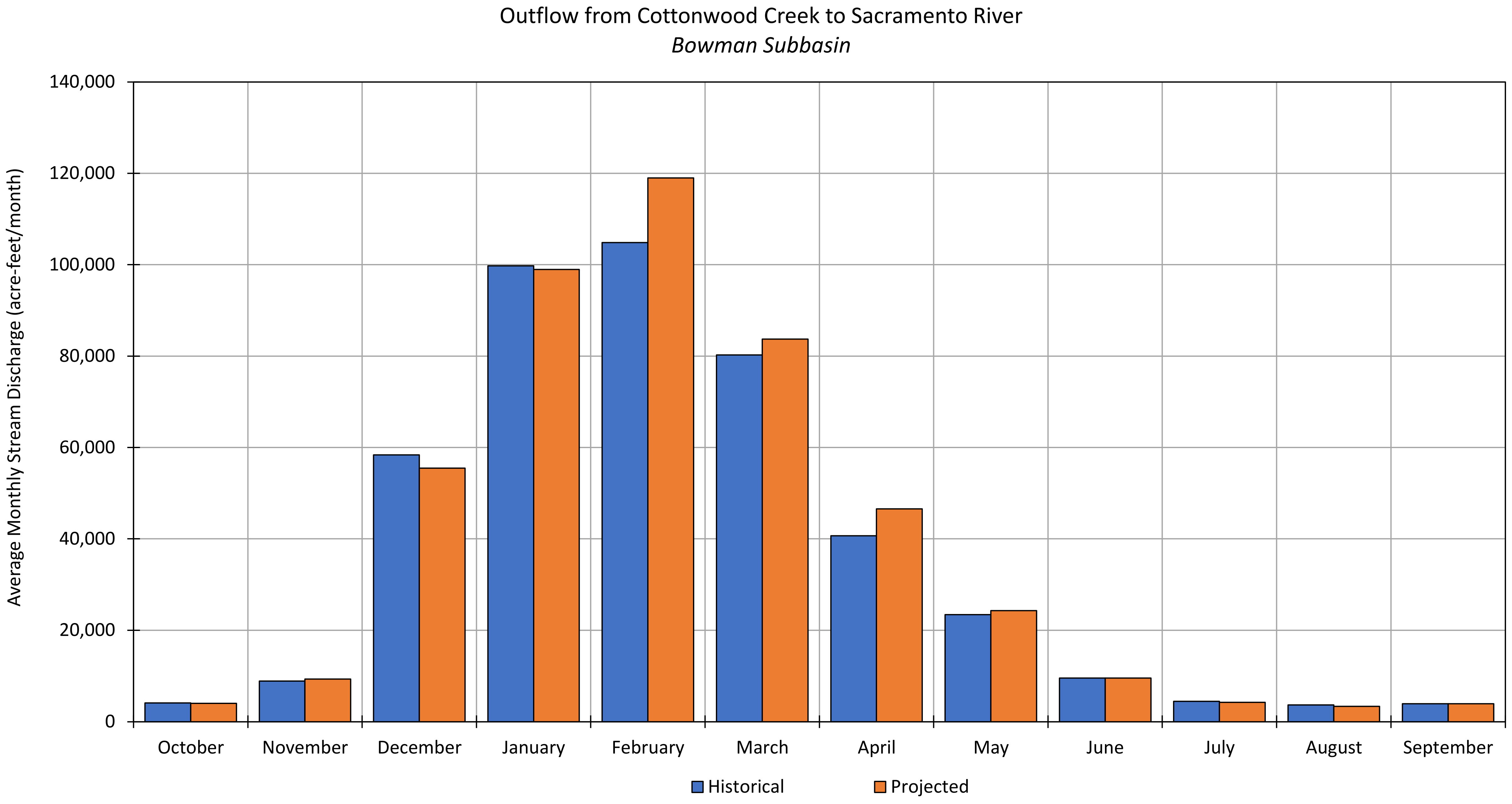

Outflow from SF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin

Tehama IHM - Projected (Current Land Use)



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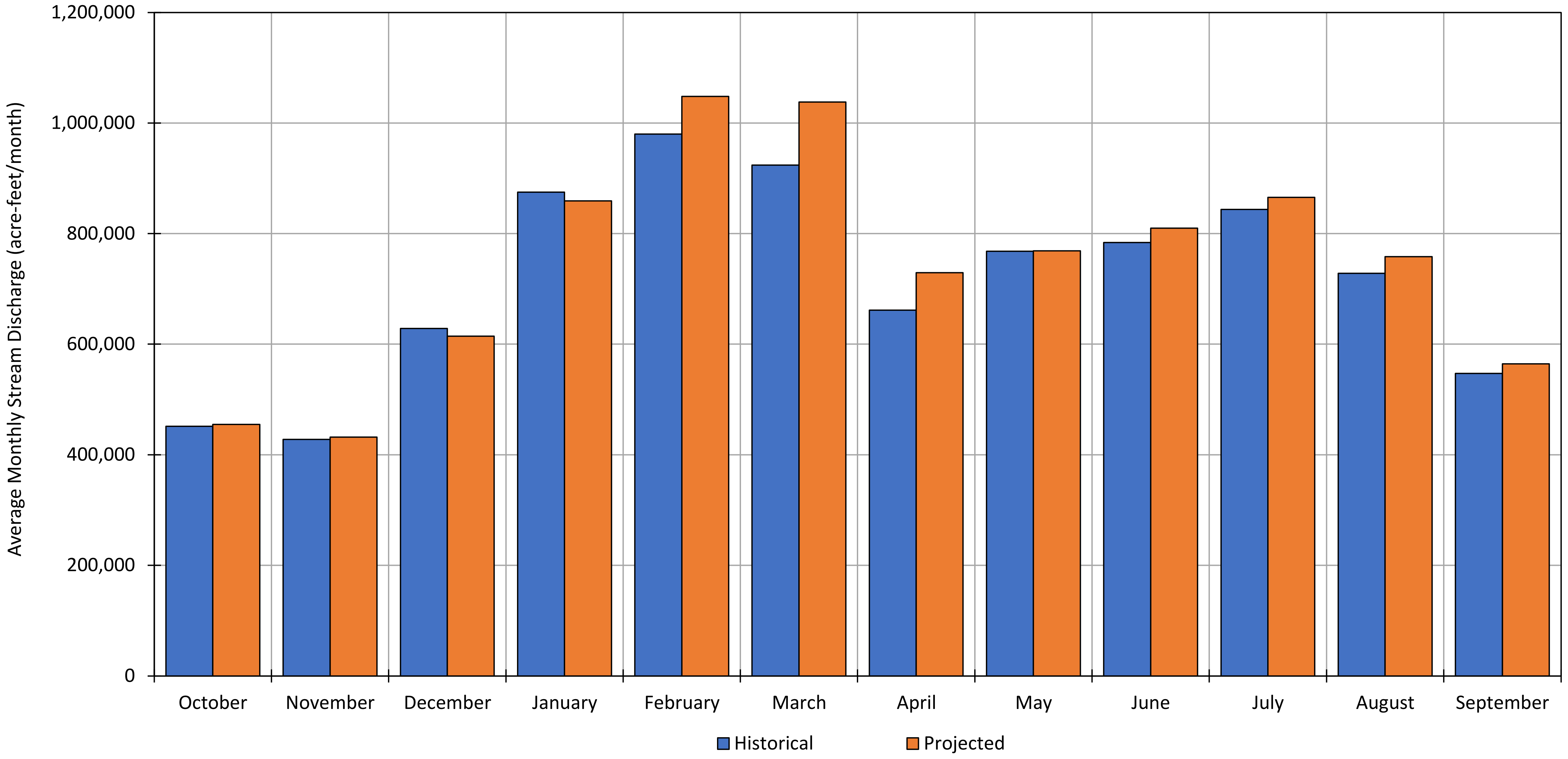
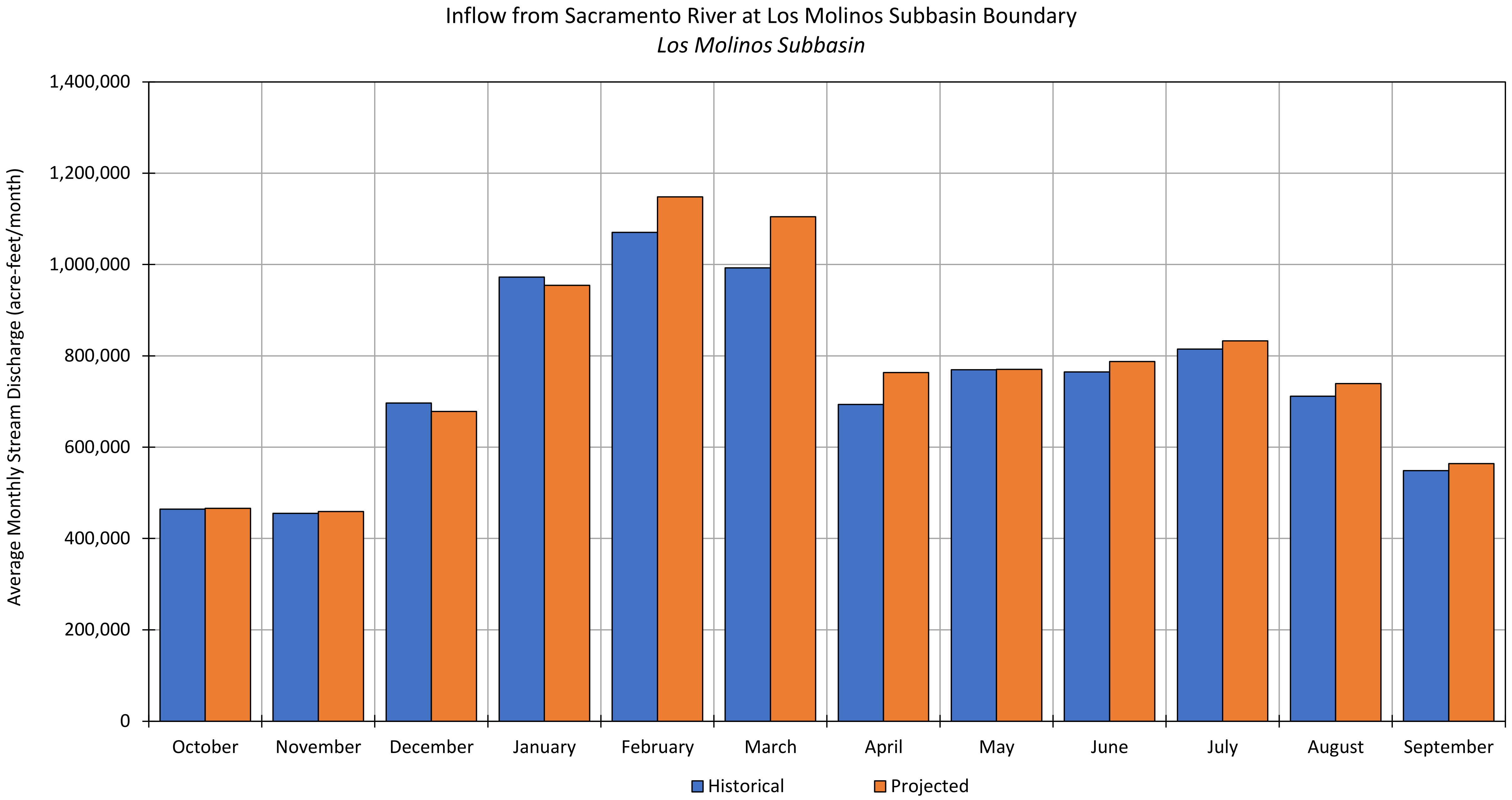


Outflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin

Tehama IHM - Projected (Current Land Use)



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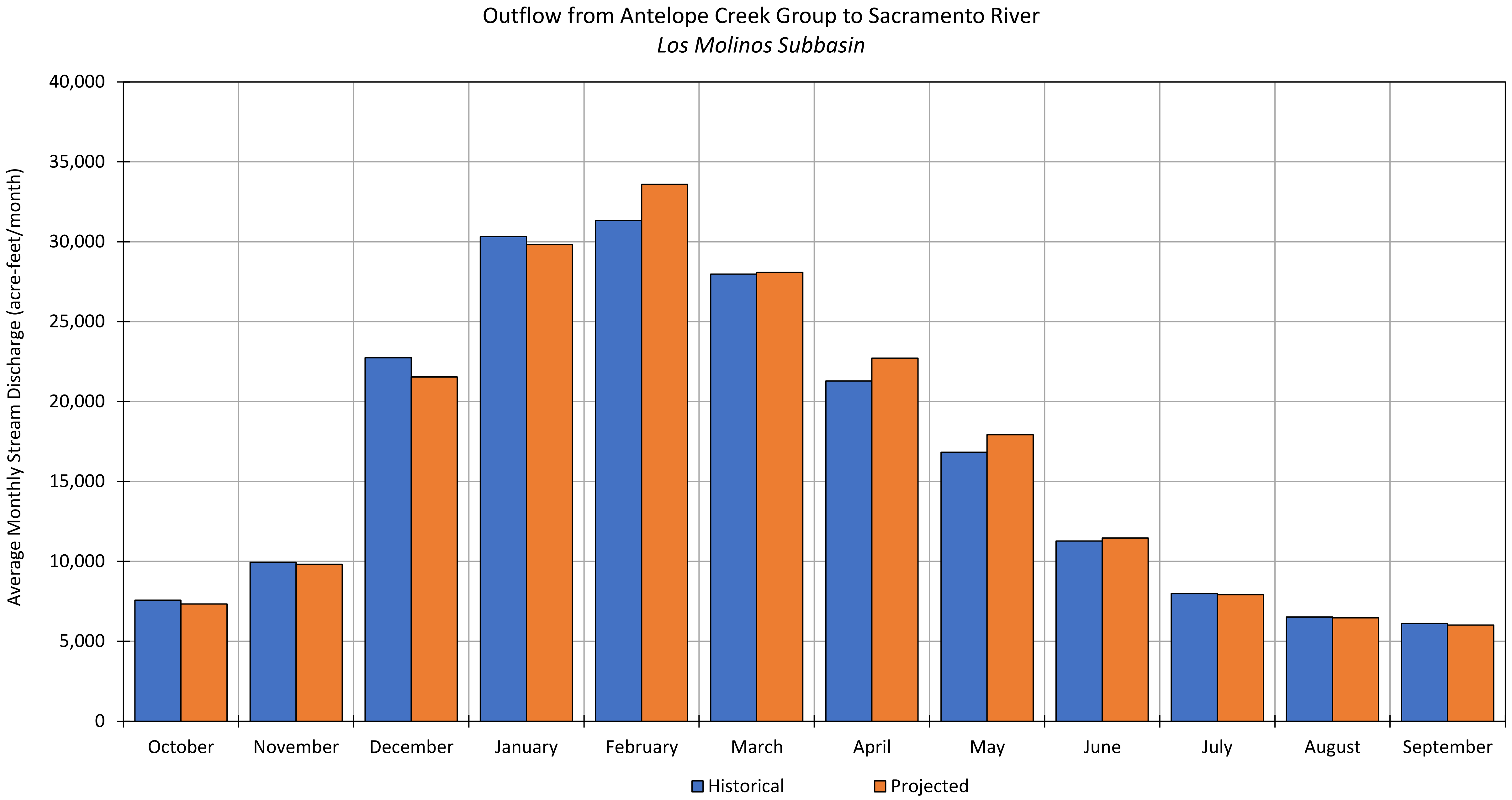

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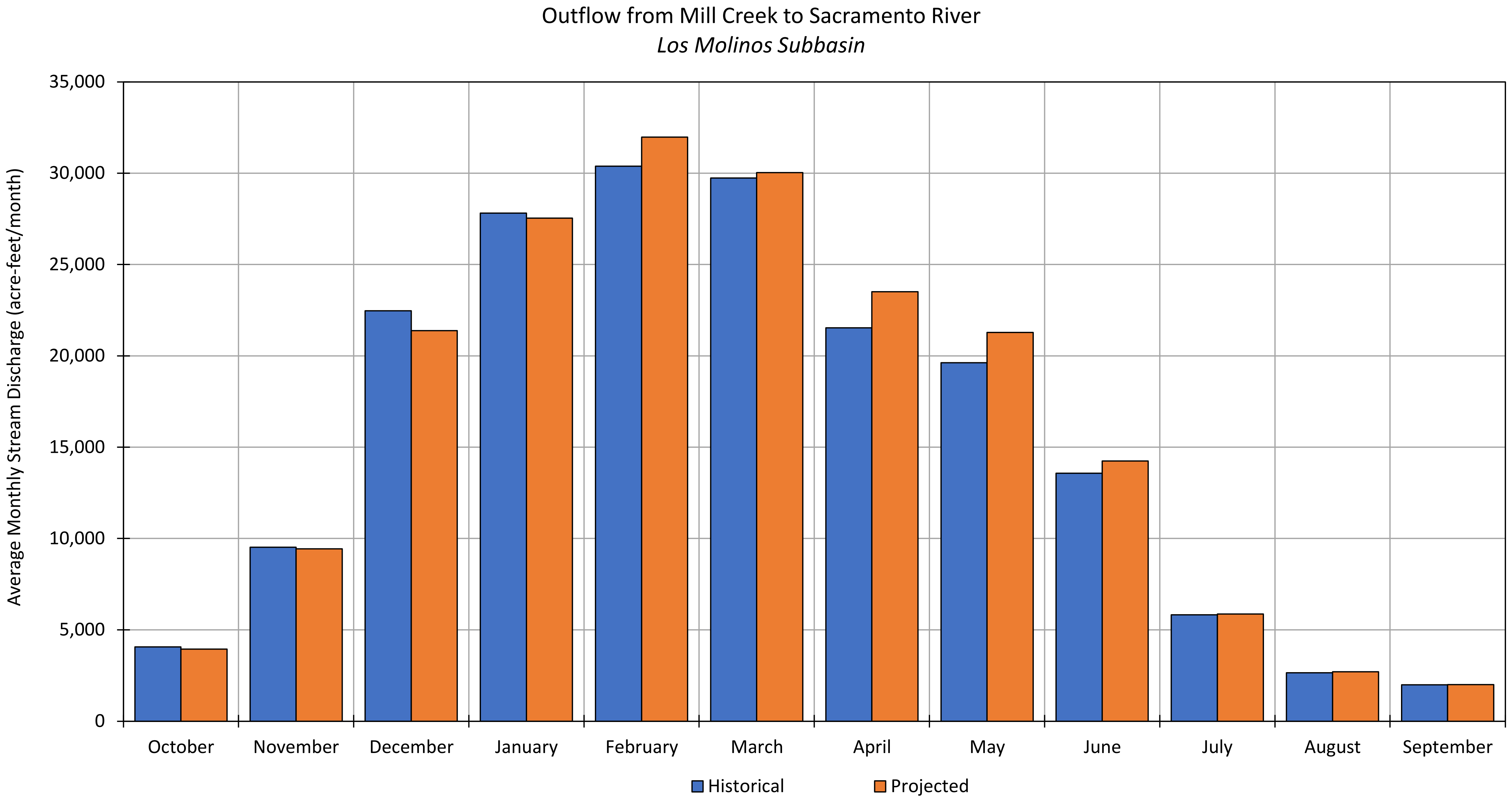

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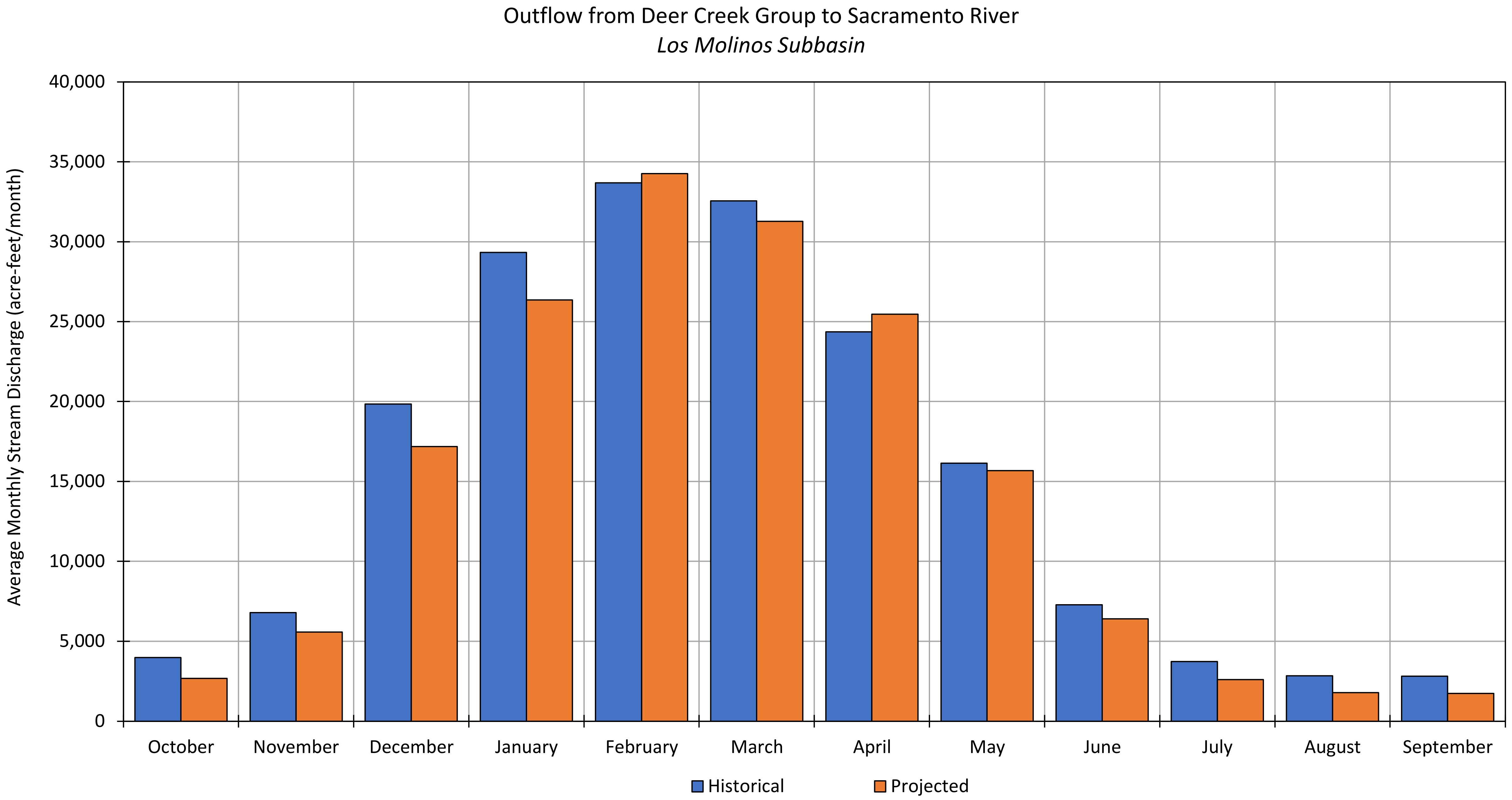


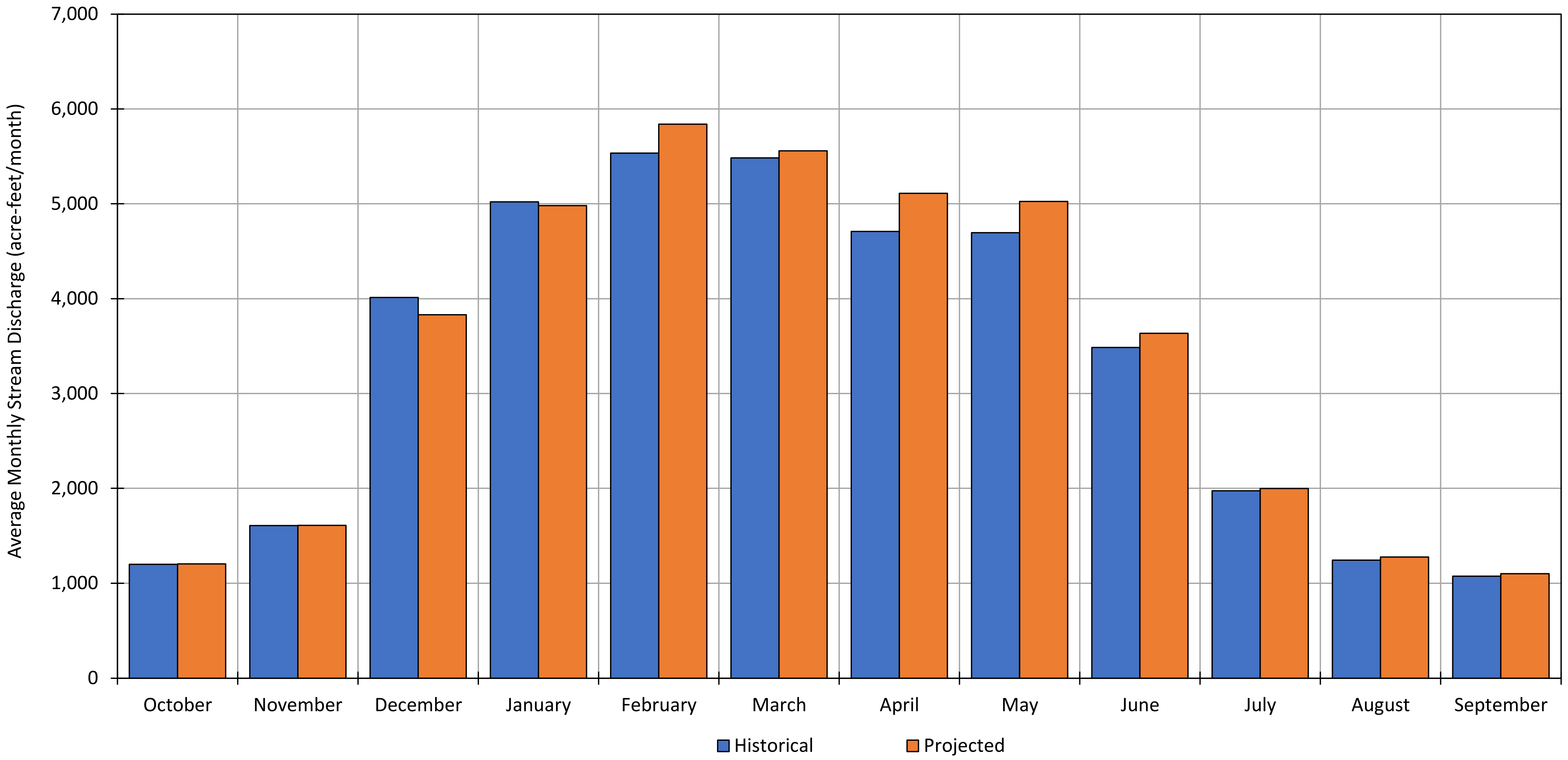
Outflow from Deer Creek Group to Sacramento River

Los Molinos Subbasin

Tehama IHM - Projected (Current Land Use)

Outflow from Dye Creek to Sacramento River

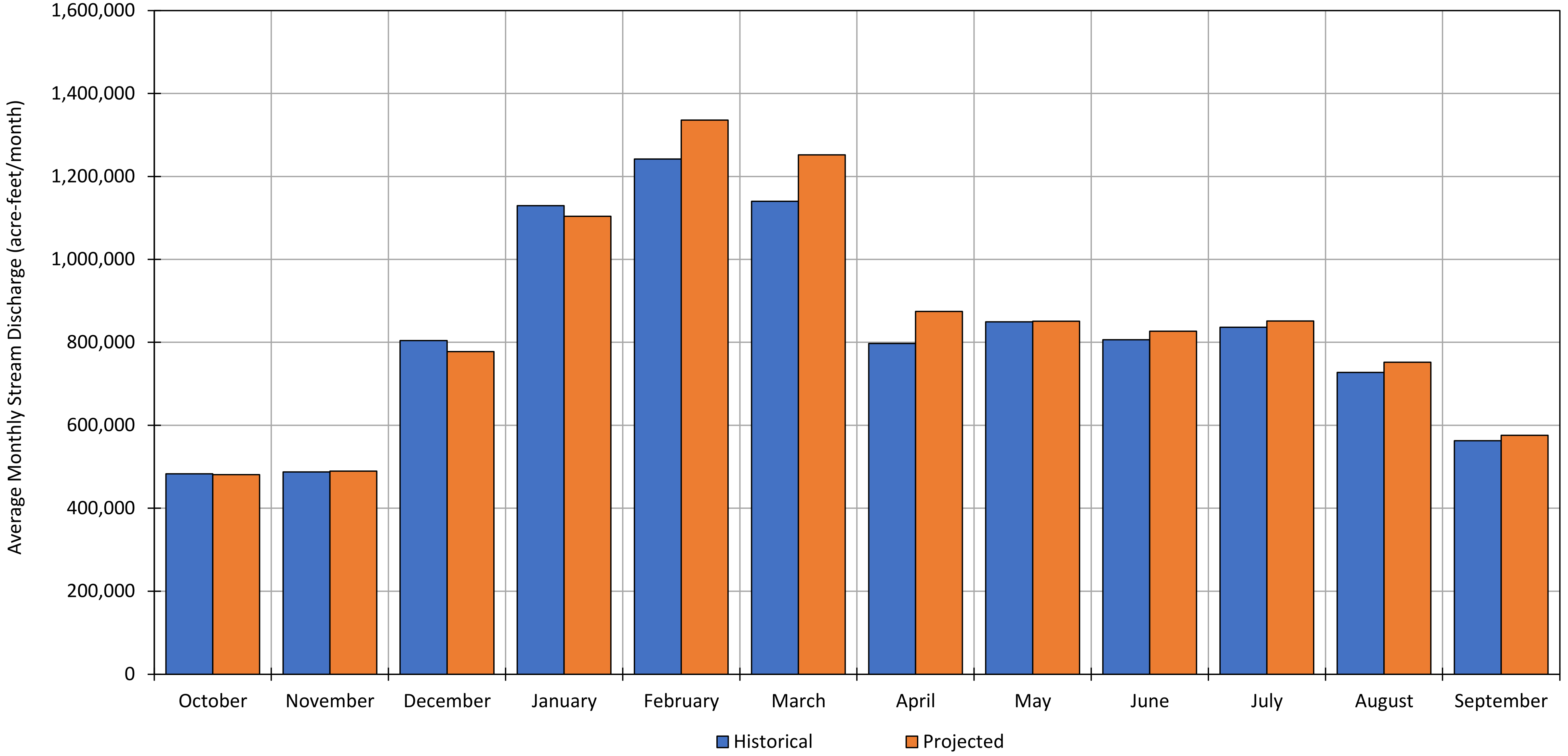
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin



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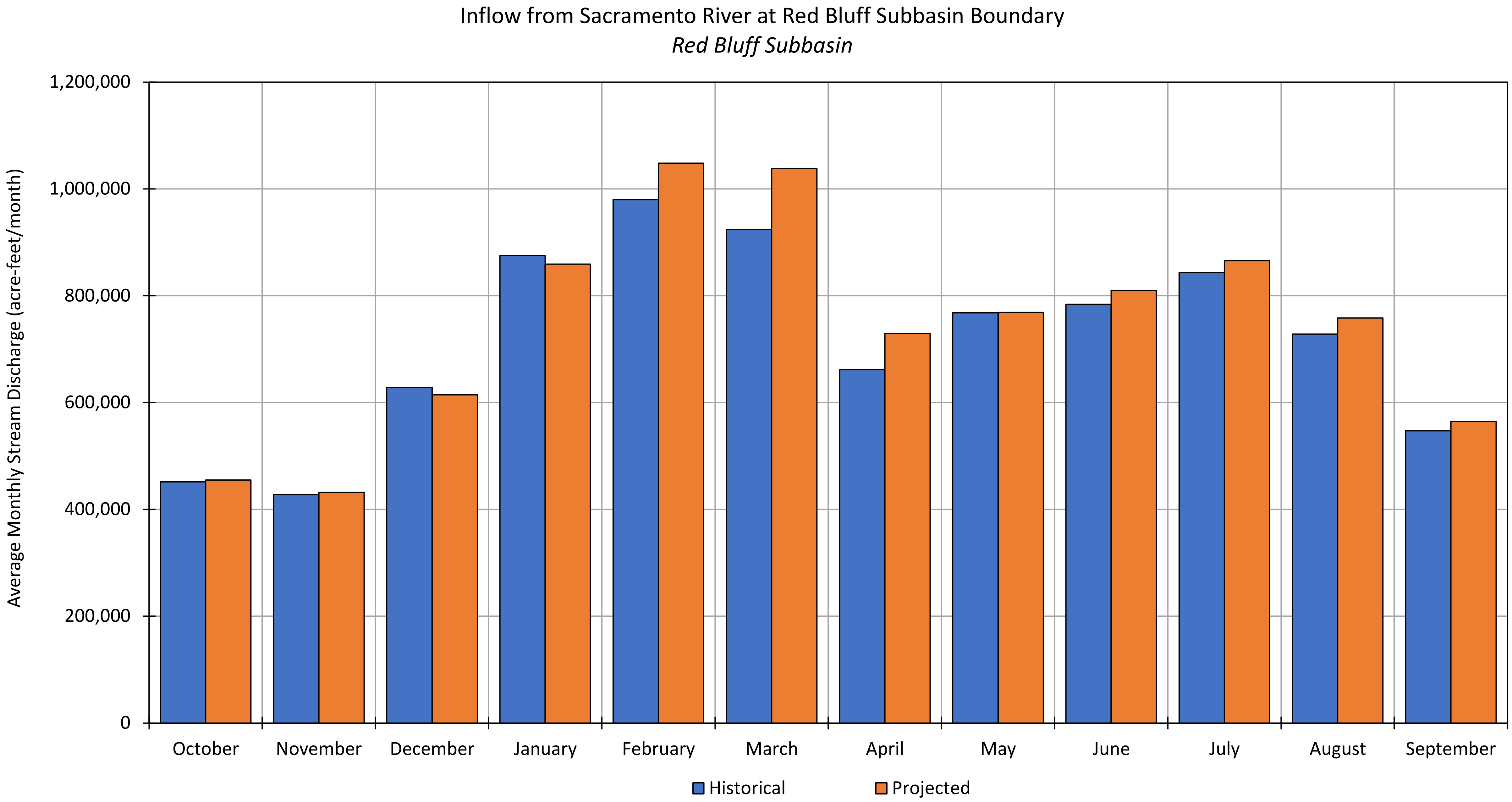


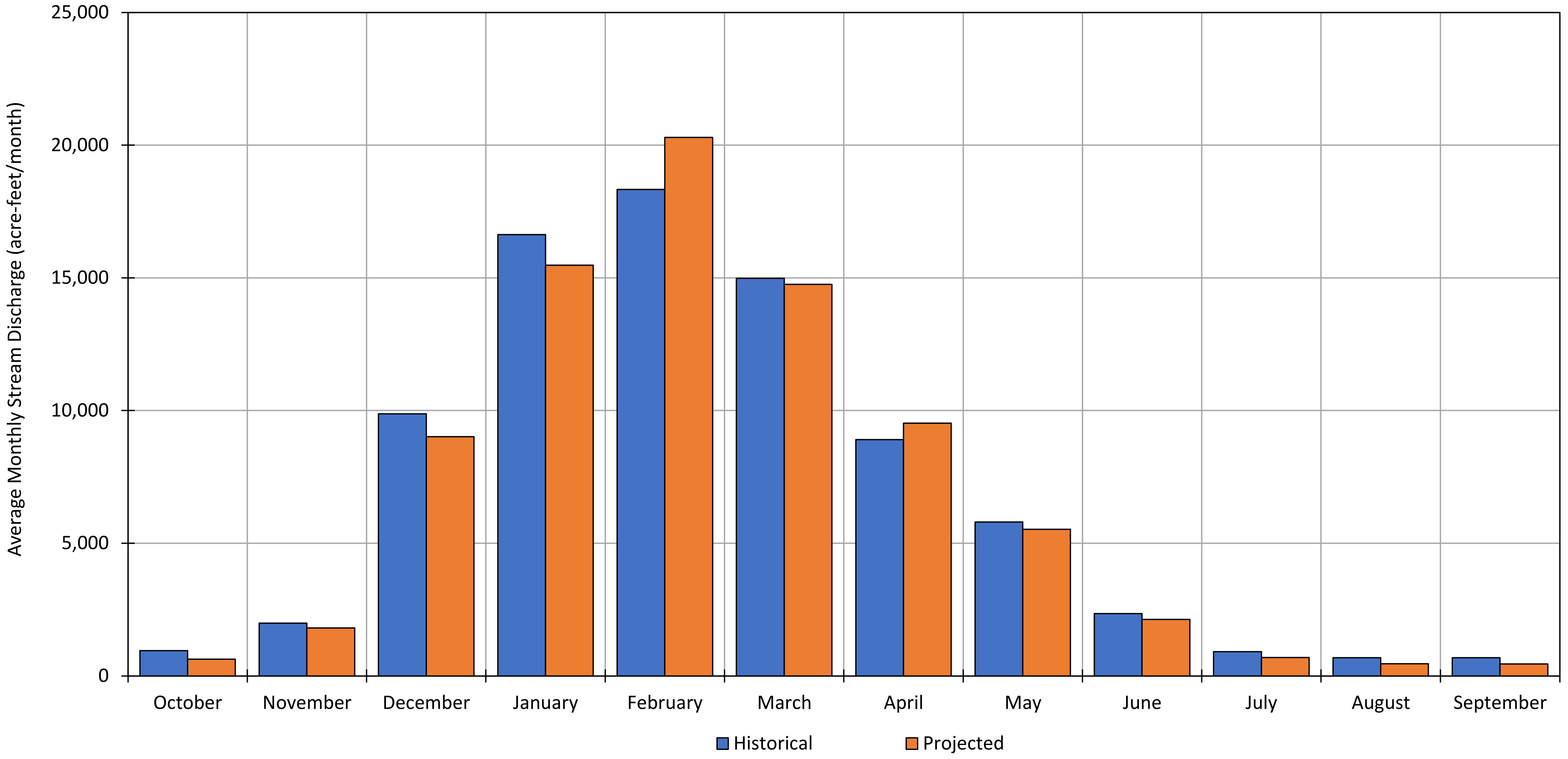
Inflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin

Tehama IHM - Projected (Current Land Use)

Outflow from Elder Creek to Sacramento River

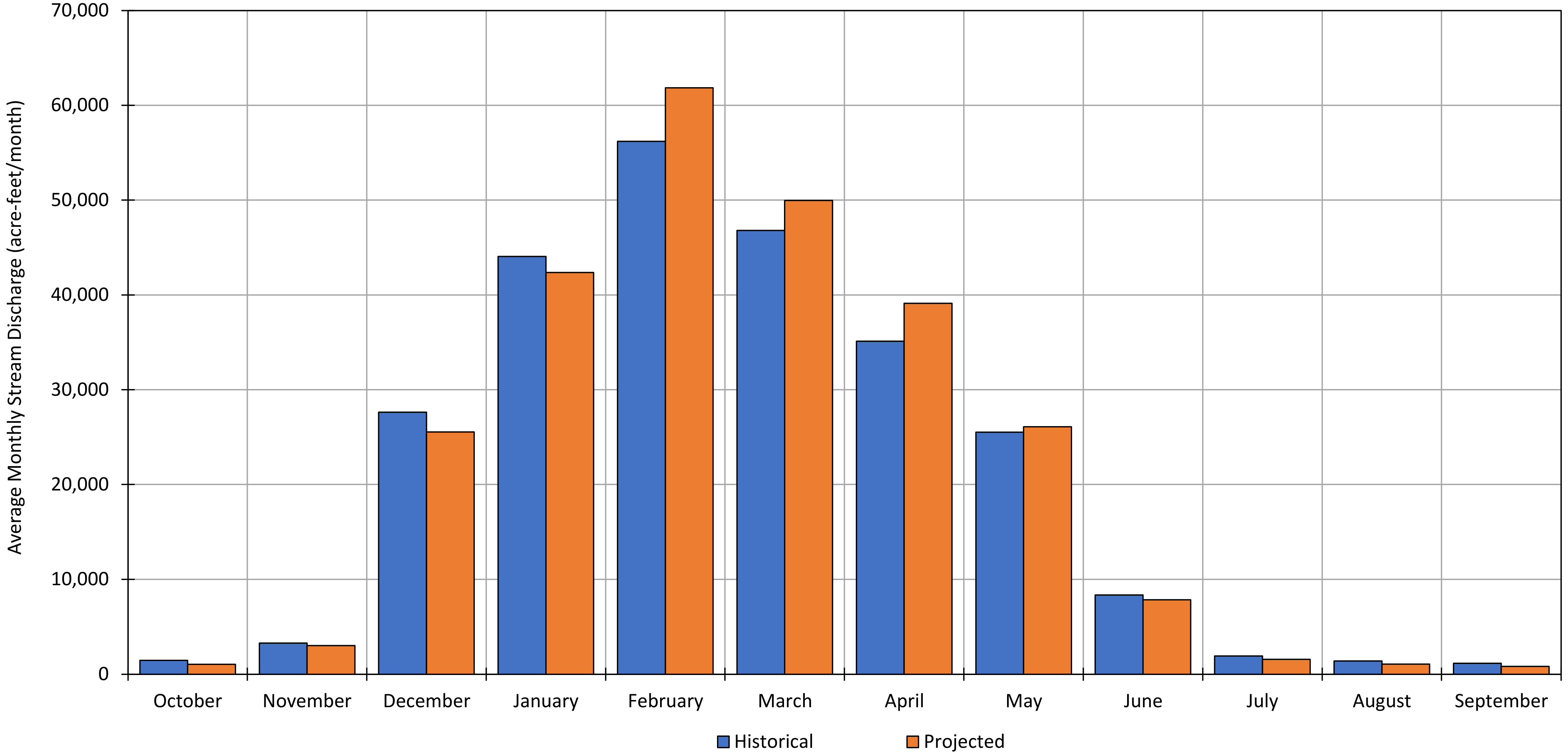
Red Bluff Subbasin



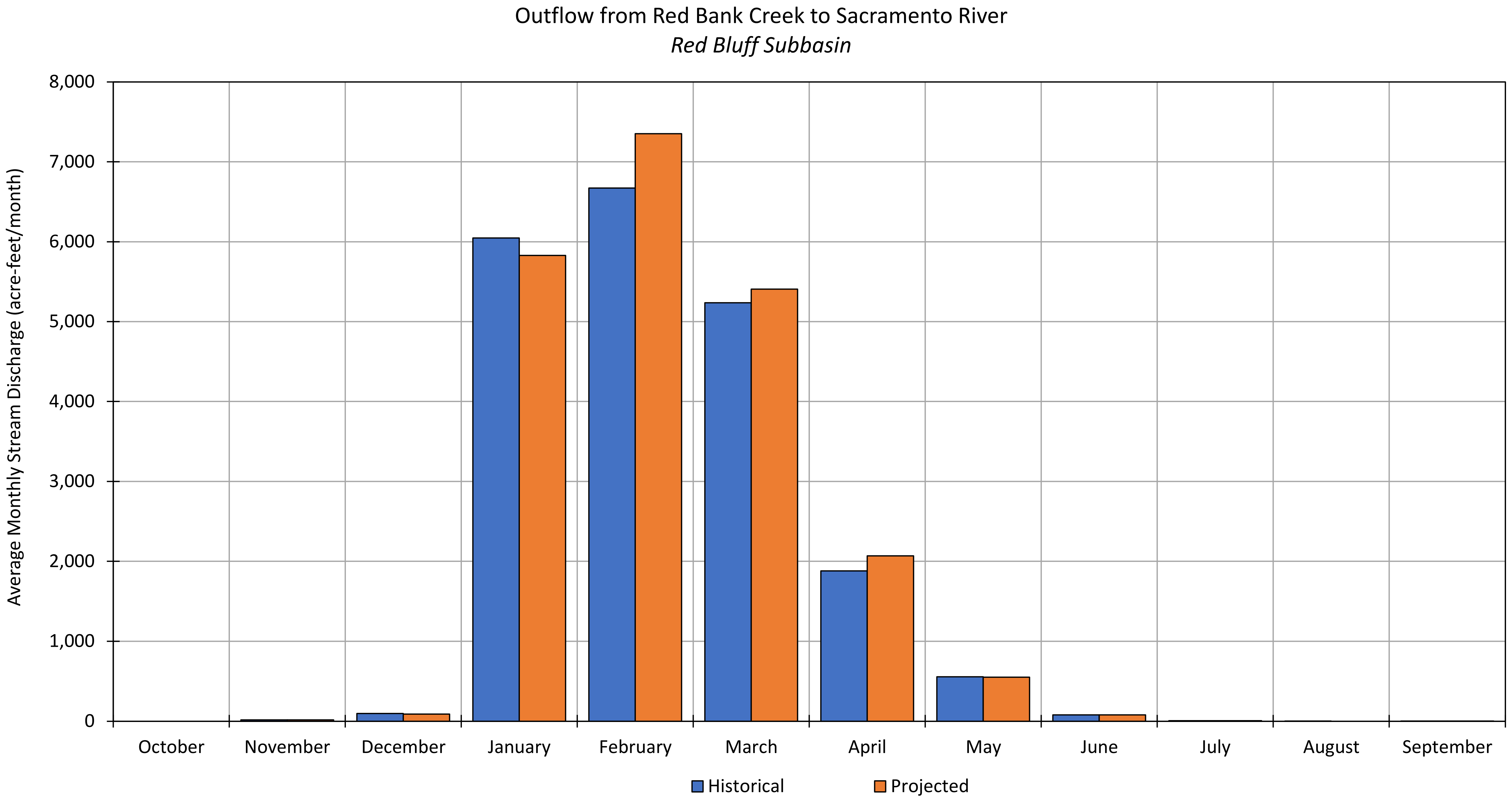
Tehama IHM - Projected (Current Land Use)

Outflow from Thomes Creek to Sacramento River

Red Bluff Subbasin



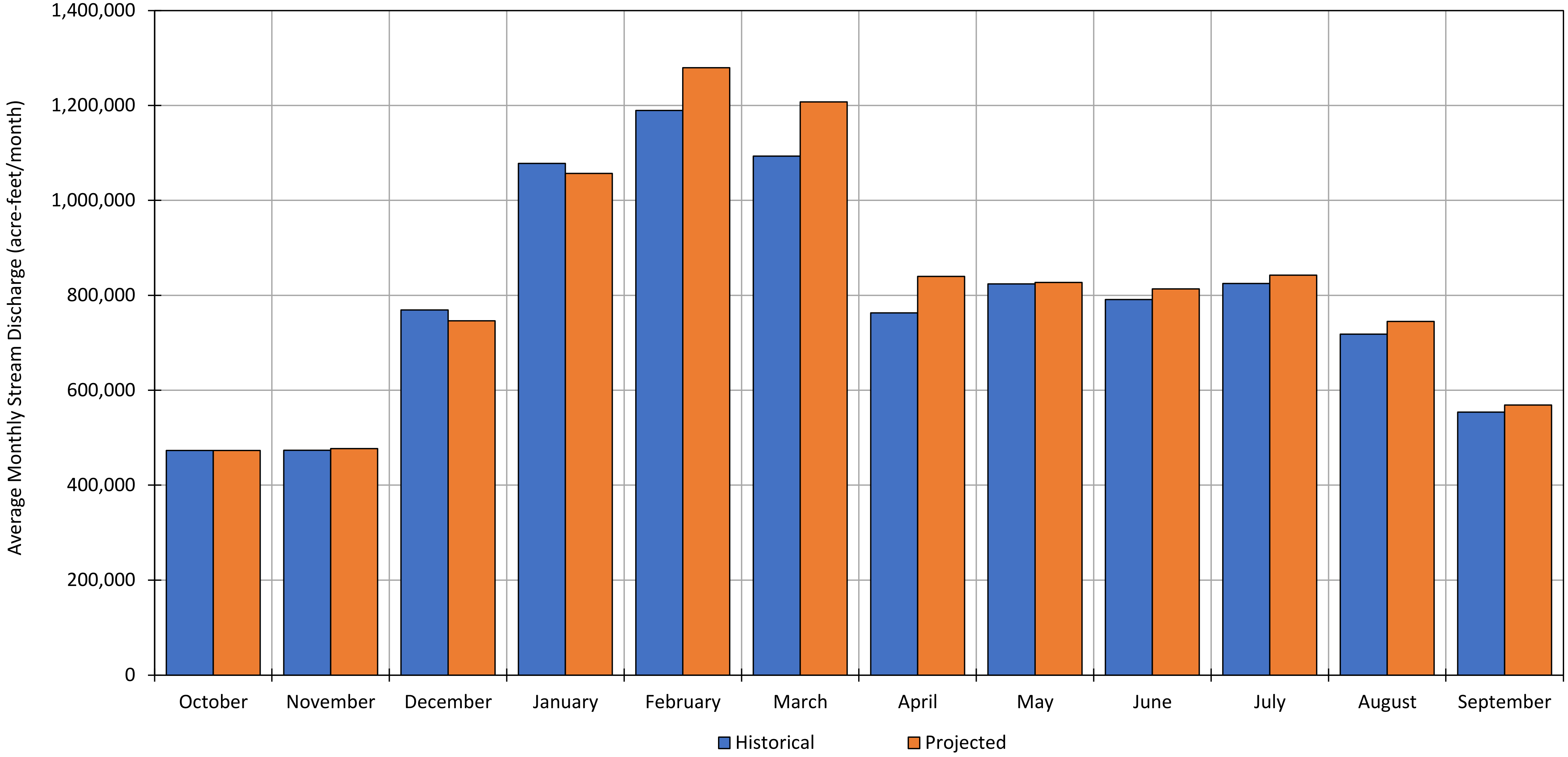
Tehama IHM - Projected (Current Land Use)



Tehama IHM - Projected (Current Land Use)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



Tehama IHM - Projected (Current Land Use)

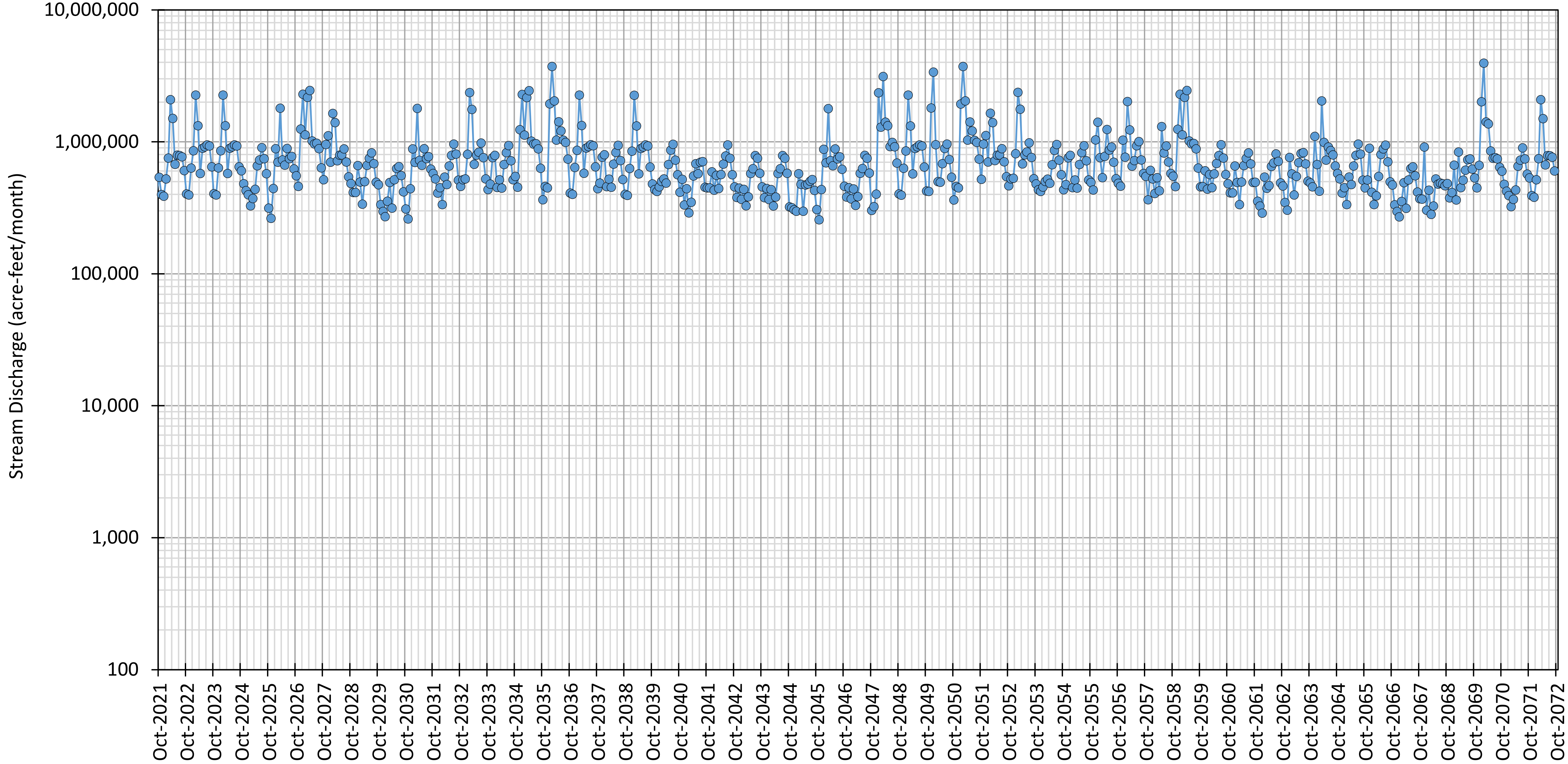
APPENDIX G-3

Tehama IHM Simulated Streamflows:

Projected (Future Land Use) Model Results

Inflow from Sacramento River at Antelope Subbasin Boundary

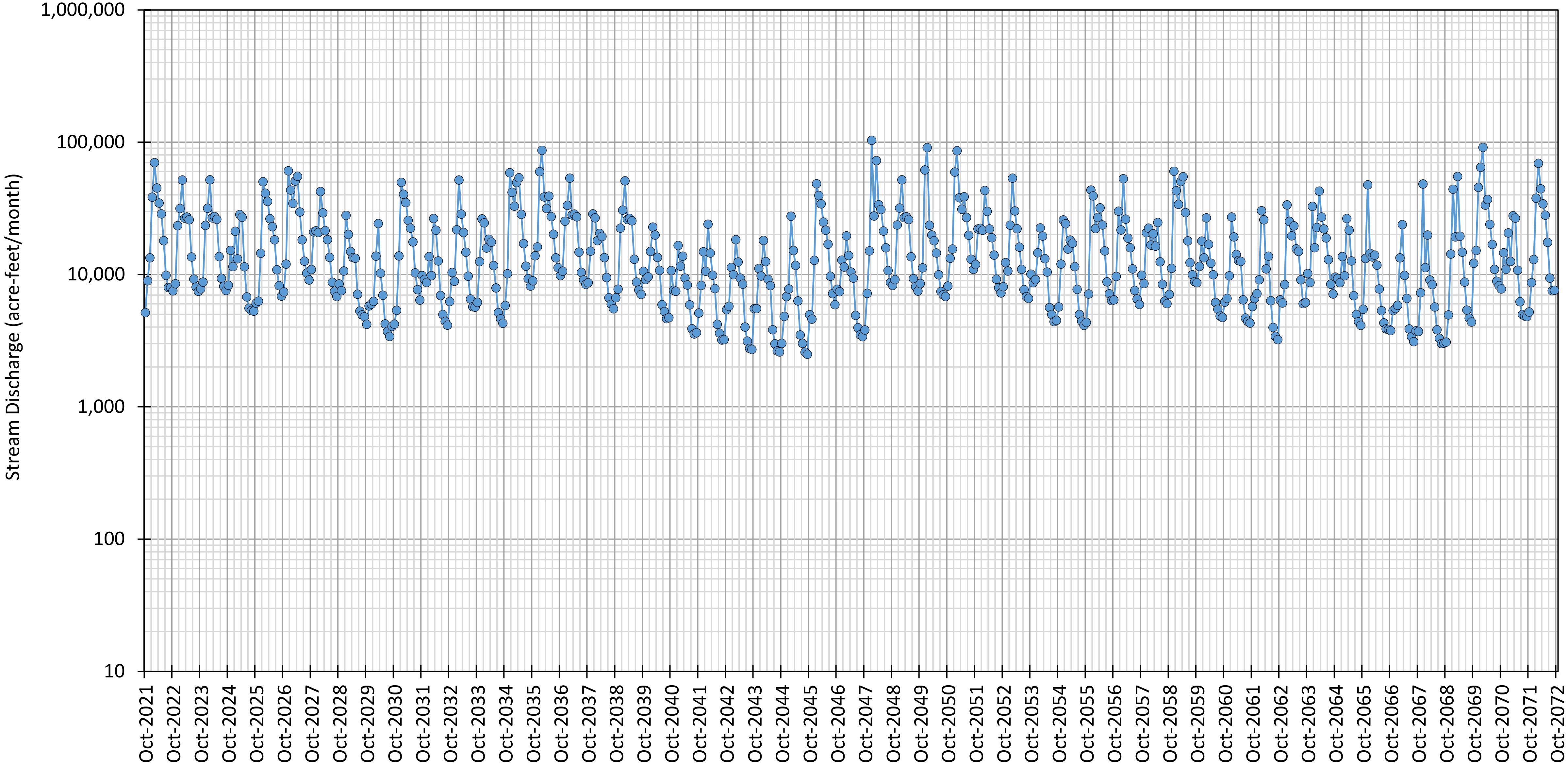
Antelope Subbasin



Tehama IHM - Projected (Future Land Use)

Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin



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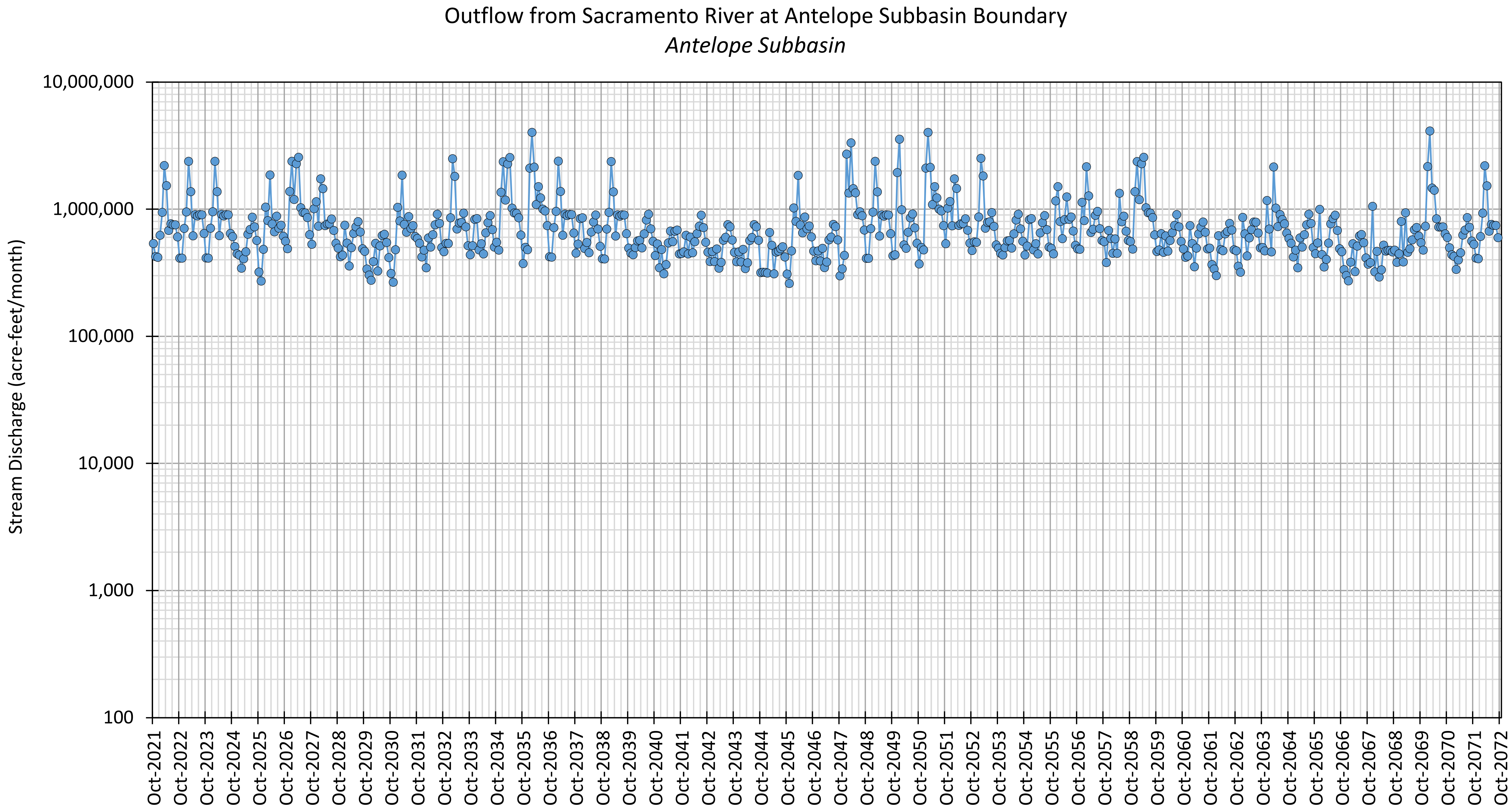
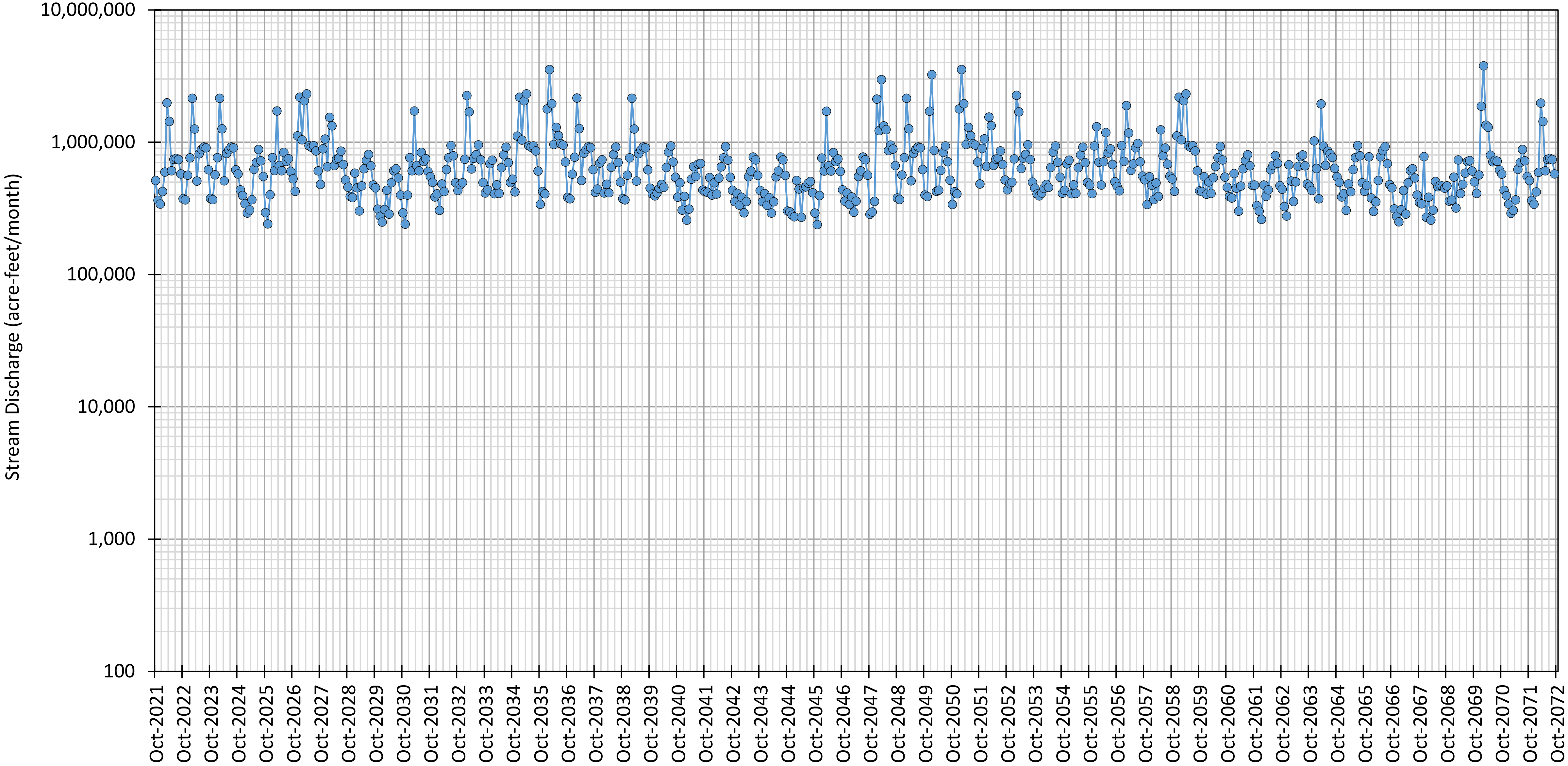


Tehama IHM - Projected (Future Land Use)

Inflow from Sacramento River at Bowman Subbasin Boundary

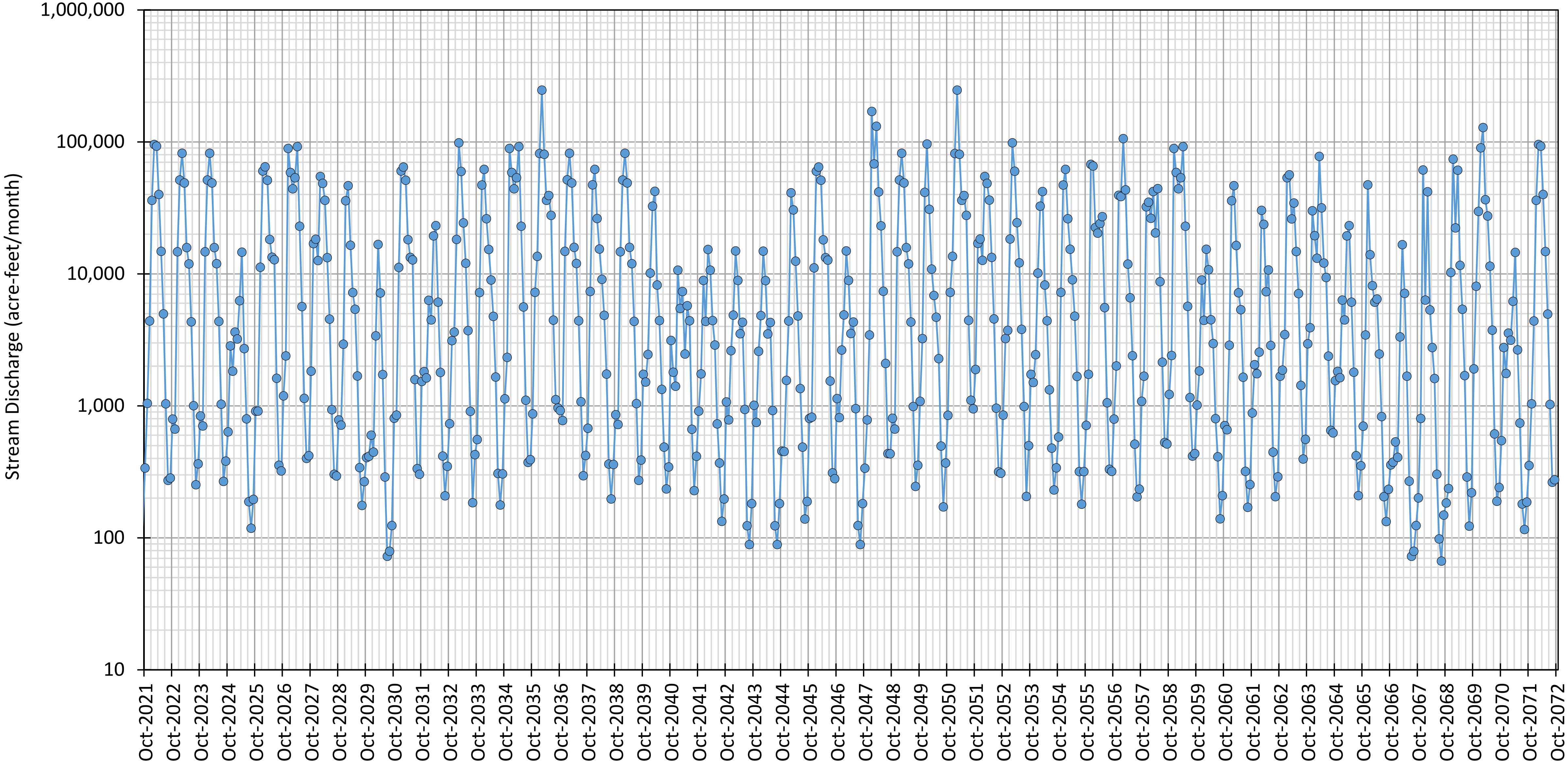
Bowman Subbasin



Tehama IHM - Projected (Future Land Use)

Outflow from MF Cottonwood Creek to Cottonwood Creek

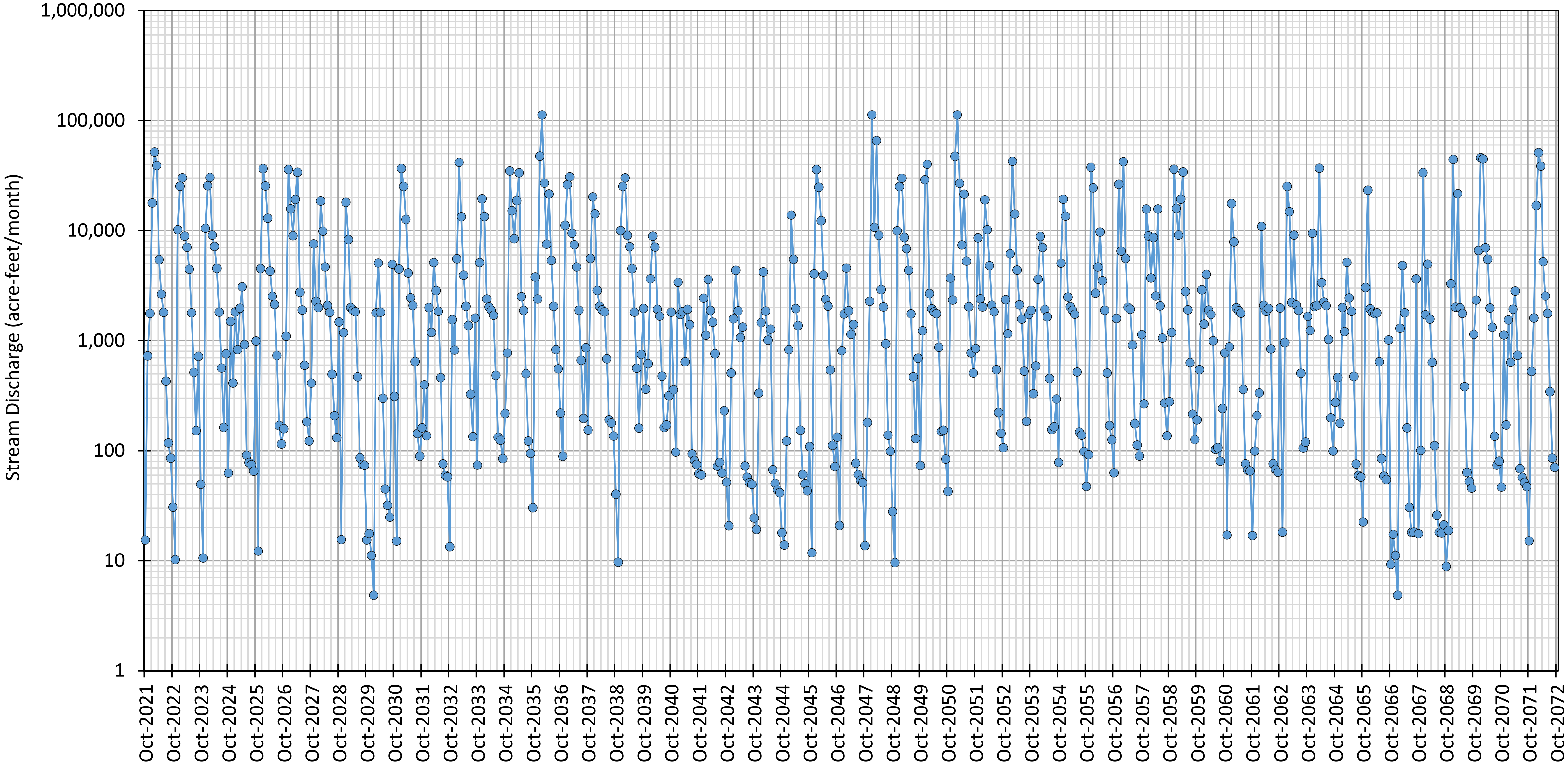
Bowman Subbasin



Tehama IHM - Projected (Future Land Use)

Outflow from SF Cottonwood Creek to Cottonwood Creek

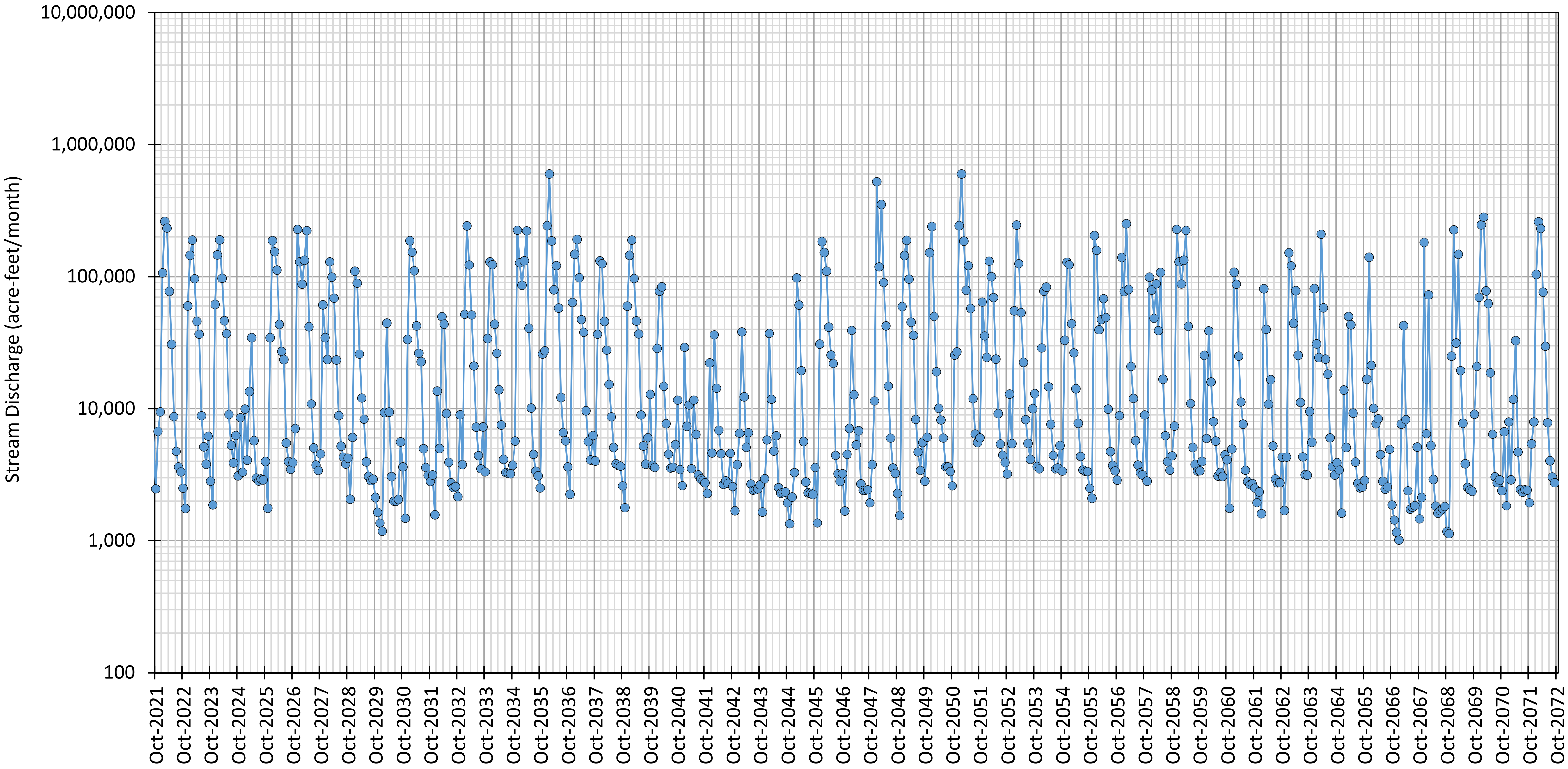
Bowman Subbasin



Tehama IHM - Projected (Future Land Use)

Outflow from Cottonwood Creek to Sacramento River

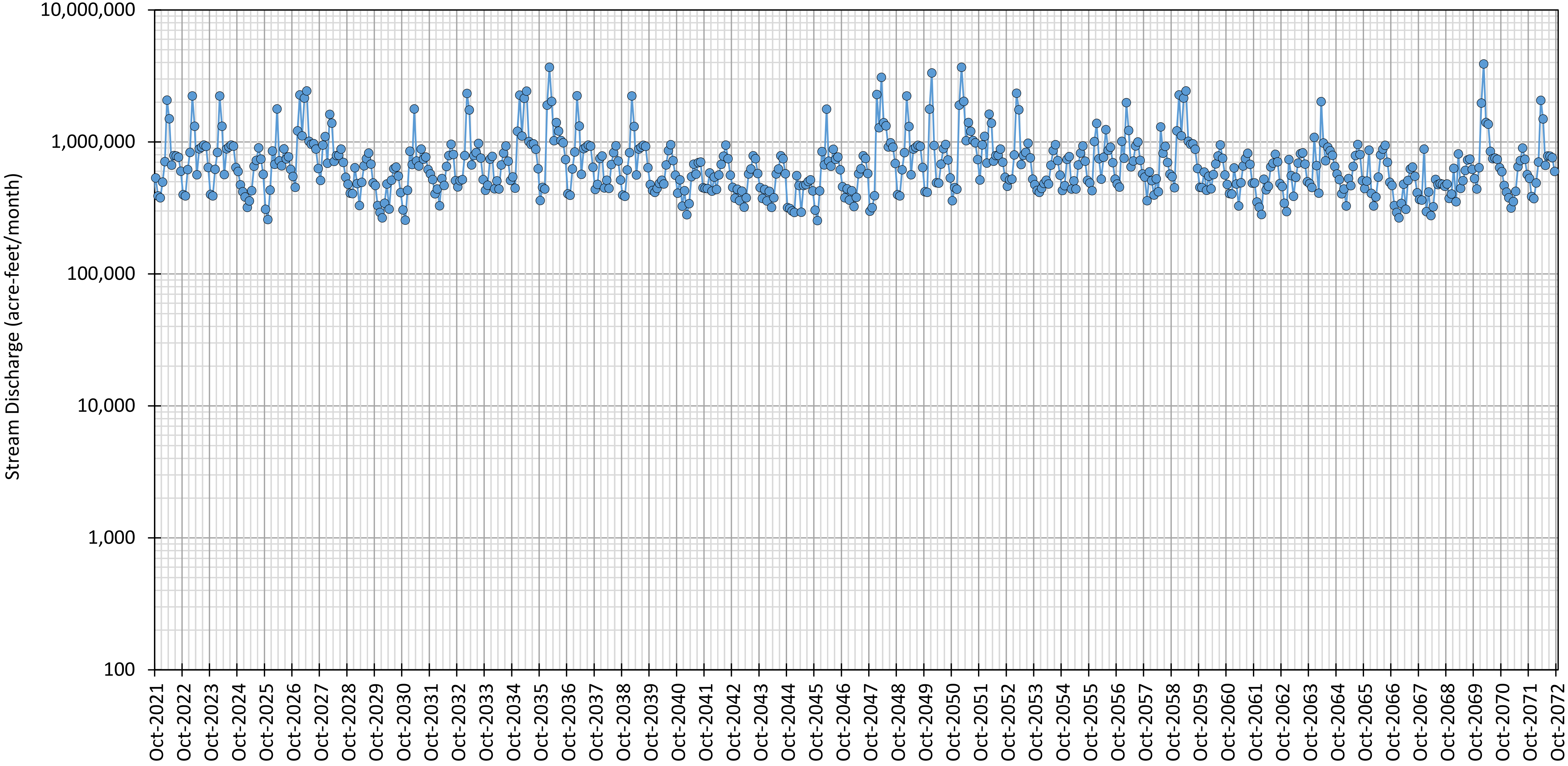
Bowman Subbasin



Tehama IHM - Projected (Future Land Use)

Outflow from Sacramento River at Bowman Subbasin Boundary

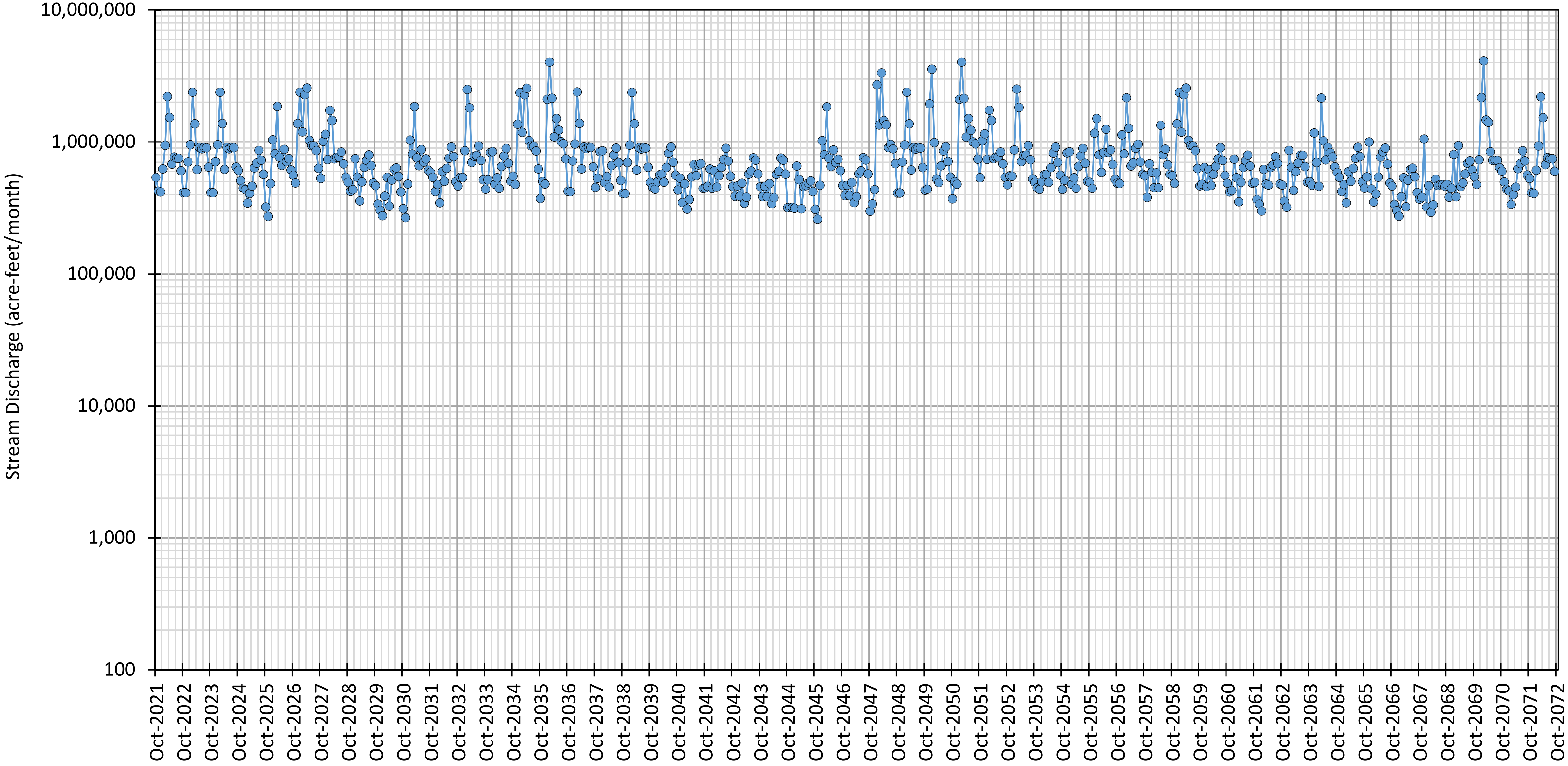
Bowman Subbasin



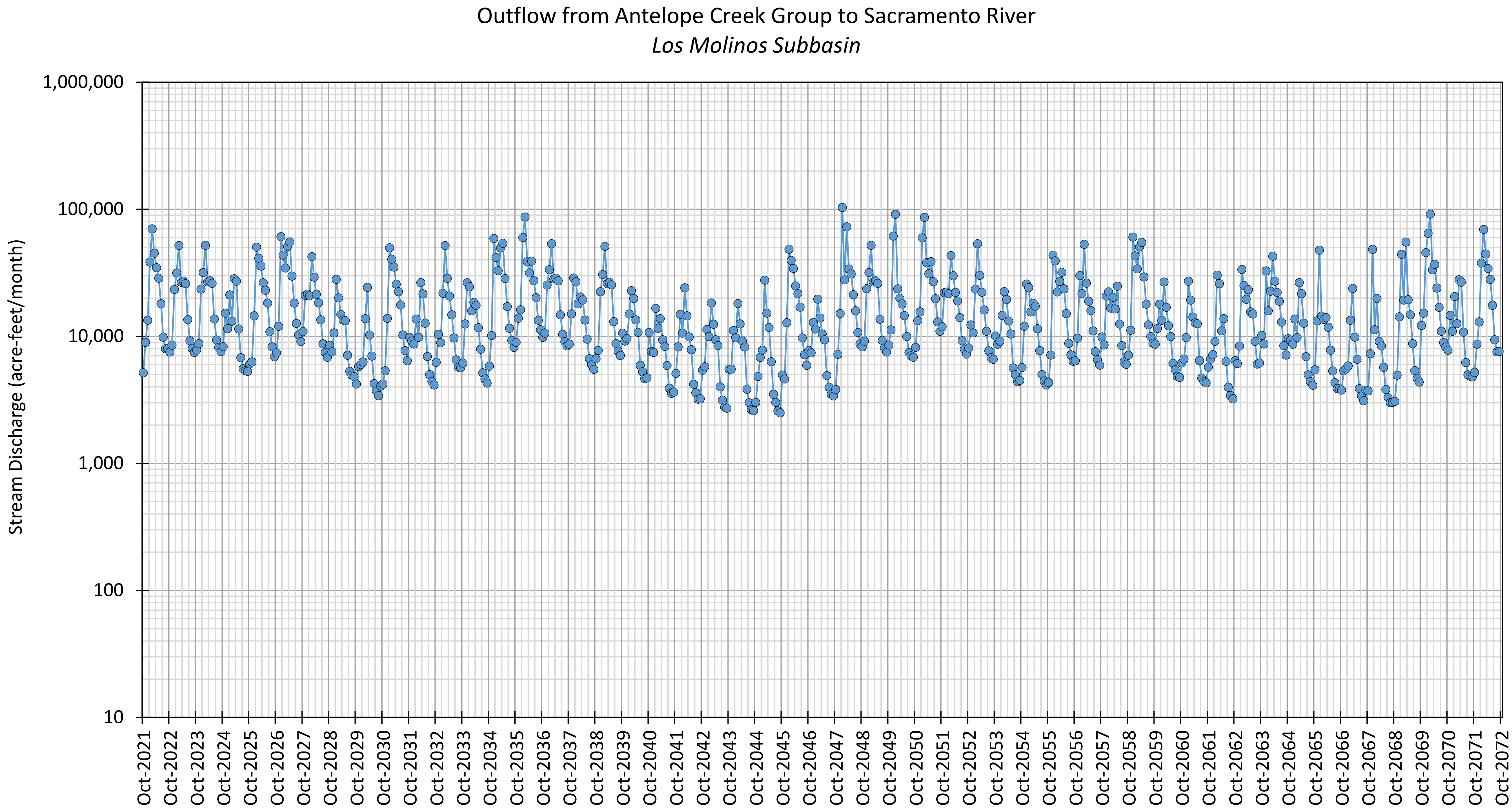
Tehama IHM - Projected (Future Land Use)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin



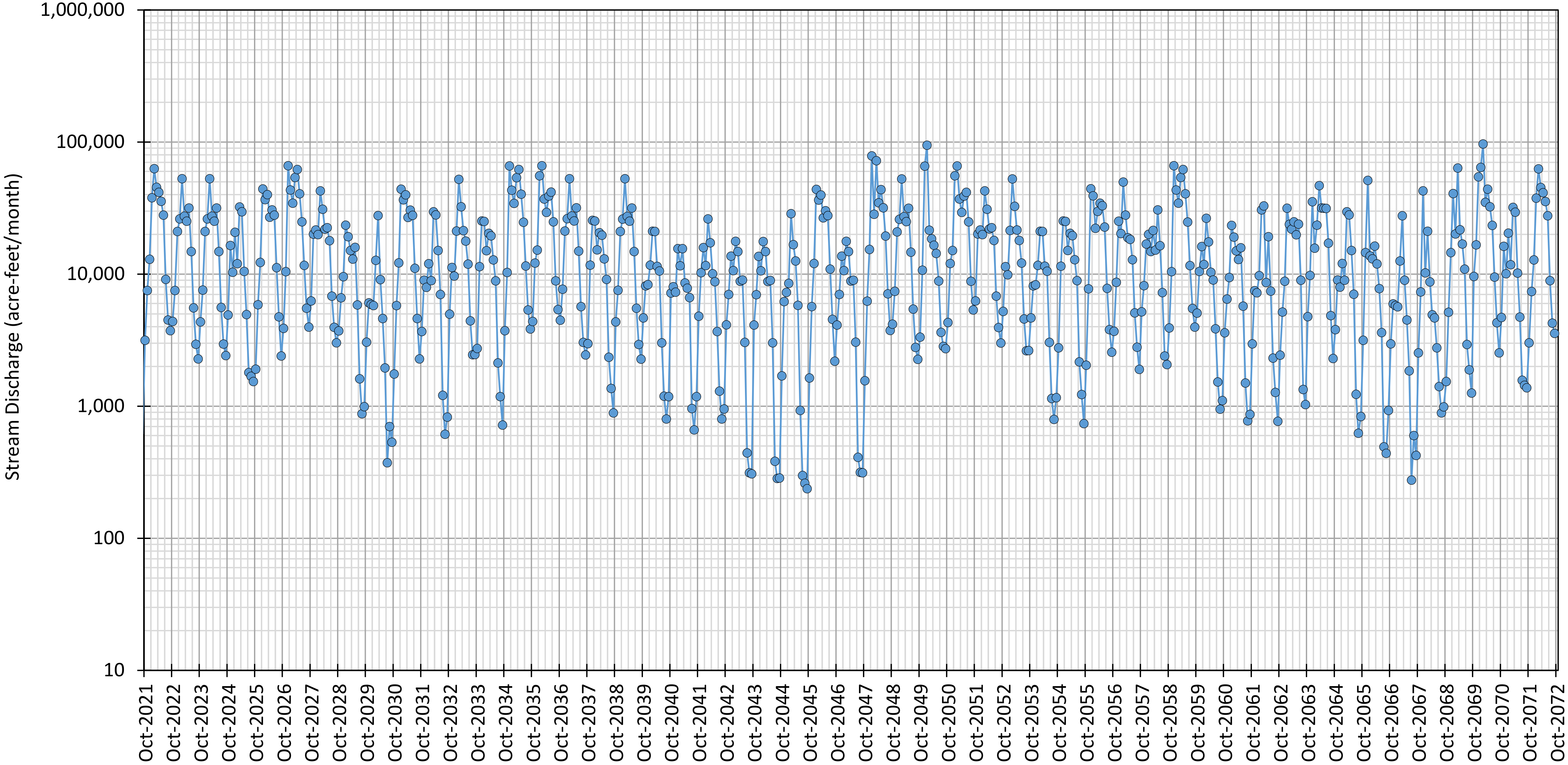
Tehama IHM - Projected (Future Land Use)



Tehama IHM - Projected (Future Land Use)

Outflow from Mill Creek to Sacramento River

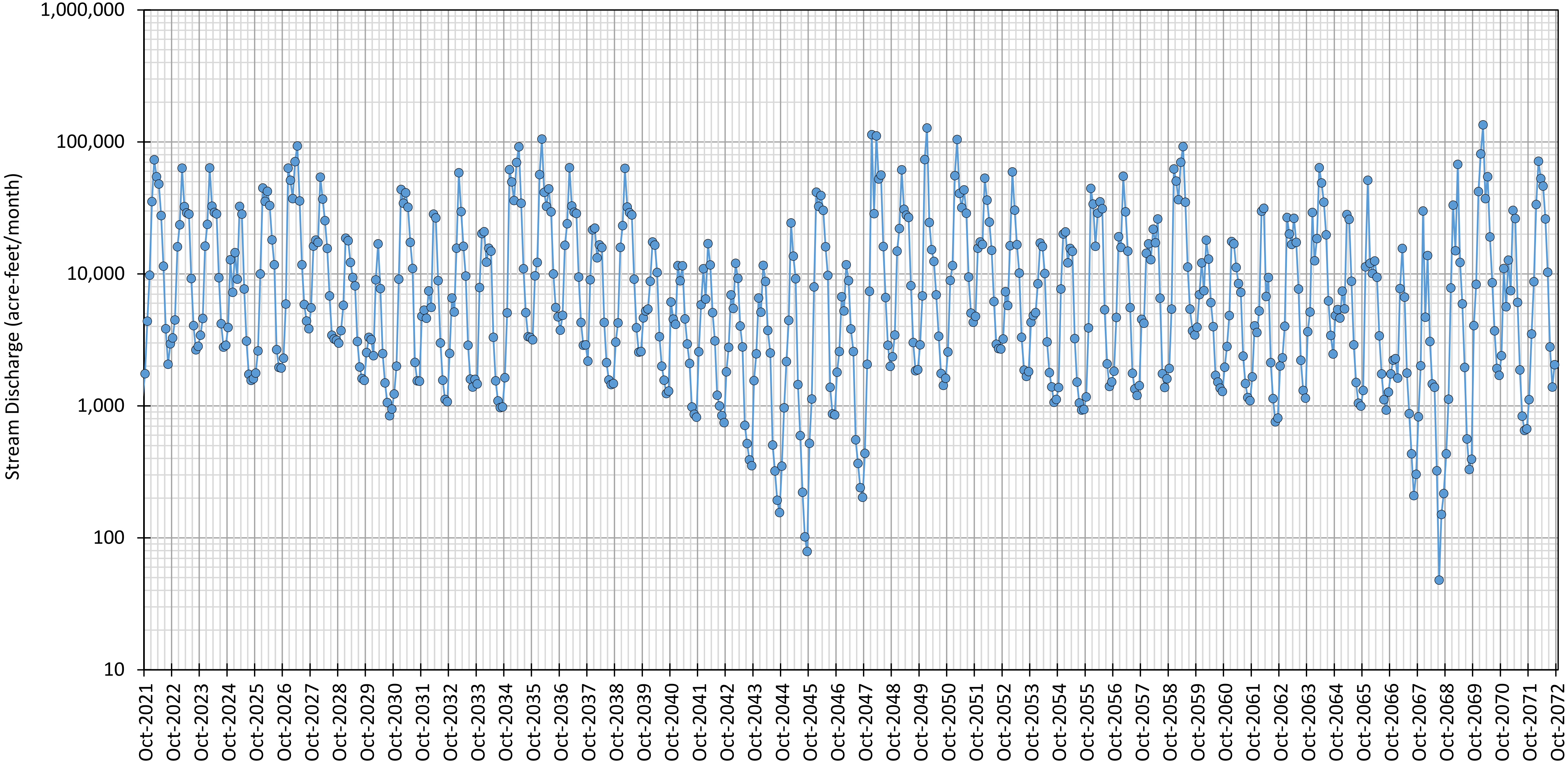
Los Molinos Subbasin



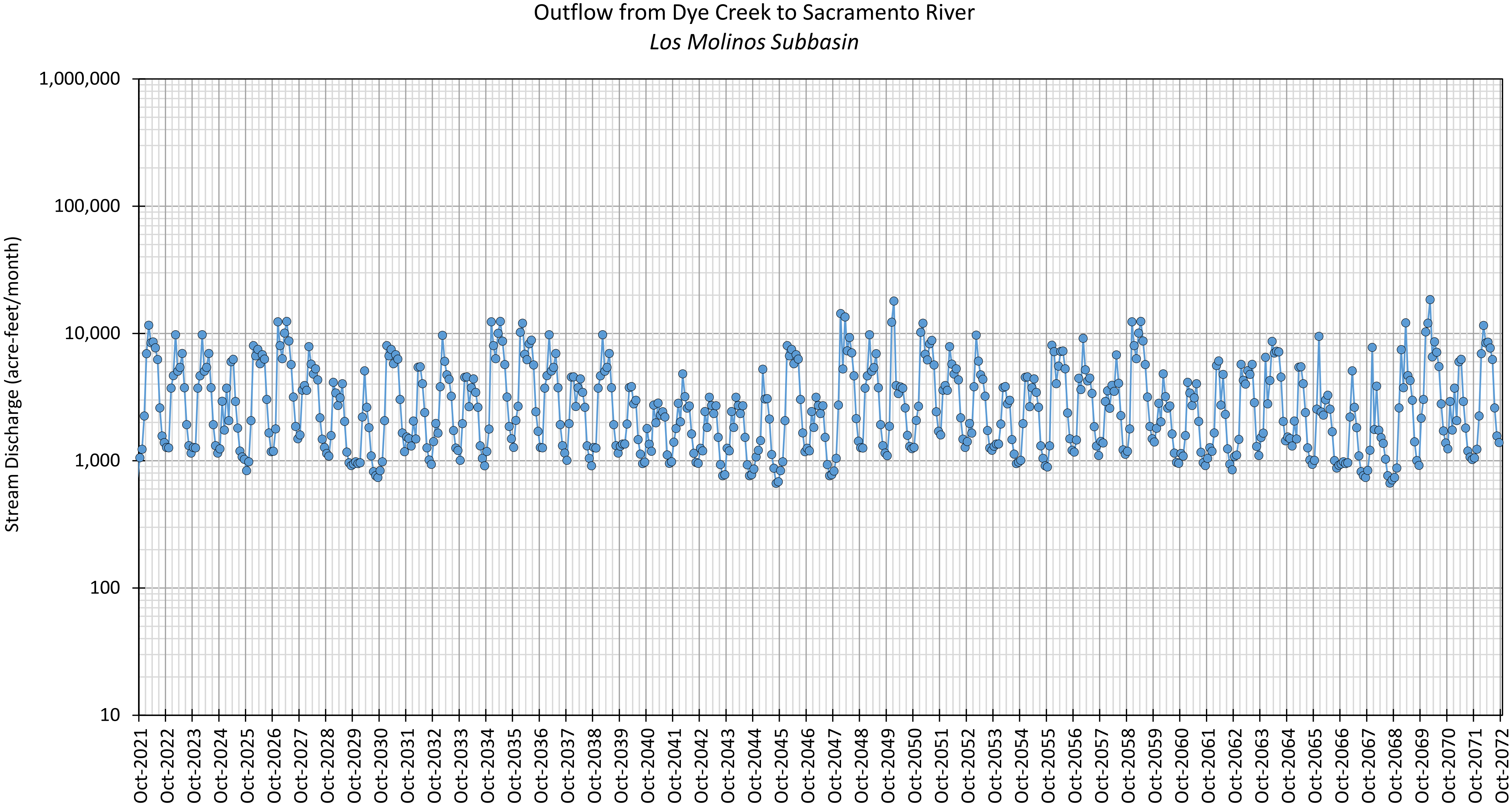
Tehama IHM - Projected (Future Land Use)

Outflow from Deer Creek Group to Sacramento River

Los Molinos Subbasin



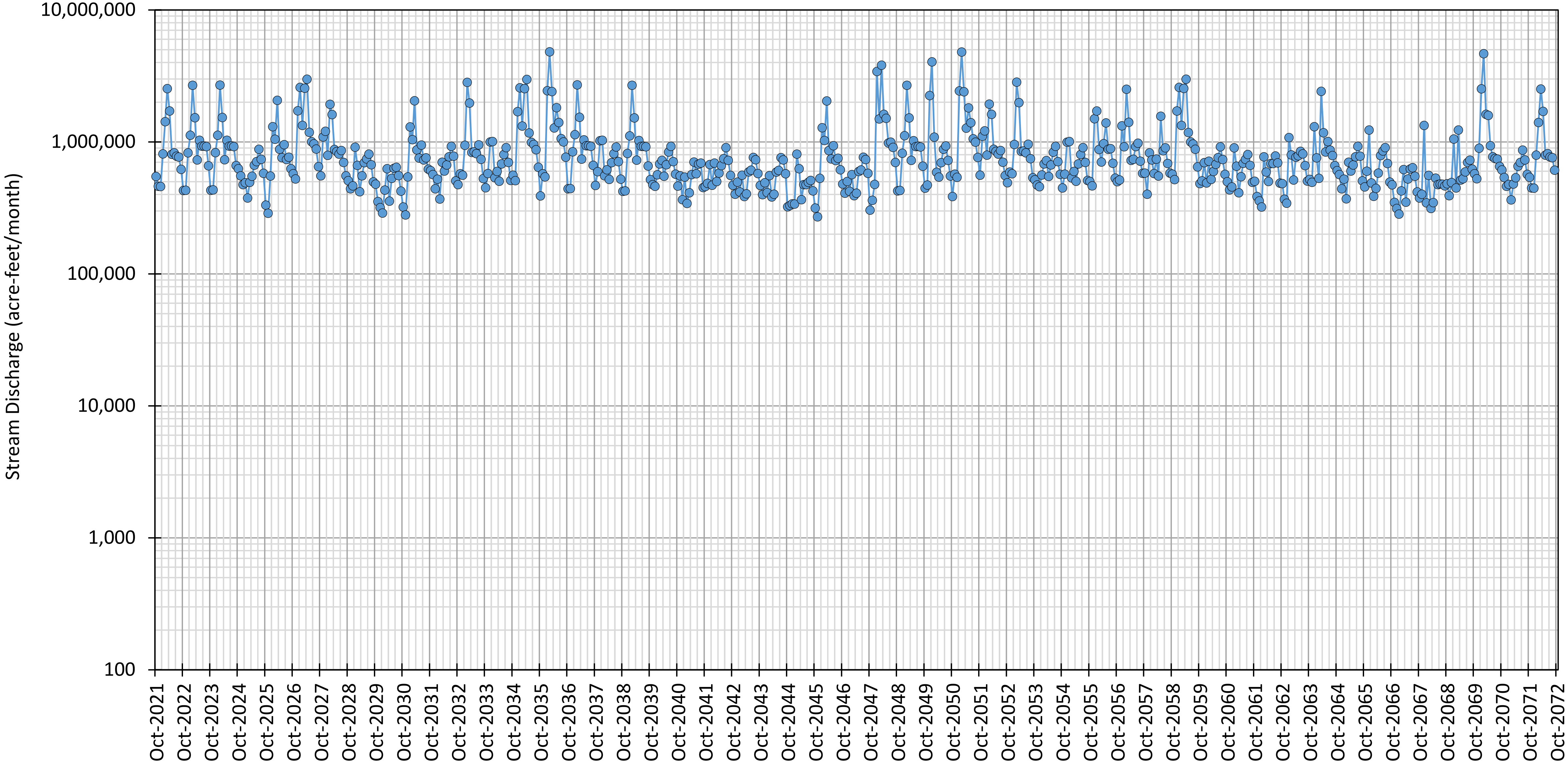
Tehama IHM - Projected (Future Land Use)



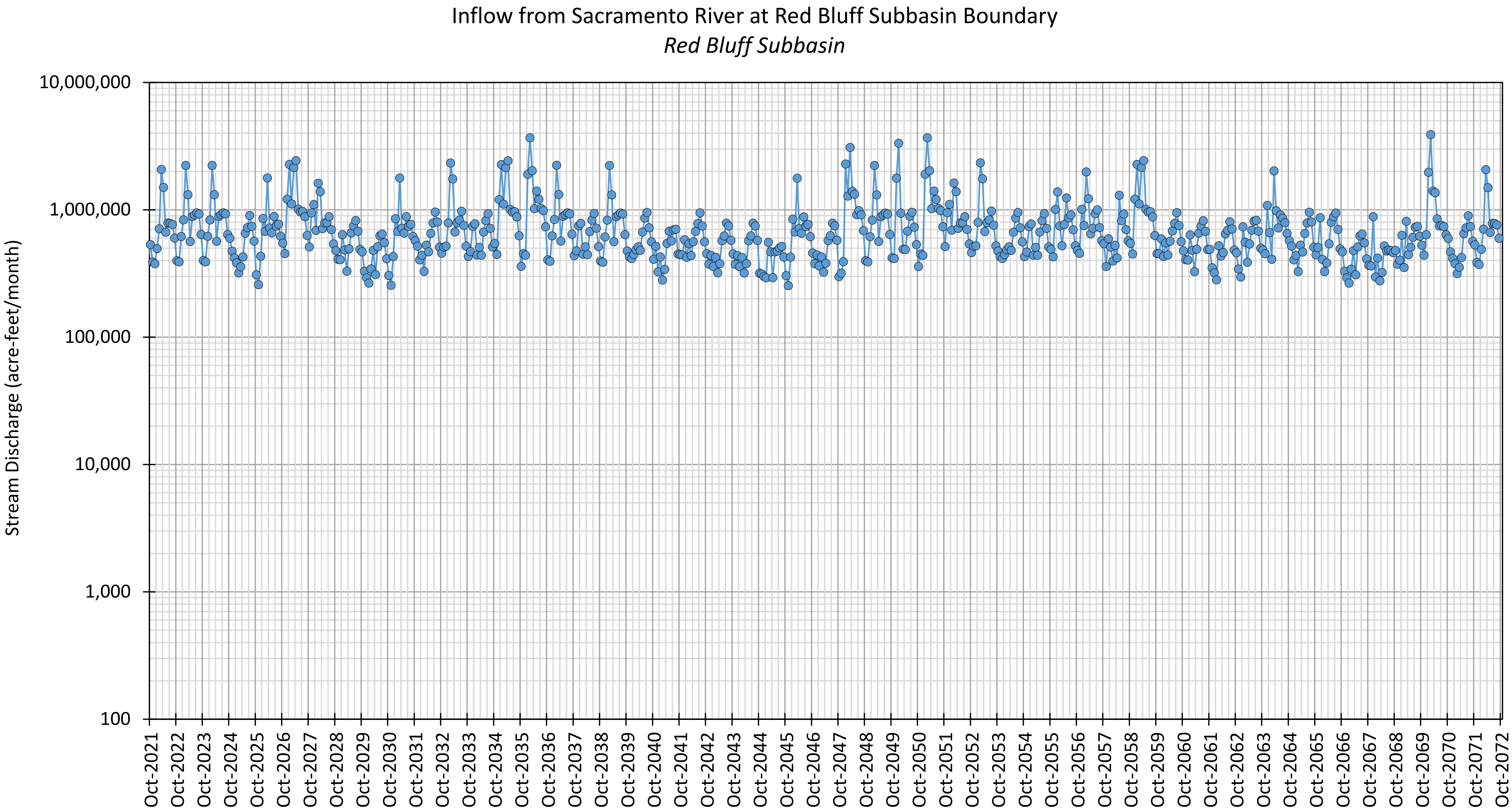
Tehama IHM - Projected (Future Land Use)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

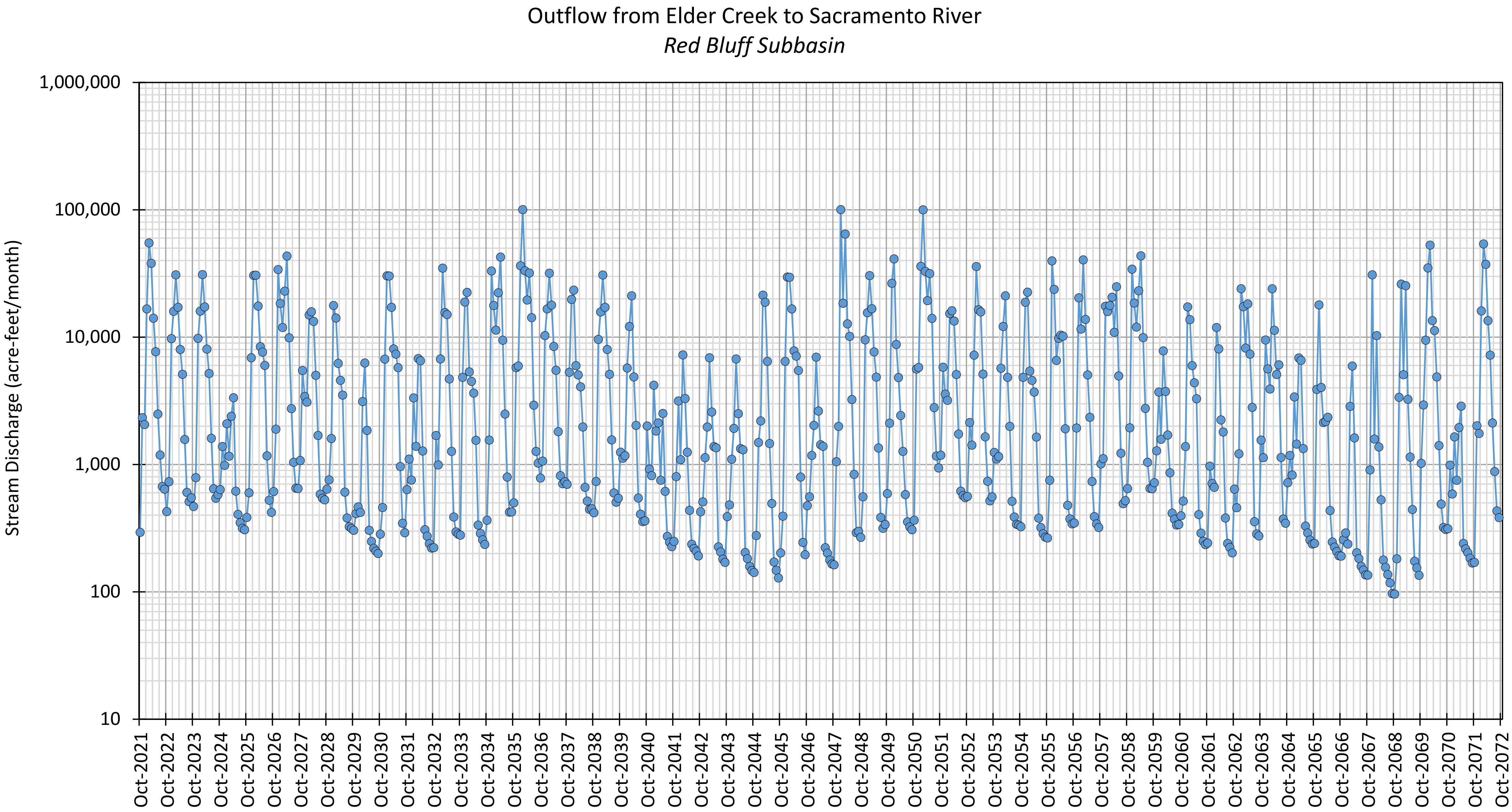
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use)



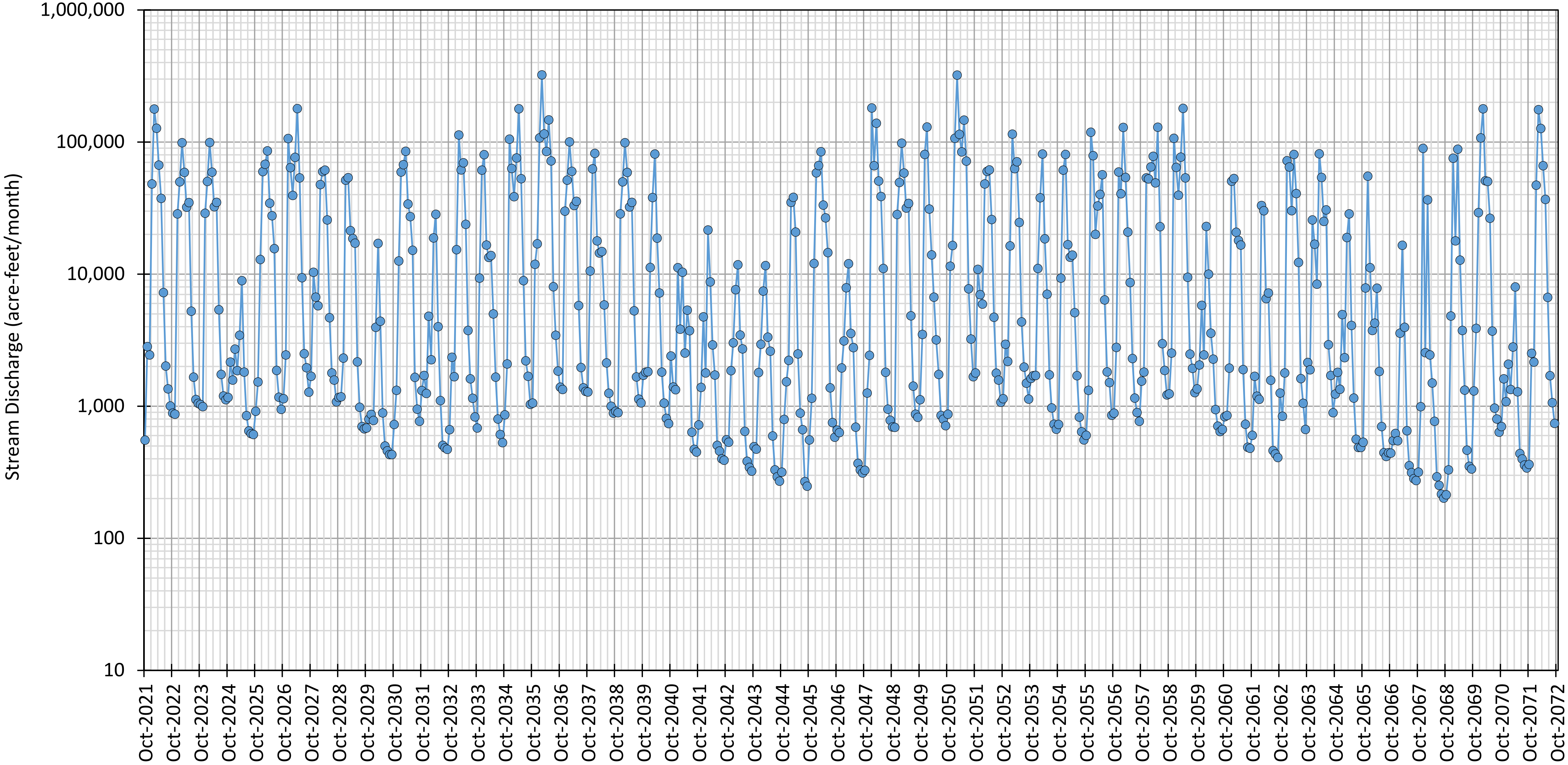
Tehama IHM - Projected (Future Land Use)



Tehama IHM - Projected (Future Land Use)

Outflow from Thomes Creek to Sacramento River

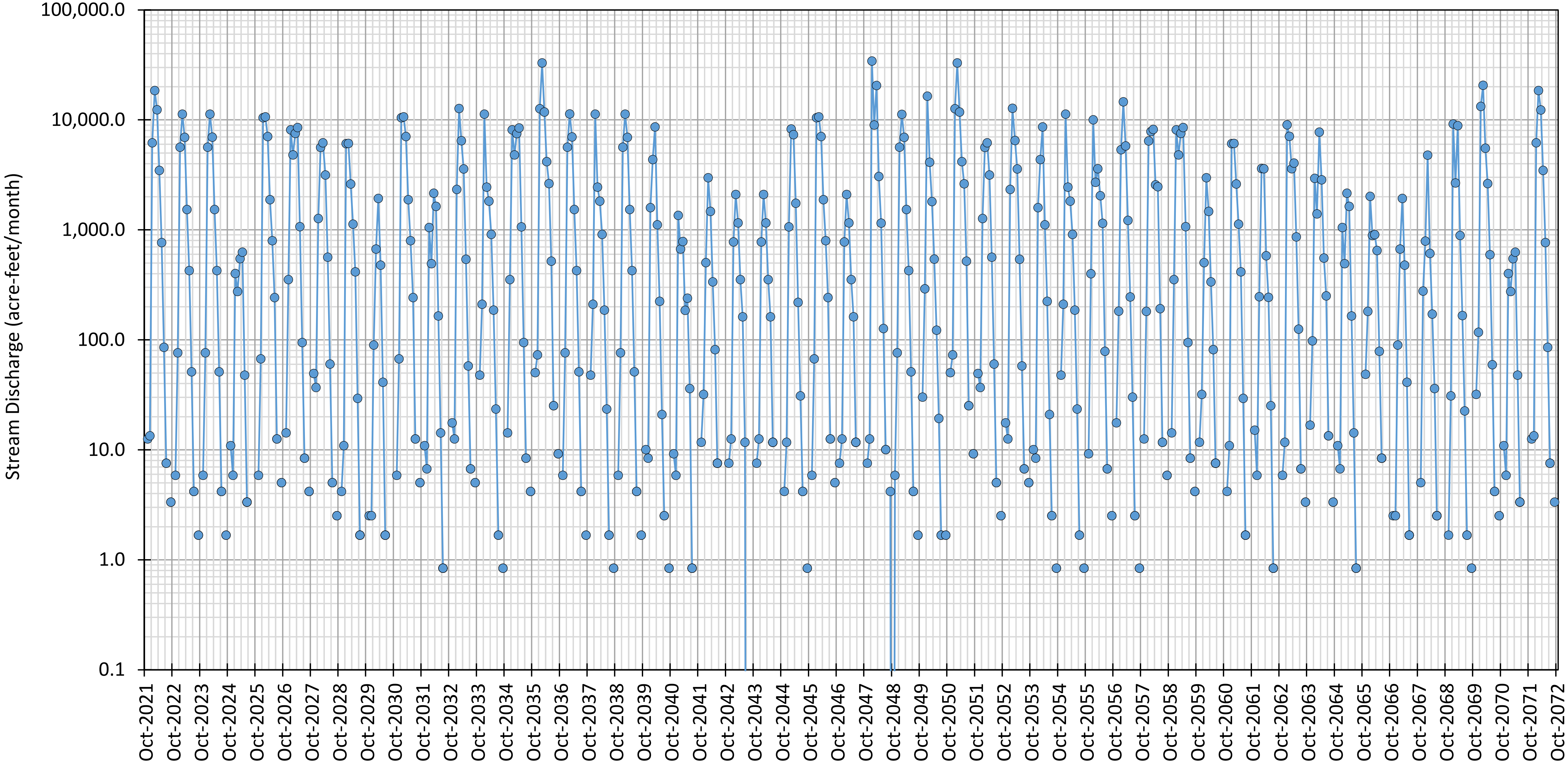
Red Bluff Subbasin



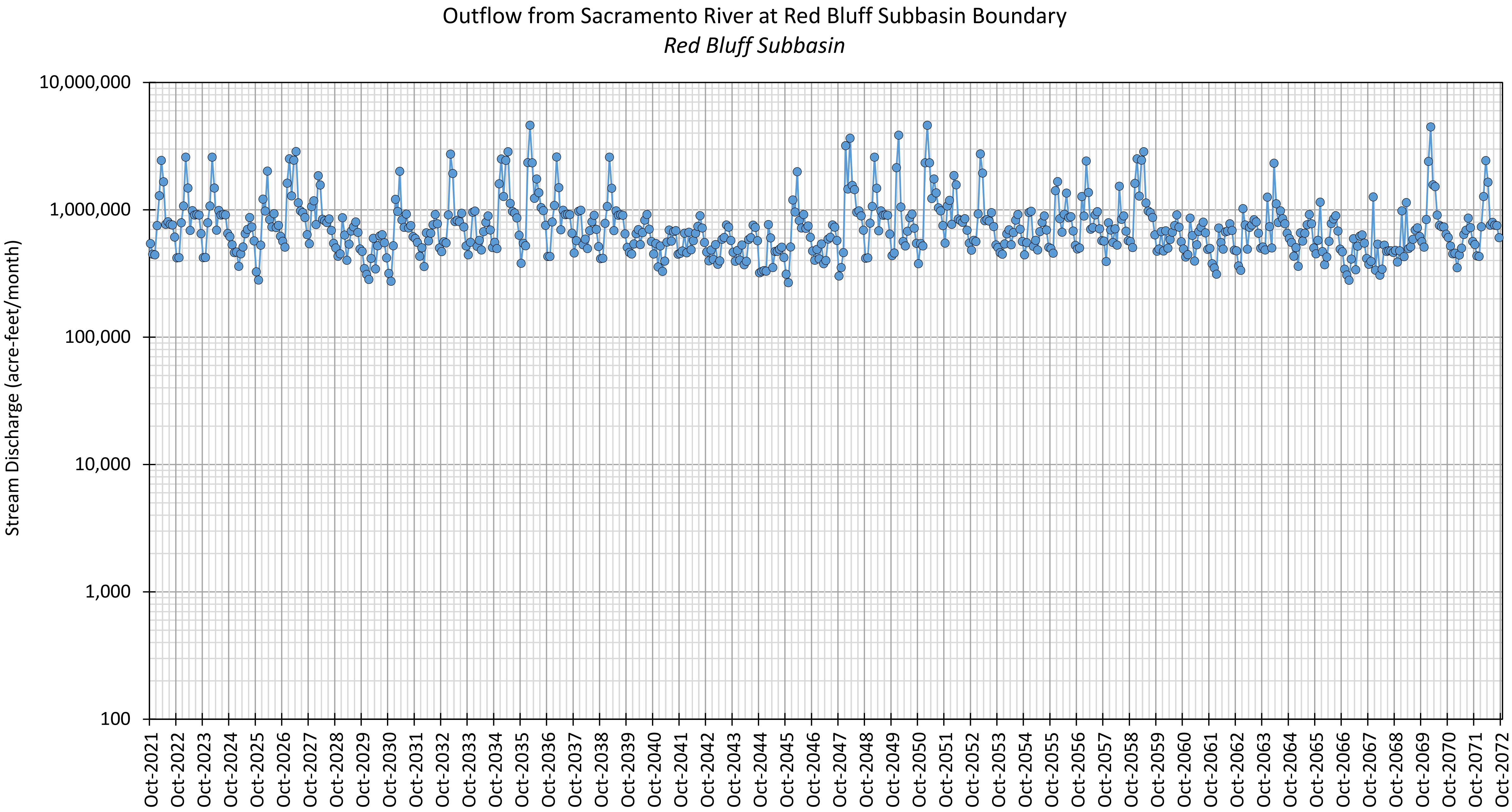
Tehama IHM - Projected (Future Land Use)

Outflow from Red Bank Creek to Sacramento River

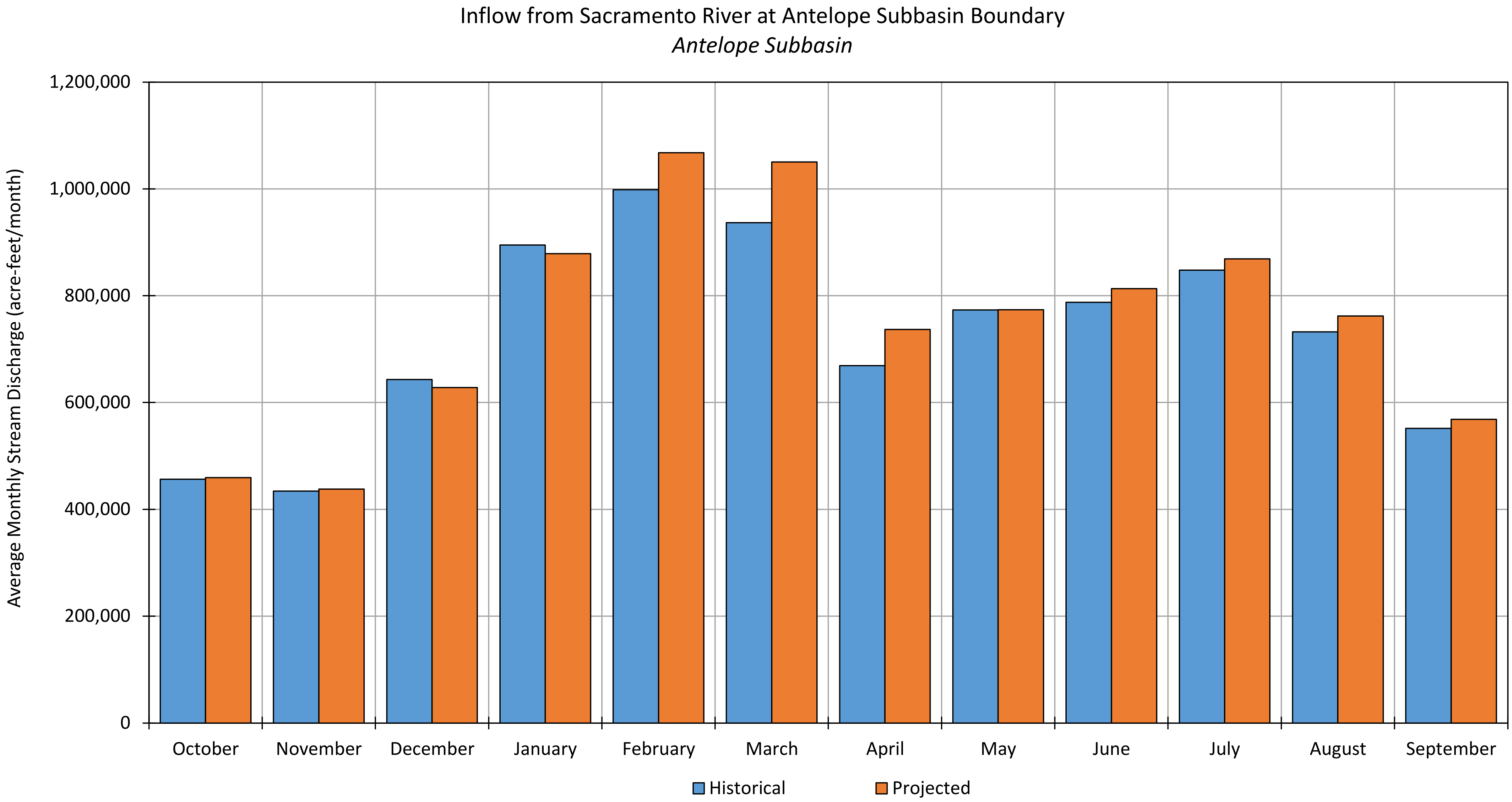
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use)



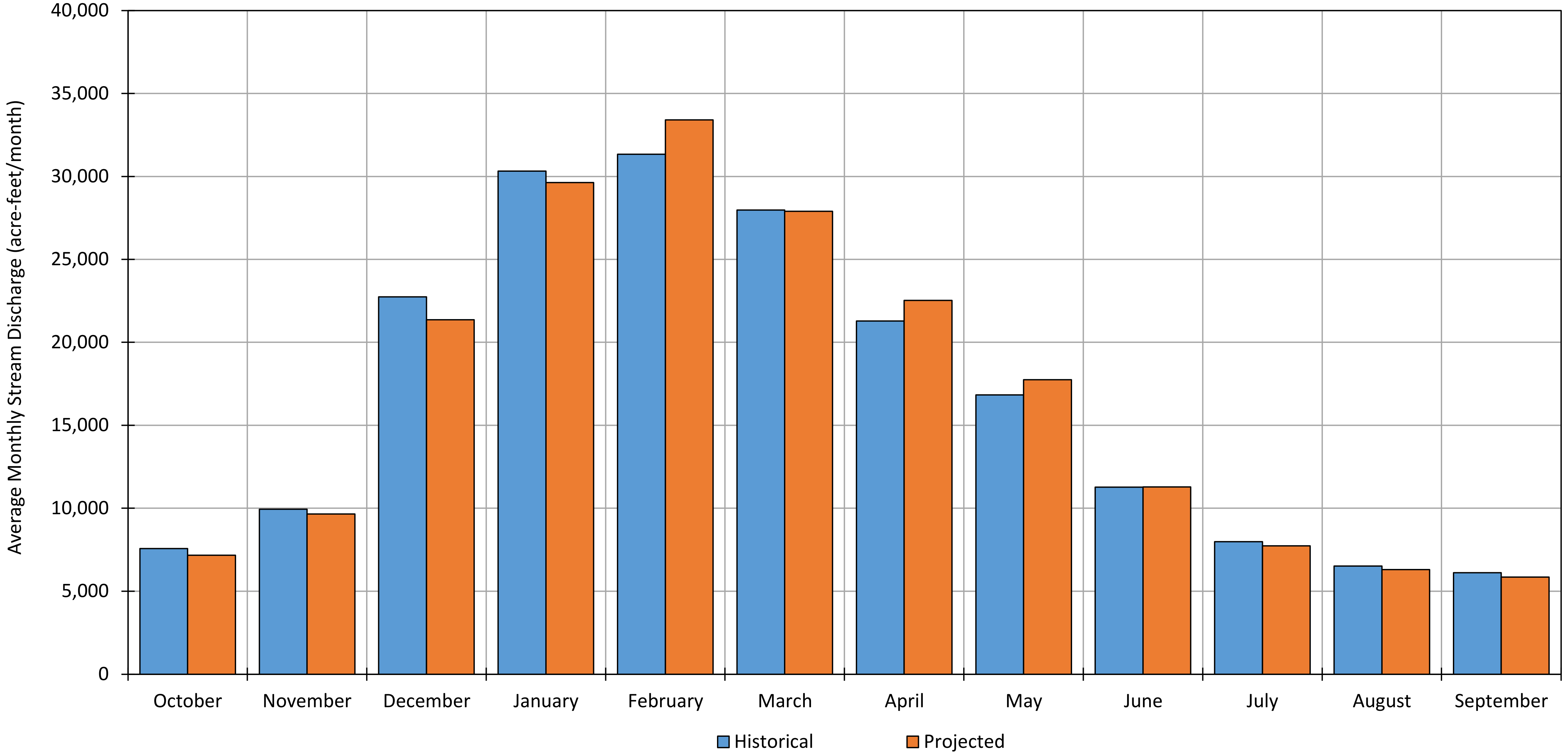
Tehama IHM - Projected (Future Land Use)



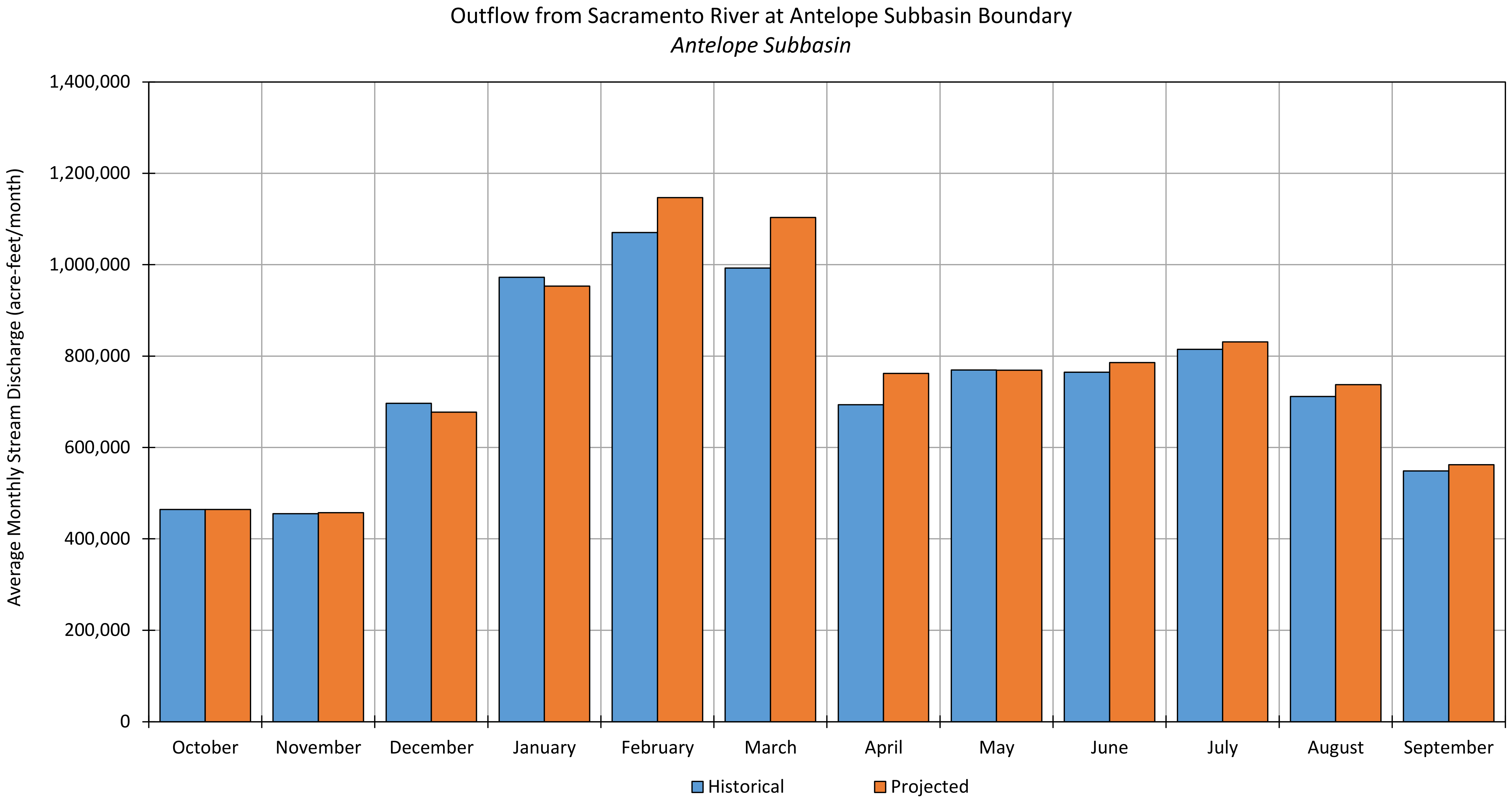
Tehama IHM - Projected (Future Land Use)

Outflow from Antelope Creek Group to Sacramento River

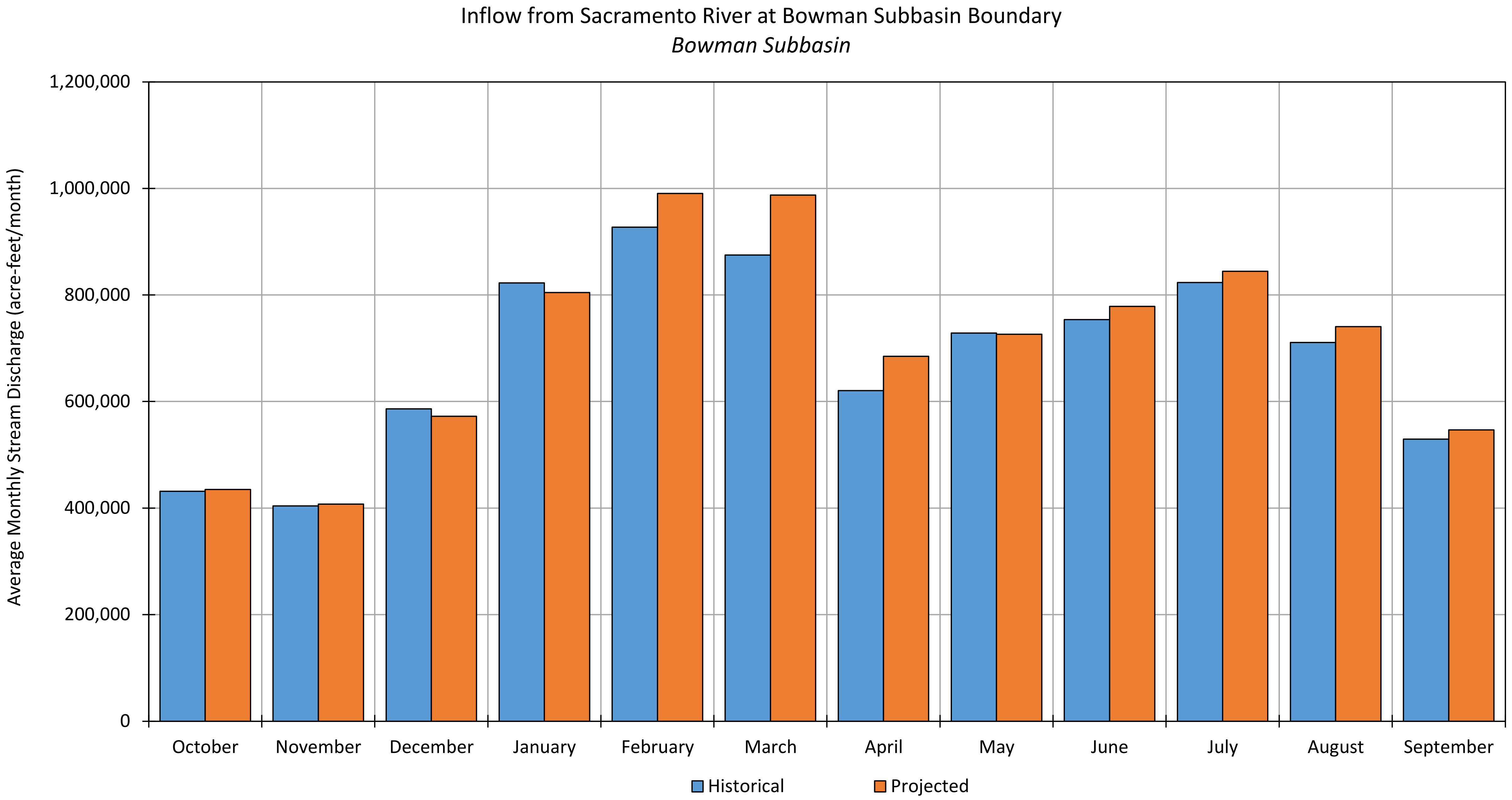
Antelope Subbasin



Tehama IHM - Projected (Future Land Use)



Tehama IHM - Projected (Future Land Use)



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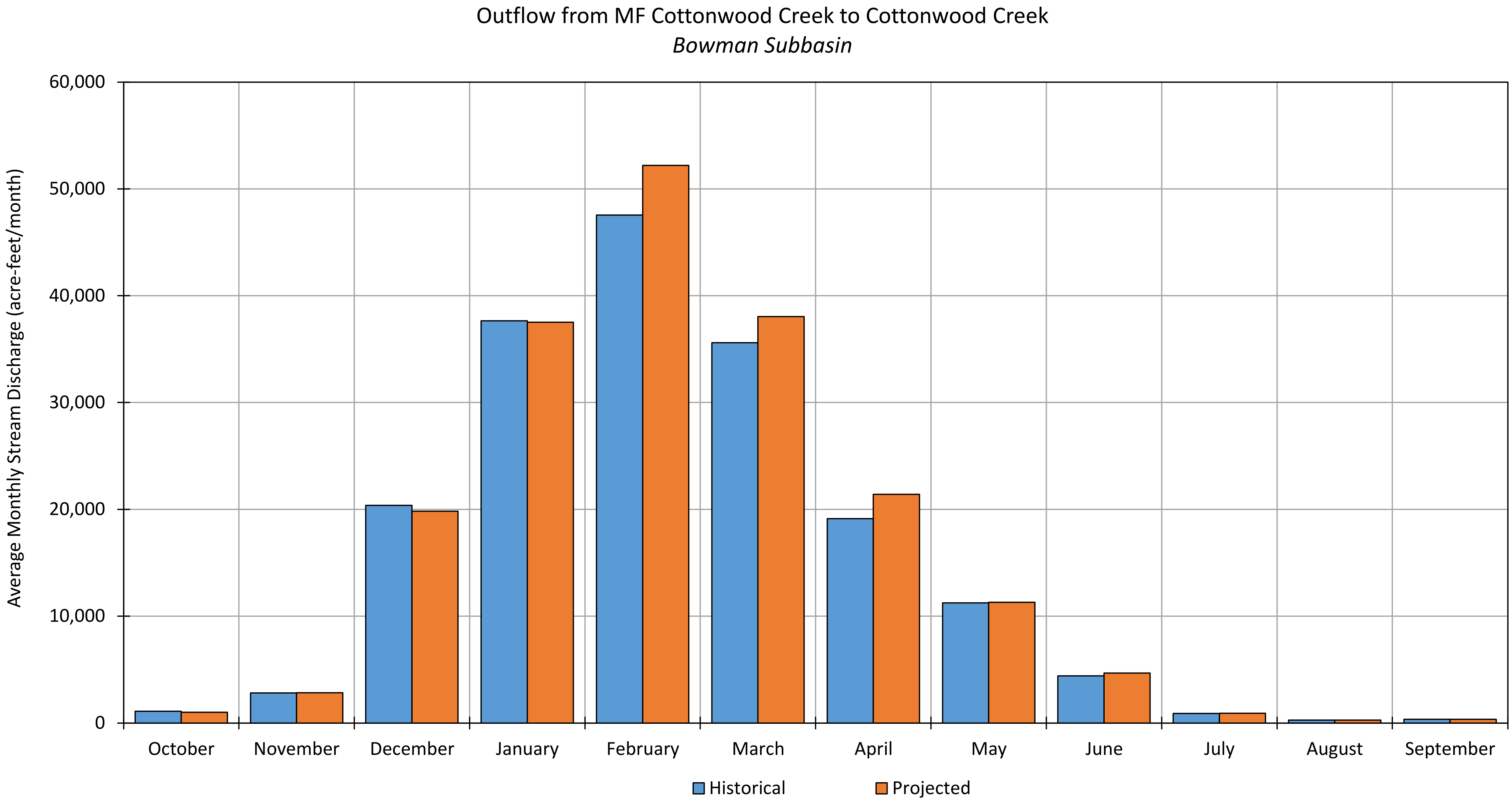

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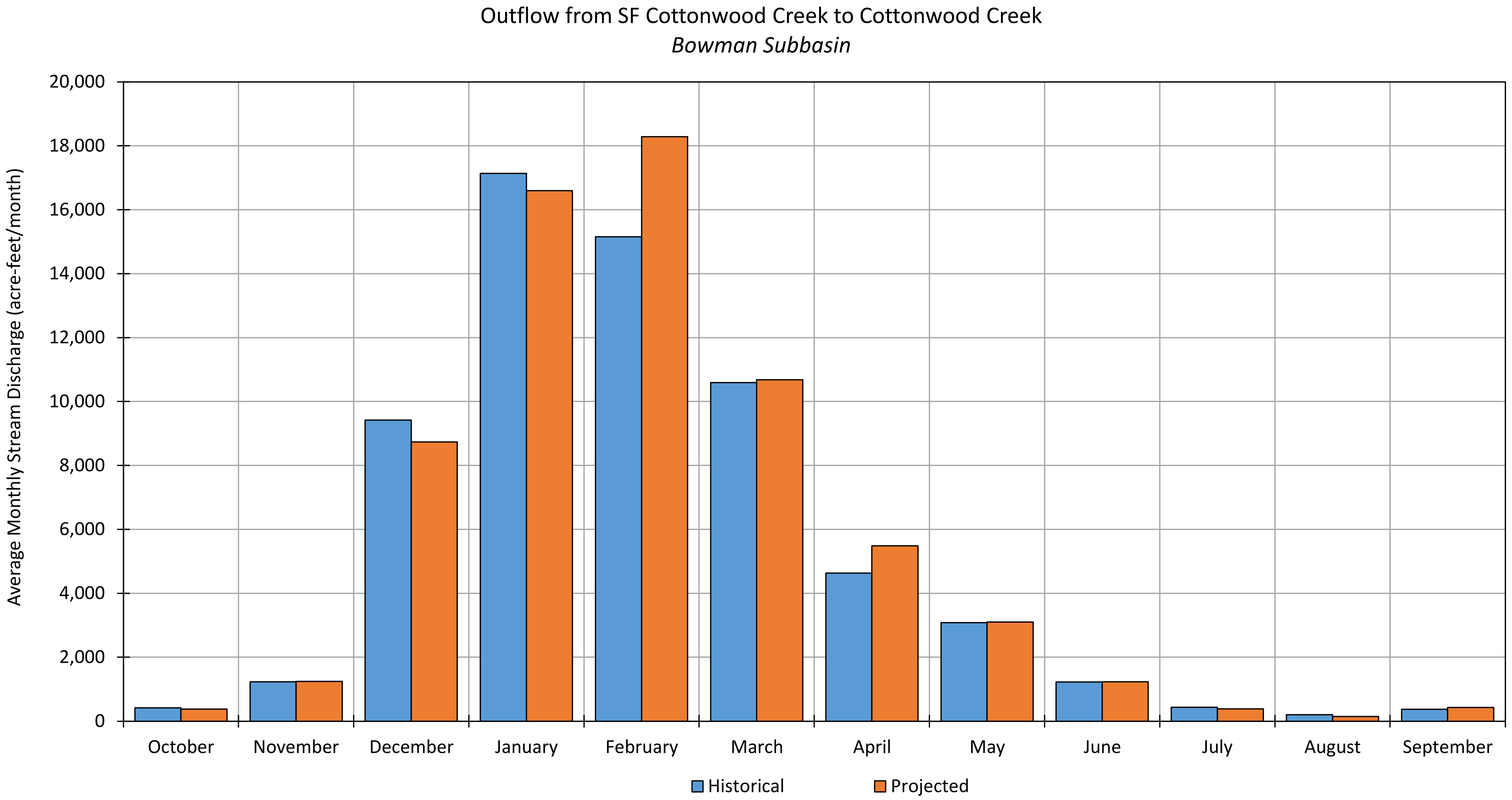
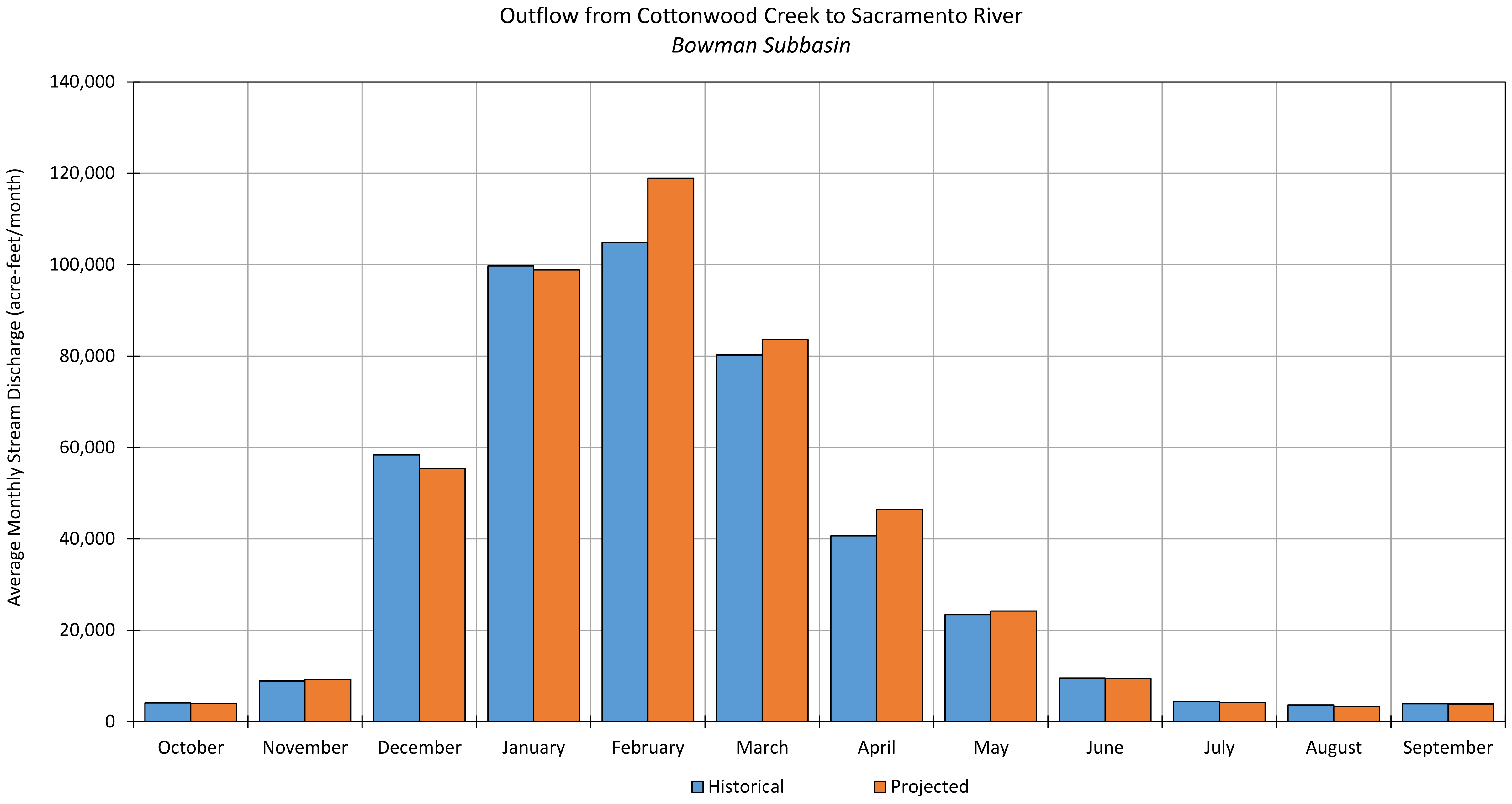


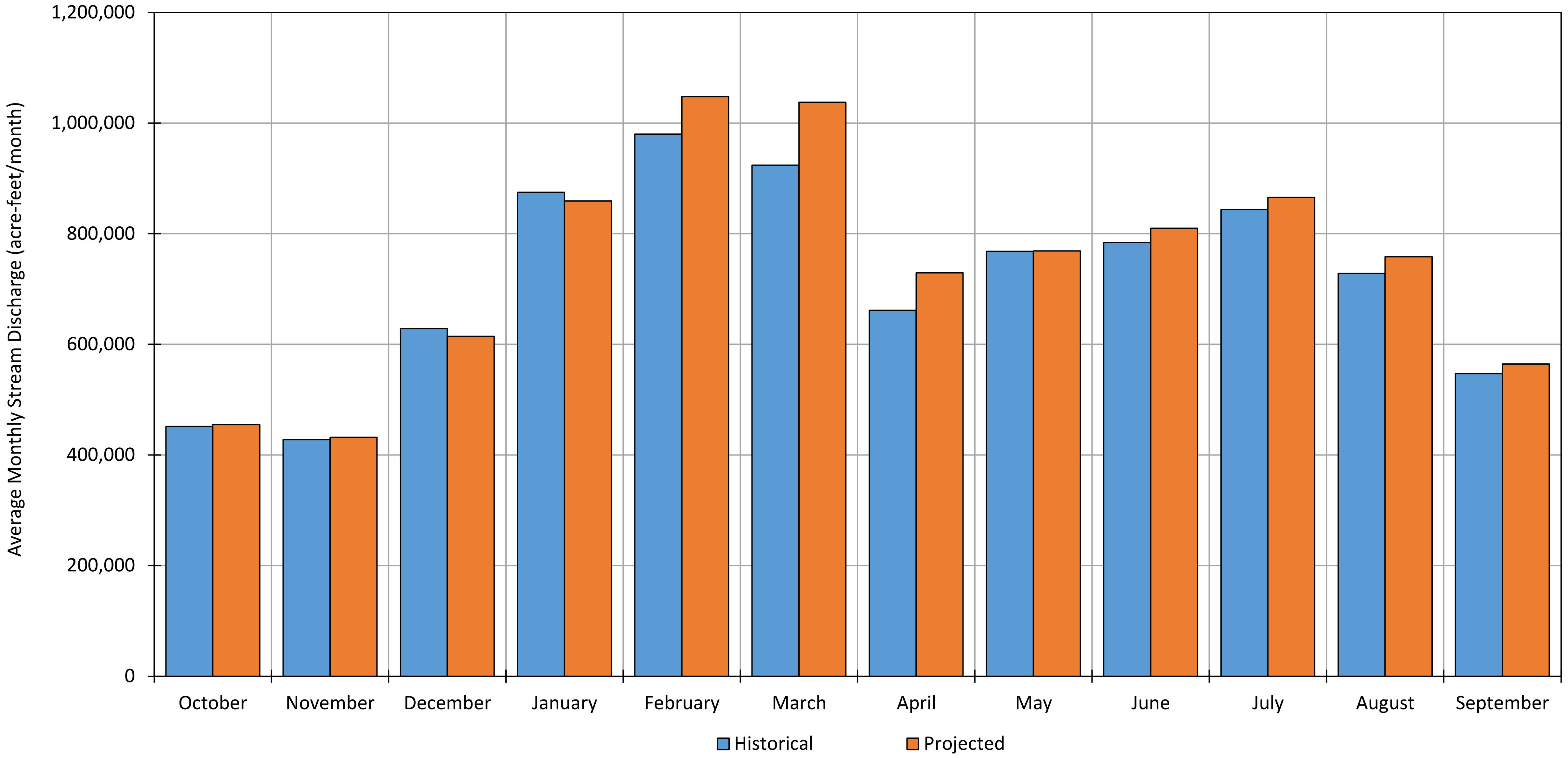
Tehama IHM - Projected (Future Land Use)



Outflow from Cottonwood Creek to Sacramento River

Bowman Subbasin

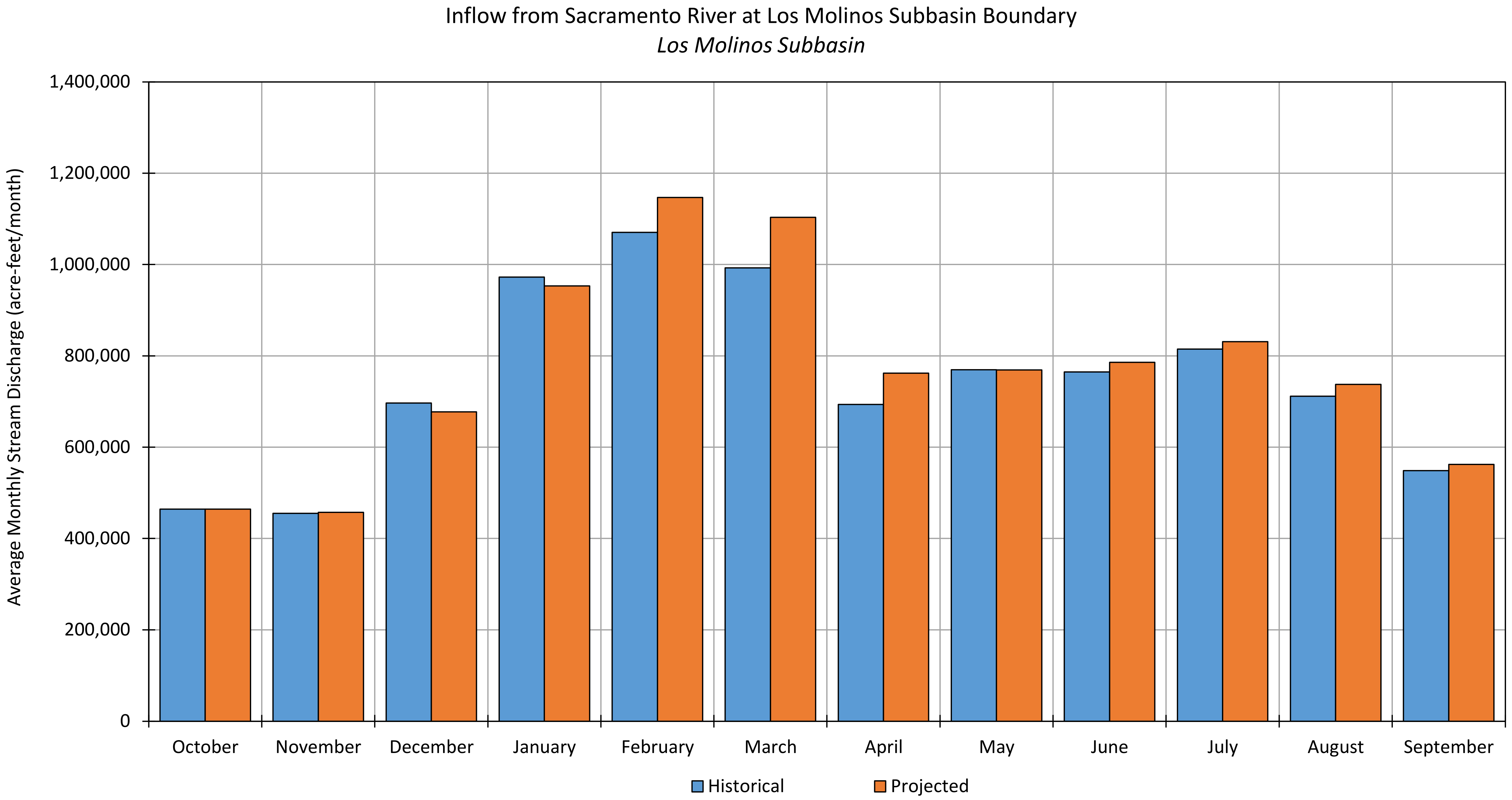
Tehama IHM - Projected (Future Land Use)



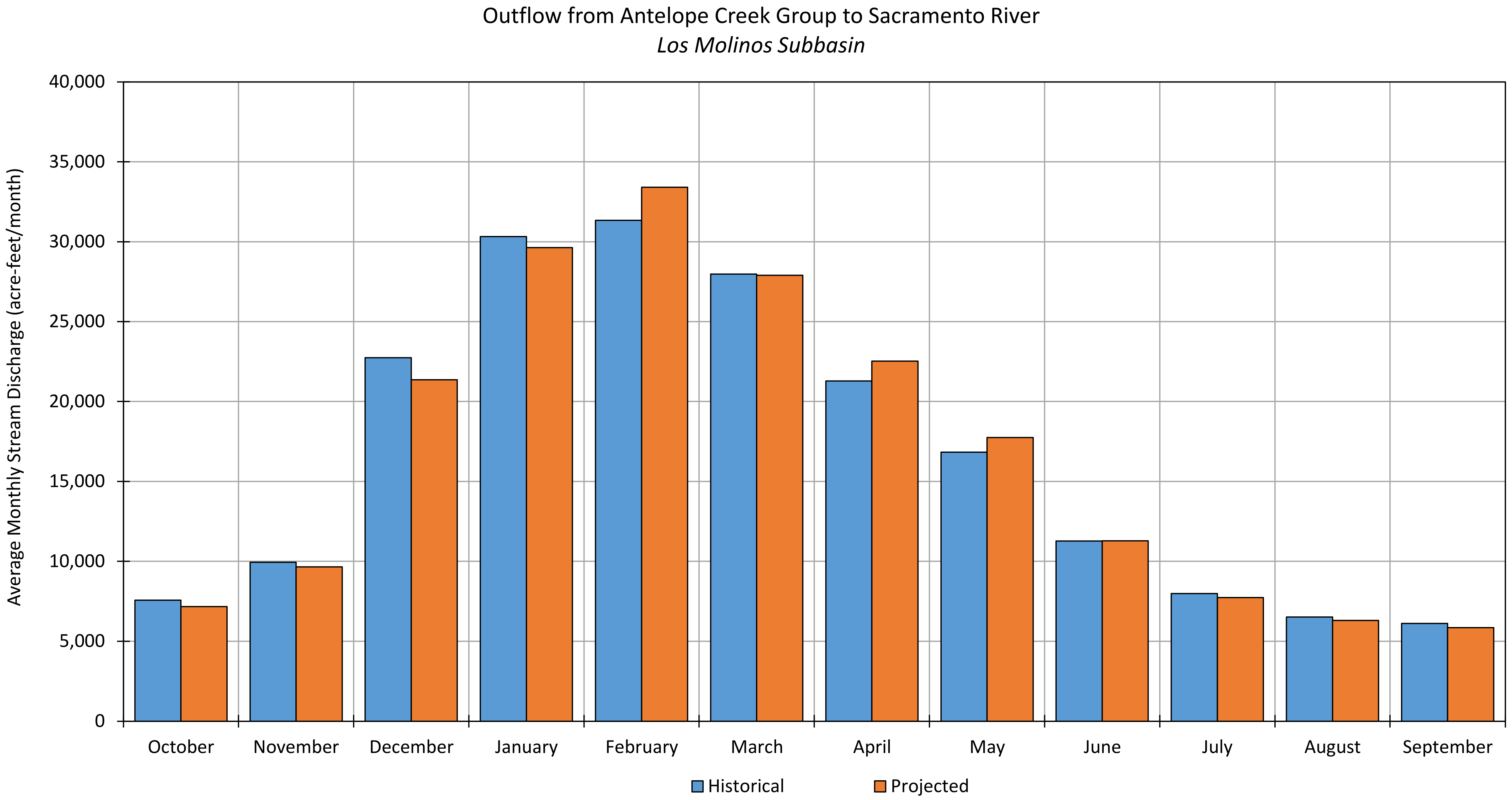
Outflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin

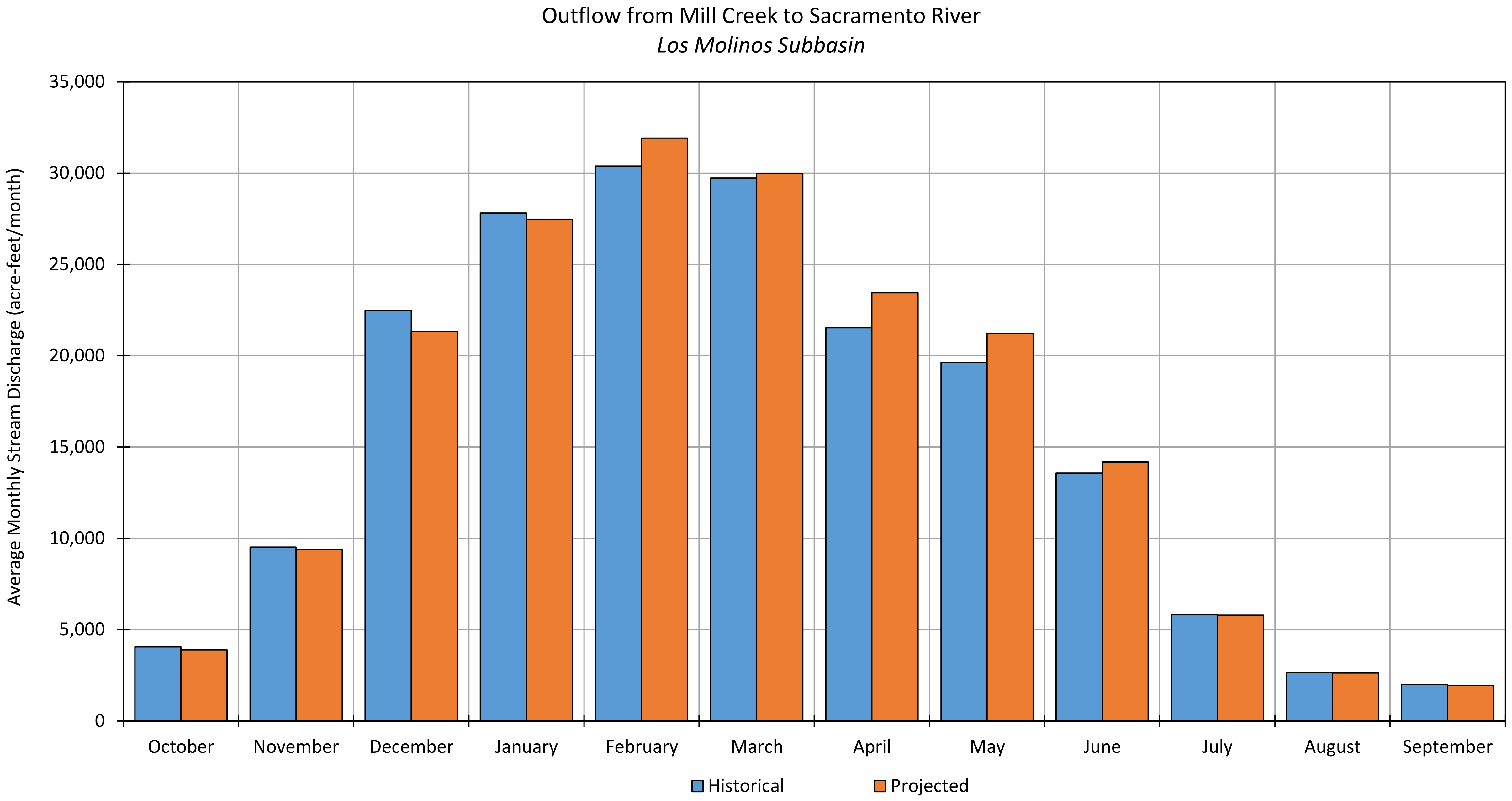
Tehama IHM - Projected (Future Land Use)



Tehama IHM - Projected (Future Land Use)



Tehama IHM - Projected (Future Land Use)



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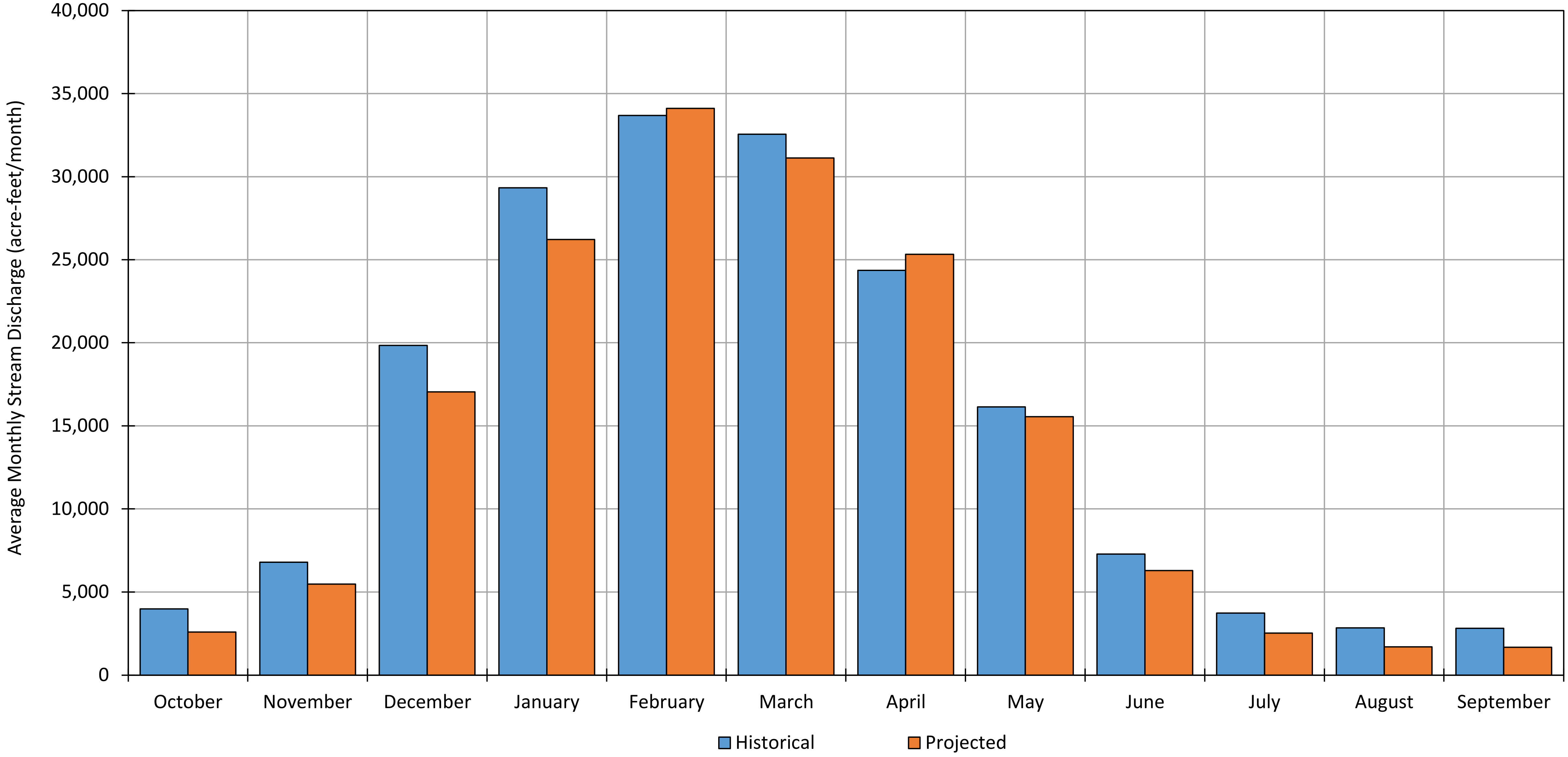
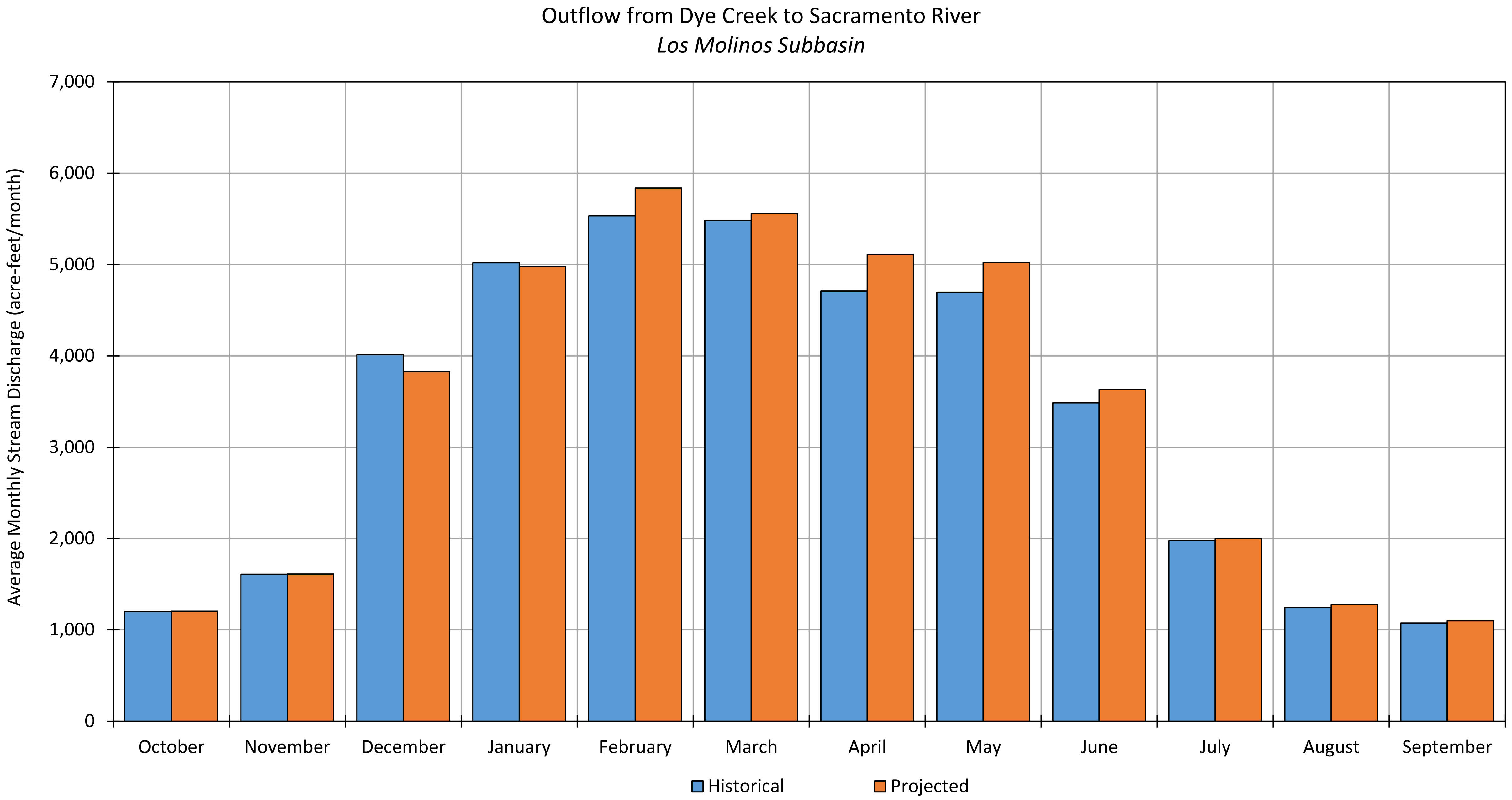


Outflow from Deer Creek Group to Sacramento River

Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use)



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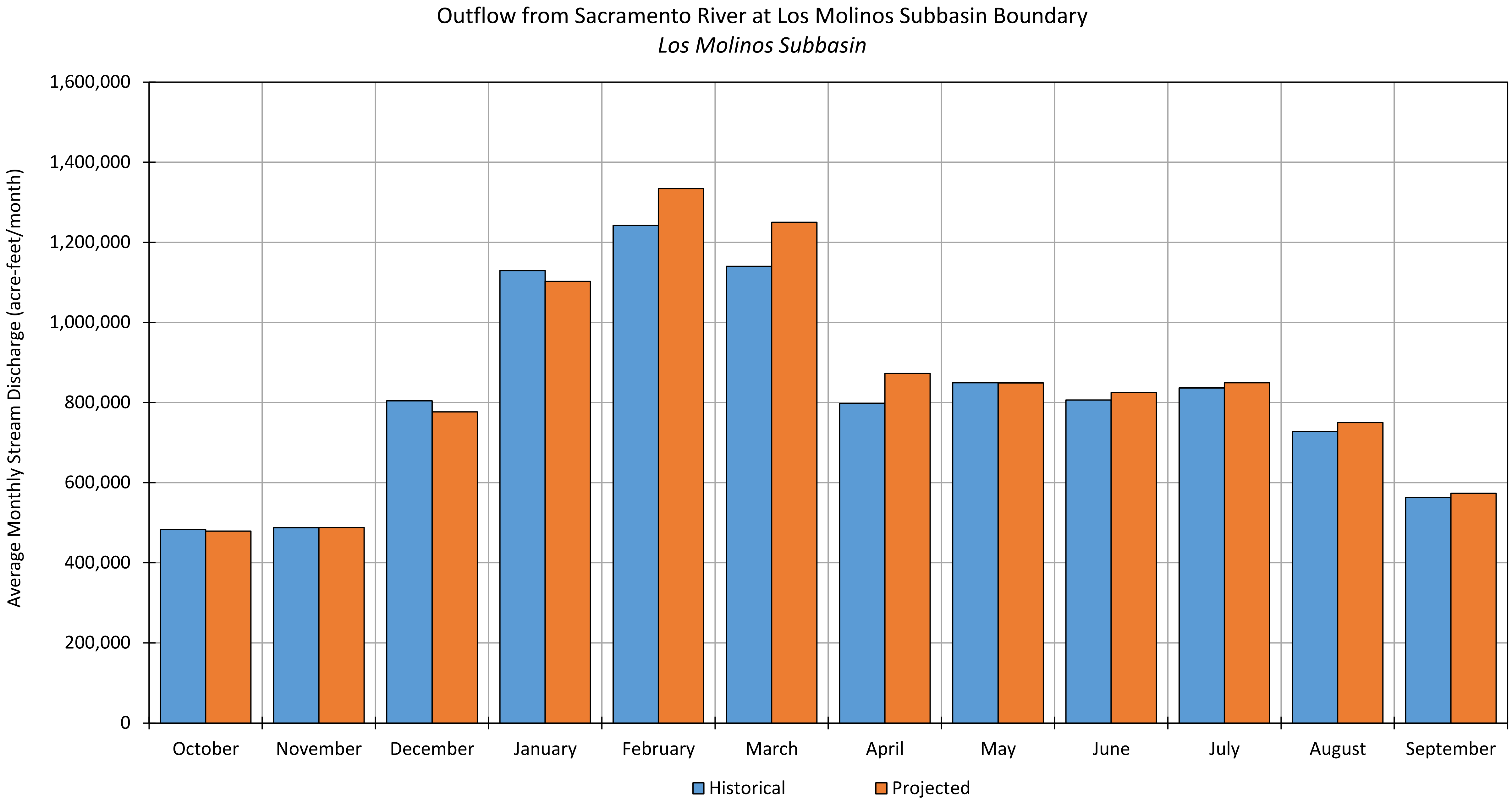

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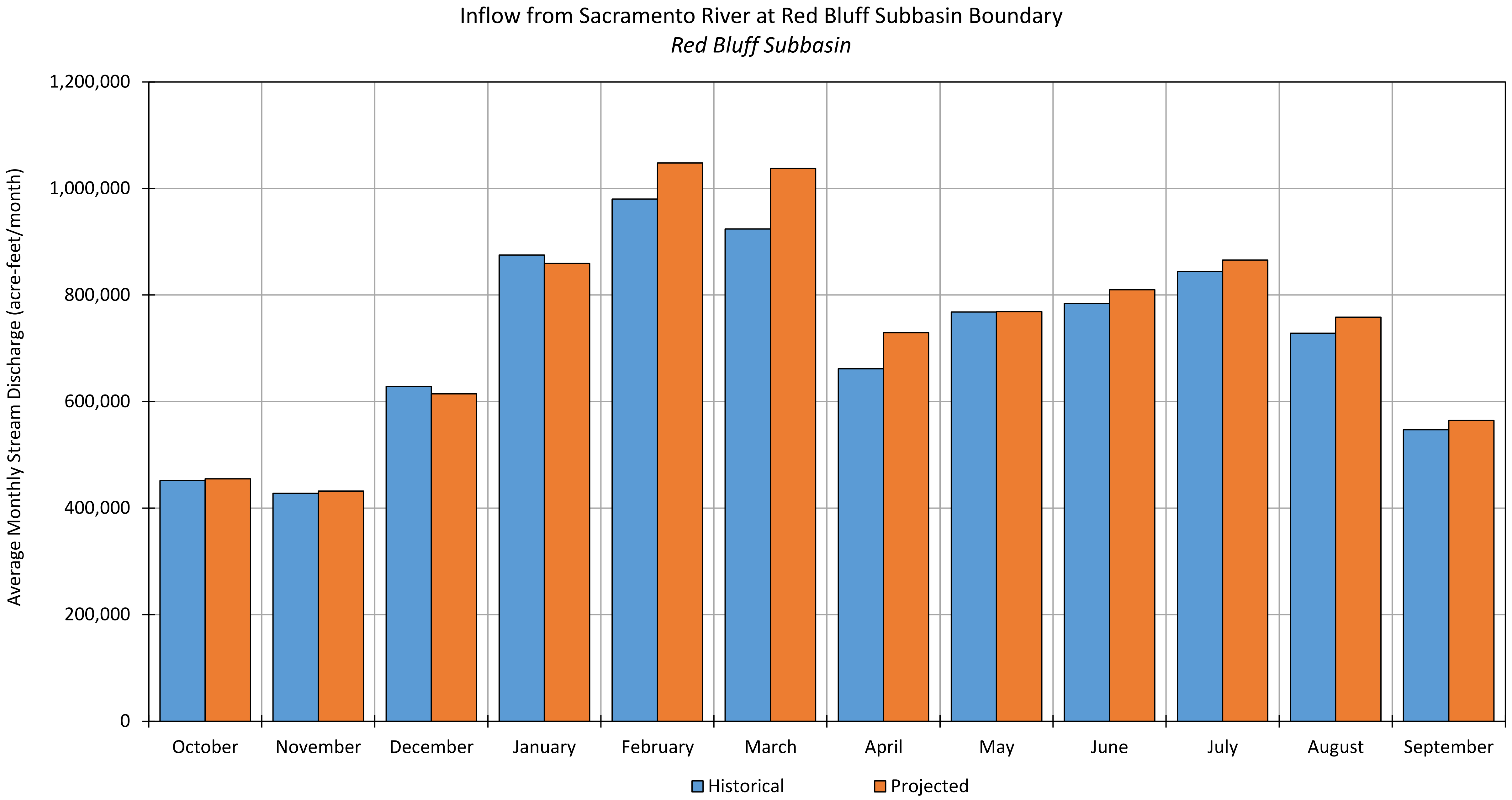
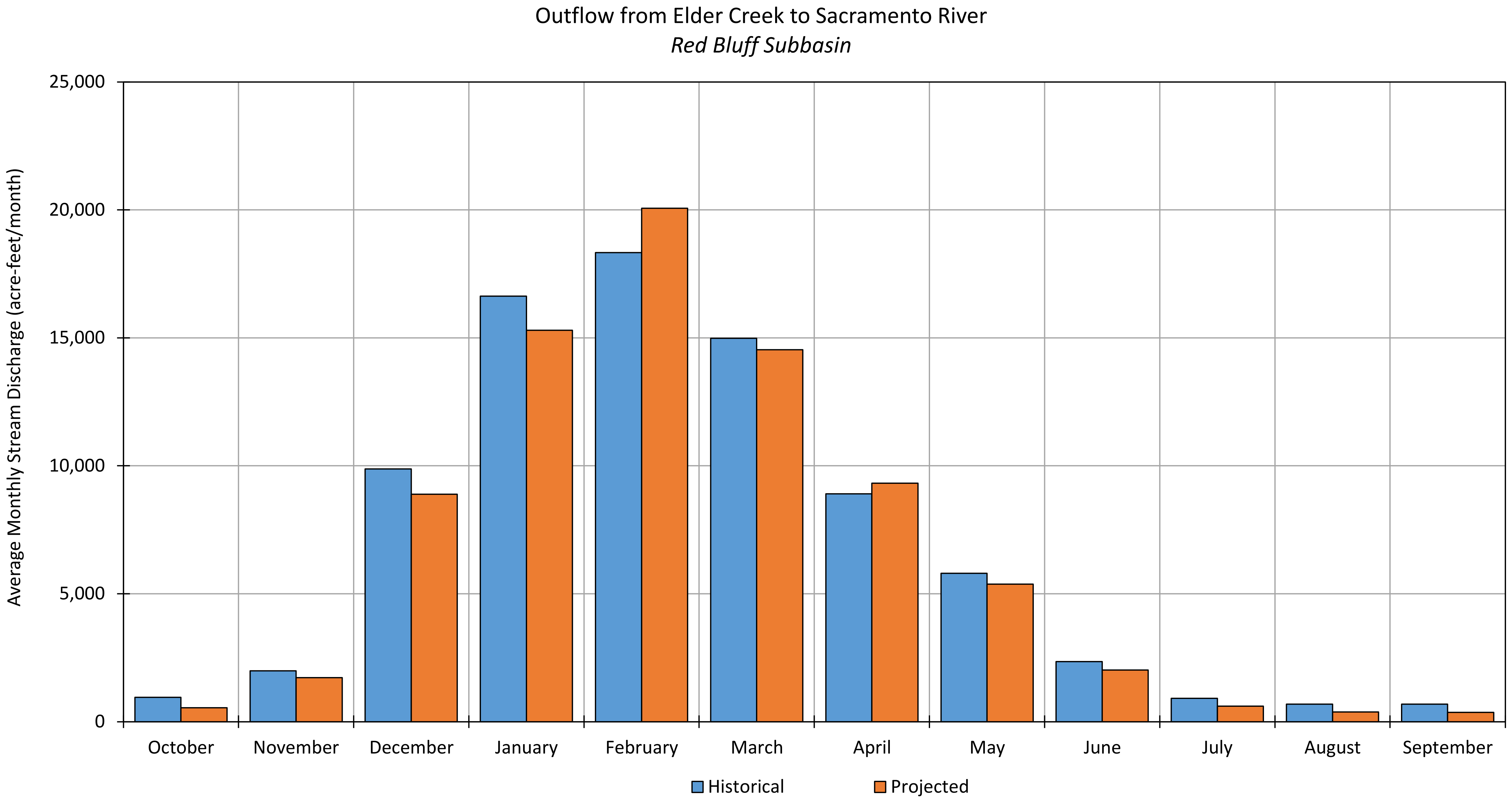
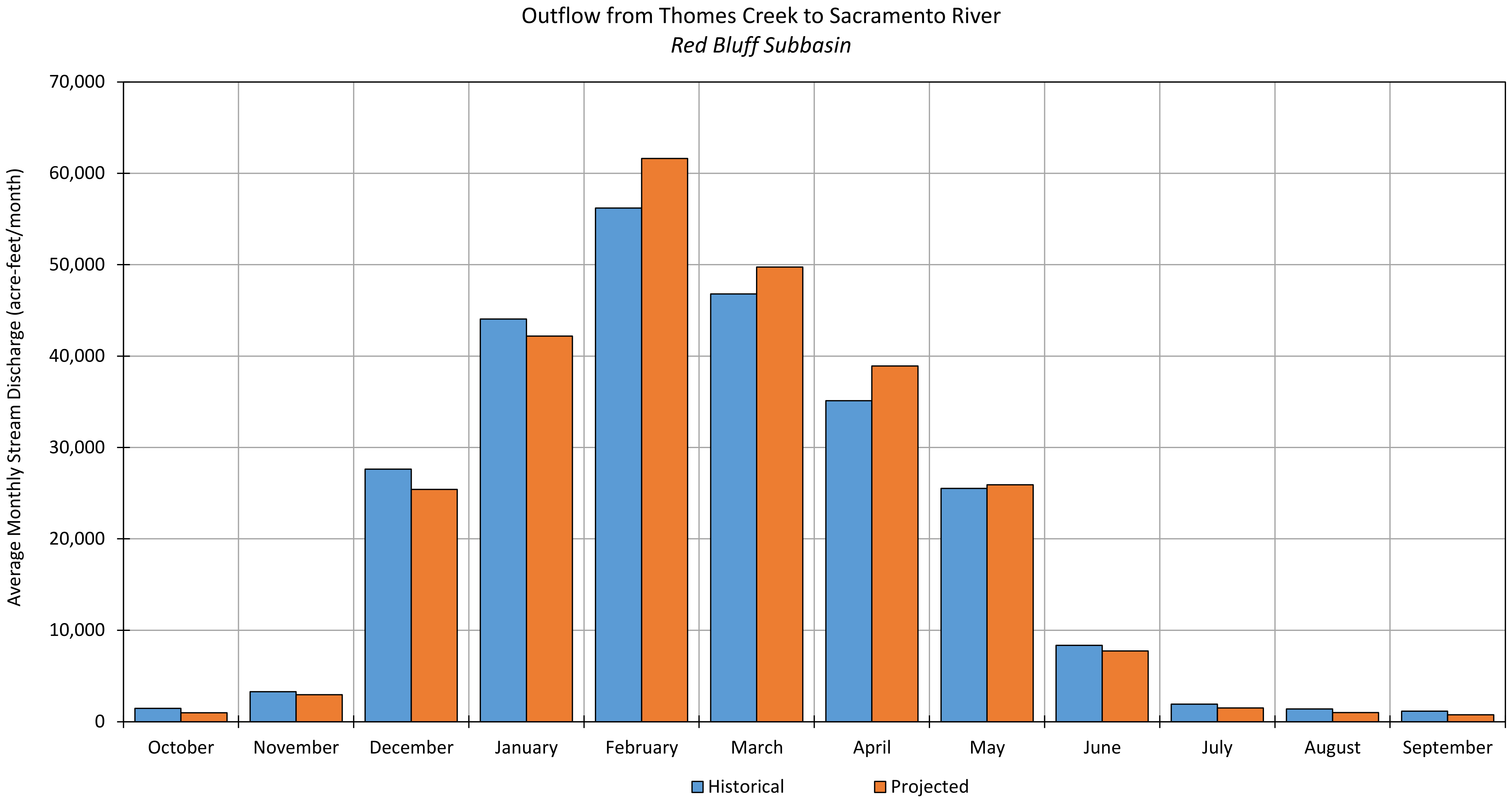


Tehama IHM - Projected (Future Land Use)



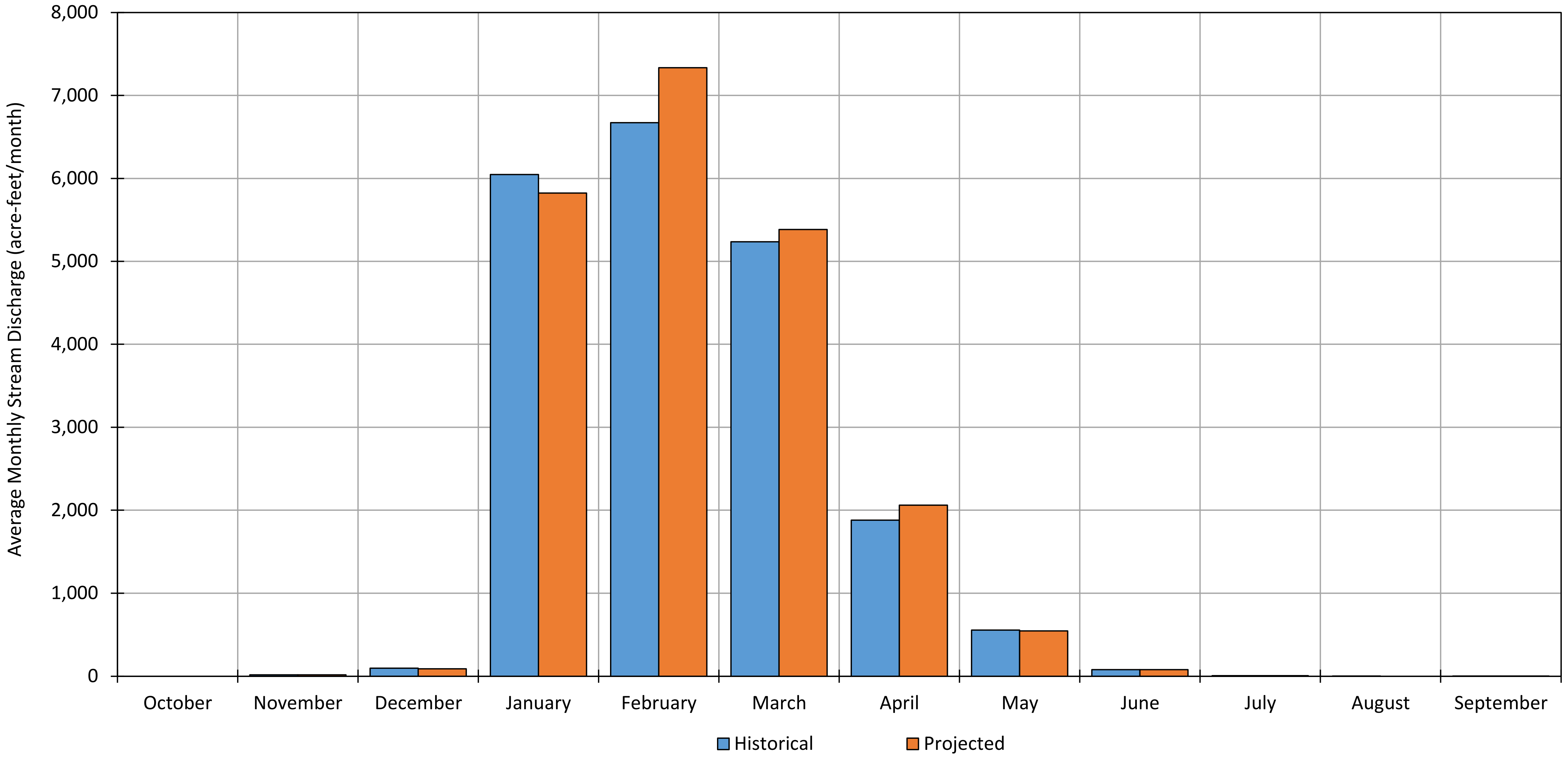
Tehama IHM - Projected (Future Land Use)



Tehama IHM - Projected (Future Land Use)

Outflow from Red Bank Creek to Sacramento River

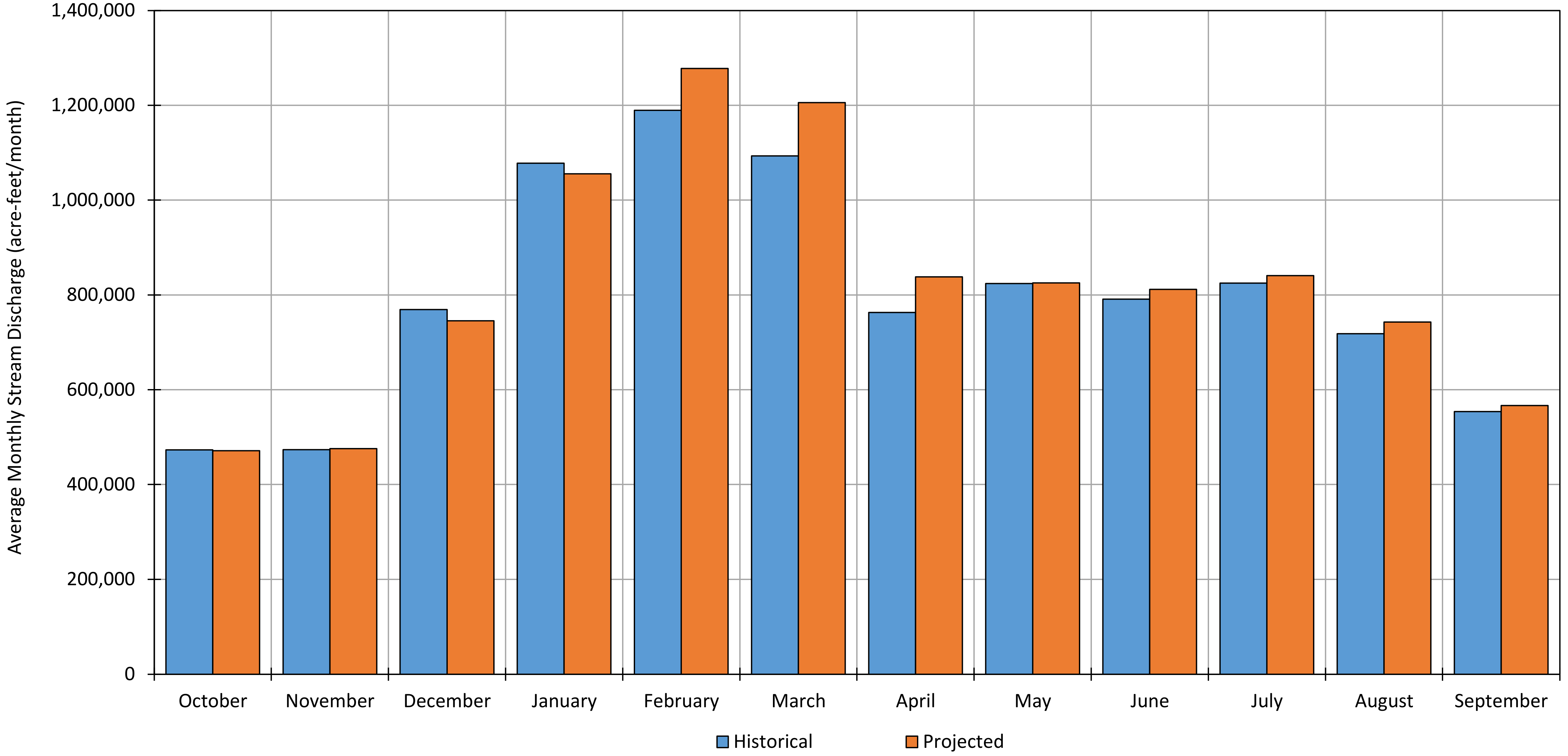
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin

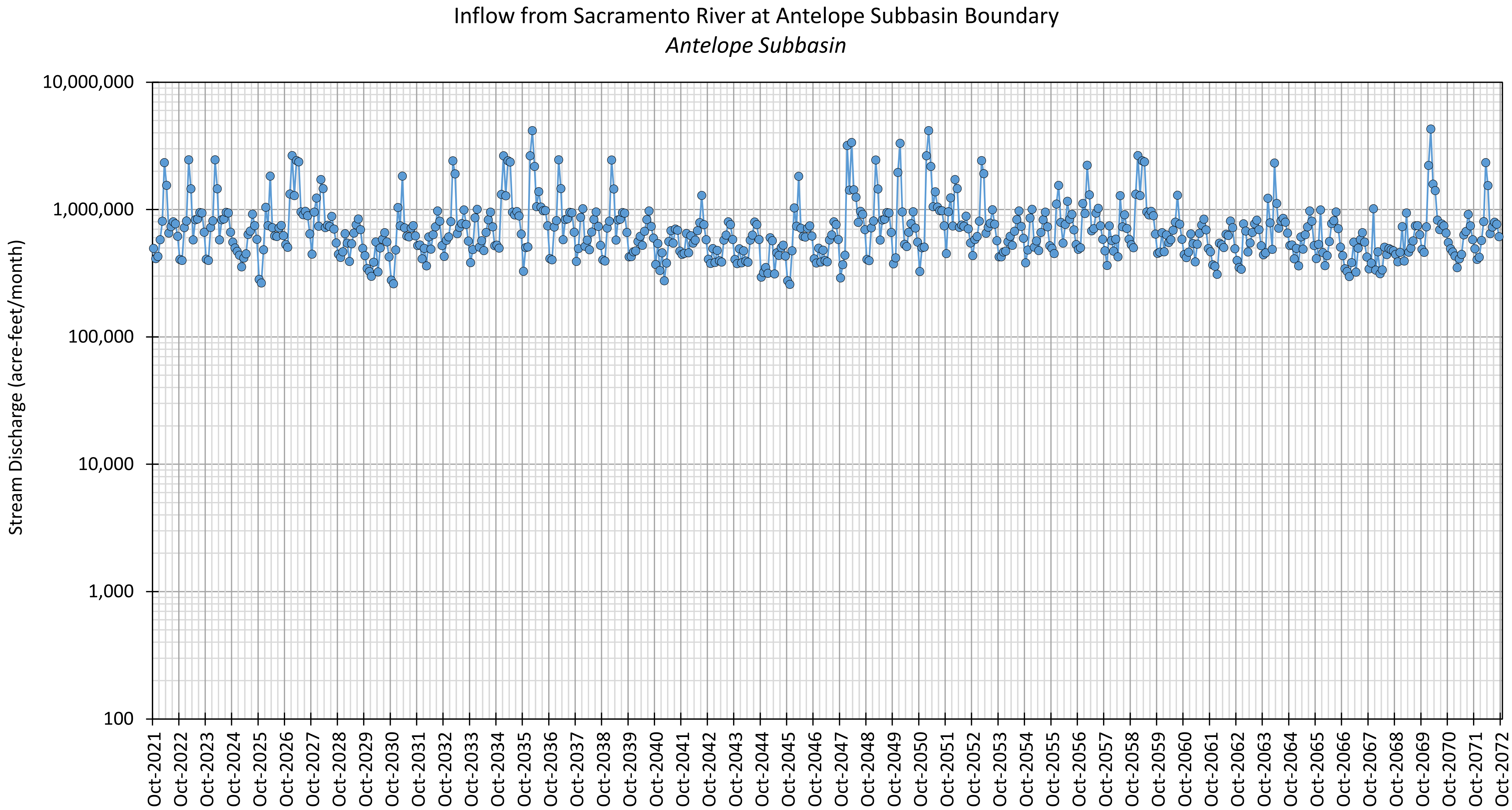


Tehama IHM - Projected (Future Land Use)

APPENDIX G-4

Tehama IHM Simulated Streamflows:

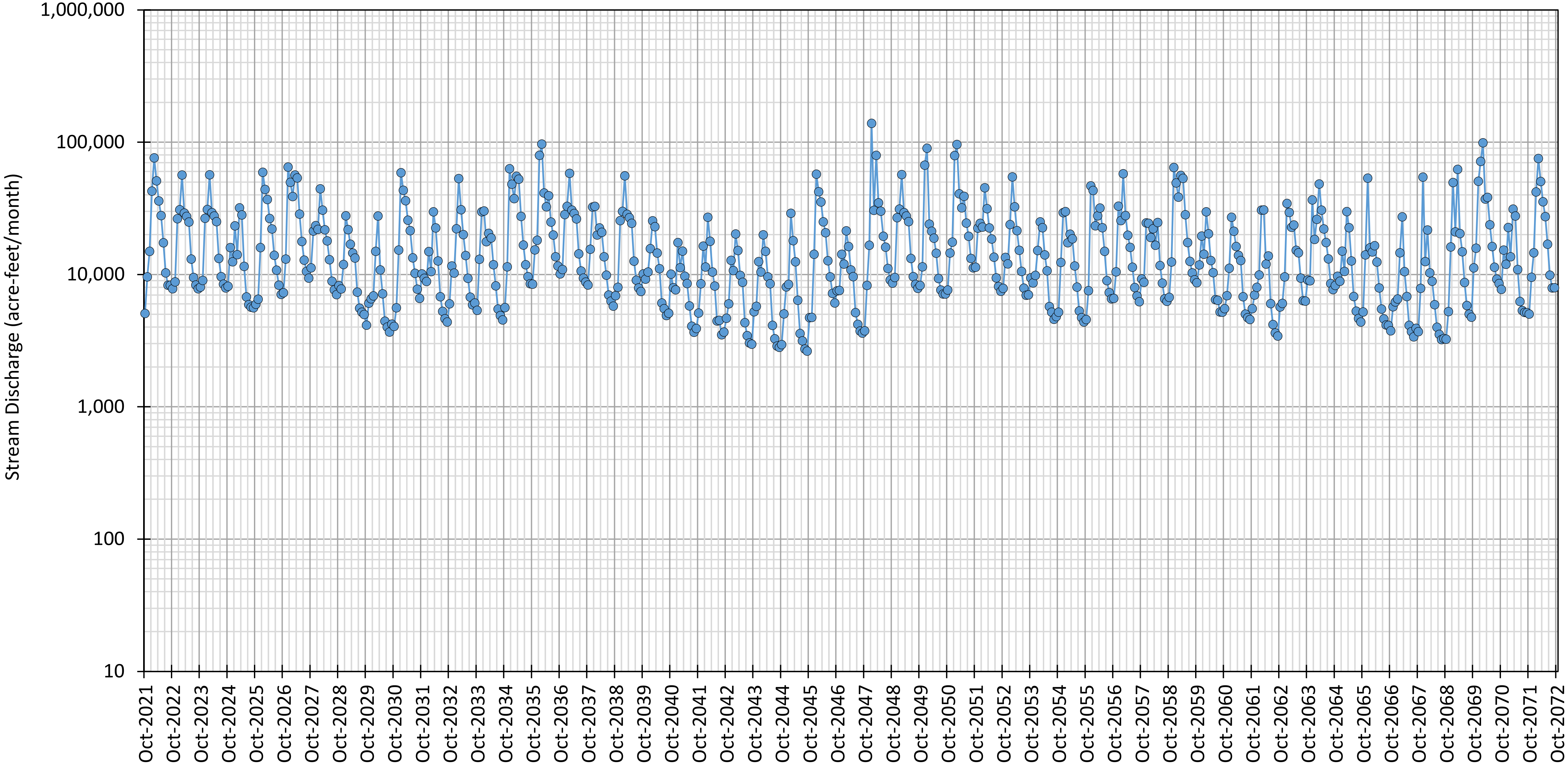
Projected (Current Land Use) with Climate Change (2030) Model Results



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Antelope Creek Group to Sacramento River

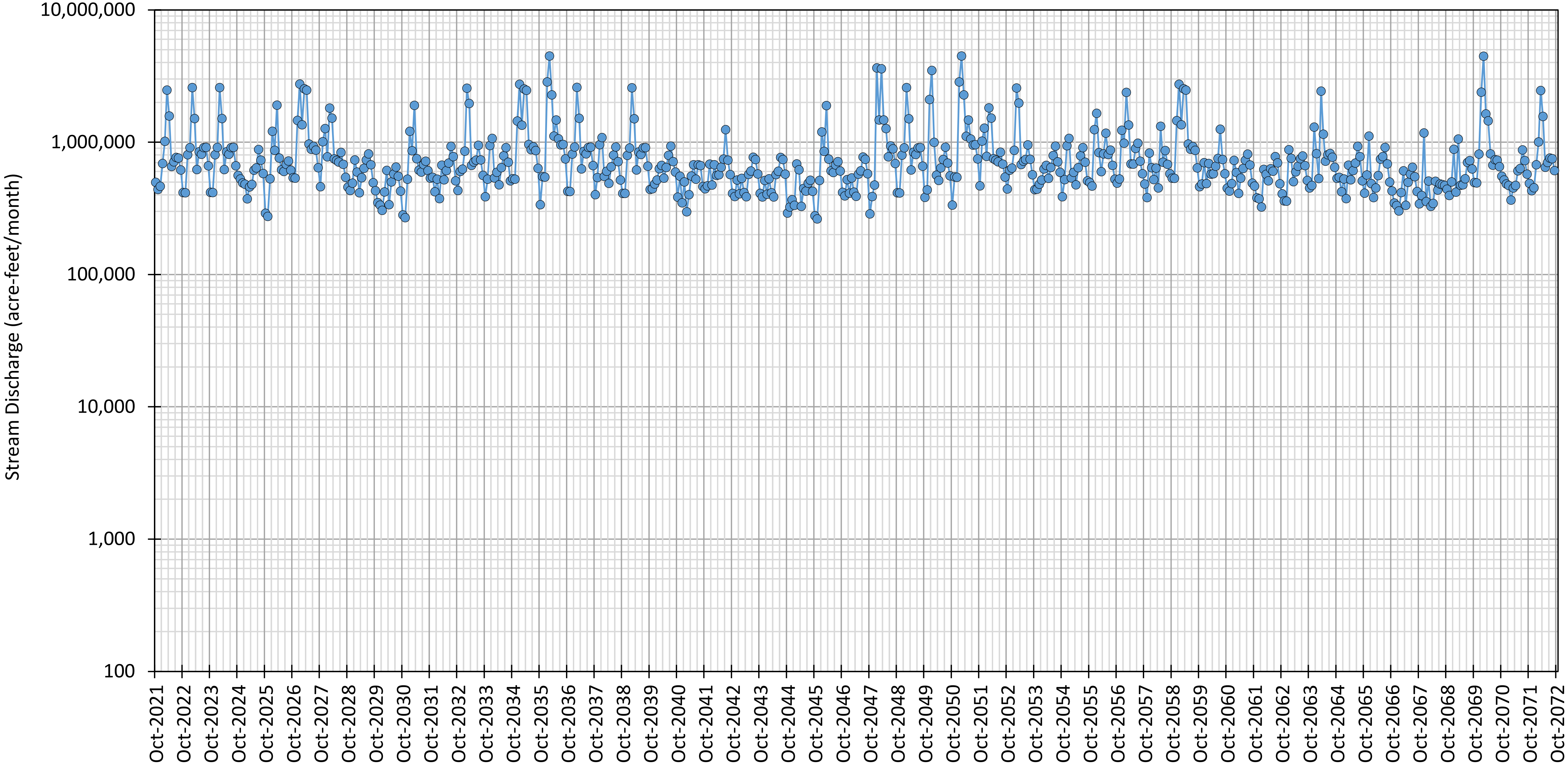
Antelope Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Sacramento River at Antelope Subbasin Boundary

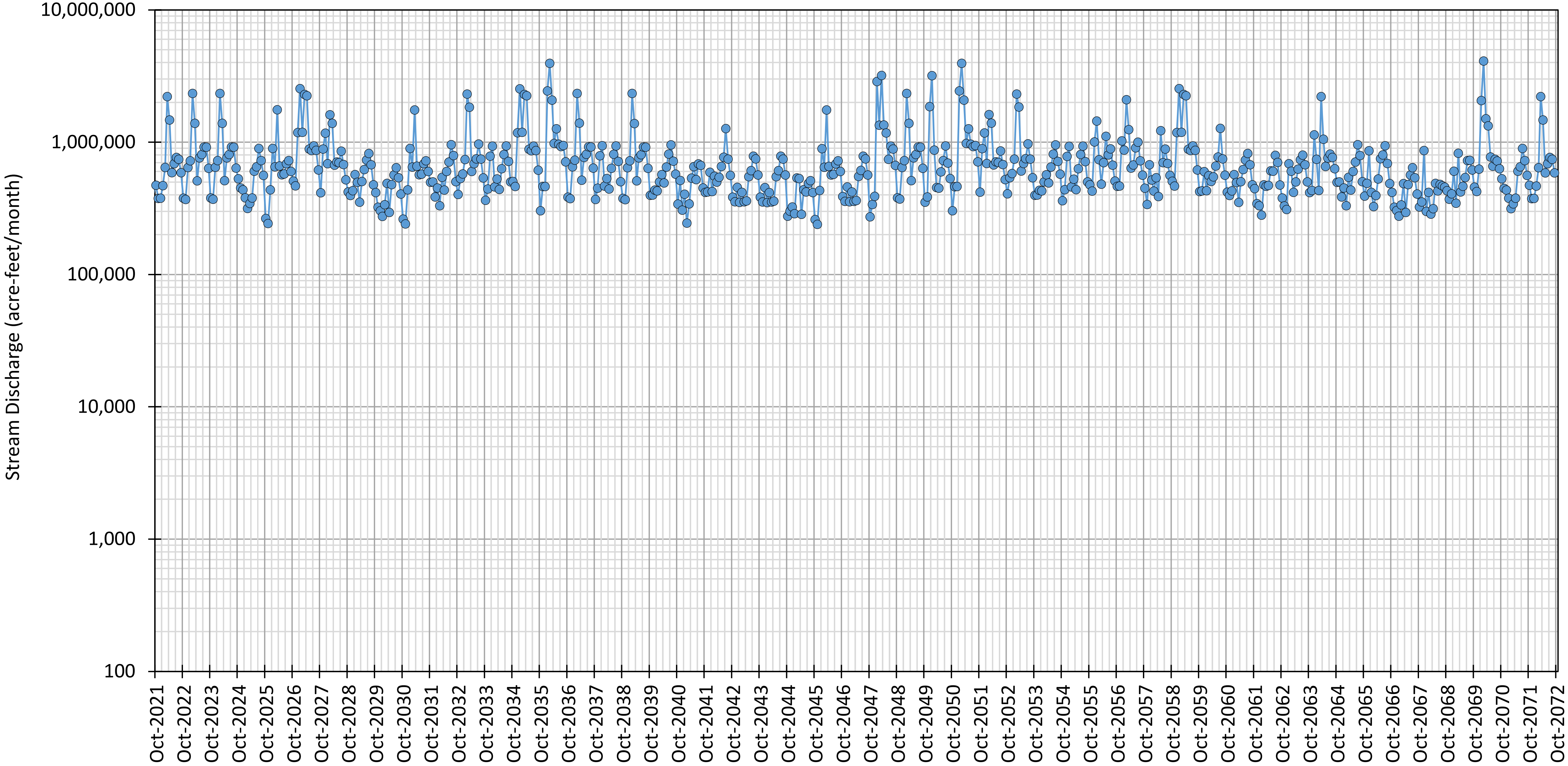
Antelope Subbasin



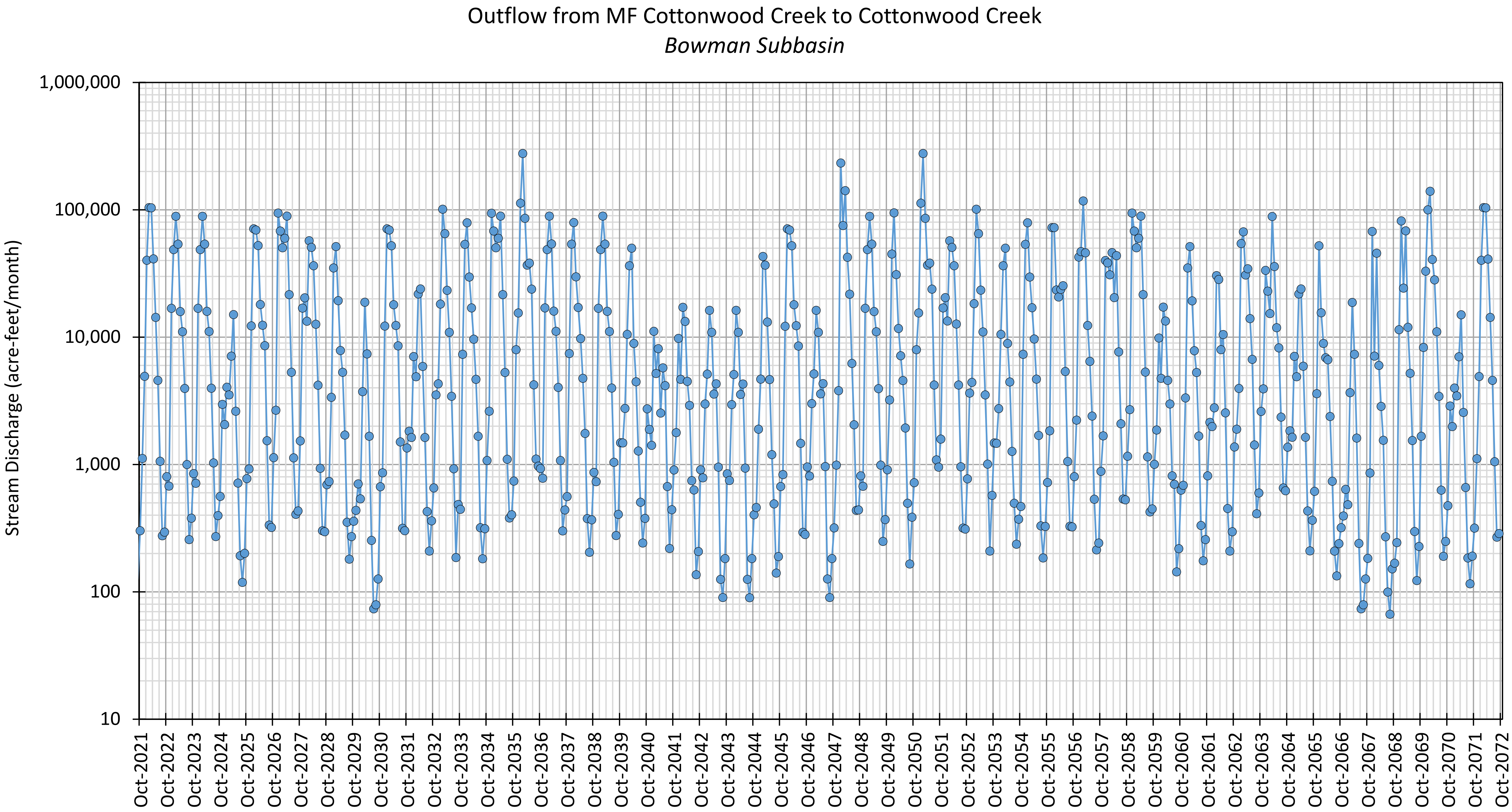
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin



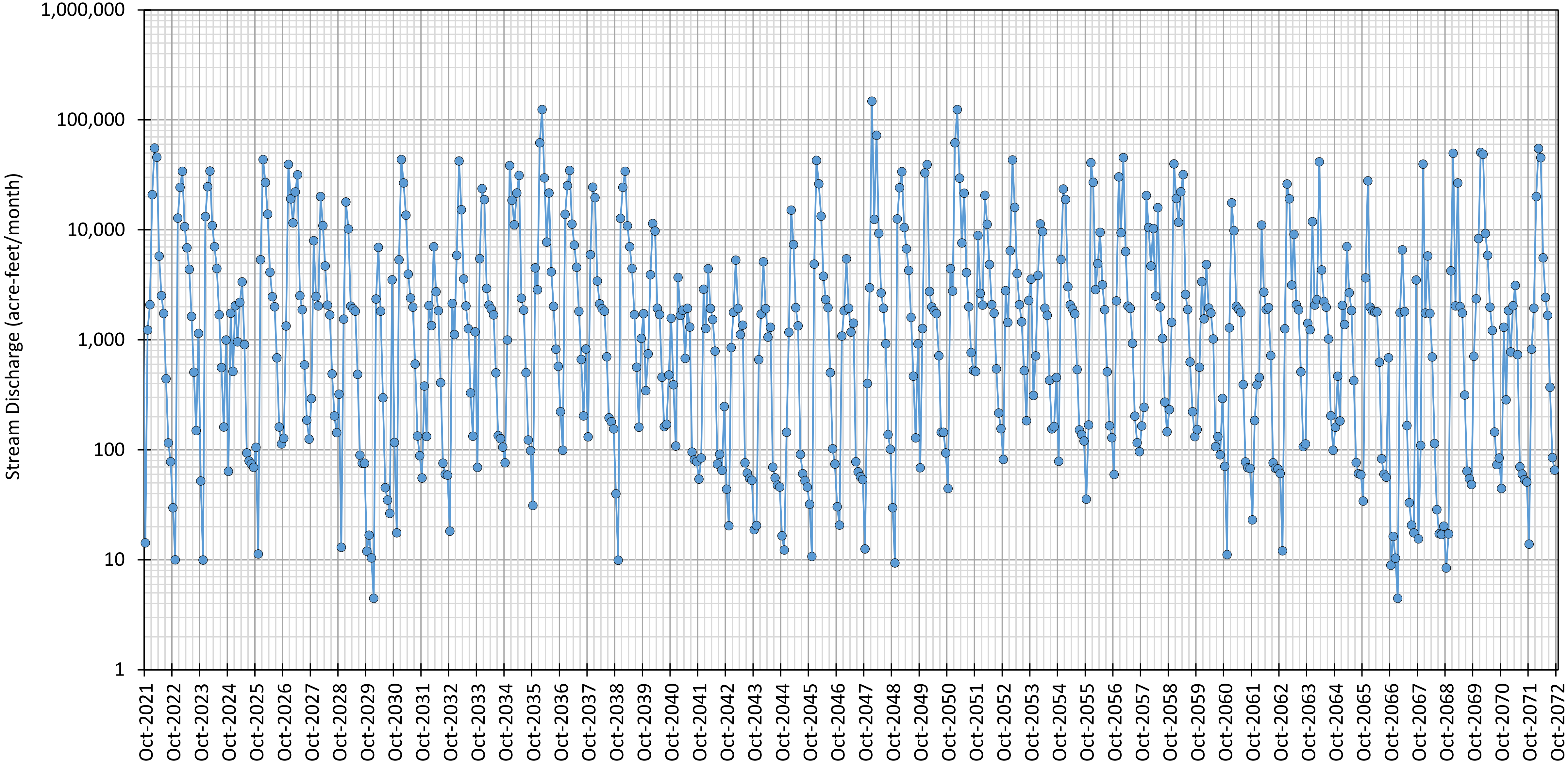
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from SF Cottonwood Creek to Cottonwood Creek

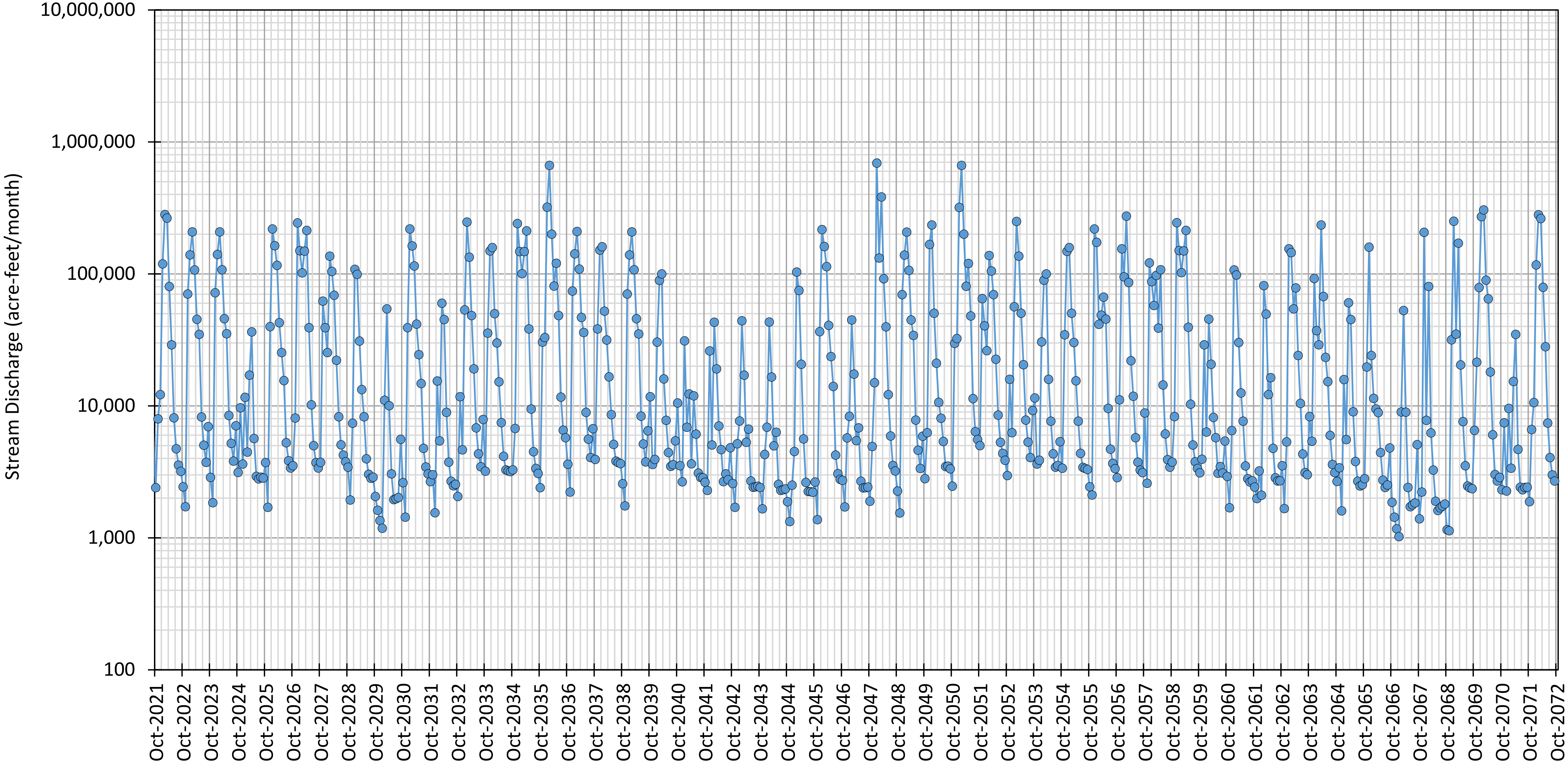
Bowman Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Cottonwood Creek to Sacramento River

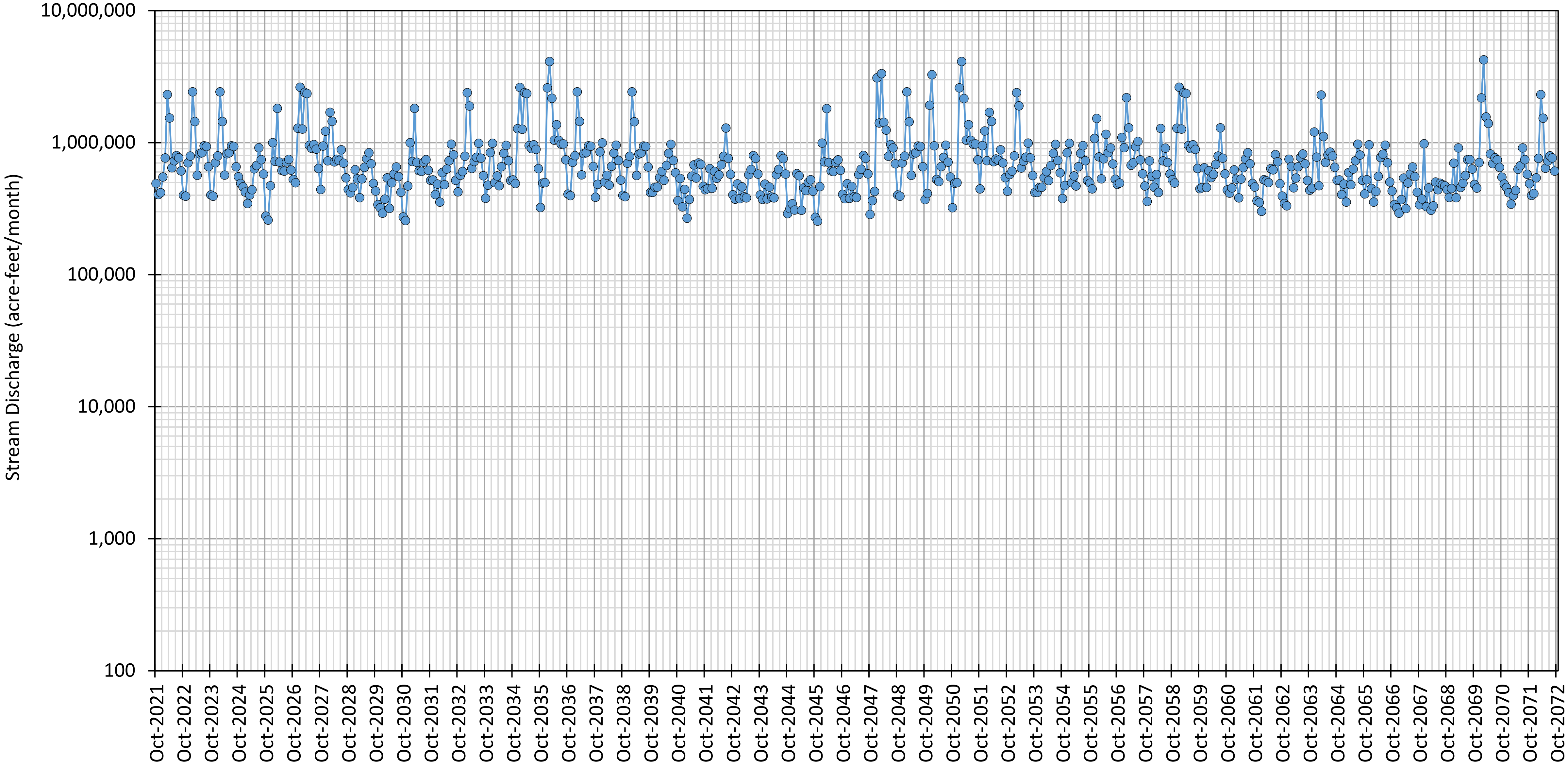
Bowman Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Sacramento River at Bowman Subbasin Boundary

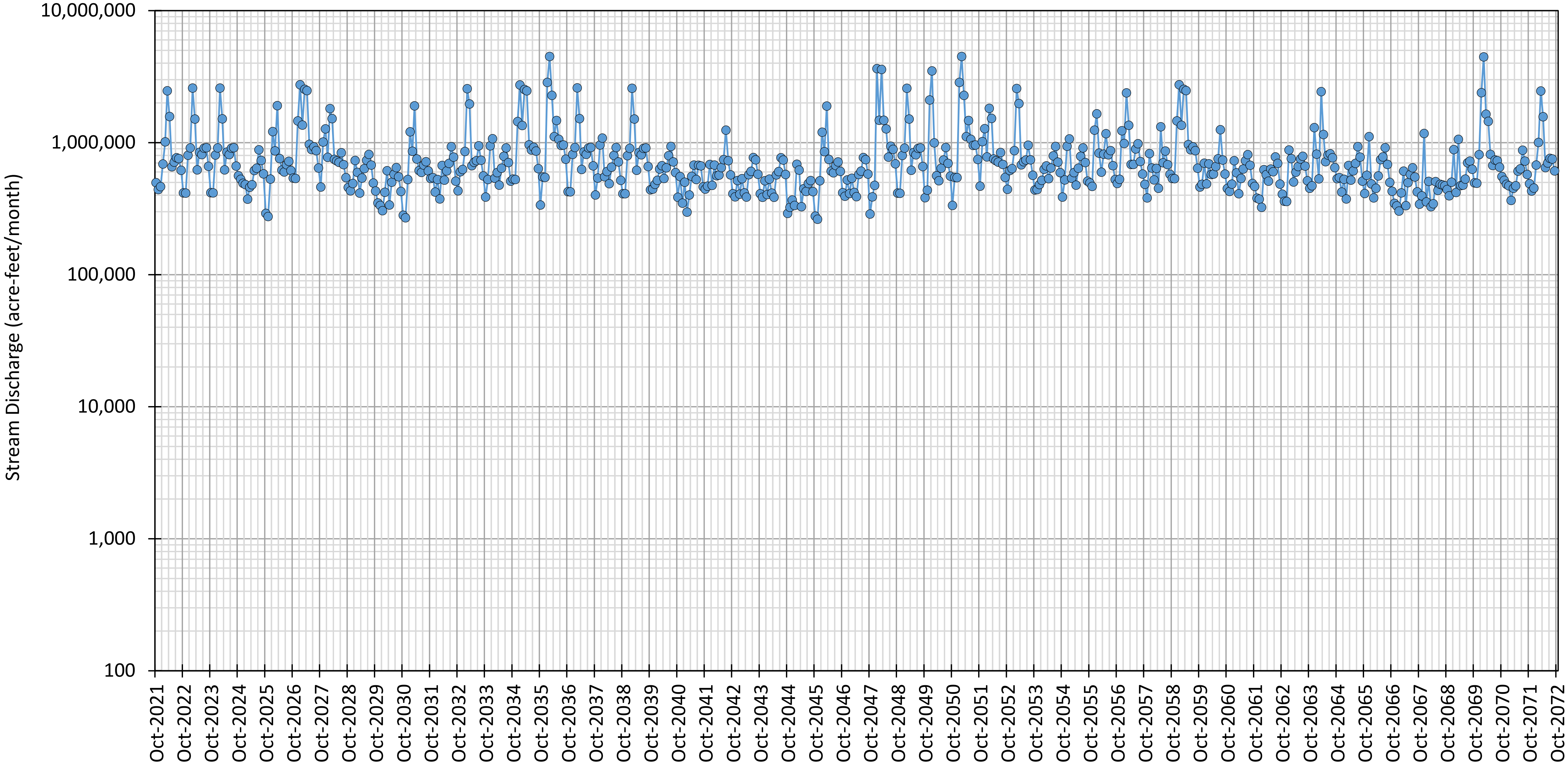
Bowman Subbasin



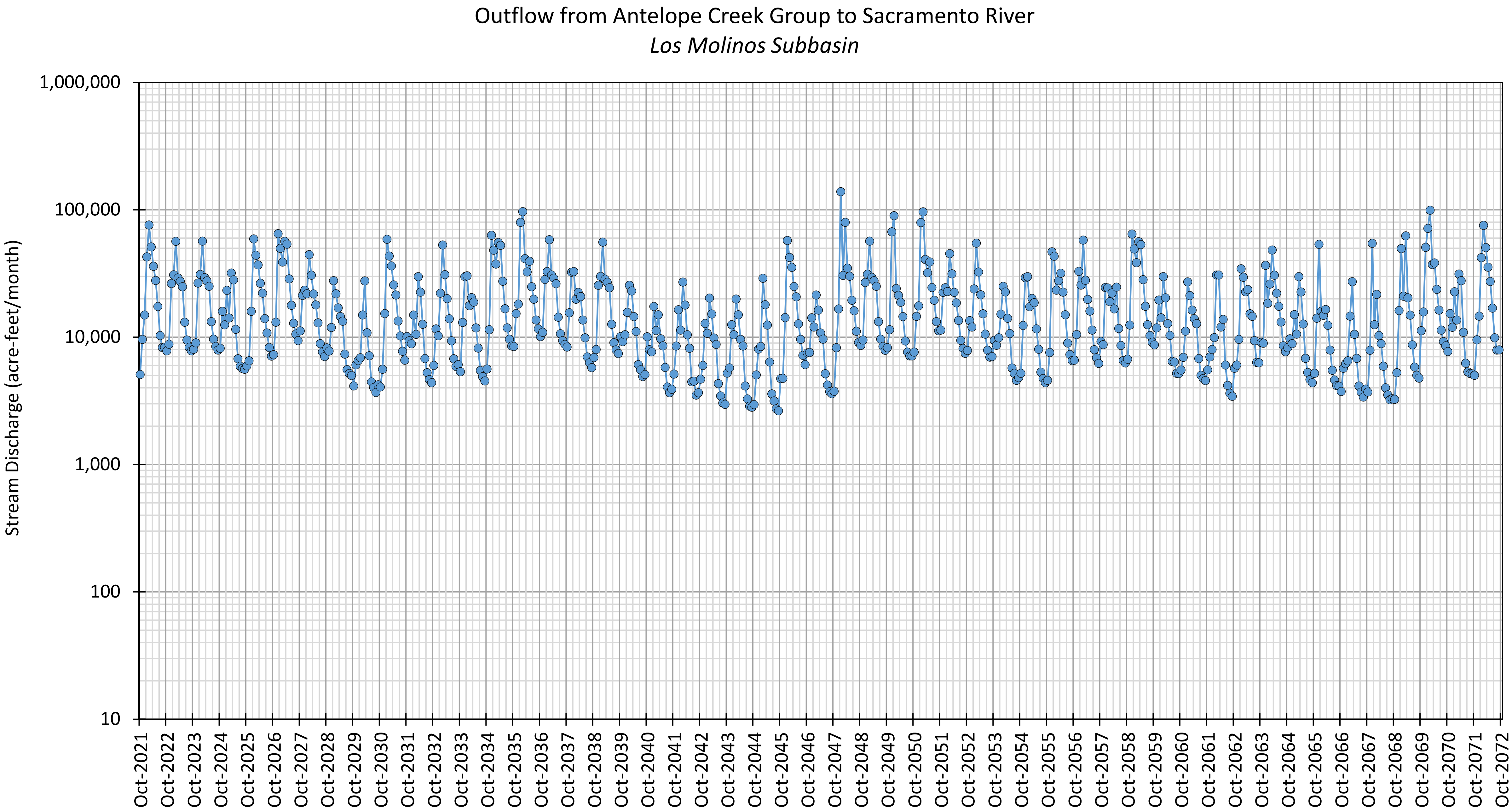
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

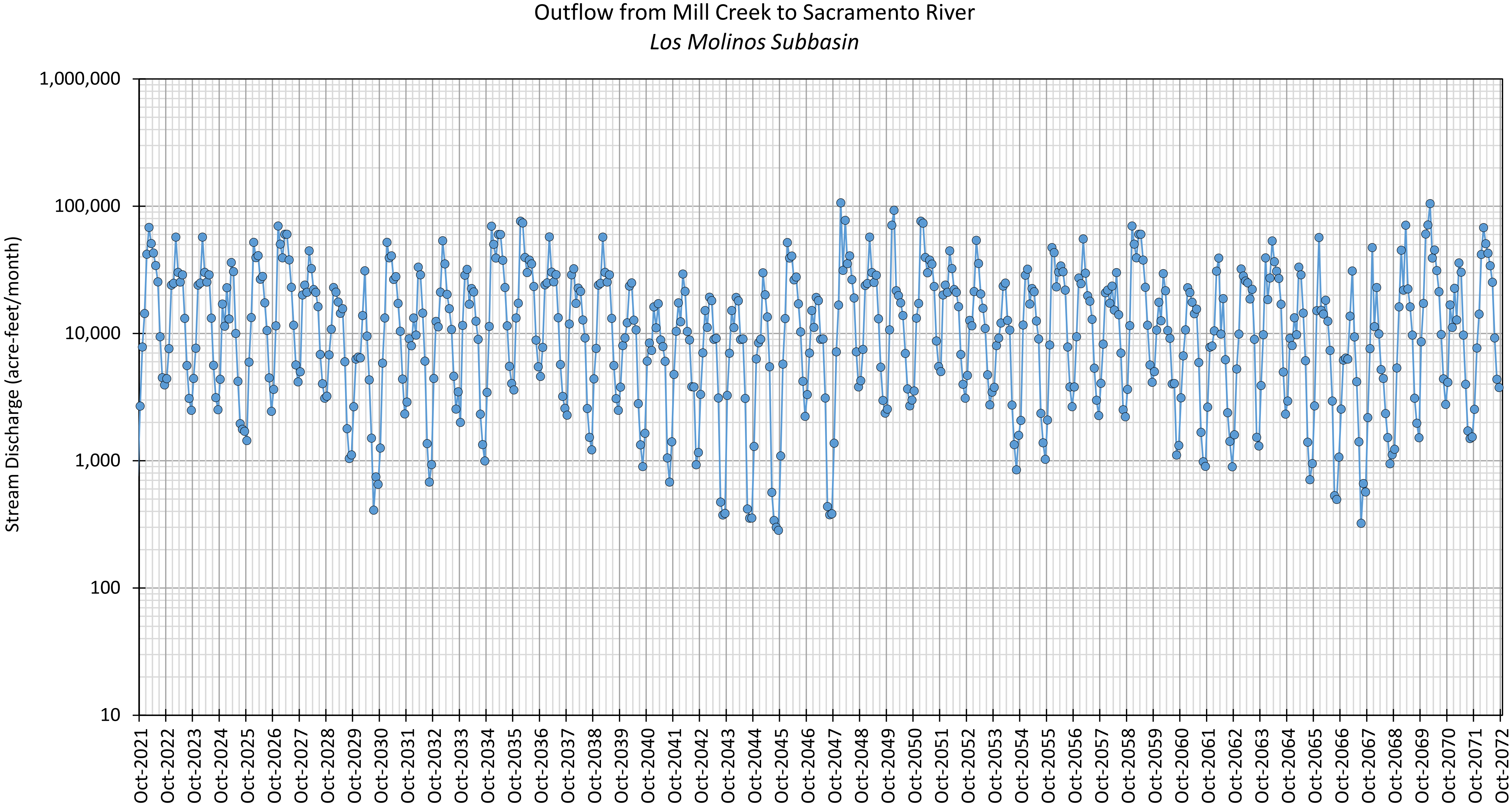
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

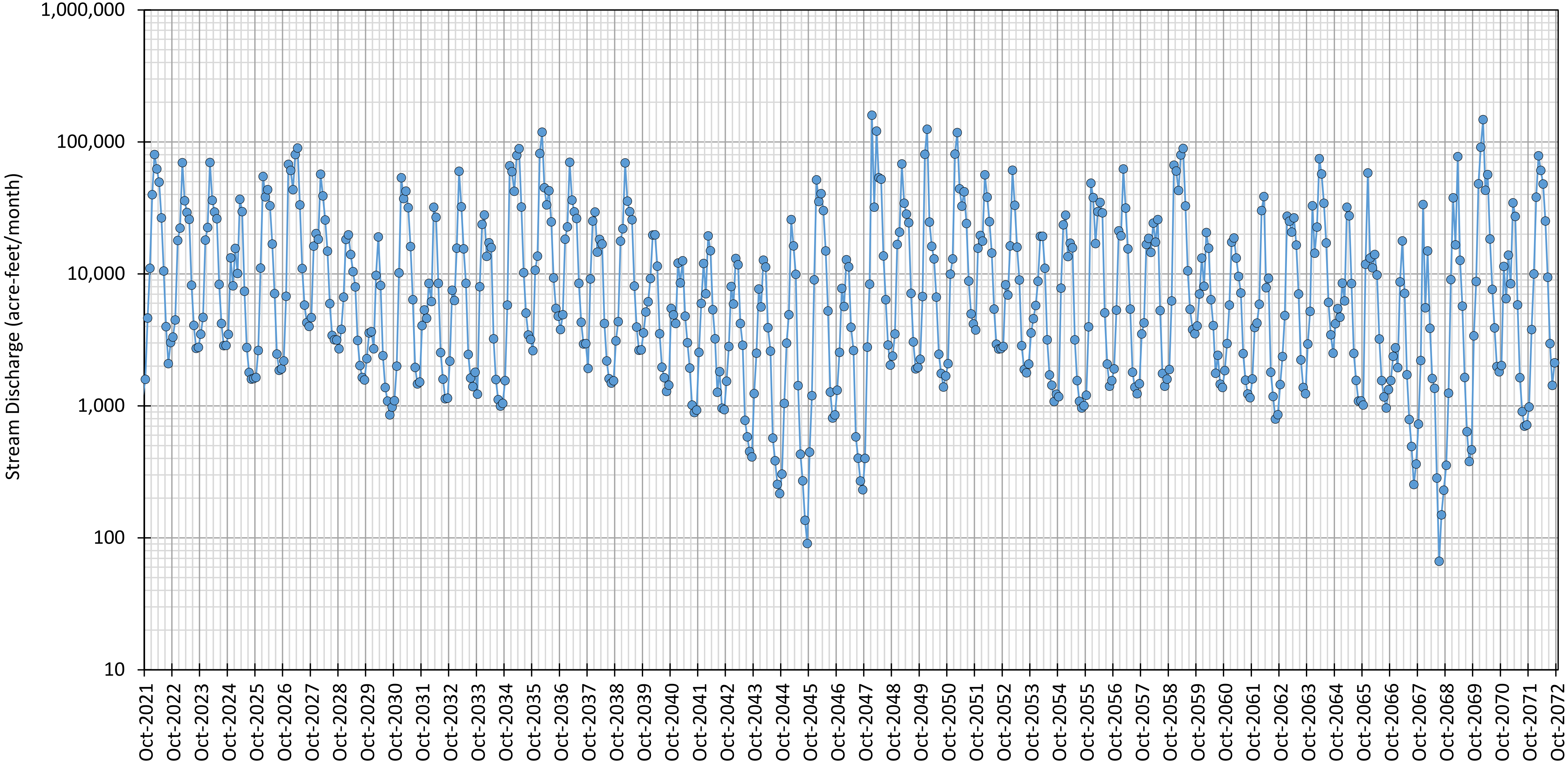


Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

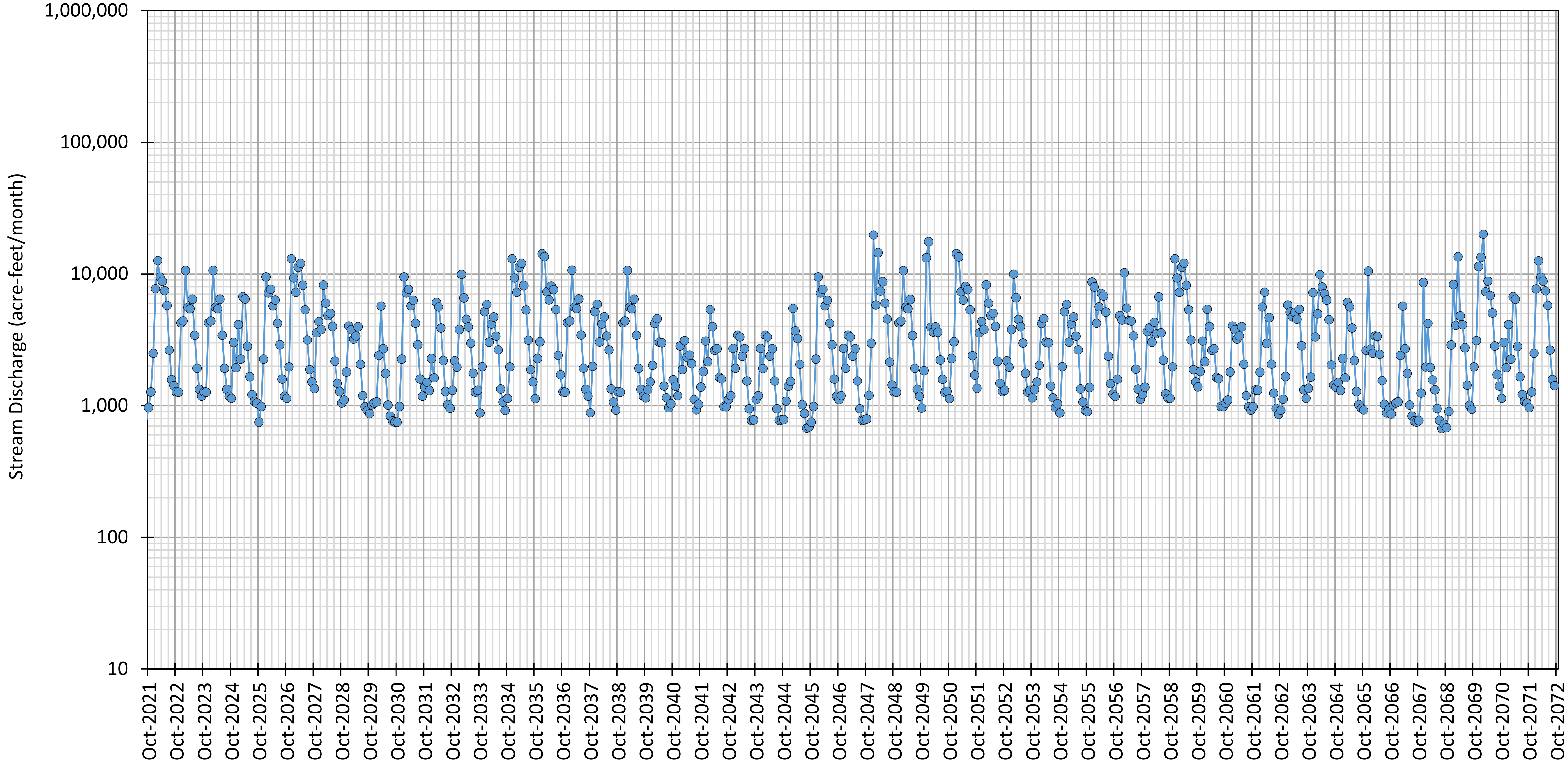
Outflow from Deer Creek Group to Sacramento River
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Dye Creek to Sacramento River

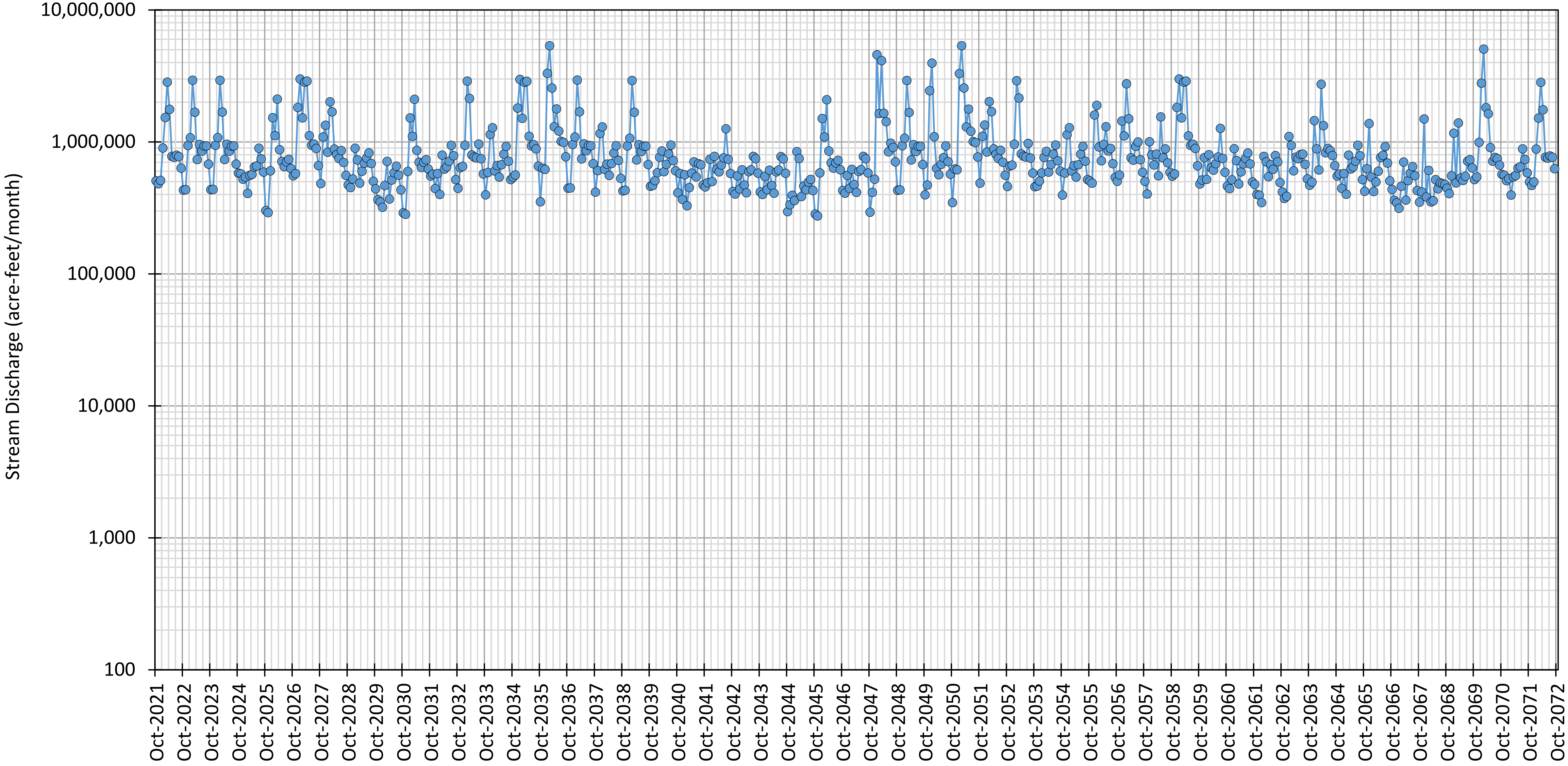
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

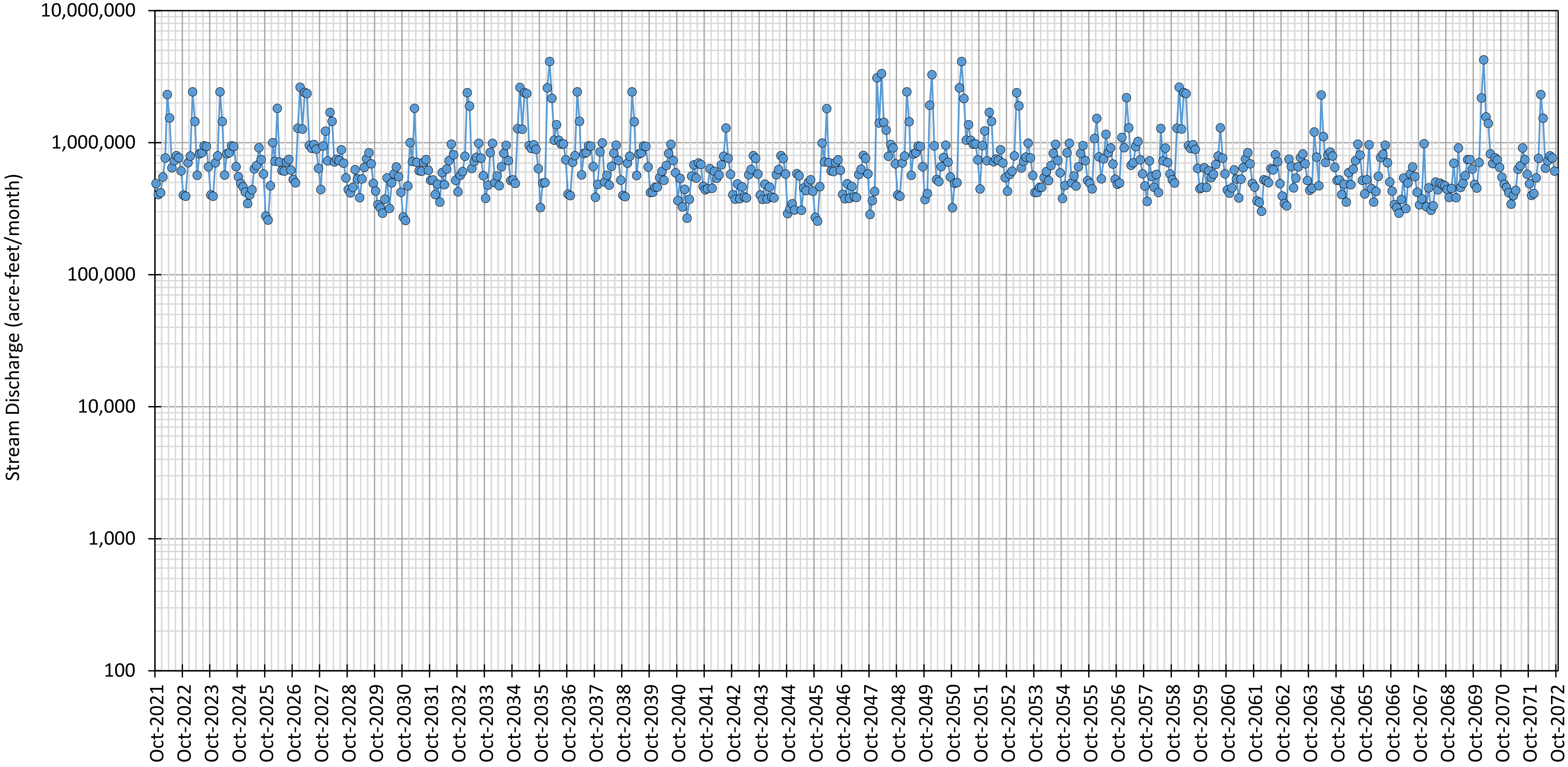
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Inflow from Sacramento River at Red Bluff Subbasin Boundary

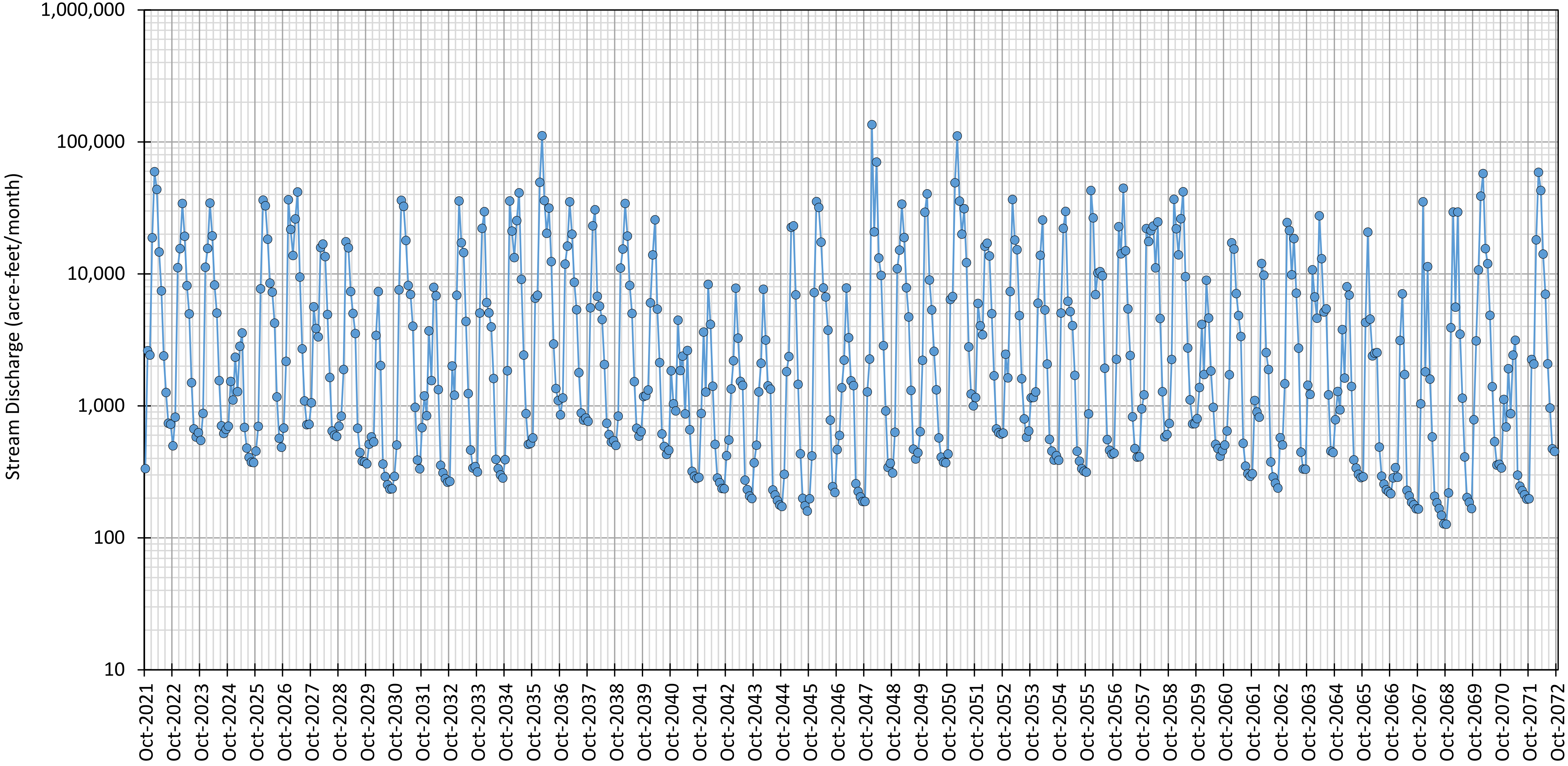
Red Bluff Subbasin



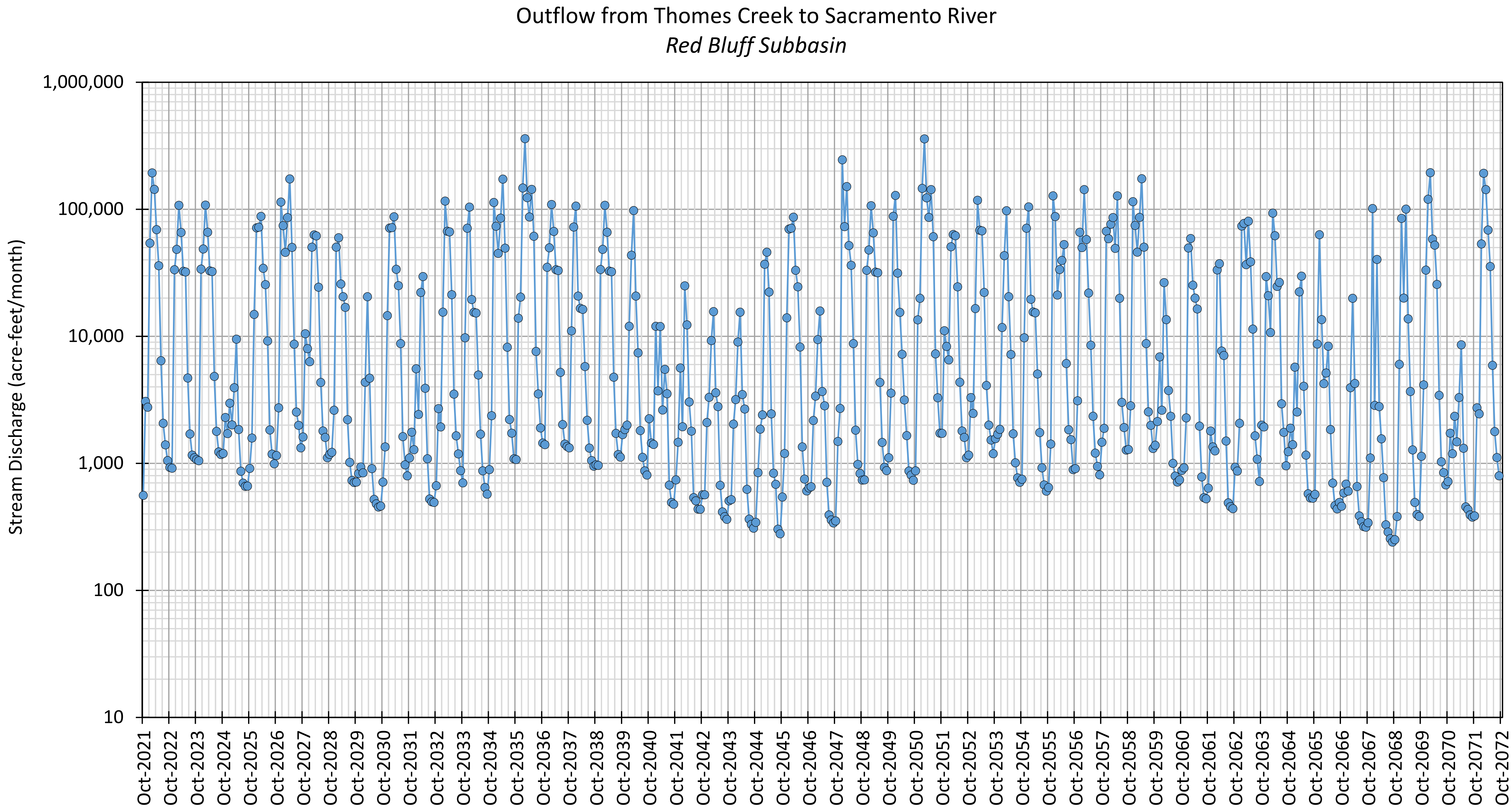
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Elder Creek to Sacramento River

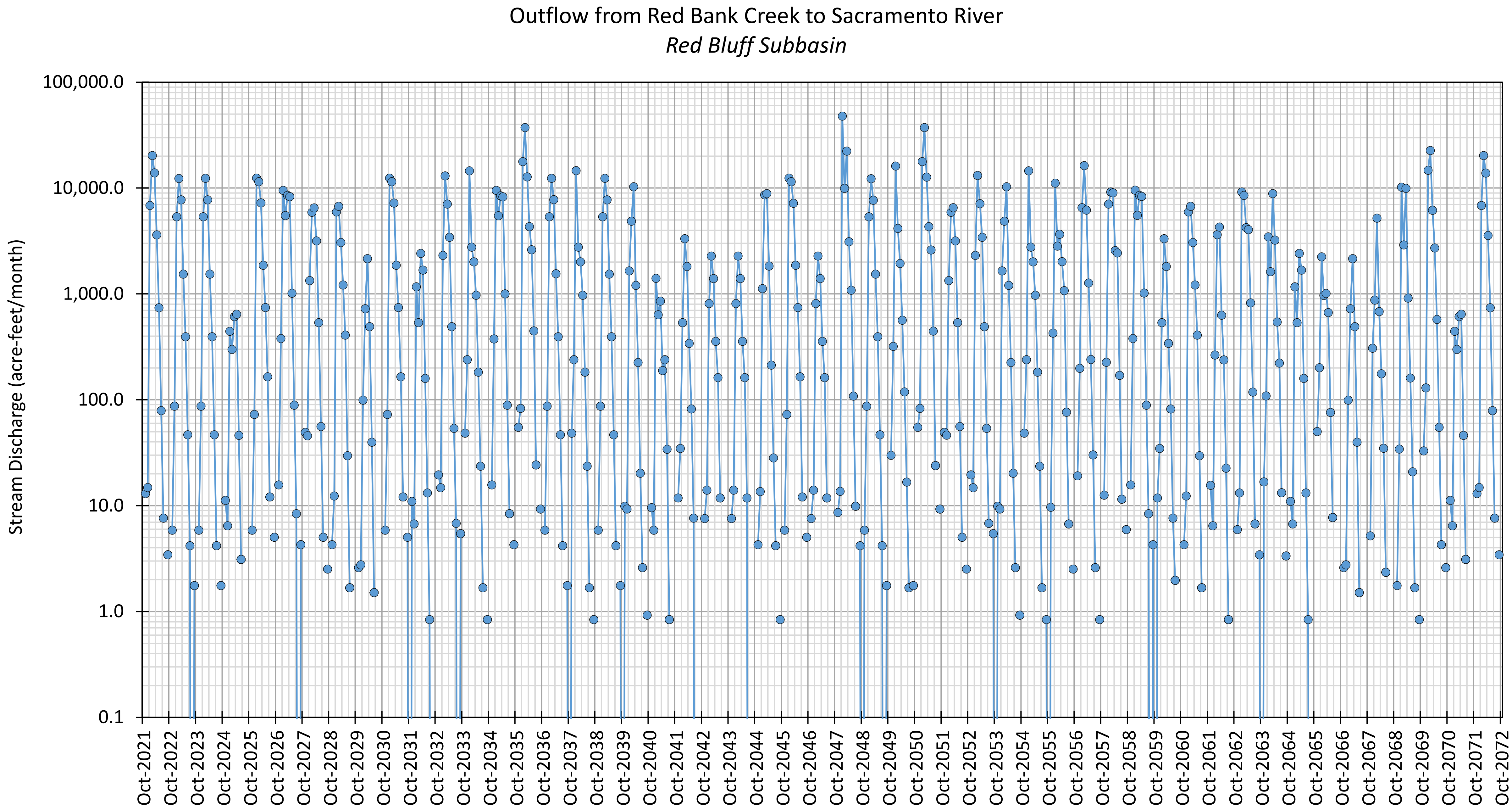
Red Bluff Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



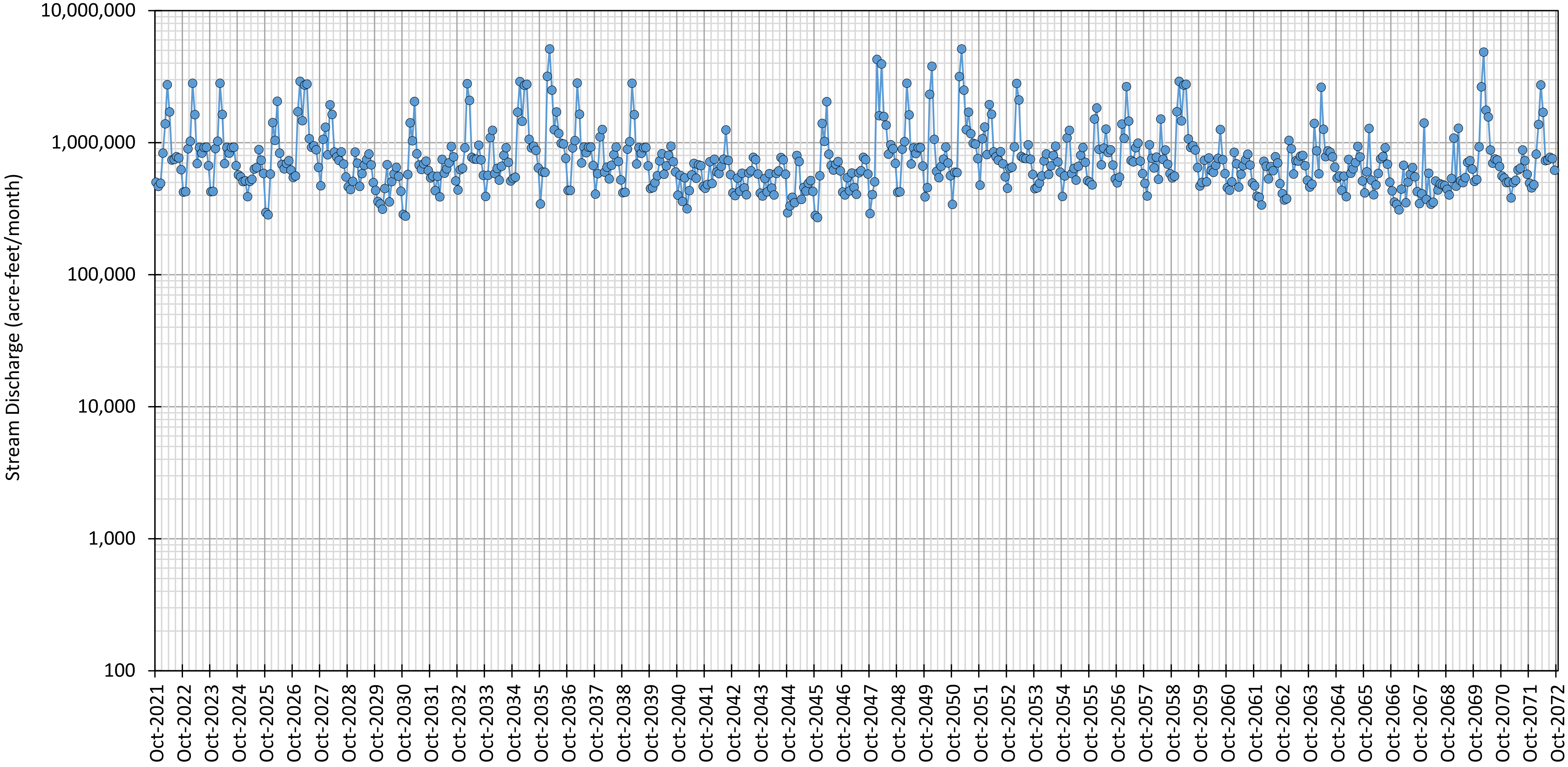
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

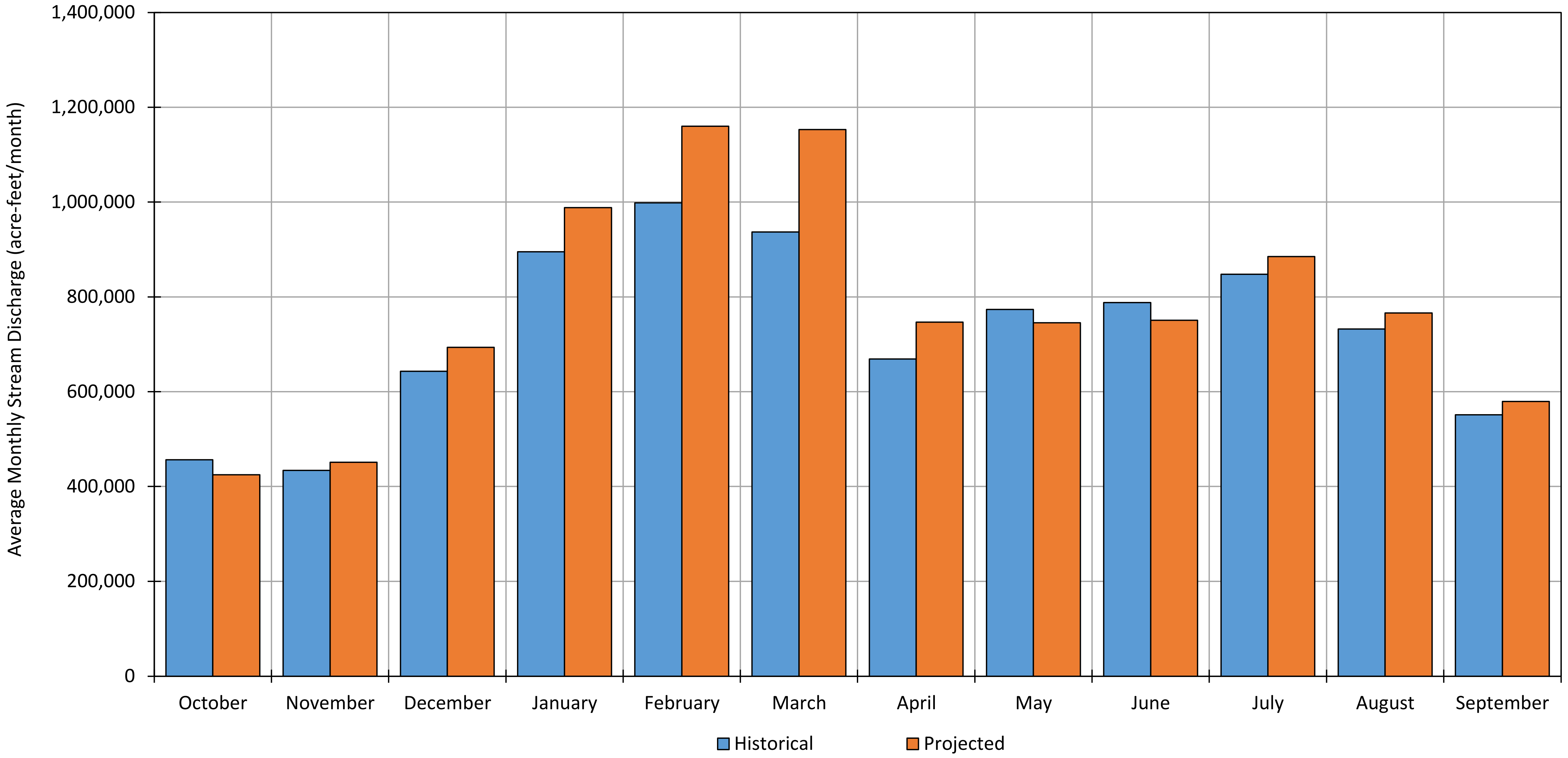
Red Bluff Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Inflow from Sacramento River at Antelope Subbasin Boundary

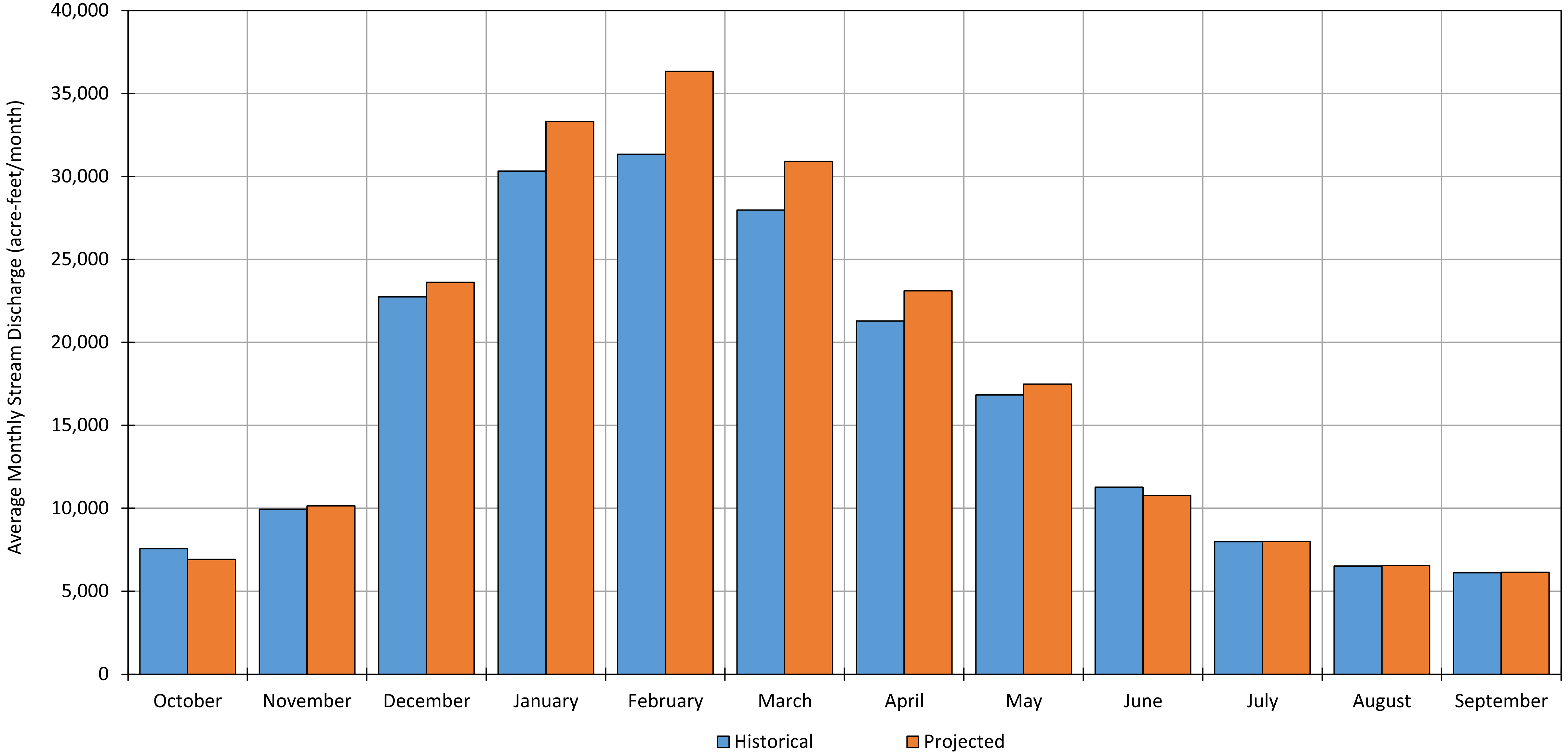
Antelope Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Antelope Creek Group to Sacramento River

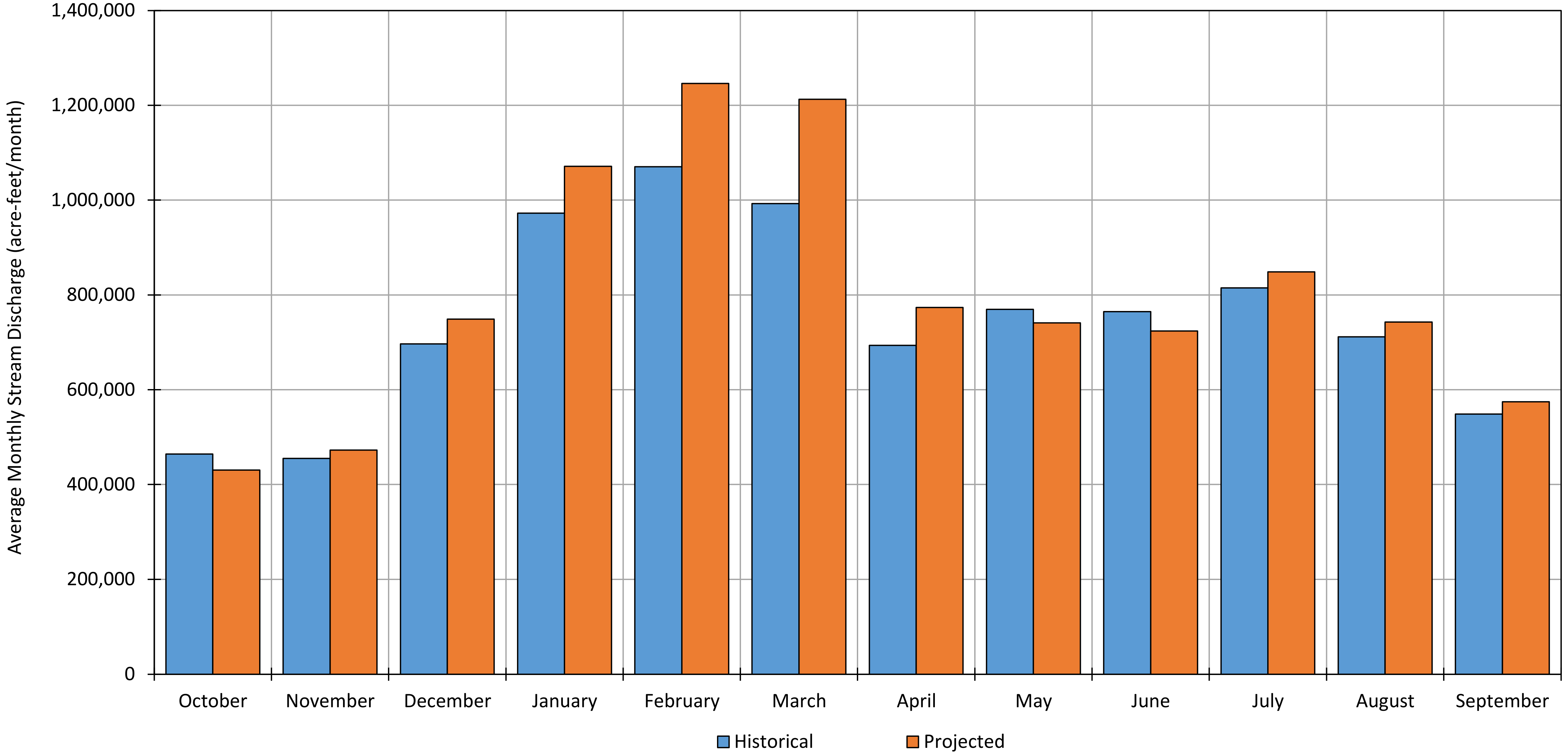
Antelope Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Sacramento River at Antelope Subbasin Boundary

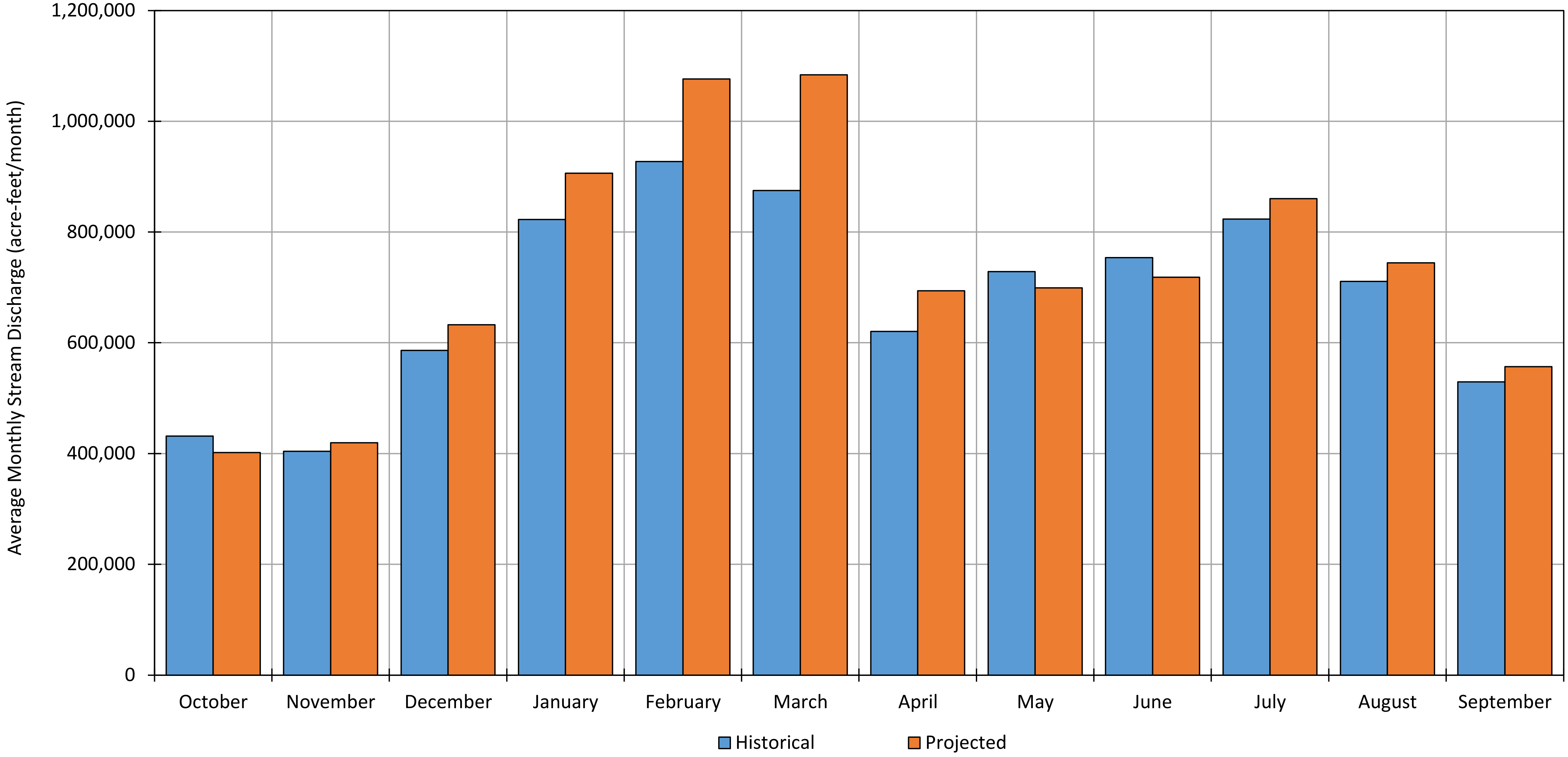
Antelope Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Inflow from Sacramento River at Bowman Subbasin Boundary

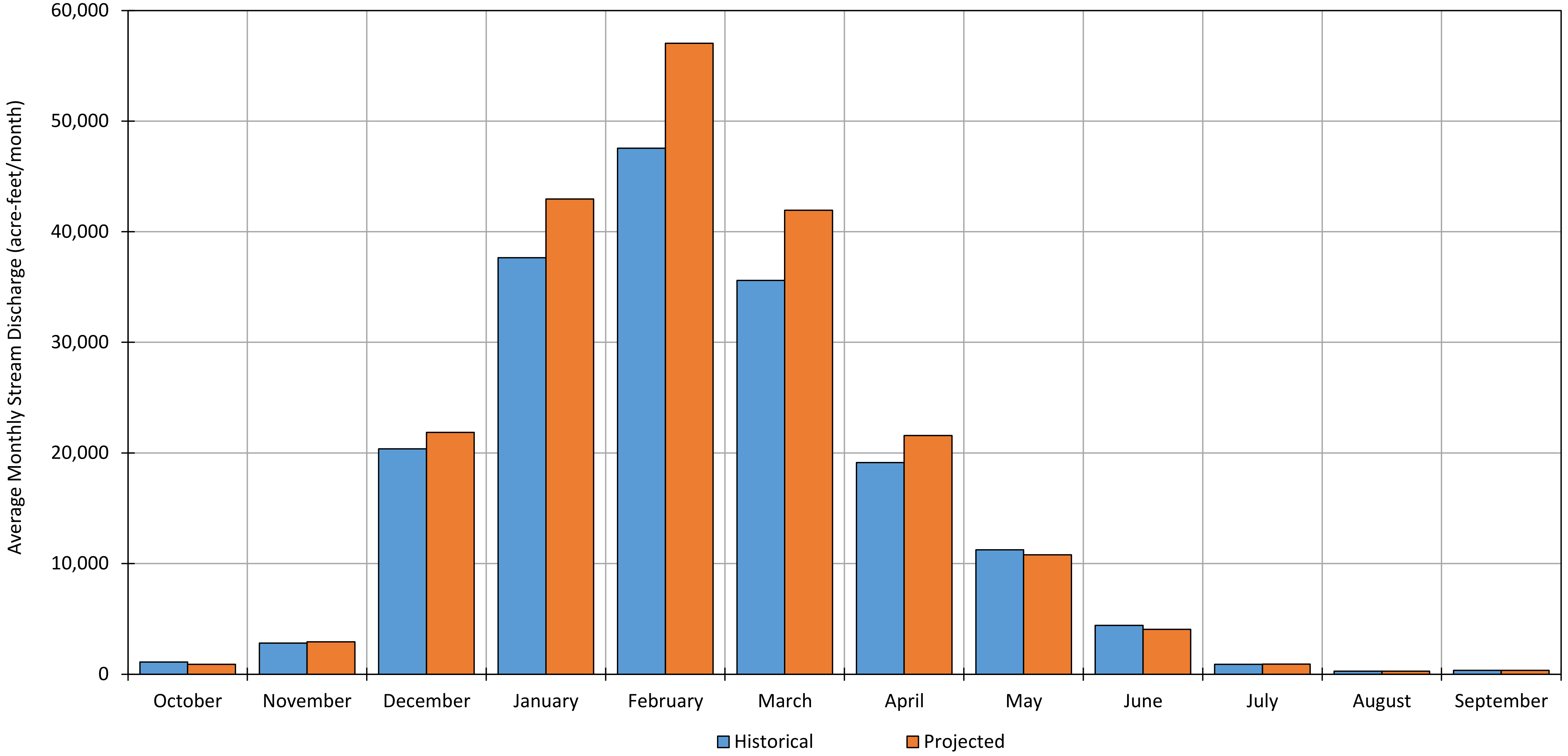
Bowman Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from MF Cottonwood Creek to Cottonwood Creek

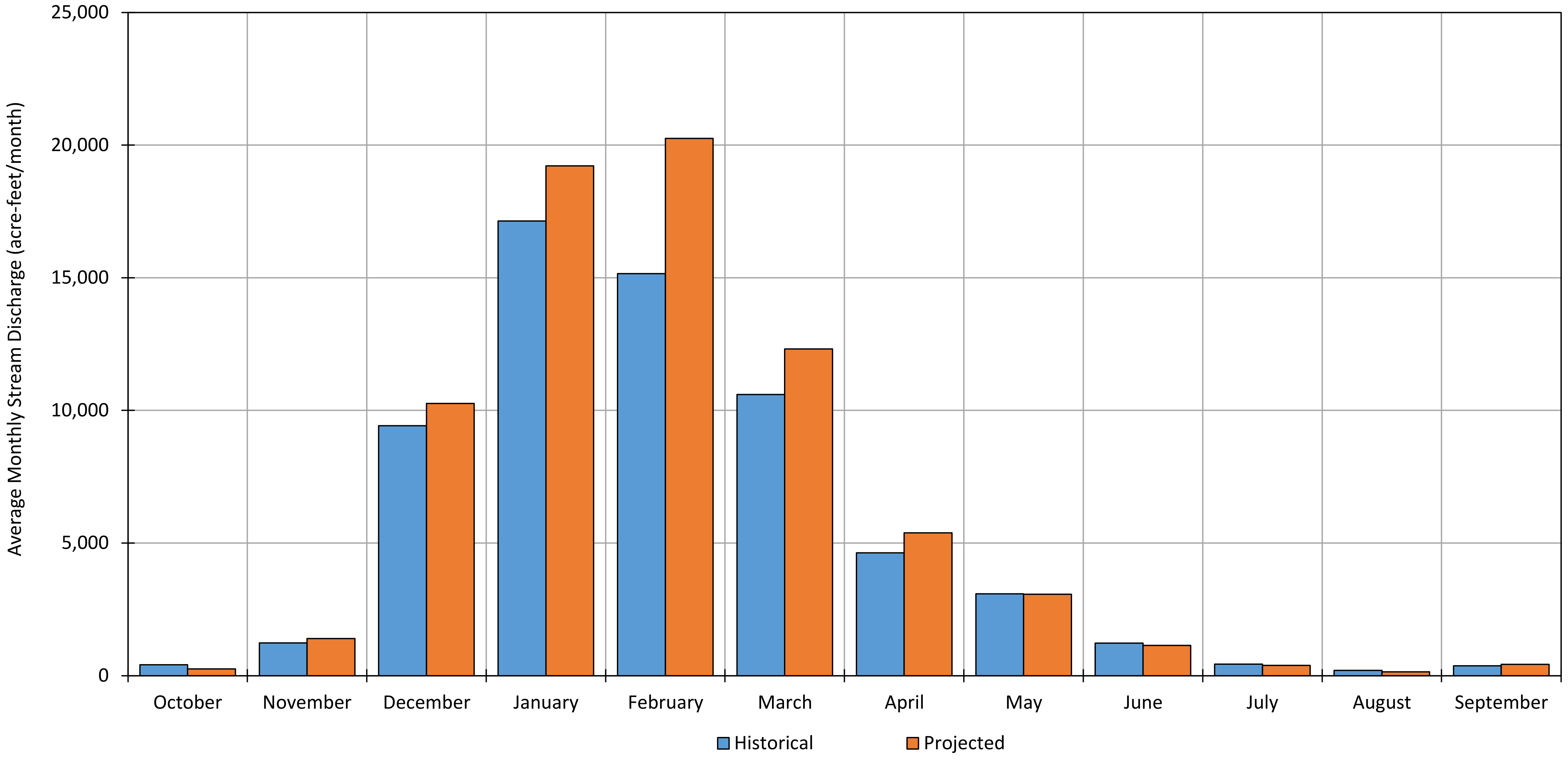
Bowman Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

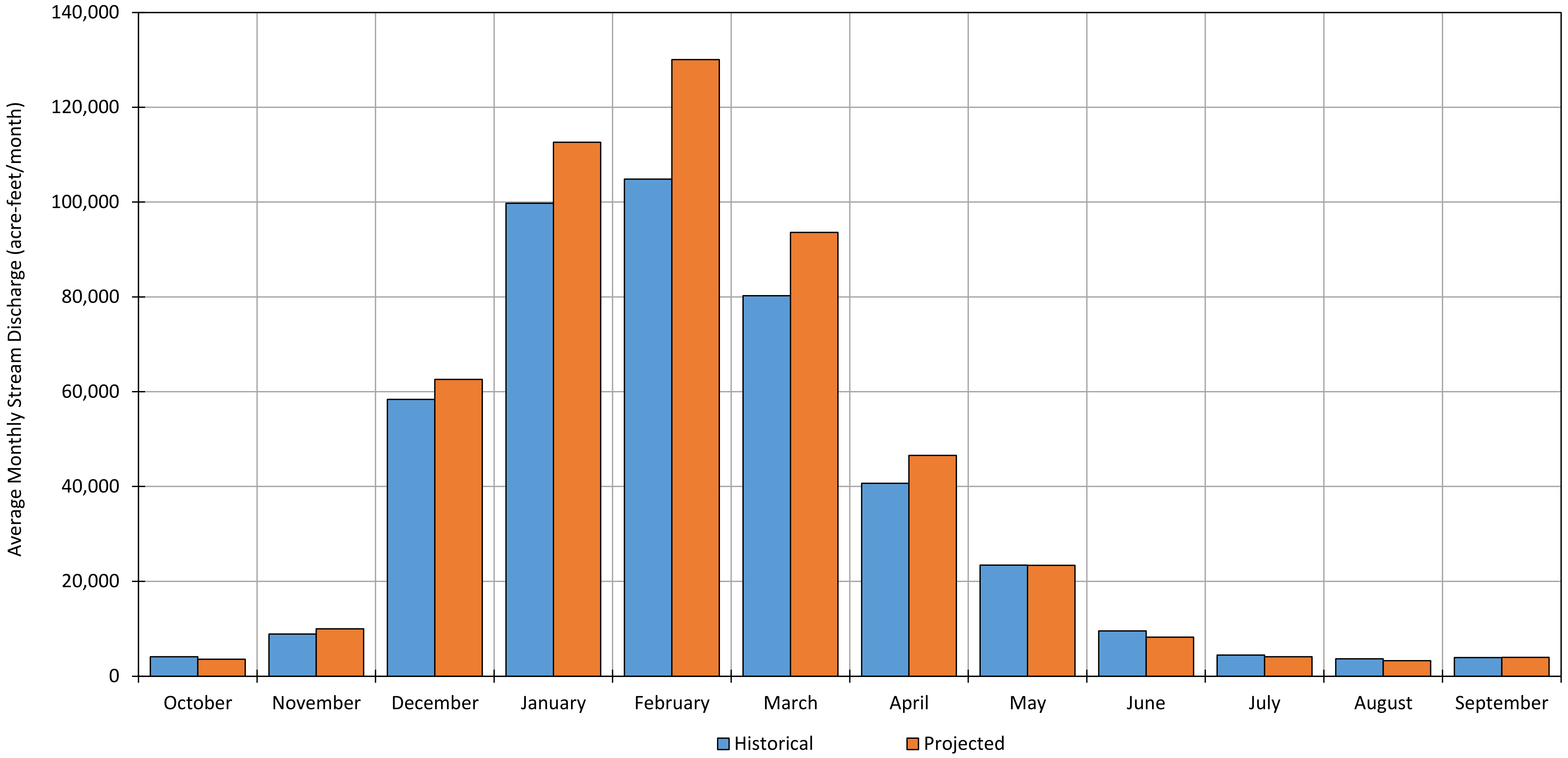
Outflow from SF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin

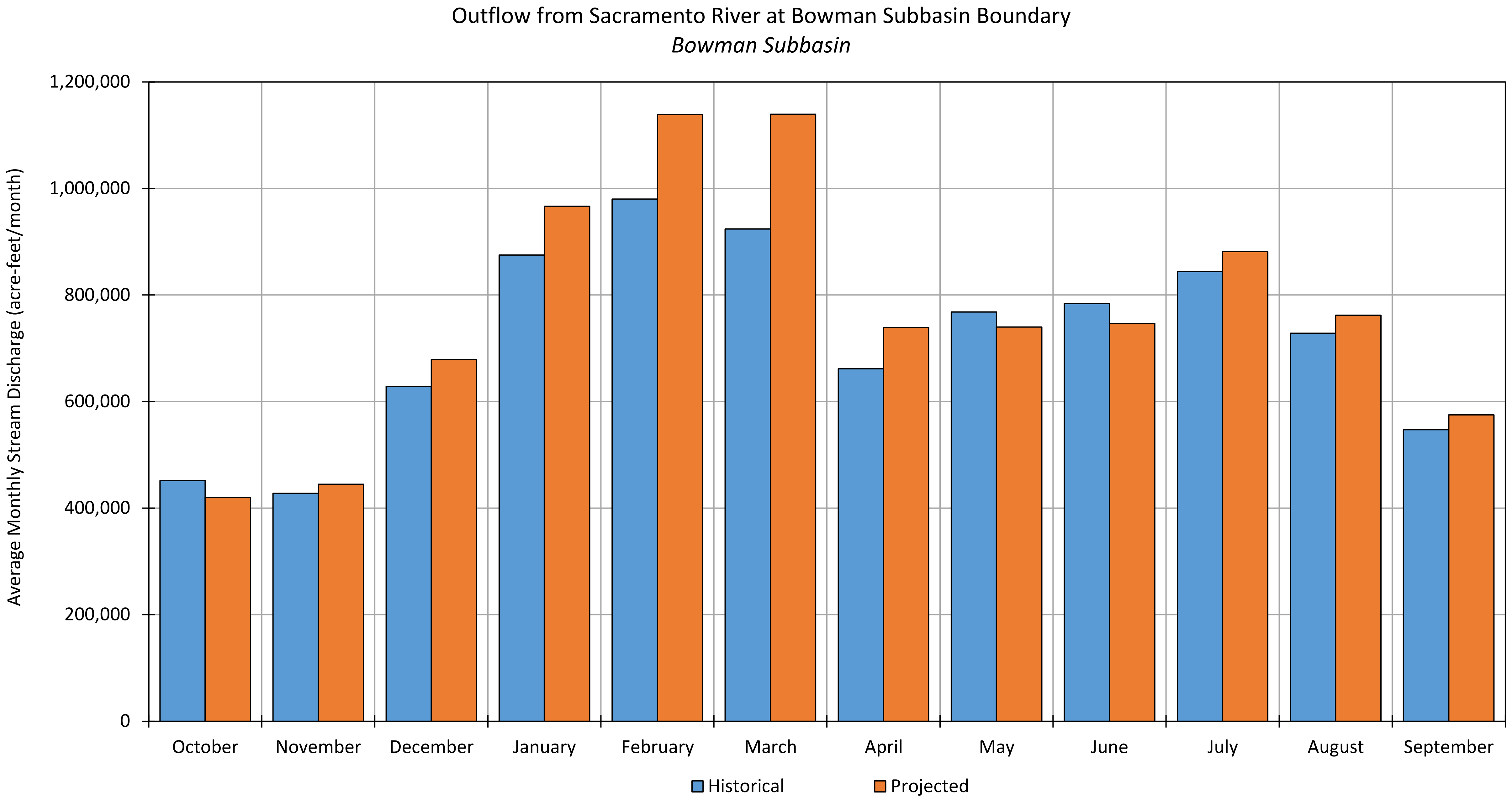


Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Cottonwood Creek to Sacramento River
Bowman Subbasin



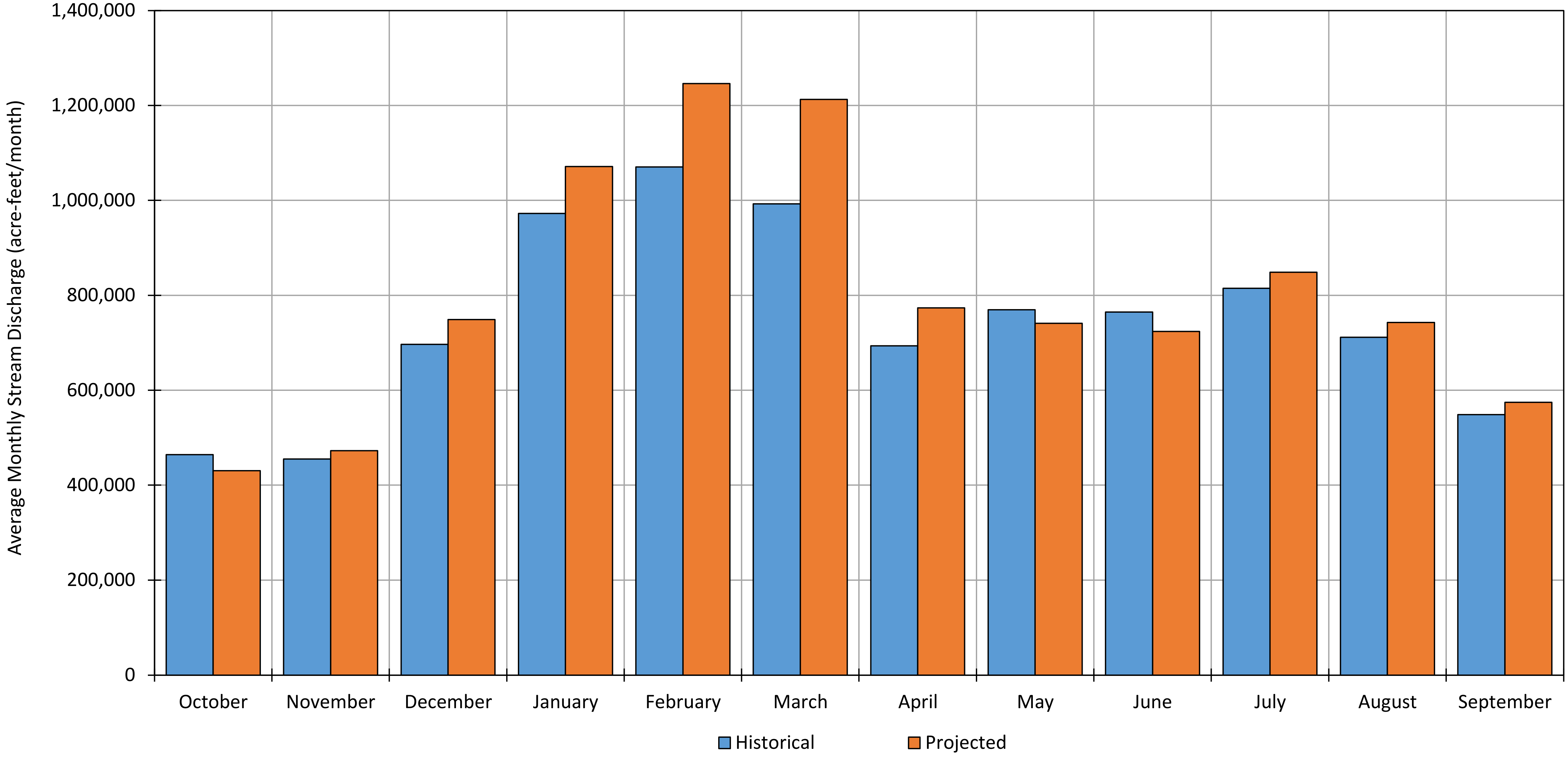
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



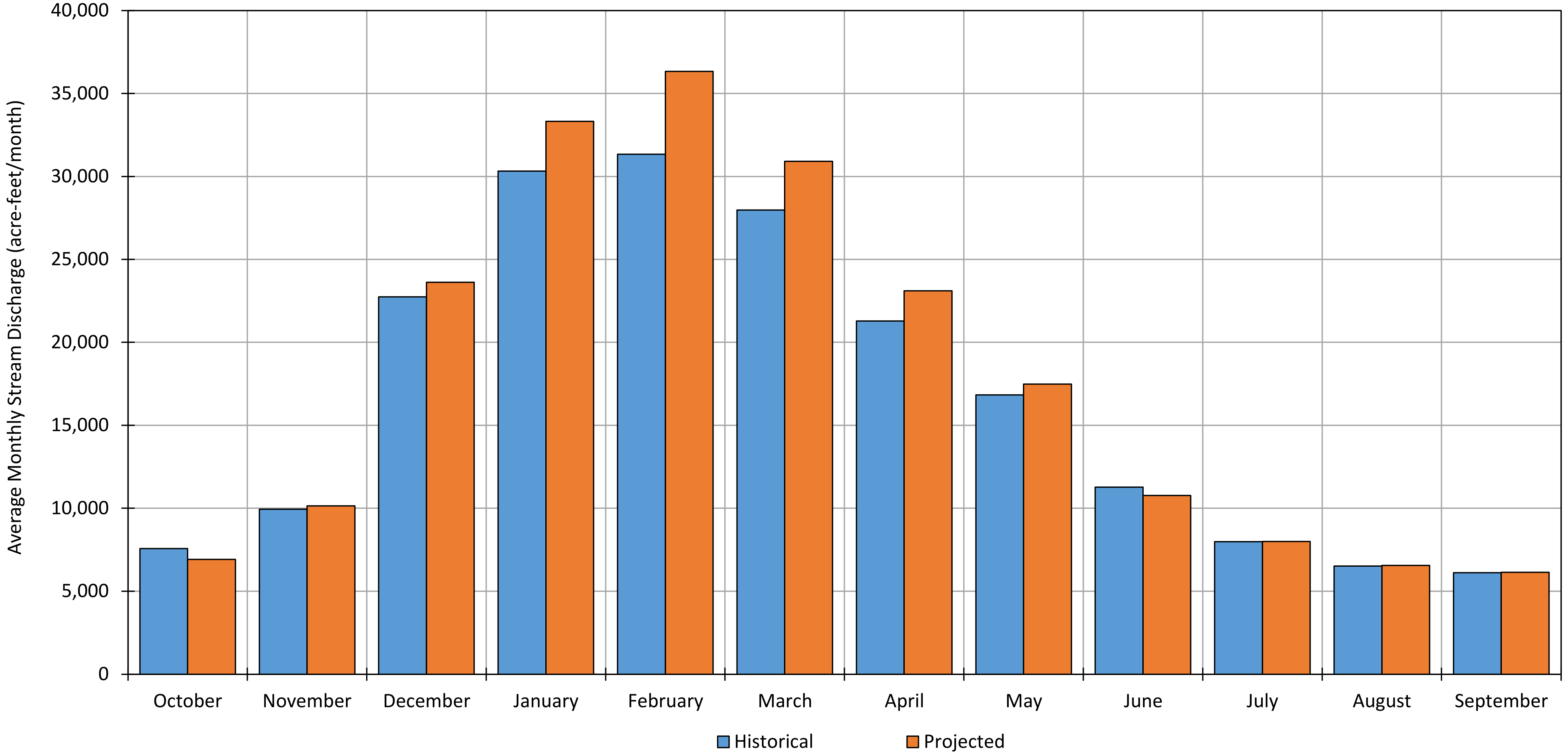
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

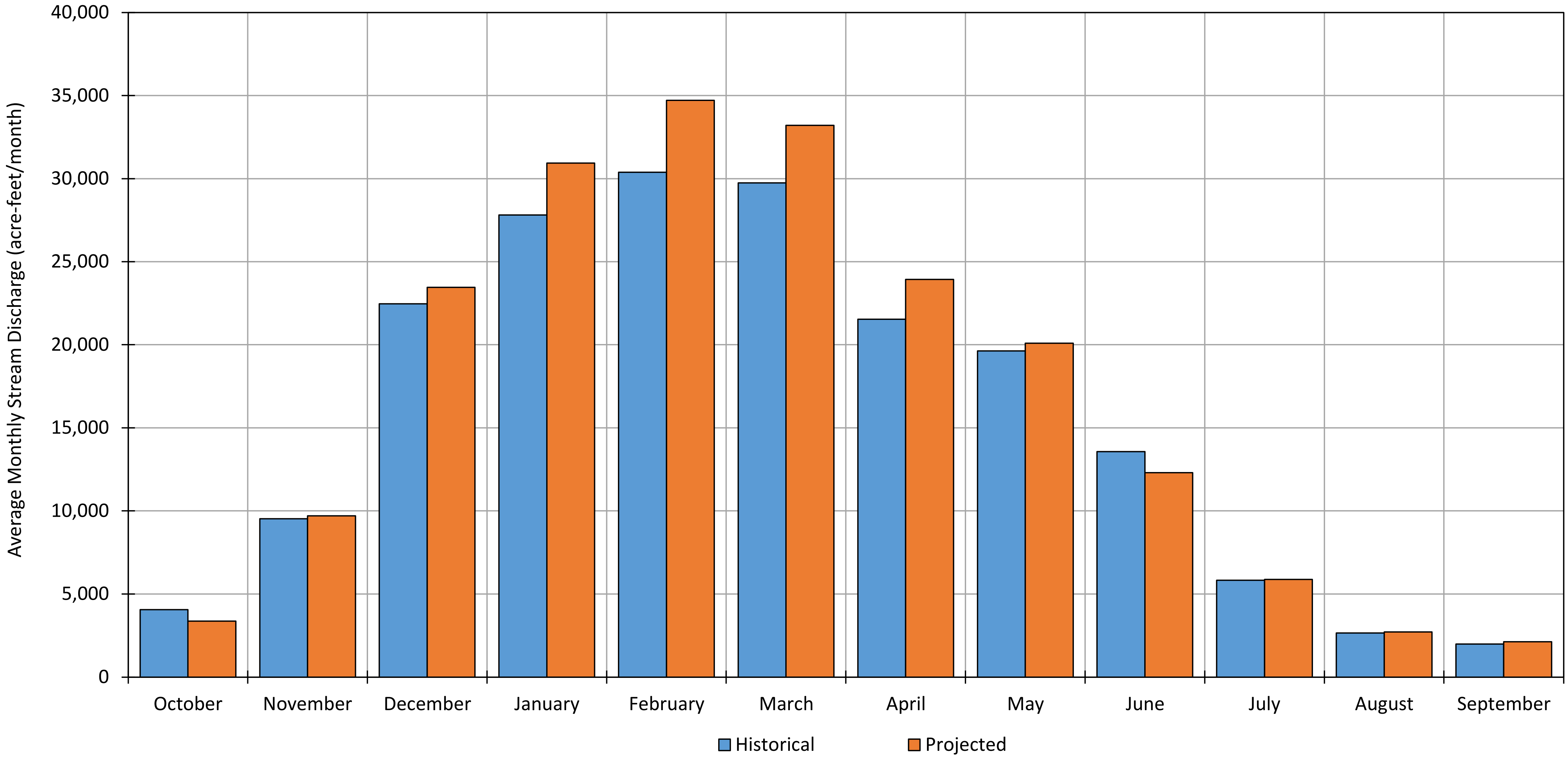


Outflow from Antelope Creek Group to Sacramento River

Los Molinos Subbasin

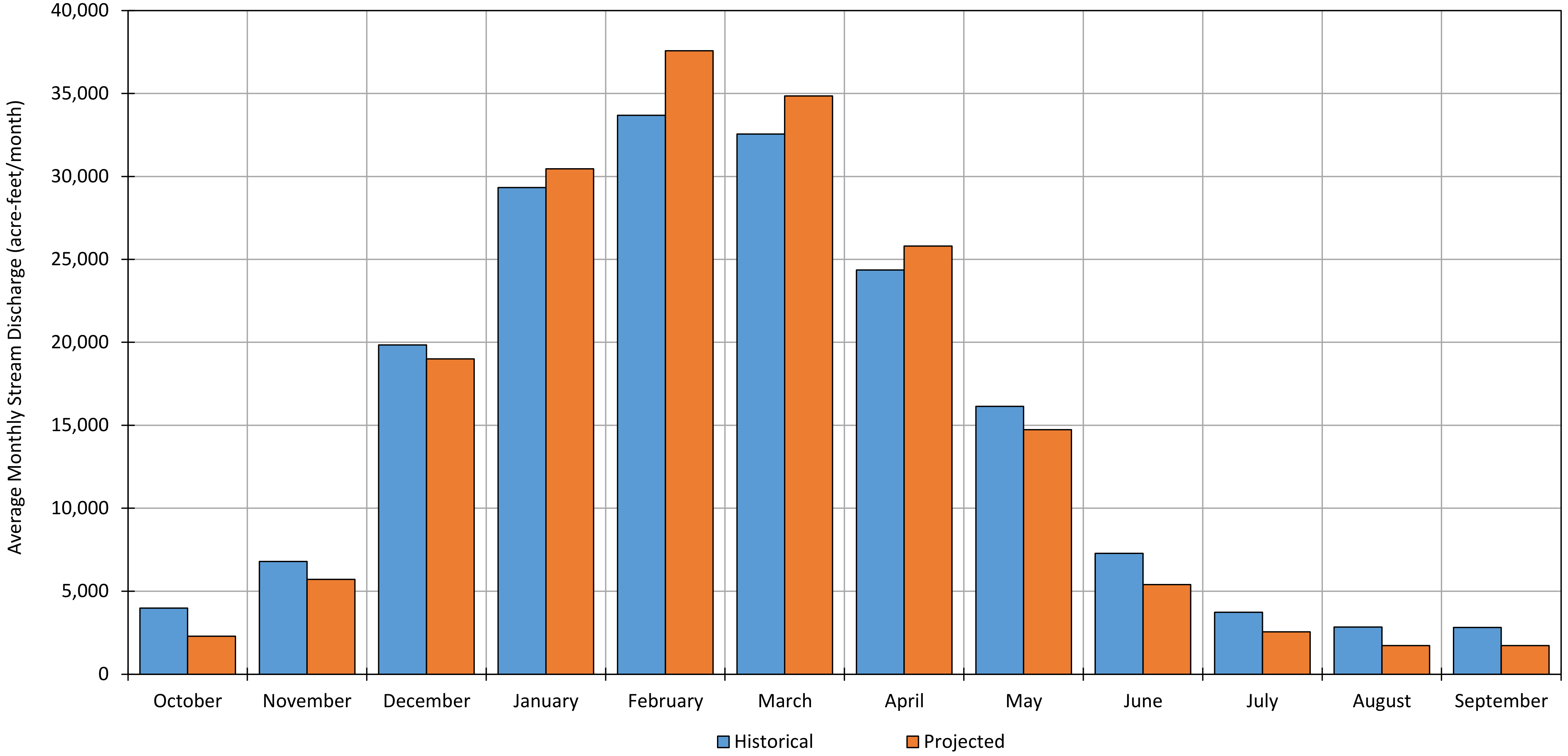
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Mill Creek to Sacramento River
Los Molinos Subbasin

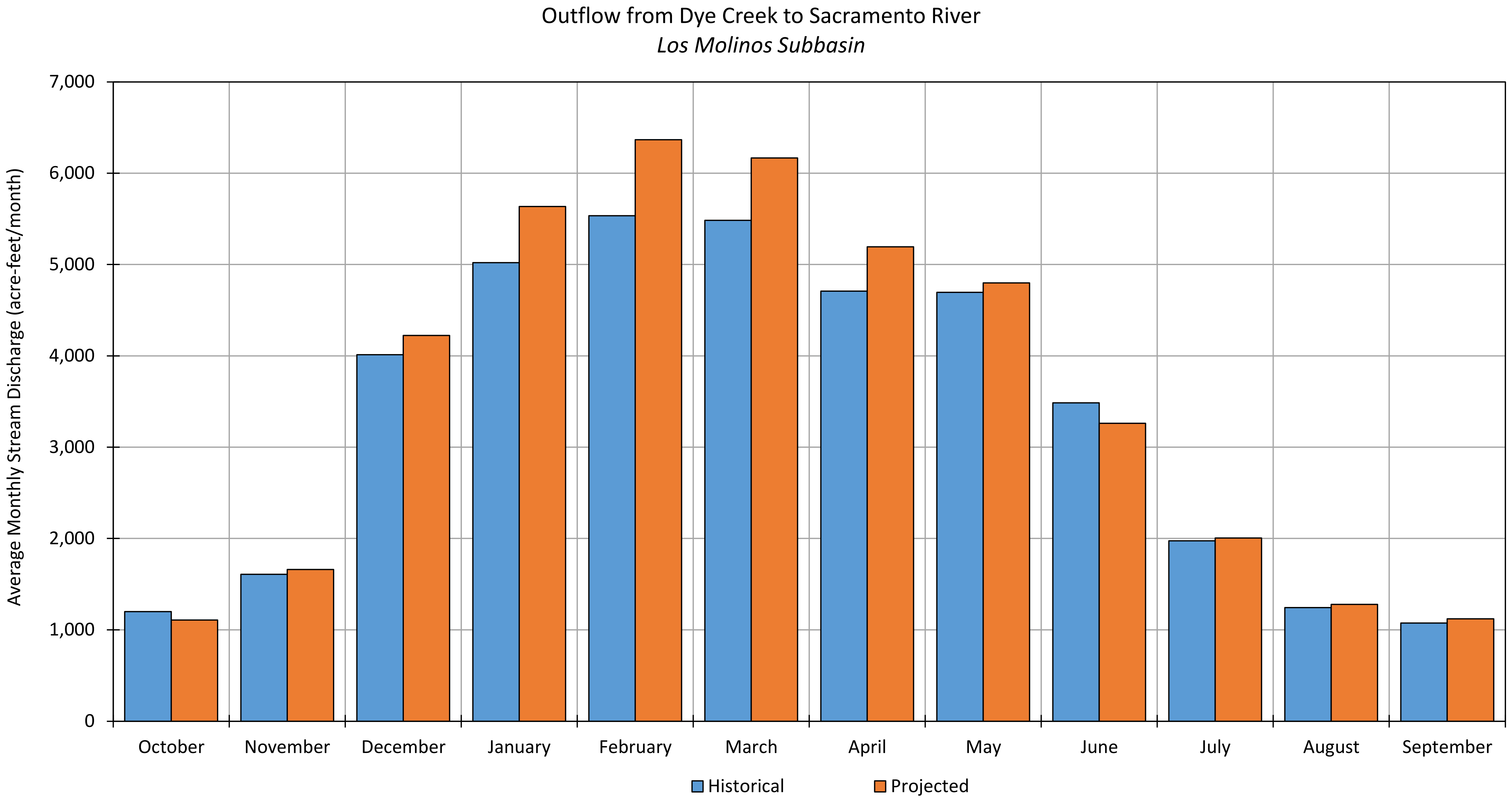


Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Deer Creek Group to Sacramento River
Los Molinos Subbasin



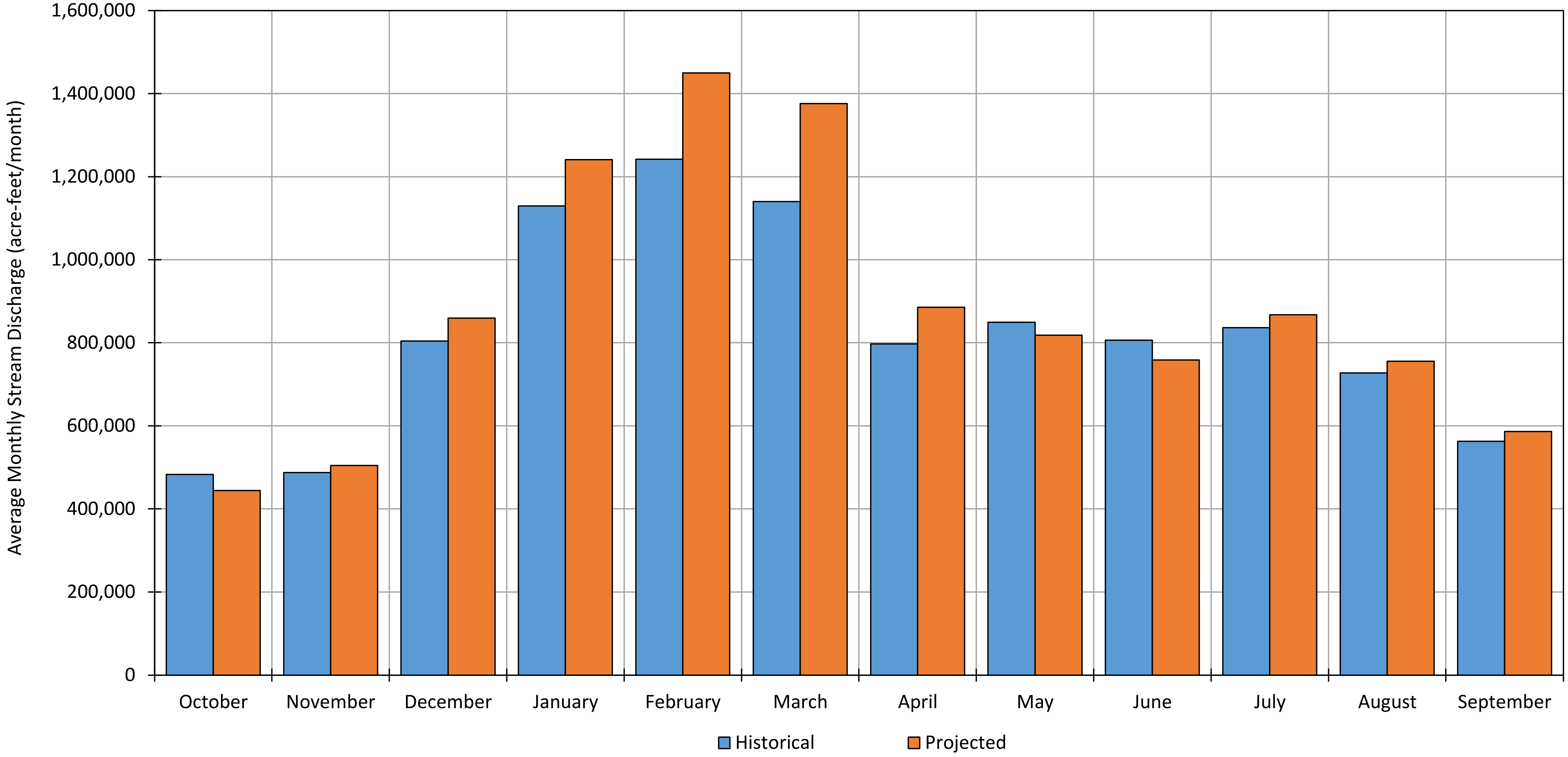
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



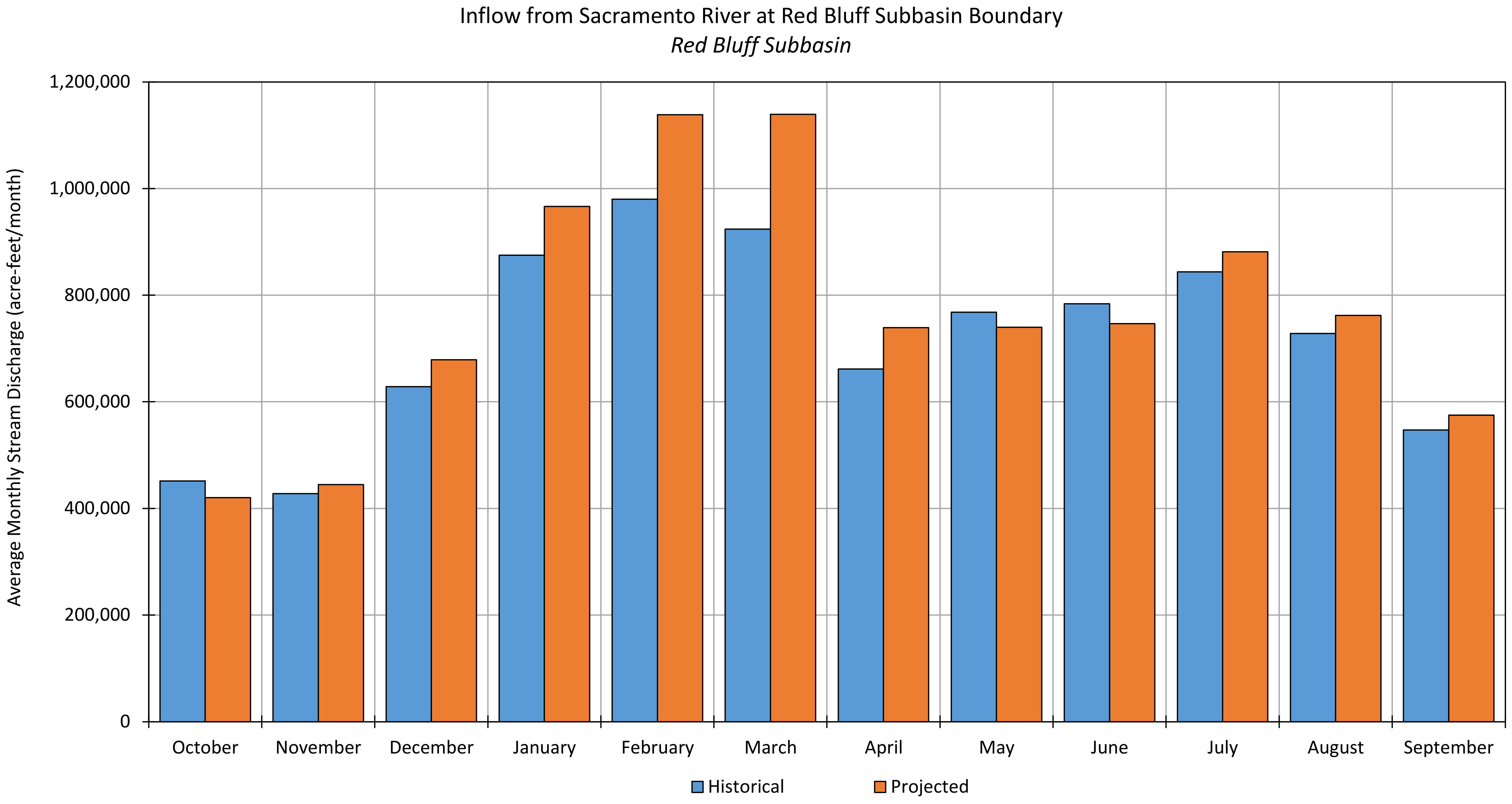
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin



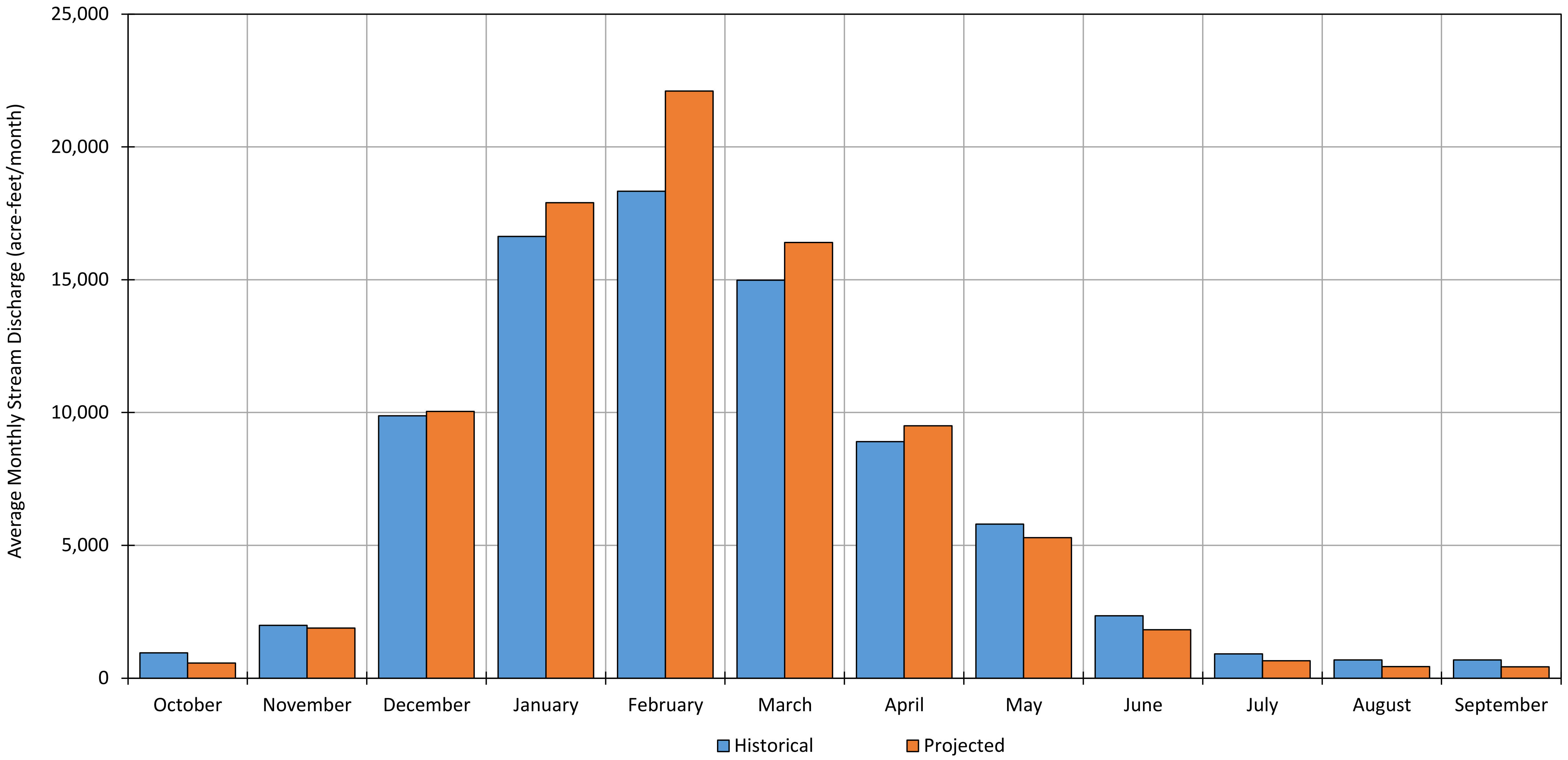
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Elder Creek to Sacramento River

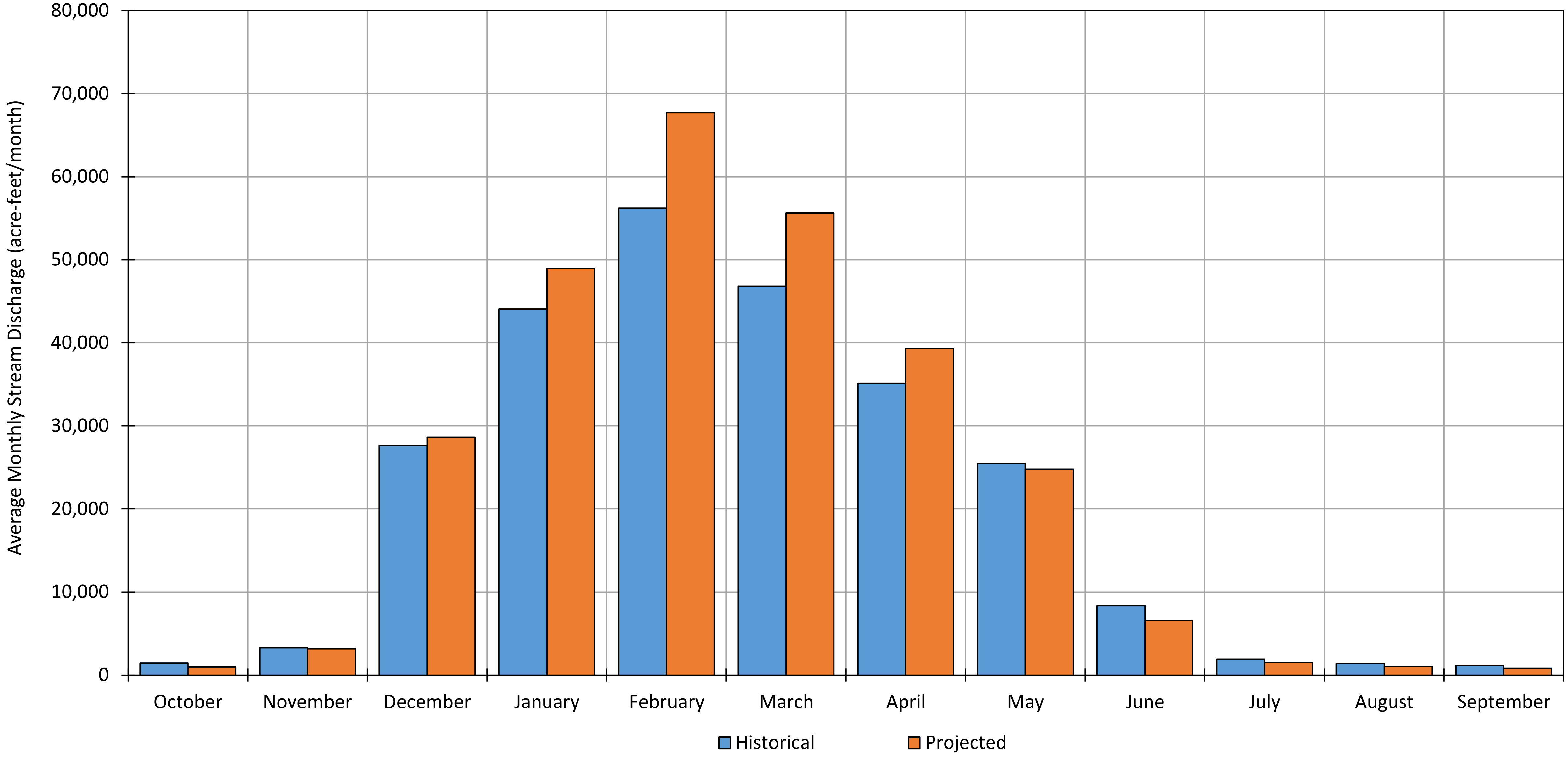
Red Bluff Subbasin



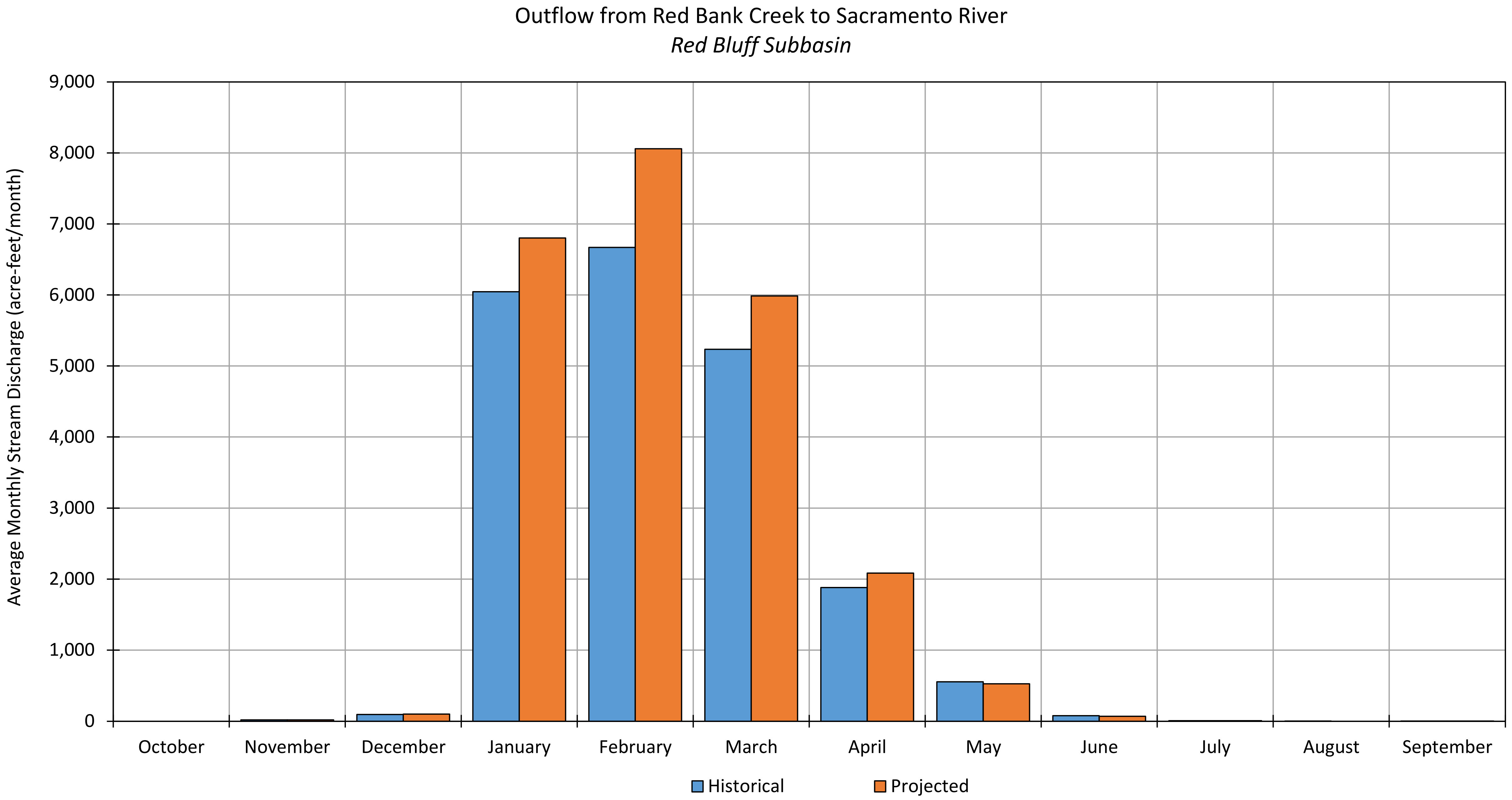
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Thomes Creek to Sacramento River

Red Bluff Subbasin



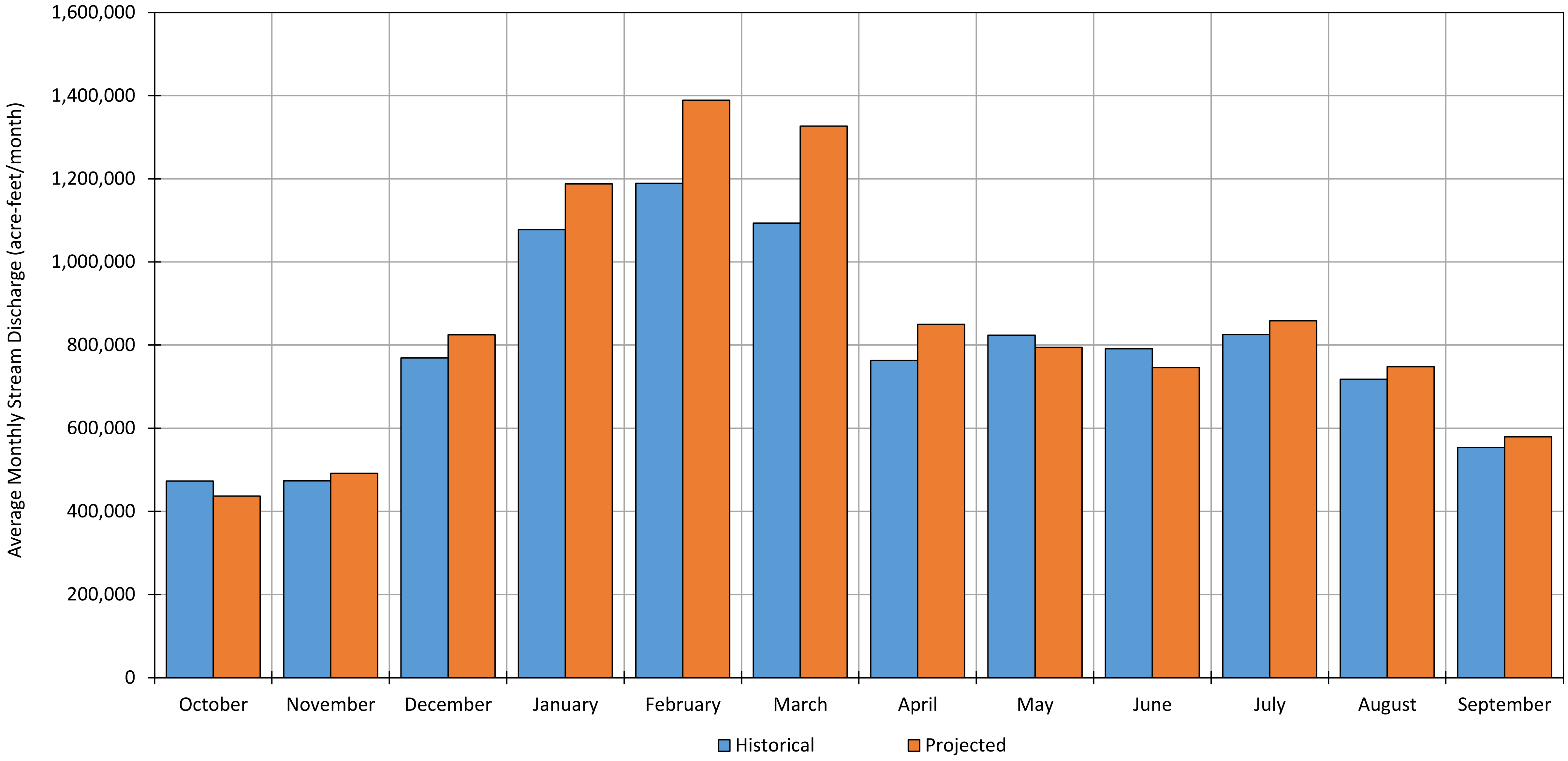
Tehama IHM - Projected (Current Land Use) with Climate Change (2030)



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

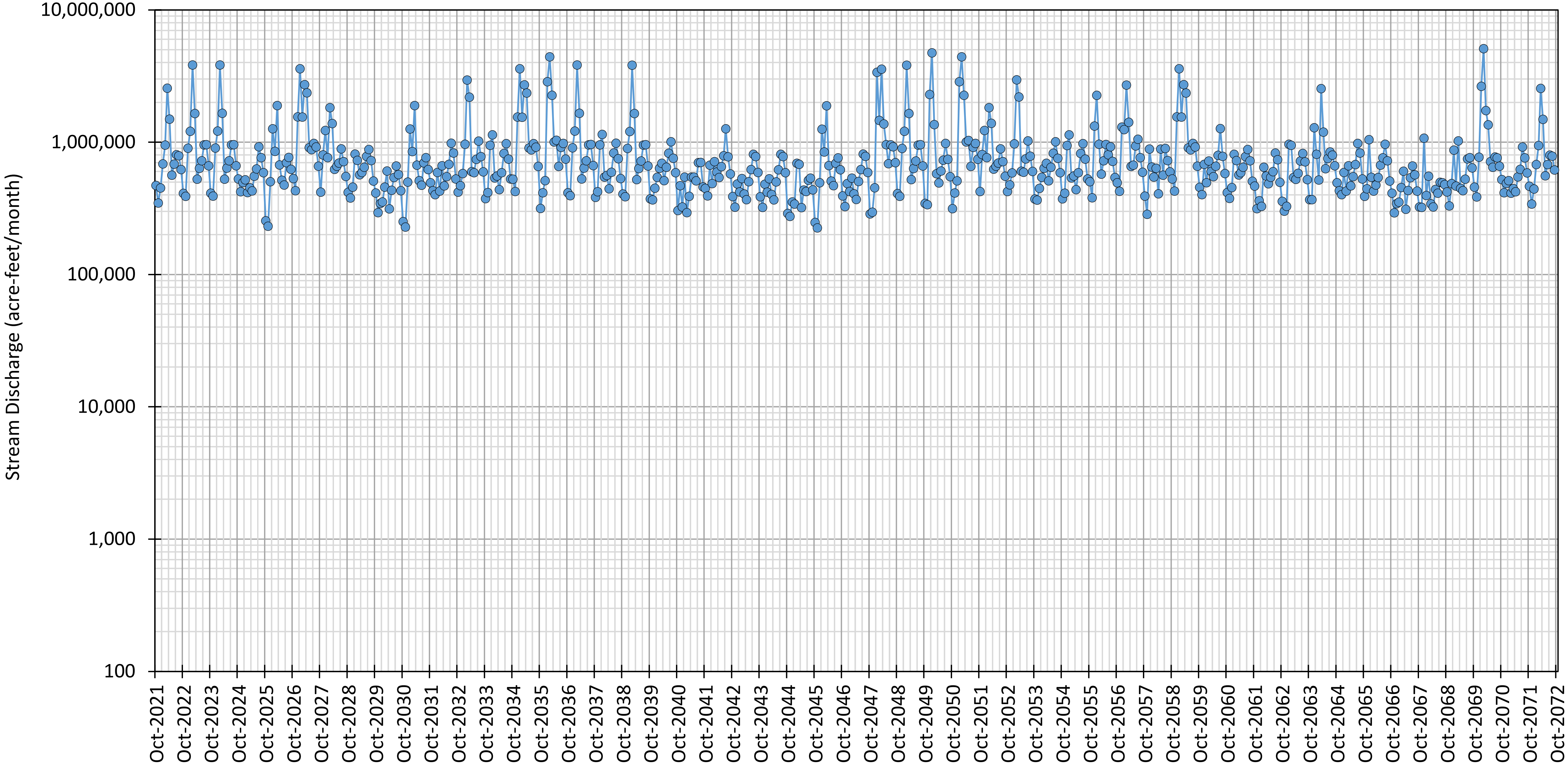
APPENDIX G-5

Tehama IHM Simulated Streamflows:

Projected (Current Land Use) with Climate Change (2070) Model Results

Inflow from Sacramento River at Antelope Subbasin Boundary

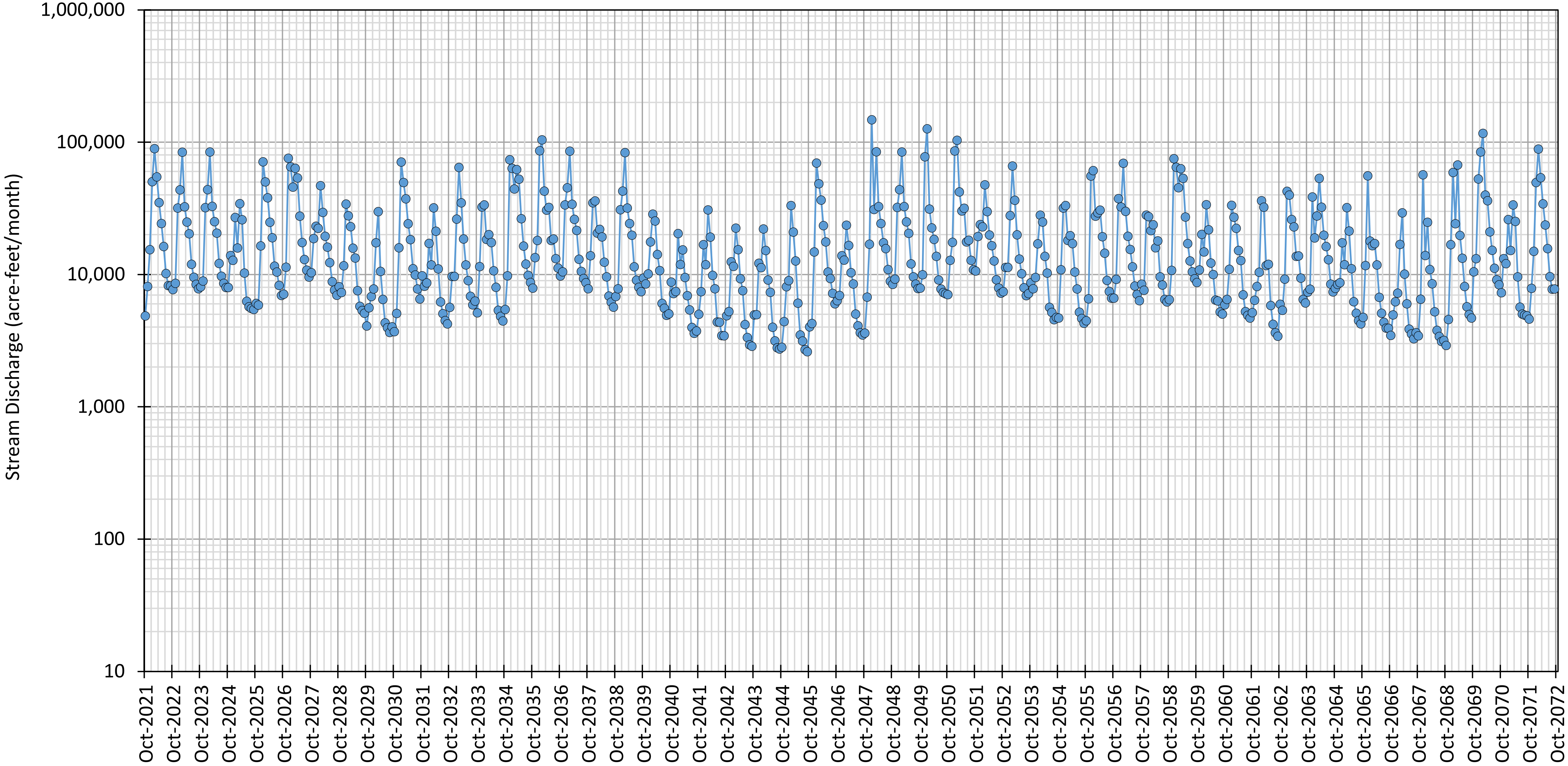
Antelope Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

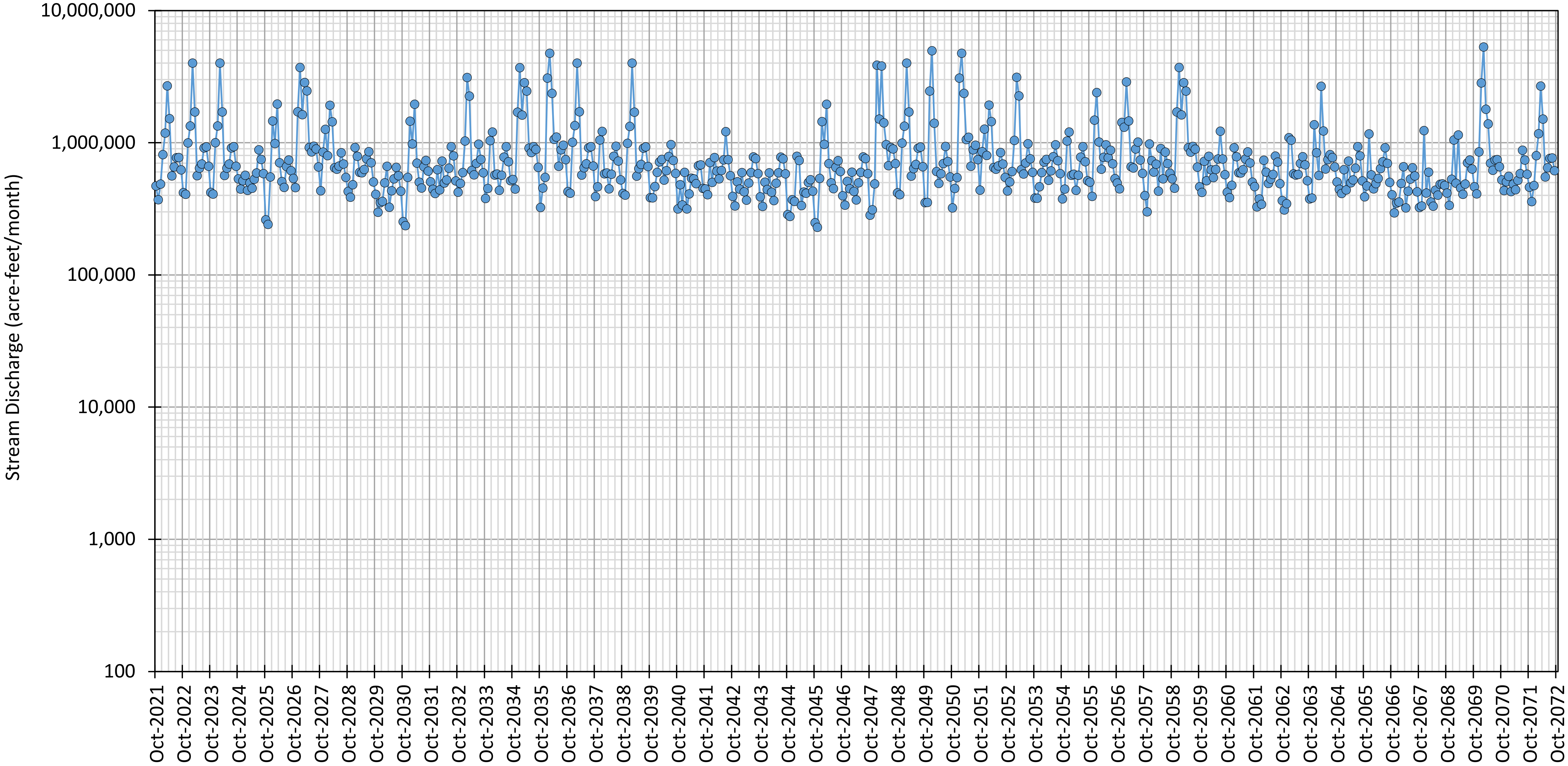
Antelope Subbasin



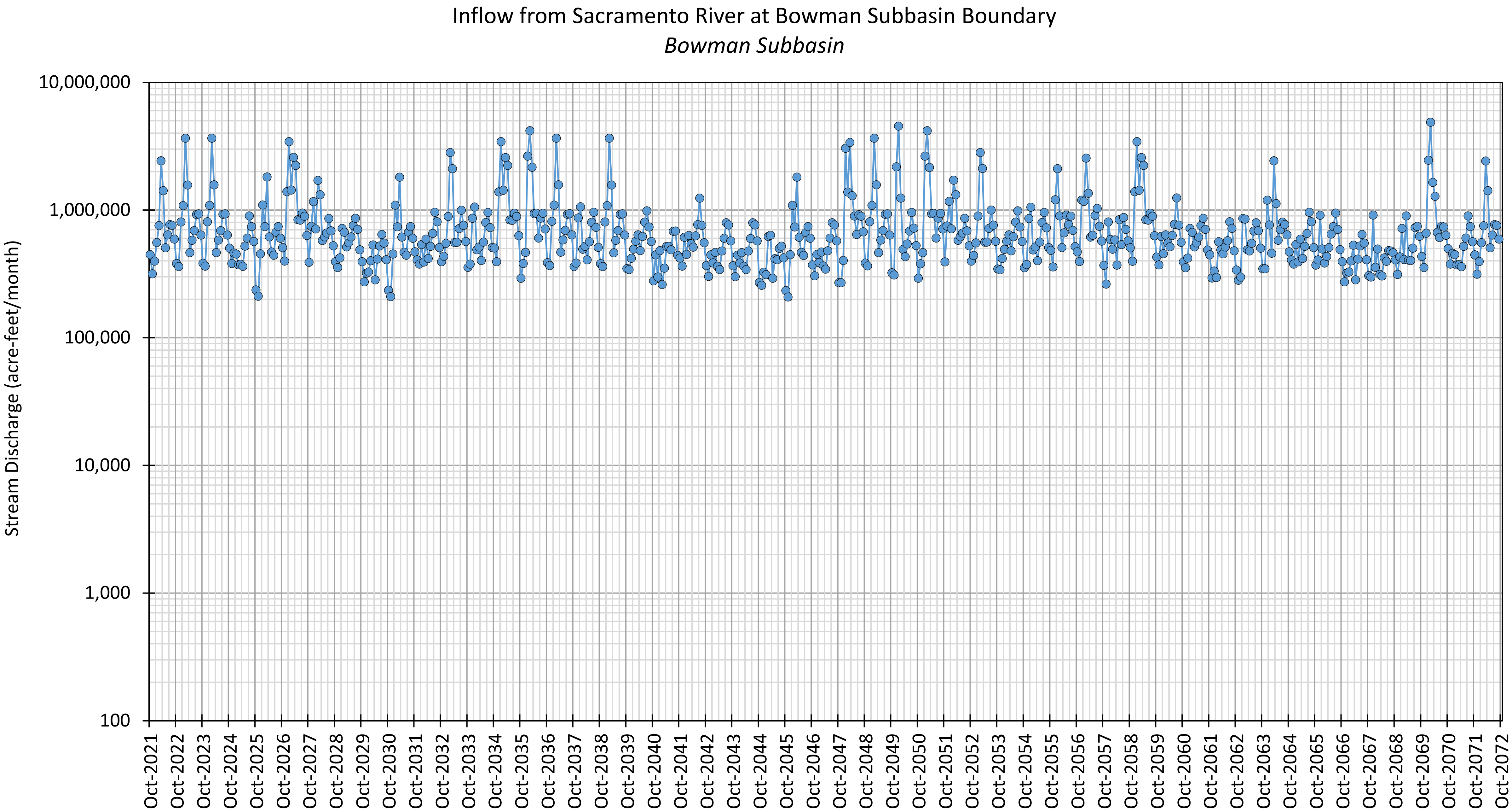
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Sacramento River at Antelope Subbasin Boundary

Antelope Subbasin



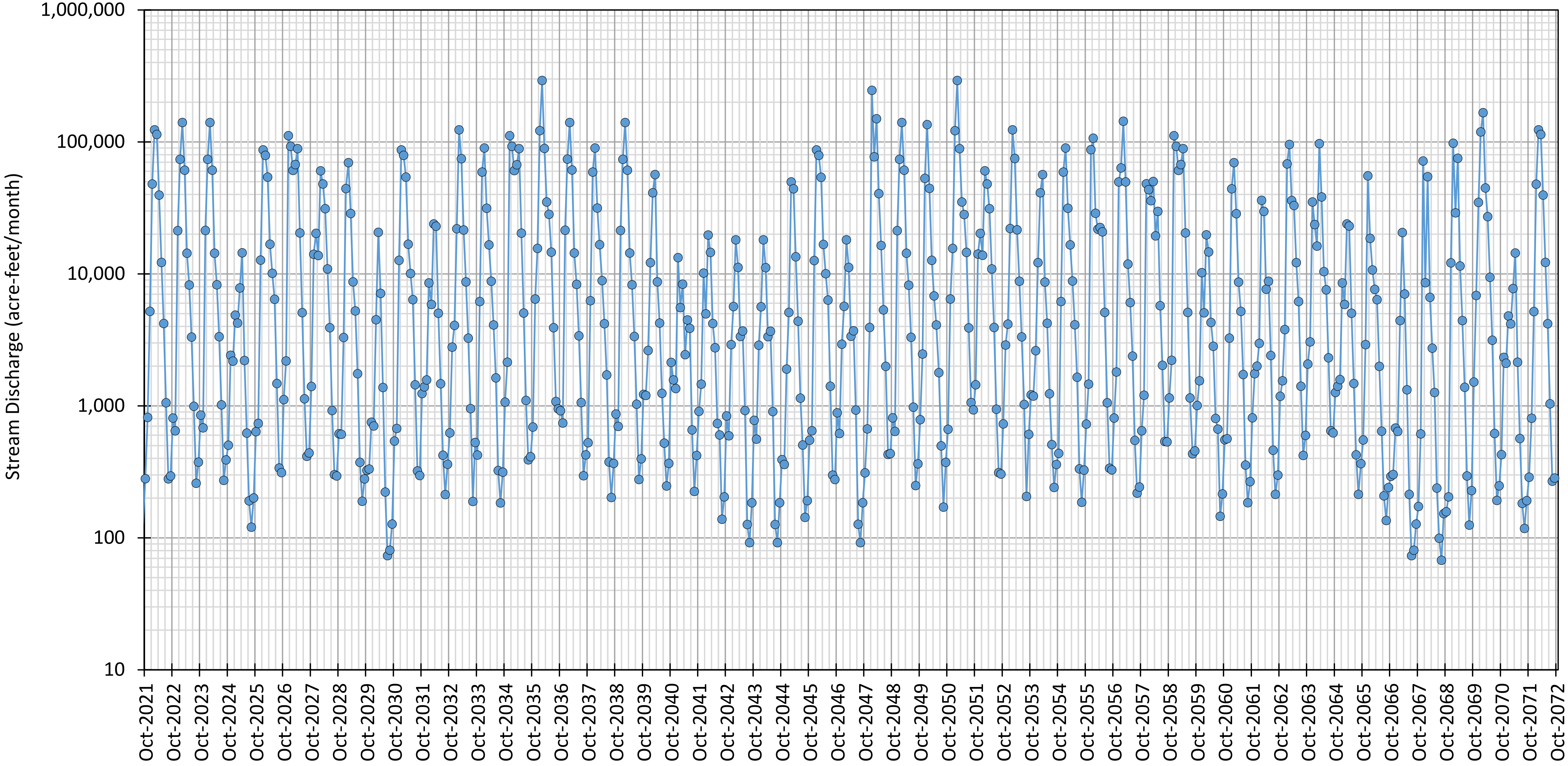
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from MF Cottonwood Creek to Cottonwood Creek

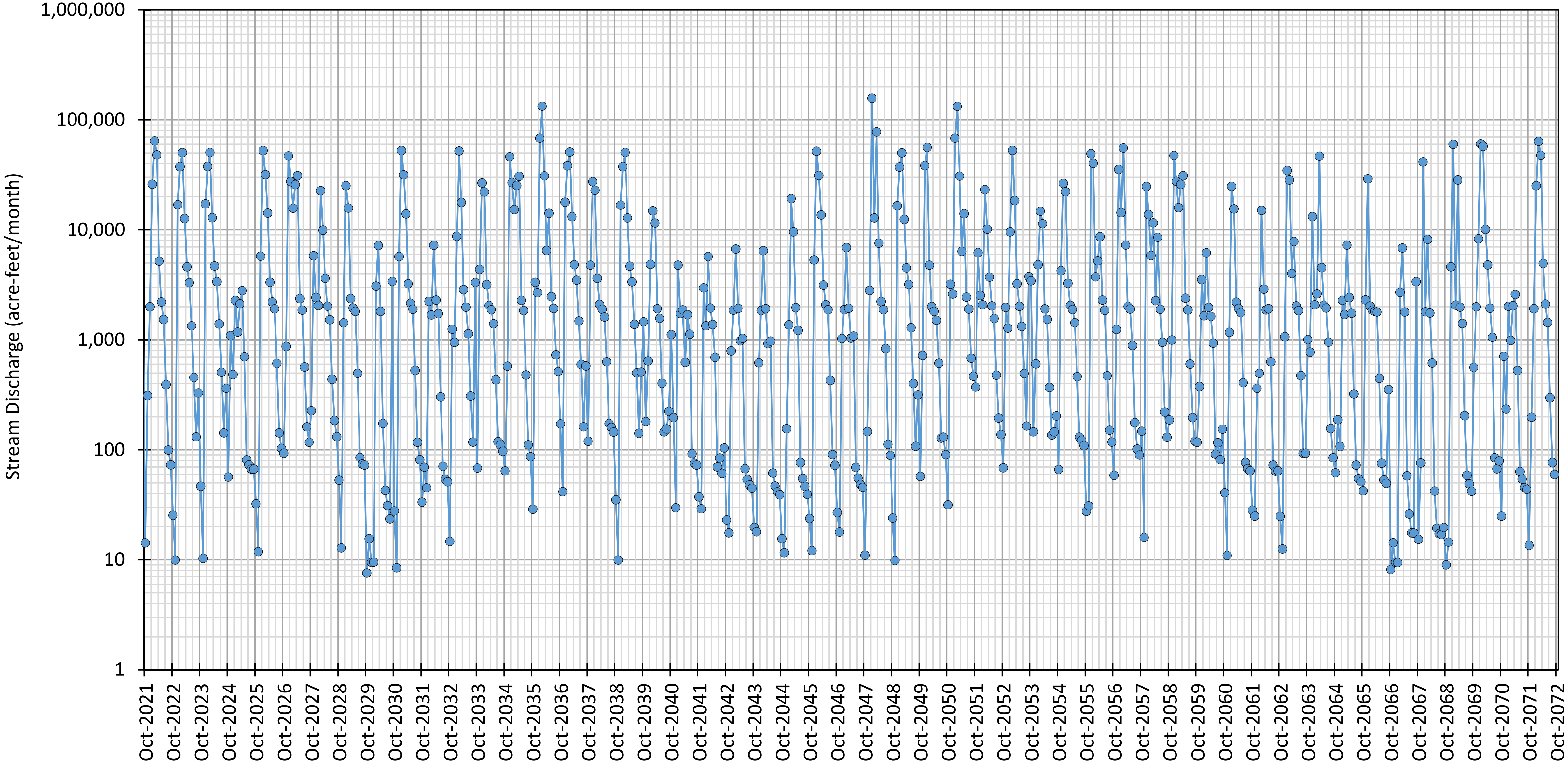
Bowman Subbasin



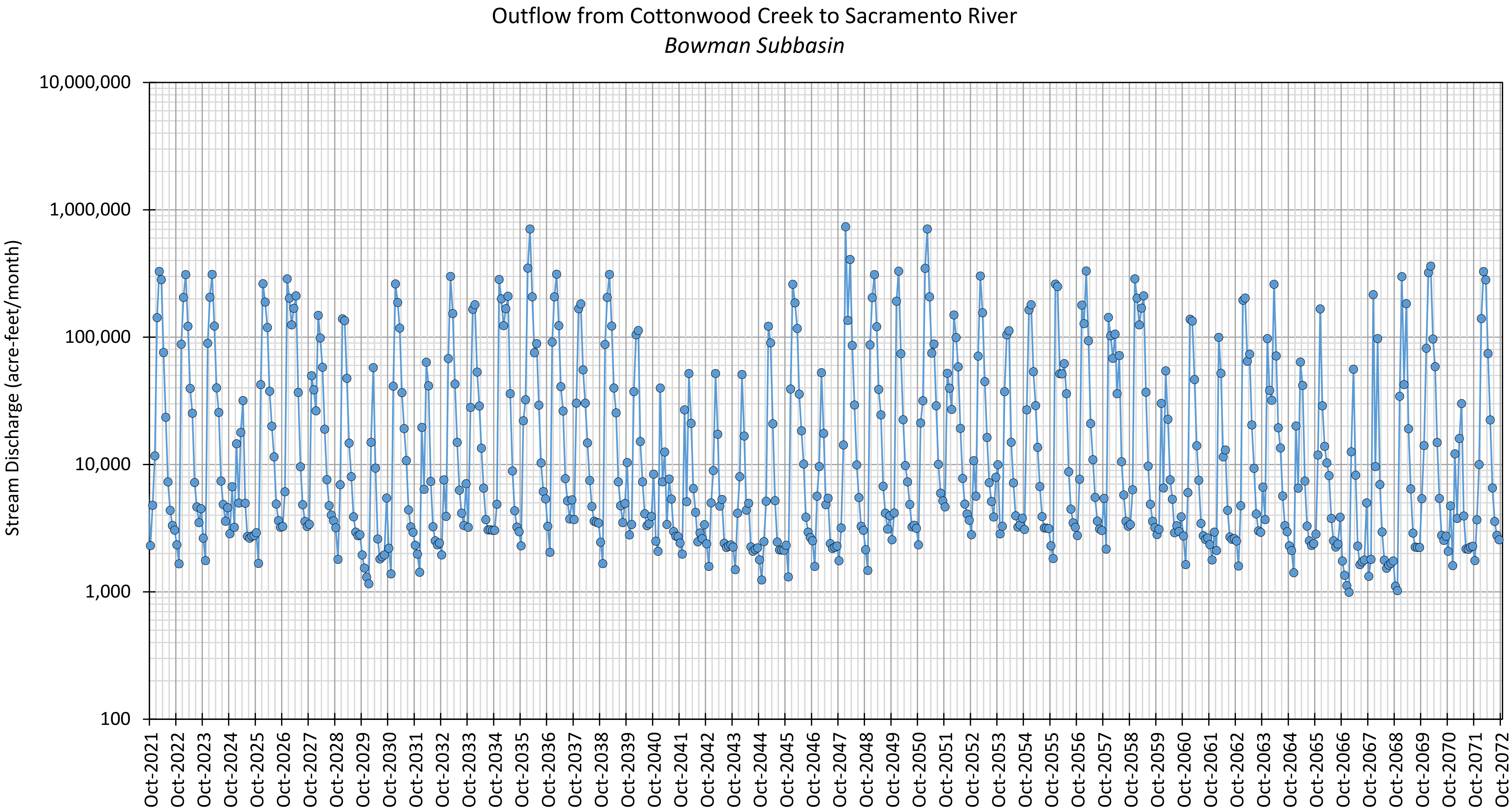
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from SF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin



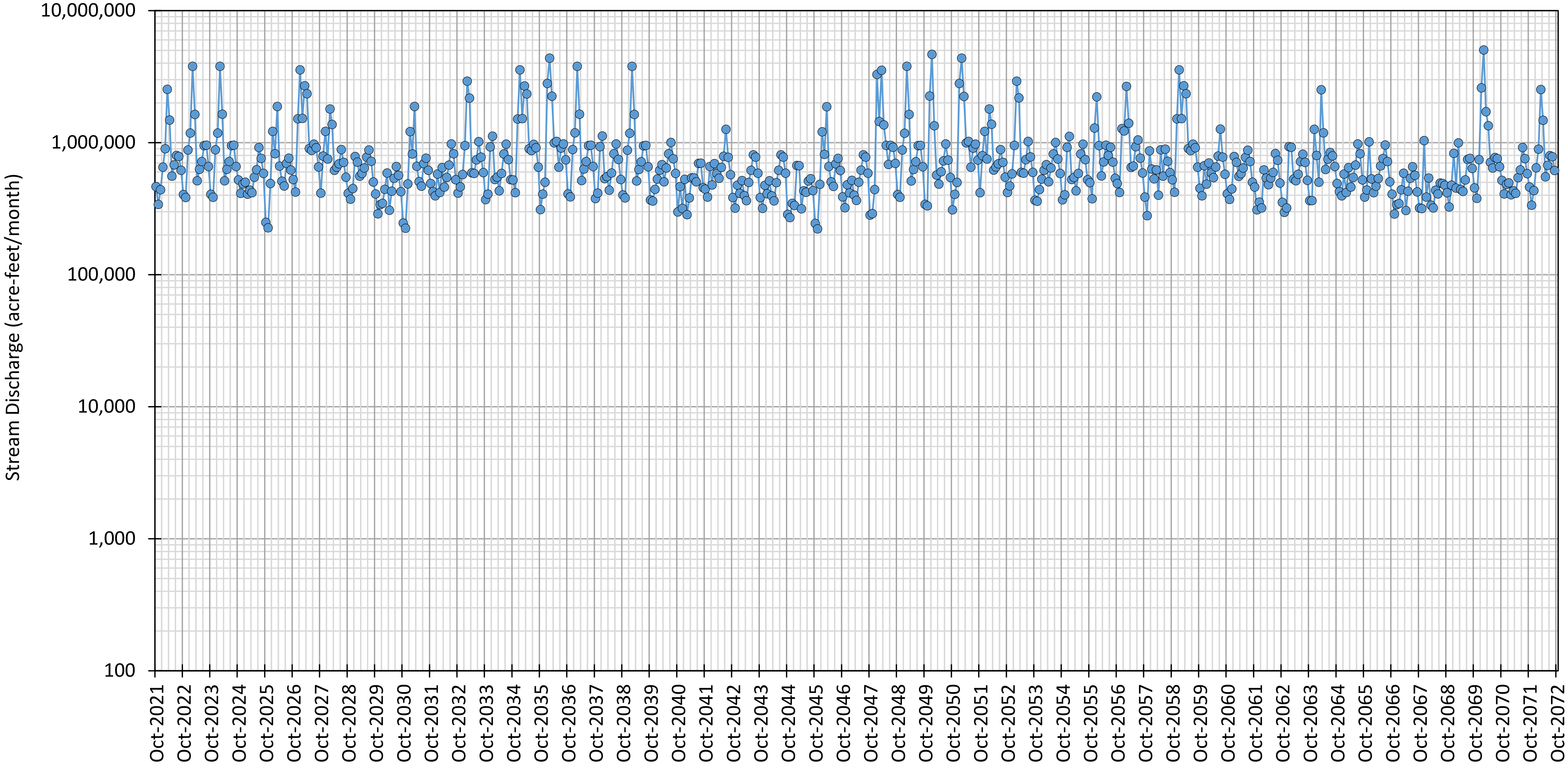
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Sacramento River at Bowman Subbasin Boundary

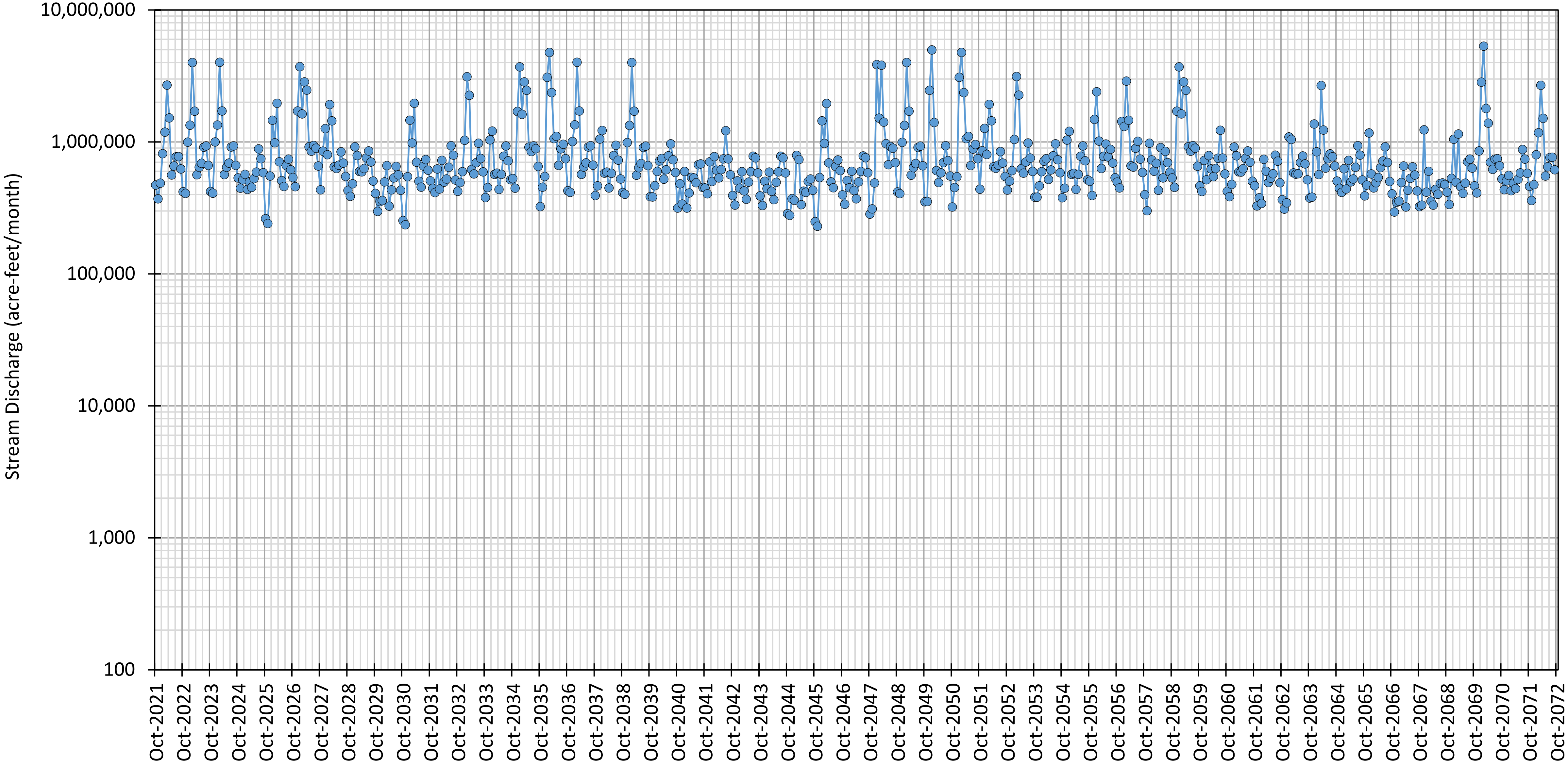
Bowman Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

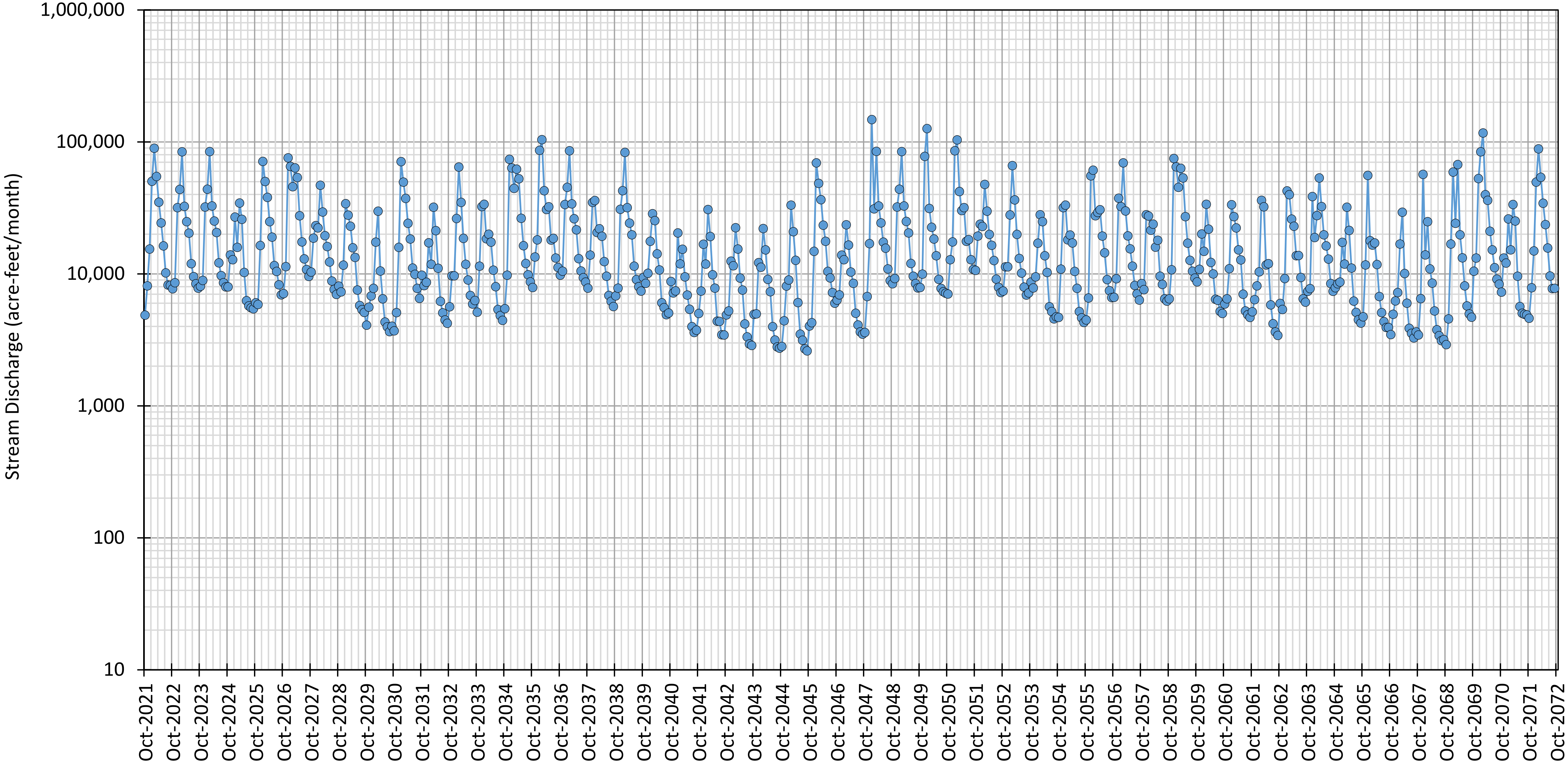
Los Molinos Subbasin



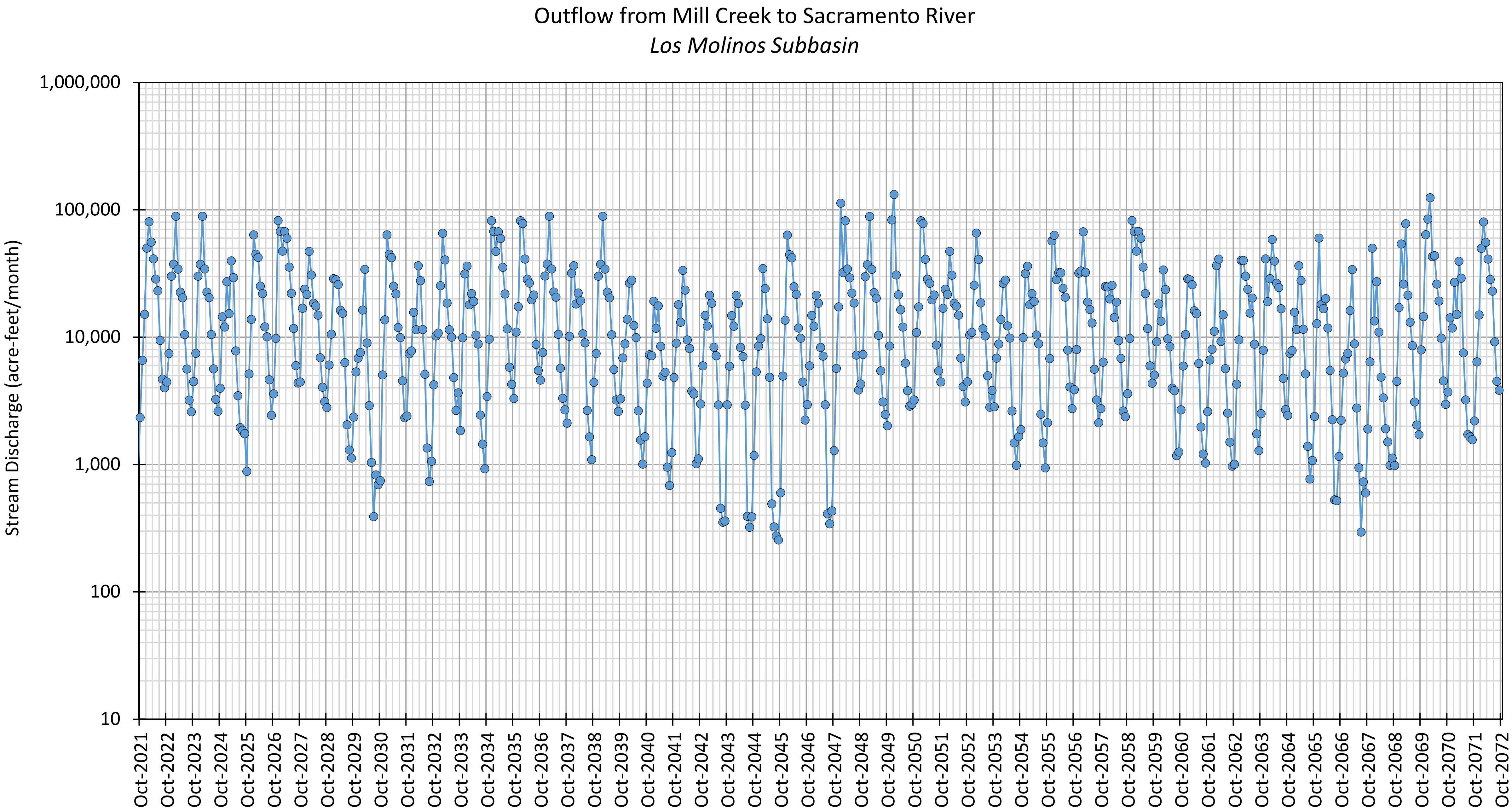
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

Los Molinos Subbasin



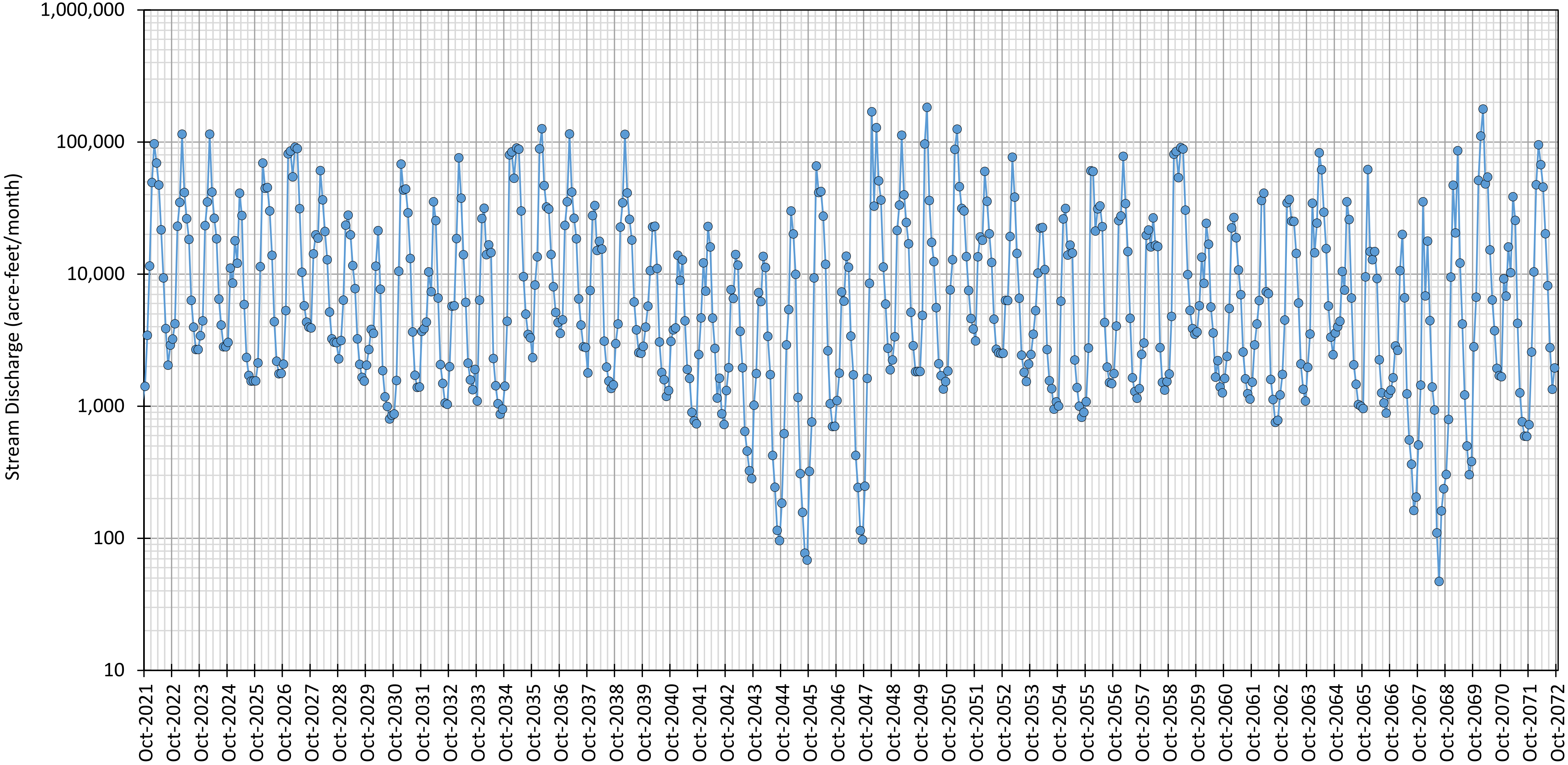
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Deer Creek Group to Sacramento River

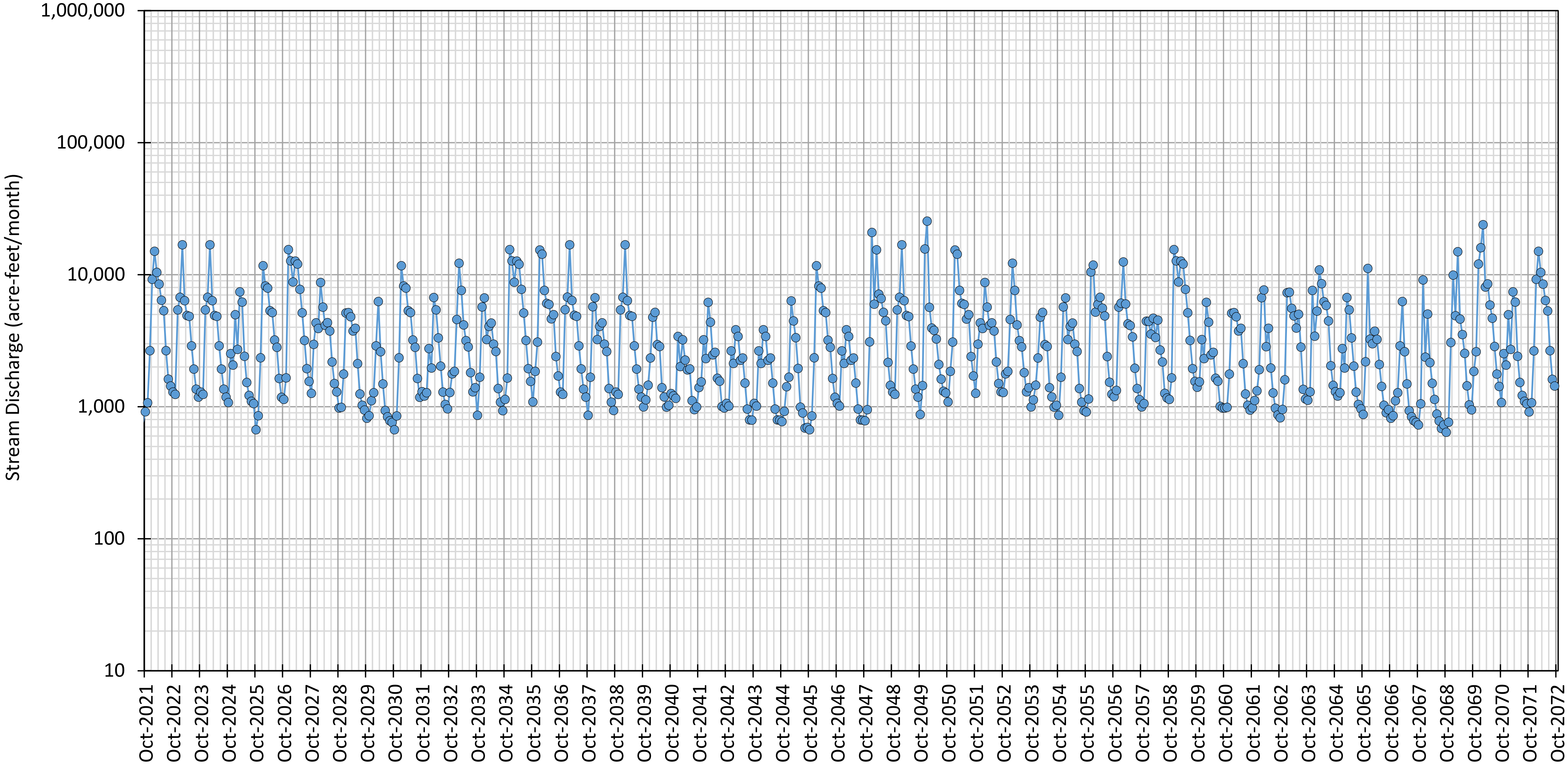
Los Molinos Subbasin



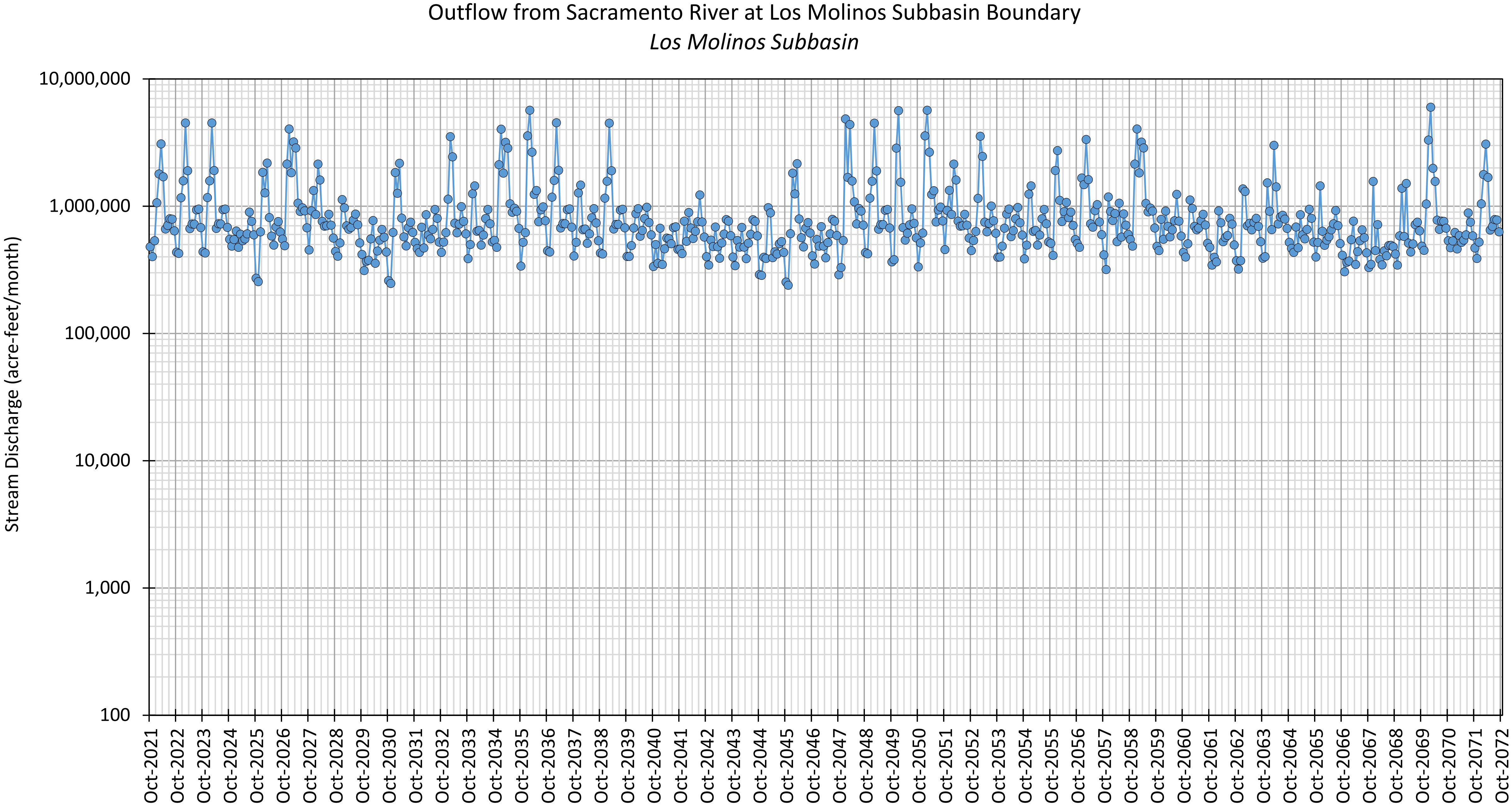
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Dye Creek to Sacramento River

Los Molinos Subbasin



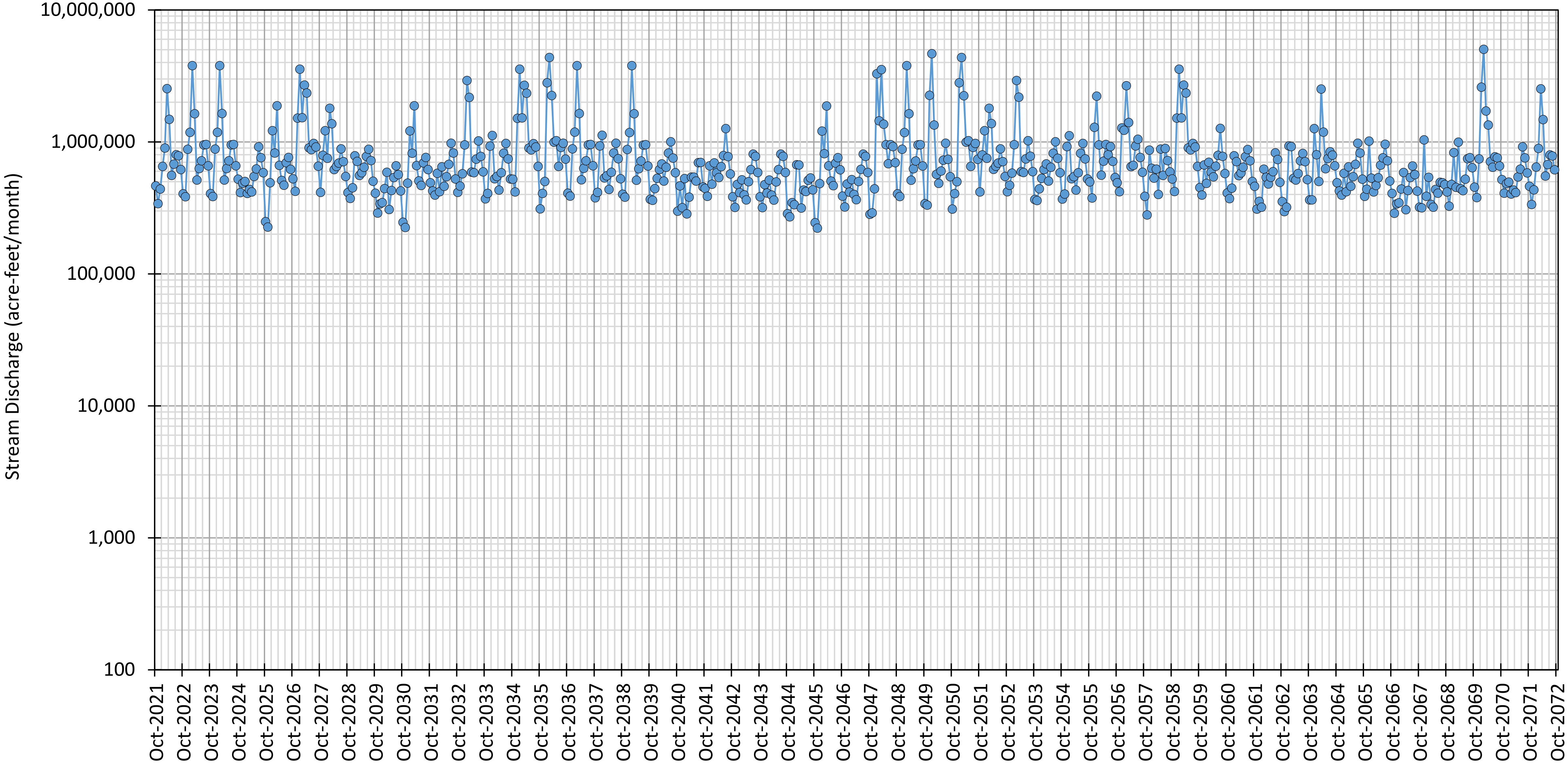
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Inflow from Sacramento River at Red Bluff Subbasin Boundary

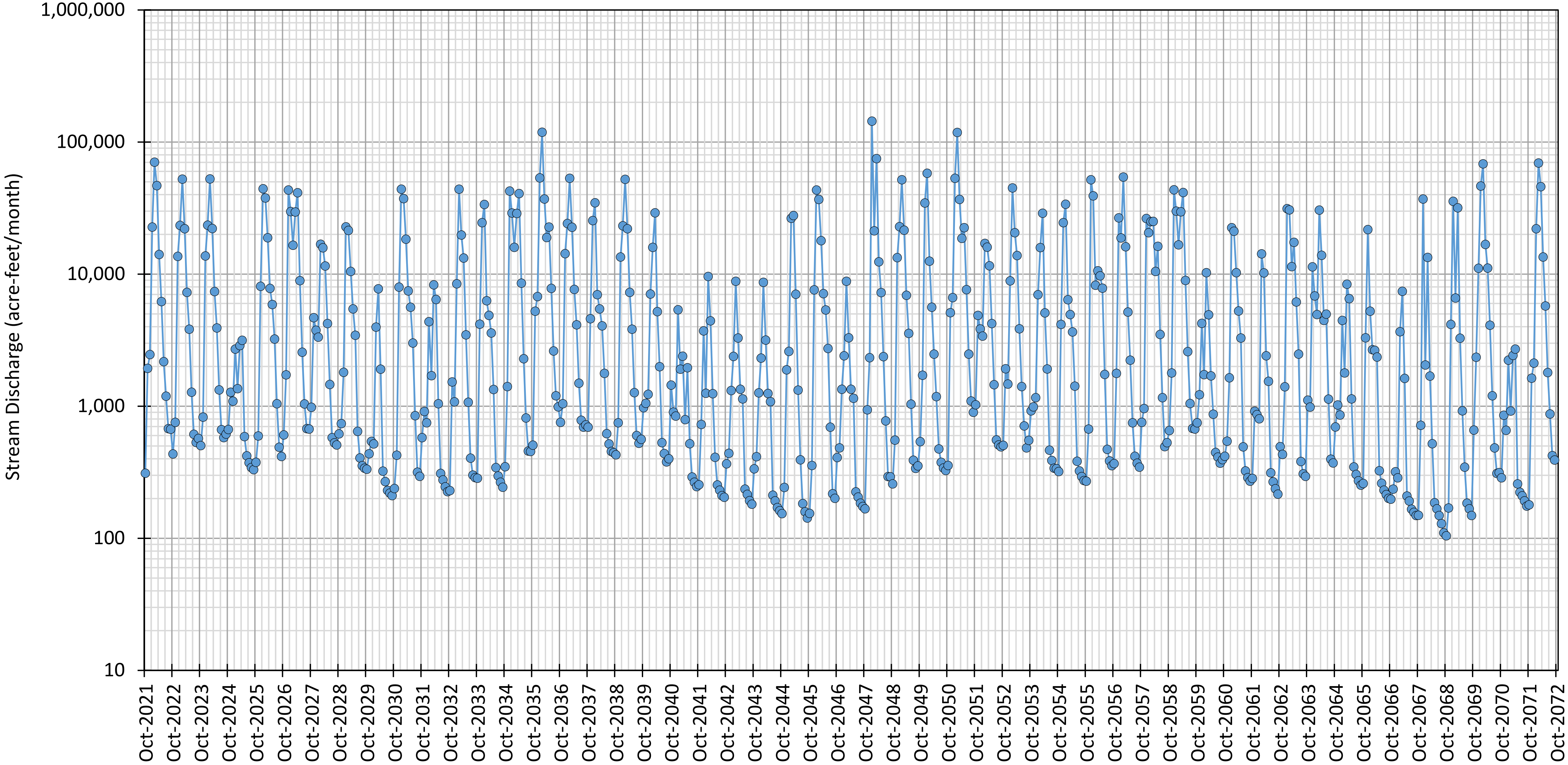
Red Bluff Subbasin



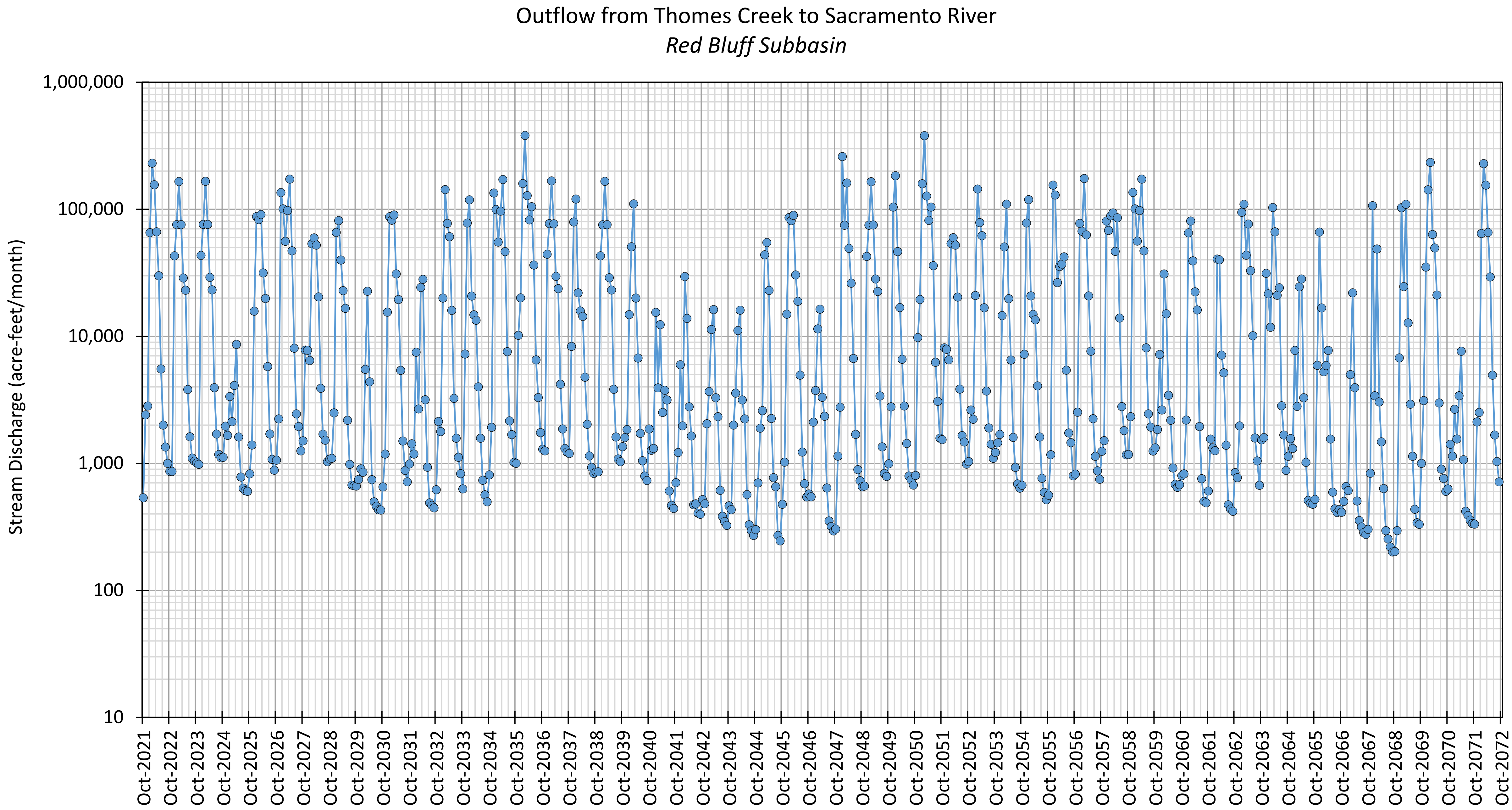
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Elder Creek to Sacramento River

Red Bluff Subbasin



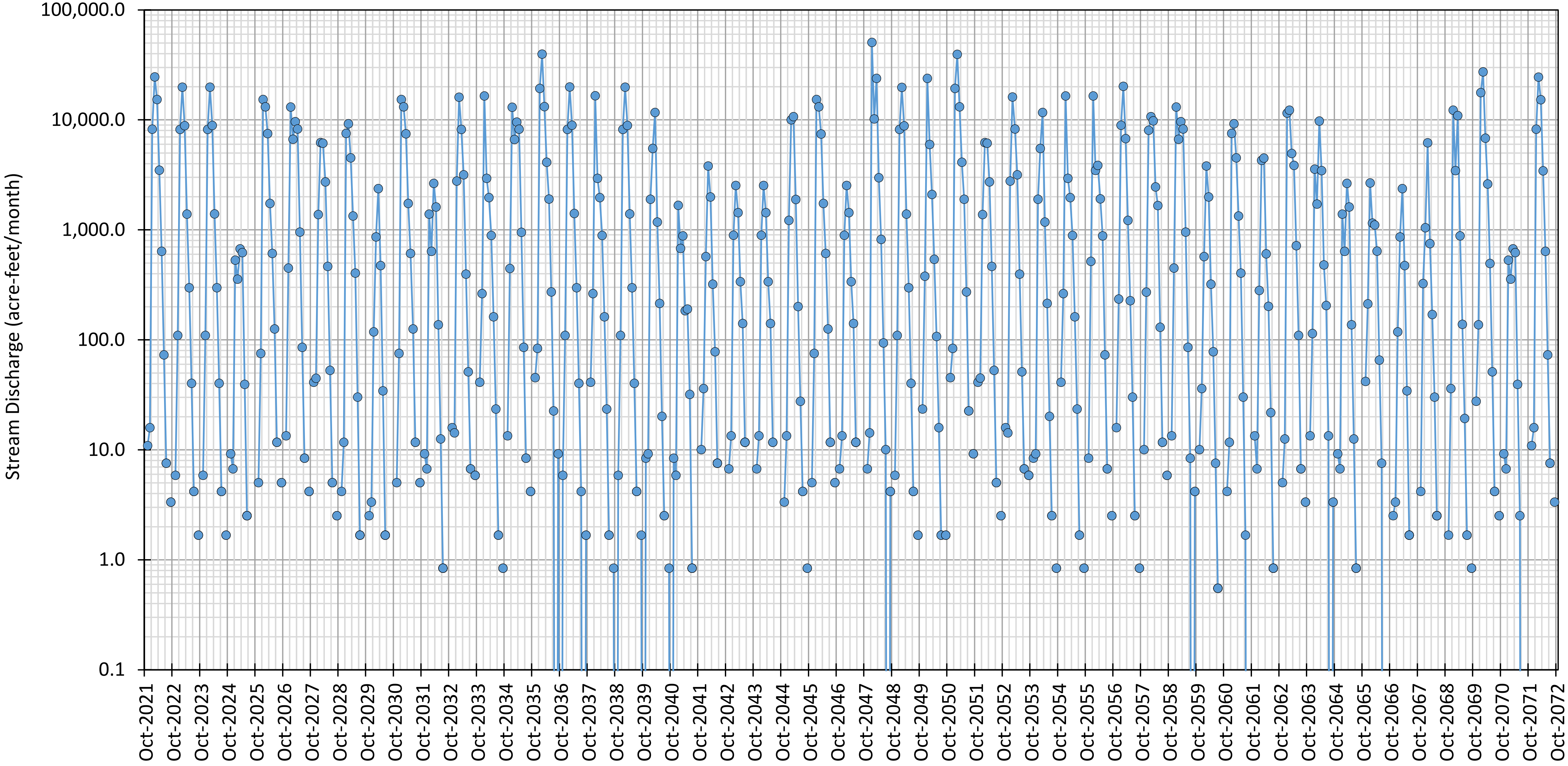
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



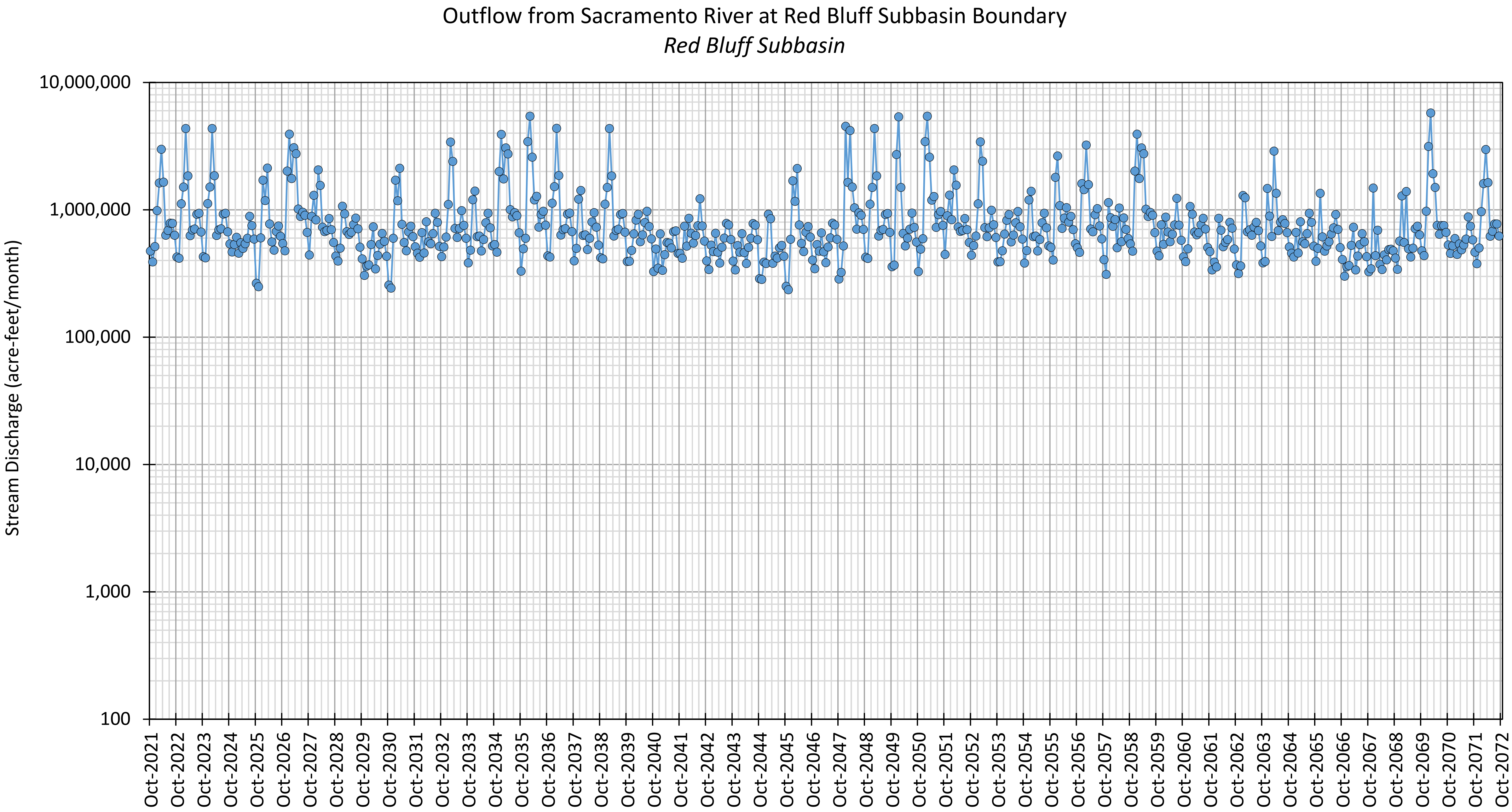
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Red Bank Creek to Sacramento River

Red Bluff Subbasin



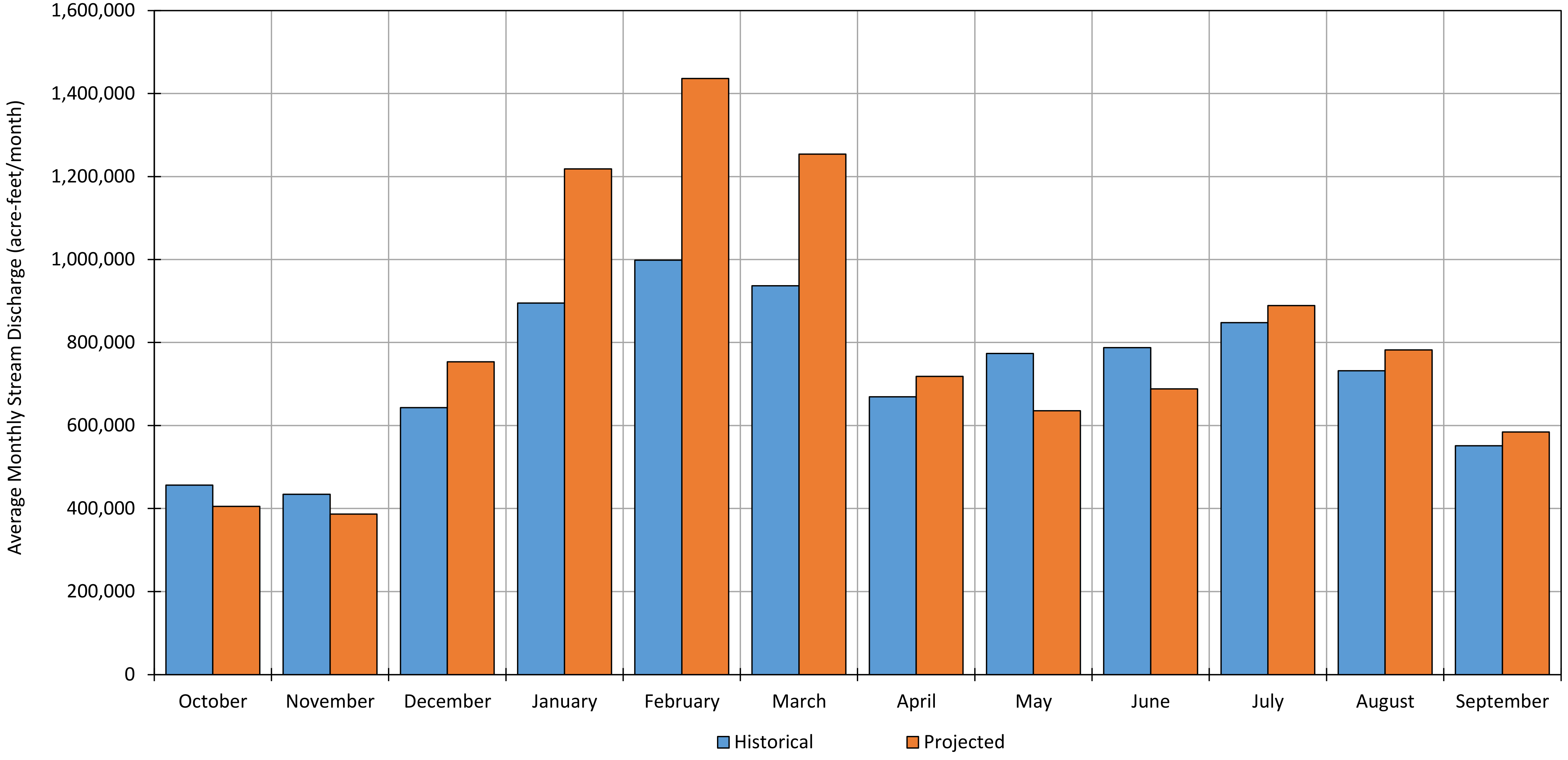
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Inflow from Sacramento River at Antelope Subbasin Boundary

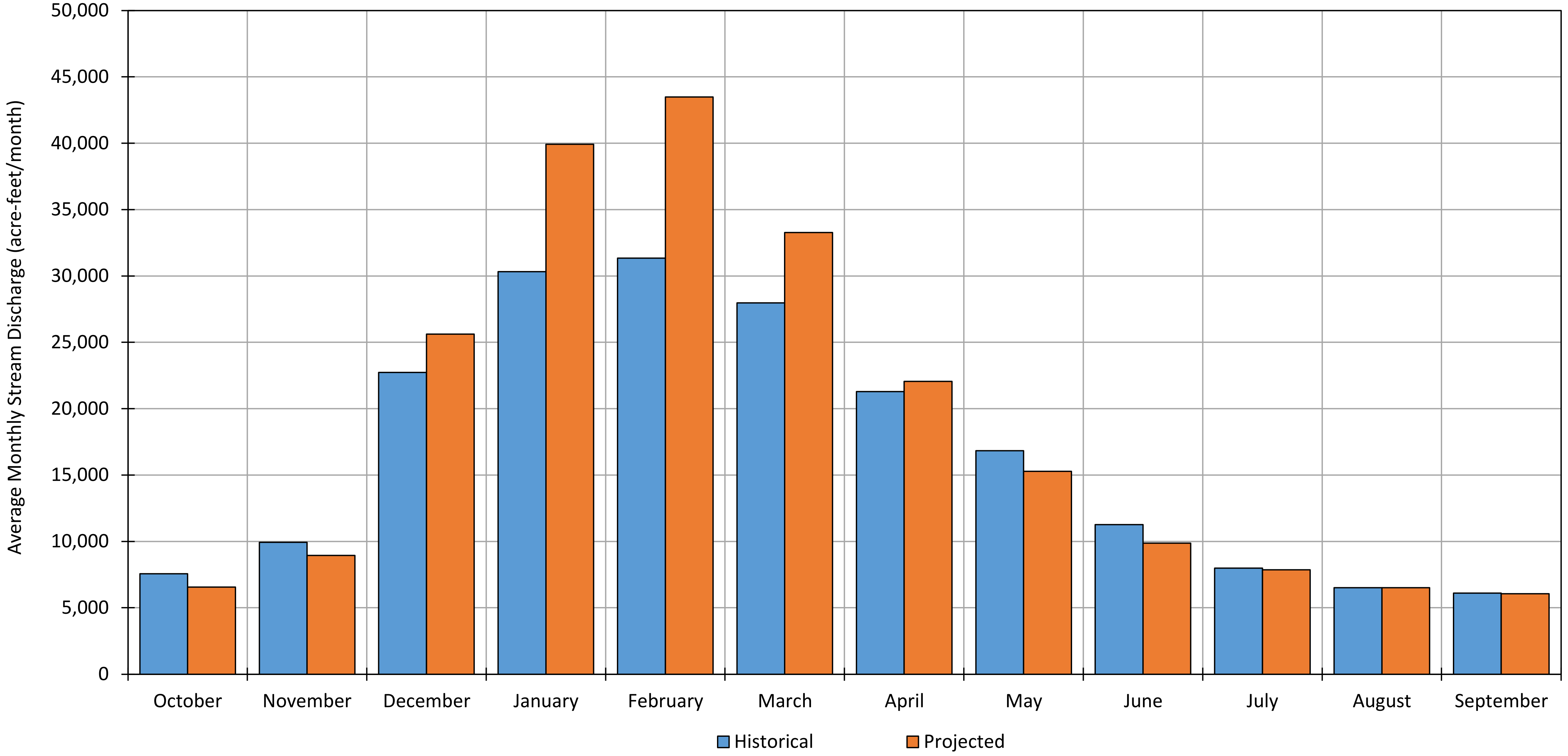
Antelope Subbasin



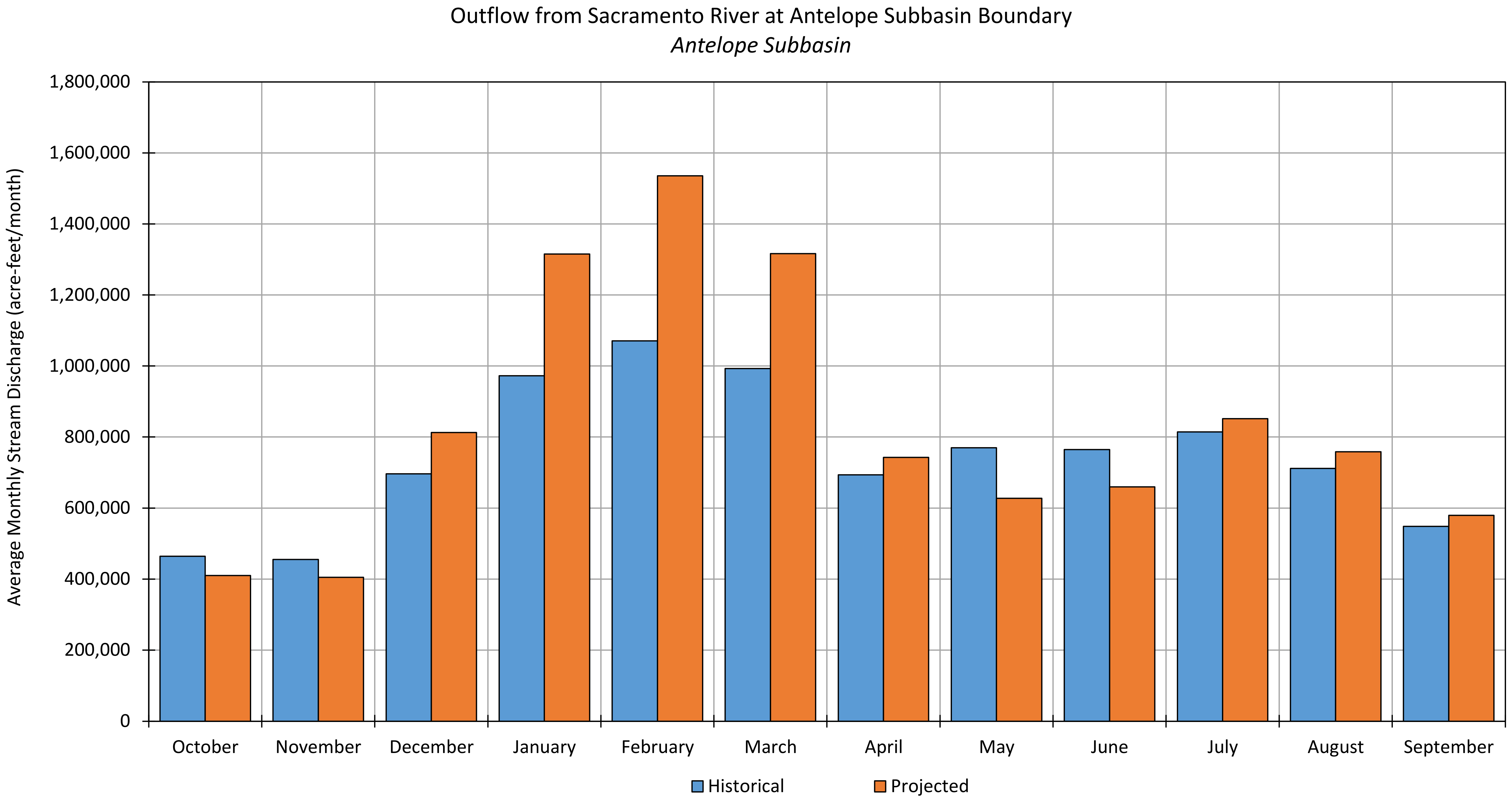
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin



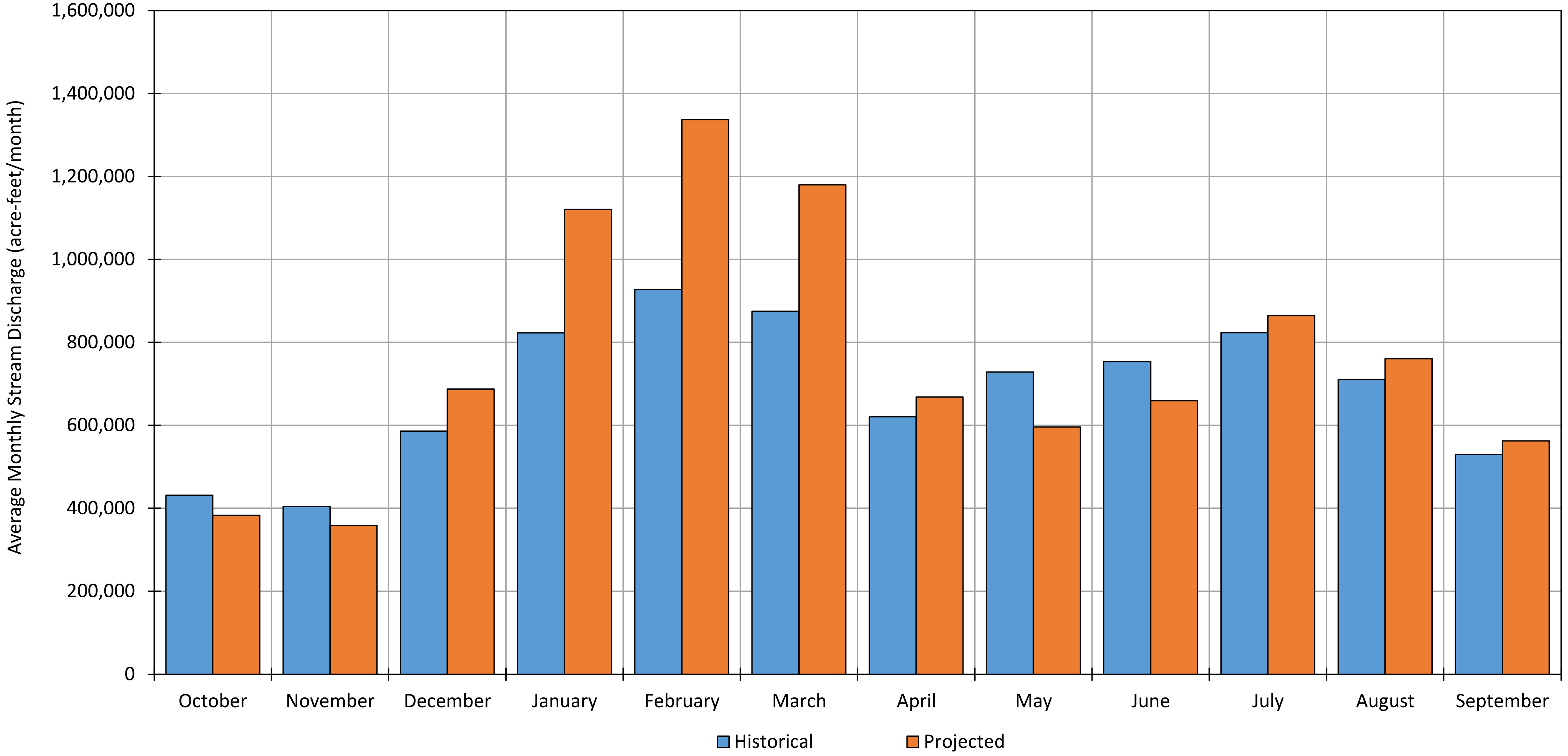
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



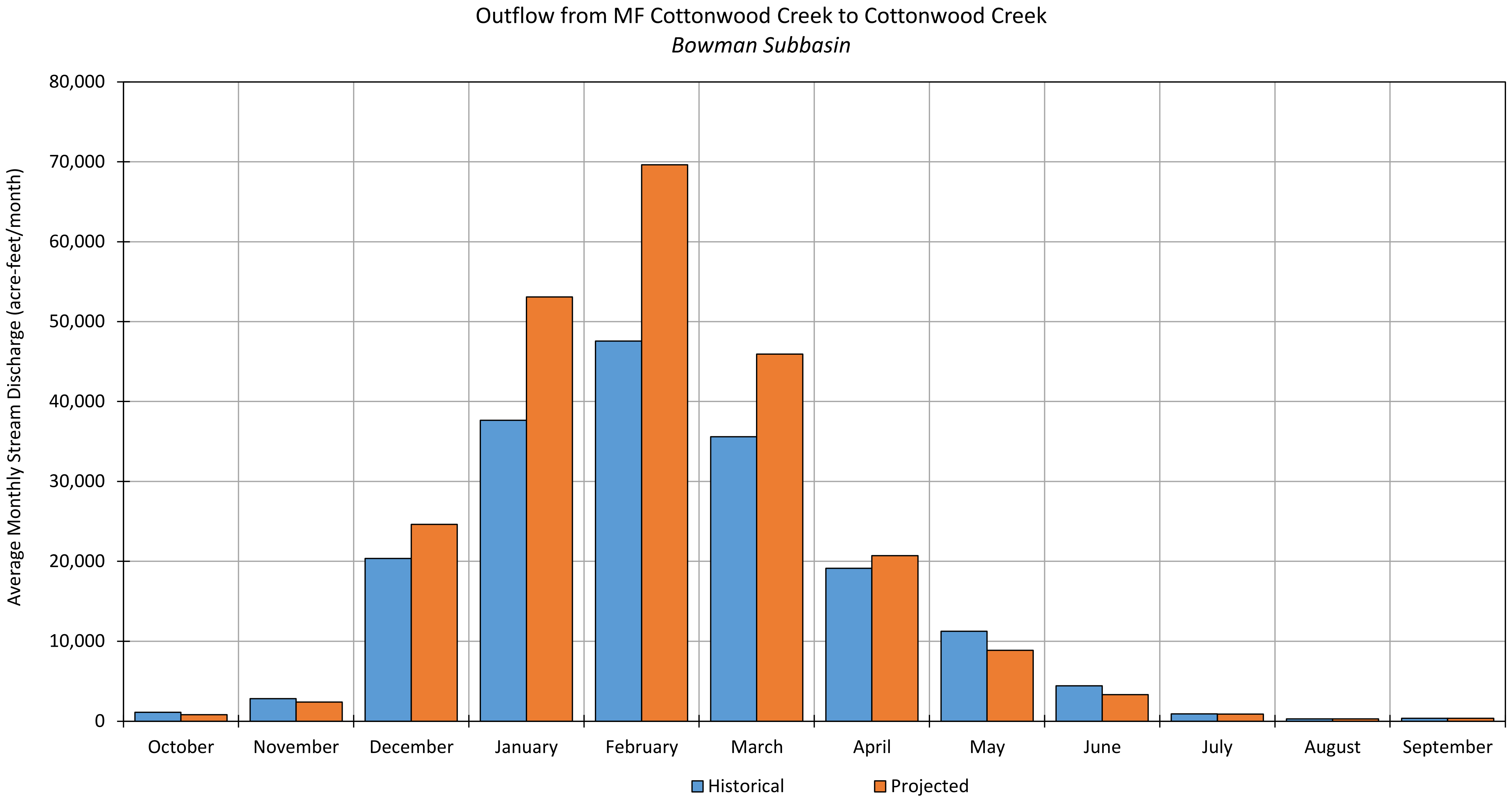
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



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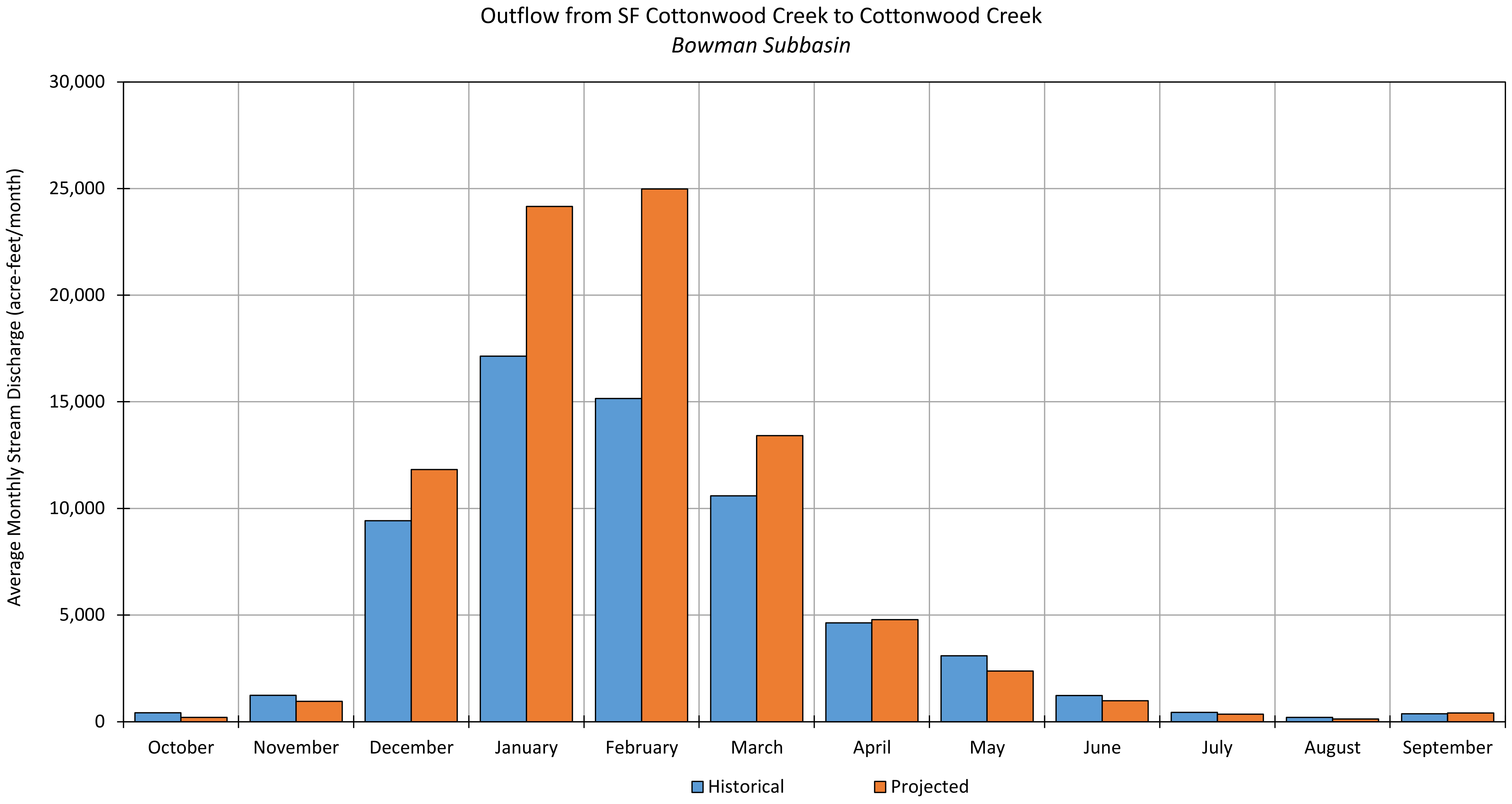
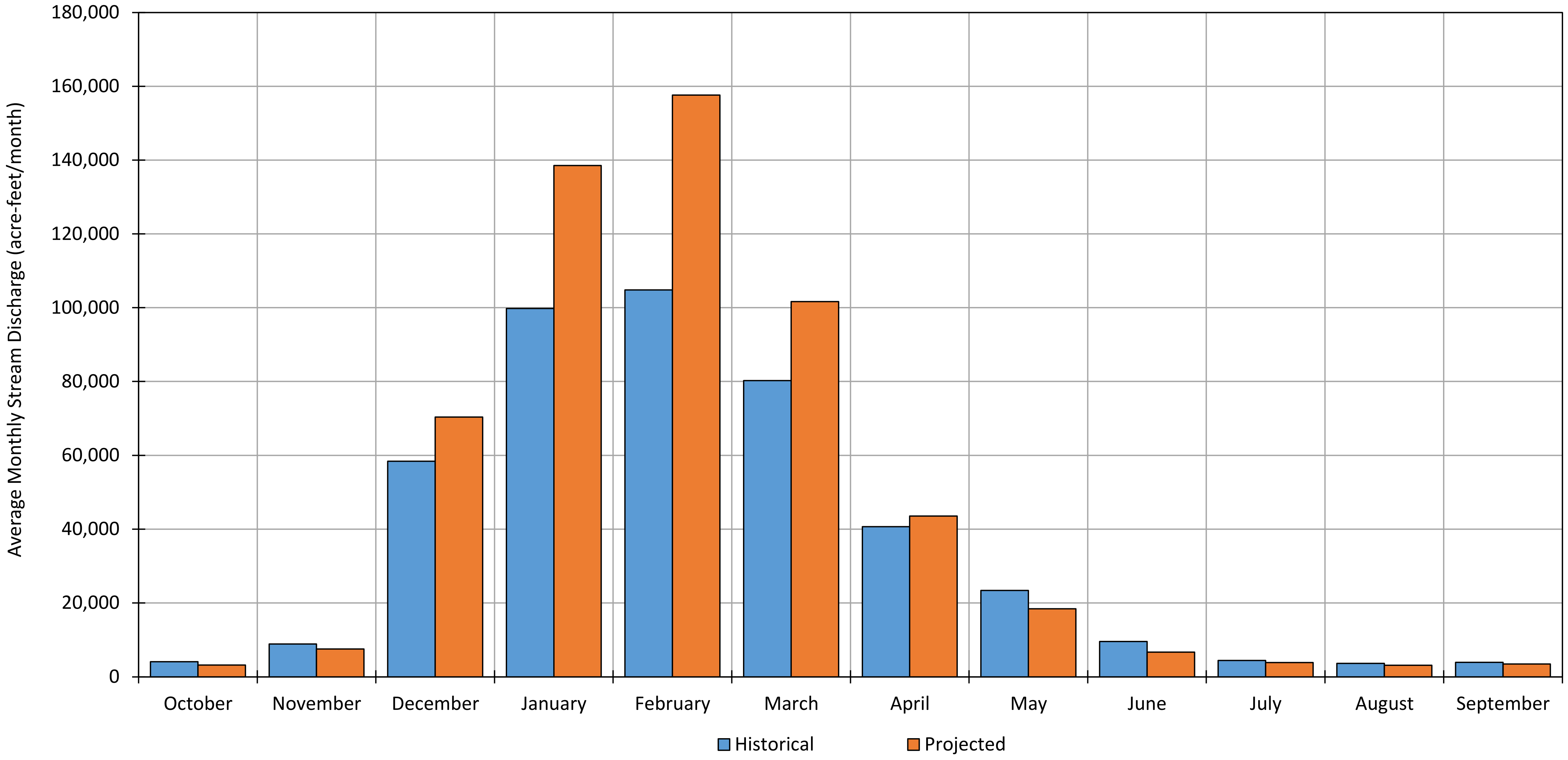


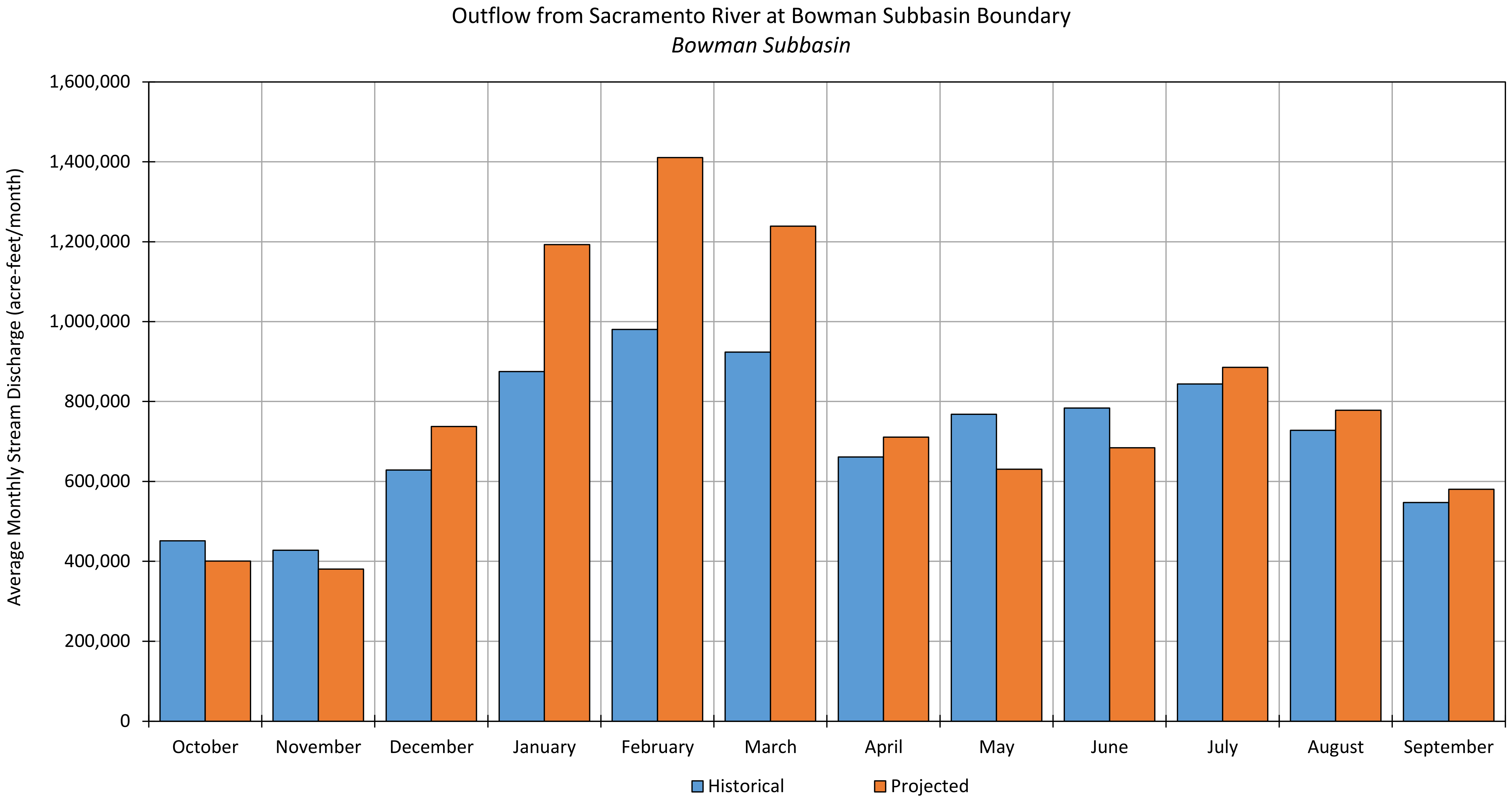
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Cottonwood Creek to Sacramento River

Bowman Subbasin



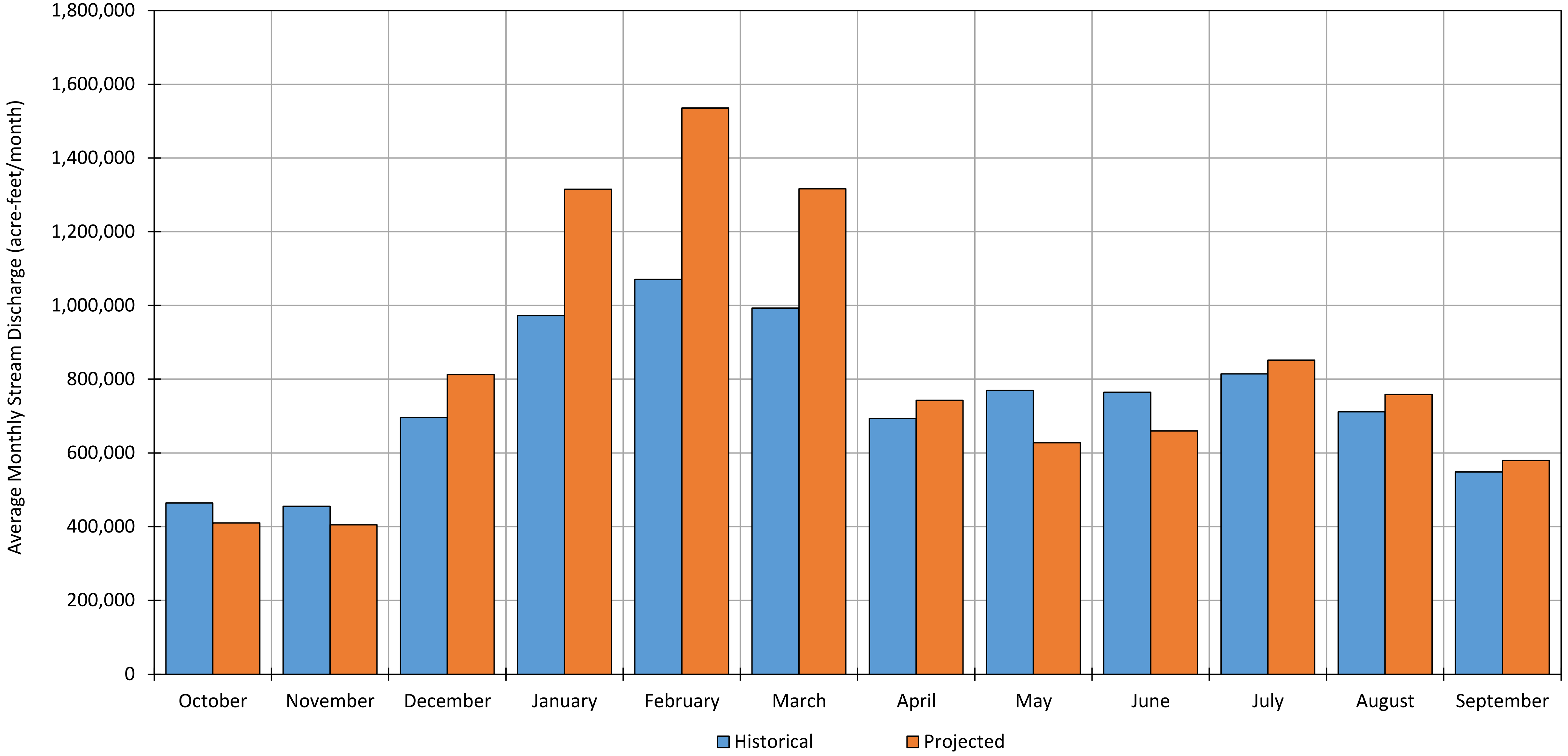
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

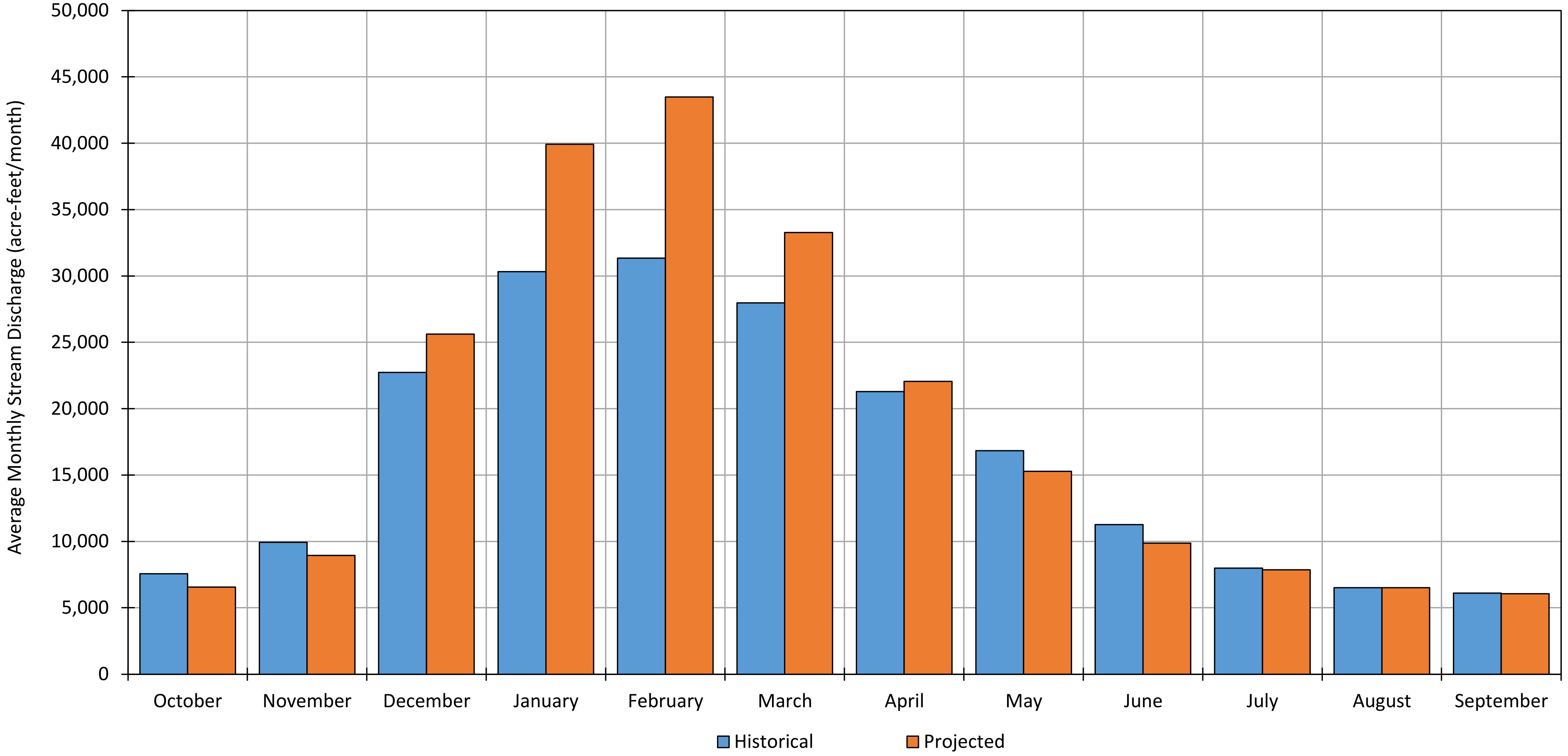
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

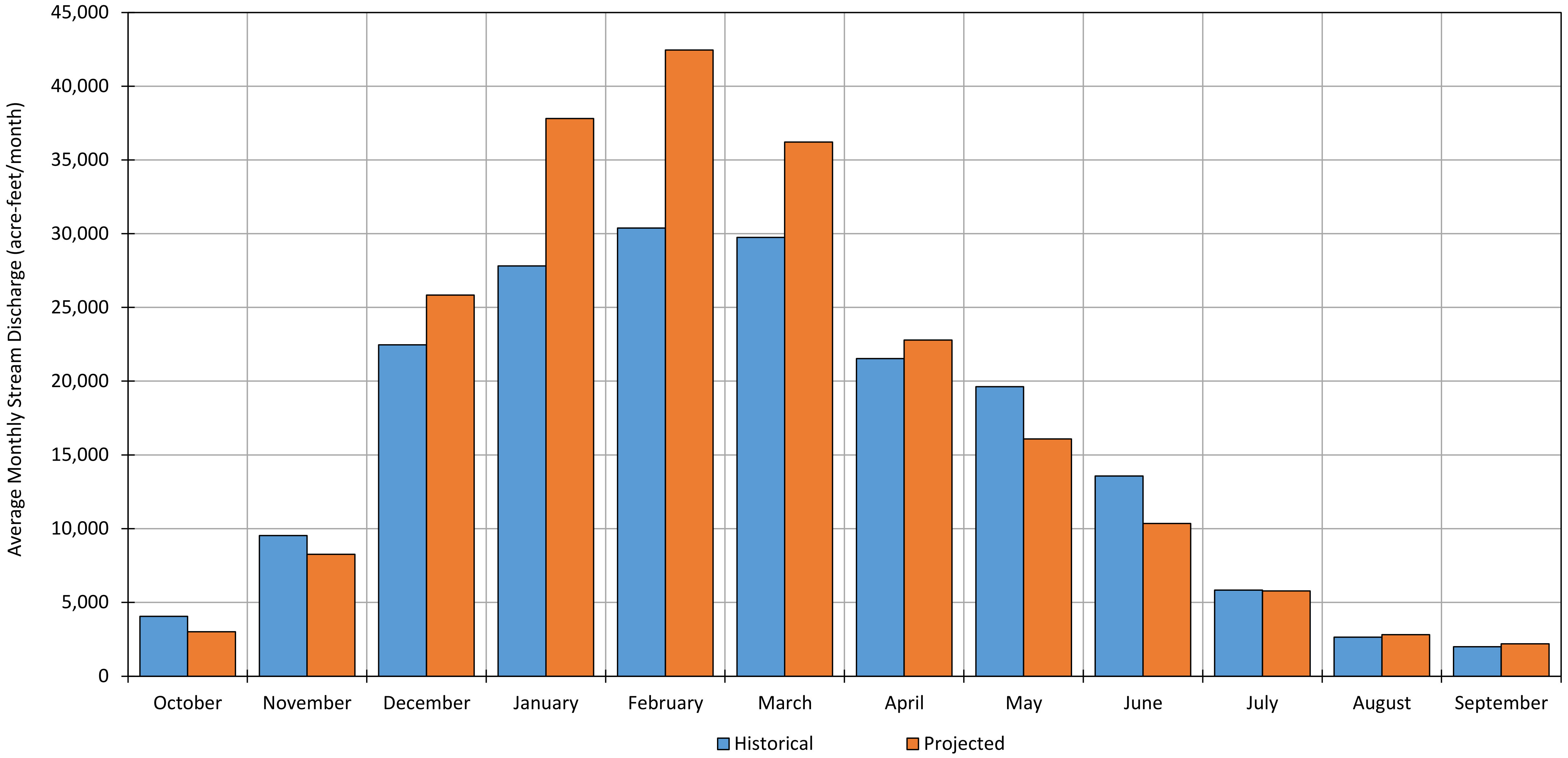
Los Molinos Subbasin



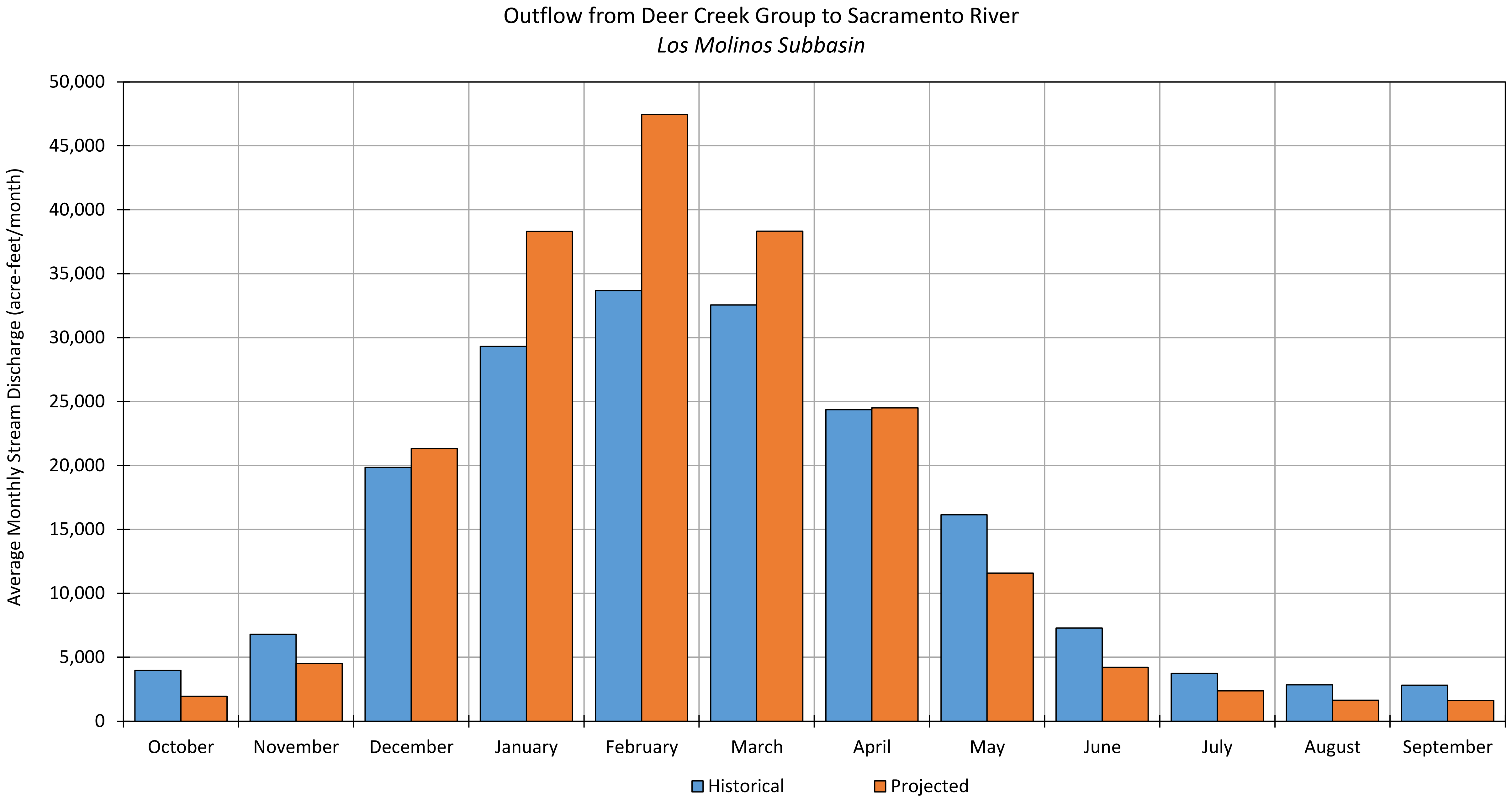
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Mill Creek to Sacramento River

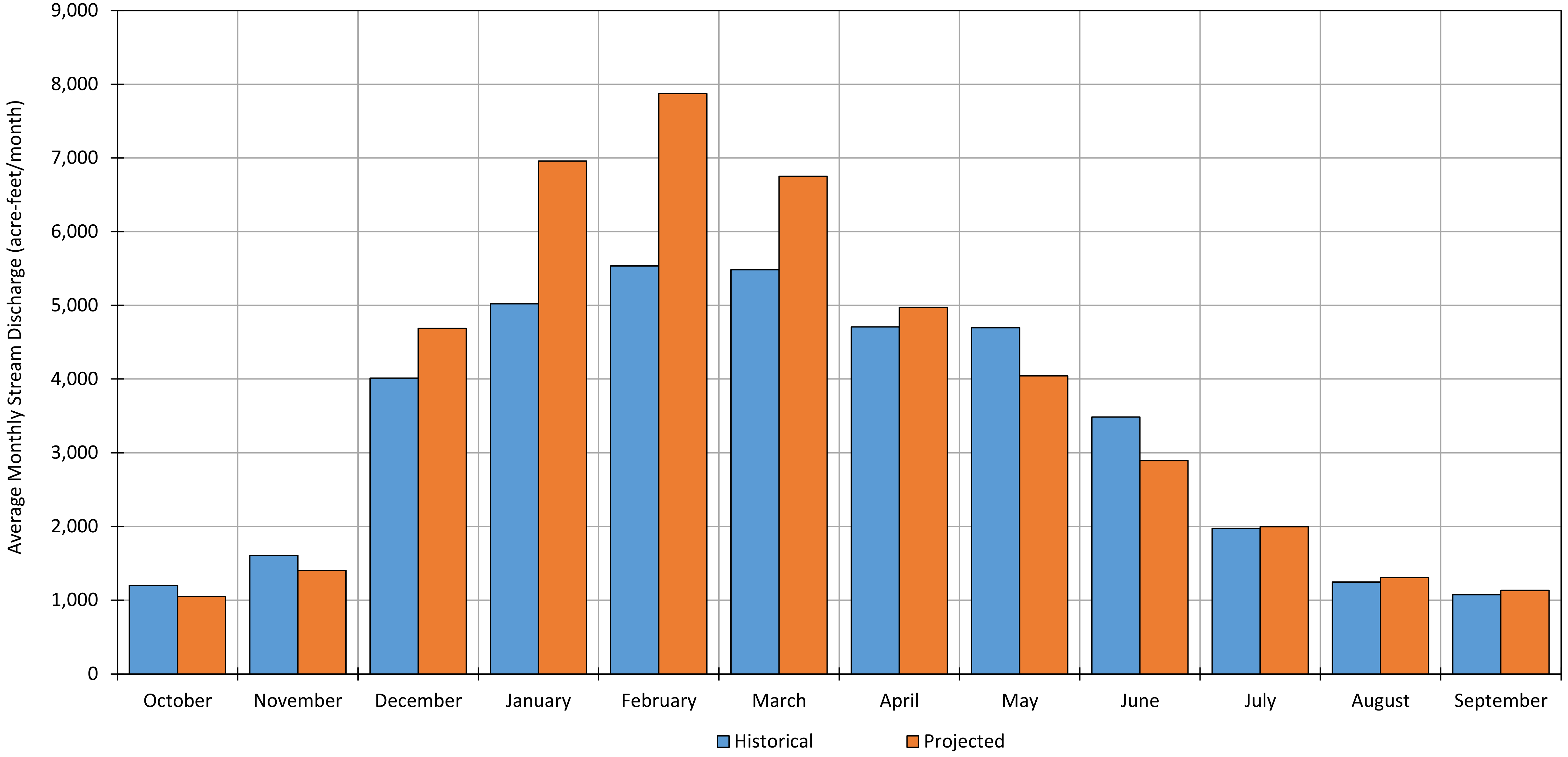
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



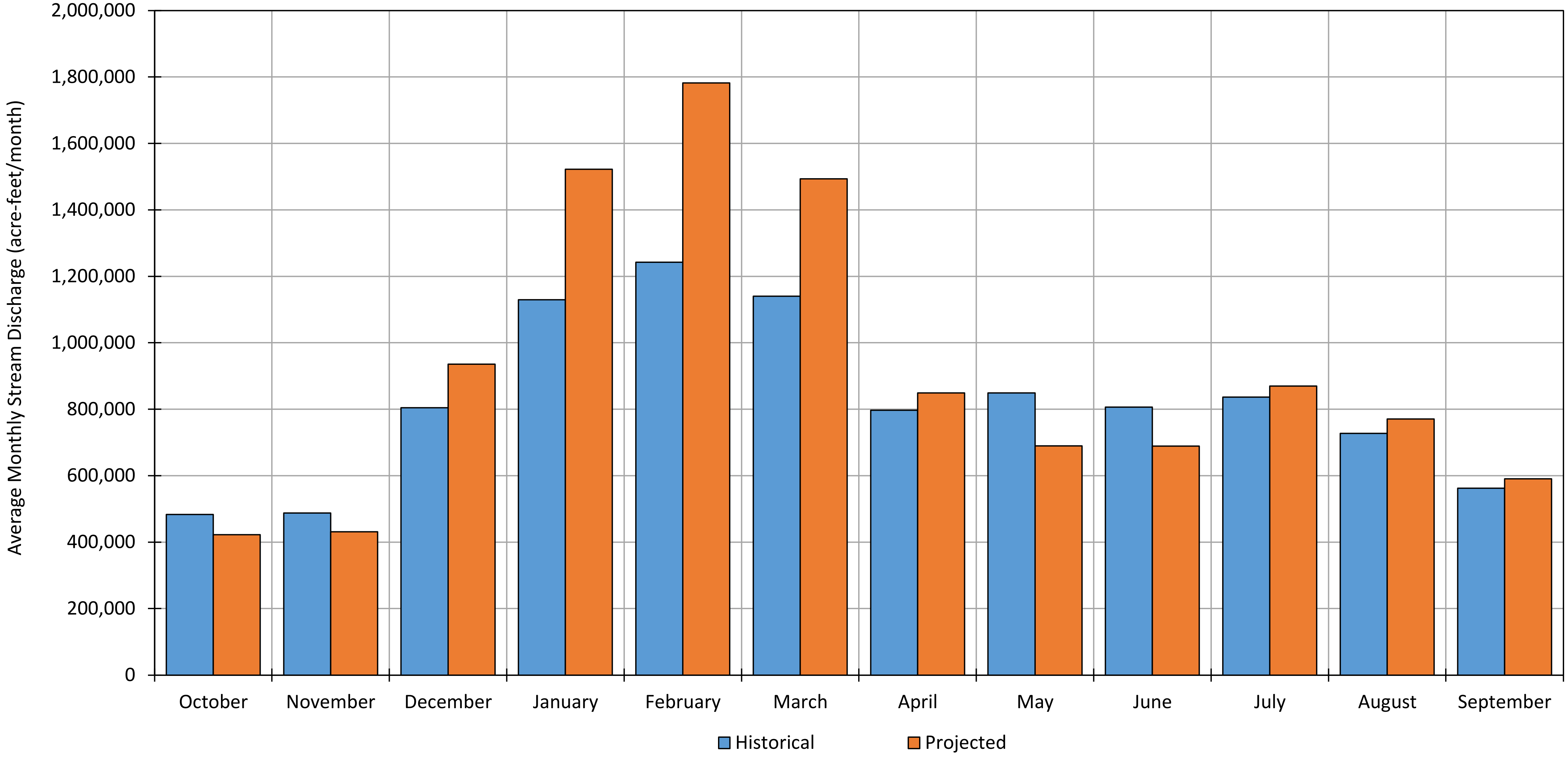
Outflow from Dye Creek to Sacramento River

Los Molinos Subbasin

Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

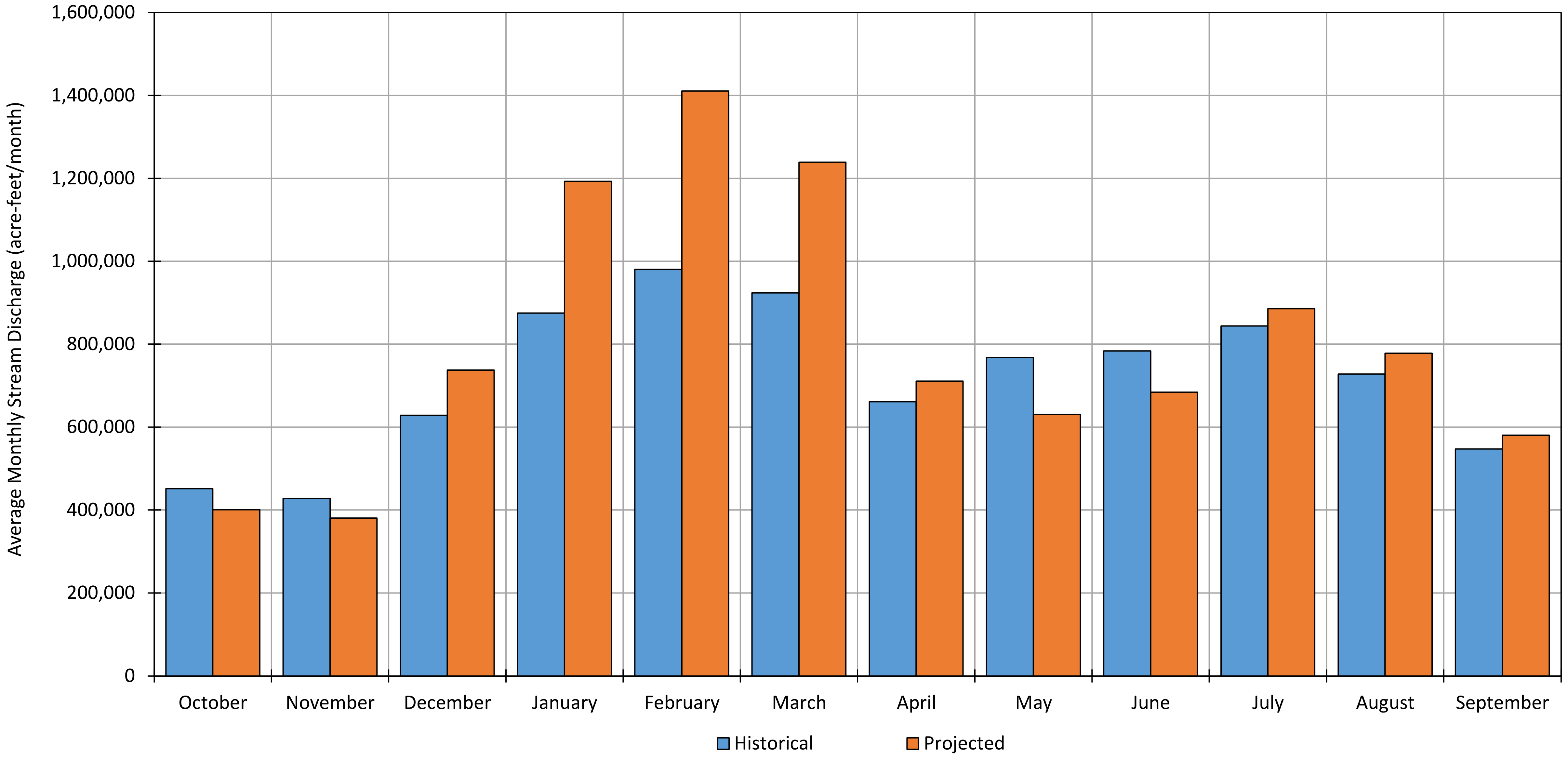
Los Molinos Subbasin



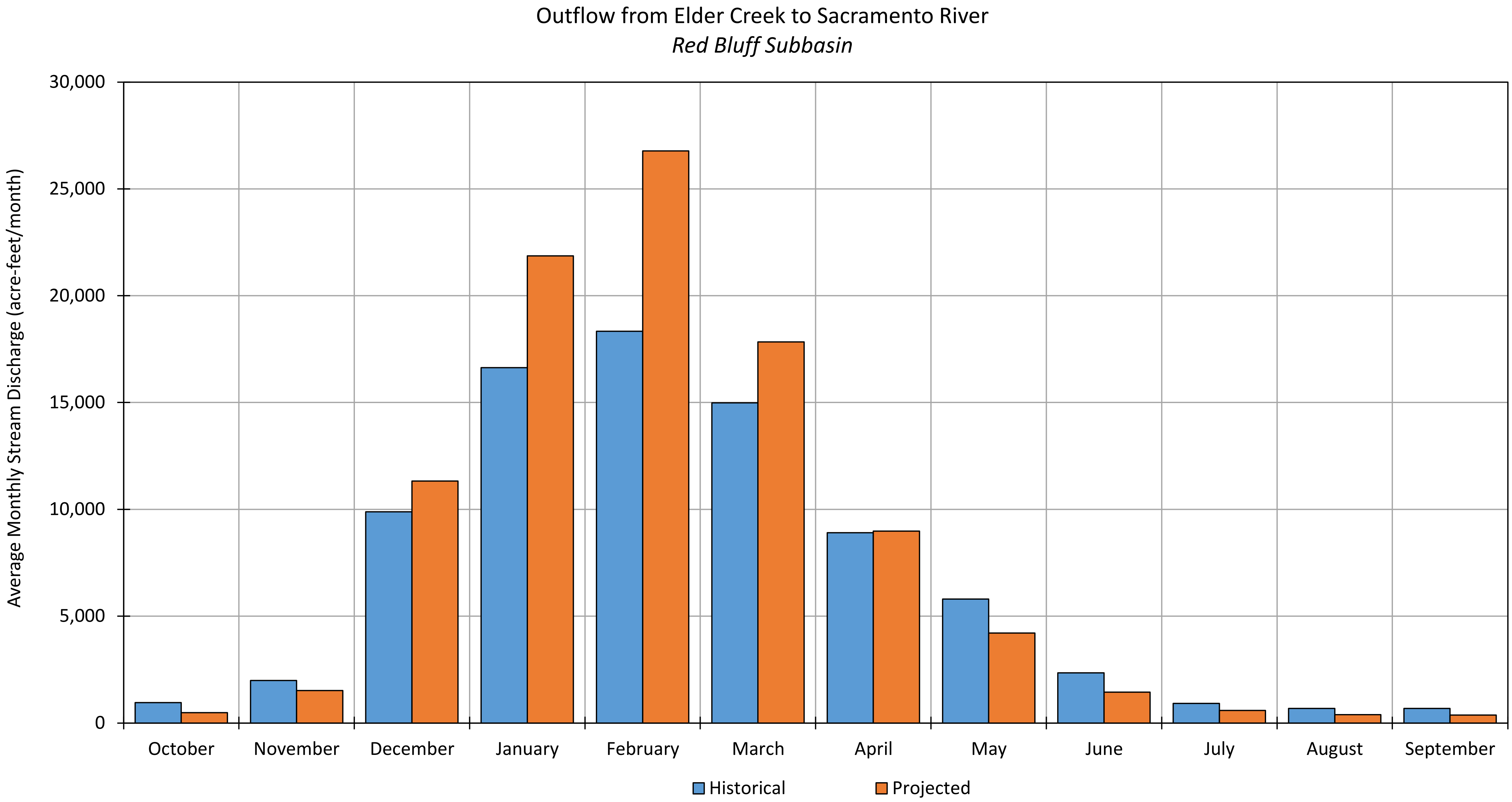
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Inflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



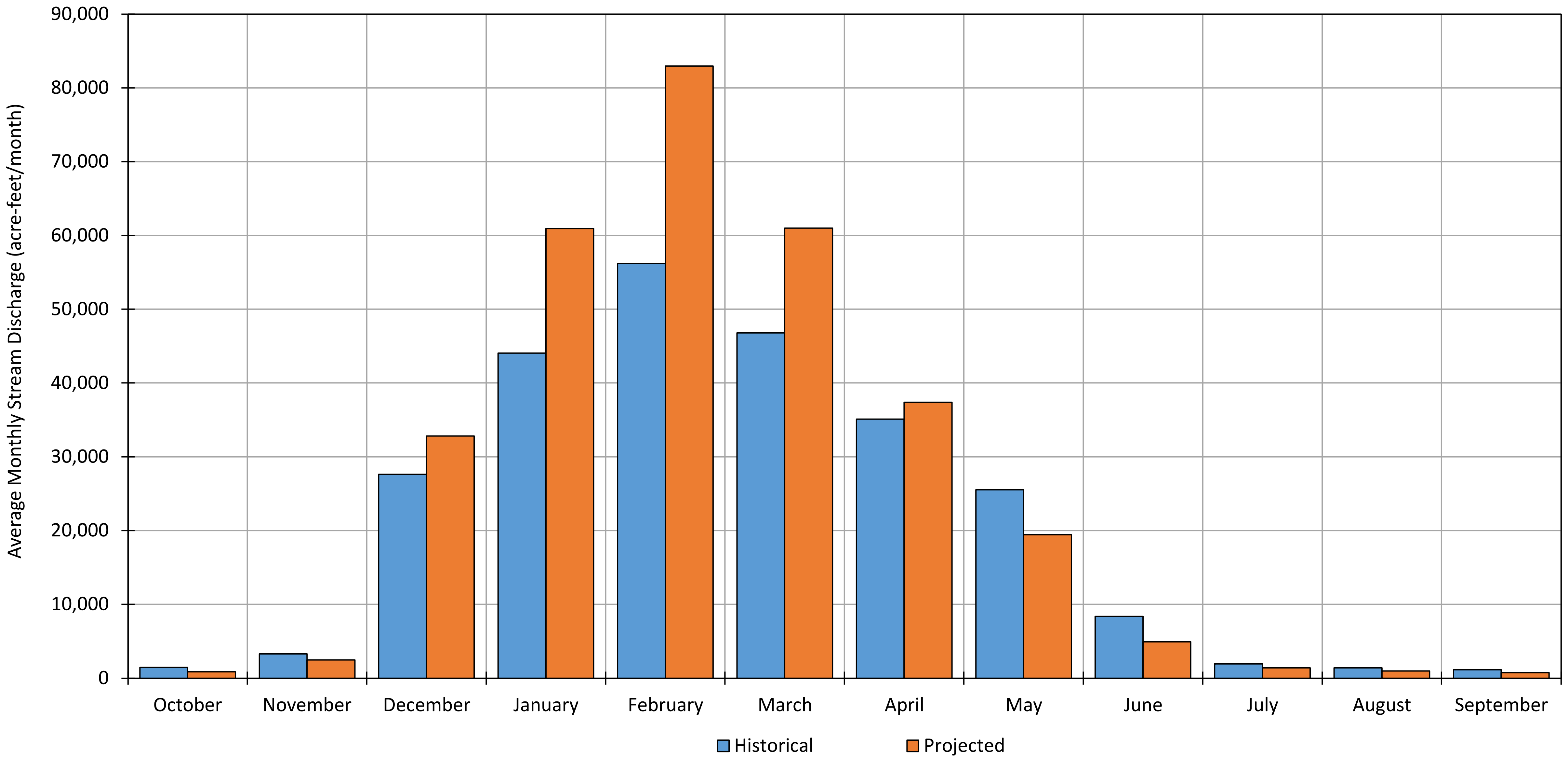
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Thomes Creek to Sacramento River

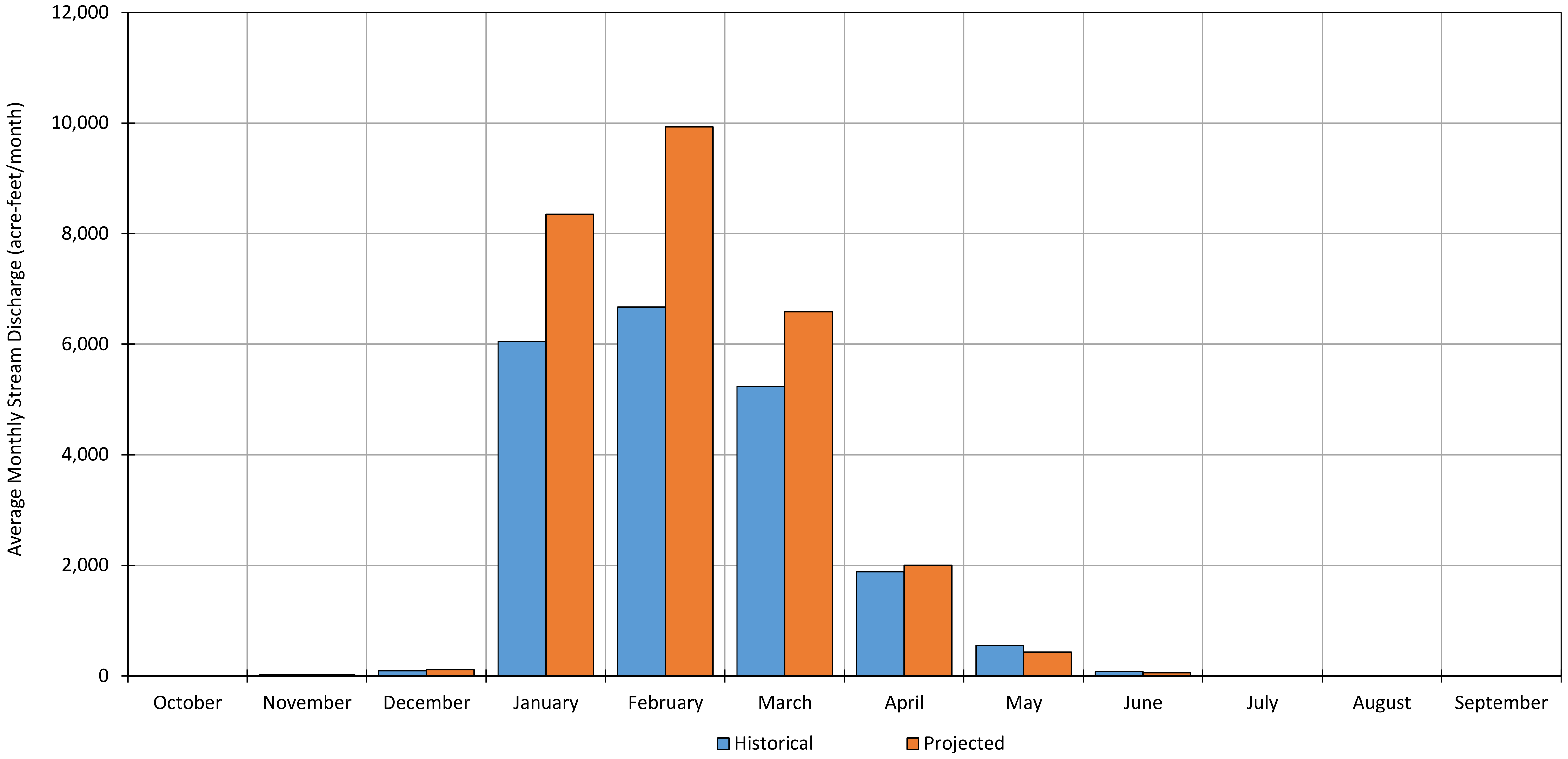
Red Bluff Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Red Bank Creek to Sacramento River

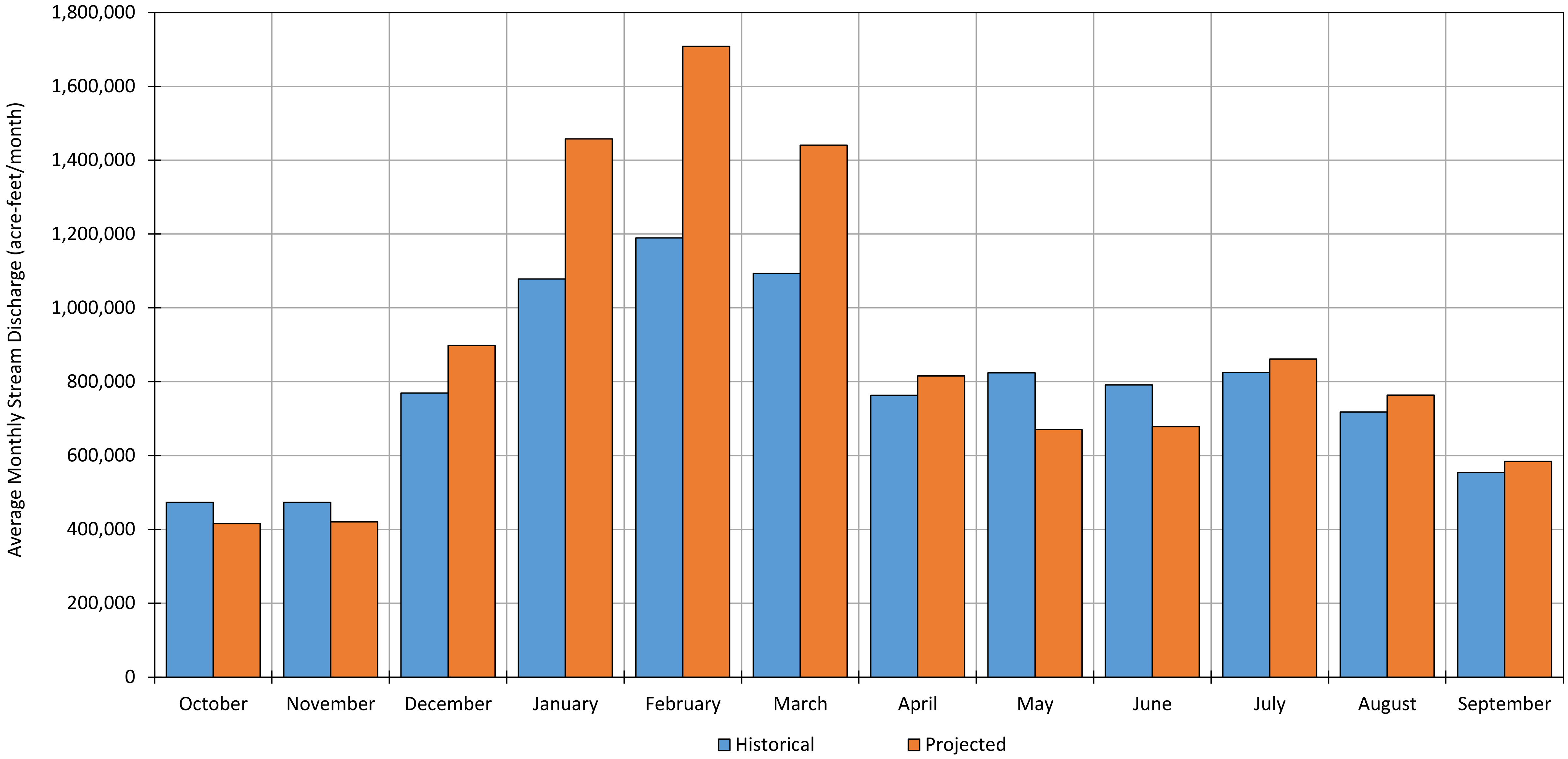
Red Bluff Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin

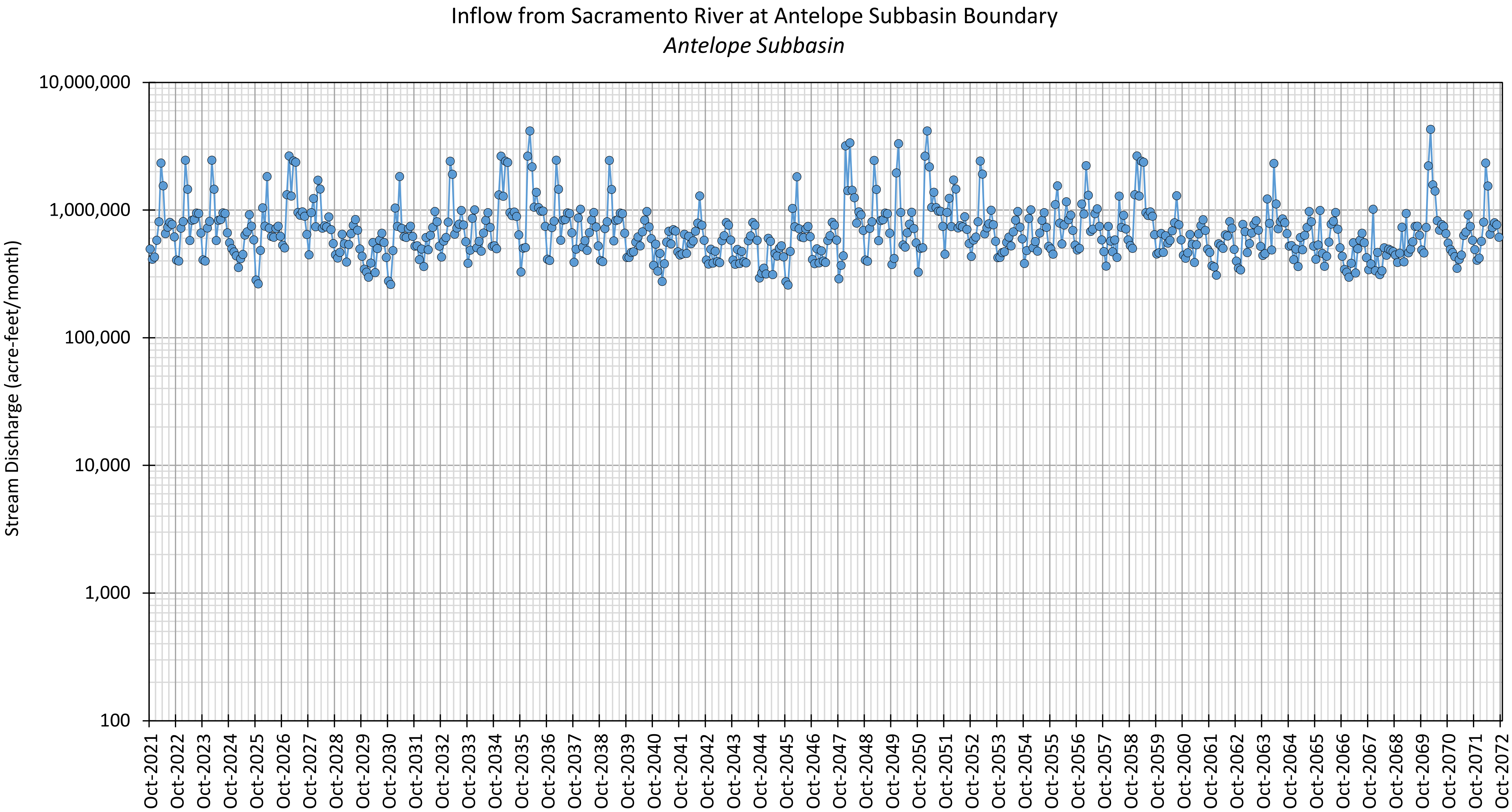


Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

APPENDIX G-6

Tehama IHM Simulated Streamflows:

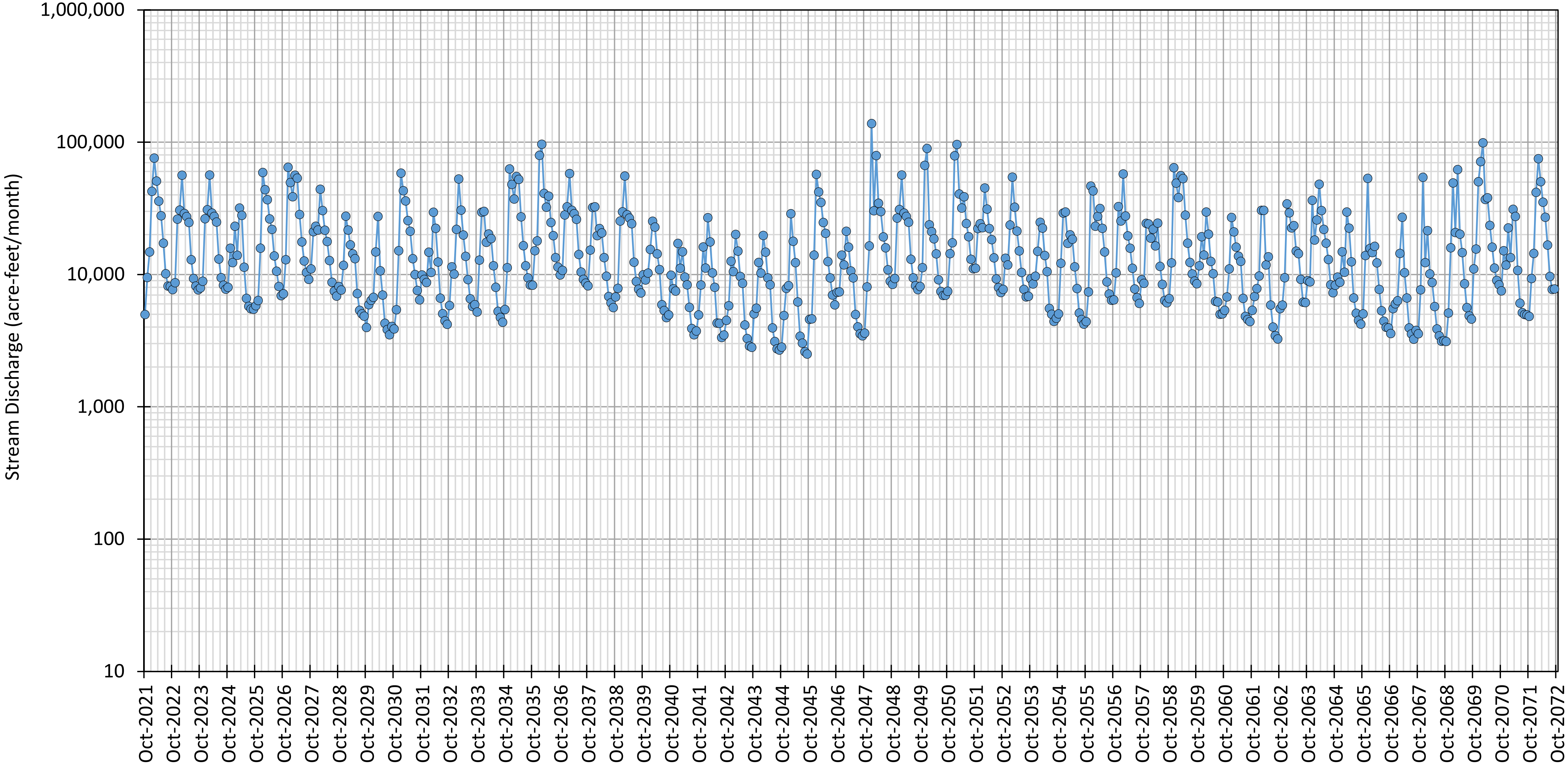
Projected (Future Land Use) with Climate Change (2030) Model Results



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin



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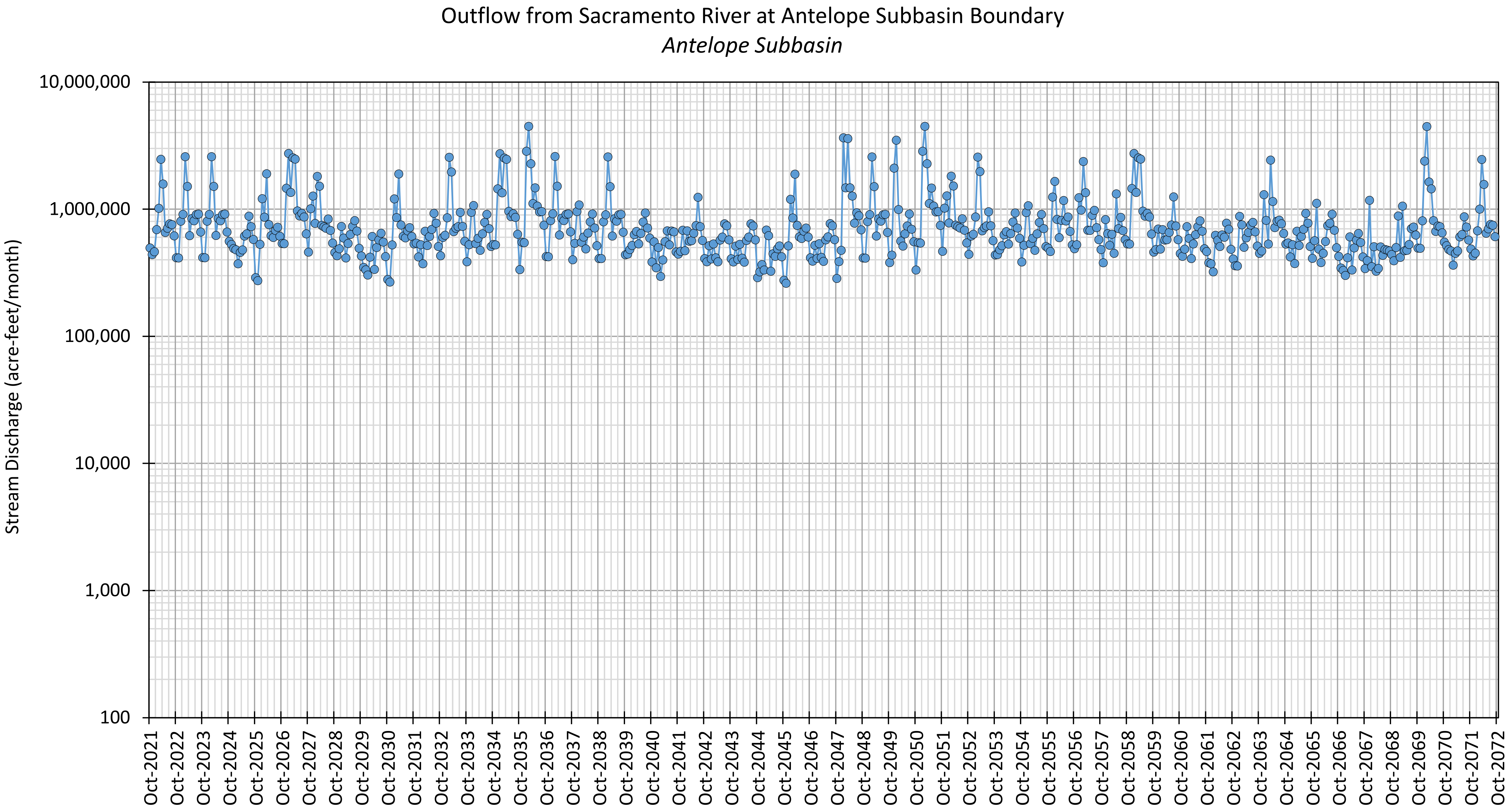
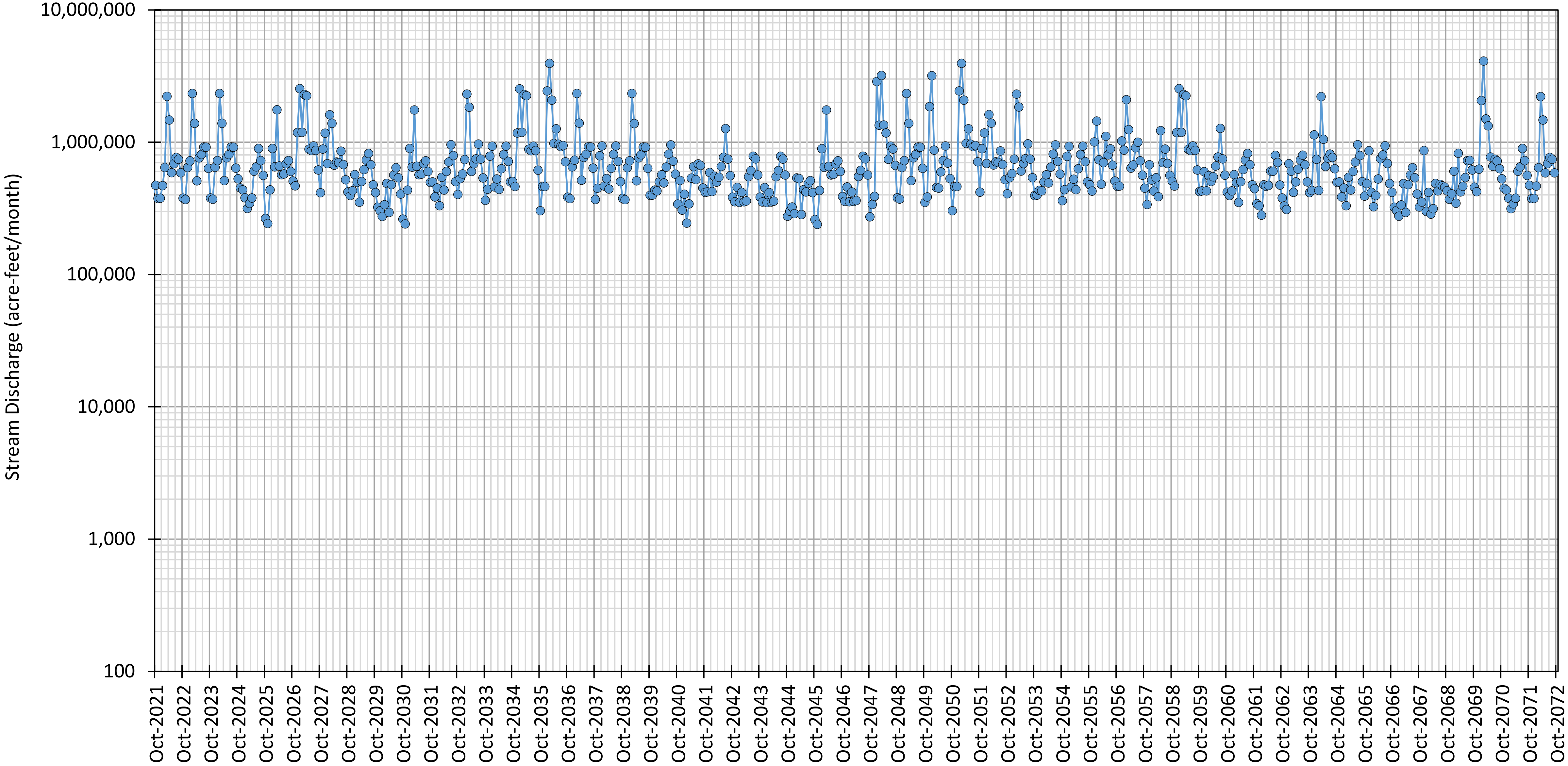


Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Inflow from Sacramento River at Bowman Subbasin Boundary

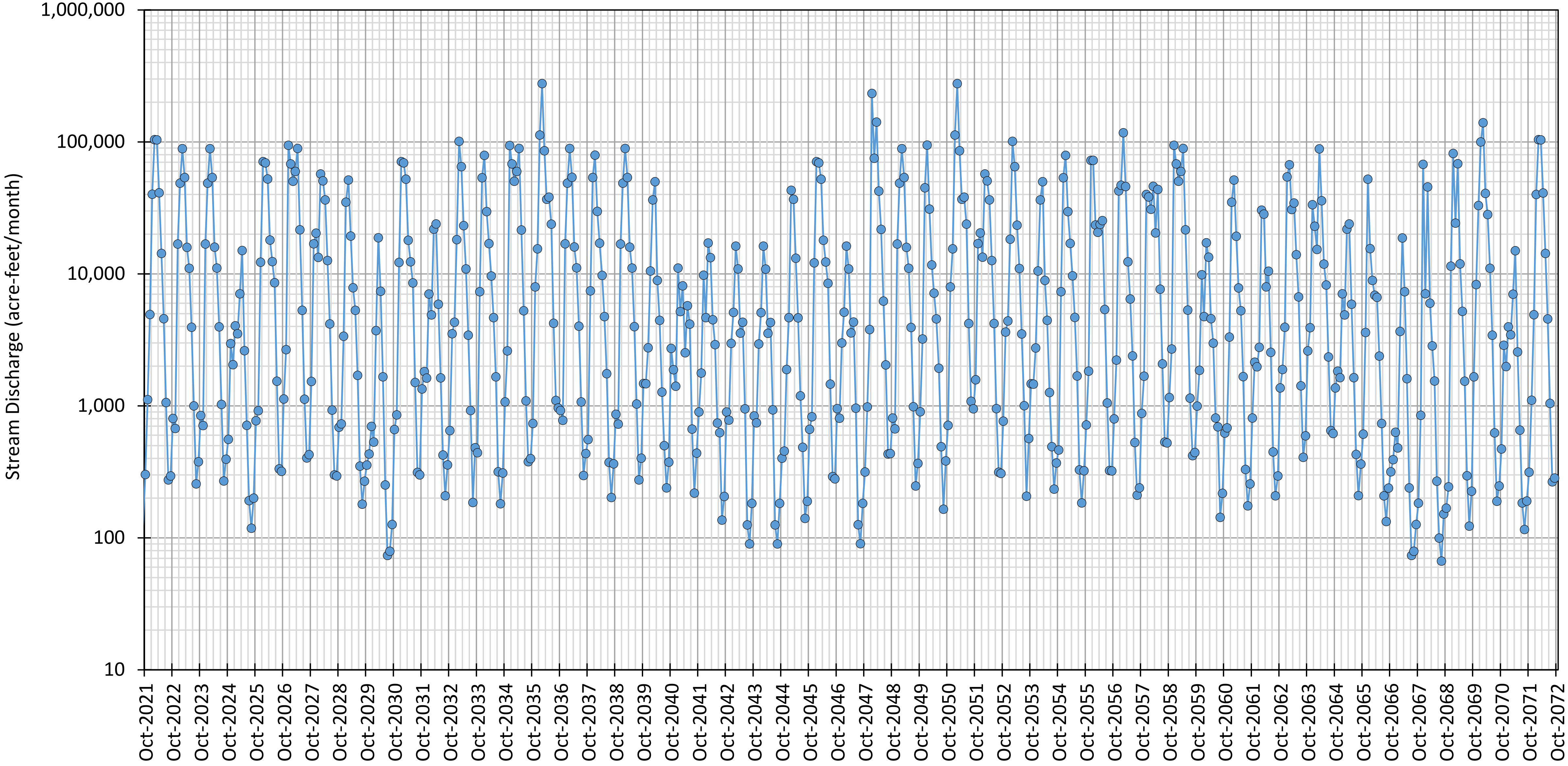
Bowman Subbasin



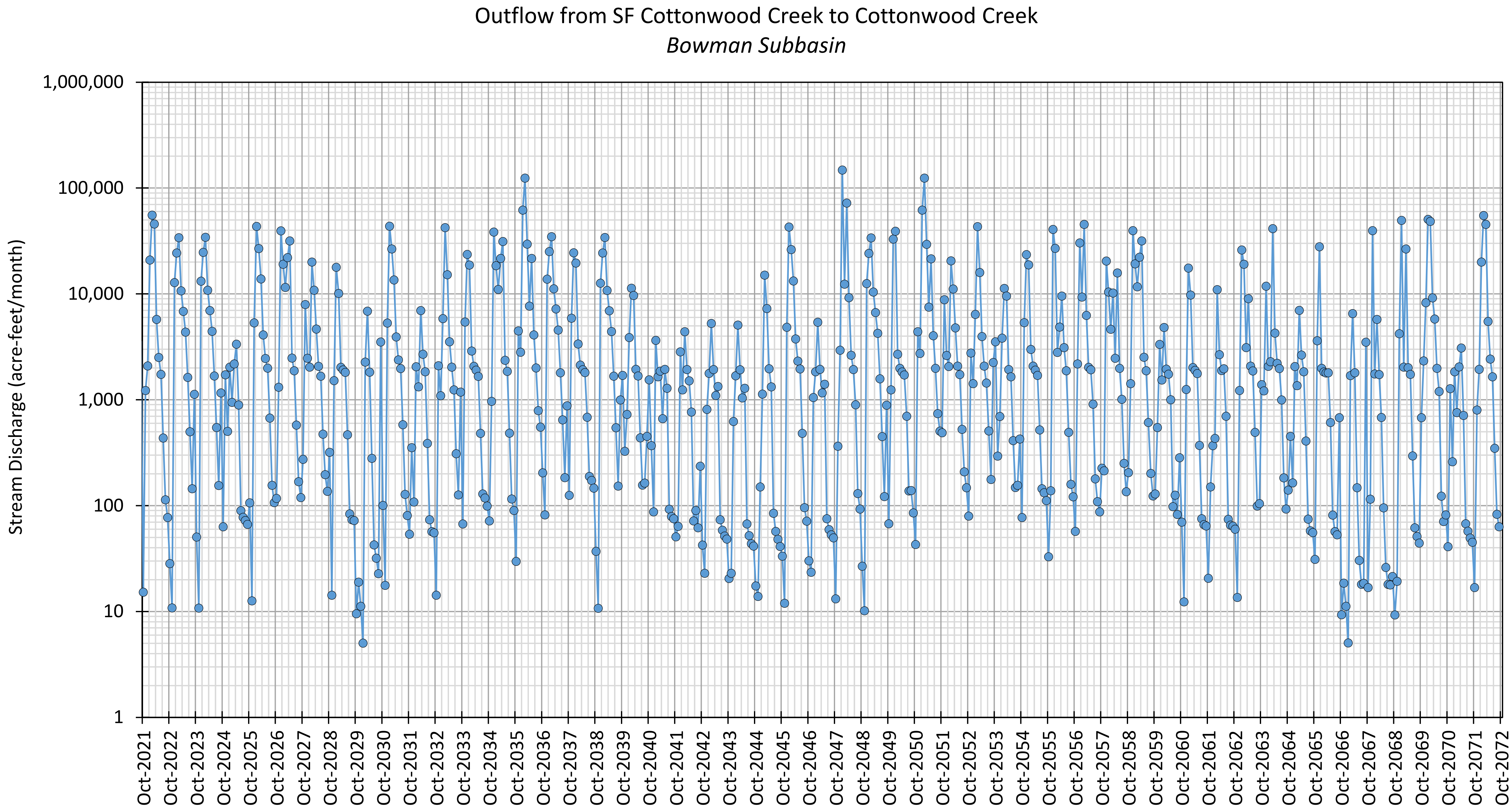
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from MF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin



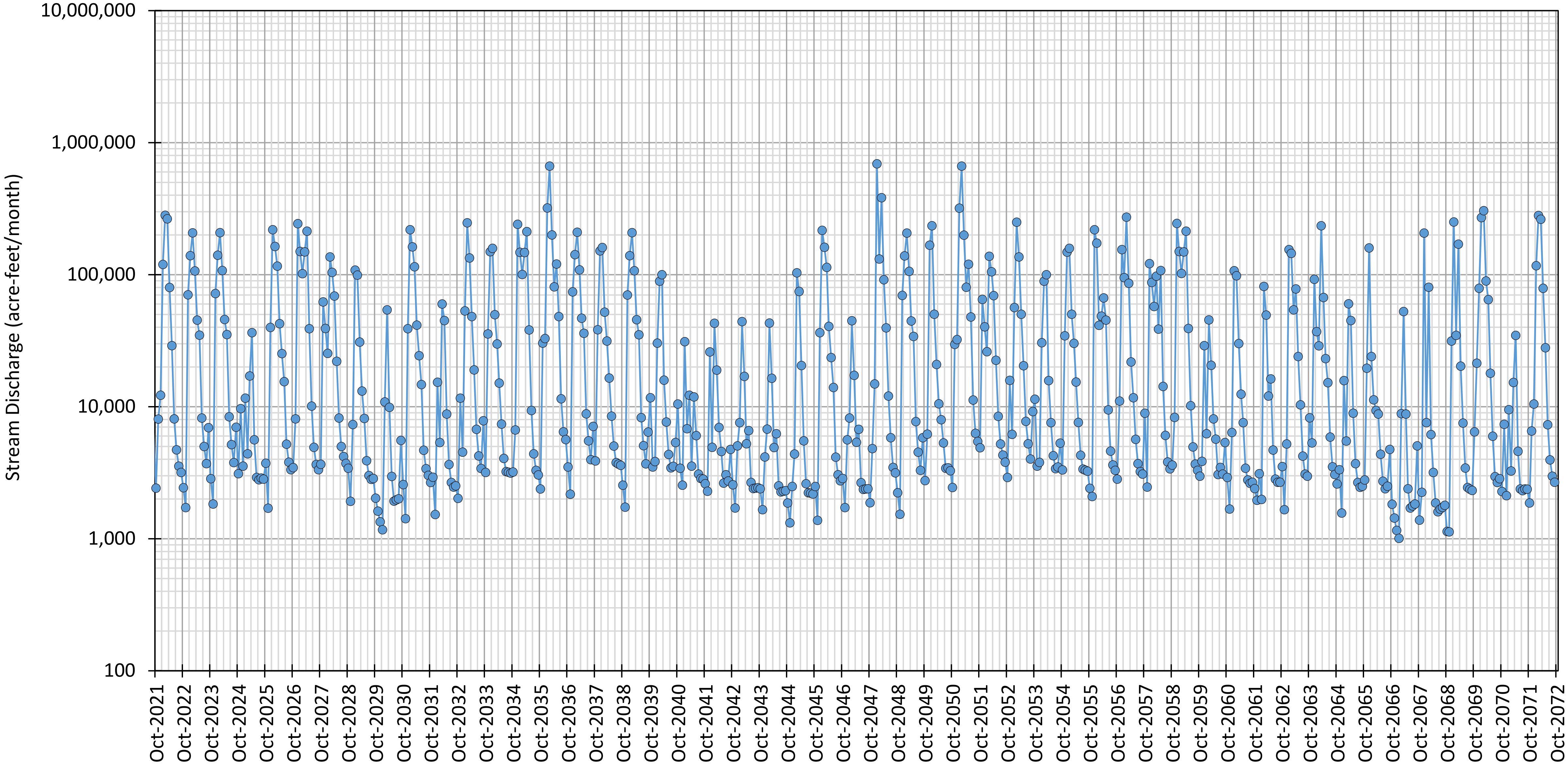
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from Cottonwood Creek to Sacramento River

Bowman Subbasin



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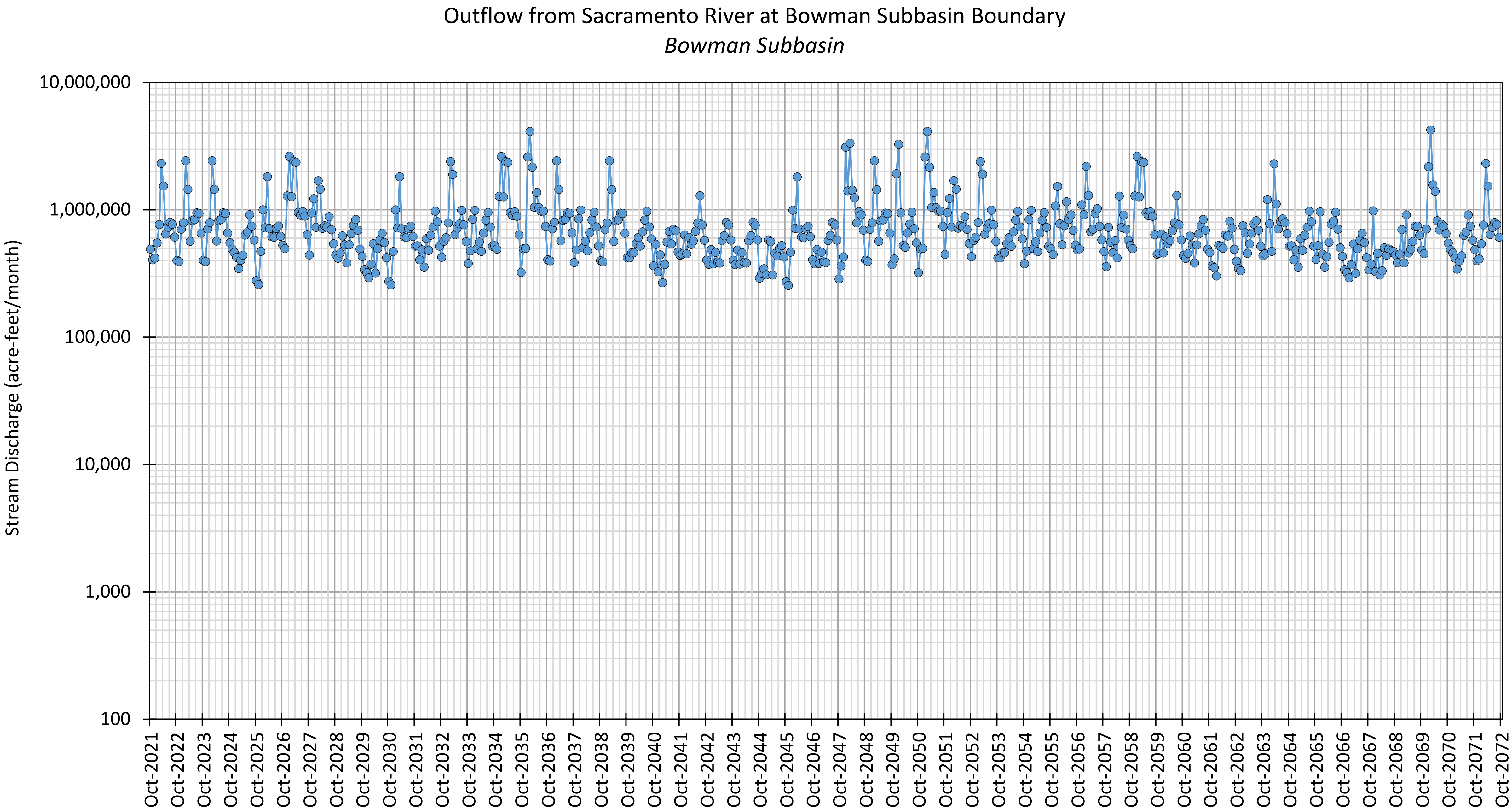

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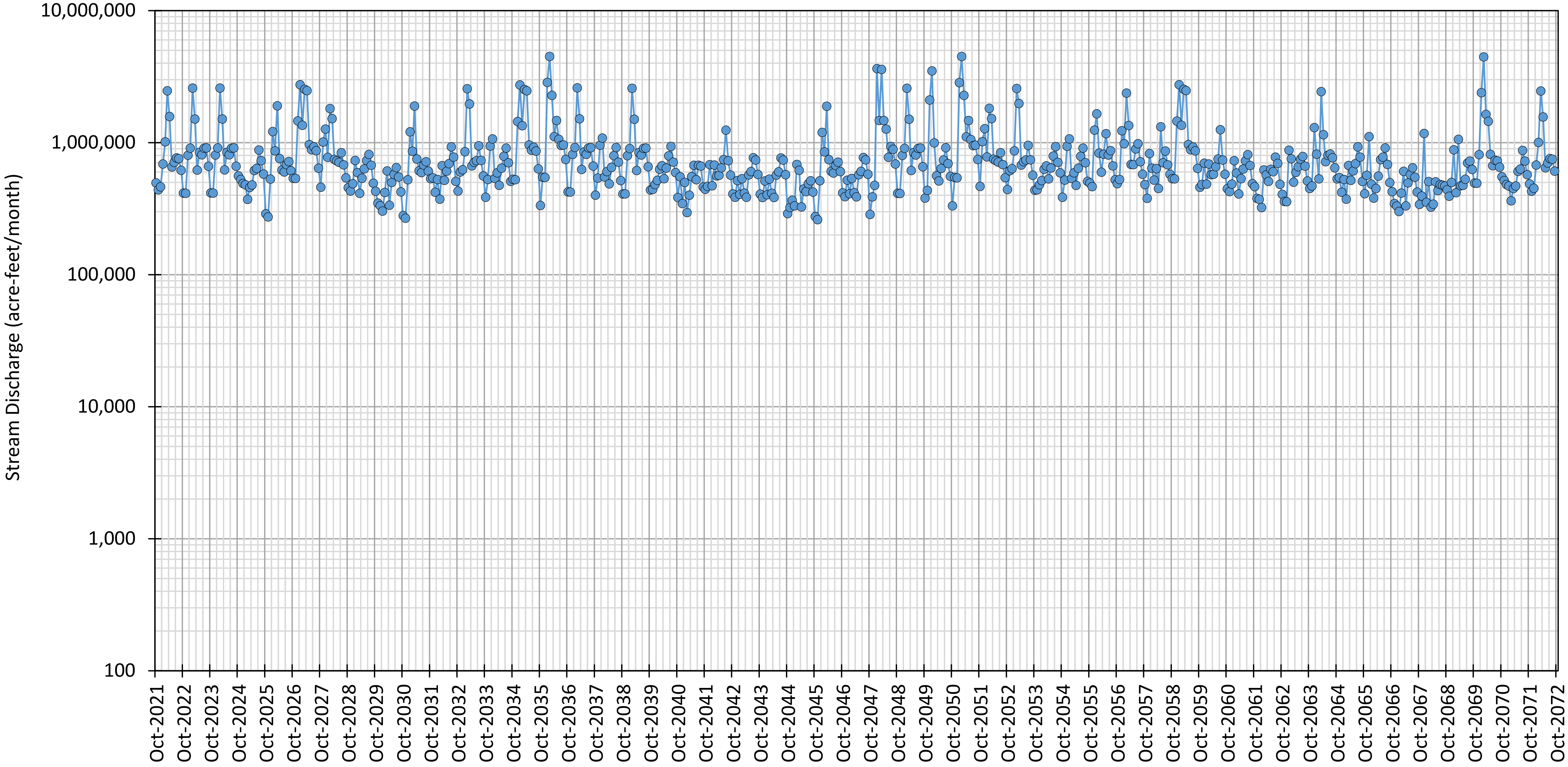
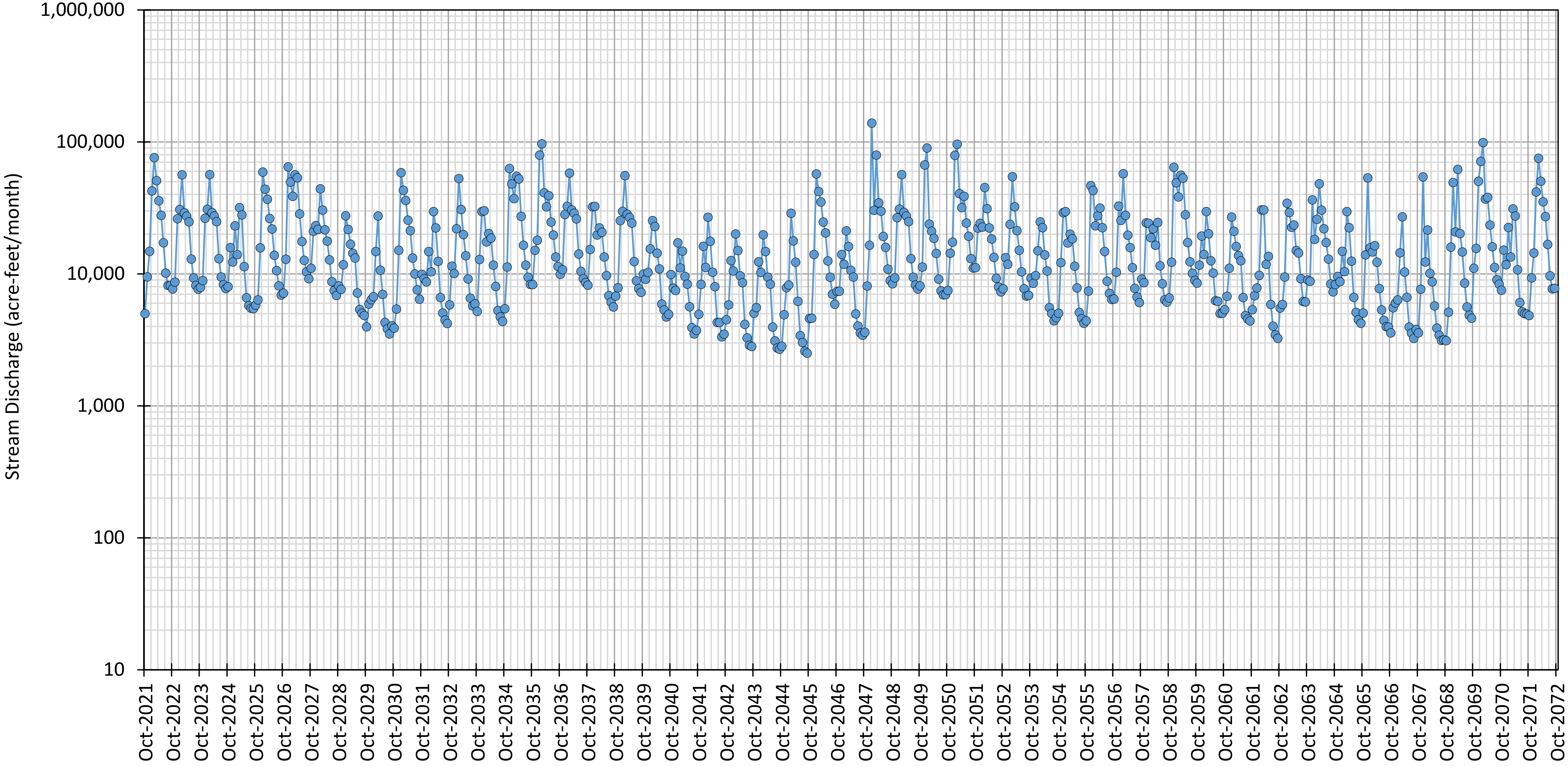


Inflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from Antelope Creek Group to Sacramento River
Los Molinos Subbasin



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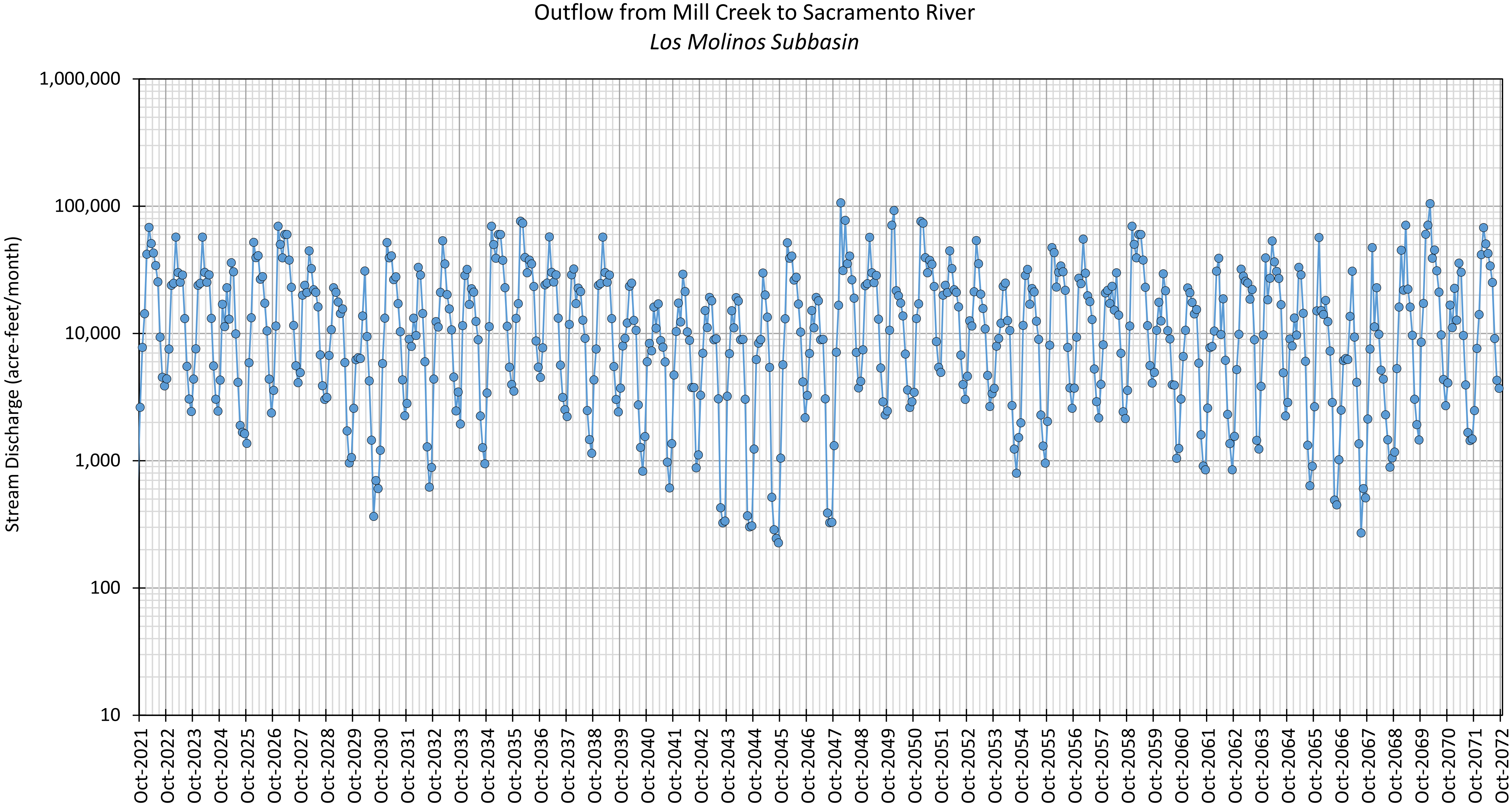

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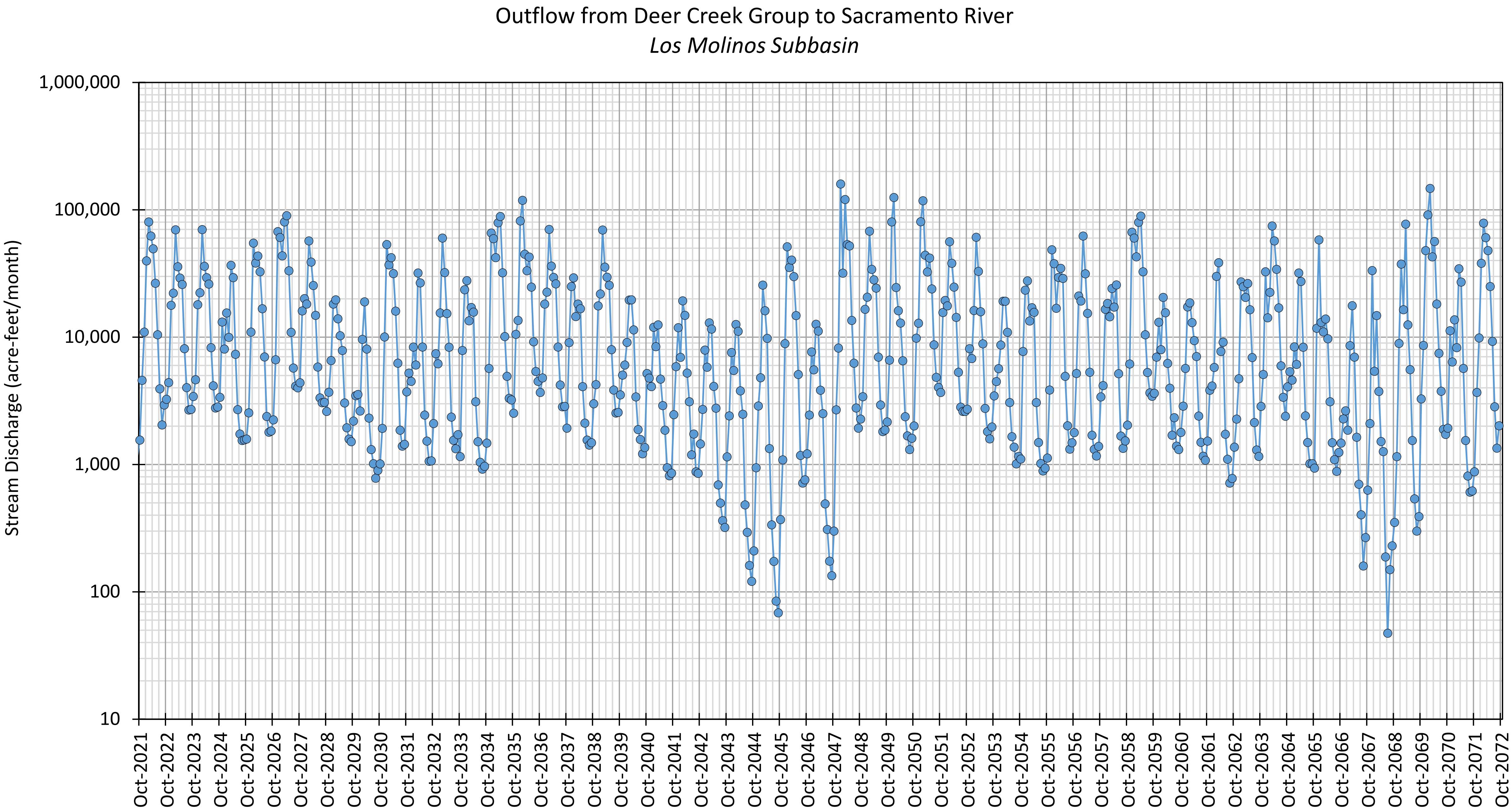
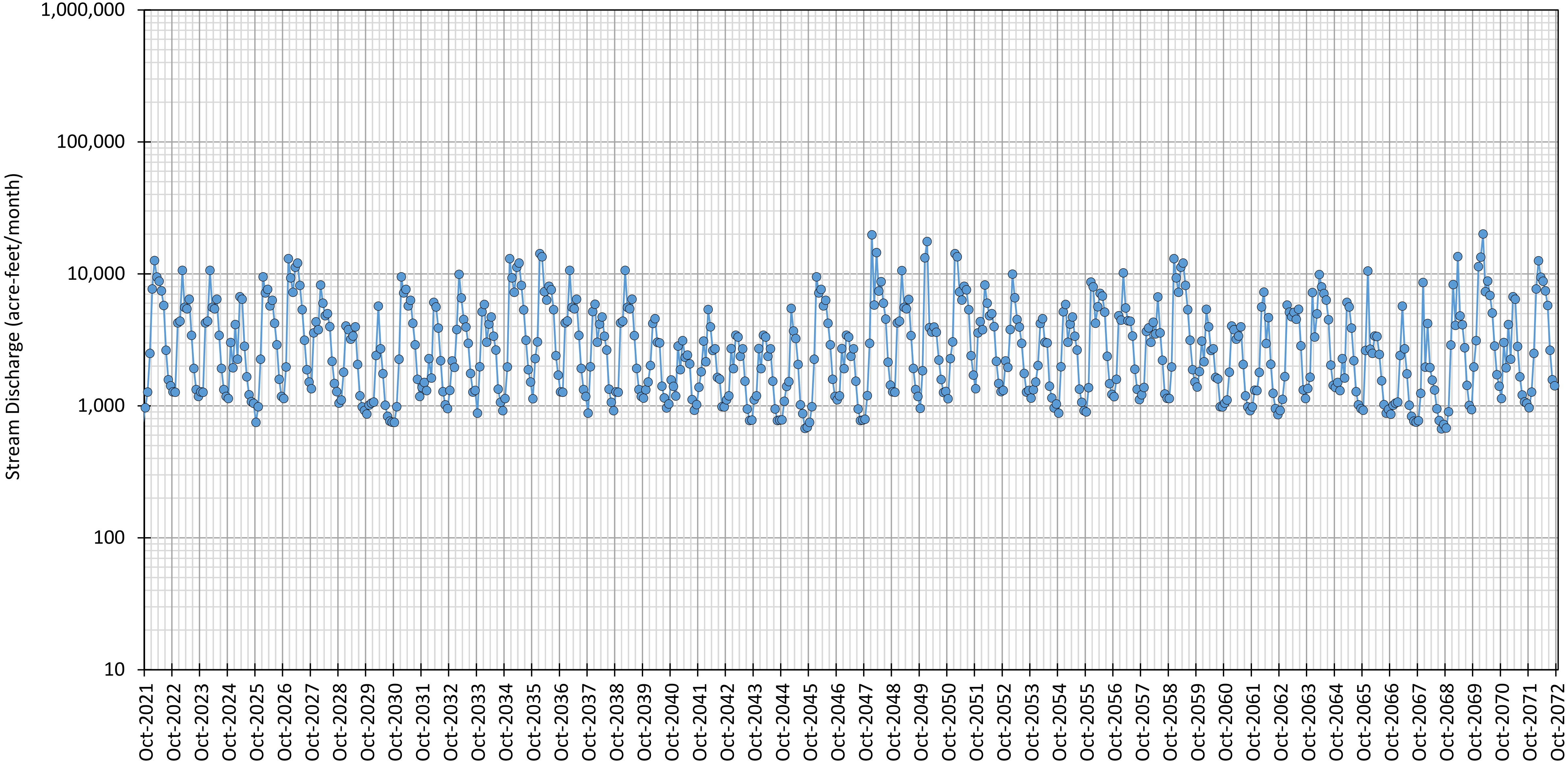


Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

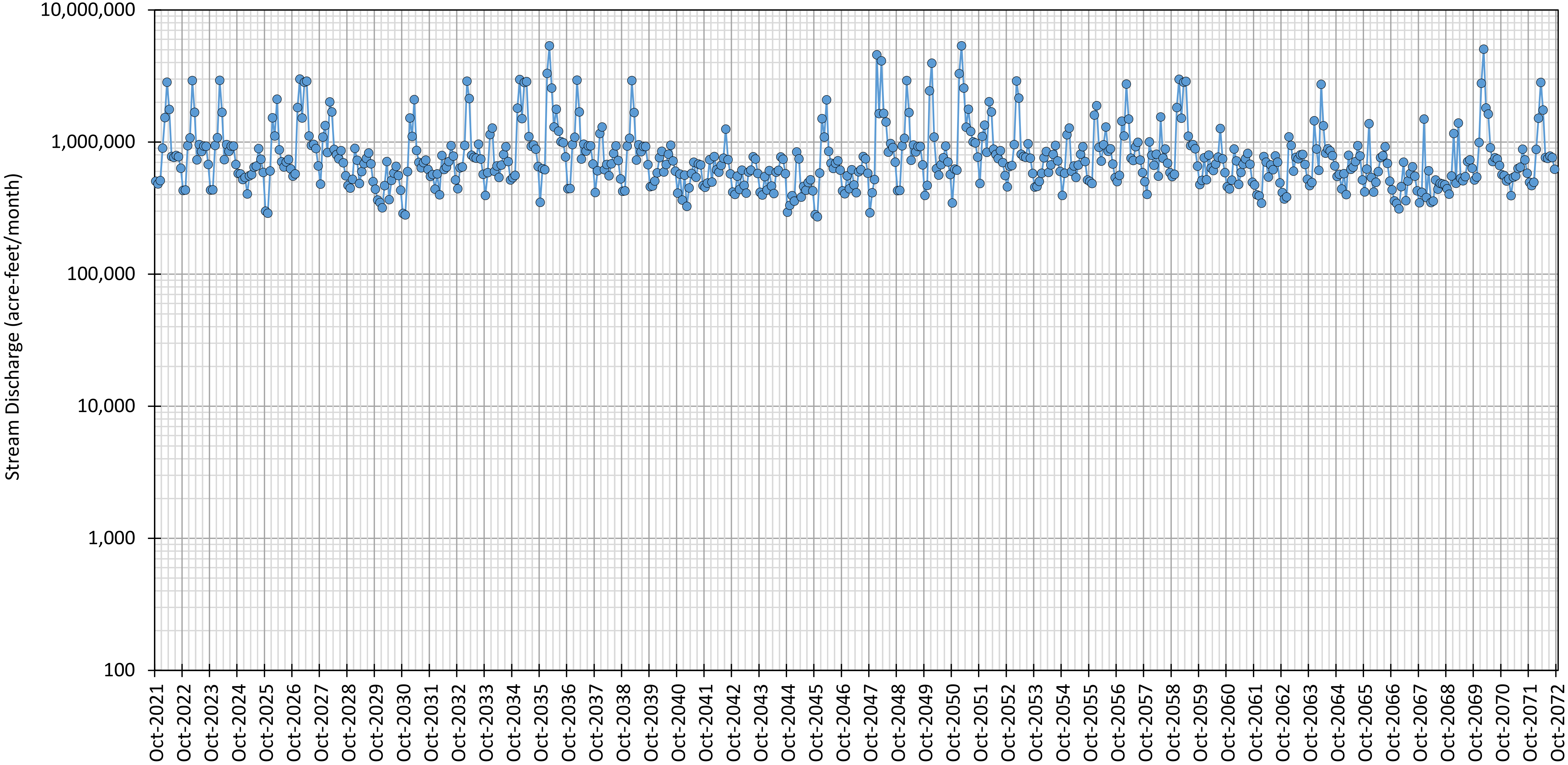
Outflow from Dye Creek to Sacramento River

Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

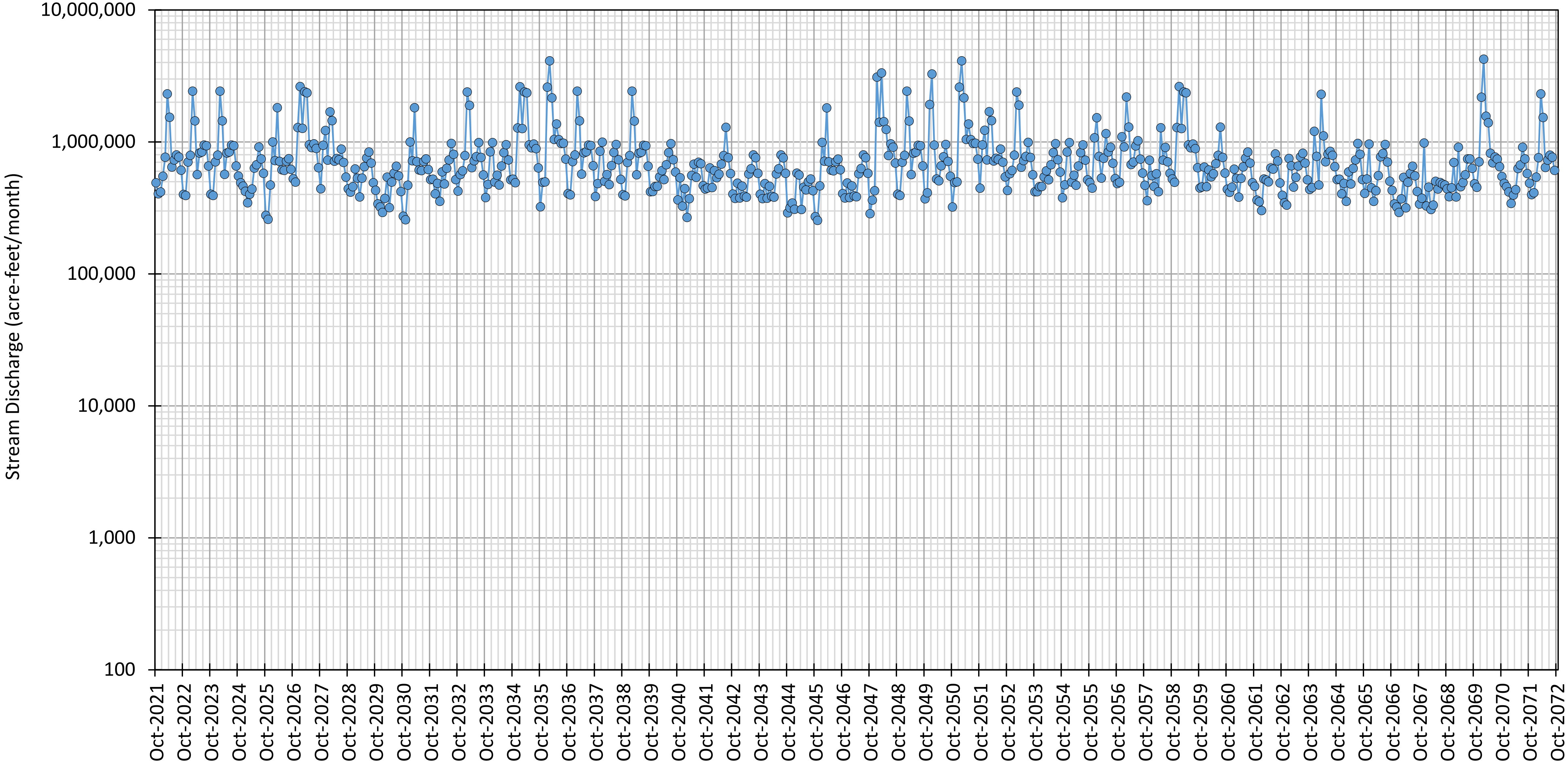
Outflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin



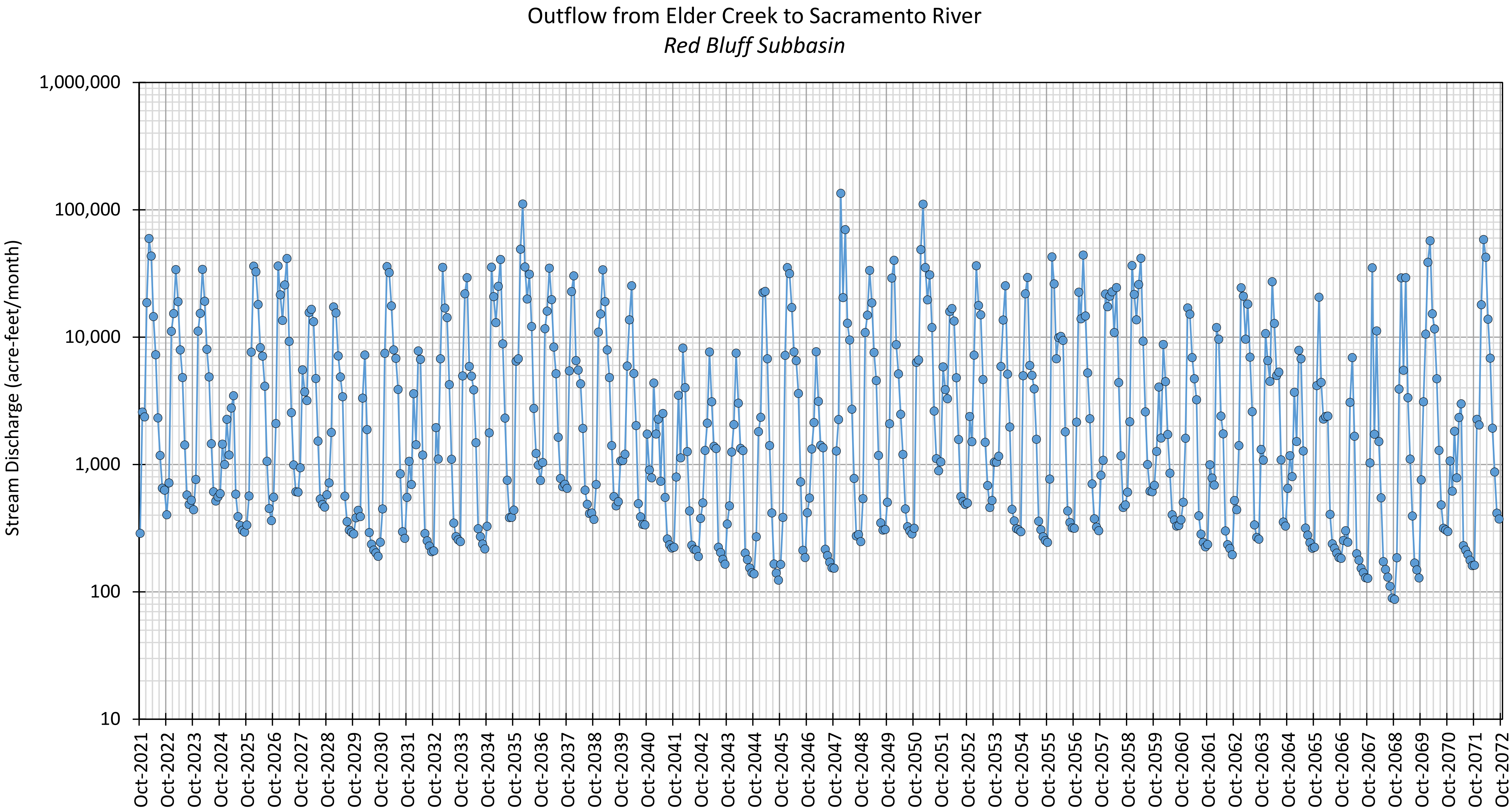
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Inflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



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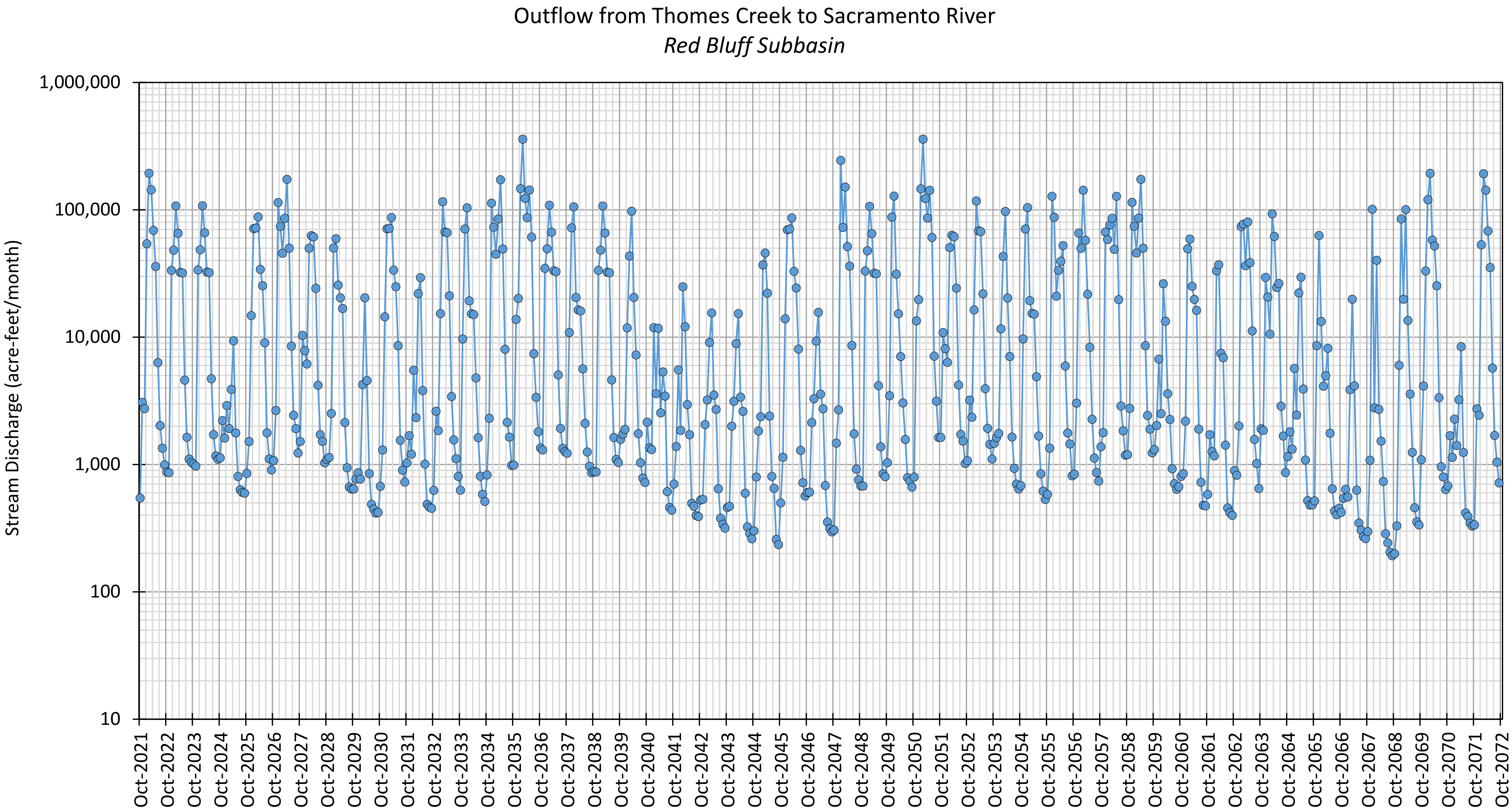
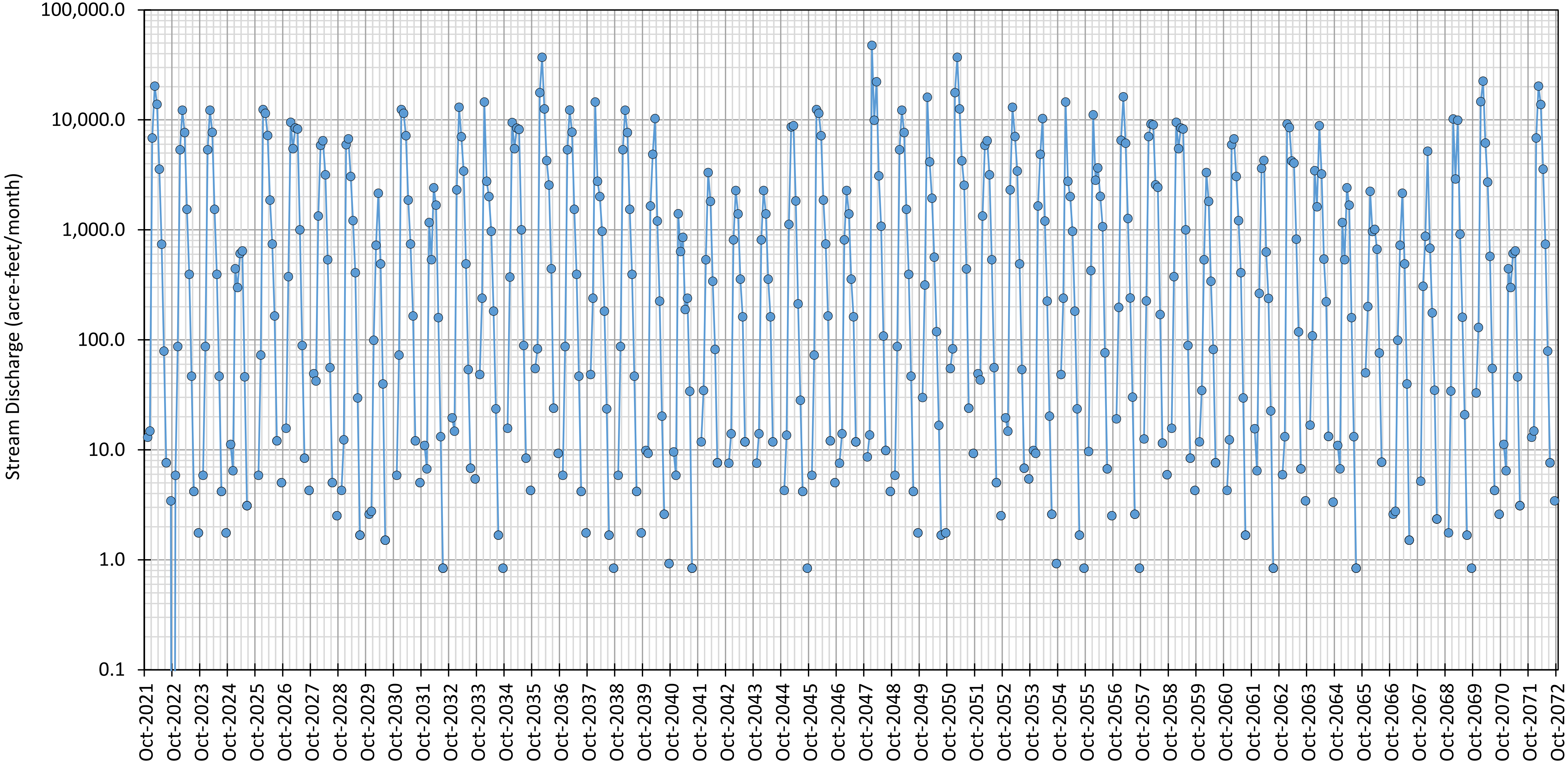


Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from Red Bank Creek to Sacramento River

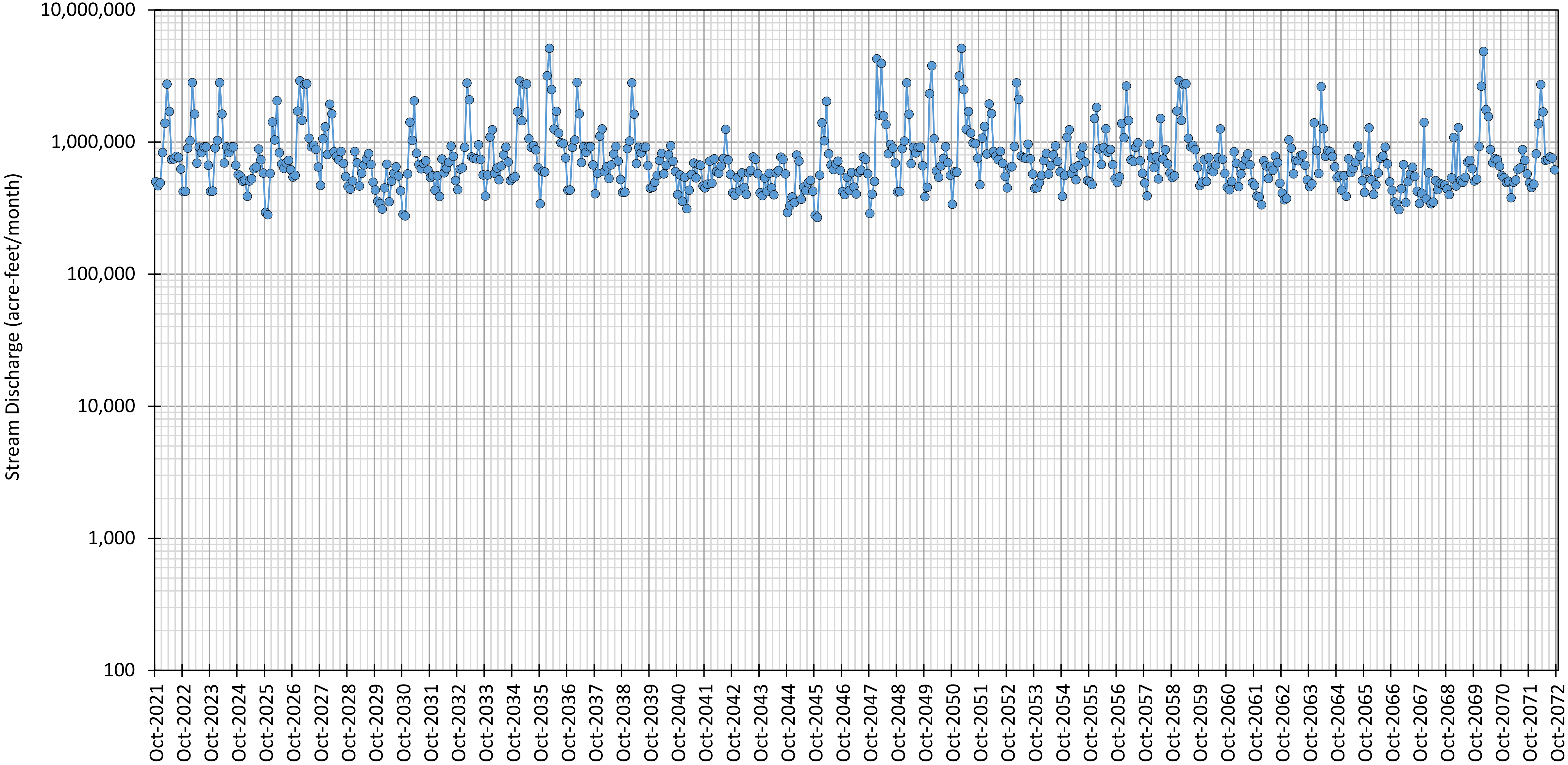
Red Bluff Subbasin



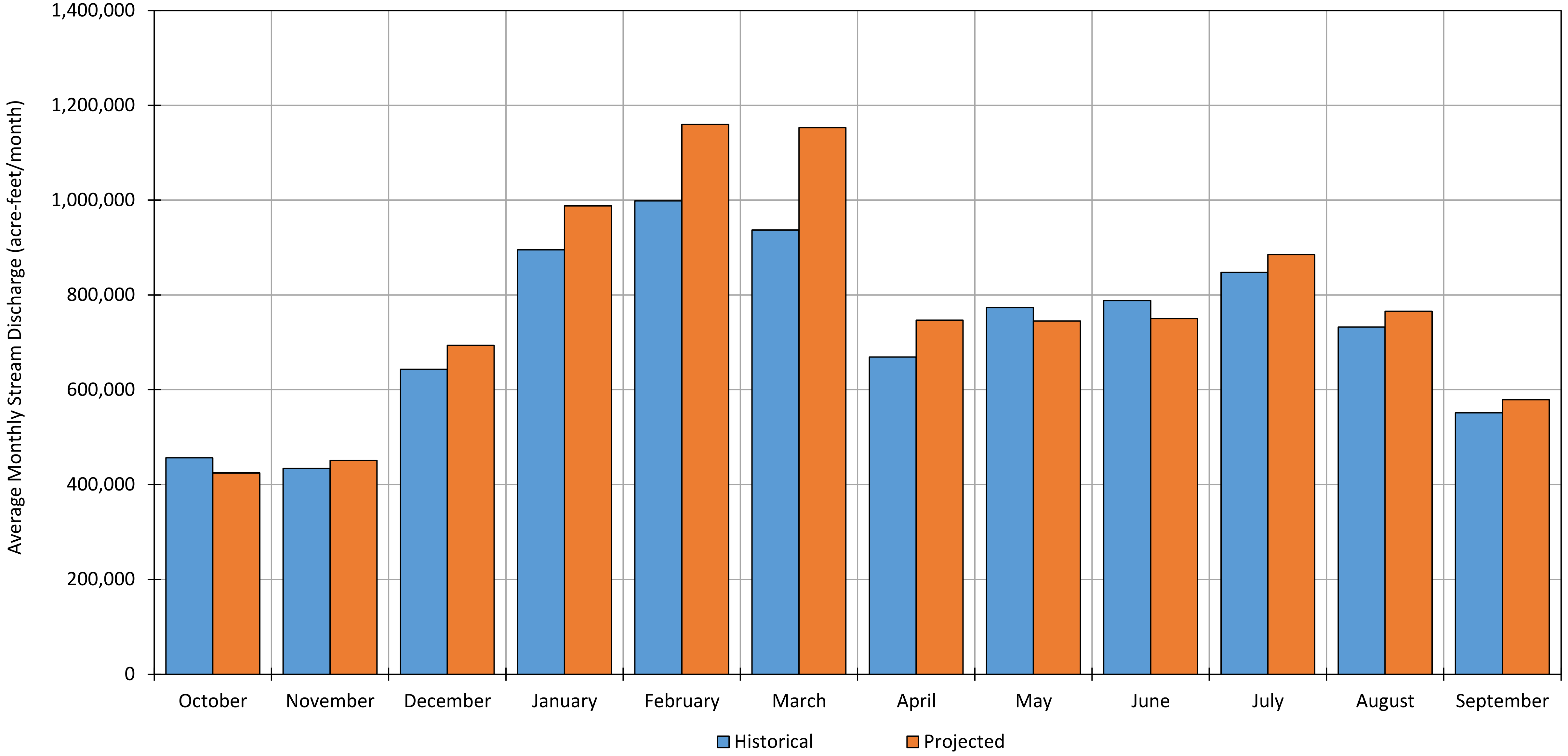
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



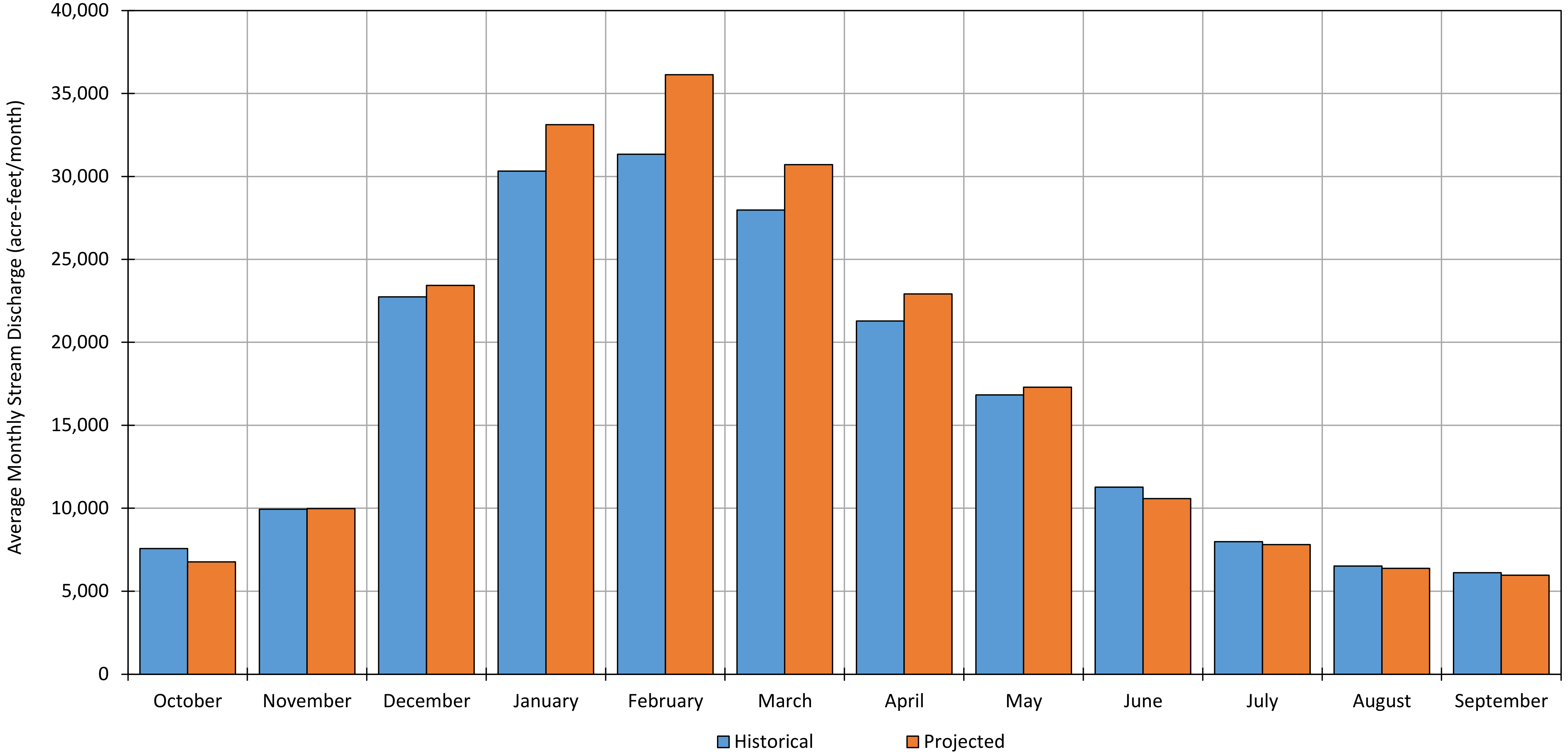
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Inflow from Sacramento River at Antelope Subbasin Boundary

Antelope Subbasin

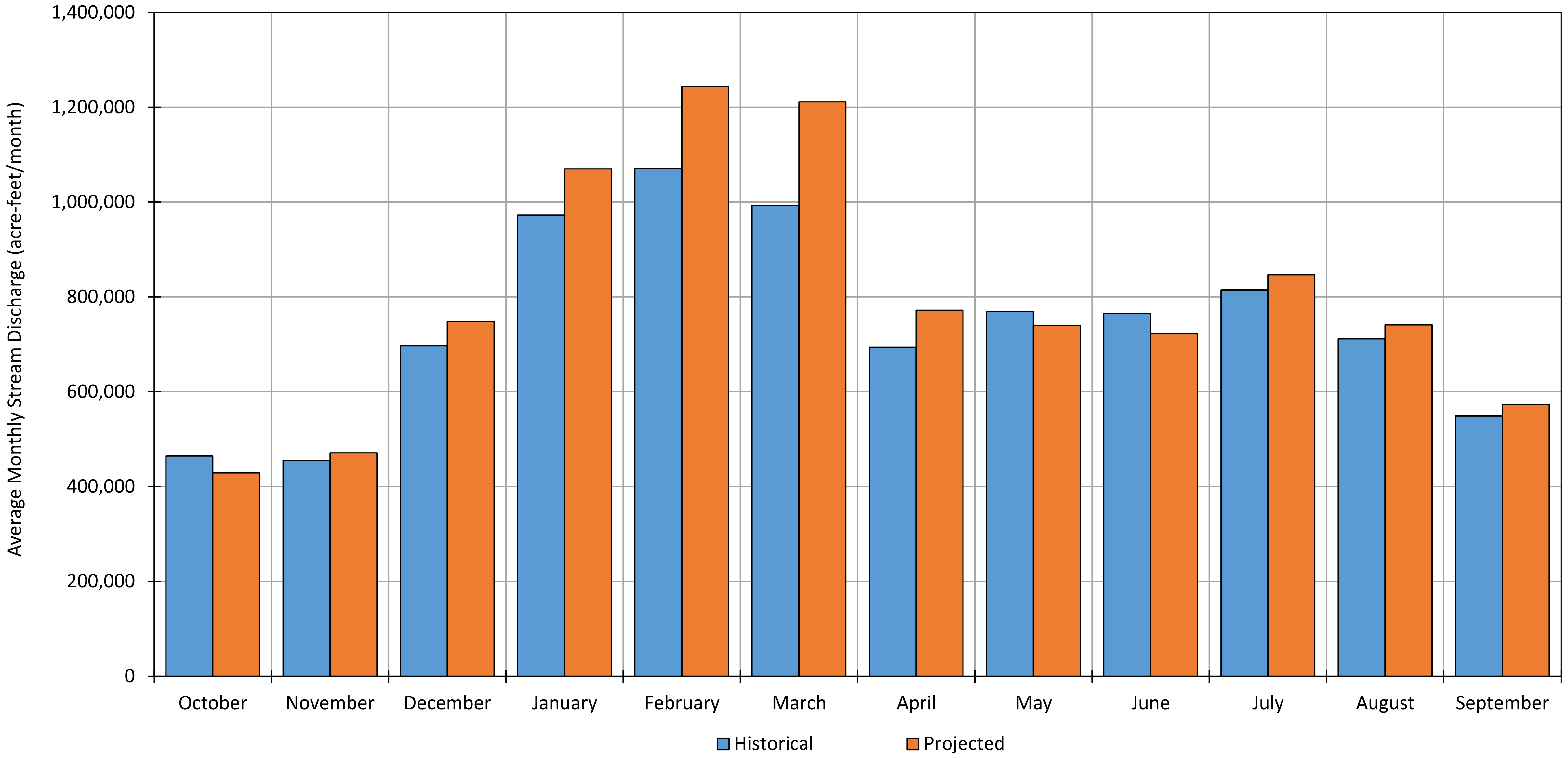
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin

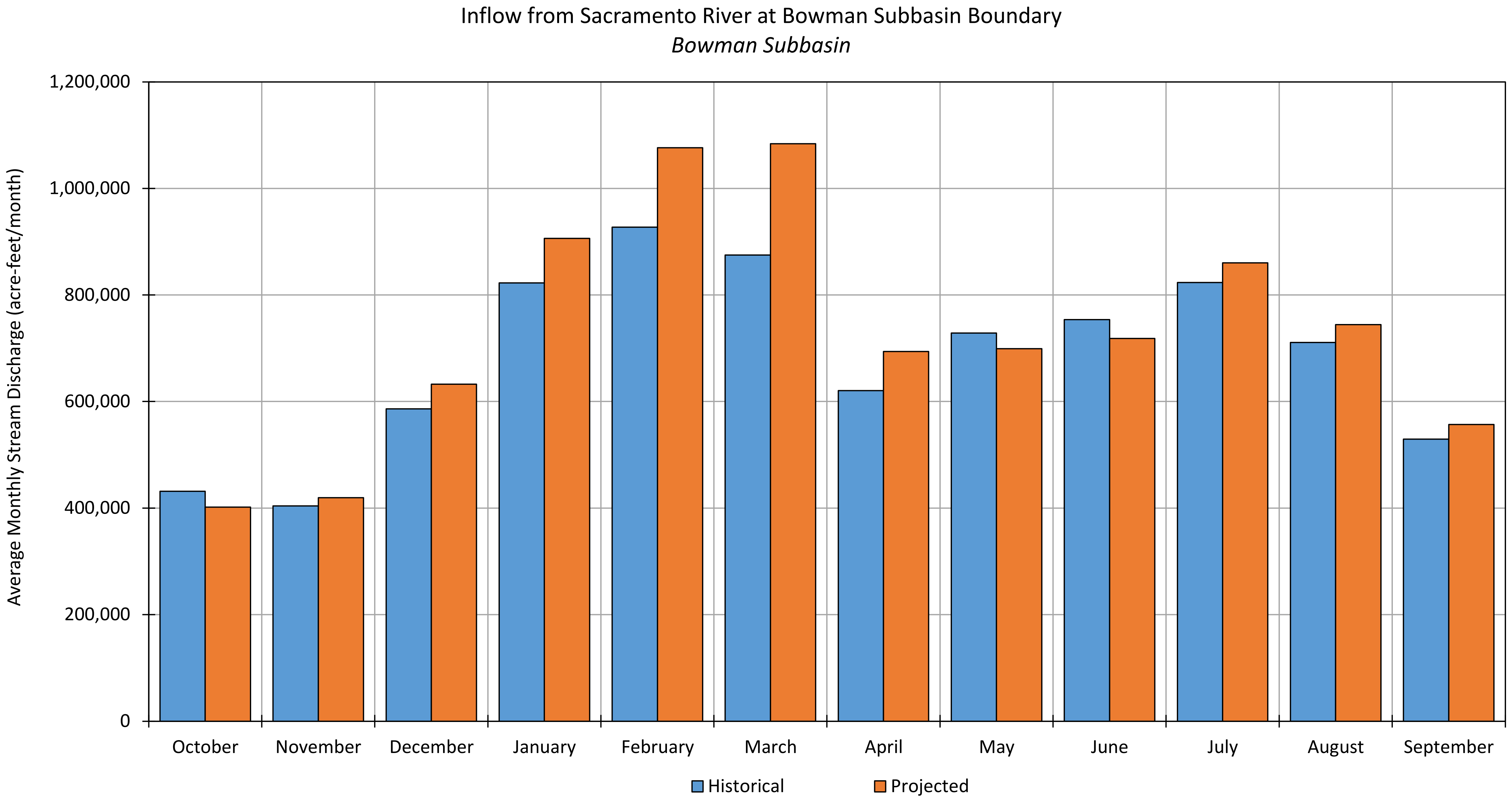
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



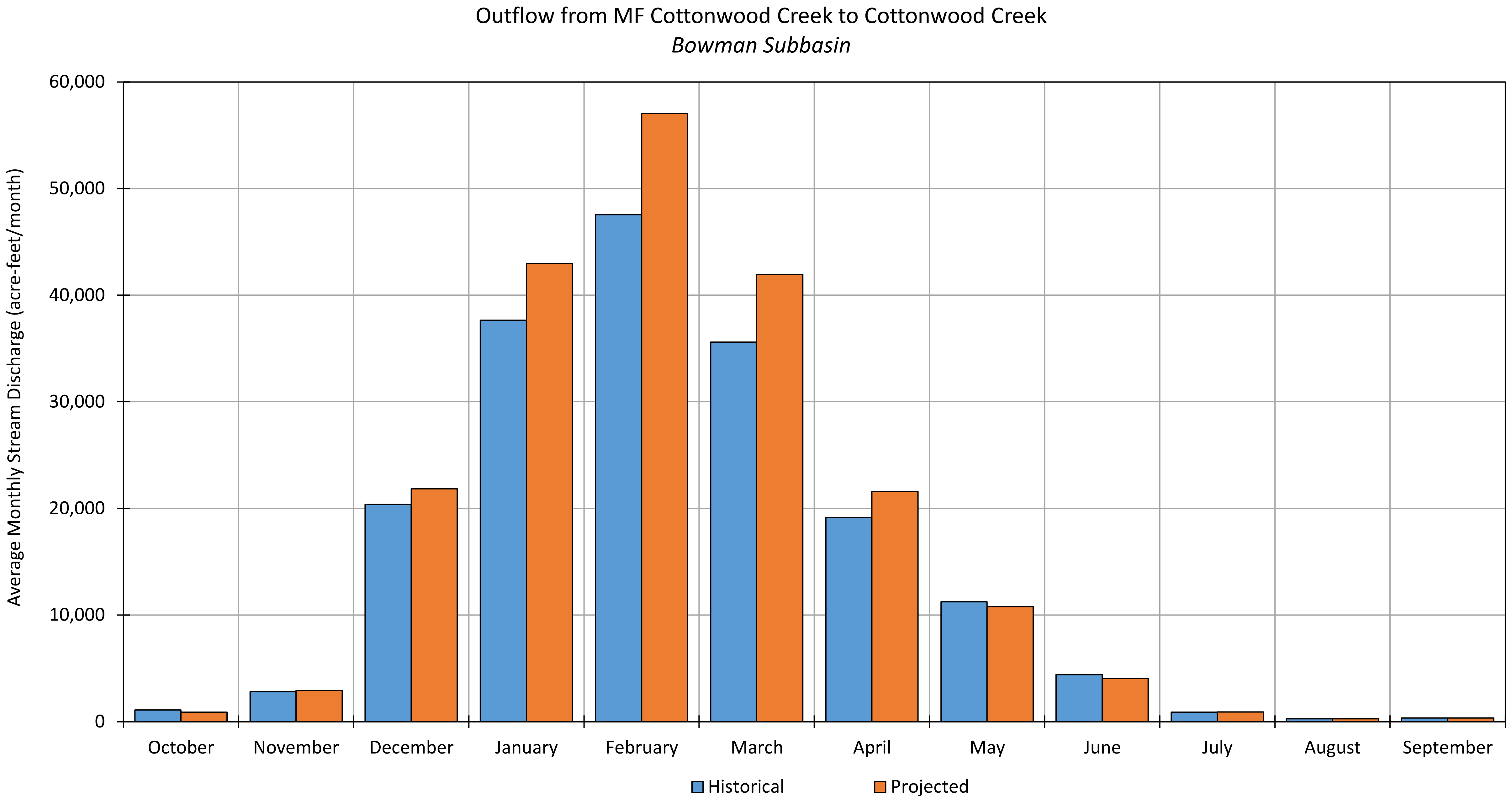
Outflow from Sacramento River at Antelope Subbasin Boundary

Antelope Subbasin

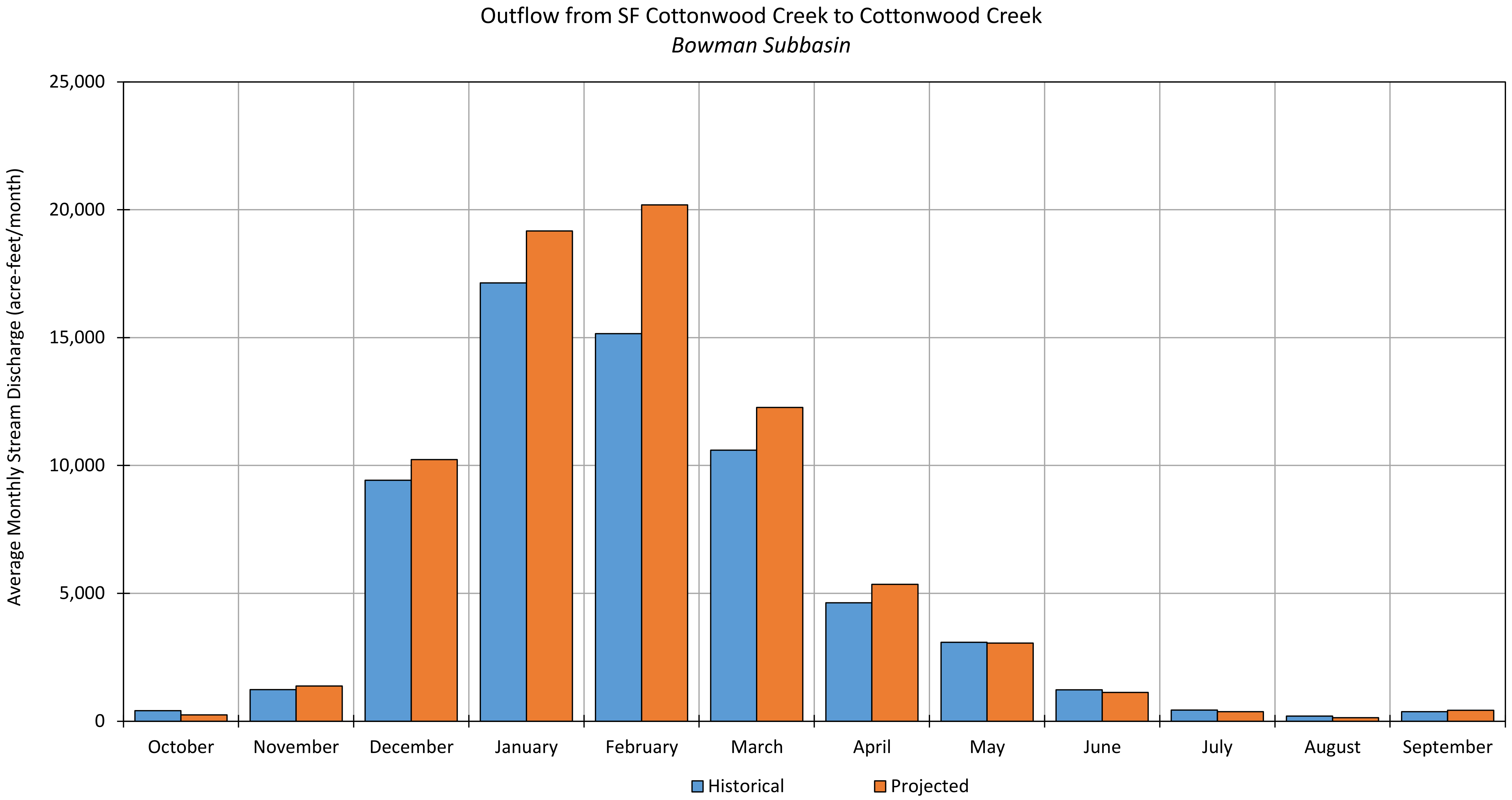
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



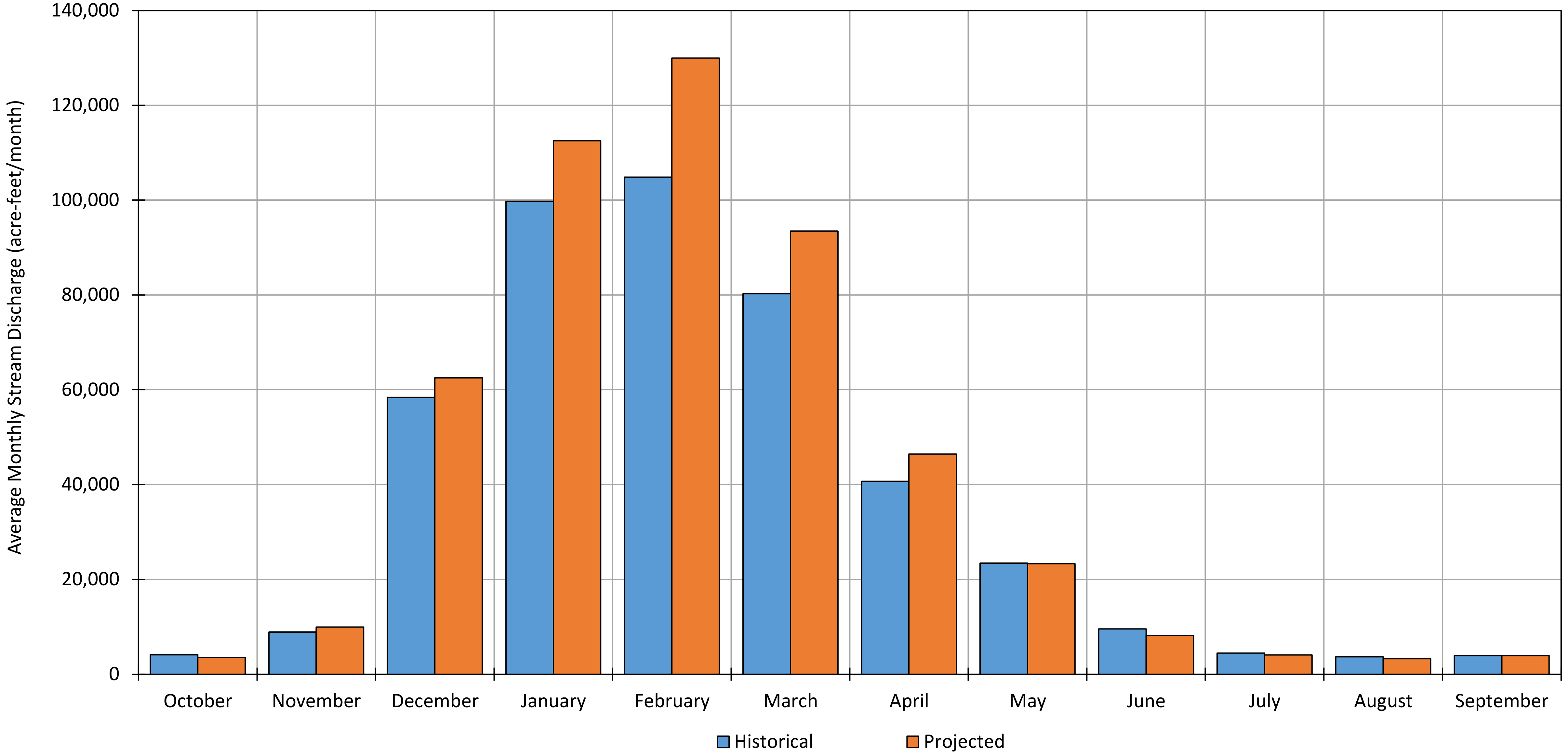
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



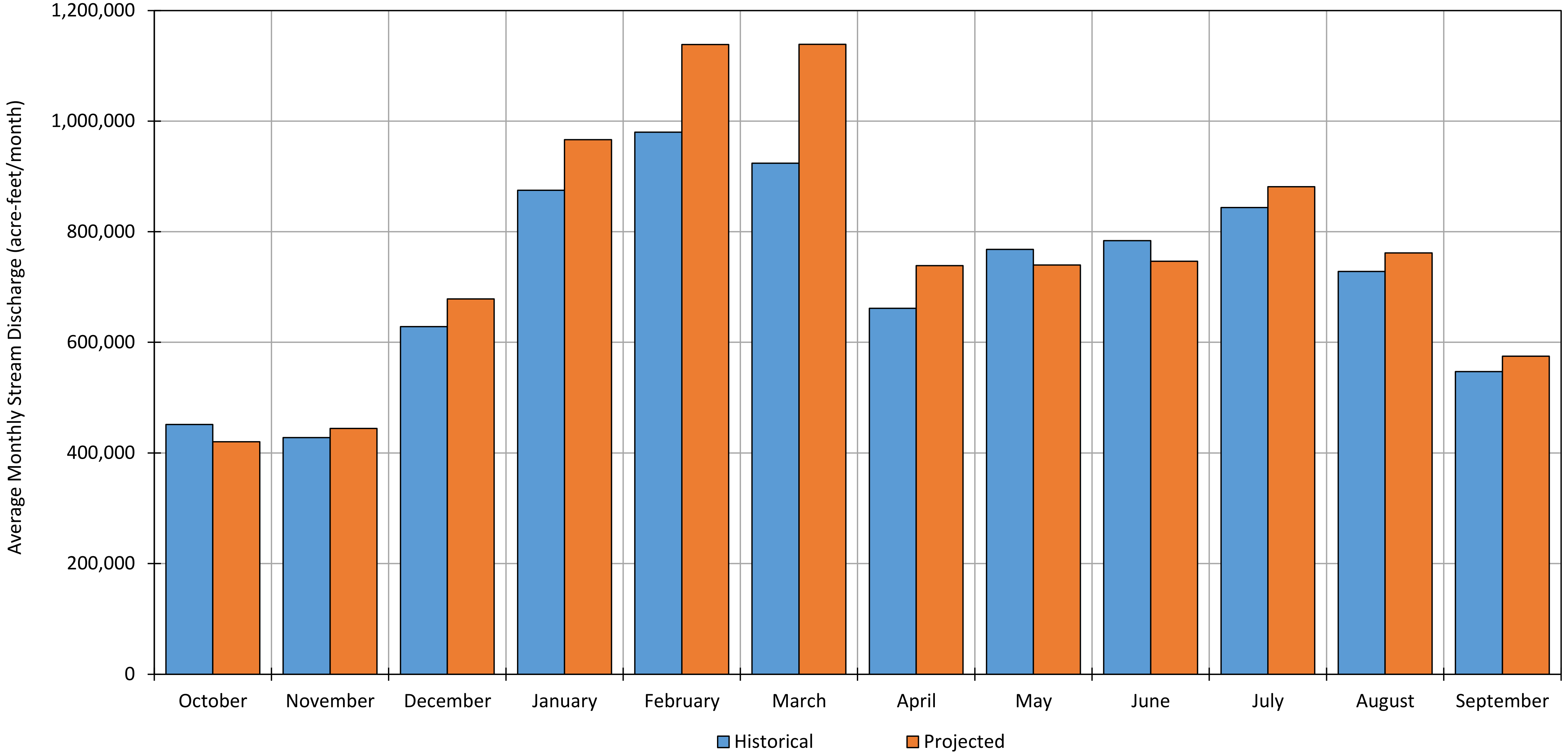
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from Cottonwood Creek to Sacramento River

Bowman Subbasin



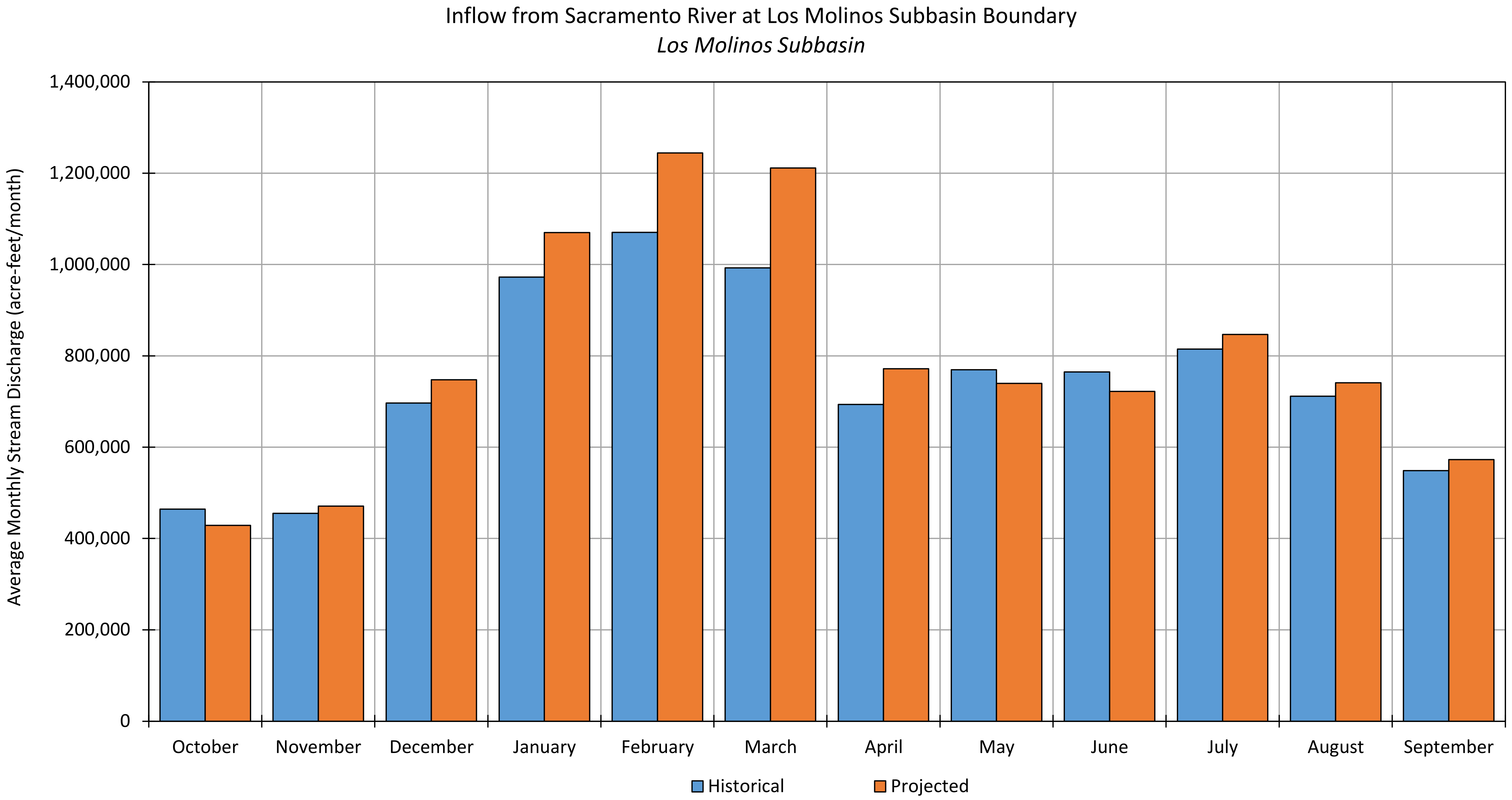
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



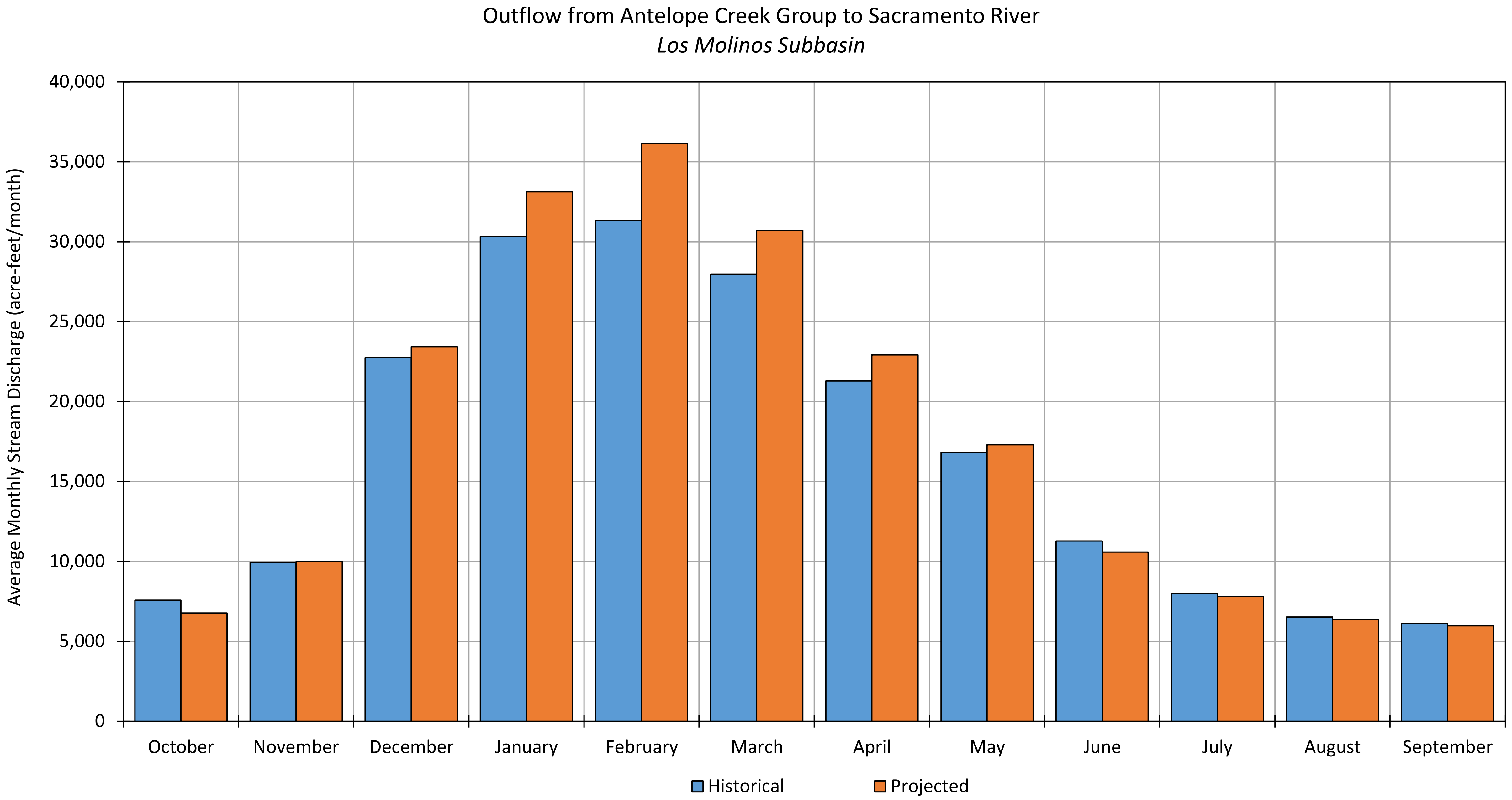
Outflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin

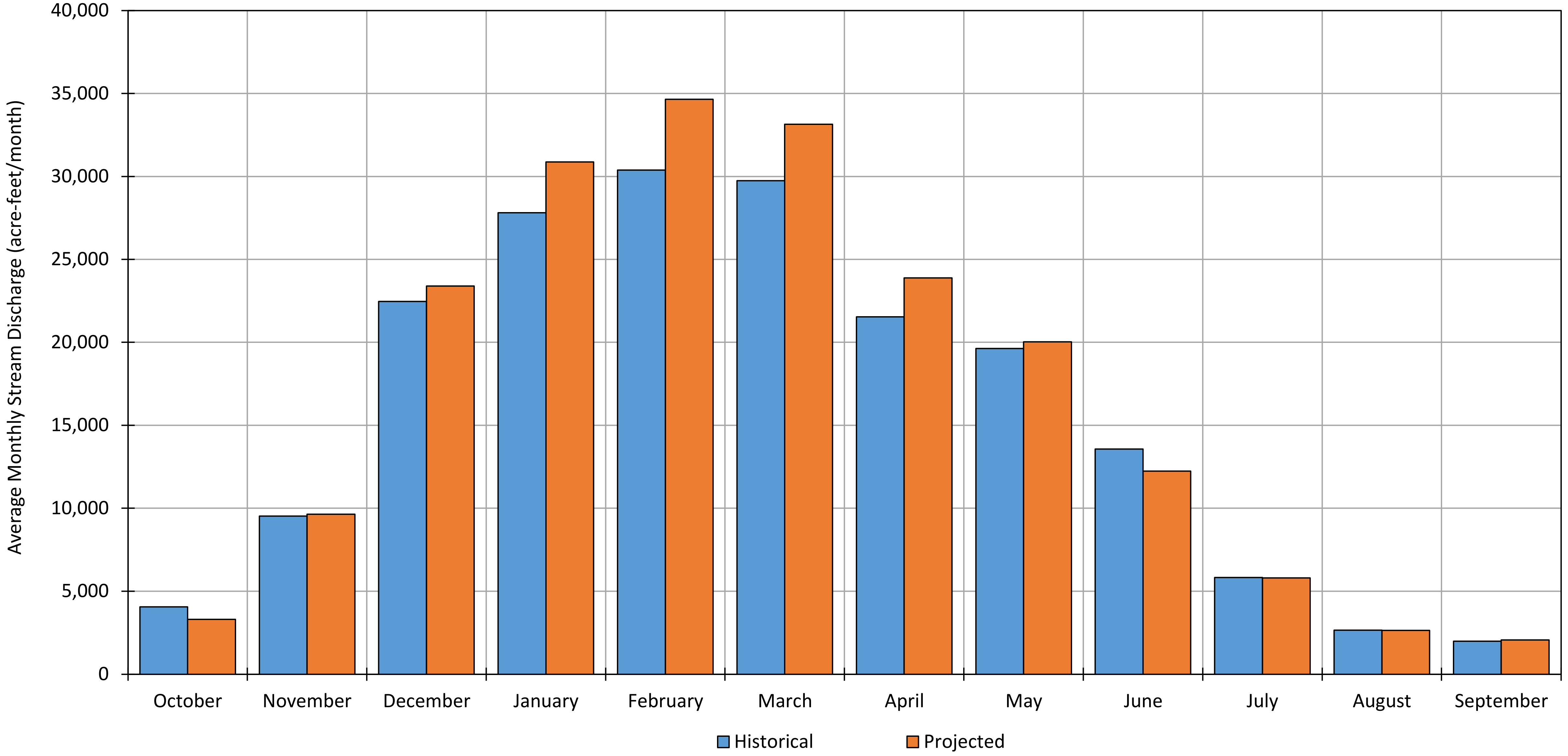
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



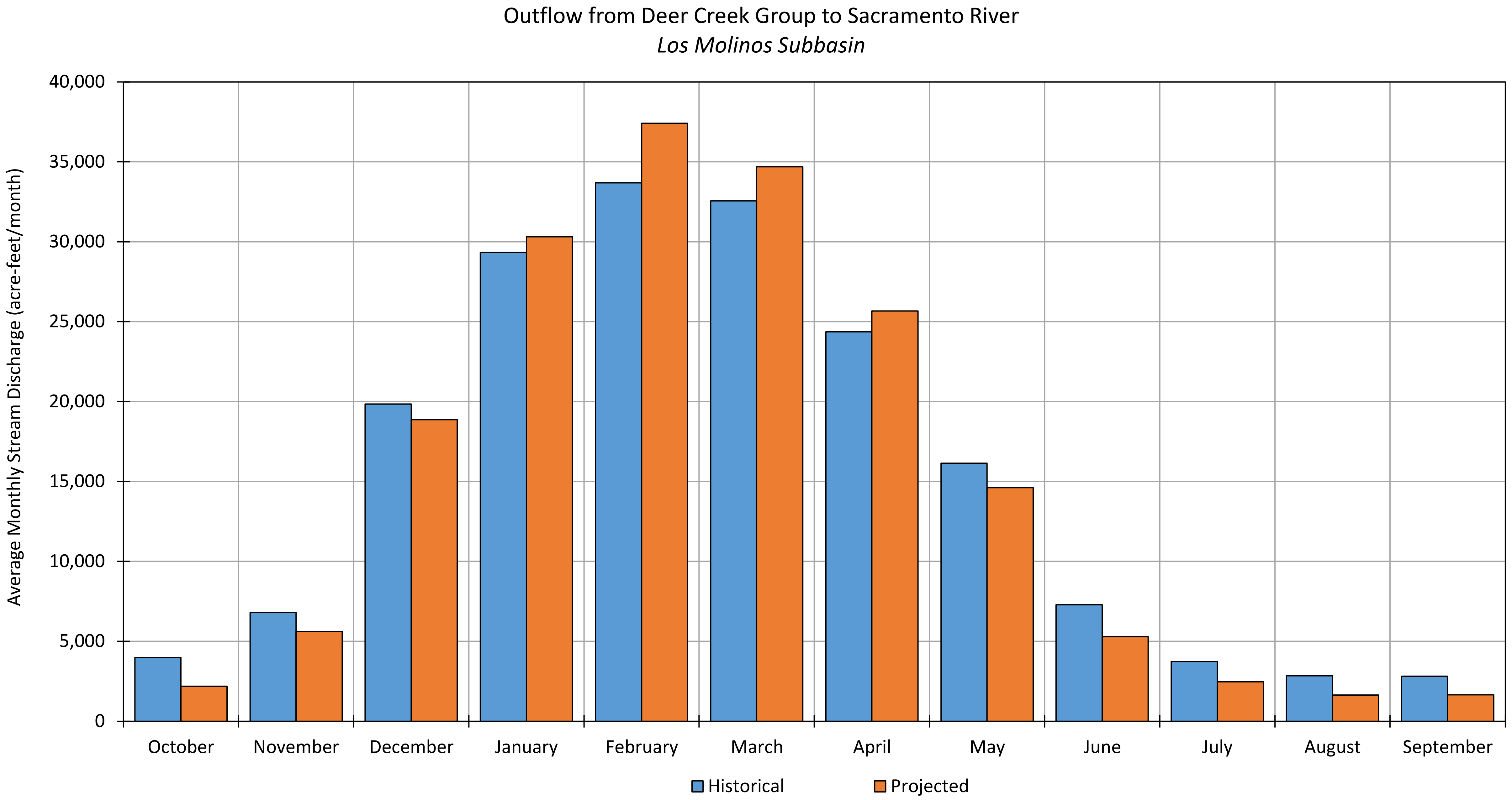
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Outflow from Mill Creek to Sacramento River

Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



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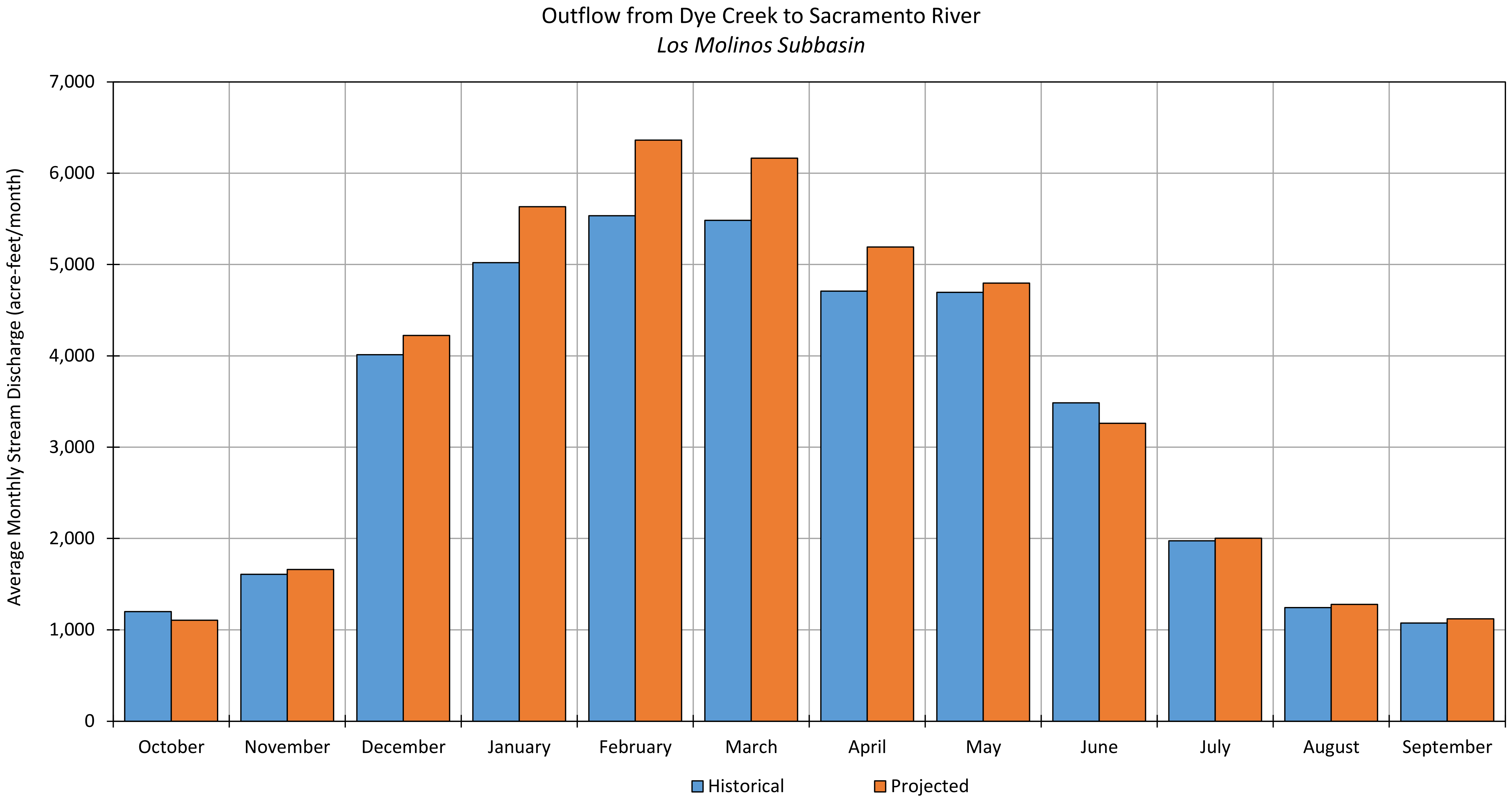
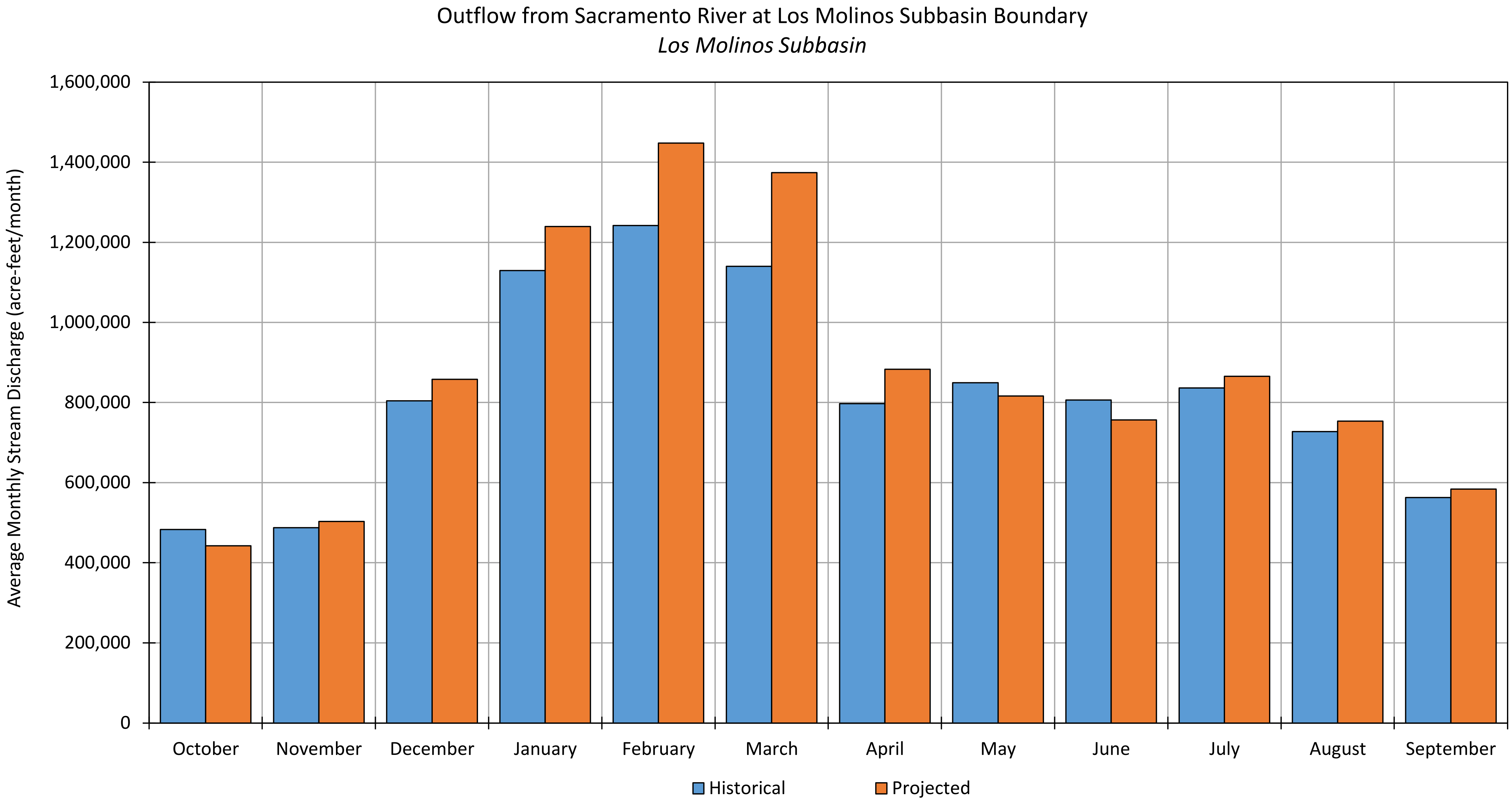
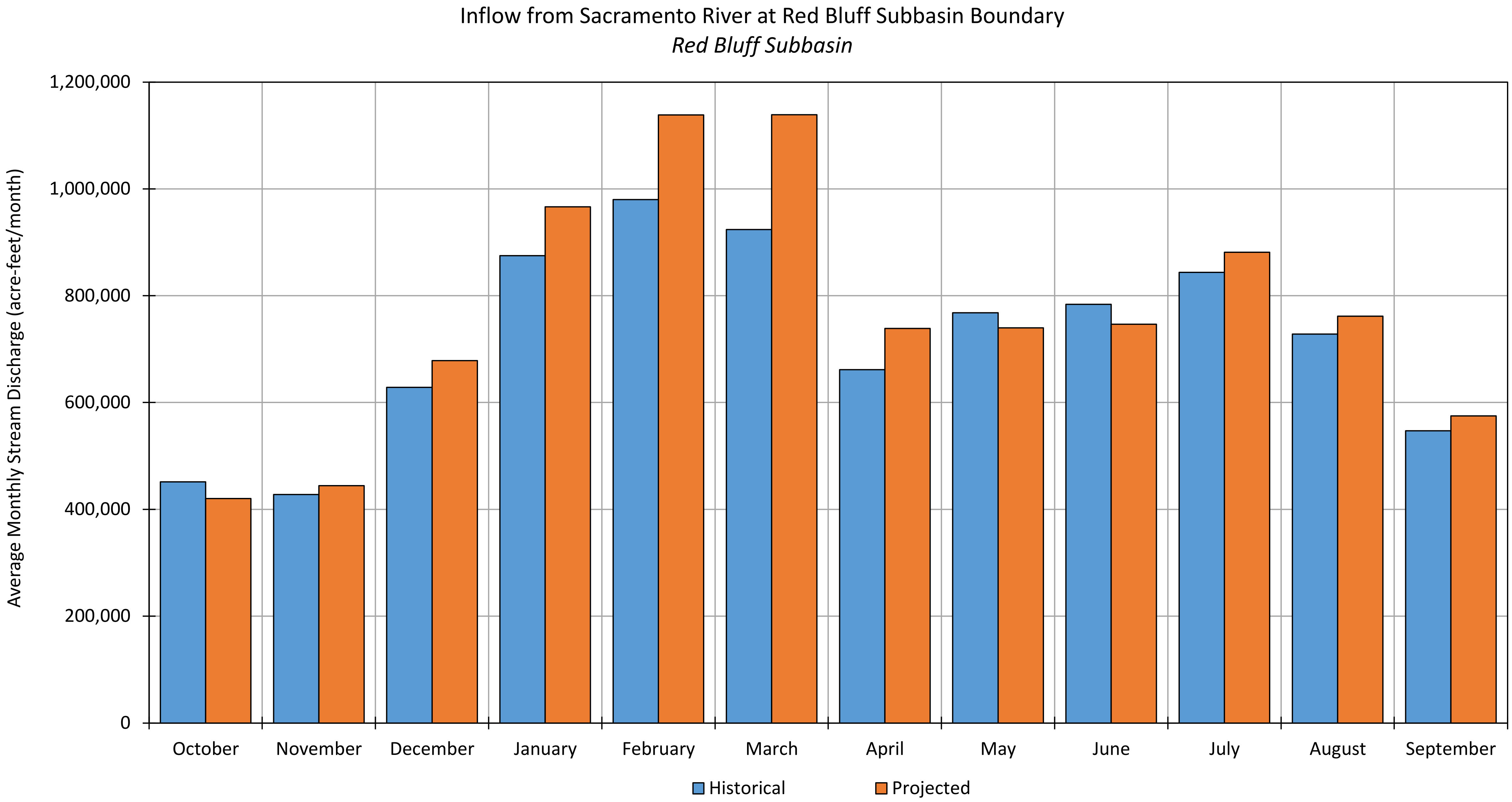


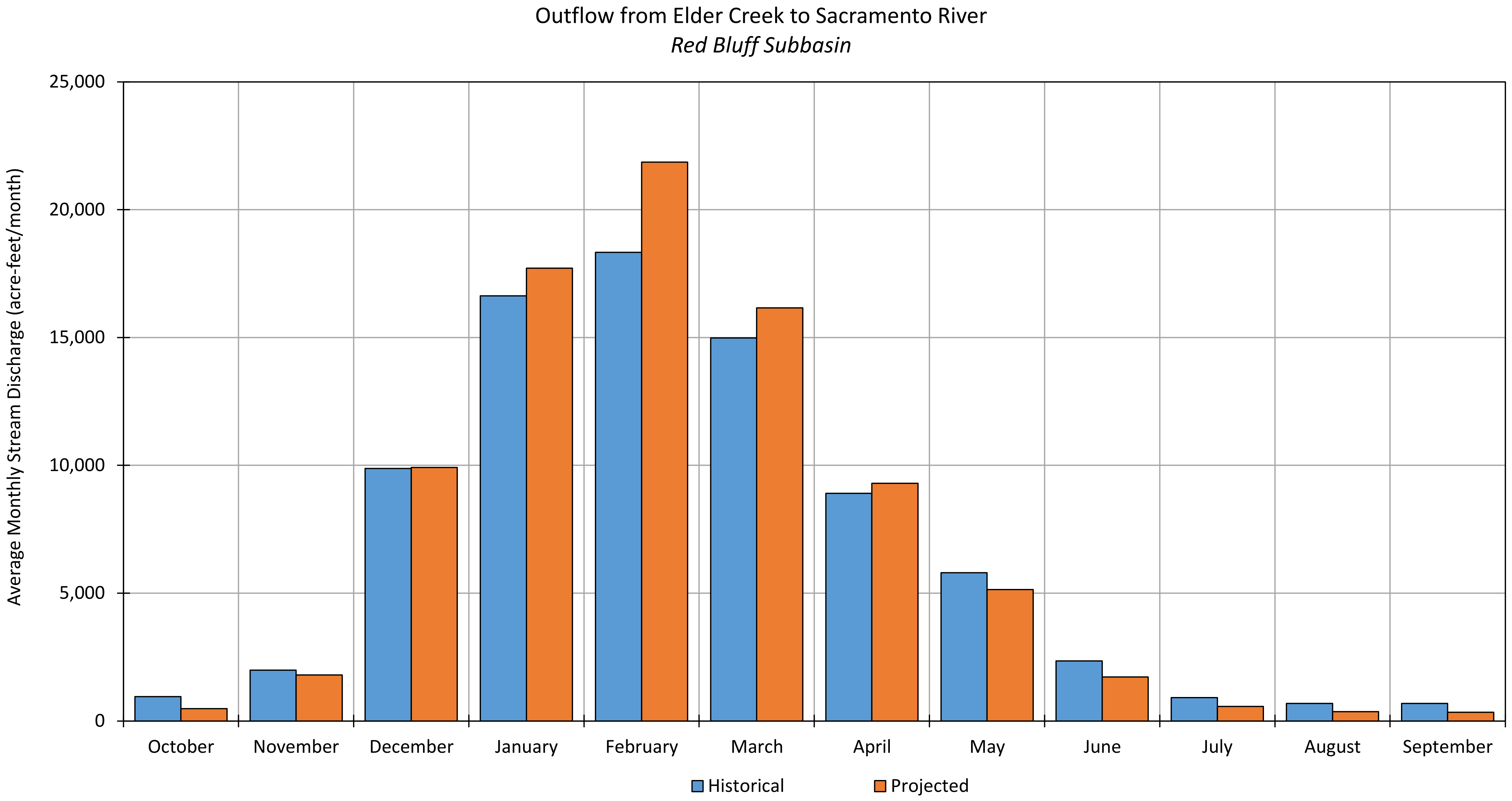
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



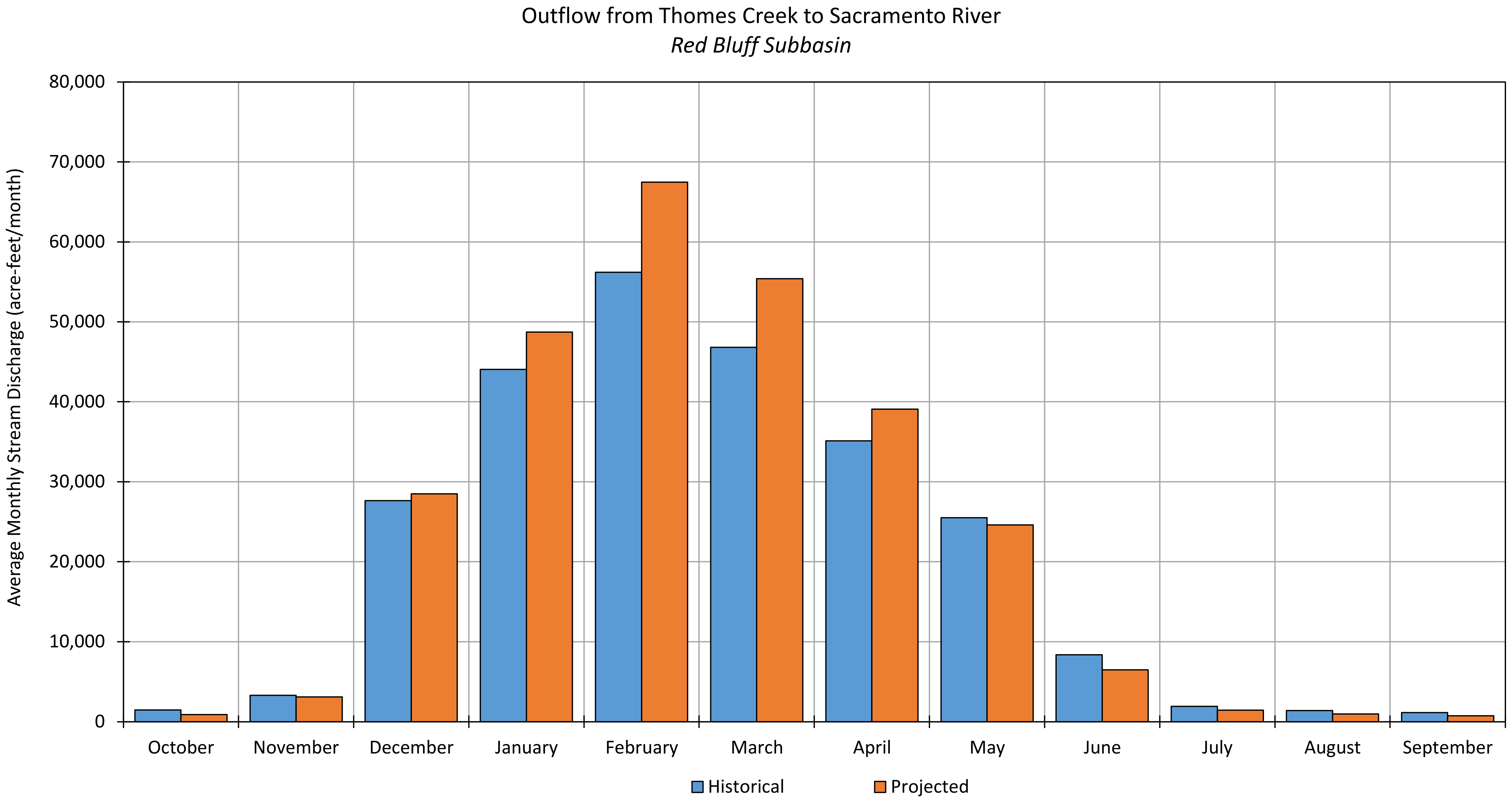
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



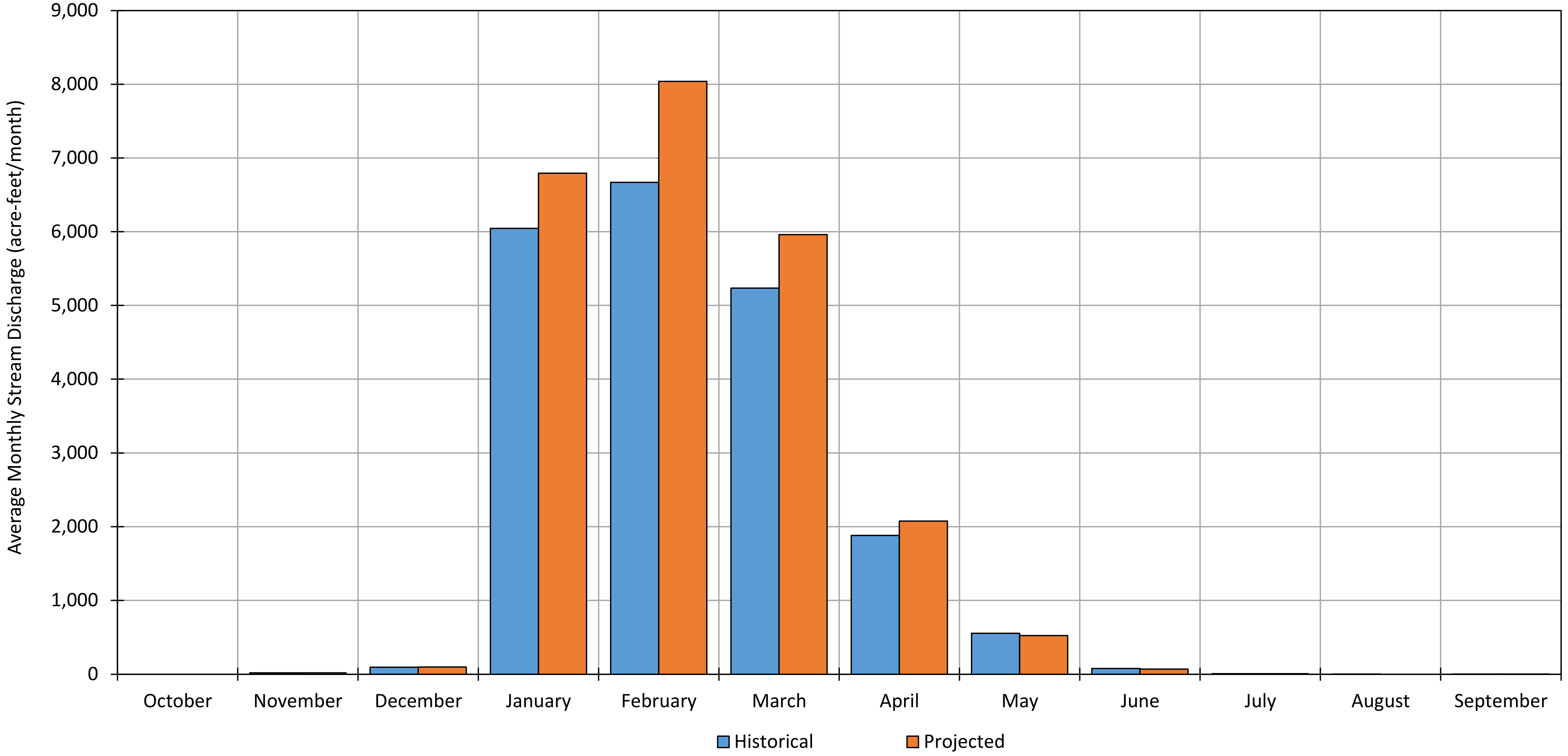
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



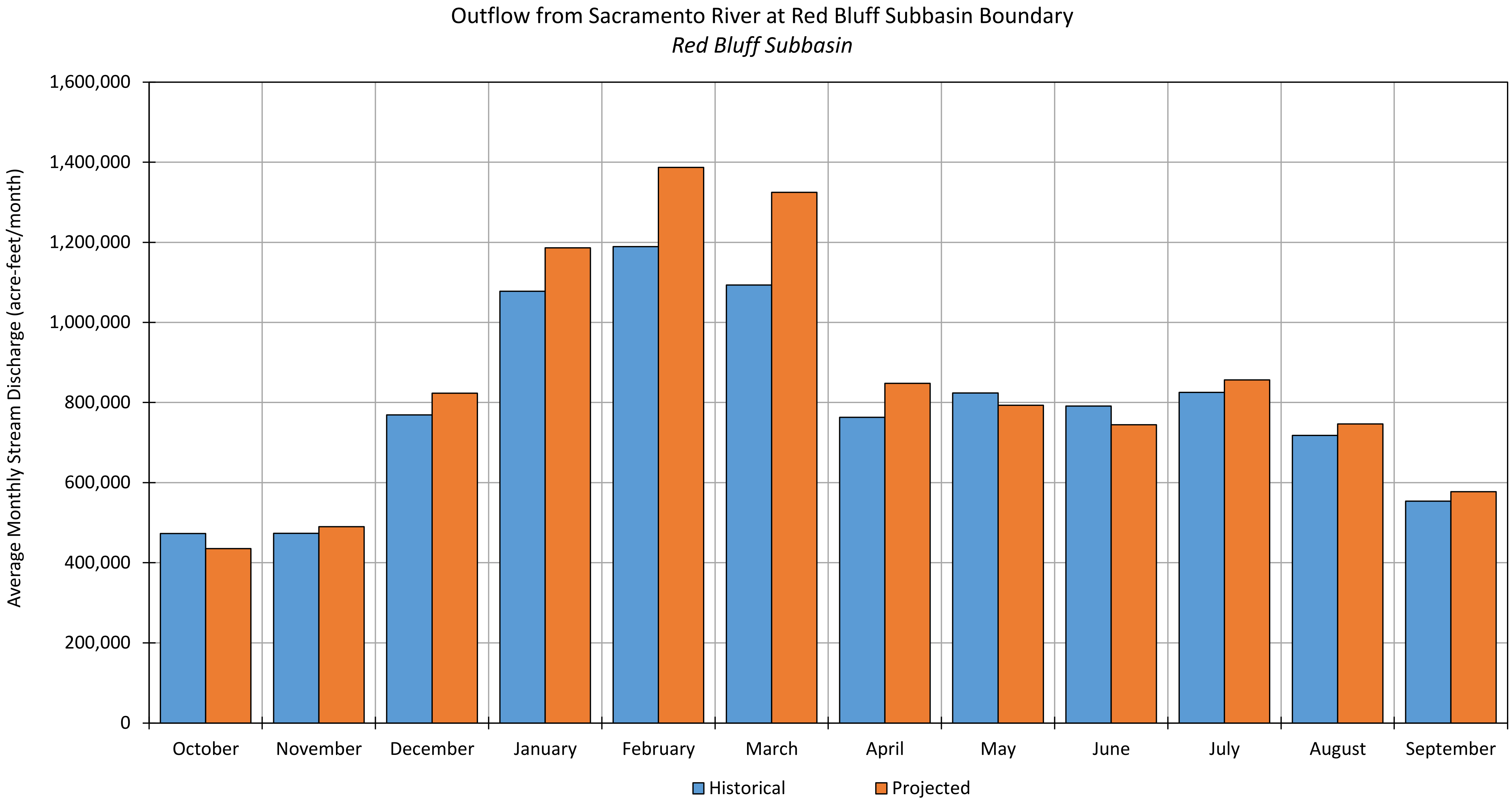
Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Outflow from Red Bank Creek to Sacramento River

Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

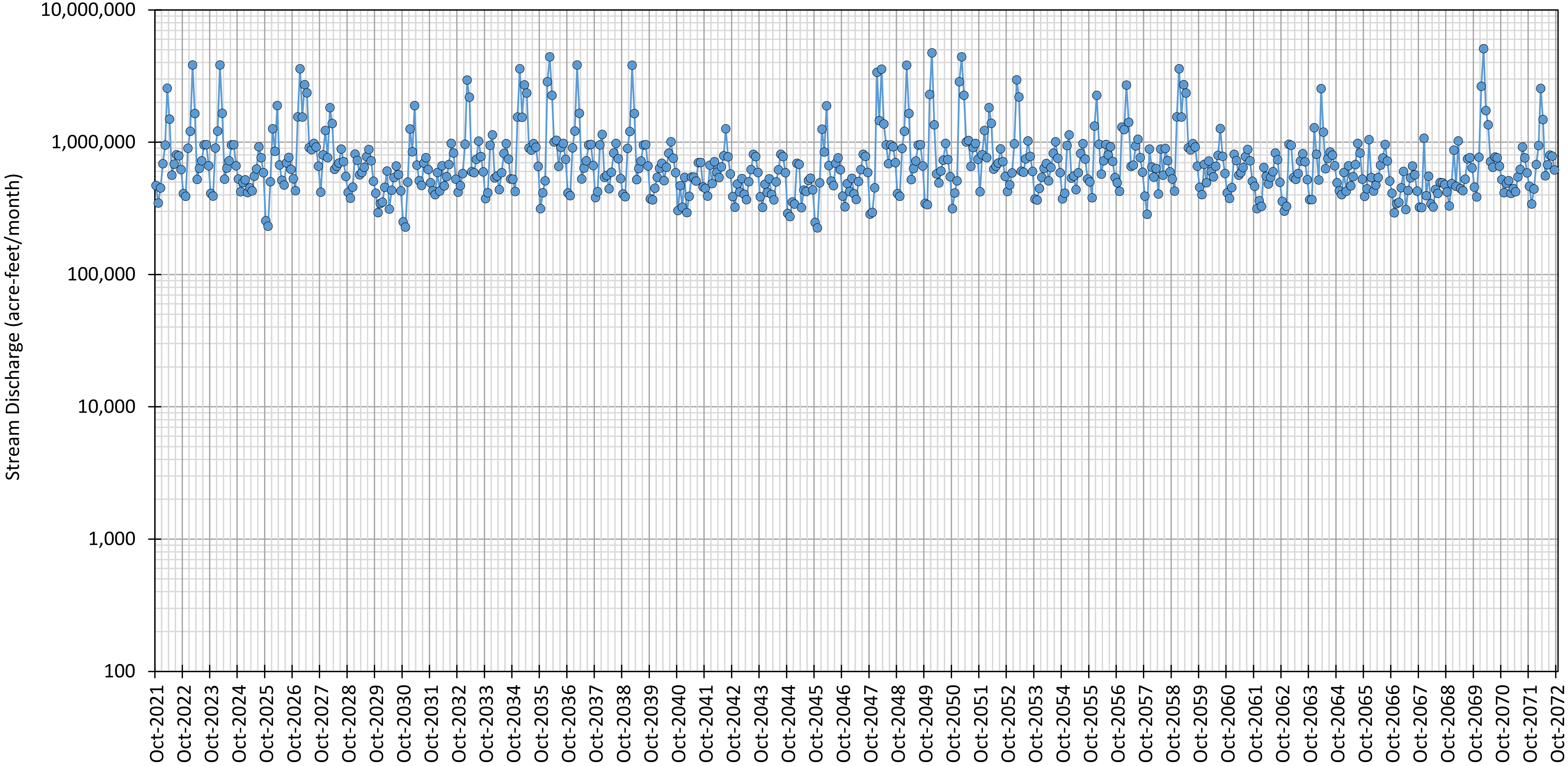
APPENDIX G-7

Tehama IHM Simulated Streamflows:

Projected (Future Land Use) with Climate Change (2070) Model Results

Inflow from Sacramento River at Antelope Subbasin Boundary

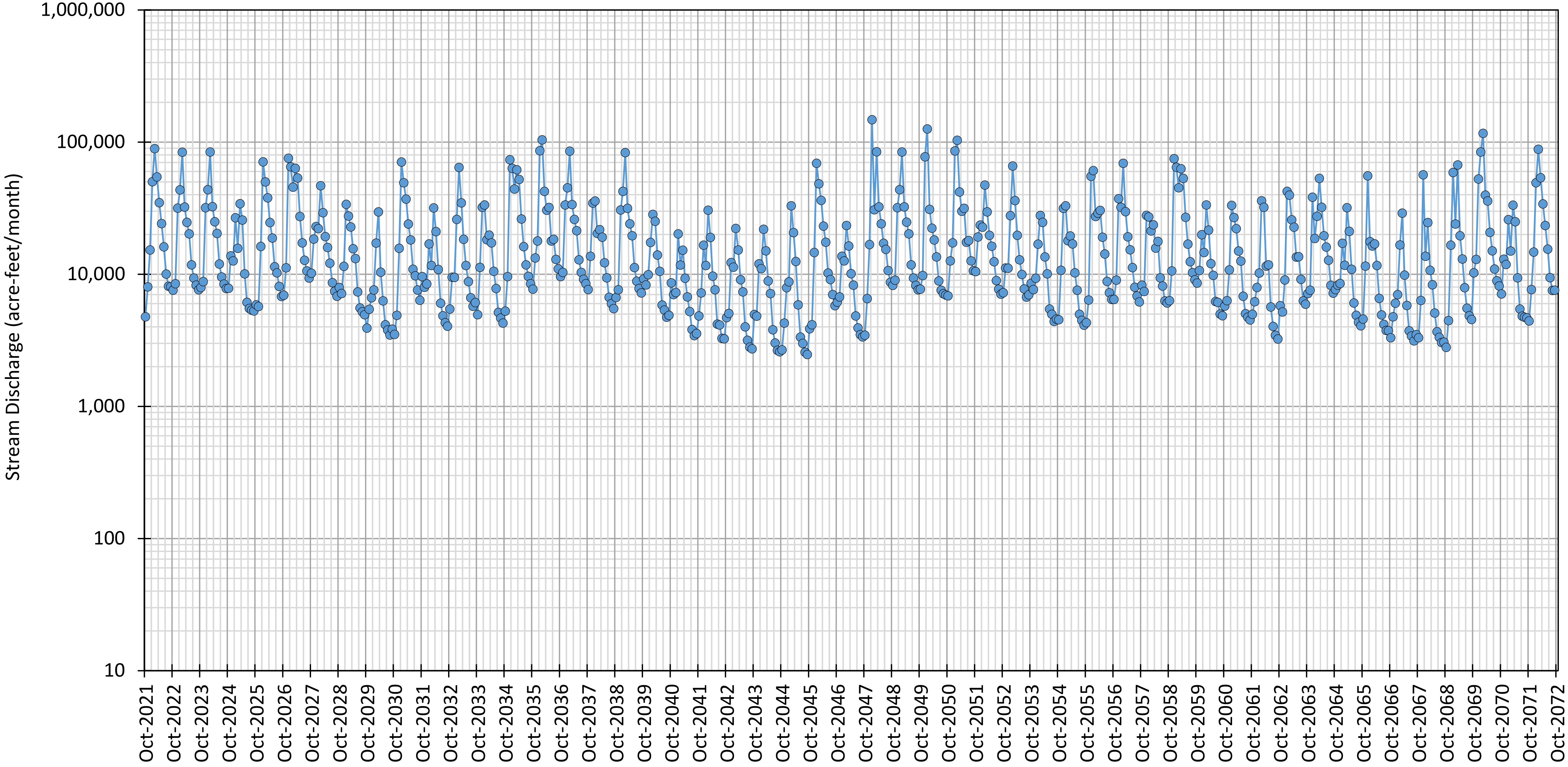
Antelope Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

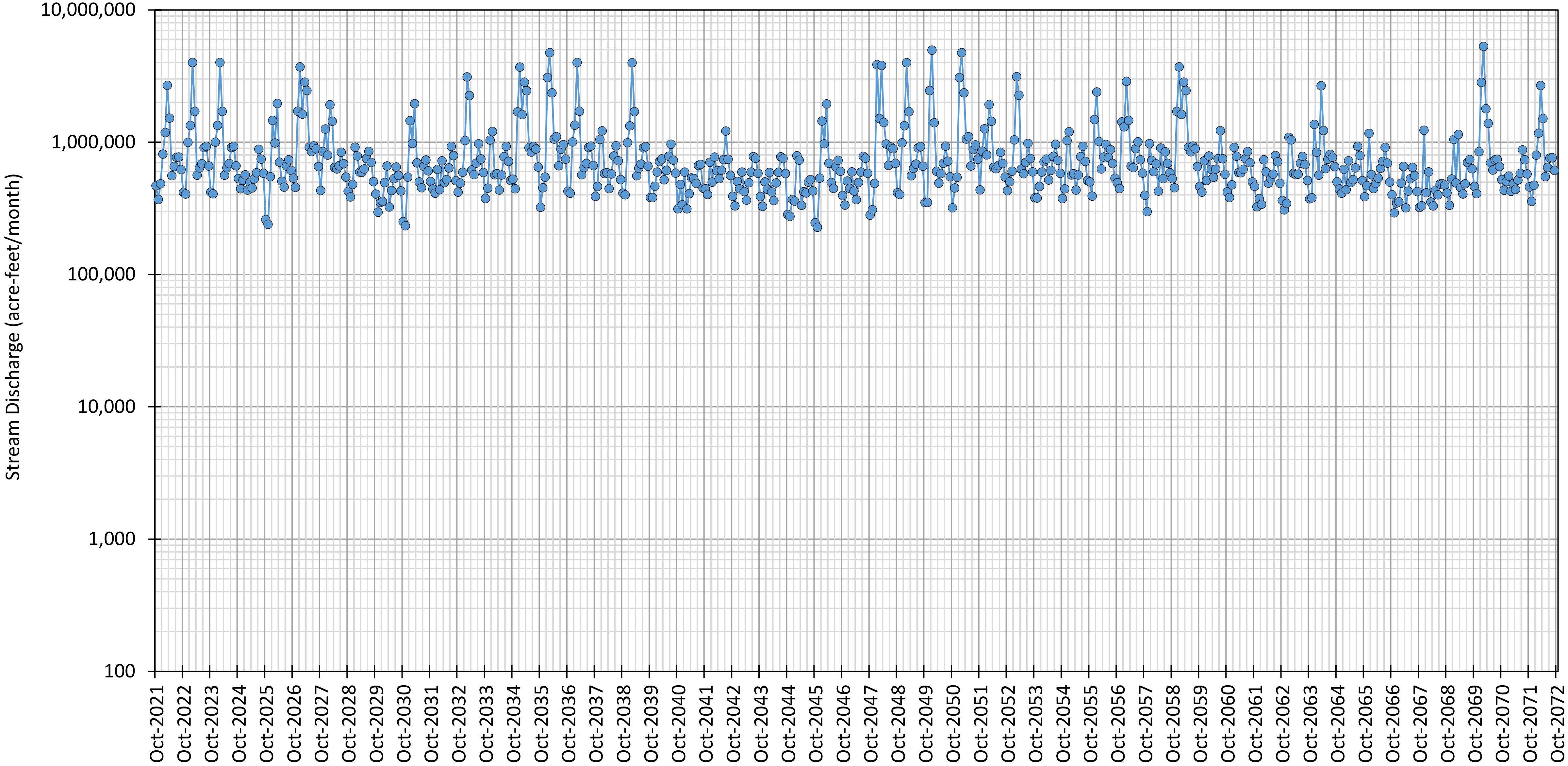
Antelope Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Sacramento River at Antelope Subbasin Boundary

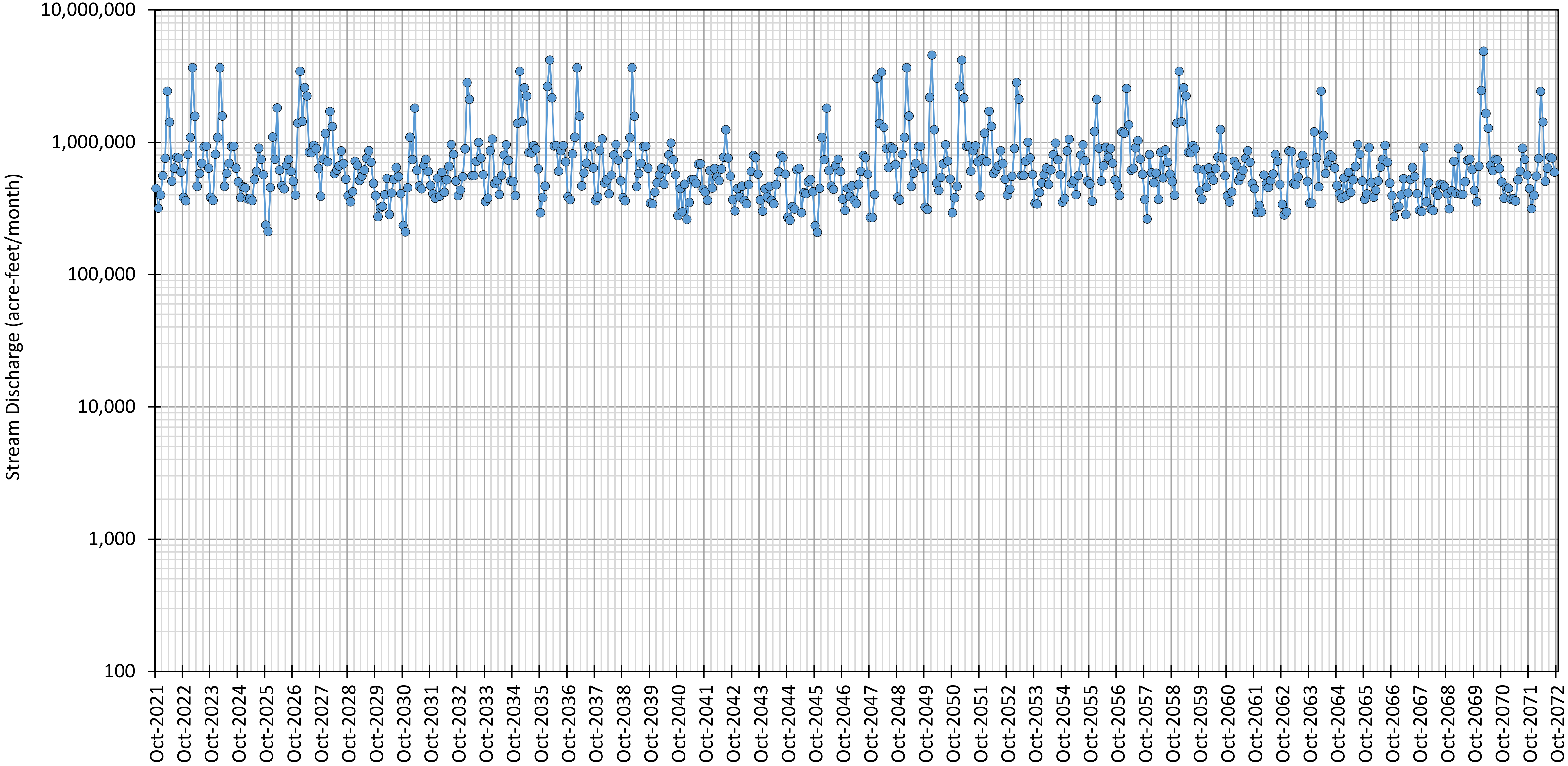
Antelope Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Inflow from Sacramento River at Bowman Subbasin Boundary

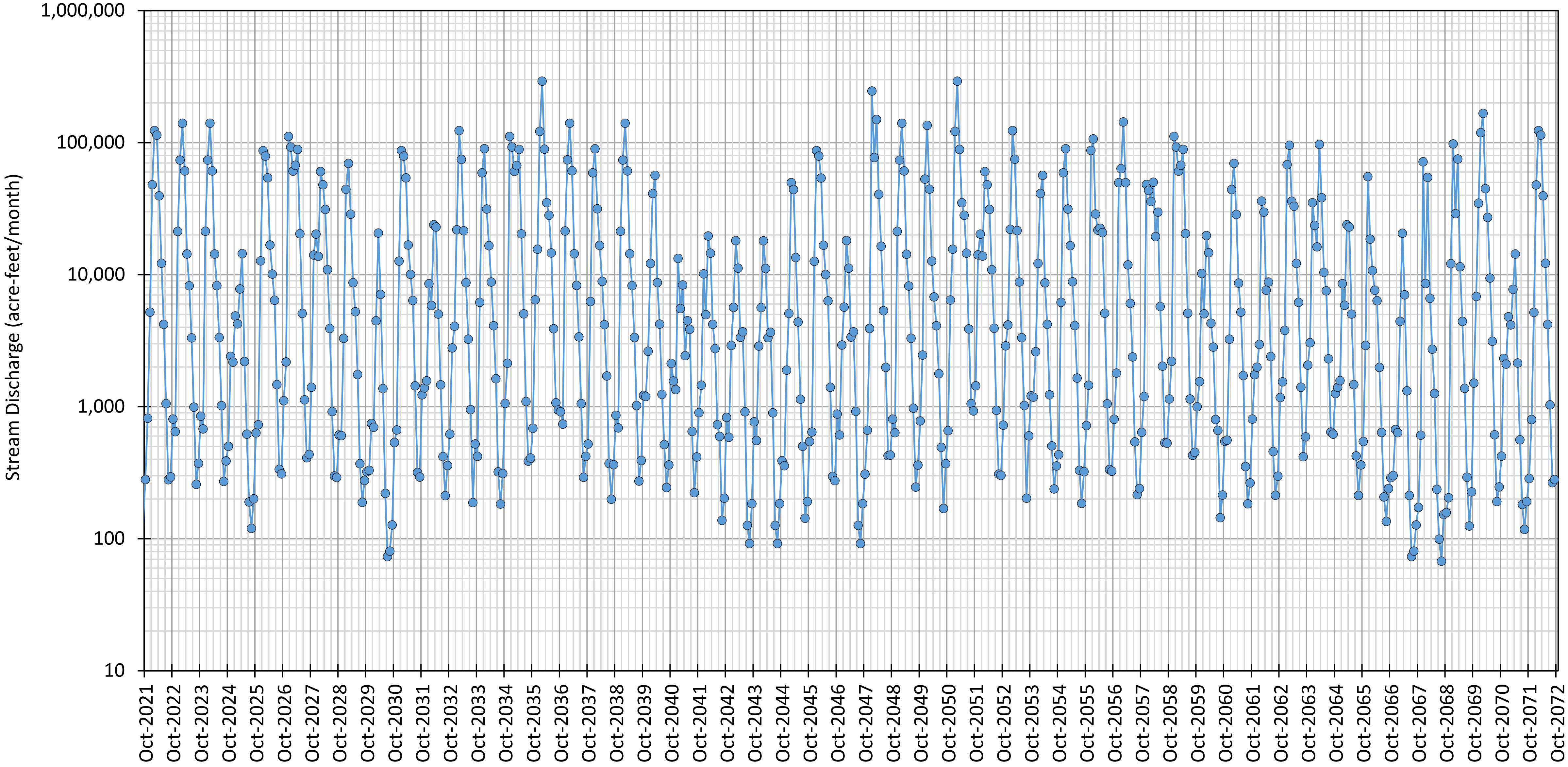
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

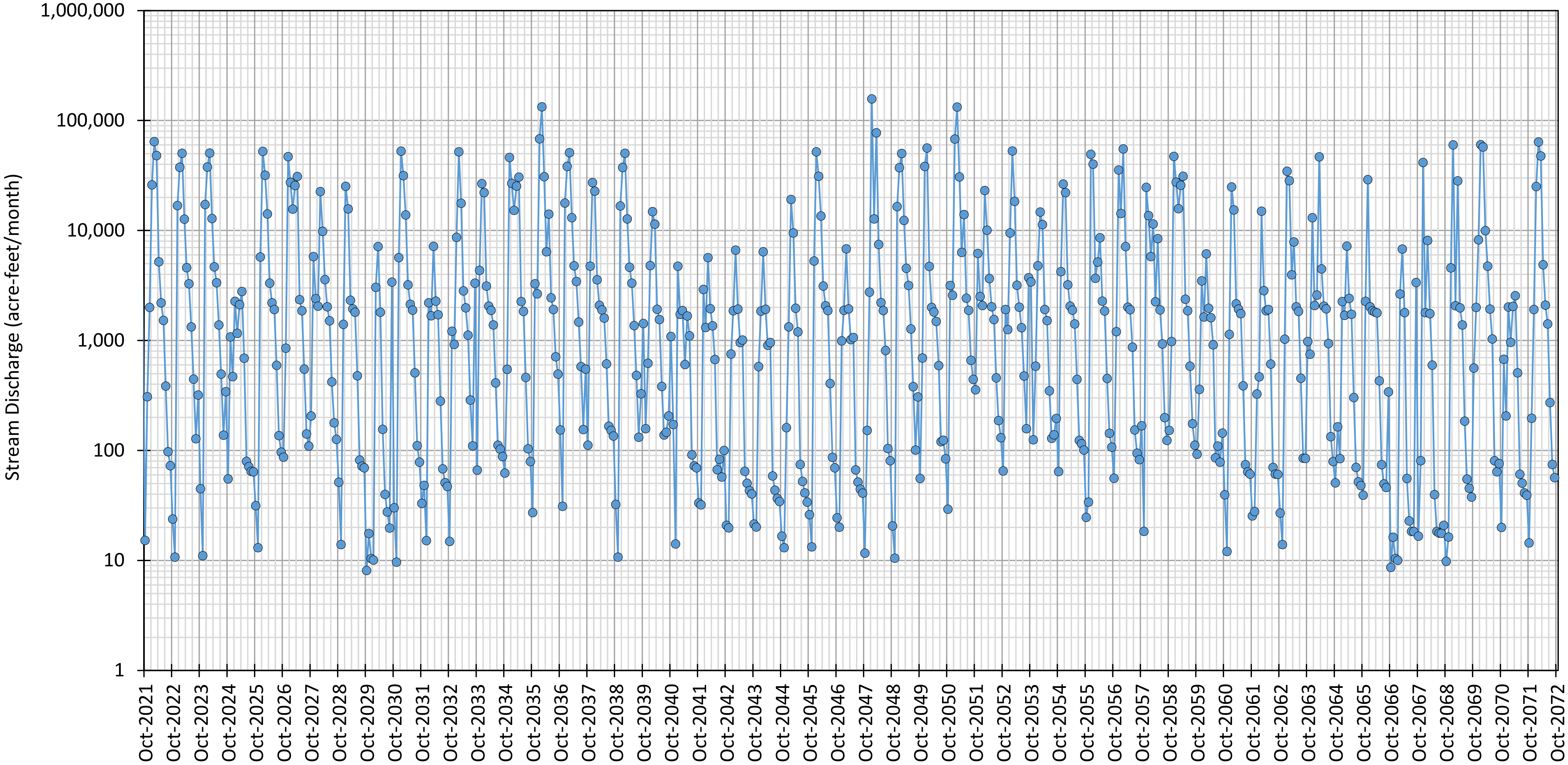
Outflow from MF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

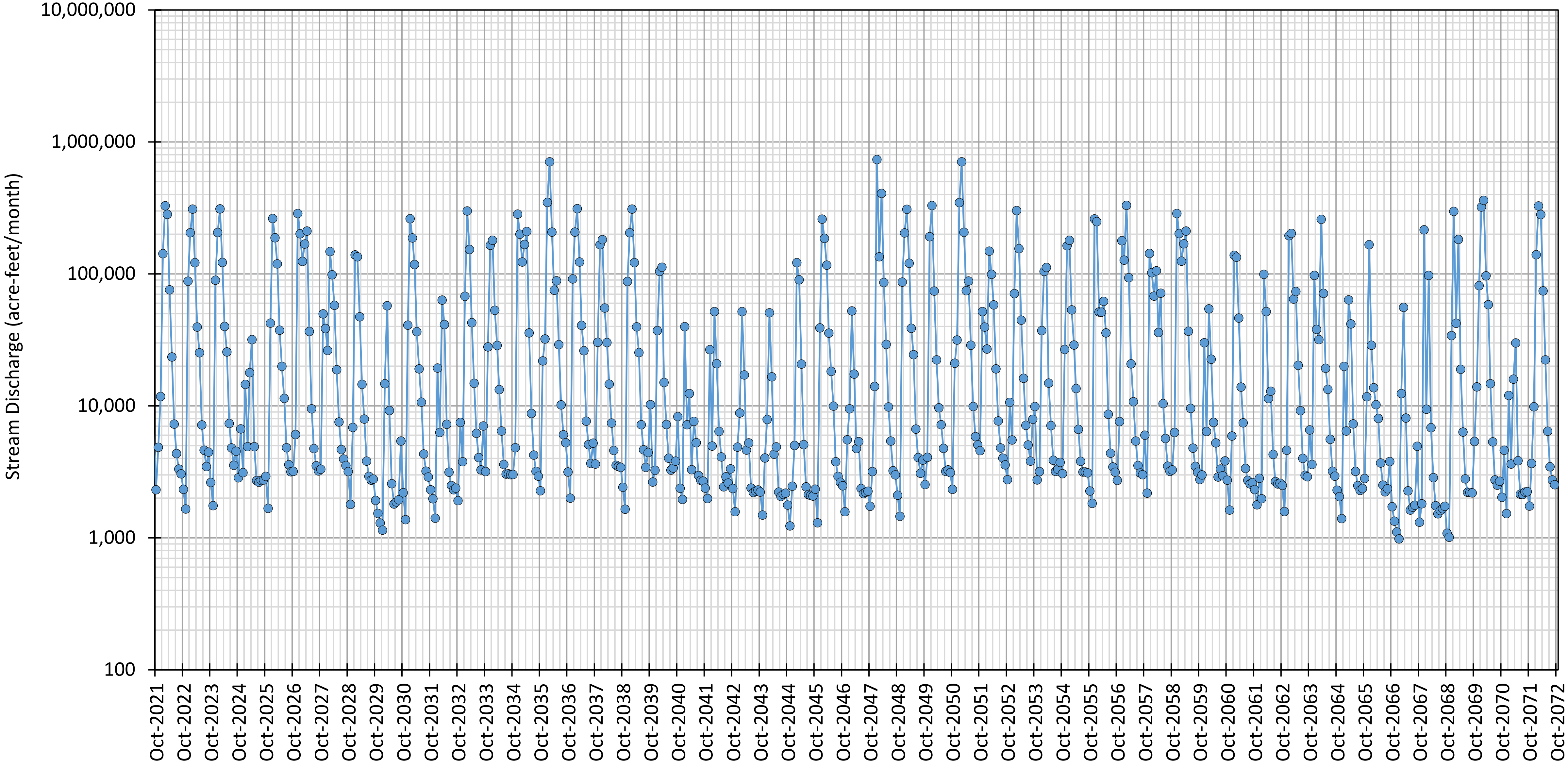
Outflow from SF Cottonwood Creek to Cottonwood Creek
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Cottonwood Creek to Sacramento River

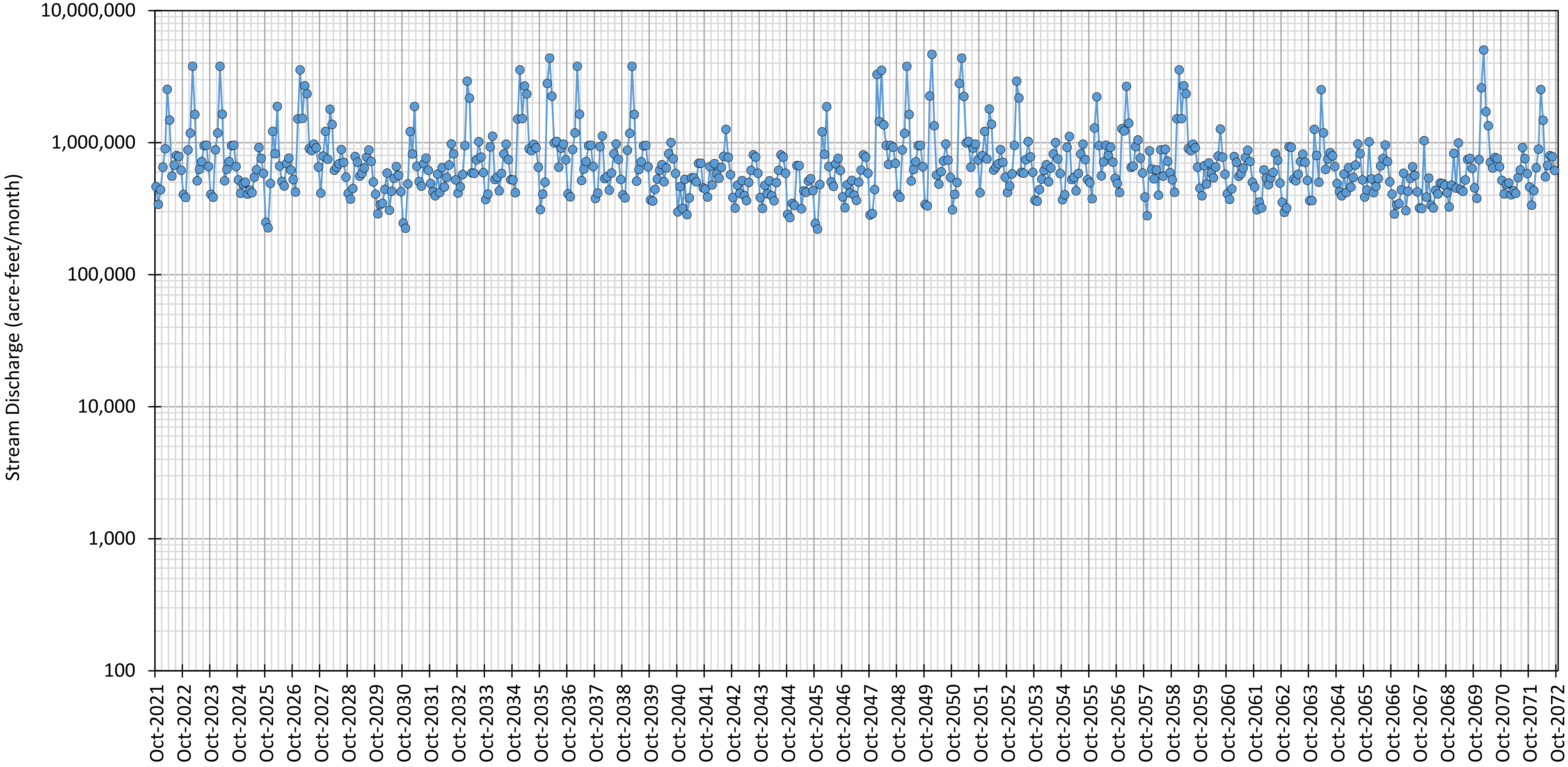
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Sacramento River at Bowman Subbasin Boundary

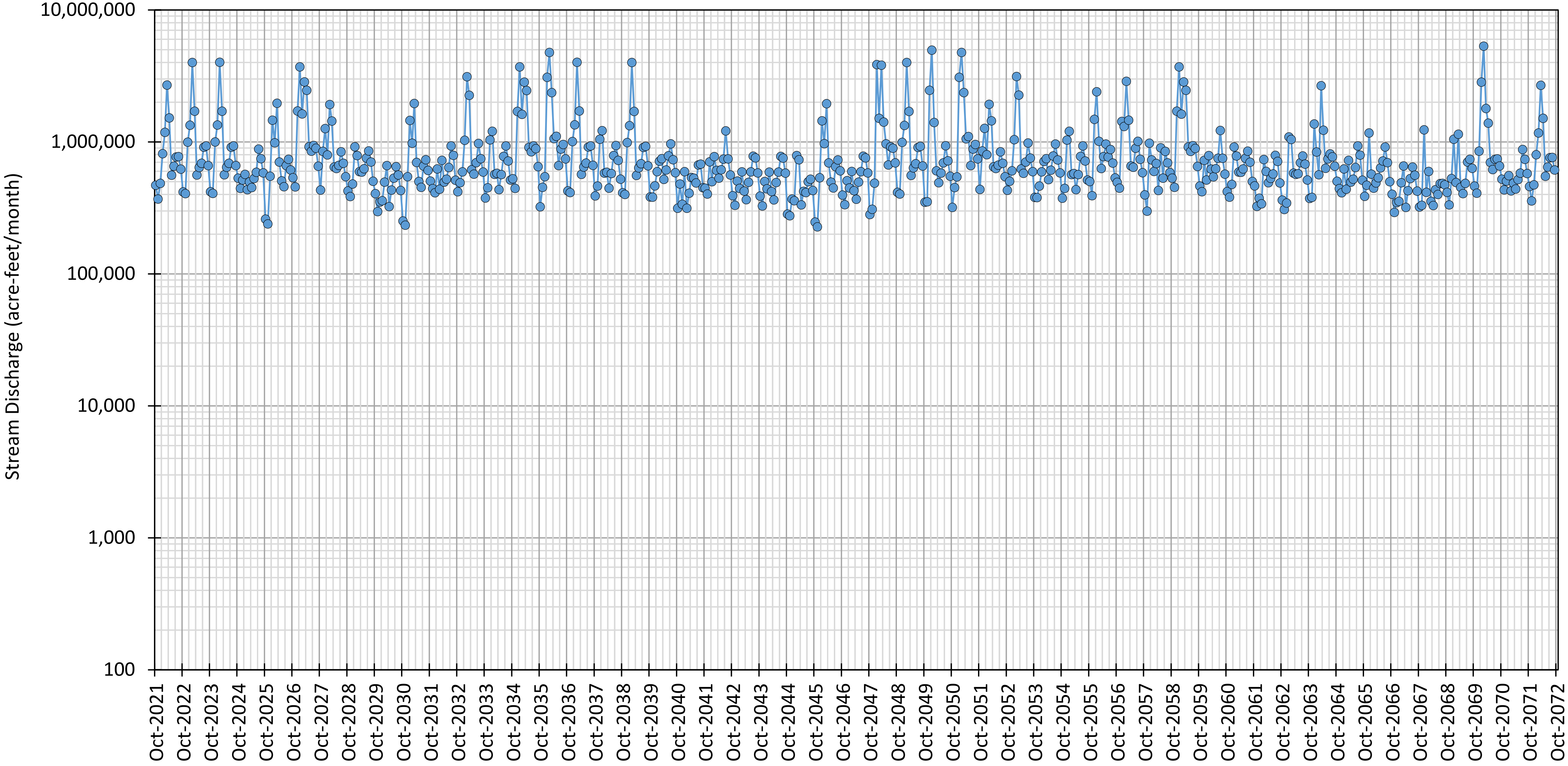
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

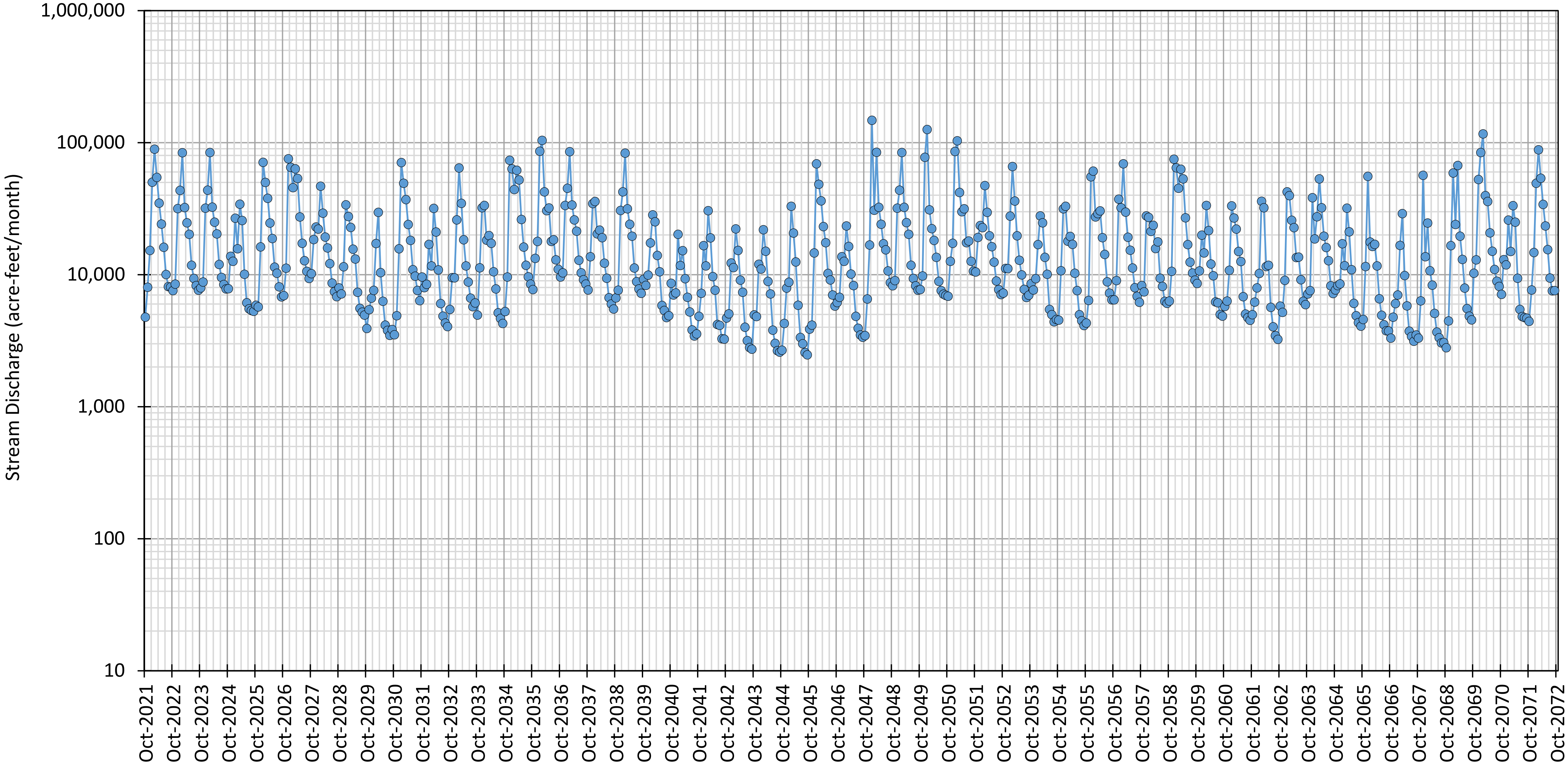
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

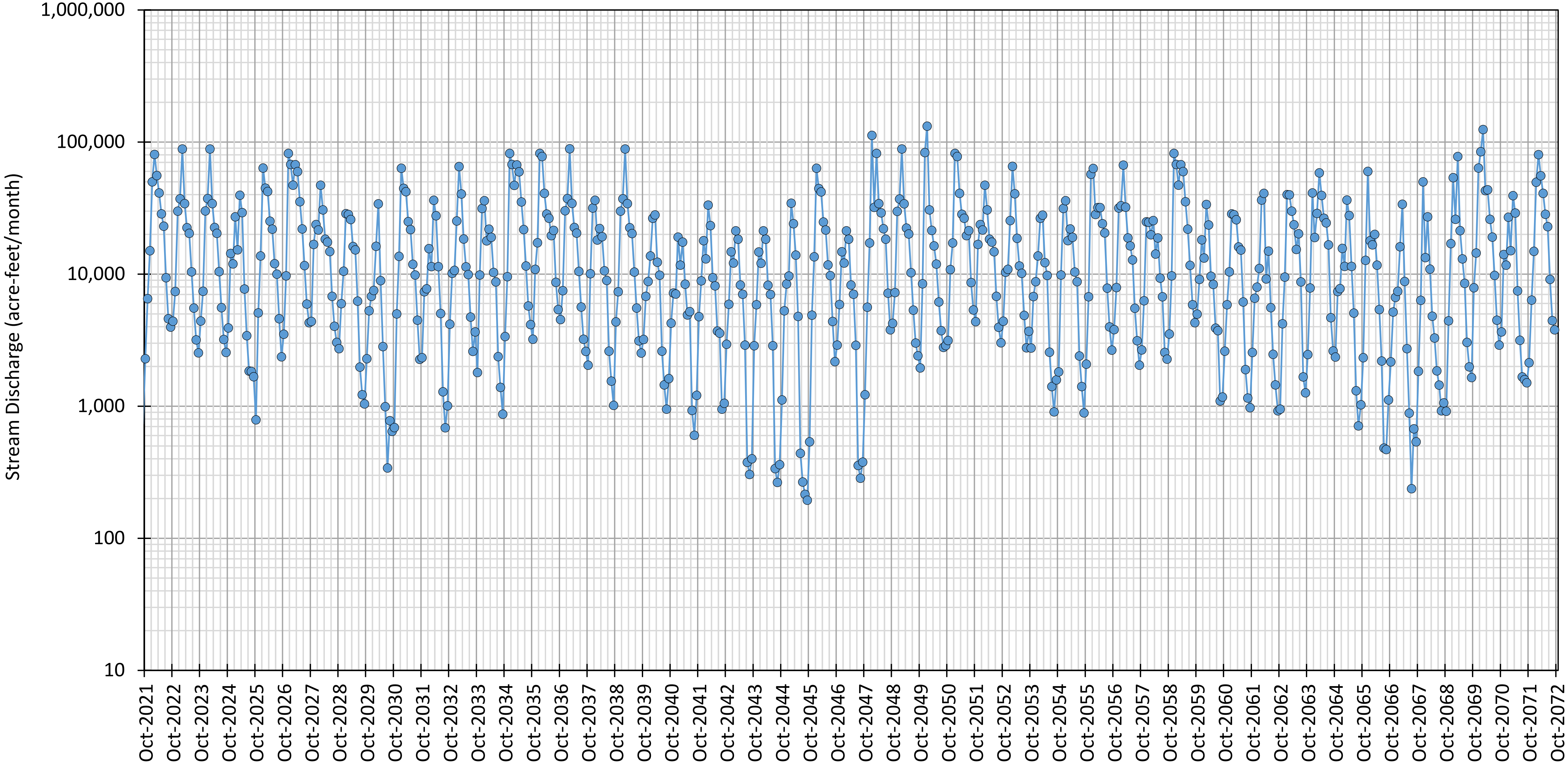
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Mill Creek to Sacramento River

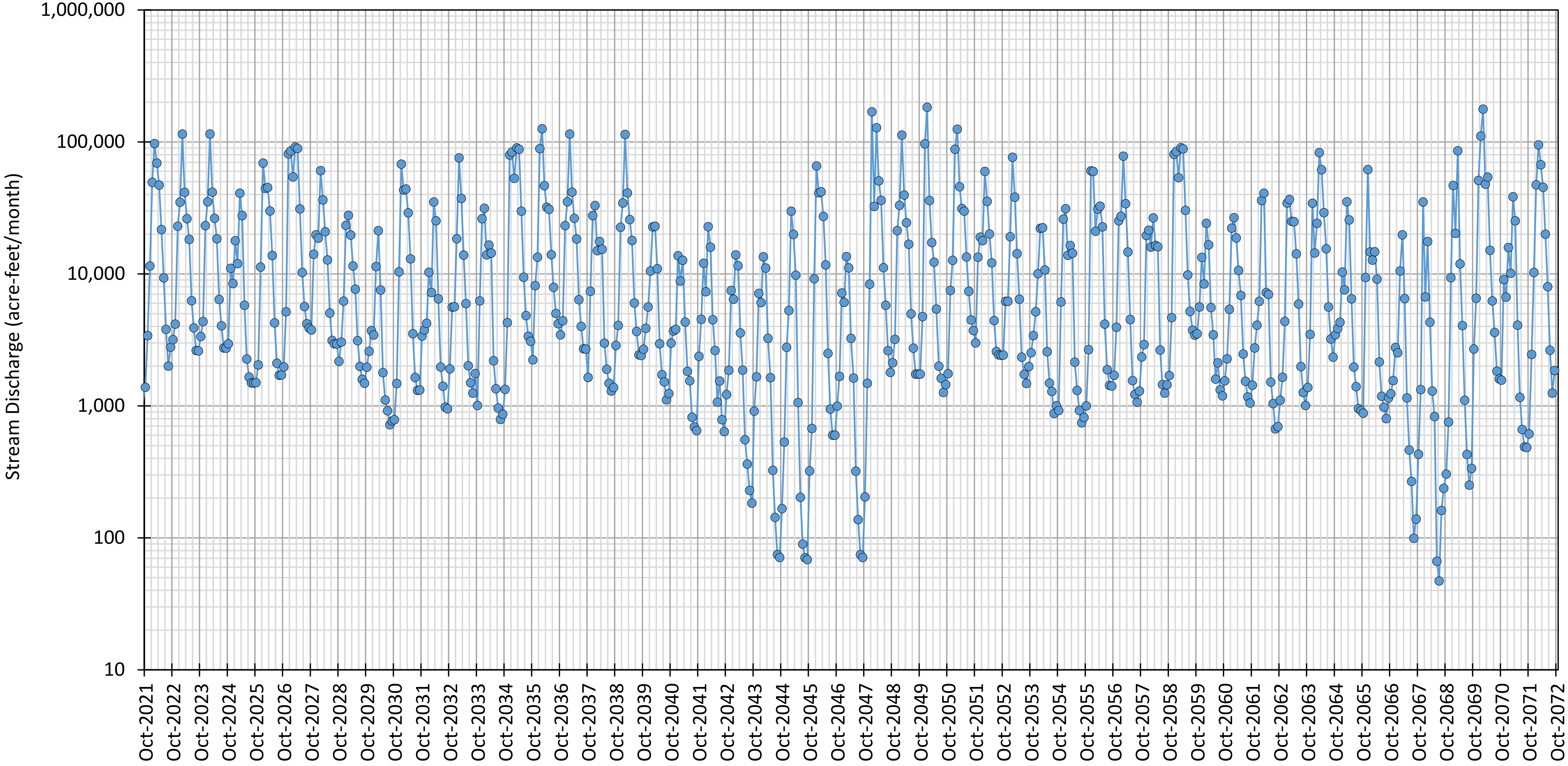
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Deer Creek Group to Sacramento River

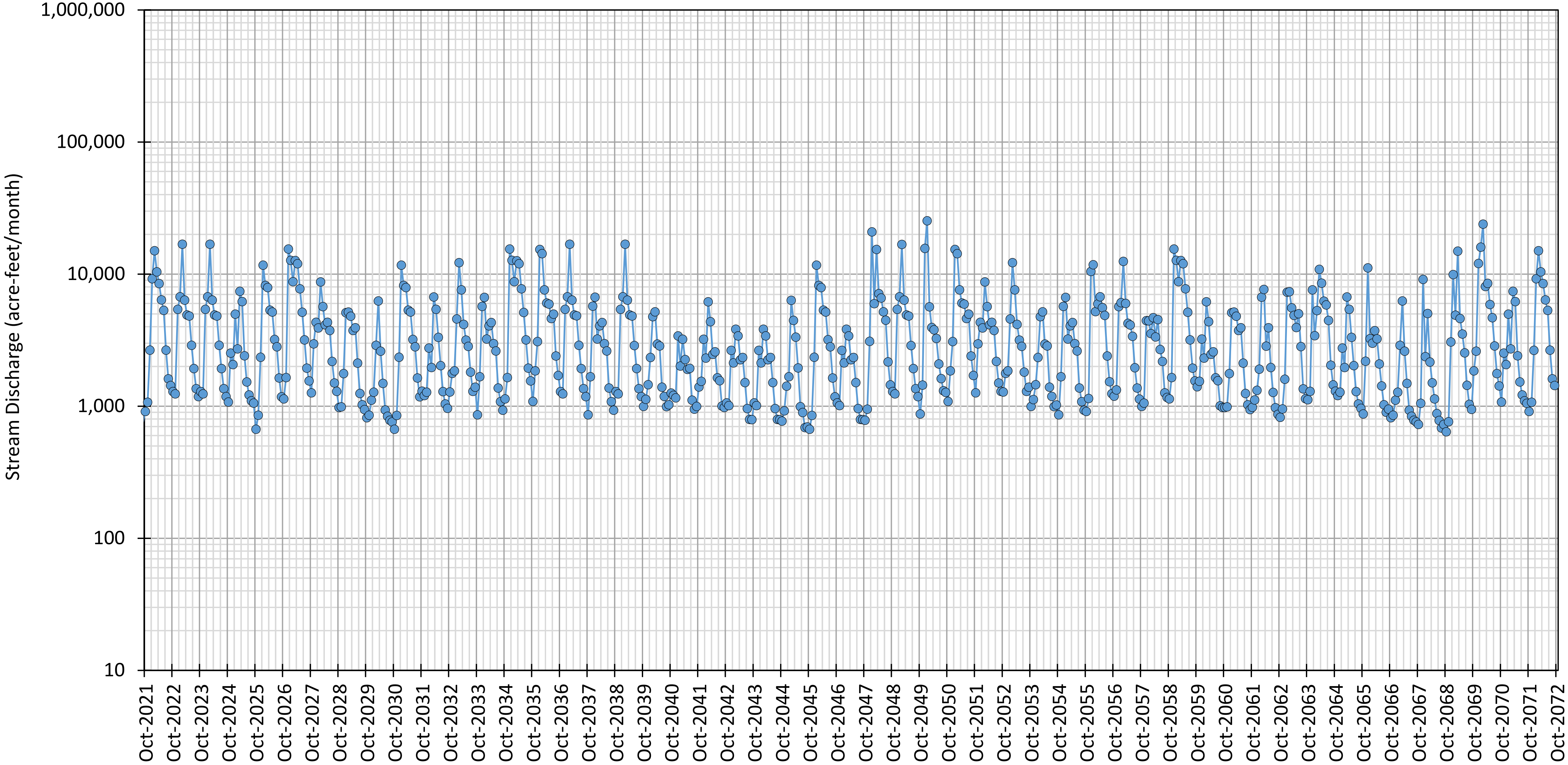
Los Molinos Subbasin



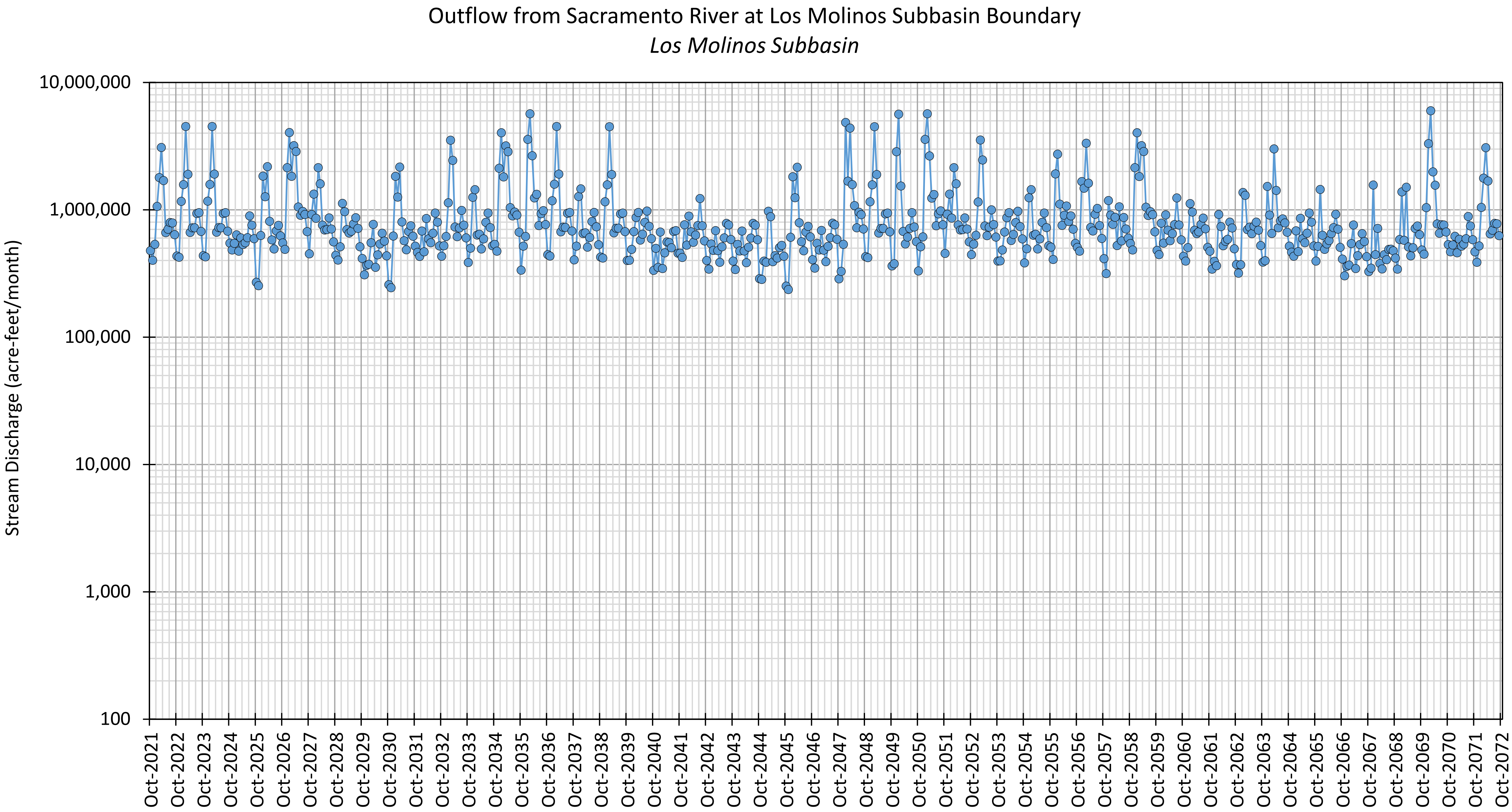
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Dye Creek to Sacramento River

Los Molinos Subbasin



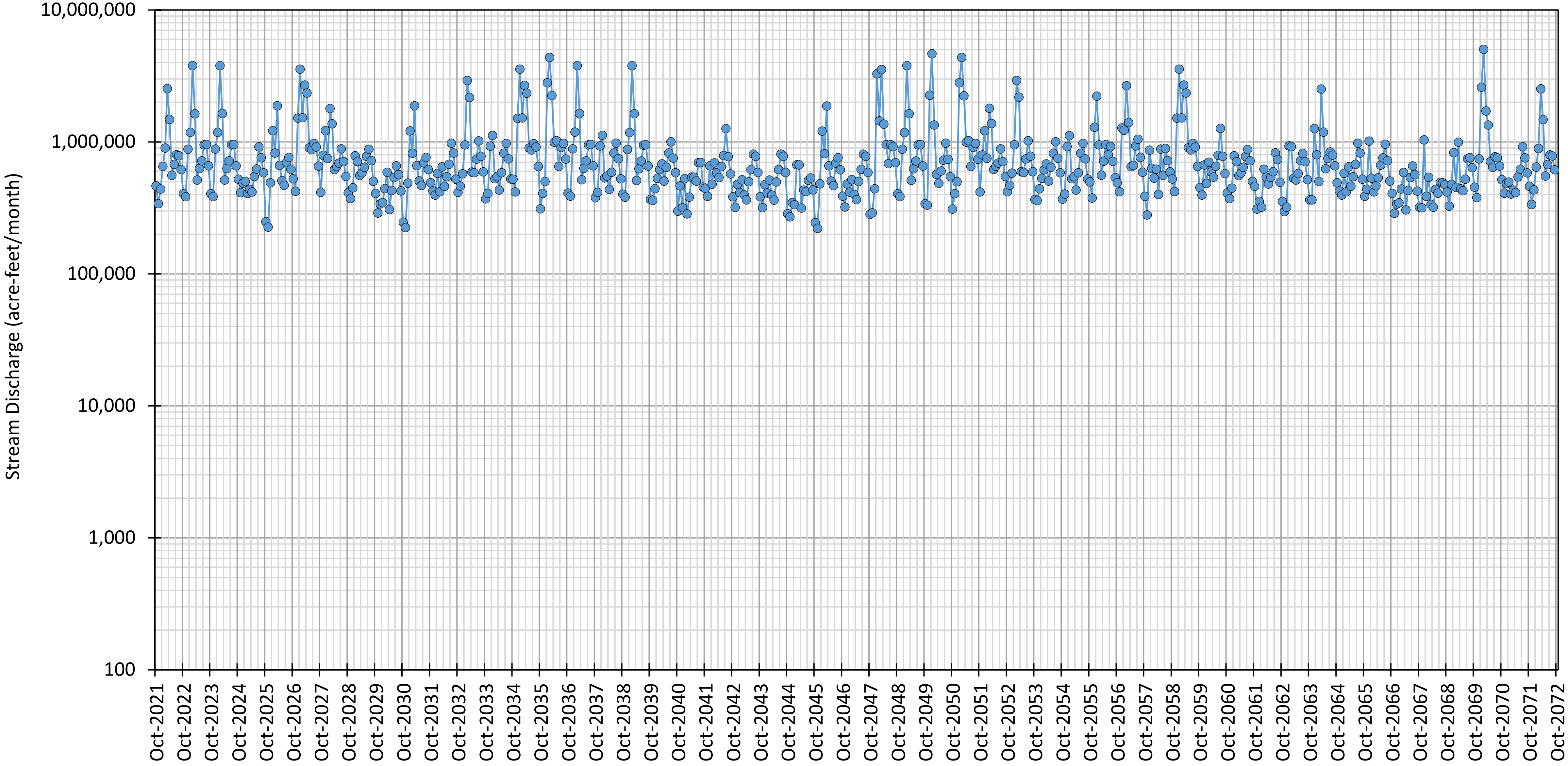
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

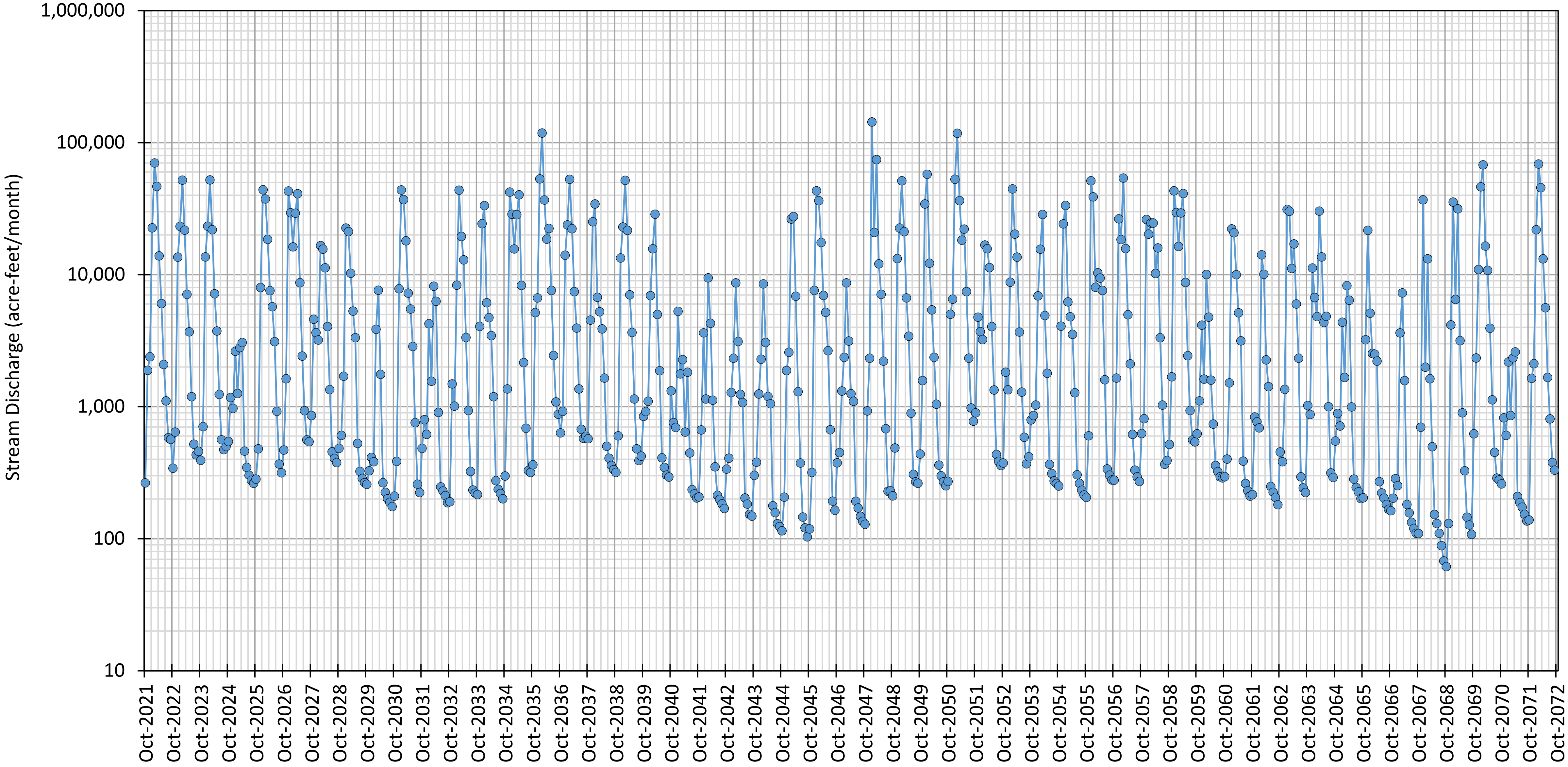
Inflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin

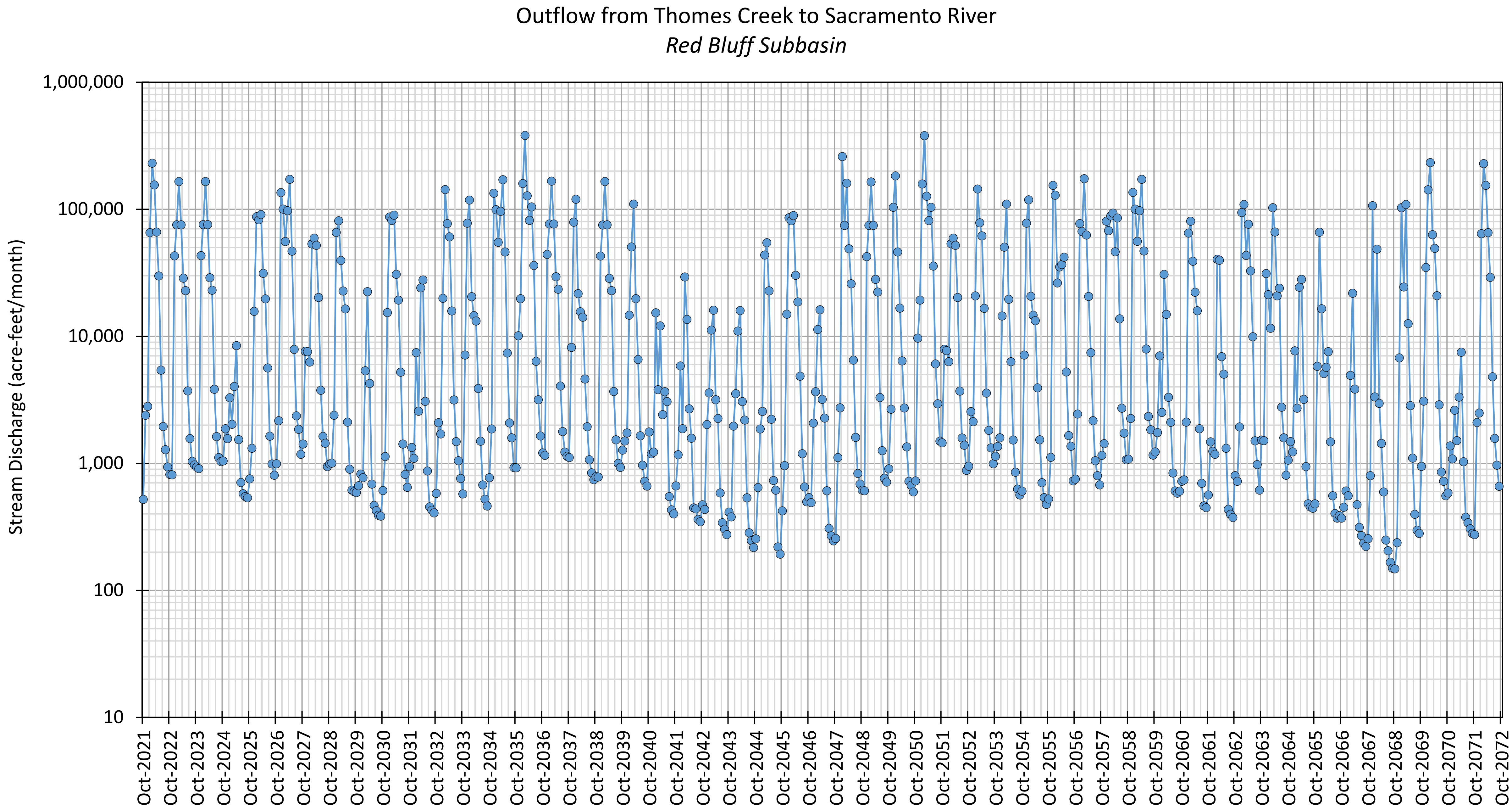


Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Elder Creek to Sacramento River
Red Bluff Subbasin



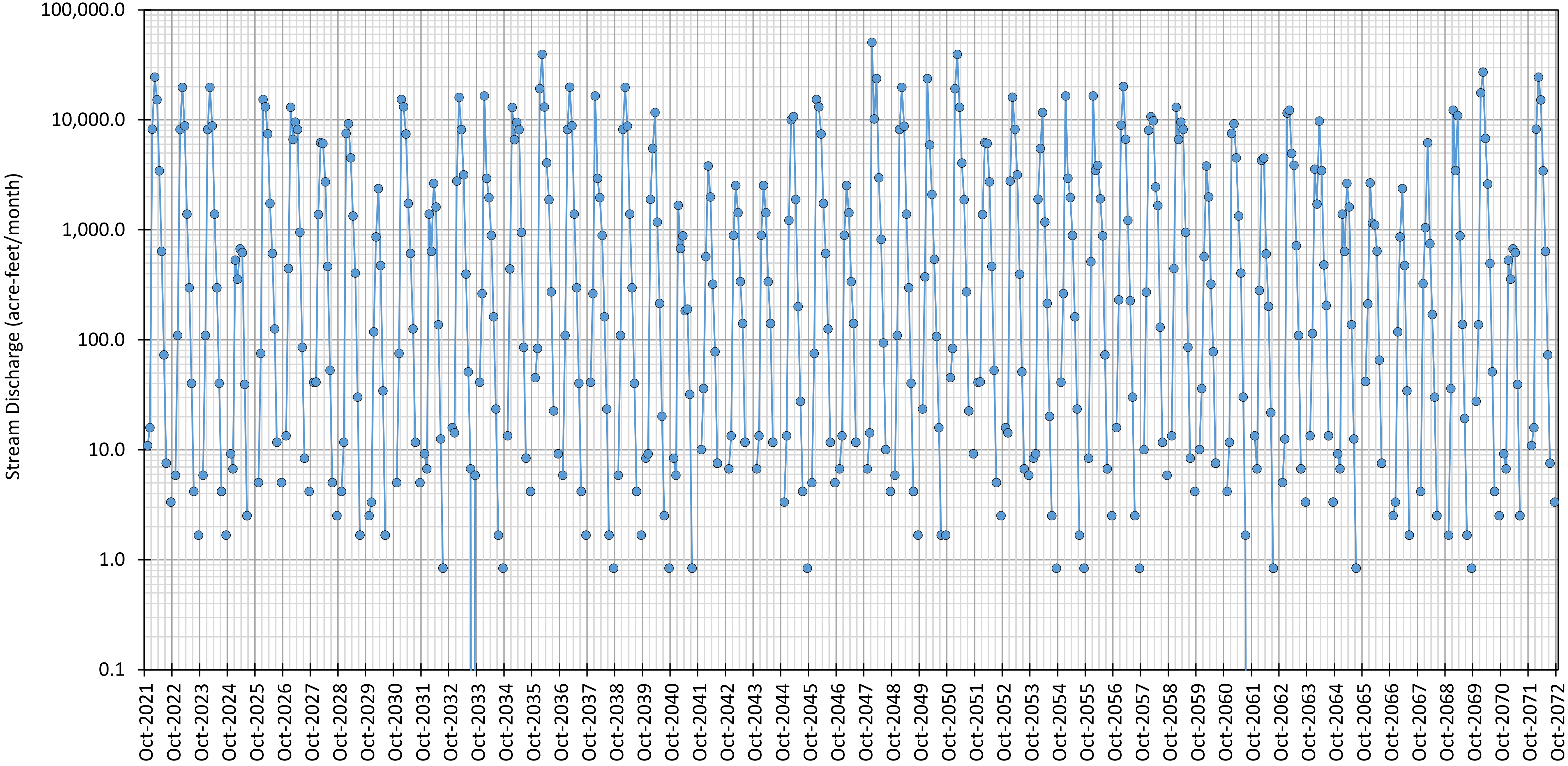
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Red Bank Creek to Sacramento River

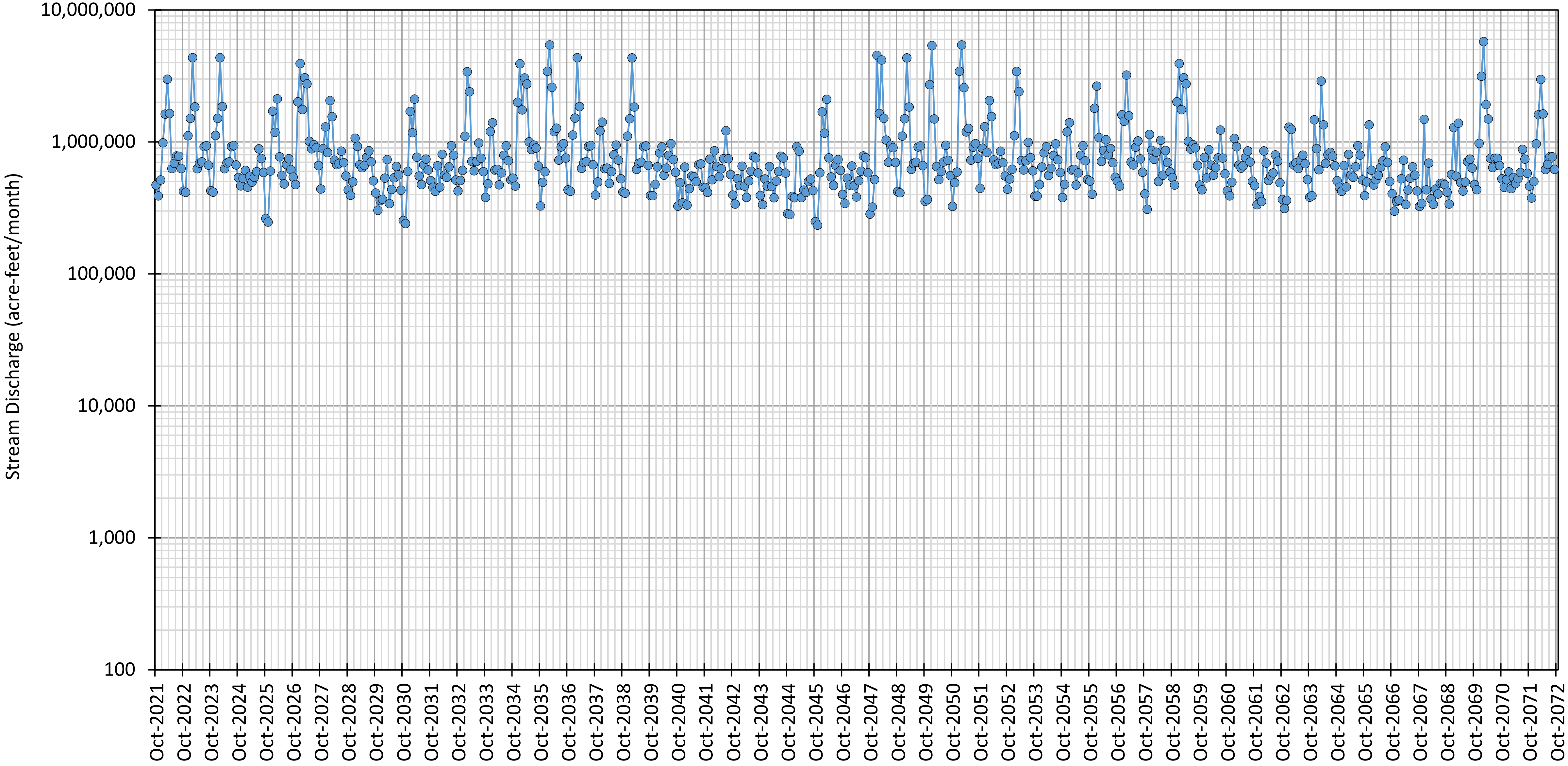
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

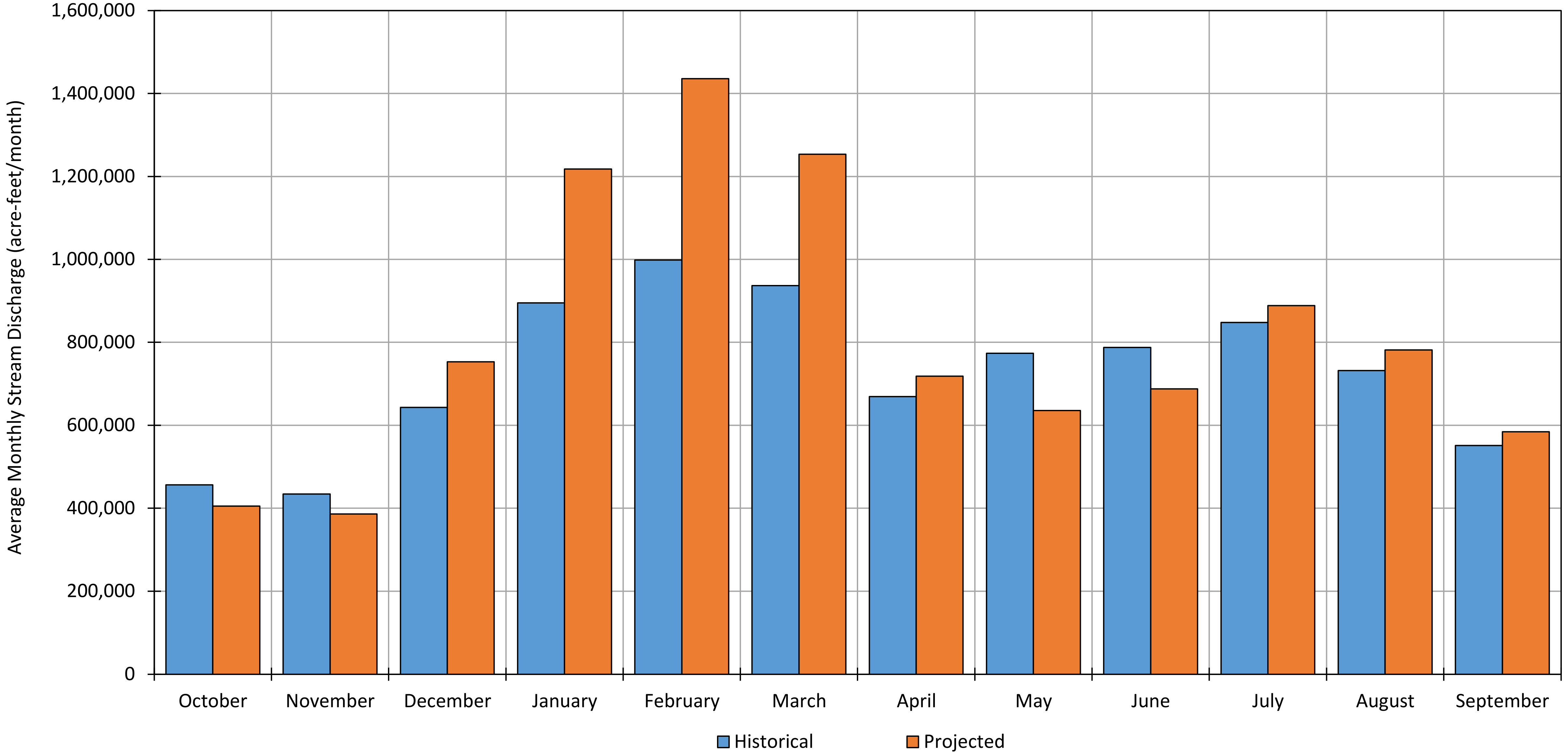
Red Bluff Subbasin



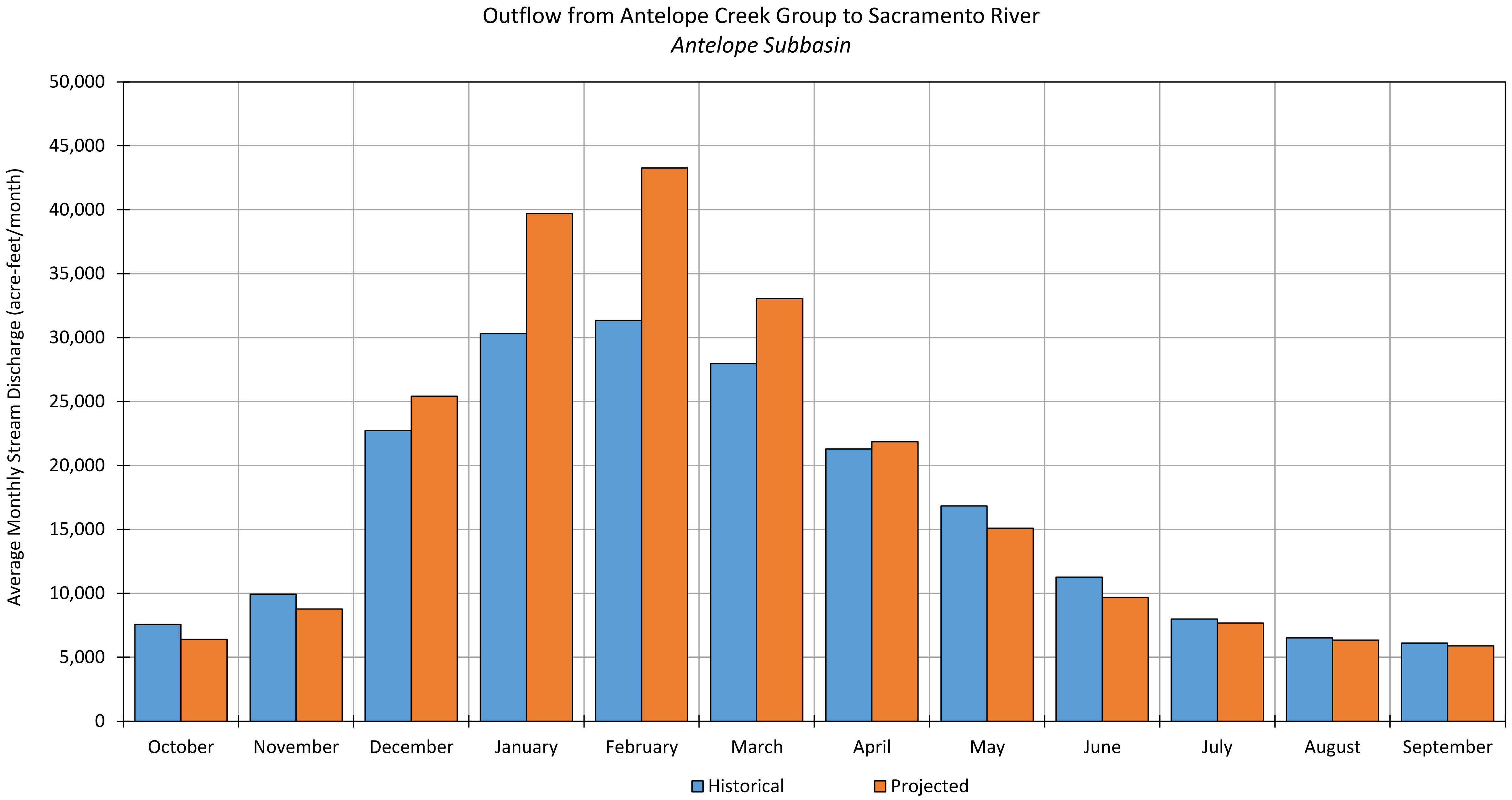
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Inflow from Sacramento River at Antelope Subbasin Boundary

Antelope Subbasin



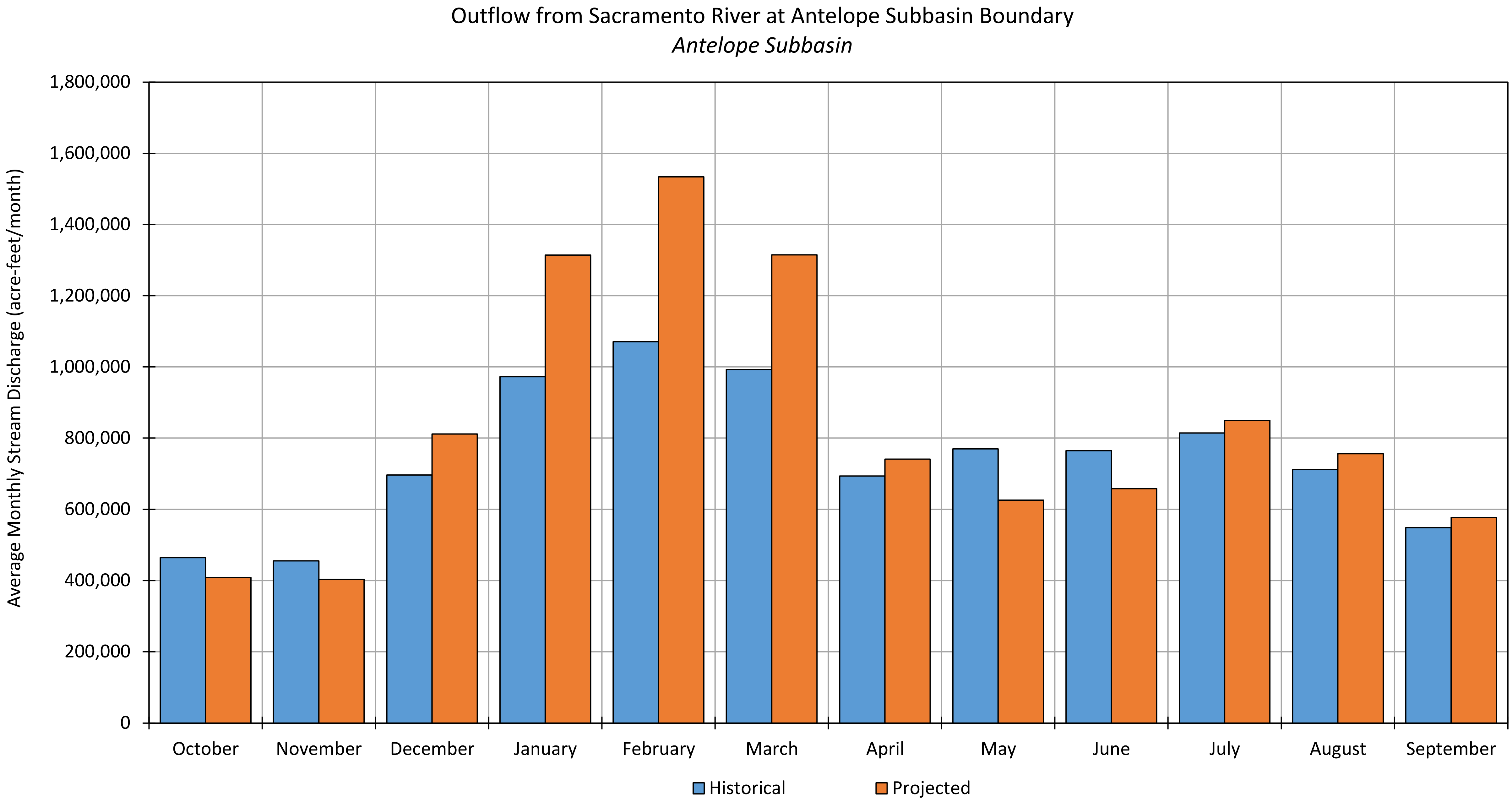
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin

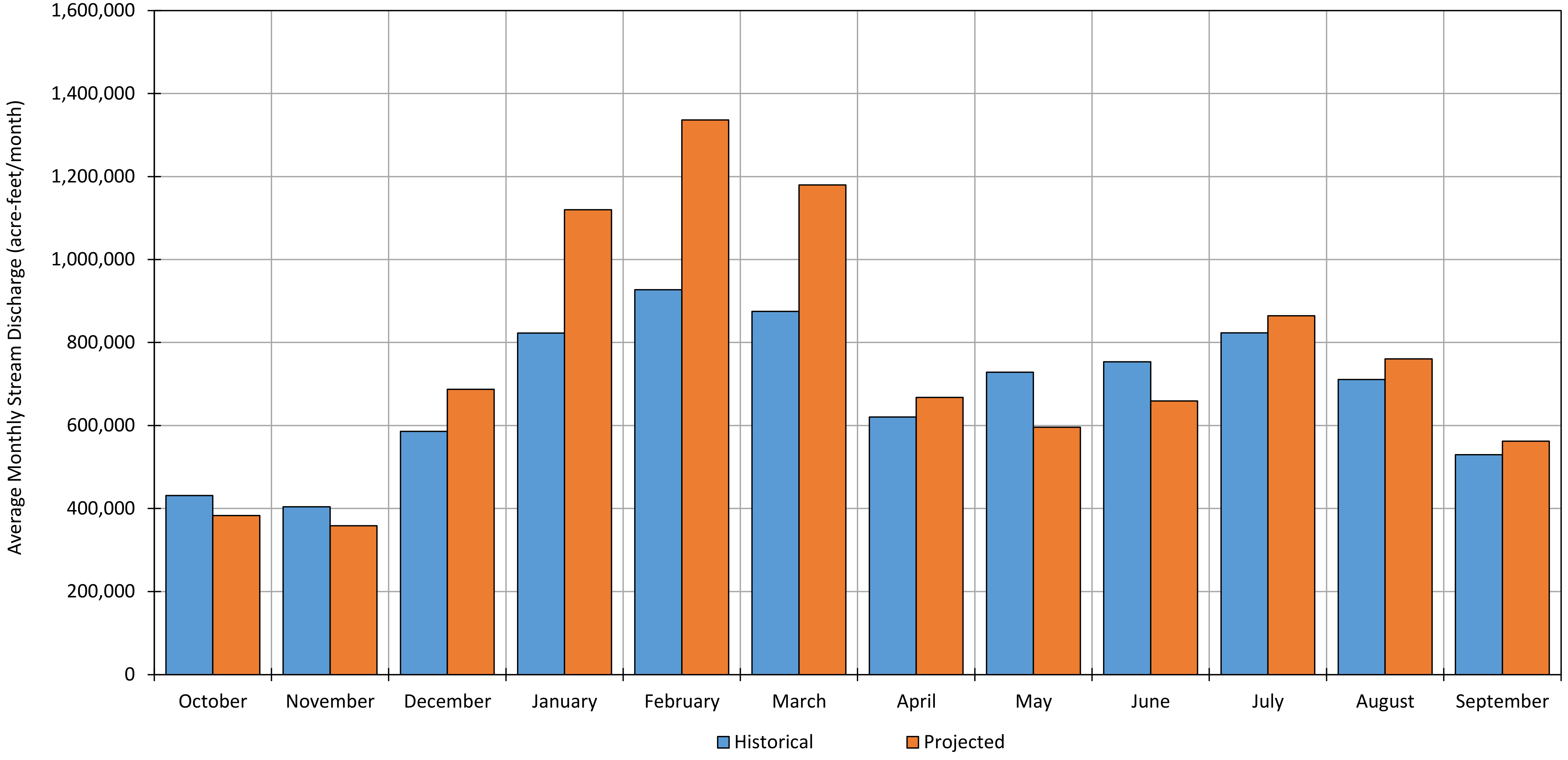
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin



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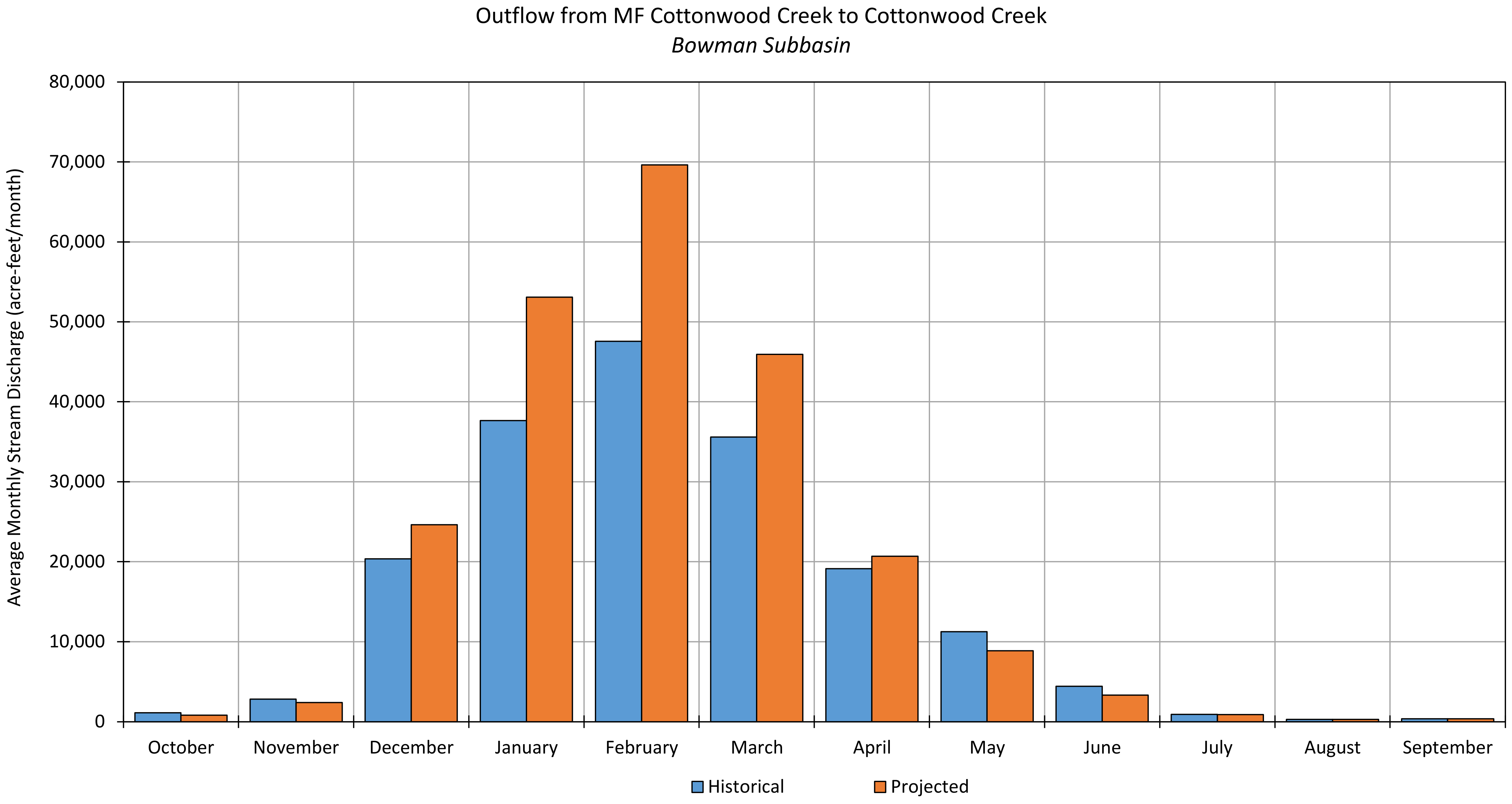
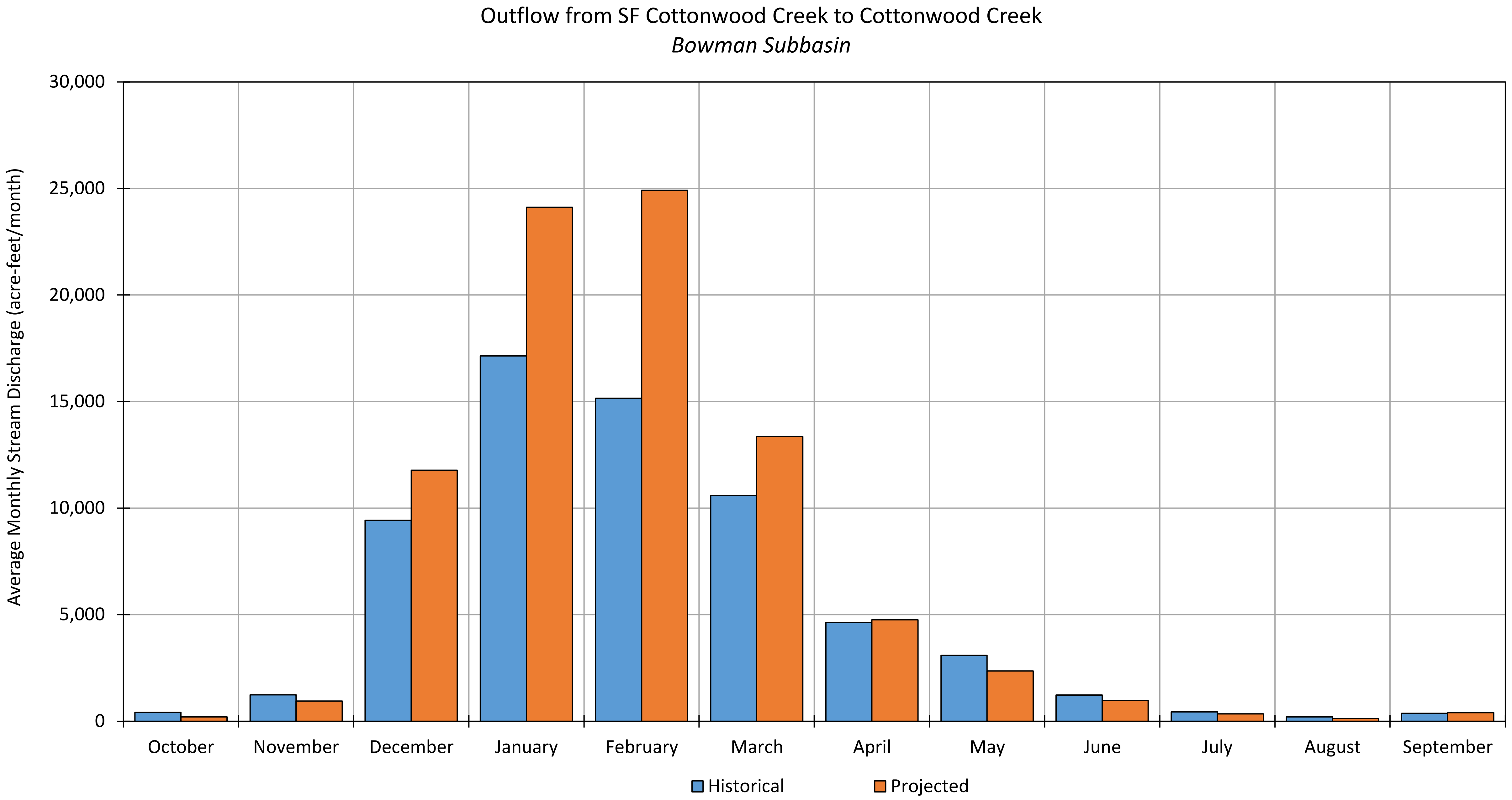


Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



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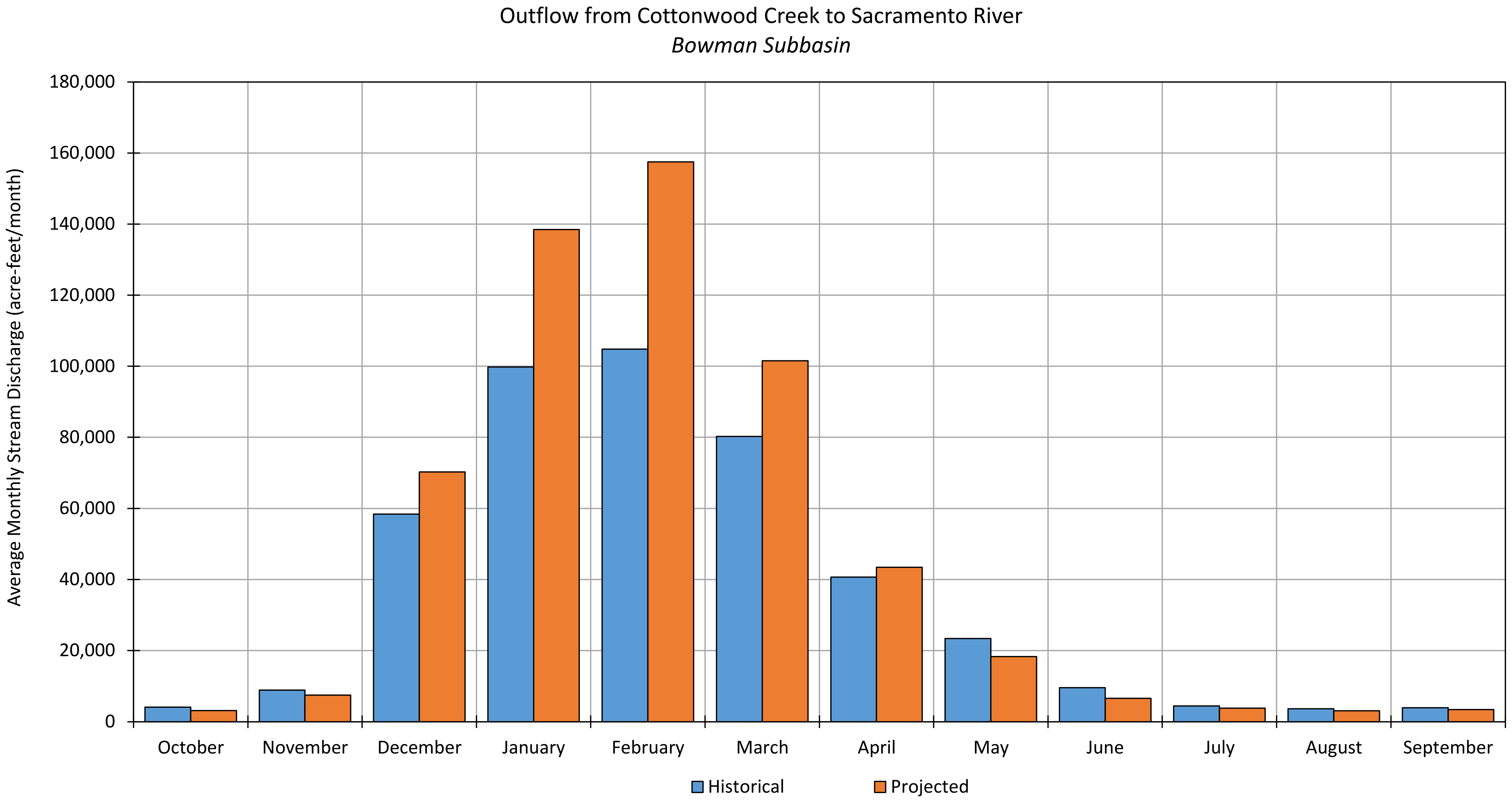
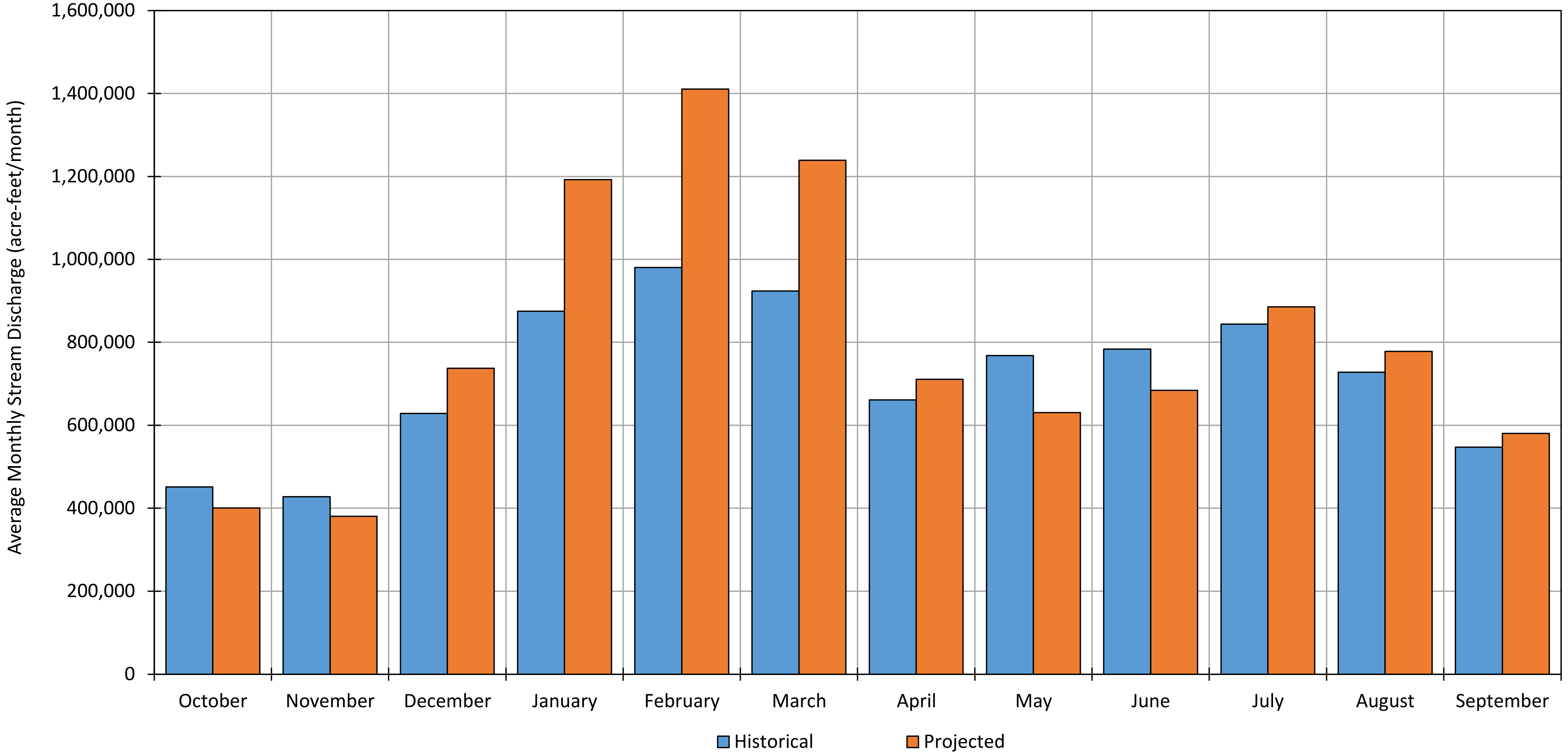


Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

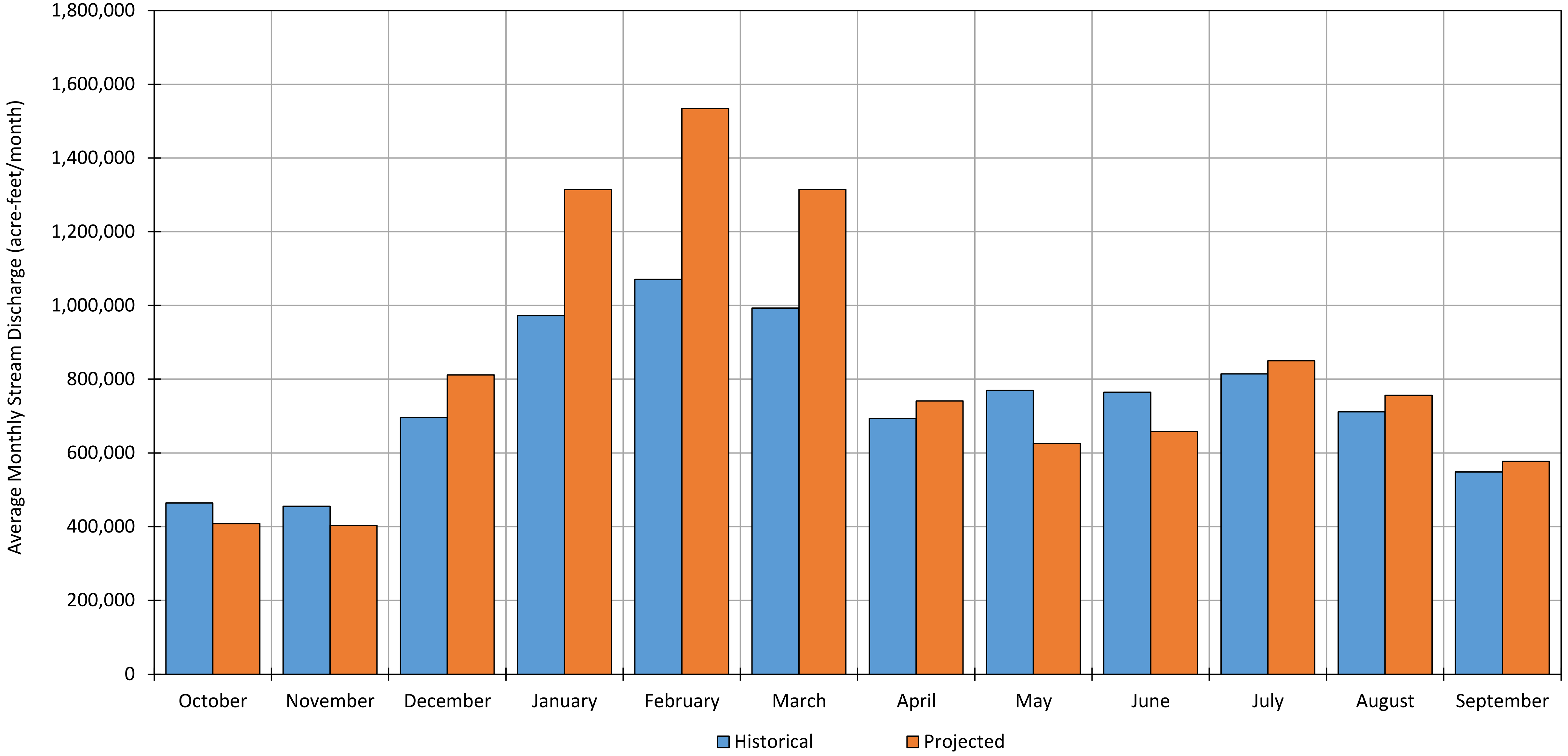
Outflow from Sacramento River at Bowman Subbasin Boundary
Bowman Subbasin



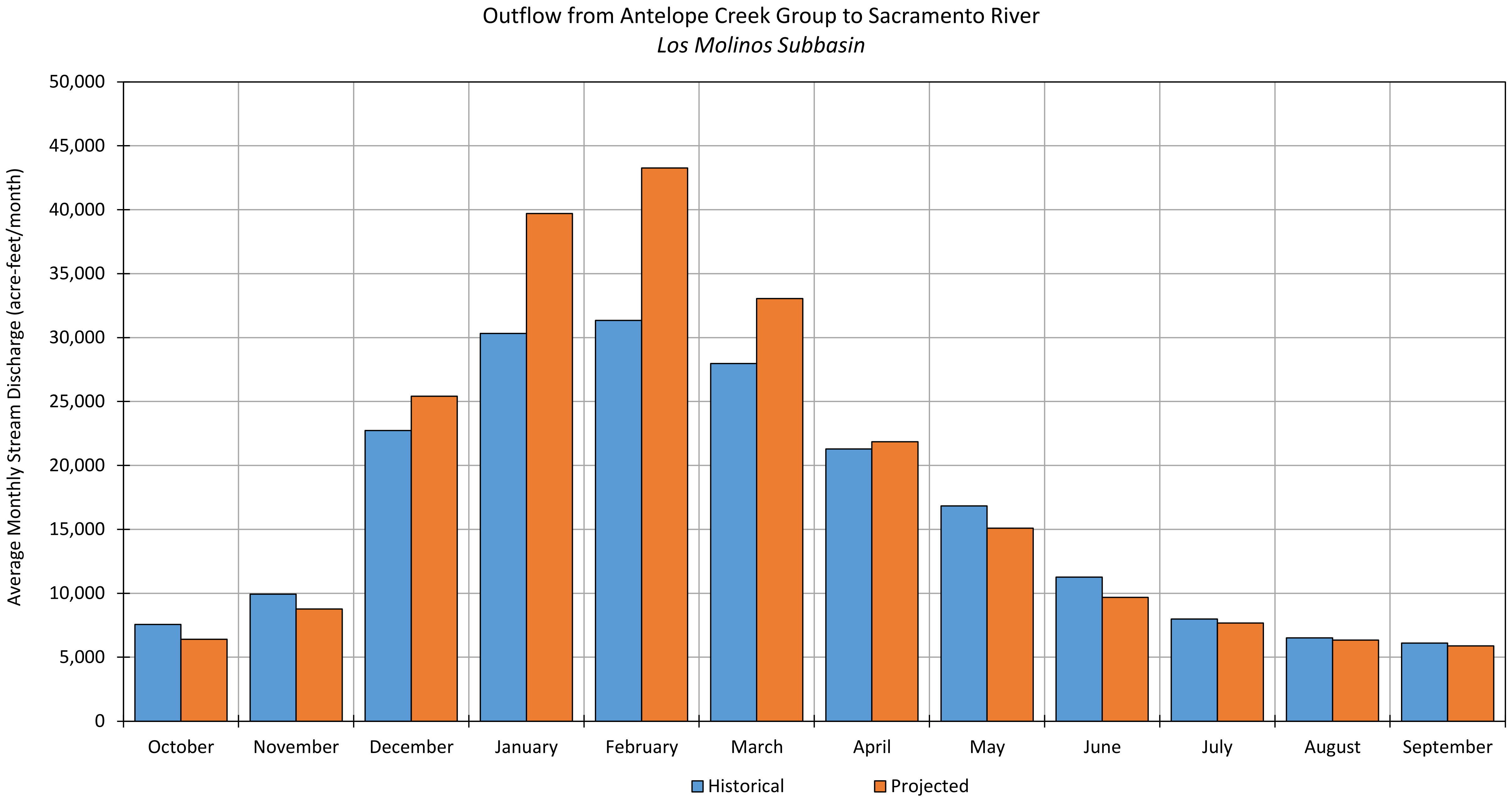
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Inflow from Sacramento River at Los Molinos Subbasin Boundary

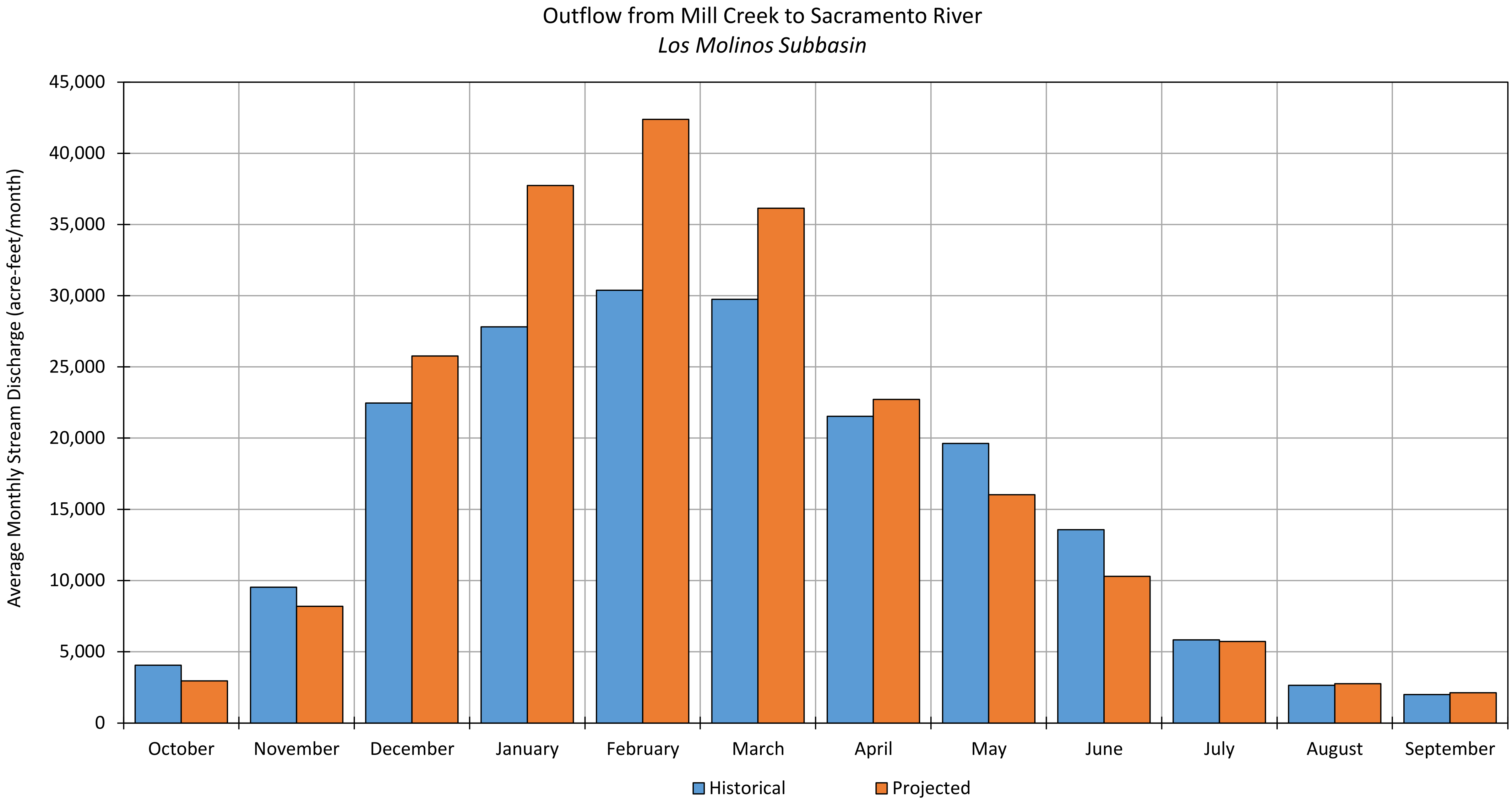
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



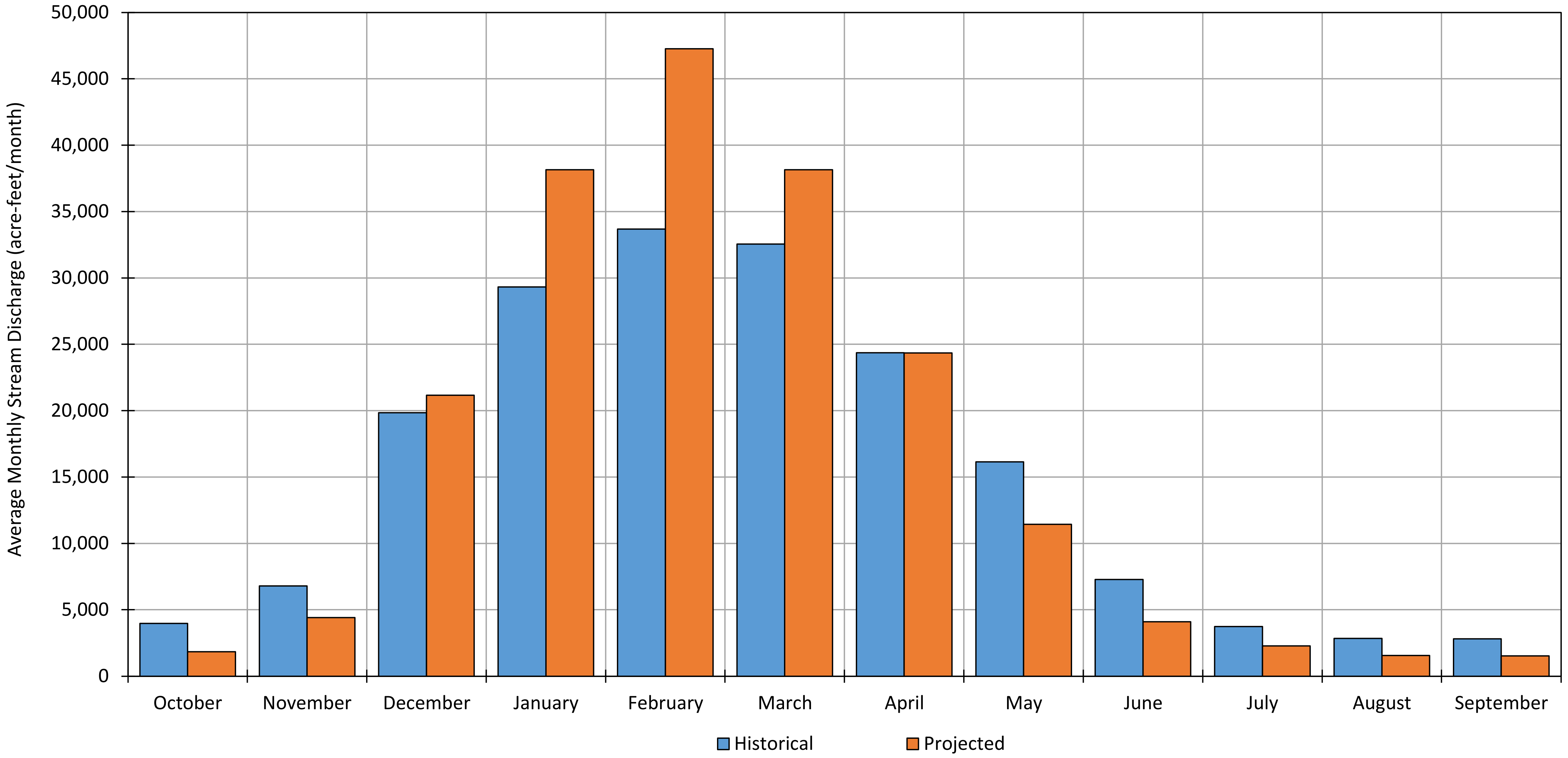
Outflow from Mill Creek to Sacramento River

Los Molinos Subbasin

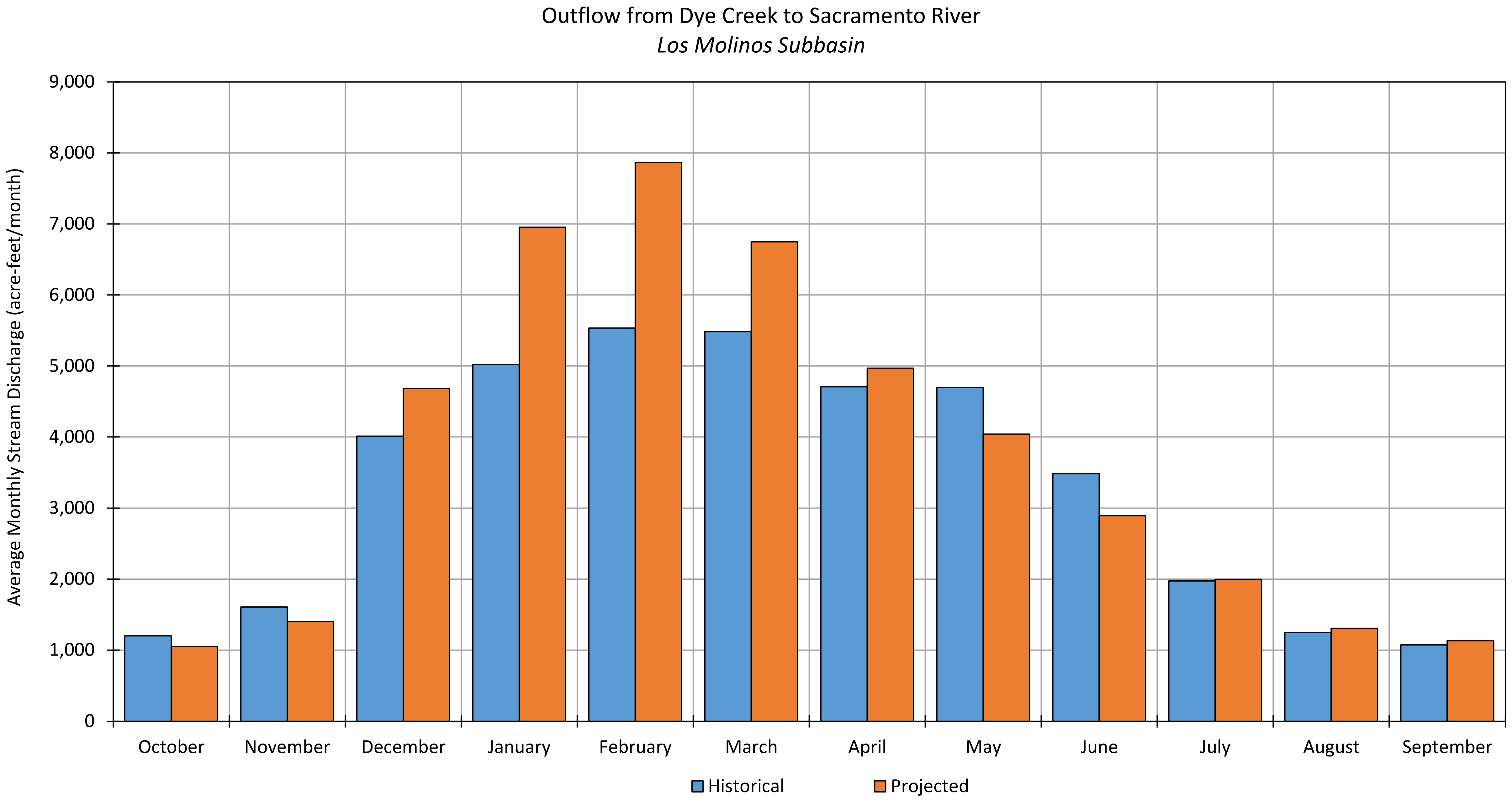
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Deer Creek Group to Sacramento River

Los Molinos Subbasin



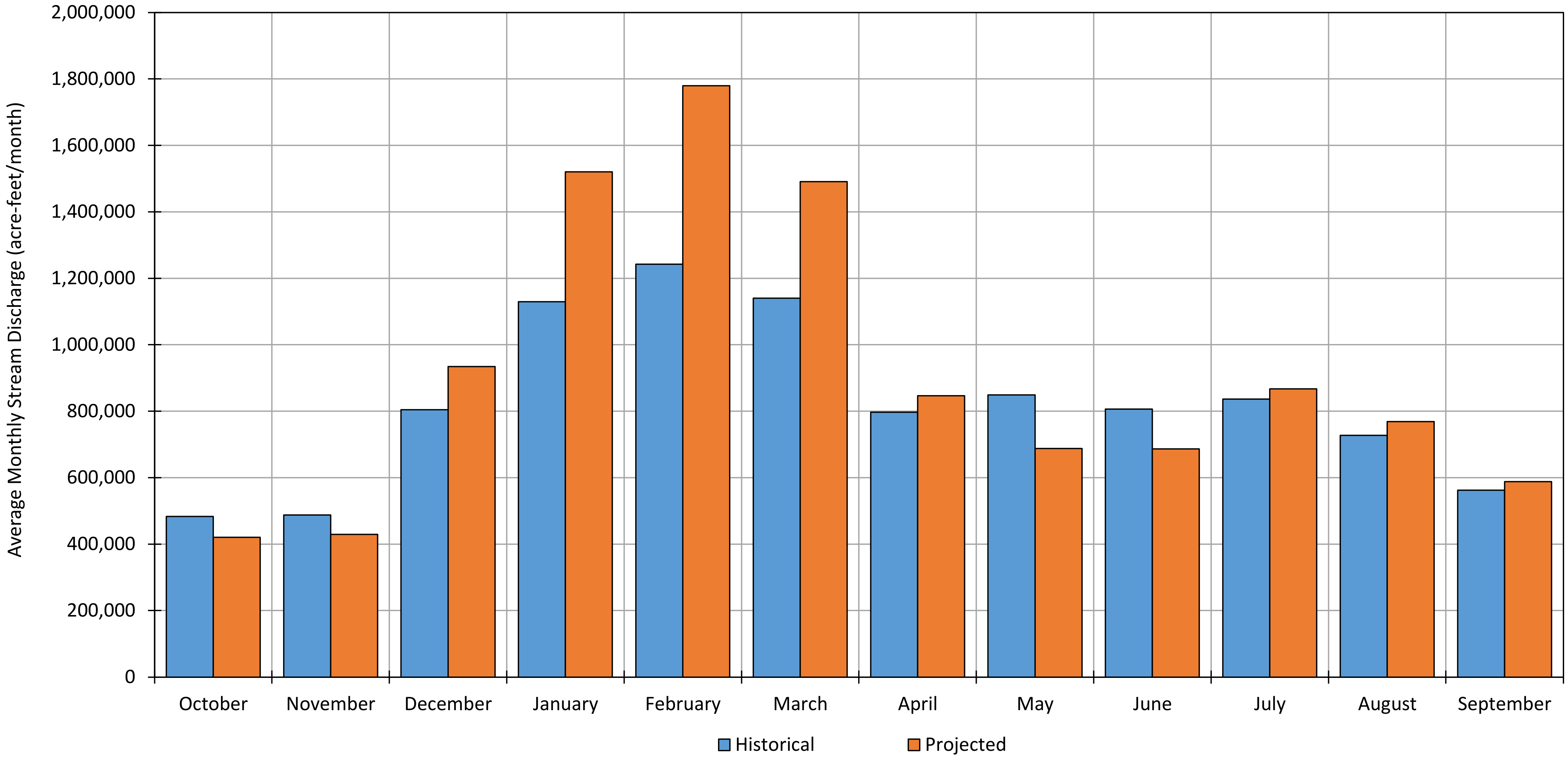
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

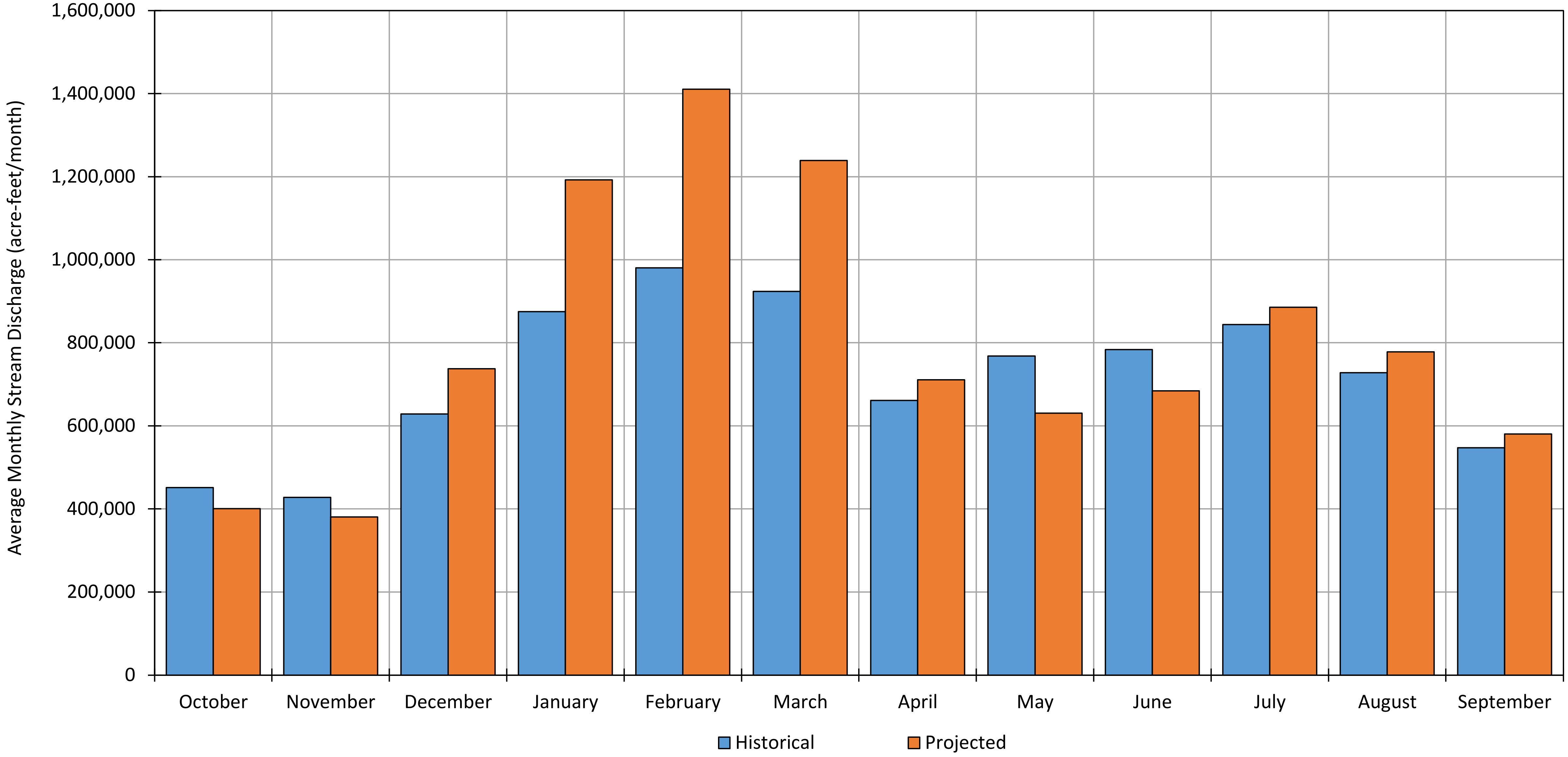
Los Molinos Subbasin



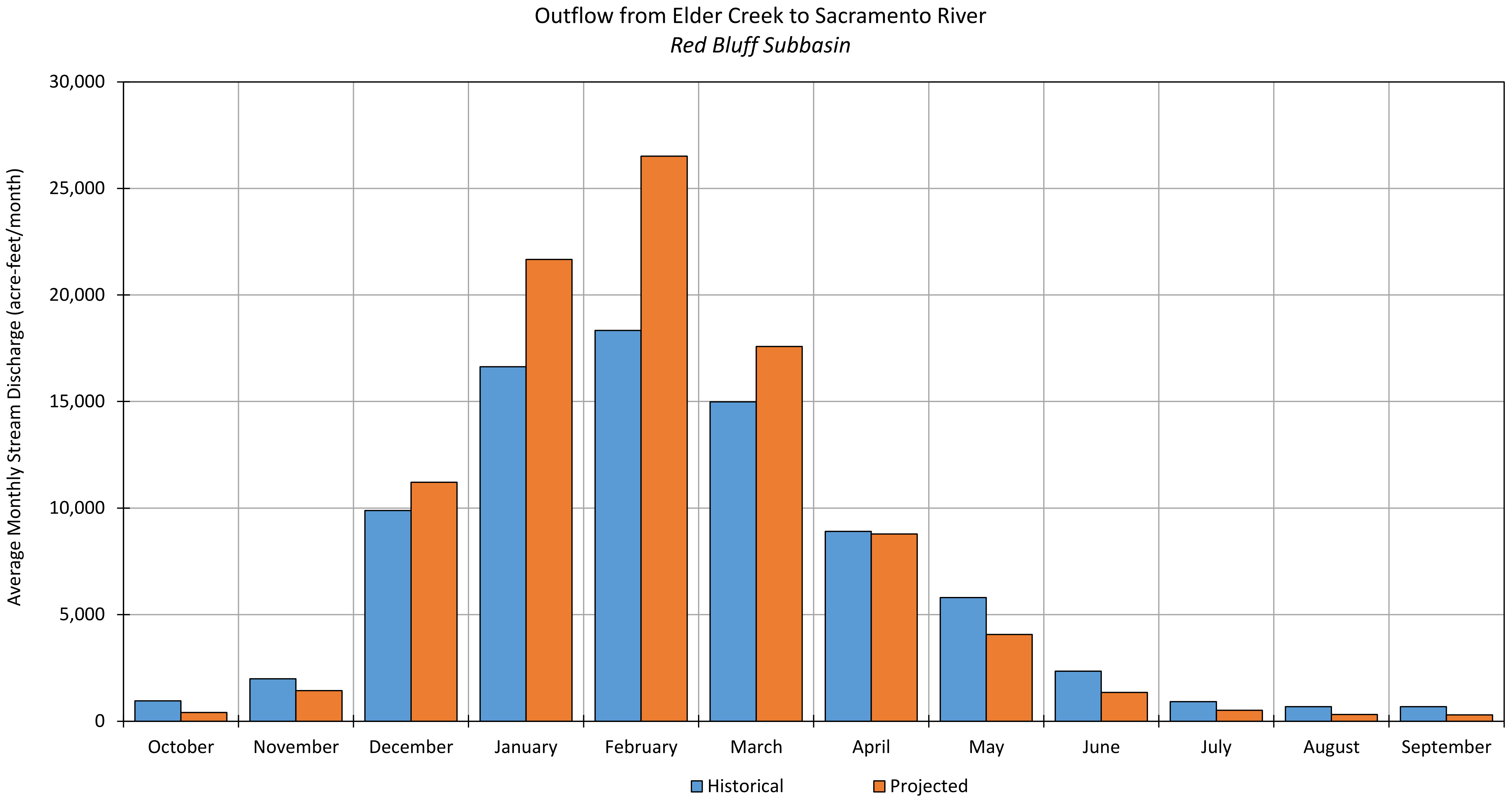
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Inflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



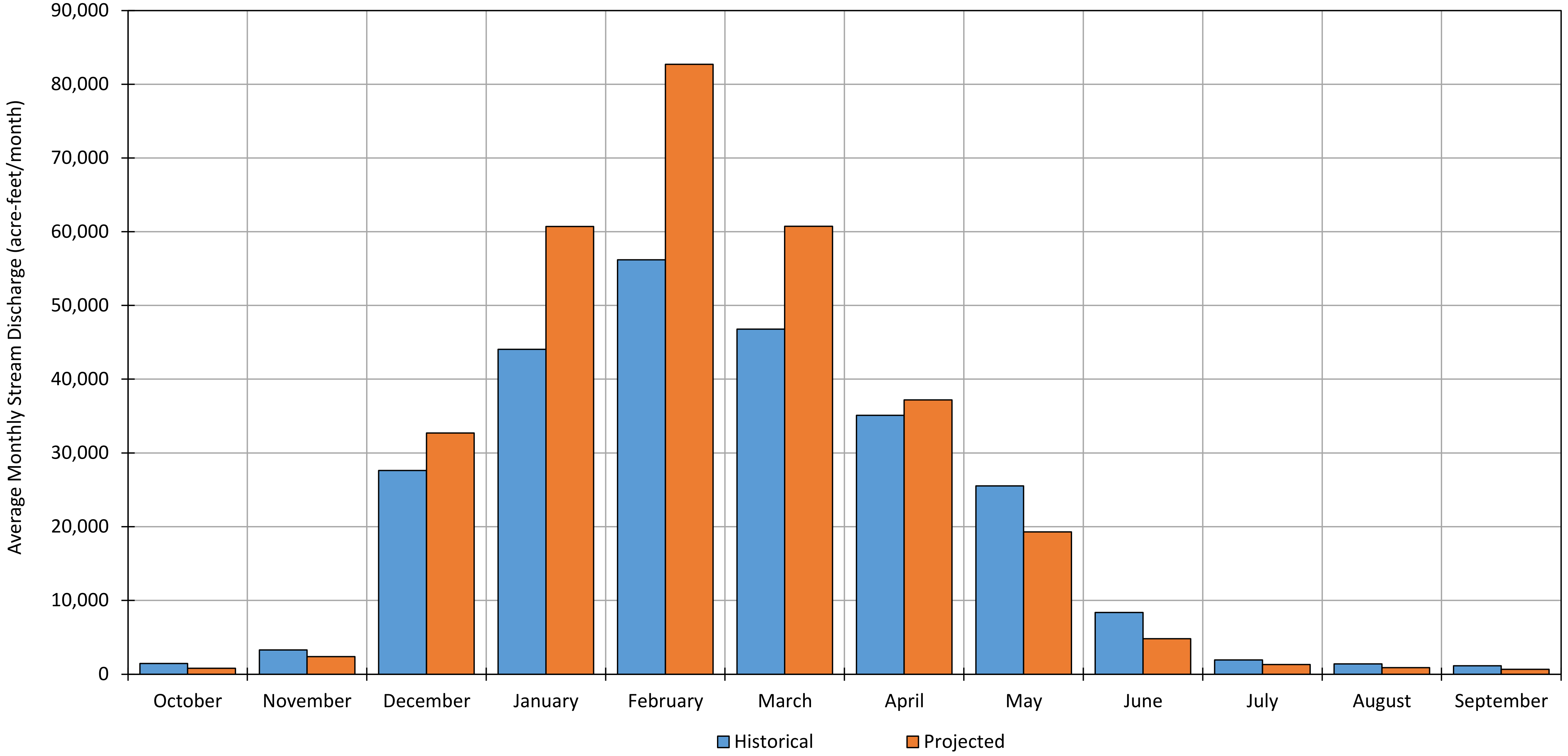
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



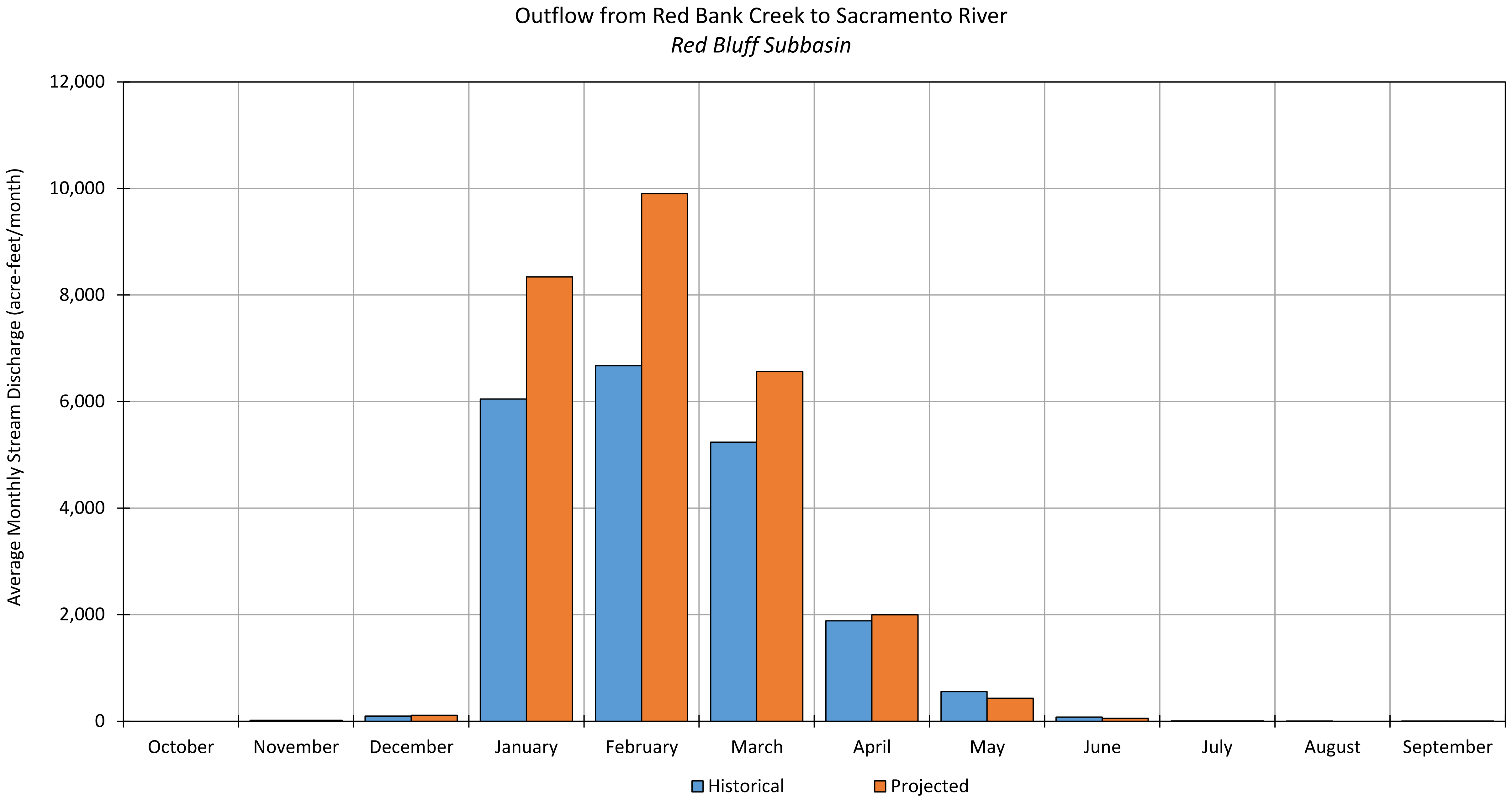
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Thomes Creek to Sacramento River

Red Bluff Subbasin



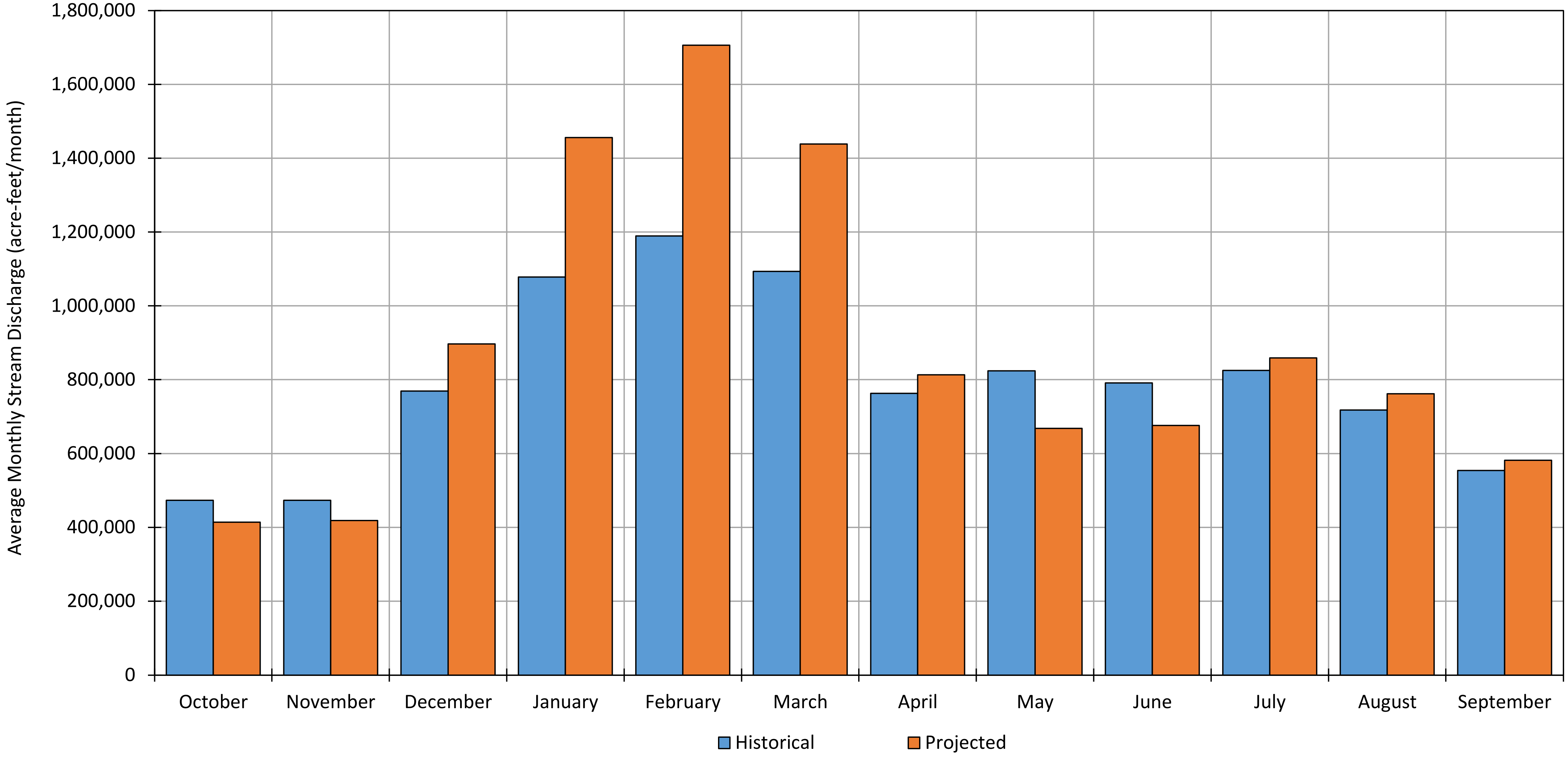
Tehama IHM - Projected (Future Land Use) with Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Outflow from Sacramento River at Red Bluff Subbasin Boundary

Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

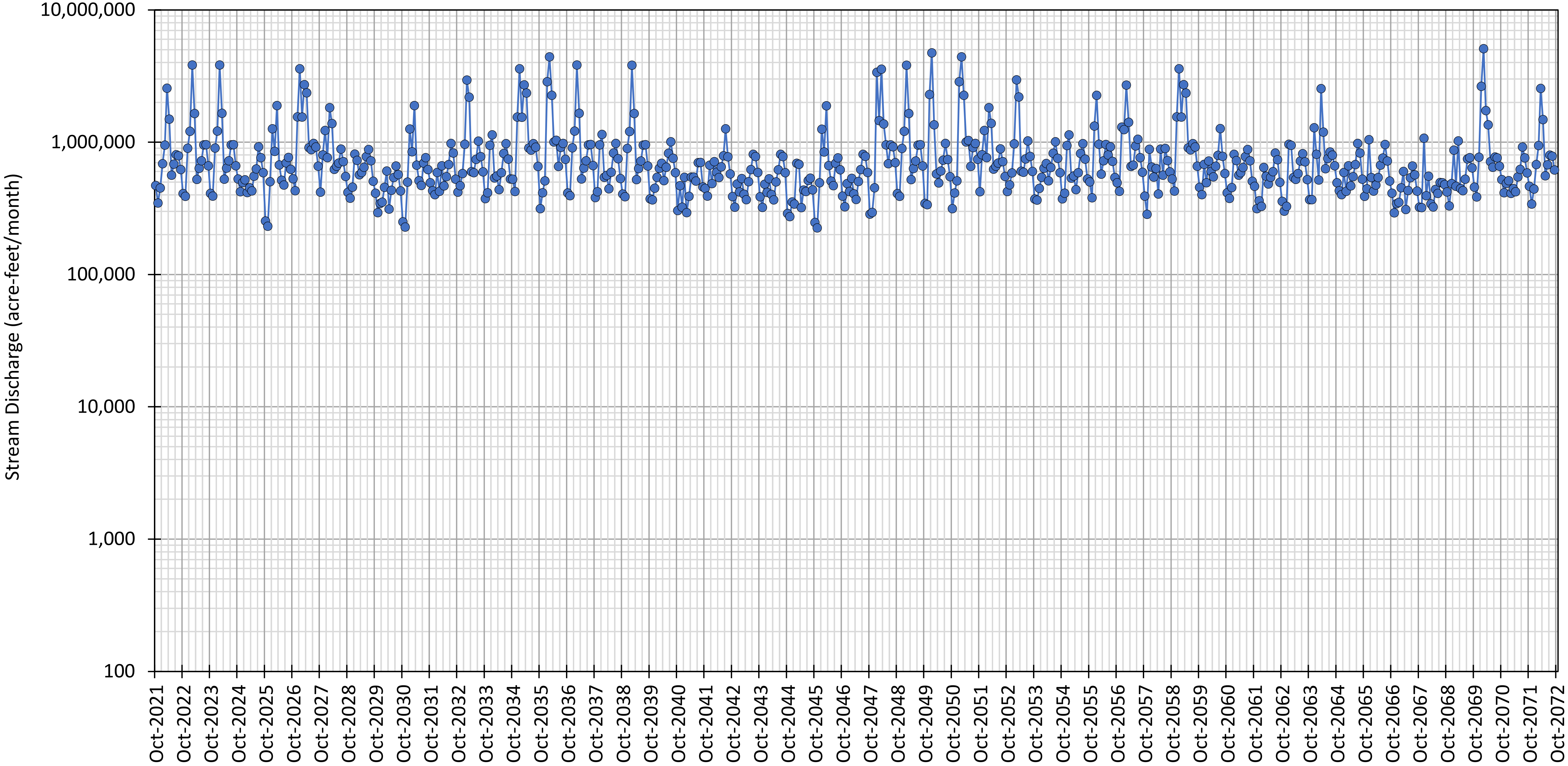
APPENDIX G-8

Tehama IHM Simulated Streamflows:

Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

Inflow from Sacramento River at Antelope Subbasin Boundary

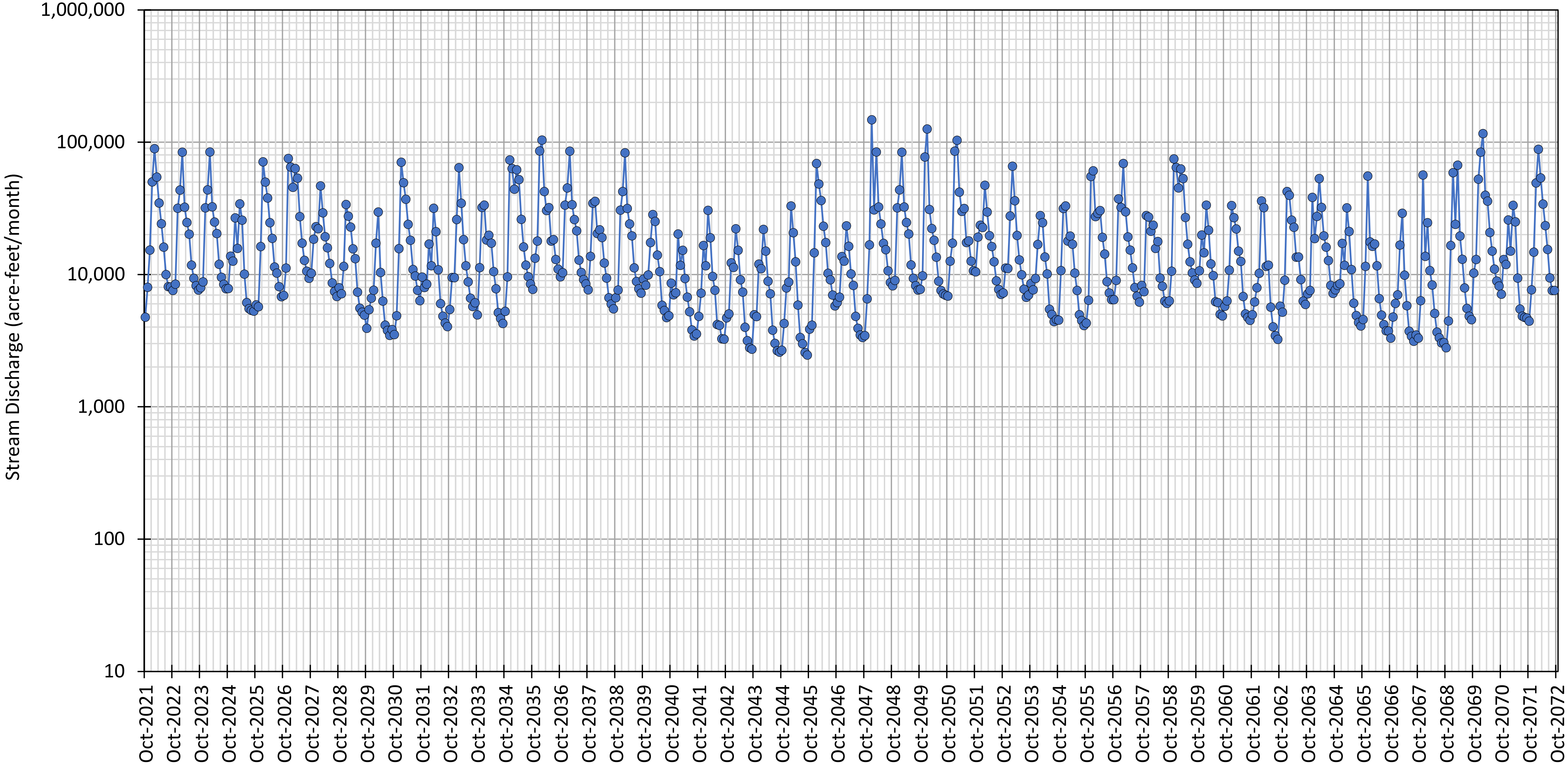
Antelope Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

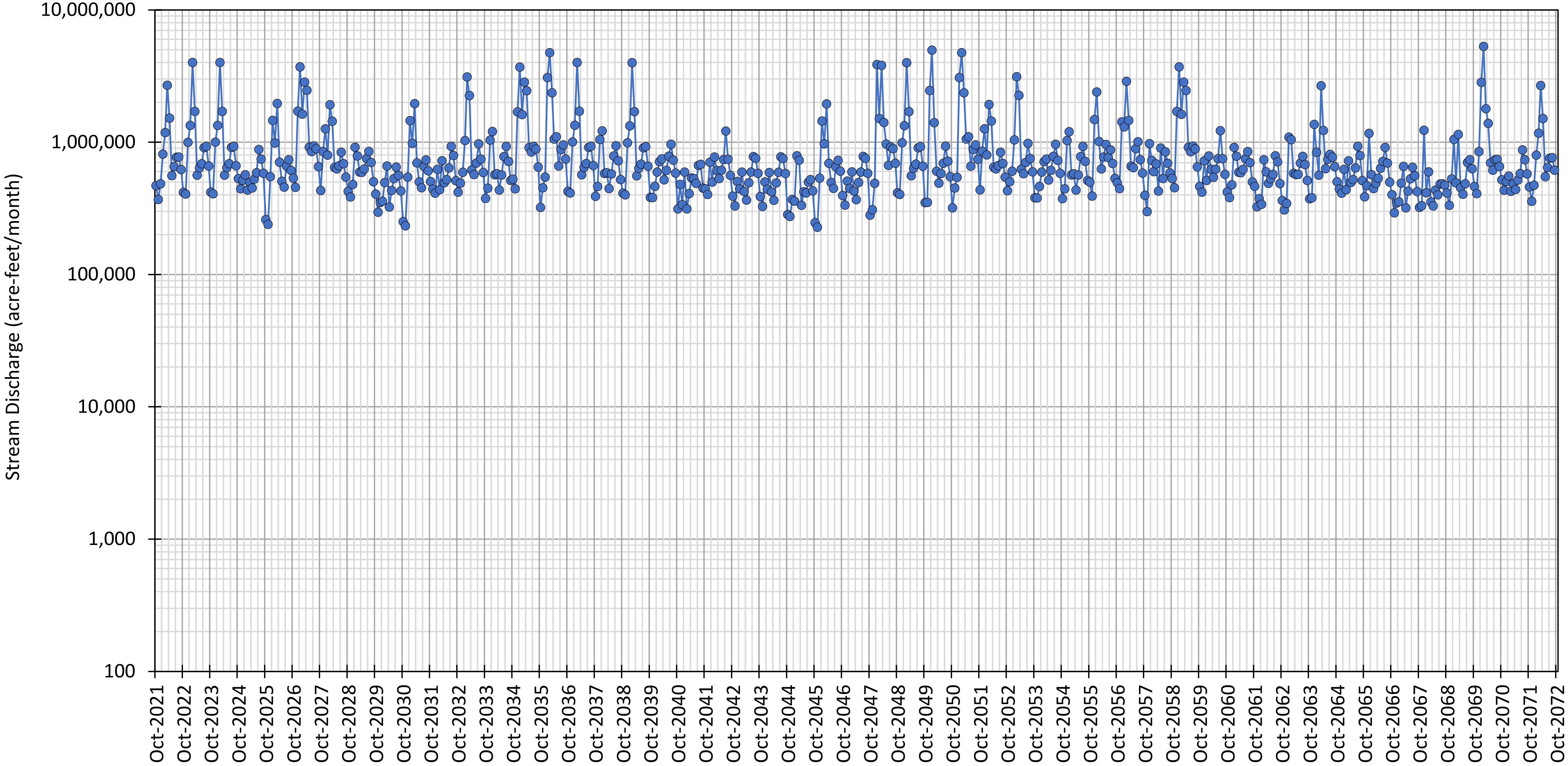
Antelope Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Sacramento River at Antelope Subbasin Boundary

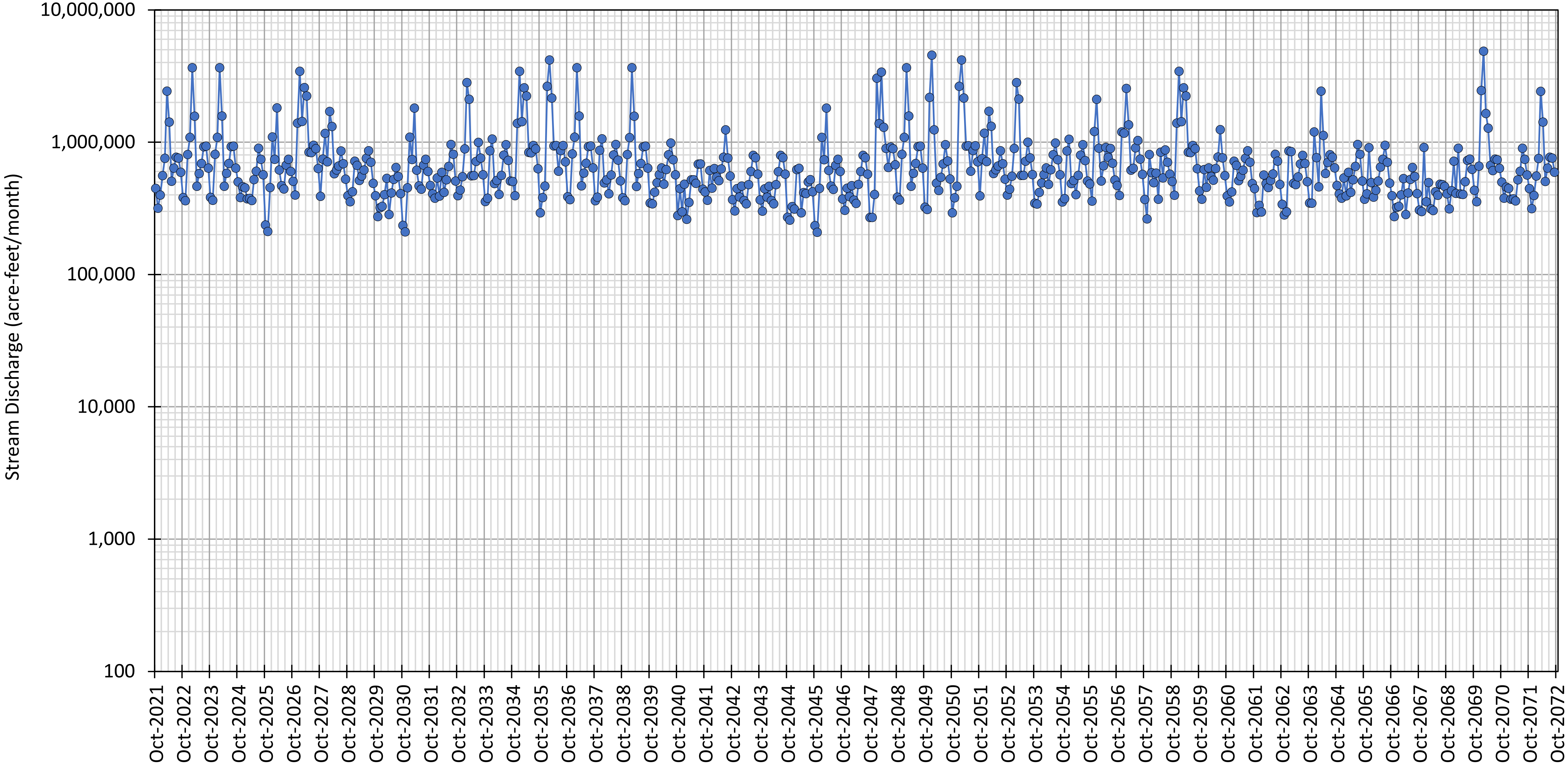
Antelope Subbasin



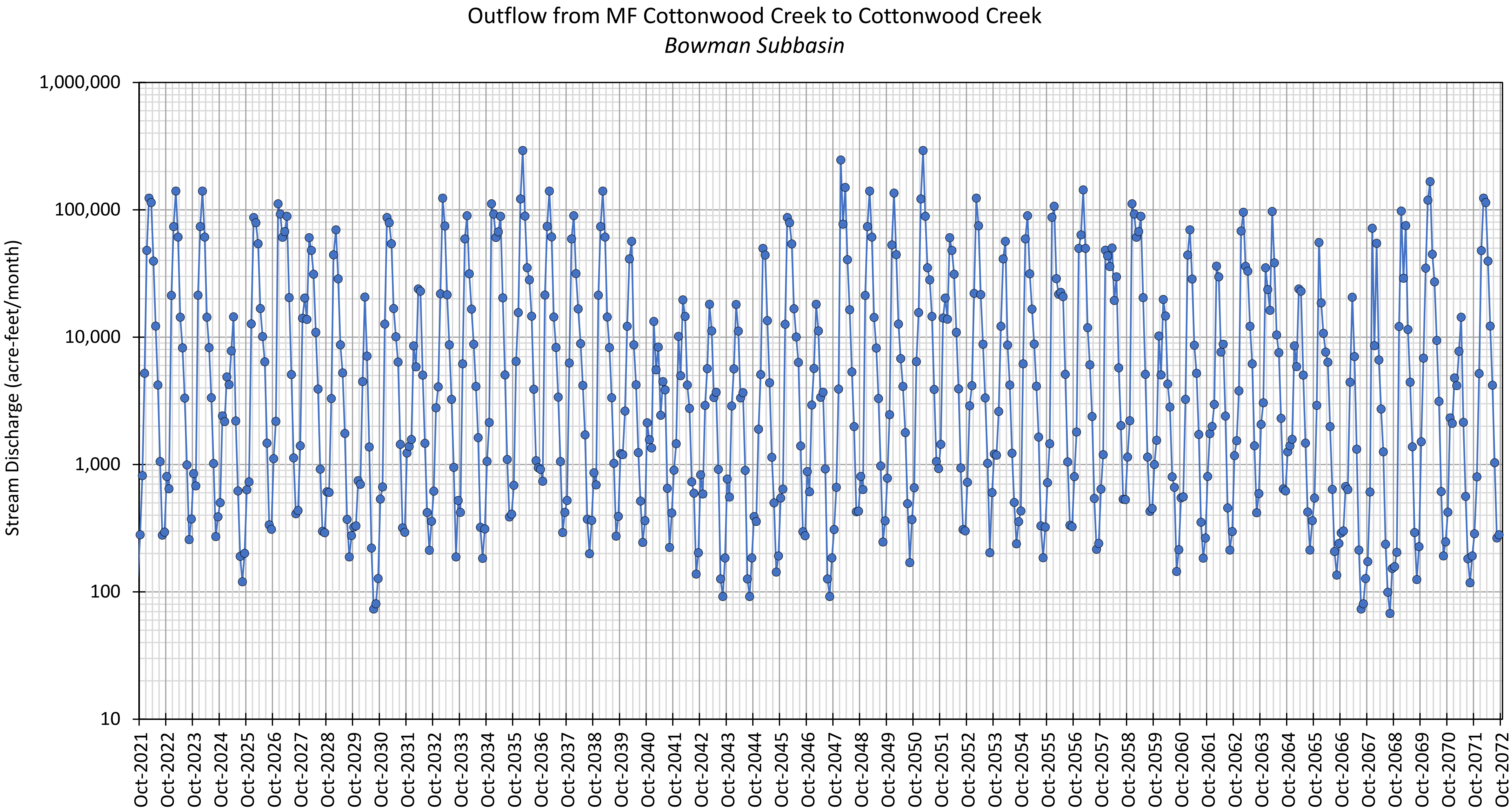
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin



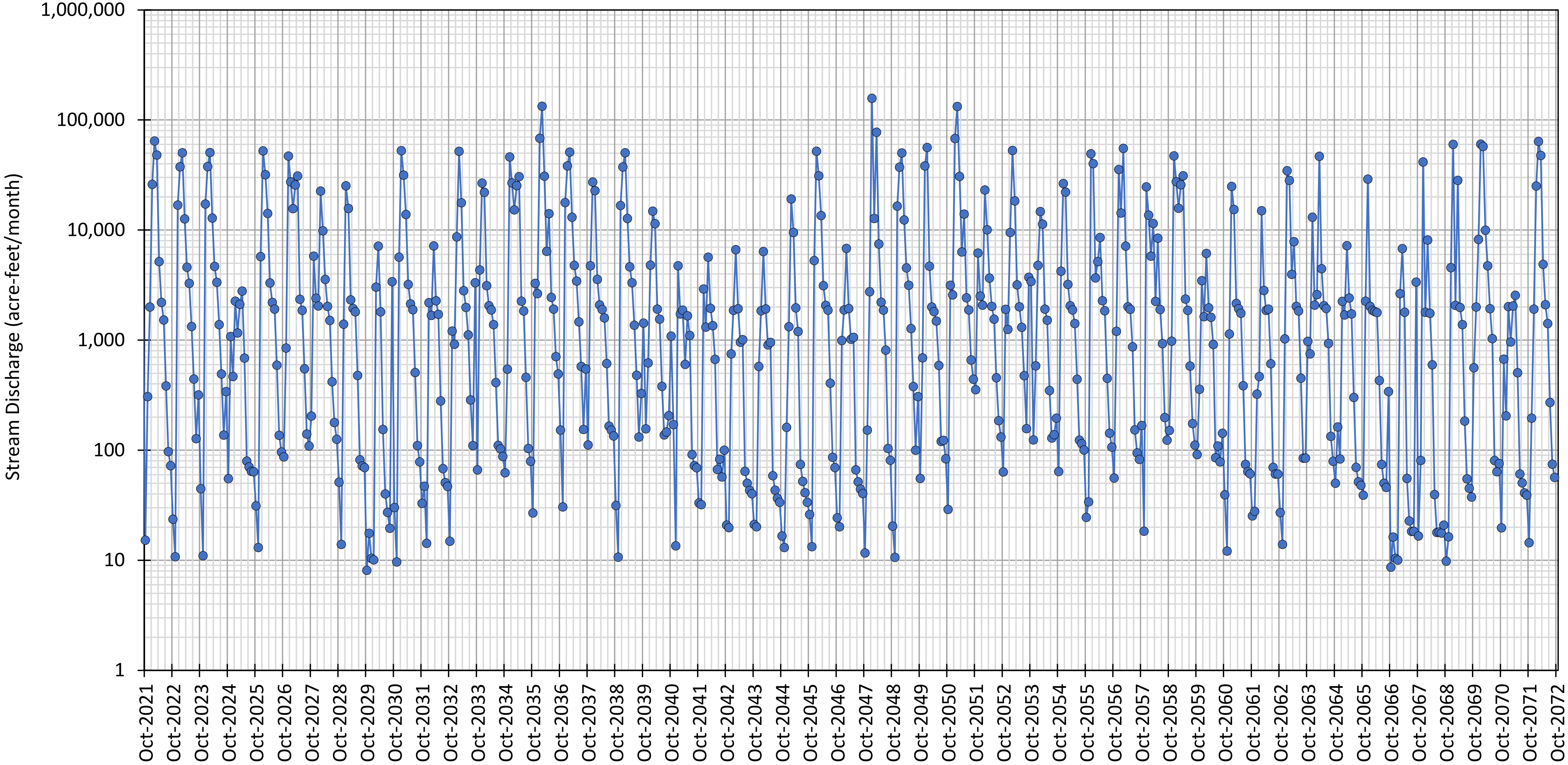
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from SF Cottonwood Creek to Cottonwood Creek

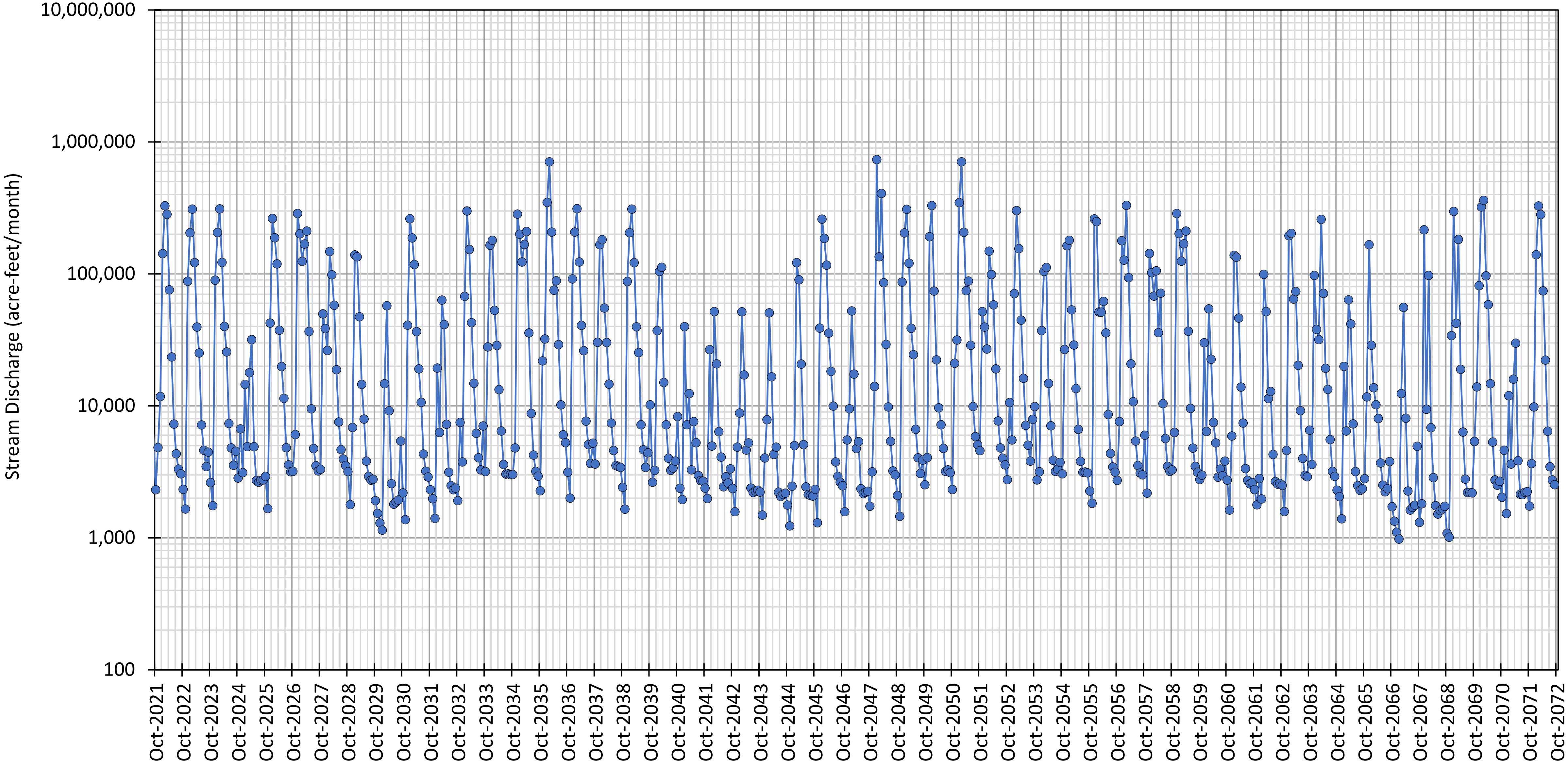
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Cottonwood Creek to Sacramento River

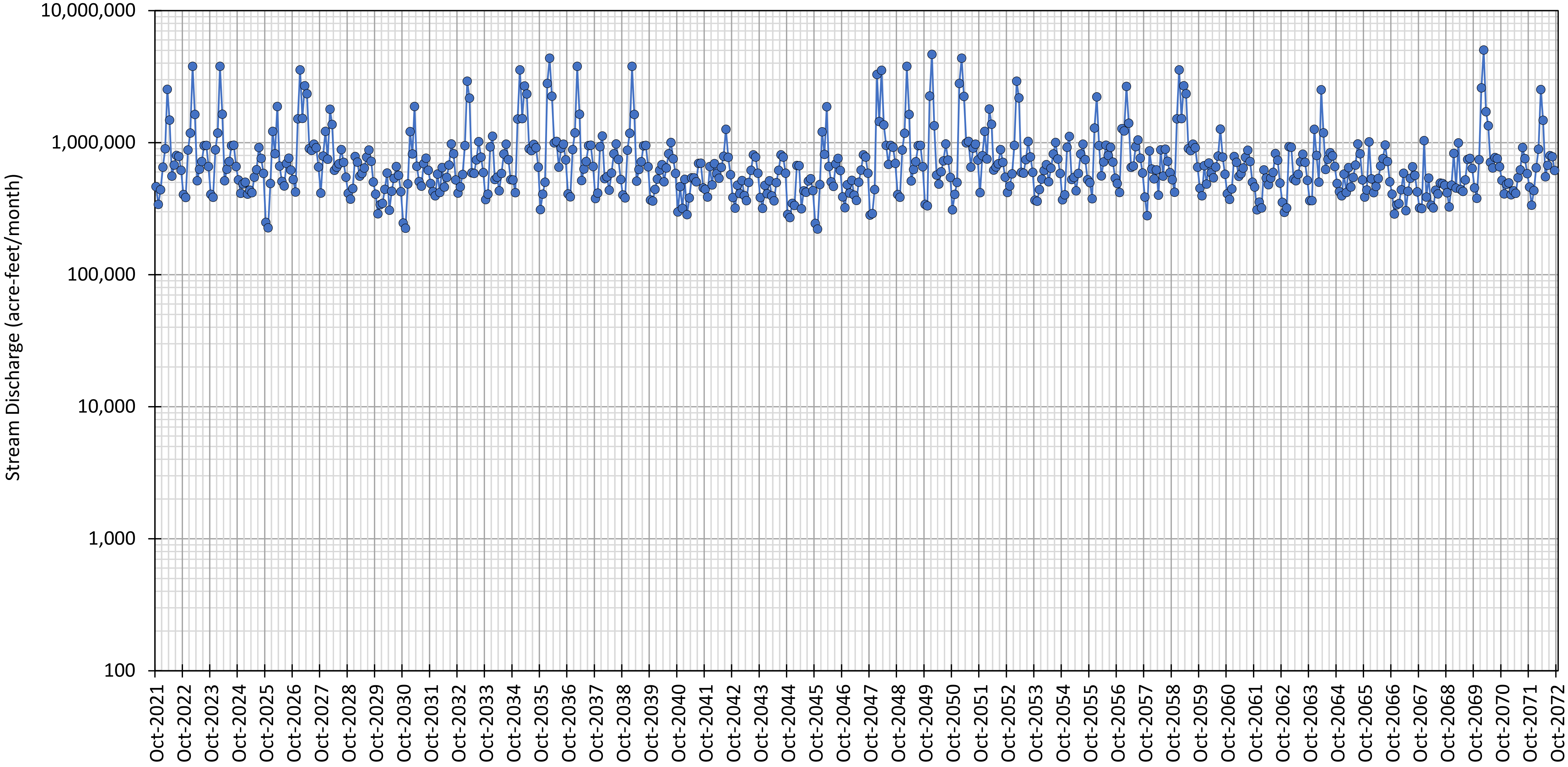
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Sacramento River at Bowman Subbasin Boundary

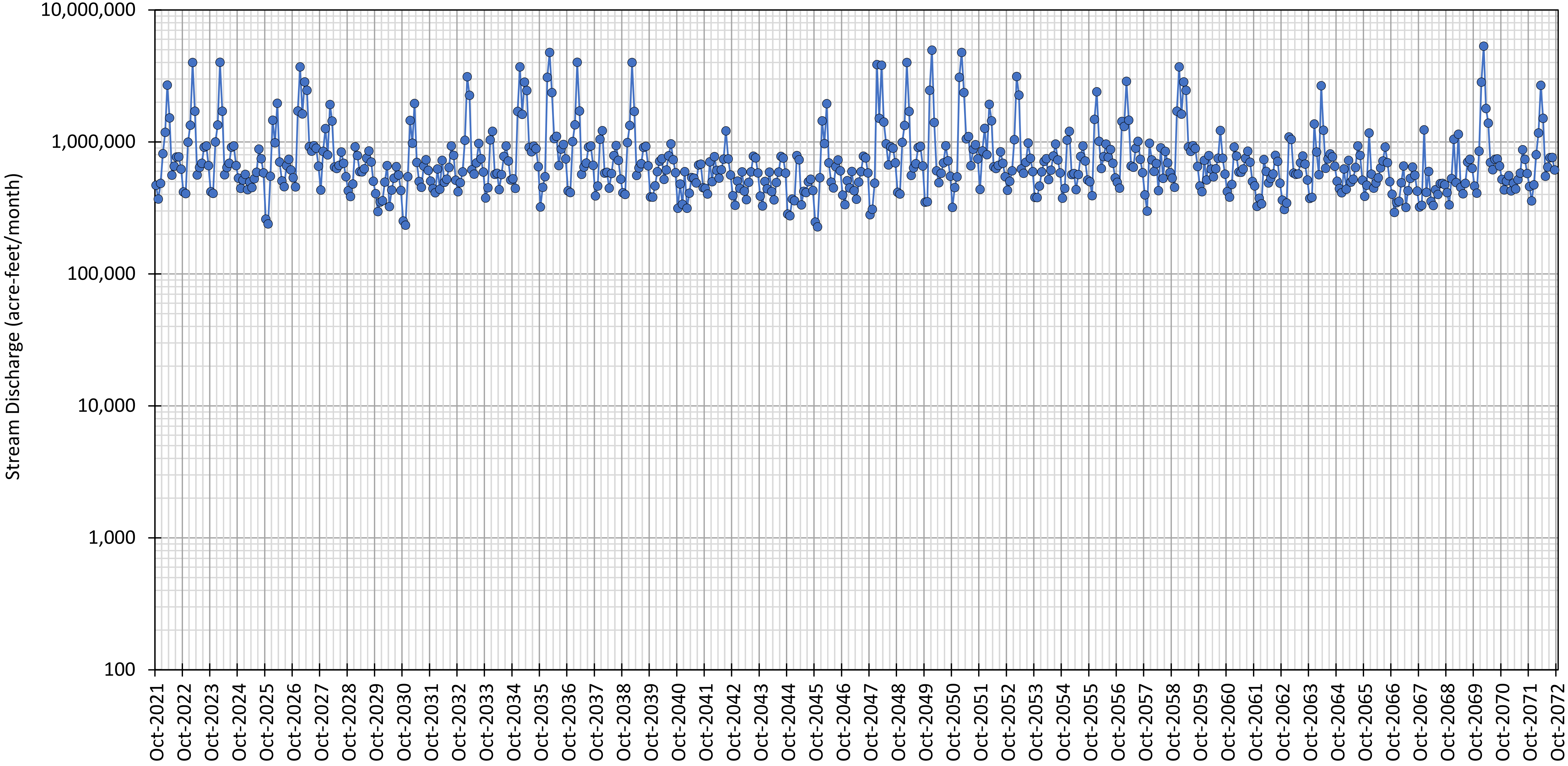
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

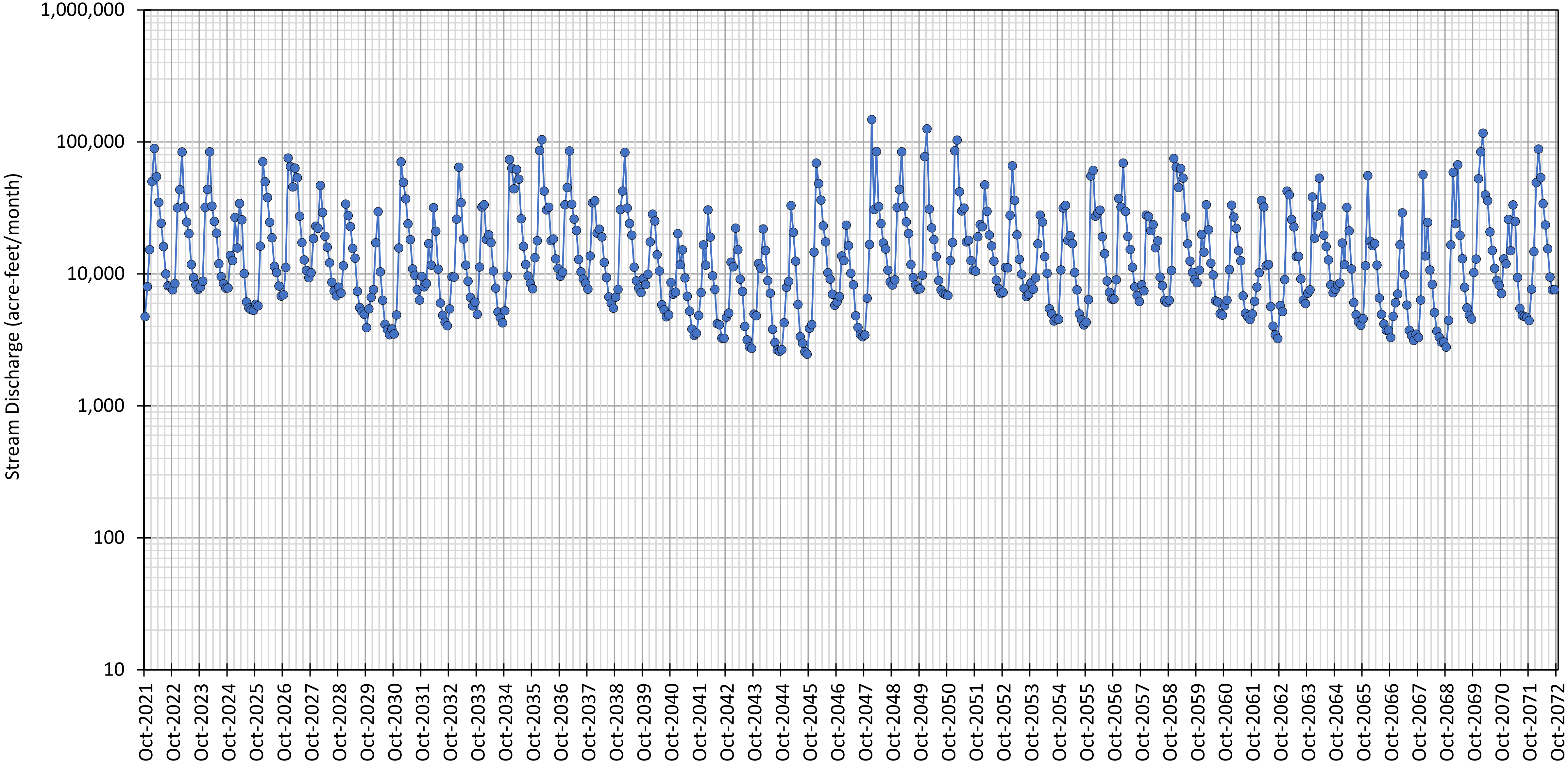
Inflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

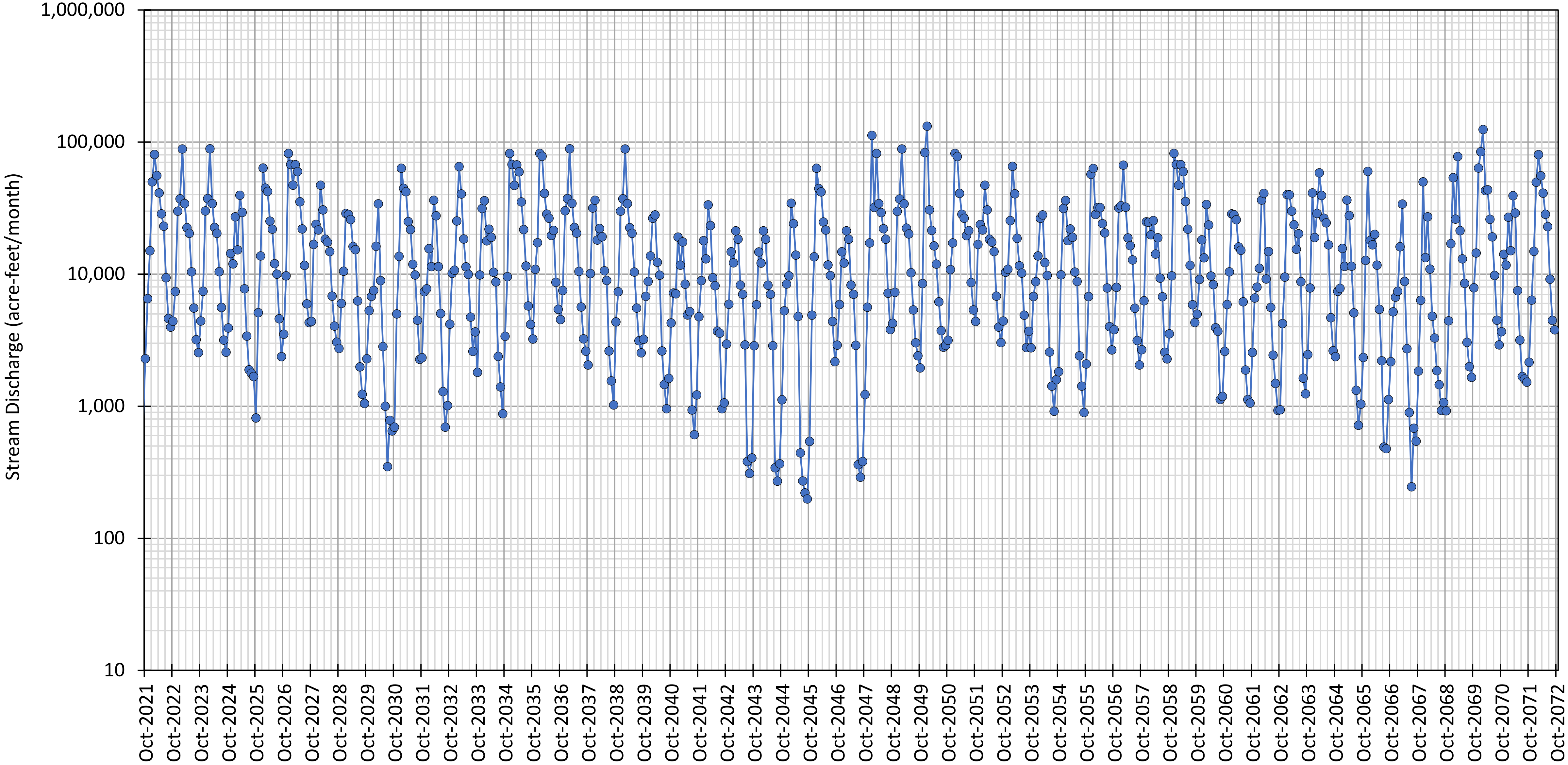
Outflow from Antelope Creek Group to Sacramento River
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Mill Creek to Sacramento River

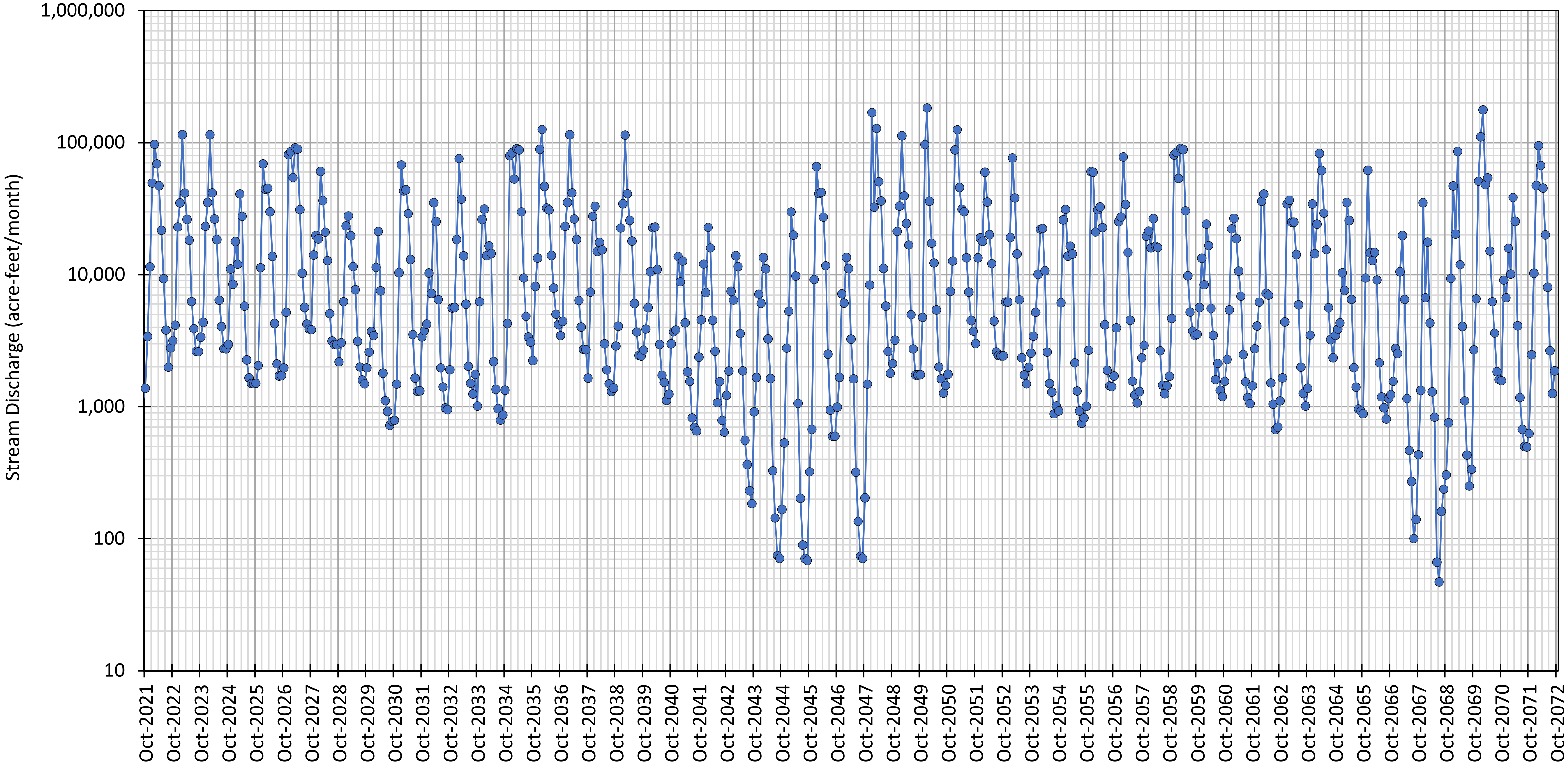
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

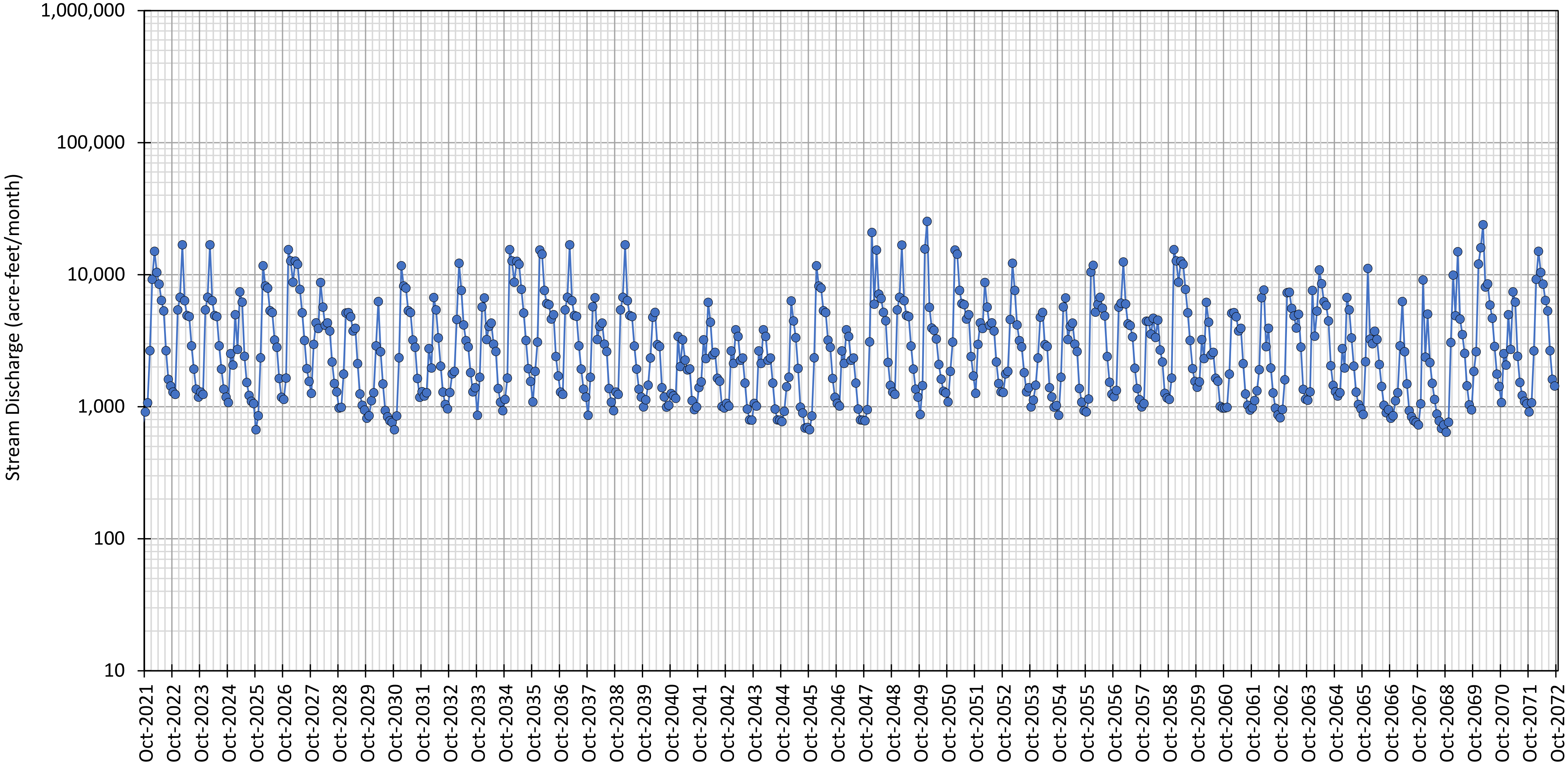
Outflow from Deer Creek Group to Sacramento River

Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

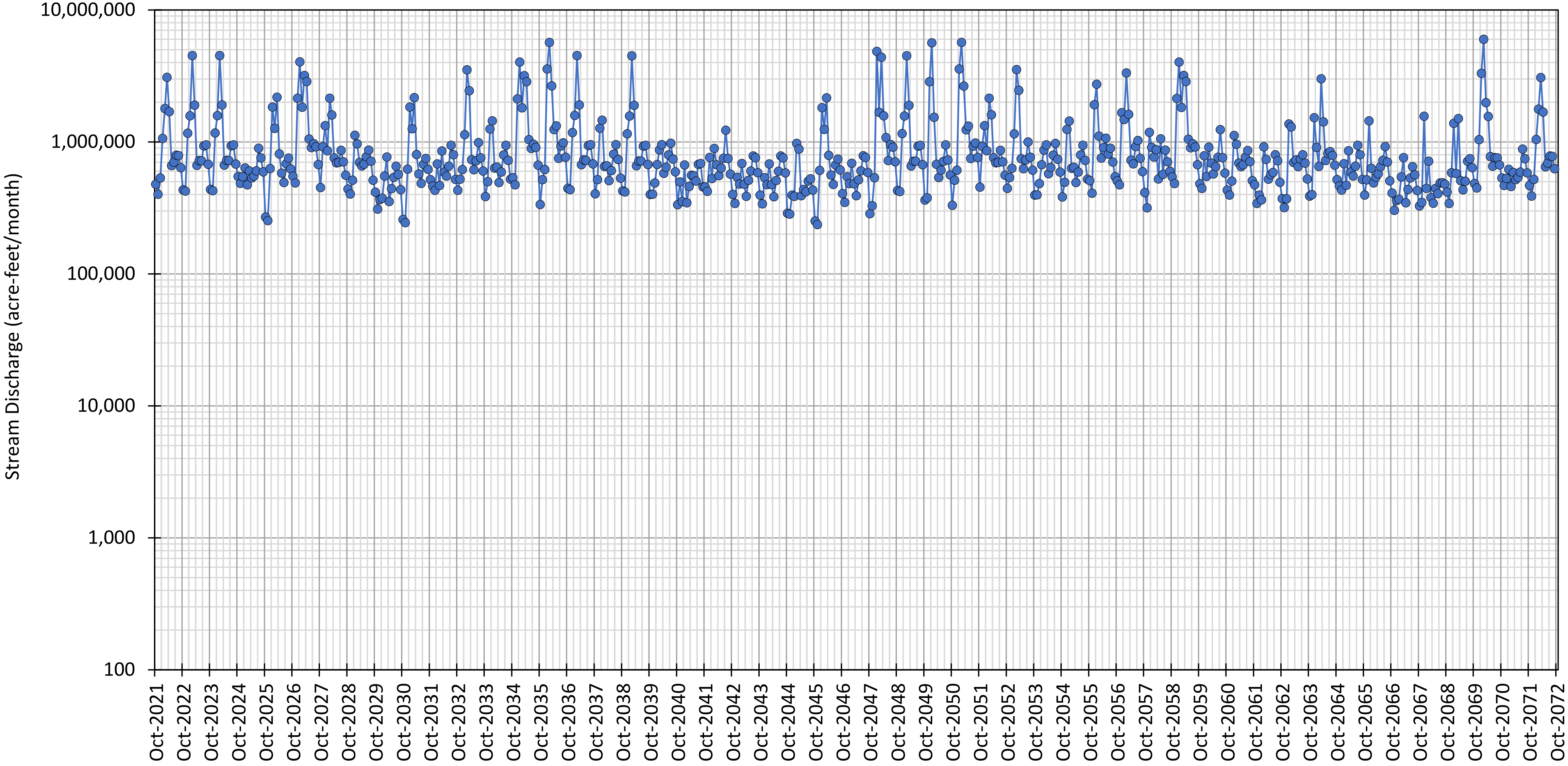
Outflow from Dye Creek to Sacramento River
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

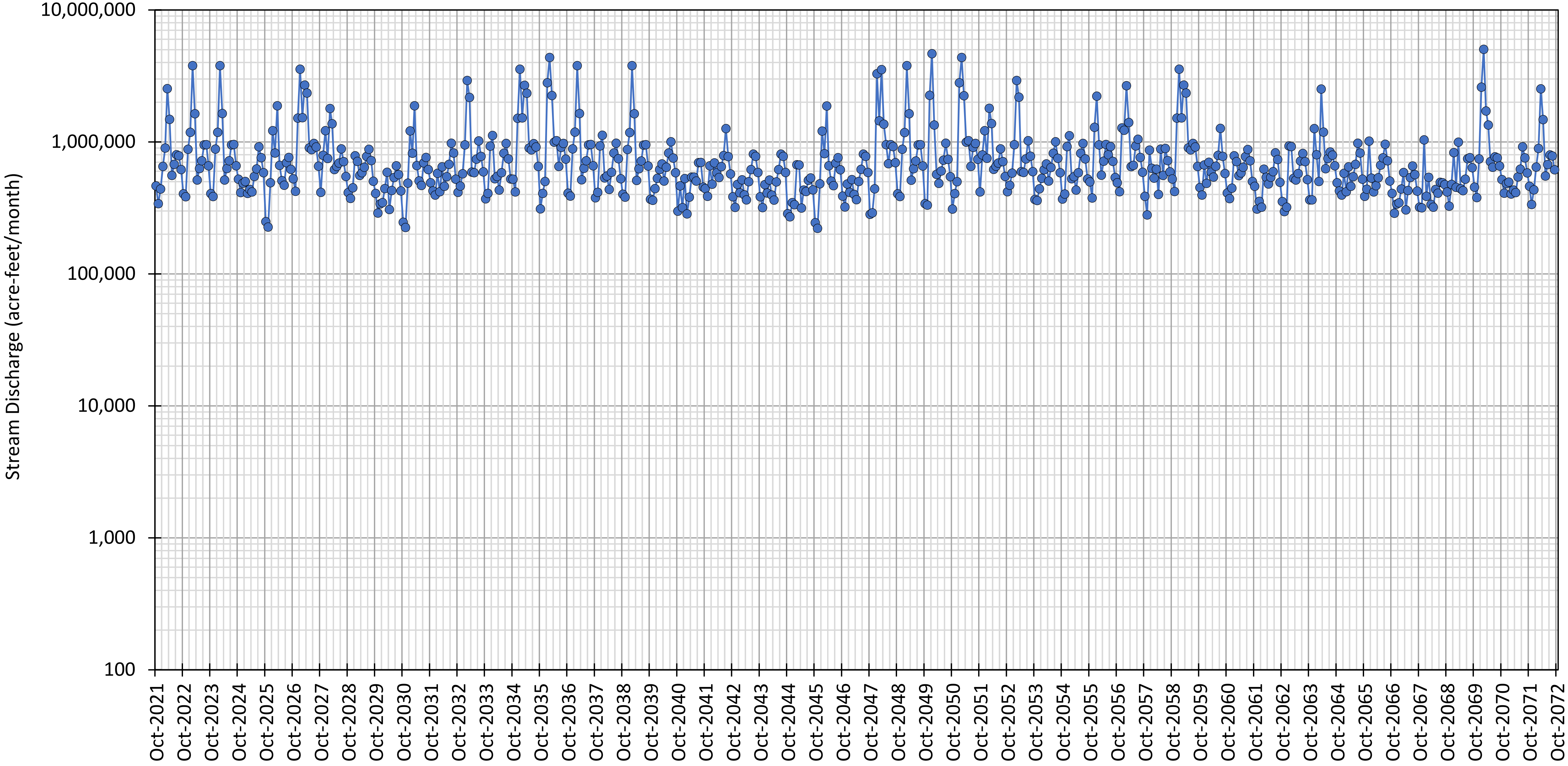
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Inflow from Sacramento River at Red Bluff Subbasin Boundary

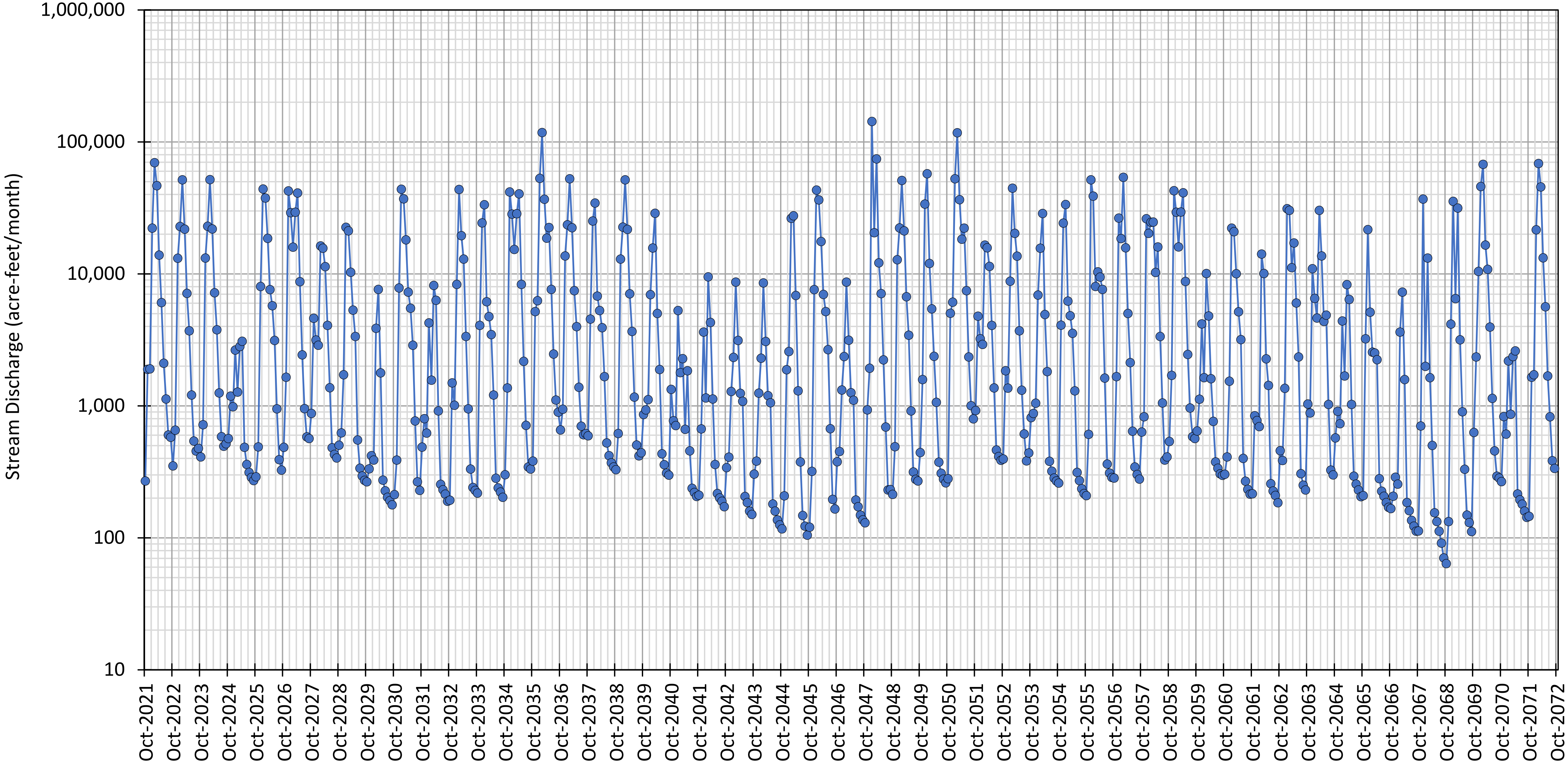
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Elder Creek to Sacramento River

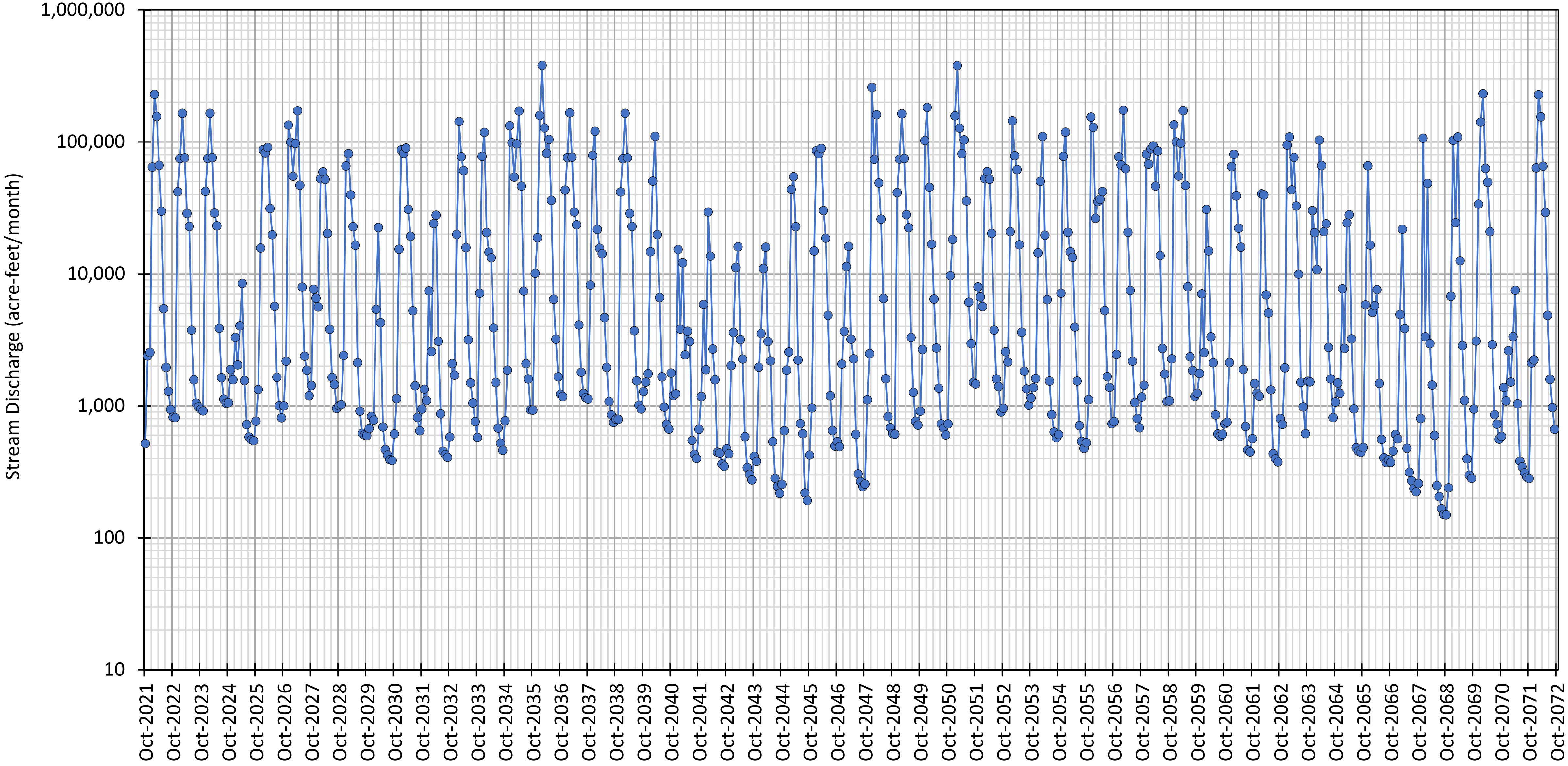
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Thomes Creek to Sacramento River

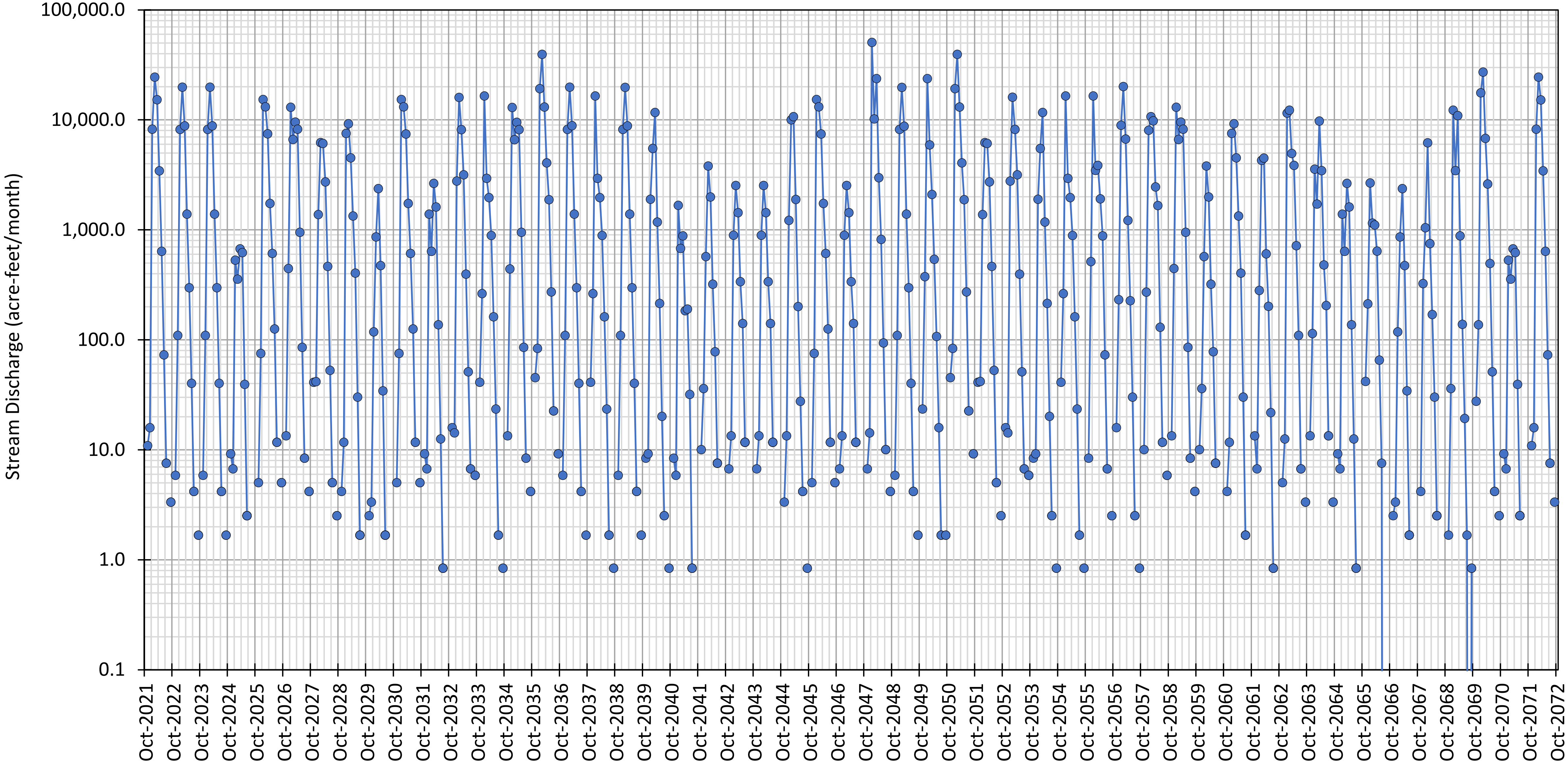
Red Bluff Subbasin



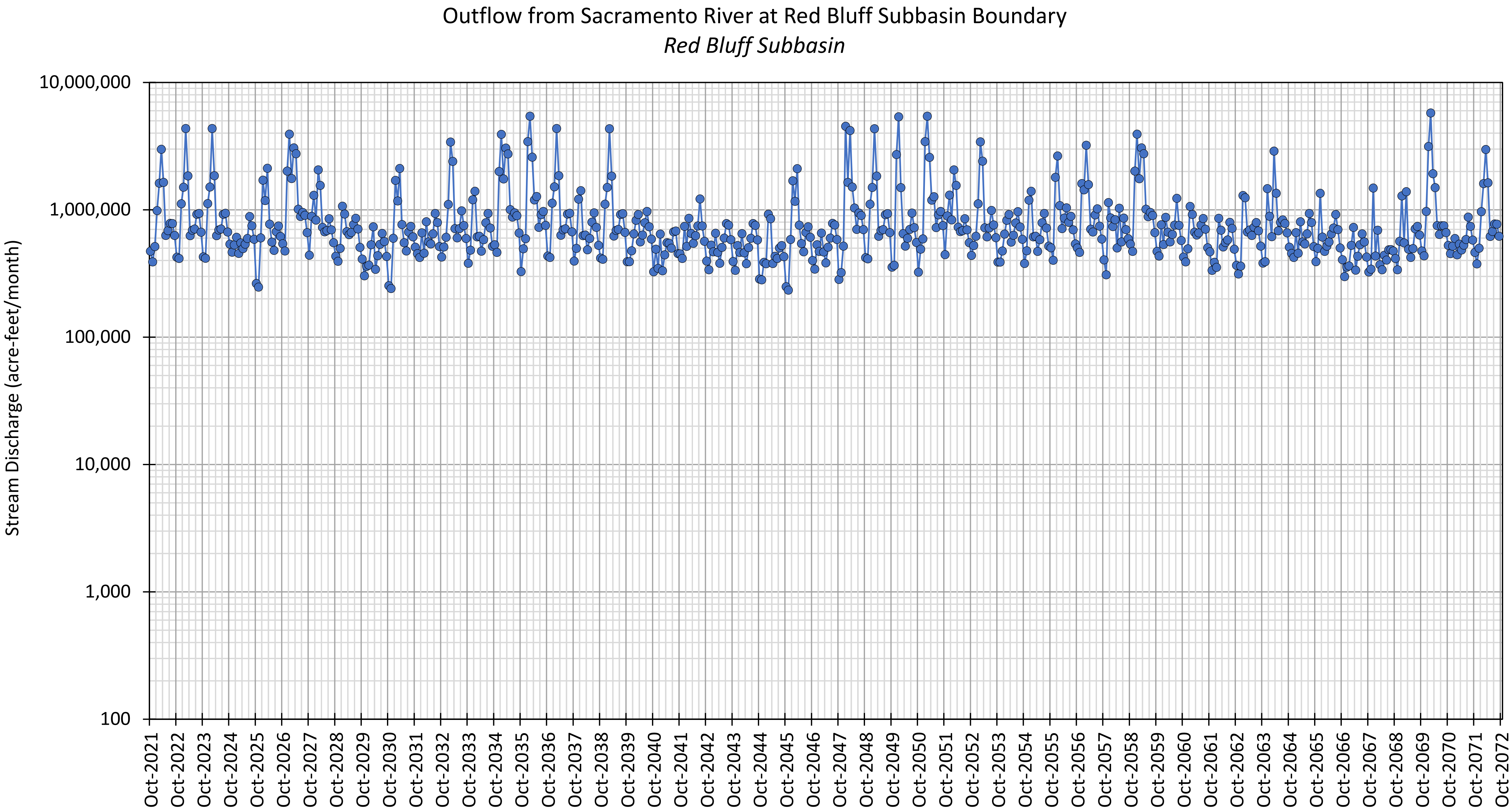
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Red Bank Creek to Sacramento River

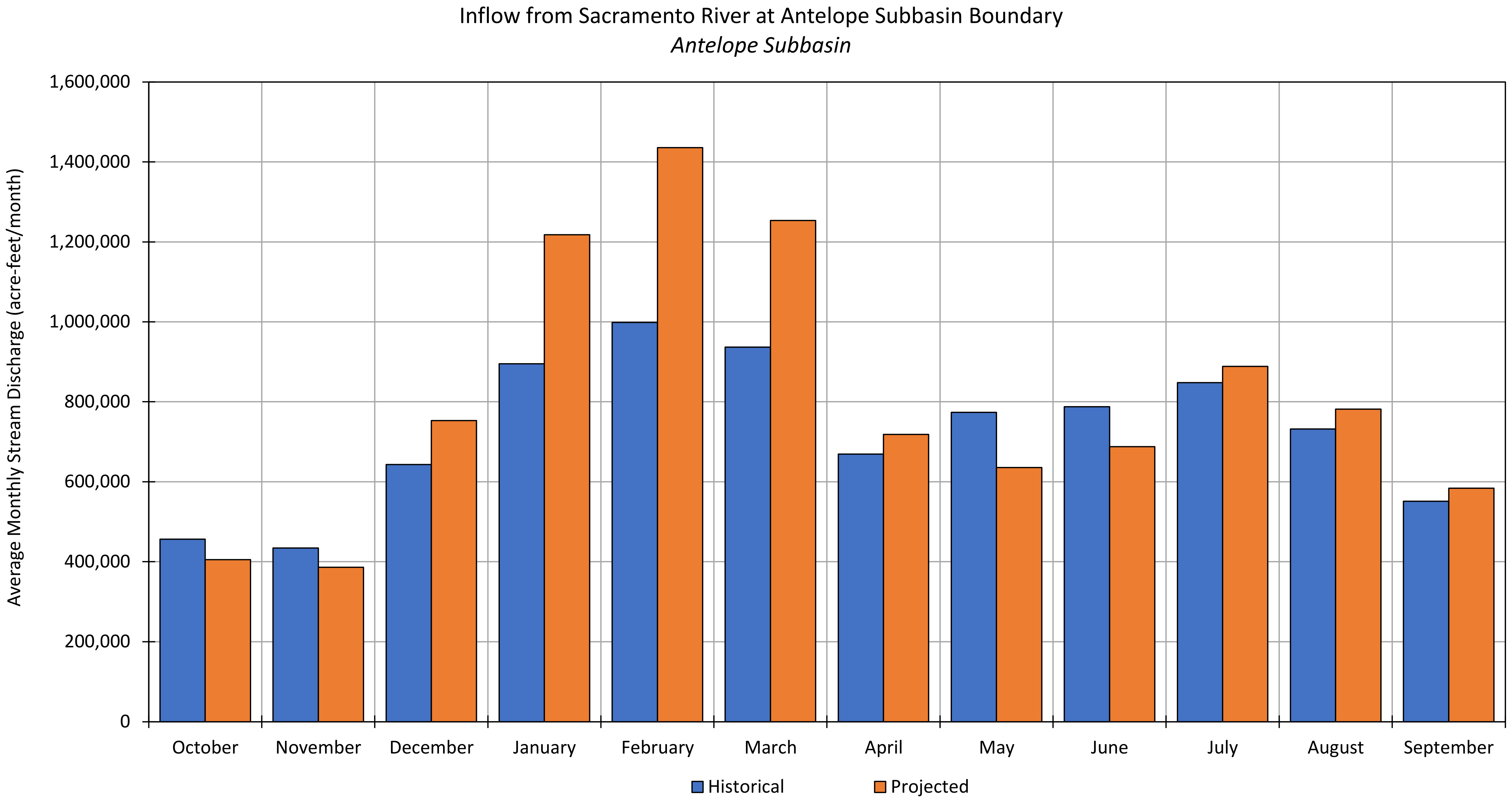
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



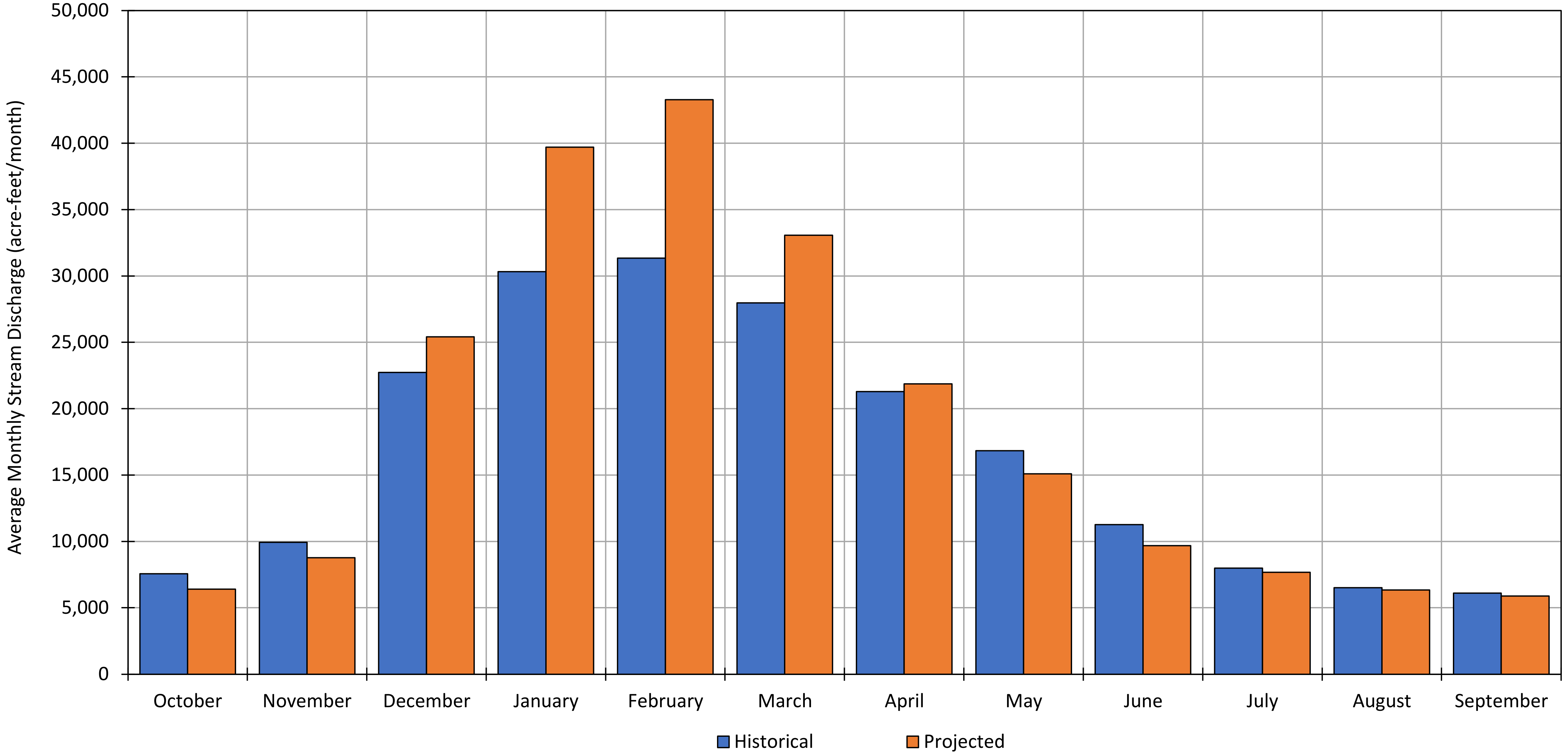
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



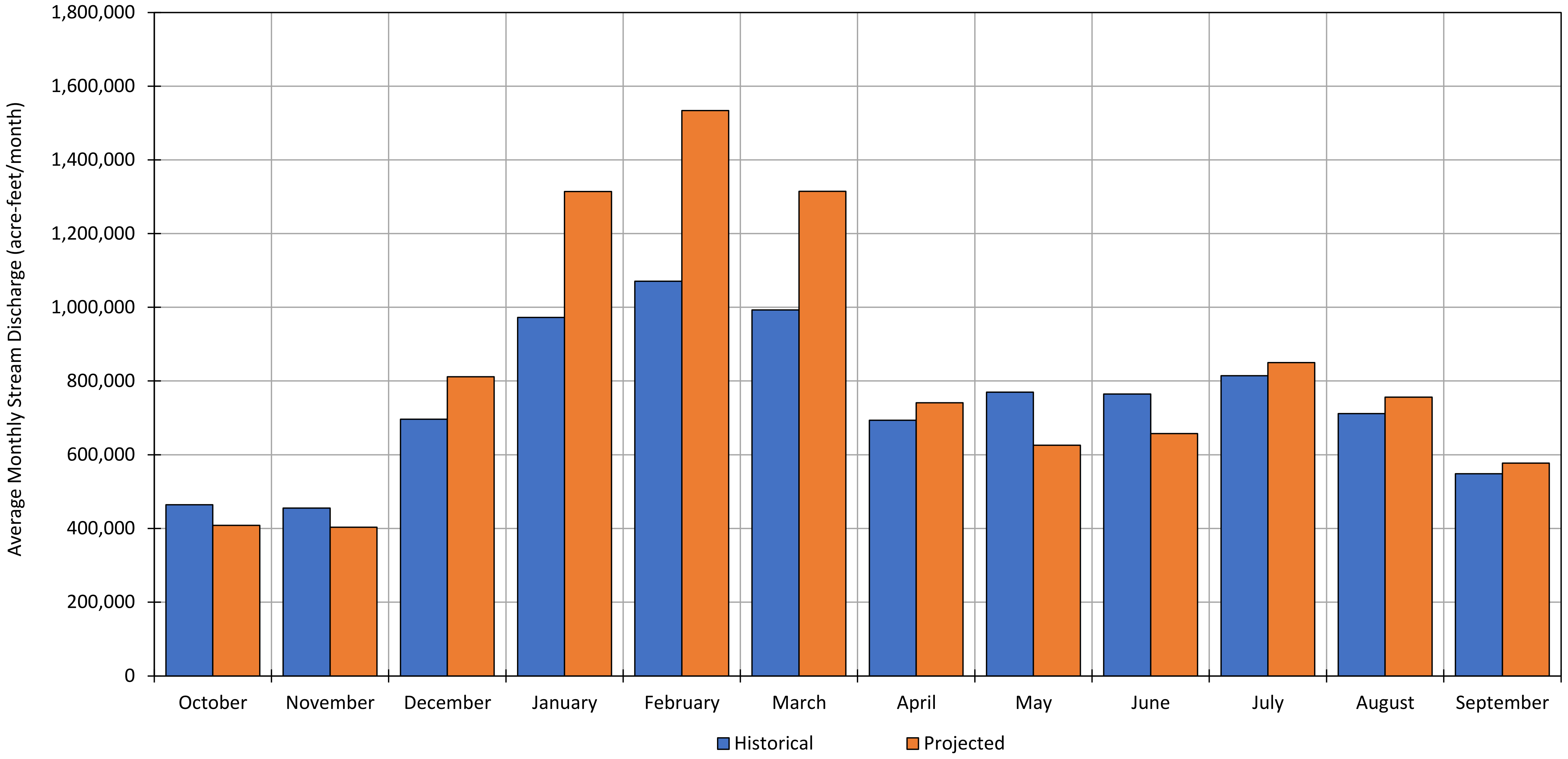
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin

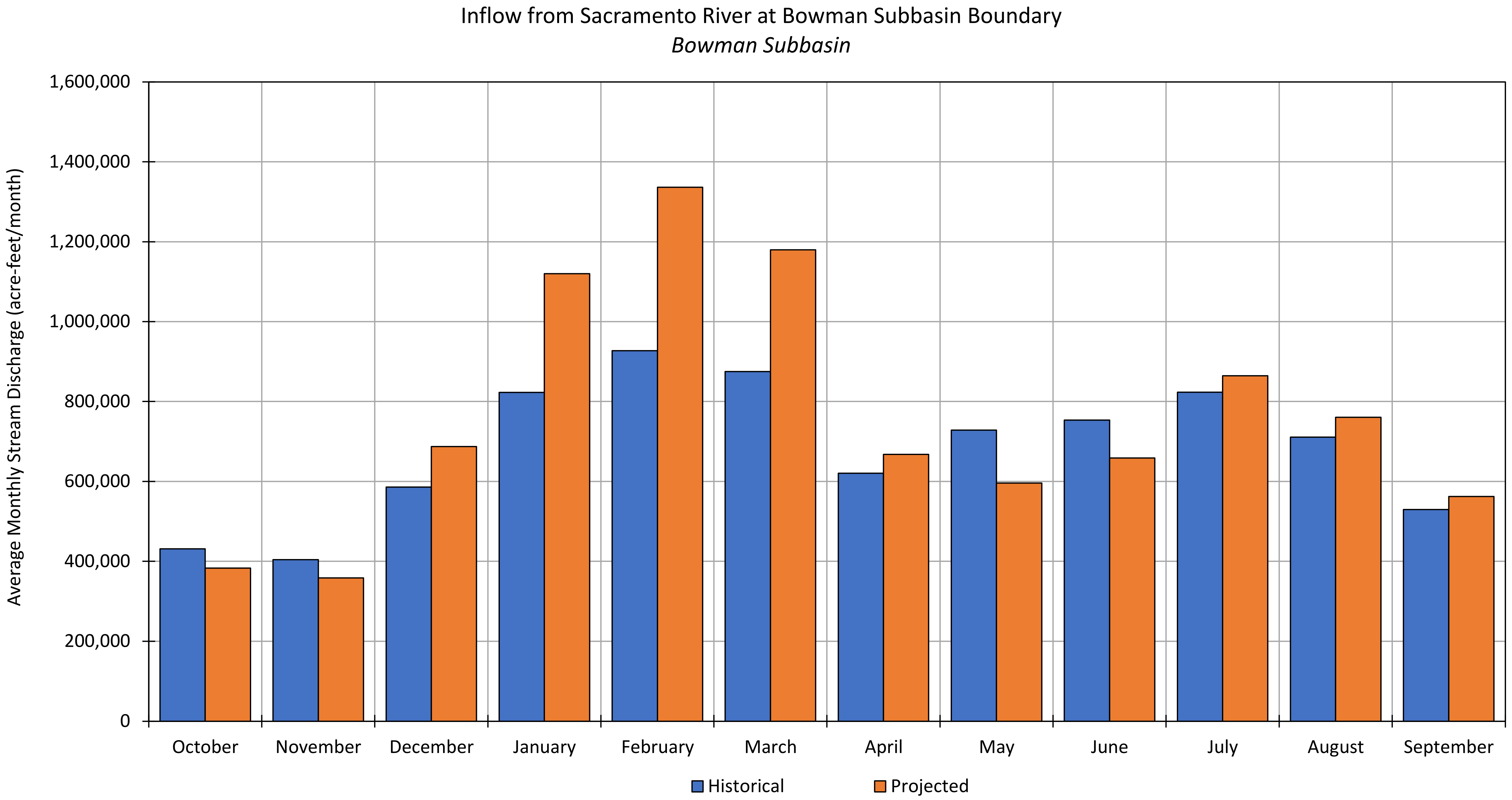


Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

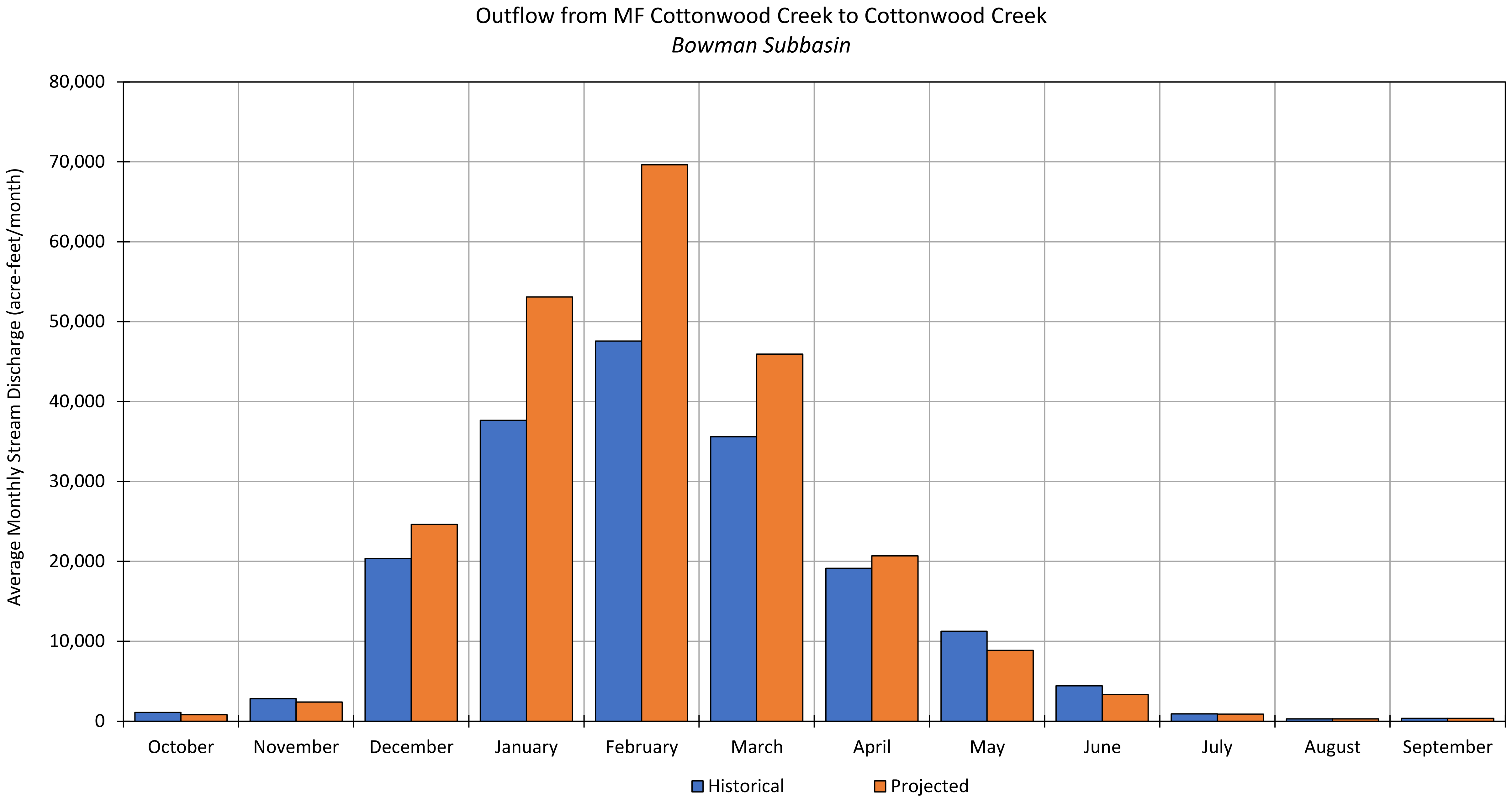


Outflow from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin

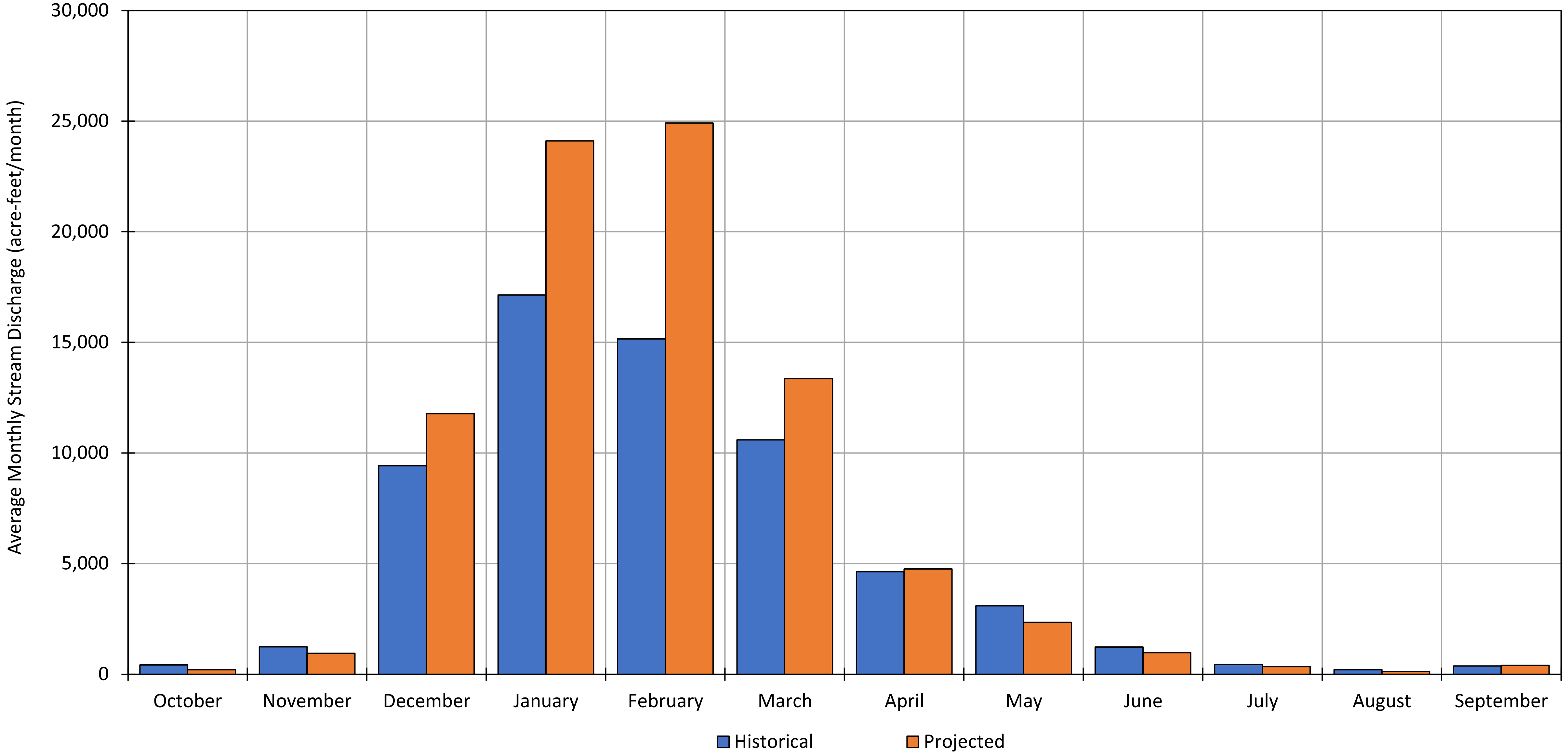
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



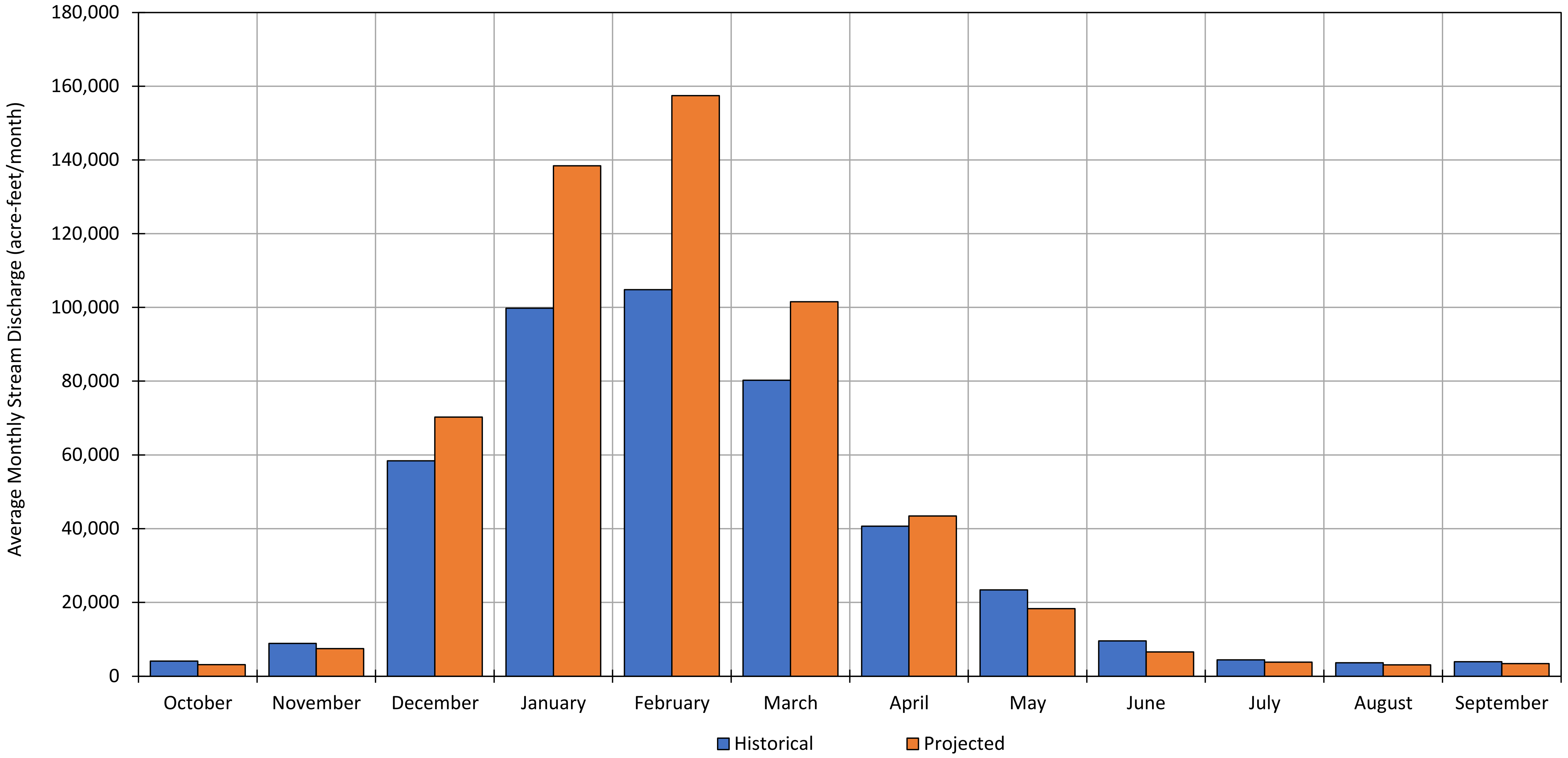
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



Outflow from SF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin

Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



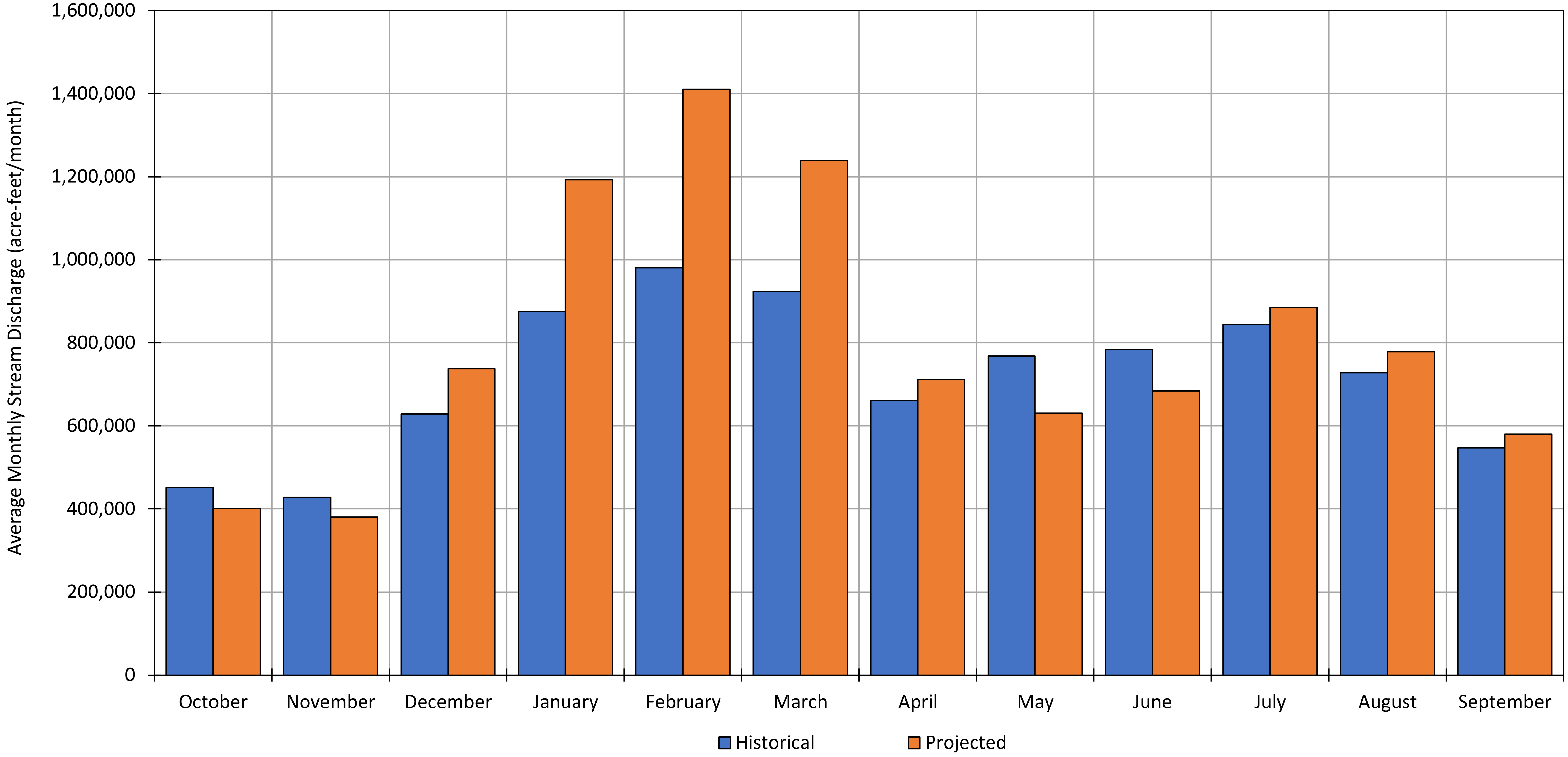
Outflow from Cottonwood Creek to Sacramento River

Bowman Subbasin

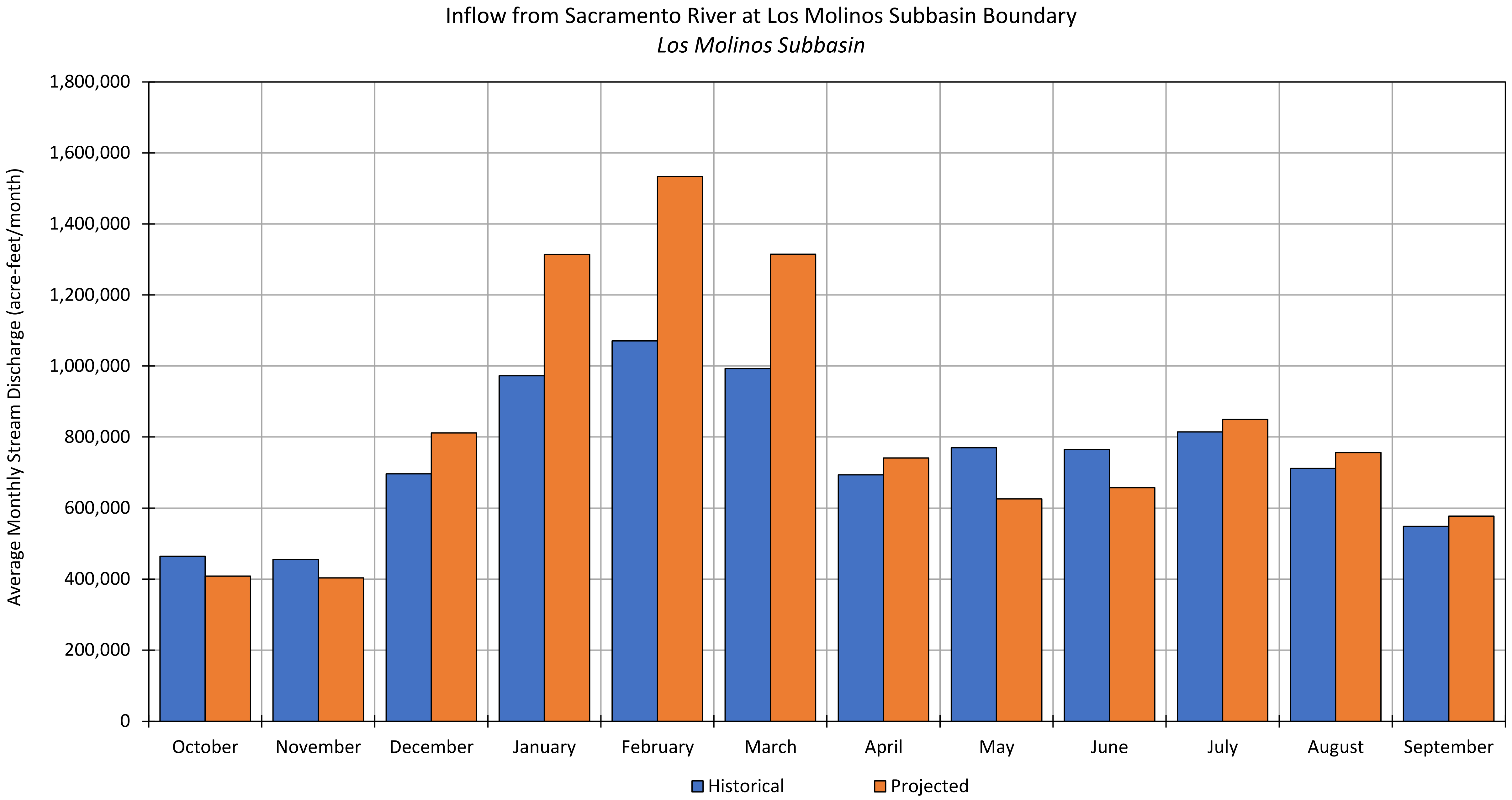
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Sacramento River at Bowman Subbasin Boundary

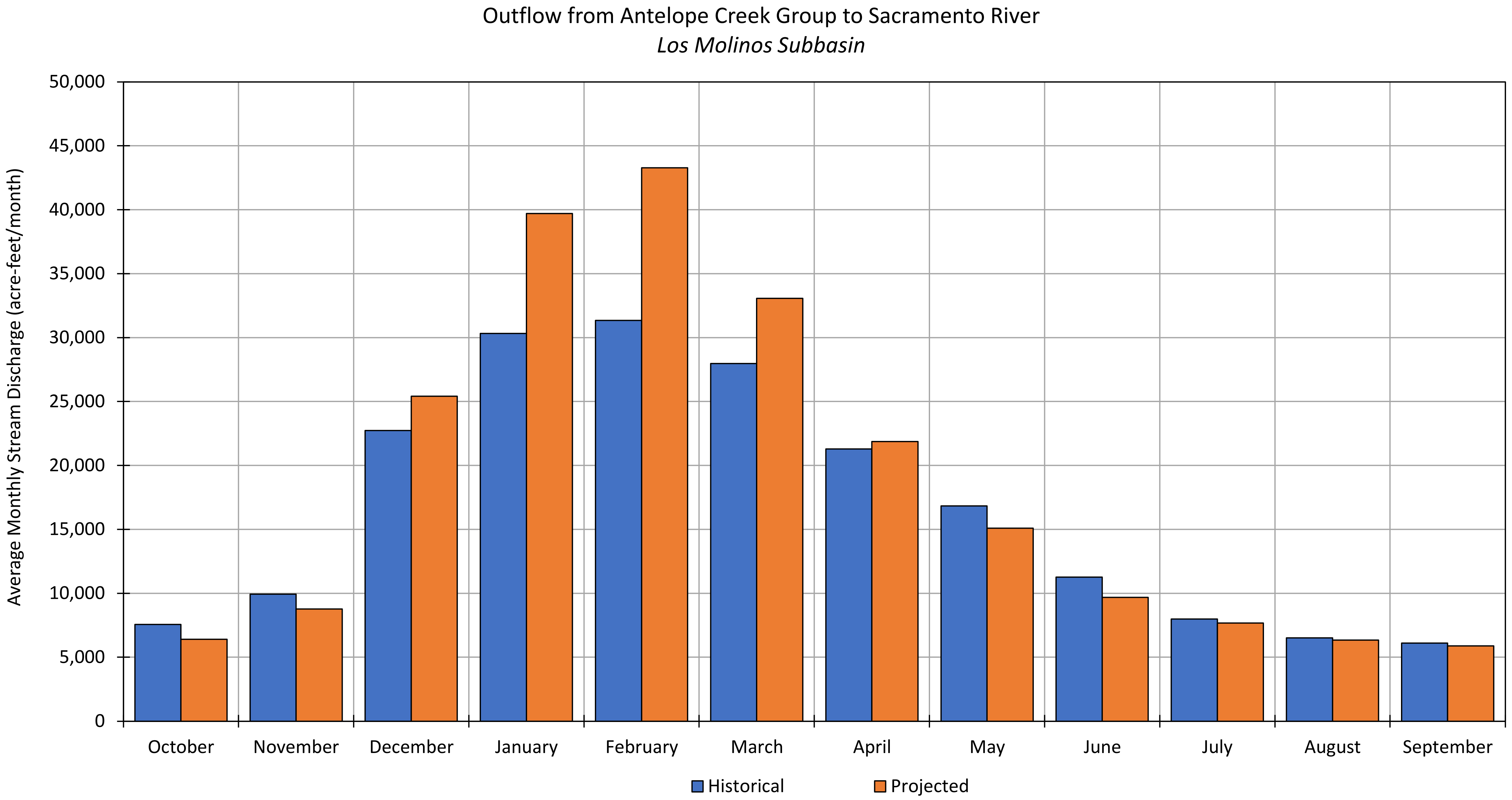
Bowman Subbasin



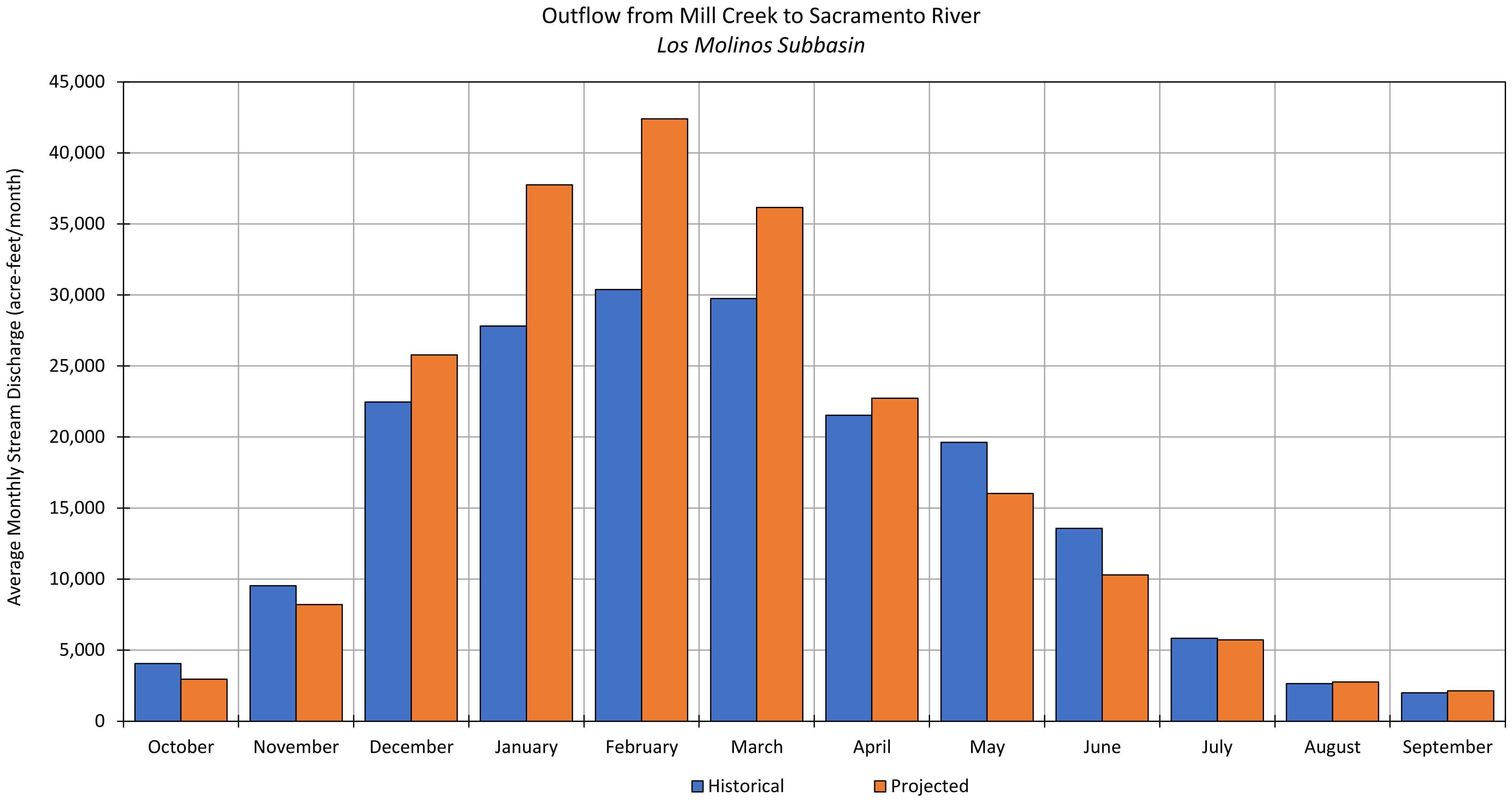
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



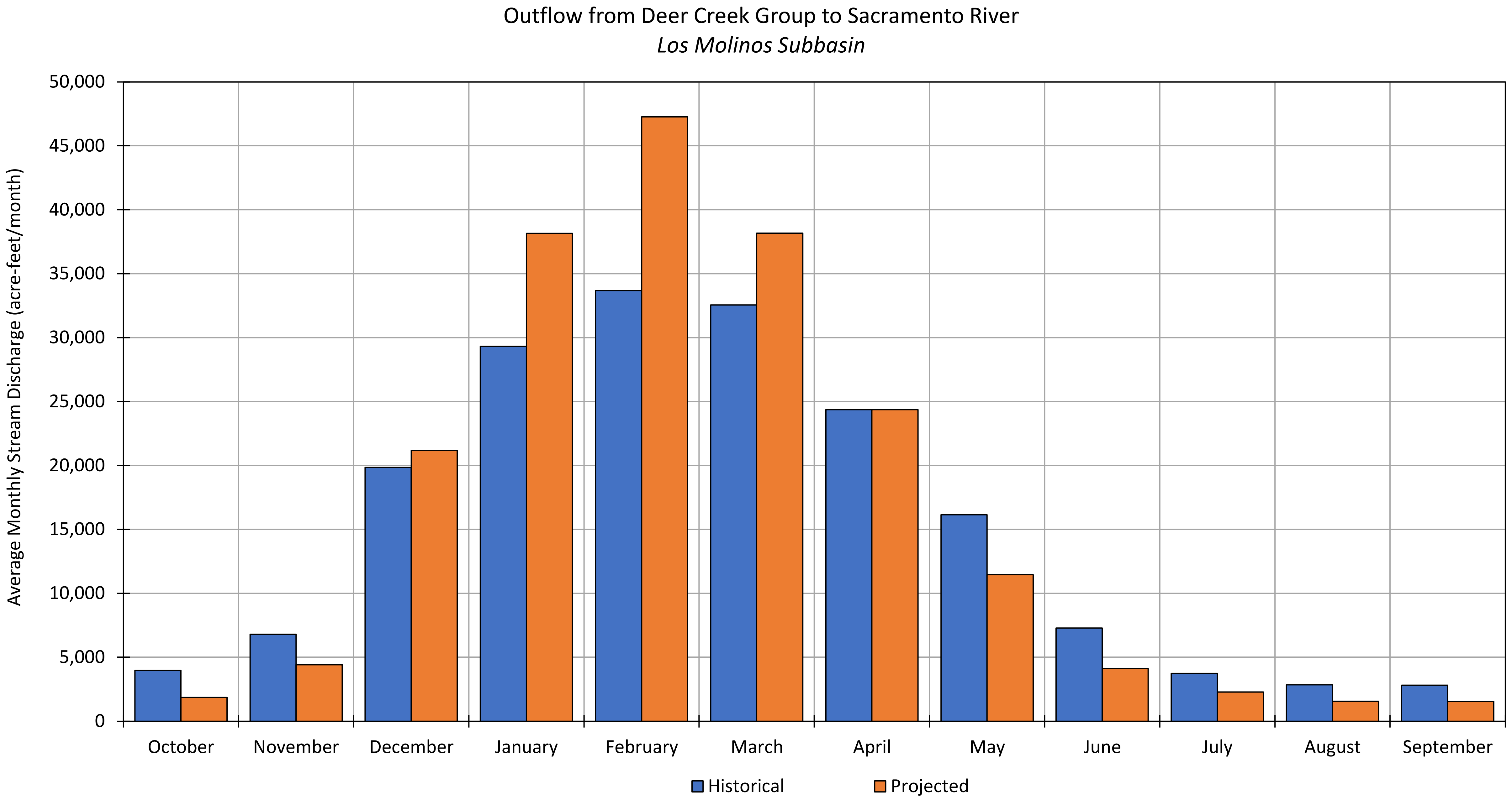
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



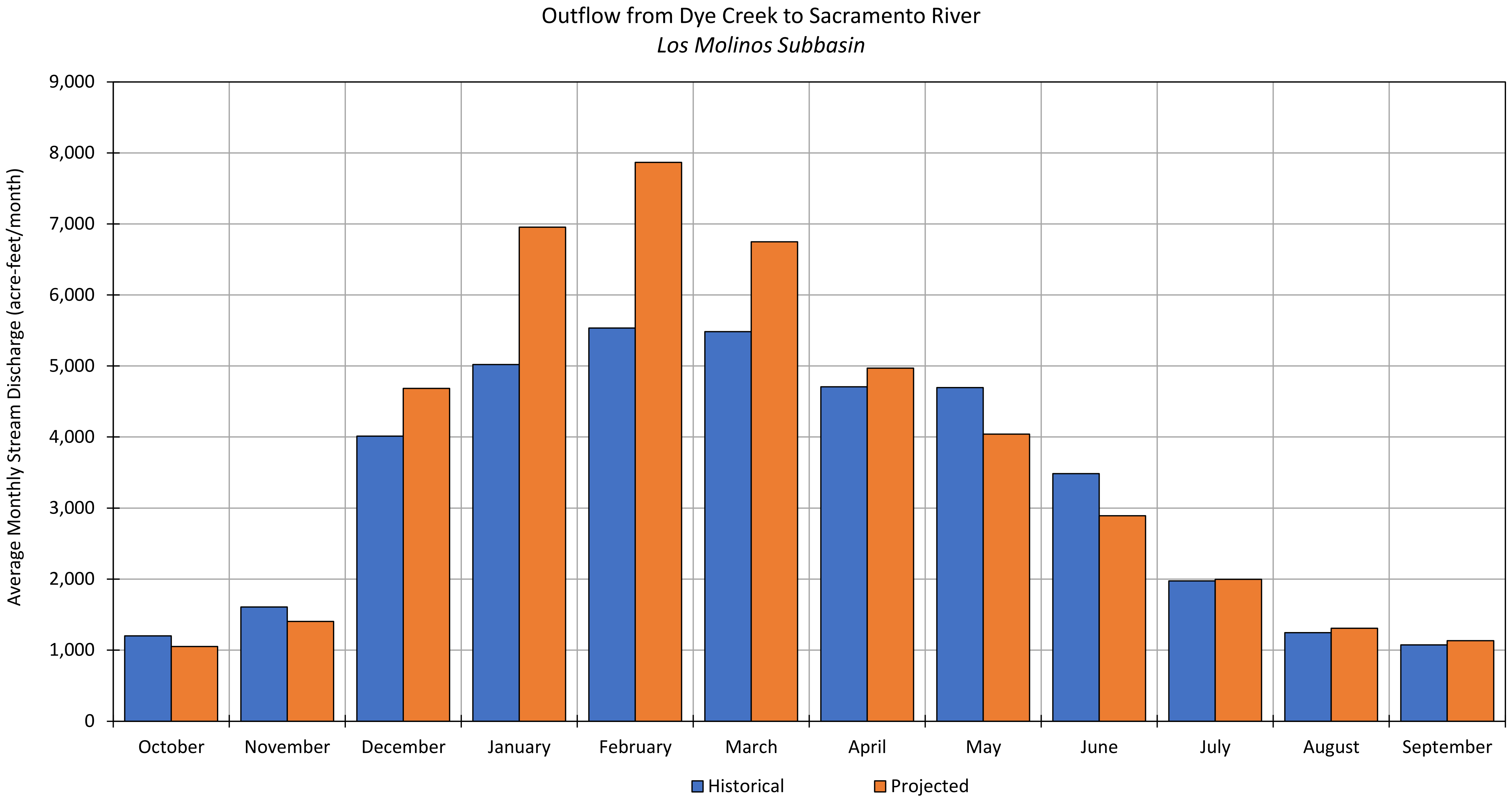
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



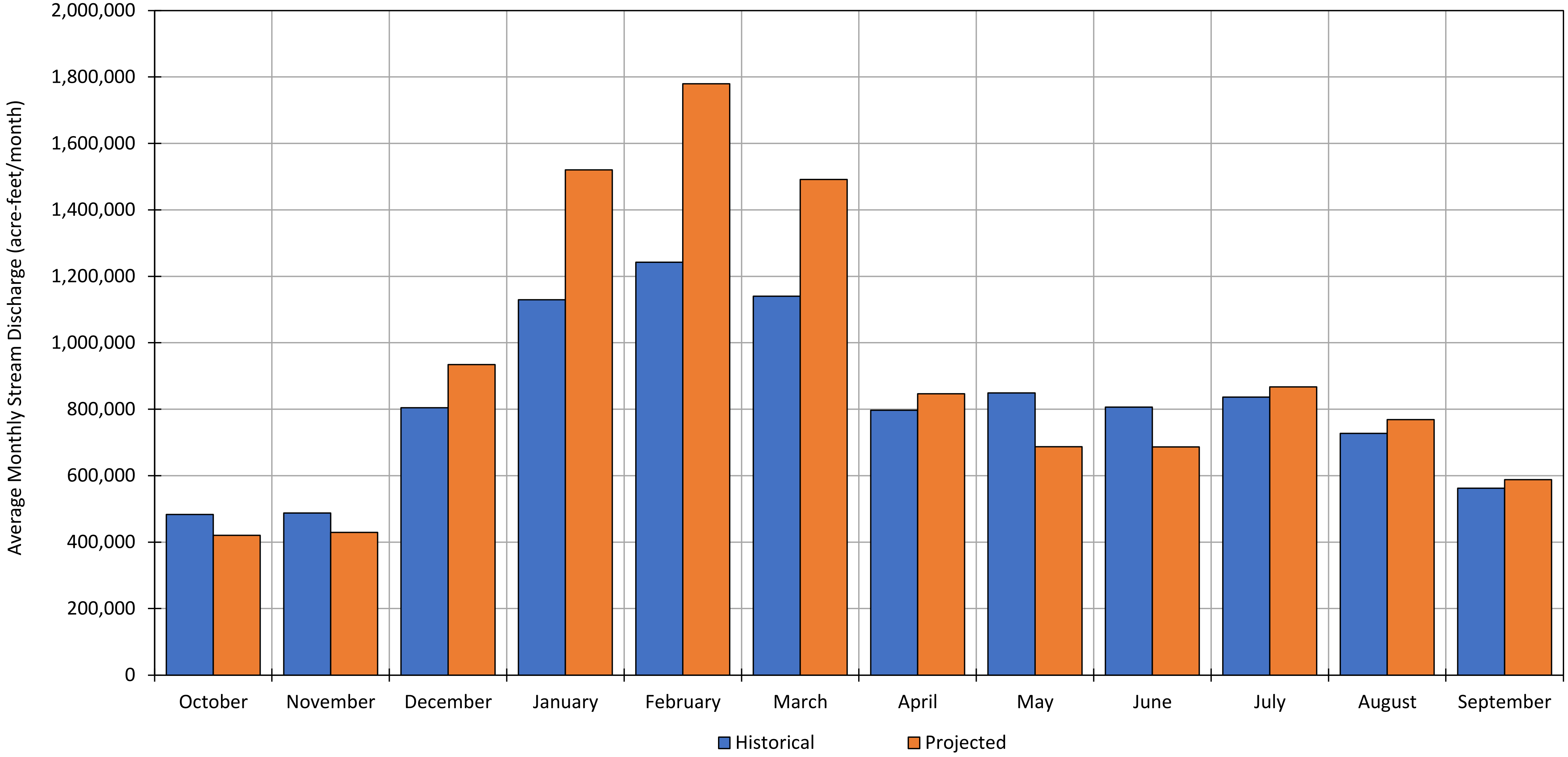
Outflow from Dye Creek to Sacramento River

Los Molinos Subbasin

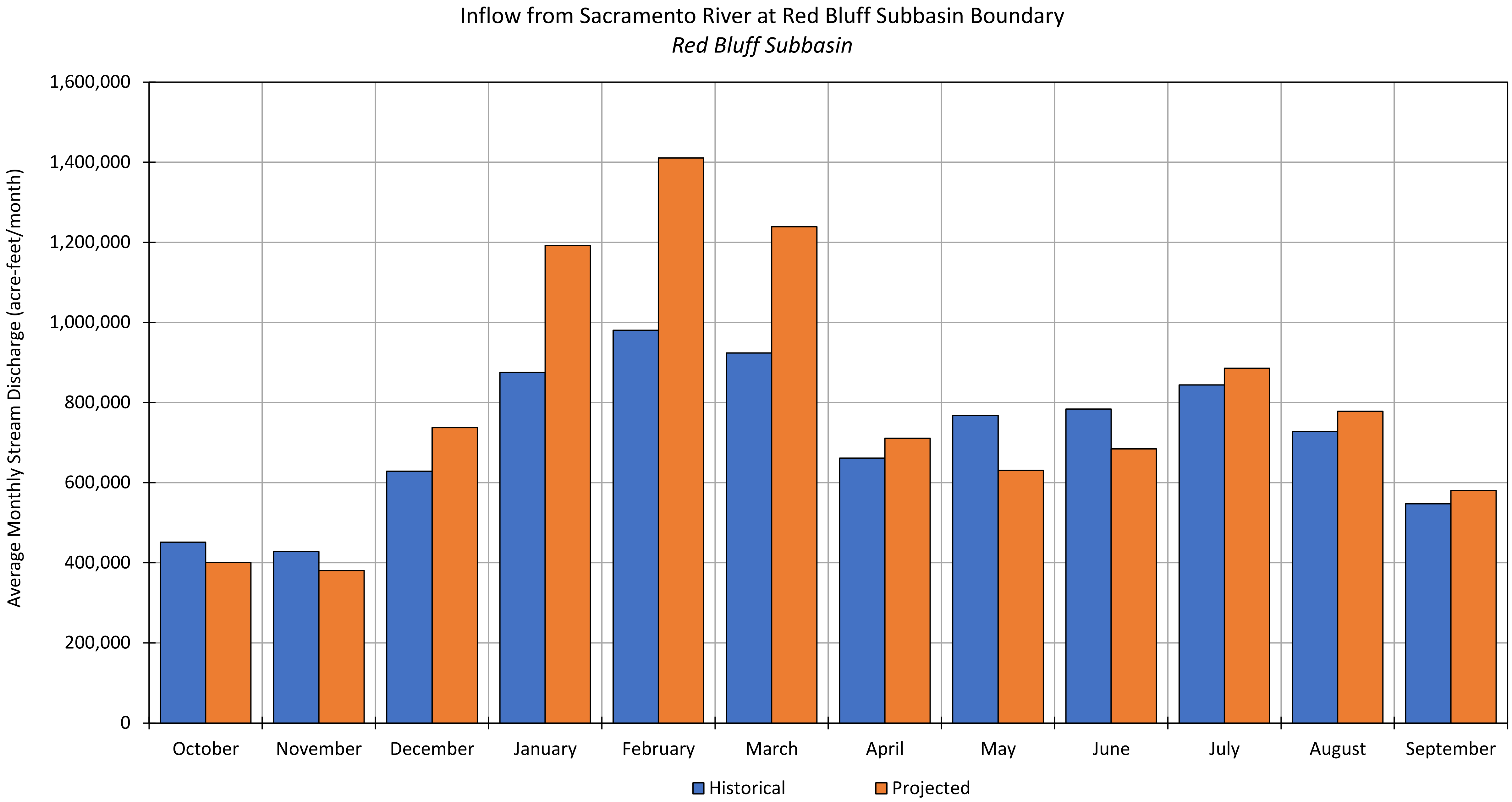
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Outflow from Sacramento River at Los Molinos Subbasin Boundary

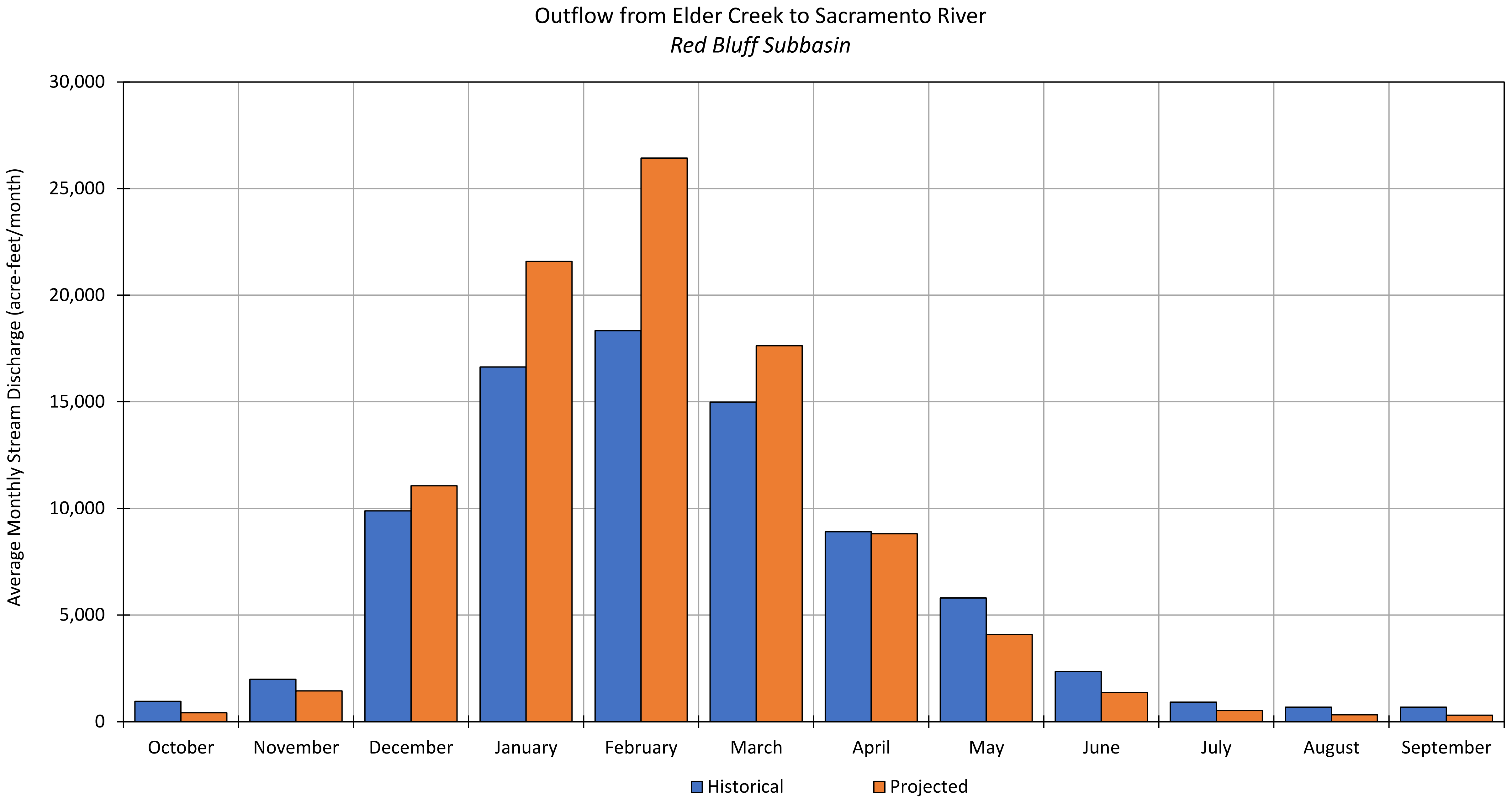
Los Molinos Subbasin



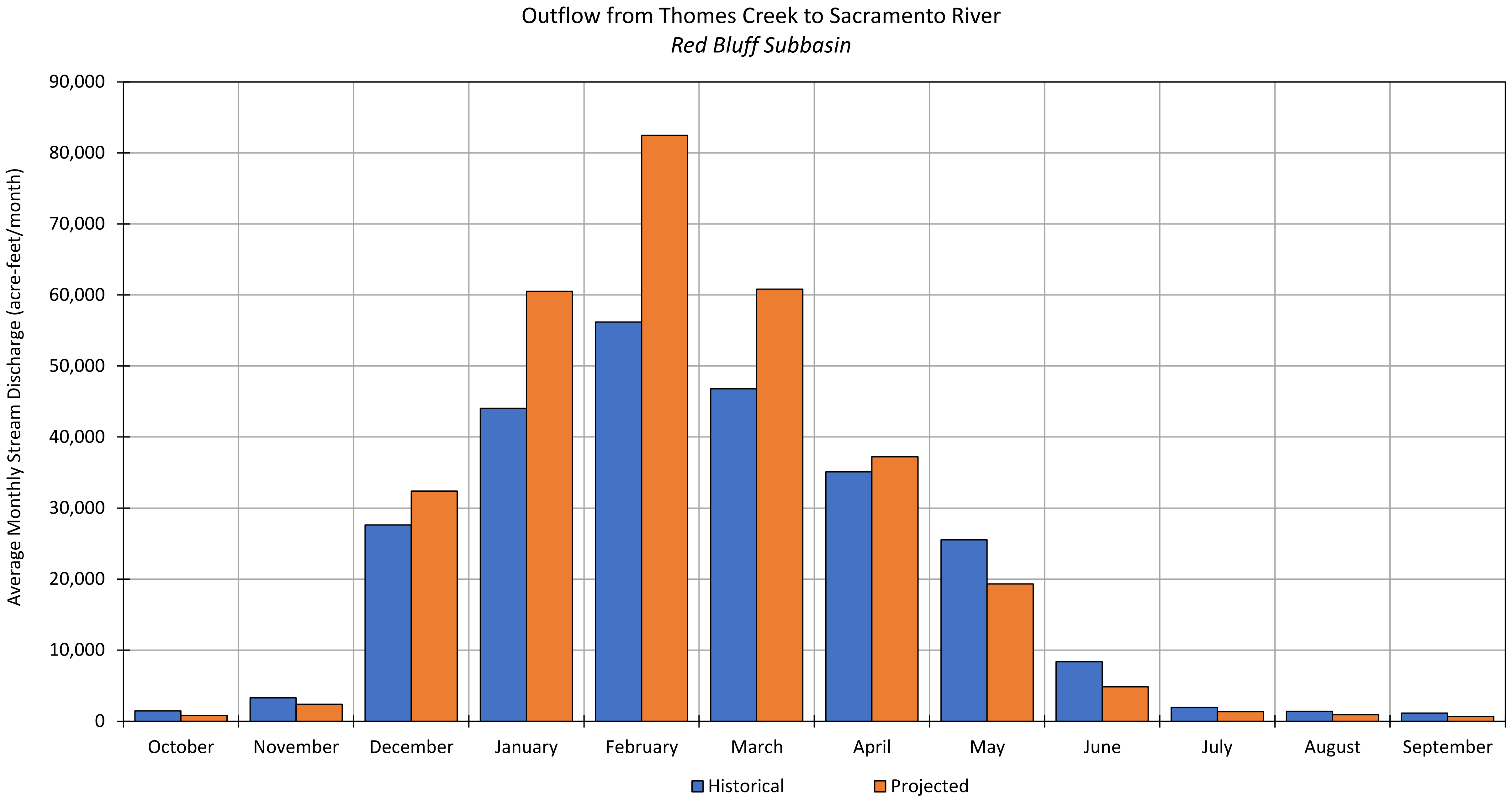
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



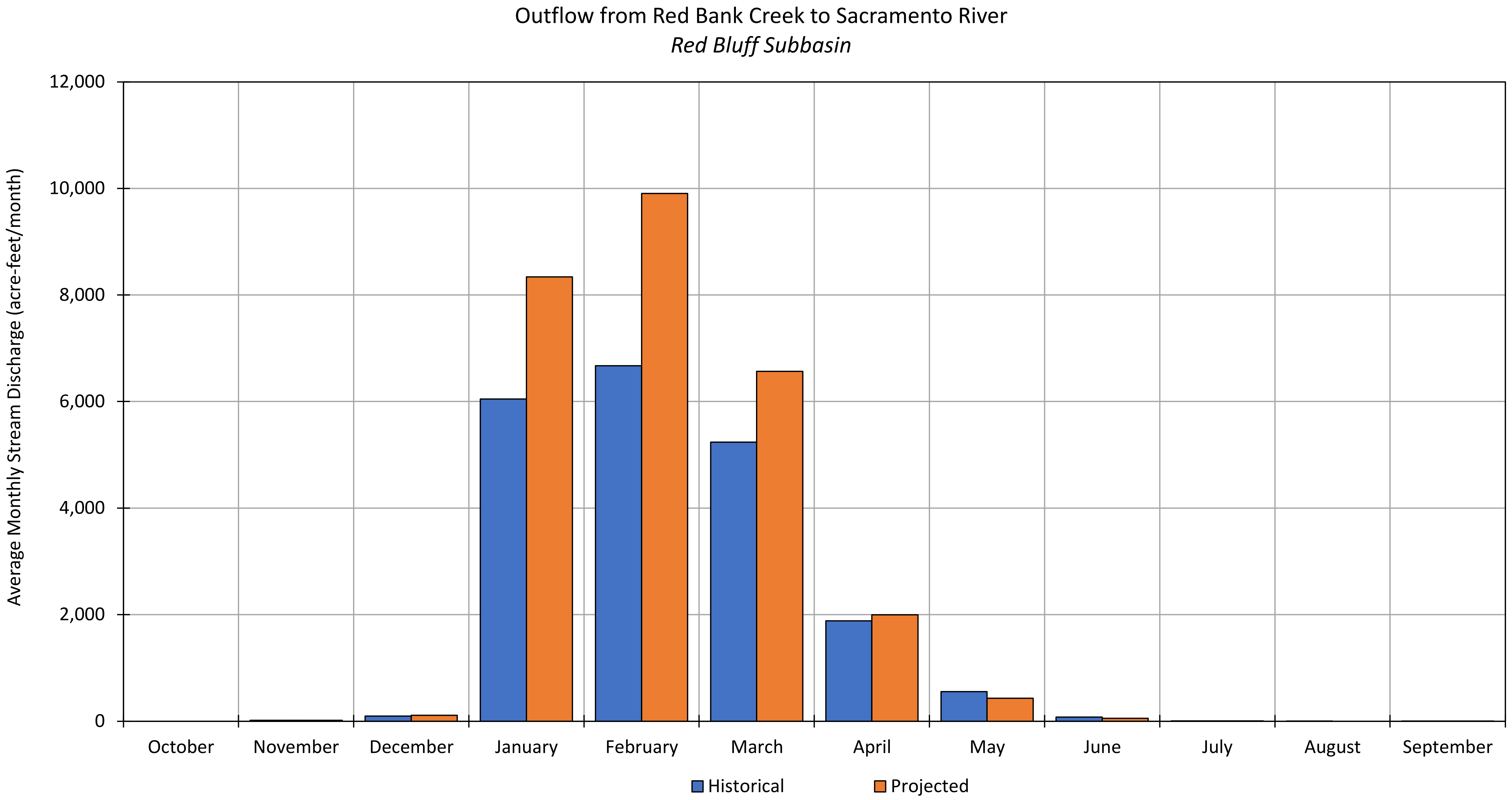
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



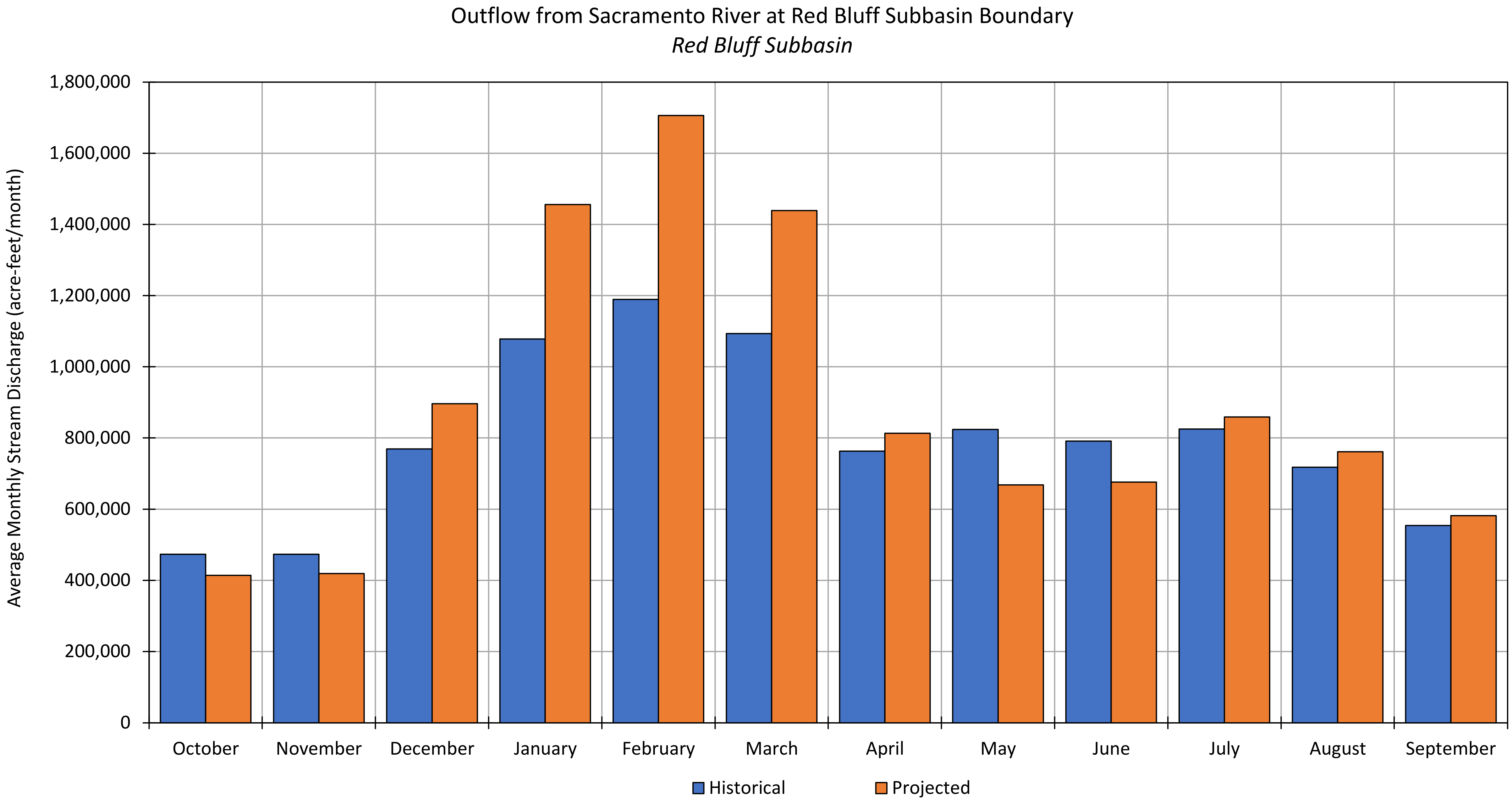
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

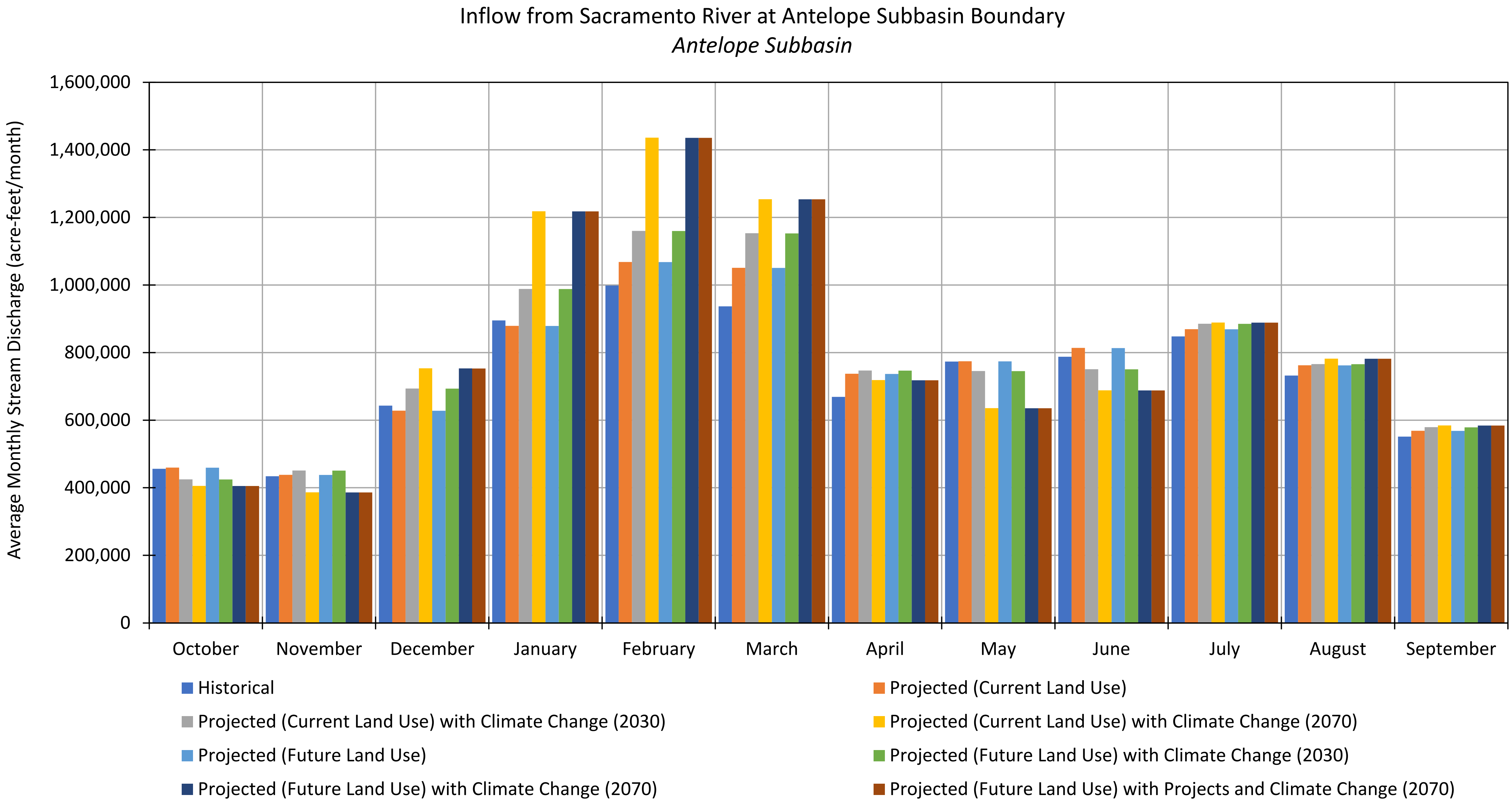


Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

APPENDIX G-9

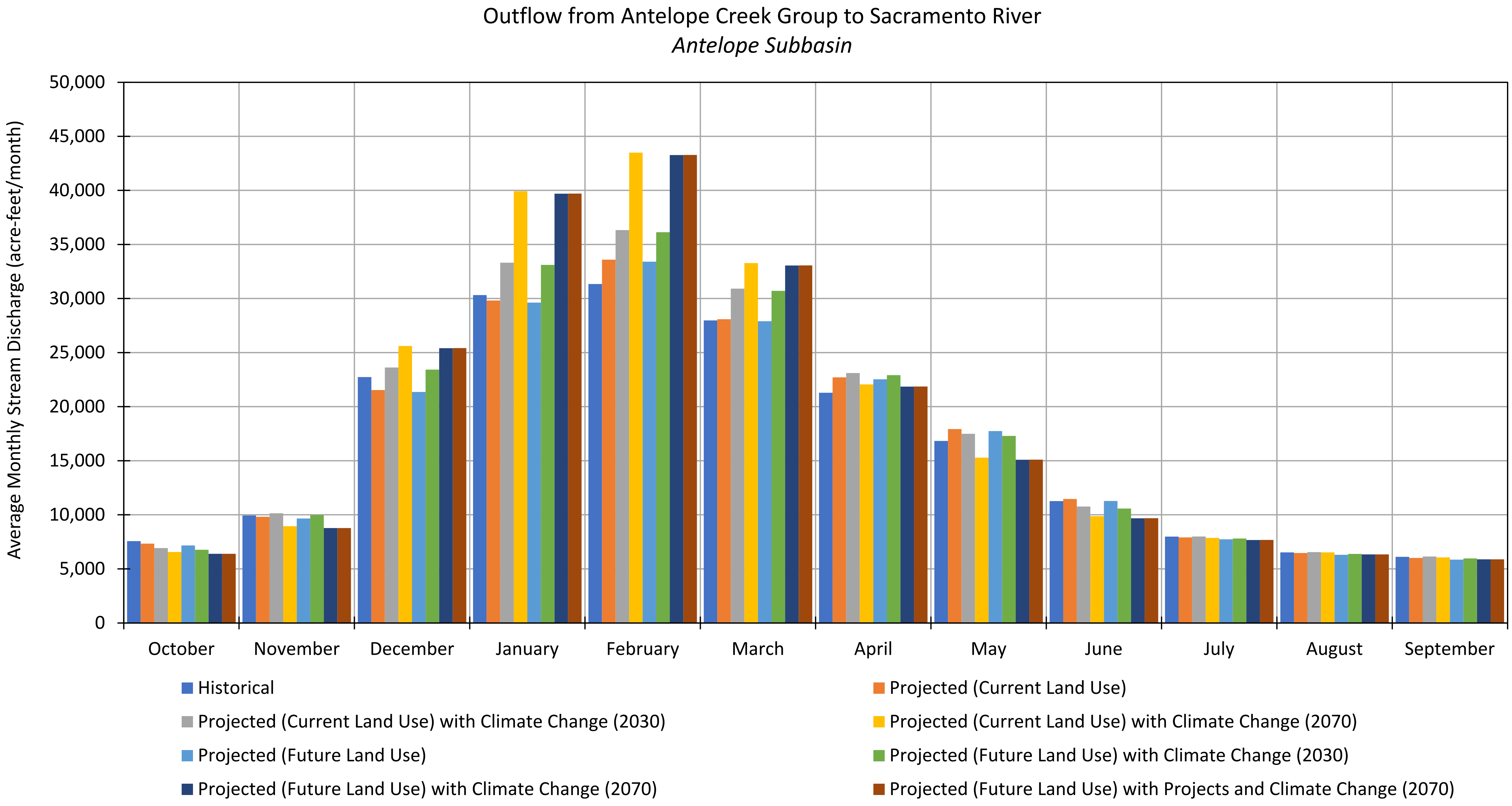
Tehama IHM Simulated Streamflows:

Comparison of Model Scenarios



Inflow from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin
Average Monthly Stream Discharge (acre-feet/month)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

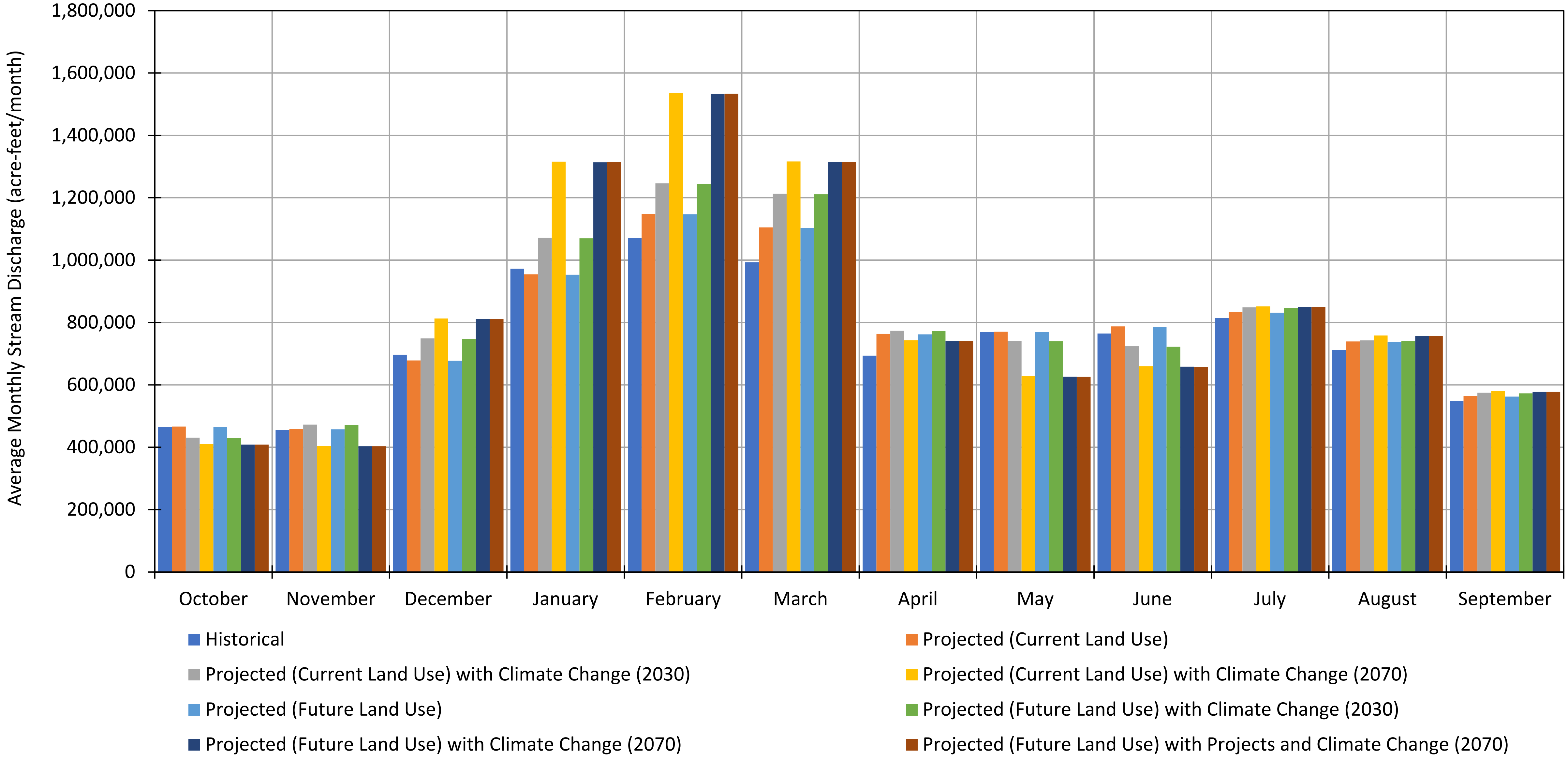
Tehama IHM


Outflow from Antelope Creek Group to Sacramento River
Antelope Subbasin
Average Monthly Stream Discharge (acre-feet/month)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

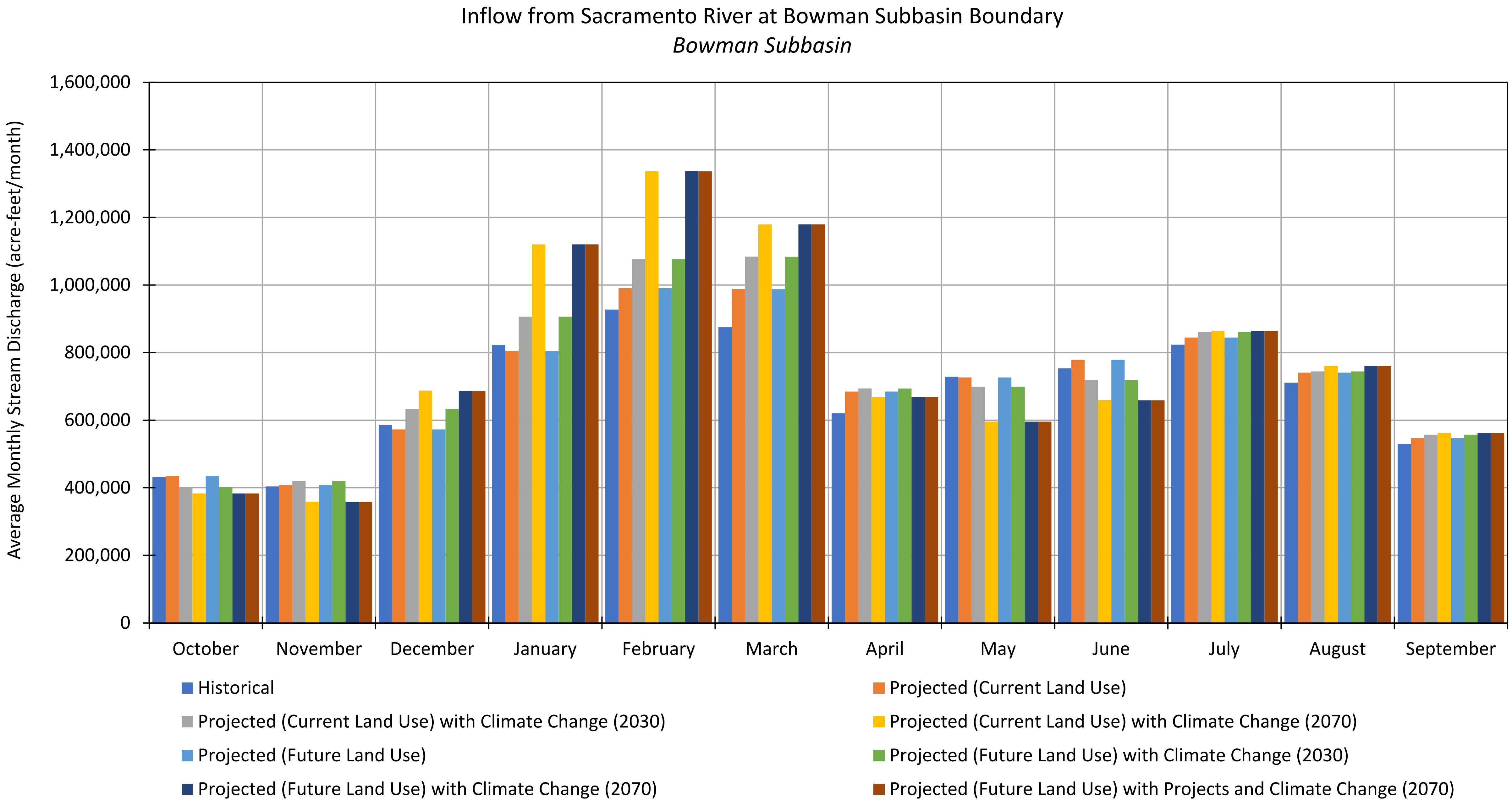
Tehama IHM

Outflow from Sacramento River at Antelope Subbasin Boundary

Antelope Subbasin



Tehama IHM



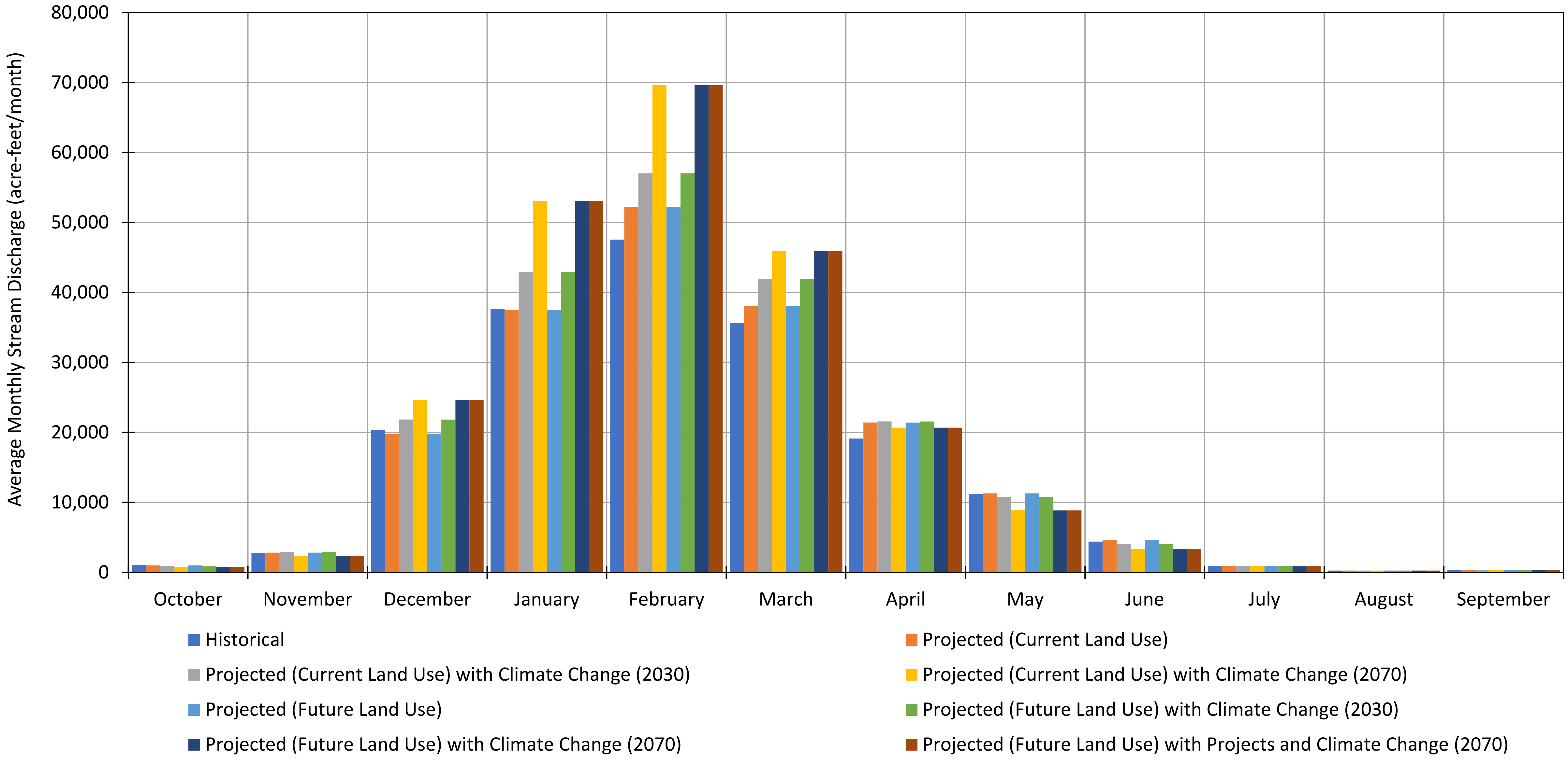
Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin

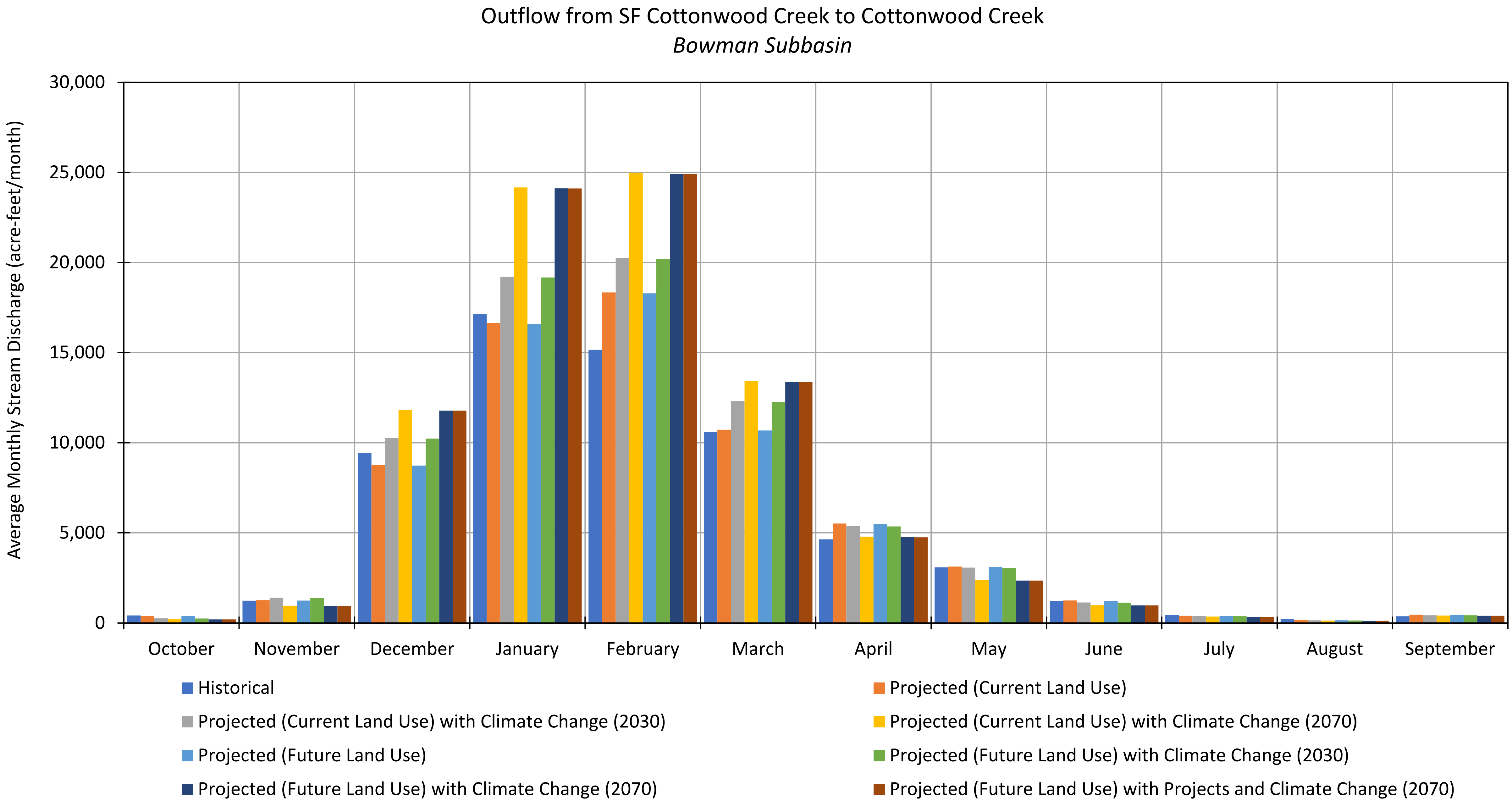
Tehama IHM

Outflow from MF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin



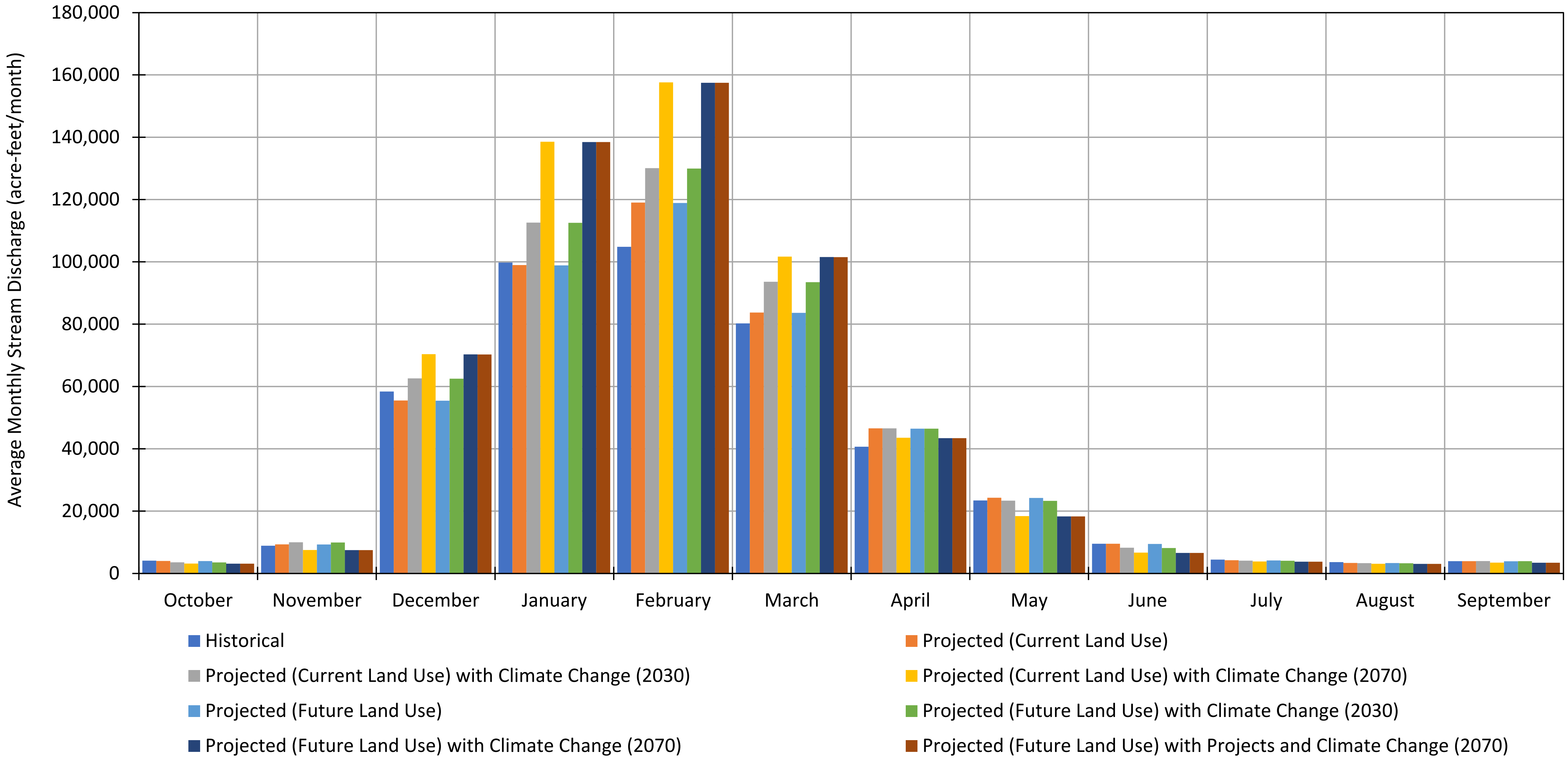
Tehama IHM


Outflow from SF Cottonwood Creek to Cottonwood Creek
Bowman Subbasin
Average Monthly Stream Discharge (acre-feet/month)
30,000
25,000
20,000
15,000
10,000
5,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

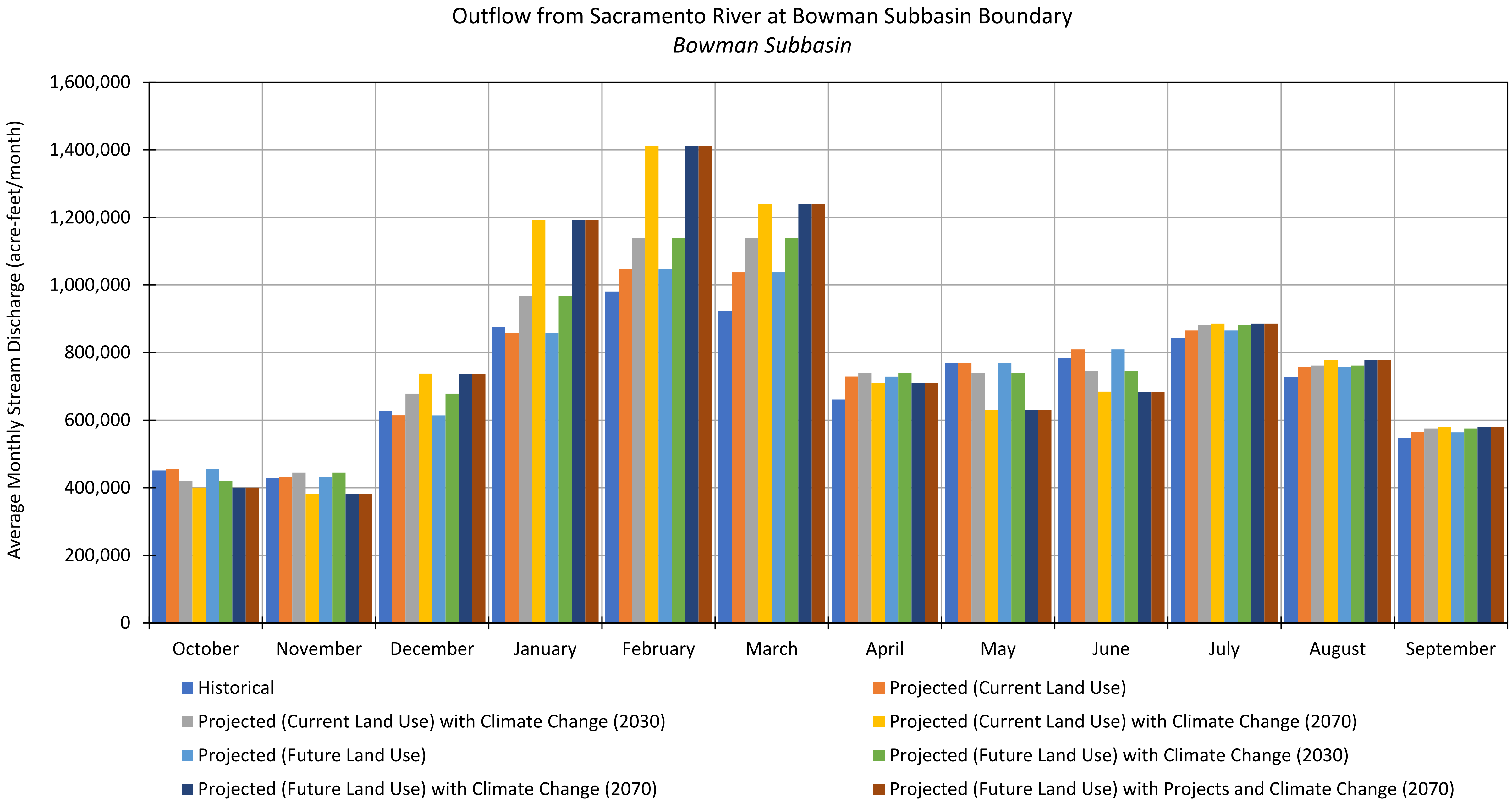
Tehama IHM

Outflow from Cottonwood Creek to Sacramento River

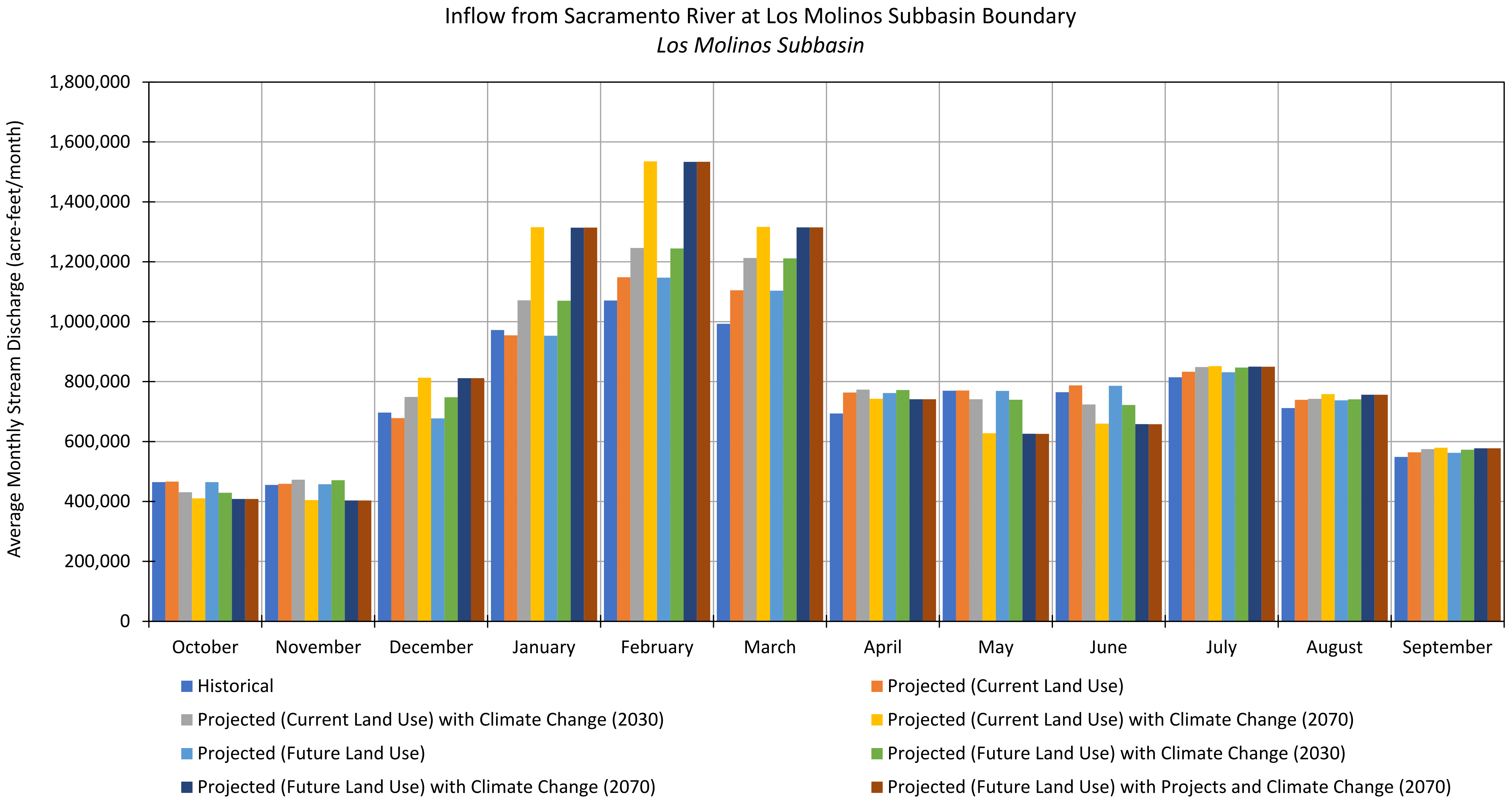
Bowman Subbasin



Tehama IHM


Outflow from Sacramento River at Bowman Subbasin Boundary
Bowman Subbasin
Average Monthly Stream Discharge (acre-feet/month)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

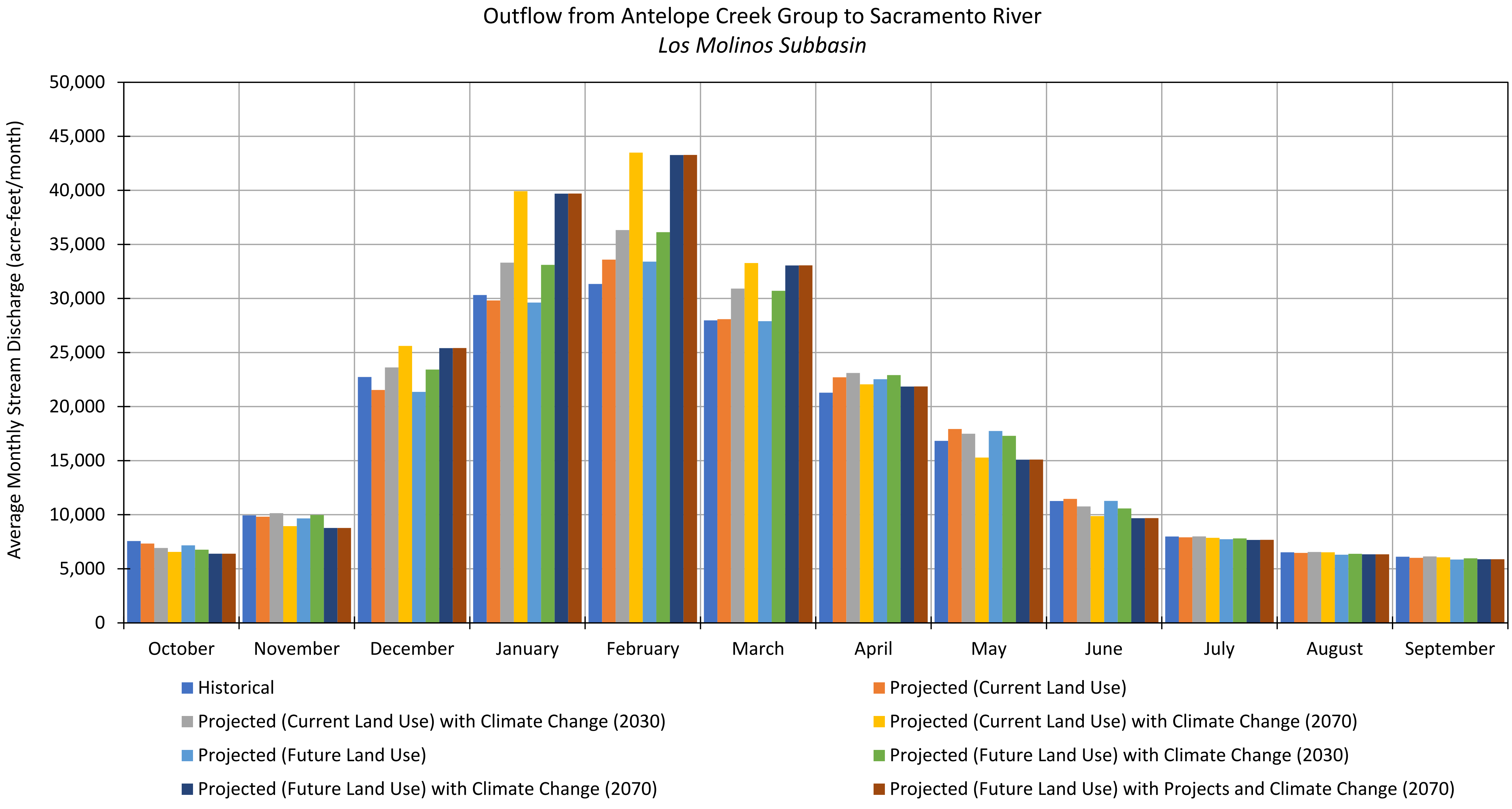
Tehama IHM



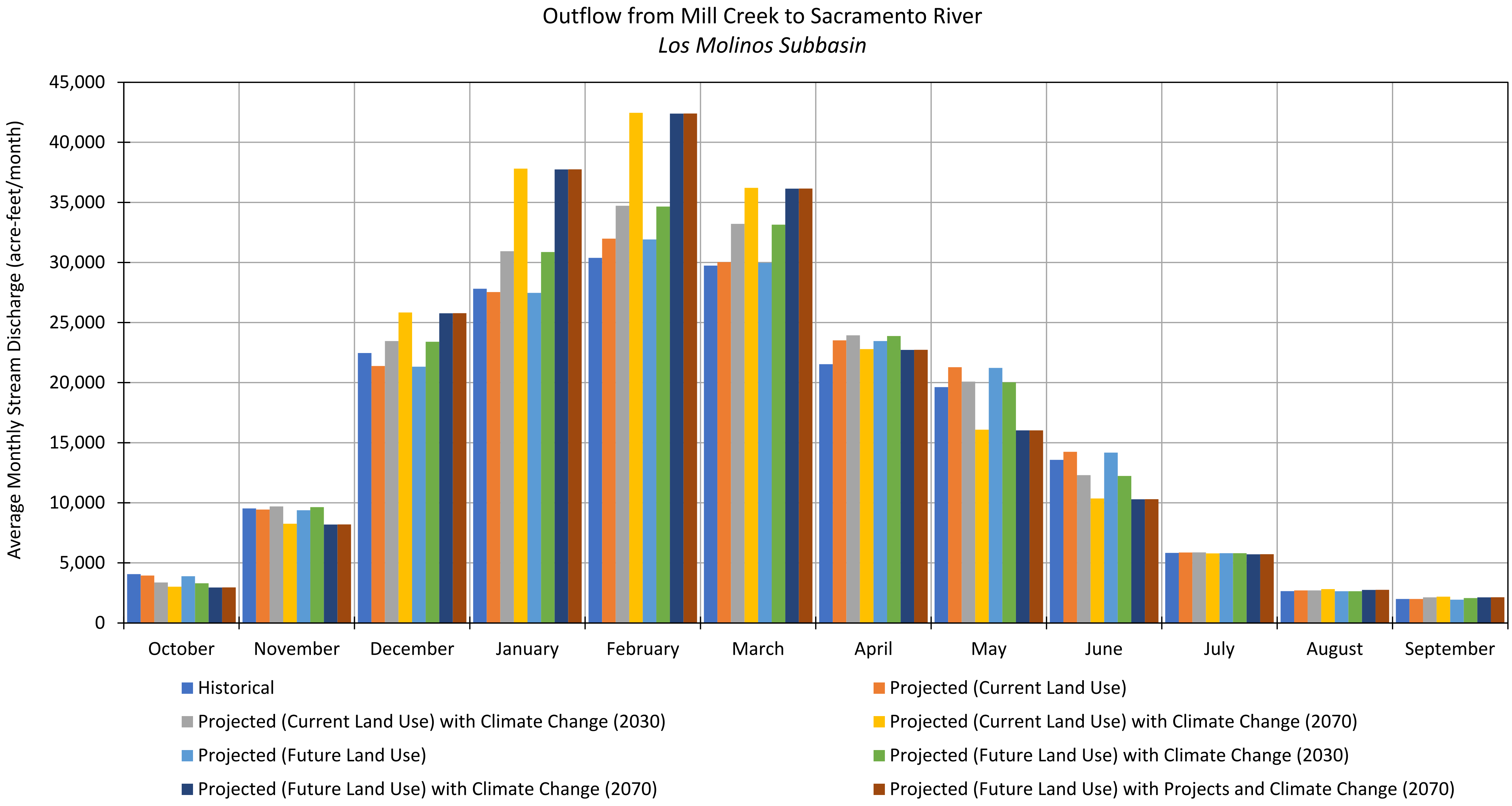
Inflow from Sacramento River at Los Molinos Subbasin Boundary

Los Molinos Subbasin

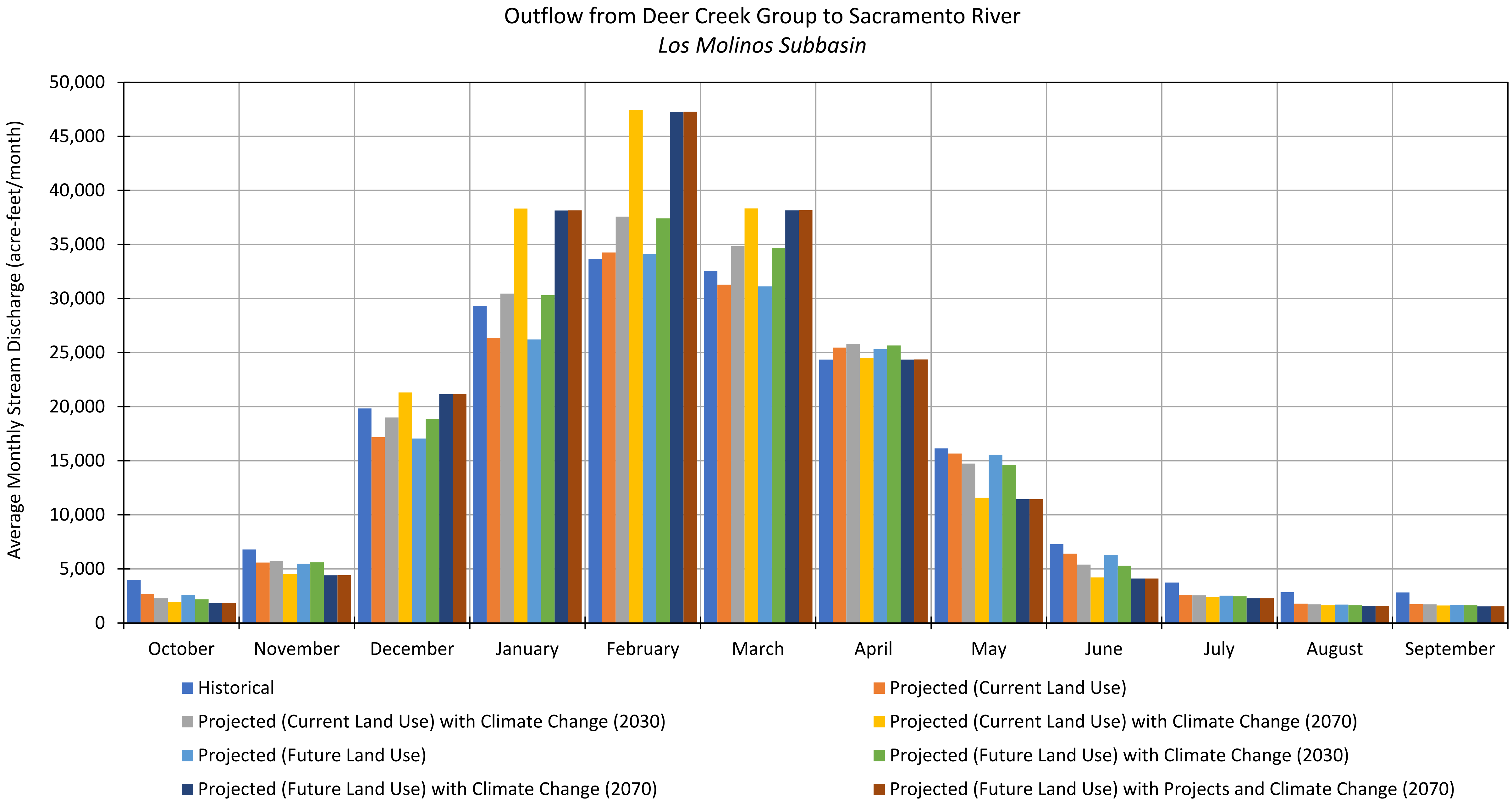
Tehama IHM


Outflow from Antelope Creek Group to Sacramento River
Los Molinos Subbasin
Average Monthly Stream Discharge (acre-feet/month)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

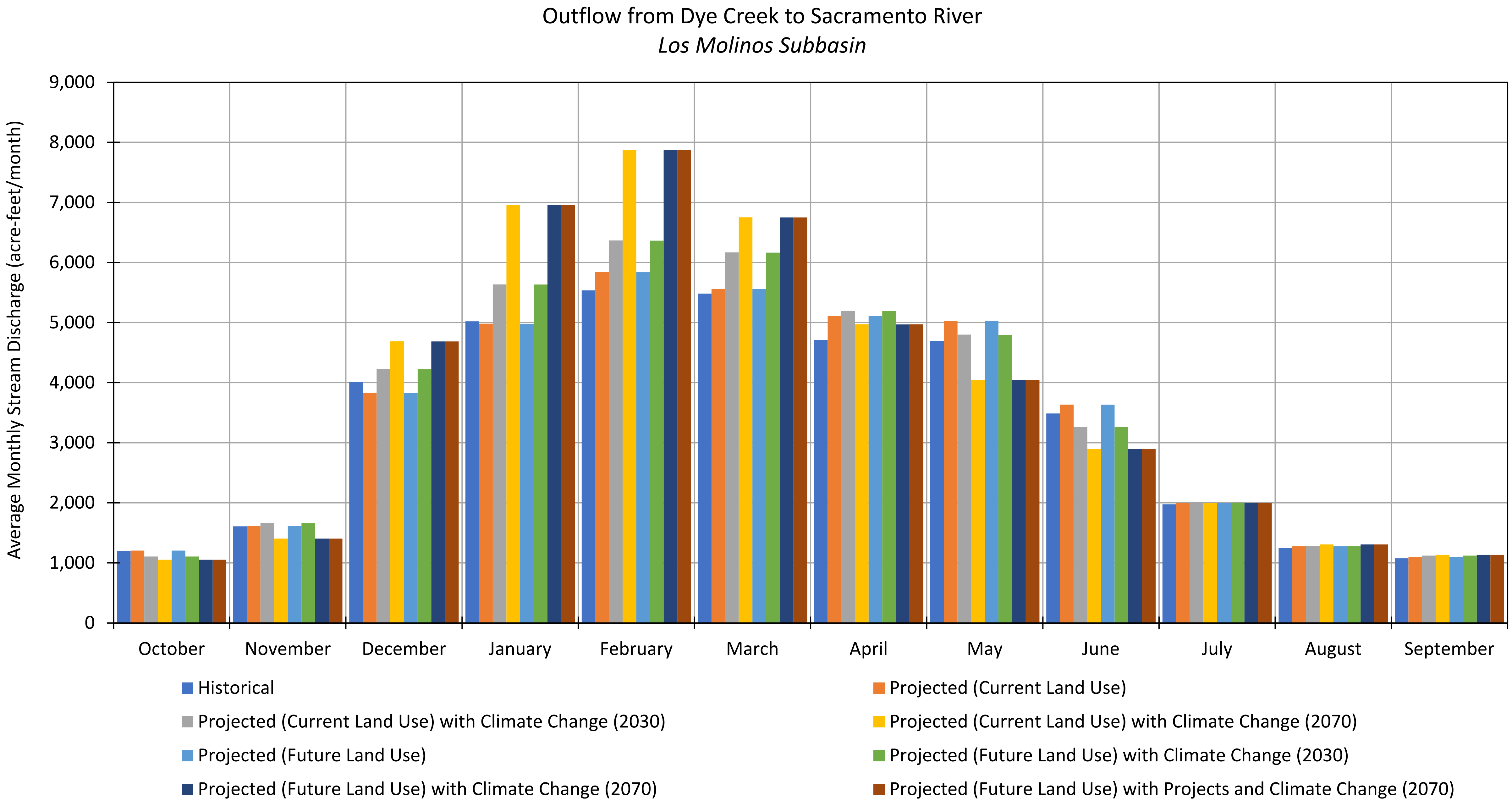
Tehama IHM


Outflow from Mill Creek to Sacramento River
Los Molinos Subbasin
Average Monthly Stream Discharge (acre-feet/month)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

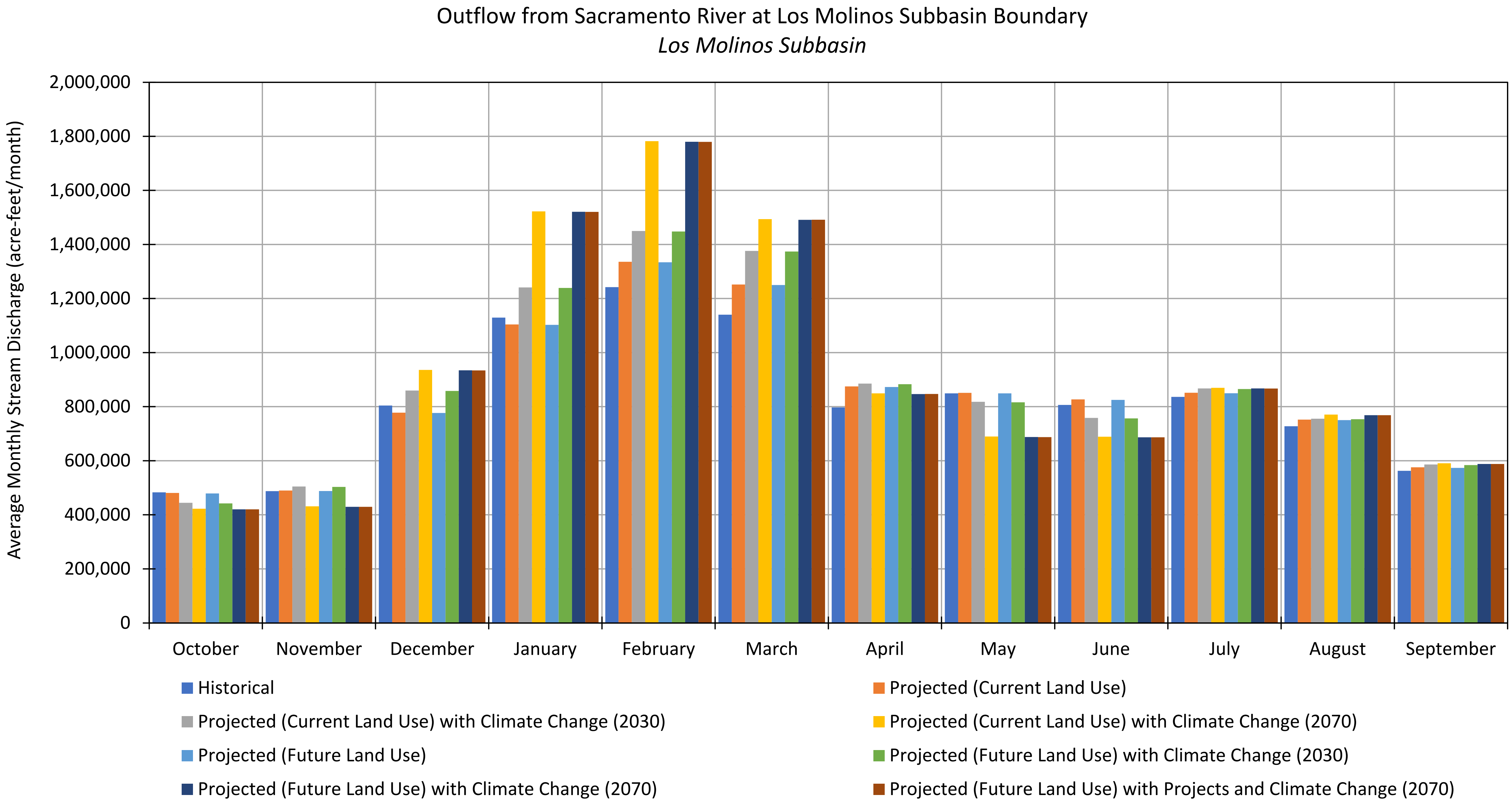
Tehama IHM


Outflow from Deer Creek Group to Sacramento River
Los Molinos Subbasin
Average Monthly Stream Discharge (acre-feet/month)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

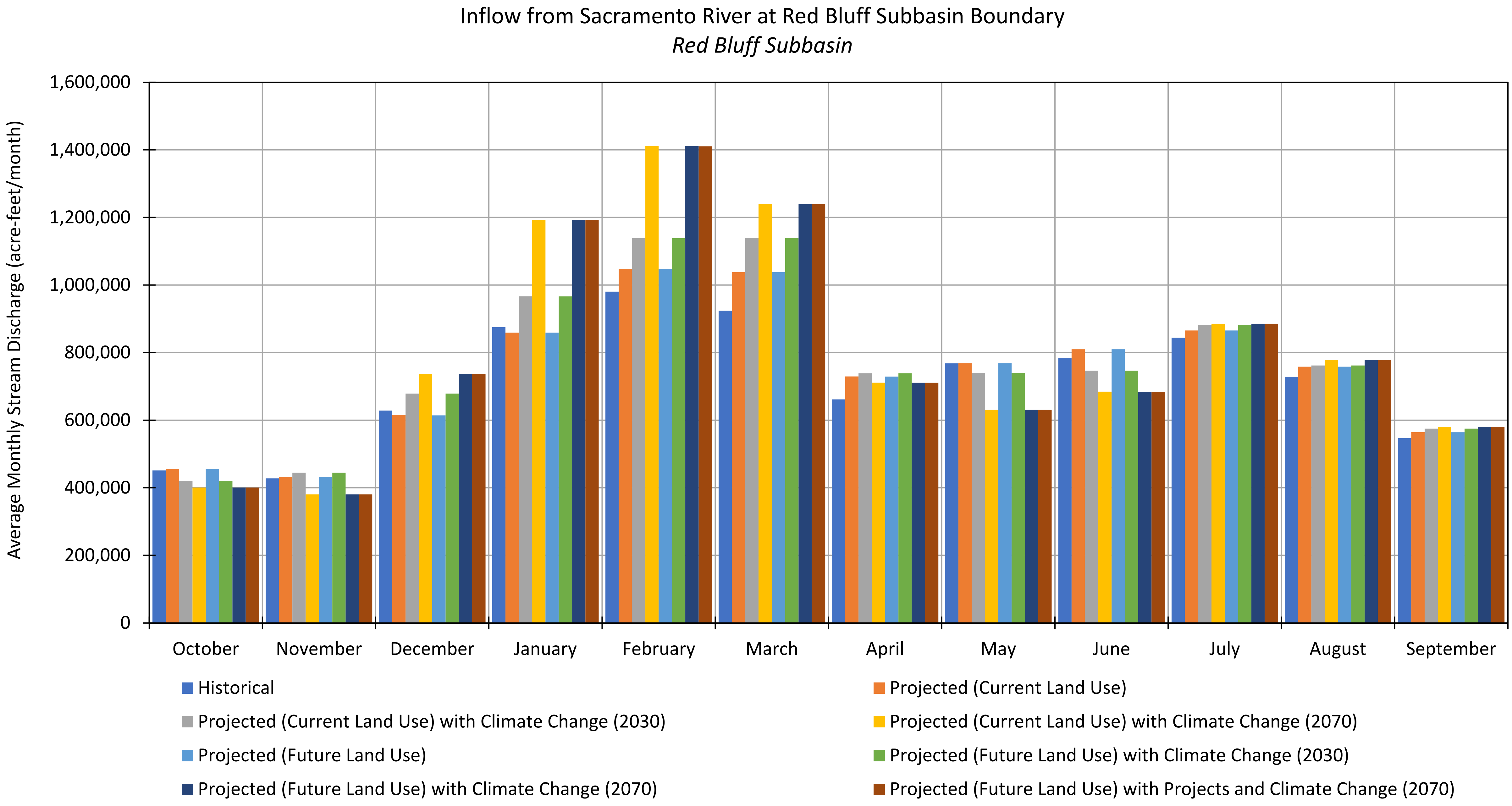
Tehama IHM


Outflow from Dye Creek to Sacramento River
Los Molinos Subbasin
Average Monthly Stream Discharge (acre-feet/month)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

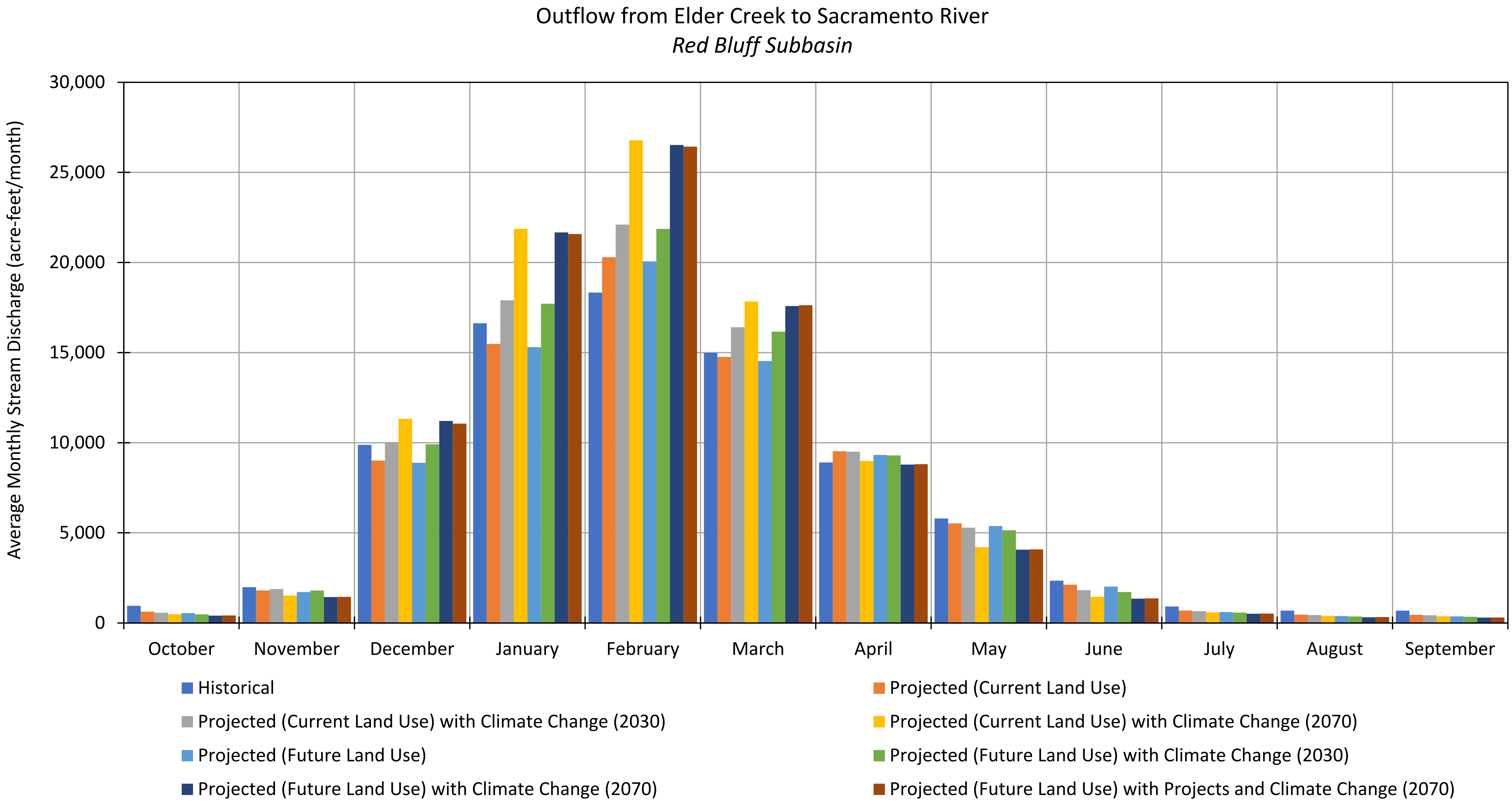
Tehama IHM

Outflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin
Average Monthly Stream Discharge (acre-feet/month)
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

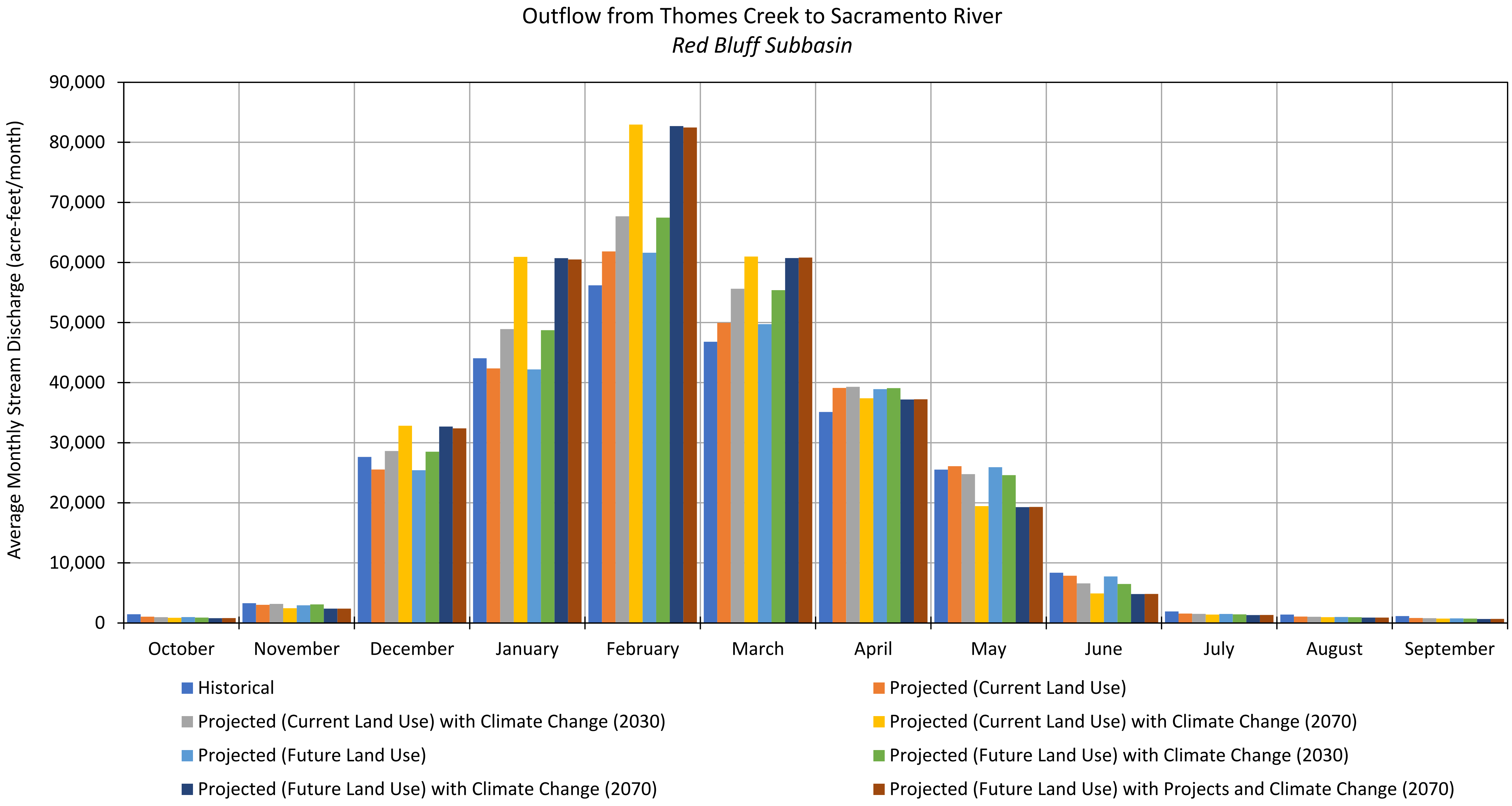
Tehama IHM


Inflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin
Average Monthly Stream Discharge (acre-feet/month)
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

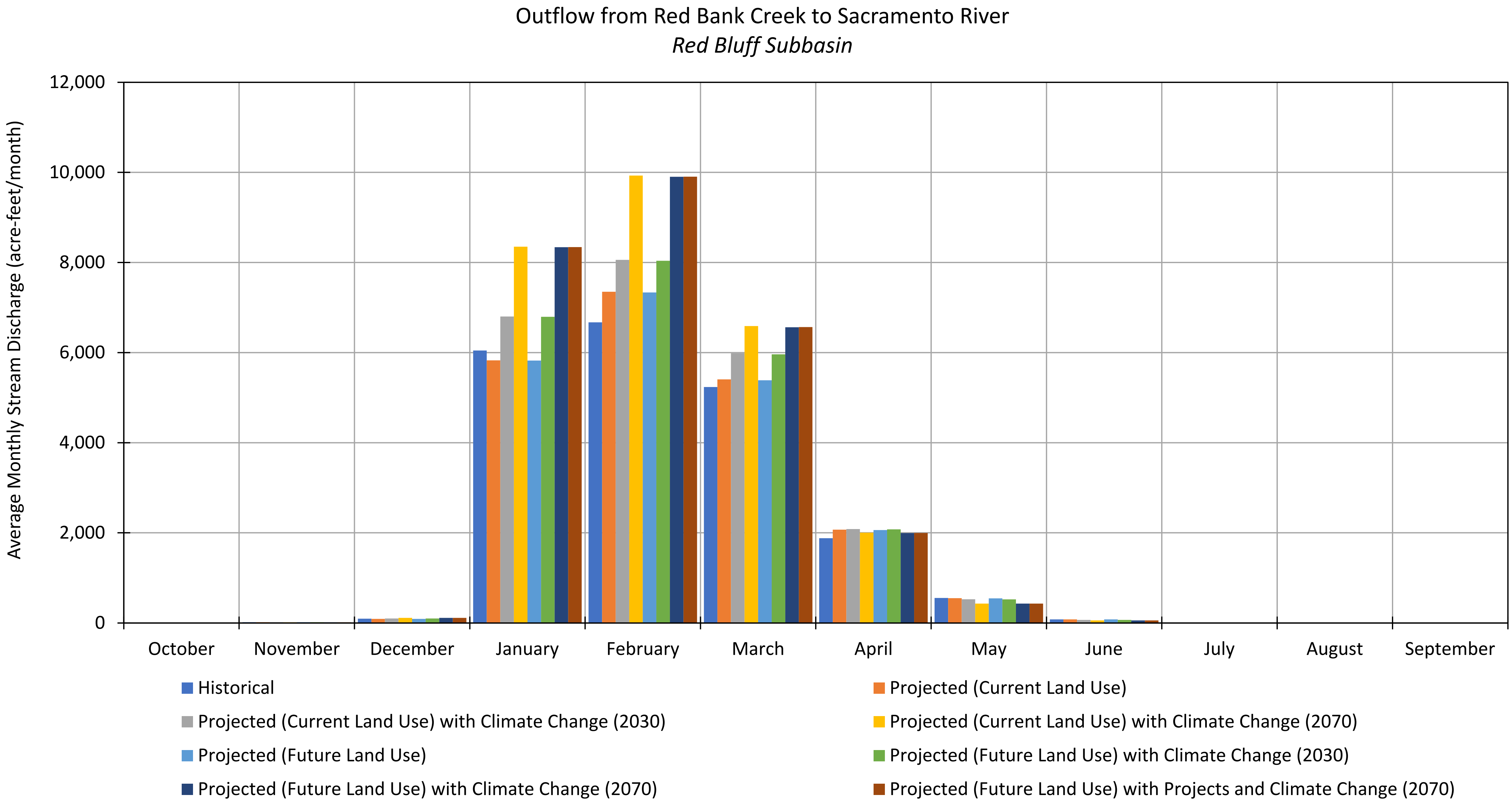
Tehama IHM


Outflow from Elder Creek to Sacramento River
Red Bluff Subbasin
Average Monthly Stream Discharge (acre-feet/month)
30,000
25,000
20,000
15,000
10,000
5,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

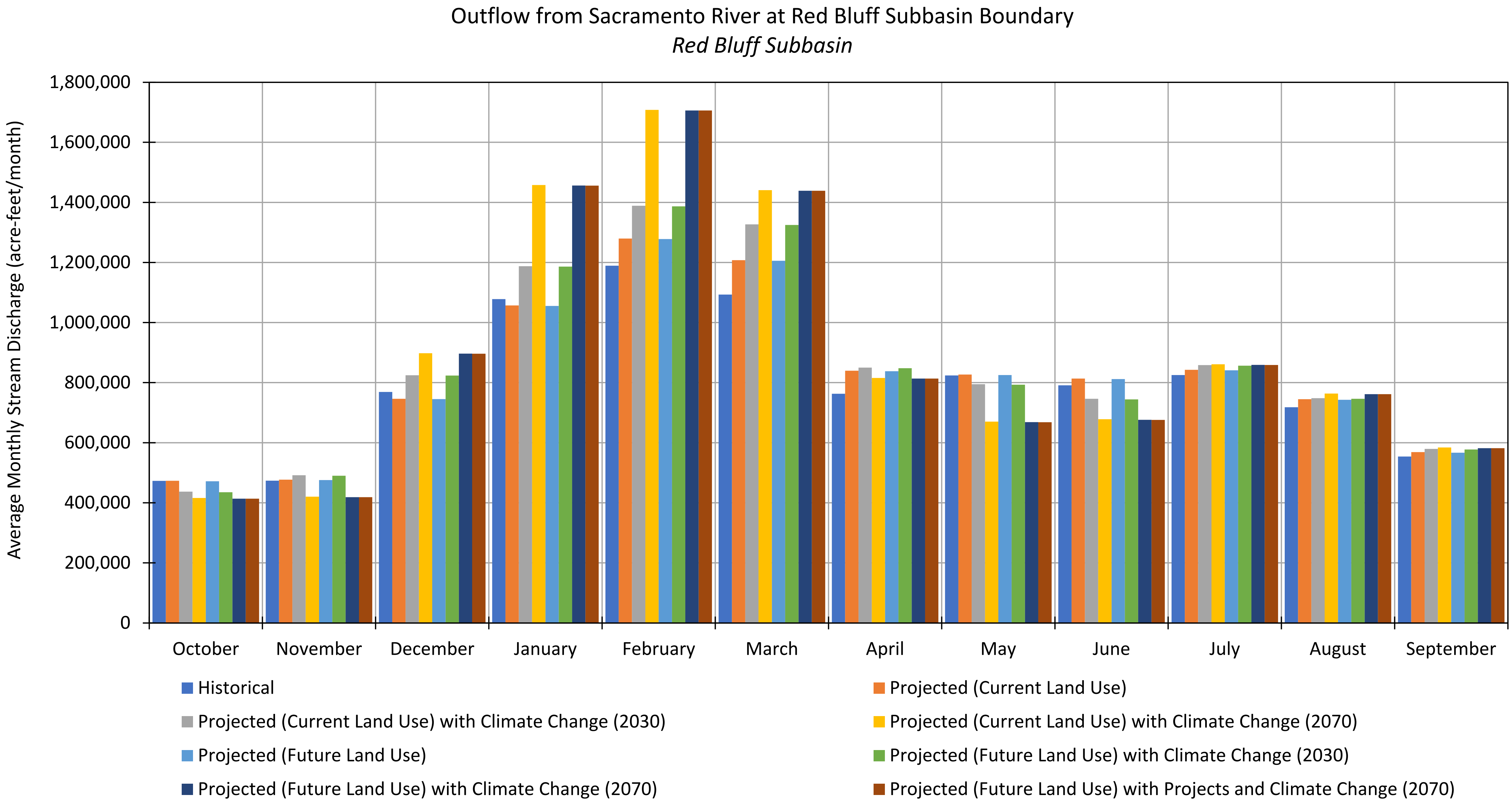
Tehama IHM


Outflow from Thomes Creek to Sacramento River
Red Bluff Subbasin
Average Monthly Stream Discharge (acre-feet/month)
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

Tehama IHM

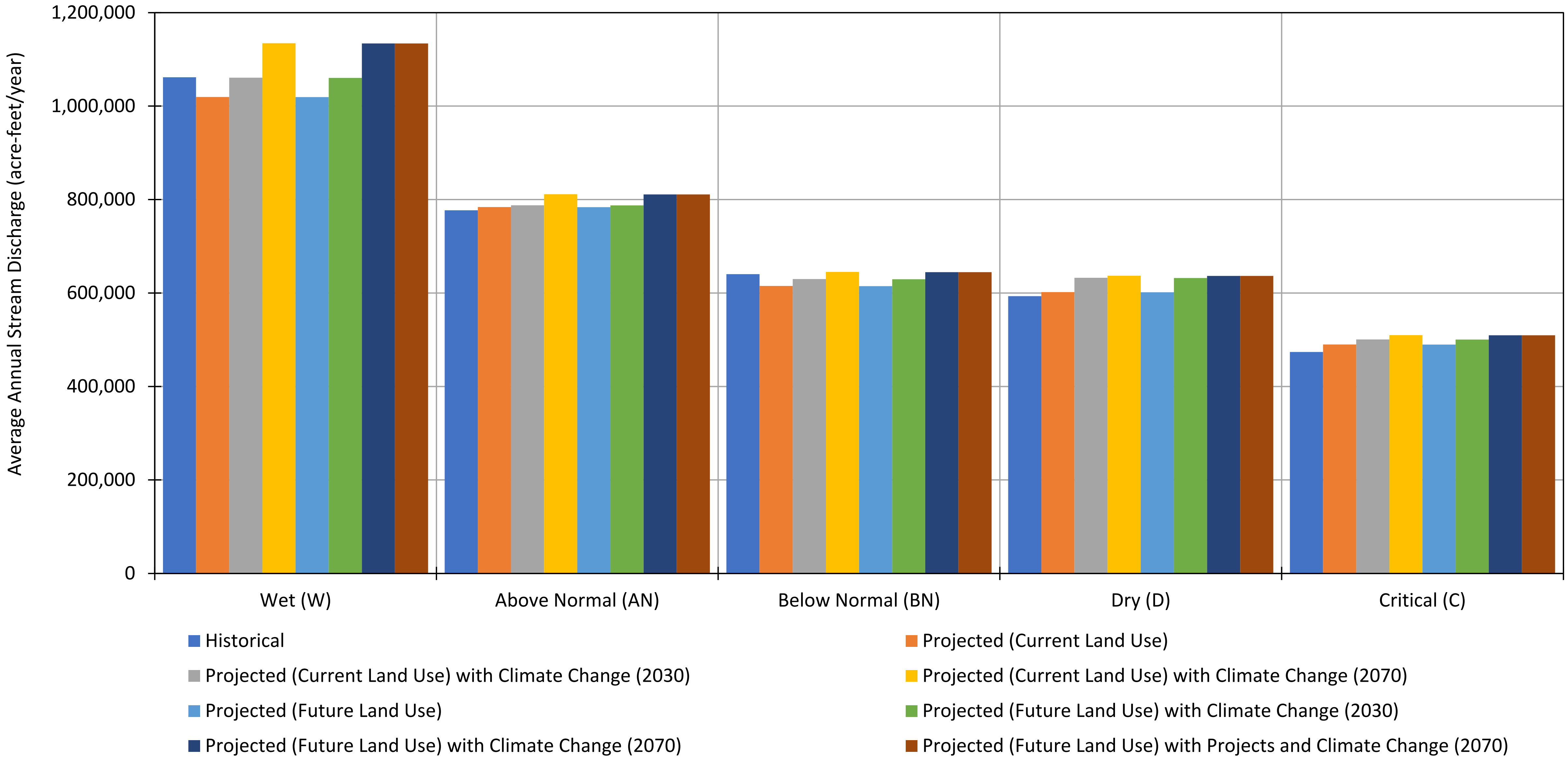

Outflow from Red Bank Creek to Sacramento River
Red Bluff Subbasin
Average Monthly Stream Discharge (acre-feet/month)
12,000
10,000
8,000
6,000
4,000
2,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

Tehama IHM


Outflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin
Average Monthly Stream Discharge (acre-feet/month)
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
October
November
December
January
February
March
April
May
June
July
August
September
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

Tehama IHM

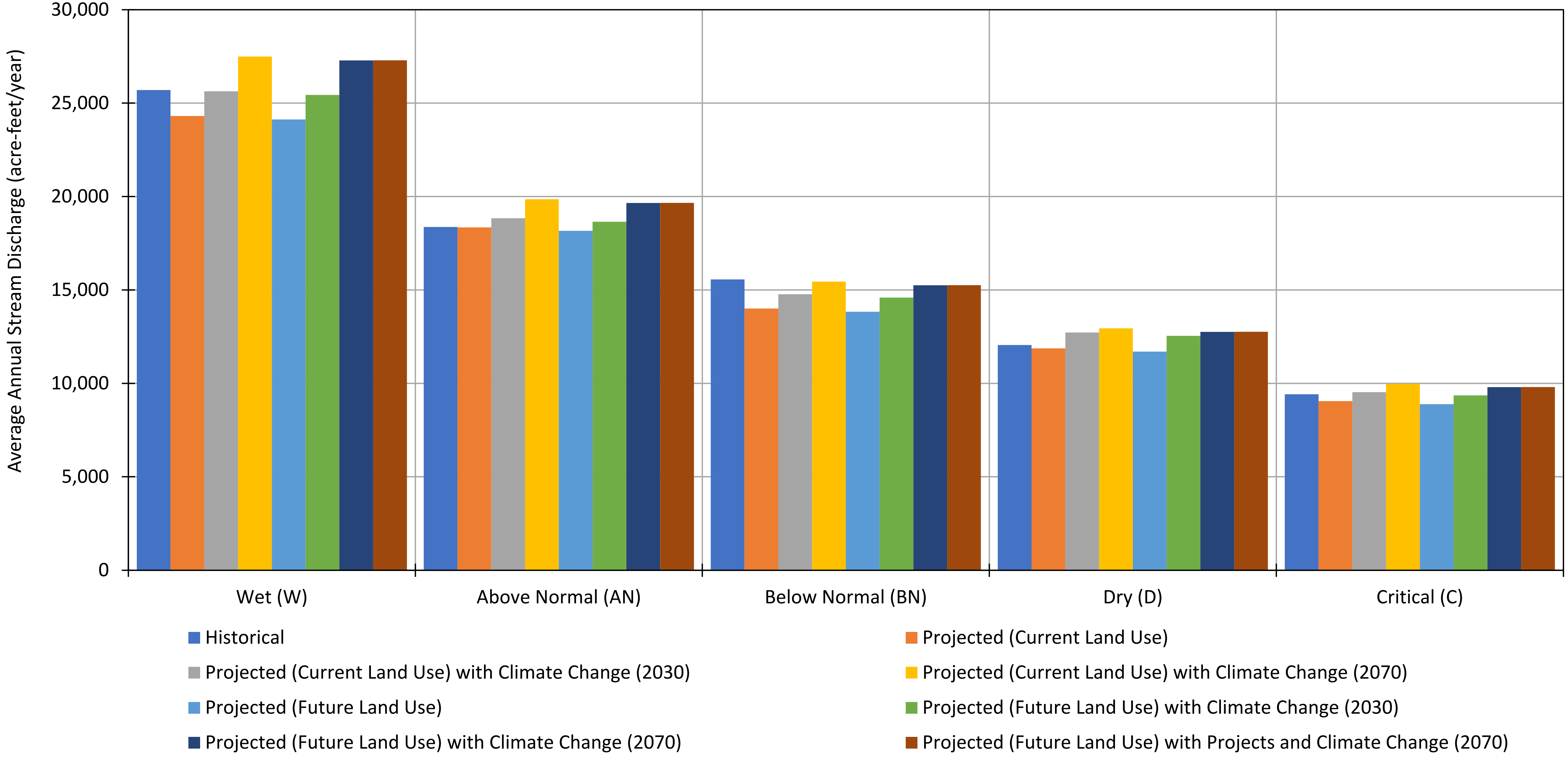
Inflow from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin



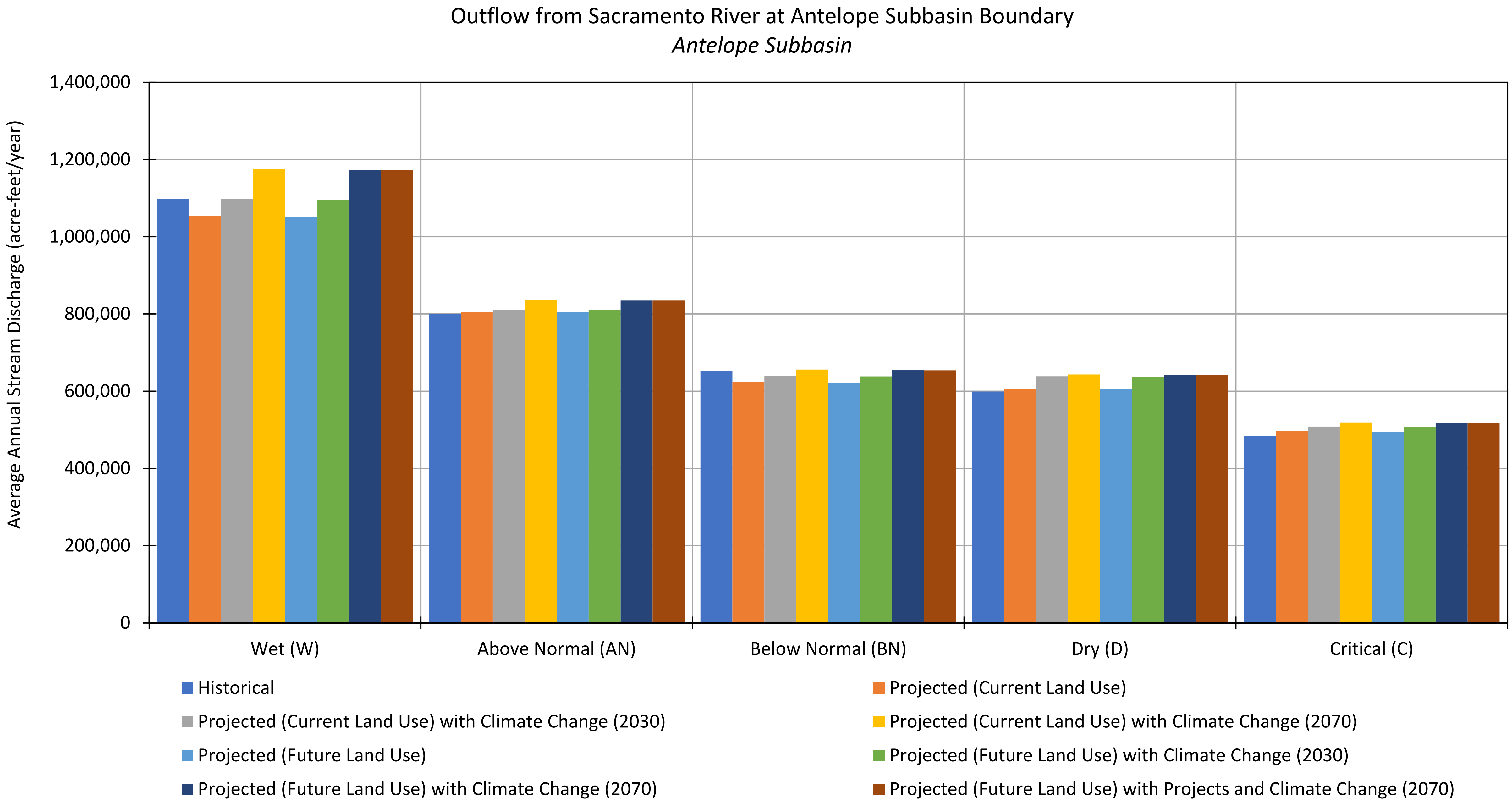
Tehama IHM

Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin



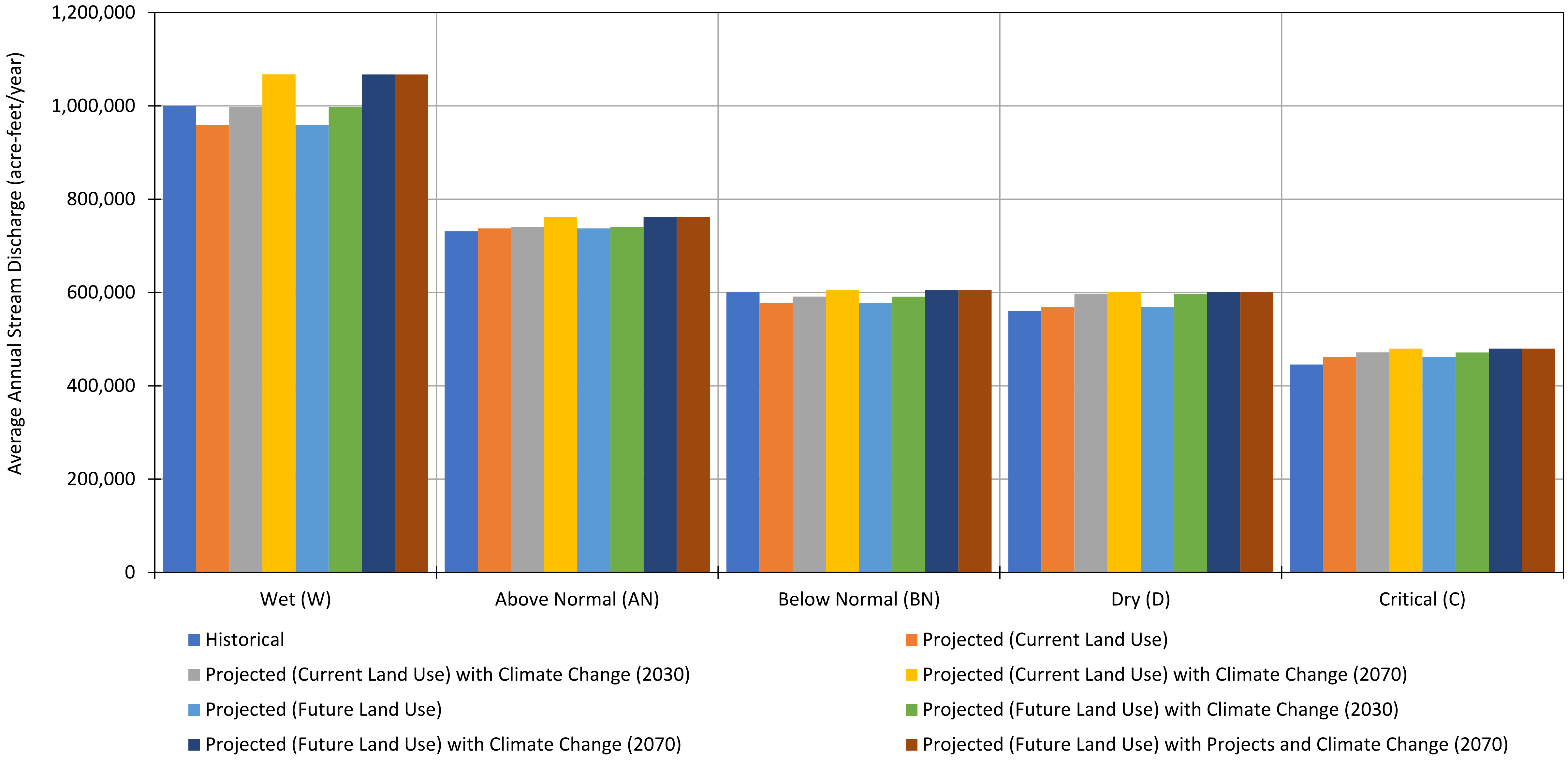
Tehama IHM


Outflow from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin
Average Annual Stream Discharge (acre-feet/year)
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

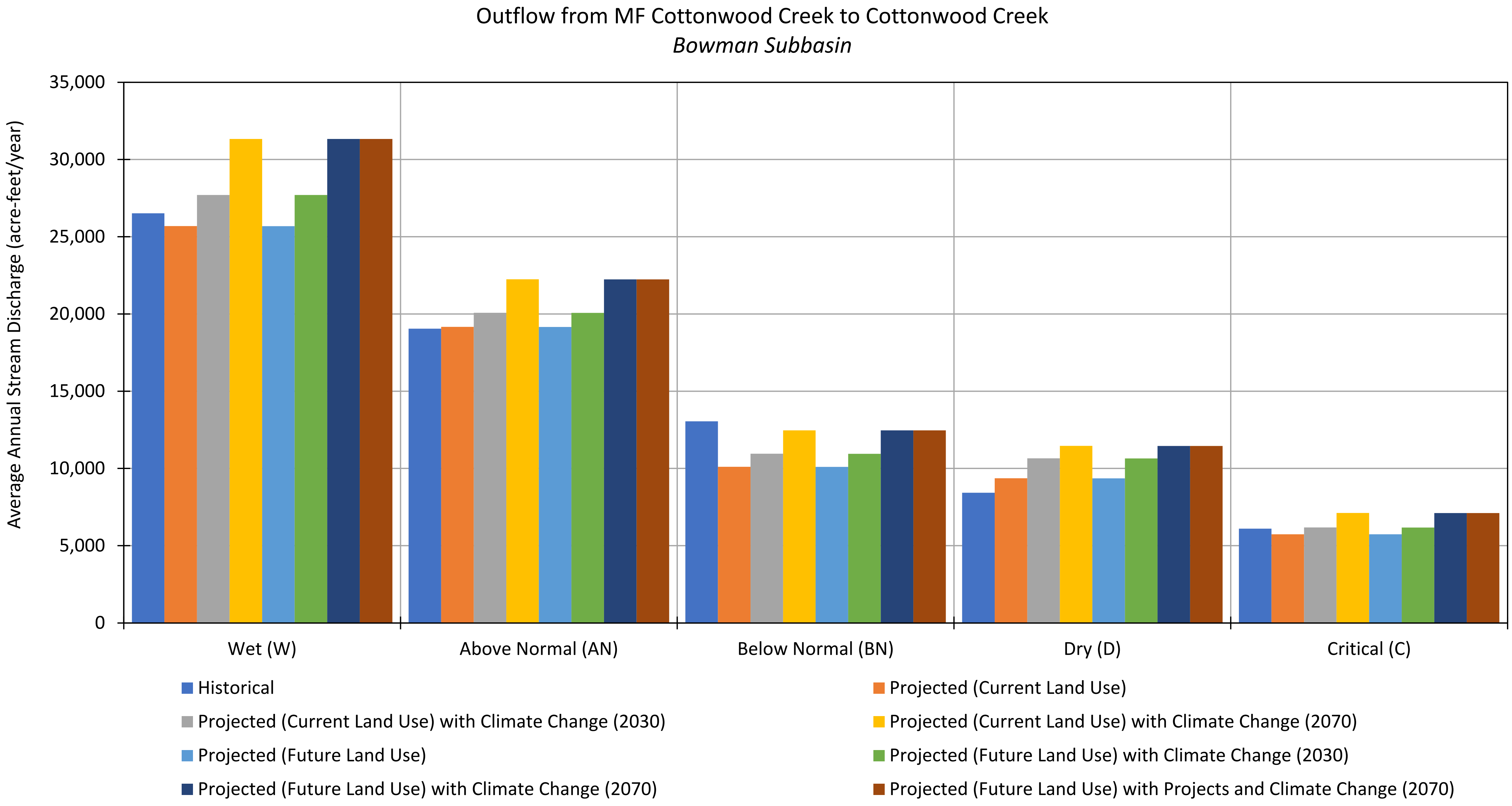
Tehama IHM

Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin



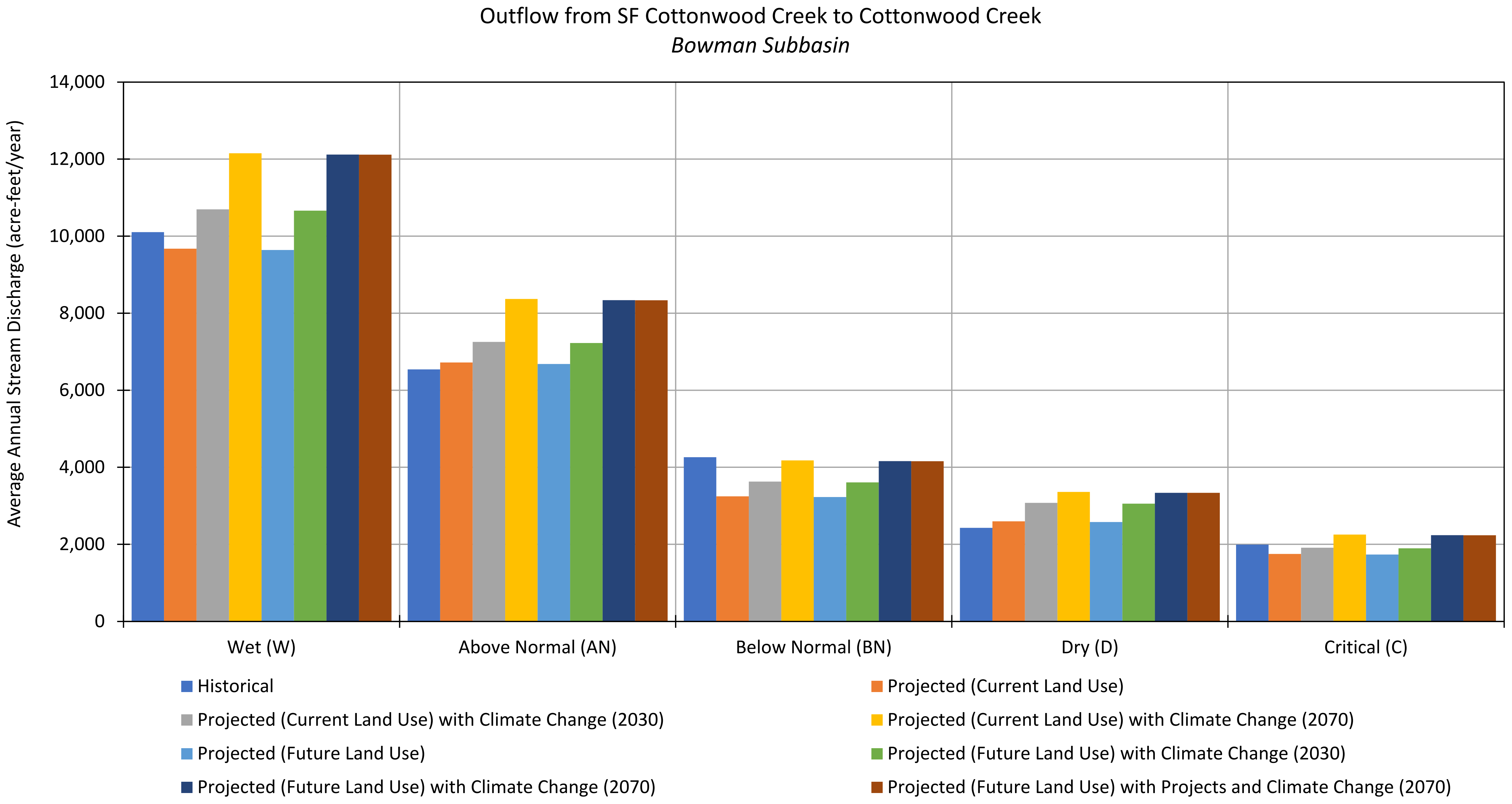
Tehama IHM



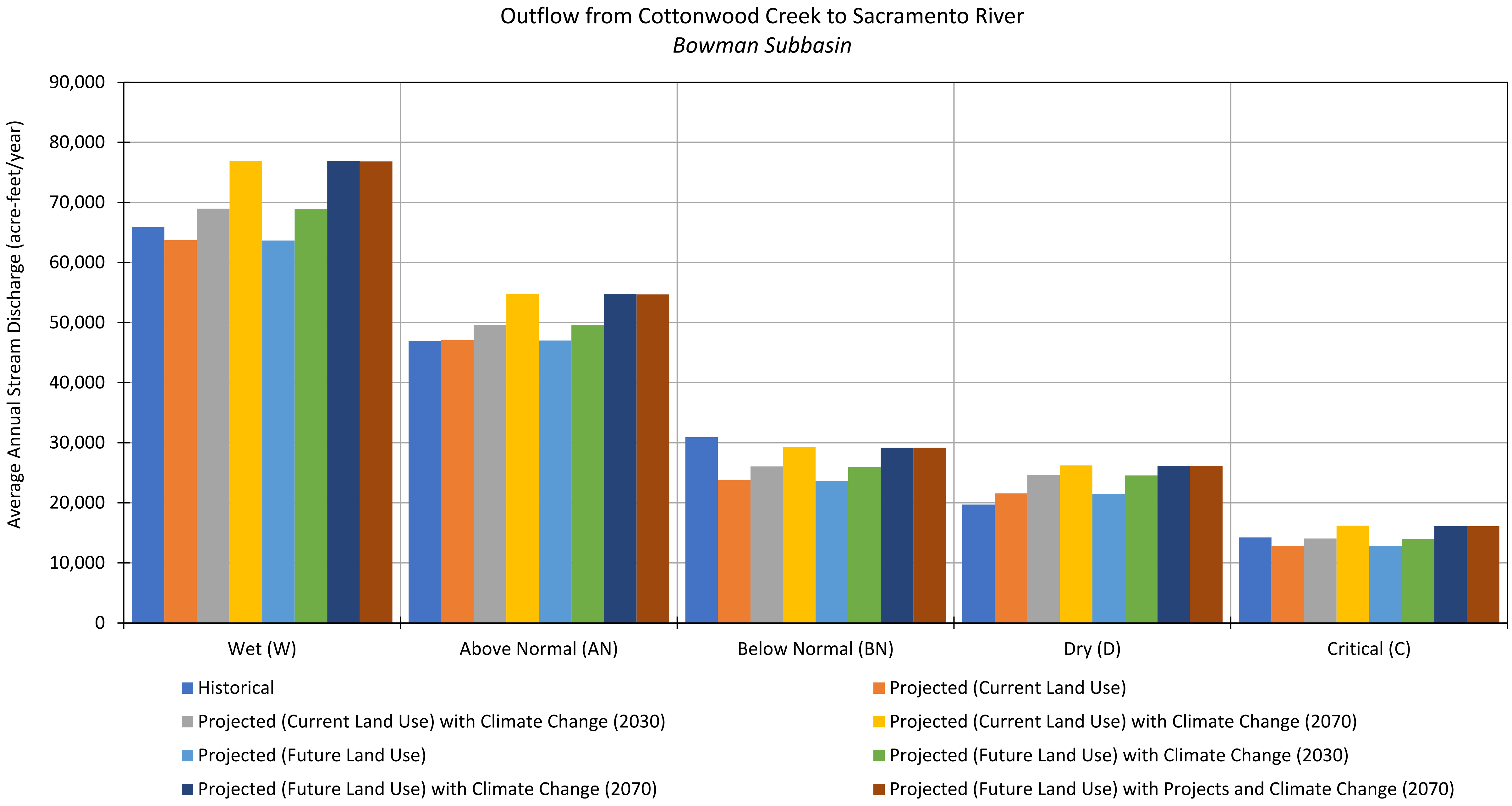
Outflow from MF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin

Tehama IHM


Outflow from SF Cottonwood Creek to Cottonwood Creek
Bowman Subbasin
Average Annual Stream Discharge (acre-feet/year)
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

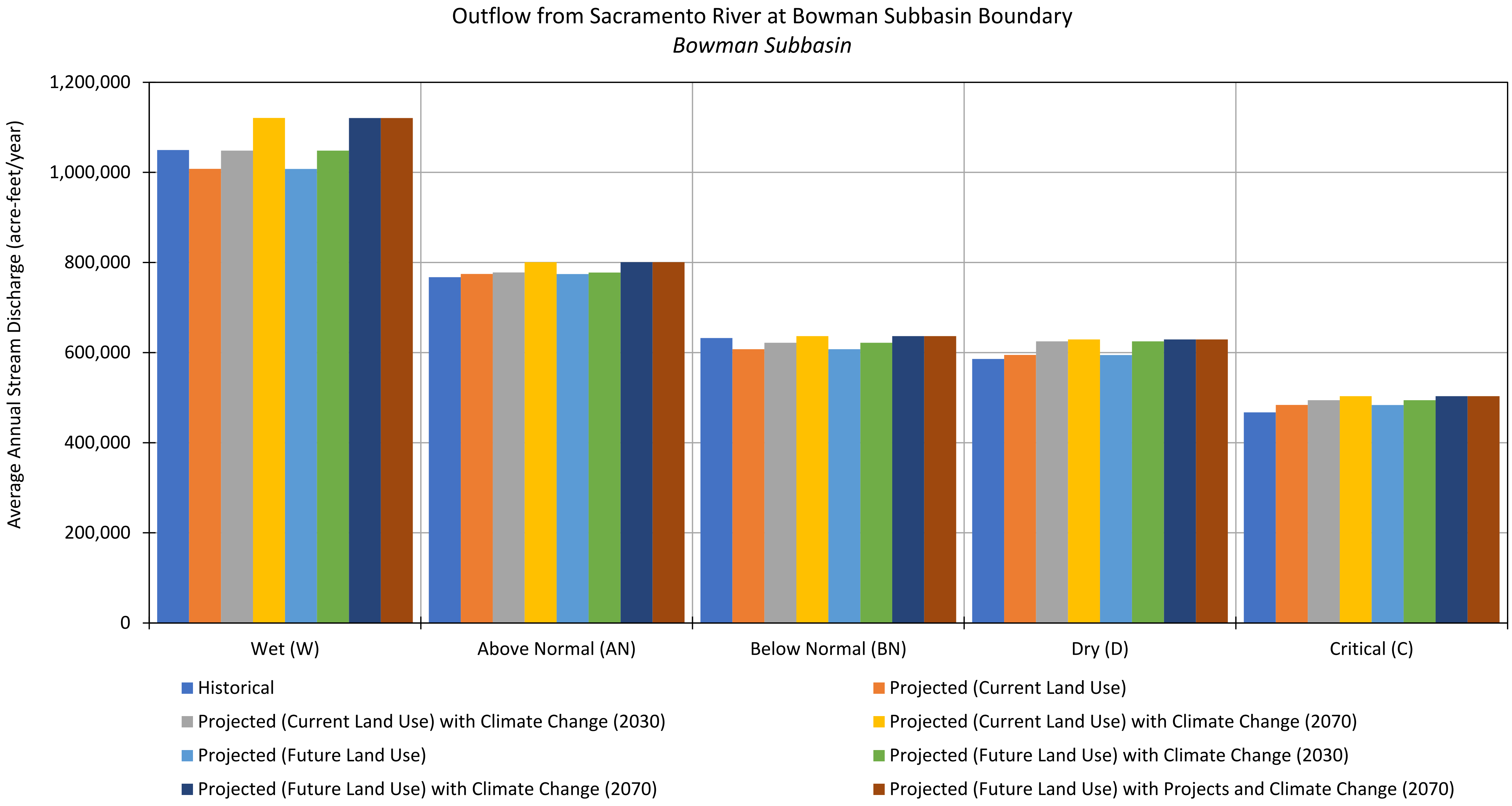
Tehama IHM



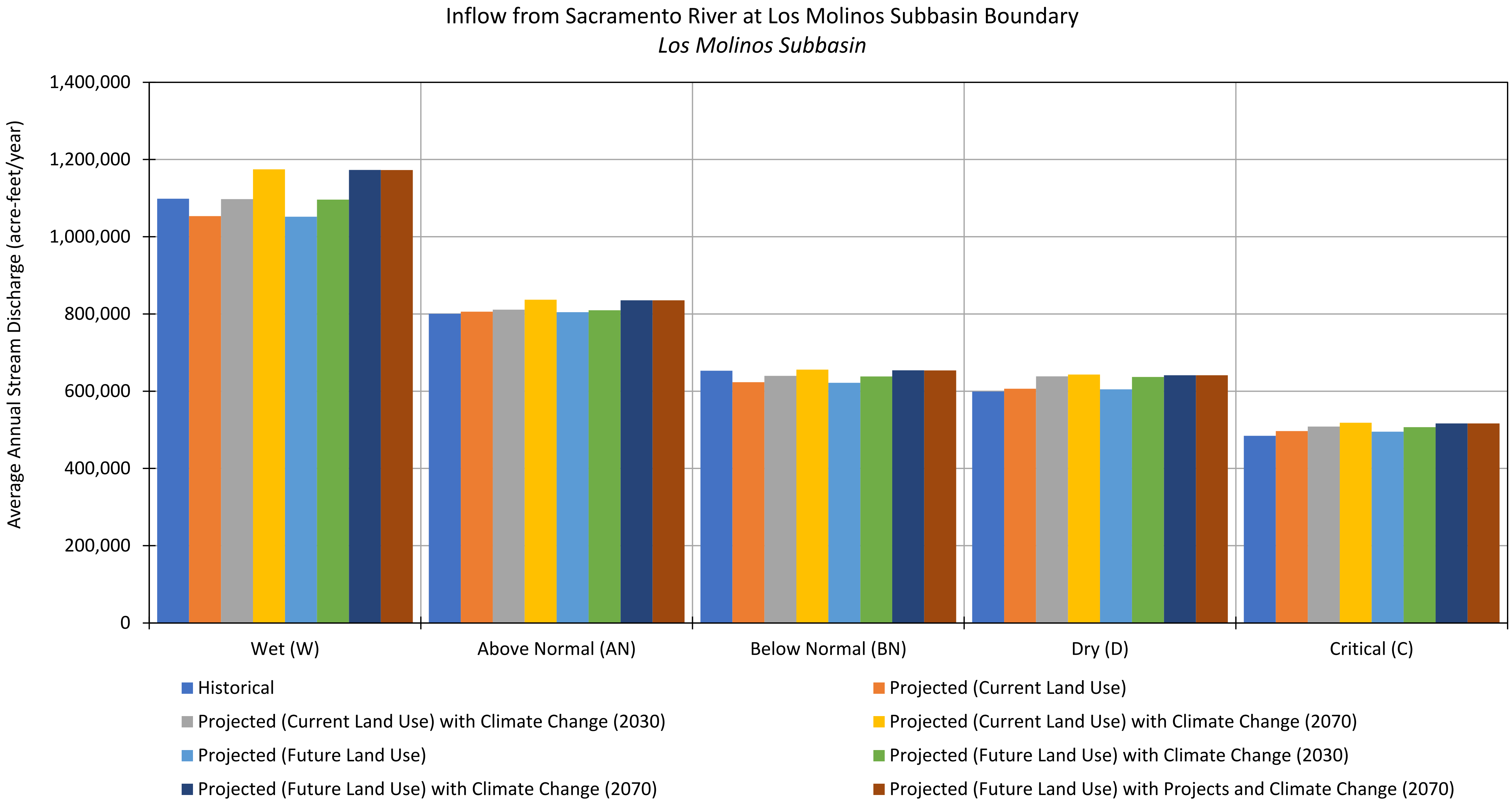
Outflow from Cottonwood Creek to Sacramento River

Bowman Subbasin

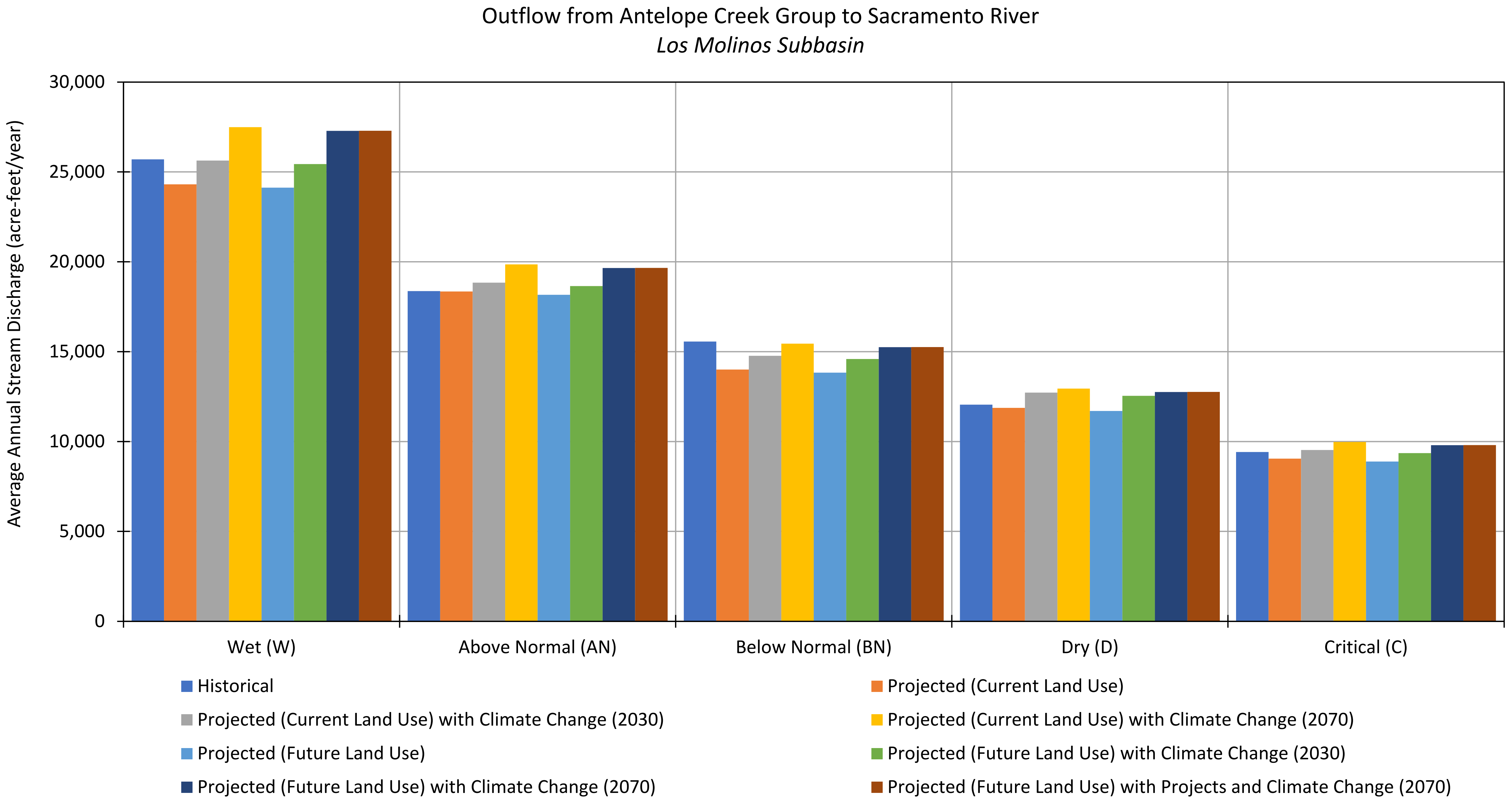
Tehama IHM


Outflow from Sacramento River at Bowman Subbasin Boundary
Bowman Subbasin
Average Annual Stream Discharge (acre-feet/year)
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

Tehama IHM


Inflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin
Average Annual Stream Discharge (acre-feet/year)
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

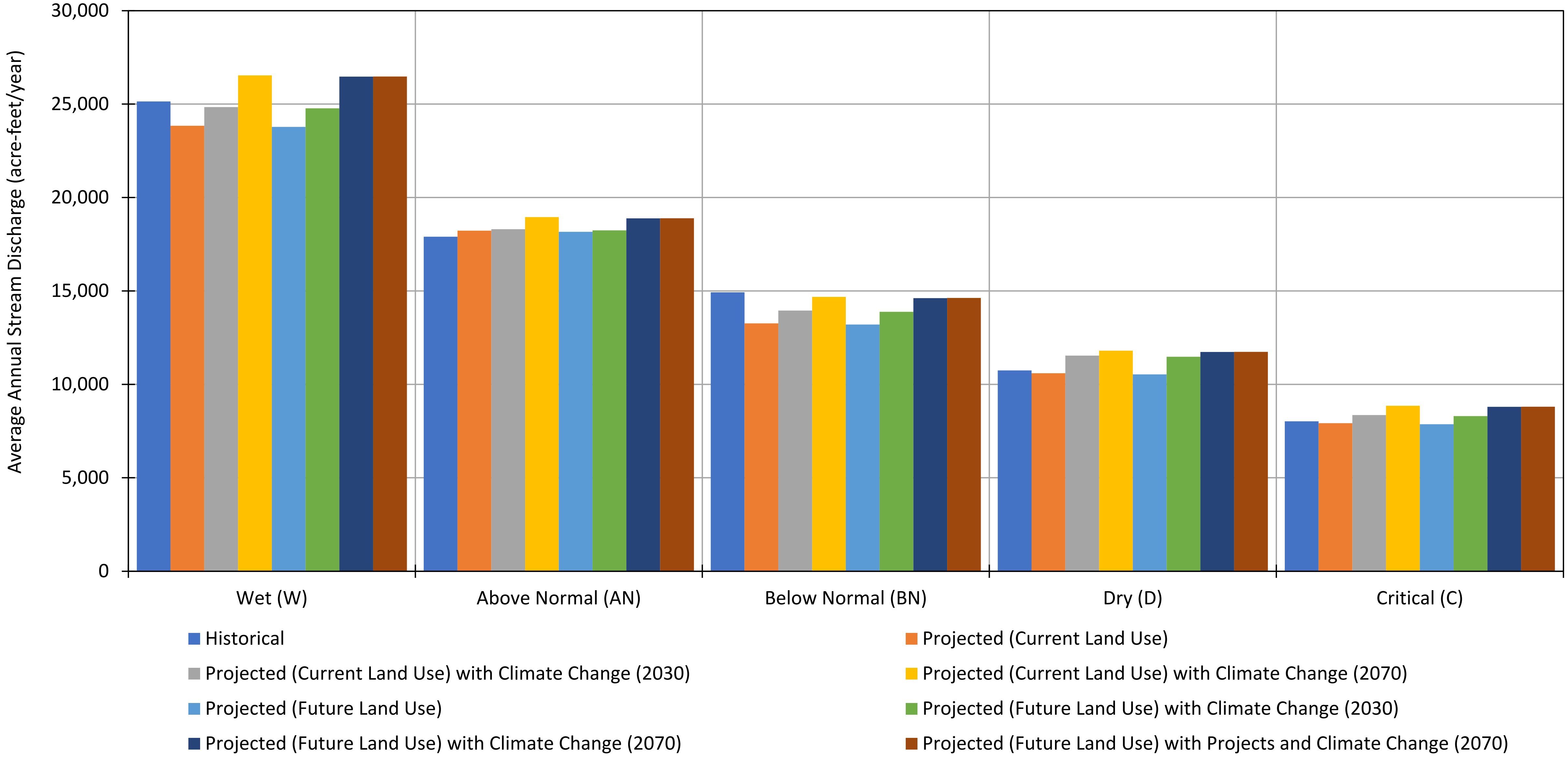
Tehama IHM


Outflow from Antelope Creek Group to Sacramento River
Los Molinos Subbasin
Average Annual Stream Discharge (acre-feet/year)
30,000
25,000
20,000
15,000
10,000
5,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

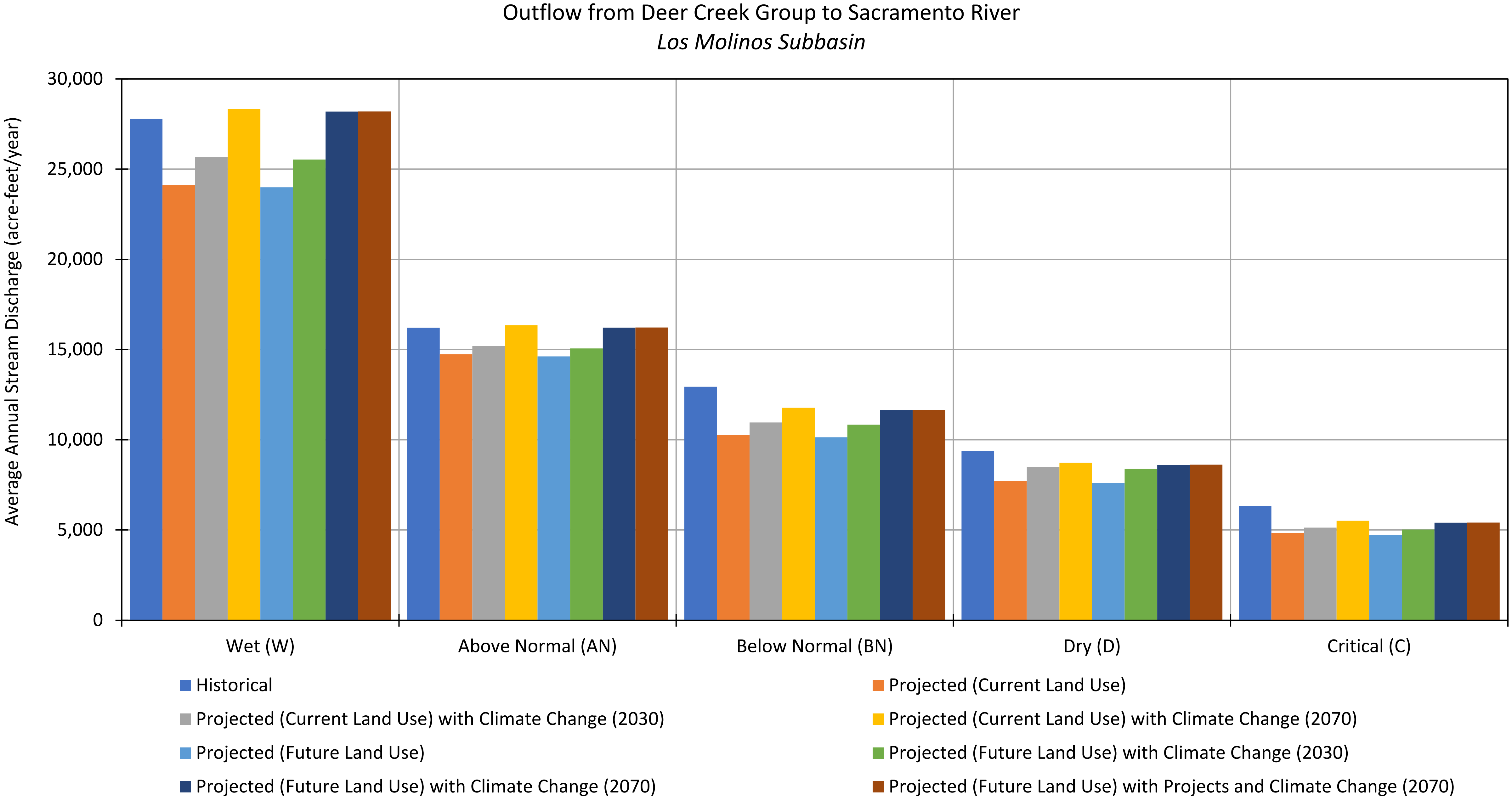
Tehama IHM

Outflow from Mill Creek to Sacramento River

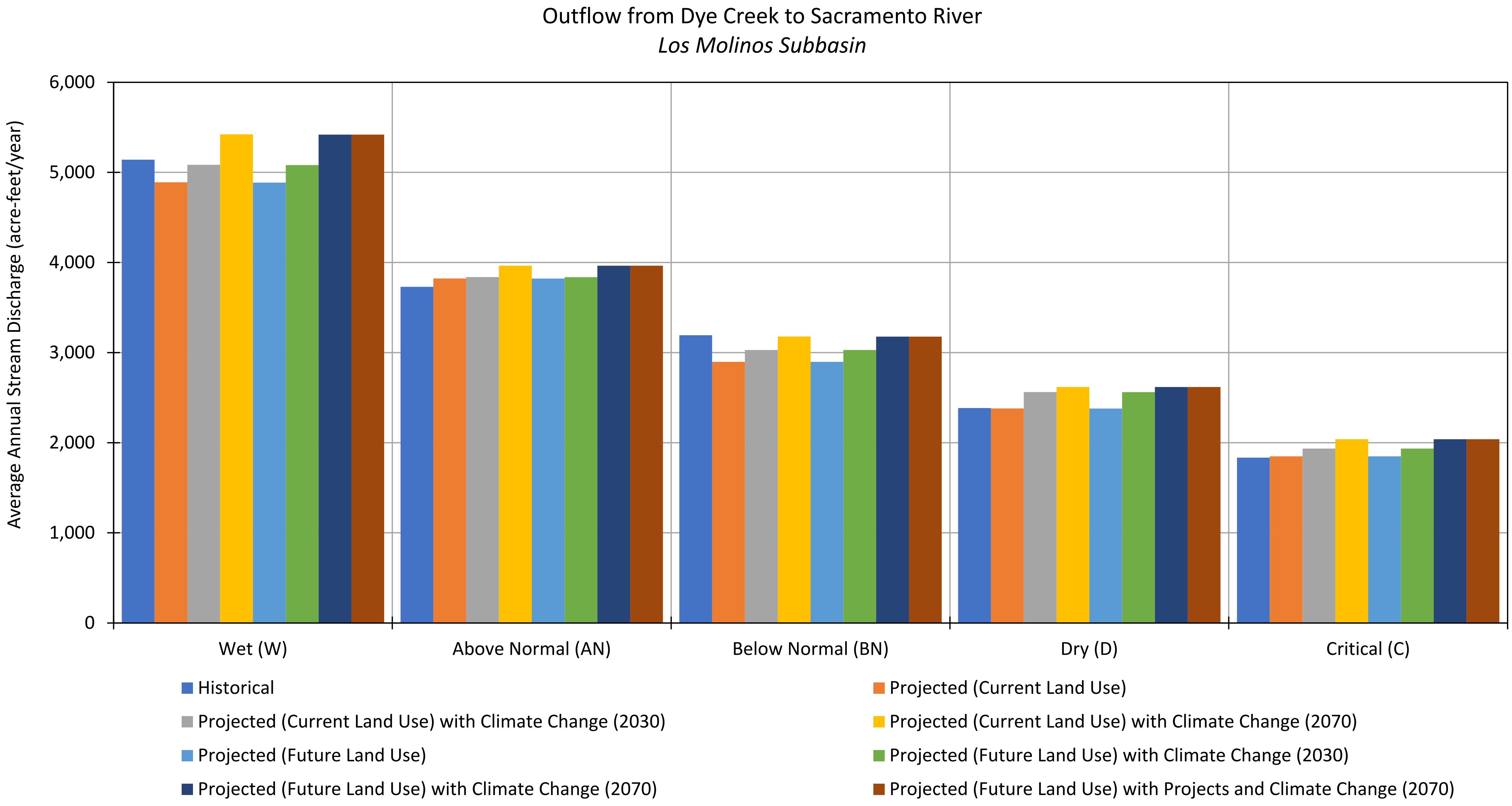
Los Molinos Subbasin



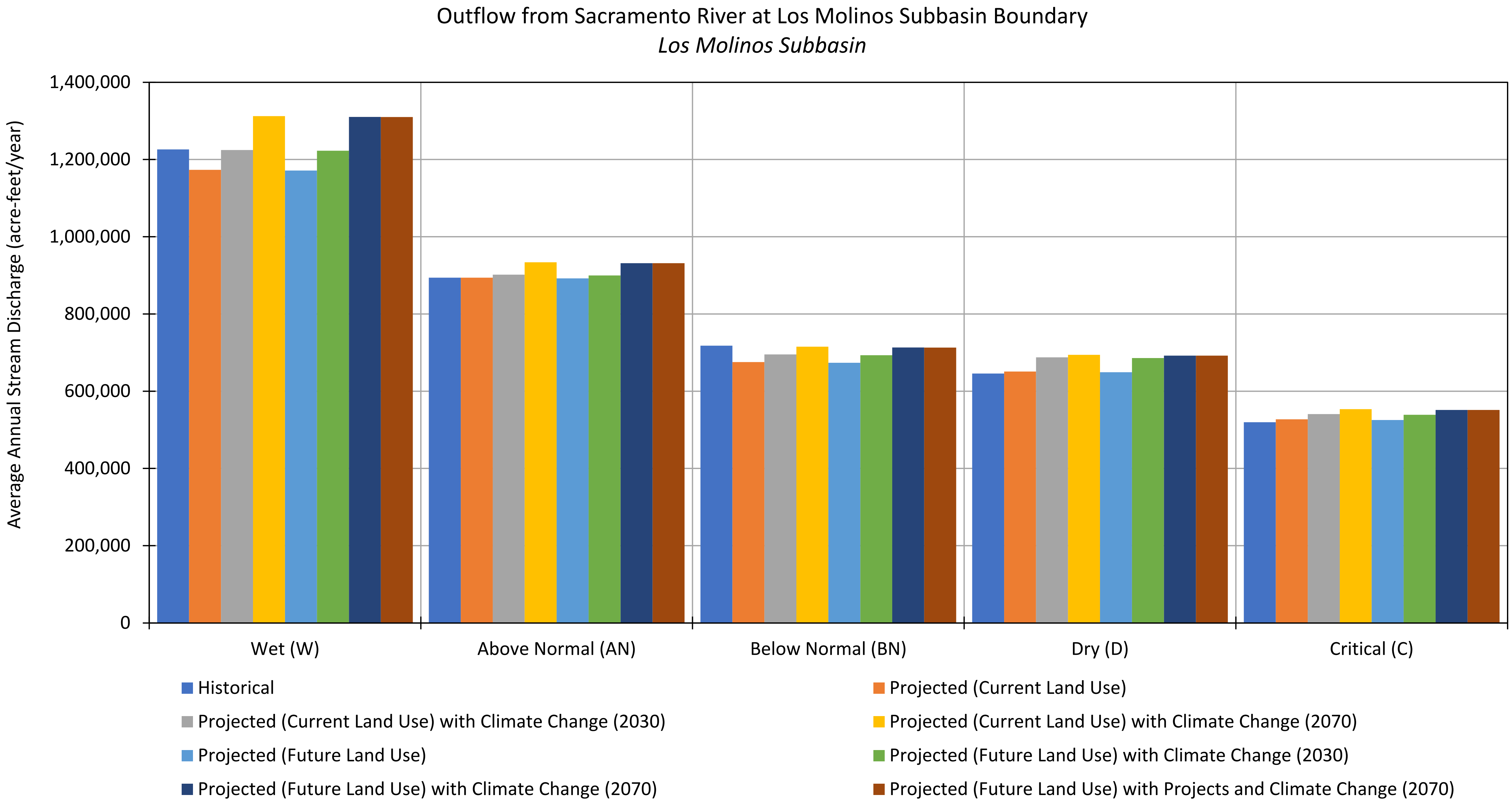
Tehama IHM


Outflow from Deer Creek Group to Sacramento River
Los Molinos Subbasin
Average Annual Stream Discharge (acre-feet/year)
30,000
25,000
20,000
15,000
10,000
5,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

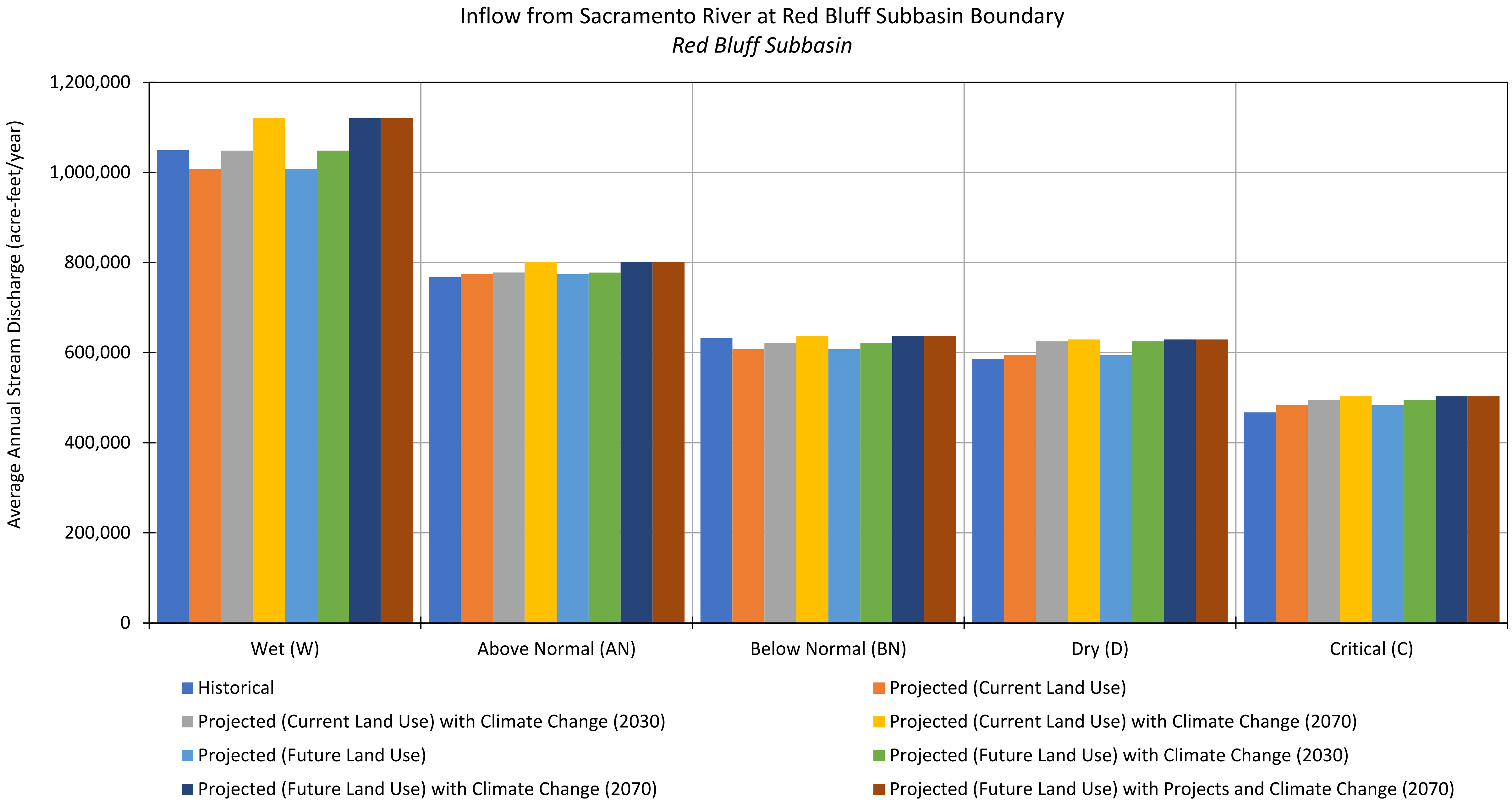
Tehama IHM


Outflow from Dye Creek to Sacramento River
Los Molinos Subbasin
Average Annual Stream Discharge (acre-feet/year)
6,000
5,000
4,000
3,000
2,000
1,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

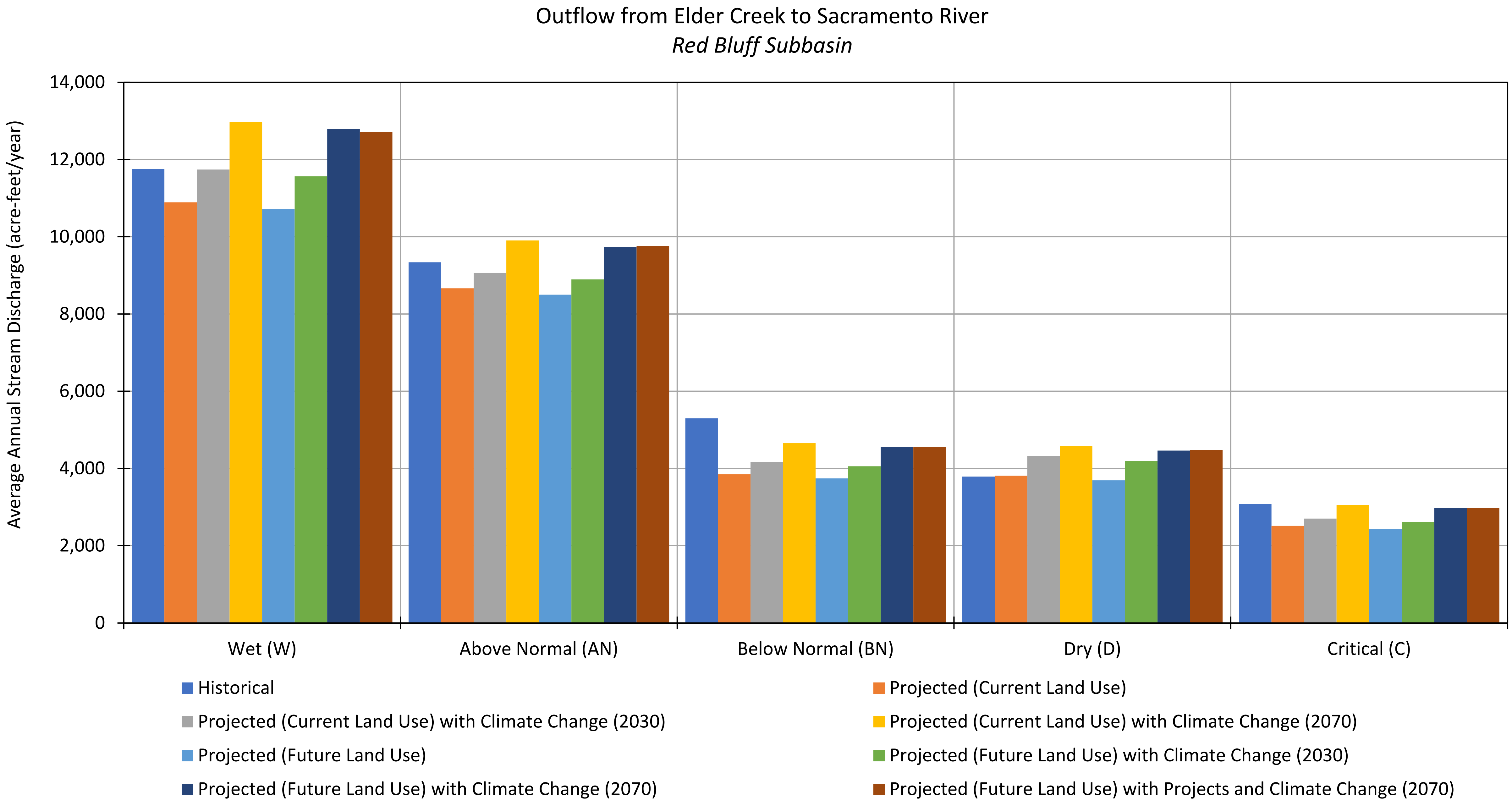
Tehama IHM


Outflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin
Average Annual Stream Discharge (acre-feet/year)
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

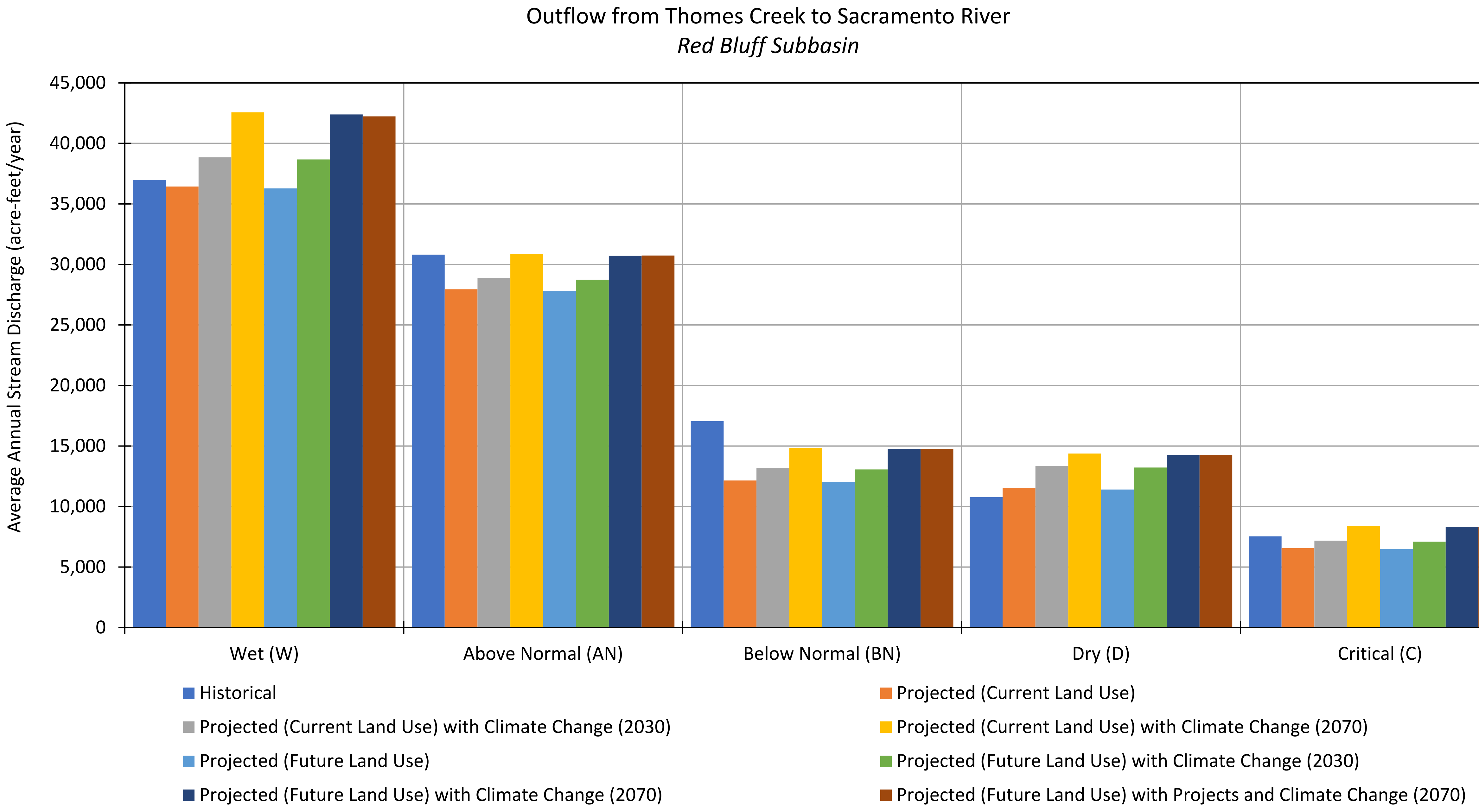
Tehama IHM


Inflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin
Average Annual Stream Discharge (acre-feet/year)
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

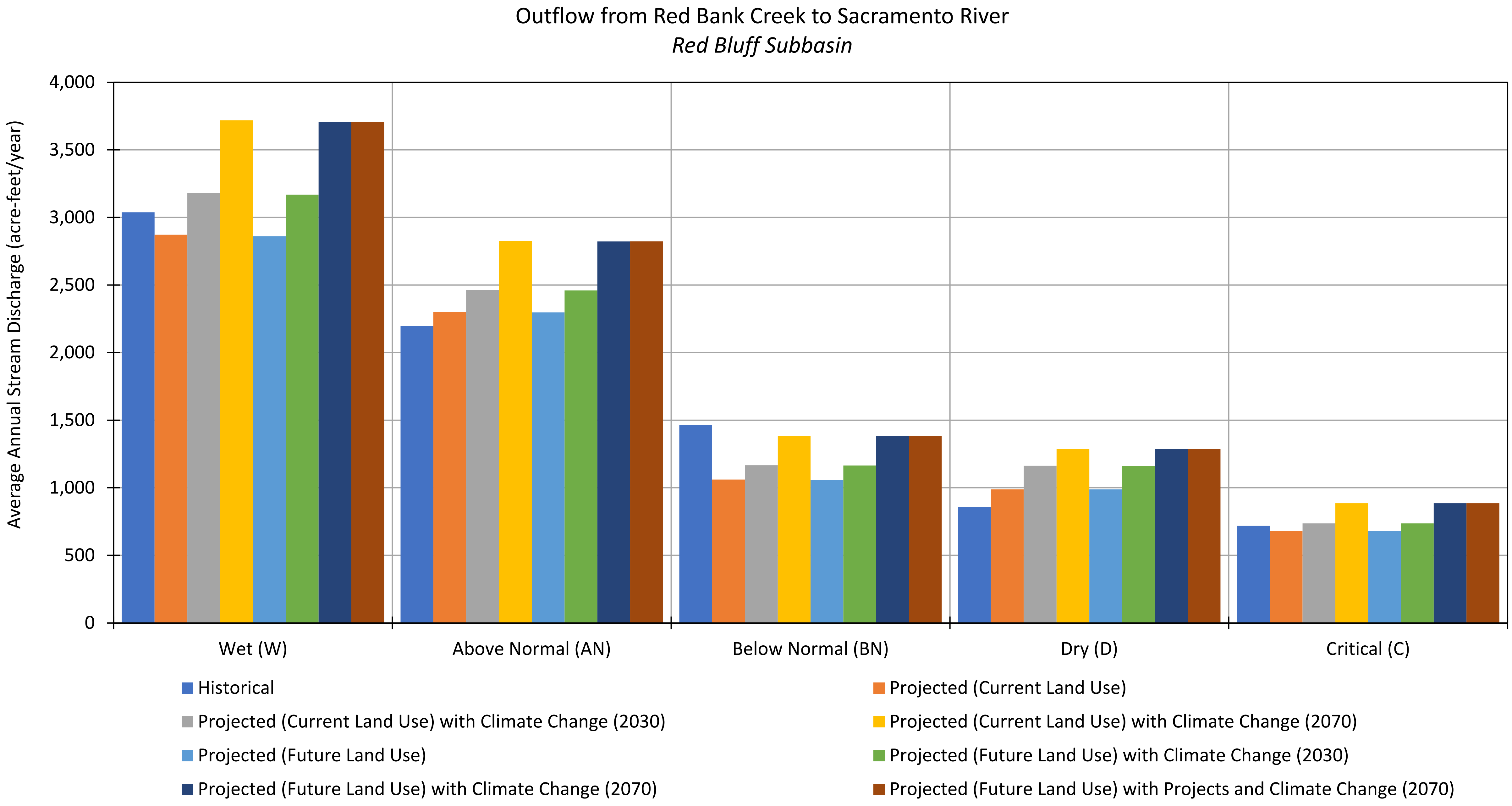
Tehama IHM


Outflow from Elder Creek to Sacramento River
Red Bluff Subbasin
Average Annual Stream Discharge (acre-feet/year)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

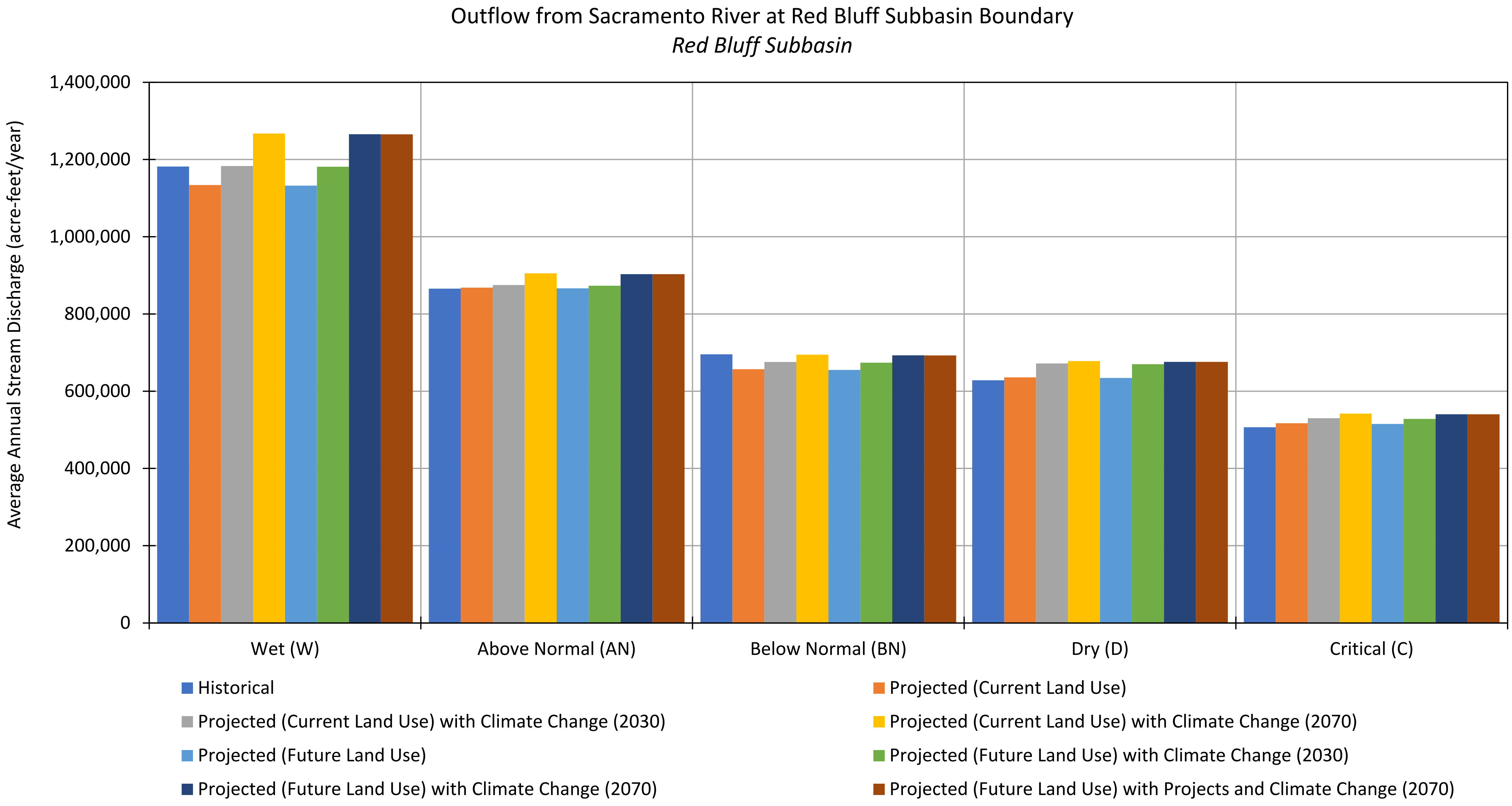
Tehama IHM


Outflow from Thomes Creek to Sacramento River
Red Bluff Subbasin
Average Annual Stream Discharge (acre-feet/year)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

Tehama IHM


Outflow from Red Bank Creek to Sacramento River
Red Bluff Subbasin
Average Annual Stream Discharge (acre-feet/year)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

Tehama IHM



Outflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin
Average Annual Stream Discharge (acre-feet/year)
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Wet (W)
Above Normal (AN)
Below Normal (BN)
Dry (D)
Critical (C)
Historical
Projected (Current Land Use)
Projected (Current Land Use) with Climate Change (2030)
Projected (Current Land Use) with Climate Change (2070)
Projected (Future Land Use)
Projected (Future Land Use) with Climate Change (2030)
Projected (Future Land Use) with Climate Change (2070)
Projected (Future Land Use) with Projects and Climate Change (2070)

Tehama IHM

Comparison of Simulated Streamflows: Inflow from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	456,200	459,540	424,839	405,386	459,243	424,537	405,065	405,047
	November	434,211	438,213	450,971	386,387	437,957	450,695	386,082	386,060
	December	642,909	628,137	693,650	753,357	627,870	693,367	753,047	753,020
	January	895,047	879,008	988,318	1,218,218	878,723	988,014	1,217,880	1,217,856
	February	998,601	1,068,098	1,160,137	1,435,965	1,067,781	1,159,799	1,435,595	1,435,569
	March	936,887	1,050,776	1,153,157	1,253,876	1,050,427	1,152,791	1,253,472	1,253,448
	April	668,994	737,256	746,929	718,571	736,903	746,554	718,163	718,144
	May	773,361	774,225	745,399	635,729	773,881	745,038	635,339	635,324
	June	787,806	813,754	750,752	688,230	813,413	750,396	687,851	687,838
	July	847,737	869,323	885,256	889,011	869,004	884,921	888,653	888,641
	August	732,161	762,310	765,877	782,105	761,999	765,552	781,761	781,748
	September	551,452	568,697	579,199	584,478	568,386	578,875	584,114	584,098
Average Annual Flow (acre-feet/year)	TOTAL	727,114	754,111	778,707	812,609	753,799	778,378	812,252	812,233
	Wet (W)	1,061,657	1,019,487	1,060,680	1,134,353	1,019,187	1,060,365	1,134,008	1,133,986
	Above Normal (AN)	777,027	783,965	787,721	811,362	783,649	787,381	810,997	810,977
	Below Normal (BN)	640,335	615,070	629,819	644,981	614,750	629,483	644,617	644,599
	Dry (D)	593,228	601,865	632,522	636,892	601,543	632,185	636,527	636,510
	Critical (C)	473,875	489,888	500,633	509,828	489,570	500,301	509,467	509,449

Change in Simulated Streamflows as compared to Historical Scenario: Inflow from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	3,340	-31,362	-50,815	3,043	-31,664	-51,136	-51,153
	November	0	4,002	16,760	-47,824	3,746	16,484	-48,130	-48,151
	December	0	-14,772	50,742	110,448	-15,038	50,459	110,139	110,111
	January	0	-16,039	93,271	323,172	-16,323	92,968	322,833	322,809
	February	0	69,497	161,536	437,364	69,181	161,199	436,995	436,968
	March	0	113,889	216,270	316,989	113,540	215,904	316,585	316,561
	April	0	68,262	77,934	49,576	67,909	77,560	49,169	49,150
	May	0	864	-27,962	-137,632	520	-28,323	-138,021	-138,036
	June	0	25,948	-37,054	-99,576	25,608	-37,410	-99,955	-99,968
	July	0	21,585	37,518	41,273	21,267	37,183	40,915	40,903
	August	0	30,149	33,716	49,944	29,838	33,391	49,600	49,587
	September	0	17,245	27,747	33,026	16,933	27,423	32,662	32,646
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	26,998	51,593	85,496	26,685	51,264	85,138	85,119
	Wet (W)	0	-42,170	-976	72,697	-42,469	-1,292	72,351	72,329
	Above Normal (AN)	0	6,938	10,694	34,335	6,622	10,355	33,970	33,950
	Below Normal (BN)	0	-25,265	-10,516	4,646	-25,585	-10,852	4,282	4,264
	Dry (D)	0	8,637	39,293	43,664	8,315	38,957	43,299	43,282
	Critical (C)	0	16,013	26,759	35,954	15,695	26,426	35,592	35,574

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Antelope Creek Group to Sacramento River
Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	7,567	7,329	6,921	6,560	7,164	6,768	6,396	6,396
	November	9,937	9,813	10,143	8,945	9,655	9,976	8,775	8,777
	December	22,739	21,538	23,618	25,615	21,359	23,426	25,410	25,414
	January	30,316	29,817	33,316	39,921	29,625	33,113	39,699	39,706
	February	31,338	33,597	36,332	43,489	33,406	36,130	43,269	43,277
	March	27,974	28,085	30,909	33,275	27,897	30,708	33,056	33,065
	April	21,289	22,713	23,107	22,061	22,529	22,912	21,855	21,865
	May	16,834	17,926	17,486	15,287	17,742	17,294	15,088	15,096
	June	11,265	11,457	10,764	9,867	11,278	10,580	9,678	9,682
	July	7,980	7,908	7,990	7,862	7,733	7,808	7,671	7,673
	August	6,519	6,468	6,552	6,518	6,302	6,380	6,339	6,339
	September	6,111	6,010	6,138	6,055	5,850	5,969	5,883	5,883
Average Annual Flow (acre-feet/year)	TOTAL	16,656	16,889	17,773	18,788	16,712	17,589	18,593	18,598
	Wet (W)	25,695	24,307	25,632	27,489	24,123	25,438	27,285	27,291
	Above Normal (AN)	18,367	18,348	18,839	19,855	18,164	18,647	19,652	19,656
	Below Normal (BN)	15,560	14,004	14,772	15,446	13,829	14,590	15,252	15,257
	Dry (D)	12,050	11,872	12,723	12,946	11,699	12,544	12,757	12,762
	Critical (C)	9,420	9,047	9,527	9,976	8,884	9,357	9,799	9,800

Tehama IHM

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Antelope Creek Group to Sacramento River

Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-238	-646	-1,007	-403	-799	-1,171	-1,171
	November	0	-124	206	-992	-282	40	-1,162	-1,160
	December	0	-1,201	878	2,875	-1,380	686	2,671	2,675
	January	0	-499	3,000	9,605	-691	2,797	9,383	9,390
	February	0	2,259	4,994	12,151	2,068	4,792	11,931	11,939
	March	0	111	2,935	5,301	-77	2,733	5,081	5,091
	April	0	1,424	1,818	772	1,240	1,623	566	576
	May	0	1,093	653	-1,547	908	460	-1,746	-1,738
	June	0	192	-501	-1,398	13	-685	-1,587	-1,583
	July	0	-72	10	-118	-247	-172	-309	-307
	August	0	-51	32	-1	-218	-139	-181	-180
	September	0	-102	27	-56	-261	-143	-229	-228
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	233	1,117	2,132	56	933	1,937	1,942
	Wet (W)	0	-1,388	-63	1,794	-1,572	-257	1,589	1,596
	Above Normal (AN)	0	-19	472	1,488	-204	280	1,284	1,289
	Below Normal (BN)	0	-1,557	-789	-114	-1,731	-970	-309	-304
	Dry (D)	0	-178	673	896	-352	494	707	712
	Critical (C)	0	-373	107	556	-536	-63	380	380

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	464,510	466,143	430,681	410,239	464,475	428,944	408,370	408,299
	November	455,194	458,835	472,472	404,740	457,413	470,994	403,097	403,139
	December	696,581	678,368	748,948	812,786	677,188	747,723	811,474	811,519
	January	972,367	954,504	1,071,400	1,315,398	953,238	1,070,051	1,313,938	1,313,998
	February	1,070,534	1,148,353	1,246,036	1,535,266	1,146,966	1,244,560	1,533,655	1,533,700
	March	992,846	1,104,857	1,212,762	1,316,590	1,103,370	1,211,206	1,314,888	1,314,944
	April	693,706	763,580	773,411	742,848	762,086	771,830	741,136	741,100
	May	769,755	770,440	741,148	627,633	768,936	739,568	625,929	625,659
	June	764,708	787,492	723,693	659,803	785,918	722,046	658,047	657,675
	July	814,606	832,896	848,733	851,800	831,265	847,026	849,976	849,685
	August	711,680	739,125	742,632	758,266	737,420	740,850	756,368	756,188
	September	548,484	564,117	574,605	579,297	562,368	572,772	577,328	577,266
Average Annual Flow (acre-feet/year)	TOTAL	746,248	772,392	798,877	834,556	770,887	797,298	832,851	832,764
	Wet (W)	1,098,421	1,053,297	1,097,481	1,174,462	1,051,891	1,096,000	1,172,859	1,172,703
	Above Normal (AN)	800,375	806,030	811,115	837,055	804,532	809,530	835,342	835,240
	Below Normal (BN)	653,062	623,456	639,722	655,836	621,897	638,090	654,066	653,863
	Dry (D)	599,250	606,407	638,545	643,130	604,866	636,940	641,403	641,399
	Critical (C)	484,394	496,860	508,529	518,359	495,239	506,838	516,543	516,601

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Sacramento River at Antelope Subbasin Boundary

Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	1,633	-33,830	-54,271	-36	-35,566	-56,141	-56,212
	November	0	3,640	17,277	-50,454	2,218	15,800	-52,098	-52,055
	December	0	-18,213	52,368	116,206	-19,393	51,142	114,893	114,938
	January	0	-17,864	99,033	343,031	-19,129	97,684	341,571	341,631
	February	0	77,820	175,502	464,732	76,432	174,027	463,122	463,166
	March	0	112,011	219,916	323,744	110,524	218,360	322,042	322,098
	April	0	69,874	79,705	49,142	68,380	78,124	47,430	47,394
	May	0	686	-28,606	-142,122	-818	-30,187	-143,825	-144,096
	June	0	22,783	-41,016	-104,905	21,210	-42,663	-106,661	-107,034
	July	0	18,290	34,127	37,194	16,658	32,420	35,370	35,079
	August	0	27,445	30,952	46,587	25,740	29,171	44,688	44,508
	September	0	15,633	26,121	30,813	13,884	24,288	28,844	28,782
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	26,145	52,629	88,308	24,639	51,050	86,603	86,517
	Wet (W)	0	-45,123	-939	76,042	-46,529	-2,421	74,439	74,283
	Above Normal (AN)	0	5,655	10,740	36,680	4,157	9,155	34,967	34,865
	Below Normal (BN)	0	-29,606	-13,340	2,774	-31,165	-14,972	1,004	801
	Dry (D)	0	7,157	39,295	43,880	5,616	37,690	42,153	42,149
	Critical (C)	0	12,467	24,135	33,966	10,845	22,444	32,149	32,207

Tehama IHM

Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Antelope Subbasin Boundary
Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	8,310	6,603	5,842	4,853	5,232	4,408	3,305	3,251
	November	20,983	20,621	21,501	18,353	19,455	20,299	17,015	17,079
	December	53,672	50,231	55,298	59,429	49,318	54,356	58,426	58,499
	January	77,321	75,496	83,082	97,180	74,515	82,037	96,058	96,142
	February	71,933	80,255	85,899	99,301	79,184	84,761	98,060	98,131
	March	55,959	54,081	59,605	62,714	52,943	58,415	61,416	61,496
	April	24,712	26,324	26,483	24,278	25,183	25,276	22,973	22,956
	May	-3,606	-3,784	-4,251	-8,096	-4,945	-5,470	-9,410	-9,666
	June	-23,097	-26,262	-27,060	-28,427	-27,495	-28,350	-29,803	-30,163
	July	-33,131	-36,426	-36,523	-37,211	-37,739	-37,895	-38,676	-38,956
	August	-20,481	-23,185	-23,245	-23,839	-24,579	-24,701	-25,393	-25,560
	September	-2,968	-4,580	-4,594	-5,181	-6,017	-6,103	-6,786	-6,832
Average Annual Flow (acre-feet/year)	TOTAL	19,134	18,281	20,170	21,946	17,088	18,919	20,599	20,532
	Wet (W)	36,764	33,810	36,801	40,109	32,704	35,635	38,851	38,717
	Above Normal (AN)	23,348	22,065	23,394	25,694	20,884	22,148	24,345	24,263
	Below Normal (BN)	12,727	8,386	9,903	10,855	7,147	8,608	9,450	9,264
	Dry (D)	6,022	4,541	6,023	6,238	3,323	4,755	4,876	4,889
	Critical (C)	10,519	6,972	7,895	8,531	5,669	6,537	7,076	7,152

Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Antelope Subbasin Boundary as Percentage of Total Outflow, Antelope Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	1.8%	1.4%	1.4%	1.2%	1.1%	1.0%	0.8%	0.8%
	November	4.6%	4.5%	4.6%	4.5%	4.3%	4.3%	4.2%	4.2%
	December	7.7%	7.4%	7.4%	7.3%	7.3%	7.3%	7.2%	7.2%
	January	8.0%	7.9%	7.8%	7.4%	7.8%	7.7%	7.3%	7.3%
	February	6.7%	7.0%	6.9%	6.5%	6.9%	6.8%	6.4%	6.4%
	March	5.6%	4.9%	4.9%	4.8%	4.8%	4.8%	4.7%	4.7%
	April	3.6%	3.4%	3.4%	3.3%	3.3%	3.3%	3.1%	3.1%
	May	-0.5%	-0.5%	-0.6%	-1.3%	-0.6%	-0.7%	-1.5%	-1.5%
	June	-3.0%	-3.3%	-3.7%	-4.3%	-3.5%	-3.9%	-4.5%	-4.6%
	July	-4.1%	-4.4%	-4.3%	-4.4%	-4.5%	-4.5%	-4.6%	-4.6%
	August	-2.9%	-3.1%	-3.1%	-3.1%	-3.3%	-3.3%	-3.4%	-3.4%
	September	-0.5%	-0.8%	-0.8%	-0.9%	-1.1%	-1.1%	-1.2%	-1.2%
Average Annual Flow (acre-feet/year)	TOTAL	2.6%	2.4%	2.5%	2.6%	2.2%	2.4%	2.5%	2.5%
	Wet (W)	3.3%	3.2%	3.4%	3.4%	3.1%	3.3%	3.3%	3.3%
	Above Normal (AN)	2.9%	2.7%	2.9%	3.1%	2.6%	2.7%	2.9%	2.9%
	Below Normal (BN)	1.9%	1.3%	1.5%	1.7%	1.1%	1.3%	1.4%	1.4%
	Dry (D)	1.0%	0.7%	0.9%	1.0%	0.5%	0.7%	0.8%	0.8%
	Critical (C)	2.2%	1.4%	1.6%	1.6%	1.1%	1.3%	1.4%	1.4%

Tehama IHM

Comparison of Simulated Streamflows: Inflow from Sacramento River at Bowman Subbasin Boundary
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	431,429	435,030	401,706	383,208	434,988	401,668	383,184	383,181
	November	404,107	407,521	419,303	358,644	407,488	419,260	358,598	358,592
	December	586,069	572,407	632,494	687,294	572,340	632,420	687,210	687,197
	January	822,706	804,779	906,175	1,120,212	804,699	906,087	1,120,105	1,120,094
	February	927,311	990,545	1,076,543	1,336,615	990,438	1,076,427	1,336,484	1,336,470
	March	874,898	987,698	1,083,870	1,179,592	987,578	1,083,743	1,179,448	1,179,436
	April	620,392	684,782	693,905	667,942	684,672	693,788	667,817	667,807
	May	728,536	726,368	699,102	595,883	726,279	699,009	595,786	595,778
	June	753,576	778,745	718,456	658,976	778,671	718,382	658,899	658,893
	July	823,444	844,540	860,386	864,448	844,490	860,333	864,392	864,389
	August	710,996	740,769	744,324	760,531	740,728	744,281	760,490	760,487
	September	529,505	546,631	556,905	562,225	546,594	556,867	562,169	562,166
Average Annual Flow (acre-feet/year)	TOTAL	684,414	709,985	732,764	764,631	709,914	732,689	764,548	764,541
	Wet (W)	999,609	958,927	997,520	1,067,576	958,850	997,440	1,067,487	1,067,478
	Above Normal (AN)	731,377	737,572	740,483	762,234	737,496	740,393	762,146	762,138
	Below Normal (BN)	601,423	578,082	591,184	604,864	578,016	591,113	604,788	604,782
	Dry (D)	559,890	568,732	597,418	601,243	568,658	597,341	601,158	601,152
	Critical (C)	445,581	462,037	471,719	479,893	461,979	471,659	479,823	479,817

Tehama IHM

Change in Simulated Streamflows as compared to Historical Scenario: Inflow from Sacramento River at Bowman Subbasin Boundary

Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	3,602	-29,723	-48,221	3,560	-29,761	-48,245	-48,248
	November	0	3,414	15,196	-45,463	3,381	15,153	-45,509	-45,515
	December	0	-13,661	46,425	101,226	-13,729	46,351	101,141	101,128
	January	0	-17,926	83,470	297,507	-18,006	83,381	297,400	297,389
	February	0	63,233	149,232	409,304	63,126	149,116	409,173	409,159
	March	0	112,801	208,972	304,695	112,681	208,846	304,551	304,538
	April	0	64,390	73,513	47,549	64,280	73,396	47,425	47,415
	May	0	-2,168	-29,433	-132,652	-2,257	-29,526	-132,750	-132,757
	June	0	25,169	-35,120	-94,601	25,095	-35,195	-94,678	-94,683
	July	0	21,096	36,942	41,003	21,045	36,889	40,948	40,944
	August	0	29,772	33,328	49,534	29,731	33,285	49,494	49,491
	September	0	17,126	27,400	32,719	17,089	27,362	32,664	32,661
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	25,571	48,350	80,217	25,500	48,275	80,134	80,127
	Wet (W)	0	-40,682	-2,089	67,967	-40,758	-2,168	67,879	67,870
	Above Normal (AN)	0	6,195	9,106	30,857	6,119	9,016	30,769	30,761
	Below Normal (BN)	0	-23,341	-10,240	3,441	-23,408	-10,310	3,365	3,359
	Dry (D)	0	8,843	37,528	41,353	8,768	37,452	41,268	41,262
	Critical (C)	0	16,456	26,138	34,312	16,398	26,078	34,242	34,236

Tehama IHM

Comparison of Simulated Streamflows: Outflow from MF Cottonwood Creek to Cottonwood Creek
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	1,102	1,005	889	807	1,001	885	802	802
	November	2,813	2,834	2,929	2,392	2,830	2,924	2,387	2,387
	December	20,363	19,832	21,848	24,634	19,827	21,843	24,629	24,628
	January	37,654	37,517	42,956	53,097	37,512	42,951	53,091	53,091
	February	47,559	52,203	57,036	69,626	52,198	57,031	69,621	69,621
	March	35,604	38,050	41,950	45,927	38,046	41,945	45,922	45,922
	April	19,129	21,416	21,579	20,698	21,412	21,575	20,693	20,692
	May	11,241	11,297	10,787	8,870	11,292	10,782	8,865	8,864
	June	4,415	4,673	4,048	3,329	4,669	4,044	3,325	3,325
	July	896	906	903	882	903	899	879	879
	August	275	272	271	273	271	270	271	271
	September	349	342	351	350	339	348	348	348
Average Annual Flow (acre-feet/year)	TOTAL	15,117	15,862	17,129	19,240	15,858	17,125	19,236	19,236
	Wet (W)	26,514	25,690	27,705	31,332	25,686	27,701	31,328	31,327
	Above Normal (AN)	19,049	19,164	20,076	22,244	19,160	20,071	22,239	22,239
	Below Normal (BN)	13,050	10,104	10,953	12,468	10,100	10,949	12,464	12,463
	Dry (D)	8,425	9,364	10,653	11,460	9,360	10,649	11,456	11,455
	Critical (C)	6,101	5,740	6,181	7,116	5,737	6,177	7,112	7,112

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from MF Cottonwood Creek to Cottonwood Creek

Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-98	-213	-296	-102	-218	-300	-300
	November	0	22	116	-421	17	112	-425	-426
	December	0	-531	1,484	4,271	-536	1,479	4,266	4,265
	January	0	-138	5,302	15,442	-142	5,297	15,437	15,437
	February	0	4,644	9,478	22,068	4,639	9,473	22,063	22,062
	March	0	2,447	6,346	10,324	2,442	6,341	10,318	10,318
	April	0	2,287	2,450	1,568	2,283	2,445	1,563	1,563
	May	0	55	-454	-2,372	51	-459	-2,377	-2,377
	June	0	258	-367	-1,086	254	-371	-1,090	-1,091
	July	0	10	7	-14	7	3	-17	-17
	August	0	-3	-4	-2	-4	-5	-4	-4
	September	0	-7	2	2	-9	0	-1	-1
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	746	2,012	4,124	742	2,008	4,119	4,119
	Wet (W)	0	-824	1,191	4,818	-828	1,187	4,814	4,814
	Above Normal (AN)	0	116	1,027	3,196	111	1,022	3,191	3,190
	Below Normal (BN)	0	-2,946	-2,097	-582	-2,950	-2,101	-587	-587
	Dry (D)	0	939	2,228	3,036	935	2,224	3,031	3,031
	Critical (C)	0	-360	80	1,015	-364	76	1,011	1,011

Comparison of Simulated Streamflows: Outflow from SF Cottonwood Creek to Cottonwood Creek
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	413	389	253	202	380	247	196	196
	November	1,233	1,260	1,397	956	1,242	1,377	942	940
	December	9,422	8,769	10,264	11,820	8,733	10,225	11,778	11,775
	January	17,136	16,640	19,213	24,161	16,597	19,169	24,112	24,108
	February	15,152	18,336	20,250	24,978	18,283	20,192	24,915	24,911
	March	10,594	10,724	12,318	13,415	10,680	12,268	13,359	13,356
	April	4,632	5,516	5,382	4,782	5,484	5,351	4,755	4,753
	May	3,084	3,124	3,071	2,371	3,102	3,049	2,350	2,349
	June	1,225	1,244	1,135	983	1,231	1,122	971	970
	July	432	396	384	351	386	373	340	339
	August	200	151	144	127	144	137	120	120
	September	370	453	427	408	428	423	396	396
Average Annual Flow (acre-feet/year)	TOTAL	5,324	5,584	6,186	7,046	5,558	6,161	7,020	7,018
	Wet (W)	10,105	9,674	10,695	12,152	9,640	10,661	12,117	12,115
	Above Normal (AN)	6,540	6,720	7,255	8,370	6,680	7,225	8,338	8,336
	Below Normal (BN)	4,263	3,245	3,629	4,179	3,227	3,609	4,159	4,157
	Dry (D)	2,429	2,598	3,078	3,360	2,578	3,056	3,338	3,336
	Critical (C)	1,992	1,750	1,911	2,253	1,736	1,896	2,237	2,236

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from SF Cottonwood Creek to Cottonwood Creek
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-24	-160	-211	-33	-166	-216	-217
	November	0	27	164	-276	9	144	-291	-292
	December	0	-652	842	2,399	-688	804	2,357	2,354
	January	0	-496	2,078	7,026	-538	2,033	6,976	6,972
	February	0	3,184	5,098	9,826	3,131	5,040	9,763	9,759
	March	0	130	1,724	2,821	85	1,674	2,765	2,761
	April	0	884	750	150	852	719	123	121
	May	0	40	-13	-713	18	-35	-734	-735
	June	0	20	-90	-242	7	-103	-254	-254
	July	0	-35	-48	-81	-46	-59	-92	-93
	August	0	-49	-56	-73	-56	-63	-80	-80
	September	0	83	57	38	58	53	26	26
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	259	862	1,722	233	837	1,695	1,693
	Wet (W)	0	-431	590	2,047	-465	556	2,012	2,010
	Above Normal (AN)	0	180	716	1,831	140	685	1,798	1,796
	Below Normal (BN)	0	-1,017	-634	-83	-1,036	-654	-104	-105
	Dry (D)	0	169	649	932	149	627	909	907
	Critical (C)	0	-243	-81	261	-256	-96	245	244

Comparison of Simulated Streamflows: Outflow from Cottonwood Creek to Sacramento River
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	4,088	3,992	3,563	3,145	3,952	3,527	3,123	3,120
	November	8,873	9,322	9,970	7,508	9,290	9,928	7,464	7,458
	December	58,383	55,487	62,581	70,367	55,421	62,508	70,285	70,272
	January	99,764	98,955	112,607	138,558	98,878	112,520	138,452	138,441
	February	104,840	119,008	130,068	157,613	118,903	129,953	157,484	157,470
	March	80,239	83,731	93,596	101,675	83,613	93,472	101,533	101,520
	April	40,660	46,560	46,563	43,541	46,452	46,448	43,418	43,408
	May	23,399	24,296	23,362	18,397	24,209	23,271	18,302	18,294
	June	9,525	9,528	8,228	6,656	9,456	8,156	6,581	6,576
	July	4,423	4,218	4,103	3,825	4,170	4,052	3,772	3,768
	August	3,634	3,359	3,278	3,097	3,320	3,238	3,058	3,055
	September	3,917	3,925	3,943	3,464	3,890	3,907	3,410	3,407
Average Annual Flow (acre-feet/year)	TOTAL	36,812	38,532	41,822	46,487	38,463	41,748	46,407	46,399
	Wet (W)	65,885	63,731	68,949	76,923	63,657	68,871	76,837	76,828
	Above Normal (AN)	46,933	47,076	49,625	54,791	47,002	49,536	54,705	54,697
	Below Normal (BN)	30,918	23,741	26,062	29,253	23,676	25,994	29,179	29,173
	Dry (D)	19,703	21,565	24,617	26,226	21,492	24,542	26,143	26,136
	Critical (C)	14,233	12,816	14,048	16,188	12,761	13,989	16,121	16,115

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Cottonwood Creek to Sacramento River
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-95	-525	-942	-135	-560	-965	-968
	November	0	449	1,096	-1,365	417	1,055	-1,409	-1,415
	December	0	-2,896	4,198	11,984	-2,962	4,125	11,901	11,889
	January	0	-810	12,842	38,793	-887	12,756	38,688	38,677
	February	0	14,168	25,228	52,773	14,063	25,113	52,644	52,630
	March	0	3,493	13,358	21,436	3,374	13,233	21,294	21,282
	April	0	5,900	5,903	2,881	5,792	5,788	2,758	2,748
	May	0	897	-37	-5,002	810	-128	-5,097	-5,105
	June	0	3	-1,297	-2,869	-69	-1,369	-2,944	-2,949
	July	0	-205	-321	-599	-254	-371	-652	-656
	August	0	-274	-355	-537	-314	-396	-575	-578
	September	0	8	26	-453	-27	-10	-507	-510
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	1,720	5,010	9,675	1,651	4,936	9,595	9,587
	Wet (W)	0	-2,154	3,063	11,038	-2,229	2,986	10,951	10,942
	Above Normal (AN)	0	143	2,692	7,858	69	2,604	7,772	7,764
	Below Normal (BN)	0	-7,177	-4,855	-1,665	-7,242	-4,924	-1,738	-1,745
	Dry (D)	0	1,861	4,913	6,522	1,789	4,838	6,439	6,433
	Critical (C)	0	-1,417	-185	1,956	-1,472	-244	1,888	1,882

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Sacramento River at Bowman Subbasin Boundary
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	451,306	454,859	420,168	400,833	454,790	420,106	400,769	400,763
	November	427,866	431,891	444,497	380,438	431,859	444,454	380,384	380,375
	December	628,464	614,334	678,697	737,309	614,284	678,641	737,241	737,226
	January	875,094	859,088	966,471	1,192,523	859,020	966,393	1,192,426	1,192,413
	February	980,184	1,047,984	1,138,606	1,410,739	1,047,885	1,138,496	1,410,613	1,410,596
	March	923,753	1,037,877	1,139,152	1,239,118	1,037,749	1,139,016	1,238,960	1,238,945
	April	661,350	729,284	738,917	710,844	729,155	738,776	710,689	710,676
	May	768,135	768,794	739,947	630,586	768,678	739,825	630,453	630,443
	June	783,687	809,779	746,726	684,282	809,670	746,613	684,162	684,153
	July	843,831	865,548	881,526	885,426	865,462	881,435	885,328	885,321
	August	728,025	758,324	761,908	778,281	758,248	761,827	778,199	778,193
	September	546,976	564,340	574,857	580,247	564,263	574,777	580,145	580,139
Average Annual Flow (acre-feet/year)	TOTAL	718,223	745,175	769,289	802,552	745,088	769,197	802,447	802,437
	Wet (W)	1,049,537	1,007,769	1,048,224	1,120,738	1,007,685	1,048,134	1,120,634	1,120,622
	Above Normal (AN)	767,426	774,433	777,776	800,674	774,345	777,675	800,564	800,553
	Below Normal (BN)	632,200	607,511	621,863	636,608	607,424	621,770	636,505	636,496
	Dry (D)	585,920	594,733	625,014	629,233	594,637	624,914	629,121	629,112
	Critical (C)	467,409	483,788	494,312	503,281	483,708	494,227	503,183	503,174

Tehama IHM

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Sacramento River at Bowman Subbasin Boundary
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	3,553	-31,138	-50,473	3,484	-31,200	-50,537	-50,543
	November	0	4,025	16,631	-47,428	3,992	16,588	-47,482	-47,491
	December	0	-14,130	50,233	108,845	-14,180	50,177	108,777	108,762
	January	0	-16,006	91,376	317,429	-16,074	91,299	317,332	317,319
	February	0	67,800	158,422	430,555	67,701	158,312	430,429	430,412
	March	0	114,125	215,399	315,365	113,996	215,263	315,207	315,192
	April	0	67,934	77,566	49,494	67,804	77,426	49,338	49,325
	May	0	659	-28,188	-137,549	543	-28,311	-137,682	-137,693
	June	0	26,092	-36,961	-99,405	25,983	-37,074	-99,525	-99,533
	July	0	21,717	37,695	41,595	21,631	37,604	41,497	41,490
	August	0	30,300	33,883	50,256	30,223	33,803	50,174	50,169
	September	0	17,365	27,881	33,272	17,287	27,802	33,170	33,164
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	26,953	51,067	84,330	26,866	50,974	84,225	84,214
	Wet (W)	0	-41,768	-1,313	71,201	-41,852	-1,403	71,097	71,085
	Above Normal (AN)	0	7,007	10,350	33,248	6,919	10,249	33,138	33,127
	Below Normal (BN)	0	-24,689	-10,337	4,408	-24,776	-10,429	4,305	4,296
	Dry (D)	0	8,813	39,094	43,313	8,717	38,995	43,201	43,192
	Critical (C)	0	16,380	26,903	35,873	16,299	26,818	35,774	35,766

Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Bowman Subbasin Boundary
Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	19,878	19,829	18,463	17,625	19,801	18,438	17,586	17,583
	November	23,759	24,370	25,194	21,795	24,371	25,194	21,786	21,783
	December	42,395	41,927	46,203	50,015	41,944	46,221	50,032	50,029
	January	52,389	54,309	60,295	72,311	54,321	60,307	72,321	72,319
	February	52,872	57,439	62,062	74,123	57,447	62,069	74,129	74,125
	March	48,855	50,179	55,282	59,526	50,170	55,273	59,512	59,509
	April	40,958	44,502	45,012	42,903	44,482	44,988	42,872	42,869
	May	39,600	42,426	40,845	34,703	42,400	40,815	34,668	34,665
	June	30,110	31,033	28,270	25,306	30,999	28,231	25,263	25,260
	July	20,387	21,008	21,140	20,978	20,973	21,102	20,936	20,933
	August	17,028	17,556	17,584	17,750	17,520	17,546	17,709	17,706
	September	17,470	17,709	17,951	18,023	17,669	17,911	17,976	17,973
Average Annual Flow (acre-feet/year)	TOTAL	33,808	35,191	36,525	37,921	35,175	36,508	37,899	37,896
	Wet (W)	49,928	48,843	50,705	53,162	48,834	50,694	53,147	53,144
	Above Normal (AN)	36,049	36,862	37,294	38,439	36,849	37,283	38,418	38,415
	Below Normal (BN)	30,776	29,428	30,679	31,744	29,408	30,657	31,716	31,713
	Dry (D)	26,030	26,001	27,596	27,990	25,979	27,573	27,963	27,960
	Critical (C)	21,827	21,752	22,593	23,389	21,729	22,568	23,360	23,357

Tehama IHM

Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Bowman Subbasin Boundary as Percentage of Total Outflow, Bowman Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
	November	5.6%	5.6%	5.7%	5.7%	5.6%	5.7%	5.7%	5.7%
	December	6.7%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
	January	6.0%	6.3%	6.2%	6.1%	6.3%	6.2%	6.1%	6.1%
	February	5.4%	5.5%	5.5%	5.3%	5.5%	5.5%	5.3%	5.3%
	March	5.3%	4.8%	4.9%	4.8%	4.8%	4.9%	4.8%	4.8%
	April	6.2%	6.1%	6.1%	6.0%	6.1%	6.1%	6.0%	6.0%
	May	5.2%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
	June	3.8%	3.8%	3.8%	3.7%	3.8%	3.8%	3.7%	3.7%
	July	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
	August	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
	September	3.2%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Average Annual Flow (acre-feet/year)	TOTAL	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%
	Wet (W)	4.8%	4.8%	4.8%	4.7%	4.8%	4.8%	4.7%	4.7%
	Above Normal (AN)	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
	Below Normal (BN)	4.9%	4.8%	4.9%	5.0%	4.8%	4.9%	5.0%	5.0%
	Dry (D)	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
	Critical (C)	4.7%	4.5%	4.6%	4.6%	4.5%	4.6%	4.6%	4.6%

Comparison of Simulated Streamflows: Inflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	464,510	466,143	430,681	410,239	464,475	428,944	408,370	408,299
	November	455,194	458,835	472,472	404,740	457,413	470,994	403,097	403,139
	December	696,581	678,368	748,948	812,786	677,188	747,723	811,474	811,519
	January	972,367	954,504	1,071,400	1,315,398	953,238	1,070,051	1,313,938	1,313,998
	February	1,070,534	1,148,353	1,246,036	1,535,266	1,146,966	1,244,560	1,533,655	1,533,700
	March	992,846	1,104,857	1,212,762	1,316,590	1,103,370	1,211,206	1,314,888	1,314,944
	April	693,706	763,580	773,411	742,848	762,086	771,830	741,136	741,100
	May	769,755	770,440	741,148	627,633	768,936	739,568	625,929	625,659
	June	764,708	787,492	723,693	659,803	785,918	722,046	658,047	657,675
	July	814,606	832,896	848,733	851,800	831,265	847,026	849,976	849,685
	August	711,680	739,125	742,632	758,266	737,420	740,850	756,368	756,188
	September	548,484	564,117	574,605	579,297	562,368	572,772	577,328	577,266
Average Annual Flow (acre-feet/year)	TOTAL	746,248	772,392	798,877	834,556	770,887	797,298	832,851	832,764
	Wet (W)	1,098,421	1,053,297	1,097,481	1,174,462	1,051,891	1,096,000	1,172,859	1,172,703
	Above Normal (AN)	800,375	806,030	811,115	837,055	804,532	809,530	835,342	835,240
	Below Normal (BN)	653,062	623,456	639,722	655,836	621,897	638,090	654,066	653,863
	Dry (D)	599,250	606,407	638,545	643,130	604,866	636,940	641,403	641,399
	Critical (C)	484,394	496,860	508,529	518,359	495,239	506,838	516,543	516,601

Change in Simulated Streamflows as compared to Historical Scenario: Inflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	1,633	-33,830	-54,271	-36	-35,566	-56,141	-56,212
	November	0	3,640	17,277	-50,454	2,218	15,800	-52,098	-52,055
	December	0	-18,213	52,368	116,206	-19,393	51,142	114,893	114,938
	January	0	-17,864	99,033	343,031	-19,129	97,684	341,571	341,631
	February	0	77,820	175,502	464,732	76,432	174,027	463,122	463,166
	March	0	112,011	219,916	323,744	110,524	218,360	322,042	322,098
	April	0	69,874	79,705	49,142	68,380	78,124	47,430	47,394
	May	0	686	-28,606	-142,122	-818	-30,187	-143,825	-144,096
	June	0	22,783	-41,016	-104,905	21,210	-42,663	-106,661	-107,034
	July	0	18,290	34,127	37,194	16,658	32,420	35,370	35,079
	August	0	27,445	30,952	46,587	25,740	29,171	44,688	44,508
	September	0	15,633	26,121	30,813	13,884	24,288	28,844	28,782
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	26,145	52,629	88,308	24,639	51,050	86,603	86,517
	Wet (W)	0	-45,123	-939	76,042	-46,529	-2,421	74,439	74,283
	Above Normal (AN)	0	5,655	10,740	36,680	4,157	9,155	34,967	34,865
	Below Normal (BN)	0	-29,606	-13,340	2,774	-31,165	-14,972	1,004	801
	Dry (D)	0	7,157	39,295	43,880	5,616	37,690	42,153	42,149
	Critical (C)	0	12,467	24,135	33,966	10,845	22,444	32,149	32,207

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Antelope Creek Group to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	7,567	7,329	6,921	6,560	7,164	6,768	6,396	6,396
	November	9,937	9,813	10,143	8,945	9,655	9,976	8,775	8,777
	December	22,739	21,538	23,618	25,615	21,359	23,426	25,410	25,414
	January	30,316	29,817	33,316	39,921	29,625	33,113	39,699	39,706
	February	31,338	33,597	36,332	43,489	33,406	36,130	43,269	43,277
	March	27,974	28,085	30,909	33,275	27,897	30,708	33,056	33,065
	April	21,289	22,713	23,107	22,061	22,529	22,912	21,855	21,865
	May	16,834	17,926	17,486	15,287	17,742	17,294	15,088	15,096
	June	11,265	11,457	10,764	9,867	11,278	10,580	9,678	9,682
	July	7,980	7,908	7,990	7,862	7,733	7,808	7,671	7,673
	August	6,519	6,468	6,552	6,518	6,302	6,380	6,339	6,339
	September	6,111	6,010	6,138	6,055	5,850	5,969	5,883	5,883
Average Annual Flow (acre-feet/year)	TOTAL	16,656	16,889	17,773	18,788	16,712	17,589	18,593	18,598
	Wet (W)	25,695	24,307	25,632	27,489	24,123	25,438	27,285	27,291
	Above Normal (AN)	18,367	18,348	18,839	19,855	18,164	18,647	19,652	19,656
	Below Normal (BN)	15,560	14,004	14,772	15,446	13,829	14,590	15,252	15,257
	Dry (D)	12,050	11,872	12,723	12,946	11,699	12,544	12,757	12,762
	Critical (C)	9,420	9,047	9,527	9,976	8,884	9,357	9,799	9,800

Tehama IHM

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Antelope Creek Group to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-238	-646	-1,007	-403	-799	-1,171	-1,171
	November	0	-124	206	-992	-282	40	-1,162	-1,160
	December	0	-1,201	878	2,875	-1,380	686	2,671	2,675
	January	0	-499	3,000	9,605	-691	2,797	9,383	9,390
	February	0	2,259	4,994	12,151	2,068	4,792	11,931	11,939
	March	0	111	2,935	5,301	-77	2,733	5,081	5,091
	April	0	1,424	1,818	772	1,240	1,623	566	576
	May	0	1,093	653	-1,547	908	460	-1,746	-1,738
	June	0	192	-501	-1,398	13	-685	-1,587	-1,583
	July	0	-72	10	-118	-247	-172	-309	-307
	August	0	-51	32	-1	-218	-139	-181	-180
	September	0	-102	27	-56	-261	-143	-229	-228
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	233	1,117	2,132	56	933	1,937	1,942
	Wet (W)	0	-1,388	-63	1,794	-1,572	-257	1,589	1,596
	Above Normal (AN)	0	-19	472	1,488	-204	280	1,284	1,289
	Below Normal (BN)	0	-1,557	-789	-114	-1,731	-970	-309	-304
	Dry (D)	0	-178	673	896	-352	494	707	712
	Critical (C)	0	-373	107	556	-536	-63	380	380

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Mill Creek to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	4,061	3,945	3,363	3,015	3,886	3,302	2,950	2,957
	November	9,527	9,437	9,697	8,254	9,379	9,637	8,193	8,199
	December	22,467	21,383	23,461	25,837	21,323	23,399	25,771	25,778
	January	27,814	27,535	30,935	37,814	27,473	30,870	37,745	37,752
	February	30,385	31,979	34,717	42,457	31,917	34,652	42,387	42,395
	March	29,741	30,029	33,212	36,212	29,969	33,149	36,145	36,153
	April	21,537	23,516	23,937	22,786	23,456	23,877	22,724	22,731
	May	19,628	21,279	20,087	16,088	21,221	20,024	16,022	16,027
	June	13,570	14,241	12,298	10,357	14,174	12,234	10,291	10,299
	July	5,826	5,861	5,871	5,783	5,801	5,804	5,715	5,722
	August	2,648	2,702	2,708	2,812	2,637	2,643	2,748	2,754
	September	1,990	1,997	2,128	2,185	1,936	2,066	2,124	2,132
Average Annual Flow (acre-feet/year)	TOTAL	15,766	16,159	16,868	17,800	16,098	16,805	17,735	17,742
	Wet (W)	25,138	23,839	24,837	26,536	23,776	24,772	26,467	26,475
	Above Normal (AN)	17,902	18,227	18,304	18,949	18,163	18,239	18,882	18,889
	Below Normal (BN)	14,925	13,264	13,948	14,680	13,203	13,883	14,615	14,622
	Dry (D)	10,748	10,597	11,540	11,799	10,534	11,476	11,734	11,741
	Critical (C)	8,021	7,918	8,358	8,855	7,864	8,301	8,796	8,802

Tehama IHM

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Mill Creek to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-116	-698	-1,046	-175	-758	-1,110	-1,104
	November	0	-90	170	-1,273	-149	110	-1,334	-1,328
	December	0	-1,085	994	3,370	-1,144	932	3,303	3,310
	January	0	-279	3,120	10,000	-341	3,055	9,930	9,938
	February	0	1,594	4,332	12,072	1,532	4,267	12,002	12,010
	March	0	288	3,471	6,471	228	3,408	6,404	6,411
	April	0	1,979	2,400	1,250	1,920	2,341	1,187	1,195
	May	0	1,651	459	-3,540	1,593	395	-3,606	-3,601
	June	0	672	-1,272	-3,213	605	-1,335	-3,279	-3,271
	July	0	35	45	-43	-25	-22	-111	-104
	August	0	54	60	164	-11	-5	101	106
	September	0	7	138	195	-55	76	134	142
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	393	1,102	2,034	332	1,039	1,968	1,975
	Wet (W)	0	-1,299	-301	1,398	-1,361	-366	1,330	1,338
	Above Normal (AN)	0	326	402	1,048	262	337	980	988
	Below Normal (BN)	0	-1,662	-978	-245	-1,722	-1,042	-310	-304
	Dry (D)	0	-151	792	1,051	-213	728	986	993
	Critical (C)	0	-102	337	834	-157	281	776	782

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Deer Creek Group to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	3,976	2,680	2,282	1,945	2,585	2,183	1,845	1,850
	November	6,795	5,579	5,713	4,512	5,475	5,605	4,403	4,408
	December	19,838	17,177	18,996	21,312	17,050	18,857	21,165	21,171
	January	29,326	26,358	30,458	38,315	26,218	30,307	38,145	38,153
	February	33,680	34,256	37,572	47,431	34,105	37,415	47,259	47,268
	March	32,554	31,272	34,848	38,327	31,122	34,690	38,149	38,159
	April	24,360	25,465	25,809	24,507	25,320	25,659	24,351	24,363
	May	16,144	15,670	14,741	11,574	15,548	14,614	11,440	11,448
	June	7,282	6,400	5,393	4,204	6,295	5,289	4,101	4,107
	July	3,728	2,606	2,546	2,369	2,522	2,459	2,279	2,284
	August	2,836	1,778	1,723	1,638	1,696	1,638	1,556	1,560
	September	2,818	1,733	1,722	1,614	1,669	1,641	1,530	1,534
Average Annual Flow (acre-feet/year)	TOTAL	15,278	14,248	15,150	16,479	14,134	15,030	16,352	16,359
	Wet (W)	27,788	24,112	25,663	28,332	23,988	25,531	28,188	28,196
	Above Normal (AN)	16,210	14,737	15,187	16,346	14,620	15,061	16,216	16,223
	Below Normal (BN)	12,939	10,256	10,956	11,772	10,136	10,834	11,645	11,653
	Dry (D)	9,368	7,712	8,489	8,724	7,610	8,382	8,610	8,618
	Critical (C)	6,340	4,826	5,132	5,512	4,725	5,025	5,404	5,408

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Deer Creek Group to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-1,297	-1,695	-2,031	-1,391	-1,793	-2,132	-2,126
	November	0	-1,216	-1,082	-2,283	-1,321	-1,190	-2,393	-2,388
	December	0	-2,661	-842	1,474	-2,788	-980	1,327	1,334
	January	0	-2,968	1,132	8,990	-3,108	982	8,819	8,828
	February	0	576	3,892	13,751	425	3,735	13,579	13,588
	March	0	-1,282	2,294	5,774	-1,432	2,136	5,595	5,605
	April	0	1,105	1,449	147	960	1,299	-9	3
	May	0	-474	-1,403	-4,571	-596	-1,530	-4,704	-4,696
	June	0	-882	-1,890	-3,078	-987	-1,993	-3,181	-3,175
	July	0	-1,122	-1,182	-1,359	-1,206	-1,269	-1,449	-1,444
	August	0	-1,058	-1,114	-1,199	-1,140	-1,199	-1,280	-1,276
	September	0	-1,085	-1,096	-1,204	-1,149	-1,176	-1,288	-1,284
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	-1,030	-128	1,201	-1,144	-248	1,074	1,081
	Wet (W)	0	-3,676	-2,126	544	-3,800	-2,257	400	408
	Above Normal (AN)	0	-1,473	-1,023	136	-1,591	-1,150	5	13
	Below Normal (BN)	0	-2,683	-1,983	-1,167	-2,803	-2,105	-1,294	-1,287
	Dry (D)	0	-1,657	-879	-644	-1,758	-986	-758	-750
	Critical (C)	0	-1,514	-1,208	-829	-1,615	-1,315	-936	-932

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Dye Creek to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	1,200	1,204	1,106	1,051	1,204	1,106	1,051	1,051
	November	1,608	1,611	1,661	1,404	1,610	1,661	1,404	1,404
	December	4,013	3,829	4,224	4,686	3,828	4,223	4,685	4,685
	January	5,020	4,982	5,635	6,958	4,980	5,633	6,955	6,955
	February	5,535	5,840	6,366	7,872	5,837	6,363	7,868	7,868
	March	5,483	5,558	6,167	6,752	5,556	6,164	6,750	6,750
	April	4,708	5,111	5,194	4,972	5,108	5,192	4,969	4,969
	May	4,696	5,025	4,800	4,044	5,022	4,797	4,042	4,042
	June	3,486	3,634	3,263	2,894	3,632	3,261	2,893	2,893
	July	1,974	1,999	2,005	1,997	1,998	2,004	1,996	1,996
	August	1,244	1,275	1,278	1,307	1,275	1,278	1,307	1,307
	September	1,075	1,100	1,121	1,134	1,099	1,121	1,134	1,134
Average Annual Flow (acre-feet/year)	TOTAL	3,337	3,431	3,568	3,756	3,429	3,567	3,754	3,755
	Wet (W)	5,140	4,890	5,084	5,422	4,886	5,080	5,419	5,419
	Above Normal (AN)	3,730	3,823	3,838	3,964	3,821	3,837	3,964	3,964
	Below Normal (BN)	3,192	2,897	3,029	3,178	2,897	3,029	3,177	3,177
	Dry (D)	2,384	2,380	2,562	2,618	2,379	2,562	2,618	2,618
	Critical (C)	1,835	1,849	1,935	2,039	1,849	1,935	2,039	2,039

Tehama IHM

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Dye Creek to Sacramento River
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	4	-94	-149	4	-94	-149	-149
	November	0	3	53	-204	2	53	-205	-205
	December	0	-183	212	674	-184	211	673	673
	January	0	-38	615	1,938	-40	613	1,936	1,936
	February	0	304	831	2,337	302	827	2,332	2,333
	March	0	76	684	1,269	73	681	1,267	1,267
	April	0	403	486	264	400	484	261	261
	May	0	329	104	-652	326	101	-654	-654
	June	0	148	-224	-592	146	-225	-593	-593
	July	0	25	31	23	24	30	22	22
	August	0	31	34	63	30	34	62	62
	September	0	25	47	59	25	46	59	59
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	94	232	419	92	230	418	418
	Wet (W)	0	-251	-57	282	-254	-60	279	279
	Above Normal (AN)	0	93	108	235	92	107	234	234
	Below Normal (BN)	0	-295	-163	-15	-295	-164	-15	-15
	Dry (D)	0	-4	178	234	-5	177	233	233
	Critical (C)	0	14	100	204	14	100	204	204

Tehama IHM

Comparison of Simulated Streamflows: Outflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	483,069	480,968	444,186	422,490	479,016	442,133	420,274	420,246
	November	487,650	489,572	504,608	431,310	487,993	502,996	429,479	429,570
	December	804,234	777,739	859,451	935,779	776,484	858,161	934,427	934,159
	January	1,129,345	1,104,038	1,240,930	1,522,474	1,102,485	1,239,259	1,520,674	1,520,574
	February	1,242,161	1,335,957	1,449,900	1,781,923	1,334,098	1,447,906	1,779,731	1,779,595
	March	1,140,145	1,251,927	1,376,054	1,493,588	1,249,860	1,373,886	1,491,216	1,491,467
	April	797,033	874,706	885,330	849,108	872,623	883,137	846,757	846,825
	May	849,232	851,061	818,106	689,734	849,106	816,052	687,547	687,366
	June	806,395	826,846	758,431	688,878	824,889	756,406	686,750	686,449
	July	836,285	851,564	867,316	869,582	849,630	865,281	867,434	867,202
	August	727,595	752,219	755,491	770,793	750,185	753,388	768,567	768,436
	September	562,570	575,636	586,175	590,418	573,515	583,951	588,054	588,039
Average Annual Flow (acre-feet/year)	TOTAL	822,143	847,686	878,832	920,507	845,824	876,880	918,409	918,327
	Wet (W)	1,226,147	1,173,104	1,224,620	1,312,228	1,171,303	1,222,720	1,310,175	1,309,916
	Above Normal (AN)	894,016	894,053	901,811	933,710	892,158	899,812	931,563	931,539
	Below Normal (BN)	718,008	675,378	695,144	715,249	673,494	693,180	713,138	712,998
	Dry (D)	645,848	650,910	687,753	694,212	649,013	685,778	692,099	692,171
	Critical (C)	519,660	527,193	540,880	553,511	525,287	538,895	551,391	551,492

Tehama IHM

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-2,101	-38,883	-60,579	-4,053	-40,937	-62,796	-62,823
	November	0	1,922	16,958	-56,340	342	15,346	-58,171	-58,080
	December	0	-26,495	55,217	131,545	-27,750	53,927	130,193	129,925
	January	0	-25,308	111,585	393,128	-26,860	109,914	391,328	391,229
	February	0	93,796	207,738	539,762	91,936	205,745	537,570	537,433
	March	0	111,782	235,909	353,443	109,715	233,741	351,071	351,323
	April	0	77,673	88,298	52,075	75,590	86,104	49,724	49,792
	May	0	1,830	-31,126	-159,498	-126	-33,180	-161,685	-161,866
	June	0	20,450	-47,964	-117,517	18,494	-49,990	-119,646	-119,946
	July	0	15,280	31,032	33,297	13,345	28,997	31,150	30,917
	August	0	24,625	27,896	43,199	22,590	25,793	40,973	40,841
	September	0	13,067	23,606	27,849	10,945	21,381	25,484	25,469
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	25,543	56,689	98,364	23,681	54,737	96,266	96,185
	Wet (W)	0	-53,044	-1,528	86,081	-54,844	-3,427	84,028	83,768
	Above Normal (AN)	0	37	7,795	39,694	-1,858	5,797	37,548	37,523
	Below Normal (BN)	0	-42,629	-22,864	-2,758	-44,514	-24,828	-4,870	-5,010
	Dry (D)	0	5,062	41,905	48,364	3,165	39,930	46,251	46,322
	Critical (C)	0	7,532	21,220	33,851	5,627	19,234	31,731	31,832

Tehama IHM

Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Los Molinos Subbasin Boundary
Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	18,559	14,825	13,505	12,251	14,541	13,188	11,904	11,948
	November	32,456	30,738	32,137	26,570	30,580	32,002	26,382	26,431
	December	107,654	99,372	110,503	122,993	99,296	110,438	122,953	122,640
	January	156,978	149,534	169,530	207,076	149,247	169,208	206,736	206,576
	February	171,628	187,604	203,864	246,657	187,132	203,346	246,076	245,895
	March	147,299	147,070	163,292	176,998	146,490	162,679	176,328	176,524
	April	103,327	111,126	111,919	106,260	110,537	111,307	105,620	105,725
	May	79,477	80,621	76,958	62,101	80,169	76,484	61,618	61,707
	June	41,687	39,354	34,739	29,075	38,971	34,360	28,702	28,775
	July	21,678	18,668	18,583	17,781	18,365	18,256	17,458	17,517
	August	15,915	13,094	12,859	12,527	12,765	12,538	12,200	12,248
	September	14,085	11,519	11,570	11,122	11,146	11,179	10,726	10,773
Average Annual Flow (acre-feet/year)	TOTAL	75,895	75,294	79,955	85,951	74,937	79,582	85,558	85,563
	Wet (W)	127,727	119,806	127,138	137,765	119,412	126,721	137,316	137,212
	Above Normal (AN)	93,640	88,023	90,695	96,654	87,625	90,283	96,221	96,299
	Below Normal (BN)	64,946	51,922	55,422	59,413	51,597	55,090	59,071	59,135
	Dry (D)	46,598	44,503	49,208	51,081	44,147	48,838	50,696	50,771
	Critical (C)	35,267	30,332	32,352	35,152	30,048	32,057	34,848	34,891

Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Los Molinos Subbasin Boundary as Percentage of Total Outflow, Los Molinos Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	3.8%	3.1%	3.0%	2.9%	3.0%	3.0%	2.8%	2.8%
	November	6.7%	6.3%	6.4%	6.2%	6.3%	6.4%	6.1%	6.2%
	December	13.4%	12.8%	12.9%	13.1%	12.8%	12.9%	13.2%	13.1%
	January	13.9%	13.5%	13.7%	13.6%	13.5%	13.7%	13.6%	13.6%
	February	13.8%	14.0%	14.1%	13.8%	14.0%	14.0%	13.8%	13.8%
	March	12.9%	11.7%	11.9%	11.9%	11.7%	11.8%	11.8%	11.8%
	April	13.0%	12.7%	12.6%	12.5%	12.7%	12.6%	12.5%	12.5%
	May	9.4%	9.5%	9.4%	9.0%	9.4%	9.4%	9.0%	9.0%
	June	5.2%	4.8%	4.6%	4.2%	4.7%	4.5%	4.2%	4.2%
	July	2.6%	2.2%	2.1%	2.0%	2.2%	2.1%	2.0%	2.0%
	August	2.2%	1.7%	1.7%	1.6%	1.7%	1.7%	1.6%	1.6%
	September	2.5%	2.0%	2.0%	1.9%	1.9%	1.9%	1.8%	1.8%
Average Annual Flow (acre-feet/year)	TOTAL	9.2%	8.9%	9.1%	9.3%	8.9%	9.1%	9.3%	9.3%
	Wet (W)	10.4%	10.2%	10.4%	10.5%	10.2%	10.4%	10.5%	10.5%
	Above Normal (AN)	10.5%	9.8%	10.1%	10.4%	9.8%	10.0%	10.3%	10.3%
	Below Normal (BN)	9.0%	7.7%	8.0%	8.3%	7.7%	7.9%	8.3%	8.3%
	Dry (D)	7.2%	6.8%	7.2%	7.4%	6.8%	7.1%	7.3%	7.3%
	Critical (C)	6.8%	5.8%	6.0%	6.4%	5.7%	5.9%	6.3%	6.3%

Tehama IHM

Comparison of Simulated Streamflows: Inflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	451,306	454,859	420,168	400,833	454,790	420,106	400,769	400,763
	November	427,866	431,891	444,497	380,438	431,859	444,454	380,384	380,375
	December	628,464	614,334	678,697	737,309	614,284	678,641	737,241	737,226
	January	875,094	859,088	966,471	1,192,523	859,020	966,393	1,192,426	1,192,413
	February	980,184	1,047,984	1,138,606	1,410,739	1,047,885	1,138,496	1,410,613	1,410,596
	March	923,753	1,037,877	1,139,152	1,239,118	1,037,749	1,139,016	1,238,960	1,238,945
	April	661,350	729,284	738,917	710,844	729,155	738,776	710,689	710,676
	May	768,135	768,794	739,947	630,586	768,678	739,825	630,453	630,443
	June	783,687	809,779	746,726	684,282	809,670	746,613	684,162	684,153
	July	843,831	865,548	881,526	885,426	865,462	881,435	885,328	885,321
	August	728,025	758,324	761,908	778,281	758,248	761,827	778,199	778,193
	September	546,976	564,340	574,857	580,247	564,263	574,777	580,145	580,139
Average Annual Flow (acre-feet/year)	TOTAL	718,223	745,175	769,289	802,552	745,088	769,197	802,447	802,437
	Wet (W)	1,049,537	1,007,769	1,048,224	1,120,738	1,007,685	1,048,134	1,120,634	1,120,622
	Above Normal (AN)	767,426	774,433	777,776	800,674	774,345	777,675	800,564	800,553
	Below Normal (BN)	632,200	607,511	621,863	636,608	607,424	621,770	636,505	636,496
	Dry (D)	585,920	594,733	625,014	629,233	594,637	624,914	629,121	629,112
	Critical (C)	467,409	483,788	494,312	503,281	483,708	494,227	503,183	503,174

Change in Simulated Streamflows as compared to Historical Scenario: Inflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	3,553	-31,138	-50,473	3,484	-31,200	-50,537	-50,543
	November	0	4,025	16,631	-47,428	3,992	16,588	-47,482	-47,491
	December	0	-14,130	50,233	108,845	-14,180	50,177	108,777	108,762
	January	0	-16,006	91,376	317,429	-16,074	91,299	317,332	317,319
	February	0	67,800	158,422	430,555	67,701	158,312	430,429	430,412
	March	0	114,125	215,399	315,365	113,996	215,263	315,207	315,192
	April	0	67,934	77,566	49,494	67,804	77,426	49,338	49,325
	May	0	659	-28,188	-137,549	543	-28,311	-137,682	-137,693
	June	0	26,092	-36,961	-99,405	25,983	-37,074	-99,525	-99,533
	July	0	21,717	37,695	41,595	21,631	37,604	41,497	41,490
	August	0	30,300	33,883	50,256	30,223	33,803	50,174	50,169
	September	0	17,365	27,881	33,272	17,287	27,802	33,170	33,164
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	26,953	51,067	84,330	26,866	50,974	84,225	84,214
	Wet (W)	0	-41,768	-1,313	71,201	-41,852	-1,403	71,097	71,085
	Above Normal (AN)	0	7,007	10,350	33,248	6,919	10,249	33,138	33,127
	Below Normal (BN)	0	-24,689	-10,337	4,408	-24,776	-10,429	4,305	4,296
	Dry (D)	0	8,813	39,094	43,313	8,717	38,995	43,201	43,192
	Critical (C)	0	16,380	26,903	35,873	16,299	26,818	35,774	35,766

Comparison of Simulated Streamflows: Outflow from Elder Creek to Sacramento River
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	949	627	564	484	540	478	402	411
	November	1,983	1,802	1,882	1,518	1,717	1,799	1,436	1,446
	December	9,879	9,010	10,039	11,326	8,887	9,914	11,207	11,060
	January	16,631	15,478	17,900	21,867	15,297	17,711	21,669	21,580
	February	18,332	20,288	22,101	26,776	20,063	21,862	26,516	26,429
	March	14,980	14,758	16,402	17,835	14,533	16,161	17,582	17,625
	April	8,905	9,521	9,500	8,984	9,321	9,293	8,784	8,811
	May	5,794	5,521	5,289	4,204	5,375	5,141	4,064	4,083
	June	2,347	2,124	1,822	1,445	2,016	1,716	1,347	1,362
	July	912	688	654	587	602	569	508	520
	August	681	459	435	387	381	359	315	326
	September	681	448	424	372	362	340	295	304
Average Annual Flow (acre-feet/year)	TOTAL	6,839	6,727	7,251	7,982	6,591	7,112	7,844	7,830
	Wet (W)	11,754	10,890	11,739	12,965	10,718	11,562	12,785	12,720
	Above Normal (AN)	9,339	8,663	9,063	9,903	8,498	8,895	9,737	9,757
	Below Normal (BN)	5,297	3,849	4,165	4,653	3,742	4,057	4,548	4,561
	Dry (D)	3,790	3,815	4,321	4,585	3,691	4,195	4,463	4,479
	Critical (C)	3,074	2,515	2,700	3,056	2,432	2,616	2,974	2,982

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Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Elder Creek to Sacramento River
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-322	-385	-464	-408	-471	-547	-537
	November	0	-180	-101	-465	-266	-184	-547	-537
	December	0	-869	160	1,447	-992	35	1,327	1,181
	January	0	-1,152	1,270	5,236	-1,333	1,081	5,038	4,949
	February	0	1,956	3,769	8,444	1,731	3,531	8,184	8,098
	March	0	-222	1,422	2,855	-448	1,181	2,601	2,645
	April	0	616	595	79	416	388	-121	-94
	May	0	-273	-506	-1,590	-420	-653	-1,730	-1,711
	June	0	-223	-525	-901	-331	-631	-1,000	-985
	July	0	-224	-257	-325	-310	-343	-404	-392
	August	0	-222	-246	-294	-300	-322	-366	-355
	September	0	-234	-257	-309	-320	-341	-387	-377
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	-112	412	1,143	-248	272	1,004	990
	Wet (W)	0	-864	-14	1,211	-1,036	-191	1,031	966
	Above Normal (AN)	0	-676	-275	565	-841	-443	398	418
	Below Normal (BN)	0	-1,449	-1,133	-645	-1,555	-1,240	-750	-737
	Dry (D)	0	25	531	795	-99	405	673	689
	Critical (C)	0	-560	-374	-18	-642	-458	-101	-92

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Comparison of Simulated Streamflows: Outflow from Thomes Creek to Sacramento River
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	1,450	1,034	960	855	968	894	794	800
	November	3,285	3,011	3,159	2,449	2,936	3,084	2,372	2,384
	December	27,624	25,538	28,624	32,818	25,415	28,498	32,688	32,391
	January	44,052	42,372	48,916	60,935	42,193	48,722	60,721	60,503
	February	56,204	61,835	67,692	82,958	61,621	67,464	82,700	82,469
	March	46,803	49,958	55,623	60,989	49,739	55,388	60,735	60,812
	April	35,110	39,117	39,303	37,400	38,913	39,090	37,185	37,227
	May	25,515	26,092	24,768	19,438	25,921	24,595	19,279	19,313
	June	8,352	7,852	6,588	4,911	7,740	6,477	4,805	4,827
	July	1,919	1,561	1,505	1,384	1,488	1,433	1,315	1,324
	August	1,392	1,053	1,026	956	988	960	891	897
	September	1,138	817	796	726	751	729	661	667
Average Annual Flow (acre-feet/year)	TOTAL	21,070	21,687	23,247	25,485	21,556	23,111	25,345	25,301
	Wet (W)	36,982	36,440	38,849	42,569	36,275	38,677	42,390	42,232
	Above Normal (AN)	30,811	27,950	28,889	30,873	27,799	28,732	30,713	30,739
	Below Normal (BN)	17,058	12,150	13,168	14,848	12,049	13,064	14,741	14,757
	Dry (D)	10,780	11,526	13,353	14,379	11,402	13,223	14,249	14,272
	Critical (C)	7,536	6,565	7,173	8,402	6,486	7,091	8,317	8,326

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Thomes Creek to Sacramento River
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	-417	-490	-596	-482	-556	-657	-651
	November	0	-273	-126	-836	-349	-201	-912	-900
	December	0	-2,087	1,000	5,194	-2,209	874	5,063	4,766
	January	0	-1,680	4,864	16,882	-1,859	4,670	16,669	16,450
	February	0	5,631	11,488	26,754	5,418	11,260	26,497	26,265
	March	0	3,154	8,820	14,185	2,935	8,585	13,932	14,009
	April	0	4,007	4,193	2,290	3,803	3,980	2,075	2,117
	May	0	577	-747	-6,077	406	-920	-6,236	-6,202
	June	0	-501	-1,764	-3,441	-613	-1,876	-3,547	-3,525
	July	0	-358	-414	-534	-430	-485	-603	-595
	August	0	-339	-366	-436	-404	-432	-501	-495
	September	0	-320	-342	-411	-387	-408	-476	-471
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	616	2,176	4,415	486	2,041	4,275	4,231
	Wet (W)	0	-541	1,867	5,587	-707	1,695	5,409	5,250
	Above Normal (AN)	0	-2,861	-1,922	62	-3,012	-2,079	-98	-72
	Below Normal (BN)	0	-4,908	-3,890	-2,209	-5,009	-3,994	-2,317	-2,301
	Dry (D)	0	746	2,573	3,599	622	2,443	3,469	3,492
	Critical (C)	0	-971	-363	866	-1,050	-445	781	790

Comparison of Simulated Streamflows: Outflow from Red Bank Creek to Sacramento River
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	0	0	0	0	0	0	0	0
	November	16	16	17	14	16	17	14	14
	December	95	89	98	112	89	98	111	111
	January	6,047	5,827	6,802	8,351	5,822	6,794	8,340	8,341
	February	6,670	7,351	8,059	9,928	7,334	8,038	9,903	9,905
	March	5,236	5,406	5,985	6,589	5,385	5,961	6,563	6,565
	April	1,881	2,069	2,083	2,003	2,062	2,076	1,995	1,995
	May	555	549	525	430	546	522	429	429
	June	77	78	67	55	78	67	55	55
	July	5	5	5	5	5	5	5	5
	August	0	0	0	0	0	0	0	0
	September	2	2	2	2	2	2	2	2
Average Annual Flow (acre-feet/year)	TOTAL	1,715	1,783	1,970	2,291	1,778	1,965	2,285	2,285
	Wet (W)	3,038	2,872	3,181	3,718	2,861	3,168	3,704	3,705
	Above Normal (AN)	2,197	2,301	2,463	2,827	2,298	2,460	2,822	2,823
	Below Normal (BN)	1,466	1,060	1,166	1,384	1,059	1,165	1,382	1,382
	Dry (D)	858	988	1,163	1,286	988	1,162	1,286	1,286
	Critical (C)	718	680	736	885	680	736	885	885

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Red Bank Creek to Sacramento River
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	0	0	0	0	0	0	0
	November	0	0	1	-2	0	1	-2	-2
	December	0	-6	4	17	-6	3	16	17
	January	0	-220	755	2,304	-224	747	2,293	2,294
	February	0	680	1,388	3,258	664	1,368	3,232	3,235
	March	0	170	750	1,354	149	726	1,327	1,330
	April	0	188	202	121	181	194	114	114
	May	0	-6	-29	-125	-9	-32	-126	-126
	June	0	1	-10	-22	1	-10	-22	-22
	July	0	0	0	0	0	0	0	0
	August	0	0	0	0	0	0	0	0
	September	0	0	0	0	0	0	0	0
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	67	255	575	63	250	569	570
	Wet (W)	0	-166	143	680	-177	130	666	667
	Above Normal (AN)	0	103	265	629	100	262	625	625
	Below Normal (BN)	0	-406	-300	-82	-407	-301	-84	-84
	Dry (D)	0	130	304	428	130	304	427	427
	Critical (C)	0	-38	18	167	-38	18	167	167

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Comparison of Simulated Streamflows: Outflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	473,033	473,300	436,986	415,857	471,481	435,085	413,800	413,763
	November	473,556	477,067	491,636	420,434	475,618	490,159	418,740	418,822
	December	768,952	746,318	824,686	897,789	745,194	823,538	896,587	896,308
	January	1,077,951	1,056,837	1,187,614	1,457,714	1,055,434	1,186,106	1,456,095	1,455,980
	February	1,189,306	1,279,582	1,388,795	1,708,109	1,277,890	1,386,983	1,706,116	1,705,965
	March	1,093,133	1,207,565	1,326,959	1,440,750	1,205,683	1,324,985	1,438,590	1,438,826
	April	762,890	839,777	850,020	815,528	837,900	848,034	813,406	813,457
	May	824,032	826,972	794,878	670,314	825,183	793,000	668,324	668,125
	June	791,015	813,552	746,171	678,186	811,761	744,320	676,236	675,926
	July	825,101	842,630	858,352	861,038	840,844	856,475	859,053	858,808
	August	718,086	744,839	748,236	763,754	742,942	746,268	761,678	761,538
	September	553,817	568,748	579,355	583,943	566,763	577,281	581,742	581,717
Average Annual Flow (acre-feet/year)	TOTAL	795,906	823,099	852,807	892,785	821,391	851,019	890,864	890,770
	Wet (W)	1,181,698	1,133,840	1,182,972	1,267,214	1,132,195	1,181,241	1,265,346	1,265,074
	Above Normal (AN)	865,660	868,126	874,994	905,051	866,385	873,161	903,090	903,055
	Below Normal (BN)	695,433	656,967	675,596	694,824	655,251	673,806	692,892	692,738
	Dry (D)	628,293	635,974	671,681	677,945	634,227	669,864	676,005	676,061
	Critical (C)	506,631	516,951	530,043	542,154	515,194	528,211	540,191	540,282

Change in Simulated Streamflows as compared to Historical Scenario: Outflow from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Average Monthly Flow (acre-feet/month)	October	0	267	-36,047	-57,176	-1,552	-37,948	-59,233	-59,270
	November	0	3,512	18,080	-53,122	2,063	16,604	-54,816	-54,733
	December	0	-22,634	55,734	128,837	-23,758	54,586	127,635	127,356
	January	0	-21,114	109,664	379,763	-22,517	108,155	378,144	378,029
	February	0	90,276	199,489	518,803	88,585	197,678	516,811	516,659
	March	0	114,432	233,827	347,617	112,550	231,852	345,457	345,693
	April	0	76,888	87,130	52,638	75,010	85,144	50,516	50,567
	May	0	2,940	-29,155	-153,718	1,151	-31,033	-155,708	-155,907
	June	0	22,537	-44,844	-112,829	20,746	-46,695	-114,779	-115,089
	July	0	17,529	33,251	35,937	15,743	31,374	33,952	33,707
	August	0	26,753	30,149	45,668	24,856	28,182	43,591	43,452
	September	0	14,932	25,538	30,126	12,946	23,464	27,925	27,900
Change in Average Annual Flow (acre-feet/year)	TOTAL	0	27,193	56,901	96,879	25,485	55,114	94,958	94,864
	Wet (W)	0	-47,858	1,274	85,516	-49,503	-457	83,648	83,376
	Above Normal (AN)	0	2,466	9,334	39,390	725	7,500	37,430	37,394
	Below Normal (BN)	0	-38,466	-19,838	-610	-40,182	-21,627	-2,541	-2,696
	Dry (D)	0	7,681	43,388	49,653	5,934	41,571	47,713	47,768
	Critical (C)	0	10,321	23,412	35,523	8,563	21,581	33,560	33,652

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Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Red Bluff Subbasin Boundary
Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	21,727	18,441	16,817	15,024	16,691	14,979	13,031	12,999
	November	45,689	45,176	47,139	39,995	43,760	45,705	38,356	38,447
	December	140,488	131,985	145,989	160,480	130,910	144,897	159,346	159,083
	January	202,857	197,749	221,144	265,191	196,414	219,712	263,668	263,567
	February	209,122	231,598	250,189	297,370	230,005	248,488	295,504	295,369
	March	169,380	169,687	187,808	201,632	167,934	185,969	199,630	199,881
	April	101,539	110,493	111,104	104,684	108,745	109,258	102,717	102,781
	May	55,897	58,178	54,930	39,728	56,505	53,175	37,871	37,682
	June	7,328	3,774	-556	-6,095	2,091	-2,293	-7,926	-8,227
	July	-18,730	-22,919	-23,174	-24,388	-24,618	-24,959	-26,275	-26,513
	August	-9,939	-13,486	-13,672	-14,528	-15,306	-15,560	-16,521	-16,656
	September	6,841	4,408	4,499	3,696	2,500	2,503	1,597	1,578
Average Annual Flow (acre-feet/year)	TOTAL	77,683	77,924	83,518	90,232	76,303	81,823	88,416	88,333
	Wet (W)	132,161	126,070	134,748	146,476	124,510	133,106	144,712	144,452
	Above Normal (AN)	98,234	93,693	97,217	104,377	92,040	95,485	102,526	102,502
	Below Normal (BN)	63,234	49,457	53,733	58,216	47,828	52,036	56,387	56,242
	Dry (D)	42,373	41,241	46,667	48,713	39,590	44,950	46,884	46,949
	Critical (C)	39,222	33,163	35,731	38,873	31,487	33,984	37,008	37,108

Tehama IHM

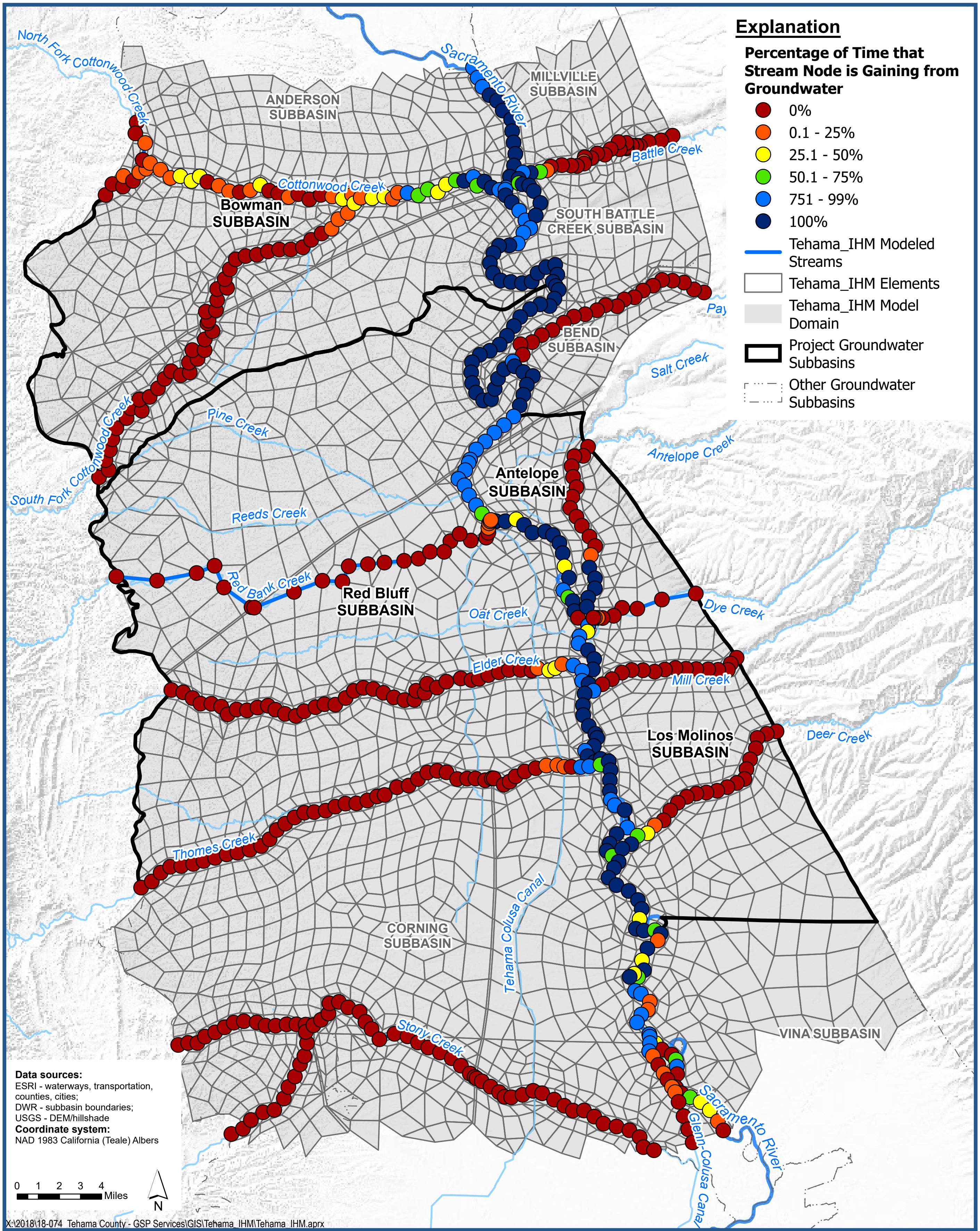
Comparison of Simulated Streamflows: Difference between Inflows and Outflows from Sacramento River at Red Bluff Subbasin Boundary as Percentage of Total Outflow, Red Bluff Subbasin

		Historical	Projected (Current Land Use)	Projected (Current Land Use) with Climate Change (2030)	Projected (Current Land Use) with Climate Change (2070)	Projected (Future Land Use)	Projected (Future Land Use) with Climate Change (2030)	Projected (Future Land Use) with Climate Change (2070)	Projected (Future Land Use) with Projects and Climate Change (2070)
Average Monthly Flow (acre-feet/month)	October	4.6%	3.9%	3.8%	3.6%	3.5%	3.4%	3.1%	3.1%
	November	9.6%	9.5%	9.6%	9.5%	9.2%	9.3%	9.2%	9.2%
	December	18.3%	17.7%	17.7%	17.9%	17.6%	17.6%	17.8%	17.7%
	January	18.8%	18.7%	18.6%	18.2%	18.6%	18.5%	18.1%	18.1%
	February	17.6%	18.1%	18.0%	17.4%	18.0%	17.9%	17.3%	17.3%
	March	15.5%	14.1%	14.2%	14.0%	13.9%	14.0%	13.9%	13.9%
	April	13.3%	13.2%	13.1%	12.8%	13.0%	12.9%	12.6%	12.6%
	May	6.8%	7.0%	6.9%	5.9%	6.8%	6.7%	5.7%	5.6%
	June	0.9%	0.5%	-0.1%	-0.9%	0.3%	-0.3%	-1.2%	-1.2%
	July	-2.3%	-2.7%	-2.7%	-2.8%	-2.9%	-2.9%	-3.1%	-3.1%
	August	-1.4%	-1.8%	-1.8%	-1.9%	-2.1%	-2.1%	-2.2%	-2.2%
	September	1.2%	0.8%	0.8%	0.6%	0.4%	0.4%	0.3%	0.3%
Average Annual Flow (acre-feet/year)	TOTAL	9.8%	9.5%	9.8%	10.1%	9.3%	9.6%	9.9%	9.9%
	Wet (W)	11.2%	11.1%	11.4%	11.6%	11.0%	11.3%	11.4%	11.4%
	Above Normal (AN)	11.3%	10.8%	11.1%	11.5%	10.6%	10.9%	11.4%	11.4%
	Below Normal (BN)	9.1%	7.5%	8.0%	8.4%	7.3%	7.7%	8.1%	8.1%
	Dry (D)	6.7%	6.5%	6.9%	7.2%	6.2%	6.7%	6.9%	6.9%
	Critical (C)	7.7%	6.4%	6.7%	7.2%	6.1%	6.4%	6.9%	6.9%

APPENDIX G-10

Tehama IHM Simulated Streamflows:

Historical Losing/Gaining Streams Maps



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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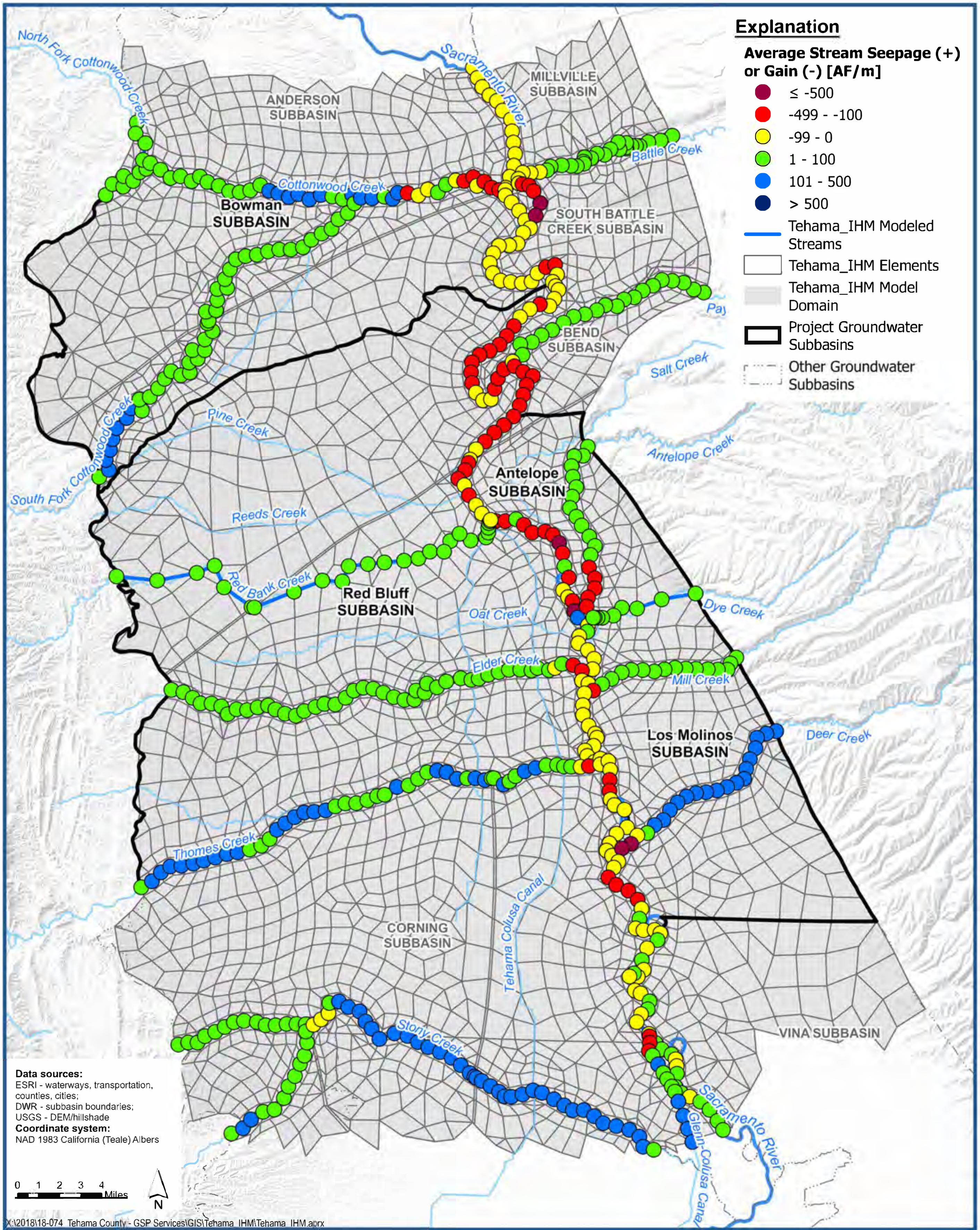
TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Tehama IHM Gaining and Losing Streams

Groundwater Sustainability Planning
Tehama County, California

Figure G-2



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Tehama_IHM.aprx

TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Tehama IHM Gaining and Losing Streams

Groundwater Sustainability Planning
Tehama County, California

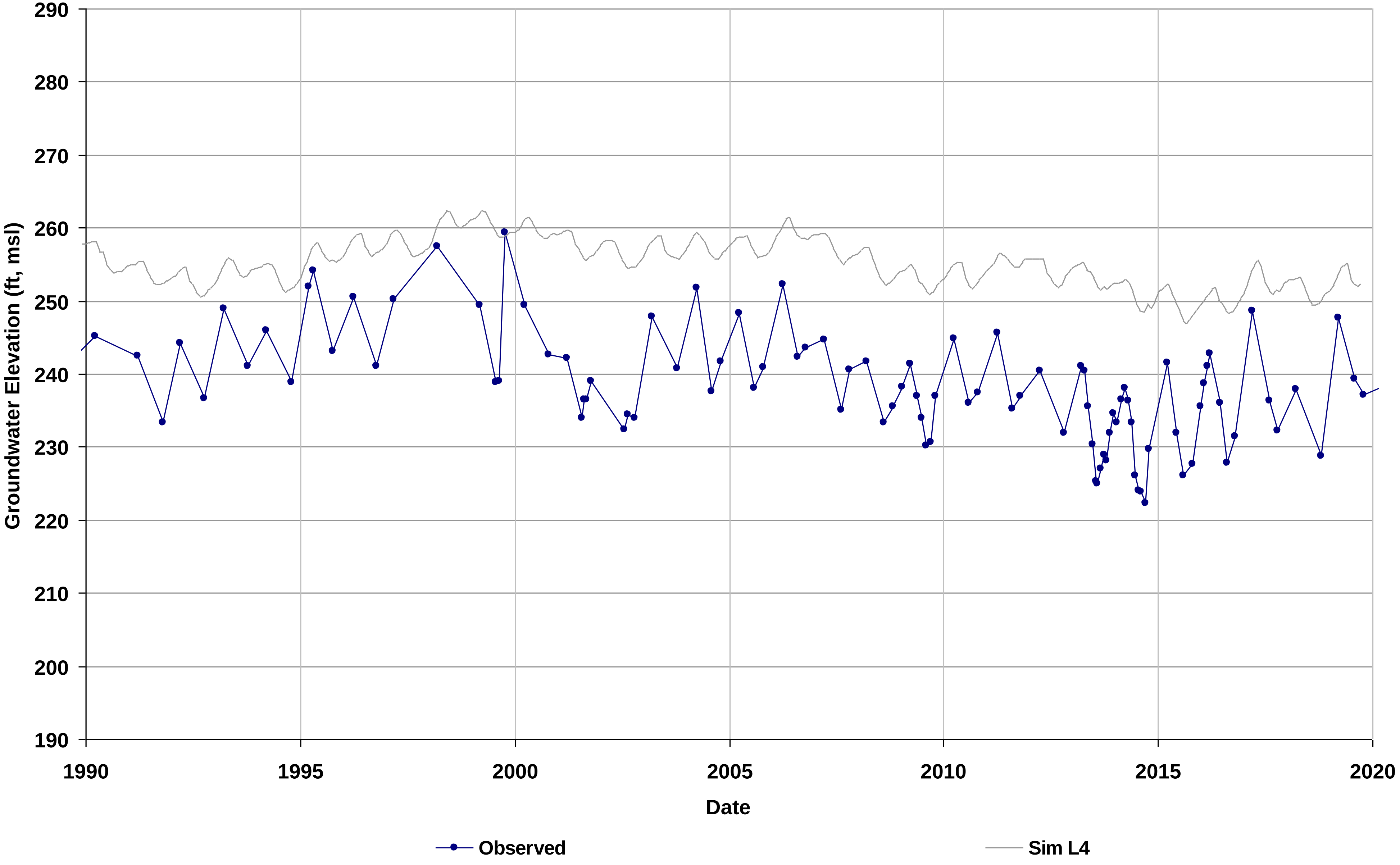
Figure G-3

Appendix H. Tehama IHM Groundwater Calibration Hydrographs

Well Name: 27N03W23D001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 271

Total Depth (ft): 250
Perf Top (ft): 30
Perf Bottom (ft): 155
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 15.92

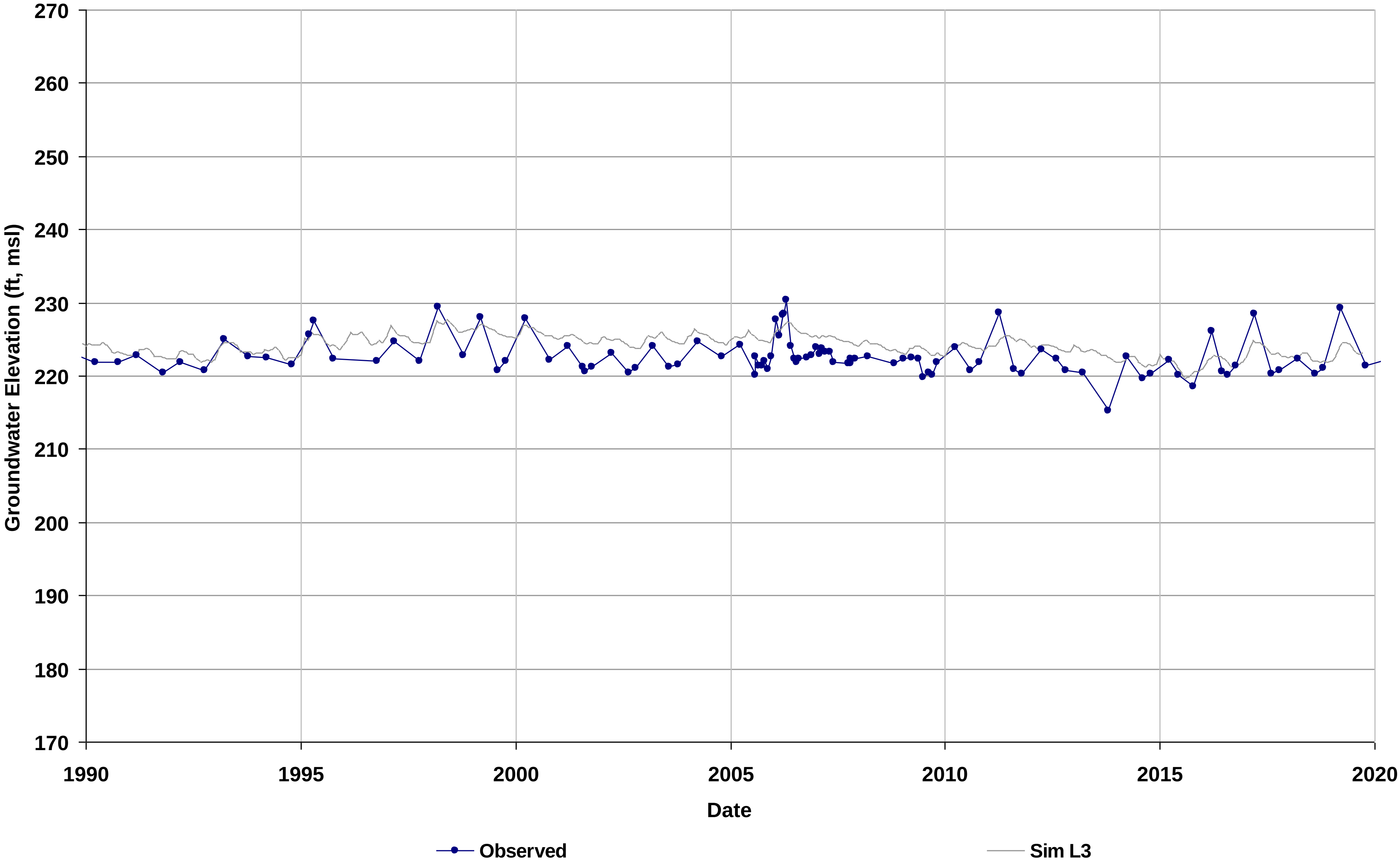


Tehama IHM - Historical

Well Name: 26N02W17E001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 240

Total Depth (ft): 145
Perf Top (ft): 55
Perf Bottom (ft): 145
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 1.78

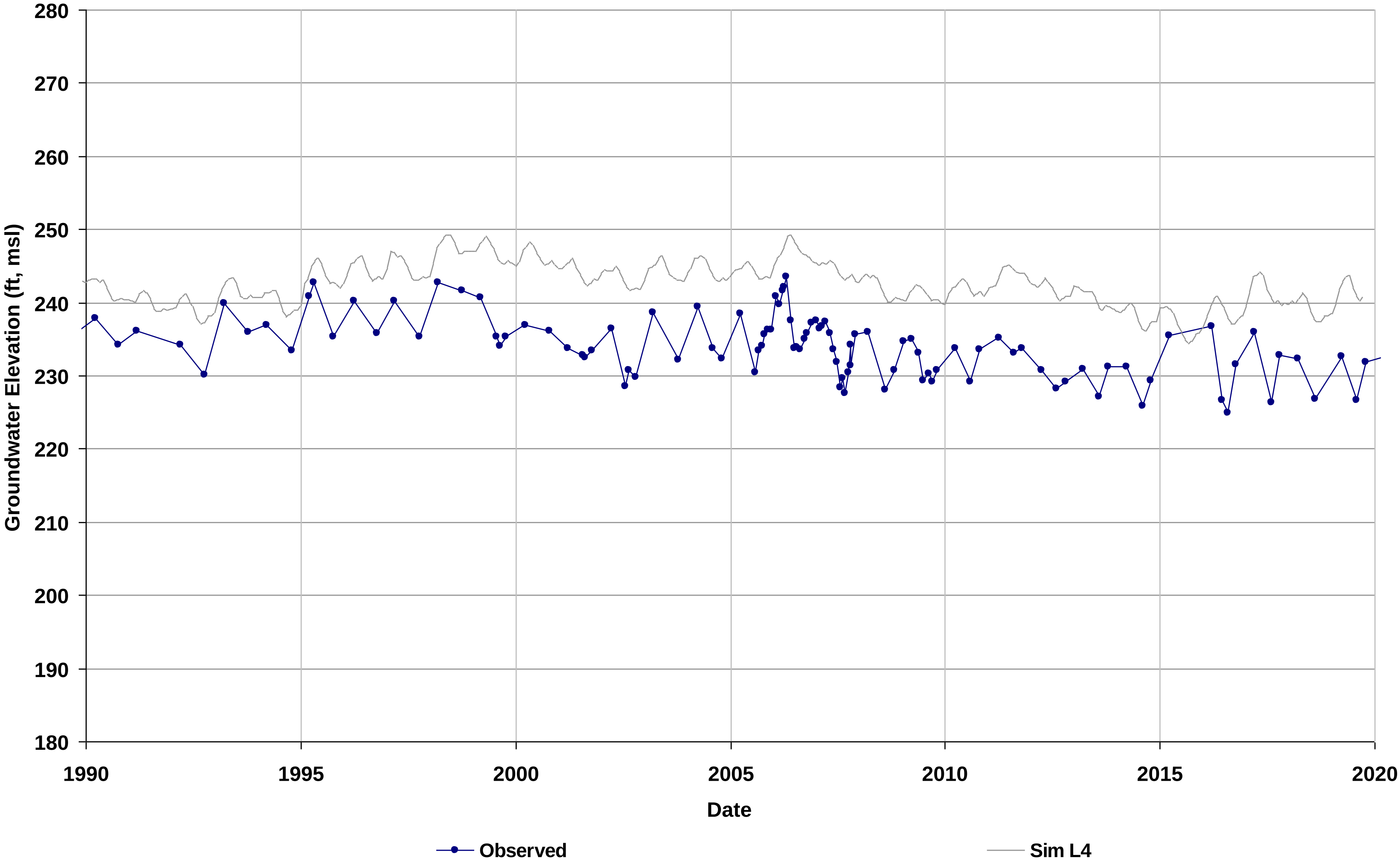


Tehama IHM - Historical

Well Name: 27N02W31C001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 263

Total Depth (ft): 540
Perf Top (ft): 40
Perf Bottom (ft): 289
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 9.01

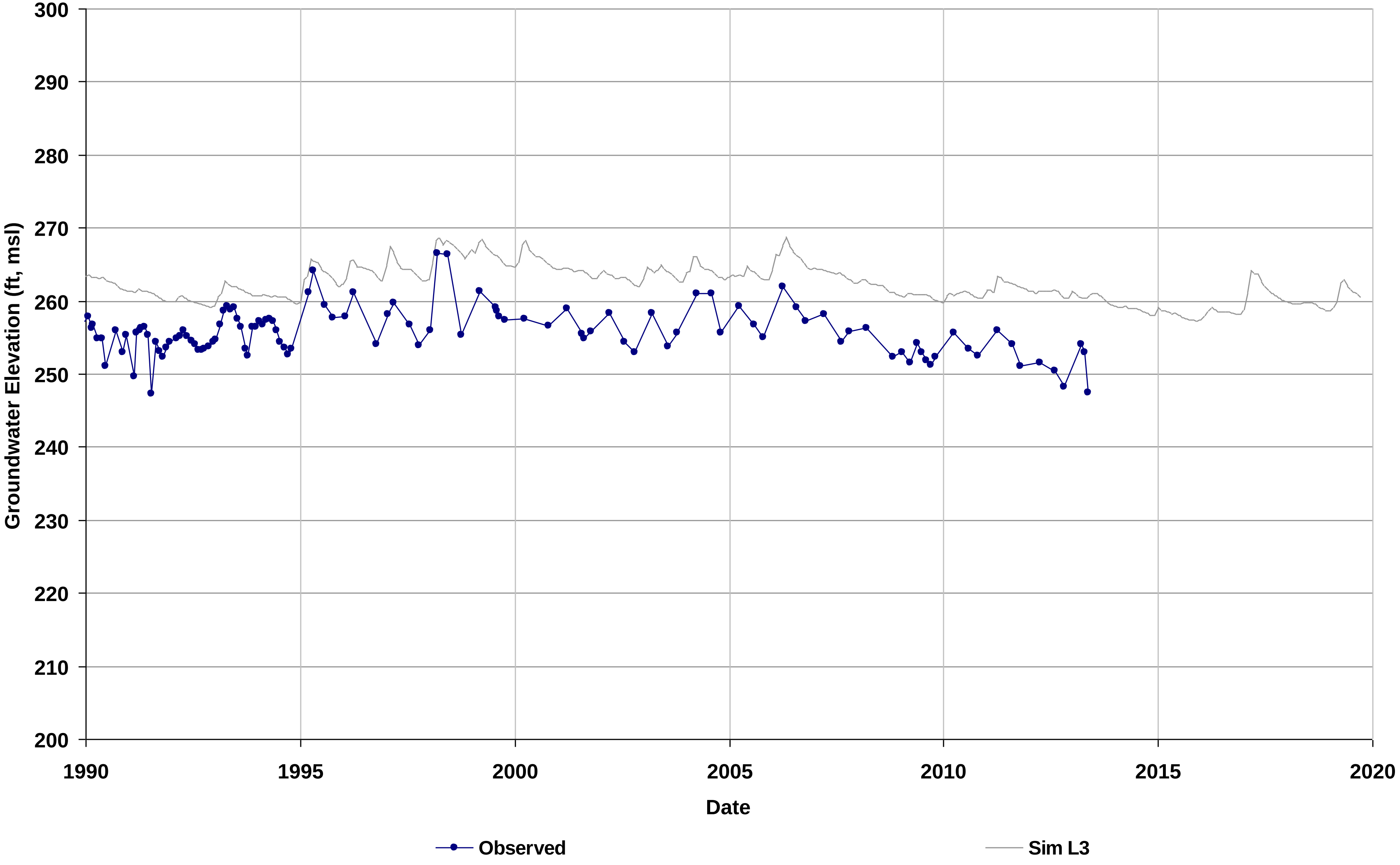


Tehama IHM - Historical

Well Name: 27N03W10B001M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 312

Total Depth (ft): 92
Perf Top (ft): 80
Perf Bottom (ft): 92
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 6.77

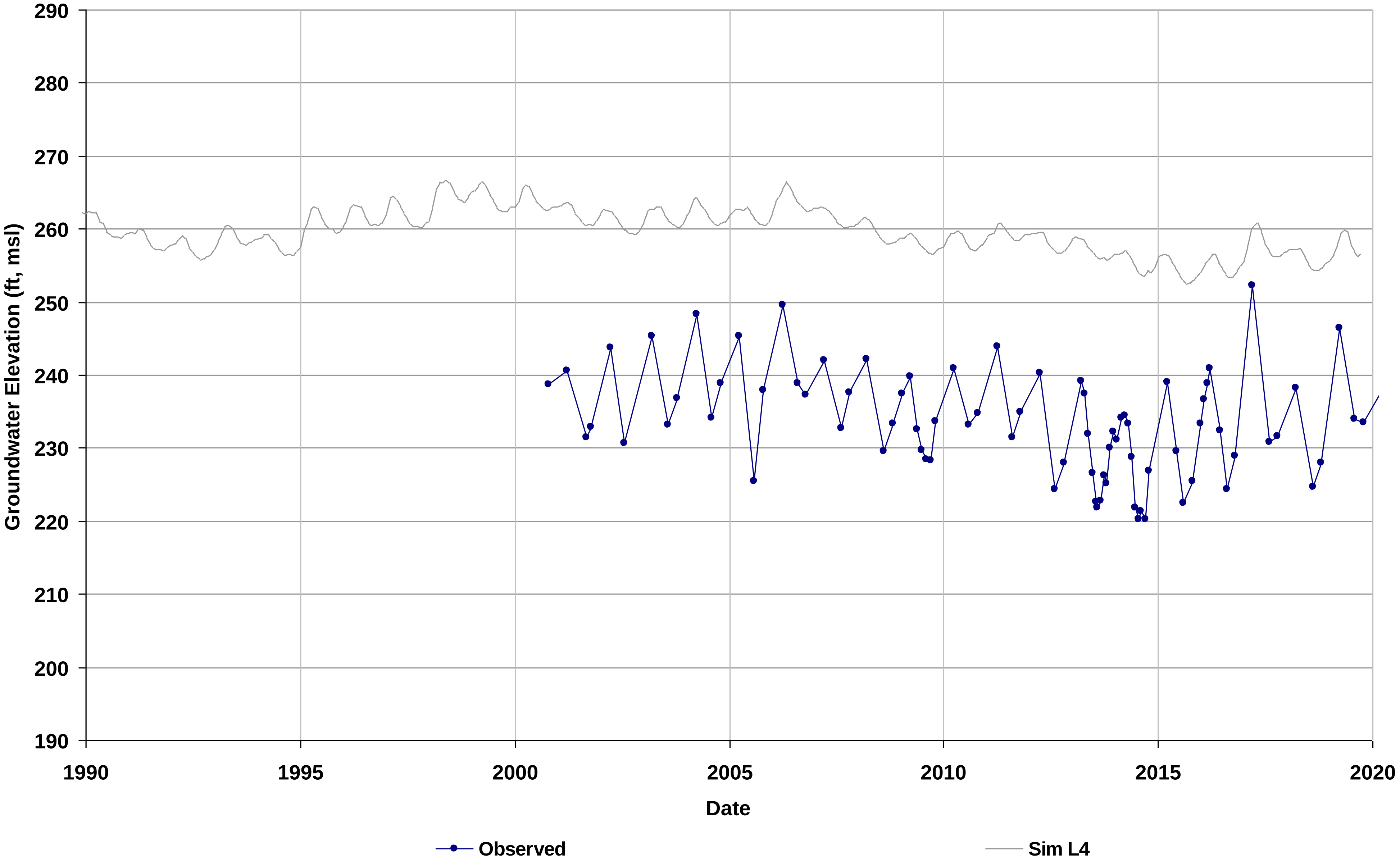


Tehama IHM - Historical

Well Name: 27N03W16K003M
Depth Zone: Upper
Subbasin: Antelope
GSE (ft, msl): 273

Total Depth (ft): 137
Perf Top (ft): 117
Perf Bottom (ft): 137
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 24.71

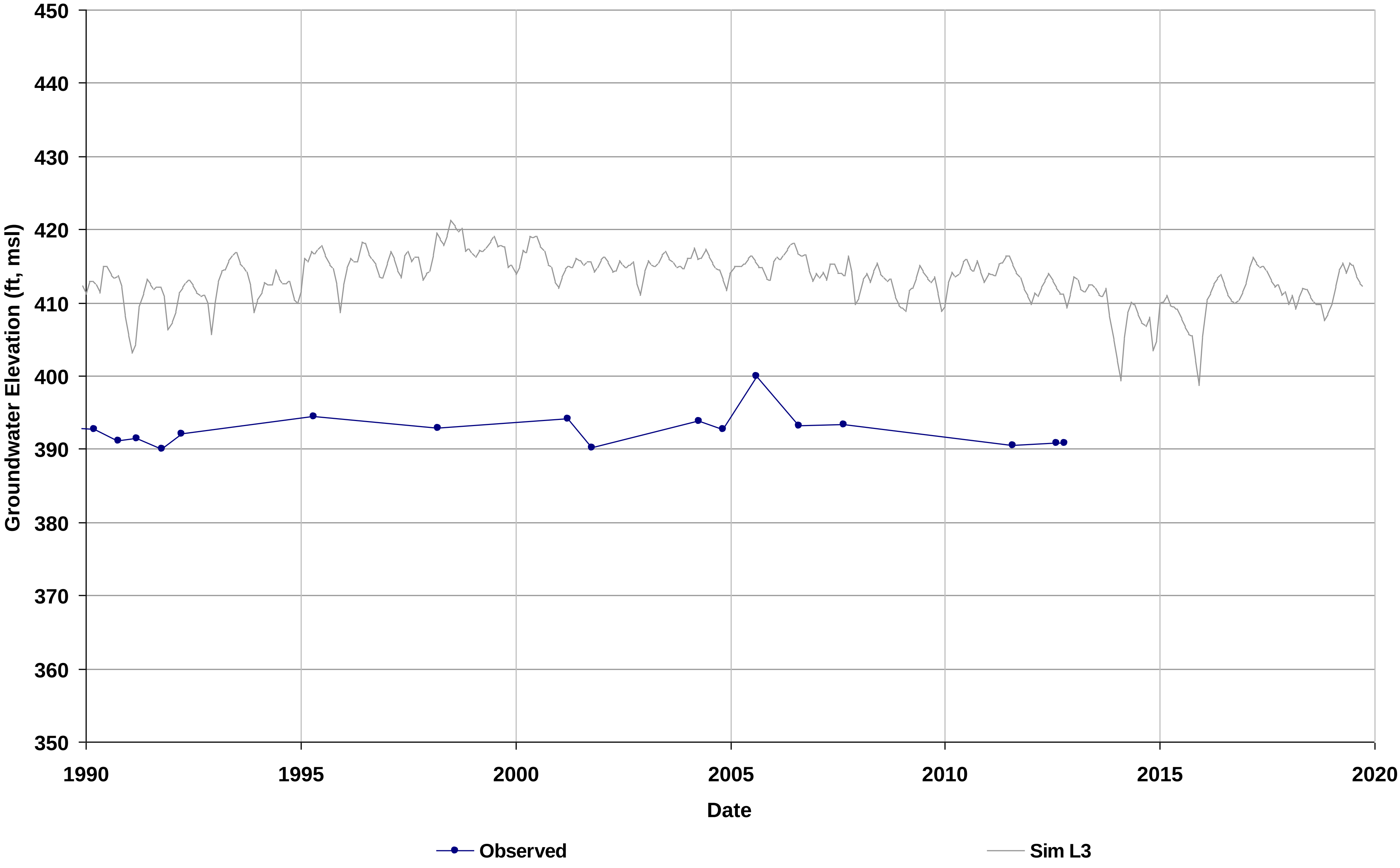


Tehama IHM - Historical

Well Name: 29N04W15E002M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 427

Total Depth (ft): 90
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 21.21

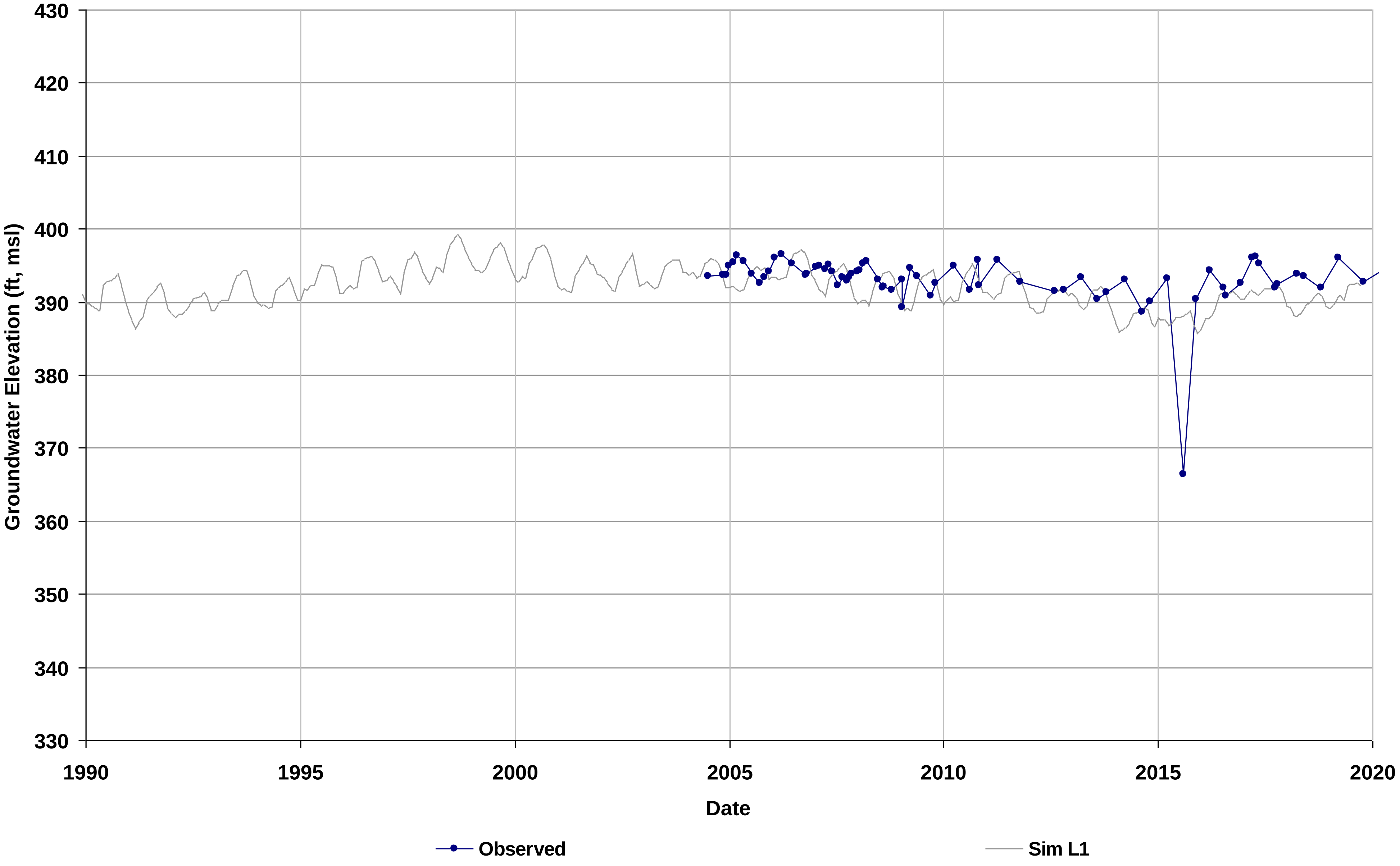


Tehama IHM - Historical

Well Name: 29N03W18M001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 418

Total Depth (ft): 234
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1

Average Residual (ft): -1.19

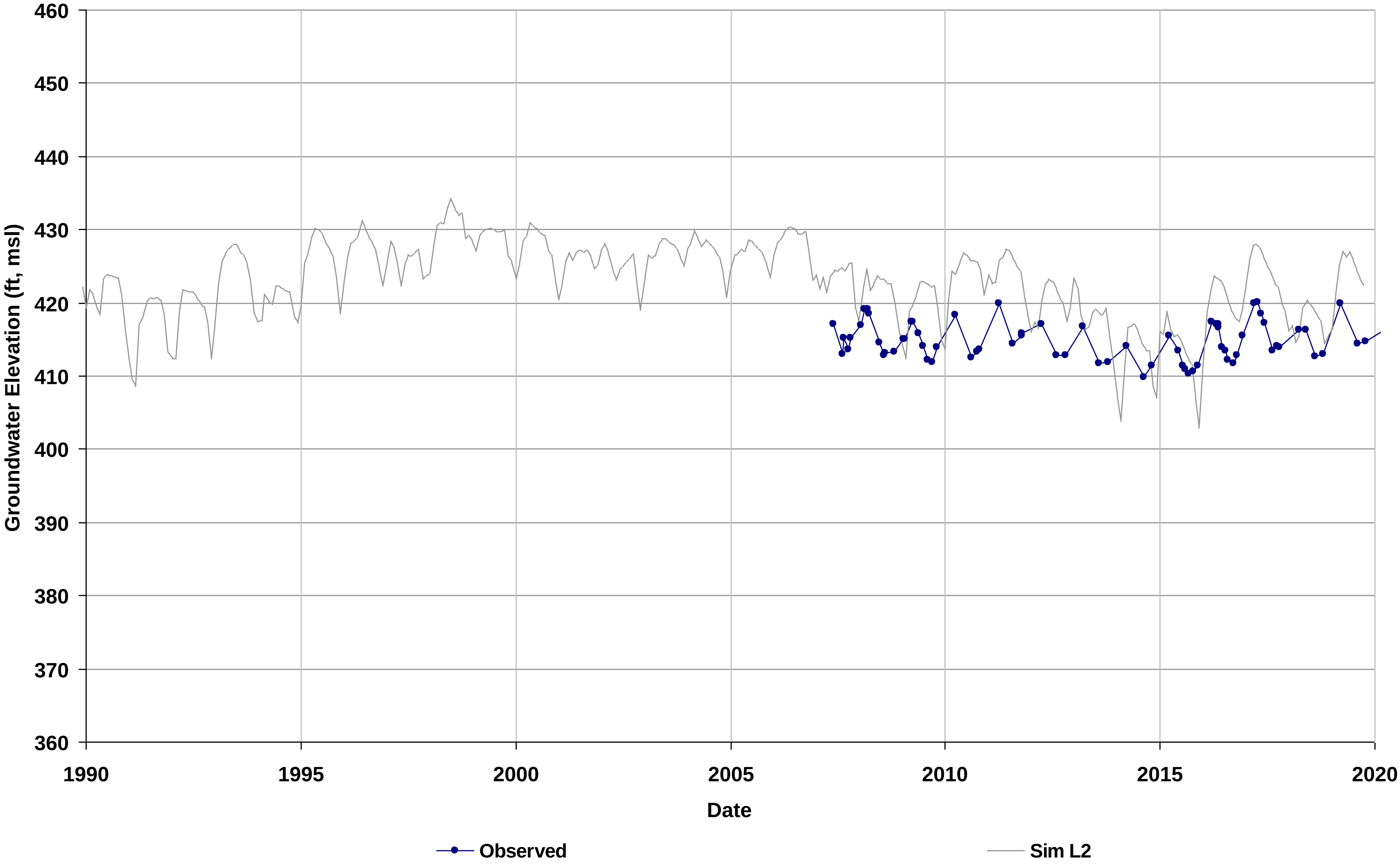


Tehama IHM - Historical

Well Name: 29N04W20A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

Total Depth (ft): 76
Perf Top (ft): 50
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): 5.9

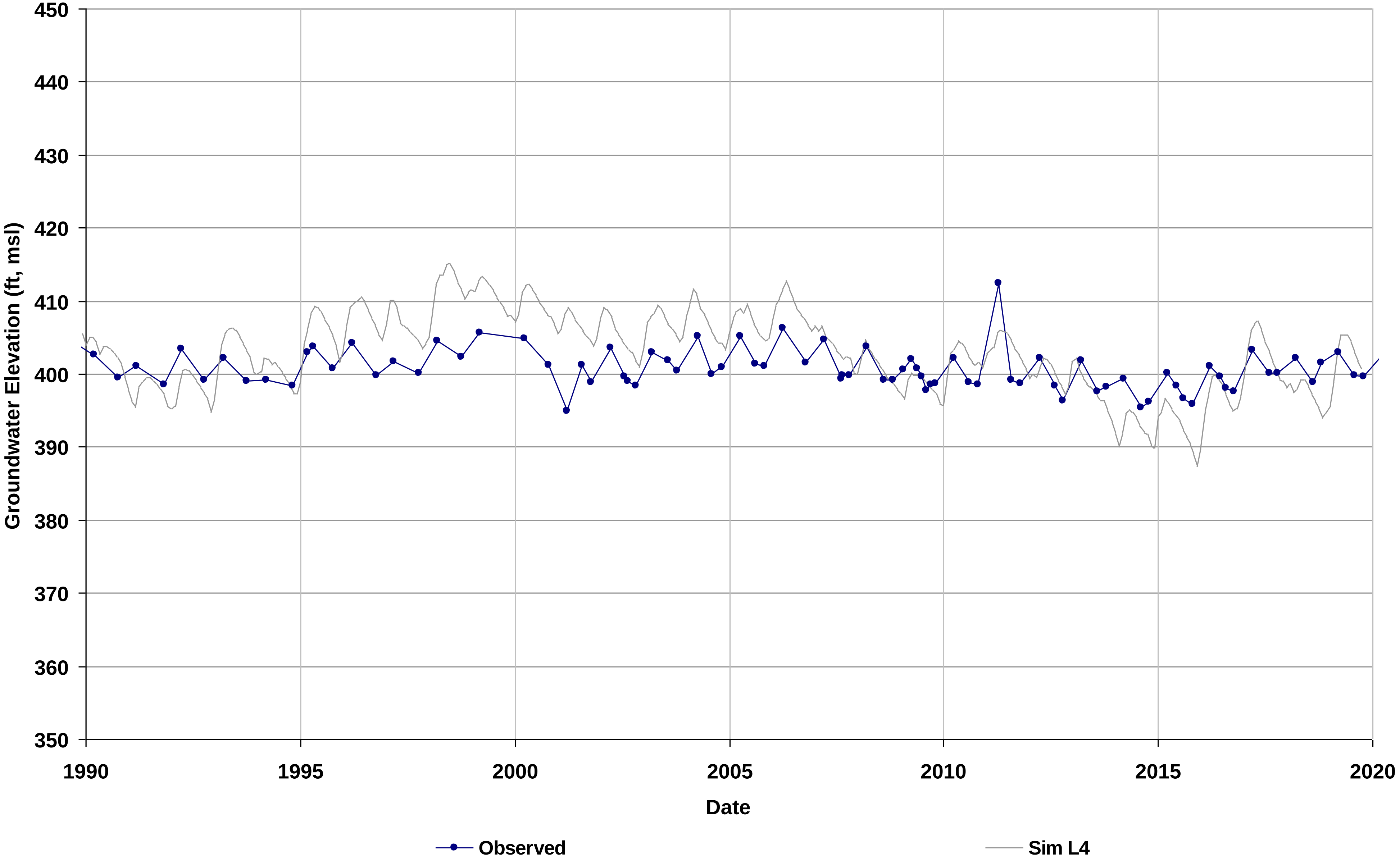


Tehama IHM - Historical

Well Name: 29N04W28D001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 502

Total Depth (ft): 134
Perf Top (ft): 114
Perf Bottom (ft): 134
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 1.72

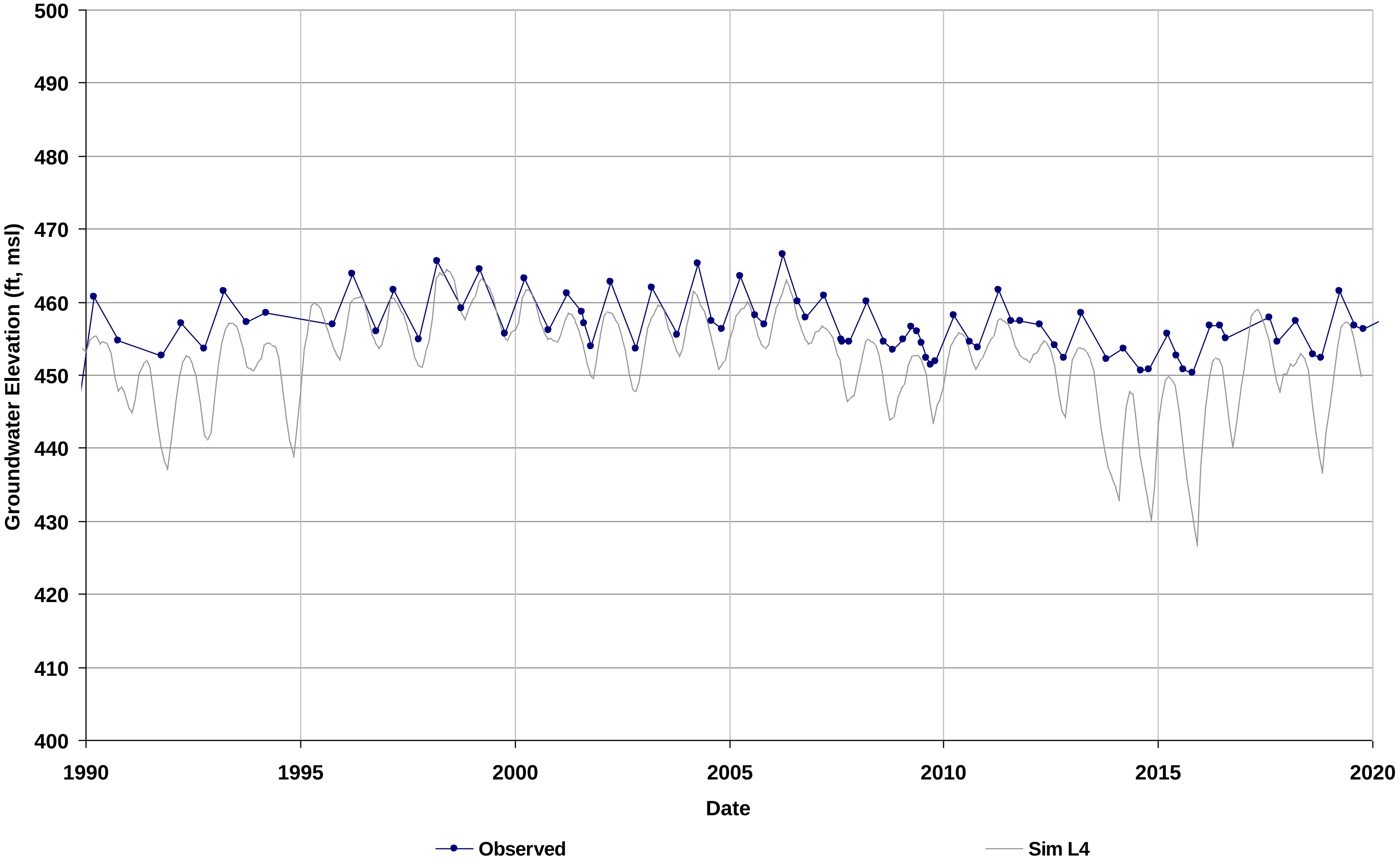


Tehama IHM - Historical

Well Name: 29N05W14L001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 492

Total Depth (ft): 130
Perf Top (ft): 110
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -5.02

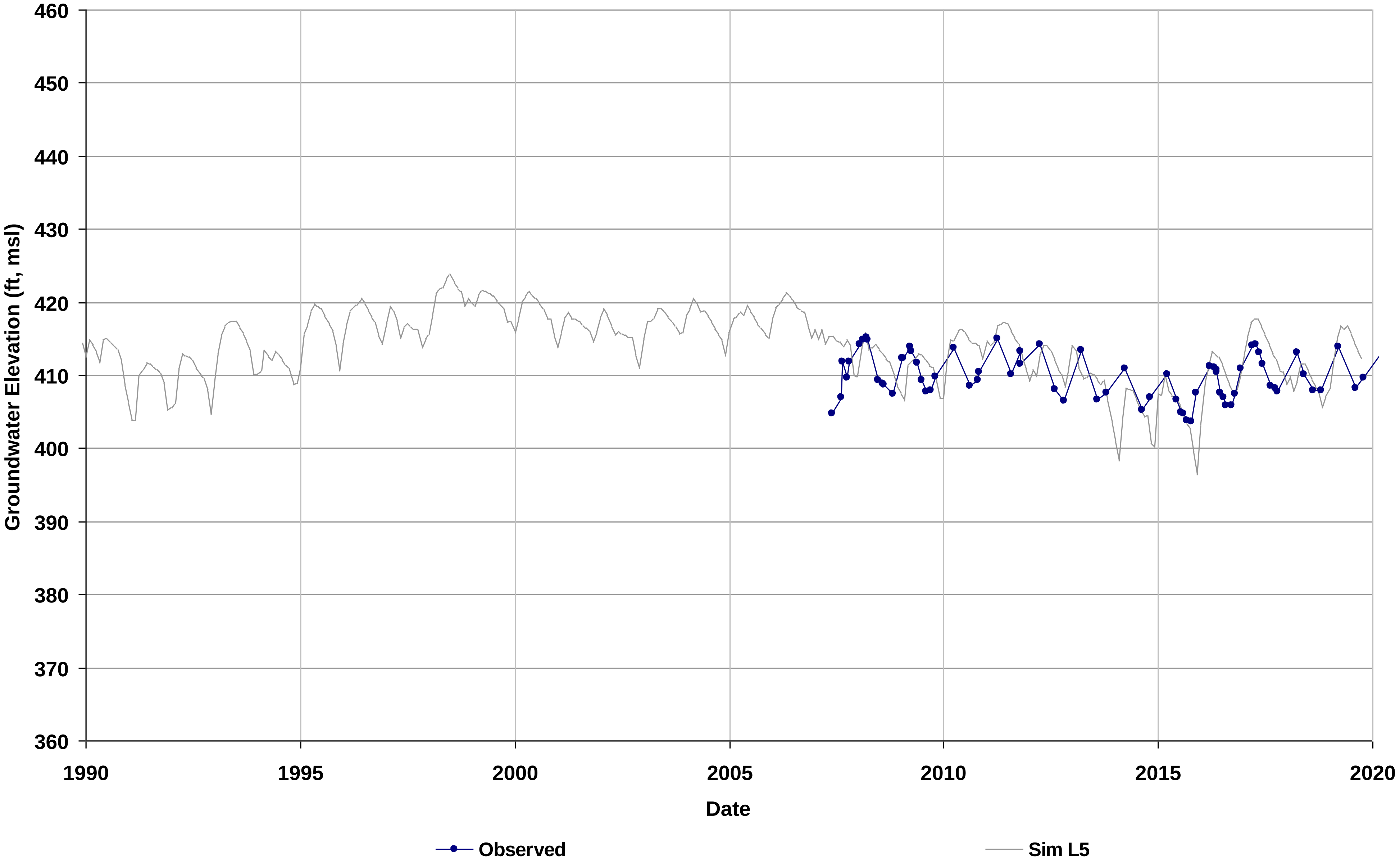


Tehama IHM - Historical

Well Name: 29N04W20A003M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 451

Total Depth (ft): 194
Perf Top (ft): 154
Perf Bottom (ft): 189
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 1.42

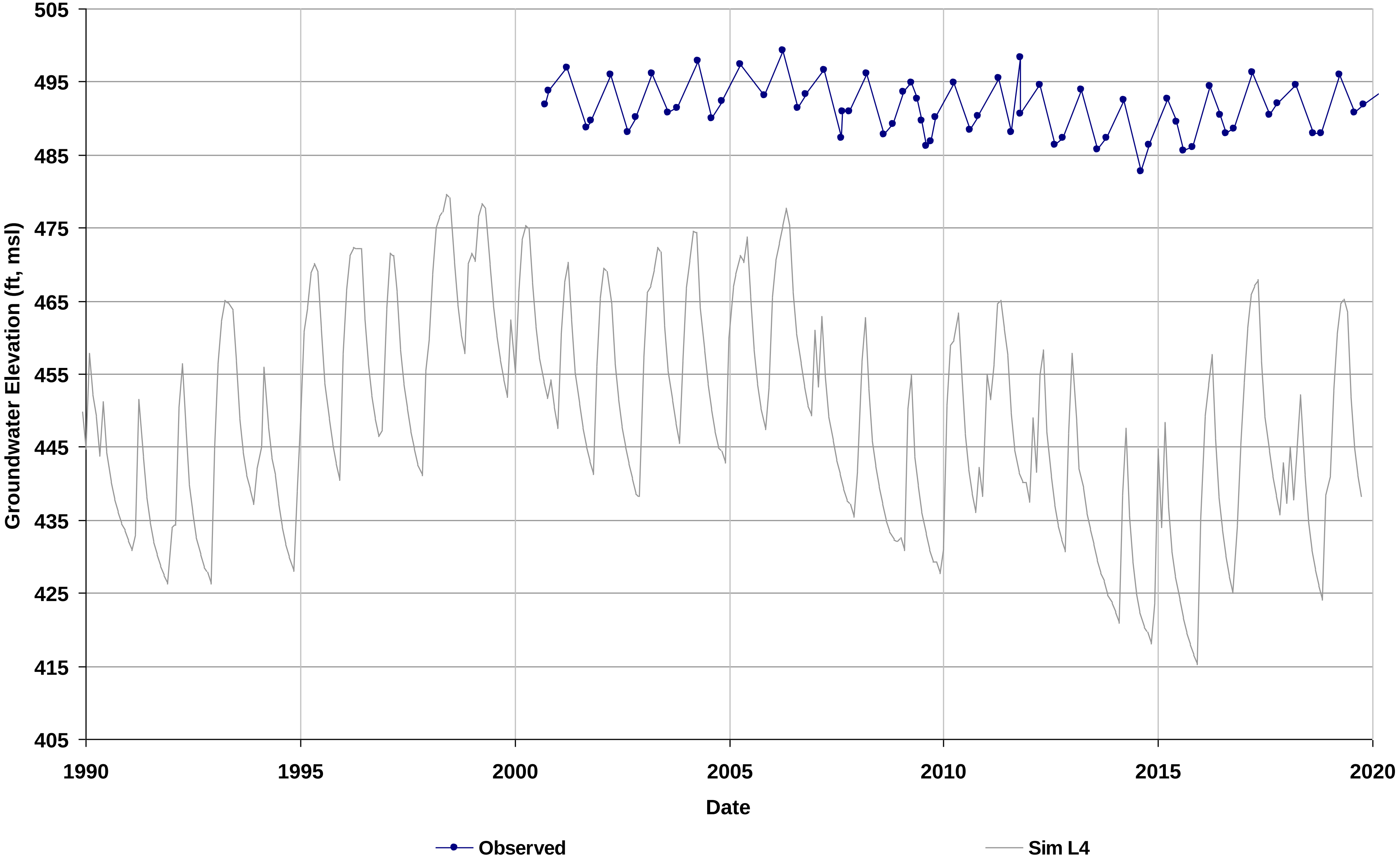


Tehama IHM - Historical

Well Name: 29N05W33A004M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 534

Total Depth (ft): 210
Perf Top (ft): 110
Perf Bottom (ft): 210
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -47.19

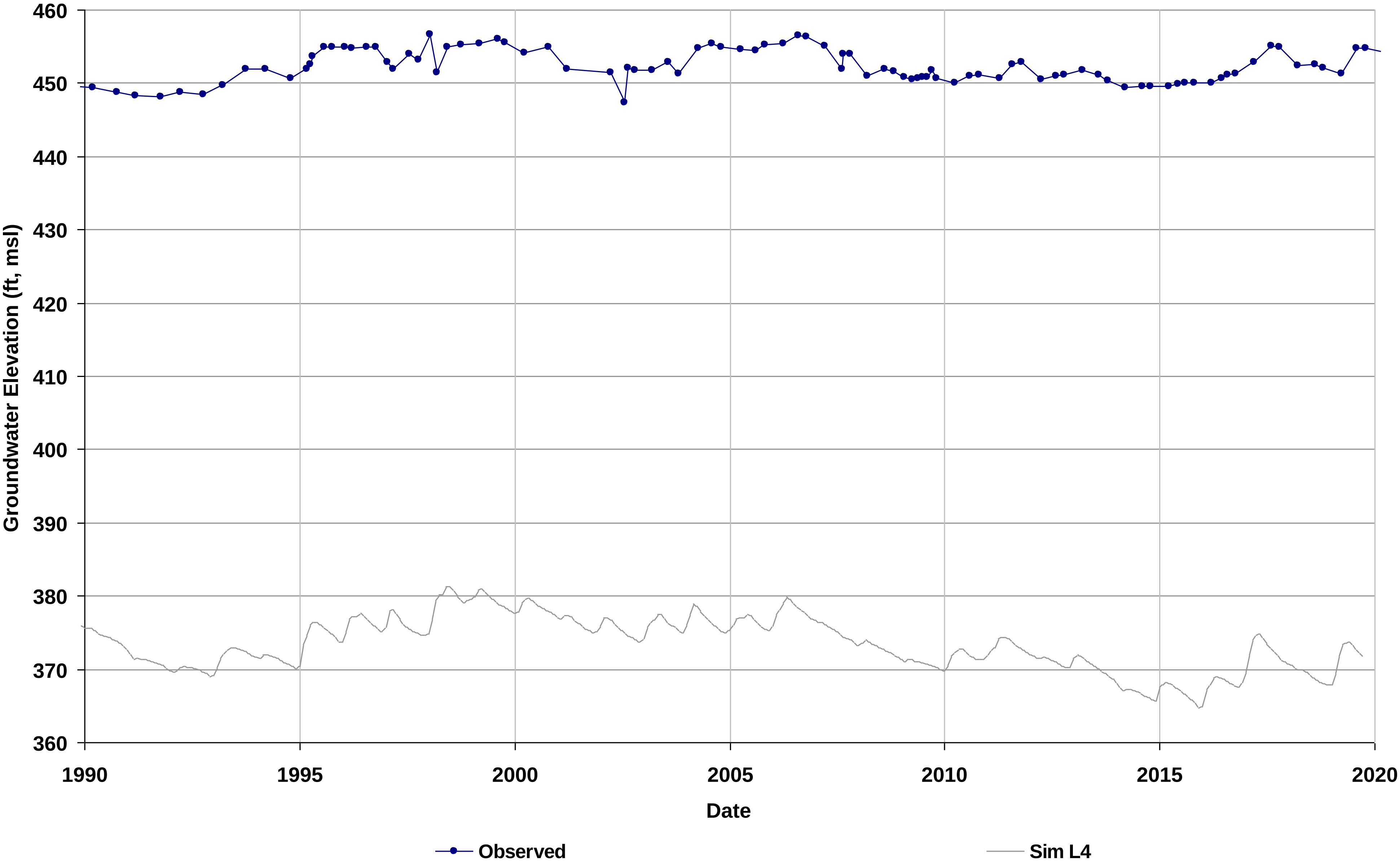


Tehama IHM - Historical

Well Name: 29N04W35B001M
Depth Zone: Composite
Subbasin: Bowman
GSE (ft, msl): 537

Total Depth (ft): 759
Perf Top (ft): 130
Perf Bottom (ft): 759
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -78.7

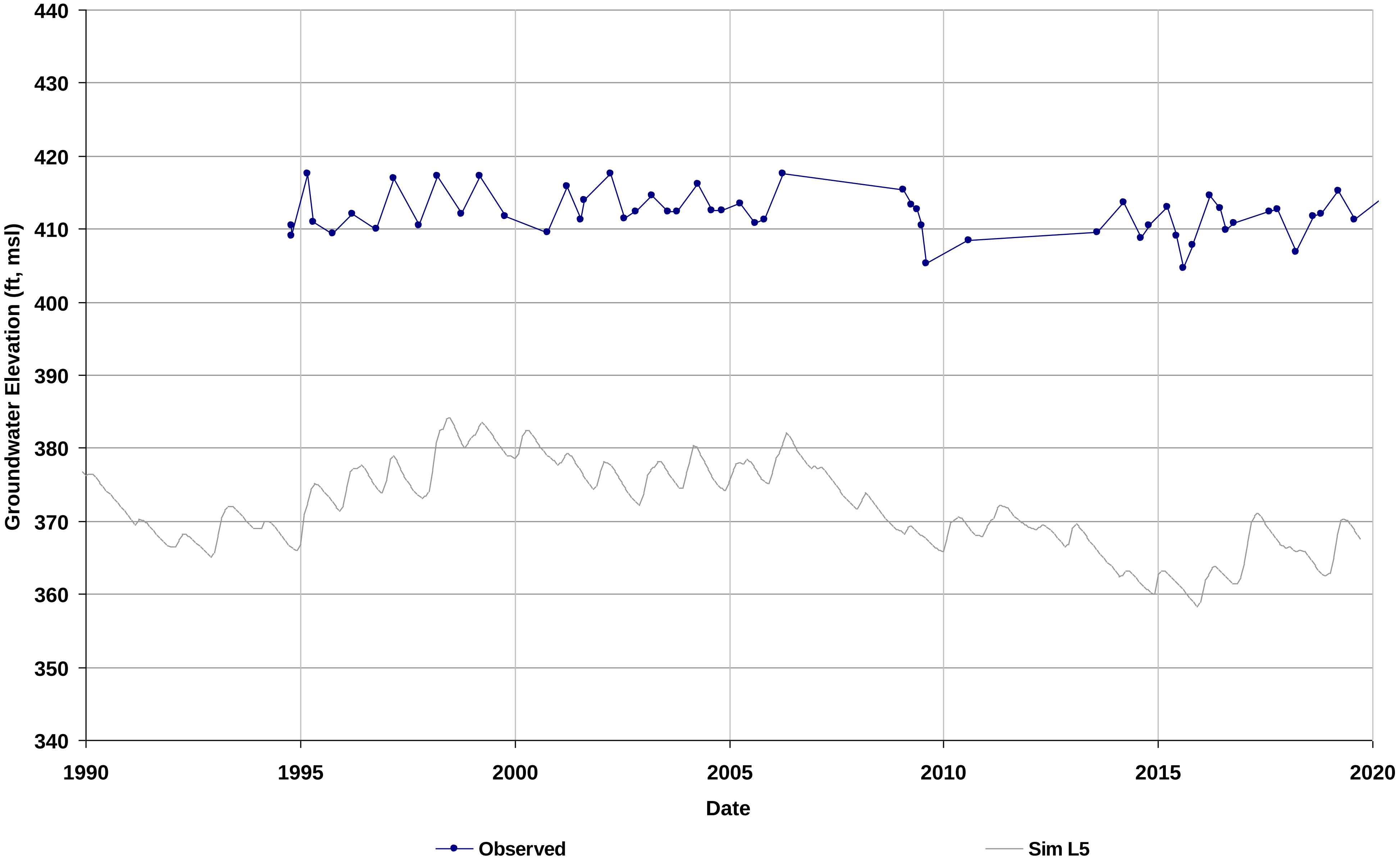


Tehama IHM - Historical

Well Name: 28N04W04P001M
Depth Zone: Upper
Subbasin: Bowman
GSE (ft, msl): 537

Total Depth (ft): 270
Perf Top (ft): 200
Perf Bottom (ft): 270
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): -40.66

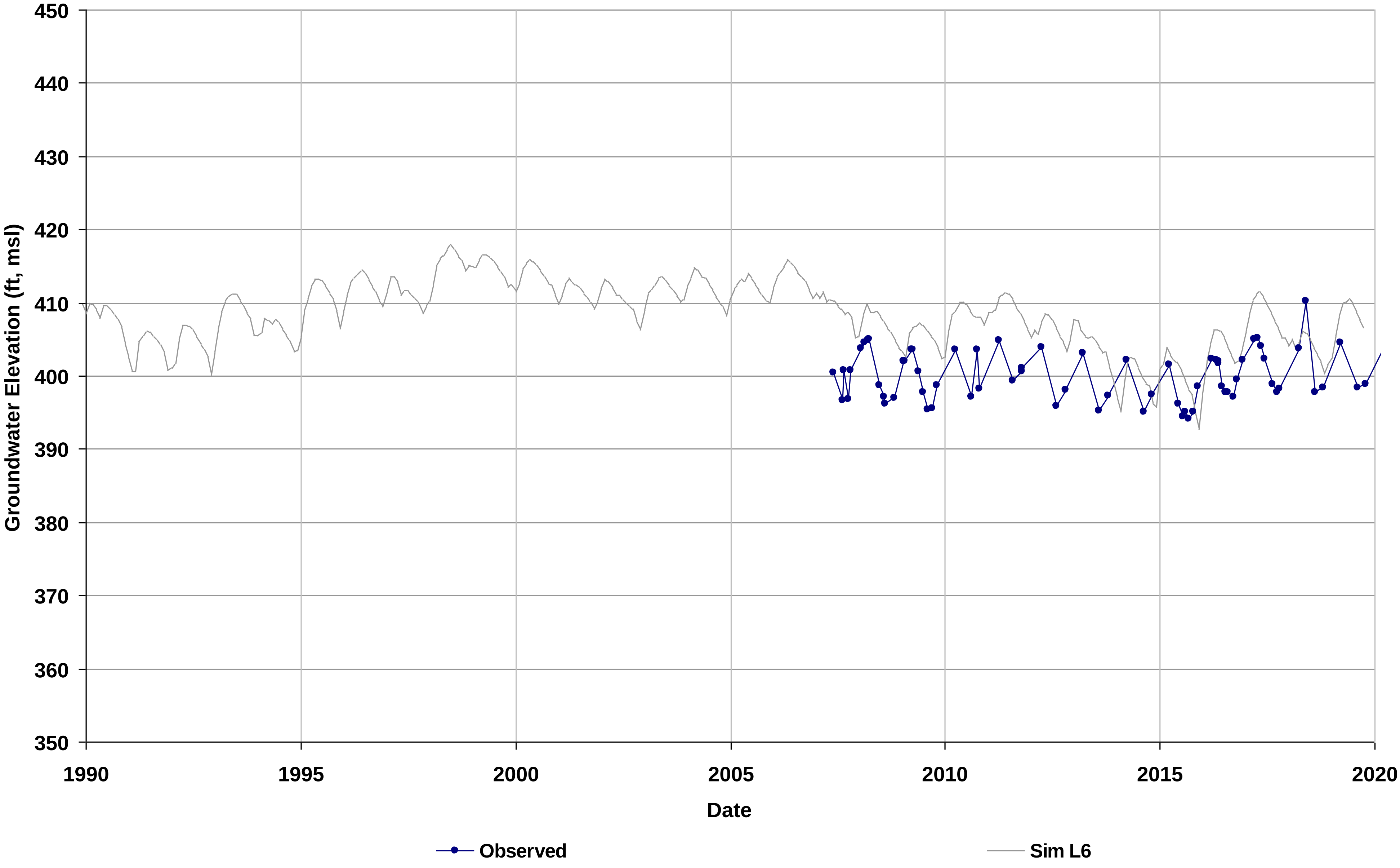


Tehama IHM - Historical

Well Name: 29N04W20A002M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

Total Depth (ft): 451
Perf Top (ft): 360
Perf Bottom (ft): 430
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): 5.63

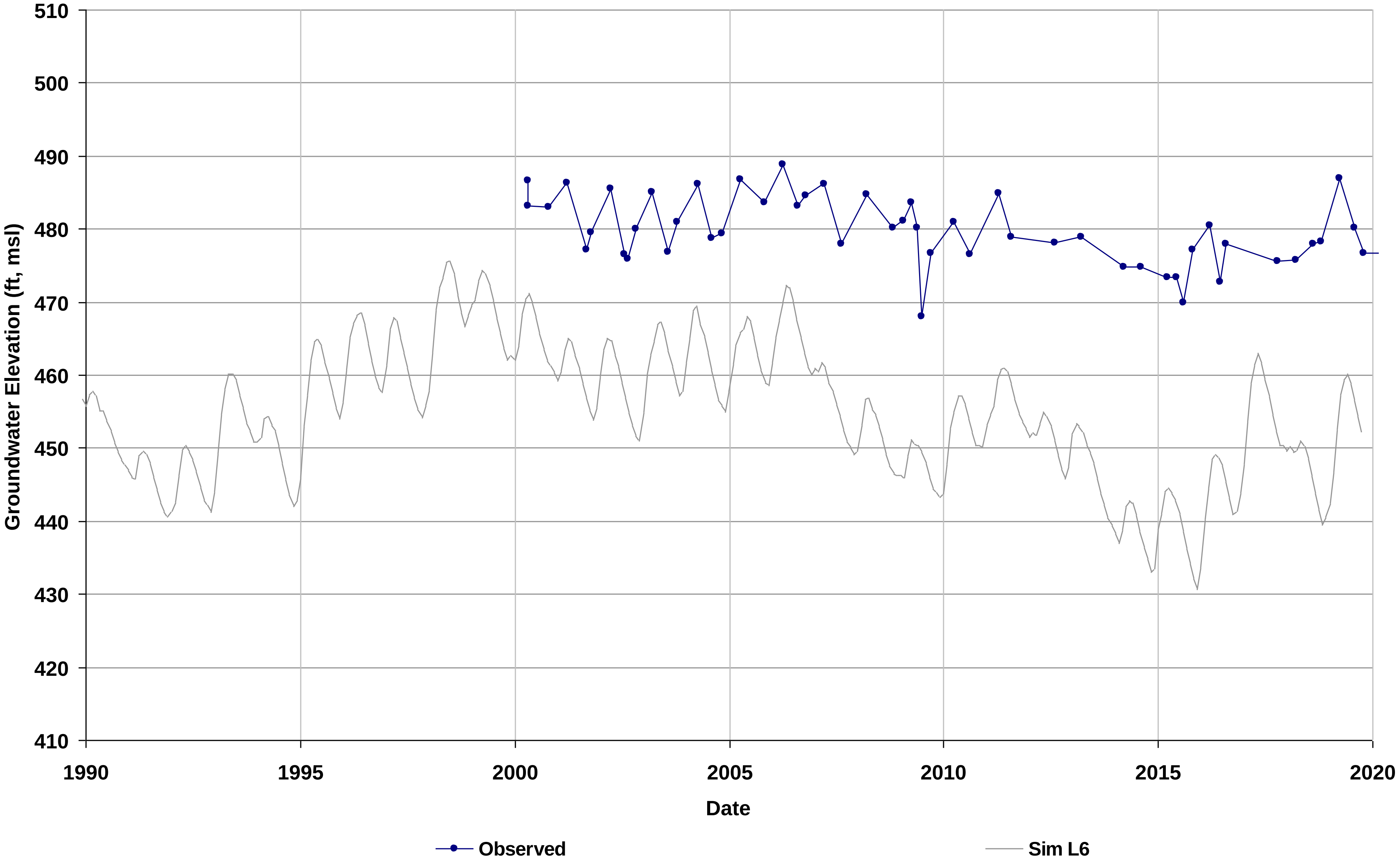


Tehama IHM - Historical

Well Name: 29N05W21H001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 622

Total Depth (ft): 280
Perf Top (ft): 250
Perf Bottom (ft): 280
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): -25.17

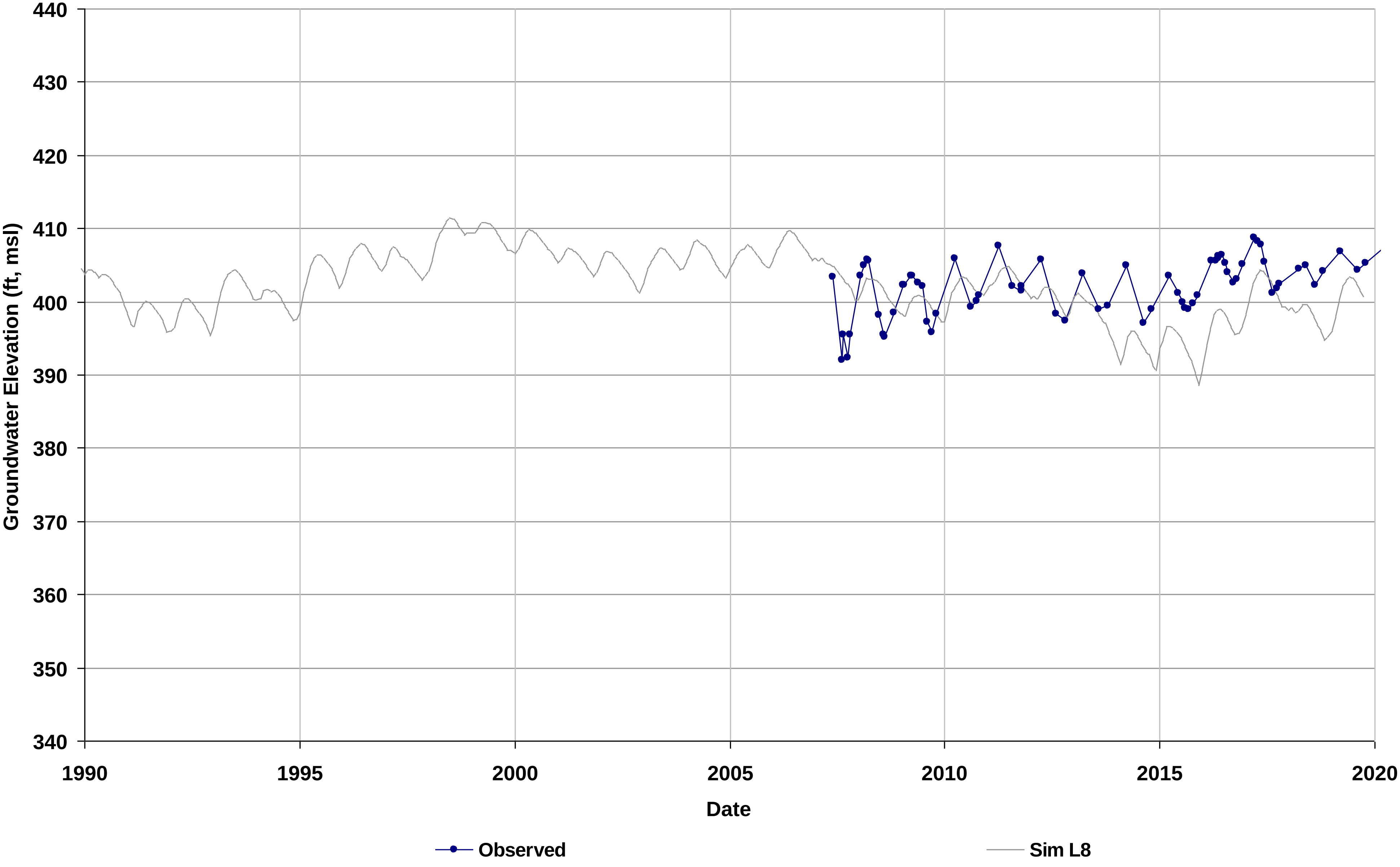


Tehama IHM - Historical

Well Name: 29N04W20A001M
Depth Zone: Lower
Subbasin: Bowman
GSE (ft, msl): 451

Total Depth (ft): 876
Perf Top (ft): 755
Perf Bottom (ft): 855
Top Model Layer: 8
Bottom Model Layer: 8

Average Residual (ft): -2.35

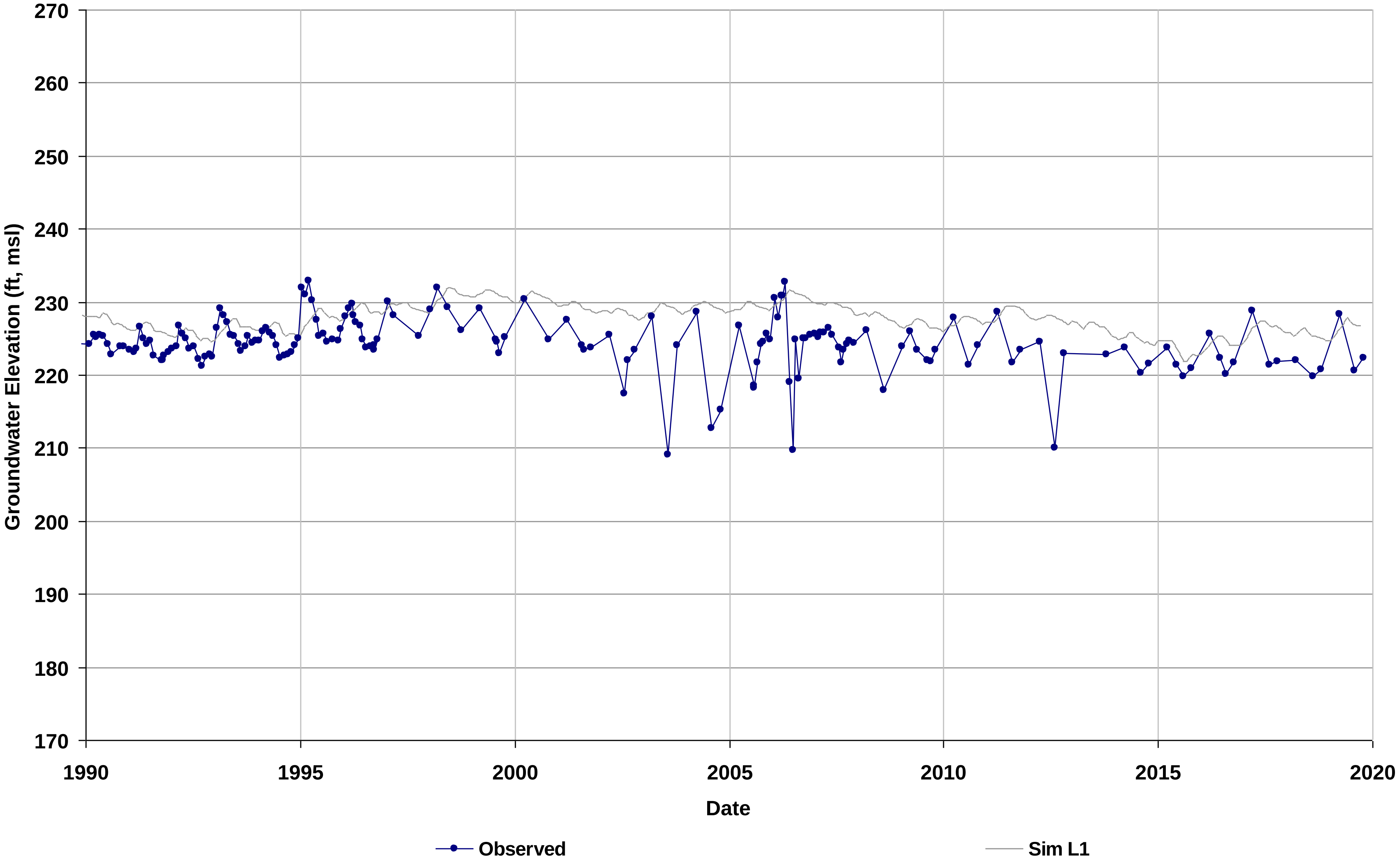


Tehama IHM - Historical

Well Name: 26N02W16C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 242

Total Depth (ft): 50
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 1
Bottom Model Layer: 1

Average Residual (ft): 3.41

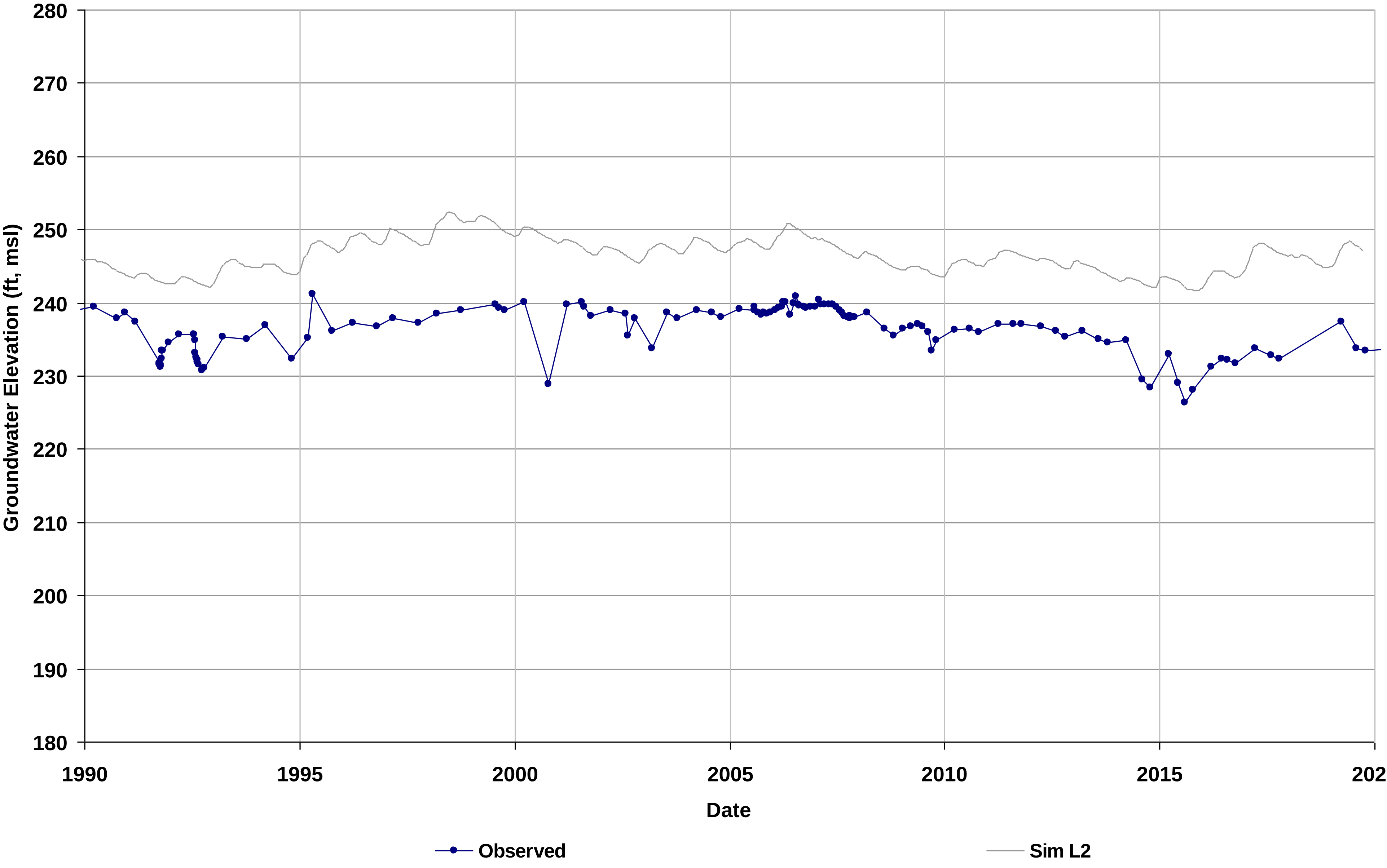


Tehama IHM - Historical

Well Name: 26N02W14G001M
Depth Zone: Likely Composite
Subbasin: Los Molinos
GSE (ft, msl): 314

Total Depth (ft): 394
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): 10.03

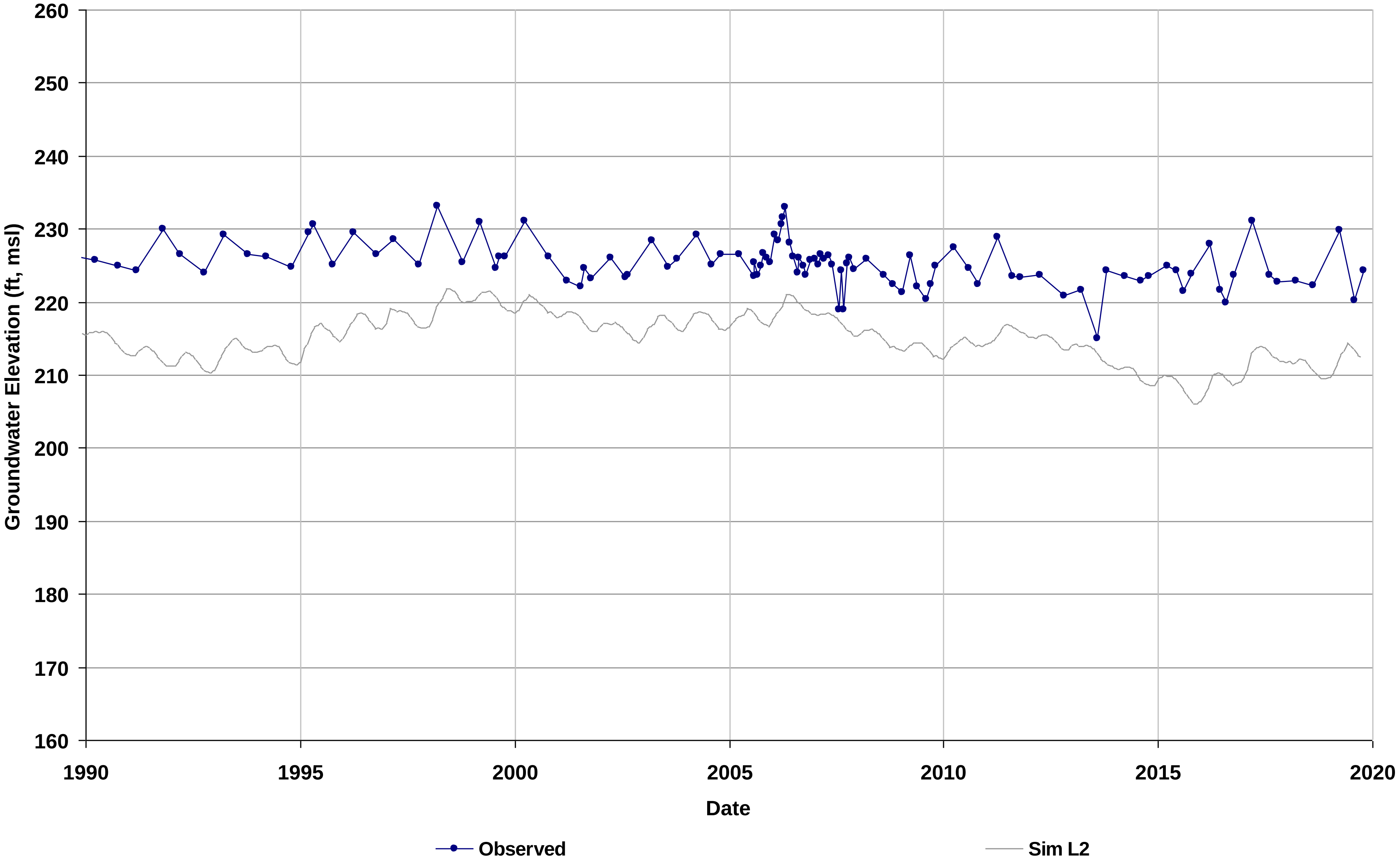


Tehama IHM - Historical

Well Name: 25N02W09G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 264

Total Depth (ft): 60
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): -9.67

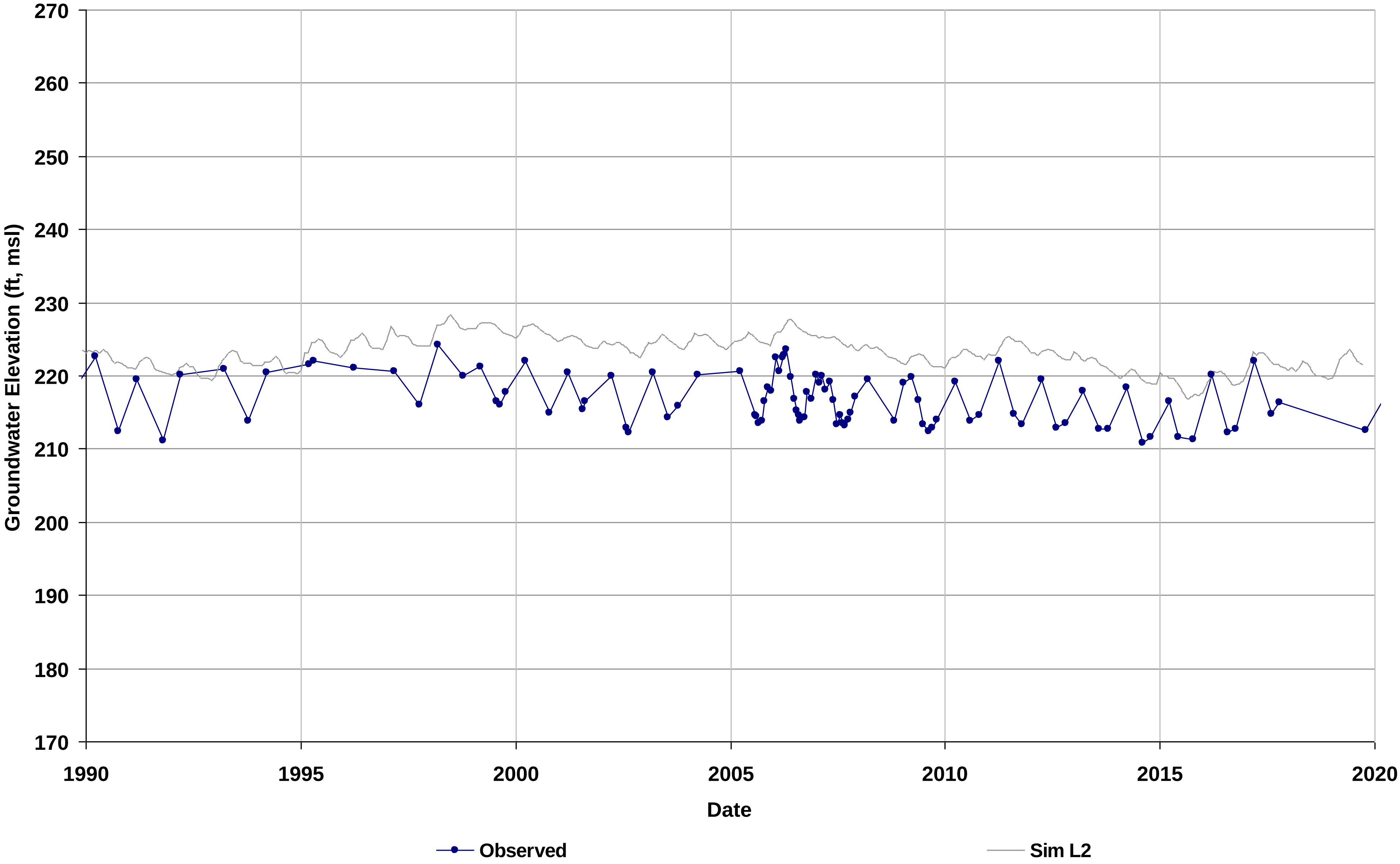


Tehama IHM - Historical

Well Name: 26N02W21Q001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 237

Total Depth (ft): 55
Perf Top (ft): 48
Perf Bottom (ft): 55
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): 6.94

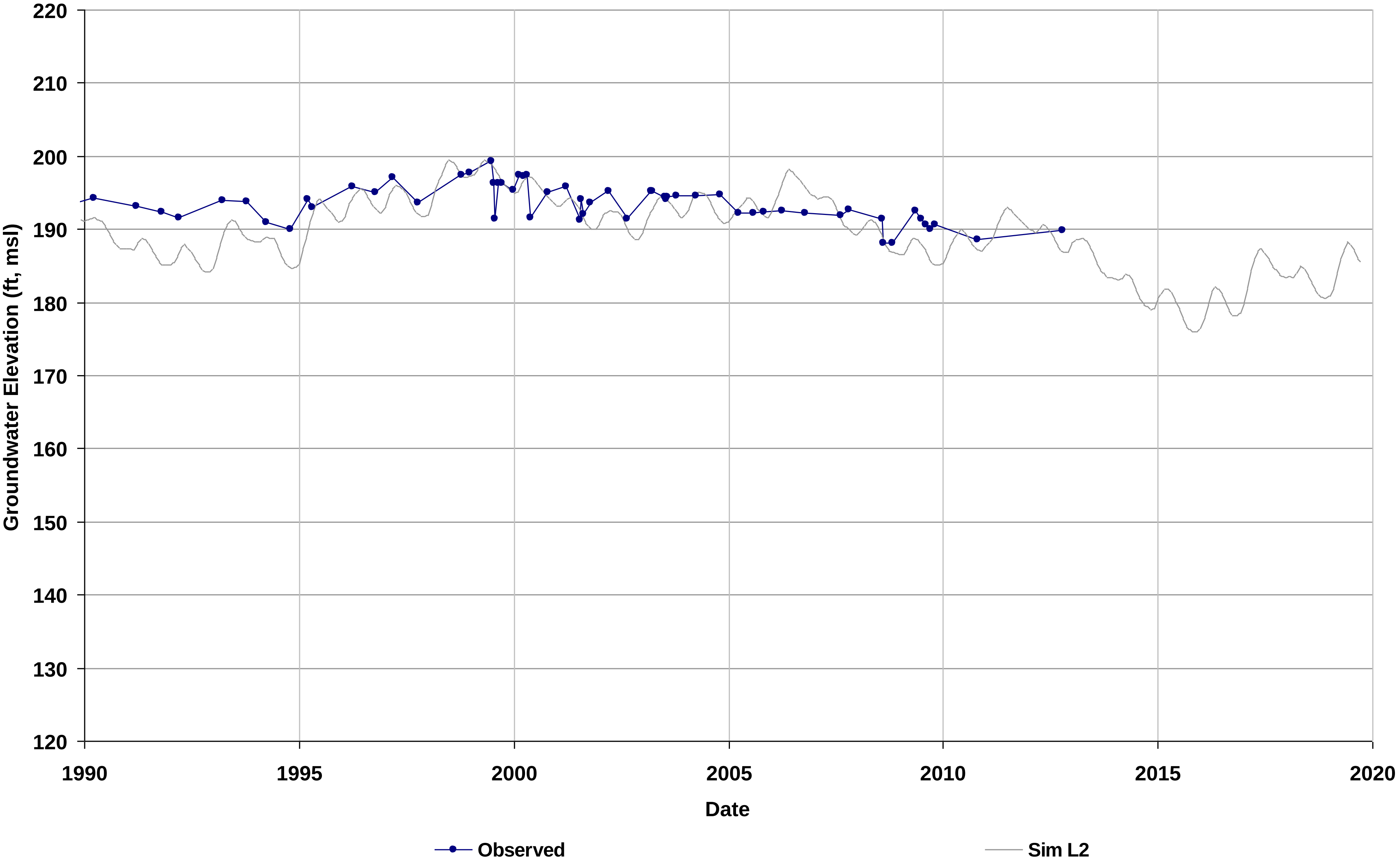


Tehama IHM - Historical

Well Name: 24N01W18N001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 256

Total Depth (ft): 102
Perf Top (ft): 64
Perf Bottom (ft): 76
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): -1.29

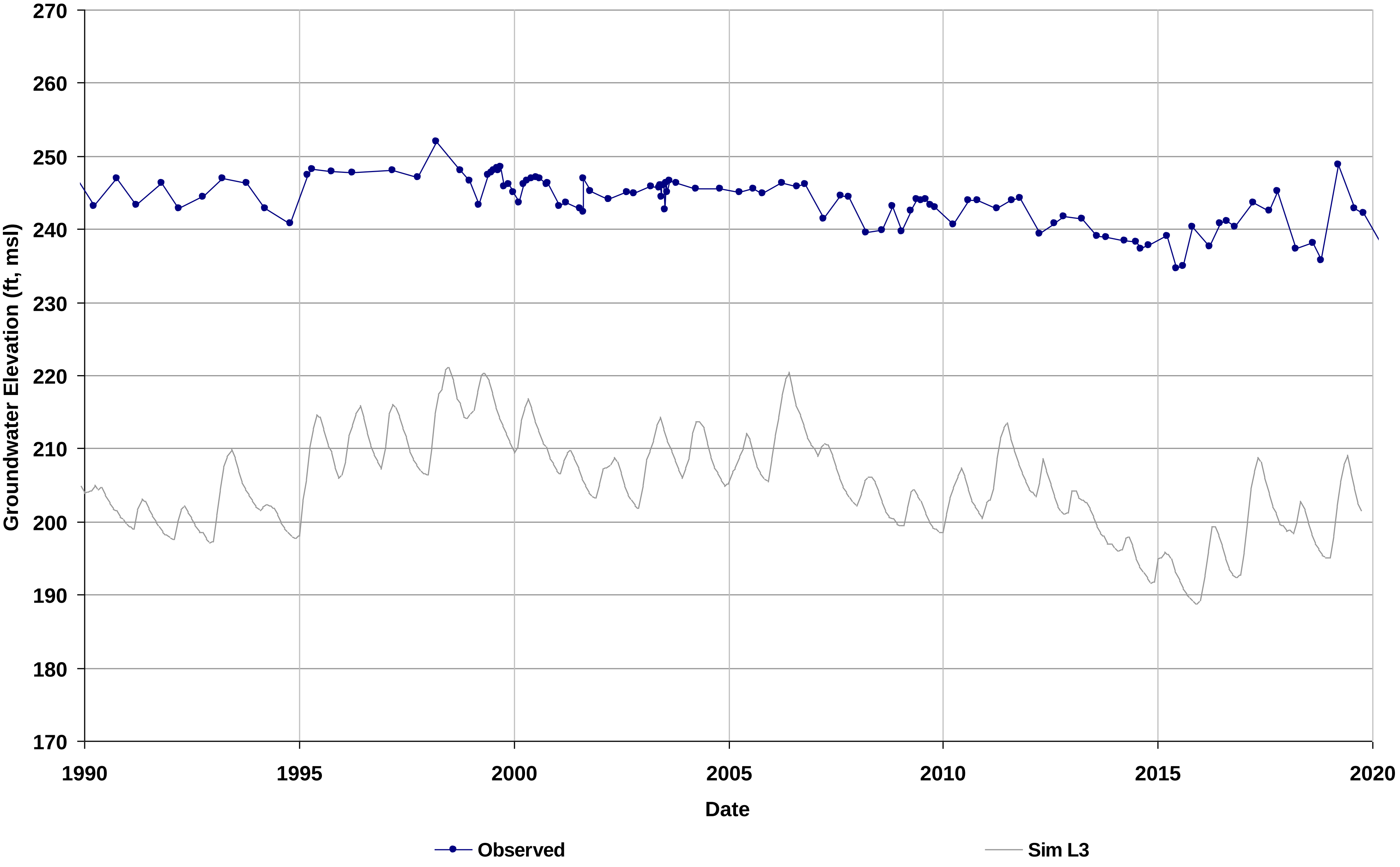


Tehama IHM - Historical

Well Name: 24N01W05Q002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 289

Total Depth (ft): 150
Perf Top (ft): 60
Perf Bottom (ft): 150
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): -37.62

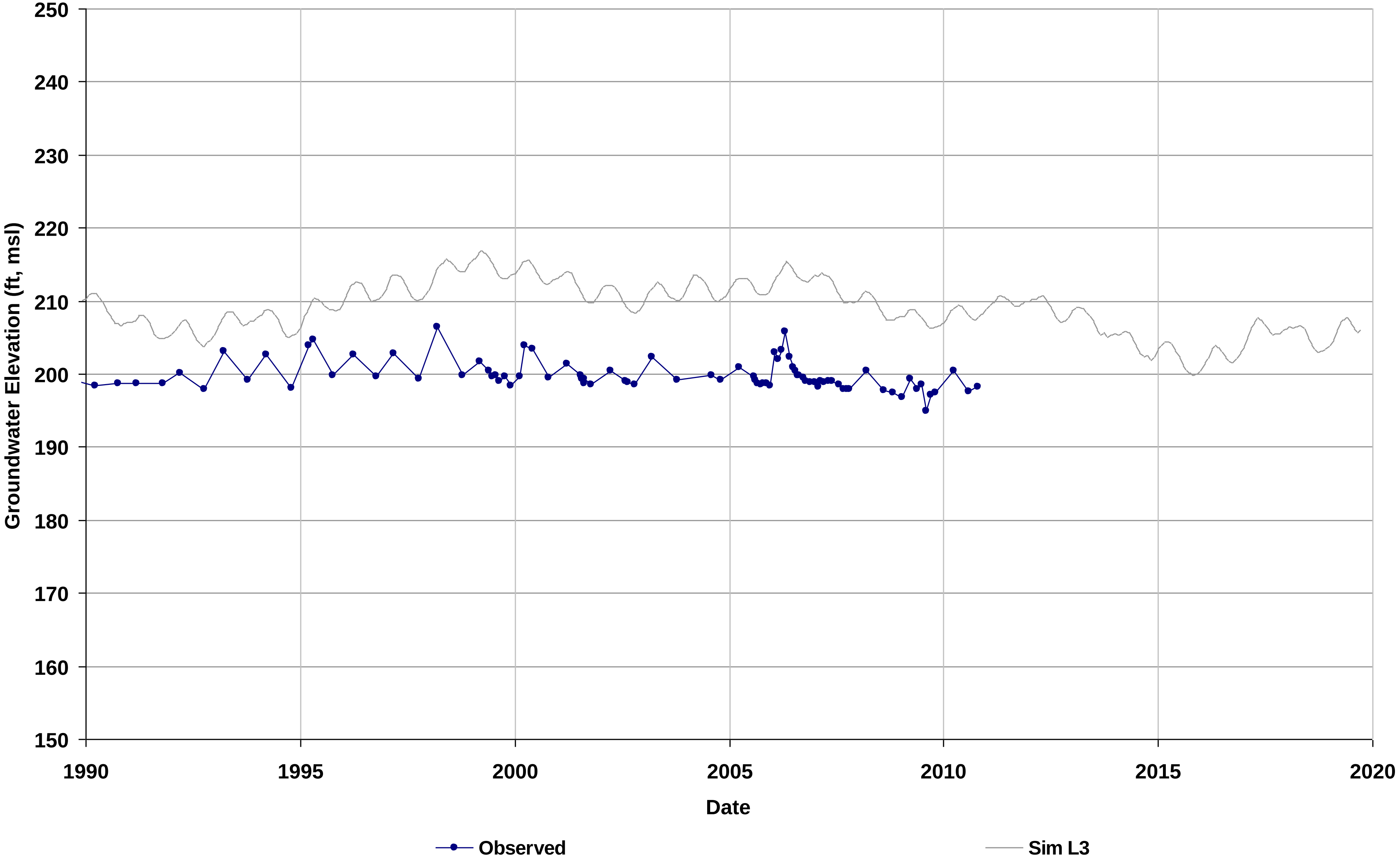


Tehama IHM - Historical

Well Name: 25N02W21B001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 212

Total Depth (ft): 110
Perf Top (ft): 52
Perf Bottom (ft): 110
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 11.21

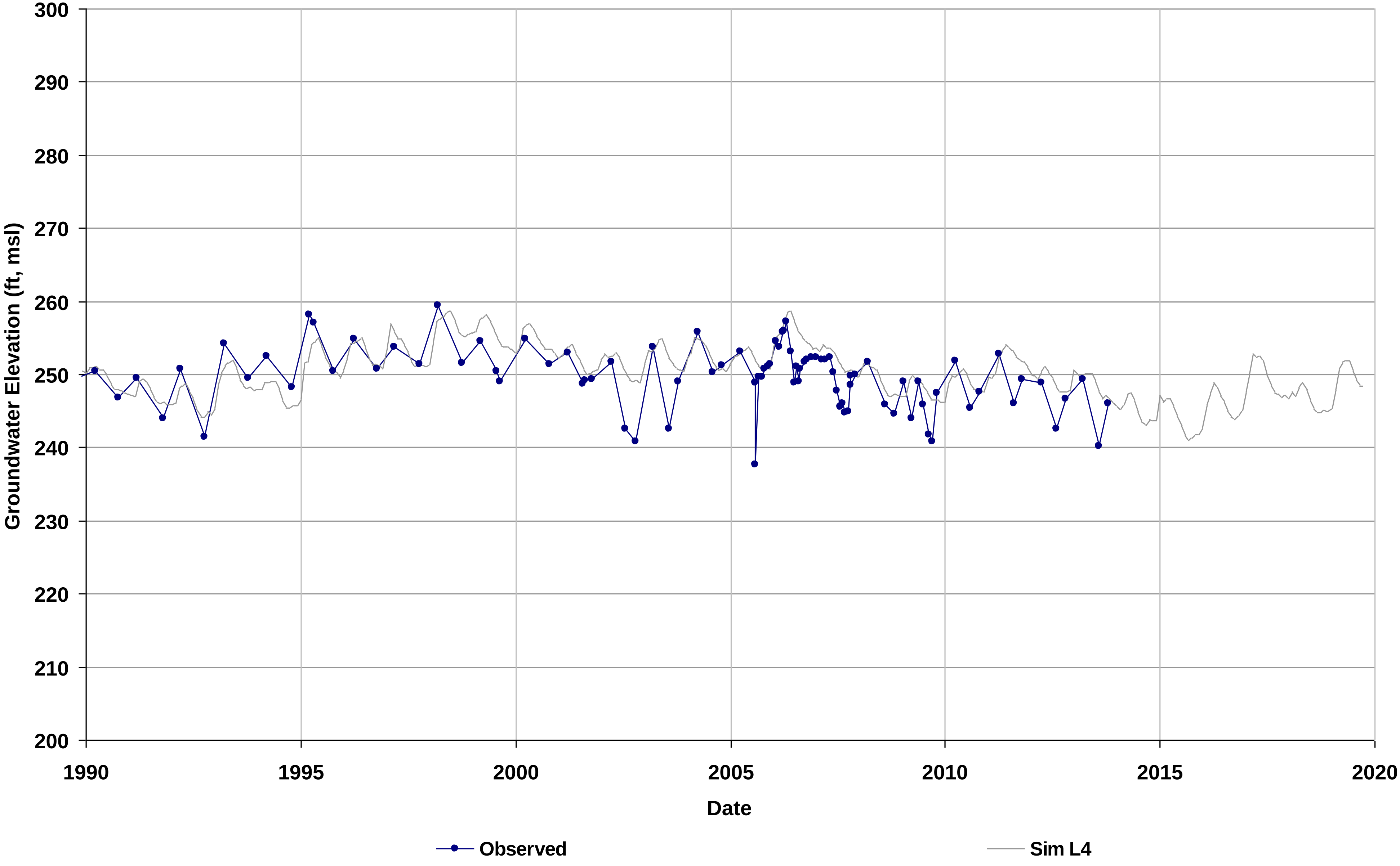


Tehama IHM - Historical

Well Name: 27N02W30C002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 282

Total Depth (ft): 296
Perf Top (ft): 50
Perf Bottom (ft): 163
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 1.97

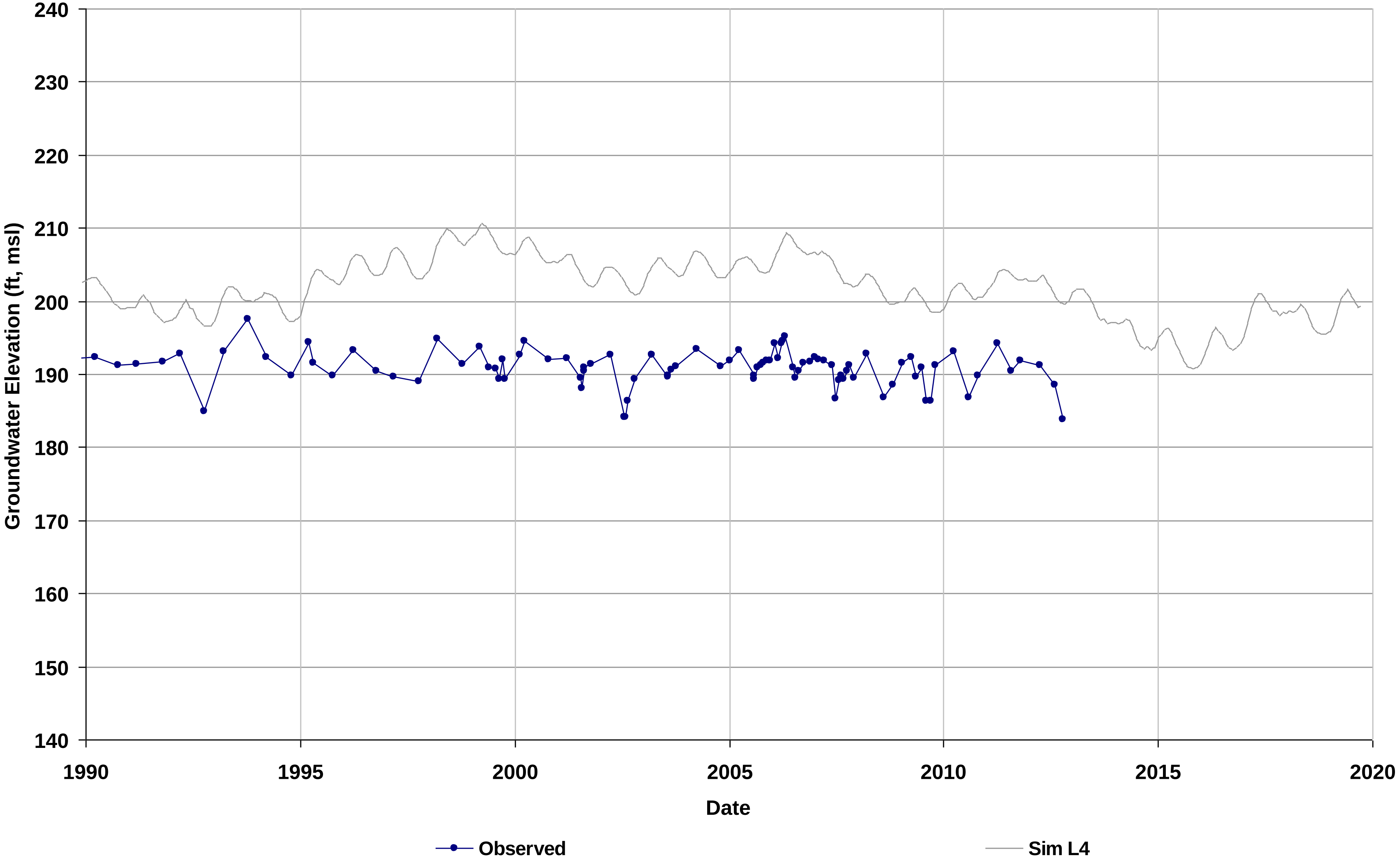


Tehama IHM - Historical

Well Name: 25N02W34K001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 206

Total Depth (ft): 235
Perf Top (ft): 46
Perf Bottom (ft): 213
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 12.82

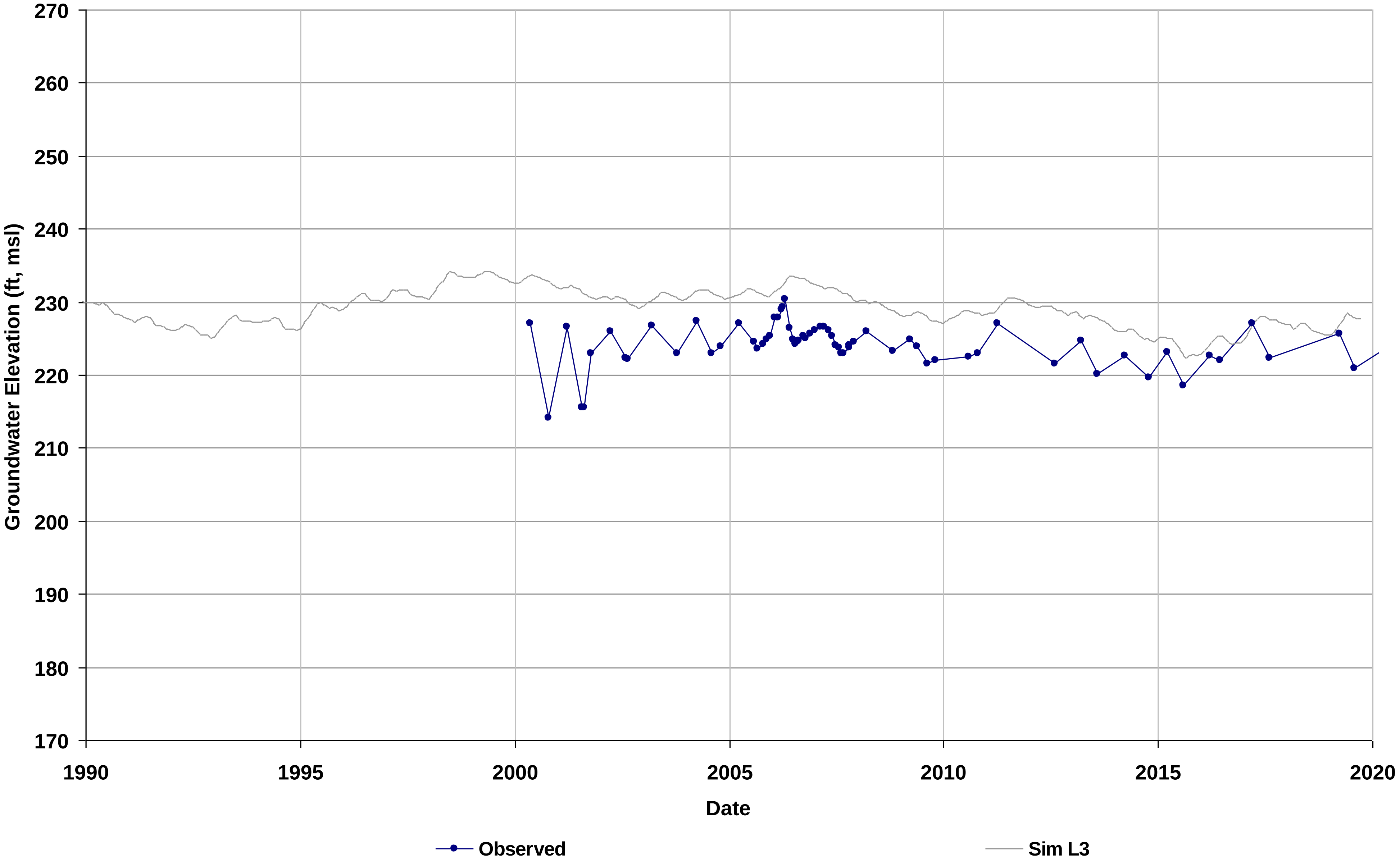


Tehama IHM - Historical

Well Name: 26N02W15C001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 260

Total Depth (ft): 100
Perf Top (ft): 78
Perf Bottom (ft): 100
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 6.27

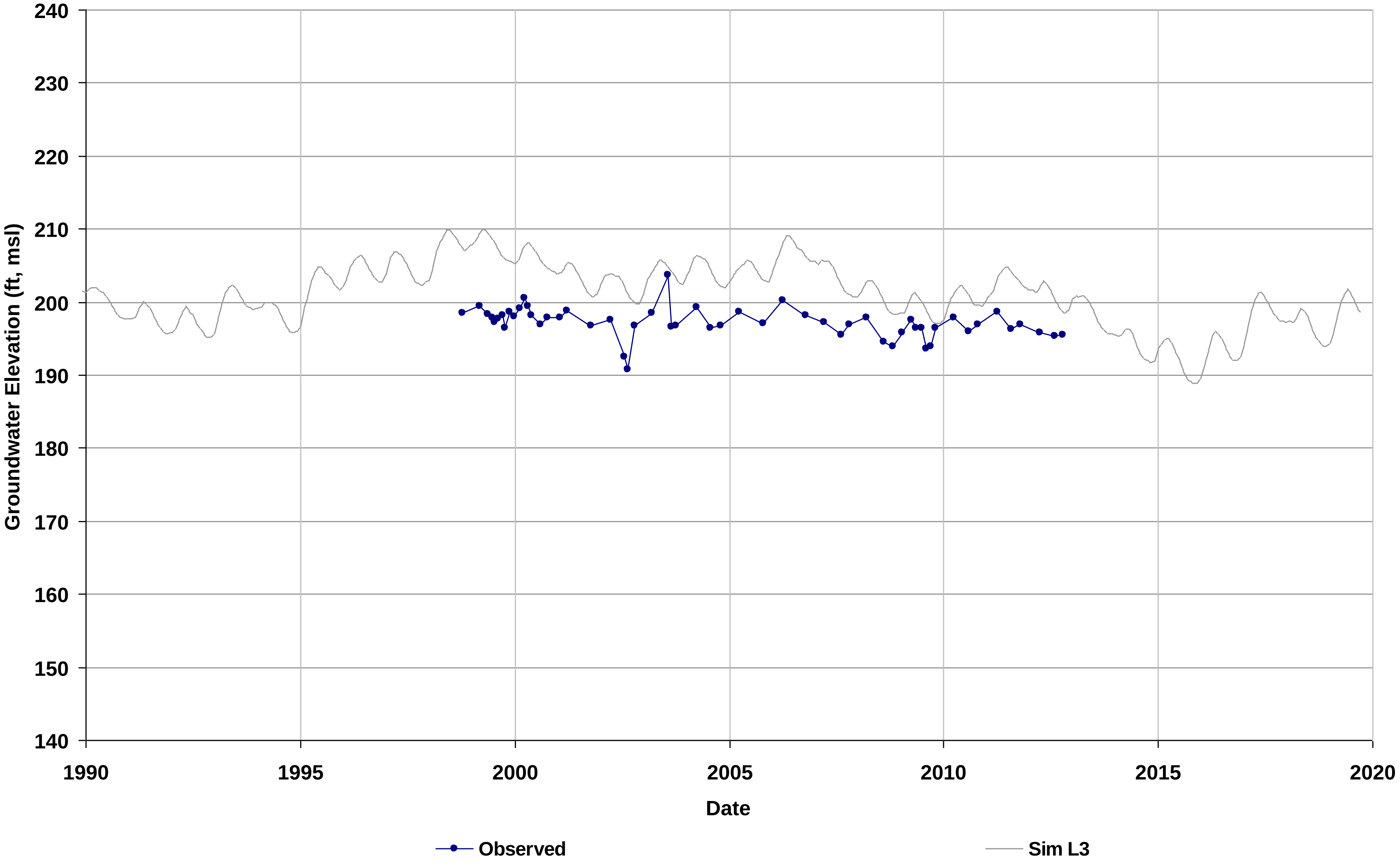


Tehama IHM - Historical

Well Name: 24N02W02E001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 202

Total Depth (ft): 328
Perf Top (ft): 90
Perf Bottom (ft): 310
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 6.38

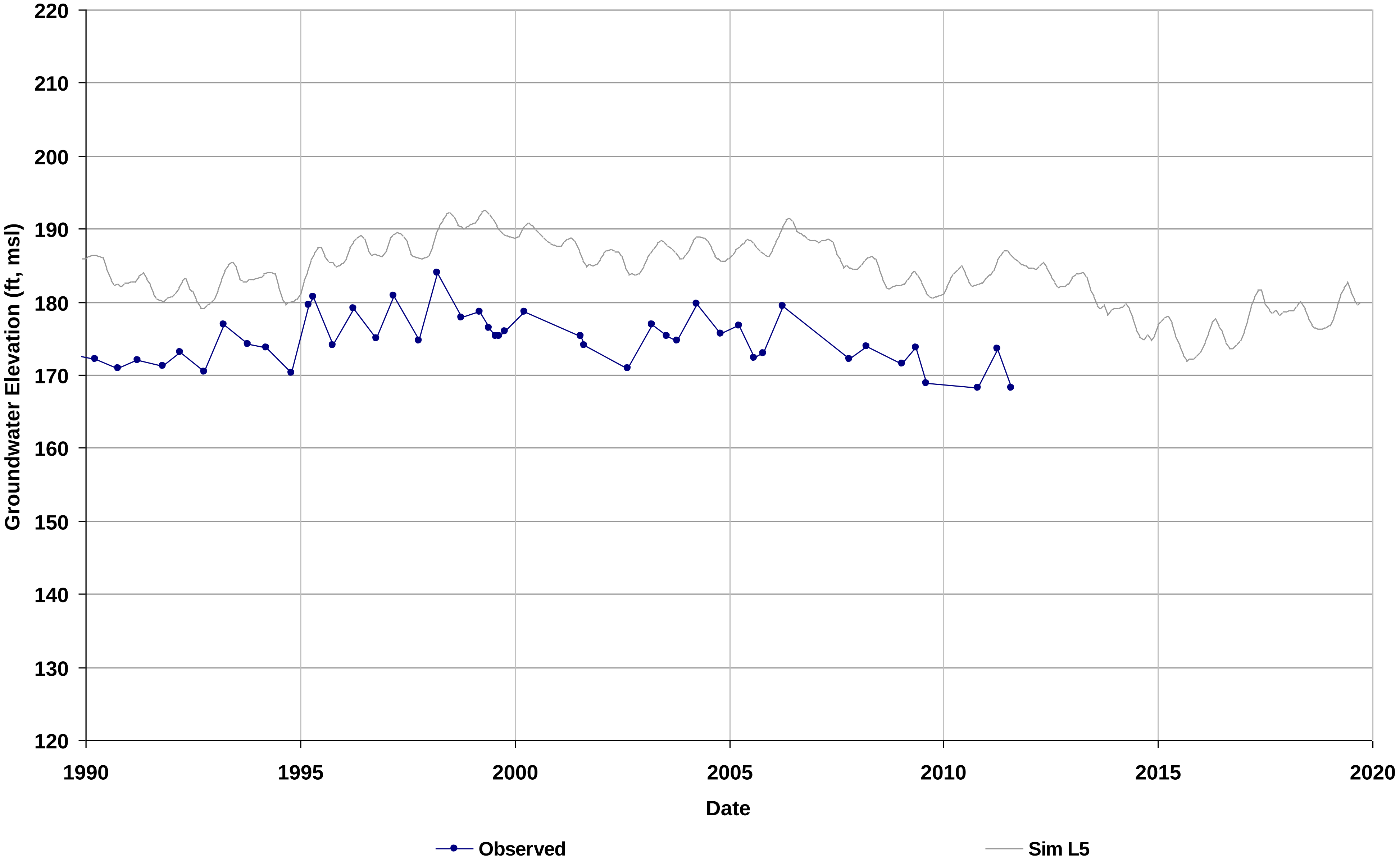


Tehama IHM - Historical

Well Name: 24N02W23G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 199

Total Depth (ft): 362
Perf Top (ft): 84
Perf Bottom (ft): 362
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 11.17

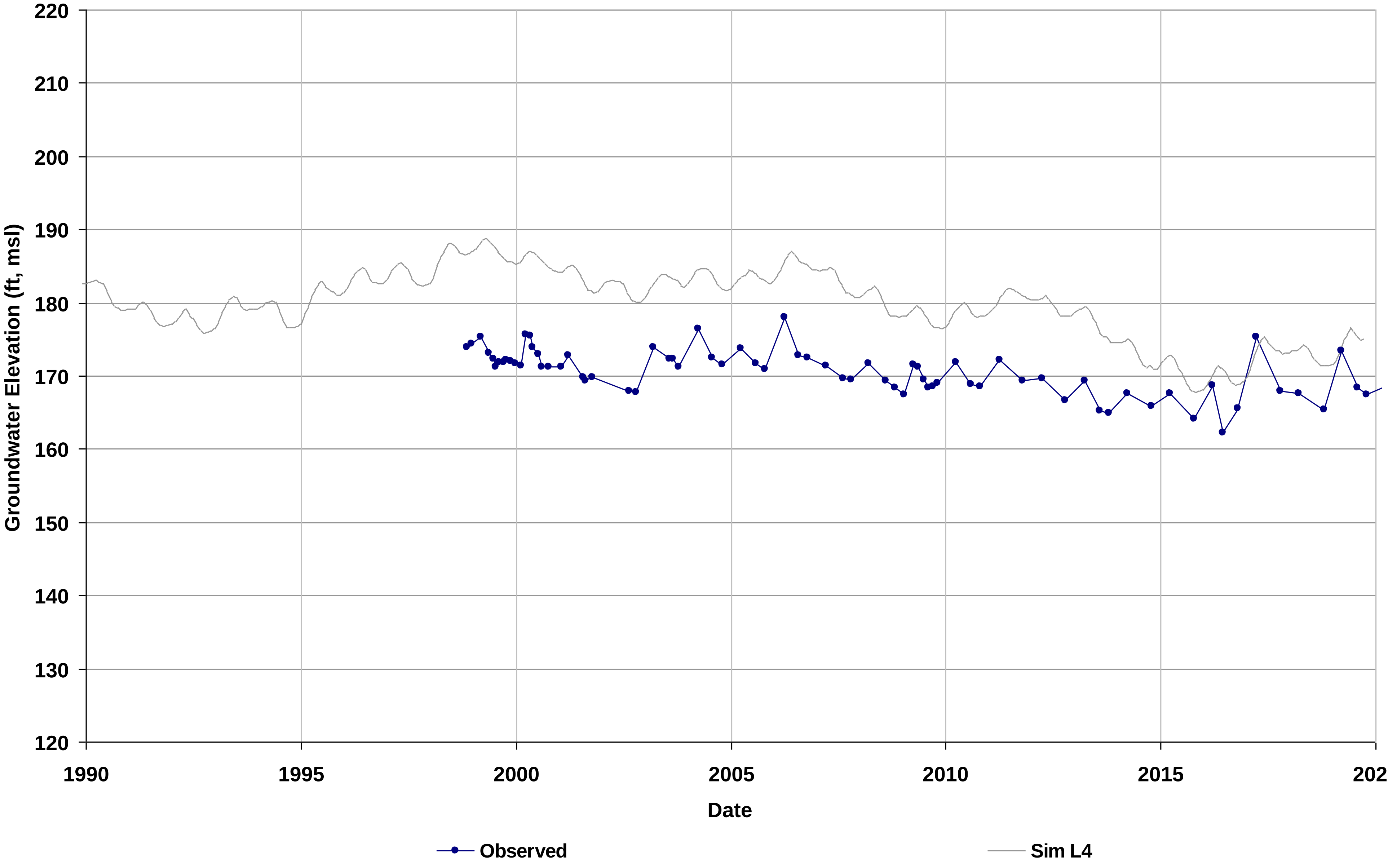


Tehama IHM - Historical

Well Name: 24N02W25G001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 194

Total Depth (ft): 256
Perf Top (ft): 108
Perf Bottom (ft): 256
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 10.49

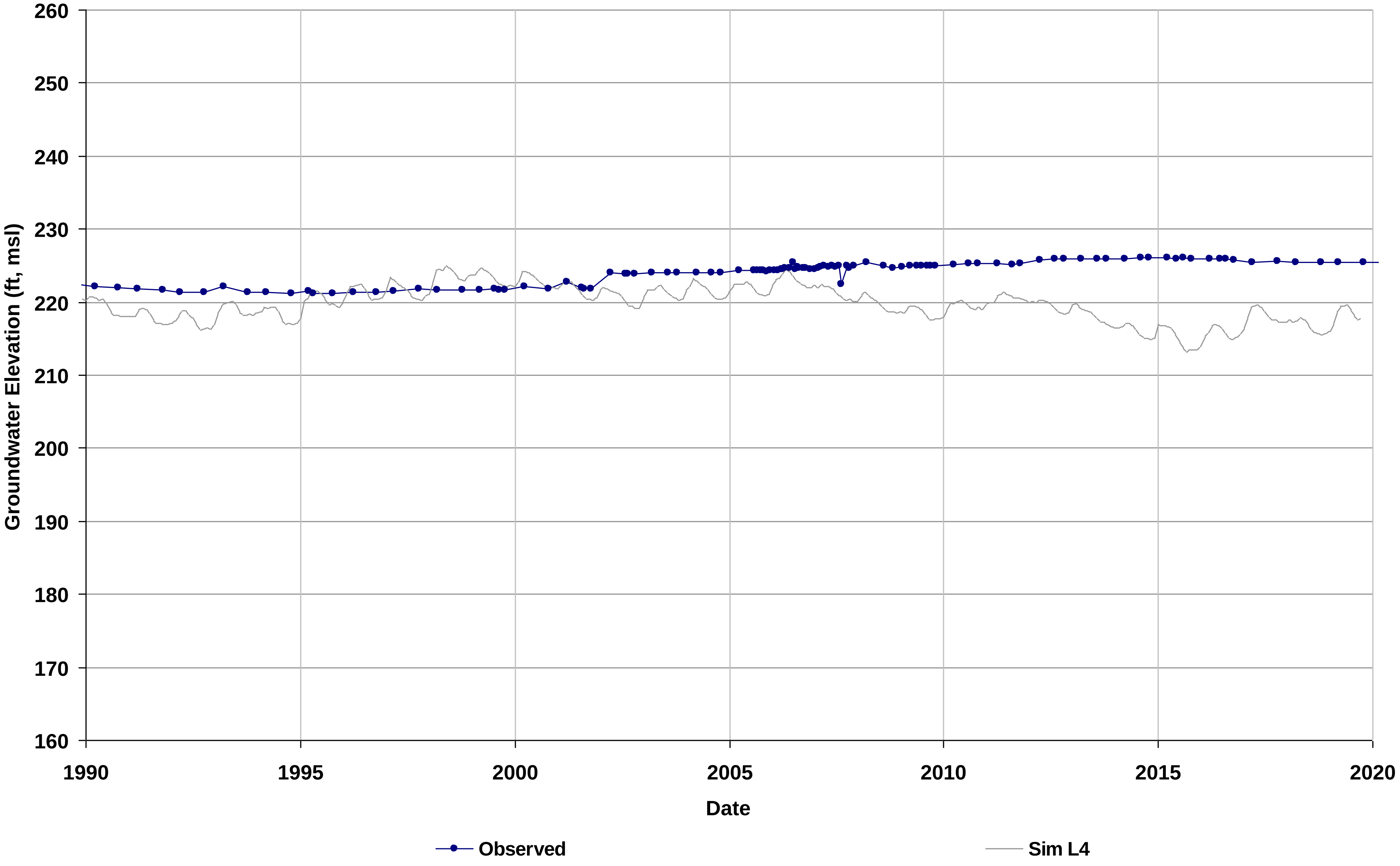


Tehama IHM - Historical

Well Name: 26N02W29R001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

Total Depth (ft): 184
Perf Top (ft): 183.5
Perf Bottom (ft): 184
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -3.81

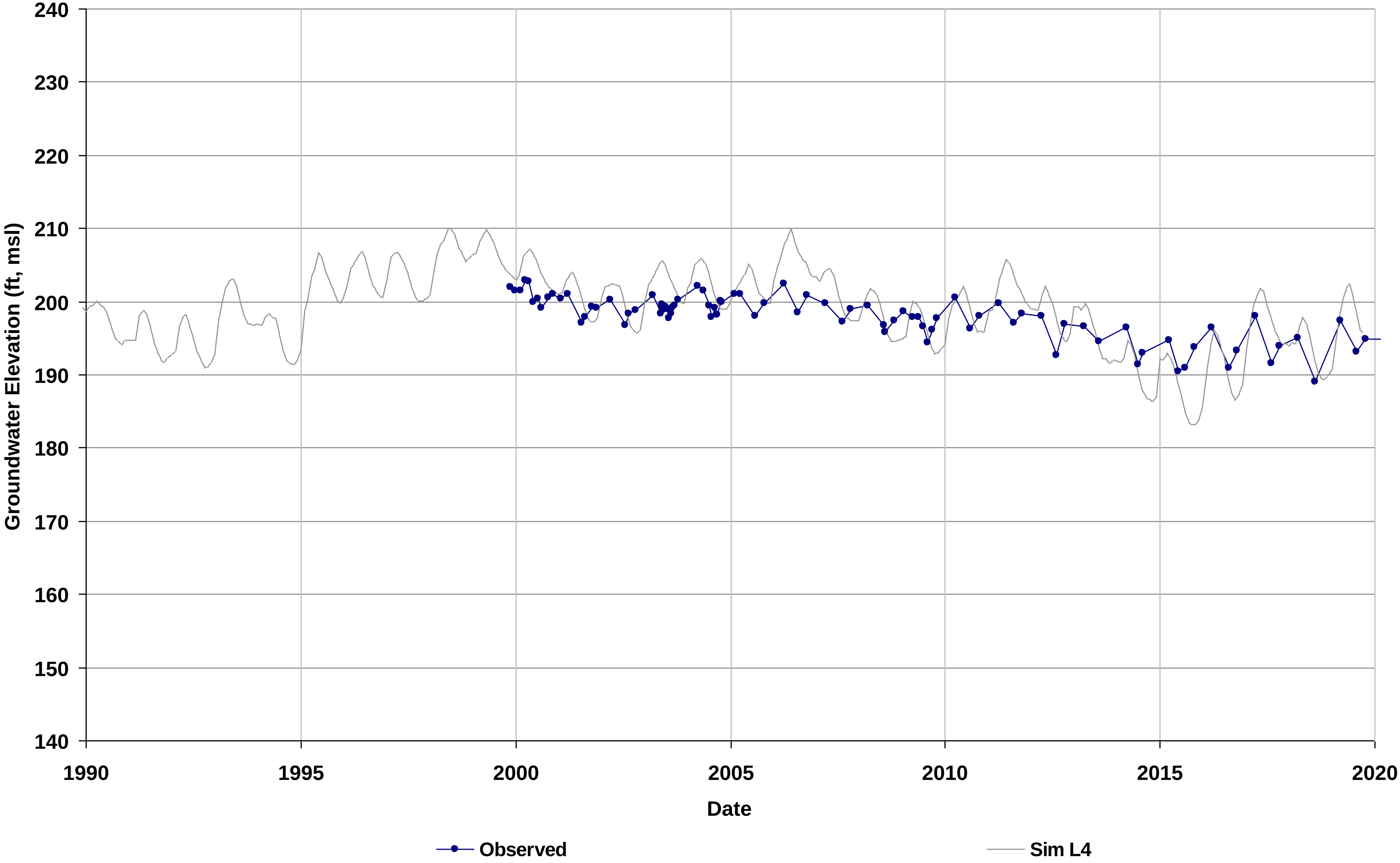


Tehama IHM - Historical

Well Name: 24N02W12P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 228

Total Depth (ft): 370
Perf Top (ft): 165
Perf Bottom (ft): 360
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 1.5

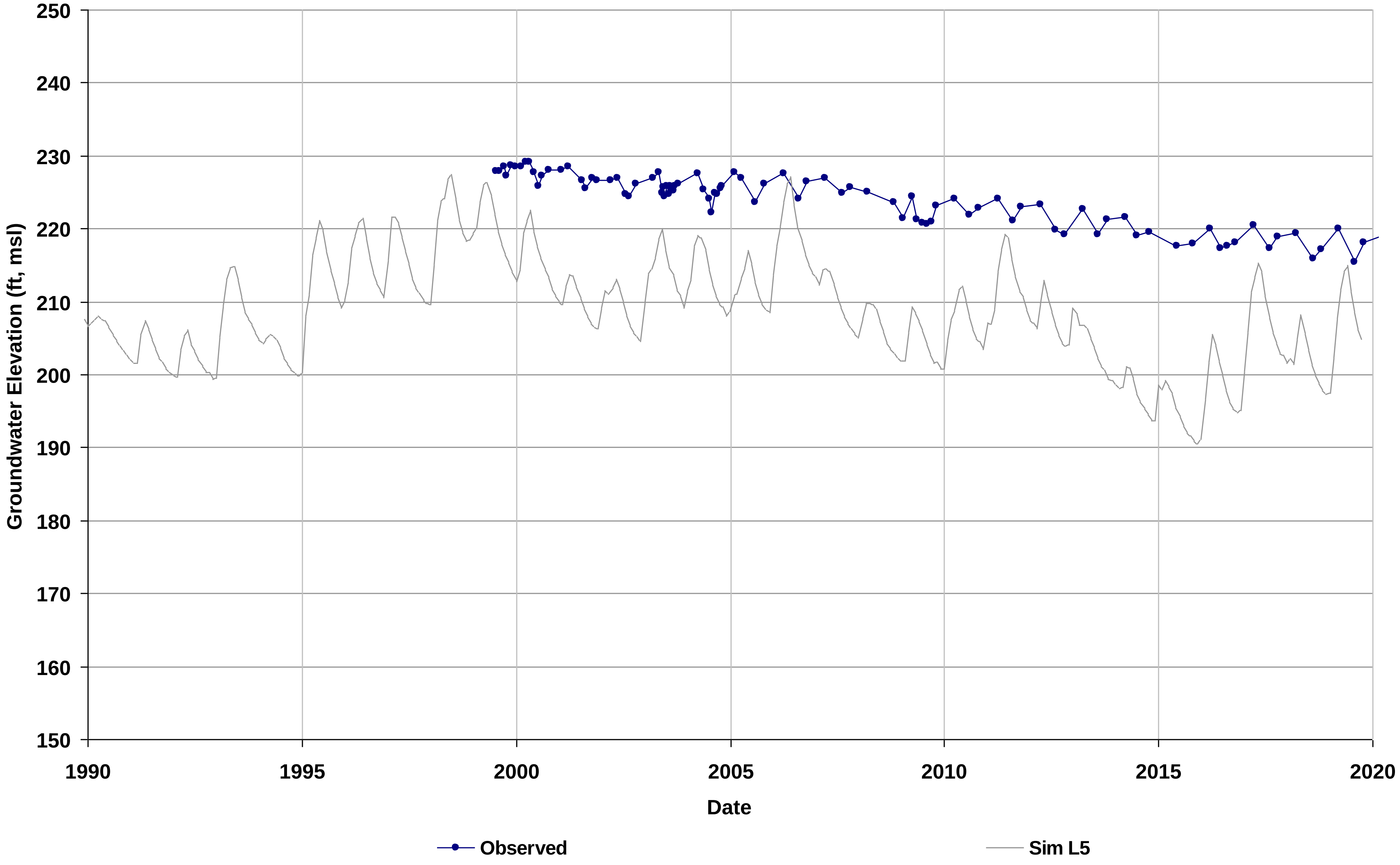


Tehama IHM - Historical

Well Name: 24N01W05J003M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 312

Total Depth (ft): 385
Perf Top (ft): 295
Perf Bottom (ft): 335
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): -14.06

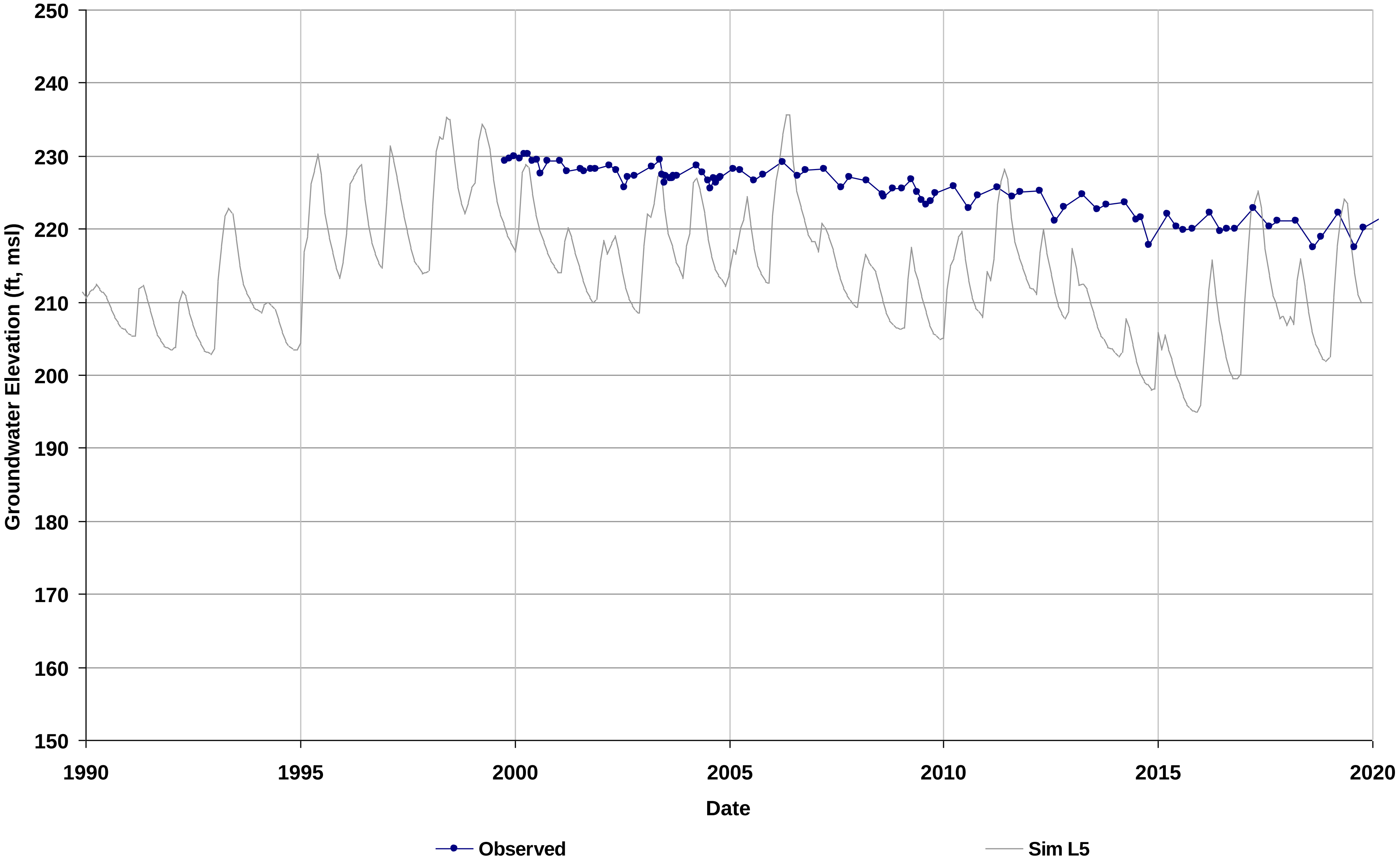


Tehama IHM - Historical

Well Name: 25N01W32P001M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 303

Total Depth (ft): 330
Perf Top (ft): 209
Perf Bottom (ft): 256
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): -11.41

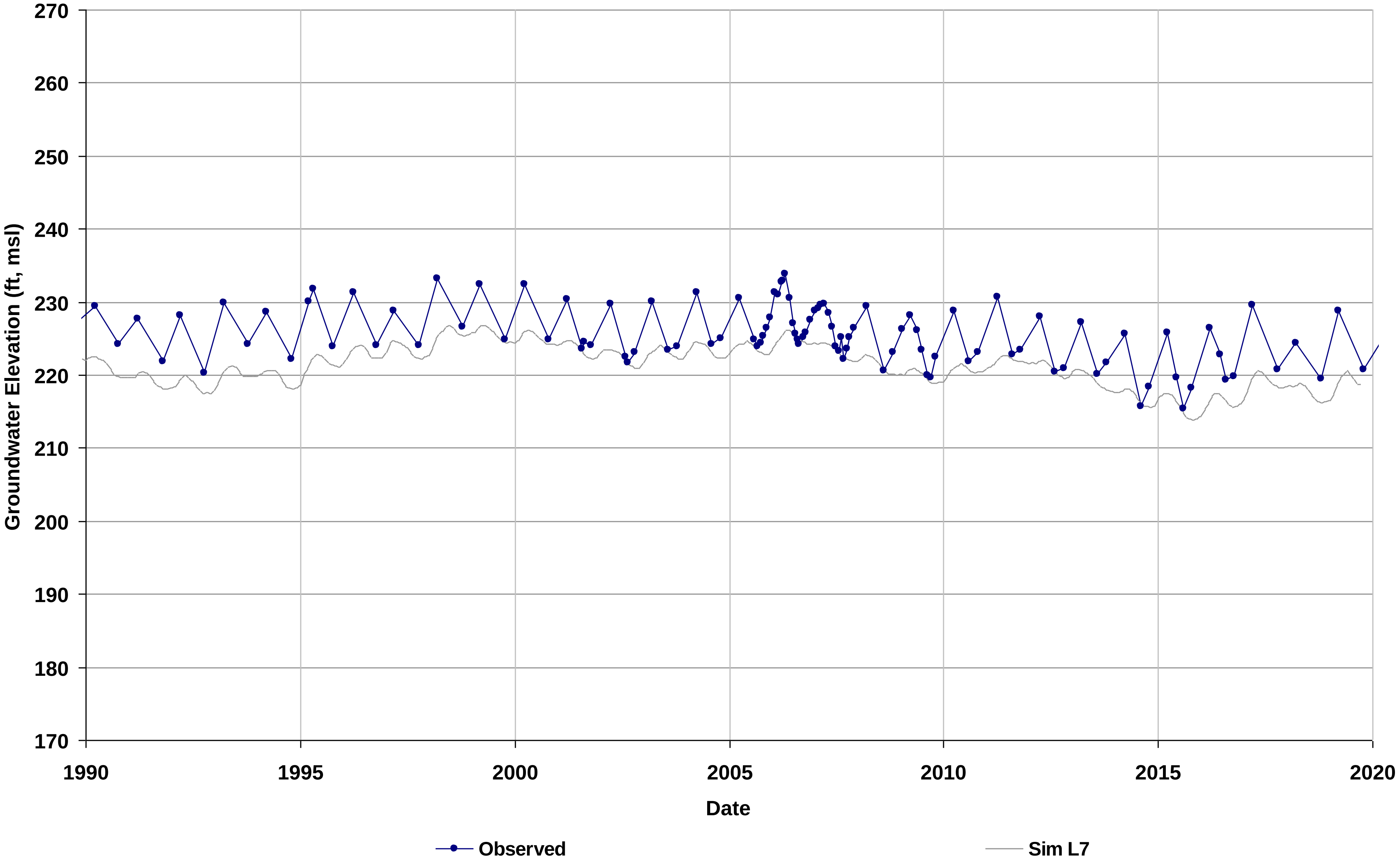


Tehama IHM - Historical

Well Name: 26N02W29R002M
Depth Zone: Upper
Subbasin: Los Molinos
GSE (ft, msl): 230

Total Depth (ft): 900
Perf Top (ft): 839.5
Perf Bottom (ft): 840.5
Top Model Layer: 7
Bottom Model Layer: 7

Average Residual (ft): -3.84

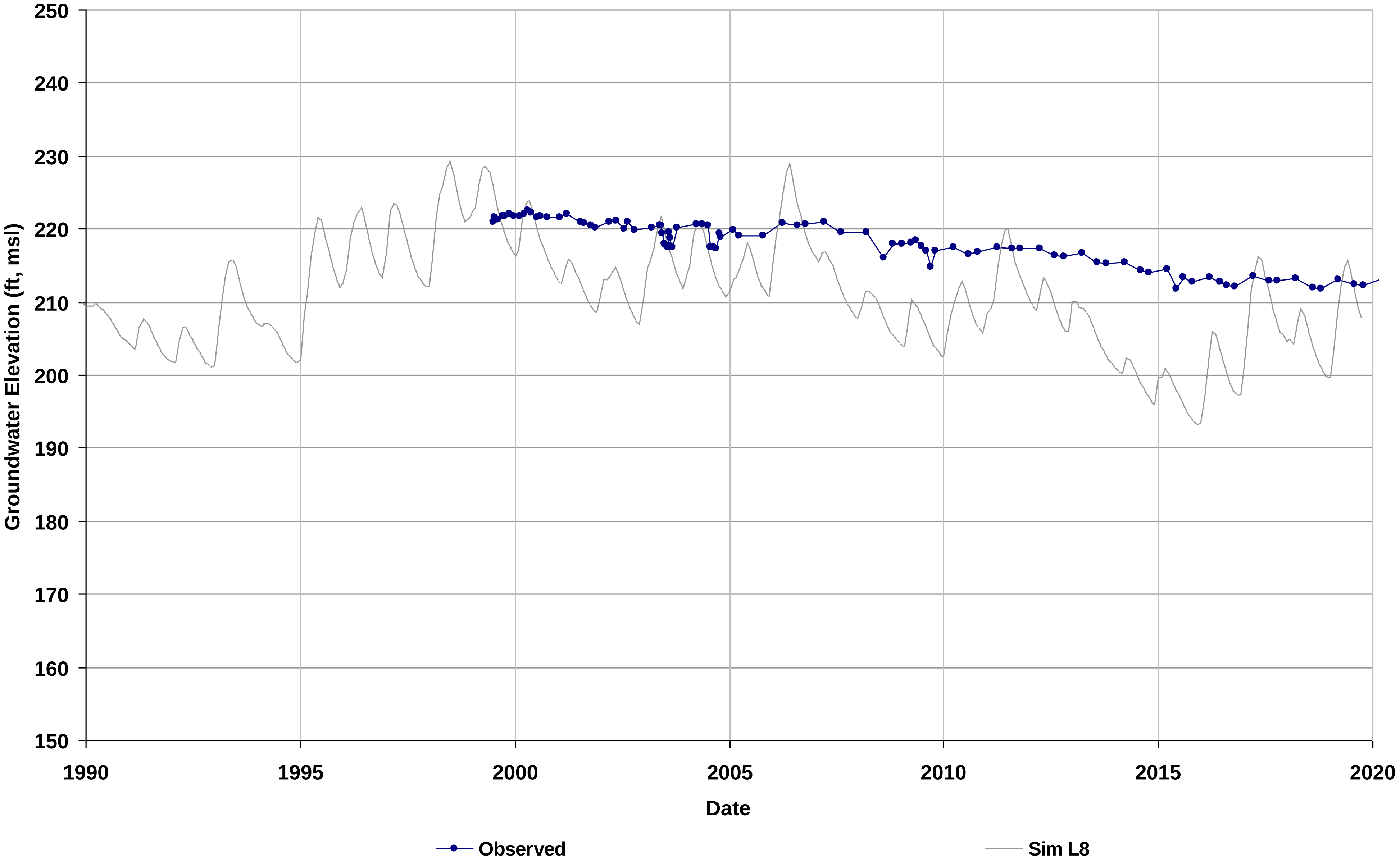


Tehama IHM - Historical

Well Name: 25N01W34N003M
Depth Zone: Lower
Subbasin: Los Molinos
GSE (ft, msl): 366

Total Depth (ft): 743
Perf Top (ft): 625
Perf Bottom (ft): 680
Top Model Layer: 8
Bottom Model Layer: 8

Average Residual (ft): -5.98

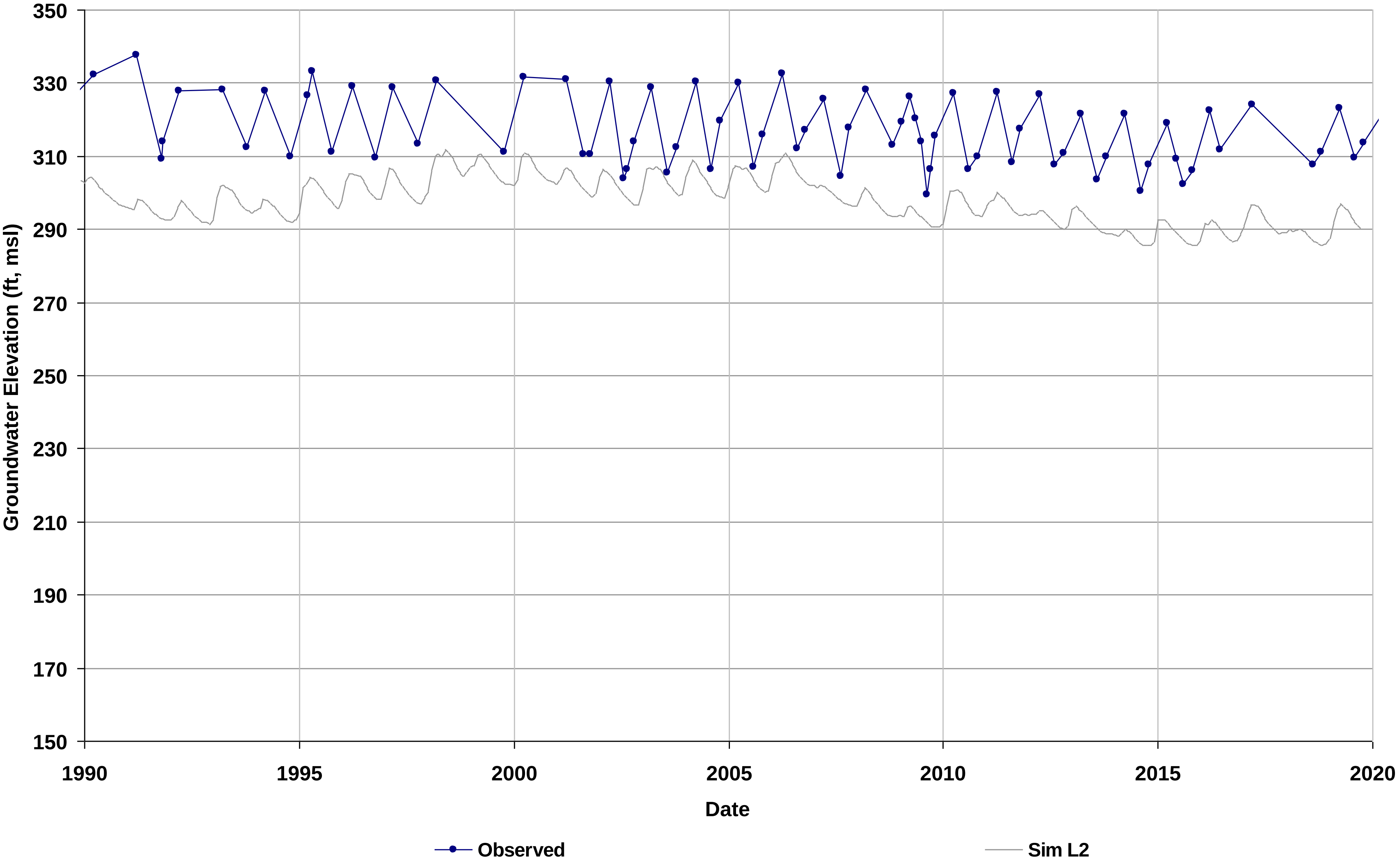


Tehama IHM - Historical

Well Name: 27N04W35E001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 438

Total Depth (ft): 280
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): -19.78

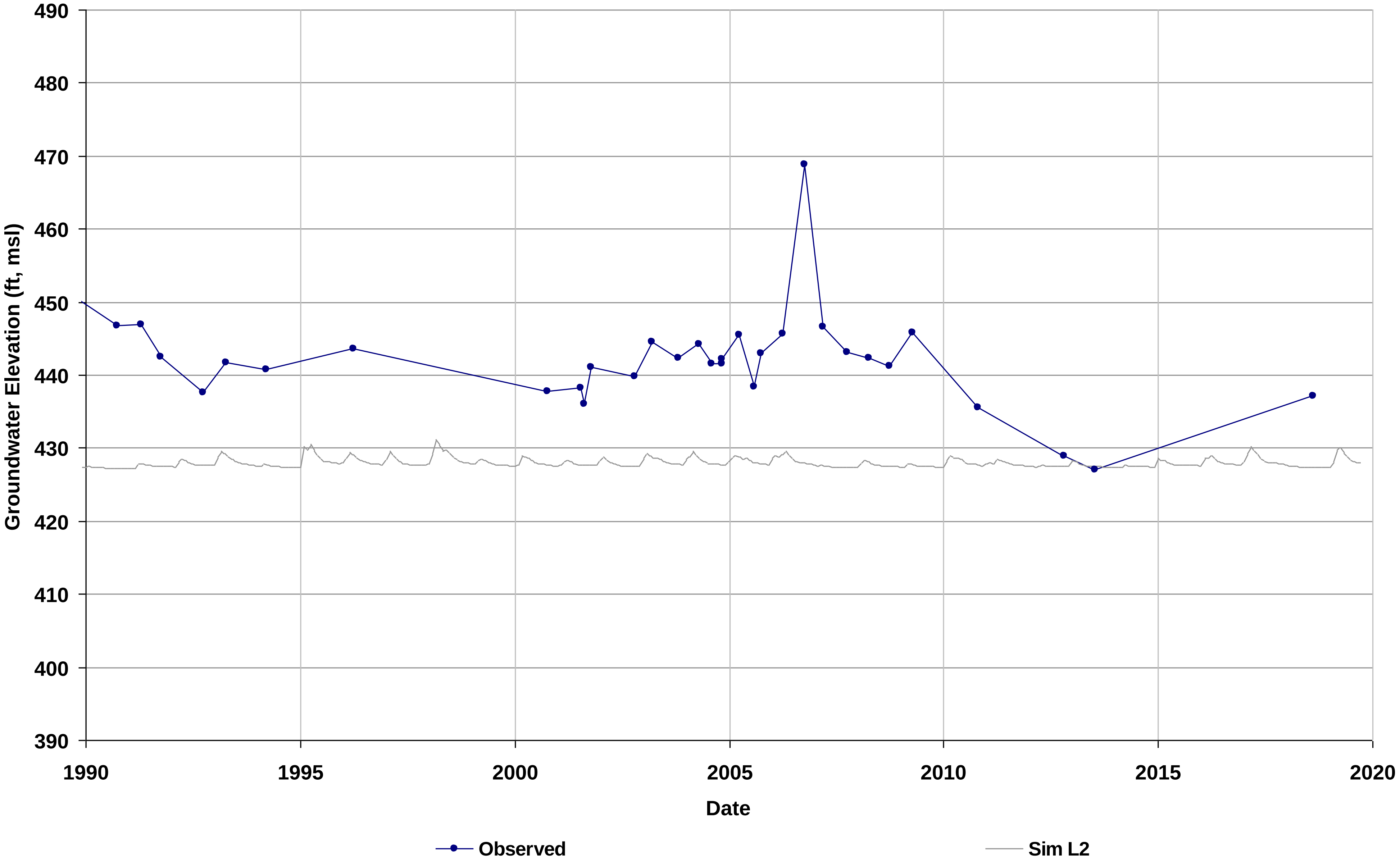


Tehama IHM - Historical

Well Name: 25N05W24D001M
Depth Zone: Unknown
Subbasin: Red Bluff
GSE (ft, msl): 515

Total Depth (ft):
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): -13.9

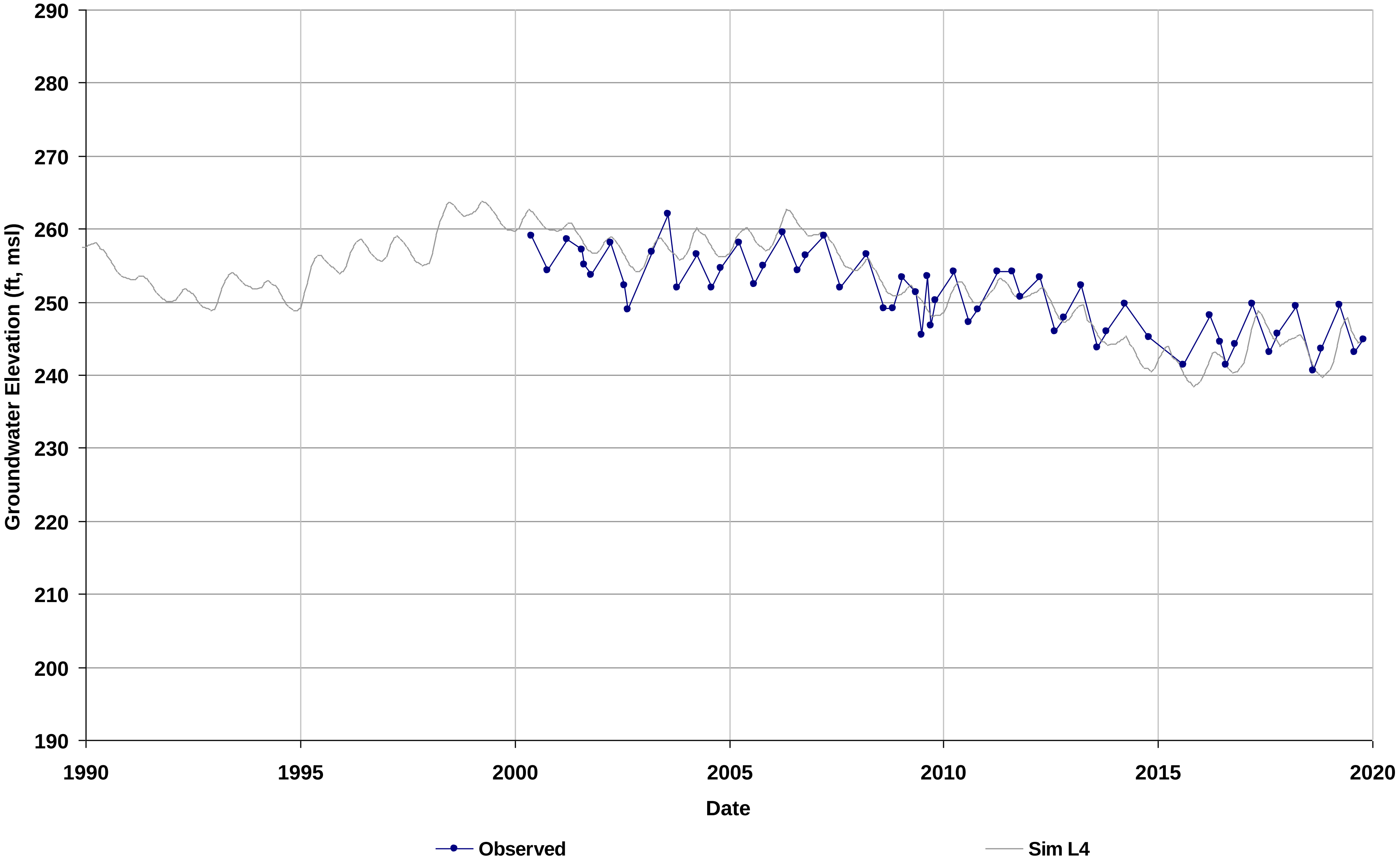


Tehama IHM - Historical

Well Name: 26N03W17B001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 309

Total Depth (ft): 180
Perf Top (ft): 160
Perf Bottom (ft): 180
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 0.65

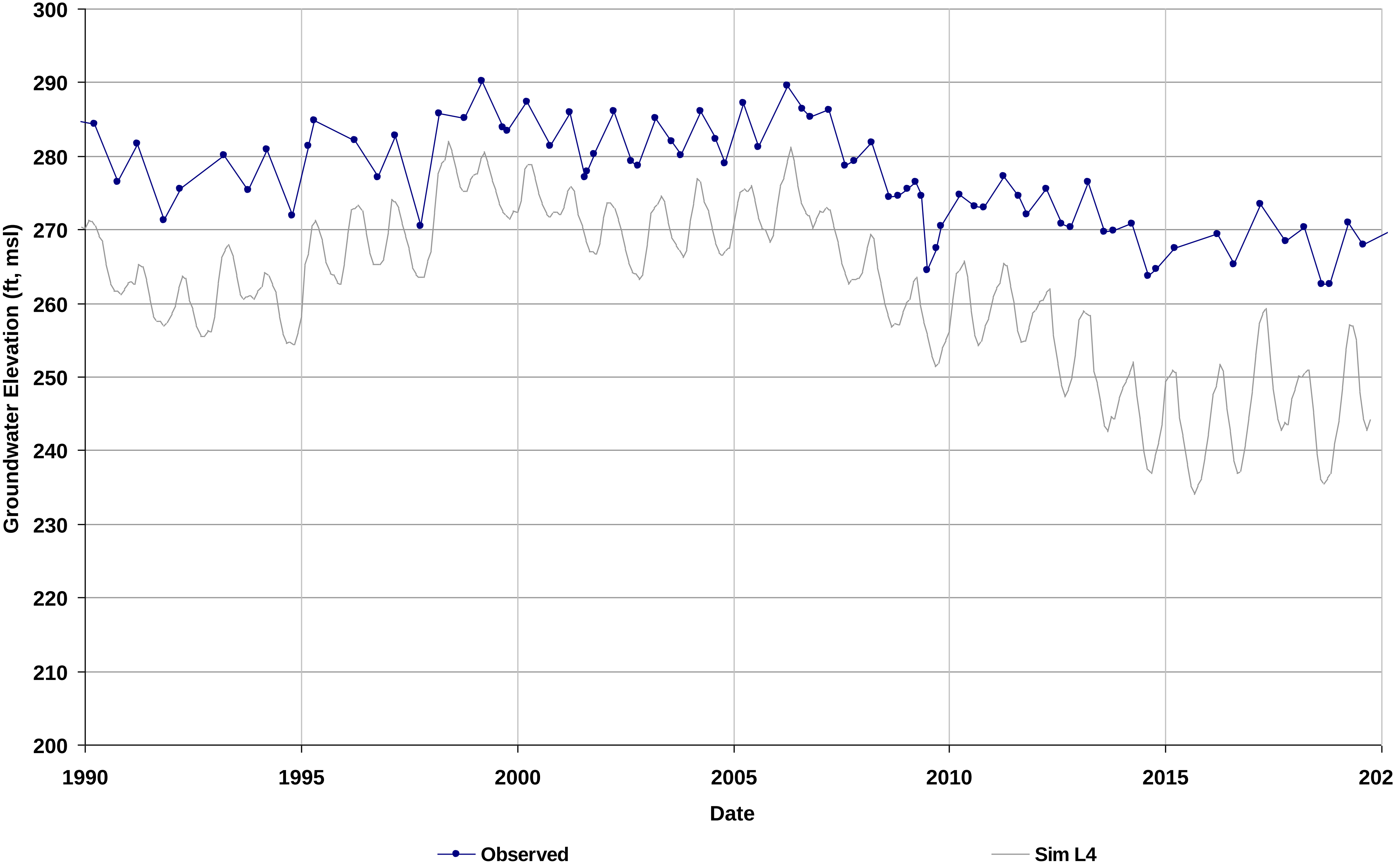


Tehama IHM - Historical

Well Name: 26N04W25J001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 333

Total Depth (ft): 128
Perf Top (ft): 116
Perf Bottom (ft): 124
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -14.84

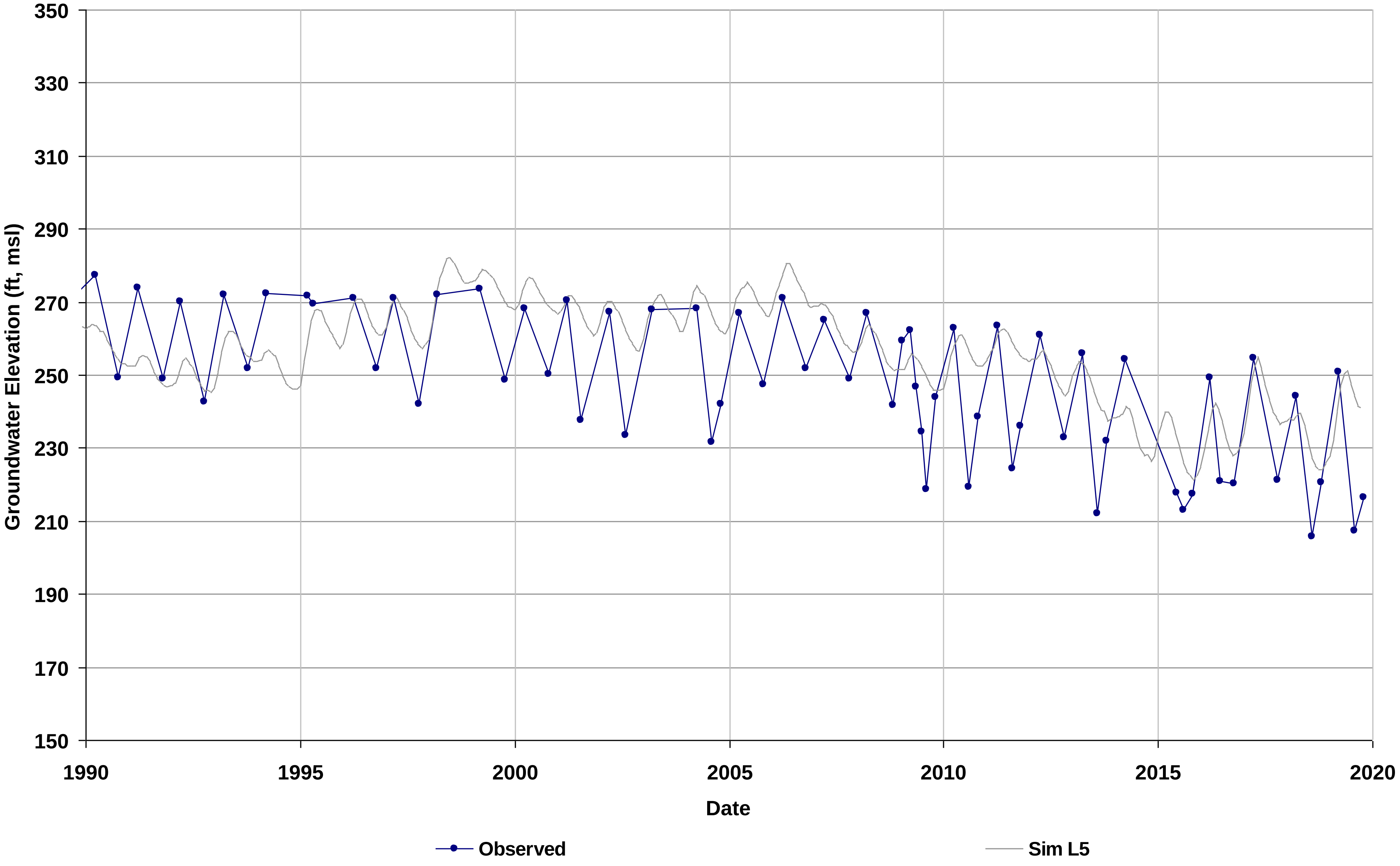


Tehama IHM - Historical

Well Name: 25N03W19N001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 327

Total Depth (ft): 370
Perf Top (ft): 135
Perf Bottom (ft): 358
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 6.64

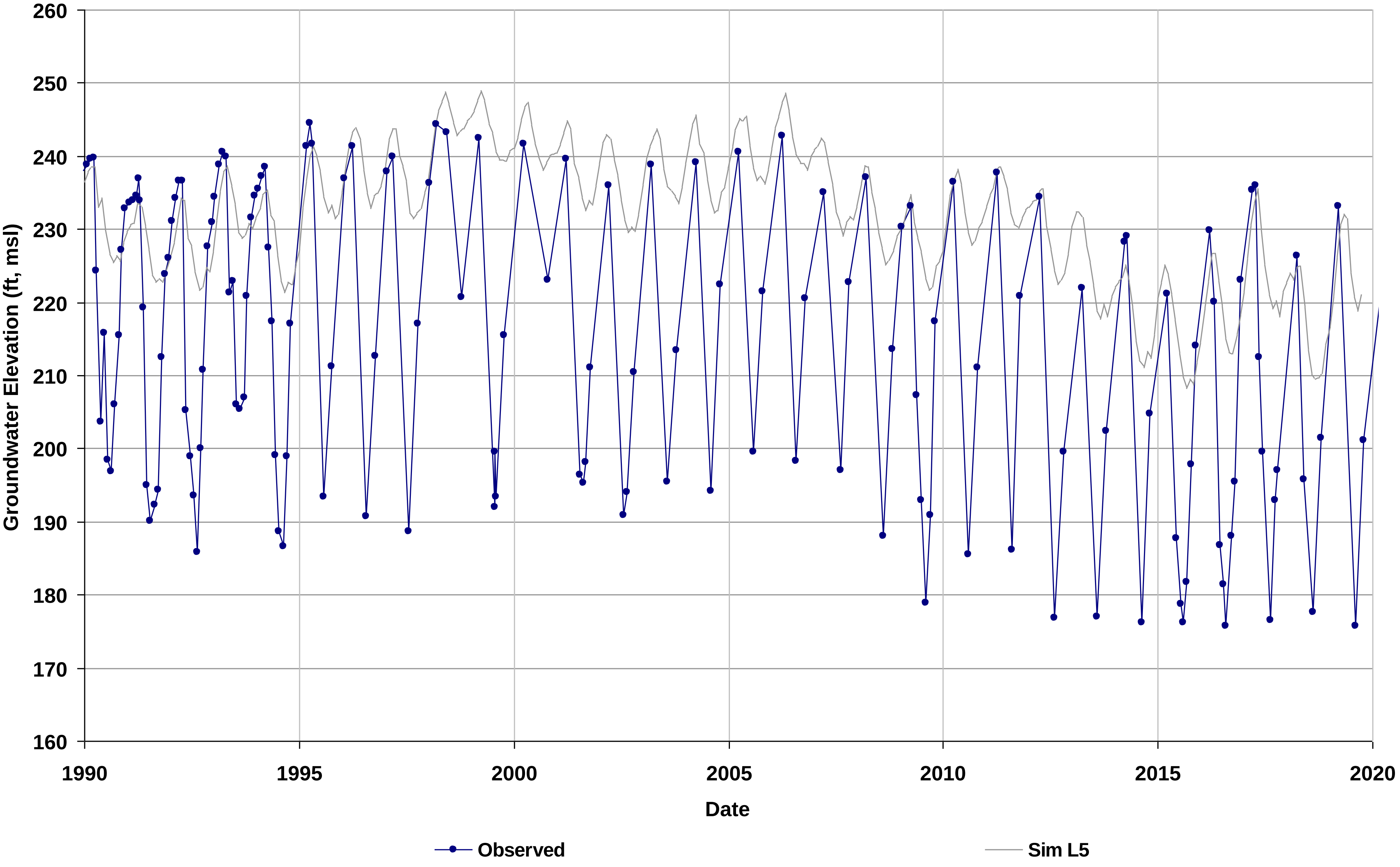


Tehama IHM - Historical

Well Name: 25N03W10L001M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 276

Total Depth (ft): 400
Perf Top (ft): 251
Perf Bottom (ft): 400
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 15.94

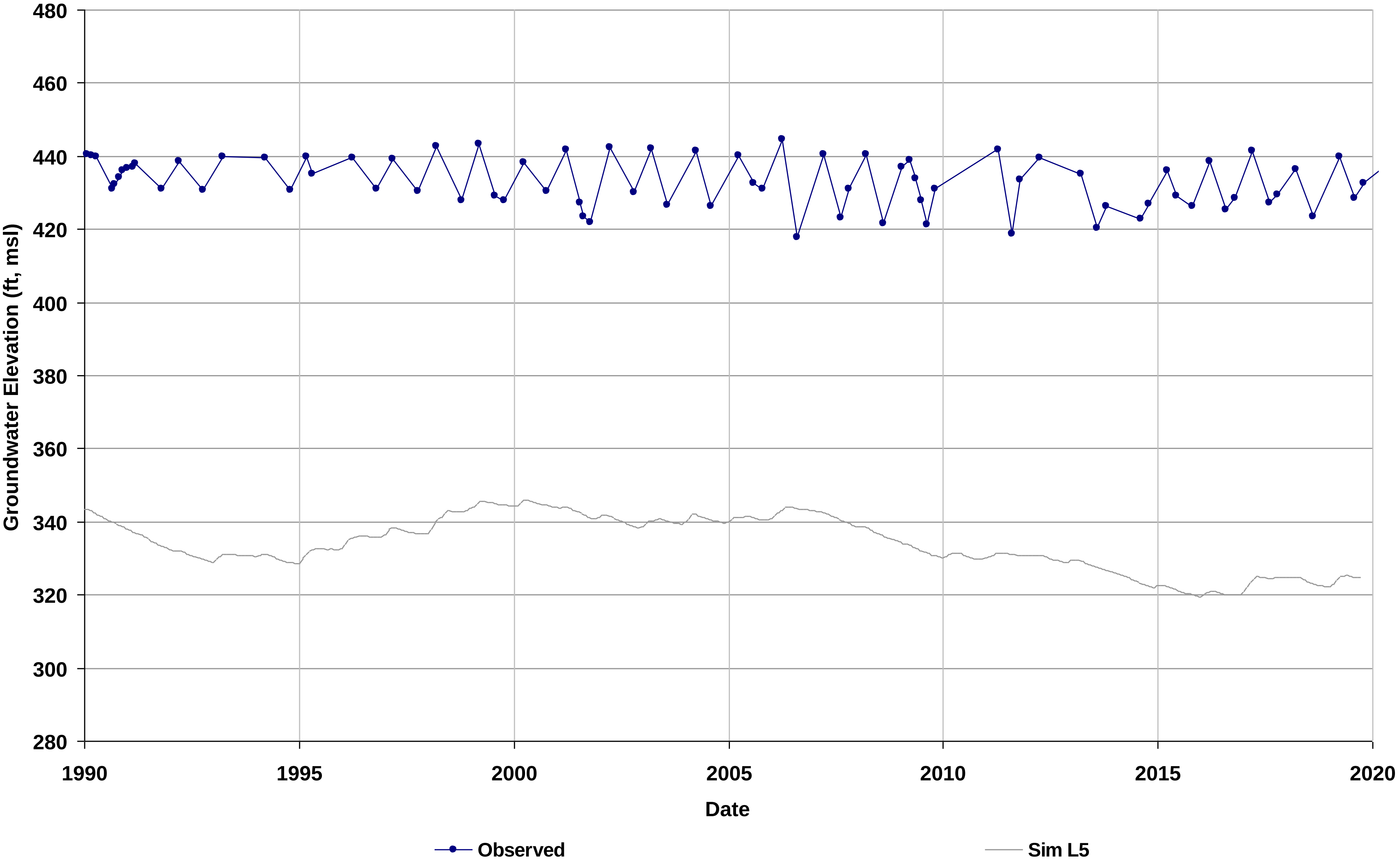


Tehama IHM - Historical

Well Name: 27N04W05G002M
Depth Zone: Upper
Subbasin: Red Bluff
GSE (ft, msl): 482

Total Depth (ft): 260
Perf Top (ft): 231
Perf Bottom (ft): 251
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): -98.13

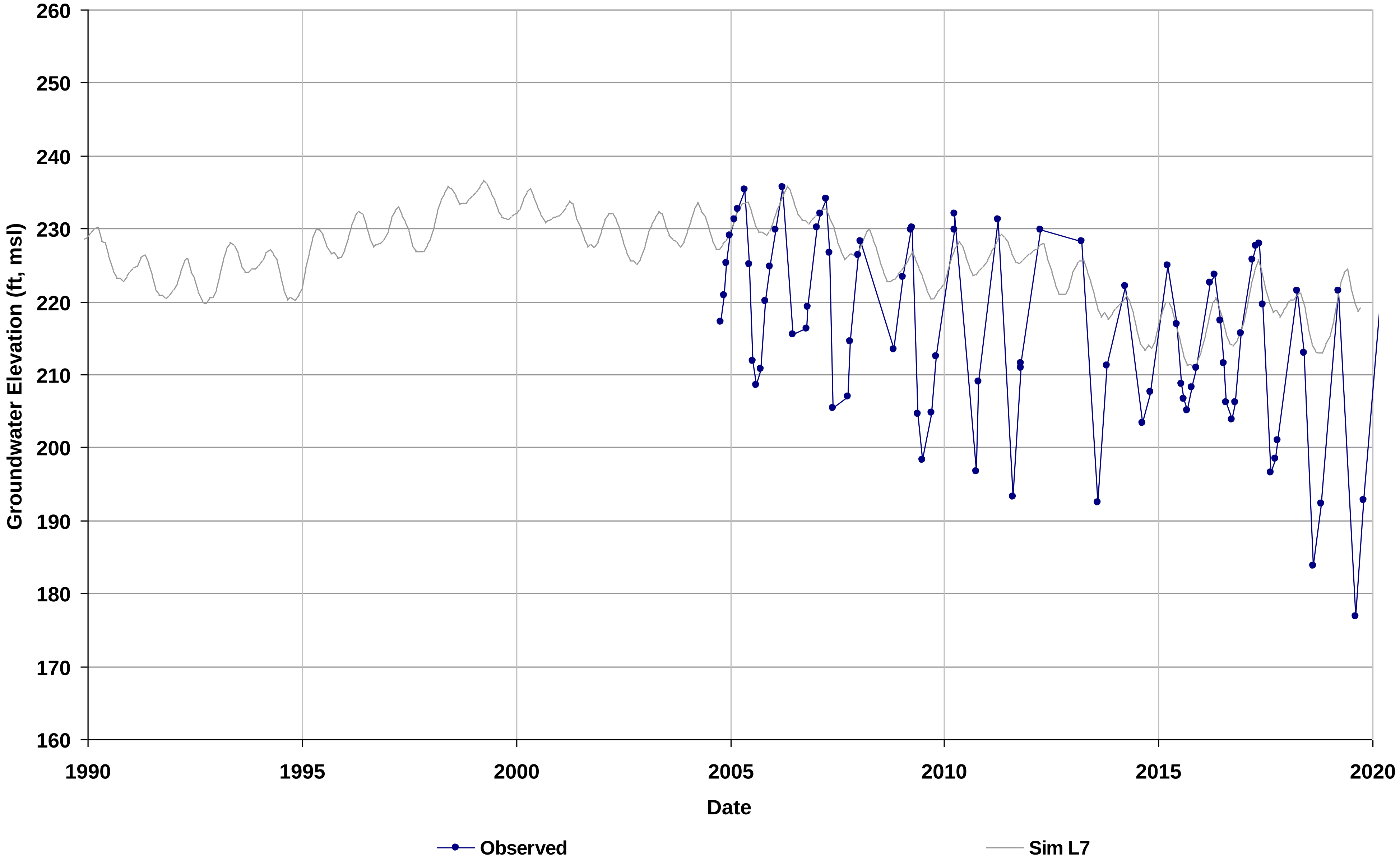


Tehama IHM - Historical

Well Name: 25N03W11B003M
Depth Zone: Lower
Subbasin: Red Bluff
GSE (ft, msl): 252

Total Depth (ft): 1000
Perf Top (ft): 940
Perf Bottom (ft): 960
Top Model Layer: 7
Bottom Model Layer: 7

Average Residual (ft): 7.26

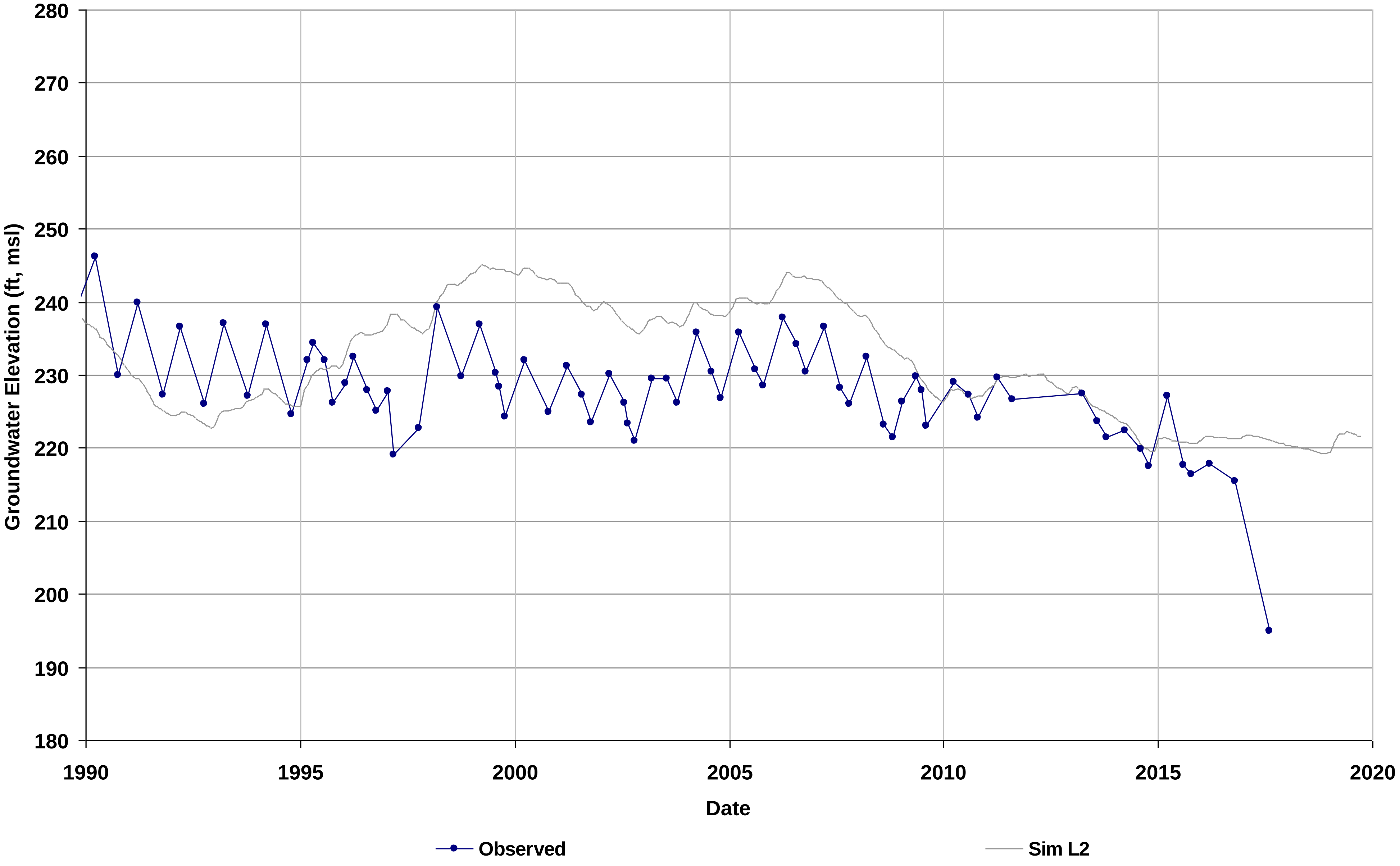


Tehama IHM - Historical

Well Name: 23N03W05G001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 279

Total Depth (ft): 70
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): 5.77

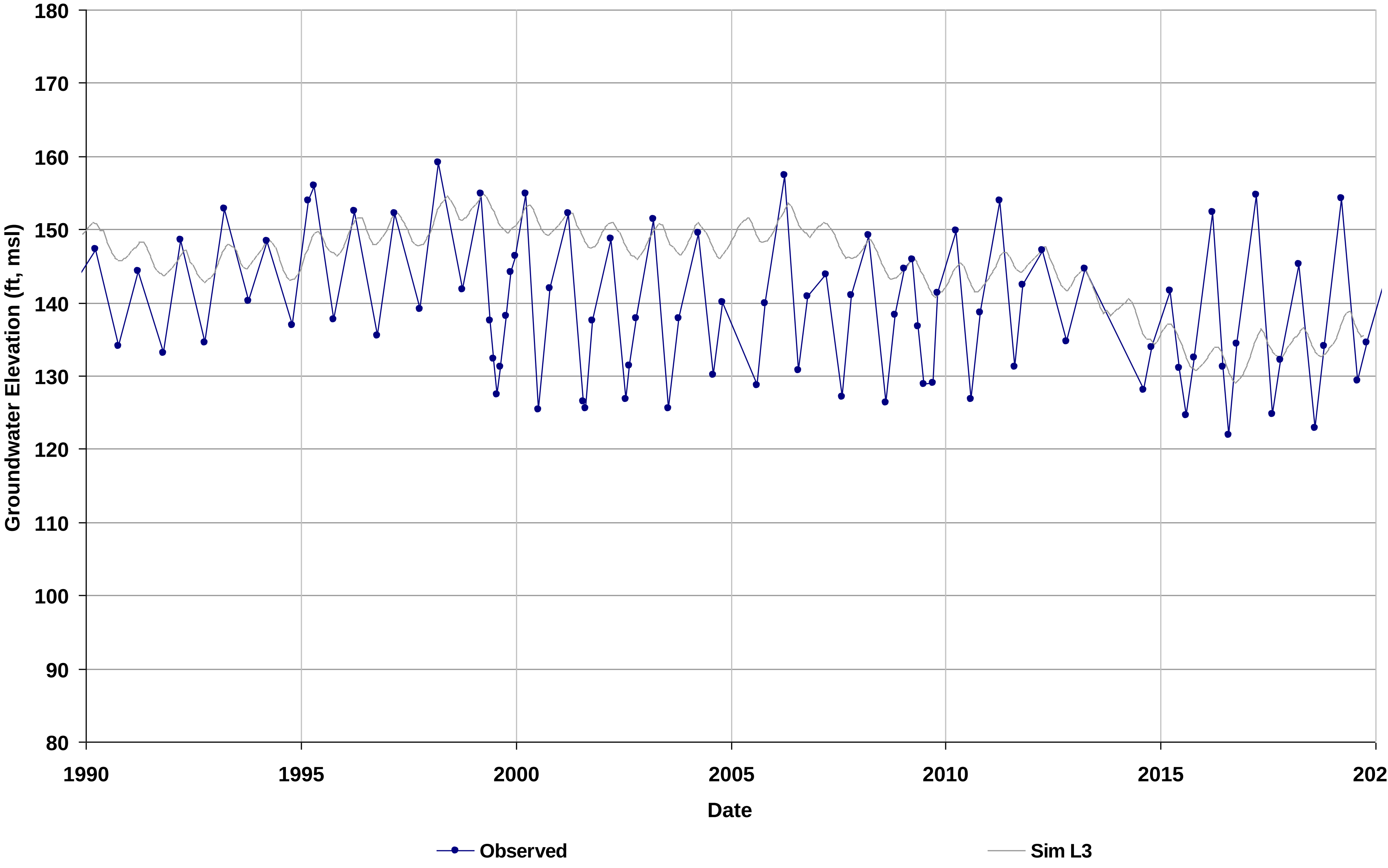


Tehama IHM - Historical

Well Name: 23N02W34A001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 172

Total Depth (ft): 130
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 5.92

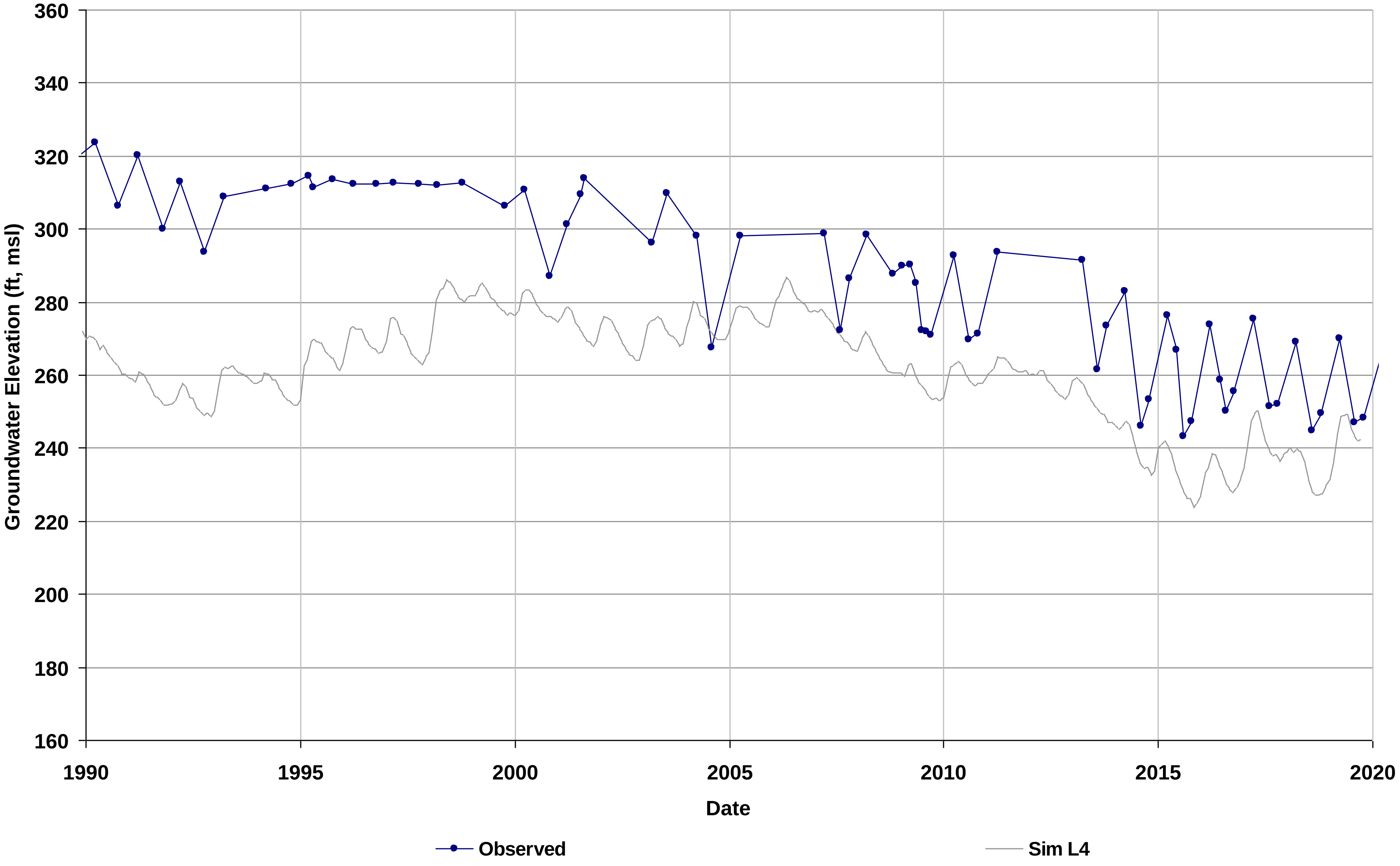


Tehama IHM - Historical

Well Name: 24N04W14N002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 375

Total Depth (ft): 180
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -29.89

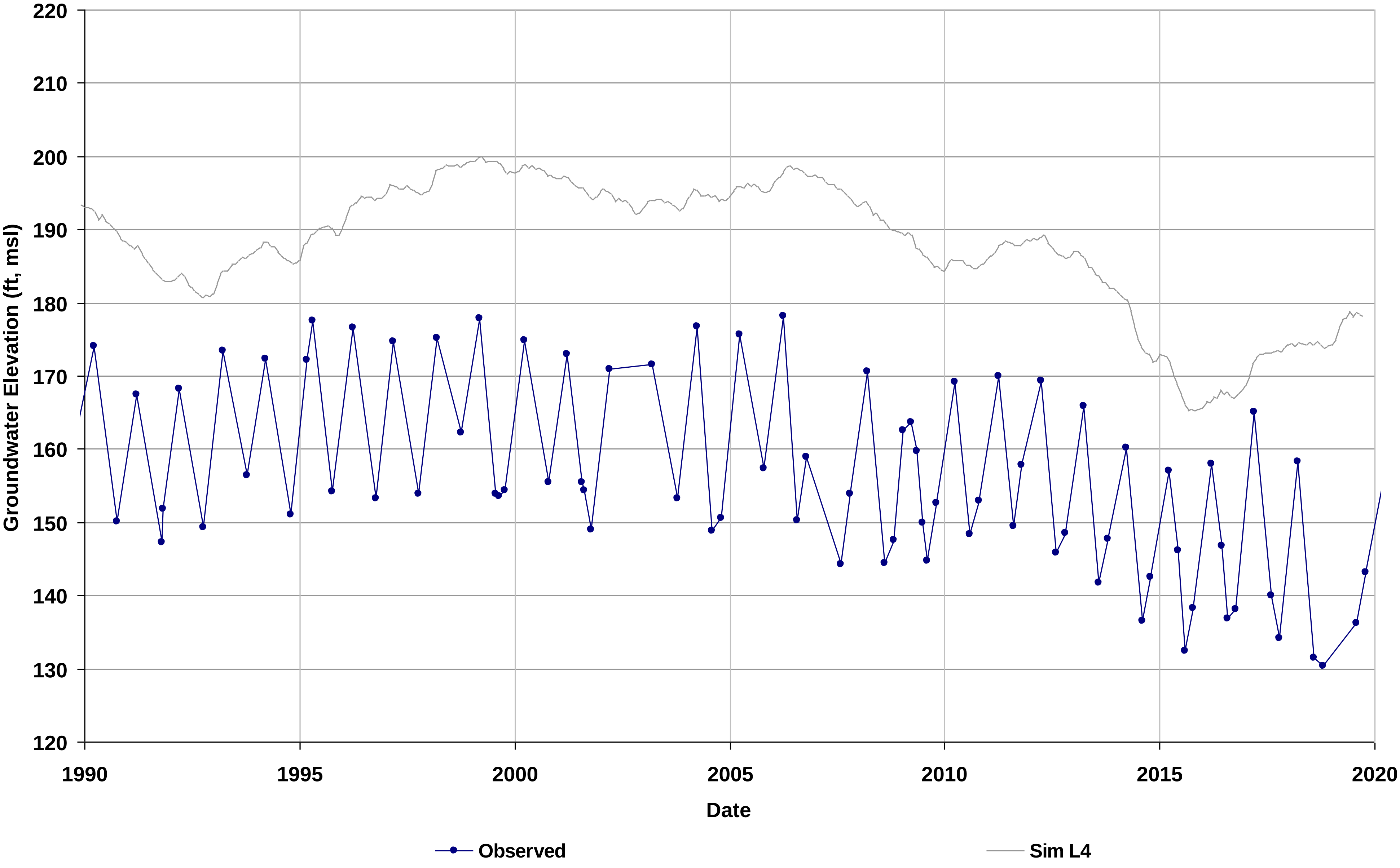


Tehama IHM - Historical

Well Name: 23N03W24A002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 207

Total Depth (ft): 200
Perf Top (ft):
Perf Bottom (ft):
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 30.42

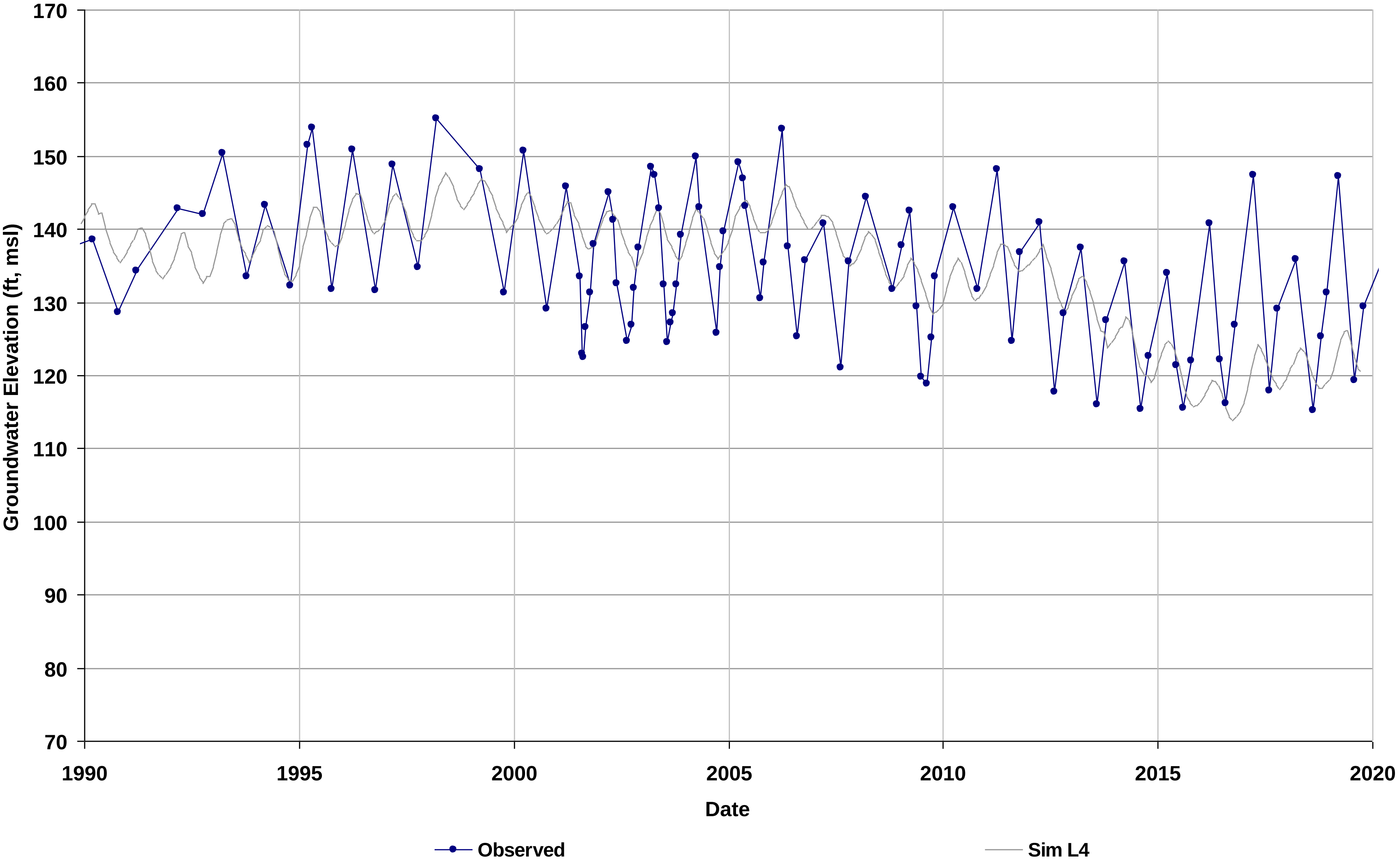


Tehama IHM - Historical

Well Name: 22N02W11Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 166

Total Depth (ft):
Perf Top (ft): 12
Perf Bottom (ft): 239
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 0.52

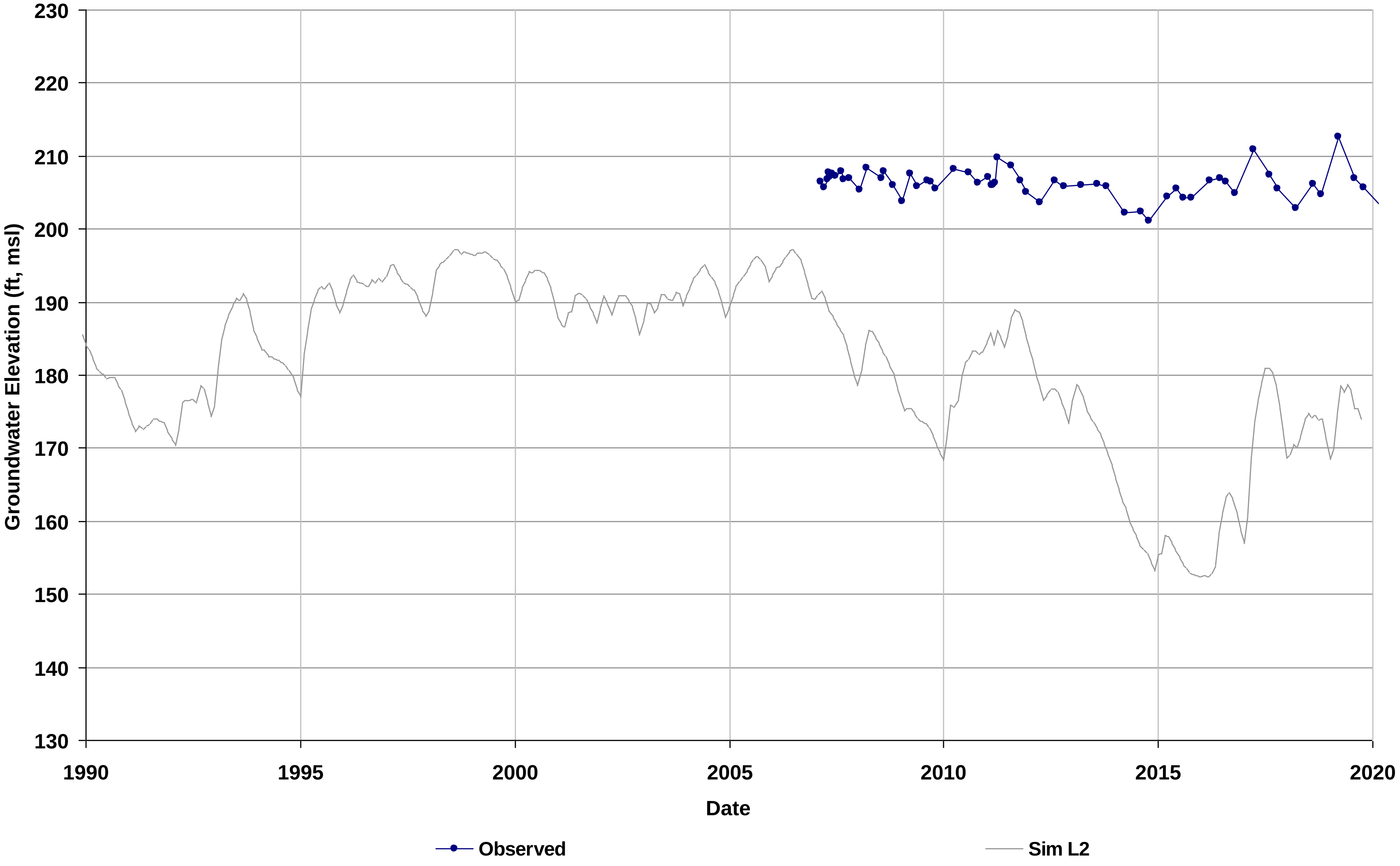


Tehama IHM - Historical

Well Name: 22N02W18C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

Total Depth (ft): 90
Perf Top (ft): 55
Perf Bottom (ft): 65
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): -29.43

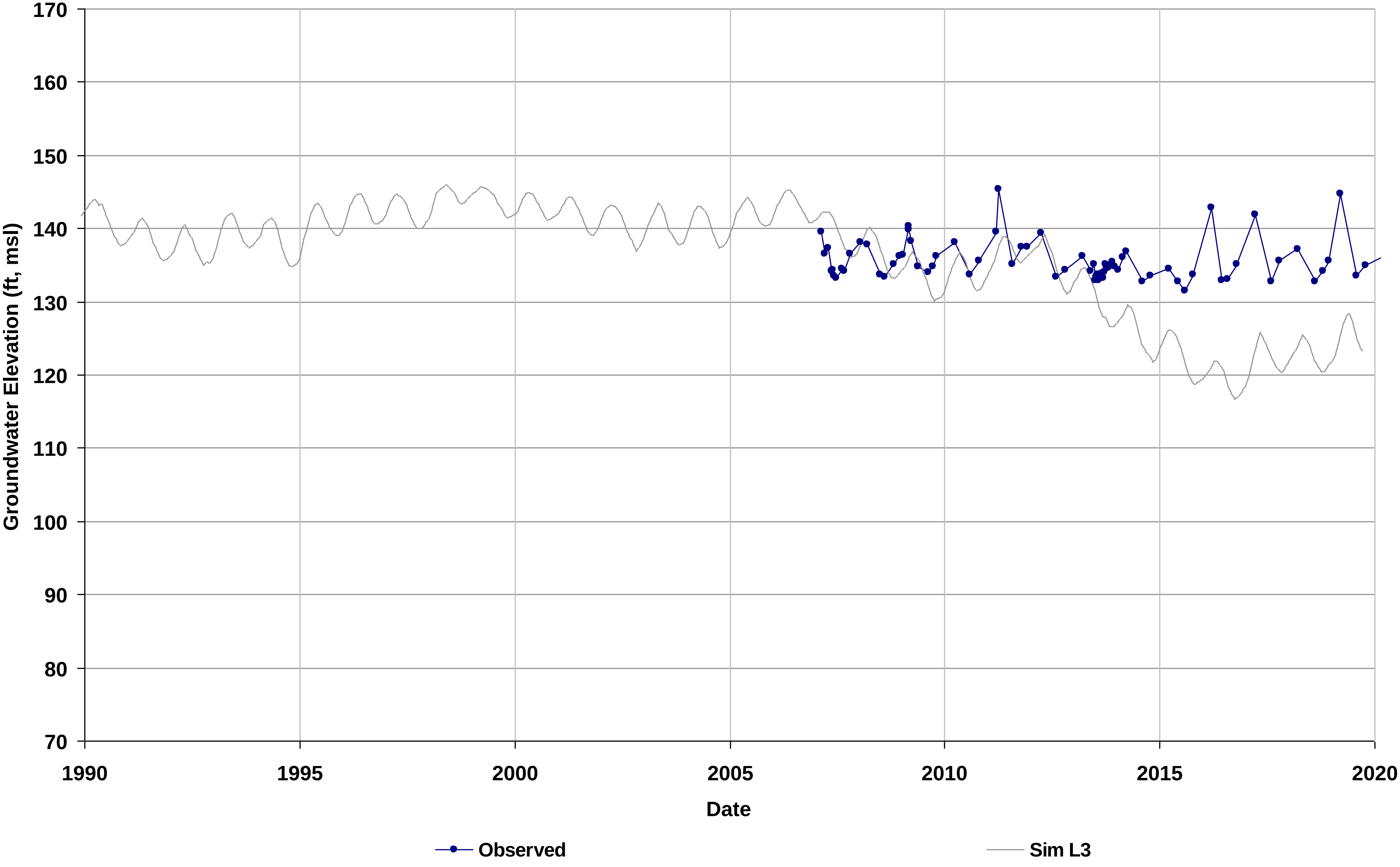


Tehama IHM - Historical

Well Name: 22N02W01N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

Total Depth (ft): 108
Perf Top (ft): 70
Perf Bottom (ft): 80
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): -4.28

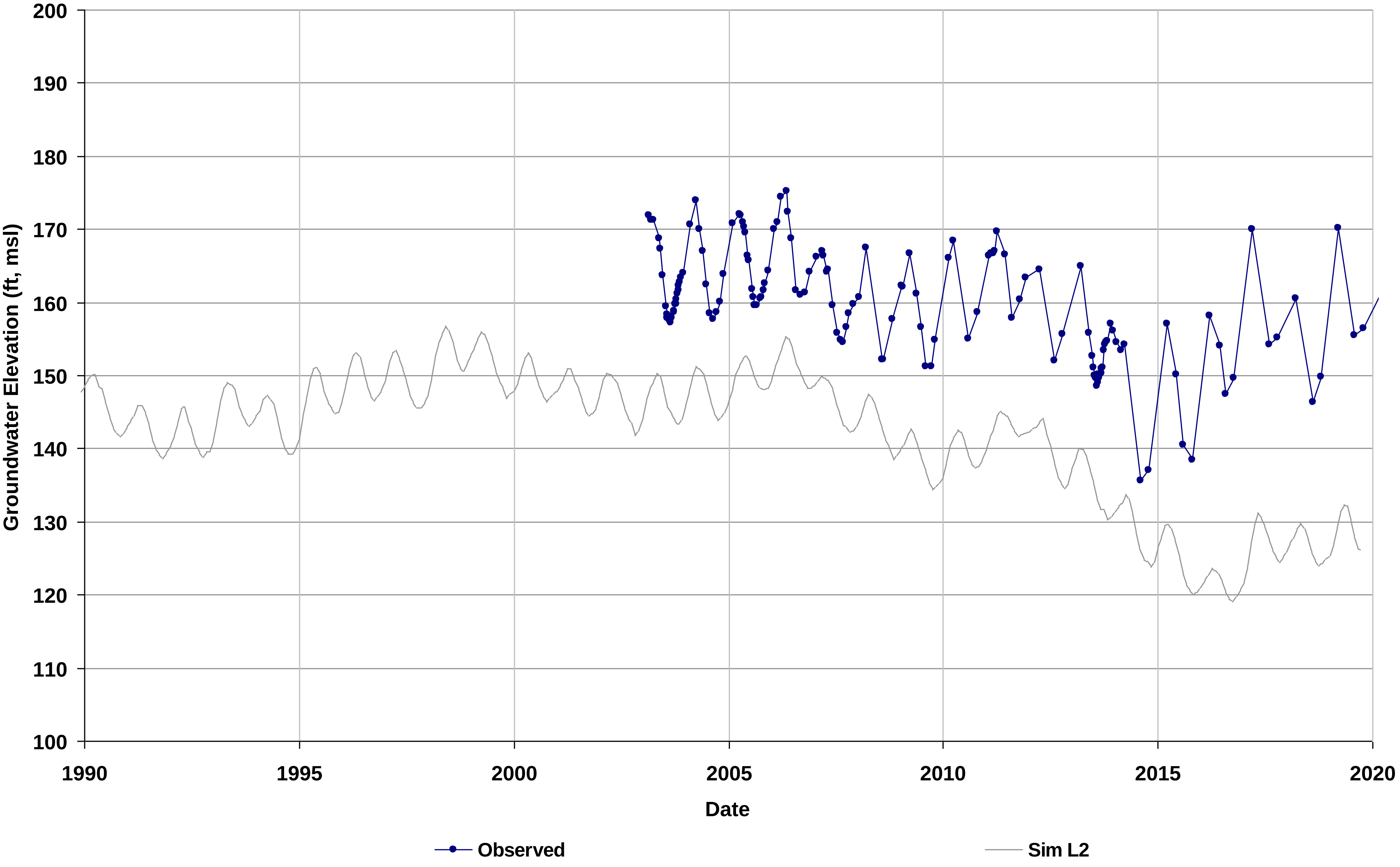


Tehama IHM - Historical

Well Name: 22N02W15C005M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

Total Depth (ft): 100
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): -18.4

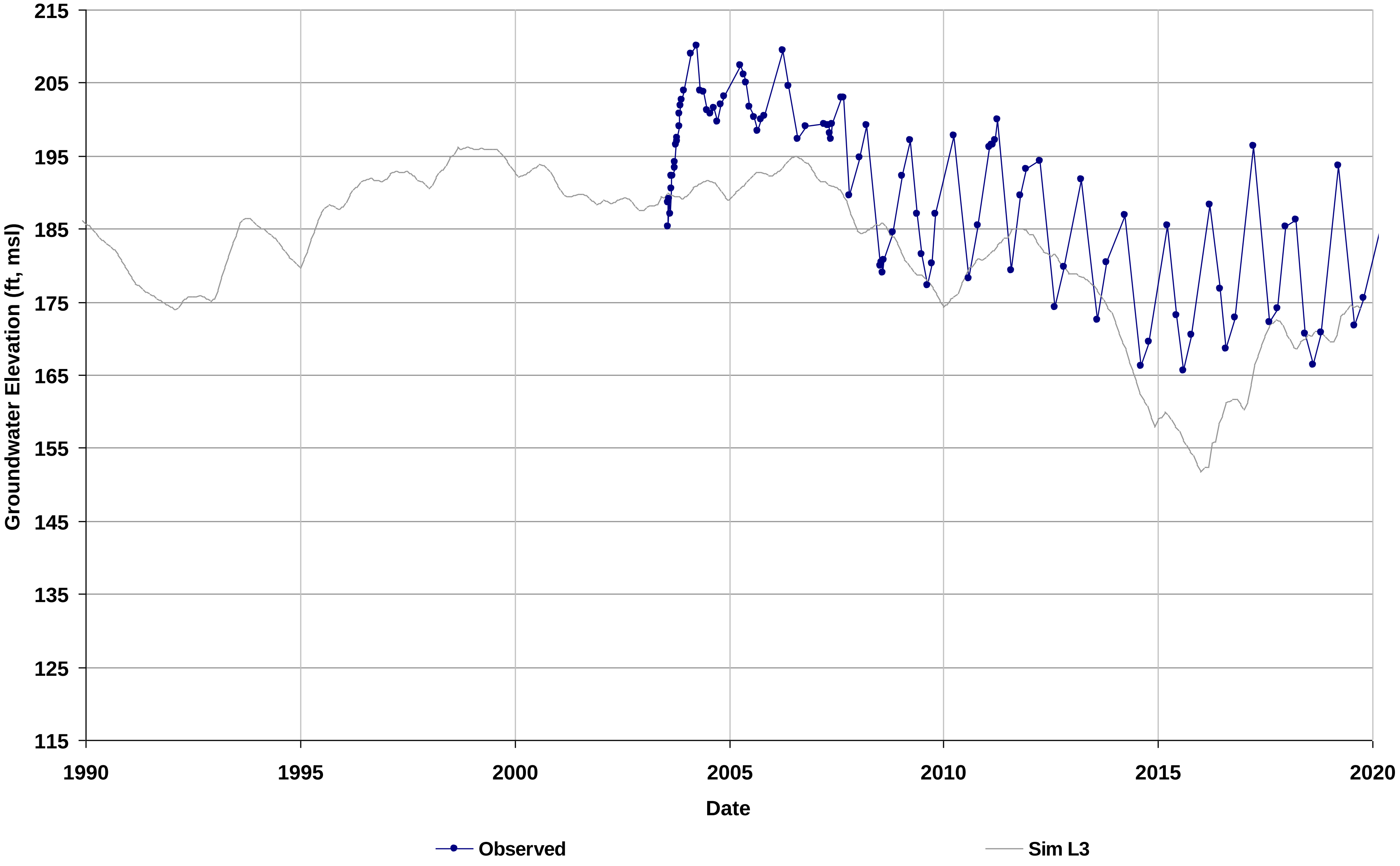


Tehama IHM - Historical

Well Name: 22N03W01R003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

Total Depth (ft): 103
Perf Top (ft): 60
Perf Bottom (ft): 70
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): -8.46

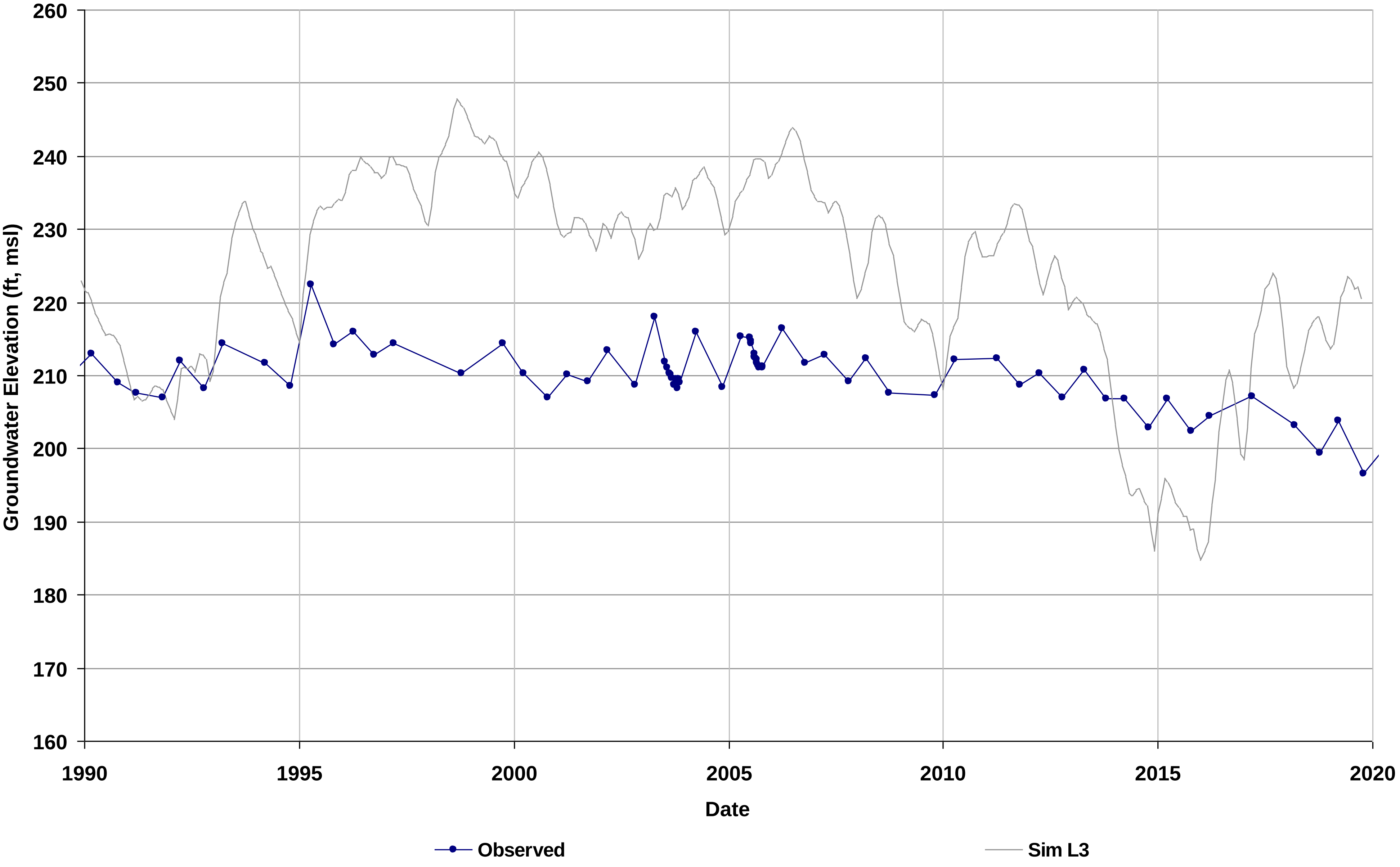


Tehama IHM - Historical

Well Name: 22N03W04E001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 285

Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 180
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): 17.11

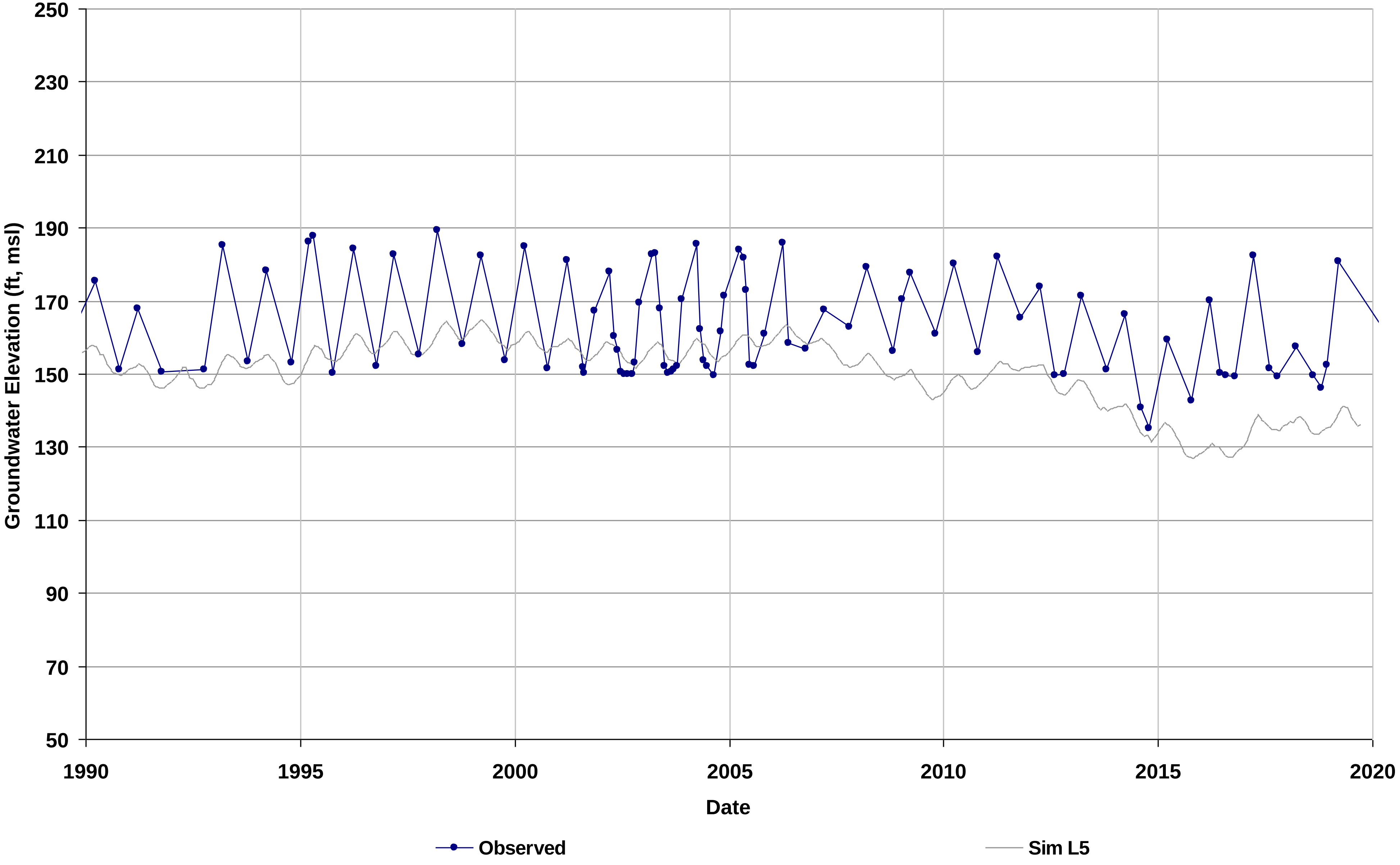


Tehama IHM - Historical

Well Name: 22N02W09L003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 197

Total Depth (ft):
Perf Top (ft): 40
Perf Bottom (ft): 536
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): -11.56

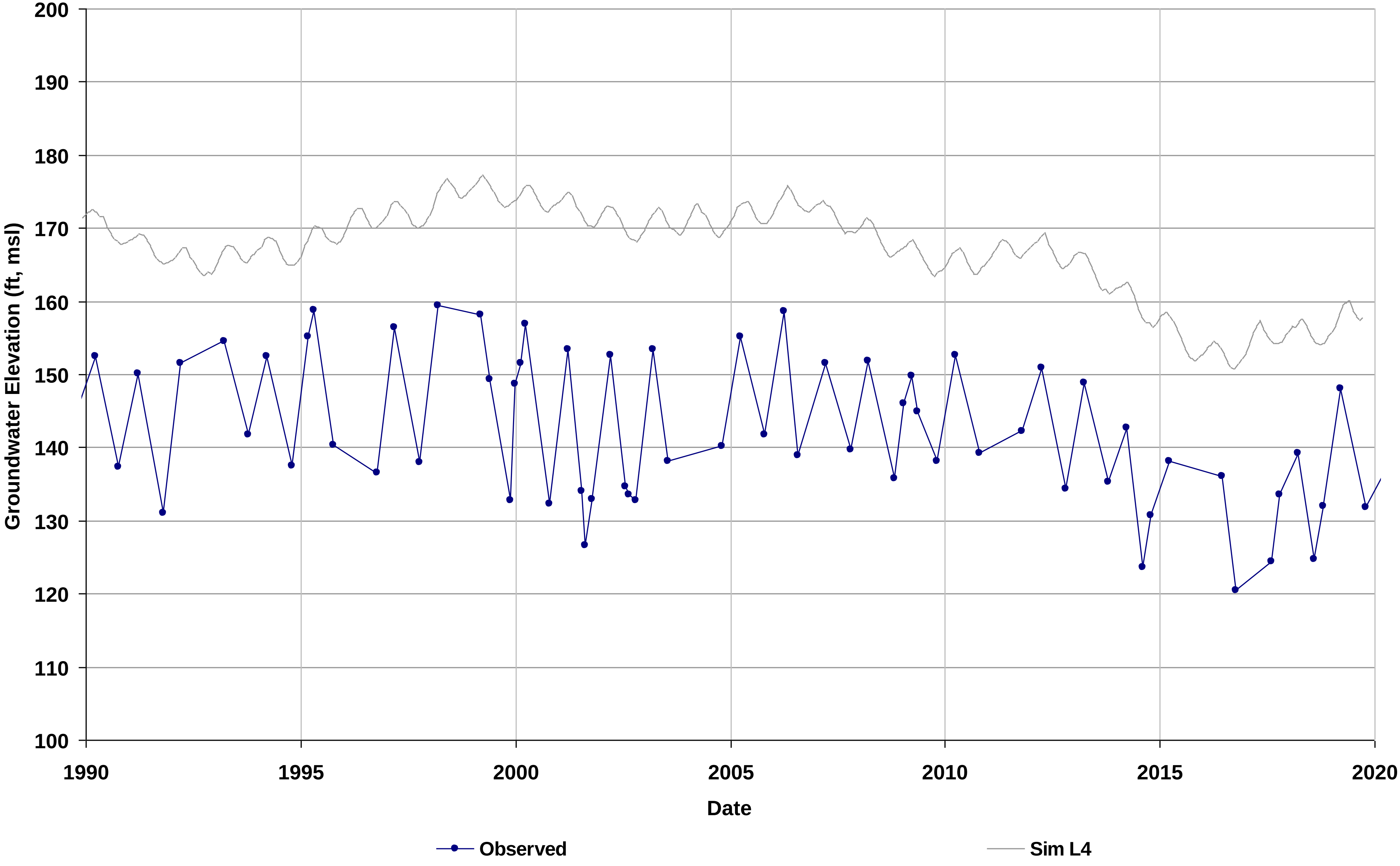


Tehama IHM - Historical

Well Name: 23N02W16B001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 184

Total Depth (ft): 120
Perf Top (ft): 100
Perf Bottom (ft): 120
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 25.24

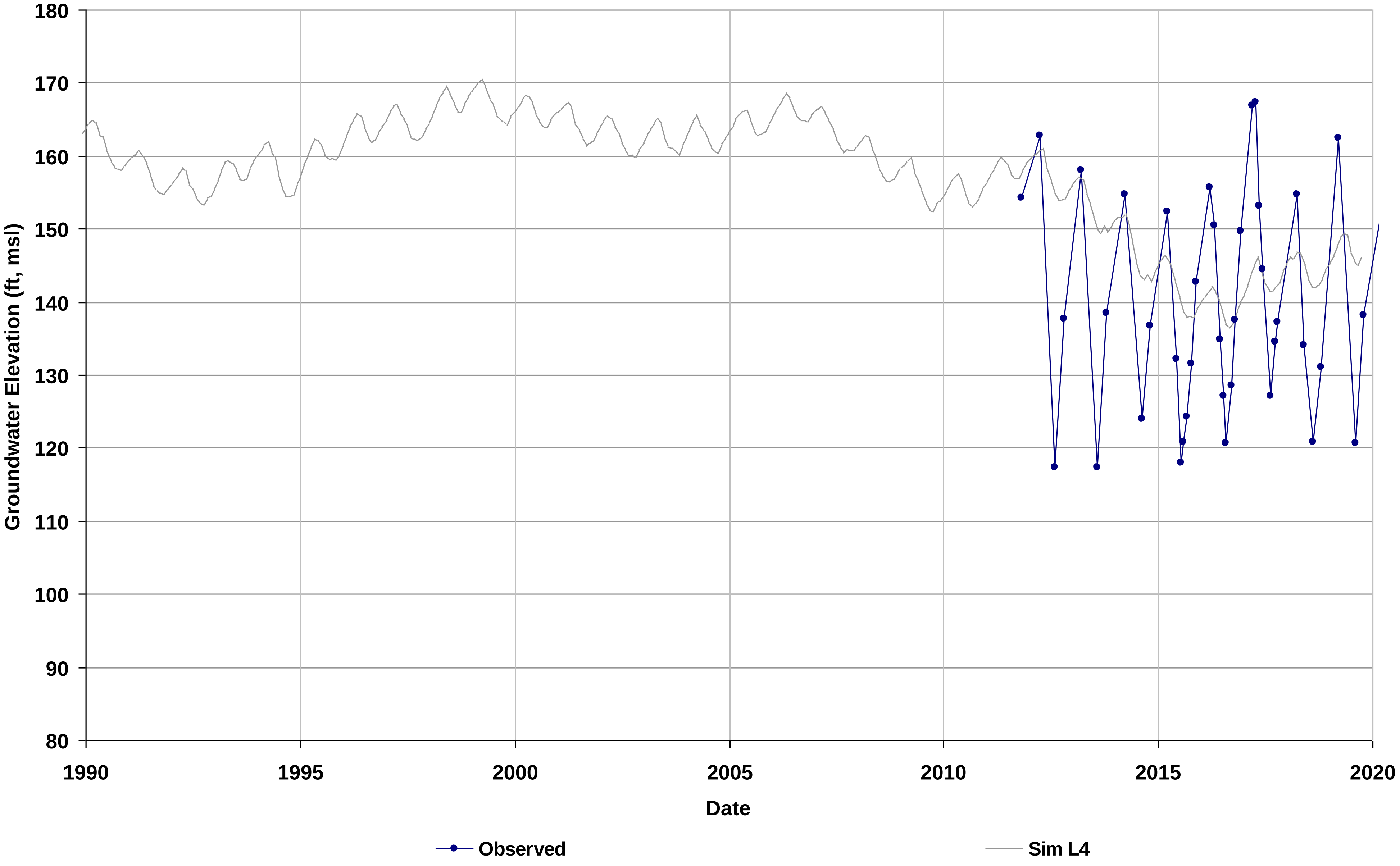


Tehama IHM - Historical

Well Name: 23N02W28N004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 202

Total Depth (ft): 205
Perf Top (ft): 100
Perf Bottom (ft): 170
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 5.35

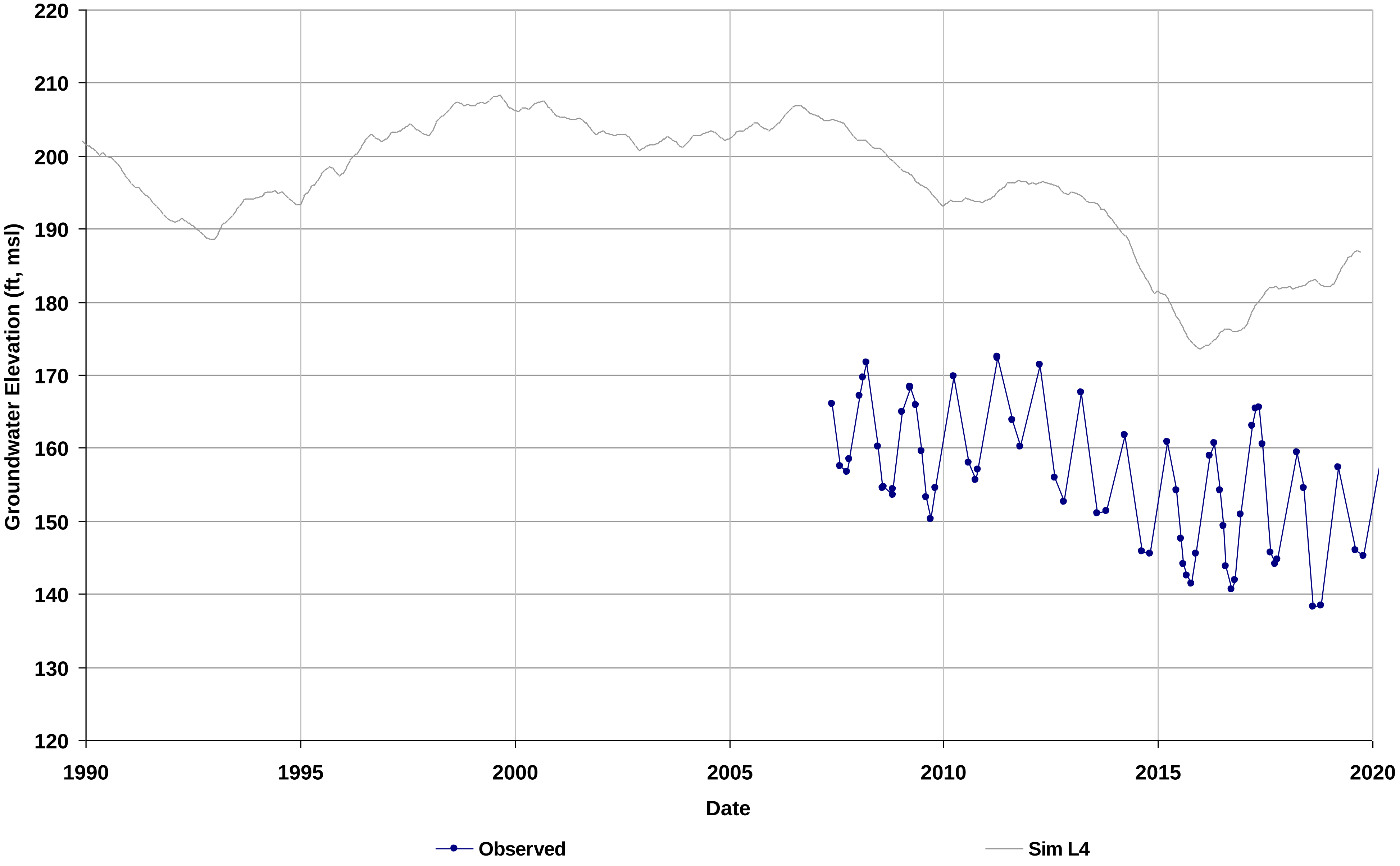


Tehama IHM - Historical

Well Name: 23N03W13C006M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 213

Total Depth (ft): 182
Perf Top (ft): 95
Perf Bottom (ft): 135
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 32.9

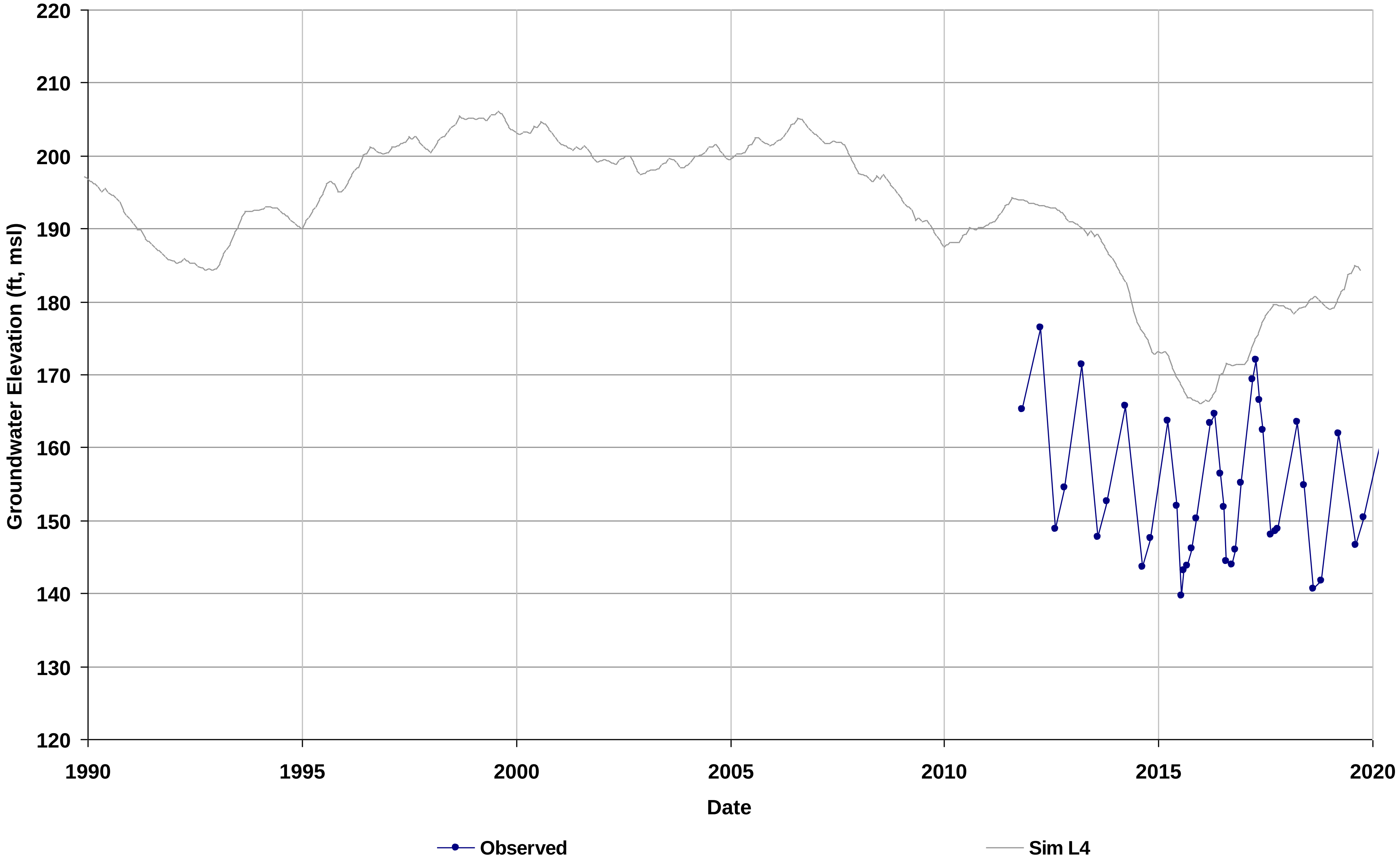


Tehama IHM - Historical

Well Name: 23N03W25M004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 235

Total Depth (ft): 155
Perf Top (ft): 120
Perf Bottom (ft): 130
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 22.15

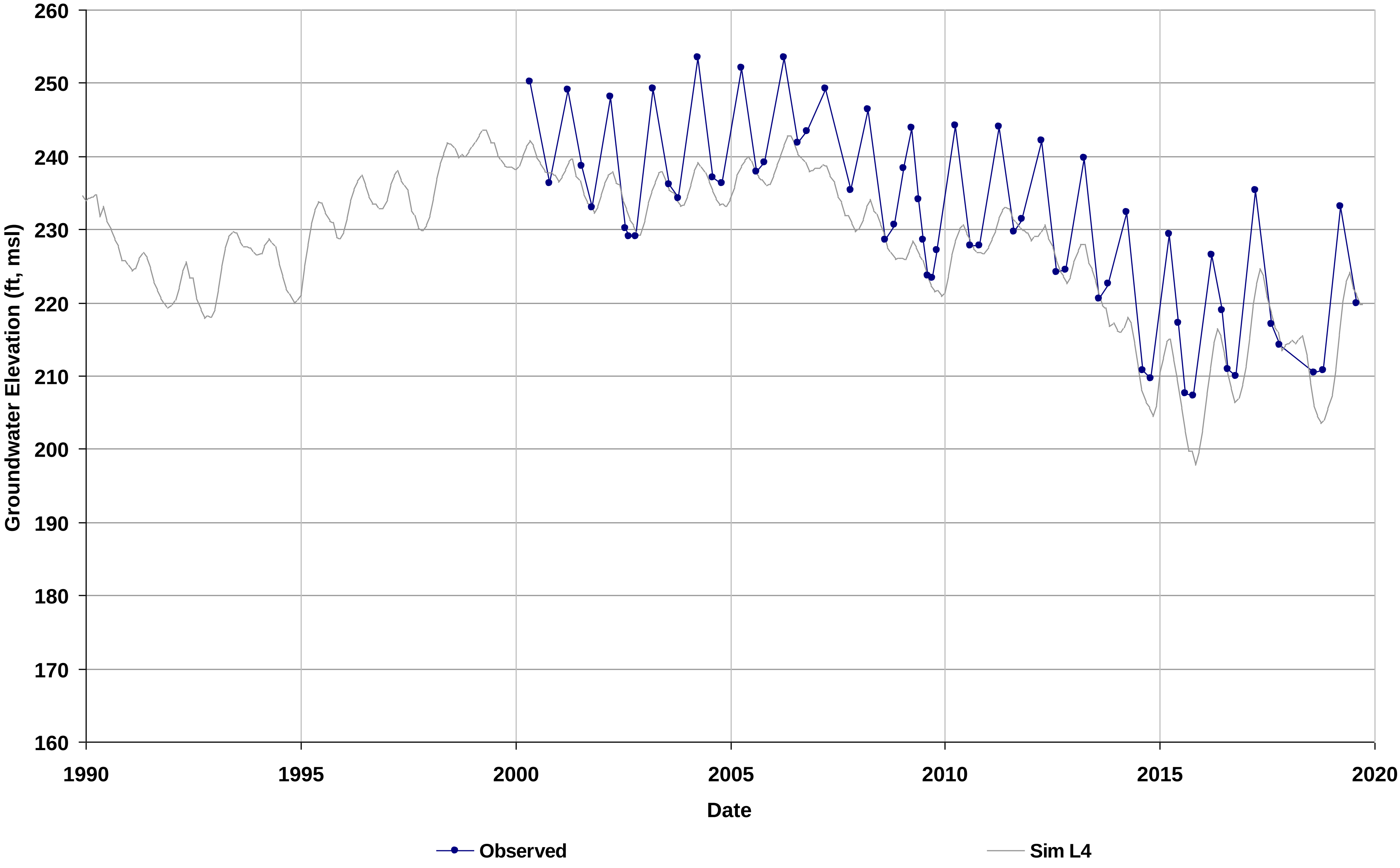


Tehama IHM - Historical

Well Name: 24N03W03R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 278

Total Depth (ft): 132
Perf Top (ft): 112
Perf Bottom (ft): 132
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -5.45

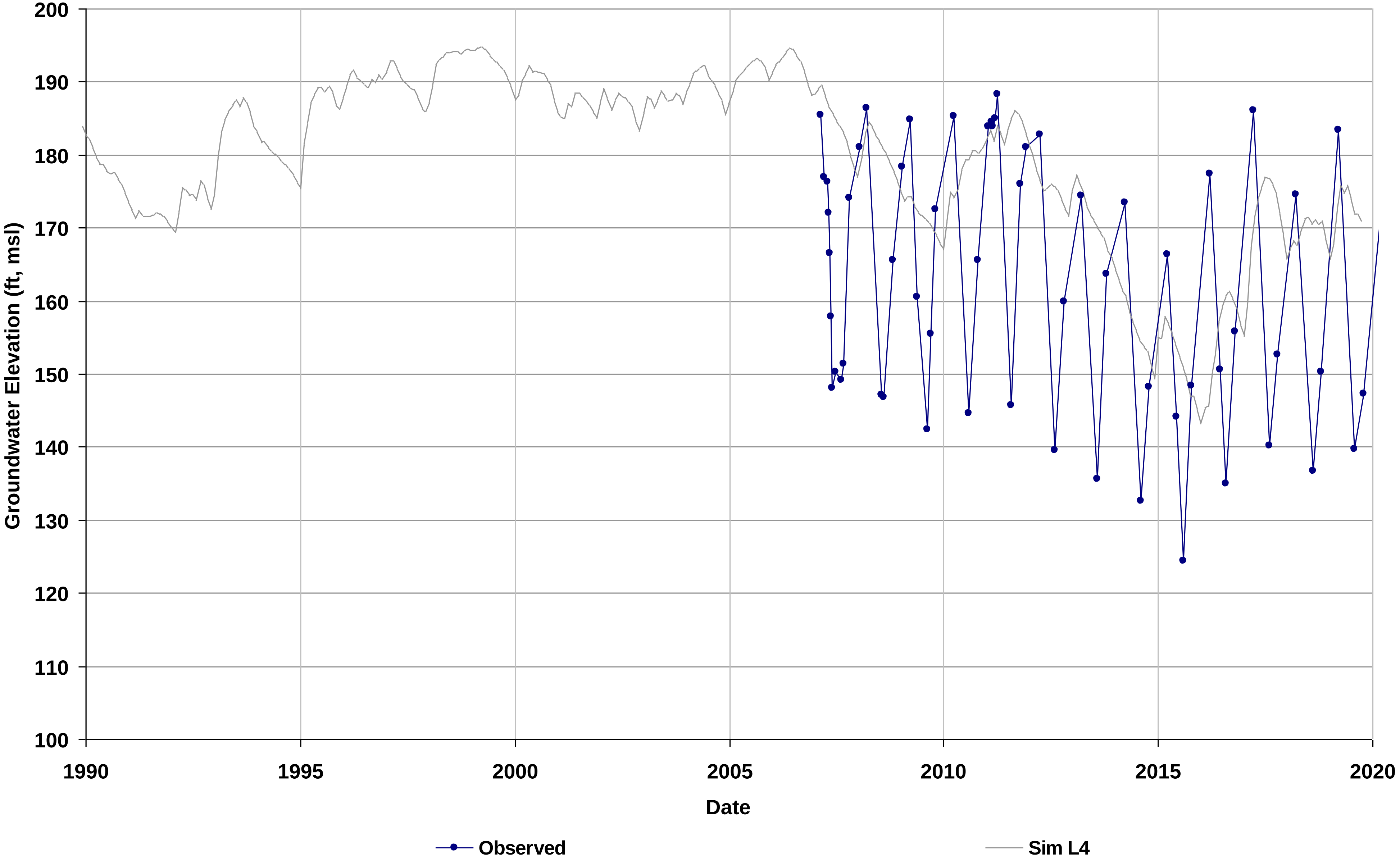


Tehama IHM - Historical

Well Name: 22N02W18C003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 223

Total Depth (ft): 188
Perf Top (ft): 165
Perf Bottom (ft): 175
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 11.23

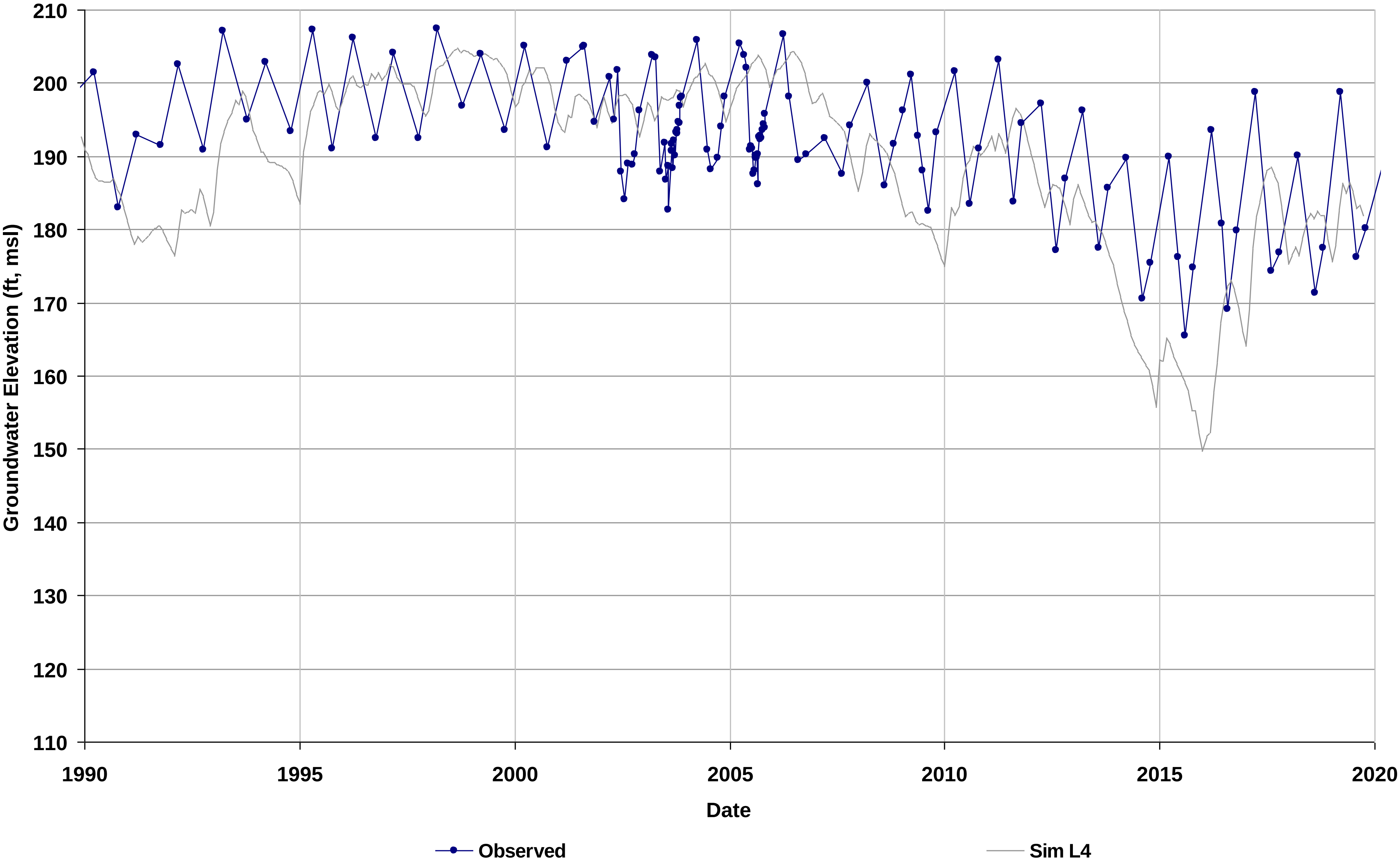


Tehama IHM - Historical

Well Name: 22N03W12Q003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 232

Total Depth (ft):
Perf Top (ft): 112
Perf Bottom (ft): 123
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 0.22

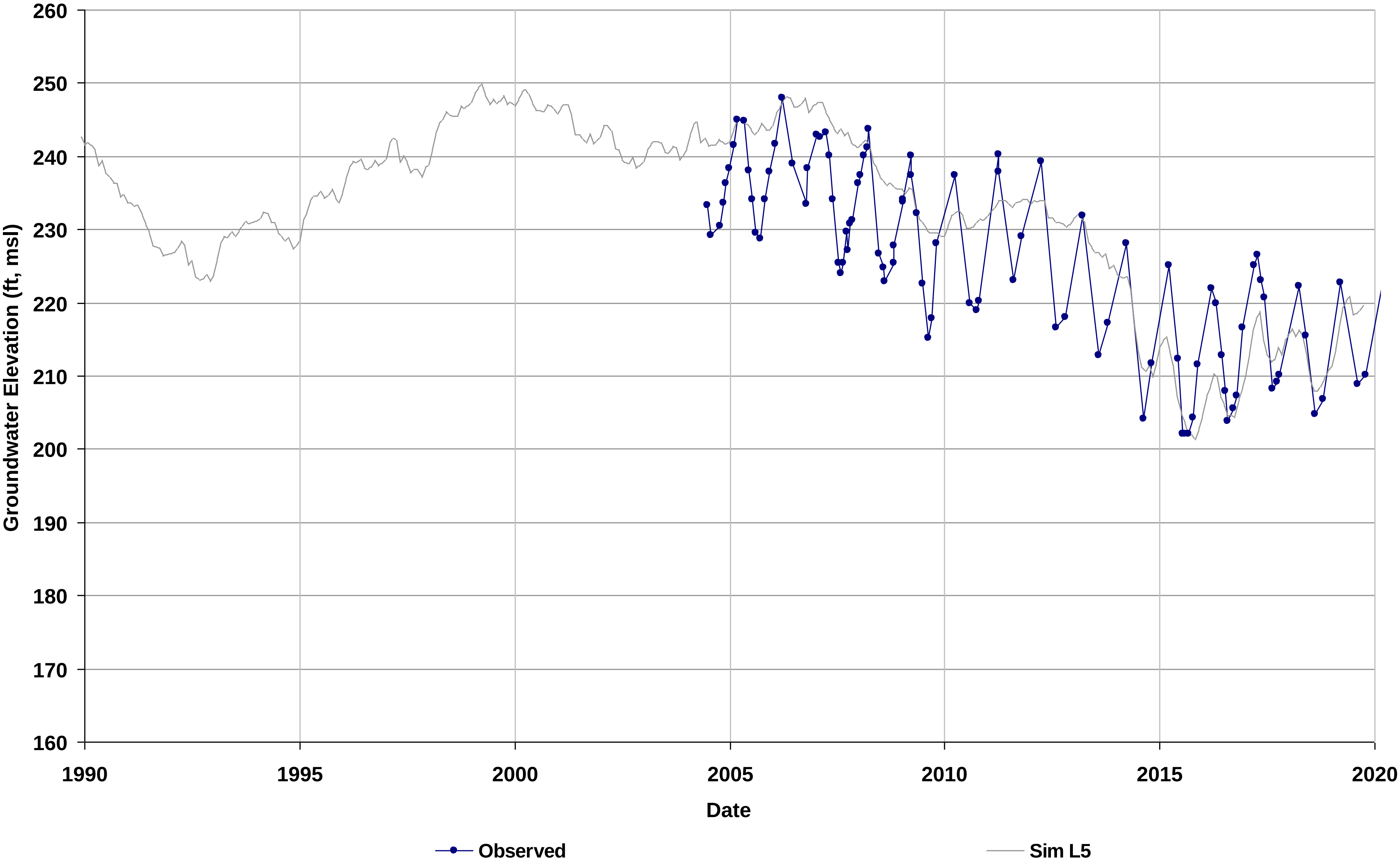


Tehama IHM - Historical

Well Name: 24N03W29Q001M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 314

Total Depth (ft): 372
Perf Top (ft): 130
Perf Bottom (ft): 360
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 3.79

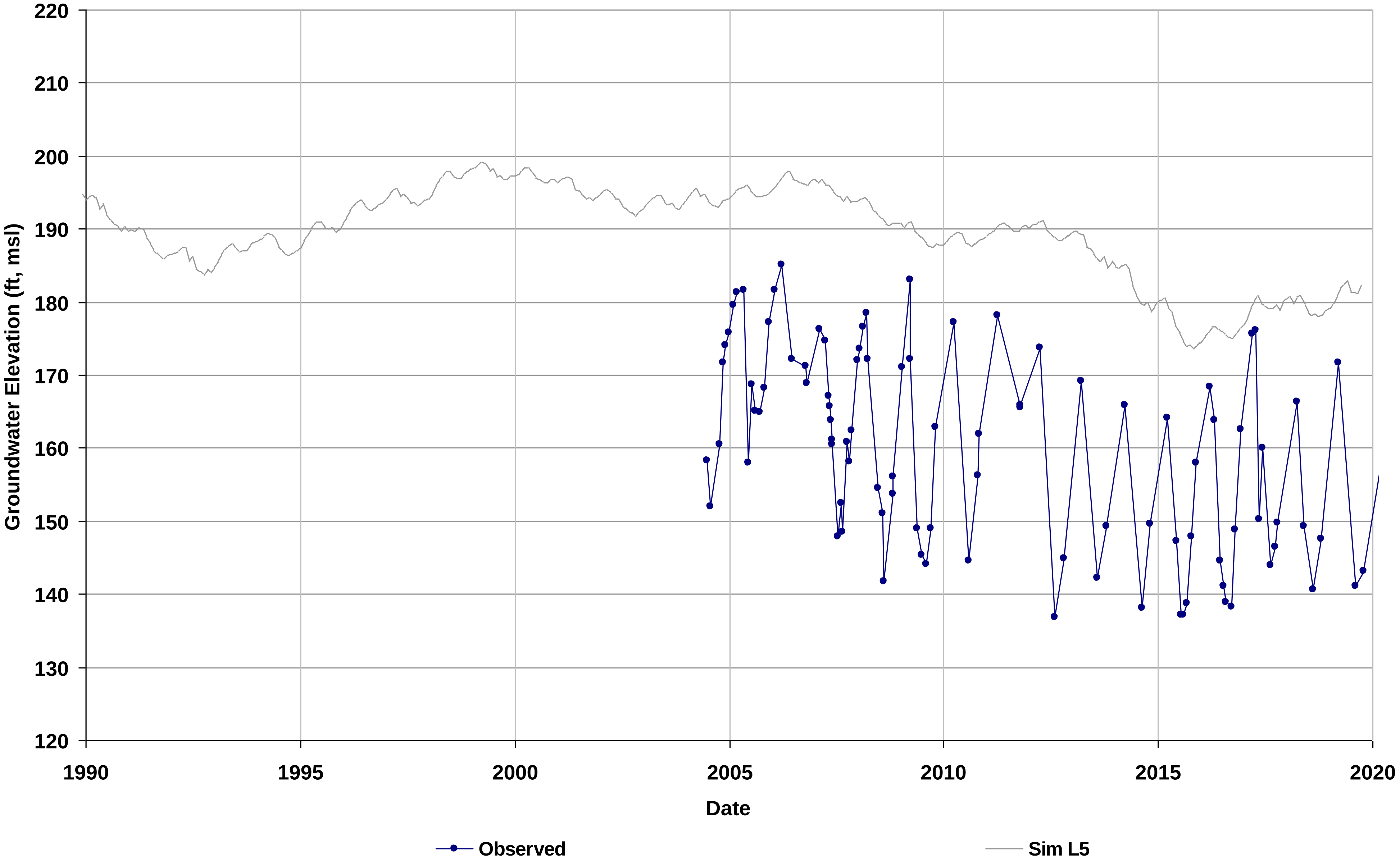


Tehama IHM - Historical

Well Name: 24N02W29N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 212

Total Depth (ft): 388
Perf Top (ft): 200
Perf Bottom (ft): 290
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 27.56

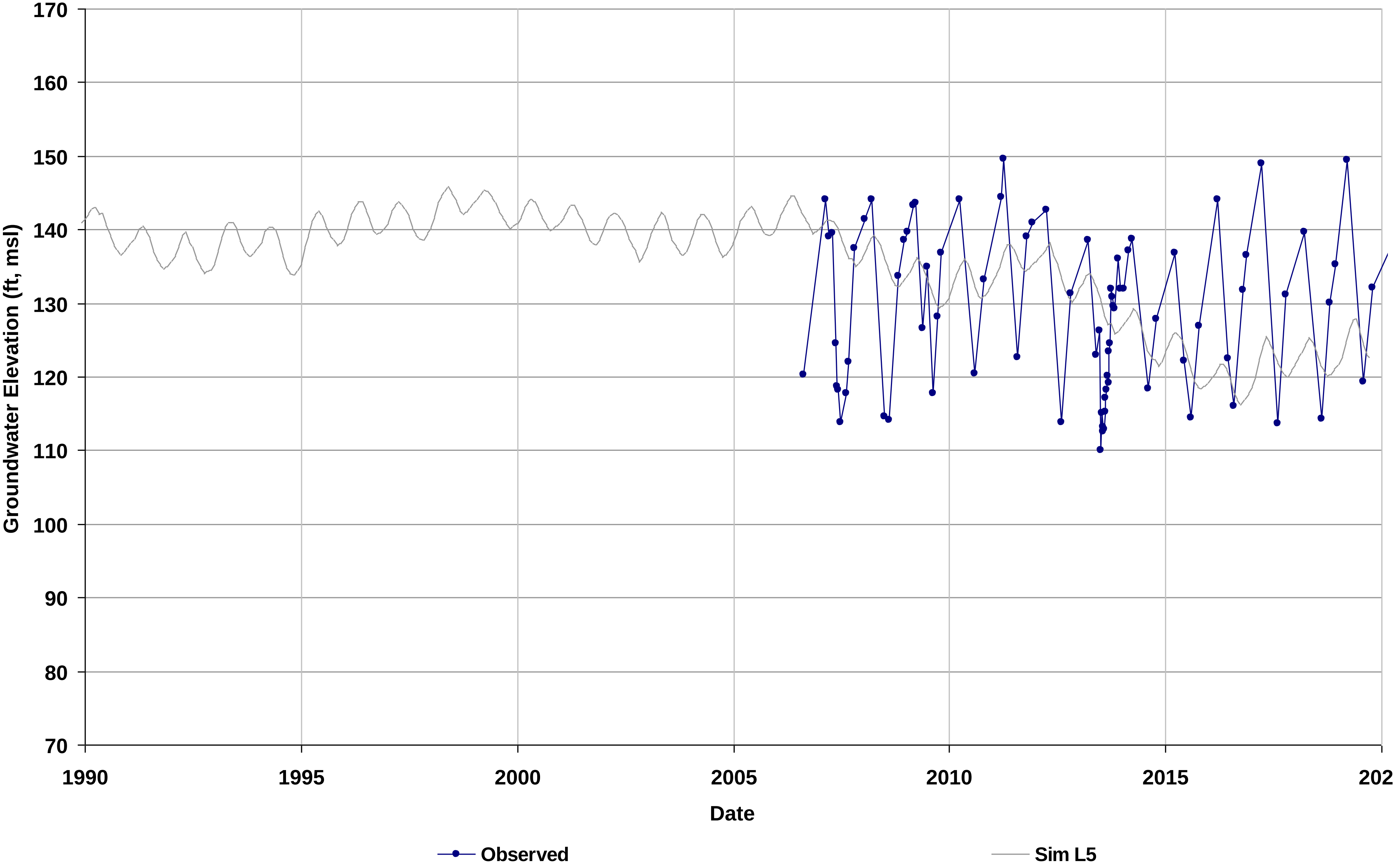


Tehama IHM - Historical

Well Name: 22N02W01N003M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 159

Total Depth (ft): 440
Perf Top (ft): 210
Perf Bottom (ft): 370
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 1.59

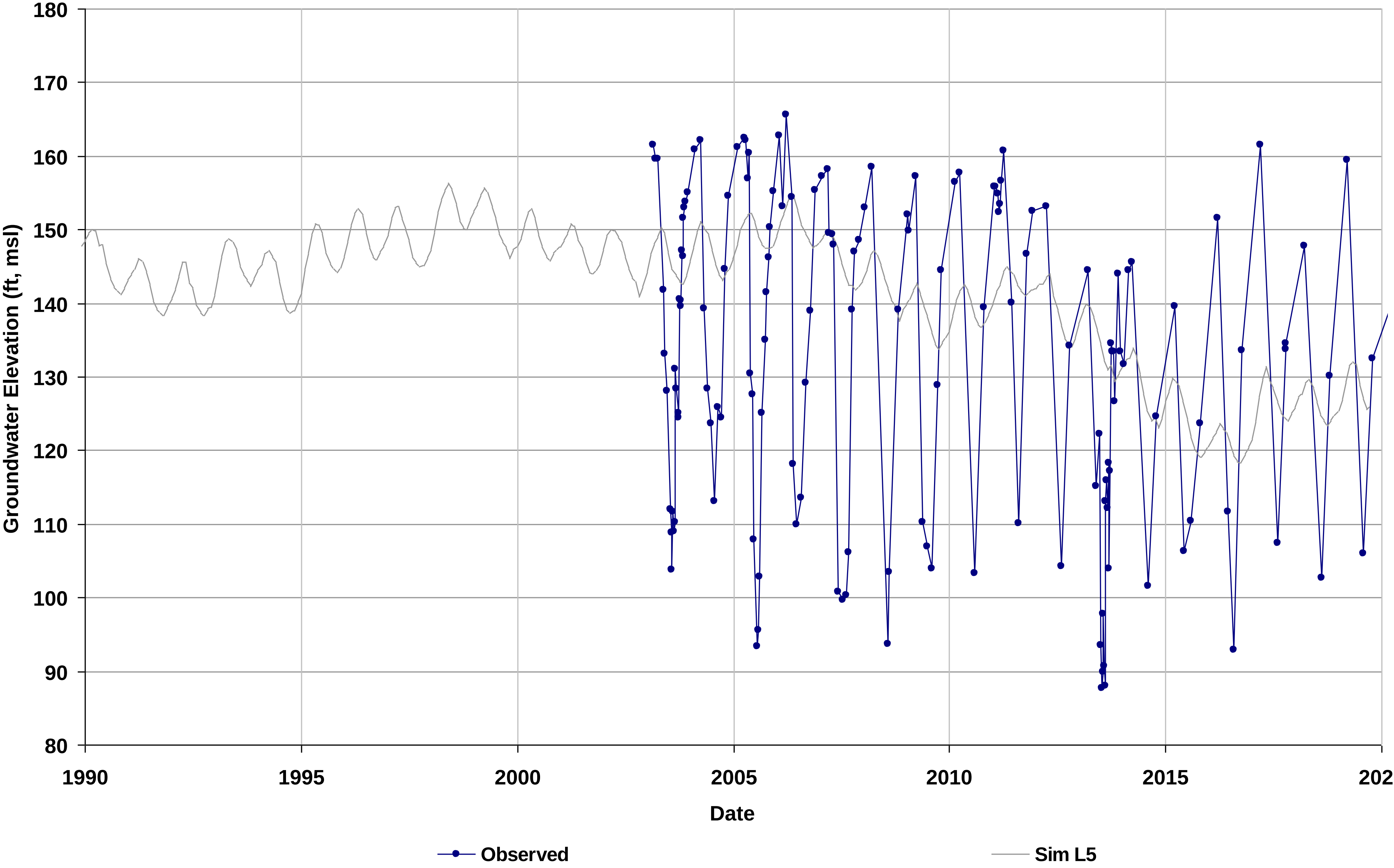


Tehama IHM - Historical

Well Name: 22N02W15C004M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 189

Total Depth (ft): 258
Perf Top (ft): 210
Perf Bottom (ft): 220
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 8.44

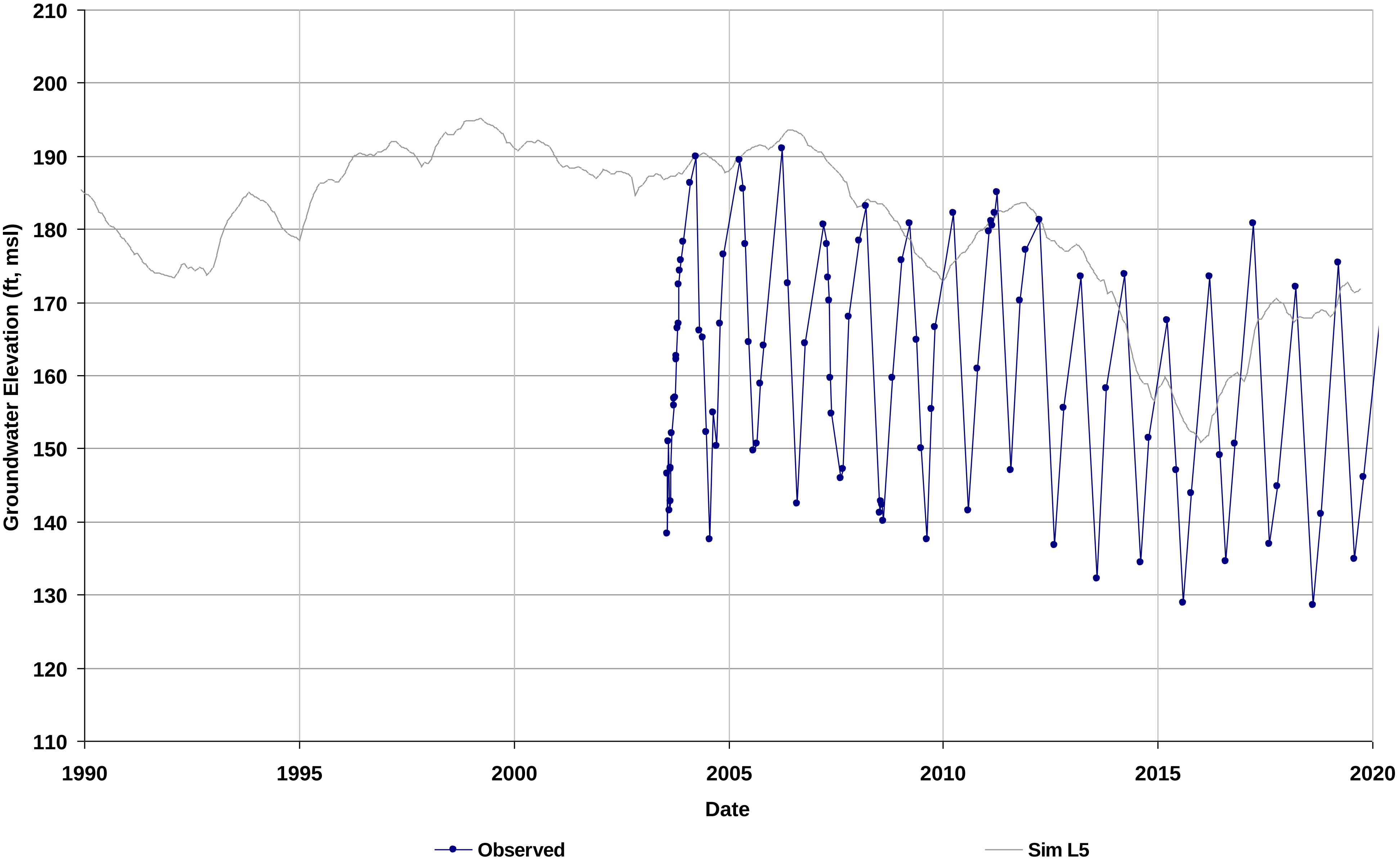


Tehama IHM - Historical

Well Name: 22N03W01R002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 226

Total Depth (ft): 314
Perf Top (ft): 270
Perf Bottom (ft): 280
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 20.6

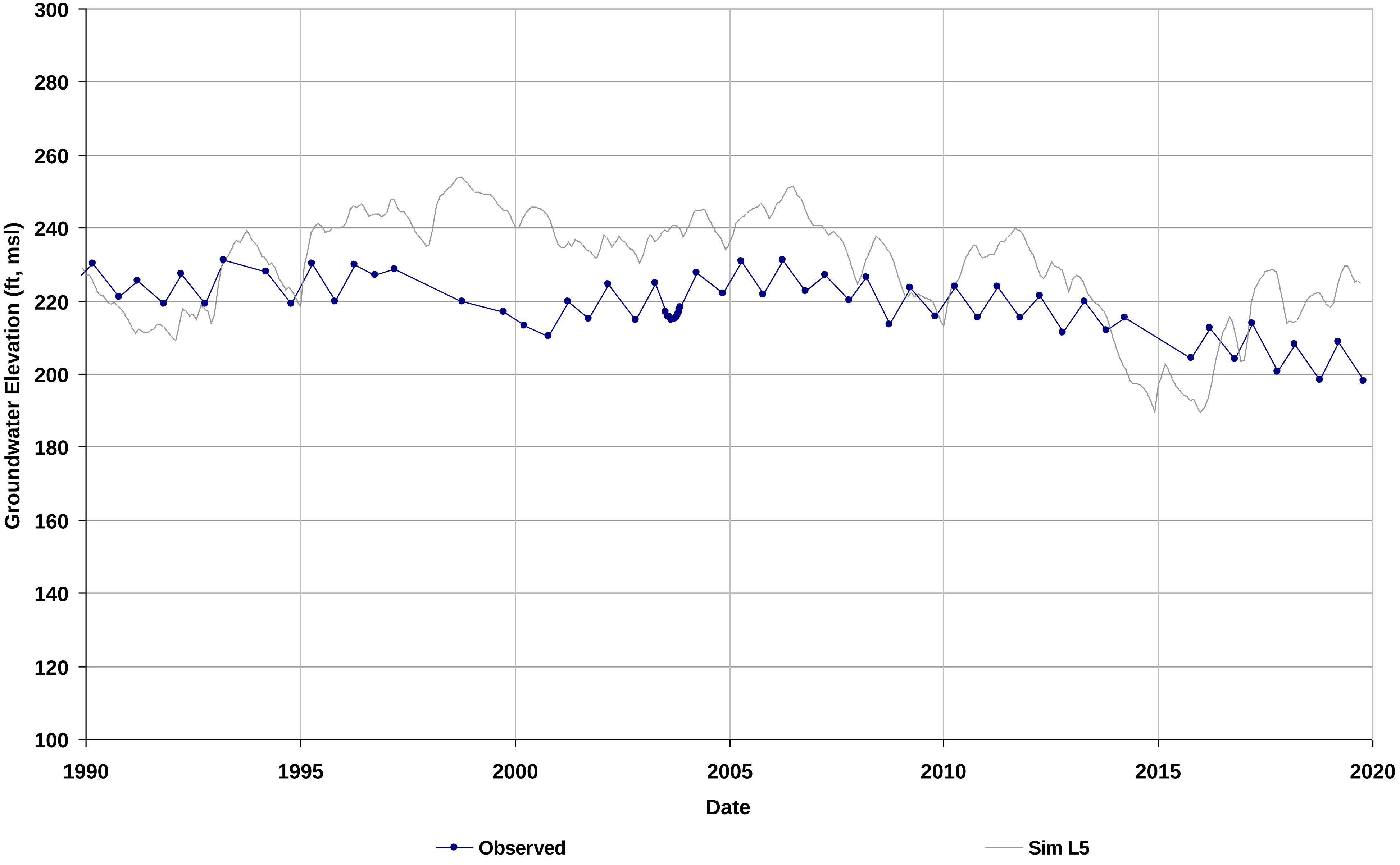


Tehama IHM - Historical

Well Name: 22N03W05F002M
Depth Zone: Upper
Subbasin: Corning
GSE (ft, msl): 297

Total Depth (ft):
Perf Top (ft): 188
Perf Bottom (ft): 218
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 12.86

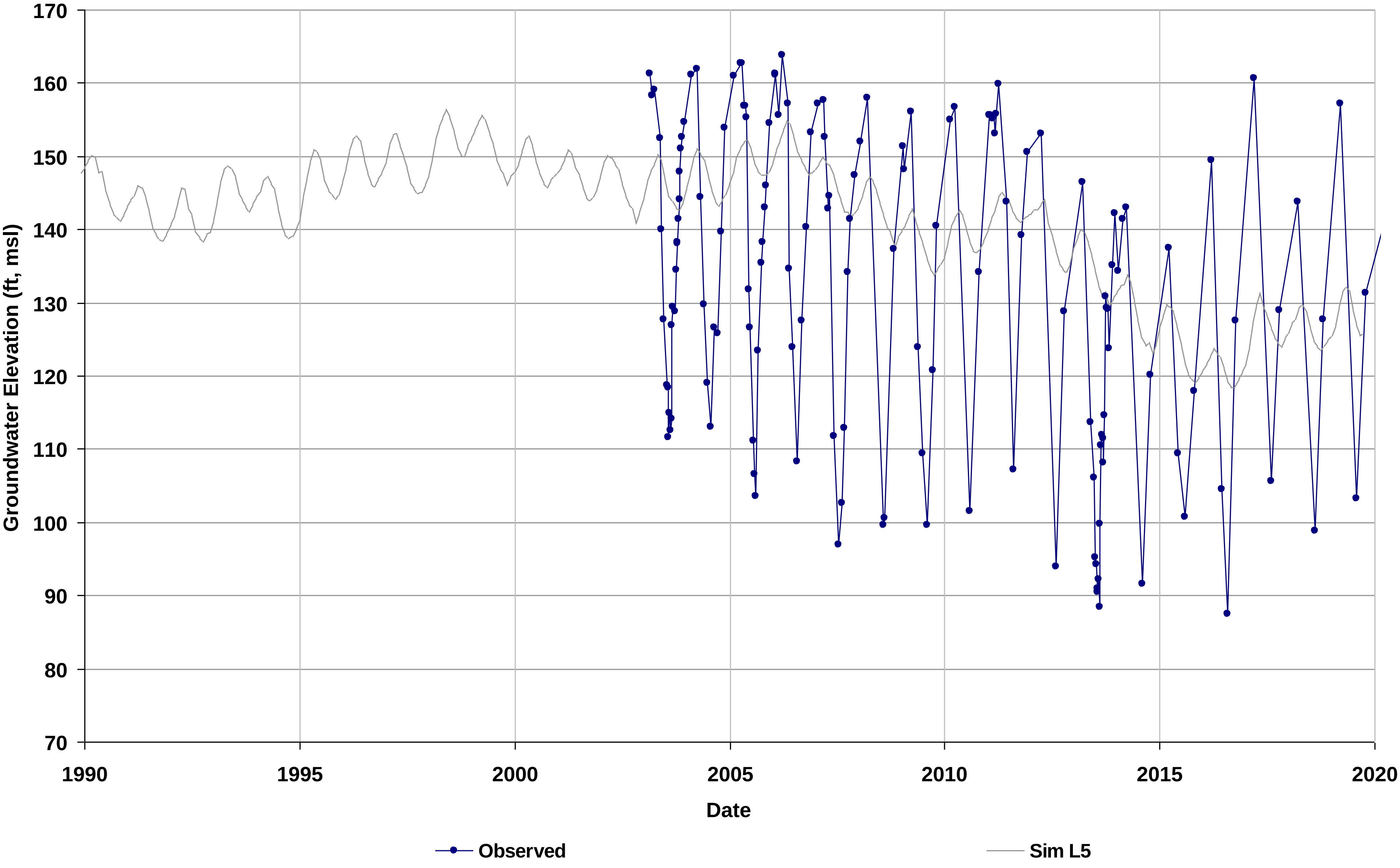


Tehama IHM - Historical

Well Name: 22N02W15C003M
Depth Zone: Composite
Subbasin: Corning
GSE (ft, msl): 189

Total Depth (ft): 422
Perf Top (ft): 370
Perf Bottom (ft): 380
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): 8.77

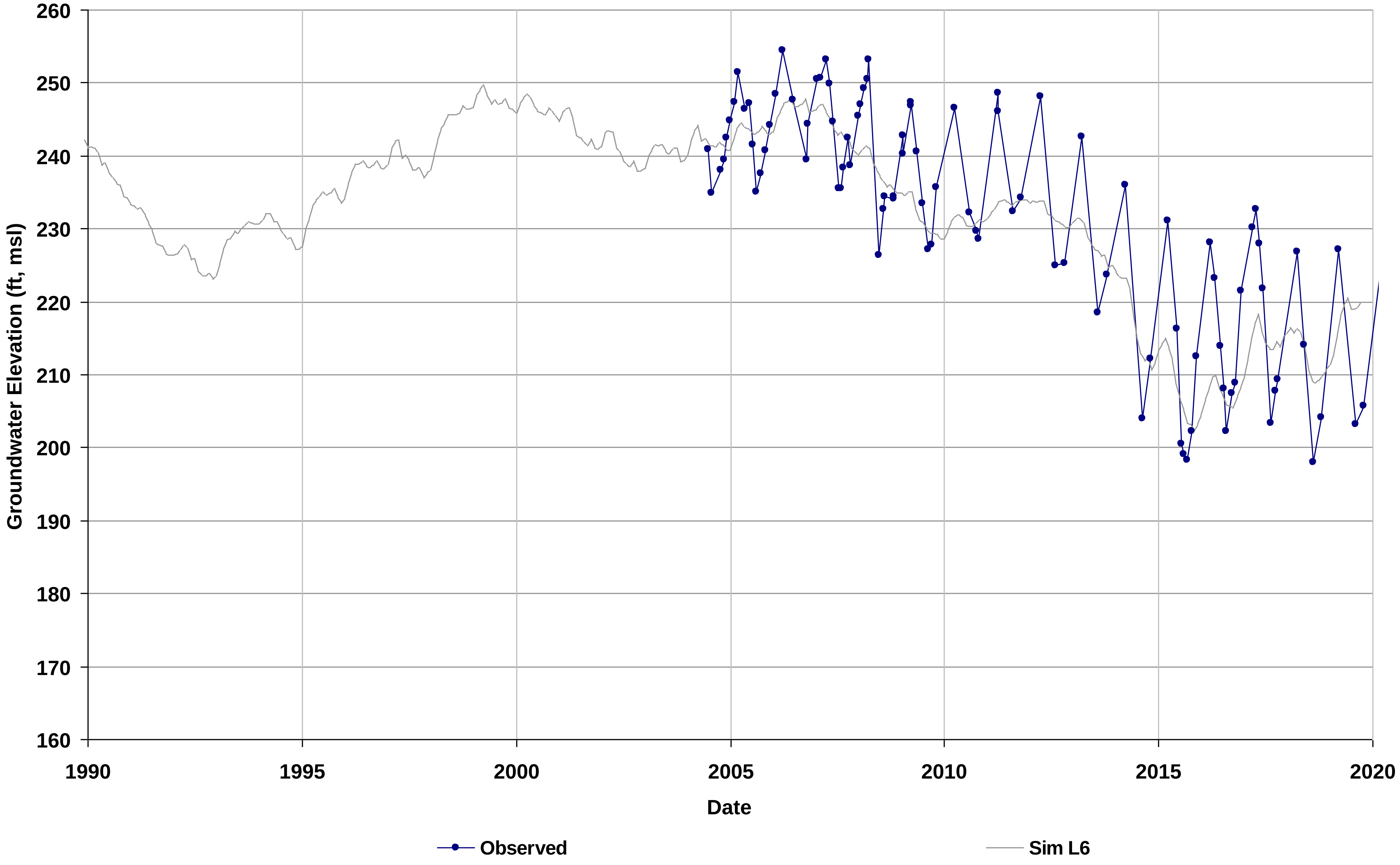


Tehama IHM - Historical

Well Name: 24N03W29Q002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

Total Depth (ft): 575
Perf Top (ft): 490
Perf Bottom (ft): 550
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): -2.51

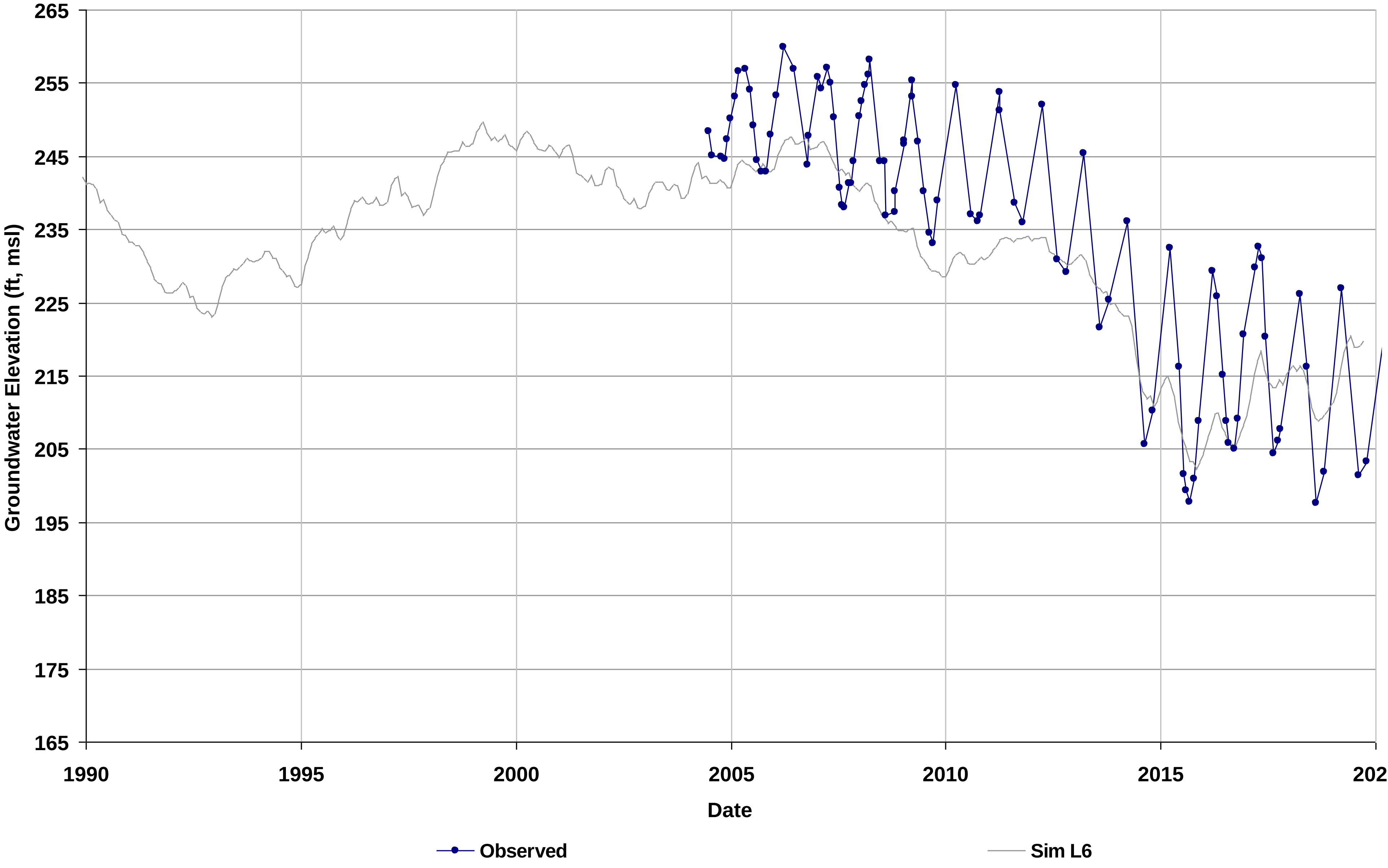


Tehama IHM - Historical

Well Name: 24N03W29Q003M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 314

Total Depth (ft): 844
Perf Top (ft): 650
Perf Bottom (ft): 710
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): -6.12

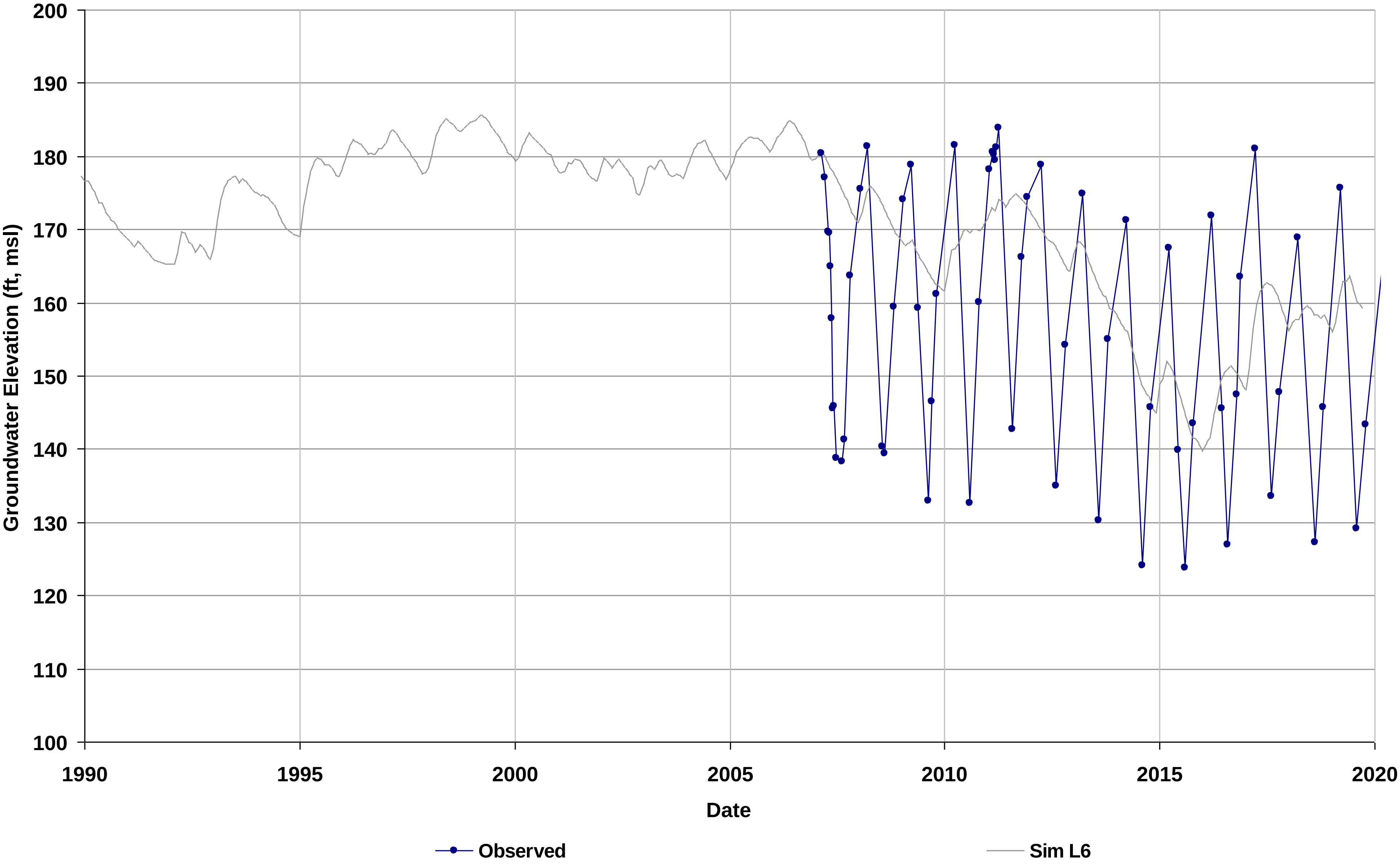


Tehama IHM - Historical

Well Name: 22N02W18C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

Total Depth (ft): 482
Perf Top (ft): 414
Perf Bottom (ft): 434
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): 8.28

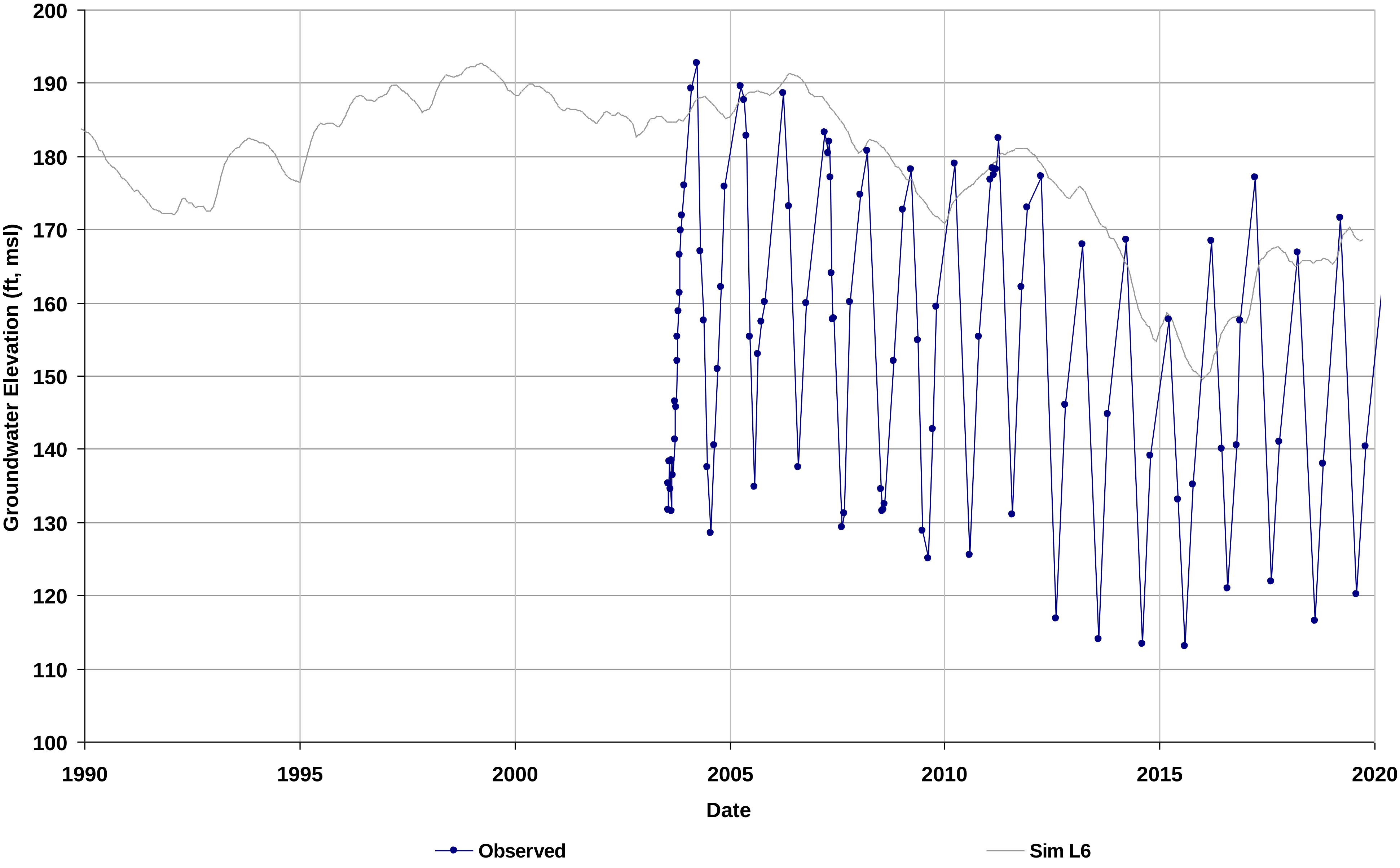


Tehama IHM - Historical

Well Name: 22N03W01R001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 226

Total Depth (ft): 515
Perf Top (ft): 470
Perf Bottom (ft): 480
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): 25.08

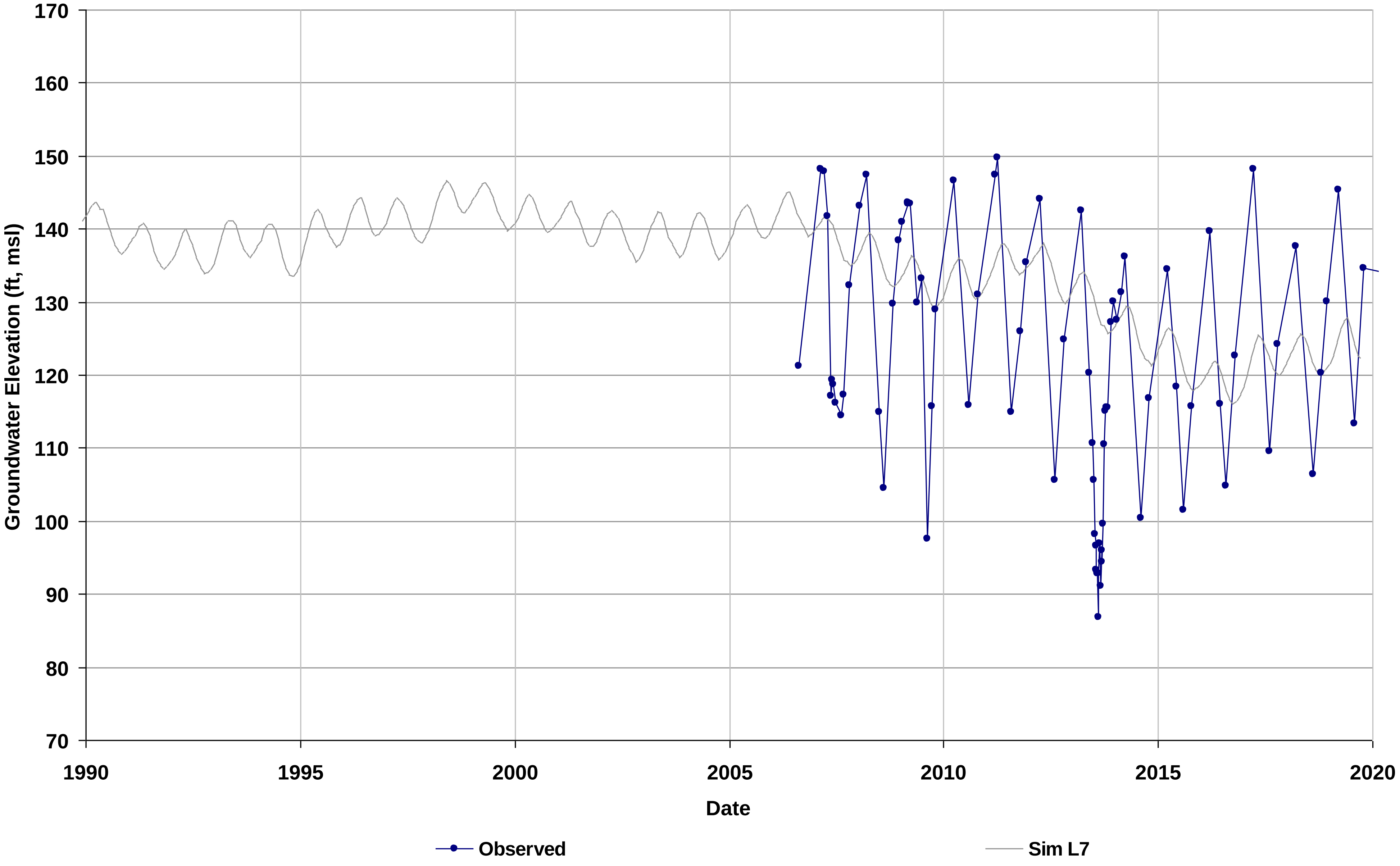


Tehama IHM - Historical

Well Name: 22N02W01N002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

Total Depth (ft): 730
Perf Top (ft): 700
Perf Bottom (ft): 710
Top Model Layer: 7
Bottom Model Layer: 7

Average Residual (ft): 9.49

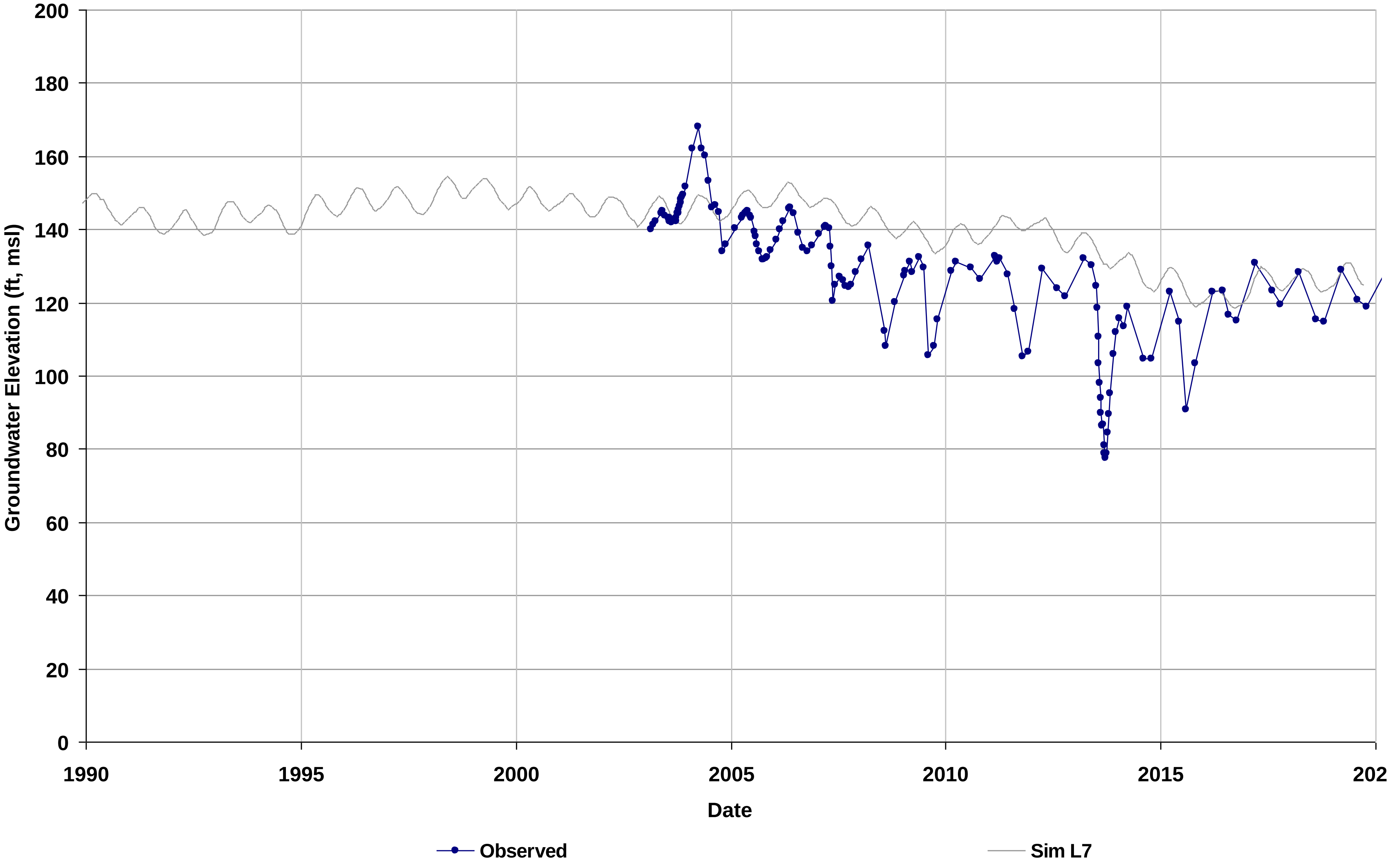


Tehama IHM - Historical

Well Name: 22N02W15C002M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 189

Total Depth (ft): 825
Perf Top (ft): 760
Perf Bottom (ft): 781
Top Model Layer: 7
Bottom Model Layer: 7

Average Residual (ft): 12.24

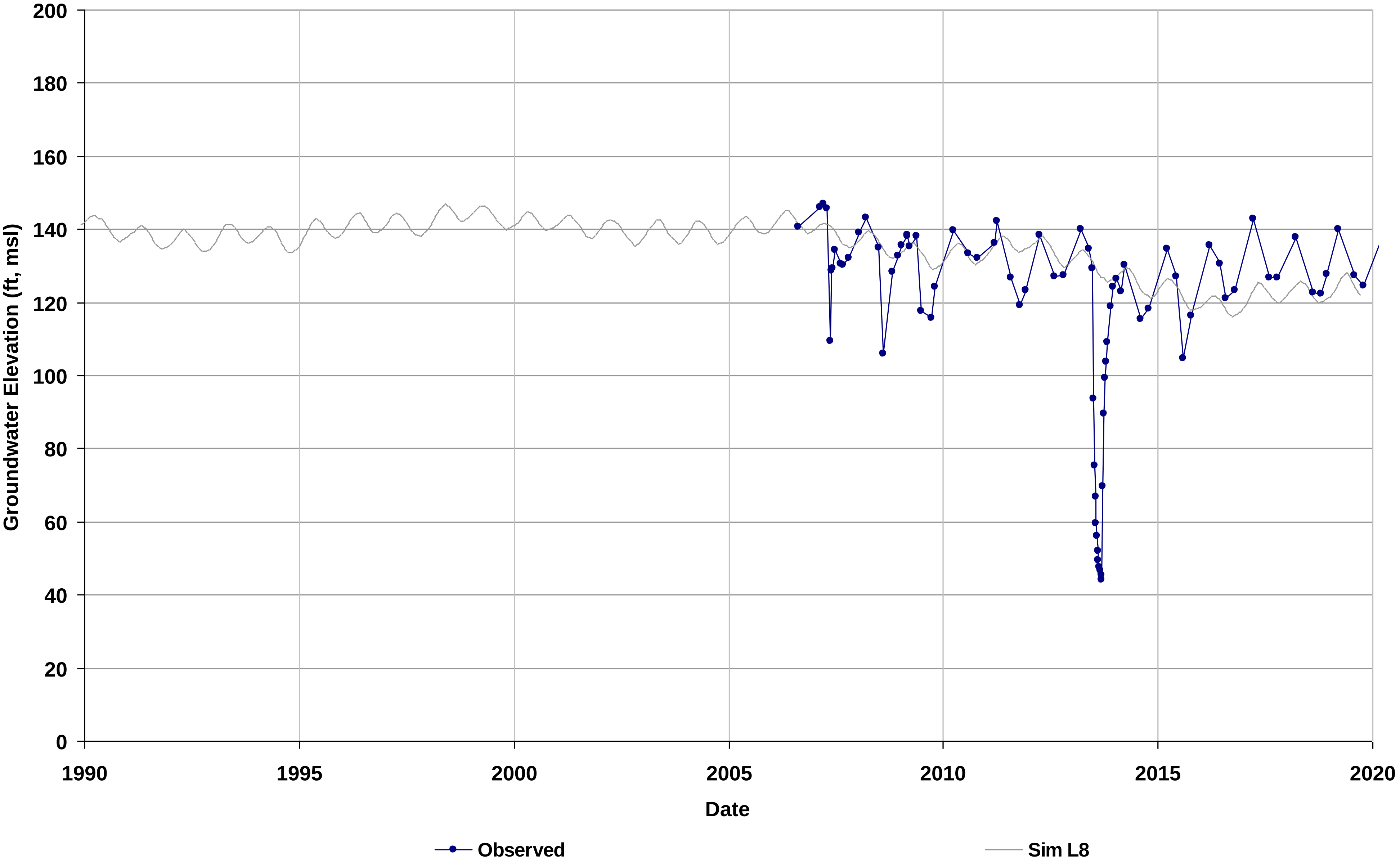


Tehama IHM - Historical

Well Name: 22N02W01N001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 159

Total Depth (ft): 1100
Perf Top (ft): 810
Perf Bottom (ft): 1050
Top Model Layer: 8
Bottom Model Layer: 8

Average Residual (ft): 14.5

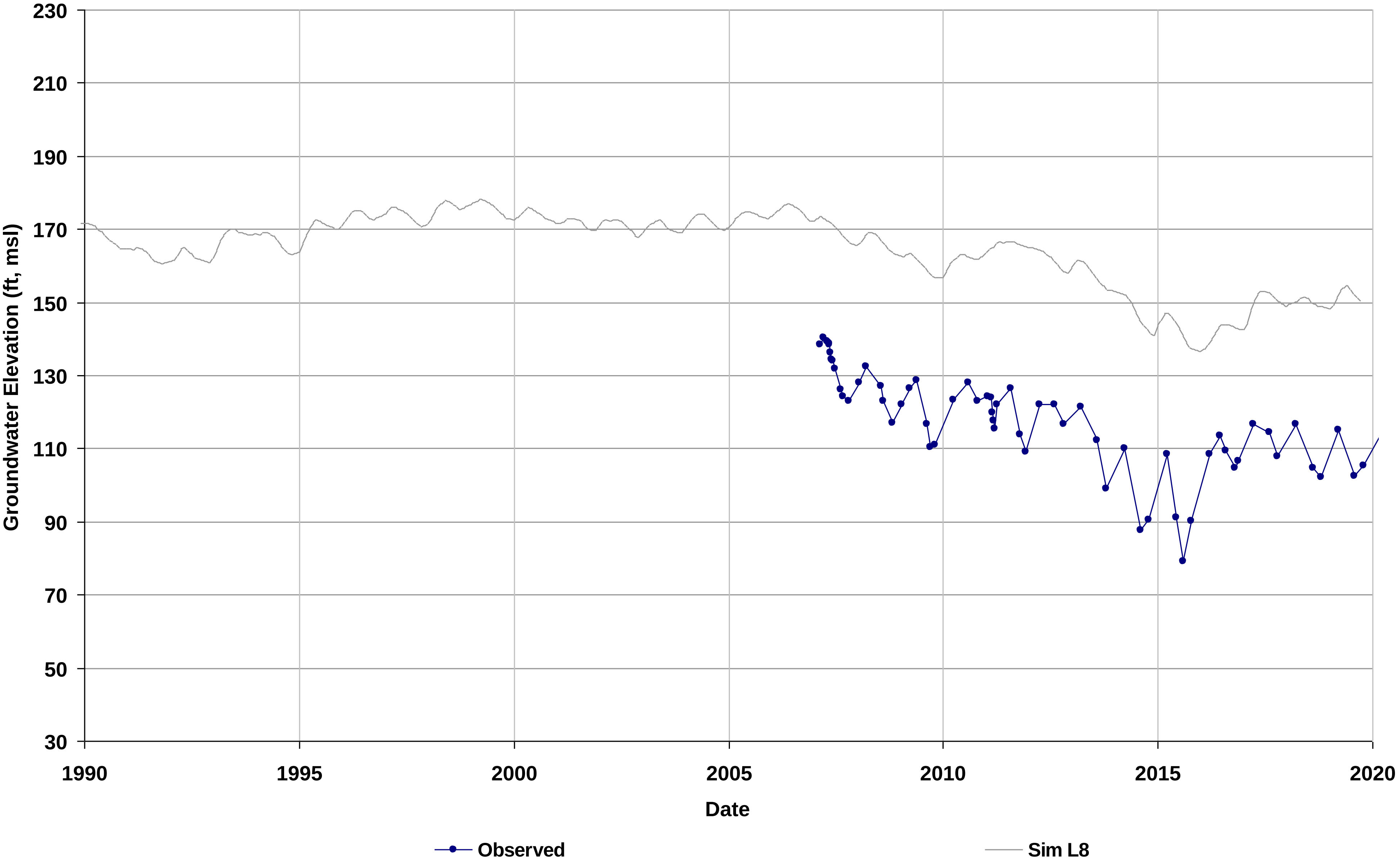


Tehama IHM - Historical

Well Name: 22N02W18C001M
Depth Zone: Lower
Subbasin: Corning
GSE (ft, msl): 223

Total Depth (ft): 1062
Perf Top (ft): 841
Perf Bottom (ft): 1029
Top Model Layer: 8
Bottom Model Layer: 8

Average Residual (ft): 41.41

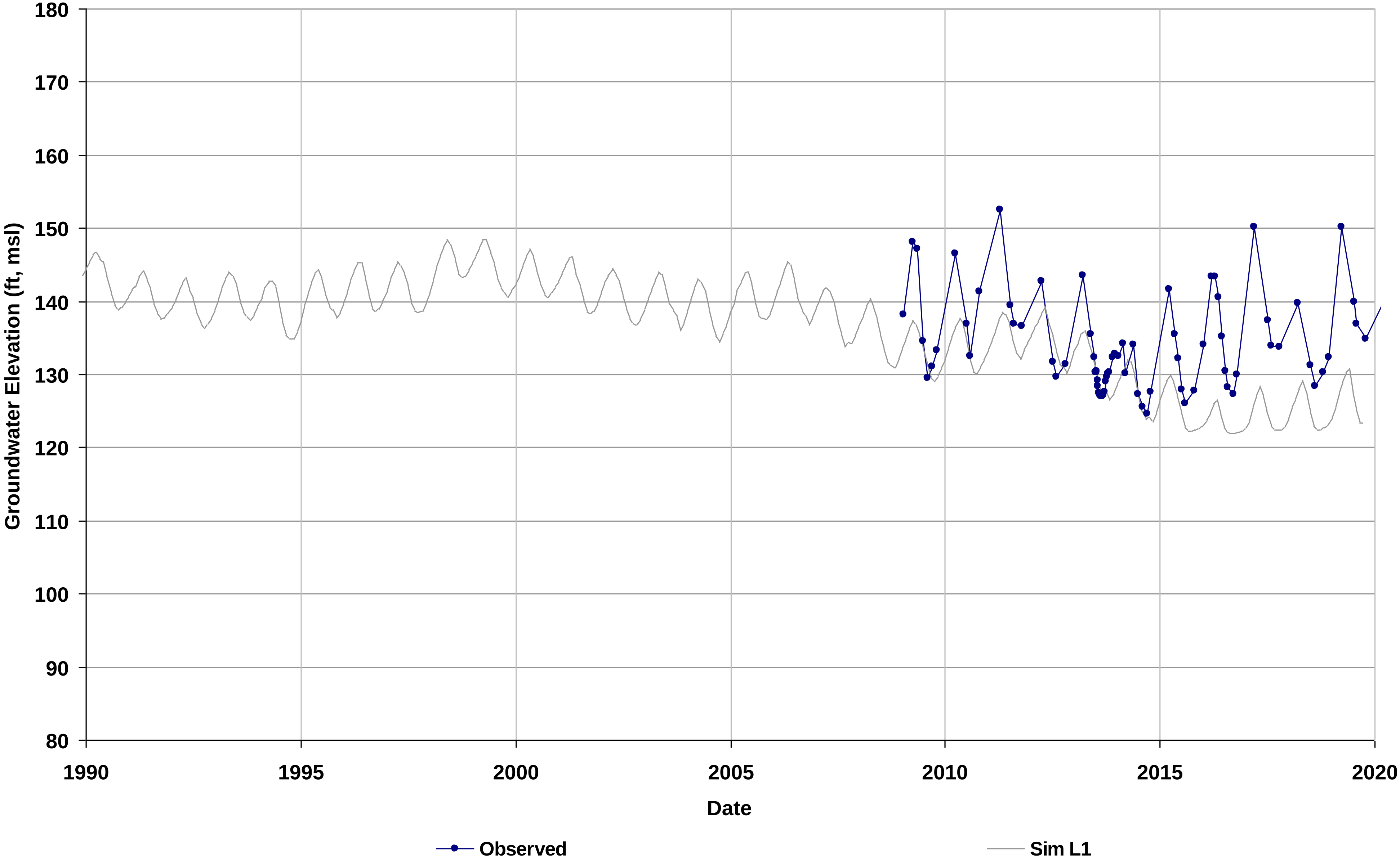


Tehama IHM - Historical

Well Name: 23N01W28M005M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 159

Total Depth (ft): 72
Perf Top (ft): 30
Perf Bottom (ft): 50
Top Model Layer: 1
Bottom Model Layer: 1

Average Residual (ft): -4.62

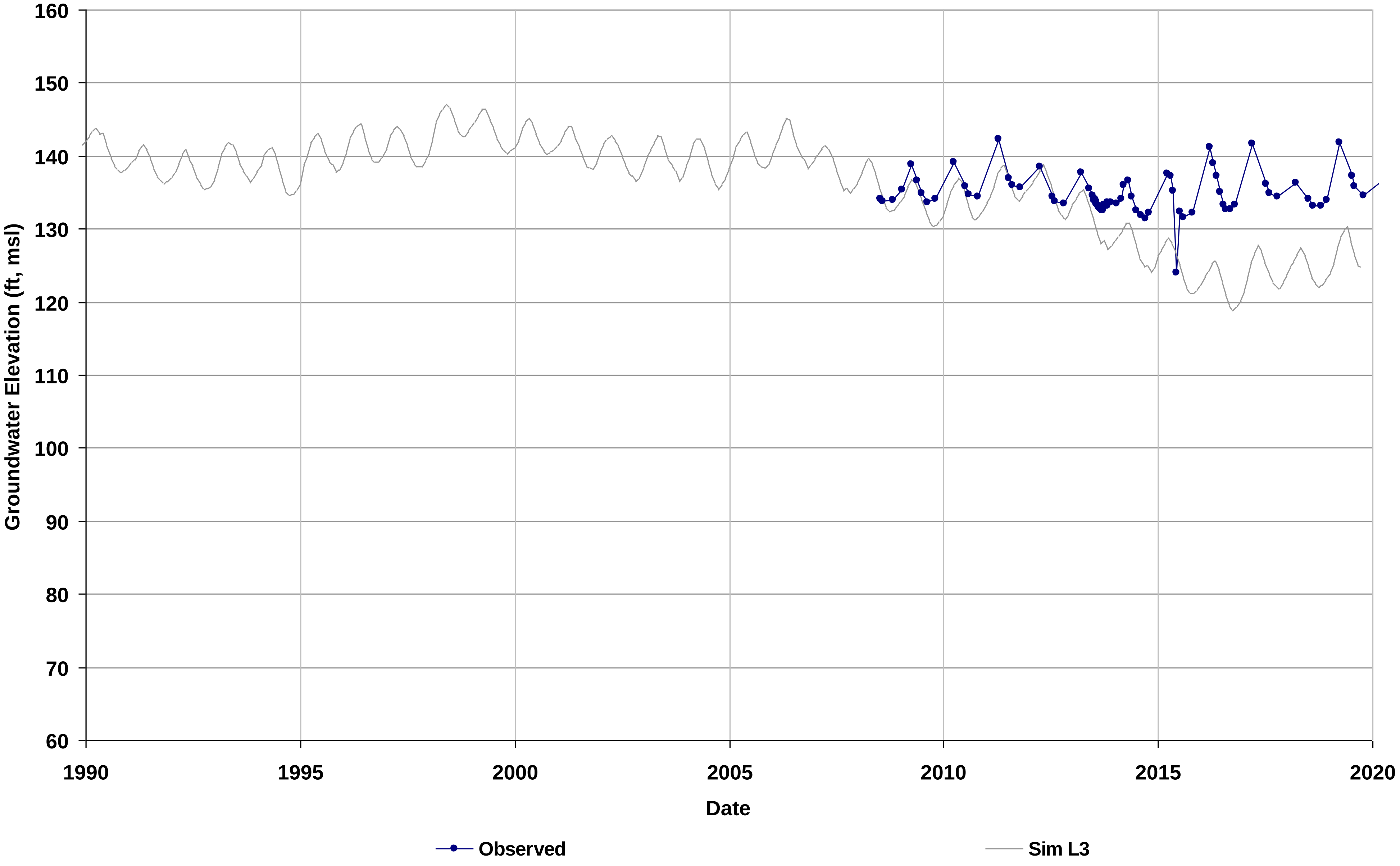


Tehama IHM - Historical

Well Name: 23N01W31M004M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

Total Depth (ft): 106
Perf Top (ft): 65.5
Perf Bottom (ft): 75.5
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): -5.35

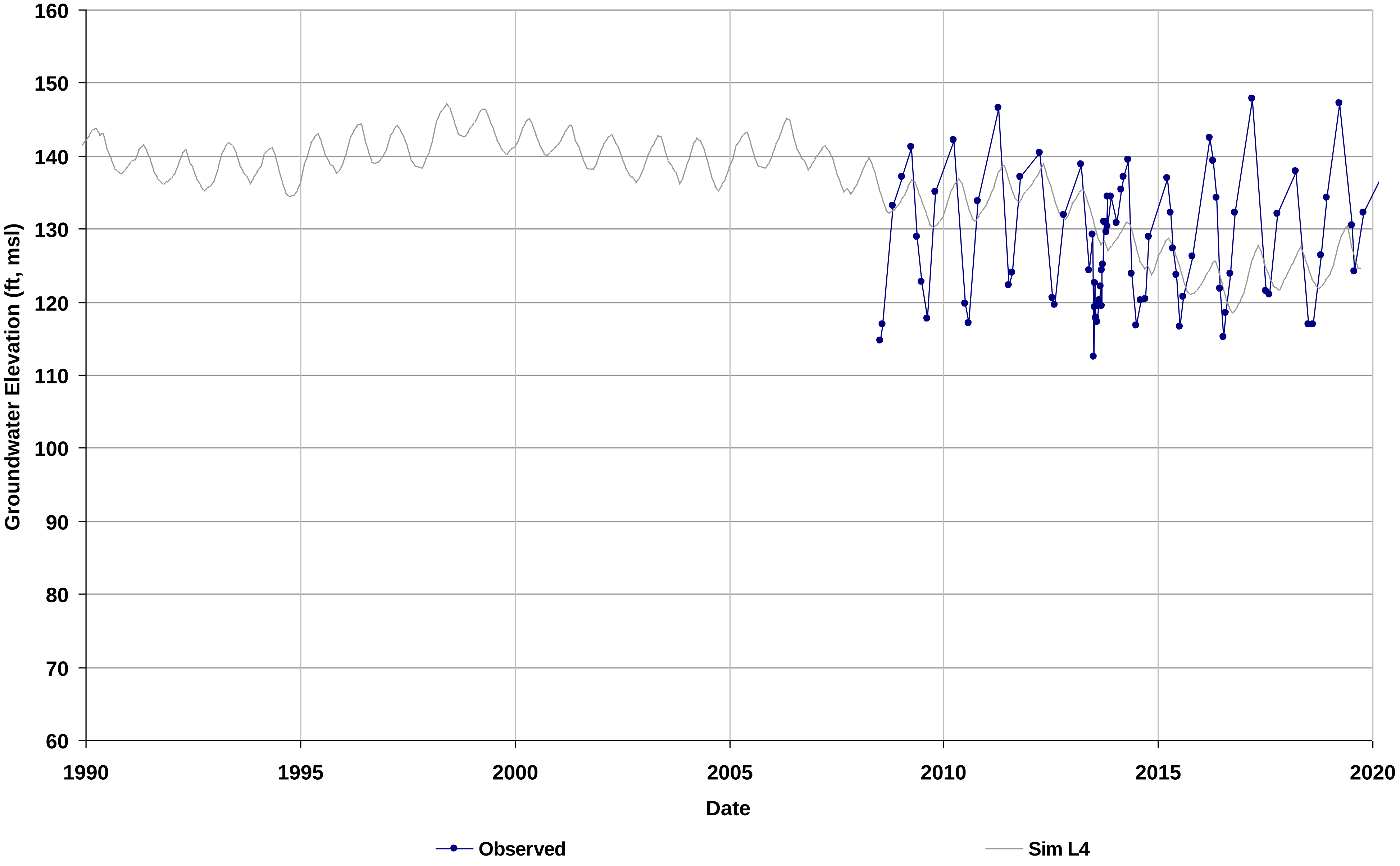


Tehama IHM - Historical

Well Name: 23N01W31M003M
Depth Zone: Upper
Subbasin: Vina
GSE (ft, msl): 154

Total Depth (ft): 245
Perf Top (ft): 140
Perf Bottom (ft): 201
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 1.83

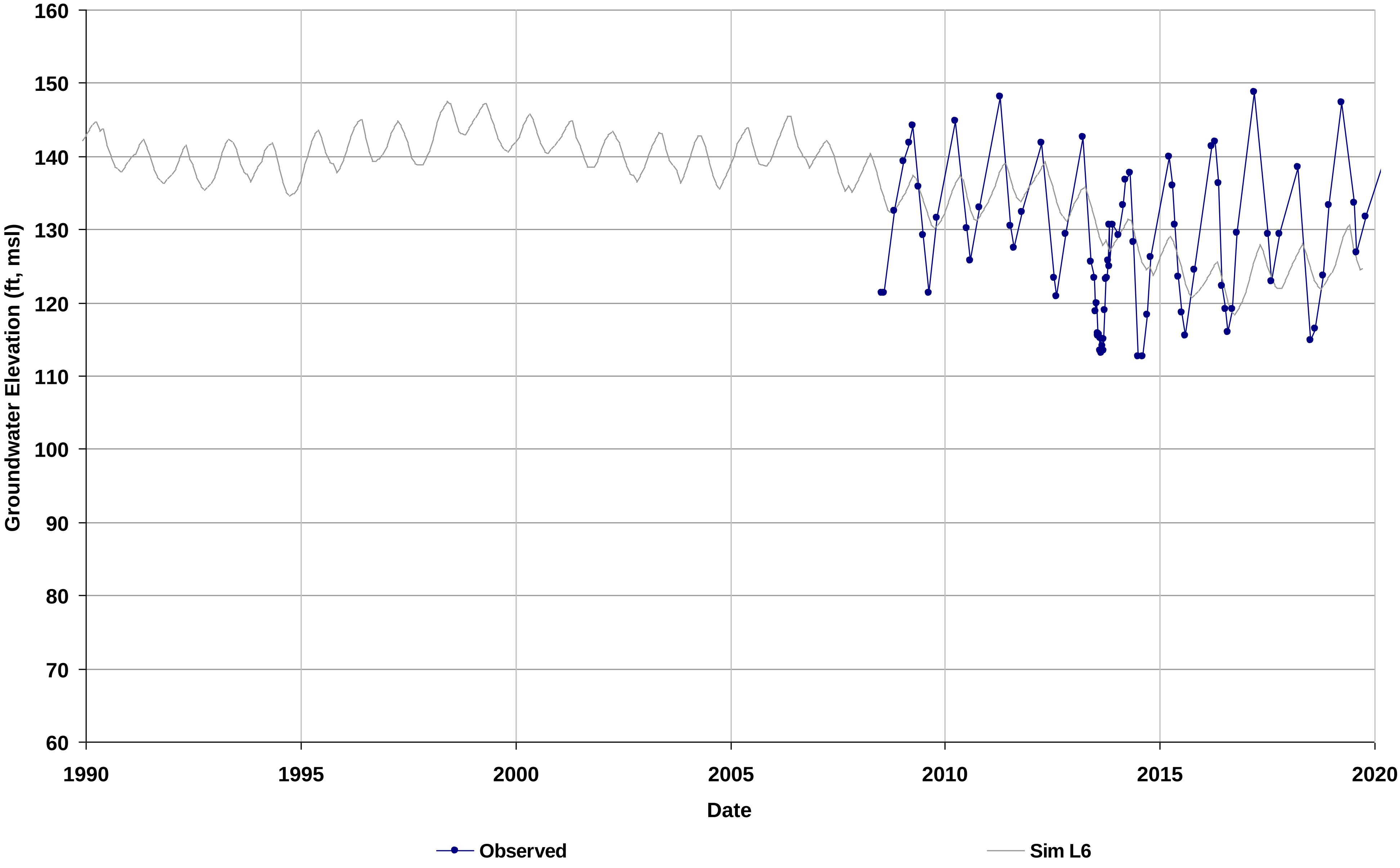


Tehama IHM - Historical

Well Name: 23N01W31M002M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

Total Depth (ft): 616
Perf Top (ft): 545
Perf Bottom (ft): 600
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): 2.43

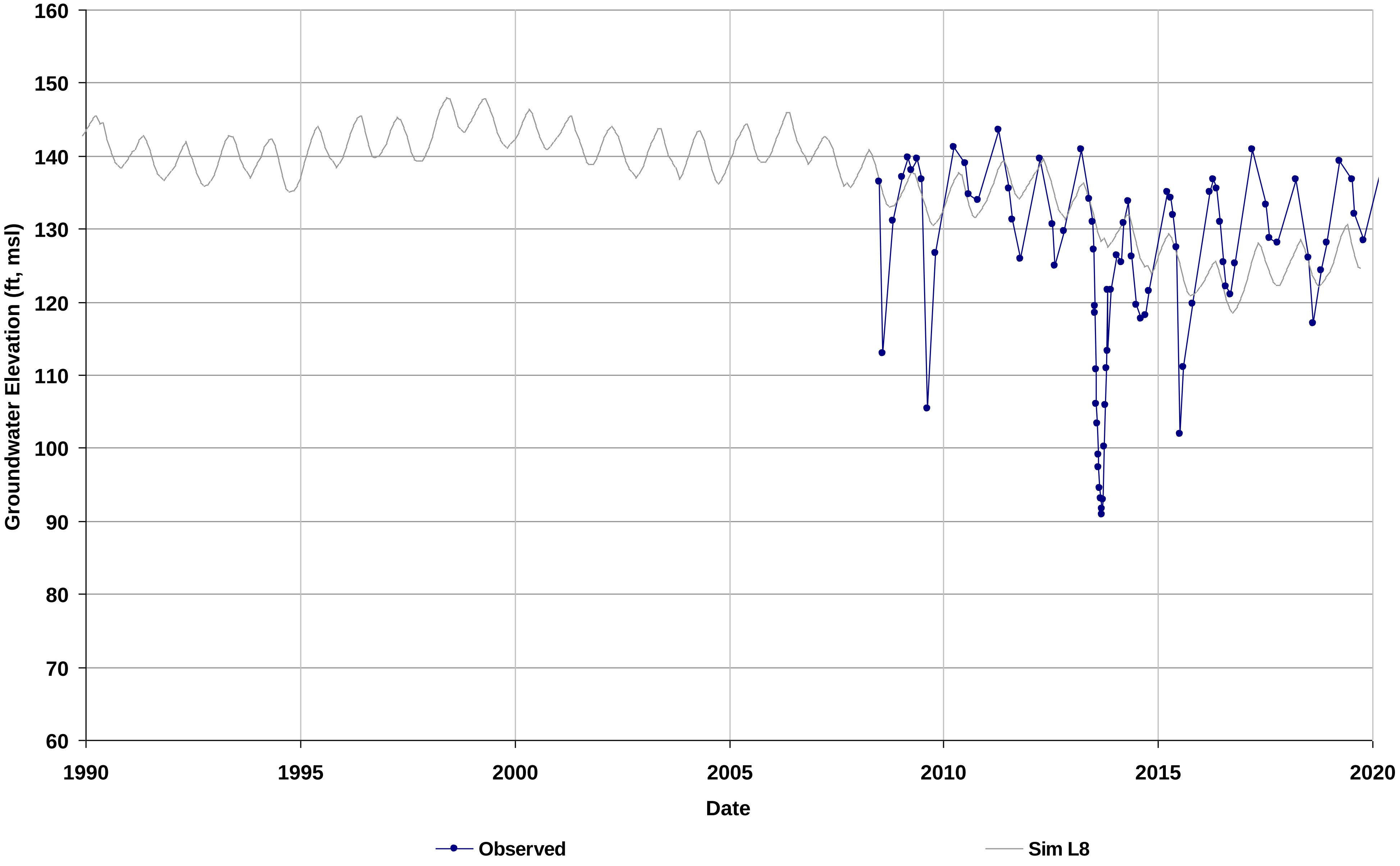


Tehama IHM - Historical

Well Name: 23N01W31M001M
Depth Zone: Lower
Subbasin: Vina
GSE (ft, msl): 154

Total Depth (ft): 1200
Perf Top (ft): 969
Perf Bottom (ft): 1030
Top Model Layer: 8
Bottom Model Layer: 8

Average Residual (ft): 6.6

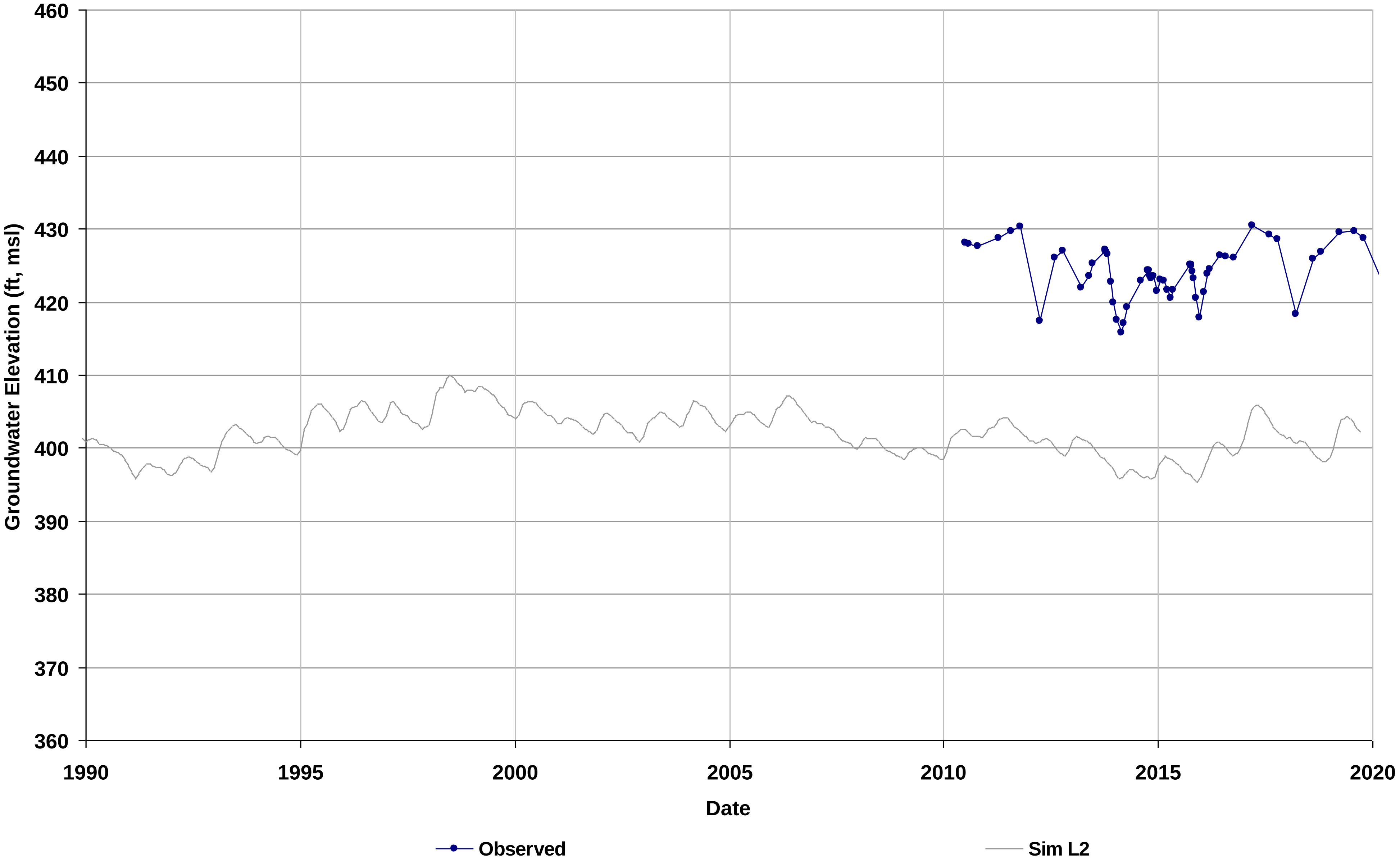


Tehama IHM - Historical

Well Name: 29N04W03R006M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 76
Perf Top (ft): 40
Perf Bottom (ft): 60
Top Model Layer: 2
Bottom Model Layer: 2

Average Residual (ft): -25.34

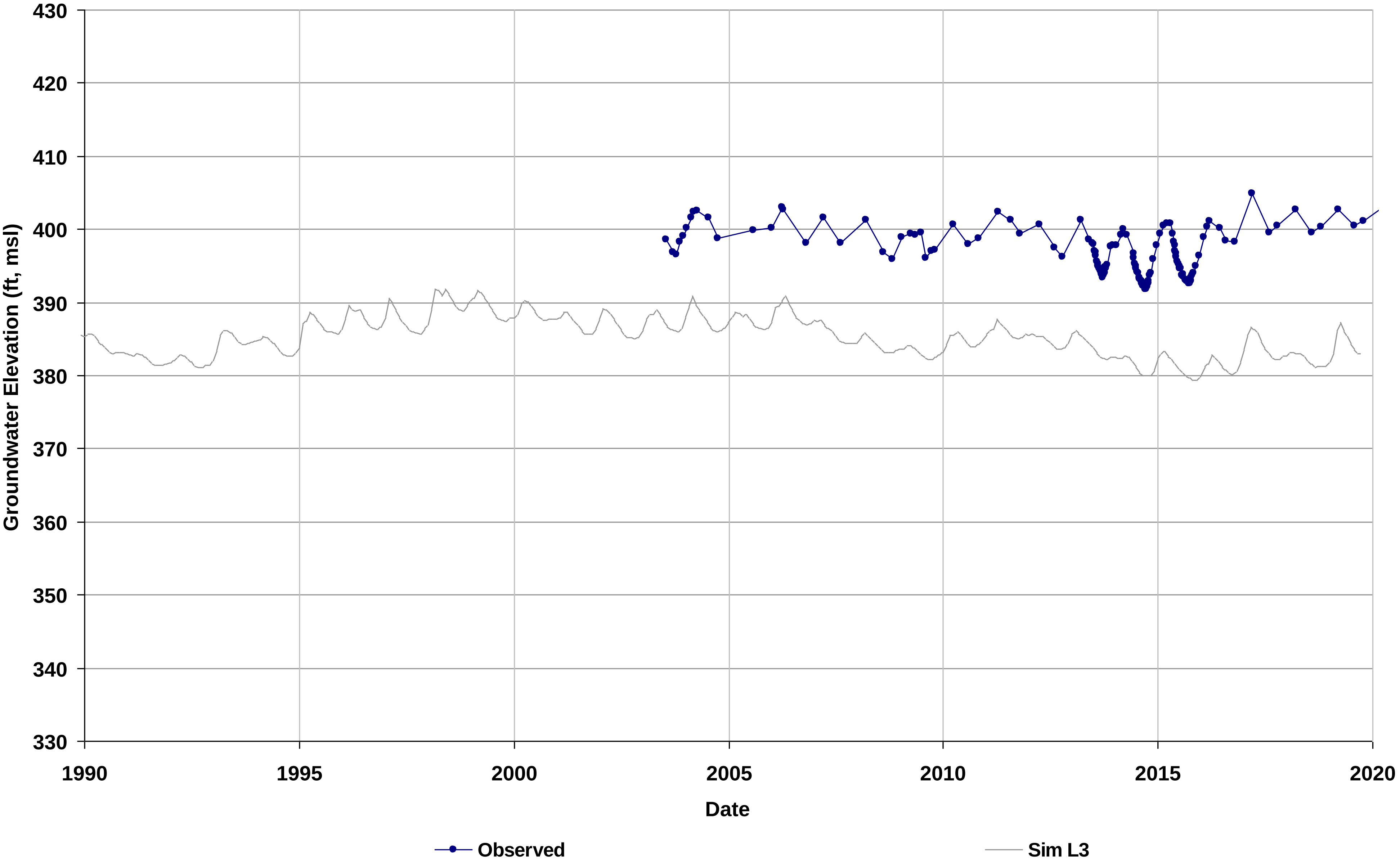


Tehama IHM - Historical

Well Name: 30N04W22F002M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

Total Depth (ft): 113
Perf Top (ft): 70
Perf Bottom (ft): 113
Top Model Layer: 3
Bottom Model Layer: 3

Average Residual (ft): -14.13

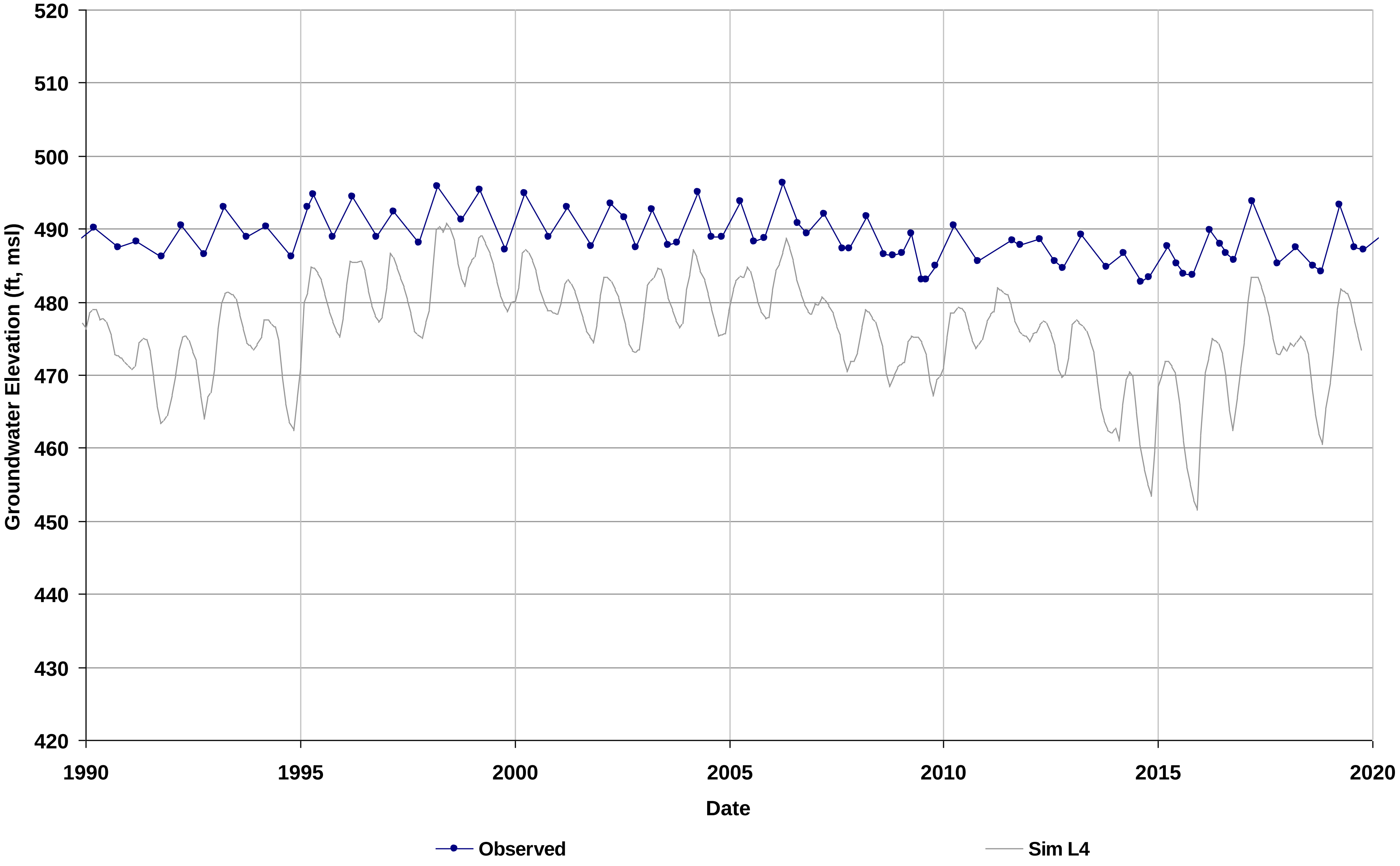


Tehama IHM - Historical

Well Name: 29N05W09L001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 517

Total Depth (ft):
Perf Top (ft): 100
Perf Bottom (ft): 140
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -13.39

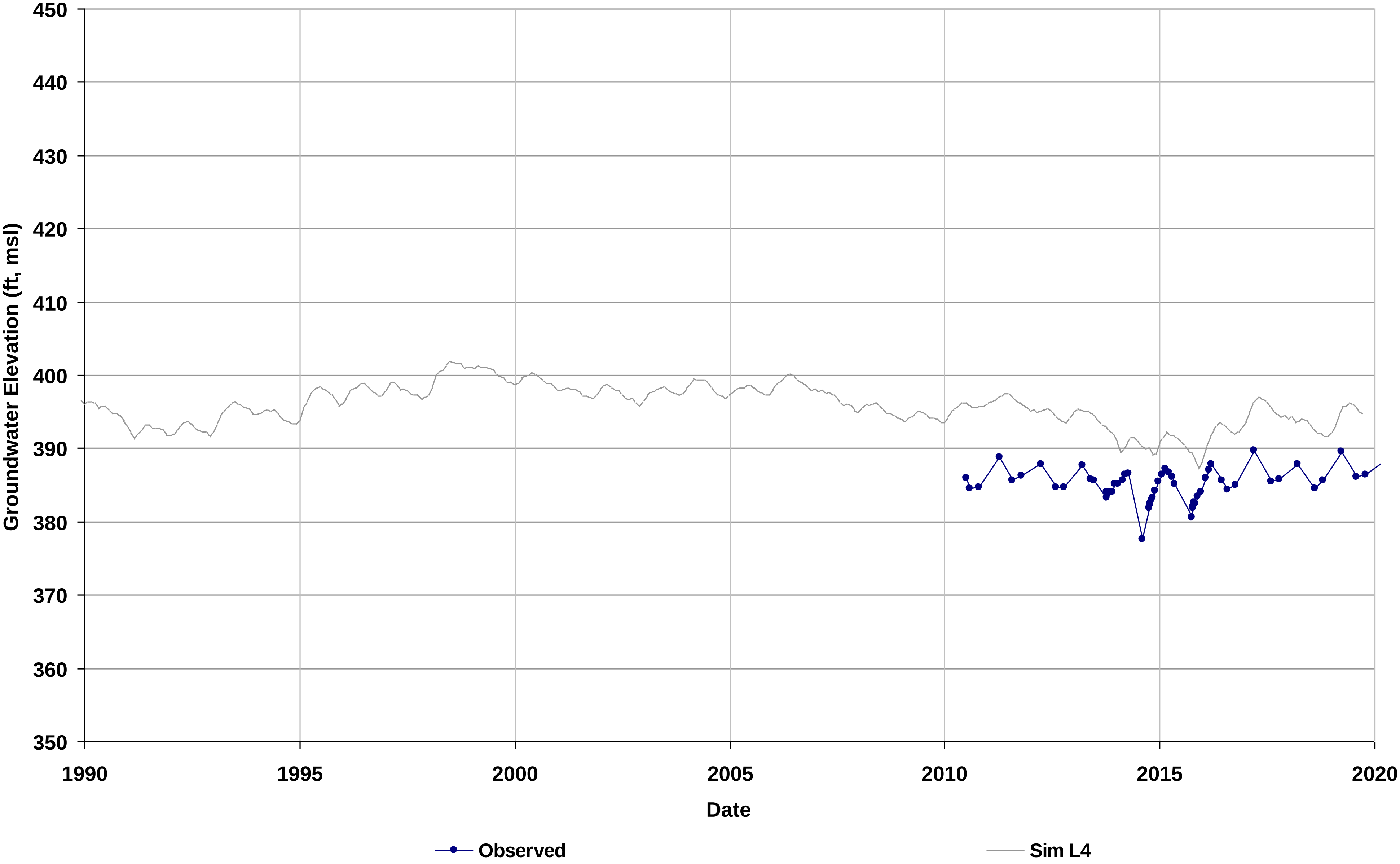


Tehama IHM - Historical

Well Name: 29N04W03R005M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 254
Perf Top (ft): 128
Perf Bottom (ft): 188
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): 7.24

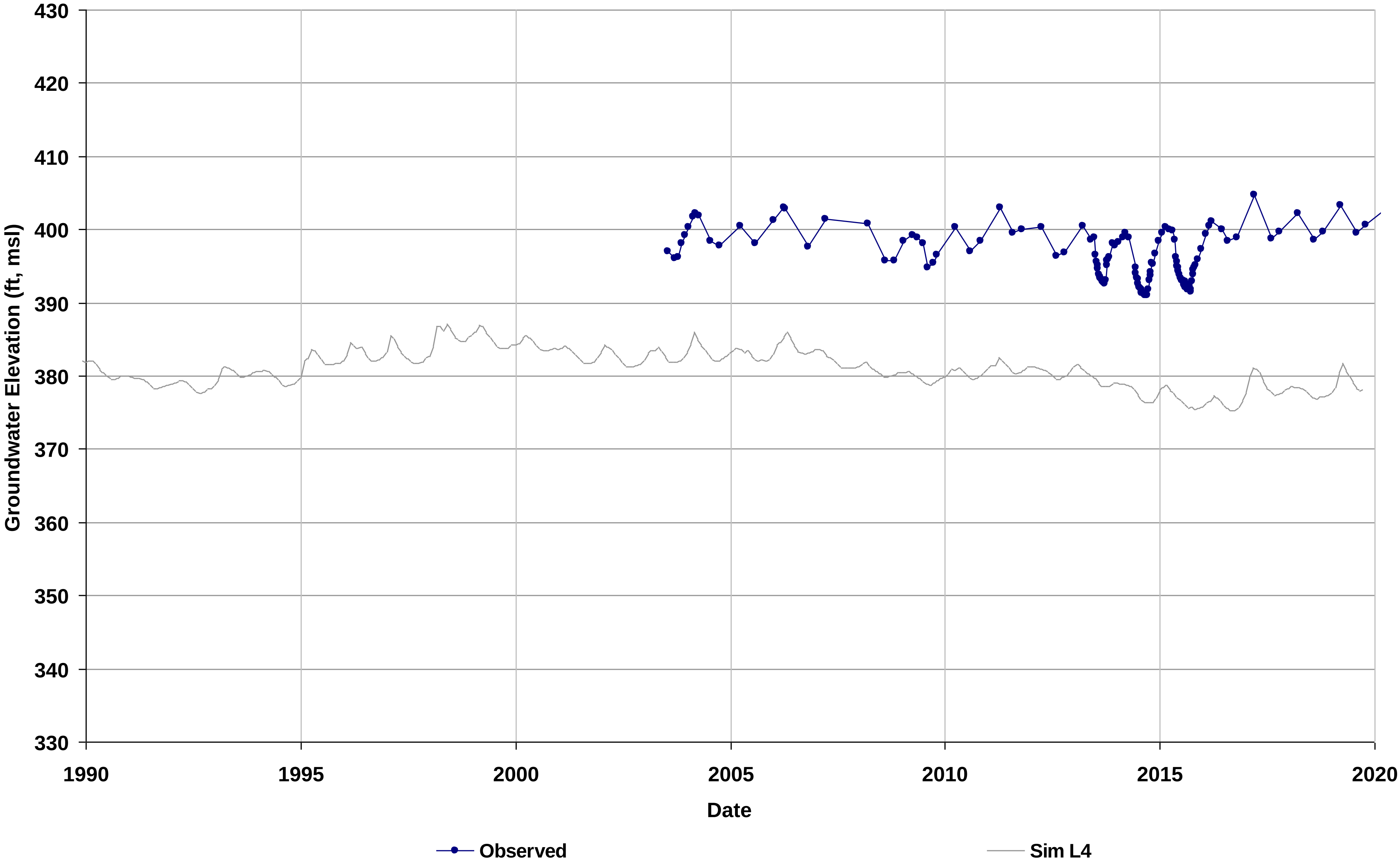


Tehama IHM - Historical

Well Name: 30N04W22F003M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

Total Depth (ft): 202
Perf Top (ft): 170
Perf Bottom (ft): 202
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -17.65

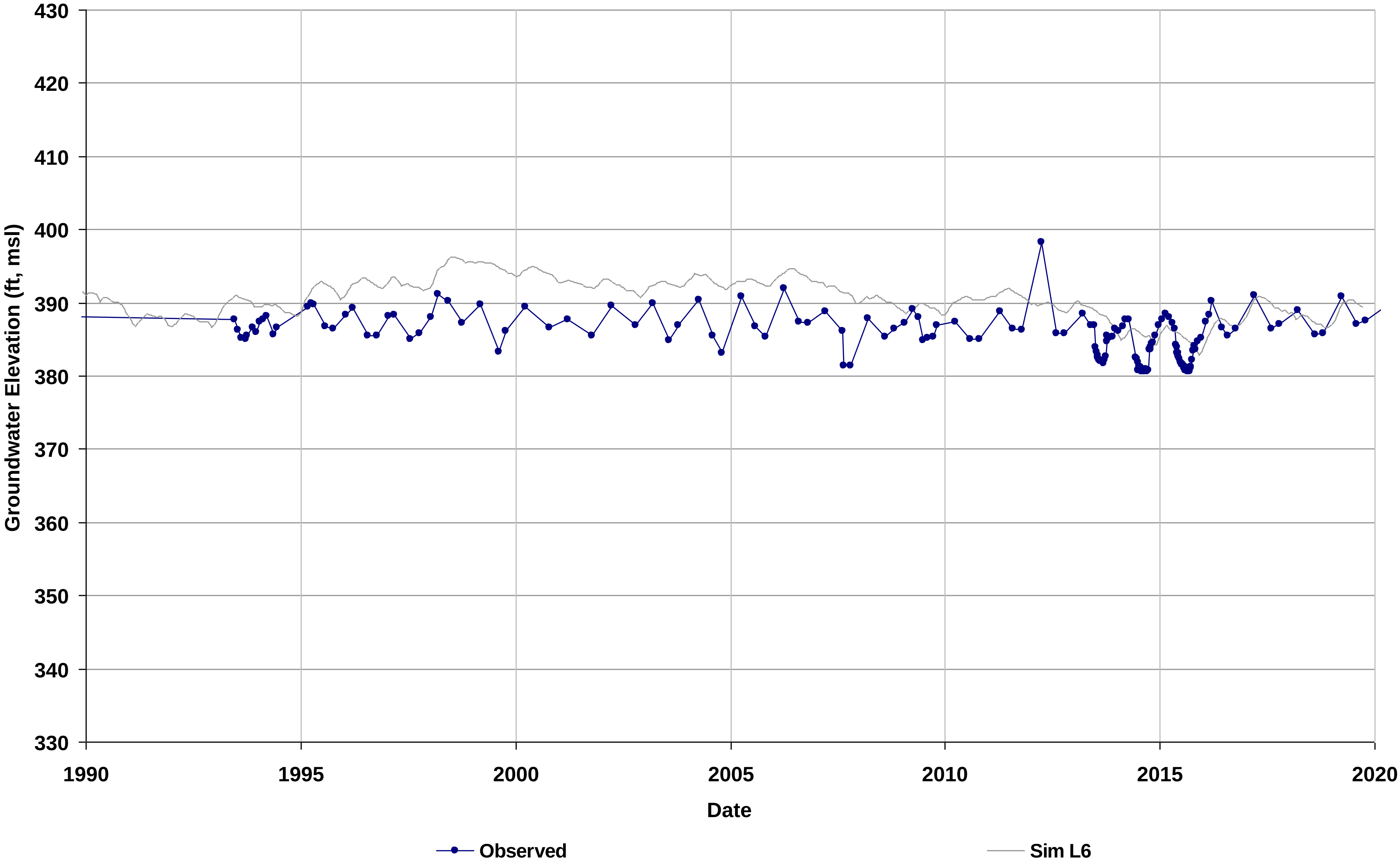


Tehama IHM - Historical

Well Name: 29N04W02P001M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 447

Total Depth (ft):
Perf Top (ft): 165
Perf Bottom (ft): 425
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): 3.41

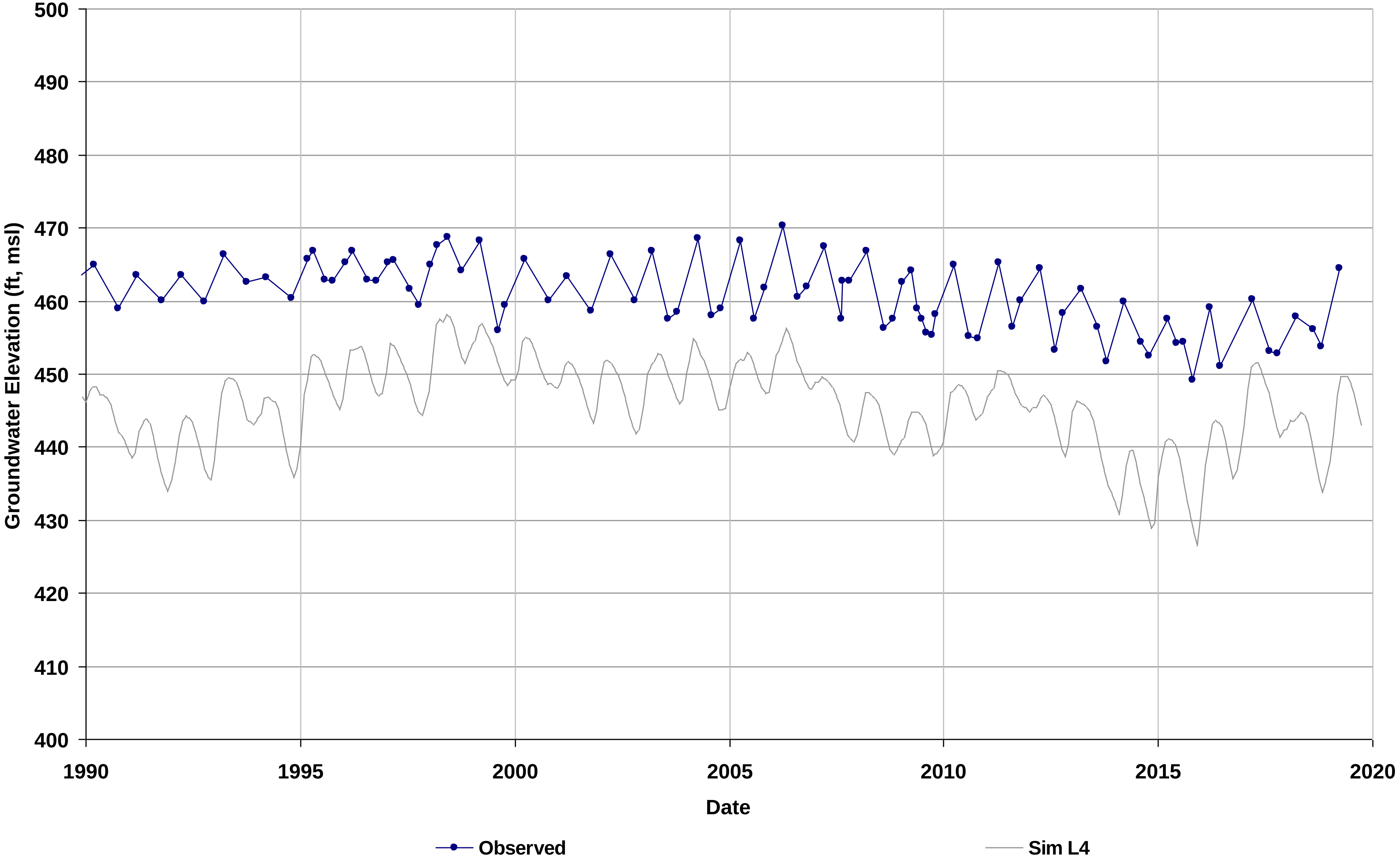


Tehama IHM - Historical

Well Name: 29N05W11A002M
Depth Zone: Composite
Subbasin: Anderson
GSE (ft, msl): 514

Total Depth (ft):
Perf Top (ft): 110
Perf Bottom (ft): 356
Top Model Layer: 4
Bottom Model Layer: 4

Average Residual (ft): -14.92

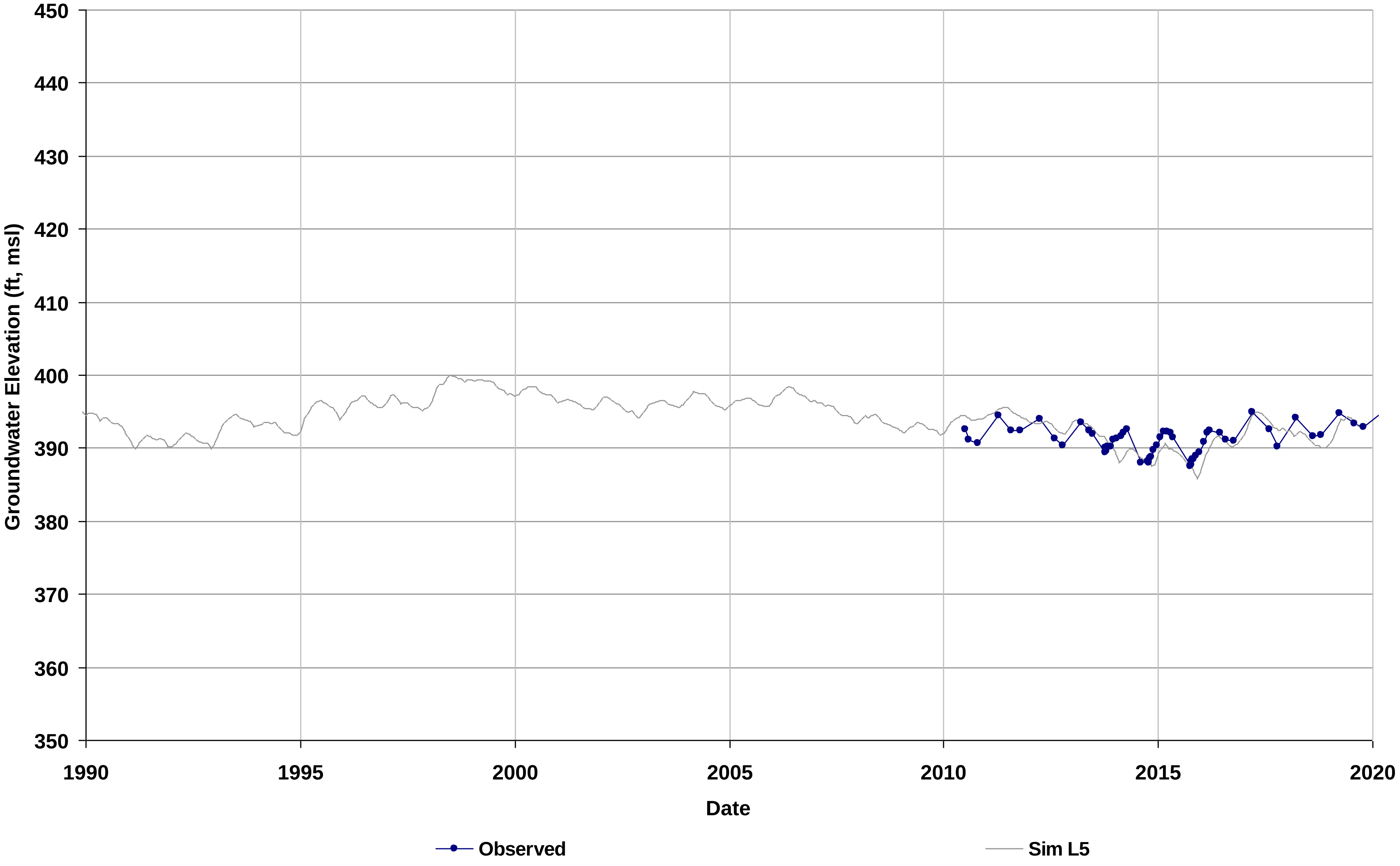


Tehama IHM - Historical

Well Name: 29N04W03R004M
Depth Zone: Upper
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 438
Perf Top (ft): 380
Perf Bottom (ft): 390
Top Model Layer: 5
Bottom Model Layer: 5

Average Residual (ft): -0.41

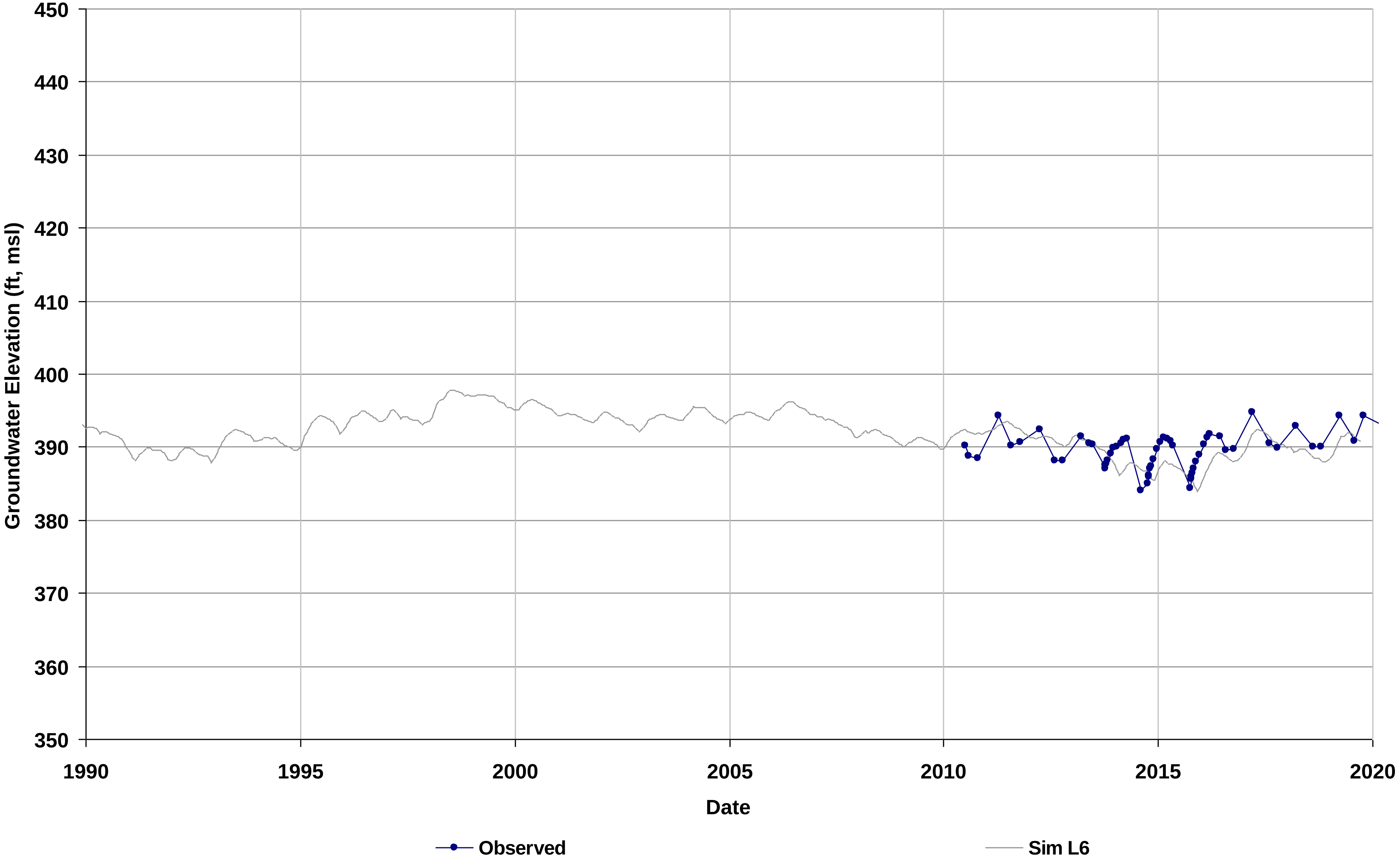


Tehama IHM - Historical

Well Name: 29N04W03R003M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

Total Depth (ft): 696
Perf Top (ft): 515
Perf Bottom (ft): 660
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): -0.93

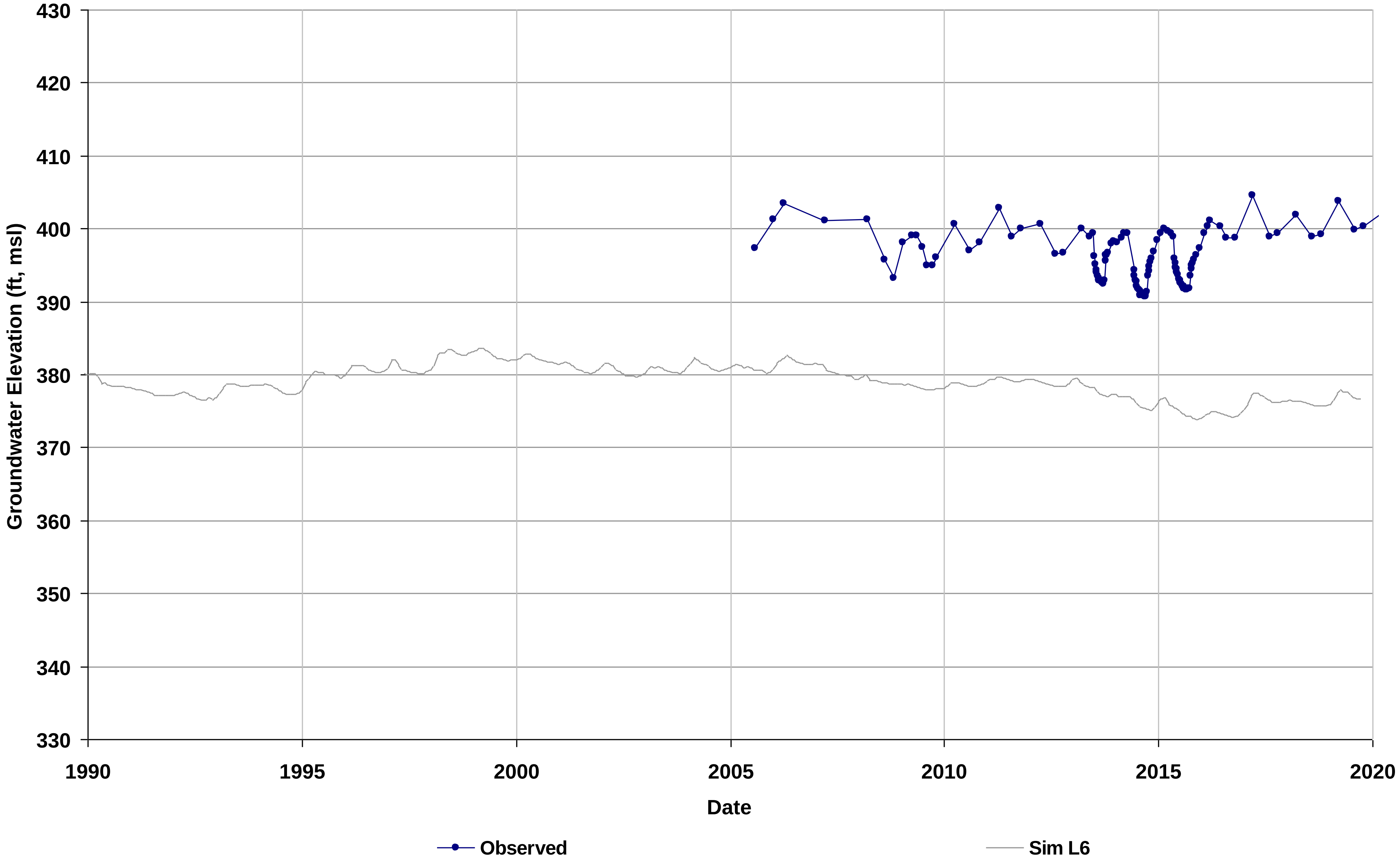


Tehama IHM - Historical

Well Name: 30N04W22F004M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 447

Total Depth (ft): 540
Perf Top (ft): 480
Perf Bottom (ft): 540
Top Model Layer: 6
Bottom Model Layer: 6

Average Residual (ft): -19.23

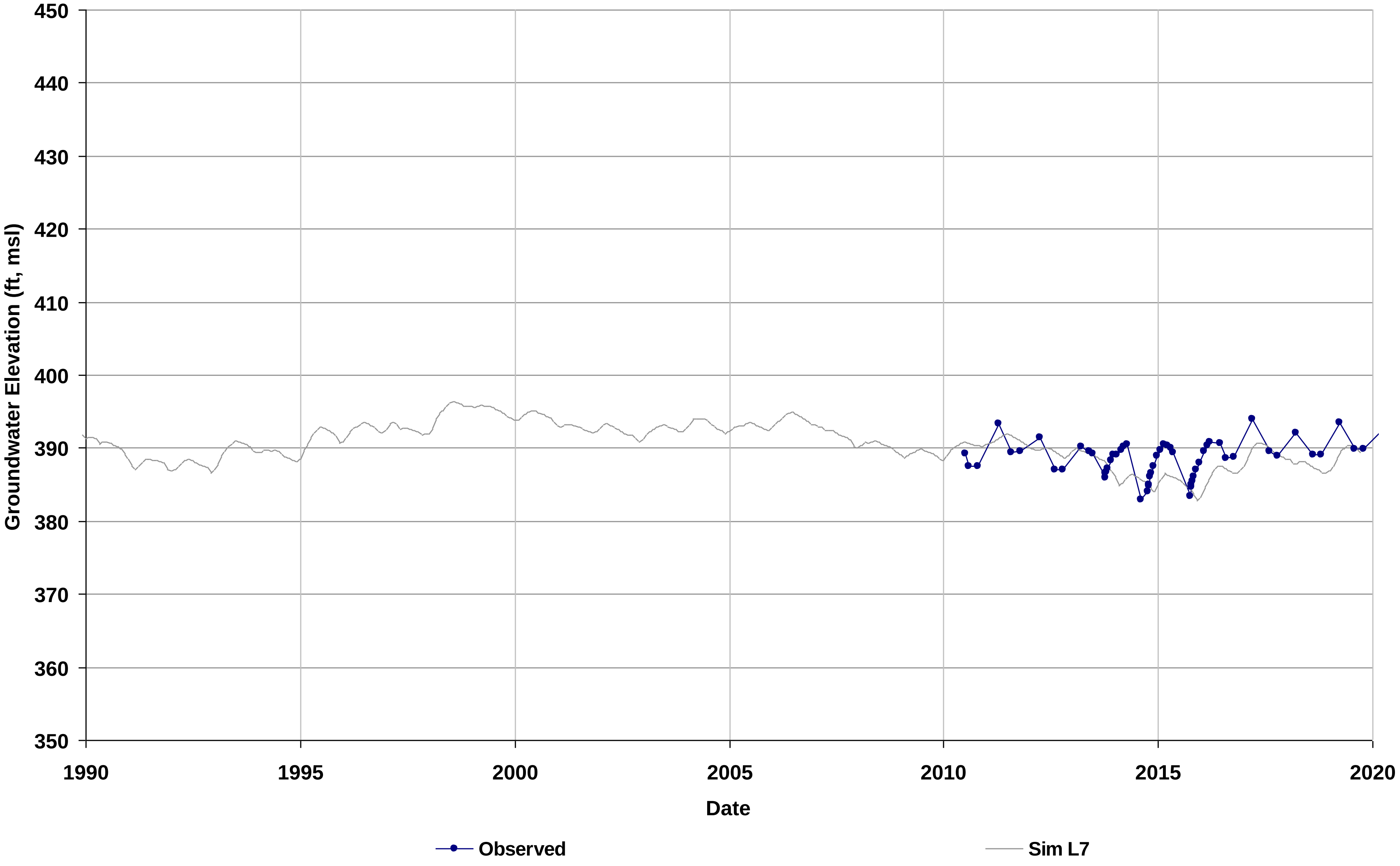


Tehama IHM - Historical

Well Name: 29N04W03R002M
Depth Zone: Lower
Subbasin: Anderson
GSE (ft, msl): 457

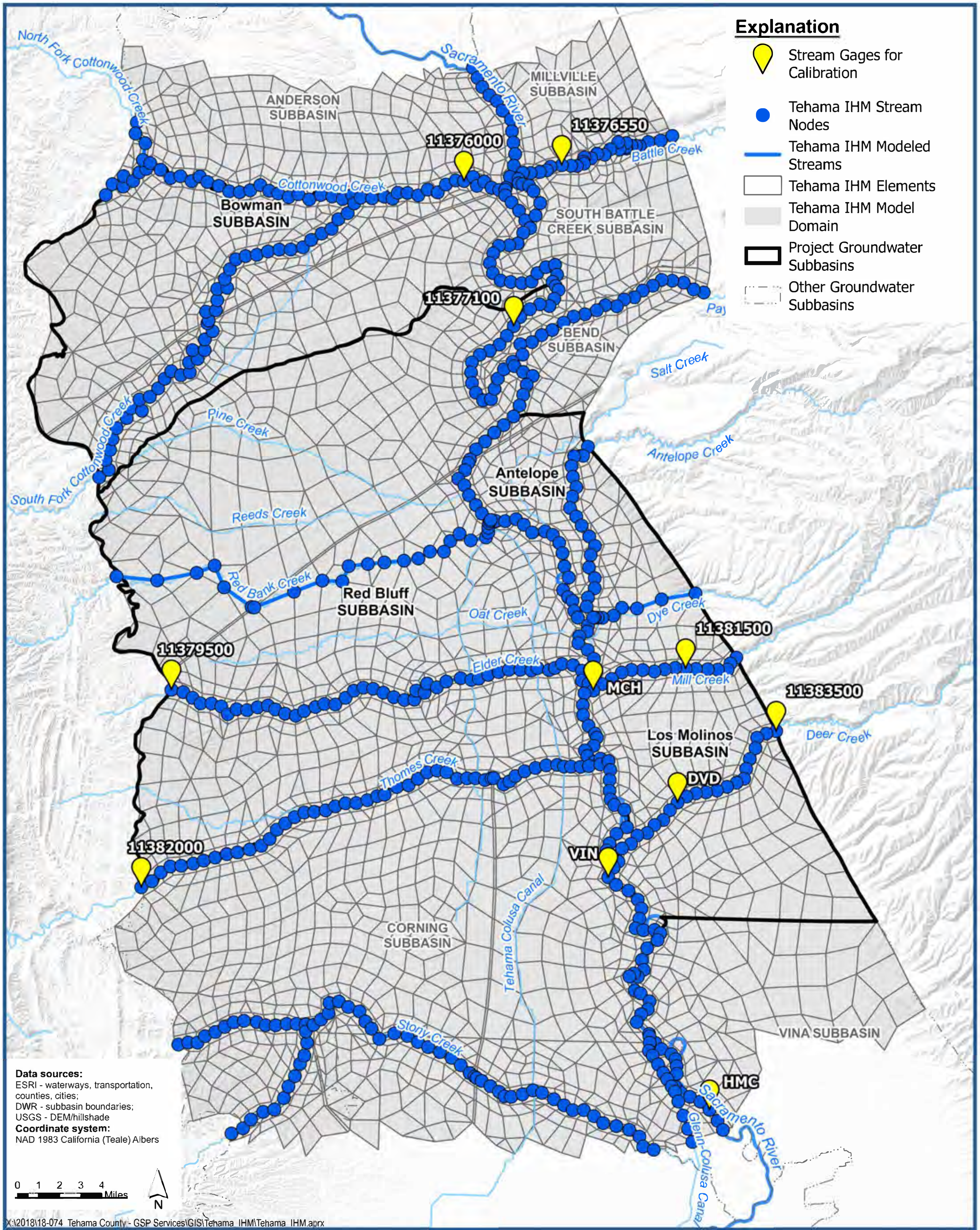
Total Depth (ft): 917
Perf Top (ft): 740
Perf Bottom (ft): 880
Top Model Layer: 7
Bottom Model Layer: 7

Average Residual (ft): -1.44



Tehama IHM - Historical

Appendix I. Tehama IHM Streamflow Calibration Hydrographs



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

X:\2018\18-074_Tehama County - GSP Services\GIS\Tehama_IHM\Tehama_IHM.aprx

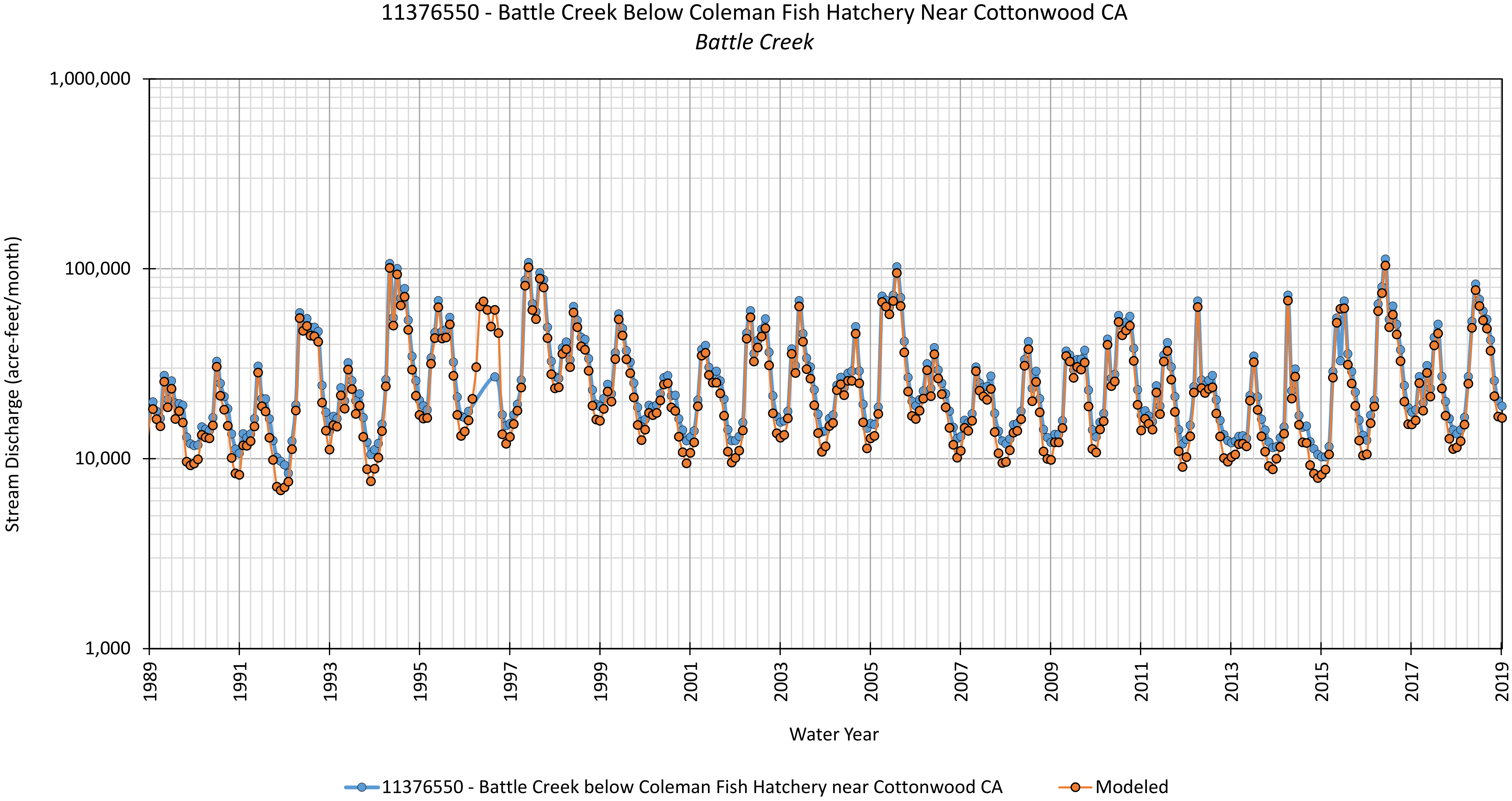
TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

LSCE Team

Map of Streamflow Calibration Gages in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

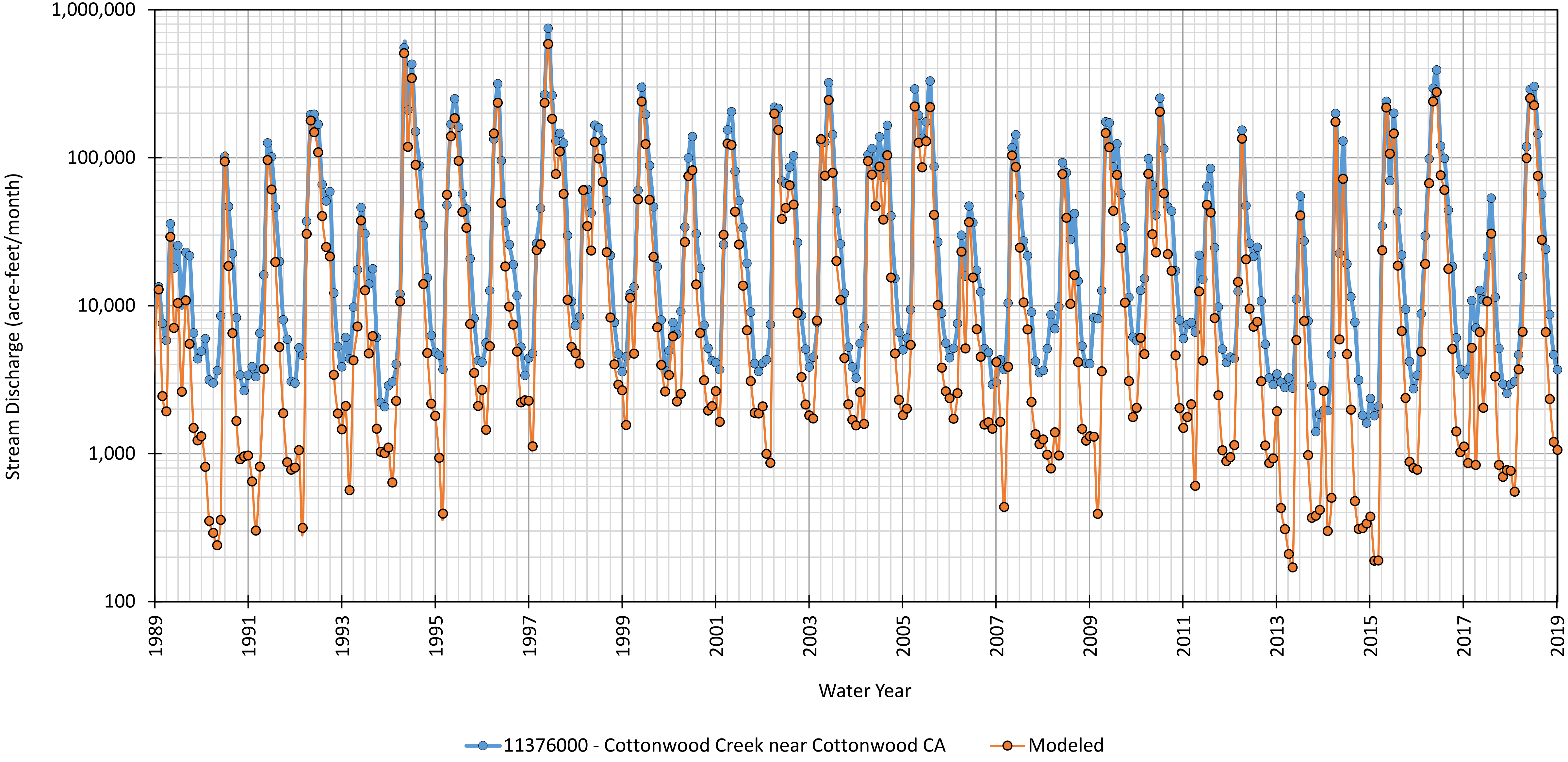
Figure I-1

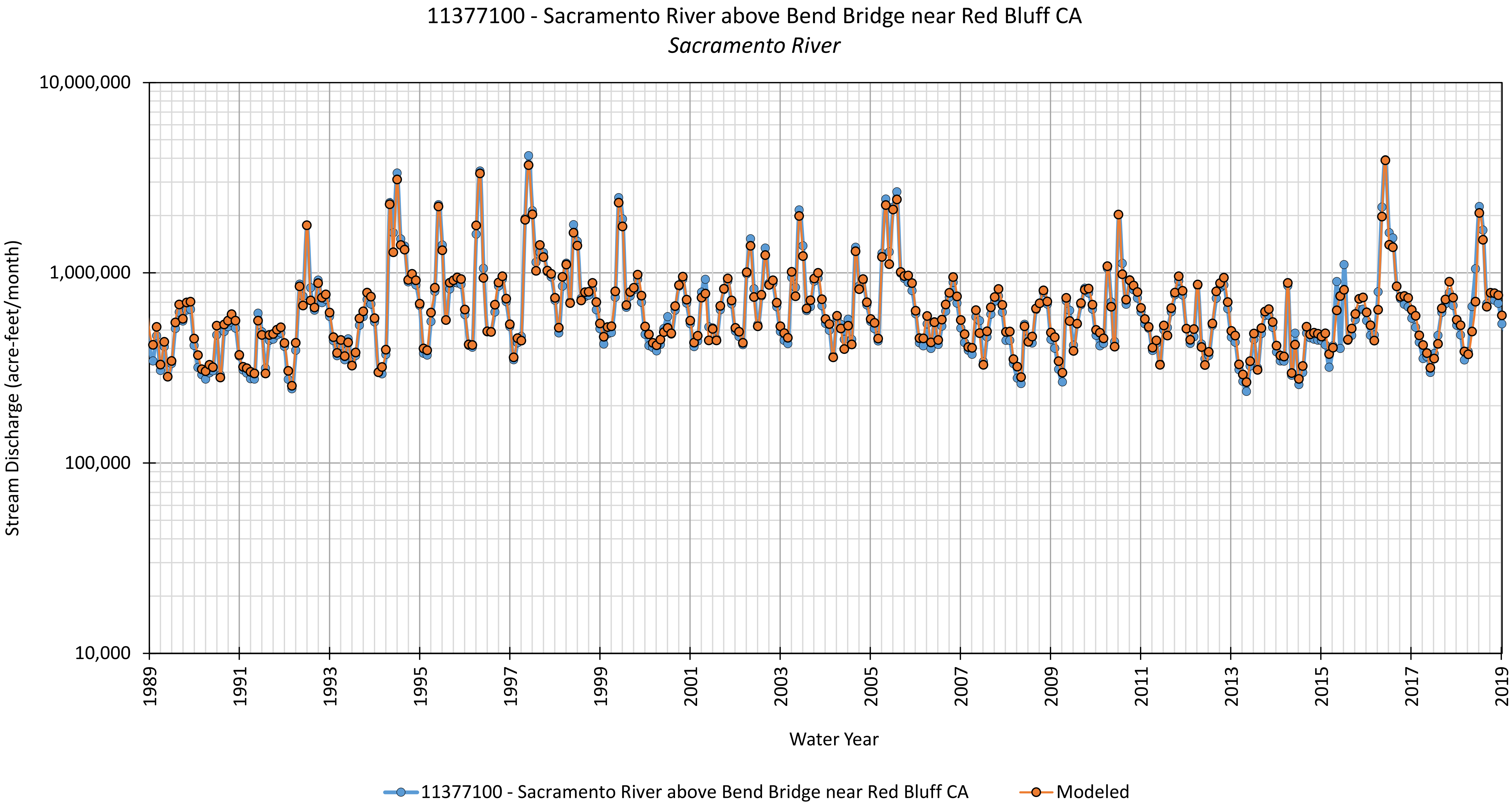


Tehama IHM - Historical

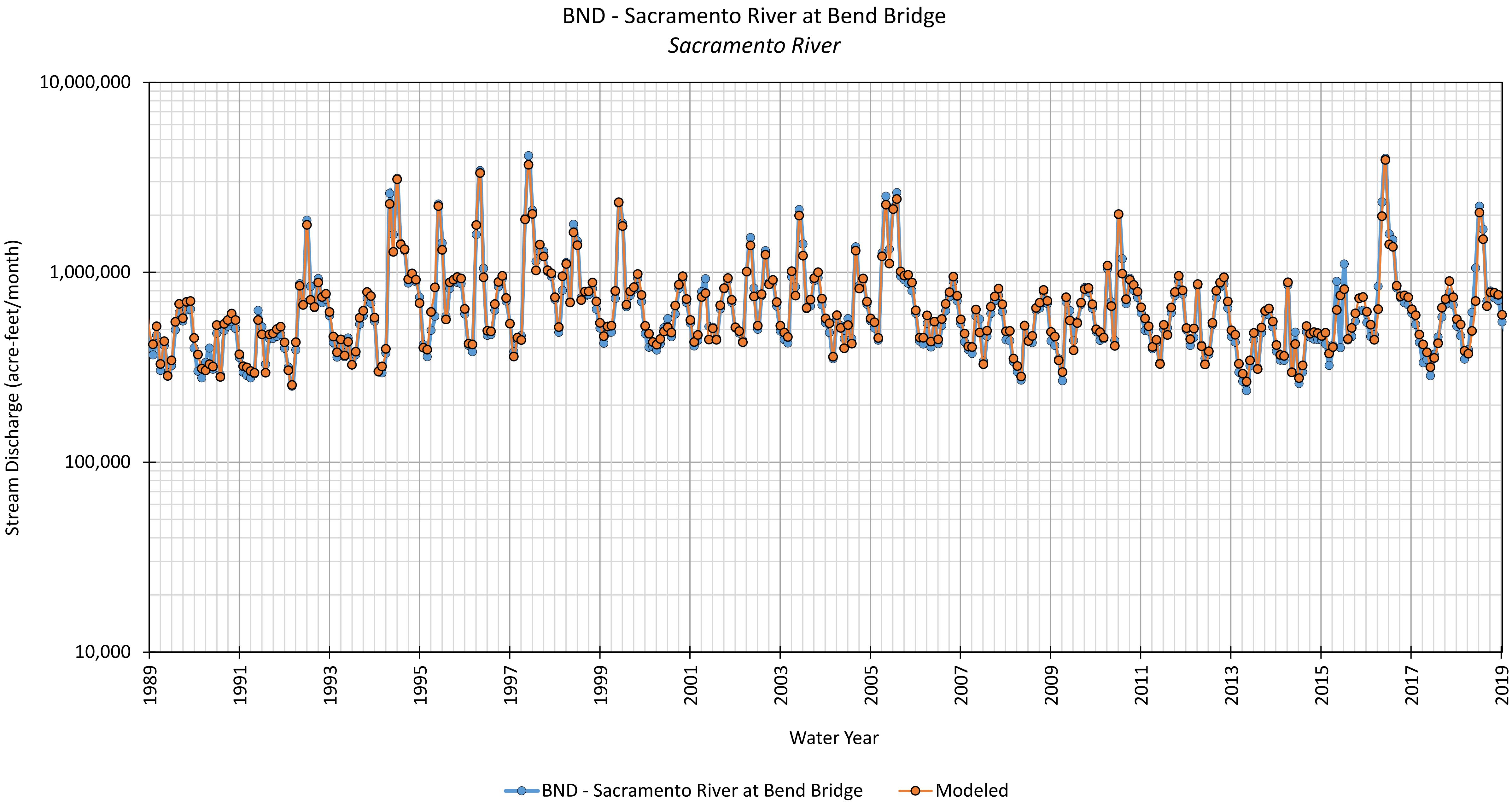
11376000 - Cottonwood Creek near Cottonwood CA

Cottonwood Creek





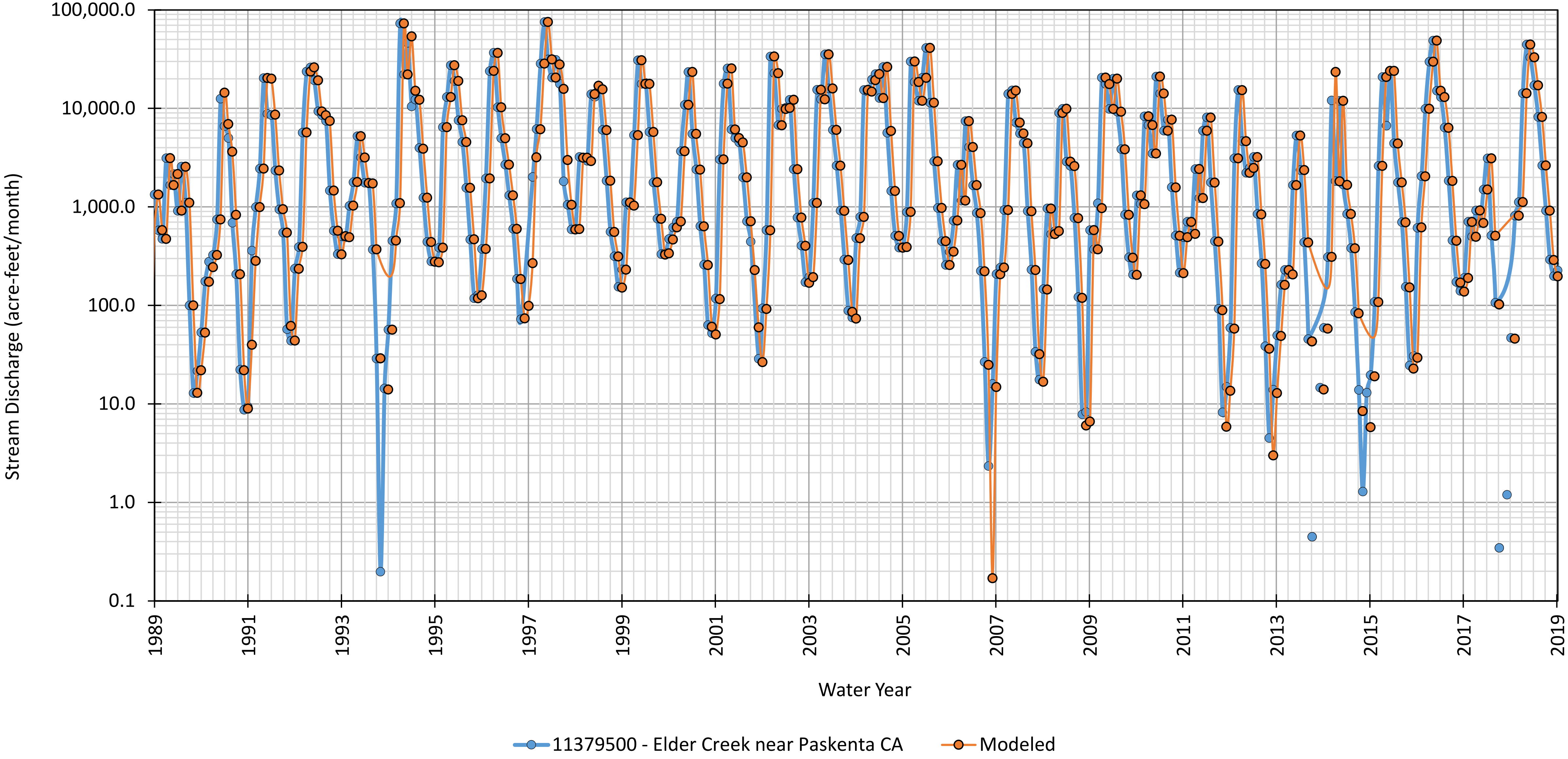
11377100 - Sacramento River above Bend Bridge near Red Bluff CA
Sacramento River
10,000,000
1,000,000
100,000
10,000
Stream Discharge (acre-feet/month)
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
Water Year
11377100 - Sacramento River above Bend Bridge near Red Bluff CA
Modeled



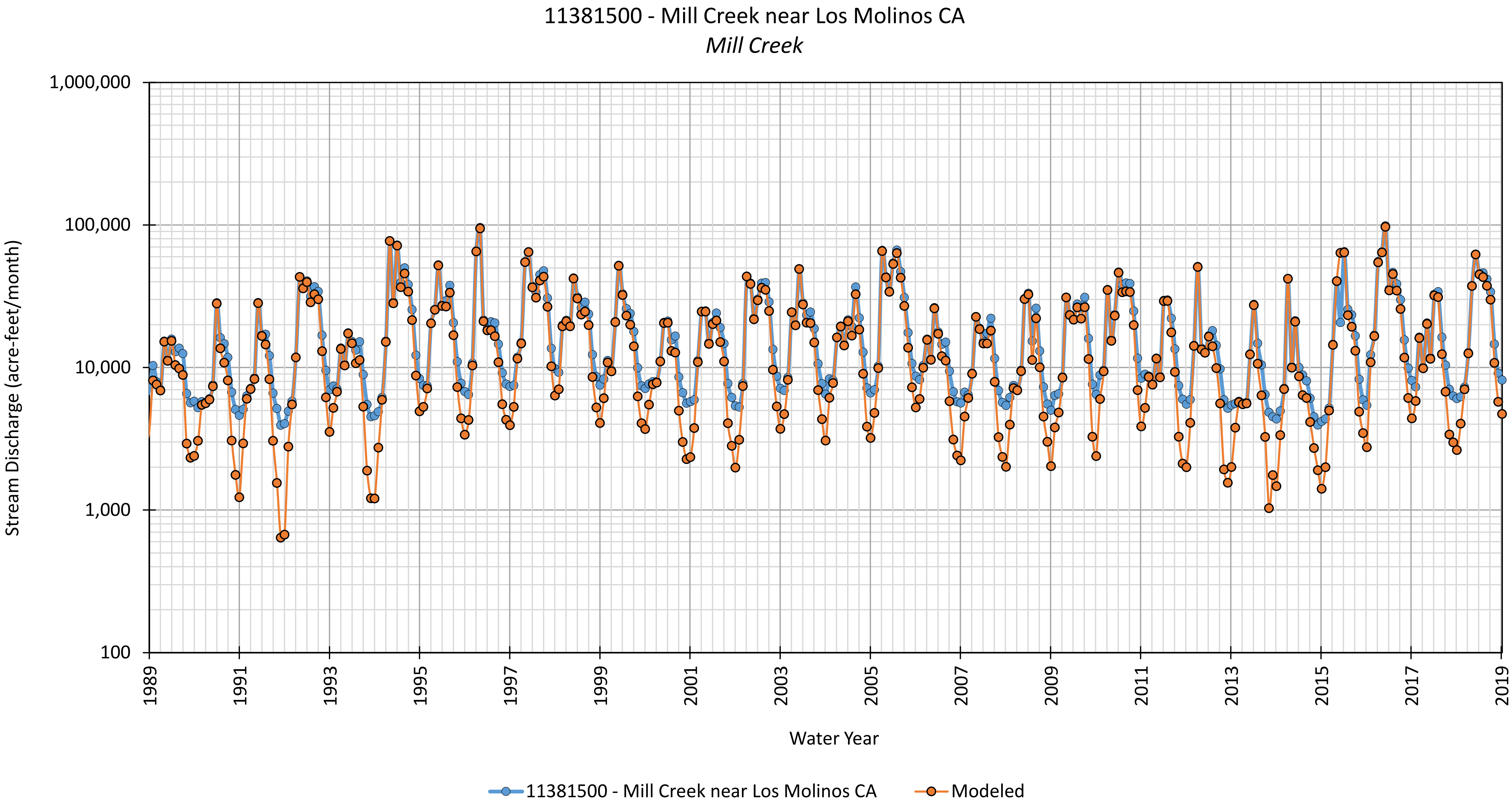
Tehama IHM - Historical

11379500 - Elder Creek near Paskenta CA

Elder Creek

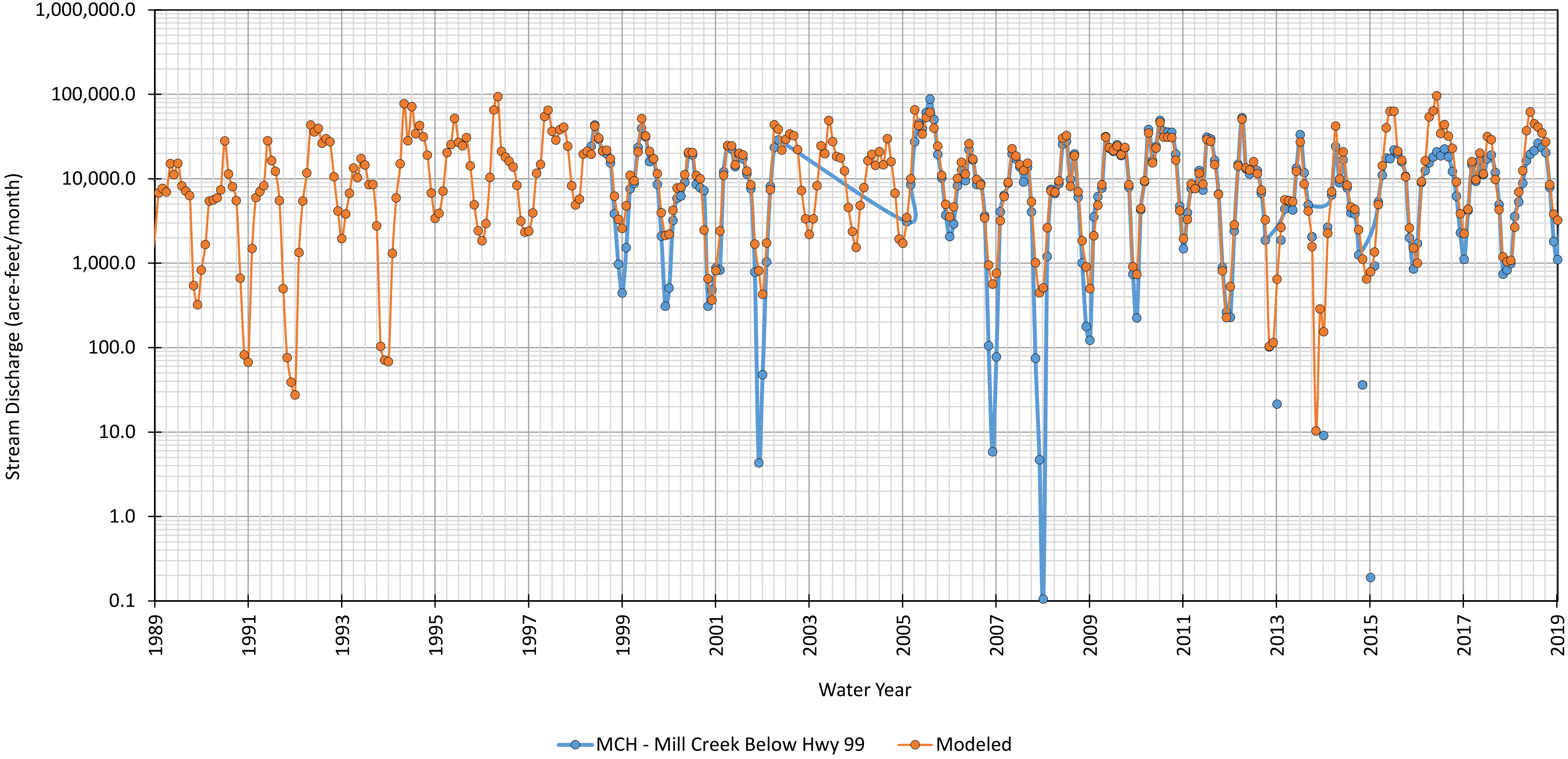


Tehama IHM - Historical

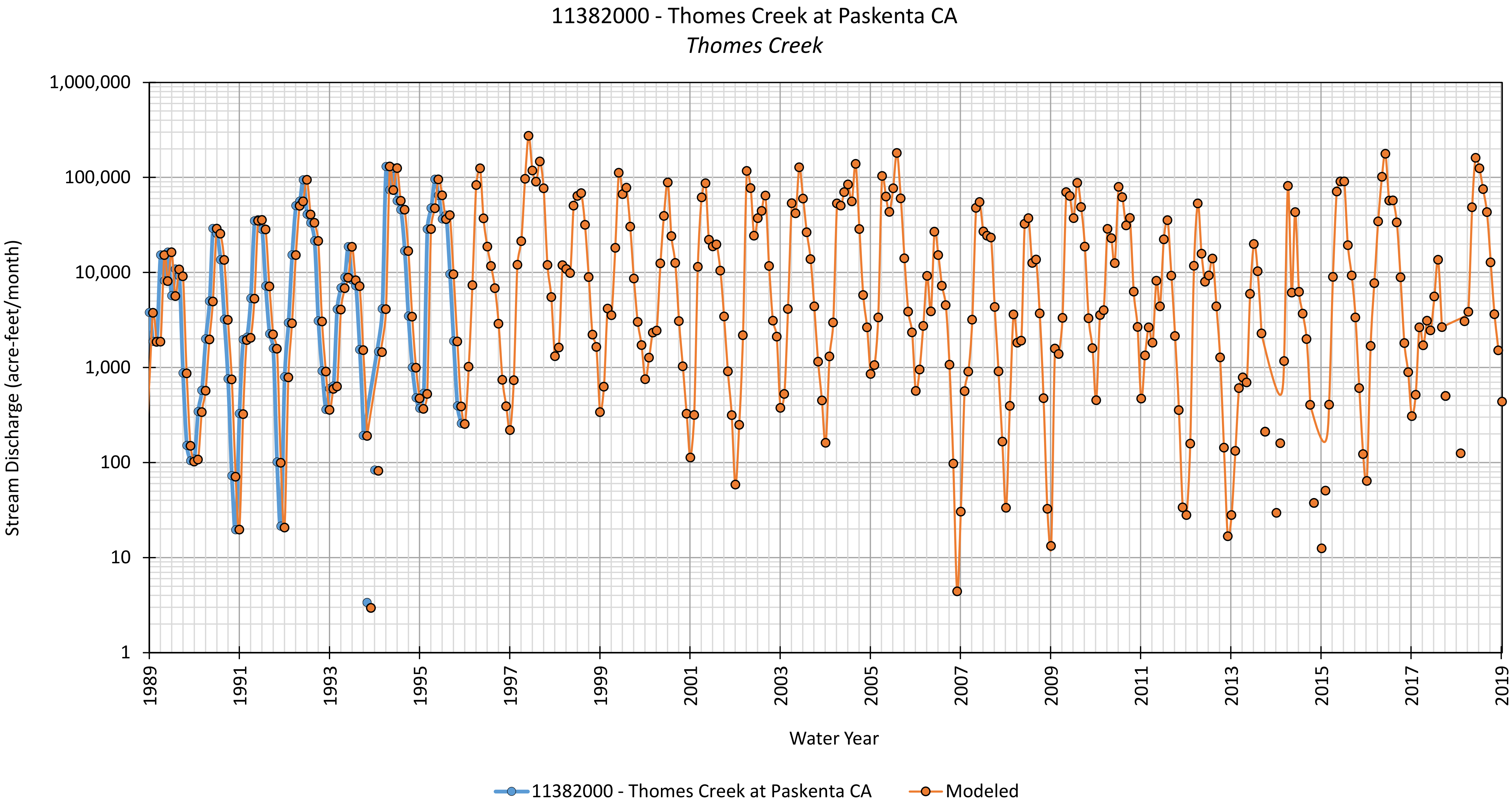

11381500 - Mill Creek near Los Molinos CA
Mill Creek
Stream Discharge (acre-feet/month)
1,000,000
100,000
10,000
1,000
100
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
Water Year
11381500 - Mill Creek near Los Molinos CA
Modeled

MCH - Mill Creek Below Hwy 99

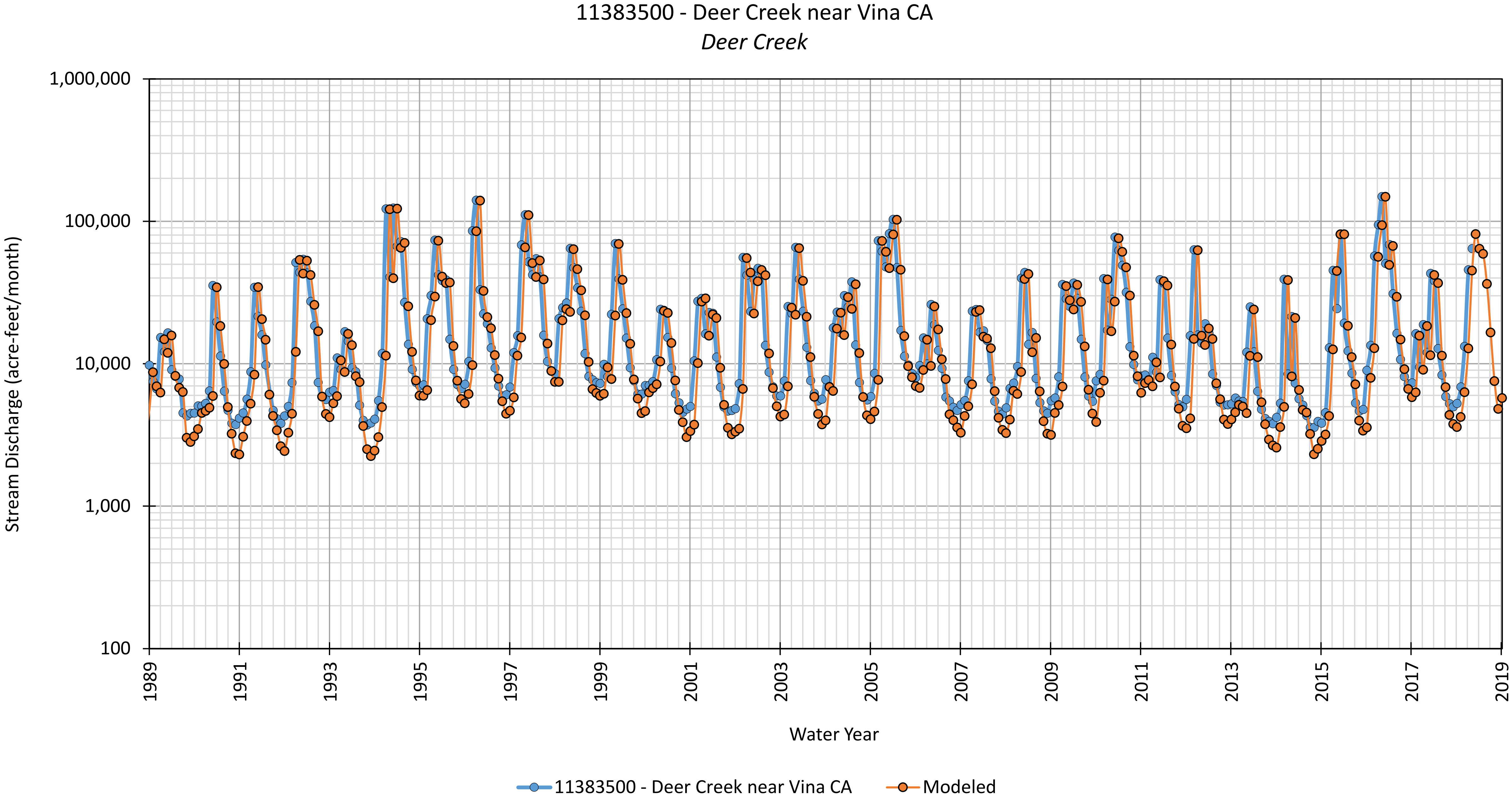
Mill Creek



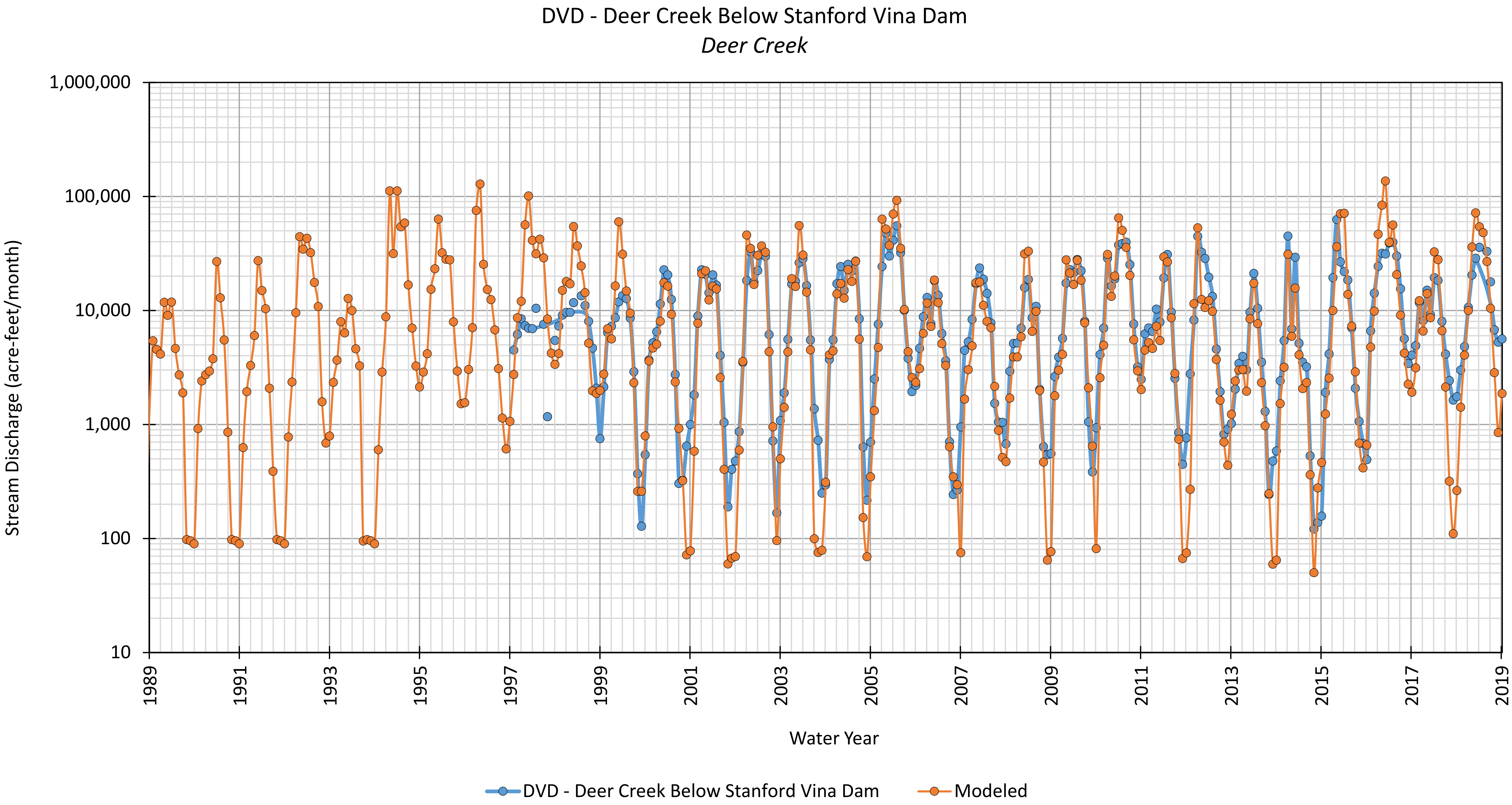
Tehama IHM - Historical



Tehama IHM - Historical



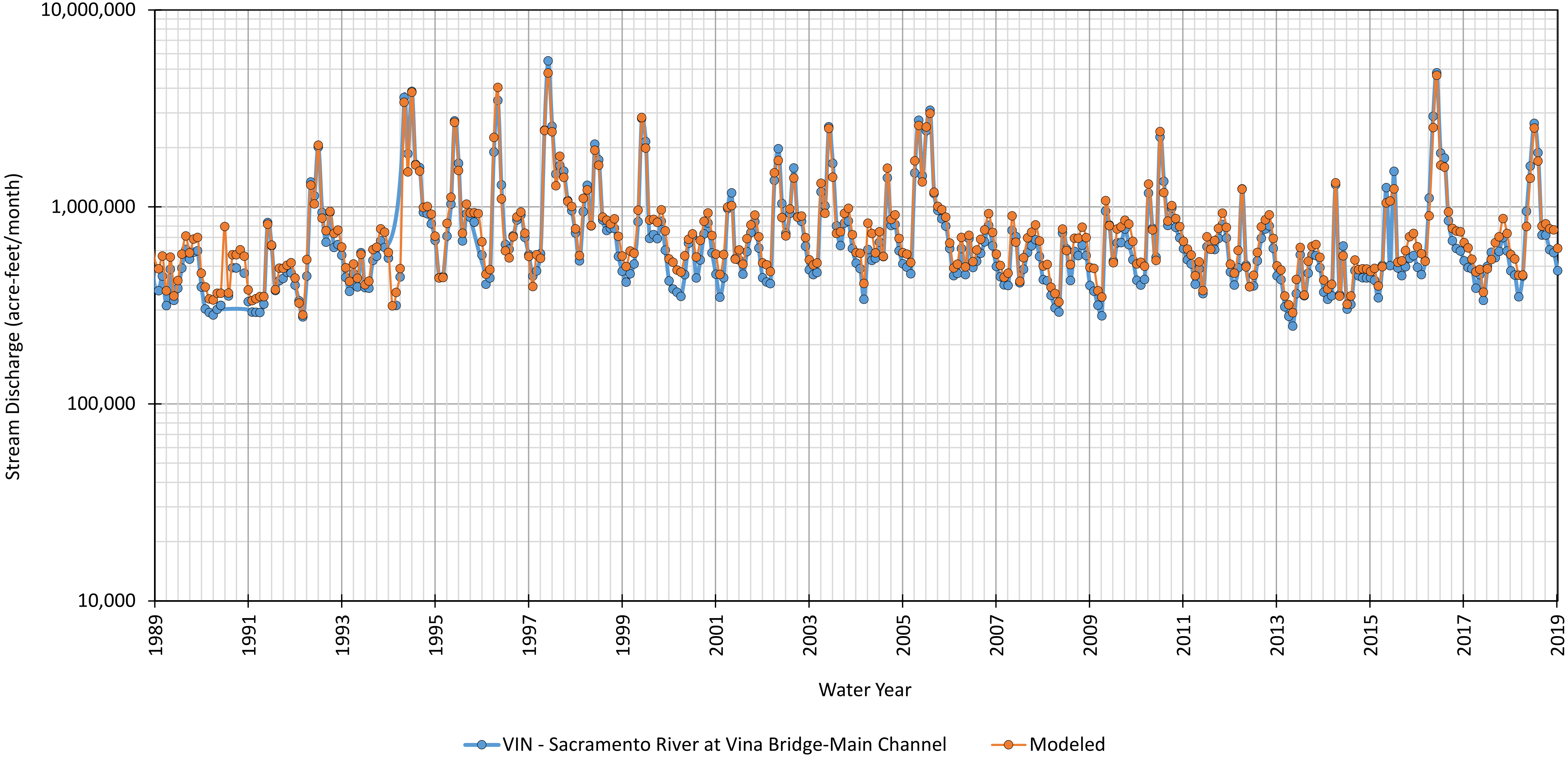
11383500 - Deer Creek near Vina CA
Deer Creek
Stream Discharge (acre-feet/month)
1,000,000
100,000
10,000
1,000
100
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
Water Year
11383500 - Deer Creek near Vina CA
Modeled

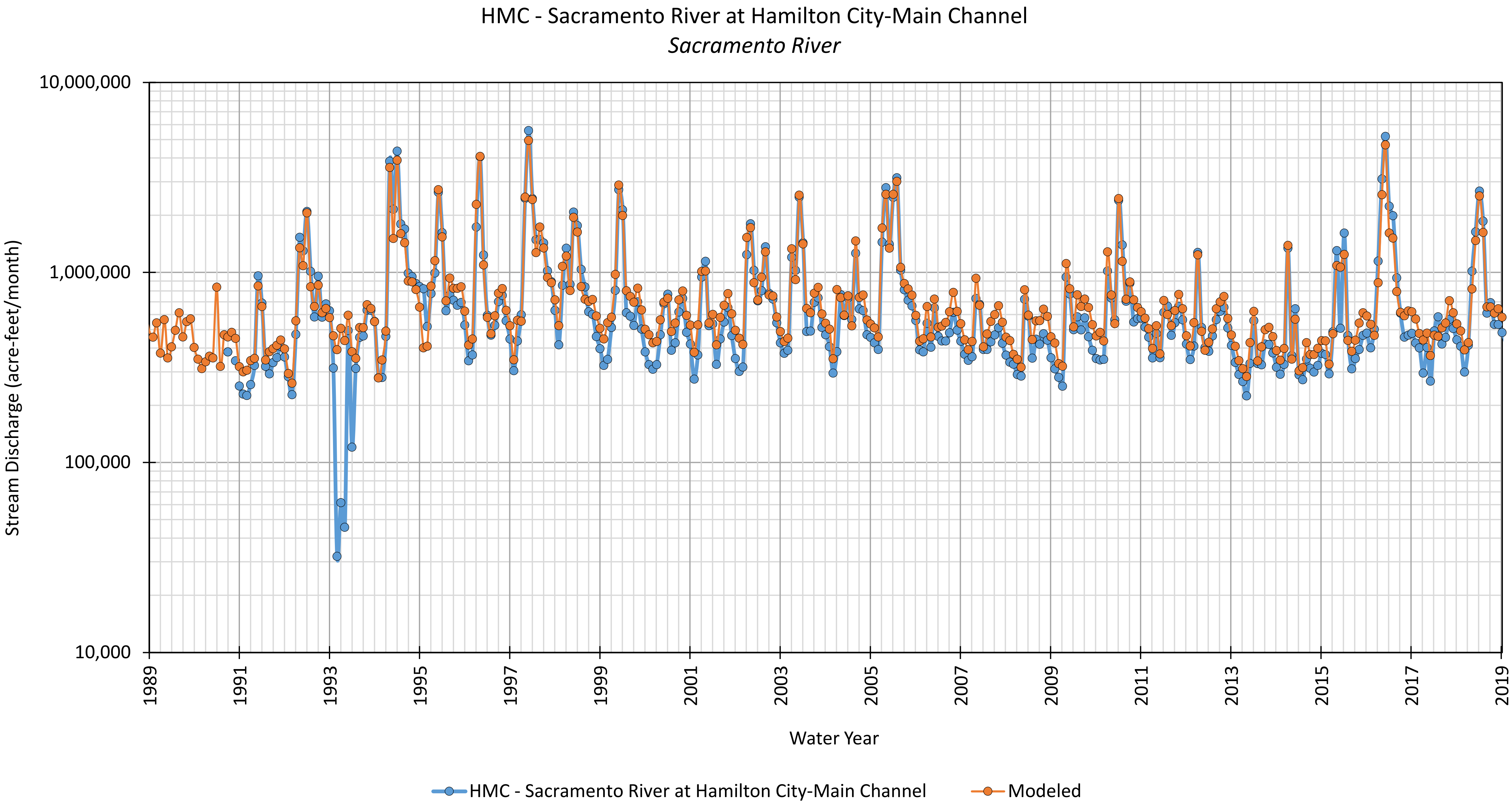


Tehama IHM - Historical

VIN - Sacramento River at Vina Bridge-Main Channel

Sacramento River





Tehama IHM - Historical

Appendix 2-J

Tehama Integrated Hydrologic Model Documentation Report

Tehama County

Sustainable Groundwater Management Act

Groundwater Sustainability Plan

Tehama IHM Model Documentation

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini, Consulting Engineers

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LIST OF ACRONYMS

AF	acre-feet
ASCE	American Society of Civil Engineers
BMP	Best Management Practices
CDEC	California Data Exchange Center
C2VSim	Central Valley Groundwater-Surface Water Simulation Model
CIMIS	California Irrigation Management Information System
CSS	Composite Scaled Sensitivity
CVP	Central Valley Project
DWR	California Department of Water Resources
ET	Evapotranspiration
Et_a	Actual Evapotranspiration
ET_{aw}	Evapotranspiration of Applied Water
ET_c	Crop Evapotranspiration
ET_o	Daily reference ET
ET_{pr}	Evapotranspiration of Precipitation
Et_r	Alfalfa Reference Evapotranspiration
eWRIMS	Electronic Water Rights Information Management System
ft/d	Feet Per Day
GDE	Groundwater Dependent Ecosystems
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWS	Groundwater System
IDC	Irrigation Demand Calculator
IWFM	Integrated Water Flow Model
Kh	Horizontal Hydraulic Conductivity
Kv	Vertical Hydraulic Conductivity
MAE	Mean of Absolute Residual Error
ME	Residual Error
METRIC	Mapping Evapotranspiration at High Resolution using Internalized Calibration
NRMSE	Normalized Root Mean of Squared Residual Error
PM	Penman-Monteith
PMAs	Projects and Management Actions
PRISM	Parameter Elevation Regression on Independent Slopes Model
R	Linear Correlation Coefficient
RMSE	Root Mean of Squared Residual Error
SEBAL	Surface Energy Balance Algorithm for Land
SGMA	Sustainable Groundwater Management Act
Ss	Specific Storage
SVSim	Sacramento Valley Groundwater-Surface Water Simulation Model
SWRCB	State Water Resources Control Board
SWS	Surface Water System
Sy	Specific Yield
TAF	Thousand Acre-Feet

Tehama IHM	Tehama Integrated Hydrologic Model
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
VIC	Variable Infiltration Capacity
WCR	Well Completion Report
WD	Water District

1. INTRODUCTION

This report documents the development and calibration of the Tehama Integrated Hydrologic Model (Tehama IHM), a numerical groundwater flow model developed for four groundwater subbasins (Antelope, Bowman, Los Molinos, and Red Bluff) within Tehama County to support preparation of the Groundwater Sustainability Plans (GSPs) for the County, along with other future potential groundwater management and planning needs. This report includes a summary of the model platform, data sources, model development and calibration, model scenarios, and model results.

1.1. Background

To support GSP preparation the Tehama County Flood Control and Water Conservation District Groundwater Sustainability Agency (GSA) developed a numerical groundwater flow model covering the Antelope, Bowman, Los Molinos, and Red Bluff Subbasins to address GSP regulations requiring use of a numerical groundwater model, or equally effective approach, to evaluate historical and projected water budget conditions and potential impacts to groundwater conditions and users from the GSP implementation while also providing a broader tool for use in groundwater management decisions in the Subbasins. The development of Tehama IHM is intended primarily to support groundwater resources management activities associated with GSP development and implementation but is also envisioned as a tool that will also support water resources management activities less related to the GSP. Tehama IHM utilizes data and the hydrogeologic conceptualization that are presented and described in the four subbasin GSPs for to improve the understanding of hydrologic processes and their relationship to key sustainability metrics within the subbasins. Tehama IHM provides a platform to evaluate potential outcomes and impacts from future management actions, projects, and adaptive management strategies through predictive modeling scenarios.

1.2. Objectives and Approach

Numerical groundwater models are structured tools developed to represent the physical basin setting and simulate groundwater flow processes by integrating many data types (e.g., lithology, groundwater levels, surface water features, groundwater pumping) that represent the conceptualization of the hydrogeologic setting and processes. Tehama IHM was developed in a manner consistent with the Modeling Best Management Practices (BMP) guidance document prepared by the California Department of Water Resources (DWR) (DWR, 2016). The objective of Tehama IHM is to simulate hydrologic processes and effectively estimate historical and projected hydrologic conditions in the four subbasins related to Sustainable Groundwater Management Act (SGMA) sustainability indicators relevant to Tehama County including:

1. Lowering of Groundwater Levels
2. Reduction of Groundwater Storage
3. Depletion of Interconnected Surface Water

The development of Tehama IHM involved starting with and evaluating the beta version of DWR's Sacramento Valley Groundwater-Surface Water Simulation Model (SVSim) (release data April 29, 2020; DWR, 2020) and eventually carving out a local model domain and conducting local refinements to the model structure (e.g., nodes, elements) and modifying or replacing inputs as needed to sufficiently and accurately simulate local conditions in Tehama County areas within the model domain. SVSim utilizes the most current version of the Integrated Water Flow Model (IWFM) code available at the time of the Tehama IHM development. IWFM and SVSim were selected as the modeling platform due to the versatility in simulating crop-water demands in the predominantly agricultural setting of the subbasins, groundwater surface-water interaction, the existing hydrologic inputs existing in the model for the time period through the end of water year 2015, and the ability to customize the existing SVSim model to be more representative of local conditions in the area of Tehama County. Tehama IHM was refined from SVSim and calibrated to a diverse set of available historical data using industry standard techniques.

1.3. Report Organization

This report is organized into the following sections:

- Section 2: Model Code and Platform
- Section 3: Groundwater Flow Model Development
- Section 4: Groundwater Flow Model Results
- Section 5: Sensitivity Analysis
- Section 6: Model Uncertainty and Limitations
- Section 7: Conclusions and Recommendations
- Section 8: References

2. MODEL CODE AND PLATFORM

The modeling code and platform utilized for Tehama IHM are described below. As required by GSP regulations, the selected model code is in the public domain. The decision to select the model codes for the Tehama IHM was based on providing Tehama County with a modeling tool that can be used for GSP development with sufficient representation of local conditions, while utilizing to the extent possible, previous modeling tools available, including regional models. With this objective in mind, the model tools and platforms described below were determined to be most suitable for adaptation for use in GSP analyses.

2.1. Integrated Water Flow Model

IWFM is a quasi-three-dimensional finite element modeling software that simulates groundwater, surface water, groundwater-surface water interaction, as well as other components of the hydrologic system (Dogrul et al., 2017). Tehama IHM is developed using the IWFM Version 2015 (IWFM-2015) code, which couples a three-dimensional finite element groundwater simulation process with one-dimensional land surface, river, lake, unsaturated zone, and small-stream watershed processes (Brush et al., 2016). A key feature of IWFM-2015 is its capability to simulate the water demand as a function of different land use and crop types and compare it to the historical or projected amount of water supply (Dogrul et al., 2017). IWFM uses a model layering structure in which model layers represent aquifer zones that are assigned aquifer properties relating to both horizontal and vertical groundwater movement (e.g., horizontal and vertical hydraulic conductivity) and storage characteristics (e.g., specific yield, specific storage) with the option to associate an aquitard to each layer, although represented aquitards are assigned a more limited set of properties relating primarily to their role in vertical flow (e.g., vertical hydraulic conductivity).

The IWFM-2015 source code and additional information and documentation relating to the IWFM-2015 code is available from DWR at the link below:

https://water.ca.gov/Library/Modeling-and-Analysis/Modeling-Platforms/Integrated-Water-Flow-Model

2.1.1. IWFM Demand Calculator

IWFM includes a stand-alone Integrated Water Flow Model Irrigation Demand Calculator (IDC) that calculates water demands. Agricultural water demands are calculated in IDC based on climate, land use, soil properties, and irrigation method whereas urban demands are calculated based on population and per-capita water use. Tehama IHM utilizes IDC to simulate root zone processes and water demands. The physically based IDC version 2015.0.88 (released August 25, 2020) is developed and maintained by DWR.

2.2. SVSim

The SVSim model utilizes the IWFM-2015 code and represents a refinement of the previous California Central Valley Groundwater-Surface Water Simulation Model (C2VSim) coarse grid (CG) and fine grid (FG) models. Refinements made in the development of SVSim include a finer horizontal discretization, an updated aquifer layering scheme, updated hydrogeology, and an extended simulation period through water year 2015 (DWR, 2020). When compared with C2VSim, SVSim improves the simulation of stream-groundwater interaction with thinner shallow model layers and a finer grid adjacent to waterways (DWR, 2020). The SVSim version available from DWR at the time of the initiation of modeling efforts to support GSP preparation in Tehama County was not a calibrated model version. In January 2021, a calibrated Version 1.0 release of SVSim was made available to the public through the California Natural Resources

Agency Open Data website (https://data.cnra.ca.gov/dataset/svsim) and was reviewed and considered during the development of the Tehama IHM. The SVSim Version 1.0 was subsequently removed from the Open Data website and as of the date of this report (September 2021), a calibrated version of SVSim is no longer available.

3. GROUNDWATER FLOW MODEL DEVELOPMENT

This section describes the spatial and temporal (time-series) structure of the model and the input data that was utilized for model development. The model development process utilized data and information that was available at the time of model development and is described in greater detail in the Subbasin GSPs.

3.1. Tehama IHM – Historical Model Simulation

The Tehama IHM historical model simulates the period from October 1985 through September 2019 at a monthly time step, with a calibration period of October 1989 through September 2018. Water years, as opposed to calendar years, are used as the time unit for defining analysis, following the DWR standard water year period (October 1 through September 30). Unless otherwise noted, all years referenced in this report are water years. The historical model calibration period extends from water years 1990 through 2018. Water years 1985 through 1989 are not included as part of the historical calibration period, but are simulated to allow the model sufficient time to adjust to the specified initial conditions and spin-up prior to the calibration period starting in October 1989.

3.1.1. Historical Base Period Selection

In accordance with GSP Regulations, the historical water budget for the Subbasins must quantify all required water budget components starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the water budget (23 CCR § 354.18(c)(2)(B)). The historical water budget period effectively represents long-term average hydrologic conditions and enables evaluation of the effects of historical hydrologic conditions and water demands on the water budget and groundwater conditions within the Subbasins over a period representative of long-term hydrologic conditions.

The historical water budget period was selected to evaluate conditions over discrete representative periods considering the following criteria: Sacramento Valley water year type; long-term mean annual water supply; inclusion of both wet and dry periods, antecedent dry conditions, adequate data availability; and inclusion of current hydrologic, cultural, and water management conditions in the Subbasins. The availability of historical data for use in developing model inputs is greatly increased for years since 1990 in the Subbasins.

Based on these criteria, the historical water budget period and model calibration period was selected as water years 1990-2018 (29 years) using historical hydrologic, climate, water supply, and land use data. The period from 1990-2018 is consistent with long-term average historical hydrologic conditions in the Subbasins as illustrated in **Table 3-1**. Further information and discussion of the historical water budget period, including discussion of historical hydrology and the historical base period selection considerations, are presented in **Section 2.3** of the Subbasin GSPs.

Table 3-1. Sacramento Valley Water Year Type Classification of the Historical Water Budget Period (1990-2018)

Sacramento Valley Water Year Type	Abbreviation	Number of Years, 1990-2018	Average Water Year Index	Average Precipitation	Percent Total Years, 1990-2018
Wet	W	8	11.87	28.8	28%
Above Normal	AN	4	8.55	28.1	14%
Below Normal	BN	5	7.07	21.0	17%
Dry	D	5	5.98	17.2	17%
Critical	C	7	4.48	17.1	24%
	Total	**29**	**7.78**	**22.5**	**100%**

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types: Wet (W) ≥9.2; Above Normal (AN) 7.8-9.2; Below Normal (BN) 6.5-7.8; Dry (D) 5.4-6.5; Critical (C) ≤5.4. Precipitation data is based on Red Bluff Municipal Airport station (NOAA station ID USW00024216).

3.1.2. Model Configuration

The Tehama IHM grid of nodes and elements was carved out of the regional SVSim model domain. While Tehama IHM focuses on the Antelope, Bowman, Los Molinos, and Red Bluff Subbasins, the model domain was extended outside the Subbasins to incorporate a buffer that includes area within the Corning, Vina, Anderson, Millville, South Battle Creek, Bend, and Colusa Subbasins. The extent of the buffer is approximately five miles outside of Tehama County, or to the extent of the SVSim model where that extent is less than five miles outside the County. The appropriate extent of the buffer was determined using DWR's C2VSimFG model (DWR, 2021), a calibrated regional model, by testing the radius of influence from pumping wells. The Tehama IHM domain, shown in **Figure 3-1**, encompasses a total of 942,227 acres. All SVSim model features (e.g., nodes, elements, streams, layers) within this domain were initially included in Tehama IHM with subsequent modifications and refinements made within Tehama IHM to these model components, as described in later sections of this report.

3.1.2.1. Nodes and Elements

The Tehama IHM grid contains 5,209 nodes and 5,398 elements (**Figure 3-1**). The X-Y coordinates for node locations are presented in the UTM Zone 10N, NAD83 (meters) projected coordinate system. While the number of nodes and elements within the Tehama IHM domain were not altered from SVSim, the locations of some nodes and elements were modified to more accurately align with added streams being simulated in Tehama IHM. **Figure 3-2** highlights the modified nodes and elements in Tehama IHM. **Table 3-2** presents Tehama IHM grid characteristics.

Table 3-2. Tehama IHM Grid Characteristics

Nodes	5,209
Elements	5,398
Average Element Size (acres)	*175*
Minimum Element Size (acres)	*0.72*
Maximum Element Size (acres)	*2,122*
Subregions	4
Aquifer Layers	9

3.1.2.2. Model Subregions

Model elements are grouped into subregions to assist in the summarization of model results and development of water budgets. Tehama IHM includes four subregions (listed in **Table 3-3**). Subregions were delineated by subbasin. While subregions are used as the basis for summarizing model results, the model simulates hydrologic processes and conditions at the resolution of elements or nodes. **Figure 3-3** shows the extent of the different subregions delineated in Tehama IHM.

Table 3-3. Model Subregions within Tehama IHM

Subregion Name	Actual Acreage	Modeled Acreage
Antelope Subbasin	19,091	19,057
Bowman Subbasin	122,534	122,760
Los Molinos Subbasin	99,422	99,351
Red Bluff Subbasin	271,794	272,155

3.1.2.3. Streams

Tehama IHM includes 29 stream reaches composed of 599 stream nodes. Most of the streams explicitly simulated in Tehama IHM were streams included in SVSim. Streams that were adapted from existing streams simulated in SVSim include Antelope Creek Group, Battle Creek, Cottonwood Creek, Deer Creek Group, Elder Creek, Glenn-Colusa Canal, Mill Creek, Paynes Creek, Sacramento River, Stoney Creek, and Thomes Creek. Streams added to Tehama IHM that were not included in SVSim include Dye Creek and Red Bank Creek. Some of the model nodes were shifted to better align with the actual stream configuration of added streams. The entire stream network included in Tehama IHM is shown in **Figure 3-4**.

3.1.2.4. Model Layers

No adjustments to the layering scheme from SVSim were made in the development of Tehama IHM. Tehama IHM includes a total of nine model layers; in the IWFM model code, model layers can be subdivided into aquifer layers and aquitard layers for representation of different hydrogeologic characteristics within a single model layer. None of the model layers specifically included simulation of an aquitard layer, although finer-grained zones with potential to impede vertical flow in ways similar to an aquitard were simulated in accordance with the HCM (**Section 2.2 of the GSPs**) and available sediment texture data. **Table 3-4** presents the average thickness of each model layer in Tehama IHM. The uppermost layers are thin in order to better represent surface water-groundwater interaction. As described in the HCM presented in **Section 2.2 of the GSP**, the Subbasin has two primary aquifers: an unconfined to semi-confined Upper Aquifer and a confined to semi-confined Lower Aquifer. In general, model layers 1 through 5 correspond with the Upper Aquifer and layers 6 through 9 correspond with the Lower Aquifer. Further information about the local geology in the Tehama County Subbasins is presented in **Section 2.2 of the Subbasin GSPs**.

Table 3-4. Average Thicknesses of Tehama IHM Layers

Average Model Layer Thickness (feet)	
Layer 1	35
Layer 2	35
Layer 3	40
Layer 4	58
Layer 5	129
Layer 6	193
Layer 7	129
Layer 8	193
Layer 9	515

Elevations and thicknesses of each of the Tehama IHM model layers are shown in **Figures 3-5** through **3-23.**

3.1.3. Land Surface System Inputs

The IWFM Land Surface Process, which includes the IDC, calculates a water budget for four land use categories: non-ponded agricultural crops, ponded agricultural crops (i.e., rice), native and riparian vegetation, and urban areas. The Land Surface Process calculates water demand at the surface, allocates water to meet demands, and routes excess water through the root zone (Brush et al., 2016). The development of land surface system input files built on previous water budget data and analyses related to surface water system water budgets available for some areas of the Subbasins and was expanded to represent the entire Subbasins and a longer analysis period. The development of the land surface system model input files is described in the following section with additional detail provided in **Section 2.3 of the GSPs**.

3.1.3.1. Precipitation

For water years 1985-2019, monthly precipitation data for all elements and small watersheds in Tehama IHM were derived from the Parameter Elevation Regression on Independent Slopes Model (PRISM) system, which is operated by the PRISM Climate Group at Oregon State University. PRISM combines weather and climate data from various monitoring station networks, applies a range of modeling techniques, and develops gridded spatial climate parameter datasets for grid cells across the United States at a spatial resolution of four kilometers (NACSE, 2021). Building on previous water budget analysis work, monthly precipitation data sets were downloaded for the coordinates nearest the centroid of each element or watershed in Tehama IHM. The monthly data sets were quality controlled and provided as model inputs for the nearest corresponding element or small watershed. PRISM gridded precipitation data were extracted and interpolated, as needed, for each element in the Tehama IHM model domain, and for the centroid of each small watershed upgradient to the Tehama IHM model domain. Precipitation inflows to each small watershed were calculated as the monthly precipitation depth derived from PRISM data, applied over the total area of that small watershed.

3.1.3.2. Evapotranspiration

Monthly evapotranspiration (ET) time series data were refined for water years 1985 through 2019. Monthly ET rates were developed for individual crop types using the best available science, as described in this section.

3.1.3.2.1 Reference Evapotranspiration Development

Daily reference ET (ET_o) values for calendar years 1985-2019 were based on measured weather data obtained from the California Irrigation Management Information System (CIMIS) "Gerber" station (CIMIS station ID 008) and "Gerber South" station (station ID 222). Data from the Gerber CIMIS station were used to represent average ET_o in the Tehama County Subbasins. The Gerber CIMIS station was used because of its long period of record and generally high-quality data compared to other CIMIS stations located in or near Tehama County. When the Gerber CIMIS station became inactive in 2014, data were obtained from the Gerber South CIMIS station. Daily time series data were evaluated following standard quality control procedures recommended by the American Society of Civil Engineers (ASCE) and others (Allen, 1996; Allen et al, 1998; Allen et al, 2005; ASCE, 2016).

For any days when quality control procedures resulted in refinements to any weather data, daily ET_o values were determined following the widely accepted standardized Penman-Monteith (PM) method, as described by the ASCE Task Committee Report on the Standardized Reference Evapotranspiration Equation (ASCE-EWRI, 2005). The Task Committee Report standardizes the ASCE PM method for application to a full-cover alfalfa reference (ET_r) and to a clipped cool season grass reference (ET_o). The clipped cool season grass reference is widely used throughout California and was selected for this application. For any days when quality control procedures did not result in refinements to weather data, ET_o values reported by the station were used directly. The combined daily ET_o time series record was used to calculate crop evapotranspiration inputs for all years in the Tehama IHM historical scenario.

3.1.3.2.2 Crop Evapotranspiration Development

Crop evapotranspiration (ET_c), or crop consumptive use, represents the volume of water that is lost to the atmosphere through both evaporation from soil and transpiration from crop surfaces. ET_c time series data are provided as inputs to the Tehama IHM. As part of the internal model processes, the Tehama IHM apportions these ET_c values between ET_{pr} and ET_{aw} by water use sector (based on land use type), as required by the GSP Regulations.

ET_c for each crop and land use class in the Tehama County Subbasins was calculated using the "crop coefficient – reference crop ET" methodology. In this method, daily ET_o values are adjusted to represent the unique and varying daily ET_c rates of other specific crops throughout their growing seasons using specific crop coefficient curves. Daily crop coefficient curves for major crops, native vegetation, and urban areas were derived using spatial land use data, daily ET_o values, and actual ET (ET_a) estimates determined from satellite imagery using two remote sensing surface energy balance models – the Surface Energy Balance Algorithm for Land (SEBAL) (Bastiaanssen, et al. 2005) and Mapping Evapotranspiration at High Resolution using Internalized Calibration (METRIC) (Allen, et al. 2007a). SEBAL and METRIC estimates of ET_a account for actual, observed conditions in the Tehama County Subbasins that affect crop consumptive use, such as salinity, deficit irrigation, disease, fertilization, immature permanent crops, and crop canopy structure, and other factors. Studies by Bastiaanssen et al. (2005), Allen et al. (2007b, 2011), Thoreson et al. (2009), and others have found that when performed by an expert analyst, seasonal ET_a estimates by these models are expected to be within five percent of actual ET determined using other reliable methods.

Spatially distributed ET_a results were available with spatial cropping data for 2009 (SEBAL) and 2017 (METRIC). Crop coefficient curves developed using 2009 SEBAL results were used to calculate ET_c values during water years 1983-2014, and crop coefficient curves developed using 2017 METRIC results were used to calculate ET_c values during water years 2015-2019.

3.1.3.3. Land Use

Characterizing historical land use is foundational for accurately quantifying how and where water is beneficially used. Land use areas are also used to distinguish the water use sector in which water is consumed, as required by the GSP Regulations. In the Tehama County Subbasins, water use sectors include agricultural, urban, and native vegetation land uses. The urban water use sector covers all urban, residential, industrial, and semi-agricultural land uses. See **Section 2.1 of the Subbasin GSPs** for more detail on land use in the Subbasins.

In the Antelope Subbasin, on average, agricultural, urban, and native vegetation land uses covered approximately 8,900 acres, 1,900 acres, and 8,300 acres, respectively, between 1990 and 2018. The total acreage of each water use sector has remained relatively steady over time, with only a slight increase in native vegetation corresponding with a slight decrease in agricultural area during the late 2000s and early 2010s. Historically, a majority of the agricultural area in the Antelope Subbasin has been comprised of orchards (primarily walnuts, prunes, and almonds) and pasture, with varying acreage of grain and hay crops over time. The overall orchard acreage has generally increased since the early 2000s. **Figure 3-24** summarizes annual land use over the historical period (1990-2018) in the Antelope Subbasin.

In the Bowman Subbasin, on average, agricultural, urban, and native vegetation land uses covered an average of 5,800 acres, 1,500 acres, and 115,100 acres, respectively, between 1990 and 2018. Since 1990, approximately 1,200 acres of native vegetation in the Bowman Subbasin has been converted to agricultural and urban land uses. Historically, irrigated pasture has been the predominant agricultural land use in the Bowman Subbasin. Other irrigated crops include mainly alfalfa, grain, and various orchard crops, especially walnuts, almonds, and prunes. Flood irrigation is typically used to support pasture, alfalfa, and grain crops in the Bowman Subbasin. **Figure 3-25** summarizes annual land use over the historical period (1990-2018) in the Bowman Subbasin.

In the Los Molinos Subbasin, on average, agricultural, urban, and native vegetation land uses covered approximately 18,200 acres, 1,600 acres, and 79,500 acres, respectively, between 1990 and 2018. The total area of each water use sector has remained relatively constant over time, though slight expansion of urban land uses in the 1990s coincided with a similar decrease in agricultural acreage. Historically, a majority of the agricultural area in the Los Molinos Subbasin has been comprised of pasture and various orchard crops, especially walnuts and prunes. The total area used to cultivate these primary crops has remained relatively constant over time, though the composition of orchard crops has shifted in recent years, with decreased acreage of prunes and increased acreage of walnuts. Slight decreases in agricultural land use have instead resulted from loss of other irrigated crop areas, such as alfalfa, grain, and safflower. **Figure 3-26** summarizes annual land use over the historical period (1990-2018) in the Los Molinos Subbasin.

In the Red Bluff Subbasin, on average, agricultural, urban, and native vegetation land uses covered approximately 36,000 acres, 6,400 acres, and 229,500 acres, respectively, between 1990 and 2018. Since 1990, the total area of native vegetation has decreased by approximately 10,000 acres, corresponding with a similar increase in agricultural acreage. Historically, a majority of the agricultural area in the Red Bluff Subbasin has been comprised of pasture, grain, and various orchard crops. Since the early 2000s, irrigated agricultural areas within the Red Bluff Subbasin have expanded, primarily due to increases in orchard acreage, especially walnuts and almonds. **Figure 3-27** summarizes annual land use over the historical period (1990-2018) in the Red Bluff Subbasin.

3.1.4. Surface Water System Inputs

The IWFM Surface Water Process calculates a water budget along each stream reach between inflows and outflows, including stream-groundwater interactions (Brush et al., 2016). The development of surface water system input files is explained in this section.

3.1.4.1. Stream Characteristics

Stream bed parameters were taken from SVSim for those stream nodes extracted from the SVSim regional model. For additional stream nodes in Tehama IHM, stream bed parameters were developed through review of stream characteristics of similar water features represented in SVSim and those characteristics were adopted for the new stream segments, as appropriate, using professional judgement and local knowledge of stream characteristics. Stream bed parameters, particularly stream bed conductivity, were further refined during the calibration process.

3.1.4.2. Surface Water Inflows

Surface water inflows into the model domain were specified in Tehama IHM for 16 surface water inflow locations shown in **Figure 3-28.** Surface water inflows to Tehama IHM were taken from SVSim or developed from data reported by the United States Geological Survey (USGS) or the United States Army Corps of Engineers (USACE), or some adjustment or correlation of these sources as noted in **Table 3-5**. Streamflow gage data were used to quantify surface water inflows, where available, through water year 2019.

Table 3-5. Information Sources to Quantify Surface Water Inflows

Waterway	Information Source
Antelope Creek	Correlation with USGS Gage 11381500
Battle Creek	USGS Gage 11376550
Black Butte Releases to Stony Creek	BLB report from USACE
Cottonwood Creek (North Fork, Middle Fork, South Fork)	SVSim inputs
Deer Creek	Correlation with USGS Gage 11383500
Dye Creek	SVSim inputs for small watershed 325
Elder Creek	USGS Gage 11379500
Mill Creek	USGS Gage 11381500
Paynes Creek (and Sevenmile Creek)	Correlation with USGS Gage 11381500
Red Bank Creek	USGS Gage 11379500 (assumed to be same as Elder Creek)
Sacramento River	SVSim inputs, adjusted to Tehama IHM model domain boundary
Stony Creek (North Fork, South Fork)	SVSim inputs
Thomes Creek	Correlation with USGS Gage 11376000

The primary surface water inflow to the Tehama IHM model domain is the Sacramento River, which flows along the boundaries of all four Subbasins. A regional SVSim model was run to adjust the Sacramento River inflows from the upstream inflow point simulated in the SVSim model domain to the inflow point in the Tehama IHM model domain.

Two additional stream reaches were added to the Tehama IHM representing inflows to Red Bank Creek and Dye Creek. Neither reach was discretely modeled in SVSim, though Dye Creek was taken to be equivalent to SVSim small watershed inflow 325. The Dye Creek inflow therefore replaced small watershed inflow 325.

3.1.4.3. Surface Water Diversions and Deliveries

Surface water diversions and deliveries were simulated in the model as diversions from a stream node with an assigned delivery destination (referred to as the element group). A total of 50 surface water diversions are included in Tehama IHM, with 30 adapted from SVSim and 20 newly added or revised in Tehama IHM. Diversion locations are shown in **Figure 3-29**. **Table 3-6** summarizes the data sources and used to quantify diversions and spillage within the four Subbasins in the Tehama IHM model domain.

Diversions and spillage of supply that is used within the four Subbasins are generally quantified based on outside data sources, including: delivery records reported by the United States Bureau of Reclamation (USBR), groundwater management or water planning documents developed by water agencies, and publicly available records maintained by the State Water Resources Control Board (SWRCB) in the

Electronic Water Rights Information Management System (eWRIMS). For water agencies without available spillage data, the percent spillage was estimated based on the conveyance system type (canal versus pipe), and the assumption that systems of adjacent suppliers or suppliers with similar systems have the same average spillage fraction.

Diversions of supply used outside the subbasins are generally assumed to be equal to diversions data specified in SVSim. Those diversions specified in SVSim that were retained unchanged, or with only slight area modifications in the Tehama IHM model domain are identified in **Table 3-6.**

Deliveries are generally calculated by Tehama IHM as the water supply used to meet simulated crop water demands, after accounting for seepage, evaporation, and spillage of the diverted supply.

For agencies that span portions of more than one subbasin, diversions, deliveries, and losses are also distributed across the relevant subbasins.

Table 3-6. Information Sources to Quantify Diversions and Spillage Within the Four Subbasins.[1]

Water Agency	Volume Specified		Delivery Location in Tehama IHM Domain Relative to Four Subbasins					Information Source	Note
	Diversion	Spillage	Antelope	Bowman	Los Molinos	Red Bluff	Outside		
Rio Alto Water District	X			X				USBR CVP delivery records (Sacramento River)	No reported volume in historical water budget period, not listed as CVP contractor in 2016.
Anderson-Cottonwood Irrigation District	X	X		X			X	USBR CVP delivery records (Sacramento River)	Service area boundaries partly overlie the Bowman Subbasin, areas in the Tehama IHM model domain but outside the subbasins, and areas outside the model domain; prorated diversion to percent irrigated area in the model domain; CVP delivery records available 1997-2019, estimated by average monthly volume earlier; Spillage fraction from 2012 Sacramento Valley Regional Water Management Plan, estimated to be similar in all years
Stanford Vina Ranch Irrigation	X	X			X			South Main Diversion: Water Data Library Site A04330 “SVWC Deer Creek South Diversion near Vina”; Cone Kimball and North Main Diversion: Tehama Regional Water Supply Inventory	South Main diversion records available 2002-2005, estimated in other years by correlation with Deer Creek Irrigation District diversion; Cone Kimball and North Main diversions estimated from relative fractions given in Table 4-9 of Tehama County Water Inventory and Analysis Report, estimated to be similar in all years; Spillage fraction estimated to be similar to Deer Creek Irrigation District
Deer Creek Irrigation District	X	X			X			Diversions: Water Data Library Site A43100 “DCID Deer Creek Diversion near Vina”; Spillage: 2011 Deer Creek Irrigation District	Diversion records available 1999-2016, estimated average monthly volume in other years; Spillage fraction from 2006-2007 water balance analysis, average estimated to be similar in all years

Water Agency	Volume Specified		Delivery Location in Tehama IHM Domain Relative to Four Subbasins					Information Source	Note
	Diversion	Spillage	Antelope	Bowman	Los Molinos	Red Bluff	Outside		
								Long Term System Improvements Feasibility Study	
Los Molinos Mutual Water Company	X	X	X		X			Upper Diversion and East Ditch Diversion: Los Molinos Mutual Water Company 2018 Northside Water Use Efficiency Master Plan; Ward Diversion: Los Molinos Mutual Water Company Southside Service Area Water Budget Results and Analysis	Diversion and spillage volumes based on Northside and Southside water budgets (2010-2017), diversions estimated by average monthly volume in other years, average spillage estimated to be similar in all years
Proberta Water District	X	X				X		USBR CVP delivery records (Corning Canal deliveries)	Volume of total CVP deliveries prorated based on contract amount; District has a piped conveyance system with approximately zero spillage, seepage, or evaporation.
Corning Water District	X	X					X	USBR CVP delivery records (Corning Canal deliveries)	Volume of total CVP deliveries prorated based on contract amount; District has a piped conveyance system with approximately zero spillage, seepage, or evaporation.
Thomes Creek Water District	X	X				X	X	USBR CVP delivery records (Corning Canal deliveries, prorated based on contract amount)	Volume of total CVP deliveries prorated based on contract amount; Spillage fraction estimated to be similar to Deer Creek Irrigation District
Thomes Creek Water Users Association	X						X	eWRIMS (S022584)	Diversion data in 2014, 2016-2019, estimated by average monthly volume in other years; Spillage estimated to

Water Agency	Volume Specified		Delivery Location in Tehama IHM Domain Relative to Four Subbasins					Information Source	Note
	Diversion	Spillage	Antelope	Bowman	Los Molinos	Red Bluff	Outside		
									occur through runoff (estimated zero spillage fraction; outside Subbasins)
Kirkwood Water District	X						X	USBR CVP delivery records (Tehama-Colusa Canal deliveries)	Spillage estimated to occur through runoff (estimated zero spillage fraction; outside Subbasins)
Edwards Ranch	X	X	X					eWRIMS (S003134, S016326)	Diversion data when available, estimated by average monthly volume in other years; Spillage fraction estimated to be similar to Los Molinos Mutual Water Company (northside)
The Nature Conservancy	X	X	X		X			eWRIMS (S020690, S028341, S028342, S028354)	Diversions are assumed to be applied to the Los Molinos Mutual Water Company service area; Diversion data when available, estimated by average monthly volume in other years; Spillage fraction estimated to be similar to Los Molinos Mutual Water Company (northside)
J.B. Unlimited, Inc.	X		X					USBR CVP delivery records (Sacramento River)	Diversion estimated by contract amount; Spillage estimated to be zero (Direct diverter, estimated to occur through runoff)
Leviathan, Inc.	X			X				USBR CVP delivery records (Sacramento River)	Diversion estimated by contract amount; Spillage estimated to be zero (Direct diverter, estimated to occur through runoff)
Micke, Daniel and Nina	X		X					USBR CVP delivery records (Sacramento River)	Diversion estimated by contract amount; Spillage estimated to be zero (Direct diverter, estimated to occur through runoff)
Sacramento River RM 273 to misc.	X			X			X	SVSim Div ID 14	Volume and specifications unchanged from SVSim (misc. diversions of relatively small volume mainly outside

Water Agency	Volume Specified		Delivery Location in Tehama IHM Domain Relative to Four Subbasins					Information Source	Note
	Diversion	Spillage	Antelope	Bowman	Los Molinos	Red Bluff	Outside		
Ag diverters (03_NA)									Bowman Subbasin; assumed that SVSim data were the best available)
Cottonwood Creek to misc. Ag diverters (02_NA)	X			X			X	SVSim Div ID 16	Volume and specifications unchanged from SVSim (misc. diversions of relatively small volume; assumed that SVSim data were the best available)
Elder Creek riparian diversions for Ag (04_NA)	X					X		SVSim Div ID 27	Volume and specifications unchanged from SVSim (misc. diversions of relatively small volume; assumed that SVSim data were the best available)
Tehama-Colusa Canal Losses (Import)	X					X	X	SVSim Div ID 35	Volume and specifications unchanged from SVSim (misc. canal losses; assumed that SVSim data were the best available)

[1] Other diversions specified in SVSim that are outside the four subbasins, but inside the Tehama IHM model domain, are retained with the same monthly volumes and specifications as established in SVSim, except those that are duplicates of diversions specified in this table.

3.1.4.4. Surface Water Bypasses

Surface water bypasses defined in the model simulate the movement of surface water between different waterways based on specified volumes or fractions. These bypasses can be used to simulate flood bypasses or water system operations. Twenty surface water bypasses were included in Tehama IHM. These bypasses represent conveyance losses from surface water diversions.

3.1.5. Groundwater System Inputs

The IFWM Groundwater Flow Process balances subsurface inflows and outflows and manages groundwater storage within each element and layer (Brush et al., 2016). The development of groundwater system input files is explained in this section.

3.1.5.1. Aquifer Parameters

At the time of the commencement of GSP analyses in the Subbasins, SVSim was not available in a calibrated form. Therefore, aquifer parameters were defined in Tehama IHM through subsurface lithologic textural analysis in conjunction with calibration of parameters based on texture. Aquifer parameters in Tehama IHM are assigned to each node for each model layer and were developed to represent subsurface hydrogeologic characteristics.

3.1.5.1.1 Lithologic Texture Data

A lithologic texture model was developed using borehole lithology data from 672 Well Completion Reports (WCRs) located within the model domain. Lithology and texture data for 615 of these well WCRs were obtained from the textural dataset developed utilized for SVSim and available from DWR, which included considerable textural data from the US Geological Survey (USGS) Central Valley Hydrologic Model (CVHM). Texture data were compiled from an additional 57 wells selected to fill spatial (lateral and vertical) gaps in the SVSim textural dataset using information available in WCRs. Textural classification of additionally compiled lithology data (i.e., identifying coarse or fine-grained texture categories based on lithological descriptions given in WCRs) was performed following procedures used by DWR and USGS in developing the initial textural dataset using lookup tables for classifying lithology descriptions by texture. Consistent with the approach by DWR in developing the SVSim textural dataset, the texture of “top soil” description given in WCRs was determined using the Natural Resources Conservation Service SSURGO soils data.

Translating the point textural dataset to a continuous textural model for use in Tehama IHM was done by assigning values for the percent coarse at each textural borehole datapoint to each model layer penetrated by the borehole and then interpolating percent coarse by layer across the entire model domain. In this process, the intervals of fine and coarse-grained textured sediments were calculated for model layers at each WCR location and the thickness-weighted percentage of coarse-grained materials within each model layer were estimated. Using values for percent coarse-grained materials by model layer at each borehole point, spatially continuous datasets representing the percentage of coarse-grained materials were developed for each model layer through point interpolation methods. Interpolation was performed using ordinary kriging interpolation tool in the ESRI ArcGIS software package, which applies a semivariogram approach. An appropriate semivariogram model was selected through exploration of the data. The resulting kriged spatial distribution of percent coarse by model layer is shown in **Figures 3-30** through **3-38**. During model development and calibration, aquifer parameters were assigned to model nodes and layers using parameter values specified for both the fine and coarse end members and relating these to the percent coarse values developed from the textural model. The process used to assign and calibrate aquifer parameters in the model based on the percent coarse values are described in the discussions of model calibration in **Section 3.2** of this document.

3.1.5.1.2 Aquifer Parameter Zones

To better represent the geology within the Tehama IHM domain, a set of aquifer parameter zones were developed to enable for more refined assignment of aquifer parameters based on the lithologic texture values, especially recognizing that aquifer properties for similar textured materials (based on the textural model) may differ by geologic formation. Informed by the HCM, four zones (Alluvium, Tehama Formation, Tuscan Formation, and Non-Tehama/Non-Tuscan Zone) were delineated for using multipliers applied to parameter values derived from the textural data. The extents of the different geologic units used to delineate aquifer parameter zones are shown in **Figures 3-39** through **3-42**.

The alluvium zone is present in layers 1 and 2. The extent of this zone was developed after review of surficial geology maps. The Tehama Formation, Tuscan Formation, and Non-Tehama/Non-Tuscan Zone are present in all model layers. Maps illustrating the assignment of nodes to parameter zones within layers 1 and 2 are presented in **Figure 3-43**, and within layers 3 through 9 are presented in **Figure 3-44**. The discussion of the calibration of aquifer parameters using the parameter zones described above, and the results of the model calibration, are presented in **Sections 3.2 and 4.7** below.

3.1.5.2. Boundary Conditions

Tehama IHM utilizes time-varying general head boundary conditions to simulate groundwater levels and fluxes at the extent of the model domain. A map of nodes where general head boundary conditions were specified in the model is presented in **Figure 3-45**. In specifying general head boundary conditions, hydraulic conductance was estimated at each boundary node by layer based on average horizontal hydraulic conductivity (Kh), cross-sectional area associated with each boundary node (product of distance between nodes and saturated layer thickness), and the distance from the model boundary (set as 1,000-feet). Transient historical water level boundary conditions were developed by using the interpreted initial head conditions in 1985 and applying relative changes for each model time step based on simulated water levels from the calibrated version of SVSim provided by DWR for each model time step for the period 1985 to 2015. Because the available version of SVSim only simulates conditions through 2015, substitute years based on similar water year conditions were used to extend the simulated heads in SVSim through 2019 using relative water levels changes. Some additional refinements were made to the boundary conditions after comparing modeled water levels to observed data.

3.1.5.3. Groundwater Pumping

Pumping within Tehama IHM is primarily determined by element based on land use characteristics and simulated demand and is calculated internally by the IDC to meet both agricultural and urban demands after available surface water deliveries have been accounted for. The vertical distribution of pumping by layer in Tehama IHM was modified from SVSim based on review of well construction information in DWR's WCR database for wells within the model domain. Agricultural and urban pumping were distributed vertically based on well construction information data in DWR's Online System for Well Completion Reports (OSWCR) for respective well types. In an effort to represent wells that are likely or potentially active in the model area, WCRs classified as well constructions (as opposed to well destructions) since 1970 in the OSWCR database were used to assign the vertical distribution of pumping in Tehama IHM.

The vertical distribution of pumping does not change over the historical simulation period. Maps of the vertical distribution of agricultural pumping by layer are presented in **Figures 3-46** through **3-54** and for urban pumping by layer in **Figures 3-55** through **3-63**.

3.1.6. Small Watersheds

A total of 33 small watersheds were included in Tehama IHM from SVSim. **Table 3-7** summarizes the contributions of small watersheds to modeled streams. Modifications were made to SVSim small watersheds to properly route water through the additional streams modeled in Tehama IHM. Nodes receiving small watershed contributions are shown in **Figure 3-64**.

Table 3-7. Summary of Tehama IHM Small Watersheds

Streams Fed by Small Watersheds	Count of Contributing Watersheds	Total Contributing Watershed Acreage
Antelope Creek Group	7	34,861
Cottonwood Creek	1	1,904
Elder Creek	3	2,645
Mill Creek	1	272
Paynes Creek	2	3,021
Sacramento River	15	120,921
Thomes Creek	4	16,055
TOTAL	**33**	**179,679**

3.1.7. Initial Conditions

Initial groundwater levels conditions for Tehama IHM were generated from mapped groundwater conditions based on groundwater level contours developed from observed data in conjunction with simulated water level output from SVSim regional model for October 1984, which represents the start of the historical model period. Available historical groundwater level data were used to interpret groundwater elevations across the domain in Fall 1985 for use in representation of initial model water level (head) conditions. The Upper Aquifer (Layers 1 through 5) were assigned initial head conditions from the interpreted observed groundwater surface. Initial heads in the Lower Aquifer (Layers 6 through 9) were then assigned by applying an offset to the observed groundwater levels based on observed offsets between depths from nested monitoring wells. Initial water level conditions used in the historical Tehama IHM runs are shown in **Figures 3-65** through **3-73**. All other initial conditions (e.g., soil moisture) were specified using the simulated conditions in October 1984 from SVSim.

3.2. Model Calibration

Tehama IHM was calibrated using a trial and error approach in conjunction with utilization of automated calibration and parameter estimation techniques involving application of UCODE-2014, an inverse modeling computer code developed by the US Geological Survey. Automated techniques were used at stages during the calibration to explore model sensitivity and inform the trial and error calibration efforts.

The calibration process focused on adjusting key model parameter values to improve the fit of simulated historical groundwater levels and streamflows to observed (measured) data. The key model parameters included in calibration were aquifer properties and streambed properties.

Aquifer parameters were developed by assigning end member values to the percent coarse-grained materials in the textural model described in **Section 3.1.5.1.1** of this report. Texture end member values are the aquifer parameter values at the two ends of the percent coarse spectrum, either 100% (coarse) or 0% (fine). The equations used to calculate the aquifer parameter values for each node and layer from the specified end-member values are presented below. For aquifer parameter zones where a multiplier was included in the calibration, the multiplier was applied to the parameter values resulting from calculations using these equations. The equations used for estimating aquifer parameters from textural model information are consistent with the methods used and described in development of the hydrogeologic conceptual model and model parameterization for SVSim (DWR, 2020).

Horizontal hydraulic conductivity (Kh) is calculated using the following equation:

$$Kh = (PCT * ({Kh_{C0}}^{pKh}) + (1 - PCT) * ({Kh_{F0}}^{pKh}))^{\frac{1}{pKh}}$$

Where: PCT is the percent coarse

Kh_{C0} is the Kh end member of coarse materials

Kh_{F0} is the Kh end member of fine materials

pKh is the power law empirical parameter for Kh

Vertical hydraulic conductivity (Kv) end members are calculated through application of an anisotropy ratio (Kv / Kh) to the Kh endmember values. The Kv value at each node and layer is then calculated using the following equation:

$$Kv = (PCT * ({Kv_{C0}}^{pKv}) + (1 - PCT) * ({Kv_{F0}}^{pKv}))^{\frac{1}{pKv}}$$

Where: PCT is the percent coarse

Kv_{C0} is the Kv end member of coarse materials

Kv_{F0} is the Kv end member of fine materials

pKv is the power law empirical parameter for Kv

Specific storage (Ss) is calculated using the following equation:

$$Ss = PCT * Ss_C + (1 - PCT) * Ss_F$$

Where: PCT is the percent coarse

Ss_C is the Ss end member of coarse materials

Ss_F is the Ss end member of fine materials

Specific yield (Sy) is calculated using the following equation:

$$SY = PCT * Sy_C + (1 - PCT) * Sy_F$$

Where: PCT is the percent coarse

Sy_C is the Sy end member of coarse materials

Sy_F is the Sy end member of fine materials

Calibrated end member values are presented in **Section 4.9** of this report.

Observations used in the calibration of aquifer parameters included approximately 7,900 groundwater level observations from 93 wells across the model domain selected based on historical data record, well construction, and spatial representation (lateral and vertical distribution) (**Figure 3-74**).

Streambed properties adjusted during the calibration included streambed conductivity. Observations used to constrain stream bed parameters included approximately 3,900 stream flow measurements from 12 gage stations (**Figure 3-75**). The results of the model calibration are presented and discussed in **Section 4.8** below.

3.3. Tehama IHM – Projected Model Simulations

The projected model simulations are intended to evaluate the effects of anticipated future conditions of hydrology, water supply availability, and water demand on the Tehama County Subbasins water budget and groundwater conditions over a 51-year GSP planning period from WY 2022 through 2072 starting October 1, 2022 and ending September 30, 2072. The projected model scenarios incorporate consideration of potential climate change and water supply availability scenarios and evaluation of the need for and benefit of any projects and management actions to be implemented in the Subbasins to maintain or achieve sustainability. The projected model scenarios use hydrologic conditions representative of the most recent 50 years of hydrology in the Subbasins, with adjustments applied in scenarios for evaluating the water budgets under climate change and/or altered water supply and demand conditions. The entire projected simulation period runs from WY 2020 through 2072, on a monthly time step, although the 51-year GSP planning period evaluated in the projected modeling covers water years 2022 through 2072. The development of the projected scenarios in Tehama IHM is described in the following sections.

3.3.1. Projected Hydrology Selection and Development

Establishing a sequence of projected hydrology is key to the development of the projected model scenarios. Future hydrology model inputs were developed based on review and consideration of the recent 51 years of hydrology for 1969-2019 and utilization of a hydrologic sequence that replicates the hydrologic patterns and trends over this period. Because of the availability of higher quality data and characterization of conditions in the Subbasins during the most recent 29 years spanning the historical base period (1990-2018), the projected analyses used surrogate years from the historical period to construct a future hydrology and analysis period representative and consistent with hydrologic conditions over the 51-year period from 1969 to 2019. Surrogate years from the historical period were assigned to represent 51 years of future hydrology based on 1) the Sacramento Valley water year index from DWR for each year and 2) mimicking variability (wet and dry) in the historical precipitation conditions in the Subbasins and replicating precipitation consistent with the annual average historical precipitation.

The projected water year type and assigned surrogate water years for use in developing the projected hydrology are shown in **Table 3-8a.** The frequency of water year types used in the projected hydrology is representative of the 51 years of hydrology for the period 1969-2019 and includes approximately equal proportions of water years with above normal (wet and above normal; 49%) and below normal (below normal, dry, critical; 51%) hydrologic conditions (**Table 3-8b**). **Figures 3-76 and 3-77** show graphs of the precipitation cumulative departure from the mean based on data at the Red Bluff and Orland Stations, respectively, over the projected period. The overall averages and cumulative departure curves highlight how closely the projected hydrology (using surrogate years) mimics the recent 51-year period. The average annual precipitation in the projected simulation period is 22.9 inches at the Red Bluff Municipal Airport station (**Table 3-8b**), similar but slightly below the average annual precipitation over the 51-year historical period from 1969 through 2019 of 23.3 inches at the Red Bluff Municipal Airport station. For comparison, the average annual precipitation over the historical water budget period of 1990-2018 is 22.5 inches based on measurements at the Red Bluff Municipal Airport station (**Table 3-1b**).

Table 3-8a. Summary of Projected Water Years in Tehama IHM

Simulation WY	WY Type	WY Index
1991	C	4.21
1992	C	4.06
1993	AN	8.54
1994	C	5.02
1995	W	12.89
1996	W	10.26
1997	W	10.82
1998	W	13.31
1999	W	9.8
2000	AN	8.94
2001	D	5.76
2002	D	6.35
2003	AN	8.21
2004	BN	7.51
2005	AN	8.49
2006	W	13.2
2007	D	6.19
2008	C	5.16
2009	D	5.78
2010	BN	7.08
2011	W	10.54
2012	BN	6.89
2013	D	5.83
2014	C	4.07
2015	C	4
2016	BN	6.71
2017	W	14.14
2018	BN	7.14
2019	W	10.34

Simulation WY	Surrogate WY	WY Type	WY Index
2020*	2007	D	6.19
2021*	2014	C	4.07
2022	2019	W	10.34
2023	1996	W	10.26
2024	1996	W	10.26
2025	2018	BN	7.14
2026	1993	AN	8.54
2027	2006	W	13.2
2028	1999	W	9.8
2029	2008	C	5.16
2030	2014	C	4.07
2031	1993	AN	8.54
2032	2012	BN	6.89
2033	2000	AN	8.94
2034	2002	D	6.35
2035	2006	W	13.2
2036	1998	W	13.31
2037	1996	W	10.26
2038	2002	D	6.35
2039	1996	W	10.26
2040	2001	D	5.76
2041	1990	C	4.81
2042	2007	D	6.19
2043	1994	C	5.02
2044	1994	C	5.02
2045	1992	C	4.06
2046	1993	AN	8.54

Simulation WY	Surrogate WY	WY Type	WY Index
2047	1994	C	5.02
2048	1995	W	12.89
2049	1996	W	10.26
2050	1997	W	10.82
2051	1998	W	13.31
2052	1999	W	9.8
2053	2000	AN	8.94
2054	2001	D	5.76
2055	2002	D	6.35
2056	2003	AN	8.21
2057	2004	BN	7.51
2058	2005	AN	8.49
2059	2006	W	13.2
2060	2007	D	6.19
2061	2008	C	5.16
2062	2009	D	5.78
2063	2010	BN	7.08
2064	2011	W	10.54
2065	2012	BN	6.89
2066	2013	D	5.83
2067	2014	C	4.07
2068	2015	C	4
2069	2016	BN	6.71
2070	2017	W	14.14
2071	2018	BN	7.14
2072	2019	W	10.34

*Years 2020-2021 were used to span the transitional period between the historical model period 1990-2019 and the projected model period 2022-2072.

Table 3-8b. Sacramento Valley Water Year Type Classification of the Projected Water Budget Period (2022-2072)

Sacramento Valley Water Year Type	Abbreviation	Number of Years, 2022-2072	Average Water Year Index	Average Precipitation	Percent Total Years, 2022-2072
Wet	W	18	11.46	27.9	35%
Above Normal	AN	7	8.60	29.3	14%
Below Normal	BN	7	7.05	19.7	14%
Dry	D	9	6.06	17.4	18%
Critical	C	10	4.64	16.6	20%
	Total	**51**	**8.17**	**22.9**	**100%**

3.3.2. Climate Change Adjustments

Climate change adjustments were also included in selected projected scenarios to evaluate the potential influence of climate change on future conditions. Adjustments to the projected hydrology were performed following DWR's Resource Guide on climate change in GSP development (DWR, 2018) using climate change adjustment factors provided by DWR for use in developing GSPs through the DWR SGMA Data Viewer (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#waterbudget). Using the DWR-provided climate adjustment factors, adjustments were made to ET, precipitation, and surface water inflow model inputs to account for the potential effects of 2030 mean (or central tendency) and 2070 mean (or central tendency) climate change conditions. The climate change adjustment factors provided by DWR were calculated from data developed for the Variable Infiltration Capacity (VIC) model as described in the DWR Resource Guide and on the SGMA Data Viewer.

For ET and precipitation adjustments, monthly change factors were averaged across the VIC grids in the Tehama IHM model domain and applied to the individual precipitation and ET inputs. For surface water inflow adjustments, monthly streamflow change factors were summarized from the HUC 8 watershed covering the majority of the Tehama IHM model domain and applied to individual surface water inflows in the model.

For each of the model inputs adjusted in the climate change scenarios (e.g., ET, precipitation, surface water inflow), the baseline projected inputs were multiplied by the 2030 or 2070 change factors corresponding to the specific historical year that was used as a surrogate year in the projected simulations. Because climate change factors were only provided for historical years through 2011, the average factors (by water year type) for the period provided were applied to historical years after 2011. The average change factors applied by model input and water year type in the 2030 and 2070 climate change scenarios are presented in **Table 3-9**. As indicated in **Table 3-9**, on average the climate change adjustments tend to increase ET, increase precipitation, and increase stream inflow volumes by varying degrees. From a water budget standpoint, increases in ET will tend to increase the water demands (outflows), whereas increases to precipitation and stream inflows will tend to increase water supplies (inflows).

Table 3-9. Climate Change Adjustment Change Factors by Data Type and Water Year Type in Tehama IHM

	No Adjustment	Climate Change 2030	Climate Change 2070
		Evapotranspiration	
Wet (W)	1.00	1.04	1.09
Above Normal (AN)	1.00	1.04	1.09
Below Normal (BN)	1.00	1.04	1.09
Dry (D)	1.00	1.04	1.08
Critical (C)	1.00	1.04	1.09
TOTAL	**1.00**	**1.04**	**1.09**
		Precipitation	
Wet (W)	1.00	1.04	1.07
Above Normal (AN)	1.00	1.02	1.06
Below Normal (BN)	1.00	1.05	1.05
Dry (D)	1.00	1.05	1.05
Critical (C)	1.00	1.04	1.06
TOTAL	**1.00**	**1.04**	**1.06**
		Stream Inflow	
Wet (W)	1.00	1.04	1.12
Above Normal (AN)	1.00	1.01	1.04
Below Normal (BN)	1.00	1.03	1.06
Dry (D)	1.00	1.06	1.07
Critical (C)	1.00	1.02	1.05
TOTAL	**1.00**	**1.04**	**1.09**

3.3.3. Overview of Projected Scenarios

Multiple projected model scenarios were developed to compare potential outcomes and evaluate the future sustainability of the Subbasins. These scenarios include two baseline projected scenarios, one with a current land use condition and another with future land use conditions. Additional scenarios were developed with each of the baseline projected scenarios with both 2030 and 2070 climate change conditions. Lastly, a projected model scenario was developed to evaluate the benefits of potential projects and management actions. **Table 3-10** outlines the different model scenarios evaluated, including seven projected scenarios in addition to the historical base period model scenario. The projected current land use scenarios assume a static land use condition based on 2018 land use conditions. The projected future land use scenarios also assume a static land use condition based on a projected land use condition in 2072 reflective of anticipated land use changes within the four Subbasins. The projected scenarios with different climate change scenarios incorporate either the 2030 mean or the 2070 mean climate change condition adjustments for precipitation, ET, stream inflows, and surface water diversion volumes in accordance with guidance provided by DWR.

Table 3-10. Summary of Tehama IHM Projected Scenarios

Scenario #	Model Scenario Name/Description	Time Period (Water Years)	Land Use Conditions	Climate Change	Projects
	Historical/Calibration	1990-2018	Historical (Transient)	None	No
1	Projected (Current Land Use)	2022-2072	Current (2018)	None	No
2	Projected (Future Land Use)	2022-2072	Future (2072)	None	No
3	Projected (Current Land Use) with 2030 Climate Change	2022-2072	Current (2018)	2030	No
4	Projected (Future Land Use) with 2030 Climate Change	2022-2072	Future (2072)	2070	No
5	Projected (Current Land Use) with 2070 Climate Change	2022-2072	Current (2018)	2070	No
6	Projected (Future Land Use) with 2070 Climate Change	2022-2072	Future (2072)	2070	No
7	Projected (Future Land Use) with Projects and 2070 Climate Change	2022-2072	Future (2072)	2070	Yes

3.3.4. Land Surface System Inputs

The development of land surface system inputs for the projected model scenarios is described below.

3.3.4.1. Precipitation

The precipitation inputs for the projected simulation period were developed through use of surrogate years from the historical model as described in **Section 3.3.1** and presented in **Table 3-8a.** As described in **Section 3.3.2**, for scenarios including climate change, precipitation inputs were modified using the climate change adjustment factors for 2030 and 2070 central tendency climate change conditions using the guidance and adjustment factors provided by DWR.

3.3.4.2. Evapotranspiration

The evapotranspiration inputs for the projected simulation period were developed through use of surrogate years from the historical model as described in **Section 3.3.1** and presented in **Table 3-8a.** As described in **Section 3.3.2**, for scenarios including climate change, precipitation inputs were modified using the climate change adjustment factors for 2030 and 2070 central tendency climate change conditions using the guidance and adjustment factors provided by DWR.

3.3.4.3. Land Use

Characterizing projected land use is foundational for predicting how and where water is beneficially used in future scenarios. Land use areas are also used to distinguish the water use sector in which water is consumed. In Tehama County, water use sectors include agricultural, urban, and native vegetation land uses. The urban water use sector covers all urban, residential, industrial, and semi-agricultural land uses. The projected scenarios include two different land use conditions: a current land use condition representative of 2018 conditions held constant over the entire simulation period and a static future land use condition based on land use change anticipated to occur in Tehama County over a 50-year planning horizon and reflecting land use conditions estimated to exist in 2072. In the projected model simulations, the land use conditions outside of Tehama County are assumed to stay as they are represented in 2018 in the historical model simulation.

3.3.4.3.1 Current Land Use Scenarios

Projected scenarios with current land use conditions include a static land use condition based on 2018 conditions.

Figure 3-78 illustrates the unchanging land use areas over the projected period (2022-2072) in the Antelope Subbasin. In the current land use scenario, agricultural, urban, and native vegetation land uses covered approximately 9,100 acres, 1,900 acres, and 8,000 acres, respectively. A majority of the agricultural area in the Antelope Subbasin is comprised of deciduous crops, pasture, and grain crops.

Figure 3-79 illustrates the unchanging land use areas over the projected period (2022-2072) in the Bowman Subbasin. In the current land use scenario, agricultural, urban, and native vegetation land uses covered approximately 6,100 acres, 1,900 acres, and 115,000 acres, respectively. A majority of the agricultural area in the Bowman Subbasin is comprised of pasture and grain crops.

Figure 3-80 illustrates the unchanging land use areas over the projected period (2022-2072) in the Los Molinos Subbasin. In the current land use scenario, agricultural, urban, and native vegetation land uses covered approximately 18,000 acres, 1,600 acres, and 79,000 acres, respectively. A majority of the agricultural area in the Los Molinos Subbasin is comprised of pasture and various orchard crops.

Figure 3-81 illustrates the unchanging land use areas over the projected period (2022-2072) in the Red Bluff Subbasin. In the current land use scenario, agricultural, urban, and native vegetation land uses covered approximately 46,000 acres, 7,000 acres, and 207,000 acres, respectively. A majority of the agricultural area in the Red Bluff Subbasin is comprised of pasture, grain, and various orchard crops.

3.3.4.3.2 Future Land Use Scenarios

The projected scenarios with future land use conditions include a static land use condition based on anticipated changes by the Subbasins in the future. The future land use conditions were developed through discussion with local stakeholders and consultation with the Tehama County Planning Department. The future land use conditions include increases in urban area reflecting expansion of urban areas focused around each urban center with native vegetation and idle cropland areas decreasing by similar amounts within all of Tehama County. In Red Bluff, there was also an increase in almonds within orchard areas.

Figure 3-82 presents the annual land use areas over the projected period (2022-2072) in the Antelope Subbasin. In the future land use scenario, there is an increase in urban acreage with a corresponding decrease in native vegetation, and relatively no change in agricultural acreage.

Figure 3-83 presents the annual land use areas over the projected period (2022-2072) in the Bowman Subbasin. In the future land use scenario, there is a very slight increase in urban acreage with a corresponding decrease in native vegetation, but overall, there is relatively no change.

Figure 3-84 presents the annual land use areas over the projected period (2022-2072) in the Los Molinos Subbasin. In the future land use scenario, there is a very slight increase in urban acreage with a corresponding decrease in native vegetation, but overall, there is relatively no change.

Figure 3-85 presents the annual land use areas over the projected period (2022-2072) in the Red Bluff Subbasin. In the future land use scenario, there is an increase in agricultural area, specifically almonds and pistachios, with a corresponding decrease in urban acreage and native vegetation.

3.3.5. Surface Water System Inputs

The development of surface water system inputs for projected future scenarios is described below.

3.3.5.1. Stream Inflows

The stream inflow volumes in each future year was assumed to be equal to the amount in the historical water year assigned to that future year (**Table 3-8a**). For scenarios with climate change adjustments, the historical stream inflow volumes were adjusted by using the CalSim II 2030 mean or 2070 mean climate change scenario monthly water year type multiplier.

3.3.5.2. Surface Water Diversions and Deliveries

The diversion volumes of each projected year were assigned by considering the diversion volumes from the associated historical year (**Table 3-8a**). For all diversions where historical data suggest the diversion was continuously active throughout the historical model period, the volume of water diverted in the projected year was assigned based on the associated historical year. For any surface water diversions that ceased diverting during the historical period 1990 through 2019, the volumes associated with these diversions were assumed to be zero for the entire projected period. The historical time-series data for each surface water diversion were evaluated and if a long period without any diversions occurred at the end of the period of available historical data, the diversion was assumed to be discontinued and assigned zero diversions for the entirety of the projected model period.

3.3.6. Groundwater System Inputs

The development of groundwater system inputs for projected future scenarios is described below.

3.3.6.1. Boundary Conditions

As described above in **Section 3.3.1**, the hydrology for the 51-year projected simulations mimics the hydrology of the historical period from 1969 through 2019 and the model inputs were developed using comparable surrogate years from the historical model period (1990-2019). The groundwater level of year 2019 was used as the initial groundwater head in boundaries for the prediction run. The groundwater levels of general head boundary condition for the predictive analysis were developed by using the associated historical boundary heads for each predictive year. For the last 31 years (2042-2072) of the projected model period , the general head boundary conditions were modified to represent long-term stability in general head conditions around the model domain. This is intended to reflect the expected achievement or maintenance of sustainable groundwater conditions around the extent of the model resulting from the implementation of groundwater management efforts associated with GSPs and elimination of any chronically declining trends in water levels.

3.3.6.2. Groundwater Pumping

The pumping specification inputs for all projected simulations used the same pumping specifications as the historical simulation, described in **Section 3.1.5.3**.

3.3.7. Initial Conditions

Initial conditions used for projected simulations starting in 2020 utilized the final conditions from the historical model at the end of 2019. The initial conditions included use of the final conditions of the historical simulation period for the unsaturated zone, root zone, small watersheds, and groundwater levels. Initial groundwater levels are shown in **Figures 3-86** through **3-94** by model layer**.**

3.3.8. Simulation of Potential Projects and Management Actions

Projects and management actions (PMAs) were developed to achieve and maintain the Red Bluff Subbasin sustainability goal by 2042 and avoid undesirable results over the GSP planning and implementation horizon. PMAs developed for implementation would help to achieve and maintain groundwater sustainability while supporting other local goals. These PMAs include a project that would divert available surface water from Thomes and Elder Creek onto fields in the Subbasin for direct or in-lieu recharge benefits, and an in-lieu recharge project that would expand use of existing Central Valley Project (CVP) contract supplies in Proberta Water District (WD) and Thomes Creek WD. Other PMAs developed for implementation include a proposed grower education program, a proposed multi-benefit groundwater recharge project that would supply groundwater recharge and provide habitat for migrating shorebirds, a proposed pump restoration project in El Camino Irrigation District, and two projects aimed at invasive species removal along various waterways in the Red Bluff Subbasin.

A projected simulation was conducted to evaluate the potential benefits that might occur from implementation of various project concepts. Stream diversions were added to the model in order to simulate the recharge projects along Thomes and Elder Creeks, while existing diversions were modified in order to simulate the recharge projects in Proberta WD and Thomes Creek WD. Additionally, in order to simulate a management action related to well permitting, all new agricultural pumping in the Red Bluff Subbasin was shifted from the Upper Aquifer to the Lower Aquifer. Maps of the vertical distribution of agricultural pumping by layer in with projects scenario are presented in **Figures 3-95** through **3-103**.

Additional detail about the projects and management actions implemented in the Red Bluff Subbasin are included in the **Red Bluff GSP Chapter 4**.

4. GROUNDWATER FLOW MODEL RESULTS

This section presents the results of Tehama IHM. Results presented in this section include Subbasin water budgets, groundwater levels, and streamflows for various scenarios, and calibrated aquifer parameters. The water budget results presented in this section are rounded to two significant digits consistent with the typical uncertainty associated with the methods and sources used in the analysis. Water budget component results may not sum to the totals presented because of rounding.

4.1. Antelope Subbasin

The following section summarizes the analyses and results relating to the Antelope Subbasin. Detailed water budget results for each of the individual model scenarios are presented in **Appendix A**.

4.1.1. Historical Water Budget Results

Annual inflows, outflows, and change in surface water system (SWS) root zone storage during the historical water budget period (1990-2018) are summarized in **Table 4-1**. Of particular note in the historical SWS water budget results are the volumes of groundwater discharge to surface water that make up a large part of the Subbasin SWS inflows. Over the historical period, groundwater discharge to surface water averaged a little over 53 thousand acre-feet (taf) per year. Surface water inflows and precipitation also represent larger SWS inflow components averaging about 43 taf per year and 41 taf per year, respectively. Groundwater extraction and uptake represent a smaller SWS inflow in the Subbasin averaging about 15 taf per year over the historical water budget period.

Among the outflows from the Subbasin SWS, surface water outflow makes up a large fraction of the total Subbasin SWS outflows. The surface water outflows total about 89 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of precipitation averaging about 25 taf per year and average ET of applied water totaling about 19 taf per year on average. All other outflow components from the SWS are relatively smaller. The outflow of deep percolation of precipitation and applied water to the groundwater system (GWS) are about 7.2 and 4.6 taf per year, respectively, and infiltration (seepage) of surface water to the GWS totals about 4.9 taf per year on average. ET of groundwater uptake averages about 1.5 taf per year and evaporation from surface water averages about 150 af per year over the historical water budget period.

Table 4-1. Antelope Subbasin Historical Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (1990-2018)
Inflows	Surface Water Inflow	43,000
	Precipitation	41,000
	Groundwater Extraction	15,000
	Groundwater Discharge	53,000
Outflows	Surface Water Outflow	89,000
	ET of Applied Water	19,000
	ET of Groundwater Uptake	1,500
	ET of Precipitation	25,000
	Evaporation	150
	Deep Percolation of Applied Water	4,500
	Deep Percolation of Precipitation	7,200
	Infiltration of Surface Water	4,900
Annual Change in Root Zone Storage		**-88**

Summarized results for major components of the historical water budget as they relate to the GWS are presented in **Table 4-2**. Among the outflows from the Subbasin GWS, groundwater pumping makes up the largest fraction of the total GWS outflows (on average -13 taf per year). Highly negative net seepage values (on average -48 taf per year) represent net groundwater discharging to surface water features and leaving the GWS. Deep percolation is the largest net inflow component averaging about 12 taf per year. Positive net subsurface flows (on average 50 taf per year) represent the combined subsurface inflows from adjacent subbasins and upland areas. Groundwater (root water) uptake directly from shallow groundwater (on average -1.5 taf per year) represents a smaller outflow from the GWS. Overall, the water budget results for the 29-year historic period indicate a cumulative change in groundwater storage of about -7 taf, which equals an average annual change in groundwater storage of only about -610 acre-feet (af) per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 0.77 af per acre on average over the 29 years and an annual decrease of less than 0.07 af per acre across the entire Subbasin (approximately 9,130 acres).

Detailed results for each of the individual water budget components in the historical water budget are presented in **Appendix A-1**.

Table 4-2. Antelope Subbasin Historical Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (1990-2018)
Total Net Seepage	-48,000
Deep Percolation	12,000
Groundwater Pumping	-13,000
Groundwater Uptake	-1,500
Total Net Subsurface Flows	50,000
Annual Change in Groundwater Storage	**-610**

4.1.2. Projected (Current Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (current land use) water budget period (2022-2072) are summarized in **Table 4-3**. Of particular note in the projected (current land use) SWS water budget results are the volume of surface water inflows that makes up a large part of the Subbasin SWS inflows. Over the projected (current land use) period, surface water inflows average about 43 taf per year. Precipitation also represents a large SWS inflow component averaging about 43 taf per year. Groundwater extraction and groundwater discharge to surface water represent relatively smaller SWS inflows in the Subbasin averaging about 16 and 43 taf per year, respectively over the projected (current land use) water budget period.

Among the outflows from the Subbasin SWS, surface water outflow makes up a large fraction of the total Subbasin SWS outflows. The surface water outflows total about 81 taf per year on average. ET of applied water and ET of precipitation also represent large SWS outflow components, averaging about 20 taf and 26 taf, respectively, per year. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for deep percolation of applied water averaging about 4.2 taf per year. The outflows of deep percolation of precipitation and infiltration (seepage) of surface water are about 7.2 and 4.9 taf per year on average, respectively. ET of groundwater uptake averages about 1.2 taf per year and evaporation from surface water averages about 150 af per year over the projected (current land use) water budget period.

Table 4-3. Antelope Subbasin Projected (Current Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	43,000
	Precipitation	43,000
	Groundwater Extraction	16,000
	Groundwater Discharge	43,000
Outflows	Surface Water Outflow	81,000
	ET of Applied Water	20,000
	ET of Groundwater Uptake	1,200
	ET of Precipitation	26,000
	Evaporation	150
	Deep Percolation of Applied Water	4,200
	Deep Percolation of Precipitation	7,200
	Infiltration of Surface Water	4,900
Annual Change in Root Zone Storage		**5**

Summarized results for major components of the projected (current land use) water budget as they relate to the GWS are presented in **Table 4-4**. The positive net subsurface flows (on average 42 taf per year) represent the combined subsurface flows from adjacent subbasins and upland areas and deep percolation represents another large net inflow averaging about 11 taf per year. The large negative net seepage values (on average -38 taf per year) represent net stream seepage to groundwater and groundwater pumping (on average -15 taf per year) is another large outflow from the GWS. Groundwater (root water) uptake directly from shallow groundwater (on average -1.2 taf per year) represents a smaller outflow from the GWS. Overall, the water budget results for the 51-year projected (current land use) period indicate a cumulative change in groundwater storage of about -15 taf, which equals an average annual change in groundwater storage of only about -290 af per year. These change in storage estimates equate to total decreases in storage in the Subbasin of about 0.03 af per acre on average over the 51 years and an annual decrease of less than 0.002 af per acre across the entire Subbasin (approximately 9,130 acres).

Detailed results for each of the individual water budget components in the projected (current land use) water budget are presented in **Appendix A-2**.

Table 4-4. Antelope Subbasin Projected (Current Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	-38,000
Deep Percolation	11,000
Groundwater Pumping	-15,000
Groundwater Uptake	-1,200
Total Net Subsurface Flows	42,000
Annual Change in Groundwater Storage	**-290**

4.1.3. Projected (Future Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (future land use) water budget period (2022-2072) are summarized in **Table 4-5**. Of particular note in the projected (future land use) SWS water budget results are the volume of surface water inflows and precipitation that make up a large part of the Subbasin SWS inflows. Over the projected (future land use) period, surface water inflows and precipitation each average about 43 taf per year. Groundwater Discharge to surface water also represents a large SWS inflow component averaging about 33 taf per year. Groundwater represents a relatively smaller SWS inflow in the Subbasin averaging about 16 taf per year over the projected (future land use) water budget period.

Among the outflows from the Subbasin SWS, surface water outflow makes up a large fraction of the total Subbasin SWS outflows. The surface water outflows total about 72 taf per year on average, a value that corresponds with the large volumes of surface water inflow. ET of applied water and ET of precipitation also represent large SWS outflow components, averaging about 20 taf and 26 taf, respectively, per year. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for deep percolation of precipitation averaging about 7 taf per year. The outflows of deep percolation of applied water and infiltration (seepage) of surface water are about 4.2 and 4.9 taf per year on average, respectively. Evaporation from surface water averages about 150 af per year over the projected (future land use) water budget period.

Table 4-5. Antelope Subbasin Projected (Future Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	43,000
	Precipitation	43,000
	Groundwater Extraction	16,000
	Groundwater Discharge	33,000
Outflows	Surface Water Outflow	72,000
	ET of Applied Water	20,000
	ET of Groundwater Uptake	820
	ET of Precipitation	26,000
	Evaporation	150
	Deep Percolation of Applied Water	4,200
	Deep Percolation of Precipitation	7,100
	Infiltration of Surface Water	4,900
Annual Change in Root Zone Storage		**5**

Summarized results for major components of the projected (future land use) water budget as they relate to the GWS are presented in **Table 4-6**. Among the outflows from the Subbasin GWS, net seepage makes up the largest fraction of the total GWS outflows (on average -28 taf per year). Net seepage represents net groundwater discharging to surface waterways and leaving the GWS. Groundwater pumping additionally makes up a large portion of GWS outflows (on average -15 taf per year). Positive net subsurface flows and deep percolation are the largest net inflow components averaging about 33 and 11 taf per year, respectively. Groundwater (root water) uptake directly from shallow groundwater (on average -820 af per year) represents a smaller outflow from the GWS. Overall, the water budget results for the 51-year projected (future land use) period indicate a cumulative change in groundwater storage of about -17 taf, which equals an average annual change in groundwater storage of only about -330 af per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 0.9 af per acre on average over the 51 years and an annual decrease of about 0.02 af per acre across the entire Subbasin (approximately 19,040 acres).

Detailed results for each of the individual water budget components in the projected (future land use) water budget are presented in **Appendix A-3**.

Table 4-6. Antelope Subbasin Projected (Future Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	-28,000
Deep Percolation	11,000
Groundwater Pumping	-15,000
Groundwater Uptake	-820
Total Net Subsurface Flows	33,000
Annual Change in Groundwater Storage	**-330**

4.1.4. Projected (Current Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (current land use) with climate change water budget as they relate to the GWS are presented in **Table 4-7**. Net seepage becomes less negative under climate change scenarios, indicating less groundwater flow to SWS. Deep percolation and net subsurface flows remain nearly unchanged under climate change scenarios. Groundwater pumping increases under climate change scenarios, becoming a greater outflow from the groundwater system. Groundwater uptake remains nearly unchanged under climate change scenarios.

Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2030) water budget are presented in **Appendix A-4**. Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2070) water budget are presented in **Appendix A-5**.

Table 4-7. Comparison of Antelope Subbasin Projected (Current Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Current Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	-38,000	-36,000	-33,000
Deep Percolation	11,000	12,000	11,000
Groundwater Pumping	-15,000	-16,000	-17,000
Groundwater Uptake	-1,200	-1,200	-1,100
Total Net Subsurface Flows	42,000	42,000	39,000
Annual Groundwater Storage Change	**-290**	**-300**	**-340**

4.1.5. Projected (Future Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (future land use) with climate change water budget as they relate to the GWS are presented in **Table 4-8**. Overall, the climate change scenarios to not appear to change the overall Subbasin GWS water budget in a considerable way. Net seepage becomes less negative under climate change scenarios, indicating a reduction of the net volume of groundwater discharging to the surface waters. Deep percolation remains nearly unchanged under climate change scenarios. Net subsurface flows to the Subbasin decrease slightly under climate change scenarios, primarily a result of reduced subsurface inflows from Red Bluff Subbasin. Groundwater extractions increase vary slightly under climate change scenarios, becoming a greater outflow from the groundwater system.

Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2030) water budget are presented in **Appendix A-6**. Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2070) water budget are presented in **Appendix A-7**.

Table 4-8. Comparison of Antelope Subbasin Projected (Future Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Future Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	-28,000	-26,000	-22,000
Deep Percolation	11,000	11,000	11,000
Groundwater Pumping	-15,000	-16,000	-18,000
Groundwater Uptake	-820	-830	-810
Total Net Subsurface Flows	33,000	32,000	29,000
Annual Groundwater Storage Change	**-330**	**-340**	**-390**

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

4.1.6. Projected (Future Land Use) with Projects and Climate Change Water Budget Results

Summarized results for major components of the projected (future land use) with projects and climate change (2070) water budget as they relate to the GWS are presented in **Table 4-9**. Among the outflows from the Subbasin GWS, net seepage makes up the largest fraction of the total GWS outflows (on average -22 taf per year). Net seepage represents net groundwater discharging to surface waterways and leaving the GWS. Groundwater pumping additionally makes up a large portion of GWS outflows (on average -18 taf per year). Positive net subsurface flows and deep percolation are the largest net inflow components averaging about 29 and 11 taf per year, respectively. Groundwater (root water) uptake directly from shallow groundwater (on average -820 af per year) represents a smaller outflow from the GWS. Overall, the water budget results for the 51-year projected (future land use) with projects and climate change (2070) period indicate a cumulative change in groundwater storage of about -19 taf, which equals an average annual change in groundwater storage of only about -380 af per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about -1.0 af per acre on average over the 51 years and an annual decrease of about -0.02 af per acre across the entire Subbasin (approximately 19,040 acres).

Detailed results for each of the individual water budget components in the projected (future land use) with projects and climate change (2070) water budget are presented in **Appendix A-8**.

Table 4-9. Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	-22,000
Deep Percolation	11,000
Groundwater Pumping	-18,000
Groundwater Uptake	-820
Total Net Subsurface Flows	29,000
Annual Change in Groundwater Storage	**-380**

4.2. Bowman Subbasin

The following section summarizes the analyses and results relating to the historical scenario for the Bowman Subbasin. Detailed water budget results for each of the individual model scenarios are presented in **Appendix B**.

4.2.1. Historical Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the historical water budget period (1990-2018) are summarized in **Table 4-10**. Of particular note in the historical SWS water budget results are the volume of precipitation that makes up a large part of the Subbasin SWS inflows averaging about 290 taf per year over the historical period. By comparison, other SWS inflows in the Subbasin are relatively smaller. Surface water inflows average about 81 taf per year. Groundwater extraction and uptake represents a relatively small SWS inflow averaging about 9.1 taf per year, and groundwater discharge to surface water is negligible over the historical water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation makes up a large fraction of the total Subbasin SWS outflows averaging about 160 taf per year over the historical period. The surface water outflows total about 110 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for deep percolation of precipitation about 44 taf per year and infiltration (seepage) of surface water about 43 taf per year on average. ET of applied water and deep percolation of applied water are about 11 and 8.6 taf per year on average, respectively. The outflows of ET of groundwater uptake and evaporation from surface water average about 3.0 and 0.7 taf per year, respectively.

Table 4-10. Bowman Subbasin Historical Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (1990-2018)
Inflows	Surface Water Inflow	81,000
	Precipitation	290,000
	Groundwater Extraction	9,100
	Groundwater Discharge	0
Outflows	Surface Water Outflow	110,000
	ET of Applied Water	11,000
	ET of Groundwater Uptake	3,000
	ET of Precipitation	160,000
	Evaporation	700
	Deep Percolation of Applied Water	8,600
	Deep Percolation of Precipitation	44,000
	Infiltration of Surface Water	43,000
Annual Change in Root Zone Storage		**-870**

Summarized results for major components of the historical water budget as they relate to the GWS are presented in **Table 4-11**. Deep percolation represents the largest inflow averaging nearly 53 taf per year while net seepage represents an inflow of about 43 taf per year. Net subsurface flows (combined subsurface flows with adjacent subbasins and upland areas) represent the largest net outflow totaling about -88 taf per year of outflow from the Bowman Subbasin on average. Groundwater pumping (on average -6.1 taf per year) and groundwater (root water) uptake directly from shallow groundwater (on average -3.0 taf per year) represent smaller outflows from the GWS. Overall, the water budget results for the 29-year historical period indicate a cumulative change in groundwater storage of about -50 taf, which equals an average annual change in groundwater storage of only about -1.7 taf per year. These changes in storage estimates equate to total decreases in storage in the Subbasin of about -0.41 af per acre over the 29 years and an annual decrease of less than -0.01 af per acre across the entire Subbasin (approximately 122,425 acres).

Detailed results for each of the individual water budget components in the historical water budget are presented in **Appendix B-1**.

Table 4-11. Bowman Subbasin Historical Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (1990-2018)
Total Net Seepage	43,000
Deep Percolation	53,000
Groundwater Pumping	-6,100
Groundwater Uptake	-3,000
Total Net Subsurface Flows	-88,000
Annual Change in Groundwater Storage	**-1,700**

4.2.2. Projected (Current Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (current land use) water budget period (2022-2072) are summarized in **Table 4-12**. Of particular note in the projected (current land use) SWS water budget results is the volume of precipitation that makes up the largest part of the Subbasin SWS inflows averaging about 300 taf per year over the projected period. By comparison, other SWS inflows in the Subbasin are relatively smaller. Surface water inflows average about 83 taf per year. Groundwater extraction and uptake represents a relatively small SWS inflow averaging about 9.1 taf per year, and groundwater discharge to surface water is negligible over the projected (current land use) water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation makes up a large fraction of the total Subbasin SWS outflows averaging about 160 taf per year over the projected (current land use) period. The surface water outflows total about 120 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for each deep percolation of precipitation totaling about 46 taf per year and infiltration (seepage) of surface water totaling about 43 taf per year, on average. ET of applied water and deep percolation of applied water are about 11 and 7.3 taf per year on average, respectively. The outflows of ET of groundwater uptake and evaporation from surface water average about 2.9 and 0.85 taf per year, respectively.

Table 4-12. Bowman Subbasin Projected (Current Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	83,000
	Precipitation	300,000
	Groundwater Extraction	9,100
	Groundwater Discharge	0
Outflows	Surface Water Outflow	120,000
	ET of Applied Water	11,000
	ET of Groundwater Uptake	2,900
	ET of Precipitation	160,000
	Evaporation	850
	Deep Percolation of Applied Water	7,300
	Deep Percolation of Precipitation	46,000
	Infiltration of Surface Water	46,000
Annual Change in Root Zone Storage		**-69**

Summarized results for major components of the projected (current land use) water budget as they relate to the GWS are presented in **Table 4-13**. Deep percolation represents the largest inflow averaging nearly 53 taf per year while net seepage represents an inflow of about 46 taf per year. Net subsurface flows (combined subsurface flows with adjacent subbasins and upland areas) represent the largest net outflow totaling about -90 taf per year of outflow from the Bowman Subbasin on average. Groundwater pumping (on average -6.2 taf per year) and groundwater (root water) uptake directly from shallow groundwater (on average -2.9 taf per year) represent smaller outflows from the GWS. Overall, the water budget results for the 51-year projected (current land use) period indicate a cumulative change in groundwater storage of about -11 taf, which equals an average annual change in groundwater storage of about -0.2 taf per year. These changes in storage estimates equate to total decreases in storage in the Subbasin of about -0.09 af per acre over the 51 years and an annual decrease of -0.002 af per acre across the entire Subbasin (approximately 122,425 acres).

Detailed results for each of the individual water budget components in the projected (current land use) water budget are presented in **Appendix B-2**.

Table 4-13. Bowman Subbasin Projected (Current Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	46,000
Deep Percolation	53,000
Groundwater Pumping	-6,200
Groundwater Uptake	-2,900
Total Net Subsurface Flows	-90,000
Annual Change in Groundwater Storage	**-210**

4.2.3. Projected (Future Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (future land use) water budget period (2022-2072) are summarized in **Table 4-14**. Of particular note in the projected (future land use) SWS water budget results is the volume of precipitation that makes up the largest part of the Subbasin SWS inflows averaging about 300 taf per year over the projected period. By comparison, other SWS inflows in the Subbasin are relatively smaller. Surface water inflows average about 83 taf per year. Groundwater extraction and uptake represents a relatively small SWS inflow averaging about 9.2 taf per year, and groundwater discharge to surface water is negligible over the projected (future land use) water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation makes up a large fraction of the total Subbasin SWS outflows averaging about 160 taf per year over the projected (future land use) period. The surface water outflows total about 120 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for infiltration (seepage) of surface water and deep percolation of precipitation totaling about 47 taf and 46 taf per year on average, respectively. ET of applied water and deep percolation of applied water are about 11 and 7.3 taf per year on average, respectively. The outflows of ET of groundwater uptake and evaporation from surface water average about 2.8 and 0.85 taf per year, respectively.

Table 4-14. Bowman Subbasin Projected (Future Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	83,000
	Precipitation	300,000
	Groundwater Extraction	9,200
	Groundwater Discharge	0
Outflows	Surface Water Outflow	120,000
	ET of Applied Water	11,000
	ET of Groundwater Uptake	2,800
	ET of Precipitation	160,000
	Evaporation	850
	Deep Percolation of Applied Water	7,300
	Deep Percolation of Precipitation	46,000
	Infiltration of Surface Water	47,000
Annual Change in Root Zone Storage		**-70**

Summarized results for major components of the projected (future land use) water budget as they relate to the GWS are presented in **Table 4-15**. Deep percolation represents the largest inflow averaging nearly 53 taf per year while net seepage represents an inflow of about 47 taf per year. Net subsurface flows (combined subsurface flows with adjacent subbasins and upland areas) represent the largest net outflow totaling about -91 taf per year of outflow from the Bowman Subbasin on average. Groundwater pumping (on average -6.4 taf per year) and groundwater (root water) uptake directly from shallow groundwater (on average -2.8 taf per year) represent smaller outflows from the GWS. Overall, the water budget results for the 51-year projected (future land use) period indicate a cumulative change in groundwater storage of about -15 taf, which equals an average annual change in groundwater storage of about -0.30 taf per year. These changes in storage estimates equate to total decreases in storage in the Subbasin of about -0.13 af per acre over the 51 years and an annual decrease of -0.002 af per acre across the entire Subbasin (approximately 122,425 acres).

Detailed results for each of the individual water budget components in the projected (future land use) water budget are presented in **Appendix B-3**.

Table 4-15. Bowman Subbasin Projected (Future Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	47,000
Deep Percolation	53,000
Groundwater Pumping	-6,400
Groundwater Uptake	-2,800
Total Net Subsurface Flows	-91,000
Annual Change in Groundwater Storage	**-300**

4.2.4. Projected (Current Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (current land use) with climate change water budget as they relate to the GWS are presented in **Table 4-16**. Net seepage increases under climate change scenarios, indicating greater stream seepage to groundwater. Deep percolation and net subsurface flows remain nearly unchanged under climate change scenarios. Groundwater pumping increases under climate change scenarios, becoming a greater outflow from the groundwater system. Groundwater uptake remains nearly unchanged under climate change scenarios.

Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2030) water budget are presented in **Appendix B-4**. Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2070) water budget are presented in **Appendix B-5**.

Table 4-16. Comparison of Bowman Subbasin Projected (Current Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Current Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	46,000	47,000	48,000
Deep Percolation	53,000	53,000	51,000
Groundwater Pumping	-6,200	-6,400	-6,900
Groundwater Uptake	-2,900	-2,900	-2,900
Total Net Subsurface Flows	-90,000	-91,000	-89,000
Annual Groundwater Storage Change	**-210**	**-240**	**-420**

4.2.5. Projected (Future Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (future land use) with climate change water budget as they relate to the GWS are presented in **Table 4-17**. Overall, the climate change scenarios do not appear to change the overall Subbasin GWS water budget in a considerable way. Net seepage increases under both 2030 and 2070 climate change scenarios and deep percolation decreases by a small amount. Net subsurface flows also do not change much under climate change scenarios. Groundwater pumping increases slightly under climate change scenarios. Groundwater uptake remains nearly unchanged under climate change scenarios.

Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2030) water budget are presented in **Appendix B-6**. Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2070) water budget are presented in **Appendix B-7**.

Table 4-17. Comparison of Bowman Subbasin Projected (Future Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Future Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	47,000	48,000	49,000
Deep Percolation	53,000	53,000	51,000
Groundwater Pumping	-6,400	-6,600	-7,100
Groundwater Uptake	-2,800	-2,800	-2,800
Total Net Subsurface Flows	-91,000	-92,000	-90,000
Annual Groundwater Storage Change	**-300**	**-340**	**-530**

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

4.2.6. Projected (Future Land Use) with Projects and Climate Change Water Budget Results

Summarized results for major components of the projected (future land use) with projects and climate change (2070) water budget as they relate to the GWS are presented in **Table 4-18**. Deep percolation represents the largest inflow averaging nearly 51 taf per year while net seepage represents an inflow of about 49 taf per year. Net subsurface flows (combined subsurface flows with adjacent subbasins and upland areas) represent the largest net outflow totaling about -91 taf per year of outflow from the Bowman Subbasin on average. Groundwater pumping (on average -7.1 taf per year) and groundwater (root water) uptake directly from shallow groundwater (on average -2.8 taf per year) represent smaller outflows from the GWS. Overall, the water budget results for the 51-year projected (future land use) with projects and climate change (2070) period indicate a cumulative change in groundwater storage of about -27 taf, which equals an average annual change in groundwater storage of about -530 af per year. These changes in storage estimates equate to decreases in storage in the Subbasin of about -0.22 af per acre over the 51 years and an annual decrease of about -0.004 af per acre across the entire Subbasin (approximately 122,425 acres).

Detailed results for each of the individual water budget components in the projected (future land use) with projects and climate change (2070) water budget are presented in **Appendix B-8**.

Table 4-18. Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	49,000
Deep Percolation	51,000
Groundwater Pumping	-7,100
Groundwater Uptake	-2,800
Total Net Subsurface Flows	-91,000
Annual Change in Groundwater Storage	**-530**

4.3. Los Molinos Subbasin

The following section summarizes the analyses and results relating to the historical scenario for the Los Molinos Subbasin. Detailed water budget results for each of the individual model scenarios are presented in **Appendix C**.

4.3.1. Historical Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the historical water budget period (1990-2018) are summarized in **Table 4-19**. Of particular note in the historical SWS water budget results are the volumes of surface water inflows that make up a large part of the Subbasin SWS inflows. Over the historical period, surface water inflows to surface water averaged about 630 taf per year. Precipitation also represents a large SWS inflow component averaging about 210 taf per year. Groundwater extraction and uptake represent a small SWS inflow in the Subbasin averaging about 33 taf per year over the historical water budget period. Groundwater discharge to surface water represents a smaller SWS inflow averaging about 2 taf per year.

Among the outflows from the Subbasin SWS, surface water outflow makes up a large fraction of the total Subbasin SWS outflows. The surface water outflows total about 620 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of precipitation about 120 taf per year and deep percolation of precipitation totaling about 39 taf per year on average. The outflow of ET of applied water, infiltration (seepage) of surface water, and ET of groundwater uptake are about 36, 35 and 17 taf per year on average, respectively. The outflows of deep percolation of applied water and evaporation from surface water are about 15 and 2.1 taf per year, respectively.

Table 4-19. Los Molinos Subbasin Historical Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (1990-2018)
Inflows	Surface Water Inflow	630,000
	Precipitation	210,000
	Groundwater Extraction	33,000
	Groundwater Discharge	2,000
Outflows	Surface Water Outflow	620,000
	ET of Applied Water	36,000
	ET of Groundwater Uptake	17,000
	ET of Precipitation	120,000
	Evaporation	2,100
	Deep Percolation of Applied Water	15,000
	Deep Percolation of Precipitation	39,000
	Infiltration of Surface Water	35,000
Annual Change in Root Zone Storage		**-630**

Summarized results for major components of the historical water budget as they relate to the GWS are presented in **Table 4-20**. The positive net seepage values (on average 33 taf per year) and deep percolation values (on average 54 taf per year) represent the major inflows to the GWS. The net subsurface flows average about -56 taf per year represent the combined net subsurface outflows from the Subbasin to adjacent subbasins. Groundwater (root water) uptake directly from shallow groundwater (on average -17 taf per year) and groundwater pumping (on average -16 taf per year) are somewhat smaller outflows from the GWS. Overall, the water budget results for the 29-year historic period indicate a cumulative change in groundwater storage of about -74 taf, which equals an average annual decrease in groundwater storage of approximately -2.5 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about -0.74 af per acre over the 29 years and an annual decrease of about -0.03 af per acre across the entire Subbasin (approximately 99,000 acres).

Detailed results for each of the individual water budget components in the historical water budget are presented in **Appendix C-1**.

Table 4-20. Los Molinos Subbasin Historical Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (1990-2018)
Total Net Seepage	33,000
Deep Percolation	54,000
Groundwater Pumping	-16,000
Groundwater Uptake	-17,000
Total Net Subsurface Flows	-56,000
Annual Change in Groundwater Storage	**-2,500**

4.3.2. Projected (Current Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (current land use) water budget period (2022-2072) are summarized in **Table 4-21**. Of particular note in the projected (current land use) SWS water budget results are the volumes of surface water inflows that make up a large part of the Subbasin SWS inflows. Over the projected (current land use) period, surface water inflows to surface water averaged about 650 taf per year. Precipitation also represents a large SWS inflow component averaging about 220 taf per year. Groundwater extraction and uptake represent a small SWS inflow in the Subbasin averaging about 27 taf per year over the projected (current land use) water budget period. Groundwater discharge to surface water is negligible throughout the projected (current land use) period.

Among the outflows from the Subbasin SWS, surface water outflow makes up a large fraction of the total Subbasin SWS outflows. The surface water outflows total about 610 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of precipitation about 120 taf per year and infiltration (seepage) of surface water totaling about 59 taf per year on average. The outflow of ET of applied water, deep percolation of precipitation, and deep percolation of applied water are about 41, 38 and 14 taf per year on average, respectively. The outflows of ET of groundwater uptake and evaporation from surface water are about 7.3 and 2.2 taf per year, respectively.

Table 4-21. Los Molinos Subbasin Projected (Current Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	650,000
	Precipitation	220,000
	Groundwater Extraction	27,000
	Groundwater Discharge	0
Outflows	Surface Water Outflow	610,000
	ET of Applied Water	41,000
	ET of Groundwater Uptake	7,300
	ET of Precipitation	120,000
	Evaporation	2,200
	Deep Percolation of Applied Water	14,000
	Deep Percolation of Precipitation	38,000
	Infiltration of Surface Water	59,000
Annual Change in Root Zone Storage		**24**

Summarized results for major components of the projected (current land use) water budget as they relate to the GWS are presented in **Table 4-22**. The positive net seepage values (on average 59 taf per year) and deep percolation values (on average 52 taf per year) represent the major inflows to the GWS. The net subsurface flows average about -86 taf per year represent the combined net subsurface outflows from the Subbasin to adjacent subbasins. Groundwater pumping (on average -20 taf per year) and groundwater (root water) uptake directly from shallow groundwater (on average -7.3 taf per year) are somewhat smaller outflows from the GWS. Overall, the water budget results for the 51-year projected (current land use) period indicate a cumulative change in groundwater storage of about -93 taf, which equals an average annual decrease in groundwater storage of approximately -1.8 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about -0.94 af per acre over the 51 years and an annual decrease of about -0.02 af per acre across the entire Subbasin (approximately 99,000 acres).

Detailed results for each of the individual water budget components in the projected (current land use) water budget are presented in **Appendix C-2**.

Table 4-22. Los Molinos Subbasin Projected (Current Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	59,000
Deep Percolation	52,000
Groundwater Pumping	-20,000
Groundwater Uptake	-7,300
Total Net Subsurface Flows	-86,000
Annual Change in Groundwater Storage	**-1,800**

4.3.3. Projected (Future Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (future land use) water budget period (2022-2072) are summarized in **Table 4-23**. Of particular note in the historical SWS water budget results are the volumes of surface water inflows that make up a large part of the Subbasin SWS inflows. Over the projected (future land use) period, surface water inflows to surface water averaged about 650 taf per year. Precipitation also represents a large SWS inflow component averaging about 220 taf per year. Groundwater extraction and uptake represent a small SWS inflow in the Subbasin averaging about 27 taf per year over the projected (current land use) water budget period. Groundwater discharge to surface water is negligible throughout the projected (current land use) period.

Among the outflows from the Subbasin SWS, surface water outflow makes up a large fraction of the total Subbasin SWS outflows. The surface water outflows total about 610 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of precipitation about 120 taf per year and infiltration (seepage) of surface water totaling about 63 taf per year on average. The outflow of ET of applied water, deep percolation of precipitation, and deep percolation of applied water are about 42, 38 and 14 taf per year on average, respectively. The outflows of ET of groundwater uptake and evaporation from surface water are about 6.1 and 2.2 taf per year, respectively.

Table 4-23. Los Molinos Subbasin Projected (Future Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	650,000
	Precipitation	220,000
	Groundwater Extraction	27,000
	Groundwater Discharge	0
Outflows	Surface Water Outflow	610,000
	ET of Applied Water	42,000
	ET of Groundwater Uptake	6,100
	ET of Precipitation	120,000
	Evaporation	2,200
	Deep Percolation of Applied Water	14,000
	Deep Percolation of Precipitation	38,000
	Infiltration of Surface Water	63,000
Annual Change in Root Zone Storage		**25**

Summarized results for major components of the projected (future land use) water budget as they relate to the GWS are presented in **Table 4-24**. The positive net seepage values (on average 63 taf per year) and deep percolation values (on average 51 taf per year) represent the major inflows to the GWS. The net subsurface flows average about -89 taf per year represent the combined net subsurface outflows from the Subbasin to adjacent subbasins. Groundwater pumping (on average -21 taf per year) and groundwater (root water) uptake directly from shallow groundwater (on average -6.1 taf per year) are somewhat smaller outflows from the GWS. Overall, the water budget results for the 51-year projected (future land use) period indicate a cumulative change in groundwater storage of about -100 taf, which equals an average annual decrease in groundwater storage of approximately -2.0 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 1.0 af per acre over the 51 years and an annual decrease of about -0.02 af per acre across the entire Subbasin (approximately 99,000 acres).

Detailed results for each of the individual water budget components in the projected (future land use) water budget are presented in **Appendix C-3**.

Table 4-24. Los Molinos Subbasin Projected (Future Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	63,000
Deep Percolation	51,000
Groundwater Pumping	-21,000
Groundwater Uptake	-6,100
Total Net Subsurface Flows	-89,000
Annual Change in Groundwater Storage	**-2,000**

4.3.4. Projected (Current Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (current land use) with climate change water budget as they relate to the GWS are presented in **Table 4-25**. Net seepage increases under climate change scenarios, indicating greater stream seepage to groundwater. Deep percolation and net subsurface flows decrease slightly under climate change scenarios. Groundwater pumping increases slightly under climate change scenarios, but the overall water budget results suggest that annual change in storage is only very slightly more negative under the climate change scenarios.

Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2030) water budget are presented in **Appendix C-4**. Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2070) water budget are presented in **Appendix C-5**.

Table 4-25. Comparison of Los Molinos Subbasin Projected (Current Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Current Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	59,000	62,000	67,000
Deep Percolation	52,000	52,000	50,000
Groundwater Pumping	-20,000	-22,000	-24,000
Groundwater Uptake	-7,300	-7,100	-6,400
Total Net Subsurface Flows	-86,000	-87,000	-88,000
Annual Groundwater Storage Change	**-1,800**	**-1,900**	**-2,100**

4.3.5. Projected (Future Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (future land use) with climate change water budget as they relate to the GWS are presented in **Table 4-26**. Overall, the climate change scenarios do not appear to change the overall Subbasin GWS water budget in a considerable way. Net seepage increases under climate change scenarios, indicating greater stream seepage to groundwater. Deep percolation and net subsurface flows decrease slightly under climate change scenarios. Groundwater pumping under climate change scenarios, but the overall change in storage is only slightly more negative under the climate change scenarios.

Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2030) water budget are presented in **Appendix C-6**. Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2070) water budget are presented in **Appendix C-7**.

Table 4-26. Comparison of Los Molinos Subbasin Projected (Future Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Future Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	63,000	66,000	71,000
Deep Percolation	51,000	51,000	49,000
Groundwater Pumping	-21,000	-22,000	-25,000
Groundwater Uptake	-6,100	-5,900	-5,100
Total Net Subsurface Flows	-89,000	-91,000	-92,000
Annual Groundwater Storage Change	**-2,000**	**-2,100**	**-2,300**

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

4.3.6. Projected (Future Land Use) with Projects and Climate Change Water Budget Results

Summarized results for major components of the projected (future land use) with projects and climate change (2070) water budget as they relate to the GWS are presented in **Table 4-27**. The positive net seepage values (on average 70 taf per year) and deep percolation values (on average 49 taf per year) represent the major inflows to the GWS. The net subsurface flows average about -92 taf per year represent the combined net subsurface outflows from the Subbasin to adjacent subbasins.

Groundwater pumping (on average -25 taf per year) and groundwater (root water) uptake directly from shallow groundwater (on average -5.2 taf per year) are somewhat smaller outflows from the GWS. Overall, the water budget results for the 51-year projected (future land use) with projects and climate change (2070) period indicate a cumulative change in groundwater storage of about -120 taf, which equals an average annual decrease in groundwater storage of approximately -2.3 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about -1.2 af per acre over the 51 years and an annual decrease of about -0.02 af per acre across the entire Subbasin (approximately 99,000 acres).

Detailed results for each of the individual water budget components in the projected (future land use) with projects and climate change (2070) water budget are presented in **Appendix C-8**.

Table 4-27. Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	70,000
Deep Percolation	49,000
Groundwater Pumping	-25,000
Groundwater Uptake	-5,200
Total Net Subsurface Flows	-92,000
Annual Change in Groundwater Storage	**-2,300**

4.4. Red Bluff Subbasin

The following section summarizes the analyses and results relating to the historical scenario for the Red Bluff Subbasin. Detailed water budget results for each of the individual model scenarios are presented in **Appendix D**.

4.4.1. Historical Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the historical water budget period (1990-2018) are summarized in **Table 4-28**. Of particular note in the historical SWS water budget results are the volume of precipitation that makes up a large part of the Subbasin SWS inflows. Over the historical period, precipitation to surface water averaged about 580 taf per year. Surface water inflows and groundwater extraction and uptake also represent large SWS inflow components averaging about 120 and 90 taf per year, respectively. Groundwater discharge to surface water represents a relatively smaller SWS inflow in the Subbasin, averaging about 42 taf per year over the historical water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation and surface water outflow make up large fractions of the total Subbasin SWS outflows. ET of precipitation averages about 350 taf per year, while surface water outflows total about 340 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of applied water and deep percolation of precipitation averaging about 61 and 55 taf per year, respectively. The outflows of deep percolation of applied water, ET of groundwater uptake and infiltration (seepage) of surface water are about 15, 9.7, and 2.4 taf per year on average, respectively. Evaporation from surface water averages about 0.7 taf per year over the historical water budget period.

Table 4-28. Red Bluff Subbasin Historical Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (1990-2018)
Inflows	Surface Water Inflow	120,000
	Precipitation	580,000
	Groundwater Extraction	90,000
	Groundwater Discharge	42,000
Outflows	Surface Water Outflow	340,000
	ET of Applied Water	61,000
	ET of Groundwater Uptake	9,700
	ET of Precipitation	350,000
	Evaporation	680
	Deep Percolation of Applied Water	15,000
	Deep Percolation of Precipitation	55,000
	Infiltration of Surface Water	2,400
Annual Change in Root Zone Storage		**-1,600**

Summarized results for major components of the historical water budget as they relate to the GWS are presented in **Table 4-29**. Among the outflows from the Subbasin GWS, groundwater pumping makes up the largest fraction of the total GWS outflows (on average -80 taf per year). Highly negative net seepage values (on average -39 taf per year) represent net groundwater discharging to surface waterways and leaving the GWS. Groundwater (root water) uptake directly from shallow groundwater (on average -9.7 taf per year) represents a smaller outflow from the GWS. Deep percolation is the largest net inflow component averaging about 70 taf per year. Positive net subsurface flows (on average 49 taf per year) represent the combined subsurface inflows from adjacent subbasins and upland areas. Overall, the water budget results for the 29-year historic period indicate a cumulative change in groundwater storage of about -310 taf, which equals an average annual change in groundwater storage of only about -11 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 1.1 af per acre on average over the 29 years and an annual decrease of less than 0.04 af per acre across the entire Subbasin (approximately 272,000 acres).

Detailed results for each of the individual water budget components in the historical water budget are presented in **Appendix D-1**.

Table 4-29. Red Bluff Subbasin Historical Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (1990-2018)
Total Net Seepage	-39,000
Deep Percolation	70,000
Groundwater Pumping	-80,000
Groundwater Uptake	-9,700
Total Net Subsurface Flows	49,000
Annual Change in Groundwater Storage	**-11,000**

4.4.2. Projected (Current Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (current land use) water budget period (2022-2072) are summarized in **Table 4-30**. Of particular note in the projected (current land use) SWS water budget results are the volume of precipitation that makes up a large part of the Subbasin SWS inflows (average about 600 taf per year over the projected period). Surface water inflows and groundwater extraction also represent large SWS inflow components averaging about 120 and 100 taf per year, respectively. Groundwater discharge to surface water is a relatively smaller SWS inflow in the Subbasin averaging about 26 taf per year over the projected (current land use) water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation and surface water outflow make up large fractions of the total Subbasin SWS outflows. ET of precipitation averages about 360 taf per year, while surface water outflows total about 330 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of applied water and deep percolation of precipitation averaging about 80 taf and 54 taf per year, respectively. The outflows of deep percolation of applied water, ET of groundwater uptake and infiltration (seepage) of surface water are about 13, 6.3, and 4.5 taf per year on average, respectively. Evaporation from surface water averages about 0.9 taf per year over the projected (current land use) water budget period.

Table 4-30. Red Bluff Subbasin Projected (Current Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	120,000
	Precipitation	600,000
	Groundwater Extraction	100,000
	Groundwater Discharge	26,000
Outflows	Surface Water Outflow	330,000
	ET of Applied Water	80,000
	ET of Groundwater Uptake	6,300
	ET of Precipitation	360,000
	Evaporation	910
	Deep Percolation of Applied Water	13,000
	Deep Percolation of Precipitation	54,000
	Infiltration of Surface Water	4,500
Annual Change in Root Zone Storage		**-46**

Summarized results for major components of the projected (current land use) water budget as they relate to the GWS are presented in **Table 4-31**. Among the outflows from the Subbasin GWS, groundwater pumping makes up the largest fraction of the total GWS outflows (on average -94 taf per year). Highly negative net seepage values (on average -21 taf per year) represent net groundwater discharging to surface waterways and leaving the GWS. Groundwater (root water) uptake directly from shallow groundwater (on average -6.3 taf per year) represents a smaller outflow from the GWS. Deep percolation is the largest net inflow component averaging about 67 taf per year. Positive net subsurface flows (on average 53 taf per year) represent the combined subsurface inflows from adjacent subbasins and upland areas. Overall, the water budget results for the 51-year projected (current land use) period indicate a cumulative change in groundwater storage of about -94 taf, which equals an average annual change in groundwater storage of only about -1.8 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 0.34 af per acre on average over the 51 years and an annual decrease of less than 0.01 af per acre across the entire Subbasin (approximately 272,000 acres).

Detailed results for each of the individual water budget components in the projected (current land use) water budget are presented in **Appendix D-2**.

Table 4-31. Red Bluff Subbasin Projected (Current Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	-21,000
Deep Percolation	67,000
Groundwater Pumping	-94,000
Groundwater Uptake	-6,300
Total Net Subsurface Flows	53,000
Annual Change in Groundwater Storage	**-1,800**

4.4.3. Projected (Future Land Use) Water Budget Results

Annual inflows, outflows, and change in SWS root zone storage during the projected (future land use) water budget period (2022-2072) are summarized in **Table 4-32**. Of particular note in the projected (future land use) SWS water budget results are the volume of precipitation that makes up a large part of the Subbasin SWS inflows (average about 600 taf over the projected period). Groundwater extraction and surface water inflows also represent large SWS inflow components averaging about 140 and 120 taf per year, respectively. Groundwater discharge to surface water is a relatively smaller SWS inflow in the Subbasin averaging about 16 taf per year over the projected (future land use) water budget period.

Among the outflows from the Subbasin SWS, ET of precipitation and surface water outflow make up large fractions of the total Subbasin SWS outflows. ET of precipitation averages about 360 taf per year, while surface water outflows total about 330 taf per year on average. By comparison, other SWS outflows in the Subbasin are relatively smaller, with values for ET of applied water and deep percolation of precipitation averaging about 110 and 51 taf per year, respectively. The outflows of deep percolation of applied water, infiltration (seepage) of surface water, and ET of groundwater uptake are about 17, 7.1, and 4.8 taf per year on average, respectively. Evaporation from surface water averages about 0.97 taf per year over the projected (current land use) water budget period.

Table 4-32. Red Bluff Subbasin Projected (Future Land Use) Surface System Annual Water Budget Summary (acre-feet)

Water Budget Component		Average (2022-2072)
Inflows	Surface Water Inflow	120,000
	Precipitation	600,000
	Groundwater Extraction	140,000
	Groundwater Discharge	16,000
Outflows	Surface Water Outflow	330,000
	ET of Applied Water	110,000
	ET of Groundwater Uptake	4,800
	ET of Precipitation	360,000
	Evaporation	970
	Deep Percolation of Applied Water	17,000
	Deep Percolation of Precipitation	51,000
	Infiltration of Surface Water	7,100
Annual Change in Root Zone Storage		**-50**

Summarized results for major components of the projected (future land use) water budget as they relate to the GWS are presented in **Table 4-33**. Among the outflows from the Subbasin GWS, groundwater pumping makes up the largest fraction of the total GWS outflows (on average -130 taf per year). Negative net seepage values (on average -9.3 taf per year) represent net groundwater discharging to surface waterways and leaving the GWS. Groundwater (root water) uptake directly from shallow groundwater (on average -4.8 taf per year) represents a smaller outflow from the GWS. Positive net subsurface flows and deep percolation are the largest net inflow components averaging about 74 and 68 taf per year, respectively. Overall, the water budget results for the 51-year projected (future land use) period indicate a cumulative change in groundwater storage of about -150 taf, which equals an average annual change in groundwater storage of only about -2.9 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about 0.54 af per acre on average over the 51 years and an annual decrease of about 0.01 af per acre across the entire Subbasin (approximately 272,000 acres).

Detailed results for each of the individual water budget components in the projected (future land use) water budget are presented in **Appendix D-3**.

Table 4-33. Red Bluff Subbasin Projected (Future Land Use) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	-9,300
Deep Percolation	68,000
Groundwater Pumping	-130,000
Groundwater Uptake	-4,800
Total Net Subsurface Flows	74,000
Annual Change in Groundwater Storage	**-2,900**

4.4.4. Projected (Current Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (current land use) with climate change water budget as they relate to the GWS are presented in **Table 4-34**. Net seepage becomes less negative under climate change scenarios, indicating less groundwater discharge to streams. Deep percolation decreases slightly, while net subsurface flows increase slightly under climate change scenarios. Groundwater pumping increases under climate change scenarios, becoming a greater outflow from the groundwater system. Overall, the annual change in groundwater storage becomes more negative under climate change scenarios.

Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2030) water budget are presented in **Appendix D-4**. Detailed results for each of the individual water budget components in the projected (current land use) with climate change (2070) water budget are presented in **Appendix D-5**.

Table 4-34. Comparison of Red Bluff Subbasin Projected (Current Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Current Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	-21,000	-18,000	-12,000
Deep Percolation	67,000	67,000	64,000
Groundwater Pumping	-94,000	-99,000	-110,000
Groundwater Uptake	-6,300	-6,200	-5,500
Total Net Subsurface Flows	53,000	54,000	56,000
Annual Groundwater Storage Change	**-1,800**	**-1,900**	**-2,400**

4.4.5. Projected (Future Land Use) with Climate Change Water Budget Results

A comparison of the major components of the projected (future land use) with climate change water budget as they relate to the GWS are presented in **Table 4-35**. Net seepage becomes less negative under 2030 climate change scenario indicating a reduction of groundwater discharge to streams. Net seepage becomes slightly positive under 2070 climate change scenario indicating seepage from surface water to groundwater. Deep percolation decreases slightly under climate change scenarios, while net subsurface flows increase slightly under climate change scenarios. Groundwater pumping increases under climate change scenarios, becoming a greater outflow from the groundwater system. Overall, the annual change in groundwater storage becomes more negative under climate change scenarios.

Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2030) water budget are presented in **Appendix D-6**. Detailed results for each of the individual water budget components in the projected (future land use) with climate change (2070) water budget are presented in **Appendix D-7**.

Table 4-35. Comparison of Red Bluff Subbasin Projected (Future Land Use) Groundwater System Annual Water Budgets with Climate Change Adjustments (acre-feet)

GWS Water Budget Component	Projected (Future Land Use)		
	Baseline Scenario	Climate Change (2030)	Climate Change (2070)
Total Net Seepage	-9,300	-6,000	830
Deep Percolation	68,000	68,000	66,000
Groundwater Pumping	-130,000	-140,000	-150,000
Groundwater Uptake	-4,800	-4,600	-4,100
Total Net Subsurface Flows	74,000	77,000	80,000
Annual Groundwater Storage Change	**-2,900**	**-3,000**	**-4,100**

Note: positive values indicate inflows/increasing storage, negative values indicate outflows/decreasing storage.

4.4.6. Projected (Future Land Use) with Projects and Climate Change Water Budget Results

Summarized results for major components of the projected (future land use) with projects and climate change (2070) water budget as they relate to the GWS are presented in **Table 4-36**. Among the outflows from the Subbasin SWS, groundwater pumping makes up the largest fraction of the total SWS outflows (on average -150 taf per year). Groundwater (root water) uptake directly from shallow groundwater (on average -4.8 taf per year) represents a smaller outflow from the GWS. Positive net subsurface flows and deep percolation are the largest net inflow components averaging about 74 and 68 taf per year, respectively. Net seepage values (on average 0.3 taf per year) represents a smaller inflow to the GWS. Overall, the water budget results for the 51-year projected (future land use) with projects and climate change (2070) period indicate a cumulative change in groundwater storage of about -180 taf, which equals an average annual change in groundwater storage of only about -3.5 taf per year. This change in storage estimates equate to total decreases in storage in the Subbasin of about -0.66 af per acre on average over the 51 years and an annual decrease of about -0.01 af per acre across the entire Subbasin (approximately 272,000 acres).

Detailed results for each of the individual water budget components in the projected (future land use) with projects and climate change (2070) water budget are presented in **Appendix D-8**.

Table 4-36. Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater System Annual Water Budget Summary (acre-feet)

Water Budget Component	Average (2022-2072)
Total Net Seepage	300
Deep Percolation	67,000
Groundwater Pumping	-150,000
Groundwater Uptake	-4,300
Total Net Subsurface Flows	79,000
Annual Change in Groundwater Storage	**-3,500**

4.5. Summary of Subbasin Water Budget Results by Aquifer Zone

This section provides a summary comparison of the Subbasin water budget results for the different historical and projected conditions evaluated, including by primary aquifer zone.

4.5.1. Antelope Subbasin

Table 4-37 provides a summary comparison of the Antelope Subbasin water budget results for the different historical and projected conditions evaluated, including by primary aquifer zone. Net seepage becomes less negative in the projected scenarios as compared to the historical scenario, indicating less groundwater discharge to streams. The decrease in groundwater discharge to streams is greatest in the climate change scenarios which correlated with higher surface water inflows occurring under the climate change scenarios. Deep percolation from the SWS to the GWS is relatively stable between the historical and projected scenarios, but decreases slightly under the climate change scenarios. Net subsurface flows decrease in the projected scenarios as compared to the historical scenario, indicating decreased inflows to the Subbasin. These subsurface inflows decrease slightly under climate change scenarios. Groundwater pumping increases slightly in the projected scenarios as compared to the historical scenario and increases only modestly under climate change scenarios. Overall, all historical and projected water budgets suggest decreases in groundwater storage by varying magnitudes. The projected changes in storage are likely within the range of uncertainty in the water budget estimates.

As presented in **Table 4-37**, groundwater pumping in the Antelope Subbasin occurs primarily from the Upper Aquifer and historically averaged about 15 taf per year from the Upper Aquifer; in projected water budget scenarios, average groundwater pumping from the Upper Aquifer is estimated to range between 16 and 18 taf per year, depending on the water budget scenario. In the historical water budget period, groundwater pumping from the Lower Aquifer was estimated to average about 27 af per year; under projected water budget scenarios groundwater pumping from the Lower Aquifer is estimated to average between 36 and 45 af per year, depending on the water budget scenario.

Net subsurface flows in the Subbasin occur primarily from the Upper Aquifer and historically averaged about 51 taf per year of inflow to the Upper Aquifer; in projected water budget scenarios, average net subsurface flows to the Upper Aquifer are estimated to range between 29 and 42 taf per year of inflow, depending on the water budget scenario. All subsurface flows are inflows the Upper Aquifer along all boundaries. Net subsurface flows from the Red Bluff Subbasin were historically inflows to the Upper Aquifer, but shift to outflows in the projected (future land use) scenarios.

In the historical water budget period, net subsurface flows to the Lower Aquifer were estimated to average about 260 af per year of outflows; under projected water budget scenarios net subsurface flows to the Lower Aquifer are estimated to average between 99 and 140 af per year of outflows, depending on the water budget scenario. The majority of net subsurface inflows to the Lower Aquifer come from the Red Bluff Subbasin and Bend Subbasin. The majority of net subsurface outflows from the Lower Aquifer are to the Los Molinos Subbasin and to the Upper Aquifer.

The average change in groundwater storage within each of the two primary aquifers in the Subbasin are very minor under all historical and projected water budget scenarios. The water budget results suggest that slight decreases in groundwater storage are projected to occur in the Upper and Lower Aquifers, depending on the projected water budget scenario. The projected changes in storage are likely within the range of uncertainty in the water budget estimates.

Table 4-37. Comparison of Antelope Subbasin GWS Water Budgets (acre-feet)

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)	No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)
Upper Aquifer							
Net Seepage	-48,000	-38,000	-36,000	-33,000	-28,000	-26,000	-22,000
Deep Percolation	12,000	11,000	12,000	11,000	11,000	11,000	11,000
Groundwater Extraction	-15,000	-16,000	-17,000	-18,000	-16,000	-17,000	-18,000
Net Subsurface Flows	51,000	42,000	42,000	39,000	33,000	32,000	29,000
Horizontal flow from (+)/to (-) Los Molinos Subbasin	12,000	9,900	9,800	9,200	8,900	8,700	8,100
Horizontal flow from (+)/to (-) Red Bluff Subbasin	3,500	1,200	980	430	-2,500	-2,900	-3,700
Horizontal flow from (+)/to (-) Bend Subbasin	2,000	2,100	2,100	2,200	2,200	2,200	2,300
Vertical flow from (+)/to (-) Lower Aquifer	34,000	29,000	29,000	27,000	24,000	23,000	22,000
Annual Groundwater Storage Change	**-330**	**-160**	**-160**	**-180**	**-170**	**-180**	**-200**
Lower Aquifer							

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)	No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)
Net Seepage	0	0	0	0	0	0	0
Deep Percolation	0	0	0	0	0	0	0
Groundwater Extraction	-27	-36	-39	-45	-36	-39	-45
Net Subsurface Flows	-260	-99	-100	-110	-120	-120	-140
Horizontal flow from (+)/to (-) Los Molinos Subbasin	-6,900	-7,000	-7,000	-7,100	-6,200	-6,200	-6,200
Horizontal flow from (+)/to (-) Red Bluff Subbasin	22,000	17,000	16,000	15,000	10,000	9,700	8,100
Horizontal flow from (+)/to (-) Bend Subbasin	18,000	19,000	19,000	19,000	20,000	20,000	20,000
Vertical flow from (+)/to (-) Upper Aquifer	-34,000	-29,000	-29,000	-27,000	-24,000	-23,000	-22,000
Annual Groundwater Storage Change	**-290**	**-130**	**-140**	**-160**	**-160**	**-160**	**-180**
Entire Groundwater System							
Net Seepage	-48,000	-38,000	-36,000	-33,000	-28,000	-26,000	-22,000
Deep Percolation	12,000	11,000	12,000	11,000	11,000	11,000	11,000
Groundwater Extraction	-15,000	-16,000	-17,000	-18,000	-16,000	-17,000	-18,000
Net Subsurface Flows	50,000	42,000	42,000	39,000	33,000	32,000	29,000
Horizontal flow from (+)/to (-) Los Molinos Subbasin	4,700	2,900	2,800	2,100	2,600	2,600	1,900
Horizontal flow from (+)/to (-) Red Bluff Subbasin	25,000	18,000	17,000	15,000	8,000	6,800	4,400
Horizontal flow from (+)/to (-) Bend Subbasin	20,000	21,000	21,000	21,000	22,000	22,000	22,000
Annual Groundwater Storage Change	**-610**	**-290**	**-300**	**-340**	**-330**	**-340**	**-390**

4.5.2. Bowman Subbasin

Table 4-38 provides a summary comparison of the Bowman Subbasin water budget results for the different historical and projected conditions evaluated, including by primary aquifer zone. Net seepage increases in the projected scenarios as compared to the historical scenario, indicating greater stream seepage to groundwater. The increases in stream seepage are greatest in the climate change scenarios which correlated with higher surface water inflows occurring under the climate change scenarios. Deep percolation from the SWS to the GWS is relatively stable between the historical and projected scenarios, but decreases slightly under the climate change scenarios. Net subsurface flows become slightly more negative in the projected scenarios as compared to the historical scenario, indicating greater outflows from the Subbasin. These subsurface outflows vary slightly under climate change scenarios. Groundwater pumping increases slightly in the projected scenarios as compared to the historical scenario, and increases under climate change scenarios. Overall, all historical and projected water budgets suggest decreases in groundwater storage by varying magnitudes. The projected changes in storage are likely within the range of uncertainty in the water budget estimates.

As presented in **Table 4-38**, groundwater pumping in the Bowman Subbasin occurs primarily from the Upper Aquifer and historically averaged about 6.9 taf per year from the Upper Aquifer; in projected water budget scenarios, average groundwater pumping from the Upper Aquifer is estimated to range between 7.1 and 7.6 taf per year, depending on the water budget scenario. In the historical water budget period, groundwater pumping from the Lower Aquifer was estimated to average about 2.2 af per year; under projected water budget scenarios groundwater pumping from the Lower Aquifer is estimated to average between 2 and 2.3 af per year, depending on the water budget scenario.

Net subsurface flows in the Subbasin occur primarily from the Upper Aquifer and historically averaged about 89 taf per year of outflow from the Upper Aquifer; in projected water budget scenarios, average net subsurface flows from the Upper Aquifer are estimated to range between 91 and 94 taf per year of outflow, depending on the water budget scenario. The majority of net subsurface inflows to the Upper Aquifer come from the Anderson Subbasin and South Battle Creek Subbasin. The majority of net subsurface outflows from the Upper Aquifer are to the Red Bluff Subbasin and to the Lower Aquifer.

In the historical water budget period, net subsurface flows to the Lower Aquifer were estimated to average about 1.1 taf per year of inflows; under projected water budget scenarios net subsurface flows to the Lower Aquifer are estimated to average between 2.1 and 2.2 taf per year of inflows, depending on the water budget scenario. The majority of net subsurface inflows to the Lower Aquifer come from the Anderson Subbasin, South Battle Creek Subbasin, and Upper Aquifer. The majority of net subsurface outflows from the Lower Aquifer are to the Red Bluff Subbasin.

The average change in groundwater storage within each of the two primary aquifers in the Subbasin are very minor under all historical and projected water budget scenarios. The water budget results suggest that slight decreases in groundwater storage are projected to occur in the Upper and Lower Aquifers, depending on the projected water budget scenario. The projected changes in storage are likely within the range of uncertainty in the water budget estimates.

Table 4-38. Comparison of Bowman Subbasin GWS Water Budgets (acre-feet)

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)	No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)
Upper Aquifer							
Net Seepage	43,000	46,000	47,000	48,000	47,000	48,000	49,000
Deep Percolation	53,000	53,000	53,000	51,000	53,000	53,000	51,000
Groundwater Extraction	-6,900	-7,100	-7,300	-7,600	-7,100	-7,300	-7,600
Net Subsurface Flows	-89,000	-92,000	-93,000	-91,000	-94,000	-94,000	-93,000
Horizontal flow from (+)/to (-) Red Bluff Subbasin	-10,000	-11,000	-11,000	-11,000	-11,000	-11,000	-11,000
Horizontal flow from (+)/to (-) Anderson Subbasin	960	1,200	1,200	1,400	1,200	1,300	1,400
Horizontal flow from (+)/to (-) South Battle Creek Subbasin	4,200	4,400	4,500	4,500	4,600	4,600	4,600
Vertical flow from (+)/ to (-) Lower Aquifer	-84,000	-87,000	-88,000	-87,000	-89,000	-89,000	-88,000
Annual Groundwater Storage Change	**-620**	**-320**	**-330**	**-380**	**-340**	**-350**	**-400**
Lower Aquifer							
Net Seepage	0	0	0	0	0	0	0
Deep Percolation	0	0	0	0	0	0	0
Groundwater Extraction	-2,200	-2,000	-2,100	-2,200	-2,100	-2,200	-2,300
Net Subsurface Flows	1,100	2,100	2,200	2,100	2,200	2,200	2,100
Horizontal flow from (+)/to (-) Red Bluff Subbasin	-110,000	-110,000	-110,000	-110,000	-110,000	-110,000	-110,000
Horizontal flow from (+)/to (-) Anderson Subbasin	21,000	21,000	21,000	21,000	22,000	22,000	22,000
Horizontal flow from (+)/to (-) South Battle Creek Subbasin	5,300	5,800	5,900	5,900	6,200	6,200	6,300
Vertical flow from (+)/to (-) Upper Aquifer	84,000	87,000	88,000	87,000	89,000	89,000	88,000
Annual Groundwater Storage Change	**-1,100**	**110**	**91**	**-33**	**35**	**11**	**-120**

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)	No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)
Entire Groundwater System							
Net Seepage	43,000	46,000	47,000	48,000	47,000	48,000	49,000
Deep Percolation	53,000	53,000	53,000	51,000	53,000	53,000	51,000
Groundwater Extraction	-9,100	-9,100	-9,300	-9,800	-9,200	-9,500	-9,900
Net Subsurface Flows	-88,000	-90,000	-91,000	-89,000	-91,000	-92,000	-90,000
Horizontal flow from (+)/to (-) Red Bluff Subbasin	-120,000	-120,000	-120,000	-120,000	-130,000	-130,000	-130,000
Horizontal flow from (+)/to (-) Anderson Subbasin	22,000	22,000	22,000	23,000	23,000	23,000	24,000
Horizontal flow from (+)/to (-) South Battle Creek Subbasin	9,400	10,000	10,000	10,000	11,000	11,000	11,000
Annual Groundwater Storage Change	**-1,700**	**-210**	**-240**	**-420**	**-300**	**-340**	**-530**

4.5.3. Los Molinos Subbasin

Table 4-39 provides a summary comparison of the Los Molinos Subbasin water budget results for the different historical and projected conditions evaluated, including by primary aquifer zone. Net seepage increases in the projected scenarios as compared to the historical scenario, indicating greater stream seepage to groundwater. The increases in stream seepage are greatest in the climate change scenarios which correlated with higher surface water inflows occurring under the climate change scenarios. Deep percolation from the SWS to the GWS decreases in the projected scenarios as compared to the historical scenario, and decreases slightly under the climate change scenarios. Net subsurface flows become more negative in the projected scenarios as compared to the historical scenario, indicating greater outflows from the Subbasin. These subsurface outflows become more negative under climate change scenarios. Groundwater pumping decreases slightly in the projected scenarios as compared to the historical scenario, and increases under climate change scenarios. Overall, all historical and projected water budgets suggest decreases in groundwater storage by varying magnitudes.

As presented in **Table 4-39**, groundwater pumping in the Los Molinos Subbasin occurs primarily from the Upper Aquifer and historically averaged about 30 taf per year from the Upper Aquifer; in projected water budget scenarios, average groundwater pumping from the Upper Aquifer is estimated to range between 24 and 27 taf per year, depending on the water budget scenario. In the historical water budget period, groundwater pumping from the Lower Aquifer was estimated to average about 2.7 af per year; under projected water budget scenarios groundwater pumping from the Lower Aquifer is estimated to average between 3.2 and 3.7 af per year, depending on the water budget scenario.

Net subsurface flows in the Subbasin occur primarily from the Upper Aquifer and historically averaged about 57 taf per year of outflow from the Upper Aquifer; in projected water budget scenarios, average net subsurface flows from the Upper Aquifer are estimated to range between 88 and 95 taf per year of outflow, depending on the water budget scenario. All subsurface flows from the Upper Aquifer are outflows from the Los Molinos Subbasin.

In the historical water budget period, net subsurface flows to the Lower Aquifer were estimated to average about 2.7 taf per year of inflows; under projected water budget scenarios net subsurface flows to the Lower Aquifer are estimated to average between 3.2 and 3.7 taf per year of inflows, depending on the water budget scenario. The majority of net subsurface inflows to the Lower Aquifer come from the Antelope Subbasin, Red Bluff Subbasin, and Upper Aquifer. The majority of net subsurface outflows from the Lower Aquifer are to the Corning Subbasin and Vina Subbasin.

The average change in groundwater storage within each of the two primary aquifers in the Subbasin are very minor under all historical and projected water budget scenarios. The water budget results suggest that slight decreases in groundwater storage are projected to occur in the Upper and Lower Aquifers, depending on the projected water budget scenario.

Table 4-39. Comparison of Los Molinos Subbasin GWS Water Budgets (acre-feet)

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)	No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)
Upper Aquifer							
Net Seepage	33,000	59,000	62,000	67,000	63,000	66,000	71,000
Deep Percolation	54,000	52,000	52,000	50,000	51,000	51,000	49,000
Groundwater Extraction	-30,000	-24,000	-25,000	-27,000	-24,000	-25,000	-26,000
Net Subsurface Flows	-57,000	-88,000	-90,000	-91,000	-92,000	-93,000	-95,000
Horizontal flow from (+)/to (-) Antelope Subbasin	-12,000	-9,900	-9,800	-9,200	-8,900	-8,700	-8,100
Horizontal flow from (+)/to (-) Red Bluff Subbasin	-3,200	-2,400	-2,500	-2,500	-2,900	-3,000	-3,000
Horizontal flow from (+)/to (-) Corning Subbasin	-390	-3,200	-3,400	-3,900	-3,500	-3,800	-4,300
Horizontal flow from (+)/to (-) Vina Subbasin	-13,000	-16,000	-16,000	-16,000	-16,000	-16,000	-16,000
Vertical flow from (+)/to (-) Lower Aquifer	-30,000	-58,000	-59,000	-61,000	-62,000	-63,000	-65,000
Annual Groundwater Storage Change	**-1,100**	**-1,100**	**-1,100**	**-1,300**	**-1,200**	**-1,200**	**-1,400**

GWS Water Budget Component	**Historical**	**Projected (Current Land Use)**			**Projected (Future Land Use)**		
		No Climate Adjust-ment	**Climate Change (2030)**	**Climate Change (2070)**	**No Climate Adjust-ment**	**Climate Change (2030)**	**Climate Change (2070)**
Lower Aquifer							
Net Seepage	0	0	0	0	0	0	0
Deep Percolation	0	0	0	0	0	0	0
Groundwater Extraction	-2,700	-3,200	-3,400	-3,700	-3,200	-3,400	-3,700
Net Subsurface Flows	1,300	2,500	2,700	2,800	2,400	2,600	2,700
Horizontal flow from (+)/to (-) Antelope Subbasin	6,900	7,000	7,000	7,100	6,200	6,200	6,200
Horizontal flow from (+)/to (-) Red Bluff Subbasin	5,400	3,300	2,900	2,100	870	320	-620
Horizontal flow from (+)/to (-) Corning Subbasin	840	-4,000	-4,500	-5,400	-5,100	-5,700	-6,700
Horizontal flow from (+)/to (-) Vina Subbasin	-43,000	-62,000	-63,000	-63,000	-62,000	-62,000	-62,000
Vertical flow from (+)/to (-) Upper Aquifer	30,000	58,000	59,000	61,000	62,000	63,000	65,000
Annual Groundwater Storage Change	**-1,400**	**-730**	**-760**	**-860**	**-810**	**-850**	**-960**
Entire Groundwater System							
Net Seepage	33,000	59,000	62,000	67,000	63,000	66,000	71,000
Deep Percolation	54,000	52,000	52,000	50,000	51,000	51,000	49,000
Groundwater Extraction	-33,000	-27,000	-29,000	-31,000	-27,000	-28,000	-30,000
Net Subsurface Flows	-56,000	-86,000	-87,000	-88,000	-89,000	-91,000	-92,000
Horizontal flow from (+)/to (-) Antelope Subbasin	-4,700	-2,900	-2,800	-2,100	-2,600	-2,600	-1,900
Horizontal flow from (+)/to (-) Red Bluff Subbasin	2,200	880	390	-360	-2,000	-2,600	-3,700
Horizontal flow from (+)/to (-) Corning Subbasin	450	-7,100	-7,900	-9,300	-8,700	-9,600	-11,000
Horizontal flow from (+)/to (-) Vina Subbasin	-56,000	-79,000	-79,000	-79,000	-78,000	-78,000	-78,000
Annual Groundwater Storage Change	**-2,500**	**-1,800**	**-1,900**	**-2,100**	**-2,000**	**-2,100**	**-2,300**

4.5.4. Red Bluff Subbasin

Table 4-40 provides a summary comparison of the Red Bluff Subbasin water budget results for the different historical and projected conditions evaluated, including by primary aquifer zone. Net seepage becomes less negative in the projected scenarios as compared to the historical scenario, indicating less groundwater discharge to streams. The decreases in groundwater discharge to streams are greatest in the climate change scenarios which correlated with higher surface water inflows occurring under the climate change scenarios. Deep percolation from the SWS to the GWS decreases between the historical and projected scenarios, and decreases slightly under the climate change scenarios. Net subsurface flows increase in the projected scenarios as compared to the historical scenario, indicating greater inflows to the Subbasin. These subsurface inflows increase under climate change scenarios. Groundwater pumping increases in the projected scenarios as compared to the historical scenario, and increases under climate change scenarios. Overall, all historical and projected water budgets suggest decreases in groundwater storage by varying magnitudes.

As presented in **Table 4-40**, groundwater pumping in the Red Bluff Subbasin occurs primarily from the Upper Aquifer and historically averaged about 78 taf per year from the Upper Aquifer; in projected water budget scenarios, average groundwater pumping from the Upper Aquifer is estimated to range between 84 and 130 taf per year, depending on the water budget scenario. In the historical water budget period, groundwater pumping from the Lower Aquifer was estimated to average about 12 af per year; under projected water budget scenarios groundwater pumping from the Lower Aquifer is estimated to average between 16 and 21 af per year, depending on the water budget scenario.

Net subsurface flows in the Subbasin occur primarily from the Upper Aquifer and historically averaged about 43 taf per year of inflow from the Upper Aquifer; in projected water budget scenarios, average net subsurface flows from the Upper Aquifer are estimated to range between 39 and 62 taf per year of inflow, depending on the water budget scenario. The majority of net subsurface inflows to the Upper Aquifer come from the Bowman Subbasin, Los Molinos Subbasin, South Battle Creek Subbasin, and the Lower Aquifer. The majority of net subsurface outflows from the Upper Aquifer are to the Corning Subbasin and to the Bend Subbasin. Net subsurface flows from the Antelope Subbasin were historically outflows to the Upper Aquifer, but shift to inflows in the projected (future land use) scenarios.

In the historical water budget period, net subsurface flows to the Lower Aquifer were estimated to average about 5.3 taf per year of inflows; under projected water budget scenarios net subsurface flows to the Lower Aquifer are estimated to average between 15 and 18 taf per year of inflows, depending on the water budget scenario. The majority of net subsurface inflows to the Lower Aquifer come from the Bowman Subbasin and South Battle Creek Subbasin. The majority of net subsurface outflows from the Lower Aquifer are to the Antelope Subbasin, Los Molinos Subbasin, Corning Subbasin, and Bend Subbasin, and Upper Aquifer.

The average change in groundwater storage within each of the two primary aquifers in the Subbasin are very minor under all historical and projected water budget scenarios. The water budget results suggest that slight decreases in groundwater storage are projected to occur in the Upper and Lower Aquifers, depending on the projected water budget scenario.

Table 4-40. Comparison of Red Bluff Subbasin GWS Water Budgets (acre-feet)

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)	No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)
Upper Aquifer							
Net Seepage	-39,000	-21,000	-18,000	-12,000	-9,300	-6,000	830
Deep Percolation	70,000	67,000	67,000	64,000	68,000	68,000	66,000
Groundwater Extraction	-78,000	-84,000	-88,000	-93,000	-120,000	-120,000	-130,000
Net Subsurface Flows	43,000	39,000	39,000	40,000	58,000	59,000	62,000
Horizontal flow from (+)/to (-) Antelope Subbasin	-3,500	-1,200	-980	-430	2,500	2,900	3,700
Horizontal flow from (+)/to (-) Bowman Subbasin	10,000	11,000	11,000	11,000	11,000	11,000	11,000
Horizontal flow from (+)/to (-) Los Molinos Subbasin	3,200	2,400	2,500	2,500	2,900	3,000	3,000
Horizontal flow from (+)/to (-) Corning Subbasin	-4,700	-5,800	-5,900	-5,900	-4,300	-4,300	-4,200
Horizontal flow from (+)/to (-) Bend Subbasin	-3,900	-3,700	-3,700	-3,700	-3,500	-3,500	-3,400
Horizontal flow from (+)/to (-) South Battle Creek Subbasin	660	670	670	660	670	670	660
Vertical flow from (+)/to (-) Lower Aquifer	41,000	35,000	35,000	36,000	48,000	49,000	51,000
Annual Groundwater Storage Change	**-3,500**	**-510**	**-560**	**-750**	**-740**	**-810**	**-1,000**
Lower Aquifer							
Net Seepage	0	0	0	0	0	0	0
Deep Percolation	0	0	0	0	0	0	0
Groundwater Extraction	-12,000	-16,000	-17,000	-18,000	-19,000	-20,000	-21,000
Net Subsurface Flows	5,300	15,000	15,000	16,000	16,000	17,000	18,000
Horizontal flow from (+)/to (-) Antelope Subbasin	-22,000	-17,000	-16,000	-15,000	-10,000	-9,700	-8,100

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjustment	Climate Change (2030)	Climate Change (2070)	No Climate Adjustment	Climate Change (2030)	Climate Change (2070)
Horizontal flow from (+)/to (-) Bowman Subbasin	110,000	110,000	110,000	110,000	110,000	110,000	110,000
Horizontal flow from (+)/to (-) Los Molinos Subbasin	-5,400	-3,300	-2,900	-2,100	-870	-320	620
Horizontal flow from (+)/to (-) Corning Subbasin	-23,000	-30,000	-30,000	-31,000	-27,000	-27,000	-27,000
Horizontal flow from (+)/to (-) Bend Subbasin	-14,000	-14,000	-14,000	-13,000	-13,000	-13,000	-13,000
Horizontal flow from (+)/to (-) South Battle Creek Subbasin	850	860	860	860	860	870	860
Vertical flow from (+)/to (-) Upper Aquifer	-41,000	-35,000	-35,000	-36,000	-48,000	-49,000	-51,000
Annual Groundwater Storage Change	**-7,100**	**-1,300**	**-1,400**	**-1,700**	**-2,100**	**-2,200**	**-2,600**
Entire Groundwater System							
Net Seepage	-39,000	-21,000	-18,000	-12,000	-9,300	-6,000	830
Deep Percolation	70,000	67,000	67,000	64,000	68,000	68,000	66,000
Groundwater Extraction	-90,000	-100,000	-100,000	-110,000	-140,000	-140,000	-150,000
Net Subsurface Flows	49,000	53,000	54,000	56,000	74,000	77,000	80,000
Horizontal flow from (+)/to (-) Antelope Subbasin	-25,000	-18,000	-17,000	-15,000	-8,000	-6,800	-4,400
Horizontal flow from (+)/to (-) Bowman Subbasin	120,000	120,000	120,000	120,000	130,000	130,000	130,000
Horizontal flow from (+)/to (-) Los Molinos Subbasin	-2,200	-880	-390	360	2,000	2,600	3,700
Horizontal flow from (+)/to (-) Corning Subbasin	-28,000	-36,000	-36,000	-37,000	-31,000	-31,000	-31,000
Horizontal flow from (+)/to (-) Bend Subbasin	-18,000	-17,000	-17,000	-17,000	-16,000	-16,000	-16,000

GWS Water Budget Component	Historical	Projected (Current Land Use)			Projected (Future Land Use)		
		No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)	No Climate Adjust-ment	Climate Change (2030)	Climate Change (2070)
Horizontal flow from (+)/to (-) South Battle Creek Subbasin	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Annual Groundwater Storage Change	**-11,000**	**-1,800**	**-1,900**	**-2,400**	**-2,900**	**-3,000**	**-3,600**

4.6. Modeled Groundwater Levels

A number of wells were selected to evaluate simulated groundwater elevations within Tehama IHM. Wells with constructions data and a long period of record were selected to provide good horizontal and vertical spatial representation and to represent various aquifer parameter zones. Hydrographs of simulated groundwater elevations are presented in **Appendix E**. In general, water levels in the projected (current land use) and projected (future land use) scenarios follow the same trends as the historical scenario. In the climate change scenarios, water levels begin showing slight declines over the projected period. Maps of historical simulated groundwater elevation for key time periods are presented in **Appendix F**.

4.7. Modeled Streamflows

A number of stream nodes were selected to evaluate simulated streamflows within Tehama IHM. These nodes represent flows through Antelope Creek Group, Cottonwood Creek , Deer Creek Group, Dye Creek, Elder Creek, Mill Creek, Red Bank Creek, Sacramento River, and Thomes Creek. Hydrographs of historical simulated streamflows are presented in **Appendix G**. In general, average monthly flows in the projected (current land use) and projected (future land use) scenarios are slightly increased in the winter and spring months and relatively unchanged in the summer and fall months. In general, average monthly flows in the winter months are significantly increased during the winter months under climate change scenarios. Flows are decreased slightly in the spring to early summer months and are relatively unchanged in the late summer through fall months under climate change scenarios.

4.8. Model Calibration Results

Model calibration was achieved through comparison of observed groundwater levels and measured stream flows to model results. Observations used to constrain aquifer parameter values included approximately 7,900 groundwater level observations from 93 wells. Observations used to constrain stream bed parameters included approximately 3,900 stream flow measurements from 12 gage stations.

Calibration quality quantifies the ability of the groundwater model to simulate observed groundwater levels. These results are evaluated with respect to fit statistics outlined by Anderson and Woessner (2002). More qualitative measures of model fit are also commonly used to evaluate model calibration quality and included in the model results.

4.8.1. Statistical Measures of Model Fit

Model calibration was evaluated through five common residual error statistics used to characterize model fit. These include the mean of residual error (ME), mean of absolute residual error (MAE), root mean of squared residual error ($RMSE$), Normalized RMSE ($NRMSE$), and linear correlation coefficient (R). The residual error here is calculated by subtracting the observed value from the simulated value at a specific physical location and time.

The mean of residual error (ME) is a measure of the general model tendency to overestimate (+) or underestimate (-) measured values. In general, it is a quantification of the model bias given by:

$$ME = \frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{y}_i)$$

Where: N is the total number of observations

y_i is the ith observed value

$\hat{y}_i$ is the ith simulated value of a model dependent variable

The mean absolute residual errors (MAE) is more robust to represent the goodness of fit as no individual errors will be canceled in the estimation as ME. The MAE estimates the average magnitude of the error between modeled and observed values and is defined as:

$$MAE = \frac{1}{N}\sum_{i=1}^{N}|(y_i - \hat{y}_i)|$$

The root mean of squared residual error ($RMSE$) is defined as the square root of the second moment of the differences between observed and simulated error. Since the error between each observed and simulated value is squared, larger errors tend to have a greater impact on the value of the $RMSE$, therefore RMSE is generally more sensitive to outliers than the MAE.

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{y}_i)^{2}}$$

The normalized root mean squared error ($NRMSE$) is calculated to account for the scale dependency of the $RMSE$ and is a measure of the $RMSE$ divided by the range of observations (Anderson and Woessner, 2002).

The linear correlation coefficient (R) is defined in the following equations:

$$R = \frac{COV(y, \hat{y})}{\sigma_y . \sigma_{\hat{y}}}$$

Where: $COV(y, \hat{y}_i)$ is the covariance between the observed (y) and simulated ($\hat{y}$) values

σ_y is the standard deviation of the observed values

$\sigma_{\hat{y}}$ is the standard deviation of the simulated values

The value of R lies between 1 (perfect linear correlation) and -1 (perfect linear correlation in the opposite direction). Usually, simulated and observed quantity is plotted in a scatter diagram to represent the model calibration results graphically with associated linear correlation coefficient R.

There are no uniform calibration standards used to determine an acceptable calibration of a groundwater flow model (Anderson and Woessner, 2002; Anderson et al., 2015). Summary statistics, such as those discussed in this section, should be used to evaluate the fit of simulated values to observed data and to minimize the error between these values (Murray-Darling Basin Commission, 2001; ASTM, 2008). For the purposes of calibrating Tehama IHM, calibration targets were set to minimize the model error to within 10% of the range of observed values.

4.8.2. Groundwater Level Calibration

A subset of the approximately 2,400 wells that have observed groundwater levels in the study area was selected for model calibration. Wells were selected to provide a broad representation of the model domain based on the spatial distribution, availability of associated well construction information, depth zone of well completion, and period of record of available water level data. A total of 93 wells were selected to be used in calibration of Tehama IHM with a total of 7,913 water level observations during the calibration period. Simulated and observed groundwater elevations were compared over the 1990 through 2018 calibration period. To summarize calibration results, a single model layer was selected to compare to observed water levels. In some cases, a well is constructed across multiple model layers, or no construction details were available to determine where the well was screened. In these cases, a single model layer was chosen for each well based on a qualitative review of the hydrograph.

Groundwater level calibration statistics are presented in **Table 4-41**. As stated in **Section 4.7.1**, the calibration targets for Tehama IHM were set to minimize the model error to within 10% of the range of observed values. Observed groundwater level measurements used for calibration range from 44 to 499 feet, therefore an acceptable *RMSE* for Tehama IHM would be 45 feet.

The final calibrated *RMSE* was 21.6 feet, resulting in a *NRMSE* of 5%, well within acceptable limits. The calculated *MAE* is 13.6 ft, a small value when compared to the range of observed groundwater levels in the model domain (**Figure 4-1**). The calculated *ME* (-0.97 ft) indicates that the model tends to simulate slightly lower groundwater levels than observed (under-predict) by an average of about 1 foot. The relation between observed and simulated groundwater elevations is shown by layer in **Figure 4-2**. Points plotting above 1-to-1 correlation line represent observations where Tehama IHM is simulating higher than observed groundwater elevations, while points plotting below the 1-to-1 correlation line represent observations where Tehama IHM simulating lower than observed groundwater elevations. In general, while points are plotting close to the 1-to-1 correlation line (R = 0.98), the model tends to under simulate water levels at higher observed groundwater elevations. Groundwater hydrographs of simulated and observed groundwater elevations used for model calibration are included in **Appendix H.**

Table 4-41. Groundwater Level Calibration Statistics

Calibration Statistic	Result	Target
Mean of Residual Error (ME)	-0.97 feet	-
Mean Absolute Residual Error (MAE)	13.6 feet	-
Root Mean of Squared Residual Error (RMSE)	21.6 feet	45 feet
Normalized Root Mean of Squared Residual Error (NRMSE)	5%	10%
Linear Correlation Coefficient (R)	0.98	1

The spatial distribution of residual errors in the simulated levels are presented in **Figure 4-3**. Tehama IHM is generally well calibrated. Residuals tend to be randomly distributed, indicating no clear bias in the model. The spatial distribution of residual errors in the simulated levels by layer are presented in **Figure 4-4**. Residuals are randomly distributed by layer, indicating no clear vertical bias in the model.

4.8.3. Streamflow Calibration

Observed stream flow was compared to simulated stream flow at 12 locations. Observed stream flow data were available from the California Data Exchange Center (CDEC) and the USGS. Hydrographs of observed versus simulated stream flows are available in **Appendix I**. In general, simulated stream flows generally match observed stream flows, where data are available. Streambed parameters were adjusted during the calibration process. The final streambed conductance values, by node, are shown in **Figure 4-5.**

4.9. Aquifer Parameters

Initial aquifer parameter values assigned to each aquifer parameter zone were based on reported literature values. These values were further refined and adjusted during the calibration process. Final calibrated values for each of the parameter zones are presented in **Table 4-42**. These parameter values were applied to the percent coarse textural model to generate aquifer parameter values for each model node in each model layer.

Table 4-42. Summary of Tehama IHM Calibrated Aquifer Parameters

		Horizontal Hydraulic Conductivity (feet/day)	Vertical Hydraulic Conductivity (feet/day)	Specific Yield (-)	Specific Storage (feet^{-1})	Anisotropy Ratio (Kv/Kh)
Percent Coarse End Member Values	Fine	5	-	0.01	1.00E-04	0.25
	Coarse	550	-	0.2	1.00E-06	
Zone Multipliers	Alluvium	1	1	1	1	
	Tuscan Formation	0.6	0.75	0.6	0.6	
	Tehama Formation	0.35	0.15	0.25	0.25	
	Non-Tuscan/Non-Tehama Zone	0.5	0.4	0.5	0.5	

NOTE: Power law empirical parameter for KH (pKh) = 1.00; for KV (pKv) = -0.62

4.9.1. Hydraulic Conductivity

The calibrated horizontal hydraulic conductivity (Kh) values range from 3.66 feet per day (ft/d) in layer 4 to 446.45 ft/d in layer 2 (**Table 4-43**). The final Kh values in the calibrated model area shown by model layer in **Figures 4-6** through **4-14**. Calibrated vertical hydraulic conductivity (Kv) values range from 0.19 ft/d in layer 4 to 13.02 ft/d in layer 2 (**Table 4-43**). The Kv values in the calibrated model are shown by model layer in **Figures 4-15** through **4-23**.

Table 4-43. Summary of Tehama IHM Calibrated Hydraulic Conductivity

	Horizontal Hydraulic Conductivity (feet/day)			Vertical Hydraulic Conductivity (feet/day)		
Model Layer	Minimum	Maximum	Average	Minimum	Maximum	Average
1	13.20	419.20	159.43	0.21	9.67	2.22
2	5.57	446.45	130.07	0.19	13.02	1.99
3	9.38	222.09	79.01	0.20	4.74	1.02
4	3.66	166.50	75.63	0.19	2.63	0.89
5	11.29	199.20	66.32	0.20	3.62	0.82
6	11.29	199.20	61.01	0.20	3.62	0.77
7	15.10	225.36	84.07	0.21	4.94	1.07
8	24.64	228.63	73.27	0.23	5.16	0.90
9	9.38	107.64	39.00	0.20	1.68	0.62
Total	**3.66**	**446.45**	**85.31**	**0.19**	**13.02**	**1.14**

4.9.2. Storage Coefficients

Final calibrated specific yield (Sy) values range from 0.003 in layers 2 and 4 to 0.164 in layer 2 (**Table 4-44**). The final Sy values in the calibrated model area shown by model layer in **Figures 4-24** through **4-32**. Calibrated specific storage (Ss) values range from 6.69E-06 ft^{-1} in layer 2 to 9.70E-05 ft^{-1} in layer 2 (**Table 4-44**). The Ss values in the calibrated model are shown by model layer in **Figures 4-33** through **4-41**.

Table 4-44. Summary of Tehama IHM Calibrated Storage Coefficients

	Specific Yield (-)			Specific Storage (feet^{-1})		
Model Layer	**Minimum**	**Maximum**	**Average**	**Minimum**	**Maximum**	**Average**
1	0.005	0.154	0.059	7.68E-06	9.21E-05	3.67E-05
2	0.003	0.164	0.049	6.69E-06	9.70E-05	4.19E-05
3	0.004	0.082	0.029	8.42E-06	5.41E-05	2.69E-05
4	0.003	0.063	0.027	1.02E-05	5.47E-05	2.77E-05
5	0.005	0.074	0.024	1.39E-05	5.64E-05	2.92E-05
6	0.005	0.074	0.022	1.44E-05	5.64E-05	3.01E-05
7	0.006	0.084	0.030	1.04E-05	5.52E-05	2.62E-05
8	0.008	0.085	0.026	9.41E-06	4.87E-05	2.82E-05
9	0.004	0.042	0.015	1.71E-05	5.70E-05	3.40E-05
Total	**0.003**	**0.164**	**0.031**	**6.69E-06**	**9.70E-05**	**3.12E-05**

5. SENSITIVITY ANALYSIS AND MODEL UNCERTAINTY

5.1. Sensitivity Analysis

A model response or prediction depends on the governing equations it solves, the mechanisms and structure of the model, and the values of the model parameters. Sensitivity analysis is a means of evaluating model uncertainty due to parameter estimates by systematically altering one of the model parameters and examining the associated change in the model response. After the groundwater flow model was calibrated, a quantitative sensitivity analysis was performed using the flow model parameters that were most uncertain and likely to affect the flow simulation results. The calibrated flow model was used as the baseline simulation and sensitivity simulations were compared with those of the baseline simulation at all observation points. Model sensitivity was evaluated for model parameters using UCODE-2014. The basis of a model parameters sensitivity was based on groundwater elevation observations given a 1% parameter value perturbation. Sensitivity was evaluated through the Composite Scaled Sensitivity (CSS) statistic described by Hill and Tiedman (2007).

Sensitivity of simulated groundwater elevations to parameter perturbation are presented in **Figure 5-1**. The CSS statistic shows the model is most sensitive to the Horizontal Hydraulic Conductivity of Coarse Materials (KHC) parameter within the aquifer system defined in **Table 4-43**.

5.2. Model Uncertainty and Limitations

All groundwater flow models are a simplification of the natural environment, and therefore have uncertainty and limitations that are important to recognize. For this reason, uncertainty exists in the ability of any numerical model to completely represent groundwater flow. Some of the uncertainty is associated with limitations in available data. Considerable effort was made to reduce model uncertainty by using measured values as model inputs whenever available, and by conducting quality assurance and quality control assessments of data that were obtained. Where limited data exist to develop input values for parameters or other inputs with high uncertainty, a conservative approach to assigning input values was followed.

Uncertainty associated with water budget results estimated using the Tehama IHM depends in part on the model inputs relating to the surface water system with additional sources of uncertainty associated with model inputs relating to the groundwater system, including aquifer and streambed properties, specification of boundary conditions, and other factors. The uncertainty estimates associated with surface water system water budget components that are also inputs or outputs of the groundwater system water budget are noted in **Section 2.3 of the GSPs**. Recognizing the uncertainty of the surface water system water budget components, the overall uncertainty of other water budget components simulated for the groundwater system, including subsurface flows, groundwater discharging to surface water, and change in groundwater storage are estimated to be in the range of 10 to 30 percent. These groundwater system water budget components are subject to slightly higher uncertainty as they incorporate uncertainty in the surface water system water inflows and outflows with additional uncertainty resulting from limitations in available input data and simplification required in modeling of the subsurface heterogeneity. However, the uncertainty in the groundwater system water budget derived from a numerical model such as the Tehama IHM depends to a considerable degree on the calibration of the model and can vary by location and depth within the Subbasin. The Tehama IHM is a product of local refinement and improvements made to the SVSim model. The Tehama IHM simulates the integrated groundwater and surface water systems and metrics relating to the calibration of the model indicate the model is reasonably well calibrated in accordance with generally accepted professional guidelines and is sufficient for GSP-related applications.

The finding and conclusions of this study are focused on a Subbasin scale and use of the model for site-specific analysis should be conducted with an understanding that representation of local site-specific conditions may be approximate and should be verified with local site-specific investigations. The flow model was developed in a manner consistent with the level of care and skill normally exercised by professionals practicing under similar conditions in the area. There is no warranty, expressed or implied, that this modeling study has considered or addresses all hydrogeological, hydrological, environmental, geotechnical, or other characteristics and properties associated with the subject model domain and the simulated system.

6. CONCLUSIONS

Based on the calibration of Tehama IHM using historical conditions over the calibration period from water year 1990 to 2018 and accompanying assessment of model sensitivity, the Tehama IHM groundwater flow model is suitable for use as a tool for analyses to support development and implementation of the Tehama County Subbasins' GSP and other water resource management interests within the Tehama County Subbasins.

Tehama IHM provides a useful tool for evaluating a wide variety of future scenarios and inform the decision-making process to achieve and maintain sustainable groundwater management in the Tehama County subbasins. A numerical model can be a convenient and cost-efficient tool for providing insights into groundwater responses to various perturbations including natural variability and change, and also changes associated with management decisions or other humanmade conditions. However, as with any other modeling tool, information obtained from a numerical model also has a level of uncertainty, especially for long-term predictions or forecasts. The level of uncertainty associated with model simulations likely increases the more the scenarios extend beyond the range of historical conditions and processes over which the model was calibrated, such as for long-term predictive scenarios or predictive scenarios with extreme alterations to the hydrologic conditions.

Future and ongoing updates to Tehama IHM will be valuable for improving the model performance and evaluating the accuracy of the model predictions. Using data from the ongoing historical monitoring efforts and forthcoming GSP monitoring, Tehama IHM should be updated periodically, including through extending of the model period and associated inputs. Although the frequency of conducting model updates may depend on a variety of factors, including evaluation of the model performance in predicting future conditions, trends in projected hydrology, and intended model applications, such an update could initially be considered every five years. This frequency of model update should be adequate and cost effective to test and improve Tehama IHM periodically with new site-specific and monitoring information. In accordance with monitoring and reporting requirements associated with the GSP, high-quality groundwater elevation, pumping, surface water deliveries, ET, and stream discharge data will especially benefit the future improvement of the model. New groundwater observation data should be compared with simulated model results to assess the performance of the model in predictive applications. If the differences between the measured groundwater data and Tehama IHM's predicted results are significant, adjustment and modification may be applied to the model input parameters.

Further refinement to Tehama IHM should be made by addressing key data gaps. Upon release of a calibrated SVSim model, an evaluation should be done to consider the benefits of incorporating any relevant aspects from the calibrated SVSim into the Tehama IHM. Through upcoming GSP-related monitoring, additional groundwater level data can be used to refine boundary condition water levels and improve model calibration. Additional improvements to model calibration can be made by the potential linking of additional well construction information to calibration wells, incorporation of additional stream flow data on ungaged streams, and refinements to the simulation of surface water distribution systems. Further refinements to Tehama IHM can be made by keeping the historical model simulations current through periodic updating of the model and review of model calibration in preparation for 5-year GSP update reports. Additional model revisions should be conducted in areas outside the Tehama County Subbasins as such data are obtained from adjacent Subbasins and determined to be beneficial in the evaluation of conditions within the Tehama County Subbasins.

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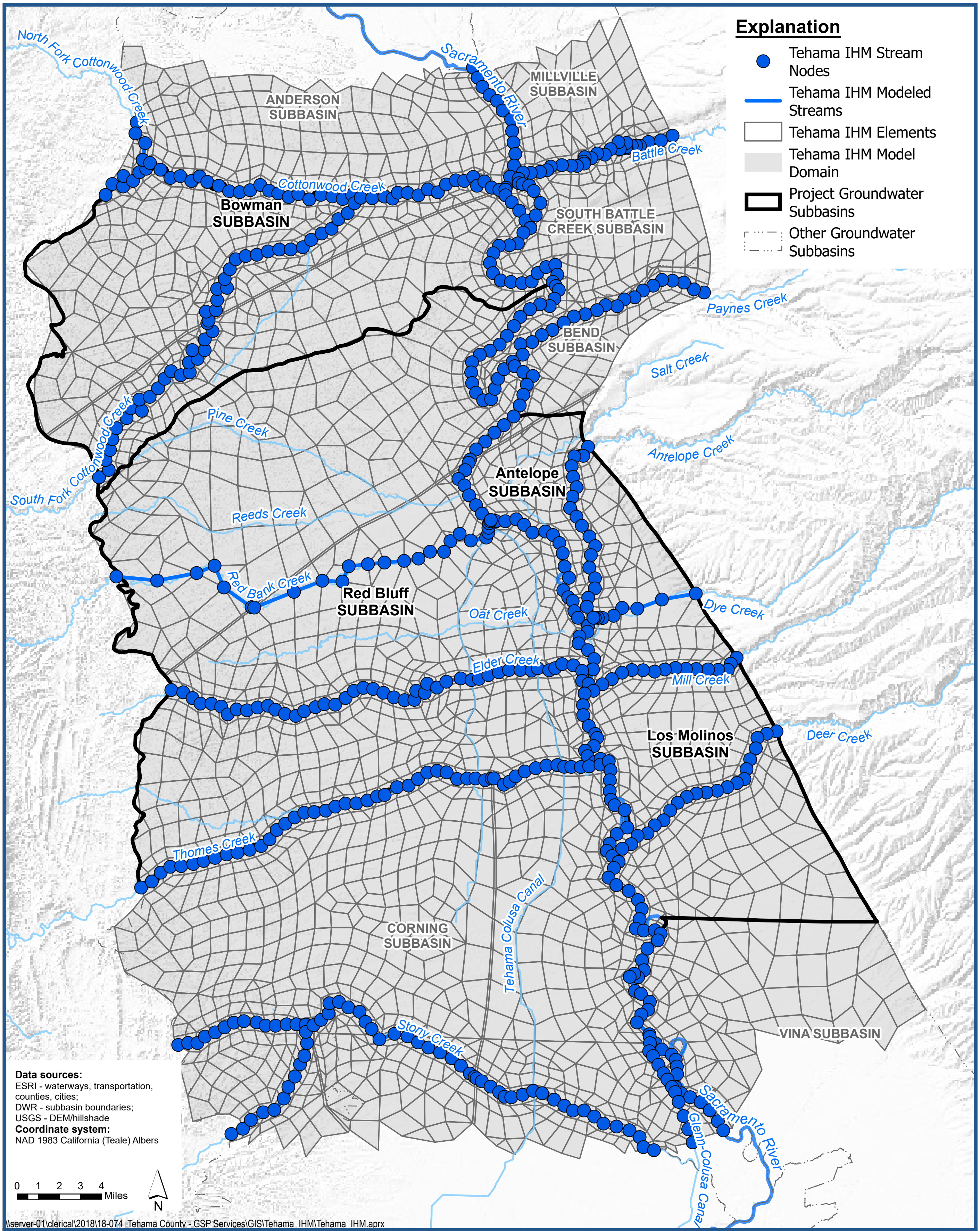

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Tehama Integrated Hydrologic Model (IHM) Domain

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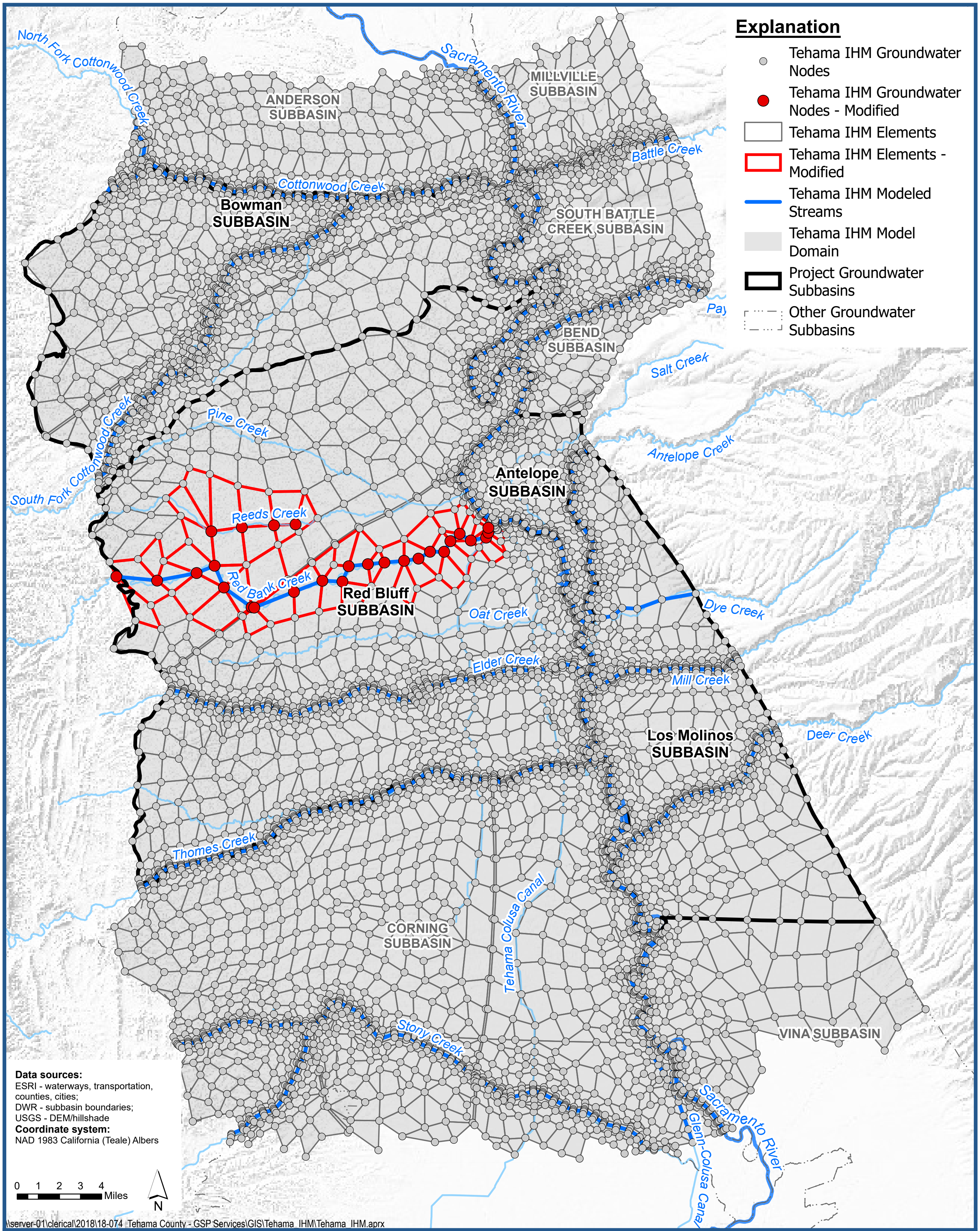
Figure 3-1



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Modified Nodes and Elements in Tehama IHM

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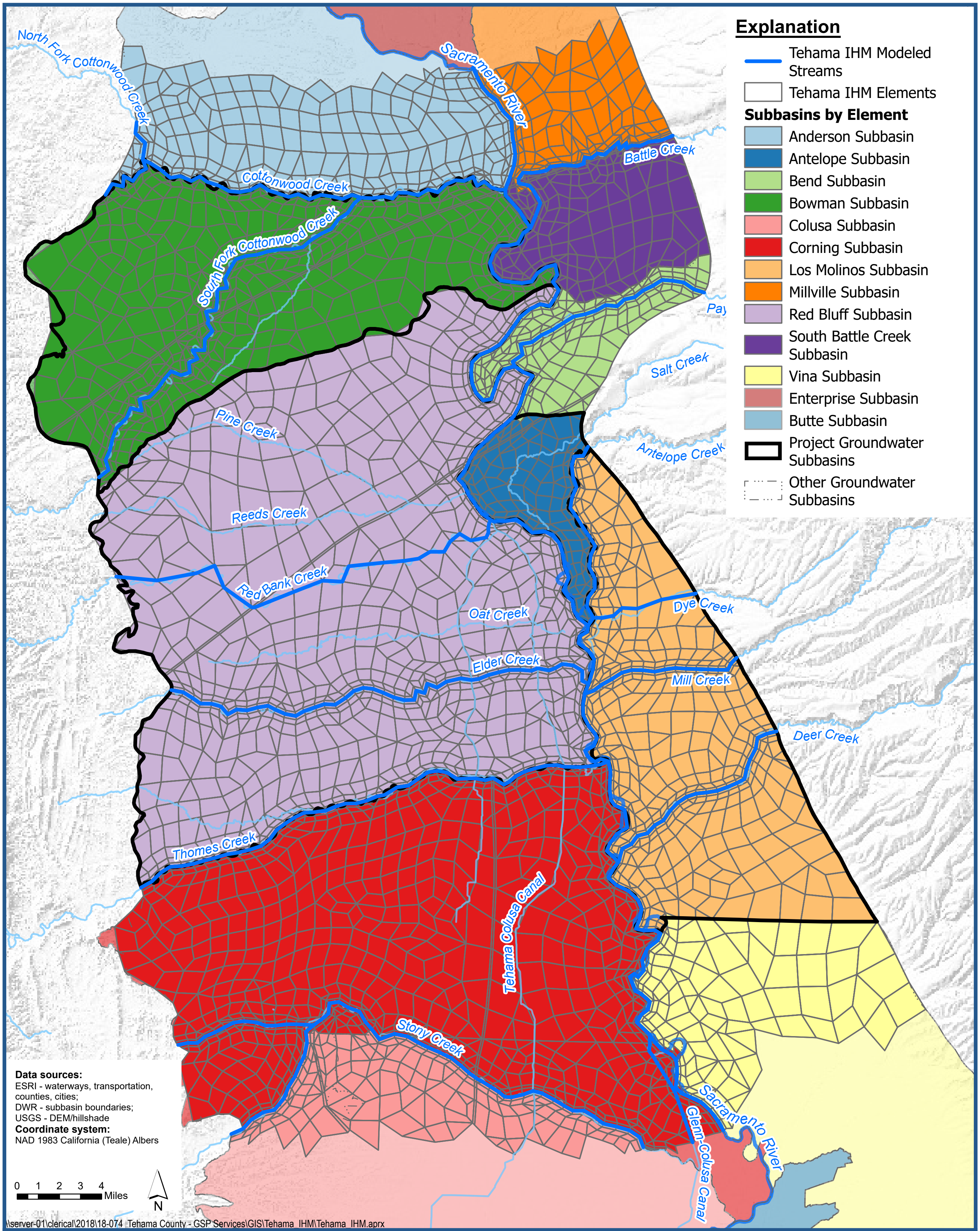
Figure 3-2



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Model Subregions within Tehama IHM

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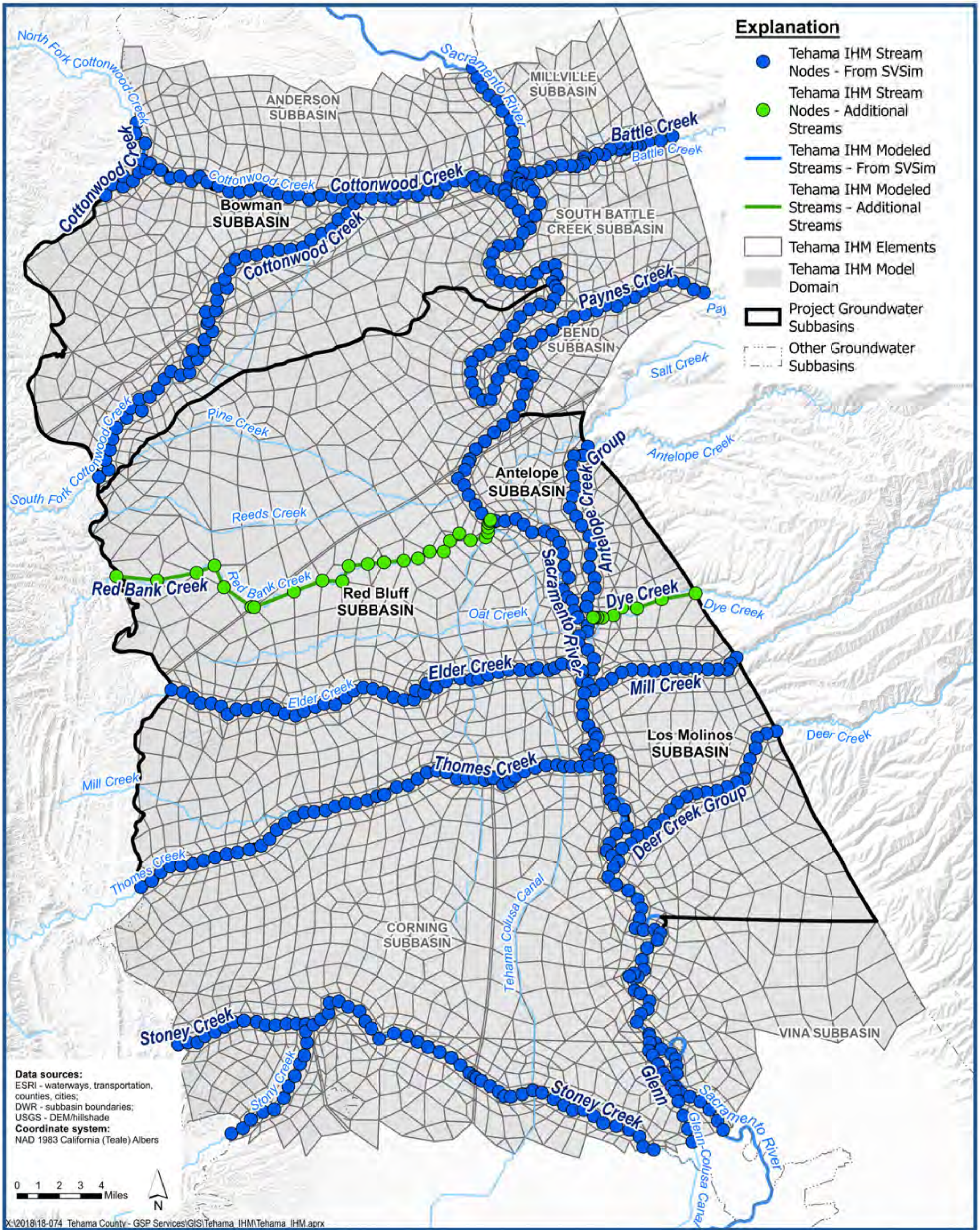
Figure 3-3



Explanation

- ● Tehama IHM Stream Nodes - From SVSim
- ● Tehama IHM Stream Nodes - Additional Streams
- — Tehama IHM Modeled Streams - From SVSim
- — Tehama IHM Modeled Streams - Additional Streams
- ☐ Tehama IHM Elements
- ▨ Tehama IHM Model Domain
- ☐ Project Groundwater Subbasins
- ⬚ Other Groundwater Subbasins

Data sources:
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Tehama IHM Stream Network

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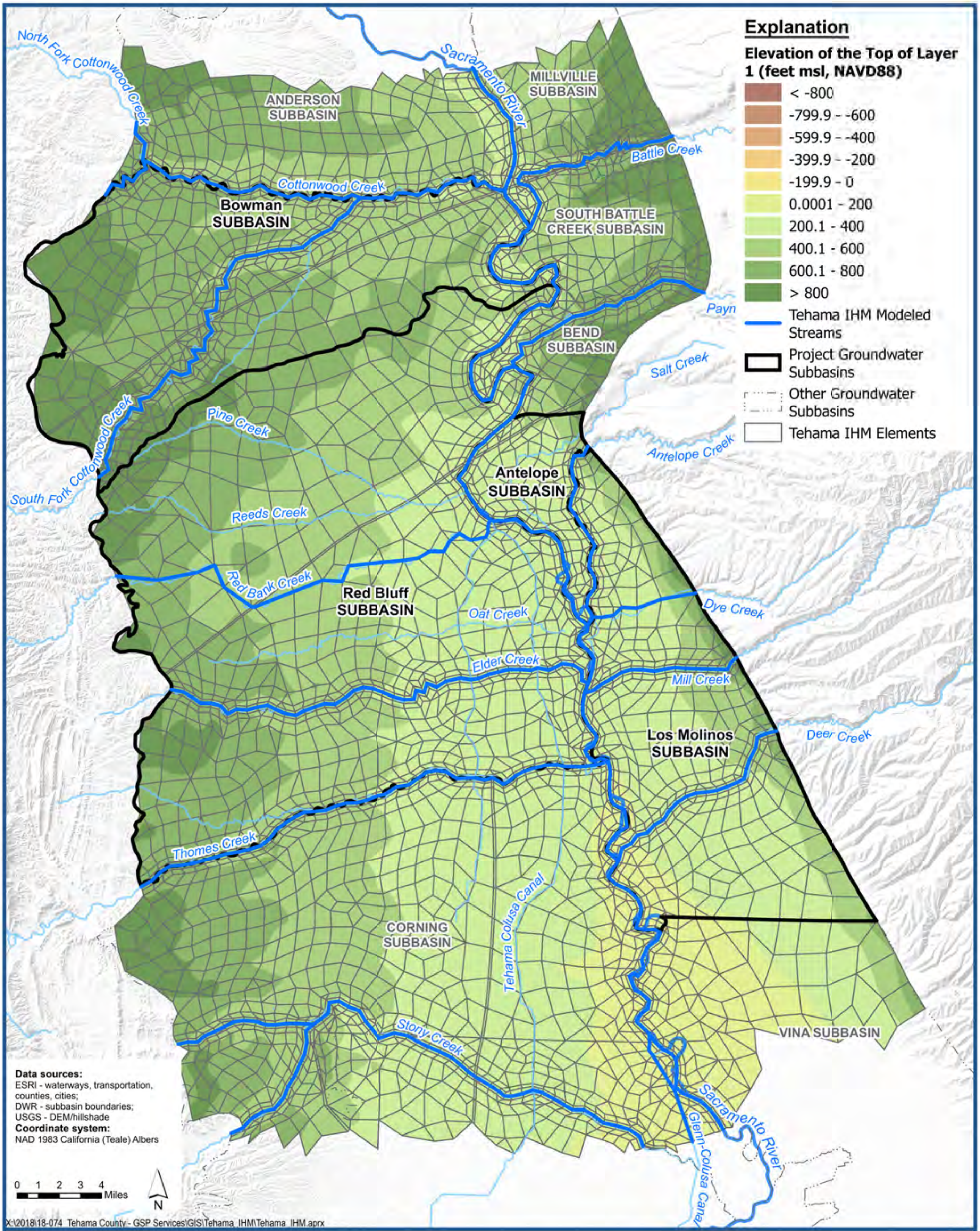
Figure 3-4



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Elevation of the Top of Layer 1 in Tehama IHM

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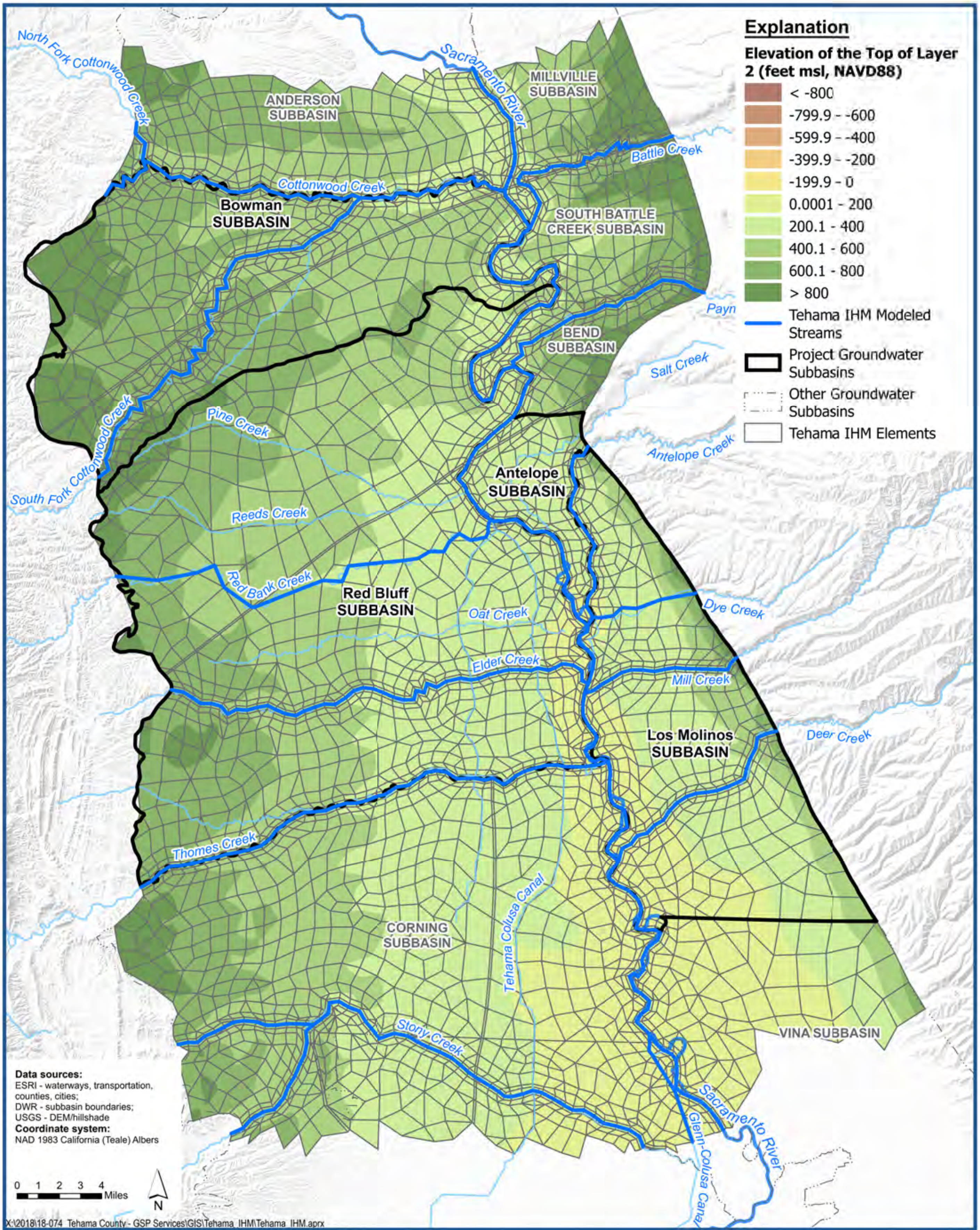
Figure 3-5



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Elevation of the Top of Layer 2 in Tehama IHM

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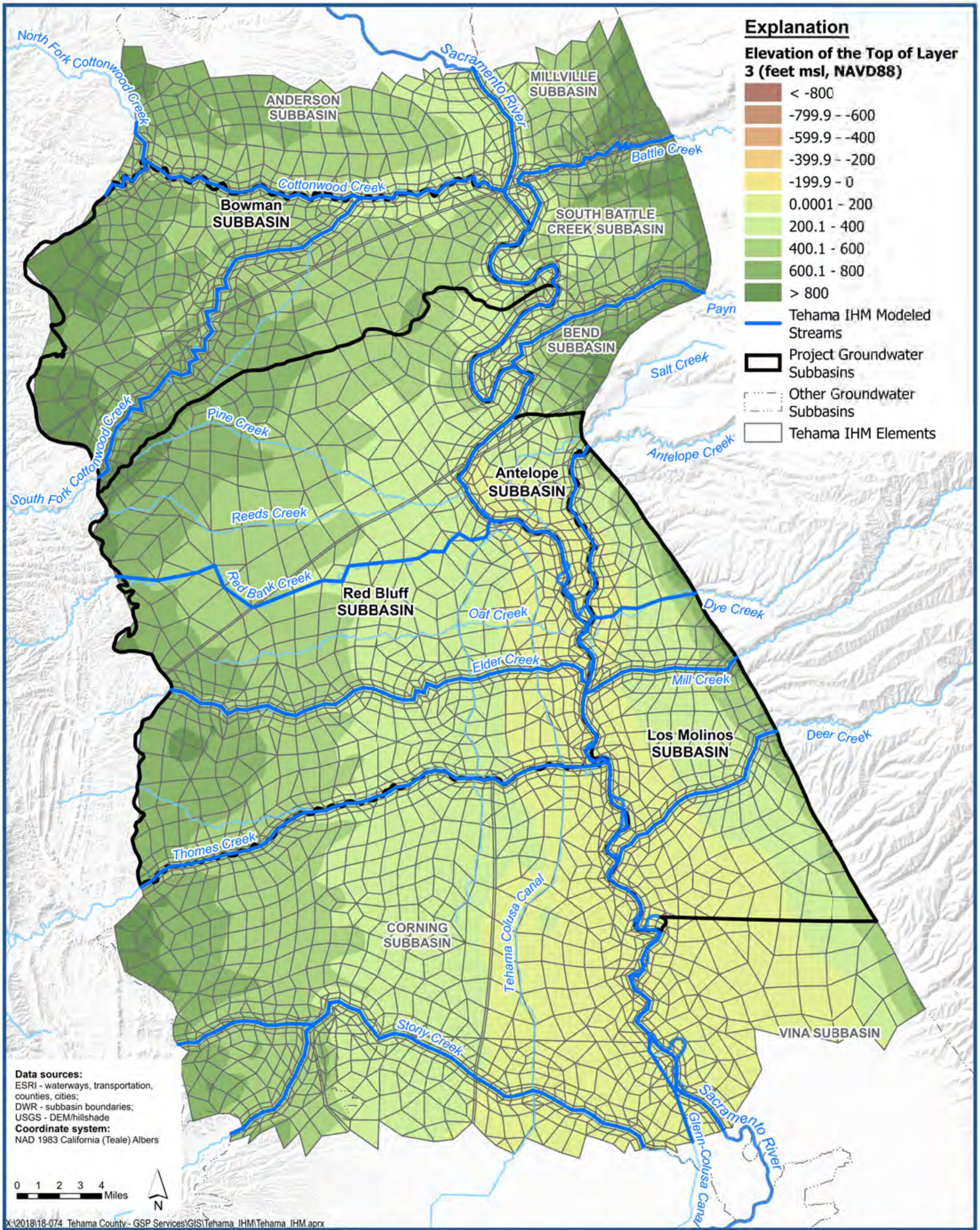
Figure 3-6



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Elevation of the Top of Layer 3 in Tehama IHM

Figure 3-7

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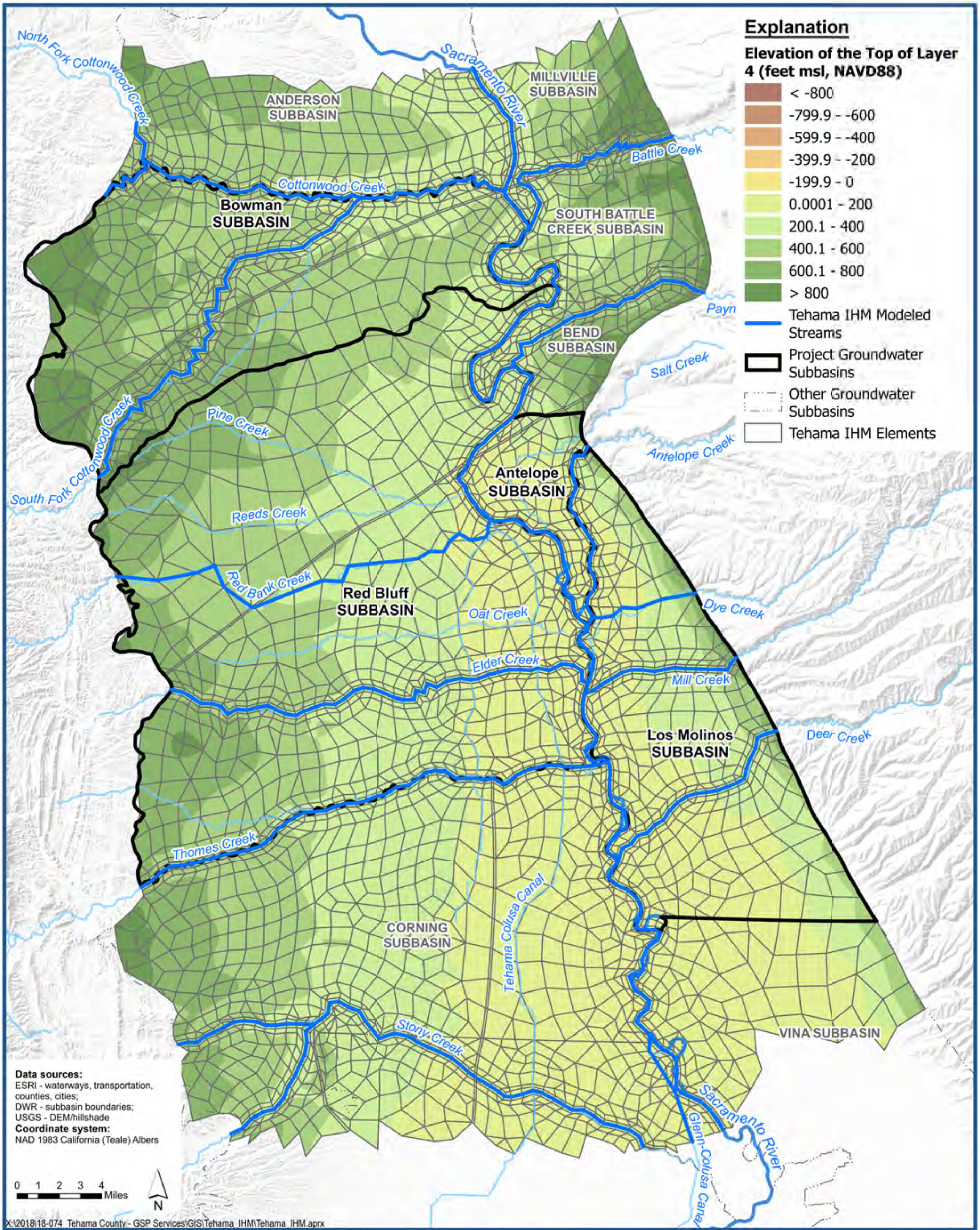

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Elevation of the Top of Layer 4 in Tehama IHM

Figure 3-8

Groundwater Sustainability Planning
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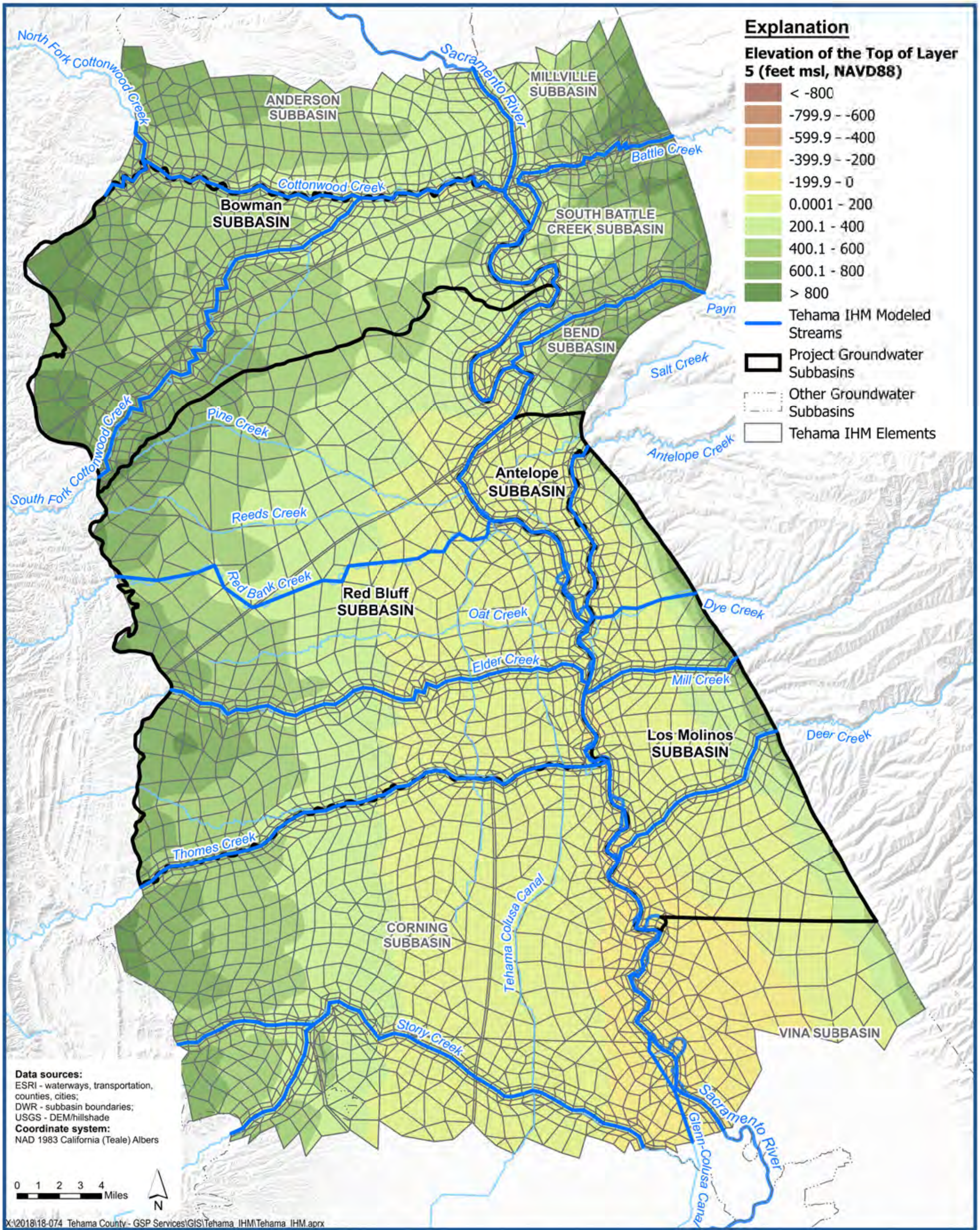

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Elevation of the Top of Layer 5 in Tehama IHM

Figure 3-9

Groundwater Sustainability Planning
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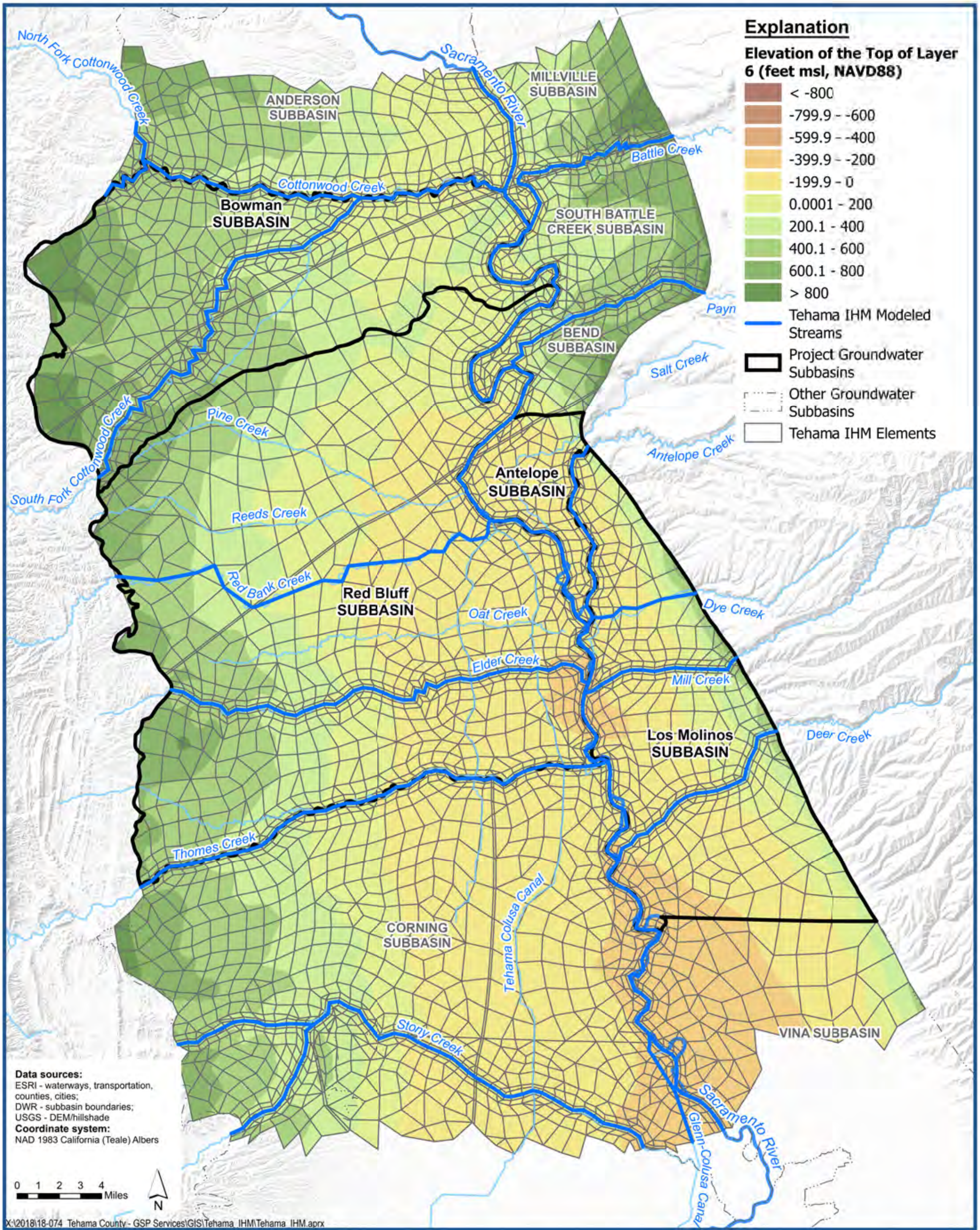

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Elevation of the Top of Layer 6 in Tehama IHM

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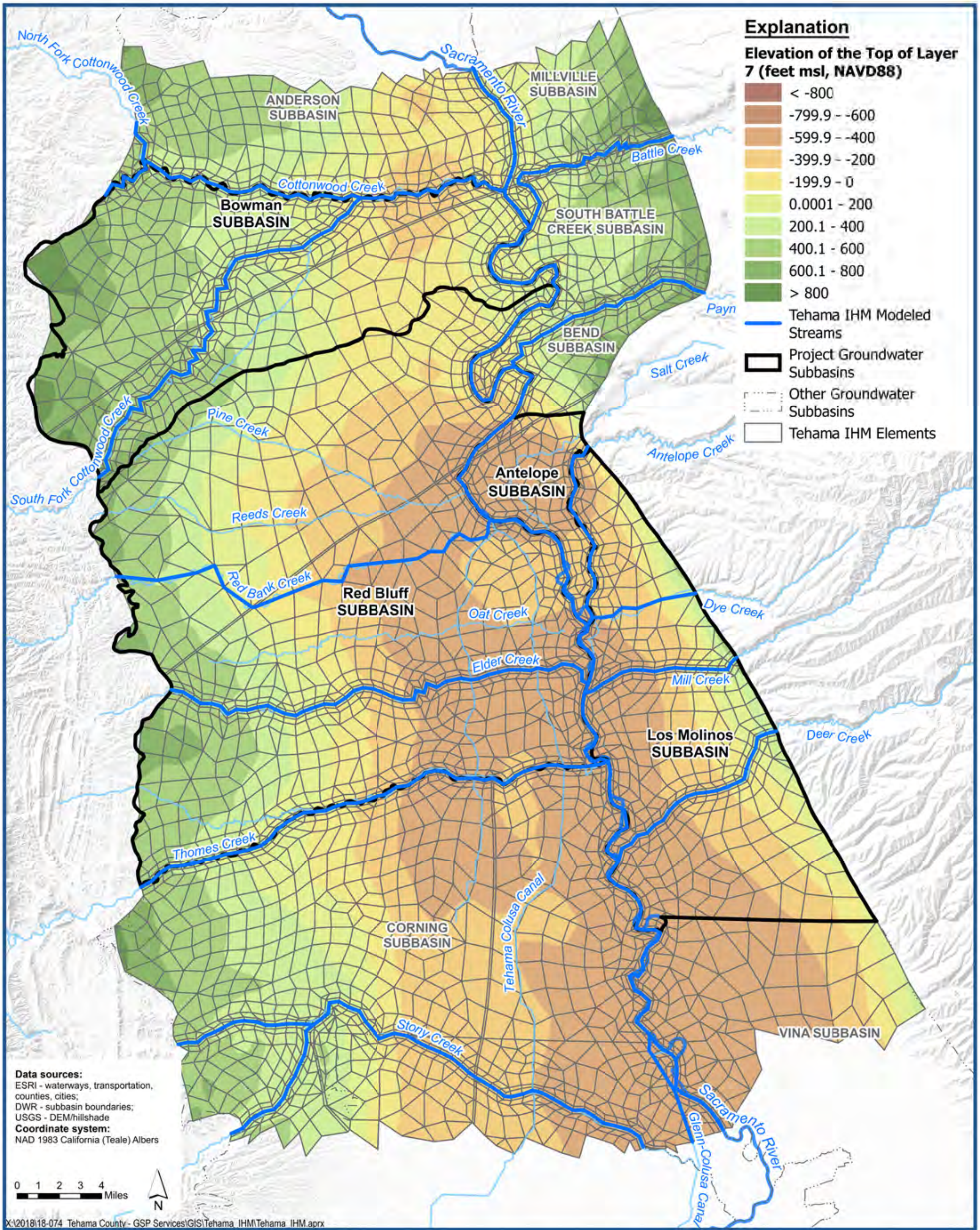
Figure 3-10



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DWR - subbasin boundaries;
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Coordinate system:
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TEHAMA COUNTY

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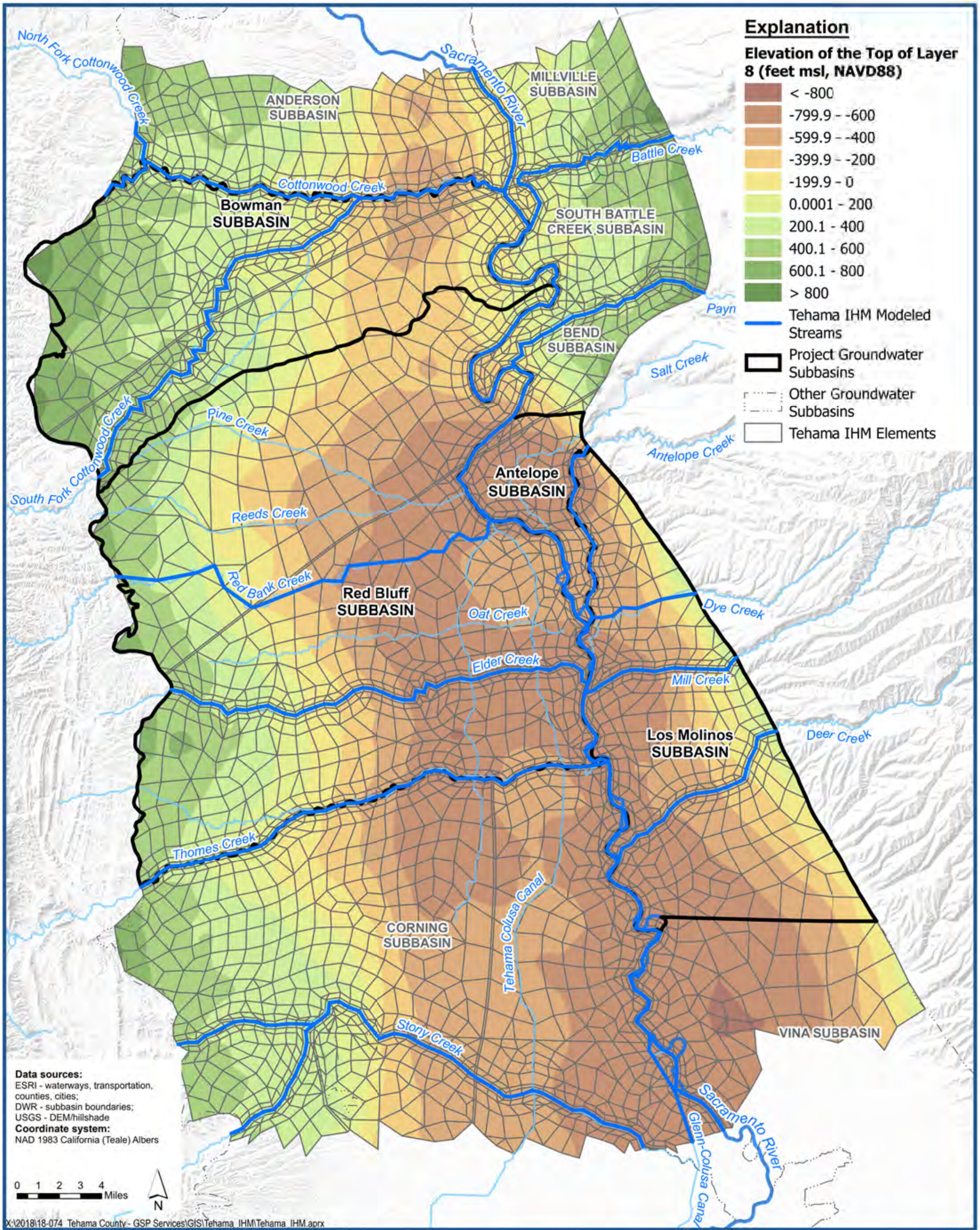
Elevation of the Top of Layer 7 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-11



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY

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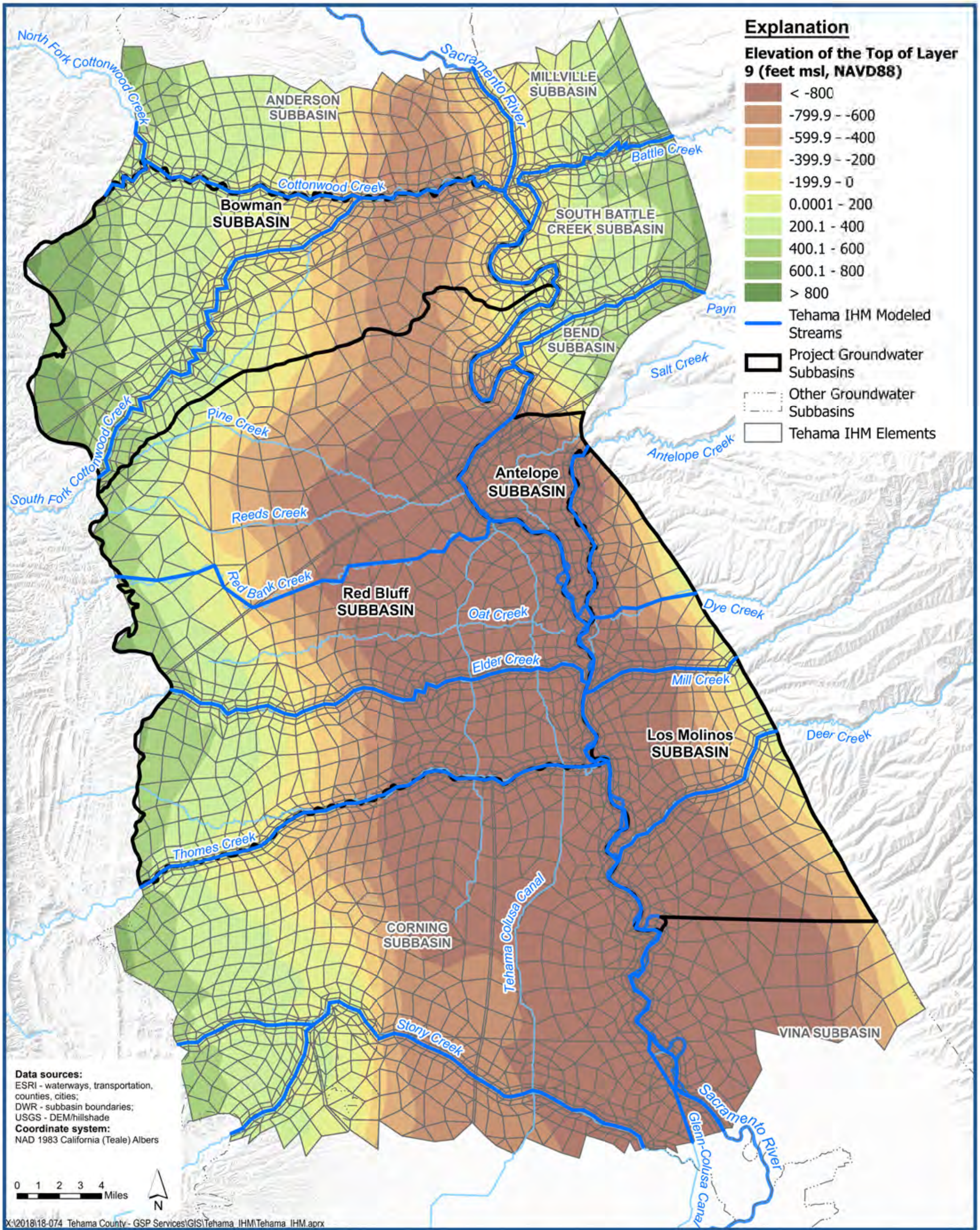
Elevation of the Top of Layer 8 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-12



Data sources:
ESRI - waterways, transportation, counties, cities;
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USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY

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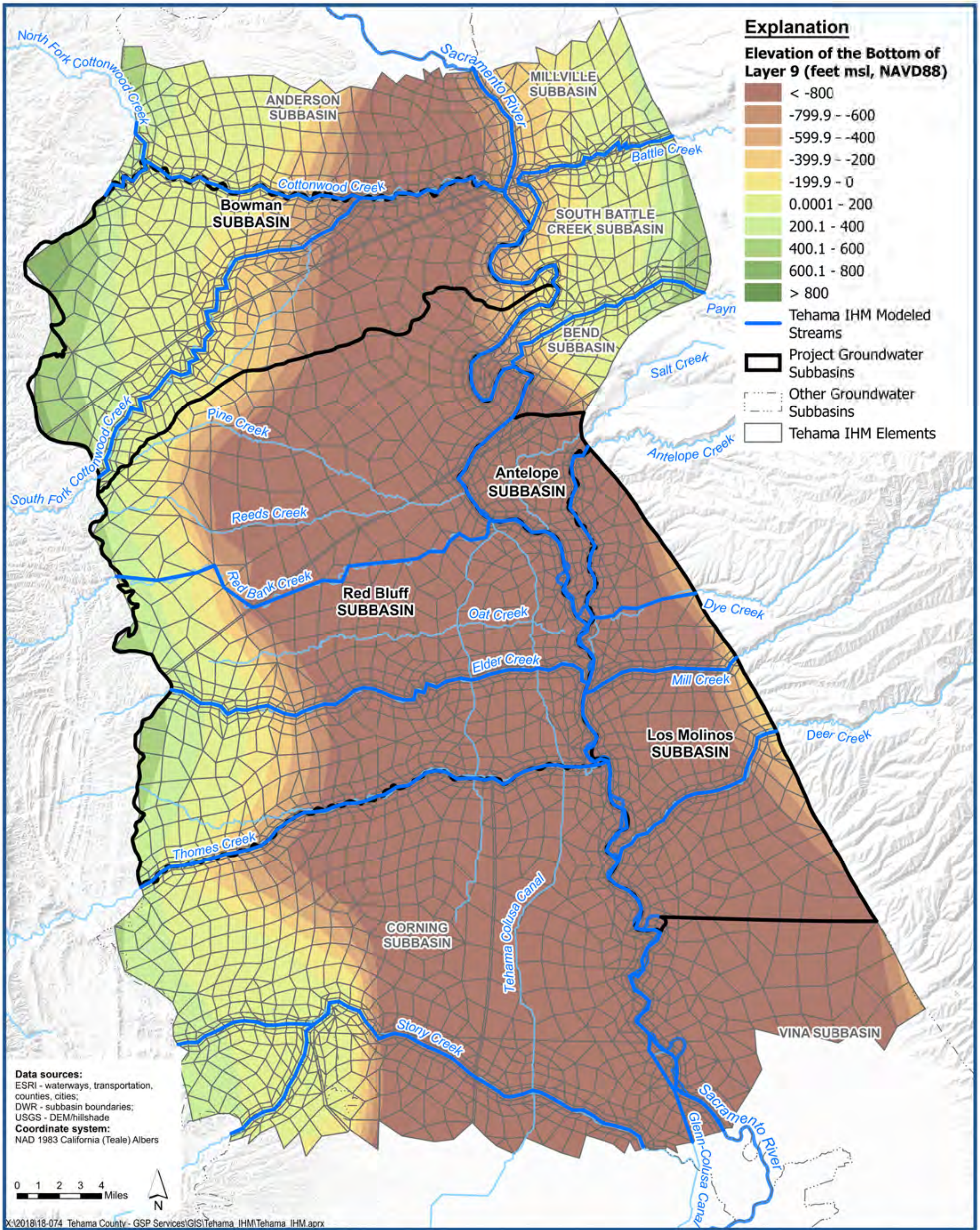
Elevation of the Top of Layer 9 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-13



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY

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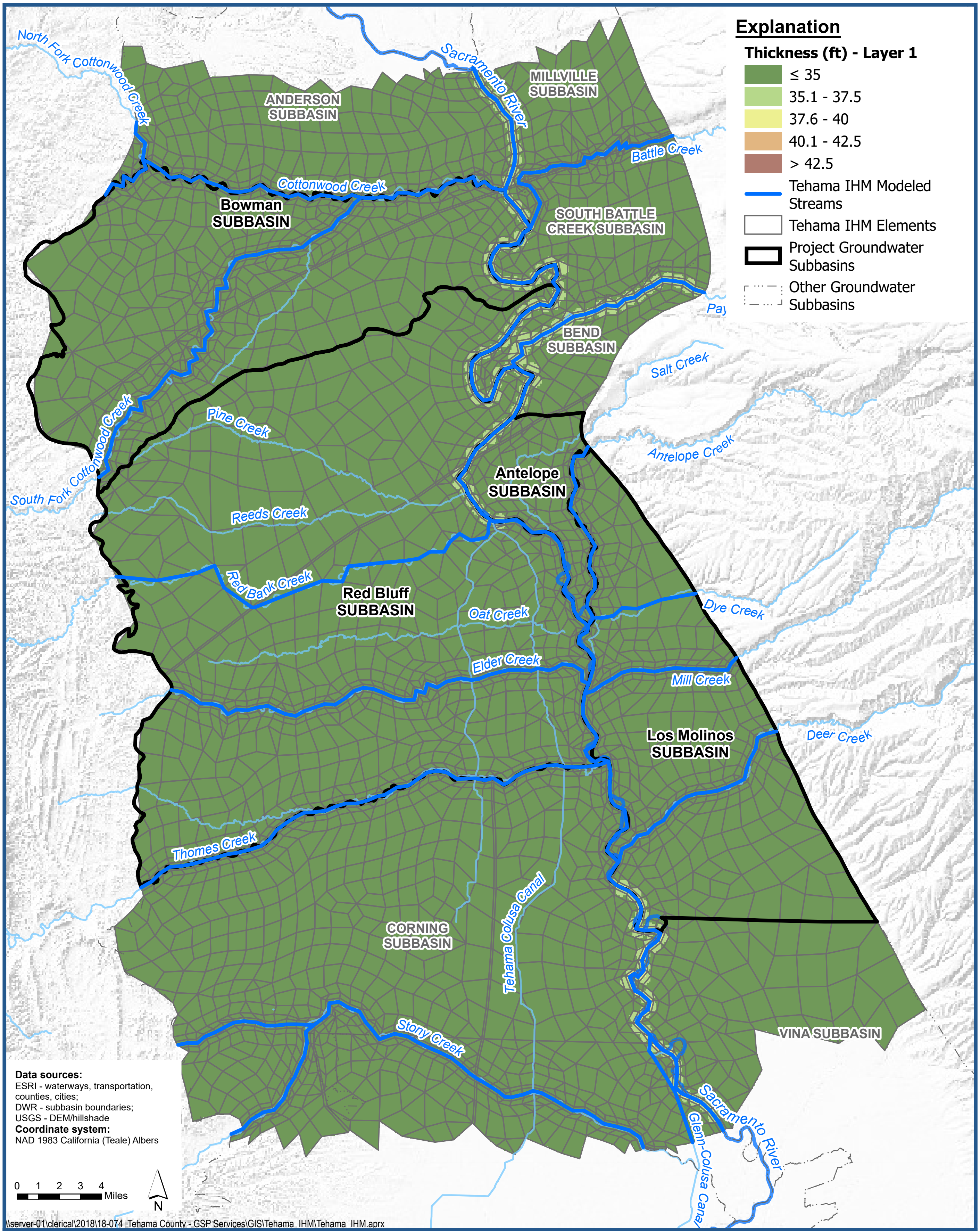
Elevation of the Bottom of Layer 9 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-14



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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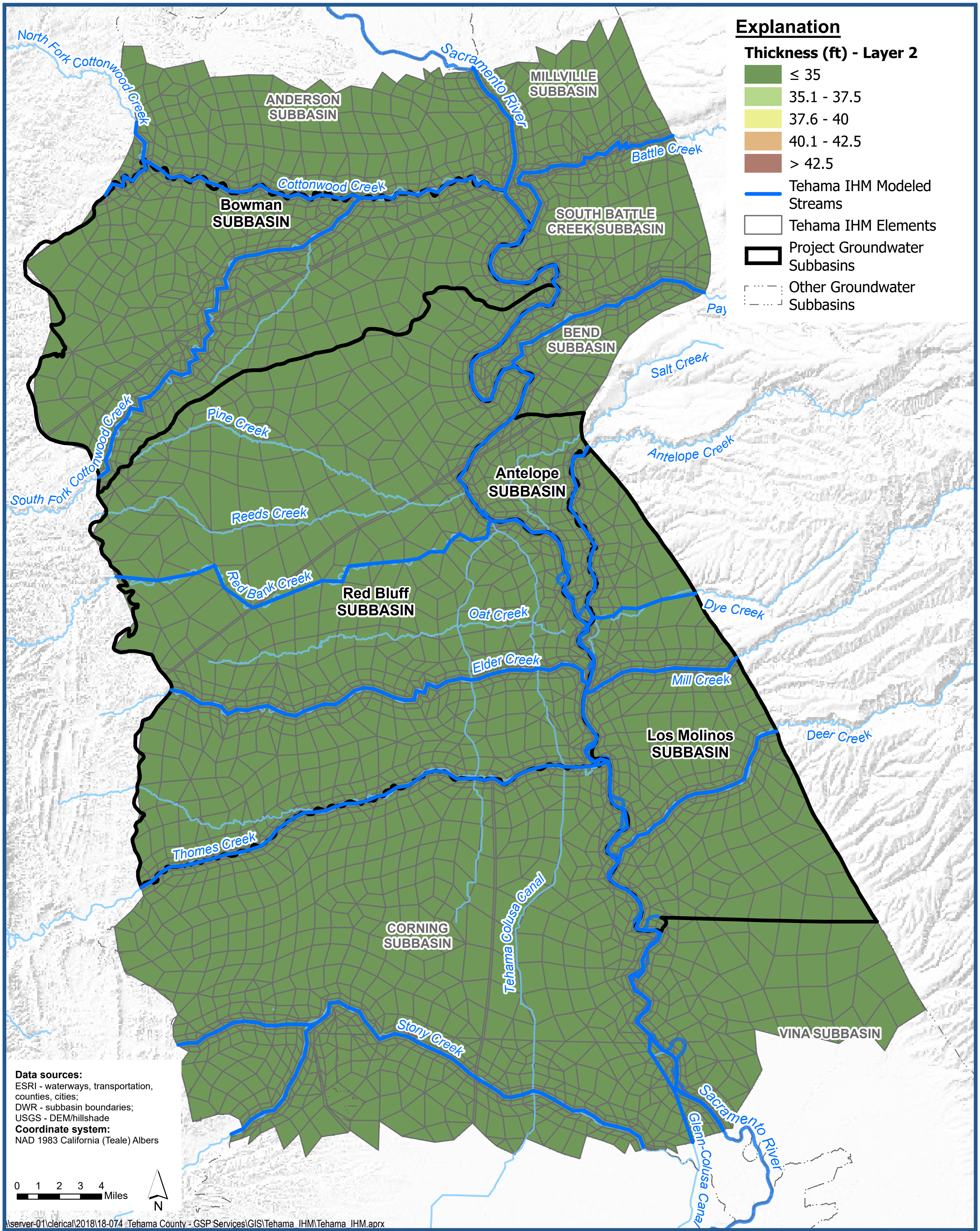
Thickness of Layer 1 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-15



Data sources:
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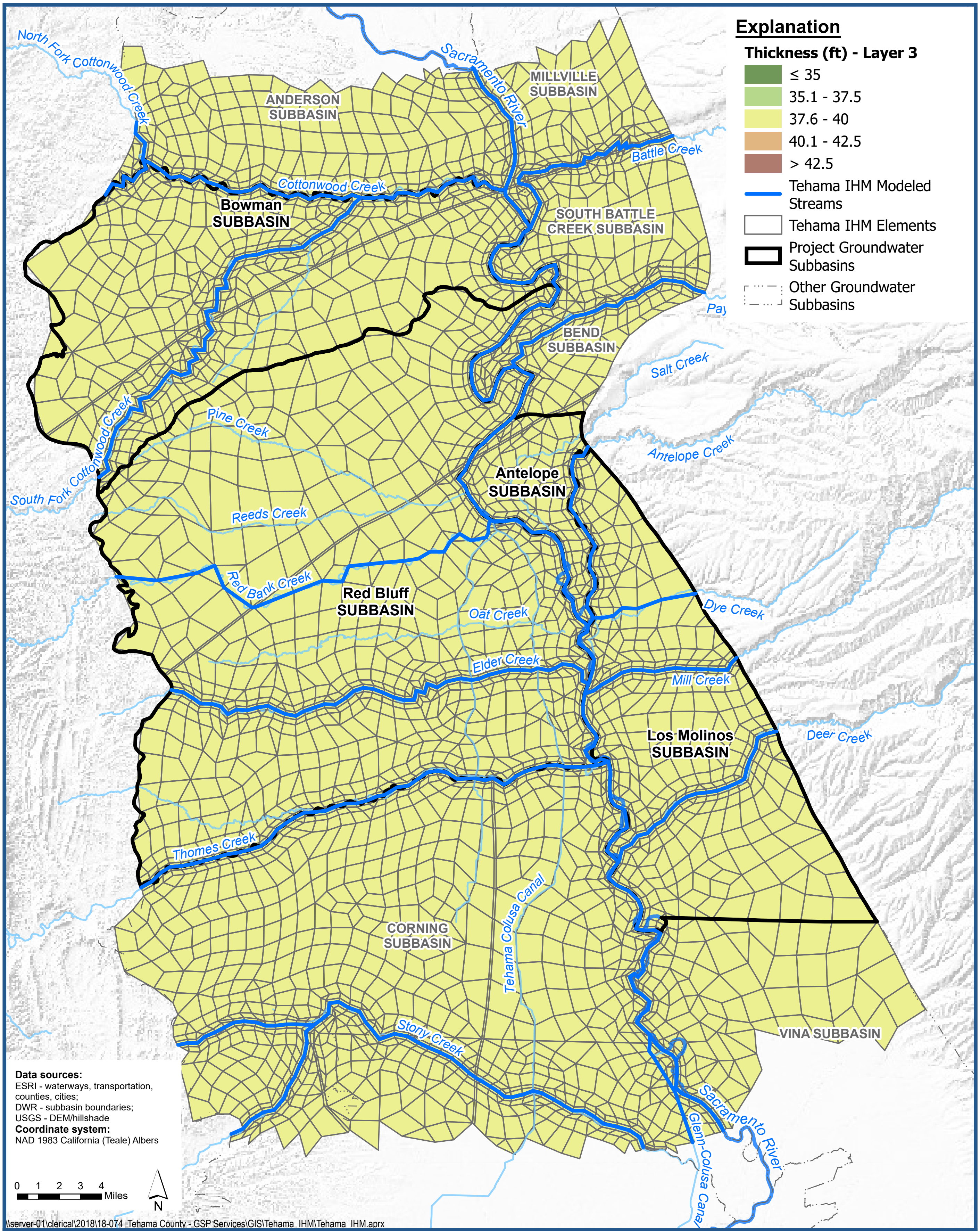
Thickness of Layer 2 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-16



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DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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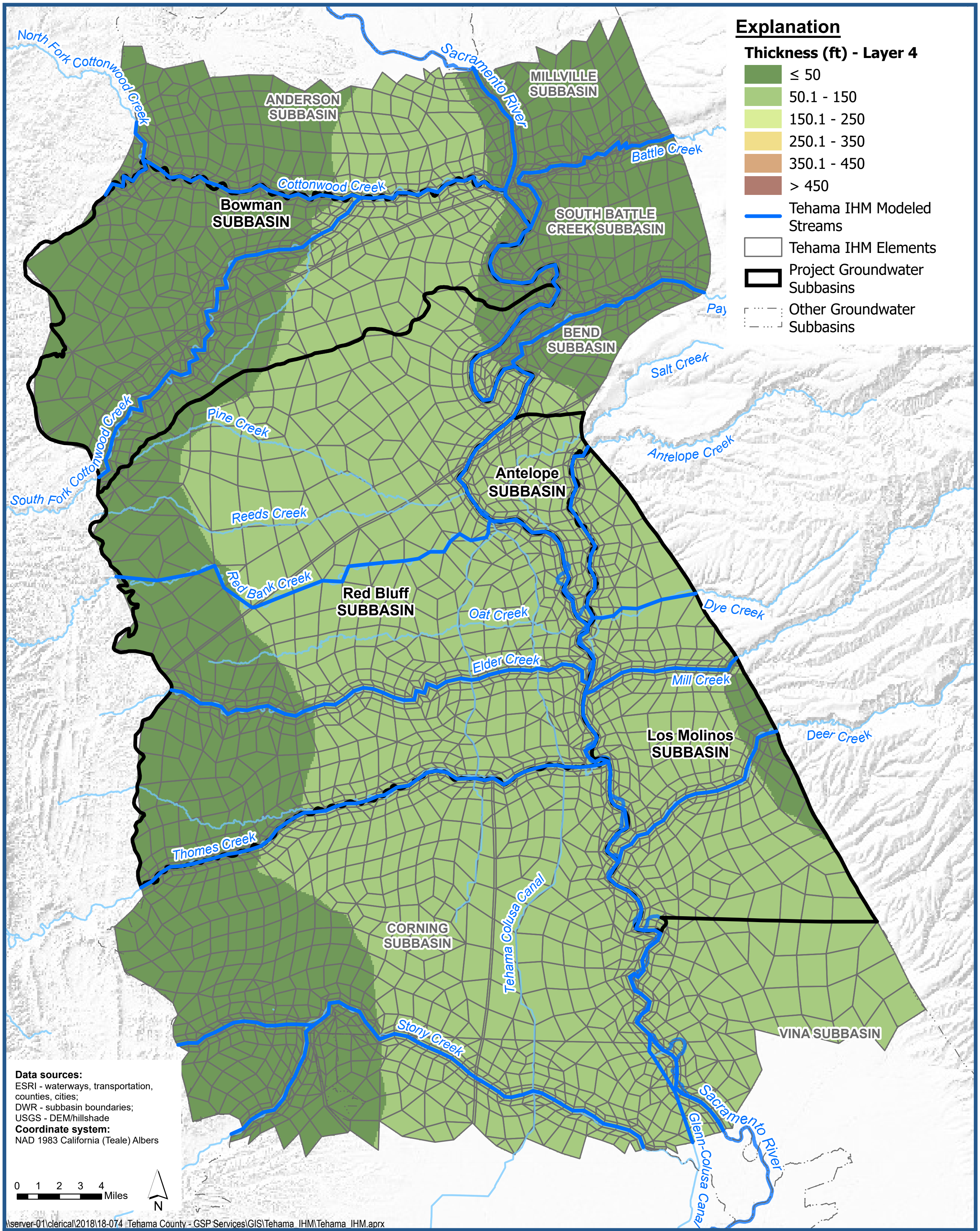
Thickness of Layer 3 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-17



Explanation

Thickness (ft) - Layer 4

- 🟩 ≤ 50
- 🟩 50.1 - 150
- 🟨 150.1 - 250
- 🟨 250.1 - 350
- 🟧 350.1 - 450
- 🟫 > 450
- Tehama IHM Modeled Streams
- ☐ Tehama IHM Elements
- ☐ Project Groundwater Subbasins
- ☐ Other Groundwater Subbasins

Data sources:
ESRI - waterways, transportation, counties, cities;
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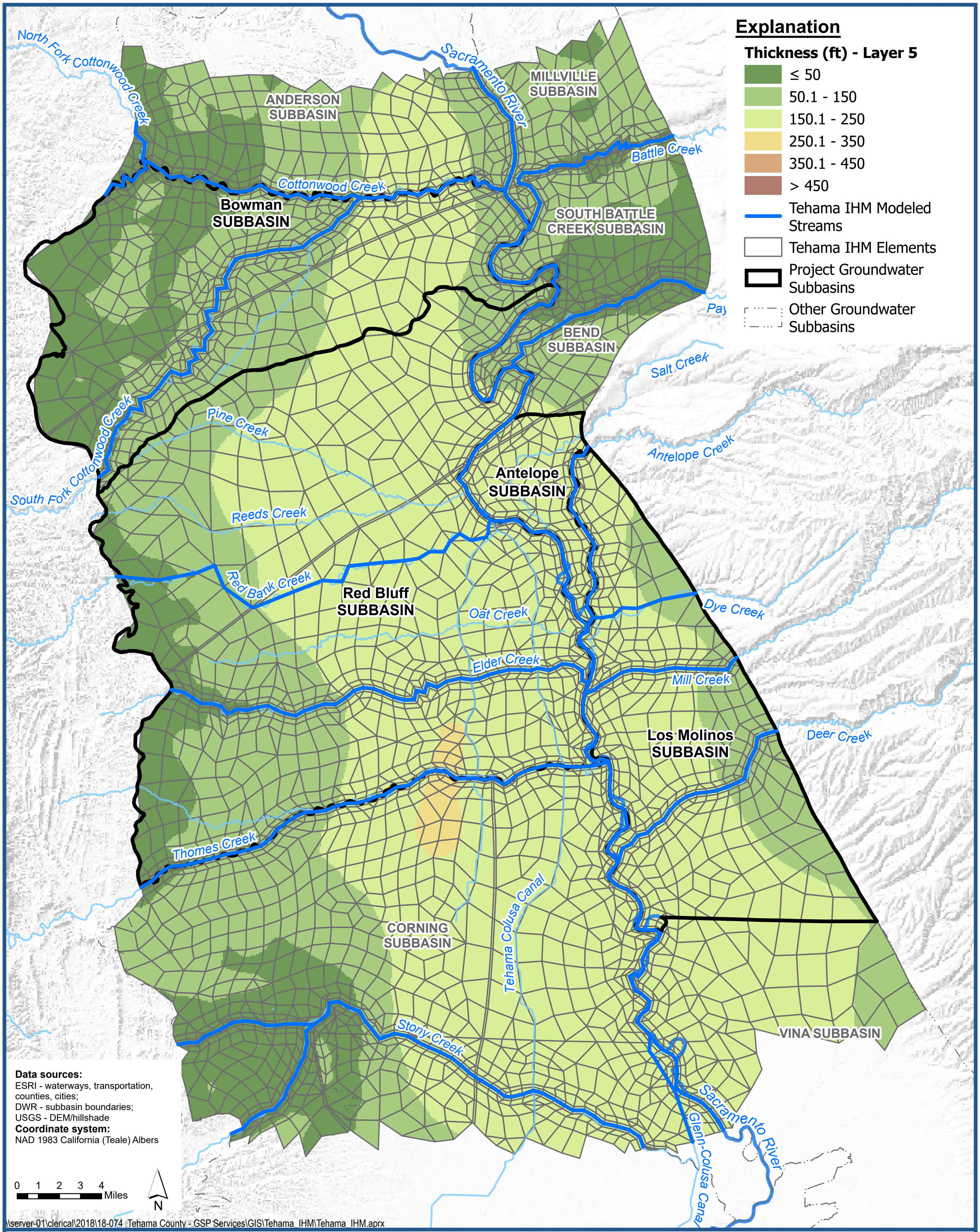
Thickness of Layer 4 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-18



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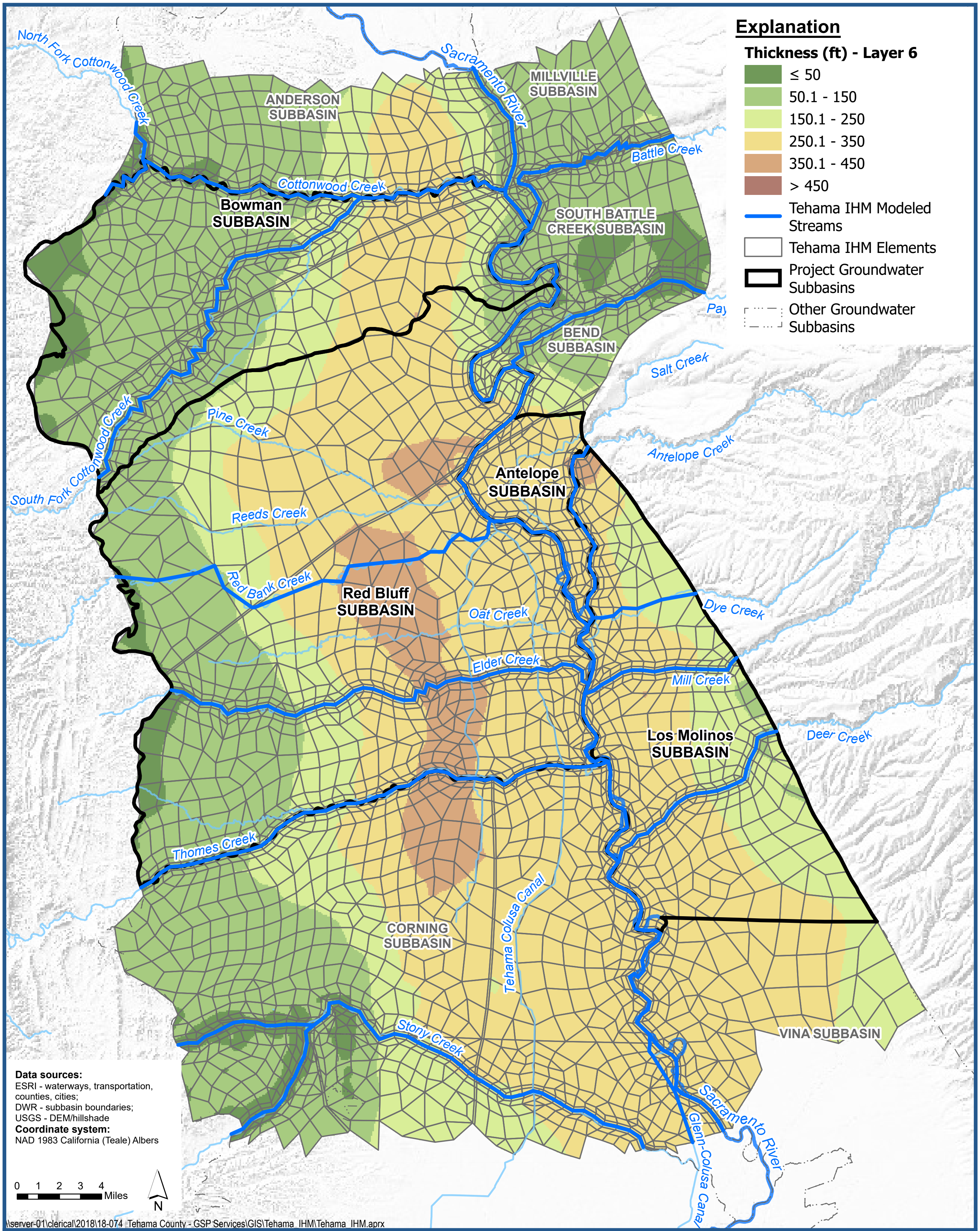
Thickness of Layer 5 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-19



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
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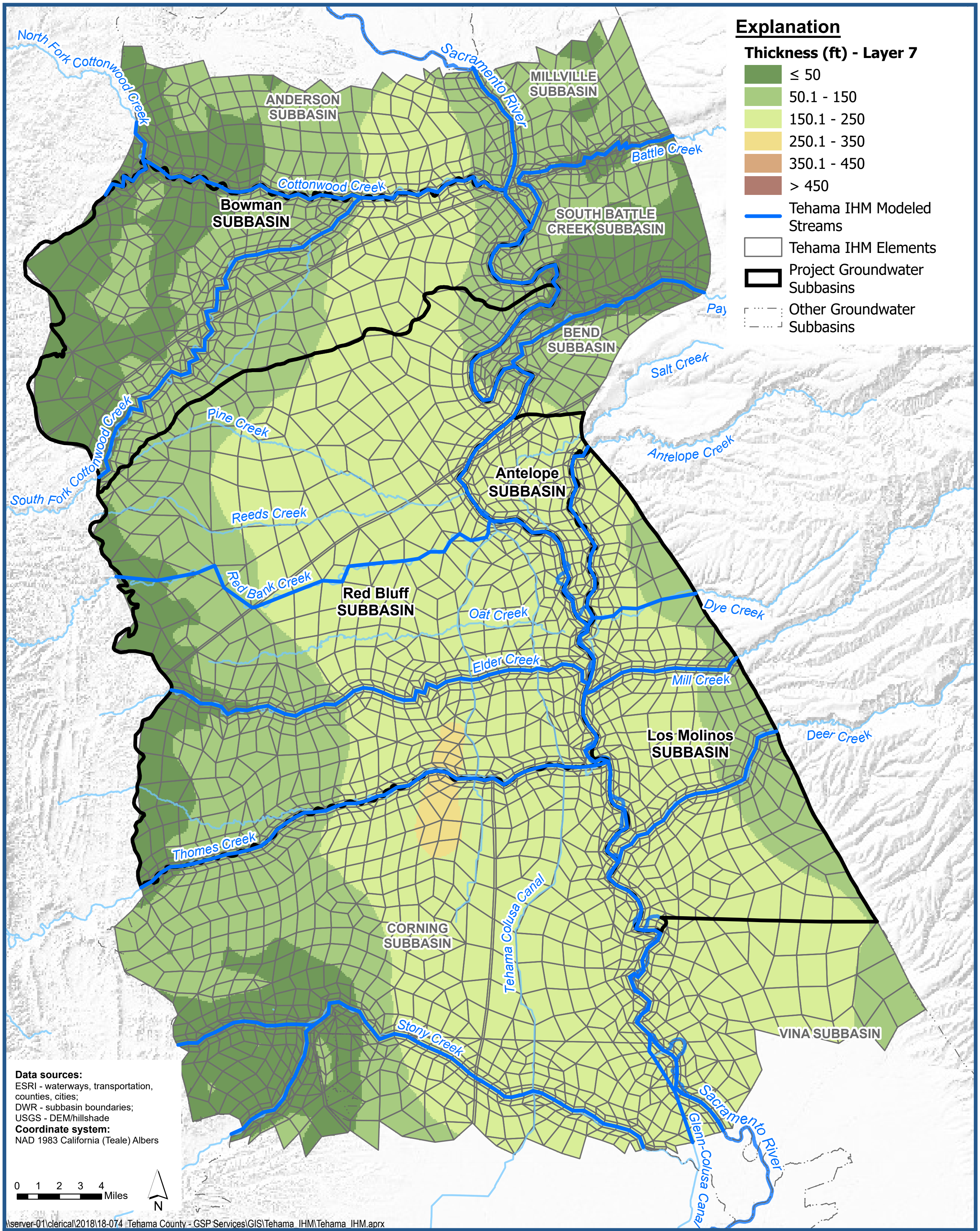
Thickness of Layer 6 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-20



Data sources:
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DWR - subbasin boundaries;
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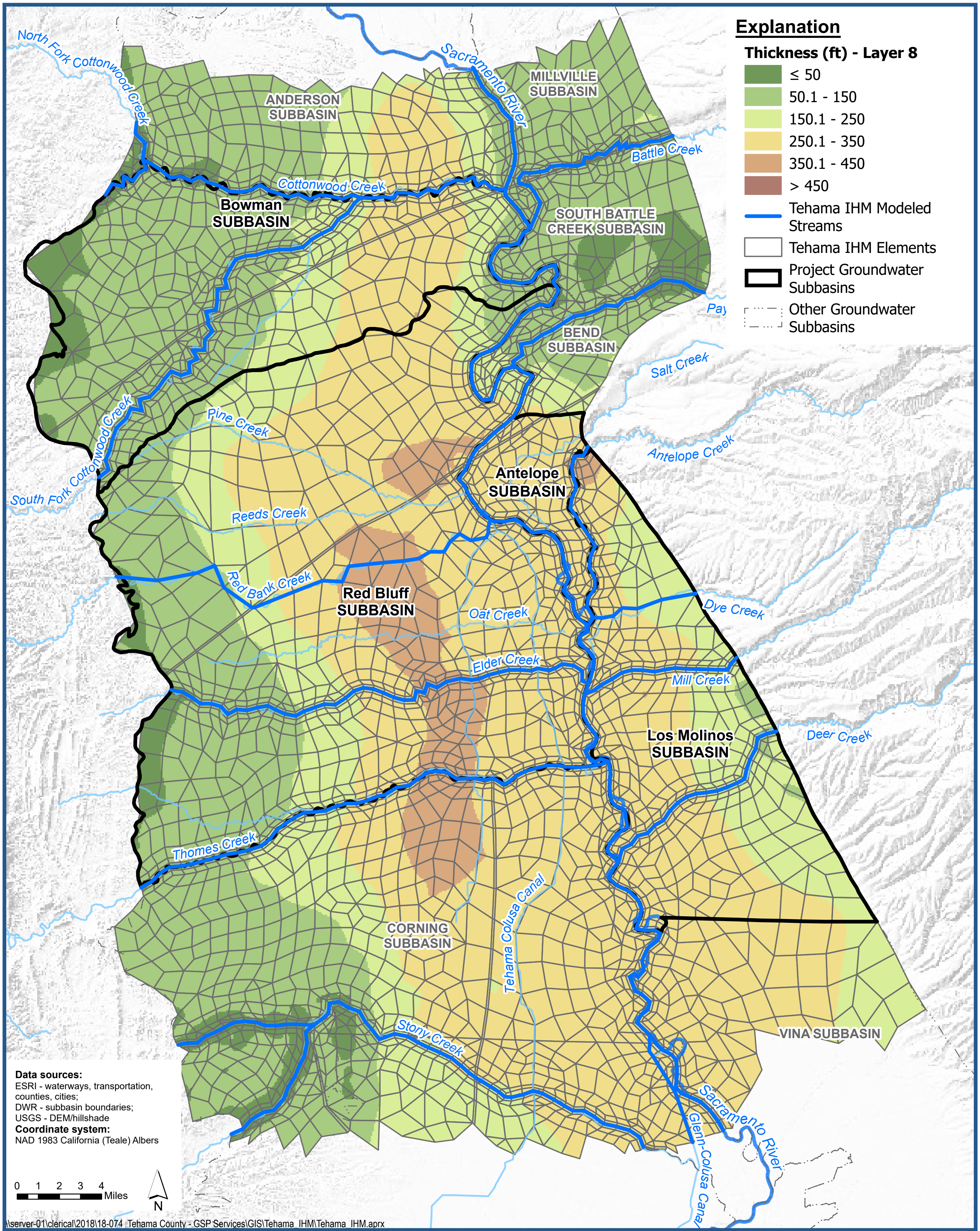
Thickness of Layer 7 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-21



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DWR - subbasin boundaries;
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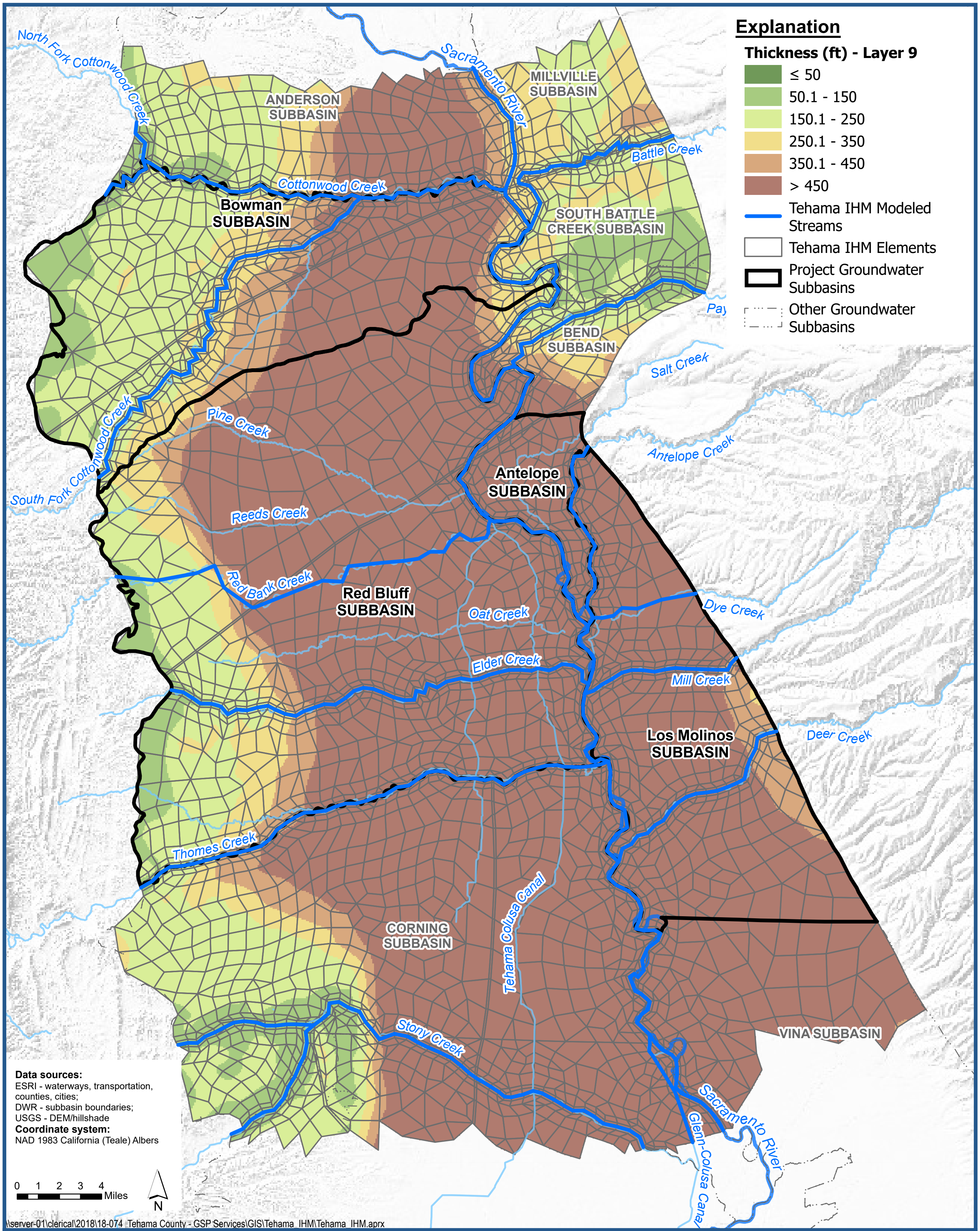
Thickness of Layer 8 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-22



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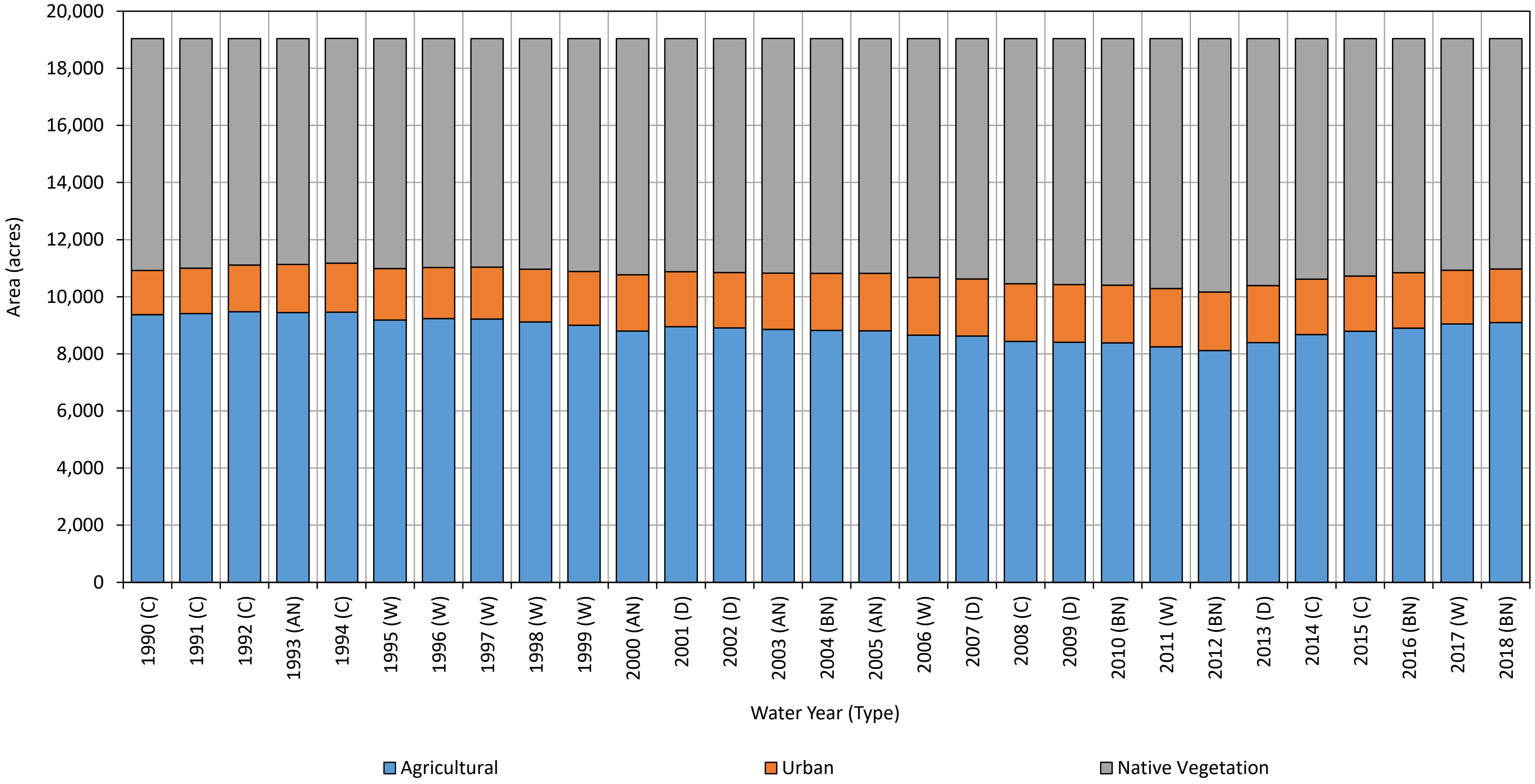
Thickness of Layer 9 in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-23



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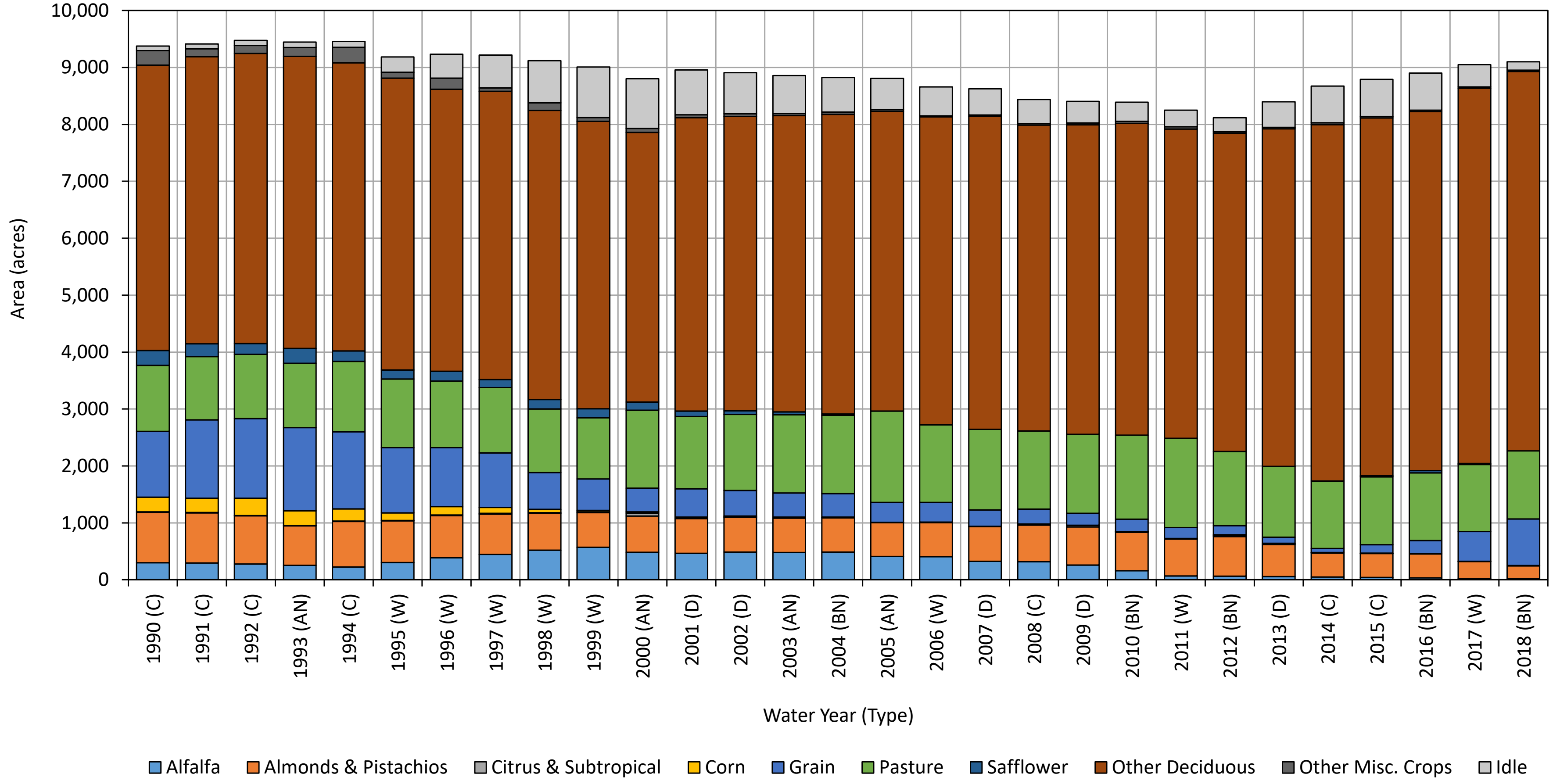
Historical Land Use in Tehama IHM – Antelope Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-24a



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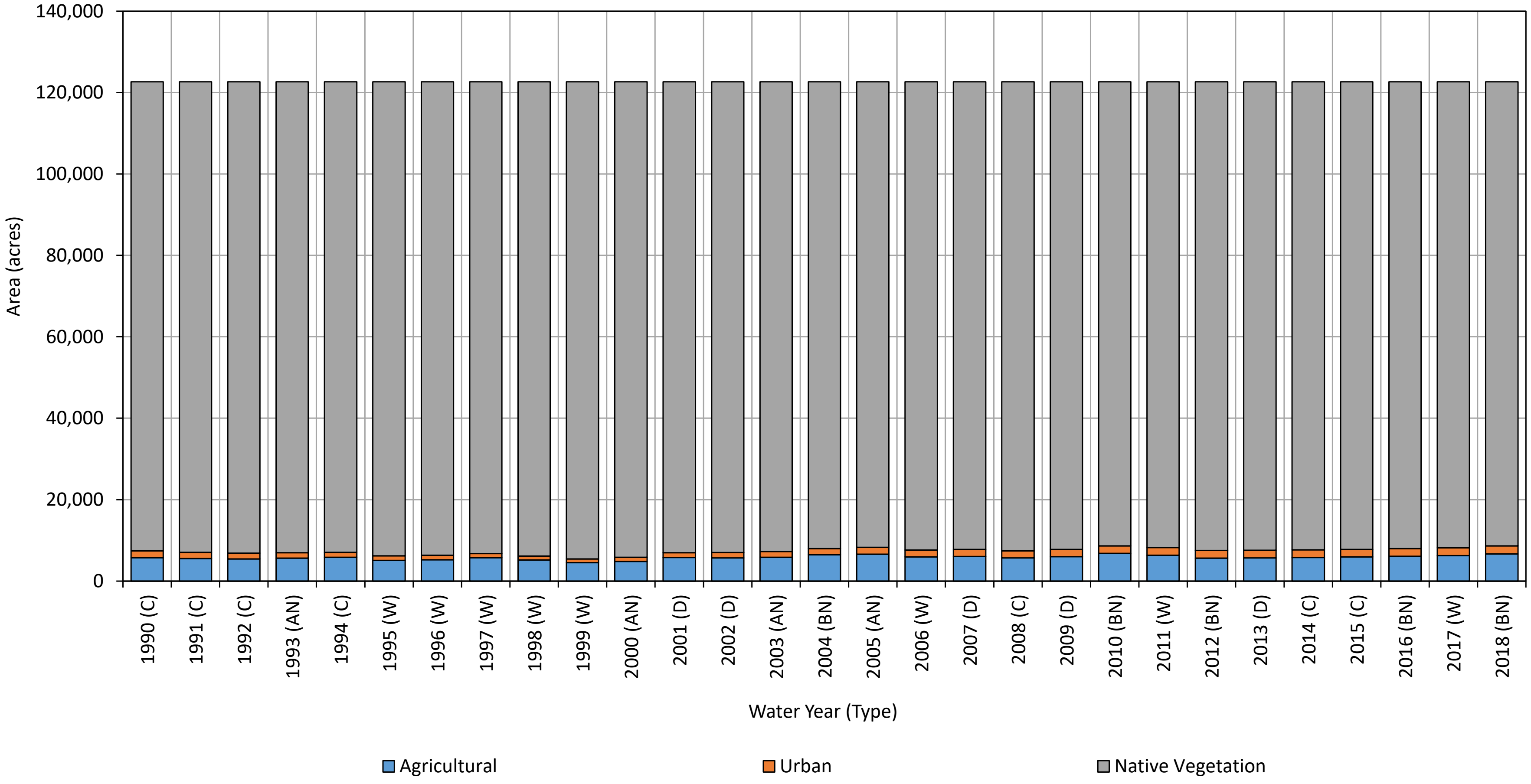
Historical Agricultural Land Use in Tehama IHM – Antelope Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-24b



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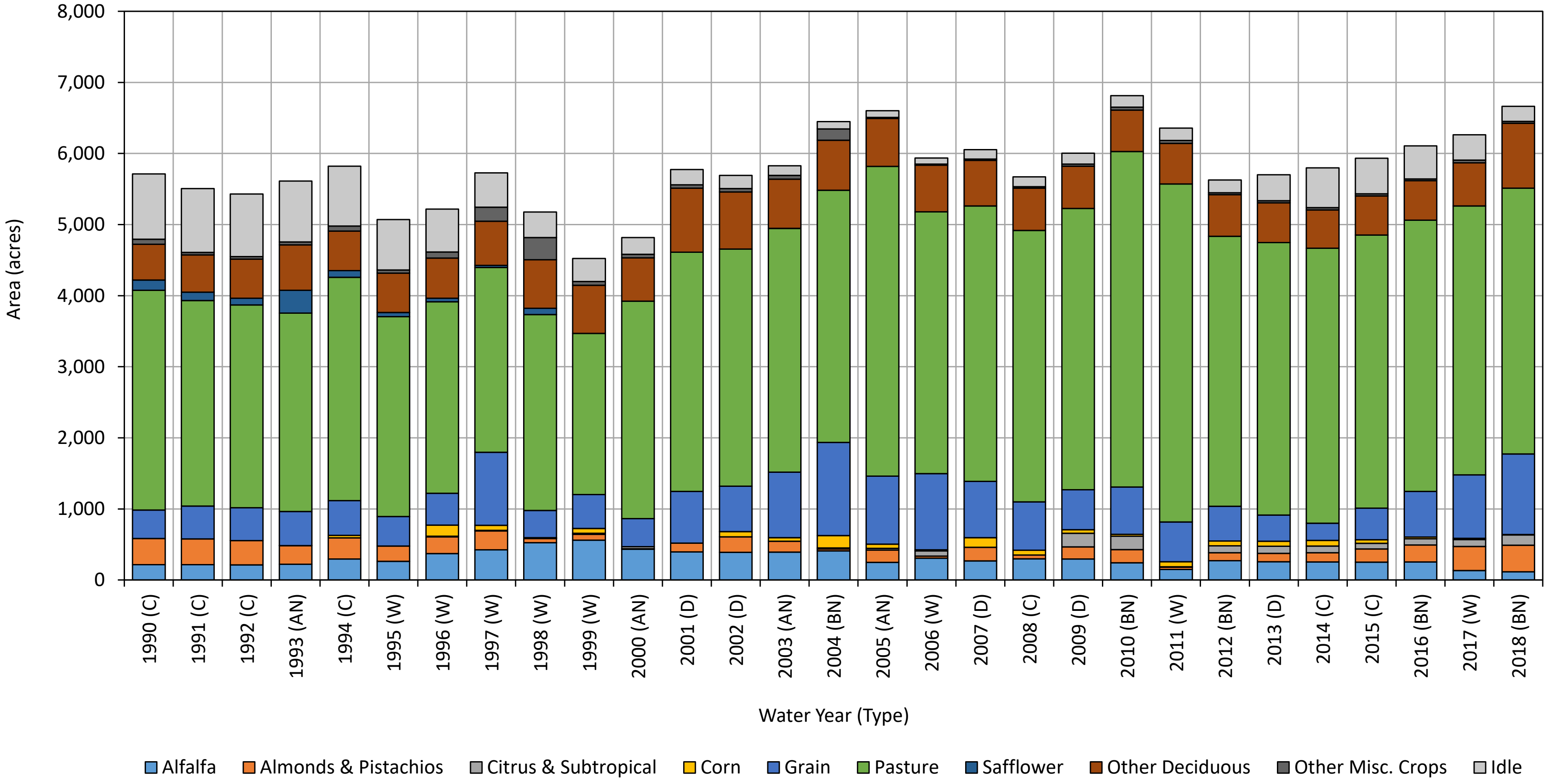
Historical Land Use in Tehama IHM – Bowman Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-25a



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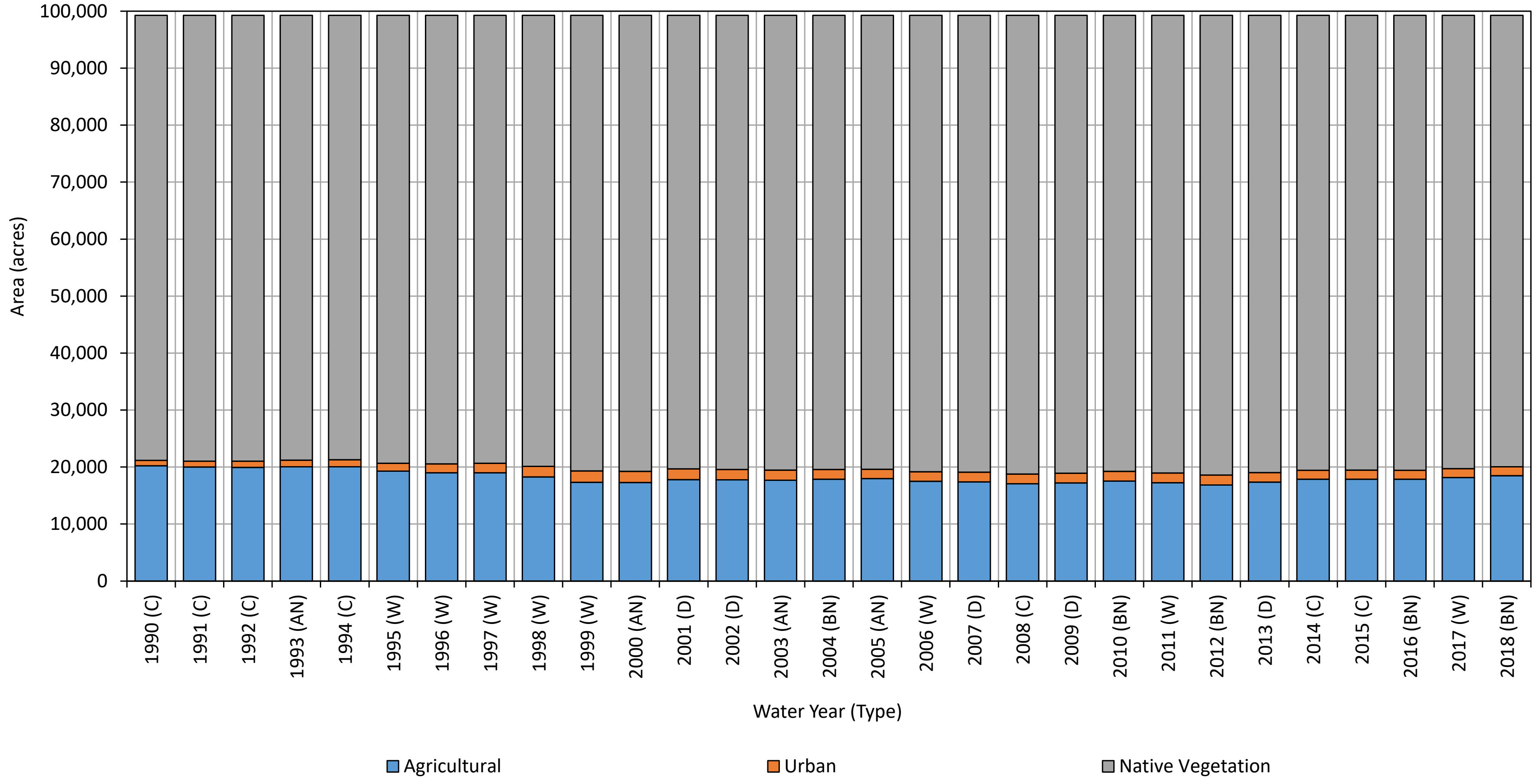
Historical Agricultural Land Use in Tehama IHM – Bowman Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-25b



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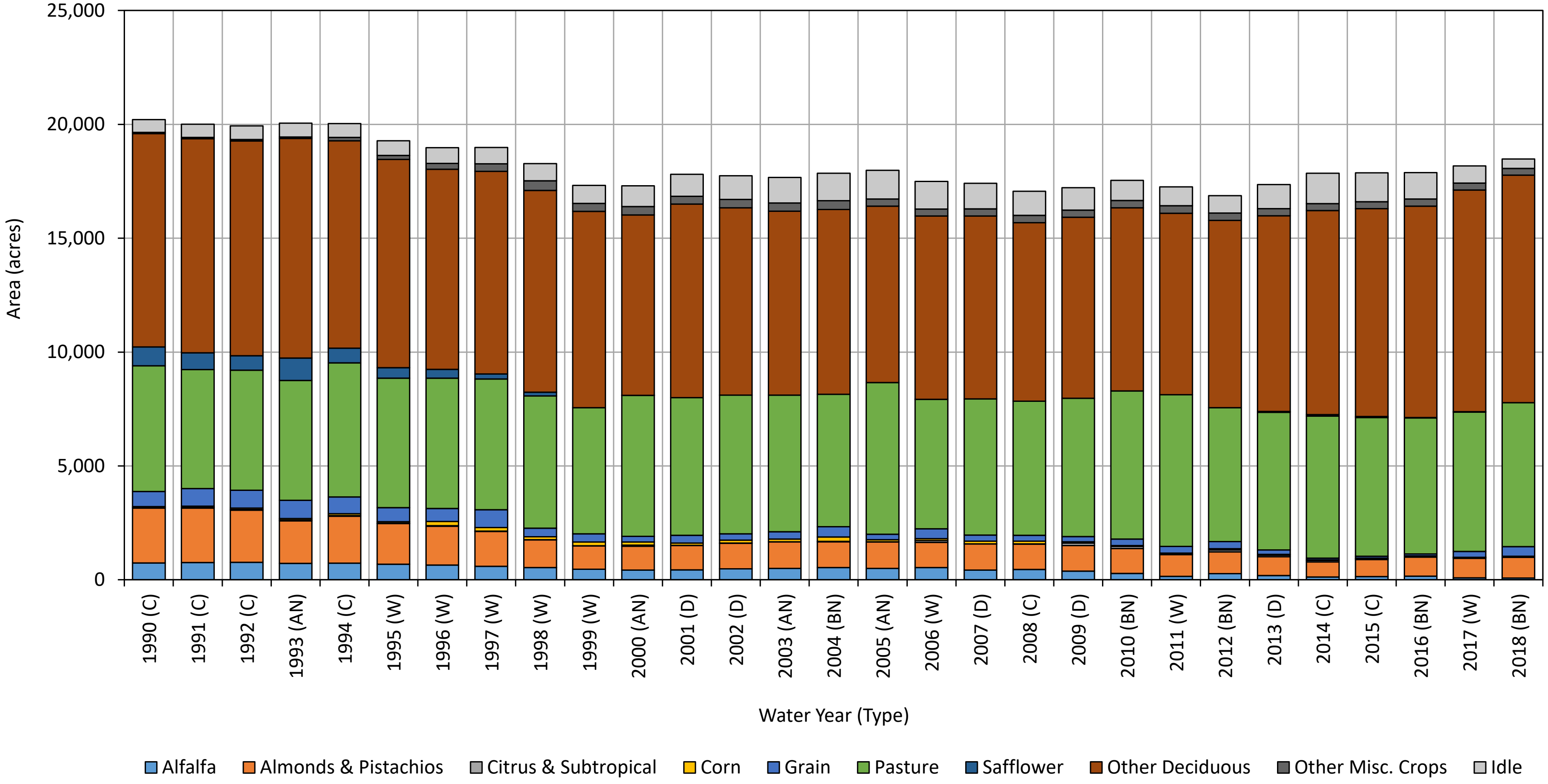
Historical Land Use in Tehama IHM – Los Molinos Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-26a



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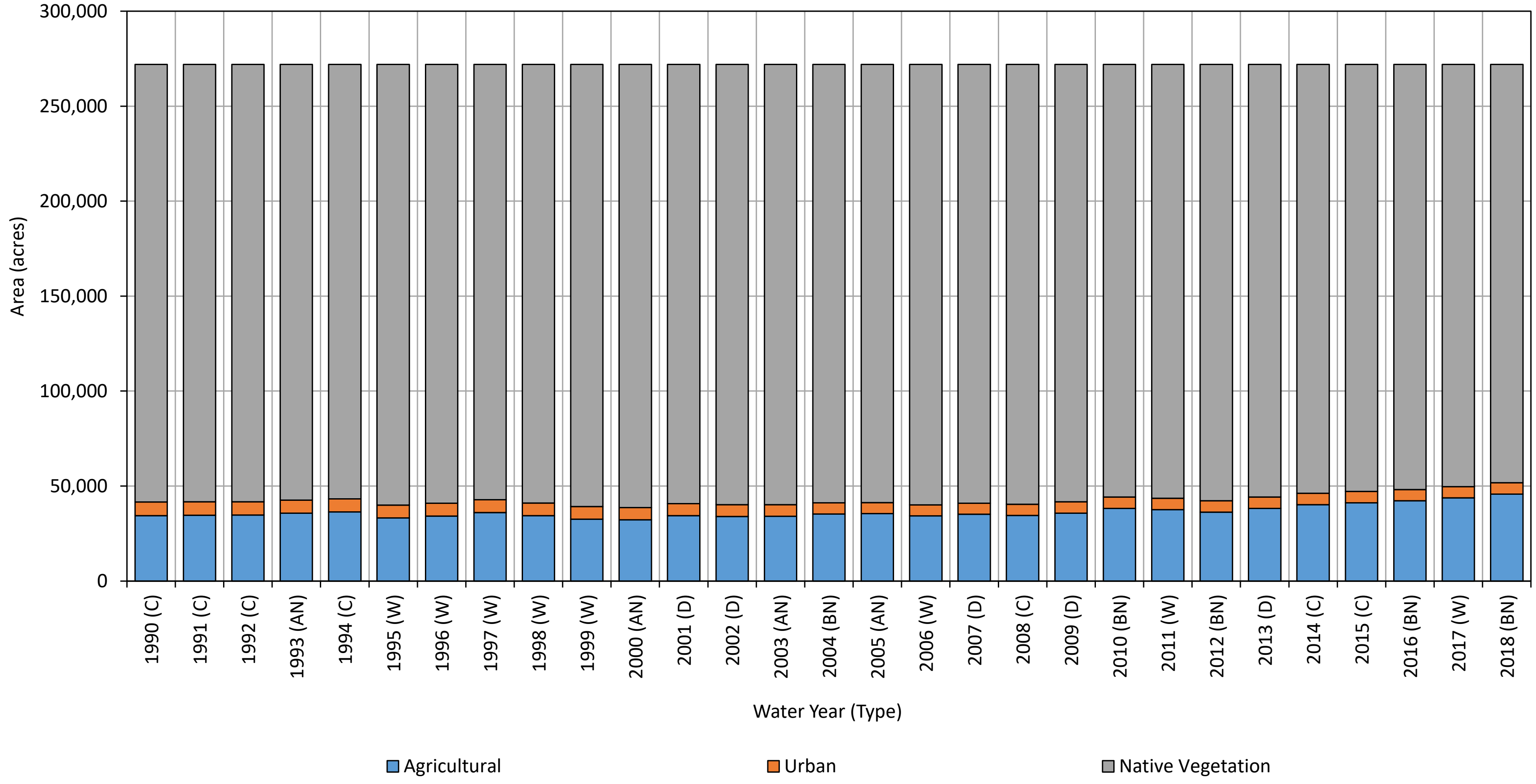
Historical Agricultural Land Use in Tehama IHM – Los Molinos Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-26b



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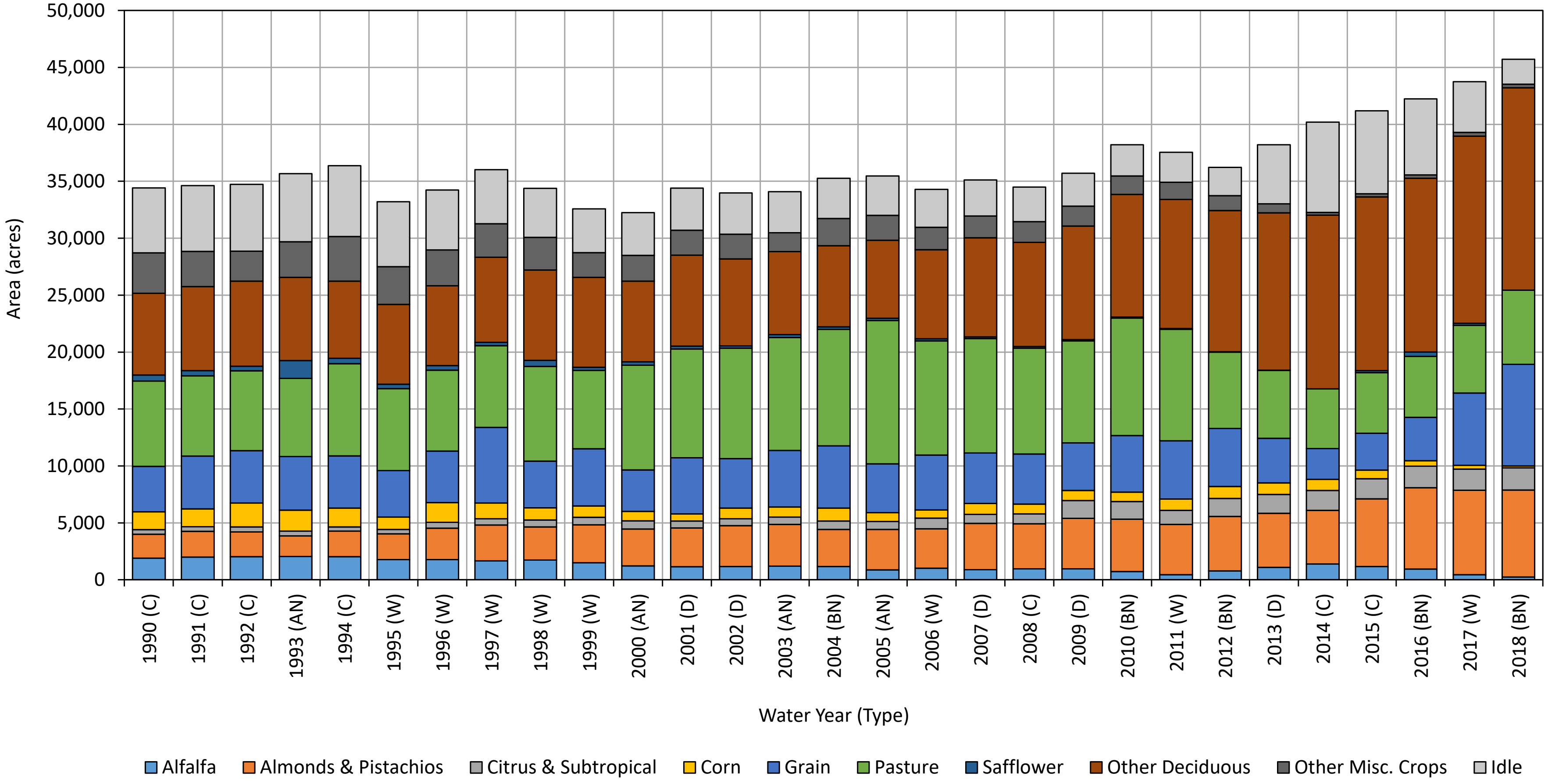
Historical Land Use in Tehama IHM – Red Bluff Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-27a



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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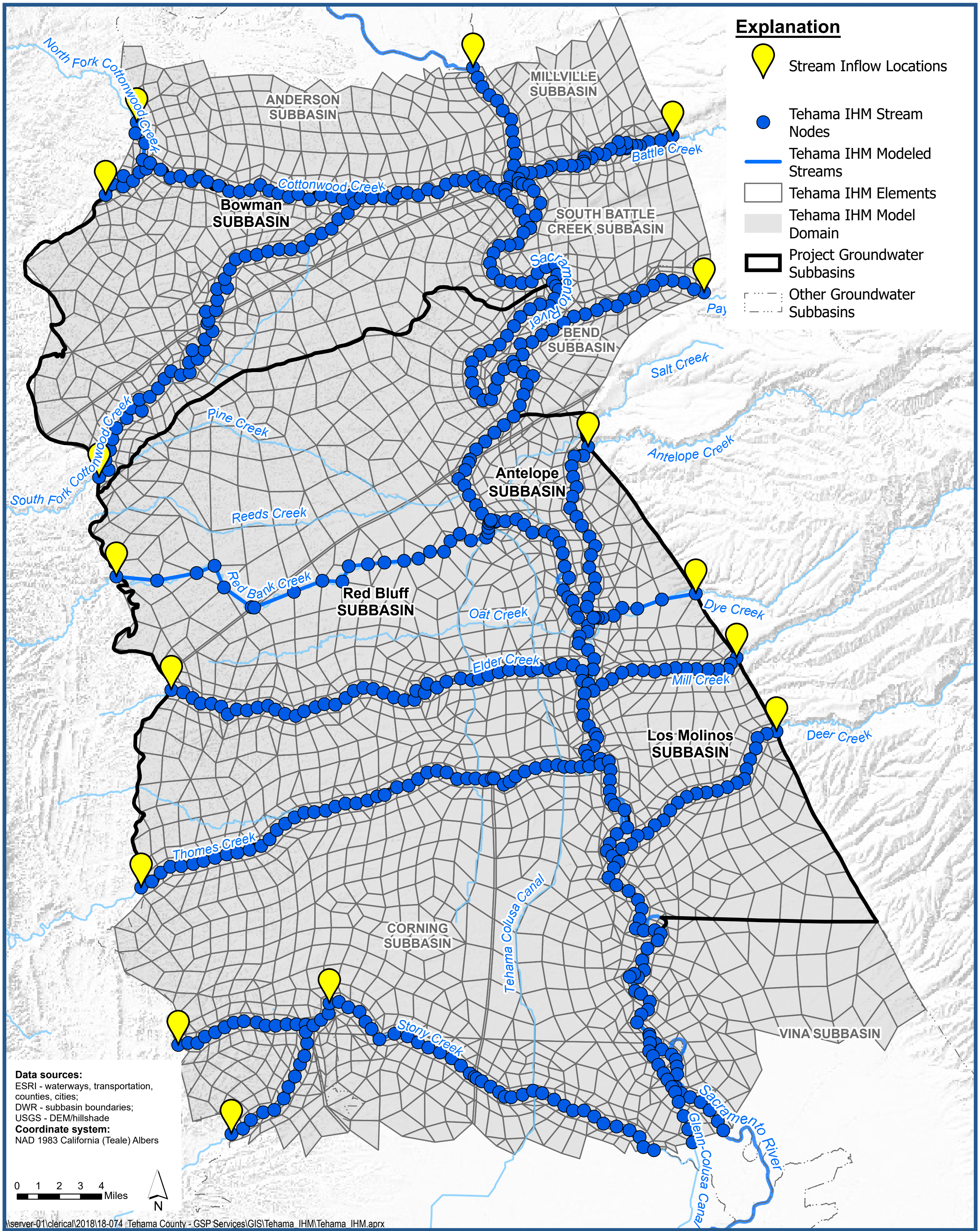
Historical Agricultural Land Use in Tehama IHM – Red Bluff Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-27b



Data sources:
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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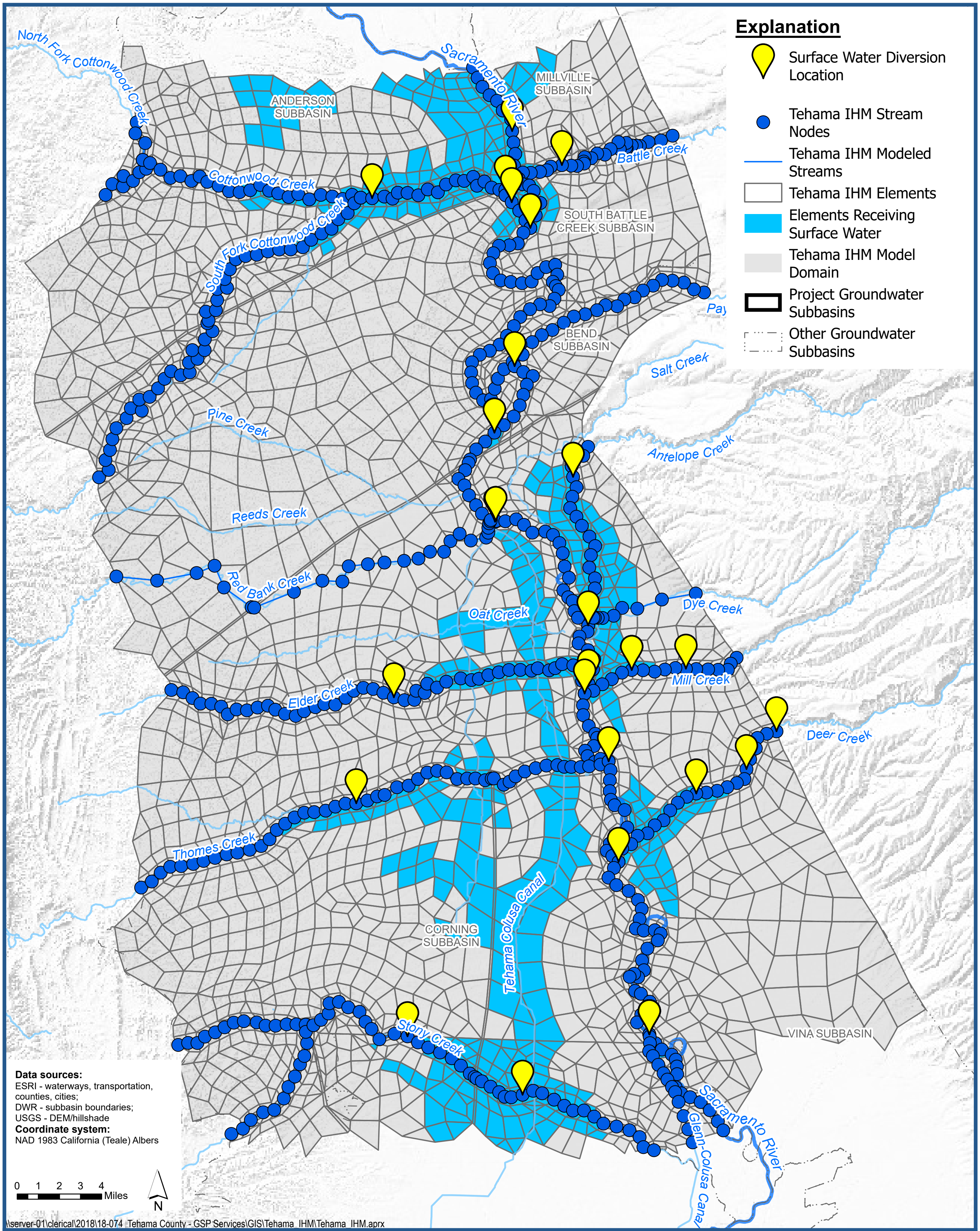
Tehama IHM Surface Water Inflow Locations

Groundwater Sustainability Planning
Tehama County, California

Figure 3-28



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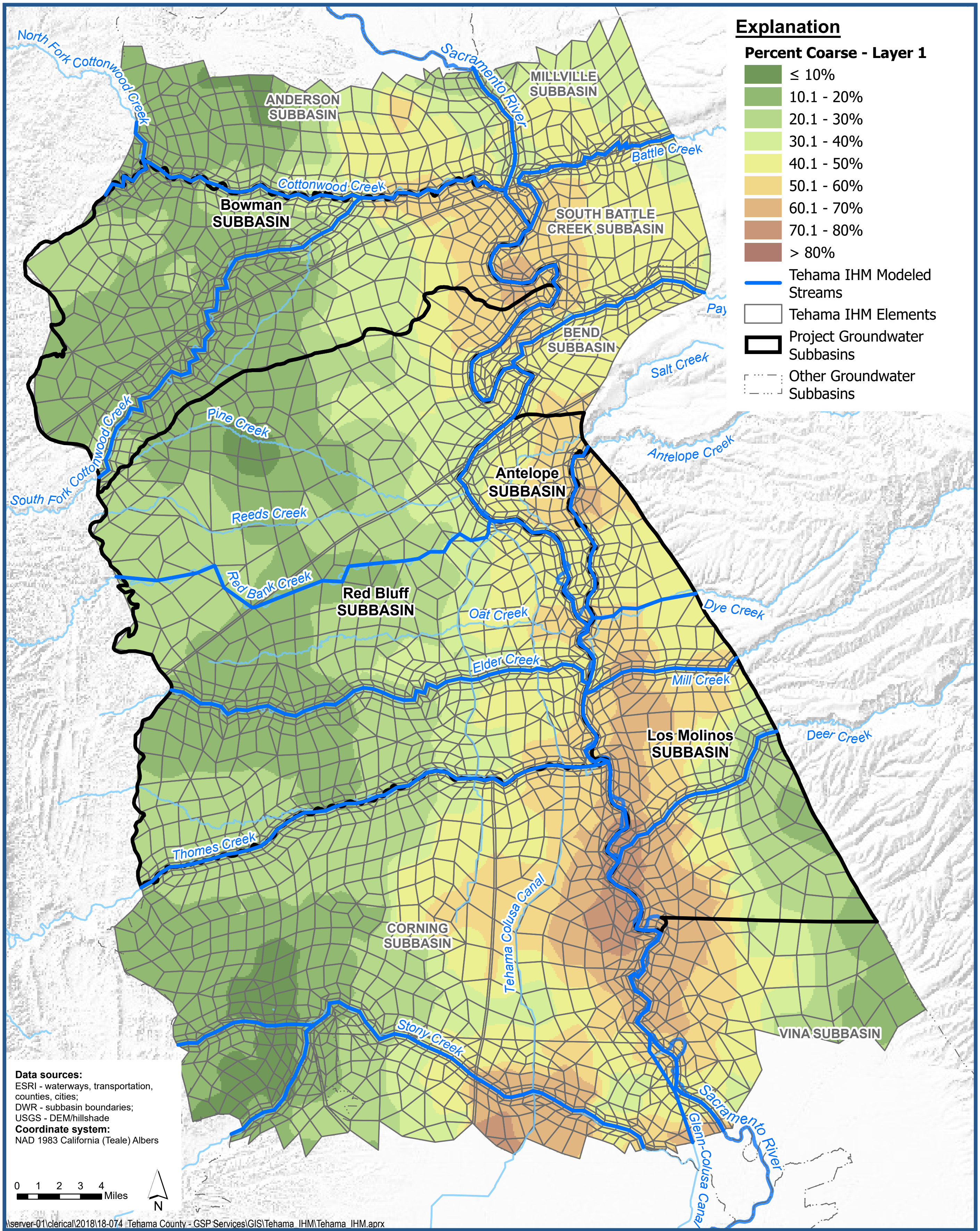
Historical Surface Water Diversion Locations in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-29



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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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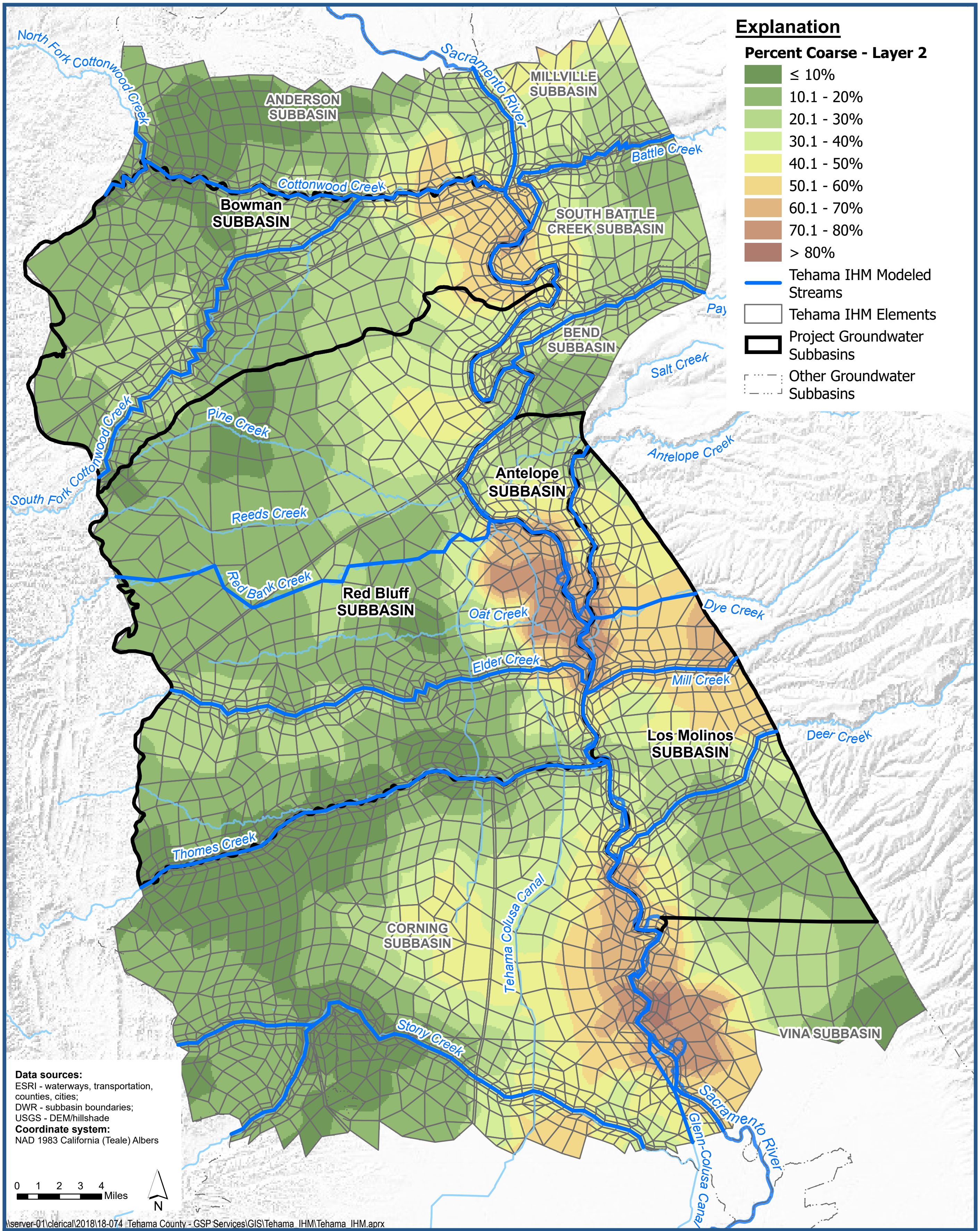
Tehama IHM Percent Coarse - Layer 1

Groundwater Sustainability Planning
Tehama County, California

Figure 3-30



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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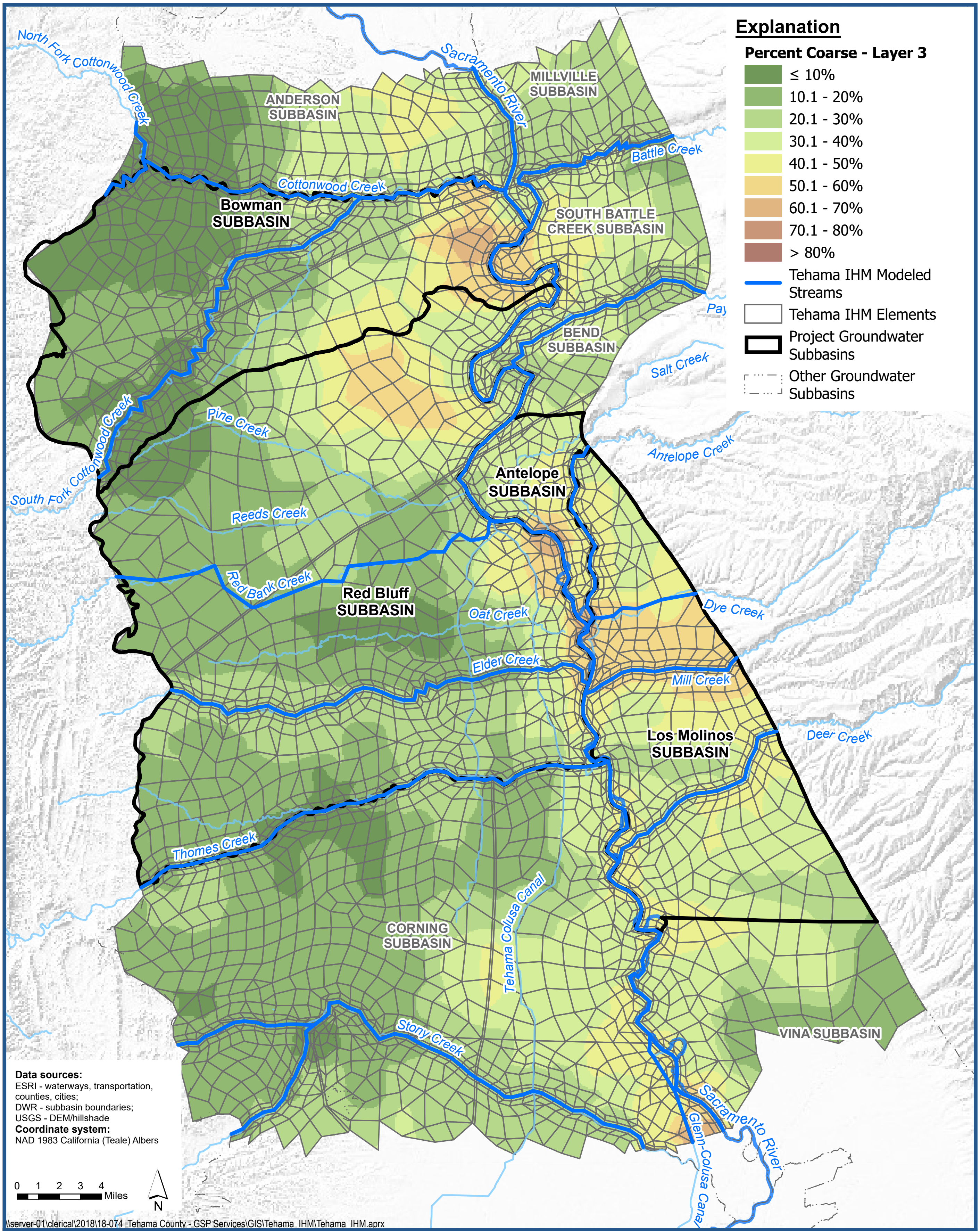
Tehama IHM Percent Coarse - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 3-31



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DWR - subbasin boundaries;
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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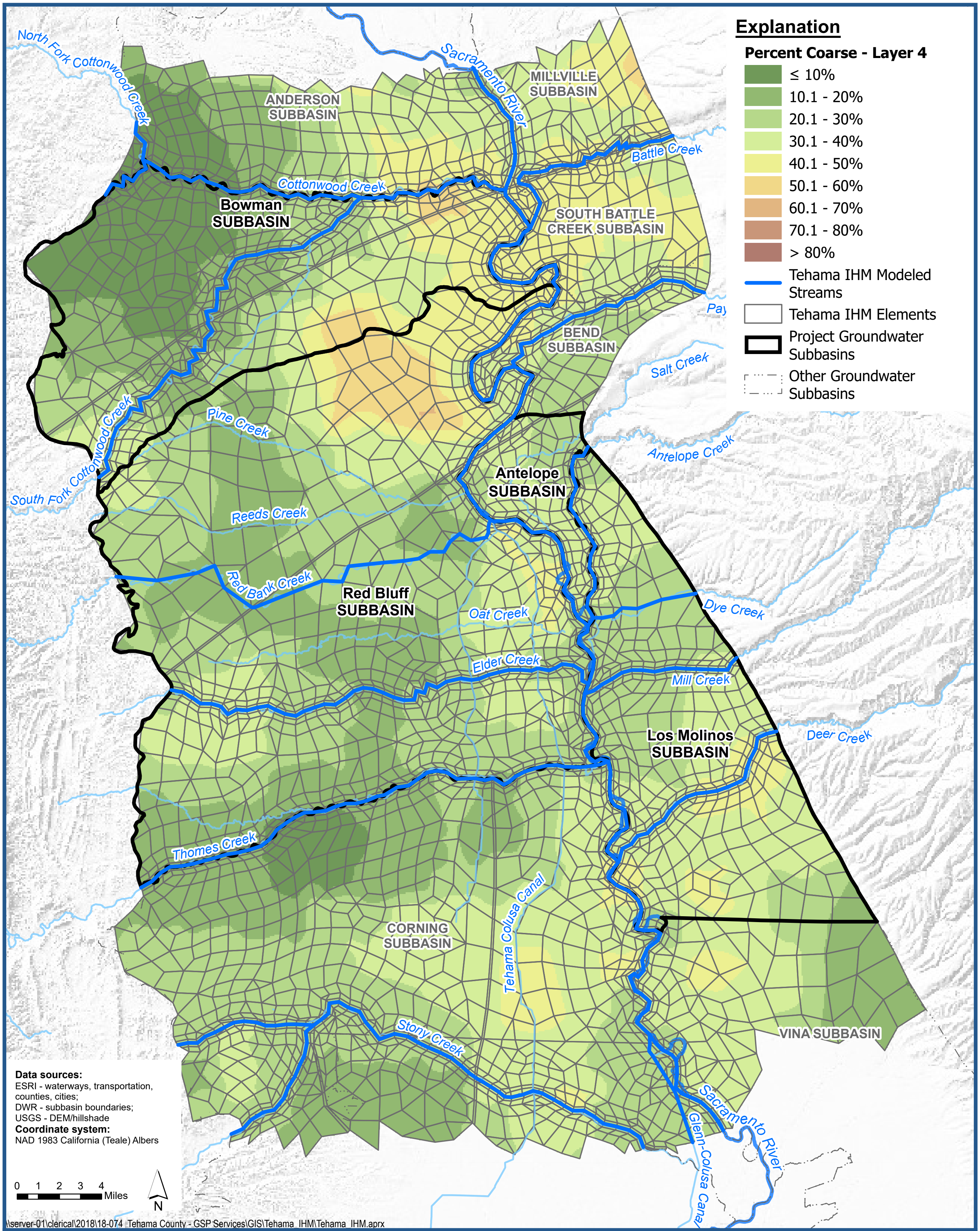
Tehama IHM Percent Coarse - Layer 3

Groundwater Sustainability Planning
Tehama County, California

Figure 3-32



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DWR - subbasin boundaries;
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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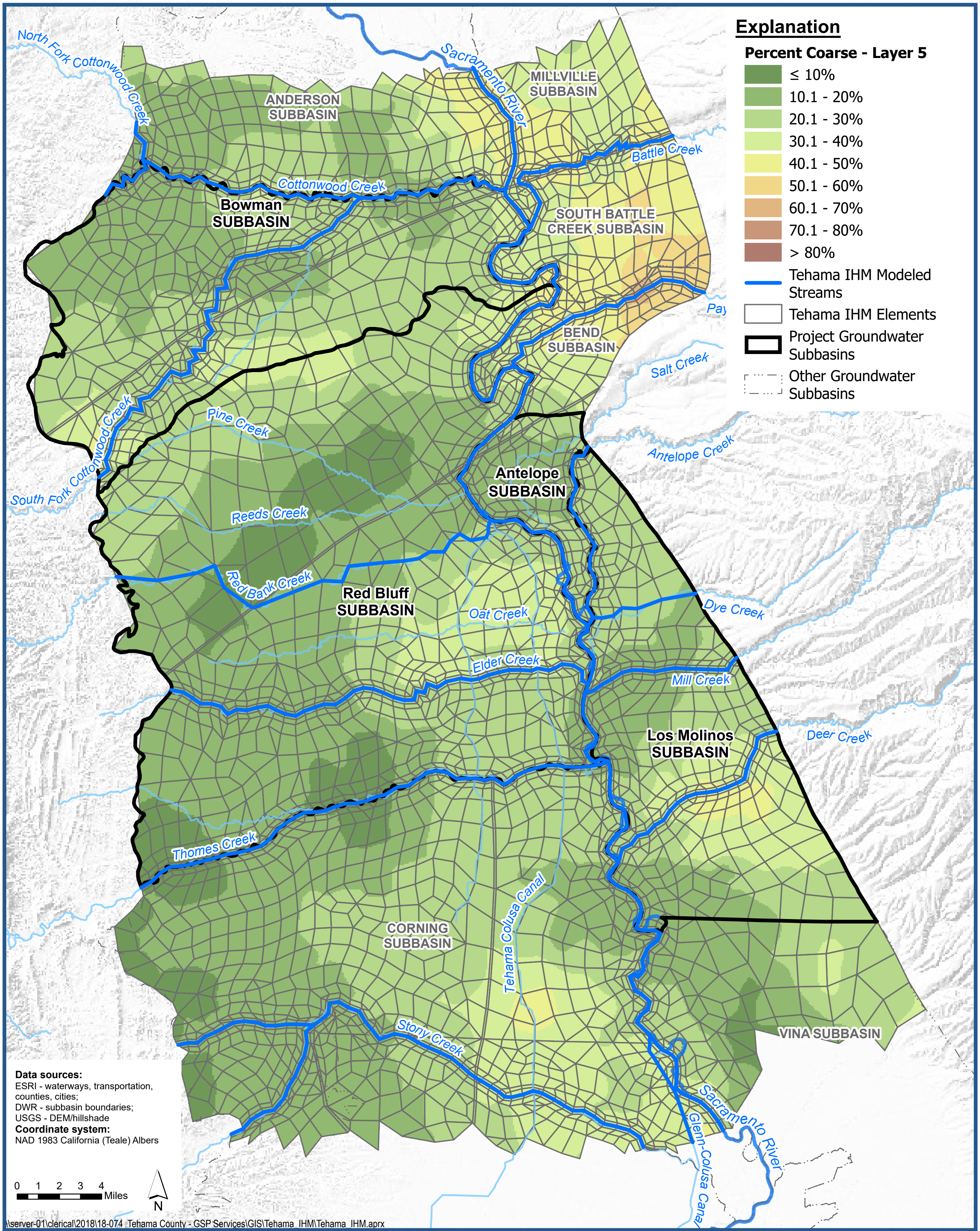
Tehama IHM Percent Coarse - Layer 4

Groundwater Sustainability Planning
Tehama County, California

Figure 3-33



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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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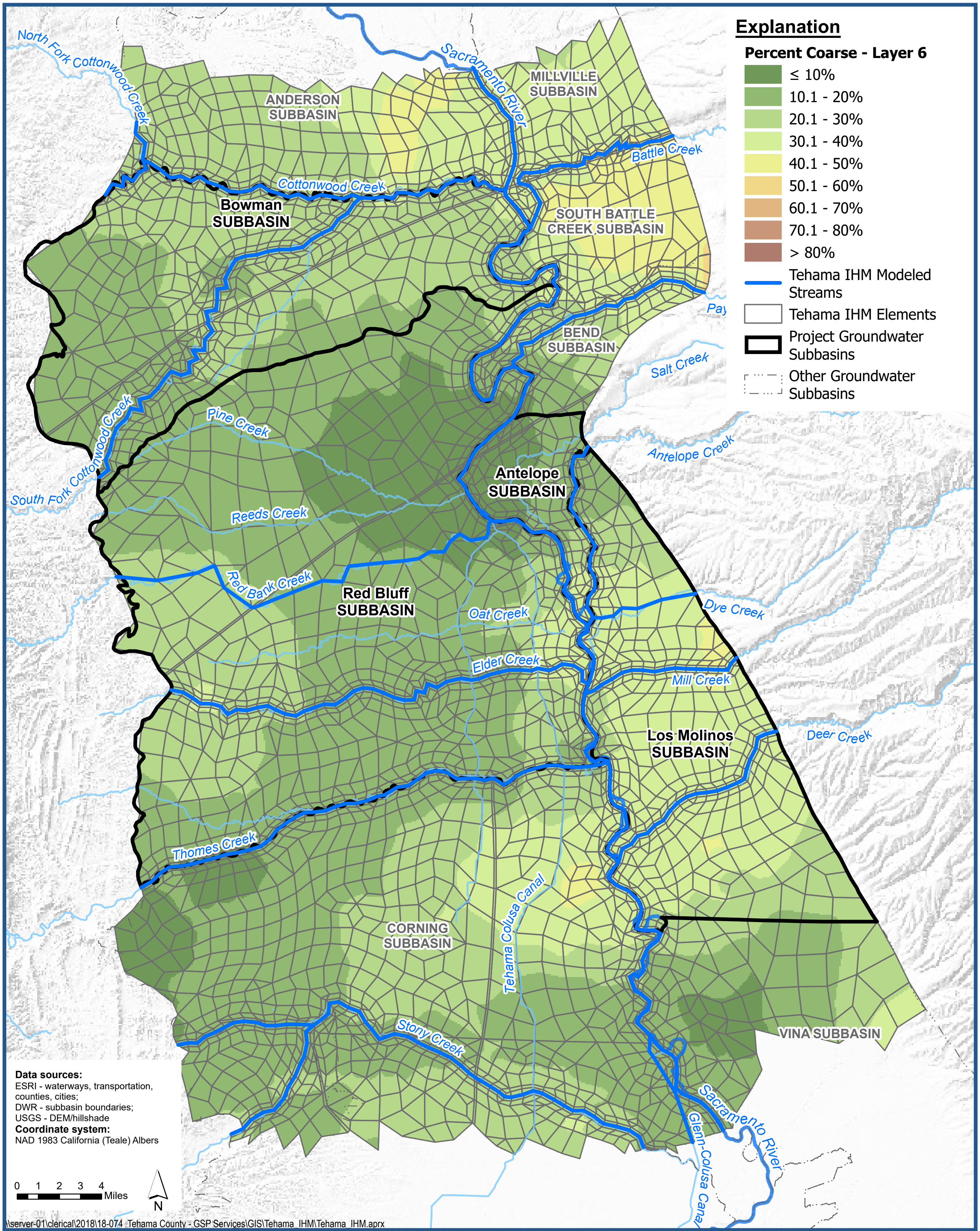
Tehama IHM Percent Coarse - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 3-34



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DWR - subbasin boundaries;
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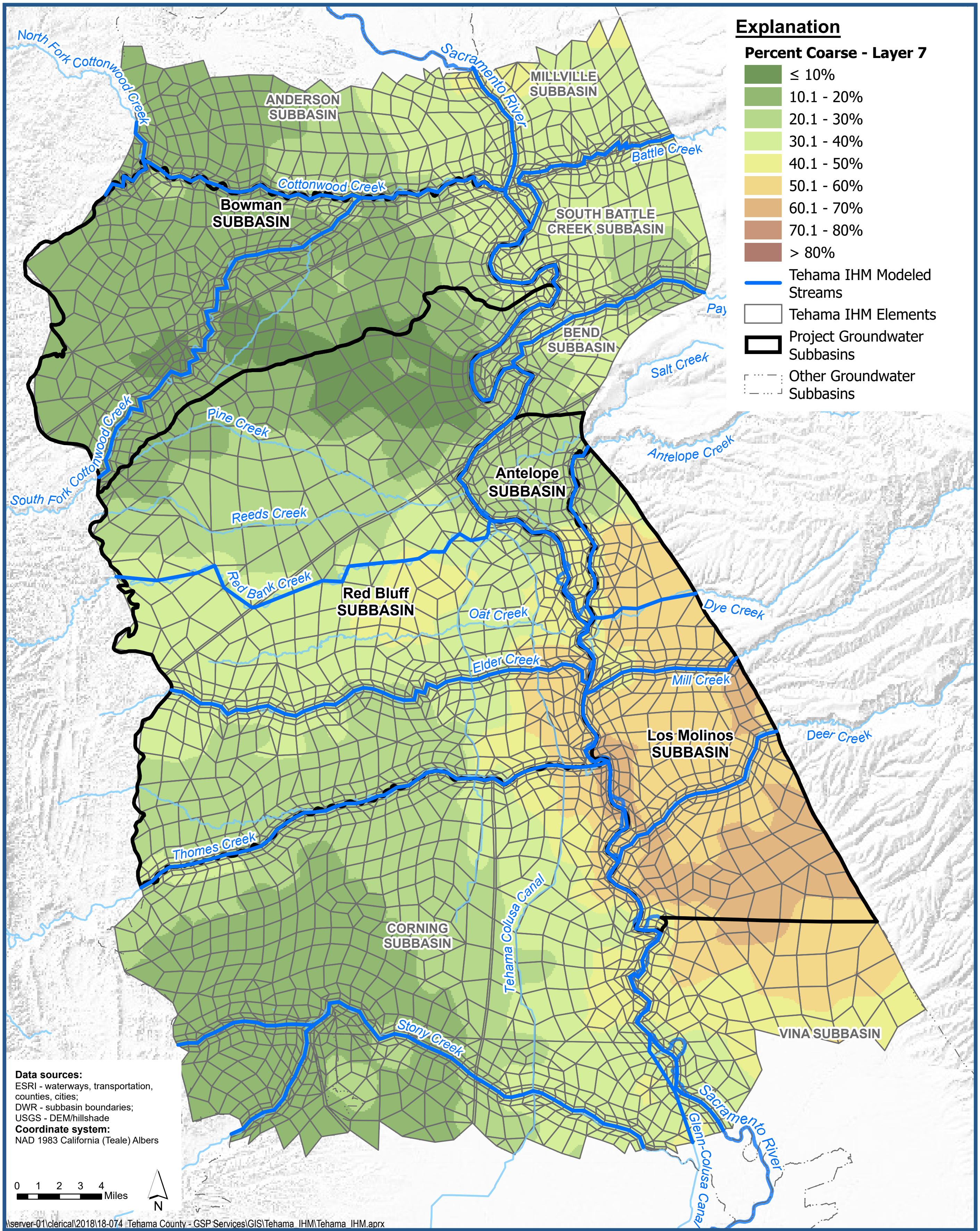
Tehama IHM Percent Coarse - Layer 6

Groundwater Sustainability Planning
Tehama County, California

Figure 3-35



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DWR - subbasin boundaries;
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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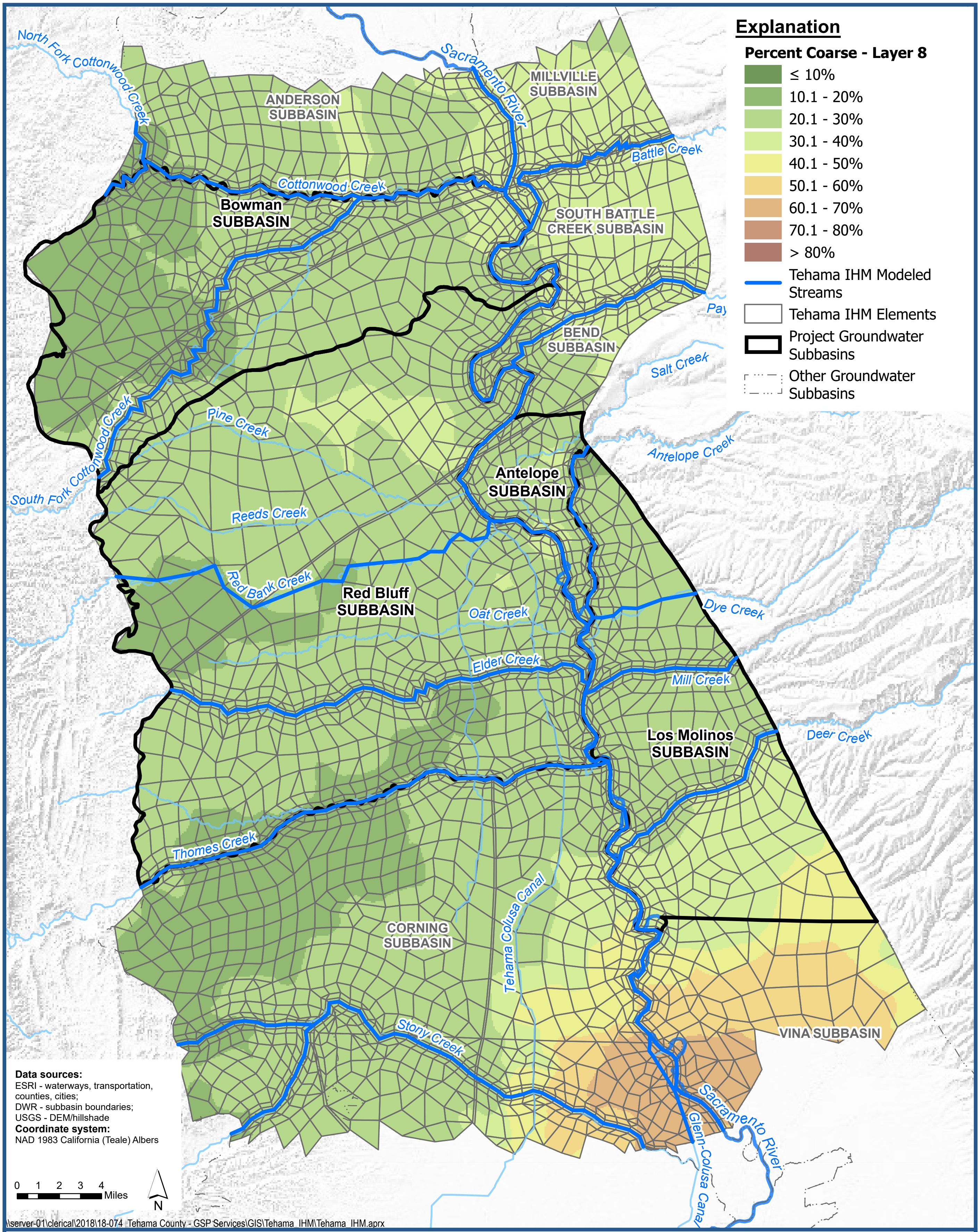
Tehama IHM Percent Coarse - Layer 7

Groundwater Sustainability Planning
Tehama County, California

Figure 3-36



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DWR - subbasin boundaries;
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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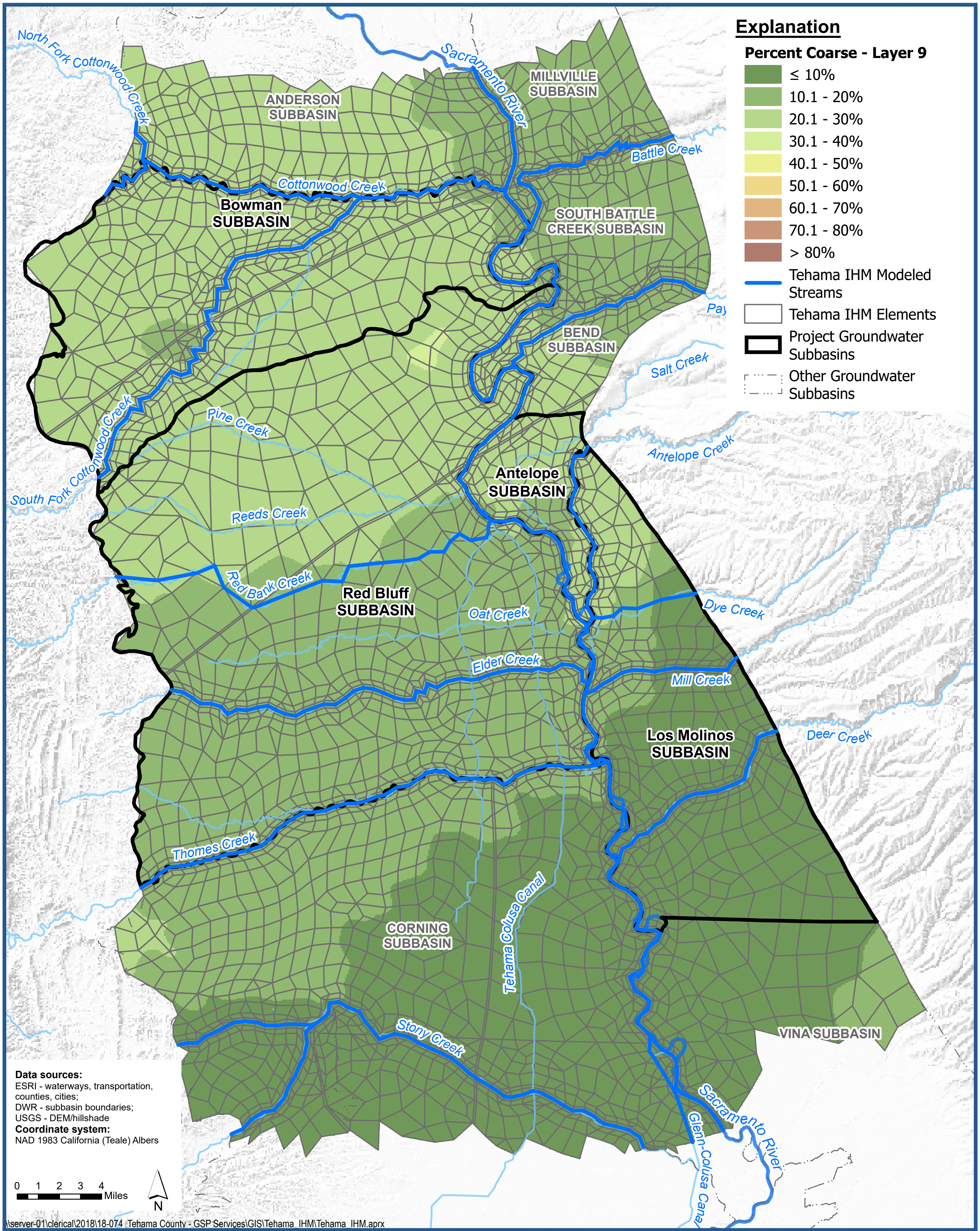
Tehama IHM Percent Coarse - Layer 8

Groundwater Sustainability Planning
Tehama County, California

Figure 3-37



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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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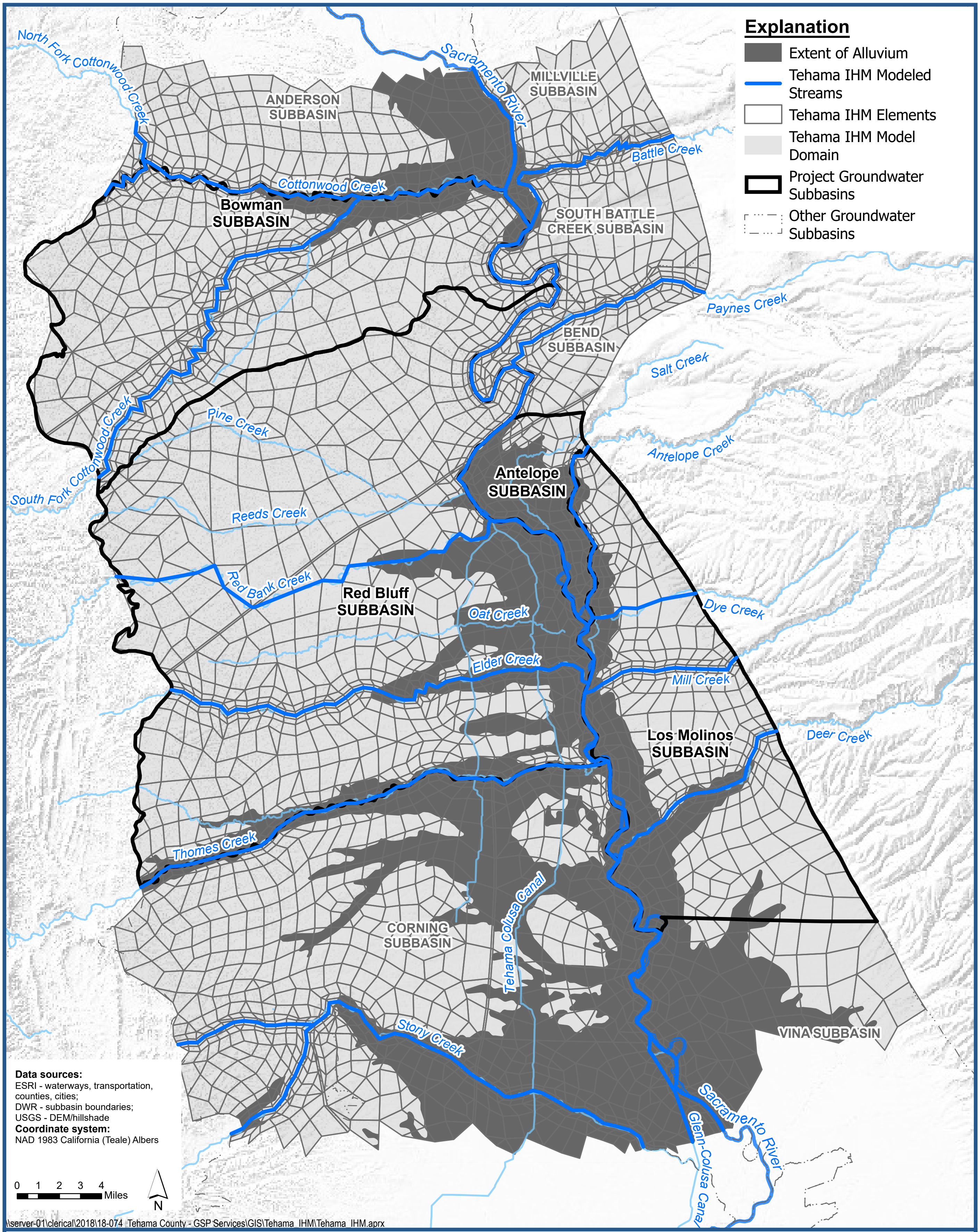
Tehama IHM Percent Coarse - Layer 9

Groundwater Sustainability Planning
Tehama County, California

Figure 3-38



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DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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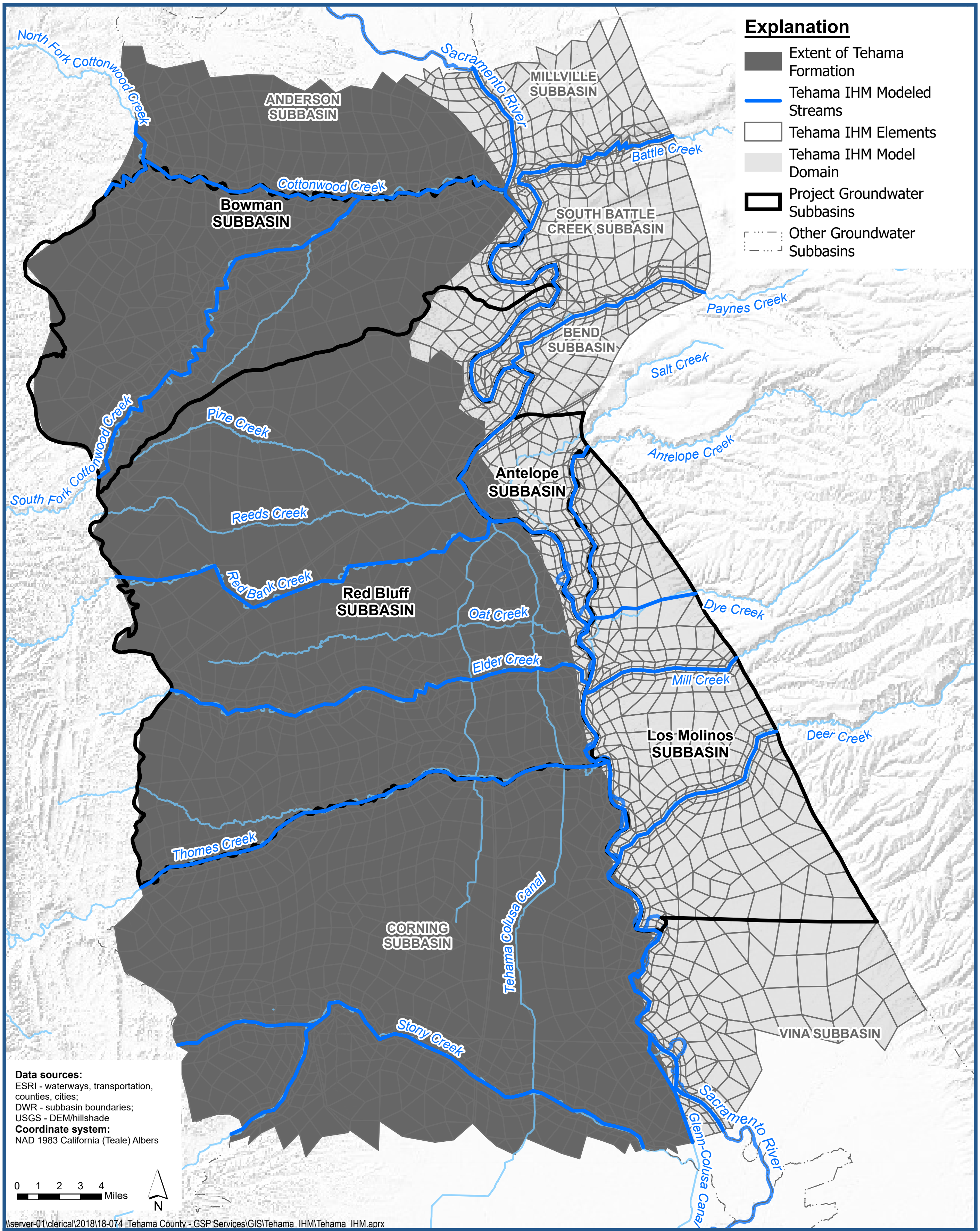
Extent of Alluvium in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-39



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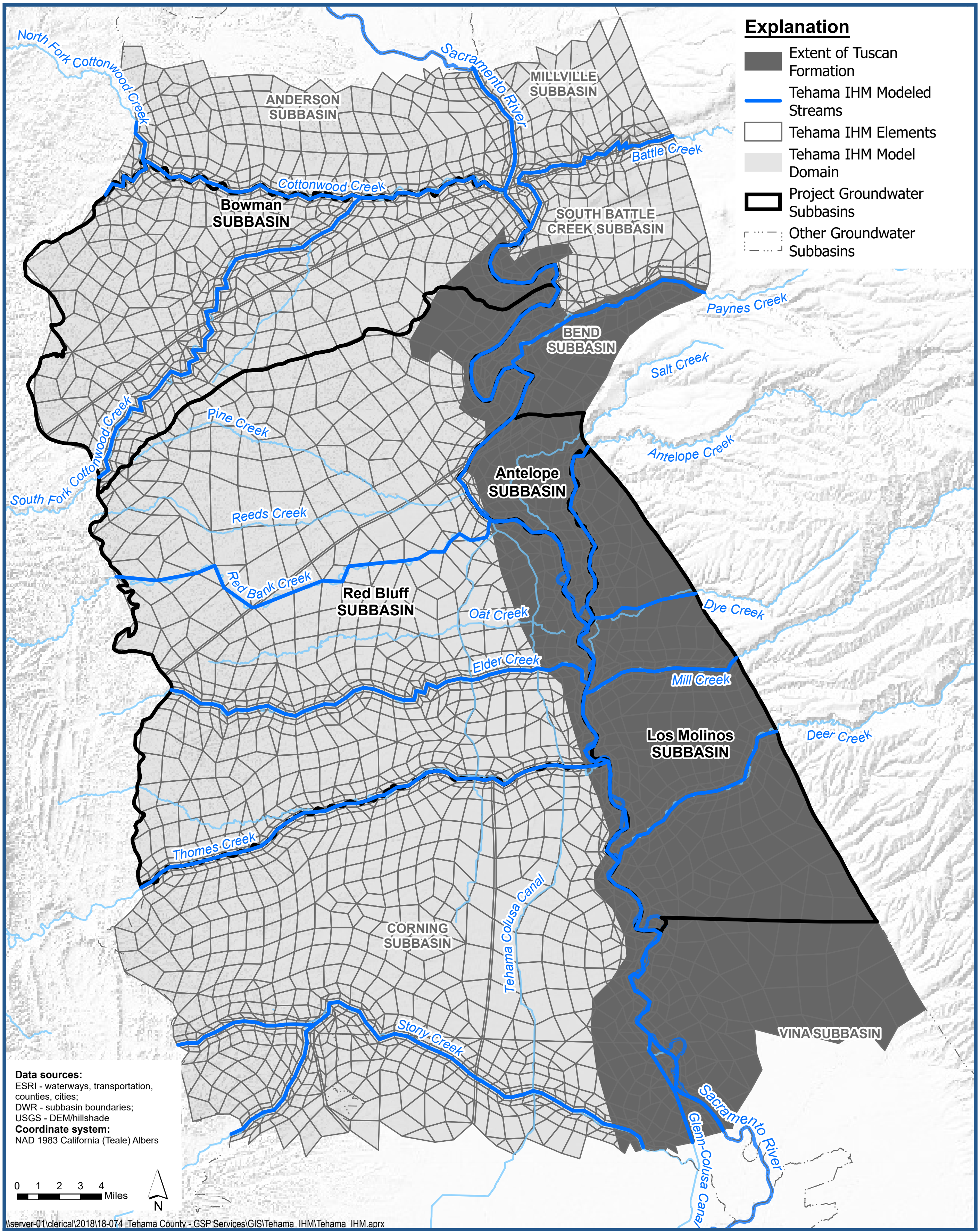
Extent of the Tehama Formation in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-40



Data sources:
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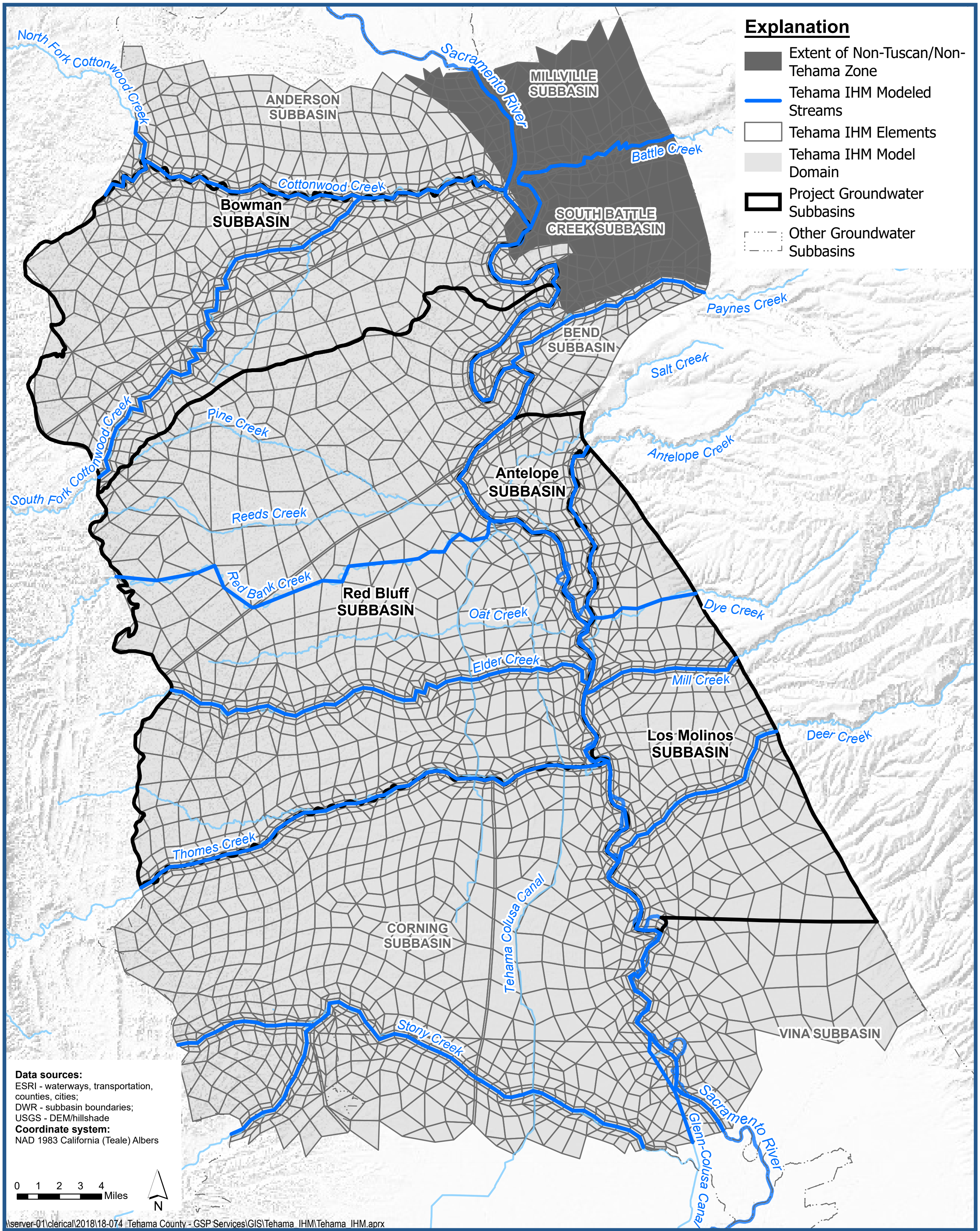
Extent of the Tuscan Formation in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-41



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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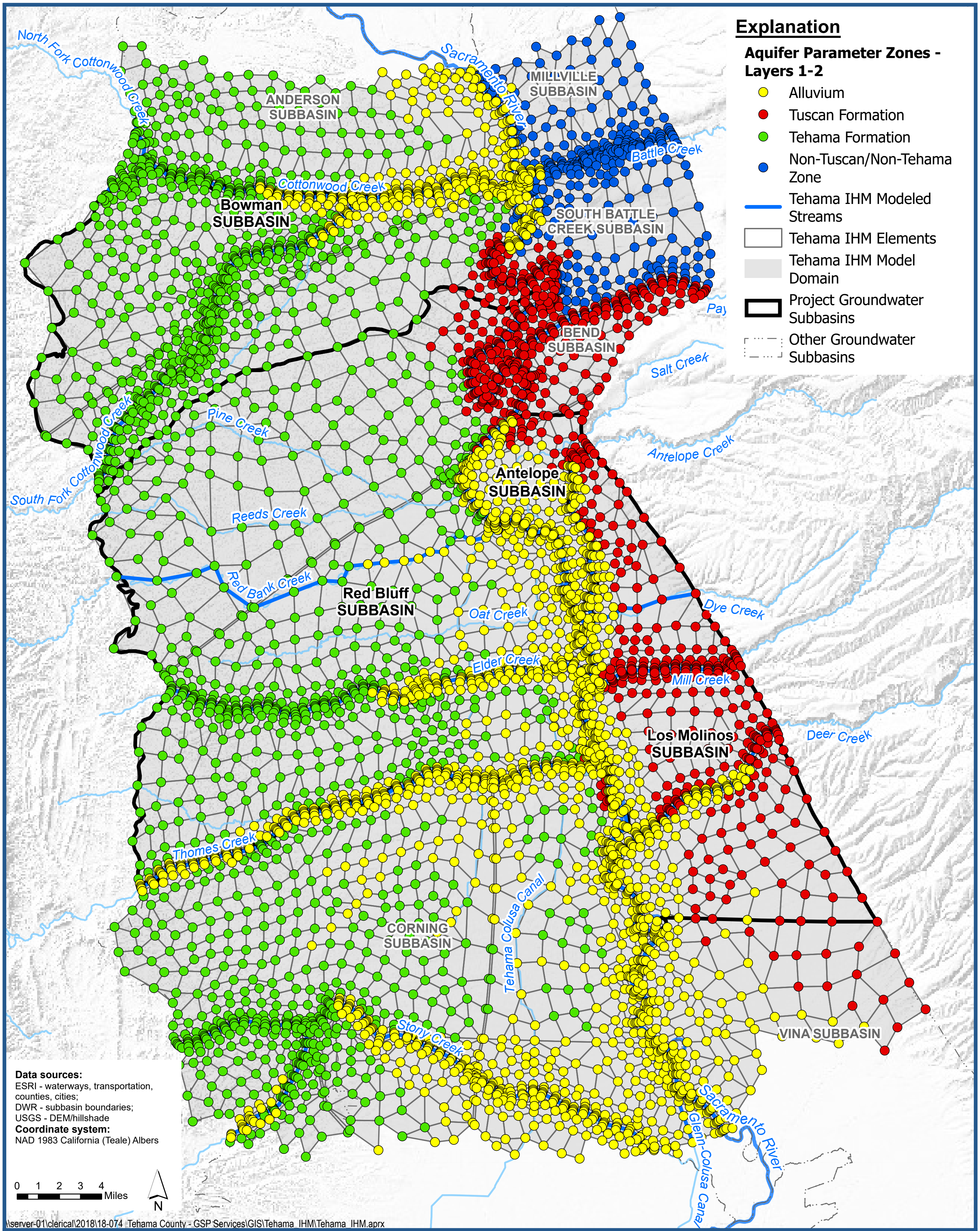
Extent of the Non-Tuscan/Non-Tehama Zone in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-42



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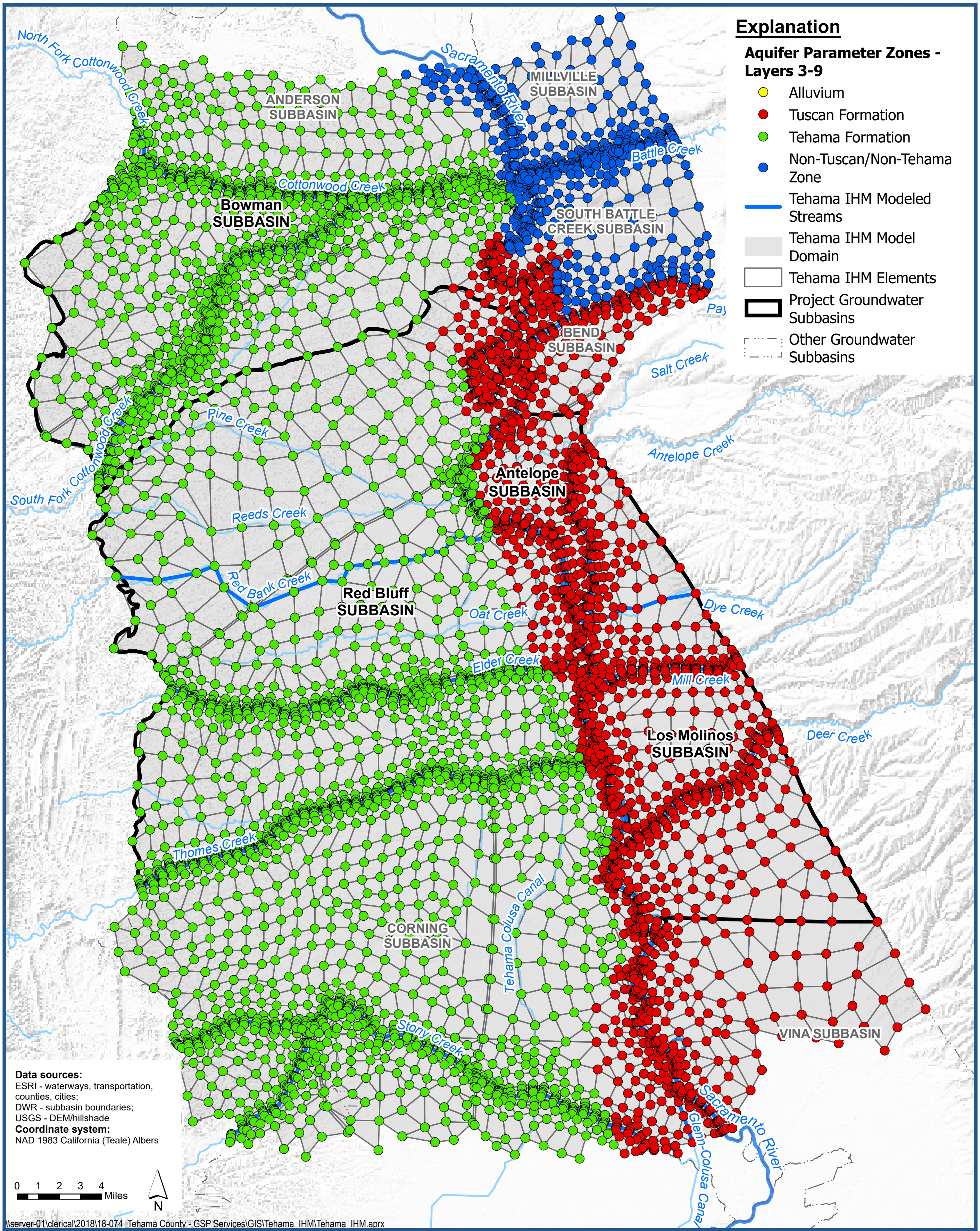
Assigned Aquifer Parameter Zone by Node in Tehama IHM - Layers 1-2

Groundwater Sustainability Planning
Tehama County, California

Figure 3-43



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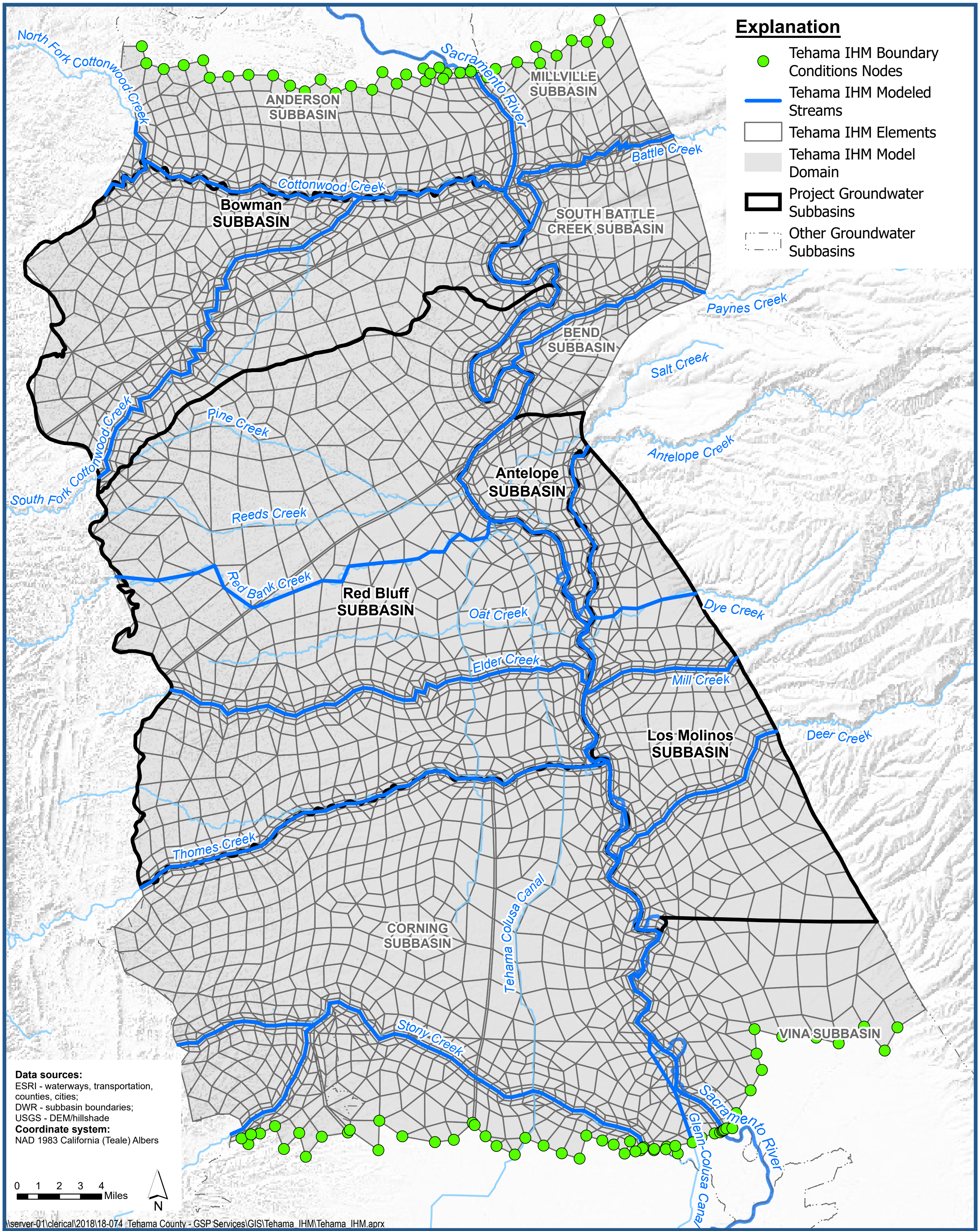
Assigned Aquifer Parameter Zone by Node in Tehama IHM - Layers 3-9

Groundwater Sustainability Planning
Tehama County, California

Figure 3-44



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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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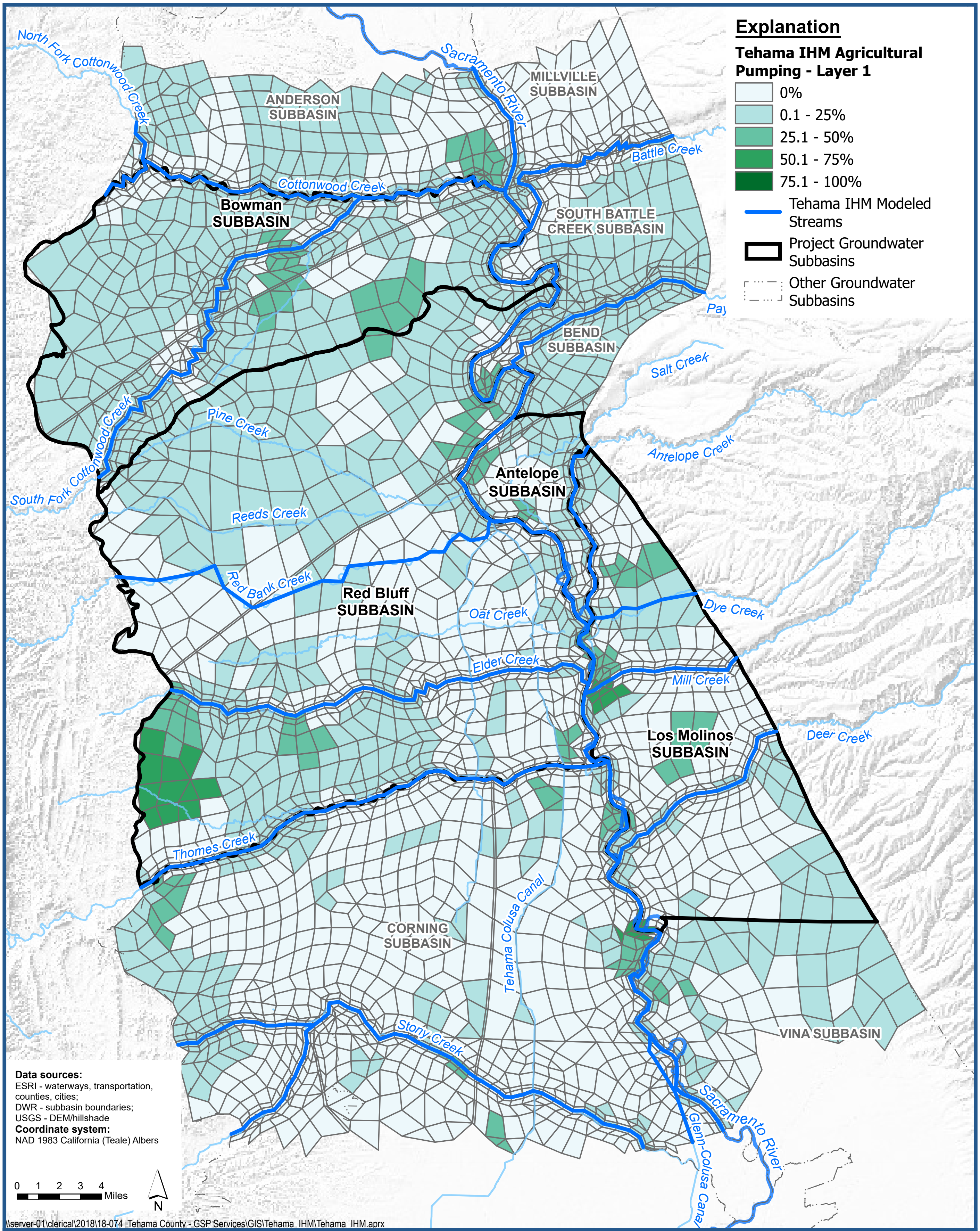
Tehama IHM Groundwater Nodes with Boundary Conditions

Groundwater Sustainability Planning
Tehama County, California

Figure 3-45



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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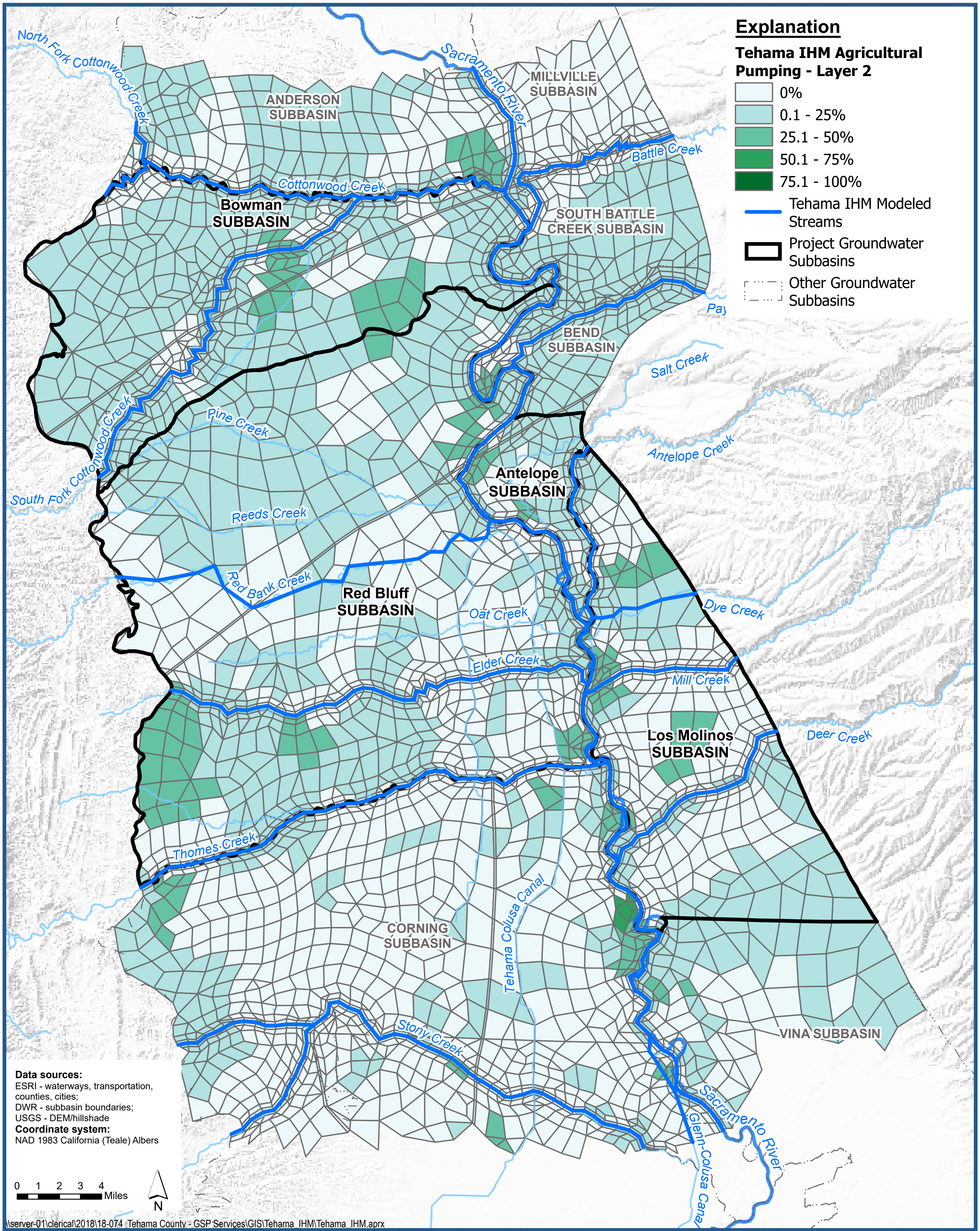
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 1

Groundwater Sustainability Planning
Tehama County, California

Figure 3-46



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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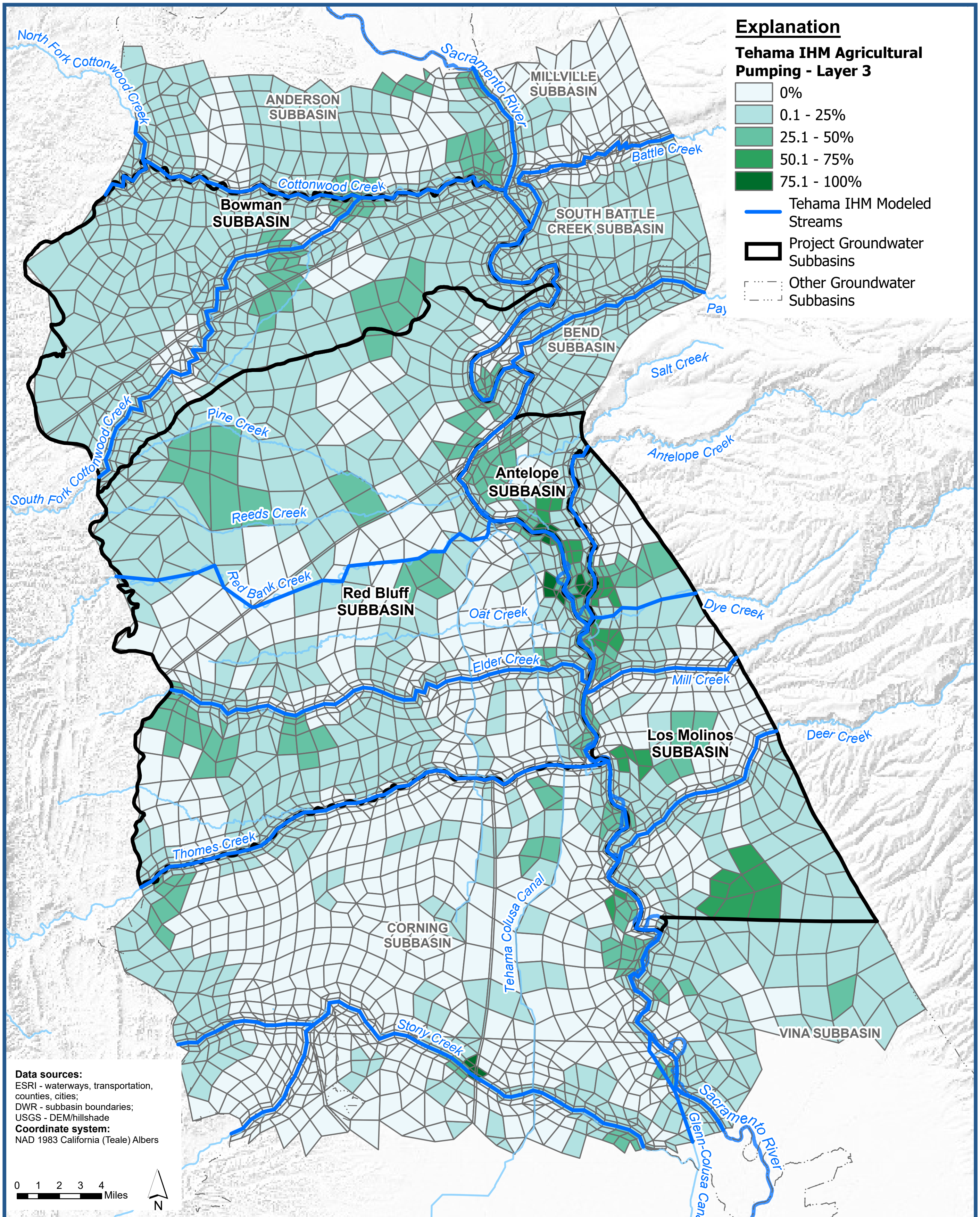
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 3-47



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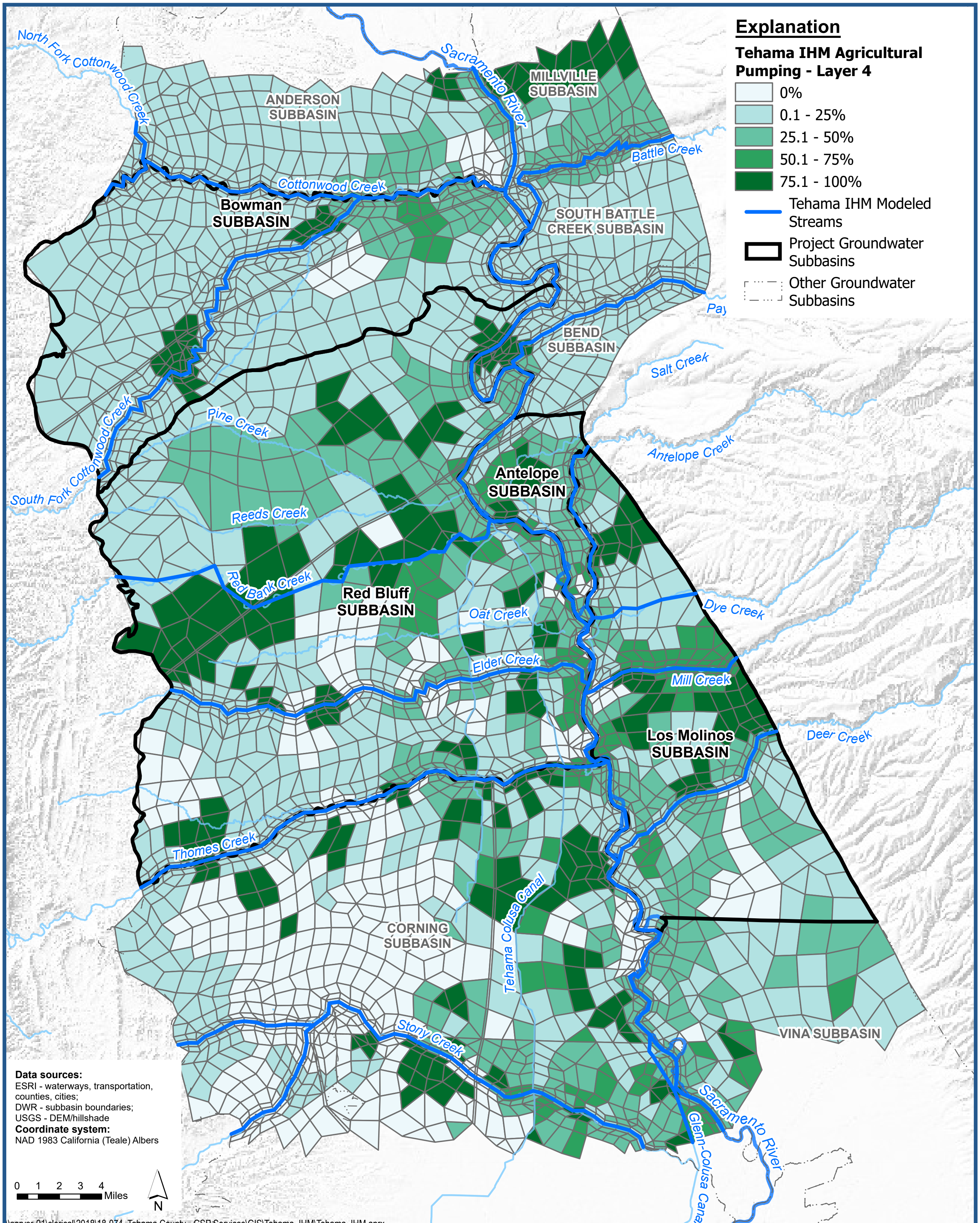
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 3

Groundwater Sustainability Planning
Tehama County, California

Figure 3-48



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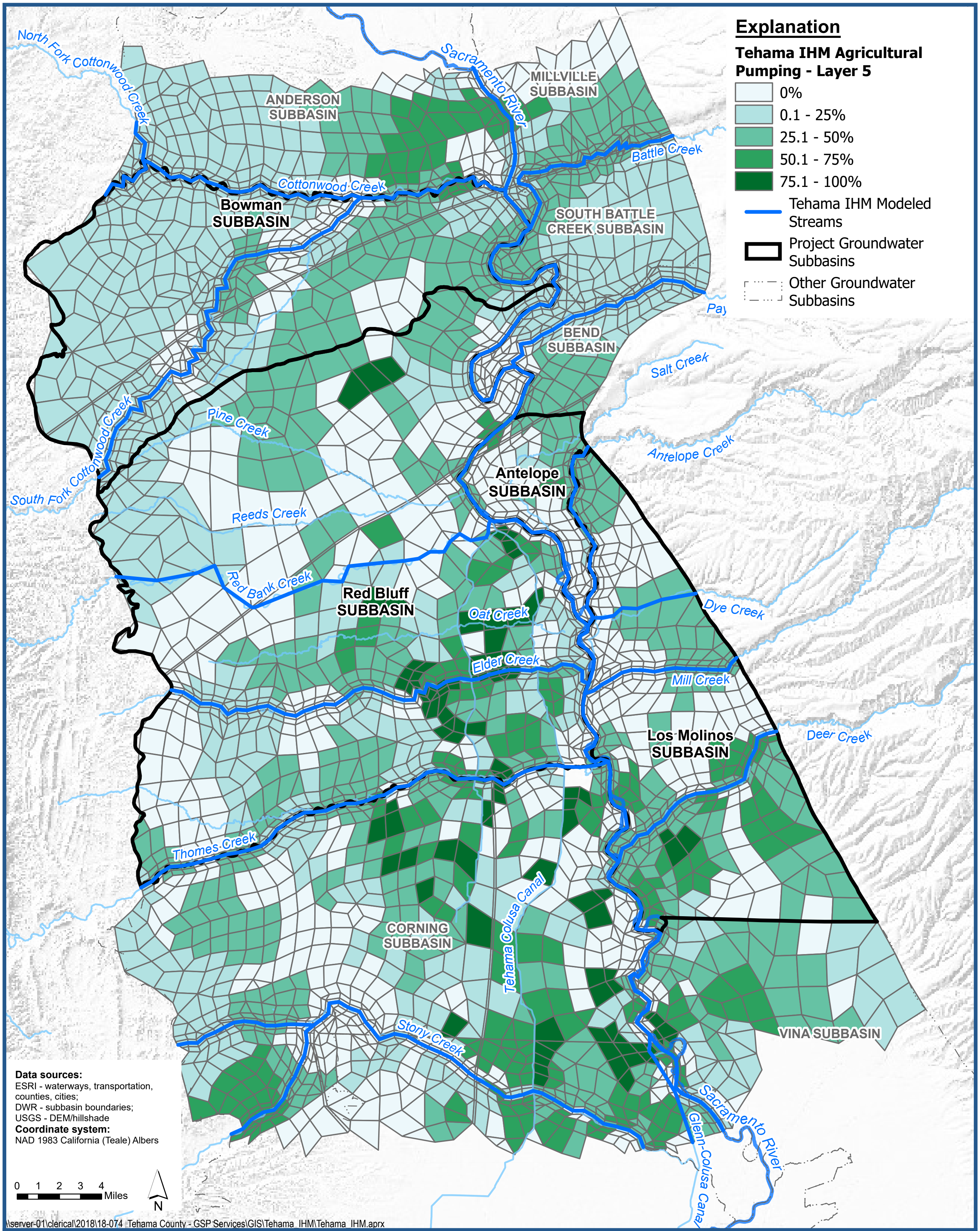
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 4

Groundwater Sustainability Planning
Tehama County, California

Figure 3-49



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DWR - subbasin boundaries;
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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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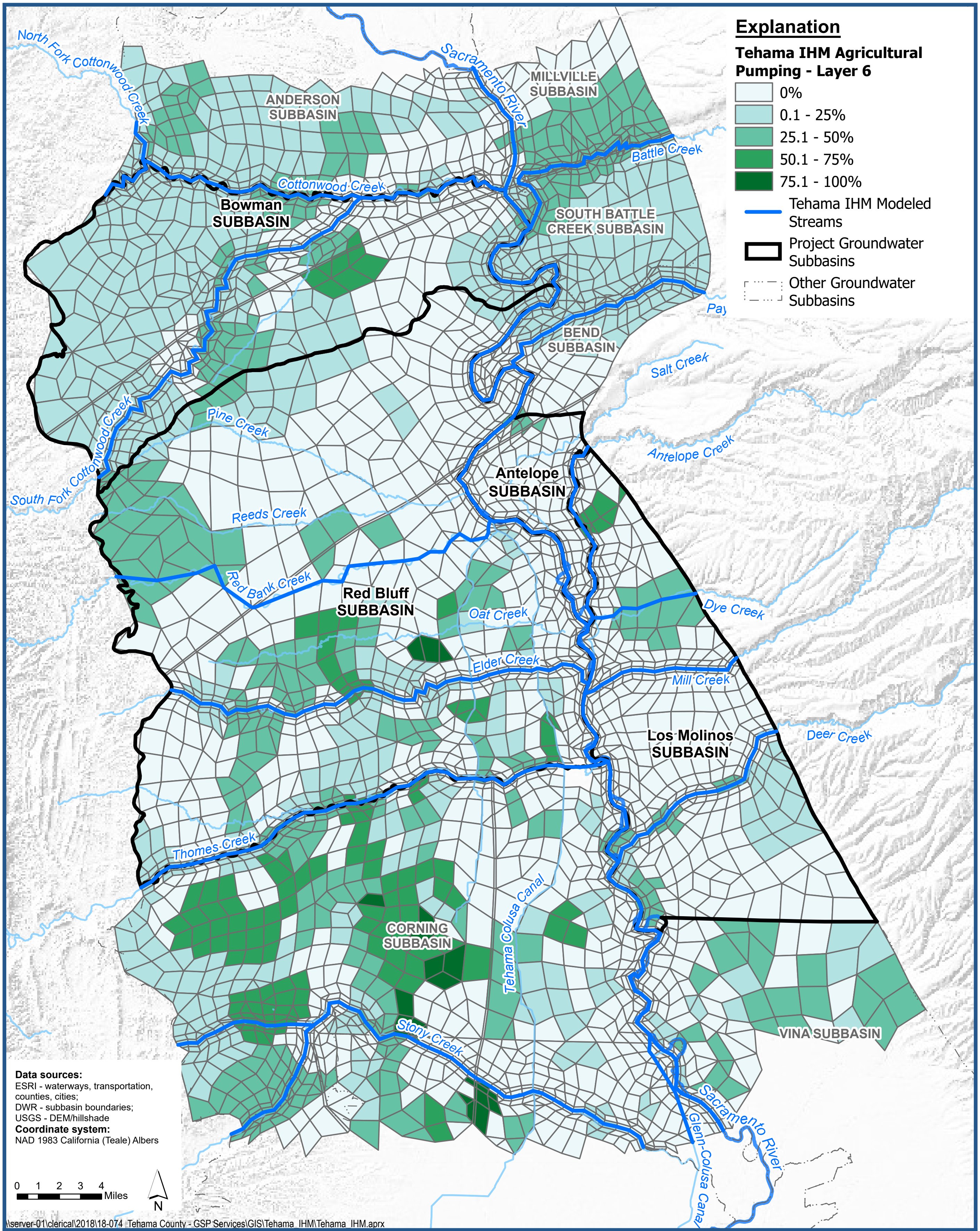
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 3-50



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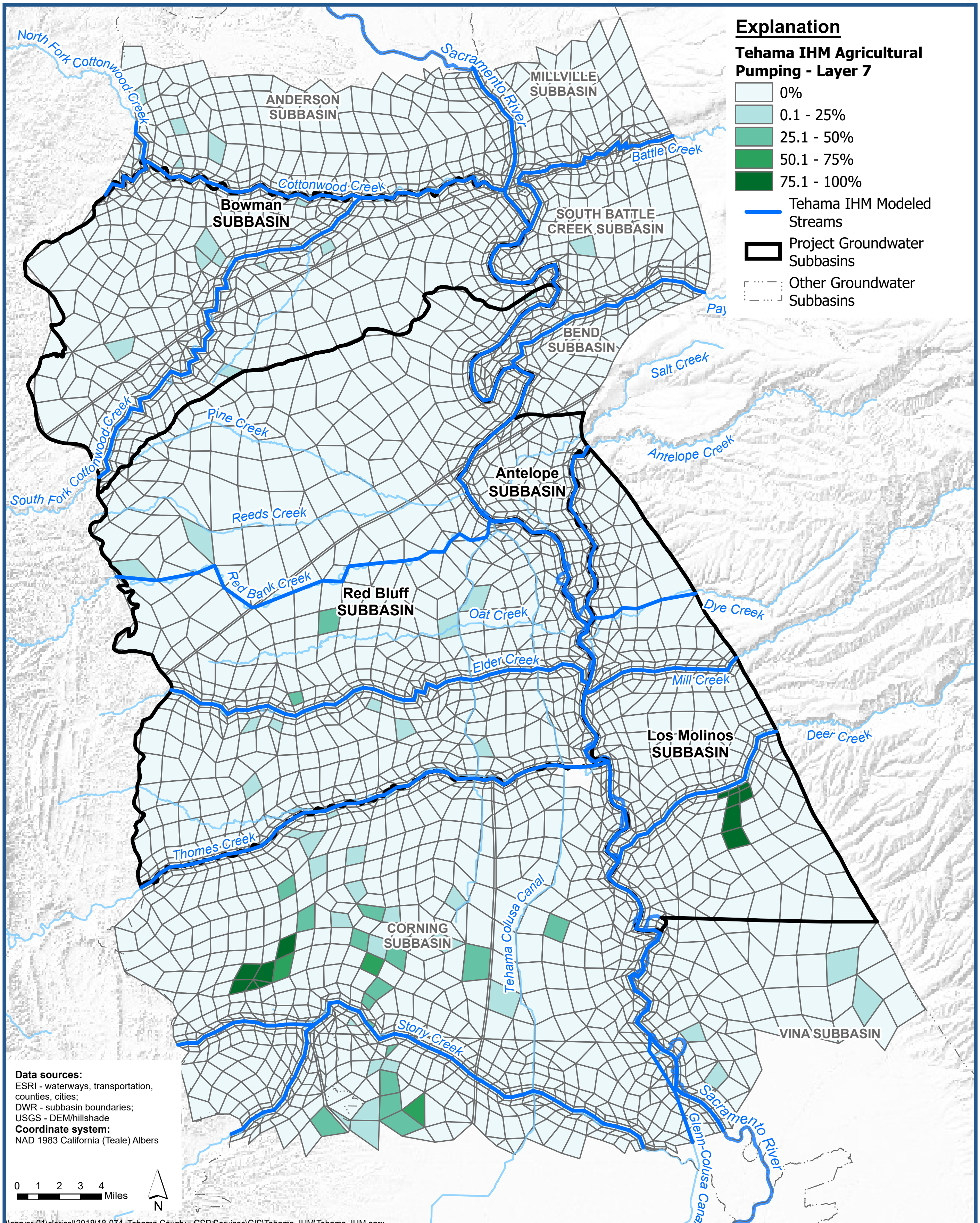
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 6

Groundwater Sustainability Planning
Tehama County, California

Figure 3-51



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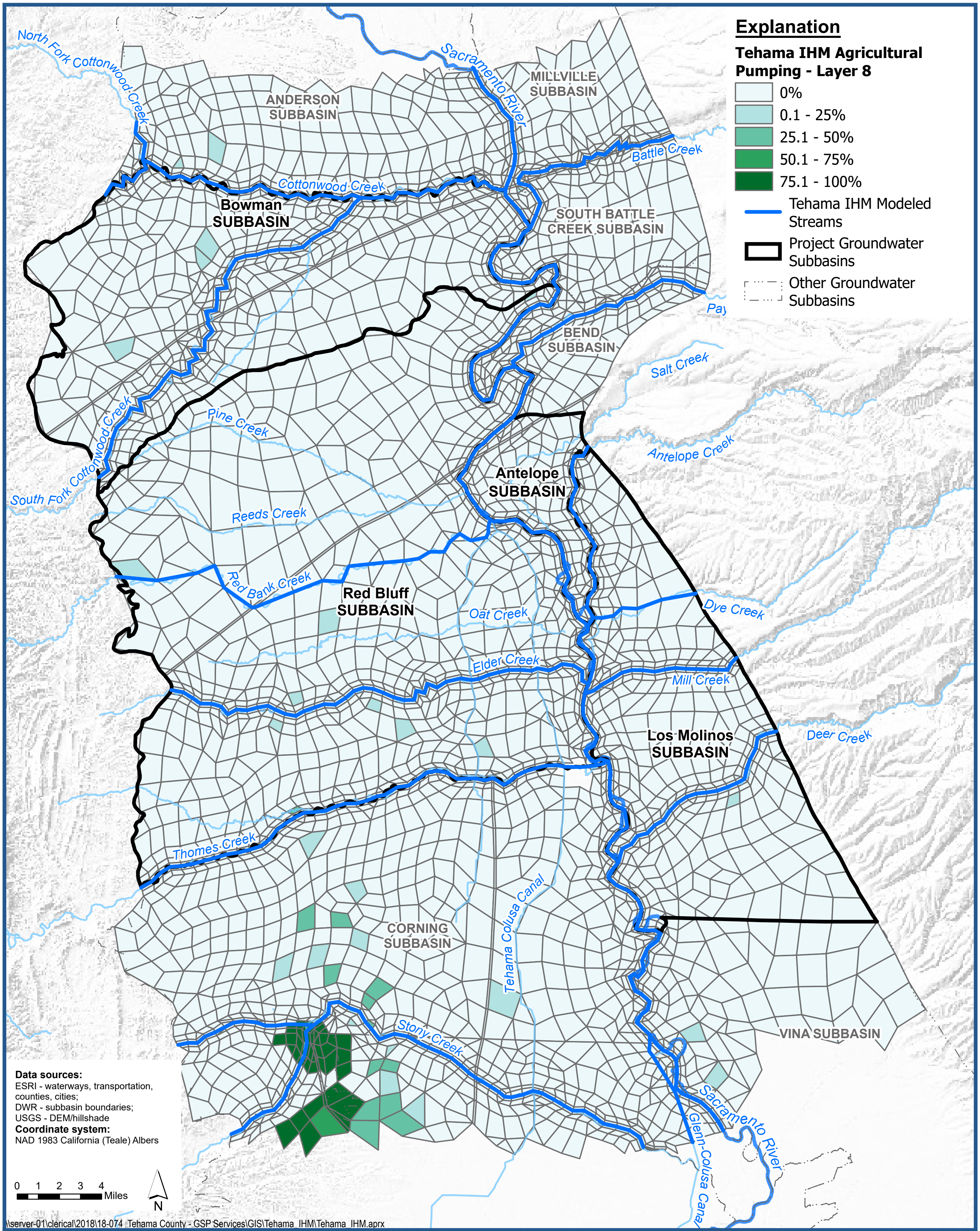
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 7

Groundwater Sustainability Planning
Tehama County, California

Figure 3-52



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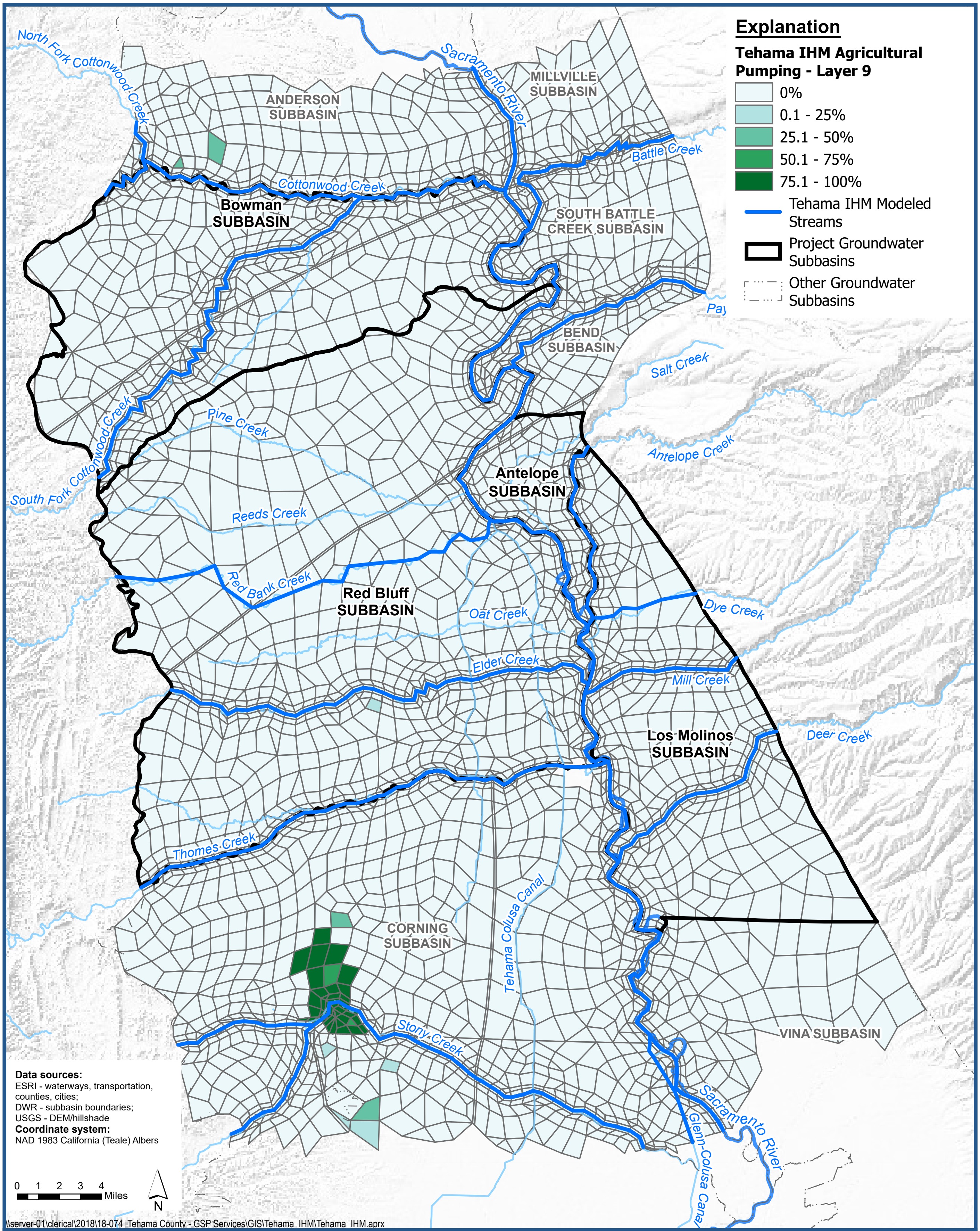
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 8

Groundwater Sustainability Planning
Tehama County, California

Figure 3-53



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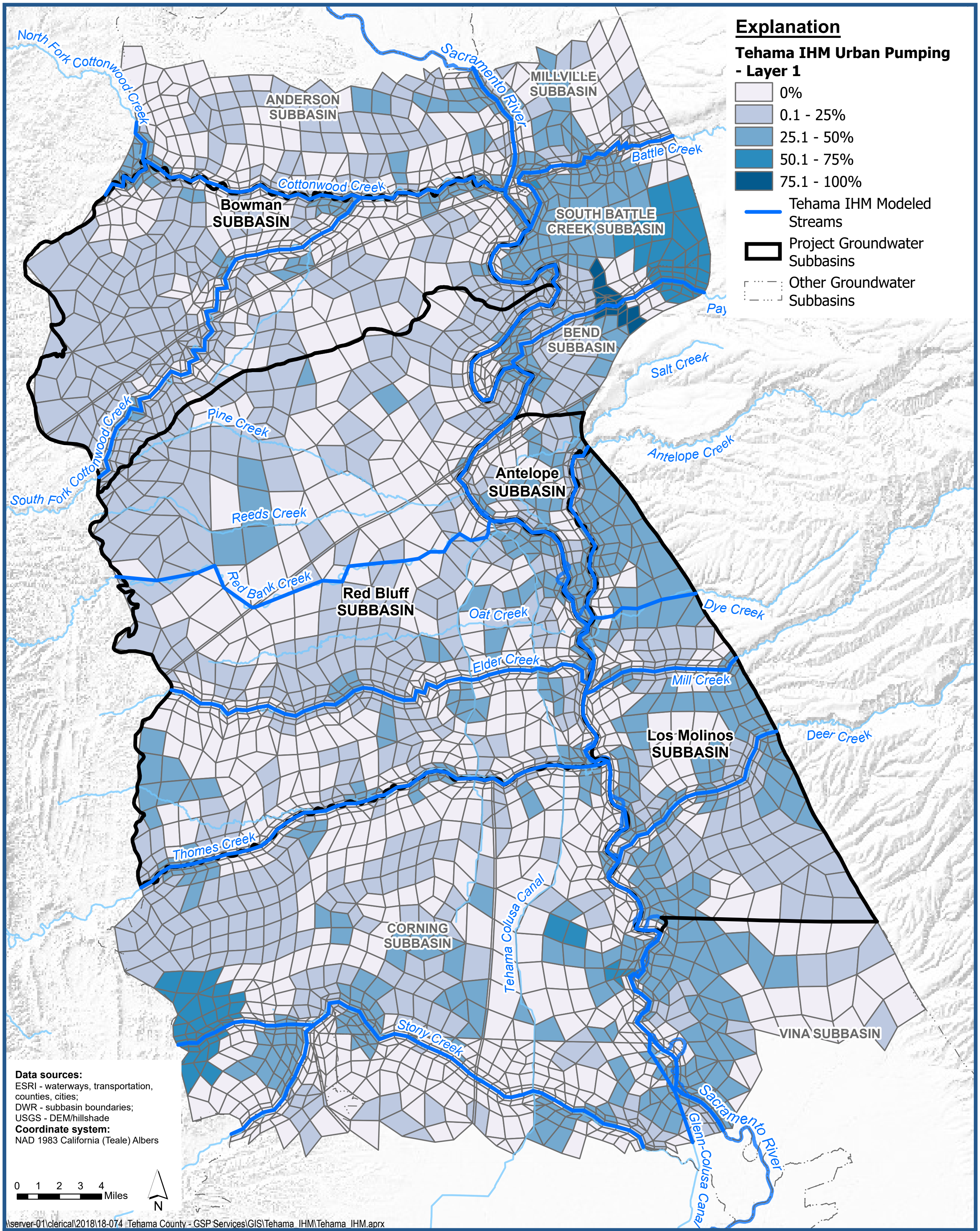
Vertical Distribution of Historical Agricultural Pumping in Tehama IHM - Layer 9

Groundwater Sustainability Planning
Tehama County, California

Figure 3-54



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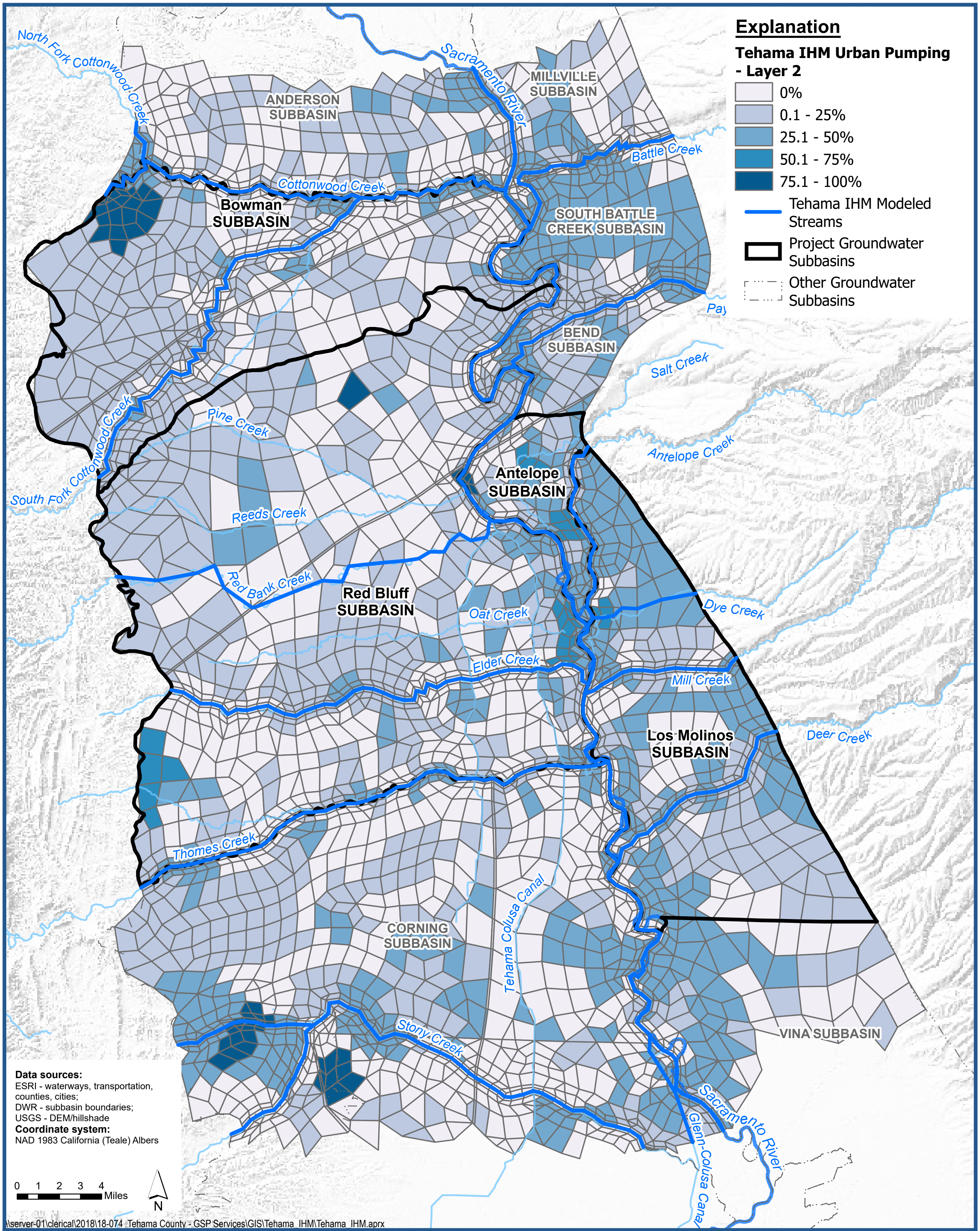
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 1

Groundwater Sustainability Planning
Tehama County, California

Figure 3-55



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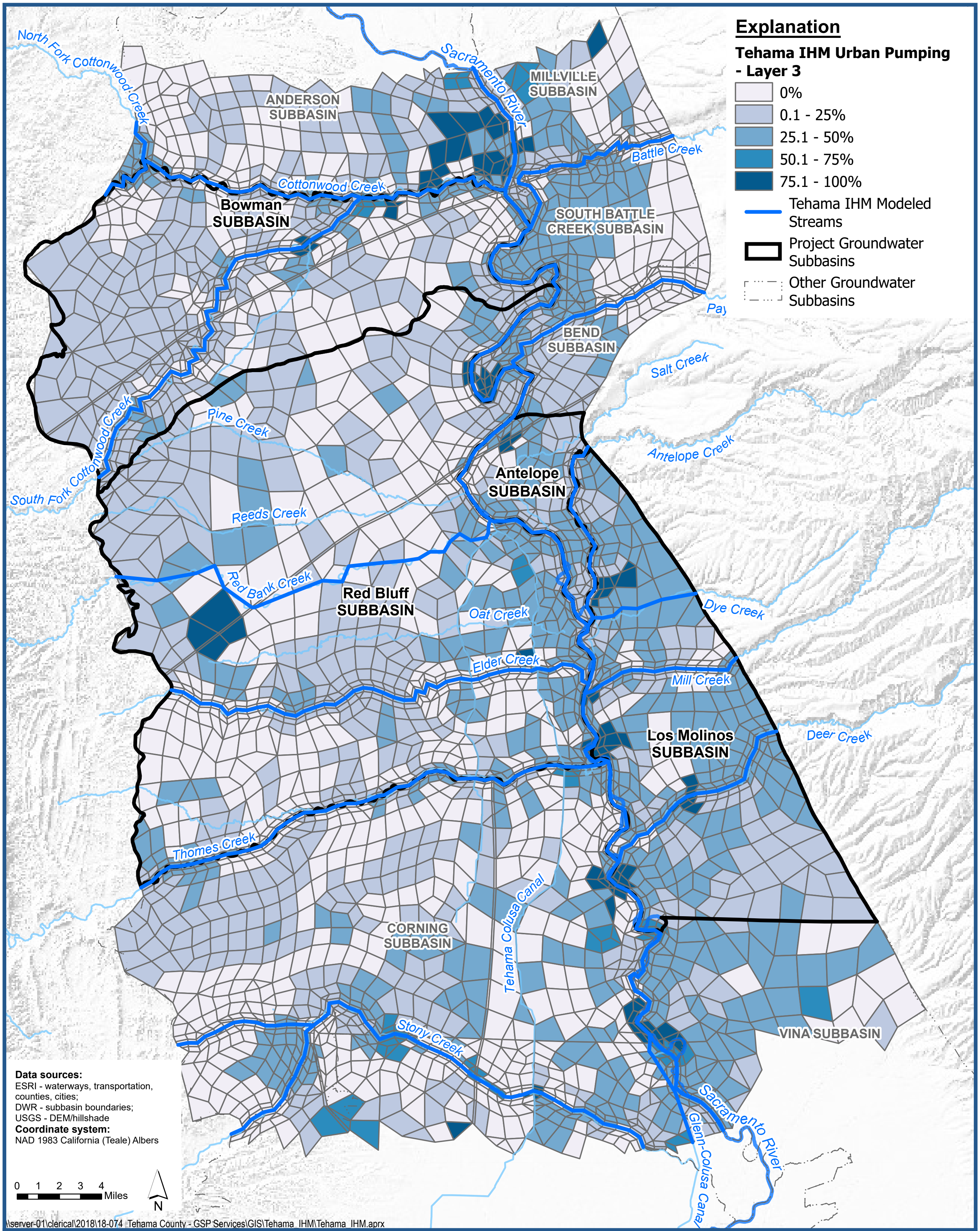
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 3-56



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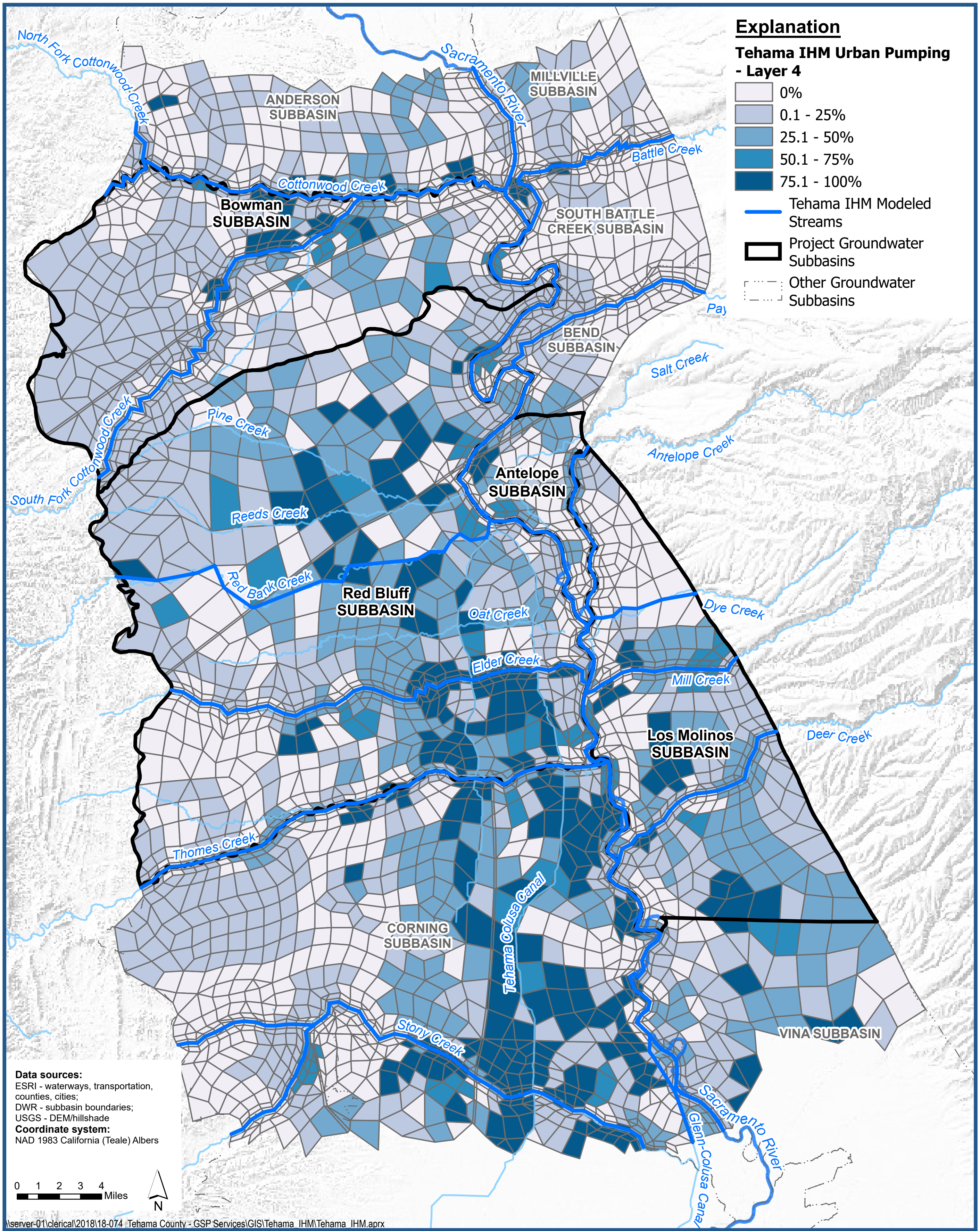
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 3

Groundwater Sustainability Planning
Tehama County, California

Figure 3-57



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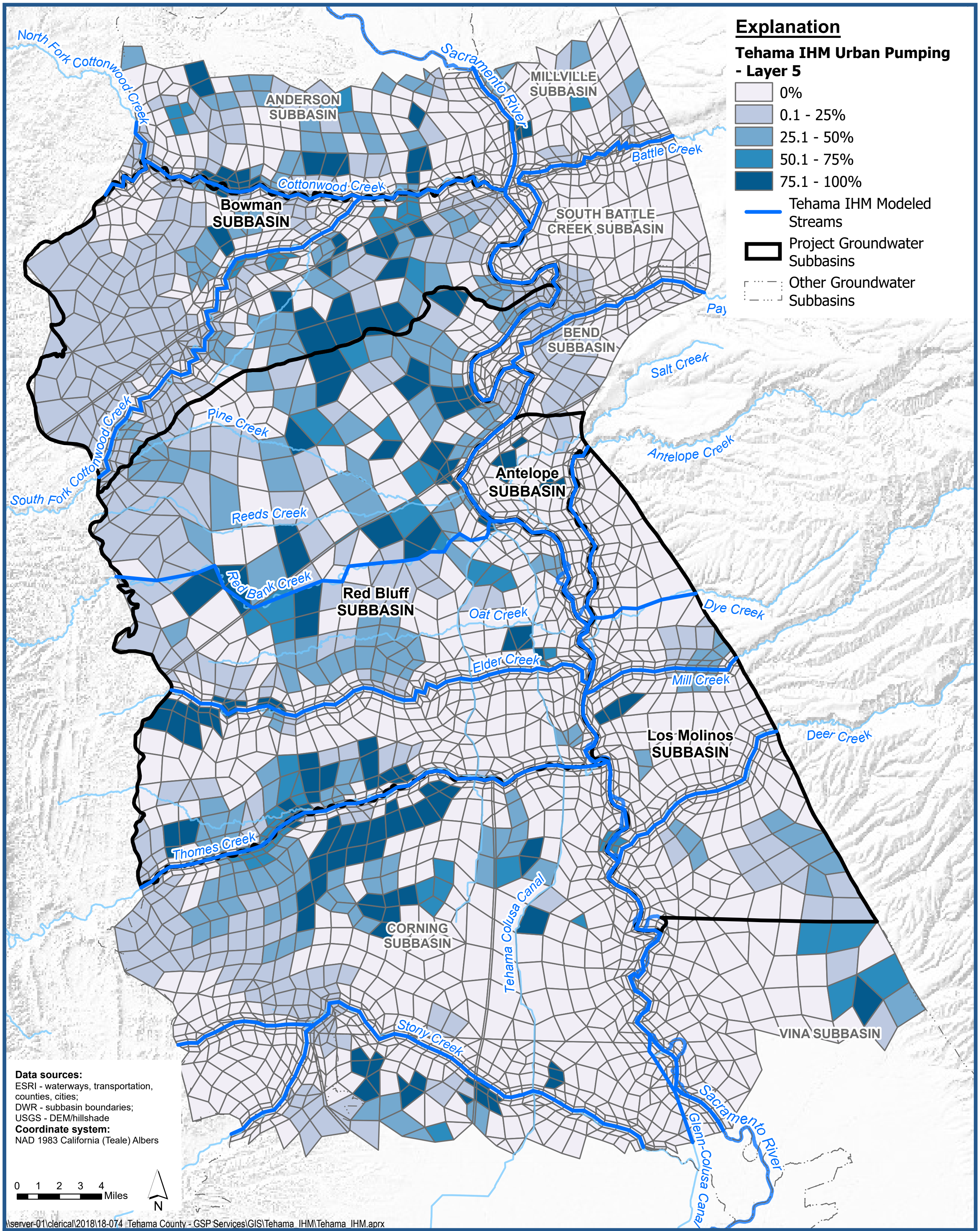
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 4

Groundwater Sustainability Planning
Tehama County, California

Figure 3-58



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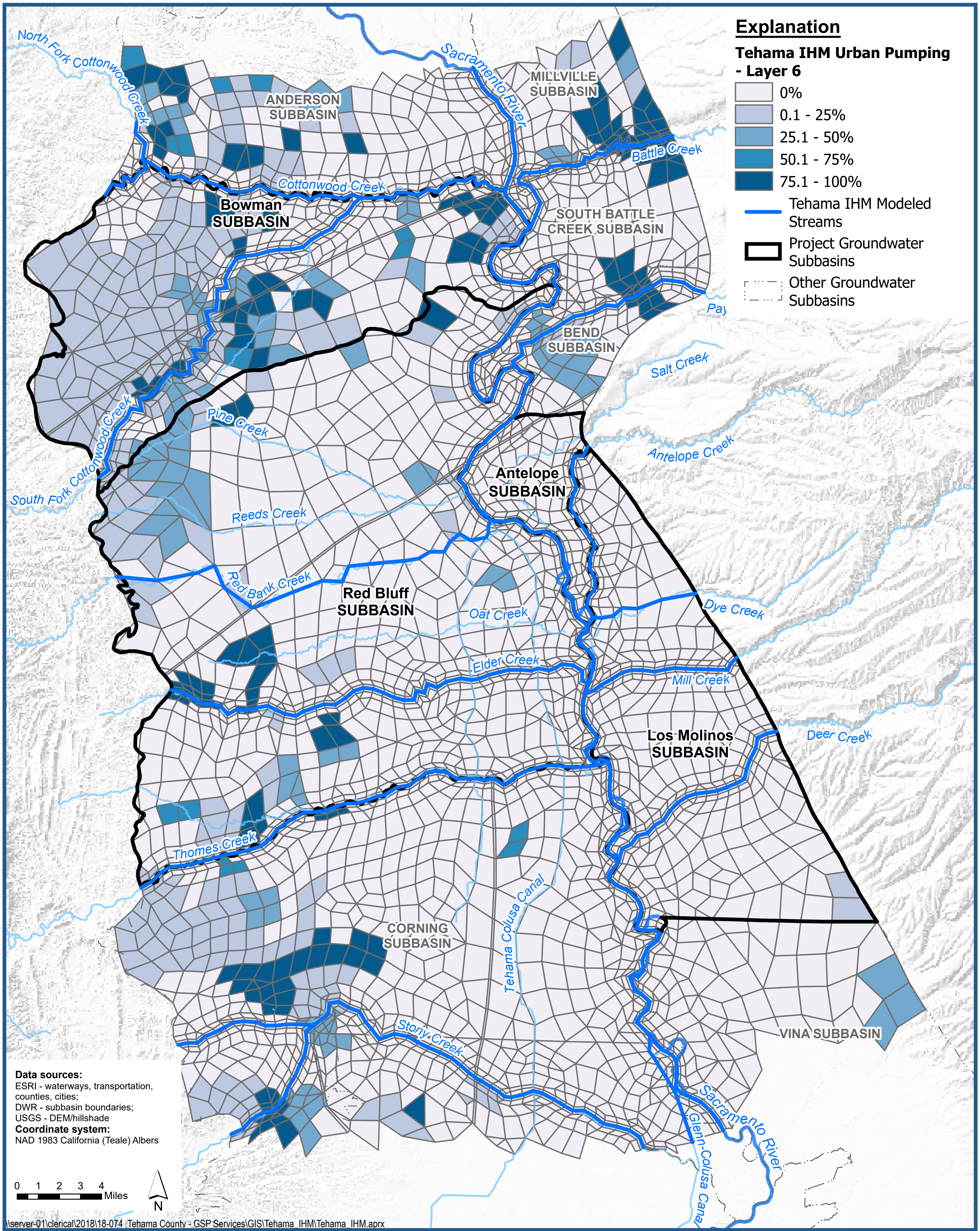
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 3-59



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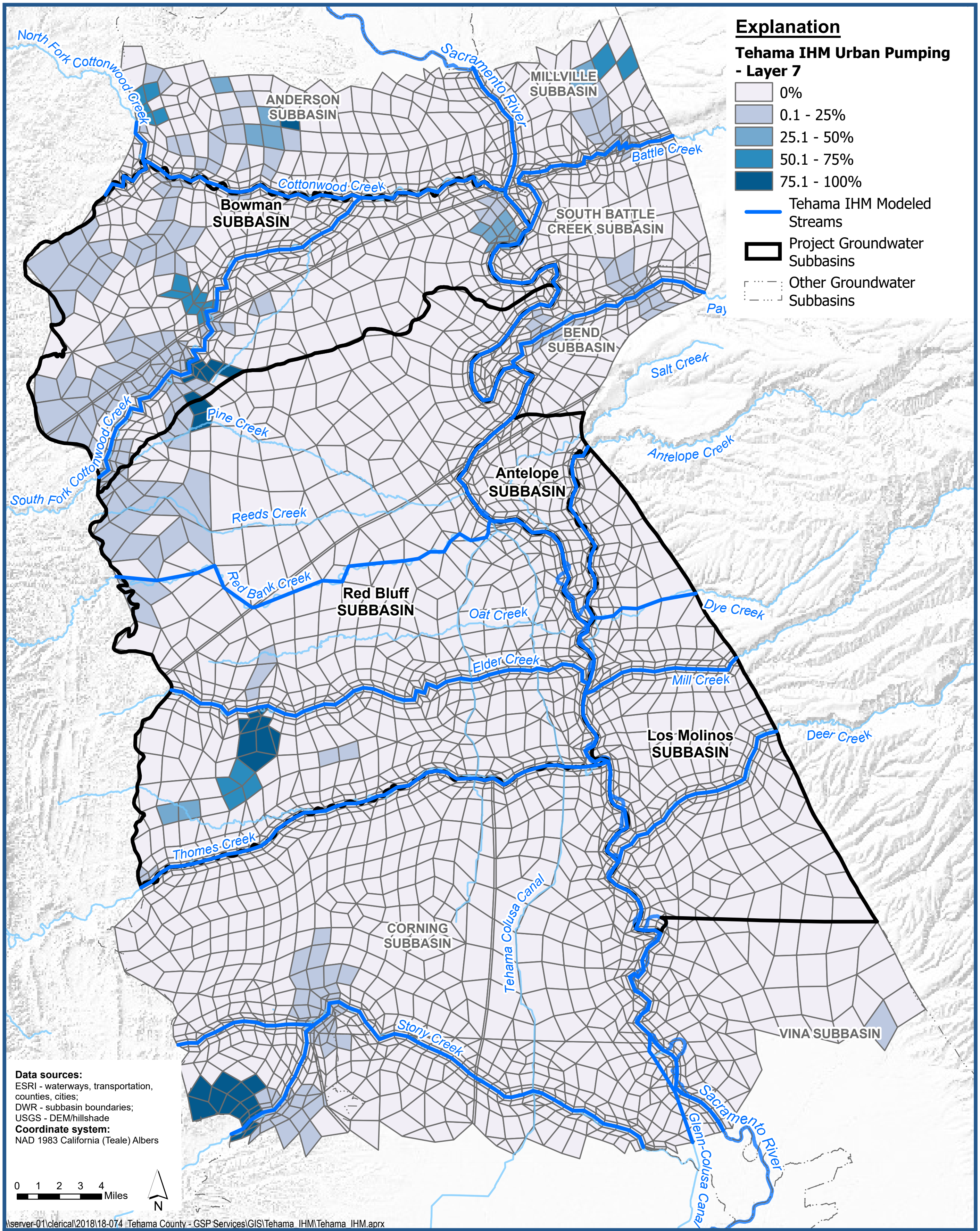
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 6

Groundwater Sustainability Planning
Tehama County, California

Figure 3-60



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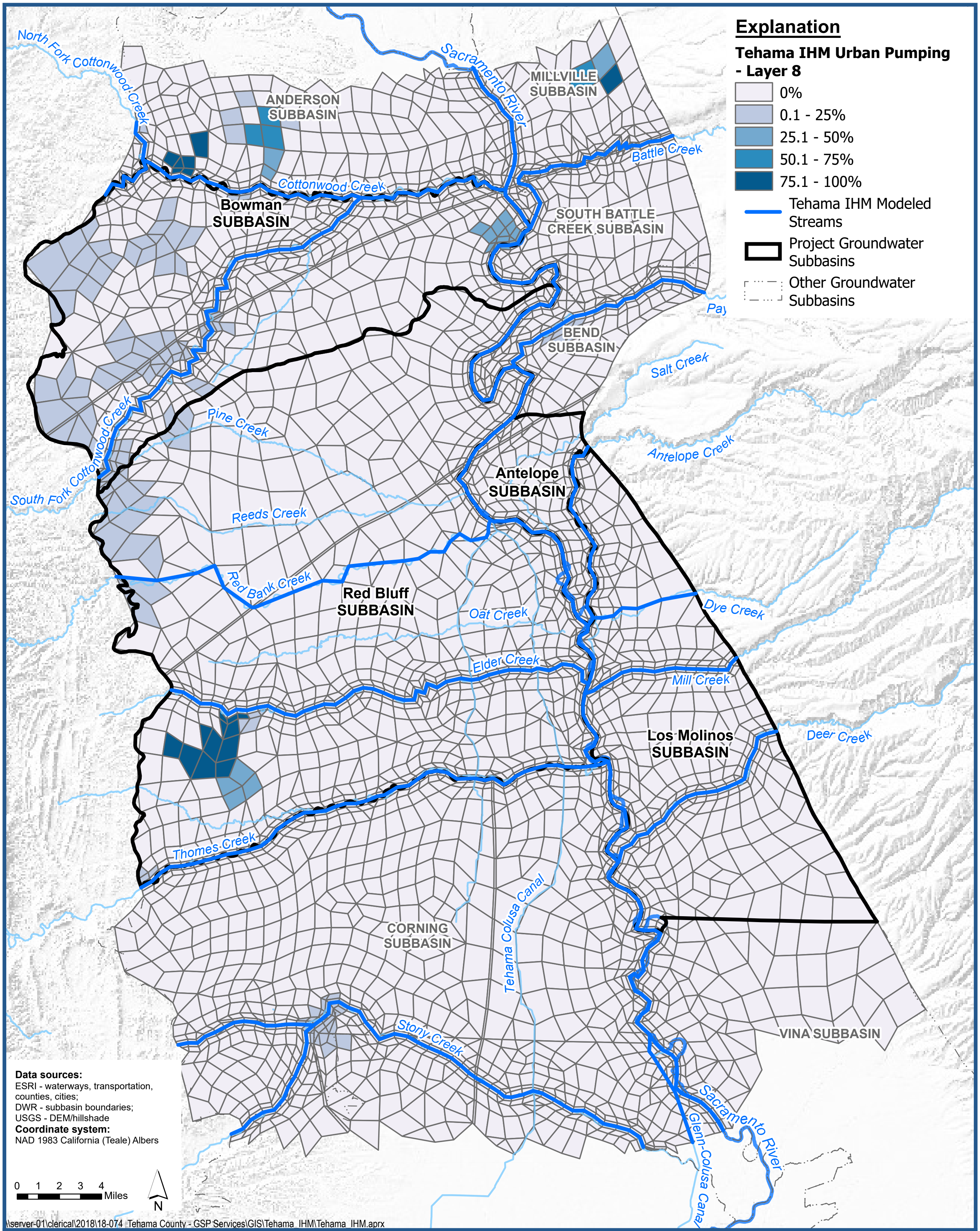
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 7

Groundwater Sustainability Planning
Tehama County, California

Figure 3-61



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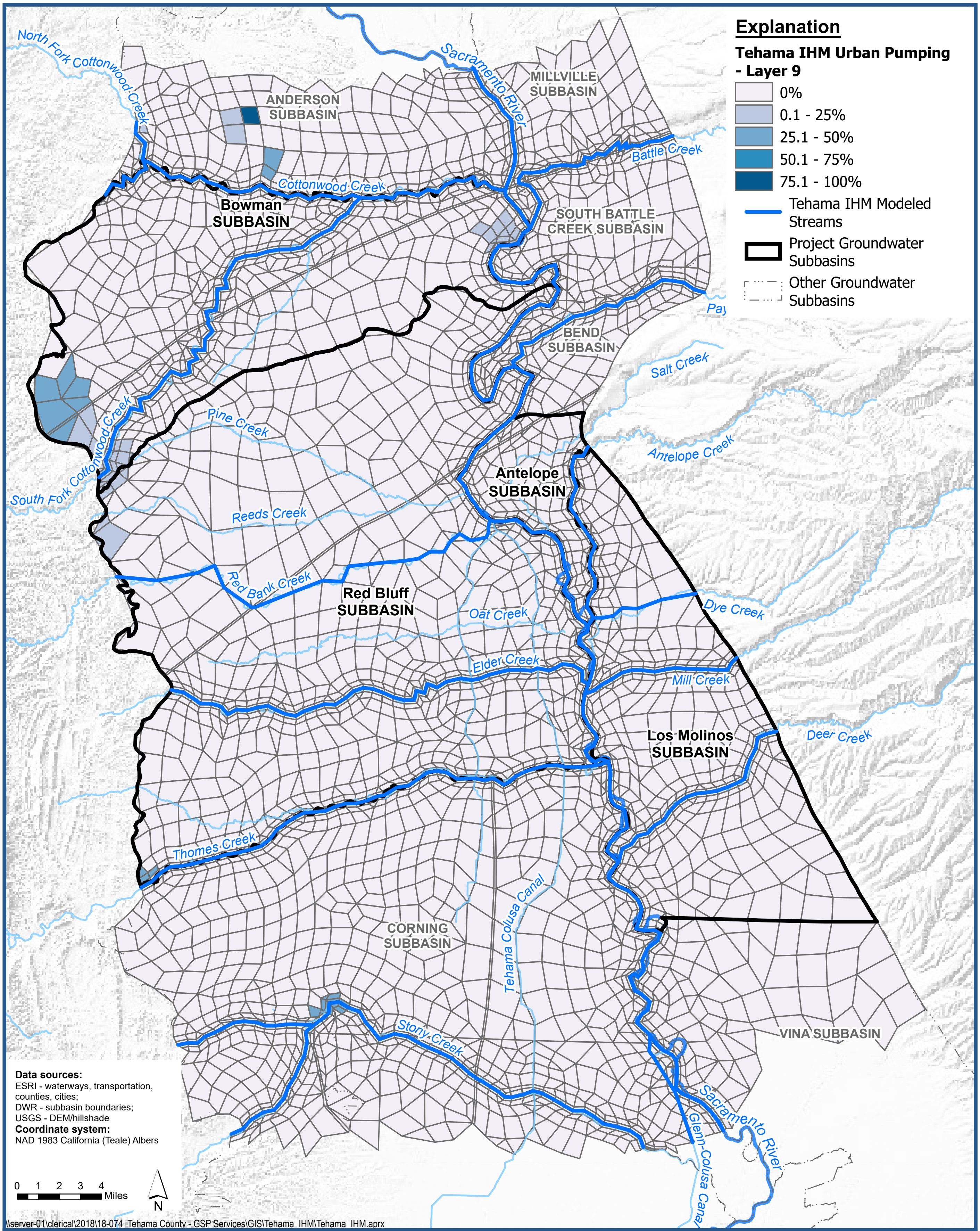
Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 8

Groundwater Sustainability Planning
Tehama County, California

Figure 3-62



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Vertical Distribution of Historical Urban Pumping in Tehama IHM - Layer 9

Groundwater Sustainability Planning
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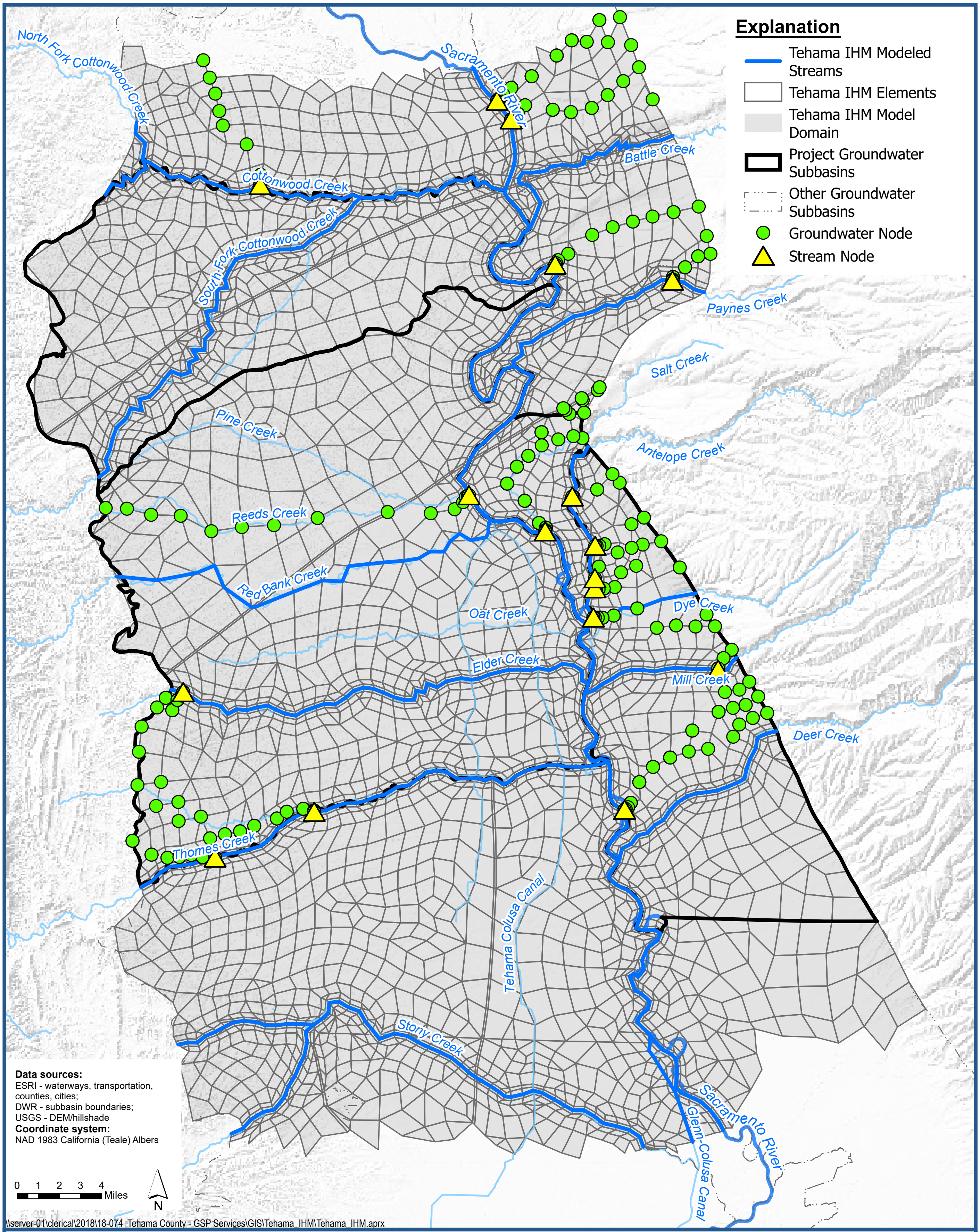
Figure 3-63



Explanation

- Tehama IHM Modeled Streams
- Tehama IHM Elements
- Tehama IHM Model Domain
- Project Groundwater Subbasins
- Other Groundwater Subbasins
- ● Groundwater Node
- △ Stream Node

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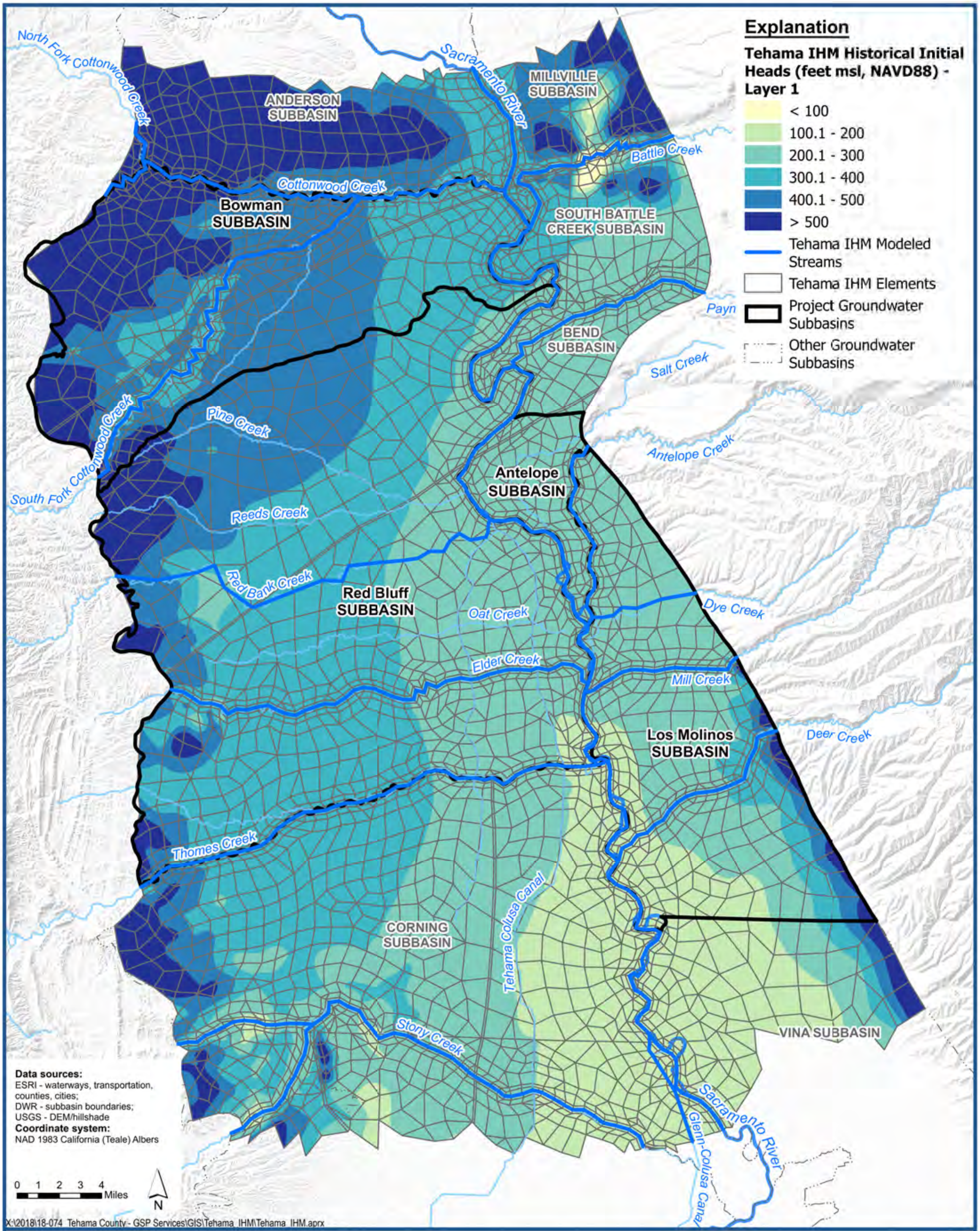
Tehama IHM Nodes Receiving Small Watershed Contributions

Groundwater Sustainability Planning
Tehama County, California

Figure 3-64



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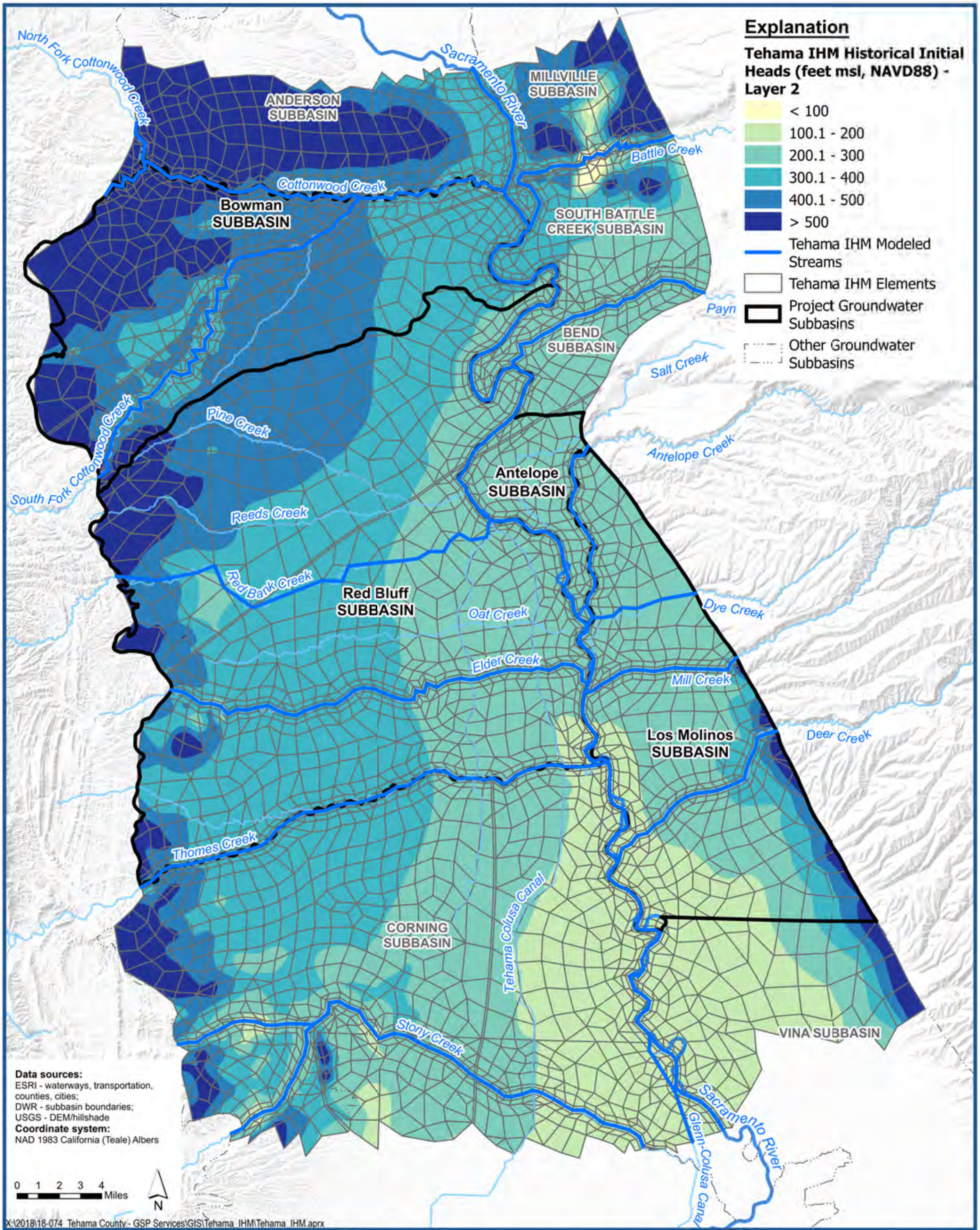
Historical Initial Groundwater Heads in Tehama IHM - Layer 1

Groundwater Sustainability Plan
Tehama County, California

Figure 3-65



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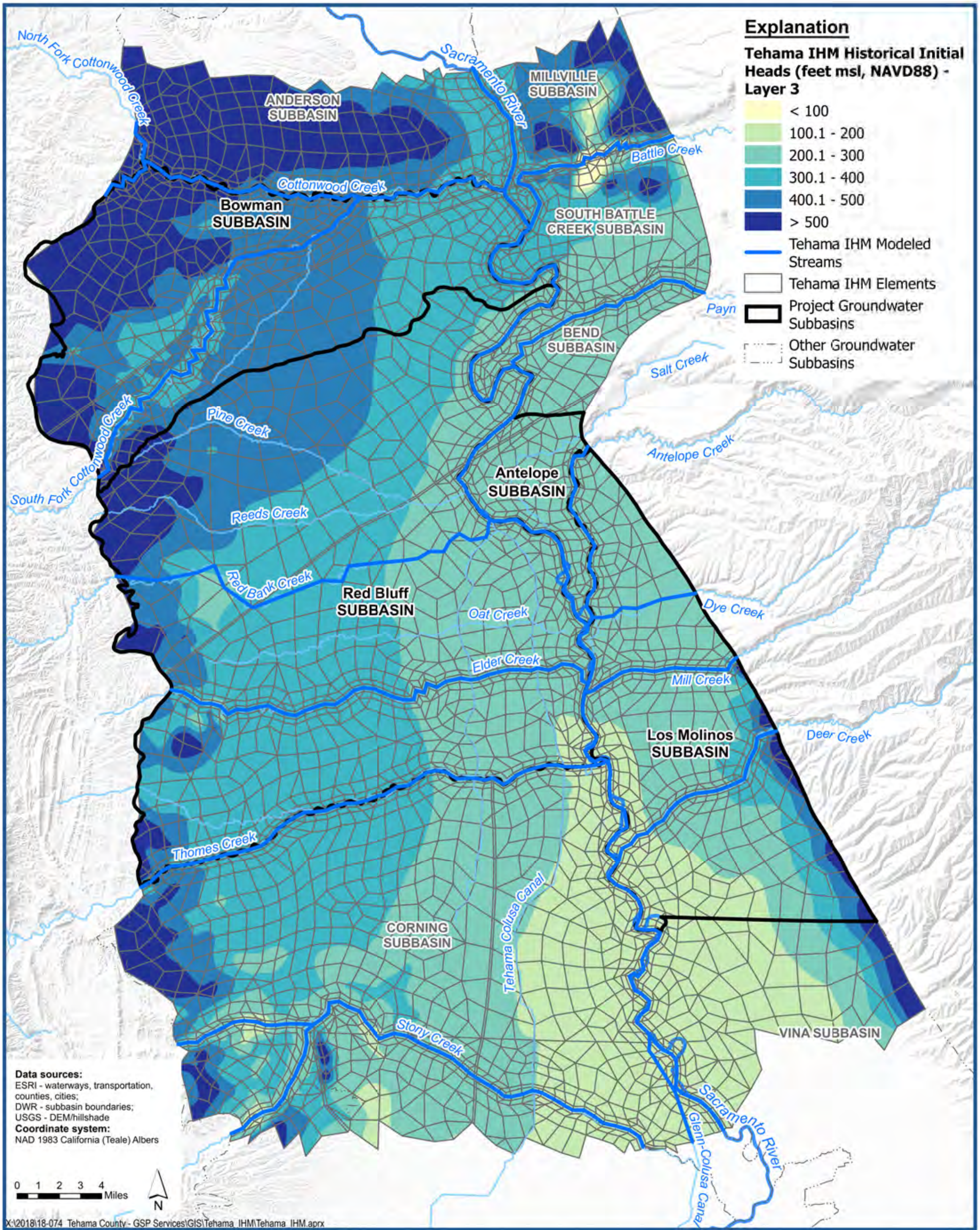
Historical Initial Groundwater Heads in Tehama IHM - Layer 2

Groundwater Sustainability Plan
Tehama County, California

Figure 3-66



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Historical Initial Groundwater Heads in Tehama IHM - Layer 3

Figure 3-67

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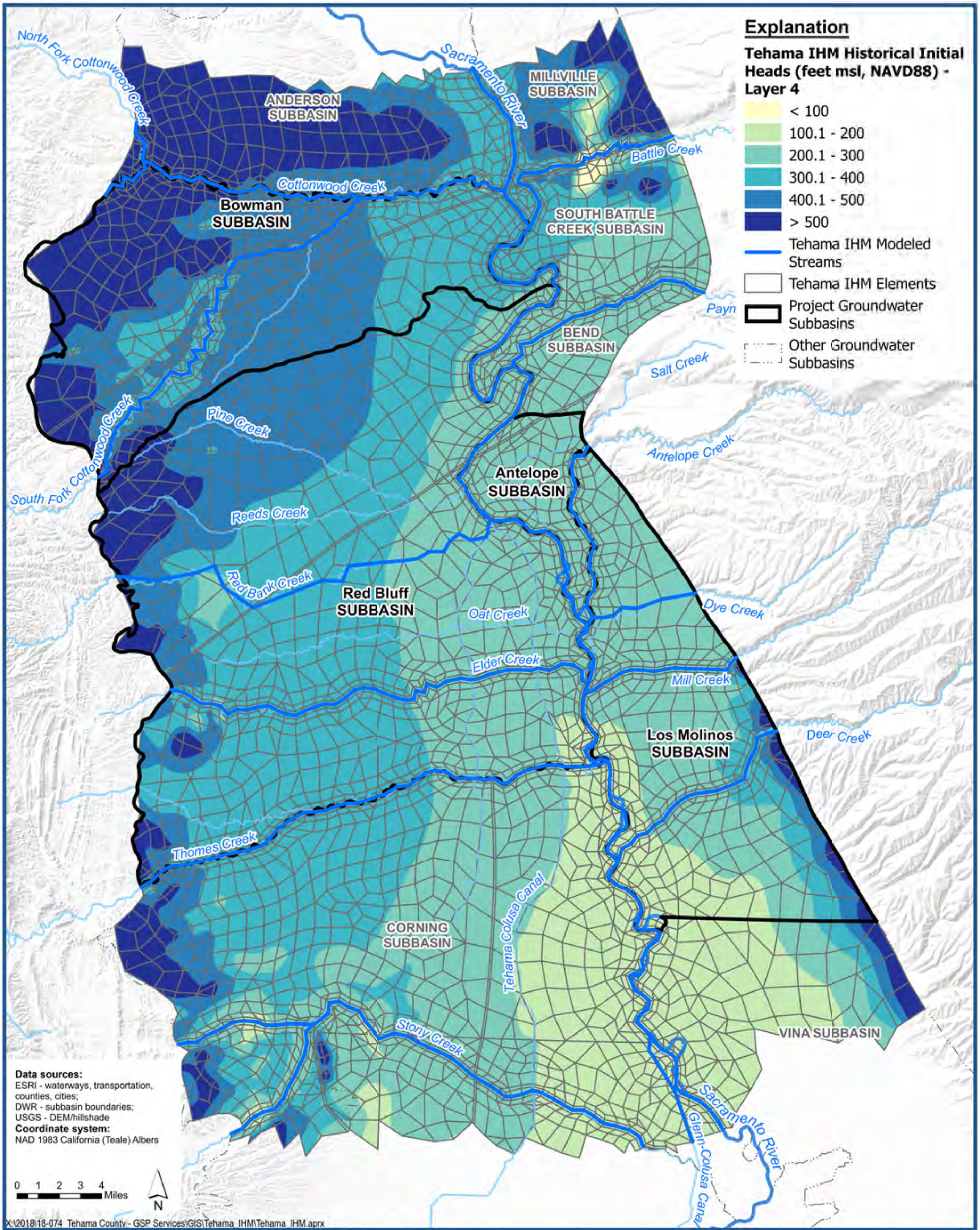

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Historical Initial Groundwater Heads in Tehama IHM - Layer 4

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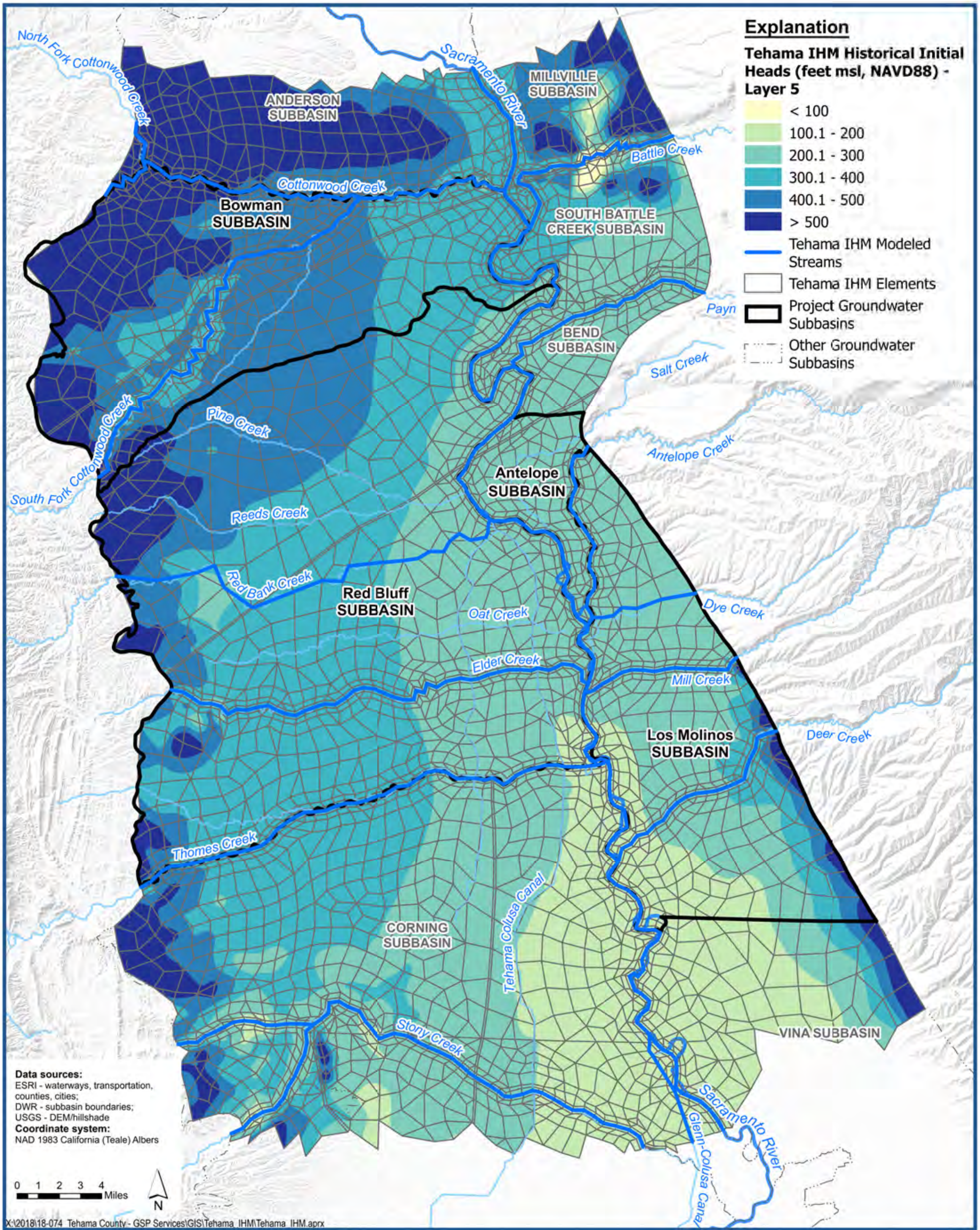
Figure 3-68



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Historical Initial Groundwater Heads in Tehama IHM - Layer 5

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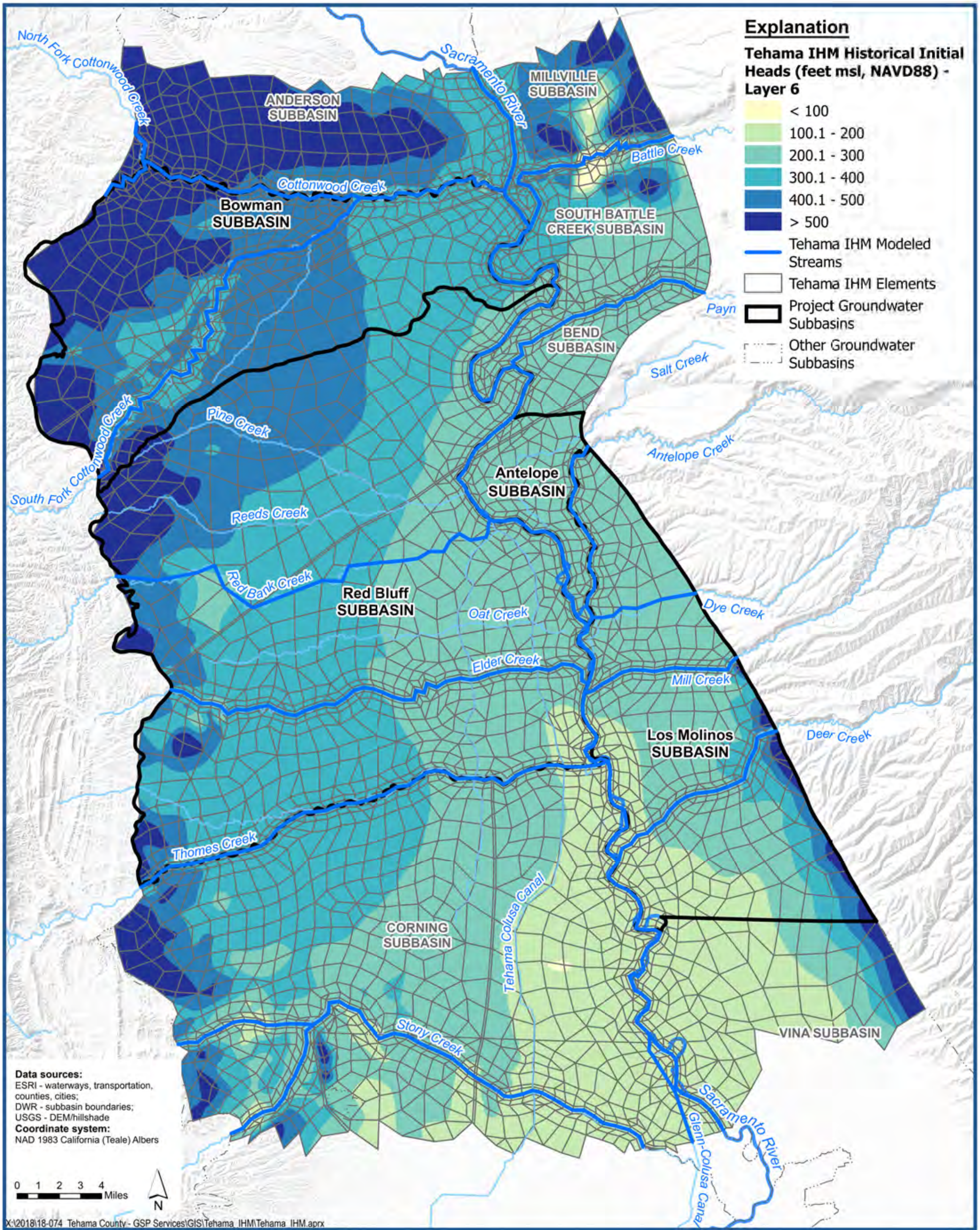
Figure 3-69



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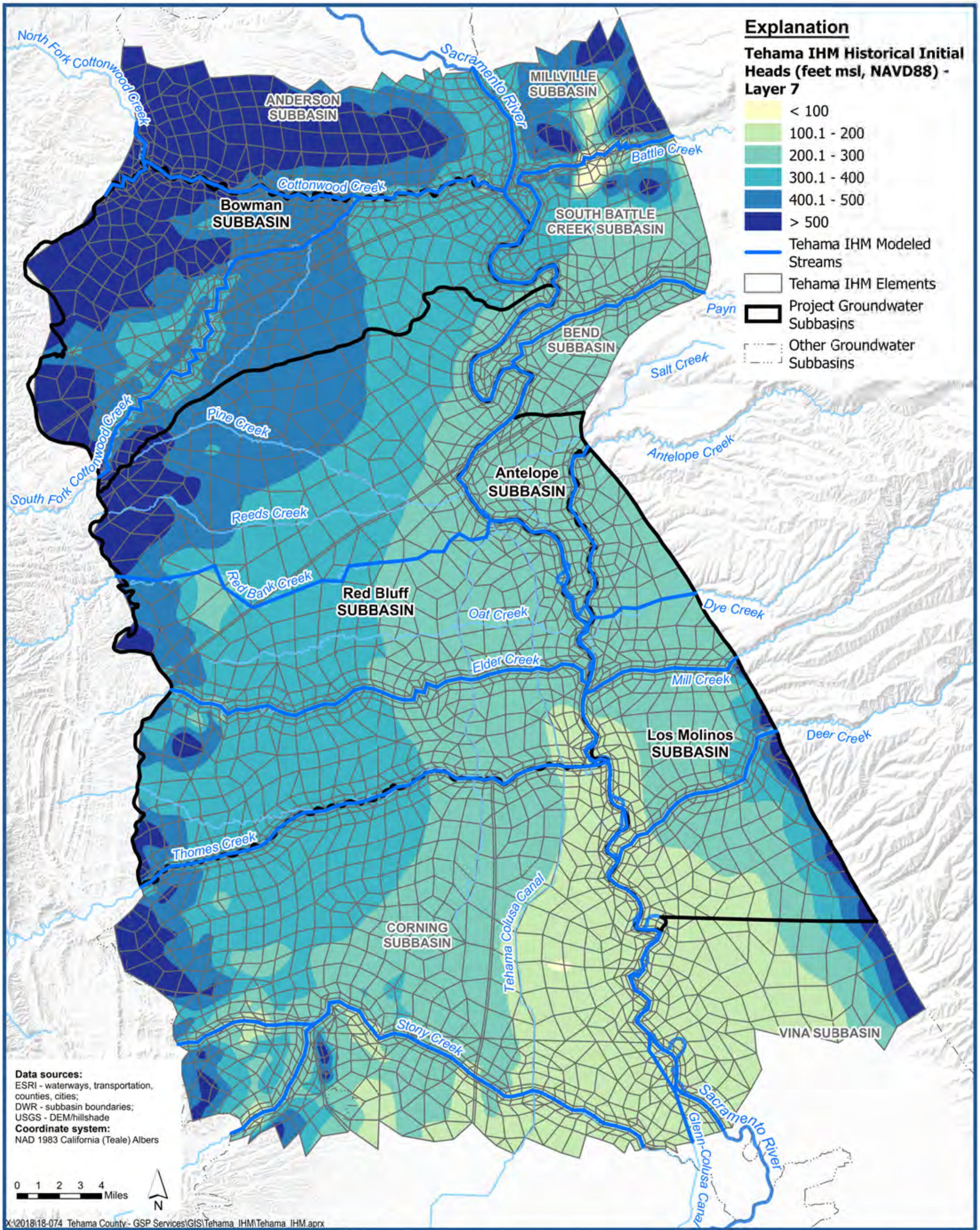
Historical Initial Groundwater Heads in Tehama IHM - Layer 6

Groundwater Sustainability Plan
Tehama County, California

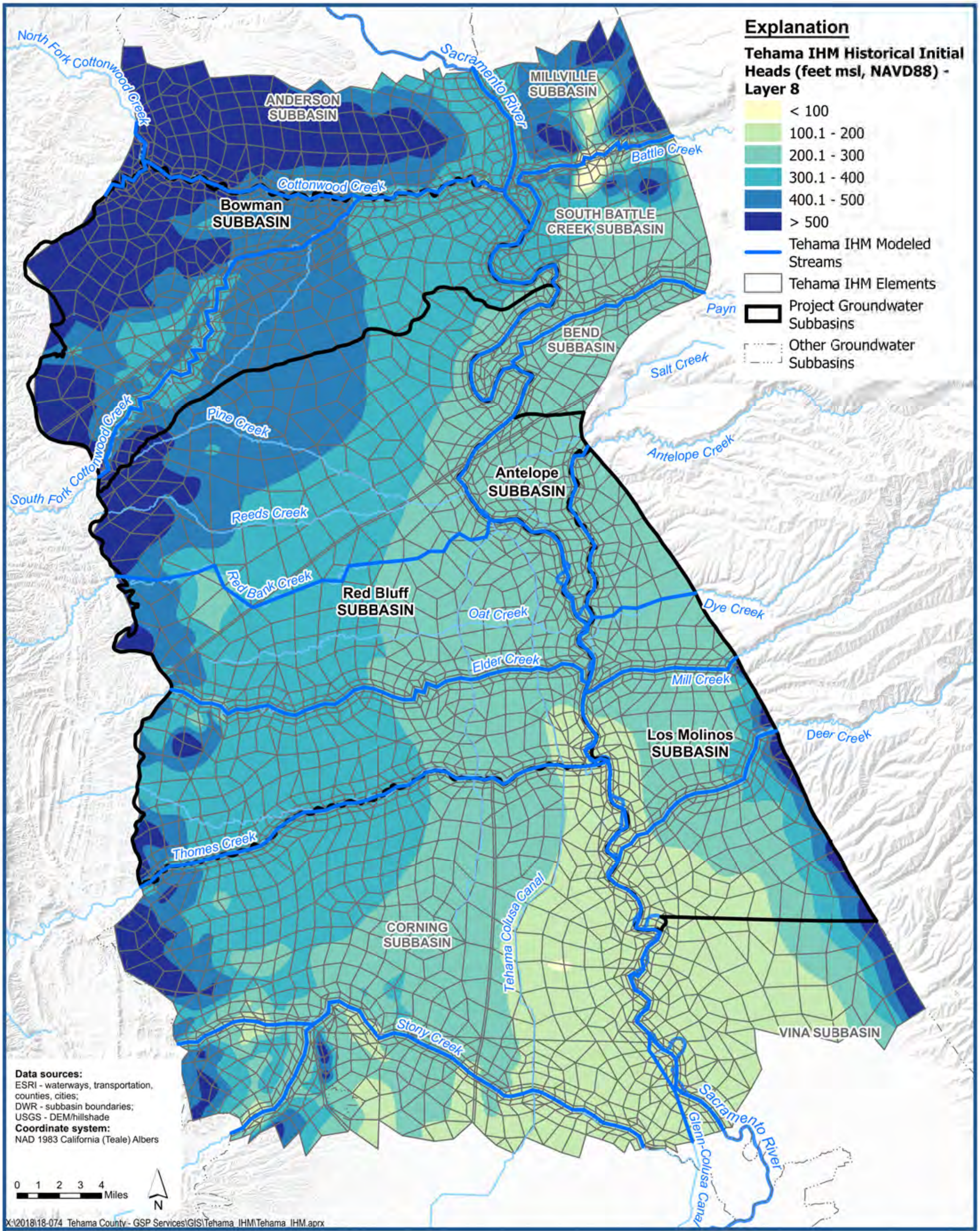
Figure 3-70



Historical Initial Groundwater Heads in Tehama IHM - Layer 7

Groundwater Sustainability Plan
Tehama County, California

Figure 3-71



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY

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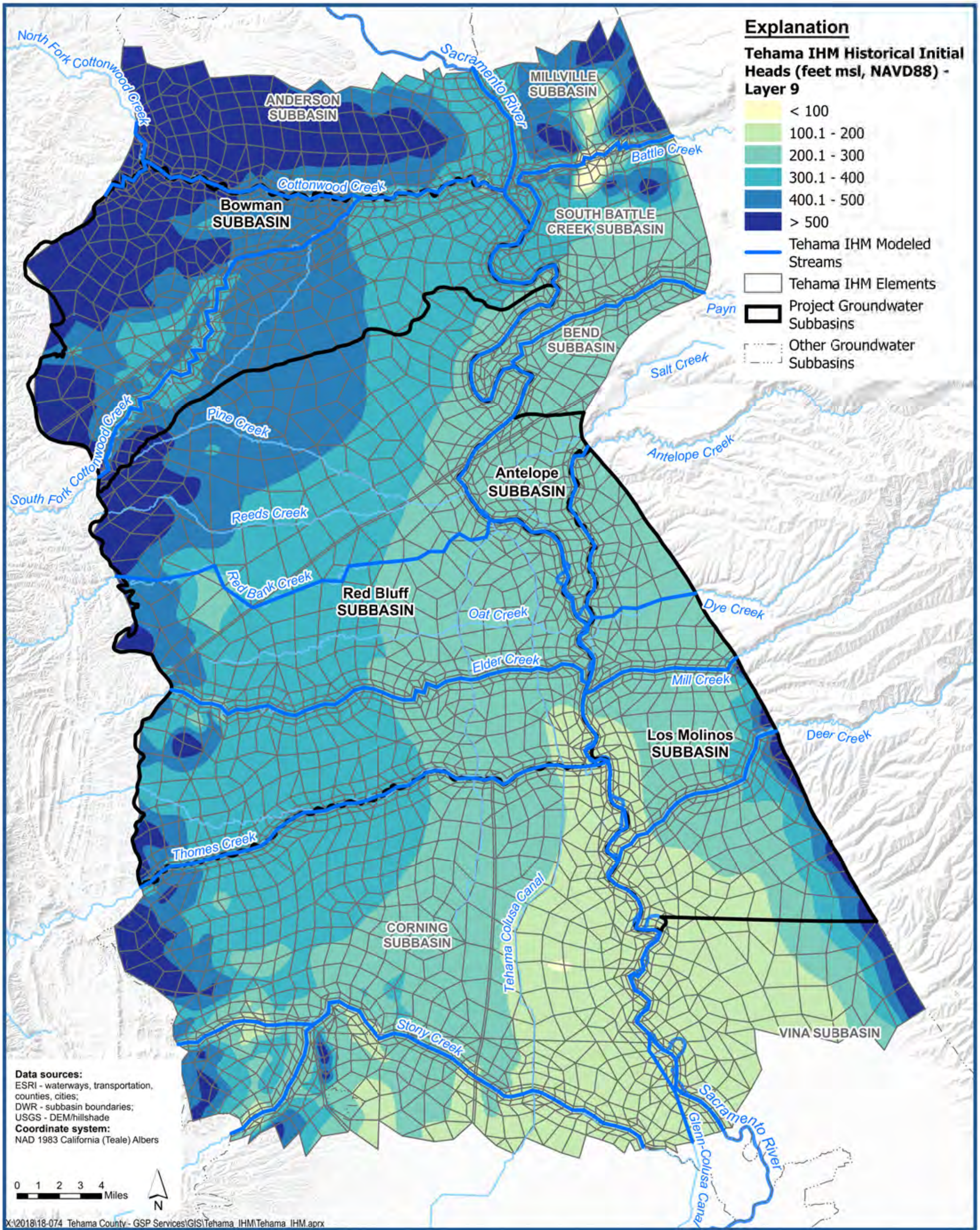
Historical Initial Groundwater Heads in Tehama IHM - Layer 8

Groundwater Sustainability Plan
Tehama County, California

Figure 3-72



Data sources:
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DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY

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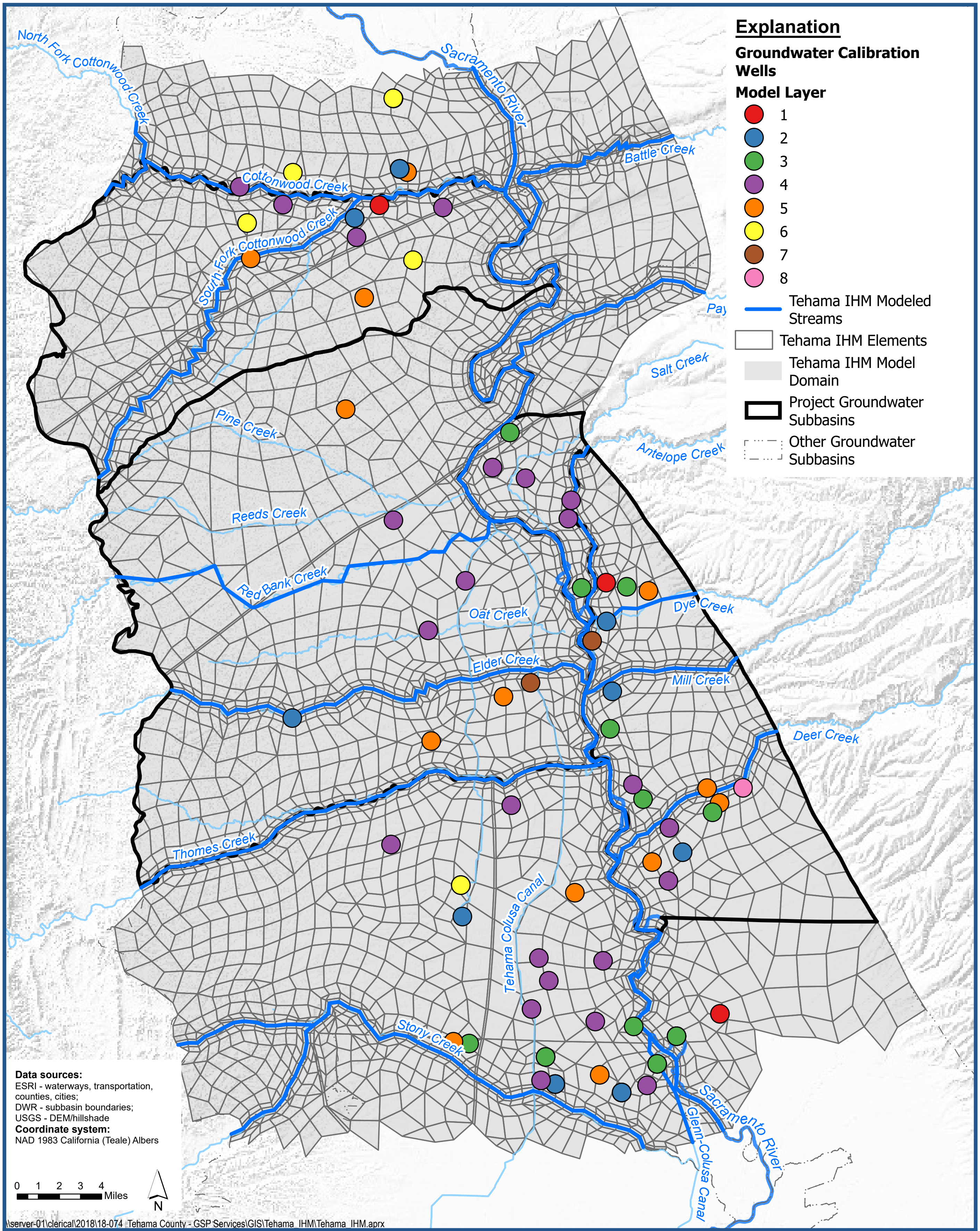
Historical Initial Groundwater Heads in Tehama IHM - Layer 9

Groundwater Sustainability Plan
Tehama County, California

Figure 3-73



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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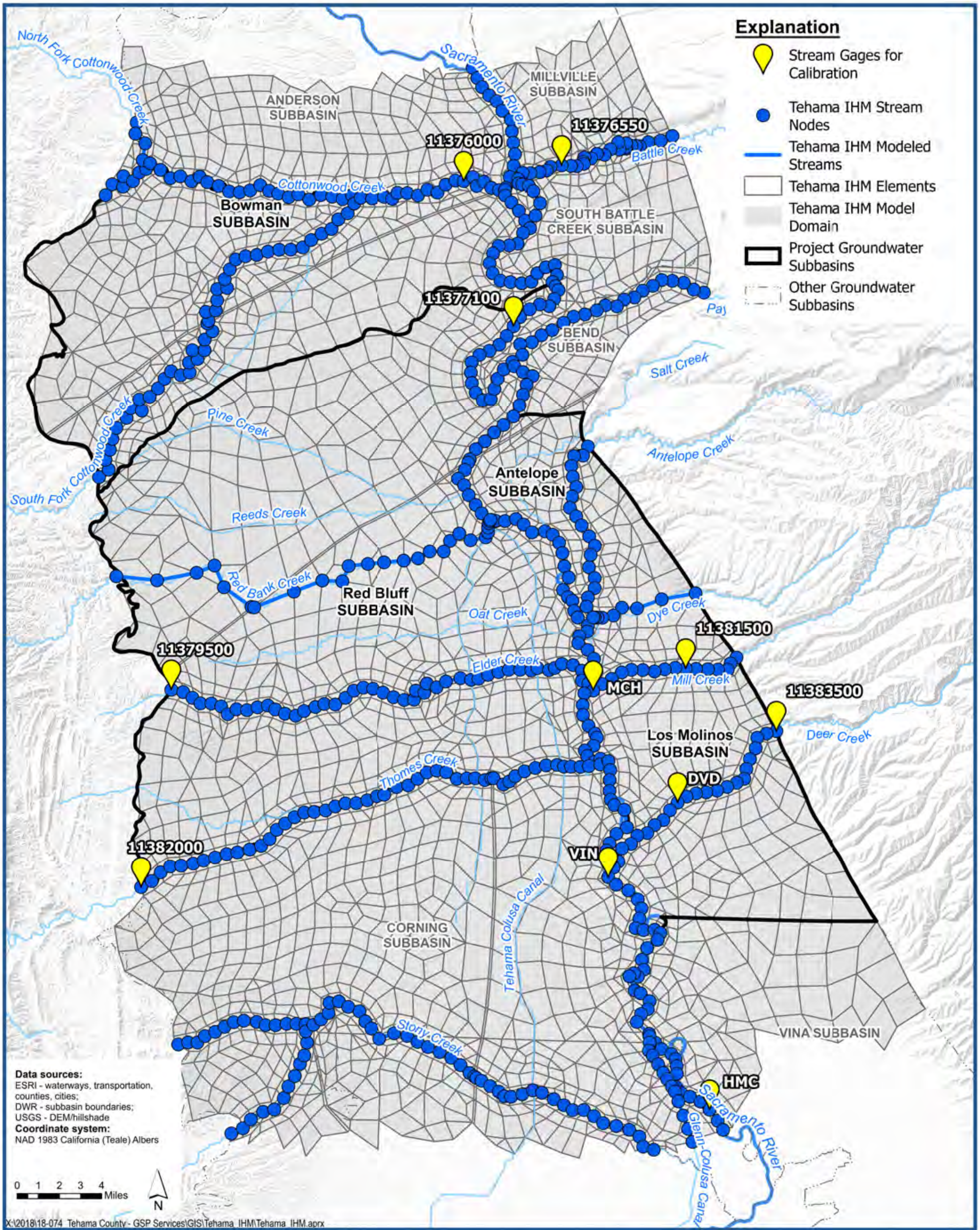
Map of Groundwater Level Calibration Wells in Tehama IHM

Groundwater Sustainability Planning
Tehama County, California

Figure 3-74



Data sources:
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Map of Streamflow Calibration Gages in Tehama IHM

Figure 3-75

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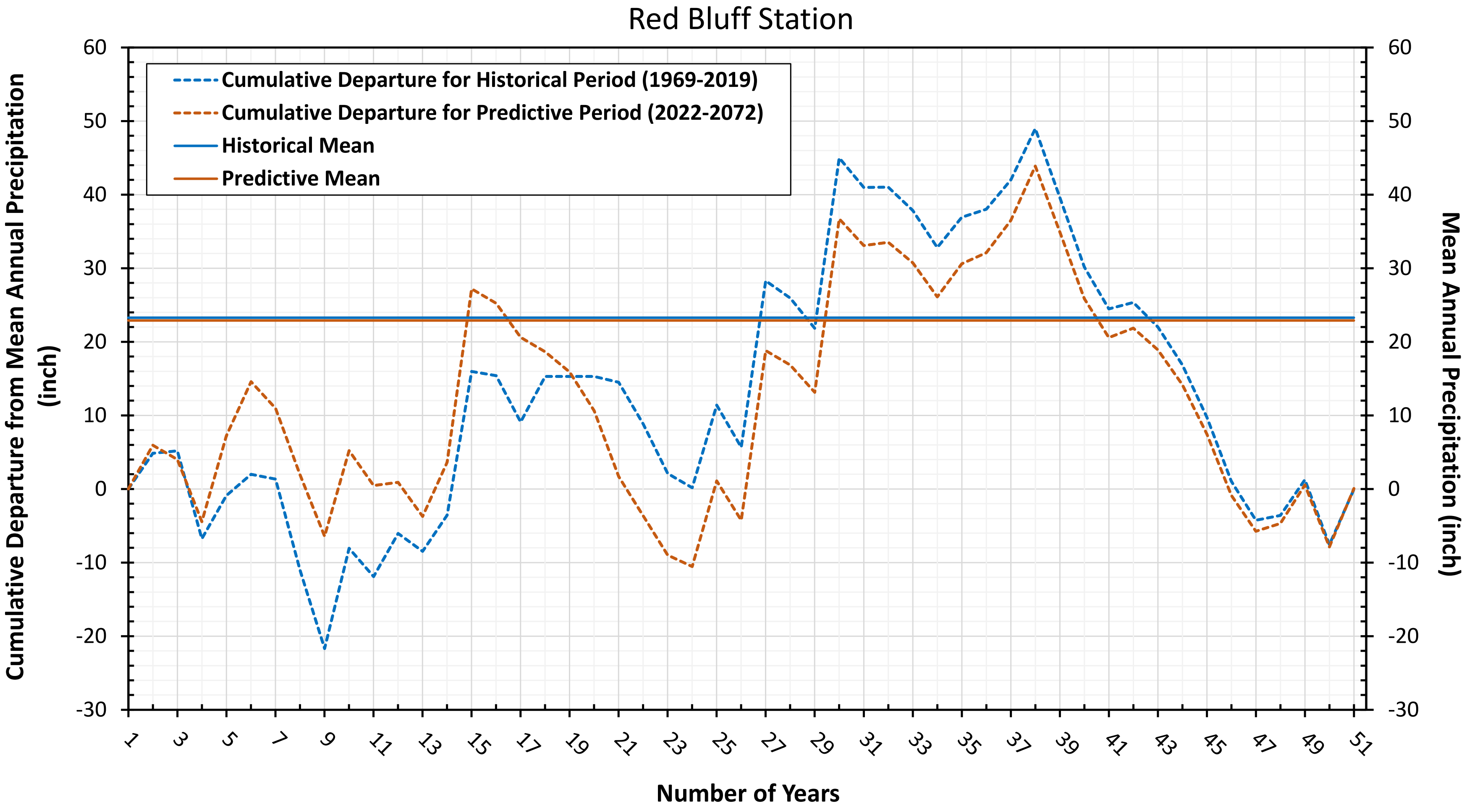
Tehama County, California



X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 3-76 Cumulative Departure of Precipitation Data – Red Bluff Station.mxd

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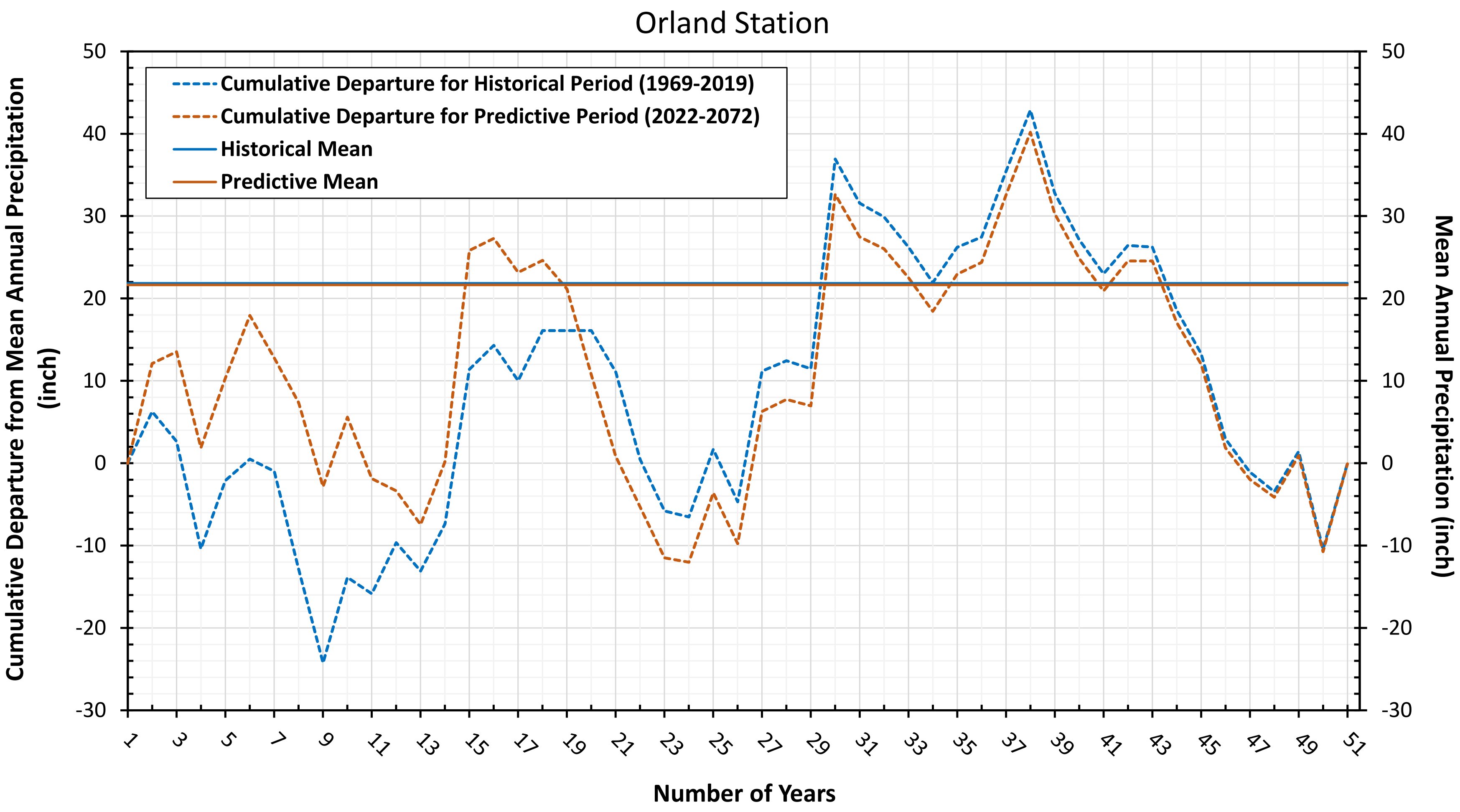
Cumulative Departure of Precipitation Data – Red Bluff Station

Groundwater Sustainability Planning
Tehama County, California

Figure 3-76



TEHAMA COUNTY

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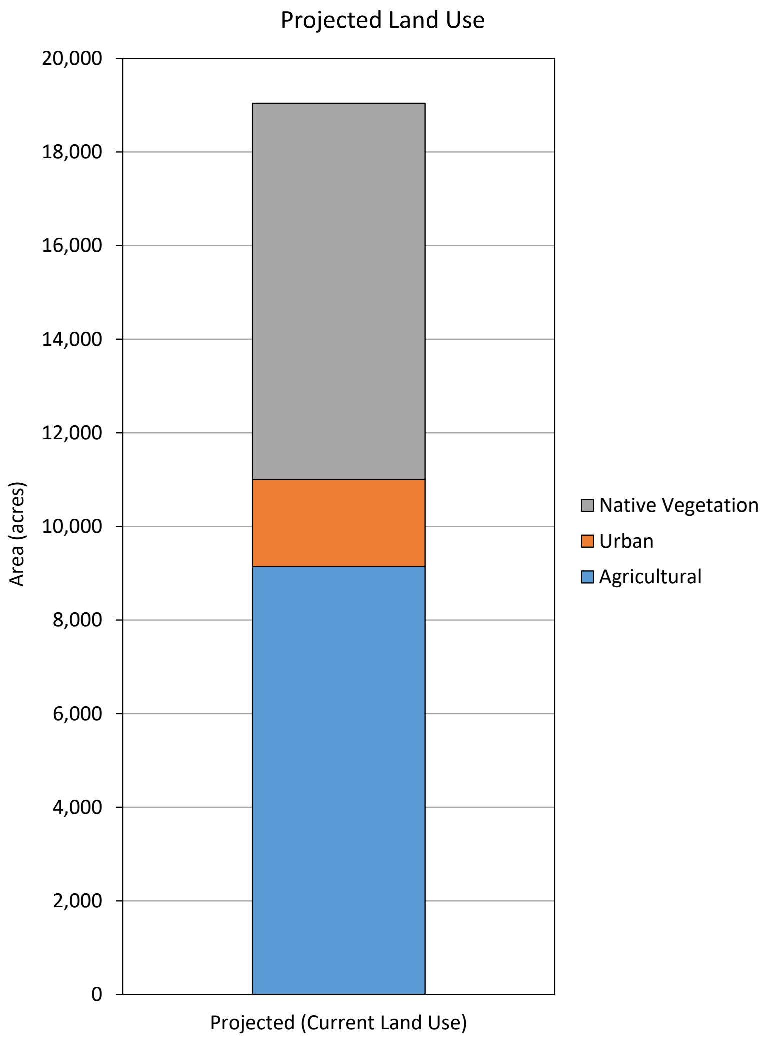
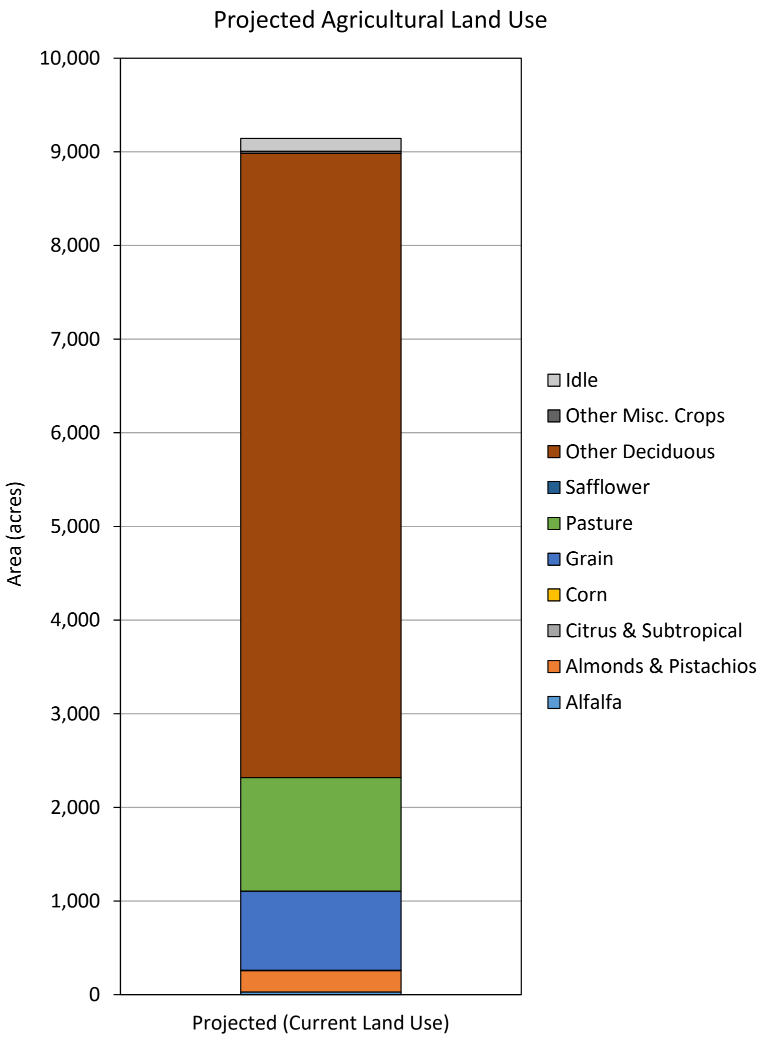
Cumulative Departure of Precipitation Data – Orland Station

Groundwater Sustainability Planning
Tehama County, California

Figure 3-77





X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 3-78 Projected (Current) Land Use in Tehama IHM – Antelope Subbasin.mxd

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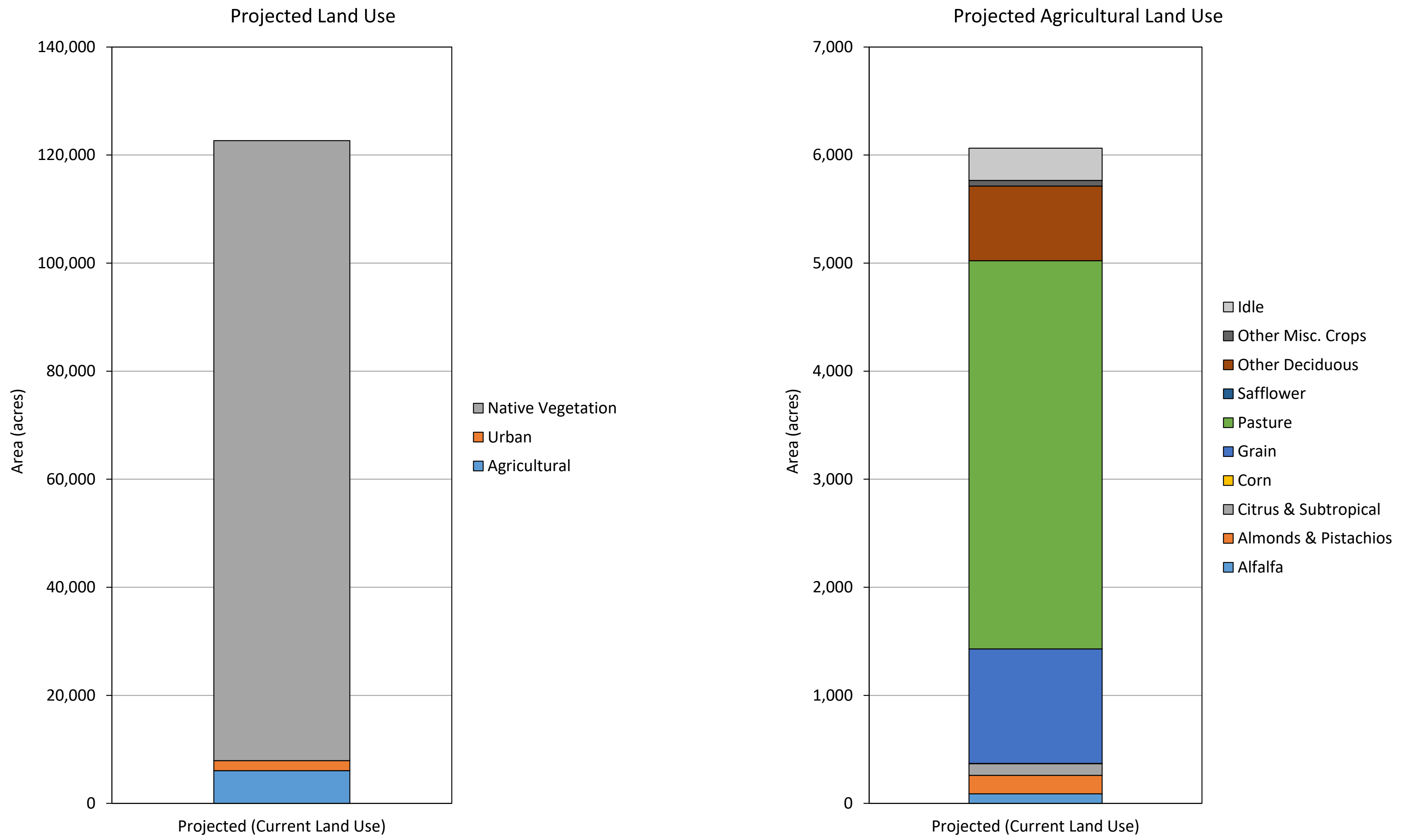
Projected Land Use in Current Land Use Scenario in Tehama IHM – Antelope Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-78



X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 3-79 Projected (Current) Land Use in Tehama IHM – Bowman Subbasin.mxd

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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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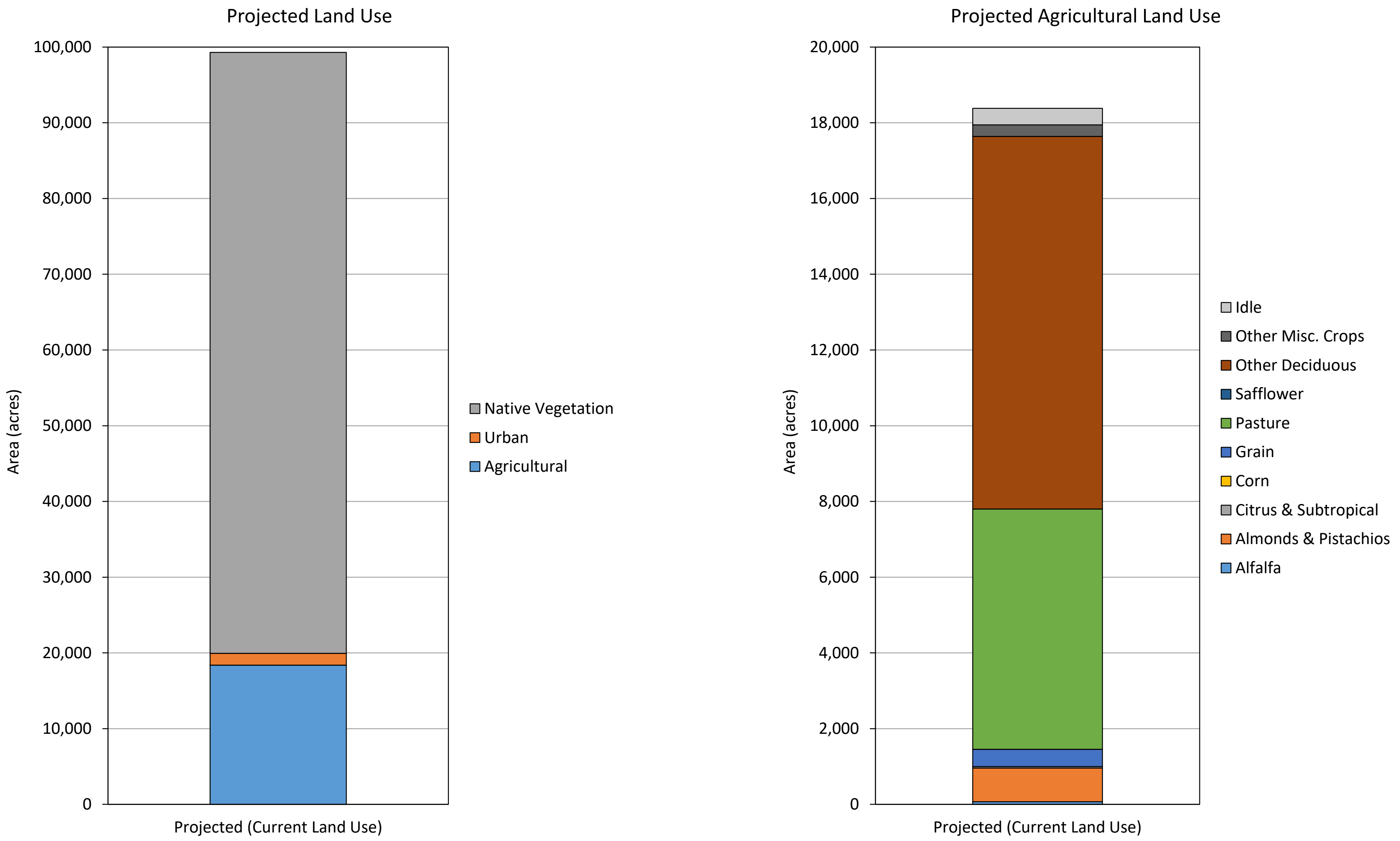
Projected Land Use in Current Land Use Scenario in Tehama IHM – Bowman Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-79



X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 3-80 Projected (Current) Land Use in Tehama IHM – Los Molinos Subbasin.mxd

TEHAMA COUNTY

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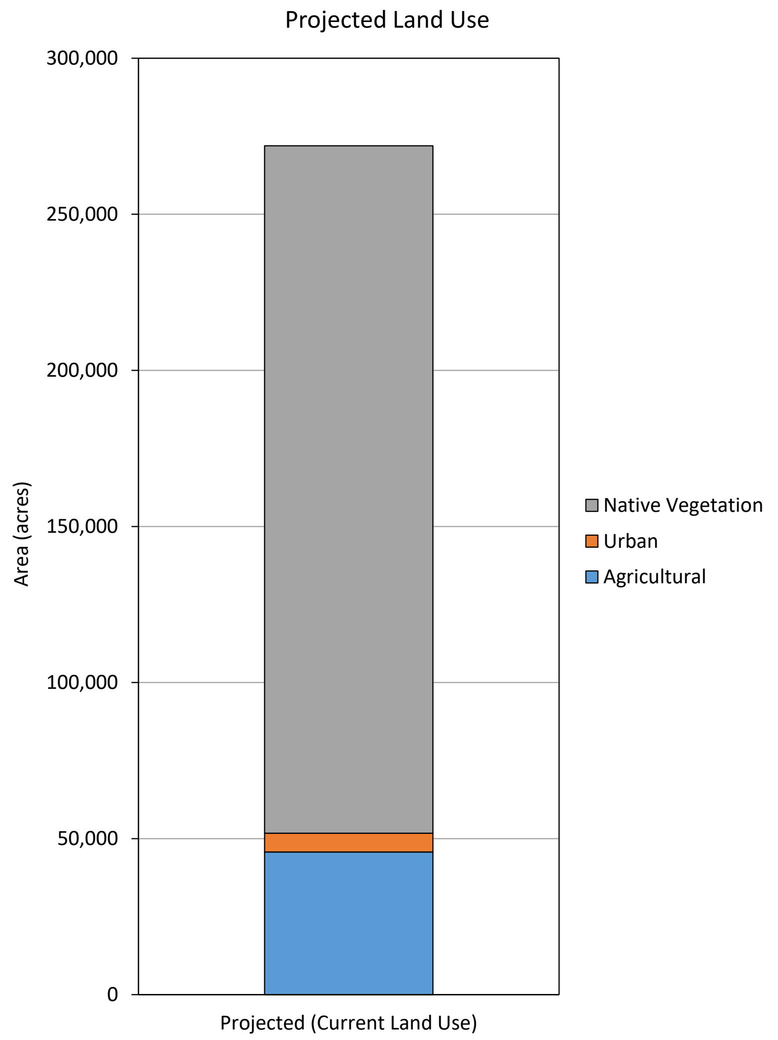
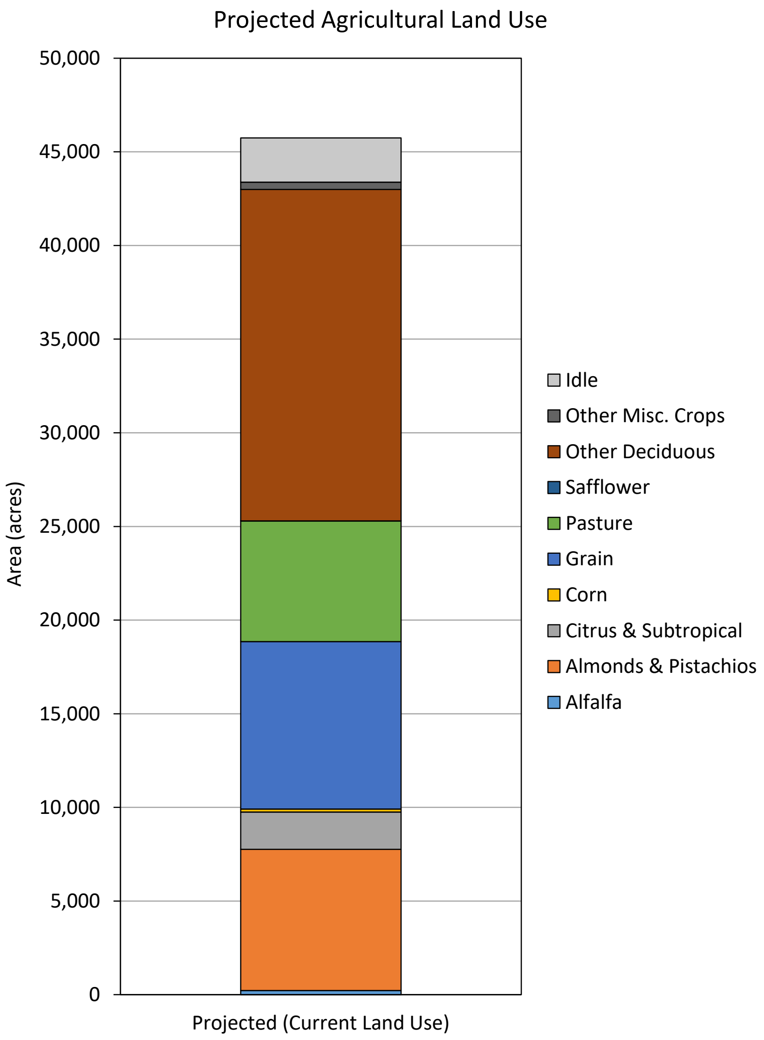
Projected Land Use in Current Land Use Scenario in Tehama IHM – Los Molinos Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-80





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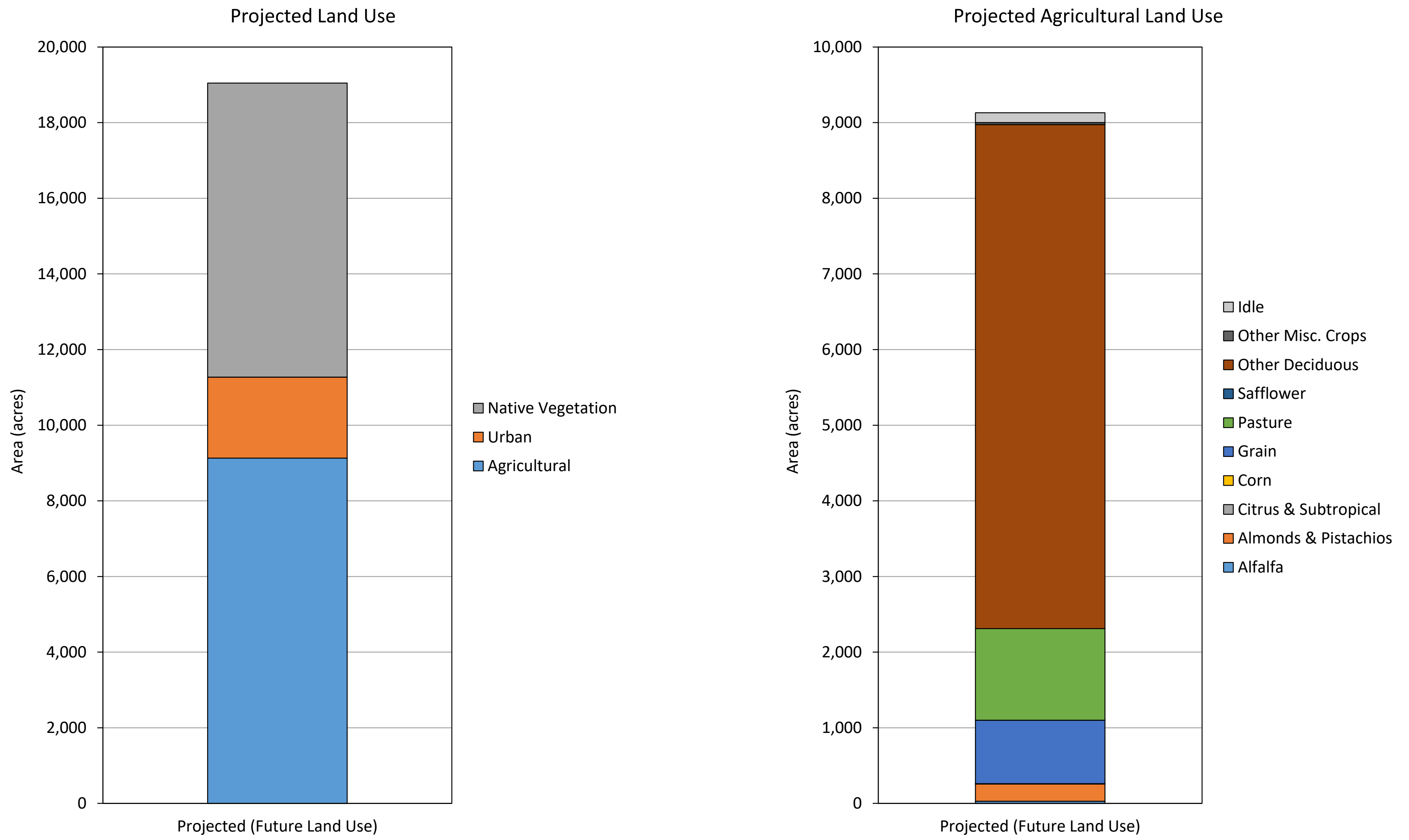
Projected Land Use in Current Land Use Scenario in Tehama IHM – Red Bluff Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-81



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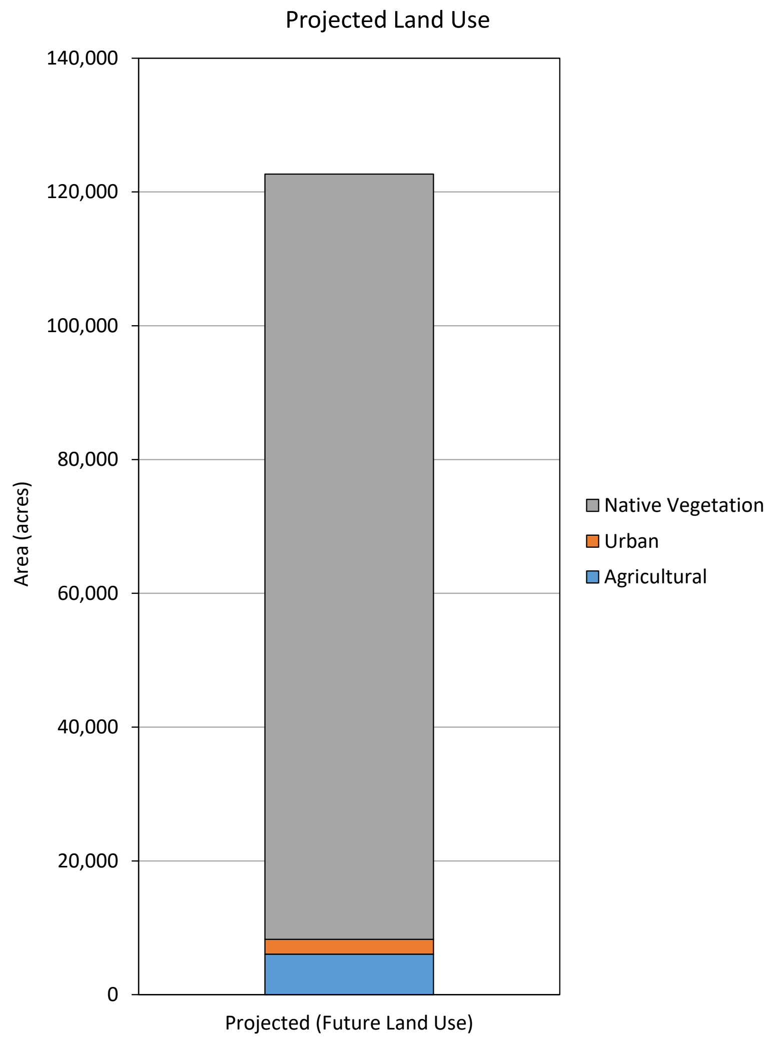
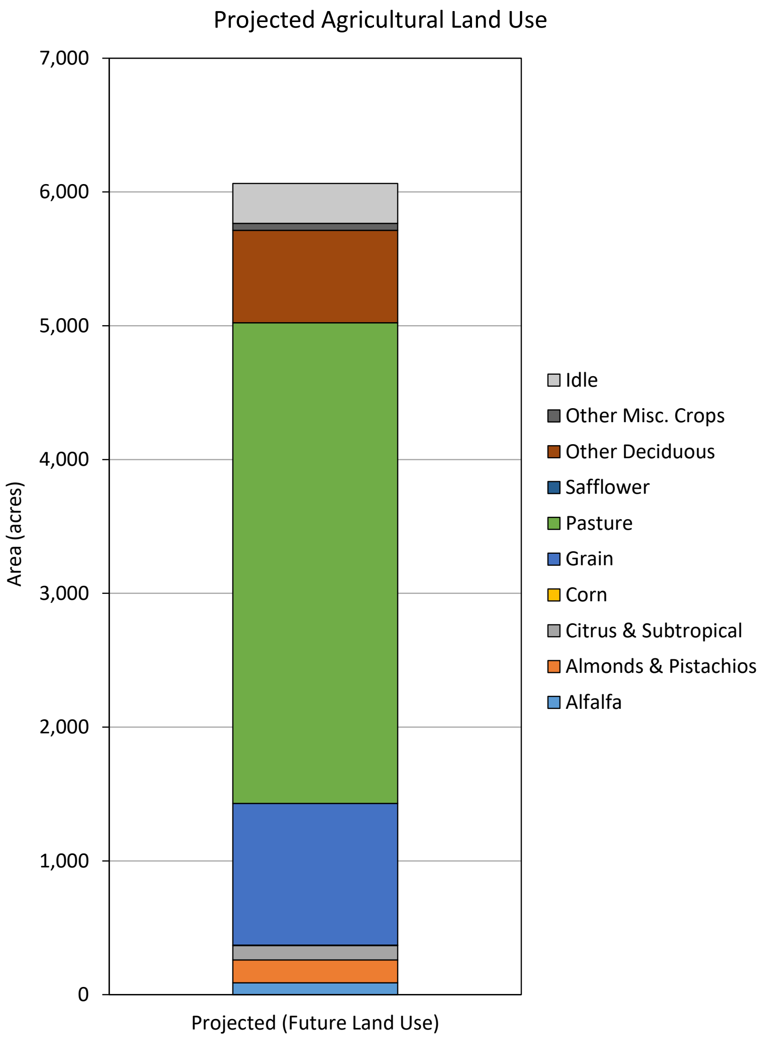
Projected Land Use in Future Land Use Scenario in Tehama IHM – Antelope Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-82





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Projected Land Use in Future Land Use Scenario in Tehama IHM – Bowman Subbasin

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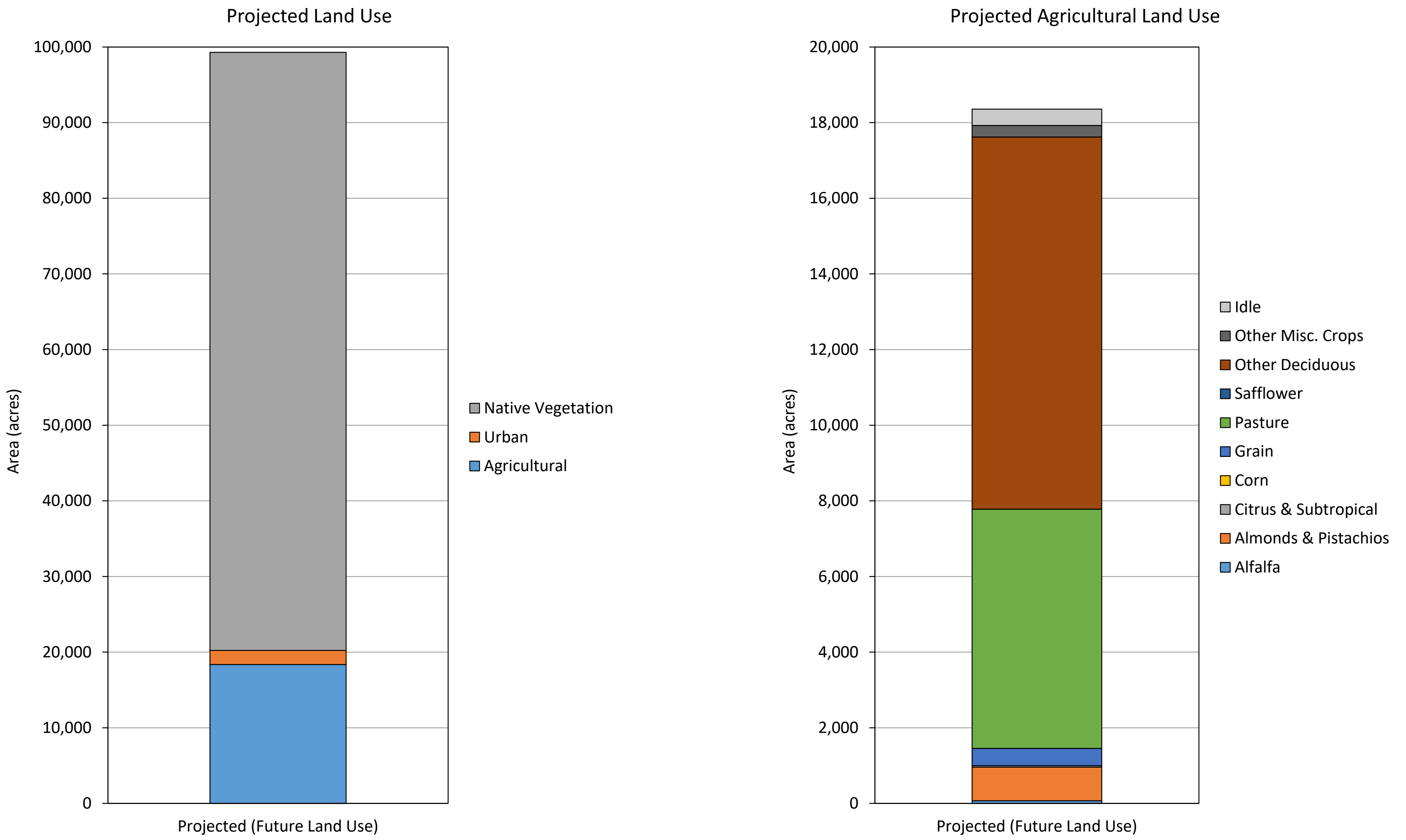
Figure 3-83



X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 3-84 Projected (Future) Land Use in Tehama IHM – Los Molinos Subbasin.mxd

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Projected Land Use in Future Land Use Scenario in Tehama IHM – Los Molinos Subbasin

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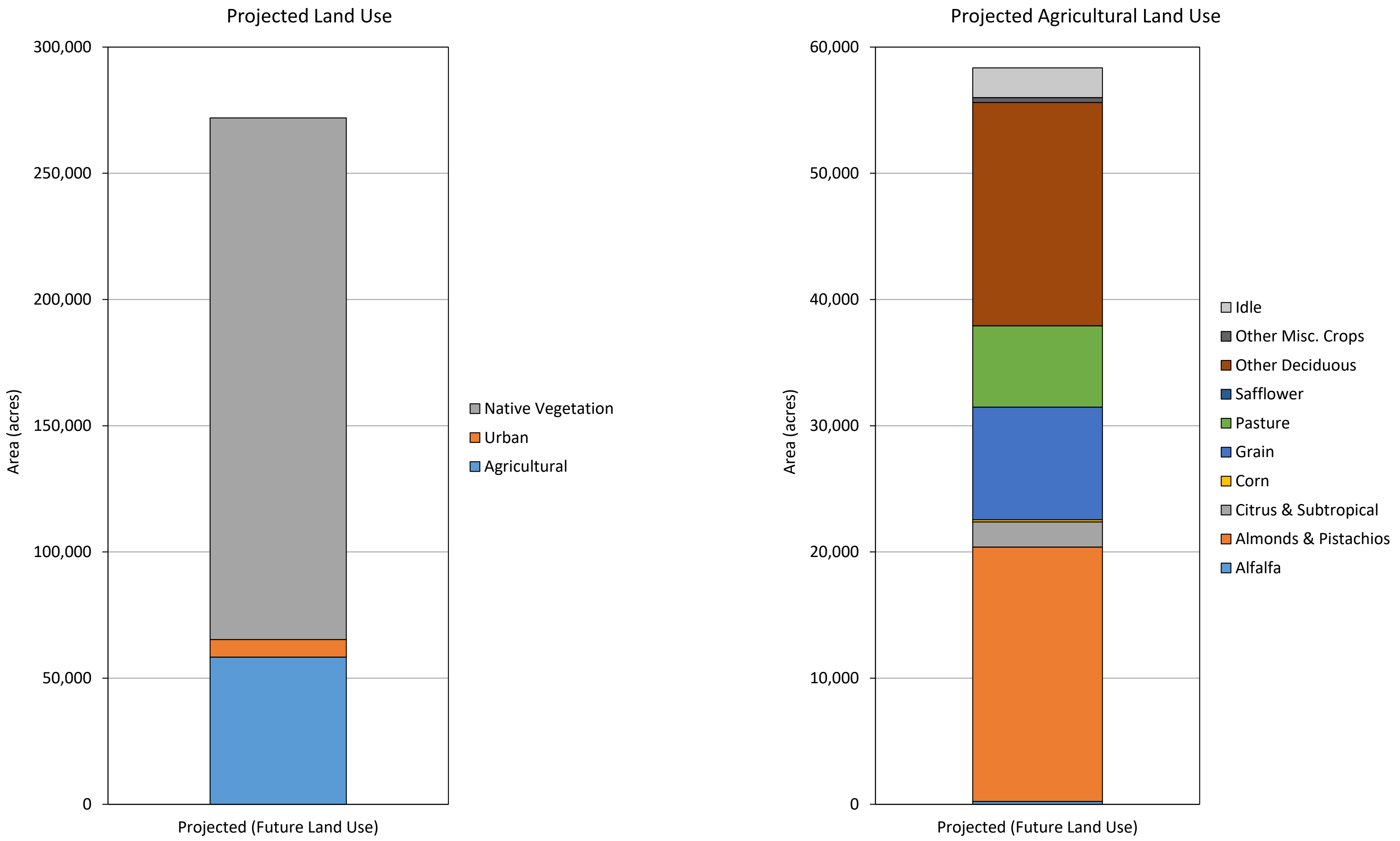
Tehama County, California

Figure 3-84

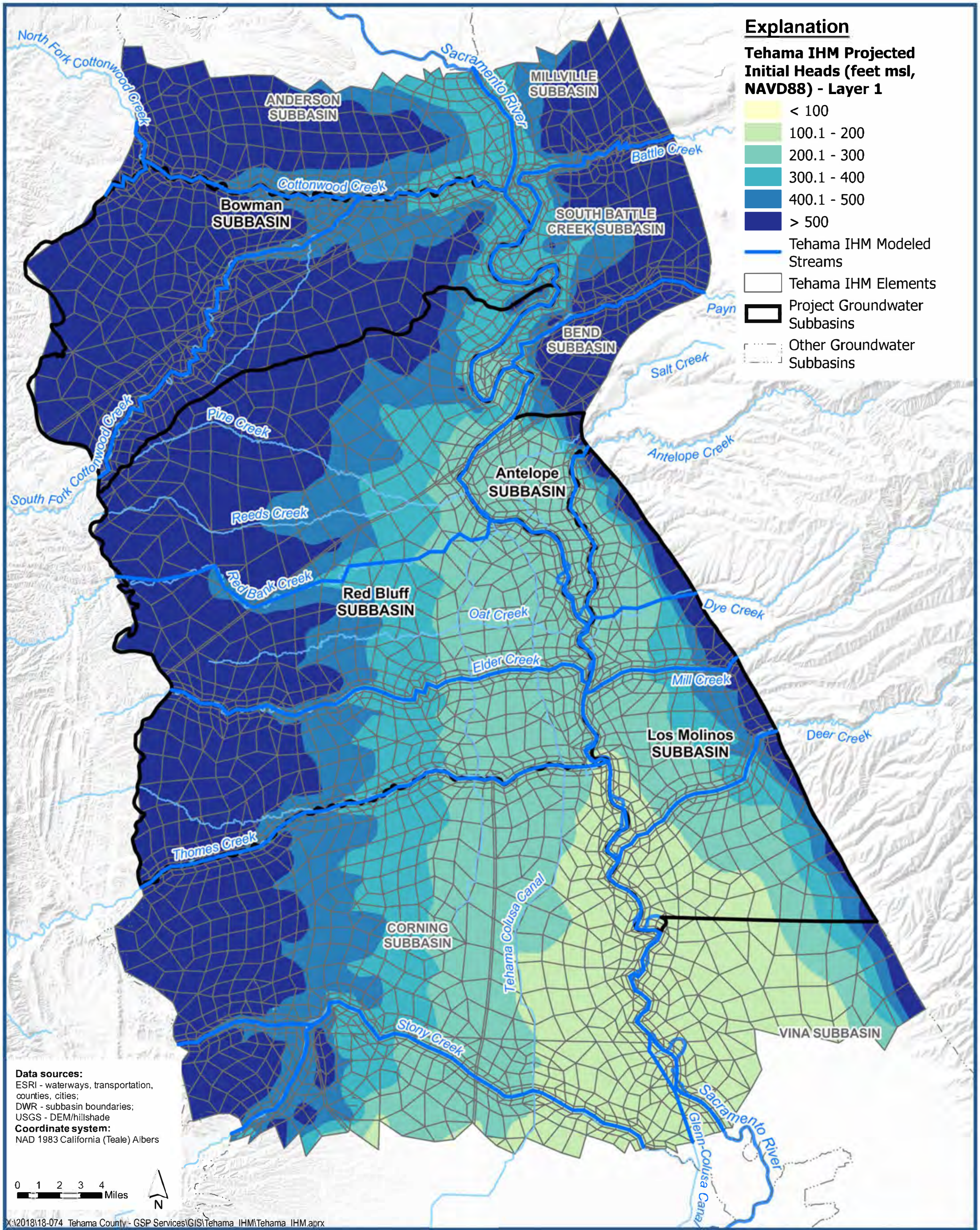


X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 3-85 Projected (Future) Land Use in Tehama IHM – Red Bluff Subbasin.mxd

Projected Land Use in Future Land Use Scenario in Tehama IHM – Red Bluff Subbasin

Groundwater Sustainability Planning
Tehama County, California

Figure 3-85



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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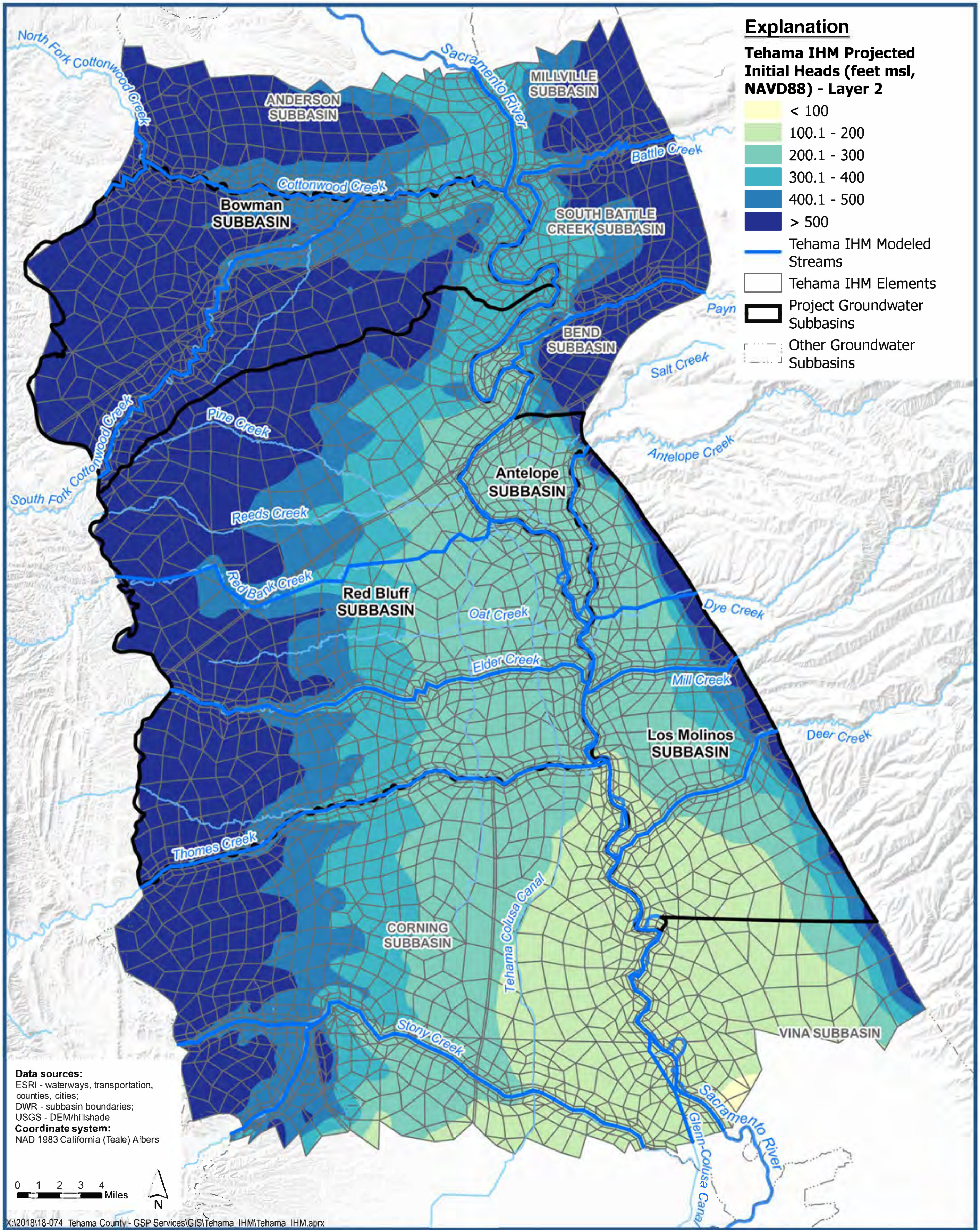
Projected Initial Groundwater Heads in Tehama IHM - Layer 1

Groundwater Sustainability Plan
Tehama County, California

Figure 3-86



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DWR - subbasin boundaries;
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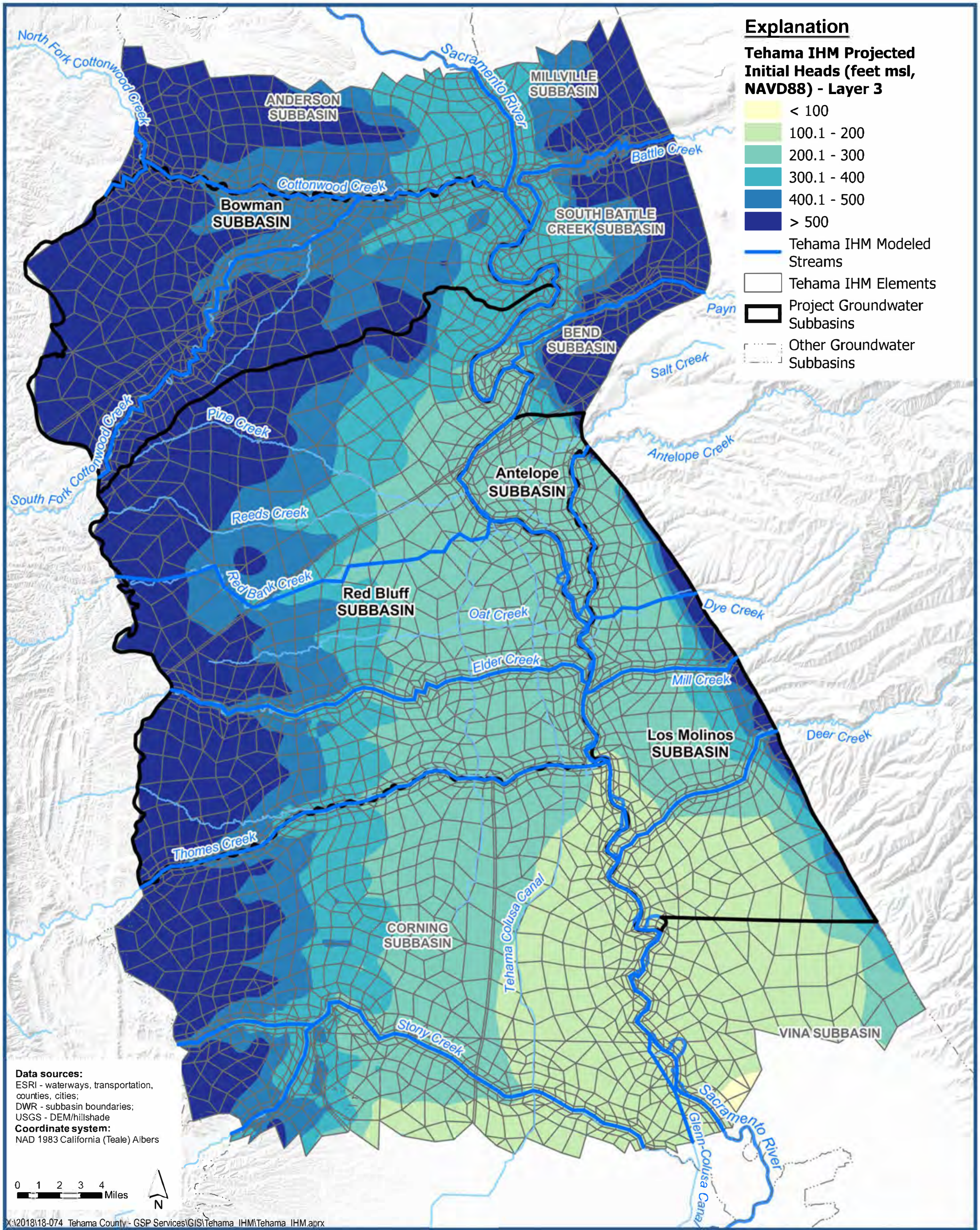
Projected Initial Groundwater Heads in Tehama IHM - Layer 2

Groundwater Sustainability Plan
Tehama County, California

Figure 3-87



Data sources:
ESRI - waterways, transportation, counties, cities;
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USGS - DEM/hillshade
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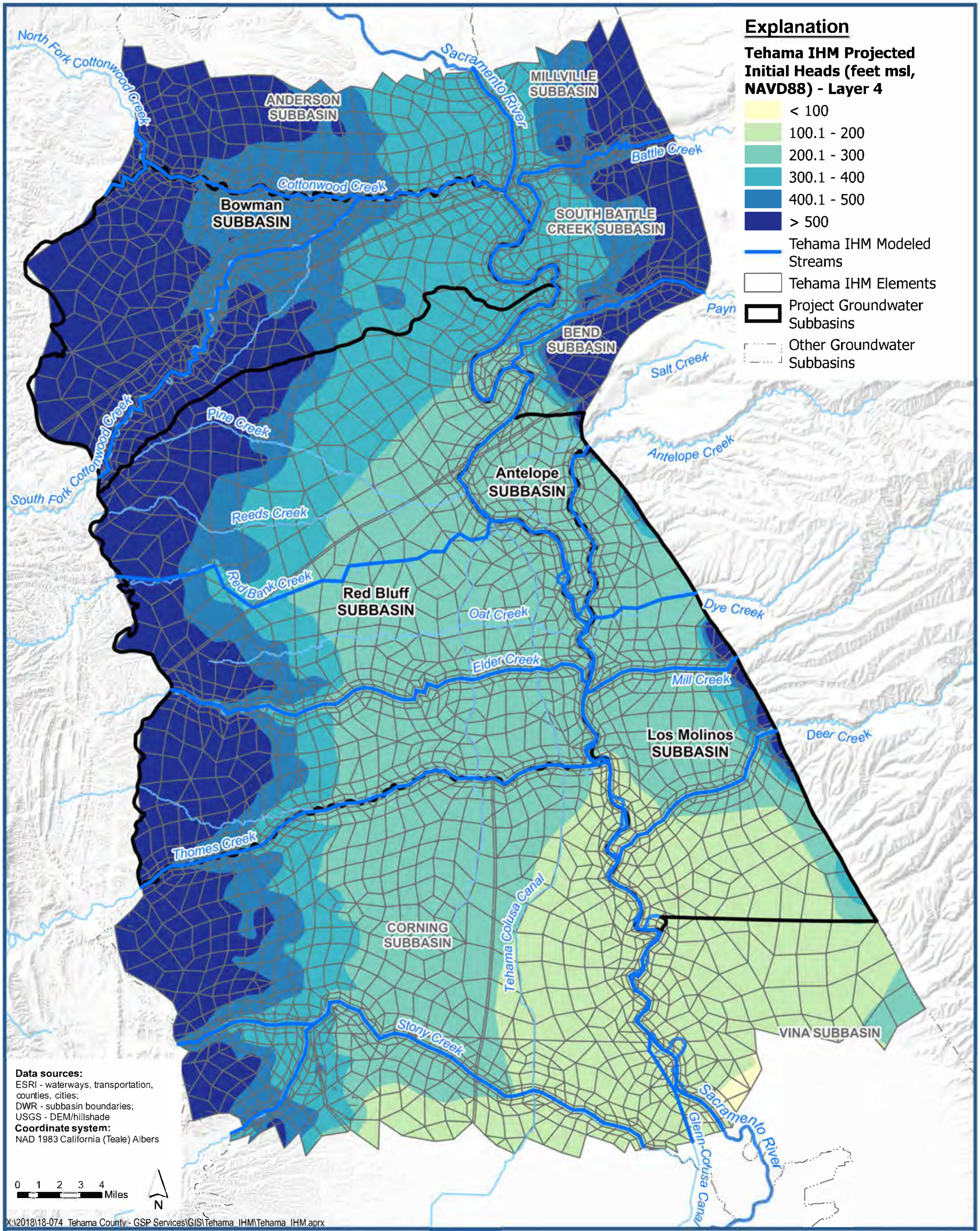
Projected Initial Groundwater Heads in Tehama IHM - Layer 3

Groundwater Sustainability Plan
Tehama County, California

Figure 3-88



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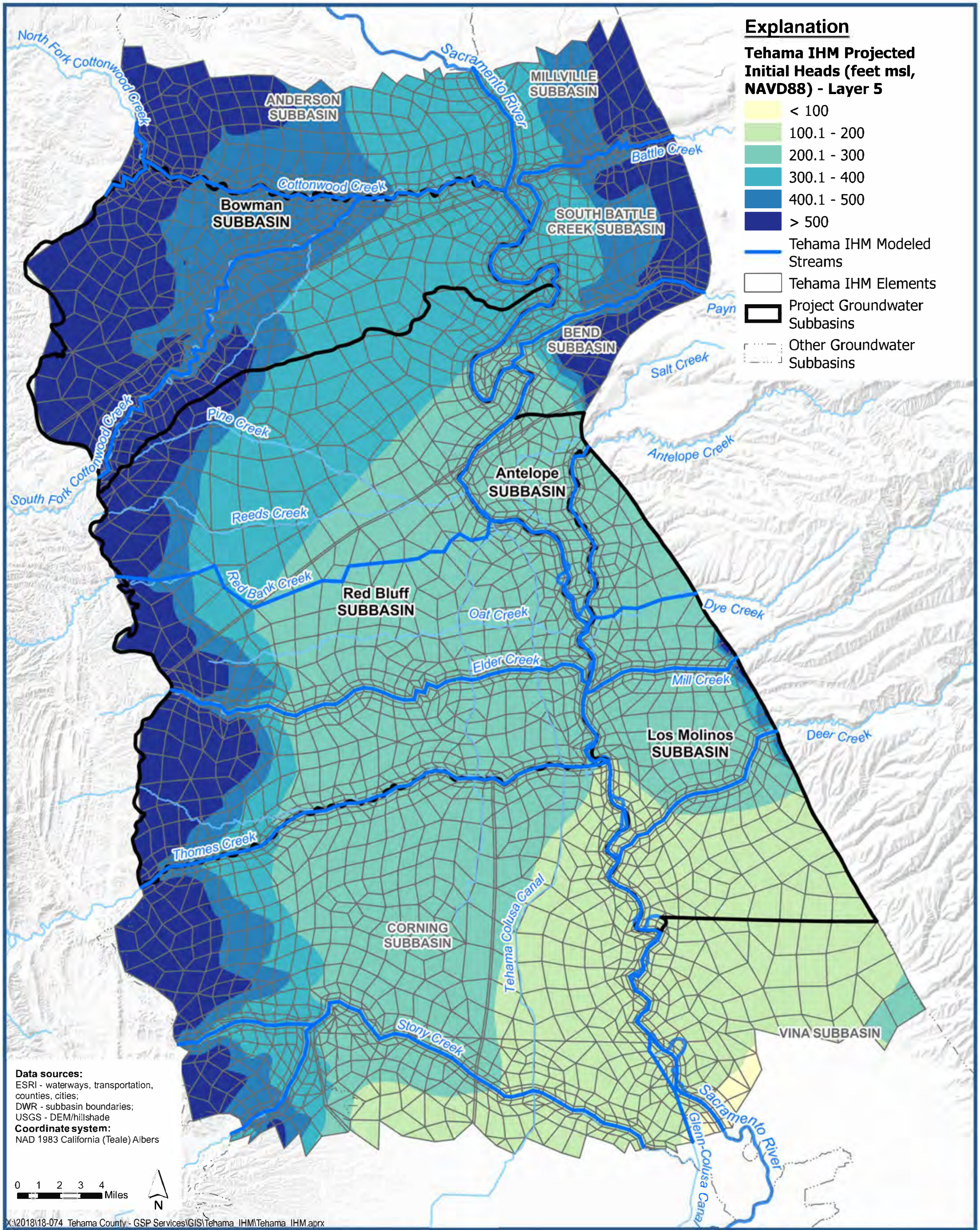
Projected Initial Groundwater Heads in Tehama IHM - Layer 4

Groundwater Sustainability Plan
Tehama County, California

Figure 3-89



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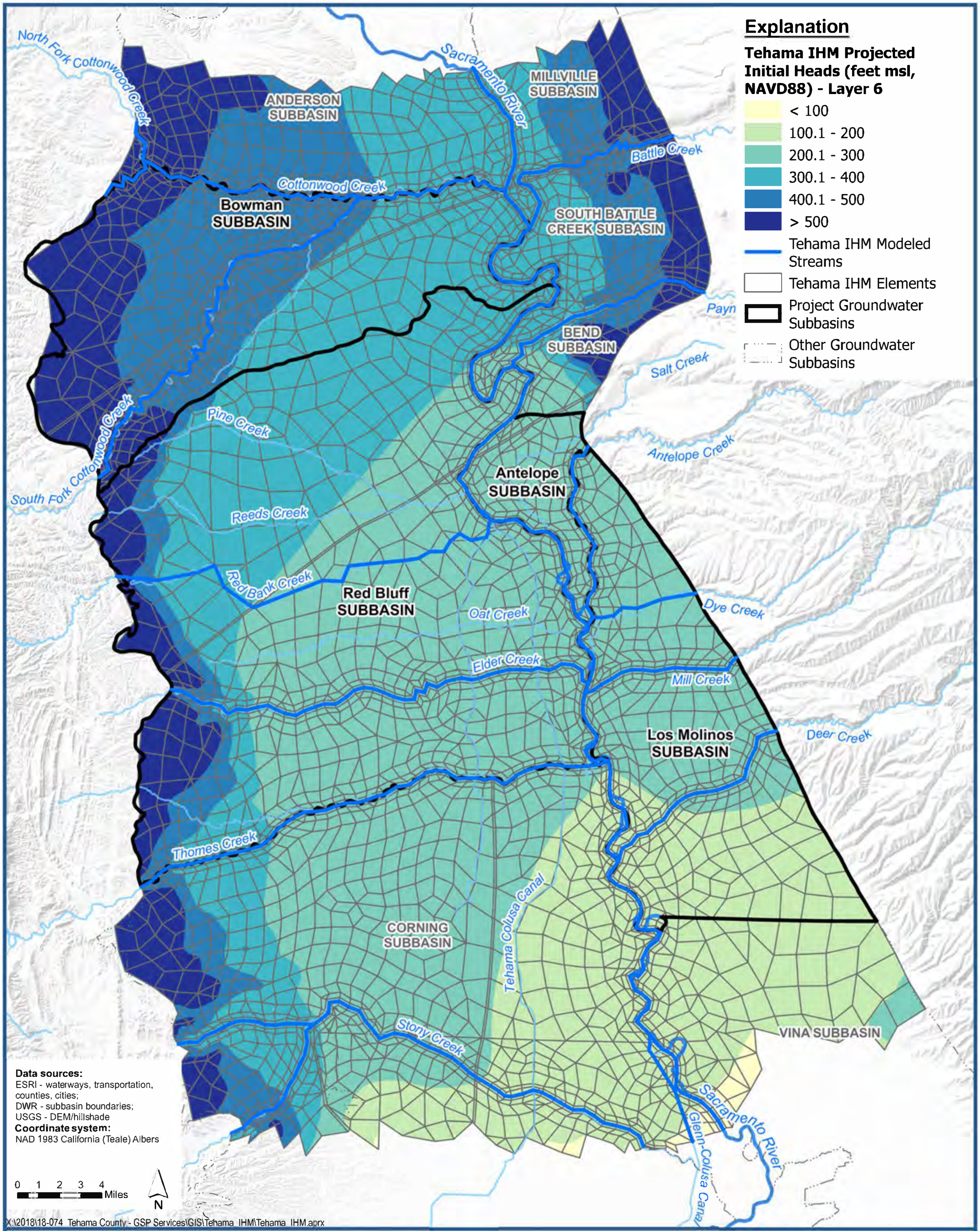
Projected Initial Groundwater Heads in Tehama IHM - Layer 5

Groundwater Sustainability Plan
Tehama County, California

Figure 3-90



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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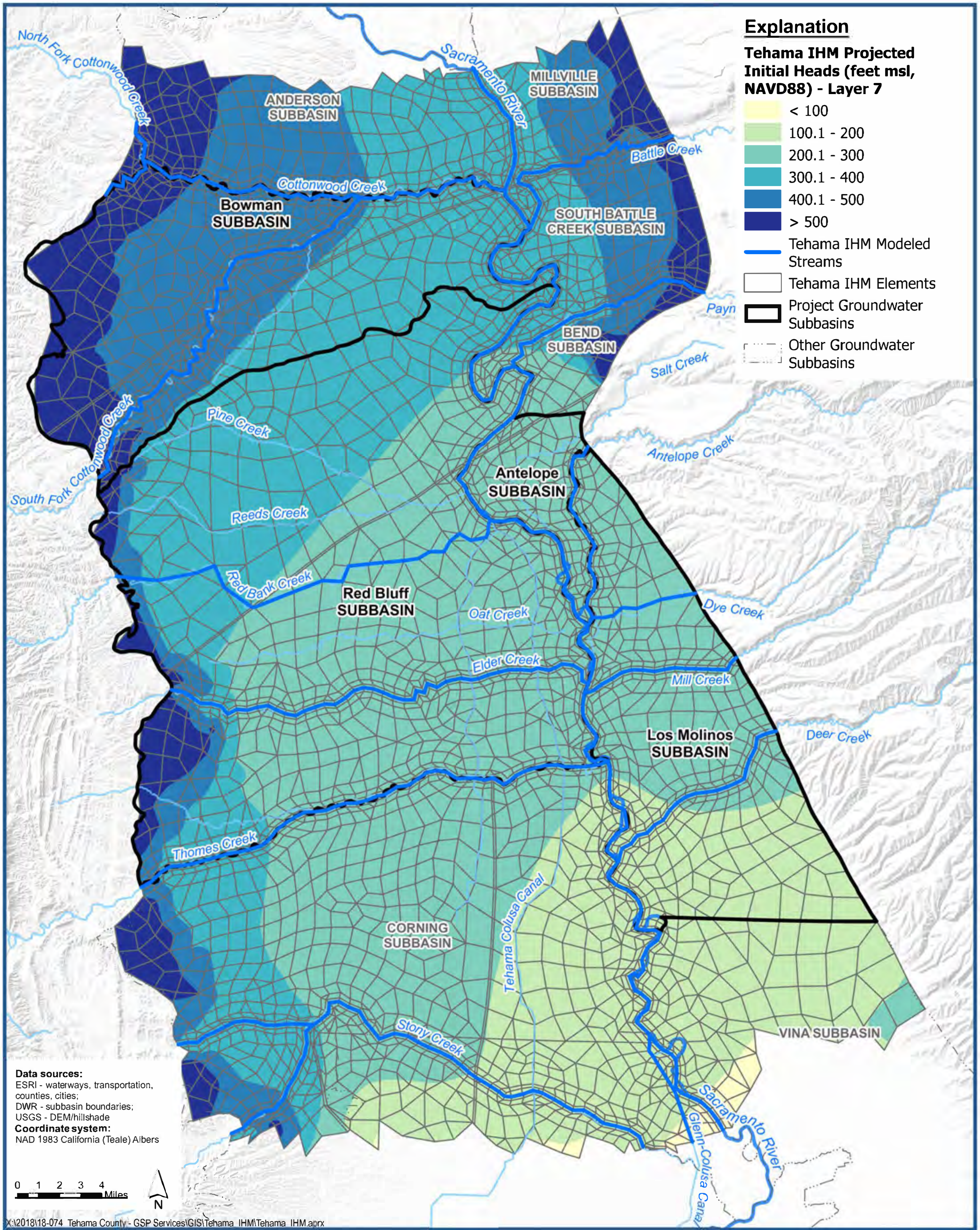
Projected Initial Groundwater Heads in Tehama IHM - Layer 6

Groundwater Sustainability Plan
Tehama County, California

Figure 3-91



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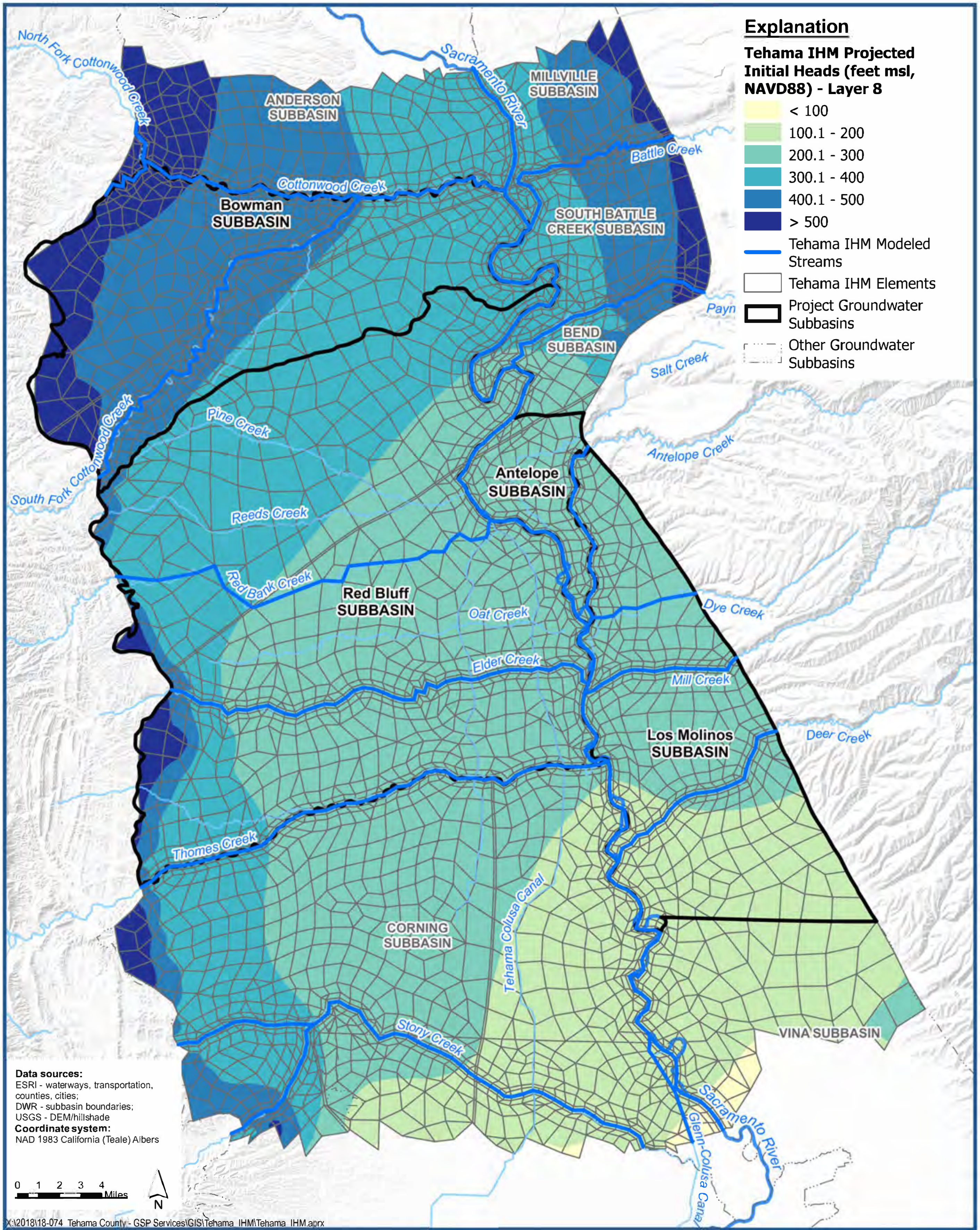
Projected Initial Groundwater Heads in Tehama IHM - Layer 7

Groundwater Sustainability Plan
Tehama County, California

Figure 3-92



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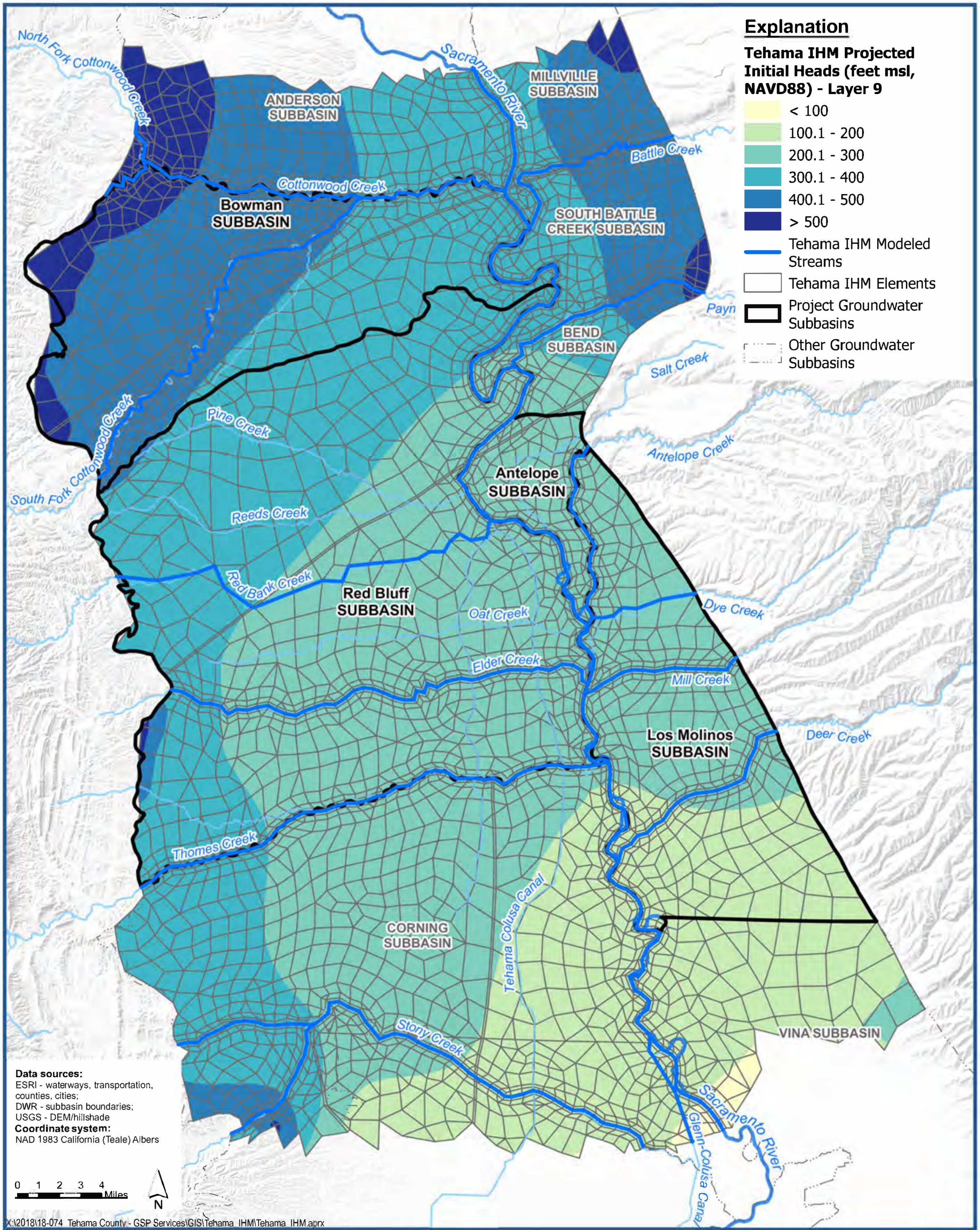
Projected Initial Groundwater Heads in Tehama IHM - Layer 8

Groundwater Sustainability Plan
Tehama County, California

Figure 3-93



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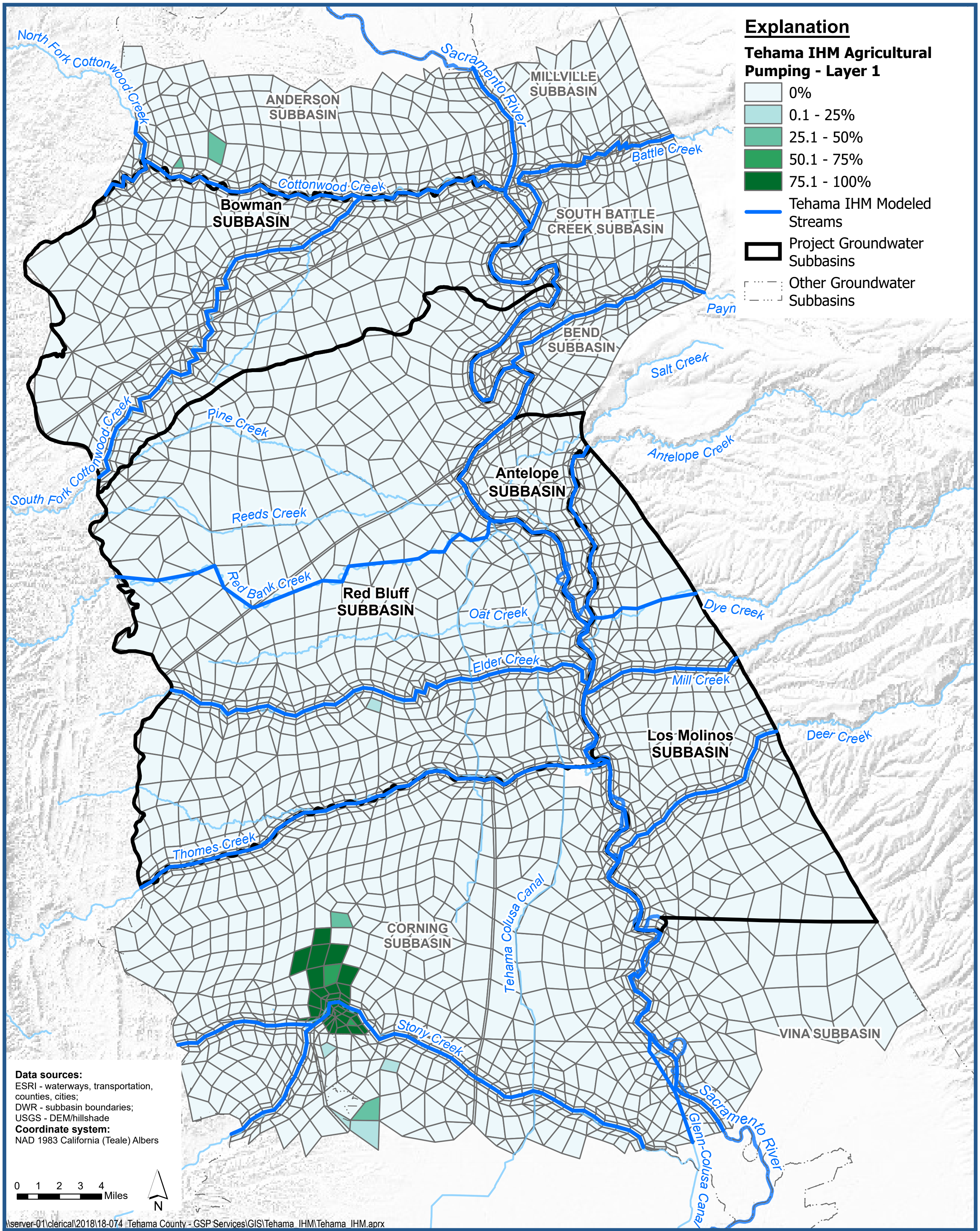
Projected Initial Groundwater Heads in Tehama IHM - Layer 9

Groundwater Sustainability Plan
Tehama County, California

Figure 3-94



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TEHAMA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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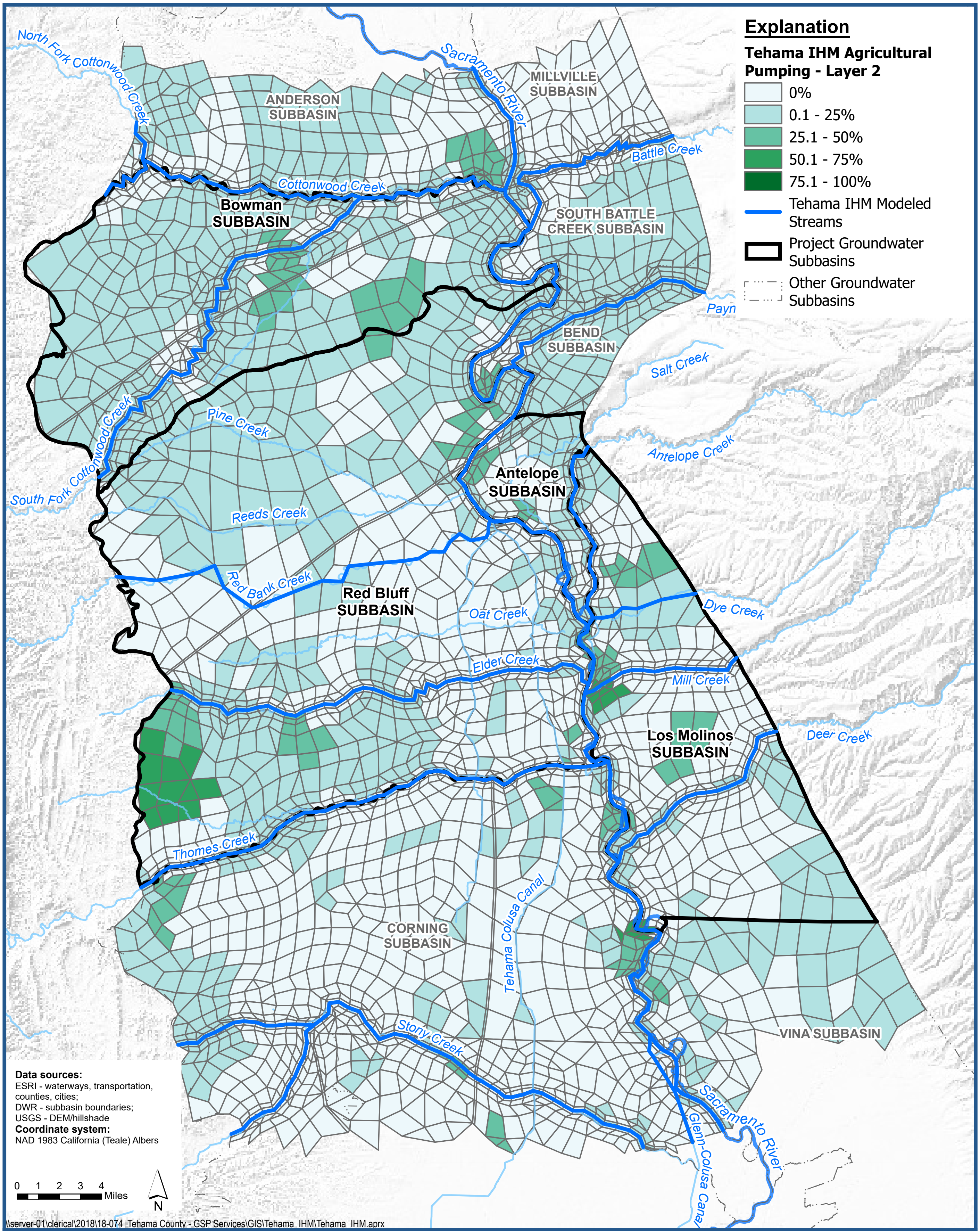
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 1

Groundwater Sustainability Planning
Tehama County, California

Figure 3-95



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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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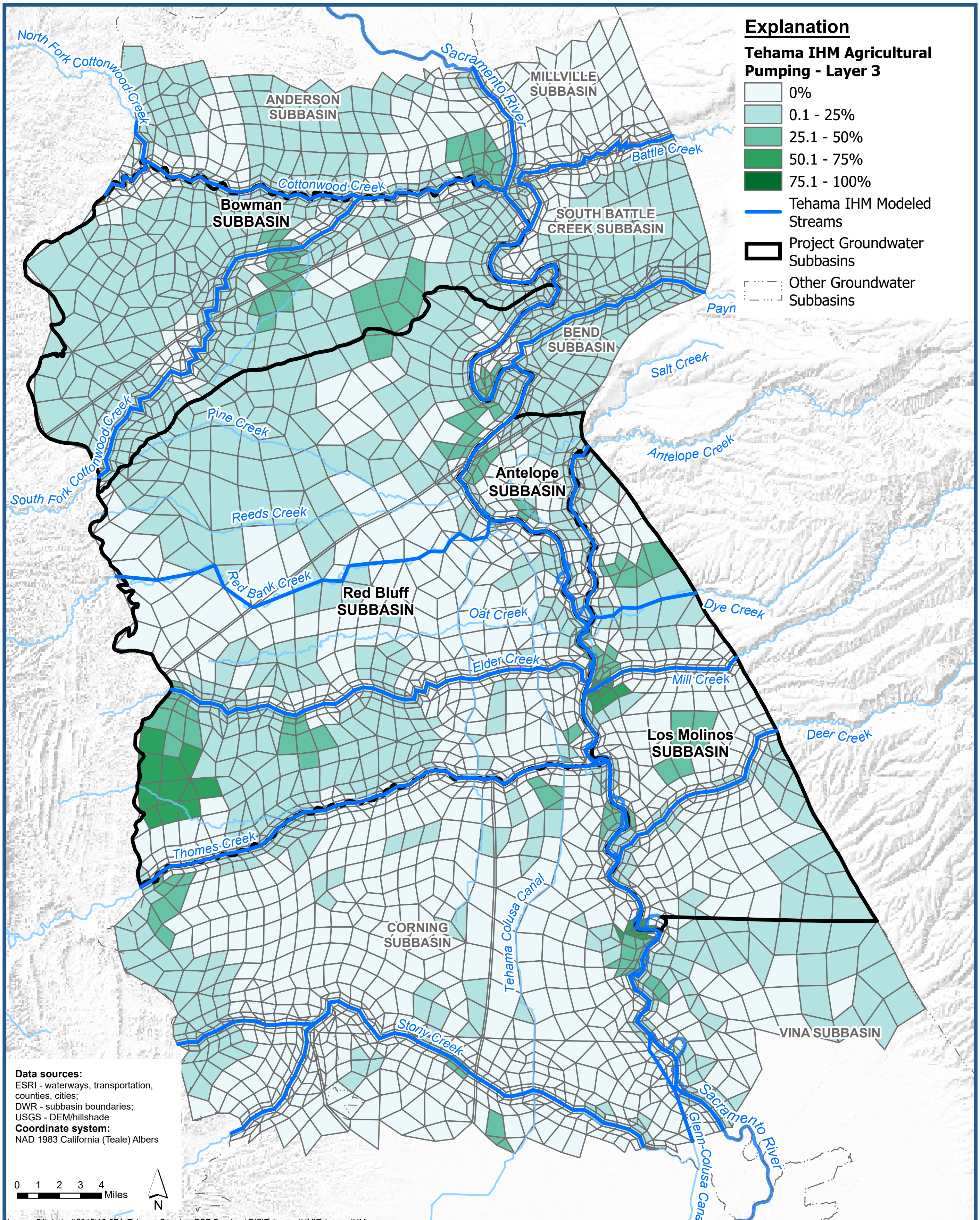
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 3-96



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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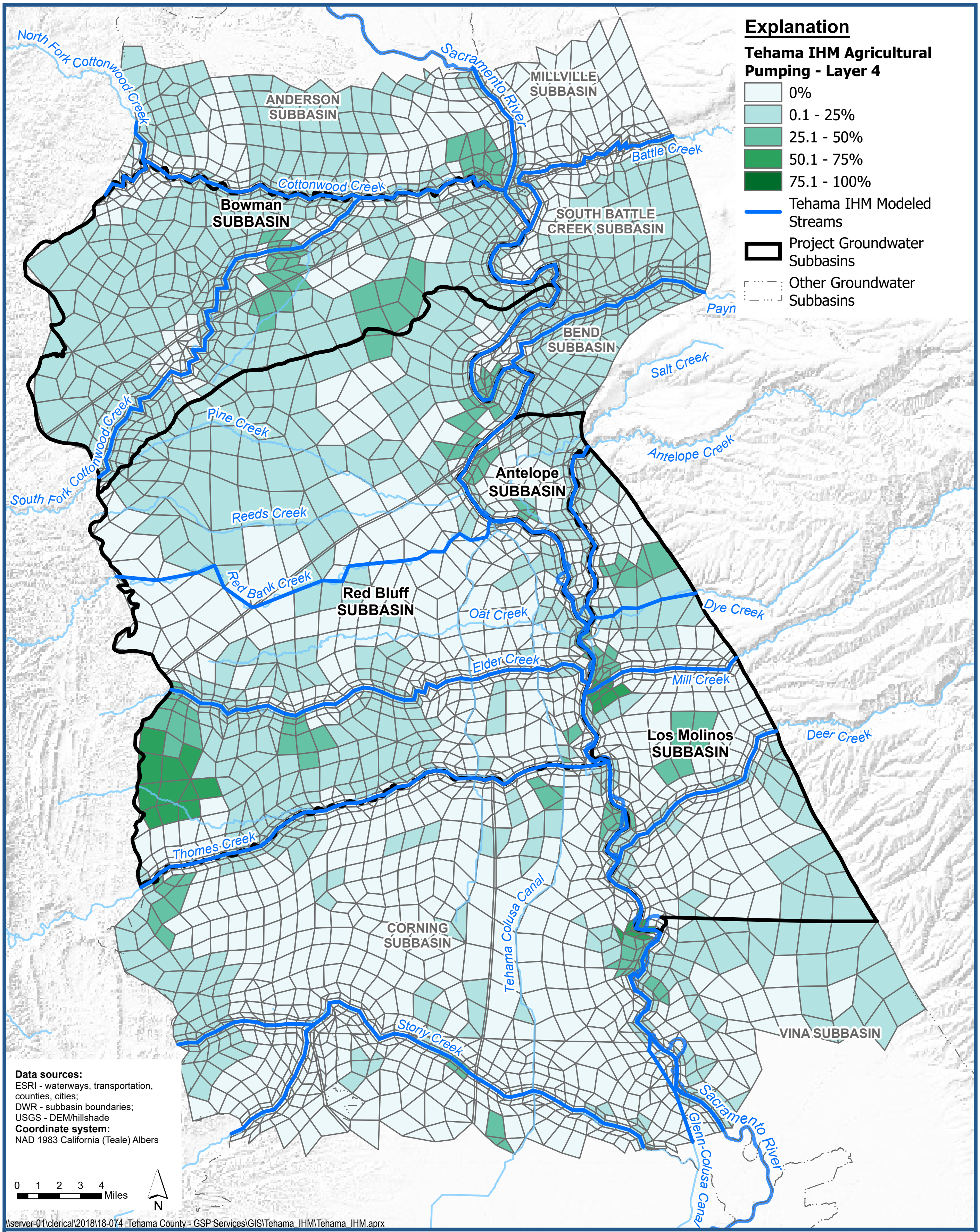
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 3

Groundwater Sustainability Planning
Tehama County, California

Figure 3-97



Explanation

Tehama IHM Agricultural Pumping - Layer 4

⬜	0%
🟩	0.1 - 25%
🟩	25.1 - 50%
🟩	50.1 - 75%
🟩	75.1 - 100%
━	Tehama IHM Modeled Streams
▭	Project Groundwater Subbasins
⬚	Other Groundwater Subbasins

Data sources:
ESRI - waterways, transportation, counties, cities;
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TEHAMA COUNTY
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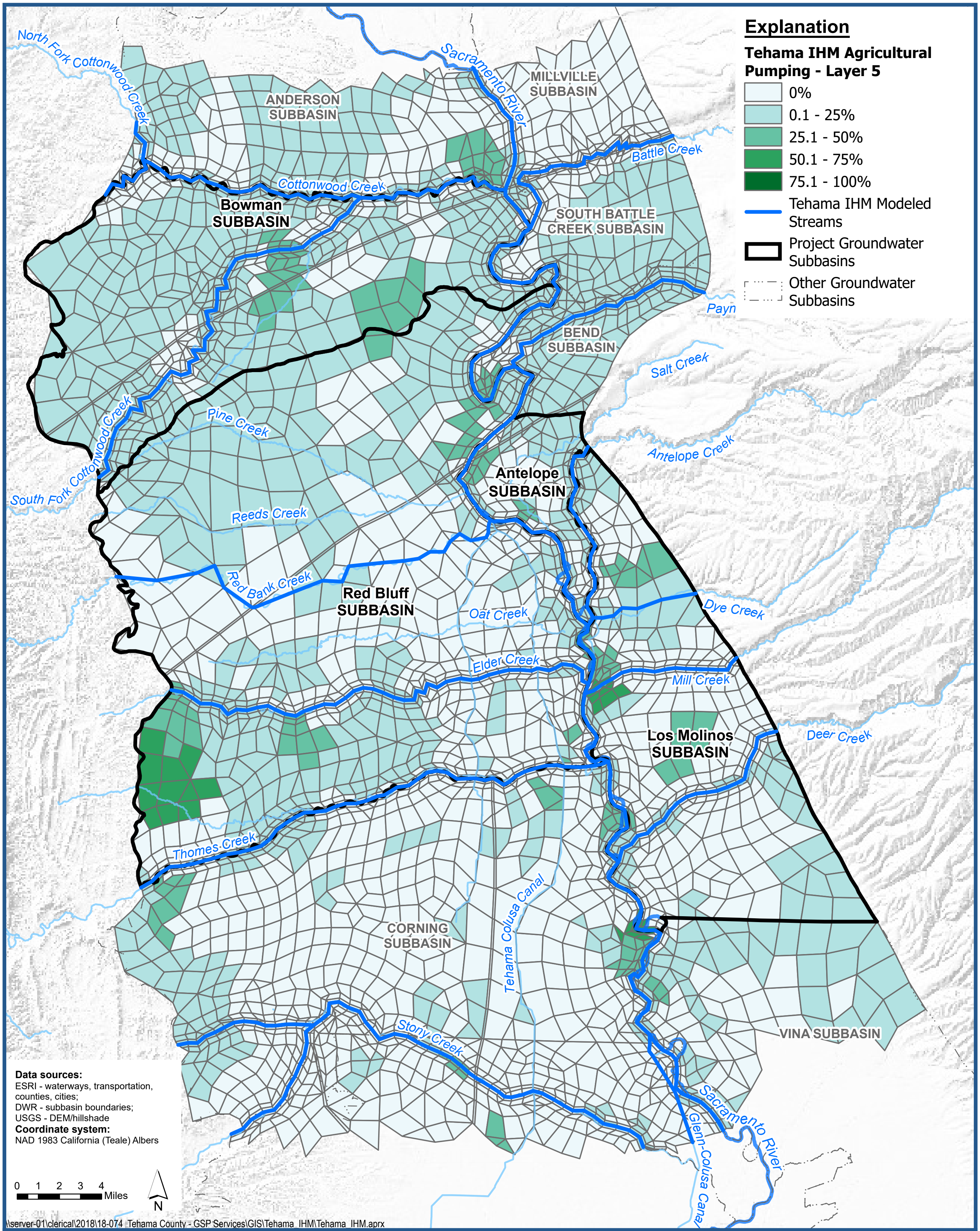
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 4

Groundwater Sustainability Planning
Tehama County, California

Figure 3-98



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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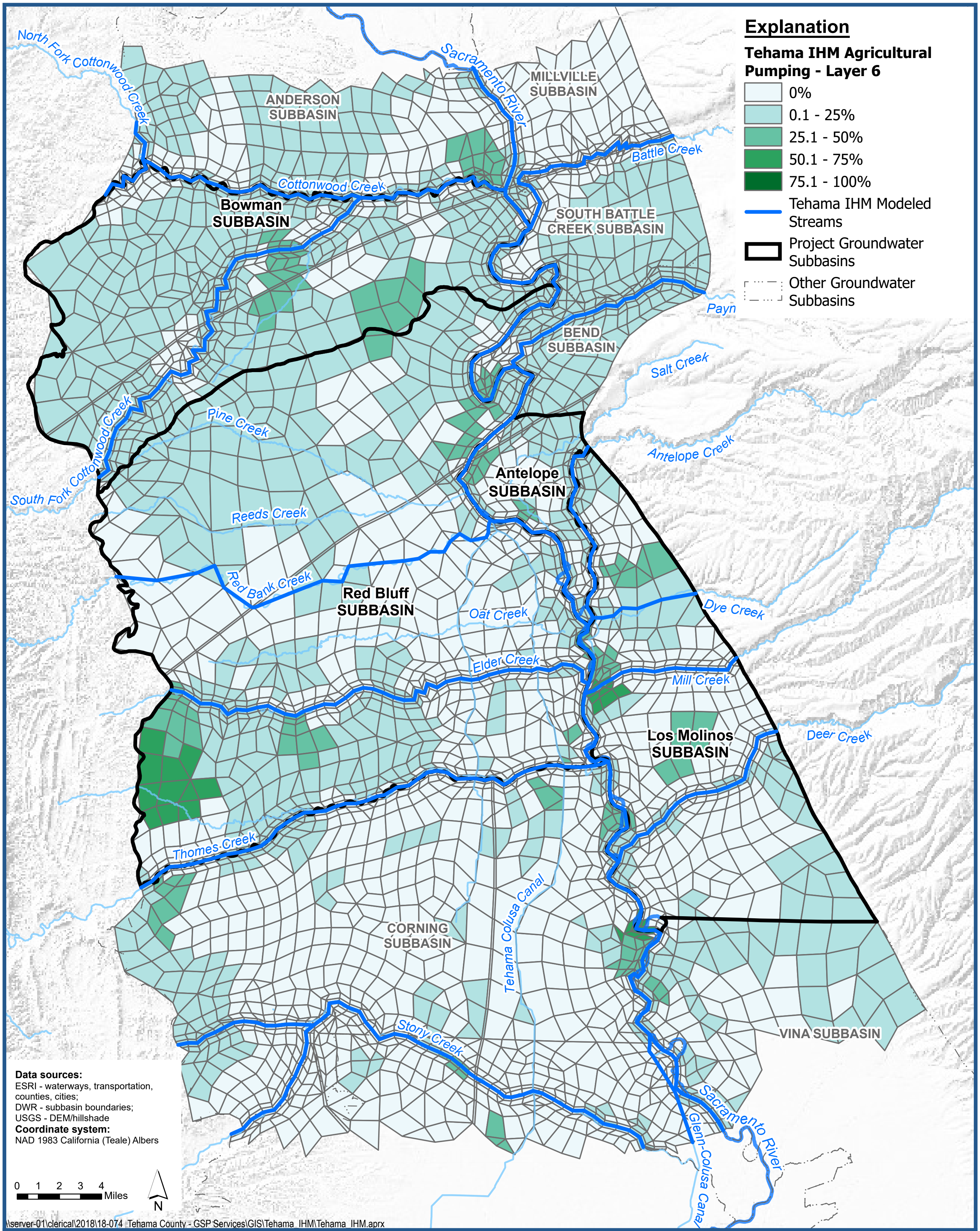
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 3-99



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ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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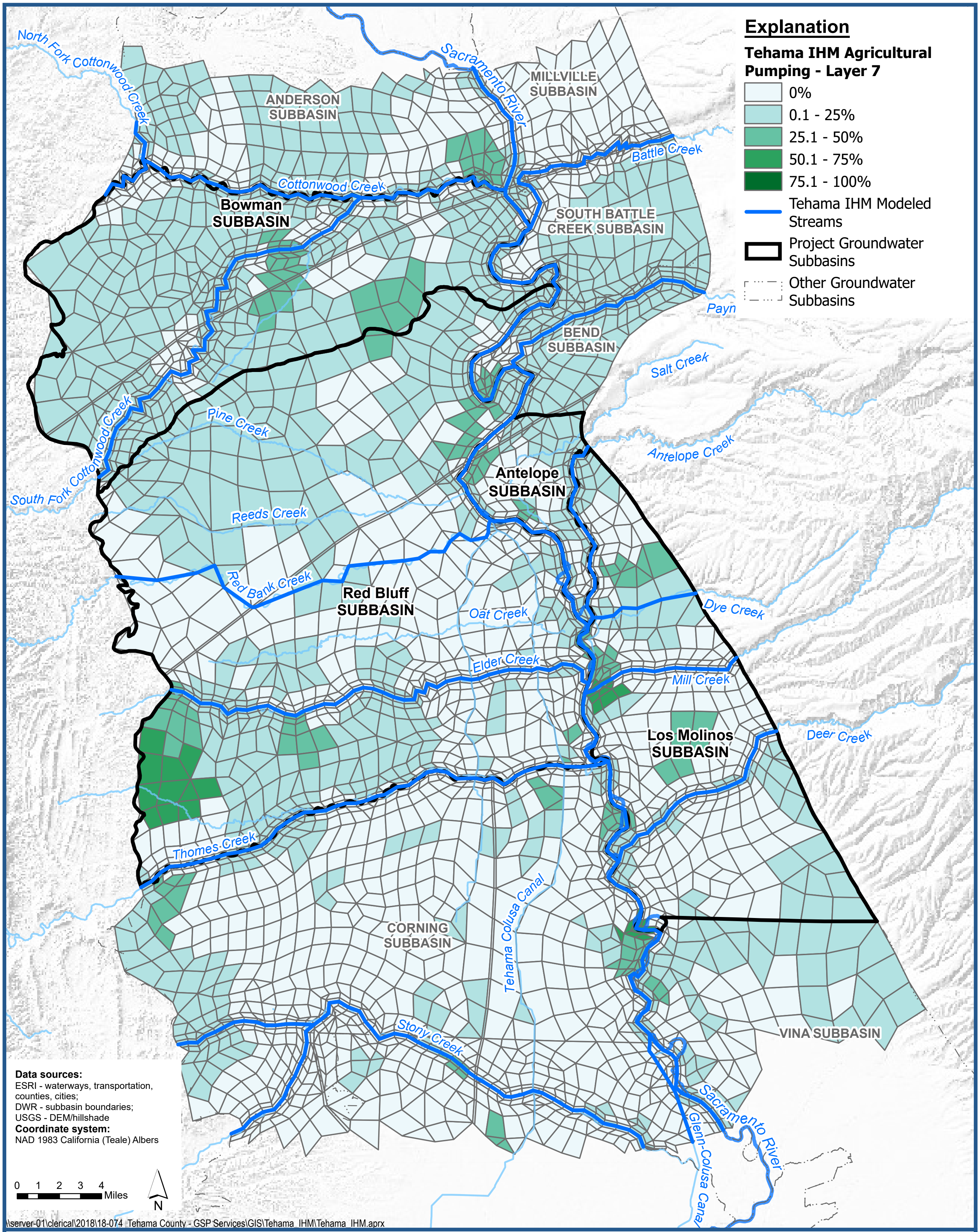
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 6

Groundwater Sustainability Planning
Tehama County, California

Figure 3-100



Data sources:
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DWR - subbasin boundaries;
USGS - DEM/hillshade
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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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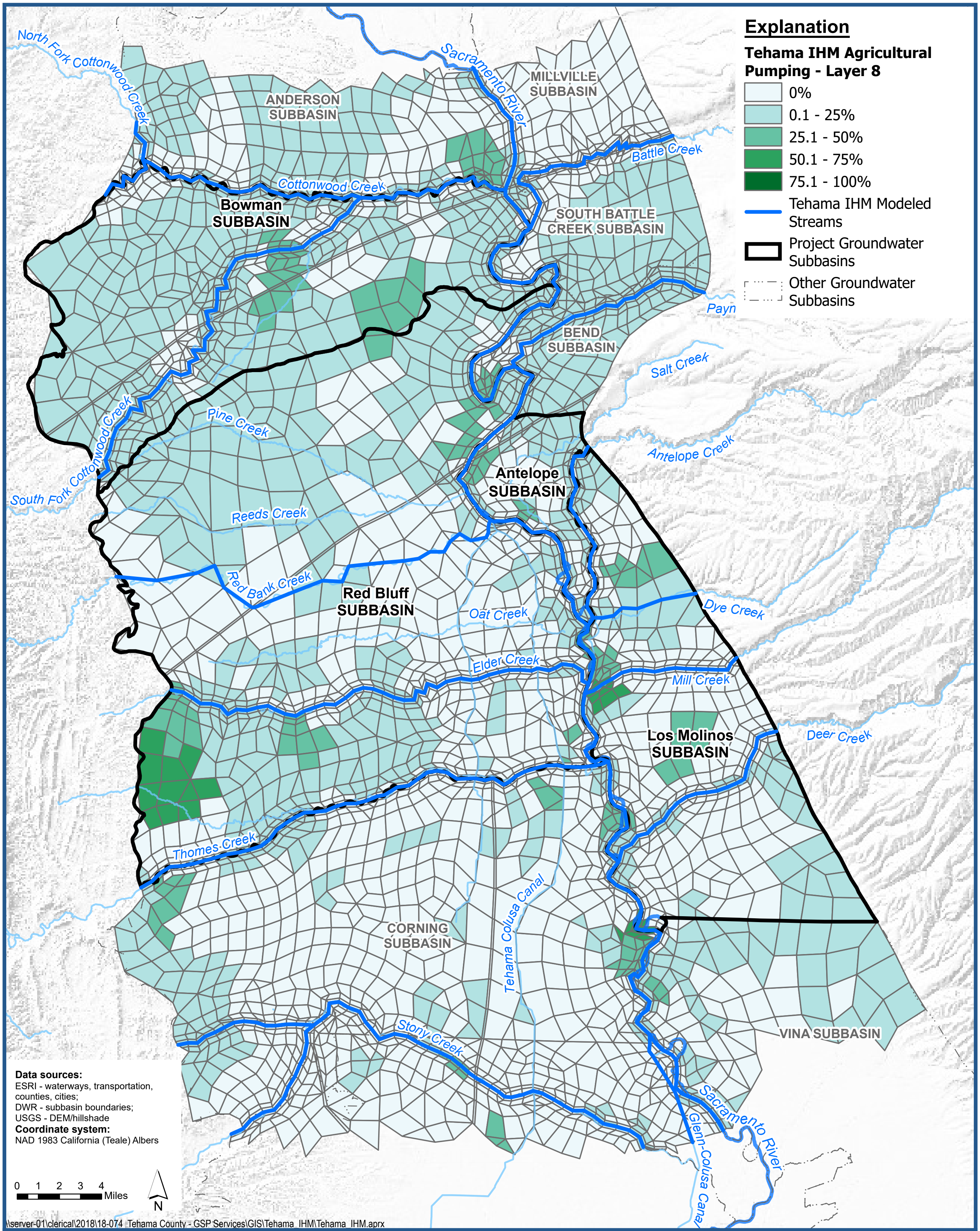
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 7

Groundwater Sustainability Planning
Tehama County, California

Figure 3-101



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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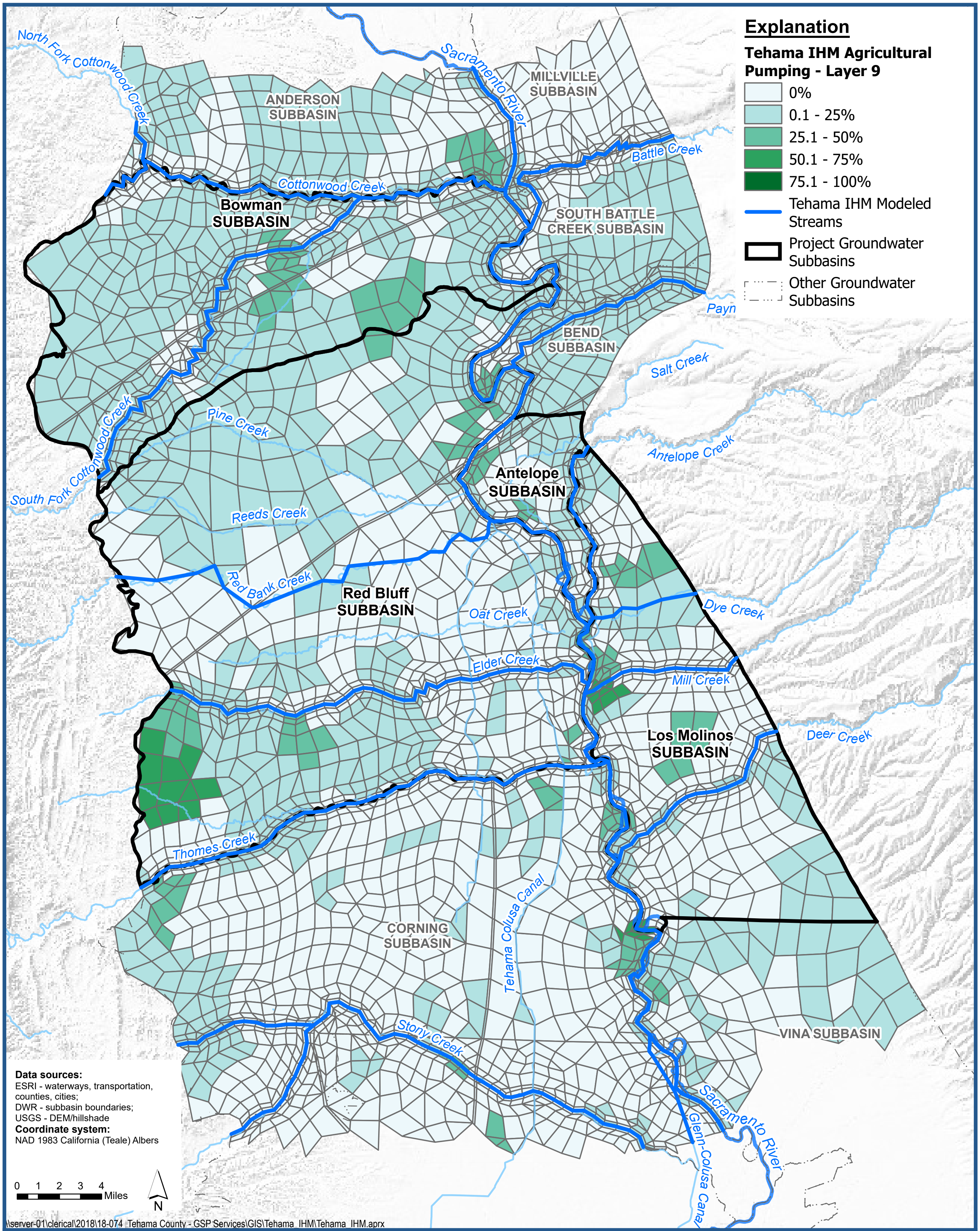
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 8

Groundwater Sustainability Planning
Tehama County, California

Figure 3-102



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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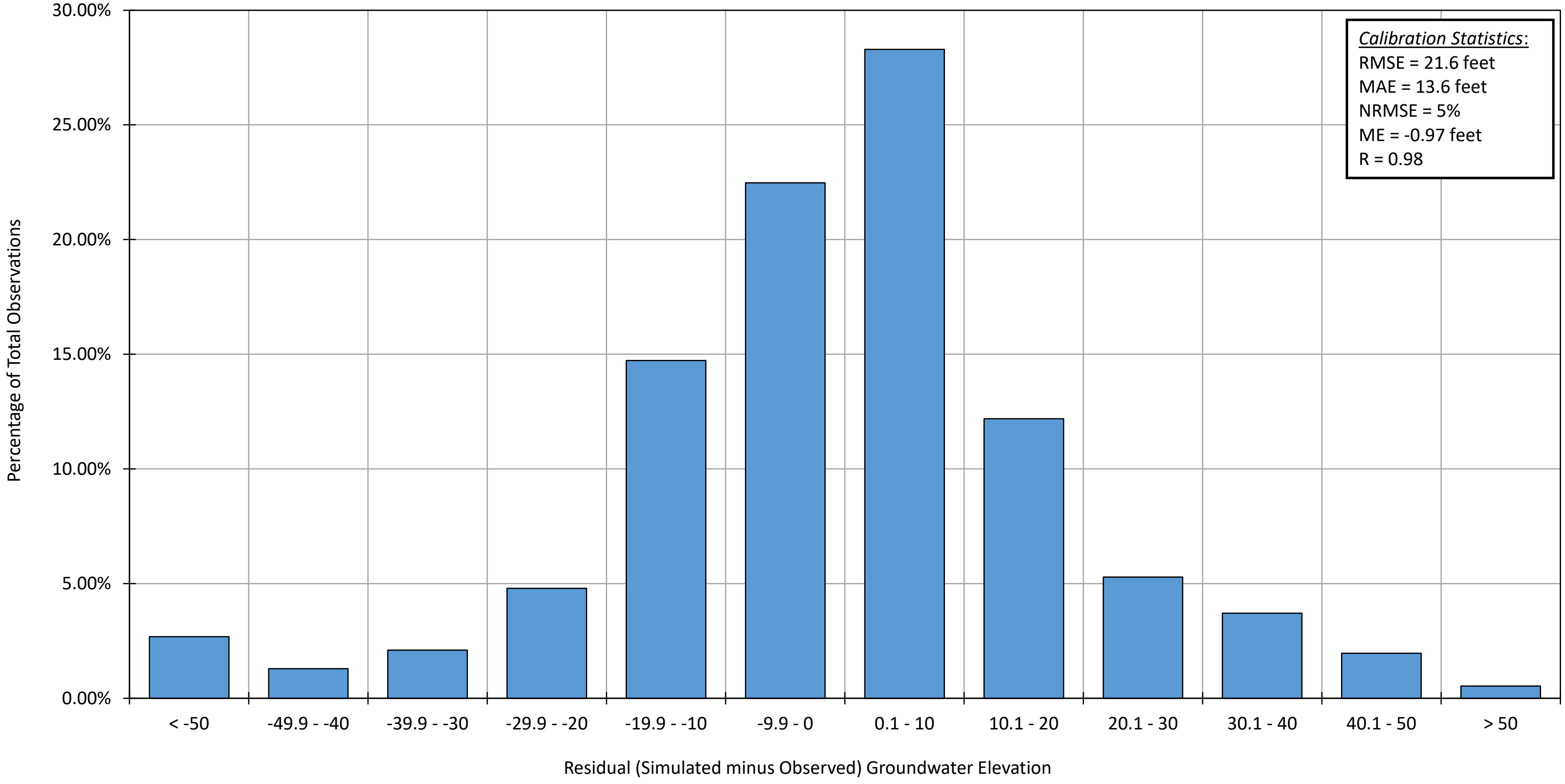
Vertical Distribution of Projected (with Projects) Agricultural Pumping in Tehama IHM - Layer 9

Groundwater Sustainability Planning
Tehama County, California

Figure 3-103



Calibration Statistics:
RMSE = 21.6 feet
MAE = 13.6 feet
NRMSE = 5%
ME = -0.97 feet
R = 0.98

X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 4-1 Histogram of Residual (Simulated minus Observed) Groundwater Elevations in Tehama IHM for All Observations.mxd

TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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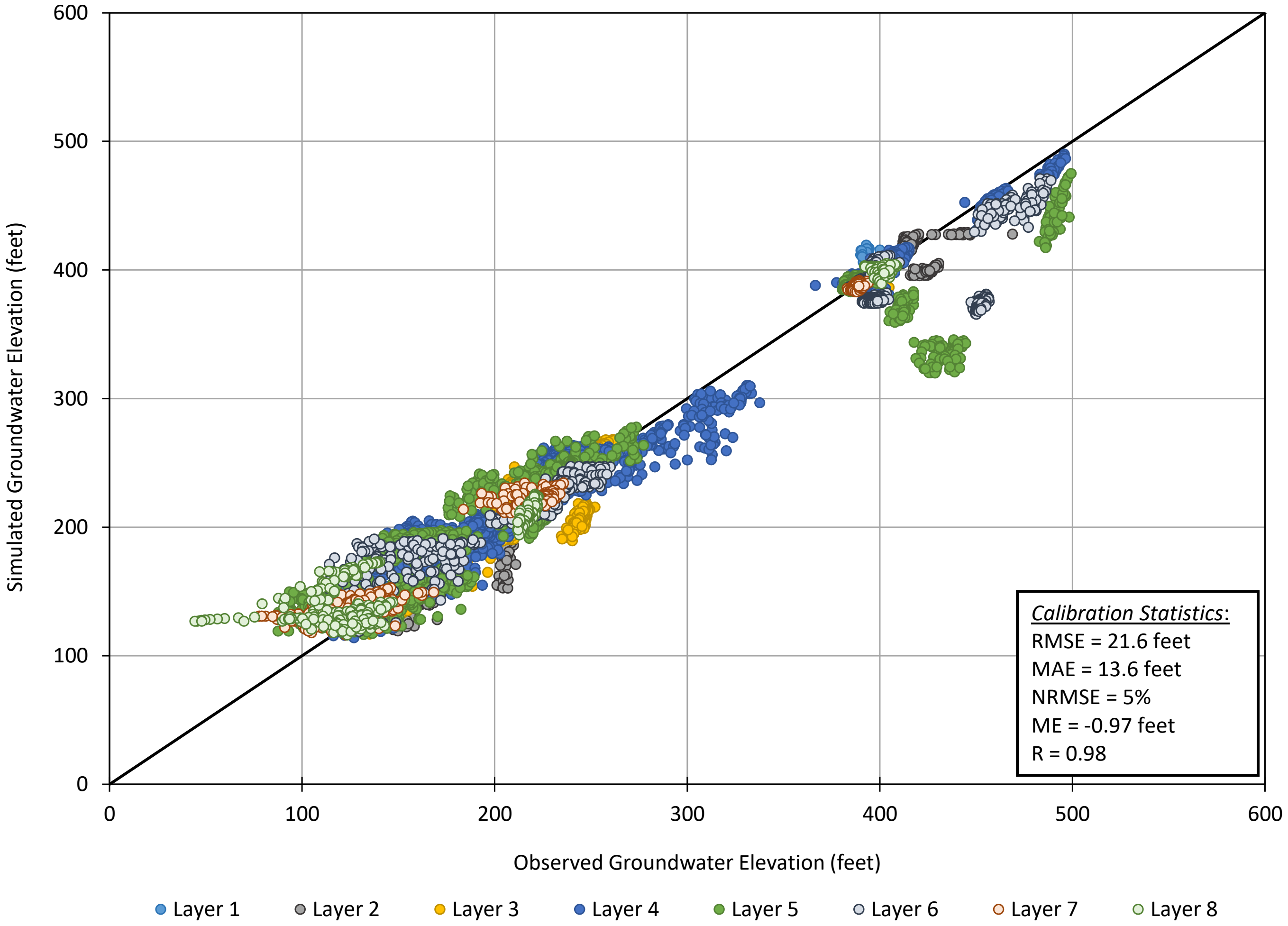
Histogram of Residual (Simulated minus Observed) Groundwater Elevations in Tehama IHM for All Observations

Groundwater Sustainability Planning
Tehama County, California

Figure 4-1



X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 4-2 Tehama IHM Simulated vs Observed Groundwater Elevations_By Layer.mxd

TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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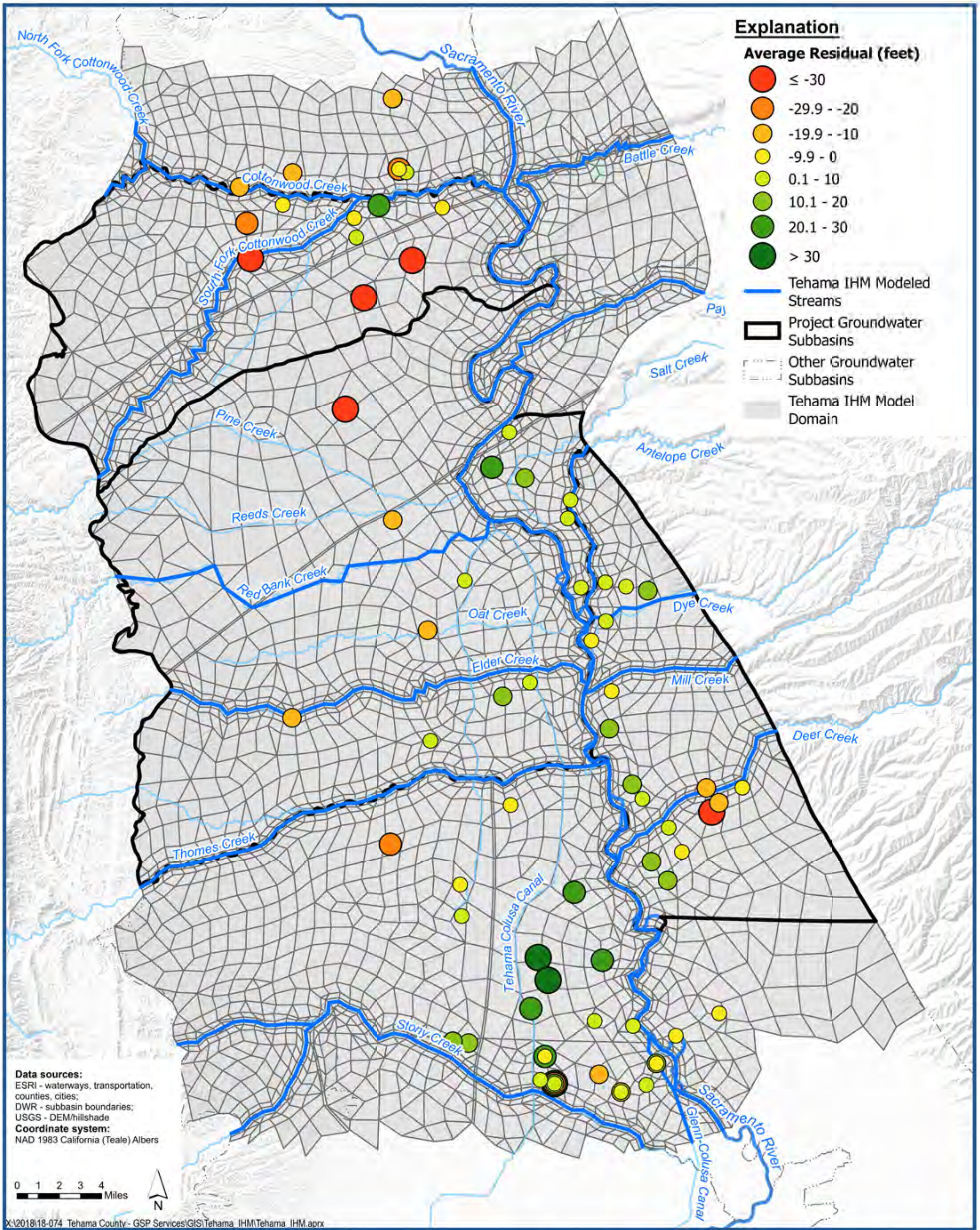
Tehama IHM Simulated vs. Observed Groundwater Elevations, By Layer

Groundwater Sustainability Planning
Tehama County, California

Figure 4-2



Data sources:
ESRI - waterways, transportation, counties, cities;
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Coordinate system:
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TEHAMA COUNTY

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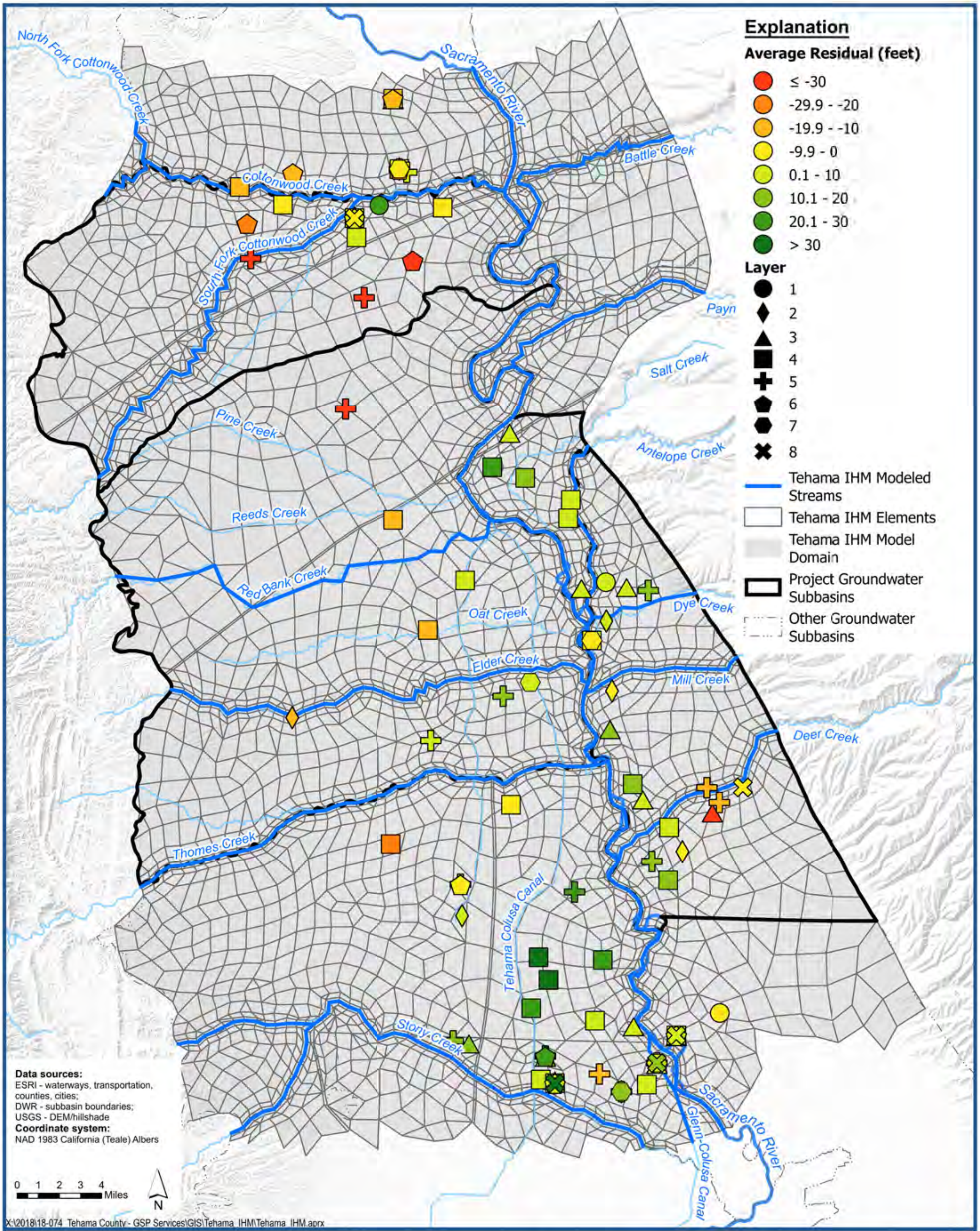
Tehama IHM Average Residual Groundwater Elevation by Calibration Well

Groundwater Sustainability Planning
Tehama County, California

Figure 4-3



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
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Coordinate system:
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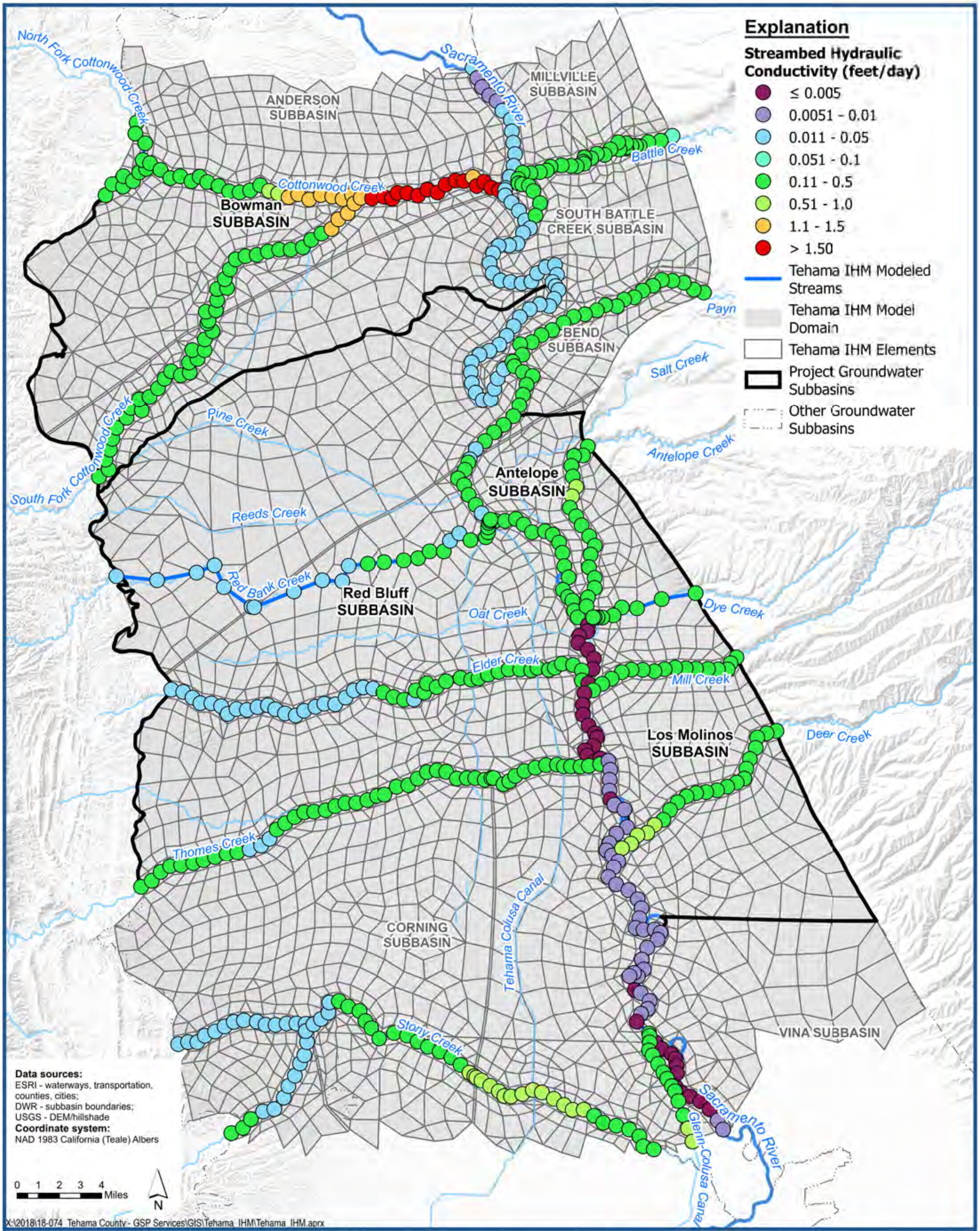
Tehama IHM Average Residual Groundwater Elevation by Model Layer

Groundwater Sustainability Planning
Tehama County, California

Figure 4-4



TEHAMA COUNTY

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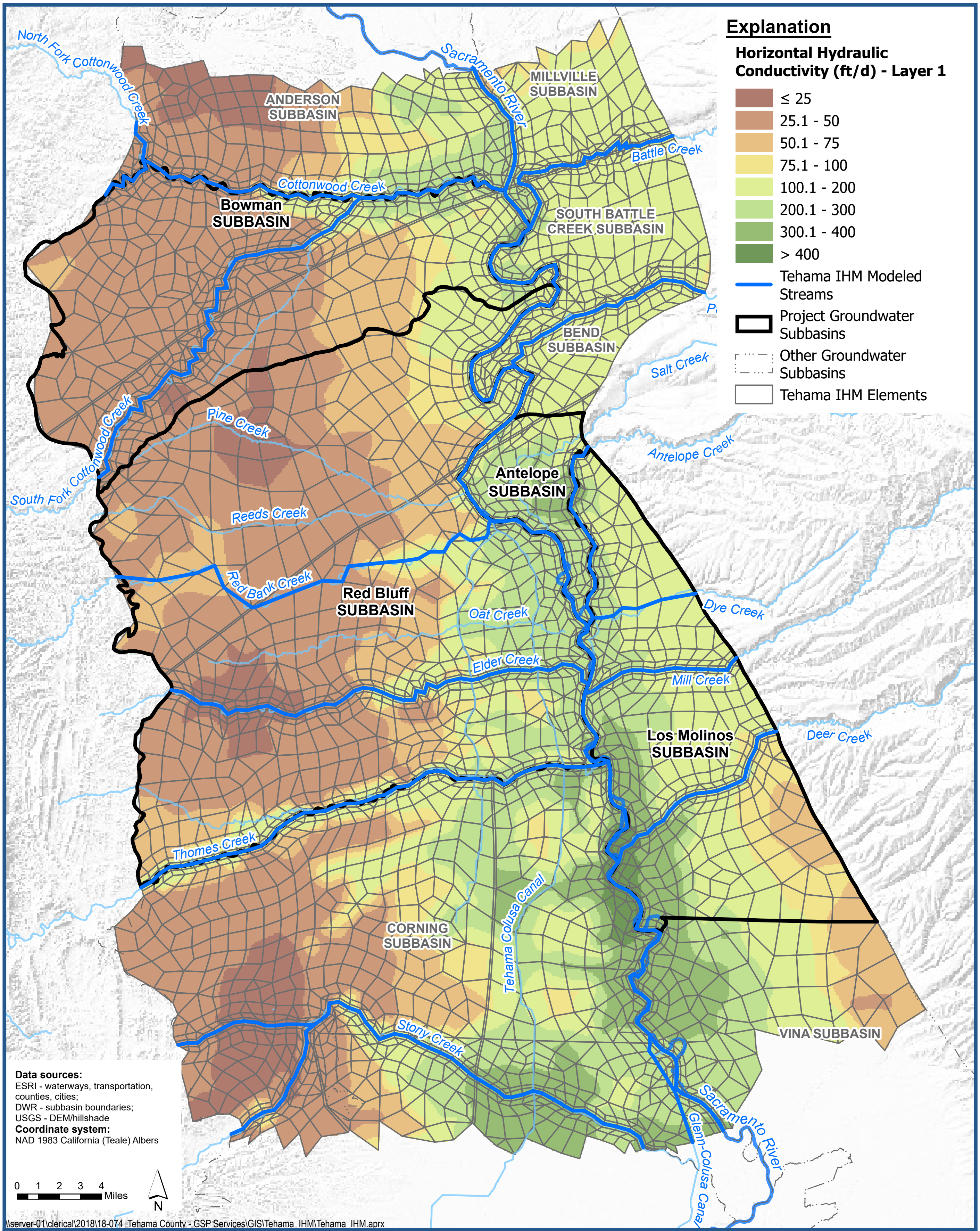
Tehama IHM Calibrated Streambed Conductance

Groundwater Sustainability Plan
Tehama County, California

Figure 4-5



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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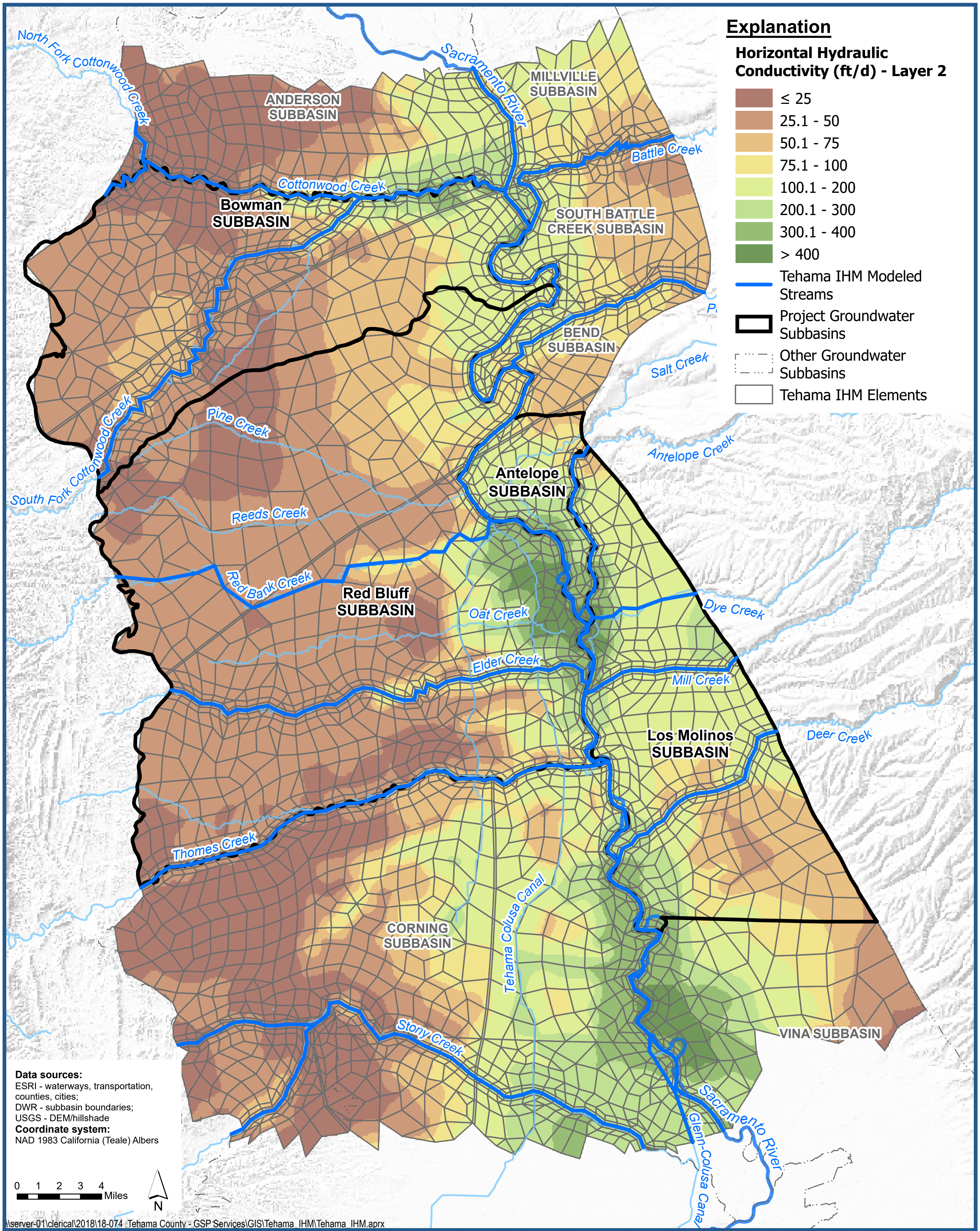
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 1

Groundwater Sustainability Planning
Tehama County, California

Figure 4-6



Data sources:
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DWR - subbasin boundaries;
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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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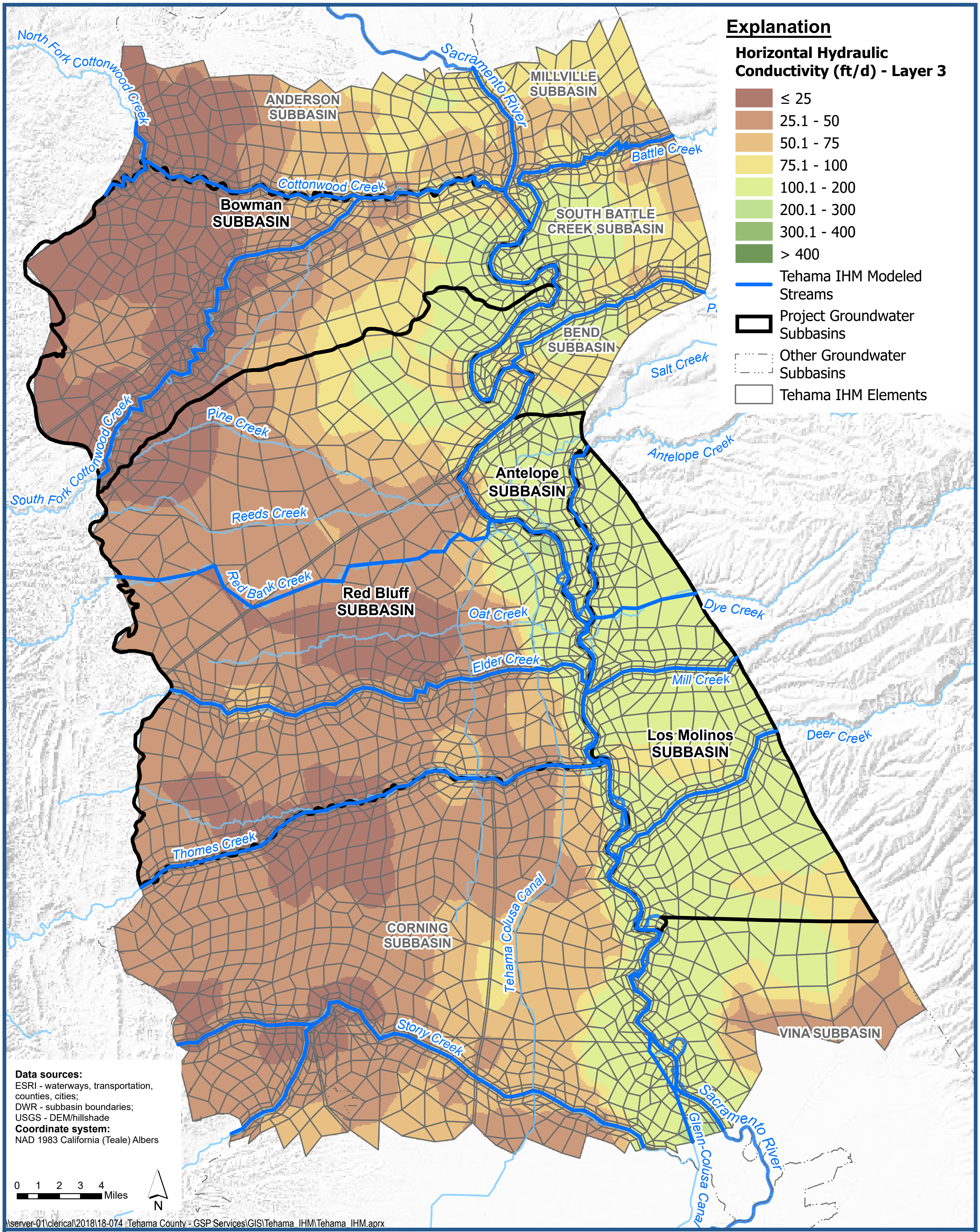
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 4-7



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
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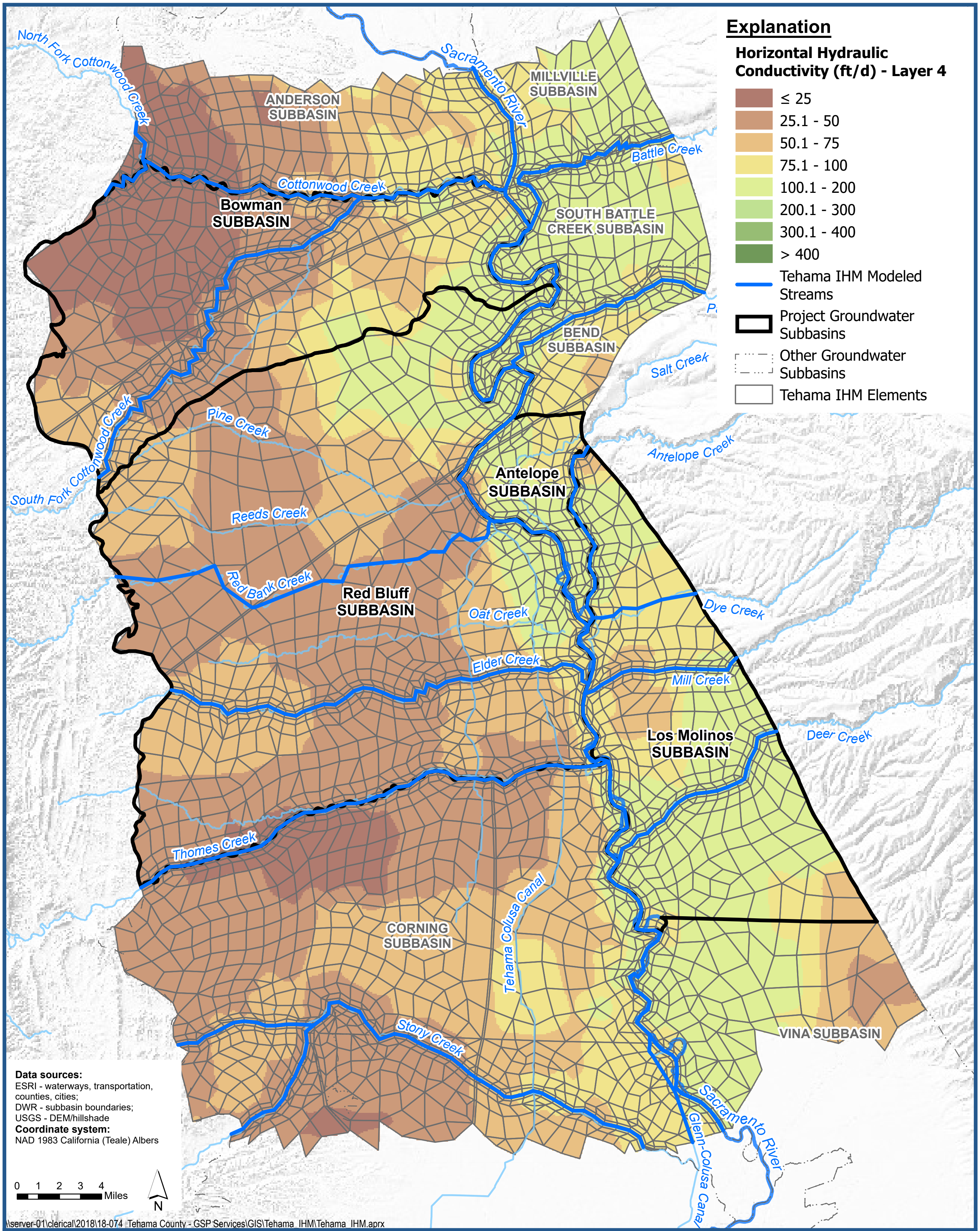
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 3

Groundwater Sustainability Planning
Tehama County, California

Figure 4-8



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
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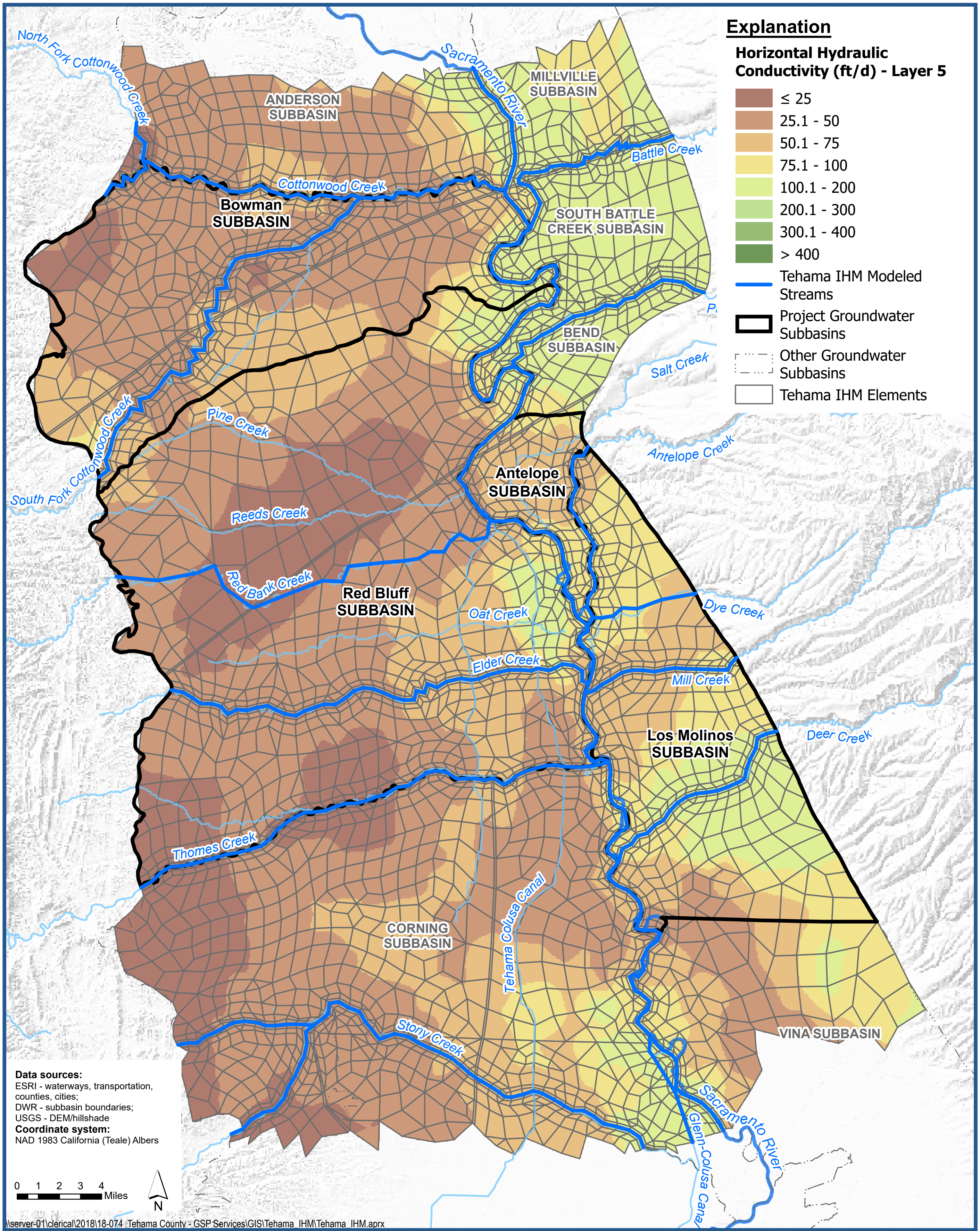
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 4

Groundwater Sustainability Planning
Tehama County, California

Figure 4-9



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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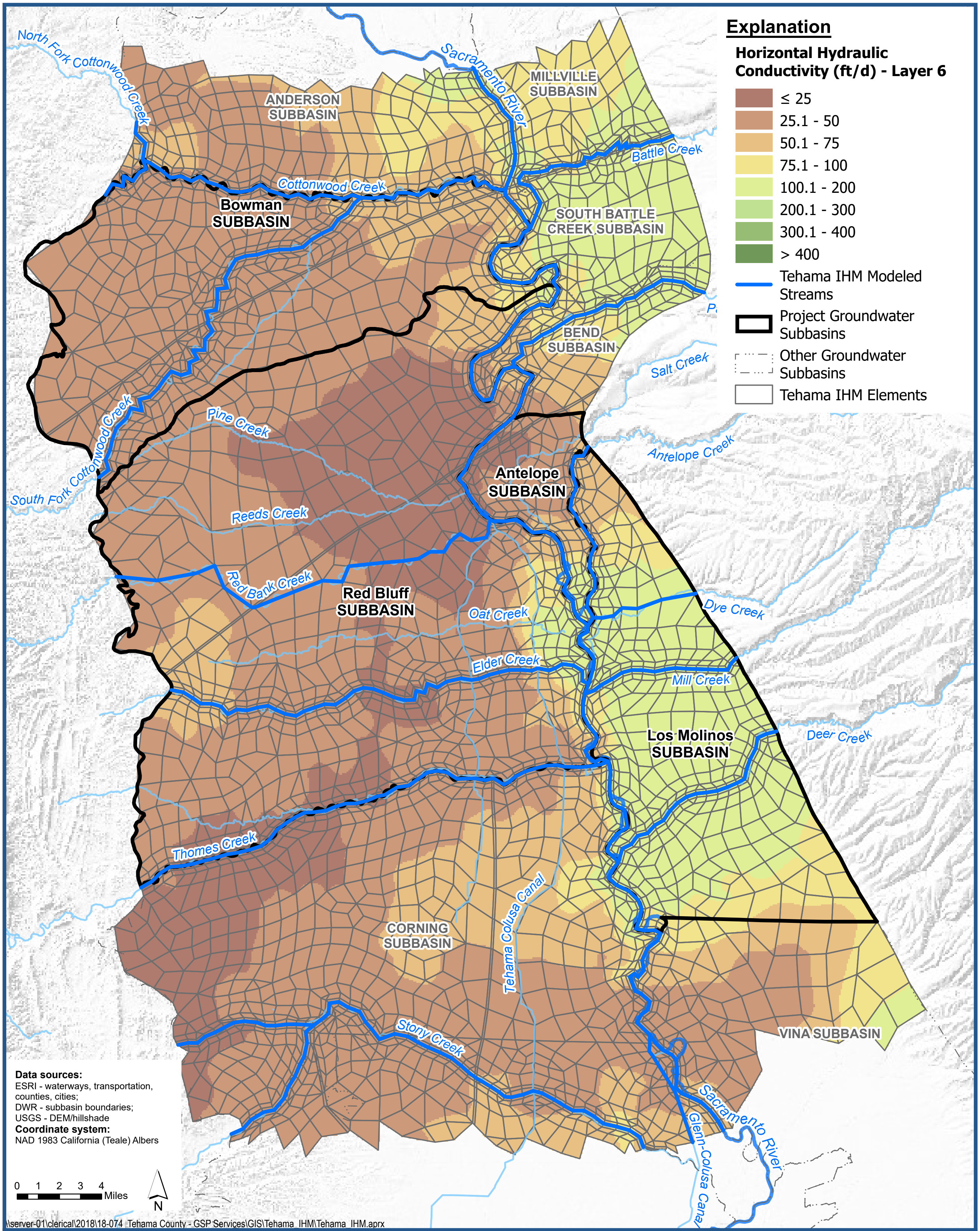
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 4-10



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
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TEHAMA COUNTY

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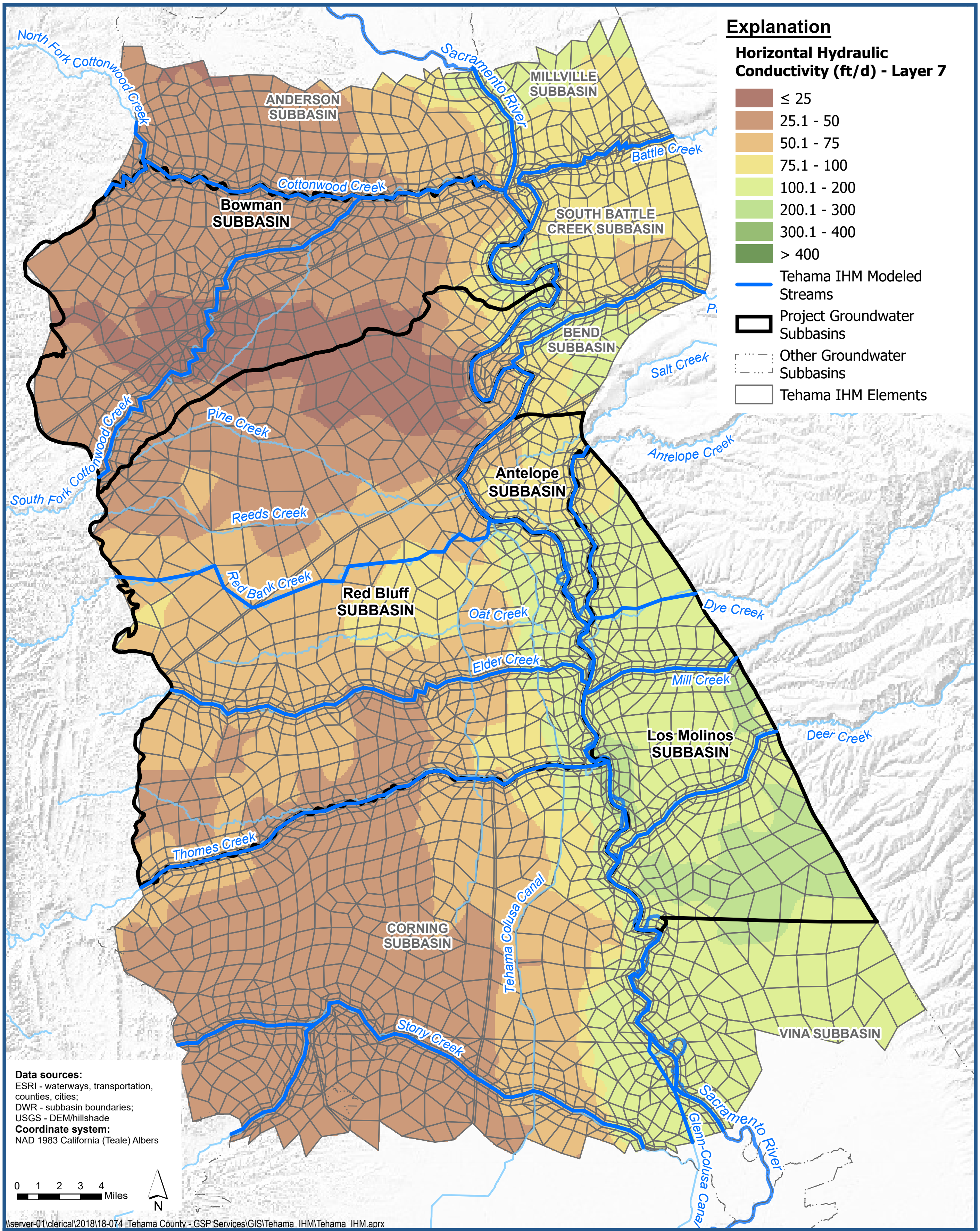
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 6

Groundwater Sustainability Planning
Tehama County, California

Figure 4-11



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
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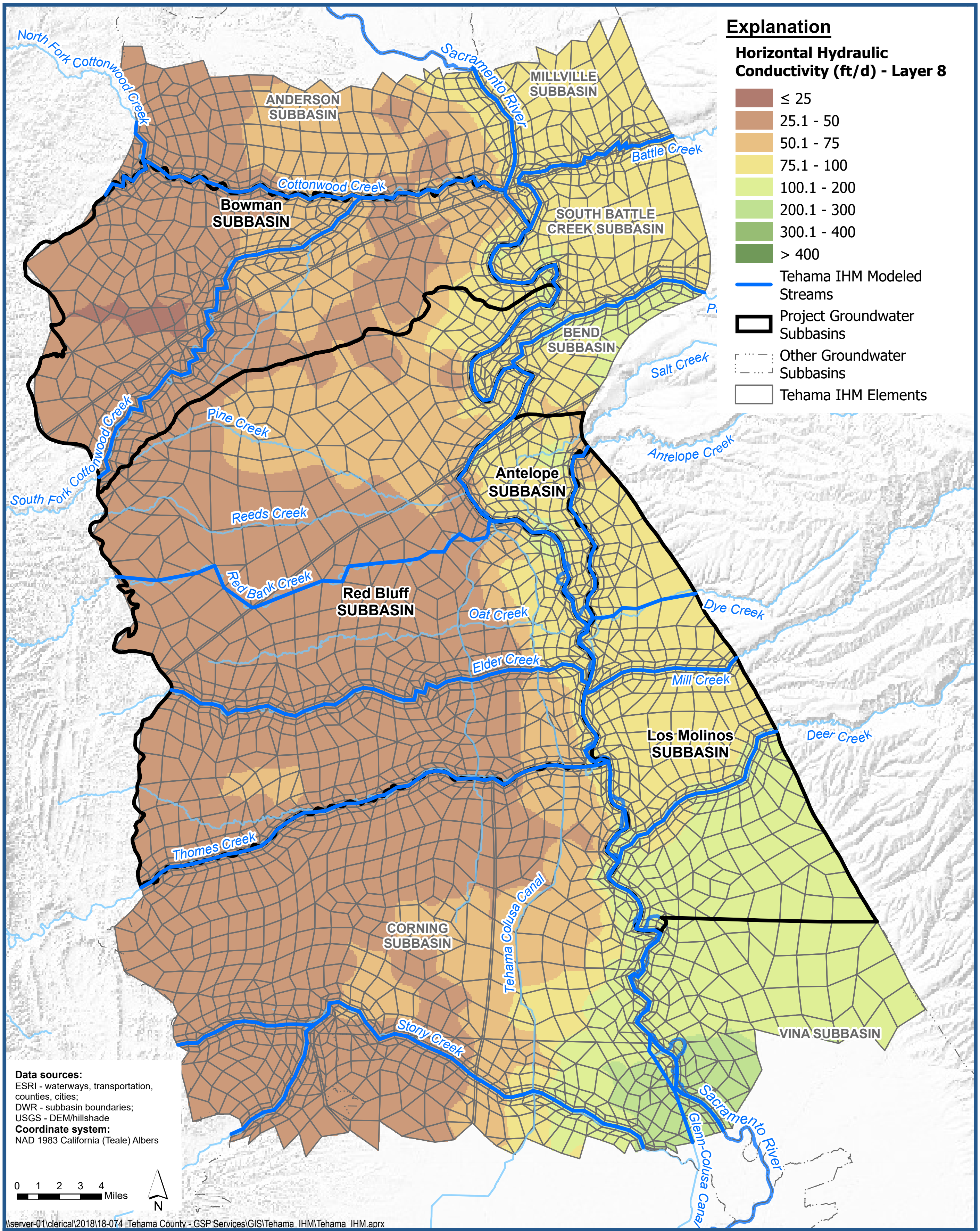
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 7

Groundwater Sustainability Planning
Tehama County, California

Figure 4-12



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 8

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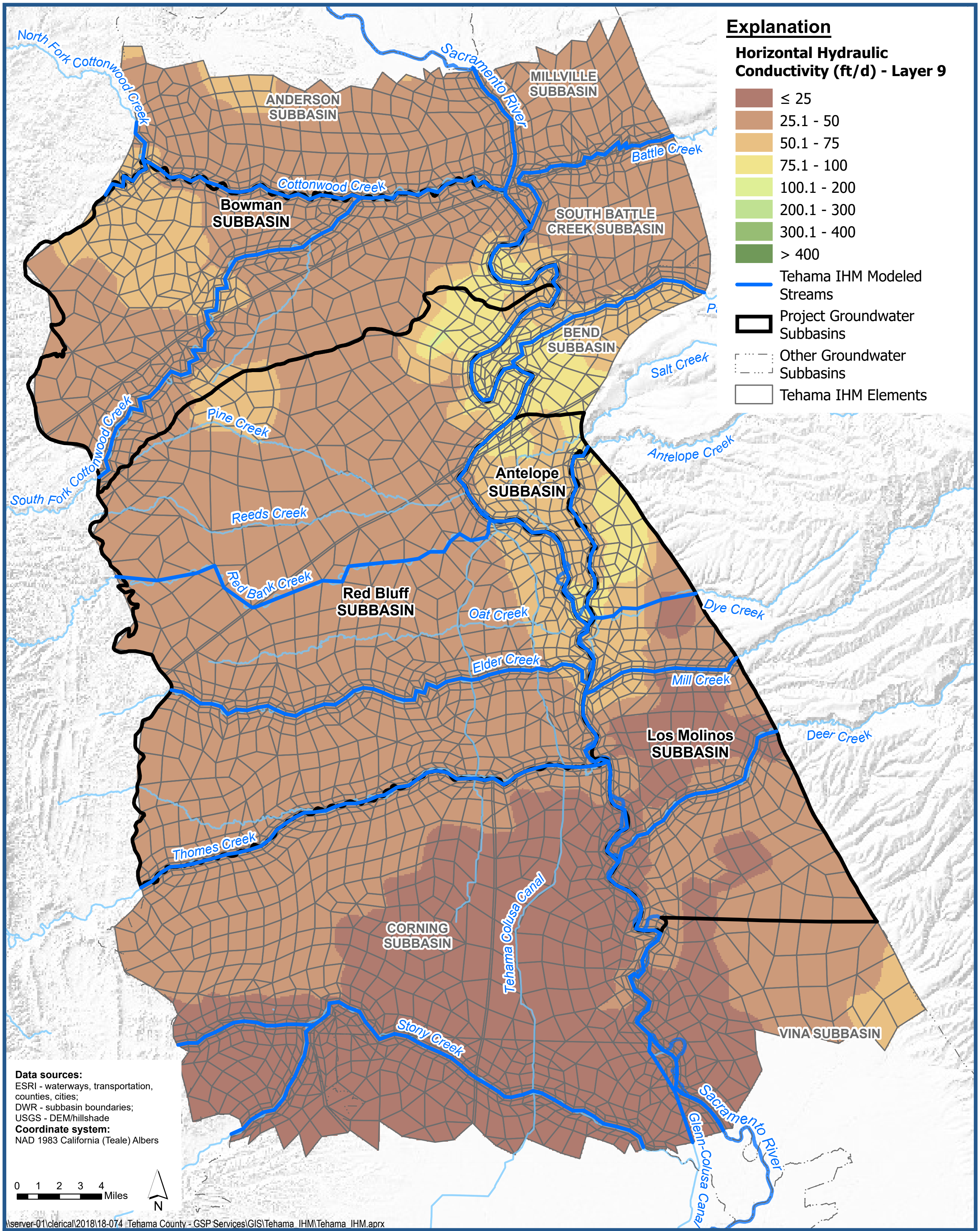
Tehama County, California

Figure 4-13



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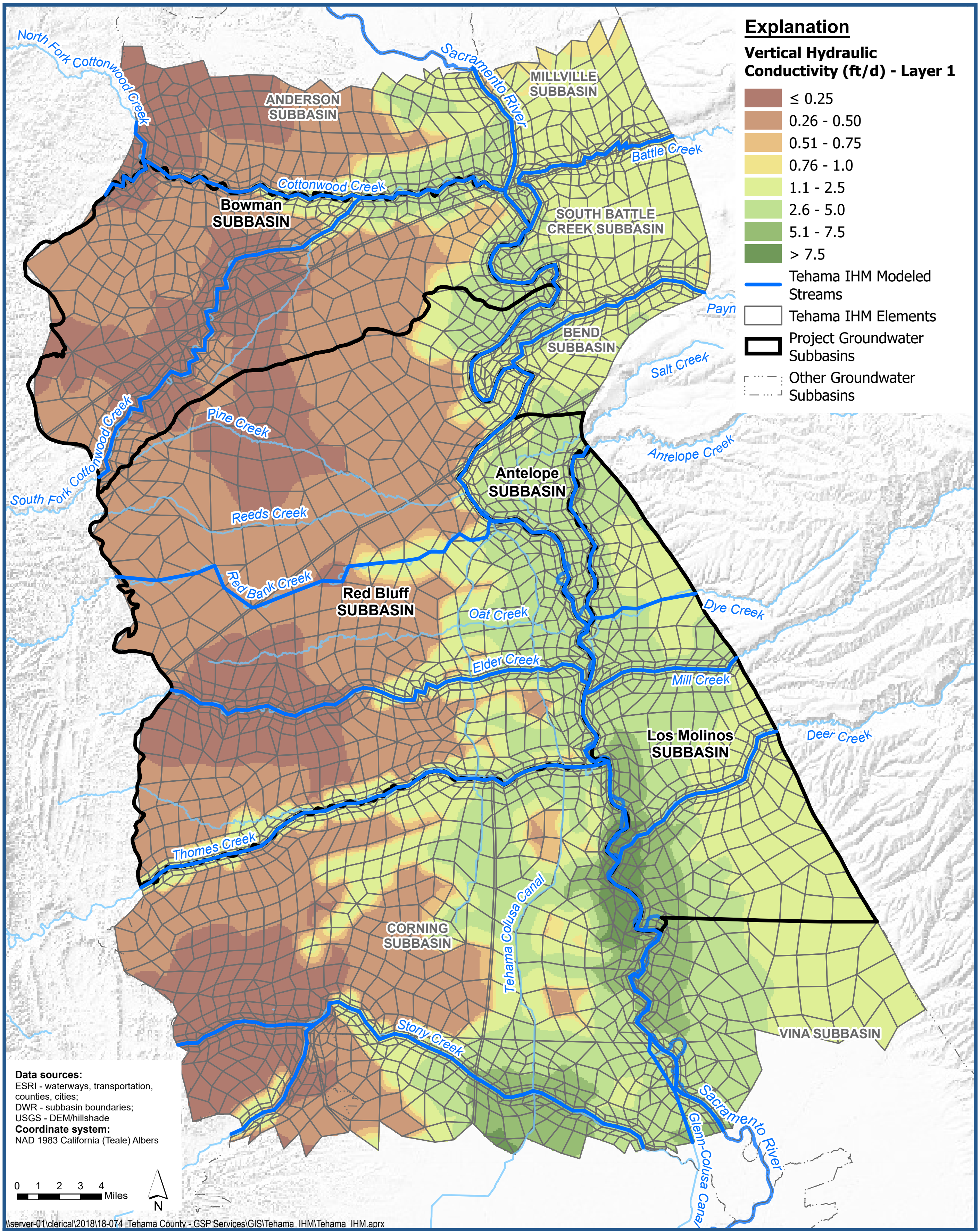
Calibrated Horizontal Hydraulic Conductivity (Kh) in Tehama IHM - Layer 9

Groundwater Sustainability Planning
Tehama County, California

Figure 4-14



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DWR - subbasin boundaries;
USGS - DEM/hillshade

Coordinate system:
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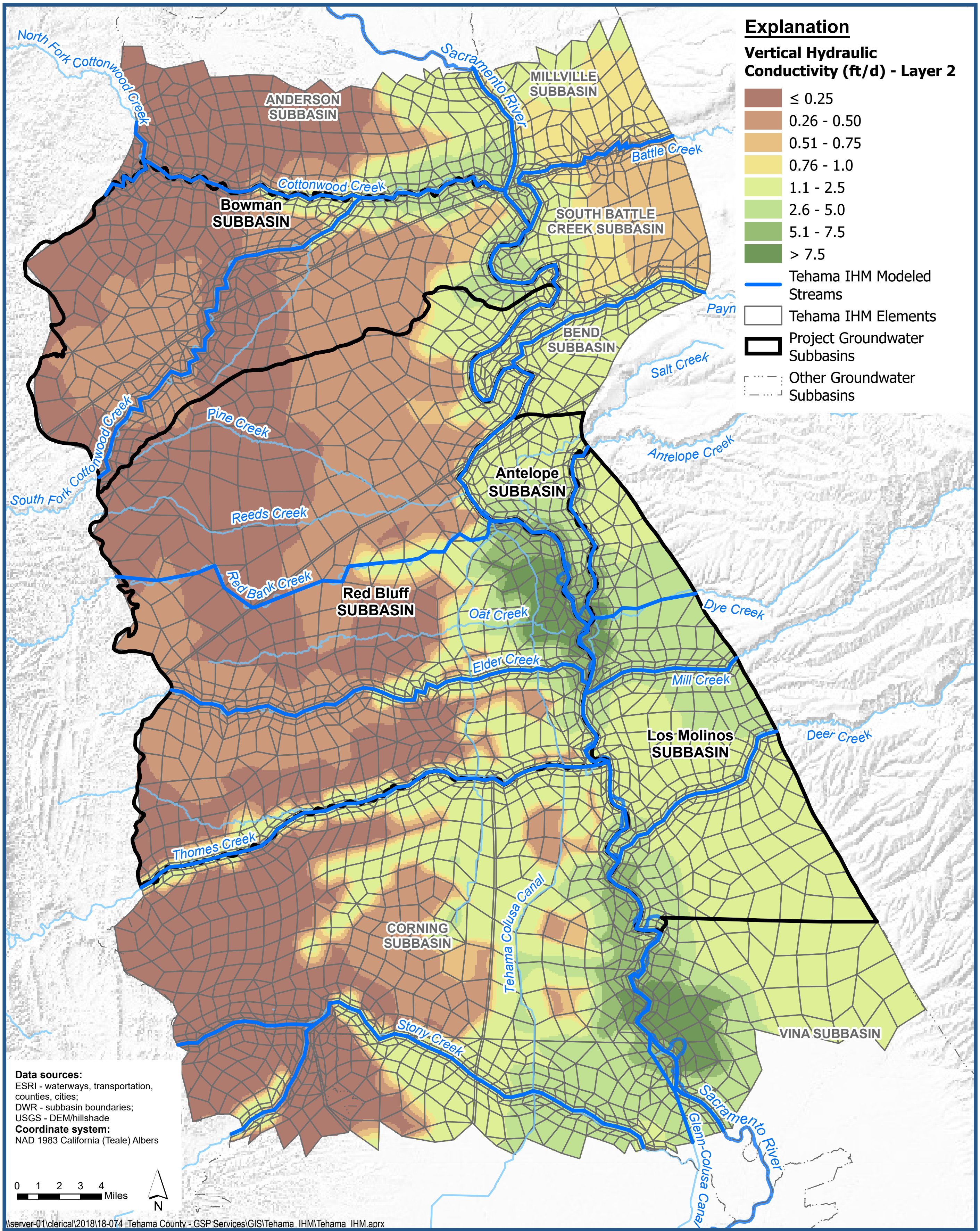
Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 1

Groundwater Sustainability Planning
Tehama County, California

Figure 4-15



Data sources:
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DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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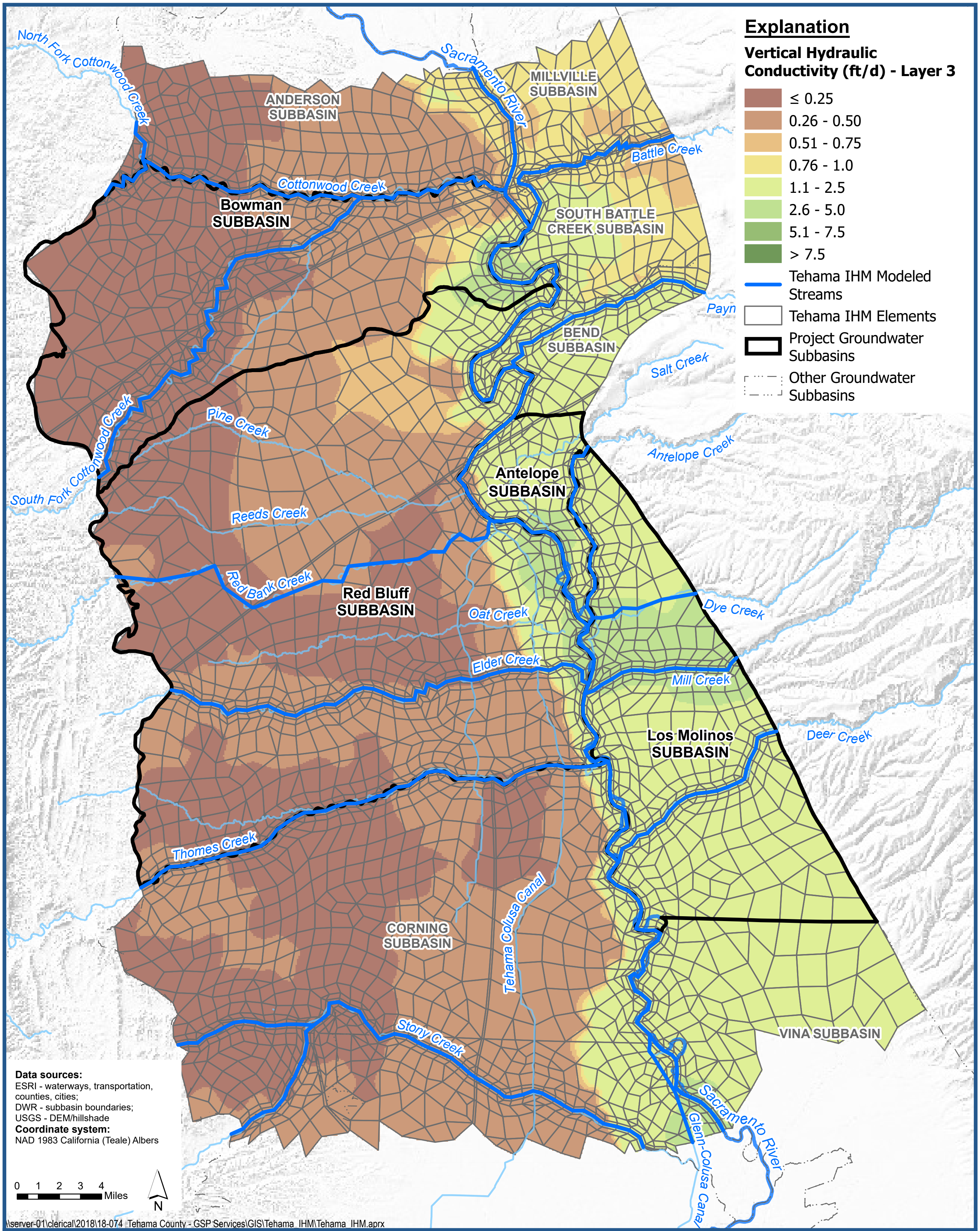
Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 4-16



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 3

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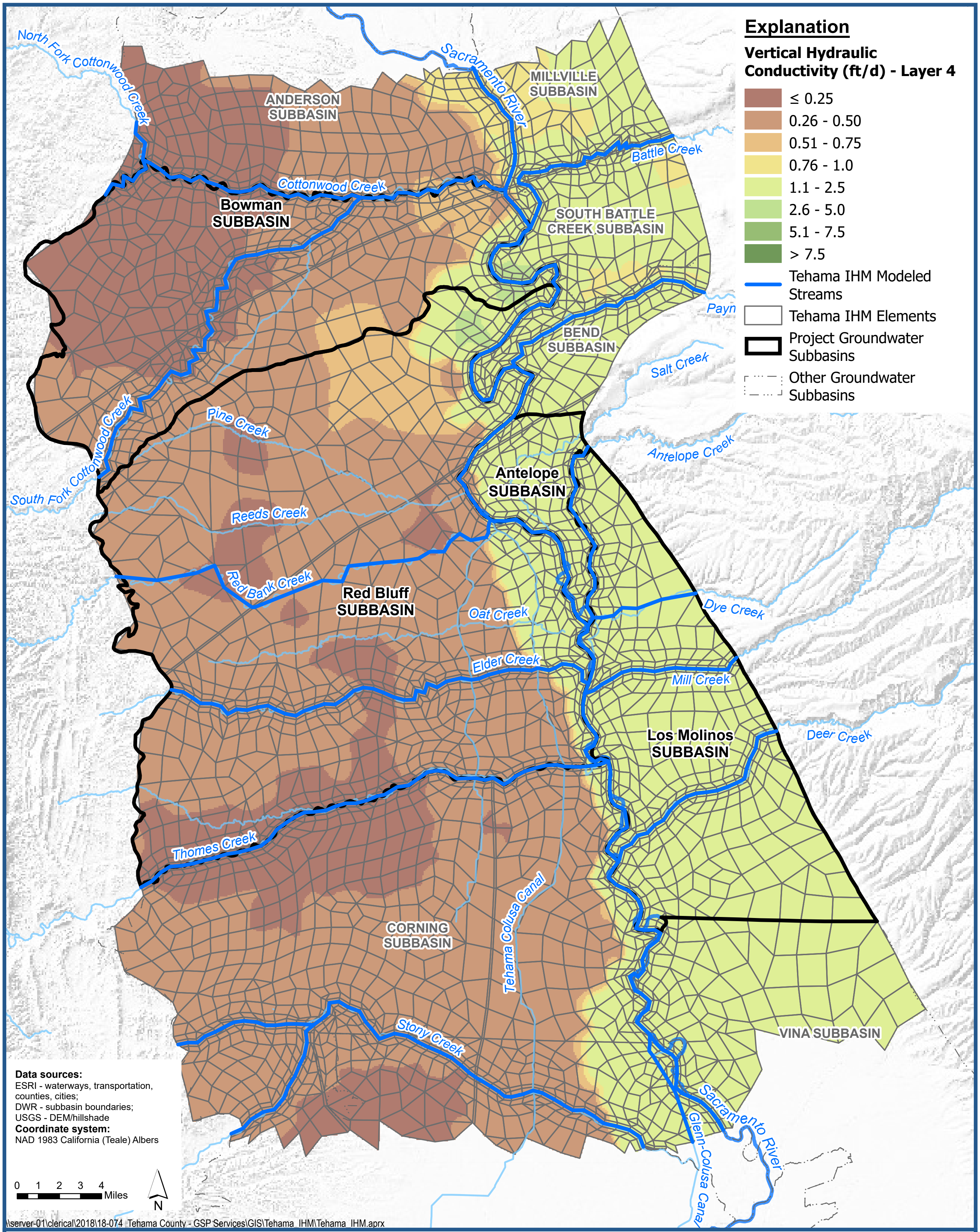
Tehama County, California

Figure 4-17



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ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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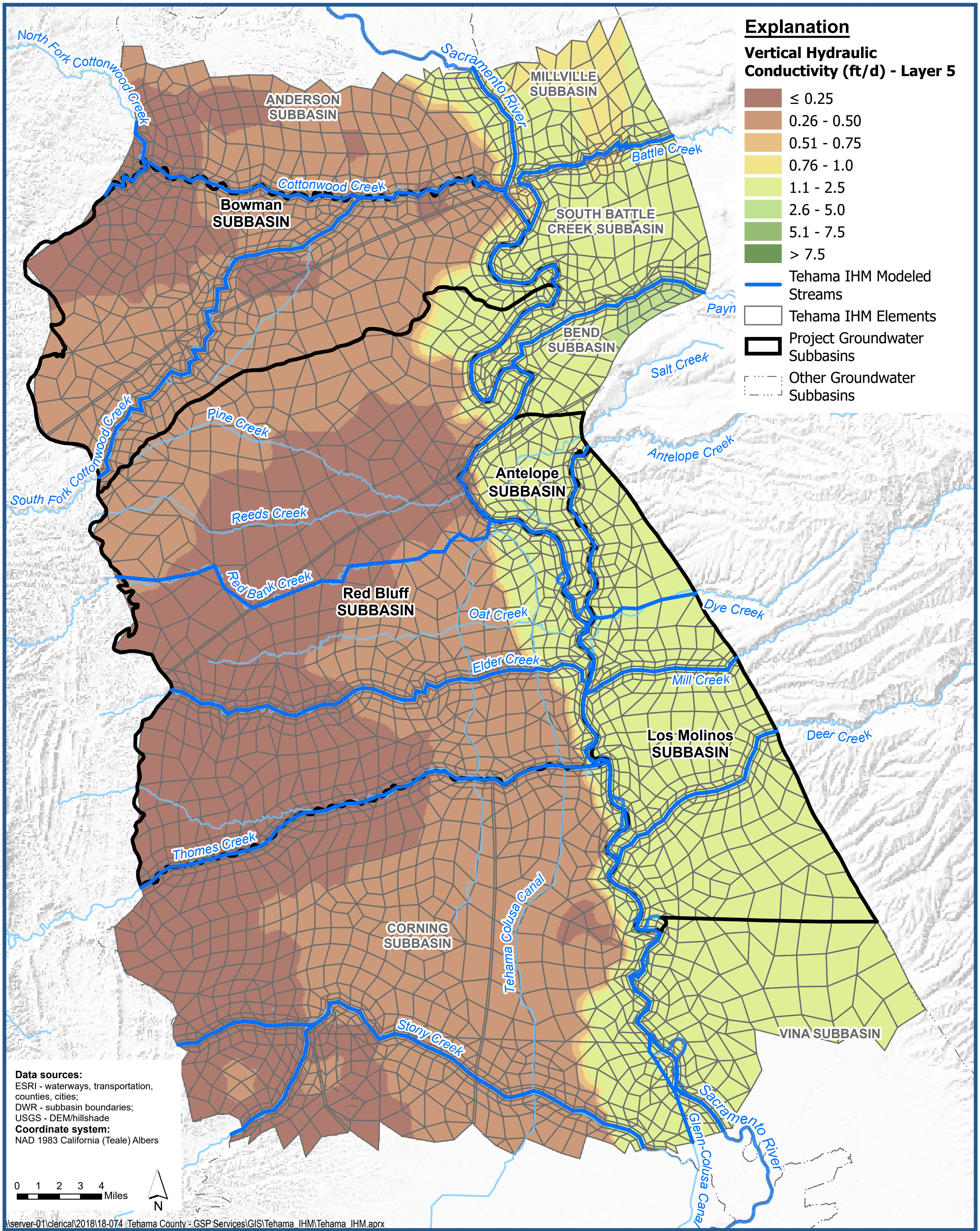
Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 4

Groundwater Sustainability Planning
Tehama County, California

Figure 4-18



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ESRI - waterways, transportation, counties, cities;
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Coordinate system:
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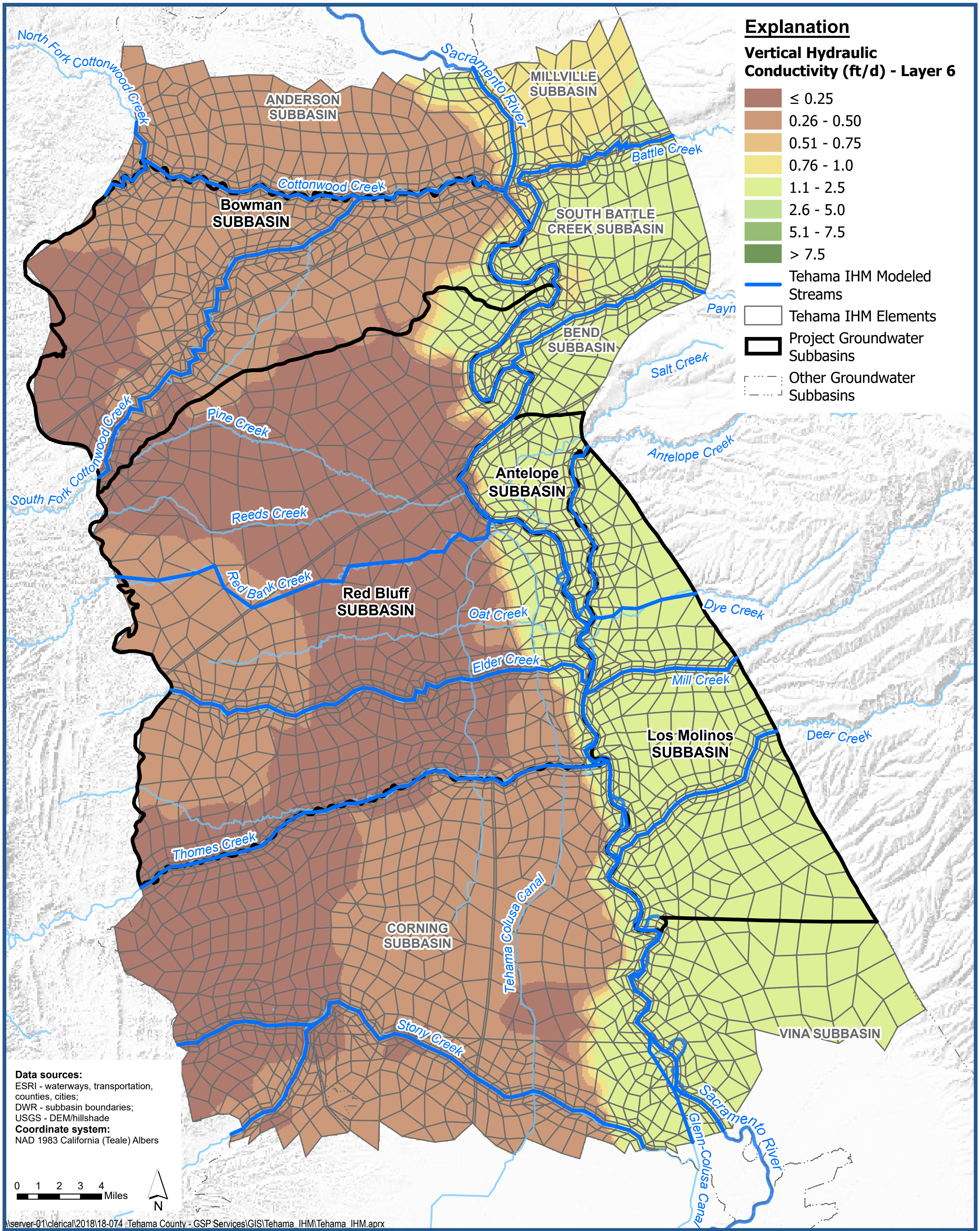
Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 4-19



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DWR - subbasin boundaries;
USGS - DEM/hillshade
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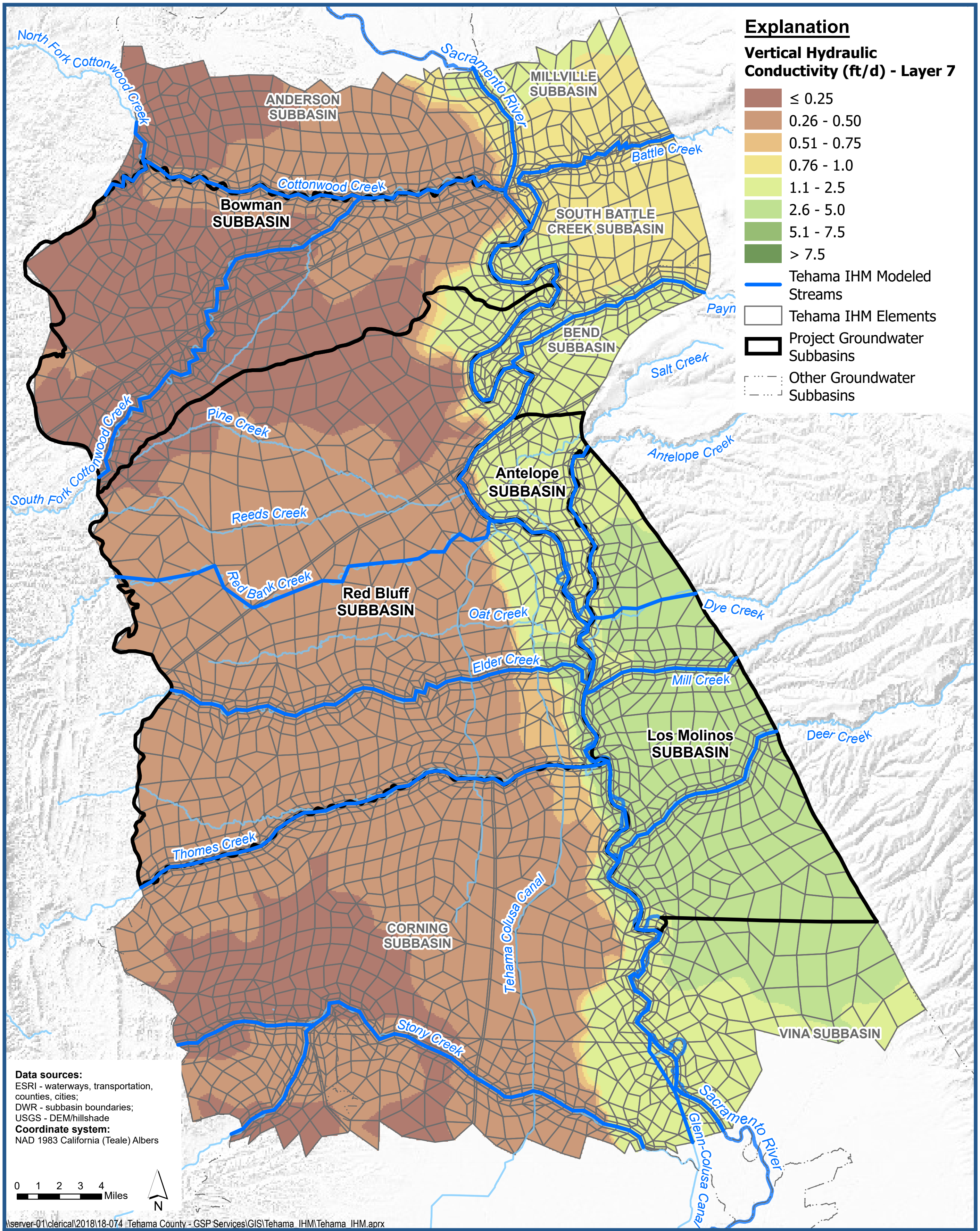
Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 6

Groundwater Sustainability Planning
Tehama County, California

Figure 4-20



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Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 7

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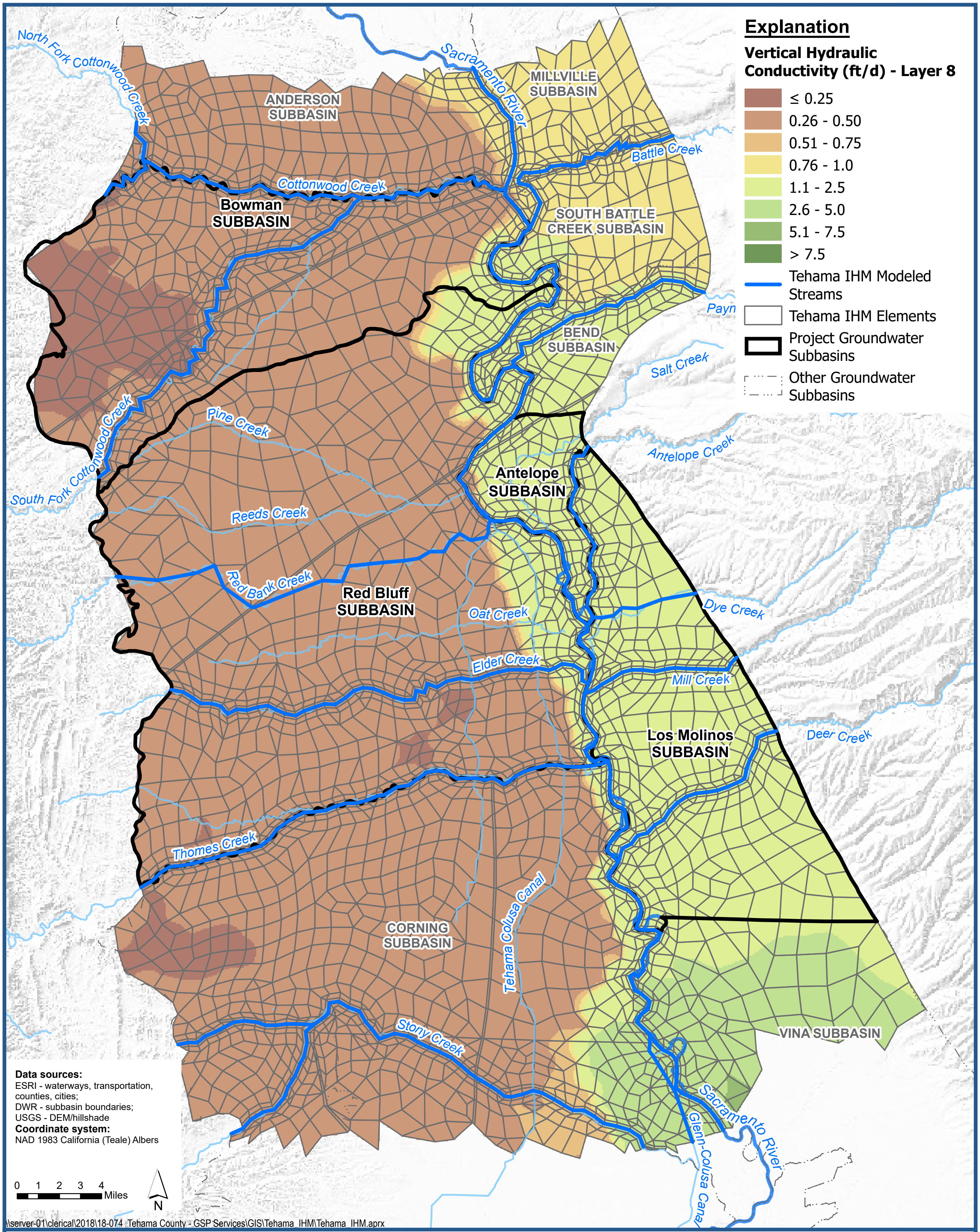
Tehama County, California

Figure 4-21



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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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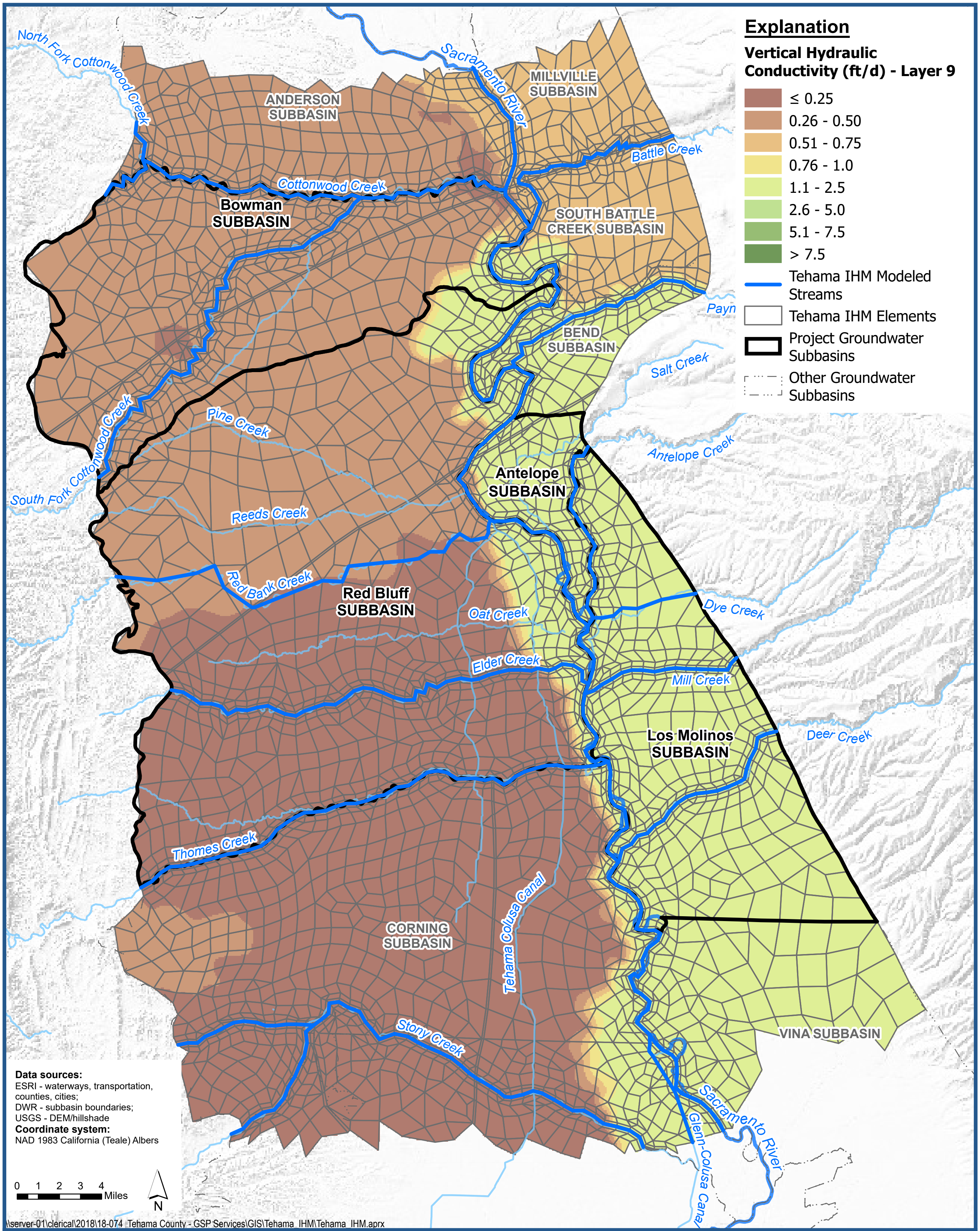
Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 8

Groundwater Sustainability Planning
Tehama County, California

Figure 4-22



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DWR - subbasin boundaries;
USGS - DEM/hillshade
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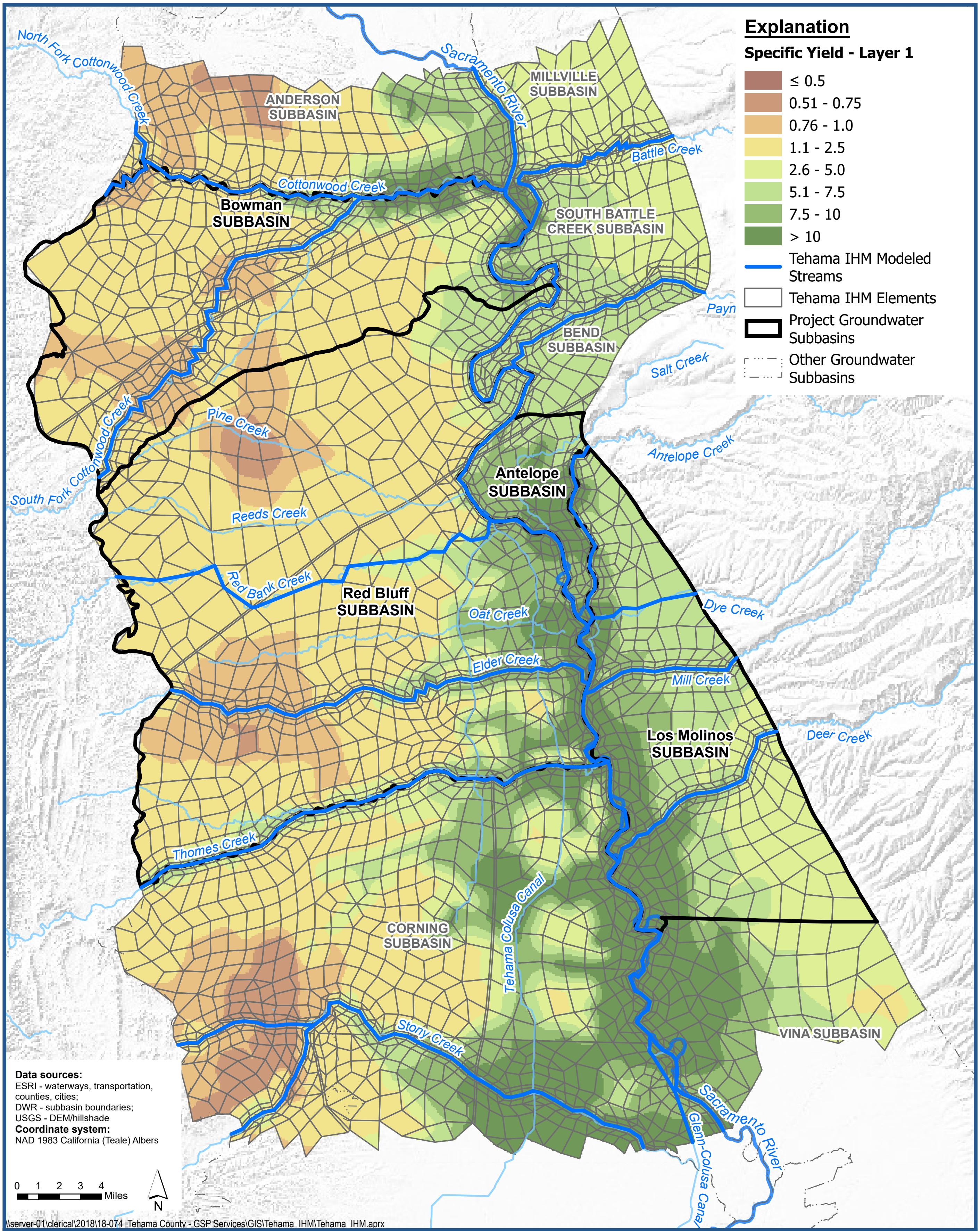
Calibrated Vertical Hydraulic Conductivity (Kv) in Tehama IHM - Layer 9

Groundwater Sustainability Planning
Tehama County, California

Figure 4-23



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DWR - subbasin boundaries;
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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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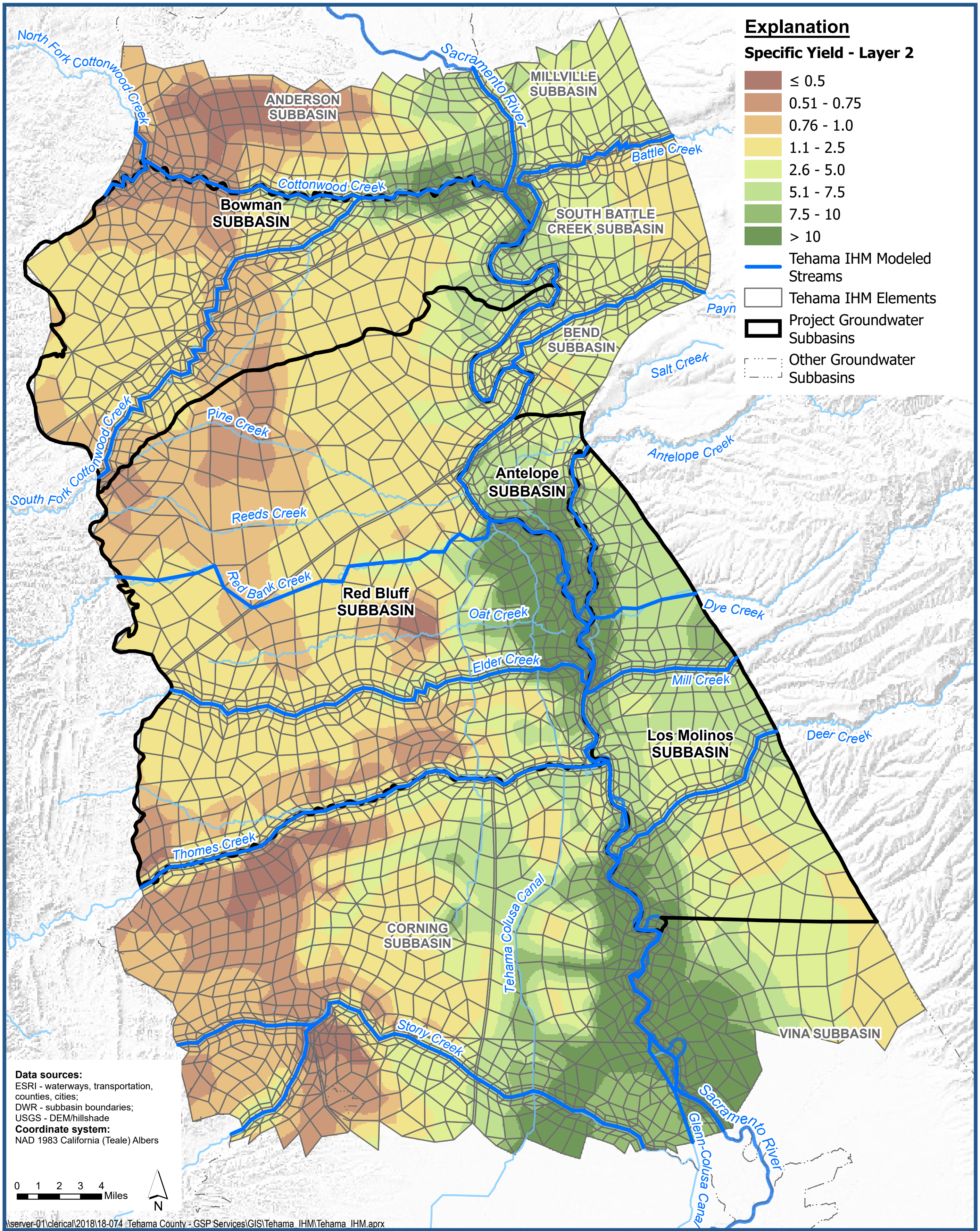
Calibrated Specific Yield (Sy)
in Tehama IHM - Layer 1

Groundwater Sustainability Planning
Tehama County, California

Figure 4-24



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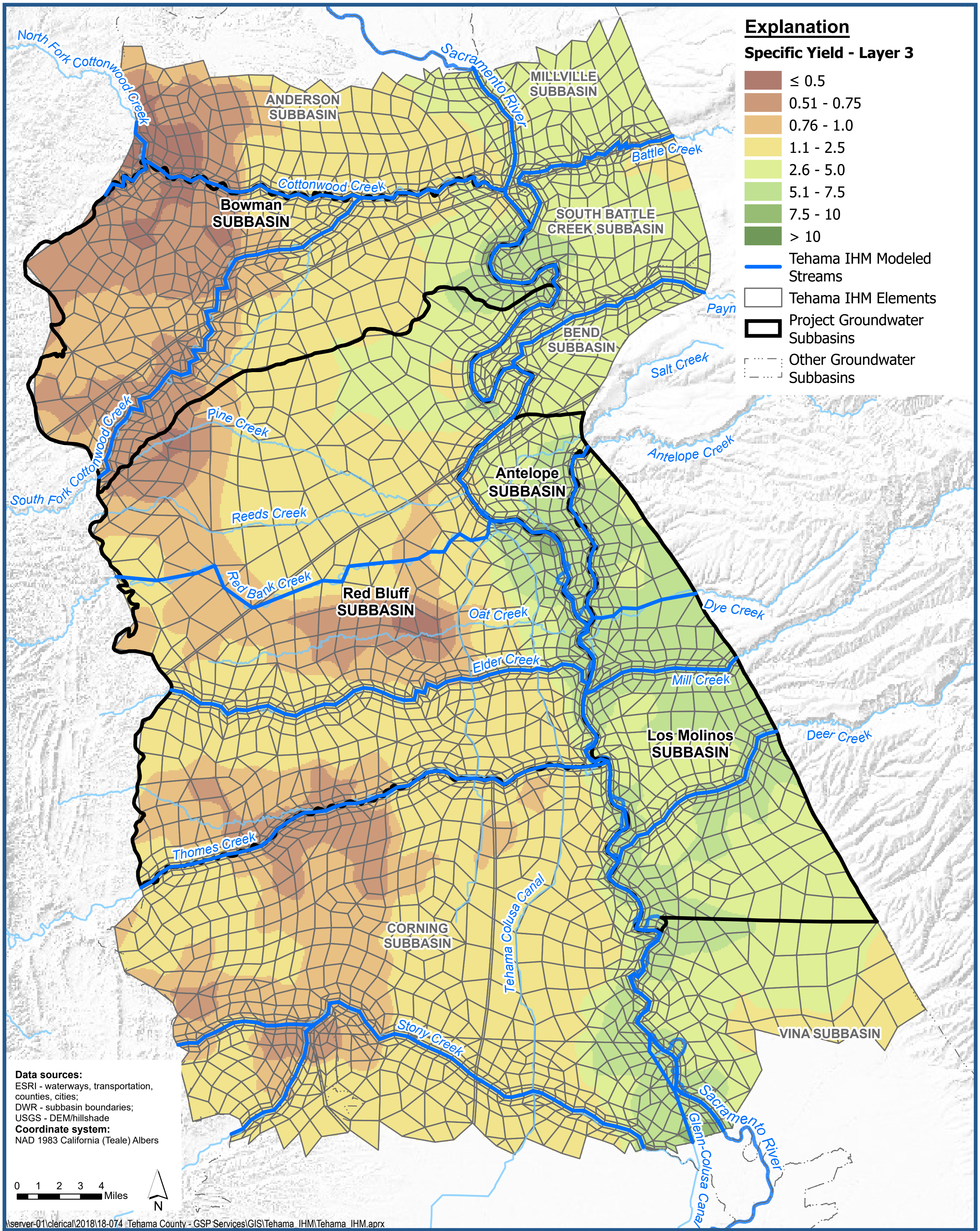
Calibrated Specific Yield (Sy) in Tehama IHM - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 4-25



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DWR - subbasin boundaries;
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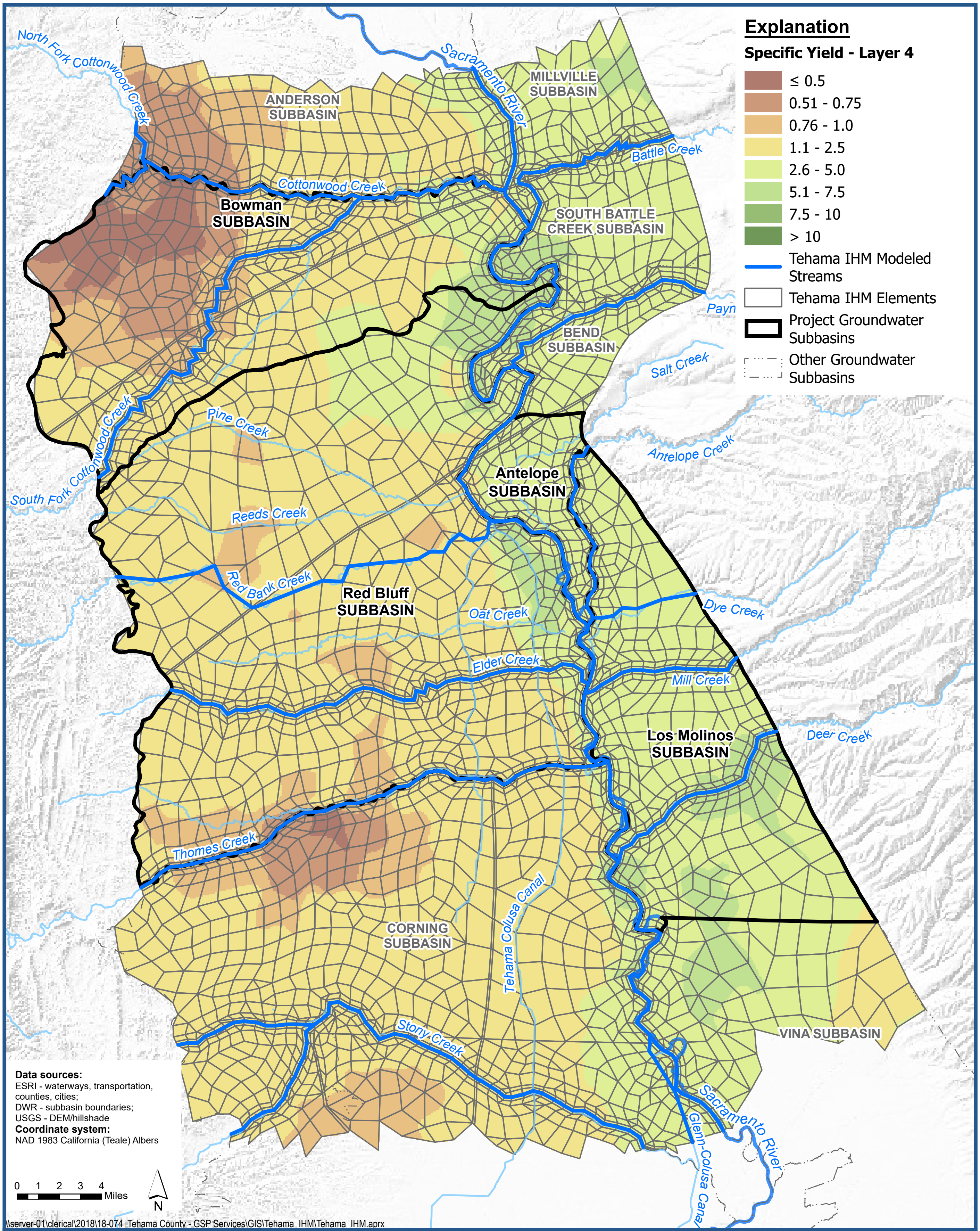
Calibrated Specific Yield (Sy) in Tehama IHM - Layer 3

Groundwater Sustainability Planning
Tehama County, California

Figure 4-26



Data sources:
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DWR - subbasin boundaries;
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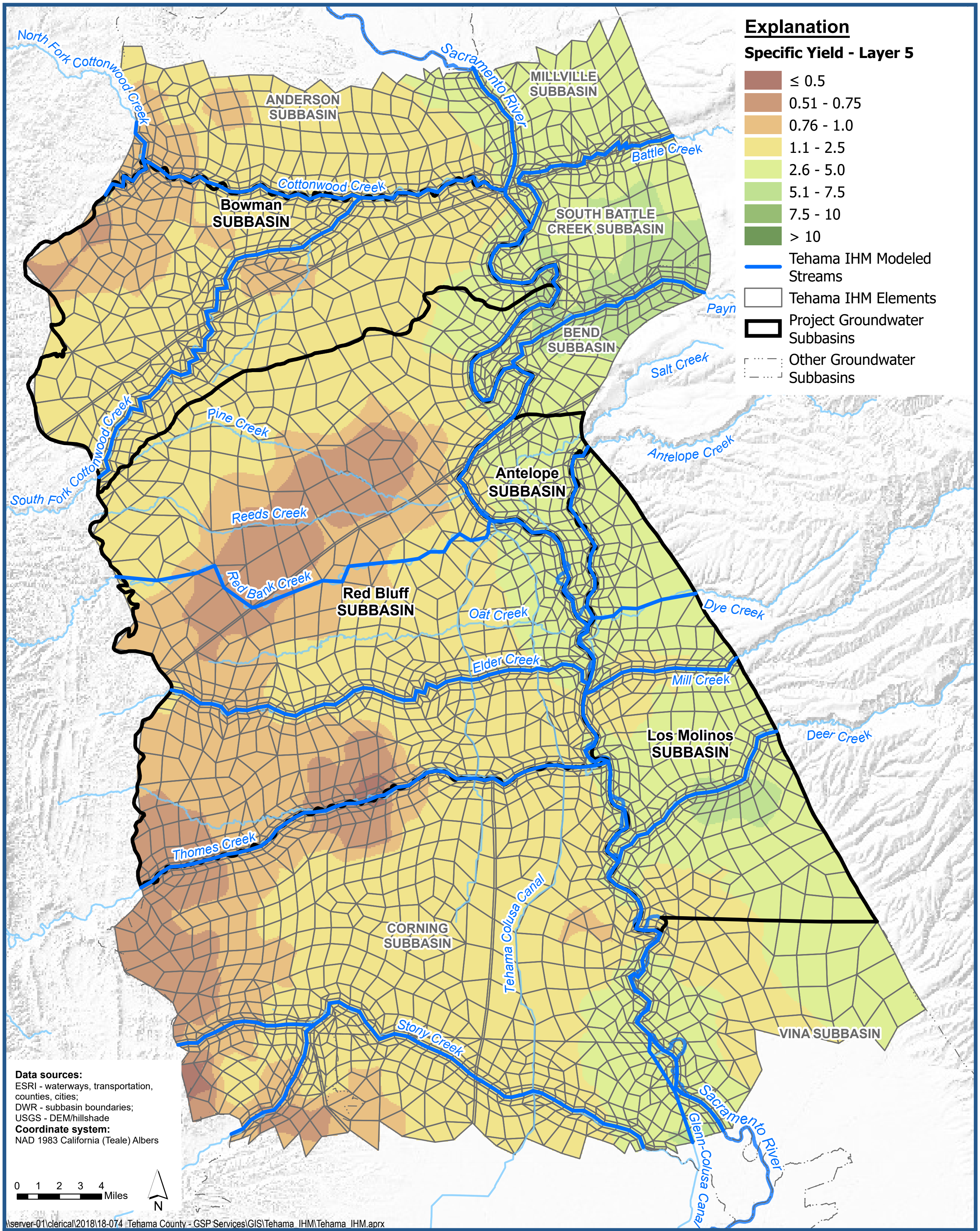
**Calibrated Specific Yield (Sy)
in Tehama IHM - Layer 4**

*Groundwater Sustainability Planning
Tehama County, California*

Figure 4-27



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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TEHAMA COUNTY
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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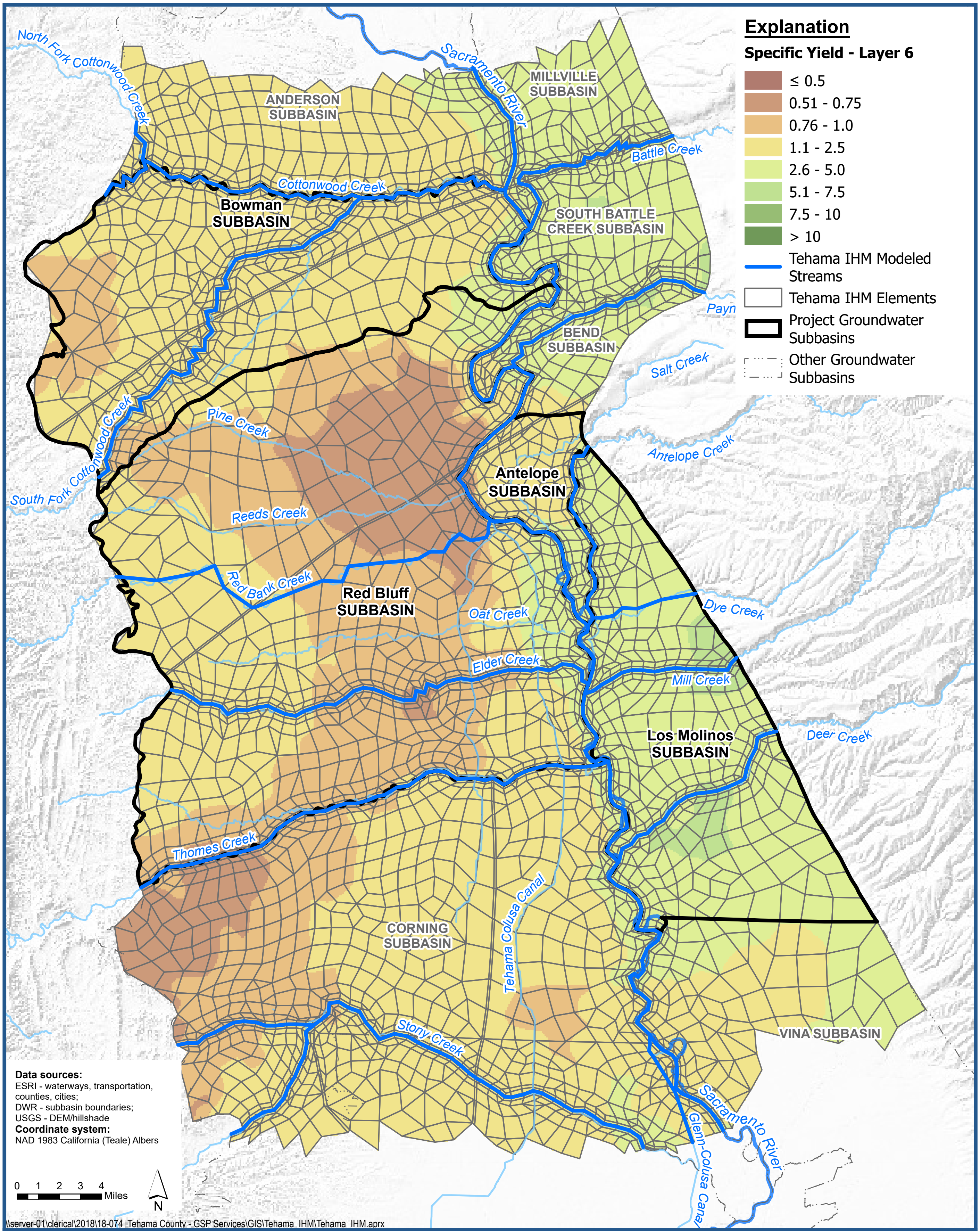
Calibrated Specific Yield (Sy) in Tehama IHM - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 4-28



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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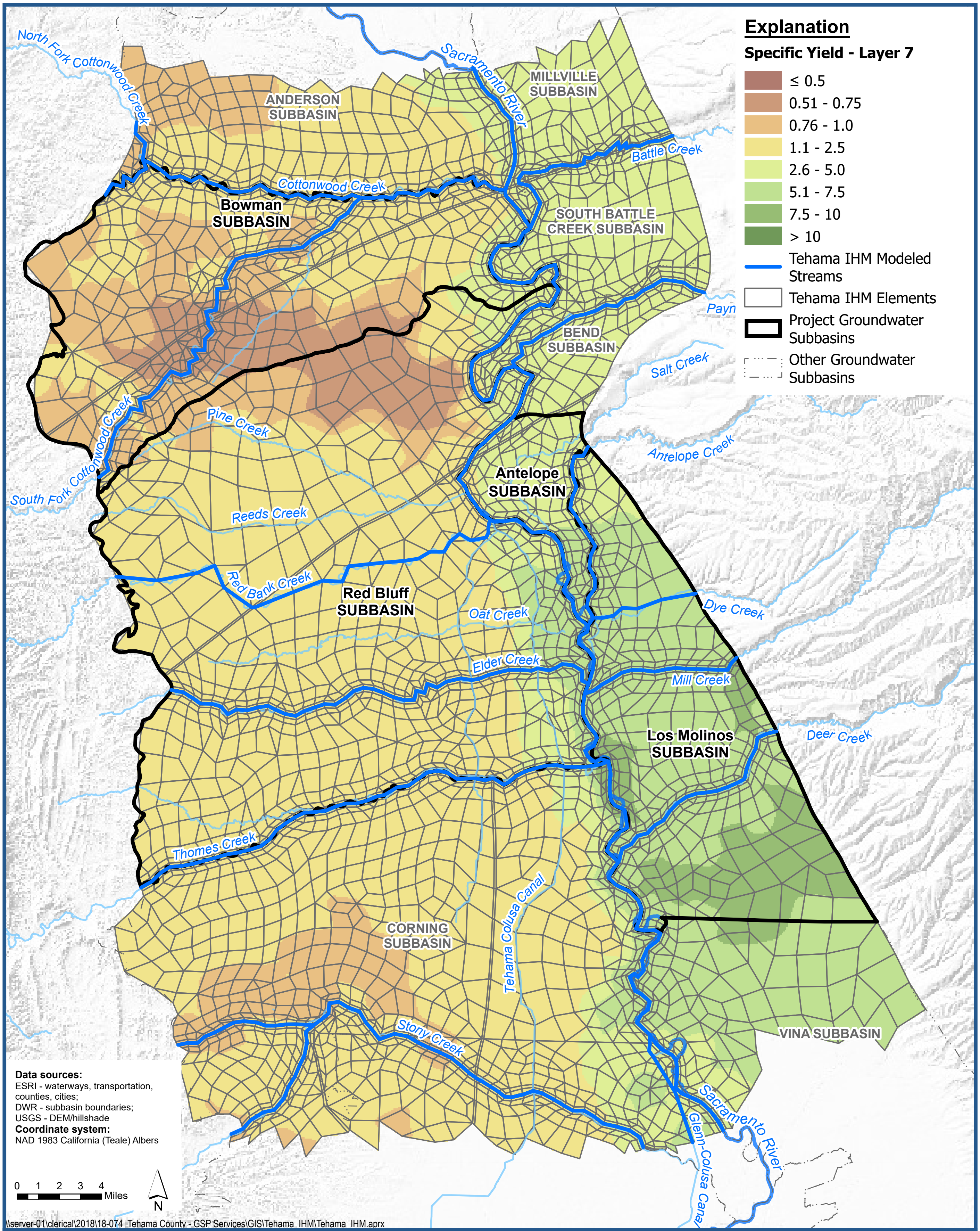
Calibrated Specific Yield (Sy) in Tehama IHM - Layer 6

Groundwater Sustainability Planning
Tehama County, California

Figure 4-29



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ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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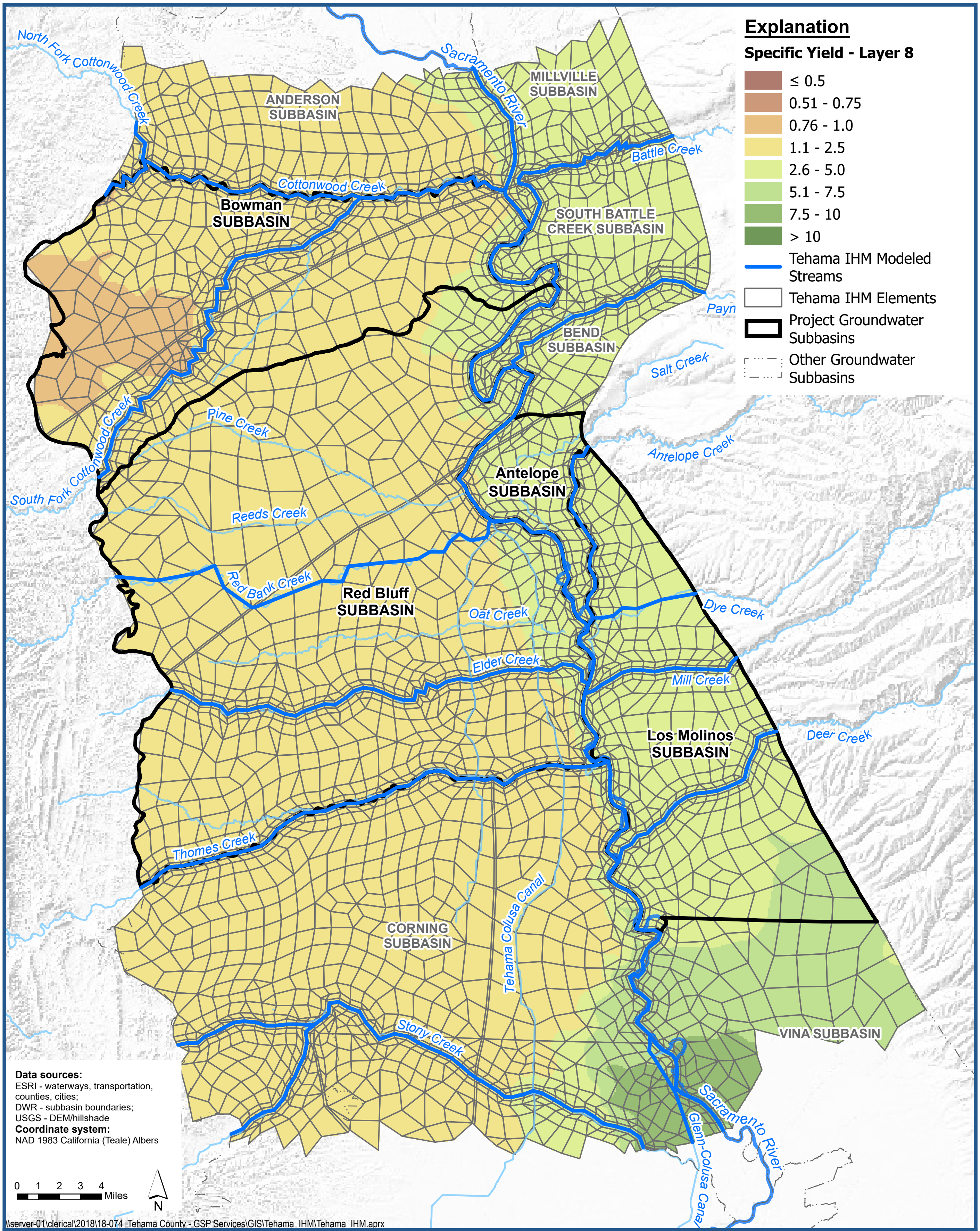
Calibrated Specific Yield (Sy)
in Tehama IHM - Layer 7

Groundwater Sustainability Planning
Tehama County, California

Figure 4-30



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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TEHAMA COUNTY
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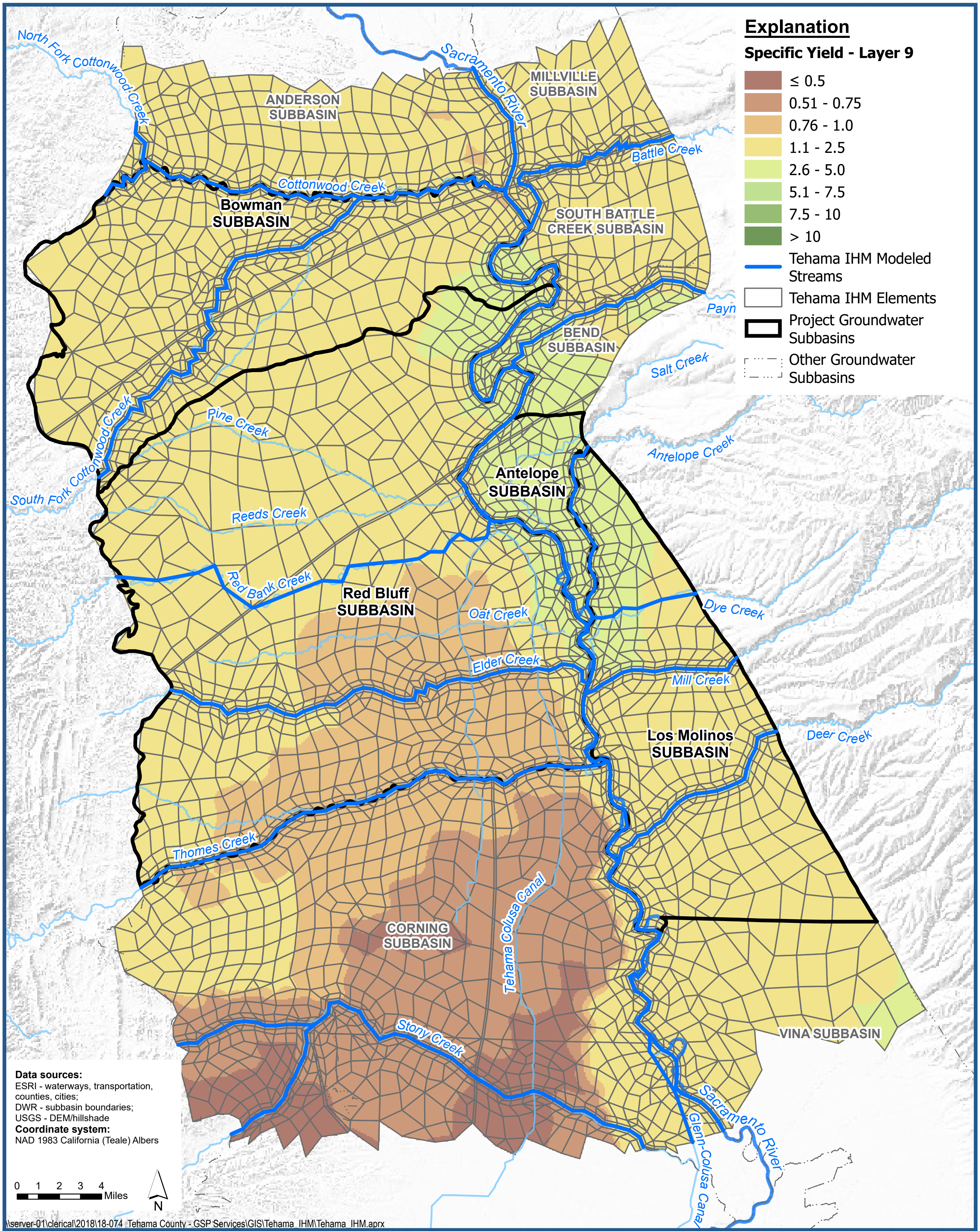
Calibrated Specific Yield (Sy) in Tehama IHM - Layer 8

Groundwater Sustainability Planning
Tehama County, California

Figure 4-31



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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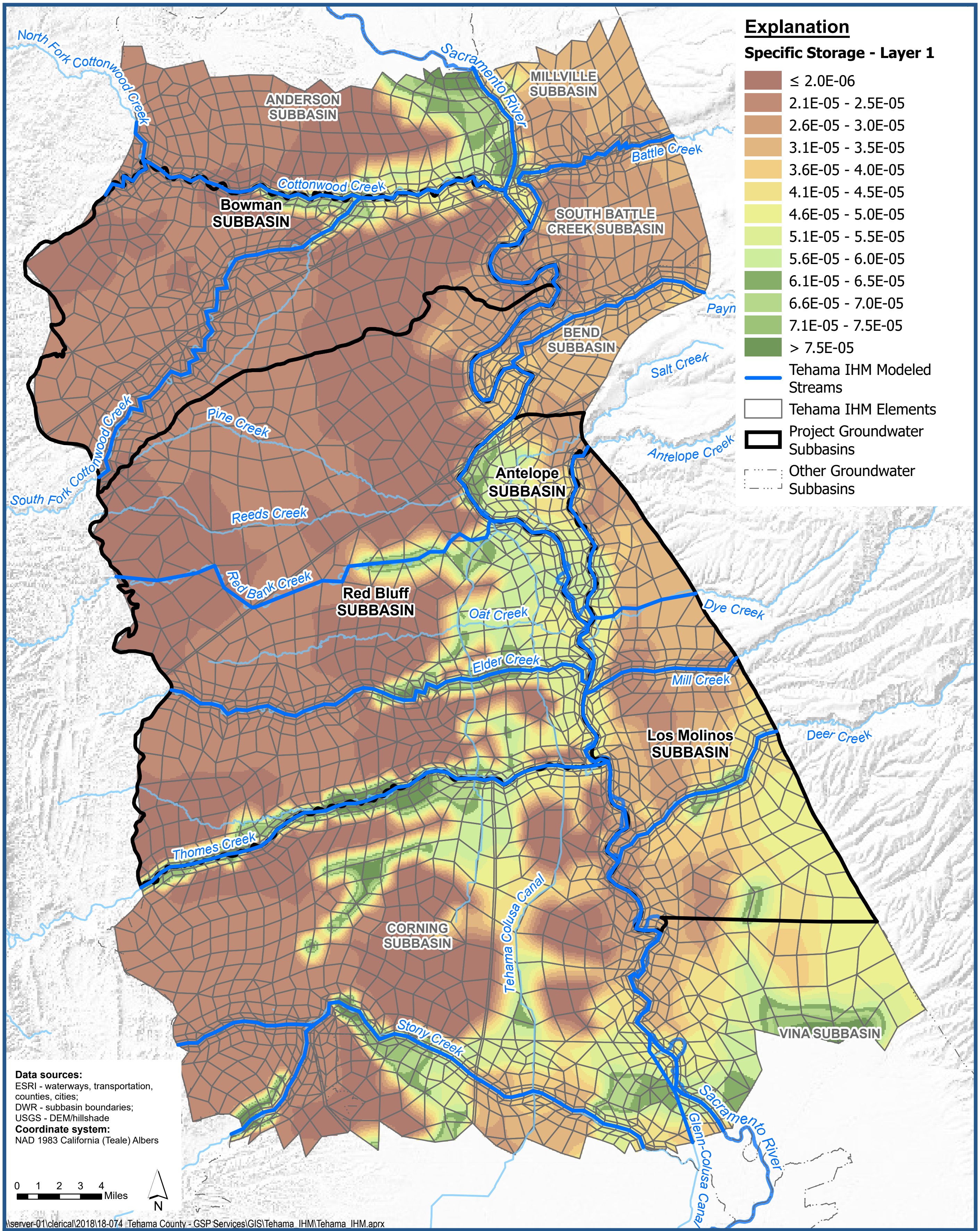
Calibrated Specific Yield (Sy) in Tehama IHM - Layer 9

Groundwater Sustainability Planning
Tehama County, California

Figure 4-32



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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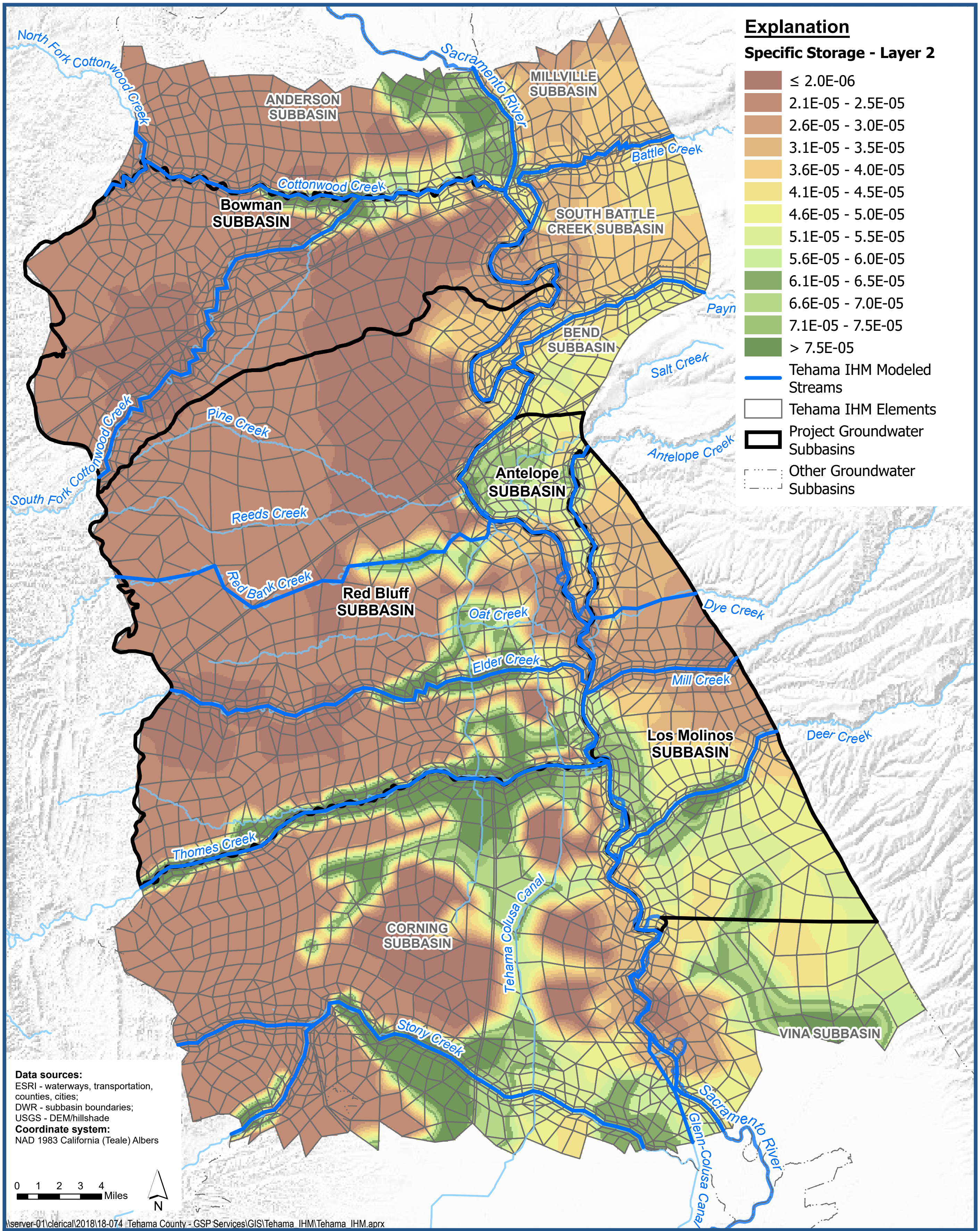
**Calibrated Specific Storage (SS)
in Tehama IHM - Layer 1**

*Groundwater Sustainability Planning
Tehama County, California*

Figure 4-33



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ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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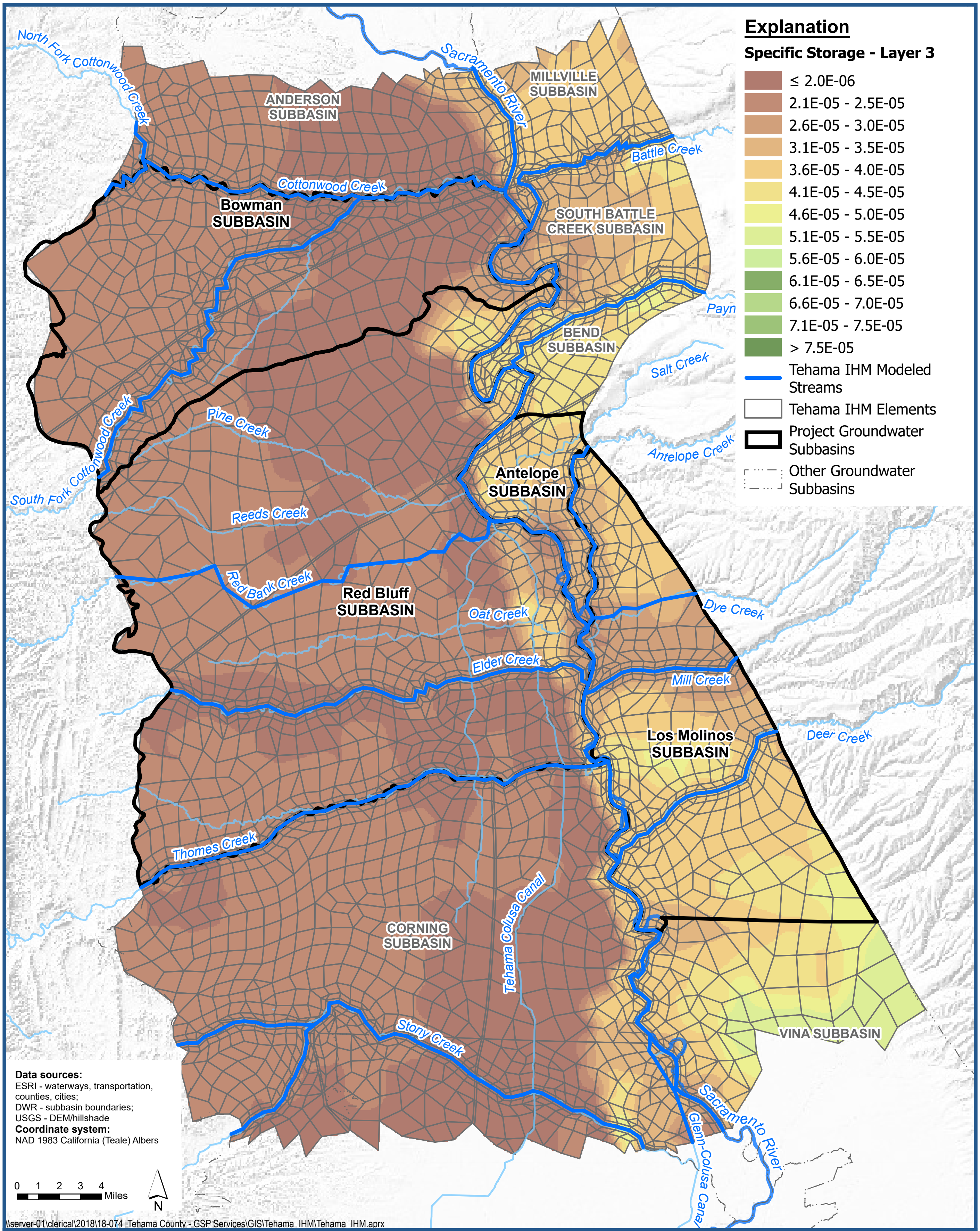
Calibrated Specific Storage (SS) in Tehama IHM - Layer 2

Groundwater Sustainability Planning
Tehama County, California

Figure 4-34



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ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
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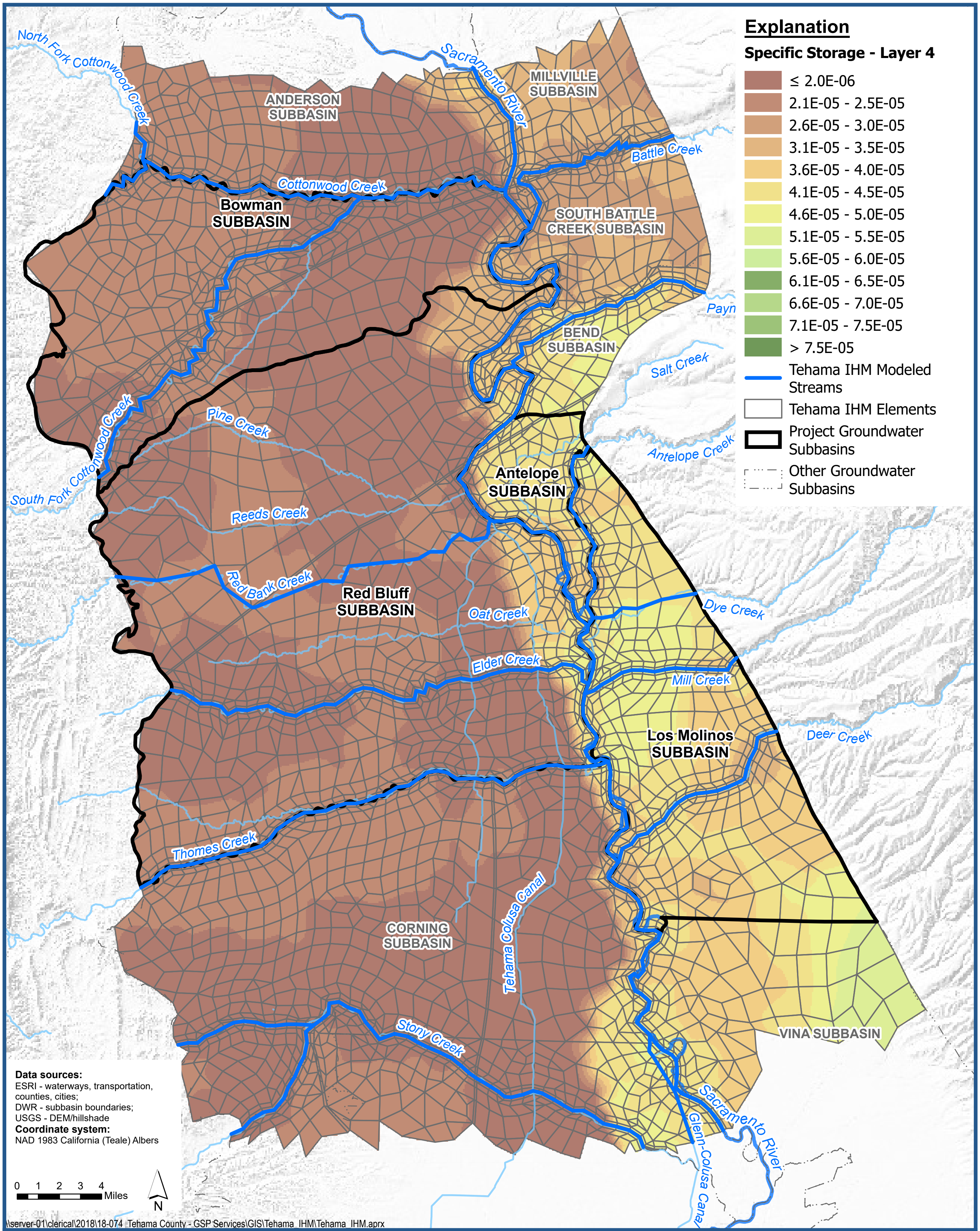
**Calibrated Specific Storage (SS)
in Tehama IHM - Layer 3**

*Groundwater Sustainability Planning
Tehama County, California*

Figure 4-35



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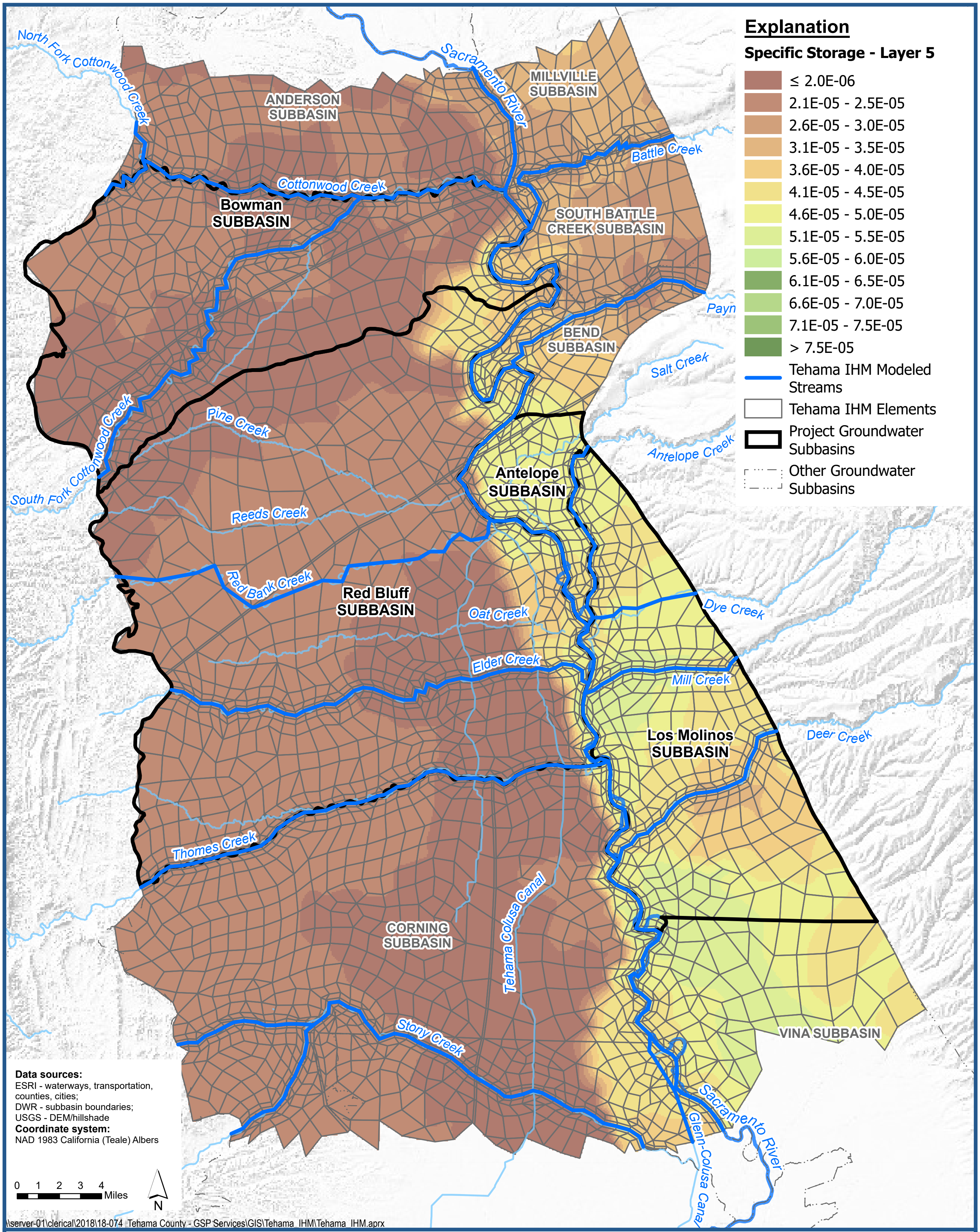
Calibrated Specific Storage (SS) in Tehama IHM - Layer 4

Groundwater Sustainability Planning
Tehama County, California

Figure 4-36



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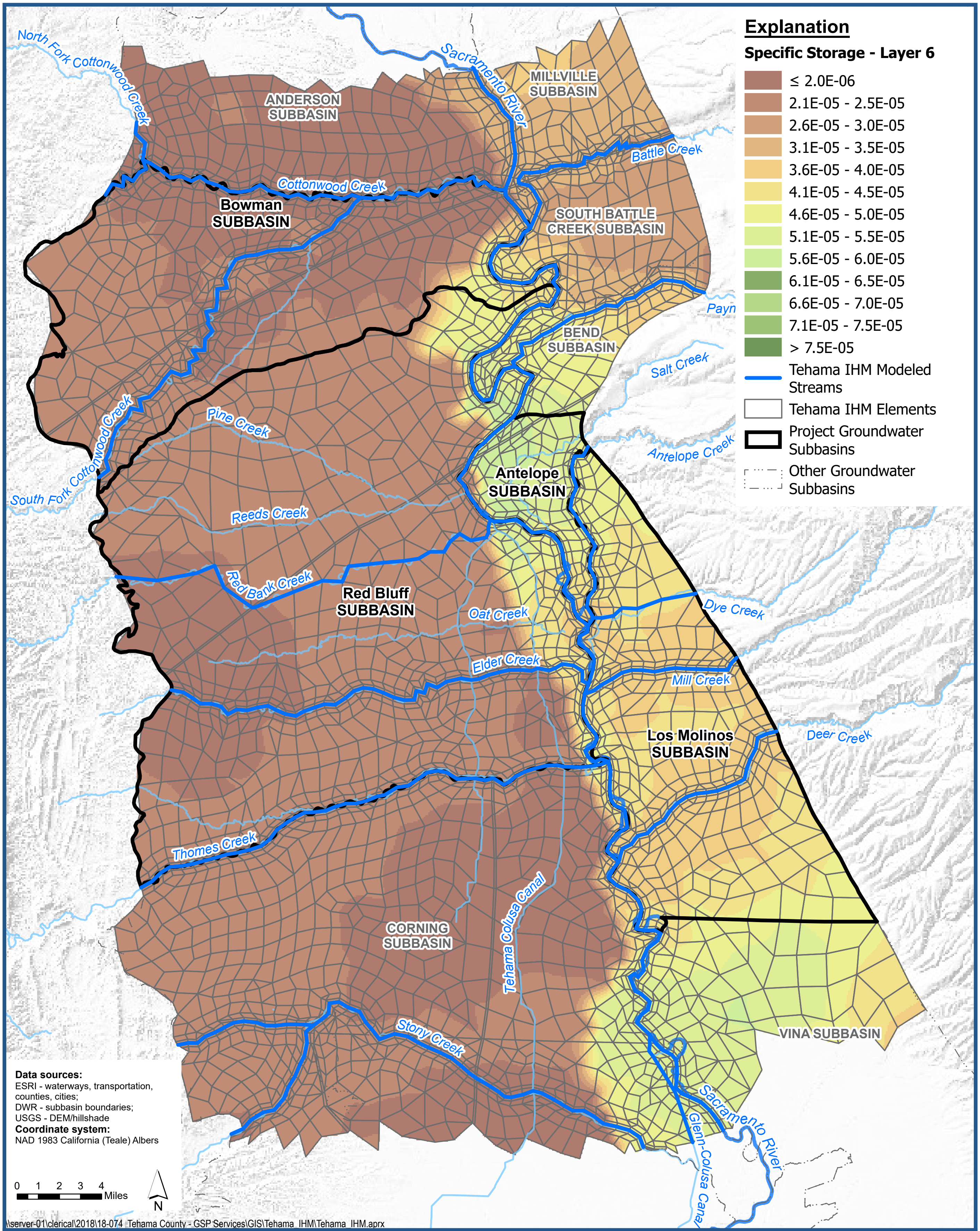
Calibrated Specific Storage (SS) in Tehama IHM - Layer 5

Groundwater Sustainability Planning
Tehama County, California

Figure 4-37



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
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Calibrated Specific Storage (SS) in Tehama IHM - Layer 6

Groundwater Sustainability Planning
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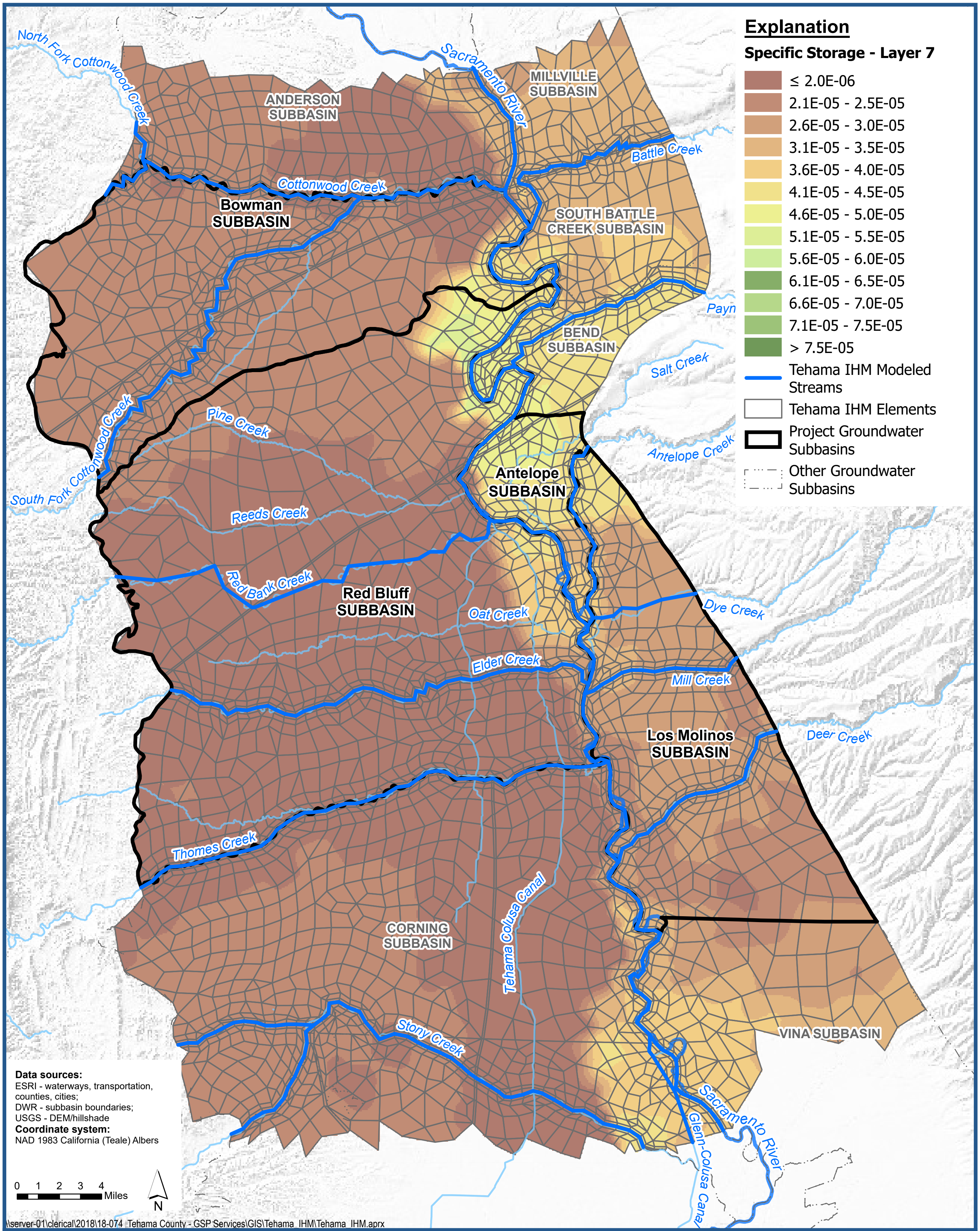
Figure 4-38



Data sources:
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TEHAMA COUNTY
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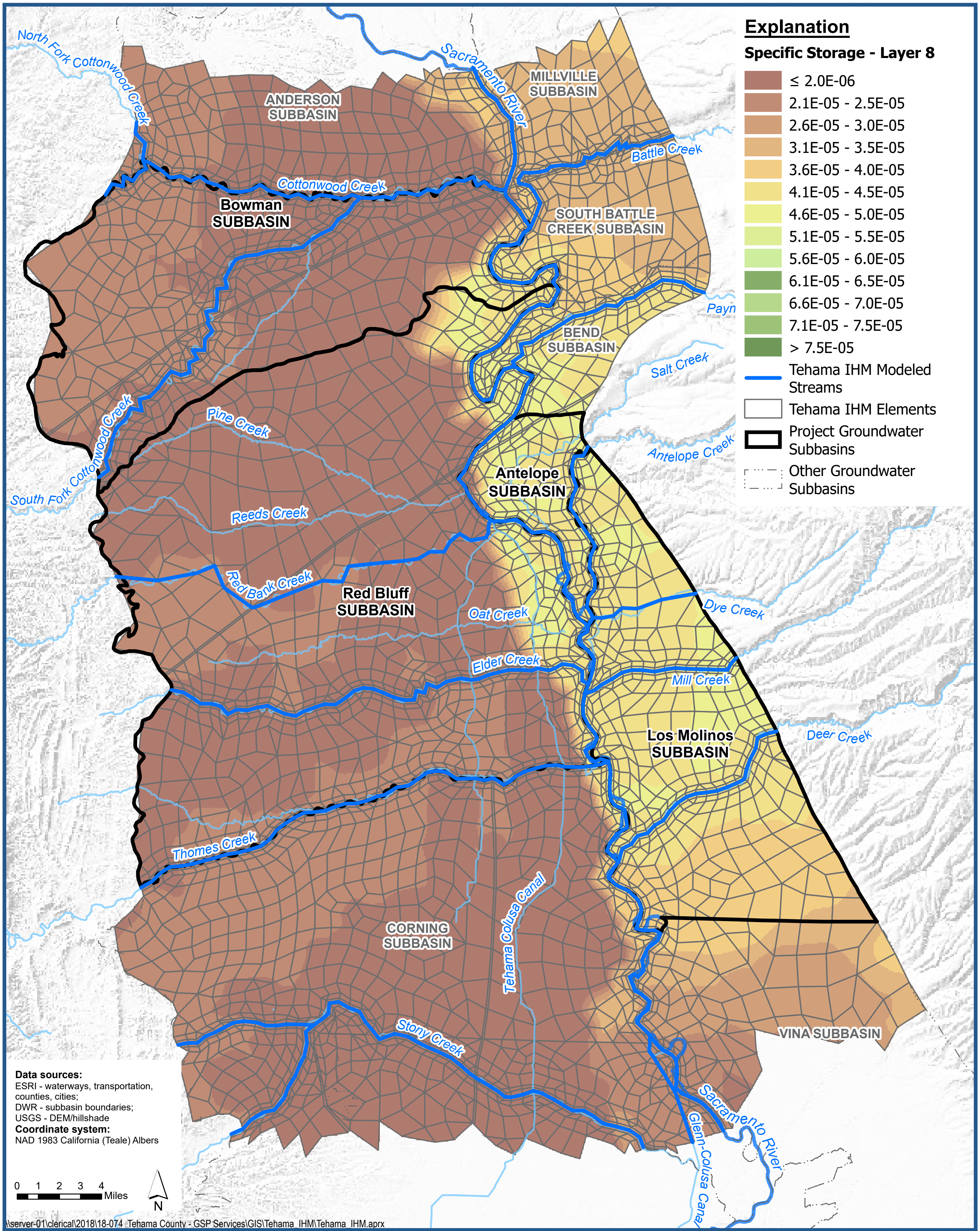
Calibrated Specific Storage (SS) in Tehama IHM - Layer 7

Groundwater Sustainability Planning
Tehama County, California

Figure 4-39



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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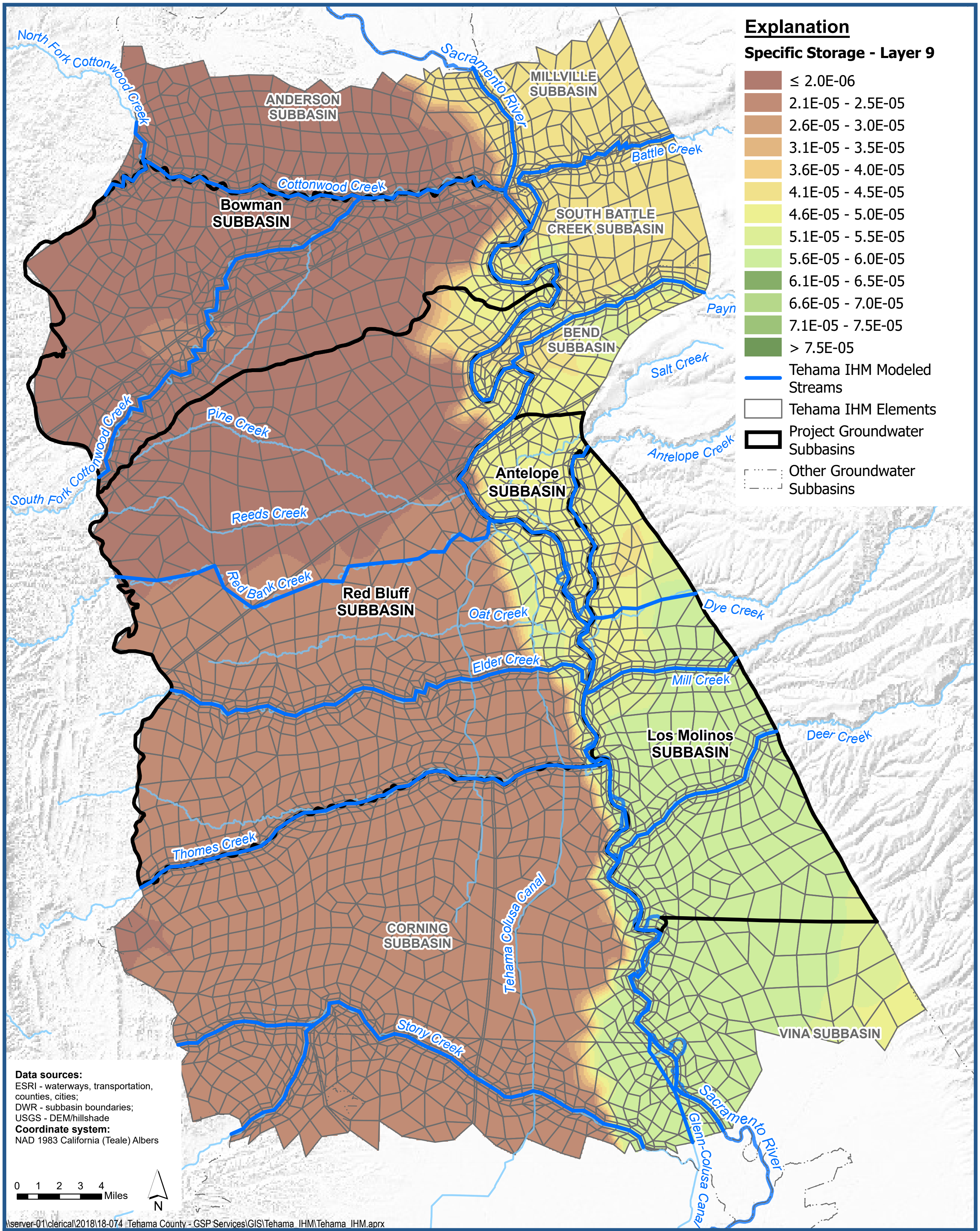
Calibrated Specific Storage (SS) in Tehama IHM - Layer 8

Groundwater Sustainability Planning
Tehama County, California

Figure 4-40



Data sources:
ESRI - waterways, transportation, counties, cities;
DWR - subbasin boundaries;
USGS - DEM/hillshade
Coordinate system:
NAD 1983 California (Teale) Albers

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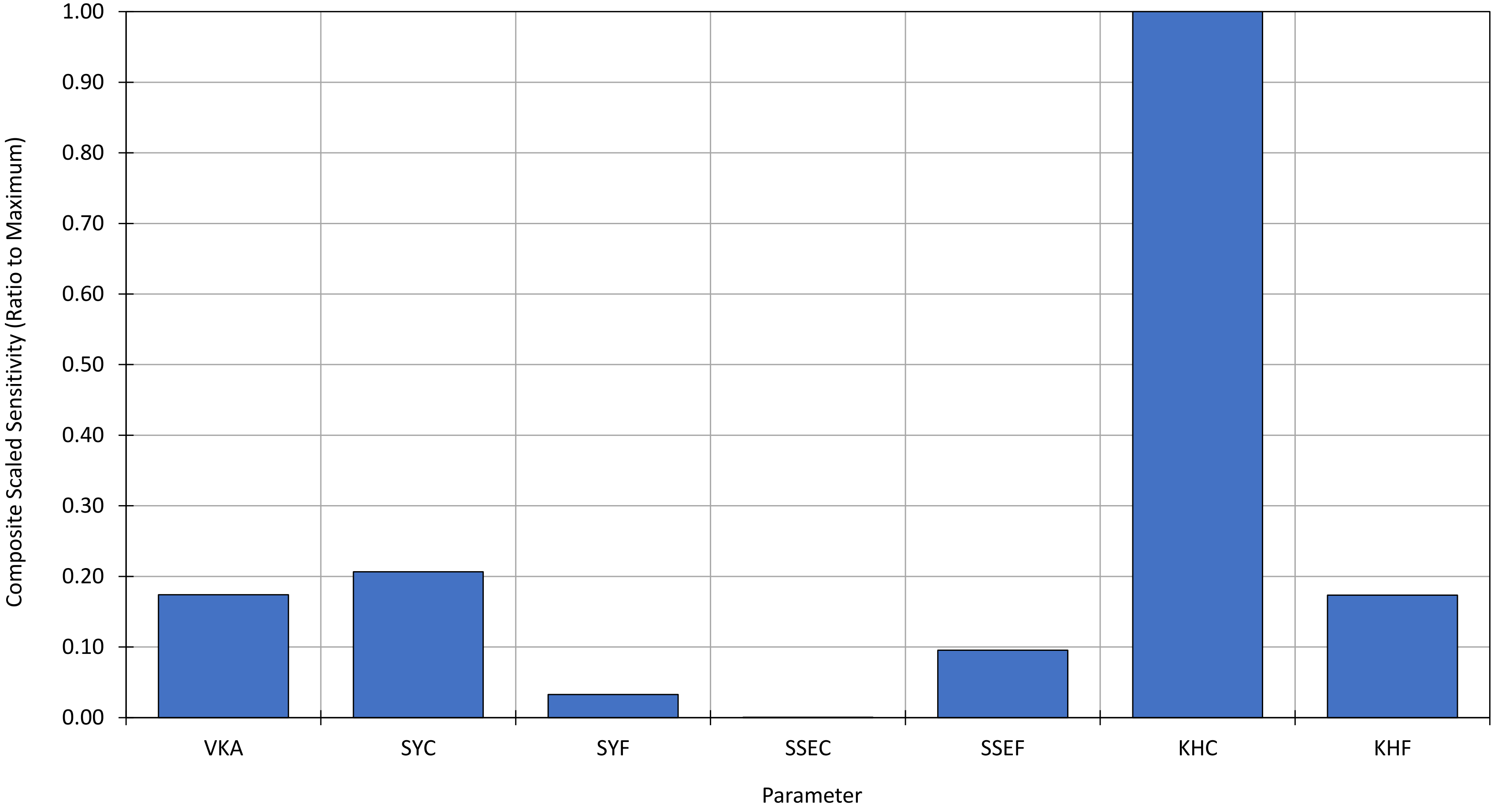
Calibrated Specific Storage (SS) in Tehama IHM - Layer 9

Groundwater Sustainability Planning
Tehama County, California

Figure 4-41



NOTE:
VKA - Anisotropy Ratio (Kv/Kh); SYC - Specific Yield of Coarse Materials; SYF - Specific Yield of Fine Materials; SSC - Specific Storage of Coarse Materials; SSF - Specific Storage of Fine Materials; KHC - Horizontal Hydraulic Conductivity of Coarse Materials; KHF - Horizontal Hydraulic Conductivity of Fine Materials

X:\2018\18-074 Tehama County - GSP Services\GIS\Tehama_IHM\Report Figures\Figure 5-1 CSS of Simulated GWEL to Model Parameter Values.mxd

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Composite Scaled Sensitivity of Simulated Groundwater Elevations to Model Parameter Values

Groundwater Sustainability Planning
Tehama County, California

Figure 5-1

Appendix A. Detailed Antelope Subbasin Water Budget Results

APPENDIX A

Detailed Antelope Subbasin Water Budget Results

A-1 Historical Model Results

A-2 Projected (Current Land Use) Model Results

A-3 Projected (Future Land Use) Model Results

A-4 Projected (Current Land Use) with Climate Change (2030) Model Results

A-5 Projected (Current Land Use) with Climate Change (2070) Model Results

A-6 Projected (Future Land Use) with Climate Change (2030) Model Results

A-7 Projected (Future Land Use) with Climate Change (2070) Model Results

A-8 Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

APPENDIX A-1

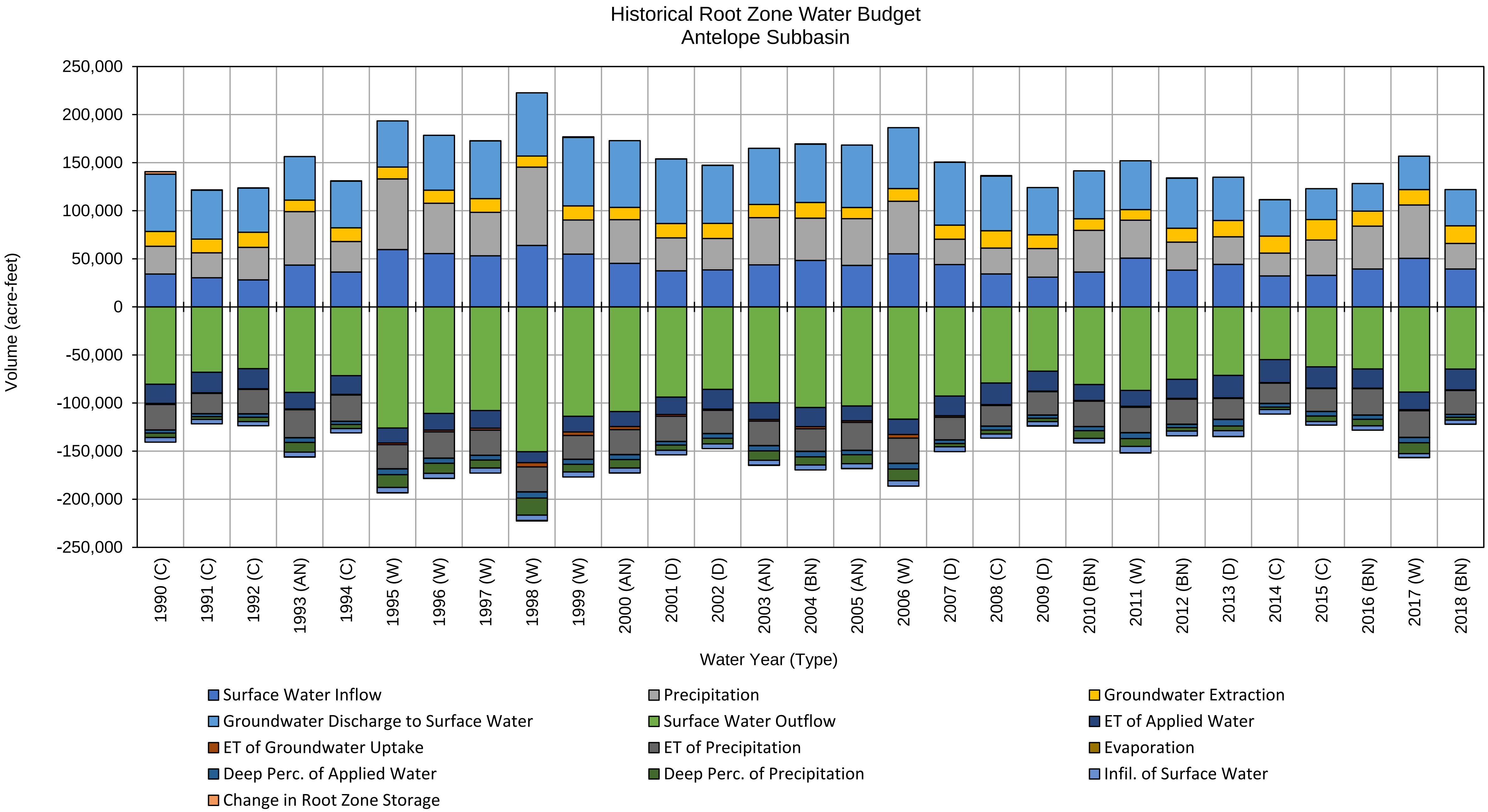
Detailed Antelope Subbasin Water Budget Results:

Historical Model Results

APPENDIX A-1a

Detailed Antelope Subbasin Water Budget Results:

Historical Model Results – Surface Water System



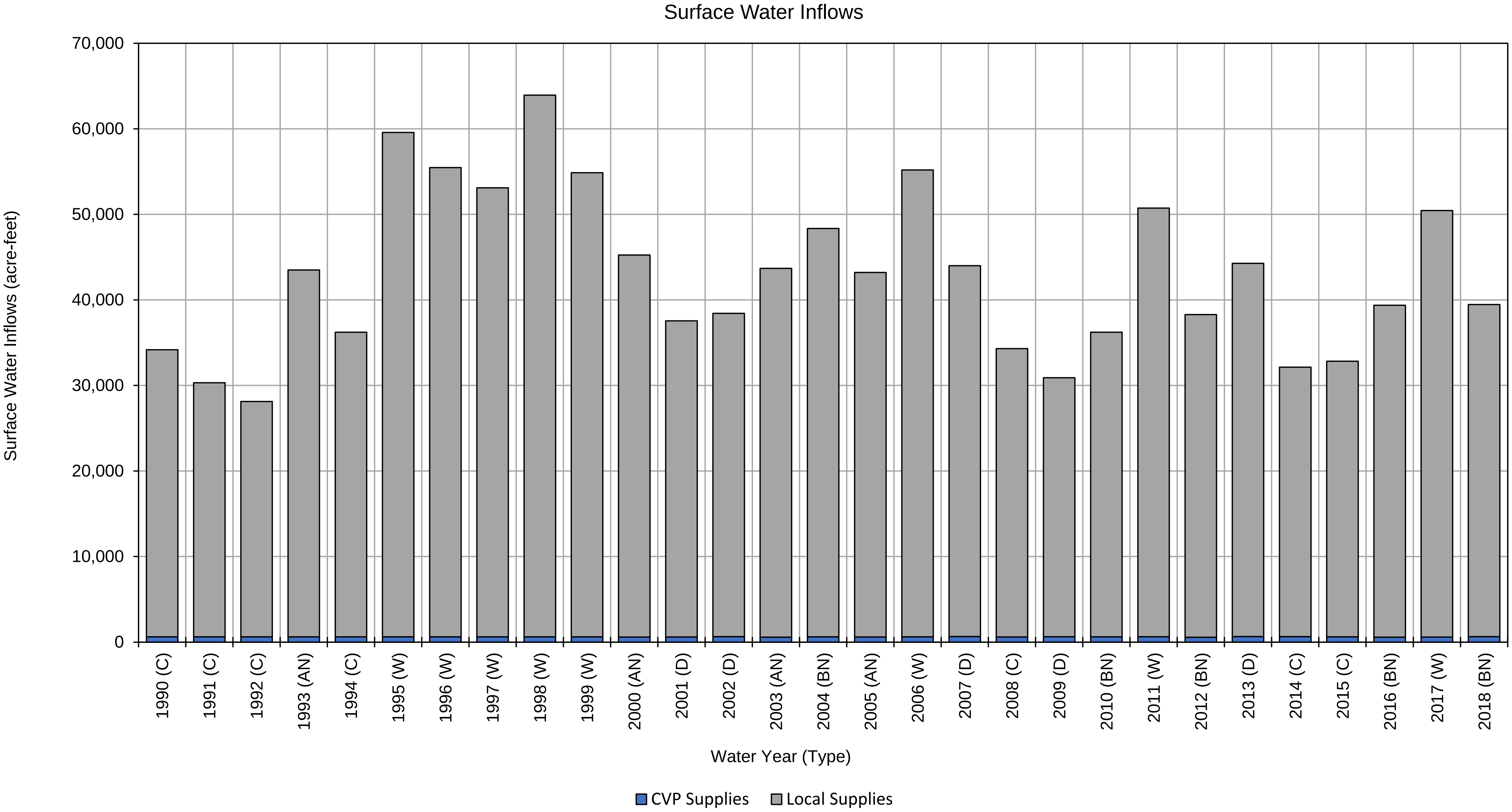
Tehama IHM - Historical

Antelope Subbasin Historical Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
1990 (C)	34,000	29,000	15,000	60,000	80,000	20,000	1,000	26,000	150	3,100	4,700	4,700	-2,600
1991 (C)	30,000	26,000	14,000	51,000	68,000	21,000	620	21,000	150	2,900	2,900	4,600	-320
1992 (C)	28,000	34,000	16,000	46,000	64,000	21,000	550	25,000	130	3,500	4,500	4,200	-48
1993 (AN)	43,000	56,000	12,000	45,000	89,000	17,000	870	29,000	150	4,700	10,000	5,000	350
1994 (C)	36,000	32,000	14,000	48,000	72,000	19,000	620	27,000	140	3,200	4,300	4,500	-420
1995 (W)	60,000	74,000	12,000	48,000	130,000	15,000	1,900	25,000	150	6,000	13,000	5,400	220
1996 (W)	55,000	52,000	14,000	57,000	110,000	17,000	1,900	27,000	150	5,300	10,000	5,300	77
1997 (W)	53,000	45,000	14,000	60,000	110,000	18,000	2,100	26,000	150	5,000	8,300	5,200	-250
1998 (W)	64,000	81,000	12,000	66,000	150,000	11,000	4,400	26,000	150	6,300	18,000	5,500	500
1999 (W)	55,000	36,000	15,000	71,000	110,000	16,000	3,600	25,000	150	5,100	7,900	5,200	-710
2000 (AN)	45,000	45,000	13,000	69,000	110,000	16,000	3,200	26,000	150	5,100	8,800	5,000	230
2001 (D)	38,000	34,000	15,000	67,000	94,000	18,000	1,800	26,000	150	3,700	5,400	4,700	-52
2002 (D)	38,000	33,000	16,000	60,000	86,000	21,000	1,300	24,000	150	4,800	5,900	4,800	-250
2003 (AN)	44,000	49,000	14,000	58,000	100,000	17,000	1,800	25,000	150	5,400	9,700	5,000	360
2004 (BN)	48,000	44,000	16,000	61,000	100,000	20,000	2,200	23,000	150	5,600	8,400	5,100	-290
2005 (AN)	43,000	49,000	12,000	65,000	100,000	15,000	1,700	29,000	150	4,400	9,300	5,000	300
2006 (W)	55,000	55,000	13,000	63,000	120,000	16,000	3,800	26,000	170	5,800	12,000	5,600	39
2007 (D)	44,000	26,000	15,000	65,000	93,000	20,000	1,600	23,000	160	3,600	3,400	5,000	-54
2008 (C)	34,000	27,000	18,000	57,000	79,000	22,000	920	22,000	130	3,900	4,100	4,400	-500
2009 (D)	31,000	30,000	14,000	49,000	67,000	21,000	670	24,000	140	3,200	3,500	4,400	290
2010 (BN)	36,000	43,000	12,000	50,000	81,000	17,000	700	26,000	140	4,200	8,000	4,600	130
2011 (W)	51,000	39,000	11,000	51,000	87,000	17,000	980	26,000	230	6,000	8,100	6,600	270
2012 (BN)	38,000	29,000	14,000	52,000	75,000	20,000	740	26,000	160	3,300	3,600	5,000	-240
2013 (D)	44,000	29,000	17,000	45,000	71,000	23,000	680	22,000	210	6,800	4,900	6,100	86
2014 (C)	32,000	24,000	18,000	38,000	55,000	24,000	560	21,000	150	3,700	2,500	4,700	-45
2015 (C)	33,000	37,000	21,000	32,000	62,000	22,000	490	24,000	110	4,800	5,600	3,700	54
2016 (BN)	39,000	45,000	16,000	29,000	65,000	20,000	570	27,000	130	4,300	6,800	4,300	160
2017 (W)	50,000	56,000	16,000	35,000	89,000	18,000	1,200	28,000	100	5,400	11,000	4,200	69
2018 (BN)	39,000	27,000	18,000	38,000	65,000	22,000	600	25,000	120	2,900	2,900	4,200	64
Average (1990-2018)	43,000	41,000	15,000	53,000	89,000	19,000	1,500	25,000	150	4,500	7,200	4,900	-88
1990-2018 W	55,000	55,000	13,000	56,000	110,000	16,000	2,500	26,000	160	5,600	11,000	5,400	28
AN	44,000	50,000	12,000	60,000	100,000	16,000	1,900	27,000	150	4,900	9,500	5,000	310
BN	40,000	38,000	15,000	46,000	78,000	20,000	960	26,000	140	4,100	6,000	4,600	-34
D	39,000	30,000	15,000	57,000	82,000	21,000	1,200	24,000	160	4,400	4,600	5,000	5
C	33,000	30,000	17,000	47,000	69,000	21,000	690	24,000	140	3,600	4,100	4,400	-550

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



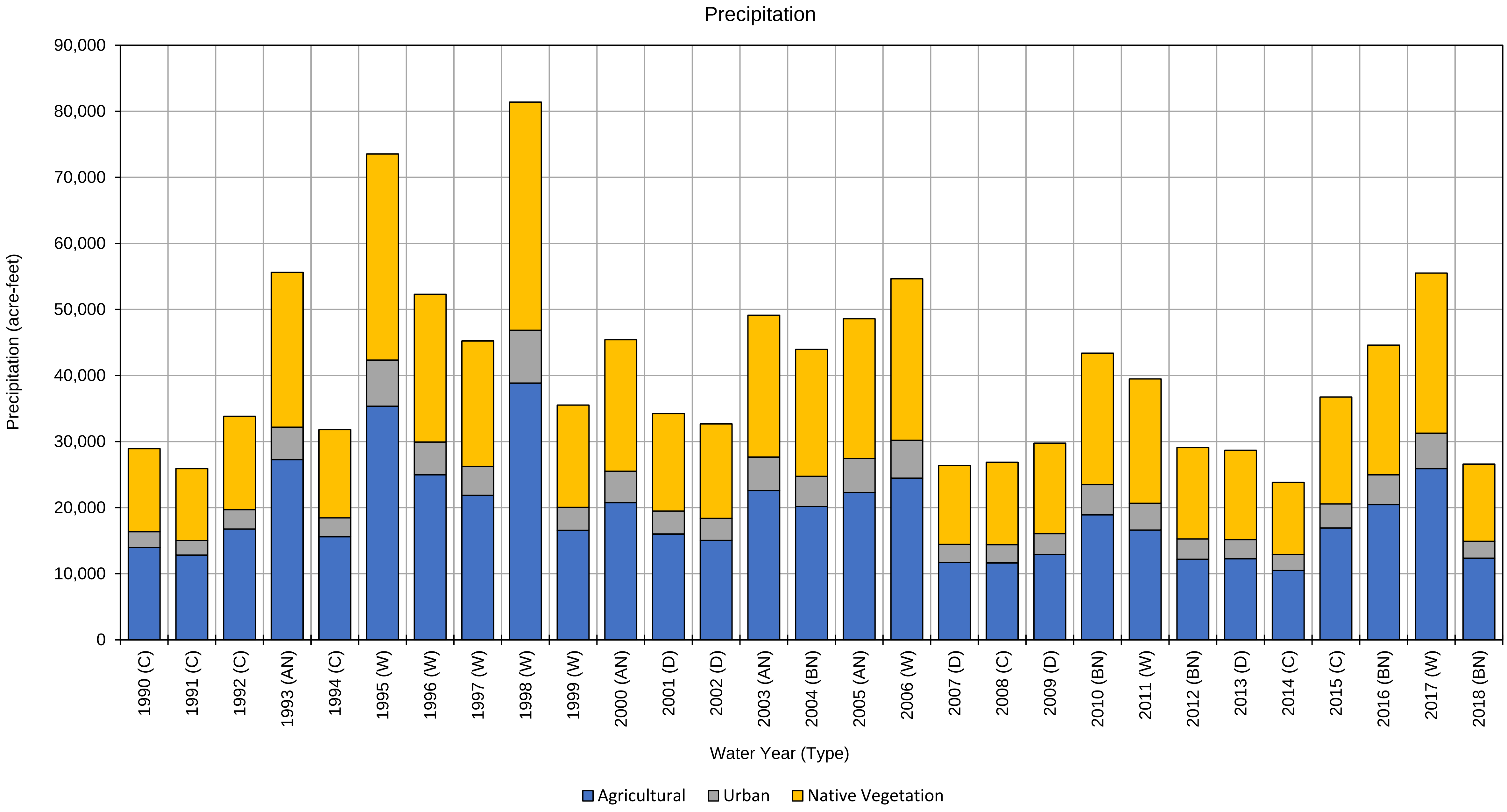
Tehama IHM - Historical

Antelope Subbasin Historical Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
1990 (C)		610	34,000	35,000
1991 (C)		610	30,000	31,000
1992 (C)		610	28,000	29,000
1993 (AN)		610	43,000	44,000
1994 (C)		610	36,000	37,000
1995 (W)		610	59,000	60,000
1996 (W)		610	55,000	56,000
1997 (W)		610	52,000	53,000
1998 (W)		610	63,000	64,000
1999 (W)		620	54,000	55,000
2000 (AN)		580	45,000	46,000
2001 (D)		600	37,000	38,000
2002 (D)		640	38,000	39,000
2003 (AN)		580	43,000	44,000
2004 (BN)		620	48,000	49,000
2005 (AN)		600	43,000	44,000
2006 (W)		610	55,000	56,000
2007 (D)		650	43,000	44,000
2008 (C)		600	34,000	35,000
2009 (D)		620	30,000	31,000
2010 (BN)		610	36,000	37,000
2011 (W)		630	50,000	51,000
2012 (BN)		560	38,000	39,000
2013 (D)		650	44,000	45,000
2014 (C)		640	31,000	32,000
2015 (C)		610	32,000	33,000
2016 (BN)		580	39,000	40,000
2017 (W)		580	50,000	51,000
2018 (BN)		630	39,000	40,000
Average (1990-2018)		610	42,000	43,000
1990-2018	W	610	55,000	56,000
	AN	590	43,000	44,000
	BN	600	40,000	41,000
	D	630	38,000	39,000
	C	610	32,000	33,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



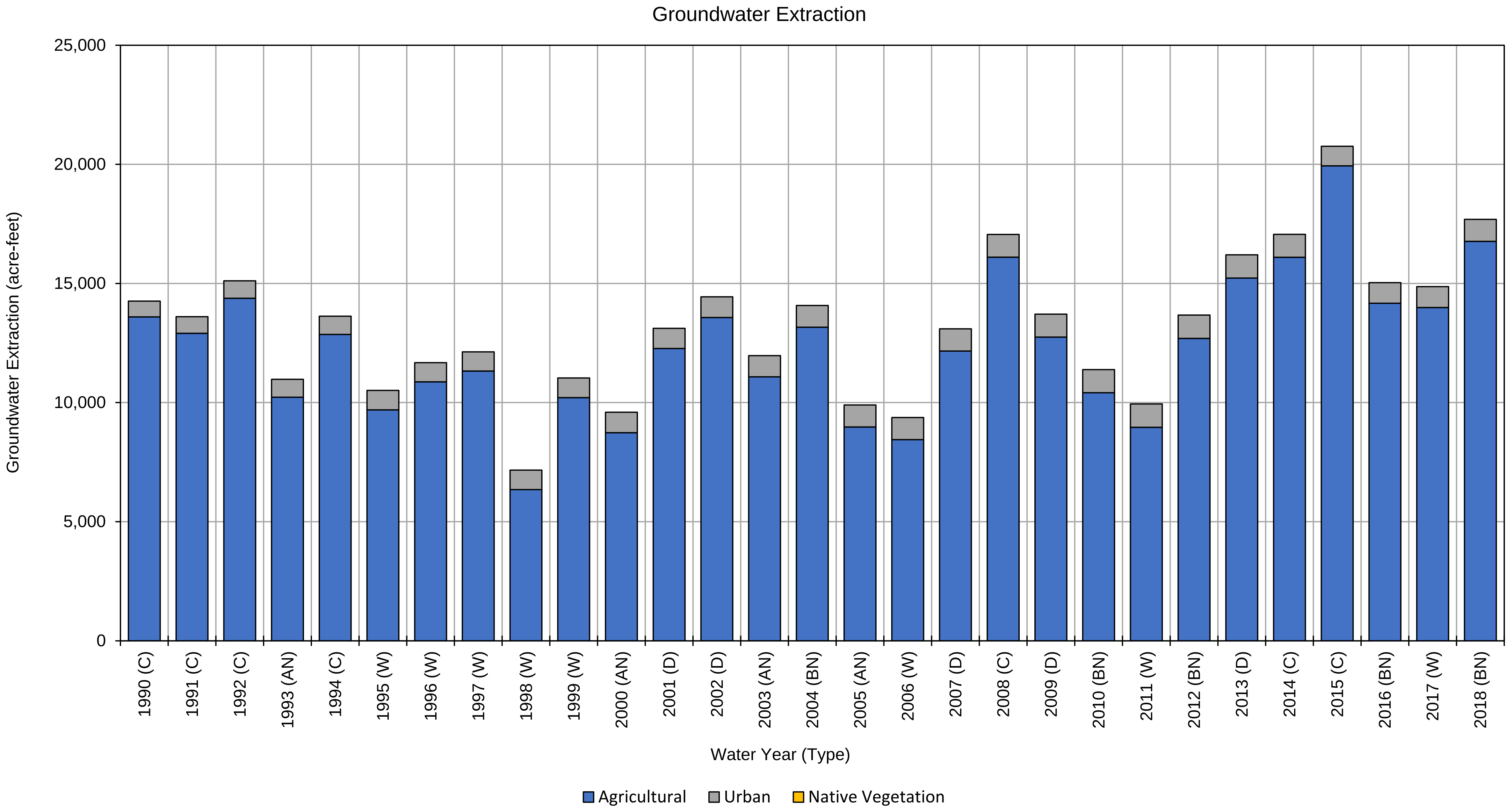
Tehama IHM - Historical

Antelope Subbasin Historical Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		14,000	2,400	13,000	29,000
1991 (C)		13,000	2,200	11,000	26,000
1992 (C)		17,000	2,900	14,000	34,000
1993 (AN)		27,000	4,900	23,000	55,000
1994 (C)		16,000	2,900	13,000	32,000
1995 (W)		35,000	7,000	31,000	73,000
1996 (W)		25,000	5,000	22,000	52,000
1997 (W)		22,000	4,400	19,000	45,000
1998 (W)		39,000	8,000	35,000	82,000
1999 (W)		17,000	3,500	15,000	36,000
2000 (AN)		21,000	4,700	20,000	46,000
2001 (D)		16,000	3,500	15,000	35,000
2002 (D)		15,000	3,300	14,000	32,000
2003 (AN)		23,000	5,100	21,000	49,000
2004 (BN)		20,000	4,600	19,000	44,000
2005 (AN)		22,000	5,100	21,000	48,000
2006 (W)		24,000	5,700	24,000	54,000
2007 (D)		12,000	2,700	12,000	27,000
2008 (C)		12,000	2,800	12,000	27,000
2009 (D)		13,000	3,100	14,000	30,000
2010 (BN)		19,000	4,600	20,000	44,000
2011 (W)		17,000	4,100	19,000	40,000
2012 (BN)		12,000	3,100	14,000	29,000
2013 (D)		12,000	2,900	14,000	29,000
2014 (C)		10,000	2,400	11,000	23,000
2015 (C)		17,000	3,600	16,000	37,000
2016 (BN)		20,000	4,500	20,000	45,000
2017 (W)		26,000	5,400	24,000	55,000
2018 (BN)		12,000	2,600	12,000	27,000
Average (1990-2018)		19,000	4,000	18,000	41,000
1990-2018	W	26,000	5,400	24,000	55,000
	AN	23,000	5,000	21,000	49,000
	BN	17,000	3,900	17,000	38,000
	D	14,000	3,100	14,000	31,000
	C	14,000	2,700	13,000	30,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



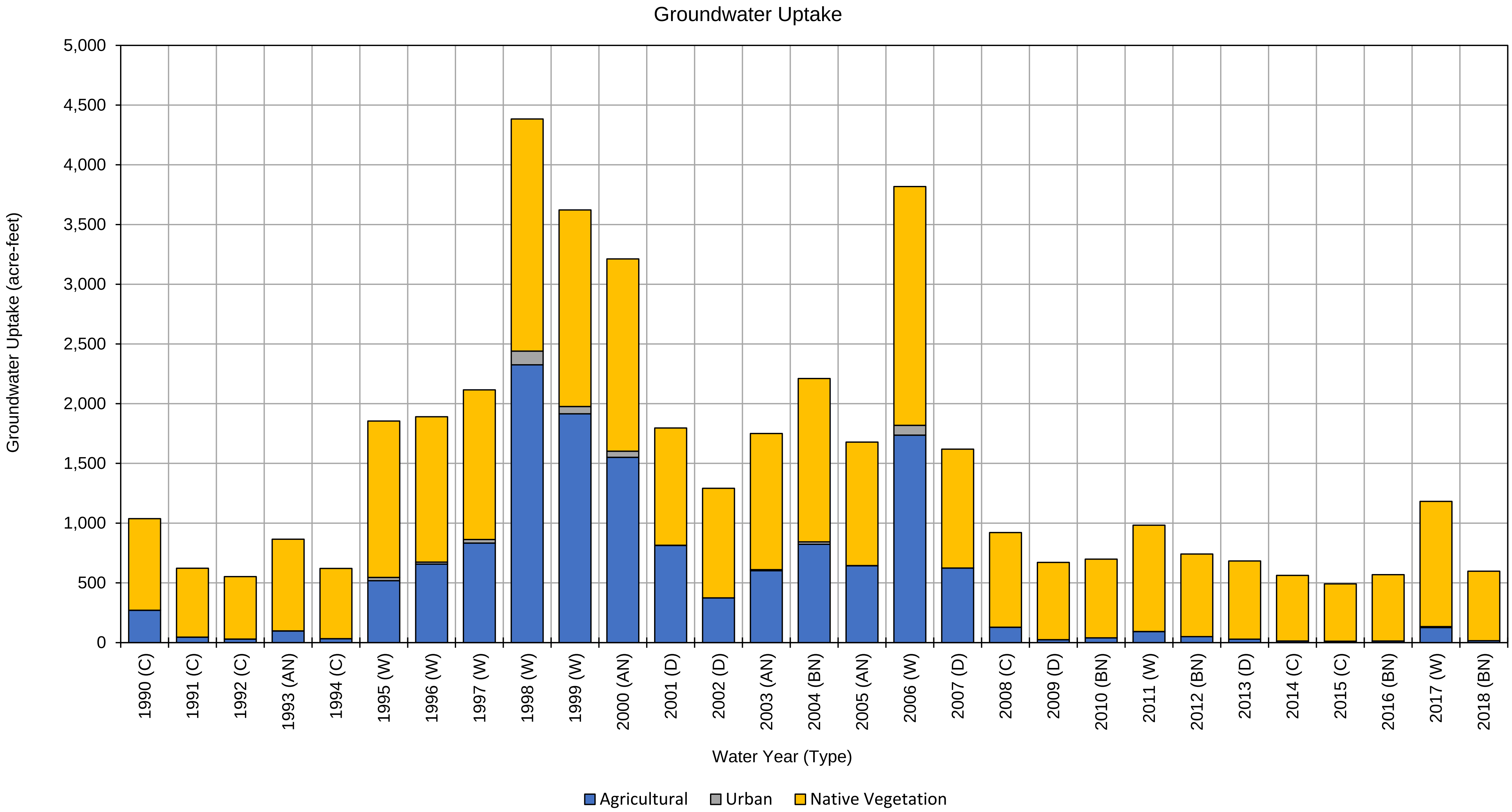
Tehama IHM - Historical

Antelope Subbasin Historical Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		14,000	660	0	15,000
1991 (C)		13,000	700	0	14,000
1992 (C)		14,000	730	0	15,000
1993 (AN)		10,000	750	0	11,000
1994 (C)		13,000	770	0	14,000
1995 (W)		9,700	820	0	11,000
1996 (W)		11,000	810	0	12,000
1997 (W)		11,000	810	0	12,000
1998 (W)		6,300	820	0	7,100
1999 (W)		10,000	830	0	11,000
2000 (AN)		8,700	860	0	9,600
2001 (D)		12,000	850	0	13,000
2002 (D)		14,000	870	0	15,000
2003 (AN)		11,000	890	0	12,000
2004 (BN)		13,000	910	0	14,000
2005 (AN)		9,000	920	0	9,900
2006 (W)		8,400	930	0	9,300
2007 (D)		12,000	930	0	13,000
2008 (C)		16,000	960	0	17,000
2009 (D)		13,000	960	0	14,000
2010 (BN)		10,000	970	0	11,000
2011 (W)		9,000	980	0	10,000
2012 (BN)		13,000	980	0	14,000
2013 (D)		15,000	980	0	16,000
2014 (C)		16,000	960	0	17,000
2015 (C)		20,000	820	0	21,000
2016 (BN)		14,000	860	0	15,000
2017 (W)		14,000	880	0	15,000
2018 (BN)		17,000	930	0	18,000
Average (1990-2018)		12,000	870	0	13,000
1990-2018	W	10,000	860	0	11,000
	AN	9,800	860	0	11,000
	BN	13,000	930	0	14,000
	D	13,000	920	0	14,000
	C	15,000	800	0	16,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



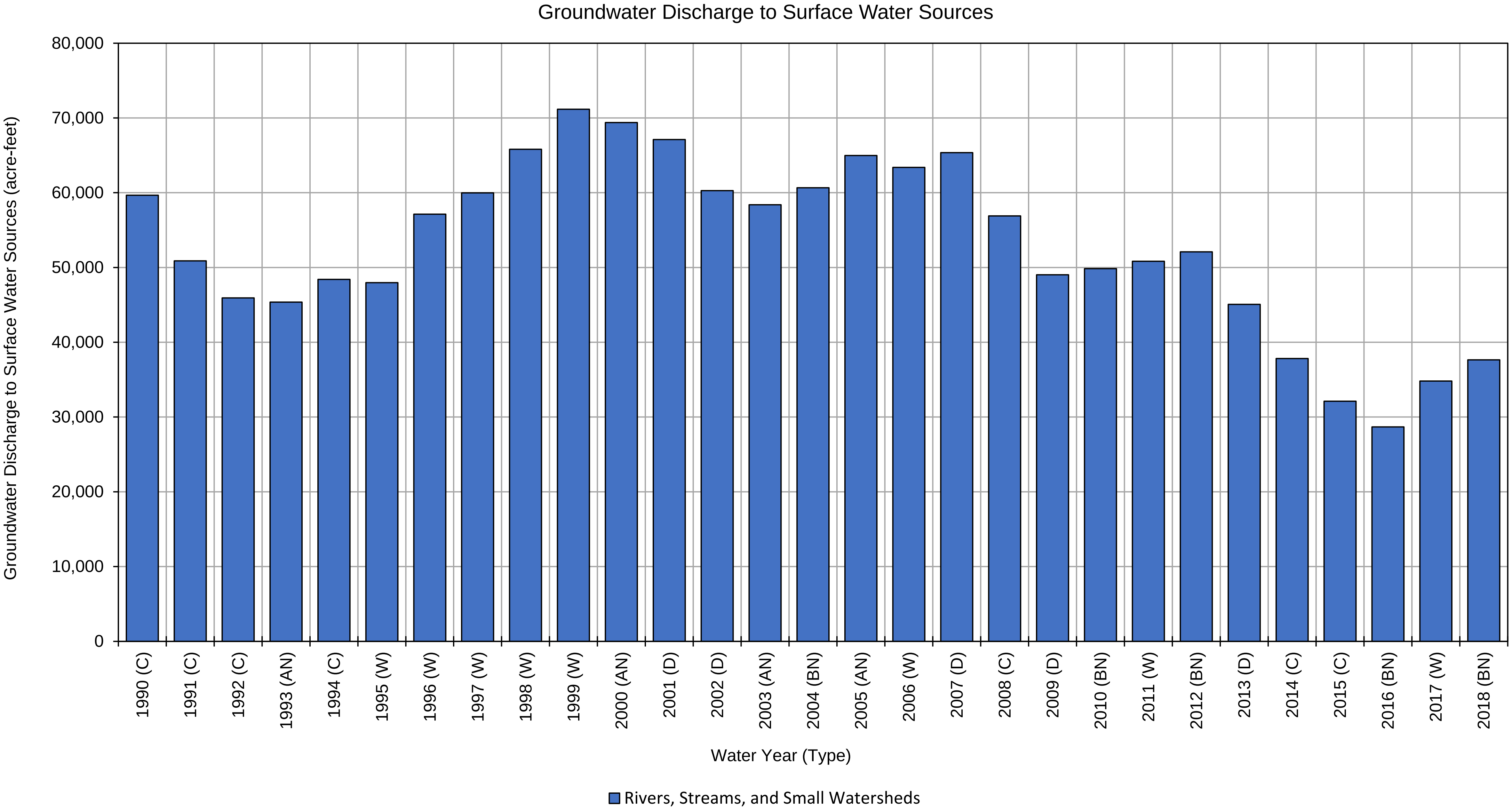
Tehama IHM - Historical

Antelope Subbasin Historical Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		270	0	770	1,000
1991 (C)		46	0	580	630
1992 (C)		29	0	520	550
1993 (AN)		96	1	770	870
1994 (C)		33	0	590	620
1995 (W)		520	28	1,300	1,800
1996 (W)		660	17	1,200	1,900
1997 (W)		830	30	1,300	2,200
1998 (W)		2,300	110	1,900	4,300
1999 (W)		1,900	61	1,600	3,600
2000 (AN)		1,600	51	1,600	3,300
2001 (D)		810	2	980	1,800
2002 (D)		370	0	920	1,300
2003 (AN)		600	9	1,100	1,700
2004 (BN)		820	21	1,400	2,200
2005 (AN)		640	2	1,000	1,600
2006 (W)		1,700	82	2,000	3,800
2007 (D)		620	0	1,000	1,600
2008 (C)		130	0	790	920
2009 (D)		24	0	650	670
2010 (BN)		39	0	660	700
2011 (W)		92	1	890	980
2012 (BN)		50	0	690	740
2013 (D)		29	0	650	680
2014 (C)		13	0	550	560
2015 (C)		11	0	480	490
2016 (BN)		13	0	560	570
2017 (W)		130	7	1,000	1,100
2018 (BN)		15	0	580	600
Average (1990-2018)		500	15	970	1,500
1990-2018	W	1,000	43	1,400	2,400
	AN	720	16	1,100	1,800
	BN	190	4	770	960
	D	370	0	840	1,200
	C	76	0	610	690

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



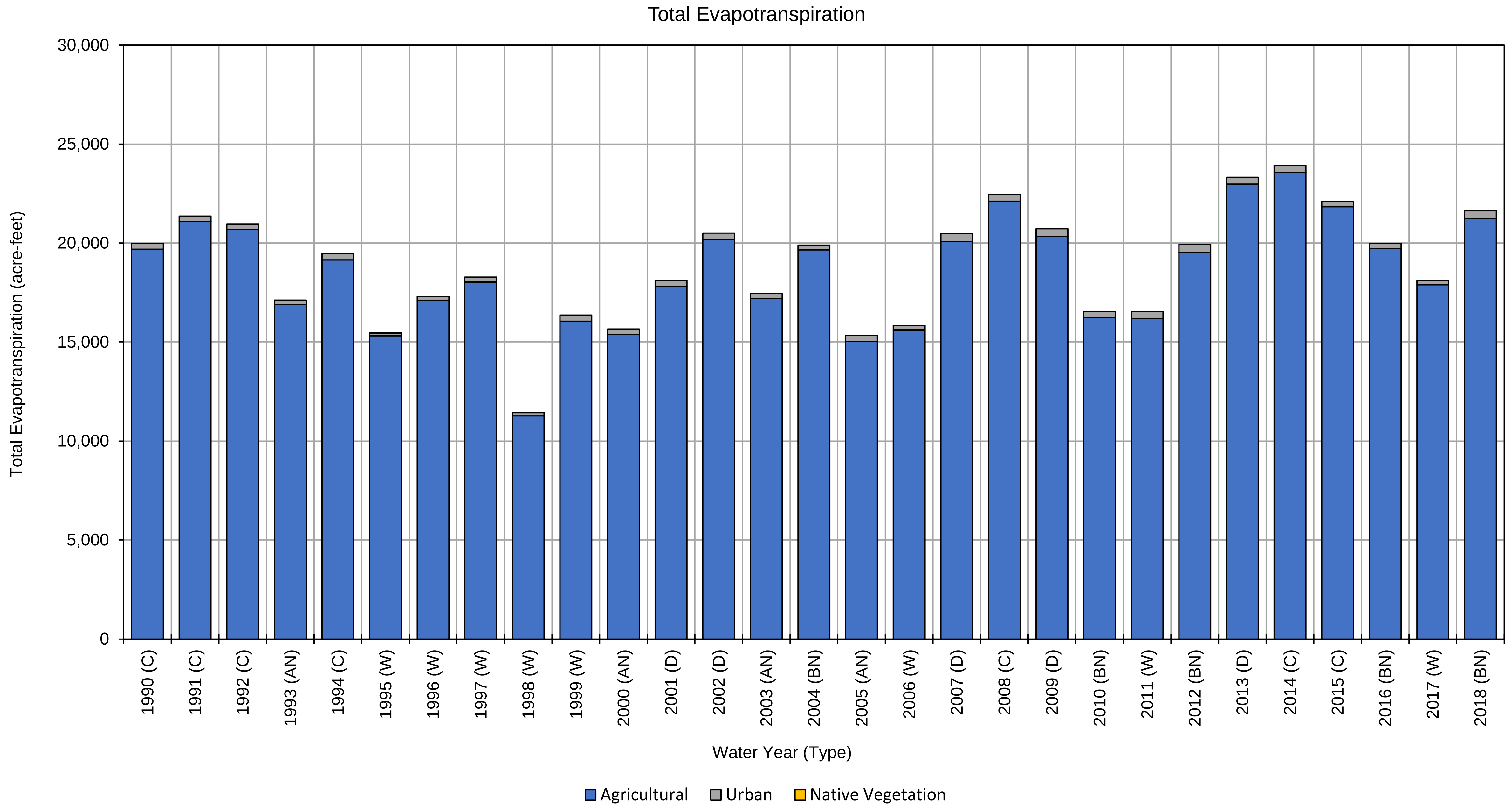
Tehama IHM - Historical

Antelope Subbasin Historical Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
1990 (C)		60,000
1991 (C)		51,000
1992 (C)		46,000
1993 (AN)		45,000
1994 (C)		48,000
1995 (W)		48,000
1996 (W)		57,000
1997 (W)		60,000
1998 (W)		66,000
1999 (W)		71,000
2000 (AN)		69,000
2001 (D)		67,000
2002 (D)		60,000
2003 (AN)		58,000
2004 (BN)		61,000
2005 (AN)		65,000
2006 (W)		63,000
2007 (D)		65,000
2008 (C)		57,000
2009 (D)		49,000
2010 (BN)		50,000
2011 (W)		51,000
2012 (BN)		52,000
2013 (D)		45,000
2014 (C)		38,000
2015 (C)		32,000
2016 (BN)		29,000
2017 (W)		35,000
2018 (BN)		38,000
Average (1990-2018)		53,000
1990-2018	W	56,000
	AN	60,000
	BN	46,000
	D	57,000
	C	47,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



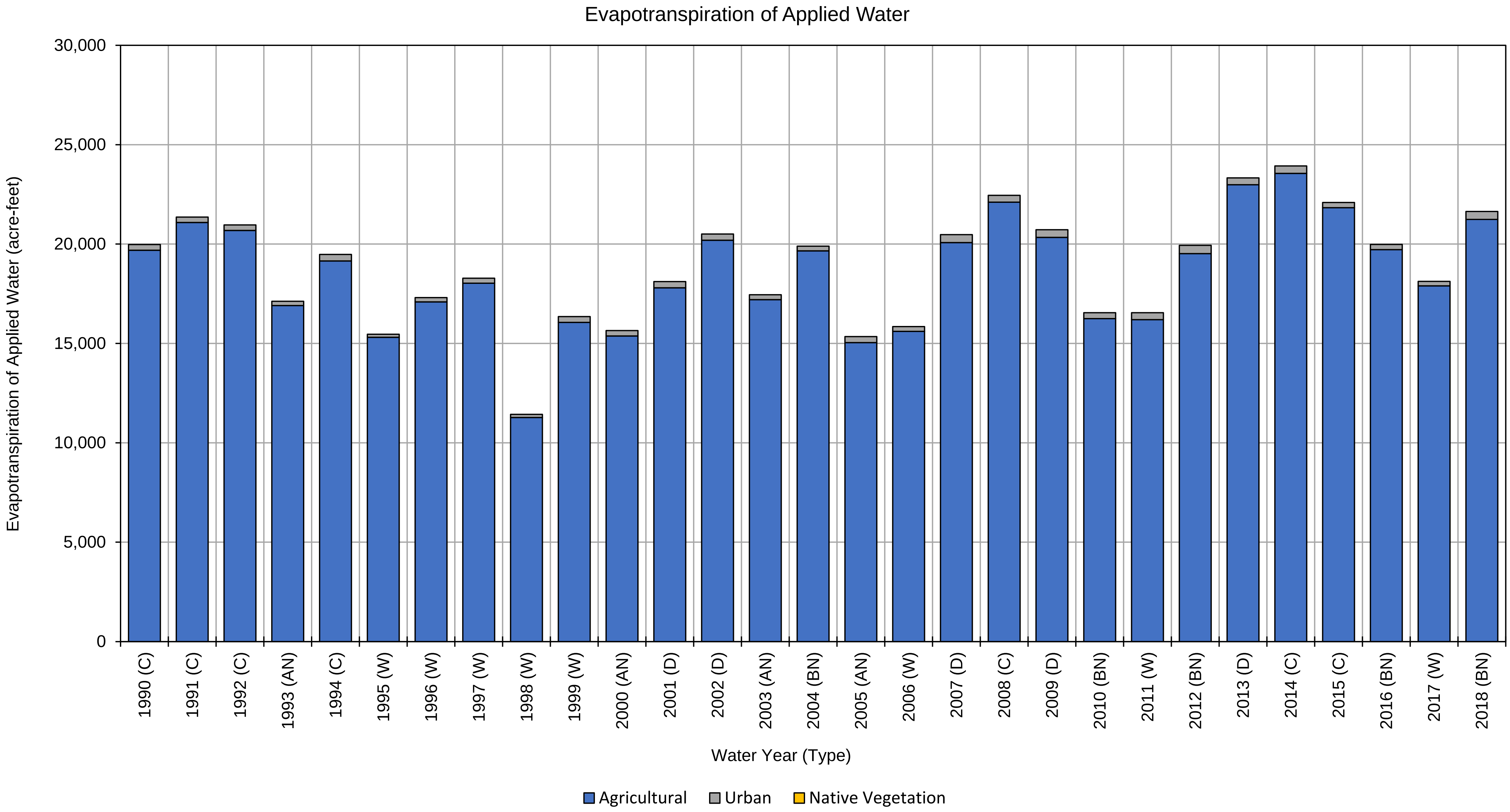
Tehama IHM - Historical

Antelope Subbasin Historical Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		32,000	1,300	14,000	47,000
1991 (C)		30,000	1,100	12,000	43,000
1992 (C)		32,000	1,400	14,000	47,000
1993 (AN)		31,000	1,600	15,000	48,000
1994 (C)		32,000	1,600	14,000	48,000
1995 (W)		28,000	1,500	13,000	43,000
1996 (W)		30,000	1,600	15,000	47,000
1997 (W)		31,000	1,600	14,000	47,000
1998 (W)		26,000	1,700	14,000	42,000
1999 (W)		29,000	1,500	14,000	45,000
2000 (AN)		28,000	1,800	15,000	45,000
2001 (D)		30,000	1,600	15,000	47,000
2002 (D)		30,000	1,500	14,000	46,000
2003 (AN)		29,000	1,700	14,000	45,000
2004 (BN)		30,000	1,400	14,000	45,000
2005 (AN)		28,000	2,000	16,000	46,000
2006 (W)		29,000	1,700	15,000	46,000
2007 (D)		30,000	1,600	14,000	46,000
2008 (C)		30,000	1,300	14,000	45,000
2009 (D)		29,000	1,600	15,000	46,000
2010 (BN)		27,000	1,700	15,000	44,000
2011 (W)		26,000	1,800	16,000	44,000
2012 (BN)		29,000	1,700	16,000	47,000
2013 (D)		30,000	1,400	14,000	45,000
2014 (C)		31,000	1,300	13,000	45,000
2015 (C)		31,000	1,400	14,000	46,000
2016 (BN)		31,000	1,700	15,000	48,000
2017 (W)		31,000	1,600	15,000	48,000
2018 (BN)		32,000	1,500	14,000	48,000
Average (1990-2018)		30,000	1,600	14,000	46,000
1990-2018	W	29,000	1,600	15,000	46,000
	AN	29,000	1,800	15,000	46,000
	BN	30,000	1,600	15,000	47,000
	D	30,000	1,500	14,000	46,000
	C	31,000	1,400	14,000	46,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

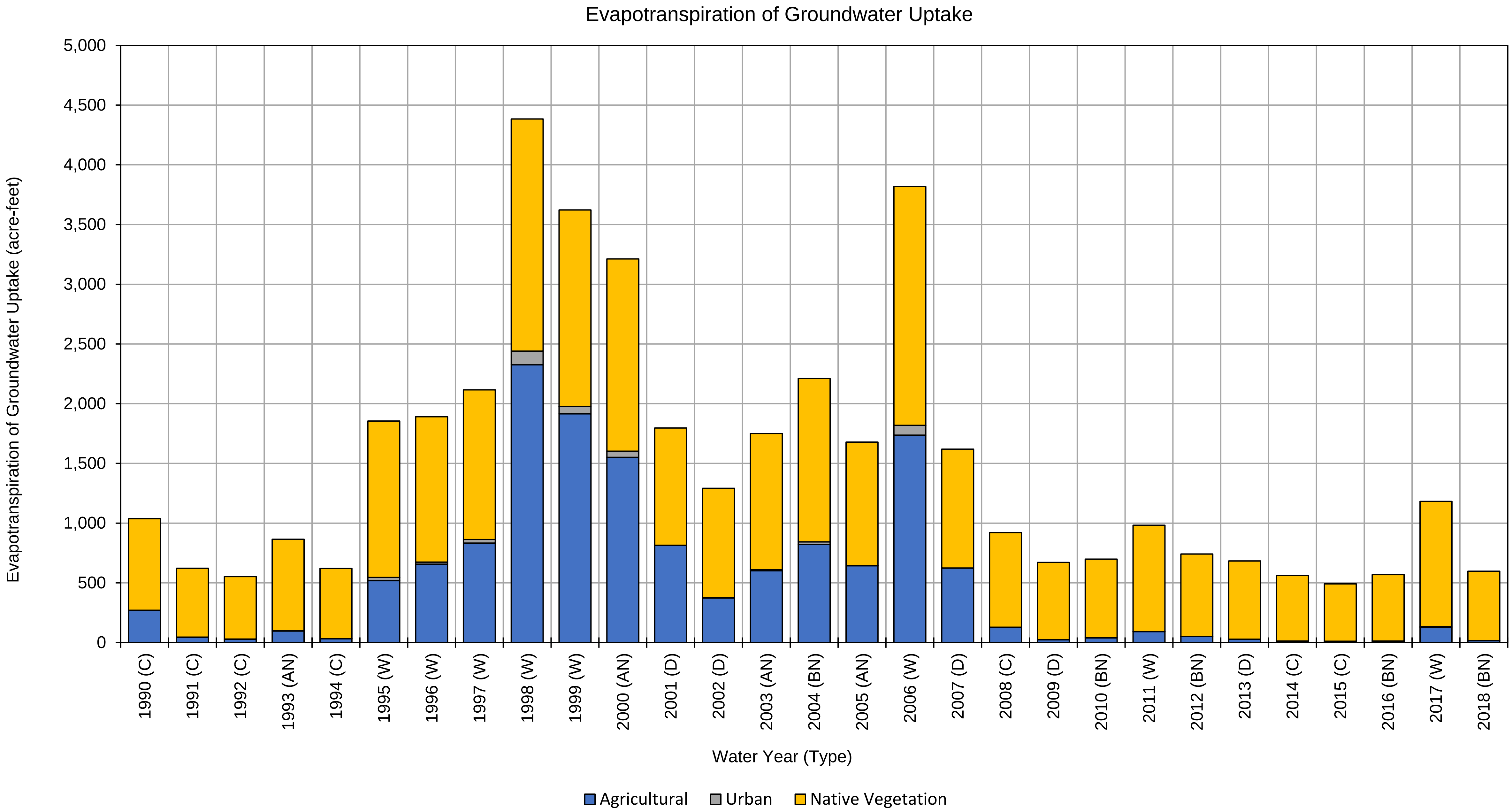

Evapotranspiration of Applied Water
Evapotranspiration of Applied Water (acre-feet)
30,000
25,000
20,000
15,000
10,000
5,000
0
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Agricultural
Urban
Native Vegetation

Antelope Subbasin Historical Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		20,000	290	0	20,000
1991 (C)		21,000	270	0	21,000
1992 (C)		21,000	270	0	21,000
1993 (AN)		17,000	210	0	17,000
1994 (C)		19,000	330	0	19,000
1995 (W)		15,000	160	0	15,000
1996 (W)		17,000	220	0	17,000
1997 (W)		18,000	250	0	18,000
1998 (W)		11,000	150	0	11,000
1999 (W)		16,000	290	0	16,000
2000 (AN)		15,000	270	0	15,000
2001 (D)		18,000	310	0	18,000
2002 (D)		20,000	310	0	20,000
2003 (AN)		17,000	250	0	17,000
2004 (BN)		20,000	240	0	20,000
2005 (AN)		15,000	300	0	15,000
2006 (W)		16,000	240	0	16,000
2007 (D)		20,000	400	0	20,000
2008 (C)		22,000	340	0	22,000
2009 (D)		20,000	390	0	20,000
2010 (BN)		16,000	300	0	16,000
2011 (W)		16,000	350	0	16,000
2012 (BN)		20,000	420	0	20,000
2013 (D)		23,000	350	0	23,000
2014 (C)		24,000	380	0	24,000
2015 (C)		22,000	260	0	22,000
2016 (BN)		20,000	270	0	20,000
2017 (W)		18,000	220	0	18,000
2018 (BN)		21,000	400	0	21,000
Average (1990-2018)		19,000	290	0	19,000
1990-2018	W	16,000	240	0	16,000
	AN	16,000	260	0	16,000
	BN	19,000	320	0	19,000
	D	20,000	350	0	20,000
	C	21,000	310	0	21,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



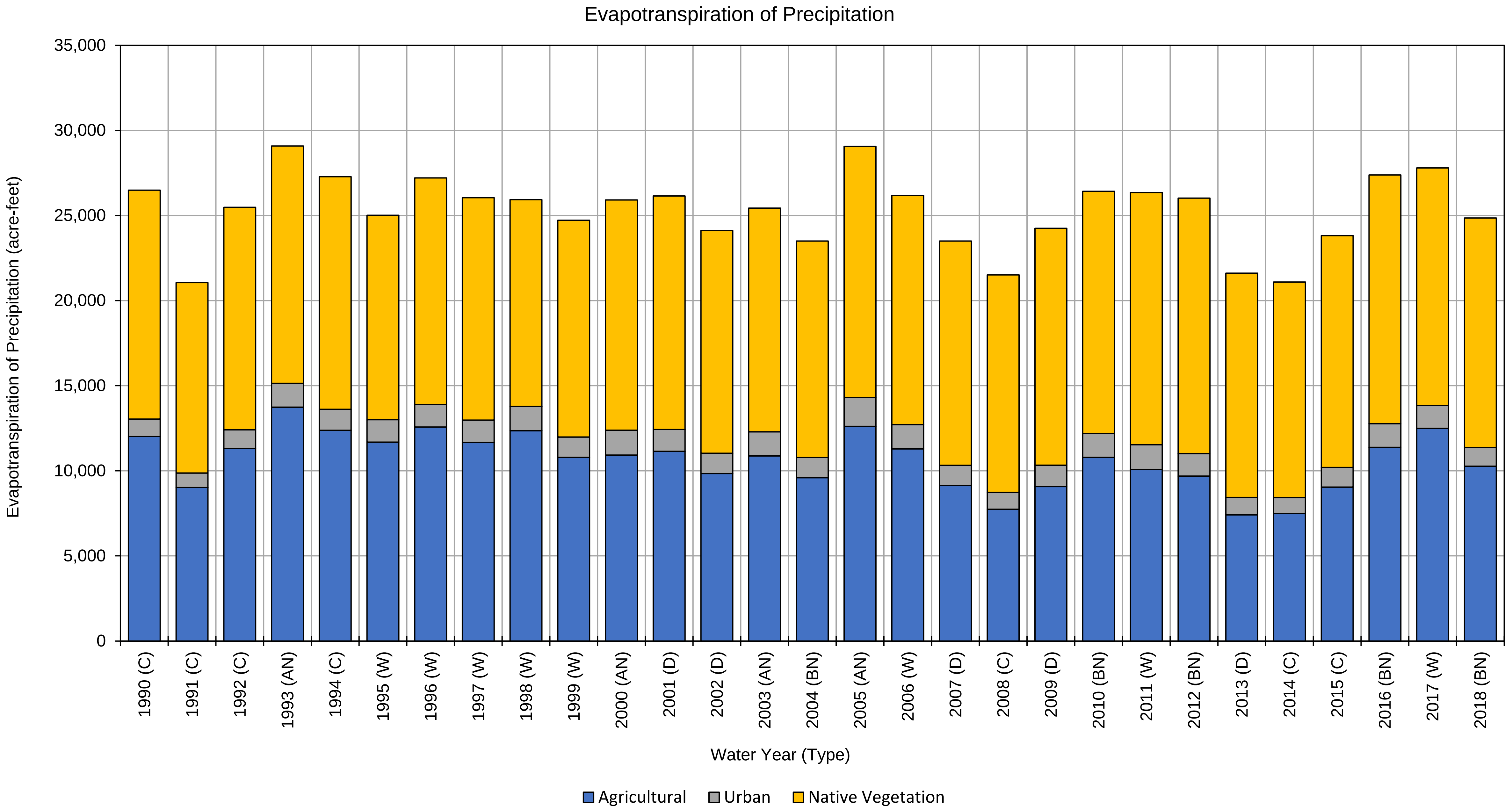
Tehama IHM - Historical

Antelope Subbasin Historical Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>270</td><td>0</td><td>770</td><td>1,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>46</td><td>0</td><td>580</td><td>630</td></tr>
<tr><td colspan="2">1992 (C)</td><td>29</td><td>0</td><td>520</td><td>550</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>96</td><td>1</td><td>770</td><td>870</td></tr>
<tr><td colspan="2">1994 (C)</td><td>33</td><td>0</td><td>590</td><td>620</td></tr>
<tr><td colspan="2">1995 (W)</td><td>520</td><td>28</td><td>1,300</td><td>1,800</td></tr>
<tr><td colspan="2">1996 (W)</td><td>660</td><td>17</td><td>1,200</td><td>1,900</td></tr>
<tr><td colspan="2">1997 (W)</td><td>830</td><td>30</td><td>1,300</td><td>2,200</td></tr>
<tr><td colspan="2">1998 (W)</td><td>2,300</td><td>110</td><td>1,900</td><td>4,300</td></tr>
<tr><td colspan="2">1999 (W)</td><td>1,900</td><td>61</td><td>1,600</td><td>3,600</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>1,600</td><td>51</td><td>1,600</td><td>3,300</td></tr>
<tr><td colspan="2">2001 (D)</td><td>810</td><td>2</td><td>980</td><td>1,800</td></tr>
<tr><td colspan="2">2002 (D)</td><td>370</td><td>0</td><td>920</td><td>1,300</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>600</td><td>9</td><td>1,100</td><td>1,700</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>820</td><td>21</td><td>1,400</td><td>2,200</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>640</td><td>2</td><td>1,000</td><td>1,600</td></tr>
<tr><td colspan="2">2006 (W)</td><td>1,700</td><td>82</td><td>2,000</td><td>3,800</td></tr>
<tr><td colspan="2">2007 (D)</td><td>620</td><td>0</td><td>1,000</td><td>1,600</td></tr>
<tr><td colspan="2">2008 (C)</td><td>130</td><td>0</td><td>790</td><td>920</td></tr>
<tr><td colspan="2">2009 (D)</td><td>24</td><td>0</td><td>650</td><td>670</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>39</td><td>0</td><td>660</td><td>700</td></tr>
<tr><td colspan="2">2011 (W)</td><td>92</td><td>1</td><td>890</td><td>980</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>50</td><td>0</td><td>690</td><td>740</td></tr>
<tr><td colspan="2">2013 (D)</td><td>29</td><td>0</td><td>650</td><td>680</td></tr>
<tr><td colspan="2">2014 (C)</td><td>13</td><td>0</td><td>550</td><td>560</td></tr>
<tr><td colspan="2">2015 (C)</td><td>11</td><td>0</td><td>480</td><td>490</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>13</td><td>0</td><td>560</td><td>570</td></tr>
<tr><td colspan="2">2017 (W)</td><td>130</td><td>7</td><td>1,000</td><td>1,100</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>15</td><td>0</td><td>580</td><td>600</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>500</td><td>15</td><td>970</td><td>1,500</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>1,000</td><td>43</td><td>1,400</td><td>2,400</td></tr>
<tr><td>AN</td><td>720</td><td>16</td><td>1,100</td><td>1,800</td></tr>
<tr><td>BN</td><td>190</td><td>4</td><td>770</td><td>960</td></tr>
<tr><td>D</td><td>370</td><td>0</td><td>840</td><td>1,200</td></tr>
<tr><td>C</td><td>76</td><td>0</td><td>610</td><td>690</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



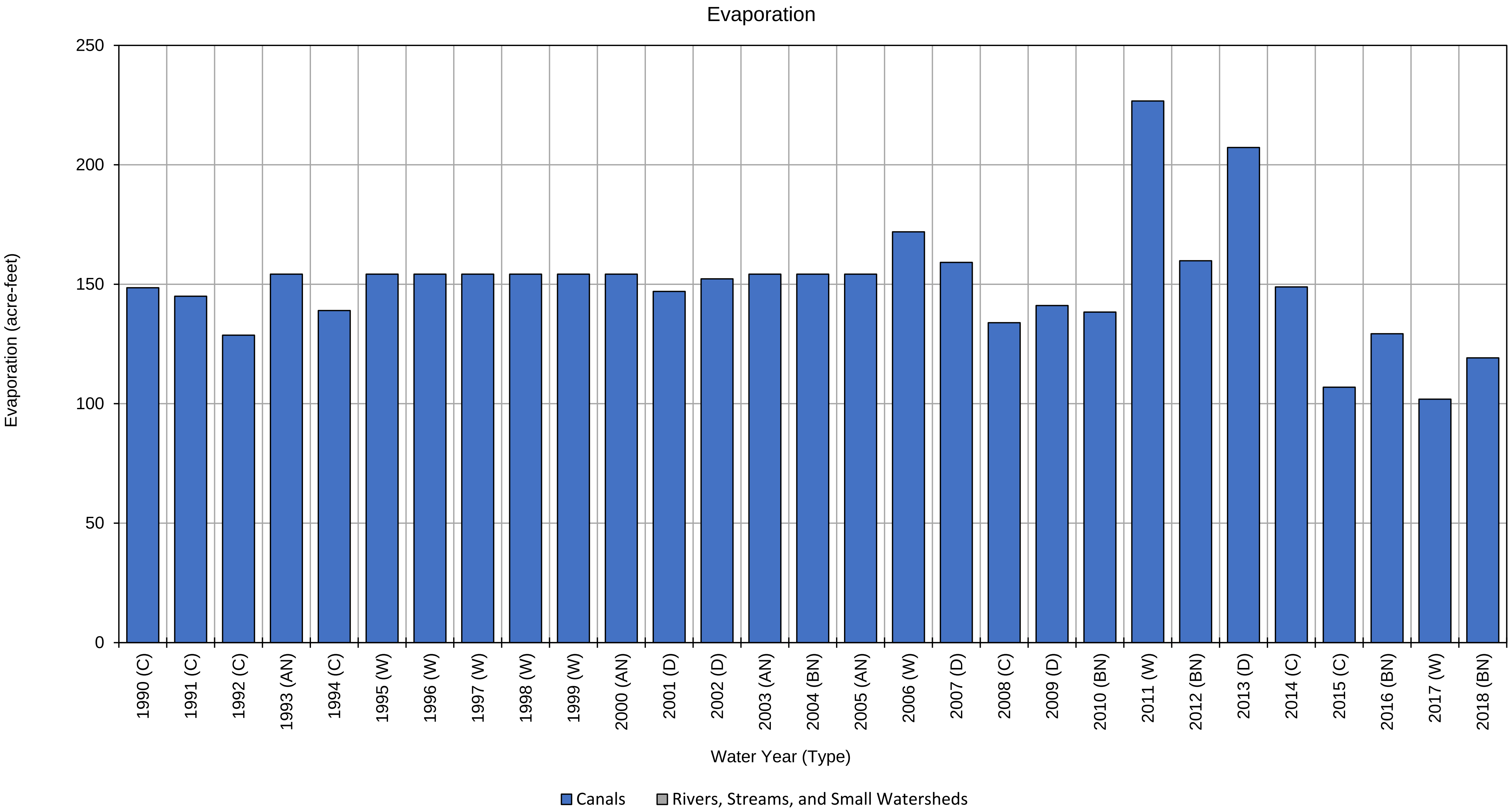
Tehama IHM - Historical

Antelope Subbasin Historical Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		12,000	1,000	13,000	26,000
1991 (C)		9,000	850	11,000	21,000
1992 (C)		11,000	1,100	13,000	25,000
1993 (AN)		14,000	1,400	14,000	29,000
1994 (C)		12,000	1,200	14,000	27,000
1995 (W)		12,000	1,300	12,000	25,000
1996 (W)		13,000	1,300	13,000	27,000
1997 (W)		12,000	1,300	13,000	26,000
1998 (W)		12,000	1,400	12,000	25,000
1999 (W)		11,000	1,200	13,000	25,000
2000 (AN)		11,000	1,500	14,000	27,000
2001 (D)		11,000	1,300	14,000	26,000
2002 (D)		9,800	1,200	13,000	24,000
2003 (AN)		11,000	1,400	13,000	25,000
2004 (BN)		9,600	1,200	13,000	24,000
2005 (AN)		13,000	1,700	15,000	30,000
2006 (W)		11,000	1,400	13,000	25,000
2007 (D)		9,100	1,200	13,000	23,000
2008 (C)		7,700	1,000	13,000	22,000
2009 (D)		9,100	1,300	14,000	24,000
2010 (BN)		11,000	1,400	14,000	26,000
2011 (W)		10,000	1,500	15,000	27,000
2012 (BN)		9,700	1,300	15,000	26,000
2013 (D)		7,400	1,000	13,000	21,000
2014 (C)		7,500	940	13,000	21,000
2015 (C)		9,000	1,200	14,000	24,000
2016 (BN)		11,000	1,400	15,000	27,000
2017 (W)		12,000	1,400	14,000	27,000
2018 (BN)		10,000	1,100	13,000	24,000
Average (1990-2018)		11,000	1,300	13,000	25,000
1990-2018	W	12,000	1,400	13,000	26,000
	AN	12,000	1,500	14,000	28,000
	BN	10,000	1,300	14,000	25,000
	D	9,300	1,200	13,000	24,000
	C	9,900	1,000	13,000	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



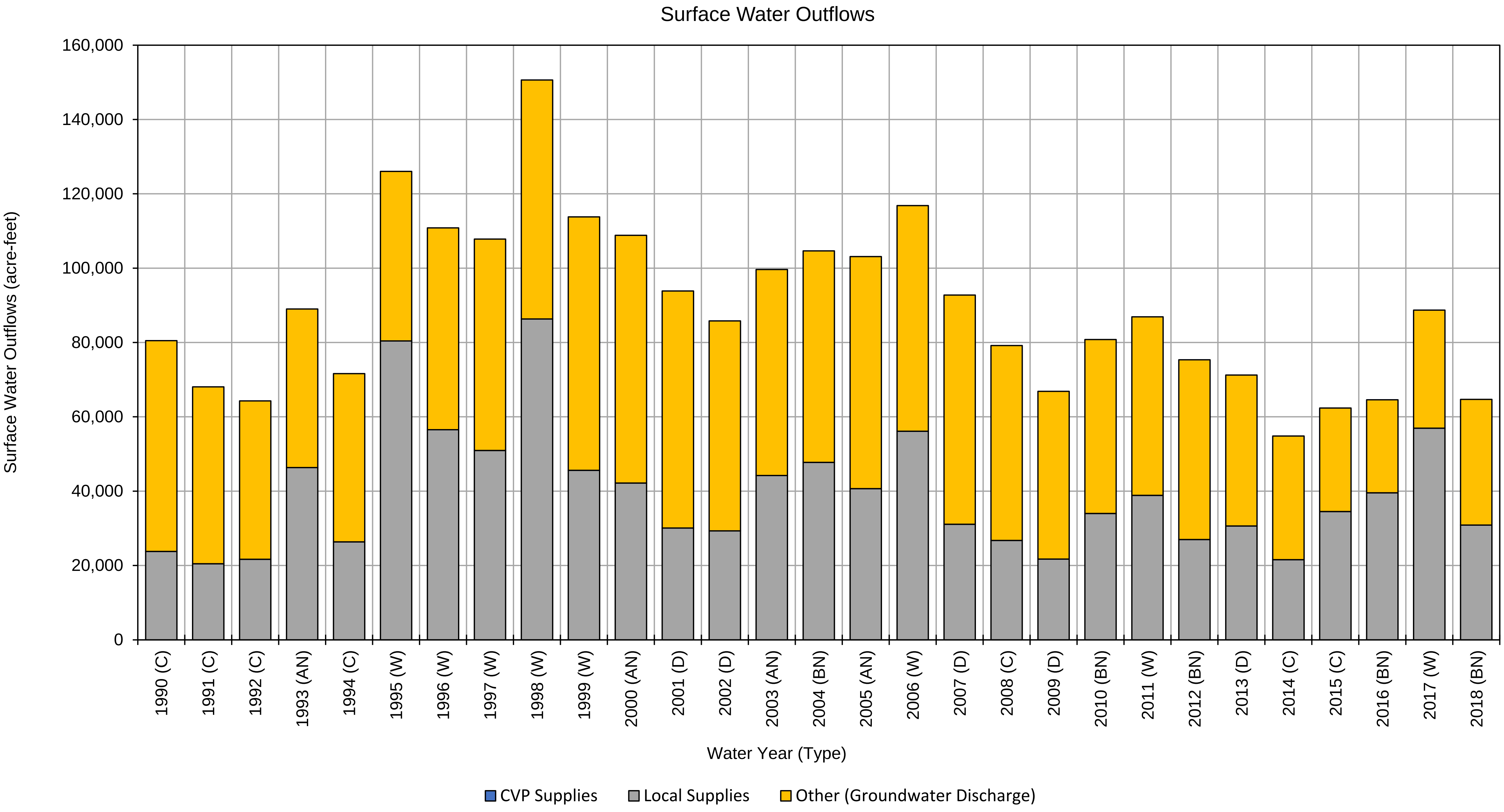
Tehama IHM - Historical

Antelope Subbasin Historical Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
1990 (C)		150	0	150
1991 (C)		150	0	150
1992 (C)		130	0	130
1993 (AN)		150	0	150
1994 (C)		140	0	140
1995 (W)		150	0	150
1996 (W)		150	0	150
1997 (W)		150	0	150
1998 (W)		150	0	150
1999 (W)		150	0	150
2000 (AN)		150	0	150
2001 (D)		150	0	150
2002 (D)		150	0	150
2003 (AN)		150	0	150
2004 (BN)		150	0	150
2005 (AN)		150	0	150
2006 (W)		170	0	170
2007 (D)		160	0	160
2008 (C)		130	0	130
2009 (D)		140	0	140
2010 (BN)		140	0	140
2011 (W)		230	0	230
2012 (BN)		160	0	160
2013 (D)		210	0	210
2014 (C)		150	0	150
2015 (C)		110	0	110
2016 (BN)		130	0	130
2017 (W)		100	0	100
2018 (BN)		120	0	120
Average (1990-2018)		150	0	150
1990-2018	W	160	0	160
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



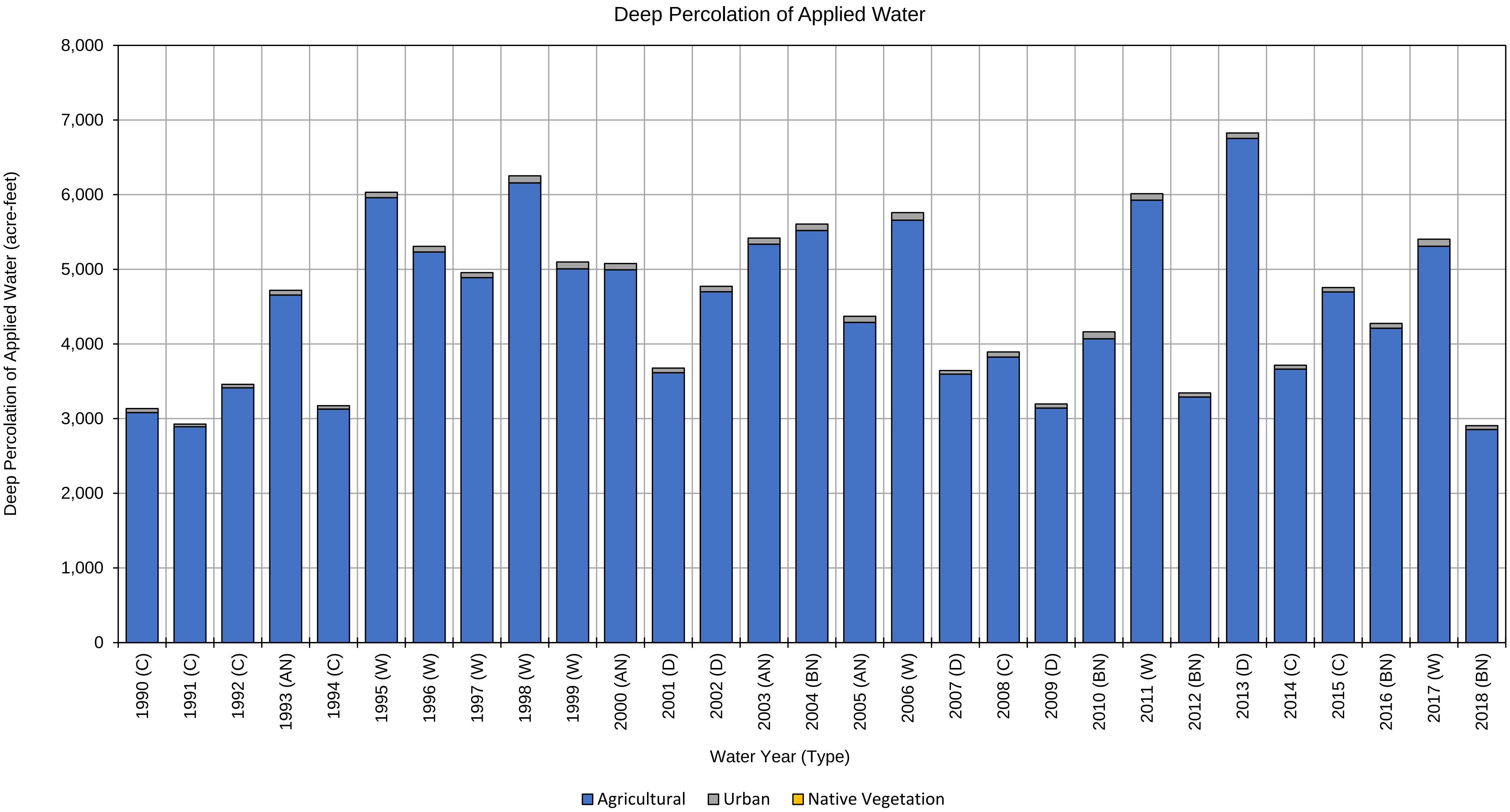
Tehama IHM - Historical

Antelope Subbasin Historical Surface Water Outflows, by Water Source Type (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>CVP Supplies</th><th>Local Supplies</th><th>Other (Groundwater Discharge)</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>0</td><td>24,000</td><td>57,000</td><td>81,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>0</td><td>20,000</td><td>48,000</td><td>68,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>0</td><td>22,000</td><td>43,000</td><td>65,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>0</td><td>46,000</td><td>43,000</td><td>89,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>0</td><td>26,000</td><td>45,000</td><td>71,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>0</td><td>80,000</td><td>46,000</td><td>130,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>0</td><td>57,000</td><td>54,000</td><td>110,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>0</td><td>51,000</td><td>57,000</td><td>110,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>0</td><td>86,000</td><td>64,000</td><td>150,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>0</td><td>46,000</td><td>68,000</td><td>110,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>0</td><td>42,000</td><td>67,000</td><td>110,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>0</td><td>30,000</td><td>64,000</td><td>94,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>0</td><td>29,000</td><td>56,000</td><td>85,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>0</td><td>44,000</td><td>55,000</td><td>99,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>0</td><td>48,000</td><td>57,000</td><td>110,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>0</td><td>41,000</td><td>62,000</td><td>100,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>0</td><td>56,000</td><td>61,000</td><td>120,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>0</td><td>31,000</td><td>62,000</td><td>93,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>0</td><td>27,000</td><td>52,000</td><td>79,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>0</td><td>22,000</td><td>45,000</td><td>67,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>0</td><td>34,000</td><td>47,000</td><td>81,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>0</td><td>39,000</td><td>48,000</td><td>87,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>0</td><td>27,000</td><td>48,000</td><td>75,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>0</td><td>31,000</td><td>41,000</td><td>72,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>0</td><td>22,000</td><td>33,000</td><td>55,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>0</td><td>35,000</td><td>28,000</td><td>63,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>0</td><td>40,000</td><td>25,000</td><td>65,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>0</td><td>57,000</td><td>32,000</td><td>89,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>0</td><td>31,000</td><td>34,000</td><td>65,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>0</td><td>39,000</td><td>50,000</td><td>89,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>0</td><td>59,000</td><td>54,000</td><td>110,000</td></tr>
<tr><td>AN</td><td>0</td><td>43,000</td><td>57,000</td><td>100,000</td></tr>
<tr><td>BN</td><td>0</td><td>36,000</td><td>42,000</td><td>78,000</td></tr>
<tr><td>D</td><td>0</td><td>29,000</td><td>54,000</td><td>83,000</td></tr>
<tr><td>C</td><td>0</td><td>25,000</td><td>44,000</td><td>69,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



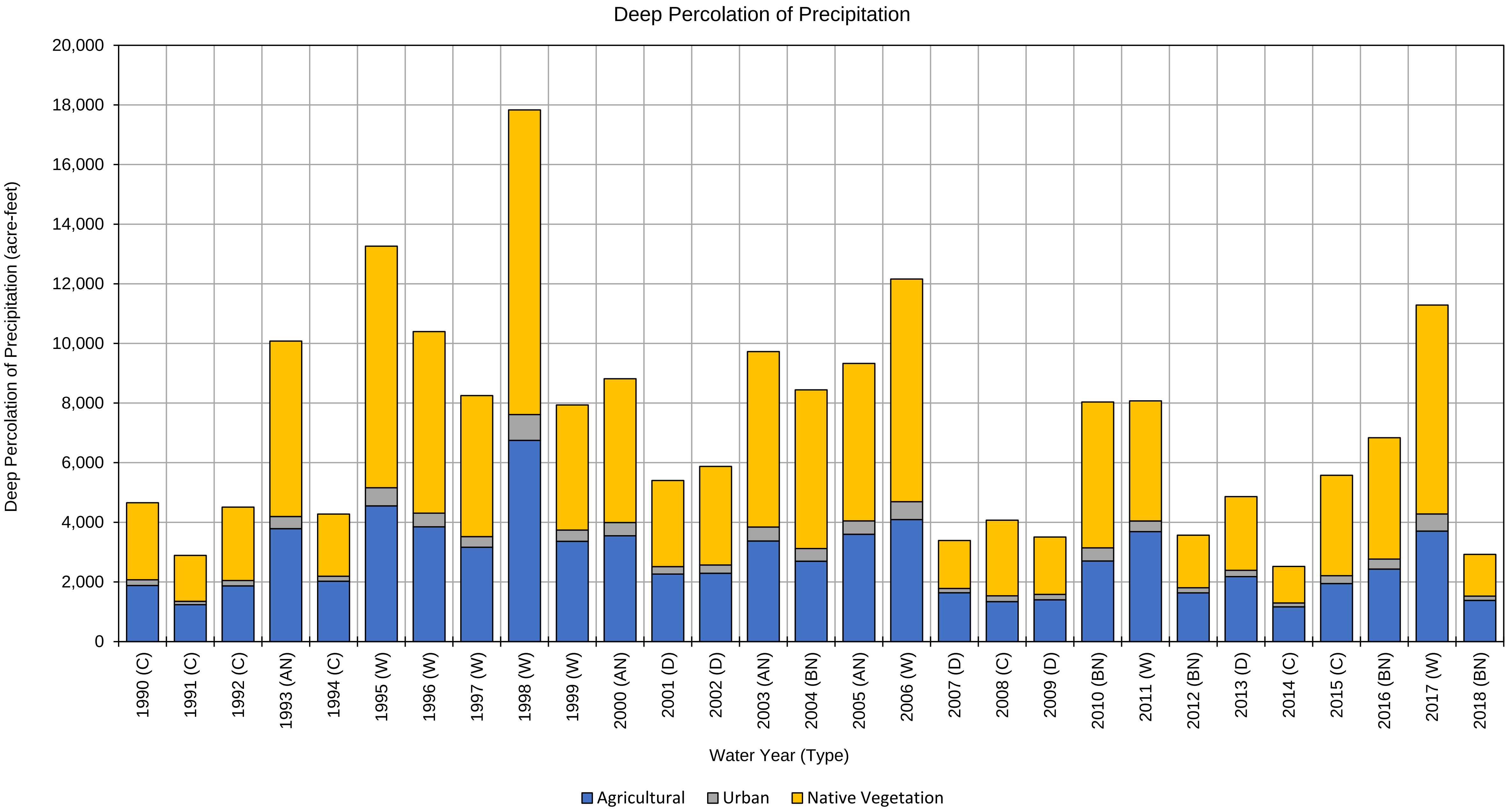
Tehama IHM - Historical

Antelope Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>3,100</td><td>54</td><td>0</td><td>3,200</td></tr>
<tr><td colspan="2">1991 (C)</td><td>2,900</td><td>35</td><td>0</td><td>2,900</td></tr>
<tr><td colspan="2">1992 (C)</td><td>3,400</td><td>46</td><td>0</td><td>3,400</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>4,700</td><td>62</td><td>0</td><td>4,800</td></tr>
<tr><td colspan="2">1994 (C)</td><td>3,100</td><td>45</td><td>0</td><td>3,100</td></tr>
<tr><td colspan="2">1995 (W)</td><td>6,000</td><td>73</td><td>0</td><td>6,100</td></tr>
<tr><td colspan="2">1996 (W)</td><td>5,200</td><td>75</td><td>0</td><td>5,300</td></tr>
<tr><td colspan="2">1997 (W)</td><td>4,900</td><td>67</td><td>0</td><td>5,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>6,200</td><td>94</td><td>0</td><td>6,300</td></tr>
<tr><td colspan="2">1999 (W)</td><td>5,000</td><td>92</td><td>0</td><td>5,100</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>5,000</td><td>82</td><td>0</td><td>5,100</td></tr>
<tr><td colspan="2">2001 (D)</td><td>3,600</td><td>61</td><td>0</td><td>3,700</td></tr>
<tr><td colspan="2">2002 (D)</td><td>4,700</td><td>73</td><td>0</td><td>4,800</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>5,300</td><td>82</td><td>0</td><td>5,400</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>5,500</td><td>86</td><td>0</td><td>5,600</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>4,300</td><td>81</td><td>0</td><td>4,400</td></tr>
<tr><td colspan="2">2006 (W)</td><td>5,700</td><td>100</td><td>0</td><td>5,800</td></tr>
<tr><td colspan="2">2007 (D)</td><td>3,600</td><td>48</td><td>0</td><td>3,600</td></tr>
<tr><td colspan="2">2008 (C)</td><td>3,800</td><td>68</td><td>0</td><td>3,900</td></tr>
<tr><td colspan="2">2009 (D)</td><td>3,100</td><td>55</td><td>0</td><td>3,200</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>4,100</td><td>93</td><td>0</td><td>4,200</td></tr>
<tr><td colspan="2">2011 (W)</td><td>5,900</td><td>86</td><td>0</td><td>6,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>3,300</td><td>55</td><td>0</td><td>3,400</td></tr>
<tr><td colspan="2">2013 (D)</td><td>6,800</td><td>72</td><td>0</td><td>6,900</td></tr>
<tr><td colspan="2">2014 (C)</td><td>3,700</td><td>52</td><td>0</td><td>3,800</td></tr>
<tr><td colspan="2">2015 (C)</td><td>4,700</td><td>59</td><td>0</td><td>4,800</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>4,200</td><td>65</td><td>0</td><td>4,300</td></tr>
<tr><td colspan="2">2017 (W)</td><td>5,300</td><td>94</td><td>0</td><td>5,400</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>2,900</td><td>52</td><td>0</td><td>3,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>4,500</td><td>69</td><td>0</td><td>4,600</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>5,500</td><td>85</td><td>0</td><td>5,600</td></tr>
<tr><td>AN</td><td>4,800</td><td>77</td><td>0</td><td>4,900</td></tr>
<tr><td>BN</td><td>4,000</td><td>70</td><td>0</td><td>4,100</td></tr>
<tr><td>D</td><td>4,400</td><td>62</td><td>0</td><td>4,500</td></tr>
<tr><td>C</td><td>3,500</td><td>51</td><td>0</td><td>3,600</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



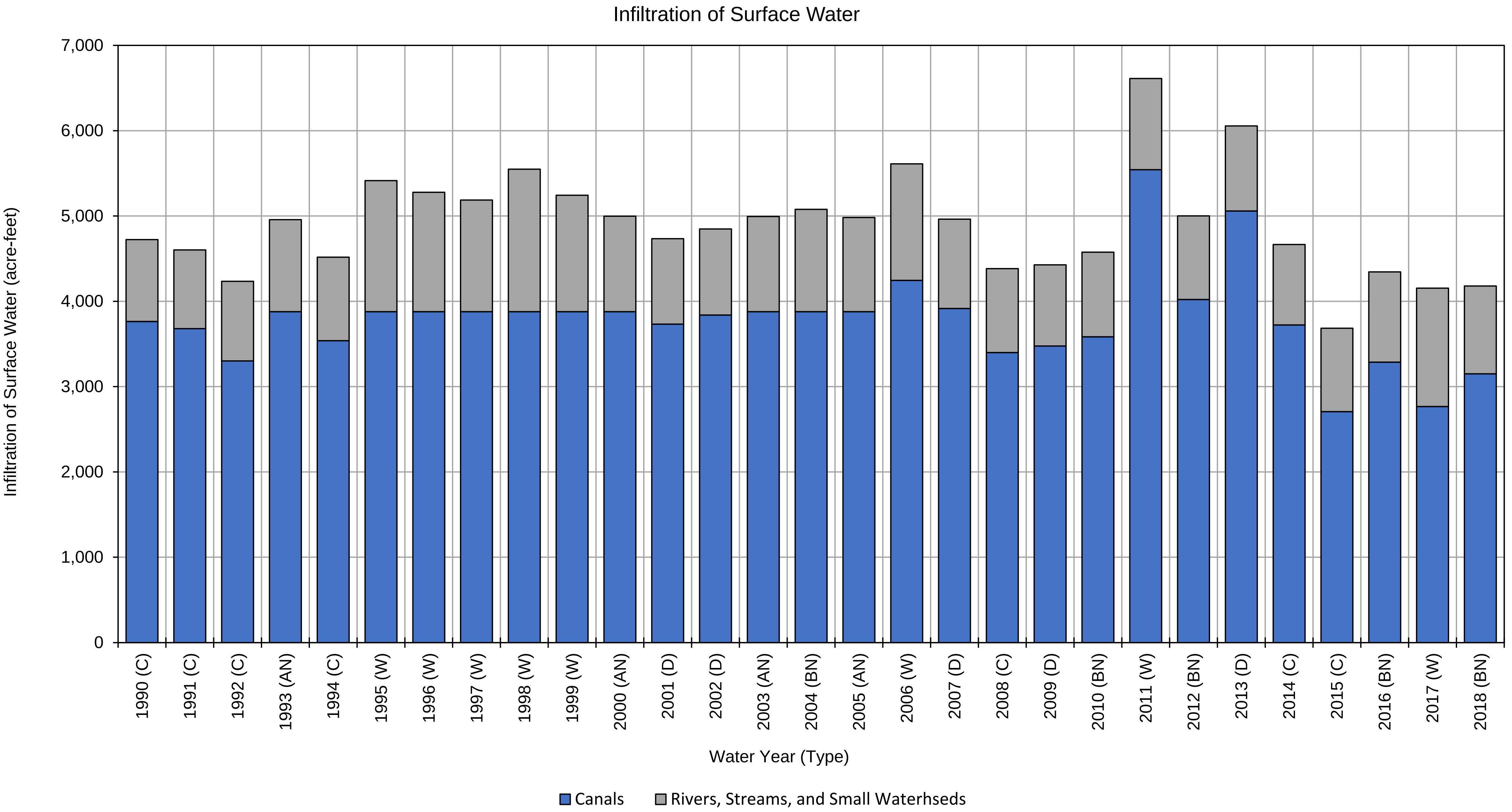
Tehama IHM - Historical

Antelope Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
1990 (C)	1,900	190	2,600	4,700
1991 (C)	1,200	110	1,500	2,800
1992 (C)	1,900	180	2,500	4,600
1993 (AN)	3,800	410	5,900	10,000
1994 (C)	2,000	170	2,100	4,300
1995 (W)	4,500	610	8,100	13,000
1996 (W)	3,800	460	6,100	10,000
1997 (W)	3,200	360	4,700	8,300
1998 (W)	6,700	860	10,000	18,000
1999 (W)	3,400	380	4,200	8,000
2000 (AN)	3,500	440	4,800	8,700
2001 (D)	2,300	250	2,900	5,500
2002 (D)	2,300	280	3,300	5,900
2003 (AN)	3,400	470	5,900	9,800
2004 (BN)	2,700	430	5,300	8,400
2005 (AN)	3,600	450	5,300	9,400
2006 (W)	4,100	600	7,500	12,000
2007 (D)	1,600	140	1,600	3,300
2008 (C)	1,300	200	2,500	4,000
2009 (D)	1,400	180	1,900	3,500
2010 (BN)	2,700	440	4,900	8,000
2011 (W)	3,700	360	4,000	8,100
2012 (BN)	1,600	170	1,800	3,600
2013 (D)	2,200	210	2,500	4,900
2014 (C)	1,200	130	1,200	2,500
2015 (C)	1,900	260	3,400	5,600
2016 (BN)	2,400	340	4,100	6,800
2017 (W)	3,700	570	7,000	11,000
2018 (BN)	1,400	140	1,400	2,900
Average (1990-2018)	2,700	340	4,100	7,100
1990-2018 W	4,100	520	6,500	11,000
AN	3,600	440	5,500	9,500
BN	2,200	300	3,500	6,000
D	2,000	210	2,400	4,600
C	1,600	180	2,300	4,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



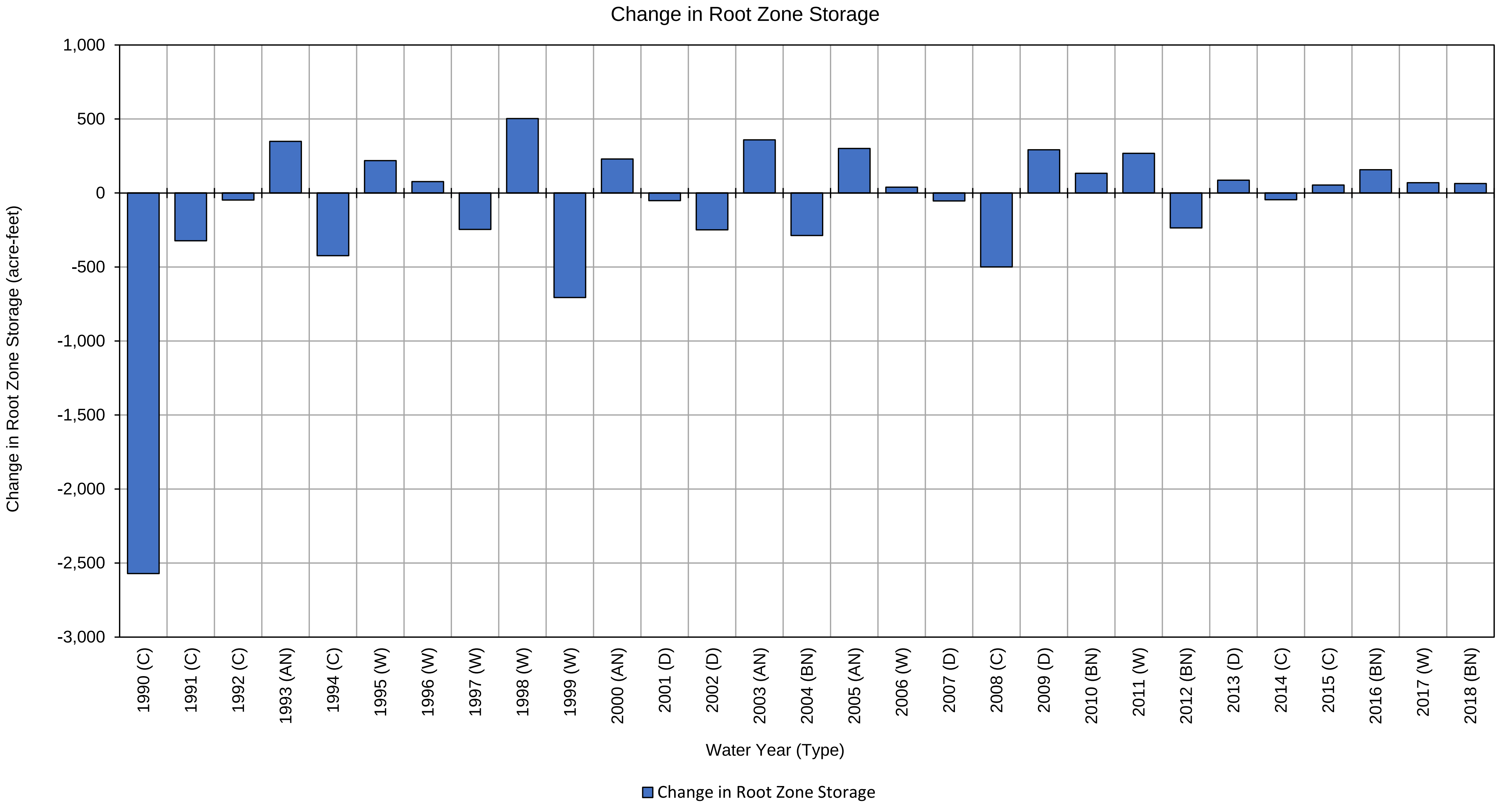
Tehama IHM - Historical

Antelope Subbasin Historical Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
1990 (C)		3,800	960	4,800
1991 (C)		3,700	920	4,600
1992 (C)		3,300	930	4,200
1993 (AN)		3,900	1,100	5,000
1994 (C)		3,500	980	4,500
1995 (W)		3,900	1,500	5,400
1996 (W)		3,900	1,400	5,300
1997 (W)		3,900	1,300	5,200
1998 (W)		3,900	1,700	5,600
1999 (W)		3,900	1,400	5,300
2000 (AN)		3,900	1,100	5,000
2001 (D)		3,700	1,000	4,700
2002 (D)		3,800	1,000	4,800
2003 (AN)		3,900	1,100	5,000
2004 (BN)		3,900	1,200	5,100
2005 (AN)		3,900	1,100	5,000
2006 (W)		4,200	1,400	5,600
2007 (D)		3,900	1,000	4,900
2008 (C)		3,400	980	4,400
2009 (D)		3,500	950	4,500
2010 (BN)		3,600	990	4,600
2011 (W)		5,500	1,100	6,600
2012 (BN)		4,000	980	5,000
2013 (D)		5,100	1,000	6,100
2014 (C)		3,700	940	4,600
2015 (C)		2,700	980	3,700
2016 (BN)		3,300	1,100	4,400
2017 (W)		2,800	1,400	4,200
2018 (BN)		3,200	1,000	4,200
Average (1990-2018)		3,800	1,100	4,900
1990-2018	W	4,000	1,400	5,400
	AN	3,900	1,100	5,000
	BN	3,600	1,100	4,700
	D	4,000	1,000	5,000
	C	3,400	960	4,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Antelope Subbasin Historical Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
1990 (C)		-2,600
1991 (C)		-320
1992 (C)		-48
1993 (AN)		350
1994 (C)		-420
1995 (W)		220
1996 (W)		77
1997 (W)		-250
1998 (W)		500
1999 (W)		-710
2000 (AN)		230
2001 (D)		-52
2002 (D)		-250
2003 (AN)		360
2004 (BN)		-290
2005 (AN)		300
2006 (W)		39
2007 (D)		-54
2008 (C)		-500
2009 (D)		290
2010 (BN)		130
2011 (W)		270
2012 (BN)		-240
2013 (D)		86
2014 (C)		-45
2015 (C)		54
2016 (BN)		160
2017 (W)		69
2018 (BN)		64
Average (1990-2018)		-88
1990-2018	W	28
	AN	310
	BN	-34
	D	5
	C	-550

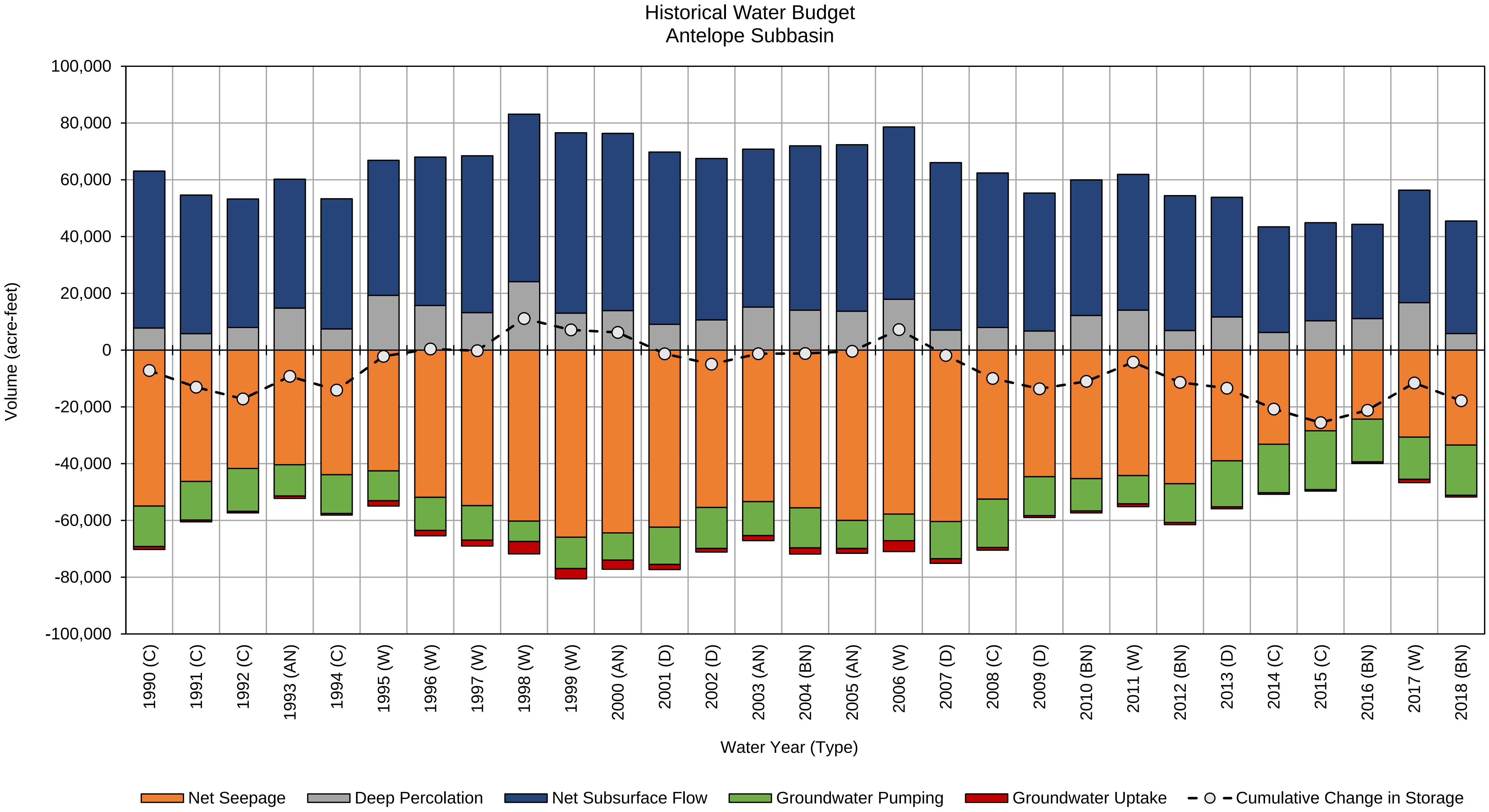
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-1b

Detailed Antelope Subbasin Water Budget Results:

Historical Model Results – Groundwater System



Tehama IHM - Historical

Antelope Subbasin Historical Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
1990 (C)		-55,000	7,800	-14,000	-1,000	55,000	-7,200	-7,200
1991 (C)		-46,000	5,800	-14,000	-620	49,000	-5,900	-13,000
1992 (C)		-42,000	8,000	-15,000	-550	45,000	-4,100	-17,000
1993 (AN)		-40,000	15,000	-11,000	-870	45,000	8,000	-9,200
1994 (C)		-44,000	7,400	-14,000	-620	46,000	-4,800	-14,000
1995 (W)		-43,000	19,000	-11,000	-1,900	48,000	12,000	-2,200
1996 (W)		-52,000	16,000	-12,000	-1,900	52,000	2,600	400
1997 (W)		-55,000	13,000	-12,000	-2,100	55,000	-600	-200
1998 (W)		-60,000	24,000	-7,200	-4,400	59,000	11,000	11,000
1999 (W)		-66,000	13,000	-11,000	-3,600	64,000	-4,000	7,100
2000 (AN)		-64,000	14,000	-9,600	-3,200	62,000	-880	6,200
2001 (D)		-62,000	9,100	-13,000	-1,800	61,000	-7,500	-1,300
2002 (D)		-55,000	11,000	-14,000	-1,300	57,000	-3,700	-5,000
2003 (AN)		-53,000	15,000	-12,000	-1,800	56,000	3,700	-1,300
2004 (BN)		-56,000	14,000	-14,000	-2,200	58,000	81	-1,200
2005 (AN)		-60,000	14,000	-9,900	-1,700	59,000	780	-410
2006 (W)		-58,000	18,000	-9,400	-3,800	61,000	7,600	7,200
2007 (D)		-60,000	7,000	-13,000	-1,600	59,000	-9,100	-1,800
2008 (C)		-53,000	8,000	-17,000	-920	54,000	-8,100	-10,000
2009 (D)		-45,000	6,700	-14,000	-670	49,000	-3,700	-14,000
2010 (BN)		-45,000	12,000	-11,000	-700	48,000	2,600	-11,000
2011 (W)		-44,000	14,000	-9,900	-980	48,000	6,800	-4,200
2012 (BN)		-47,000	6,900	-14,000	-740	47,000	-7,100	-11,000
2013 (D)		-39,000	12,000	-16,000	-680	42,000	-2,000	-13,000
2014 (C)		-33,000	6,200	-17,000	-560	37,000	-7,300	-21,000
2015 (C)		-28,000	10,000	-21,000	-490	35,000	-4,800	-26,000
2016 (BN)		-24,000	11,000	-15,000	-570	33,000	4,400	-21,000
2017 (W)		-31,000	17,000	-15,000	-1,200	40,000	9,600	-12,000
2018 (BN)		-33,000	5,800	-18,000	-600	40,000	-6,300	-18,000
Average (1990-2018)		-48,000	12,000	-13,000	-1,500	50,000	-610	
1990-2018	W	-51,000	17,000	-11,000	-2,500	53,000		
	AN	-55,000	14,000	-11,000	-1,900	56,000		
	BN	-41,000	10,000	-14,000	-960	45,000		
	D	-52,000	9,000	-14,000	-1,200	53,000		
	C	-43,000	7,700	-16,000	-690	46,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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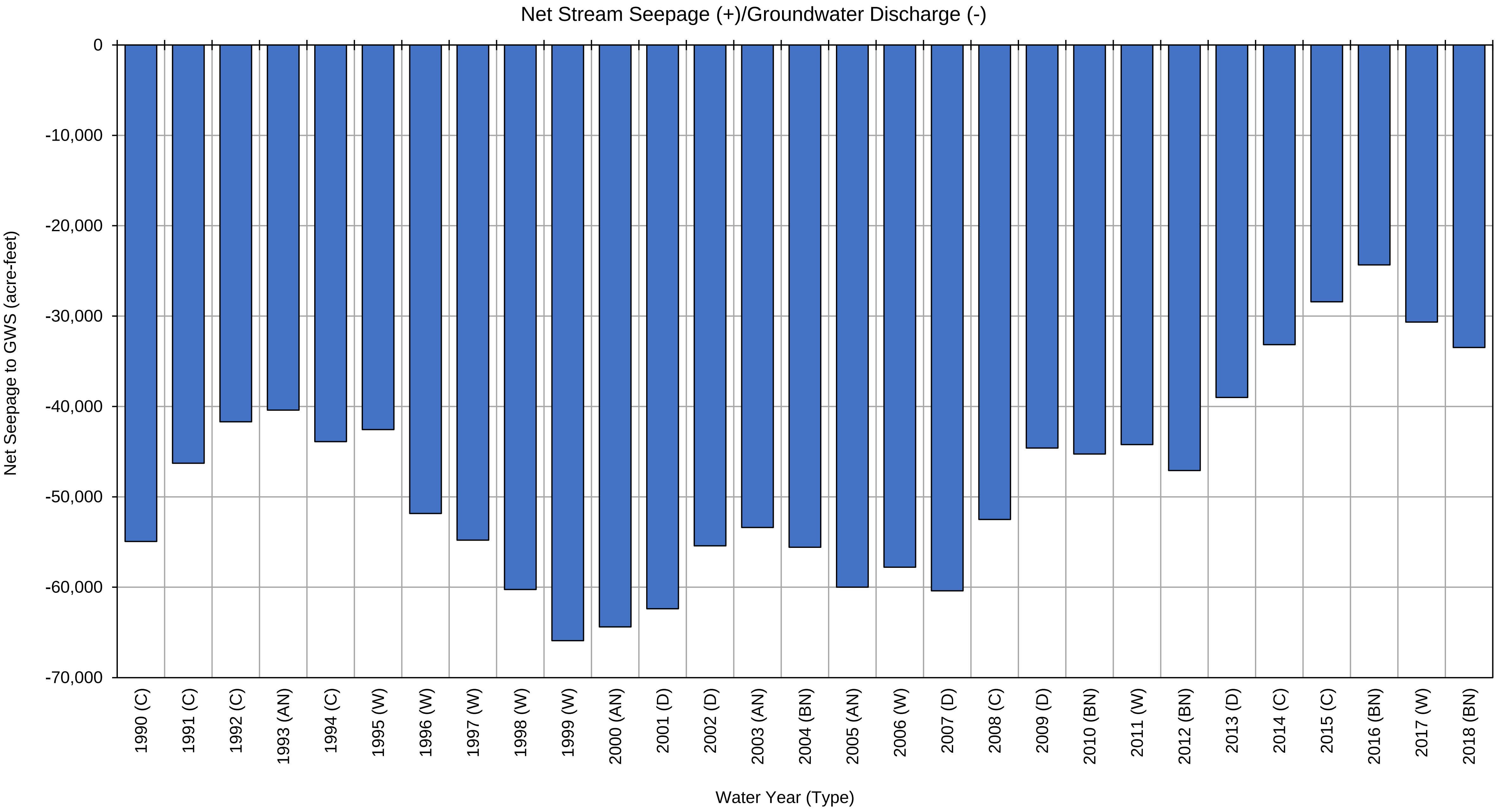
D	Dry
C	Critical



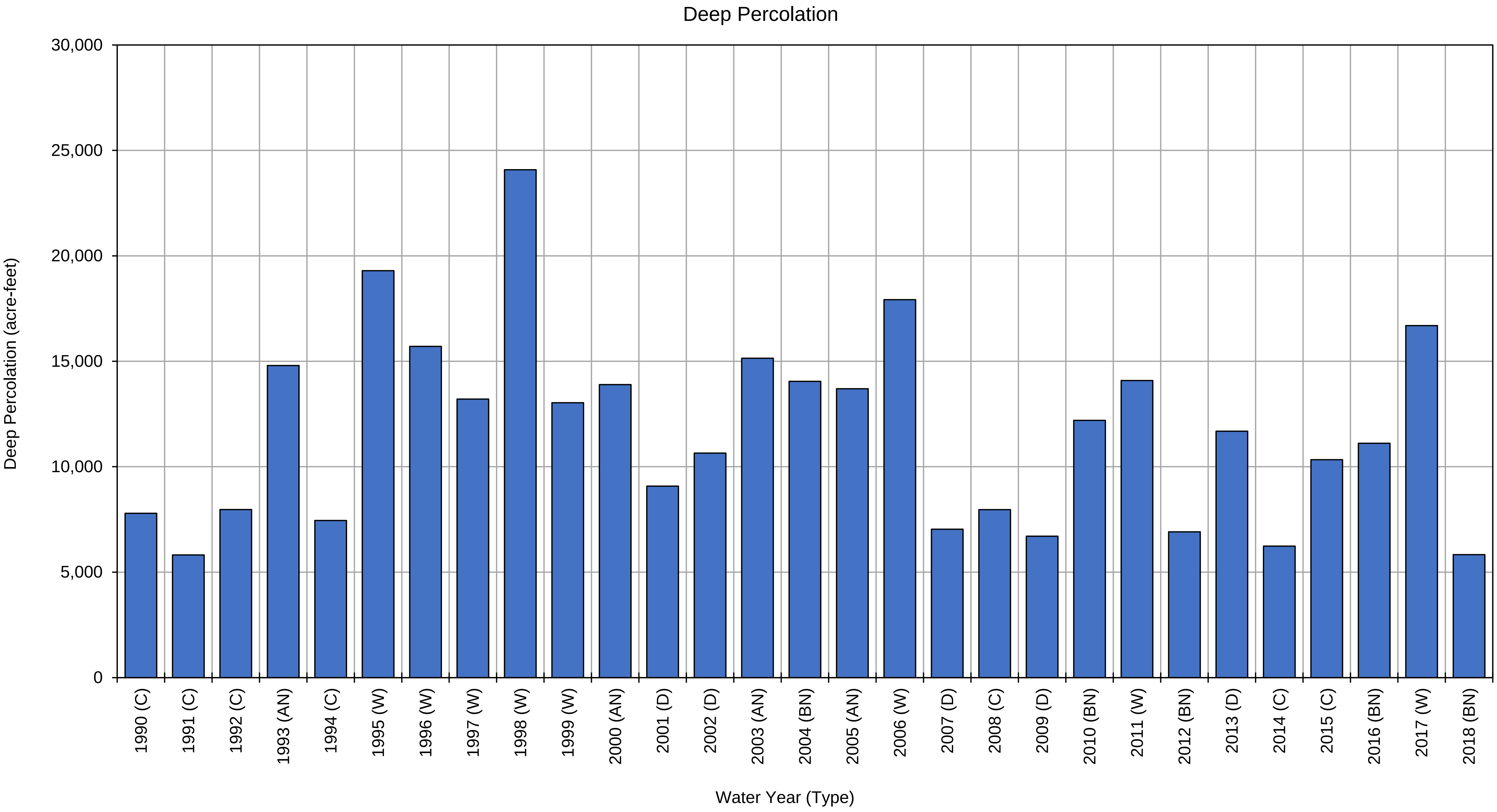
Tehama IHM - Historical

Antelope Subbasin Historical Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
1990 (C)		-55,000
1991 (C)		-46,000
1992 (C)		-42,000
1993 (AN)		-40,000
1994 (C)		-44,000
1995 (W)		-43,000
1996 (W)		-52,000
1997 (W)		-55,000
1998 (W)		-60,000
1999 (W)		-66,000
2000 (AN)		-64,000
2001 (D)		-62,000
2002 (D)		-55,000
2003 (AN)		-53,000
2004 (BN)		-56,000
2005 (AN)		-60,000
2006 (W)		-58,000
2007 (D)		-60,000
2008 (C)		-53,000
2009 (D)		-45,000
2010 (BN)		-45,000
2011 (W)		-44,000
2012 (BN)		-47,000
2013 (D)		-39,000
2014 (C)		-33,000
2015 (C)		-28,000
2016 (BN)		-24,000
2017 (W)		-31,000
2018 (BN)		-33,000
Average (1990-2018)		-48,000
1990-2018	W	-51,000
	AN	-55,000
	BN	-41,000
	D	-52,000
	C	-43,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Antelope Subbasin Historical Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
1990 (C)		7,800
1991 (C)		5,800
1992 (C)		8,000
1993 (AN)		15,000
1994 (C)		7,400
1995 (W)		19,000
1996 (W)		16,000
1997 (W)		13,000
1998 (W)		24,000
1999 (W)		13,000
2000 (AN)		14,000
2001 (D)		9,100
2002 (D)		11,000
2003 (AN)		15,000
2004 (BN)		14,000
2005 (AN)		14,000
2006 (W)		18,000
2007 (D)		7,000
2008 (C)		8,000
2009 (D)		6,700
2010 (BN)		12,000
2011 (W)		14,000
2012 (BN)		6,900
2013 (D)		12,000
2014 (C)		6,200
2015 (C)		10,000
2016 (BN)		11,000
2017 (W)		17,000
2018 (BN)		5,800
Average (1990-2018)		12,000
1990-2018	W	17,000
	AN	14,000
	BN	10,000
	D	9,000
	C	7,700

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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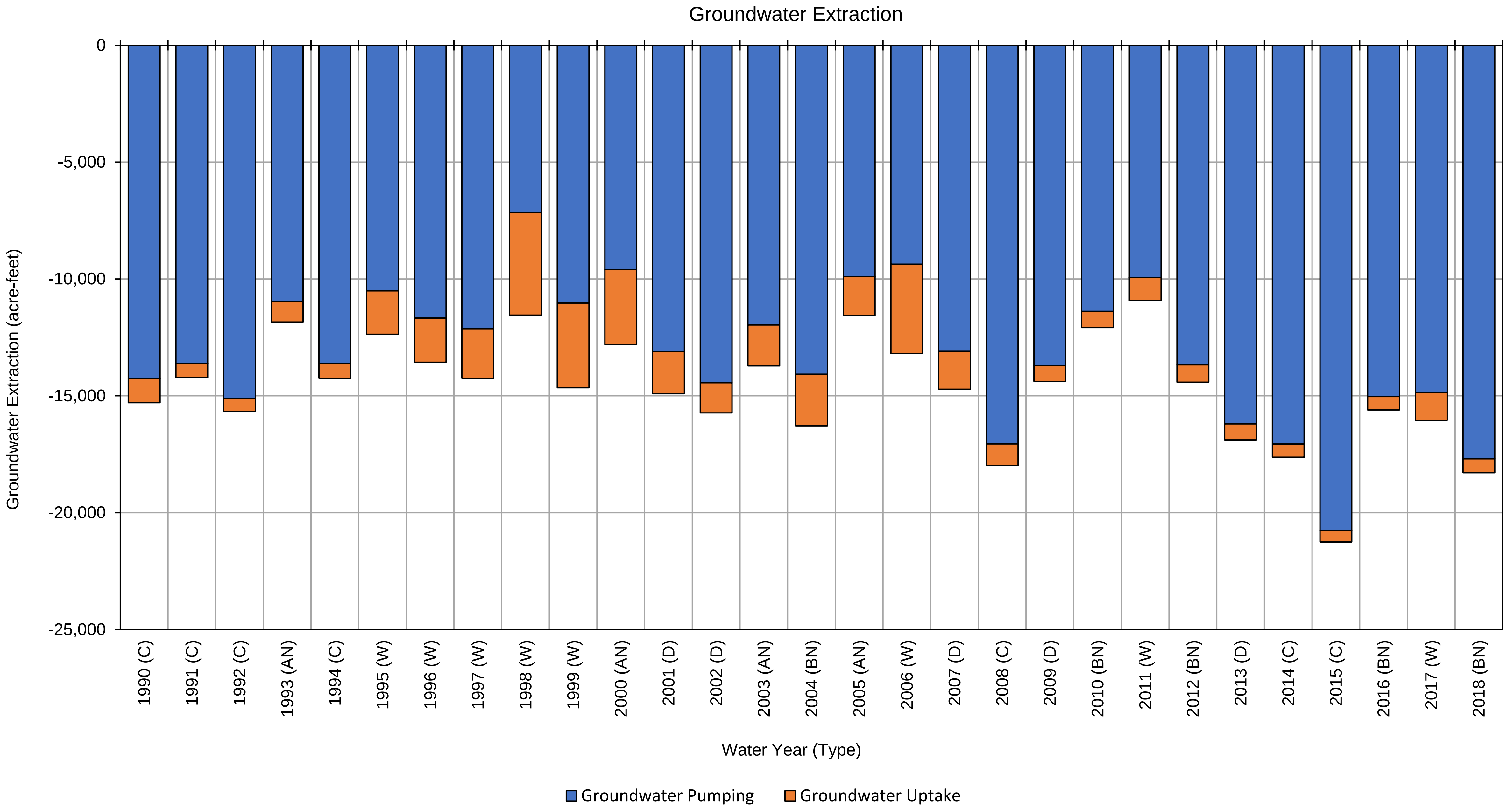
BN	Below Normal
D	Dry
C	Critical



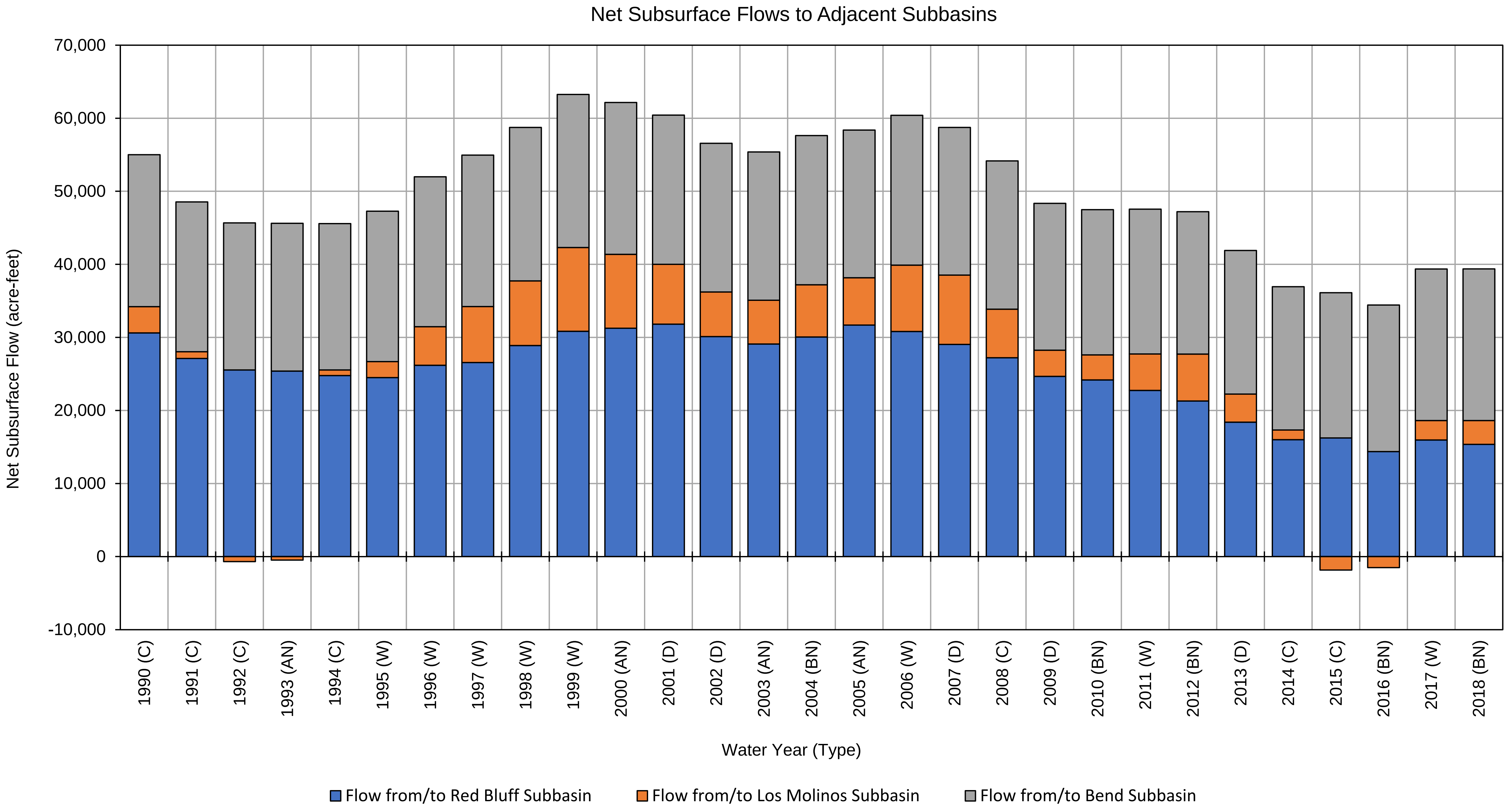
Tehama IHM - Historical

Antelope Subbasin Historical Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
1990 (C)		-14,000	-1,000	-15,000
1991 (C)		-14,000	-620	-14,000
1992 (C)		-15,000	-550	-16,000
1993 (AN)		-11,000	-870	-12,000
1994 (C)		-14,000	-620	-14,000
1995 (W)		-11,000	-1,900	-12,000
1996 (W)		-12,000	-1,900	-14,000
1997 (W)		-12,000	-2,100	-14,000
1998 (W)		-7,200	-4,400	-12,000
1999 (W)		-11,000	-3,600	-15,000
2000 (AN)		-9,600	-3,200	-13,000
2001 (D)		-13,000	-1,800	-15,000
2002 (D)		-14,000	-1,300	-16,000
2003 (AN)		-12,000	-1,800	-14,000
2004 (BN)		-14,000	-2,200	-16,000
2005 (AN)		-9,900	-1,700	-12,000
2006 (W)		-9,400	-3,800	-13,000
2007 (D)		-13,000	-1,600	-15,000
2008 (C)		-17,000	-920	-18,000
2009 (D)		-14,000	-670	-14,000
2010 (BN)		-11,000	-700	-12,000
2011 (W)		-9,900	-980	-11,000
2012 (BN)		-14,000	-740	-14,000
2013 (D)		-16,000	-680	-17,000
2014 (C)		-17,000	-560	-18,000
2015 (C)		-21,000	-490	-21,000
2016 (BN)		-15,000	-570	-16,000
2017 (W)		-15,000	-1,200	-16,000
2018 (BN)		-18,000	-600	-18,000
Average (1990-2018)		-13,000	-1,500	-15,000
1990-2018	W	-11,000	-2,500	-13,000
	AN	-11,000	-1,900	-12,000
	BN	-14,000	-960	-15,000
	D	-14,000	-1,200	-15,000
	C	-16,000	-690	-17,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



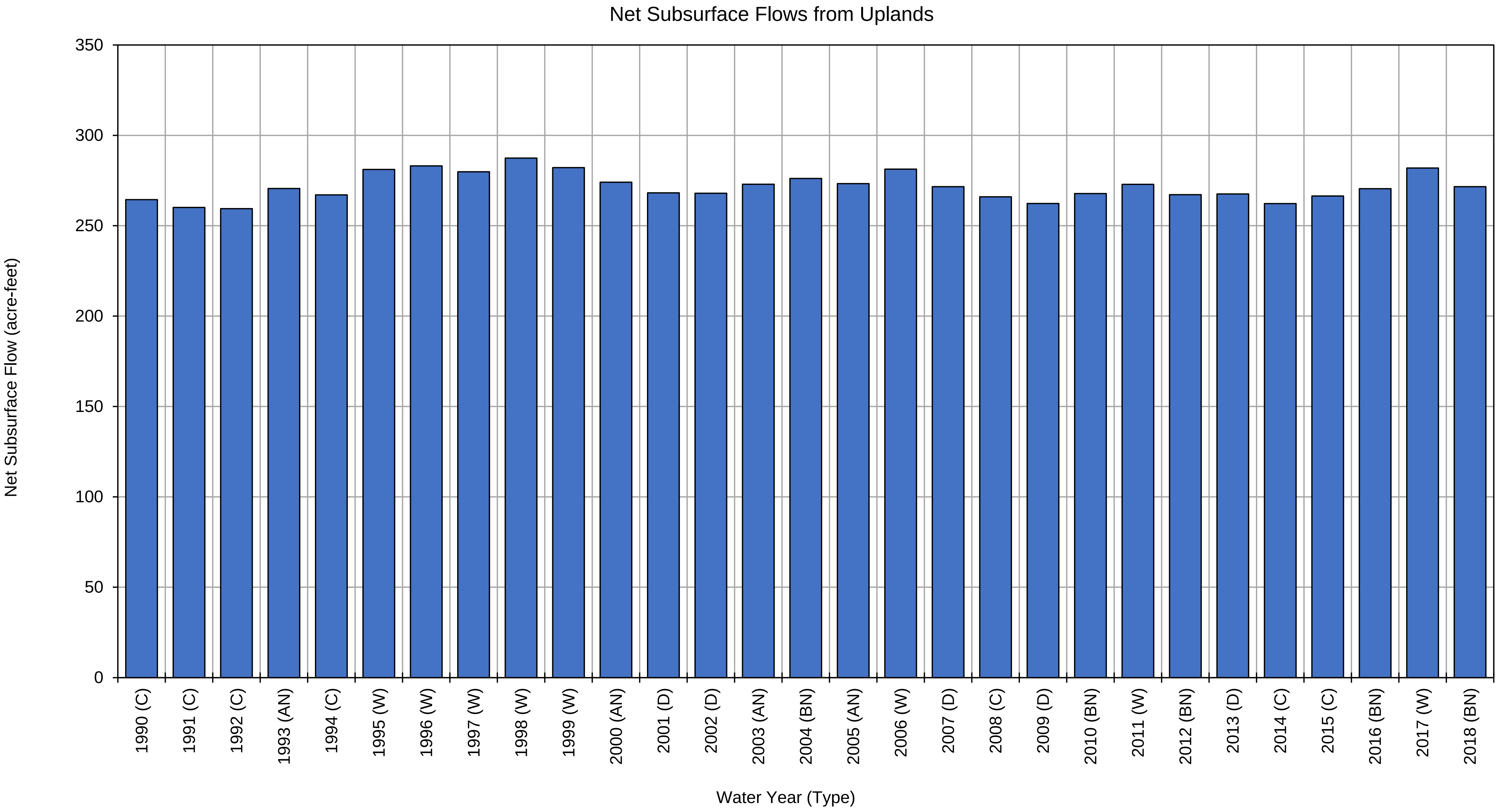
Tehama IHM - Historical

Antelope Subbasin Historical Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
1990 (C)		31,000	3,600	21,000	55,000
1991 (C)		27,000	930	21,000	49,000
1992 (C)		26,000	-690	20,000	45,000
1993 (AN)		25,000	-480	20,000	45,000
1994 (C)		25,000	770	20,000	46,000
1995 (W)		25,000	2,200	21,000	47,000
1996 (W)		26,000	5,300	21,000	52,000
1997 (W)		27,000	7,700	21,000	55,000
1998 (W)		29,000	8,800	21,000	59,000
1999 (W)		31,000	11,000	21,000	63,000
2000 (AN)		31,000	10,000	21,000	62,000
2001 (D)		32,000	8,200	20,000	60,000
2002 (D)		30,000	6,100	20,000	57,000
2003 (AN)		29,000	6,000	20,000	55,000
2004 (BN)		30,000	7,100	20,000	58,000
2005 (AN)		32,000	6,500	20,000	58,000
2006 (W)		31,000	9,100	21,000	60,000
2007 (D)		29,000	9,500	20,000	59,000
2008 (C)		27,000	6,700	20,000	54,000
2009 (D)		25,000	3,600	20,000	48,000
2010 (BN)		24,000	3,400	20,000	47,000
2011 (W)		23,000	5,000	20,000	48,000
2012 (BN)		21,000	6,400	19,000	47,000
2013 (D)		18,000	3,800	20,000	42,000
2014 (C)		16,000	1,300	20,000	37,000
2015 (C)		16,000	-1,800	20,000	34,000
2016 (BN)		14,000	-1,500	20,000	33,000
2017 (W)		16,000	2,700	21,000	39,000
2018 (BN)		15,000	3,300	21,000	39,000
Average (1990-2018)		25,000	4,700	20,000	50,000
1990-2018	W	26,000	6,500	21,000	53,000
	AN	29,000	5,500	20,000	55,000
	BN	21,000	3,700	20,000	45,000
	D	27,000	6,200	20,000	53,000
	C	24,000	1,500	20,000	46,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



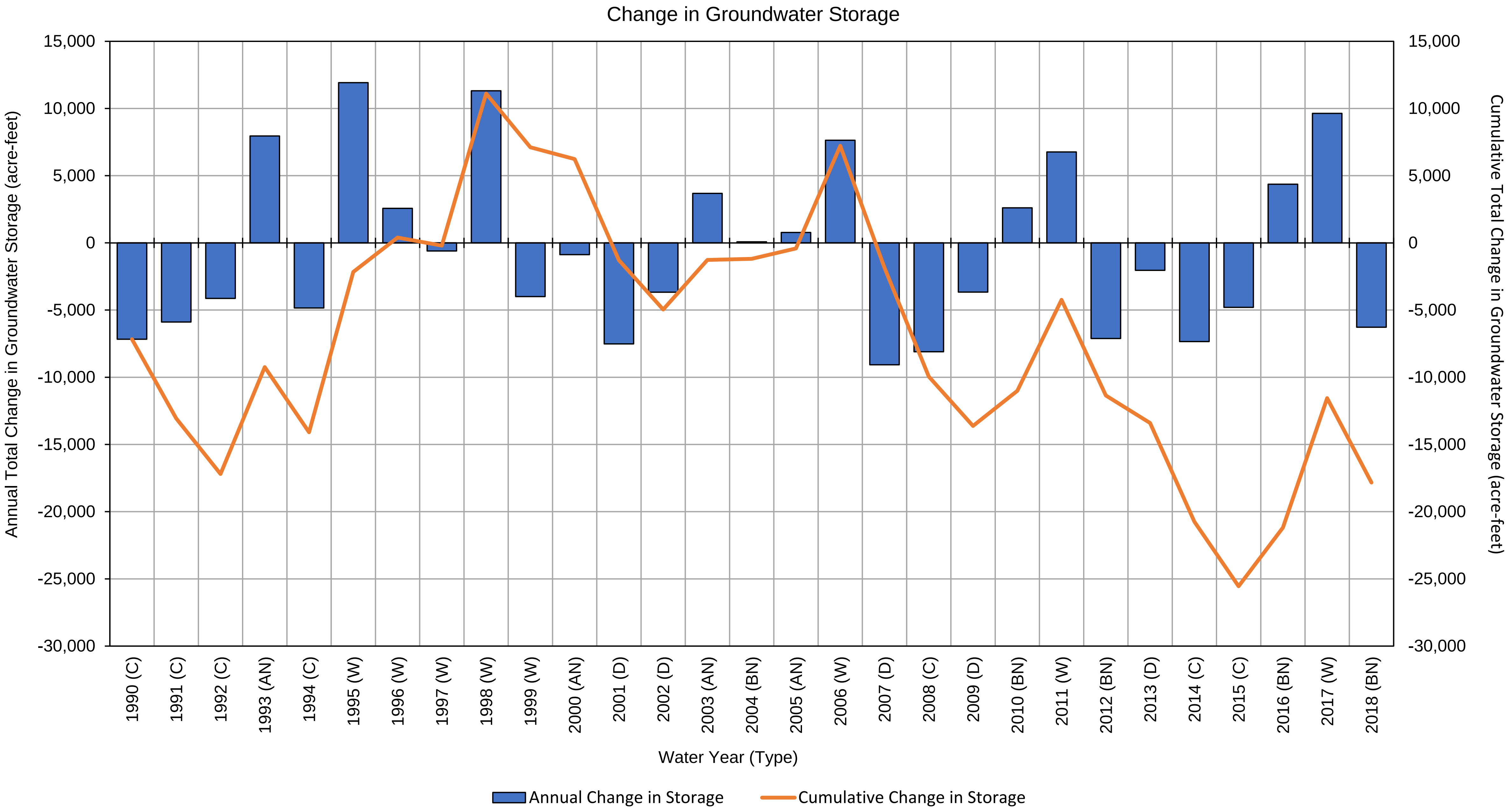
Tehama IHM - Historical

Antelope Subbasin Historical Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
1990 (C)		260
1991 (C)		260
1992 (C)		260
1993 (AN)		270
1994 (C)		270
1995 (W)		280
1996 (W)		280
1997 (W)		280
1998 (W)		290
1999 (W)		280
2000 (AN)		270
2001 (D)		270
2002 (D)		270
2003 (AN)		270
2004 (BN)		280
2005 (AN)		270
2006 (W)		280
2007 (D)		270
2008 (C)		270
2009 (D)		260
2010 (BN)		270
2011 (W)		270
2012 (BN)		270
2013 (D)		270
2014 (C)		260
2015 (C)		270
2016 (BN)		270
2017 (W)		280
2018 (BN)		270
Average (1990-2018)		270
1990-2018	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Antelope Subbasin Historical Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">1990 (C)</td><td>-7,200</td><td>-7,200</td></tr>
<tr><td colspan="2">1991 (C)</td><td>-5,900</td><td>-13,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>-4,100</td><td>-17,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>8,000</td><td>-9,200</td></tr>
<tr><td colspan="2">1994 (C)</td><td>-4,800</td><td>-14,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>12,000</td><td>-2,200</td></tr>
<tr><td colspan="2">1996 (W)</td><td>2,600</td><td>400</td></tr>
<tr><td colspan="2">1997 (W)</td><td>-600</td><td>-200</td></tr>
<tr><td colspan="2">1998 (W)</td><td>11,000</td><td>11,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>-4,000</td><td>7,100</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>-880</td><td>6,200</td></tr>
<tr><td colspan="2">2001 (D)</td><td>-7,500</td><td>-1,300</td></tr>
<tr><td colspan="2">2002 (D)</td><td>-3,700</td><td>-5,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>3,700</td><td>-1,300</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>81</td><td>-1,200</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>780</td><td>-410</td></tr>
<tr><td colspan="2">2006 (W)</td><td>7,600</td><td>7,200</td></tr>
<tr><td colspan="2">2007 (D)</td><td>-9,100</td><td>-1,800</td></tr>
<tr><td colspan="2">2008 (C)</td><td>-8,100</td><td>-10,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>-3,700</td><td>-14,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>2,600</td><td>-11,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>6,800</td><td>-4,200</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>-7,100</td><td>-11,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>-2,000</td><td>-13,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>-7,300</td><td>-21,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>-4,800</td><td>-26,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>4,400</td><td>-21,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>9,600</td><td>-12,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>-6,300</td><td>-18,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>-610</td><td></td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-2

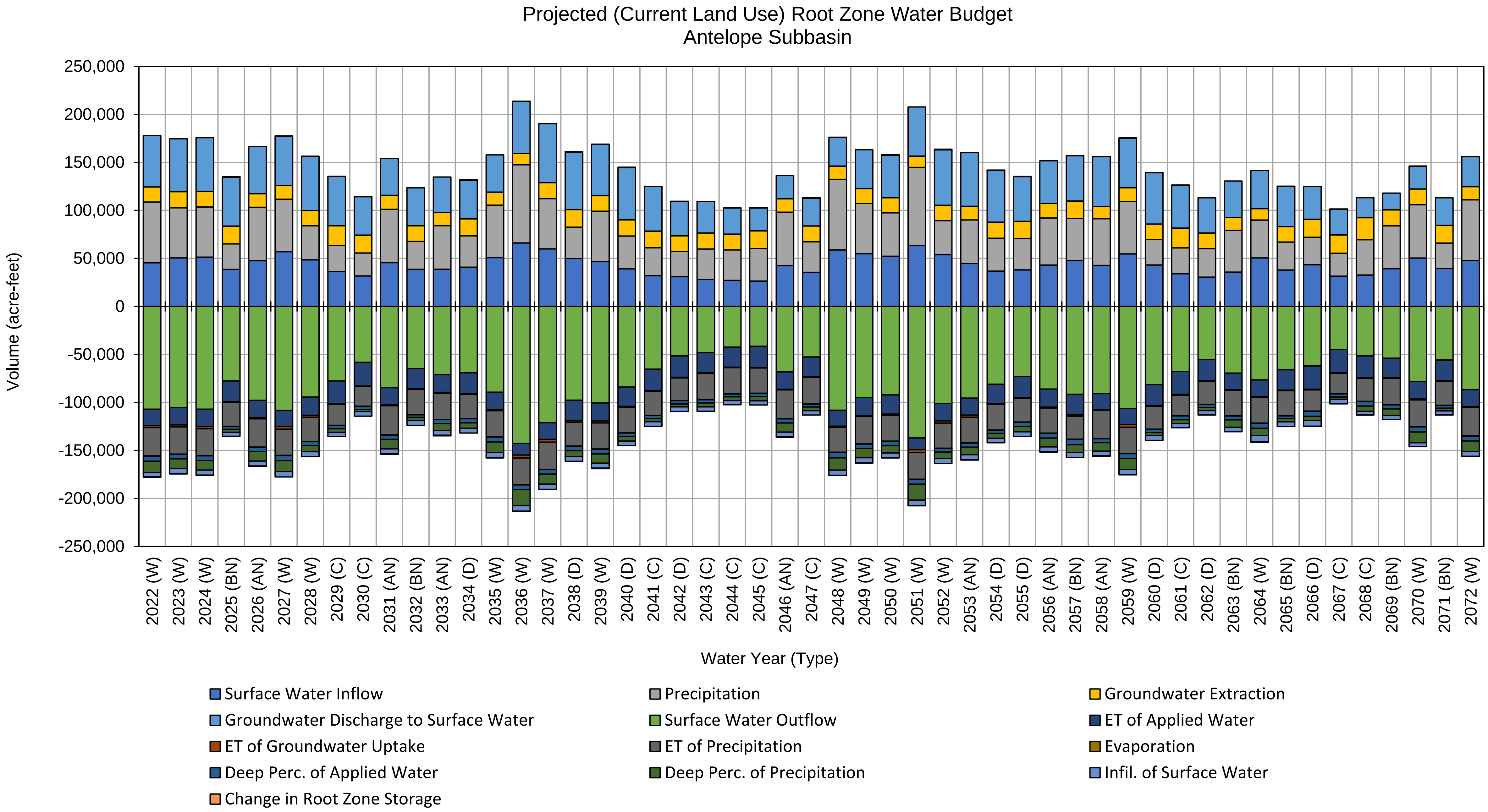
Detailed Antelope Subbasin Water Budget Results:

Projected (Current Land Use) Model Results

APPENDIX A-2a

Detailed Antelope Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Surface Water System



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

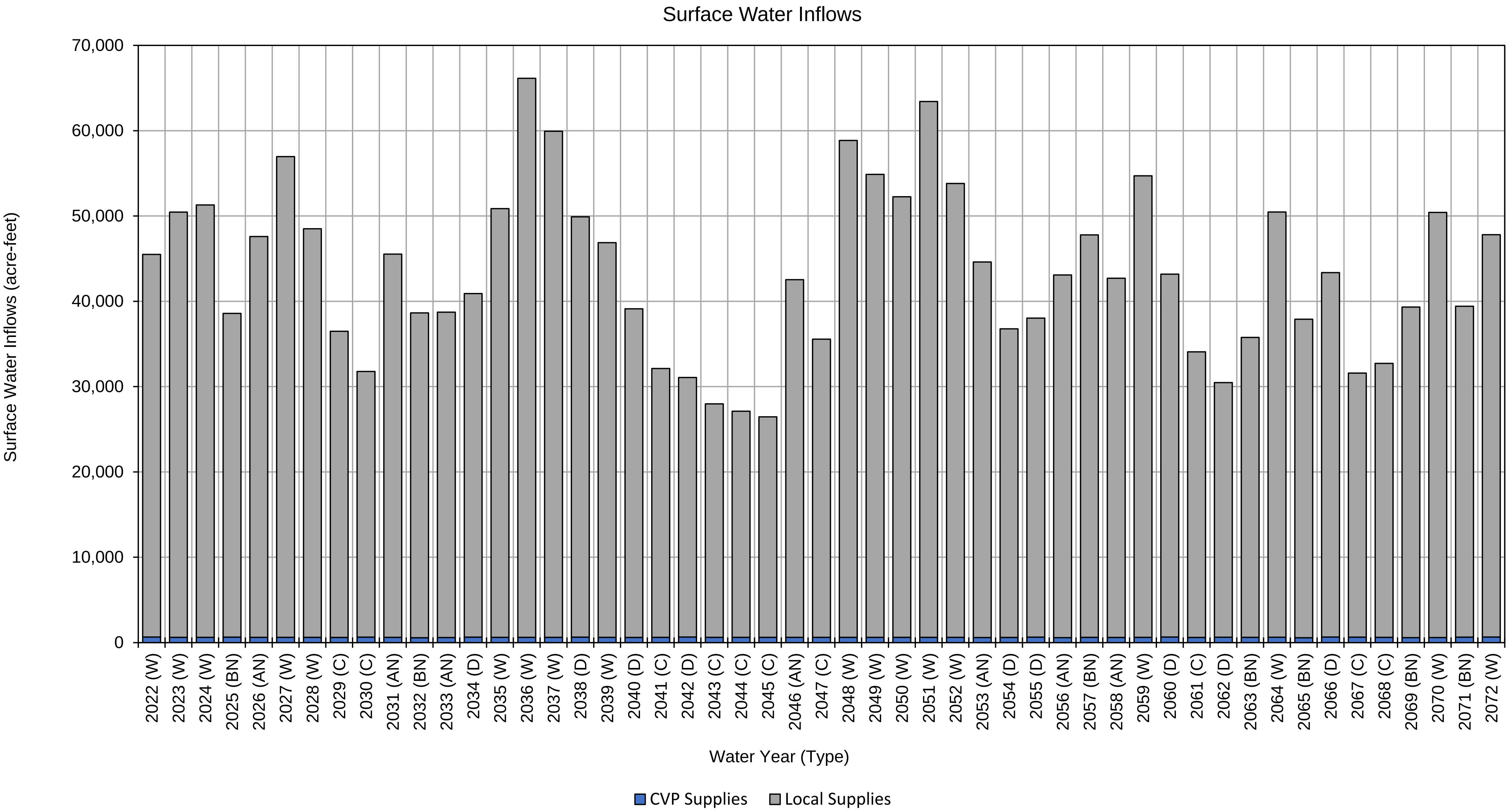
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	45,000	63,000	16,000	54,000	110,000	17,000	2,000	30,000	140	5,300	12,000	4,800	280
2023 (W)	50,000	52,000	17,000	55,000	110,000	18,000	2,200	28,000	150	4,700	10,000	5,200	540
2024 (W)	51,000	52,000	16,000	56,000	110,000	18,000	2,300	28,000	150	4,800	10,000	5,200	3
2025 (BN)	39,000	27,000	18,000	51,000	78,000	21,000	810	25,000	120	2,900	3,100	4,200	-540
2026 (AN)	48,000	56,000	14,000	49,000	98,000	18,000	1,200	29,000	150	4,600	9,800	5,100	350
2027 (W)	57,000	55,000	14,000	52,000	110,000	17,000	2,700	27,000	170	5,200	11,000	5,700	-140
2028 (W)	49,000	36,000	16,000	56,000	94,000	19,000	2,000	25,000	150	4,000	6,500	5,100	-180
2029 (C)	36,000	27,000	21,000	51,000	78,000	24,000	820	22,000	130	3,400	3,800	4,400	-250
2030 (C)	32,000	24,000	19,000	40,000	58,000	25,000	600	20,000	150	3,200	2,300	4,700	-62
2031 (AN)	46,000	56,000	15,000	38,000	85,000	18,000	810	30,000	150	4,500	10,000	5,000	630
2032 (BN)	39,000	29,000	16,000	39,000	65,000	21,000	640	27,000	160	2,600	3,200	5,000	-340
2033 (AN)	39,000	45,000	14,000	37,000	71,000	18,000	920	27,000	150	4,100	7,400	4,900	580
2034 (D)	41,000	33,000	18,000	40,000	69,000	22,000	670	25,000	150	4,300	5,600	4,900	-660
2035 (W)	51,000	55,000	14,000	39,000	89,000	18,000	1,400	27,000	170	5,200	11,000	5,500	260
2036 (W)	66,000	81,000	12,000	54,000	140,000	12,000	3,200	28,000	150	5,000	17,000	5,600	520
2037 (W)	60,000	52,000	17,000	61,000	120,000	17,000	2,900	28,000	150	4,700	10,000	5,500	-160
2038 (D)	50,000	33,000	18,000	60,000	98,000	21,000	1,600	25,000	150	4,600	5,900	5,100	-610
2039 (W)	47,000	52,000	16,000	54,000	100,000	19,000	2,000	27,000	150	4,900	9,700	5,100	600
2040 (D)	39,000	34,000	17,000	54,000	84,000	20,000	950	27,000	150	3,400	5,000	4,800	-350
2041 (C)	32,000	29,000	17,000	46,000	65,000	22,000	650	25,000	150	3,200	3,400	4,700	-34
2042 (D)	31,000	26,000	16,000	36,000	52,000	22,000	620	24,000	160	3,400	3,000	4,800	-150
2043 (C)	28,000	32,000	17,000	33,000	48,000	21,000	550	27,000	140	3,400	4,100	4,500	-13
2044 (C)	27,000	32,000	16,000	27,000	42,000	21,000	510	27,000	140	2,900	3,800	4,500	0
2045 (C)	26,000	34,000	18,000	24,000	41,000	22,000	460	26,000	130	3,500	4,400	4,200	-89
2046 (AN)	43,000	56,000	14,000	24,000	68,000	18,000	620	30,000	150	4,300	9,500	4,900	440
2047 (C)	36,000	32,000	16,000	29,000	53,000	20,000	510	28,000	140	2,900	3,900	4,500	-350
2048 (W)	59,000	74,000	14,000	30,000	110,000	17,000	1,100	26,000	150	5,700	13,000	5,400	330
2049 (W)	55,000	52,000	16,000	40,000	95,000	19,000	1,000	29,000	150	4,600	9,600	5,300	200
2050 (W)	52,000	45,000	16,000	44,000	92,000	20,000	1,200	27,000	150	4,500	7,700	5,200	-270
2051 (W)	63,000	81,000	12,000	51,000	140,000	12,000	2,900	28,000	150	5,000	17,000	5,500	450
2052 (W)	54,000	36,000	16,000	58,000	100,000	18,000	2,200	26,000	150	3,900	6,800	5,200	-660
2053 (AN)	45,000	45,000	14,000	56,000	96,000	18,000	2,000	27,000	150	4,300	7,900	5,000	570
2054 (D)	37,000	34,000	17,000	54,000	81,000	20,000	900	27,000	150	3,400	5,000	4,700	-430
2055 (D)	38,000	33,000	18,000	47,000	73,000	22,000	790	25,000	150	4,400	5,500	4,800	-250
2056 (AN)	43,000	49,000	15,000	44,000	86,000	19,000	1,000	26,000	150	5,000	9,200	5,000	310
2057 (BN)	48,000	44,000	18,000	47,000	92,000	21,000	1,300	24,000	150	5,500	8,100	5,100	-250
2058 (AN)	43,000	49,000	13,000	52,000	91,000	16,000	890	30,000	150	4,000	8,800	5,000	370
2059 (W)	55,000	55,000	14,000	52,000	110,000	17,000	2,700	27,000	170	5,100	11,000	5,600	-150
2060 (D)	43,000	26,000	16,000	54,000	81,000	22,000	900	24,000	160	3,300	3,100	5,000	-200
2061 (C)	34,000	27,000	21,000	45,000	68,000	24,000	700	22,000	130	4,000	4,000	4,400	-230
2062 (D)	30,000	30,000	16,000	37,000	55,000	22,000	590	24,000	140	3,000	3,300	4,400	110
2063 (BN)	36,000	43,000	14,000	38,000	70,000	17,000	590	27,000	140	4,000	7,700	4,600	100
2064 (W)	50,000	39,000	12,000	40,000	77,000	17,000	800	27,000	230	5,200	7,600	6,600	390
2065 (BN)	38,000	29,000	16,000	42,000	66,000	21,000	650	26,000	160	2,800	3,300	5,000	-370

Antelope Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		43,000	29,000	19,000	34,000	62,000	24,000	600	22,000	210	5,100	4,400	6,100	86
2067 (C)		32,000	24,000	19,000	27,000	45,000	25,000	500	21,000	150	3,300	2,400	4,700	-380
2068 (C)		33,000	37,000	23,000	21,000	52,000	23,000	430	24,000	110	4,800	5,500	3,700	240
2069 (BN)		39,000	45,000	17,000	17,000	54,000	21,000	480	27,000	130	4,200	6,700	4,300	130
2070 (W)		50,000	56,000	16,000	24,000	78,000	18,000	970	28,000	100	5,300	11,000	4,200	-100
2071 (BN)		39,000	27,000	18,000	29,000	56,000	22,000	550	25,000	120	2,900	2,900	4,200	18
2072 (W)		48,000	63,000	14,000	31,000	87,000	18,000	810	30,000	140	5,100	11,000	4,800	-26
Average (2022-2072)		43,000	43,000	16,000	43,000	81,000	20,000	1,200	26,000	150	4,200	7,200	4,900	5
2022-2072	W	54,000	56,000	15,000	47,000	100,000	17,000	1,900	28,000	160	4,900	11,000	5,300	100
	AN	44,000	51,000	14,000	43,000	85,000	18,000	1,100	29,000	150	4,400	8,900	5,000	470
	BN	40,000	35,000	17,000	38,000	68,000	21,000	720	26,000	140	3,600	5,000	4,600	-180
	D	39,000	31,000	17,000	46,000	73,000	22,000	840	25,000	160	3,900	4,500	5,000	-270
	C	32,000	30,000	19,000	34,000	55,000	23,000	570	24,000	140	3,500	3,700	4,400	-120

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

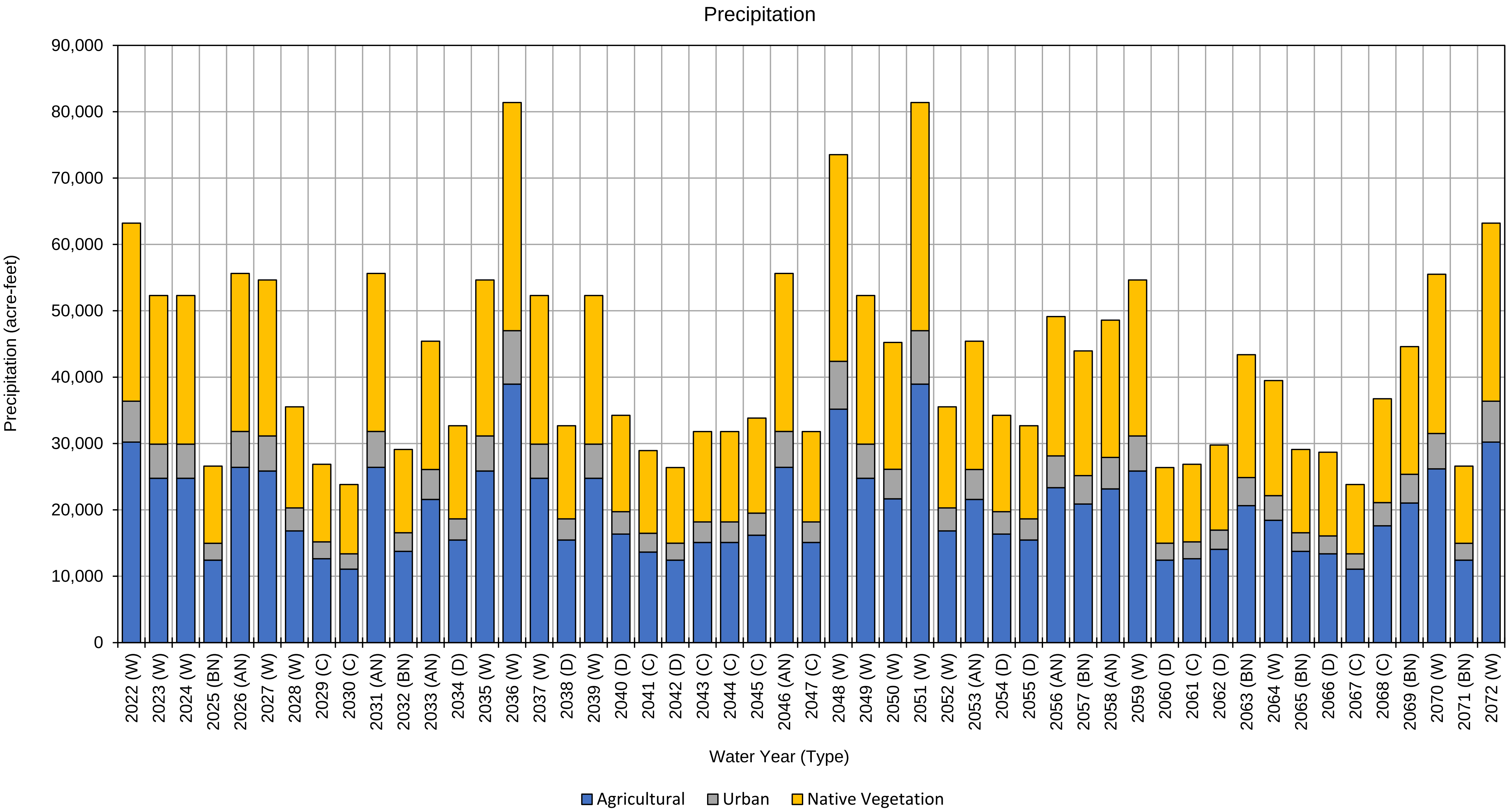
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	45,000	46,000
2023 (W)	610	50,000	51,000
2024 (W)	610	51,000	52,000
2025 (BN)	630	38,000	39,000
2026 (AN)	610	47,000	48,000
2027 (W)	610	56,000	57,000
2028 (W)	620	48,000	49,000
2029 (C)	600	36,000	37,000
2030 (C)	640	31,000	32,000
2031 (AN)	610	45,000	46,000
2032 (BN)	560	38,000	39,000
2033 (AN)	580	38,000	39,000
2034 (D)	640	40,000	41,000
2035 (W)	610	50,000	51,000
2036 (W)	610	66,000	67,000
2037 (W)	610	59,000	60,000
2038 (D)	640	49,000	50,000
2039 (W)	610	46,000	47,000
2040 (D)	600	39,000	40,000
2041 (C)	610	32,000	33,000
2042 (D)	650	30,000	31,000
2043 (C)	610	27,000	28,000
2044 (C)	610	27,000	28,000
2045 (C)	610	26,000	27,000
2046 (AN)	610	42,000	43,000
2047 (C)	610	35,000	36,000
2048 (W)	610	58,000	59,000
2049 (W)	610	54,000	55,000
2050 (W)	610	52,000	53,000
2051 (W)	610	63,000	64,000
2052 (W)	620	53,000	54,000
2053 (AN)	580	44,000	45,000
2054 (D)	600	36,000	37,000
2055 (D)	640	37,000	38,000
2056 (AN)	580	43,000	44,000
2057 (BN)	620	47,000	48,000
2058 (AN)	600	42,000	43,000
2059 (W)	610	54,000	55,000
2060 (D)	650	43,000	44,000
2061 (C)	600	33,000	34,000
2062 (D)	620	30,000	31,000
2063 (BN)	610	35,000	36,000

Antelope Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		630	50,000	51,000
2065 (BN)		560	37,000	38,000
2066 (D)		650	43,000	44,000
2067 (C)		640	31,000	32,000
2068 (C)		610	32,000	33,000
2069 (BN)		580	39,000	40,000
2070 (W)		580	50,000	51,000
2071 (BN)		630	39,000	40,000
2072 (W)		650	47,000	48,000
Average (2022-2072)		610	43,000	44,000
2022-2072	W	620	53,000	54,000
	AN	600	43,000	44,000
	BN	600	39,000	40,000
	D	630	39,000	40,000
	C	610	31,000	32,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

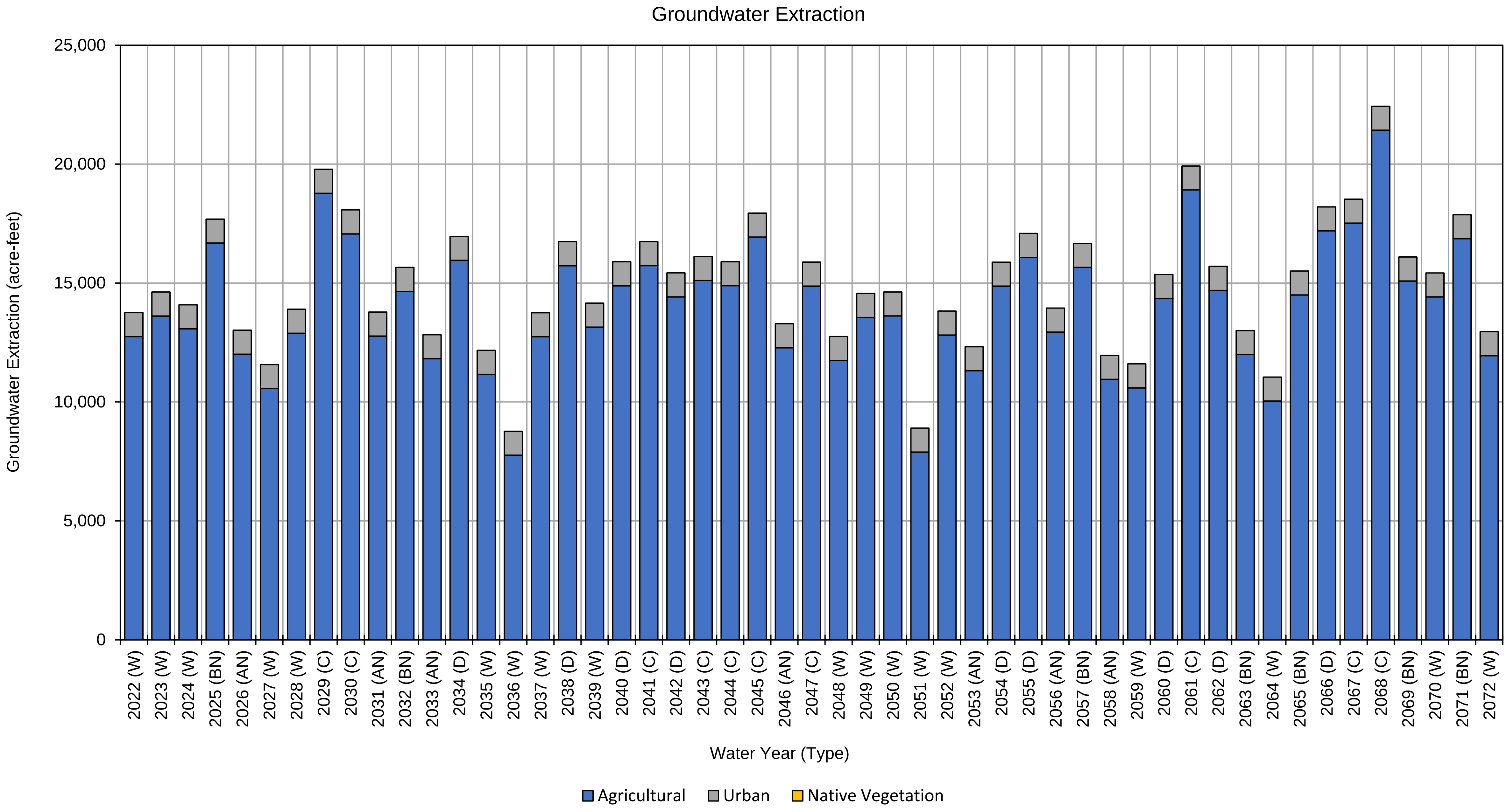
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	30,000	6,200	27,000	63,000
2023 (W)	25,000	5,100	22,000	52,000
2024 (W)	25,000	5,100	22,000	52,000
2025 (BN)	12,000	2,500	12,000	27,000
2026 (AN)	26,000	5,400	24,000	55,000
2027 (W)	26,000	5,300	24,000	55,000
2028 (W)	17,000	3,500	15,000	36,000
2029 (C)	13,000	2,500	12,000	28,000
2030 (C)	11,000	2,300	10,000	23,000
2031 (AN)	26,000	5,400	24,000	55,000
2032 (BN)	14,000	2,800	13,000	30,000
2033 (AN)	22,000	4,500	19,000	46,000
2034 (D)	15,000	3,200	14,000	32,000
2035 (W)	26,000	5,300	24,000	55,000
2036 (W)	39,000	8,000	34,000	81,000
2037 (W)	25,000	5,100	22,000	52,000
2038 (D)	15,000	3,200	14,000	32,000
2039 (W)	25,000	5,100	22,000	52,000
2040 (D)	16,000	3,400	15,000	34,000
2041 (C)	14,000	2,800	12,000	29,000
2042 (D)	12,000	2,500	11,000	26,000
2043 (C)	15,000	3,100	14,000	32,000
2044 (C)	15,000	3,100	14,000	32,000
2045 (C)	16,000	3,300	14,000	33,000
2046 (AN)	26,000	5,400	24,000	55,000
2047 (C)	15,000	3,100	14,000	32,000
2048 (W)	35,000	7,200	31,000	73,000
2049 (W)	25,000	5,100	22,000	52,000
2050 (W)	22,000	4,400	19,000	45,000
2051 (W)	39,000	8,000	34,000	81,000
2052 (W)	17,000	3,500	15,000	36,000
2053 (AN)	22,000	4,500	19,000	46,000
2054 (D)	16,000	3,400	15,000	34,000
2055 (D)	15,000	3,200	14,000	32,000
2056 (AN)	23,000	4,800	21,000	49,000
2057 (BN)	21,000	4,300	19,000	44,000
2058 (AN)	23,000	4,700	21,000	49,000
2059 (W)	26,000	5,300	24,000	55,000
2060 (D)	12,000	2,500	11,000	26,000
2061 (C)	13,000	2,500	12,000	28,000
2062 (D)	14,000	2,900	13,000	30,000
2063 (BN)	21,000	4,200	19,000	44,000

Antelope Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		18,000	3,700	17,000	39,000
2065 (BN)		14,000	2,800	13,000	30,000
2066 (D)		13,000	2,700	13,000	29,000
2067 (C)		11,000	2,300	10,000	23,000
2068 (C)		18,000	3,500	16,000	38,000
2069 (BN)		21,000	4,300	19,000	44,000
2070 (W)		26,000	5,300	24,000	55,000
2071 (BN)		12,000	2,500	12,000	27,000
2072 (W)		30,000	6,200	27,000	63,000
Average (2022-2072)		20,000	4,100	18,000	42,000
2022-2072	W	26,000	5,400	24,000	55,000
	AN	24,000	5,000	22,000	51,000
	BN	16,000	3,400	15,000	34,000
	D	15,000	3,000	13,000	31,000
	C	14,000	2,900	13,000	30,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

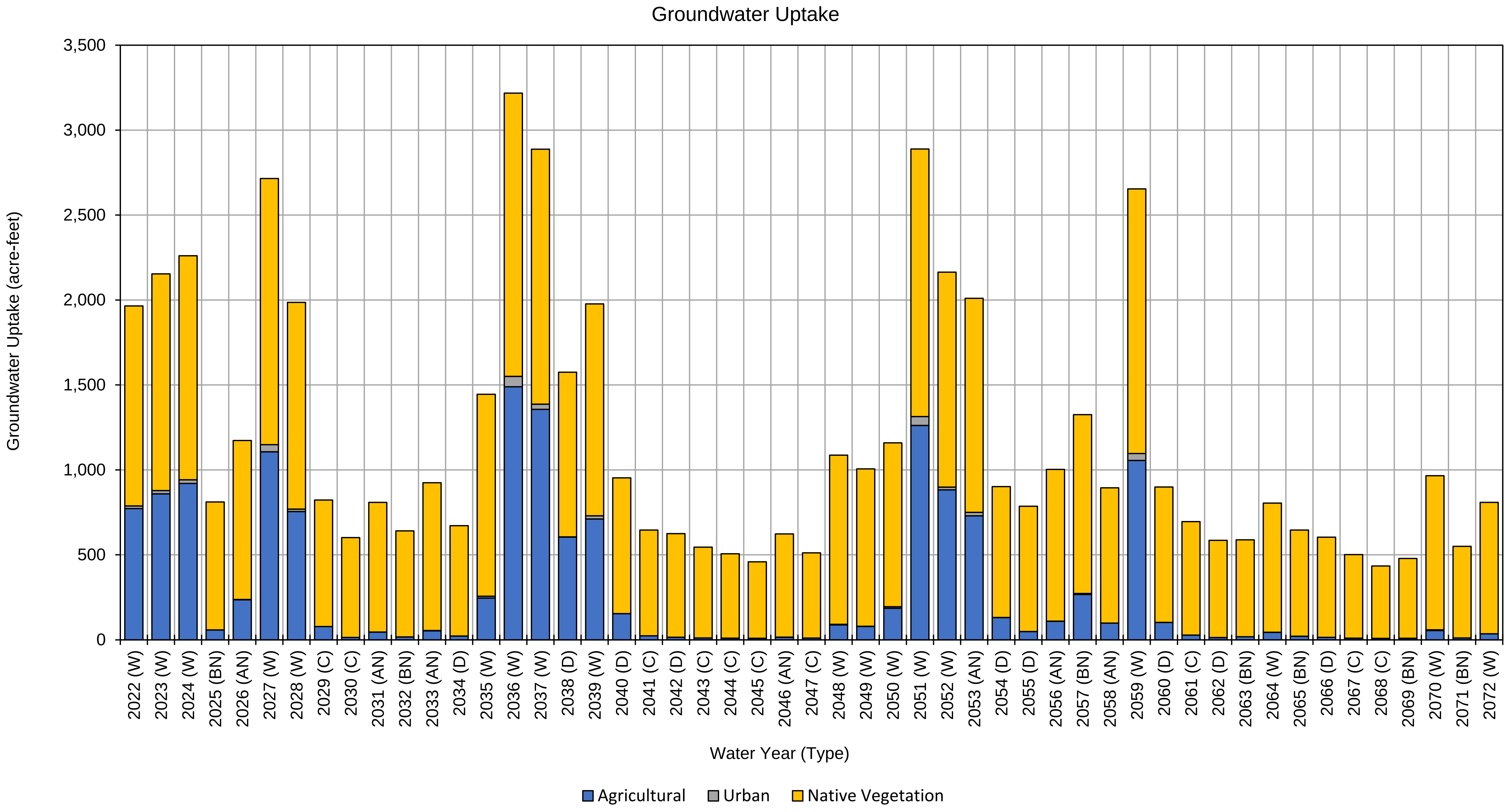
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,000	0	14,000
2023 (W)	14,000	1,000	0	15,000
2024 (W)	13,000	1,000	0	14,000
2025 (BN)	17,000	1,000	0	18,000
2026 (AN)	12,000	1,000	0	13,000
2027 (W)	11,000	1,000	0	12,000
2028 (W)	13,000	1,000	0	14,000
2029 (C)	19,000	1,000	0	20,000
2030 (C)	17,000	1,000	0	18,000
2031 (AN)	13,000	1,000	0	14,000
2032 (BN)	15,000	1,000	0	16,000
2033 (AN)	12,000	1,000	0	13,000
2034 (D)	16,000	1,000	0	17,000
2035 (W)	11,000	1,000	0	12,000
2036 (W)	7,800	1,000	0	8,800
2037 (W)	13,000	1,000	0	14,000
2038 (D)	16,000	1,000	0	17,000
2039 (W)	13,000	1,000	0	14,000
2040 (D)	15,000	1,000	0	16,000
2041 (C)	16,000	1,000	0	17,000
2042 (D)	14,000	1,000	0	15,000
2043 (C)	15,000	1,000	0	16,000
2044 (C)	15,000	1,000	0	16,000
2045 (C)	17,000	1,000	0	18,000
2046 (AN)	12,000	1,000	0	13,000
2047 (C)	15,000	1,000	0	16,000
2048 (W)	12,000	1,000	0	13,000
2049 (W)	14,000	1,000	0	15,000
2050 (W)	14,000	1,000	0	15,000
2051 (W)	7,900	1,000	0	8,900
2052 (W)	13,000	1,000	0	14,000
2053 (AN)	11,000	1,000	0	12,000
2054 (D)	15,000	1,000	0	16,000
2055 (D)	16,000	1,000	0	17,000
2056 (AN)	13,000	1,000	0	14,000
2057 (BN)	16,000	1,000	0	17,000
2058 (AN)	11,000	1,000	0	12,000
2059 (W)	11,000	1,000	0	12,000
2060 (D)	14,000	1,000	0	15,000
2061 (C)	19,000	1,000	0	20,000
2062 (D)	15,000	1,000	0	16,000
2063 (BN)	12,000	1,000	0	13,000

Antelope Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		10,000	1,000	0	11,000
2065 (BN)		14,000	1,000	0	15,000
2066 (D)		17,000	1,000	0	18,000
2067 (C)		18,000	1,000	0	19,000
2068 (C)		21,000	1,000	0	22,000
2069 (BN)		15,000	1,000	0	16,000
2070 (W)		14,000	1,000	0	15,000
2071 (BN)		17,000	1,000	0	18,000
2072 (W)		12,000	1,000	0	13,000
Average (2022-2072)		14,000	1,000	0	15,000
2022-2072	W	12,000	1,000	0	13,000
	AN	12,000	1,000	0	13,000
	BN	15,000	1,000	0	16,000
	D	15,000	1,000	0	16,000
	C	17,000	1,000	0	18,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	770	16	1,200	2,000
2023 (W)	860	19	1,300	2,200
2024 (W)	920	22	1,300	2,200
2025 (BN)	58	0	750	810
2026 (AN)	240	2	940	1,200
2027 (W)	1,100	42	1,600	2,700
2028 (W)	750	15	1,200	2,000
2029 (C)	78	0	740	820
2030 (C)	14	0	590	600
2031 (AN)	45	0	760	810
2032 (BN)	17	0	620	640
2033 (AN)	53	2	870	920
2034 (D)	22	0	650	670
2035 (W)	250	11	1,200	1,500
2036 (W)	1,500	61	1,700	3,300
2037 (W)	1,400	31	1,500	2,900
2038 (D)	600	1	970	1,600
2039 (W)	710	19	1,200	1,900
2040 (D)	150	0	800	950
2041 (C)	23	0	620	640
2042 (D)	15	0	610	630
2043 (C)	11	0	530	540
2044 (C)	10	0	500	510
2045 (C)	9	0	450	460
2046 (AN)	15	0	610	630
2047 (C)	10	0	500	510
2048 (W)	87	4	1,000	1,100
2049 (W)	78	1	930	1,000
2050 (W)	190	9	960	1,200
2051 (W)	1,300	52	1,600	3,000
2052 (W)	880	16	1,300	2,200
2053 (AN)	730	20	1,300	2,100
2054 (D)	130	0	770	900
2055 (D)	48	0	740	790
2056 (AN)	110	0	890	1,000
2057 (BN)	270	6	1,100	1,400
2058 (AN)	98	0	800	900
2059 (W)	1,100	41	1,600	2,700
2060 (D)	100	0	800	900
2061 (C)	28	0	670	700
2062 (D)	13	0	570	580
2063 (BN)	18	0	570	590

Antelope Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		44	0	760	800
2065 (BN)		21	0	630	650
2066 (D)		15	0	590	610
2067 (C)		10	0	490	500
2068 (C)		8	0	430	440
2069 (BN)		9	0	470	480
2070 (W)		55	4	910	970
2071 (BN)		11	0	540	550
2072 (W)		35	1	770	810
Average (2022-2072)		290	8	880	1,200
2022-2072	W	660	20	1,200	1,900
	AN	180	4	870	1,100
	BN	57	1	660	720
	D	120	0	720	840
	C	20	0	550	570

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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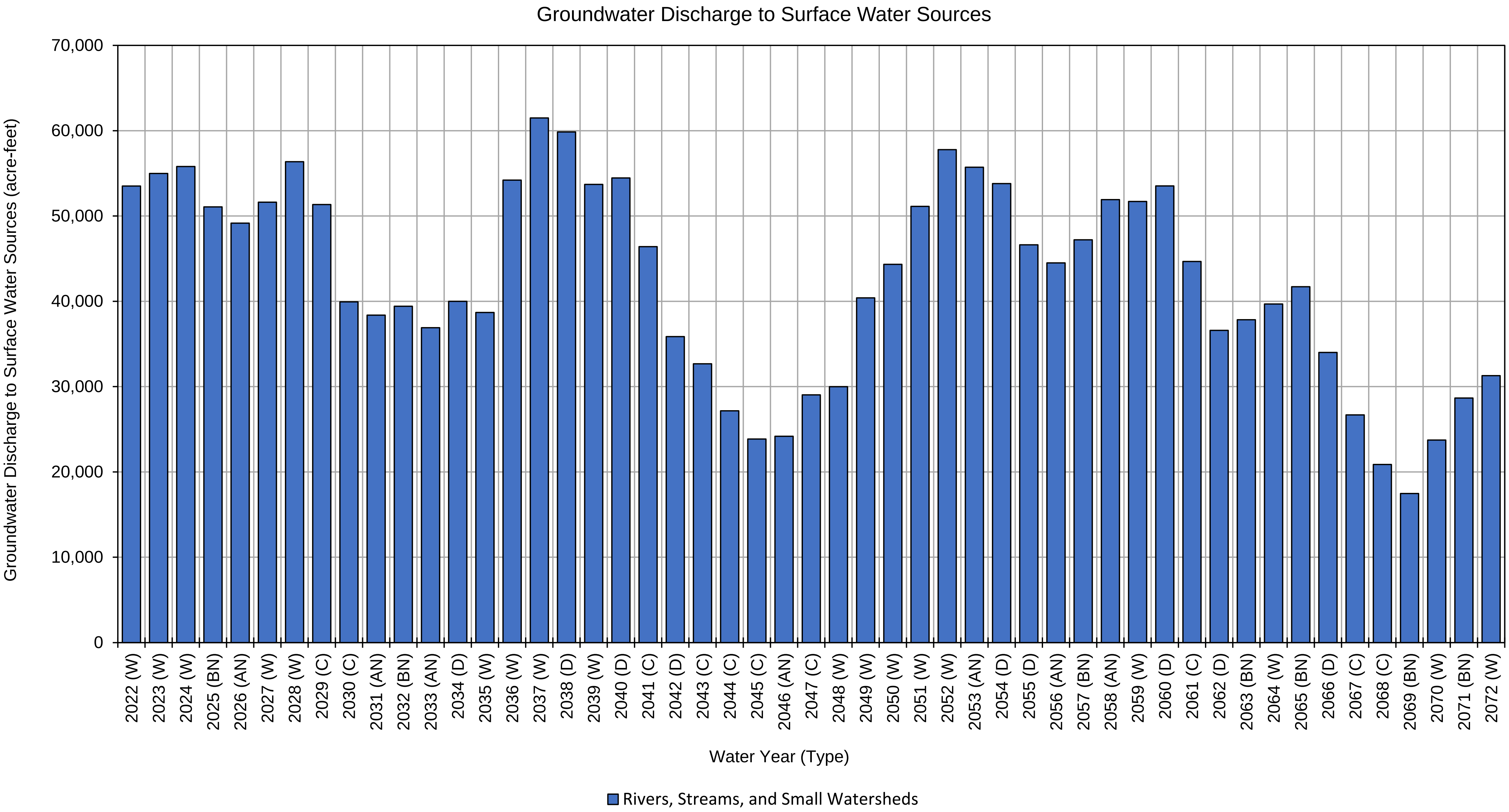
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

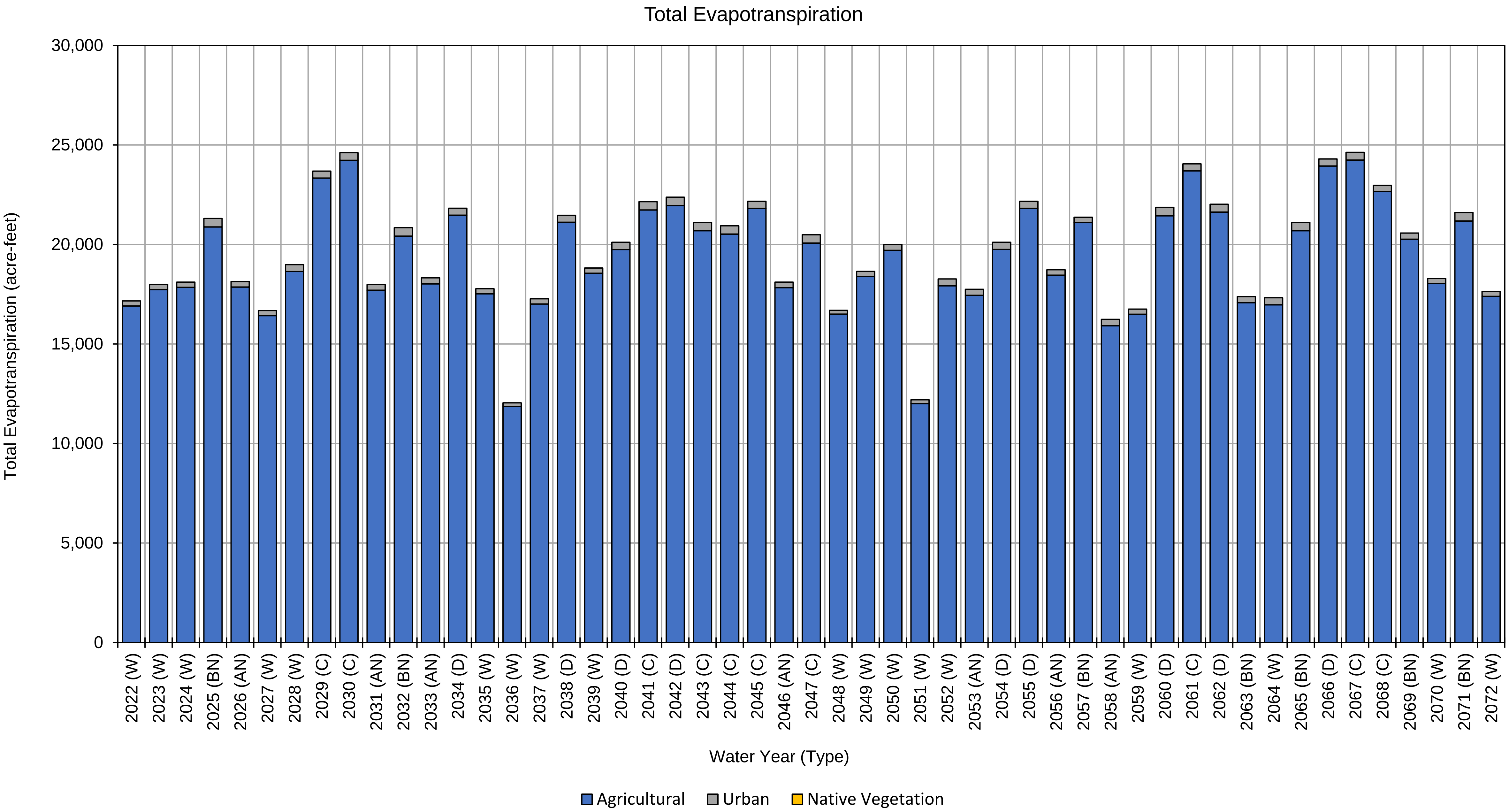
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	54,000
2023 (W)	55,000
2024 (W)	56,000
2025 (BN)	51,000
2026 (AN)	49,000
2027 (W)	52,000
2028 (W)	56,000
2029 (C)	51,000
2030 (C)	40,000
2031 (AN)	38,000
2032 (BN)	39,000
2033 (AN)	37,000
2034 (D)	40,000
2035 (W)	39,000
2036 (W)	54,000
2037 (W)	61,000
2038 (D)	60,000
2039 (W)	54,000
2040 (D)	54,000
2041 (C)	46,000
2042 (D)	36,000
2043 (C)	33,000
2044 (C)	27,000
2045 (C)	24,000
2046 (AN)	24,000
2047 (C)	29,000
2048 (W)	30,000
2049 (W)	40,000
2050 (W)	44,000
2051 (W)	51,000
2052 (W)	58,000
2053 (AN)	56,000
2054 (D)	54,000
2055 (D)	47,000
2056 (AN)	44,000
2057 (BN)	47,000
2058 (AN)	52,000
2059 (W)	52,000
2060 (D)	54,000
2061 (C)	45,000
2062 (D)	37,000
2063 (BN)	38,000

Antelope Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		40,000
2065 (BN)		42,000
2066 (D)		34,000
2067 (C)		27,000
2068 (C)		21,000
2069 (BN)		17,000
2070 (W)		24,000
2071 (BN)		29,000
2072 (W)		31,000
Average (2022-2072)		43,000
2022-2072	W	47,000
	AN	43,000
	BN	38,000
	D	46,000
	C	34,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

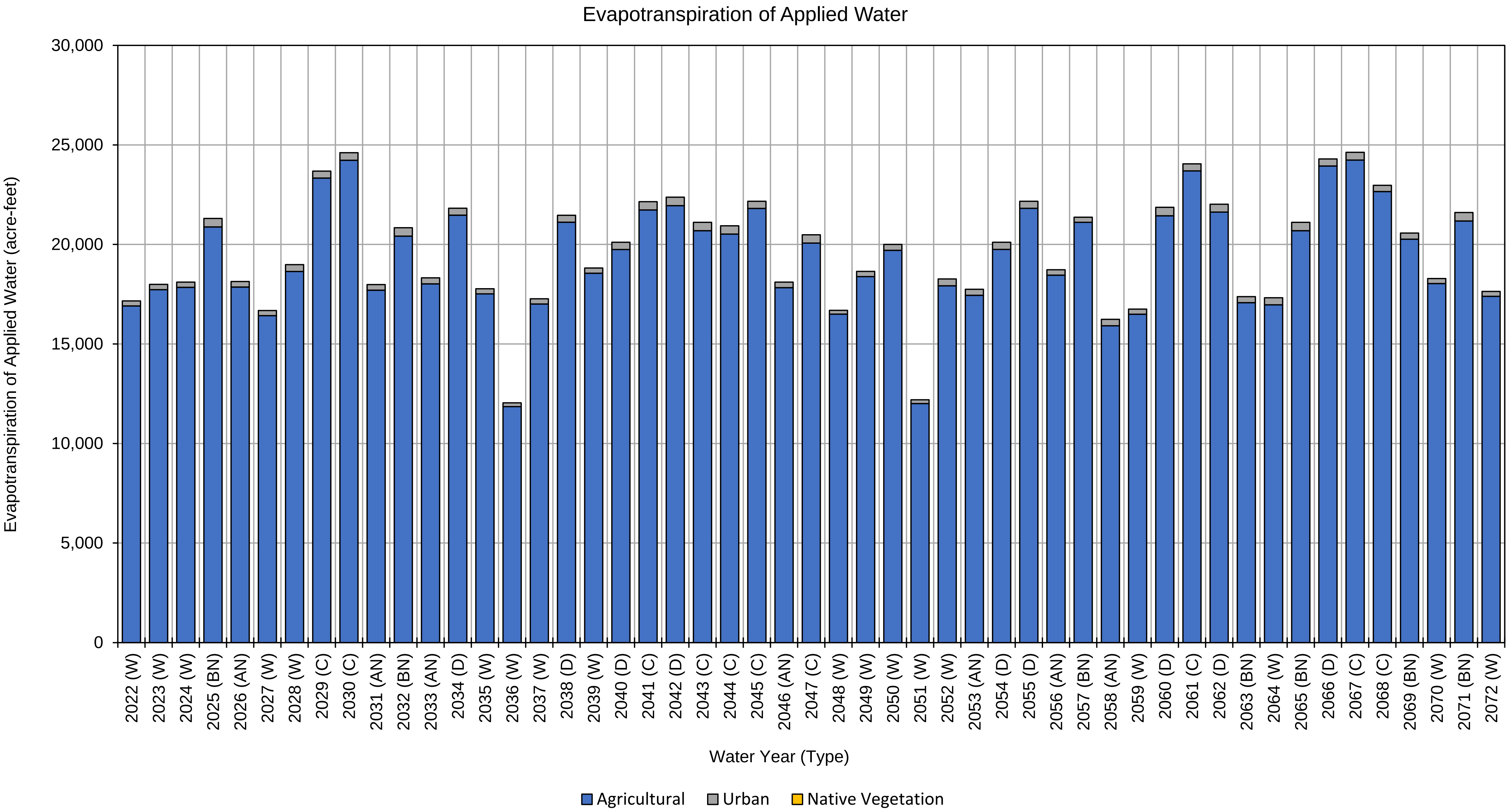
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	31,000	1,800	16,000	49,000
2023 (W)	32,000	1,600	15,000	49,000
2024 (W)	32,000	1,600	15,000	49,000
2025 (BN)	32,000	1,500	14,000	48,000
2026 (AN)	32,000	1,800	15,000	49,000
2027 (W)	30,000	1,600	15,000	47,000
2028 (W)	31,000	1,500	14,000	47,000
2029 (C)	32,000	1,200	13,000	46,000
2030 (C)	32,000	1,300	12,000	45,000
2031 (AN)	32,000	1,800	16,000	50,000
2032 (BN)	32,000	1,600	15,000	49,000
2033 (AN)	30,000	1,700	15,000	47,000
2034 (D)	32,000	1,500	14,000	48,000
2035 (W)	30,000	1,600	15,000	47,000
2036 (W)	27,000	1,700	14,000	43,000
2037 (W)	32,000	1,600	15,000	49,000
2038 (D)	32,000	1,500	14,000	48,000
2039 (W)	32,000	1,600	15,000	49,000
2040 (D)	32,000	1,600	15,000	49,000
2041 (C)	32,000	1,600	14,000	48,000
2042 (D)	32,000	1,500	13,000	47,000
2043 (C)	32,000	1,700	15,000	49,000
2044 (C)	32,000	1,700	15,000	49,000
2045 (C)	33,000	1,600	14,000	49,000
2046 (AN)	32,000	1,800	15,000	49,000
2047 (C)	32,000	1,700	15,000	49,000
2048 (W)	29,000	1,500	14,000	45,000
2049 (W)	32,000	1,600	15,000	49,000
2050 (W)	32,000	1,600	15,000	49,000
2051 (W)	27,000	1,700	14,000	43,000
2052 (W)	31,000	1,500	14,000	47,000
2053 (AN)	30,000	1,700	15,000	47,000
2054 (D)	32,000	1,600	15,000	49,000
2055 (D)	32,000	1,500	14,000	48,000
2056 (AN)	30,000	1,600	14,000	46,000
2057 (BN)	32,000	1,300	14,000	47,000
2058 (AN)	30,000	1,900	15,000	47,000
2059 (W)	30,000	1,600	15,000	47,000
2060 (D)	32,000	1,500	14,000	48,000
2061 (C)	32,000	1,200	13,000	46,000
2062 (D)	32,000	1,500	14,000	48,000
2063 (BN)	29,000	1,600	14,000	45,000

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		29,000	1,700	15,000	46,000
2065 (BN)		32,000	1,600	14,000	48,000
2066 (D)		33,000	1,300	13,000	47,000
2067 (C)		32,000	1,300	13,000	46,000
2068 (C)		32,000	1,400	14,000	47,000
2069 (BN)		32,000	1,600	15,000	49,000
2070 (W)		31,000	1,600	15,000	48,000
2071 (BN)		32,000	1,500	14,000	48,000
2072 (W)		31,000	1,800	15,000	48,000
Average (2022-2072)		31,000	1,600	14,000	47,000
2022-2072	W	30,000	1,600	15,000	47,000
	AN	31,000	1,700	15,000	48,000
	BN	31,000	1,500	14,000	47,000
	D	32,000	1,500	14,000	48,000
	C	32,000	1,500	14,000	48,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

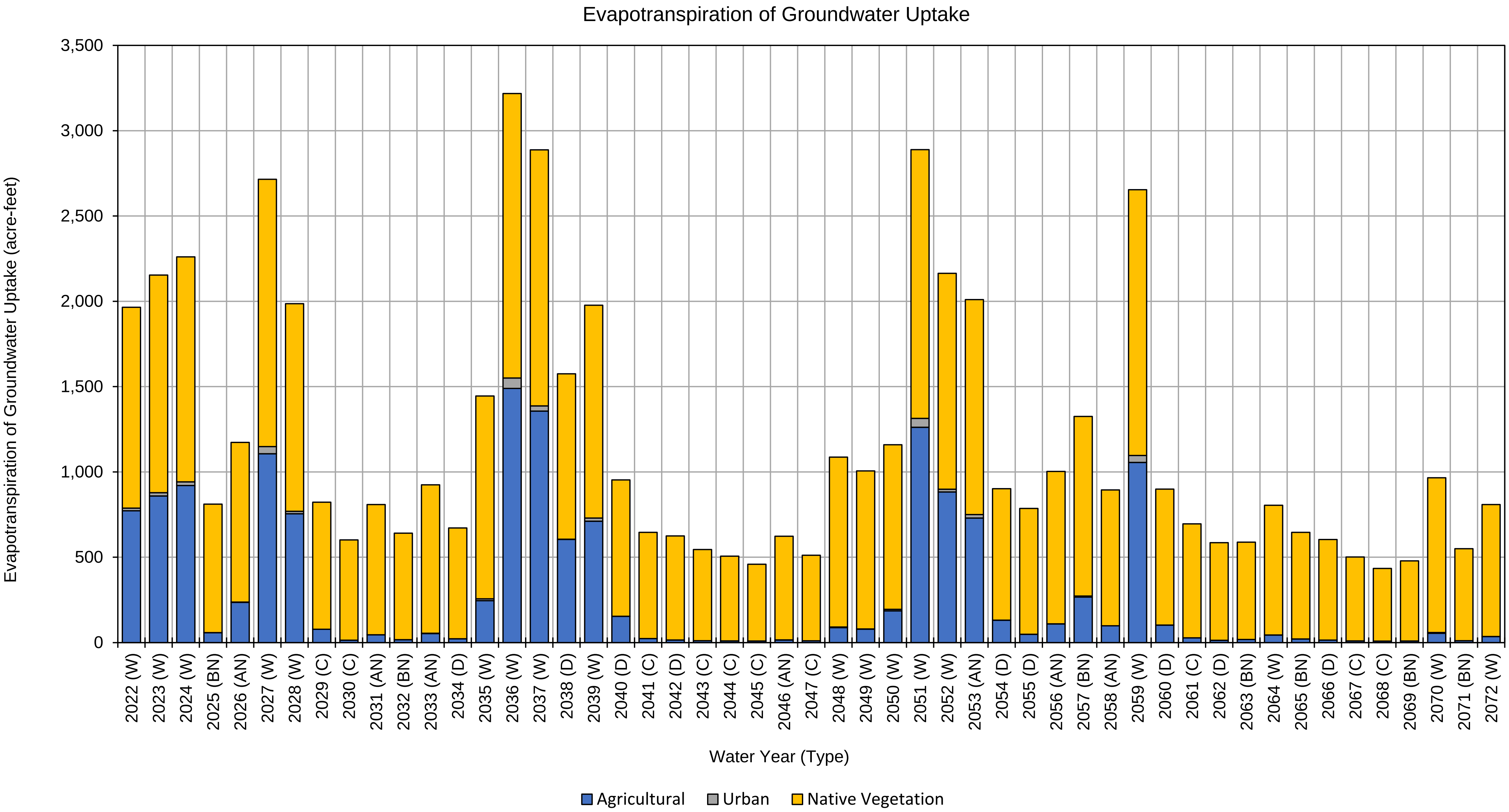
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	250	0	17,000
2023 (W)	18,000	270	0	18,000
2024 (W)	18,000	260	0	18,000
2025 (BN)	21,000	430	0	21,000
2026 (AN)	18,000	280	0	18,000
2027 (W)	16,000	260	0	16,000
2028 (W)	19,000	340	0	19,000
2029 (C)	23,000	350	0	23,000
2030 (C)	24,000	380	0	24,000
2031 (AN)	18,000	280	0	18,000
2032 (BN)	20,000	420	0	20,000
2033 (AN)	18,000	300	0	18,000
2034 (D)	21,000	350	0	21,000
2035 (W)	18,000	260	0	18,000
2036 (W)	12,000	190	0	12,000
2037 (W)	17,000	260	0	17,000
2038 (D)	21,000	350	0	21,000
2039 (W)	19,000	260	0	19,000
2040 (D)	20,000	360	0	20,000
2041 (C)	22,000	410	0	22,000
2042 (D)	22,000	430	0	22,000
2043 (C)	21,000	420	0	21,000
2044 (C)	21,000	410	0	21,000
2045 (C)	22,000	360	0	22,000
2046 (AN)	18,000	280	0	18,000
2047 (C)	20,000	420	0	20,000
2048 (W)	17,000	190	0	17,000
2049 (W)	18,000	260	0	18,000
2050 (W)	20,000	300	0	20,000
2051 (W)	12,000	190	0	12,000
2052 (W)	18,000	340	0	18,000
2053 (AN)	17,000	300	0	17,000
2054 (D)	20,000	360	0	20,000
2055 (D)	22,000	350	0	22,000
2056 (AN)	18,000	270	0	18,000
2057 (BN)	21,000	260	0	21,000
2058 (AN)	16,000	320	0	16,000
2059 (W)	16,000	260	0	16,000
2060 (D)	21,000	420	0	21,000
2061 (C)	24,000	350	0	24,000
2062 (D)	22,000	390	0	22,000
2063 (BN)	17,000	300	0	17,000

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		17,000	360	0	17,000
2065 (BN)		21,000	420	0	21,000
2066 (D)		24,000	350	0	24,000
2067 (C)		24,000	390	0	24,000
2068 (C)		23,000	320	0	23,000
2069 (BN)		20,000	310	0	20,000
2070 (W)		18,000	250	0	18,000
2071 (BN)		21,000	430	0	21,000
2072 (W)		17,000	250	0	17,000
Average (2022-2072)		19,000	320	0	19,000
2022-2072	W	17,000	260	0	17,000
	AN	18,000	290	0	18,000
	BN	20,000	370	0	20,000
	D	21,000	370	0	21,000
	C	22,000	380	0	22,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

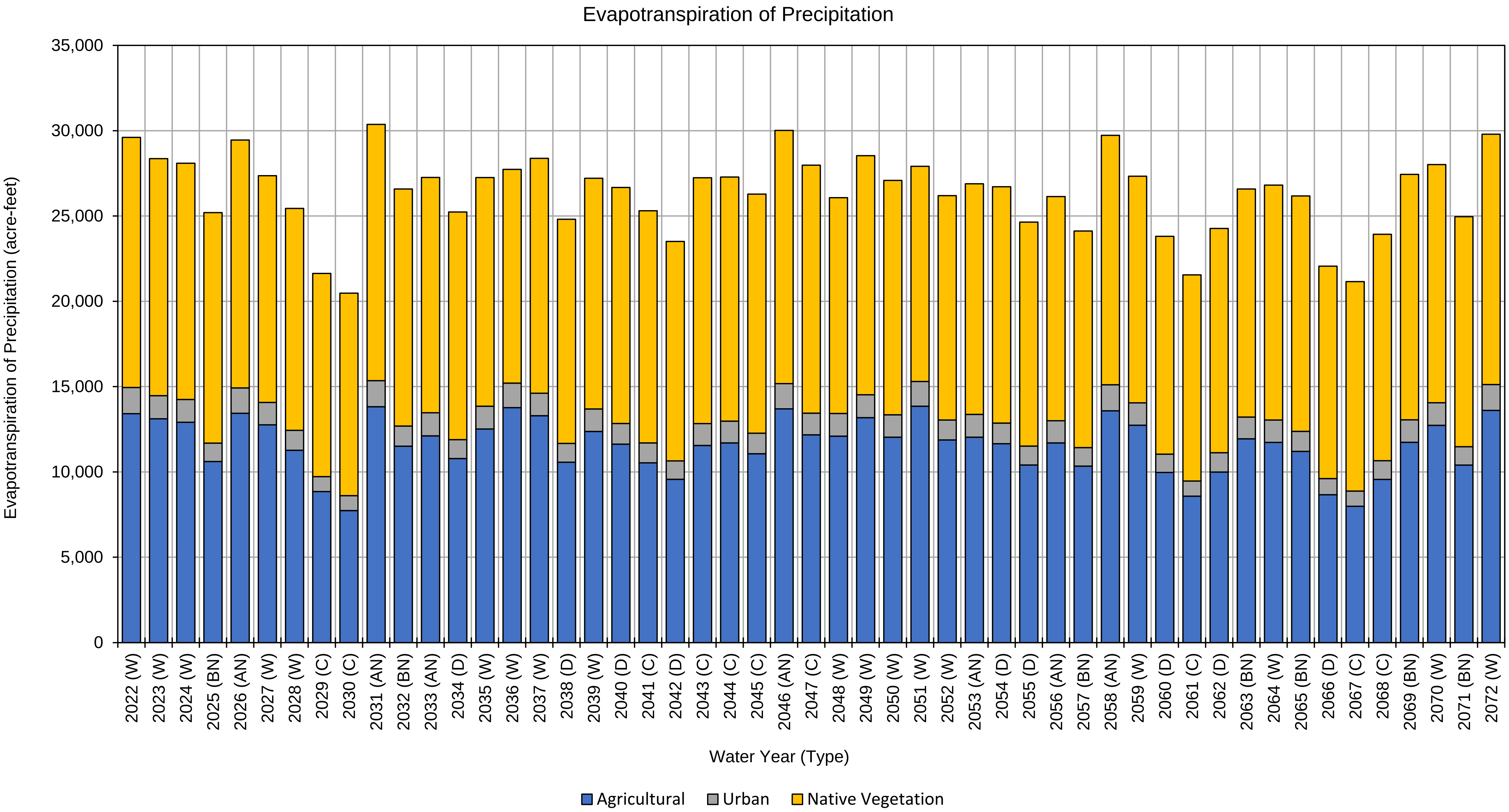
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	770	16	1,200	2,000
2023 (W)	860	19	1,300	2,200
2024 (W)	920	22	1,300	2,200
2025 (BN)	58	0	750	810
2026 (AN)	240	2	940	1,200
2027 (W)	1,100	42	1,600	2,700
2028 (W)	750	15	1,200	2,000
2029 (C)	78	0	740	820
2030 (C)	14	0	590	600
2031 (AN)	45	0	760	810
2032 (BN)	17	0	620	640
2033 (AN)	53	2	870	920
2034 (D)	22	0	650	670
2035 (W)	250	11	1,200	1,500
2036 (W)	1,500	61	1,700	3,300
2037 (W)	1,400	31	1,500	2,900
2038 (D)	600	1	970	1,600
2039 (W)	710	19	1,200	1,900
2040 (D)	150	0	800	950
2041 (C)	23	0	620	640
2042 (D)	15	0	610	630
2043 (C)	11	0	530	540
2044 (C)	10	0	500	510
2045 (C)	9	0	450	460
2046 (AN)	15	0	610	630
2047 (C)	10	0	500	510
2048 (W)	87	4	1,000	1,100
2049 (W)	78	1	930	1,000
2050 (W)	190	9	960	1,200
2051 (W)	1,300	52	1,600	3,000
2052 (W)	880	16	1,300	2,200
2053 (AN)	730	20	1,300	2,100
2054 (D)	130	0	770	900
2055 (D)	48	0	740	790
2056 (AN)	110	0	890	1,000
2057 (BN)	270	6	1,100	1,400
2058 (AN)	98	0	800	900
2059 (W)	1,100	41	1,600	2,700
2060 (D)	100	0	800	900
2061 (C)	28	0	670	700
2062 (D)	13	0	570	580
2063 (BN)	18	0	570	590

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		44	0	760	800
2065 (BN)		21	0	630	650
2066 (D)		15	0	590	610
2067 (C)		10	0	490	500
2068 (C)		8	0	430	440
2069 (BN)		9	0	470	480
2070 (W)		55	4	910	970
2071 (BN)		11	0	540	550
2072 (W)		35	1	770	810
Average (2022-2072)		290	8	880	1,200
2022-2072	W	660	20	1,200	1,900
	AN	180	4	870	1,100
	BN	57	1	660	720
	D	120	0	720	840
	C	20	0	550	570

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

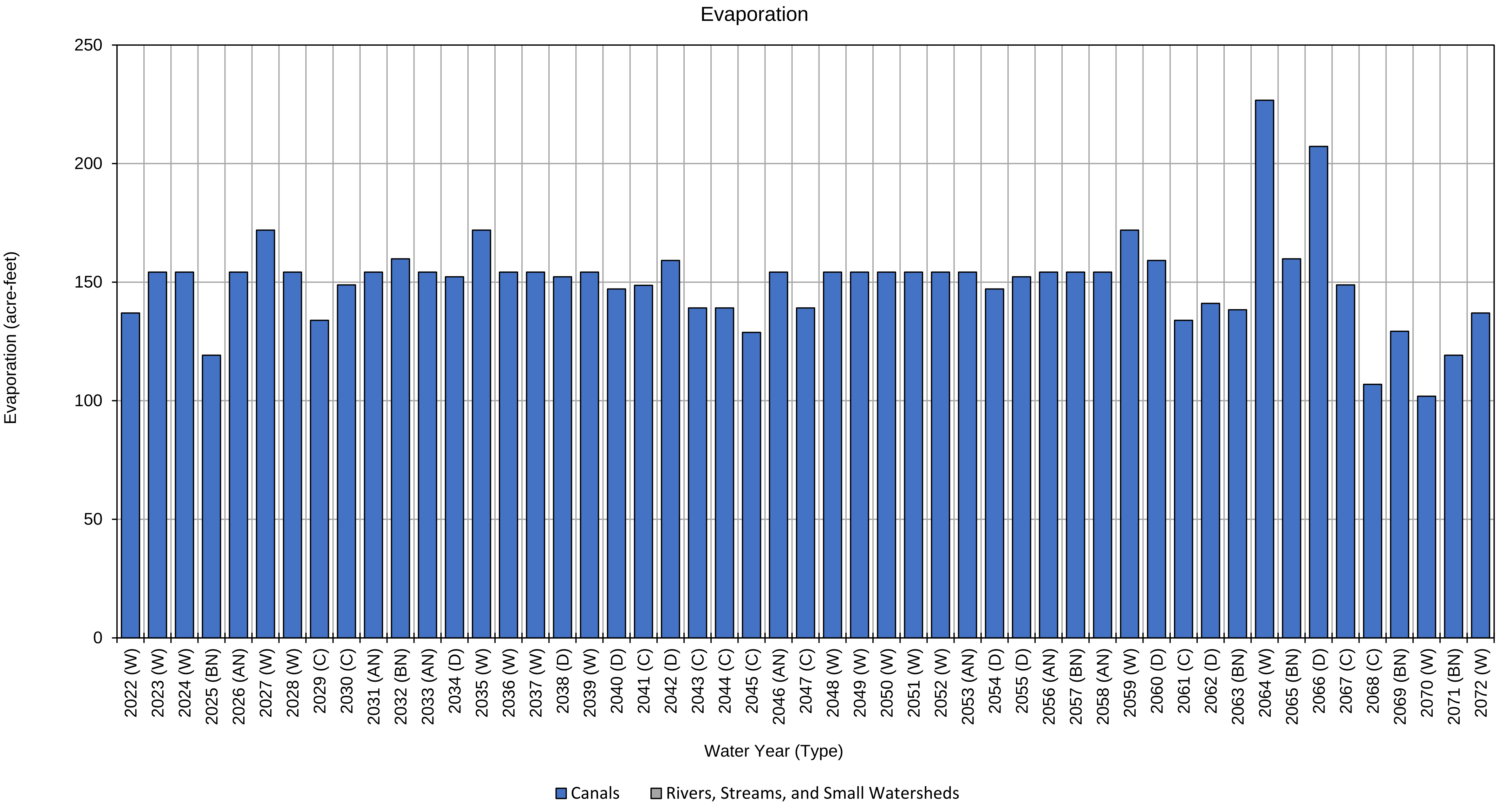
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,500	15,000	30,000
2023 (W)	13,000	1,400	14,000	28,000
2024 (W)	13,000	1,300	14,000	28,000
2025 (BN)	11,000	1,100	14,000	26,000
2026 (AN)	13,000	1,500	15,000	30,000
2027 (W)	13,000	1,300	13,000	27,000
2028 (W)	11,000	1,200	13,000	25,000
2029 (C)	8,800	880	12,000	22,000
2030 (C)	7,700	870	12,000	21,000
2031 (AN)	14,000	1,500	15,000	31,000
2032 (BN)	12,000	1,200	14,000	27,000
2033 (AN)	12,000	1,400	14,000	27,000
2034 (D)	11,000	1,100	13,000	25,000
2035 (W)	13,000	1,300	13,000	27,000
2036 (W)	14,000	1,400	13,000	28,000
2037 (W)	13,000	1,300	14,000	28,000
2038 (D)	11,000	1,100	13,000	25,000
2039 (W)	12,000	1,300	14,000	27,000
2040 (D)	12,000	1,200	14,000	27,000
2041 (C)	11,000	1,200	14,000	26,000
2042 (D)	9,600	1,100	13,000	24,000
2043 (C)	12,000	1,300	14,000	27,000
2044 (C)	12,000	1,300	14,000	27,000
2045 (C)	11,000	1,200	14,000	26,000
2046 (AN)	14,000	1,500	15,000	31,000
2047 (C)	12,000	1,300	15,000	28,000
2048 (W)	12,000	1,300	13,000	26,000
2049 (W)	13,000	1,300	14,000	28,000
2050 (W)	12,000	1,300	14,000	27,000
2051 (W)	14,000	1,500	13,000	29,000
2052 (W)	12,000	1,200	13,000	26,000
2053 (AN)	12,000	1,300	14,000	27,000
2054 (D)	12,000	1,200	14,000	27,000
2055 (D)	10,000	1,100	13,000	24,000
2056 (AN)	12,000	1,300	13,000	26,000
2057 (BN)	10,000	1,100	13,000	24,000
2058 (AN)	14,000	1,500	15,000	31,000
2059 (W)	13,000	1,300	13,000	27,000
2060 (D)	10,000	1,100	13,000	24,000
2061 (C)	8,600	890	12,000	21,000
2062 (D)	10,000	1,100	13,000	24,000
2063 (BN)	12,000	1,300	13,000	26,000

Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		12,000	1,300	14,000	27,000
2065 (BN)		11,000	1,200	14,000	26,000
2066 (D)		8,700	940	12,000	22,000
2067 (C)		8,000	890	12,000	21,000
2068 (C)		9,600	1,100	13,000	24,000
2069 (BN)		12,000	1,300	14,000	27,000
2070 (W)		13,000	1,300	14,000	28,000
2071 (BN)		10,000	1,100	13,000	24,000
2072 (W)		14,000	1,500	15,000	31,000
Average (2022-2072)		12,000	1,200	14,000	27,000
2022-2072	W	13,000	1,300	14,000	28,000
	AN	13,000	1,400	14,000	28,000
	BN	11,000	1,200	14,000	26,000
	D	10,000	1,100	13,000	24,000
	C	10,000	1,100	13,000	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	160	0	160
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150
2059 (W)	170	0	170
2060 (D)	160	0	160
2061 (C)	130	0	130
2062 (D)	140	0	140
2063 (BN)	140	0	140

Antelope Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	160	0	160
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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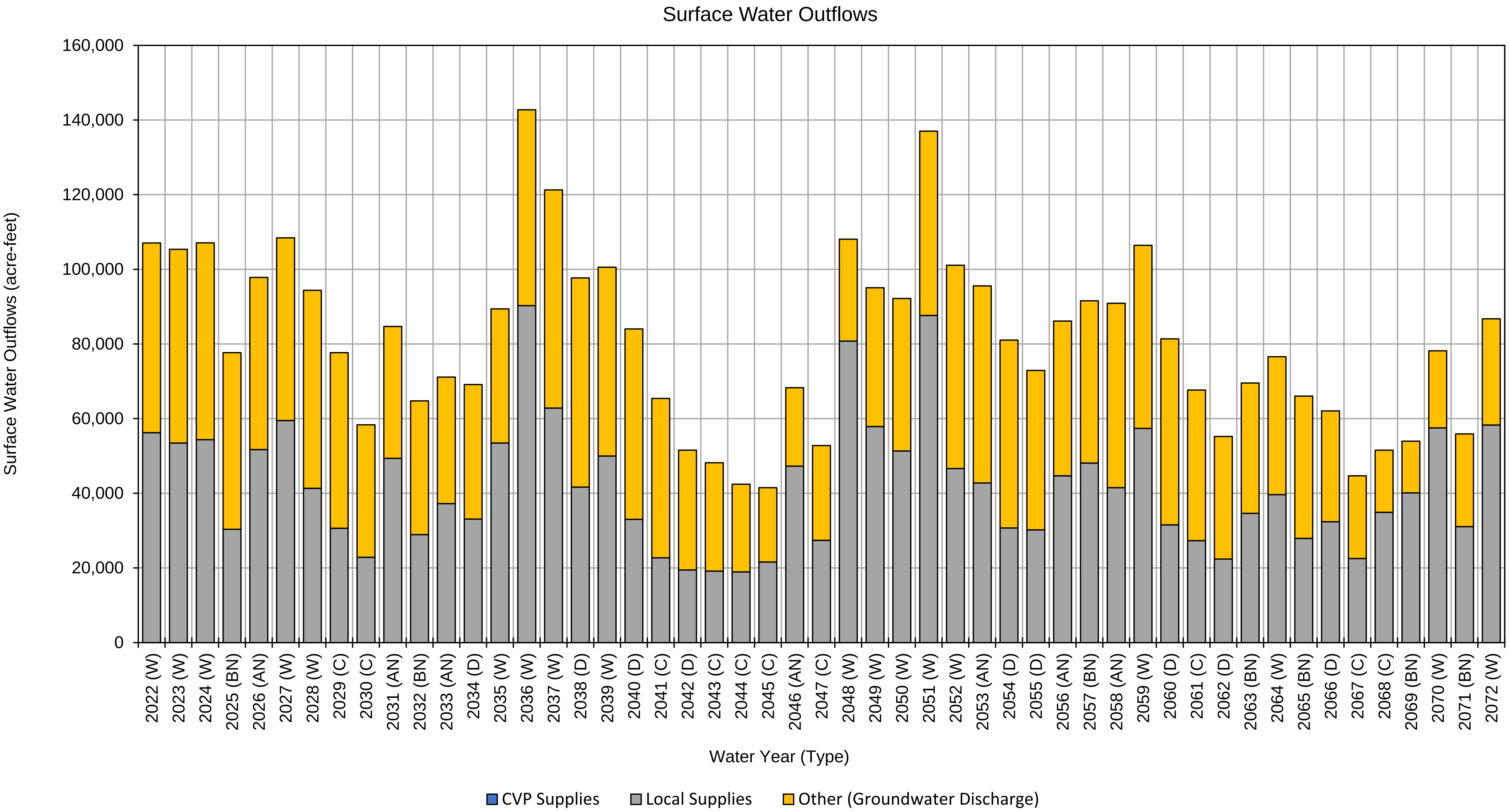
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	56,000	51,000	110,000
2023 (W)	0	53,000	52,000	110,000
2024 (W)	0	54,000	53,000	110,000
2025 (BN)	0	30,000	47,000	77,000
2026 (AN)	0	52,000	46,000	98,000
2027 (W)	0	59,000	49,000	110,000
2028 (W)	0	41,000	53,000	94,000
2029 (C)	0	31,000	47,000	78,000
2030 (C)	0	23,000	35,000	58,000
2031 (AN)	0	49,000	35,000	84,000
2032 (BN)	0	29,000	36,000	65,000
2033 (AN)	0	37,000	34,000	71,000
2034 (D)	0	33,000	36,000	69,000
2035 (W)	0	53,000	36,000	89,000
2036 (W)	0	90,000	52,000	140,000
2037 (W)	0	63,000	58,000	120,000
2038 (D)	0	42,000	56,000	98,000
2039 (W)	0	50,000	51,000	100,000
2040 (D)	0	33,000	51,000	84,000
2041 (C)	0	23,000	43,000	66,000
2042 (D)	0	19,000	32,000	51,000
2043 (C)	0	19,000	29,000	48,000
2044 (C)	0	19,000	24,000	43,000
2045 (C)	0	22,000	20,000	42,000
2046 (AN)	0	47,000	21,000	68,000
2047 (C)	0	27,000	25,000	52,000
2048 (W)	0	81,000	27,000	110,000
2049 (W)	0	58,000	37,000	95,000
2050 (W)	0	51,000	41,000	92,000
2051 (W)	0	88,000	49,000	140,000
2052 (W)	0	47,000	54,000	100,000
2053 (AN)	0	43,000	53,000	96,000
2054 (D)	0	31,000	50,000	81,000
2055 (D)	0	30,000	43,000	73,000
2056 (AN)	0	45,000	41,000	86,000
2057 (BN)	0	48,000	43,000	91,000
2058 (AN)	0	42,000	49,000	91,000
2059 (W)	0	57,000	49,000	110,000
2060 (D)	0	32,000	50,000	82,000
2061 (C)	0	27,000	40,000	67,000
2062 (D)	0	22,000	33,000	55,000
2063 (BN)	0	35,000	35,000	70,000

Antelope Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	40,000	37,000	77,000
2065 (BN)		0	28,000	38,000	66,000
2066 (D)		0	32,000	30,000	62,000
2067 (C)		0	23,000	22,000	45,000
2068 (C)		0	35,000	17,000	52,000
2069 (BN)		0	40,000	14,000	54,000
2070 (W)		0	58,000	21,000	79,000
2071 (BN)		0	31,000	25,000	56,000
2072 (W)		0	58,000	28,000	86,000
Average (2022-2072)		0	42,000	39,000	81,000
2022-2072	W	0	59,000	44,000	100,000
	AN	0	45,000	40,000	85,000
	BN	0	34,000	34,000	68,000
	D	0	30,000	42,000	72,000
	C	0	25,000	30,000	55,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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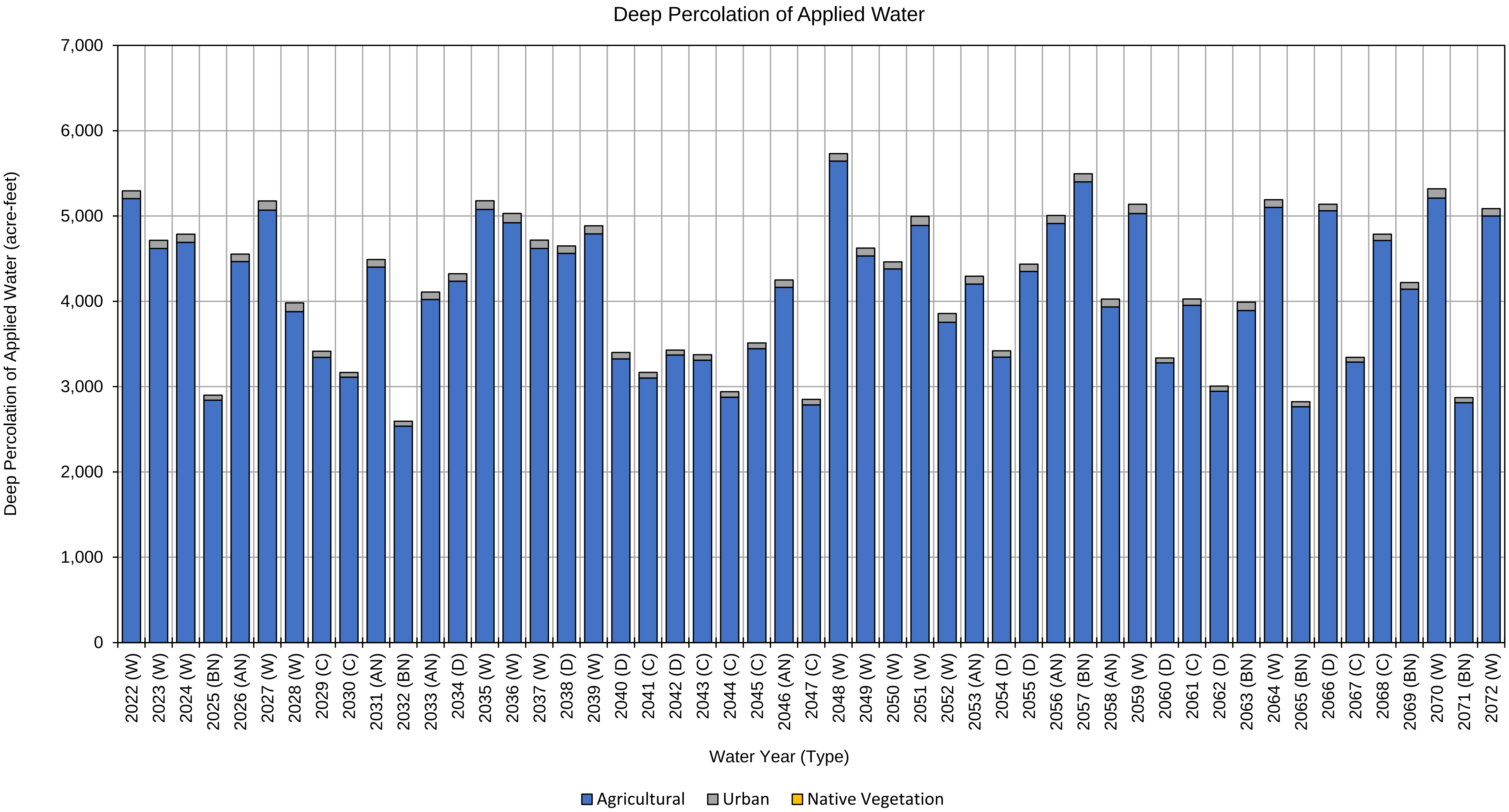
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	91	0	5,300
2023 (W)	4,600	96	0	4,700
2024 (W)	4,700	96	0	4,800
2025 (BN)	2,800	59	0	2,900
2026 (AN)	4,500	87	0	4,600
2027 (W)	5,100	110	0	5,200
2028 (W)	3,900	100	0	4,000
2029 (C)	3,300	73	0	3,400
2030 (C)	3,100	55	0	3,200
2031 (AN)	4,400	89	0	4,500
2032 (BN)	2,500	58	0	2,600
2033 (AN)	4,000	88	0	4,100
2034 (D)	4,200	87	0	4,300
2035 (W)	5,100	100	0	5,200
2036 (W)	4,900	110	0	5,000
2037 (W)	4,600	98	0	4,700
2038 (D)	4,600	87	0	4,700
2039 (W)	4,800	95	0	4,900
2040 (D)	3,300	75	0	3,400
2041 (C)	3,100	66	0	3,200
2042 (D)	3,400	58	0	3,500
2043 (C)	3,300	65	0	3,400
2044 (C)	2,900	64	0	3,000
2045 (C)	3,400	66	0	3,500
2046 (AN)	4,200	87	0	4,300
2047 (C)	2,800	65	0	2,900
2048 (W)	5,600	87	0	5,700
2049 (W)	4,500	92	0	4,600
2050 (W)	4,400	83	0	4,500
2051 (W)	4,900	110	0	5,000
2052 (W)	3,800	100	0	3,900
2053 (AN)	4,200	92	0	4,300
2054 (D)	3,300	75	0	3,400
2055 (D)	4,300	87	0	4,400
2056 (AN)	4,900	95	0	5,000
2057 (BN)	5,400	95	0	5,500
2058 (AN)	3,900	92	0	4,000
2059 (W)	5,000	110	0	5,100
2060 (D)	3,300	58	0	3,400
2061 (C)	4,000	74	0	4,100
2062 (D)	2,900	62	0	3,000
2063 (BN)	3,900	98	0	4,000

Antelope Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		5,100	89	0	5,200
2065 (BN)		2,800	58	0	2,900
2066 (D)		5,100	76	0	5,200
2067 (C)		3,300	56	0	3,400
2068 (C)		4,700	74	0	4,800
2069 (BN)		4,100	78	0	4,200
2070 (W)		5,200	110	0	5,300
2071 (BN)		2,800	59	0	2,900
2072 (W)		5,000	86	0	5,100
Average (2022-2072)		4,100	83	0	4,200
2022-2072	W	4,800	98	0	4,900
	AN	4,300	90	0	4,400
	BN	3,500	72	0	3,600
	D	3,800	74	0	3,900
	C	3,400	66	0	3,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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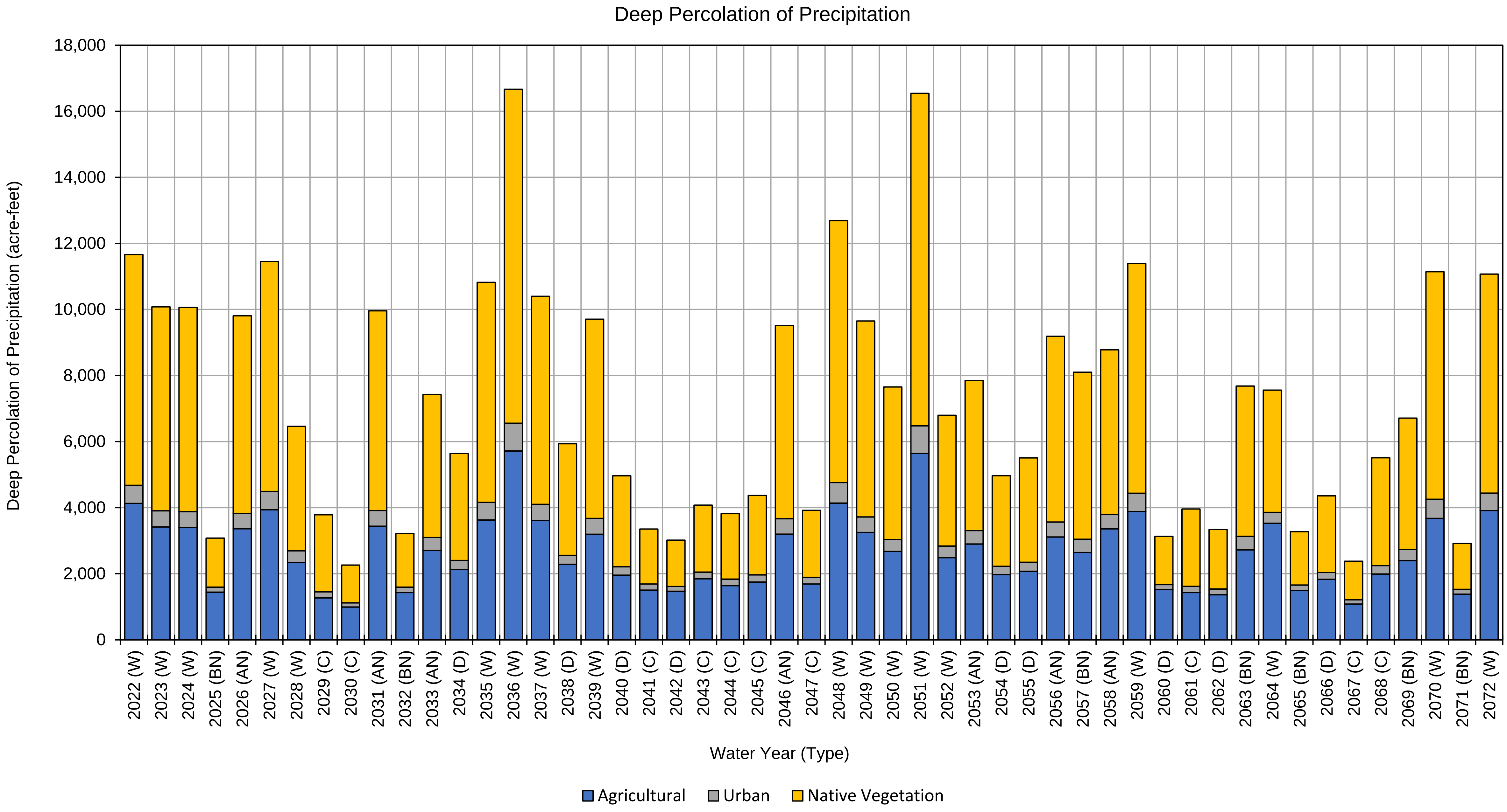


Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

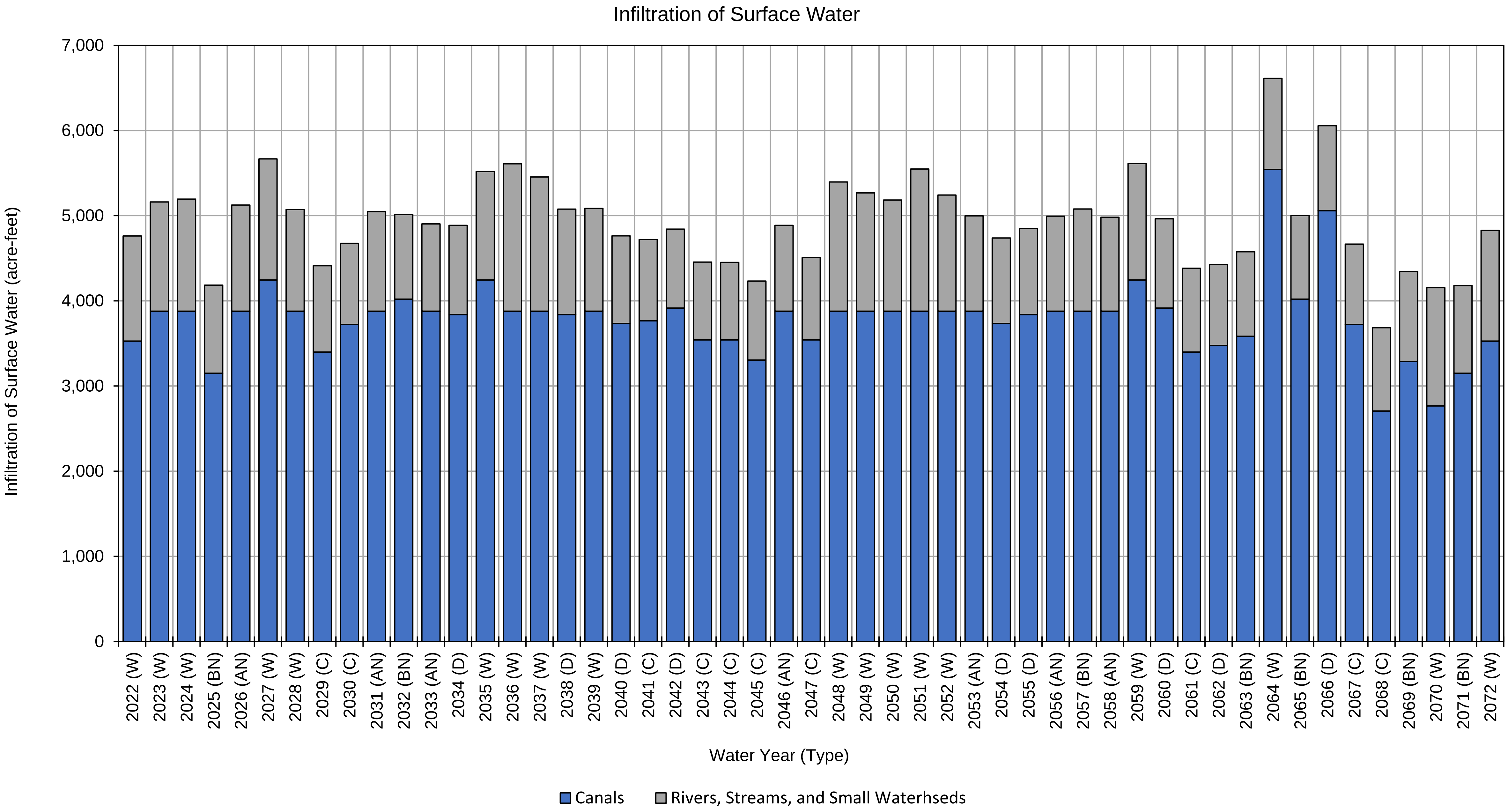
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,100	550	7,000	12,000
2023 (W)	3,400	480	6,200	10,000
2024 (W)	3,400	480	6,200	10,000
2025 (BN)	1,400	150	1,500	3,100
2026 (AN)	3,400	470	6,000	9,900
2027 (W)	3,900	550	7,000	11,000
2028 (W)	2,300	350	3,800	6,500
2029 (C)	1,300	180	2,300	3,800
2030 (C)	990	130	1,100	2,200
2031 (AN)	3,400	480	6,000	9,900
2032 (BN)	1,400	160	1,600	3,200
2033 (AN)	2,700	390	4,300	7,400
2034 (D)	2,100	270	3,200	5,600
2035 (W)	3,600	530	6,700	11,000
2036 (W)	5,700	840	10,000	17,000
2037 (W)	3,600	490	6,300	10,000
2038 (D)	2,300	270	3,400	6,000
2039 (W)	3,200	480	6,000	9,700
2040 (D)	2,000	250	2,800	5,100
2041 (C)	1,500	190	1,700	3,400
2042 (D)	1,500	150	1,400	3,100
2043 (C)	1,800	200	2,000	4,000
2044 (C)	1,600	200	2,000	3,800
2045 (C)	1,700	220	2,400	4,300
2046 (AN)	3,200	470	5,800	9,500
2047 (C)	1,700	200	2,000	3,900
2048 (W)	4,100	620	7,900	13,000
2049 (W)	3,200	470	5,900	9,600
2050 (W)	2,700	360	4,600	7,700
2051 (W)	5,600	840	10,000	16,000
2052 (W)	2,500	350	4,000	6,900
2053 (AN)	2,900	410	4,500	7,800
2054 (D)	2,000	250	2,700	5,000
2055 (D)	2,100	270	3,200	5,600
2056 (AN)	3,100	450	5,600	9,200
2057 (BN)	2,600	400	5,100	8,100
2058 (AN)	3,400	430	5,000	8,800
2059 (W)	3,900	550	6,900	11,000
2060 (D)	1,500	150	1,500	3,200
2061 (C)	1,400	190	2,300	3,900
2062 (D)	1,400	180	1,800	3,400
2063 (BN)	2,700	410	4,600	7,700

Antelope Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		3,500	330	3,700	7,500
2065 (BN)		1,500	160	1,600	3,300
2066 (D)		1,800	200	2,300	4,300
2067 (C)		1,100	130	1,200	2,400
2068 (C)		2,000	260	3,300	5,600
2069 (BN)		2,400	340	4,000	6,700
2070 (W)		3,700	580	6,900	11,000
2071 (BN)		1,400	150	1,400	3,000
2072 (W)		3,900	530	6,600	11,000
Average (2022-2072)		2,600	360	4,200	7,200
2022-2072	W	3,700	520	6,400	11,000
	AN	3,200	440	5,300	8,900
	BN	1,900	250	2,800	5,000
	D	1,800	220	2,500	4,500
	C	1,500	190	2,000	3,700

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

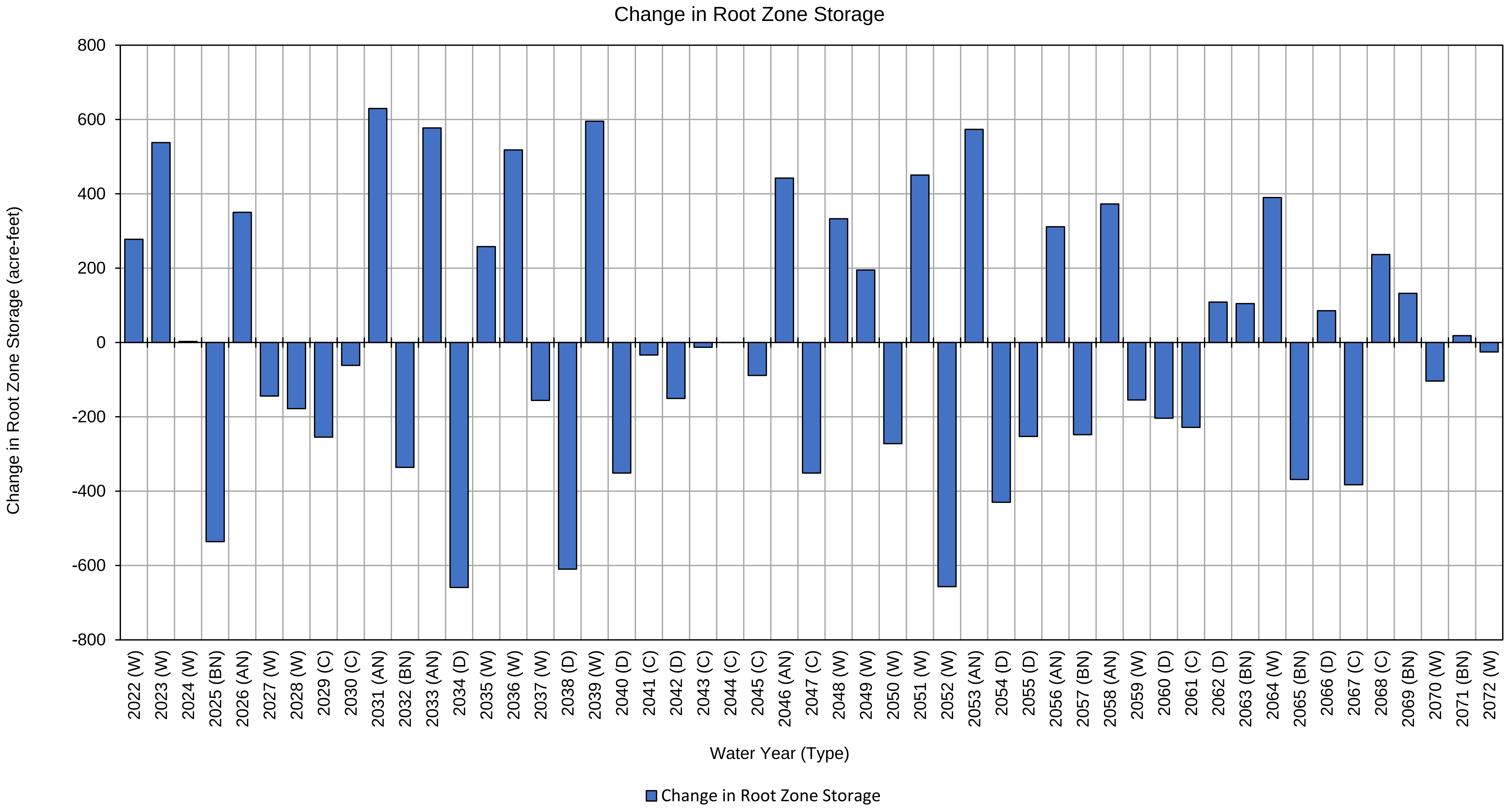
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	3,500	1,200	4,700
2023 (W)	3,900	1,300	5,200
2024 (W)	3,900	1,300	5,200
2025 (BN)	3,200	1,000	4,200
2026 (AN)	3,900	1,200	5,100
2027 (W)	4,200	1,400	5,600
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	950	4,700
2031 (AN)	3,900	1,200	5,100
2032 (BN)	4,000	990	5,000
2033 (AN)	3,900	1,000	4,900
2034 (D)	3,800	1,000	4,800
2035 (W)	4,200	1,300	5,500
2036 (W)	3,900	1,700	5,600
2037 (W)	3,900	1,600	5,500
2038 (D)	3,800	1,200	5,000
2039 (W)	3,900	1,200	5,100
2040 (D)	3,700	1,000	4,700
2041 (C)	3,800	950	4,800
2042 (D)	3,900	930	4,800
2043 (C)	3,500	910	4,400
2044 (C)	3,500	910	4,400
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,000	4,900
2047 (C)	3,500	960	4,500
2048 (W)	3,900	1,500	5,400
2049 (W)	3,900	1,400	5,300
2050 (W)	3,900	1,300	5,200
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,300
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,700	1,000	4,700
2055 (D)	3,800	1,000	4,800
2056 (AN)	3,900	1,100	5,000
2057 (BN)	3,900	1,200	5,100
2058 (AN)	3,900	1,100	5,000
2059 (W)	4,200	1,400	5,600
2060 (D)	3,900	1,000	4,900
2061 (C)	3,400	980	4,400
2062 (D)	3,500	950	4,500
2063 (BN)	3,600	990	4,600

Antelope Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		5,500	1,100	6,600
2065 (BN)		4,000	980	5,000
2066 (D)		5,100	1,000	6,100
2067 (C)		3,700	940	4,600
2068 (C)		2,700	980	3,700
2069 (BN)		3,300	1,100	4,400
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,300	4,800
Average (2022-2072)		3,800	1,100	4,900
2022-2072	W	3,900	1,400	5,300
	AN	3,900	1,100	5,000
	BN	3,600	1,000	4,600
	D	3,900	1,000	4,900
	C	3,500	950	4,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	280
2023 (W)	540
2024 (W)	3
2025 (BN)	-540
2026 (AN)	350
2027 (W)	-140
2028 (W)	-180
2029 (C)	-250
2030 (C)	-62
2031 (AN)	630
2032 (BN)	-340
2033 (AN)	580
2034 (D)	-660
2035 (W)	260
2036 (W)	520
2037 (W)	-160
2038 (D)	-610
2039 (W)	600
2040 (D)	-350
2041 (C)	-34
2042 (D)	-150
2043 (C)	-13
2044 (C)	0
2045 (C)	-89
2046 (AN)	440
2047 (C)	-350
2048 (W)	330
2049 (W)	200
2050 (W)	-270
2051 (W)	450
2052 (W)	-660
2053 (AN)	570
2054 (D)	-430
2055 (D)	-250
2056 (AN)	310
2057 (BN)	-250
2058 (AN)	370
2059 (W)	-150
2060 (D)	-200
2061 (C)	-230
2062 (D)	110
2063 (BN)	100

Antelope Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		390
2065 (BN)		-370
2066 (D)		86
2067 (C)		-380
2068 (C)		240
2069 (BN)		130
2070 (W)		-100
2071 (BN)		18
2072 (W)		-26
Average (2022-2072)		5
2022-2072	W	100
	AN	470
	BN	-180
	D	-270
	C	-120

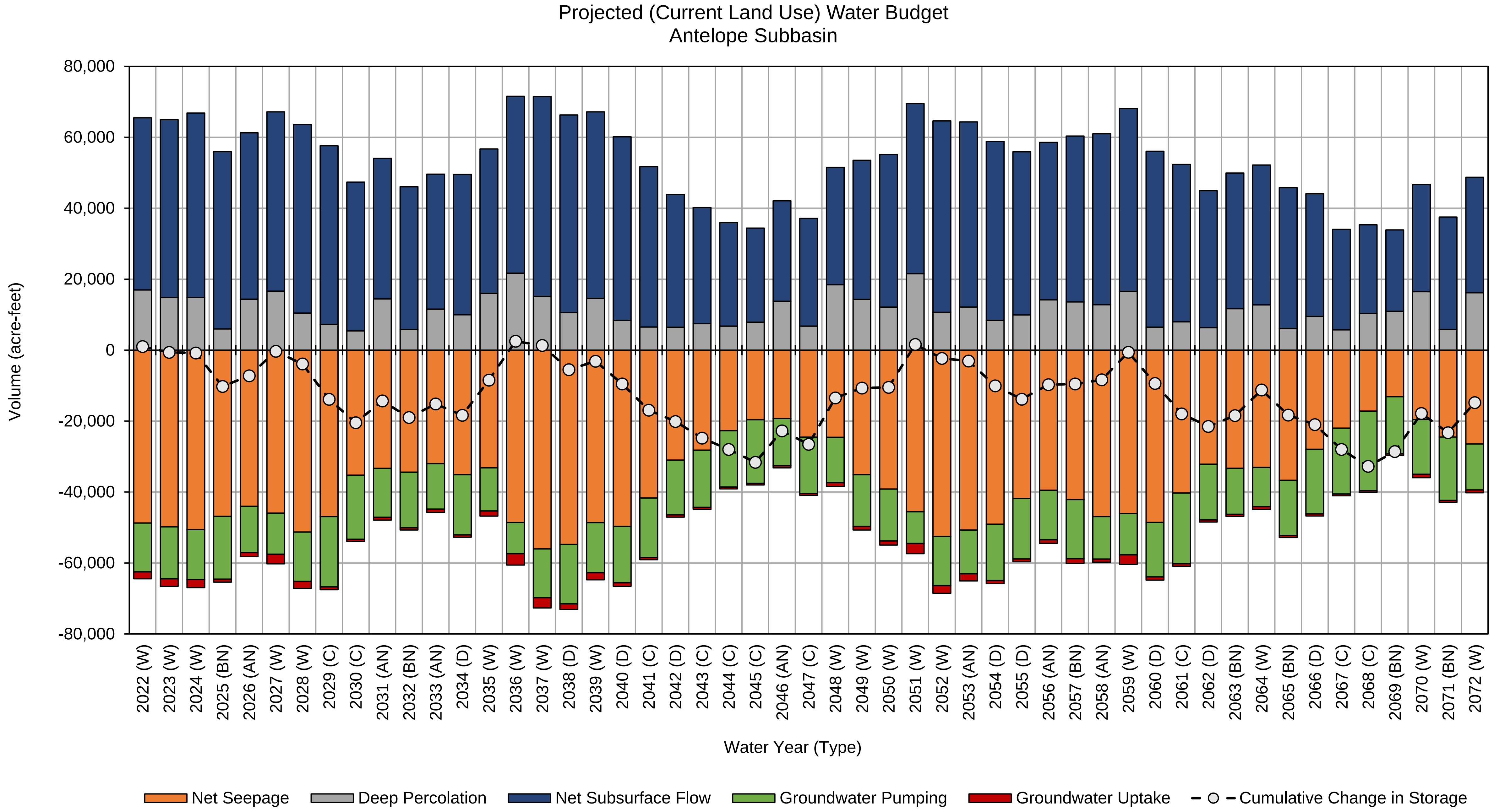
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-2b

Detailed Antelope Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Groundwater System



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

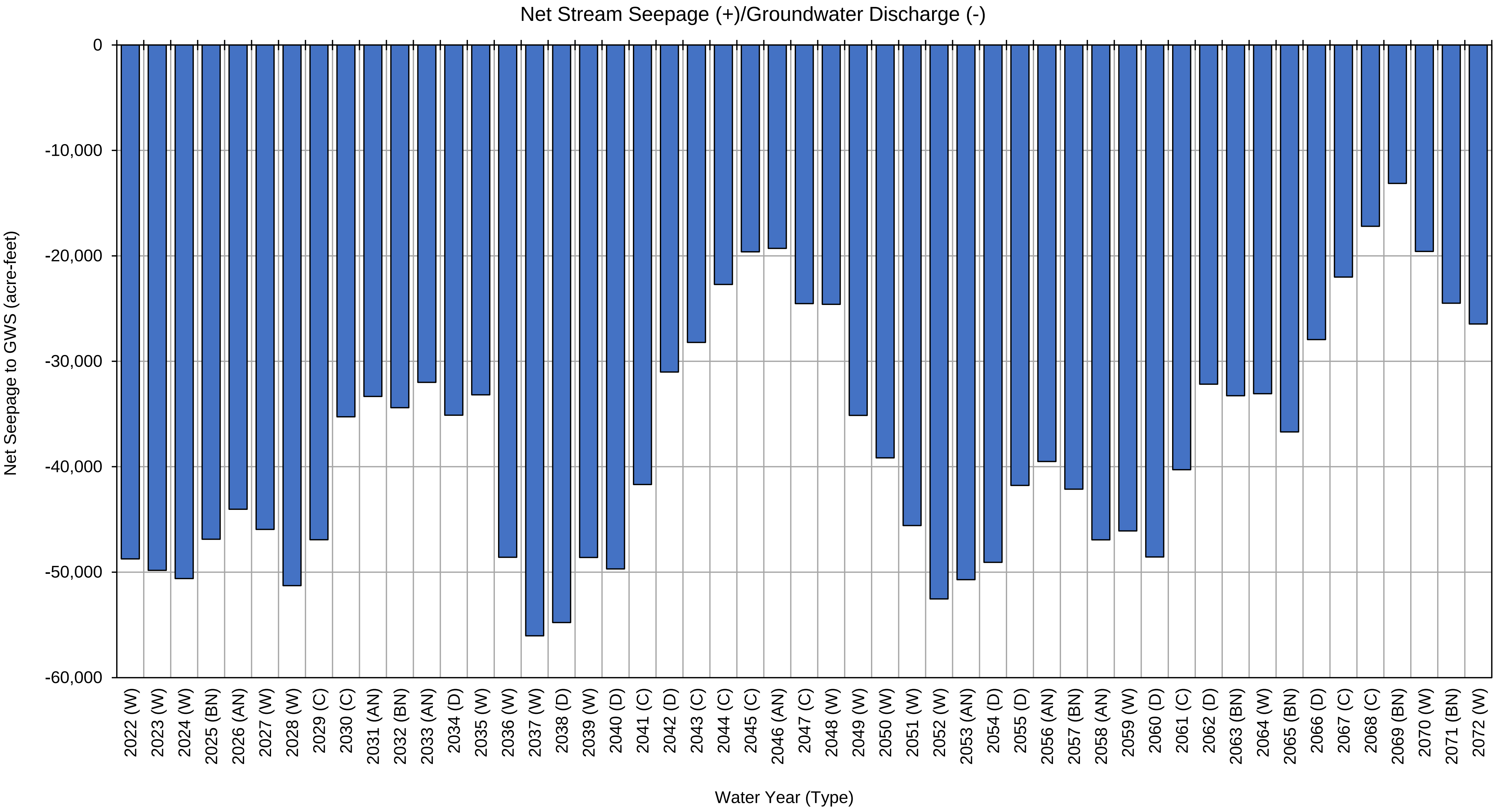
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-49,000	17,000	-14,000	-2,000	49,000	1,000	1,000
2023 (W)	-50,000	15,000	-15,000	-2,200	50,000	-1,700	-650
2024 (W)	-51,000	15,000	-14,000	-2,300	52,000	-150	-800
2025 (BN)	-47,000	6,000	-18,000	-810	50,000	-9,500	-10,000
2026 (AN)	-44,000	14,000	-13,000	-1,200	47,000	3,000	-7,200
2027 (W)	-46,000	17,000	-12,000	-2,700	51,000	6,900	-330
2028 (W)	-51,000	10,000	-14,000	-2,000	53,000	-3,600	-3,900
2029 (C)	-47,000	7,200	-20,000	-820	50,000	-9,900	-14,000
2030 (C)	-35,000	5,400	-18,000	-600	42,000	-6,600	-20,000
2031 (AN)	-33,000	14,000	-14,000	-810	40,000	6,100	-14,000
2032 (BN)	-34,000	5,800	-16,000	-640	40,000	-4,700	-19,000
2033 (AN)	-32,000	12,000	-13,000	-920	38,000	3,800	-15,000
2034 (D)	-35,000	10,000	-17,000	-670	40,000	-3,200	-18,000
2035 (W)	-33,000	16,000	-12,000	-1,400	41,000	9,900	-8,500
2036 (W)	-49,000	22,000	-8,800	-3,200	50,000	11,000	2,500
2037 (W)	-56,000	15,000	-14,000	-2,900	56,000	-1,200	1,300
2038 (D)	-55,000	11,000	-17,000	-1,600	56,000	-6,800	-5,500
2039 (W)	-49,000	15,000	-14,000	-2,000	53,000	2,400	-3,100
2040 (D)	-50,000	8,400	-16,000	-950	52,000	-6,400	-9,500
2041 (C)	-42,000	6,500	-17,000	-650	45,000	-7,400	-17,000
2042 (D)	-31,000	6,400	-15,000	-620	37,000	-3,200	-20,000
2043 (C)	-28,000	7,500	-16,000	-550	33,000	-4,700	-25,000
2044 (C)	-23,000	6,800	-16,000	-510	29,000	-3,200	-28,000
2045 (C)	-20,000	7,900	-18,000	-460	27,000	-3,600	-32,000
2046 (AN)	-19,000	14,000	-13,000	-620	28,000	8,900	-23,000
2047 (C)	-25,000	6,800	-16,000	-510	30,000	-3,800	-27,000
2048 (W)	-25,000	18,000	-13,000	-1,100	33,000	13,000	-13,000
2049 (W)	-35,000	14,000	-15,000	-1,000	39,000	2,800	-11,000
2050 (W)	-39,000	12,000	-15,000	-1,200	43,000	190	-10,000
2051 (W)	-46,000	22,000	-8,900	-2,900	48,000	12,000	1,600
2052 (W)	-53,000	11,000	-14,000	-2,200	54,000	-3,900	-2,300
2053 (AN)	-51,000	12,000	-12,000	-2,000	52,000	-740	-3,100
2054 (D)	-49,000	8,400	-16,000	-900	50,000	-7,000	-10,000
2055 (D)	-42,000	9,900	-17,000	-790	46,000	-3,800	-14,000
2056 (AN)	-40,000	14,000	-14,000	-1,000	44,000	4,100	-9,700
2057 (BN)	-42,000	14,000	-17,000	-1,300	47,000	190	-9,500
2058 (AN)	-47,000	13,000	-12,000	-890	48,000	1,200	-8,400
2059 (W)	-46,000	17,000	-12,000	-2,700	52,000	7,800	-600
2060 (D)	-49,000	6,500	-15,000	-900	50,000	-8,800	-9,400
2061 (C)	-40,000	8,000	-20,000	-700	44,000	-8,600	-18,000
2062 (D)	-32,000	6,300	-16,000	-590	39,000	-3,500	-21,000
2063 (BN)	-33,000	12,000	-13,000	-590	38,000	3,000	-18,000
2064 (W)	-33,000	13,000	-11,000	-800	39,000	7,200	-11,000
2065 (BN)	-37,000	6,100	-16,000	-650	40,000	-7,100	-18,000

Antelope Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-28,000	9,500	-18,000	-600	35,000	-2,700	-21,000
2067 (C)		-22,000	5,700	-19,000	-500	28,000	-7,000	-28,000
2068 (C)		-17,000	10,000	-22,000	-430	25,000	-4,800	-33,000
2069 (BN)		-13,000	11,000	-16,000	-480	23,000	4,200	-29,000
2070 (W)		-20,000	16,000	-15,000	-970	30,000	11,000	-18,000
2071 (BN)		-24,000	5,800	-18,000	-550	32,000	-5,400	-23,000
2072 (W)		-26,000	16,000	-13,000	-810	33,000	8,500	-15,000
Average (2022-2072)		-38,000	11,000	-15,000	-1,200	42,000	-290	
2022-2072	W	-42,000	16,000	-13,000	-1,900	46,000		
	AN	-38,000	13,000	-13,000	-1,100	43,000		
	BN	-33,000	8,600	-16,000	-720	38,000		
	D	-41,000	8,400	-16,000	-840	45,000		
	C	-30,000	7,200	-18,000	-570	35,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-49,000
2023 (W)	-50,000
2024 (W)	-51,000
2025 (BN)	-47,000
2026 (AN)	-44,000
2027 (W)	-46,000
2028 (W)	-51,000
2029 (C)	-47,000
2030 (C)	-35,000
2031 (AN)	-33,000
2032 (BN)	-34,000
2033 (AN)	-32,000
2034 (D)	-35,000
2035 (W)	-33,000
2036 (W)	-49,000
2037 (W)	-56,000
2038 (D)	-55,000
2039 (W)	-49,000
2040 (D)	-50,000
2041 (C)	-42,000
2042 (D)	-31,000
2043 (C)	-28,000
2044 (C)	-23,000
2045 (C)	-20,000
2046 (AN)	-19,000
2047 (C)	-25,000
2048 (W)	-25,000
2049 (W)	-35,000
2050 (W)	-39,000
2051 (W)	-46,000
2052 (W)	-53,000
2053 (AN)	-51,000
2054 (D)	-49,000
2055 (D)	-42,000
2056 (AN)	-40,000
2057 (BN)	-42,000
2058 (AN)	-47,000
2059 (W)	-46,000
2060 (D)	-49,000
2061 (C)	-40,000
2062 (D)	-32,000
2063 (BN)	-33,000

Antelope Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-33,000
2065 (BN)		-37,000
2066 (D)		-28,000
2067 (C)		-22,000
2068 (C)		-17,000
2069 (BN)		-13,000
2070 (W)		-20,000
2071 (BN)		-24,000
2072 (W)		-26,000
Average (2022-2072)		-38,000
2022-2072	W	-42,000
	AN	-38,000
	BN	-33,000
	D	-41,000
	C	-30,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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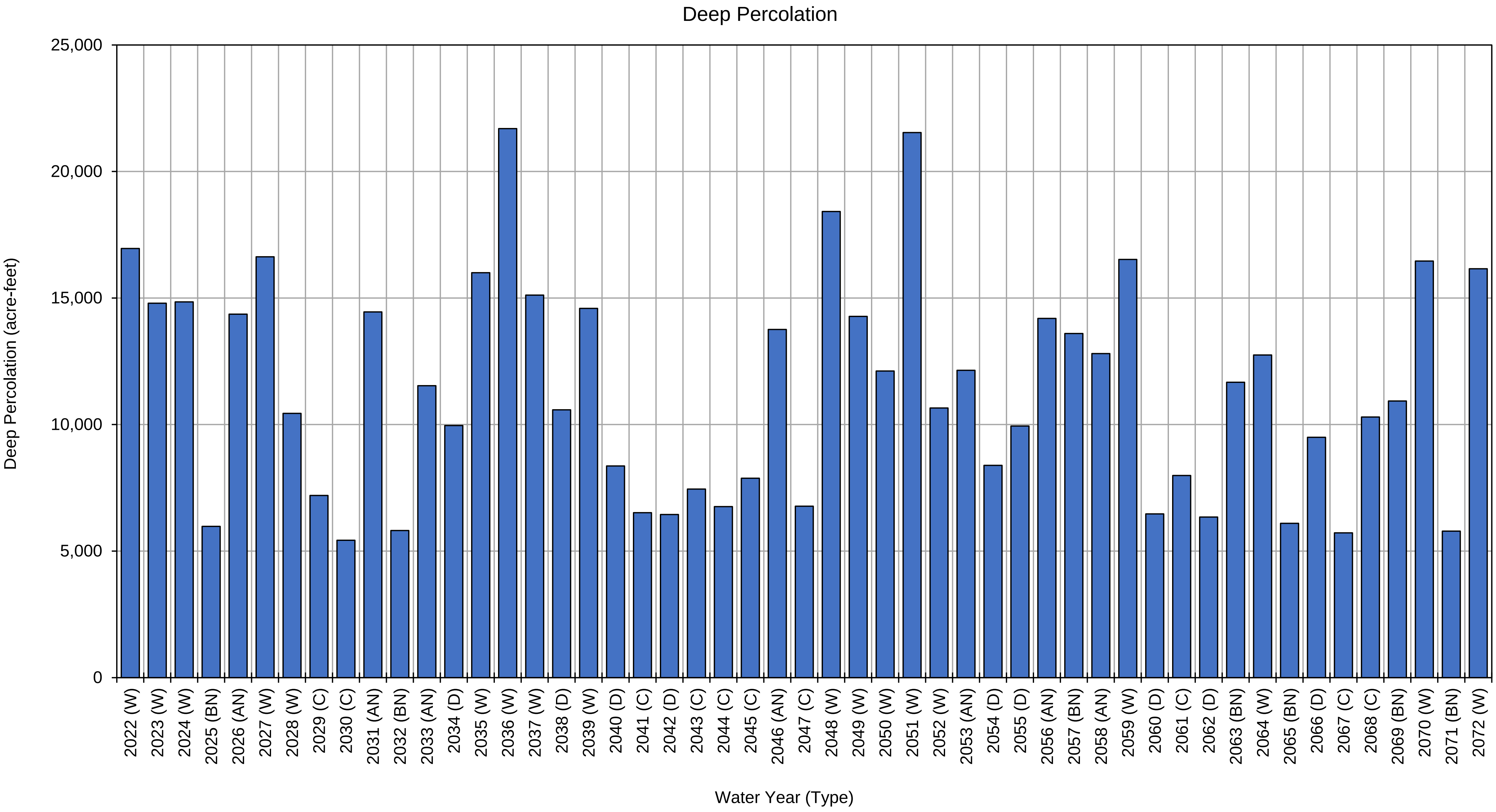
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

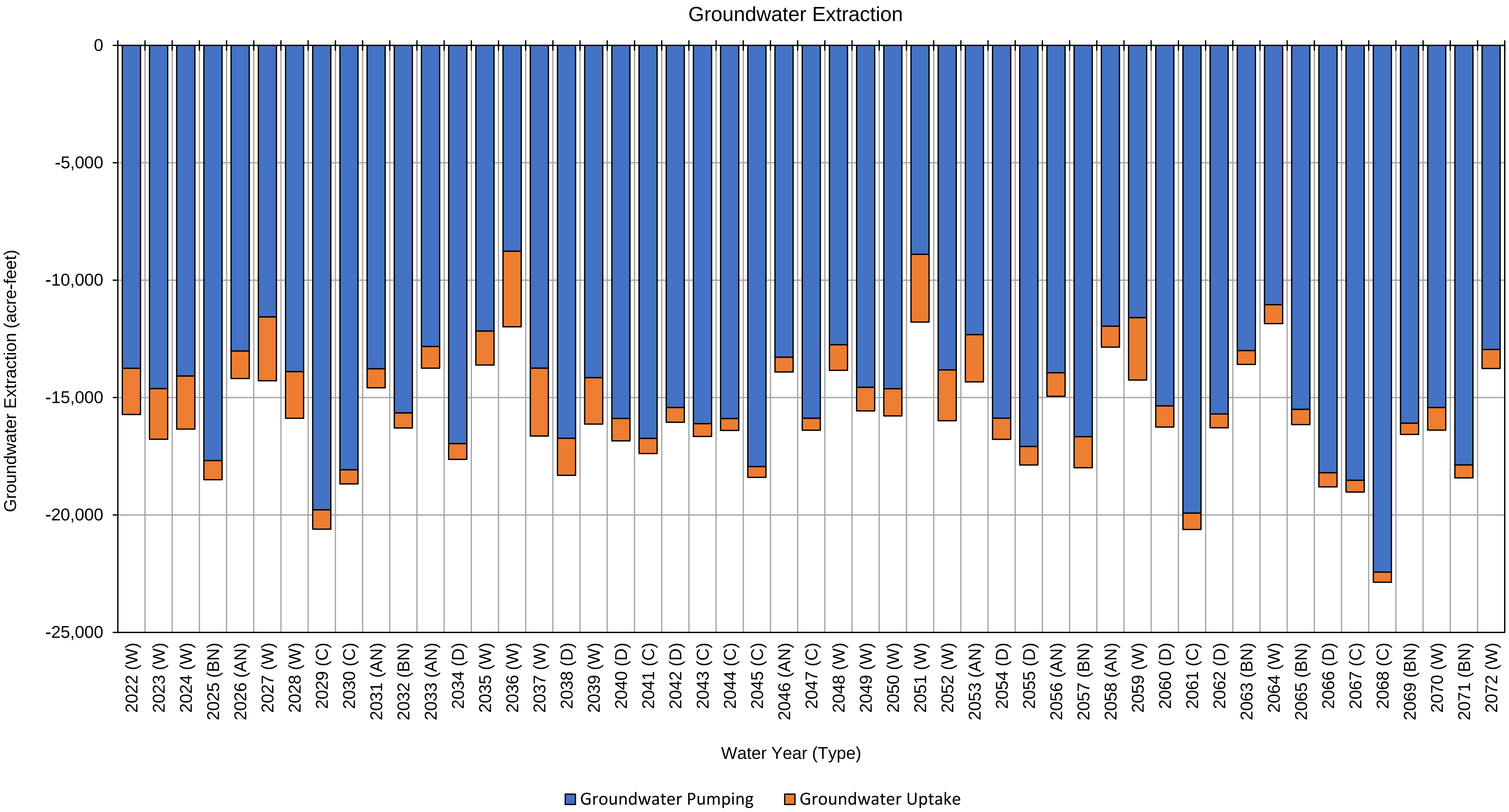
WY (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	6,000
2026 (AN)	14,000
2027 (W)	17,000
2028 (W)	10,000
2029 (C)	7,200
2030 (C)	5,400
2031 (AN)	14,000
2032 (BN)	5,800
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	22,000
2037 (W)	15,000
2038 (D)	11,000
2039 (W)	15,000
2040 (D)	8,400
2041 (C)	6,500
2042 (D)	6,400
2043 (C)	7,500
2044 (C)	6,800
2045 (C)	7,900
2046 (AN)	14,000
2047 (C)	6,800
2048 (W)	18,000
2049 (W)	14,000
2050 (W)	12,000
2051 (W)	22,000
2052 (W)	11,000
2053 (AN)	12,000
2054 (D)	8,400
2055 (D)	9,900
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	17,000
2060 (D)	6,500
2061 (C)	8,000
2062 (D)	6,300
2063 (BN)	12,000

Antelope Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		13,000
2065 (BN)		6,100
2066 (D)		9,500
2067 (C)		5,700
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,800
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	16,000
	AN	13,000
	BN	8,600
	D	8,400
	C	7,200

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

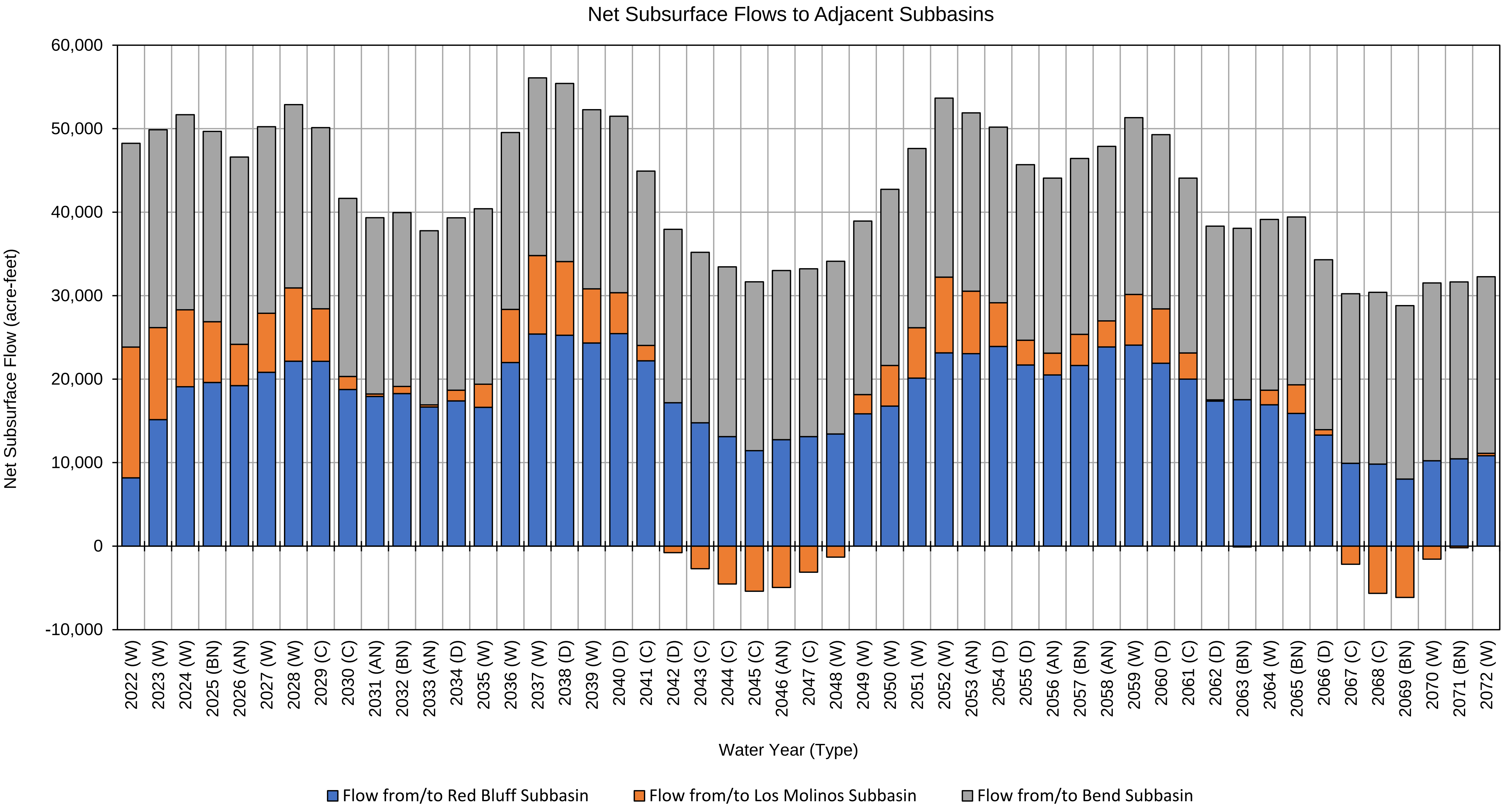
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-14,000	-2,000	-16,000
2023 (W)	-15,000	-2,200	-17,000
2024 (W)	-14,000	-2,300	-16,000
2025 (BN)	-18,000	-810	-18,000
2026 (AN)	-13,000	-1,200	-14,000
2027 (W)	-12,000	-2,700	-14,000
2028 (W)	-14,000	-2,000	-16,000
2029 (C)	-20,000	-820	-21,000
2030 (C)	-18,000	-600	-19,000
2031 (AN)	-14,000	-810	-15,000
2032 (BN)	-16,000	-640	-16,000
2033 (AN)	-13,000	-920	-14,000
2034 (D)	-17,000	-670	-18,000
2035 (W)	-12,000	-1,400	-14,000
2036 (W)	-8,800	-3,200	-12,000
2037 (W)	-14,000	-2,900	-17,000
2038 (D)	-17,000	-1,600	-18,000
2039 (W)	-14,000	-2,000	-16,000
2040 (D)	-16,000	-950	-17,000
2041 (C)	-17,000	-650	-17,000
2042 (D)	-15,000	-620	-16,000
2043 (C)	-16,000	-550	-17,000
2044 (C)	-16,000	-510	-16,000
2045 (C)	-18,000	-460	-18,000
2046 (AN)	-13,000	-620	-14,000
2047 (C)	-16,000	-510	-16,000
2048 (W)	-13,000	-1,100	-14,000
2049 (W)	-15,000	-1,000	-16,000
2050 (W)	-15,000	-1,200	-16,000
2051 (W)	-8,900	-2,900	-12,000
2052 (W)	-14,000	-2,200	-16,000
2053 (AN)	-12,000	-2,000	-14,000
2054 (D)	-16,000	-900	-17,000
2055 (D)	-17,000	-790	-18,000
2056 (AN)	-14,000	-1,000	-15,000
2057 (BN)	-17,000	-1,300	-18,000
2058 (AN)	-12,000	-890	-13,000
2059 (W)	-12,000	-2,700	-14,000
2060 (D)	-15,000	-900	-16,000
2061 (C)	-20,000	-700	-21,000
2062 (D)	-16,000	-590	-16,000
2063 (BN)	-13,000	-590	-14,000

Antelope Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-11,000	-800	-12,000
2065 (BN)		-16,000	-650	-16,000
2066 (D)		-18,000	-600	-19,000
2067 (C)		-19,000	-500	-19,000
2068 (C)		-22,000	-430	-23,000
2069 (BN)		-16,000	-480	-17,000
2070 (W)		-15,000	-970	-16,000
2071 (BN)		-18,000	-550	-18,000
2072 (W)		-13,000	-810	-14,000
Average (2022-2072)		-15,000	-1,200	-16,000
2022-2072	W	-13,000	-1,900	-15,000
	AN	-13,000	-1,100	-14,000
	BN	-16,000	-720	-17,000
	D	-16,000	-840	-17,000
	C	-18,000	-570	-19,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

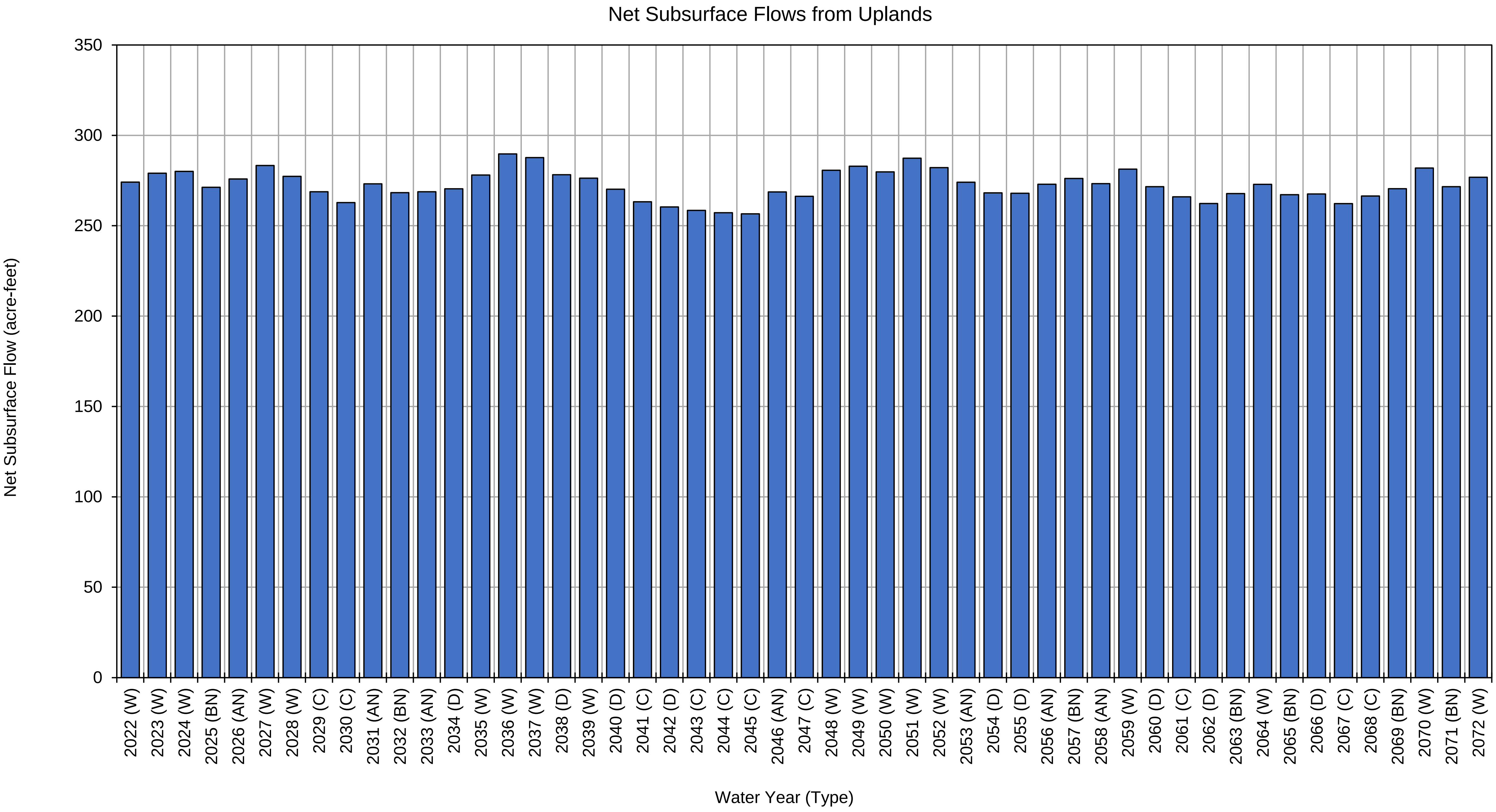
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	8,200	16,000	24,000	48,000
2023 (W)	15,000	11,000	24,000	50,000
2024 (W)	19,000	9,200	23,000	52,000
2025 (BN)	20,000	7,300	23,000	50,000
2026 (AN)	19,000	4,900	22,000	47,000
2027 (W)	21,000	7,100	22,000	50,000
2028 (W)	22,000	8,800	22,000	53,000
2029 (C)	22,000	6,300	22,000	50,000
2030 (C)	19,000	1,600	21,000	42,000
2031 (AN)	18,000	290	21,000	39,000
2032 (BN)	18,000	850	21,000	40,000
2033 (AN)	17,000	260	21,000	38,000
2034 (D)	17,000	1,300	21,000	39,000
2035 (W)	17,000	2,800	21,000	40,000
2036 (W)	22,000	6,400	21,000	50,000
2037 (W)	25,000	9,400	21,000	56,000
2038 (D)	25,000	8,800	21,000	55,000
2039 (W)	24,000	6,500	21,000	52,000
2040 (D)	25,000	4,900	21,000	51,000
2041 (C)	22,000	1,800	21,000	45,000
2042 (D)	17,000	-780	21,000	37,000
2043 (C)	15,000	-2,700	20,000	32,000
2044 (C)	13,000	-4,500	20,000	29,000
2045 (C)	11,000	-5,400	20,000	26,000
2046 (AN)	13,000	-5,000	20,000	28,000
2047 (C)	13,000	-3,100	20,000	30,000
2048 (W)	13,000	-1,300	21,000	33,000
2049 (W)	16,000	2,300	21,000	39,000
2050 (W)	17,000	4,900	21,000	43,000
2051 (W)	20,000	6,000	21,000	48,000
2052 (W)	23,000	9,100	21,000	54,000
2053 (AN)	23,000	7,500	21,000	52,000
2054 (D)	24,000	5,200	21,000	50,000
2055 (D)	22,000	3,000	21,000	46,000
2056 (AN)	21,000	2,600	21,000	44,000
2057 (BN)	22,000	3,700	21,000	46,000
2058 (AN)	24,000	3,100	21,000	48,000
2059 (W)	24,000	6,100	21,000	51,000
2060 (D)	22,000	6,500	21,000	49,000
2061 (C)	20,000	3,100	21,000	44,000
2062 (D)	17,000	150	21,000	38,000
2063 (BN)	18,000	-110	21,000	38,000

Antelope Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		17,000	1,700	20,000	39,000
2065 (BN)		16,000	3,400	20,000	39,000
2066 (D)		13,000	650	20,000	34,000
2067 (C)		9,900	-2,200	20,000	28,000
2068 (C)		9,800	-5,700	21,000	25,000
2069 (BN)		8,000	-6,100	21,000	23,000
2070 (W)		10,000	-1,600	21,000	30,000
2071 (BN)		10,000	-200	21,000	31,000
2072 (W)		11,000	290	21,000	32,000
Average (2022-2072)		18,000	2,900	21,000	42,000
2022-2072	W	18,000	5,800	22,000	46,000
	AN	19,000	2,000	21,000	42,000
	BN	16,000	1,300	21,000	38,000
	D	20,000	3,300	21,000	45,000
	C	16,000	-1,100	21,000	35,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

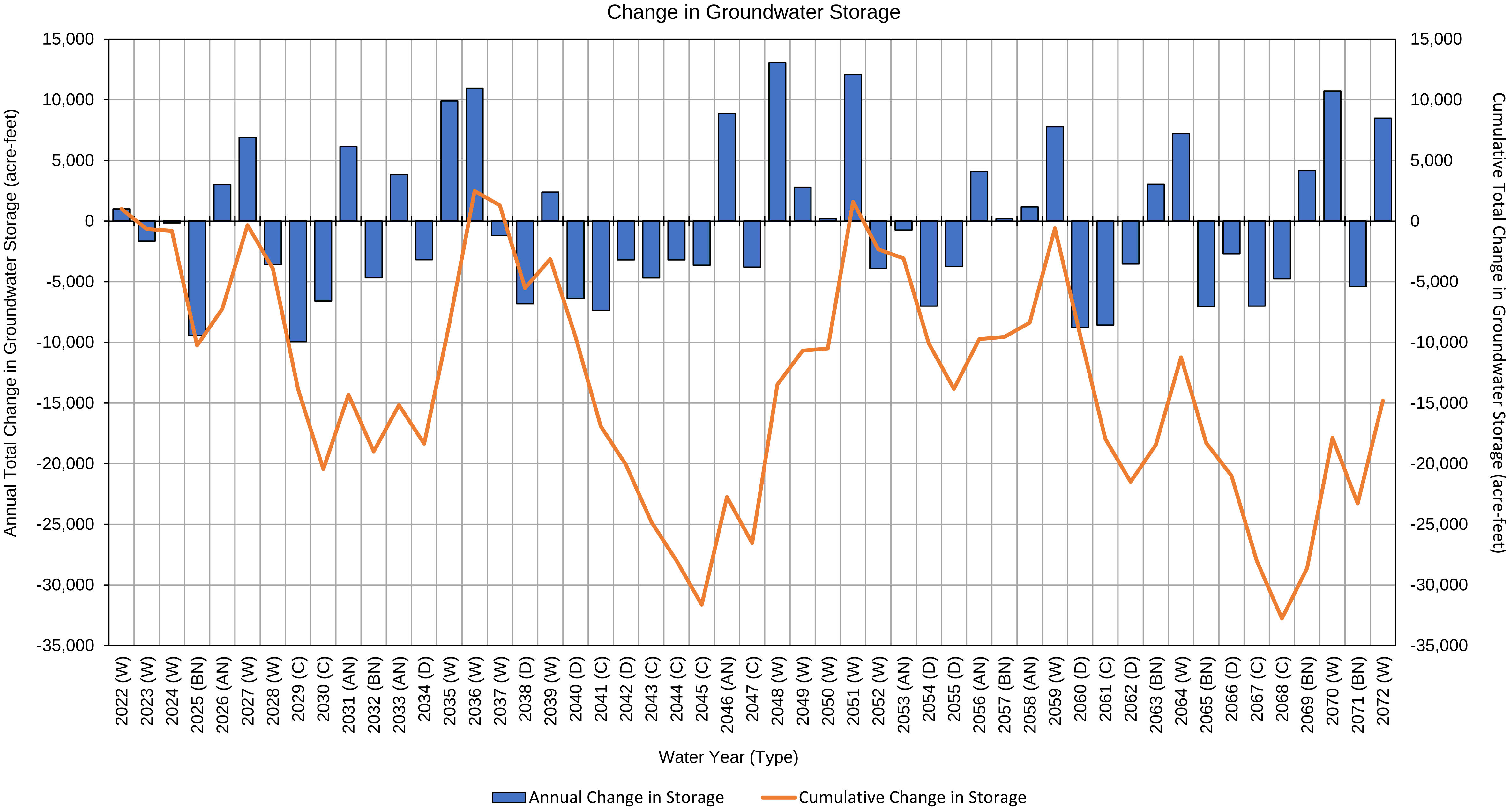
WY (Type)	Subsurface Flows from Uplands
2022 (W)	270
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280
2060 (D)	270
2061 (C)	270
2062 (D)	260
2063 (BN)	270

Antelope Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Antelope Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	1,000	1,000
2023 (W)	-1,700	-650
2024 (W)	-150	-800
2025 (BN)	-9,500	-10,000
2026 (AN)	3,000	-7,200
2027 (W)	6,900	-330
2028 (W)	-3,600	-3,900
2029 (C)	-9,900	-14,000
2030 (C)	-6,600	-20,000
2031 (AN)	6,100	-14,000
2032 (BN)	-4,700	-19,000
2033 (AN)	3,800	-15,000
2034 (D)	-3,200	-18,000
2035 (W)	9,900	-8,500
2036 (W)	11,000	2,500
2037 (W)	-1,200	1,300
2038 (D)	-6,800	-5,500
2039 (W)	2,400	-3,100
2040 (D)	-6,400	-9,500
2041 (C)	-7,400	-17,000
2042 (D)	-3,200	-20,000
2043 (C)	-4,700	-25,000
2044 (C)	-3,200	-28,000
2045 (C)	-3,600	-32,000
2046 (AN)	8,900	-23,000
2047 (C)	-3,800	-27,000
2048 (W)	13,000	-13,000
2049 (W)	2,800	-11,000
2050 (W)	190	-10,000
2051 (W)	12,000	1,600
2052 (W)	-3,900	-2,300
2053 (AN)	-740	-3,100
2054 (D)	-7,000	-10,000
2055 (D)	-3,800	-14,000
2056 (AN)	4,100	-9,700
2057 (BN)	190	-9,500
2058 (AN)	1,200	-8,400
2059 (W)	7,800	-600
2060 (D)	-8,800	-9,400
2061 (C)	-8,600	-18,000
2062 (D)	-3,500	-21,000
2063 (BN)	3,000	-18,000

Antelope Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		7,200	-11,000
2065 (BN)		-7,100	-18,000
2066 (D)		-2,700	-21,000
2067 (C)		-7,000	-28,000
2068 (C)		-4,800	-33,000
2069 (BN)		4,200	-29,000
2070 (W)		11,000	-18,000
2071 (BN)		-5,400	-23,000
2072 (W)		8,500	-15,000
Average (2022-2072)		-290	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-3

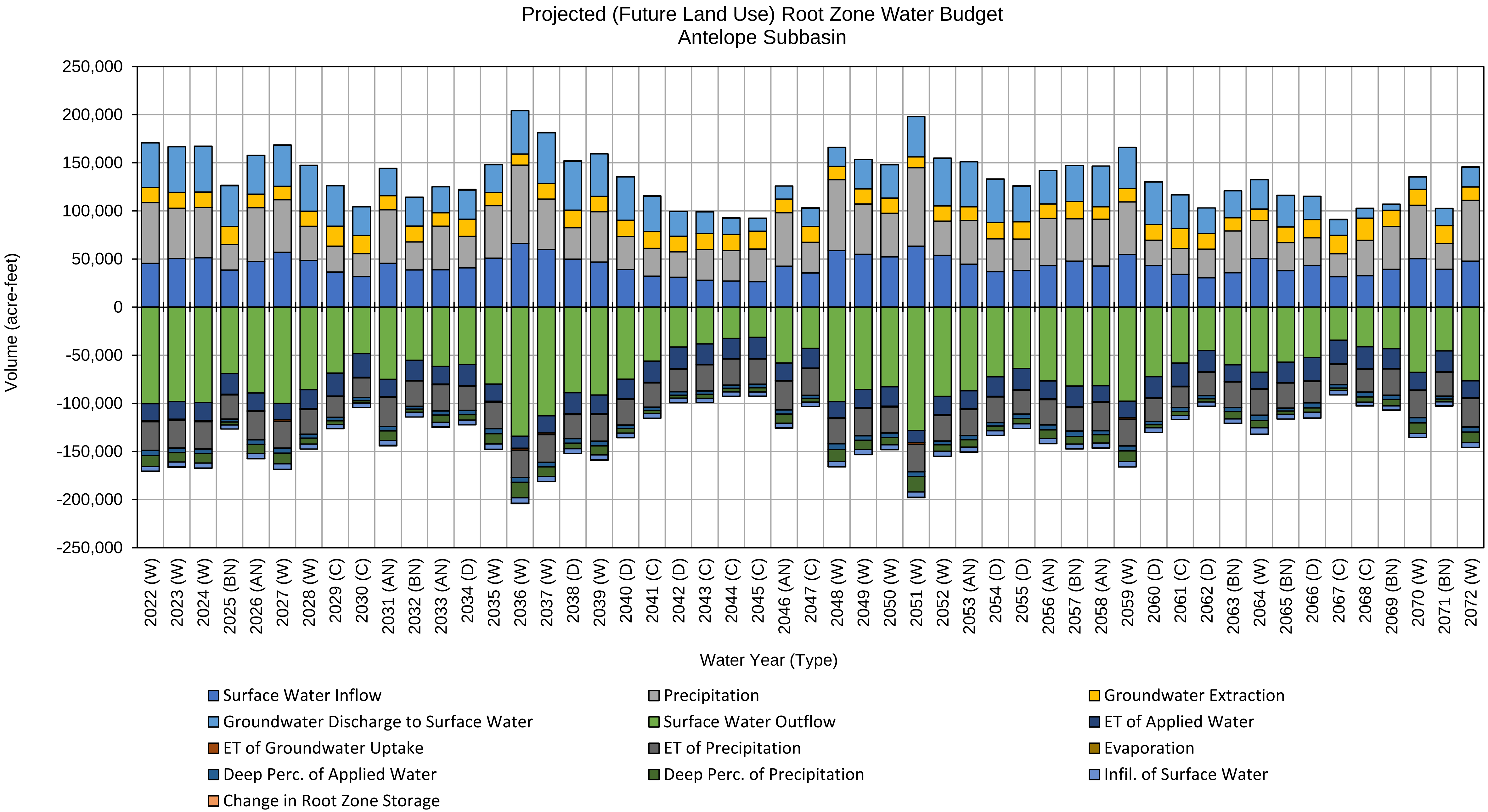
Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) Model Results

APPENDIX A-3a

Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) Model Results– Surface Water System


Projected (Future Land Use) Root Zone Water Budget
Antelope Subbasin
Volume (acre-feet)
250,000
200,000
150,000
100,000
50,000
0
-50,000
-100,000
-150,000
-200,000
-250,000
2022 (W)
2023 (W)
2024 (W)
2025 (BN)
2026 (AN)
2027 (W)
2028 (W)
2029 (C)
2030 (C)
2031 (AN)
2032 (BN)
2033 (AN)
2034 (D)
2035 (W)
2036 (W)
2037 (W)
2038 (D)
2039 (W)
2040 (D)
2041 (C)
2042 (D)
2043 (C)
2044 (C)
2045 (C)
2046 (AN)
2047 (C)
2048 (W)
2049 (W)
2050 (W)
2051 (W)
2052 (W)
2053 (AN)
2054 (D)
2055 (D)
2056 (AN)
2057 (BN)
2058 (AN)
2059 (W)
2060 (D)
2061 (C)
2062 (D)
2063 (BN)
2064 (W)
2065 (BN)
2066 (D)
2067 (C)
2068 (C)
2069 (BN)
2070 (W)
2071 (BN)
2072 (W)
Water Year (Type)
Surface Water Inflow
Precipitation
Groundwater Extraction
Groundwater Discharge to Surface Water
Surface Water Outflow
ET of Applied Water
ET of Groundwater Uptake
ET of Precipitation
Evaporation
Deep Perc. of Applied Water
Deep Perc. of Precipitation
Infil. of Surface Water
Change in Root Zone Storage

Antelope Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

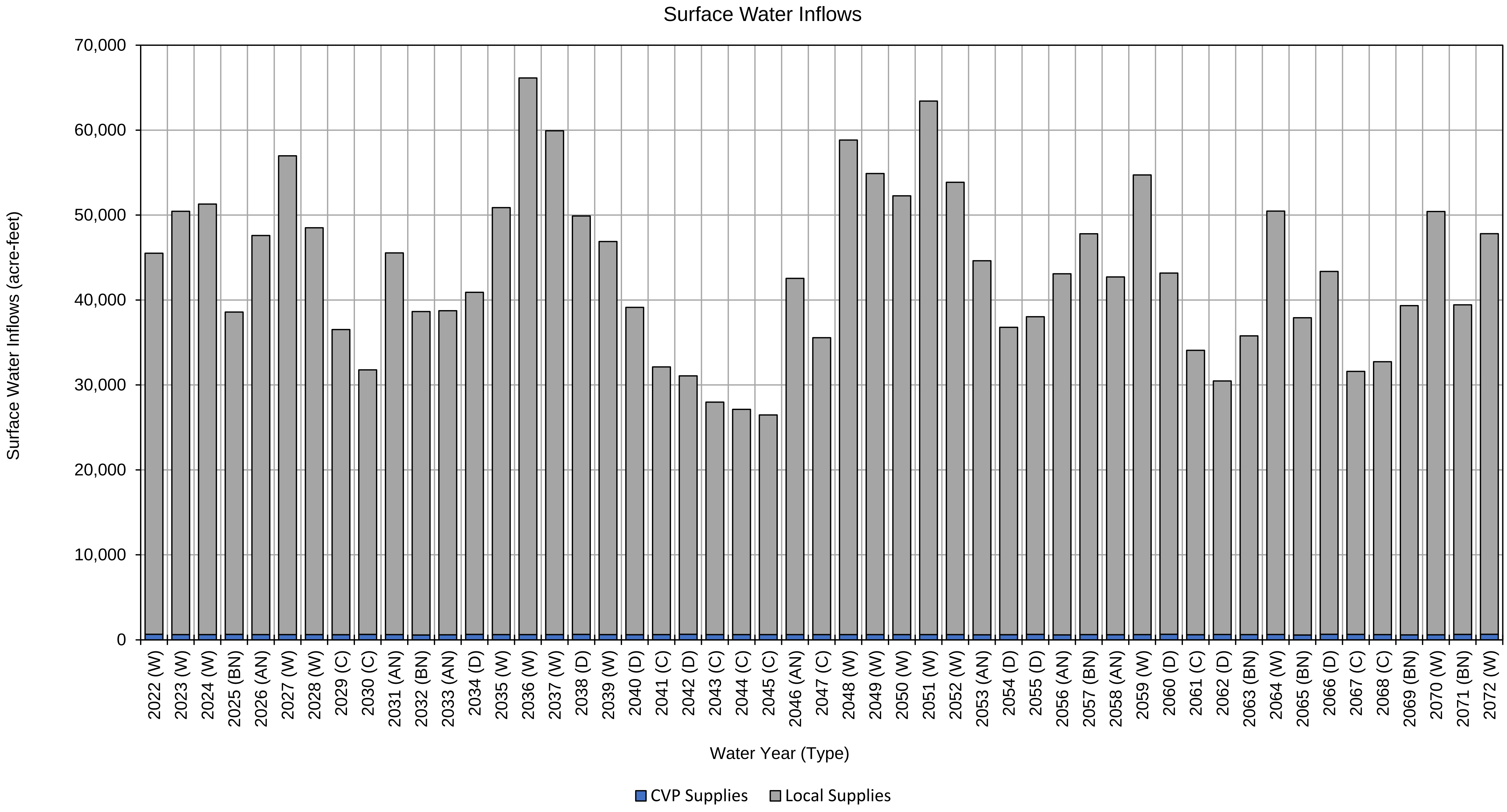
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	46,000	63,000	16,000	46,000	100,000	17,000	1,300	30,000	140	5,300	11,000	4,800	250
2023 (W)	50,000	52,000	17,000	47,000	98,000	18,000	1,300	29,000	150	4,700	9,800	5,200	540
2024 (W)	51,000	52,000	16,000	48,000	99,000	19,000	1,300	28,000	150	4,800	9,700	5,200	1
2025 (BN)	39,000	27,000	19,000	42,000	69,000	21,000	660	25,000	120	3,000	3,100	4,200	-490
2026 (AN)	48,000	56,000	14,000	40,000	89,000	18,000	820	29,000	150	4,600	9,700	5,100	320
2027 (W)	57,000	55,000	14,000	43,000	100,000	17,000	1,700	28,000	170	5,100	11,000	5,700	-150
2028 (W)	49,000	36,000	16,000	48,000	86,000	19,000	1,100	26,000	150	4,000	6,200	5,100	-160
2029 (C)	37,000	27,000	21,000	42,000	69,000	24,000	660	22,000	130	3,500	3,800	4,400	-230
2030 (C)	32,000	24,000	19,000	30,000	48,000	25,000	530	20,000	150	3,300	2,300	4,700	-82
2031 (AN)	46,000	56,000	15,000	28,000	75,000	18,000	660	30,000	150	4,600	9,900	5,000	620
2032 (BN)	39,000	29,000	16,000	30,000	55,000	21,000	560	26,000	160	2,700	3,200	5,000	-310
2033 (AN)	39,000	45,000	14,000	27,000	62,000	18,000	750	27,000	150	4,200	7,300	4,900	550
2034 (D)	41,000	33,000	18,000	30,000	60,000	22,000	580	25,000	150	4,400	5,600	4,900	-630
2035 (W)	51,000	55,000	14,000	29,000	80,000	18,000	1,000	27,000	170	5,300	11,000	5,500	230
2036 (W)	66,000	81,000	12,000	45,000	130,000	12,000	2,000	28,000	150	5,000	16,000	5,600	470
2037 (W)	60,000	52,000	16,000	53,000	110,000	18,000	1,700	29,000	150	4,700	10,000	5,500	-130
2038 (D)	50,000	33,000	18,000	51,000	89,000	22,000	860	25,000	150	4,600	5,800	5,100	-560
2039 (W)	47,000	52,000	16,000	44,000	91,000	19,000	1,100	27,000	150	4,900	9,400	5,100	560
2040 (D)	39,000	34,000	17,000	45,000	75,000	20,000	680	27,000	150	3,500	4,900	4,800	-320
2041 (C)	32,000	29,000	18,000	37,000	56,000	22,000	560	25,000	150	3,300	3,400	4,700	-30
2042 (D)	31,000	26,000	16,000	26,000	42,000	22,000	540	23,000	160	3,500	3,000	4,800	-150
2043 (C)	28,000	32,000	17,000	23,000	38,000	21,000	480	27,000	140	3,500	4,100	4,500	-11
2044 (C)	27,000	32,000	17,000	17,000	33,000	21,000	440	27,000	140	3,000	3,800	4,500	-1
2045 (C)	26,000	34,000	19,000	13,000	31,000	22,000	410	26,000	130	3,600	4,400	4,200	-89
2046 (AN)	43,000	56,000	14,000	14,000	58,000	18,000	540	30,000	150	4,300	9,400	4,900	420
2047 (C)	36,000	32,000	17,000	19,000	43,000	21,000	450	28,000	140	2,900	3,900	4,500	-330
2048 (W)	59,000	74,000	14,000	20,000	98,000	17,000	850	26,000	150	5,800	13,000	5,400	300
2049 (W)	55,000	52,000	16,000	31,000	86,000	19,000	800	28,000	150	4,700	9,500	5,300	190
2050 (W)	52,000	45,000	16,000	35,000	83,000	20,000	840	27,000	150	4,500	7,500	5,200	-250
2051 (W)	63,000	81,000	11,000	42,000	130,000	13,000	1,700	28,000	150	4,900	16,000	5,500	390
2052 (W)	54,000	36,000	16,000	49,000	93,000	19,000	1,200	26,000	150	3,900	6,500	5,200	-600
2053 (AN)	45,000	45,000	14,000	47,000	87,000	18,000	1,200	27,000	150	4,300	7,600	5,000	560
2054 (D)	37,000	34,000	17,000	45,000	72,000	20,000	670	27,000	150	3,500	4,900	4,700	-400
2055 (D)	38,000	33,000	18,000	37,000	64,000	22,000	650	25,000	150	4,500	5,500	4,800	-240
2056 (AN)	43,000	49,000	15,000	35,000	77,000	19,000	750	26,000	150	5,100	9,100	5,000	280
2057 (BN)	48,000	44,000	18,000	37,000	82,000	22,000	900	24,000	150	5,600	8,000	5,100	-230
2058 (AN)	43,000	49,000	13,000	42,000	82,000	16,000	680	30,000	150	4,100	8,700	5,000	350
2059 (W)	55,000	55,000	14,000	43,000	98,000	17,000	1,600	28,000	170	5,100	11,000	5,600	-160
2060 (D)	43,000	26,000	16,000	44,000	72,000	22,000	690	24,000	160	3,400	3,100	5,000	-180
2061 (C)	34,000	27,000	21,000	35,000	58,000	24,000	590	21,000	130	4,100	3,900	4,400	-210
2062 (D)	30,000	30,000	16,000	26,000	45,000	22,000	510	24,000	140	3,100	3,300	4,400	100
2063 (BN)	36,000	43,000	14,000	28,000	60,000	17,000	510	26,000	140	4,100	7,600	4,600	91
2064 (W)	50,000	39,000	12,000	30,000	68,000	17,000	680	27,000	230	5,300	7,500	6,600	380
2065 (BN)	38,000	29,000	16,000	33,000	57,000	21,000	570	26,000	160	2,900	3,300	5,000	-340

Antelope Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		43,000	29,000	19,000	24,000	53,000	24,000	530	22,000	210	5,200	4,400	6,100	78
2067 (C)		32,000	24,000	19,000	16,000	34,000	25,000	450	21,000	150	3,500	2,400	4,700	-390
2068 (C)		33,000	37,000	23,000	10,000	41,000	23,000	380	24,000	110	4,900	5,500	3,700	250
2069 (BN)		39,000	45,000	17,000	6,400	43,000	21,000	410	27,000	130	4,300	6,700	4,300	120
2070 (W)		50,000	56,000	16,000	13,000	68,000	18,000	770	28,000	100	5,400	11,000	4,200	-110
2071 (BN)		39,000	27,000	19,000	18,000	46,000	22,000	480	25,000	120	3,000	2,900	4,200	33
2072 (W)		48,000	63,000	14,000	21,000	77,000	18,000	660	30,000	140	5,200	11,000	4,800	-55
Average (2022-2072)		43,000	43,000	16,000	33,000	72,000	20,000	820	26,000	150	4,200	7,100	4,900	5
2022-2072	W	54,000	56,000	15,000	38,000	94,000	18,000	1,200	28,000	160	4,900	10,000	5,300	94
	AN	44,000	51,000	14,000	33,000	76,000	18,000	770	29,000	150	4,500	8,800	5,000	440
	BN	40,000	35,000	17,000	28,000	59,000	21,000	590	26,000	140	3,600	5,000	4,600	-160
	D	39,000	31,000	17,000	37,000	63,000	22,000	640	25,000	160	4,000	4,500	5,000	-260
	C	32,000	30,000	19,000	24,000	45,000	23,000	500	24,000	140	3,600	3,700	4,400	-110

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

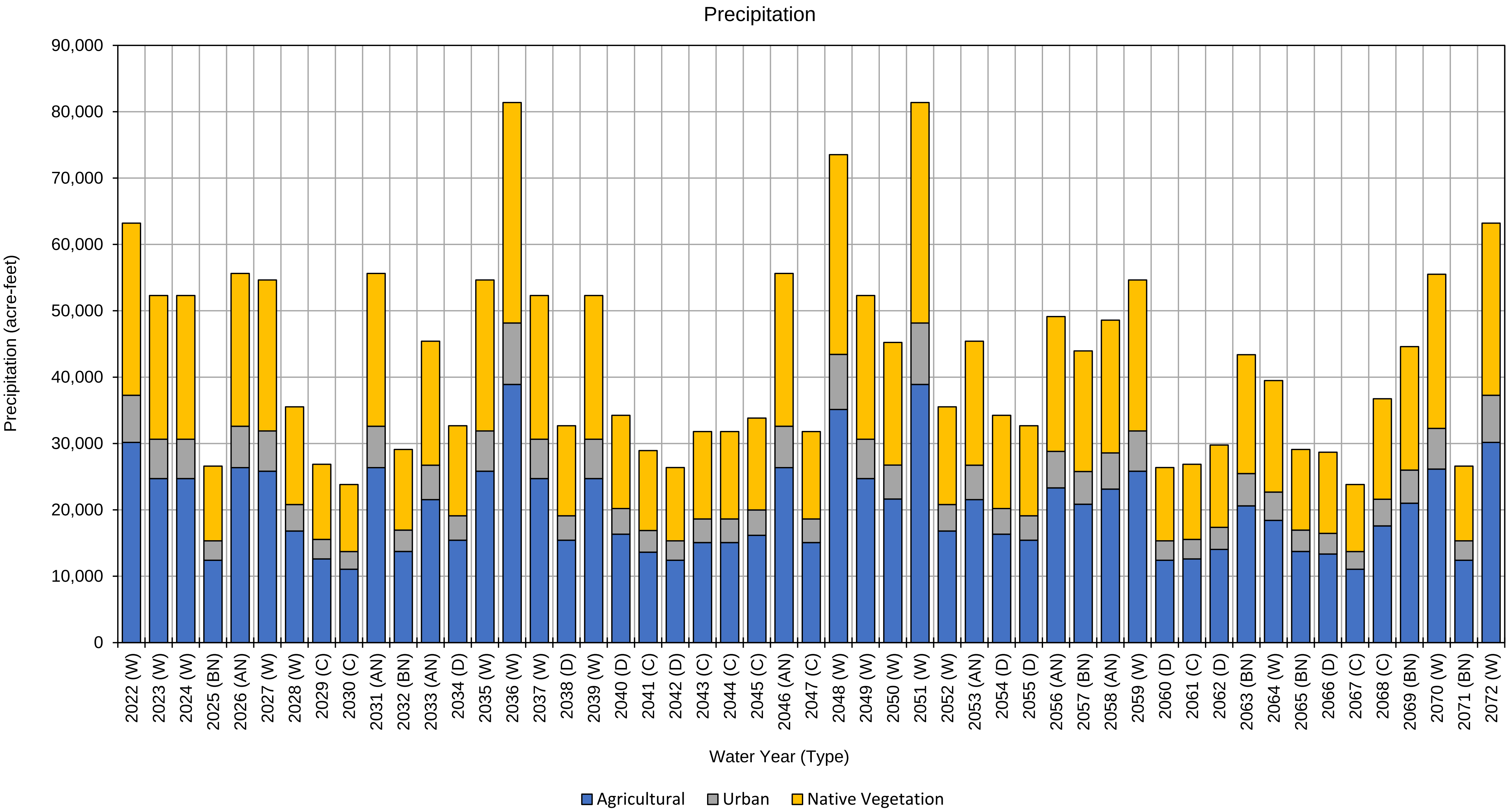
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	45,000	46,000
2023 (W)	610	50,000	51,000
2024 (W)	610	51,000	52,000
2025 (BN)	630	38,000	39,000
2026 (AN)	610	47,000	48,000
2027 (W)	610	56,000	57,000
2028 (W)	620	48,000	49,000
2029 (C)	600	36,000	37,000
2030 (C)	640	31,000	32,000
2031 (AN)	610	45,000	46,000
2032 (BN)	560	38,000	39,000
2033 (AN)	580	38,000	39,000
2034 (D)	640	40,000	41,000
2035 (W)	610	50,000	51,000
2036 (W)	610	66,000	67,000
2037 (W)	610	59,000	60,000
2038 (D)	640	49,000	50,000
2039 (W)	610	46,000	47,000
2040 (D)	600	39,000	40,000
2041 (C)	610	32,000	33,000
2042 (D)	650	30,000	31,000
2043 (C)	610	27,000	28,000
2044 (C)	610	27,000	28,000
2045 (C)	610	26,000	27,000
2046 (AN)	610	42,000	43,000
2047 (C)	610	35,000	36,000
2048 (W)	610	58,000	59,000
2049 (W)	610	54,000	55,000
2050 (W)	610	52,000	53,000
2051 (W)	610	63,000	64,000
2052 (W)	620	53,000	54,000
2053 (AN)	580	44,000	45,000
2054 (D)	600	36,000	37,000
2055 (D)	640	37,000	38,000
2056 (AN)	580	43,000	44,000
2057 (BN)	620	47,000	48,000
2058 (AN)	600	42,000	43,000
2059 (W)	610	54,000	55,000
2060 (D)	650	43,000	44,000
2061 (C)	600	33,000	34,000
2062 (D)	620	30,000	31,000
2063 (BN)	610	35,000	36,000

Antelope Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		630	50,000	51,000
2065 (BN)		560	37,000	38,000
2066 (D)		650	43,000	44,000
2067 (C)		640	31,000	32,000
2068 (C)		610	32,000	33,000
2069 (BN)		580	39,000	40,000
2070 (W)		580	50,000	51,000
2071 (BN)		630	39,000	40,000
2072 (W)		650	47,000	48,000
Average (2022-2072)		610	43,000	44,000
2022-2072	W	620	53,000	54,000
	AN	600	43,000	44,000
	BN	600	39,000	40,000
	D	630	39,000	40,000
	C	610	31,000	32,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

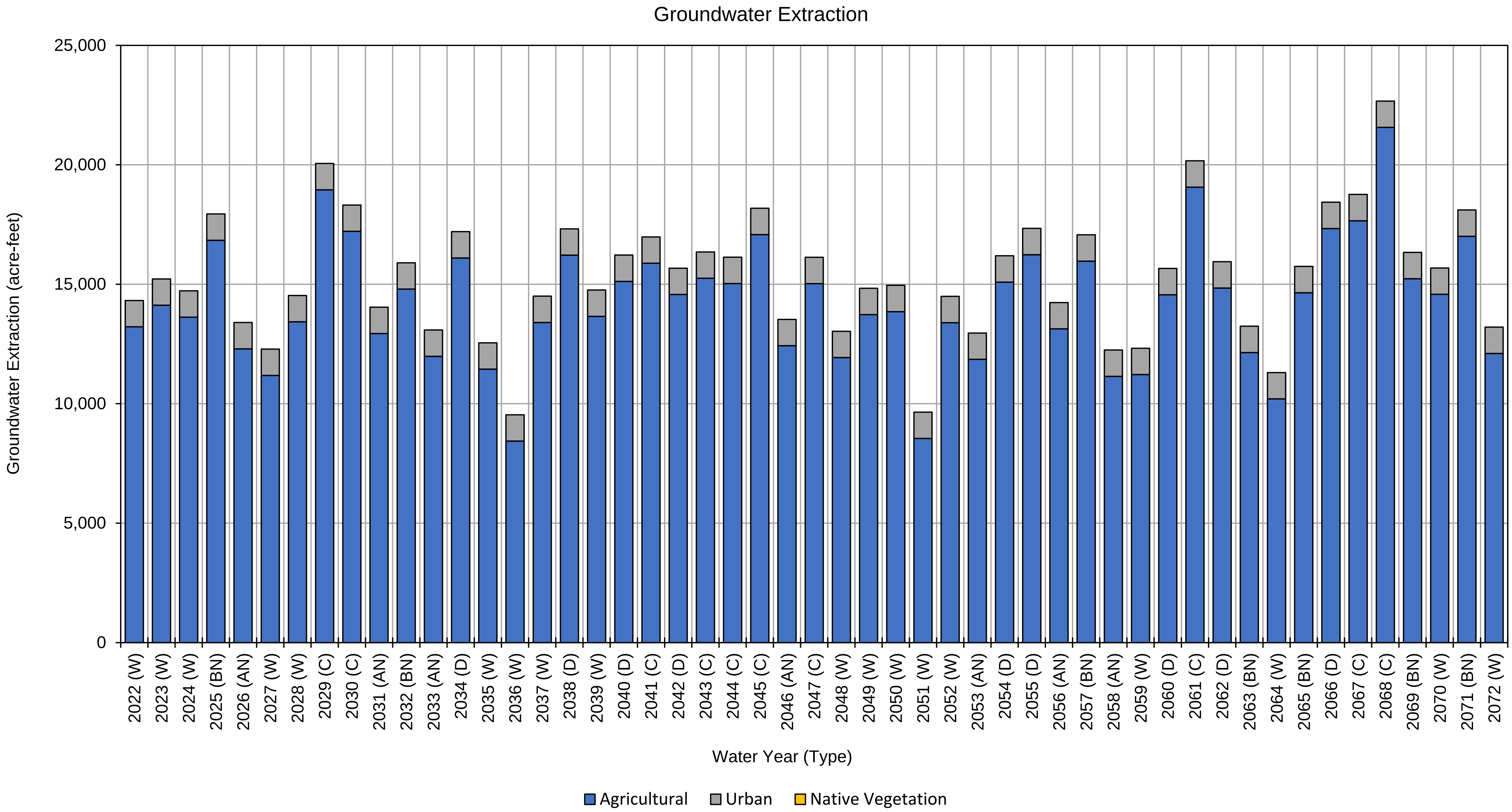
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	30,000	7,100	26,000	63,000
2023 (W)	25,000	5,900	22,000	53,000
2024 (W)	25,000	5,900	22,000	53,000
2025 (BN)	12,000	2,900	11,000	26,000
2026 (AN)	26,000	6,200	23,000	55,000
2027 (W)	26,000	6,100	23,000	55,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	13,000	2,900	11,000	27,000
2030 (C)	11,000	2,700	10,000	24,000
2031 (AN)	26,000	6,200	23,000	55,000
2032 (BN)	14,000	3,200	12,000	29,000
2033 (AN)	22,000	5,200	19,000	46,000
2034 (D)	15,000	3,700	14,000	33,000
2035 (W)	26,000	6,100	23,000	55,000
2036 (W)	39,000	9,300	33,000	81,000
2037 (W)	25,000	5,900	22,000	53,000
2038 (D)	15,000	3,700	14,000	33,000
2039 (W)	25,000	5,900	22,000	53,000
2040 (D)	16,000	3,900	14,000	34,000
2041 (C)	14,000	3,300	12,000	29,000
2042 (D)	12,000	2,900	11,000	26,000
2043 (C)	15,000	3,600	13,000	32,000
2044 (C)	15,000	3,600	13,000	32,000
2045 (C)	16,000	3,800	14,000	34,000
2046 (AN)	26,000	6,200	23,000	55,000
2047 (C)	15,000	3,600	13,000	32,000
2048 (W)	35,000	8,300	30,000	73,000
2049 (W)	25,000	5,900	22,000	53,000
2050 (W)	22,000	5,100	18,000	45,000
2051 (W)	39,000	9,300	33,000	81,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	22,000	5,200	19,000	46,000
2054 (D)	16,000	3,900	14,000	34,000
2055 (D)	15,000	3,700	14,000	33,000
2056 (AN)	23,000	5,500	20,000	49,000
2057 (BN)	21,000	4,900	18,000	44,000
2058 (AN)	23,000	5,500	20,000	49,000
2059 (W)	26,000	6,100	23,000	55,000
2060 (D)	12,000	2,900	11,000	26,000
2061 (C)	13,000	2,900	11,000	27,000
2062 (D)	14,000	3,300	12,000	29,000
2063 (BN)	21,000	4,900	18,000	44,000

Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		18,000	4,300	17,000	39,000
2065 (BN)		14,000	3,200	12,000	29,000
2066 (D)		13,000	3,100	12,000	28,000
2067 (C)		11,000	2,700	10,000	24,000
2068 (C)		18,000	4,000	15,000	37,000
2069 (BN)		21,000	5,000	19,000	45,000
2070 (W)		26,000	6,100	23,000	55,000
2071 (BN)		12,000	2,900	11,000	26,000
2072 (W)		30,000	7,100	26,000	63,000
Average (2022-2072)		20,000	4,800	18,000	43,000
2022-2072	W	26,000	6,200	23,000	55,000
	AN	24,000	5,700	21,000	51,000
	BN	16,000	3,900	15,000	35,000
	D	15,000	3,500	13,000	32,000
	C	14,000	3,300	12,000	29,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

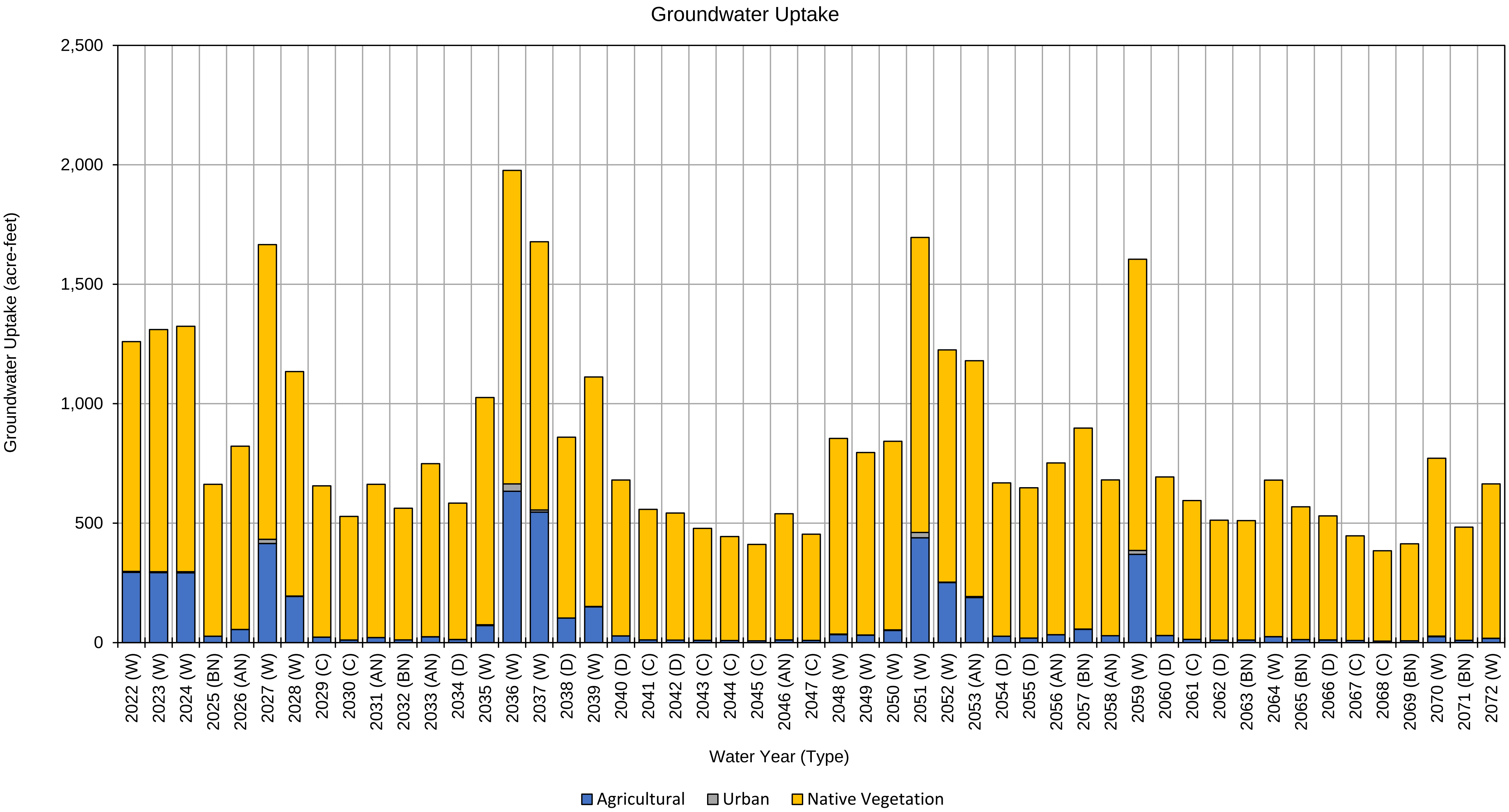
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,100	0	14,000
2023 (W)	14,000	1,100	0	15,000
2024 (W)	14,000	1,100	0	15,000
2025 (BN)	17,000	1,100	0	18,000
2026 (AN)	12,000	1,100	0	13,000
2027 (W)	11,000	1,100	0	12,000
2028 (W)	13,000	1,100	0	14,000
2029 (C)	19,000	1,100	0	20,000
2030 (C)	17,000	1,100	0	18,000
2031 (AN)	13,000	1,100	0	14,000
2032 (BN)	15,000	1,100	0	16,000
2033 (AN)	12,000	1,100	0	13,000
2034 (D)	16,000	1,100	0	17,000
2035 (W)	11,000	1,100	0	12,000
2036 (W)	8,400	1,100	0	9,500
2037 (W)	13,000	1,100	0	14,000
2038 (D)	16,000	1,100	0	17,000
2039 (W)	14,000	1,100	0	15,000
2040 (D)	15,000	1,100	0	16,000
2041 (C)	16,000	1,100	0	17,000
2042 (D)	15,000	1,100	0	16,000
2043 (C)	15,000	1,100	0	16,000
2044 (C)	15,000	1,100	0	16,000
2045 (C)	17,000	1,100	0	18,000
2046 (AN)	12,000	1,100	0	13,000
2047 (C)	15,000	1,100	0	16,000
2048 (W)	12,000	1,100	0	13,000
2049 (W)	14,000	1,100	0	15,000
2050 (W)	14,000	1,100	0	15,000
2051 (W)	8,500	1,100	0	9,600
2052 (W)	13,000	1,100	0	14,000
2053 (AN)	12,000	1,100	0	13,000
2054 (D)	15,000	1,100	0	16,000
2055 (D)	16,000	1,100	0	17,000
2056 (AN)	13,000	1,100	0	14,000
2057 (BN)	16,000	1,100	0	17,000
2058 (AN)	11,000	1,100	0	12,000
2059 (W)	11,000	1,100	0	12,000
2060 (D)	15,000	1,100	0	16,000
2061 (C)	19,000	1,100	0	20,000
2062 (D)	15,000	1,100	0	16,000
2063 (BN)	12,000	1,100	0	13,000

Antelope Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		10,000	1,100	0	11,000
2065 (BN)		15,000	1,100	0	16,000
2066 (D)		17,000	1,100	0	18,000
2067 (C)		18,000	1,100	0	19,000
2068 (C)		22,000	1,100	0	23,000
2069 (BN)		15,000	1,100	0	16,000
2070 (W)		15,000	1,100	0	16,000
2071 (BN)		17,000	1,100	0	18,000
2072 (W)		12,000	1,100	0	13,000
Average (2022-2072)		14,000	1,100	0	15,000
2022-2072	W	12,000	1,100	0	13,000
	AN	12,000	1,100	0	13,000
	BN	15,000	1,100	0	16,000
	D	16,000	1,100	0	17,000
	C	17,000	1,100	0	18,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	290	4	960	1,300
2023 (W)	290	4	1,000	1,300
2024 (W)	290	5	1,000	1,300
2025 (BN)	26	0	640	670
2026 (AN)	54	0	770	820
2027 (W)	410	18	1,200	1,600
2028 (W)	190	2	940	1,100
2029 (C)	23	0	630	650
2030 (C)	11	0	520	530
2031 (AN)	21	0	640	660
2032 (BN)	11	0	550	560
2033 (AN)	24	1	720	750
2034 (D)	13	0	570	580
2035 (W)	71	3	950	1,000
2036 (W)	630	31	1,300	2,000
2037 (W)	550	9	1,100	1,700
2038 (D)	100	0	760	860
2039 (W)	150	2	960	1,100
2040 (D)	28	0	650	680
2041 (C)	11	0	550	560
2042 (D)	10	0	530	540
2043 (C)	9	0	470	480
2044 (C)	9	0	440	450
2045 (C)	8	0	400	410
2046 (AN)	11	0	530	540
2047 (C)	9	0	440	450
2048 (W)	33	3	820	860
2049 (W)	31	1	760	790
2050 (W)	51	2	790	840
2051 (W)	440	22	1,200	1,700
2052 (W)	250	2	970	1,200
2053 (AN)	190	5	990	1,200
2054 (D)	27	0	640	670
2055 (D)	19	0	630	650
2056 (AN)	33	0	720	750
2057 (BN)	55	1	840	900
2058 (AN)	29	0	650	680
2059 (W)	370	16	1,200	1,600
2060 (D)	30	0	660	690
2061 (C)	13	0	580	590
2062 (D)	10	0	500	510
2063 (BN)	11	0	500	510

Antelope Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		25	0	660	690
2065 (BN)		12	0	560	570
2066 (D)		11	0	520	530
2067 (C)		9	0	440	450
2068 (C)		6	0	380	390
2069 (BN)		7	0	410	420
2070 (W)		24	3	740	770
2071 (BN)		10	0	470	480
2072 (W)		18	1	650	670
Average (2022-2072)		98	3	720	820
2022-2072	W	230	7	960	1,200
	AN	51	1	720	770
	BN	19	0	570	590
	D	28	0	610	640
	C	11	0	480	490

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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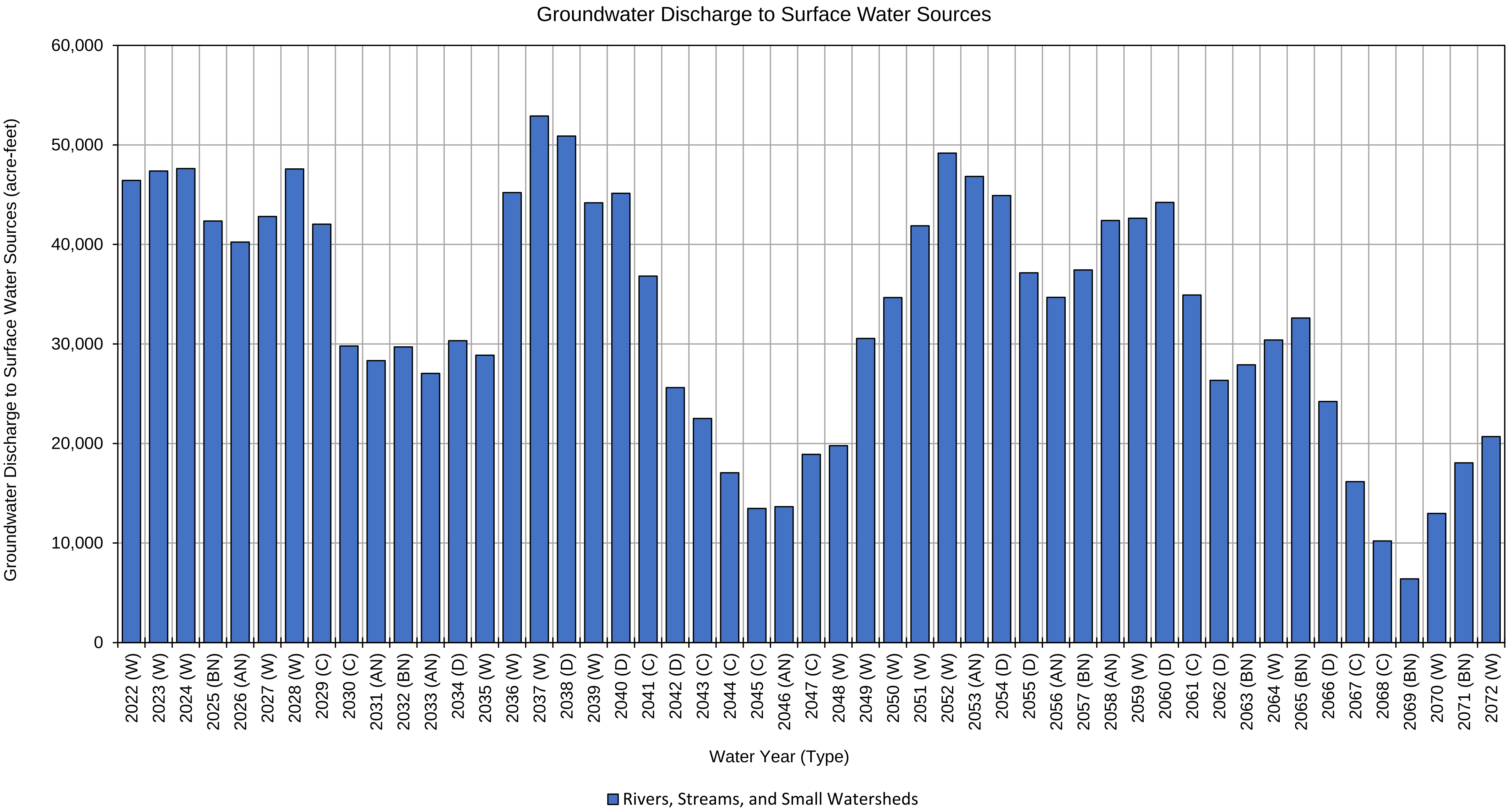
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

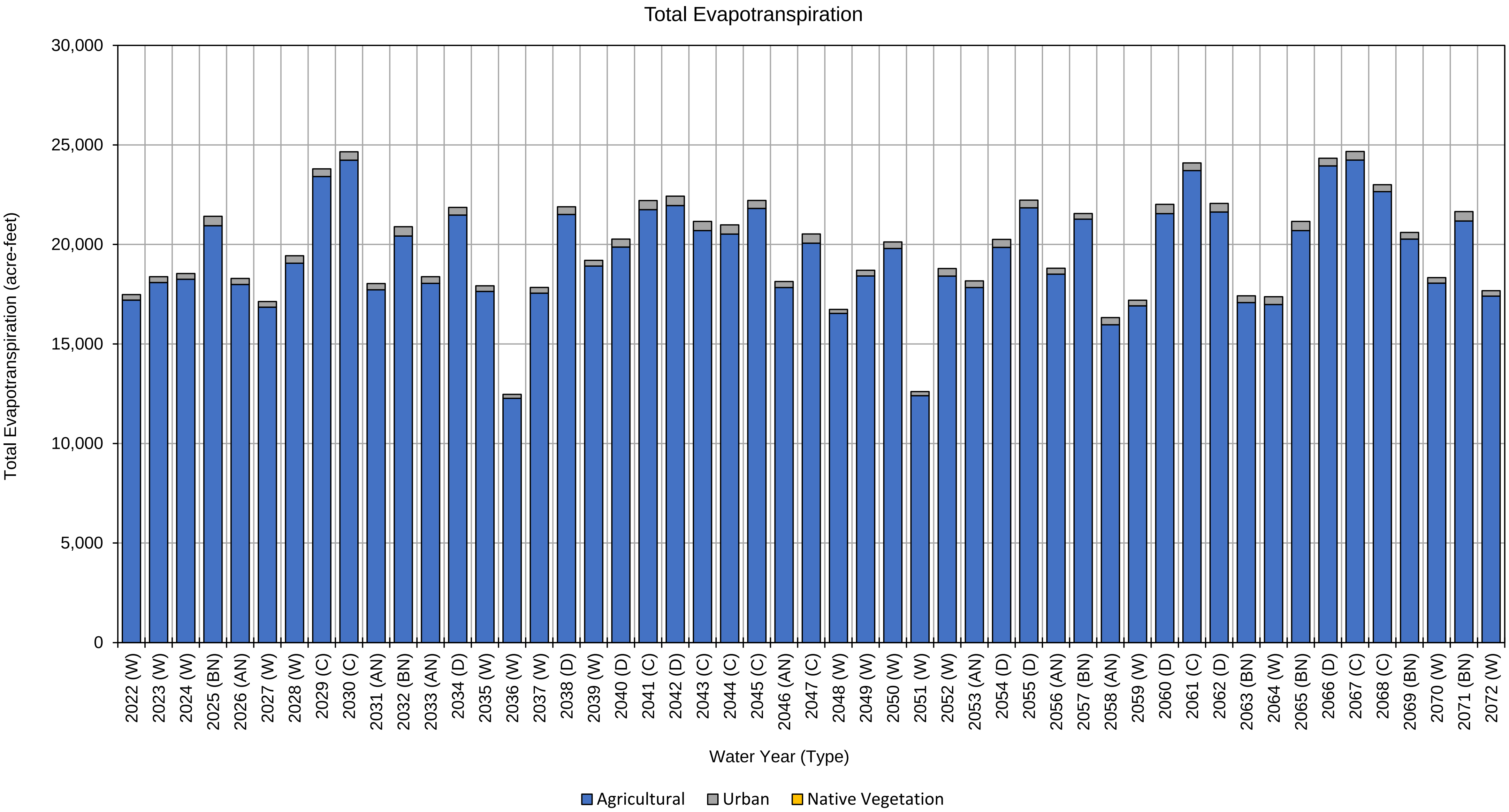
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	46,000
2023 (W)	47,000
2024 (W)	48,000
2025 (BN)	42,000
2026 (AN)	40,000
2027 (W)	43,000
2028 (W)	48,000
2029 (C)	42,000
2030 (C)	30,000
2031 (AN)	28,000
2032 (BN)	30,000
2033 (AN)	27,000
2034 (D)	30,000
2035 (W)	29,000
2036 (W)	45,000
2037 (W)	53,000
2038 (D)	51,000
2039 (W)	44,000
2040 (D)	45,000
2041 (C)	37,000
2042 (D)	26,000
2043 (C)	23,000
2044 (C)	17,000
2045 (C)	13,000
2046 (AN)	14,000
2047 (C)	19,000
2048 (W)	20,000
2049 (W)	31,000
2050 (W)	35,000
2051 (W)	42,000
2052 (W)	49,000
2053 (AN)	47,000
2054 (D)	45,000
2055 (D)	37,000
2056 (AN)	35,000
2057 (BN)	37,000
2058 (AN)	42,000
2059 (W)	43,000
2060 (D)	44,000
2061 (C)	35,000
2062 (D)	26,000
2063 (BN)	28,000

Antelope Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		30,000
2065 (BN)		33,000
2066 (D)		24,000
2067 (C)		16,000
2068 (C)		10,000
2069 (BN)		6,400
2070 (W)		13,000
2071 (BN)		18,000
2072 (W)		21,000
Average (2022-2072)		33,000
2022-2072	W	38,000
	AN	33,000
	BN	28,000
	D	37,000
	C	24,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

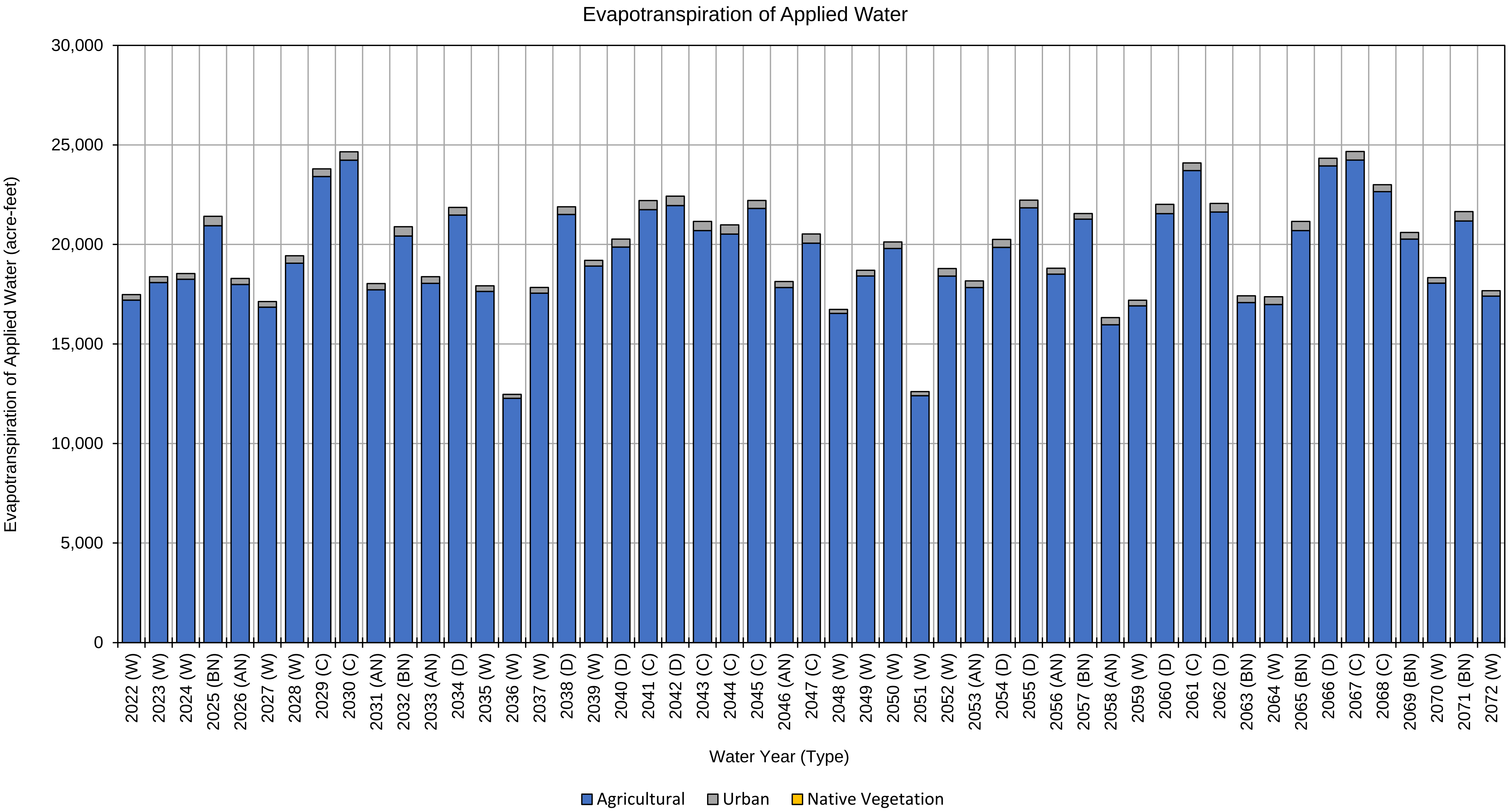
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	31,000	2,100	15,000	48,000
2023 (W)	32,000	1,900	15,000	49,000
2024 (W)	32,000	1,900	15,000	49,000
2025 (BN)	32,000	1,700	14,000	48,000
2026 (AN)	32,000	2,000	15,000	49,000
2027 (W)	30,000	1,800	14,000	46,000
2028 (W)	31,000	1,700	14,000	47,000
2029 (C)	32,000	1,400	12,000	45,000
2030 (C)	32,000	1,400	12,000	45,000
2031 (AN)	32,000	2,100	15,000	49,000
2032 (BN)	32,000	1,800	14,000	48,000
2033 (AN)	30,000	1,900	14,000	46,000
2034 (D)	32,000	1,700	14,000	48,000
2035 (W)	30,000	1,800	14,000	46,000
2036 (W)	27,000	1,900	14,000	43,000
2037 (W)	32,000	1,800	15,000	49,000
2038 (D)	32,000	1,700	14,000	48,000
2039 (W)	32,000	1,800	14,000	48,000
2040 (D)	32,000	1,800	14,000	48,000
2041 (C)	32,000	1,800	14,000	48,000
2042 (D)	32,000	1,700	13,000	47,000
2043 (C)	32,000	2,000	15,000	49,000
2044 (C)	32,000	1,900	14,000	48,000
2045 (C)	33,000	1,800	14,000	49,000
2046 (AN)	32,000	2,000	15,000	49,000
2047 (C)	32,000	1,900	15,000	49,000
2048 (W)	29,000	1,700	13,000	44,000
2049 (W)	32,000	1,800	15,000	49,000
2050 (W)	32,000	1,900	14,000	48,000
2051 (W)	27,000	1,900	14,000	43,000
2052 (W)	31,000	1,700	14,000	47,000
2053 (AN)	30,000	1,900	14,000	46,000
2054 (D)	32,000	1,800	14,000	48,000
2055 (D)	32,000	1,700	13,000	47,000
2056 (AN)	30,000	1,800	14,000	46,000
2057 (BN)	32,000	1,500	13,000	47,000
2058 (AN)	30,000	2,100	15,000	47,000
2059 (W)	30,000	1,800	14,000	46,000
2060 (D)	31,000	1,700	13,000	46,000
2061 (C)	32,000	1,400	12,000	45,000
2062 (D)	32,000	1,800	13,000	47,000
2063 (BN)	29,000	1,800	14,000	45,000

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		29,000	1,900	14,000	45,000
2065 (BN)		32,000	1,800	14,000	48,000
2066 (D)		33,000	1,500	13,000	48,000
2067 (C)		32,000	1,500	12,000	46,000
2068 (C)		32,000	1,600	13,000	47,000
2069 (BN)		32,000	1,900	14,000	48,000
2070 (W)		31,000	1,800	14,000	47,000
2071 (BN)		32,000	1,700	14,000	48,000
2072 (W)		31,000	2,000	15,000	48,000
Average (2022-2072)		31,000	1,800	14,000	47,000
2022-2072	W	30,000	1,900	14,000	46,000
	AN	31,000	2,000	15,000	48,000
	BN	31,000	1,800	14,000	47,000
	D	32,000	1,700	14,000	48,000
	C	32,000	1,700	13,000	47,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

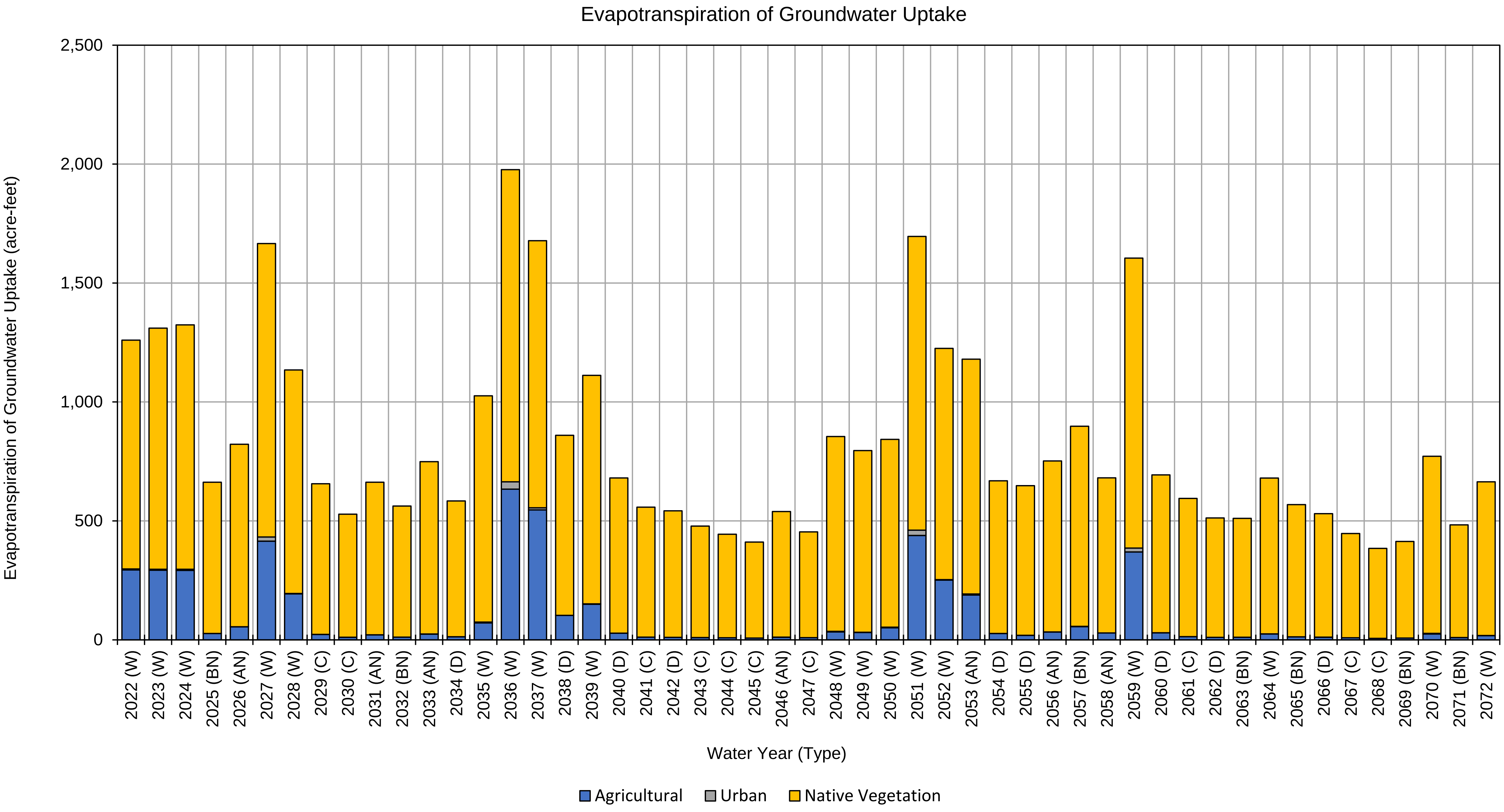
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	280	0	17,000
2023 (W)	18,000	290	0	18,000
2024 (W)	18,000	290	0	18,000
2025 (BN)	21,000	470	0	21,000
2026 (AN)	18,000	300	0	18,000
2027 (W)	17,000	280	0	17,000
2028 (W)	19,000	380	0	19,000
2029 (C)	23,000	380	0	23,000
2030 (C)	24,000	420	0	24,000
2031 (AN)	18,000	310	0	18,000
2032 (BN)	20,000	470	0	20,000
2033 (AN)	18,000	330	0	18,000
2034 (D)	21,000	380	0	21,000
2035 (W)	18,000	280	0	18,000
2036 (W)	12,000	210	0	12,000
2037 (W)	18,000	290	0	18,000
2038 (D)	22,000	380	0	22,000
2039 (W)	19,000	290	0	19,000
2040 (D)	20,000	400	0	20,000
2041 (C)	22,000	460	0	22,000
2042 (D)	22,000	470	0	22,000
2043 (C)	21,000	460	0	21,000
2044 (C)	21,000	460	0	21,000
2045 (C)	22,000	400	0	22,000
2046 (AN)	18,000	300	0	18,000
2047 (C)	20,000	460	0	20,000
2048 (W)	17,000	200	0	17,000
2049 (W)	18,000	290	0	18,000
2050 (W)	20,000	330	0	20,000
2051 (W)	12,000	210	0	12,000
2052 (W)	18,000	380	0	18,000
2053 (AN)	18,000	330	0	18,000
2054 (D)	20,000	400	0	20,000
2055 (D)	22,000	380	0	22,000
2056 (AN)	19,000	300	0	19,000
2057 (BN)	21,000	280	0	21,000
2058 (AN)	16,000	360	0	16,000
2059 (W)	17,000	280	0	17,000
2060 (D)	22,000	470	0	22,000
2061 (C)	24,000	390	0	24,000
2062 (D)	22,000	440	0	22,000
2063 (BN)	17,000	340	0	17,000

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		17,000	390	0	17,000
2065 (BN)		21,000	470	0	21,000
2066 (D)		24,000	390	0	24,000
2067 (C)		24,000	430	0	24,000
2068 (C)		23,000	350	0	23,000
2069 (BN)		20,000	340	0	20,000
2070 (W)		18,000	280	0	18,000
2071 (BN)		21,000	470	0	21,000
2072 (W)		17,000	270	0	17,000
Average (2022-2072)		19,000	360	0	19,000
2022-2072	W	17,000	290	0	17,000
	AN	18,000	320	0	18,000
	BN	20,000	400	0	20,000
	D	22,000	410	0	22,000
	C	22,000	420	0	22,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	290	4	960	1,300
2023 (W)	290	4	1,000	1,300
2024 (W)	290	5	1,000	1,300
2025 (BN)	26	0	640	670
2026 (AN)	54	0	770	820
2027 (W)	410	18	1,200	1,600
2028 (W)	190	2	940	1,100
2029 (C)	23	0	630	650
2030 (C)	11	0	520	530
2031 (AN)	21	0	640	660
2032 (BN)	11	0	550	560
2033 (AN)	24	1	720	750
2034 (D)	13	0	570	580
2035 (W)	71	3	950	1,000
2036 (W)	630	31	1,300	2,000
2037 (W)	550	9	1,100	1,700
2038 (D)	100	0	760	860
2039 (W)	150	2	960	1,100
2040 (D)	28	0	650	680
2041 (C)	11	0	550	560
2042 (D)	10	0	530	540
2043 (C)	9	0	470	480
2044 (C)	9	0	440	450
2045 (C)	8	0	400	410
2046 (AN)	11	0	530	540
2047 (C)	9	0	440	450
2048 (W)	33	3	820	860
2049 (W)	31	1	760	790
2050 (W)	51	2	790	840
2051 (W)	440	22	1,200	1,700
2052 (W)	250	2	970	1,200
2053 (AN)	190	5	990	1,200
2054 (D)	27	0	640	670
2055 (D)	19	0	630	650
2056 (AN)	33	0	720	750
2057 (BN)	55	1	840	900
2058 (AN)	29	0	650	680
2059 (W)	370	16	1,200	1,600
2060 (D)	30	0	660	690
2061 (C)	13	0	580	590
2062 (D)	10	0	500	510
2063 (BN)	11	0	500	510

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		25	0	660	690
2065 (BN)		12	0	560	570
2066 (D)		11	0	520	530
2067 (C)		9	0	440	450
2068 (C)		6	0	380	390
2069 (BN)		7	0	410	420
2070 (W)		24	3	740	770
2071 (BN)		10	0	470	480
2072 (W)		18	1	650	670
Average (2022-2072)		98	3	720	820
2022-2072	W	230	7	960	1,200
	AN	51	1	720	770
	BN	19	0	570	590
	D	28	0	610	640
	C	11	0	480	490

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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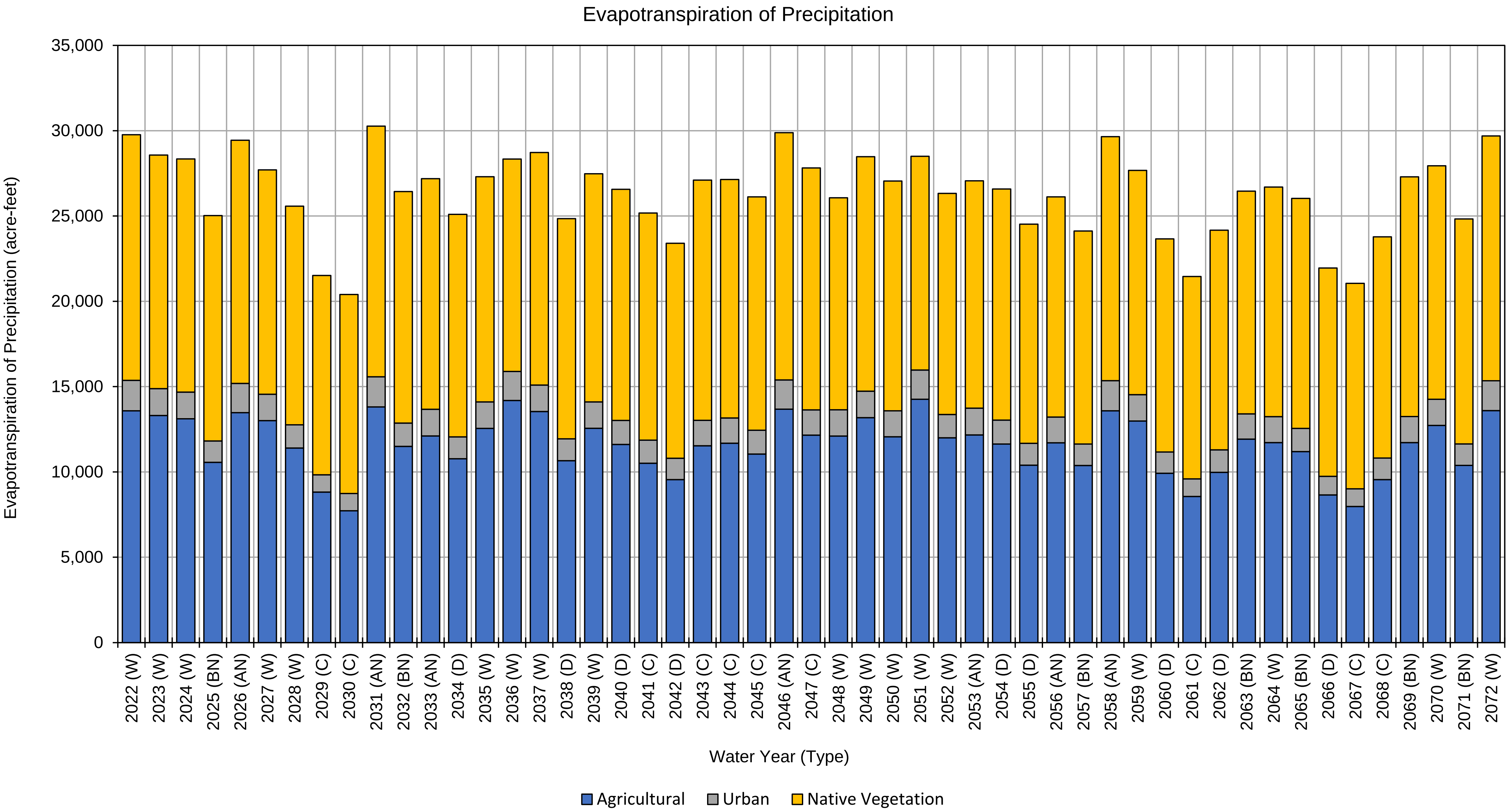
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

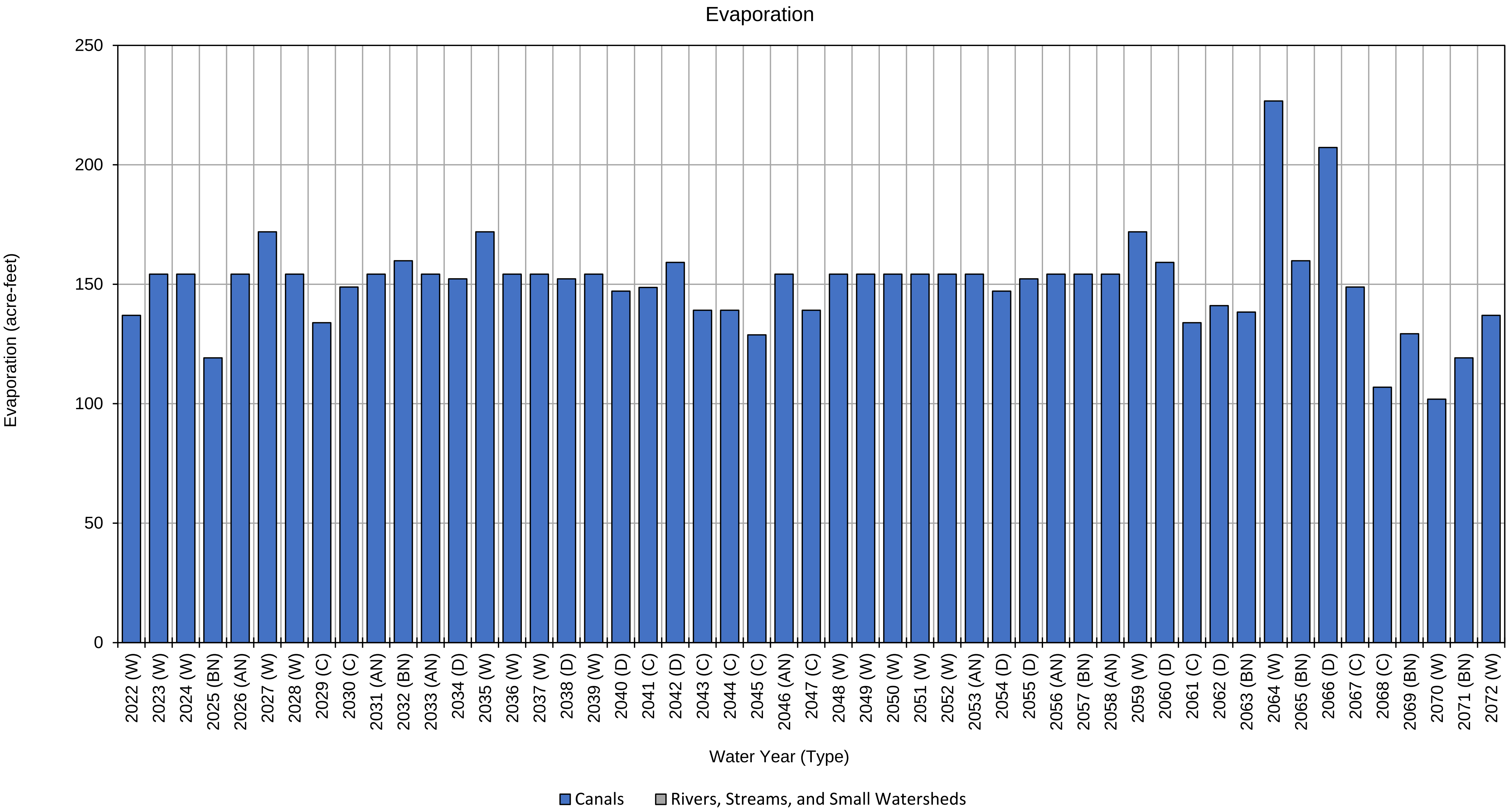
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	14,000	1,800	14,000	30,000
2023 (W)	13,000	1,600	14,000	29,000
2024 (W)	13,000	1,600	14,000	29,000
2025 (BN)	11,000	1,300	13,000	25,000
2026 (AN)	13,000	1,700	14,000	29,000
2027 (W)	13,000	1,500	13,000	28,000
2028 (W)	11,000	1,400	13,000	25,000
2029 (C)	8,800	1,000	12,000	22,000
2030 (C)	7,700	1,000	12,000	21,000
2031 (AN)	14,000	1,800	15,000	31,000
2032 (BN)	11,000	1,400	14,000	26,000
2033 (AN)	12,000	1,600	14,000	28,000
2034 (D)	11,000	1,300	13,000	25,000
2035 (W)	13,000	1,600	13,000	28,000
2036 (W)	14,000	1,700	12,000	28,000
2037 (W)	14,000	1,500	14,000	30,000
2038 (D)	11,000	1,300	13,000	25,000
2039 (W)	13,000	1,500	13,000	28,000
2040 (D)	12,000	1,400	14,000	27,000
2041 (C)	11,000	1,400	13,000	25,000
2042 (D)	9,600	1,300	13,000	24,000
2043 (C)	12,000	1,500	14,000	28,000
2044 (C)	12,000	1,500	14,000	28,000
2045 (C)	11,000	1,400	14,000	26,000
2046 (AN)	14,000	1,700	14,000	30,000
2047 (C)	12,000	1,500	14,000	28,000
2048 (W)	12,000	1,500	12,000	26,000
2049 (W)	13,000	1,600	14,000	29,000
2050 (W)	12,000	1,500	13,000	27,000
2051 (W)	14,000	1,700	13,000	29,000
2052 (W)	12,000	1,400	13,000	26,000
2053 (AN)	12,000	1,600	13,000	27,000
2054 (D)	12,000	1,400	14,000	27,000
2055 (D)	10,000	1,300	13,000	24,000
2056 (AN)	12,000	1,500	13,000	27,000
2057 (BN)	10,000	1,300	12,000	23,000
2058 (AN)	14,000	1,800	14,000	30,000
2059 (W)	13,000	1,500	13,000	28,000
2060 (D)	9,900	1,200	12,000	23,000
2061 (C)	8,600	1,000	12,000	22,000
2062 (D)	10,000	1,300	13,000	24,000
2063 (BN)	12,000	1,500	13,000	27,000

Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		12,000	1,500	13,000	27,000
2065 (BN)		11,000	1,400	13,000	25,000
2066 (D)		8,700	1,100	12,000	22,000
2067 (C)		8,000	1,000	12,000	21,000
2068 (C)		9,500	1,300	13,000	24,000
2069 (BN)		12,000	1,500	14,000	28,000
2070 (W)		13,000	1,500	14,000	29,000
2071 (BN)		10,000	1,300	13,000	24,000
2072 (W)		14,000	1,700	14,000	30,000
Average (2022-2072)		12,000	1,400	13,000	26,000
2022-2072	W	13,000	1,600	13,000	28,000
	AN	13,000	1,700	14,000	29,000
	BN	11,000	1,400	13,000	25,000
	D	10,000	1,300	13,000	24,000
	C	10,000	1,300	13,000	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

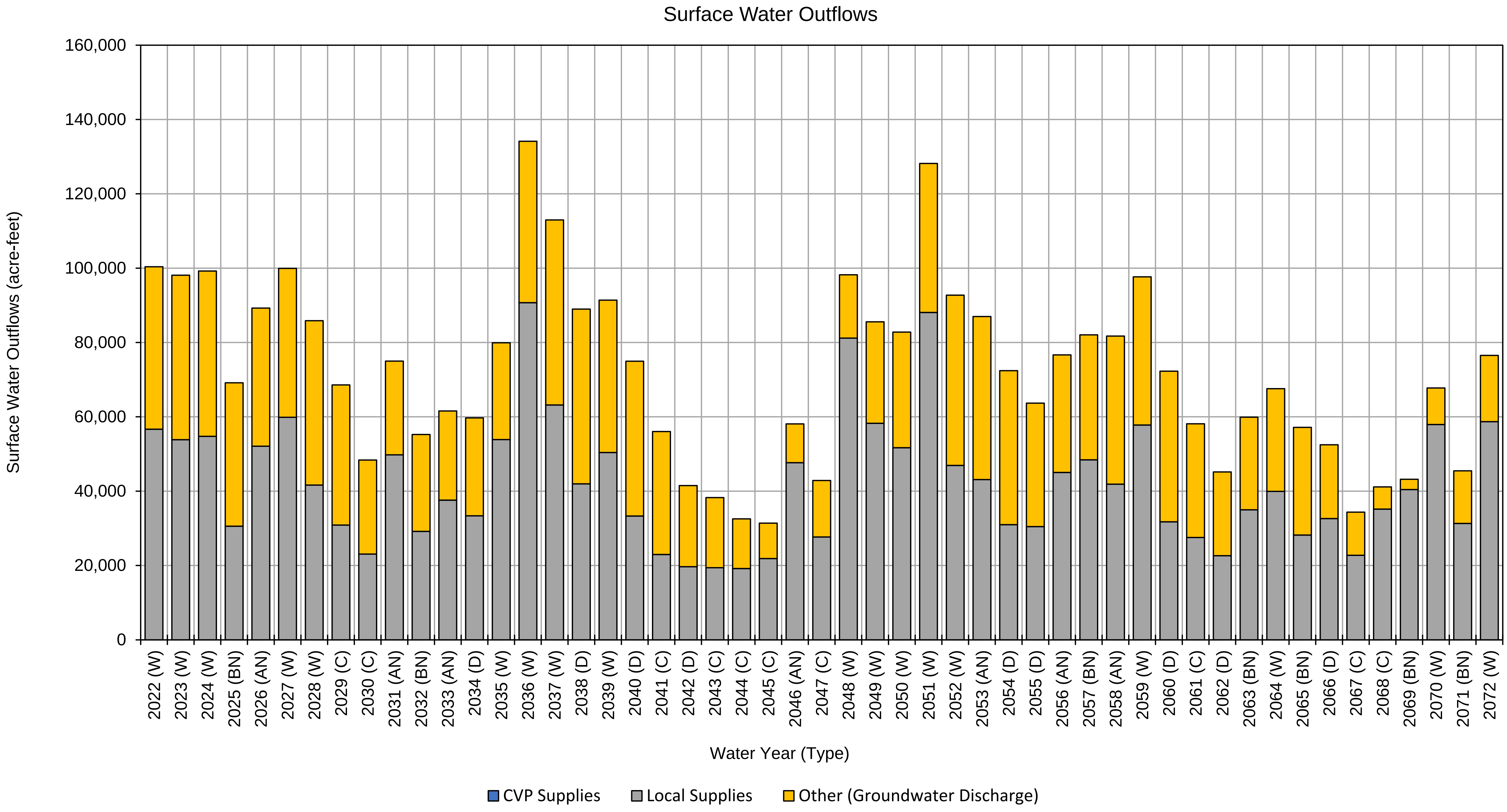
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	160	0	160
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150
2059 (W)	170	0	170
2060 (D)	160	0	160
2061 (C)	130	0	130
2062 (D)	140	0	140
2063 (BN)	140	0	140

Antelope Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	160	0	160
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

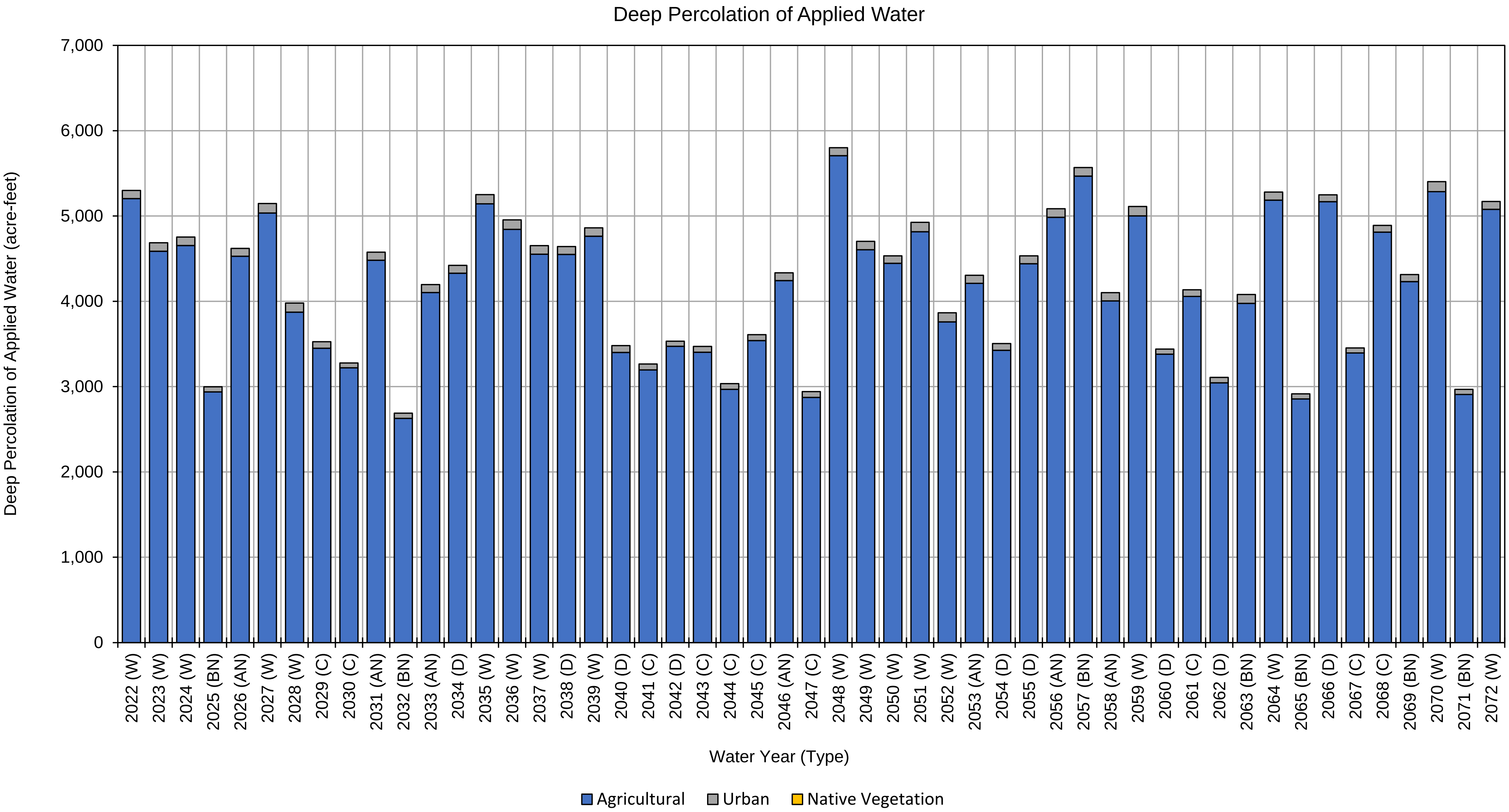
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	57,000	44,000	100,000
2023 (W)	0	54,000	44,000	98,000
2024 (W)	0	55,000	44,000	99,000
2025 (BN)	0	31,000	39,000	70,000
2026 (AN)	0	52,000	37,000	89,000
2027 (W)	0	60,000	40,000	100,000
2028 (W)	0	42,000	44,000	86,000
2029 (C)	0	31,000	38,000	69,000
2030 (C)	0	23,000	25,000	48,000
2031 (AN)	0	50,000	25,000	75,000
2032 (BN)	0	29,000	26,000	55,000
2033 (AN)	0	38,000	24,000	62,000
2034 (D)	0	33,000	26,000	59,000
2035 (W)	0	54,000	26,000	80,000
2036 (W)	0	91,000	43,000	130,000
2037 (W)	0	63,000	50,000	110,000
2038 (D)	0	42,000	47,000	89,000
2039 (W)	0	50,000	41,000	91,000
2040 (D)	0	33,000	42,000	75,000
2041 (C)	0	23,000	33,000	56,000
2042 (D)	0	20,000	22,000	42,000
2043 (C)	0	19,000	19,000	38,000
2044 (C)	0	19,000	13,000	32,000
2045 (C)	0	22,000	9,500	32,000
2046 (AN)	0	48,000	10,000	58,000
2047 (C)	0	28,000	15,000	43,000
2048 (W)	0	81,000	17,000	98,000
2049 (W)	0	58,000	27,000	85,000
2050 (W)	0	52,000	31,000	83,000
2051 (W)	0	88,000	40,000	130,000
2052 (W)	0	47,000	46,000	93,000
2053 (AN)	0	43,000	44,000	87,000
2054 (D)	0	31,000	41,000	72,000
2055 (D)	0	30,000	33,000	63,000
2056 (AN)	0	45,000	32,000	77,000
2057 (BN)	0	48,000	34,000	82,000
2058 (AN)	0	42,000	40,000	82,000
2059 (W)	0	58,000	40,000	98,000
2060 (D)	0	32,000	41,000	73,000
2061 (C)	0	28,000	31,000	59,000
2062 (D)	0	23,000	23,000	46,000
2063 (BN)	0	35,000	25,000	60,000

Antelope Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	40,000	28,000	68,000
2065 (BN)		0	28,000	29,000	57,000
2066 (D)		0	33,000	20,000	53,000
2067 (C)		0	23,000	12,000	35,000
2068 (C)		0	35,000	6,000	41,000
2069 (BN)		0	40,000	2,800	43,000
2070 (W)		0	58,000	9,800	68,000
2071 (BN)		0	31,000	14,000	45,000
2072 (W)		0	59,000	18,000	77,000
Average (2022-2072)		0	42,000	30,000	72,000
2022-2072	W	0	59,000	35,000	94,000
	AN	0	45,000	30,000	75,000
	BN	0	35,000	24,000	59,000
	D	0	31,000	33,000	64,000
	C	0	25,000	20,000	45,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	95	0	5,300
2023 (W)	4,600	99	0	4,700
2024 (W)	4,700	99	0	4,800
2025 (BN)	2,900	61	0	3,000
2026 (AN)	4,500	92	0	4,600
2027 (W)	5,000	110	0	5,100
2028 (W)	3,900	110	0	4,000
2029 (C)	3,400	77	0	3,500
2030 (C)	3,200	57	0	3,300
2031 (AN)	4,500	94	0	4,600
2032 (BN)	2,600	61	0	2,700
2033 (AN)	4,100	93	0	4,200
2034 (D)	4,300	93	0	4,400
2035 (W)	5,100	110	0	5,200
2036 (W)	4,800	110	0	4,900
2037 (W)	4,600	100	0	4,700
2038 (D)	4,500	93	0	4,600
2039 (W)	4,800	98	0	4,900
2040 (D)	3,400	80	0	3,500
2041 (C)	3,200	69	0	3,300
2042 (D)	3,500	60	0	3,600
2043 (C)	3,400	68	0	3,500
2044 (C)	3,000	67	0	3,100
2045 (C)	3,500	70	0	3,600
2046 (AN)	4,200	92	0	4,300
2047 (C)	2,900	67	0	3,000
2048 (W)	5,700	93	0	5,800
2049 (W)	4,600	98	0	4,700
2050 (W)	4,400	87	0	4,500
2051 (W)	4,800	110	0	4,900
2052 (W)	3,800	110	0	3,900
2053 (AN)	4,200	94	0	4,300
2054 (D)	3,400	80	0	3,500
2055 (D)	4,400	93	0	4,500
2056 (AN)	5,000	100	0	5,100
2057 (BN)	5,500	100	0	5,600
2058 (AN)	4,000	98	0	4,100
2059 (W)	5,000	110	0	5,100
2060 (D)	3,400	60	0	3,500
2061 (C)	4,100	78	0	4,200
2062 (D)	3,000	64	0	3,100
2063 (BN)	4,000	100	0	4,100

Antelope Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		5,200	95	0	5,300
2065 (BN)		2,900	61	0	3,000
2066 (D)		5,200	81	0	5,300
2067 (C)		3,400	58	0	3,500
2068 (C)		4,800	79	0	4,900
2069 (BN)		4,200	83	0	4,300
2070 (W)		5,300	120	0	5,400
2071 (BN)		2,900	60	0	3,000
2072 (W)		5,100	92	0	5,200
Average (2022-2072)		4,200	87	0	4,300
2022-2072	W	4,800	100	0	4,900
	AN	4,400	95	0	4,500
	BN	3,600	76	0	3,700
	D	3,900	78	0	4,000
	C	3,500	69	0	3,600

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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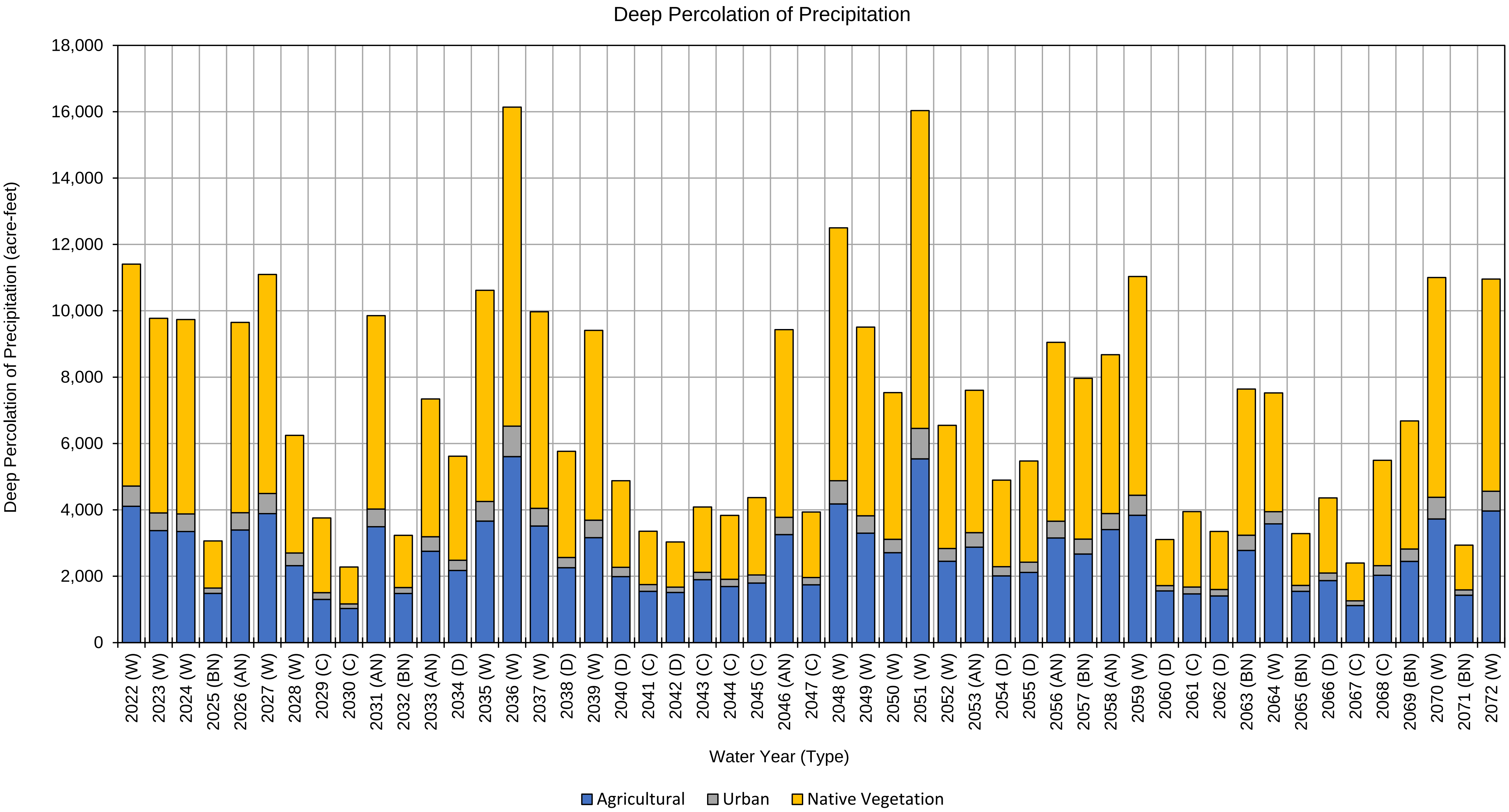
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

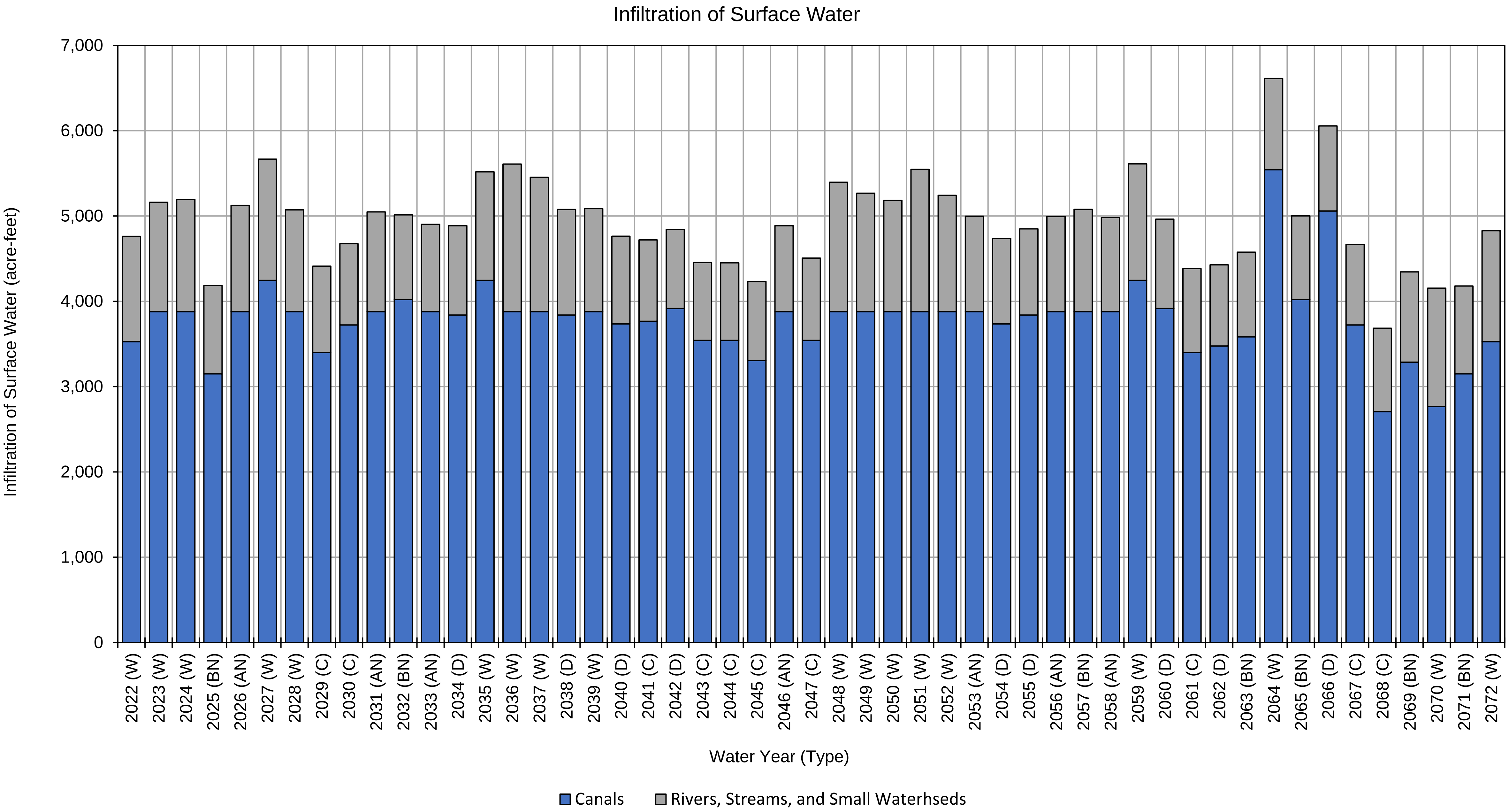
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,100	610	6,700	11,000
2023 (W)	3,400	530	5,900	9,800
2024 (W)	3,300	530	5,900	9,700
2025 (BN)	1,500	160	1,400	3,100
2026 (AN)	3,400	520	5,700	9,600
2027 (W)	3,900	600	6,600	11,000
2028 (W)	2,300	380	3,500	6,200
2029 (C)	1,300	200	2,300	3,800
2030 (C)	1,000	140	1,100	2,200
2031 (AN)	3,500	530	5,800	9,800
2032 (BN)	1,500	180	1,600	3,300
2033 (AN)	2,800	440	4,200	7,400
2034 (D)	2,200	310	3,100	5,600
2035 (W)	3,700	590	6,400	11,000
2036 (W)	5,600	920	9,600	16,000
2037 (W)	3,500	530	5,900	9,900
2038 (D)	2,300	310	3,200	5,800
2039 (W)	3,200	530	5,700	9,400
2040 (D)	2,000	280	2,600	4,900
2041 (C)	1,500	200	1,600	3,300
2042 (D)	1,500	160	1,400	3,100
2043 (C)	1,900	220	2,000	4,100
2044 (C)	1,700	220	1,900	3,800
2045 (C)	1,800	240	2,300	4,300
2046 (AN)	3,300	520	5,700	9,500
2047 (C)	1,700	220	2,000	3,900
2048 (W)	4,200	700	7,600	13,000
2049 (W)	3,300	530	5,700	9,500
2050 (W)	2,700	400	4,400	7,500
2051 (W)	5,500	920	9,600	16,000
2052 (W)	2,400	390	3,700	6,500
2053 (AN)	2,900	440	4,300	7,600
2054 (D)	2,000	280	2,600	4,900
2055 (D)	2,100	310	3,100	5,500
2056 (AN)	3,200	510	5,400	9,100
2057 (BN)	2,700	450	4,800	8,000
2058 (AN)	3,400	480	4,800	8,700
2059 (W)	3,800	600	6,600	11,000
2060 (D)	1,600	160	1,400	3,200
2061 (C)	1,500	210	2,300	4,000
2062 (D)	1,400	190	1,800	3,400
2063 (BN)	2,800	460	4,400	7,700

Antelope Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		3,600	370	3,600	7,600
2065 (BN)		1,500	180	1,600	3,300
2066 (D)		1,900	230	2,300	4,400
2067 (C)		1,100	140	1,100	2,300
2068 (C)		2,000	290	3,200	5,500
2069 (BN)		2,400	370	3,900	6,700
2070 (W)		3,700	650	6,600	11,000
2071 (BN)		1,400	160	1,400	3,000
2072 (W)		4,000	590	6,400	11,000
Average (2022-2072)		2,600	390	4,000	7,000
2022-2072	W	3,700	580	6,100	10,000
	AN	3,200	490	5,100	8,800
	BN	2,000	280	2,700	5,000
	D	1,900	250	2,400	4,600
	C	1,600	210	2,000	3,800

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

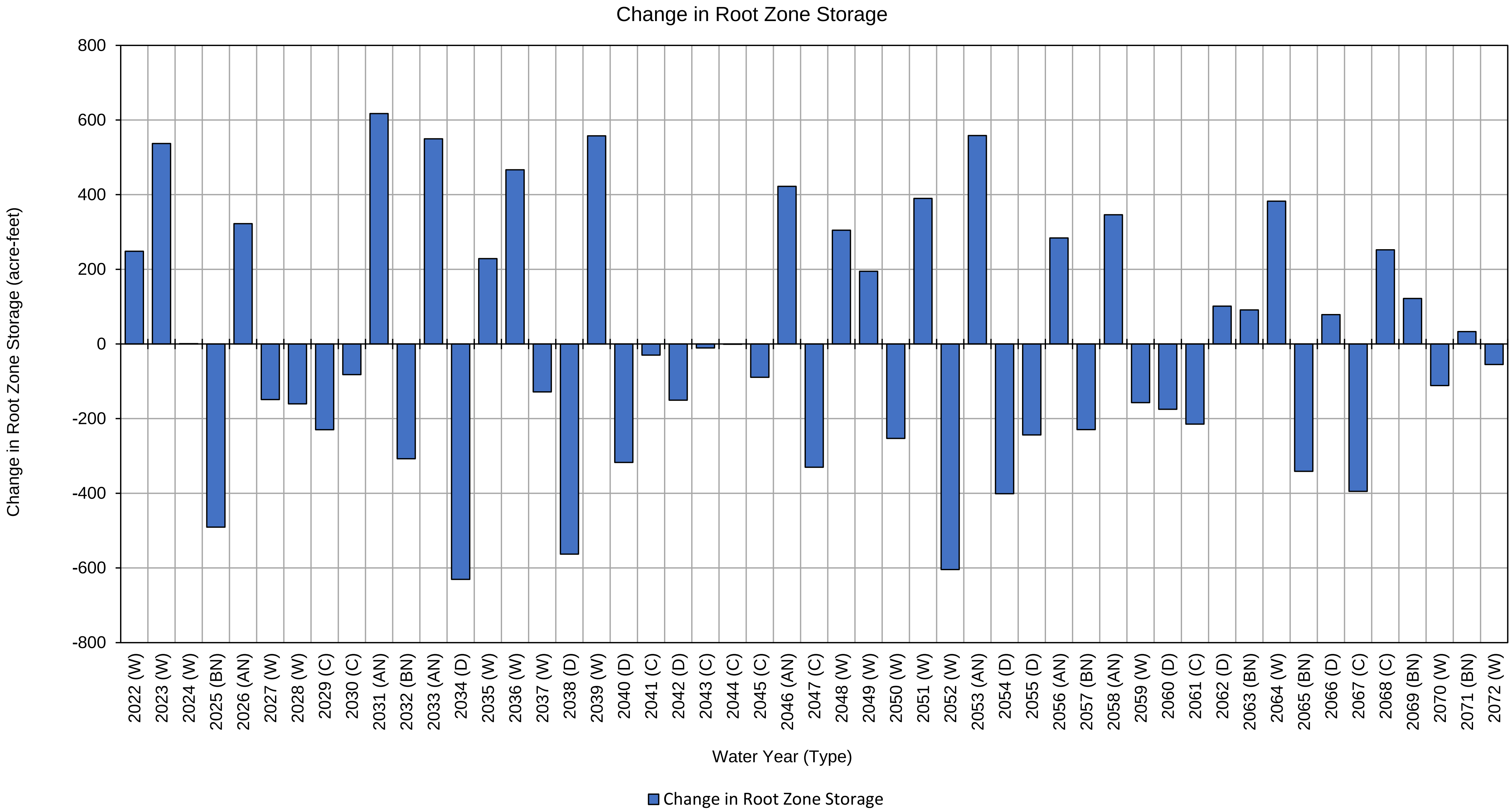
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	3,500	1,200	4,700
2023 (W)	3,900	1,300	5,200
2024 (W)	3,900	1,300	5,200
2025 (BN)	3,200	1,000	4,200
2026 (AN)	3,900	1,200	5,100
2027 (W)	4,200	1,400	5,600
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	950	4,700
2031 (AN)	3,900	1,200	5,100
2032 (BN)	4,000	990	5,000
2033 (AN)	3,900	1,000	4,900
2034 (D)	3,800	1,000	4,800
2035 (W)	4,200	1,300	5,500
2036 (W)	3,900	1,700	5,600
2037 (W)	3,900	1,600	5,500
2038 (D)	3,800	1,200	5,000
2039 (W)	3,900	1,200	5,100
2040 (D)	3,700	1,000	4,700
2041 (C)	3,800	950	4,800
2042 (D)	3,900	930	4,800
2043 (C)	3,500	910	4,400
2044 (C)	3,500	910	4,400
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,000	4,900
2047 (C)	3,500	960	4,500
2048 (W)	3,900	1,500	5,400
2049 (W)	3,900	1,400	5,300
2050 (W)	3,900	1,300	5,200
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,300
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,700	1,000	4,700
2055 (D)	3,800	1,000	4,800
2056 (AN)	3,900	1,100	5,000
2057 (BN)	3,900	1,200	5,100
2058 (AN)	3,900	1,100	5,000
2059 (W)	4,200	1,400	5,600
2060 (D)	3,900	1,000	4,900
2061 (C)	3,400	980	4,400
2062 (D)	3,500	950	4,500
2063 (BN)	3,600	990	4,600

Antelope Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		5,500	1,100	6,600
2065 (BN)		4,000	980	5,000
2066 (D)		5,100	1,000	6,100
2067 (C)		3,700	940	4,600
2068 (C)		2,700	980	3,700
2069 (BN)		3,300	1,100	4,400
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,300	4,800
Average (2022-2072)		3,800	1,100	4,900
2022-2072	W	3,900	1,400	5,300
	AN	3,900	1,100	5,000
	BN	3,600	1,000	4,600
	D	3,900	1,000	4,900
	C	3,500	950	4,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	250
2023 (W)	540
2024 (W)	1
2025 (BN)	-490
2026 (AN)	320
2027 (W)	-150
2028 (W)	-160
2029 (C)	-230
2030 (C)	-82
2031 (AN)	620
2032 (BN)	-310
2033 (AN)	550
2034 (D)	-630
2035 (W)	230
2036 (W)	470
2037 (W)	-130
2038 (D)	-560
2039 (W)	560
2040 (D)	-320
2041 (C)	-30
2042 (D)	-150
2043 (C)	-11
2044 (C)	-1
2045 (C)	-89
2046 (AN)	420
2047 (C)	-330
2048 (W)	300
2049 (W)	190
2050 (W)	-250
2051 (W)	390
2052 (W)	-600
2053 (AN)	560
2054 (D)	-400
2055 (D)	-240
2056 (AN)	280
2057 (BN)	-230
2058 (AN)	350
2059 (W)	-160
2060 (D)	-180
2061 (C)	-210
2062 (D)	100
2063 (BN)	91

Antelope Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		380
2065 (BN)		-340
2066 (D)		78
2067 (C)		-390
2068 (C)		250
2069 (BN)		120
2070 (W)		-110
2071 (BN)		33
2072 (W)		-55
Average (2022-2072)		5
2022-2072	W	94
	AN	440
	BN	-160
	D	-260
	C	-110

Sacramento Valley Water Year Index and is classified into five types:

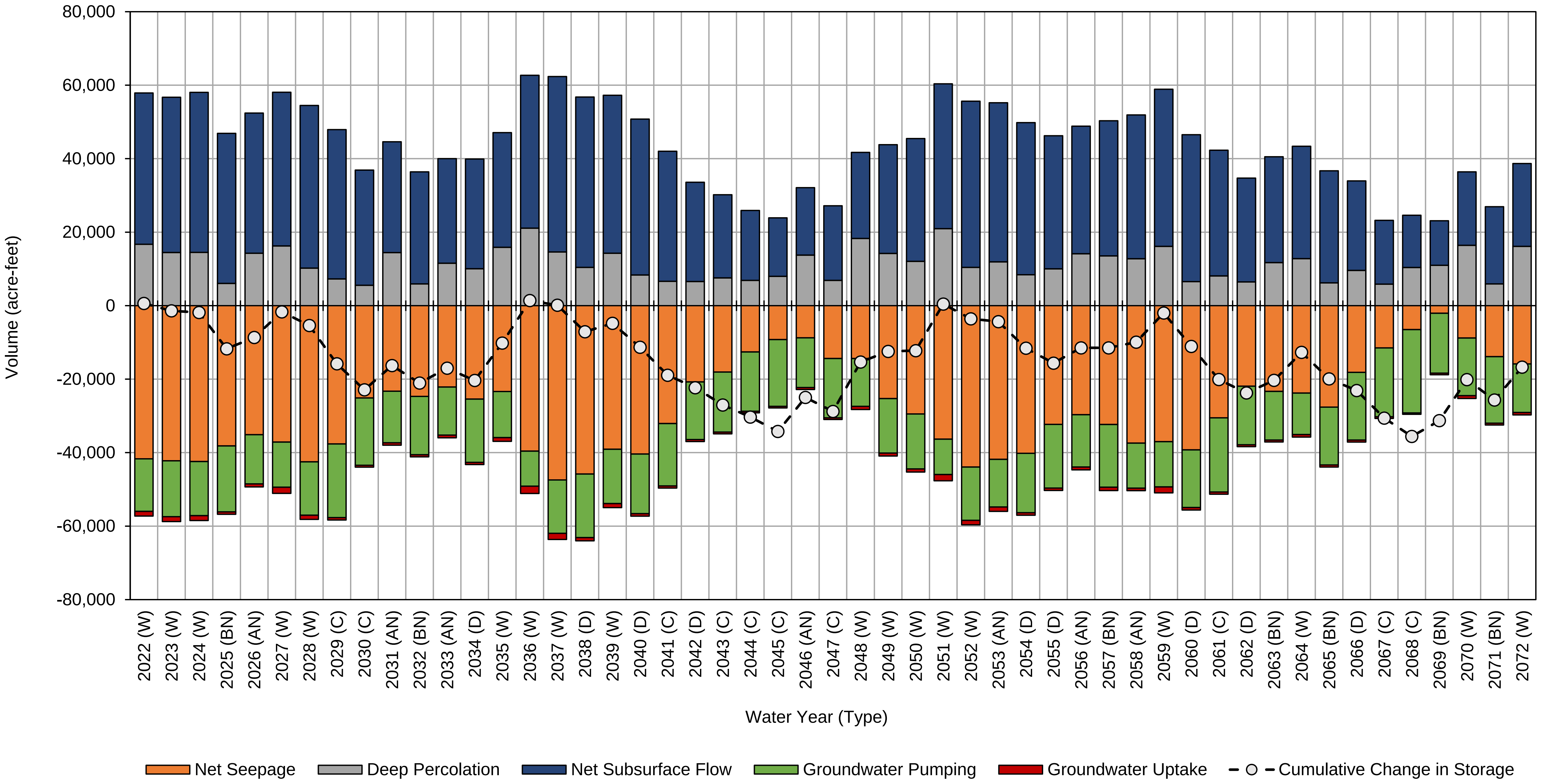
W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-3b

Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) Model Results – Groundwater System

Projected (Future Land Use) Water Budget
Antelope Subbasin



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

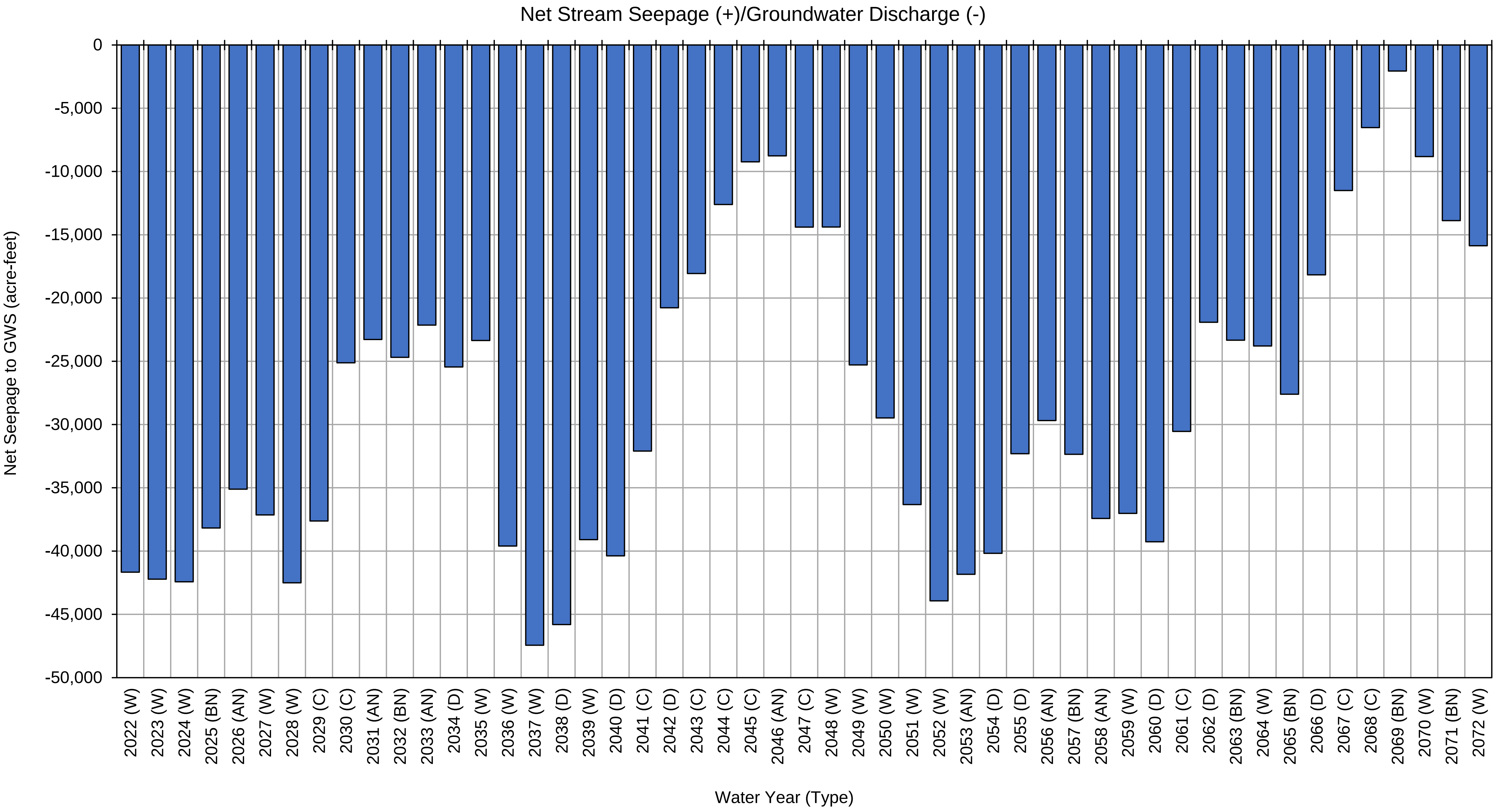
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-42,000	17,000	-14,000	-1,300	41,000	620	620
2023 (W)	-42,000	14,000	-15,000	-1,300	42,000	-2,000	-1,400
2024 (W)	-42,000	14,000	-15,000	-1,300	44,000	-440	-1,800
2025 (BN)	-38,000	6,100	-18,000	-660	41,000	-9,900	-12,000
2026 (AN)	-35,000	14,000	-13,000	-820	38,000	3,100	-8,700
2027 (W)	-37,000	16,000	-12,000	-1,700	42,000	7,000	-1,700
2028 (W)	-43,000	10,000	-15,000	-1,100	44,000	-3,700	-5,400
2029 (C)	-38,000	7,300	-20,000	-660	41,000	-10,000	-16,000
2030 (C)	-25,000	5,600	-18,000	-530	31,000	-7,100	-23,000
2031 (AN)	-23,000	14,000	-14,000	-660	30,000	6,600	-16,000
2032 (BN)	-25,000	5,900	-16,000	-560	30,000	-4,700	-21,000
2033 (AN)	-22,000	12,000	-13,000	-750	28,000	4,000	-17,000
2034 (D)	-25,000	10,000	-17,000	-580	30,000	-3,300	-20,000
2035 (W)	-23,000	16,000	-13,000	-1,000	31,000	10,000	-10,000
2036 (W)	-40,000	21,000	-9,500	-2,000	42,000	12,000	1,400
2037 (W)	-47,000	15,000	-15,000	-1,700	48,000	-1,300	120
2038 (D)	-46,000	10,000	-17,000	-860	46,000	-7,200	-7,100
2039 (W)	-39,000	14,000	-15,000	-1,100	43,000	2,300	-4,800
2040 (D)	-40,000	8,400	-16,000	-680	42,000	-6,500	-11,000
2041 (C)	-32,000	6,600	-17,000	-560	35,000	-7,600	-19,000
2042 (D)	-21,000	6,600	-16,000	-540	27,000	-3,400	-22,000
2043 (C)	-18,000	7,600	-16,000	-480	23,000	-4,700	-27,000
2044 (C)	-13,000	6,900	-16,000	-440	19,000	-3,300	-30,000
2045 (C)	-9,200	8,000	-18,000	-410	16,000	-3,900	-34,000
2046 (AN)	-8,800	14,000	-14,000	-540	18,000	9,300	-25,000
2047 (C)	-14,000	6,900	-16,000	-450	20,000	-3,800	-29,000
2048 (W)	-14,000	18,000	-13,000	-850	23,000	13,000	-15,000
2049 (W)	-25,000	14,000	-15,000	-800	30,000	2,900	-12,000
2050 (W)	-29,000	12,000	-15,000	-840	33,000	200	-12,000
2051 (W)	-36,000	21,000	-9,600	-1,700	39,000	13,000	440
2052 (W)	-44,000	10,000	-14,000	-1,200	45,000	-4,000	-3,600
2053 (AN)	-42,000	12,000	-13,000	-1,200	43,000	-760	-4,300
2054 (D)	-40,000	8,400	-16,000	-670	41,000	-7,200	-12,000
2055 (D)	-32,000	10,000	-17,000	-650	36,000	-4,100	-16,000
2056 (AN)	-30,000	14,000	-14,000	-750	35,000	4,200	-11,000
2057 (BN)	-32,000	14,000	-17,000	-900	37,000	-1	-11,000
2058 (AN)	-37,000	13,000	-12,000	-680	39,000	1,500	-9,900
2059 (W)	-37,000	16,000	-12,000	-1,600	43,000	7,900	-2,000
2060 (D)	-39,000	6,500	-16,000	-690	40,000	-9,100	-11,000
2061 (C)	-31,000	8,100	-20,000	-590	34,000	-9,000	-20,000
2062 (D)	-22,000	6,500	-16,000	-510	28,000	-3,700	-24,000
2063 (BN)	-23,000	12,000	-13,000	-510	29,000	3,400	-20,000
2064 (W)	-24,000	13,000	-11,000	-680	31,000	7,600	-13,000
2065 (BN)	-28,000	6,200	-16,000	-570	31,000	-7,200	-20,000

Antelope Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-18,000	9,600	-18,000	-530	24,000	-3,200	-23,000
2067 (C)		-12,000	5,800	-19,000	-450	17,000	-7,500	-31,000
2068 (C)		-6,500	10,000	-23,000	-380	14,000	-5,000	-36,000
2069 (BN)		-2,100	11,000	-16,000	-410	12,000	4,300	-31,000
2070 (W)		-8,800	16,000	-16,000	-770	20,000	11,000	-20,000
2071 (BN)		-14,000	5,900	-18,000	-480	21,000	-5,500	-26,000
2072 (W)		-16,000	16,000	-13,000	-660	23,000	8,900	-17,000
Average (2022-2072)		-28,000	11,000	-15,000	-820	33,000	-330	
2022-2072	W	-33,000	15,000	-13,000	-1,200	37,000		
	AN	-28,000	13,000	-13,000	-770	33,000		
	BN	-23,000	8,600	-16,000	-590	29,000		
	D	-32,000	8,500	-17,000	-640	35,000		
	C	-20,000	7,300	-18,000	-500	25,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

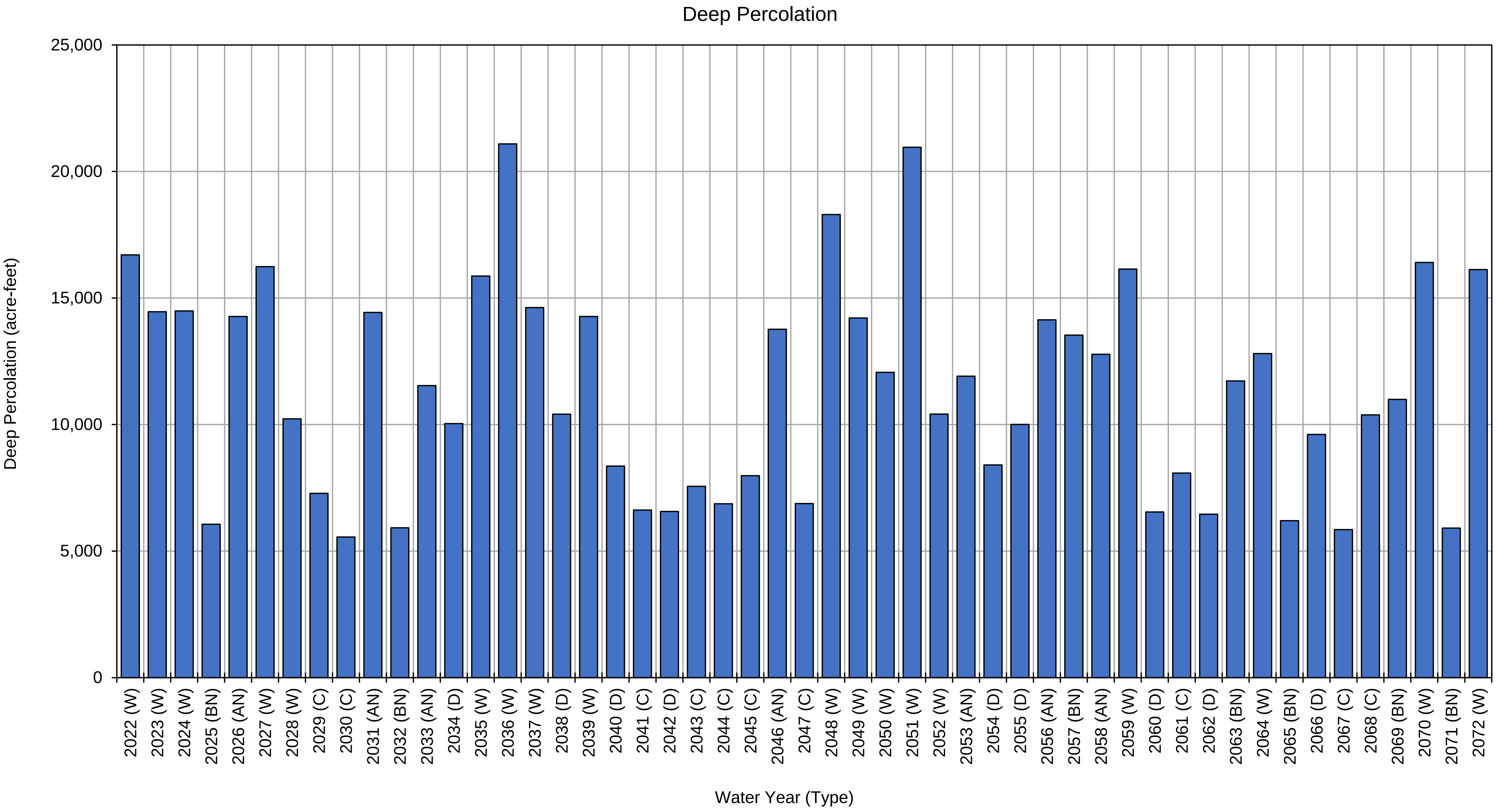
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-42,000
2023 (W)	-42,000
2024 (W)	-42,000
2025 (BN)	-38,000
2026 (AN)	-35,000
2027 (W)	-37,000
2028 (W)	-43,000
2029 (C)	-38,000
2030 (C)	-25,000
2031 (AN)	-23,000
2032 (BN)	-25,000
2033 (AN)	-22,000
2034 (D)	-25,000
2035 (W)	-23,000
2036 (W)	-40,000
2037 (W)	-47,000
2038 (D)	-46,000
2039 (W)	-39,000
2040 (D)	-40,000
2041 (C)	-32,000
2042 (D)	-21,000
2043 (C)	-18,000
2044 (C)	-13,000
2045 (C)	-9,200
2046 (AN)	-8,800
2047 (C)	-14,000
2048 (W)	-14,000
2049 (W)	-25,000
2050 (W)	-29,000
2051 (W)	-36,000
2052 (W)	-44,000
2053 (AN)	-42,000
2054 (D)	-40,000
2055 (D)	-32,000
2056 (AN)	-30,000
2057 (BN)	-32,000
2058 (AN)	-37,000
2059 (W)	-37,000
2060 (D)	-39,000
2061 (C)	-31,000
2062 (D)	-22,000
2063 (BN)	-23,000

Antelope Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-24,000
2065 (BN)		-28,000
2066 (D)		-18,000
2067 (C)		-12,000
2068 (C)		-6,500
2069 (BN)		-2,100
2070 (W)		-8,800
2071 (BN)		-14,000
2072 (W)		-16,000
Average (2022-2072)		-28,000
2022-2072	W	-33,000
	AN	-28,000
	BN	-23,000
	D	-32,000
	C	-20,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

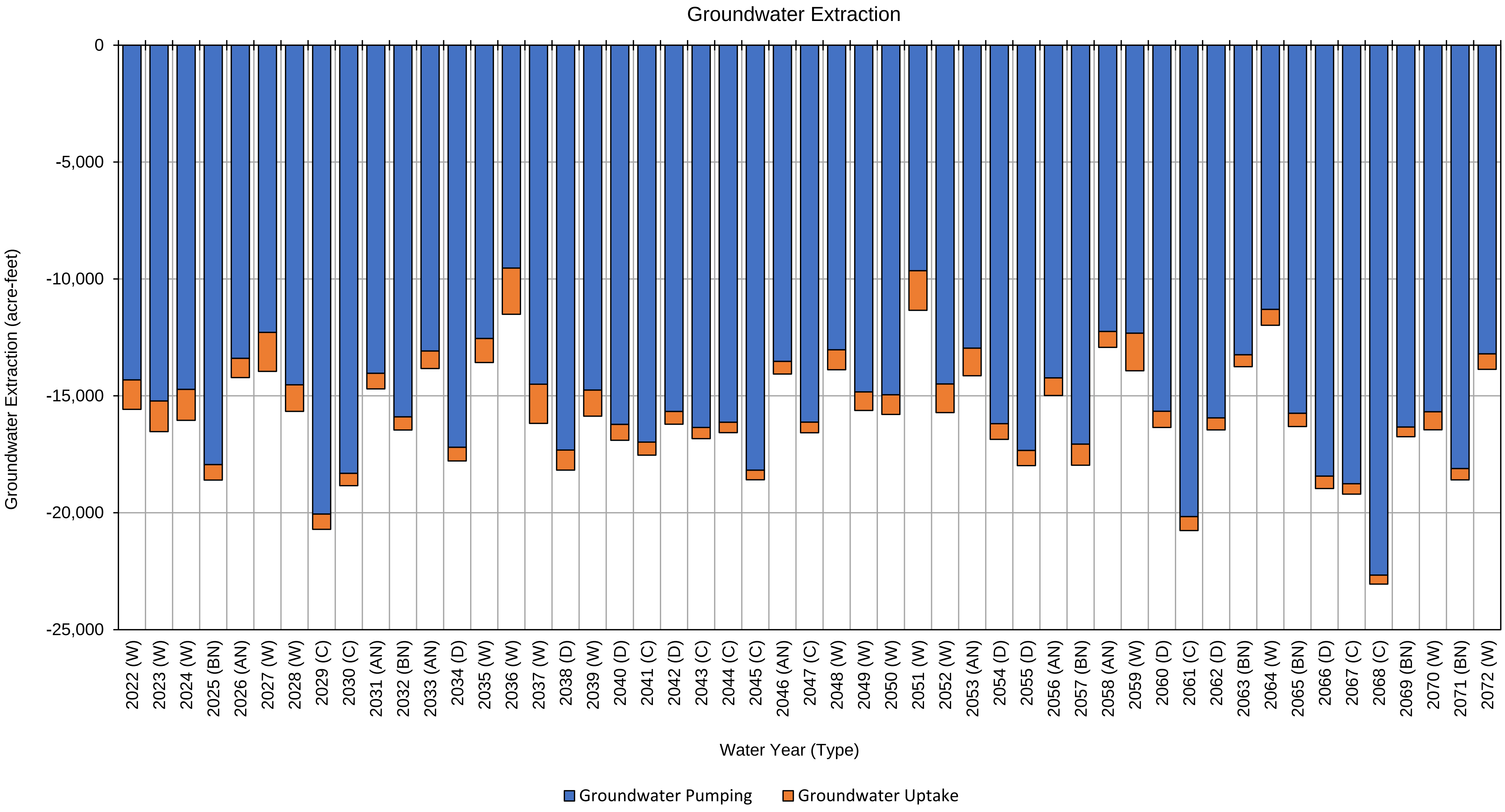
WY (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	14,000
2024 (W)	14,000
2025 (BN)	6,100
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	10,000
2029 (C)	7,300
2030 (C)	5,600
2031 (AN)	14,000
2032 (BN)	5,900
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	21,000
2037 (W)	15,000
2038 (D)	10,000
2039 (W)	14,000
2040 (D)	8,400
2041 (C)	6,600
2042 (D)	6,600
2043 (C)	7,600
2044 (C)	6,900
2045 (C)	8,000
2046 (AN)	14,000
2047 (C)	6,900
2048 (W)	18,000
2049 (W)	14,000
2050 (W)	12,000
2051 (W)	21,000
2052 (W)	10,000
2053 (AN)	12,000
2054 (D)	8,400
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000
2060 (D)	6,500
2061 (C)	8,100
2062 (D)	6,500
2063 (BN)	12,000

Antelope Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		13,000
2065 (BN)		6,200
2066 (D)		9,600
2067 (C)		5,800
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,900
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,600
	D	8,500
	C	7,300

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

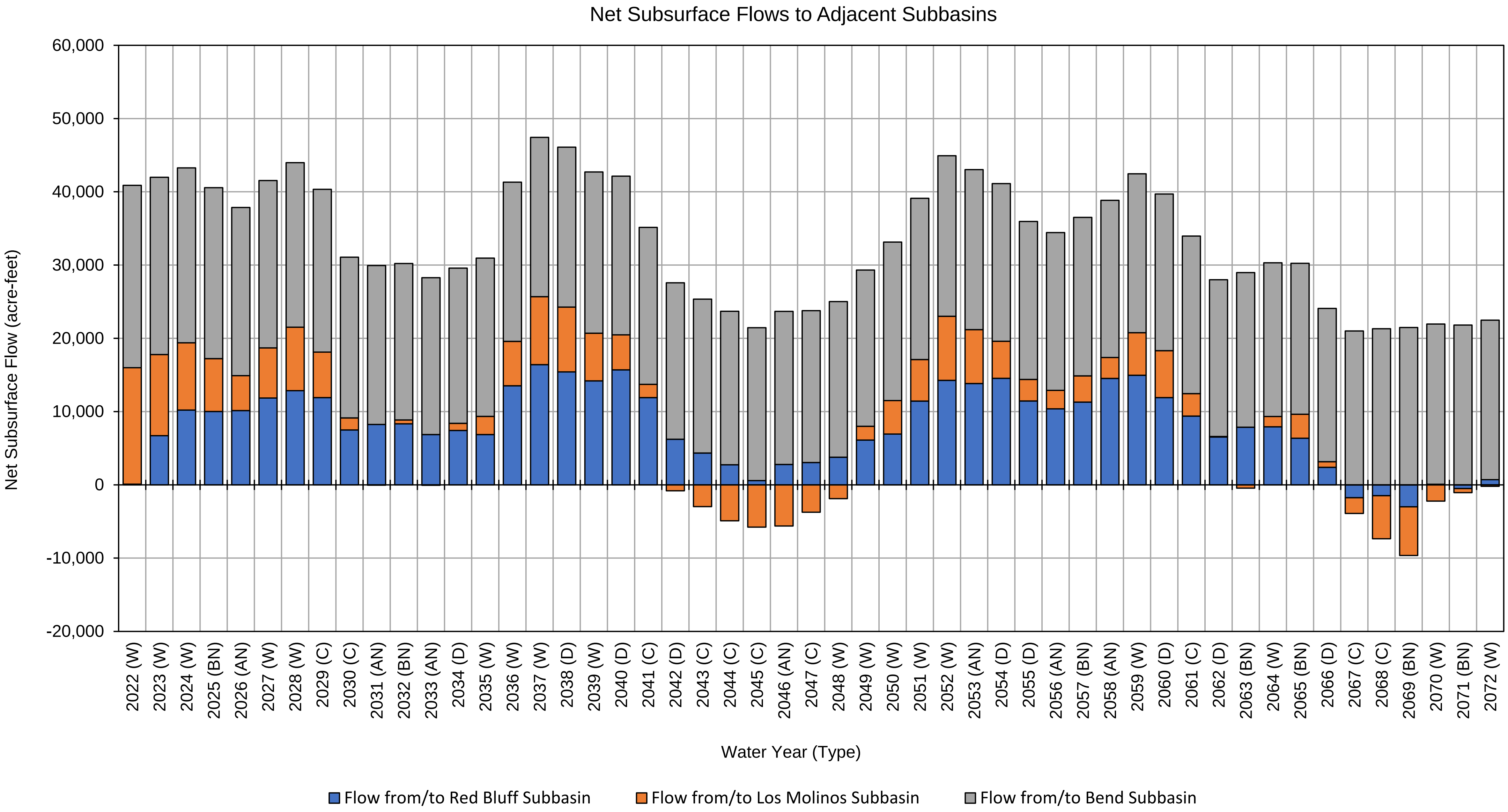
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-14,000	-1,300	-16,000
2023 (W)	-15,000	-1,300	-17,000
2024 (W)	-15,000	-1,300	-16,000
2025 (BN)	-18,000	-660	-19,000
2026 (AN)	-13,000	-820	-14,000
2027 (W)	-12,000	-1,700	-14,000
2028 (W)	-15,000	-1,100	-16,000
2029 (C)	-20,000	-660	-21,000
2030 (C)	-18,000	-530	-19,000
2031 (AN)	-14,000	-660	-15,000
2032 (BN)	-16,000	-560	-16,000
2033 (AN)	-13,000	-750	-14,000
2034 (D)	-17,000	-580	-18,000
2035 (W)	-13,000	-1,000	-14,000
2036 (W)	-9,500	-2,000	-12,000
2037 (W)	-15,000	-1,700	-16,000
2038 (D)	-17,000	-860	-18,000
2039 (W)	-15,000	-1,100	-16,000
2040 (D)	-16,000	-680	-17,000
2041 (C)	-17,000	-560	-18,000
2042 (D)	-16,000	-540	-16,000
2043 (C)	-16,000	-480	-17,000
2044 (C)	-16,000	-440	-17,000
2045 (C)	-18,000	-410	-19,000
2046 (AN)	-14,000	-540	-14,000
2047 (C)	-16,000	-450	-17,000
2048 (W)	-13,000	-850	-14,000
2049 (W)	-15,000	-800	-16,000
2050 (W)	-15,000	-840	-16,000
2051 (W)	-9,600	-1,700	-11,000
2052 (W)	-14,000	-1,200	-16,000
2053 (AN)	-13,000	-1,200	-14,000
2054 (D)	-16,000	-670	-17,000
2055 (D)	-17,000	-650	-18,000
2056 (AN)	-14,000	-750	-15,000
2057 (BN)	-17,000	-900	-18,000
2058 (AN)	-12,000	-680	-13,000
2059 (W)	-12,000	-1,600	-14,000
2060 (D)	-16,000	-690	-16,000
2061 (C)	-20,000	-590	-21,000
2062 (D)	-16,000	-510	-16,000
2063 (BN)	-13,000	-510	-14,000

Antelope Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-11,000	-680	-12,000
2065 (BN)		-16,000	-570	-16,000
2066 (D)		-18,000	-530	-19,000
2067 (C)		-19,000	-450	-19,000
2068 (C)		-23,000	-380	-23,000
2069 (BN)		-16,000	-410	-17,000
2070 (W)		-16,000	-770	-16,000
2071 (BN)		-18,000	-480	-19,000
2072 (W)		-13,000	-660	-14,000
Average (2022-2072)		-15,000	-820	-16,000
2022-2072	W	-13,000	-1,200	-15,000
	AN	-13,000	-770	-14,000
	BN	-16,000	-590	-17,000
	D	-17,000	-640	-17,000
	C	-18,000	-500	-19,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

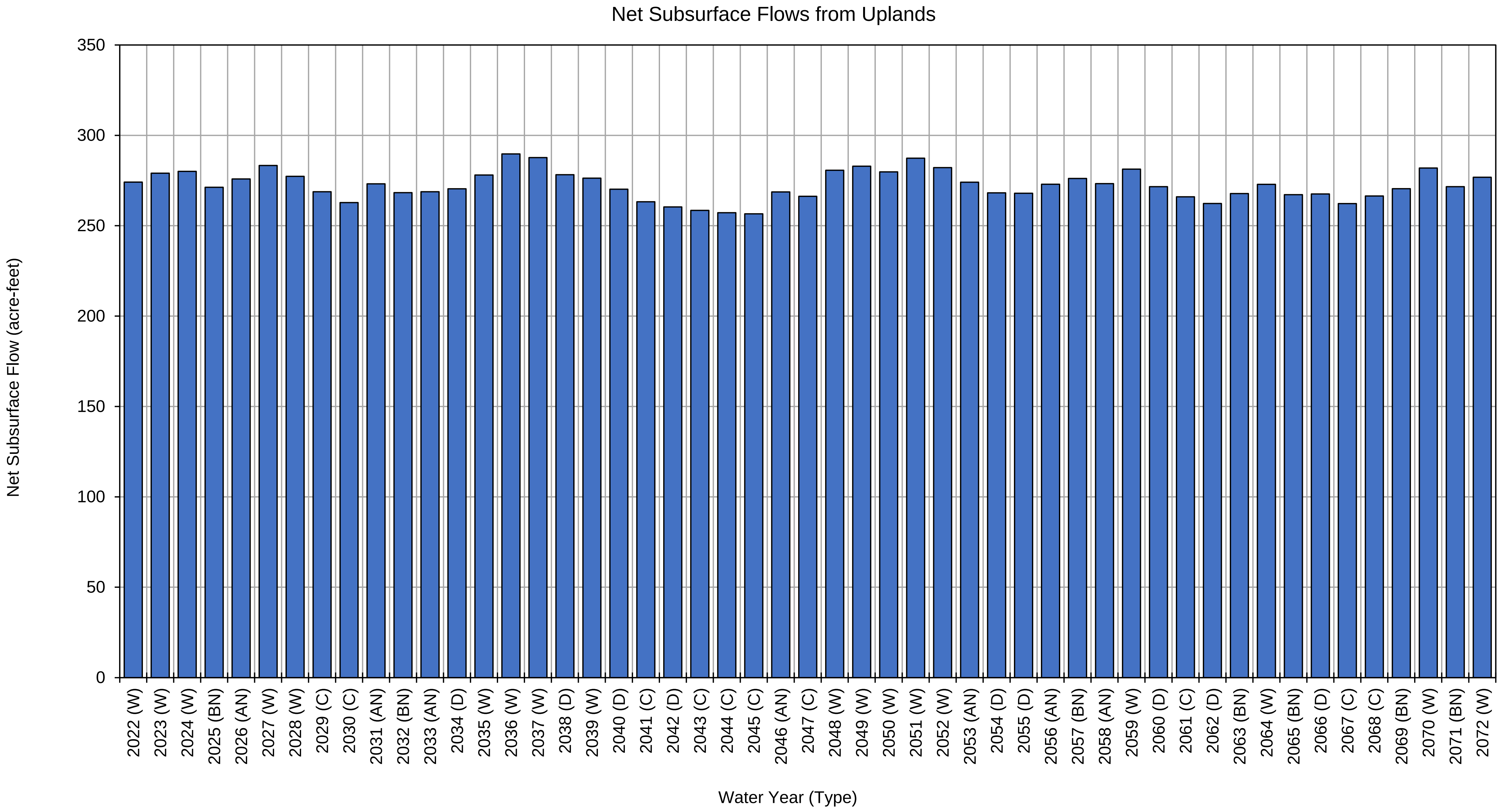
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	88	16,000	25,000	41,000
2023 (W)	6,700	11,000	24,000	42,000
2024 (W)	10,000	9,200	24,000	43,000
2025 (BN)	10,000	7,200	23,000	41,000
2026 (AN)	10,000	4,800	23,000	38,000
2027 (W)	12,000	6,800	23,000	42,000
2028 (W)	13,000	8,700	22,000	44,000
2029 (C)	12,000	6,200	22,000	40,000
2030 (C)	7,500	1,600	22,000	31,000
2031 (AN)	8,200	-53	22,000	30,000
2032 (BN)	8,300	520	21,000	30,000
2033 (AN)	6,900	-65	21,000	28,000
2034 (D)	7,400	970	21,000	30,000
2035 (W)	6,900	2,500	22,000	31,000
2036 (W)	14,000	6,100	22,000	41,000
2037 (W)	16,000	9,300	22,000	47,000
2038 (D)	15,000	8,800	22,000	46,000
2039 (W)	14,000	6,500	22,000	43,000
2040 (D)	16,000	4,800	22,000	42,000
2041 (C)	12,000	1,800	21,000	35,000
2042 (D)	6,200	-820	21,000	27,000
2043 (C)	4,300	-3,000	21,000	22,000
2044 (C)	2,700	-4,900	21,000	19,000
2045 (C)	590	-5,800	21,000	16,000
2046 (AN)	2,800	-5,600	21,000	18,000
2047 (C)	3,000	-3,700	21,000	20,000
2048 (W)	3,800	-1,900	21,000	23,000
2049 (W)	6,100	1,900	21,000	29,000
2050 (W)	6,900	4,600	22,000	33,000
2051 (W)	11,000	5,700	22,000	39,000
2052 (W)	14,000	8,800	22,000	45,000
2053 (AN)	14,000	7,400	22,000	43,000
2054 (D)	15,000	5,100	22,000	41,000
2055 (D)	11,000	2,900	22,000	36,000
2056 (AN)	10,000	2,500	22,000	34,000
2057 (BN)	11,000	3,600	22,000	37,000
2058 (AN)	15,000	2,900	21,000	39,000
2059 (W)	15,000	5,800	22,000	42,000
2060 (D)	12,000	6,400	21,000	40,000
2061 (C)	9,400	3,100	22,000	34,000
2062 (D)	6,500	76	21,000	28,000
2063 (BN)	7,900	-450	21,000	29,000

Antelope Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		7,900	1,400	21,000	30,000
2065 (BN)		6,400	3,300	21,000	30,000
2066 (D)		2,400	760	21,000	24,000
2067 (C)		-1,800	-2,100	21,000	17,000
2068 (C)		-1,500	-5,900	21,000	14,000
2069 (BN)		-3,000	-6,600	21,000	12,000
2070 (W)		83	-2,200	22,000	20,000
2071 (BN)		-500	-560	22,000	21,000
2072 (W)		710	-200	22,000	22,000
Average (2022-2072)		8,000	2,600	22,000	32,000
2022-2072	W	8,800	5,500	22,000	37,000
	AN	9,500	1,700	22,000	33,000
	BN	5,800	990	22,000	28,000
	D	10,000	3,200	21,000	35,000
	C	4,800	-1,300	21,000	25,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

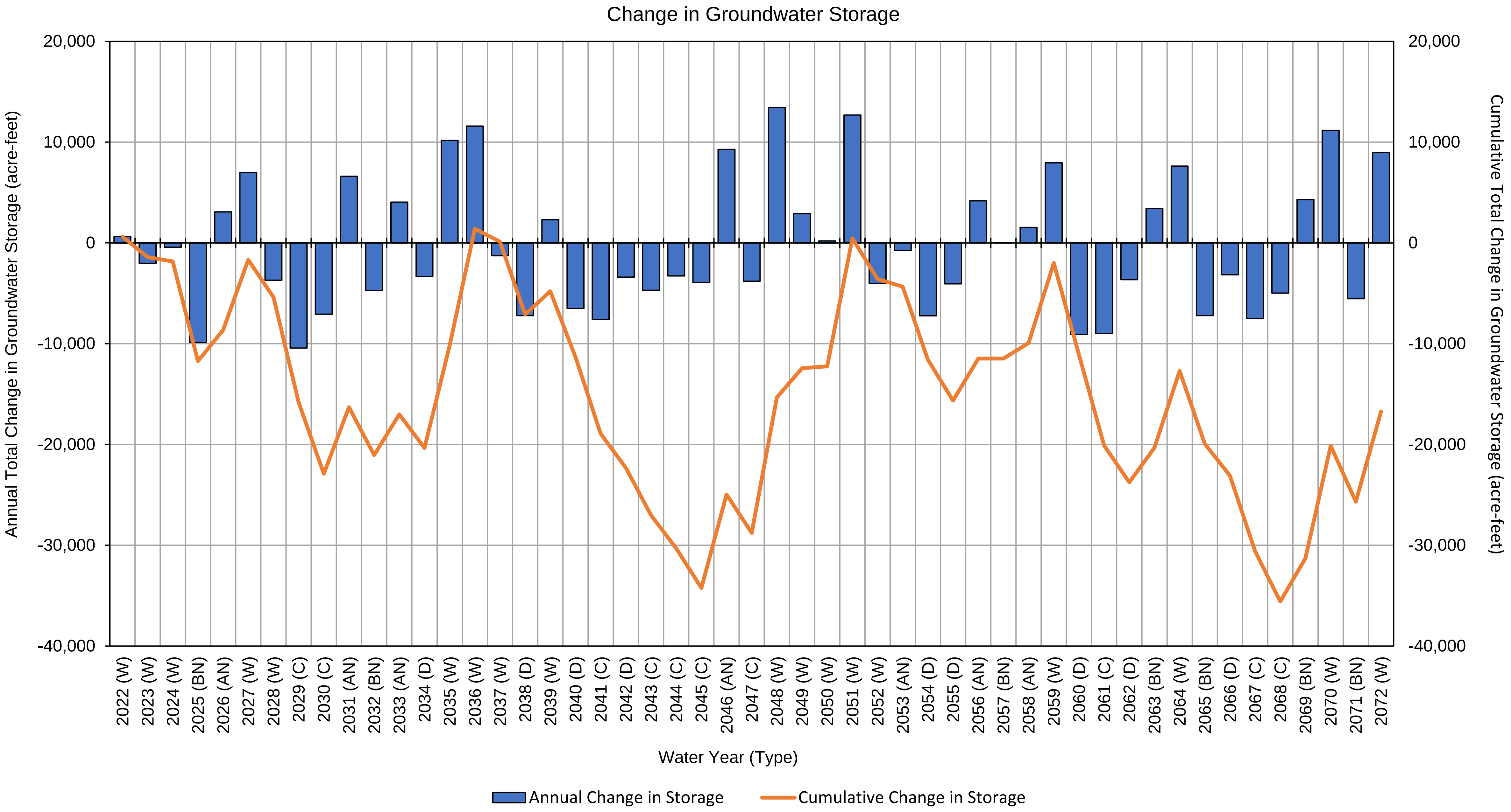
WY (Type)	Subsurface Flows from Uplands
2022 (W)	270
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280
2060 (D)	270
2061 (C)	270
2062 (D)	260
2063 (BN)	270

Antelope Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Antelope Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	620	620
2023 (W)	-2,000	-1,400
2024 (W)	-440	-1,800
2025 (BN)	-9,900	-12,000
2026 (AN)	3,100	-8,700
2027 (W)	7,000	-1,700
2028 (W)	-3,700	-5,400
2029 (C)	-10,000	-16,000
2030 (C)	-7,100	-23,000
2031 (AN)	6,600	-16,000
2032 (BN)	-4,700	-21,000
2033 (AN)	4,000	-17,000
2034 (D)	-3,300	-20,000
2035 (W)	10,000	-10,000
2036 (W)	12,000	1,400
2037 (W)	-1,300	120
2038 (D)	-7,200	-7,100
2039 (W)	2,300	-4,800
2040 (D)	-6,500	-11,000
2041 (C)	-7,600	-19,000
2042 (D)	-3,400	-22,000
2043 (C)	-4,700	-27,000
2044 (C)	-3,300	-30,000
2045 (C)	-3,900	-34,000
2046 (AN)	9,300	-25,000
2047 (C)	-3,800	-29,000
2048 (W)	13,000	-15,000
2049 (W)	2,900	-12,000
2050 (W)	200	-12,000
2051 (W)	13,000	440
2052 (W)	-4,000	-3,600
2053 (AN)	-760	-4,300
2054 (D)	-7,200	-12,000
2055 (D)	-4,100	-16,000
2056 (AN)	4,200	-11,000
2057 (BN)	-1	-11,000
2058 (AN)	1,500	-9,900
2059 (W)	7,900	-2,000
2060 (D)	-9,100	-11,000
2061 (C)	-9,000	-20,000
2062 (D)	-3,700	-24,000
2063 (BN)	3,400	-20,000

Antelope Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		7,600	-13,000
2065 (BN)		-7,200	-20,000
2066 (D)		-3,200	-23,000
2067 (C)		-7,500	-31,000
2068 (C)		-5,000	-36,000
2069 (BN)		4,300	-31,000
2070 (W)		11,000	-20,000
2071 (BN)		-5,500	-26,000
2072 (W)		8,900	-17,000
Average (2022-2072)		-330	
2022-2072	W		
	AN		
	BN		
	D		
	C		

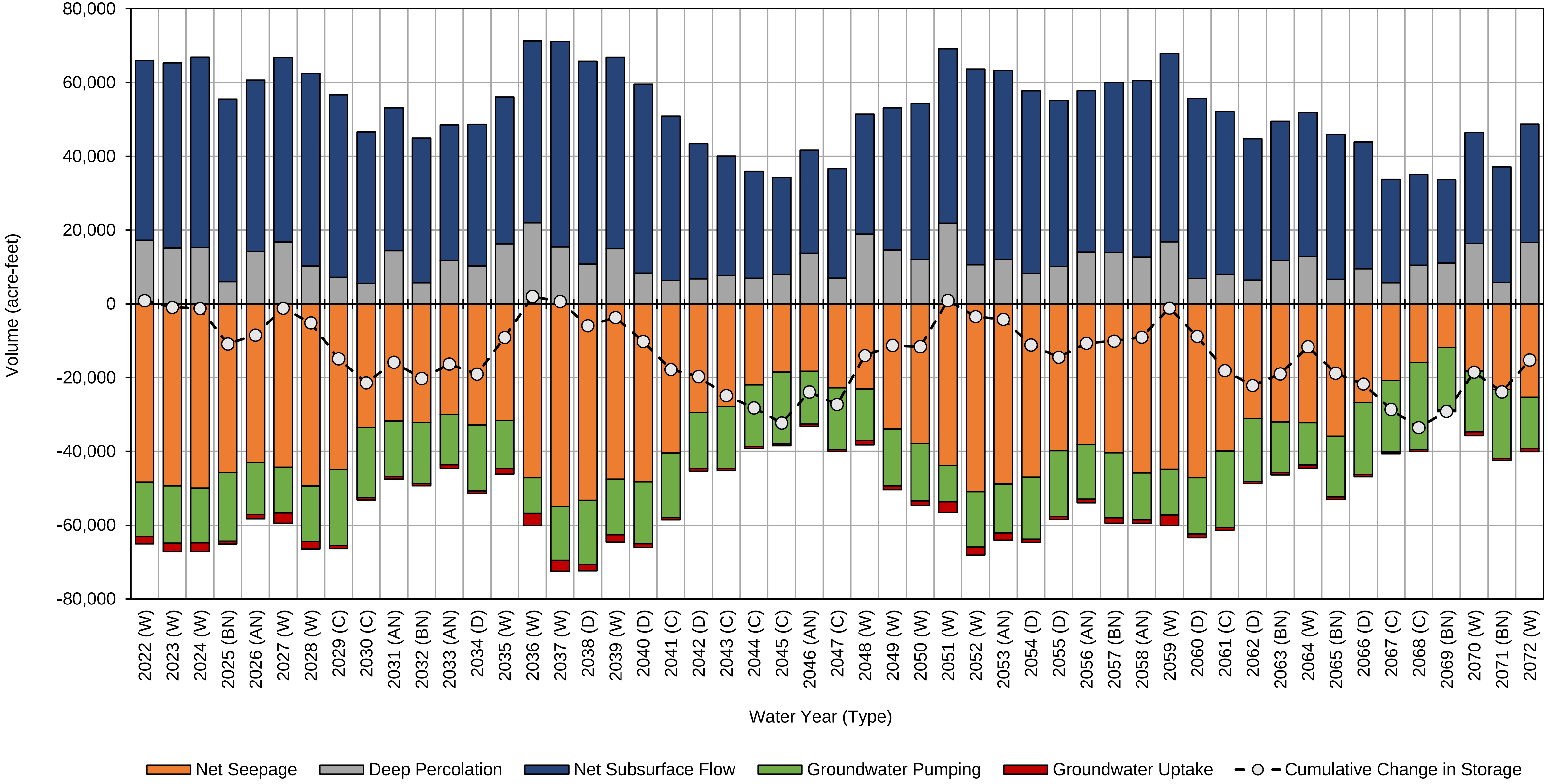
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-4

Detailed Antelope Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2030) Model Results



Projected (Current Land Use) with Climate Change (2030) Water Budget
Antelope Subbasin

Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

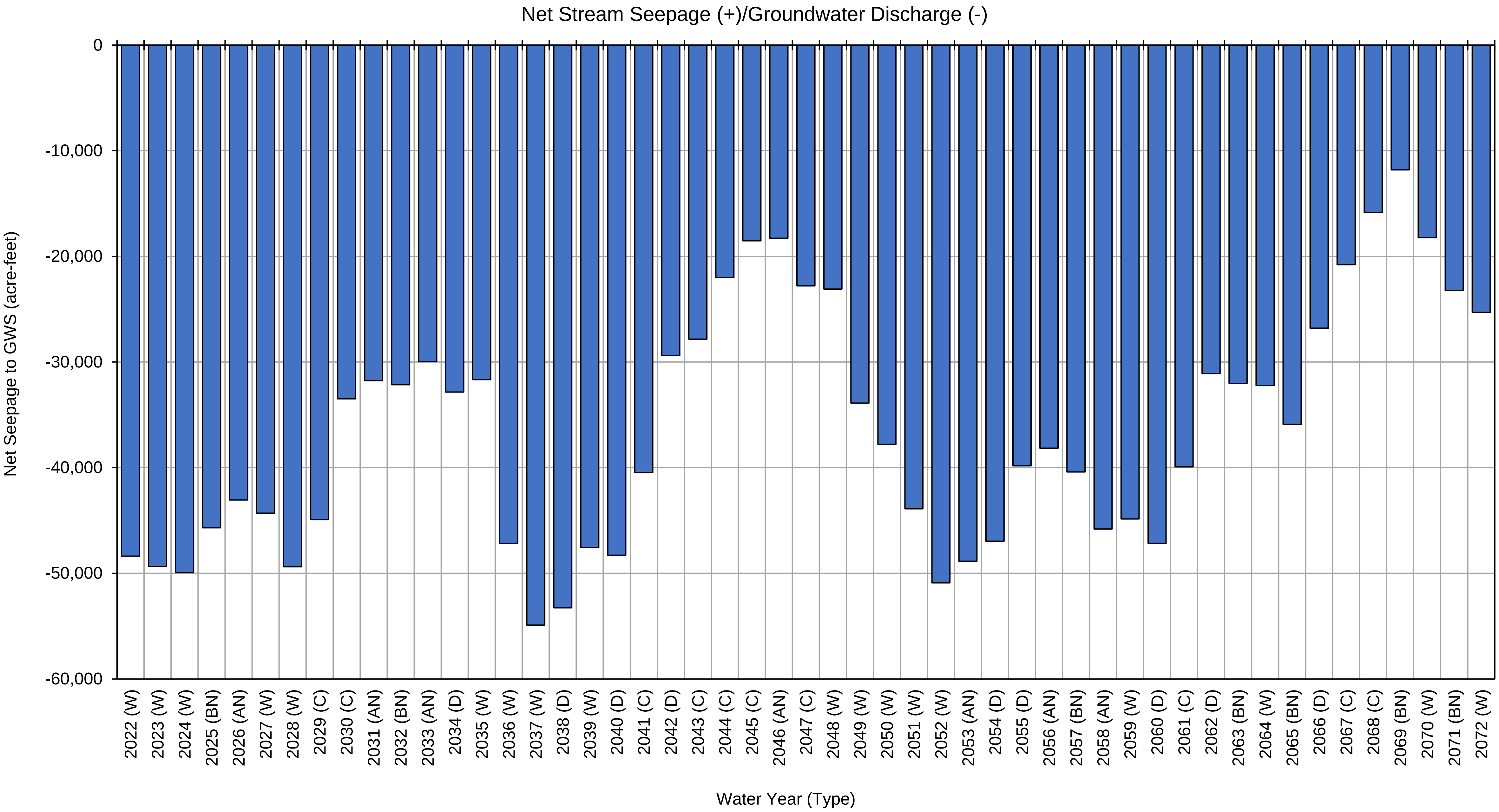
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-48,000	17,000	-15,000	-2,100	49,000	870	870
2023 (W)	-49,000	15,000	-16,000	-2,300	50,000	-1,800	-960
2024 (W)	-50,000	15,000	-15,000	-2,300	52,000	-290	-1,200
2025 (BN)	-46,000	6,000	-19,000	-820	50,000	-9,600	-11,000
2026 (AN)	-43,000	14,000	-14,000	-1,200	46,000	2,400	-8,500
2027 (W)	-44,000	17,000	-12,000	-2,800	50,000	7,300	-1,200
2028 (W)	-49,000	10,000	-15,000	-1,900	52,000	-4,000	-5,200
2029 (C)	-45,000	7,200	-21,000	-810	49,000	-9,700	-15,000
2030 (C)	-33,000	5,500	-19,000	-610	41,000	-6,500	-21,000
2031 (AN)	-32,000	14,000	-15,000	-800	39,000	5,600	-16,000
2032 (BN)	-32,000	5,700	-17,000	-640	39,000	-4,400	-20,000
2033 (AN)	-30,000	12,000	-14,000	-920	37,000	3,900	-16,000
2034 (D)	-33,000	10,000	-18,000	-700	38,000	-2,700	-19,000
2035 (W)	-32,000	16,000	-13,000	-1,500	40,000	9,900	-9,100
2036 (W)	-47,000	22,000	-9,600	-3,300	49,000	11,000	2,000
2037 (W)	-55,000	15,000	-15,000	-2,900	56,000	-1,300	640
2038 (D)	-53,000	11,000	-17,000	-1,700	55,000	-6,600	-5,900
2039 (W)	-48,000	15,000	-15,000	-2,000	52,000	2,200	-3,700
2040 (D)	-48,000	8,300	-17,000	-970	51,000	-6,500	-10,000
2041 (C)	-40,000	6,400	-17,000	-650	45,000	-7,600	-18,000
2042 (D)	-29,000	6,800	-15,000	-660	37,000	-1,900	-20,000
2043 (C)	-28,000	7,600	-17,000	-570	32,000	-5,200	-25,000
2044 (C)	-22,000	6,900	-17,000	-520	29,000	-3,300	-28,000
2045 (C)	-19,000	8,000	-19,000	-470	26,000	-4,100	-32,000
2046 (AN)	-18,000	14,000	-14,000	-620	28,000	8,400	-24,000
2047 (C)	-23,000	7,000	-17,000	-520	30,000	-3,400	-27,000
2048 (W)	-23,000	19,000	-14,000	-1,200	33,000	13,000	-14,000
2049 (W)	-34,000	15,000	-15,000	-1,000	39,000	2,700	-11,000
2050 (W)	-38,000	12,000	-16,000	-1,100	42,000	-330	-12,000
2051 (W)	-44,000	22,000	-9,800	-3,000	47,000	13,000	910
2052 (W)	-51,000	11,000	-15,000	-2,100	53,000	-4,400	-3,500
2053 (AN)	-49,000	12,000	-13,000	-1,900	51,000	-740	-4,200
2054 (D)	-47,000	8,300	-17,000	-890	49,000	-6,900	-11,000
2055 (D)	-40,000	10,000	-18,000	-820	45,000	-3,300	-14,000
2056 (AN)	-38,000	14,000	-15,000	-1,000	44,000	3,800	-11,000
2057 (BN)	-40,000	14,000	-18,000	-1,400	46,000	560	-10,000
2058 (AN)	-46,000	13,000	-13,000	-910	48,000	1,100	-9,000
2059 (W)	-45,000	17,000	-12,000	-2,800	51,000	7,900	-1,100
2060 (D)	-47,000	6,800	-15,000	-950	49,000	-7,700	-8,800
2061 (C)	-40,000	8,000	-21,000	-720	44,000	-9,300	-18,000
2062 (D)	-31,000	6,400	-17,000	-600	38,000	-4,000	-22,000
2063 (BN)	-32,000	12,000	-14,000	-600	38,000	3,100	-19,000
2064 (W)	-32,000	13,000	-11,000	-850	39,000	7,400	-12,000
2065 (BN)	-36,000	6,700	-16,000	-660	39,000	-7,200	-19,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-27,000	9,500	-19,000	-620	34,000	-2,900	-22,000
2067 (C)		-21,000	5,700	-19,000	-510	28,000	-6,900	-29,000
2068 (C)		-16,000	10,000	-24,000	-440	25,000	-5,000	-34,000
2069 (BN)		-12,000	11,000	-17,000	-500	23,000	4,400	-29,000
2070 (W)		-18,000	16,000	-17,000	-1,000	30,000	11,000	-19,000
2071 (BN)		-23,000	5,800	-19,000	-560	31,000	-5,400	-24,000
2072 (W)		-25,000	17,000	-14,000	-840	32,000	8,600	-15,000
Average (2022-2072)		-36,000	12,000	-16,000	-1,200	42,000	-300	
2022-2072	W	-41,000	16,000	-14,000	-1,900	45,000		
	AN	-37,000	13,000	-14,000	-1,100	42,000		
	BN	-32,000	8,700	-17,000	-740	38,000		
	D	-40,000	8,600	-17,000	-870	44,000		
	C	-29,000	7,300	-19,000	-580	35,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

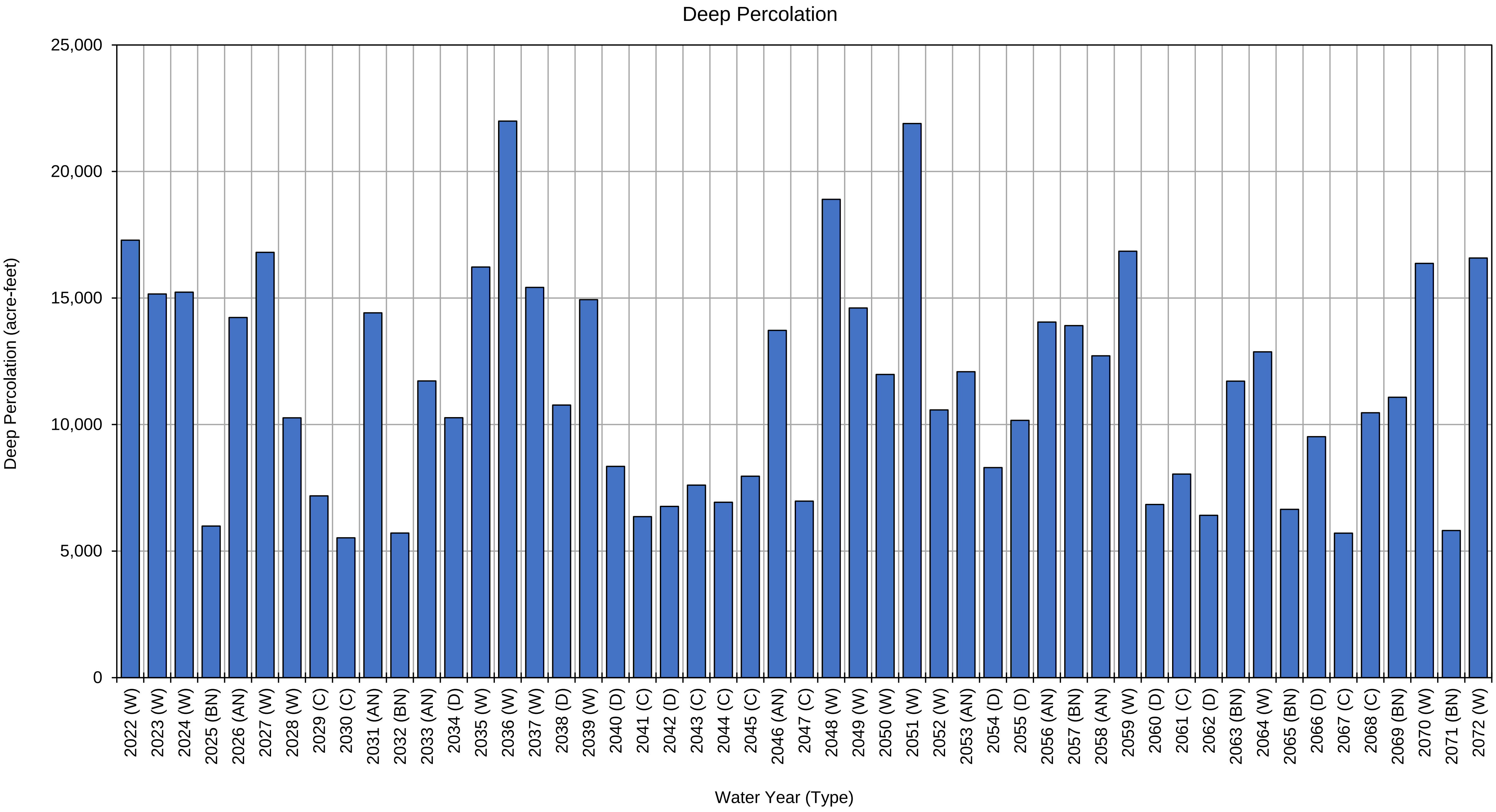
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-48,000
2023 (W)	-49,000
2024 (W)	-50,000
2025 (BN)	-46,000
2026 (AN)	-43,000
2027 (W)	-44,000
2028 (W)	-49,000
2029 (C)	-45,000
2030 (C)	-33,000
2031 (AN)	-32,000
2032 (BN)	-32,000
2033 (AN)	-30,000
2034 (D)	-33,000
2035 (W)	-32,000
2036 (W)	-47,000
2037 (W)	-55,000
2038 (D)	-53,000
2039 (W)	-48,000
2040 (D)	-48,000
2041 (C)	-40,000
2042 (D)	-29,000
2043 (C)	-28,000
2044 (C)	-22,000
2045 (C)	-19,000
2046 (AN)	-18,000
2047 (C)	-23,000
2048 (W)	-23,000
2049 (W)	-34,000
2050 (W)	-38,000
2051 (W)	-44,000
2052 (W)	-51,000
2053 (AN)	-49,000
2054 (D)	-47,000
2055 (D)	-40,000
2056 (AN)	-38,000
2057 (BN)	-40,000
2058 (AN)	-46,000
2059 (W)	-45,000
2060 (D)	-47,000
2061 (C)	-40,000
2062 (D)	-31,000
2063 (BN)	-32,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-32,000
2065 (BN)		-36,000
2066 (D)		-27,000
2067 (C)		-21,000
2068 (C)		-16,000
2069 (BN)		-12,000
2070 (W)		-18,000
2071 (BN)		-23,000
2072 (W)		-25,000
Average (2022-2072)		-36,000
2022-2072	W	-41,000
	AN	-37,000
	BN	-32,000
	D	-40,000
	C	-29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

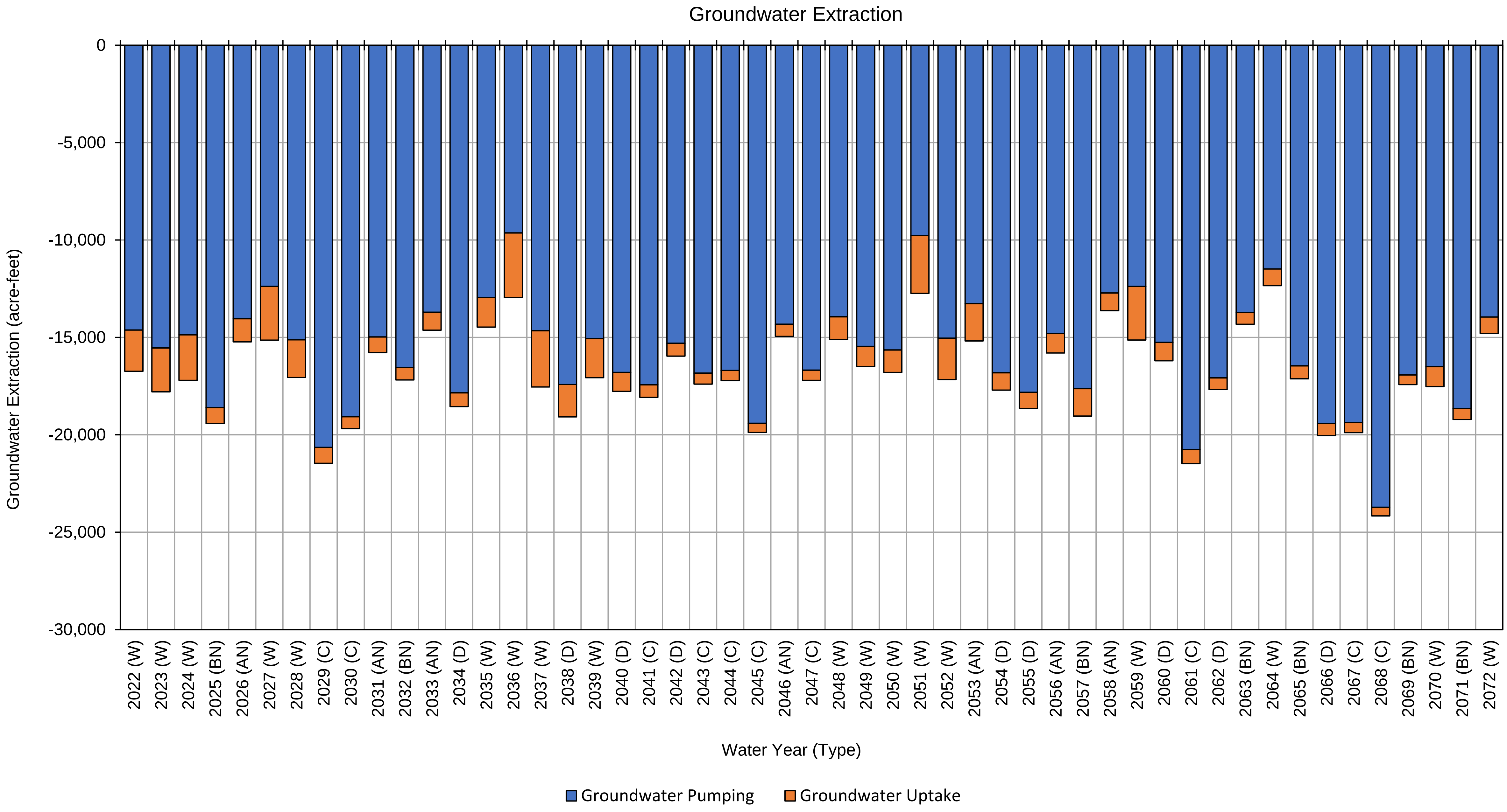
WY (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	6,000
2026 (AN)	14,000
2027 (W)	17,000
2028 (W)	10,000
2029 (C)	7,200
2030 (C)	5,500
2031 (AN)	14,000
2032 (BN)	5,700
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	22,000
2037 (W)	15,000
2038 (D)	11,000
2039 (W)	15,000
2040 (D)	8,300
2041 (C)	6,400
2042 (D)	6,800
2043 (C)	7,600
2044 (C)	6,900
2045 (C)	8,000
2046 (AN)	14,000
2047 (C)	7,000
2048 (W)	19,000
2049 (W)	15,000
2050 (W)	12,000
2051 (W)	22,000
2052 (W)	11,000
2053 (AN)	12,000
2054 (D)	8,300
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	17,000
2060 (D)	6,800
2061 (C)	8,000
2062 (D)	6,400
2063 (BN)	12,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		13,000
2065 (BN)		6,700
2066 (D)		9,500
2067 (C)		5,700
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,800
2072 (W)		17,000
Average (2022-2072)		12,000
2022-2072	W	16,000
	AN	13,000
	BN	8,700
	D	8,600
	C	7,300

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

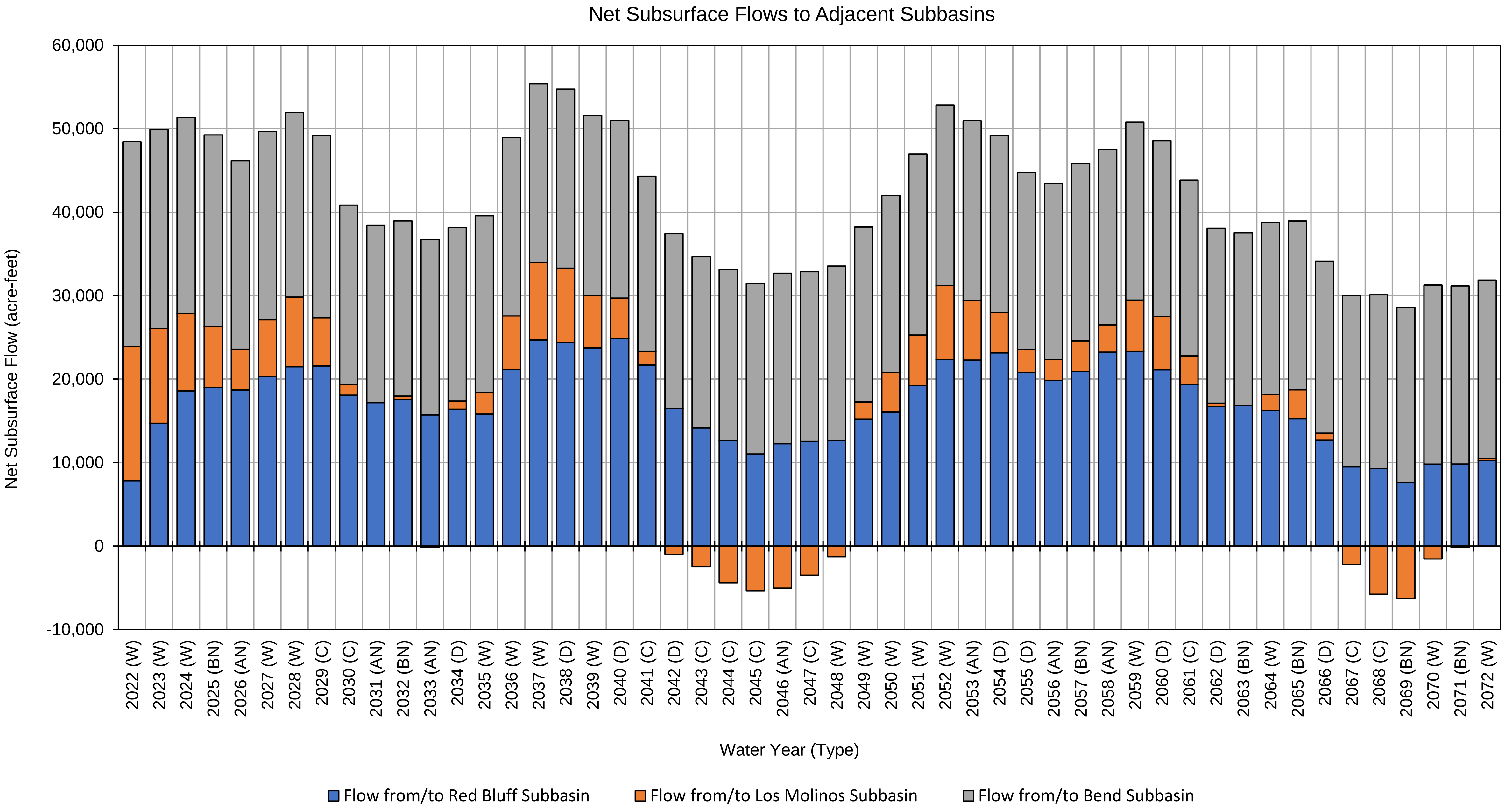
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-15,000	-2,100	-17,000
2023 (W)	-16,000	-2,300	-18,000
2024 (W)	-15,000	-2,300	-17,000
2025 (BN)	-19,000	-820	-19,000
2026 (AN)	-14,000	-1,200	-15,000
2027 (W)	-12,000	-2,800	-15,000
2028 (W)	-15,000	-1,900	-17,000
2029 (C)	-21,000	-810	-21,000
2030 (C)	-19,000	-610	-20,000
2031 (AN)	-15,000	-800	-16,000
2032 (BN)	-17,000	-640	-17,000
2033 (AN)	-14,000	-920	-15,000
2034 (D)	-18,000	-700	-19,000
2035 (W)	-13,000	-1,500	-14,000
2036 (W)	-9,600	-3,300	-13,000
2037 (W)	-15,000	-2,900	-18,000
2038 (D)	-17,000	-1,700	-19,000
2039 (W)	-15,000	-2,000	-17,000
2040 (D)	-17,000	-970	-18,000
2041 (C)	-17,000	-650	-18,000
2042 (D)	-15,000	-660	-16,000
2043 (C)	-17,000	-570	-17,000
2044 (C)	-17,000	-520	-17,000
2045 (C)	-19,000	-470	-20,000
2046 (AN)	-14,000	-620	-15,000
2047 (C)	-17,000	-520	-17,000
2048 (W)	-14,000	-1,200	-15,000
2049 (W)	-15,000	-1,000	-16,000
2050 (W)	-16,000	-1,100	-17,000
2051 (W)	-9,800	-3,000	-13,000
2052 (W)	-15,000	-2,100	-17,000
2053 (AN)	-13,000	-1,900	-15,000
2054 (D)	-17,000	-890	-18,000
2055 (D)	-18,000	-820	-19,000
2056 (AN)	-15,000	-1,000	-16,000
2057 (BN)	-18,000	-1,400	-19,000
2058 (AN)	-13,000	-910	-14,000
2059 (W)	-12,000	-2,800	-15,000
2060 (D)	-15,000	-950	-16,000
2061 (C)	-21,000	-720	-21,000
2062 (D)	-17,000	-600	-18,000
2063 (BN)	-14,000	-600	-14,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-11,000	-850	-12,000
2065 (BN)		-16,000	-660	-17,000
2066 (D)		-19,000	-620	-20,000
2067 (C)		-19,000	-510	-20,000
2068 (C)		-24,000	-440	-24,000
2069 (BN)		-17,000	-500	-17,000
2070 (W)		-17,000	-1,000	-18,000
2071 (BN)		-19,000	-560	-19,000
2072 (W)		-14,000	-840	-15,000
Average (2022-2072)		-16,000	-1,200	-17,000
2022-2072	W	-14,000	-1,900	-16,000
	AN	-14,000	-1,100	-15,000
	BN	-17,000	-740	-18,000
	D	-17,000	-870	-18,000
	C	-19,000	-580	-20,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

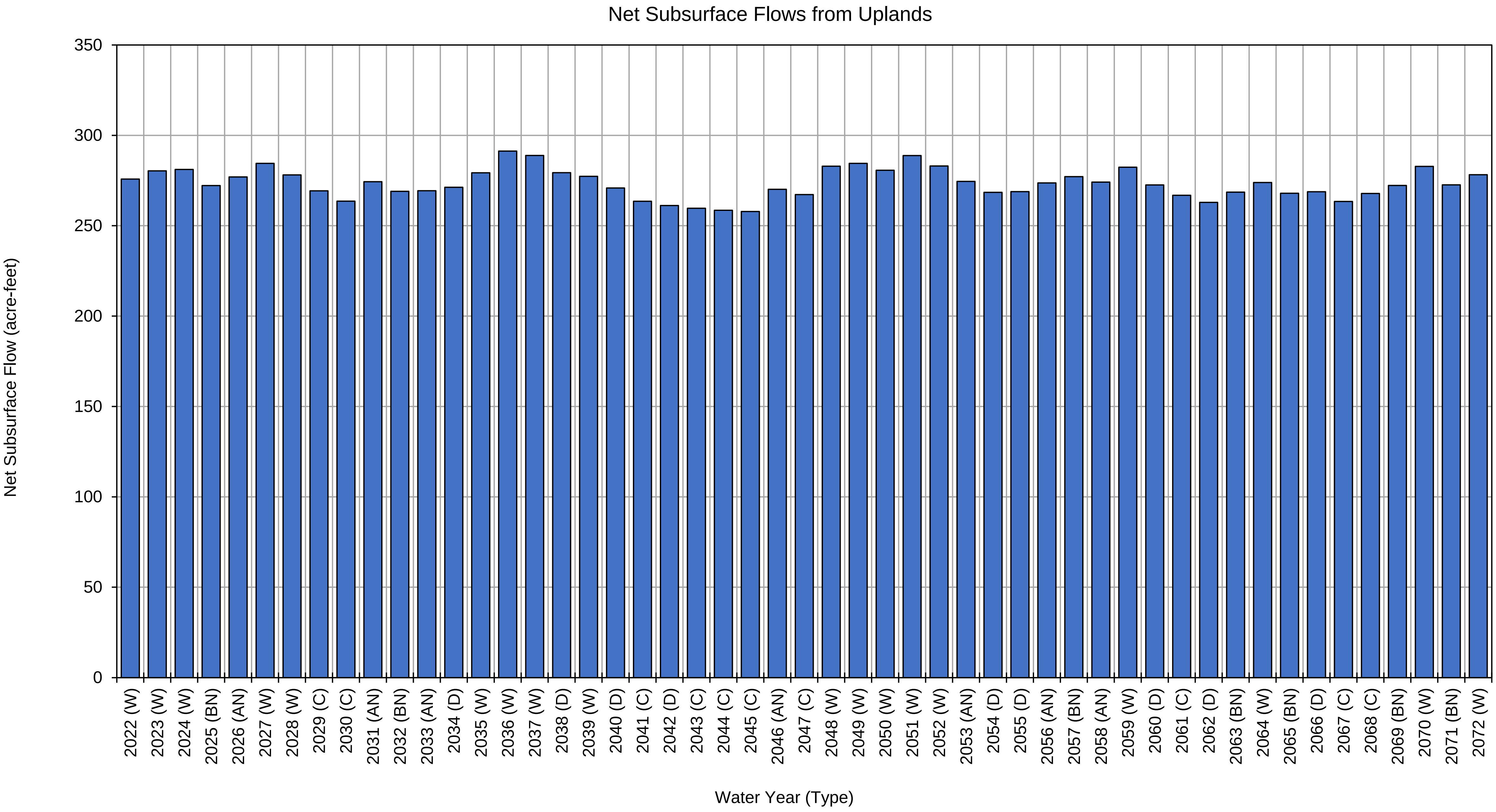
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	7,800	16,000	25,000	48,000
2023 (W)	15,000	11,000	24,000	50,000
2024 (W)	19,000	9,300	23,000	51,000
2025 (BN)	19,000	7,300	23,000	49,000
2026 (AN)	19,000	4,900	23,000	46,000
2027 (W)	20,000	6,800	23,000	50,000
2028 (W)	21,000	8,400	22,000	52,000
2029 (C)	22,000	5,800	22,000	49,000
2030 (C)	18,000	1,300	22,000	41,000
2031 (AN)	17,000	-8	21,000	38,000
2032 (BN)	18,000	400	21,000	39,000
2033 (AN)	16,000	-190	21,000	37,000
2034 (D)	16,000	970	21,000	38,000
2035 (W)	16,000	2,600	21,000	40,000
2036 (W)	21,000	6,400	21,000	49,000
2037 (W)	25,000	9,300	21,000	55,000
2038 (D)	24,000	8,900	21,000	55,000
2039 (W)	24,000	6,300	22,000	52,000
2040 (D)	25,000	4,800	21,000	51,000
2041 (C)	22,000	1,600	21,000	44,000
2042 (D)	16,000	-980	21,000	36,000
2043 (C)	14,000	-2,500	21,000	32,000
2044 (C)	13,000	-4,400	20,000	29,000
2045 (C)	11,000	-5,300	20,000	26,000
2046 (AN)	12,000	-5,000	20,000	28,000
2047 (C)	13,000	-3,500	20,000	29,000
2048 (W)	13,000	-1,300	21,000	32,000
2049 (W)	15,000	2,000	21,000	38,000
2050 (W)	16,000	4,700	21,000	42,000
2051 (W)	19,000	6,000	22,000	47,000
2052 (W)	22,000	8,900	22,000	53,000
2053 (AN)	22,000	7,100	22,000	51,000
2054 (D)	23,000	4,900	21,000	49,000
2055 (D)	21,000	2,800	21,000	45,000
2056 (AN)	20,000	2,500	21,000	43,000
2057 (BN)	21,000	3,600	21,000	46,000
2058 (AN)	23,000	3,300	21,000	48,000
2059 (W)	23,000	6,200	21,000	51,000
2060 (D)	21,000	6,400	21,000	49,000
2061 (C)	19,000	3,400	21,000	44,000
2062 (D)	17,000	370	21,000	38,000
2063 (BN)	17,000	-2	21,000	38,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		16,000	1,900	21,000	39,000
2065 (BN)		15,000	3,500	20,000	39,000
2066 (D)		13,000	840	21,000	34,000
2067 (C)		9,500	-2,200	21,000	28,000
2068 (C)		9,300	-5,800	21,000	24,000
2069 (BN)		7,600	-6,300	21,000	22,000
2070 (W)		9,800	-1,500	21,000	30,000
2071 (BN)		9,800	-180	21,000	31,000
2072 (W)		10,000	250	21,000	32,000
Average (2022-2072)		17,000	2,800	21,000	41,000
2022-2072	W	17,000	5,800	22,000	45,000
	AN	18,000	1,800	21,000	42,000
	BN	15,000	1,200	21,000	38,000
	D	20,000	3,200	21,000	44,000
	C	15,000	-1,200	21,000	35,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

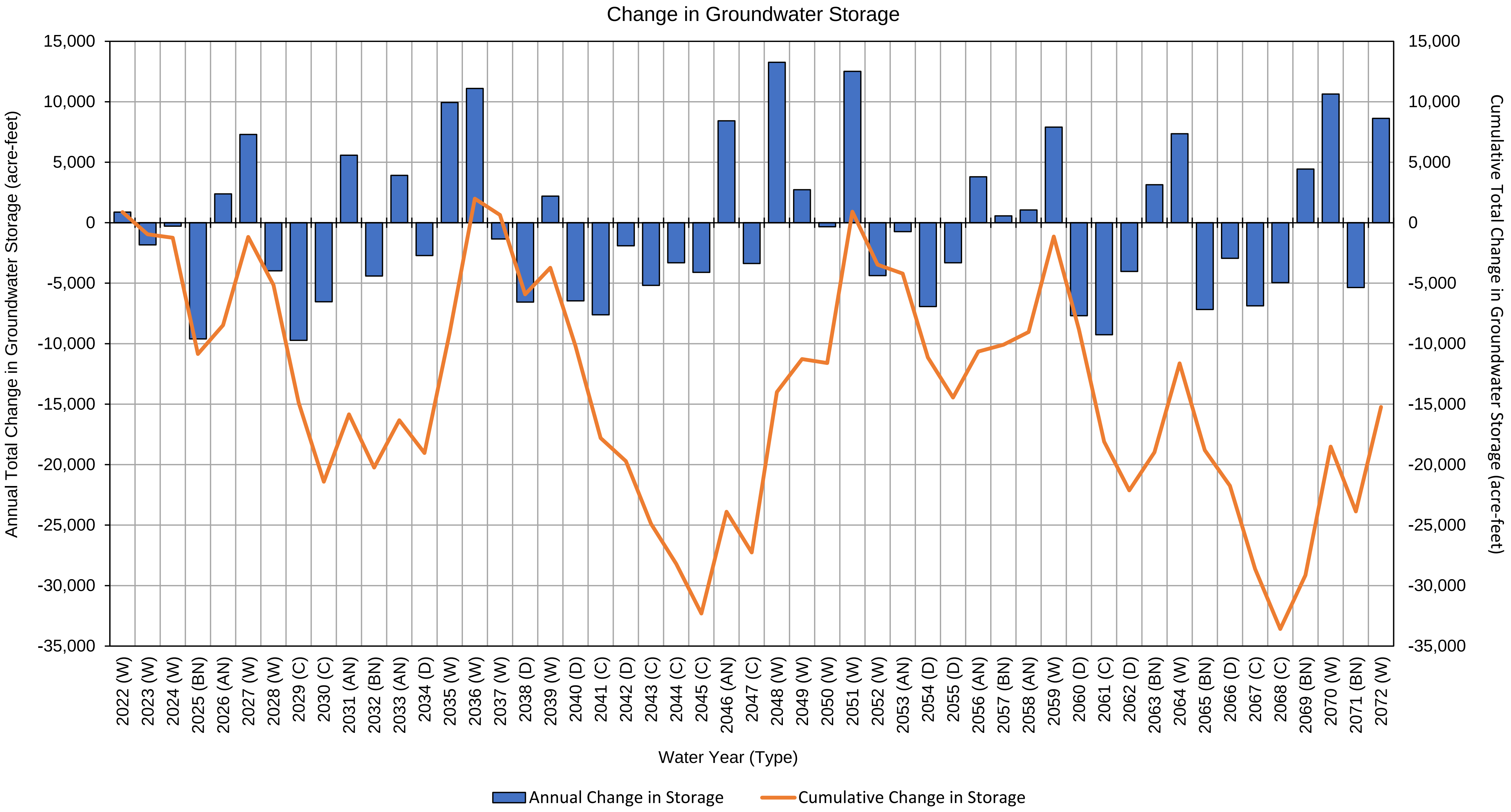
WY (Type)	Subsurface Flows from Uplands
2022 (W)	280
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280
2060 (D)	270
2061 (C)	270
2062 (D)	260
2063 (BN)	270

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	870	870
2023 (W)	-1,800	-960
2024 (W)	-290	-1,200
2025 (BN)	-9,600	-11,000
2026 (AN)	2,400	-8,500
2027 (W)	7,300	-1,200
2028 (W)	-4,000	-5,200
2029 (C)	-9,700	-15,000
2030 (C)	-6,500	-21,000
2031 (AN)	5,600	-16,000
2032 (BN)	-4,400	-20,000
2033 (AN)	3,900	-16,000
2034 (D)	-2,700	-19,000
2035 (W)	9,900	-9,100
2036 (W)	11,000	2,000
2037 (W)	-1,300	640
2038 (D)	-6,600	-5,900
2039 (W)	2,200	-3,700
2040 (D)	-6,500	-10,000
2041 (C)	-7,600	-18,000
2042 (D)	-1,900	-20,000
2043 (C)	-5,200	-25,000
2044 (C)	-3,300	-28,000
2045 (C)	-4,100	-32,000
2046 (AN)	8,400	-24,000
2047 (C)	-3,400	-27,000
2048 (W)	13,000	-14,000
2049 (W)	2,700	-11,000
2050 (W)	-330	-12,000
2051 (W)	13,000	910
2052 (W)	-4,400	-3,500
2053 (AN)	-740	-4,200
2054 (D)	-6,900	-11,000
2055 (D)	-3,300	-14,000
2056 (AN)	3,800	-11,000
2057 (BN)	560	-10,000
2058 (AN)	1,100	-9,000
2059 (W)	7,900	-1,100
2060 (D)	-7,700	-8,800
2061 (C)	-9,300	-18,000
2062 (D)	-4,000	-22,000
2063 (BN)	3,100	-19,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		7,400	-12,000
2065 (BN)		-7,200	-19,000
2066 (D)		-2,900	-22,000
2067 (C)		-6,900	-29,000
2068 (C)		-5,000	-34,000
2069 (BN)		4,400	-29,000
2070 (W)		11,000	-19,000
2071 (BN)		-5,400	-24,000
2072 (W)		8,600	-15,000
Average (2022-2072)		-300	
2022-2072	W		
	AN		
	BN		
	D		
	C		

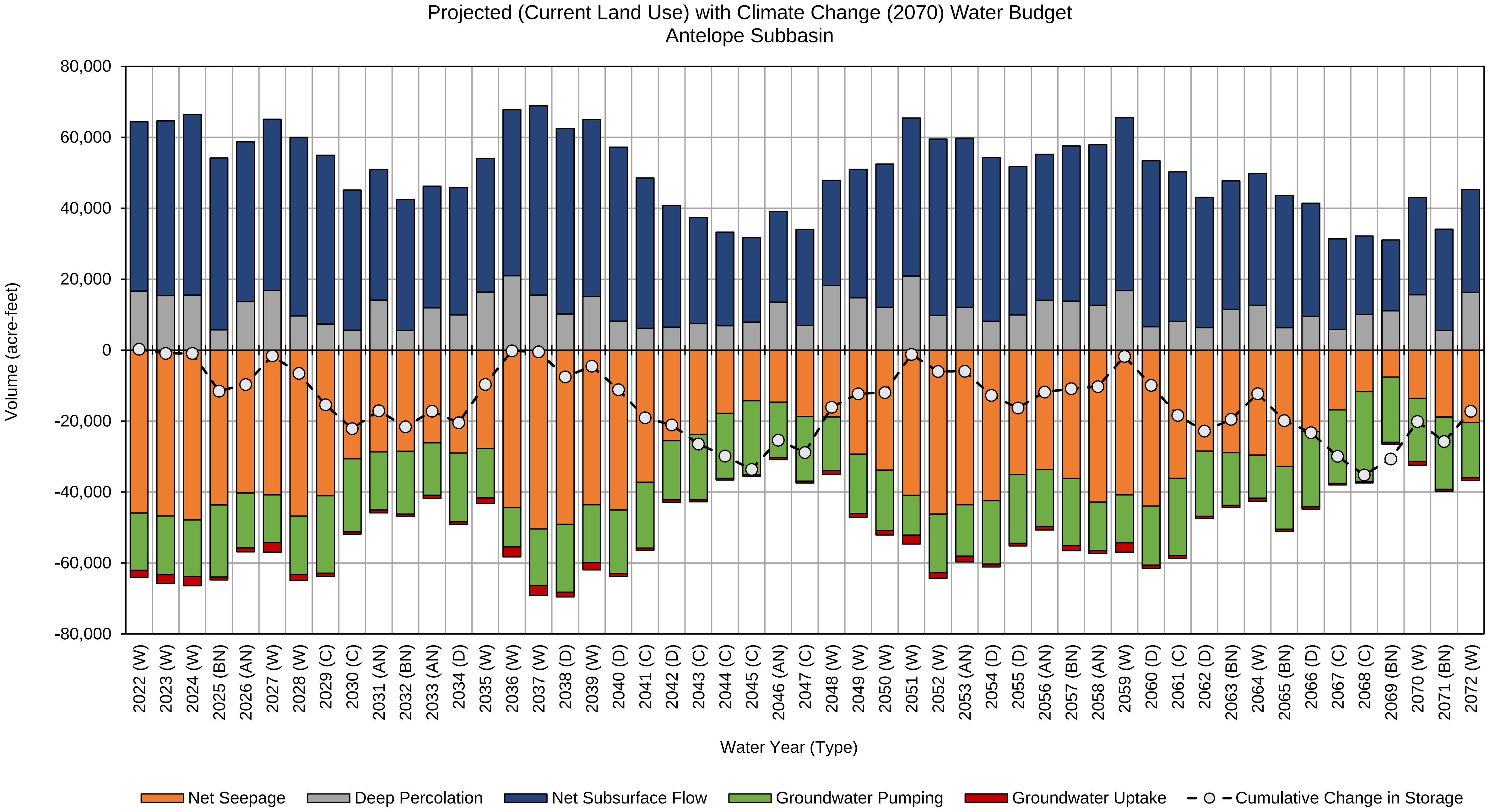
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-5

Detailed Antelope Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2070) Model Results



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

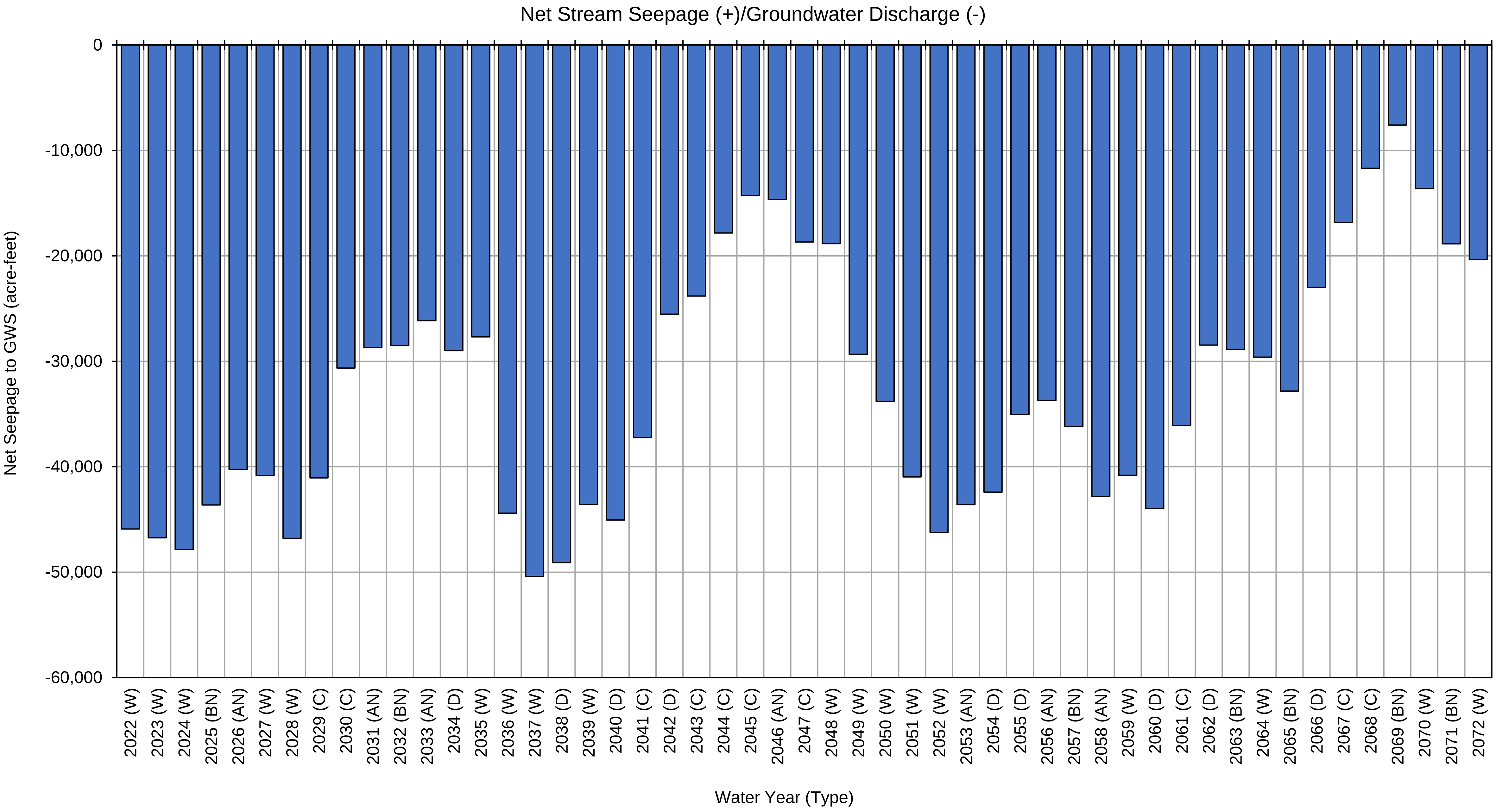
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-46,000	17,000	-16,000	-2,000	48,000	270	270
2023 (W)	-47,000	15,000	-17,000	-2,500	49,000	-1,200	-910
2024 (W)	-48,000	16,000	-16,000	-2,600	51,000	-10	-920
2025 (BN)	-44,000	5,700	-20,000	-810	48,000	-11,000	-12,000
2026 (AN)	-40,000	14,000	-15,000	-1,100	45,000	1,800	-9,700
2027 (W)	-41,000	17,000	-13,000	-2,700	48,000	8,100	-1,600
2028 (W)	-47,000	9,600	-16,000	-1,700	50,000	-5,000	-6,500
2029 (C)	-41,000	7,300	-22,000	-830	48,000	-8,800	-15,000
2030 (C)	-31,000	5,600	-21,000	-600	39,000	-6,800	-22,000
2031 (AN)	-29,000	14,000	-16,000	-790	37,000	5,000	-17,000
2032 (BN)	-28,000	5,500	-18,000	-630	37,000	-4,500	-22,000
2033 (AN)	-26,000	12,000	-15,000	-930	34,000	4,400	-17,000
2034 (D)	-29,000	9,900	-19,000	-690	36,000	-3,200	-20,000
2035 (W)	-28,000	16,000	-14,000	-1,500	38,000	11,000	-9,700
2036 (W)	-44,000	21,000	-11,000	-2,800	47,000	9,500	-210
2037 (W)	-50,000	16,000	-16,000	-2,800	53,000	-270	-480
2038 (D)	-49,000	10,000	-19,000	-1,300	52,000	-7,100	-7,600
2039 (W)	-44,000	15,000	-16,000	-2,100	50,000	3,000	-4,500
2040 (D)	-45,000	8,200	-18,000	-890	49,000	-6,600	-11,000
2041 (C)	-37,000	6,100	-19,000	-620	42,000	-7,900	-19,000
2042 (D)	-26,000	6,500	-17,000	-650	34,000	-2,000	-21,000
2043 (C)	-24,000	7,400	-18,000	-550	30,000	-5,400	-26,000
2044 (C)	-18,000	6,900	-18,000	-510	26,000	-3,400	-30,000
2045 (C)	-14,000	7,900	-21,000	-470	24,000	-3,800	-34,000
2046 (AN)	-15,000	14,000	-16,000	-620	26,000	8,200	-25,000
2047 (C)	-19,000	7,000	-18,000	-510	27,000	-3,500	-29,000
2048 (W)	-19,000	18,000	-15,000	-1,100	30,000	13,000	-16,000
2049 (W)	-29,000	15,000	-17,000	-1,100	36,000	3,800	-12,000
2050 (W)	-34,000	12,000	-17,000	-1,200	40,000	330	-12,000
2051 (W)	-41,000	21,000	-11,000	-2,500	45,000	11,000	-1,200
2052 (W)	-46,000	9,700	-16,000	-1,600	50,000	-4,800	-6,000
2053 (AN)	-44,000	12,000	-14,000	-1,600	48,000	53	-6,000
2054 (D)	-42,000	8,200	-18,000	-800	46,000	-6,800	-13,000
2055 (D)	-35,000	9,900	-19,000	-780	42,000	-3,500	-16,000
2056 (AN)	-34,000	14,000	-16,000	-980	41,000	4,400	-12,000
2057 (BN)	-36,000	14,000	-19,000	-1,400	44,000	970	-11,000
2058 (AN)	-43,000	13,000	-14,000	-810	45,000	570	-10,000
2059 (W)	-41,000	17,000	-13,000	-2,700	49,000	8,500	-1,800
2060 (D)	-44,000	6,600	-17,000	-880	47,000	-8,200	-9,900
2061 (C)	-36,000	8,100	-22,000	-750	42,000	-8,500	-18,000
2062 (D)	-28,000	6,300	-18,000	-600	37,000	-4,400	-23,000
2063 (BN)	-29,000	11,000	-15,000	-620	36,000	3,300	-20,000
2064 (W)	-30,000	13,000	-12,000	-840	37,000	7,200	-12,000
2065 (BN)	-33,000	6,300	-18,000	-650	37,000	-7,600	-20,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-23,000	9,500	-21,000	-600	32,000	-3,400	-23,000
2067 (C)		-17,000	5,800	-21,000	-500	26,000	-6,700	-30,000
2068 (C)		-12,000	10,000	-25,000	-430	22,000	-5,300	-35,000
2069 (BN)		-7,600	11,000	-18,000	-490	20,000	4,500	-31,000
2070 (W)		-14,000	16,000	-18,000	-1,000	27,000	11,000	-20,000
2071 (BN)		-19,000	5,500	-20,000	-540	29,000	-5,700	-26,000
2072 (W)		-20,000	16,000	-16,000	-810	29,000	8,500	-17,000
Average (2022-2072)		-33,000	11,000	-17,000	-1,100	39,000	-340	
2022-2072	W	-37,000	15,000	-15,000	-1,900	43,000		
	AN	-33,000	13,000	-15,000	-990	39,000		
	BN	-28,000	8,500	-18,000	-740	36,000		
	D	-36,000	8,400	-19,000	-800	42,000		
	C	-25,000	7,200	-20,000	-580	33,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

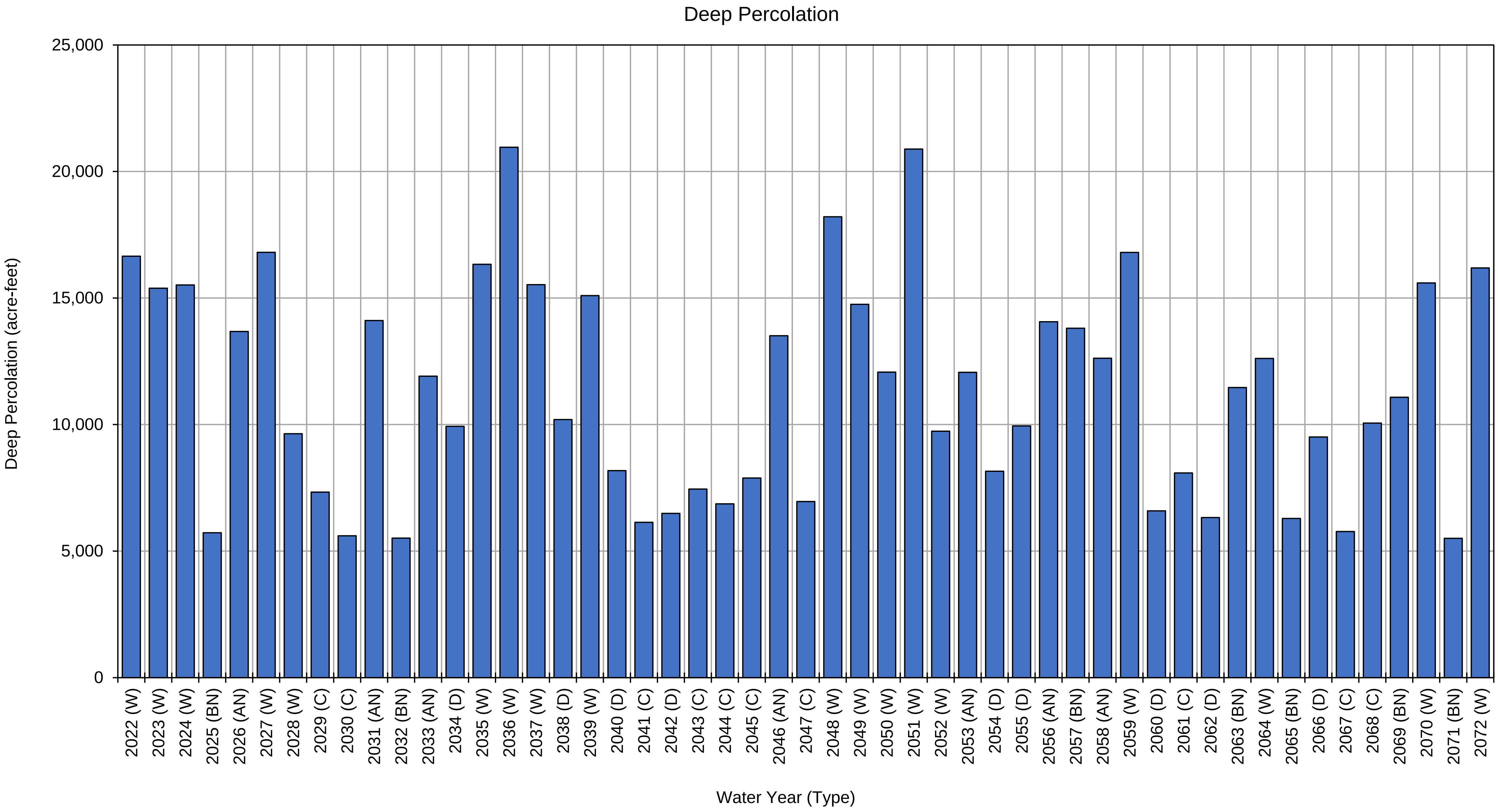
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-46,000
2023 (W)	-47,000
2024 (W)	-48,000
2025 (BN)	-44,000
2026 (AN)	-40,000
2027 (W)	-41,000
2028 (W)	-47,000
2029 (C)	-41,000
2030 (C)	-31,000
2031 (AN)	-29,000
2032 (BN)	-28,000
2033 (AN)	-26,000
2034 (D)	-29,000
2035 (W)	-28,000
2036 (W)	-44,000
2037 (W)	-50,000
2038 (D)	-49,000
2039 (W)	-44,000
2040 (D)	-45,000
2041 (C)	-37,000
2042 (D)	-26,000
2043 (C)	-24,000
2044 (C)	-18,000
2045 (C)	-14,000
2046 (AN)	-15,000
2047 (C)	-19,000
2048 (W)	-19,000
2049 (W)	-29,000
2050 (W)	-34,000
2051 (W)	-41,000
2052 (W)	-46,000
2053 (AN)	-44,000
2054 (D)	-42,000
2055 (D)	-35,000
2056 (AN)	-34,000
2057 (BN)	-36,000
2058 (AN)	-43,000
2059 (W)	-41,000
2060 (D)	-44,000
2061 (C)	-36,000
2062 (D)	-28,000
2063 (BN)	-29,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-30,000
2065 (BN)		-33,000
2066 (D)		-23,000
2067 (C)		-17,000
2068 (C)		-12,000
2069 (BN)		-7,600
2070 (W)		-14,000
2071 (BN)		-19,000
2072 (W)		-20,000
Average (2022-2072)		-33,000
2022-2072	W	-37,000
	AN	-33,000
	BN	-28,000
	D	-36,000
	C	-25,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

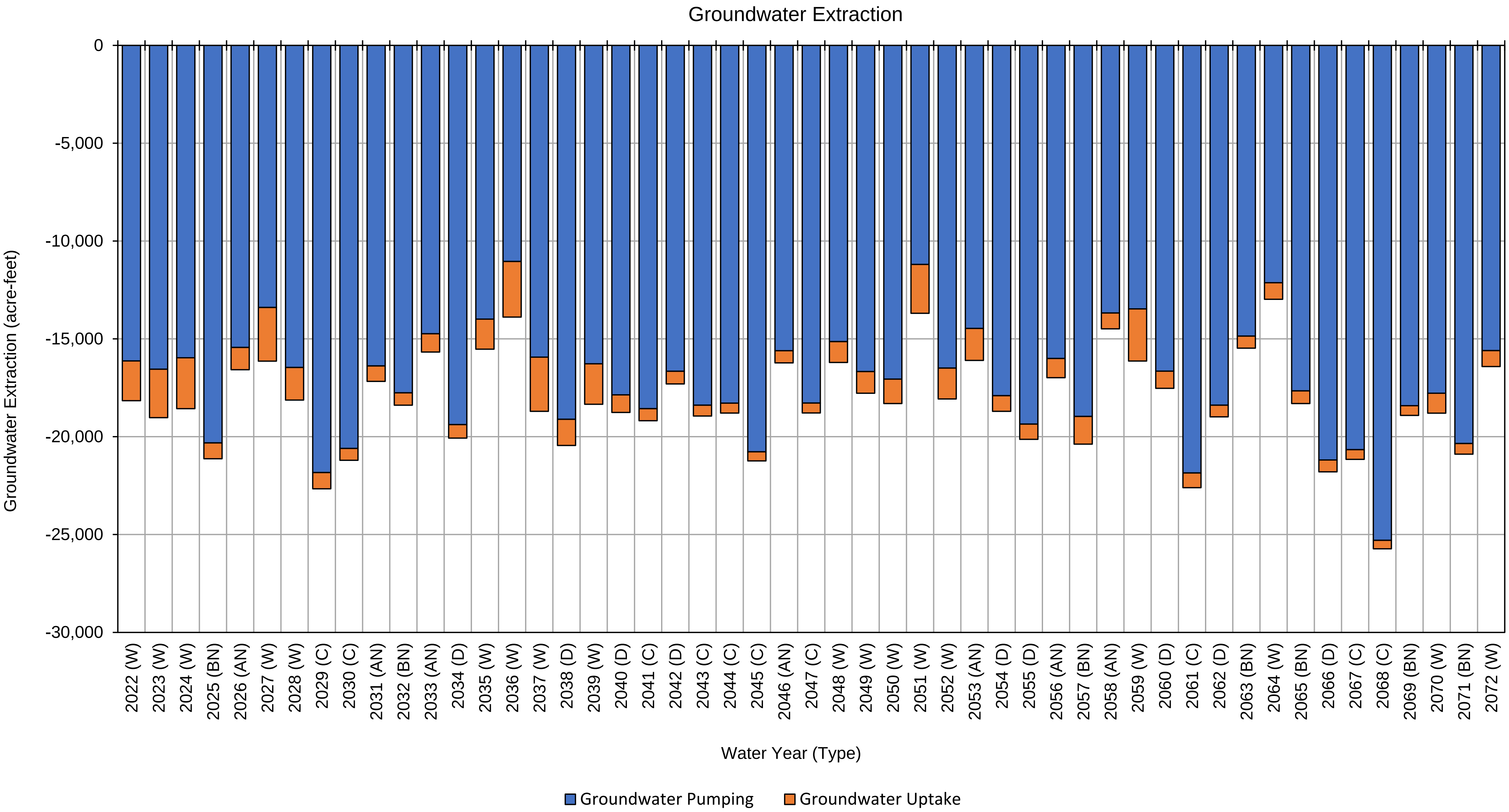
WY (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	15,000
2024 (W)	16,000
2025 (BN)	5,700
2026 (AN)	14,000
2027 (W)	17,000
2028 (W)	9,600
2029 (C)	7,300
2030 (C)	5,600
2031 (AN)	14,000
2032 (BN)	5,500
2033 (AN)	12,000
2034 (D)	9,900
2035 (W)	16,000
2036 (W)	21,000
2037 (W)	16,000
2038 (D)	10,000
2039 (W)	15,000
2040 (D)	8,200
2041 (C)	6,100
2042 (D)	6,500
2043 (C)	7,400
2044 (C)	6,900
2045 (C)	7,900
2046 (AN)	14,000
2047 (C)	7,000
2048 (W)	18,000
2049 (W)	15,000
2050 (W)	12,000
2051 (W)	21,000
2052 (W)	9,700
2053 (AN)	12,000
2054 (D)	8,200
2055 (D)	9,900
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	17,000
2060 (D)	6,600
2061 (C)	8,100
2062 (D)	6,300
2063 (BN)	11,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		13,000
2065 (BN)		6,300
2066 (D)		9,500
2067 (C)		5,800
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,500
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,500
	D	8,400
	C	7,200

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

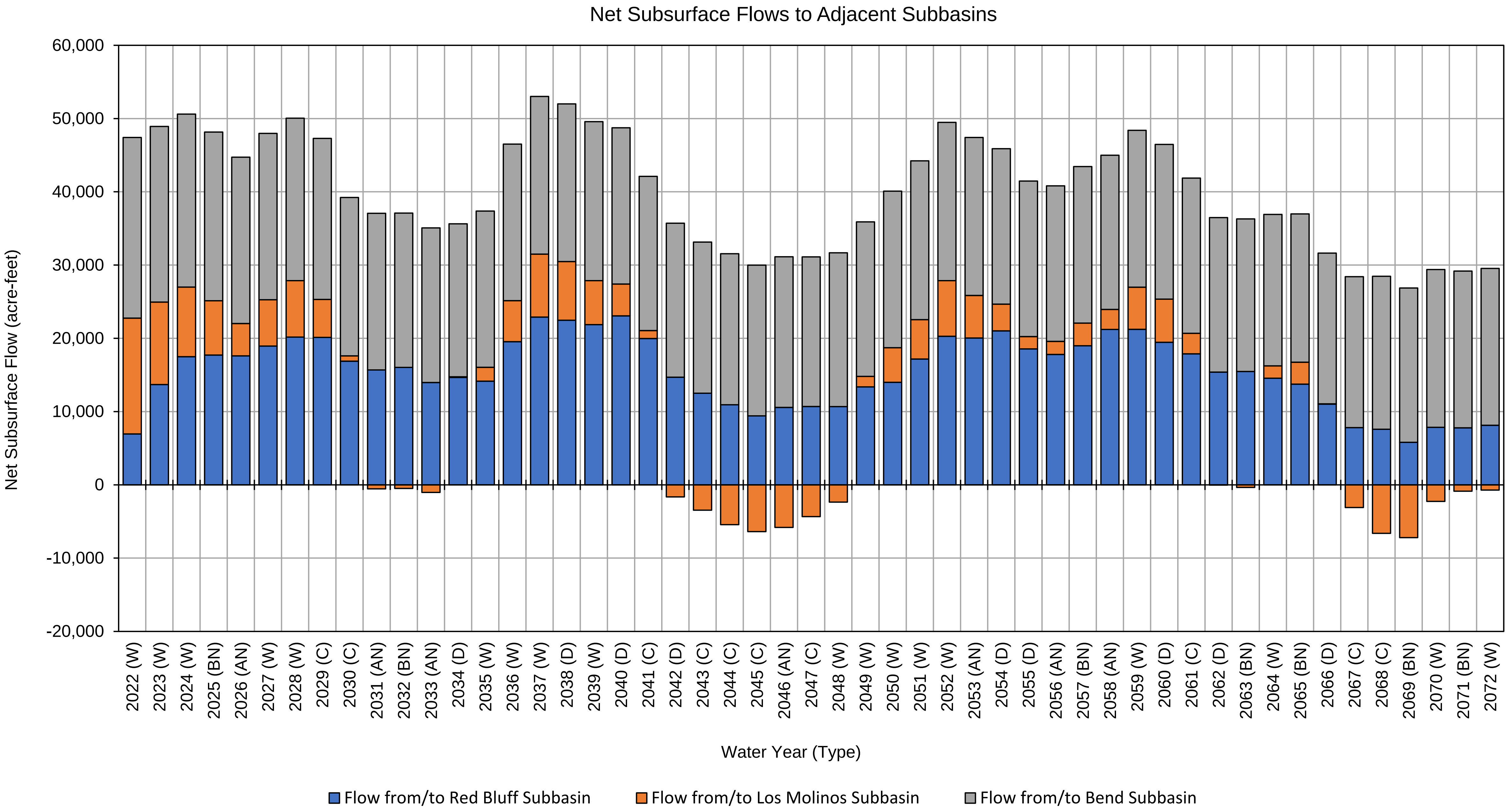
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-16,000	-2,000	-18,000
2023 (W)	-17,000	-2,500	-19,000
2024 (W)	-16,000	-2,600	-19,000
2025 (BN)	-20,000	-810	-21,000
2026 (AN)	-15,000	-1,100	-17,000
2027 (W)	-13,000	-2,700	-16,000
2028 (W)	-16,000	-1,700	-18,000
2029 (C)	-22,000	-830	-23,000
2030 (C)	-21,000	-600	-21,000
2031 (AN)	-16,000	-790	-17,000
2032 (BN)	-18,000	-630	-18,000
2033 (AN)	-15,000	-930	-16,000
2034 (D)	-19,000	-690	-20,000
2035 (W)	-14,000	-1,500	-16,000
2036 (W)	-11,000	-2,800	-14,000
2037 (W)	-16,000	-2,800	-19,000
2038 (D)	-19,000	-1,300	-20,000
2039 (W)	-16,000	-2,100	-18,000
2040 (D)	-18,000	-890	-19,000
2041 (C)	-19,000	-620	-19,000
2042 (D)	-17,000	-650	-17,000
2043 (C)	-18,000	-550	-19,000
2044 (C)	-18,000	-510	-19,000
2045 (C)	-21,000	-470	-21,000
2046 (AN)	-16,000	-620	-16,000
2047 (C)	-18,000	-510	-19,000
2048 (W)	-15,000	-1,100	-16,000
2049 (W)	-17,000	-1,100	-18,000
2050 (W)	-17,000	-1,200	-18,000
2051 (W)	-11,000	-2,500	-14,000
2052 (W)	-16,000	-1,600	-18,000
2053 (AN)	-14,000	-1,600	-16,000
2054 (D)	-18,000	-800	-19,000
2055 (D)	-19,000	-780	-20,000
2056 (AN)	-16,000	-980	-17,000
2057 (BN)	-19,000	-1,400	-20,000
2058 (AN)	-14,000	-810	-14,000
2059 (W)	-13,000	-2,700	-16,000
2060 (D)	-17,000	-880	-18,000
2061 (C)	-22,000	-750	-23,000
2062 (D)	-18,000	-600	-19,000
2063 (BN)	-15,000	-620	-15,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-12,000	-840	-13,000
2065 (BN)		-18,000	-650	-18,000
2066 (D)		-21,000	-600	-22,000
2067 (C)		-21,000	-500	-21,000
2068 (C)		-25,000	-430	-26,000
2069 (BN)		-18,000	-490	-19,000
2070 (W)		-18,000	-1,000	-19,000
2071 (BN)		-20,000	-540	-21,000
2072 (W)		-16,000	-810	-16,000
Average (2022-2072)		-17,000	-1,100	-18,000
2022-2072	W	-15,000	-1,900	-17,000
	AN	-15,000	-990	-16,000
	BN	-18,000	-740	-19,000
	D	-19,000	-800	-19,000
	C	-20,000	-580	-21,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

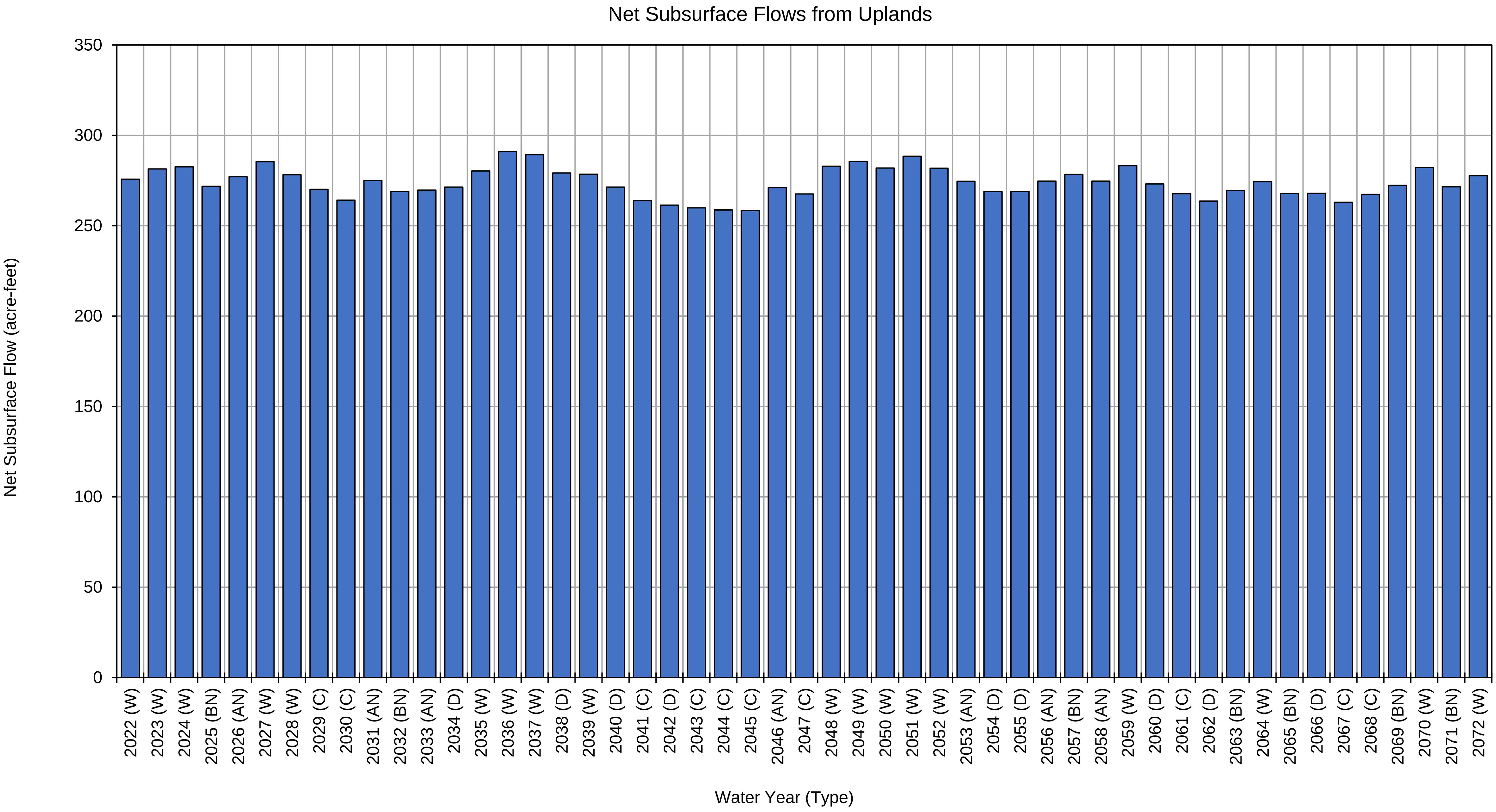
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	6,900	16,000	25,000	47,000
2023 (W)	14,000	11,000	24,000	49,000
2024 (W)	17,000	9,500	24,000	51,000
2025 (BN)	18,000	7,400	23,000	48,000
2026 (AN)	18,000	4,400	23,000	45,000
2027 (W)	19,000	6,300	23,000	48,000
2028 (W)	20,000	7,700	22,000	50,000
2029 (C)	20,000	5,200	22,000	47,000
2030 (C)	17,000	720	22,000	39,000
2031 (AN)	16,000	-550	21,000	37,000
2032 (BN)	16,000	-500	21,000	37,000
2033 (AN)	14,000	-1,000	21,000	34,000
2034 (D)	15,000	92	21,000	36,000
2035 (W)	14,000	1,900	21,000	37,000
2036 (W)	20,000	5,600	21,000	47,000
2037 (W)	23,000	8,600	22,000	53,000
2038 (D)	22,000	8,000	22,000	52,000
2039 (W)	22,000	6,000	22,000	50,000
2040 (D)	23,000	4,300	21,000	49,000
2041 (C)	20,000	1,100	21,000	42,000
2042 (D)	15,000	-1,600	21,000	34,000
2043 (C)	13,000	-3,500	21,000	30,000
2044 (C)	11,000	-5,400	21,000	26,000
2045 (C)	9,400	-6,400	21,000	24,000
2046 (AN)	11,000	-5,800	21,000	25,000
2047 (C)	11,000	-4,300	20,000	27,000
2048 (W)	11,000	-2,400	21,000	29,000
2049 (W)	13,000	1,400	21,000	36,000
2050 (W)	14,000	4,700	21,000	40,000
2051 (W)	17,000	5,400	22,000	44,000
2052 (W)	20,000	7,600	22,000	49,000
2053 (AN)	20,000	5,800	22,000	47,000
2054 (D)	21,000	3,600	21,000	46,000
2055 (D)	19,000	1,700	21,000	41,000
2056 (AN)	18,000	1,800	21,000	41,000
2057 (BN)	19,000	3,100	21,000	43,000
2058 (AN)	21,000	2,700	21,000	45,000
2059 (W)	21,000	5,800	21,000	48,000
2060 (D)	19,000	5,900	21,000	46,000
2061 (C)	18,000	2,800	21,000	42,000
2062 (D)	15,000	-38	21,000	36,000
2063 (BN)	15,000	-350	21,000	36,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		15,000	1,700	21,000	37,000
2065 (BN)		14,000	3,000	20,000	37,000
2066 (D)		11,000	41	21,000	32,000
2067 (C)		7,800	-3,100	21,000	25,000
2068 (C)		7,600	-6,600	21,000	22,000
2069 (BN)		5,800	-7,200	21,000	20,000
2070 (W)		7,900	-2,300	22,000	27,000
2071 (BN)		7,800	-860	21,000	28,000
2072 (W)		8,100	-710	21,000	29,000
Average (2022-2072)		15,000	2,100	21,000	39,000
2022-2072	W	16,000	5,200	22,000	43,000
	AN	17,000	1,000	21,000	39,000
	BN	14,000	660	21,000	36,000
	D	18,000	2,400	21,000	41,000
	C	13,000	-2,000	21,000	32,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

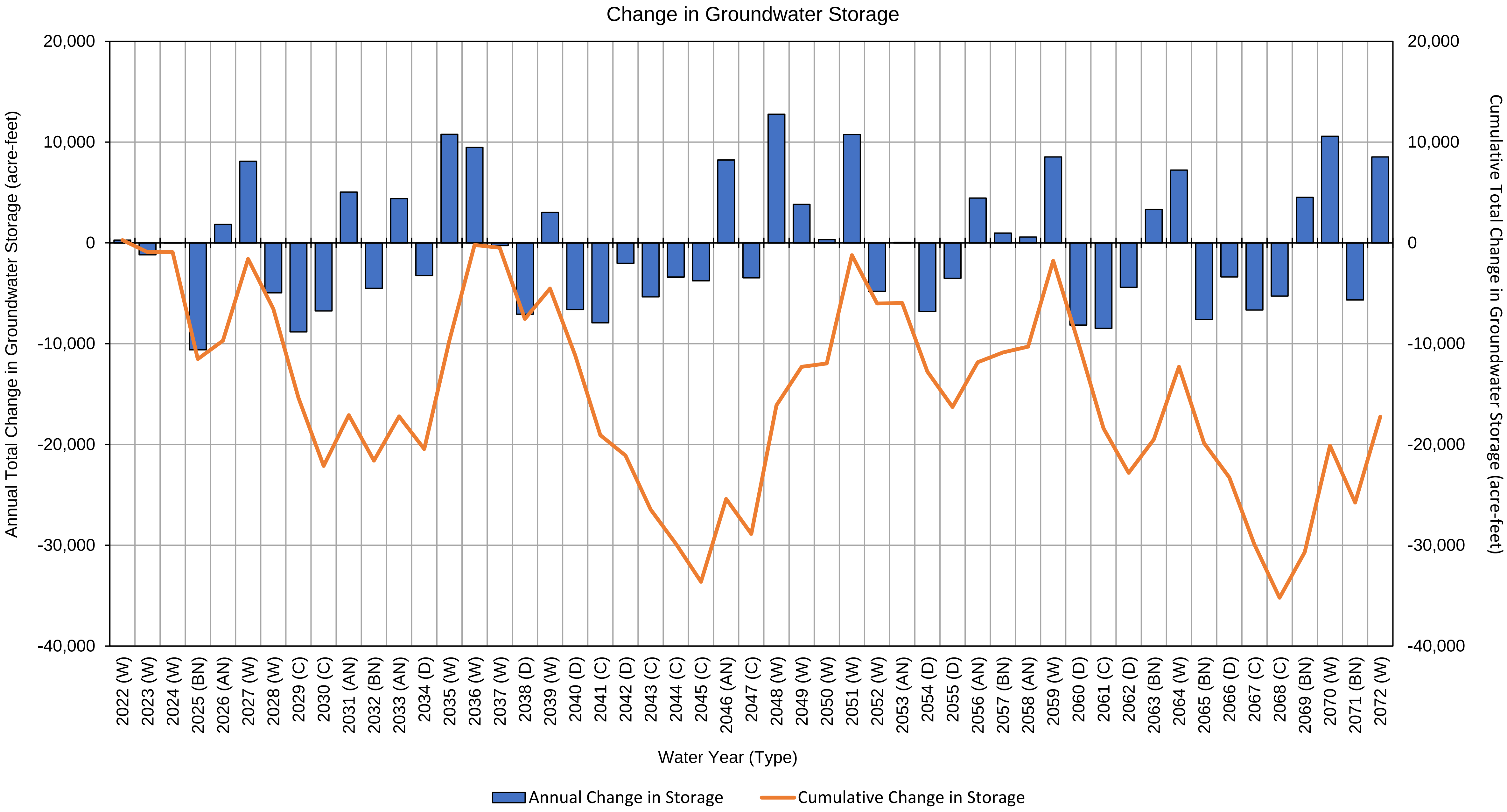
WY (Type)	Subsurface Flows from Uplands
2022 (W)	280
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	290
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	280
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	290
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280
2060 (D)	270
2061 (C)	270
2062 (D)	260
2063 (BN)	270

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	270	270
2023 (W)	-1,200	-910
2024 (W)	-10	-920
2025 (BN)	-11,000	-12,000
2026 (AN)	1,800	-9,700
2027 (W)	8,100	-1,600
2028 (W)	-5,000	-6,500
2029 (C)	-8,800	-15,000
2030 (C)	-6,800	-22,000
2031 (AN)	5,000	-17,000
2032 (BN)	-4,500	-22,000
2033 (AN)	4,400	-17,000
2034 (D)	-3,200	-20,000
2035 (W)	11,000	-9,700
2036 (W)	9,500	-210
2037 (W)	-270	-480
2038 (D)	-7,100	-7,600
2039 (W)	3,000	-4,500
2040 (D)	-6,600	-11,000
2041 (C)	-7,900	-19,000
2042 (D)	-2,000	-21,000
2043 (C)	-5,400	-26,000
2044 (C)	-3,400	-30,000
2045 (C)	-3,800	-34,000
2046 (AN)	8,200	-25,000
2047 (C)	-3,500	-29,000
2048 (W)	13,000	-16,000
2049 (W)	3,800	-12,000
2050 (W)	330	-12,000
2051 (W)	11,000	-1,200
2052 (W)	-4,800	-6,000
2053 (AN)	53	-6,000
2054 (D)	-6,800	-13,000
2055 (D)	-3,500	-16,000
2056 (AN)	4,400	-12,000
2057 (BN)	970	-11,000
2058 (AN)	570	-10,000
2059 (W)	8,500	-1,800
2060 (D)	-8,200	-9,900
2061 (C)	-8,500	-18,000
2062 (D)	-4,400	-23,000
2063 (BN)	3,300	-20,000

Antelope Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		7,200	-12,000
2065 (BN)		-7,600	-20,000
2066 (D)		-3,400	-23,000
2067 (C)		-6,700	-30,000
2068 (C)		-5,300	-35,000
2069 (BN)		4,500	-31,000
2070 (W)		11,000	-20,000
2071 (BN)		-5,700	-26,000
2072 (W)		8,500	-17,000
Average (2022-2072)		-340	
2022-2072	W		
	AN		
	BN		
	D		
	C		

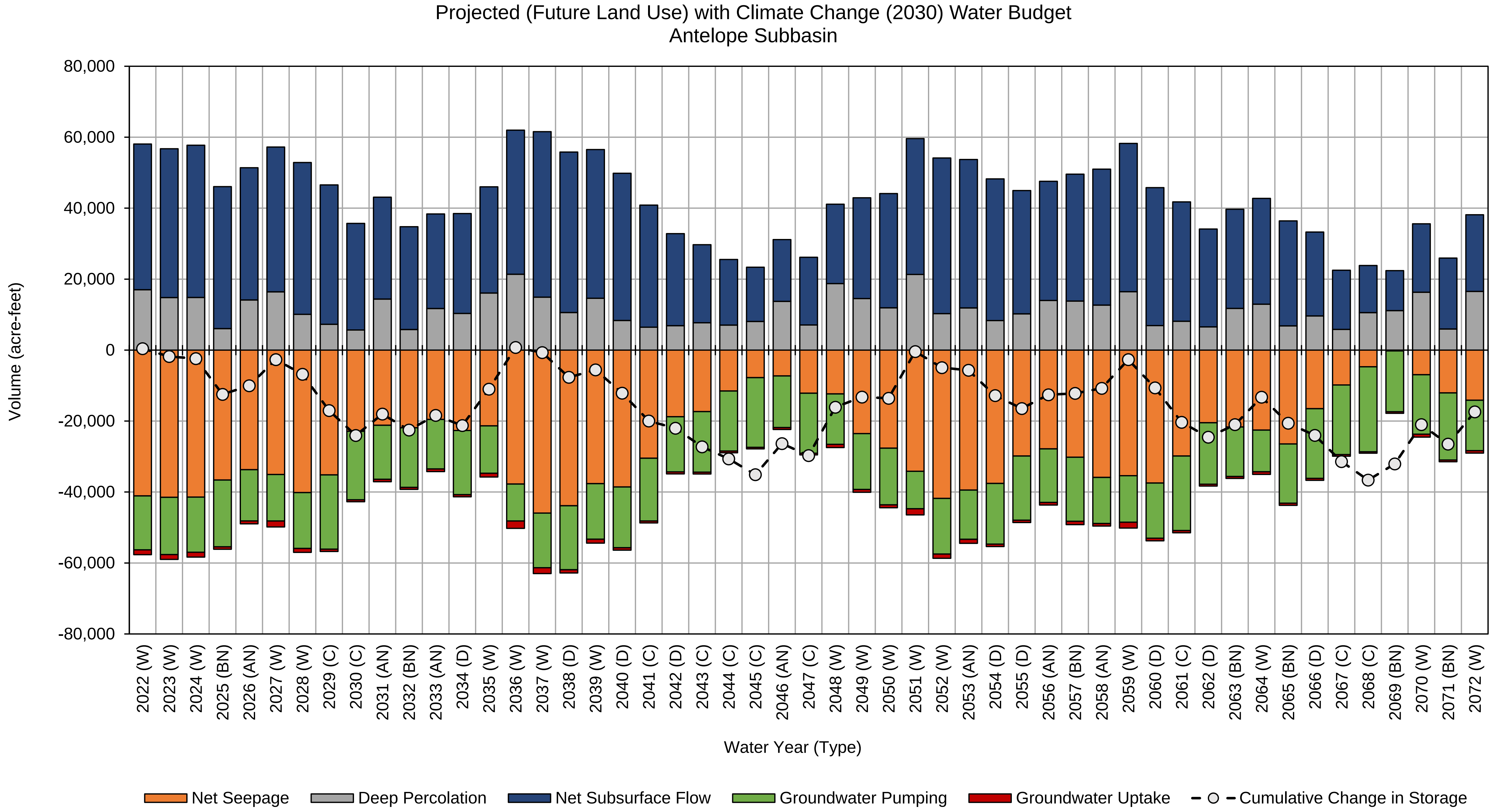
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-6

Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2030) Model Results



Projected (Future Land Use) with Climate Change (2030) Water Budget
Antelope Subbasin

Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

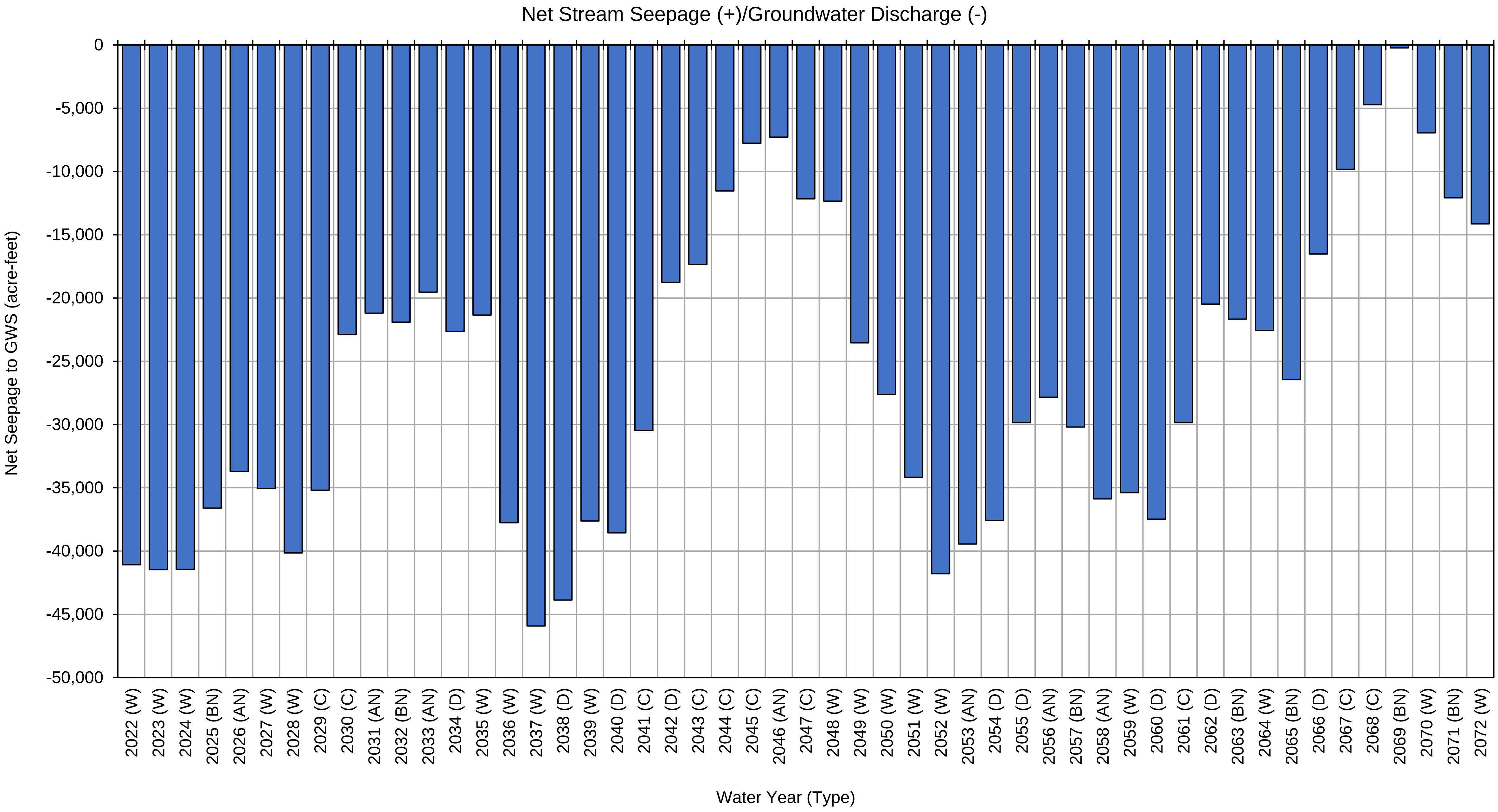
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-41,000	17,000	-15,000	-1,400	41,000	420	420
2023 (W)	-41,000	15,000	-16,000	-1,400	42,000	-2,200	-1,800
2024 (W)	-41,000	15,000	-16,000	-1,400	43,000	-580	-2,400
2025 (BN)	-37,000	6,100	-19,000	-670	40,000	-10,000	-12,000
2026 (AN)	-34,000	14,000	-14,000	-820	37,000	2,400	-10,000
2027 (W)	-35,000	16,000	-13,000	-1,700	41,000	7,400	-2,700
2028 (W)	-40,000	10,000	-16,000	-1,100	43,000	-4,100	-6,800
2029 (C)	-35,000	7,300	-21,000	-660	39,000	-10,000	-17,000
2030 (C)	-23,000	5,600	-19,000	-530	30,000	-7,000	-24,000
2031 (AN)	-21,000	14,000	-15,000	-650	29,000	6,000	-18,000
2032 (BN)	-22,000	5,800	-17,000	-560	29,000	-4,500	-23,000
2033 (AN)	-20,000	12,000	-14,000	-740	27,000	4,100	-18,000
2034 (D)	-23,000	10,000	-18,000	-600	28,000	-2,900	-21,000
2035 (W)	-21,000	16,000	-13,000	-1,100	30,000	10,000	-11,000
2036 (W)	-38,000	21,000	-10,000	-2,000	41,000	12,000	740
2037 (W)	-46,000	15,000	-15,000	-1,700	47,000	-1,400	-690
2038 (D)	-44,000	11,000	-18,000	-890	45,000	-7,000	-7,700
2039 (W)	-38,000	15,000	-16,000	-1,100	42,000	2,100	-5,600
2040 (D)	-39,000	8,300	-17,000	-700	41,000	-6,600	-12,000
2041 (C)	-30,000	6,500	-18,000	-560	34,000	-7,800	-20,000
2042 (D)	-19,000	6,900	-16,000	-570	26,000	-2,100	-22,000
2043 (C)	-17,000	7,700	-17,000	-490	22,000	-5,200	-27,000
2044 (C)	-12,000	7,000	-17,000	-460	18,000	-3,400	-31,000
2045 (C)	-7,800	8,100	-20,000	-420	15,000	-4,500	-35,000
2046 (AN)	-7,300	14,000	-15,000	-530	17,000	8,800	-26,000
2047 (C)	-12,000	7,100	-17,000	-460	19,000	-3,400	-30,000
2048 (W)	-12,000	19,000	-14,000	-890	22,000	14,000	-16,000
2049 (W)	-24,000	15,000	-16,000	-810	28,000	2,900	-13,000
2050 (W)	-28,000	12,000	-16,000	-840	32,000	-340	-14,000
2051 (W)	-34,000	21,000	-11,000	-1,700	38,000	13,000	-410
2052 (W)	-42,000	10,000	-16,000	-1,200	44,000	-4,500	-4,900
2053 (AN)	-39,000	12,000	-14,000	-1,100	42,000	-750	-5,700
2054 (D)	-38,000	8,300	-17,000	-670	40,000	-7,100	-13,000
2055 (D)	-30,000	10,000	-18,000	-670	35,000	-3,600	-16,000
2056 (AN)	-28,000	14,000	-15,000	-750	34,000	3,900	-13,000
2057 (BN)	-30,000	14,000	-18,000	-940	36,000	390	-12,000
2058 (AN)	-36,000	13,000	-13,000	-690	38,000	1,400	-11,000
2059 (W)	-35,000	16,000	-13,000	-1,700	42,000	8,100	-2,700
2060 (D)	-37,000	6,900	-16,000	-730	39,000	-8,000	-11,000
2061 (C)	-30,000	8,100	-21,000	-610	34,000	-9,700	-20,000
2062 (D)	-20,000	6,500	-17,000	-520	28,000	-4,200	-25,000
2063 (BN)	-22,000	12,000	-14,000	-520	28,000	3,500	-21,000
2064 (W)	-23,000	13,000	-12,000	-710	30,000	7,700	-13,000
2065 (BN)	-26,000	6,800	-17,000	-580	30,000	-7,300	-21,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-17,000	9,600	-20,000	-540	24,000	-3,400	-24,000
2067 (C)		-9,800	5,800	-20,000	-450	17,000	-7,400	-31,000
2068 (C)		-4,700	11,000	-24,000	-390	13,000	-5,200	-37,000
2069 (BN)		-230	11,000	-17,000	-420	11,000	4,600	-32,000
2070 (W)		-6,900	16,000	-17,000	-800	19,000	11,000	-21,000
2071 (BN)		-12,000	5,900	-19,000	-490	20,000	-5,500	-26,000
2072 (W)		-14,000	17,000	-14,000	-680	22,000	9,100	-17,000
Average (2022-2072)		-26,000	11,000	-16,000	-830	32,000	-340	
2022-2072	W	-31,000	16,000	-14,000	-1,200	36,000		
	AN	-26,000	13,000	-14,000	-760	32,000		
	BN	-21,000	8,800	-17,000	-600	28,000		
	D	-30,000	8,600	-17,000	-650	34,000		
	C	-18,000	7,400	-19,000	-500	24,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

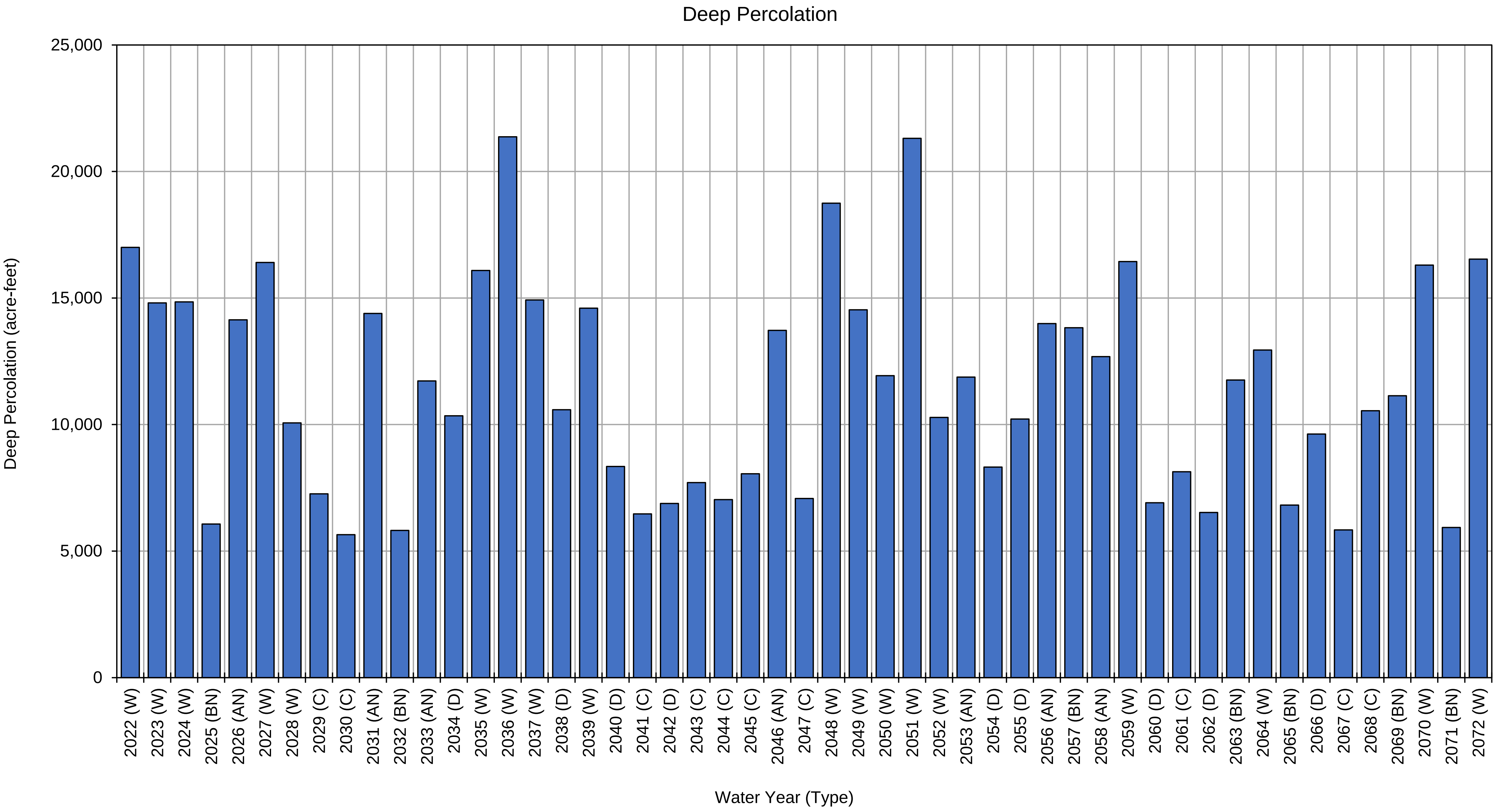
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-41,000
2023 (W)	-41,000
2024 (W)	-41,000
2025 (BN)	-37,000
2026 (AN)	-34,000
2027 (W)	-35,000
2028 (W)	-40,000
2029 (C)	-35,000
2030 (C)	-23,000
2031 (AN)	-21,000
2032 (BN)	-22,000
2033 (AN)	-20,000
2034 (D)	-23,000
2035 (W)	-21,000
2036 (W)	-38,000
2037 (W)	-46,000
2038 (D)	-44,000
2039 (W)	-38,000
2040 (D)	-39,000
2041 (C)	-30,000
2042 (D)	-19,000
2043 (C)	-17,000
2044 (C)	-12,000
2045 (C)	-7,800
2046 (AN)	-7,300
2047 (C)	-12,000
2048 (W)	-12,000
2049 (W)	-24,000
2050 (W)	-28,000
2051 (W)	-34,000
2052 (W)	-42,000
2053 (AN)	-39,000
2054 (D)	-38,000
2055 (D)	-30,000
2056 (AN)	-28,000
2057 (BN)	-30,000
2058 (AN)	-36,000
2059 (W)	-35,000
2060 (D)	-37,000
2061 (C)	-30,000
2062 (D)	-20,000
2063 (BN)	-22,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-23,000
2065 (BN)		-26,000
2066 (D)		-17,000
2067 (C)		-9,800
2068 (C)		-4,700
2069 (BN)		-230
2070 (W)		-6,900
2071 (BN)		-12,000
2072 (W)		-14,000
Average (2022-2072)		-26,000
2022-2072	W	-31,000
	AN	-26,000
	BN	-21,000
	D	-30,000
	C	-18,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

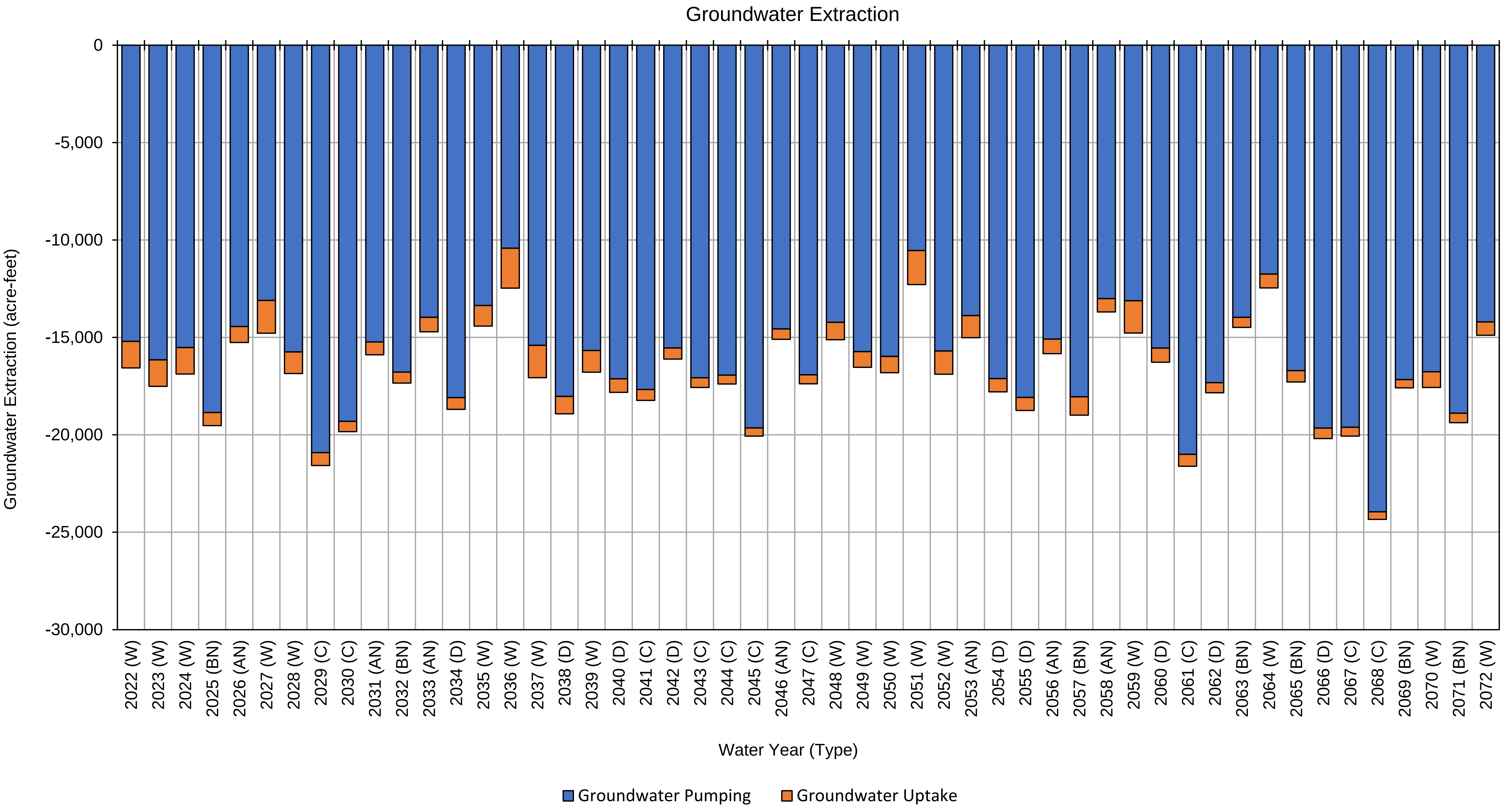
WY (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	6,100
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	10,000
2029 (C)	7,300
2030 (C)	5,600
2031 (AN)	14,000
2032 (BN)	5,800
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	21,000
2037 (W)	15,000
2038 (D)	11,000
2039 (W)	15,000
2040 (D)	8,300
2041 (C)	6,500
2042 (D)	6,900
2043 (C)	7,700
2044 (C)	7,000
2045 (C)	8,100
2046 (AN)	14,000
2047 (C)	7,100
2048 (W)	19,000
2049 (W)	15,000
2050 (W)	12,000
2051 (W)	21,000
2052 (W)	10,000
2053 (AN)	12,000
2054 (D)	8,300
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000
2060 (D)	6,900
2061 (C)	8,100
2062 (D)	6,500
2063 (BN)	12,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		13,000
2065 (BN)		6,800
2066 (D)		9,600
2067 (C)		5,800
2068 (C)		11,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,900
2072 (W)		17,000
Average (2022-2072)		11,000
2022-2072	W	16,000
	AN	13,000
	BN	8,800
	D	8,600
	C	7,400

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

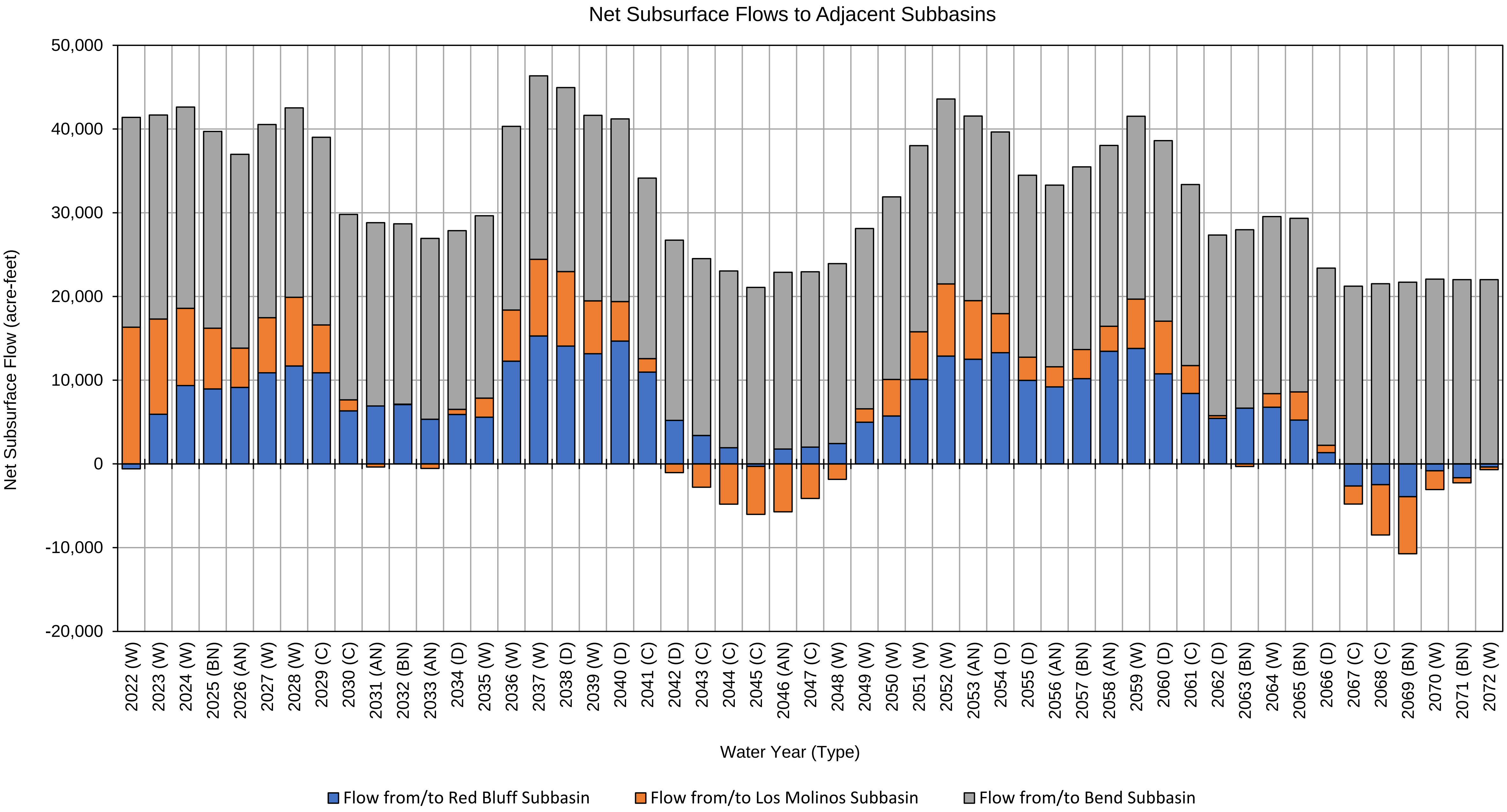
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-15,000	-1,400	-17,000
2023 (W)	-16,000	-1,400	-18,000
2024 (W)	-16,000	-1,400	-17,000
2025 (BN)	-19,000	-670	-20,000
2026 (AN)	-14,000	-820	-15,000
2027 (W)	-13,000	-1,700	-15,000
2028 (W)	-16,000	-1,100	-17,000
2029 (C)	-21,000	-660	-22,000
2030 (C)	-19,000	-530	-20,000
2031 (AN)	-15,000	-650	-16,000
2032 (BN)	-17,000	-560	-17,000
2033 (AN)	-14,000	-740	-15,000
2034 (D)	-18,000	-600	-19,000
2035 (W)	-13,000	-1,100	-14,000
2036 (W)	-10,000	-2,000	-12,000
2037 (W)	-15,000	-1,700	-17,000
2038 (D)	-18,000	-890	-19,000
2039 (W)	-16,000	-1,100	-17,000
2040 (D)	-17,000	-700	-18,000
2041 (C)	-18,000	-560	-18,000
2042 (D)	-16,000	-570	-16,000
2043 (C)	-17,000	-490	-18,000
2044 (C)	-17,000	-460	-17,000
2045 (C)	-20,000	-420	-20,000
2046 (AN)	-15,000	-530	-15,000
2047 (C)	-17,000	-460	-17,000
2048 (W)	-14,000	-890	-15,000
2049 (W)	-16,000	-810	-17,000
2050 (W)	-16,000	-840	-17,000
2051 (W)	-11,000	-1,700	-12,000
2052 (W)	-16,000	-1,200	-17,000
2053 (AN)	-14,000	-1,100	-15,000
2054 (D)	-17,000	-670	-18,000
2055 (D)	-18,000	-670	-19,000
2056 (AN)	-15,000	-750	-16,000
2057 (BN)	-18,000	-940	-19,000
2058 (AN)	-13,000	-690	-14,000
2059 (W)	-13,000	-1,700	-15,000
2060 (D)	-16,000	-730	-16,000
2061 (C)	-21,000	-610	-22,000
2062 (D)	-17,000	-520	-18,000
2063 (BN)	-14,000	-520	-14,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-12,000	-710	-12,000
2065 (BN)		-17,000	-580	-17,000
2066 (D)		-20,000	-540	-20,000
2067 (C)		-20,000	-450	-20,000
2068 (C)		-24,000	-390	-24,000
2069 (BN)		-17,000	-420	-18,000
2070 (W)		-17,000	-800	-18,000
2071 (BN)		-19,000	-490	-19,000
2072 (W)		-14,000	-680	-15,000
Average (2022-2072)		-16,000	-830	-17,000
2022-2072	W	-14,000	-1,200	-16,000
	AN	-14,000	-760	-15,000
	BN	-17,000	-600	-18,000
	D	-17,000	-650	-18,000
	C	-19,000	-500	-20,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

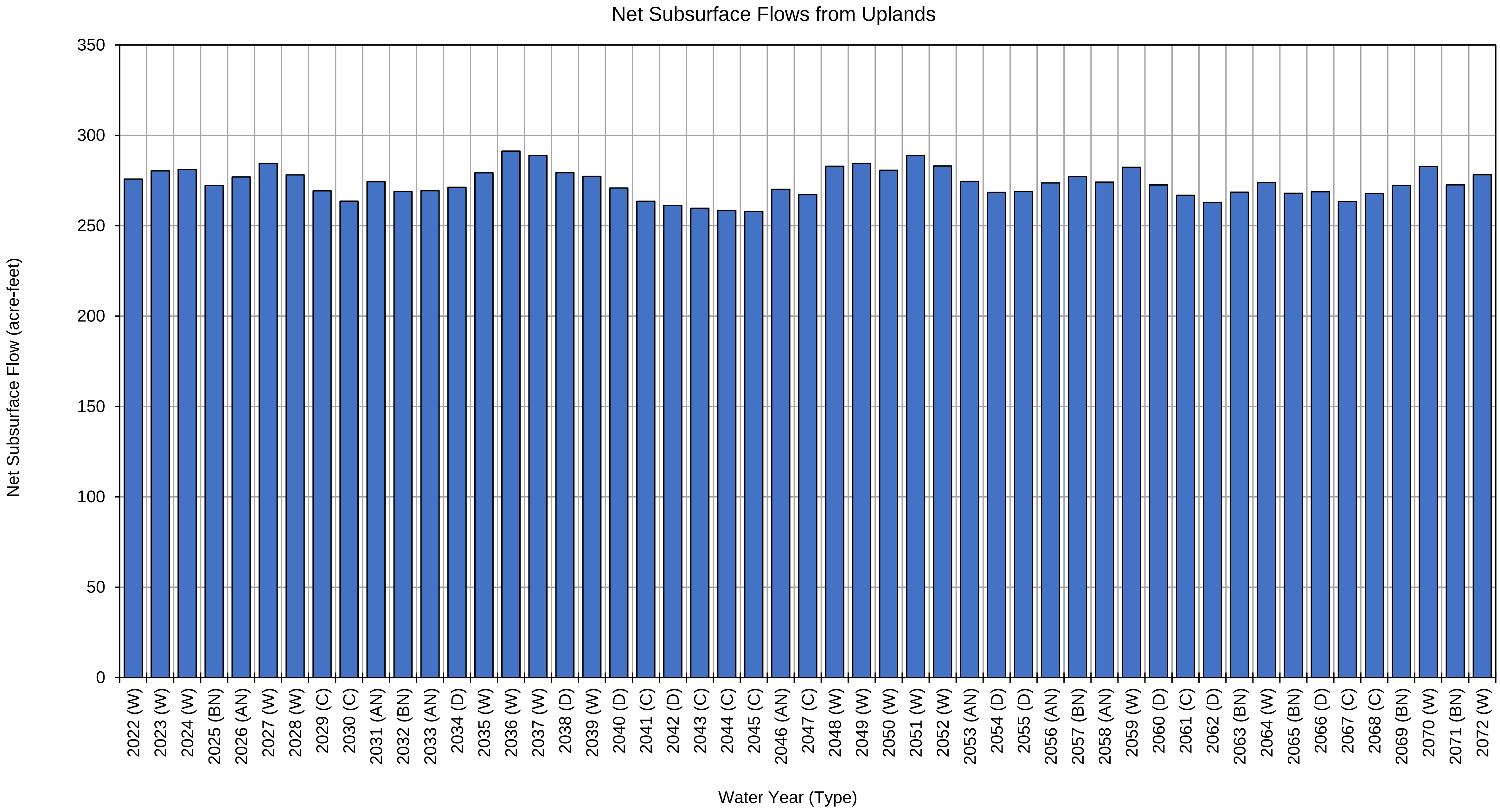
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-590	16,000	25,000	41,000
2023 (W)	5,900	11,000	24,000	42,000
2024 (W)	9,400	9,200	24,000	43,000
2025 (BN)	9,000	7,300	24,000	40,000
2026 (AN)	9,100	4,700	23,000	37,000
2027 (W)	11,000	6,600	23,000	41,000
2028 (W)	12,000	8,200	23,000	43,000
2029 (C)	11,000	5,700	22,000	39,000
2030 (C)	6,300	1,300	22,000	30,000
2031 (AN)	6,900	-370	22,000	28,000
2032 (BN)	7,100	48	22,000	29,000
2033 (AN)	5,300	-550	22,000	26,000
2034 (D)	5,900	620	21,000	28,000
2035 (W)	5,600	2,300	22,000	30,000
2036 (W)	12,000	6,100	22,000	40,000
2037 (W)	15,000	9,200	22,000	46,000
2038 (D)	14,000	8,900	22,000	45,000
2039 (W)	13,000	6,300	22,000	42,000
2040 (D)	15,000	4,700	22,000	41,000
2041 (C)	11,000	1,600	22,000	34,000
2042 (D)	5,200	-1,000	22,000	26,000
2043 (C)	3,400	-2,800	21,000	22,000
2044 (C)	1,900	-4,800	21,000	18,000
2045 (C)	-300	-5,700	21,000	15,000
2046 (AN)	1,800	-5,700	21,000	17,000
2047 (C)	2,000	-4,100	21,000	19,000
2048 (W)	2,400	-1,800	21,000	22,000
2049 (W)	5,000	1,600	22,000	28,000
2050 (W)	5,700	4,400	22,000	32,000
2051 (W)	10,000	5,700	22,000	38,000
2052 (W)	13,000	8,600	22,000	44,000
2053 (AN)	12,000	7,000	22,000	42,000
2054 (D)	13,000	4,700	22,000	40,000
2055 (D)	10,000	2,800	22,000	34,000
2056 (AN)	9,200	2,400	22,000	33,000
2057 (BN)	10,000	3,500	22,000	35,000
2058 (AN)	13,000	3,000	22,000	38,000
2059 (W)	14,000	5,900	22,000	42,000
2060 (D)	11,000	6,300	22,000	39,000
2061 (C)	8,400	3,300	22,000	33,000
2062 (D)	5,400	320	22,000	27,000
2063 (BN)	6,700	-310	21,000	28,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		6,800	1,600	21,000	30,000
2065 (BN)		5,200	3,400	21,000	29,000
2066 (D)		1,300	890	21,000	23,000
2067 (C)		-2,600	-2,200	21,000	16,000
2068 (C)		-2,500	-6,000	22,000	13,000
2069 (BN)		-3,900	-6,800	22,000	11,000
2070 (W)		-820	-2,200	22,000	19,000
2071 (BN)		-1,600	-610	22,000	20,000
2072 (W)		-380	-320	22,000	21,000
Average (2022-2072)		6,800	2,600	22,000	31,000
2022-2072	W	7,700	5,500	22,000	36,000
	AN	8,300	1,500	22,000	32,000
	BN	4,700	910	22,000	27,000
	D	9,000	3,100	22,000	34,000
	C	3,800	-1,400	21,000	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

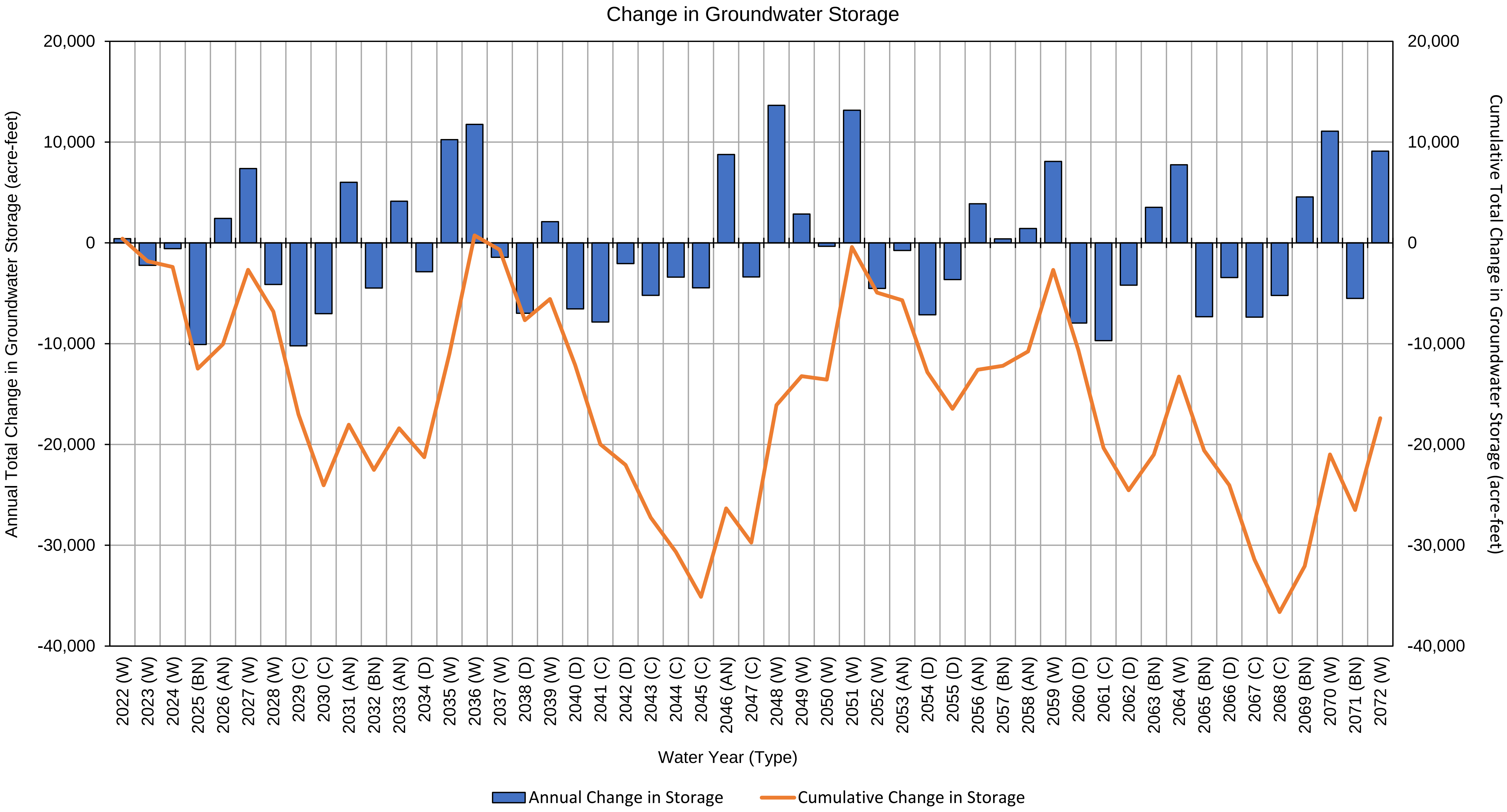
WY (Type)	Subsurface Flows from Uplands
2022 (W)	280
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280
2060 (D)	270
2061 (C)	270
2062 (D)	260
2063 (BN)	270

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	420	420
2023 (W)	-2,200	-1,800
2024 (W)	-580	-2,400
2025 (BN)	-10,000	-12,000
2026 (AN)	2,400	-10,000
2027 (W)	7,400	-2,700
2028 (W)	-4,100	-6,800
2029 (C)	-10,000	-17,000
2030 (C)	-7,000	-24,000
2031 (AN)	6,000	-18,000
2032 (BN)	-4,500	-23,000
2033 (AN)	4,100	-18,000
2034 (D)	-2,900	-21,000
2035 (W)	10,000	-11,000
2036 (W)	12,000	740
2037 (W)	-1,400	-690
2038 (D)	-7,000	-7,700
2039 (W)	2,100	-5,600
2040 (D)	-6,600	-12,000
2041 (C)	-7,800	-20,000
2042 (D)	-2,100	-22,000
2043 (C)	-5,200	-27,000
2044 (C)	-3,400	-31,000
2045 (C)	-4,500	-35,000
2046 (AN)	8,800	-26,000
2047 (C)	-3,400	-30,000
2048 (W)	14,000	-16,000
2049 (W)	2,900	-13,000
2050 (W)	-340	-14,000
2051 (W)	13,000	-410
2052 (W)	-4,500	-4,900
2053 (AN)	-750	-5,700
2054 (D)	-7,100	-13,000
2055 (D)	-3,600	-16,000
2056 (AN)	3,900	-13,000
2057 (BN)	390	-12,000
2058 (AN)	1,400	-11,000
2059 (W)	8,100	-2,700
2060 (D)	-8,000	-11,000
2061 (C)	-9,700	-20,000
2062 (D)	-4,200	-25,000
2063 (BN)	3,500	-21,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		7,700	-13,000
2065 (BN)		-7,300	-21,000
2066 (D)		-3,400	-24,000
2067 (C)		-7,400	-31,000
2068 (C)		-5,200	-37,000
2069 (BN)		4,600	-32,000
2070 (W)		11,000	-21,000
2071 (BN)		-5,500	-26,000
2072 (W)		9,100	-17,000
Average (2022-2072)		-340	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-7

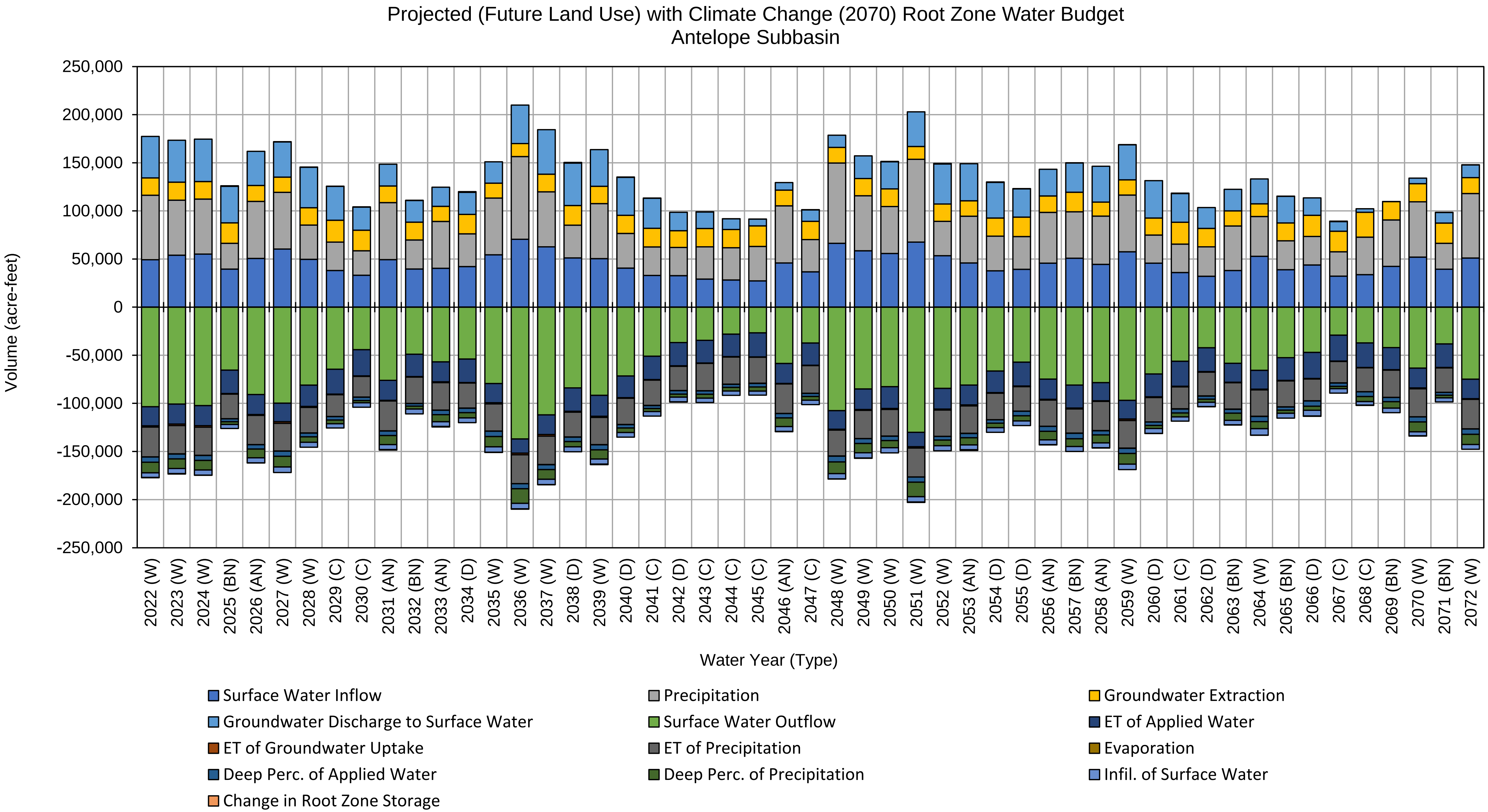
Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results

APPENDIX A-7a

Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results – Surface Water System



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

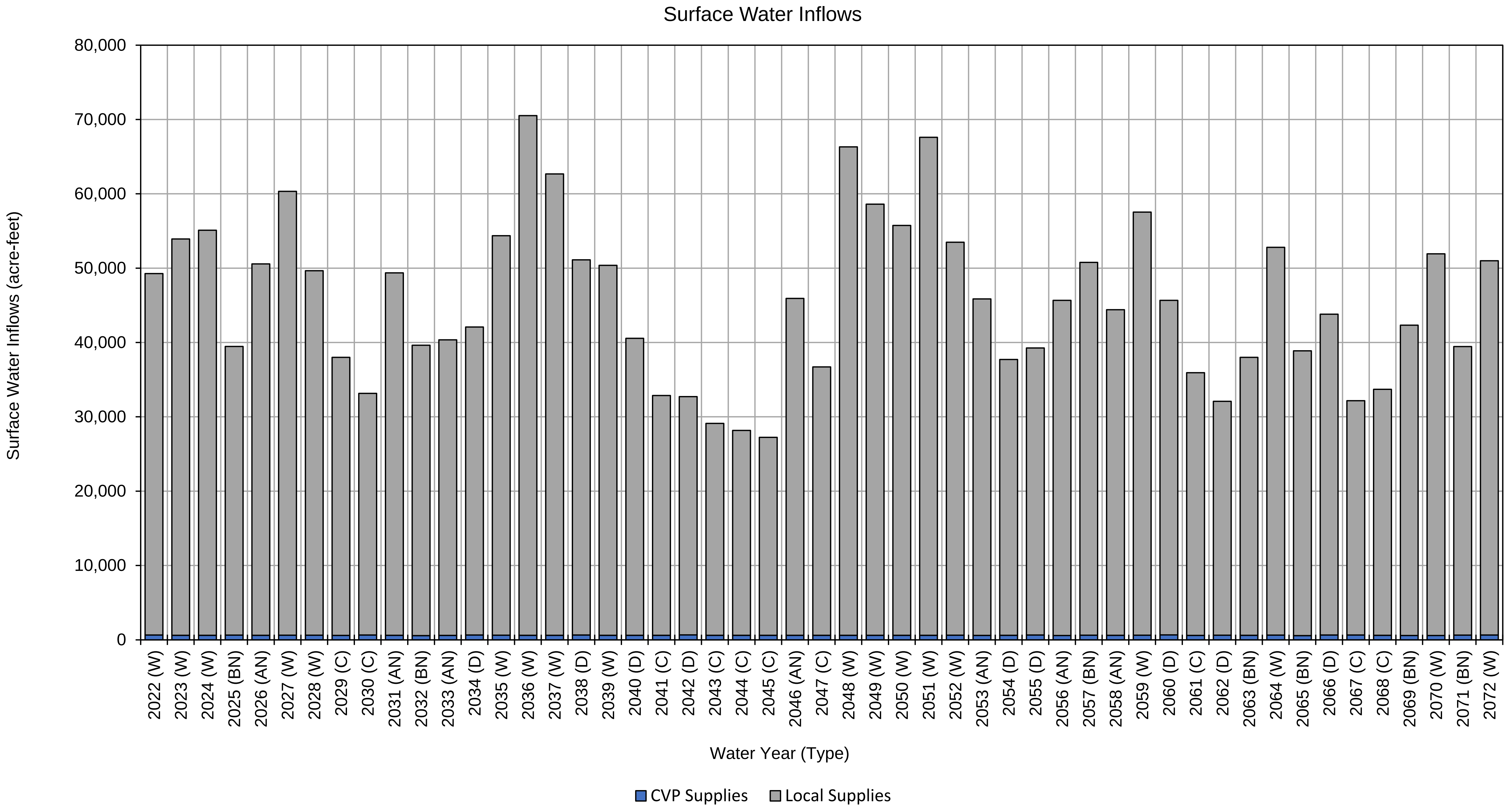
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	49,000	67,000	18,000	43,000	100,000	20,000	1,300	31,000	140	5,400	11,000	4,900	350
2023 (W)	54,000	57,000	19,000	44,000	100,000	21,000	1,500	29,000	150	5,000	10,000	5,300	500
2024 (W)	55,000	57,000	18,000	44,000	100,000	21,000	1,600	29,000	150	5,100	10,000	5,300	1
2025 (BN)	39,000	27,000	21,000	38,000	66,000	24,000	670	26,000	120	3,000	2,800	4,200	-490
2026 (AN)	51,000	59,000	17,000	35,000	91,000	21,000	810	30,000	150	4,400	9,200	5,200	120
2027 (W)	60,000	59,000	16,000	37,000	100,000	19,000	1,700	29,000	170	5,300	11,000	5,800	-73
2028 (W)	50,000	36,000	18,000	42,000	81,000	22,000	980	27,000	150	3,900	5,600	5,100	-180
2029 (C)	38,000	30,000	23,000	35,000	65,000	26,000	680	23,000	130	3,500	3,900	4,400	-130
2030 (C)	33,000	25,000	21,000	24,000	44,000	27,000	520	22,000	150	3,400	2,300	4,600	-92
2031 (AN)	49,000	59,000	17,000	23,000	76,000	21,000	650	31,000	150	4,700	9,400	5,200	470
2032 (BN)	40,000	30,000	19,000	23,000	49,000	23,000	550	27,000	160	2,600	3,000	5,100	-130
2033 (AN)	40,000	49,000	16,000	20,000	57,000	21,000	750	29,000	150	4,600	7,300	4,900	580
2034 (D)	42,000	34,000	20,000	23,000	54,000	24,000	590	26,000	150	4,600	5,400	4,900	-730
2035 (W)	54,000	59,000	15,000	22,000	79,000	20,000	1,100	28,000	170	5,500	11,000	5,600	200
2036 (W)	71,000	86,000	13,000	40,000	140,000	15,000	1,600	30,000	150	5,200	15,000	5,700	410
2037 (W)	63,000	57,000	18,000	46,000	110,000	20,000	1,600	30,000	150	5,000	10,000	5,500	47
2038 (D)	51,000	34,000	20,000	44,000	84,000	24,000	820	26,000	150	4,600	5,500	5,100	-650
2039 (W)	50,000	57,000	18,000	38,000	92,000	22,000	1,200	28,000	150	5,200	9,600	5,200	650
2040 (D)	41,000	36,000	19,000	39,000	72,000	23,000	680	27,000	150	3,500	4,700	4,800	-310
2041 (C)	33,000	30,000	19,000	31,000	51,000	24,000	530	26,000	150	3,100	3,100	4,700	-44
2042 (D)	33,000	29,000	17,000	19,000	37,000	24,000	560	25,000	170	3,500	3,100	5,000	48
2043 (C)	29,000	33,000	19,000	17,000	35,000	23,000	480	28,000	140	3,500	4,100	4,500	-290
2044 (C)	28,000	33,000	19,000	11,000	28,000	23,000	440	28,000	140	3,100	3,800	4,500	-1
2045 (C)	27,000	36,000	21,000	7,000	27,000	25,000	400	27,000	130	3,700	4,300	4,200	-60
2046 (AN)	46,000	59,000	16,000	7,900	59,000	21,000	530	31,000	150	4,400	9,100	5,000	290
2047 (C)	37,000	33,000	19,000	12,000	37,000	23,000	450	29,000	140	3,100	3,900	4,600	-230
2048 (W)	66,000	83,000	16,000	13,000	110,000	19,000	830	27,000	150	6,100	12,000	5,500	220
2049 (W)	59,000	57,000	18,000	24,000	85,000	21,000	860	29,000	150	5,000	9,600	5,400	380
2050 (W)	56,000	49,000	18,000	28,000	83,000	23,000	920	28,000	150	4,600	7,500	5,300	-420
2051 (W)	68,000	86,000	13,000	36,000	130,000	15,000	1,400	30,000	150	5,300	15,000	5,600	380
2052 (W)	53,000	36,000	18,000	42,000	84,000	22,000	960	27,000	150	3,800	5,800	5,200	-580
2053 (AN)	46,000	49,000	16,000	38,000	81,000	21,000	1,000	29,000	150	4,500	7,400	5,000	710
2054 (D)	38,000	36,000	19,000	37,000	66,000	22,000	650	27,000	150	3,400	4,800	4,800	-400
2055 (D)	39,000	34,000	20,000	29,000	57,000	25,000	650	25,000	150	4,700	5,300	4,900	-330
2056 (AN)	46,000	53,000	17,000	28,000	75,000	21,000	750	27,000	150	5,100	8,900	5,100	200
2057 (BN)	51,000	48,000	20,000	30,000	81,000	24,000	960	25,000	150	5,700	8,100	5,200	-150
2058 (AN)	44,000	50,000	15,000	37,000	78,000	19,000	640	30,000	150	4,300	8,300	5,000	280
2059 (W)	58,000	59,000	16,000	36,000	97,000	19,000	1,600	29,000	170	5,400	11,000	5,700	-120
2060 (D)	46,000	29,000	18,000	39,000	69,000	24,000	710	25,000	170	3,500	3,200	5,100	140
2061 (C)	36,000	30,000	23,000	30,000	56,000	26,000	640	23,000	130	4,100	4,100	4,400	-440
2062 (D)	32,000	31,000	19,000	22,000	42,000	25,000	510	25,000	140	3,200	3,200	4,500	100
2063 (BN)	38,000	46,000	16,000	22,000	58,000	20,000	530	27,000	140	4,000	7,500	4,600	120
2064 (W)	53,000	41,000	13,000	26,000	66,000	20,000	700	27,000	230	5,300	7,300	6,700	190
2065 (BN)	39,000	30,000	18,000	28,000	53,000	24,000	570	27,000	160	3,200	3,200	5,000	-160

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		44,000	30,000	22,000	18,000	47,000	27,000	520	23,000	210	5,400	4,200	6,000	280
2067 (C)		32,000	25,000	21,000	9,900	29,000	27,000	440	22,000	150	3,500	2,400	4,600	-630
2068 (C)		34,000	39,000	26,000	3,600	37,000	26,000	370	25,000	110	4,900	5,200	3,700	370
2069 (BN)		42,000	48,000	19,000	0	42,000	23,000	420	28,000	130	4,400	6,700	4,700	-73
2070 (W)		52,000	58,000	19,000	5,700	63,000	21,000	800	29,000	100	5,300	10,000	4,200	220
2071 (BN)		39,000	27,000	21,000	11,000	38,000	24,000	470	25,000	120	2,900	2,700	4,200	-150
2072 (W)		51,000	67,000	17,000	13,000	75,000	20,000	660	31,000	140	5,500	11,000	4,900	-12
Average (2022-2072)		46,000	45,000	18,000	27,000	69,000	22,000	810	27,000	150	4,400	6,900	5,000	7
2022-2072	W	57,000	60,000	17,000	32,000	94,000	20,000	1,200	29,000	160	5,100	10,000	5,400	120
	AN	46,000	54,000	16,000	27,000	74,000	21,000	740	30,000	150	4,600	8,500	5,100	380
	BN	41,000	37,000	19,000	22,000	55,000	23,000	600	27,000	140	3,700	4,800	4,700	-150
	D	41,000	33,000	19,000	30,000	59,000	24,000	630	26,000	160	4,000	4,400	5,000	-210
	C	33,000	31,000	21,000	18,000	41,000	25,000	500	25,000	140	3,600	3,700	4,400	-160

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

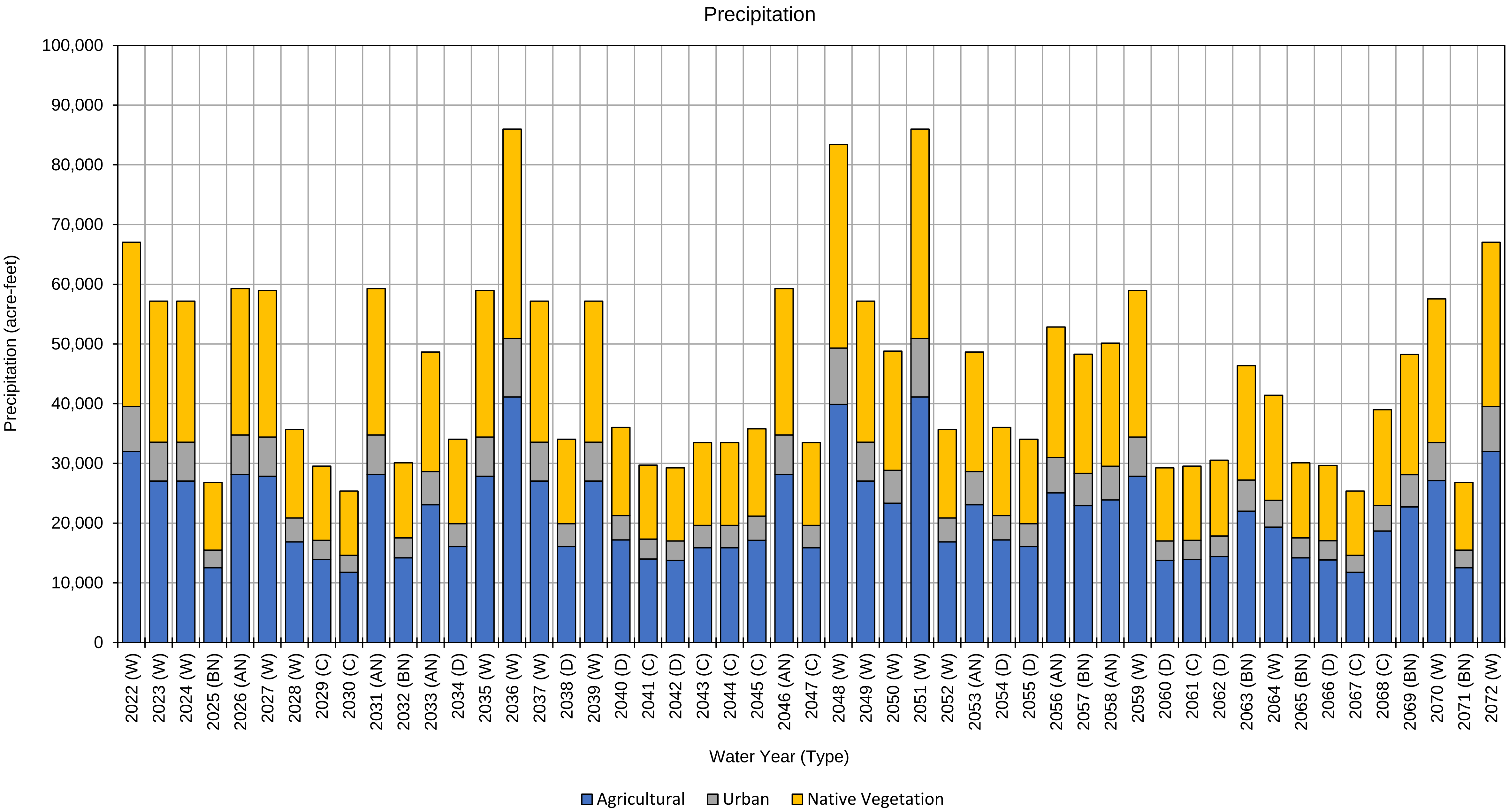
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	49,000	50,000
2023 (W)	610	53,000	54,000
2024 (W)	610	54,000	55,000
2025 (BN)	630	39,000	40,000
2026 (AN)	610	50,000	51,000
2027 (W)	610	60,000	61,000
2028 (W)	620	49,000	50,000
2029 (C)	600	37,000	38,000
2030 (C)	640	33,000	34,000
2031 (AN)	610	49,000	50,000
2032 (BN)	560	39,000	40,000
2033 (AN)	580	40,000	41,000
2034 (D)	640	41,000	42,000
2035 (W)	610	54,000	55,000
2036 (W)	610	70,000	71,000
2037 (W)	610	62,000	63,000
2038 (D)	640	50,000	51,000
2039 (W)	610	50,000	51,000
2040 (D)	600	40,000	41,000
2041 (C)	610	32,000	33,000
2042 (D)	650	32,000	33,000
2043 (C)	610	29,000	30,000
2044 (C)	610	28,000	29,000
2045 (C)	610	27,000	28,000
2046 (AN)	610	45,000	46,000
2047 (C)	610	36,000	37,000
2048 (W)	610	66,000	67,000
2049 (W)	610	58,000	59,000
2050 (W)	610	55,000	56,000
2051 (W)	610	67,000	68,000
2052 (W)	620	53,000	54,000
2053 (AN)	580	45,000	46,000
2054 (D)	600	37,000	38,000
2055 (D)	640	39,000	40,000
2056 (AN)	580	45,000	46,000
2057 (BN)	620	50,000	51,000
2058 (AN)	600	44,000	45,000
2059 (W)	610	57,000	58,000
2060 (D)	650	45,000	46,000
2061 (C)	600	35,000	36,000
2062 (D)	620	31,000	32,000
2063 (BN)	610	37,000	38,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		630	52,000	53,000
2065 (BN)		560	38,000	39,000
2066 (D)		650	43,000	44,000
2067 (C)		640	32,000	33,000
2068 (C)		610	33,000	34,000
2069 (BN)		580	42,000	43,000
2070 (W)		580	51,000	52,000
2071 (BN)		630	39,000	40,000
2072 (W)		650	50,000	51,000
Average (2022-2072)		610	45,000	46,000
2022-2072	W	620	56,000	57,000
	AN	600	45,000	46,000
	BN	600	41,000	42,000
	D	630	40,000	41,000
	C	610	32,000	33,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

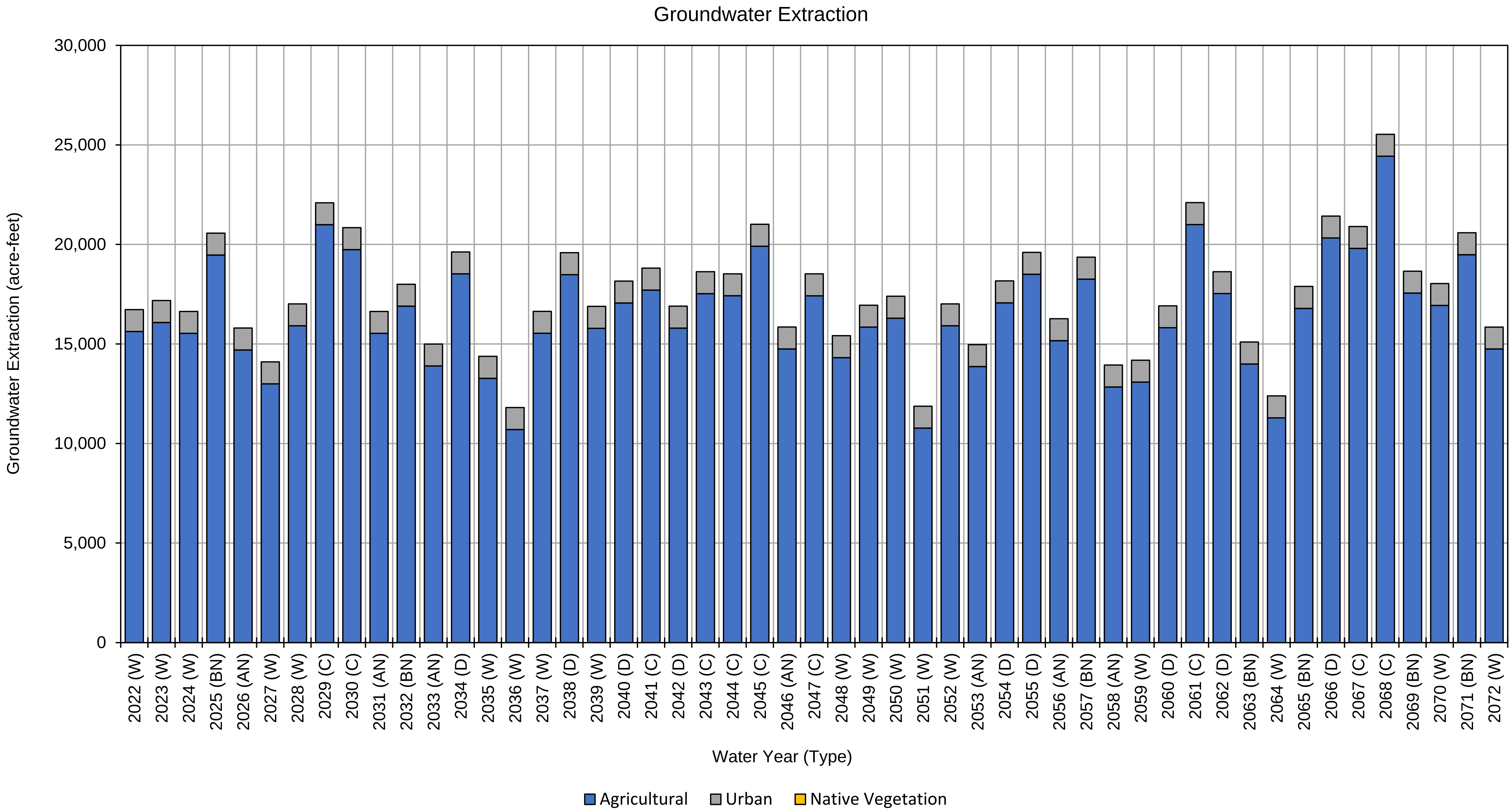
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	32,000	7,500	28,000	68,000
2023 (W)	27,000	6,500	24,000	58,000
2024 (W)	27,000	6,500	24,000	58,000
2025 (BN)	13,000	3,000	11,000	27,000
2026 (AN)	28,000	6,600	25,000	60,000
2027 (W)	28,000	6,600	25,000	60,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	14,000	3,200	12,000	29,000
2030 (C)	12,000	2,800	11,000	26,000
2031 (AN)	28,000	6,600	25,000	60,000
2032 (BN)	14,000	3,300	13,000	30,000
2033 (AN)	23,000	5,600	20,000	49,000
2034 (D)	16,000	3,800	14,000	34,000
2035 (W)	28,000	6,600	25,000	60,000
2036 (W)	41,000	9,800	35,000	86,000
2037 (W)	27,000	6,500	24,000	58,000
2038 (D)	16,000	3,800	14,000	34,000
2039 (W)	27,000	6,500	24,000	58,000
2040 (D)	17,000	4,100	15,000	36,000
2041 (C)	14,000	3,300	12,000	29,000
2042 (D)	14,000	3,300	12,000	29,000
2043 (C)	16,000	3,800	14,000	34,000
2044 (C)	16,000	3,800	14,000	34,000
2045 (C)	17,000	4,100	15,000	36,000
2046 (AN)	28,000	6,600	25,000	60,000
2047 (C)	16,000	3,800	14,000	34,000
2048 (W)	40,000	9,400	34,000	83,000
2049 (W)	27,000	6,500	24,000	58,000
2050 (W)	23,000	5,500	20,000	49,000
2051 (W)	41,000	9,800	35,000	86,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	23,000	5,600	20,000	49,000
2054 (D)	17,000	4,100	15,000	36,000
2055 (D)	16,000	3,800	14,000	34,000
2056 (AN)	25,000	5,900	22,000	53,000
2057 (BN)	23,000	5,400	20,000	48,000
2058 (AN)	24,000	5,600	21,000	51,000
2059 (W)	28,000	6,600	25,000	60,000
2060 (D)	14,000	3,300	12,000	29,000
2061 (C)	14,000	3,200	12,000	29,000
2062 (D)	14,000	3,400	13,000	30,000
2063 (BN)	22,000	5,200	19,000	46,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		19,000	4,500	18,000	42,000
2065 (BN)		14,000	3,300	13,000	30,000
2066 (D)		14,000	3,200	13,000	30,000
2067 (C)		12,000	2,800	11,000	26,000
2068 (C)		19,000	4,300	16,000	39,000
2069 (BN)		23,000	5,400	20,000	48,000
2070 (W)		27,000	6,400	24,000	57,000
2071 (BN)		13,000	3,000	11,000	27,000
2072 (W)		32,000	7,500	28,000	68,000
Average (2022-2072)		21,000	5,100	19,000	45,000
2022-2072	W	28,000	6,700	25,000	60,000
	AN	26,000	6,100	22,000	54,000
	BN	17,000	4,100	15,000	36,000
	D	15,000	3,600	14,000	33,000
	C	15,000	3,500	13,000	32,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

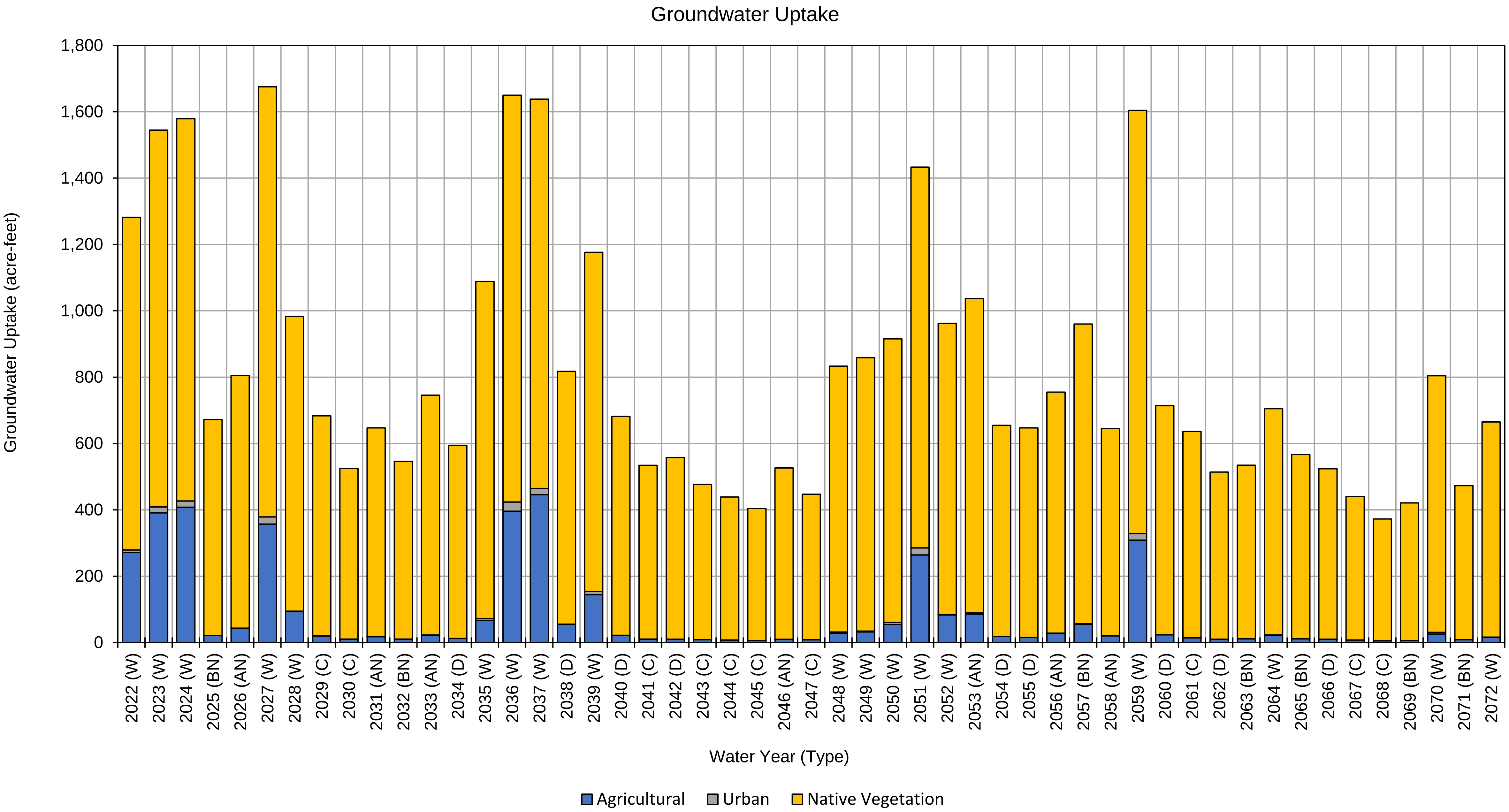
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	1,100	0	17,000
2023 (W)	16,000	1,100	0	17,000
2024 (W)	16,000	1,100	0	17,000
2025 (BN)	19,000	1,100	0	20,000
2026 (AN)	15,000	1,100	0	16,000
2027 (W)	13,000	1,100	0	14,000
2028 (W)	16,000	1,100	0	17,000
2029 (C)	21,000	1,100	0	22,000
2030 (C)	20,000	1,100	0	21,000
2031 (AN)	16,000	1,100	0	17,000
2032 (BN)	17,000	1,100	0	18,000
2033 (AN)	14,000	1,100	0	15,000
2034 (D)	19,000	1,100	0	20,000
2035 (W)	13,000	1,100	0	14,000
2036 (W)	11,000	1,100	0	12,000
2037 (W)	16,000	1,100	0	17,000
2038 (D)	18,000	1,100	0	19,000
2039 (W)	16,000	1,100	0	17,000
2040 (D)	17,000	1,100	0	18,000
2041 (C)	18,000	1,100	0	19,000
2042 (D)	16,000	1,100	0	17,000
2043 (C)	18,000	1,100	0	19,000
2044 (C)	17,000	1,100	0	18,000
2045 (C)	20,000	1,100	0	21,000
2046 (AN)	15,000	1,100	0	16,000
2047 (C)	17,000	1,100	0	18,000
2048 (W)	14,000	1,100	0	15,000
2049 (W)	16,000	1,100	0	17,000
2050 (W)	16,000	1,100	0	17,000
2051 (W)	11,000	1,100	0	12,000
2052 (W)	16,000	1,100	0	17,000
2053 (AN)	14,000	1,100	0	15,000
2054 (D)	17,000	1,100	0	18,000
2055 (D)	19,000	1,100	0	20,000
2056 (AN)	15,000	1,100	0	16,000
2057 (BN)	18,000	1,100	0	19,000
2058 (AN)	13,000	1,100	0	14,000
2059 (W)	13,000	1,100	0	14,000
2060 (D)	16,000	1,100	0	17,000
2061 (C)	21,000	1,100	0	22,000
2062 (D)	18,000	1,100	0	19,000
2063 (BN)	14,000	1,100	0	15,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		11,000	1,100	0	12,000
2065 (BN)		17,000	1,100	0	18,000
2066 (D)		20,000	1,100	0	21,000
2067 (C)		20,000	1,100	0	21,000
2068 (C)		24,000	1,100	0	25,000
2069 (BN)		18,000	1,100	0	19,000
2070 (W)		17,000	1,100	0	18,000
2071 (BN)		19,000	1,100	0	20,000
2072 (W)		15,000	1,100	0	16,000
Average (2022-2072)		16,000	1,100	0	17,000
2022-2072	W	14,000	1,100	0	15,000
	AN	14,000	1,100	0	15,000
	BN	17,000	1,100	0	18,000
	D	18,000	1,100	0	19,000
	C	20,000	1,100	0	21,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

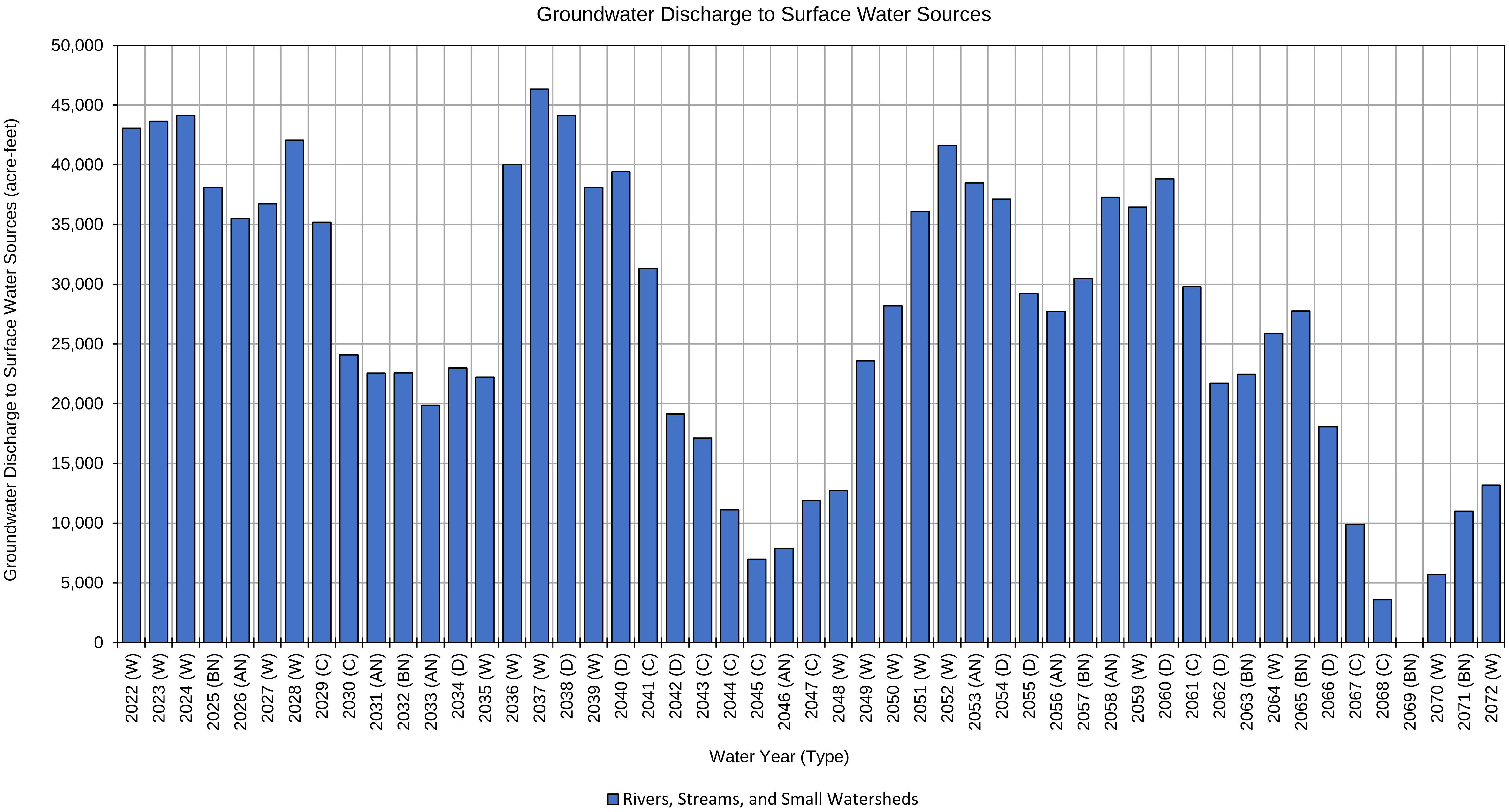
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	270	7	1,000	1,300
2023 (W)	390	18	1,100	1,500
2024 (W)	410	19	1,200	1,600
2025 (BN)	22	0	650	670
2026 (AN)	43	1	760	800
2027 (W)	360	22	1,300	1,700
2028 (W)	94	1	890	990
2029 (C)	20	0	660	680
2030 (C)	10	0	510	520
2031 (AN)	17	0	630	650
2032 (BN)	11	0	540	550
2033 (AN)	21	2	720	740
2034 (D)	12	0	580	590
2035 (W)	67	5	1,000	1,100
2036 (W)	400	28	1,200	1,600
2037 (W)	450	19	1,200	1,700
2038 (D)	55	0	760	820
2039 (W)	140	9	1,000	1,100
2040 (D)	22	0	660	680
2041 (C)	10	0	520	530
2042 (D)	10	0	550	560
2043 (C)	9	0	470	480
2044 (C)	8	0	430	440
2045 (C)	6	0	400	410
2046 (AN)	10	0	520	530
2047 (C)	8	0	440	450
2048 (W)	28	4	800	830
2049 (W)	32	3	820	850
2050 (W)	55	6	850	910
2051 (W)	260	21	1,100	1,400
2052 (W)	83	1	880	960
2053 (AN)	86	4	950	1,000
2054 (D)	18	0	640	660
2055 (D)	16	0	630	650
2056 (AN)	27	1	730	760
2057 (BN)	55	2	900	960
2058 (AN)	20	0	620	640
2059 (W)	310	20	1,300	1,600
2060 (D)	24	0	690	710
2061 (C)	14	0	620	630
2062 (D)	10	0	500	510
2063 (BN)	11	0	520	530

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		22	1	680	700
2065 (BN)		12	0	560	570
2066 (D)		10	0	510	520
2067 (C)		8	0	430	440
2068 (C)		5	0	370	380
2069 (BN)		6	0	410	420
2070 (W)		26	5	770	800
2071 (BN)		9	0	460	470
2072 (W)		16	1	650	670
Average (2022-2072)		79	4	730	810
2022-2072	W	190	11	990	1,200
	AN	32	1	700	730
	BN	18	0	580	600
	D	20	0	610	630
	C	10	0	490	500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

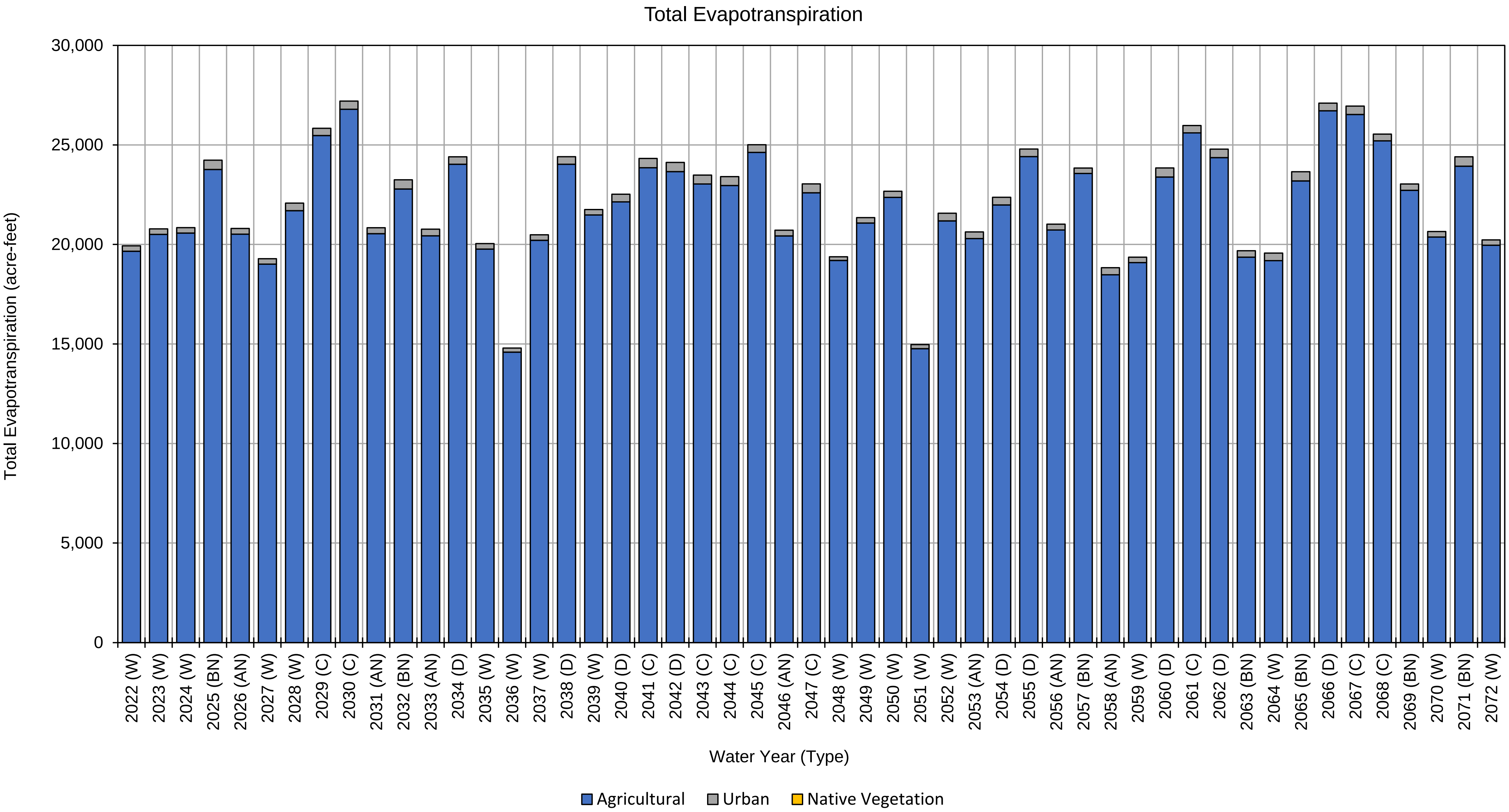
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	43,000
2023 (W)	44,000
2024 (W)	44,000
2025 (BN)	38,000
2026 (AN)	35,000
2027 (W)	37,000
2028 (W)	42,000
2029 (C)	35,000
2030 (C)	24,000
2031 (AN)	23,000
2032 (BN)	23,000
2033 (AN)	20,000
2034 (D)	23,000
2035 (W)	22,000
2036 (W)	40,000
2037 (W)	46,000
2038 (D)	44,000
2039 (W)	38,000
2040 (D)	39,000
2041 (C)	31,000
2042 (D)	19,000
2043 (C)	17,000
2044 (C)	11,000
2045 (C)	7,000
2046 (AN)	7,900
2047 (C)	12,000
2048 (W)	13,000
2049 (W)	24,000
2050 (W)	28,000
2051 (W)	36,000
2052 (W)	42,000
2053 (AN)	38,000
2054 (D)	37,000
2055 (D)	29,000
2056 (AN)	28,000
2057 (BN)	30,000
2058 (AN)	37,000
2059 (W)	36,000
2060 (D)	39,000
2061 (C)	30,000
2062 (D)	22,000
2063 (BN)	22,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		26,000
2065 (BN)		28,000
2066 (D)		18,000
2067 (C)		9,900
2068 (C)		3,600
2069 (BN)		0
2070 (W)		5,700
2071 (BN)		11,000
2072 (W)		13,000
Average (2022-2072)		27,000
2022-2072	W	32,000
	AN	27,000
	BN	22,000
	D	30,000
	C	18,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

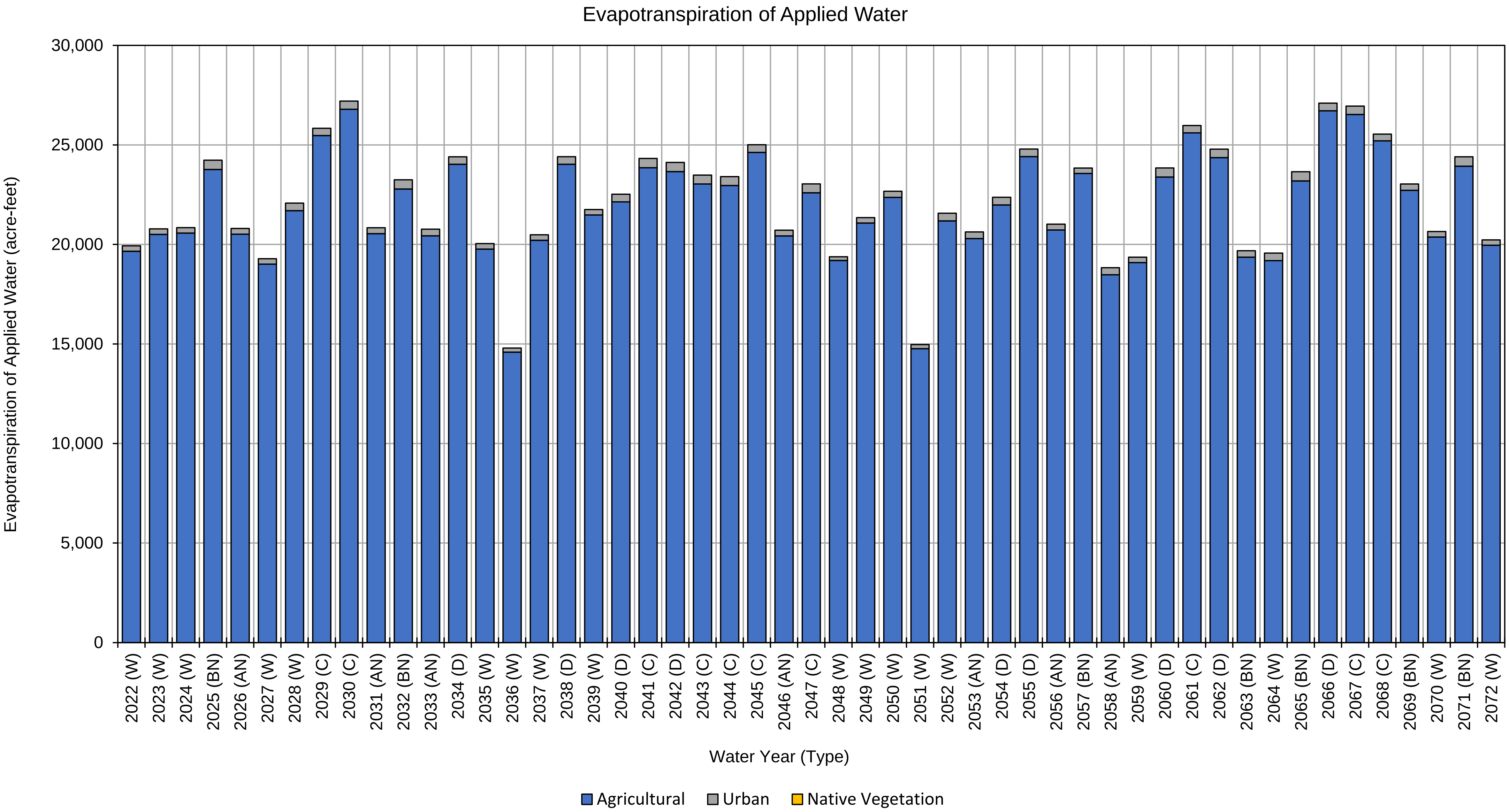
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	34,000	2,100	16,000	52,000
2023 (W)	34,000	1,900	15,000	51,000
2024 (W)	34,000	1,900	15,000	51,000
2025 (BN)	34,000	1,700	14,000	50,000
2026 (AN)	34,000	2,000	16,000	52,000
2027 (W)	33,000	1,900	15,000	50,000
2028 (W)	33,000	1,800	14,000	49,000
2029 (C)	35,000	1,400	13,000	49,000
2030 (C)	35,000	1,500	13,000	50,000
2031 (AN)	34,000	2,100	16,000	52,000
2032 (BN)	35,000	1,900	15,000	52,000
2033 (AN)	33,000	2,000	15,000	50,000
2034 (D)	35,000	1,700	14,000	51,000
2035 (W)	33,000	1,900	15,000	50,000
2036 (W)	30,000	2,000	15,000	47,000
2037 (W)	34,000	1,900	15,000	51,000
2038 (D)	35,000	1,700	14,000	51,000
2039 (W)	34,000	1,900	15,000	51,000
2040 (D)	34,000	1,800	15,000	51,000
2041 (C)	35,000	1,900	15,000	52,000
2042 (D)	34,000	1,800	14,000	50,000
2043 (C)	35,000	2,000	15,000	52,000
2044 (C)	35,000	2,000	15,000	52,000
2045 (C)	36,000	1,800	15,000	53,000
2046 (AN)	34,000	2,000	16,000	52,000
2047 (C)	35,000	2,000	15,000	52,000
2048 (W)	31,000	1,800	14,000	47,000
2049 (W)	34,000	1,900	15,000	51,000
2050 (W)	35,000	1,800	15,000	52,000
2051 (W)	30,000	2,000	15,000	47,000
2052 (W)	33,000	1,800	15,000	50,000
2053 (AN)	33,000	2,000	15,000	50,000
2054 (D)	34,000	1,800	15,000	51,000
2055 (D)	35,000	1,700	14,000	51,000
2056 (AN)	33,000	1,900	14,000	49,000
2057 (BN)	34,000	1,600	14,000	50,000
2058 (AN)	32,000	2,100	16,000	50,000
2059 (W)	33,000	1,900	15,000	50,000
2060 (D)	34,000	1,800	14,000	50,000
2061 (C)	35,000	1,500	13,000	50,000
2062 (D)	34,000	1,700	14,000	50,000
2063 (BN)	32,000	1,900	14,000	48,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		31,000	1,900	15,000	48,000
2065 (BN)		35,000	1,900	15,000	52,000
2066 (D)		35,000	1,500	13,000	50,000
2067 (C)		35,000	1,500	13,000	50,000
2068 (C)		35,000	1,700	14,000	51,000
2069 (BN)		35,000	1,900	15,000	52,000
2070 (W)		33,000	1,900	15,000	50,000
2071 (BN)		34,000	1,700	14,000	50,000
2072 (W)		34,000	2,100	16,000	52,000
Average (2022-2072)		34,000	1,800	15,000	51,000
2022-2072	W	33,000	1,900	15,000	50,000
	AN	33,000	2,000	15,000	50,000
	BN	34,000	1,800	14,000	50,000
	D	34,000	1,700	14,000	50,000
	C	35,000	1,700	14,000	51,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

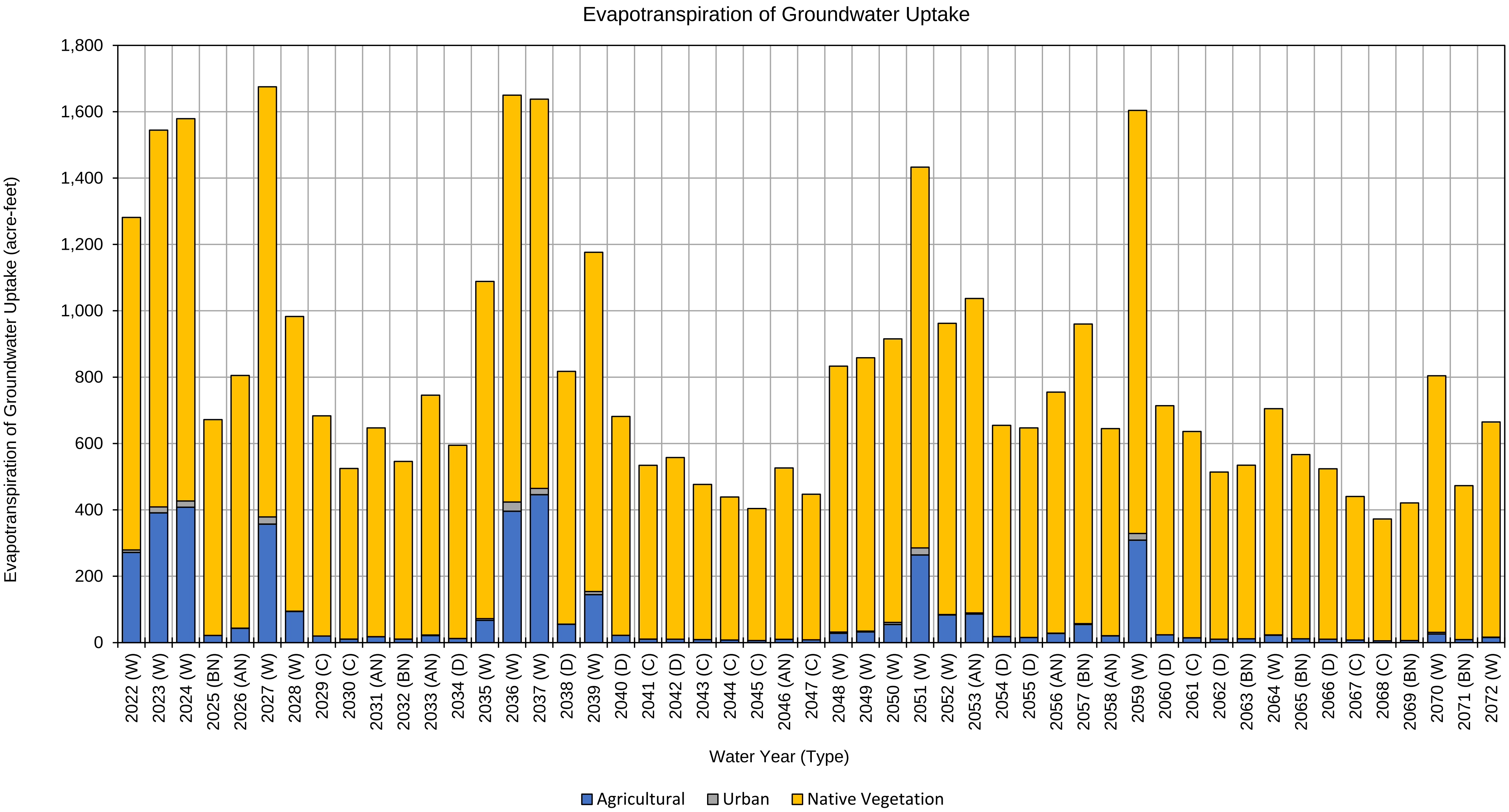
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	20,000	270	0	20,000
2023 (W)	21,000	280	0	21,000
2024 (W)	21,000	280	0	21,000
2025 (BN)	24,000	470	0	24,000
2026 (AN)	21,000	290	0	21,000
2027 (W)	19,000	280	0	19,000
2028 (W)	22,000	380	0	22,000
2029 (C)	25,000	370	0	25,000
2030 (C)	27,000	410	0	27,000
2031 (AN)	21,000	300	0	21,000
2032 (BN)	23,000	460	0	23,000
2033 (AN)	20,000	330	0	20,000
2034 (D)	24,000	380	0	24,000
2035 (W)	20,000	270	0	20,000
2036 (W)	15,000	200	0	15,000
2037 (W)	20,000	270	0	20,000
2038 (D)	24,000	380	0	24,000
2039 (W)	21,000	270	0	21,000
2040 (D)	22,000	390	0	22,000
2041 (C)	24,000	470	0	24,000
2042 (D)	24,000	460	0	24,000
2043 (C)	23,000	450	0	23,000
2044 (C)	23,000	440	0	23,000
2045 (C)	25,000	390	0	25,000
2046 (AN)	20,000	290	0	20,000
2047 (C)	23,000	450	0	23,000
2048 (W)	19,000	190	0	19,000
2049 (W)	21,000	270	0	21,000
2050 (W)	22,000	310	0	22,000
2051 (W)	15,000	210	0	15,000
2052 (W)	21,000	380	0	21,000
2053 (AN)	20,000	330	0	20,000
2054 (D)	22,000	390	0	22,000
2055 (D)	24,000	380	0	24,000
2056 (AN)	21,000	290	0	21,000
2057 (BN)	24,000	270	0	24,000
2058 (AN)	18,000	350	0	18,000
2059 (W)	19,000	280	0	19,000
2060 (D)	23,000	460	0	23,000
2061 (C)	26,000	370	0	26,000
2062 (D)	24,000	420	0	24,000
2063 (BN)	19,000	320	0	19,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		19,000	380	0	19,000
2065 (BN)		23,000	460	0	23,000
2066 (D)		27,000	390	0	27,000
2067 (C)		27,000	420	0	27,000
2068 (C)		25,000	340	0	25,000
2069 (BN)		23,000	320	0	23,000
2070 (W)		20,000	280	0	20,000
2071 (BN)		24,000	470	0	24,000
2072 (W)		20,000	260	0	20,000
Average (2022-2072)		22,000	350	0	22,000
2022-2072	W	20,000	280	0	20,000
	AN	20,000	310	0	20,000
	BN	23,000	400	0	23,000
	D	24,000	400	0	24,000
	C	25,000	410	0	25,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

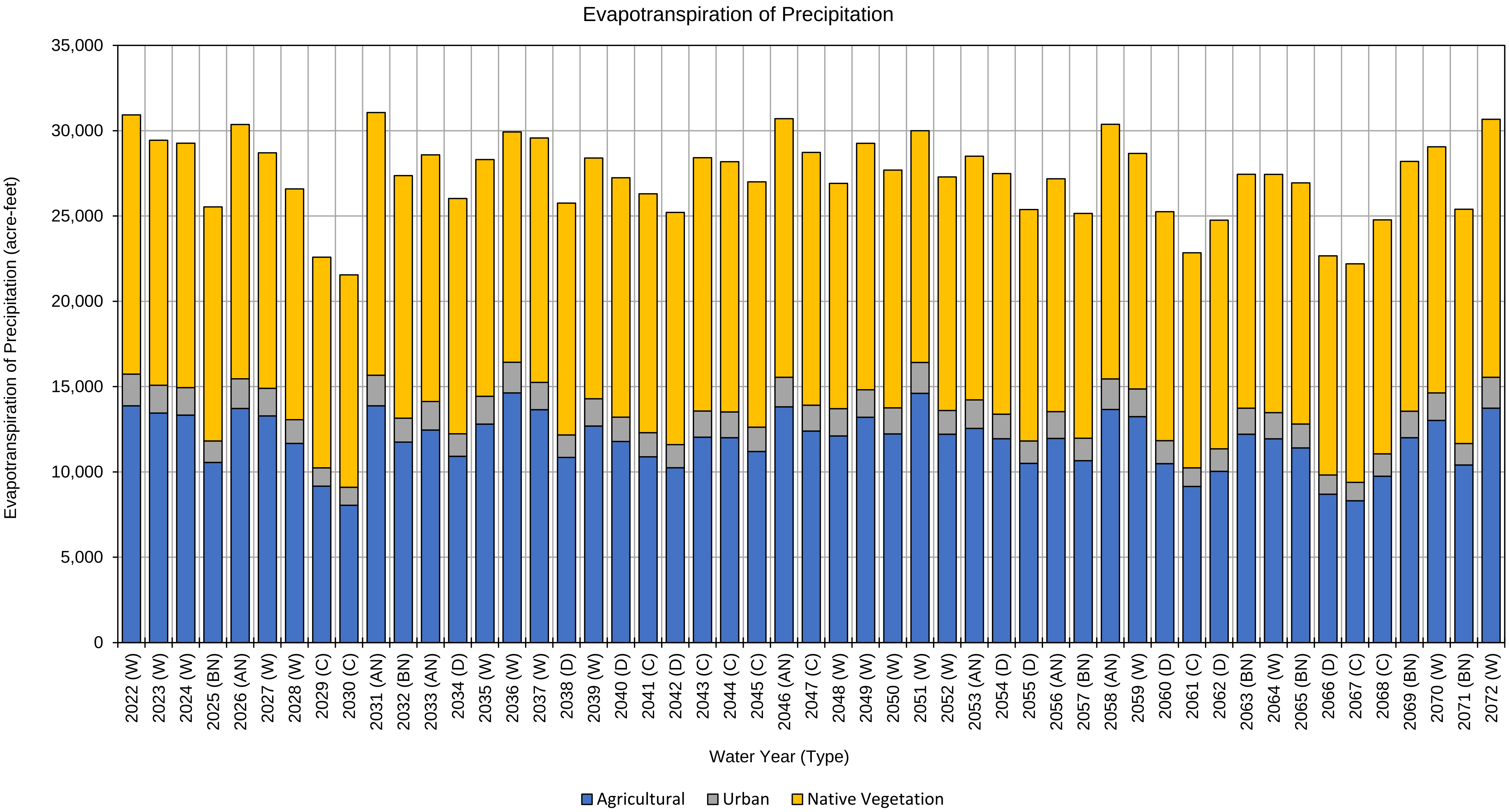
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	270	7	1,000	1,300
2023 (W)	390	18	1,100	1,500
2024 (W)	410	19	1,200	1,600
2025 (BN)	22	0	650	670
2026 (AN)	43	1	760	800
2027 (W)	360	22	1,300	1,700
2028 (W)	94	1	890	990
2029 (C)	20	0	660	680
2030 (C)	10	0	510	520
2031 (AN)	17	0	630	650
2032 (BN)	11	0	540	550
2033 (AN)	21	2	720	740
2034 (D)	12	0	580	590
2035 (W)	67	5	1,000	1,100
2036 (W)	400	28	1,200	1,600
2037 (W)	450	19	1,200	1,700
2038 (D)	55	0	760	820
2039 (W)	140	9	1,000	1,100
2040 (D)	22	0	660	680
2041 (C)	10	0	520	530
2042 (D)	10	0	550	560
2043 (C)	9	0	470	480
2044 (C)	8	0	430	440
2045 (C)	6	0	400	410
2046 (AN)	10	0	520	530
2047 (C)	8	0	440	450
2048 (W)	28	4	800	830
2049 (W)	32	3	820	850
2050 (W)	55	6	850	910
2051 (W)	260	21	1,100	1,400
2052 (W)	83	1	880	960
2053 (AN)	86	4	950	1,000
2054 (D)	18	0	640	660
2055 (D)	16	0	630	650
2056 (AN)	27	1	730	760
2057 (BN)	55	2	900	960
2058 (AN)	20	0	620	640
2059 (W)	310	20	1,300	1,600
2060 (D)	24	0	690	710
2061 (C)	14	0	620	630
2062 (D)	10	0	500	510
2063 (BN)	11	0	520	530

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		22	1	680	700
2065 (BN)		12	0	560	570
2066 (D)		10	0	510	520
2067 (C)		8	0	430	440
2068 (C)		5	0	370	380
2069 (BN)		6	0	410	420
2070 (W)		26	5	770	800
2071 (BN)		9	0	460	470
2072 (W)		16	1	650	670
Average (2022-2072)		79	4	730	810
2022-2072	W	190	11	990	1,200
	AN	32	1	700	730
	BN	18	0	580	600
	D	20	0	610	630
	C	10	0	490	500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

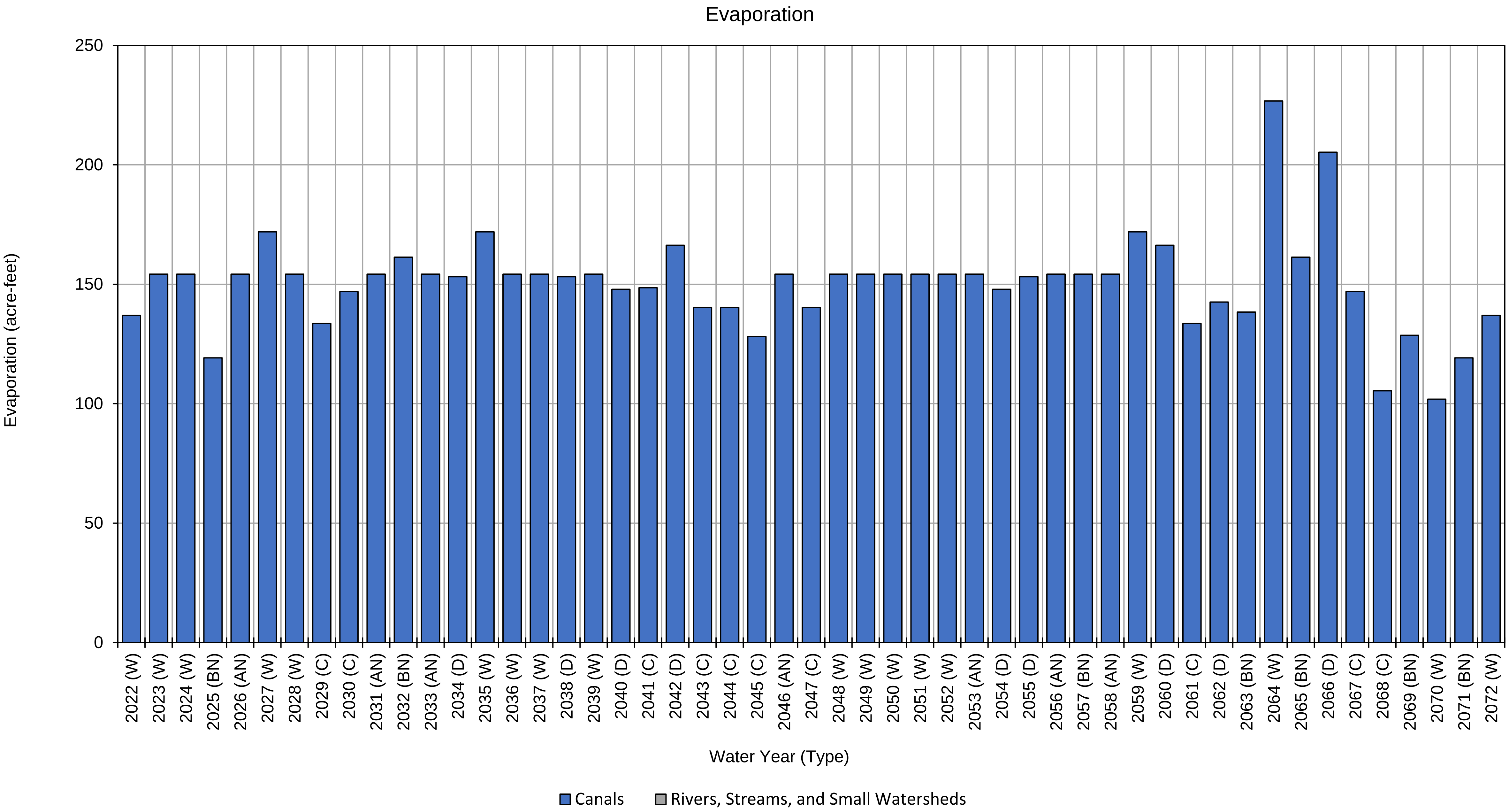
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	14,000	1,900	15,000	31,000
2023 (W)	13,000	1,600	14,000	29,000
2024 (W)	13,000	1,600	14,000	29,000
2025 (BN)	11,000	1,300	14,000	26,000
2026 (AN)	14,000	1,700	15,000	31,000
2027 (W)	13,000	1,600	14,000	29,000
2028 (W)	12,000	1,400	14,000	27,000
2029 (C)	9,200	1,100	12,000	22,000
2030 (C)	8,000	1,100	12,000	21,000
2031 (AN)	14,000	1,800	15,000	31,000
2032 (BN)	12,000	1,400	14,000	27,000
2033 (AN)	12,000	1,700	14,000	28,000
2034 (D)	11,000	1,300	14,000	26,000
2035 (W)	13,000	1,600	14,000	29,000
2036 (W)	15,000	1,800	13,000	30,000
2037 (W)	14,000	1,600	14,000	30,000
2038 (D)	11,000	1,300	14,000	26,000
2039 (W)	13,000	1,600	14,000	29,000
2040 (D)	12,000	1,400	14,000	27,000
2041 (C)	11,000	1,400	14,000	26,000
2042 (D)	10,000	1,400	14,000	25,000
2043 (C)	12,000	1,500	15,000	29,000
2044 (C)	12,000	1,500	15,000	29,000
2045 (C)	11,000	1,400	14,000	26,000
2046 (AN)	14,000	1,700	15,000	31,000
2047 (C)	12,000	1,500	15,000	29,000
2048 (W)	12,000	1,600	13,000	27,000
2049 (W)	13,000	1,600	14,000	29,000
2050 (W)	12,000	1,500	14,000	28,000
2051 (W)	15,000	1,800	14,000	31,000
2052 (W)	12,000	1,400	14,000	27,000
2053 (AN)	13,000	1,700	14,000	29,000
2054 (D)	12,000	1,400	14,000	27,000
2055 (D)	11,000	1,300	14,000	26,000
2056 (AN)	12,000	1,600	14,000	28,000
2057 (BN)	11,000	1,300	13,000	25,000
2058 (AN)	14,000	1,800	15,000	31,000
2059 (W)	13,000	1,600	14,000	29,000
2060 (D)	10,000	1,400	13,000	24,000
2061 (C)	9,100	1,100	13,000	23,000
2062 (D)	10,000	1,300	13,000	24,000
2063 (BN)	12,000	1,500	14,000	28,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		12,000	1,500	14,000	28,000
2065 (BN)		11,000	1,400	14,000	26,000
2066 (D)		8,700	1,100	13,000	23,000
2067 (C)		8,300	1,100	13,000	22,000
2068 (C)		9,700	1,300	14,000	25,000
2069 (BN)		12,000	1,500	15,000	29,000
2070 (W)		13,000	1,600	14,000	29,000
2071 (BN)		10,000	1,300	14,000	25,000
2072 (W)		14,000	1,800	15,000	31,000
Average (2022-2072)		12,000	1,500	14,000	28,000
2022-2072	W	13,000	1,600	14,000	29,000
	AN	13,000	1,700	15,000	30,000
	BN	11,000	1,400	14,000	26,000
	D	11,000	1,300	14,000	26,000
	C	10,000	1,300	14,000	25,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

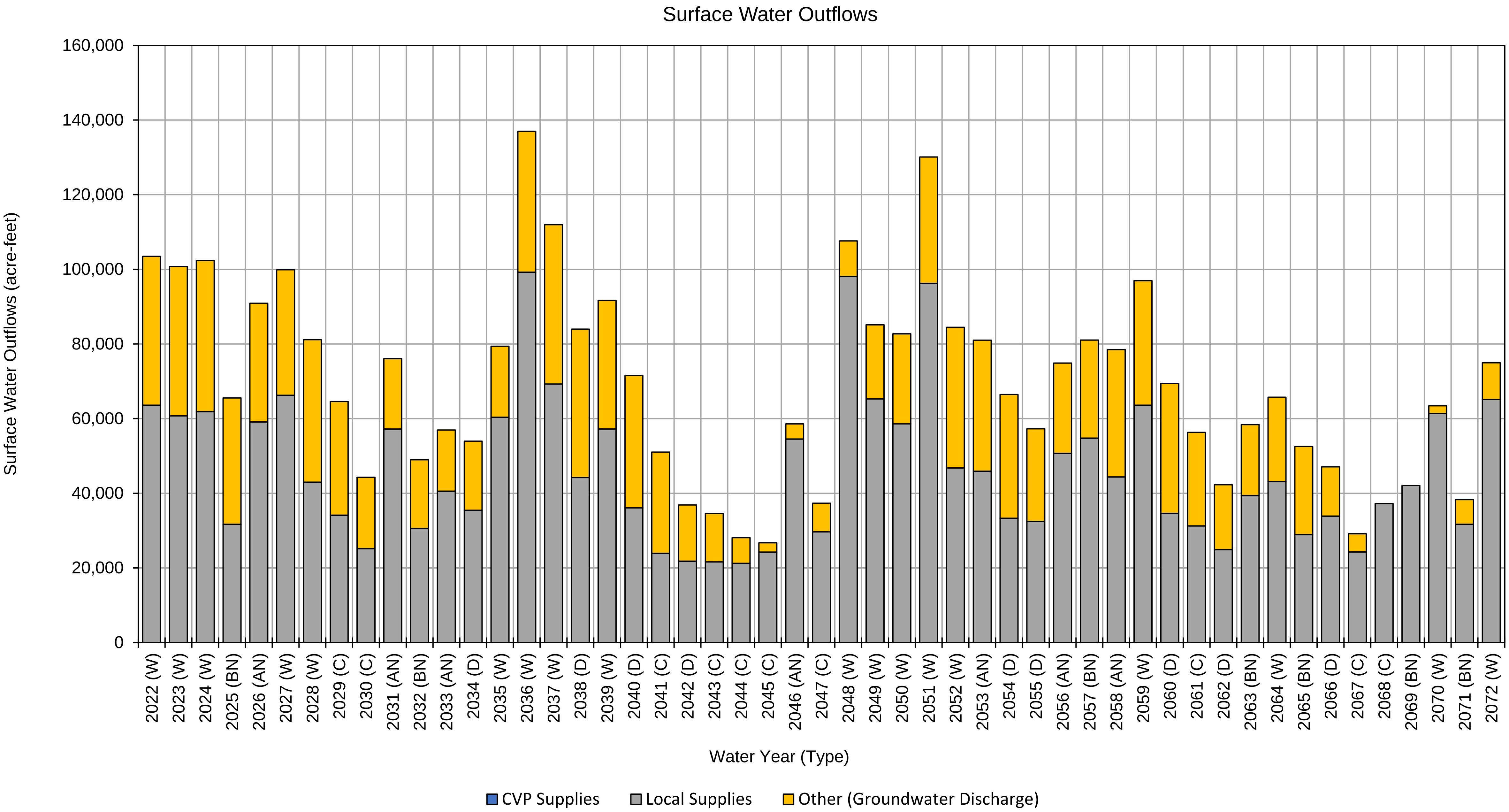
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	170	0	170
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150
2059 (W)	170	0	170
2060 (D)	170	0	170
2061 (C)	130	0	130
2062 (D)	140	0	140
2063 (BN)	140	0	140

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	160	0	160
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

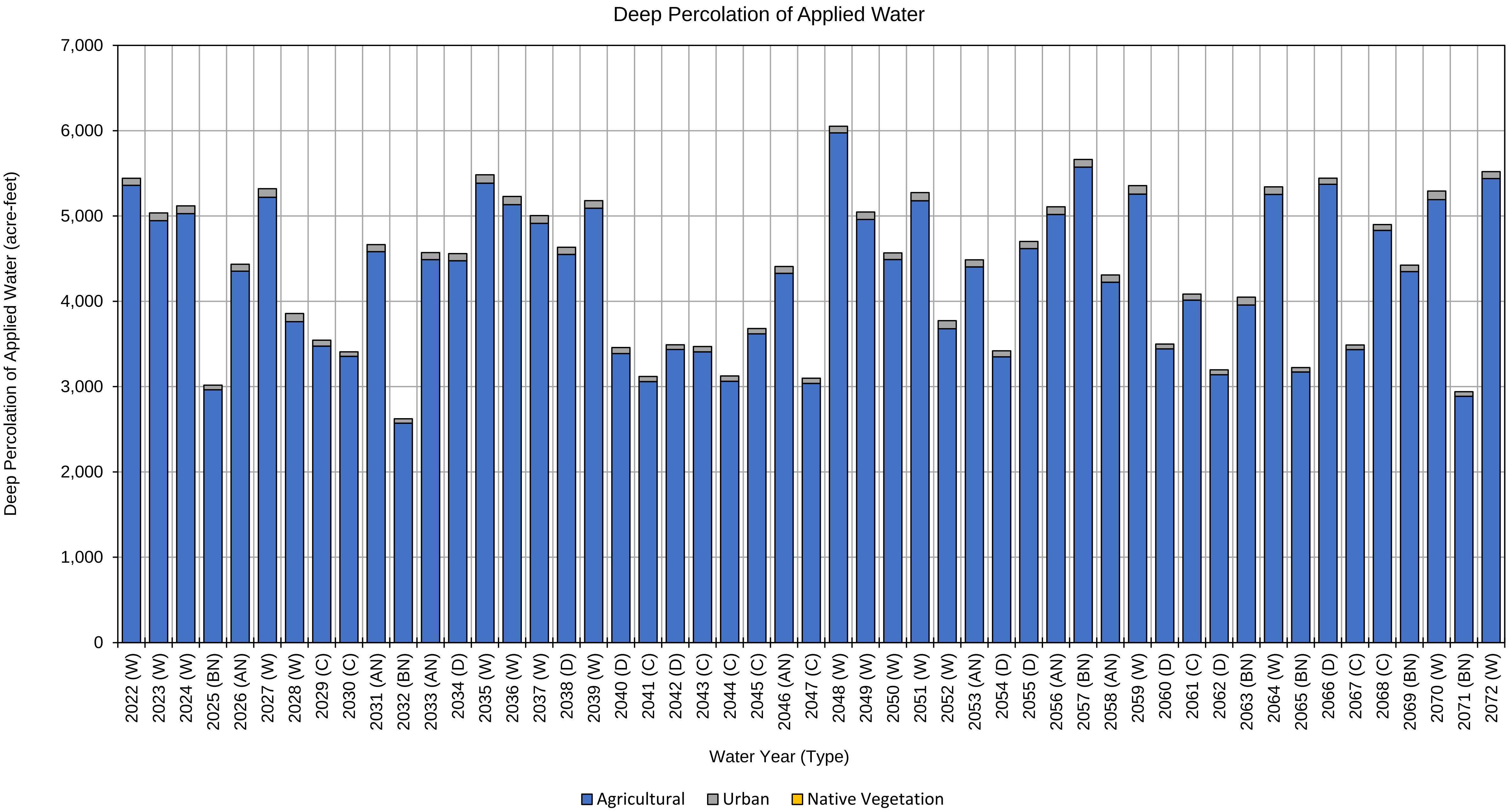
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	64,000	40,000	100,000
2023 (W)	0	61,000	40,000	100,000
2024 (W)	0	62,000	40,000	100,000
2025 (BN)	0	32,000	34,000	66,000
2026 (AN)	0	59,000	32,000	91,000
2027 (W)	0	66,000	34,000	100,000
2028 (W)	0	43,000	38,000	81,000
2029 (C)	0	34,000	30,000	64,000
2030 (C)	0	25,000	19,000	44,000
2031 (AN)	0	57,000	19,000	76,000
2032 (BN)	0	31,000	18,000	49,000
2033 (AN)	0	41,000	16,000	57,000
2034 (D)	0	35,000	19,000	54,000
2035 (W)	0	60,000	19,000	79,000
2036 (W)	0	99,000	38,000	140,000
2037 (W)	0	69,000	43,000	110,000
2038 (D)	0	44,000	40,000	84,000
2039 (W)	0	57,000	34,000	91,000
2040 (D)	0	36,000	35,000	71,000
2041 (C)	0	24,000	27,000	51,000
2042 (D)	0	22,000	15,000	37,000
2043 (C)	0	22,000	13,000	35,000
2044 (C)	0	21,000	6,900	28,000
2045 (C)	0	24,000	2,500	27,000
2046 (AN)	0	55,000	4,100	59,000
2047 (C)	0	30,000	7,700	38,000
2048 (W)	0	98,000	9,500	110,000
2049 (W)	0	65,000	20,000	85,000
2050 (W)	0	59,000	24,000	83,000
2051 (W)	0	96,000	34,000	130,000
2052 (W)	0	47,000	38,000	85,000
2053 (AN)	0	46,000	35,000	81,000
2054 (D)	0	33,000	33,000	66,000
2055 (D)	0	32,000	25,000	57,000
2056 (AN)	0	51,000	24,000	75,000
2057 (BN)	0	55,000	26,000	81,000
2058 (AN)	0	44,000	34,000	78,000
2059 (W)	0	64,000	33,000	97,000
2060 (D)	0	35,000	35,000	70,000
2061 (C)	0	31,000	25,000	56,000
2062 (D)	0	25,000	17,000	42,000
2063 (BN)	0	39,000	19,000	58,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	43,000	23,000	66,000
2065 (BN)		0	29,000	24,000	53,000
2066 (D)		0	34,000	13,000	47,000
2067 (C)		0	24,000	4,900	29,000
2068 (C)		0	37,000	0	37,000
2069 (BN)		0	42,000	0	42,000
2070 (W)		0	61,000	2,100	63,000
2071 (BN)		0	32,000	6,600	39,000
2072 (W)		0	65,000	9,800	75,000
Average (2022-2072)		0	46,000	23,000	69,000
2022-2072	W	0	66,000	29,000	95,000
	AN	0	50,000	23,000	73,000
	BN	0	37,000	18,000	55,000
	D	0	33,000	26,000	59,000
	C	0	27,000	14,000	41,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

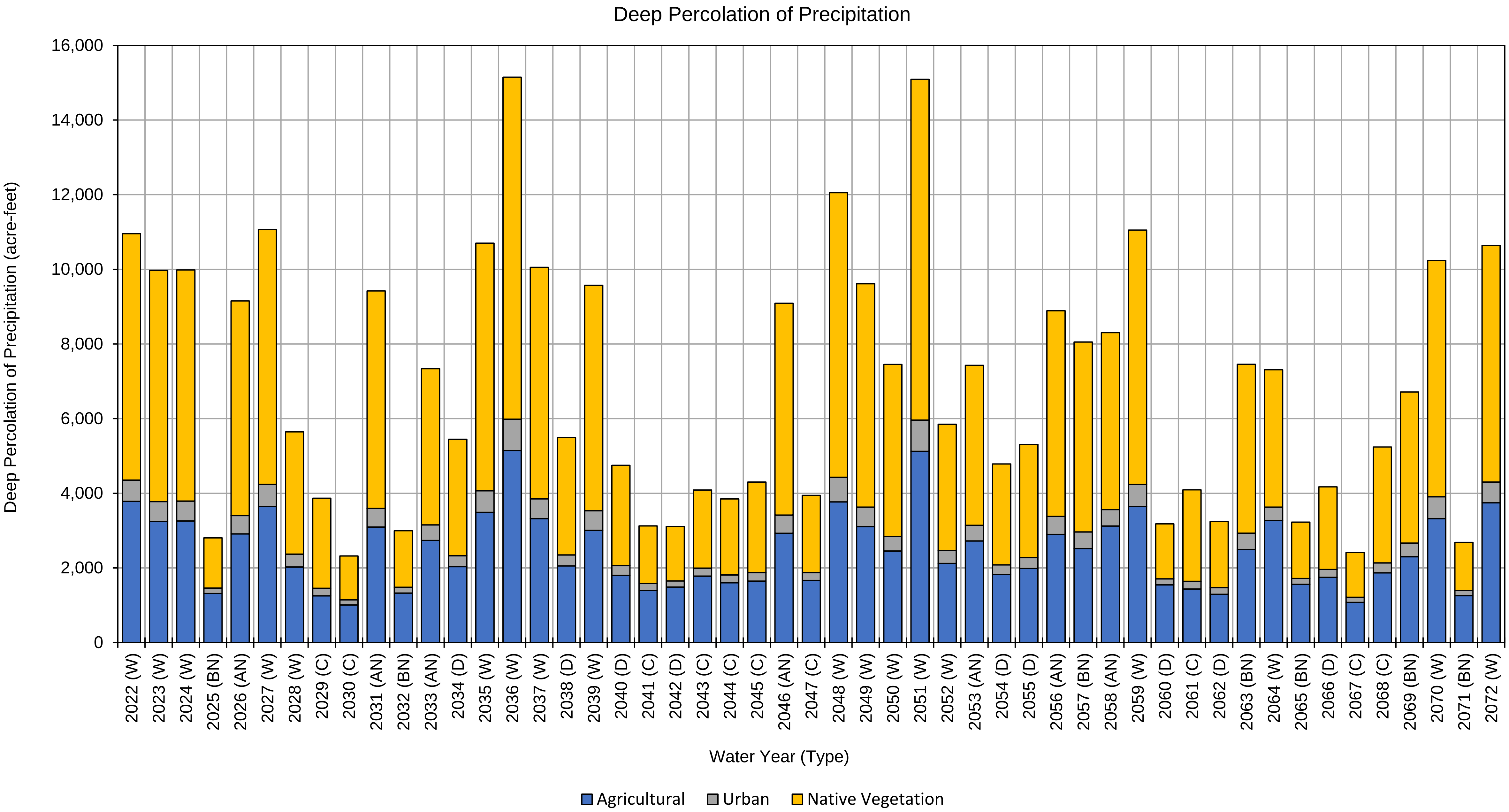
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,400	84	0	5,500
2023 (W)	4,900	91	0	5,000
2024 (W)	5,000	91	0	5,100
2025 (BN)	3,000	54	0	3,100
2026 (AN)	4,400	81	0	4,500
2027 (W)	5,200	100	0	5,300
2028 (W)	3,800	95	0	3,900
2029 (C)	3,500	70	0	3,600
2030 (C)	3,400	53	0	3,500
2031 (AN)	4,600	83	0	4,700
2032 (BN)	2,600	52	0	2,700
2033 (AN)	4,500	83	0	4,600
2034 (D)	4,500	84	0	4,600
2035 (W)	5,400	97	0	5,500
2036 (W)	5,100	95	0	5,200
2037 (W)	4,900	91	0	5,000
2038 (D)	4,500	84	0	4,600
2039 (W)	5,100	89	0	5,200
2040 (D)	3,400	70	0	3,500
2041 (C)	3,100	60	0	3,200
2042 (D)	3,400	56	0	3,500
2043 (C)	3,400	63	0	3,500
2044 (C)	3,100	62	0	3,200
2045 (C)	3,600	63	0	3,700
2046 (AN)	4,300	81	0	4,400
2047 (C)	3,000	62	0	3,100
2048 (W)	6,000	77	0	6,100
2049 (W)	5,000	88	0	5,100
2050 (W)	4,500	78	0	4,600
2051 (W)	5,200	95	0	5,300
2052 (W)	3,700	96	0	3,800
2053 (AN)	4,400	83	0	4,500
2054 (D)	3,300	70	0	3,400
2055 (D)	4,600	84	0	4,700
2056 (AN)	5,000	90	0	5,100
2057 (BN)	5,600	91	0	5,700
2058 (AN)	4,200	86	0	4,300
2059 (W)	5,300	100	0	5,400
2060 (D)	3,400	55	0	3,500
2061 (C)	4,000	71	0	4,100
2062 (D)	3,100	58	0	3,200
2063 (BN)	4,000	93	0	4,100

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		5,300	88	0	5,400
2065 (BN)		3,200	52	0	3,300
2066 (D)		5,400	72	0	5,500
2067 (C)		3,400	54	0	3,500
2068 (C)		4,800	69	0	4,900
2069 (BN)		4,300	75	0	4,400
2070 (W)		5,200	100	0	5,300
2071 (BN)		2,900	54	0	3,000
2072 (W)		5,400	81	0	5,500
Average (2022-2072)		4,300	78	0	4,400
2022-2072	W	5,000	91	0	5,100
	AN	4,500	84	0	4,600
	BN	3,600	67	0	3,700
	D	4,000	70	0	4,100
	C	3,500	63	0	3,600

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

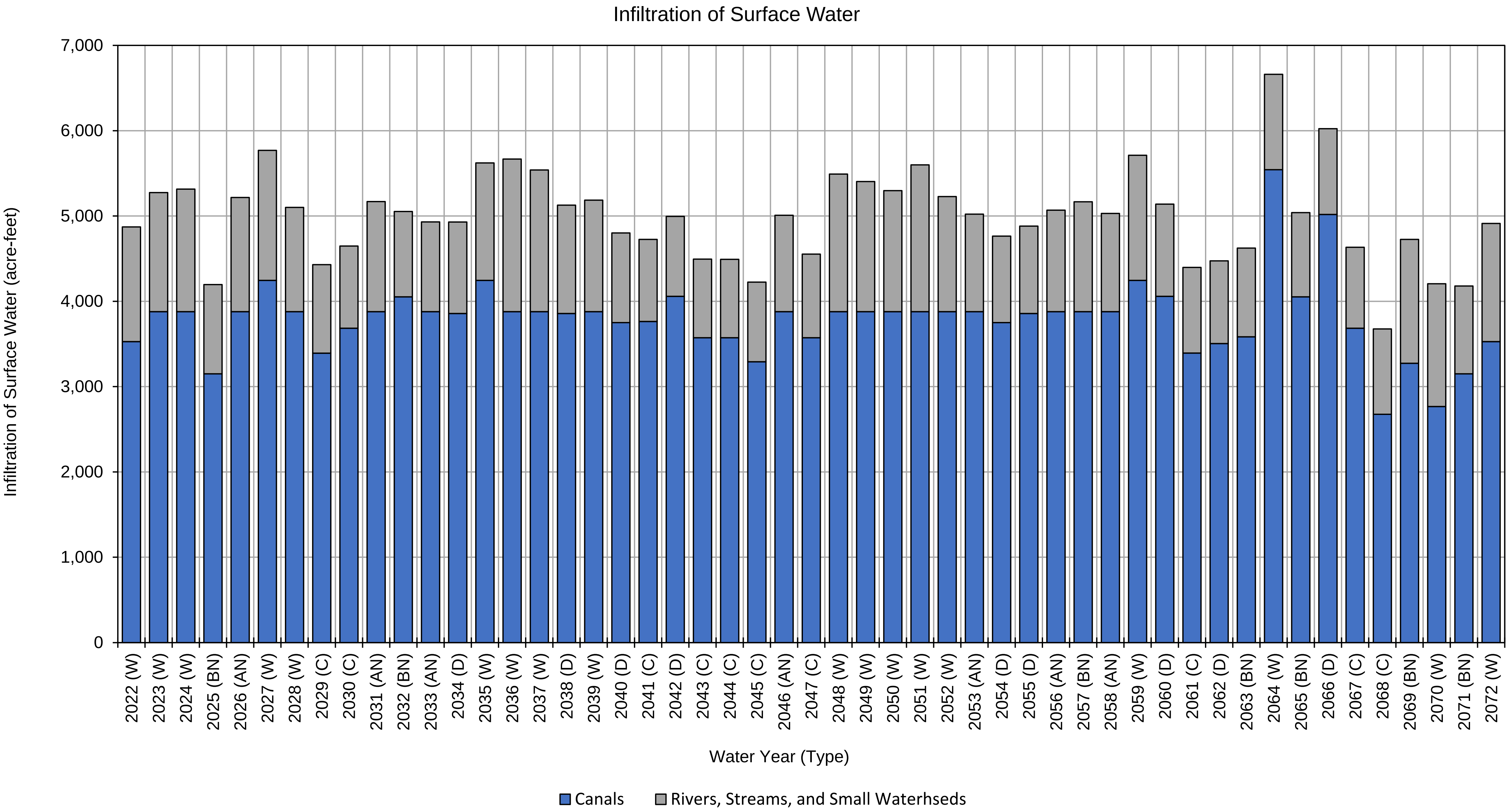
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	3,800	570	6,600	11,000
2023 (W)	3,200	530	6,200	9,900
2024 (W)	3,300	530	6,200	10,000
2025 (BN)	1,300	150	1,300	2,800
2026 (AN)	2,900	490	5,800	9,200
2027 (W)	3,600	590	6,800	11,000
2028 (W)	2,000	350	3,300	5,700
2029 (C)	1,300	200	2,400	3,900
2030 (C)	1,000	140	1,200	2,300
2031 (AN)	3,100	500	5,800	9,400
2032 (BN)	1,300	160	1,500	3,000
2033 (AN)	2,700	420	4,200	7,300
2034 (D)	2,000	290	3,100	5,400
2035 (W)	3,500	580	6,600	11,000
2036 (W)	5,100	840	9,200	15,000
2037 (W)	3,300	530	6,200	10,000
2038 (D)	2,100	290	3,100	5,500
2039 (W)	3,000	520	6,000	9,500
2040 (D)	1,800	260	2,700	4,800
2041 (C)	1,400	180	1,500	3,100
2042 (D)	1,500	160	1,500	3,200
2043 (C)	1,800	210	2,100	4,100
2044 (C)	1,600	210	2,000	3,800
2045 (C)	1,600	230	2,400	4,200
2046 (AN)	2,900	490	5,700	9,100
2047 (C)	1,700	210	2,100	4,000
2048 (W)	3,800	660	7,600	12,000
2049 (W)	3,100	520	6,000	9,600
2050 (W)	2,500	390	4,600	7,500
2051 (W)	5,100	830	9,100	15,000
2052 (W)	2,100	350	3,400	5,900
2053 (AN)	2,700	420	4,300	7,400
2054 (D)	1,800	260	2,700	4,800
2055 (D)	2,000	290	3,000	5,300
2056 (AN)	2,900	480	5,500	8,900
2057 (BN)	2,500	440	5,100	8,000
2058 (AN)	3,100	440	4,700	8,200
2059 (W)	3,600	590	6,800	11,000
2060 (D)	1,500	160	1,500	3,200
2061 (C)	1,400	210	2,400	4,000
2062 (D)	1,300	180	1,800	3,300
2063 (BN)	2,500	440	4,500	7,400

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		3,300	360	3,700	7,400
2065 (BN)		1,600	160	1,500	3,300
2066 (D)		1,700	210	2,200	4,100
2067 (C)		1,100	140	1,200	2,400
2068 (C)		1,900	270	3,100	5,300
2069 (BN)		2,300	370	4,000	6,700
2070 (W)		3,300	590	6,300	10,000
2071 (BN)		1,300	140	1,300	2,700
2072 (W)		3,700	560	6,300	11,000
Average (2022-2072)		2,500	370	4,100	7,000
2022-2072	W	3,400	550	6,200	10,000
	AN	2,900	460	5,100	8,500
	BN	1,800	260	2,800	4,900
	D	1,800	230	2,400	4,400
	C	1,500	200	2,000	3,700

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

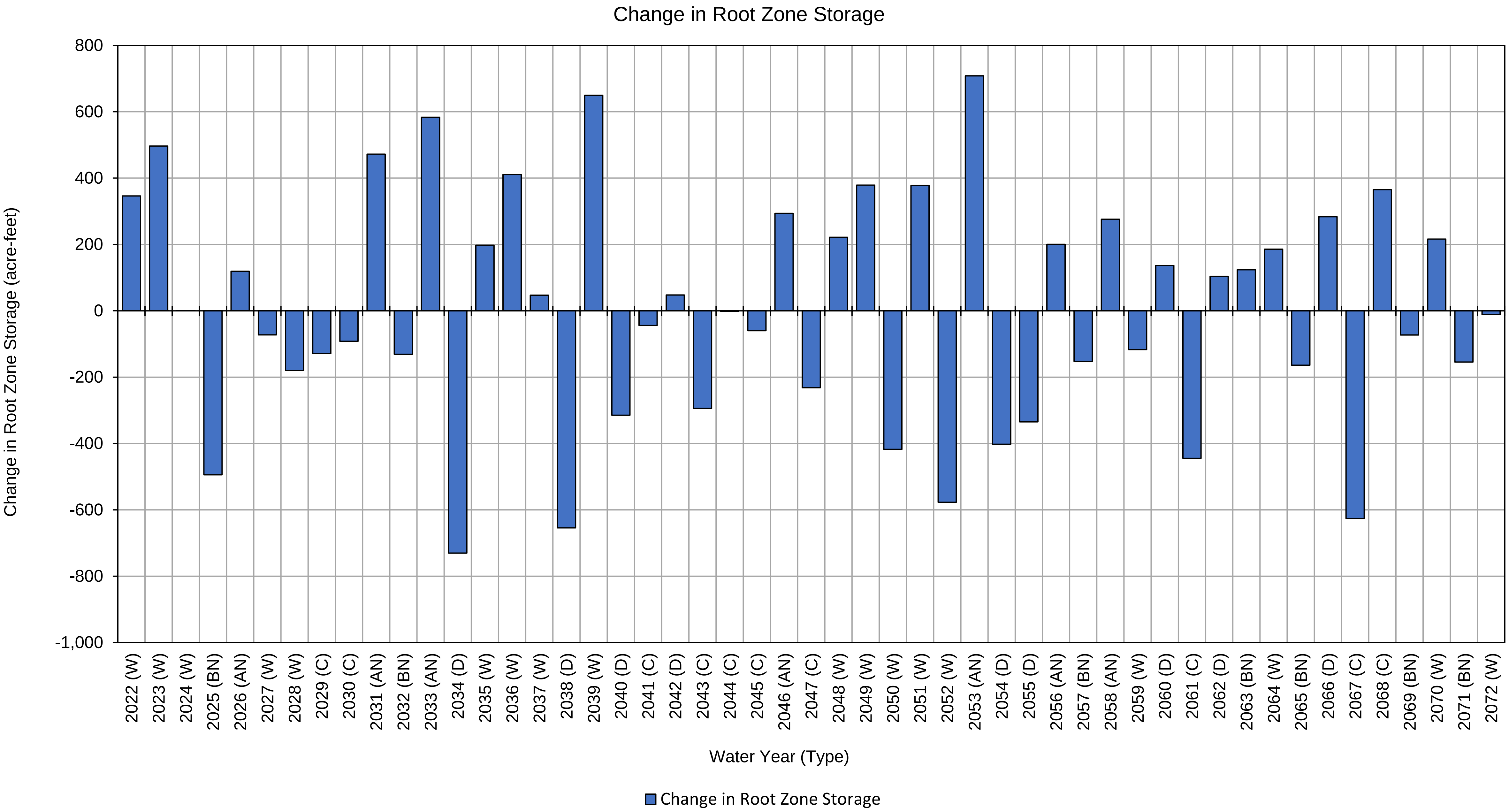
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	3,500	1,300	4,800
2023 (W)	3,900	1,400	5,300
2024 (W)	3,900	1,400	5,300
2025 (BN)	3,200	1,000	4,200
2026 (AN)	3,900	1,300	5,200
2027 (W)	4,200	1,500	5,700
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	960	4,700
2031 (AN)	3,900	1,300	5,200
2032 (BN)	4,100	1,000	5,100
2033 (AN)	3,900	1,100	5,000
2034 (D)	3,900	1,100	5,000
2035 (W)	4,200	1,400	5,600
2036 (W)	3,900	1,800	5,700
2037 (W)	3,900	1,700	5,600
2038 (D)	3,900	1,300	5,200
2039 (W)	3,900	1,300	5,200
2040 (D)	3,800	1,100	4,900
2041 (C)	3,800	960	4,800
2042 (D)	4,100	940	5,000
2043 (C)	3,600	920	4,500
2044 (C)	3,600	920	4,500
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,100	5,000
2047 (C)	3,600	980	4,600
2048 (W)	3,900	1,600	5,500
2049 (W)	3,900	1,500	5,400
2050 (W)	3,900	1,400	5,300
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,300	5,200
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,800	1,000	4,800
2055 (D)	3,900	1,000	4,900
2056 (AN)	3,900	1,200	5,100
2057 (BN)	3,900	1,300	5,200
2058 (AN)	3,900	1,200	5,100
2059 (W)	4,200	1,500	5,700
2060 (D)	4,100	1,100	5,200
2061 (C)	3,400	1,000	4,400
2062 (D)	3,500	970	4,500
2063 (BN)	3,600	1,000	4,600

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		5,500	1,100	6,600
2065 (BN)		4,100	990	5,100
2066 (D)		5,000	1,000	6,000
2067 (C)		3,700	950	4,700
2068 (C)		2,700	1,000	3,700
2069 (BN)		3,300	1,500	4,800
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,400	4,900
Average (2022-2072)		3,800	1,200	5,000
2022-2072	W	3,900	1,400	5,300
	AN	3,900	1,200	5,100
	BN	3,600	1,100	4,700
	D	4,000	1,000	5,000
	C	3,500	970	4,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	350
2023 (W)	500
2024 (W)	1
2025 (BN)	-490
2026 (AN)	120
2027 (W)	-73
2028 (W)	-180
2029 (C)	-130
2030 (C)	-92
2031 (AN)	470
2032 (BN)	-130
2033 (AN)	580
2034 (D)	-730
2035 (W)	200
2036 (W)	410
2037 (W)	47
2038 (D)	-650
2039 (W)	650
2040 (D)	-310
2041 (C)	-44
2042 (D)	48
2043 (C)	-290
2044 (C)	-1
2045 (C)	-60
2046 (AN)	290
2047 (C)	-230
2048 (W)	220
2049 (W)	380
2050 (W)	-420
2051 (W)	380
2052 (W)	-580
2053 (AN)	710
2054 (D)	-400
2055 (D)	-330
2056 (AN)	200
2057 (BN)	-150
2058 (AN)	280
2059 (W)	-120
2060 (D)	140
2061 (C)	-440
2062 (D)	100
2063 (BN)	120

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		190
2065 (BN)		-160
2066 (D)		280
2067 (C)		-630
2068 (C)		370
2069 (BN)		-73
2070 (W)		220
2071 (BN)		-150
2072 (W)		-12
Average (2022-2072)		7
2022-2072	W	120
	AN	380
	BN	-150
	D	-210
	C	-160

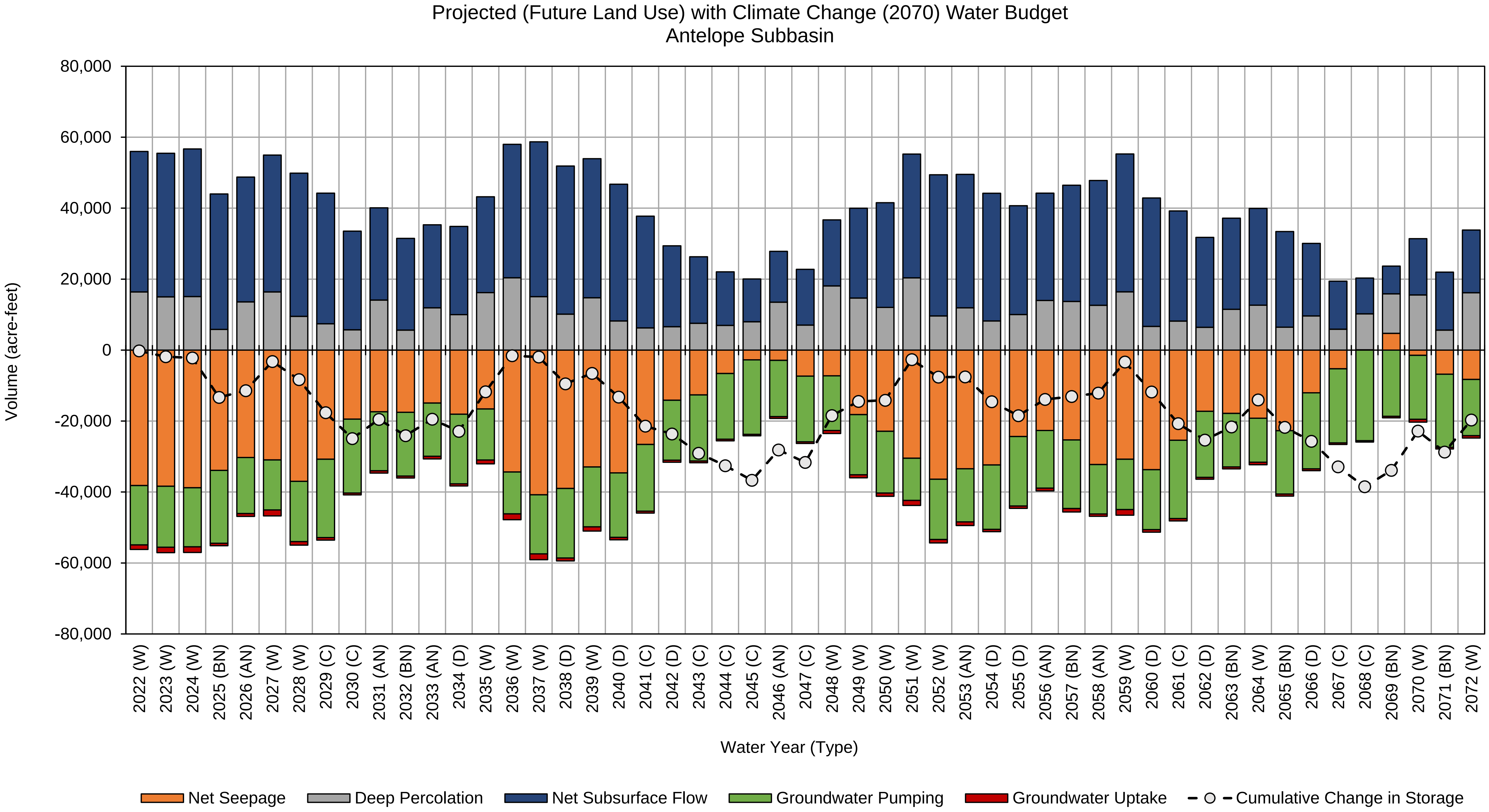
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-7b

Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results – Groundwater System



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

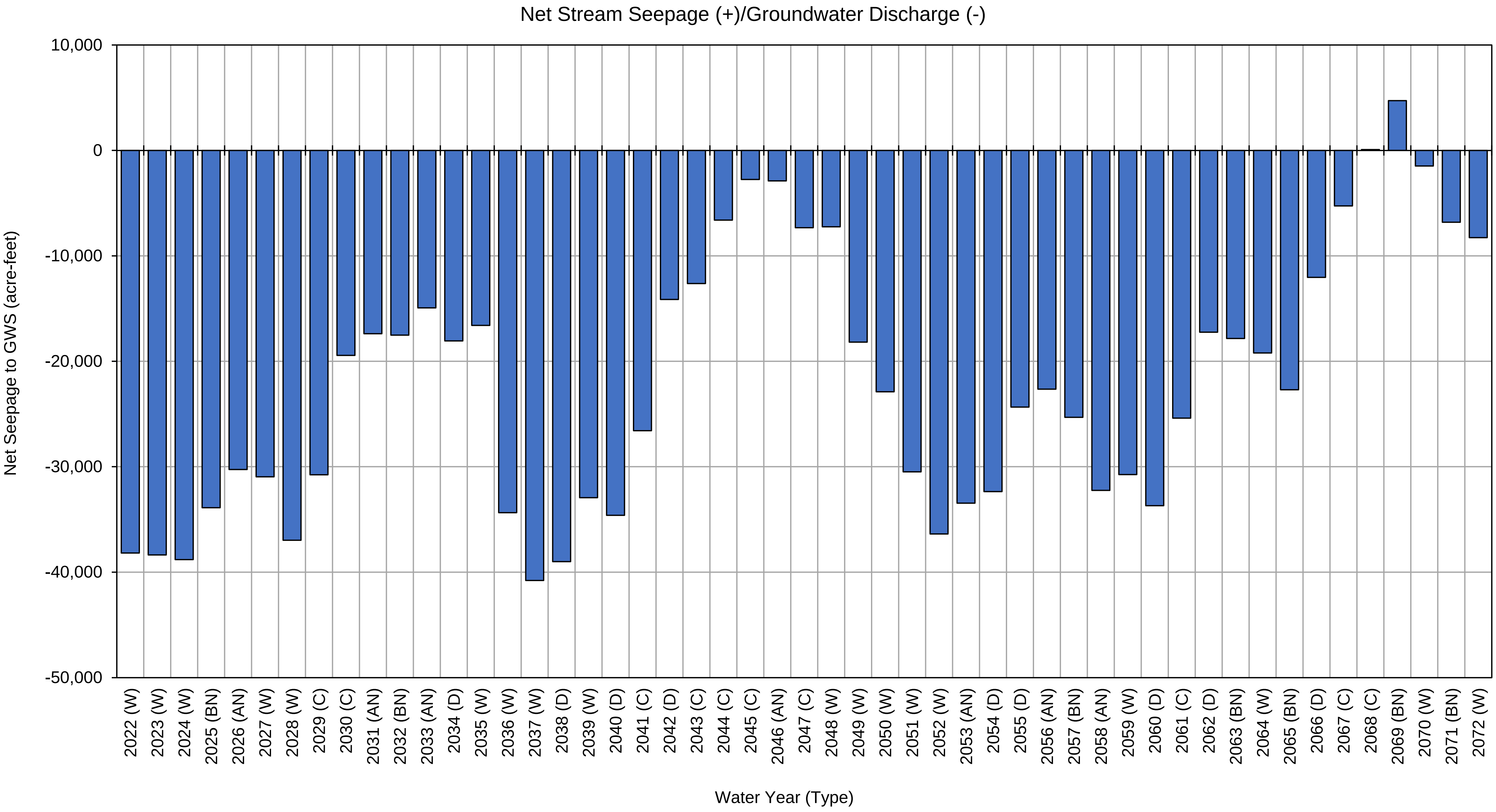
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-38,000	16,000	-17,000	-1,300	40,000	-230	-230
2023 (W)	-38,000	15,000	-17,000	-1,500	40,000	-1,600	-1,900
2024 (W)	-39,000	15,000	-17,000	-1,600	42,000	-320	-2,200
2025 (BN)	-34,000	5,800	-21,000	-670	38,000	-11,000	-13,000
2026 (AN)	-30,000	14,000	-16,000	-810	35,000	1,900	-11,000
2027 (W)	-31,000	16,000	-14,000	-1,700	39,000	8,200	-3,200
2028 (W)	-37,000	9,500	-17,000	-980	40,000	-5,100	-8,300
2029 (C)	-31,000	7,400	-22,000	-680	37,000	-9,300	-18,000
2030 (C)	-19,000	5,700	-21,000	-520	28,000	-7,300	-25,000
2031 (AN)	-17,000	14,000	-17,000	-650	26,000	5,400	-20,000
2032 (BN)	-18,000	5,600	-18,000	-550	26,000	-4,600	-24,000
2033 (AN)	-15,000	12,000	-15,000	-750	23,000	4,600	-19,000
2034 (D)	-18,000	10,000	-20,000	-590	25,000	-3,400	-23,000
2035 (W)	-17,000	16,000	-14,000	-1,100	27,000	11,000	-12,000
2036 (W)	-34,000	20,000	-12,000	-1,700	38,000	10,000	-1,600
2037 (W)	-41,000	15,000	-17,000	-1,600	44,000	-380	-2,000
2038 (D)	-39,000	10,000	-20,000	-820	42,000	-7,500	-9,500
2039 (W)	-33,000	15,000	-17,000	-1,200	39,000	2,900	-6,500
2040 (D)	-35,000	8,200	-18,000	-680	39,000	-6,700	-13,000
2041 (C)	-27,000	6,200	-19,000	-530	31,000	-8,200	-21,000
2042 (D)	-14,000	6,600	-17,000	-560	23,000	-2,200	-24,000
2043 (C)	-13,000	7,600	-19,000	-480	19,000	-5,400	-29,000
2044 (C)	-6,600	7,000	-19,000	-440	15,000	-3,500	-33,000
2045 (C)	-2,800	8,000	-21,000	-400	12,000	-4,100	-37,000
2046 (AN)	-2,900	13,000	-16,000	-530	14,000	8,600	-28,000
2047 (C)	-7,300	7,000	-19,000	-450	16,000	-3,500	-32,000
2048 (W)	-7,200	18,000	-15,000	-830	19,000	13,000	-18,000
2049 (W)	-18,000	15,000	-17,000	-860	25,000	4,000	-14,000
2050 (W)	-23,000	12,000	-17,000	-920	30,000	330	-14,000
2051 (W)	-30,000	20,000	-12,000	-1,400	35,000	11,000	-2,700
2052 (W)	-36,000	9,600	-17,000	-960	40,000	-4,900	-7,600
2053 (AN)	-33,000	12,000	-15,000	-1,000	38,000	60	-7,600
2054 (D)	-32,000	8,200	-18,000	-650	36,000	-7,000	-15,000
2055 (D)	-24,000	10,000	-20,000	-650	31,000	-3,900	-18,000
2056 (AN)	-23,000	14,000	-16,000	-750	30,000	4,600	-14,000
2057 (BN)	-25,000	14,000	-19,000	-960	33,000	830	-13,000
2058 (AN)	-32,000	13,000	-14,000	-640	35,000	970	-12,000
2059 (W)	-31,000	16,000	-14,000	-1,600	39,000	8,700	-3,400
2060 (D)	-34,000	6,700	-17,000	-710	36,000	-8,400	-12,000
2061 (C)	-25,000	8,200	-22,000	-640	31,000	-8,900	-21,000
2062 (D)	-17,000	6,400	-19,000	-510	25,000	-4,600	-25,000
2063 (BN)	-18,000	12,000	-15,000	-530	26,000	3,700	-22,000
2064 (W)	-19,000	13,000	-12,000	-700	27,000	7,600	-14,000
2065 (BN)	-23,000	6,500	-18,000	-570	27,000	-7,800	-22,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-12,000	9,600	-21,000	-520	20,000	-3,900	-26,000
2067 (C)		-5,300	5,900	-21,000	-440	14,000	-7,200	-33,000
2068 (C)		81	10,000	-26,000	-370	10,000	-5,600	-38,000
2069 (BN)		4,700	11,000	-19,000	-420	7,800	4,600	-34,000
2070 (W)		-1,500	16,000	-18,000	-800	16,000	11,000	-23,000
2071 (BN)		-6,800	5,600	-21,000	-470	16,000	-5,900	-29,000
2072 (W)		-8,300	16,000	-16,000	-660	18,000	9,000	-20,000
Average (2022-2072)		-22,000	11,000	-18,000	-810	29,000	-390	
2022-2072	W	-27,000	15,000	-16,000	-1,200	33,000		
	AN	-22,000	13,000	-15,000	-740	29,000		
	BN	-17,000	8,600	-19,000	-600	25,000		
	D	-25,000	8,400	-19,000	-630	31,000		
	C	-14,000	7,300	-21,000	-500	21,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

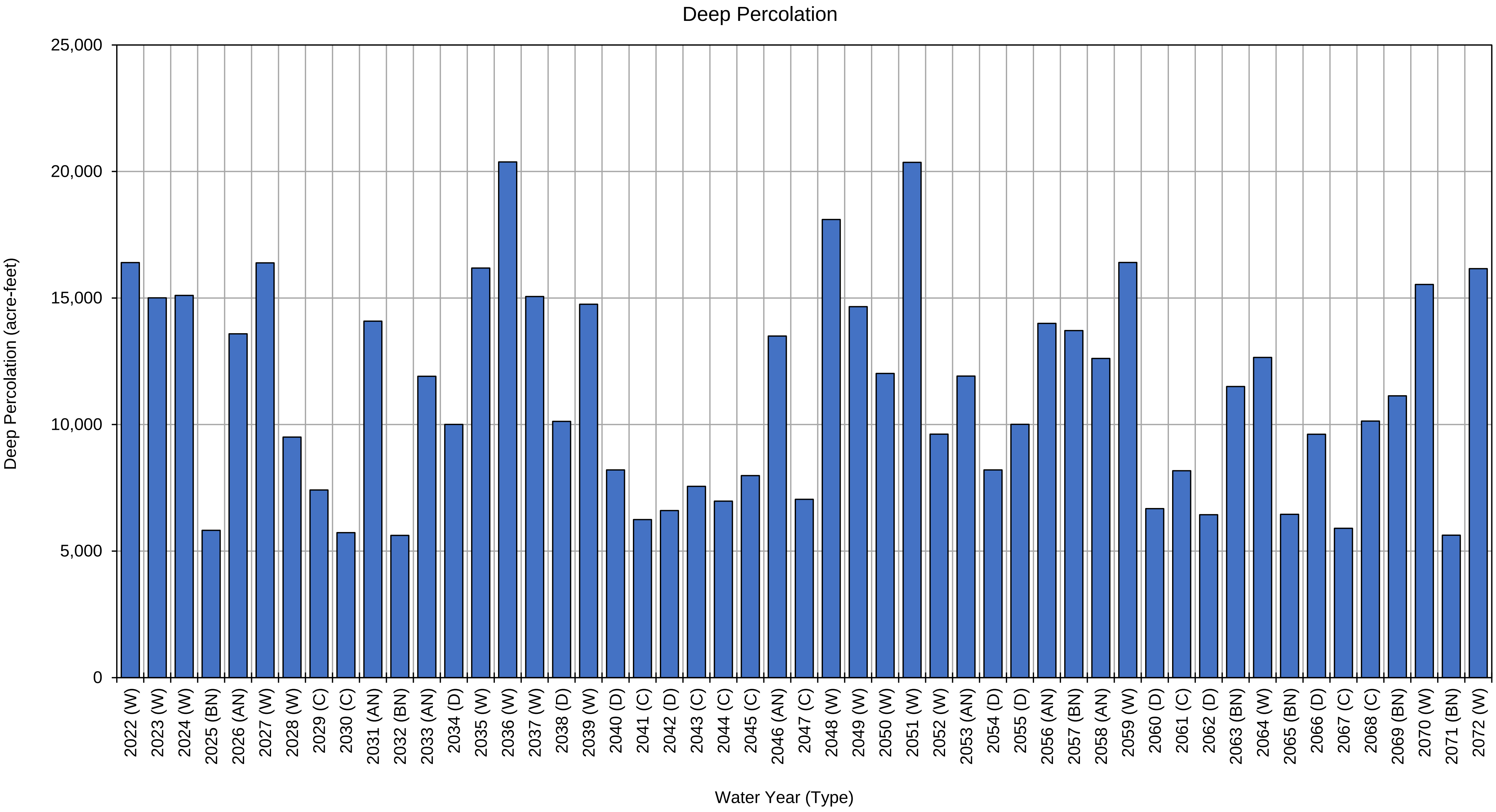
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-38,000
2023 (W)	-38,000
2024 (W)	-39,000
2025 (BN)	-34,000
2026 (AN)	-30,000
2027 (W)	-31,000
2028 (W)	-37,000
2029 (C)	-31,000
2030 (C)	-19,000
2031 (AN)	-17,000
2032 (BN)	-18,000
2033 (AN)	-15,000
2034 (D)	-18,000
2035 (W)	-17,000
2036 (W)	-34,000
2037 (W)	-41,000
2038 (D)	-39,000
2039 (W)	-33,000
2040 (D)	-35,000
2041 (C)	-27,000
2042 (D)	-14,000
2043 (C)	-13,000
2044 (C)	-6,600
2045 (C)	-2,800
2046 (AN)	-2,900
2047 (C)	-7,300
2048 (W)	-7,200
2049 (W)	-18,000
2050 (W)	-23,000
2051 (W)	-30,000
2052 (W)	-36,000
2053 (AN)	-33,000
2054 (D)	-32,000
2055 (D)	-24,000
2056 (AN)	-23,000
2057 (BN)	-25,000
2058 (AN)	-32,000
2059 (W)	-31,000
2060 (D)	-34,000
2061 (C)	-25,000
2062 (D)	-17,000
2063 (BN)	-18,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-19,000
2065 (BN)		-23,000
2066 (D)		-12,000
2067 (C)		-5,300
2068 (C)		81
2069 (BN)		4,700
2070 (W)		-1,500
2071 (BN)		-6,800
2072 (W)		-8,300
Average (2022-2072)		-22,000
2022-2072	W	-27,000
	AN	-22,000
	BN	-17,000
	D	-25,000
	C	-14,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

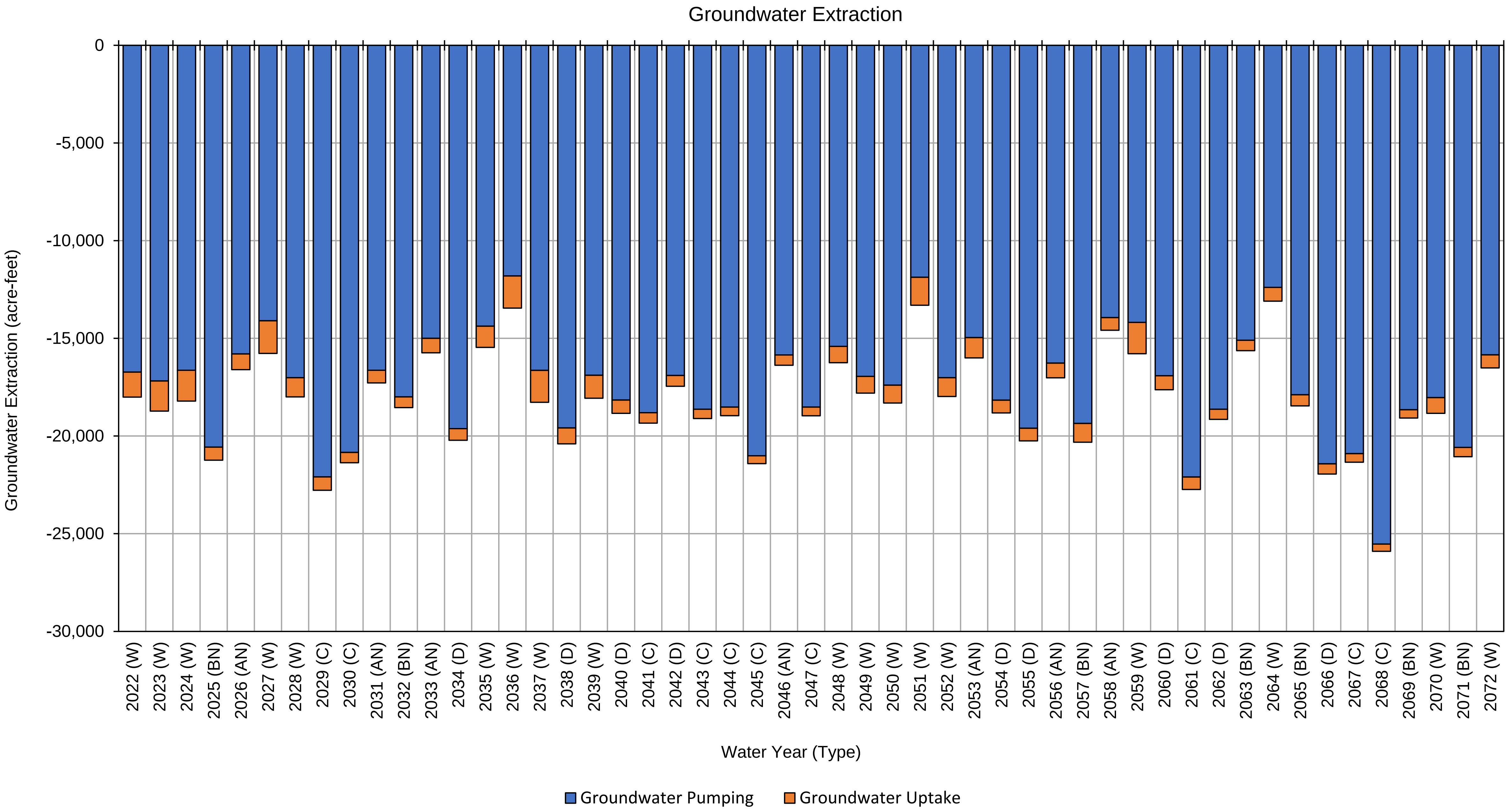
WY (Type)	Deep Percolation from the SWS
2022 (W)	16,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	5,800
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	9,500
2029 (C)	7,400
2030 (C)	5,700
2031 (AN)	14,000
2032 (BN)	5,600
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	20,000
2037 (W)	15,000
2038 (D)	10,000
2039 (W)	15,000
2040 (D)	8,200
2041 (C)	6,200
2042 (D)	6,600
2043 (C)	7,600
2044 (C)	7,000
2045 (C)	8,000
2046 (AN)	13,000
2047 (C)	7,000
2048 (W)	18,000
2049 (W)	15,000
2050 (W)	12,000
2051 (W)	20,000
2052 (W)	9,600
2053 (AN)	12,000
2054 (D)	8,200
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000
2060 (D)	6,700
2061 (C)	8,200
2062 (D)	6,400
2063 (BN)	12,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		13,000
2065 (BN)		6,500
2066 (D)		9,600
2067 (C)		5,900
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,600
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,600
	D	8,400
	C	7,300

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

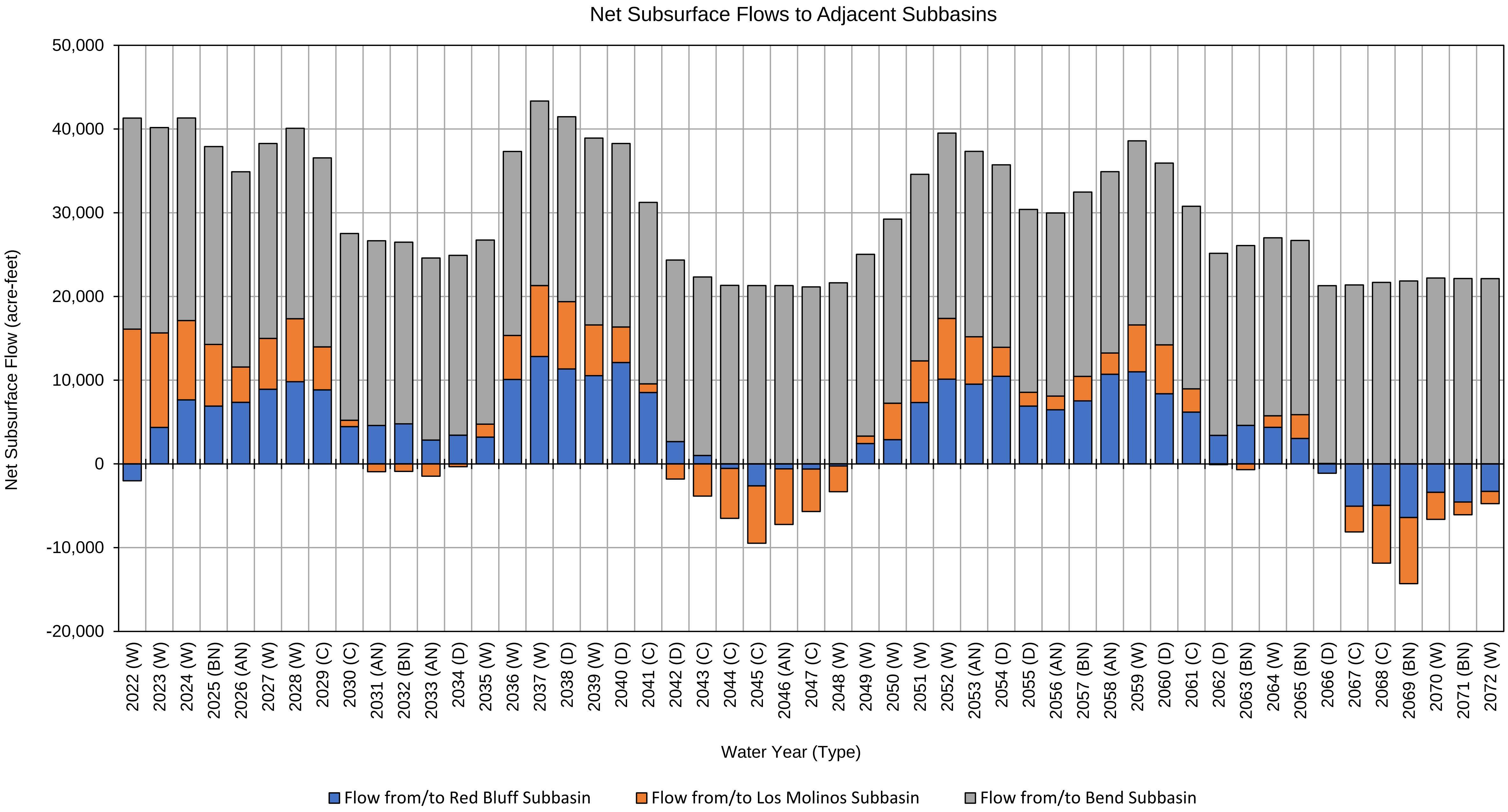
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-17,000	-1,300	-18,000
2023 (W)	-17,000	-1,500	-19,000
2024 (W)	-17,000	-1,600	-18,000
2025 (BN)	-21,000	-670	-21,000
2026 (AN)	-16,000	-810	-17,000
2027 (W)	-14,000	-1,700	-16,000
2028 (W)	-17,000	-980	-18,000
2029 (C)	-22,000	-680	-23,000
2030 (C)	-21,000	-520	-21,000
2031 (AN)	-17,000	-650	-17,000
2032 (BN)	-18,000	-550	-19,000
2033 (AN)	-15,000	-750	-16,000
2034 (D)	-20,000	-590	-20,000
2035 (W)	-14,000	-1,100	-15,000
2036 (W)	-12,000	-1,700	-13,000
2037 (W)	-17,000	-1,600	-18,000
2038 (D)	-20,000	-820	-20,000
2039 (W)	-17,000	-1,200	-18,000
2040 (D)	-18,000	-680	-19,000
2041 (C)	-19,000	-530	-19,000
2042 (D)	-17,000	-560	-17,000
2043 (C)	-19,000	-480	-19,000
2044 (C)	-19,000	-440	-19,000
2045 (C)	-21,000	-400	-21,000
2046 (AN)	-16,000	-530	-16,000
2047 (C)	-19,000	-450	-19,000
2048 (W)	-15,000	-830	-16,000
2049 (W)	-17,000	-860	-18,000
2050 (W)	-17,000	-920	-18,000
2051 (W)	-12,000	-1,400	-13,000
2052 (W)	-17,000	-960	-18,000
2053 (AN)	-15,000	-1,000	-16,000
2054 (D)	-18,000	-650	-19,000
2055 (D)	-20,000	-650	-20,000
2056 (AN)	-16,000	-750	-17,000
2057 (BN)	-19,000	-960	-20,000
2058 (AN)	-14,000	-640	-15,000
2059 (W)	-14,000	-1,600	-16,000
2060 (D)	-17,000	-710	-18,000
2061 (C)	-22,000	-640	-23,000
2062 (D)	-19,000	-510	-19,000
2063 (BN)	-15,000	-530	-16,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-12,000	-700	-13,000
2065 (BN)		-18,000	-570	-18,000
2066 (D)		-21,000	-520	-22,000
2067 (C)		-21,000	-440	-21,000
2068 (C)		-26,000	-370	-26,000
2069 (BN)		-19,000	-420	-19,000
2070 (W)		-18,000	-800	-19,000
2071 (BN)		-21,000	-470	-21,000
2072 (W)		-16,000	-660	-17,000
Average (2022-2072)		-18,000	-810	-18,000
2022-2072	W	-16,000	-1,200	-17,000
	AN	-15,000	-740	-16,000
	BN	-19,000	-600	-19,000
	D	-19,000	-630	-19,000
	C	-21,000	-500	-21,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

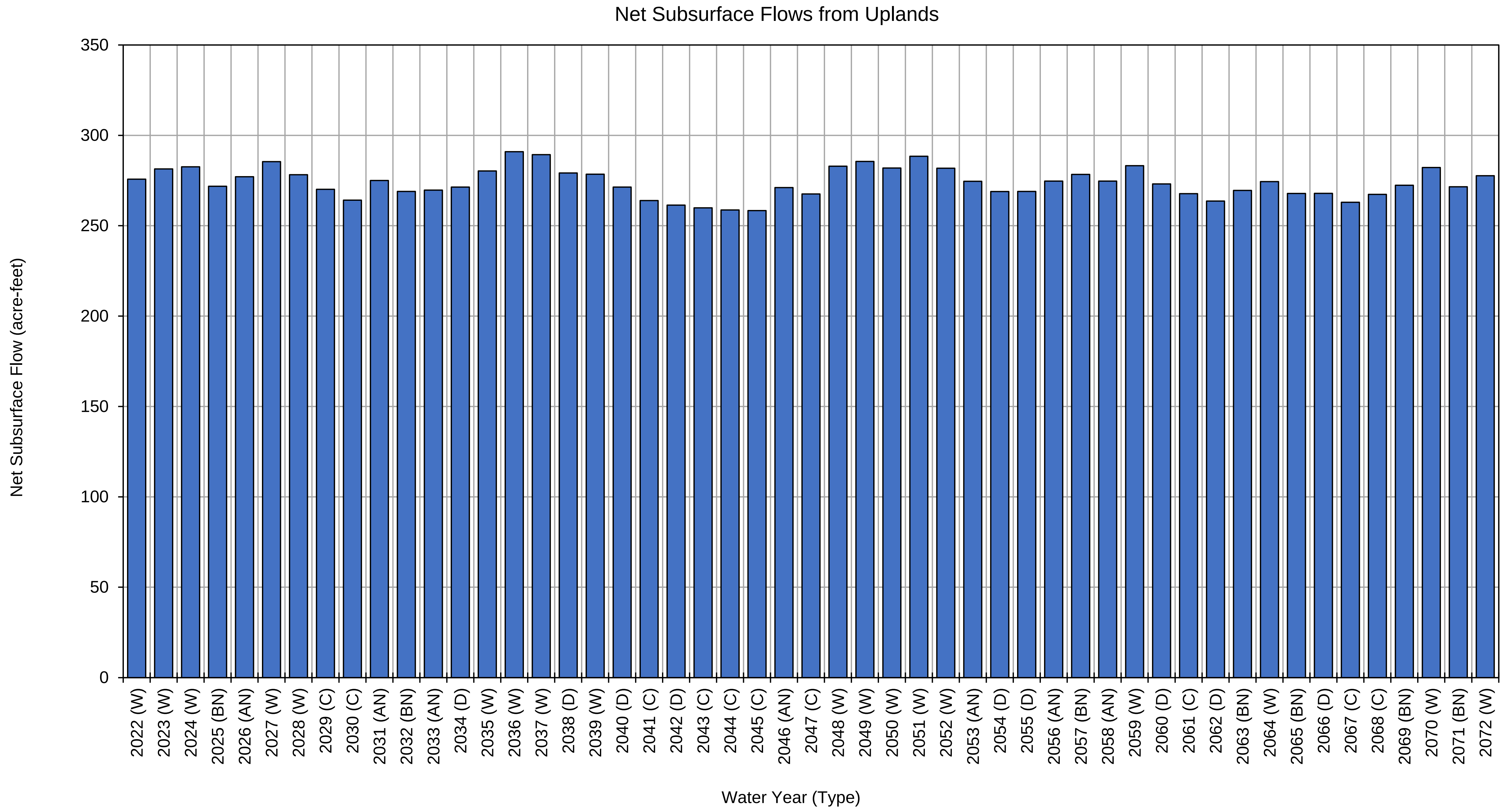
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-2,000	16,000	25,000	39,000
2023 (W)	4,400	11,000	25,000	40,000
2024 (W)	7,600	9,500	24,000	41,000
2025 (BN)	6,900	7,400	24,000	38,000
2026 (AN)	7,400	4,200	23,000	35,000
2027 (W)	8,900	6,100	23,000	38,000
2028 (W)	9,800	7,500	23,000	40,000
2029 (C)	8,800	5,100	23,000	37,000
2030 (C)	4,500	760	22,000	28,000
2031 (AN)	4,600	-930	22,000	26,000
2032 (BN)	4,800	-900	22,000	26,000
2033 (AN)	2,900	-1,500	22,000	23,000
2034 (D)	3,400	-330	21,000	25,000
2035 (W)	3,200	1,600	22,000	27,000
2036 (W)	10,000	5,300	22,000	37,000
2037 (W)	13,000	8,500	22,000	43,000
2038 (D)	11,000	8,000	22,000	41,000
2039 (W)	11,000	6,100	22,000	39,000
2040 (D)	12,000	4,200	22,000	38,000
2041 (C)	8,500	1,000	22,000	31,000
2042 (D)	2,700	-1,800	22,000	23,000
2043 (C)	1,000	-3,800	21,000	18,000
2044 (C)	-550	-6,000	21,000	15,000
2045 (C)	-2,600	-6,900	21,000	12,000
2046 (AN)	-590	-6,600	21,000	14,000
2047 (C)	-620	-5,100	21,000	15,000
2048 (W)	-250	-3,100	22,000	18,000
2049 (W)	2,400	890	22,000	25,000
2050 (W)	2,900	4,400	22,000	29,000
2051 (W)	7,300	5,000	22,000	35,000
2052 (W)	10,000	7,200	22,000	40,000
2053 (AN)	9,500	5,700	22,000	37,000
2054 (D)	10,000	3,500	22,000	36,000
2055 (D)	6,900	1,600	22,000	30,000
2056 (AN)	6,500	1,600	22,000	30,000
2057 (BN)	7,500	2,900	22,000	32,000
2058 (AN)	11,000	2,500	22,000	35,000
2059 (W)	11,000	5,600	22,000	39,000
2060 (D)	8,400	5,800	22,000	36,000
2061 (C)	6,200	2,800	22,000	31,000
2062 (D)	3,400	-88	22,000	25,000
2063 (BN)	4,600	-690	21,000	25,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		4,400	1,400	21,000	27,000
2065 (BN)		3,000	2,800	21,000	27,000
2066 (D)		-1,100	58	21,000	20,000
2067 (C)		-5,100	-3,100	21,000	13,000
2068 (C)		-5,000	-6,900	22,000	9,800
2069 (BN)		-6,400	-7,900	22,000	7,500
2070 (W)		-3,400	-3,200	22,000	16,000
2071 (BN)		-4,500	-1,500	22,000	16,000
2072 (W)		-3,300	-1,500	22,000	17,000
Average (2022-2072)		4,400	1,900	22,000	28,000
2022-2072	W	5,400	4,900	23,000	33,000
	AN	5,800	720	22,000	29,000
	BN	2,300	300	22,000	25,000
	D	6,400	2,300	22,000	30,000
	C	1,500	-2,200	22,000	21,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

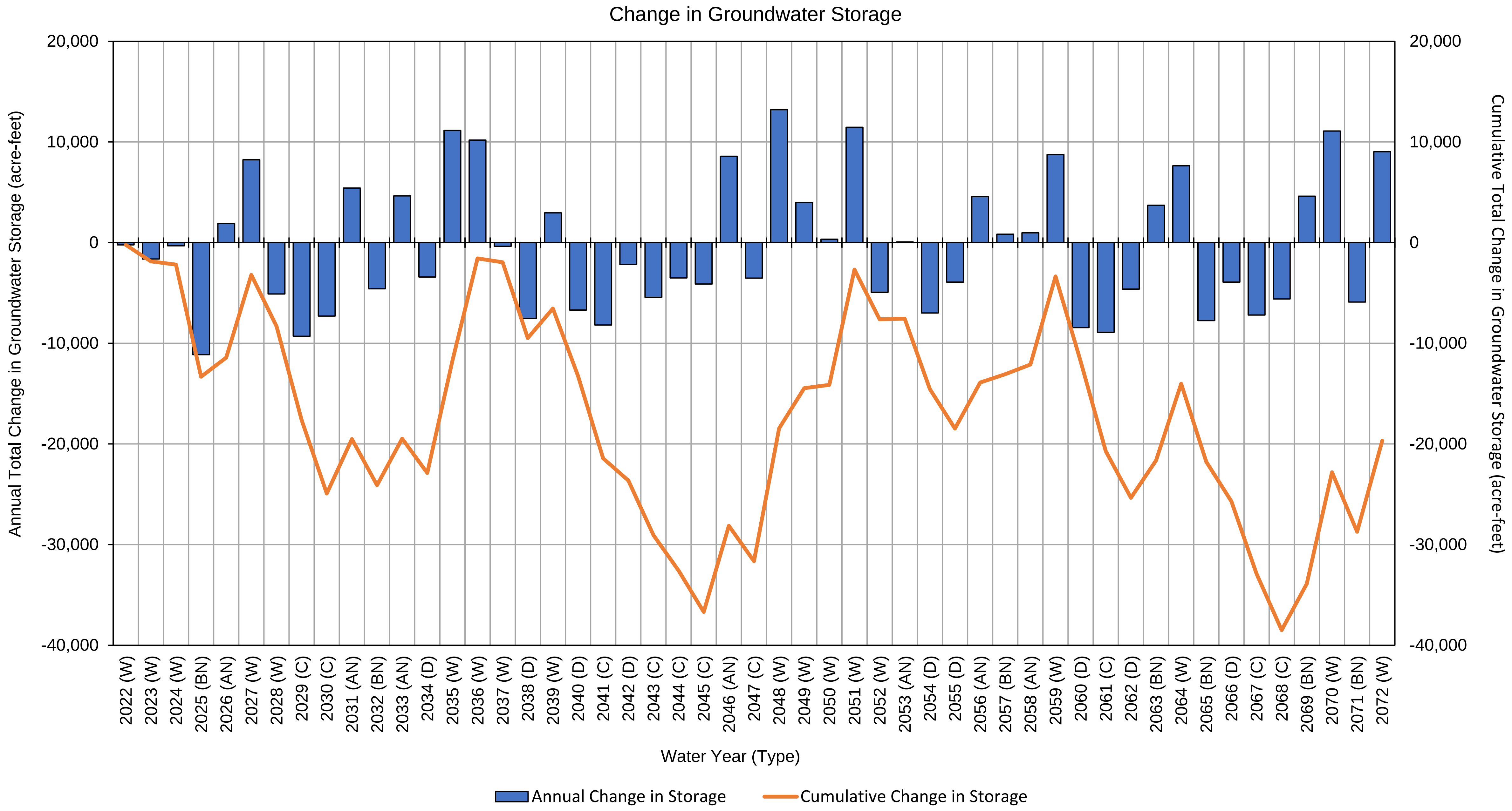
WY (Type)	Subsurface Flows from Uplands
2022 (W)	280
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	290
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	280
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	290
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280
2060 (D)	270
2061 (C)	270
2062 (D)	260
2063 (BN)	270

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-230	-230
2023 (W)	-1,600	-1,900
2024 (W)	-320	-2,200
2025 (BN)	-11,000	-13,000
2026 (AN)	1,900	-11,000
2027 (W)	8,200	-3,200
2028 (W)	-5,100	-8,300
2029 (C)	-9,300	-18,000
2030 (C)	-7,300	-25,000
2031 (AN)	5,400	-20,000
2032 (BN)	-4,600	-24,000
2033 (AN)	4,600	-19,000
2034 (D)	-3,400	-23,000
2035 (W)	11,000	-12,000
2036 (W)	10,000	-1,600
2037 (W)	-380	-2,000
2038 (D)	-7,500	-9,500
2039 (W)	2,900	-6,500
2040 (D)	-6,700	-13,000
2041 (C)	-8,200	-21,000
2042 (D)	-2,200	-24,000
2043 (C)	-5,400	-29,000
2044 (C)	-3,500	-33,000
2045 (C)	-4,100	-37,000
2046 (AN)	8,600	-28,000
2047 (C)	-3,500	-32,000
2048 (W)	13,000	-18,000
2049 (W)	4,000	-14,000
2050 (W)	330	-14,000
2051 (W)	11,000	-2,700
2052 (W)	-4,900	-7,600
2053 (AN)	60	-7,600
2054 (D)	-7,000	-15,000
2055 (D)	-3,900	-18,000
2056 (AN)	4,600	-14,000
2057 (BN)	830	-13,000
2058 (AN)	970	-12,000
2059 (W)	8,700	-3,400
2060 (D)	-8,400	-12,000
2061 (C)	-8,900	-21,000
2062 (D)	-4,600	-25,000
2063 (BN)	3,700	-22,000

Antelope Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		7,600	-14,000
2065 (BN)		-7,800	-22,000
2066 (D)		-3,900	-26,000
2067 (C)		-7,200	-33,000
2068 (C)		-5,600	-38,000
2069 (BN)		4,600	-34,000
2070 (W)		11,000	-23,000
2071 (BN)		-5,900	-29,000
2072 (W)		9,000	-20,000
Average (2022-2072)		-390	
2022-2072	W		
	AN		
	BN		
	D		
	C		

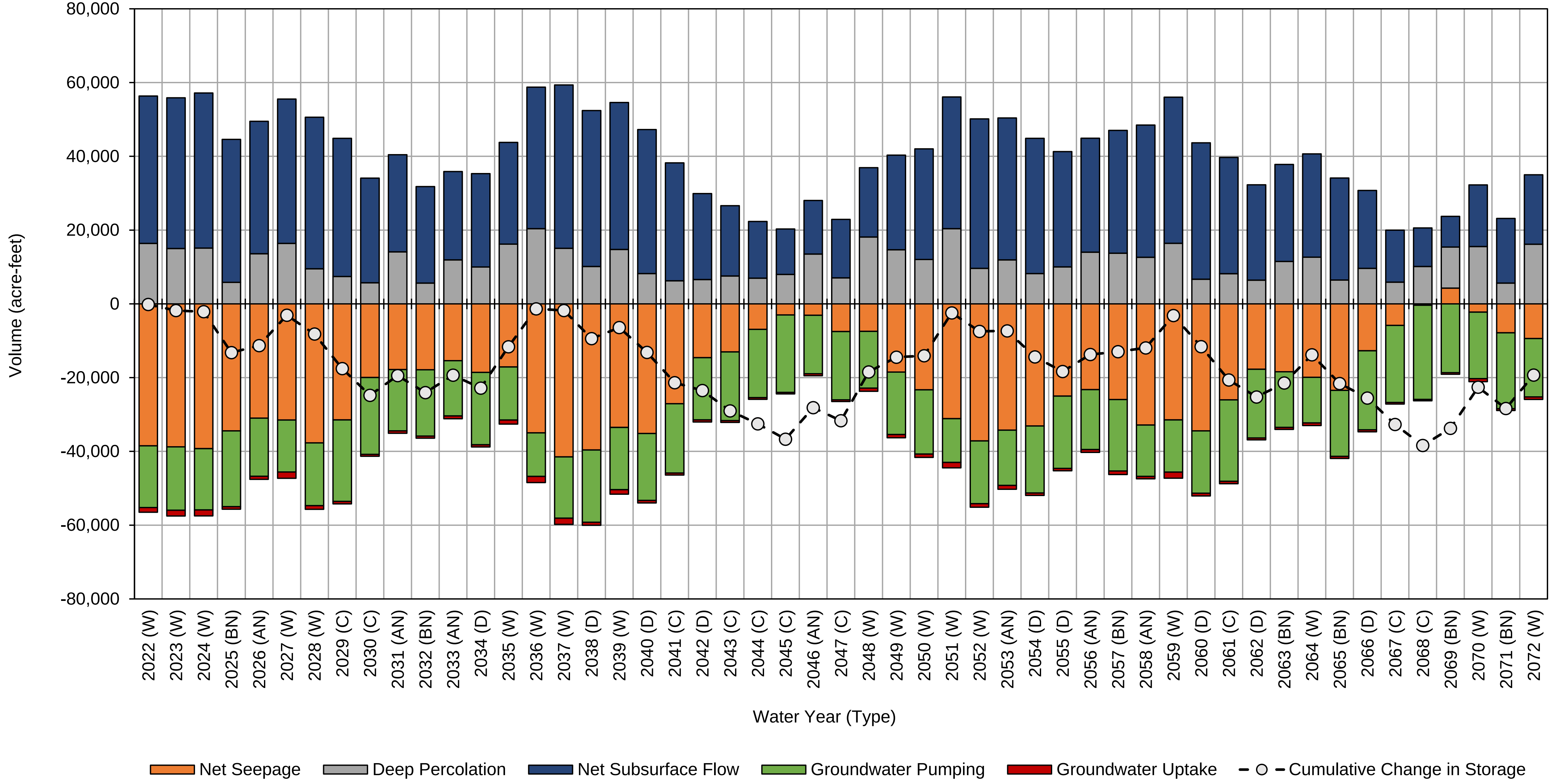
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX A-8

Detailed Antelope Subbasin Water Budget Results:

Projected (Future Land Use) with Projects and Climate Change (2070) Model Results



Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget
Antelope Subbasin

Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

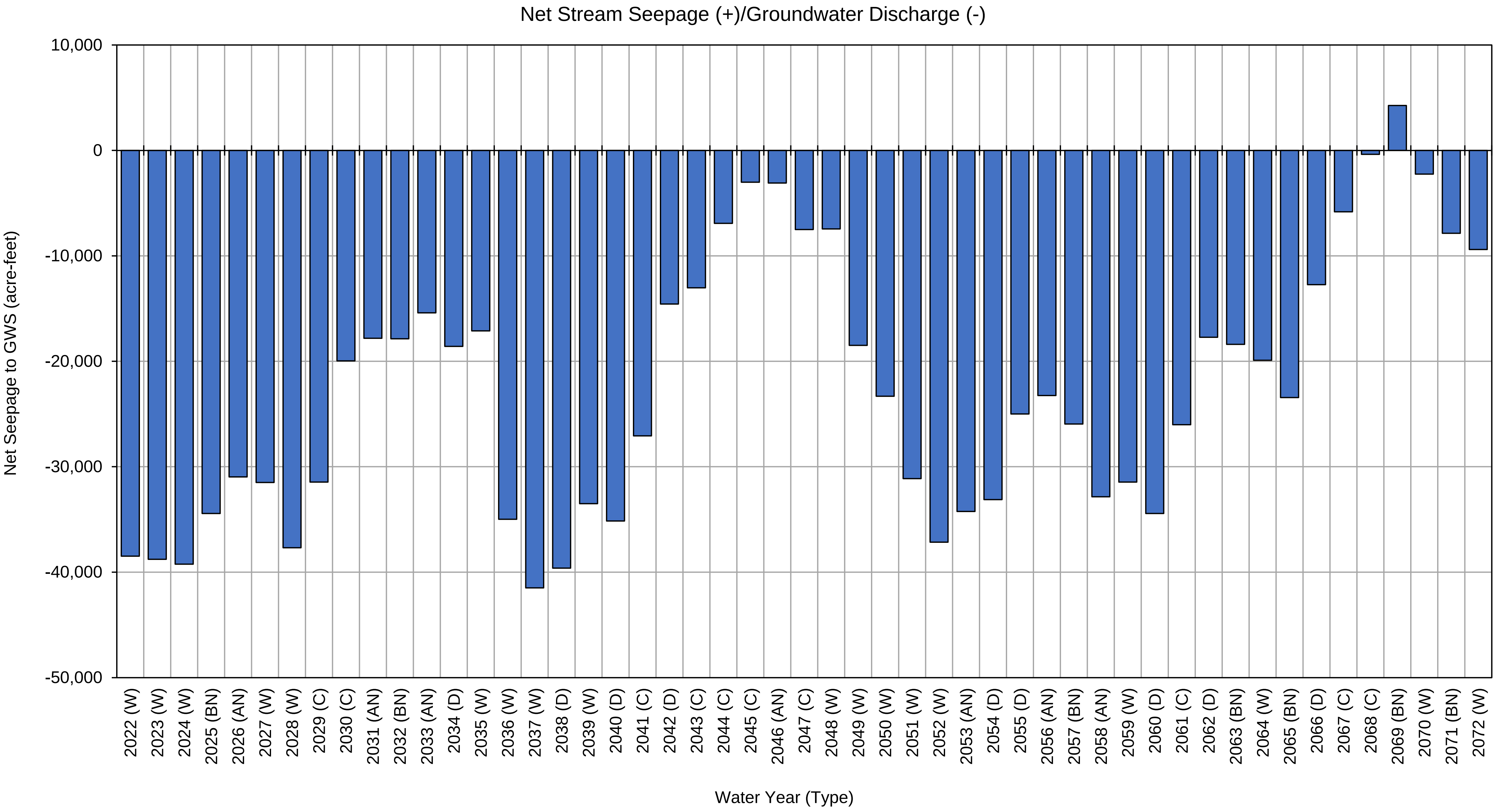
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-38,000	16,000	-17,000	-1,300	40,000	-160	-160
2023 (W)	-39,000	15,000	-17,000	-1,600	41,000	-1,700	-1,800
2024 (W)	-39,000	15,000	-17,000	-1,600	42,000	-320	-2,100
2025 (BN)	-34,000	5,800	-21,000	-680	39,000	-11,000	-13,000
2026 (AN)	-31,000	14,000	-16,000	-810	36,000	1,900	-11,000
2027 (W)	-32,000	16,000	-14,000	-1,700	39,000	8,200	-3,100
2028 (W)	-38,000	9,500	-17,000	-1,000	41,000	-5,100	-8,200
2029 (C)	-31,000	7,400	-22,000	-690	37,000	-9,400	-18,000
2030 (C)	-20,000	5,700	-21,000	-530	28,000	-7,200	-25,000
2031 (AN)	-18,000	14,000	-17,000	-650	26,000	5,300	-19,000
2032 (BN)	-18,000	5,600	-18,000	-550	26,000	-4,600	-24,000
2033 (AN)	-15,000	12,000	-15,000	-750	24,000	4,700	-19,000
2034 (D)	-19,000	10,000	-20,000	-600	25,000	-3,500	-23,000
2035 (W)	-17,000	16,000	-14,000	-1,100	28,000	11,000	-12,000
2036 (W)	-35,000	20,000	-12,000	-1,700	38,000	10,000	-1,300
2037 (W)	-41,000	15,000	-17,000	-1,700	44,000	-450	-1,800
2038 (D)	-40,000	10,000	-20,000	-830	42,000	-7,600	-9,400
2039 (W)	-34,000	15,000	-17,000	-1,200	40,000	3,000	-6,400
2040 (D)	-35,000	8,200	-18,000	-690	39,000	-6,700	-13,000
2041 (C)	-27,000	6,200	-19,000	-540	32,000	-8,200	-21,000
2042 (D)	-15,000	6,600	-17,000	-560	23,000	-2,100	-24,000
2043 (C)	-13,000	7,600	-19,000	-480	19,000	-5,500	-29,000
2044 (C)	-6,900	7,000	-19,000	-440	15,000	-3,500	-33,000
2045 (C)	-3,000	8,000	-21,000	-400	12,000	-4,100	-37,000
2046 (AN)	-3,100	13,000	-16,000	-530	15,000	8,600	-28,000
2047 (C)	-7,500	7,000	-19,000	-450	16,000	-3,600	-32,000
2048 (W)	-7,400	18,000	-15,000	-840	19,000	13,000	-18,000
2049 (W)	-18,000	15,000	-17,000	-860	26,000	4,000	-14,000
2050 (W)	-23,000	12,000	-17,000	-920	30,000	380	-14,000
2051 (W)	-31,000	20,000	-12,000	-1,500	36,000	12,000	-2,400
2052 (W)	-37,000	9,600	-17,000	-980	41,000	-5,000	-7,500
2053 (AN)	-34,000	12,000	-15,000	-1,100	38,000	140	-7,300
2054 (D)	-33,000	8,200	-18,000	-660	37,000	-7,100	-14,000
2055 (D)	-25,000	10,000	-20,000	-650	31,000	-4,000	-18,000
2056 (AN)	-23,000	14,000	-16,000	-760	31,000	4,600	-14,000
2057 (BN)	-26,000	14,000	-19,000	-970	33,000	760	-13,000
2058 (AN)	-33,000	13,000	-14,000	-650	36,000	1,000	-12,000
2059 (W)	-31,000	16,000	-14,000	-1,600	40,000	8,800	-3,200
2060 (D)	-34,000	6,700	-17,000	-720	37,000	-8,400	-12,000
2061 (C)	-26,000	8,200	-22,000	-640	32,000	-9,100	-21,000
2062 (D)	-18,000	6,400	-19,000	-520	26,000	-4,600	-25,000
2063 (BN)	-18,000	12,000	-15,000	-540	26,000	3,800	-21,000
2064 (W)	-20,000	13,000	-12,000	-710	28,000	7,700	-14,000
2065 (BN)	-23,000	6,500	-18,000	-570	28,000	-7,800	-22,000

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-13,000	9,600	-21,000	-530	21,000	-3,900	-26,000
2067 (C)		-5,800	5,900	-21,000	-440	14,000	-7,200	-33,000
2068 (C)		-370	10,000	-26,000	-370	10,000	-5,700	-38,000
2069 (BN)		4,300	11,000	-19,000	-420	8,300	4,600	-34,000
2070 (W)		-2,300	16,000	-18,000	-810	17,000	11,000	-23,000
2071 (BN)		-7,900	5,600	-21,000	-480	18,000	-5,800	-28,000
2072 (W)		-9,400	16,000	-16,000	-670	19,000	9,100	-19,000
Average (2022-2072)		-22,000	11,000	-18,000	-820	29,000	-380	
2022-2072	W	-27,000	15,000	-16,000	-1,200	34,000		
	AN	-23,000	13,000	-15,000	-740	29,000		
	BN	-18,000	8,600	-19,000	-600	25,000		
	D	-26,000	8,400	-19,000	-640	31,000		
	C	-14,000	7,300	-21,000	-500	22,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-38,000
2023 (W)	-39,000
2024 (W)	-39,000
2025 (BN)	-34,000
2026 (AN)	-31,000
2027 (W)	-32,000
2028 (W)	-38,000
2029 (C)	-31,000
2030 (C)	-20,000
2031 (AN)	-18,000
2032 (BN)	-18,000
2033 (AN)	-15,000
2034 (D)	-19,000
2035 (W)	-17,000
2036 (W)	-35,000
2037 (W)	-41,000
2038 (D)	-40,000
2039 (W)	-34,000
2040 (D)	-35,000
2041 (C)	-27,000
2042 (D)	-15,000
2043 (C)	-13,000
2044 (C)	-6,900
2045 (C)	-3,000
2046 (AN)	-3,100
2047 (C)	-7,500
2048 (W)	-7,400
2049 (W)	-18,000
2050 (W)	-23,000
2051 (W)	-31,000
2052 (W)	-37,000
2053 (AN)	-34,000
2054 (D)	-33,000
2055 (D)	-25,000
2056 (AN)	-23,000
2057 (BN)	-26,000
2058 (AN)	-33,000
2059 (W)	-31,000
2060 (D)	-34,000
2061 (C)	-26,000
2062 (D)	-18,000
2063 (BN)	-18,000

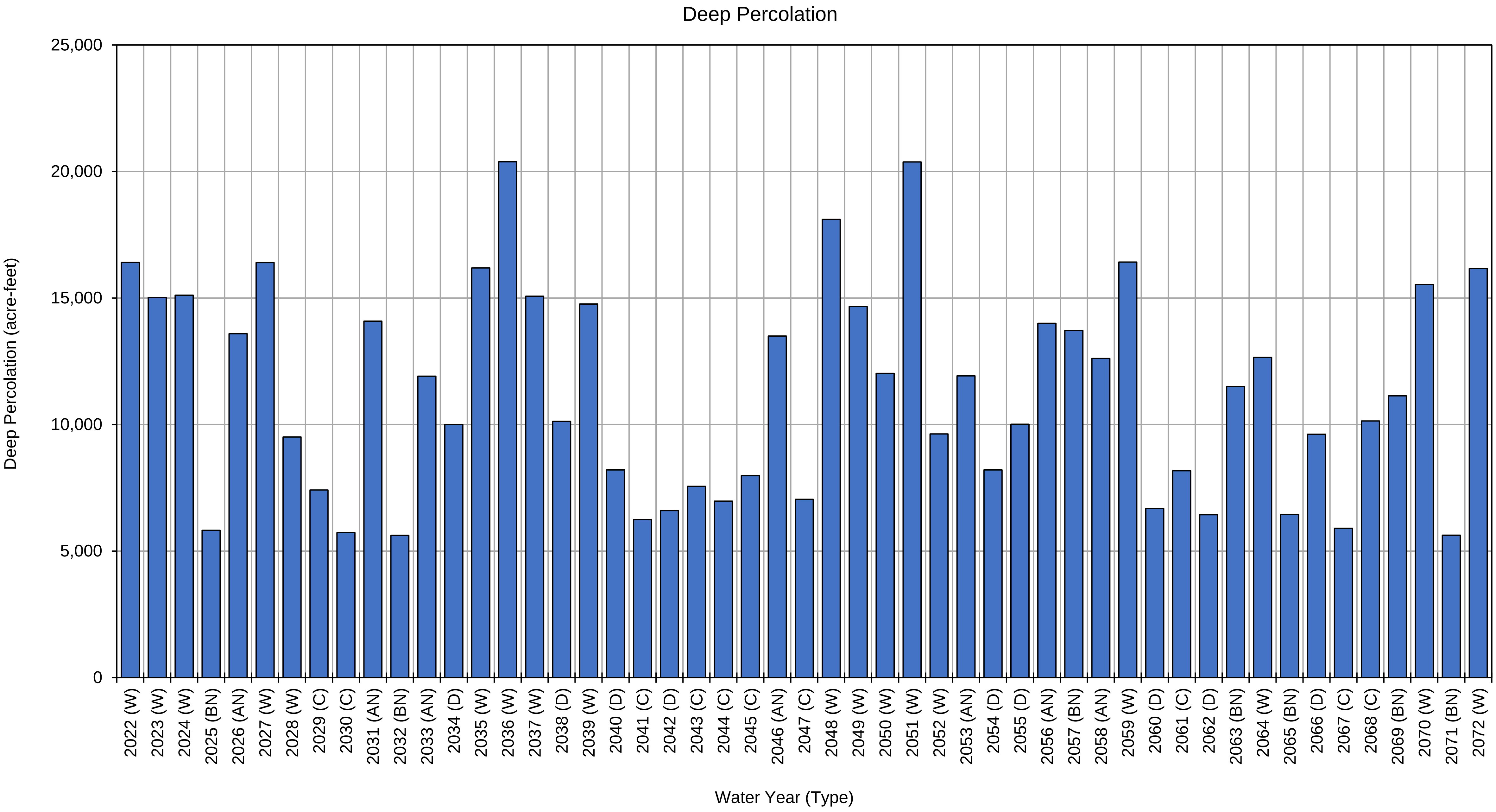
Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-20,000
2065 (BN)		-23,000
2066 (D)		-13,000
2067 (C)		-5,800
2068 (C)		-370
2069 (BN)		4,300
2070 (W)		-2,300
2071 (BN)		-7,900
2072 (W)		-9,400
Average (2022-2072)		-22,000
2022-2072	W	-27,000
	AN	-23,000
	BN	-18,000
	D	-26,000
	C	-14,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

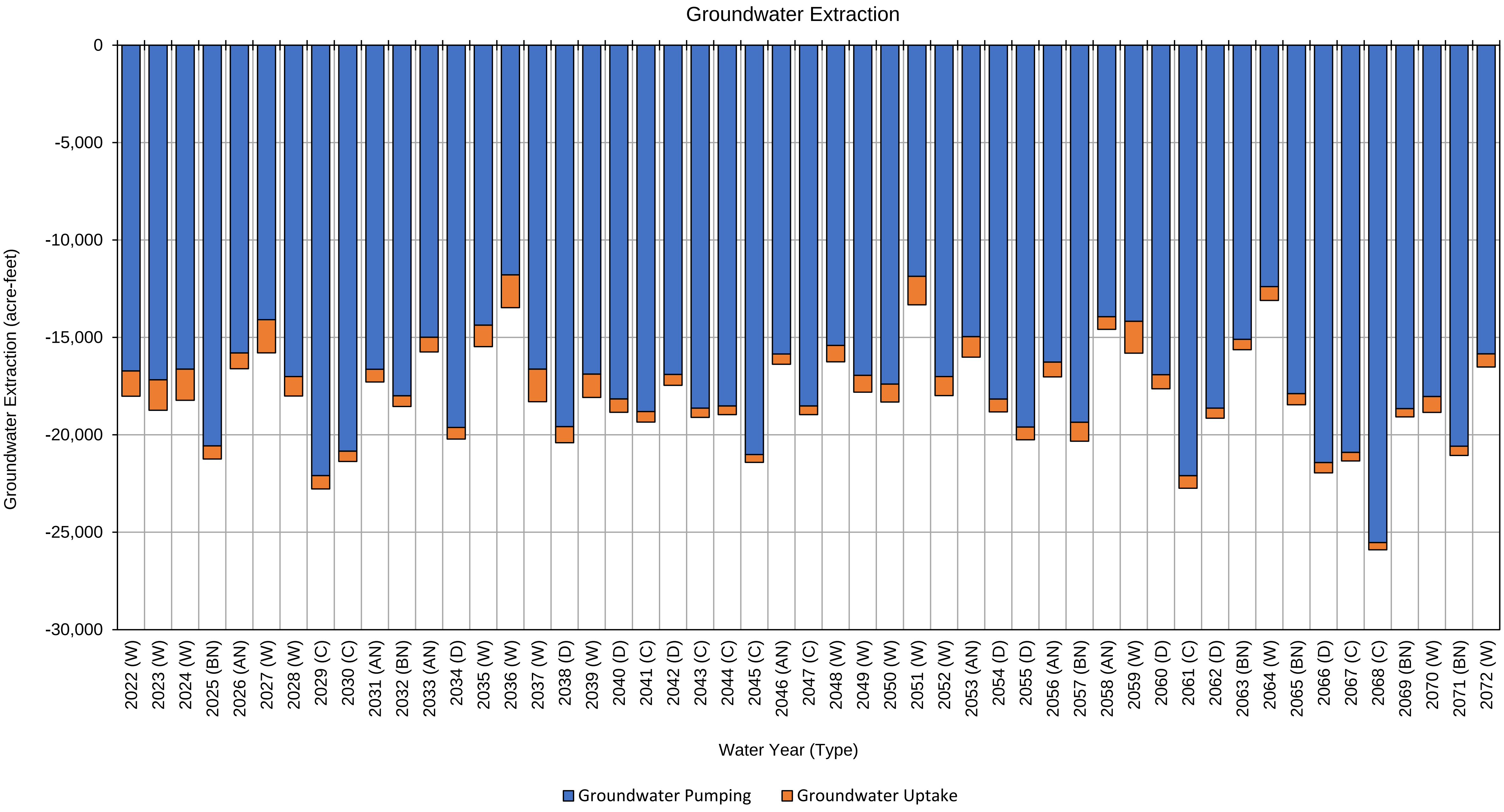
WY (Type)	Deep Percolation from the SWS
2022 (W)	16,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	5,800
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	9,500
2029 (C)	7,400
2030 (C)	5,700
2031 (AN)	14,000
2032 (BN)	5,600
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	20,000
2037 (W)	15,000
2038 (D)	10,000
2039 (W)	15,000
2040 (D)	8,200
2041 (C)	6,200
2042 (D)	6,600
2043 (C)	7,600
2044 (C)	7,000
2045 (C)	8,000
2046 (AN)	13,000
2047 (C)	7,000
2048 (W)	18,000
2049 (W)	15,000
2050 (W)	12,000
2051 (W)	20,000
2052 (W)	9,600
2053 (AN)	12,000
2054 (D)	8,200
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000
2060 (D)	6,700
2061 (C)	8,200
2062 (D)	6,400
2063 (BN)	12,000

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		13,000
2065 (BN)		6,500
2066 (D)		9,600
2067 (C)		5,900
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,600
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,600
	D	8,400
	C	7,300

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

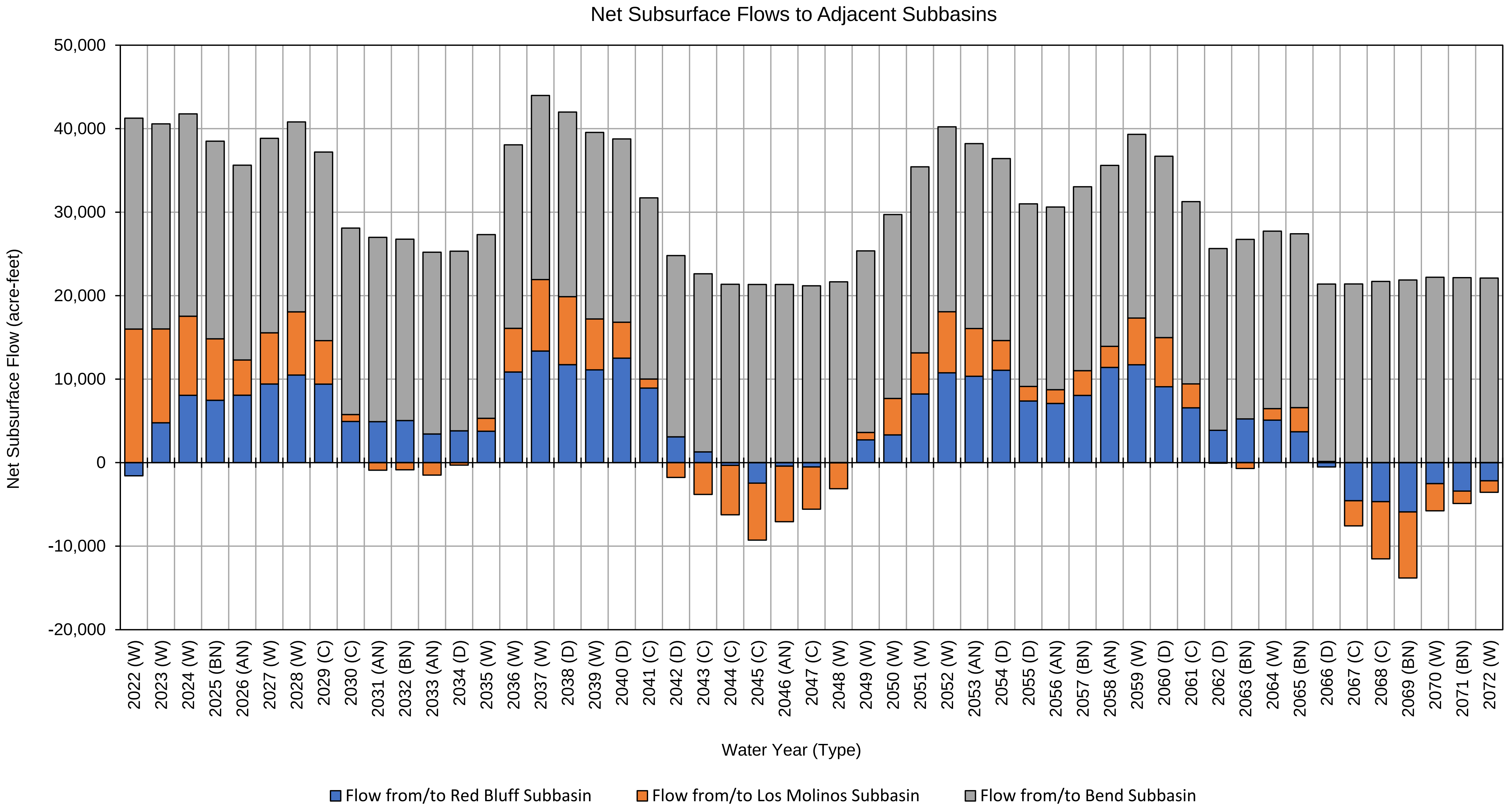
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-17,000	-1,300	-18,000
2023 (W)	-17,000	-1,600	-19,000
2024 (W)	-17,000	-1,600	-18,000
2025 (BN)	-21,000	-680	-21,000
2026 (AN)	-16,000	-810	-17,000
2027 (W)	-14,000	-1,700	-16,000
2028 (W)	-17,000	-1,000	-18,000
2029 (C)	-22,000	-690	-23,000
2030 (C)	-21,000	-530	-21,000
2031 (AN)	-17,000	-650	-17,000
2032 (BN)	-18,000	-550	-19,000
2033 (AN)	-15,000	-750	-16,000
2034 (D)	-20,000	-600	-20,000
2035 (W)	-14,000	-1,100	-15,000
2036 (W)	-12,000	-1,700	-13,000
2037 (W)	-17,000	-1,700	-18,000
2038 (D)	-20,000	-830	-20,000
2039 (W)	-17,000	-1,200	-18,000
2040 (D)	-18,000	-690	-19,000
2041 (C)	-19,000	-540	-19,000
2042 (D)	-17,000	-560	-17,000
2043 (C)	-19,000	-480	-19,000
2044 (C)	-19,000	-440	-19,000
2045 (C)	-21,000	-400	-21,000
2046 (AN)	-16,000	-530	-16,000
2047 (C)	-19,000	-450	-19,000
2048 (W)	-15,000	-840	-16,000
2049 (W)	-17,000	-860	-18,000
2050 (W)	-17,000	-920	-18,000
2051 (W)	-12,000	-1,500	-13,000
2052 (W)	-17,000	-980	-18,000
2053 (AN)	-15,000	-1,100	-16,000
2054 (D)	-18,000	-660	-19,000
2055 (D)	-20,000	-650	-20,000
2056 (AN)	-16,000	-760	-17,000
2057 (BN)	-19,000	-970	-20,000
2058 (AN)	-14,000	-650	-15,000
2059 (W)	-14,000	-1,600	-16,000
2060 (D)	-17,000	-720	-18,000
2061 (C)	-22,000	-640	-23,000
2062 (D)	-19,000	-520	-19,000
2063 (BN)	-15,000	-540	-16,000

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-12,000	-710	-13,000
2065 (BN)		-18,000	-570	-18,000
2066 (D)		-21,000	-530	-22,000
2067 (C)		-21,000	-440	-21,000
2068 (C)		-26,000	-370	-26,000
2069 (BN)		-19,000	-420	-19,000
2070 (W)		-18,000	-810	-19,000
2071 (BN)		-21,000	-480	-21,000
2072 (W)		-16,000	-670	-17,000
Average (2022-2072)		-18,000	-820	-18,000
2022-2072	W	-16,000	-1,200	-17,000
	AN	-15,000	-740	-16,000
	BN	-19,000	-600	-19,000
	D	-19,000	-640	-19,000
	C	-21,000	-500	-21,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

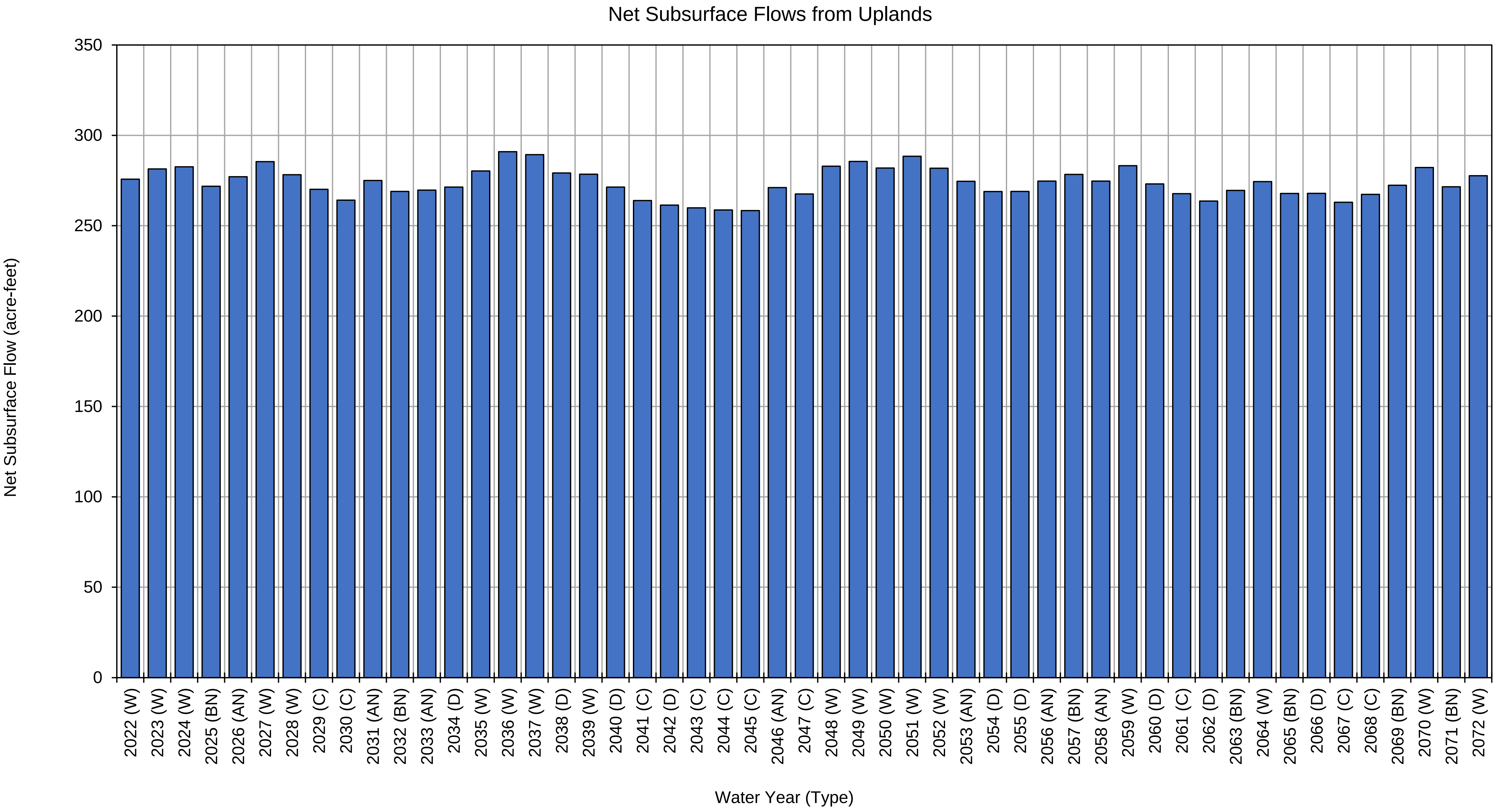
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-1,600	16,000	25,000	40,000
2023 (W)	4,800	11,000	25,000	41,000
2024 (W)	8,100	9,500	24,000	42,000
2025 (BN)	7,500	7,400	24,000	38,000
2026 (AN)	8,100	4,200	23,000	36,000
2027 (W)	9,400	6,100	23,000	39,000
2028 (W)	10,000	7,600	23,000	41,000
2029 (C)	9,400	5,200	23,000	37,000
2030 (C)	4,900	820	22,000	28,000
2031 (AN)	4,900	-910	22,000	26,000
2032 (BN)	5,000	-860	22,000	26,000
2033 (AN)	3,400	-1,500	22,000	24,000
2034 (D)	3,800	-300	22,000	25,000
2035 (W)	3,800	1,500	22,000	27,000
2036 (W)	11,000	5,200	22,000	38,000
2037 (W)	13,000	8,500	22,000	44,000
2038 (D)	12,000	8,200	22,000	42,000
2039 (W)	11,000	6,100	22,000	40,000
2040 (D)	13,000	4,300	22,000	39,000
2041 (C)	8,900	1,100	22,000	32,000
2042 (D)	3,100	-1,800	22,000	23,000
2043 (C)	1,300	-3,800	21,000	19,000
2044 (C)	-330	-5,900	21,000	15,000
2045 (C)	-2,500	-6,800	21,000	12,000
2046 (AN)	-420	-6,700	21,000	14,000
2047 (C)	-520	-5,100	21,000	16,000
2048 (W)	-26	-3,100	22,000	19,000
2049 (W)	2,700	890	22,000	25,000
2050 (W)	3,300	4,400	22,000	30,000
2051 (W)	8,200	4,900	22,000	35,000
2052 (W)	11,000	7,300	22,000	40,000
2053 (AN)	10,000	5,700	22,000	38,000
2054 (D)	11,000	3,600	22,000	36,000
2055 (D)	7,400	1,700	22,000	31,000
2056 (AN)	7,100	1,600	22,000	31,000
2057 (BN)	8,100	3,000	22,000	33,000
2058 (AN)	11,000	2,500	22,000	36,000
2059 (W)	12,000	5,600	22,000	39,000
2060 (D)	9,100	5,900	22,000	37,000
2061 (C)	6,600	2,900	22,000	31,000
2062 (D)	3,900	-63	22,000	26,000
2063 (BN)	5,200	-710	22,000	26,000

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		5,100	1,400	21,000	28,000
2065 (BN)		3,700	2,900	21,000	27,000
2066 (D)		-520	140	21,000	21,000
2067 (C)		-4,600	-3,000	21,000	14,000
2068 (C)		-4,700	-6,800	22,000	10,000
2069 (BN)		-5,900	-7,900	22,000	8,100
2070 (W)		-2,500	-3,300	22,000	16,000
2071 (BN)		-3,400	-1,500	22,000	17,000
2072 (W)		-2,200	-1,400	22,000	19,000
Average (2022-2072)		5,000	1,900	22,000	29,000
2022-2072	W	6,000	4,900	23,000	33,000
	AN	6,400	720	22,000	29,000
	BN	2,900	320	22,000	25,000
	D	6,900	2,400	22,000	31,000
	C	1,900	-2,100	22,000	21,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

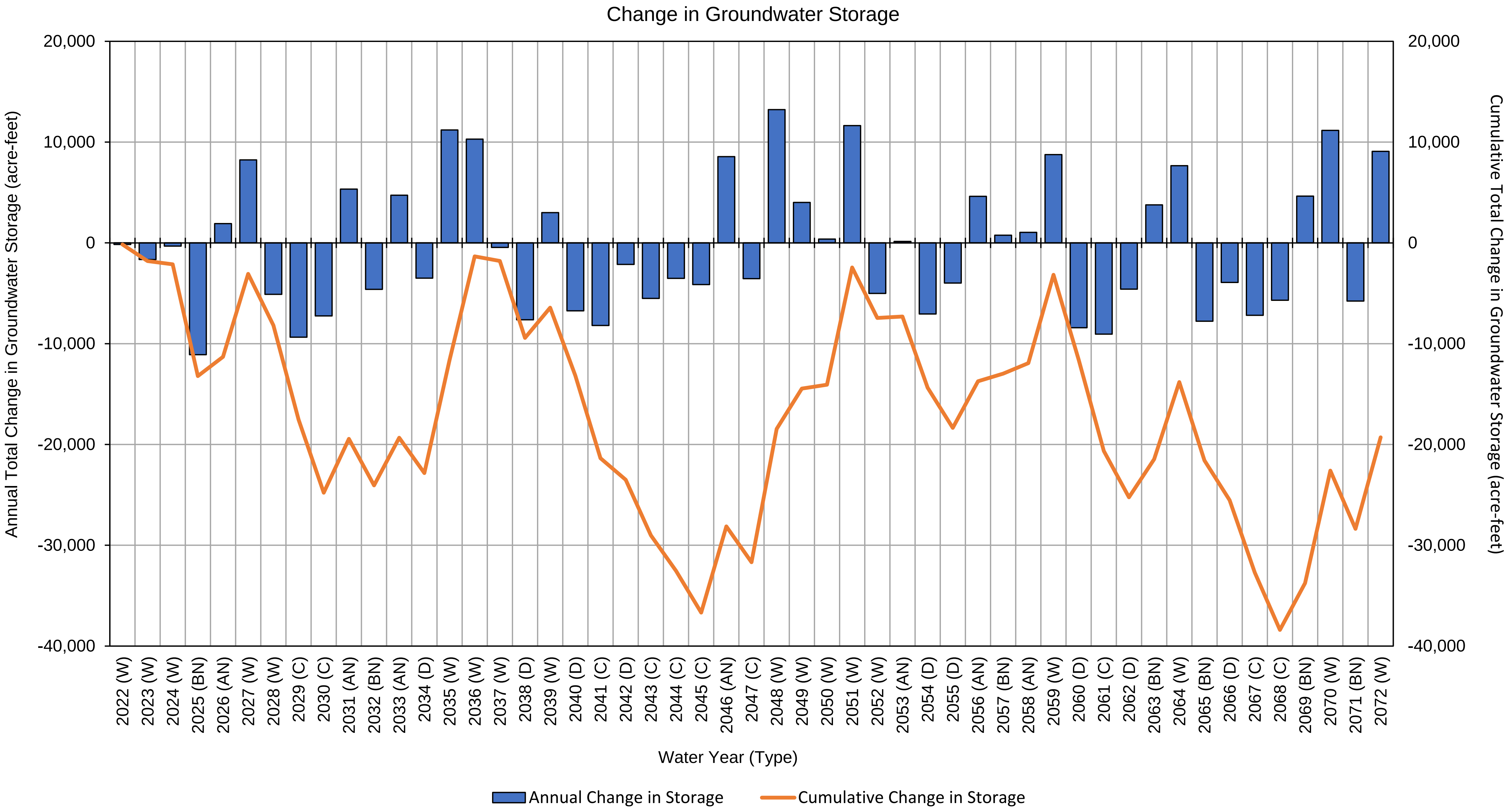
WY (Type)	Subsurface Flows from Uplands
2022 (W)	280
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	290
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	280
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	290
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280
2060 (D)	270
2061 (C)	270
2062 (D)	260
2063 (BN)	270

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070)
Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-160	-160
2023 (W)	-1,700	-1,800
2024 (W)	-320	-2,100
2025 (BN)	-11,000	-13,000
2026 (AN)	1,900	-11,000
2027 (W)	8,200	-3,100
2028 (W)	-5,100	-8,200
2029 (C)	-9,400	-18,000
2030 (C)	-7,200	-25,000
2031 (AN)	5,300	-19,000
2032 (BN)	-4,600	-24,000
2033 (AN)	4,700	-19,000
2034 (D)	-3,500	-23,000
2035 (W)	11,000	-12,000
2036 (W)	10,000	-1,300
2037 (W)	-450	-1,800
2038 (D)	-7,600	-9,400
2039 (W)	3,000	-6,400
2040 (D)	-6,700	-13,000
2041 (C)	-8,200	-21,000
2042 (D)	-2,100	-24,000
2043 (C)	-5,500	-29,000
2044 (C)	-3,500	-33,000
2045 (C)	-4,100	-37,000
2046 (AN)	8,600	-28,000
2047 (C)	-3,600	-32,000
2048 (W)	13,000	-18,000
2049 (W)	4,000	-14,000
2050 (W)	380	-14,000
2051 (W)	12,000	-2,400
2052 (W)	-5,000	-7,500
2053 (AN)	140	-7,300
2054 (D)	-7,100	-14,000
2055 (D)	-4,000	-18,000
2056 (AN)	4,600	-14,000
2057 (BN)	760	-13,000
2058 (AN)	1,000	-12,000
2059 (W)	8,800	-3,200
2060 (D)	-8,400	-12,000
2061 (C)	-9,100	-21,000
2062 (D)	-4,600	-25,000
2063 (BN)	3,800	-21,000

Antelope Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		7,700	-14,000
2065 (BN)		-7,800	-22,000
2066 (D)		-3,900	-26,000
2067 (C)		-7,200	-33,000
2068 (C)		-5,700	-38,000
2069 (BN)		4,600	-34,000
2070 (W)		11,000	-23,000
2071 (BN)		-5,800	-28,000
2072 (W)		9,100	-19,000
Average (2022-2072)		-380	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

Appendix B. Detailed Bowman Subbasin Water Budget Results

APPENDIX B

Detailed Bowman Subbasin Water Budget Results

B-1	Historical Model Results
B-2	Projected (Current Land Use) Model Results
B-3	Projected (Future Land Use) Model Results
B-4	Projected (Current Land Use) with Climate Change (2030) Model Results
B-5	Projected (Current Land Use) with Climate Change (2070) Model Results
B-6	Projected (Future Land Use) with Climate Change (2030) Model Results
B-7	Projected (Future Land Use) with Climate Change (2070) Model Results
B-8	Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

APPENDIX B-1

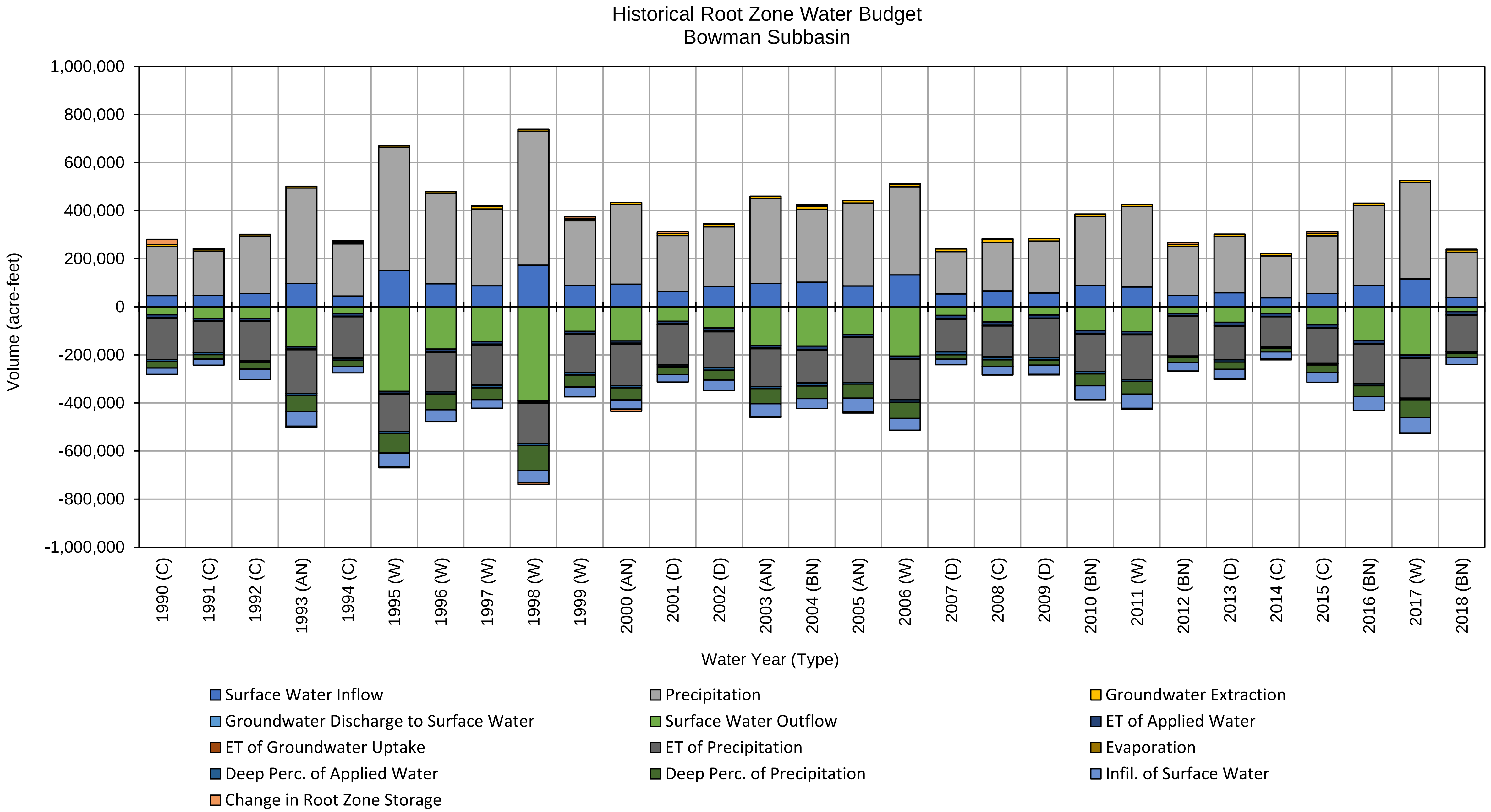
Detailed Bowman Subbasin Water Budget Results:

Historical Model Results

APPENDIX B-1a

Detailed Bowman Subbasin Water Budget Results:

Historical Model Results – Surface Water System

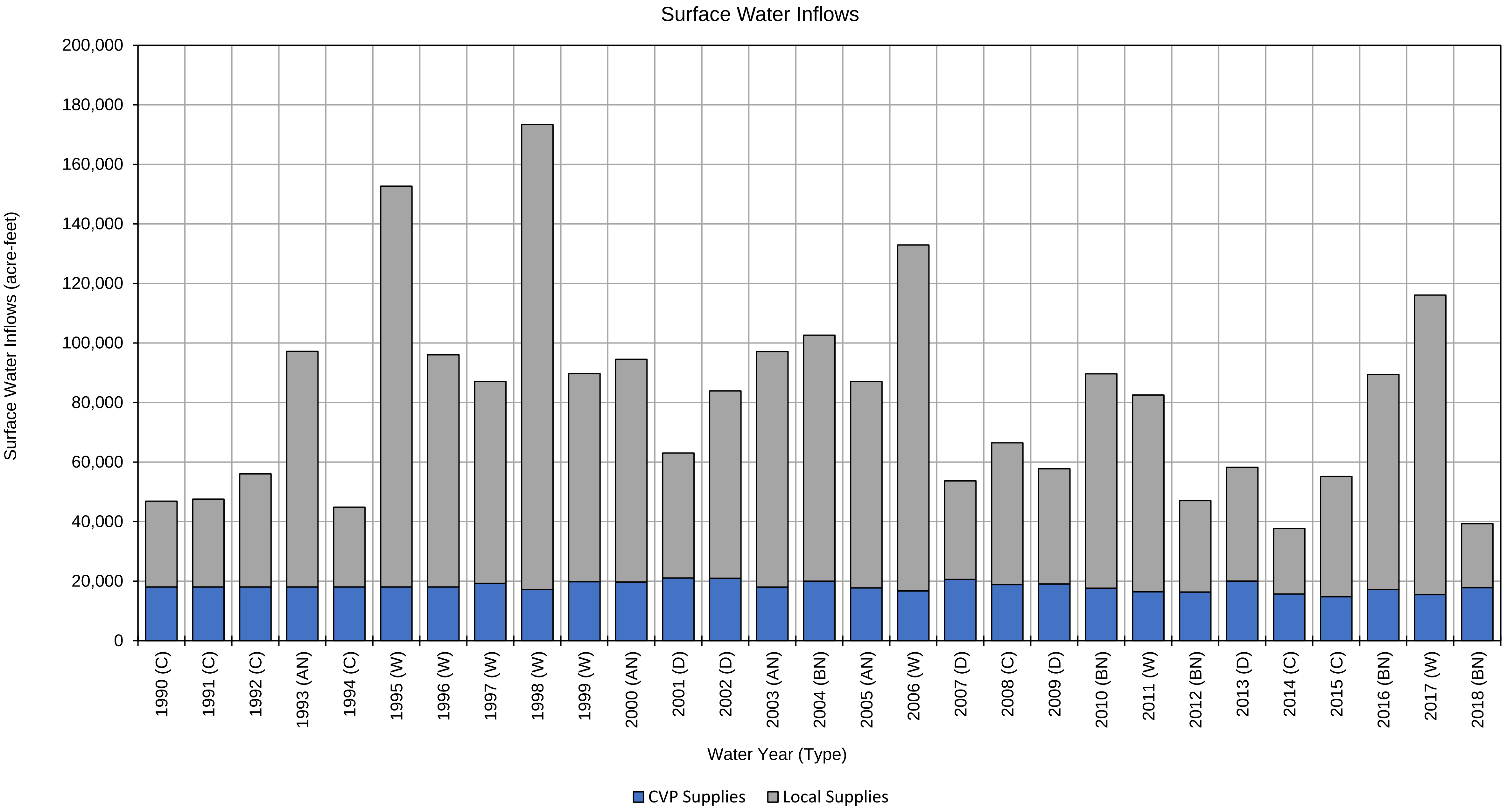

Historical Root Zone Water Budget
Bowman Subbasin
Volume (acre-feet)
1,000,000
800,000
600,000
400,000
200,000
0
-200,000
-400,000
-600,000
-800,000
-1,000,000
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Surface Water Inflow
Precipitation
Groundwater Extraction
Groundwater Discharge to Surface Water
Surface Water Outflow
ET of Applied Water
ET of Groundwater Uptake
ET of Precipitation
Evaporation
Deep Perc. of Applied Water
Deep Perc. of Precipitation
Infil. of Surface Water
Change in Root Zone Storage

Bowman Subbasin Historical Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
1990 (C)		47,000	200,000	8,600	0	33,000	11,000	3,000	170,000	330	7,900	27,000	26,000	-22,000
1991 (C)		48,000	180,000	7,300	0	47,000	11,000	2,300	130,000	330	8,400	18,000	26,000	-3,100
1992 (C)		56,000	240,000	7,100	0	47,000	11,000	2,200	160,000	330	6,800	27,000	42,000	620
1993 (AN)		97,000	400,000	7,200	0	170,000	9,200	3,100	180,000	330	8,700	66,000	61,000	5,100
1994 (C)		45,000	220,000	7,600	0	28,000	11,000	2,300	170,000	320	8,400	26,000	27,000	-5,100
1995 (W)		150,000	510,000	6,700	0	350,000	8,000	3,300	160,000	390	8,400	80,000	57,000	4,600
1996 (W)		96,000	370,000	8,200	0	180,000	9,200	3,600	160,000	490	9,000	66,000	48,000	2,100
1997 (W)		87,000	320,000	10,000	0	140,000	11,000	3,500	170,000	600	11,000	49,000	35,000	-3,900
1998 (W)		170,000	560,000	8,000	0	390,000	6,900	4,400	170,000	500	8,900	100,000	52,000	6,500
1999 (W)		90,000	270,000	7,700	0	100,000	8,800	4,300	160,000	740	9,500	50,000	41,000	-8,800
2000 (AN)		95,000	330,000	7,800	0	140,000	8,800	4,000	170,000	710	9,200	50,000	38,000	8,600
2001 (D)		63,000	230,000	9,300	0	60,000	11,000	3,300	170,000	770	7,900	32,000	31,000	-7,100
2002 (D)		84,000	250,000	11,000	0	88,000	13,000	3,400	150,000	850	11,000	41,000	43,000	-3,700
2003 (AN)		97,000	350,000	9,000	0	160,000	10,000	3,500	160,000	780	8,500	63,000	52,000	4,600
2004 (BN)		100,000	300,000	12,000	0	160,000	13,000	3,700	140,000	970	12,000	53,000	41,000	-4,600
2005 (AN)		87,000	340,000	9,800	0	110,000	9,900	3,600	190,000	770	6,300	58,000	55,000	6,700
2006 (W)		130,000	370,000	9,800	0	200,000	10,000	4,000	170,000	830	10,000	67,000	49,000	-3,700
2007 (D)		54,000	180,000	11,000	0	35,000	13,000	3,100	130,000	970	12,000	18,000	23,000	170
2008 (C)		66,000	200,000	12,000	0	63,000	14,000	2,900	130,000	960	11,000	27,000	36,000	-4,000
2009 (D)		58,000	220,000	9,300	0	34,000	13,000	2,400	160,000	940	9,900	21,000	38,000	2,600
2010 (BN)		90,000	290,000	10,000	0	99,000	12,000	2,700	150,000	890	9,800	49,000	57,000	1,300
2011 (W)		83,000	330,000	9,400	0	100,000	10,000	3,200	190,000	760	7,000	52,000	59,000	4,000
2012 (BN)		47,000	200,000	8,200	0	27,000	11,000	2,300	160,000	830	6,100	19,000	36,000	-7,000
2013 (D)		58,000	230,000	10,000	0	64,000	14,000	2,300	140,000	970	9,100	30,000	37,000	5,600
2014 (C)		38,000	170,000	8,700	0	27,000	13,000	1,700	130,000	820	5,400	14,000	28,000	4,800
2015 (C)		55,000	240,000	11,000	0	75,000	13,000	1,700	150,000	770	5,900	31,000	42,000	-7,900
2016 (BN)		89,000	330,000	8,900	0	140,000	12,000	2,300	170,000	830	6,900	44,000	59,000	-710
2017 (W)		120,000	400,000	8,200	0	200,000	10,000	2,800	170,000	760	6,000	73,000	65,000	1,700
2018 (BN)		39,000	190,000	9,700	0	20,000	13,000	1,900	150,000	820	6,300	17,000	30,000	-3,000
Average (1990-2018)		81,000	290,000	9,100	0	110,000	11,000	3,000	160,000	700	8,600	44,000	43,000	-870
1990-2018	W	120,000	390,000	8,500	0	210,000	9,300	3,600	170,000	640	8,800	68,000	51,000	300
	AN	94,000	360,000	8,400	0	150,000	9,600	3,500	170,000	650	8,200	59,000	52,000	6,200
	BN	74,000	260,000	9,900	0	90,000	12,000	2,600	150,000	870	8,300	37,000	45,000	-2,800
	D	63,000	220,000	10,000	0	56,000	13,000	2,900	150,000	900	10,000	28,000	34,000	-480
	C	51,000	210,000	8,800	0	46,000	12,000	2,300	150,000	550	7,700	24,000	32,000	-5,200

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



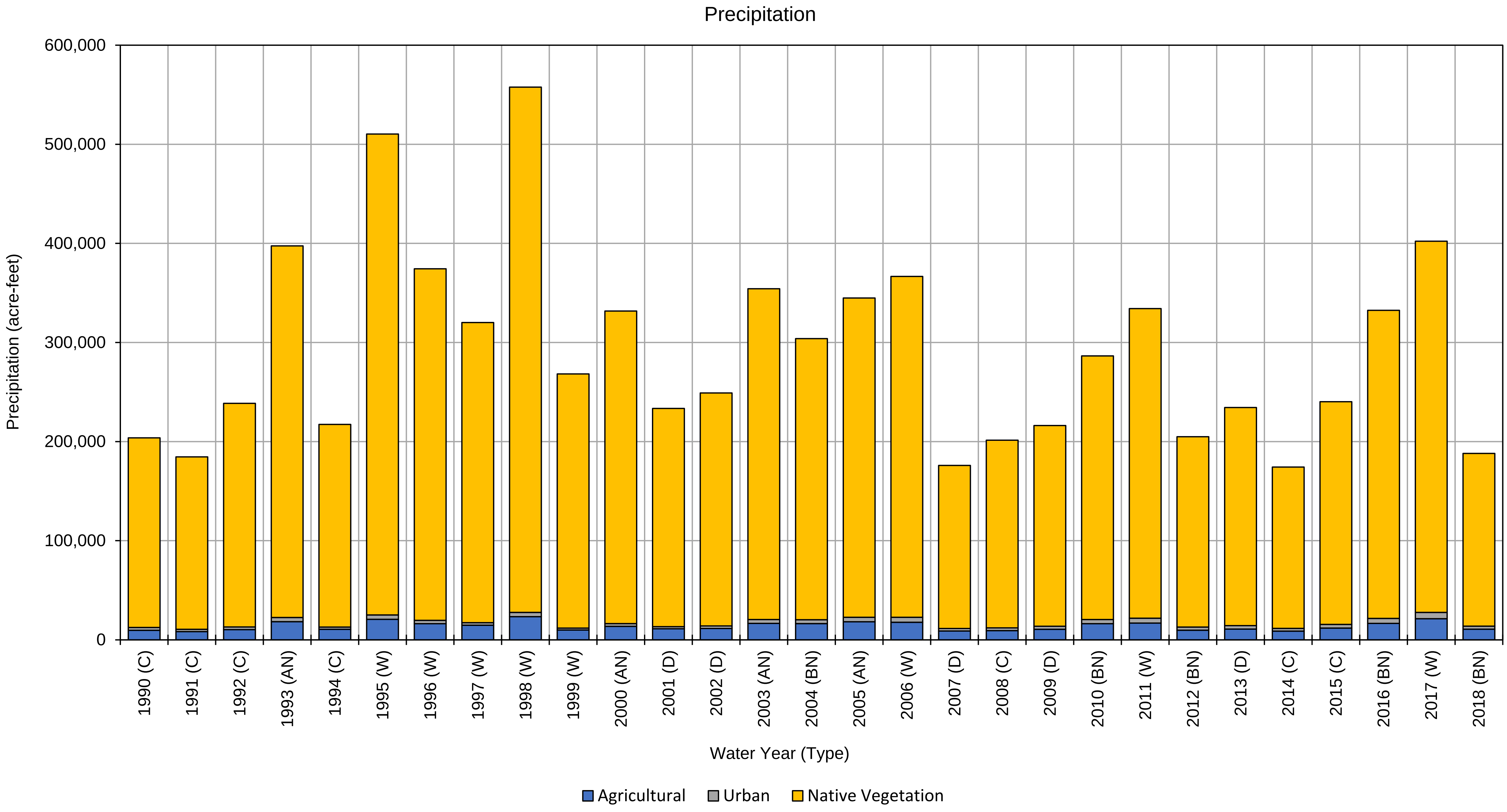
Tehama IHM - Historical

Bowman Subbasin Historical Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
1990 (C)		18,000	29,000	47,000
1991 (C)		18,000	29,000	47,000
1992 (C)		18,000	38,000	56,000
1993 (AN)		18,000	79,000	97,000
1994 (C)		18,000	27,000	45,000
1995 (W)		18,000	130,000	150,000
1996 (W)		18,000	78,000	96,000
1997 (W)		19,000	68,000	87,000
1998 (W)		17,000	160,000	180,000
1999 (W)		20,000	70,000	90,000
2000 (AN)		20,000	75,000	95,000
2001 (D)		21,000	42,000	63,000
2002 (D)		21,000	63,000	84,000
2003 (AN)		18,000	79,000	97,000
2004 (BN)		20,000	83,000	100,000
2005 (AN)		18,000	69,000	87,000
2006 (W)		17,000	120,000	140,000
2007 (D)		21,000	33,000	54,000
2008 (C)		19,000	48,000	67,000
2009 (D)		19,000	39,000	58,000
2010 (BN)		18,000	72,000	90,000
2011 (W)		16,000	66,000	82,000
2012 (BN)		16,000	31,000	47,000
2013 (D)		20,000	38,000	58,000
2014 (C)		16,000	22,000	38,000
2015 (C)		15,000	40,000	55,000
2016 (BN)		17,000	72,000	89,000
2017 (W)		16,000	100,000	120,000
2018 (BN)		18,000	22,000	40,000
Average (1990-2018)		18,000	63,000	81,000
1990-2018	W	18,000	99,000	120,000
	AN	18,000	76,000	94,000
	BN	18,000	56,000	74,000
	D	20,000	43,000	63,000
	C	17,000	33,000	50,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



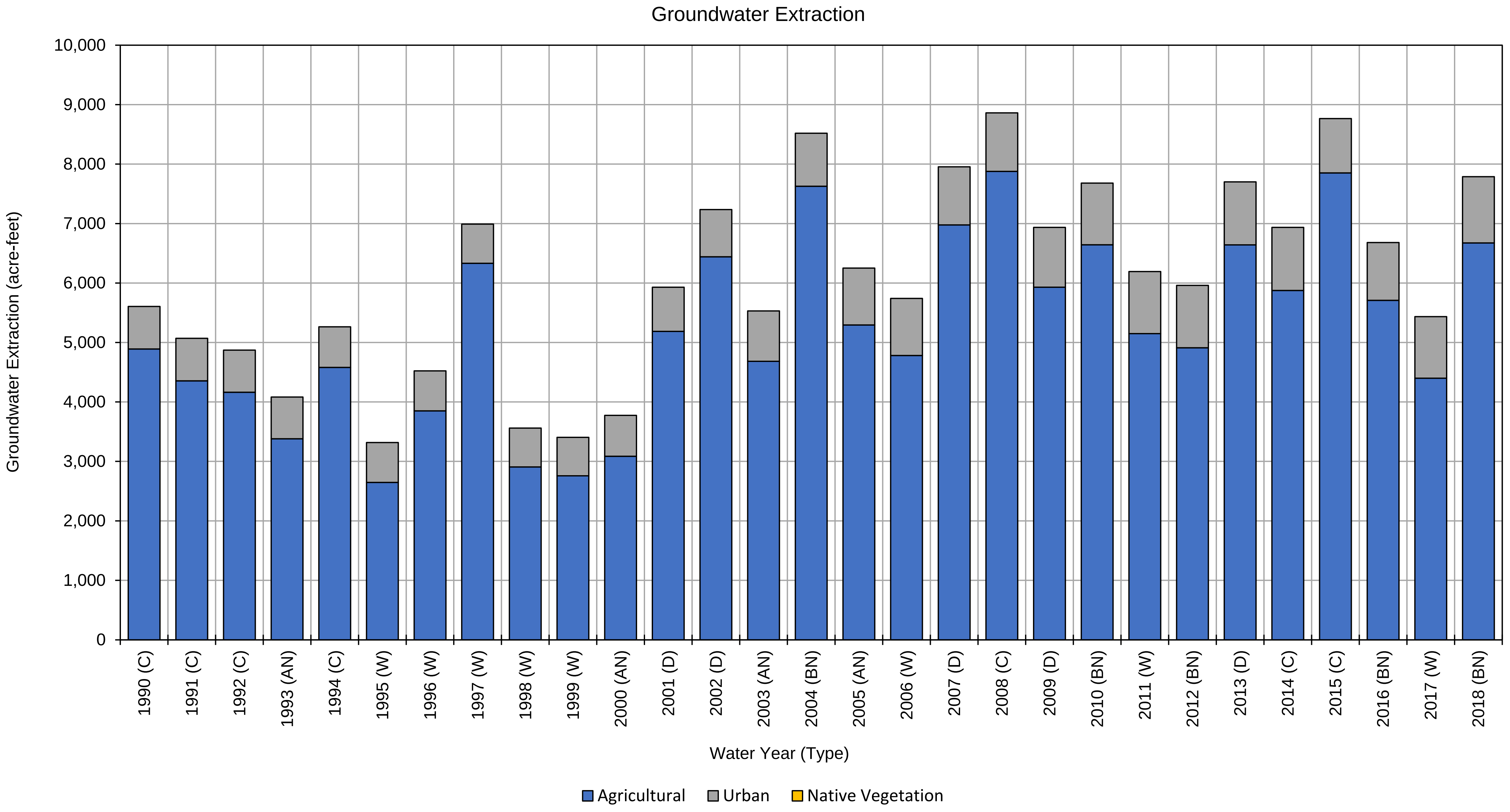
Tehama IHM - Historical

Bowman Subbasin Historical Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		9,600	2,800	190,000	200,000
1991 (C)		8,200	2,300	170,000	180,000
1992 (C)		10,000	2,600	230,000	240,000
1993 (AN)		18,000	4,300	370,000	390,000
1994 (C)		11,000	2,200	200,000	210,000
1995 (W)		21,000	4,400	490,000	520,000
1996 (W)		16,000	3,400	350,000	370,000
1997 (W)		15,000	2,500	300,000	320,000
1998 (W)		23,000	4,300	530,000	560,000
1999 (W)		9,900	2,000	260,000	270,000
2000 (AN)		14,000	2,800	320,000	340,000
2001 (D)		11,000	2,200	220,000	230,000
2002 (D)		11,000	2,500	240,000	250,000
2003 (AN)		16,000	4,000	330,000	350,000
2004 (BN)		16,000	3,900	280,000	300,000
2005 (AN)		18,000	4,600	320,000	340,000
2006 (W)		18,000	5,000	340,000	360,000
2007 (D)		8,900	2,500	160,000	170,000
2008 (C)		9,300	2,800	190,000	200,000
2009 (D)		11,000	3,100	200,000	210,000
2010 (BN)		16,000	4,300	270,000	290,000
2011 (W)		17,000	4,900	310,000	330,000
2012 (BN)		9,700	3,100	190,000	200,000
2013 (D)		11,000	3,500	220,000	230,000
2014 (C)		8,800	2,700	160,000	170,000
2015 (C)		12,000	3,700	220,000	240,000
2016 (BN)		17,000	5,000	310,000	330,000
2017 (W)		21,000	6,400	370,000	400,000
2018 (BN)		11,000	3,100	170,000	180,000
Average (1990-2018)		14,000	3,500	270,000	290,000
1990-2018	W	18,000	4,100	370,000	390,000
	AN	17,000	3,900	340,000	360,000
	BN	14,000	3,900	250,000	270,000
	D	11,000	2,800	210,000	220,000
	C	9,800	2,700	200,000	210,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



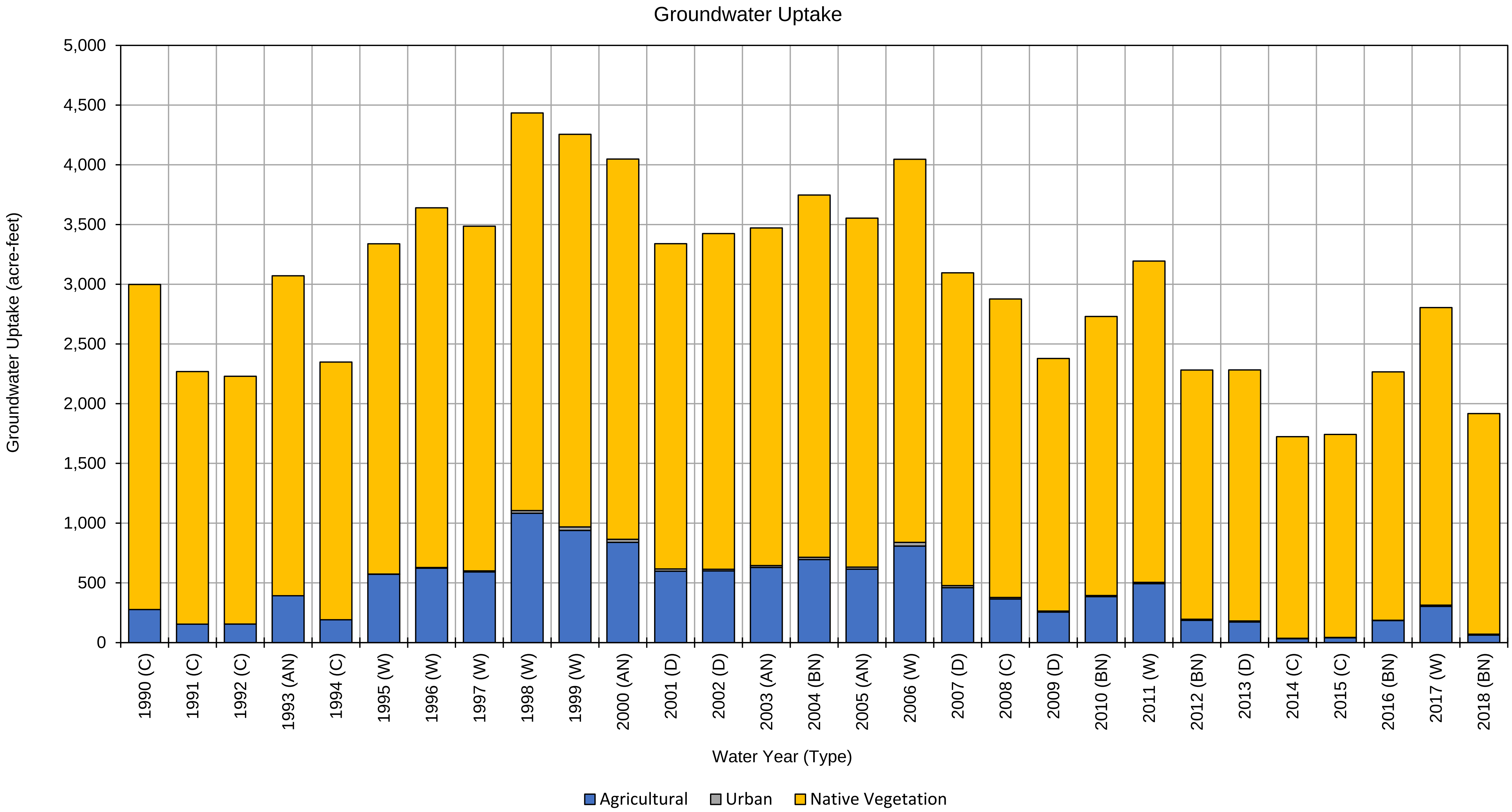
Tehama IHM - Historical

Bowman Subbasin Historical Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		4,900	720	0	5,600
1991 (C)		4,400	710	0	5,100
1992 (C)		4,200	710	0	4,900
1993 (AN)		3,400	700	0	4,100
1994 (C)		4,600	680	0	5,300
1995 (W)		2,600	670	0	3,300
1996 (W)		3,800	670	0	4,500
1997 (W)		6,300	660	0	7,000
1998 (W)		2,900	650	0	3,600
1999 (W)		2,800	650	0	3,500
2000 (AN)		3,100	690	0	3,800
2001 (D)		5,200	740	0	5,900
2002 (D)		6,400	790	0	7,200
2003 (AN)		4,700	850	0	5,600
2004 (BN)		7,600	890	0	8,500
2005 (AN)		5,300	960	0	6,300
2006 (W)		4,800	960	0	5,800
2007 (D)		7,000	980	0	8,000
2008 (C)		7,900	980	0	8,900
2009 (D)		5,900	1,000	0	6,900
2010 (BN)		6,600	1,000	0	7,600
2011 (W)		5,100	1,000	0	6,100
2012 (BN)		4,900	1,000	0	5,900
2013 (D)		6,600	1,100	0	7,700
2014 (C)		5,900	1,100	0	7,000
2015 (C)		7,900	910	0	8,800
2016 (BN)		5,700	970	0	6,700
2017 (W)		4,400	1,000	0	5,400
2018 (BN)		6,700	1,100	0	7,800
Average (1990-2018)		5,200	860	0	6,100
1990-2018	W	4,100	790	0	4,900
	AN	4,100	800	0	4,900
	BN	6,300	1,000	0	7,300
	D	6,200	920	0	7,100
	C	5,700	830	0	6,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Bowman Subbasin Historical Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>280</td><td>0</td><td>2,700</td><td>3,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>150</td><td>0</td><td>2,100</td><td>2,300</td></tr>
<tr><td colspan="2">1992 (C)</td><td>160</td><td>0</td><td>2,100</td><td>2,300</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>390</td><td>0</td><td>2,700</td><td>3,100</td></tr>
<tr><td colspan="2">1994 (C)</td><td>190</td><td>0</td><td>2,200</td><td>2,400</td></tr>
<tr><td colspan="2">1995 (W)</td><td>570</td><td>2</td><td>2,800</td><td>3,400</td></tr>
<tr><td colspan="2">1996 (W)</td><td>620</td><td>5</td><td>3,000</td><td>3,600</td></tr>
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<tr><td colspan="2">1998 (W)</td><td>1,100</td><td>23</td><td>3,300</td><td>4,400</td></tr>
<tr><td colspan="2">1999 (W)</td><td>940</td><td>29</td><td>3,300</td><td>4,300</td></tr>
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<tr><td colspan="2">2014 (C)</td><td>32</td><td>4</td><td>1,700</td><td>1,700</td></tr>
<tr><td colspan="2">2015 (C)</td><td>40</td><td>3</td><td>1,700</td><td>1,700</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>180</td><td>3</td><td>2,100</td><td>2,300</td></tr>
<tr><td colspan="2">2017 (W)</td><td>300</td><td>10</td><td>2,500</td><td>2,800</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>63</td><td>7</td><td>1,800</td><td>1,900</td></tr>
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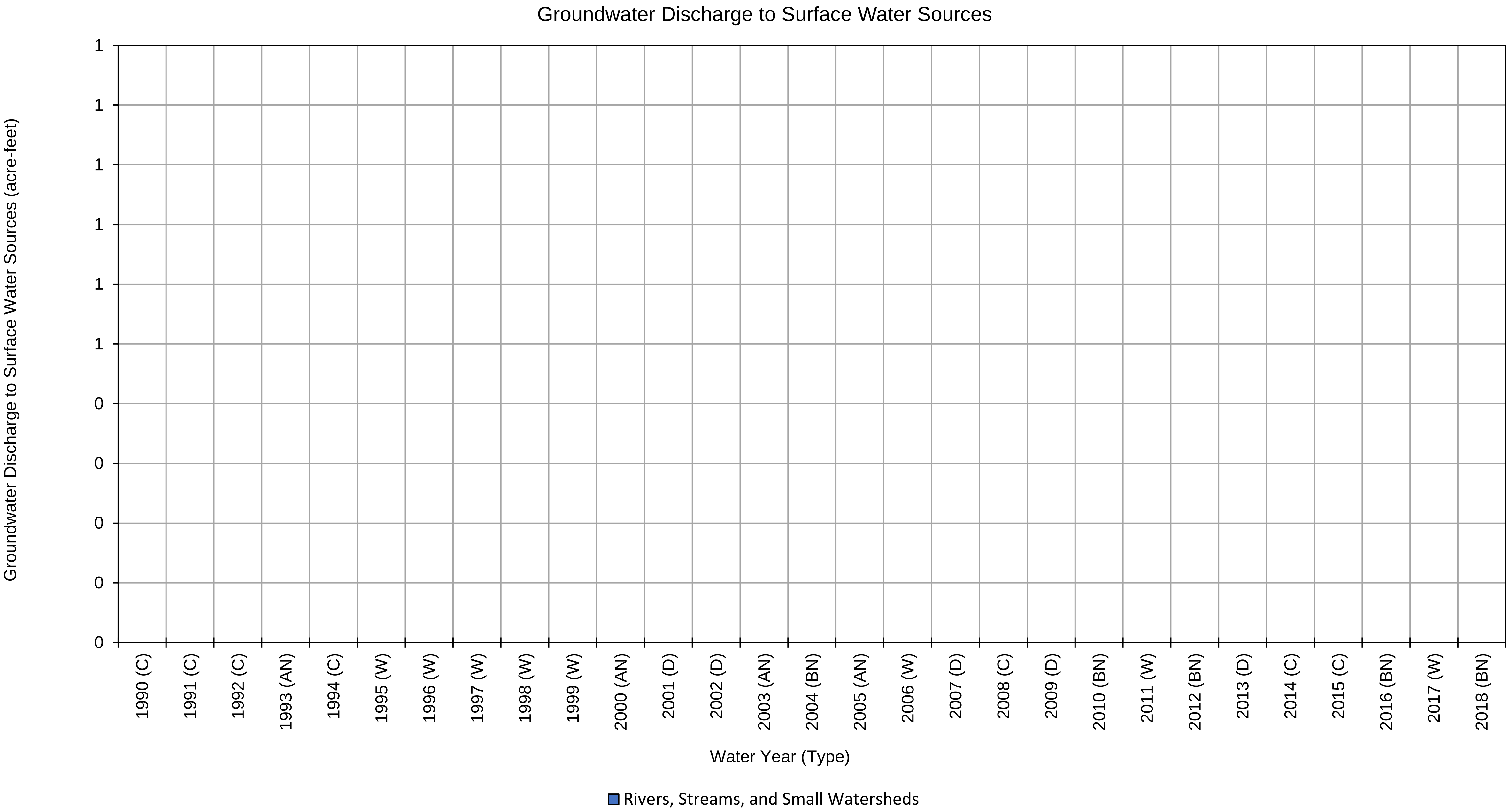
<tr><td>BN</td><td>300</td><td>10</td><td>2,300</td><td>2,600</td></tr>
<tr><td>D</td><td>420</td><td>13</td><td>2,500</td><td>2,900</td></tr>
<tr><td>C</td><td>170</td><td>3</td><td>2,100</td><td>2,300</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



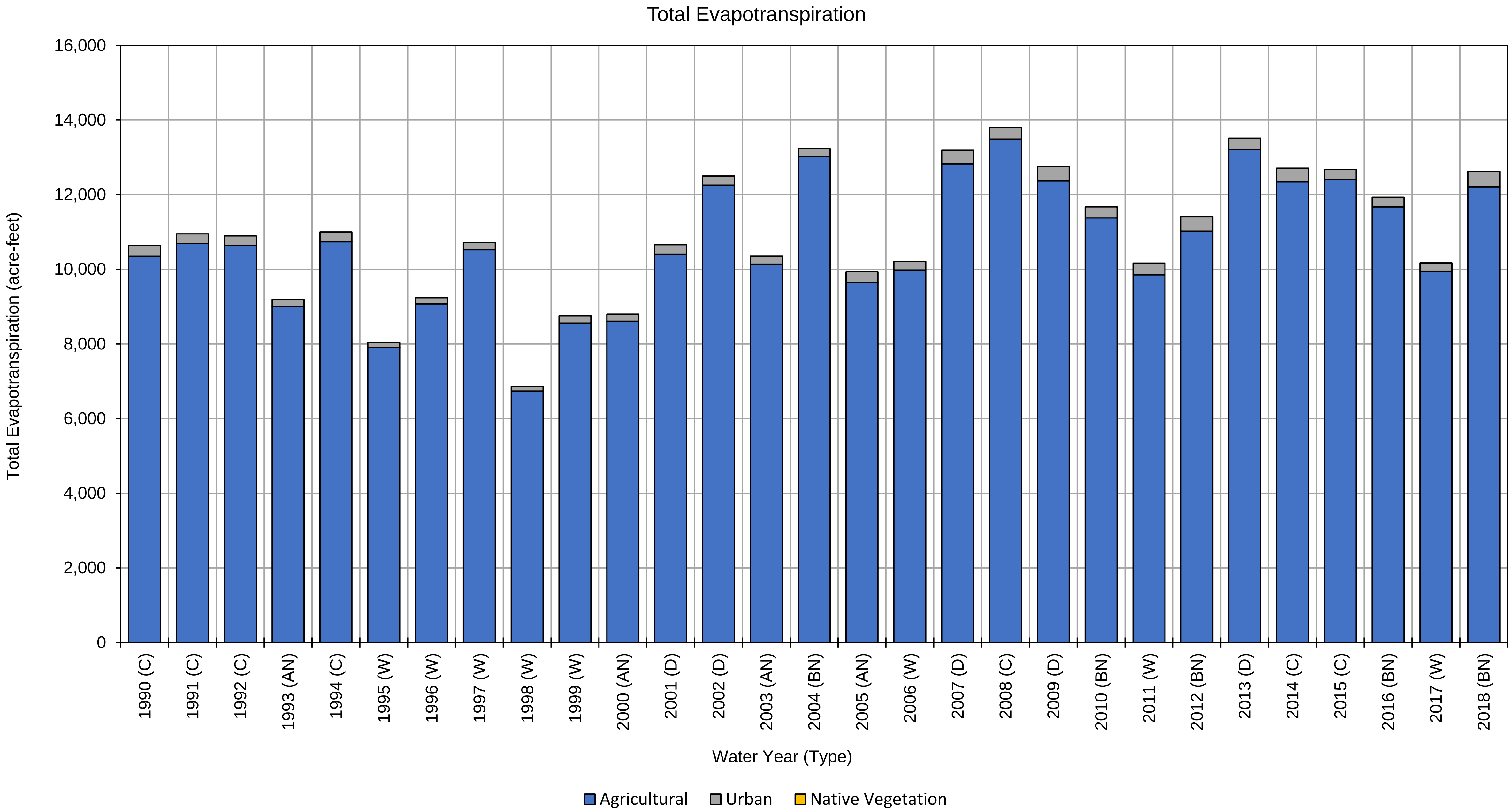
Tehama IHM - Historical

Bowman Subbasin Historical Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
1990 (C)		0
1991 (C)		0
1992 (C)		0
1993 (AN)		0
1994 (C)		0
1995 (W)		0
1996 (W)		0
1997 (W)		0
1998 (W)		0
1999 (W)		0
2000 (AN)		0
2001 (D)		0
2002 (D)		0
2003 (AN)		0
2004 (BN)		0
2005 (AN)		0
2006 (W)		0
2007 (D)		0
2008 (C)		0
2009 (D)		0
2010 (BN)		0
2011 (W)		0
2012 (BN)		0
2013 (D)		0
2014 (C)		0
2015 (C)		0
2016 (BN)		0
2017 (W)		0
2018 (BN)		0
Average (1990-2018)		0
1990-2018	W	0
	AN	0
	BN	0
	D	0
	C	0

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



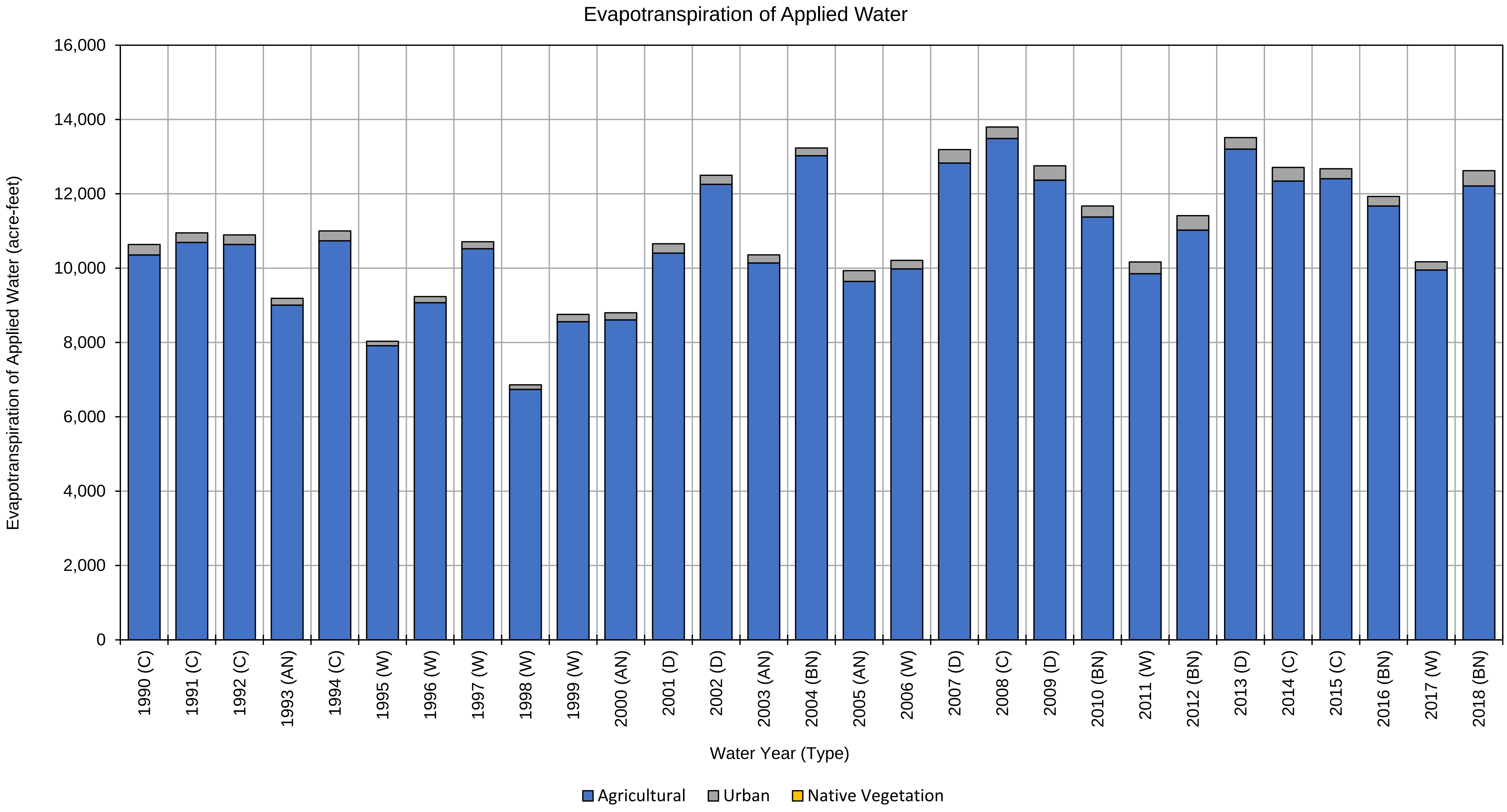
Tehama IHM - Historical

Bowman Subbasin Historical Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
1990 (C)	17,000	1,400	170,000	190,000
1991 (C)	15,000	1,100	130,000	150,000
1992 (C)	16,000	1,200	160,000	180,000
1993 (AN)	16,000	1,300	180,000	200,000
1994 (C)	17,000	1,100	170,000	190,000
1995 (W)	13,000	930	150,000	160,000
1996 (W)	15,000	1,000	160,000	180,000
1997 (W)	17,000	920	160,000	180,000
1998 (W)	14,000	920	160,000	170,000
1999 (W)	13,000	800	160,000	170,000
2000 (AN)	14,000	980	170,000	180,000
2001 (D)	17,000	1,000	160,000	180,000
2002 (D)	18,000	1,000	140,000	160,000
2003 (AN)	17,000	1,300	150,000	170,000
2004 (BN)	19,000	1,100	130,000	150,000
2005 (AN)	19,000	1,700	180,000	200,000
2006 (W)	17,000	1,400	160,000	180,000
2007 (D)	18,000	1,300	130,000	150,000
2008 (C)	18,000	1,200	130,000	150,000
2009 (D)	18,000	1,600	160,000	180,000
2010 (BN)	19,000	1,500	150,000	170,000
2011 (W)	18,000	1,800	180,000	200,000
2012 (BN)	17,000	1,600	160,000	180,000
2013 (D)	18,000	1,300	140,000	160,000
2014 (C)	17,000	1,300	120,000	140,000
2015 (C)	18,000	1,400	140,000	160,000
2016 (BN)	18,000	1,600	160,000	180,000
2017 (W)	18,000	1,600	160,000	180,000
2018 (BN)	19,000	1,600	140,000	160,000
Average (1990-2018)	17,000	1,300	150,000	170,000
1990-2018 W	16,000	1,200	160,000	180,000
AN	17,000	1,300	170,000	190,000
BN	18,000	1,500	150,000	170,000
D	18,000	1,200	150,000	170,000
C	17,000	1,200	140,000	160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



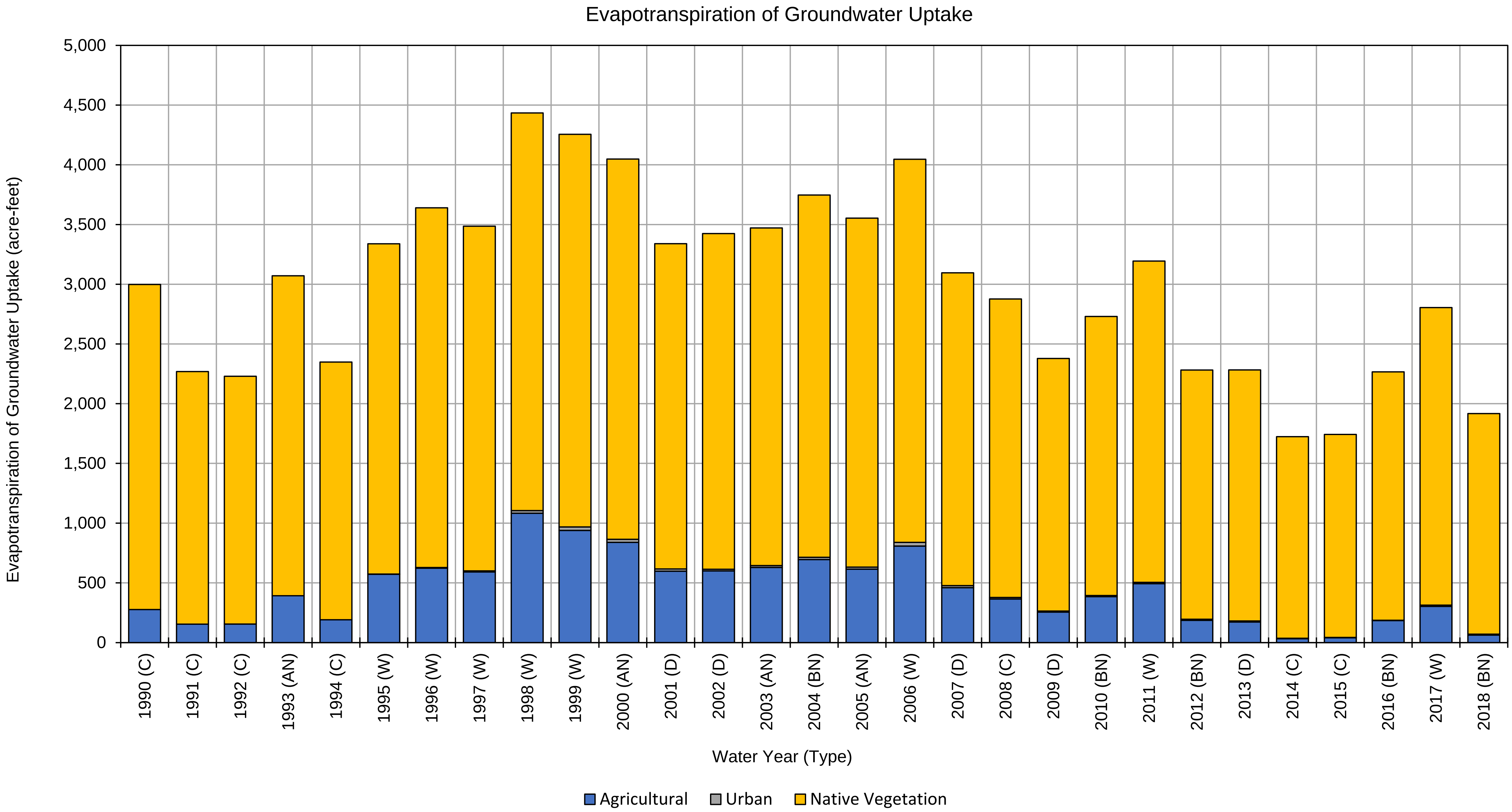
Tehama IHM - Historical

Bowman Subbasin Historical Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		10,000	280	0	10,000
1991 (C)		11,000	260	0	11,000
1992 (C)		11,000	260	0	11,000
1993 (AN)		9,000	180	0	9,200
1994 (C)		11,000	270	0	11,000
1995 (W)		7,900	120	0	8,000
1996 (W)		9,100	170	0	9,300
1997 (W)		11,000	190	0	11,000
1998 (W)		6,700	120	0	6,800
1999 (W)		8,600	200	0	8,800
2000 (AN)		8,600	190	0	8,800
2001 (D)		10,000	250	0	10,000
2002 (D)		12,000	240	0	12,000
2003 (AN)		10,000	220	0	10,000
2004 (BN)		13,000	210	0	13,000
2005 (AN)		9,600	290	0	9,900
2006 (W)		10,000	230	0	10,000
2007 (D)		13,000	360	0	13,000
2008 (C)		13,000	310	0	13,000
2009 (D)		12,000	380	0	12,000
2010 (BN)		11,000	300	0	11,000
2011 (W)		9,900	310	0	10,000
2012 (BN)		11,000	390	0	11,000
2013 (D)		13,000	310	0	13,000
2014 (C)		12,000	370	0	12,000
2015 (C)		12,000	270	0	12,000
2016 (BN)		12,000	260	0	12,000
2017 (W)		9,900	220	0	10,000
2018 (BN)		12,000	410	0	12,000
Average (1990-2018)		11,000	260	0	11,000
1990-2018	W	9,100	200	0	9,300
	AN	9,300	220	0	9,500
	BN	12,000	310	0	12,000
	D	12,000	310	0	12,000
	C	12,000	290	0	12,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Bowman Subbasin Historical Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>280</td><td>0</td><td>2,700</td><td>3,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>150</td><td>0</td><td>2,100</td><td>2,300</td></tr>
<tr><td colspan="2">1992 (C)</td><td>160</td><td>0</td><td>2,100</td><td>2,300</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>390</td><td>0</td><td>2,700</td><td>3,100</td></tr>
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<tr><td colspan="2">2018 (BN)</td><td>63</td><td>7</td><td>1,800</td><td>1,900</td></tr>
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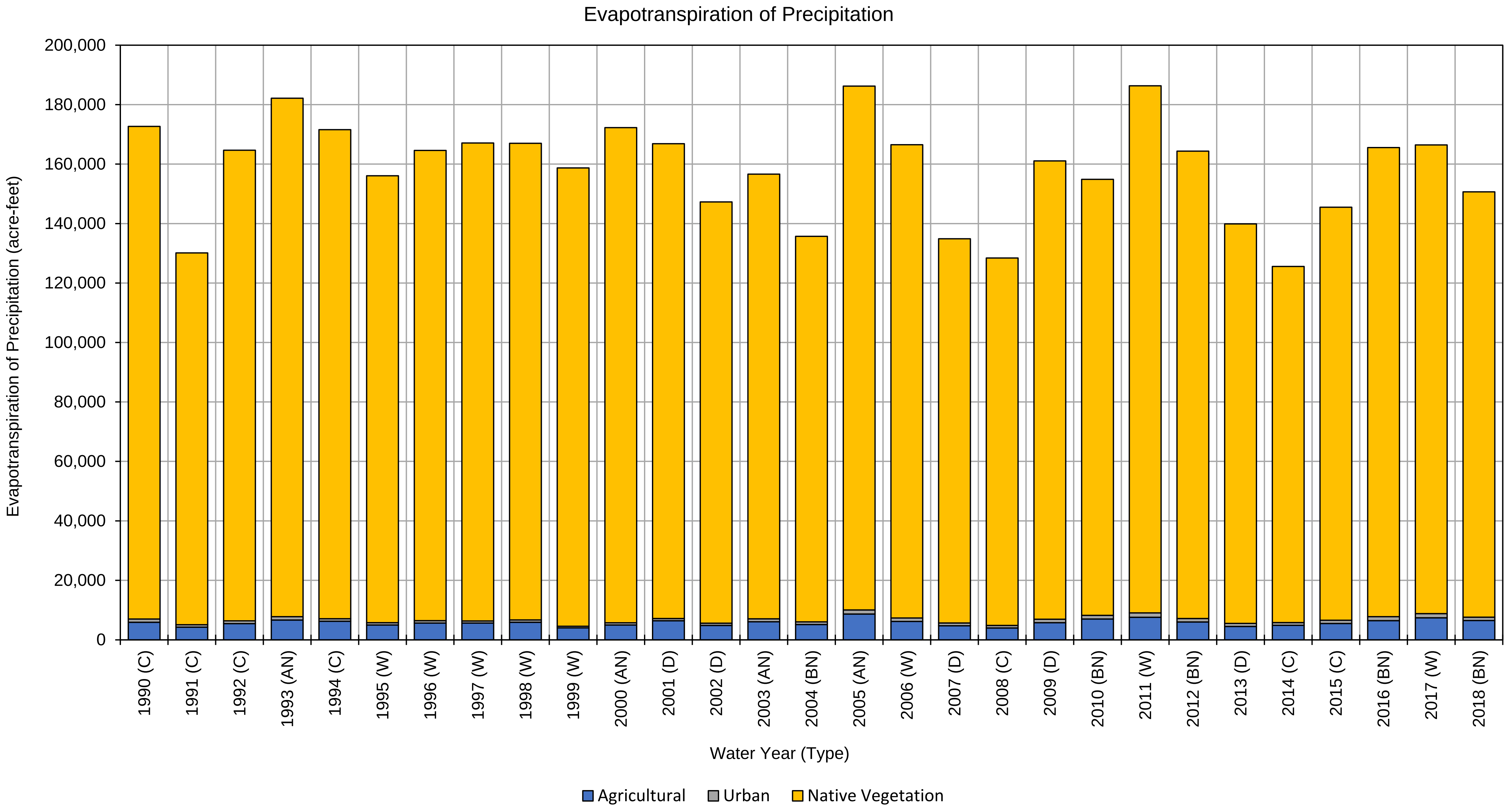
C	Critical



Tehama IHM - Historical

Bowman Subbasin Historical Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
1990 (C)	5,900	1,100	170,000	180,000
1991 (C)	4,300	830	130,000	140,000
1992 (C)	5,400	950	160,000	170,000
1993 (AN)	6,700	1,100	170,000	180,000
1994 (C)	6,200	850	160,000	170,000
1995 (W)	5,000	810	150,000	160,000
1996 (W)	5,600	830	160,000	170,000
1997 (W)	5,600	720	160,000	170,000
1998 (W)	5,900	780	160,000	170,000
1999 (W)	4,000	570	150,000	150,000
2000 (AN)	5,000	770	170,000	180,000
2001 (D)	6,400	750	160,000	170,000
2002 (D)	4,800	770	140,000	150,000
2003 (AN)	6,100	1,000	150,000	160,000
2004 (BN)	5,100	880	130,000	140,000
2005 (AN)	8,600	1,400	180,000	190,000
2006 (W)	6,200	1,200	160,000	170,000
2007 (D)	4,700	920	130,000	140,000
2008 (C)	4,000	860	120,000	120,000
2009 (D)	5,800	1,200	150,000	160,000
2010 (BN)	7,000	1,200	150,000	160,000
2011 (W)	7,600	1,500	180,000	190,000
2012 (BN)	6,000	1,200	160,000	170,000
2013 (D)	4,500	1,000	130,000	140,000
2014 (C)	4,800	940	120,000	130,000
2015 (C)	5,500	1,100	140,000	150,000
2016 (BN)	6,500	1,300	160,000	170,000
2017 (W)	7,400	1,400	160,000	170,000
2018 (BN)	6,500	1,100	140,000	150,000
Average (1990-2018)	5,800	1,000	150,000	160,000
1990-2018 W	5,900	960	160,000	170,000
AN	6,600	1,100	170,000	180,000
BN	6,200	1,100	150,000	160,000
D	5,200	930	140,000	150,000
C	5,200	950	140,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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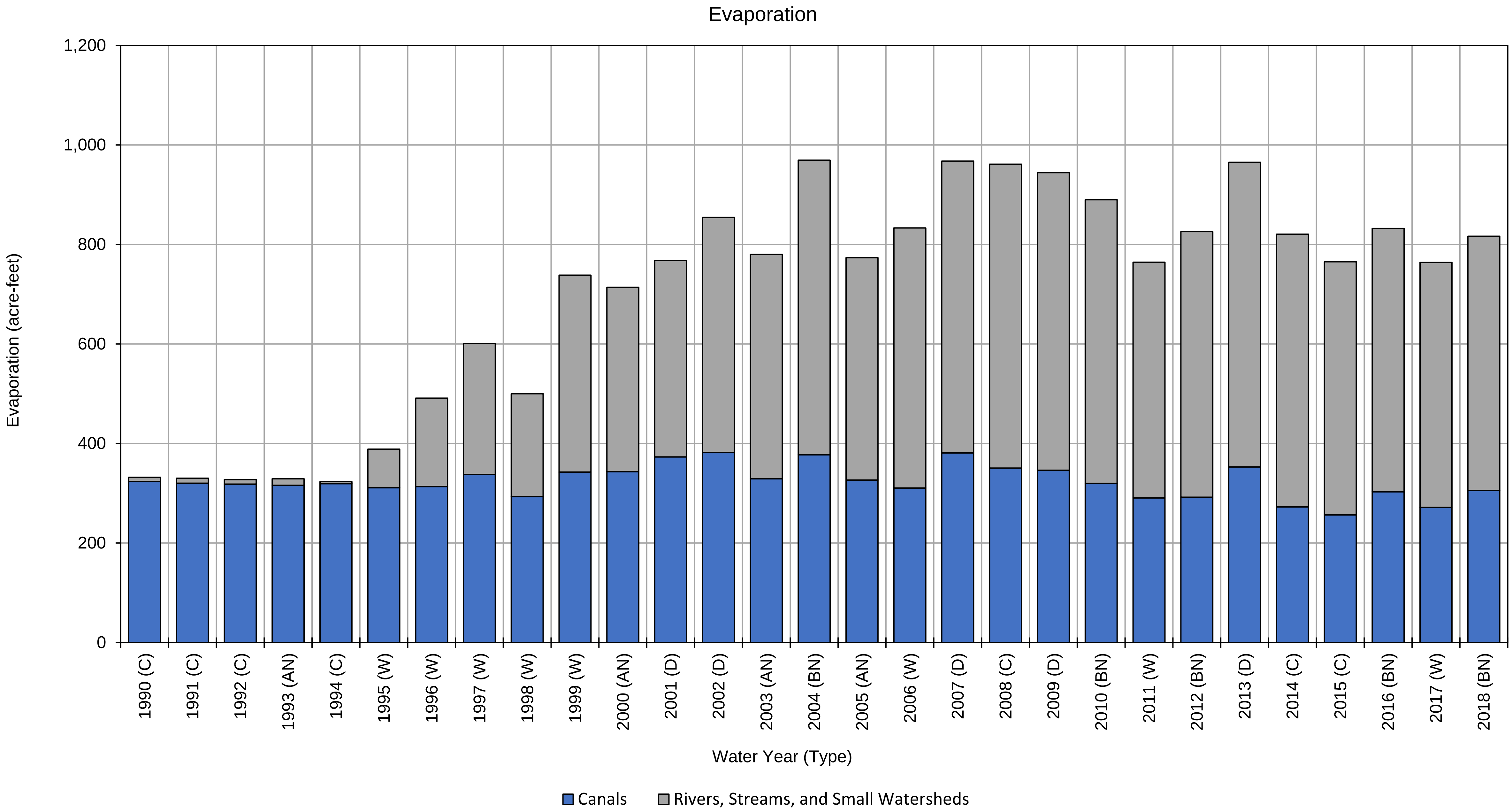
C	Critical



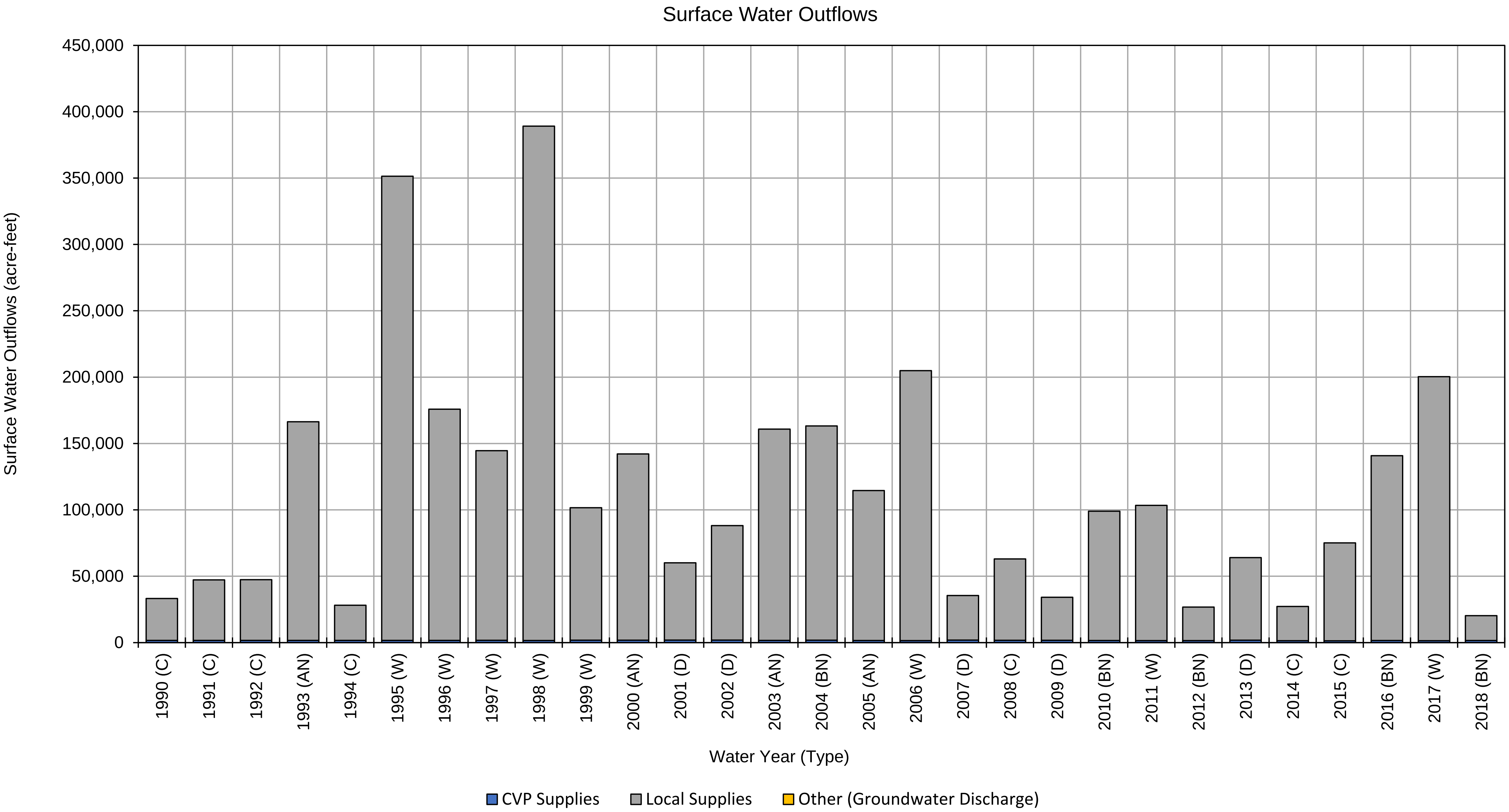
Tehama IHM - Historical

Bowman Subbasin Historical Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
1990 (C)		320	8	330
1991 (C)		320	10	330
1992 (C)		320	9	330
1993 (AN)		320	13	330
1994 (C)		320	4	320
1995 (W)		310	78	390
1996 (W)		310	180	490
1997 (W)		340	260	600
1998 (W)		290	210	500
1999 (W)		340	400	740
2000 (AN)		340	370	710
2001 (D)		370	390	760
2002 (D)		380	470	850
2003 (AN)		330	450	780
2004 (BN)		380	590	970
2005 (AN)		330	450	780
2006 (W)		310	520	830
2007 (D)		380	590	970
2008 (C)		350	610	960
2009 (D)		350	600	950
2010 (BN)		320	570	890
2011 (W)		290	470	760
2012 (BN)		290	530	820
2013 (D)		350	610	960
2014 (C)		270	550	820
2015 (C)		260	510	770
2016 (BN)		300	530	830
2017 (W)		270	490	760
2018 (BN)		310	510	820
Average (1990-2018)		320	380	700
1990-2018	W	310	330	640
	AN	330	320	650
	BN	320	550	870
	D	370	530	900
	C	310	240	550

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



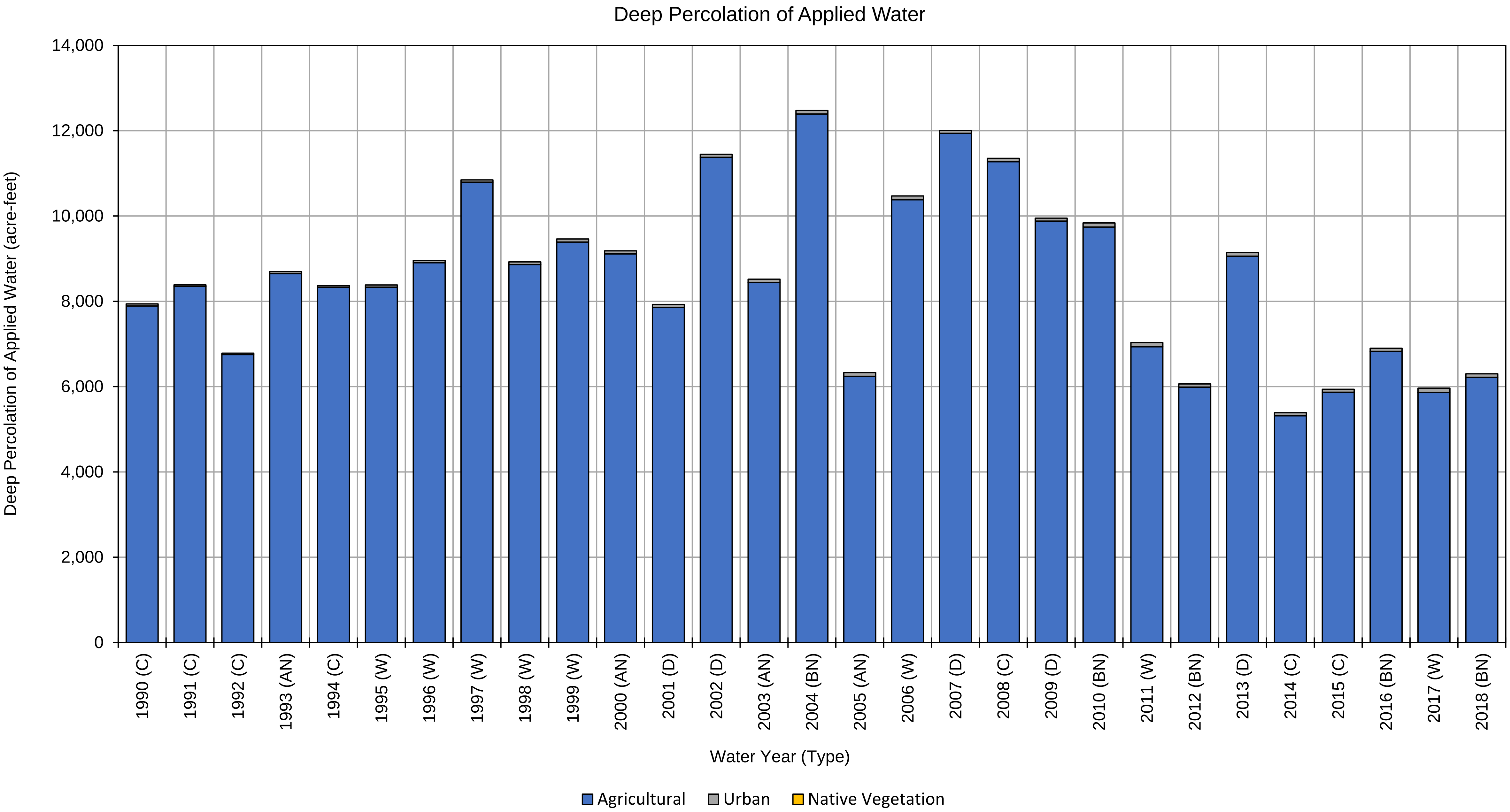
Tehama IHM - Historical

Bowman Subbasin Historical Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
1990 (C)		1,600	32,000	0	34,000
1991 (C)		1,600	46,000	0	48,000
1992 (C)		1,600	46,000	0	48,000
1993 (AN)		1,600	160,000	0	160,000
1994 (C)		1,600	26,000	0	28,000
1995 (W)		1,600	350,000	0	350,000
1996 (W)		1,600	170,000	0	170,000
1997 (W)		1,700	140,000	0	140,000
1998 (W)		1,500	390,000	0	390,000
1999 (W)		1,800	100,000	0	100,000
2000 (AN)		1,800	140,000	0	140,000
2001 (D)		1,900	58,000	0	60,000
2002 (D)		1,900	86,000	0	88,000
2003 (AN)		1,600	160,000	0	160,000
2004 (BN)		1,800	160,000	0	160,000
2005 (AN)		1,600	110,000	0	110,000
2006 (W)		1,500	200,000	0	200,000
2007 (D)		1,800	34,000	0	36,000
2008 (C)		1,700	61,000	0	63,000
2009 (D)		1,700	32,000	0	34,000
2010 (BN)		1,600	97,000	0	99,000
2011 (W)		1,500	100,000	0	100,000
2012 (BN)		1,500	25,000	0	27,000
2013 (D)		1,800	62,000	0	64,000
2014 (C)		1,400	26,000	0	27,000
2015 (C)		1,300	74,000	0	75,000
2016 (BN)		1,500	140,000	0	140,000
2017 (W)		1,400	200,000	0	200,000
2018 (BN)		1,600	19,000	0	21,000
Average (1990-2018)		1,600	110,000	0	110,000
1990-2018	W	1,600	210,000	0	210,000
	AN	1,600	140,000	0	140,000
	BN	1,600	88,000	0	90,000
	D	1,800	55,000	0	57,000
	C	1,500	44,000	0	46,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



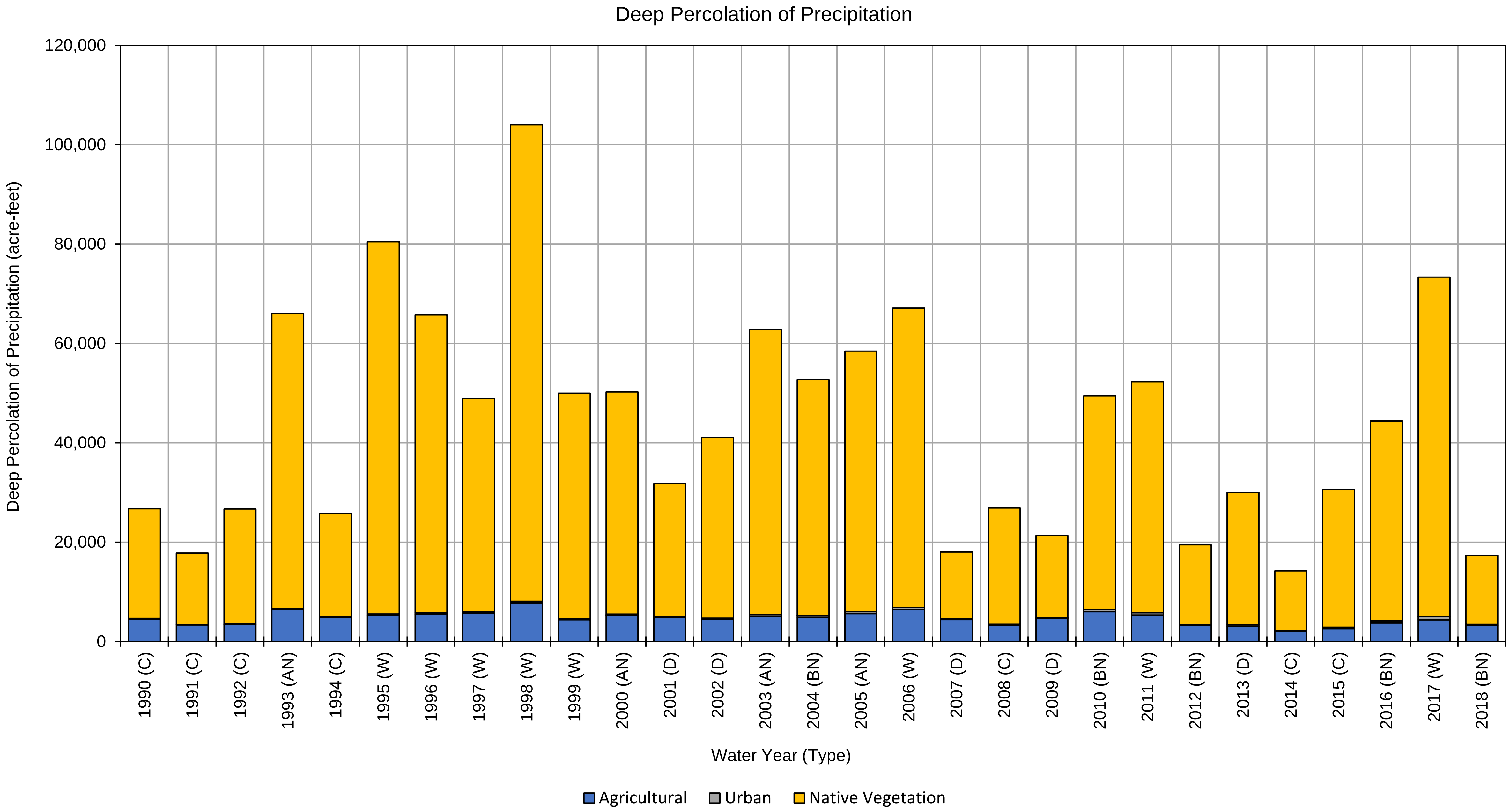
Tehama IHM - Historical

Bowman Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		7,900	47	0	7,900
1991 (C)		8,400	34	0	8,400
1992 (C)		6,700	35	0	6,700
1993 (AN)		8,700	45	0	8,700
1994 (C)		8,300	36	0	8,300
1995 (W)		8,300	50	0	8,400
1996 (W)		8,900	52	0	9,000
1997 (W)		11,000	52	0	11,000
1998 (W)		8,900	63	0	9,000
1999 (W)		9,400	71	0	9,500
2000 (AN)		9,100	71	0	9,200
2001 (D)		7,900	73	0	8,000
2002 (D)		11,000	73	0	11,000
2003 (AN)		8,400	76	0	8,500
2004 (BN)		12,000	84	0	12,000
2005 (AN)		6,200	85	0	6,300
2006 (W)		10,000	91	0	10,000
2007 (D)		12,000	71	0	12,000
2008 (C)		11,000	78	0	11,000
2009 (D)		9,900	69	0	10,000
2010 (BN)		9,700	95	0	9,800
2011 (W)		6,900	97	0	7,000
2012 (BN)		6,000	74	0	6,100
2013 (D)		9,100	85	0	9,200
2014 (C)		5,300	69	0	5,400
2015 (C)		5,900	71	0	6,000
2016 (BN)		6,800	73	0	6,900
2017 (W)		5,900	100	0	6,000
2018 (BN)		6,200	81	0	6,300
Average (1990-2018)		8,500	69	0	8,600
1990-2018	W	8,700	72	0	8,800
	AN	8,100	69	0	8,200
	BN	8,200	81	0	8,300
	D	10,000	74	0	10,000
	C	7,700	53	0	7,800

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical


Deep Percolation of Precipitation
Deep Percolation of Precipitation (acre-feet)
120,000
100,000
80,000
60,000
40,000
20,000
0
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
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2000 (AN)
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2002 (D)
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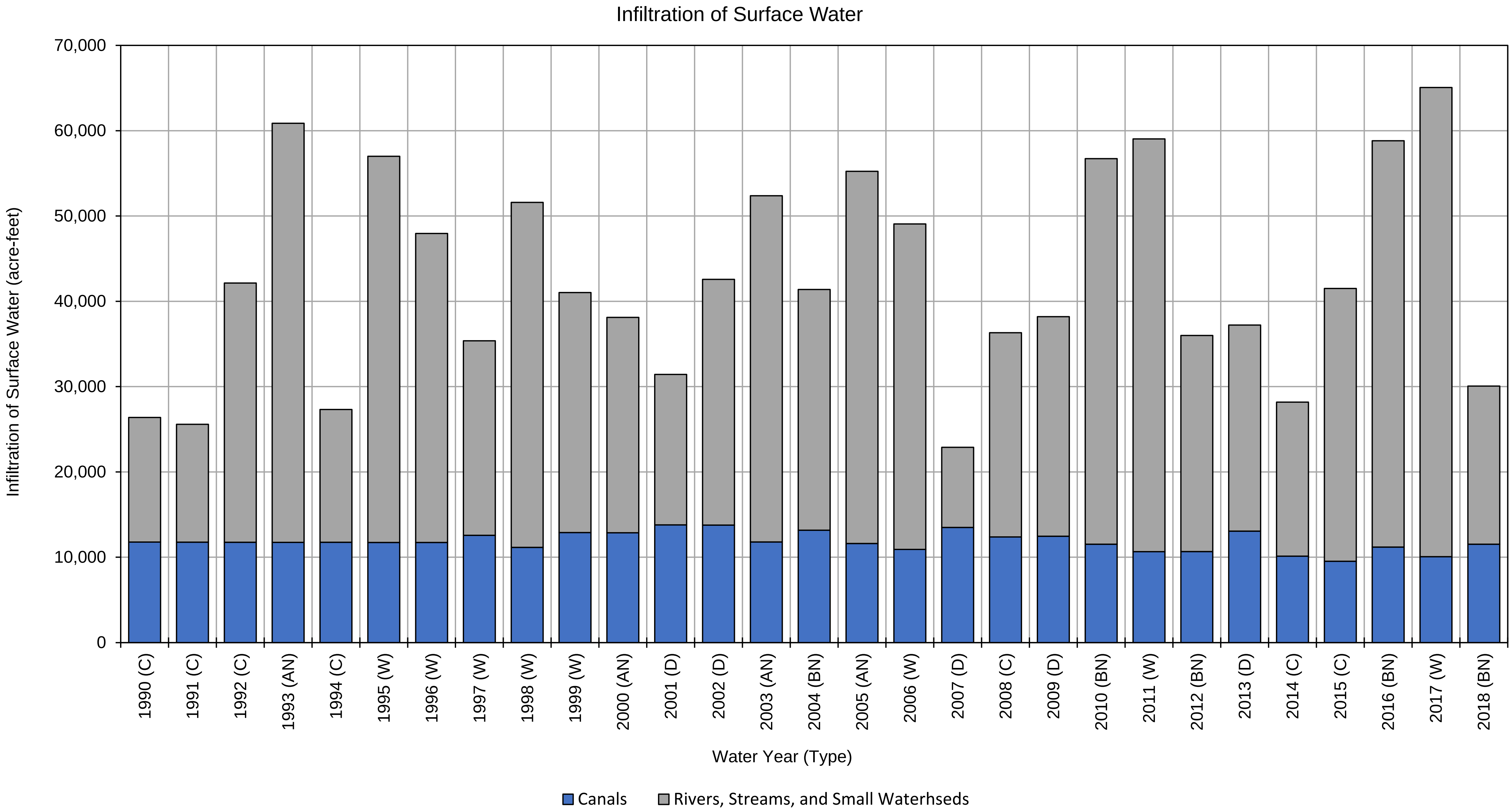
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Agricultural
Urban
Native Vegetation

Bowman Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		4,500	190	22,000	27,000
1991 (C)		3,300	110	14,000	17,000
1992 (C)		3,400	130	23,000	27,000
1993 (AN)		6,400	280	59,000	66,000
1994 (C)		4,800	120	21,000	26,000
1995 (W)		5,200	330	75,000	81,000
1996 (W)		5,500	260	60,000	66,000
1997 (W)		5,800	200	43,000	49,000
1998 (W)		7,700	400	96,000	100,000
1999 (W)		4,400	210	45,000	50,000
2000 (AN)		5,200	280	45,000	50,000
2001 (D)		4,800	210	27,000	32,000
2002 (D)		4,500	230	36,000	41,000
2003 (AN)		5,000	350	57,000	62,000
2004 (BN)		4,900	360	47,000	52,000
2005 (AN)		5,600	410	52,000	58,000
2006 (W)		6,400	460	60,000	67,000
2007 (D)		4,400	180	13,000	18,000
2008 (C)		3,300	220	23,000	27,000
2009 (D)		4,600	210	16,000	21,000
2010 (BN)		6,000	390	43,000	49,000
2011 (W)		5,300	450	46,000	52,000
2012 (BN)		3,300	220	16,000	20,000
2013 (D)		3,100	280	27,000	30,000
2014 (C)		2,100	180	12,000	14,000
2015 (C)		2,600	290	28,000	31,000
2016 (BN)		3,800	370	40,000	44,000
2017 (W)		4,400	630	68,000	73,000
2018 (BN)		3,300	220	14,000	18,000
Average (1990-2018)		4,600	280	39,000	44,000
1990-2018	W	5,600	370	62,000	68,000
	AN	5,600	330	53,000	59,000
	BN	4,200	310	32,000	37,000
	D	4,300	220	24,000	29,000
	C	3,400	170	20,000	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W Wet
AN Above Normal
BN Below Normal
D Dry
C Critical



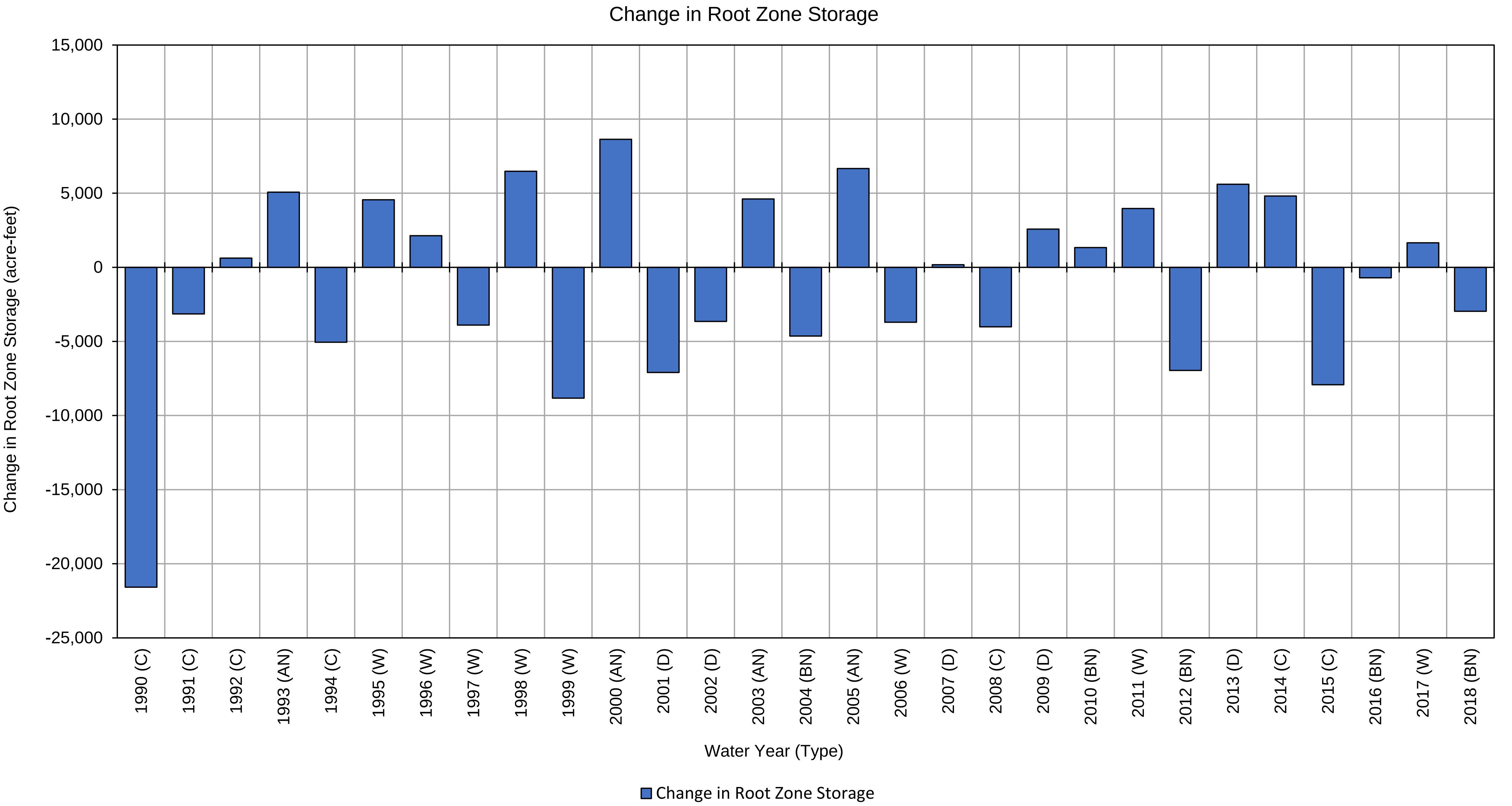
Tehama IHM - Historical

Bowman Subbasin Historical Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
1990 (C)		12,000	15,000	27,000
1991 (C)		12,000	14,000	26,000
1992 (C)		12,000	30,000	42,000
1993 (AN)		12,000	49,000	61,000
1994 (C)		12,000	16,000	28,000
1995 (W)		12,000	45,000	57,000
1996 (W)		12,000	36,000	48,000
1997 (W)		13,000	23,000	36,000
1998 (W)		11,000	40,000	51,000
1999 (W)		13,000	28,000	41,000
2000 (AN)		13,000	25,000	38,000
2001 (D)		14,000	18,000	32,000
2002 (D)		14,000	29,000	43,000
2003 (AN)		12,000	41,000	53,000
2004 (BN)		13,000	28,000	41,000
2005 (AN)		12,000	44,000	56,000
2006 (W)		11,000	38,000	49,000
2007 (D)		13,000	9,400	22,000
2008 (C)		12,000	24,000	36,000
2009 (D)		12,000	26,000	38,000
2010 (BN)		12,000	45,000	57,000
2011 (W)		11,000	48,000	59,000
2012 (BN)		11,000	25,000	36,000
2013 (D)		13,000	24,000	37,000
2014 (C)		10,000	18,000	28,000
2015 (C)		9,500	32,000	42,000
2016 (BN)		11,000	48,000	59,000
2017 (W)		10,000	55,000	65,000
2018 (BN)		12,000	19,000	31,000
Average (1990-2018)		12,000	31,000	43,000
1990-2018	W	11,000	39,000	50,000
	AN	12,000	40,000	52,000
	BN	12,000	33,000	45,000
	D	13,000	21,000	34,000
	C	11,000	21,000	32,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Bowman Subbasin Historical Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
1990 (C)		-22,000
1991 (C)		-3,100
1992 (C)		620
1993 (AN)		5,100
1994 (C)		-5,100
1995 (W)		4,600
1996 (W)		2,100
1997 (W)		-3,900
1998 (W)		6,500
1999 (W)		-8,800
2000 (AN)		8,600
2001 (D)		-7,100
2002 (D)		-3,700
2003 (AN)		4,600
2004 (BN)		-4,600
2005 (AN)		6,700
2006 (W)		-3,700
2007 (D)		170
2008 (C)		-4,000
2009 (D)		2,600
2010 (BN)		1,300
2011 (W)		4,000
2012 (BN)		-7,000
2013 (D)		5,600
2014 (C)		4,800
2015 (C)		-7,900
2016 (BN)		-710
2017 (W)		1,700
2018 (BN)		-3,000
Average (1990-2018)		-870
1990-2018	W	300
	AN	6,200
	BN	-2,800
	D	-480
	C	-5,200

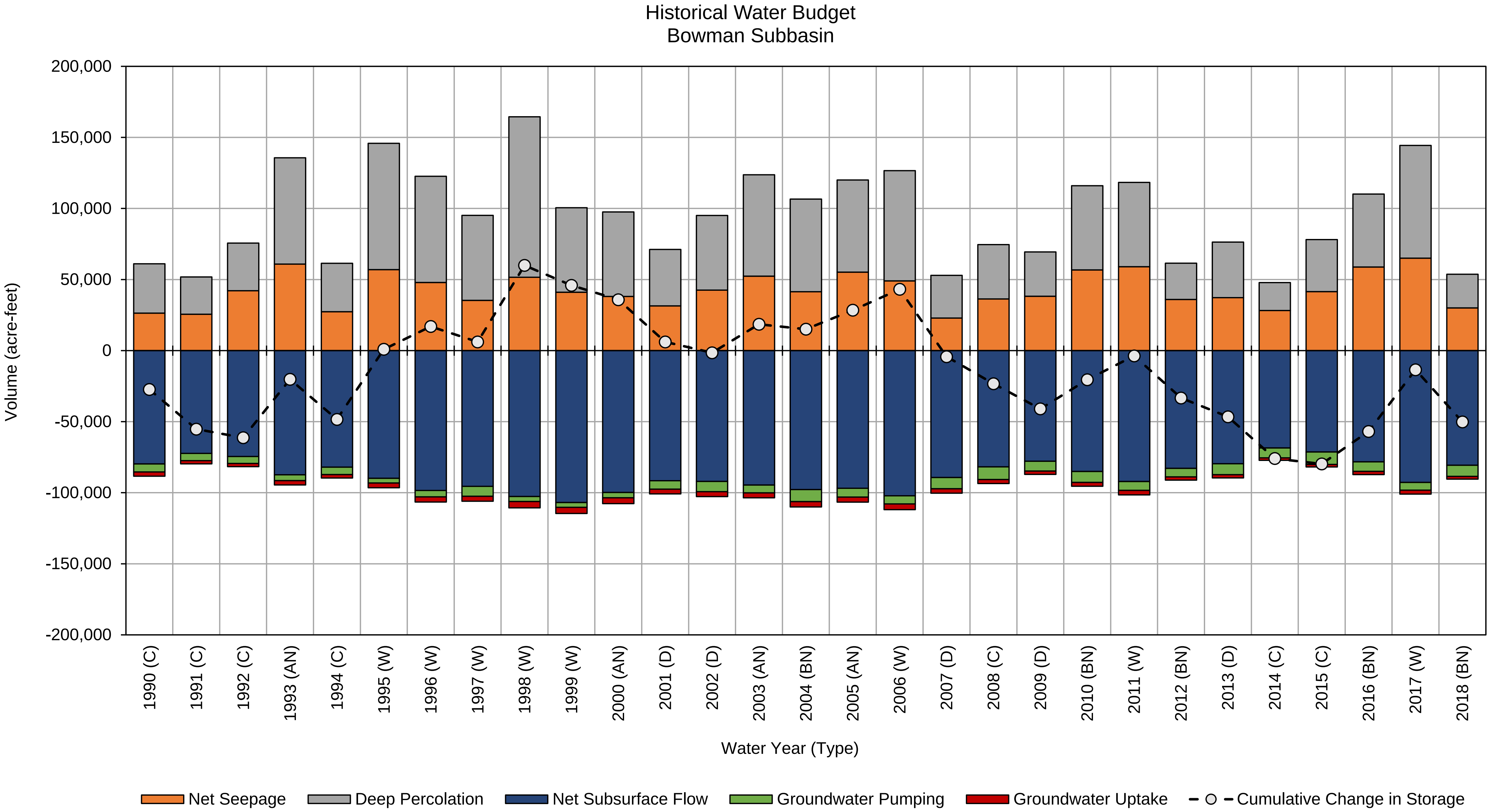
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-1b

Detailed Bowman Subbasin Water Budget Results:

Historical Model Results – Groundwater System



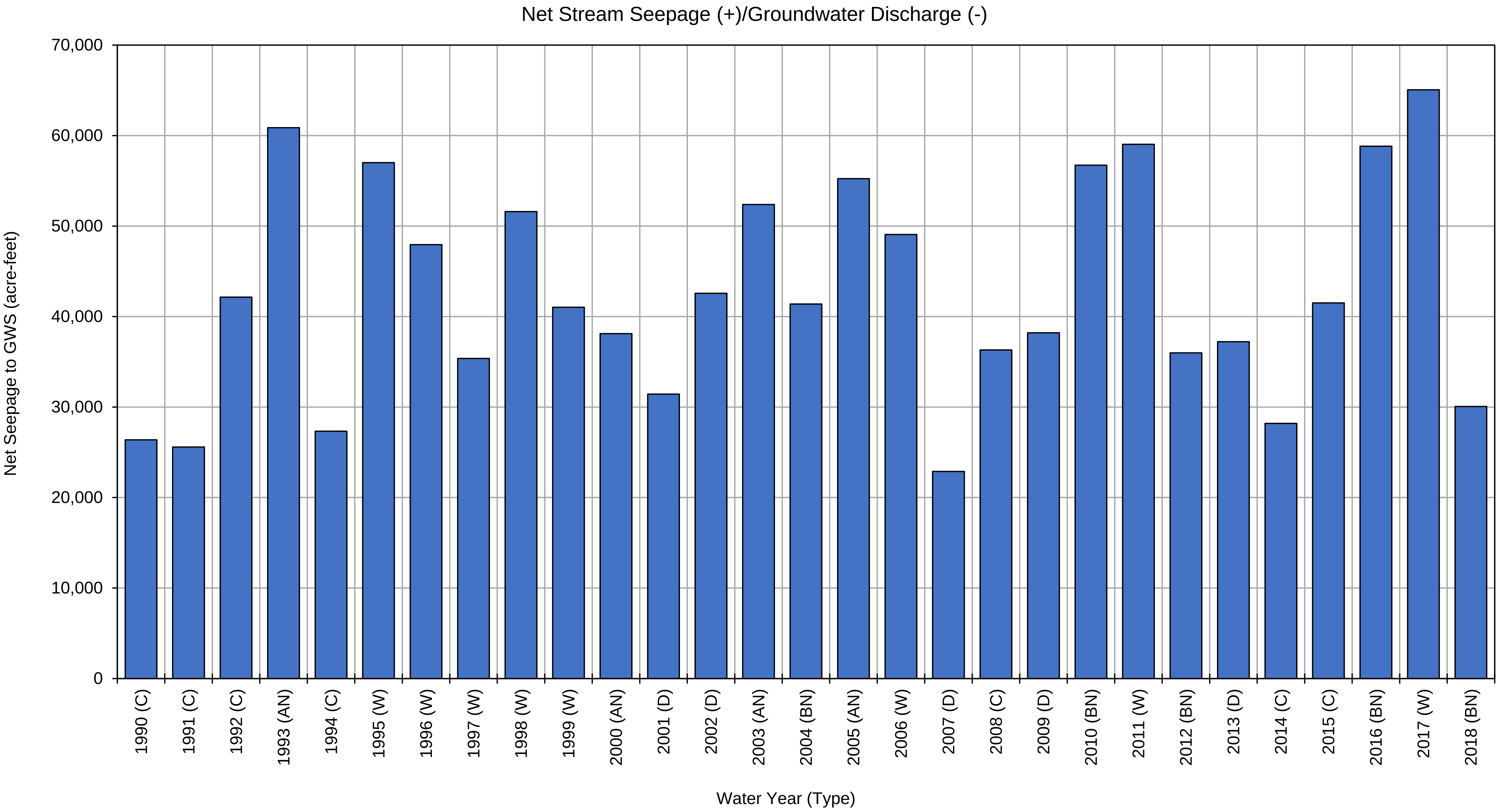
Tehama IHM - Historical

Bowman Subbasin Historical Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
1990 (C)		26,000	35,000	-5,600	-3,000	-80,000	-27,000	-27,000
1991 (C)		26,000	26,000	-5,100	-2,300	-72,000	-28,000	-55,000
1992 (C)		42,000	33,000	-4,900	-2,200	-75,000	-6,000	-61,000
1993 (AN)		61,000	75,000	-4,100	-3,100	-87,000	41,000	-20,000
1994 (C)		27,000	34,000	-5,300	-2,300	-82,000	-28,000	-48,000
1995 (W)		57,000	89,000	-3,300	-3,300	-90,000	49,000	910
1996 (W)		48,000	75,000	-4,500	-3,600	-98,000	16,000	17,000
1997 (W)		35,000	60,000	-7,000	-3,500	-96,000	-11,000	6,100
1998 (W)		52,000	110,000	-3,600	-4,400	-100,000	54,000	60,000
1999 (W)		41,000	59,000	-3,400	-4,300	-110,000	-14,000	46,000
2000 (AN)		38,000	59,000	-3,800	-4,000	-100,000	-10,000	36,000
2001 (D)		31,000	40,000	-5,900	-3,300	-92,000	-30,000	6,100
2002 (D)		43,000	53,000	-7,200	-3,400	-92,000	-7,600	-1,500
2003 (AN)		52,000	71,000	-5,500	-3,500	-95,000	20,000	19,000
2004 (BN)		41,000	65,000	-8,500	-3,700	-98,000	-3,500	15,000
2005 (AN)		55,000	65,000	-6,300	-3,600	-97,000	13,000	28,000
2006 (W)		49,000	78,000	-5,700	-4,000	-100,000	15,000	43,000
2007 (D)		23,000	30,000	-8,000	-3,100	-89,000	-47,000	-4,300
2008 (C)		36,000	38,000	-8,900	-2,900	-82,000	-19,000	-23,000
2009 (D)		38,000	31,000	-6,900	-2,400	-78,000	-18,000	-41,000
2010 (BN)		57,000	59,000	-7,700	-2,700	-85,000	21,000	-20,000
2011 (W)		59,000	59,000	-6,200	-3,200	-92,000	17,000	-3,700
2012 (BN)		36,000	26,000	-6,000	-2,300	-83,000	-30,000	-33,000
2013 (D)		37,000	39,000	-7,700	-2,300	-80,000	-13,000	-47,000
2014 (C)		28,000	20,000	-6,900	-1,700	-69,000	-29,000	-76,000
2015 (C)		42,000	37,000	-8,800	-1,700	-71,000	-3,800	-80,000
2016 (BN)		59,000	51,000	-6,700	-2,300	-78,000	23,000	-57,000
2017 (W)		65,000	79,000	-5,400	-2,800	-93,000	43,000	-13,000
2018 (BN)		30,000	24,000	-7,800	-1,900	-81,000	-37,000	-50,000
Average (1990-2018)		43,000	53,000	-6,100	-3,000	-88,000	-1,700	
1990-2018	W	51,000	76,000	-4,900	-3,700	-98,000		
	AN	52,000	68,000	-4,900	-3,500	-95,000		
	BN	45,000	45,000	-7,300	-2,600	-85,000		
	D	34,000	39,000	-7,200	-2,900	-86,000		
	C	32,000	32,000	-6,500	-2,300	-76,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



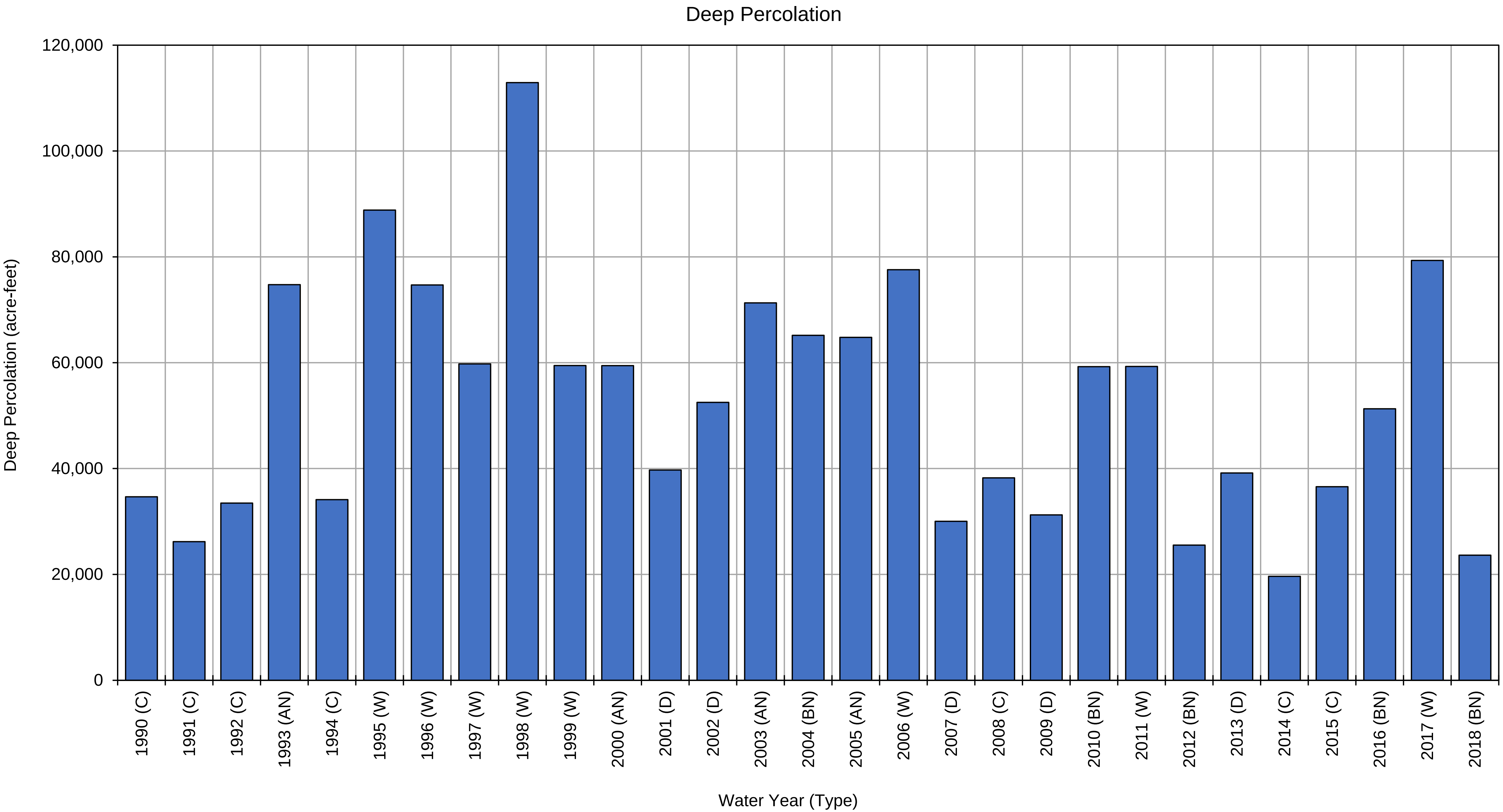
Tehama IHM - Historical

Bowman Subbasin Historical Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
1990 (C)		26,000
1991 (C)		26,000
1992 (C)		42,000
1993 (AN)		61,000
1994 (C)		27,000
1995 (W)		57,000
1996 (W)		48,000
1997 (W)		35,000
1998 (W)		52,000
1999 (W)		41,000
2000 (AN)		38,000
2001 (D)		31,000
2002 (D)		43,000
2003 (AN)		52,000
2004 (BN)		41,000
2005 (AN)		55,000
2006 (W)		49,000
2007 (D)		23,000
2008 (C)		36,000
2009 (D)		38,000
2010 (BN)		57,000
2011 (W)		59,000
2012 (BN)		36,000
2013 (D)		37,000
2014 (C)		28,000
2015 (C)		42,000
2016 (BN)		59,000
2017 (W)		65,000
2018 (BN)		30,000
Average (1990-2018)		43,000
1990-2018	W	51,000
	AN	52,000
	BN	45,000
	D	34,000
	C	32,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



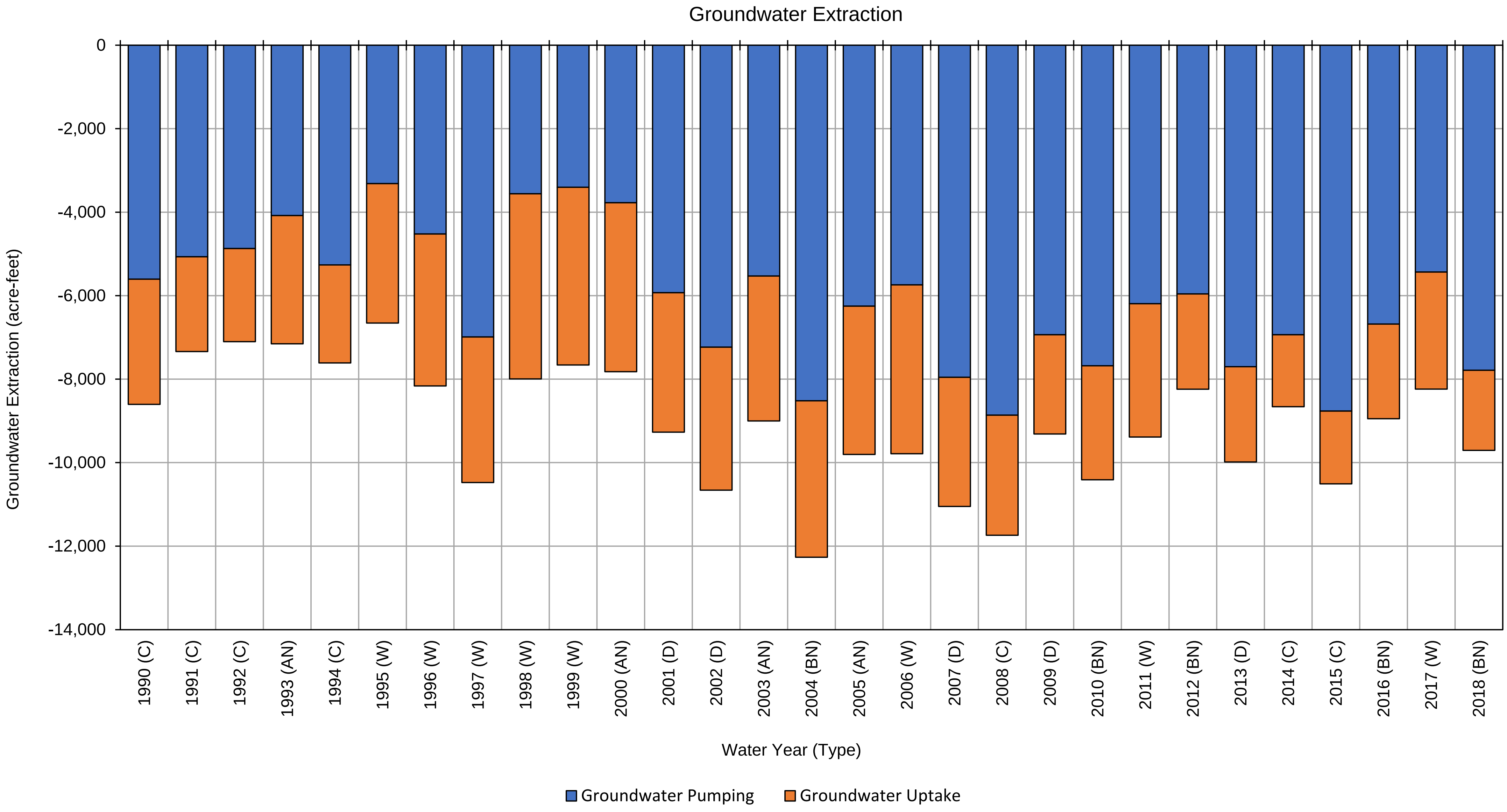
Tehama IHM - Historical

Bowman Subbasin Historical Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
1990 (C)		35,000
1991 (C)		26,000
1992 (C)		33,000
1993 (AN)		75,000
1994 (C)		34,000
1995 (W)		89,000
1996 (W)		75,000
1997 (W)		60,000
1998 (W)		110,000
1999 (W)		59,000
2000 (AN)		59,000
2001 (D)		40,000
2002 (D)		53,000
2003 (AN)		71,000
2004 (BN)		65,000
2005 (AN)		65,000
2006 (W)		78,000
2007 (D)		30,000
2008 (C)		38,000
2009 (D)		31,000
2010 (BN)		59,000
2011 (W)		59,000
2012 (BN)		26,000
2013 (D)		39,000
2014 (C)		20,000
2015 (C)		37,000
2016 (BN)		51,000
2017 (W)		79,000
2018 (BN)		24,000
Average (1990-2018)		53,000
1990-2018	W	76,000
	AN	68,000
	BN	45,000
	D	39,000
	C	32,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



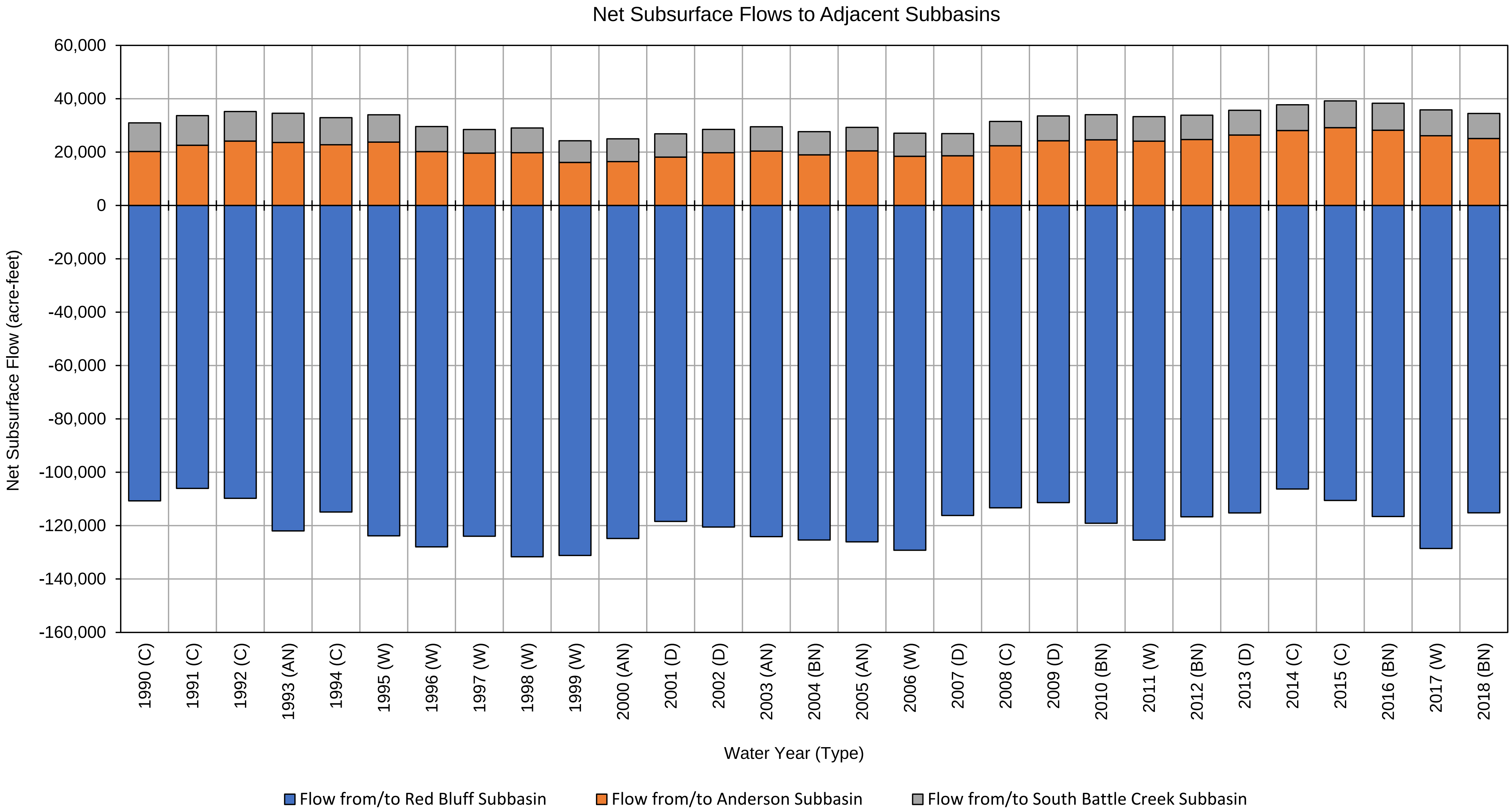
Tehama IHM - Historical

Bowman Subbasin Historical Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
1990 (C)		-5,600	-3,000	-8,600
1991 (C)		-5,100	-2,300	-7,300
1992 (C)		-4,900	-2,200	-7,100
1993 (AN)		-4,100	-3,100	-7,200
1994 (C)		-5,300	-2,300	-7,600
1995 (W)		-3,300	-3,300	-6,700
1996 (W)		-4,500	-3,600	-8,200
1997 (W)		-7,000	-3,500	-10,000
1998 (W)		-3,600	-4,400	-8,000
1999 (W)		-3,400	-4,300	-7,700
2000 (AN)		-3,800	-4,000	-7,800
2001 (D)		-5,900	-3,300	-9,300
2002 (D)		-7,200	-3,400	-11,000
2003 (AN)		-5,500	-3,500	-9,000
2004 (BN)		-8,500	-3,700	-12,000
2005 (AN)		-6,300	-3,600	-9,800
2006 (W)		-5,700	-4,000	-9,800
2007 (D)		-8,000	-3,100	-11,000
2008 (C)		-8,900	-2,900	-12,000
2009 (D)		-6,900	-2,400	-9,300
2010 (BN)		-7,700	-2,700	-10,000
2011 (W)		-6,200	-3,200	-9,400
2012 (BN)		-6,000	-2,300	-8,200
2013 (D)		-7,700	-2,300	-10,000
2014 (C)		-6,900	-1,700	-8,700
2015 (C)		-8,800	-1,700	-11,000
2016 (BN)		-6,700	-2,300	-8,900
2017 (W)		-5,400	-2,800	-8,200
2018 (BN)		-7,800	-1,900	-9,700
Average (1990-2018)		-6,100	-3,000	-9,100
1990-2018	W	-4,900	-3,700	-8,500
	AN	-4,900	-3,500	-8,400
	BN	-7,300	-2,600	-9,900
	D	-7,200	-2,900	-10,000
	C	-6,500	-2,300	-8,800

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



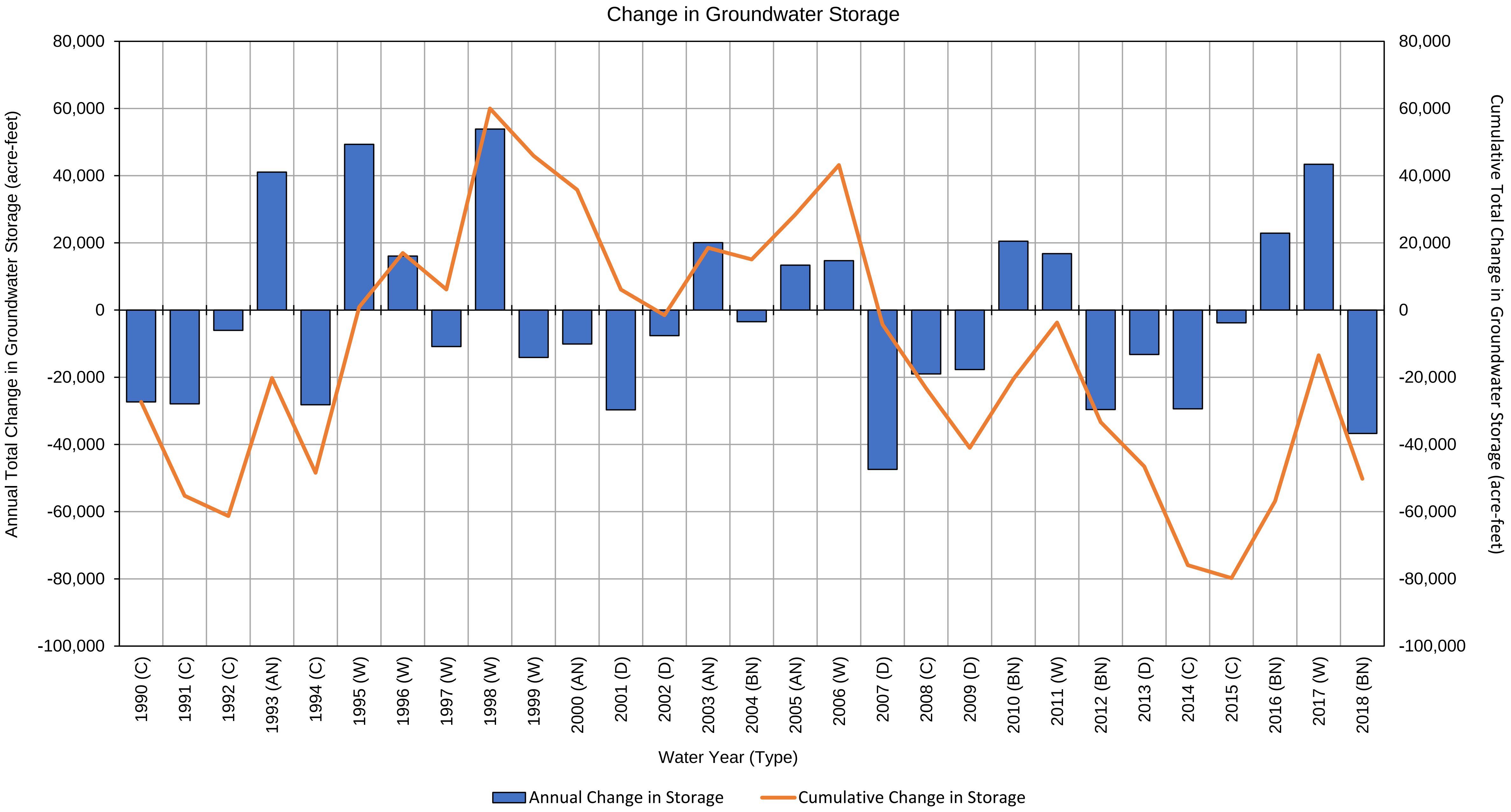
Tehama IHM - Historical

Bowman Subbasin Historical Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
1990 (C)		-110,000	20,000	11,000	-80,000
1991 (C)		-110,000	23,000	11,000	-72,000
1992 (C)		-110,000	24,000	11,000	-75,000
1993 (AN)		-120,000	24,000	11,000	-87,000
1994 (C)		-110,000	23,000	10,000	-82,000
1995 (W)		-120,000	24,000	10,000	-90,000
1996 (W)		-130,000	20,000	9,400	-98,000
1997 (W)		-120,000	20,000	8,900	-96,000
1998 (W)		-130,000	20,000	9,300	-100,000
1999 (W)		-130,000	16,000	8,100	-110,000
2000 (AN)		-120,000	16,000	8,600	-100,000
2001 (D)		-120,000	18,000	8,700	-92,000
2002 (D)		-120,000	20,000	8,800	-92,000
2003 (AN)		-120,000	20,000	9,100	-95,000
2004 (BN)		-130,000	19,000	8,700	-98,000
2005 (AN)		-130,000	20,000	8,800	-97,000
2006 (W)		-130,000	18,000	8,600	-100,000
2007 (D)		-120,000	19,000	8,300	-89,000
2008 (C)		-110,000	22,000	9,100	-82,000
2009 (D)		-110,000	24,000	9,300	-78,000
2010 (BN)		-120,000	25,000	9,500	-85,000
2011 (W)		-130,000	24,000	9,200	-92,000
2012 (BN)		-120,000	25,000	9,100	-83,000
2013 (D)		-120,000	26,000	9,300	-80,000
2014 (C)		-110,000	28,000	9,600	-69,000
2015 (C)		-110,000	29,000	10,000	-71,000
2016 (BN)		-120,000	28,000	10,000	-78,000
2017 (W)		-130,000	26,000	9,700	-93,000
2018 (BN)		-120,000	25,000	9,400	-81,000
Average (1990-2018)		-120,000	22,000	9,400	-88,000
1990-2018	W	-130,000	21,000	9,200	-98,000
	AN	-120,000	20,000	9,400	-95,000
	BN	-120,000	24,000	9,300	-85,000
	D	-120,000	21,000	8,900	-86,000
	C	-110,000	24,000	10,000	-76,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Bowman Subbasin Historical Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">1990 (C)</td><td>-27,000</td><td>-27,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>-28,000</td><td>-55,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>-6,000</td><td>-61,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>41,000</td><td>-20,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>-28,000</td><td>-48,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>49,000</td><td>910</td></tr>
<tr><td colspan="2">1996 (W)</td><td>16,000</td><td>17,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>-11,000</td><td>6,100</td></tr>
<tr><td colspan="2">1998 (W)</td><td>54,000</td><td>60,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>-14,000</td><td>46,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>-10,000</td><td>36,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>-30,000</td><td>6,100</td></tr>
<tr><td colspan="2">2002 (D)</td><td>-7,600</td><td>-1,500</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>20,000</td><td>19,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>-3,500</td><td>15,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>13,000</td><td>28,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>15,000</td><td>43,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>-47,000</td><td>-4,300</td></tr>
<tr><td colspan="2">2008 (C)</td><td>-19,000</td><td>-23,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>-18,000</td><td>-41,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>21,000</td><td>-20,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>17,000</td><td>-3,700</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>-30,000</td><td>-33,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>-13,000</td><td>-47,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>-29,000</td><td>-76,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>-3,800</td><td>-80,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>23,000</td><td>-57,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>43,000</td><td>-13,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>-37,000</td><td>-50,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>-1,700</td><td></td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W Wet
AN Above Normal
BN Below Normal
D Dry
C Critical

APPENDIX B-2

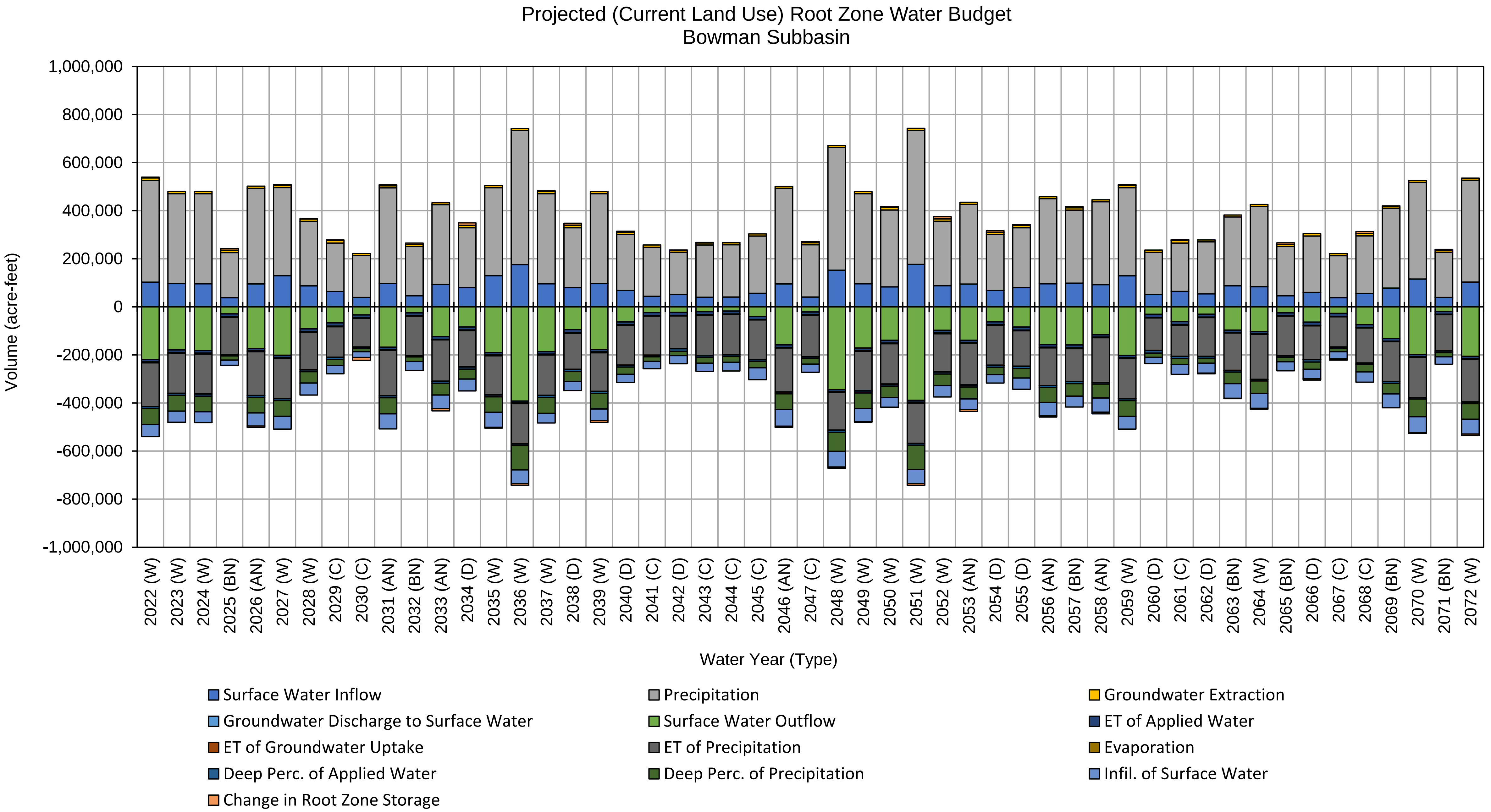
Detailed Bowman Subbasin Water Budget Results:

Projected (Current Land Use) Model Results

APPENDIX B-2a

Detailed Bowman Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Surface Water System



Projected (Current Land Use) Root Zone Water Budget
Bowman Subbasin

Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

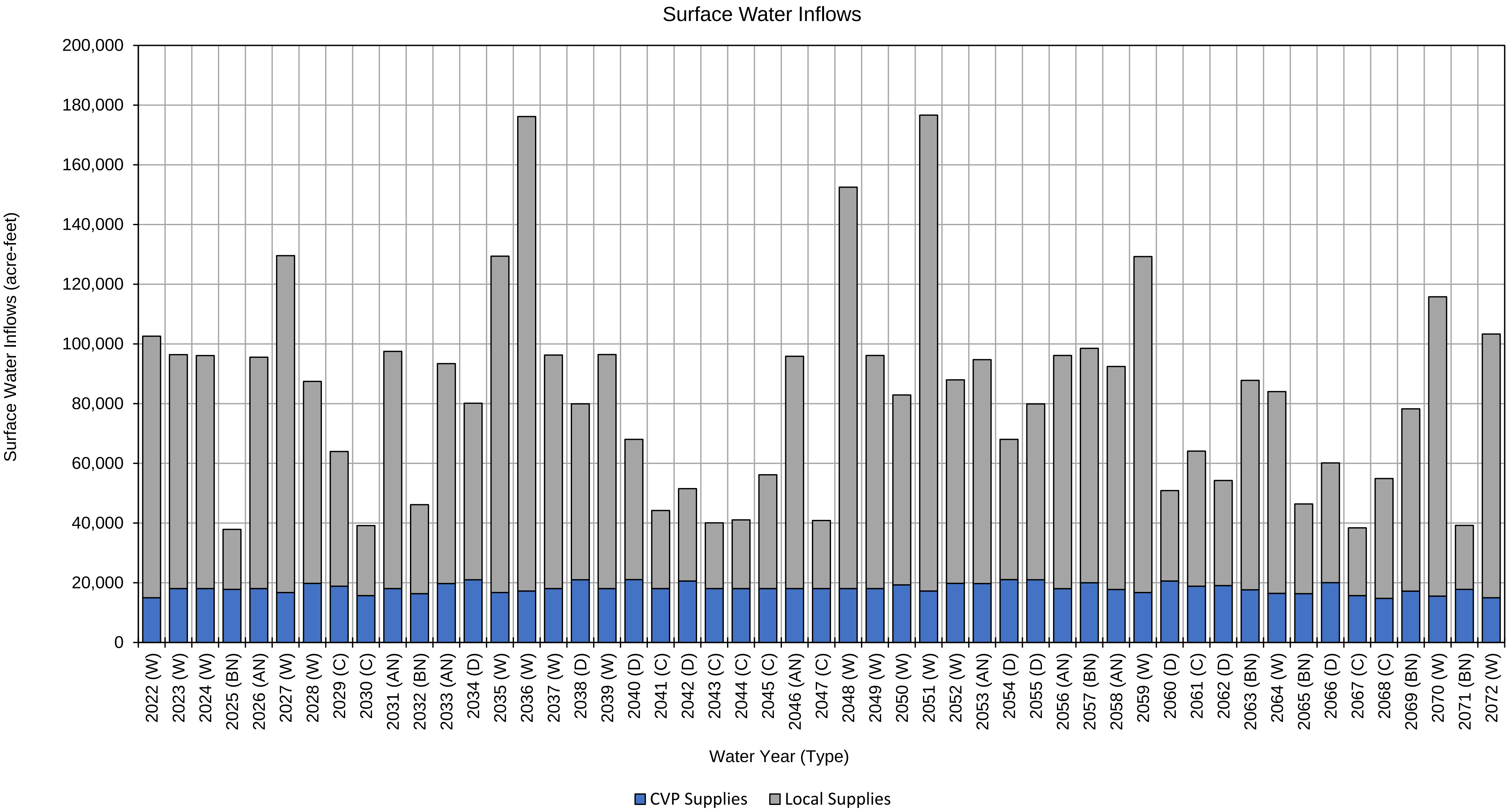
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	100,000	420,000	10,000	0	220,000	9,900	3,900	180,000	730	6,600	67,000	51,000	-3,400
2023 (W)	96,000	370,000	10,000	0	180,000	10,000	3,800	170,000	810	8,300	65,000	47,000	640
2024 (W)	96,000	370,000	10,000	0	180,000	10,000	4,000	170,000	810	8,300	65,000	44,000	1
2025 (BN)	38,000	190,000	9,700	0	29,000	12,000	2,900	150,000	800	5,800	18,000	21,000	-7,300
2026 (AN)	96,000	400,000	9,100	0	170,000	10,000	3,500	180,000	860	7,000	65,000	55,000	5,800
2027 (W)	130,000	370,000	8,800	0	200,000	9,800	3,800	170,000	790	7,600	66,000	53,000	-3,500
2028 (W)	87,000	270,000	9,600	0	92,000	11,000	3,700	160,000	950	7,700	47,000	50,000	-1,700
2029 (C)	64,000	200,000	11,000	0	66,000	13,000	3,000	130,000	990	7,800	26,000	34,000	-2,200
2030 (C)	39,000	170,000	8,700	0	33,000	13,000	2,000	120,000	840	5,200	14,000	24,000	12,000
2031 (AN)	98,000	400,000	8,800	0	170,000	9,900	3,000	190,000	850	7,800	67,000	63,000	-4,200
2032 (BN)	46,000	200,000	7,800	0	25,000	11,000	2,200	160,000	820	5,100	19,000	38,000	-6,400
2033 (AN)	93,000	330,000	8,000	0	120,000	10,000	2,900	170,000	860	8,000	49,000	56,000	10,000
2034 (D)	80,000	250,000	10,000	0	84,000	12,000	2,800	150,000	950	8,200	42,000	49,000	-10,000
2035 (W)	130,000	370,000	8,300	0	190,000	10,000	3,200	160,000	780	7,500	64,000	62,000	3,200
2036 (W)	180,000	560,000	8,400	0	390,000	7,100	3,900	170,000	650	6,300	100,000	57,000	7,300
2037 (W)	96,000	370,000	10,000	0	190,000	10,000	3,900	170,000	820	8,300	66,000	40,000	-2,300
2038 (D)	80,000	250,000	11,000	0	95,000	12,000	3,500	150,000	960	8,500	41,000	38,000	-8,200
2039 (W)	96,000	370,000	9,700	0	180,000	11,000	3,500	160,000	810	8,500	64,000	47,000	8,200
2040 (D)	68,000	230,000	8,800	0	63,000	11,000	3,000	170,000	900	7,400	30,000	34,000	-4,600
2041 (C)	44,000	200,000	9,500	0	24,000	12,000	2,500	160,000	920	6,400	19,000	30,000	540
2042 (D)	52,000	180,000	8,800	0	23,000	13,000	2,100	140,000	940	10,000	18,000	34,000	-510
2043 (C)	40,000	220,000	8,600	0	20,000	12,000	1,900	170,000	830	6,300	24,000	34,000	-2,200
2044 (C)	41,000	220,000	8,500	0	18,000	12,000	1,800	170,000	830	6,700	24,000	36,000	-14
2045 (C)	56,000	240,000	8,600	0	40,000	12,000	1,800	170,000	870	6,700	26,000	50,000	270
2046 (AN)	96,000	400,000	8,100	0	160,000	10,000	2,500	180,000	860	7,200	65,000	70,000	4,900
2047 (C)	41,000	220,000	8,600	0	22,000	12,000	1,900	170,000	830	6,200	24,000	34,000	-5,100
2048 (W)	150,000	510,000	8,200	0	340,000	9,400	2,900	160,000	760	8,100	79,000	65,000	4,500
2049 (W)	96,000	370,000	9,200	0	170,000	10,000	3,000	170,000	800	8,200	65,000	54,000	2,100
2050 (W)	83,000	320,000	11,000	0	140,000	12,000	2,900	170,000	920	8,000	47,000	41,000	-4,000
2051 (W)	180,000	560,000	8,300	0	390,000	7,300	3,800	170,000	650	6,600	100,000	60,000	6,400
2052 (W)	88,000	270,000	9,800	0	97,000	11,000	3,800	160,000	950	7,700	49,000	47,000	-8,900
2053 (AN)	95,000	330,000	8,700	0	140,000	10,000	3,600	170,000	870	8,200	49,000	43,000	8,800
2054 (D)	68,000	230,000	8,900	0	63,000	11,000	2,900	170,000	890	7,200	31,000	35,000	-6,700
2055 (D)	80,000	250,000	10,000	0	84,000	13,000	3,000	150,000	960	8,400	40,000	47,000	-3,700
2056 (AN)	96,000	350,000	8,200	0	160,000	10,000	3,100	160,000	820	7,300	62,000	56,000	4,700
2057 (BN)	99,000	300,000	9,800	0	160,000	12,000	3,300	140,000	970	8,800	52,000	45,000	-4,600
2058 (AN)	92,000	340,000	7,900	0	120,000	8,900	3,200	190,000	760	5,700	58,000	59,000	7,000
2059 (W)	130,000	370,000	8,700	0	200,000	9,900	3,600	170,000	800	7,400	66,000	53,000	-3,900
2060 (D)	51,000	180,000	9,300	0	31,000	12,000	2,700	130,000	960	10,000	18,000	25,000	430
2061 (C)	64,000	200,000	11,000	0	61,000	14,000	2,500	130,000	990	8,000	26,000	40,000	-4,400
2062 (D)	54,000	220,000	8,100	0	31,000	12,000	2,100	160,000	940	7,100	20,000	42,000	2,700
2063 (BN)	88,000	290,000	7,700	0	97,000	9,800	2,500	160,000	850	6,700	48,000	61,000	1,700
2064 (W)	84,000	330,000	7,800	0	100,000	9,000	2,900	190,000	750	5,900	52,000	62,000	3,900
2065 (BN)	46,000	200,000	7,800	0	25,000	11,000	2,100	160,000	820	5,200	19,000	38,000	-7,300

Bowman Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)	60,000	230,000	10,000	0	64,000	13,000	2,200	140,000	960	9,500	30,000	39,000	5,700
2067 (C)	38,000	170,000	8,800	0	27,000	12,000	1,700	130,000	830	4,800	14,000	30,000	4,900
2068 (C)	55,000	240,000	10,000	0	74,000	12,000	1,700	150,000	770	5,600	31,000	43,000	-8,000
2069 (BN)	78,000	330,000	8,800	0	130,000	12,000	2,100	170,000	840	6,800	44,000	58,000	-720
2070 (W)	120,000	400,000	8,100	0	200,000	9,700	2,700	170,000	750	5,800	73,000	67,000	1,700
2071 (BN)	39,000	190,000	8,700	0	19,000	12,000	1,900	150,000	790	6,400	17,000	31,000	-3,100
2072 (W)	100,000	420,000	8,900	0	210,000	10,000	2,800	180,000	740	7,000	65,000	62,000	6,700
Average (2022-2072)	83,000	300,000	9,100	0	120,000	11,000	2,900	160,000	850	7,300	46,000	46,000	-69
2022-2072 W	110,000	390,000	9,200	0	200,000	9,900	3,500	170,000	790	7,400	67,000	53,000	940
AN	95,000	370,000	8,400	0	150,000	9,900	3,100	180,000	840	7,300	59,000	57,000	5,300
BN	62,000	240,000	8,600	0	69,000	11,000	2,400	160,000	840	6,400	31,000	42,000	-3,900
D	66,000	220,000	9,500	0	60,000	12,000	2,700	150,000	940	8,600	30,000	38,000	-2,800
C	48,000	210,000	9,300	0	39,000	12,000	2,100	150,000	870	6,400	23,000	35,000	-460

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

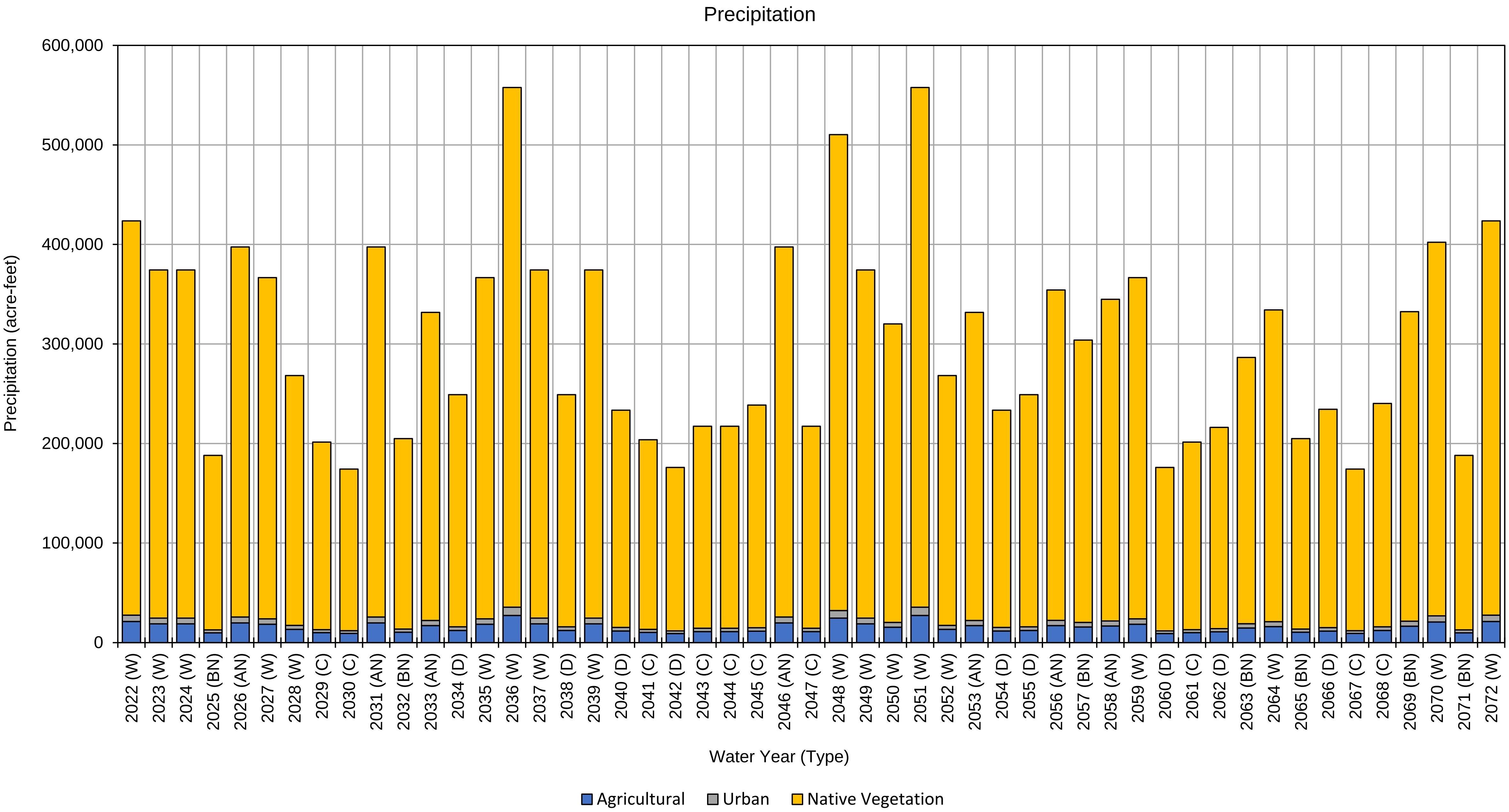
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	15,000	88,000	100,000
2023 (W)	18,000	78,000	96,000
2024 (W)	18,000	78,000	96,000
2025 (BN)	18,000	20,000	38,000
2026 (AN)	18,000	77,000	95,000
2027 (W)	17,000	110,000	130,000
2028 (W)	20,000	68,000	88,000
2029 (C)	19,000	45,000	64,000
2030 (C)	16,000	23,000	39,000
2031 (AN)	18,000	79,000	97,000
2032 (BN)	16,000	30,000	46,000
2033 (AN)	20,000	74,000	94,000
2034 (D)	21,000	59,000	80,000
2035 (W)	17,000	110,000	130,000
2036 (W)	17,000	160,000	180,000
2037 (W)	18,000	78,000	96,000
2038 (D)	21,000	59,000	80,000
2039 (W)	18,000	78,000	96,000
2040 (D)	21,000	47,000	68,000
2041 (C)	18,000	26,000	44,000
2042 (D)	21,000	31,000	52,000
2043 (C)	18,000	22,000	40,000
2044 (C)	18,000	23,000	41,000
2045 (C)	18,000	38,000	56,000
2046 (AN)	18,000	78,000	96,000
2047 (C)	18,000	23,000	41,000
2048 (W)	18,000	130,000	150,000
2049 (W)	18,000	78,000	96,000
2050 (W)	19,000	64,000	83,000
2051 (W)	17,000	160,000	180,000
2052 (W)	20,000	68,000	88,000
2053 (AN)	20,000	75,000	95,000
2054 (D)	21,000	47,000	68,000
2055 (D)	21,000	59,000	80,000
2056 (AN)	18,000	78,000	96,000
2057 (BN)	20,000	79,000	99,000
2058 (AN)	18,000	75,000	93,000
2059 (W)	17,000	110,000	130,000
2060 (D)	21,000	30,000	51,000
2061 (C)	19,000	45,000	64,000
2062 (D)	19,000	35,000	54,000
2063 (BN)	18,000	70,000	88,000

Bowman Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		16,000	68,000	84,000
2065 (BN)		16,000	30,000	46,000
2066 (D)		20,000	40,000	60,000
2067 (C)		16,000	23,000	39,000
2068 (C)		15,000	40,000	55,000
2069 (BN)		17,000	61,000	78,000
2070 (W)		16,000	100,000	120,000
2071 (BN)		18,000	21,000	39,000
2072 (W)		15,000	88,000	100,000
Average (2022-2072)		18,000	64,000	82,000
2022-2072	W	17,000	96,000	110,000
	AN	18,000	77,000	95,000
	BN	18,000	44,000	62,000
	D	21,000	45,000	66,000
	C	17,000	31,000	48,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

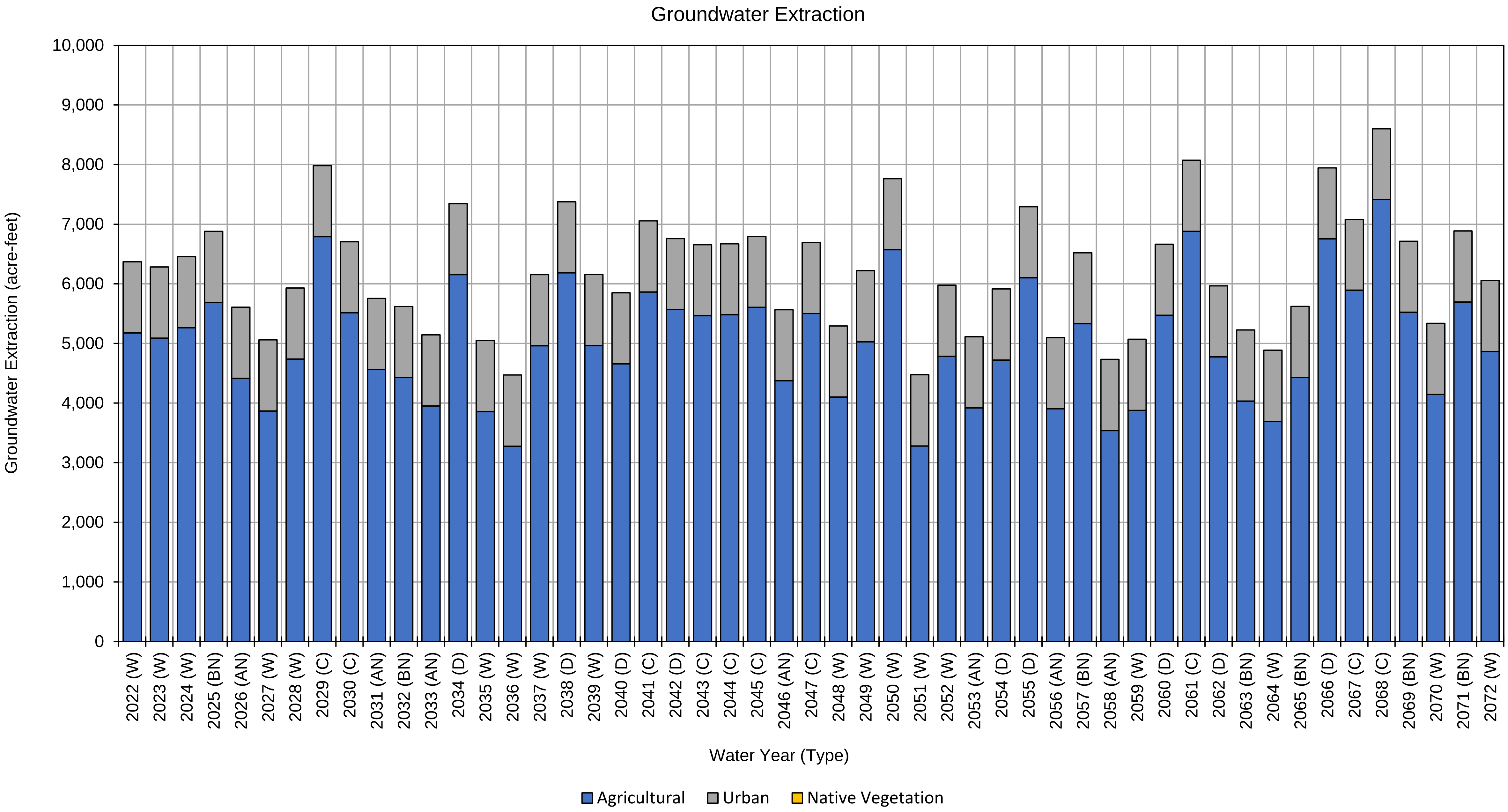
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	21,000	6,400	400,000	430,000
2023 (W)	19,000	5,700	350,000	370,000
2024 (W)	19,000	5,700	350,000	370,000
2025 (BN)	9,800	2,900	180,000	190,000
2026 (AN)	20,000	6,000	370,000	400,000
2027 (W)	18,000	5,500	340,000	360,000
2028 (W)	13,000	4,000	250,000	270,000
2029 (C)	10,000	3,000	190,000	200,000
2030 (C)	9,200	2,700	160,000	170,000
2031 (AN)	20,000	6,000	370,000	400,000
2032 (BN)	10,000	3,100	190,000	200,000
2033 (AN)	17,000	5,100	310,000	330,000
2034 (D)	12,000	3,700	230,000	250,000
2035 (W)	18,000	5,500	340,000	360,000
2036 (W)	27,000	8,300	520,000	560,000
2037 (W)	19,000	5,700	350,000	370,000
2038 (D)	12,000	3,700	230,000	250,000
2039 (W)	19,000	5,700	350,000	370,000
2040 (D)	12,000	3,500	220,000	240,000
2041 (C)	10,000	3,100	190,000	200,000
2042 (D)	9,100	2,700	160,000	170,000
2043 (C)	11,000	3,300	200,000	210,000
2044 (C)	11,000	3,300	200,000	210,000
2045 (C)	11,000	3,500	220,000	230,000
2046 (AN)	20,000	6,000	370,000	400,000
2047 (C)	11,000	3,300	200,000	210,000
2048 (W)	25,000	7,500	480,000	510,000
2049 (W)	19,000	5,700	350,000	370,000
2050 (W)	15,000	4,800	300,000	320,000
2051 (W)	27,000	8,300	520,000	560,000
2052 (W)	13,000	4,000	250,000	270,000
2053 (AN)	17,000	5,100	310,000	330,000
2054 (D)	12,000	3,500	220,000	240,000
2055 (D)	12,000	3,700	230,000	250,000
2056 (AN)	17,000	5,200	330,000	350,000
2057 (BN)	16,000	4,600	280,000	300,000
2058 (AN)	17,000	5,000	320,000	340,000
2059 (W)	18,000	5,500	340,000	360,000
2060 (D)	9,100	2,700	160,000	170,000
2061 (C)	10,000	3,000	190,000	200,000
2062 (D)	11,000	3,200	200,000	210,000
2063 (BN)	15,000	4,300	270,000	290,000

Bowman Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		16,000	4,900	310,000	330,000
2065 (BN)		10,000	3,100	190,000	200,000
2066 (D)		11,000	3,500	220,000	230,000
2067 (C)		9,200	2,700	160,000	170,000
2068 (C)		12,000	3,700	220,000	240,000
2069 (BN)		16,000	5,000	310,000	330,000
2070 (W)		21,000	6,200	380,000	410,000
2071 (BN)		9,800	2,900	180,000	190,000
2072 (W)		21,000	6,400	400,000	430,000
Average (2022-2072)		15,000	4,500	280,000	300,000
2022-2072	W	19,000	5,900	370,000	390,000
	AN	18,000	5,500	340,000	360,000
	BN	12,000	3,700	230,000	250,000
	D	11,000	3,300	210,000	220,000
	C	11,000	3,200	190,000	200,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

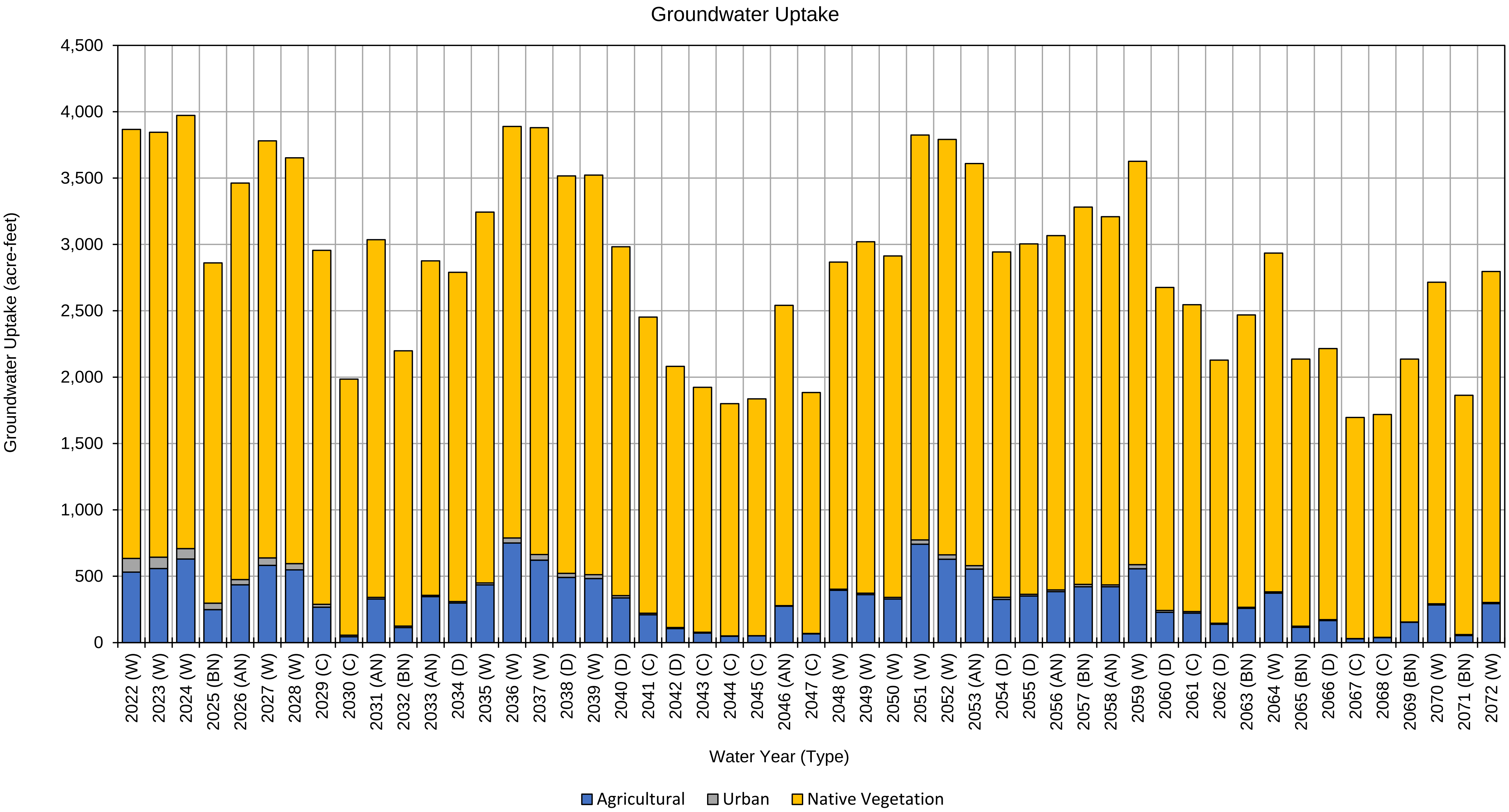
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	1,200	0	6,400
2023 (W)	5,100	1,200	0	6,300
2024 (W)	5,300	1,200	0	6,500
2025 (BN)	5,700	1,200	0	6,900
2026 (AN)	4,400	1,200	0	5,600
2027 (W)	3,900	1,200	0	5,100
2028 (W)	4,700	1,200	0	5,900
2029 (C)	6,800	1,200	0	8,000
2030 (C)	5,500	1,200	0	6,700
2031 (AN)	4,600	1,200	0	5,800
2032 (BN)	4,400	1,200	0	5,600
2033 (AN)	4,000	1,200	0	5,200
2034 (D)	6,200	1,200	0	7,400
2035 (W)	3,900	1,200	0	5,100
2036 (W)	3,300	1,200	0	4,500
2037 (W)	5,000	1,200	0	6,200
2038 (D)	6,200	1,200	0	7,400
2039 (W)	5,000	1,200	0	6,200
2040 (D)	4,700	1,200	0	5,900
2041 (C)	5,900	1,200	0	7,100
2042 (D)	5,600	1,200	0	6,800
2043 (C)	5,500	1,200	0	6,700
2044 (C)	5,500	1,200	0	6,700
2045 (C)	5,600	1,200	0	6,800
2046 (AN)	4,400	1,200	0	5,600
2047 (C)	5,500	1,200	0	6,700
2048 (W)	4,100	1,200	0	5,300
2049 (W)	5,000	1,200	0	6,200
2050 (W)	6,600	1,200	0	7,800
2051 (W)	3,300	1,200	0	4,500
2052 (W)	4,800	1,200	0	6,000
2053 (AN)	3,900	1,200	0	5,100
2054 (D)	4,700	1,200	0	5,900
2055 (D)	6,100	1,200	0	7,300
2056 (AN)	3,900	1,200	0	5,100
2057 (BN)	5,300	1,200	0	6,500
2058 (AN)	3,500	1,200	0	4,700
2059 (W)	3,900	1,200	0	5,100
2060 (D)	5,500	1,200	0	6,700
2061 (C)	6,900	1,200	0	8,100
2062 (D)	4,800	1,200	0	6,000
2063 (BN)	4,000	1,200	0	5,200

Bowman Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2064 (W)</td><td>3,700</td><td>1,200</td><td>0</td><td>4,900</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>4,400</td><td>1,200</td><td>0</td><td>5,600</td></tr>
<tr><td colspan="2">2066 (D)</td><td>6,800</td><td>1,200</td><td>0</td><td>8,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>5,900</td><td>1,200</td><td>0</td><td>7,100</td></tr>
<tr><td colspan="2">2068 (C)</td><td>7,400</td><td>1,200</td><td>0</td><td>8,600</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>5,500</td><td>1,200</td><td>0</td><td>6,700</td></tr>
<tr><td colspan="2">2070 (W)</td><td>4,100</td><td>1,200</td><td>0</td><td>5,300</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>5,700</td><td>1,200</td><td>0</td><td>6,900</td></tr>
<tr><td colspan="2">2072 (W)</td><td>4,900</td><td>1,200</td><td>0</td><td>6,100</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>5,000</td><td>1,200</td><td>0</td><td>6,200</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>4,500</td><td>1,200</td><td>0</td><td>5,700</td></tr>
<tr><td>AN</td><td>4,100</td><td>1,200</td><td>0</td><td>5,300</td></tr>
<tr><td>BN</td><td>5,000</td><td>1,200</td><td>0</td><td>6,200</td></tr>
<tr><td>D</td><td>5,600</td><td>1,200</td><td>0</td><td>6,800</td></tr>
<tr><td>C</td><td>6,000</td><td>1,200</td><td>0</td><td>7,200</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	530	100	3,200	3,800
2023 (W)	560	86	3,200	3,800
2024 (W)	630	78	3,300	4,000
2025 (BN)	250	49	2,600	2,900
2026 (AN)	440	39	3,000	3,500
2027 (W)	580	56	3,100	3,700
2028 (W)	550	47	3,100	3,700
2029 (C)	270	22	2,700	3,000
2030 (C)	44	11	1,900	2,000
2031 (AN)	330	12	2,700	3,000
2032 (BN)	110	11	2,100	2,200
2033 (AN)	350	11	2,500	2,900
2034 (D)	300	10	2,500	2,800
2035 (W)	430	15	2,800	3,200
2036 (W)	750	37	3,100	3,900
2037 (W)	620	42	3,200	3,900
2038 (D)	490	31	3,000	3,500
2039 (W)	480	29	3,000	3,500
2040 (D)	340	17	2,600	3,000
2041 (C)	210	12	2,200	2,400
2042 (D)	100	9	2,000	2,100
2043 (C)	72	6	1,800	1,900
2044 (C)	47	3	1,800	1,900
2045 (C)	51	1	1,800	1,900
2046 (AN)	270	4	2,300	2,600
2047 (C)	66	3	1,800	1,900
2048 (W)	390	8	2,500	2,900
2049 (W)	360	11	2,600	3,000
2050 (W)	330	13	2,600	2,900
2051 (W)	740	32	3,100	3,900
2052 (W)	630	34	3,100	3,800
2053 (AN)	550	26	3,000	3,600
2054 (D)	330	16	2,600	2,900
2055 (D)	350	13	2,600	3,000
2056 (AN)	380	13	2,700	3,100
2057 (BN)	420	18	2,800	3,200
2058 (AN)	420	14	2,800	3,200
2059 (W)	560	31	3,000	3,600
2060 (D)	230	14	2,400	2,600
2061 (C)	220	11	2,300	2,500
2062 (D)	140	8	2,000	2,100
2063 (BN)	260	8	2,200	2,500

Bowman Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		370	11	2,600	3,000
2065 (BN)		110	9	2,000	2,100
2066 (D)		170	7	2,000	2,200
2067 (C)		28	3	1,700	1,700
2068 (C)		37	2	1,700	1,700
2069 (BN)		150	2	2,000	2,200
2070 (W)		280	8	2,400	2,700
2071 (BN)		54	6	1,800	1,900
2072 (W)		290	9	2,500	2,800
Average (2022-2072)		330	21	2,500	2,900
2022-2072	W	510	36	2,900	3,400
	AN	390	17	2,700	3,100
	BN	190	15	2,200	2,400
	D	270	14	2,400	2,700
	C	100	7	2,000	2,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
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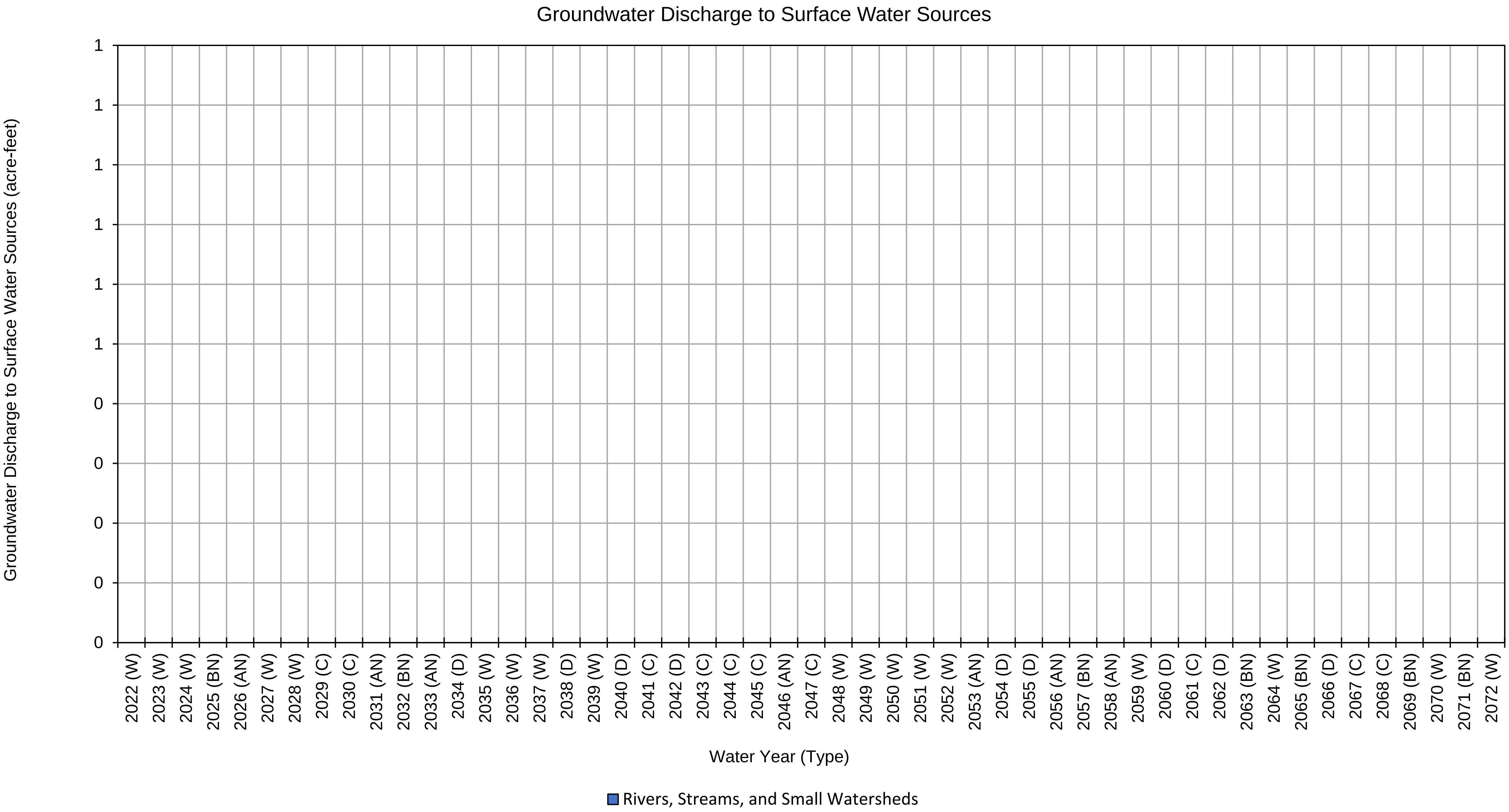
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

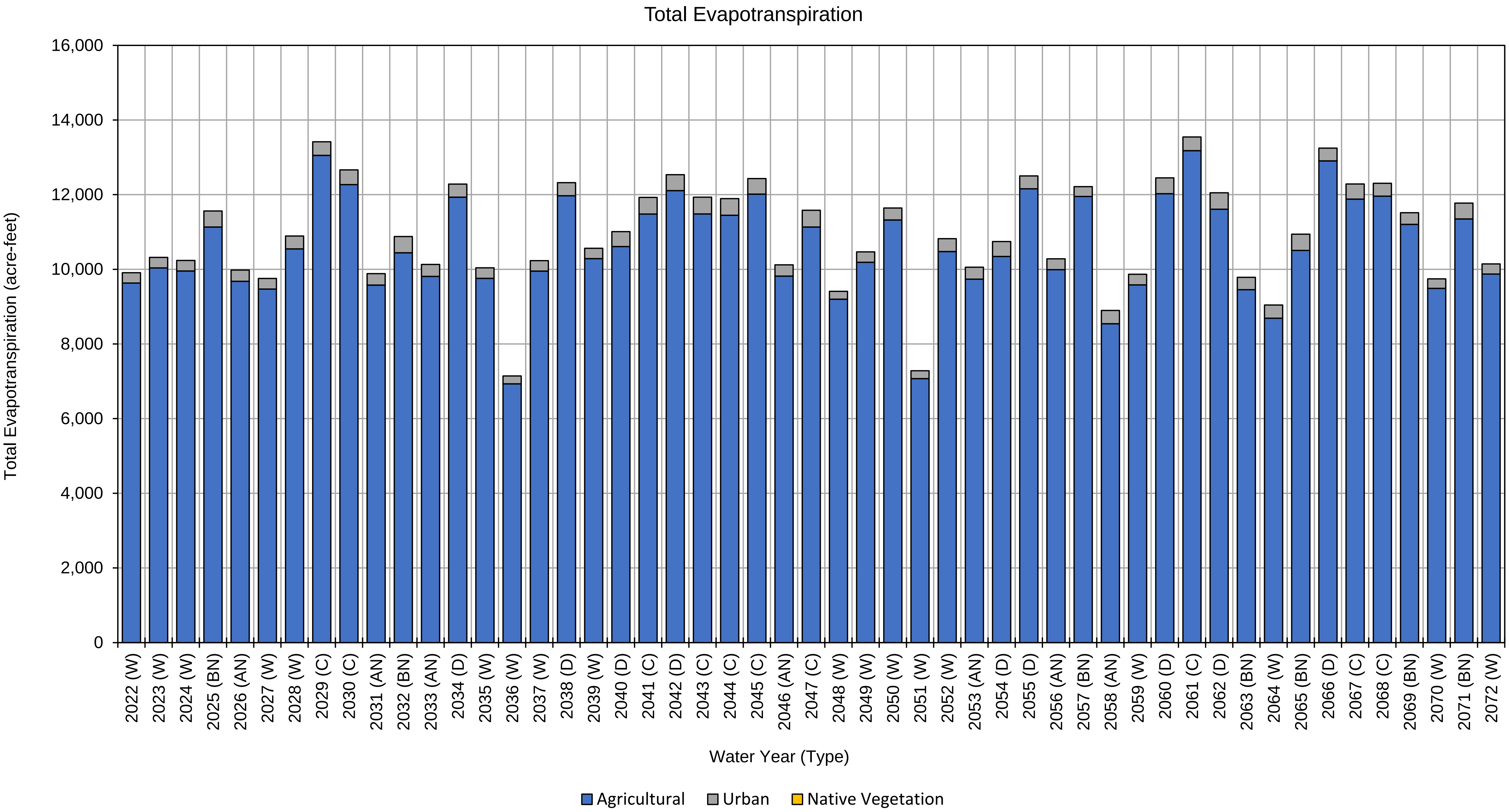
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	0
2023 (W)	0
2024 (W)	0
2025 (BN)	0
2026 (AN)	0
2027 (W)	0
2028 (W)	0
2029 (C)	0
2030 (C)	0
2031 (AN)	0
2032 (BN)	0
2033 (AN)	0
2034 (D)	0
2035 (W)	0
2036 (W)	0
2037 (W)	0
2038 (D)	0
2039 (W)	0
2040 (D)	0
2041 (C)	0
2042 (D)	0
2043 (C)	0
2044 (C)	0
2045 (C)	0
2046 (AN)	0
2047 (C)	0
2048 (W)	0
2049 (W)	0
2050 (W)	0
2051 (W)	0
2052 (W)	0
2053 (AN)	0
2054 (D)	0
2055 (D)	0
2056 (AN)	0
2057 (BN)	0
2058 (AN)	0
2059 (W)	0
2060 (D)	0
2061 (C)	0
2062 (D)	0
2063 (BN)	0

Bowman Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		0
2066 (D)		0
2067 (C)		0
2068 (C)		0
2069 (BN)		0
2070 (W)		0
2071 (BN)		0
2072 (W)		0
Average (2022-2072)		0
2022-2072	W	0
	AN	0
	BN	0
	D	0
	C	0

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	1,800	180,000	200,000
2023 (W)	18,000	1,700	160,000	180,000
2024 (W)	18,000	1,700	160,000	180,000
2025 (BN)	17,000	1,500	150,000	170,000
2026 (AN)	18,000	1,800	180,000	200,000
2027 (W)	17,000	1,600	160,000	180,000
2028 (W)	17,000	1,500	150,000	170,000
2029 (C)	18,000	1,300	120,000	140,000
2030 (C)	17,000	1,300	110,000	130,000
2031 (AN)	18,000	1,900	180,000	200,000
2032 (BN)	17,000	1,600	160,000	180,000
2033 (AN)	17,000	1,700	170,000	190,000
2034 (D)	18,000	1,400	150,000	170,000
2035 (W)	17,000	1,600	160,000	180,000
2036 (W)	15,000	1,700	160,000	180,000
2037 (W)	18,000	1,600	160,000	180,000
2038 (D)	18,000	1,400	150,000	170,000
2039 (W)	17,000	1,600	160,000	180,000
2040 (D)	17,000	1,600	160,000	180,000
2041 (C)	18,000	1,600	160,000	180,000
2042 (D)	17,000	1,400	130,000	150,000
2043 (C)	18,000	1,700	160,000	180,000
2044 (C)	18,000	1,700	160,000	180,000
2045 (C)	18,000	1,600	160,000	180,000
2046 (AN)	18,000	1,800	180,000	200,000
2047 (C)	18,000	1,700	170,000	190,000
2048 (W)	16,000	1,500	150,000	170,000
2049 (W)	17,000	1,600	160,000	180,000
2050 (W)	18,000	1,600	160,000	180,000
2051 (W)	15,000	1,700	160,000	180,000
2052 (W)	17,000	1,500	150,000	170,000
2053 (AN)	17,000	1,700	170,000	190,000
2054 (D)	17,000	1,600	160,000	180,000
2055 (D)	18,000	1,400	140,000	160,000
2056 (AN)	17,000	1,600	150,000	170,000
2057 (BN)	17,000	1,300	130,000	150,000
2058 (AN)	17,000	1,900	180,000	200,000
2059 (W)	17,000	1,600	160,000	180,000
2060 (D)	17,000	1,400	130,000	150,000
2061 (C)	18,000	1,300	130,000	150,000
2062 (D)	18,000	1,600	160,000	180,000
2063 (BN)	16,000	1,500	150,000	170,000

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		16,000	1,800	180,000	200,000
2065 (BN)		17,000	1,600	160,000	180,000
2066 (D)		18,000	1,400	140,000	160,000
2067 (C)		17,000	1,300	120,000	140,000
2068 (C)		18,000	1,400	140,000	160,000
2069 (BN)		18,000	1,600	160,000	180,000
2070 (W)		17,000	1,600	160,000	180,000
2071 (BN)		17,000	1,500	150,000	170,000
2072 (W)		17,000	1,700	170,000	190,000
Average (2022-2072)		17,000	1,600	160,000	180,000
2022-2072	W	17,000	1,600	160,000	180,000
	AN	17,000	1,800	170,000	190,000
	BN	17,000	1,500	150,000	170,000
	D	18,000	1,500	150,000	170,000
	C	18,000	1,500	140,000	160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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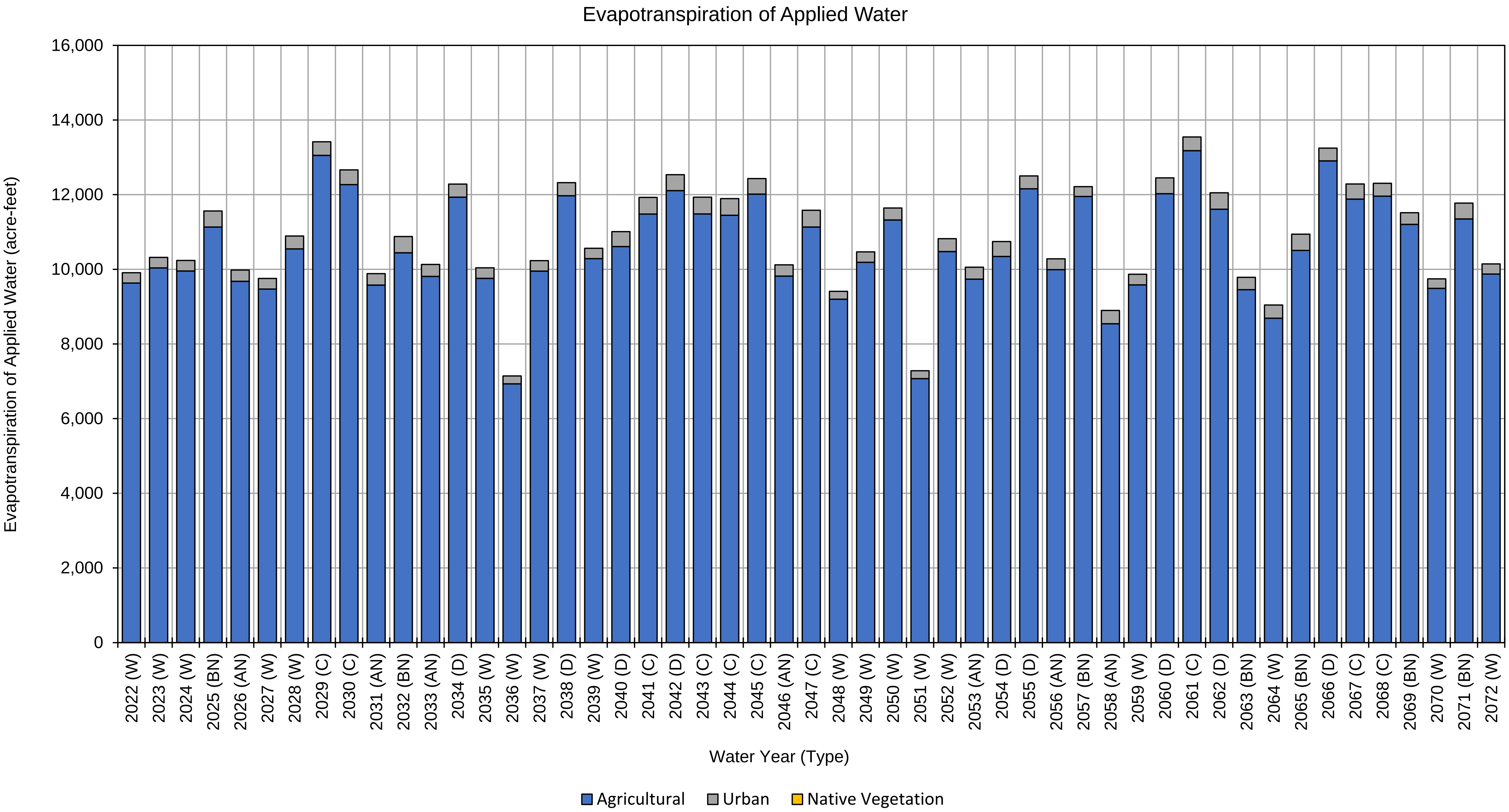

Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	9,600	280	0	9,900
2023 (W)	10,000	280	0	10,000
2024 (W)	10,000	280	0	10,000
2025 (BN)	11,000	430	0	11,000
2026 (AN)	9,700	300	0	10,000
2027 (W)	9,500	280	0	9,800
2028 (W)	11,000	340	0	11,000
2029 (C)	13,000	360	0	13,000
2030 (C)	12,000	390	0	12,000
2031 (AN)	9,600	310	0	9,900
2032 (BN)	10,000	430	0	10,000
2033 (AN)	9,800	320	0	10,000
2034 (D)	12,000	350	0	12,000
2035 (W)	9,800	280	0	10,000
2036 (W)	6,900	210	0	7,100
2037 (W)	10,000	280	0	10,000
2038 (D)	12,000	350	0	12,000
2039 (W)	10,000	280	0	10,000
2040 (D)	11,000	400	0	11,000
2041 (C)	11,000	450	0	11,000
2042 (D)	12,000	430	0	12,000
2043 (C)	11,000	450	0	11,000
2044 (C)	11,000	450	0	11,000
2045 (C)	12,000	420	0	12,000
2046 (AN)	9,800	300	0	10,000
2047 (C)	11,000	450	0	11,000
2048 (W)	9,200	210	0	9,400
2049 (W)	10,000	280	0	10,000
2050 (W)	11,000	320	0	11,000
2051 (W)	7,100	210	0	7,300
2052 (W)	10,000	340	0	10,000
2053 (AN)	9,700	320	0	10,000
2054 (D)	10,000	400	0	10,000
2055 (D)	12,000	350	0	12,000
2056 (AN)	10,000	290	0	10,000
2057 (BN)	12,000	260	0	12,000
2058 (AN)	8,500	350	0	8,900
2059 (W)	9,600	280	0	9,900
2060 (D)	12,000	430	0	12,000
2061 (C)	13,000	370	0	13,000
2062 (D)	12,000	440	0	12,000
2063 (BN)	9,500	330	0	9,800

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		8,700	350	0	9,100
2065 (BN)		11,000	430	0	11,000
2066 (D)		13,000	340	0	13,000
2067 (C)		12,000	410	0	12,000
2068 (C)		12,000	350	0	12,000
2069 (BN)		11,000	310	0	11,000
2070 (W)		9,500	250	0	9,800
2071 (BN)		11,000	430	0	11,000
2072 (W)		9,900	270	0	10,000
Average (2022-2072)		11,000	340	0	11,000
2022-2072	W	9,600	280	0	9,900
	AN	9,600	310	0	9,900
	BN	11,000	380	0	11,000
	D	12,000	390	0	12,000
	C	12,000	410	0	12,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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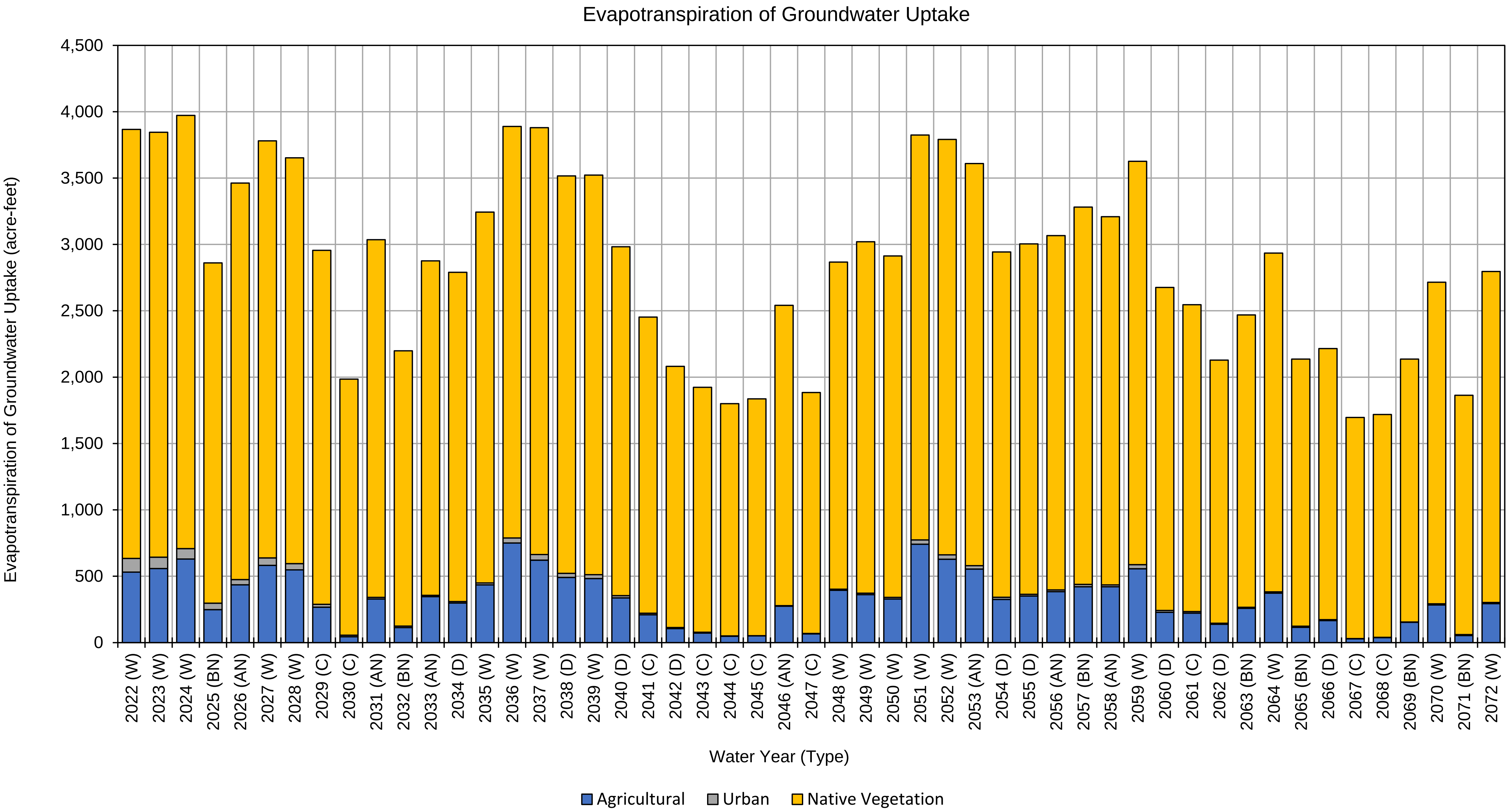


Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

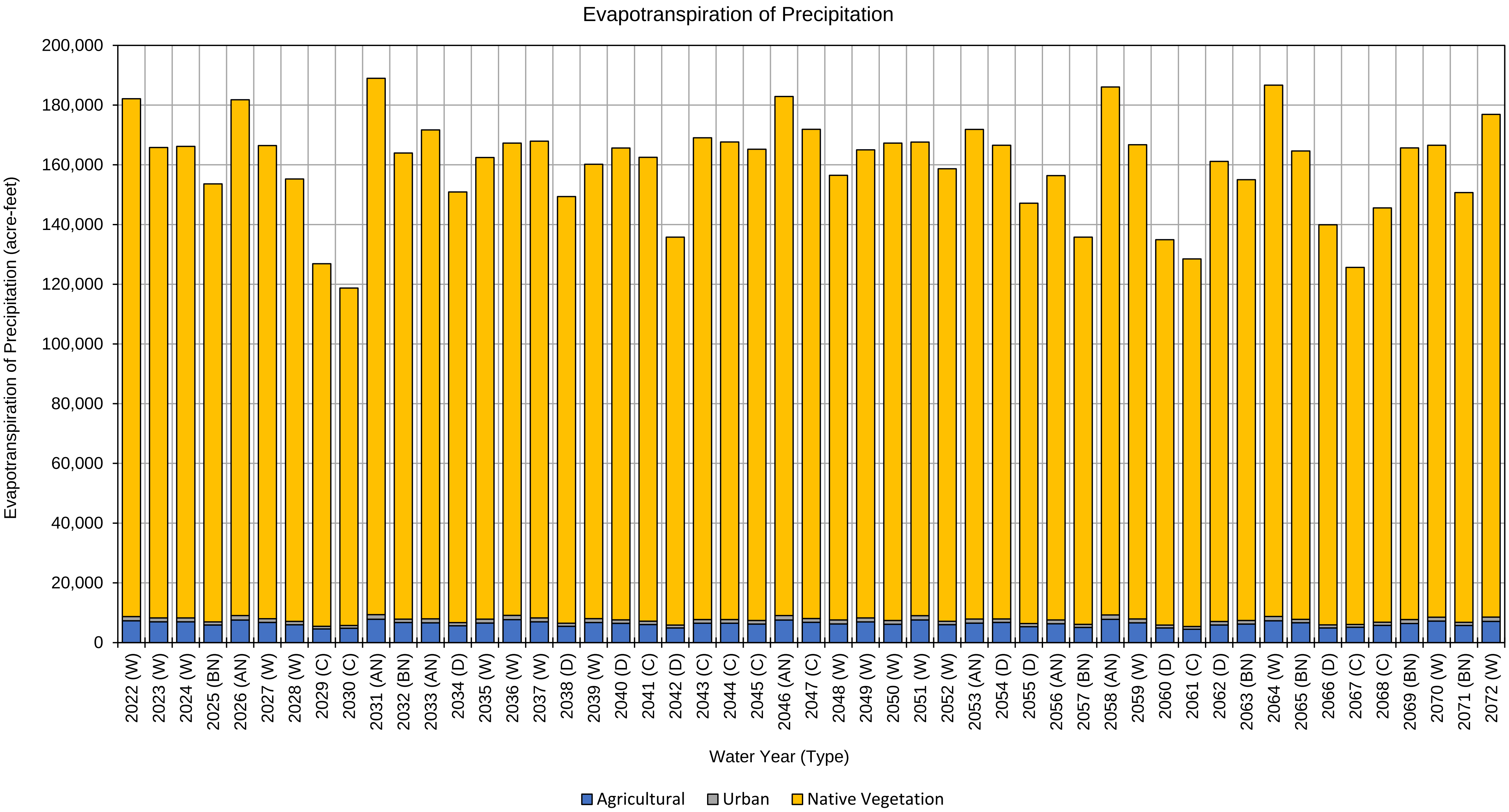
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	530	100	3,200	3,800
2023 (W)	560	86	3,200	3,800
2024 (W)	630	78	3,300	4,000
2025 (BN)	250	49	2,600	2,900
2026 (AN)	440	39	3,000	3,500
2027 (W)	580	56	3,100	3,700
2028 (W)	550	47	3,100	3,700
2029 (C)	270	22	2,700	3,000
2030 (C)	44	11	1,900	2,000
2031 (AN)	330	12	2,700	3,000
2032 (BN)	110	11	2,100	2,200
2033 (AN)	350	11	2,500	2,900
2034 (D)	300	10	2,500	2,800
2035 (W)	430	15	2,800	3,200
2036 (W)	750	37	3,100	3,900
2037 (W)	620	42	3,200	3,900
2038 (D)	490	31	3,000	3,500
2039 (W)	480	29	3,000	3,500
2040 (D)	340	17	2,600	3,000
2041 (C)	210	12	2,200	2,400
2042 (D)	100	9	2,000	2,100
2043 (C)	72	6	1,800	1,900
2044 (C)	47	3	1,800	1,900
2045 (C)	51	1	1,800	1,900
2046 (AN)	270	4	2,300	2,600
2047 (C)	66	3	1,800	1,900
2048 (W)	390	8	2,500	2,900
2049 (W)	360	11	2,600	3,000
2050 (W)	330	13	2,600	2,900
2051 (W)	740	32	3,100	3,900
2052 (W)	630	34	3,100	3,800
2053 (AN)	550	26	3,000	3,600
2054 (D)	330	16	2,600	2,900
2055 (D)	350	13	2,600	3,000
2056 (AN)	380	13	2,700	3,100
2057 (BN)	420	18	2,800	3,200
2058 (AN)	420	14	2,800	3,200
2059 (W)	560	31	3,000	3,600
2060 (D)	230	14	2,400	2,600
2061 (C)	220	11	2,300	2,500
2062 (D)	140	8	2,000	2,100
2063 (BN)	260	8	2,200	2,500

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		370	11	2,600	3,000
2065 (BN)		110	9	2,000	2,100
2066 (D)		170	7	2,000	2,200
2067 (C)		28	3	1,700	1,700
2068 (C)		37	2	1,700	1,700
2069 (BN)		150	2	2,000	2,200
2070 (W)		280	8	2,400	2,700
2071 (BN)		54	6	1,800	1,900
2072 (W)		290	9	2,500	2,800
Average (2022-2072)		330	21	2,500	2,900
2022-2072	W	510	36	2,900	3,400
	AN	390	17	2,700	3,100
	BN	190	15	2,200	2,400
	D	270	14	2,400	2,700
	C	100	7	2,000	2,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

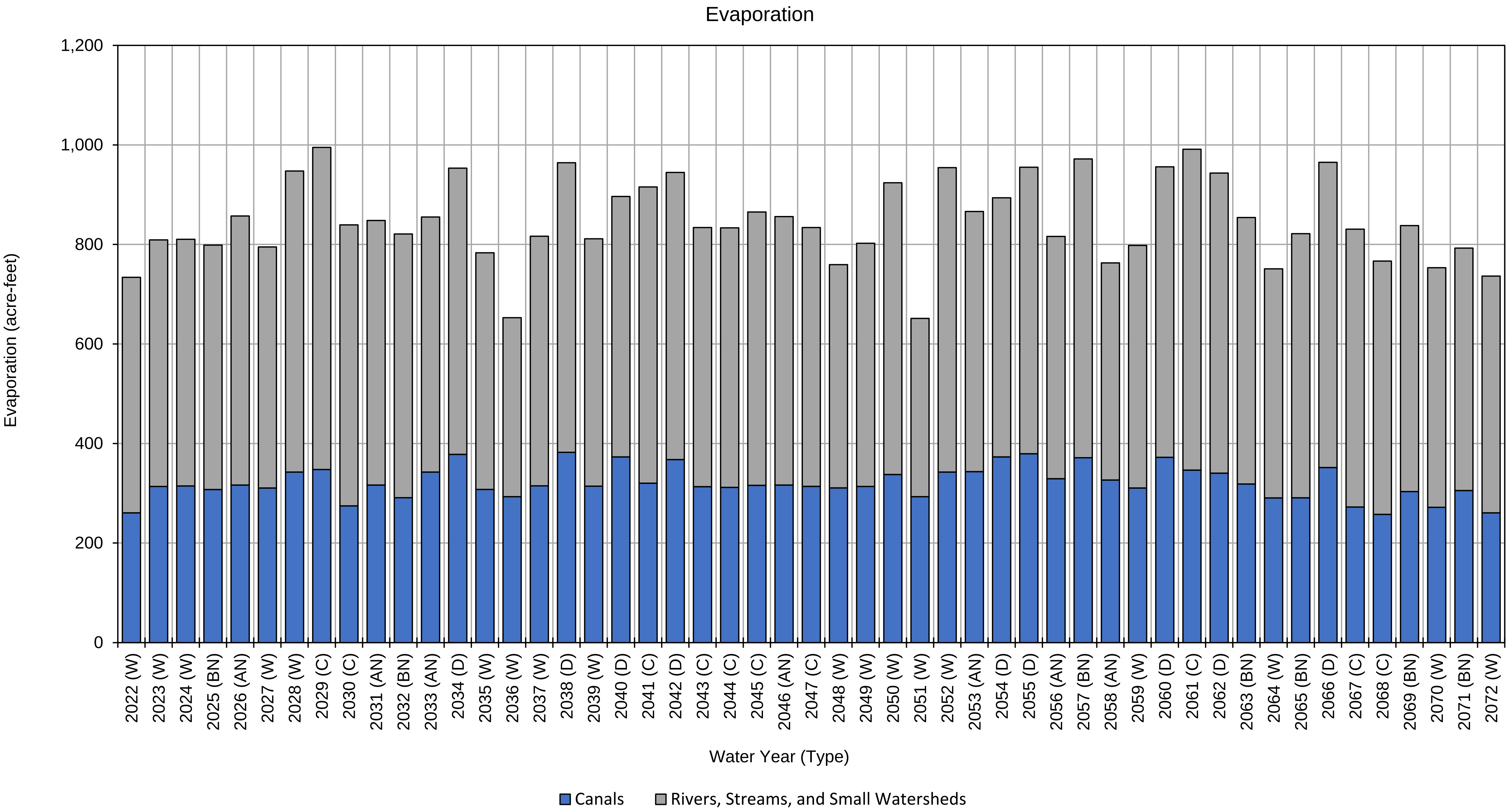
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	7,300	1,400	170,000	180,000
2023 (W)	7,000	1,300	160,000	170,000
2024 (W)	7,000	1,300	160,000	170,000
2025 (BN)	5,900	1,000	150,000	160,000
2026 (AN)	7,500	1,500	170,000	180,000
2027 (W)	6,700	1,300	160,000	170,000
2028 (W)	6,000	1,100	150,000	160,000
2029 (C)	4,500	890	120,000	130,000
2030 (C)	4,800	900	110,000	120,000
2031 (AN)	7,800	1,500	180,000	190,000
2032 (BN)	6,700	1,100	160,000	170,000
2033 (AN)	6,600	1,400	160,000	170,000
2034 (D)	5,600	1,100	140,000	150,000
2035 (W)	6,500	1,300	150,000	160,000
2036 (W)	7,700	1,400	160,000	170,000
2037 (W)	7,000	1,300	160,000	170,000
2038 (D)	5,400	1,000	140,000	150,000
2039 (W)	6,700	1,300	150,000	160,000
2040 (D)	6,400	1,200	160,000	170,000
2041 (C)	6,000	1,100	160,000	170,000
2042 (D)	4,900	960	130,000	140,000
2043 (C)	6,500	1,300	160,000	170,000
2044 (C)	6,500	1,300	160,000	170,000
2045 (C)	6,200	1,200	160,000	170,000
2046 (AN)	7,500	1,500	170,000	180,000
2047 (C)	6,800	1,300	160,000	170,000
2048 (W)	6,200	1,300	150,000	160,000
2049 (W)	6,900	1,300	160,000	170,000
2050 (W)	6,100	1,300	160,000	170,000
2051 (W)	7,600	1,400	160,000	170,000
2052 (W)	6,000	1,100	150,000	160,000
2053 (AN)	6,500	1,400	160,000	170,000
2054 (D)	6,800	1,200	160,000	170,000
2055 (D)	5,300	1,100	140,000	150,000
2056 (AN)	6,300	1,300	150,000	160,000
2057 (BN)	5,100	1,000	130,000	140,000
2058 (AN)	7,800	1,500	180,000	190,000
2059 (W)	6,600	1,300	160,000	170,000
2060 (D)	4,900	950	130,000	140,000
2061 (C)	4,500	910	120,000	130,000
2062 (D)	5,900	1,200	150,000	160,000
2063 (BN)	6,200	1,200	150,000	160,000

Bowman Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		7,300	1,400	180,000	190,000
2065 (BN)		6,600	1,100	160,000	170,000
2066 (D)		4,900	1,000	130,000	140,000
2067 (C)		5,100	930	120,000	130,000
2068 (C)		5,800	1,100	140,000	150,000
2069 (BN)		6,400	1,300	160,000	170,000
2070 (W)		7,200	1,300	160,000	170,000
2071 (BN)		5,700	1,000	140,000	150,000
2072 (W)		7,100	1,400	170,000	180,000
Average (2022-2072)		6,300	1,200	150,000	160,000
2022-2072	W	6,800	1,300	160,000	170,000
	AN	7,200	1,400	170,000	180,000
	BN	6,100	1,100	150,000	160,000
	D	5,600	1,100	140,000	150,000
	C	5,700	1,100	140,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

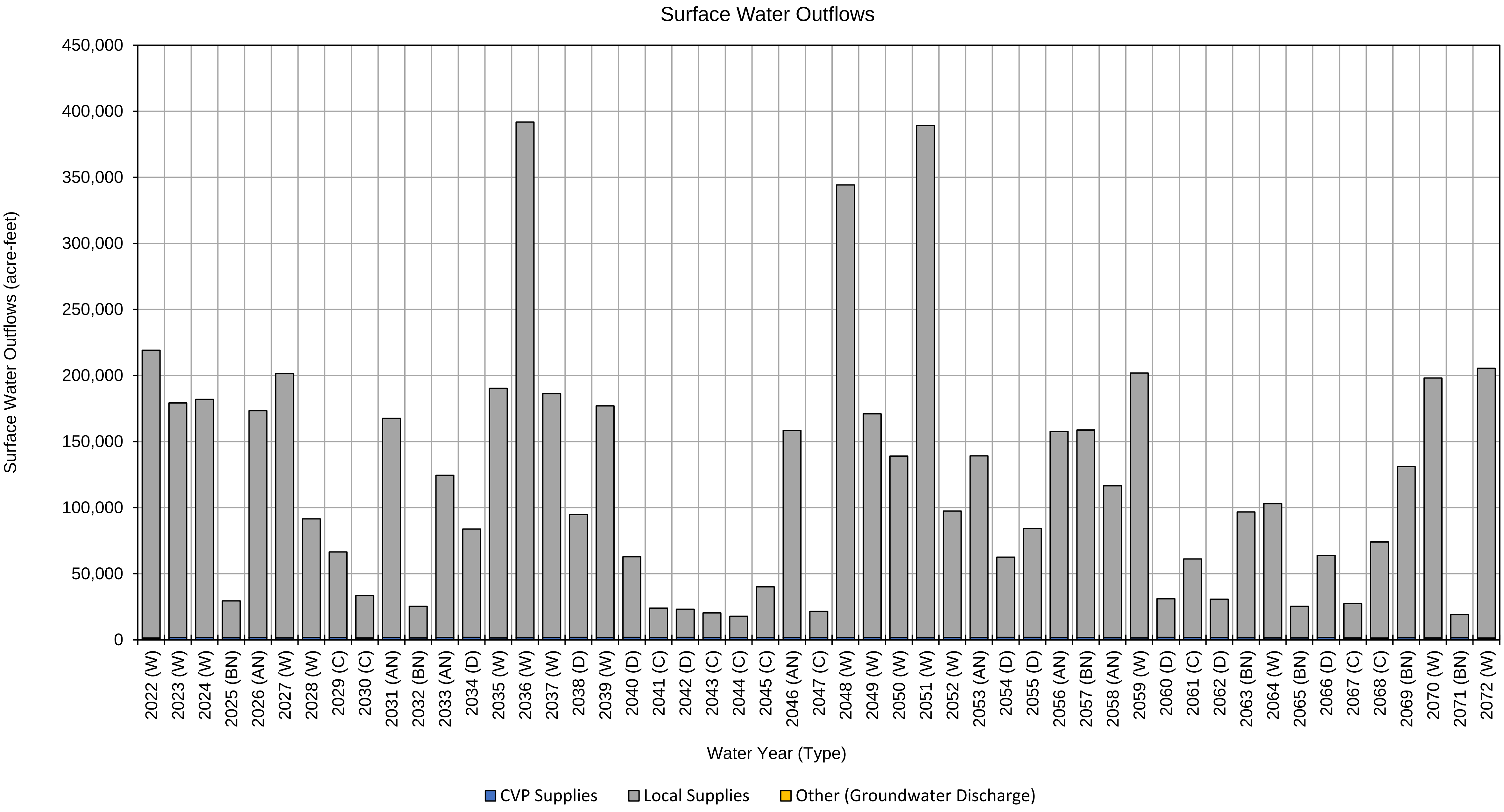
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	260	470	730
2023 (W)	310	500	810
2024 (W)	310	500	810
2025 (BN)	310	490	800
2026 (AN)	320	540	860
2027 (W)	310	480	790
2028 (W)	340	600	940
2029 (C)	350	650	1,000
2030 (C)	270	560	830
2031 (AN)	320	530	850
2032 (BN)	290	530	820
2033 (AN)	340	510	850
2034 (D)	380	580	960
2035 (W)	310	480	790
2036 (W)	290	360	650
2037 (W)	310	500	810
2038 (D)	380	580	960
2039 (W)	310	500	810
2040 (D)	370	520	890
2041 (C)	320	600	920
2042 (D)	370	580	950
2043 (C)	310	520	830
2044 (C)	310	520	830
2045 (C)	320	550	870
2046 (AN)	320	540	860
2047 (C)	310	520	830
2048 (W)	310	450	760
2049 (W)	310	490	800
2050 (W)	340	590	930
2051 (W)	290	360	650
2052 (W)	340	610	950
2053 (AN)	340	520	860
2054 (D)	370	520	890
2055 (D)	380	580	960
2056 (AN)	330	490	820
2057 (BN)	370	600	970
2058 (AN)	330	440	770
2059 (W)	310	490	800
2060 (D)	370	580	950
2061 (C)	350	640	990
2062 (D)	340	600	940
2063 (BN)	320	540	860

Bowman Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		290	460	750
2065 (BN)		290	530	820
2066 (D)		350	610	960
2067 (C)		270	560	830
2068 (C)		260	510	770
2069 (BN)		300	530	830
2070 (W)		270	480	750
2071 (BN)		310	490	800
2072 (W)		260	480	740
Average (2022-2072)		320	530	850
2022-2072	W	310	490	800
	AN	330	510	840
	BN	310	530	840
	D	370	570	940
	C	310	560	870

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

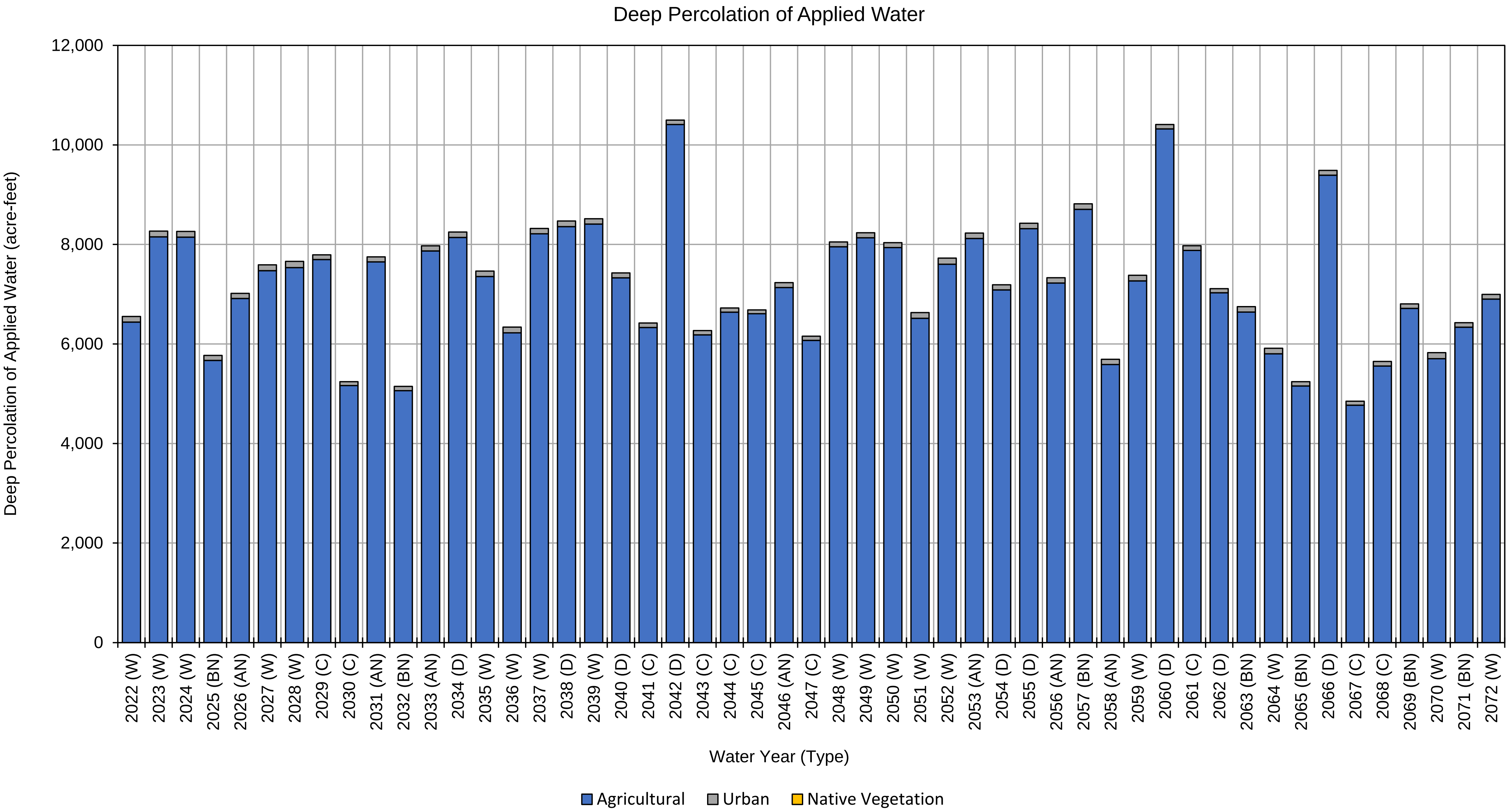
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	1,300	220,000	0	220,000
2023 (W)	1,600	180,000	0	180,000
2024 (W)	1,600	180,000	0	180,000
2025 (BN)	1,600	28,000	0	30,000
2026 (AN)	1,600	170,000	0	170,000
2027 (W)	1,500	200,000	0	200,000
2028 (W)	1,800	90,000	0	92,000
2029 (C)	1,700	65,000	0	67,000
2030 (C)	1,400	32,000	0	33,000
2031 (AN)	1,600	170,000	0	170,000
2032 (BN)	1,500	24,000	0	26,000
2033 (AN)	1,800	120,000	0	120,000
2034 (D)	1,900	82,000	0	84,000
2035 (W)	1,500	190,000	0	190,000
2036 (W)	1,500	390,000	0	390,000
2037 (W)	1,600	180,000	0	180,000
2038 (D)	1,900	93,000	0	95,000
2039 (W)	1,600	180,000	0	180,000
2040 (D)	1,900	61,000	0	63,000
2041 (C)	1,600	22,000	0	24,000
2042 (D)	1,800	21,000	0	23,000
2043 (C)	1,600	19,000	0	21,000
2044 (C)	1,600	16,000	0	18,000
2045 (C)	1,600	38,000	0	40,000
2046 (AN)	1,600	160,000	0	160,000
2047 (C)	1,600	20,000	0	22,000
2048 (W)	1,600	340,000	0	340,000
2049 (W)	1,600	170,000	0	170,000
2050 (W)	1,700	140,000	0	140,000
2051 (W)	1,500	390,000	0	390,000
2052 (W)	1,800	96,000	0	98,000
2053 (AN)	1,800	140,000	0	140,000
2054 (D)	1,900	61,000	0	63,000
2055 (D)	1,900	82,000	0	84,000
2056 (AN)	1,600	160,000	0	160,000
2057 (BN)	1,800	160,000	0	160,000
2058 (AN)	1,600	110,000	0	110,000
2059 (W)	1,500	200,000	0	200,000
2060 (D)	1,800	29,000	0	31,000
2061 (C)	1,700	59,000	0	61,000
2062 (D)	1,700	29,000	0	31,000
2063 (BN)	1,600	95,000	0	97,000

Bowman Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		1,500	100,000	0	100,000
2065 (BN)		1,500	24,000	0	26,000
2066 (D)		1,800	62,000	0	64,000
2067 (C)		1,400	26,000	0	27,000
2068 (C)		1,300	73,000	0	74,000
2069 (BN)		1,500	130,000	0	130,000
2070 (W)		1,400	200,000	0	200,000
2071 (BN)		1,600	18,000	0	20,000
2072 (W)		1,300	200,000	0	200,000
Average (2022-2072)		1,600	120,000	0	120,000
2022-2072	W	1,600	200,000	0	200,000
	AN	1,600	150,000	0	150,000
	BN	1,600	68,000	0	70,000
	D	1,800	58,000	0	60,000
	C	1,500	37,000	0	39,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	6,400	110	0	6,500
2023 (W)	8,200	120	0	8,300
2024 (W)	8,100	110	0	8,200
2025 (BN)	5,700	99	0	5,800
2026 (AN)	6,900	100	0	7,000
2027 (W)	7,500	120	0	7,600
2028 (W)	7,500	130	0	7,600
2029 (C)	7,700	95	0	7,800
2030 (C)	5,200	79	0	5,300
2031 (AN)	7,600	100	0	7,700
2032 (BN)	5,100	86	0	5,200
2033 (AN)	7,900	100	0	8,000
2034 (D)	8,100	110	0	8,200
2035 (W)	7,400	110	0	7,500
2036 (W)	6,200	120	0	6,300
2037 (W)	8,200	110	0	8,300
2038 (D)	8,400	110	0	8,500
2039 (W)	8,400	110	0	8,500
2040 (D)	7,300	99	0	7,400
2041 (C)	6,300	91	0	6,400
2042 (D)	10,000	88	0	10,000
2043 (C)	6,200	86	0	6,300
2044 (C)	6,600	84	0	6,700
2045 (C)	6,600	76	0	6,700
2046 (AN)	7,100	97	0	7,200
2047 (C)	6,100	84	0	6,200
2048 (W)	8,000	98	0	8,100
2049 (W)	8,100	100	0	8,200
2050 (W)	7,900	97	0	8,000
2051 (W)	6,500	120	0	6,600
2052 (W)	7,600	120	0	7,700
2053 (AN)	8,100	110	0	8,200
2054 (D)	7,100	100	0	7,200
2055 (D)	8,300	110	0	8,400
2056 (AN)	7,200	110	0	7,300
2057 (BN)	8,700	110	0	8,800
2058 (AN)	5,600	110	0	5,700
2059 (W)	7,300	110	0	7,400
2060 (D)	10,000	89	0	10,000
2061 (C)	7,900	94	0	8,000
2062 (D)	7,000	82	0	7,100
2063 (BN)	6,600	110	0	6,700

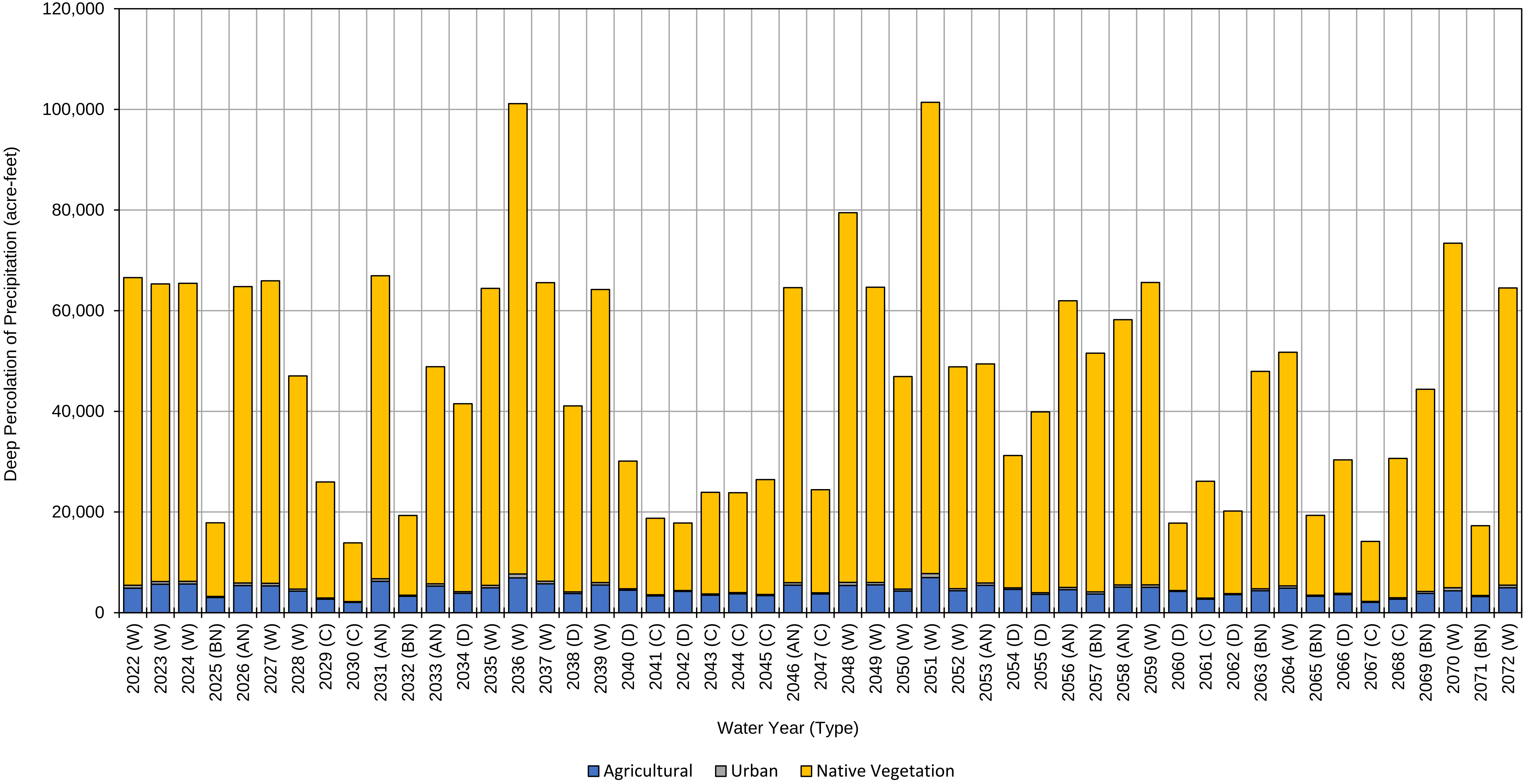
Bowman Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		5,800	110	0	5,900
2065 (BN)		5,200	85	0	5,300
2066 (D)		9,400	97	0	9,500
2067 (C)		4,800	78	0	4,900
2068 (C)		5,600	94	0	5,700
2069 (BN)		6,700	90	0	6,800
2070 (W)		5,700	120	0	5,800
2071 (BN)		6,300	89	0	6,400
2072 (W)		6,900	96	0	7,000
Average (2022-2072)		7,200	100	0	7,300
2022-2072	W	7,300	110	0	7,400
	AN	7,200	100	0	7,300
	BN	6,300	96	0	6,400
	D	8,500	98	0	8,600
	C	6,300	86	0	6,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

Deep Percolation of Precipitation



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

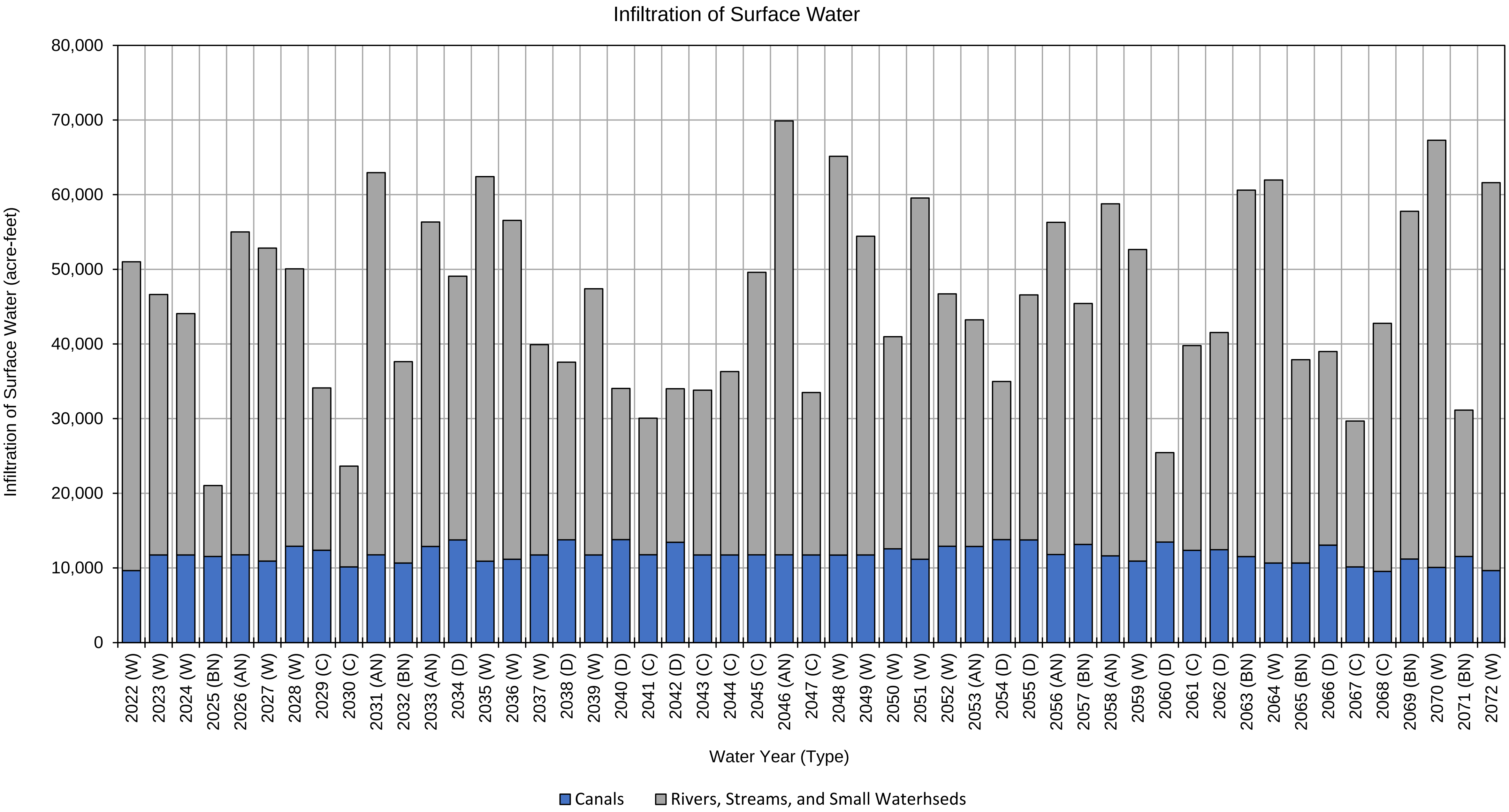
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,900	580	61,000	66,000
2023 (W)	5,600	530	59,000	65,000
2024 (W)	5,700	520	59,000	65,000
2025 (BN)	3,000	240	15,000	18,000
2026 (AN)	5,400	510	59,000	65,000
2027 (W)	5,300	520	60,000	66,000
2028 (W)	4,300	410	42,000	47,000
2029 (C)	2,700	230	23,000	26,000
2030 (C)	2,000	180	12,000	14,000
2031 (AN)	6,200	510	60,000	67,000
2032 (BN)	3,200	220	16,000	19,000
2033 (AN)	5,300	450	43,000	49,000
2034 (D)	3,800	330	37,000	41,000
2035 (W)	4,900	500	59,000	64,000
2036 (W)	6,900	790	93,000	100,000
2037 (W)	5,700	500	59,000	65,000
2038 (D)	3,800	340	37,000	41,000
2039 (W)	5,500	490	58,000	64,000
2040 (D)	4,500	290	25,000	30,000
2041 (C)	3,300	230	15,000	19,000
2042 (D)	4,200	200	13,000	17,000
2043 (C)	3,500	240	20,000	24,000
2044 (C)	3,700	230	20,000	24,000
2045 (C)	3,400	220	23,000	27,000
2046 (AN)	5,500	490	59,000	65,000
2047 (C)	3,700	240	20,000	24,000
2048 (W)	5,400	620	73,000	79,000
2049 (W)	5,500	490	59,000	65,000
2050 (W)	4,300	380	42,000	47,000
2051 (W)	7,000	790	94,000	100,000
2052 (W)	4,400	410	44,000	49,000
2053 (AN)	5,400	450	44,000	50,000
2054 (D)	4,600	300	26,000	31,000
2055 (D)	3,600	330	36,000	40,000
2056 (AN)	4,600	460	57,000	62,000
2057 (BN)	3,700	430	47,000	51,000
2058 (AN)	5,100	440	53,000	59,000
2059 (W)	5,000	500	60,000	66,000
2060 (D)	4,200	200	13,000	17,000
2061 (C)	2,700	230	23,000	26,000
2062 (D)	3,600	220	16,000	20,000
2063 (BN)	4,400	390	43,000	48,000

Bowman Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		4,900	450	46,000	51,000
2065 (BN)		3,300	220	16,000	20,000
2066 (D)		3,600	280	27,000	31,000
2067 (C)		2,100	180	12,000	14,000
2068 (C)		2,700	290	28,000	31,000
2069 (BN)		3,800	380	40,000	44,000
2070 (W)		4,300	620	68,000	73,000
2071 (BN)		3,200	220	14,000	17,000
2072 (W)		4,900	510	59,000	64,000
Average (2022-2072)		4,400	390	41,000	46,000
2022-2072	W	5,300	530	61,000	67,000
	AN	5,300	470	53,000	59,000
	BN	3,500	300	27,000	31,000
	D	4,000	280	26,000	30,000
	C	3,000	230	20,000	23,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

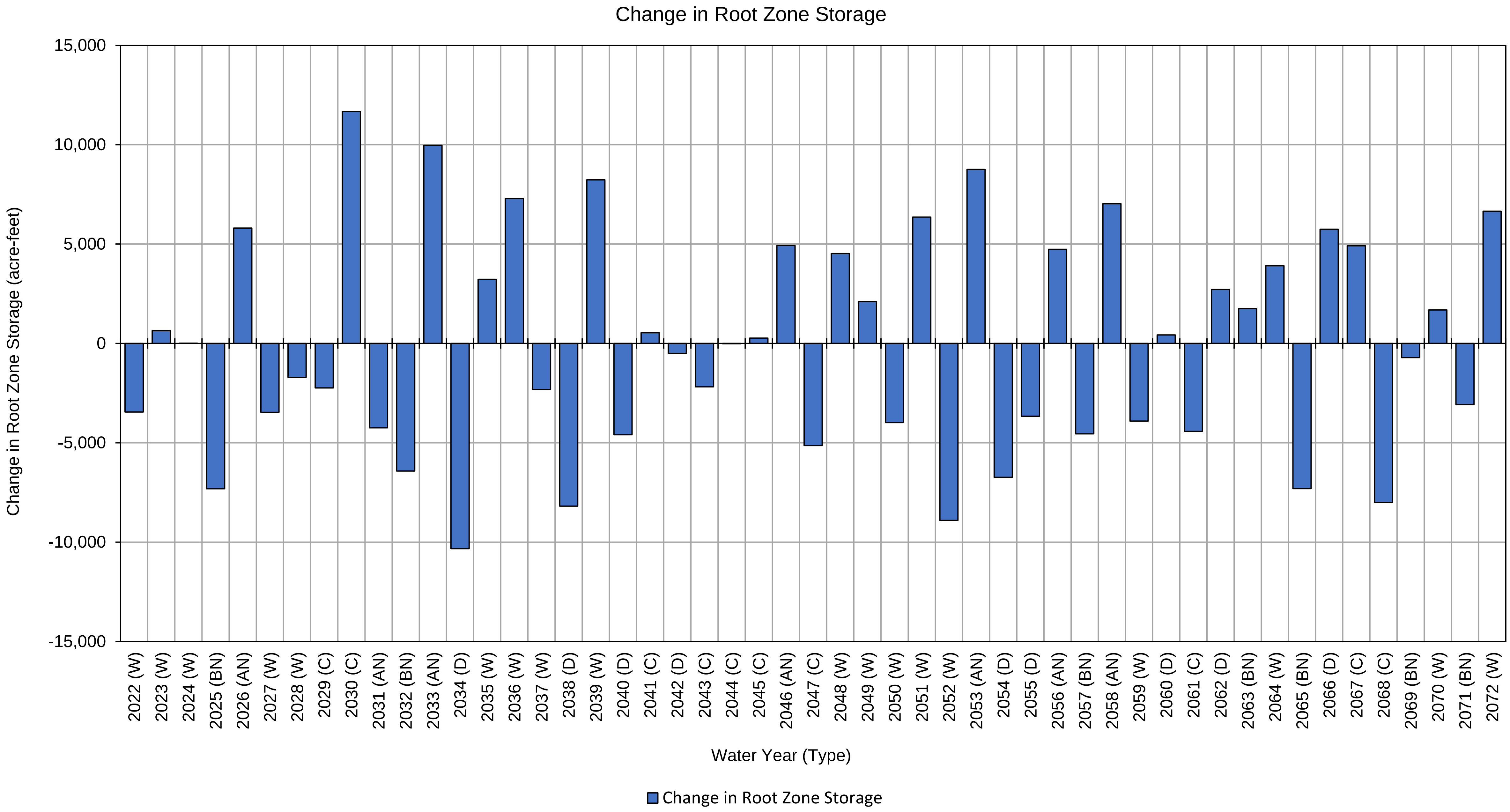
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	9,600	41,000	51,000
2023 (W)	12,000	35,000	47,000
2024 (W)	12,000	32,000	44,000
2025 (BN)	12,000	9,500	22,000
2026 (AN)	12,000	43,000	55,000
2027 (W)	11,000	42,000	53,000
2028 (W)	13,000	37,000	50,000
2029 (C)	12,000	22,000	34,000
2030 (C)	10,000	13,000	23,000
2031 (AN)	12,000	51,000	63,000
2032 (BN)	11,000	27,000	38,000
2033 (AN)	13,000	43,000	56,000
2034 (D)	14,000	35,000	49,000
2035 (W)	11,000	52,000	63,000
2036 (W)	11,000	45,000	56,000
2037 (W)	12,000	28,000	40,000
2038 (D)	14,000	24,000	38,000
2039 (W)	12,000	36,000	48,000
2040 (D)	14,000	20,000	34,000
2041 (C)	12,000	18,000	30,000
2042 (D)	13,000	21,000	34,000
2043 (C)	12,000	22,000	34,000
2044 (C)	12,000	25,000	37,000
2045 (C)	12,000	38,000	50,000
2046 (AN)	12,000	58,000	70,000
2047 (C)	12,000	22,000	34,000
2048 (W)	12,000	53,000	65,000
2049 (W)	12,000	43,000	55,000
2050 (W)	13,000	28,000	41,000
2051 (W)	11,000	48,000	59,000
2052 (W)	13,000	34,000	47,000
2053 (AN)	13,000	30,000	43,000
2054 (D)	14,000	21,000	35,000
2055 (D)	14,000	33,000	47,000
2056 (AN)	12,000	44,000	56,000
2057 (BN)	13,000	32,000	45,000
2058 (AN)	12,000	47,000	59,000
2059 (W)	11,000	42,000	53,000
2060 (D)	13,000	12,000	25,000
2061 (C)	12,000	27,000	39,000
2062 (D)	12,000	29,000	41,000
2063 (BN)	12,000	49,000	61,000

Bowman Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		11,000	51,000	62,000
2065 (BN)		11,000	27,000	38,000
2066 (D)		13,000	26,000	39,000
2067 (C)		10,000	20,000	30,000
2068 (C)		9,500	33,000	43,000
2069 (BN)		11,000	47,000	58,000
2070 (W)		10,000	57,000	67,000
2071 (BN)		12,000	20,000	32,000
2072 (W)		9,600	52,000	62,000
Average (2022-2072)		12,000	34,000	46,000
2022-2072	W	11,000	42,000	53,000
	AN	12,000	45,000	57,000
	BN	11,000	30,000	41,000
	D	13,000	25,000	38,000
	C	11,000	24,000	35,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	-3,400
2023 (W)	640
2024 (W)	1
2025 (BN)	-7,300
2026 (AN)	5,800
2027 (W)	-3,500
2028 (W)	-1,700
2029 (C)	-2,200
2030 (C)	12,000
2031 (AN)	-4,200
2032 (BN)	-6,400
2033 (AN)	10,000
2034 (D)	-10,000
2035 (W)	3,200
2036 (W)	7,300
2037 (W)	-2,300
2038 (D)	-8,200
2039 (W)	8,200
2040 (D)	-4,600
2041 (C)	540
2042 (D)	-510
2043 (C)	-2,200
2044 (C)	-14
2045 (C)	270
2046 (AN)	4,900
2047 (C)	-5,100
2048 (W)	4,500
2049 (W)	2,100
2050 (W)	-4,000
2051 (W)	6,400
2052 (W)	-8,900
2053 (AN)	8,800
2054 (D)	-6,700
2055 (D)	-3,700
2056 (AN)	4,700
2057 (BN)	-4,600
2058 (AN)	7,000
2059 (W)	-3,900
2060 (D)	430
2061 (C)	-4,400
2062 (D)	2,700
2063 (BN)	1,700

Bowman Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		3,900
2065 (BN)		-7,300
2066 (D)		5,700
2067 (C)		4,900
2068 (C)		-8,000
2069 (BN)		-720
2070 (W)		1,700
2071 (BN)		-3,100
2072 (W)		6,700
Average (2022-2072)		-69
2022-2072	W	940
	AN	5,300
	BN	-3,900
	D	-2,800
	C	-460

Sacramento Valley Water Year Index and is classified into five types:

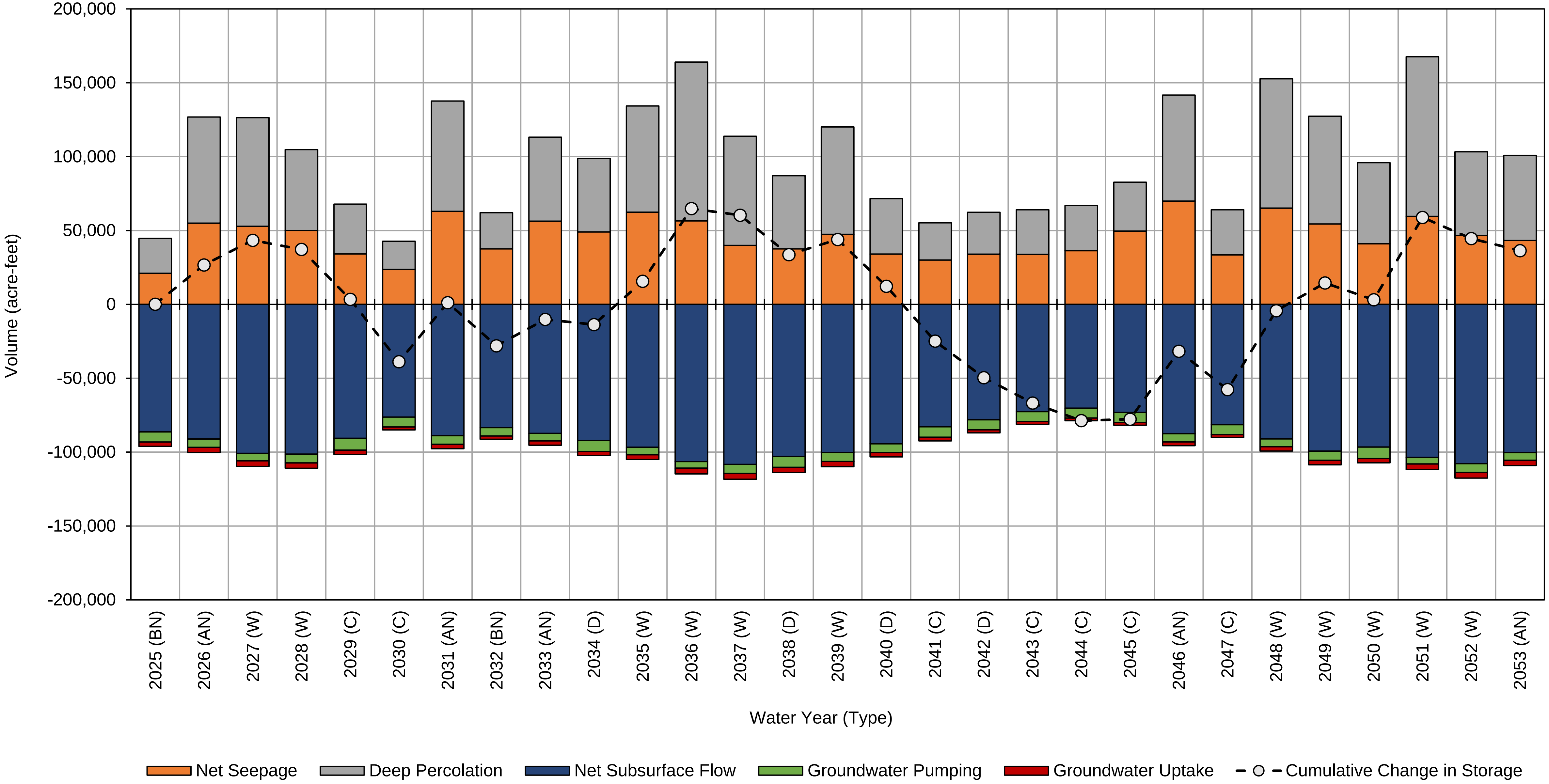
W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-2b

Detailed Bowman Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Groundwater System

Projected (Current Land Use) Water Budget
Bowman Subbasin



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

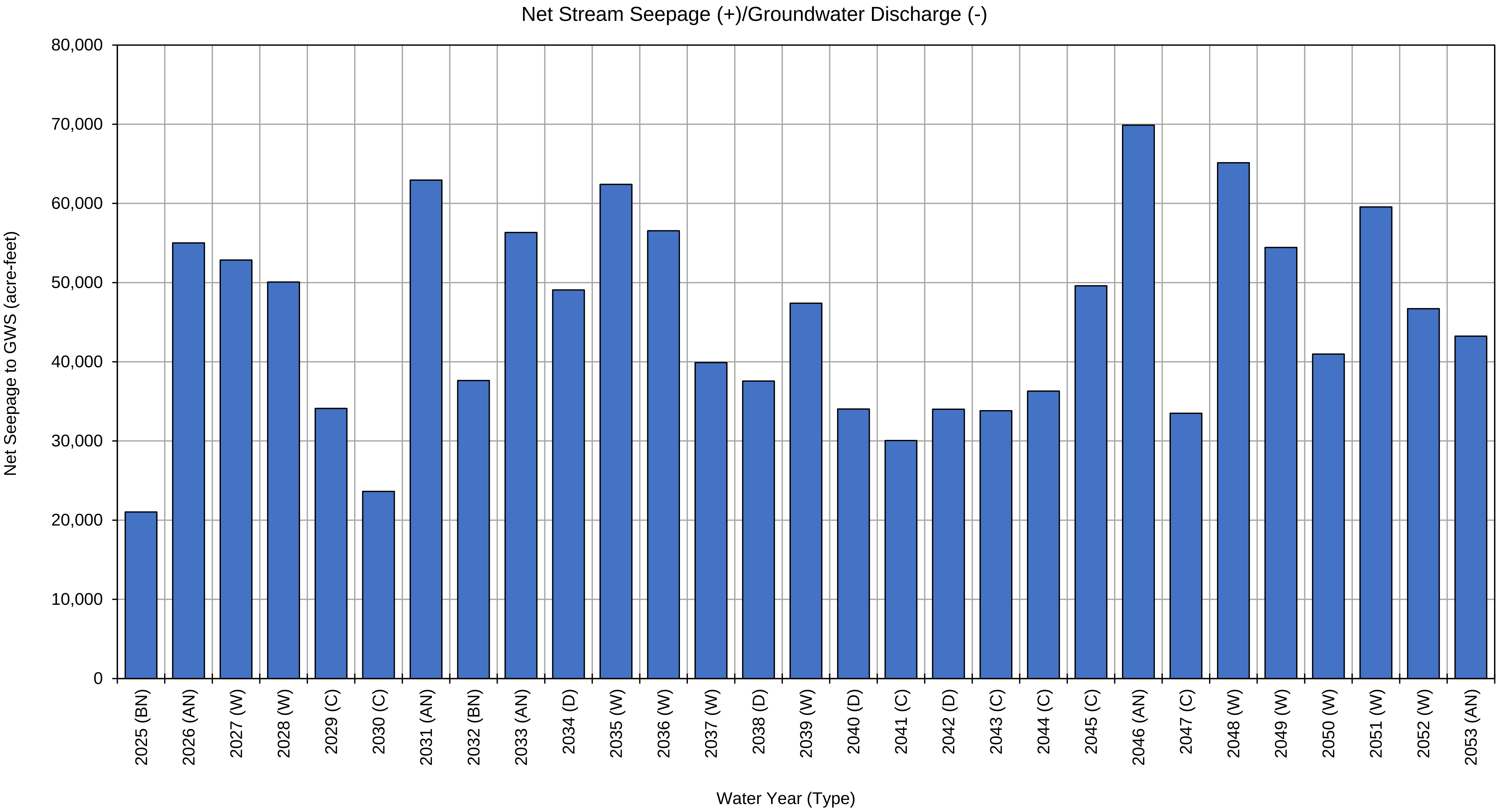
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	51,000	73,000	-6,400	-3,900	-85,000	29,000	29,000
2023 (W)	47,000	74,000	-6,300	-3,800	-95,000	15,000	44,000
2024 (W)	44,000	74,000	-6,500	-4,000	-100,000	7,400	52,000
2025 (BN)	21,000	24,000	-6,900	-2,900	-86,000	-51,000	100
2026 (AN)	55,000	72,000	-5,600	-3,500	-91,000	27,000	27,000
2027 (W)	53,000	74,000	-5,100	-3,800	-100,000	17,000	43,000
2028 (W)	50,000	55,000	-5,900	-3,700	-100,000	-6,200	37,000
2029 (C)	34,000	34,000	-8,000	-3,000	-91,000	-34,000	3,400
2030 (C)	24,000	19,000	-6,700	-2,000	-76,000	-42,000	-39,000
2031 (AN)	63,000	75,000	-5,800	-3,000	-89,000	40,000	1,100
2032 (BN)	38,000	24,000	-5,600	-2,200	-83,000	-29,000	-28,000
2033 (AN)	56,000	57,000	-5,100	-2,900	-87,000	18,000	-10,000
2034 (D)	49,000	50,000	-7,300	-2,800	-92,000	-3,500	-14,000
2035 (W)	62,000	72,000	-5,100	-3,200	-97,000	29,000	16,000
2036 (W)	57,000	110,000	-4,500	-3,900	-110,000	49,000	65,000
2037 (W)	40,000	74,000	-6,200	-3,900	-110,000	-4,500	60,000
2038 (D)	38,000	50,000	-7,400	-3,500	-100,000	-27,000	34,000
2039 (W)	47,000	73,000	-6,200	-3,500	-100,000	10,000	44,000
2040 (D)	34,000	38,000	-5,800	-3,000	-94,000	-32,000	12,000
2041 (C)	30,000	25,000	-7,100	-2,500	-83,000	-37,000	-25,000
2042 (D)	34,000	28,000	-6,800	-2,100	-78,000	-25,000	-50,000
2043 (C)	34,000	30,000	-6,700	-1,900	-73,000	-17,000	-67,000
2044 (C)	36,000	31,000	-6,700	-1,800	-70,000	-12,000	-79,000
2045 (C)	50,000	33,000	-6,800	-1,800	-73,000	910	-78,000
2046 (AN)	70,000	72,000	-5,600	-2,500	-88,000	46,000	-32,000
2047 (C)	34,000	31,000	-6,700	-1,900	-81,000	-26,000	-58,000
2048 (W)	65,000	88,000	-5,300	-2,900	-91,000	53,000	-4,300
2049 (W)	54,000	73,000	-6,200	-3,000	-99,000	19,000	15,000
2050 (W)	41,000	55,000	-7,800	-2,900	-97,000	-11,000	3,100
2051 (W)	60,000	110,000	-4,500	-3,800	-100,000	56,000	59,000
2052 (W)	47,000	57,000	-6,000	-3,800	-110,000	-14,000	45,000
2053 (AN)	43,000	58,000	-5,100	-3,600	-100,000	-8,200	36,000
2054 (D)	35,000	38,000	-5,900	-2,900	-93,000	-28,000	8,000
2055 (D)	47,000	48,000	-7,300	-3,000	-93,000	-8,600	-630
2056 (AN)	56,000	69,000	-5,100	-3,100	-96,000	21,000	20,000
2057 (BN)	45,000	60,000	-6,500	-3,300	-99,000	-3,100	17,000
2058 (AN)	59,000	64,000	-4,700	-3,200	-100,000	15,000	32,000
2059 (W)	53,000	73,000	-5,100	-3,600	-100,000	13,000	45,000
2060 (D)	25,000	28,000	-6,700	-2,700	-91,000	-47,000	-2,000
2061 (C)	40,000	34,000	-8,100	-2,500	-84,000	-20,000	-22,000
2062 (D)	42,000	27,000	-6,000	-2,100	-79,000	-18,000	-40,000
2063 (BN)	61,000	55,000	-5,200	-2,500	-86,000	22,000	-18,000
2064 (W)	62,000	58,000	-4,900	-2,900	-94,000	18,000	-18
2065 (BN)	38,000	25,000	-5,600	-2,100	-85,000	-30,000	-30,000

Bowman Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		39,000	40,000	-7,900	-2,200	-82,000	-13,000	-43,000
2067 (C)		30,000	19,000	-7,100	-1,700	-70,000	-30,000	-73,000
2068 (C)		43,000	36,000	-8,600	-1,700	-73,000	-4,100	-77,000
2069 (BN)		58,000	51,000	-6,700	-2,100	-79,000	22,000	-56,000
2070 (W)		67,000	79,000	-5,300	-2,700	-94,000	45,000	-11,000
2071 (BN)		31,000	24,000	-6,900	-1,900	-82,000	-36,000	-46,000
2072 (W)		62,000	72,000	-6,100	-2,800	-88,000	36,000	-11,000
Average (2022-2072)		46,000	53,000	-6,200	-2,900	-90,000	-210	
2022-2072	W	53,000	74,000	-5,700	-3,500	-98,000		
	AN	57,000	67,000	-5,300	-3,100	-93,000		
	BN	42,000	38,000	-6,200	-2,400	-86,000		
	D	38,000	39,000	-6,800	-2,700	-89,000		
	C	35,000	29,000	-7,200	-2,100	-77,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	51,000
2023 (W)	47,000
2024 (W)	44,000
2025 (BN)	21,000
2026 (AN)	55,000
2027 (W)	53,000
2028 (W)	50,000
2029 (C)	34,000
2030 (C)	24,000
2031 (AN)	63,000
2032 (BN)	38,000
2033 (AN)	56,000
2034 (D)	49,000
2035 (W)	62,000
2036 (W)	57,000
2037 (W)	40,000
2038 (D)	38,000
2039 (W)	47,000
2040 (D)	34,000
2041 (C)	30,000
2042 (D)	34,000
2043 (C)	34,000
2044 (C)	36,000
2045 (C)	50,000
2046 (AN)	70,000
2047 (C)	34,000
2048 (W)	65,000
2049 (W)	54,000
2050 (W)	41,000
2051 (W)	60,000
2052 (W)	47,000
2053 (AN)	43,000
2054 (D)	35,000
2055 (D)	47,000
2056 (AN)	56,000
2057 (BN)	45,000
2058 (AN)	59,000
2059 (W)	53,000
2060 (D)	25,000
2061 (C)	40,000
2062 (D)	42,000
2063 (BN)	61,000
2064 (W)	62,000
2065 (BN)	38,000

Bowman Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2066 (D)		39,000
2067 (C)		30,000
2068 (C)		43,000
2069 (BN)		58,000
2070 (W)		67,000
2071 (BN)		31,000
2072 (W)		62,000
Average (2022-2072)		46,000
2022-2072	W	53,000
	AN	57,000
	BN	42,000
	D	38,000
	C	35,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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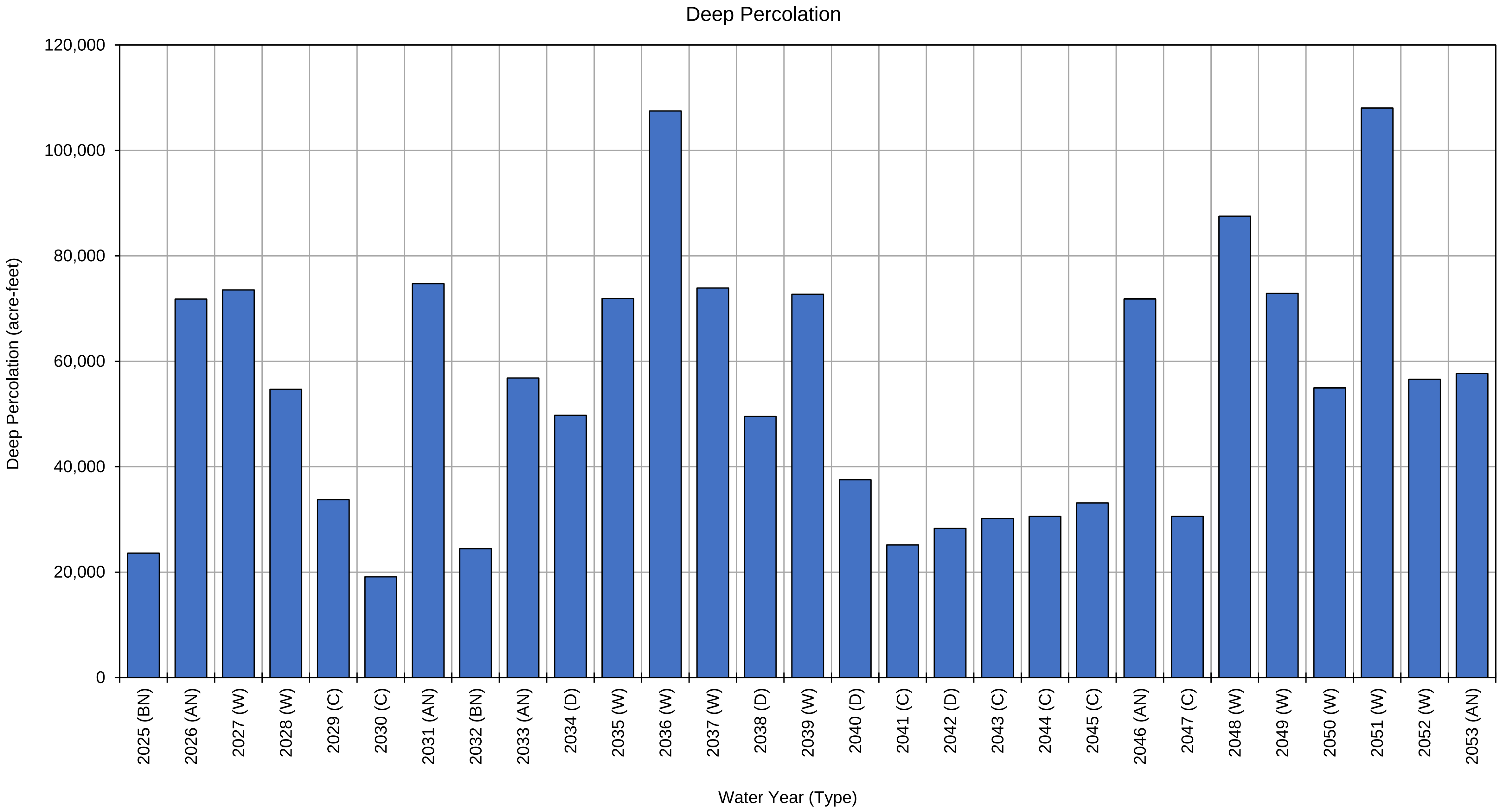
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

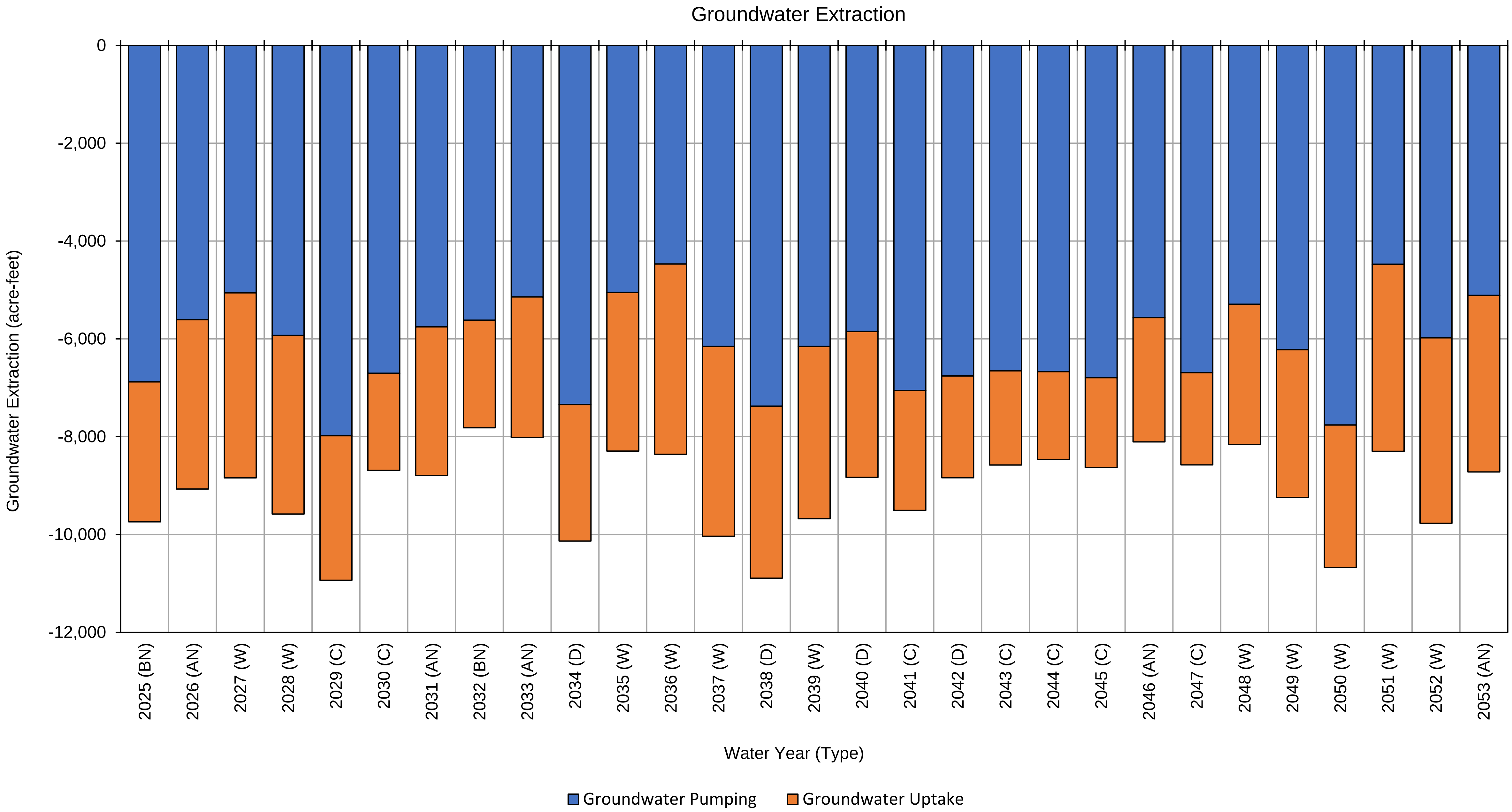
WY (Type)	Deep Percolation from the SWS
2022 (W)	73,000
2023 (W)	74,000
2024 (W)	74,000
2025 (BN)	24,000
2026 (AN)	72,000
2027 (W)	74,000
2028 (W)	55,000
2029 (C)	34,000
2030 (C)	19,000
2031 (AN)	75,000
2032 (BN)	24,000
2033 (AN)	57,000
2034 (D)	50,000
2035 (W)	72,000
2036 (W)	110,000
2037 (W)	74,000
2038 (D)	50,000
2039 (W)	73,000
2040 (D)	38,000
2041 (C)	25,000
2042 (D)	28,000
2043 (C)	30,000
2044 (C)	31,000
2045 (C)	33,000
2046 (AN)	72,000
2047 (C)	31,000
2048 (W)	88,000
2049 (W)	73,000
2050 (W)	55,000
2051 (W)	110,000
2052 (W)	57,000
2053 (AN)	58,000
2054 (D)	38,000
2055 (D)	48,000
2056 (AN)	69,000
2057 (BN)	60,000
2058 (AN)	64,000
2059 (W)	73,000
2060 (D)	28,000
2061 (C)	34,000
2062 (D)	27,000
2063 (BN)	55,000
2064 (W)	58,000
2065 (BN)	25,000

Bowman Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2066 (D)		40,000
2067 (C)		19,000
2068 (C)		36,000
2069 (BN)		51,000
2070 (W)		79,000
2071 (BN)		24,000
2072 (W)		72,000
Average (2022-2072)		53,000
2022-2072	W	74,000
	AN	67,000
	BN	38,000
	D	39,000
	C	29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

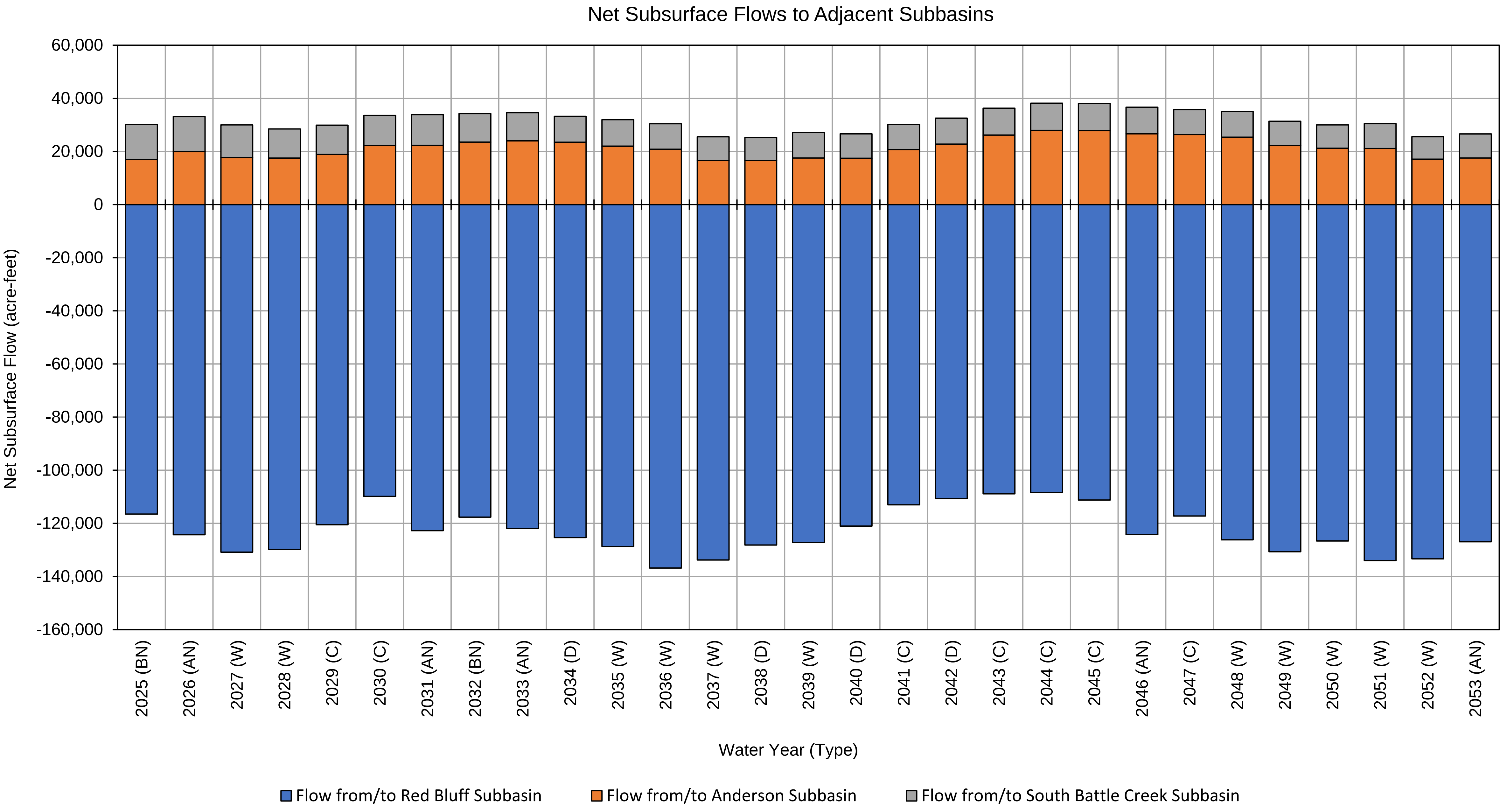
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-6,400	-3,900	-10,000
2023 (W)	-6,300	-3,800	-10,000
2024 (W)	-6,500	-4,000	-10,000
2025 (BN)	-6,900	-2,900	-9,700
2026 (AN)	-5,600	-3,500	-9,100
2027 (W)	-5,100	-3,800	-8,800
2028 (W)	-5,900	-3,700	-9,600
2029 (C)	-8,000	-3,000	-11,000
2030 (C)	-6,700	-2,000	-8,700
2031 (AN)	-5,800	-3,000	-8,800
2032 (BN)	-5,600	-2,200	-7,800
2033 (AN)	-5,100	-2,900	-8,000
2034 (D)	-7,300	-2,800	-10,000
2035 (W)	-5,100	-3,200	-8,300
2036 (W)	-4,500	-3,900	-8,400
2037 (W)	-6,200	-3,900	-10,000
2038 (D)	-7,400	-3,500	-11,000
2039 (W)	-6,200	-3,500	-9,700
2040 (D)	-5,800	-3,000	-8,800
2041 (C)	-7,100	-2,500	-9,500
2042 (D)	-6,800	-2,100	-8,800
2043 (C)	-6,700	-1,900	-8,600
2044 (C)	-6,700	-1,800	-8,500
2045 (C)	-6,800	-1,800	-8,600
2046 (AN)	-5,600	-2,500	-8,100
2047 (C)	-6,700	-1,900	-8,600
2048 (W)	-5,300	-2,900	-8,200
2049 (W)	-6,200	-3,000	-9,200
2050 (W)	-7,800	-2,900	-11,000
2051 (W)	-4,500	-3,800	-8,300
2052 (W)	-6,000	-3,800	-9,800
2053 (AN)	-5,100	-3,600	-8,700
2054 (D)	-5,900	-2,900	-8,900
2055 (D)	-7,300	-3,000	-10,000
2056 (AN)	-5,100	-3,100	-8,200
2057 (BN)	-6,500	-3,300	-9,800
2058 (AN)	-4,700	-3,200	-7,900
2059 (W)	-5,100	-3,600	-8,700
2060 (D)	-6,700	-2,700	-9,300
2061 (C)	-8,100	-2,500	-11,000
2062 (D)	-6,000	-2,100	-8,100
2063 (BN)	-5,200	-2,500	-7,700
2064 (W)	-4,900	-2,900	-7,800
2065 (BN)	-5,600	-2,100	-7,800

Bowman Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2066 (D)		-7,900	-2,200	-10,000
2067 (C)		-7,100	-1,700	-8,800
2068 (C)		-8,600	-1,700	-10,000
2069 (BN)		-6,700	-2,100	-8,800
2070 (W)		-5,300	-2,700	-8,100
2071 (BN)		-6,900	-1,900	-8,700
2072 (W)		-6,100	-2,800	-8,900
Average (2022-2072)		-6,200	-2,900	-9,100
2022-2072	W	-5,700	-3,500	-9,200
	AN	-5,300	-3,100	-8,400
	BN	-6,200	-2,400	-8,600
	D	-6,800	-2,700	-9,500
	C	-7,200	-2,100	-9,300

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

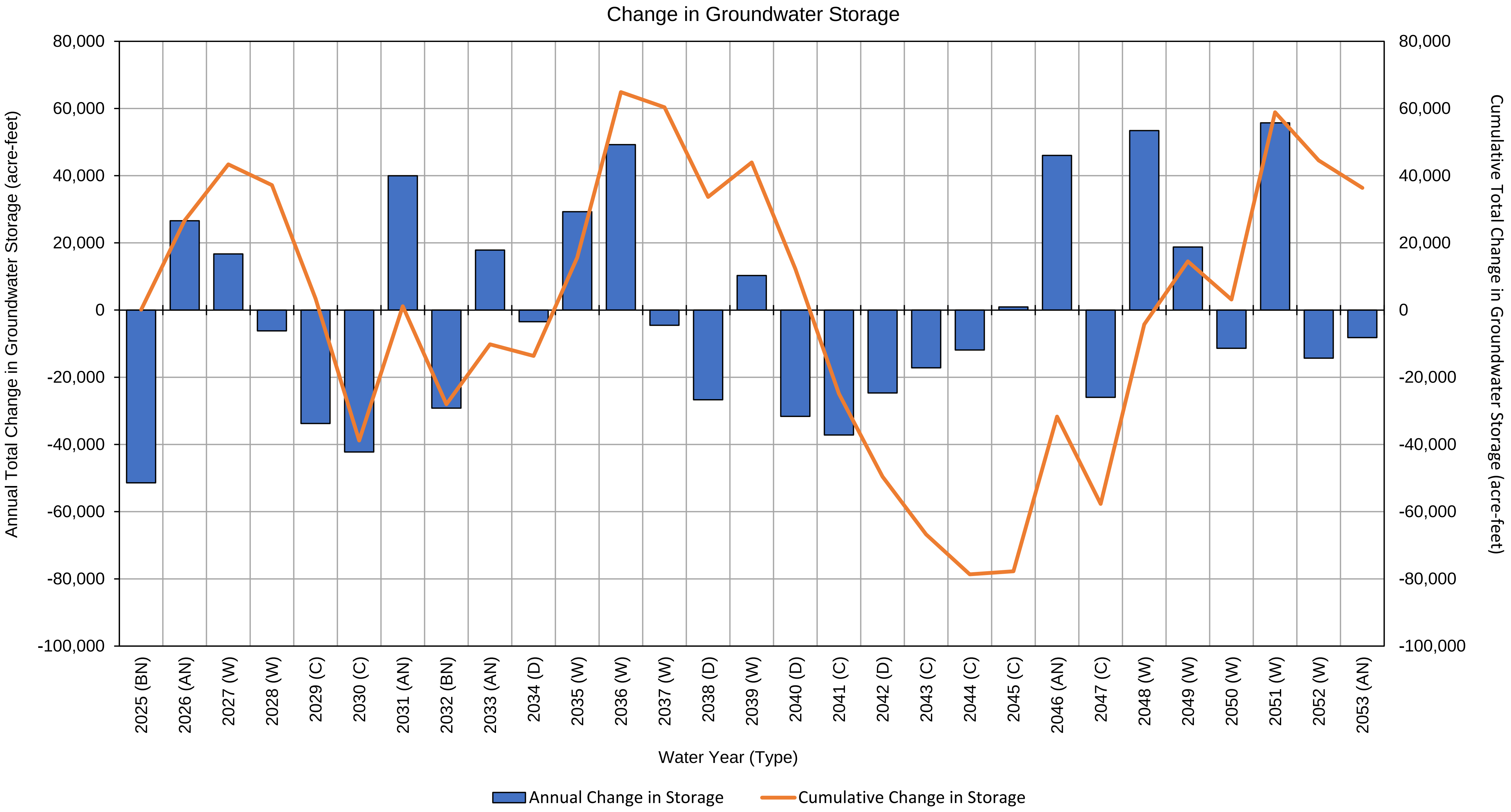
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-120,000	20,000	17,000	-85,000
2023 (W)	-130,000	18,000	15,000	-95,000
2024 (W)	-130,000	16,000	14,000	-100,000
2025 (BN)	-120,000	17,000	13,000	-86,000
2026 (AN)	-120,000	20,000	13,000	-91,000
2027 (W)	-130,000	18,000	12,000	-100,000
2028 (W)	-130,000	17,000	11,000	-100,000
2029 (C)	-120,000	19,000	11,000	-91,000
2030 (C)	-110,000	22,000	11,000	-76,000
2031 (AN)	-120,000	22,000	12,000	-89,000
2032 (BN)	-120,000	24,000	11,000	-83,000
2033 (AN)	-120,000	24,000	11,000	-87,000
2034 (D)	-130,000	23,000	9,700	-92,000
2035 (W)	-130,000	22,000	9,900	-97,000
2036 (W)	-140,000	21,000	9,600	-110,000
2037 (W)	-130,000	17,000	8,800	-110,000
2038 (D)	-130,000	17,000	8,700	-100,000
2039 (W)	-130,000	18,000	9,500	-100,000
2040 (D)	-120,000	17,000	9,200	-94,000
2041 (C)	-110,000	21,000	9,400	-83,000
2042 (D)	-110,000	23,000	9,800	-78,000
2043 (C)	-110,000	26,000	10,000	-73,000
2044 (C)	-110,000	28,000	10,000	-70,000
2045 (C)	-110,000	28,000	10,000	-73,000
2046 (AN)	-120,000	27,000	10,000	-88,000
2047 (C)	-120,000	26,000	9,400	-81,000
2048 (W)	-130,000	25,000	9,700	-91,000
2049 (W)	-130,000	22,000	9,100	-99,000
2050 (W)	-130,000	21,000	8,800	-97,000
2051 (W)	-130,000	21,000	9,400	-100,000
2052 (W)	-130,000	17,000	8,500	-110,000
2053 (AN)	-130,000	18,000	9,000	-100,000
2054 (D)	-120,000	18,000	9,300	-93,000
2055 (D)	-120,000	20,000	9,300	-93,000
2056 (AN)	-130,000	20,000	9,600	-96,000
2057 (BN)	-130,000	19,000	9,200	-99,000
2058 (AN)	-130,000	19,000	9,100	-100,000
2059 (W)	-130,000	18,000	9,100	-100,000
2060 (D)	-120,000	18,000	8,800	-91,000
2061 (C)	-110,000	22,000	9,600	-84,000
2062 (D)	-110,000	24,000	9,800	-79,000
2063 (BN)	-120,000	25,000	9,800	-86,000
2064 (W)	-130,000	24,000	9,500	-94,000
2065 (BN)	-120,000	24,000	9,300	-85,000

Bowman Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2066 (D)		-120,000	26,000	9,500	-82,000
2067 (C)		-110,000	27,000	10,000	-70,000
2068 (C)		-110,000	29,000	10,000	-73,000
2069 (BN)		-120,000	28,000	11,000	-79,000
2070 (W)		-130,000	26,000	10,000	-94,000
2071 (BN)		-120,000	25,000	9,700	-82,000
2072 (W)		-120,000	25,000	10,000	-88,000
Average (2022-2072)		-120,000	22,000	10,000	-90,000
2022-2072	W	-130,000	20,000	11,000	-98,000
	AN	-120,000	21,000	10,000	-93,000
	BN	-120,000	23,000	10,000	-86,000
	D	-120,000	21,000	9,300	-89,000
	C	-110,000	25,000	10,000	-77,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Bowman Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	29,000	29,000
2023 (W)	15,000	44,000
2024 (W)	7,400	52,000
2025 (BN)	-51,000	100
2026 (AN)	27,000	27,000
2027 (W)	17,000	43,000
2028 (W)	-6,200	37,000
2029 (C)	-34,000	3,400
2030 (C)	-42,000	-39,000
2031 (AN)	40,000	1,100
2032 (BN)	-29,000	-28,000
2033 (AN)	18,000	-10,000
2034 (D)	-3,500	-14,000
2035 (W)	29,000	16,000
2036 (W)	49,000	65,000
2037 (W)	-4,500	60,000
2038 (D)	-27,000	34,000
2039 (W)	10,000	44,000
2040 (D)	-32,000	12,000
2041 (C)	-37,000	-25,000
2042 (D)	-25,000	-50,000
2043 (C)	-17,000	-67,000
2044 (C)	-12,000	-79,000
2045 (C)	910	-78,000
2046 (AN)	46,000	-32,000
2047 (C)	-26,000	-58,000
2048 (W)	53,000	-4,300
2049 (W)	19,000	15,000
2050 (W)	-11,000	3,100
2051 (W)	56,000	59,000
2052 (W)	-14,000	45,000
2053 (AN)	-8,200	36,000
2054 (D)	-28,000	8,000
2055 (D)	-8,600	-630
2056 (AN)	21,000	20,000
2057 (BN)	-3,100	17,000
2058 (AN)	15,000	32,000
2059 (W)	13,000	45,000
2060 (D)	-47,000	-2,000
2061 (C)	-20,000	-22,000
2062 (D)	-18,000	-40,000
2063 (BN)	22,000	-18,000
2064 (W)	18,000	-18
2065 (BN)	-30,000	-30,000

Bowman Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-13,000	-43,000
2067 (C)		-30,000	-73,000
2068 (C)		-4,100	-77,000
2069 (BN)		22,000	-56,000
2070 (W)		45,000	-11,000
2071 (BN)		-36,000	-46,000
2072 (W)		36,000	-11,000
Average (2022-2072)		-210	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-3

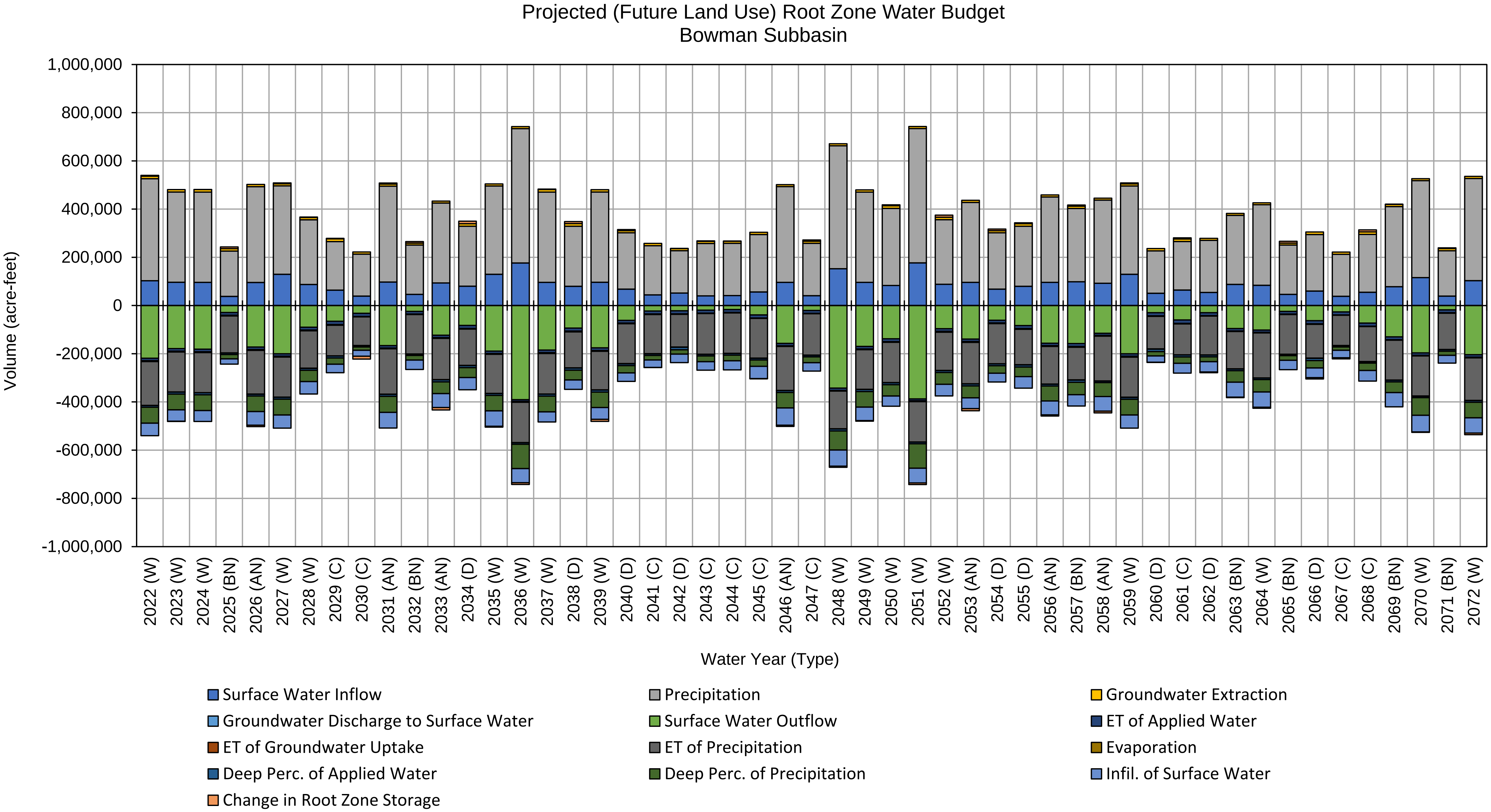
Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) Model Results

APPENDIX B-3a

Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) Model Results– Surface Water System



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

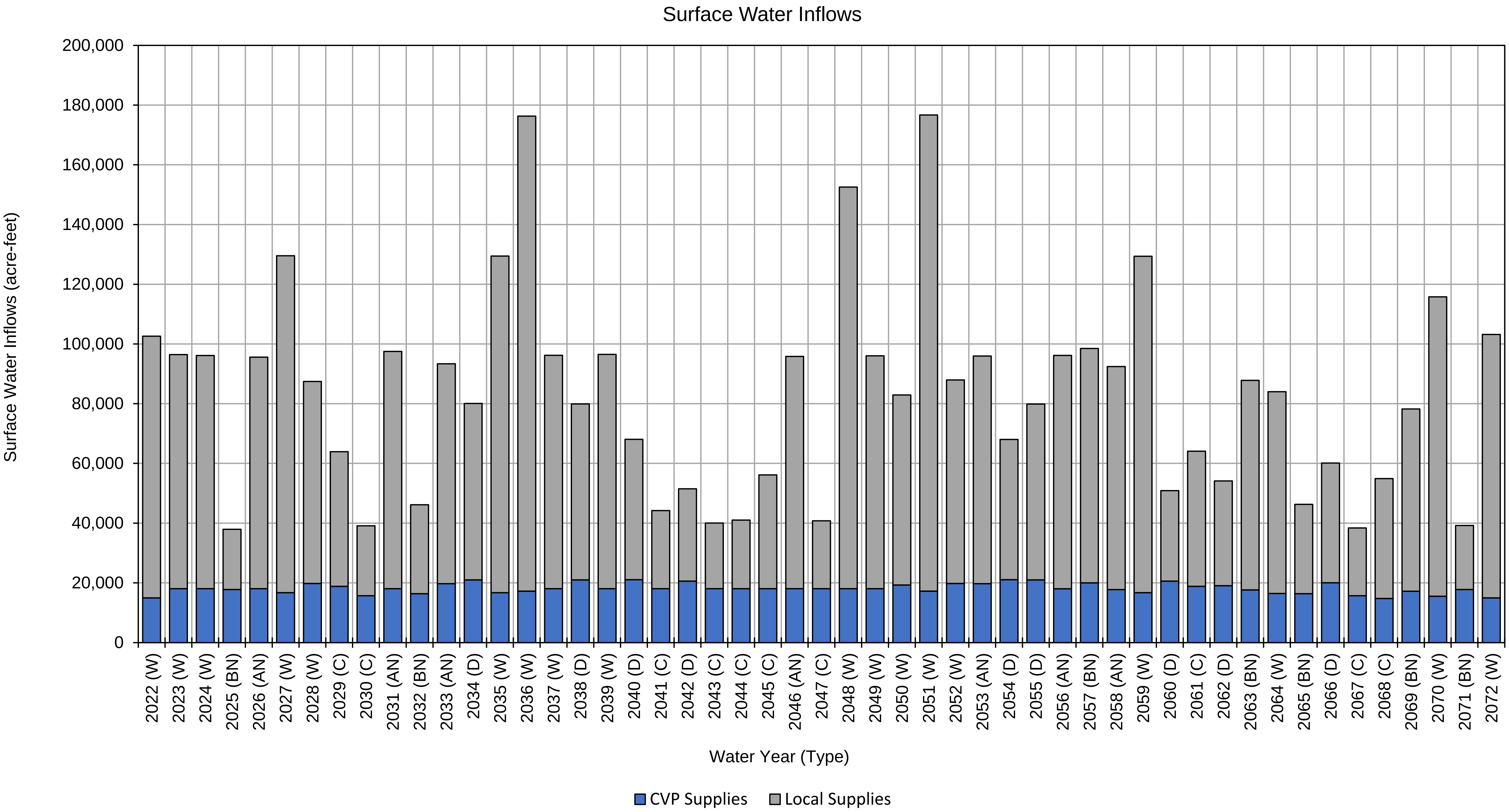
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	100,000	420,000	10,000	0	220,000	10,000	3,800	180,000	740	6,600	66,000	52,000	-3,400
2023 (W)	96,000	370,000	10,000	0	180,000	10,000	3,800	170,000	820	8,300	65,000	48,000	640
2024 (W)	96,000	370,000	11,000	0	180,000	10,000	3,900	170,000	820	8,300	65,000	45,000	0
2025 (BN)	38,000	190,000	9,900	0	29,000	12,000	2,800	150,000	810	5,800	18,000	22,000	-7,300
2026 (AN)	96,000	400,000	9,200	0	170,000	10,000	3,400	180,000	860	7,000	65,000	56,000	5,800
2027 (W)	130,000	370,000	9,000	0	200,000	9,800	3,700	170,000	790	7,600	66,000	54,000	-3,500
2028 (W)	87,000	270,000	9,700	0	91,000	11,000	3,600	160,000	950	7,700	47,000	51,000	-1,700
2029 (C)	64,000	200,000	11,000	0	66,000	13,000	2,900	130,000	1,000	7,800	26,000	35,000	-2,200
2030 (C)	39,000	170,000	8,800	0	33,000	13,000	1,900	120,000	850	5,200	14,000	25,000	12,000
2031 (AN)	98,000	400,000	8,900	0	170,000	9,900	2,900	190,000	850	7,800	67,000	65,000	-4,200
2032 (BN)	46,000	200,000	8,000	0	24,000	11,000	2,100	160,000	830	5,200	19,000	39,000	-6,400
2033 (AN)	93,000	330,000	8,100	0	120,000	10,000	2,800	170,000	860	8,000	49,000	58,000	9,900
2034 (D)	80,000	250,000	10,000	0	83,000	12,000	2,700	150,000	960	8,200	41,000	51,000	-10,000
2035 (W)	130,000	370,000	8,400	0	190,000	10,000	3,200	160,000	790	7,500	64,000	64,000	3,200
2036 (W)	180,000	560,000	8,500	0	390,000	7,200	3,800	170,000	660	6,400	100,000	59,000	7,300
2037 (W)	96,000	370,000	10,000	0	190,000	10,000	3,800	170,000	820	8,300	65,000	42,000	-2,300
2038 (D)	80,000	250,000	11,000	0	94,000	12,000	3,400	150,000	970	8,500	41,000	39,000	-8,200
2039 (W)	97,000	370,000	9,700	0	180,000	11,000	3,400	160,000	820	8,500	64,000	49,000	8,200
2040 (D)	68,000	230,000	8,900	0	62,000	11,000	2,900	170,000	900	7,400	30,000	35,000	-4,600
2041 (C)	44,000	200,000	9,600	0	23,000	12,000	2,400	160,000	920	6,400	19,000	31,000	540
2042 (D)	52,000	180,000	9,000	0	22,000	13,000	2,000	140,000	950	11,000	18,000	35,000	-500
2043 (C)	40,000	220,000	8,800	0	20,000	12,000	1,900	170,000	840	6,300	24,000	35,000	-2,200
2044 (C)	41,000	220,000	8,700	0	17,000	12,000	1,800	170,000	840	6,700	24,000	37,000	-15
2045 (C)	56,000	240,000	8,800	0	39,000	13,000	1,800	170,000	870	6,700	26,000	51,000	260
2046 (AN)	96,000	400,000	8,300	0	160,000	10,000	2,500	180,000	860	7,200	64,000	72,000	4,900
2047 (C)	41,000	220,000	8,800	0	21,000	12,000	1,800	170,000	840	6,100	24,000	35,000	-5,100
2048 (W)	150,000	510,000	8,300	0	340,000	9,500	2,800	160,000	760	8,100	79,000	67,000	4,500
2049 (W)	96,000	370,000	9,400	0	170,000	11,000	2,900	160,000	800	8,200	64,000	56,000	2,100
2050 (W)	83,000	320,000	11,000	0	140,000	12,000	2,800	170,000	930	8,100	47,000	42,000	-4,000
2051 (W)	180,000	560,000	8,400	0	390,000	7,300	3,700	170,000	660	6,600	100,000	62,000	6,400
2052 (W)	88,000	270,000	9,900	0	96,000	11,000	3,700	160,000	950	7,800	49,000	48,000	-8,900
2053 (AN)	96,000	330,000	8,800	0	140,000	10,000	3,500	170,000	870	8,300	49,000	45,000	8,800
2054 (D)	68,000	230,000	9,000	0	62,000	11,000	2,800	170,000	900	7,200	31,000	36,000	-6,800
2055 (D)	80,000	250,000	10,000	0	83,000	13,000	2,900	150,000	960	8,400	40,000	48,000	-3,600
2056 (AN)	96,000	350,000	8,300	0	160,000	10,000	3,000	160,000	820	7,400	62,000	58,000	4,700
2057 (BN)	98,000	300,000	9,900	0	160,000	12,000	3,200	140,000	970	8,800	51,000	47,000	-4,600
2058 (AN)	92,000	340,000	8,000	0	120,000	9,000	3,100	190,000	770	5,700	58,000	61,000	7,000
2059 (W)	130,000	370,000	8,800	0	200,000	9,900	3,500	170,000	800	7,400	65,000	54,000	-3,900
2060 (D)	51,000	180,000	9,500	0	30,000	13,000	2,600	130,000	960	10,000	18,000	27,000	420
2061 (C)	64,000	200,000	11,000	0	60,000	14,000	2,500	130,000	1,000	8,000	26,000	41,000	-4,400
2062 (D)	54,000	220,000	8,300	0	30,000	12,000	2,100	160,000	950	7,100	20,000	43,000	2,700
2063 (BN)	88,000	290,000	7,800	0	96,000	9,800	2,400	150,000	860	6,700	48,000	62,000	1,800
2064 (W)	84,000	330,000	7,900	0	100,000	9,100	2,800	190,000	750	5,900	52,000	64,000	3,900
2065 (BN)	46,000	200,000	7,900	0	24,000	11,000	2,100	160,000	830	5,300	19,000	39,000	-7,300

Bowman Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		60,000	230,000	10,000	0	63,000	13,000	2,200	140,000	970	9,600	30,000	40,000	5,700
2067 (C)		38,000	170,000	9,000	0	27,000	12,000	1,700	130,000	840	4,900	14,000	31,000	4,900
2068 (C)		55,000	240,000	10,000	0	73,000	12,000	1,700	150,000	780	5,700	31,000	44,000	-8,000
2069 (BN)		78,000	330,000	9,000	0	130,000	12,000	2,100	170,000	850	6,800	44,000	59,000	-730
2070 (W)		120,000	400,000	8,200	0	200,000	9,800	2,600	170,000	760	5,800	73,000	69,000	1,700
2071 (BN)		39,000	190,000	8,900	0	18,000	12,000	1,800	150,000	800	6,400	17,000	32,000	-3,100
2072 (W)		100,000	420,000	9,000	0	200,000	10,000	2,700	180,000	740	7,000	64,000	63,000	6,600
Average (2022-2072)		83,000	300,000	9,200	0	120,000	11,000	2,800	160,000	850	7,300	46,000	47,000	-70
2022-2072	W	110,000	390,000	9,300	0	200,000	9,900	3,400	170,000	800	7,500	67,000	55,000	930
	AN	95,000	370,000	8,500	0	150,000	10,000	3,000	180,000	840	7,300	59,000	59,000	5,300
	BN	62,000	240,000	8,800	0	69,000	11,000	2,300	160,000	850	6,400	31,000	43,000	-3,900
	D	66,000	220,000	9,600	0	59,000	12,000	2,600	150,000	950	8,600	30,000	39,000	-2,800
	C	48,000	210,000	9,500	0	38,000	12,000	2,000	150,000	880	6,400	23,000	36,000	-460

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

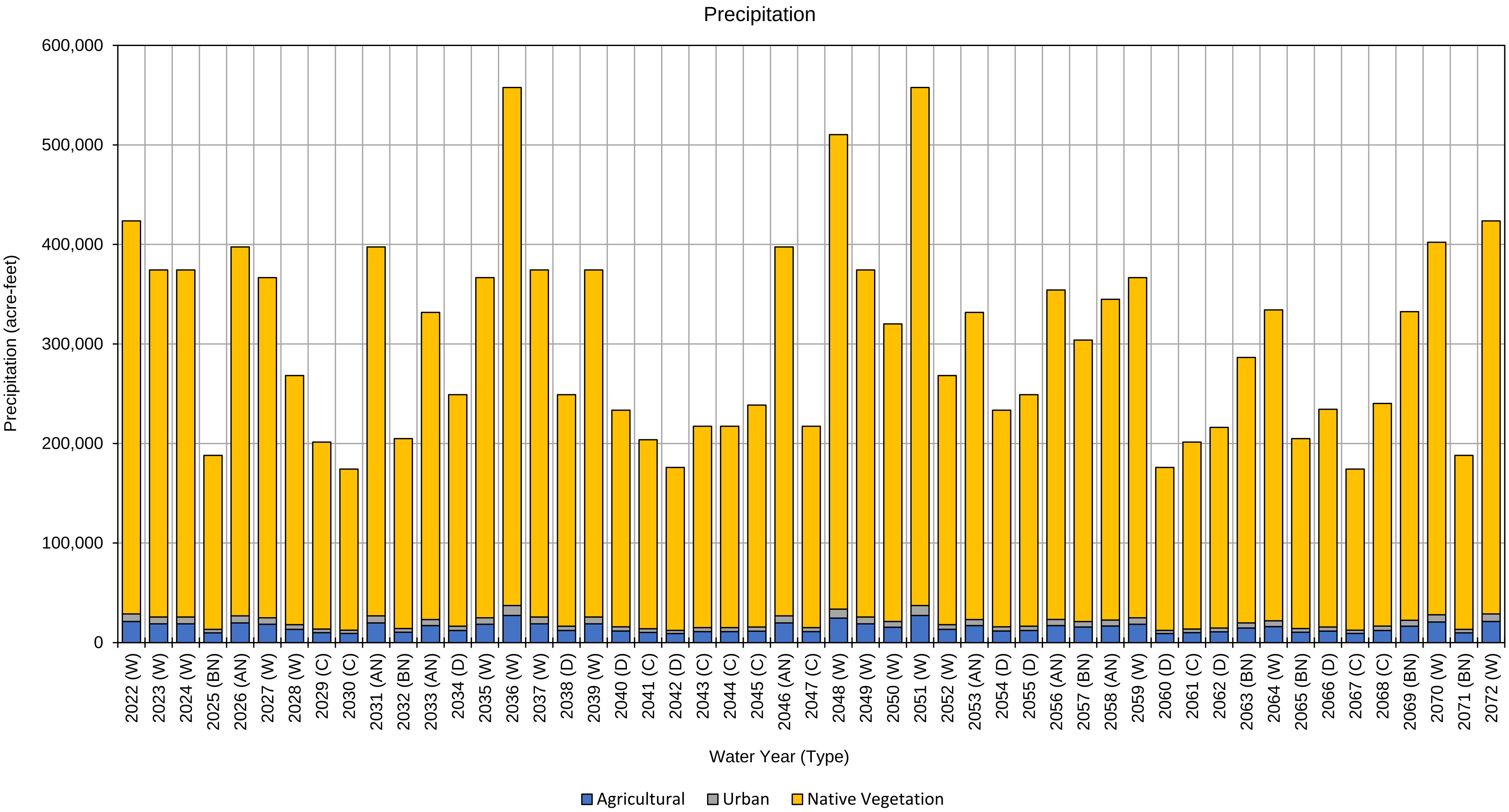
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	15,000	88,000	100,000
2023 (W)	18,000	78,000	96,000
2024 (W)	18,000	78,000	96,000
2025 (BN)	18,000	20,000	38,000
2026 (AN)	18,000	78,000	96,000
2027 (W)	17,000	110,000	130,000
2028 (W)	20,000	68,000	88,000
2029 (C)	19,000	45,000	64,000
2030 (C)	16,000	23,000	39,000
2031 (AN)	18,000	79,000	97,000
2032 (BN)	16,000	30,000	46,000
2033 (AN)	20,000	74,000	94,000
2034 (D)	21,000	59,000	80,000
2035 (W)	17,000	110,000	130,000
2036 (W)	17,000	160,000	180,000
2037 (W)	18,000	78,000	96,000
2038 (D)	21,000	59,000	80,000
2039 (W)	18,000	78,000	96,000
2040 (D)	21,000	47,000	68,000
2041 (C)	18,000	26,000	44,000
2042 (D)	21,000	31,000	52,000
2043 (C)	18,000	22,000	40,000
2044 (C)	18,000	23,000	41,000
2045 (C)	18,000	38,000	56,000
2046 (AN)	18,000	78,000	96,000
2047 (C)	18,000	23,000	41,000
2048 (W)	18,000	130,000	150,000
2049 (W)	18,000	78,000	96,000
2050 (W)	19,000	64,000	83,000
2051 (W)	17,000	160,000	180,000
2052 (W)	20,000	68,000	88,000
2053 (AN)	20,000	76,000	96,000
2054 (D)	21,000	47,000	68,000
2055 (D)	21,000	59,000	80,000
2056 (AN)	18,000	78,000	96,000
2057 (BN)	20,000	78,000	98,000
2058 (AN)	18,000	75,000	93,000
2059 (W)	17,000	110,000	130,000
2060 (D)	21,000	30,000	51,000
2061 (C)	19,000	45,000	64,000
2062 (D)	19,000	35,000	54,000
2063 (BN)	18,000	70,000	88,000

Bowman Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		16,000	68,000	84,000
2065 (BN)		16,000	30,000	46,000
2066 (D)		20,000	40,000	60,000
2067 (C)		16,000	23,000	39,000
2068 (C)		15,000	40,000	55,000
2069 (BN)		17,000	61,000	78,000
2070 (W)		16,000	100,000	120,000
2071 (BN)		18,000	21,000	39,000
2072 (W)		15,000	88,000	100,000
Average (2022-2072)		18,000	65,000	83,000
2022-2072	W	17,000	96,000	110,000
	AN	18,000	77,000	95,000
	BN	18,000	44,000	62,000
	D	21,000	45,000	66,000
	C	17,000	31,000	48,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

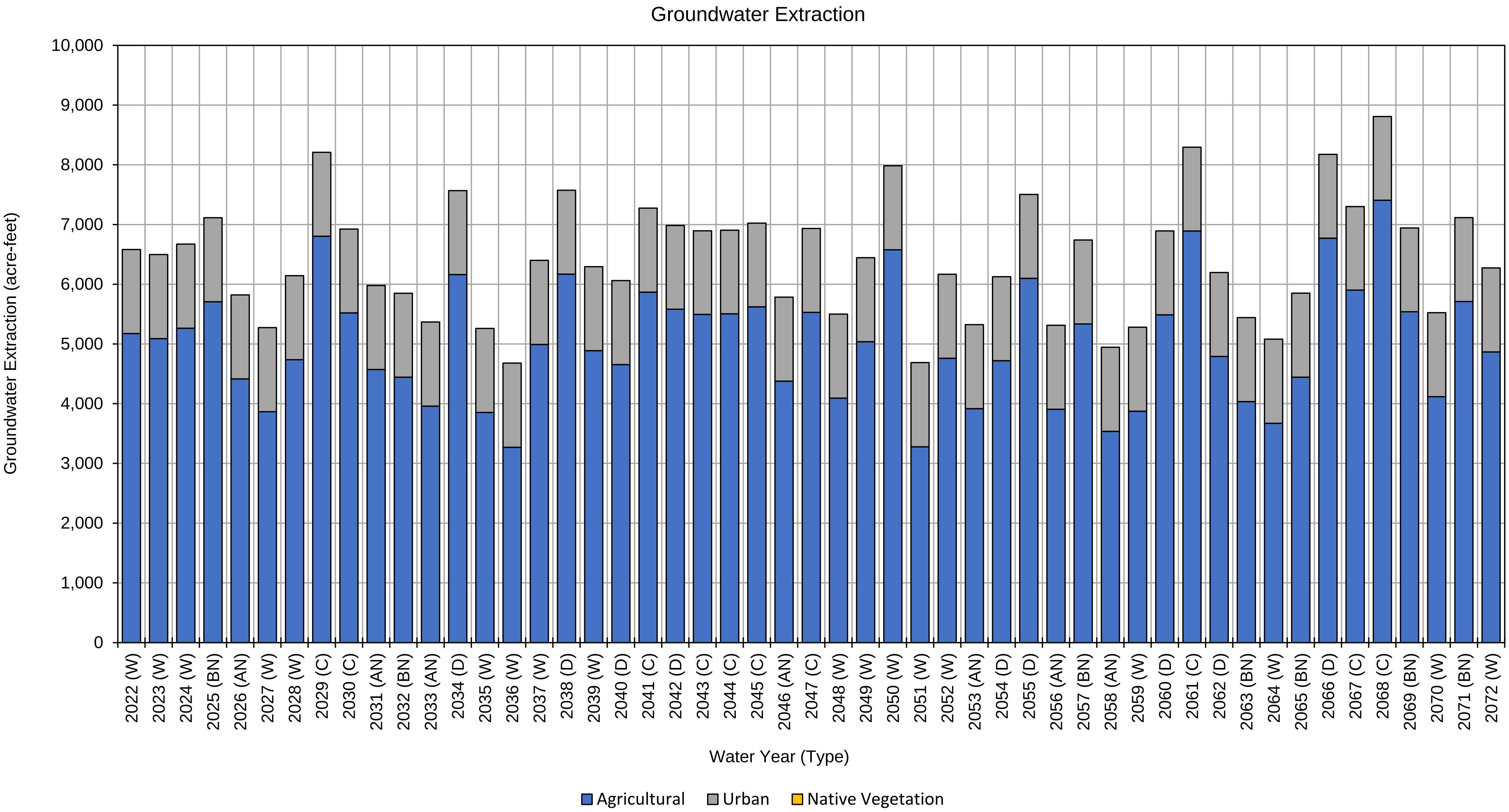
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	21,000	7,600	390,000	420,000
2023 (W)	19,000	6,800	350,000	380,000
2024 (W)	19,000	6,800	350,000	380,000
2025 (BN)	9,800	3,500	170,000	180,000
2026 (AN)	20,000	7,100	370,000	400,000
2027 (W)	18,000	6,500	340,000	360,000
2028 (W)	13,000	4,800	250,000	270,000
2029 (C)	10,000	3,600	190,000	200,000
2030 (C)	9,200	3,300	160,000	170,000
2031 (AN)	20,000	7,100	370,000	400,000
2032 (BN)	10,000	3,700	190,000	200,000
2033 (AN)	17,000	6,100	310,000	330,000
2034 (D)	12,000	4,400	230,000	250,000
2035 (W)	18,000	6,500	340,000	360,000
2036 (W)	27,000	9,900	520,000	560,000
2037 (W)	19,000	6,800	350,000	380,000
2038 (D)	12,000	4,400	230,000	250,000
2039 (W)	19,000	6,800	350,000	380,000
2040 (D)	12,000	4,200	220,000	240,000
2041 (C)	10,000	3,700	190,000	200,000
2042 (D)	9,100	3,200	160,000	170,000
2043 (C)	11,000	4,000	200,000	220,000
2044 (C)	11,000	4,000	200,000	220,000
2045 (C)	11,000	4,200	220,000	240,000
2046 (AN)	20,000	7,100	370,000	400,000
2047 (C)	11,000	4,000	200,000	220,000
2048 (W)	25,000	9,000	480,000	510,000
2049 (W)	19,000	6,800	350,000	380,000
2050 (W)	15,000	5,700	300,000	320,000
2051 (W)	27,000	9,900	520,000	560,000
2052 (W)	13,000	4,800	250,000	270,000
2053 (AN)	17,000	6,100	310,000	330,000
2054 (D)	12,000	4,200	220,000	240,000
2055 (D)	12,000	4,400	230,000	250,000
2056 (AN)	17,000	6,200	330,000	350,000
2057 (BN)	16,000	5,500	280,000	300,000
2058 (AN)	17,000	6,000	320,000	340,000
2059 (W)	18,000	6,500	340,000	360,000
2060 (D)	9,100	3,200	160,000	170,000
2061 (C)	10,000	3,600	190,000	200,000
2062 (D)	11,000	3,800	200,000	210,000
2063 (BN)	15,000	5,100	270,000	290,000

Bowman Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		16,000	5,800	310,000	330,000
2065 (BN)		10,000	3,700	190,000	200,000
2066 (D)		11,000	4,200	220,000	240,000
2067 (C)		9,200	3,300	160,000	170,000
2068 (C)		12,000	4,400	220,000	240,000
2069 (BN)		16,000	5,900	310,000	330,000
2070 (W)		21,000	7,400	370,000	400,000
2071 (BN)		9,800	3,500	170,000	180,000
2072 (W)		21,000	7,600	390,000	420,000
Average (2022-2072)		15,000	5,400	280,000	300,000
2022-2072	W	19,000	7,000	360,000	390,000
	AN	18,000	6,500	340,000	360,000
	BN	12,000	4,400	230,000	250,000
	D	11,000	4,000	210,000	230,000
	C	11,000	3,800	190,000	200,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

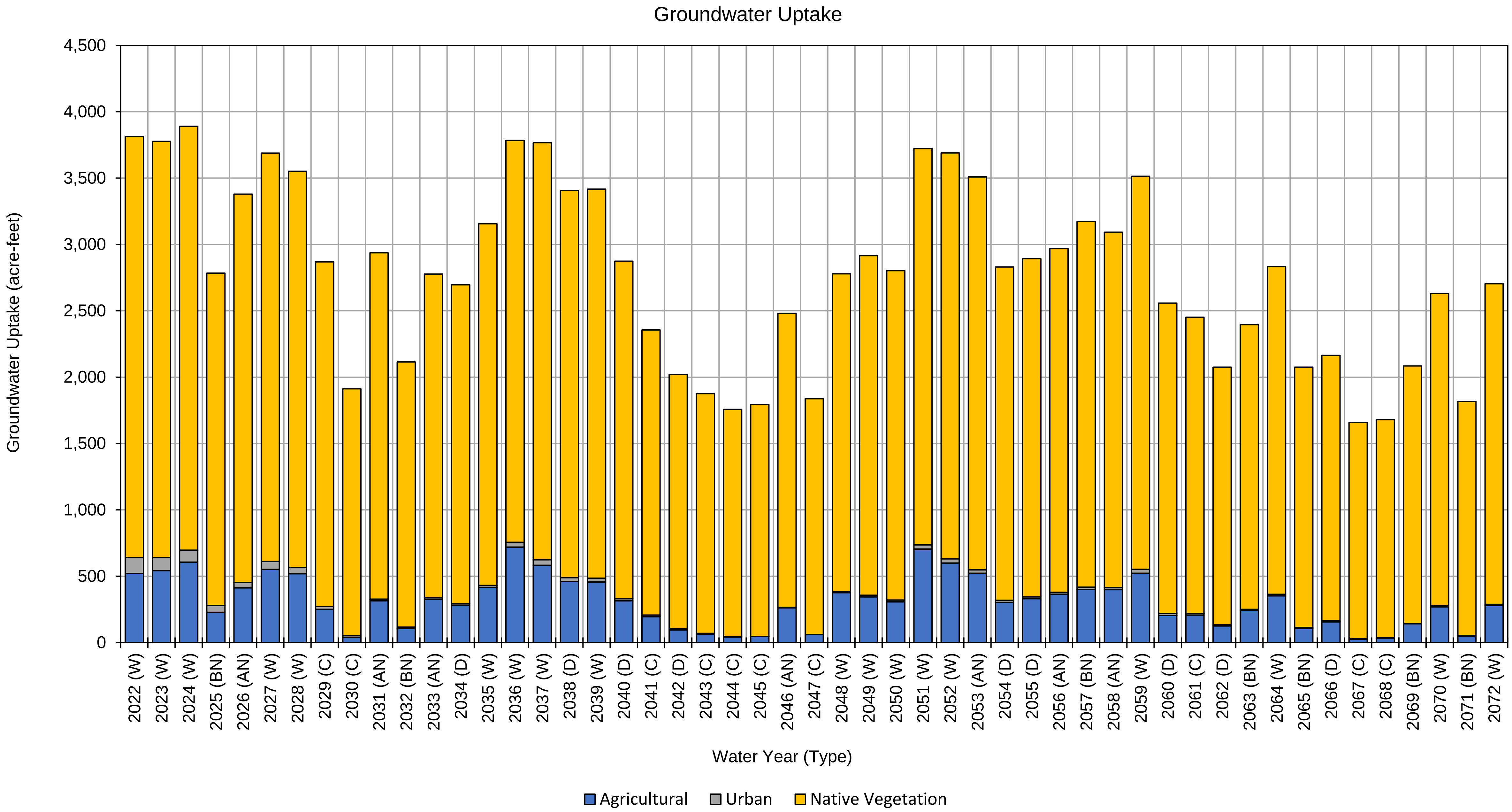
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	1,400	0	6,600
2023 (W)	5,100	1,400	0	6,500
2024 (W)	5,300	1,400	0	6,700
2025 (BN)	5,700	1,400	0	7,100
2026 (AN)	4,400	1,400	0	5,800
2027 (W)	3,900	1,400	0	5,300
2028 (W)	4,700	1,400	0	6,100
2029 (C)	6,800	1,400	0	8,200
2030 (C)	5,500	1,400	0	6,900
2031 (AN)	4,600	1,400	0	6,000
2032 (BN)	4,400	1,400	0	5,800
2033 (AN)	4,000	1,400	0	5,400
2034 (D)	6,200	1,400	0	7,600
2035 (W)	3,900	1,400	0	5,300
2036 (W)	3,300	1,400	0	4,700
2037 (W)	5,000	1,400	0	6,400
2038 (D)	6,200	1,400	0	7,600
2039 (W)	4,900	1,400	0	6,300
2040 (D)	4,700	1,400	0	6,100
2041 (C)	5,900	1,400	0	7,300
2042 (D)	5,600	1,400	0	7,000
2043 (C)	5,500	1,400	0	6,900
2044 (C)	5,500	1,400	0	6,900
2045 (C)	5,600	1,400	0	7,000
2046 (AN)	4,400	1,400	0	5,800
2047 (C)	5,500	1,400	0	6,900
2048 (W)	4,100	1,400	0	5,500
2049 (W)	5,000	1,400	0	6,400
2050 (W)	6,600	1,400	0	8,000
2051 (W)	3,300	1,400	0	4,700
2052 (W)	4,800	1,400	0	6,200
2053 (AN)	3,900	1,400	0	5,300
2054 (D)	4,700	1,400	0	6,100
2055 (D)	6,100	1,400	0	7,500
2056 (AN)	3,900	1,400	0	5,300
2057 (BN)	5,300	1,400	0	6,700
2058 (AN)	3,500	1,400	0	4,900
2059 (W)	3,900	1,400	0	5,300
2060 (D)	5,500	1,400	0	6,900
2061 (C)	6,900	1,400	0	8,300
2062 (D)	4,800	1,400	0	6,200
2063 (BN)	4,000	1,400	0	5,400

Bowman Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		3,700	1,400	0	5,100
2065 (BN)		4,400	1,400	0	5,800
2066 (D)		6,800	1,400	0	8,200
2067 (C)		5,900	1,400	0	7,300
2068 (C)		7,400	1,400	0	8,800
2069 (BN)		5,500	1,400	0	6,900
2070 (W)		4,100	1,400	0	5,500
2071 (BN)		5,700	1,400	0	7,100
2072 (W)		4,900	1,400	0	6,300
Average (2022-2072)		5,000	1,400	0	6,400
2022-2072	W	4,500	1,400	0	5,900
	AN	4,100	1,400	0	5,500
	BN	5,000	1,400	0	6,400
	D	5,600	1,400	0	7,000
	C	6,100	1,400	0	7,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	520	120	3,200	3,800
2023 (W)	540	99	3,100	3,700
2024 (W)	610	90	3,200	3,900
2025 (BN)	230	52	2,500	2,800
2026 (AN)	410	40	2,900	3,400
2027 (W)	550	59	3,100	3,700
2028 (W)	520	48	3,000	3,600
2029 (C)	250	22	2,600	2,900
2030 (C)	40	12	1,900	2,000
2031 (AN)	310	13	2,600	2,900
2032 (BN)	100	11	2,000	2,100
2033 (AN)	330	11	2,400	2,700
2034 (D)	280	11	2,400	2,700
2035 (W)	420	15	2,700	3,100
2036 (W)	720	37	3,000	3,800
2037 (W)	580	41	3,100	3,700
2038 (D)	460	29	2,900	3,400
2039 (W)	460	28	2,900	3,400
2040 (D)	310	17	2,500	2,800
2041 (C)	190	13	2,100	2,300
2042 (D)	94	9	1,900	2,000
2043 (C)	64	5	1,800	1,900
2044 (C)	41	2	1,700	1,700
2045 (C)	47	0	1,700	1,700
2046 (AN)	260	3	2,200	2,500
2047 (C)	59	2	1,800	1,900
2048 (W)	380	8	2,400	2,800
2049 (W)	340	12	2,600	3,000
2050 (W)	310	13	2,500	2,800
2051 (W)	710	32	3,000	3,700
2052 (W)	600	32	3,100	3,700
2053 (AN)	520	26	3,000	3,500
2054 (D)	300	16	2,500	2,800
2055 (D)	330	14	2,500	2,800
2056 (AN)	360	15	2,600	3,000
2057 (BN)	400	18	2,800	3,200
2058 (AN)	400	16	2,700	3,100
2059 (W)	520	30	3,000	3,600
2060 (D)	200	16	2,300	2,500
2061 (C)	210	13	2,200	2,400
2062 (D)	130	8	1,900	2,000
2063 (BN)	240	8	2,100	2,300

Bowman Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		350	11	2,500	2,900
2065 (BN)		110	9	2,000	2,100
2066 (D)		160	7	2,000	2,200
2067 (C)		26	2	1,600	1,600
2068 (C)		34	1	1,600	1,600
2069 (BN)		140	1	1,900	2,000
2070 (W)		270	9	2,400	2,700
2071 (BN)		48	6	1,800	1,900
2072 (W)		280	9	2,400	2,700
Average (2022-2072)		310	22	2,400	2,700
2022-2072	W	480	39	2,800	3,300
	AN	370	18	2,600	3,000
	BN	180	15	2,200	2,400
	D	250	14	2,300	2,600
	C	96	7	1,900	2,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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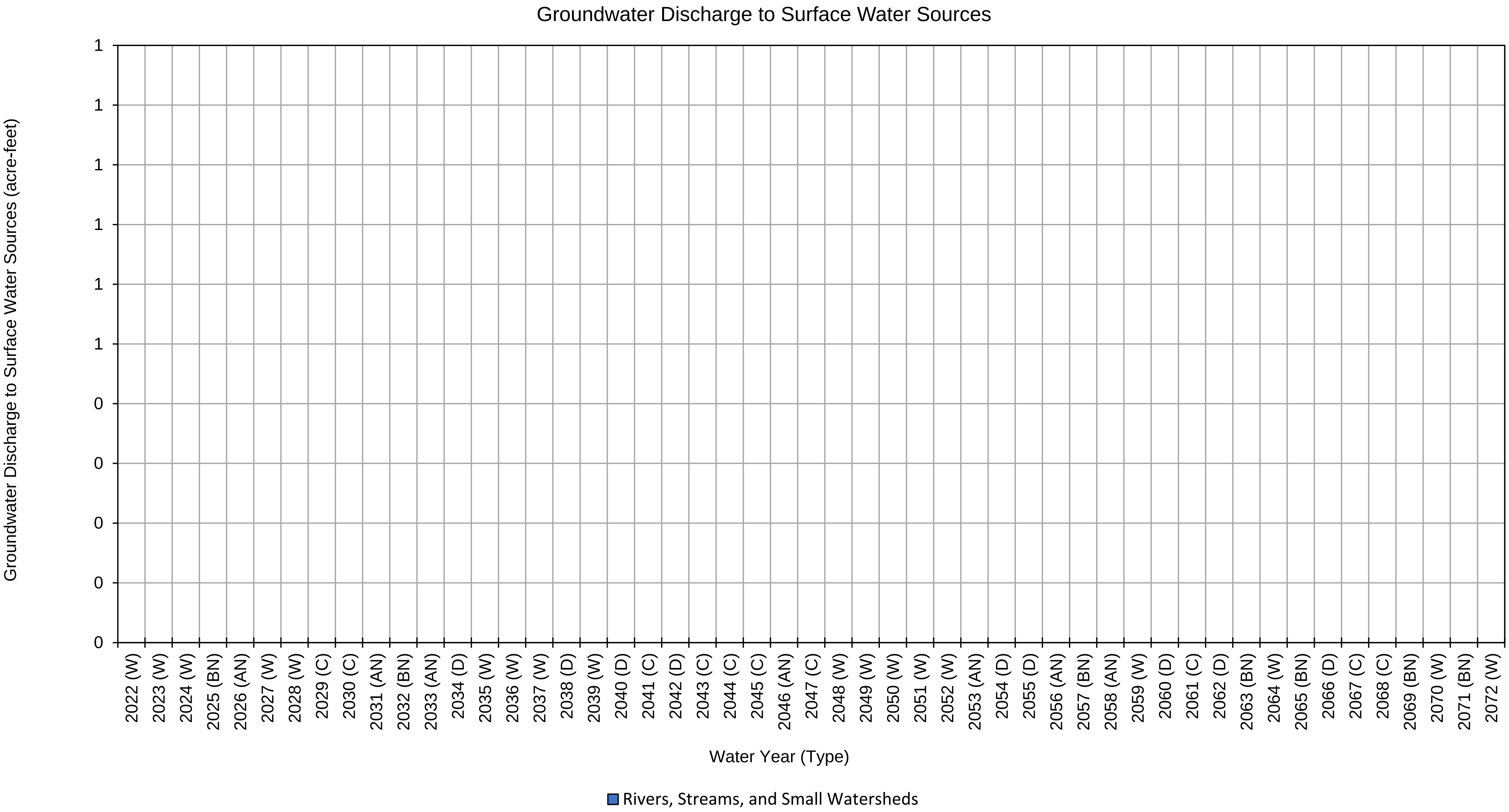
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

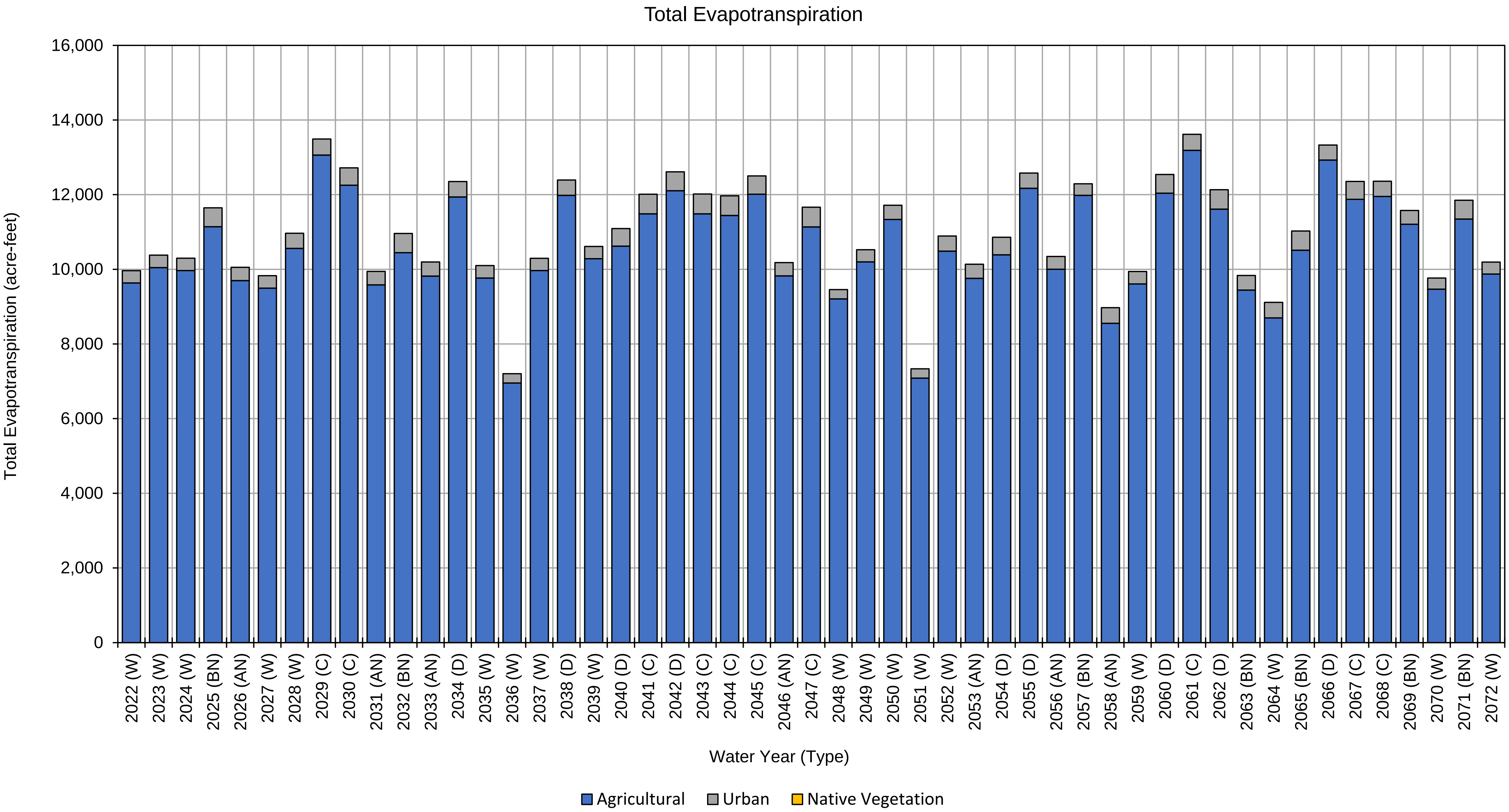
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	0
2023 (W)	0
2024 (W)	0
2025 (BN)	0
2026 (AN)	0
2027 (W)	0
2028 (W)	0
2029 (C)	0
2030 (C)	0
2031 (AN)	0
2032 (BN)	0
2033 (AN)	0
2034 (D)	0
2035 (W)	0
2036 (W)	0
2037 (W)	0
2038 (D)	0
2039 (W)	0
2040 (D)	0
2041 (C)	0
2042 (D)	0
2043 (C)	0
2044 (C)	0
2045 (C)	0
2046 (AN)	0
2047 (C)	0
2048 (W)	0
2049 (W)	0
2050 (W)	0
2051 (W)	0
2052 (W)	0
2053 (AN)	0
2054 (D)	0
2055 (D)	0
2056 (AN)	0
2057 (BN)	0
2058 (AN)	0
2059 (W)	0
2060 (D)	0
2061 (C)	0
2062 (D)	0
2063 (BN)	0

Bowman Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		0
2066 (D)		0
2067 (C)		0
2068 (C)		0
2069 (BN)		0
2070 (W)		0
2071 (BN)		0
2072 (W)		0
Average (2022-2072)		0
2022-2072	W	0
	AN	0
	BN	0
	D	0
	C	0

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	2,100	180,000	200,000
2023 (W)	18,000	2,000	160,000	180,000
2024 (W)	18,000	2,000	160,000	180,000
2025 (BN)	17,000	1,800	150,000	170,000
2026 (AN)	18,000	2,200	180,000	200,000
2027 (W)	17,000	1,900	160,000	180,000
2028 (W)	17,000	1,800	150,000	170,000
2029 (C)	18,000	1,500	120,000	140,000
2030 (C)	17,000	1,600	110,000	130,000
2031 (AN)	18,000	2,200	180,000	200,000
2032 (BN)	17,000	1,900	160,000	180,000
2033 (AN)	17,000	2,000	170,000	190,000
2034 (D)	18,000	1,700	150,000	170,000
2035 (W)	17,000	1,900	160,000	180,000
2036 (W)	15,000	2,000	160,000	180,000
2037 (W)	18,000	1,900	160,000	180,000
2038 (D)	18,000	1,700	150,000	170,000
2039 (W)	17,000	1,900	150,000	170,000
2040 (D)	17,000	1,900	160,000	180,000
2041 (C)	18,000	1,900	160,000	180,000
2042 (D)	17,000	1,700	130,000	150,000
2043 (C)	18,000	2,000	160,000	180,000
2044 (C)	18,000	2,000	160,000	180,000
2045 (C)	18,000	1,900	160,000	180,000
2046 (AN)	18,000	2,200	180,000	200,000
2047 (C)	18,000	2,000	170,000	190,000
2048 (W)	16,000	1,800	150,000	170,000
2049 (W)	17,000	1,900	160,000	180,000
2050 (W)	18,000	1,900	160,000	180,000
2051 (W)	15,000	2,000	160,000	180,000
2052 (W)	17,000	1,800	150,000	170,000
2053 (AN)	17,000	2,000	170,000	190,000
2054 (D)	17,000	1,900	160,000	180,000
2055 (D)	18,000	1,700	140,000	160,000
2056 (AN)	17,000	1,900	150,000	170,000
2057 (BN)	17,000	1,500	130,000	150,000
2058 (AN)	17,000	2,200	180,000	200,000
2059 (W)	17,000	1,900	160,000	180,000
2060 (D)	17,000	1,600	130,000	150,000
2061 (C)	18,000	1,500	130,000	150,000
2062 (D)	18,000	1,900	160,000	180,000
2063 (BN)	16,000	1,800	150,000	170,000

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		16,000	2,100	180,000	200,000
2065 (BN)		17,000	1,900	160,000	180,000
2066 (D)		18,000	1,600	140,000	160,000
2067 (C)		17,000	1,600	120,000	140,000
2068 (C)		18,000	1,700	140,000	160,000
2069 (BN)		18,000	1,900	160,000	180,000
2070 (W)		17,000	1,900	160,000	180,000
2071 (BN)		17,000	1,800	150,000	170,000
2072 (W)		17,000	2,100	170,000	190,000
Average (2022-2072)		17,000	1,900	150,000	170,000
2022-2072	W	17,000	1,900	160,000	180,000
	AN	17,000	2,100	170,000	190,000
	BN	17,000	1,800	150,000	170,000
	D	18,000	1,700	150,000	170,000
	C	18,000	1,800	140,000	160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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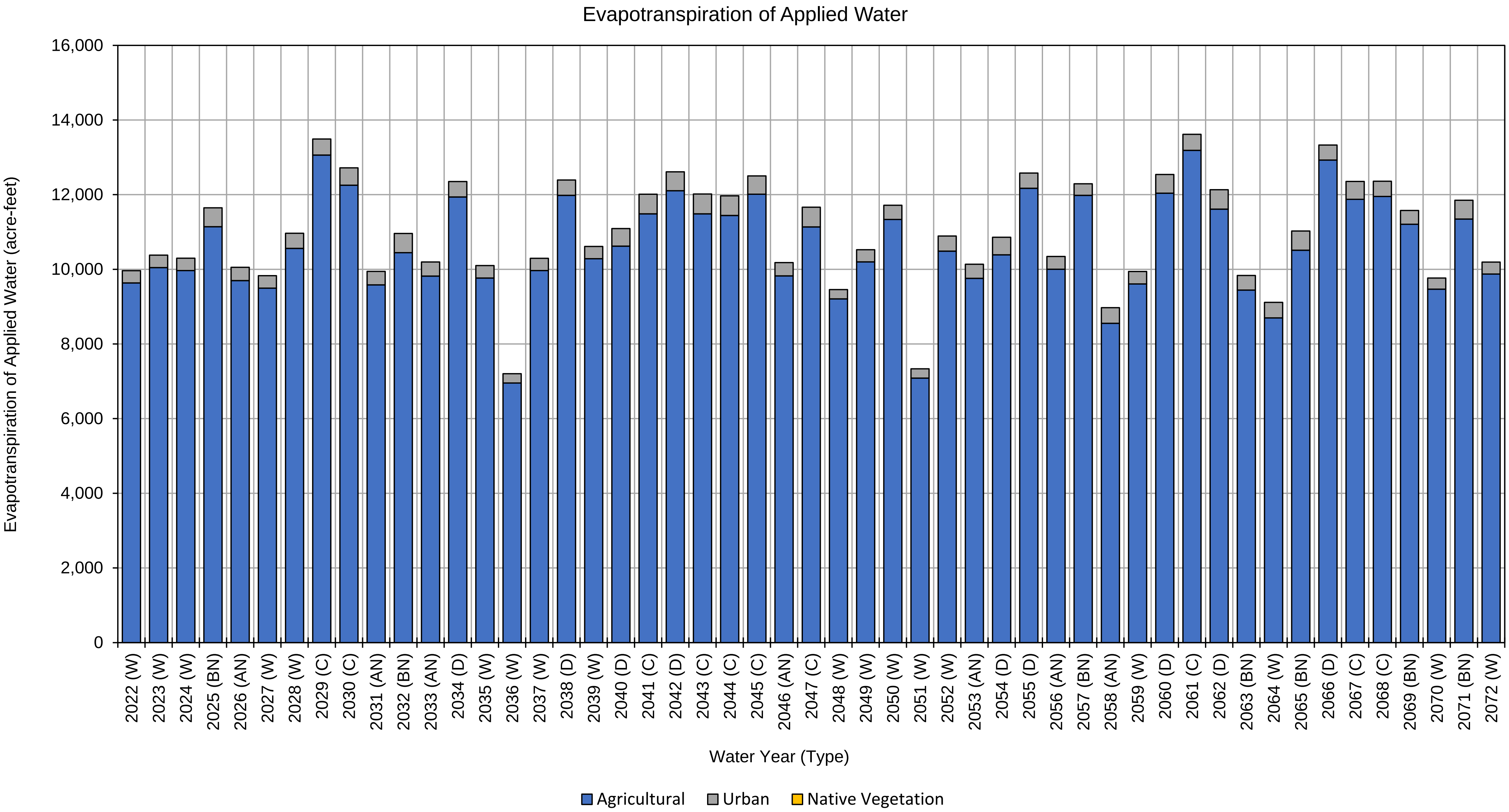
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

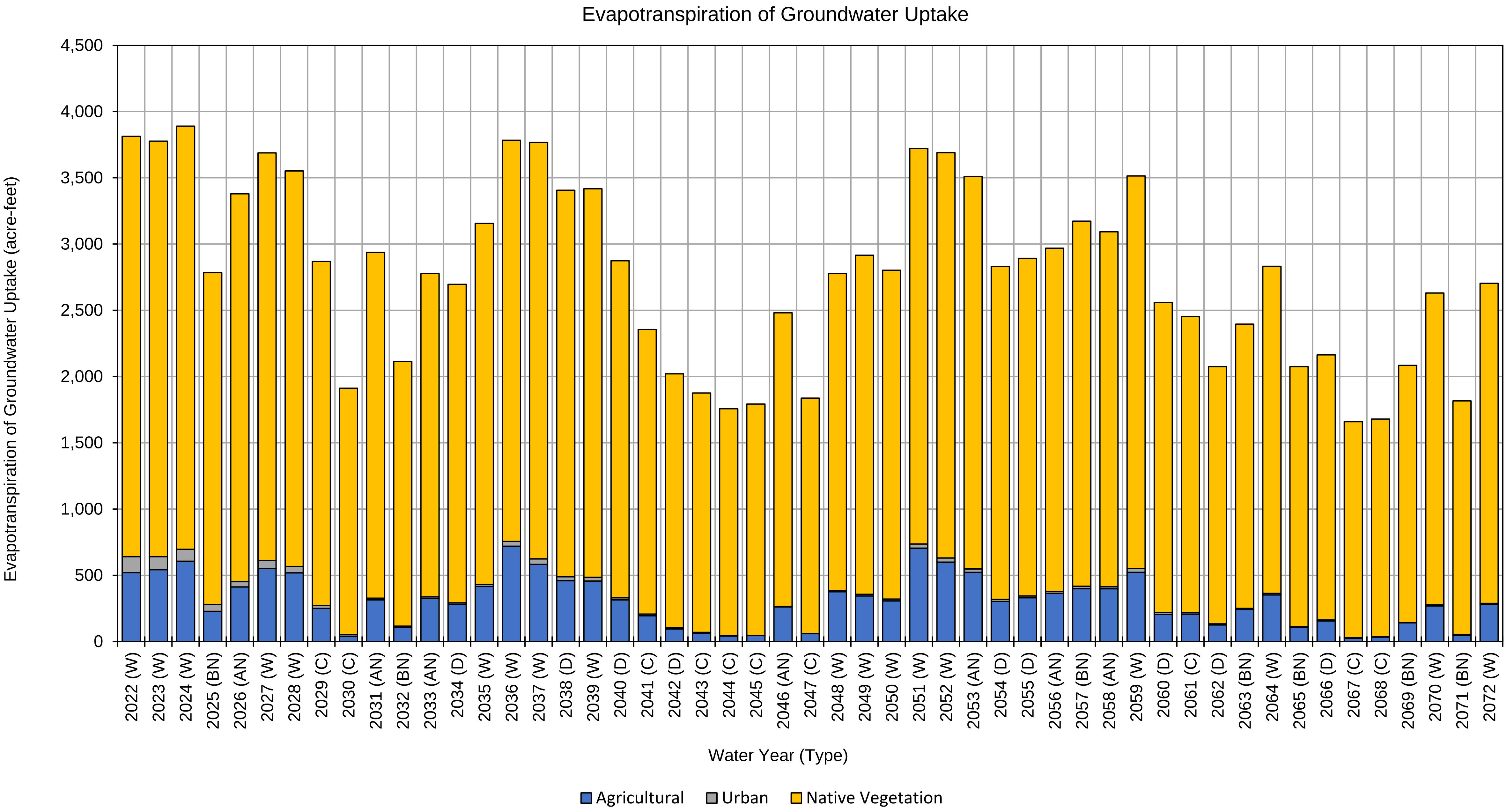
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	9,600	330	0	9,900
2023 (W)	10,000	330	0	10,000
2024 (W)	10,000	330	0	10,000
2025 (BN)	11,000	510	0	12,000
2026 (AN)	9,700	360	0	10,000
2027 (W)	9,500	330	0	9,800
2028 (W)	11,000	410	0	11,000
2029 (C)	13,000	430	0	13,000
2030 (C)	12,000	470	0	12,000
2031 (AN)	9,600	360	0	10,000
2032 (BN)	10,000	510	0	11,000
2033 (AN)	9,800	380	0	10,000
2034 (D)	12,000	410	0	12,000
2035 (W)	9,800	330	0	10,000
2036 (W)	7,000	250	0	7,300
2037 (W)	10,000	330	0	10,000
2038 (D)	12,000	410	0	12,000
2039 (W)	10,000	330	0	10,000
2040 (D)	11,000	470	0	11,000
2041 (C)	11,000	530	0	12,000
2042 (D)	12,000	510	0	13,000
2043 (C)	11,000	530	0	12,000
2044 (C)	11,000	530	0	12,000
2045 (C)	12,000	490	0	12,000
2046 (AN)	9,800	360	0	10,000
2047 (C)	11,000	530	0	12,000
2048 (W)	9,200	250	0	9,500
2049 (W)	10,000	330	0	10,000
2050 (W)	11,000	380	0	11,000
2051 (W)	7,100	250	0	7,400
2052 (W)	10,000	410	0	10,000
2053 (AN)	9,800	380	0	10,000
2054 (D)	10,000	470	0	10,000
2055 (D)	12,000	410	0	12,000
2056 (AN)	10,000	340	0	10,000
2057 (BN)	12,000	310	0	12,000
2058 (AN)	8,600	420	0	9,000
2059 (W)	9,600	330	0	9,900
2060 (D)	12,000	500	0	13,000
2061 (C)	13,000	430	0	13,000
2062 (D)	12,000	520	0	13,000
2063 (BN)	9,400	390	0	9,800

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2064 (W)</td><td>8,700</td><td>420</td><td>0</td><td>9,100</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>11,000</td><td>510</td><td>0</td><td>12,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>13,000</td><td>400</td><td>0</td><td>13,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>12,000</td><td>480</td><td>0</td><td>12,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>12,000</td><td>410</td><td>0</td><td>12,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>11,000</td><td>370</td><td>0</td><td>11,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>9,500</td><td>300</td><td>0</td><td>9,800</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>11,000</td><td>500</td><td>0</td><td>12,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>9,900</td><td>320</td><td>0</td><td>10,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>11,000</td><td>400</td><td>0</td><td>11,000</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>9,600</td><td>330</td><td>0</td><td>9,900</td></tr>
<tr><td>AN</td><td>9,600</td><td>370</td><td>0</td><td>10,000</td></tr>
<tr><td>BN</td><td>11,000</td><td>440</td><td>0</td><td>11,000</td></tr>
<tr><td>D</td><td>12,000</td><td>460</td><td>0</td><td>12,000</td></tr>
<tr><td>C</td><td>12,000</td><td>480</td><td>0</td><td>12,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

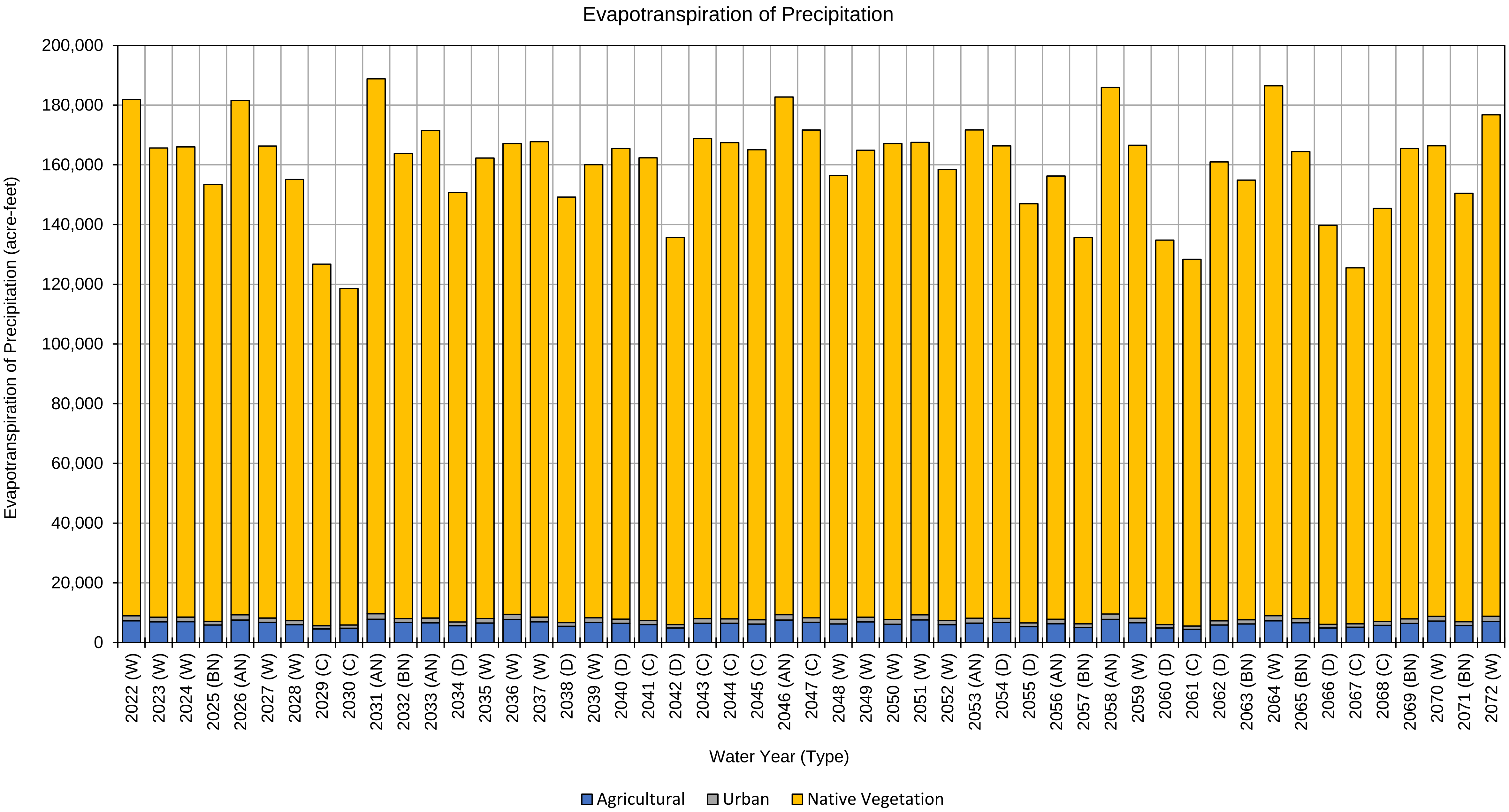
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	520	120	3,200	3,800
2023 (W)	540	99	3,100	3,700
2024 (W)	610	90	3,200	3,900
2025 (BN)	230	52	2,500	2,800
2026 (AN)	410	40	2,900	3,400
2027 (W)	550	59	3,100	3,700
2028 (W)	520	48	3,000	3,600
2029 (C)	250	22	2,600	2,900
2030 (C)	40	12	1,900	2,000
2031 (AN)	310	13	2,600	2,900
2032 (BN)	100	11	2,000	2,100
2033 (AN)	330	11	2,400	2,700
2034 (D)	280	11	2,400	2,700
2035 (W)	420	15	2,700	3,100
2036 (W)	720	37	3,000	3,800
2037 (W)	580	41	3,100	3,700
2038 (D)	460	29	2,900	3,400
2039 (W)	460	28	2,900	3,400
2040 (D)	310	17	2,500	2,800
2041 (C)	190	13	2,100	2,300
2042 (D)	94	9	1,900	2,000
2043 (C)	64	5	1,800	1,900
2044 (C)	41	2	1,700	1,700
2045 (C)	47	0	1,700	1,700
2046 (AN)	260	3	2,200	2,500
2047 (C)	59	2	1,800	1,900
2048 (W)	380	8	2,400	2,800
2049 (W)	340	12	2,600	3,000
2050 (W)	310	13	2,500	2,800
2051 (W)	710	32	3,000	3,700
2052 (W)	600	32	3,100	3,700
2053 (AN)	520	26	3,000	3,500
2054 (D)	300	16	2,500	2,800
2055 (D)	330	14	2,500	2,800
2056 (AN)	360	15	2,600	3,000
2057 (BN)	400	18	2,800	3,200
2058 (AN)	400	16	2,700	3,100
2059 (W)	520	30	3,000	3,600
2060 (D)	200	16	2,300	2,500
2061 (C)	210	13	2,200	2,400
2062 (D)	130	8	1,900	2,000
2063 (BN)	240	8	2,100	2,300

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		350	11	2,500	2,900
2065 (BN)		110	9	2,000	2,100
2066 (D)		160	7	2,000	2,200
2067 (C)		26	2	1,600	1,600
2068 (C)		34	1	1,600	1,600
2069 (BN)		140	1	1,900	2,000
2070 (W)		270	9	2,400	2,700
2071 (BN)		48	6	1,800	1,900
2072 (W)		280	9	2,400	2,700
Average (2022-2072)		310	22	2,400	2,700
2022-2072	W	480	39	2,800	3,300
	AN	370	18	2,600	3,000
	BN	180	15	2,200	2,400
	D	250	14	2,300	2,600
	C	96	7	1,900	2,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

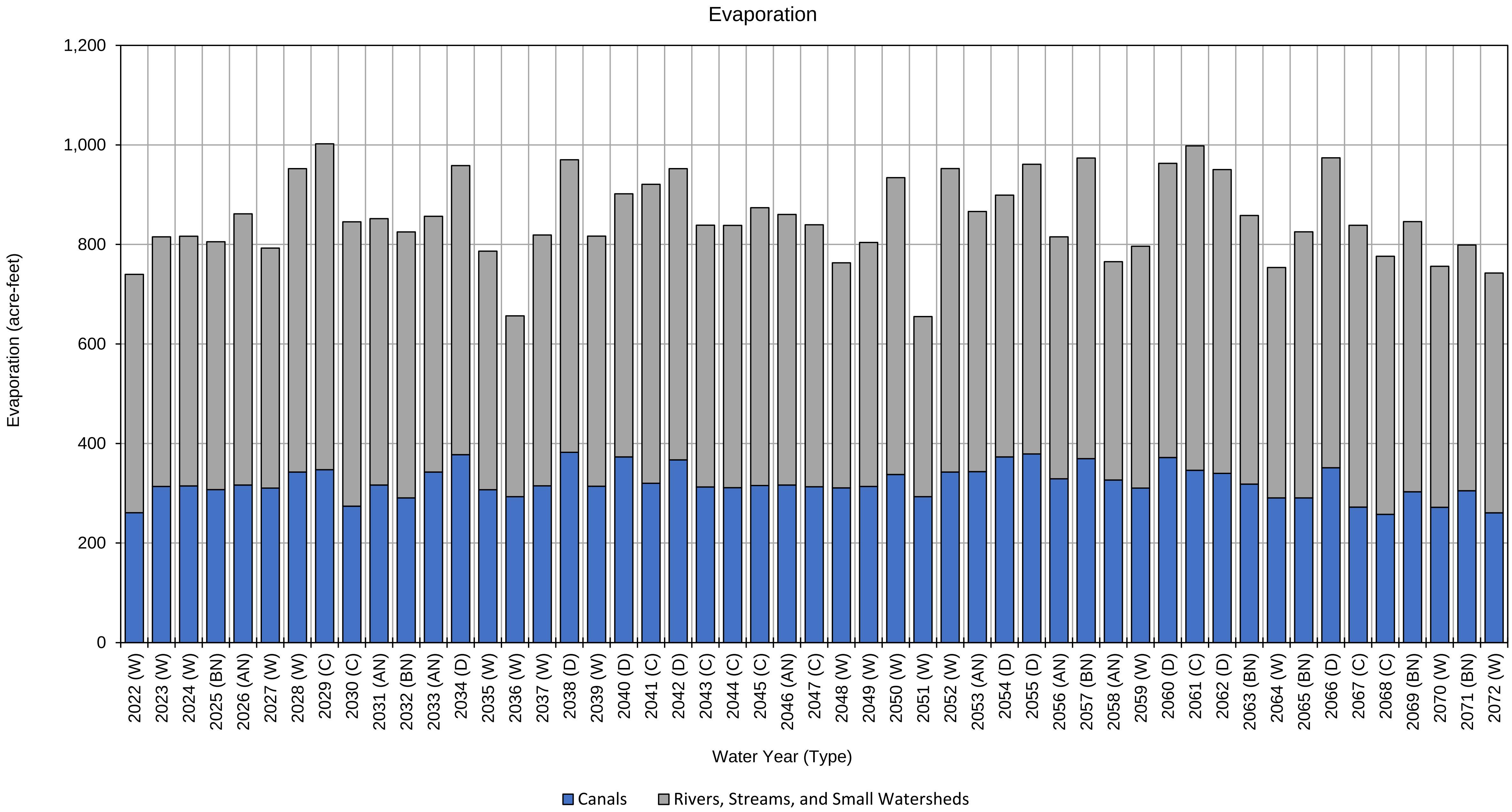
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	7,300	1,700	170,000	180,000
2023 (W)	7,000	1,500	160,000	170,000
2024 (W)	7,000	1,500	160,000	170,000
2025 (BN)	5,900	1,200	150,000	160,000
2026 (AN)	7,500	1,800	170,000	180,000
2027 (W)	6,700	1,500	160,000	170,000
2028 (W)	6,000	1,300	150,000	160,000
2029 (C)	4,500	1,100	120,000	130,000
2030 (C)	4,800	1,100	110,000	120,000
2031 (AN)	7,800	1,800	180,000	190,000
2032 (BN)	6,700	1,300	160,000	170,000
2033 (AN)	6,600	1,600	160,000	170,000
2034 (D)	5,600	1,300	140,000	150,000
2035 (W)	6,500	1,500	150,000	160,000
2036 (W)	7,700	1,700	160,000	170,000
2037 (W)	7,000	1,600	160,000	170,000
2038 (D)	5,400	1,300	140,000	150,000
2039 (W)	6,700	1,600	150,000	160,000
2040 (D)	6,500	1,400	160,000	170,000
2041 (C)	6,000	1,400	150,000	160,000
2042 (D)	4,900	1,100	130,000	140,000
2043 (C)	6,500	1,500	160,000	170,000
2044 (C)	6,500	1,500	160,000	170,000
2045 (C)	6,200	1,500	160,000	170,000
2046 (AN)	7,500	1,800	170,000	180,000
2047 (C)	6,800	1,500	160,000	170,000
2048 (W)	6,200	1,600	150,000	160,000
2049 (W)	6,900	1,600	160,000	170,000
2050 (W)	6,100	1,500	160,000	170,000
2051 (W)	7,600	1,700	160,000	170,000
2052 (W)	6,000	1,400	150,000	160,000
2053 (AN)	6,500	1,600	160,000	170,000
2054 (D)	6,700	1,400	160,000	170,000
2055 (D)	5,300	1,300	140,000	150,000
2056 (AN)	6,300	1,500	150,000	160,000
2057 (BN)	5,100	1,200	130,000	140,000
2058 (AN)	7,800	1,800	180,000	190,000
2059 (W)	6,600	1,500	160,000	170,000
2060 (D)	4,900	1,100	130,000	140,000
2061 (C)	4,500	1,100	120,000	130,000
2062 (D)	5,900	1,400	150,000	160,000
2063 (BN)	6,200	1,400	150,000	160,000

Bowman Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		7,300	1,700	180,000	190,000
2065 (BN)		6,600	1,300	160,000	170,000
2066 (D)		4,900	1,200	130,000	140,000
2067 (C)		5,100	1,100	120,000	130,000
2068 (C)		5,800	1,300	140,000	150,000
2069 (BN)		6,400	1,600	160,000	170,000
2070 (W)		7,200	1,600	160,000	170,000
2071 (BN)		5,700	1,200	140,000	150,000
2072 (W)		7,100	1,700	170,000	180,000
Average (2022-2072)		6,300	1,400	150,000	160,000
2022-2072	W	6,800	1,600	160,000	170,000
	AN	7,200	1,700	170,000	180,000
	BN	6,100	1,300	150,000	160,000
	D	5,600	1,300	140,000	150,000
	C	5,700	1,300	140,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

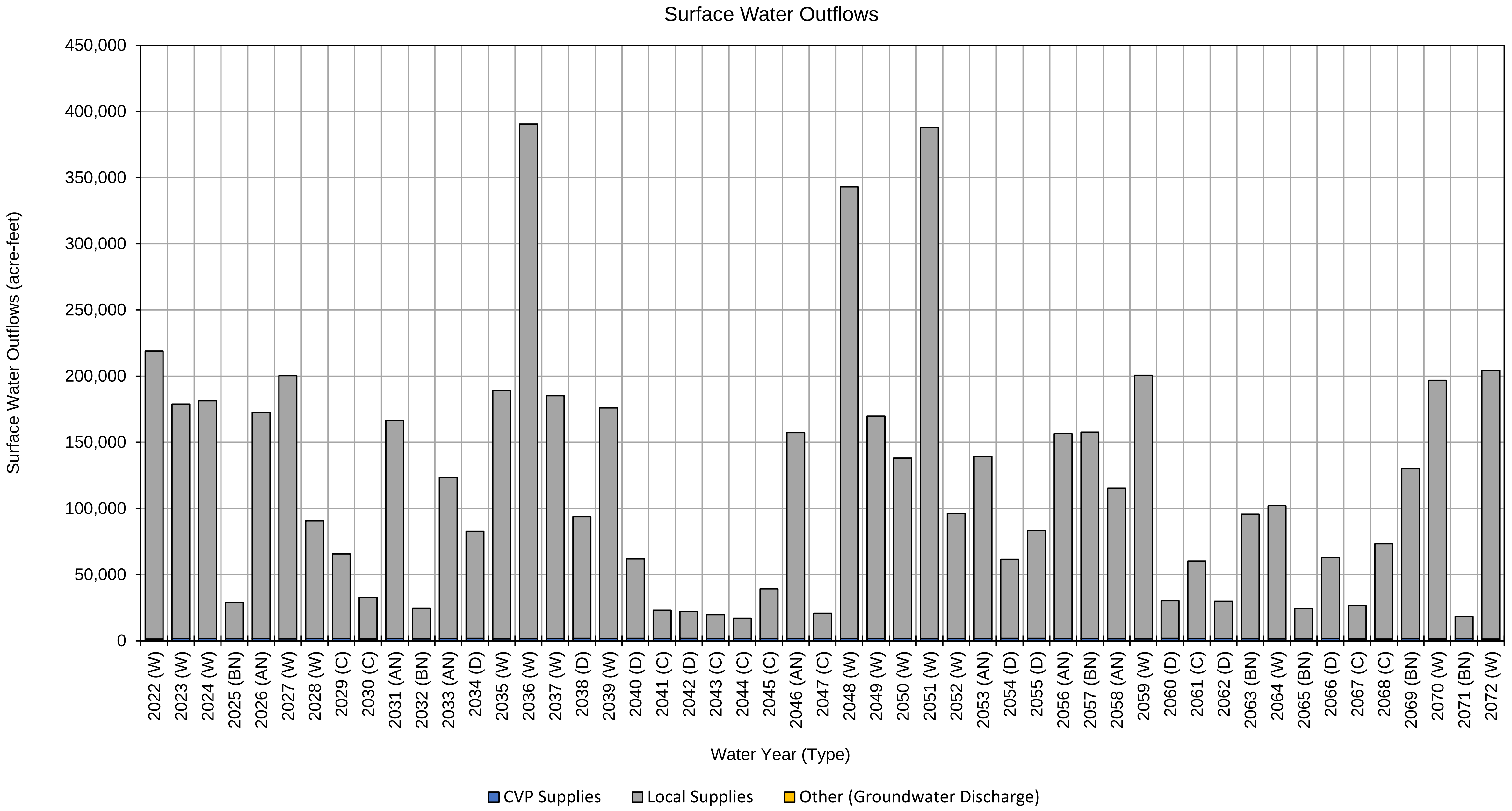
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	260	480	740
2023 (W)	310	500	810
2024 (W)	310	500	810
2025 (BN)	310	500	810
2026 (AN)	320	540	860
2027 (W)	310	480	790
2028 (W)	340	610	950
2029 (C)	350	650	1,000
2030 (C)	270	570	840
2031 (AN)	320	540	860
2032 (BN)	290	530	820
2033 (AN)	340	510	850
2034 (D)	380	580	960
2035 (W)	310	480	790
2036 (W)	290	360	650
2037 (W)	310	500	810
2038 (D)	380	590	970
2039 (W)	310	500	810
2040 (D)	370	530	900
2041 (C)	320	600	920
2042 (D)	370	590	960
2043 (C)	310	530	840
2044 (C)	310	530	840
2045 (C)	320	560	880
2046 (AN)	320	540	860
2047 (C)	310	530	840
2048 (W)	310	450	760
2049 (W)	310	490	800
2050 (W)	340	600	940
2051 (W)	290	360	650
2052 (W)	340	610	950
2053 (AN)	340	520	860
2054 (D)	370	530	900
2055 (D)	380	580	960
2056 (AN)	330	490	820
2057 (BN)	370	600	970
2058 (AN)	330	440	770
2059 (W)	310	490	800
2060 (D)	370	590	960
2061 (C)	350	650	1,000
2062 (D)	340	610	950
2063 (BN)	320	540	860

Bowman Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		290	460	750
2065 (BN)		290	530	820
2066 (D)		350	620	970
2067 (C)		270	570	840
2068 (C)		260	520	780
2069 (BN)		300	540	840
2070 (W)		270	480	750
2071 (BN)		300	490	790
2072 (W)		260	480	740
Average (2022-2072)		320	530	850
2022-2072	W	310	490	800
	AN	330	510	840
	BN	310	540	850
	D	370	580	950
	C	310	570	880

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

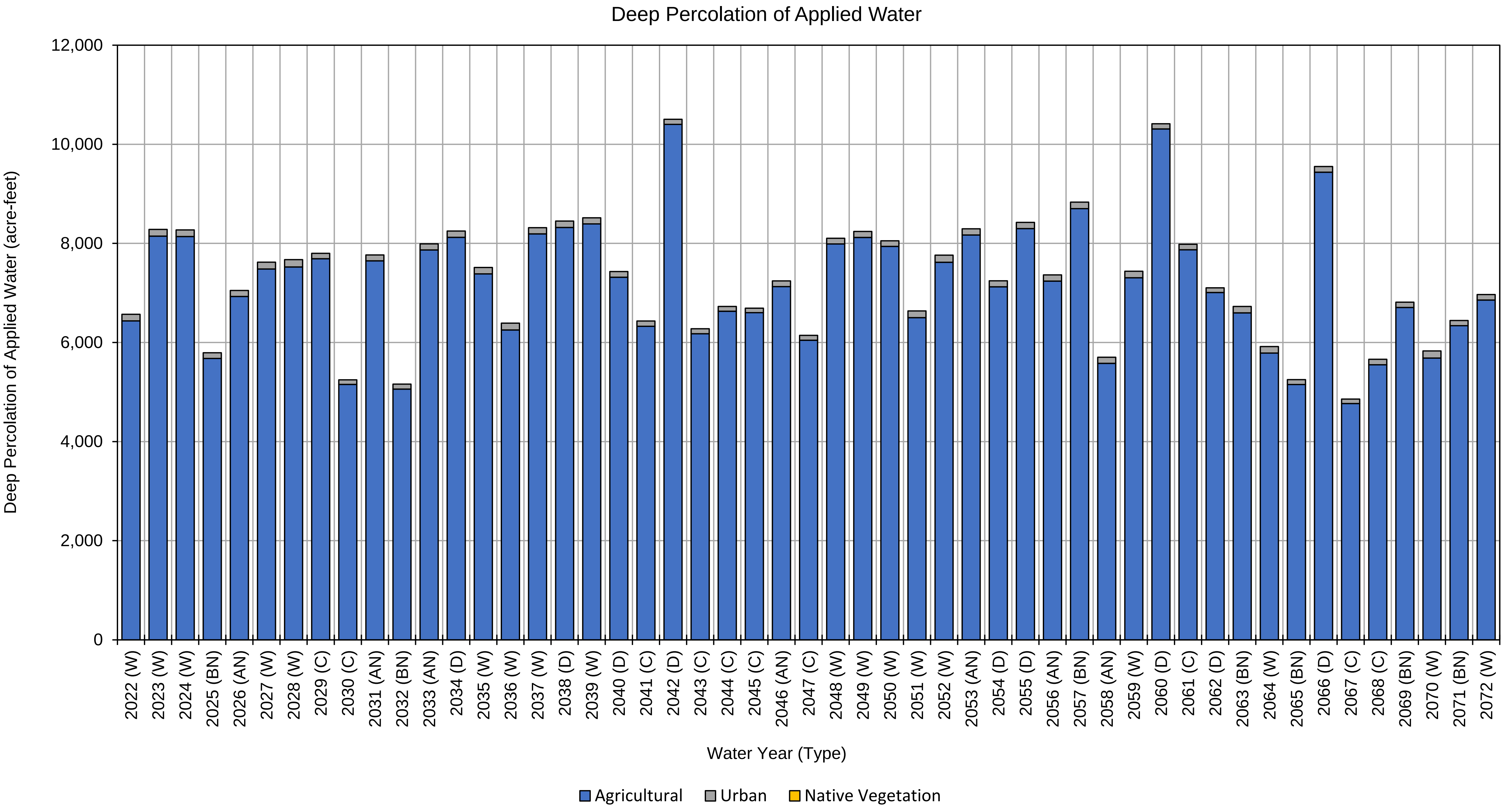
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	1,300	220,000	0	220,000
2023 (W)	1,600	180,000	0	180,000
2024 (W)	1,600	180,000	0	180,000
2025 (BN)	1,600	27,000	0	29,000
2026 (AN)	1,600	170,000	0	170,000
2027 (W)	1,500	200,000	0	200,000
2028 (W)	1,800	89,000	0	91,000
2029 (C)	1,700	64,000	0	66,000
2030 (C)	1,400	31,000	0	32,000
2031 (AN)	1,600	160,000	0	160,000
2032 (BN)	1,500	23,000	0	25,000
2033 (AN)	1,800	120,000	0	120,000
2034 (D)	1,900	81,000	0	83,000
2035 (W)	1,500	190,000	0	190,000
2036 (W)	1,500	390,000	0	390,000
2037 (W)	1,600	180,000	0	180,000
2038 (D)	1,900	92,000	0	94,000
2039 (W)	1,600	170,000	0	170,000
2040 (D)	1,900	60,000	0	62,000
2041 (C)	1,600	21,000	0	23,000
2042 (D)	1,800	20,000	0	22,000
2043 (C)	1,600	18,000	0	20,000
2044 (C)	1,600	15,000	0	17,000
2045 (C)	1,600	38,000	0	40,000
2046 (AN)	1,600	160,000	0	160,000
2047 (C)	1,600	19,000	0	21,000
2048 (W)	1,600	340,000	0	340,000
2049 (W)	1,600	170,000	0	170,000
2050 (W)	1,700	140,000	0	140,000
2051 (W)	1,500	390,000	0	390,000
2052 (W)	1,800	95,000	0	97,000
2053 (AN)	1,800	140,000	0	140,000
2054 (D)	1,900	60,000	0	62,000
2055 (D)	1,900	81,000	0	83,000
2056 (AN)	1,600	150,000	0	150,000
2057 (BN)	1,800	160,000	0	160,000
2058 (AN)	1,600	110,000	0	110,000
2059 (W)	1,500	200,000	0	200,000
2060 (D)	1,800	28,000	0	30,000
2061 (C)	1,700	59,000	0	61,000
2062 (D)	1,700	28,000	0	30,000
2063 (BN)	1,600	94,000	0	96,000

Bowman Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		1,500	100,000	0	100,000
2065 (BN)		1,500	23,000	0	25,000
2066 (D)		1,800	61,000	0	63,000
2067 (C)		1,400	25,000	0	26,000
2068 (C)		1,300	72,000	0	73,000
2069 (BN)		1,500	130,000	0	130,000
2070 (W)		1,400	200,000	0	200,000
2071 (BN)		1,600	17,000	0	19,000
2072 (W)		1,300	200,000	0	200,000
Average (2022-2072)		1,600	120,000	0	120,000
2022-2072	W	1,600	200,000	0	200,000
	AN	1,600	150,000	0	150,000
	BN	1,600	67,000	0	69,000
	D	1,800	57,000	0	59,000
	C	1,500	36,000	0	38,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

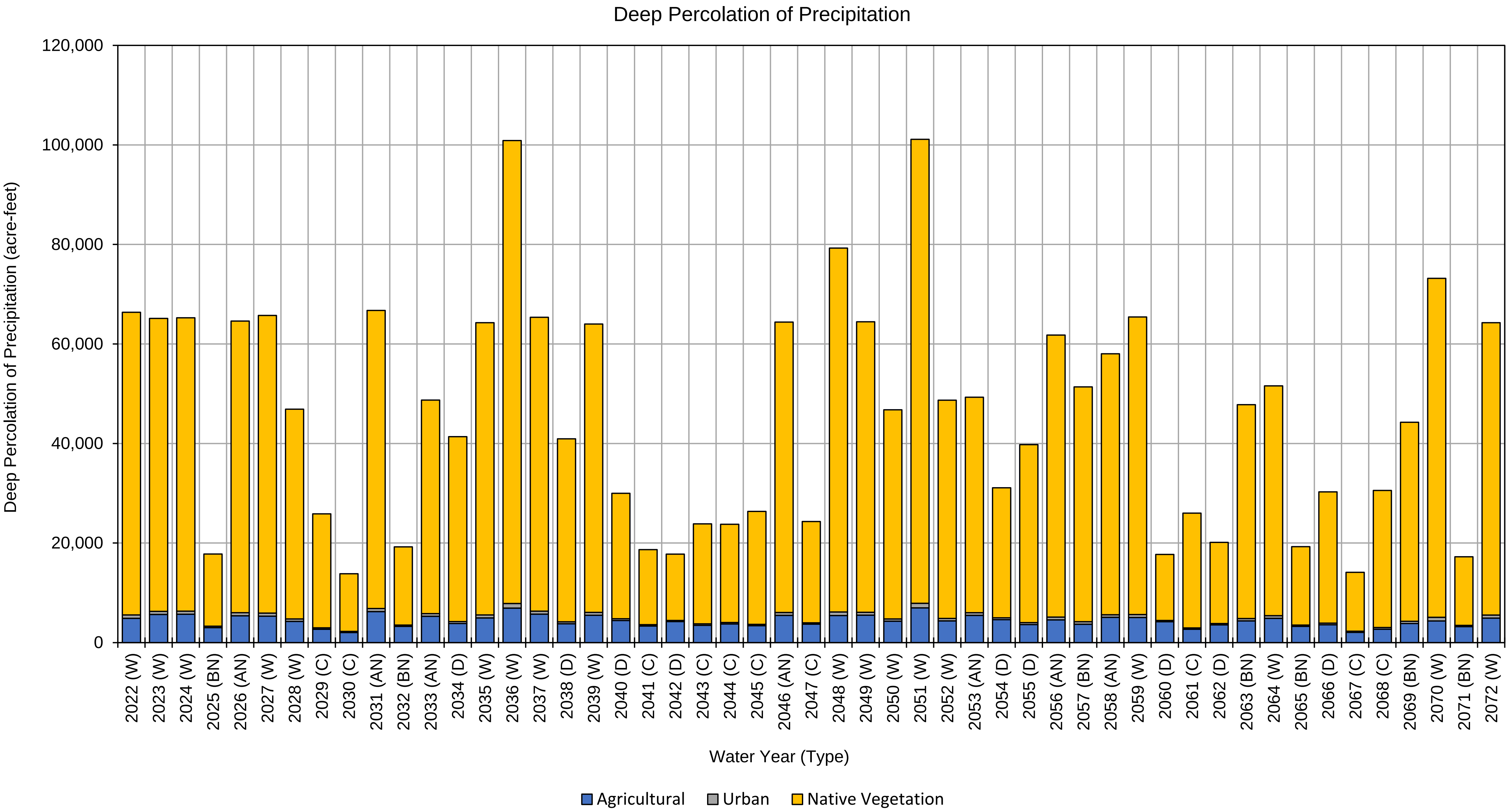
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	6,400	130	0	6,500
2023 (W)	8,100	140	0	8,200
2024 (W)	8,100	130	0	8,200
2025 (BN)	5,700	120	0	5,800
2026 (AN)	6,900	120	0	7,000
2027 (W)	7,500	140	0	7,600
2028 (W)	7,500	150	0	7,700
2029 (C)	7,700	110	0	7,800
2030 (C)	5,200	93	0	5,300
2031 (AN)	7,600	120	0	7,700
2032 (BN)	5,100	100	0	5,200
2033 (AN)	7,900	120	0	8,000
2034 (D)	8,100	130	0	8,200
2035 (W)	7,400	130	0	7,500
2036 (W)	6,300	140	0	6,400
2037 (W)	8,200	130	0	8,300
2038 (D)	8,300	130	0	8,400
2039 (W)	8,400	120	0	8,500
2040 (D)	7,300	120	0	7,400
2041 (C)	6,300	110	0	6,400
2042 (D)	10,000	100	0	10,000
2043 (C)	6,200	100	0	6,300
2044 (C)	6,600	98	0	6,700
2045 (C)	6,600	89	0	6,700
2046 (AN)	7,100	110	0	7,200
2047 (C)	6,000	99	0	6,100
2048 (W)	8,000	120	0	8,100
2049 (W)	8,100	120	0	8,200
2050 (W)	7,900	110	0	8,000
2051 (W)	6,500	140	0	6,600
2052 (W)	7,600	150	0	7,800
2053 (AN)	8,200	130	0	8,300
2054 (D)	7,100	120	0	7,200
2055 (D)	8,300	130	0	8,400
2056 (AN)	7,200	130	0	7,300
2057 (BN)	8,700	130	0	8,800
2058 (AN)	5,600	120	0	5,700
2059 (W)	7,300	130	0	7,400
2060 (D)	10,000	100	0	10,000
2061 (C)	7,900	110	0	8,000
2062 (D)	7,000	96	0	7,100
2063 (BN)	6,600	130	0	6,700

Bowman Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		5,800	130	0	5,900
2065 (BN)		5,200	100	0	5,300
2066 (D)		9,400	110	0	9,500
2067 (C)		4,800	92	0	4,900
2068 (C)		5,600	110	0	5,700
2069 (BN)		6,700	110	0	6,800
2070 (W)		5,700	140	0	5,800
2071 (BN)		6,300	100	0	6,400
2072 (W)		6,900	110	0	7,000
Average (2022-2072)		7,200	120	0	7,300
2022-2072	W	7,300	130	0	7,400
	AN	7,200	120	0	7,300
	BN	6,300	110	0	6,400
	D	8,500	120	0	8,600
	C	6,300	100	0	6,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

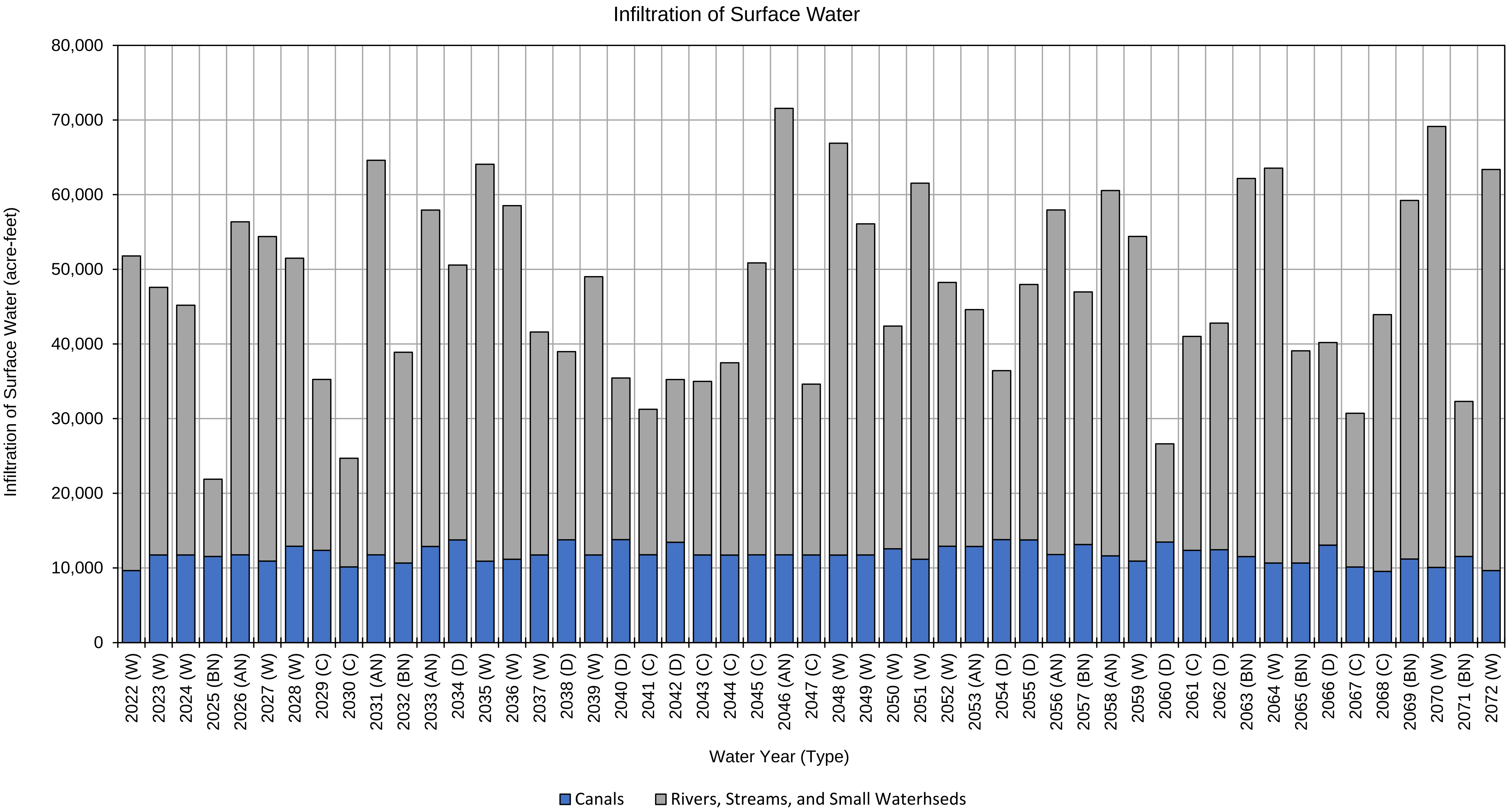
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,900	690	61,000	67,000
2023 (W)	5,600	630	59,000	65,000
2024 (W)	5,700	620	59,000	65,000
2025 (BN)	3,000	280	15,000	18,000
2026 (AN)	5,400	600	59,000	65,000
2027 (W)	5,300	610	60,000	66,000
2028 (W)	4,300	490	42,000	47,000
2029 (C)	2,700	280	23,000	26,000
2030 (C)	2,000	210	12,000	14,000
2031 (AN)	6,200	600	60,000	67,000
2032 (BN)	3,200	260	16,000	19,000
2033 (AN)	5,300	530	43,000	49,000
2034 (D)	3,800	400	37,000	41,000
2035 (W)	5,000	590	59,000	65,000
2036 (W)	6,900	940	93,000	100,000
2037 (W)	5,700	590	59,000	65,000
2038 (D)	3,800	400	37,000	41,000
2039 (W)	5,500	590	58,000	64,000
2040 (D)	4,400	340	25,000	30,000
2041 (C)	3,300	280	15,000	19,000
2042 (D)	4,200	230	13,000	17,000
2043 (C)	3,500	280	20,000	24,000
2044 (C)	3,700	280	20,000	24,000
2045 (C)	3,400	260	23,000	27,000
2046 (AN)	5,500	580	58,000	64,000
2047 (C)	3,700	280	20,000	24,000
2048 (W)	5,400	730	73,000	79,000
2049 (W)	5,500	580	58,000	64,000
2050 (W)	4,300	460	42,000	47,000
2051 (W)	7,000	930	93,000	100,000
2052 (W)	4,400	480	44,000	49,000
2053 (AN)	5,500	540	43,000	49,000
2054 (D)	4,600	350	26,000	31,000
2055 (D)	3,600	390	36,000	40,000
2056 (AN)	4,600	550	57,000	62,000
2057 (BN)	3,700	510	47,000	51,000
2058 (AN)	5,100	520	52,000	58,000
2059 (W)	5,000	600	60,000	66,000
2060 (D)	4,200	230	13,000	17,000
2061 (C)	2,700	280	23,000	26,000
2062 (D)	3,600	260	16,000	20,000
2063 (BN)	4,400	470	43,000	48,000

Bowman Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		4,900	530	46,000	51,000
2065 (BN)		3,300	260	16,000	20,000
2066 (D)		3,600	340	26,000	30,000
2067 (C)		2,100	210	12,000	14,000
2068 (C)		2,700	350	28,000	31,000
2069 (BN)		3,800	450	40,000	44,000
2070 (W)		4,300	740	68,000	73,000
2071 (BN)		3,200	260	14,000	17,000
2072 (W)		4,900	610	59,000	65,000
Average (2022-2072)		4,400	460	41,000	46,000
2022-2072	W	5,300	630	61,000	67,000
	AN	5,400	560	53,000	59,000
	BN	3,500	360	27,000	31,000
	D	4,000	330	26,000	30,000
	C	3,000	270	19,000	22,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

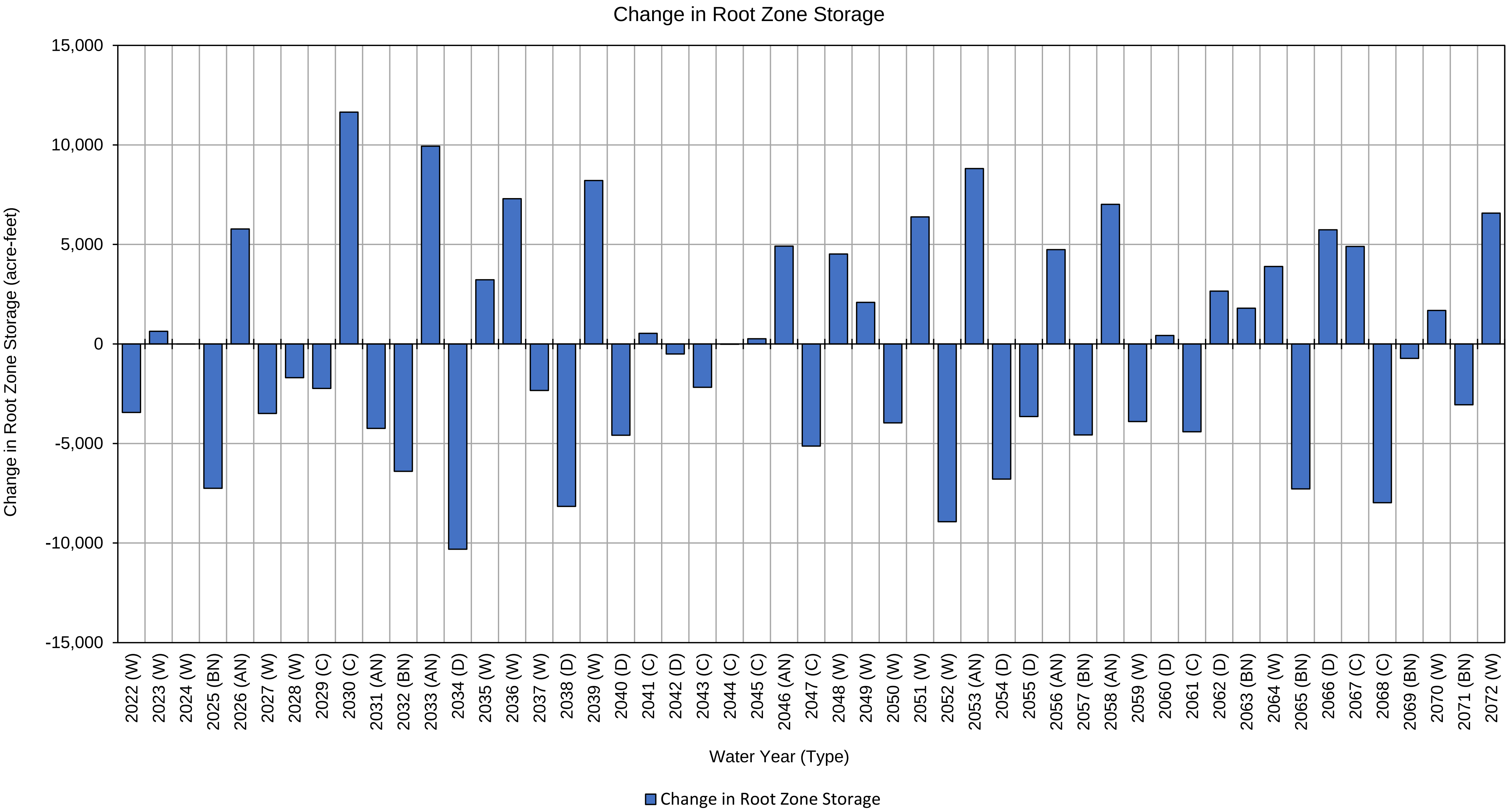
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	9,600	42,000	52,000
2023 (W)	12,000	36,000	48,000
2024 (W)	12,000	33,000	45,000
2025 (BN)	12,000	10,000	22,000
2026 (AN)	12,000	45,000	57,000
2027 (W)	11,000	43,000	54,000
2028 (W)	13,000	39,000	52,000
2029 (C)	12,000	23,000	35,000
2030 (C)	10,000	15,000	25,000
2031 (AN)	12,000	53,000	65,000
2032 (BN)	11,000	28,000	39,000
2033 (AN)	13,000	45,000	58,000
2034 (D)	14,000	37,000	51,000
2035 (W)	11,000	53,000	64,000
2036 (W)	11,000	47,000	58,000
2037 (W)	12,000	30,000	42,000
2038 (D)	14,000	25,000	39,000
2039 (W)	12,000	37,000	49,000
2040 (D)	14,000	22,000	36,000
2041 (C)	12,000	19,000	31,000
2042 (D)	13,000	22,000	35,000
2043 (C)	12,000	23,000	35,000
2044 (C)	12,000	26,000	38,000
2045 (C)	12,000	39,000	51,000
2046 (AN)	12,000	60,000	72,000
2047 (C)	12,000	23,000	35,000
2048 (W)	12,000	55,000	67,000
2049 (W)	12,000	44,000	56,000
2050 (W)	13,000	30,000	43,000
2051 (W)	11,000	50,000	61,000
2052 (W)	13,000	35,000	48,000
2053 (AN)	13,000	32,000	45,000
2054 (D)	14,000	23,000	37,000
2055 (D)	14,000	34,000	48,000
2056 (AN)	12,000	46,000	58,000
2057 (BN)	13,000	34,000	47,000
2058 (AN)	12,000	49,000	61,000
2059 (W)	11,000	43,000	54,000
2060 (D)	13,000	13,000	26,000
2061 (C)	12,000	29,000	41,000
2062 (D)	12,000	30,000	42,000
2063 (BN)	12,000	51,000	63,000

Bowman Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		11,000	53,000	64,000
2065 (BN)		11,000	28,000	39,000
2066 (D)		13,000	27,000	40,000
2067 (C)		10,000	21,000	31,000
2068 (C)		9,500	34,000	44,000
2069 (BN)		11,000	48,000	59,000
2070 (W)		10,000	59,000	69,000
2071 (BN)		12,000	21,000	33,000
2072 (W)		9,600	54,000	64,000
Average (2022-2072)		12,000	36,000	48,000
2022-2072	W	11,000	44,000	55,000
	AN	12,000	47,000	59,000
	BN	11,000	31,000	42,000
	D	13,000	26,000	39,000
	C	11,000	25,000	36,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	-3,400
2023 (W)	640
2024 (W)	0
2025 (BN)	-7,300
2026 (AN)	5,800
2027 (W)	-3,500
2028 (W)	-1,700
2029 (C)	-2,200
2030 (C)	12,000
2031 (AN)	-4,200
2032 (BN)	-6,400
2033 (AN)	9,900
2034 (D)	-10,000
2035 (W)	3,200
2036 (W)	7,300
2037 (W)	-2,300
2038 (D)	-8,200
2039 (W)	8,200
2040 (D)	-4,600
2041 (C)	540
2042 (D)	-500
2043 (C)	-2,200
2044 (C)	-15
2045 (C)	260
2046 (AN)	4,900
2047 (C)	-5,100
2048 (W)	4,500
2049 (W)	2,100
2050 (W)	-4,000
2051 (W)	6,400
2052 (W)	-8,900
2053 (AN)	8,800
2054 (D)	-6,800
2055 (D)	-3,600
2056 (AN)	4,700
2057 (BN)	-4,600
2058 (AN)	7,000
2059 (W)	-3,900
2060 (D)	420
2061 (C)	-4,400
2062 (D)	2,700
2063 (BN)	1,800

Bowman Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		3,900
2065 (BN)		-7,300
2066 (D)		5,700
2067 (C)		4,900
2068 (C)		-8,000
2069 (BN)		-730
2070 (W)		1,700
2071 (BN)		-3,100
2072 (W)		6,600
Average (2022-2072)		-70
2022-2072	W	930
	AN	5,300
	BN	-3,900
	D	-2,800
	C	-460

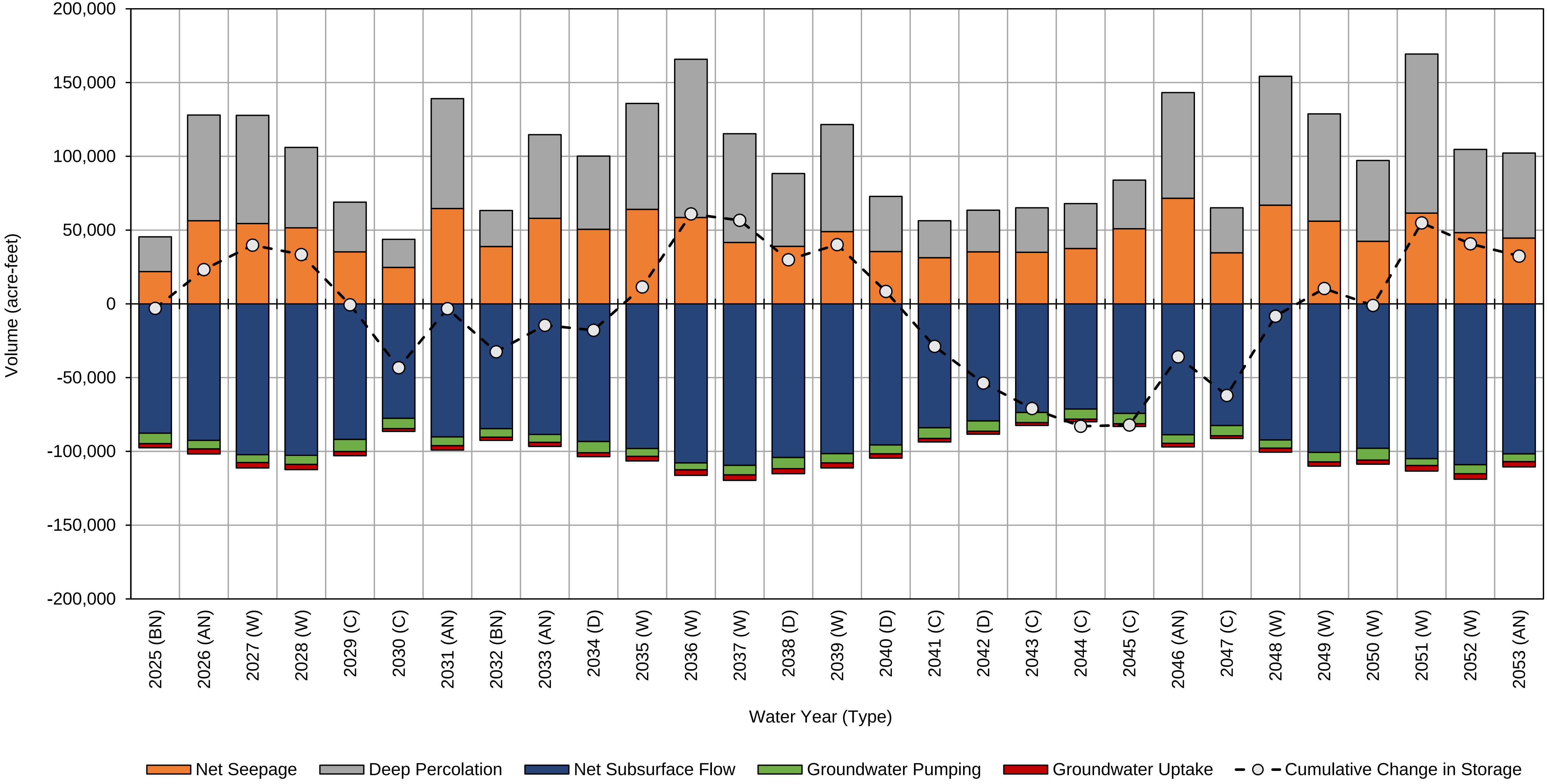
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-3b

Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) Model Results – Groundwater System



Projected (Future Land Use) Water Budget
Bowman Subbasin

Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

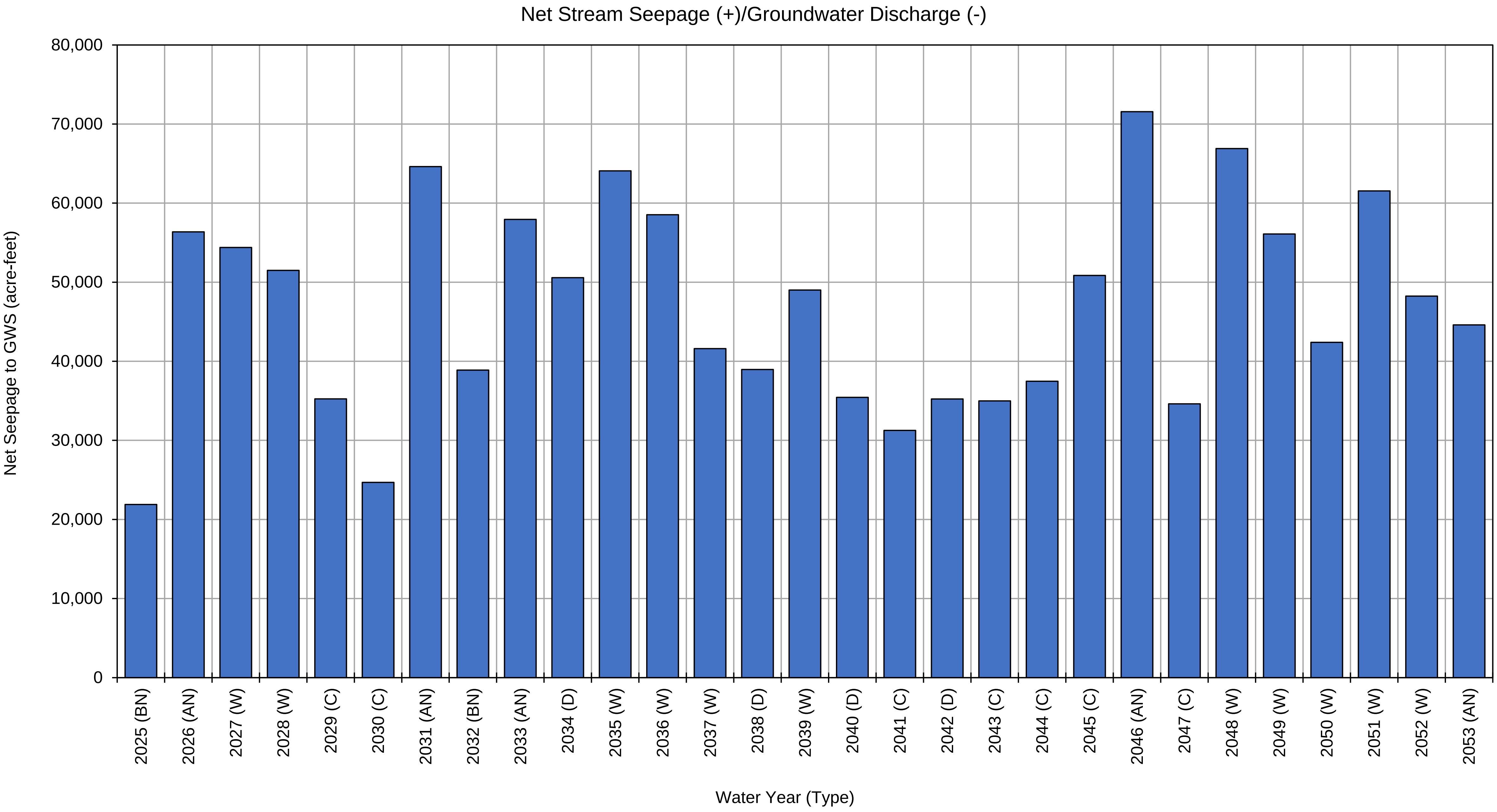
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	52,000	73,000	-6,600	-3,800	-86,000	28,000	28,000
2023 (W)	48,000	73,000	-6,500	-3,800	-96,000	14,000	42,000
2024 (W)	45,000	74,000	-6,700	-3,900	-100,000	6,800	49,000
2025 (BN)	22,000	24,000	-7,100	-2,800	-88,000	-52,000	-3,000
2026 (AN)	56,000	72,000	-5,800	-3,400	-93,000	26,000	23,000
2027 (W)	54,000	73,000	-5,300	-3,700	-100,000	17,000	40,000
2028 (W)	51,000	55,000	-6,100	-3,600	-100,000	-6,300	33,000
2029 (C)	35,000	34,000	-8,200	-2,900	-92,000	-34,000	-580
2030 (C)	25,000	19,000	-6,900	-1,900	-78,000	-43,000	-43,000
2031 (AN)	65,000	75,000	-6,000	-2,900	-90,000	40,000	-3,200
2032 (BN)	39,000	24,000	-5,800	-2,100	-85,000	-29,000	-32,000
2033 (AN)	58,000	57,000	-5,400	-2,800	-88,000	18,000	-14,000
2034 (D)	51,000	50,000	-7,600	-2,700	-93,000	-3,400	-18,000
2035 (W)	64,000	72,000	-5,300	-3,200	-98,000	29,000	11,000
2036 (W)	59,000	110,000	-4,700	-3,800	-110,000	50,000	61,000
2037 (W)	42,000	74,000	-6,400	-3,800	-110,000	-4,400	57,000
2038 (D)	39,000	49,000	-7,600	-3,400	-100,000	-27,000	30,000
2039 (W)	49,000	73,000	-6,300	-3,400	-100,000	10,000	40,000
2040 (D)	35,000	37,000	-6,100	-2,900	-96,000	-32,000	8,500
2041 (C)	31,000	25,000	-7,300	-2,400	-84,000	-37,000	-29,000
2042 (D)	35,000	28,000	-7,000	-2,000	-79,000	-25,000	-54,000
2043 (C)	35,000	30,000	-6,900	-1,900	-74,000	-17,000	-71,000
2044 (C)	37,000	30,000	-6,900	-1,800	-71,000	-12,000	-83,000
2045 (C)	51,000	33,000	-7,000	-1,800	-74,000	810	-82,000
2046 (AN)	72,000	72,000	-5,800	-2,500	-89,000	46,000	-36,000
2047 (C)	35,000	30,000	-6,900	-1,800	-82,000	-26,000	-62,000
2048 (W)	67,000	87,000	-5,500	-2,800	-92,000	54,000	-8,300
2049 (W)	56,000	73,000	-6,400	-2,900	-100,000	19,000	10,000
2050 (W)	42,000	55,000	-8,000	-2,800	-98,000	-11,000	-1,100
2051 (W)	62,000	110,000	-4,700	-3,700	-100,000	56,000	55,000
2052 (W)	48,000	56,000	-6,200	-3,700	-110,000	-14,000	41,000
2053 (AN)	45,000	58,000	-5,300	-3,500	-100,000	-8,300	32,000
2054 (D)	36,000	38,000	-6,100	-2,800	-94,000	-28,000	4,200
2055 (D)	48,000	48,000	-7,500	-2,900	-95,000	-8,800	-4,700
2056 (AN)	58,000	69,000	-5,300	-3,000	-98,000	21,000	16,000
2057 (BN)	47,000	60,000	-6,700	-3,200	-100,000	-3,300	13,000
2058 (AN)	61,000	64,000	-4,900	-3,100	-100,000	15,000	28,000
2059 (W)	54,000	73,000	-5,300	-3,500	-110,000	13,000	41,000
2060 (D)	27,000	28,000	-6,900	-2,600	-92,000	-47,000	-6,200
2061 (C)	41,000	34,000	-8,300	-2,500	-85,000	-20,000	-27,000
2062 (D)	43,000	27,000	-6,200	-2,100	-80,000	-18,000	-45,000
2063 (BN)	62,000	55,000	-5,400	-2,400	-87,000	22,000	-23,000
2064 (W)	64,000	57,000	-5,100	-2,800	-95,000	18,000	-4,100
2065 (BN)	39,000	25,000	-5,900	-2,100	-86,000	-30,000	-34,000

Bowman Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		40,000	40,000	-8,200	-2,200	-83,000	-13,000	-47,000
2067 (C)		31,000	19,000	-7,300	-1,700	-71,000	-31,000	-78,000
2068 (C)		44,000	36,000	-8,800	-1,700	-74,000	-4,400	-82,000
2069 (BN)		59,000	51,000	-6,900	-2,100	-80,000	22,000	-61,000
2070 (W)		69,000	79,000	-5,500	-2,600	-95,000	45,000	-15,000
2071 (BN)		32,000	24,000	-7,100	-1,800	-83,000	-36,000	-51,000
2072 (W)		63,000	71,000	-6,300	-2,700	-90,000	36,000	-15,000
Average (2022-2072)		47,000	53,000	-6,400	-2,800	-91,000	-300	
2022-2072	W	55,000	74,000	-5,900	-3,400	-100,000		
	AN	59,000	66,000	-5,500	-3,000	-94,000		
	BN	43,000	37,000	-6,400	-2,300	-87,000		
	D	39,000	38,000	-7,000	-2,600	-91,000		
	C	36,000	29,000	-7,500	-2,000	-79,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	52,000
2023 (W)	48,000
2024 (W)	45,000
2025 (BN)	22,000
2026 (AN)	56,000
2027 (W)	54,000
2028 (W)	51,000
2029 (C)	35,000
2030 (C)	25,000
2031 (AN)	65,000
2032 (BN)	39,000
2033 (AN)	58,000
2034 (D)	51,000
2035 (W)	64,000
2036 (W)	59,000
2037 (W)	42,000
2038 (D)	39,000
2039 (W)	49,000
2040 (D)	35,000
2041 (C)	31,000
2042 (D)	35,000
2043 (C)	35,000
2044 (C)	37,000
2045 (C)	51,000
2046 (AN)	72,000
2047 (C)	35,000
2048 (W)	67,000
2049 (W)	56,000
2050 (W)	42,000
2051 (W)	62,000
2052 (W)	48,000
2053 (AN)	45,000
2054 (D)	36,000
2055 (D)	48,000
2056 (AN)	58,000
2057 (BN)	47,000
2058 (AN)	61,000
2059 (W)	54,000
2060 (D)	27,000
2061 (C)	41,000
2062 (D)	43,000
2063 (BN)	62,000
2064 (W)	64,000
2065 (BN)	39,000

Bowman Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2066 (D)		40,000
2067 (C)		31,000
2068 (C)		44,000
2069 (BN)		59,000
2070 (W)		69,000
2071 (BN)		32,000
2072 (W)		63,000
Average (2022-2072)		47,000
2022-2072	W	55,000
	AN	59,000
	BN	43,000
	D	39,000
	C	36,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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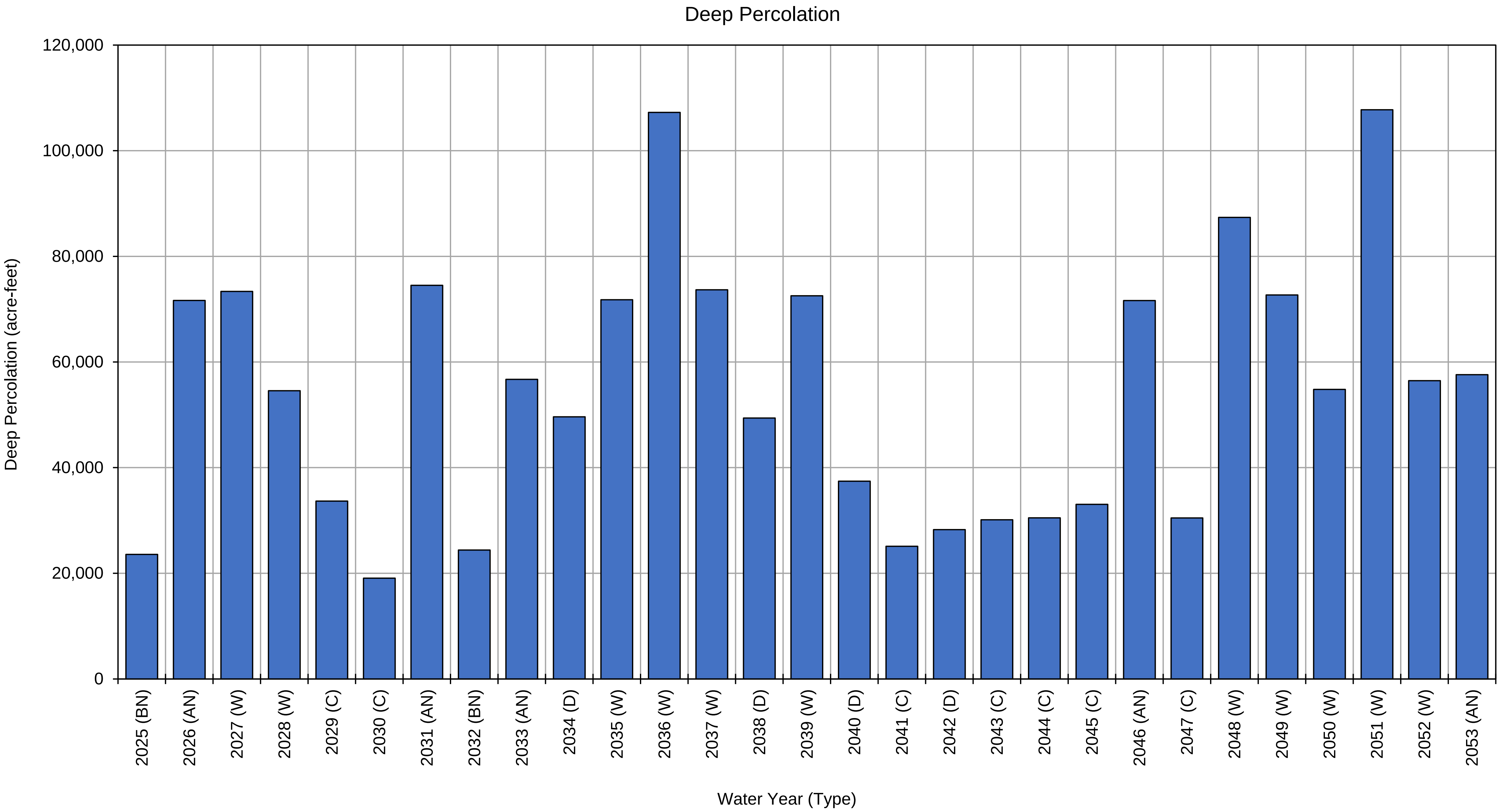
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

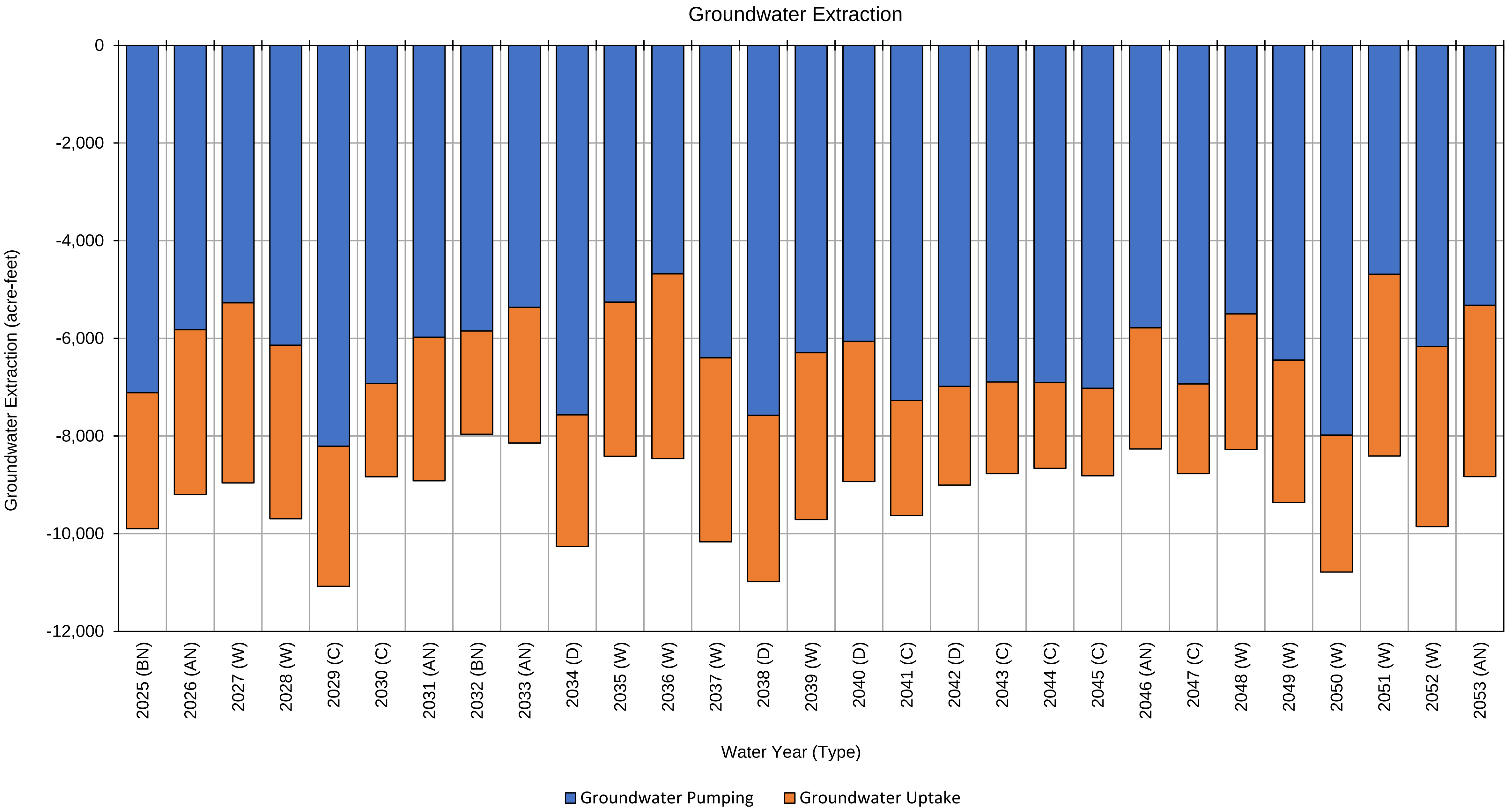
WY (Type)	Deep Percolation from the SWS
2022 (W)	73,000
2023 (W)	73,000
2024 (W)	74,000
2025 (BN)	24,000
2026 (AN)	72,000
2027 (W)	73,000
2028 (W)	55,000
2029 (C)	34,000
2030 (C)	19,000
2031 (AN)	75,000
2032 (BN)	24,000
2033 (AN)	57,000
2034 (D)	50,000
2035 (W)	72,000
2036 (W)	110,000
2037 (W)	74,000
2038 (D)	49,000
2039 (W)	73,000
2040 (D)	37,000
2041 (C)	25,000
2042 (D)	28,000
2043 (C)	30,000
2044 (C)	30,000
2045 (C)	33,000
2046 (AN)	72,000
2047 (C)	30,000
2048 (W)	87,000
2049 (W)	73,000
2050 (W)	55,000
2051 (W)	110,000
2052 (W)	56,000
2053 (AN)	58,000
2054 (D)	38,000
2055 (D)	48,000
2056 (AN)	69,000
2057 (BN)	60,000
2058 (AN)	64,000
2059 (W)	73,000
2060 (D)	28,000
2061 (C)	34,000
2062 (D)	27,000
2063 (BN)	55,000
2064 (W)	57,000
2065 (BN)	25,000

Bowman Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2066 (D)		40,000
2067 (C)		19,000
2068 (C)		36,000
2069 (BN)		51,000
2070 (W)		79,000
2071 (BN)		24,000
2072 (W)		71,000
Average (2022-2072)		53,000
2022-2072	W	74,000
	AN	66,000
	BN	37,000
	D	38,000
	C	29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

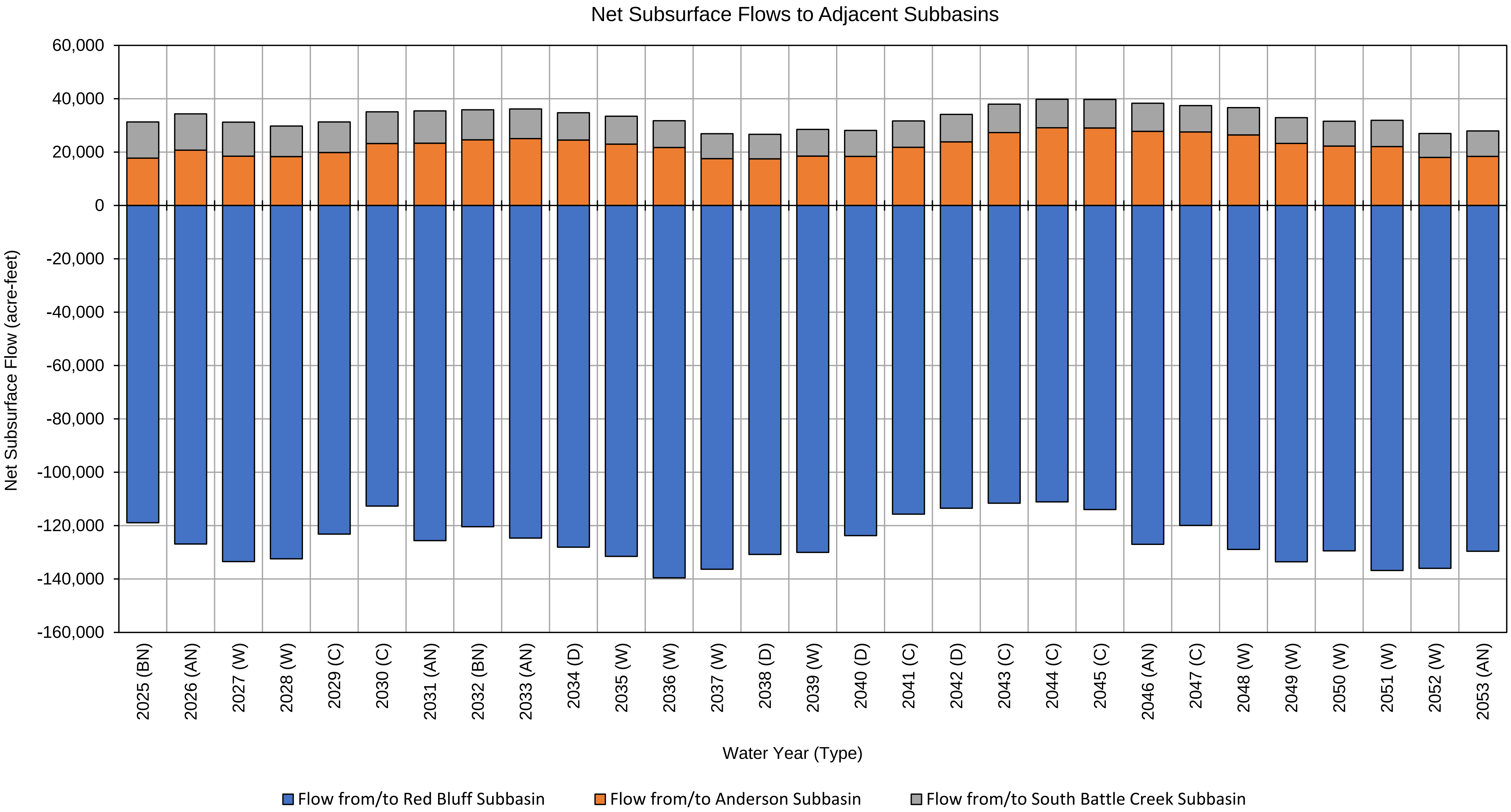
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-6,600	-3,800	-10,000
2023 (W)	-6,500	-3,800	-10,000
2024 (W)	-6,700	-3,900	-11,000
2025 (BN)	-7,100	-2,800	-9,900
2026 (AN)	-5,800	-3,400	-9,200
2027 (W)	-5,300	-3,700	-9,000
2028 (W)	-6,100	-3,600	-9,700
2029 (C)	-8,200	-2,900	-11,000
2030 (C)	-6,900	-1,900	-8,800
2031 (AN)	-6,000	-2,900	-8,900
2032 (BN)	-5,800	-2,100	-8,000
2033 (AN)	-5,400	-2,800	-8,100
2034 (D)	-7,600	-2,700	-10,000
2035 (W)	-5,300	-3,200	-8,400
2036 (W)	-4,700	-3,800	-8,500
2037 (W)	-6,400	-3,800	-10,000
2038 (D)	-7,600	-3,400	-11,000
2039 (W)	-6,300	-3,400	-9,700
2040 (D)	-6,100	-2,900	-8,900
2041 (C)	-7,300	-2,400	-9,600
2042 (D)	-7,000	-2,000	-9,000
2043 (C)	-6,900	-1,900	-8,800
2044 (C)	-6,900	-1,800	-8,700
2045 (C)	-7,000	-1,800	-8,800
2046 (AN)	-5,800	-2,500	-8,300
2047 (C)	-6,900	-1,800	-8,800
2048 (W)	-5,500	-2,800	-8,300
2049 (W)	-6,400	-2,900	-9,400
2050 (W)	-8,000	-2,800	-11,000
2051 (W)	-4,700	-3,700	-8,400
2052 (W)	-6,200	-3,700	-9,900
2053 (AN)	-5,300	-3,500	-8,800
2054 (D)	-6,100	-2,800	-9,000
2055 (D)	-7,500	-2,900	-10,000
2056 (AN)	-5,300	-3,000	-8,300
2057 (BN)	-6,700	-3,200	-9,900
2058 (AN)	-4,900	-3,100	-8,000
2059 (W)	-5,300	-3,500	-8,800
2060 (D)	-6,900	-2,600	-9,500
2061 (C)	-8,300	-2,500	-11,000
2062 (D)	-6,200	-2,100	-8,300
2063 (BN)	-5,400	-2,400	-7,800
2064 (W)	-5,100	-2,800	-7,900
2065 (BN)	-5,900	-2,100	-7,900

Bowman Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2066 (D)		-8,200	-2,200	-10,000
2067 (C)		-7,300	-1,700	-9,000
2068 (C)		-8,800	-1,700	-10,000
2069 (BN)		-6,900	-2,100	-9,000
2070 (W)		-5,500	-2,600	-8,200
2071 (BN)		-7,100	-1,800	-8,900
2072 (W)		-6,300	-2,700	-9,000
Average (2022-2072)		-6,400	-2,800	-9,200
2022-2072	W	-5,900	-3,400	-9,300
	AN	-5,500	-3,000	-8,500
	BN	-6,400	-2,300	-8,800
	D	-7,000	-2,600	-9,600
	C	-7,500	-2,000	-9,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

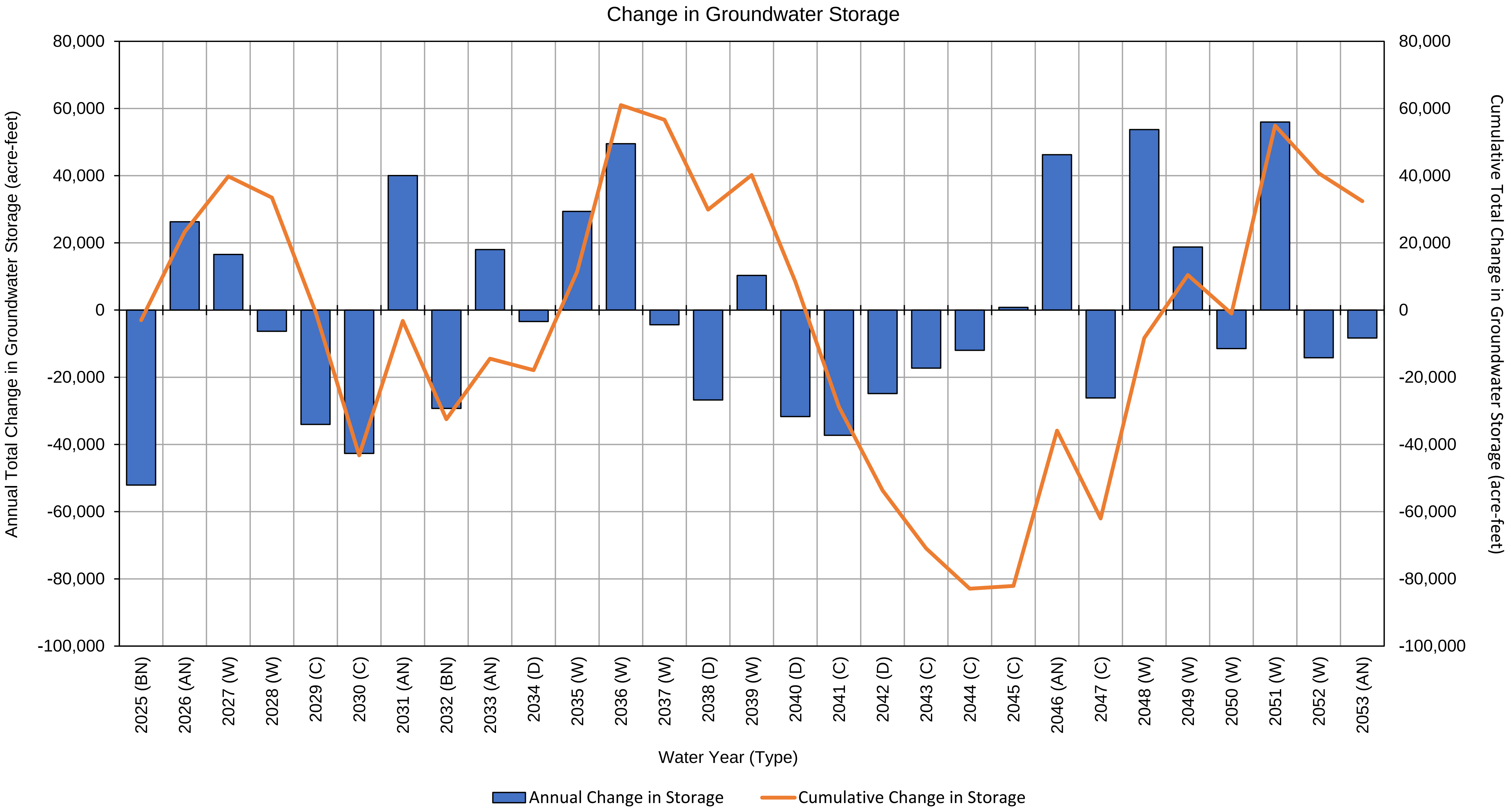
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-120,000	20,000	17,000	-86,000
2023 (W)	-130,000	18,000	16,000	-96,000
2024 (W)	-130,000	16,000	15,000	-100,000
2025 (BN)	-120,000	18,000	14,000	-88,000
2026 (AN)	-130,000	21,000	14,000	-93,000
2027 (W)	-130,000	18,000	13,000	-100,000
2028 (W)	-130,000	18,000	11,000	-100,000
2029 (C)	-120,000	20,000	11,000	-92,000
2030 (C)	-110,000	23,000	12,000	-78,000
2031 (AN)	-130,000	23,000	12,000	-90,000
2032 (BN)	-120,000	25,000	11,000	-85,000
2033 (AN)	-120,000	25,000	11,000	-88,000
2034 (D)	-130,000	25,000	10,000	-93,000
2035 (W)	-130,000	23,000	10,000	-98,000
2036 (W)	-140,000	22,000	10,000	-110,000
2037 (W)	-140,000	18,000	9,300	-110,000
2038 (D)	-130,000	17,000	9,200	-100,000
2039 (W)	-130,000	18,000	10,000	-100,000
2040 (D)	-120,000	18,000	9,700	-96,000
2041 (C)	-120,000	22,000	9,900	-84,000
2042 (D)	-110,000	24,000	10,000	-79,000
2043 (C)	-110,000	27,000	11,000	-74,000
2044 (C)	-110,000	29,000	11,000	-71,000
2045 (C)	-110,000	29,000	11,000	-74,000
2046 (AN)	-130,000	28,000	11,000	-89,000
2047 (C)	-120,000	28,000	9,900	-82,000
2048 (W)	-130,000	26,000	10,000	-92,000
2049 (W)	-130,000	23,000	9,600	-100,000
2050 (W)	-130,000	22,000	9,300	-98,000
2051 (W)	-140,000	22,000	9,900	-100,000
2052 (W)	-140,000	18,000	9,000	-110,000
2053 (AN)	-130,000	18,000	9,500	-100,000
2054 (D)	-120,000	19,000	9,700	-94,000
2055 (D)	-130,000	21,000	9,800	-95,000
2056 (AN)	-130,000	21,000	10,000	-98,000
2057 (BN)	-130,000	20,000	9,700	-100,000
2058 (AN)	-130,000	20,000	9,600	-100,000
2059 (W)	-130,000	19,000	9,600	-110,000
2060 (D)	-120,000	19,000	9,300	-92,000
2061 (C)	-120,000	23,000	10,000	-85,000
2062 (D)	-120,000	26,000	10,000	-80,000
2063 (BN)	-120,000	26,000	10,000	-87,000
2064 (W)	-130,000	25,000	10,000	-95,000
2065 (BN)	-120,000	25,000	9,800	-86,000

Bowman Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2066 (D)		-120,000	27,000	10,000	-83,000
2067 (C)		-110,000	29,000	11,000	-71,000
2068 (C)		-110,000	30,000	11,000	-74,000
2069 (BN)		-120,000	30,000	11,000	-80,000
2070 (W)		-130,000	27,000	11,000	-95,000
2071 (BN)		-120,000	26,000	10,000	-83,000
2072 (W)		-130,000	27,000	11,000	-90,000
Average (2022-2072)		-130,000	23,000	11,000	-91,000
2022-2072	W	-130,000	21,000	11,000	-100,000
	AN	-130,000	22,000	11,000	-94,000
	BN	-120,000	24,000	11,000	-87,000
	D	-120,000	22,000	9,800	-91,000
	C	-120,000	26,000	11,000	-79,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Bowman Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	28,000	28,000
2023 (W)	14,000	42,000
2024 (W)	6,800	49,000
2025 (BN)	-52,000	-3,000
2026 (AN)	26,000	23,000
2027 (W)	17,000	40,000
2028 (W)	-6,300	33,000
2029 (C)	-34,000	-580
2030 (C)	-43,000	-43,000
2031 (AN)	40,000	-3,200
2032 (BN)	-29,000	-32,000
2033 (AN)	18,000	-14,000
2034 (D)	-3,400	-18,000
2035 (W)	29,000	11,000
2036 (W)	50,000	61,000
2037 (W)	-4,400	57,000
2038 (D)	-27,000	30,000
2039 (W)	10,000	40,000
2040 (D)	-32,000	8,500
2041 (C)	-37,000	-29,000
2042 (D)	-25,000	-54,000
2043 (C)	-17,000	-71,000
2044 (C)	-12,000	-83,000
2045 (C)	810	-82,000
2046 (AN)	46,000	-36,000
2047 (C)	-26,000	-62,000
2048 (W)	54,000	-8,300
2049 (W)	19,000	10,000
2050 (W)	-11,000	-1,100
2051 (W)	56,000	55,000
2052 (W)	-14,000	41,000
2053 (AN)	-8,300	32,000
2054 (D)	-28,000	4,200
2055 (D)	-8,800	-4,700
2056 (AN)	21,000	16,000
2057 (BN)	-3,300	13,000
2058 (AN)	15,000	28,000
2059 (W)	13,000	41,000
2060 (D)	-47,000	-6,200
2061 (C)	-20,000	-27,000
2062 (D)	-18,000	-45,000
2063 (BN)	22,000	-23,000
2064 (W)	18,000	-4,100
2065 (BN)	-30,000	-34,000

Bowman Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-13,000	-47,000
2067 (C)		-31,000	-78,000
2068 (C)		-4,400	-82,000
2069 (BN)		22,000	-61,000
2070 (W)		45,000	-15,000
2071 (BN)		-36,000	-51,000
2072 (W)		36,000	-15,000
Average (2022-2072)		-300	
2022-2072	W		
	AN		
	BN		
	D		
	C		

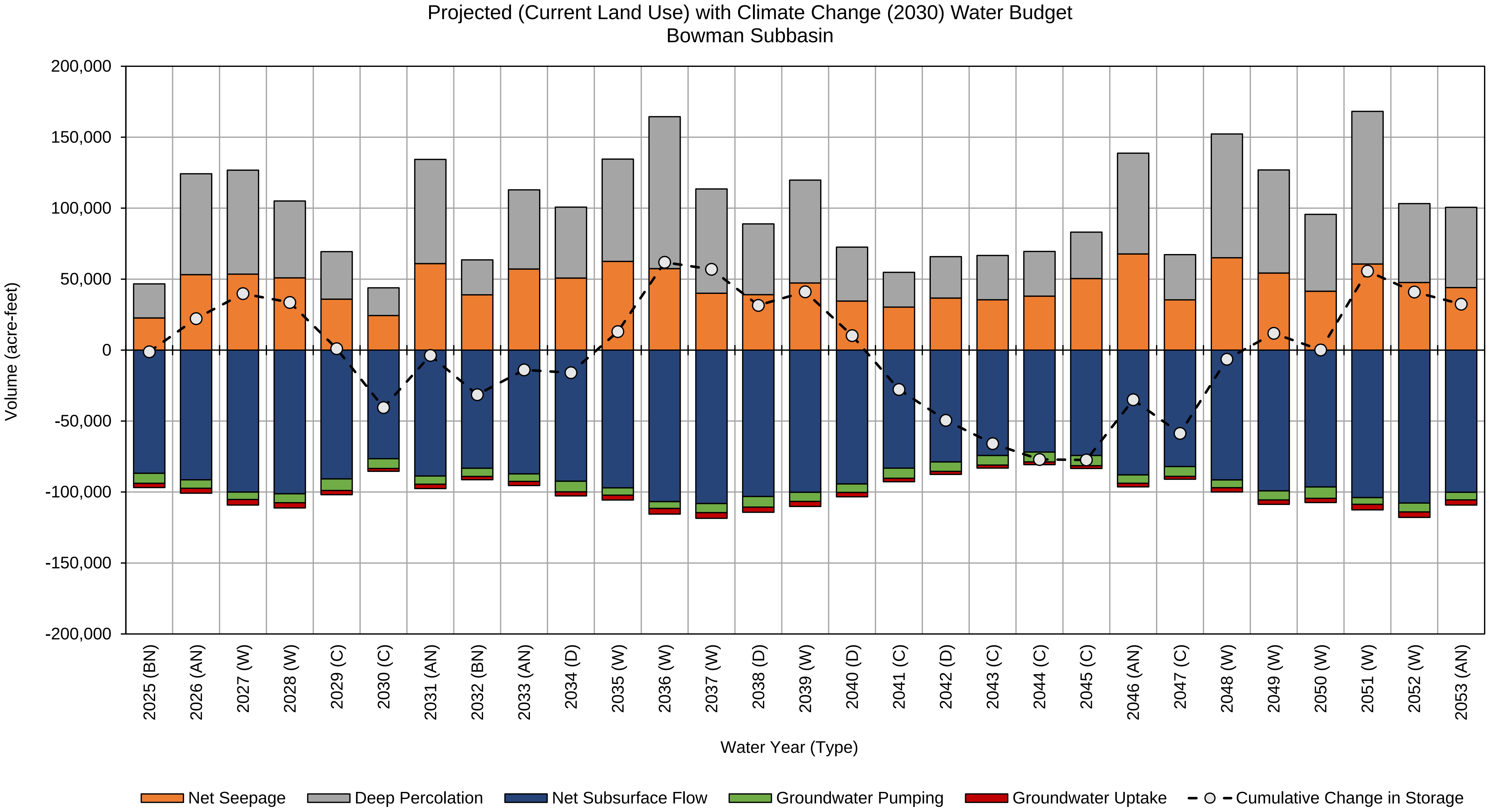
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-4

Detailed Bowman Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2030) Model Results



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

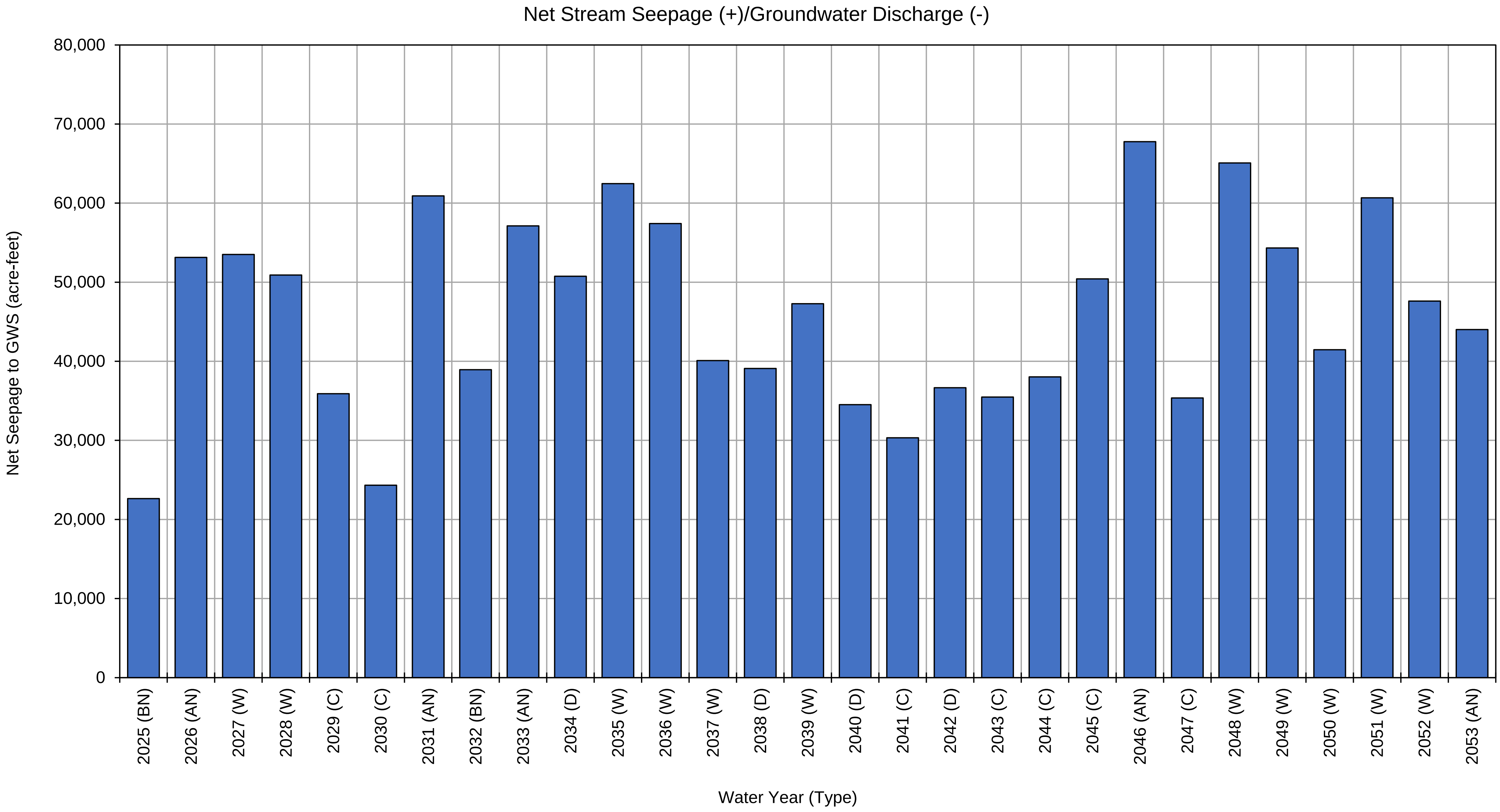
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	51,000	73,000	-6,700	-4,000	-85,000	28,000	28,000
2023 (W)	46,000	73,000	-6,500	-3,900	-95,000	14,000	42,000
2024 (W)	44,000	74,000	-6,700	-4,000	-100,000	6,800	49,000
2025 (BN)	23,000	24,000	-7,100	-3,000	-87,000	-50,000	-1,200
2026 (AN)	53,000	71,000	-5,900	-3,500	-91,000	23,000	22,000
2027 (W)	54,000	73,000	-5,200	-3,900	-100,000	18,000	40,000
2028 (W)	51,000	54,000	-6,300	-3,700	-100,000	-6,200	34,000
2029 (C)	36,000	33,000	-8,200	-3,000	-91,000	-33,000	1,000
2030 (C)	24,000	20,000	-6,900	-2,000	-77,000	-42,000	-40,000
2031 (AN)	61,000	73,000	-5,800	-3,100	-89,000	37,000	-3,700
2032 (BN)	39,000	25,000	-5,800	-2,200	-83,000	-28,000	-31,000
2033 (AN)	57,000	56,000	-5,400	-2,900	-87,000	17,000	-14,000
2034 (D)	51,000	50,000	-7,500	-2,900	-92,000	-2,000	-16,000
2035 (W)	62,000	72,000	-5,200	-3,400	-97,000	29,000	13,000
2036 (W)	57,000	110,000	-4,800	-4,000	-110,000	49,000	62,000
2037 (W)	40,000	73,000	-6,500	-3,900	-110,000	-5,000	57,000
2038 (D)	39,000	50,000	-7,500	-3,600	-100,000	-25,000	32,000
2039 (W)	47,000	72,000	-6,400	-3,600	-100,000	9,600	41,000
2040 (D)	35,000	38,000	-6,000	-3,000	-94,000	-31,000	10,000
2041 (C)	30,000	24,000	-7,200	-2,400	-83,000	-38,000	-28,000
2042 (D)	37,000	29,000	-6,700	-2,100	-79,000	-22,000	-49,000
2043 (C)	35,000	31,000	-6,800	-2,000	-74,000	-16,000	-66,000
2044 (C)	38,000	31,000	-6,900	-1,900	-72,000	-11,000	-77,000
2045 (C)	50,000	33,000	-7,200	-1,900	-74,000	-270	-77,000
2046 (AN)	68,000	71,000	-5,900	-2,600	-88,000	42,000	-35,000
2047 (C)	35,000	32,000	-6,900	-2,000	-82,000	-24,000	-59,000
2048 (W)	65,000	87,000	-5,500	-3,000	-91,000	52,000	-6,400
2049 (W)	54,000	73,000	-6,400	-3,100	-99,000	18,000	12,000
2050 (W)	41,000	54,000	-8,000	-2,900	-96,000	-12,000	75
2051 (W)	61,000	110,000	-4,800	-3,900	-100,000	56,000	56,000
2052 (W)	48,000	56,000	-6,300	-3,800	-110,000	-15,000	41,000
2053 (AN)	44,000	57,000	-5,400	-3,600	-100,000	-8,500	32,000
2054 (D)	36,000	39,000	-6,100	-3,000	-93,000	-27,000	5,200
2055 (D)	48,000	48,000	-7,400	-3,100	-94,000	-7,800	-2,600
2056 (AN)	57,000	68,000	-5,300	-3,100	-96,000	20,000	17,000
2057 (BN)	46,000	61,000	-6,600	-3,400	-99,000	-1,800	15,000
2058 (AN)	58,000	63,000	-4,900	-3,300	-100,000	13,000	29,000
2059 (W)	53,000	73,000	-5,200	-3,700	-100,000	13,000	42,000
2060 (D)	28,000	29,000	-6,600	-2,700	-92,000	-44,000	-2,200
2061 (C)	41,000	34,000	-8,100	-2,700	-85,000	-20,000	-23,000
2062 (D)	42,000	27,000	-6,200	-2,200	-79,000	-19,000	-41,000
2063 (BN)	60,000	55,000	-5,300	-2,500	-86,000	21,000	-20,000
2064 (W)	63,000	57,000	-5,000	-3,000	-94,000	18,000	-2,100
2065 (BN)	39,000	25,000	-5,800	-2,200	-85,000	-29,000	-32,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		40,000	41,000	-8,200	-2,300	-82,000	-12,000	-44,000
2067 (C)		30,000	20,000	-7,300	-1,800	-71,000	-30,000	-74,000
2068 (C)		44,000	37,000	-9,000	-1,800	-74,000	-4,300	-78,000
2069 (BN)		58,000	52,000	-7,000	-2,200	-79,000	22,000	-56,000
2070 (W)		67,000	78,000	-5,500	-2,800	-93,000	43,000	-13,000
2071 (BN)		33,000	24,000	-7,100	-1,900	-82,000	-34,000	-47,000
2072 (W)		62,000	72,000	-6,300	-2,900	-89,000	35,000	-12,000
Average (2022-2072)		47,000	53,000	-6,400	-2,900	-91,000	-240	
2022-2072	W	54,000	74,000	-6,000	-3,500	-98,000		
	AN	57,000	66,000	-5,500	-3,100	-93,000		
	BN	43,000	38,000	-6,400	-2,500	-86,000		
	D	39,000	39,000	-6,900	-2,800	-90,000		
	C	36,000	29,000	-7,400	-2,200	-78,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

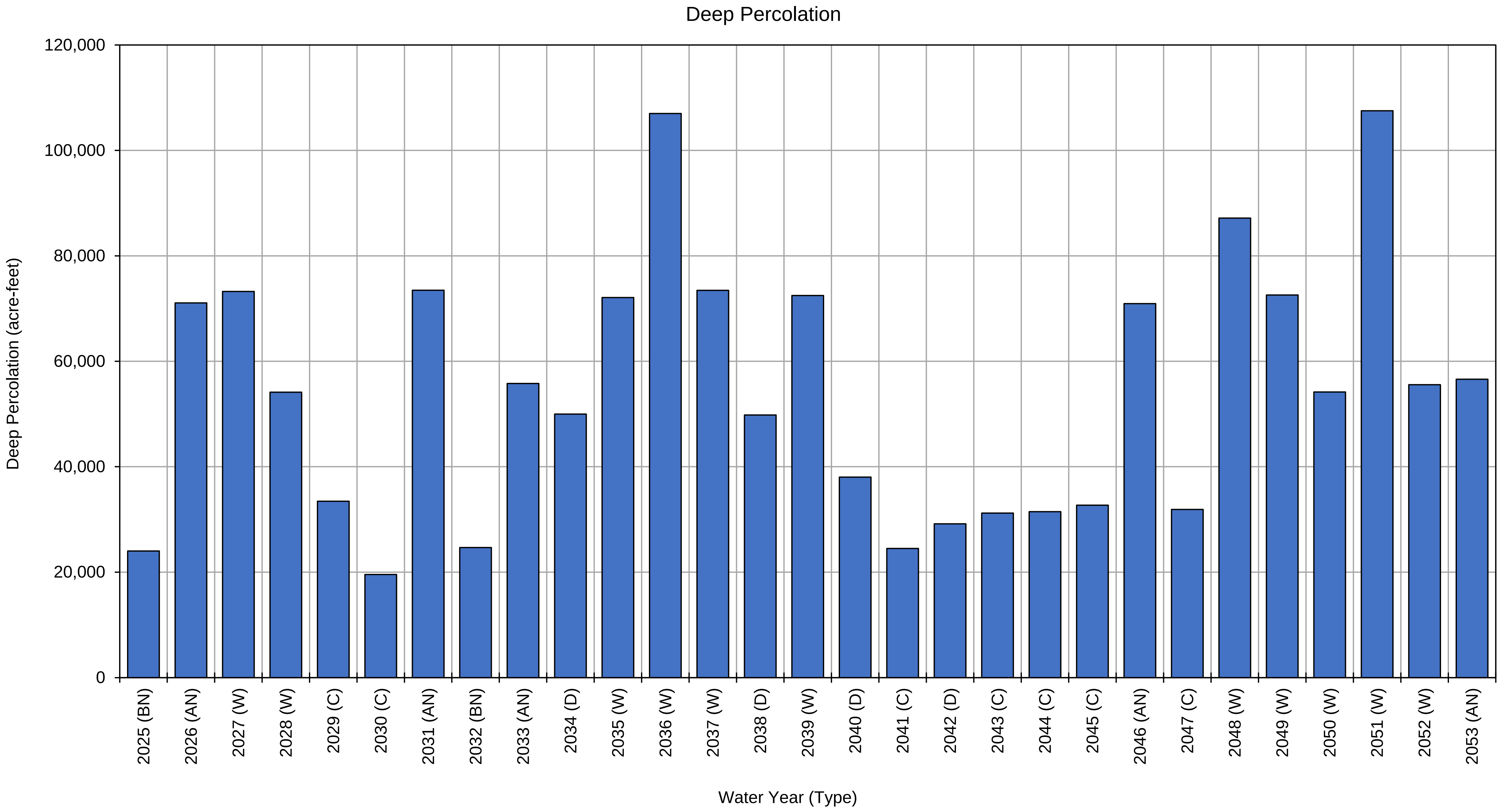
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	51,000
2023 (W)	46,000
2024 (W)	44,000
2025 (BN)	23,000
2026 (AN)	53,000
2027 (W)	54,000
2028 (W)	51,000
2029 (C)	36,000
2030 (C)	24,000
2031 (AN)	61,000
2032 (BN)	39,000
2033 (AN)	57,000
2034 (D)	51,000
2035 (W)	62,000
2036 (W)	57,000
2037 (W)	40,000
2038 (D)	39,000
2039 (W)	47,000
2040 (D)	35,000
2041 (C)	30,000
2042 (D)	37,000
2043 (C)	35,000
2044 (C)	38,000
2045 (C)	50,000
2046 (AN)	68,000
2047 (C)	35,000
2048 (W)	65,000
2049 (W)	54,000
2050 (W)	41,000
2051 (W)	61,000
2052 (W)	48,000
2053 (AN)	44,000
2054 (D)	36,000
2055 (D)	48,000
2056 (AN)	57,000
2057 (BN)	46,000
2058 (AN)	58,000
2059 (W)	53,000
2060 (D)	28,000
2061 (C)	41,000
2062 (D)	42,000
2063 (BN)	60,000
2064 (W)	63,000
2065 (BN)	39,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2066 (D)		40,000
2067 (C)		30,000
2068 (C)		44,000
2069 (BN)		58,000
2070 (W)		67,000
2071 (BN)		33,000
2072 (W)		62,000
Average (2022-2072)		47,000
2022-2072	W	54,000
	AN	57,000
	BN	43,000
	D	39,000
	C	36,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

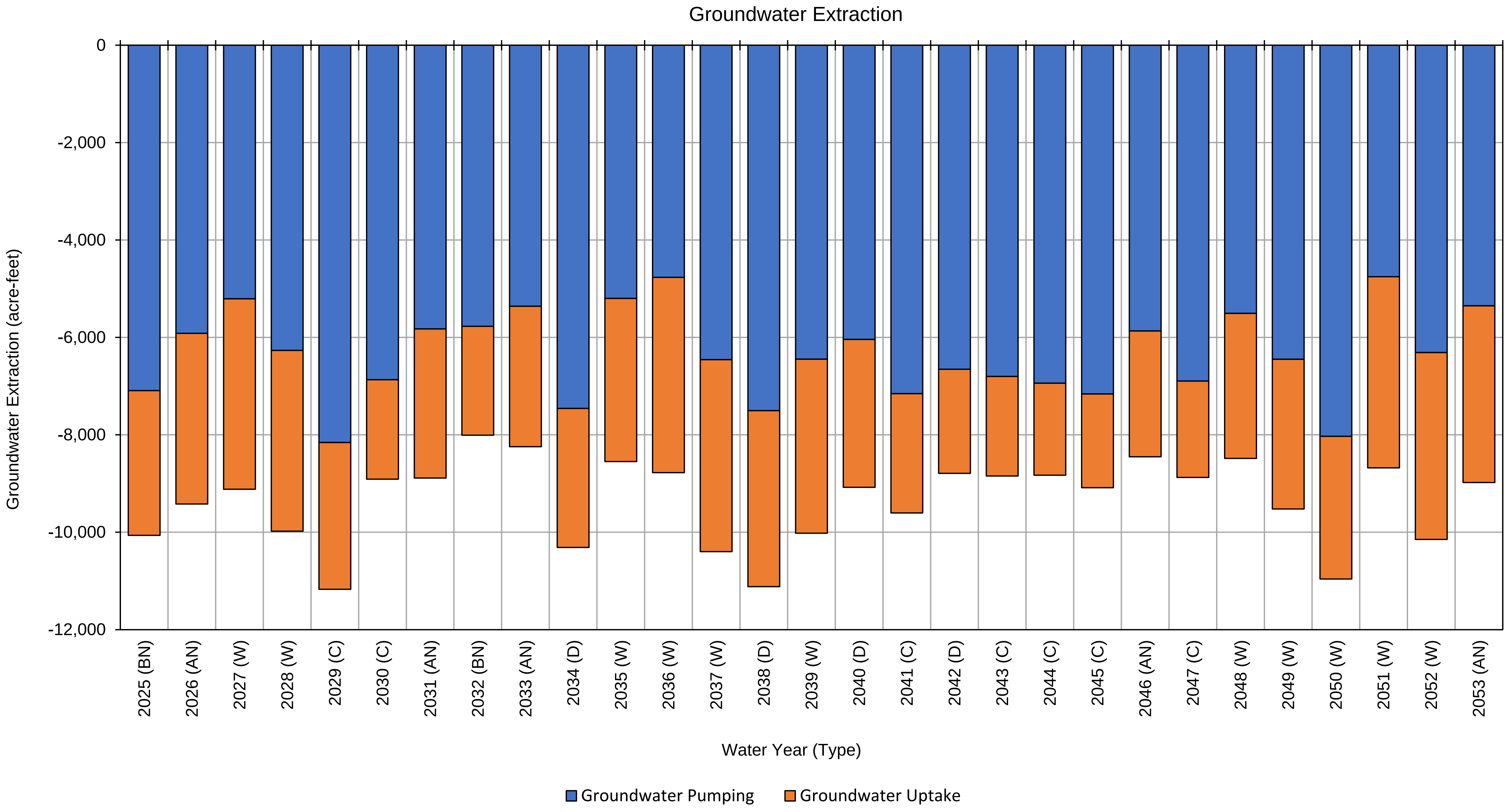
WY (Type)	Deep Percolation from the SWS
2022 (W)	73,000
2023 (W)	73,000
2024 (W)	74,000
2025 (BN)	24,000
2026 (AN)	71,000
2027 (W)	73,000
2028 (W)	54,000
2029 (C)	33,000
2030 (C)	20,000
2031 (AN)	73,000
2032 (BN)	25,000
2033 (AN)	56,000
2034 (D)	50,000
2035 (W)	72,000
2036 (W)	110,000
2037 (W)	73,000
2038 (D)	50,000
2039 (W)	72,000
2040 (D)	38,000
2041 (C)	24,000
2042 (D)	29,000
2043 (C)	31,000
2044 (C)	31,000
2045 (C)	33,000
2046 (AN)	71,000
2047 (C)	32,000
2048 (W)	87,000
2049 (W)	73,000
2050 (W)	54,000
2051 (W)	110,000
2052 (W)	56,000
2053 (AN)	57,000
2054 (D)	39,000
2055 (D)	48,000
2056 (AN)	68,000
2057 (BN)	61,000
2058 (AN)	63,000
2059 (W)	73,000
2060 (D)	29,000
2061 (C)	34,000
2062 (D)	27,000
2063 (BN)	55,000
2064 (W)	57,000
2065 (BN)	25,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2066 (D)		41,000
2067 (C)		20,000
2068 (C)		37,000
2069 (BN)		52,000
2070 (W)		78,000
2071 (BN)		24,000
2072 (W)		72,000
Average (2022-2072)		53,000
2022-2072	W	74,000
	AN	66,000
	BN	38,000
	D	39,000
	C	29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

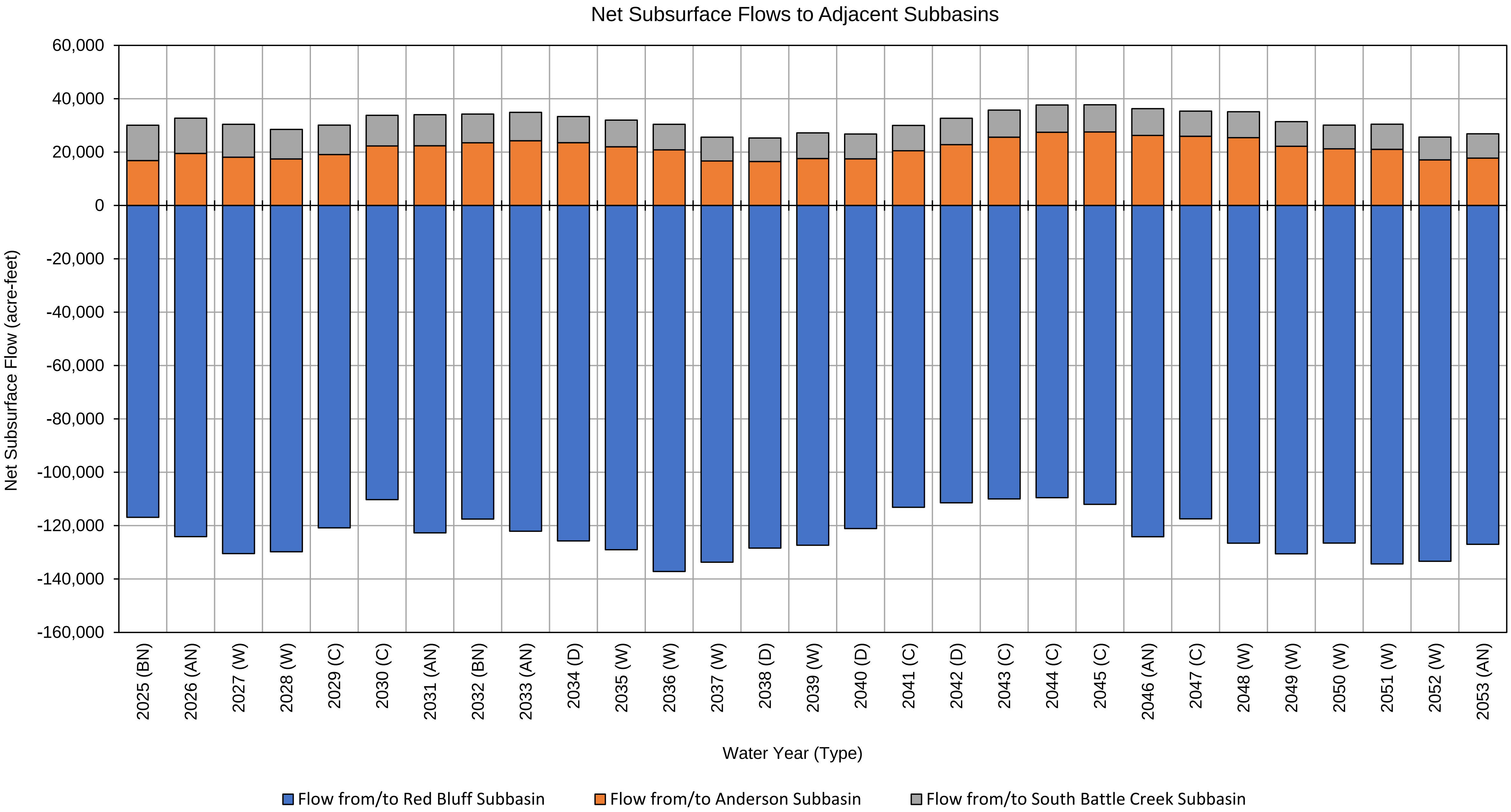
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-6,700	-4,000	-11,000
2023 (W)	-6,500	-3,900	-10,000
2024 (W)	-6,700	-4,000	-11,000
2025 (BN)	-7,100	-3,000	-10,000
2026 (AN)	-5,900	-3,500	-9,400
2027 (W)	-5,200	-3,900	-9,100
2028 (W)	-6,300	-3,700	-10,000
2029 (C)	-8,200	-3,000	-11,000
2030 (C)	-6,900	-2,000	-8,900
2031 (AN)	-5,800	-3,100	-8,900
2032 (BN)	-5,800	-2,200	-8,000
2033 (AN)	-5,400	-2,900	-8,200
2034 (D)	-7,500	-2,900	-10,000
2035 (W)	-5,200	-3,400	-8,600
2036 (W)	-4,800	-4,000	-8,800
2037 (W)	-6,500	-3,900	-10,000
2038 (D)	-7,500	-3,600	-11,000
2039 (W)	-6,400	-3,600	-10,000
2040 (D)	-6,000	-3,000	-9,100
2041 (C)	-7,200	-2,400	-9,600
2042 (D)	-6,700	-2,100	-8,800
2043 (C)	-6,800	-2,000	-8,800
2044 (C)	-6,900	-1,900	-8,800
2045 (C)	-7,200	-1,900	-9,100
2046 (AN)	-5,900	-2,600	-8,500
2047 (C)	-6,900	-2,000	-8,900
2048 (W)	-5,500	-3,000	-8,500
2049 (W)	-6,400	-3,100	-9,500
2050 (W)	-8,000	-2,900	-11,000
2051 (W)	-4,800	-3,900	-8,700
2052 (W)	-6,300	-3,800	-10,000
2053 (AN)	-5,400	-3,600	-9,000
2054 (D)	-6,100	-3,000	-9,100
2055 (D)	-7,400	-3,100	-10,000
2056 (AN)	-5,300	-3,100	-8,400
2057 (BN)	-6,600	-3,400	-10,000
2058 (AN)	-4,900	-3,300	-8,200
2059 (W)	-5,200	-3,700	-8,900
2060 (D)	-6,600	-2,700	-9,300
2061 (C)	-8,100	-2,700	-11,000
2062 (D)	-6,200	-2,200	-8,400
2063 (BN)	-5,300	-2,500	-7,900
2064 (W)	-5,000	-3,000	-8,000
2065 (BN)	-5,800	-2,200	-8,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2066 (D)		-8,200	-2,300	-10,000
2067 (C)		-7,300	-1,800	-9,100
2068 (C)		-9,000	-1,800	-11,000
2069 (BN)		-7,000	-2,200	-9,200
2070 (W)		-5,500	-2,800	-8,300
2071 (BN)		-7,100	-1,900	-9,000
2072 (W)		-6,300	-2,900	-9,200
Average (2022-2072)		-6,400	-2,900	-9,300
2022-2072	W	-6,000	-3,500	-9,500
	AN	-5,500	-3,100	-8,600
	BN	-6,400	-2,500	-8,900
	D	-6,900	-2,800	-9,700
	C	-7,400	-2,200	-9,600

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

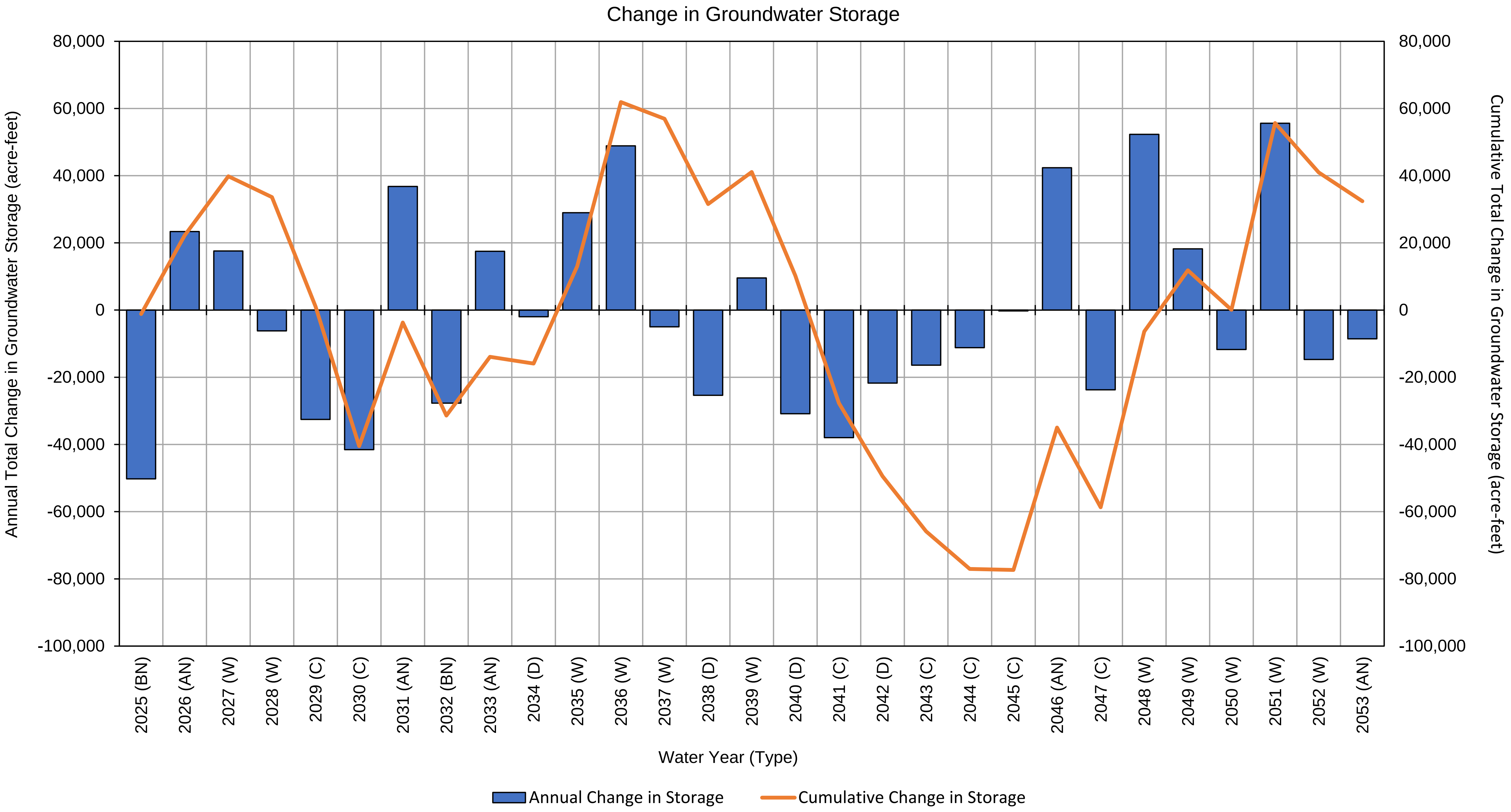
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-120,000	19,000	17,000	-85,000
2023 (W)	-130,000	17,000	15,000	-95,000
2024 (W)	-130,000	15,000	14,000	-100,000
2025 (BN)	-120,000	17,000	13,000	-87,000
2026 (AN)	-120,000	19,000	13,000	-91,000
2027 (W)	-130,000	18,000	12,000	-100,000
2028 (W)	-130,000	17,000	11,000	-100,000
2029 (C)	-120,000	19,000	11,000	-91,000
2030 (C)	-110,000	22,000	11,000	-77,000
2031 (AN)	-120,000	22,000	12,000	-89,000
2032 (BN)	-120,000	23,000	11,000	-83,000
2033 (AN)	-120,000	24,000	11,000	-87,000
2034 (D)	-130,000	24,000	9,800	-92,000
2035 (W)	-130,000	22,000	10,000	-97,000
2036 (W)	-140,000	21,000	9,600	-110,000
2037 (W)	-130,000	17,000	8,900	-110,000
2038 (D)	-130,000	16,000	8,800	-100,000
2039 (W)	-130,000	18,000	9,600	-100,000
2040 (D)	-120,000	17,000	9,300	-94,000
2041 (C)	-110,000	21,000	9,500	-83,000
2042 (D)	-110,000	23,000	9,900	-79,000
2043 (C)	-110,000	26,000	10,000	-74,000
2044 (C)	-110,000	27,000	10,000	-72,000
2045 (C)	-110,000	28,000	10,000	-74,000
2046 (AN)	-120,000	26,000	10,000	-88,000
2047 (C)	-120,000	26,000	9,400	-82,000
2048 (W)	-130,000	25,000	9,800	-91,000
2049 (W)	-130,000	22,000	9,200	-99,000
2050 (W)	-130,000	21,000	8,900	-96,000
2051 (W)	-130,000	21,000	9,400	-100,000
2052 (W)	-130,000	17,000	8,500	-110,000
2053 (AN)	-130,000	18,000	9,100	-100,000
2054 (D)	-120,000	19,000	9,400	-93,000
2055 (D)	-120,000	20,000	9,400	-94,000
2056 (AN)	-130,000	21,000	9,700	-96,000
2057 (BN)	-130,000	19,000	9,300	-99,000
2058 (AN)	-130,000	19,000	9,200	-100,000
2059 (W)	-130,000	18,000	9,200	-100,000
2060 (D)	-120,000	18,000	8,900	-92,000
2061 (C)	-120,000	21,000	9,700	-85,000
2062 (D)	-110,000	24,000	9,800	-79,000
2063 (BN)	-120,000	25,000	9,900	-86,000
2064 (W)	-130,000	24,000	9,700	-94,000
2065 (BN)	-120,000	24,000	9,400	-85,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2066 (D)		-120,000	25,000	9,600	-82,000
2067 (C)		-110,000	27,000	10,000	-71,000
2068 (C)		-110,000	29,000	10,000	-74,000
2069 (BN)		-120,000	28,000	11,000	-79,000
2070 (W)		-130,000	26,000	10,000	-93,000
2071 (BN)		-120,000	25,000	9,900	-82,000
2072 (W)		-120,000	25,000	11,000	-89,000
Average (2022-2072)		-120,000	22,000	10,000	-91,000
2022-2072	W	-130,000	20,000	11,000	-98,000
	AN	-130,000	21,000	11,000	-93,000
	BN	-120,000	23,000	10,000	-86,000
	D	-120,000	21,000	9,400	-90,000
	C	-110,000	25,000	10,000	-78,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	28,000	28,000
2023 (W)	14,000	42,000
2024 (W)	6,800	49,000
2025 (BN)	-50,000	-1,200
2026 (AN)	23,000	22,000
2027 (W)	18,000	40,000
2028 (W)	-6,200	34,000
2029 (C)	-33,000	1,000
2030 (C)	-42,000	-40,000
2031 (AN)	37,000	-3,700
2032 (BN)	-28,000	-31,000
2033 (AN)	17,000	-14,000
2034 (D)	-2,000	-16,000
2035 (W)	29,000	13,000
2036 (W)	49,000	62,000
2037 (W)	-5,000	57,000
2038 (D)	-25,000	32,000
2039 (W)	9,600	41,000
2040 (D)	-31,000	10,000
2041 (C)	-38,000	-28,000
2042 (D)	-22,000	-49,000
2043 (C)	-16,000	-66,000
2044 (C)	-11,000	-77,000
2045 (C)	-270	-77,000
2046 (AN)	42,000	-35,000
2047 (C)	-24,000	-59,000
2048 (W)	52,000	-6,400
2049 (W)	18,000	12,000
2050 (W)	-12,000	75
2051 (W)	56,000	56,000
2052 (W)	-15,000	41,000
2053 (AN)	-8,500	32,000
2054 (D)	-27,000	5,200
2055 (D)	-7,800	-2,600
2056 (AN)	20,000	17,000
2057 (BN)	-1,800	15,000
2058 (AN)	13,000	29,000
2059 (W)	13,000	42,000
2060 (D)	-44,000	-2,200
2061 (C)	-20,000	-23,000
2062 (D)	-19,000	-41,000
2063 (BN)	21,000	-20,000
2064 (W)	18,000	-2,100
2065 (BN)	-29,000	-32,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-12,000	-44,000
2067 (C)		-30,000	-74,000
2068 (C)		-4,300	-78,000
2069 (BN)		22,000	-56,000
2070 (W)		43,000	-13,000
2071 (BN)		-34,000	-47,000
2072 (W)		35,000	-12,000
Average (2022-2072)		-240	
2022-2072	W		
	AN		
	BN		
	D		
	C		

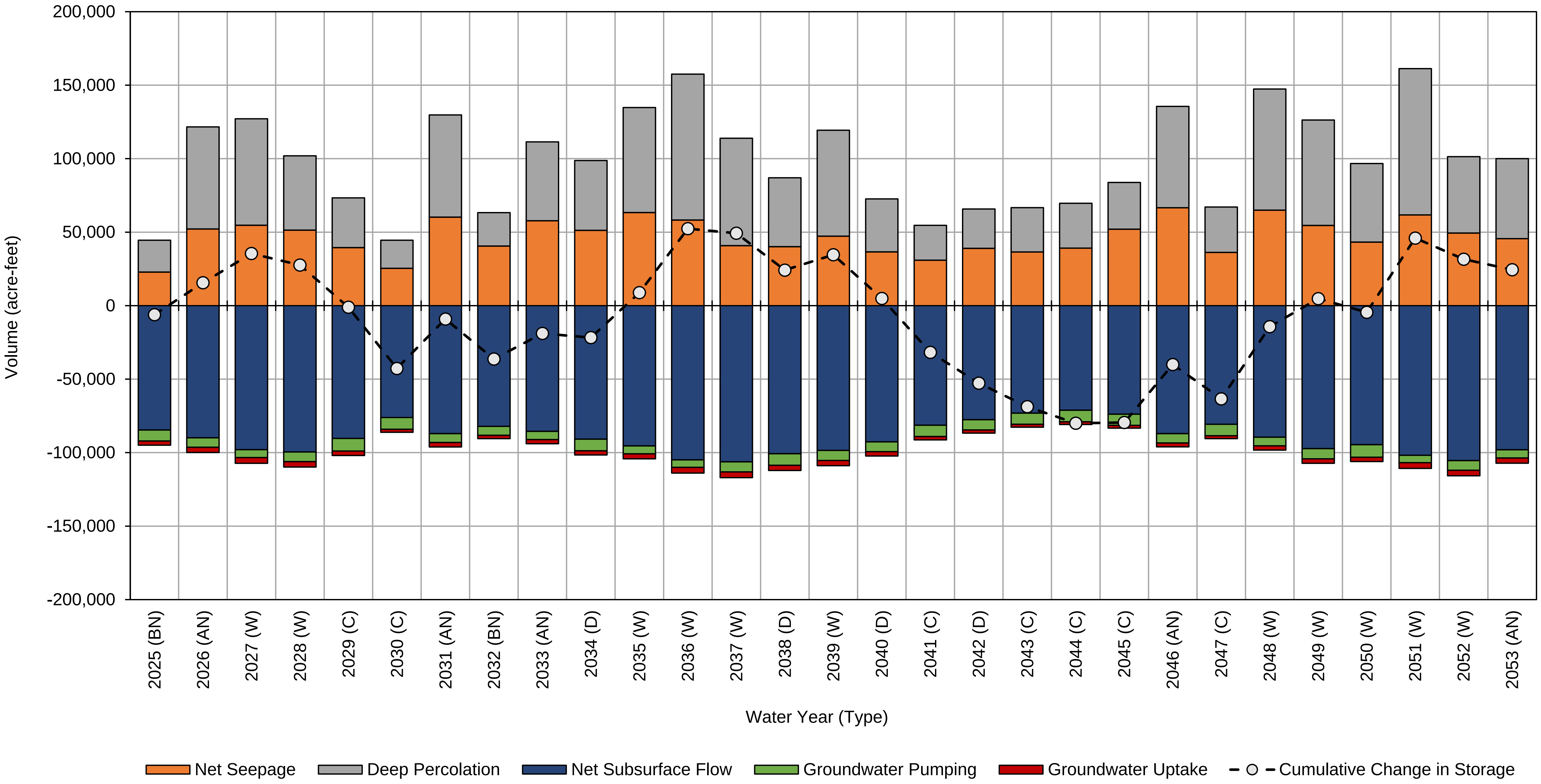
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-5

Detailed Bowman Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2070) Model Results



Projected (Current Land Use) with Climate Change (2070) Water Budget
Bowman Subbasin

Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

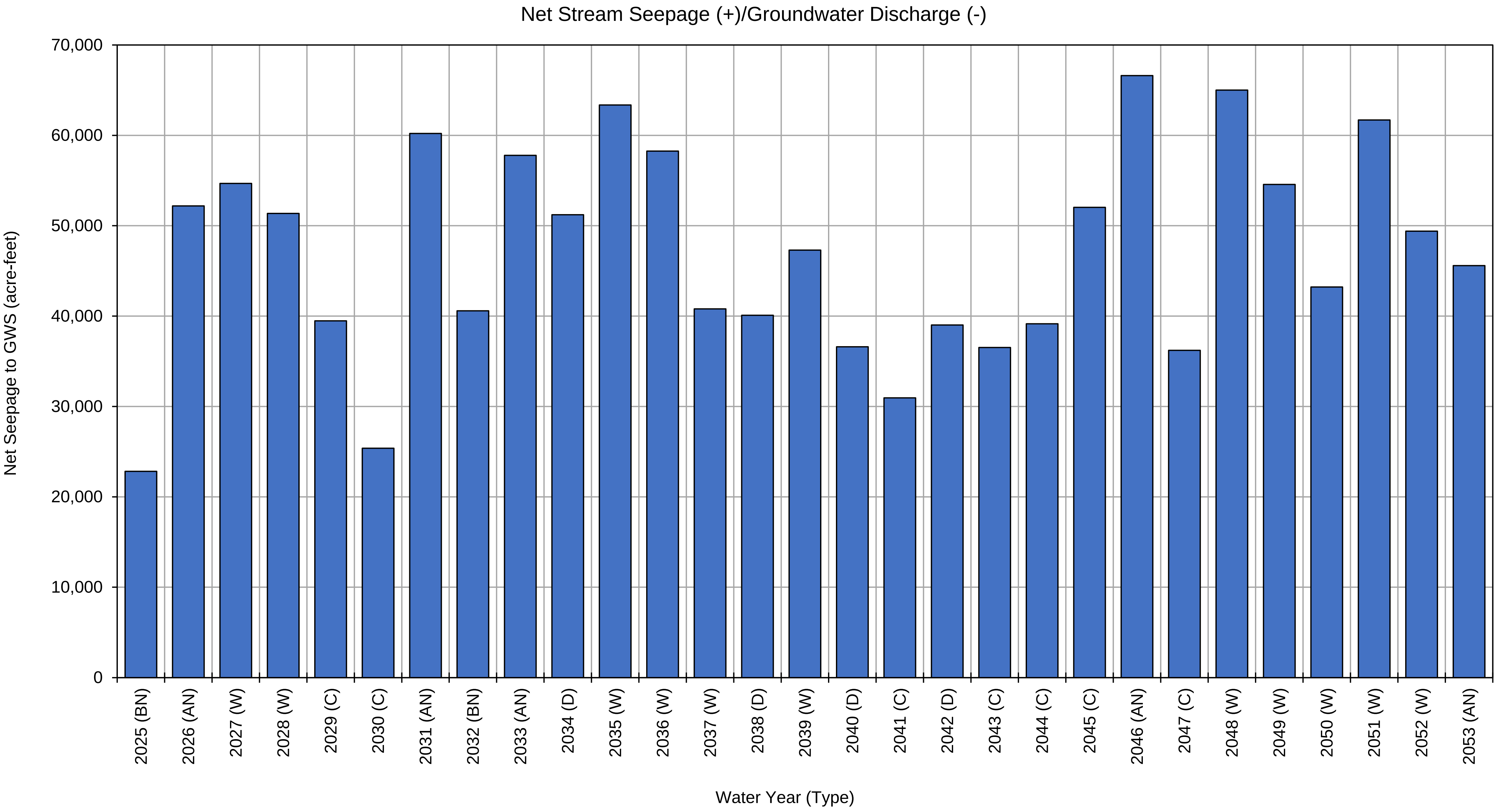
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	50,000	69,000	-7,300	-4,000	-84,000	24,000	24,000
2023 (W)	46,000	72,000	-6,900	-3,900	-94,000	14,000	38,000
2024 (W)	43,000	72,000	-7,100	-4,000	-98,000	6,700	44,000
2025 (BN)	23,000	22,000	-7,500	-2,900	-85,000	-50,000	-6,100
2026 (AN)	52,000	69,000	-6,400	-3,600	-90,000	22,000	16,000
2027 (W)	55,000	72,000	-5,400	-3,900	-98,000	20,000	35,000
2028 (W)	51,000	51,000	-6,600	-3,600	-100,000	-7,900	28,000
2029 (C)	39,000	34,000	-8,600	-3,100	-90,000	-29,000	-1,100
2030 (C)	25,000	19,000	-8,000	-2,100	-76,000	-42,000	-43,000
2031 (AN)	60,000	70,000	-6,000	-3,100	-87,000	34,000	-9,100
2032 (BN)	41,000	23,000	-6,100	-2,200	-82,000	-27,000	-36,000
2033 (AN)	58,000	54,000	-5,600	-2,800	-86,000	17,000	-19,000
2034 (D)	51,000	48,000	-7,900	-2,800	-91,000	-2,800	-22,000
2035 (W)	63,000	71,000	-5,400	-3,400	-95,000	31,000	8,900
2036 (W)	58,000	99,000	-5,100	-3,900	-100,000	44,000	52,000
2037 (W)	41,000	73,000	-6,900	-3,900	-110,000	-3,100	49,000
2038 (D)	40,000	47,000	-7,900	-3,500	-100,000	-25,000	24,000
2039 (W)	47,000	72,000	-6,900	-3,600	-98,000	10,000	35,000
2040 (D)	37,000	36,000	-6,700	-3,000	-93,000	-30,000	4,900
2041 (C)	31,000	24,000	-7,700	-2,300	-81,000	-37,000	-32,000
2042 (D)	39,000	27,000	-7,000	-2,100	-78,000	-21,000	-53,000
2043 (C)	37,000	30,000	-7,600	-2,000	-73,000	-16,000	-69,000
2044 (C)	39,000	30,000	-7,800	-1,800	-71,000	-11,000	-80,000
2045 (C)	52,000	32,000	-7,500	-2,000	-74,000	450	-79,000
2046 (AN)	67,000	69,000	-6,400	-2,600	-87,000	39,000	-40,000
2047 (C)	36,000	31,000	-7,800	-1,900	-81,000	-23,000	-63,000
2048 (W)	65,000	82,000	-5,800	-2,900	-90,000	49,000	-14,000
2049 (W)	55,000	72,000	-6,900	-3,100	-97,000	19,000	4,800
2050 (W)	43,000	54,000	-8,600	-2,800	-95,000	-9,300	-4,500
2051 (W)	62,000	100,000	-5,100	-3,900	-100,000	51,000	46,000
2052 (W)	49,000	52,000	-6,600	-3,700	-110,000	-14,000	32,000
2053 (AN)	46,000	54,000	-5,600	-3,500	-98,000	-7,200	24,000
2054 (D)	38,000	37,000	-6,900	-2,900	-91,000	-26,000	-1,700
2055 (D)	49,000	46,000	-7,900	-2,900	-92,000	-7,400	-9,100
2056 (AN)	58,000	66,000	-5,500	-3,100	-95,000	21,000	12,000
2057 (BN)	48,000	60,000	-7,200	-3,400	-98,000	-1,200	11,000
2058 (AN)	58,000	61,000	-5,300	-3,300	-99,000	11,000	22,000
2059 (W)	54,000	72,000	-5,400	-3,700	-100,000	15,000	37,000
2060 (D)	30,000	27,000	-6,900	-2,700	-91,000	-43,000	-6,300
2061 (C)	45,000	34,000	-8,400	-2,700	-84,000	-17,000	-23,000
2062 (D)	42,000	26,000	-6,500	-2,200	-79,000	-20,000	-43,000
2063 (BN)	60,000	54,000	-5,900	-2,600	-86,000	20,000	-23,000
2064 (W)	63,000	53,000	-5,300	-2,900	-93,000	16,000	-7,400
2065 (BN)	40,000	23,000	-6,100	-2,200	-84,000	-29,000	-37,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		42,000	38,000	-8,700	-2,300	-81,000	-12,000	-49,000
2067 (C)		32,000	19,000	-8,400	-1,800	-70,000	-29,000	-78,000
2068 (C)		45,000	34,000	-9,700	-1,800	-73,000	-5,400	-83,000
2069 (BN)		61,000	51,000	-7,600	-2,200	-79,000	23,000	-61,000
2070 (W)		68,000	73,000	-6,100	-2,700	-91,000	40,000	-21,000
2071 (BN)		34,000	21,000	-7,500	-1,900	-80,000	-34,000	-55,000
2072 (W)		62,000	68,000	-6,800	-2,800	-87,000	34,000	-21,000
Average (2022-2072)		48,000	51,000	-6,900	-2,900	-89,000	-420	
2022-2072	W	54,000	71,000	-6,300	-3,500	-97,000		
	AN	57,000	63,000	-5,800	-3,100	-92,000		
	BN	44,000	36,000	-6,800	-2,500	-85,000		
	D	41,000	37,000	-7,400	-2,700	-88,000		
	C	38,000	29,000	-8,100	-2,100	-77,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

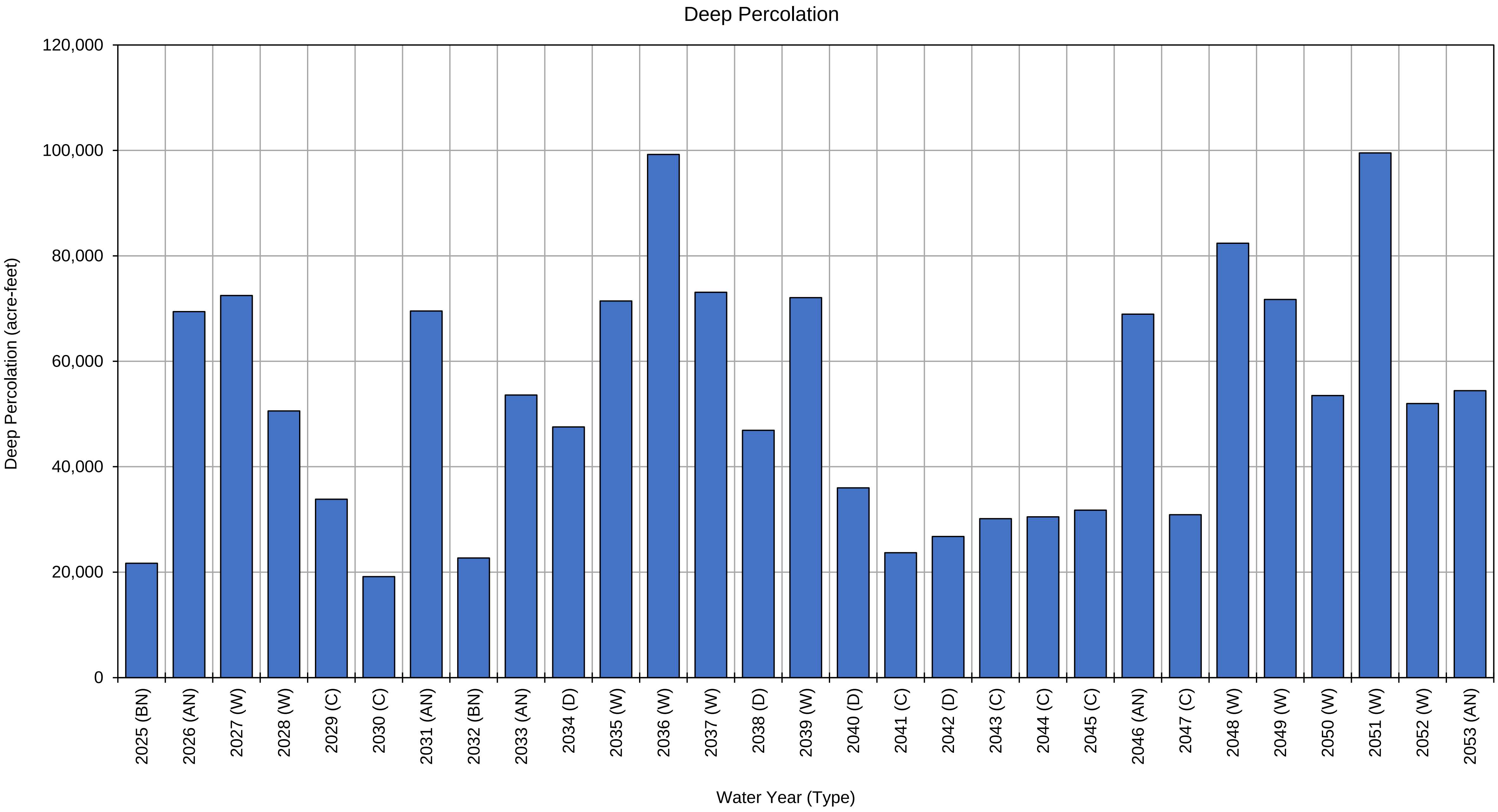
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	50,000
2023 (W)	46,000
2024 (W)	43,000
2025 (BN)	23,000
2026 (AN)	52,000
2027 (W)	55,000
2028 (W)	51,000
2029 (C)	39,000
2030 (C)	25,000
2031 (AN)	60,000
2032 (BN)	41,000
2033 (AN)	58,000
2034 (D)	51,000
2035 (W)	63,000
2036 (W)	58,000
2037 (W)	41,000
2038 (D)	40,000
2039 (W)	47,000
2040 (D)	37,000
2041 (C)	31,000
2042 (D)	39,000
2043 (C)	37,000
2044 (C)	39,000
2045 (C)	52,000
2046 (AN)	67,000
2047 (C)	36,000
2048 (W)	65,000
2049 (W)	55,000
2050 (W)	43,000
2051 (W)	62,000
2052 (W)	49,000
2053 (AN)	46,000
2054 (D)	38,000
2055 (D)	49,000
2056 (AN)	58,000
2057 (BN)	48,000
2058 (AN)	58,000
2059 (W)	54,000
2060 (D)	30,000
2061 (C)	45,000
2062 (D)	42,000
2063 (BN)	60,000
2064 (W)	63,000
2065 (BN)	40,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2066 (D)		42,000
2067 (C)		32,000
2068 (C)		45,000
2069 (BN)		61,000
2070 (W)		68,000
2071 (BN)		34,000
2072 (W)		62,000
Average (2022-2072)		48,000
2022-2072	W	54,000
	AN	57,000
	BN	44,000
	D	41,000
	C	38,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

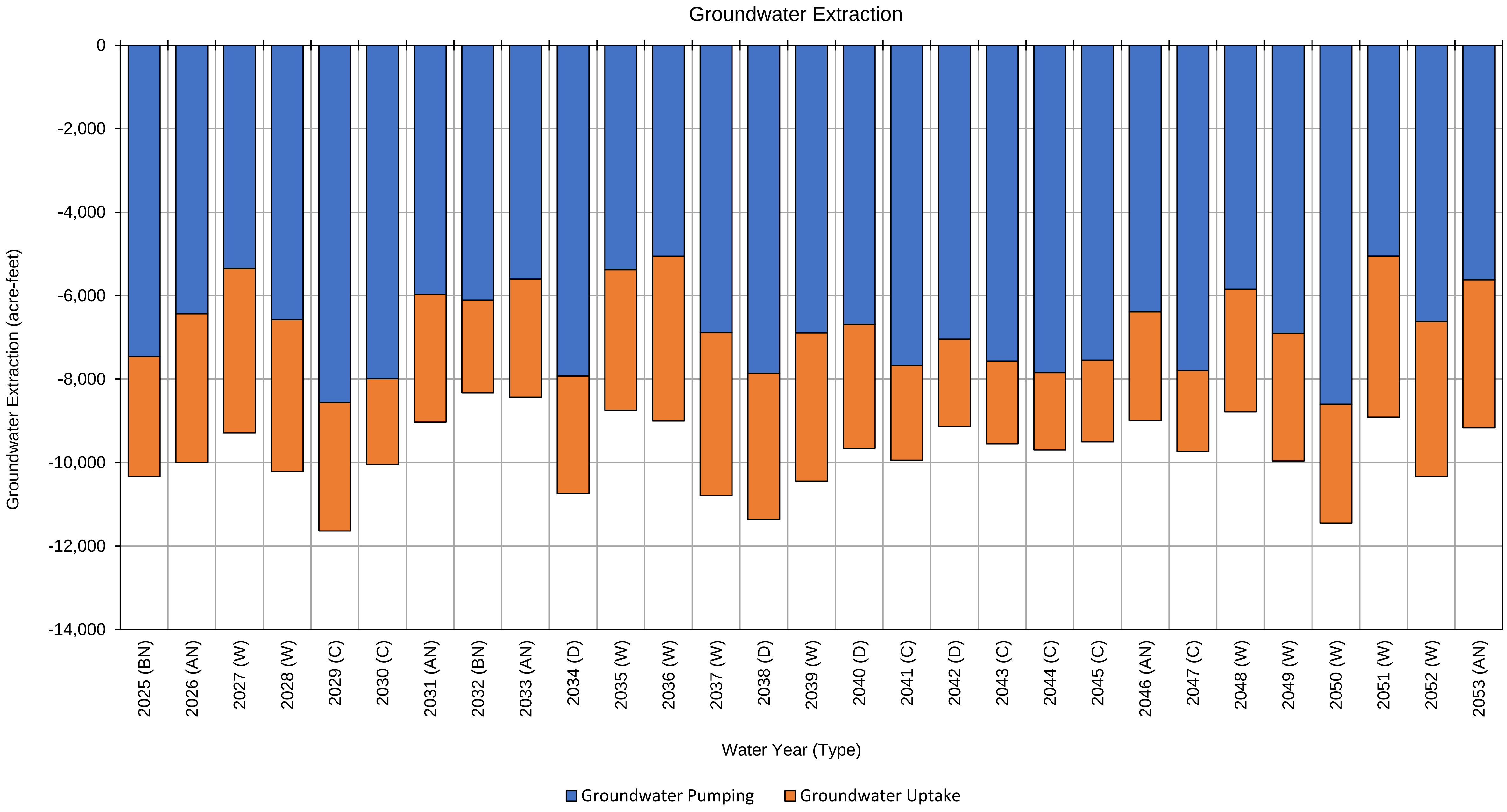
WY (Type)	Deep Percolation from the SWS
2022 (W)	69,000
2023 (W)	72,000
2024 (W)	72,000
2025 (BN)	22,000
2026 (AN)	69,000
2027 (W)	72,000
2028 (W)	51,000
2029 (C)	34,000
2030 (C)	19,000
2031 (AN)	70,000
2032 (BN)	23,000
2033 (AN)	54,000
2034 (D)	48,000
2035 (W)	71,000
2036 (W)	99,000
2037 (W)	73,000
2038 (D)	47,000
2039 (W)	72,000
2040 (D)	36,000
2041 (C)	24,000
2042 (D)	27,000
2043 (C)	30,000
2044 (C)	30,000
2045 (C)	32,000
2046 (AN)	69,000
2047 (C)	31,000
2048 (W)	82,000
2049 (W)	72,000
2050 (W)	54,000
2051 (W)	100,000
2052 (W)	52,000
2053 (AN)	54,000
2054 (D)	37,000
2055 (D)	46,000
2056 (AN)	66,000
2057 (BN)	60,000
2058 (AN)	61,000
2059 (W)	72,000
2060 (D)	27,000
2061 (C)	34,000
2062 (D)	26,000
2063 (BN)	54,000
2064 (W)	53,000
2065 (BN)	23,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2066 (D)		38,000
2067 (C)		19,000
2068 (C)		34,000
2069 (BN)		51,000
2070 (W)		73,000
2071 (BN)		21,000
2072 (W)		68,000
Average (2022-2072)		51,000
2022-2072	W	71,000
	AN	63,000
	BN	36,000
	D	37,000
	C	29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

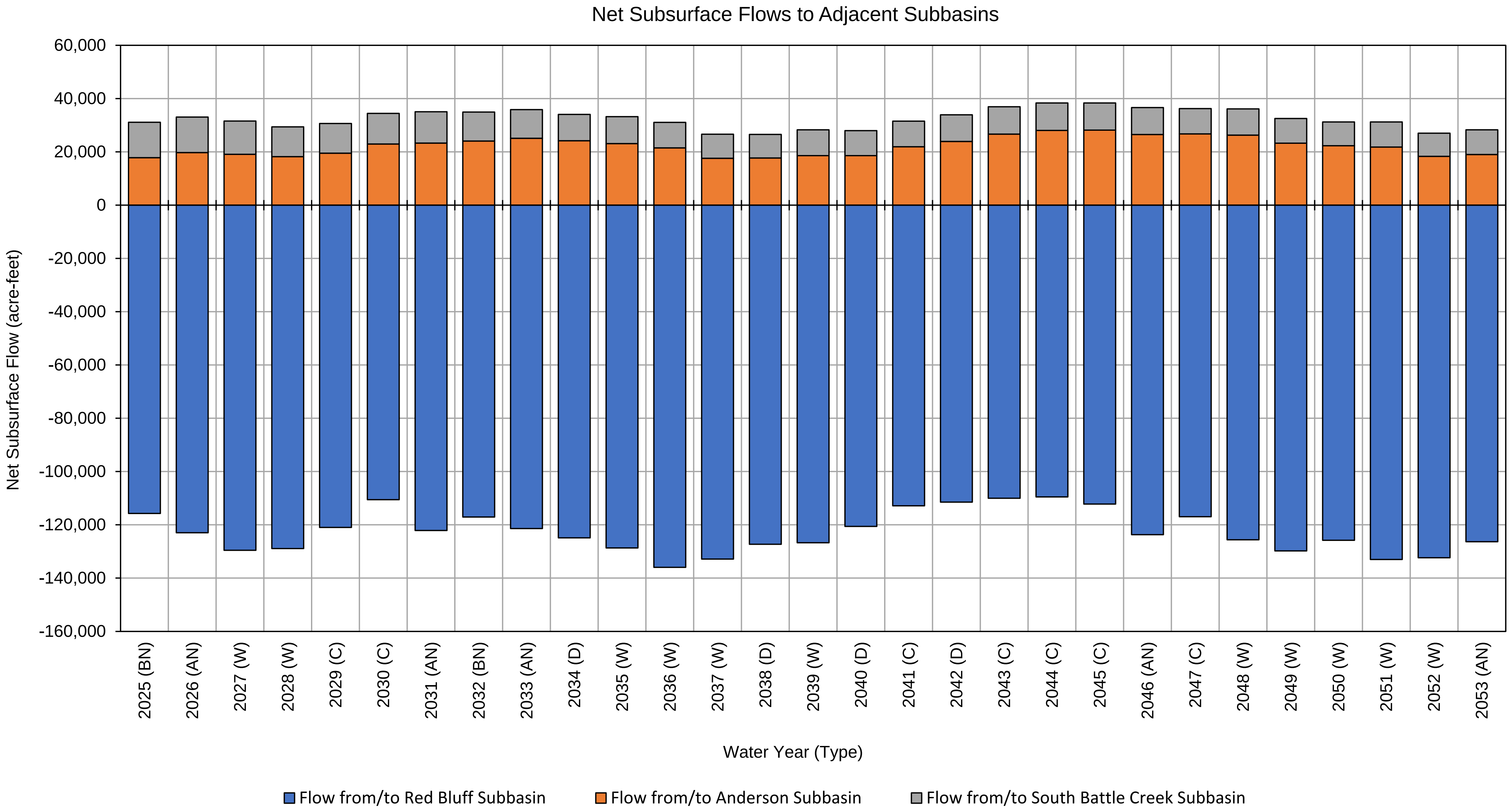
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-7,300	-4,000	-11,000
2023 (W)	-6,900	-3,900	-11,000
2024 (W)	-7,100	-4,000	-11,000
2025 (BN)	-7,500	-2,900	-10,000
2026 (AN)	-6,400	-3,600	-10,000
2027 (W)	-5,400	-3,900	-9,300
2028 (W)	-6,600	-3,600	-10,000
2029 (C)	-8,600	-3,100	-12,000
2030 (C)	-8,000	-2,100	-10,000
2031 (AN)	-6,000	-3,100	-9,000
2032 (BN)	-6,100	-2,200	-8,300
2033 (AN)	-5,600	-2,800	-8,400
2034 (D)	-7,900	-2,800	-11,000
2035 (W)	-5,400	-3,400	-8,700
2036 (W)	-5,100	-3,900	-9,000
2037 (W)	-6,900	-3,900	-11,000
2038 (D)	-7,900	-3,500	-11,000
2039 (W)	-6,900	-3,600	-10,000
2040 (D)	-6,700	-3,000	-9,700
2041 (C)	-7,700	-2,300	-9,900
2042 (D)	-7,000	-2,100	-9,100
2043 (C)	-7,600	-2,000	-9,500
2044 (C)	-7,800	-1,800	-9,700
2045 (C)	-7,500	-2,000	-9,500
2046 (AN)	-6,400	-2,600	-9,000
2047 (C)	-7,800	-1,900	-9,700
2048 (W)	-5,800	-2,900	-8,800
2049 (W)	-6,900	-3,100	-10,000
2050 (W)	-8,600	-2,800	-11,000
2051 (W)	-5,100	-3,900	-8,900
2052 (W)	-6,600	-3,700	-10,000
2053 (AN)	-5,600	-3,500	-9,200
2054 (D)	-6,900	-2,900	-9,800
2055 (D)	-7,900	-2,900	-11,000
2056 (AN)	-5,500	-3,100	-8,600
2057 (BN)	-7,200	-3,400	-11,000
2058 (AN)	-5,300	-3,300	-8,500
2059 (W)	-5,400	-3,700	-9,100
2060 (D)	-6,900	-2,700	-9,600
2061 (C)	-8,400	-2,700	-11,000
2062 (D)	-6,500	-2,200	-8,700
2063 (BN)	-5,900	-2,600	-8,500
2064 (W)	-5,300	-2,900	-8,200
2065 (BN)	-6,100	-2,200	-8,300

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2066 (D)		-8,700	-2,300	-11,000
2067 (C)		-8,400	-1,800	-10,000
2068 (C)		-9,700	-1,800	-12,000
2069 (BN)		-7,600	-2,200	-9,800
2070 (W)		-6,100	-2,700	-8,800
2071 (BN)		-7,500	-1,900	-9,400
2072 (W)		-6,800	-2,800	-9,600
Average (2022-2072)		-6,900	-2,900	-9,800
2022-2072	W	-6,300	-3,500	-9,800
	AN	-5,800	-3,100	-9,000
	BN	-6,800	-2,500	-9,300
	D	-7,400	-2,700	-10,000
	C	-8,100	-2,100	-10,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

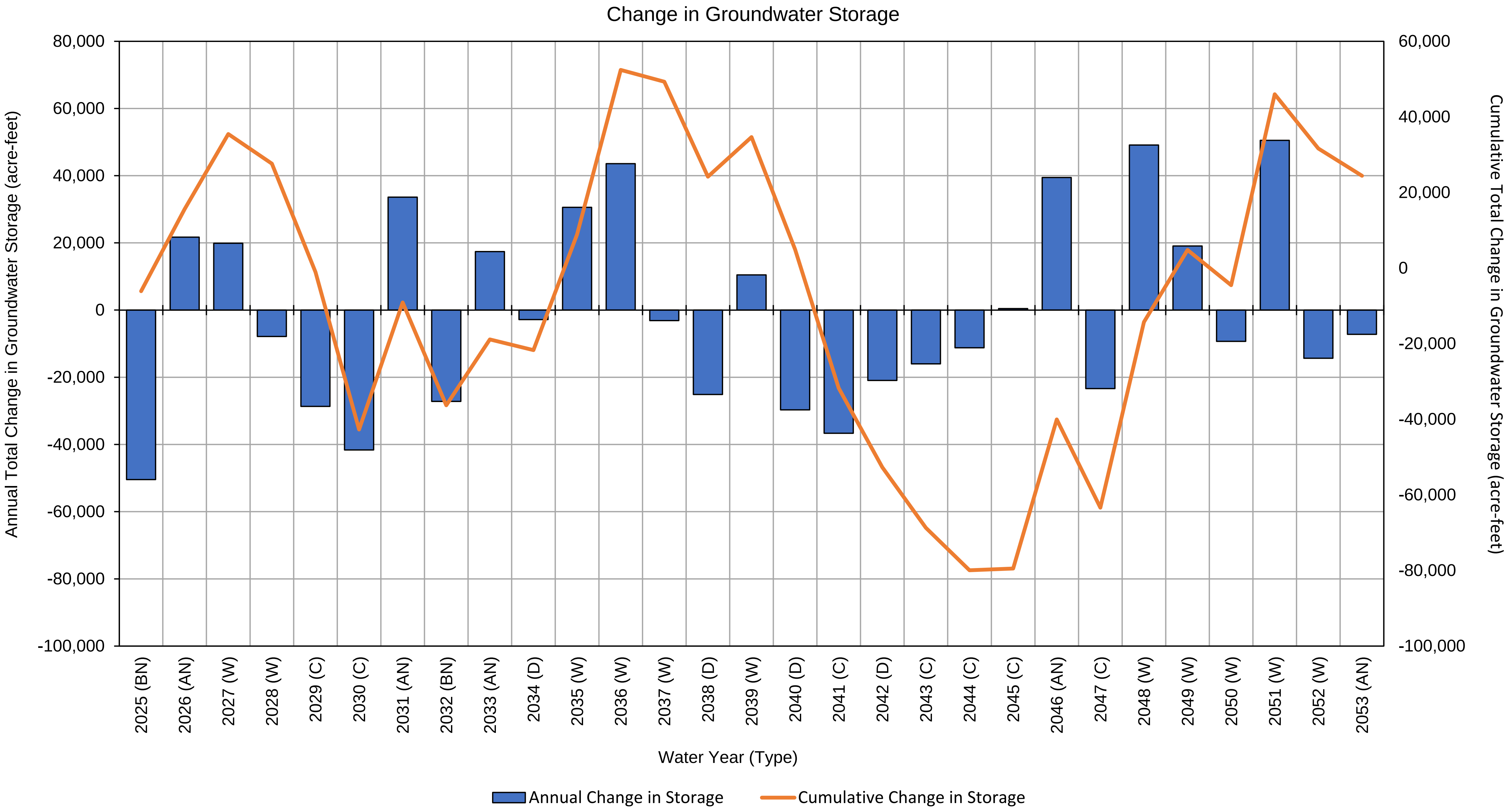
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-120,000	20,000	17,000	-84,000
2023 (W)	-130,000	18,000	15,000	-94,000
2024 (W)	-130,000	16,000	14,000	-98,000
2025 (BN)	-120,000	18,000	13,000	-85,000
2026 (AN)	-120,000	20,000	13,000	-90,000
2027 (W)	-130,000	19,000	13,000	-98,000
2028 (W)	-130,000	18,000	11,000	-100,000
2029 (C)	-120,000	19,000	11,000	-90,000
2030 (C)	-110,000	23,000	12,000	-76,000
2031 (AN)	-120,000	23,000	12,000	-87,000
2032 (BN)	-120,000	24,000	11,000	-82,000
2033 (AN)	-120,000	25,000	11,000	-86,000
2034 (D)	-120,000	24,000	9,900	-91,000
2035 (W)	-130,000	23,000	10,000	-95,000
2036 (W)	-140,000	21,000	9,600	-100,000
2037 (W)	-130,000	18,000	9,100	-110,000
2038 (D)	-130,000	18,000	8,800	-100,000
2039 (W)	-130,000	19,000	9,700	-98,000
2040 (D)	-120,000	19,000	9,400	-93,000
2041 (C)	-110,000	22,000	9,600	-81,000
2042 (D)	-110,000	24,000	10,000	-78,000
2043 (C)	-110,000	27,000	10,000	-73,000
2044 (C)	-110,000	28,000	10,000	-71,000
2045 (C)	-110,000	28,000	10,000	-74,000
2046 (AN)	-120,000	27,000	10,000	-87,000
2047 (C)	-120,000	27,000	9,500	-81,000
2048 (W)	-130,000	26,000	9,800	-90,000
2049 (W)	-130,000	23,000	9,300	-97,000
2050 (W)	-130,000	22,000	9,000	-95,000
2051 (W)	-130,000	22,000	9,400	-100,000
2052 (W)	-130,000	18,000	8,700	-110,000
2053 (AN)	-130,000	19,000	9,300	-98,000
2054 (D)	-120,000	20,000	9,400	-91,000
2055 (D)	-120,000	21,000	9,400	-92,000
2056 (AN)	-130,000	22,000	9,800	-95,000
2057 (BN)	-130,000	20,000	9,400	-98,000
2058 (AN)	-130,000	19,000	9,200	-99,000
2059 (W)	-130,000	19,000	9,300	-100,000
2060 (D)	-120,000	19,000	9,000	-91,000
2061 (C)	-120,000	22,000	9,700	-84,000
2062 (D)	-110,000	24,000	9,900	-79,000
2063 (BN)	-120,000	25,000	10,000	-86,000
2064 (W)	-130,000	24,000	9,700	-93,000
2065 (BN)	-120,000	25,000	9,500	-84,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2066 (D)		-120,000	26,000	9,600	-81,000
2067 (C)		-110,000	28,000	10,000	-70,000
2068 (C)		-110,000	29,000	11,000	-73,000
2069 (BN)		-120,000	29,000	11,000	-79,000
2070 (W)		-130,000	27,000	10,000	-91,000
2071 (BN)		-120,000	26,000	9,900	-80,000
2072 (W)		-120,000	27,000	11,000	-87,000
Average (2022-2072)		-120,000	23,000	10,000	-89,000
2022-2072	W	-130,000	21,000	11,000	-97,000
	AN	-120,000	22,000	11,000	-92,000
	BN	-120,000	24,000	11,000	-85,000
	D	-120,000	22,000	9,500	-88,000
	C	-110,000	25,000	10,000	-77,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	24,000	24,000
2023 (W)	14,000	38,000
2024 (W)	6,700	44,000
2025 (BN)	-50,000	-6,100
2026 (AN)	22,000	16,000
2027 (W)	20,000	35,000
2028 (W)	-7,900	28,000
2029 (C)	-29,000	-1,100
2030 (C)	-42,000	-43,000
2031 (AN)	34,000	-9,100
2032 (BN)	-27,000	-36,000
2033 (AN)	17,000	-19,000
2034 (D)	-2,800	-22,000
2035 (W)	31,000	8,900
2036 (W)	44,000	52,000
2037 (W)	-3,100	49,000
2038 (D)	-25,000	24,000
2039 (W)	10,000	35,000
2040 (D)	-30,000	4,900
2041 (C)	-37,000	-32,000
2042 (D)	-21,000	-53,000
2043 (C)	-16,000	-69,000
2044 (C)	-11,000	-80,000
2045 (C)	450	-79,000
2046 (AN)	39,000	-40,000
2047 (C)	-23,000	-63,000
2048 (W)	49,000	-14,000
2049 (W)	19,000	4,800
2050 (W)	-9,300	-4,500
2051 (W)	51,000	46,000
2052 (W)	-14,000	32,000
2053 (AN)	-7,200	24,000
2054 (D)	-26,000	-1,700
2055 (D)	-7,400	-9,100
2056 (AN)	21,000	12,000
2057 (BN)	-1,200	11,000
2058 (AN)	11,000	22,000
2059 (W)	15,000	37,000
2060 (D)	-43,000	-6,300
2061 (C)	-17,000	-23,000
2062 (D)	-20,000	-43,000
2063 (BN)	20,000	-23,000
2064 (W)	16,000	-7,400
2065 (BN)	-29,000	-37,000

Bowman Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-12,000	-49,000
2067 (C)		-29,000	-78,000
2068 (C)		-5,400	-83,000
2069 (BN)		23,000	-61,000
2070 (W)		40,000	-21,000
2071 (BN)		-34,000	-55,000
2072 (W)		34,000	-21,000
Average (2022-2072)		-420	
2022-2072	W		
	AN		
	BN		
	D		
	C		

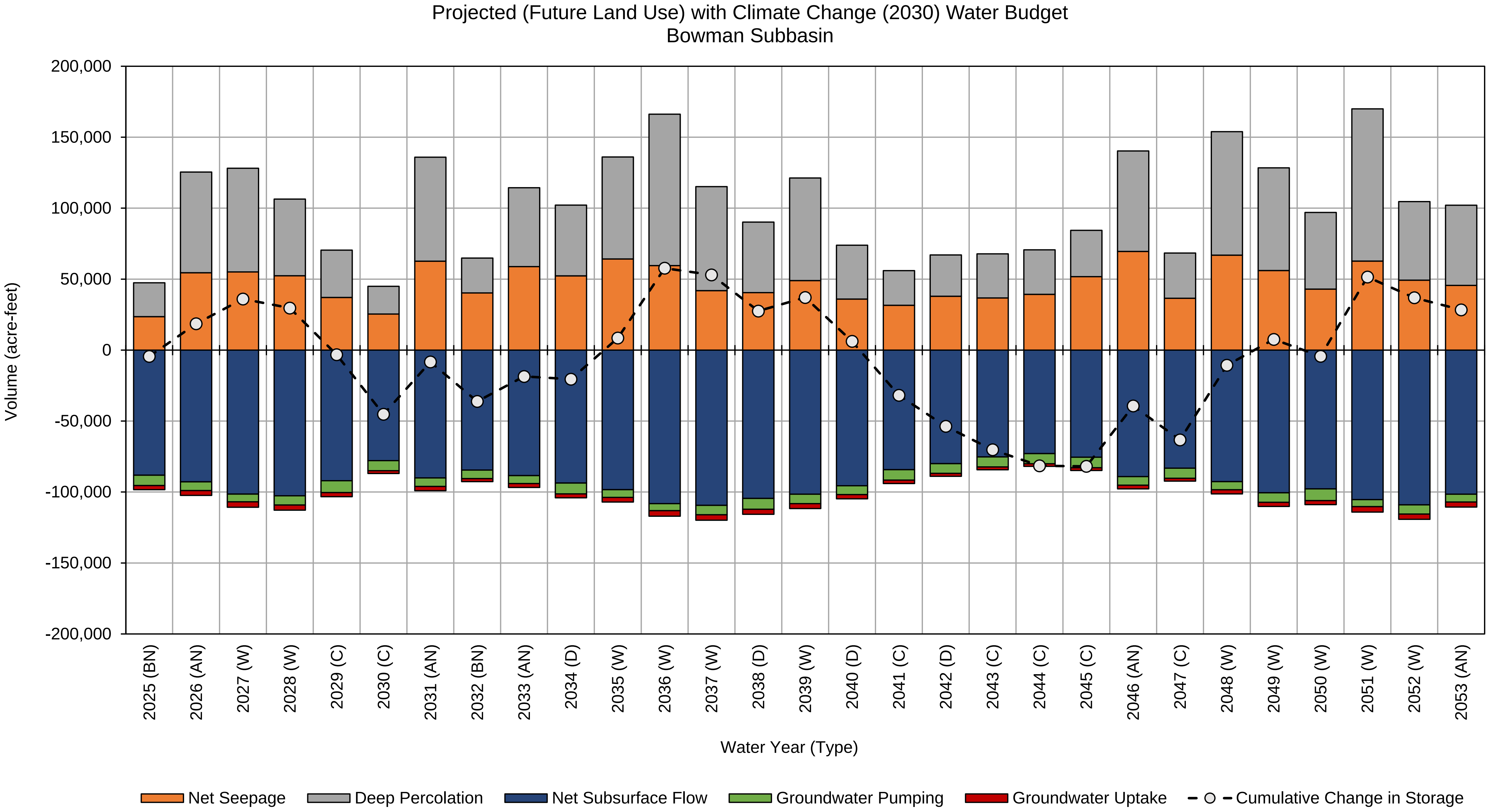
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-6

Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2030) Model Results


Projected (Future Land Use) with Climate Change (2030) Water Budget
Bowman Subbasin

Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

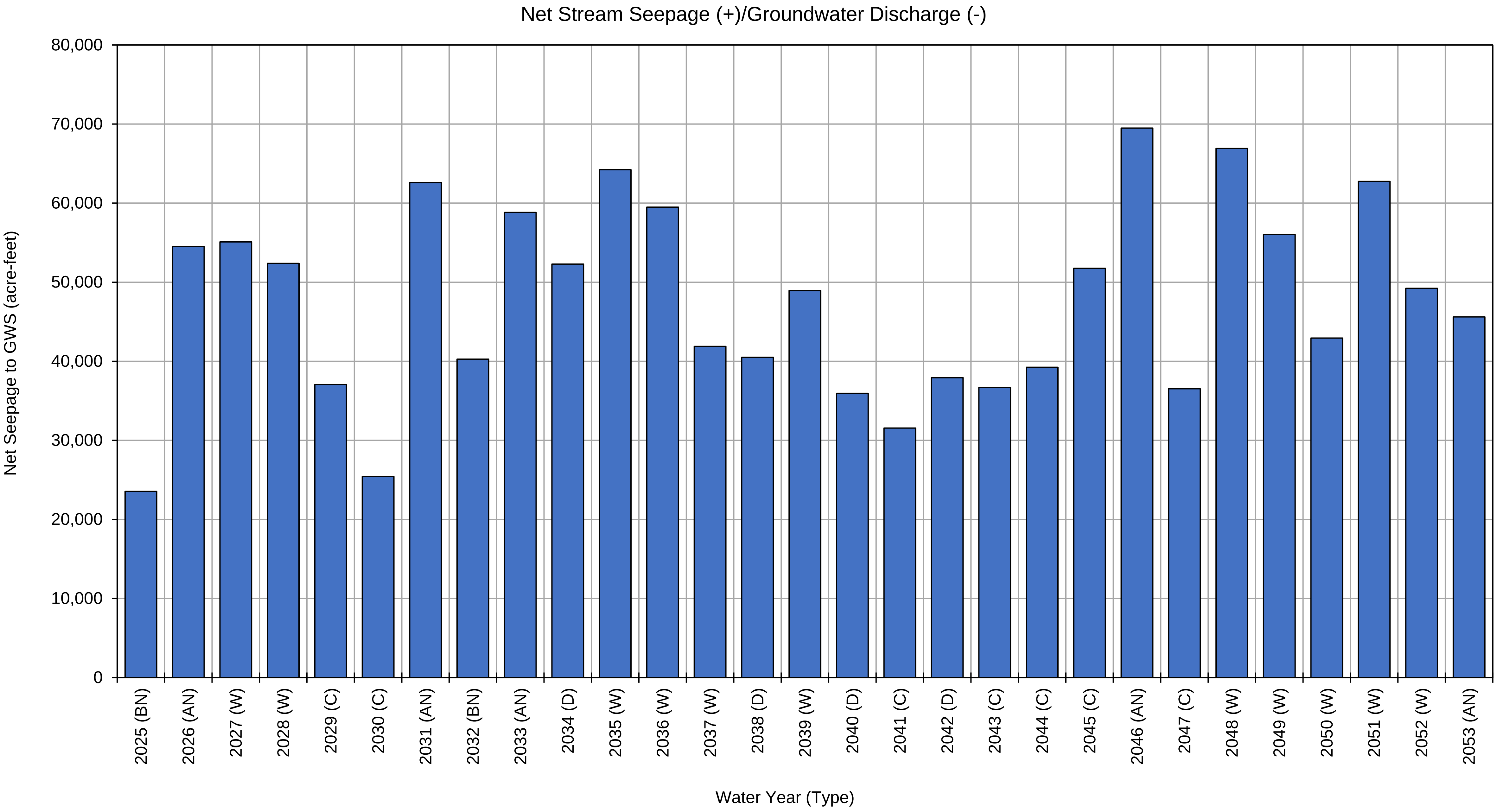
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	52,000	73,000	-6,900	-3,900	-87,000	27,000	27,000
2023 (W)	47,000	73,000	-6,700	-3,800	-96,000	13,000	40,000
2024 (W)	45,000	73,000	-6,900	-4,000	-100,000	6,100	46,000
2025 (BN)	24,000	24,000	-7,300	-2,900	-88,000	-51,000	-4,500
2026 (AN)	55,000	71,000	-6,100	-3,400	-93,000	23,000	19,000
2027 (W)	55,000	73,000	-5,400	-3,800	-100,000	17,000	36,000
2028 (W)	52,000	54,000	-6,500	-3,600	-100,000	-6,300	30,000
2029 (C)	37,000	33,000	-8,400	-2,900	-92,000	-33,000	-3,200
2030 (C)	25,000	20,000	-7,100	-2,000	-78,000	-42,000	-45,000
2031 (AN)	63,000	73,000	-6,000	-3,000	-90,000	37,000	-8,300
2032 (BN)	40,000	25,000	-6,000	-2,200	-85,000	-28,000	-36,000
2033 (AN)	59,000	56,000	-5,500	-2,800	-88,000	18,000	-19,000
2034 (D)	52,000	50,000	-7,700	-2,800	-94,000	-1,900	-20,000
2035 (W)	64,000	72,000	-5,400	-3,300	-98,000	29,000	8,500
2036 (W)	59,000	110,000	-5,000	-3,900	-110,000	49,000	58,000
2037 (W)	42,000	73,000	-6,700	-3,800	-110,000	-4,700	53,000
2038 (D)	41,000	50,000	-7,700	-3,500	-100,000	-25,000	28,000
2039 (W)	49,000	72,000	-6,700	-3,500	-100,000	9,600	37,000
2040 (D)	36,000	38,000	-6,300	-2,900	-96,000	-31,000	6,200
2041 (C)	32,000	24,000	-7,400	-2,300	-84,000	-38,000	-32,000
2042 (D)	38,000	29,000	-6,900	-2,100	-80,000	-22,000	-54,000
2043 (C)	37,000	31,000	-7,000	-2,000	-75,000	-16,000	-70,000
2044 (C)	39,000	31,000	-7,200	-1,800	-73,000	-11,000	-81,000
2045 (C)	52,000	33,000	-7,400	-1,900	-76,000	-420	-82,000
2046 (AN)	69,000	71,000	-6,100	-2,500	-89,000	43,000	-39,000
2047 (C)	37,000	32,000	-7,100	-1,900	-83,000	-24,000	-63,000
2048 (W)	67,000	87,000	-5,700	-2,900	-93,000	53,000	-11,000
2049 (W)	56,000	72,000	-6,700	-3,000	-100,000	18,000	7,500
2050 (W)	43,000	54,000	-8,200	-2,800	-98,000	-12,000	-4,400
2051 (W)	63,000	110,000	-5,000	-3,800	-110,000	56,000	51,000
2052 (W)	49,000	55,000	-6,500	-3,700	-110,000	-15,000	37,000
2053 (AN)	46,000	56,000	-5,600	-3,500	-100,000	-8,500	28,000
2054 (D)	37,000	39,000	-6,300	-2,900	-94,000	-27,000	1,100
2055 (D)	50,000	48,000	-7,700	-3,000	-95,000	-8,000	-6,900
2056 (AN)	58,000	68,000	-5,500	-3,000	-98,000	20,000	13,000
2057 (BN)	48,000	61,000	-6,900	-3,300	-100,000	-2,000	11,000
2058 (AN)	60,000	63,000	-5,100	-3,100	-100,000	13,000	24,000
2059 (W)	55,000	73,000	-5,400	-3,600	-110,000	13,000	37,000
2060 (D)	30,000	29,000	-6,800	-2,600	-93,000	-44,000	-6,600
2061 (C)	42,000	34,000	-8,300	-2,600	-86,000	-21,000	-27,000
2062 (D)	44,000	27,000	-6,400	-2,100	-81,000	-19,000	-46,000
2063 (BN)	62,000	55,000	-5,600	-2,500	-87,000	21,000	-25,000
2064 (W)	64,000	57,000	-5,200	-2,900	-95,000	18,000	-6,400
2065 (BN)	40,000	25,000	-6,000	-2,100	-86,000	-29,000	-36,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		41,000	41,000	-8,400	-2,200	-83,000	-12,000	-48,000
2067 (C)		31,000	20,000	-7,500	-1,700	-72,000	-30,000	-78,000
2068 (C)		45,000	37,000	-9,200	-1,800	-75,000	-4,600	-83,000
2069 (BN)		60,000	52,000	-7,200	-2,100	-81,000	22,000	-61,000
2070 (W)		69,000	78,000	-5,700	-2,700	-95,000	43,000	-18,000
2071 (BN)		34,000	24,000	-7,300	-1,900	-84,000	-35,000	-52,000
2072 (W)		64,000	71,000	-6,500	-2,800	-91,000	35,000	-17,000
Average (2022-2072)		48,000	53,000	-6,600	-2,800	-92,000	-340	
2022-2072	W	55,000	74,000	-6,200	-3,400	-100,000		
	AN	59,000	65,000	-5,700	-3,100	-94,000		
	BN	44,000	38,000	-6,600	-2,400	-87,000		
	D	41,000	39,000	-7,100	-2,700	-91,000		
	C	38,000	29,000	-7,700	-2,100	-79,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

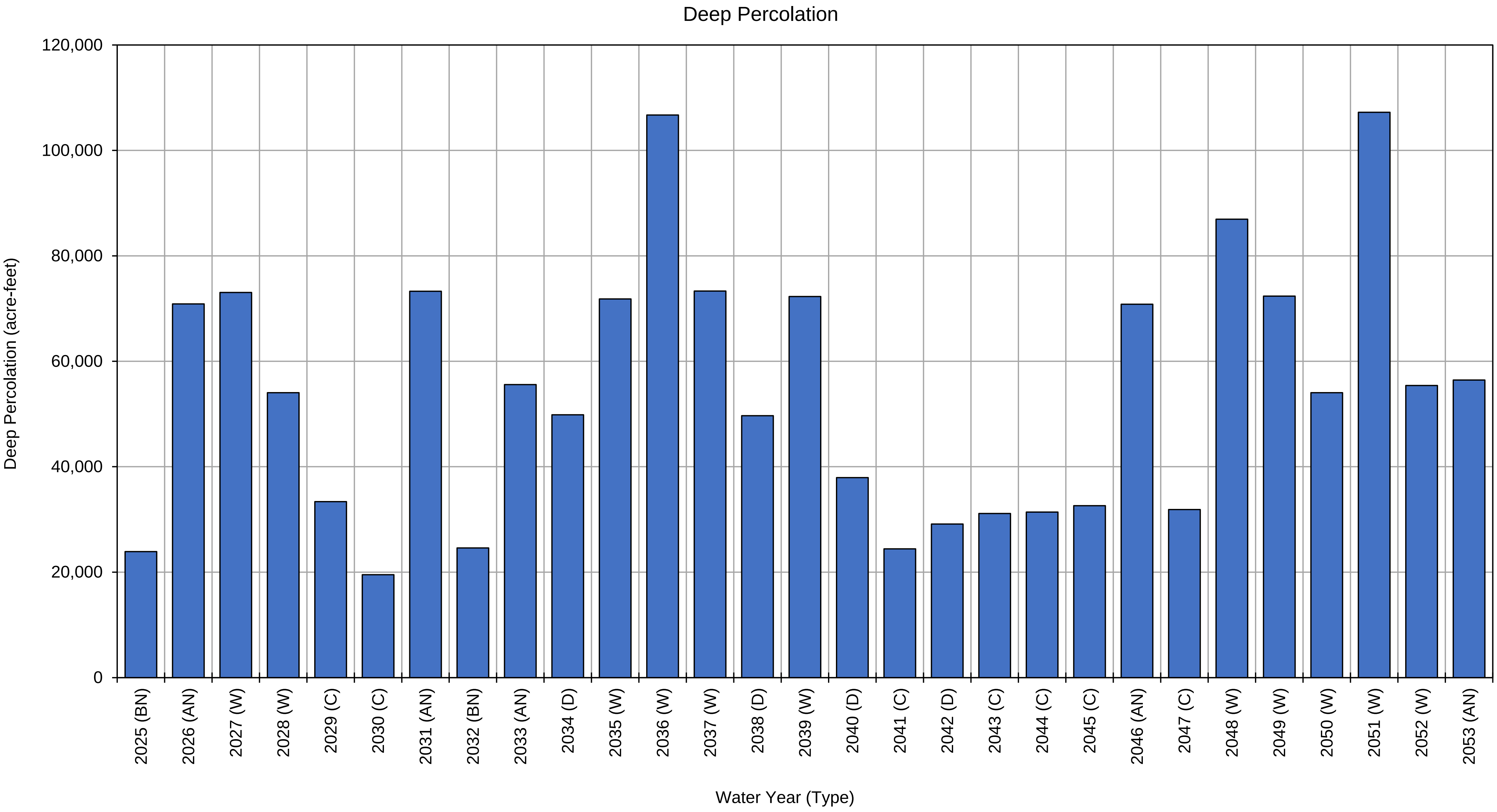
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	52,000
2023 (W)	47,000
2024 (W)	45,000
2025 (BN)	24,000
2026 (AN)	55,000
2027 (W)	55,000
2028 (W)	52,000
2029 (C)	37,000
2030 (C)	25,000
2031 (AN)	63,000
2032 (BN)	40,000
2033 (AN)	59,000
2034 (D)	52,000
2035 (W)	64,000
2036 (W)	59,000
2037 (W)	42,000
2038 (D)	41,000
2039 (W)	49,000
2040 (D)	36,000
2041 (C)	32,000
2042 (D)	38,000
2043 (C)	37,000
2044 (C)	39,000
2045 (C)	52,000
2046 (AN)	69,000
2047 (C)	37,000
2048 (W)	67,000
2049 (W)	56,000
2050 (W)	43,000
2051 (W)	63,000
2052 (W)	49,000
2053 (AN)	46,000
2054 (D)	37,000
2055 (D)	50,000
2056 (AN)	58,000
2057 (BN)	48,000
2058 (AN)	60,000
2059 (W)	55,000
2060 (D)	30,000
2061 (C)	42,000
2062 (D)	44,000
2063 (BN)	62,000
2064 (W)	64,000
2065 (BN)	40,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2066 (D)		41,000
2067 (C)		31,000
2068 (C)		45,000
2069 (BN)		60,000
2070 (W)		69,000
2071 (BN)		34,000
2072 (W)		64,000
Average (2022-2072)		48,000
2022-2072	W	55,000
	AN	59,000
	BN	44,000
	D	41,000
	C	38,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

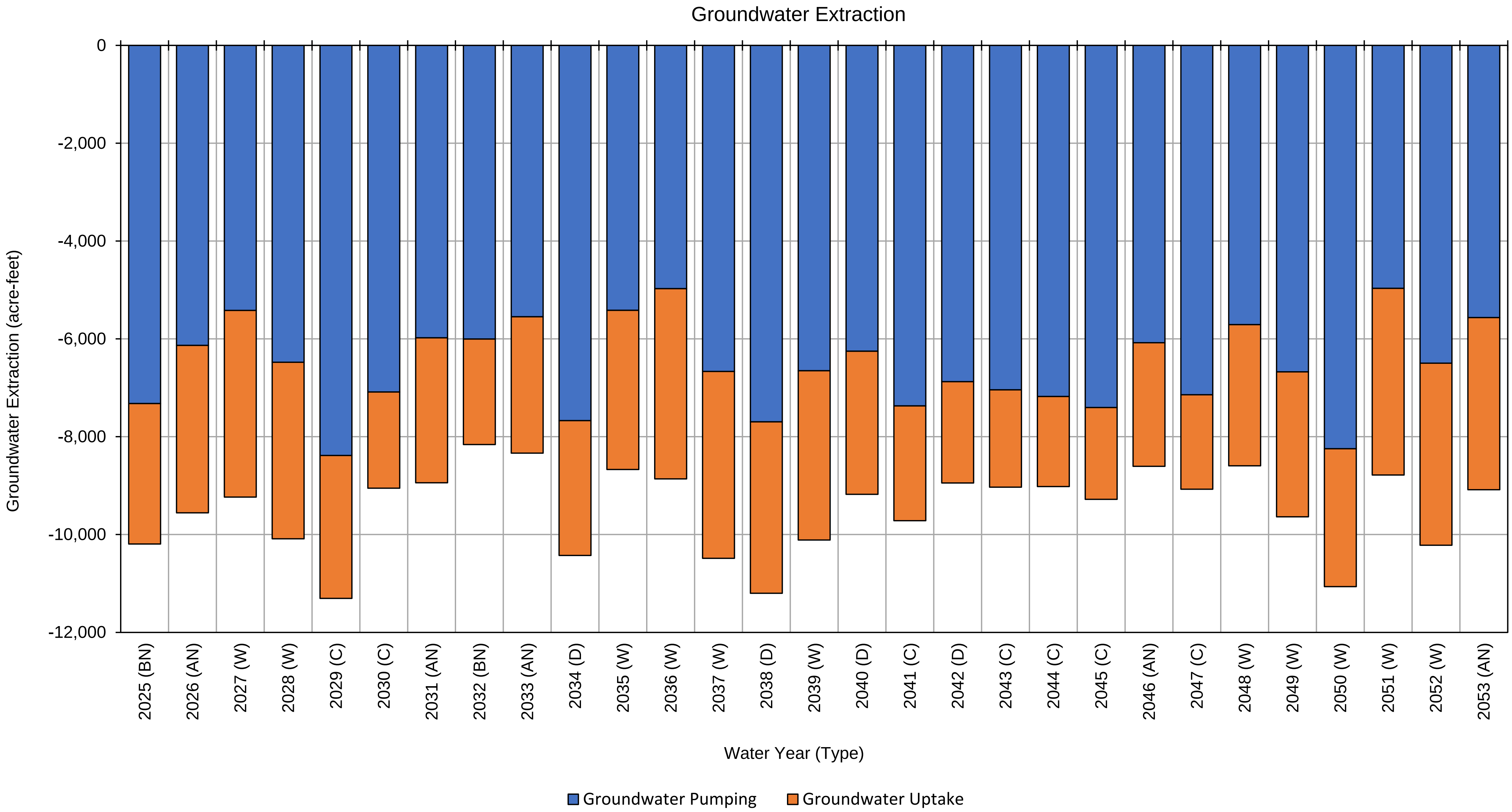
WY (Type)	Deep Percolation from the SWS
2022 (W)	73,000
2023 (W)	73,000
2024 (W)	73,000
2025 (BN)	24,000
2026 (AN)	71,000
2027 (W)	73,000
2028 (W)	54,000
2029 (C)	33,000
2030 (C)	20,000
2031 (AN)	73,000
2032 (BN)	25,000
2033 (AN)	56,000
2034 (D)	50,000
2035 (W)	72,000
2036 (W)	110,000
2037 (W)	73,000
2038 (D)	50,000
2039 (W)	72,000
2040 (D)	38,000
2041 (C)	24,000
2042 (D)	29,000
2043 (C)	31,000
2044 (C)	31,000
2045 (C)	33,000
2046 (AN)	71,000
2047 (C)	32,000
2048 (W)	87,000
2049 (W)	72,000
2050 (W)	54,000
2051 (W)	110,000
2052 (W)	55,000
2053 (AN)	56,000
2054 (D)	39,000
2055 (D)	48,000
2056 (AN)	68,000
2057 (BN)	61,000
2058 (AN)	63,000
2059 (W)	73,000
2060 (D)	29,000
2061 (C)	34,000
2062 (D)	27,000
2063 (BN)	55,000
2064 (W)	57,000
2065 (BN)	25,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2066 (D)		41,000
2067 (C)		20,000
2068 (C)		37,000
2069 (BN)		52,000
2070 (W)		78,000
2071 (BN)		24,000
2072 (W)		71,000
Average (2022-2072)		53,000
2022-2072	W	74,000
	AN	65,000
	BN	38,000
	D	39,000
	C	29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

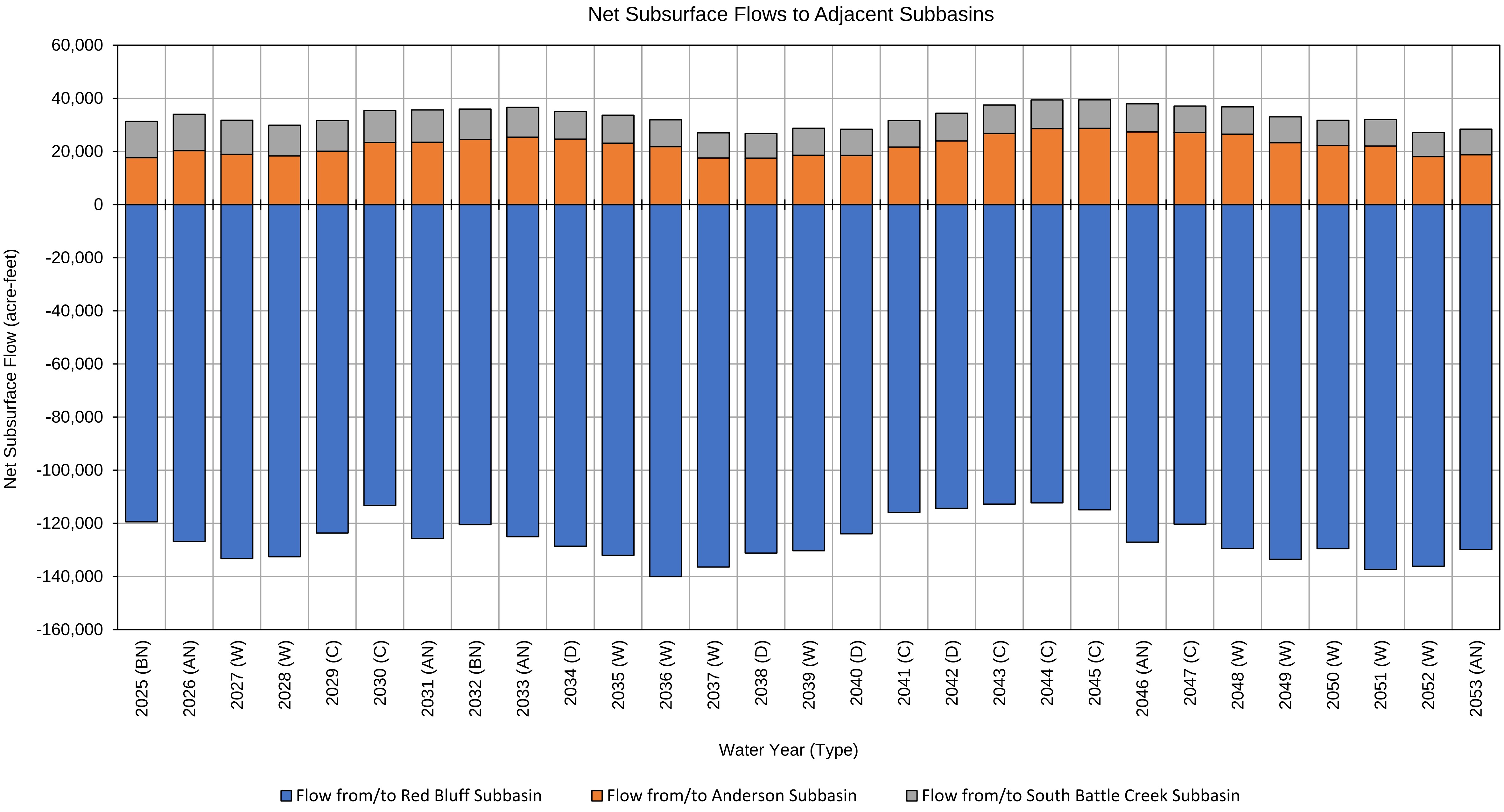
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-6,900	-3,900	-11,000
2023 (W)	-6,700	-3,800	-11,000
2024 (W)	-6,900	-4,000	-11,000
2025 (BN)	-7,300	-2,900	-10,000
2026 (AN)	-6,100	-3,400	-9,600
2027 (W)	-5,400	-3,800	-9,200
2028 (W)	-6,500	-3,600	-10,000
2029 (C)	-8,400	-2,900	-11,000
2030 (C)	-7,100	-2,000	-9,100
2031 (AN)	-6,000	-3,000	-8,900
2032 (BN)	-6,000	-2,200	-8,200
2033 (AN)	-5,500	-2,800	-8,300
2034 (D)	-7,700	-2,800	-10,000
2035 (W)	-5,400	-3,300	-8,700
2036 (W)	-5,000	-3,900	-8,900
2037 (W)	-6,700	-3,800	-10,000
2038 (D)	-7,700	-3,500	-11,000
2039 (W)	-6,700	-3,500	-10,000
2040 (D)	-6,300	-2,900	-9,200
2041 (C)	-7,400	-2,300	-9,700
2042 (D)	-6,900	-2,100	-8,900
2043 (C)	-7,000	-2,000	-9,000
2044 (C)	-7,200	-1,800	-9,000
2045 (C)	-7,400	-1,900	-9,300
2046 (AN)	-6,100	-2,500	-8,600
2047 (C)	-7,100	-1,900	-9,100
2048 (W)	-5,700	-2,900	-8,600
2049 (W)	-6,700	-3,000	-9,600
2050 (W)	-8,200	-2,800	-11,000
2051 (W)	-5,000	-3,800	-8,800
2052 (W)	-6,500	-3,700	-10,000
2053 (AN)	-5,600	-3,500	-9,100
2054 (D)	-6,300	-2,900	-9,200
2055 (D)	-7,700	-3,000	-11,000
2056 (AN)	-5,500	-3,000	-8,500
2057 (BN)	-6,900	-3,300	-10,000
2058 (AN)	-5,100	-3,100	-8,200
2059 (W)	-5,400	-3,600	-9,000
2060 (D)	-6,800	-2,600	-9,400
2061 (C)	-8,300	-2,600	-11,000
2062 (D)	-6,400	-2,100	-8,500
2063 (BN)	-5,600	-2,500	-8,000
2064 (W)	-5,200	-2,900	-8,100
2065 (BN)	-6,000	-2,100	-8,100

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2066 (D)		-8,400	-2,200	-11,000
2067 (C)		-7,500	-1,700	-9,200
2068 (C)		-9,200	-1,800	-11,000
2069 (BN)		-7,200	-2,100	-9,300
2070 (W)		-5,700	-2,700	-8,400
2071 (BN)		-7,300	-1,900	-9,200
2072 (W)		-6,500	-2,800	-9,300
Average (2022-2072)		-6,600	-2,800	-9,500
2022-2072	W	-6,200	-3,400	-9,600
	AN	-5,700	-3,100	-8,800
	BN	-6,600	-2,400	-9,000
	D	-7,100	-2,700	-9,800
	C	-7,700	-2,100	-9,800

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

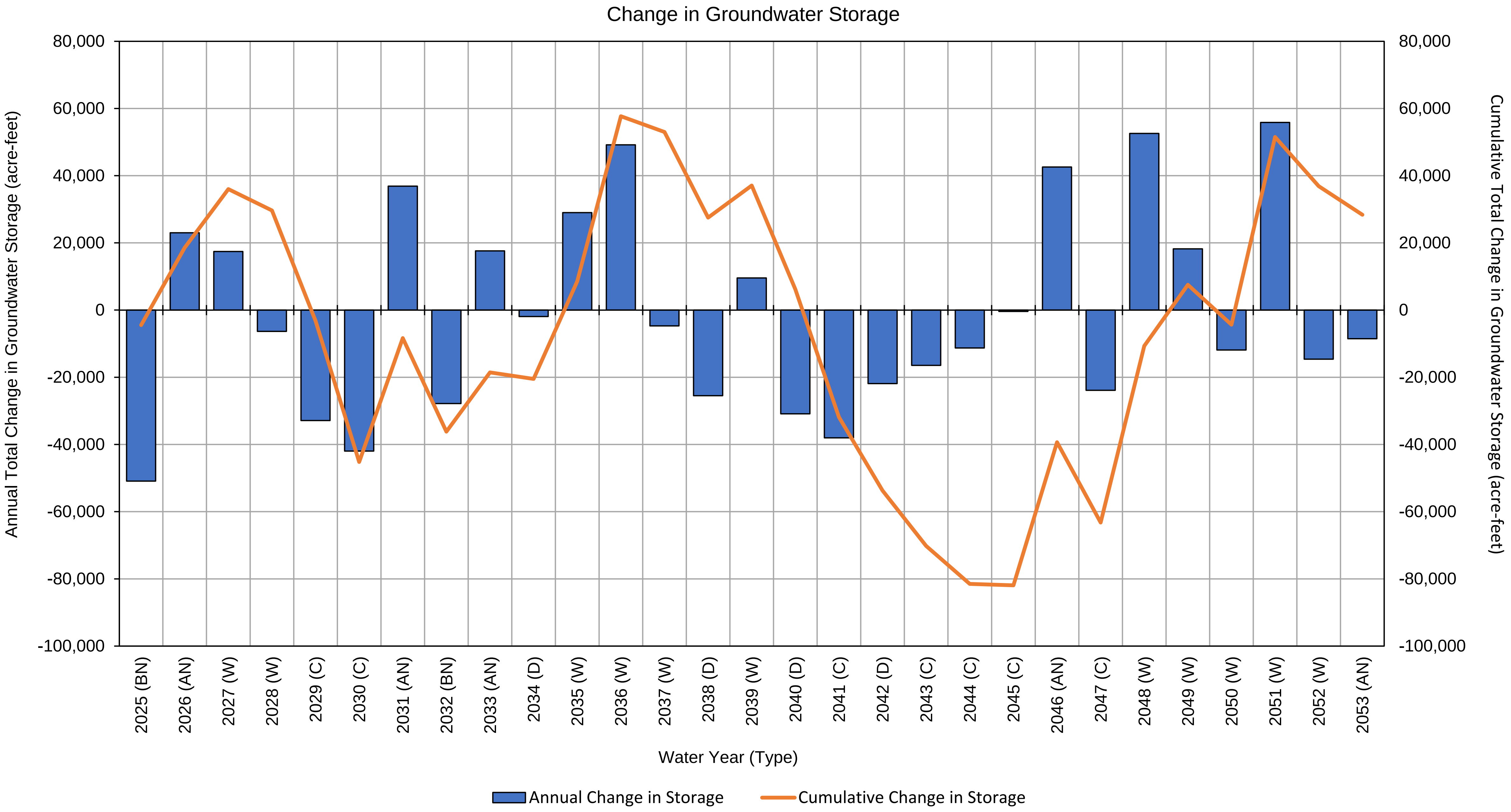
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-120,000	20,000	17,000	-87,000
2023 (W)	-130,000	18,000	16,000	-96,000
2024 (W)	-130,000	16,000	15,000	-100,000
2025 (BN)	-120,000	18,000	14,000	-88,000
2026 (AN)	-130,000	20,000	14,000	-93,000
2027 (W)	-130,000	19,000	13,000	-100,000
2028 (W)	-130,000	18,000	12,000	-100,000
2029 (C)	-120,000	20,000	12,000	-92,000
2030 (C)	-110,000	23,000	12,000	-78,000
2031 (AN)	-130,000	23,000	12,000	-90,000
2032 (BN)	-120,000	25,000	11,000	-85,000
2033 (AN)	-130,000	25,000	11,000	-88,000
2034 (D)	-130,000	25,000	10,000	-94,000
2035 (W)	-130,000	23,000	11,000	-98,000
2036 (W)	-140,000	22,000	10,000	-110,000
2037 (W)	-140,000	18,000	9,500	-110,000
2038 (D)	-130,000	17,000	9,300	-100,000
2039 (W)	-130,000	19,000	10,000	-100,000
2040 (D)	-120,000	19,000	9,800	-96,000
2041 (C)	-120,000	22,000	10,000	-84,000
2042 (D)	-110,000	24,000	10,000	-80,000
2043 (C)	-110,000	27,000	11,000	-75,000
2044 (C)	-110,000	29,000	11,000	-73,000
2045 (C)	-110,000	29,000	11,000	-76,000
2046 (AN)	-130,000	27,000	11,000	-89,000
2047 (C)	-120,000	27,000	10,000	-83,000
2048 (W)	-130,000	27,000	10,000	-93,000
2049 (W)	-130,000	23,000	9,700	-100,000
2050 (W)	-130,000	22,000	9,400	-98,000
2051 (W)	-140,000	22,000	9,900	-110,000
2052 (W)	-140,000	18,000	9,000	-110,000
2053 (AN)	-130,000	19,000	9,600	-100,000
2054 (D)	-120,000	20,000	9,800	-94,000
2055 (D)	-130,000	21,000	9,900	-95,000
2056 (AN)	-130,000	22,000	10,000	-98,000
2057 (BN)	-130,000	20,000	9,800	-100,000
2058 (AN)	-130,000	20,000	9,700	-100,000
2059 (W)	-130,000	19,000	9,700	-110,000
2060 (D)	-120,000	19,000	9,400	-93,000
2061 (C)	-120,000	23,000	10,000	-86,000
2062 (D)	-120,000	25,000	10,000	-81,000
2063 (BN)	-120,000	26,000	10,000	-87,000
2064 (W)	-130,000	25,000	10,000	-95,000
2065 (BN)	-120,000	25,000	9,900	-86,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2066 (D)		-120,000	27,000	10,000	-83,000
2067 (C)		-110,000	28,000	11,000	-72,000
2068 (C)		-120,000	30,000	11,000	-75,000
2069 (BN)		-120,000	30,000	11,000	-81,000
2070 (W)		-130,000	27,000	11,000	-95,000
2071 (BN)		-120,000	26,000	10,000	-84,000
2072 (W)		-130,000	26,000	11,000	-91,000
Average (2022-2072)		-130,000	23,000	11,000	-92,000
2022-2072	W	-130,000	21,000	11,000	-100,000
	AN	-130,000	22,000	11,000	-94,000
	BN	-120,000	24,000	11,000	-87,000
	D	-120,000	22,000	9,900	-91,000
	C	-120,000	26,000	11,000	-79,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	27,000	27,000
2023 (W)	13,000	40,000
2024 (W)	6,100	46,000
2025 (BN)	-51,000	-4,500
2026 (AN)	23,000	19,000
2027 (W)	17,000	36,000
2028 (W)	-6,300	30,000
2029 (C)	-33,000	-3,200
2030 (C)	-42,000	-45,000
2031 (AN)	37,000	-8,300
2032 (BN)	-28,000	-36,000
2033 (AN)	18,000	-19,000
2034 (D)	-1,900	-20,000
2035 (W)	29,000	8,500
2036 (W)	49,000	58,000
2037 (W)	-4,700	53,000
2038 (D)	-25,000	28,000
2039 (W)	9,600	37,000
2040 (D)	-31,000	6,200
2041 (C)	-38,000	-32,000
2042 (D)	-22,000	-54,000
2043 (C)	-16,000	-70,000
2044 (C)	-11,000	-81,000
2045 (C)	-420	-82,000
2046 (AN)	43,000	-39,000
2047 (C)	-24,000	-63,000
2048 (W)	53,000	-11,000
2049 (W)	18,000	7,500
2050 (W)	-12,000	-4,400
2051 (W)	56,000	51,000
2052 (W)	-15,000	37,000
2053 (AN)	-8,500	28,000
2054 (D)	-27,000	1,100
2055 (D)	-8,000	-6,900
2056 (AN)	20,000	13,000
2057 (BN)	-2,000	11,000
2058 (AN)	13,000	24,000
2059 (W)	13,000	37,000
2060 (D)	-44,000	-6,600
2061 (C)	-21,000	-27,000
2062 (D)	-19,000	-46,000
2063 (BN)	21,000	-25,000
2064 (W)	18,000	-6,400
2065 (BN)	-29,000	-36,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-12,000	-48,000
2067 (C)		-30,000	-78,000
2068 (C)		-4,600	-83,000
2069 (BN)		22,000	-61,000
2070 (W)		43,000	-18,000
2071 (BN)		-35,000	-52,000
2072 (W)		35,000	-17,000
Average (2022-2072)		-340	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-7

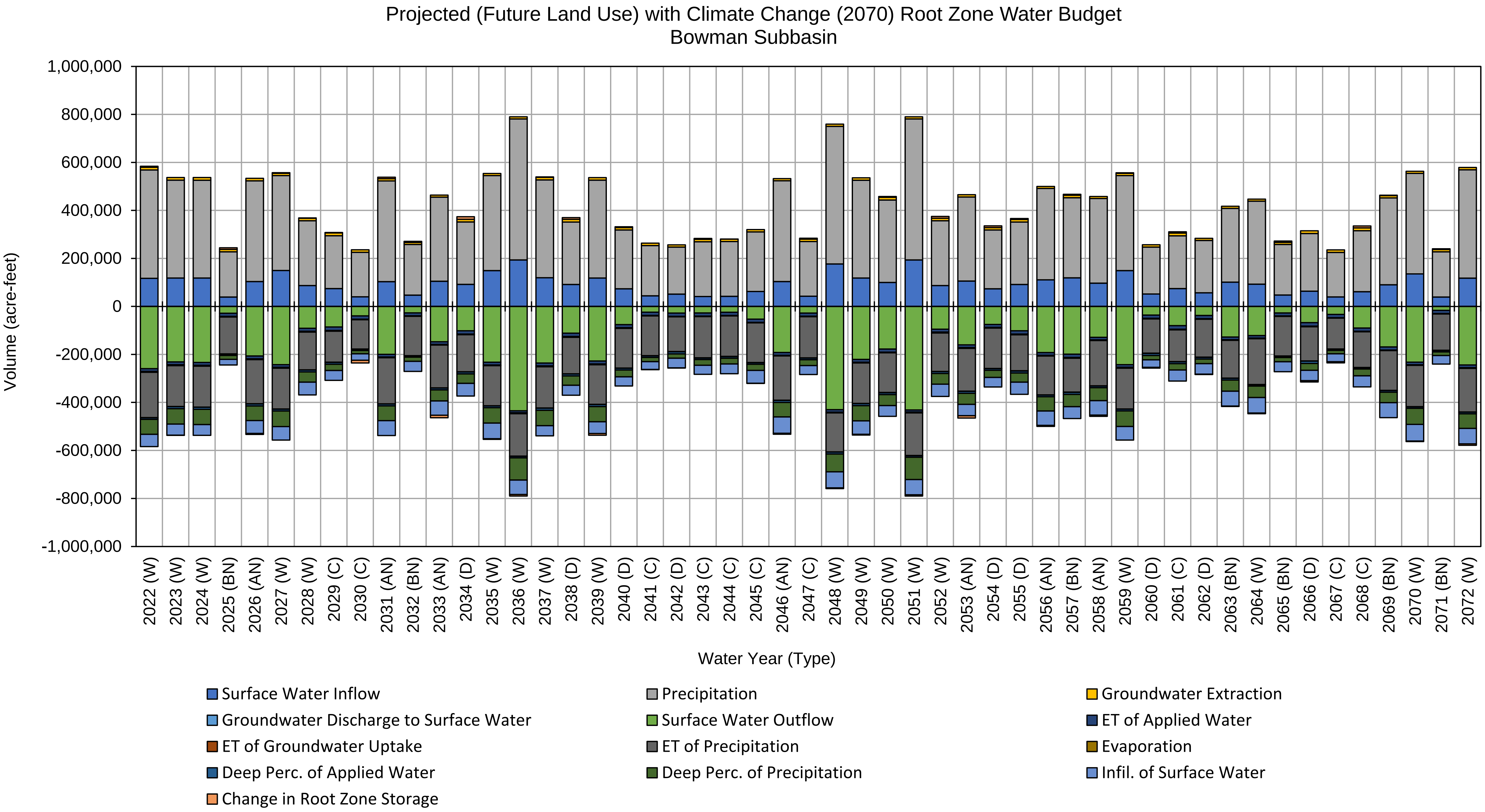
Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results

APPENDIX B-7a

Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results – Surface Water System



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

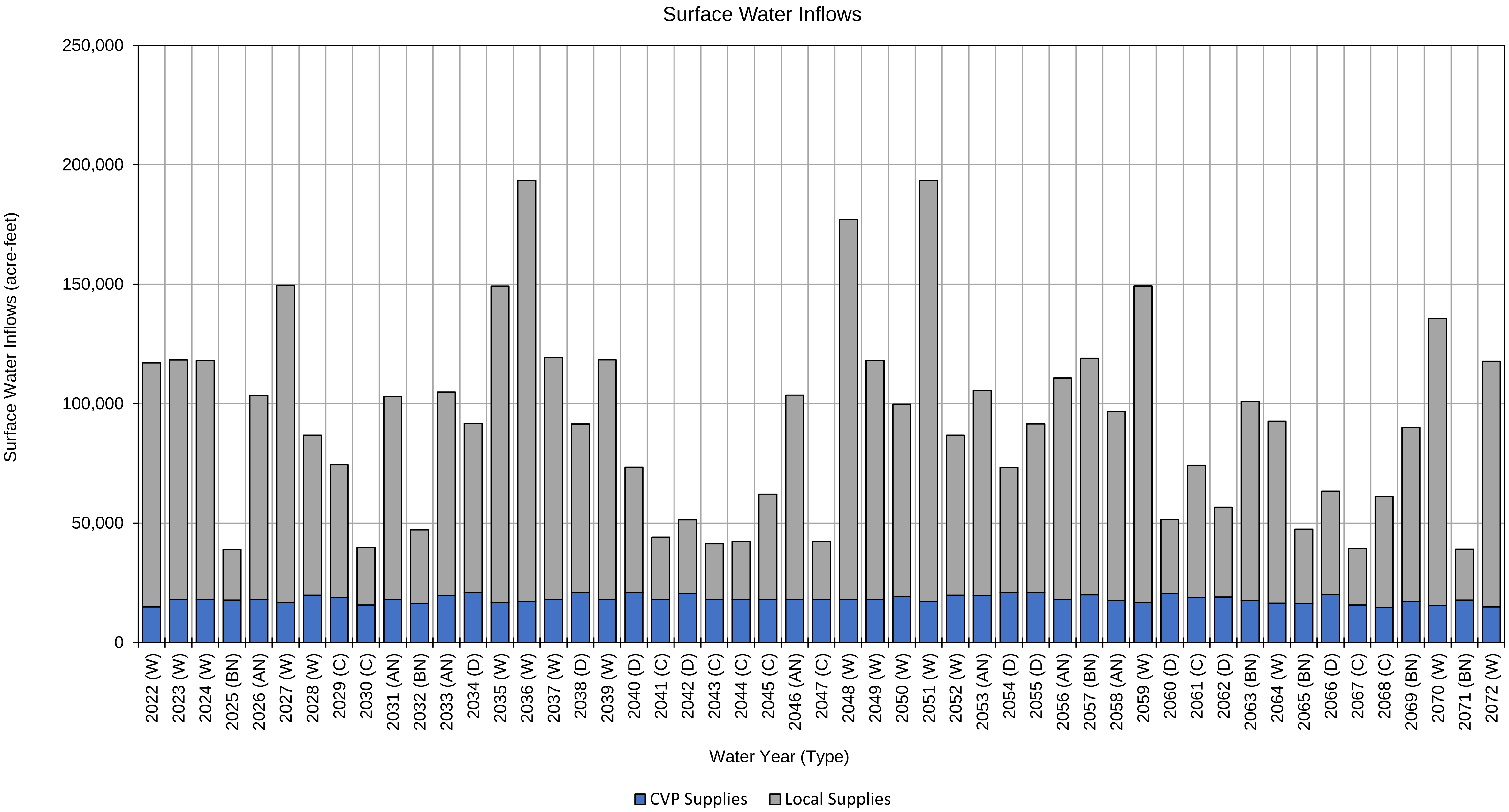
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	120,000	450,000	11,000	0	260,000	11,000	3,900	190,000	800	6,200	62,000	51,000	-4,200
2023 (W)	120,000	410,000	11,000	0	230,000	12,000	3,900	170,000	870	8,400	64,000	47,000	190
2024 (W)	120,000	410,000	11,000	0	230,000	12,000	3,900	170,000	870	8,300	64,000	44,000	0
2025 (BN)	39,000	190,000	10,000	0	29,000	13,000	2,800	150,000	840	5,500	16,000	24,000	-6,400
2026 (AN)	100,000	420,000	10,000	0	210,000	12,000	3,500	180,000	930	8,400	61,000	54,000	4,200
2027 (W)	150,000	400,000	9,400	0	240,000	11,000	3,800	170,000	830	7,200	65,000	56,000	-2,400
2028 (W)	87,000	270,000	10,000	0	91,000	12,000	3,500	160,000	990	7,600	43,000	53,000	-1,300
2029 (C)	74,000	220,000	12,000	0	86,000	15,000	3,000	130,000	1,000	7,500	26,000	41,000	-1,700
2030 (C)	40,000	190,000	10,000	0	39,000	14,000	2,000	120,000	870	5,100	14,000	27,000	12,000
2031 (AN)	100,000	420,000	9,100	0	200,000	11,000	2,900	190,000	930	7,500	62,000	62,000	-6,300
2032 (BN)	47,000	210,000	8,500	0	27,000	12,000	2,200	160,000	870	4,900	18,000	42,000	-4,500
2033 (AN)	100,000	350,000	8,600	0	150,000	11,000	2,700	180,000	910	7,500	46,000	60,000	10,000
2034 (D)	92,000	260,000	11,000	0	100,000	14,000	2,700	150,000	990	7,900	40,000	53,000	-11,000
2035 (W)	150,000	400,000	8,900	0	230,000	11,000	3,300	170,000	830	7,100	64,000	65,000	2,500
2036 (W)	190,000	590,000	9,100	0	430,000	8,300	3,800	180,000	700	6,400	93,000	60,000	6,300
2037 (W)	120,000	410,000	11,000	0	240,000	12,000	3,800	170,000	880	8,800	64,000	43,000	-1,600
2038 (D)	92,000	260,000	11,000	0	110,000	14,000	3,400	150,000	1,000	8,000	39,000	42,000	-7,100
2039 (W)	120,000	410,000	11,000	0	230,000	12,000	3,400	170,000	870	8,600	63,000	49,000	7,100
2040 (D)	73,000	250,000	9,700	0	76,000	12,000	2,800	170,000	950	7,000	29,000	38,000	-3,400
2041 (C)	44,000	210,000	10,000	0	24,000	13,000	2,200	170,000	990	6,000	18,000	32,000	1,200
2042 (D)	51,000	200,000	9,300	0	28,000	13,000	2,000	140,000	990	8,800	18,000	40,000	110
2043 (C)	41,000	230,000	9,700	0	27,000	13,000	1,900	170,000	890	6,100	24,000	38,000	-3,800
2044 (C)	42,000	230,000	9,900	0	24,000	13,000	1,800	170,000	890	6,700	24,000	40,000	-9
2045 (C)	62,000	250,000	9,700	0	53,000	14,000	1,900	170,000	900	6,200	25,000	53,000	85
2046 (AN)	100,000	420,000	9,100	0	190,000	12,000	2,500	180,000	930	8,300	60,000	68,000	3,600
2047 (C)	42,000	230,000	9,900	0	28,000	13,000	1,900	170,000	890	6,600	24,000	37,000	-3,600
2048 (W)	180,000	570,000	8,900	0	430,000	11,000	2,800	160,000	820	8,000	74,000	67,000	3,000
2049 (W)	120,000	410,000	10,000	0	220,000	12,000	2,900	170,000	860	8,500	63,000	56,000	2,800
2050 (W)	100,000	340,000	12,000	0	180,000	13,000	2,700	170,000	970	7,900	45,000	45,000	-3,300
2051 (W)	190,000	590,000	9,000	0	430,000	8,400	3,700	180,000	700	6,500	93,000	64,000	5,100
2052 (W)	87,000	270,000	10,000	0	95,000	12,000	3,600	160,000	990	7,500	44,000	51,000	-7,500
2053 (AN)	110,000	350,000	9,300	0	160,000	11,000	3,400	180,000	930	7,800	46,000	47,000	9,600
2054 (D)	73,000	250,000	9,900	0	75,000	12,000	2,800	170,000	940	6,900	30,000	40,000	-7,200
2055 (D)	92,000	260,000	11,000	0	100,000	14,000	2,800	150,000	1,000	8,100	38,000	51,000	-3,700
2056 (AN)	110,000	380,000	8,700	0	190,000	11,000	3,000	160,000	870	6,600	60,000	60,000	4,000
2057 (BN)	120,000	330,000	11,000	0	200,000	14,000	3,300	140,000	1,000	8,500	51,000	49,000	-3,800
2058 (AN)	97,000	350,000	8,600	0	130,000	10,000	3,100	190,000	850	6,800	54,000	60,000	4,900
2059 (W)	150,000	400,000	9,200	0	240,000	11,000	3,600	170,000	830	7,100	65,000	56,000	-2,700
2060 (D)	51,000	200,000	9,700	0	36,000	13,000	2,500	140,000	1,000	8,700	18,000	32,000	2,600
2061 (C)	74,000	220,000	11,000	0	80,000	15,000	2,600	130,000	1,000	7,400	26,000	46,000	-5,600
2062 (D)	57,000	220,000	8,900	0	38,000	13,000	2,100	160,000	1,000	6,700	19,000	44,000	1,700
2063 (BN)	100,000	310,000	8,600	0	130,000	11,000	2,500	160,000	910	7,000	47,000	62,000	1,900
2064 (W)	93,000	350,000	8,300	0	120,000	10,000	2,800	190,000	840	5,600	47,000	65,000	2,600
2065 (BN)	47,000	210,000	8,500	0	28,000	12,000	2,100	170,000	870	5,100	18,000	42,000	-5,400

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		63,000	240,000	11,000	0	68,000	15,000	2,200	140,000	1,000	9,800	28,000	43,000	5,800
2067 (C)		39,000	190,000	10,000	0	33,000	14,000	1,700	130,000	860	4,900	14,000	33,000	4,900
2068 (C)		61,000	250,000	12,000	0	90,000	14,000	1,800	150,000	790	5,400	29,000	46,000	-7,900
2069 (BN)		90,000	360,000	9,900	0	170,000	13,000	2,100	170,000	860	6,600	44,000	62,000	-1,600
2070 (W)		140,000	420,000	9,000	0	230,000	11,000	2,600	170,000	800	5,700	67,000	70,000	2,200
2071 (BN)		39,000	190,000	9,600	0	17,000	13,000	1,800	150,000	830	5,700	15,000	35,000	-3,100
2072 (W)		120,000	450,000	9,700	0	240,000	11,000	2,700	180,000	800	6,500	61,000	64,000	6,200
Average (2022-2072)		92,000	320,000	9,900	0	140,000	12,000	2,800	160,000	900	7,100	44,000	49,000	-84
2022-2072	W	130,000	420,000	9,900	0	240,000	11,000	3,400	170,000	850	7,300	63,000	56,000	830
	AN	100,000	380,000	9,100	0	180,000	11,000	3,000	180,000	910	7,500	56,000	59,000	4,400
	BN	69,000	260,000	9,500	0	85,000	13,000	2,400	160,000	890	6,200	30,000	45,000	-3,300
	D	72,000	240,000	10,000	0	71,000	13,000	2,600	150,000	990	8,000	29,000	42,000	-2,400
	C	52,000	220,000	10,000	0	49,000	14,000	2,100	150,000	920	6,200	22,000	39,000	-480

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

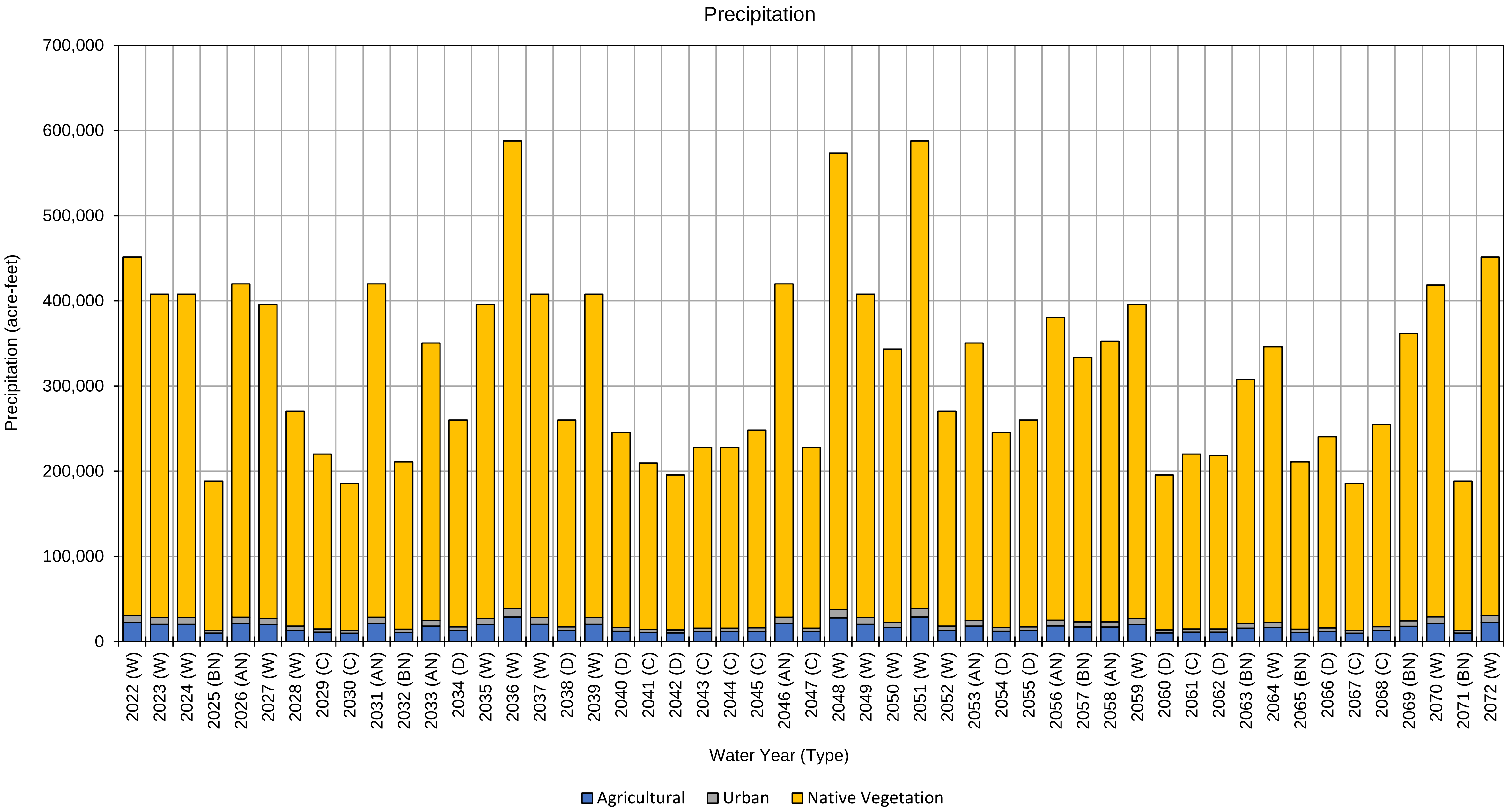
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	15,000	100,000	120,000
2023 (W)	18,000	100,000	120,000
2024 (W)	18,000	100,000	120,000
2025 (BN)	18,000	21,000	39,000
2026 (AN)	18,000	86,000	100,000
2027 (W)	17,000	130,000	150,000
2028 (W)	20,000	67,000	87,000
2029 (C)	19,000	56,000	75,000
2030 (C)	16,000	24,000	40,000
2031 (AN)	18,000	85,000	100,000
2032 (BN)	16,000	31,000	47,000
2033 (AN)	20,000	85,000	110,000
2034 (D)	21,000	71,000	92,000
2035 (W)	17,000	130,000	150,000
2036 (W)	17,000	180,000	200,000
2037 (W)	18,000	100,000	120,000
2038 (D)	21,000	71,000	92,000
2039 (W)	18,000	100,000	120,000
2040 (D)	21,000	52,000	73,000
2041 (C)	18,000	26,000	44,000
2042 (D)	21,000	31,000	52,000
2043 (C)	18,000	23,000	41,000
2044 (C)	18,000	24,000	42,000
2045 (C)	18,000	44,000	62,000
2046 (AN)	18,000	86,000	100,000
2047 (C)	18,000	24,000	42,000
2048 (W)	18,000	160,000	180,000
2049 (W)	18,000	100,000	120,000
2050 (W)	19,000	80,000	99,000
2051 (W)	17,000	180,000	200,000
2052 (W)	20,000	67,000	87,000
2053 (AN)	20,000	86,000	110,000
2054 (D)	21,000	52,000	73,000
2055 (D)	21,000	71,000	92,000
2056 (AN)	18,000	93,000	110,000
2057 (BN)	20,000	99,000	120,000
2058 (AN)	18,000	79,000	97,000
2059 (W)	17,000	130,000	150,000
2060 (D)	21,000	31,000	52,000
2061 (C)	19,000	55,000	74,000
2062 (D)	19,000	38,000	57,000
2063 (BN)	18,000	83,000	100,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		16,000	76,000	92,000
2065 (BN)		16,000	31,000	47,000
2066 (D)		20,000	43,000	63,000
2067 (C)		16,000	24,000	40,000
2068 (C)		15,000	46,000	61,000
2069 (BN)		17,000	73,000	90,000
2070 (W)		16,000	120,000	140,000
2071 (BN)		18,000	21,000	39,000
2072 (W)		15,000	100,000	120,000
Average (2022-2072)		18,000	74,000	92,000
2022-2072	W	17,000	110,000	130,000
	AN	18,000	86,000	100,000
	BN	18,000	51,000	69,000
	D	21,000	51,000	72,000
	C	17,000	35,000	52,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

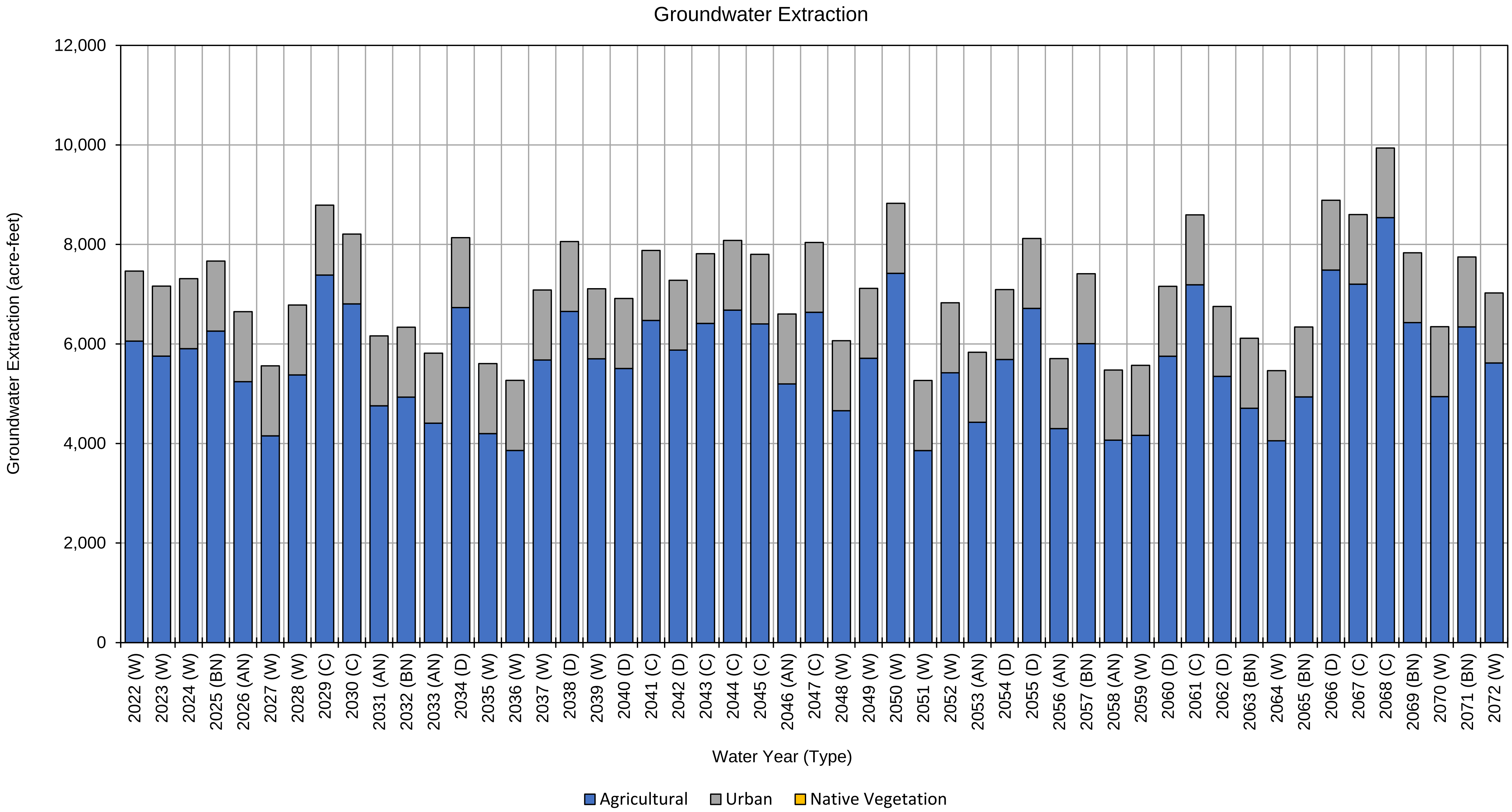
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	22,000	8,100	420,000	450,000
2023 (W)	20,000	7,400	380,000	410,000
2024 (W)	20,000	7,400	380,000	410,000
2025 (BN)	9,800	3,500	180,000	190,000
2026 (AN)	21,000	7,500	390,000	420,000
2027 (W)	20,000	7,000	370,000	400,000
2028 (W)	13,000	4,800	250,000	270,000
2029 (C)	11,000	3,900	210,000	220,000
2030 (C)	9,800	3,500	170,000	180,000
2031 (AN)	21,000	7,500	390,000	420,000
2032 (BN)	11,000	3,800	200,000	210,000
2033 (AN)	18,000	6,500	330,000	350,000
2034 (D)	13,000	4,600	240,000	260,000
2035 (W)	20,000	7,000	370,000	400,000
2036 (W)	29,000	10,000	550,000	590,000
2037 (W)	20,000	7,400	380,000	410,000
2038 (D)	13,000	4,600	240,000	260,000
2039 (W)	20,000	7,400	380,000	410,000
2040 (D)	12,000	4,400	230,000	250,000
2041 (C)	11,000	3,800	200,000	210,000
2042 (D)	10,000	3,600	180,000	190,000
2043 (C)	12,000	4,200	210,000	230,000
2044 (C)	12,000	4,200	210,000	230,000
2045 (C)	12,000	4,300	230,000	250,000
2046 (AN)	21,000	7,500	390,000	420,000
2047 (C)	12,000	4,200	210,000	230,000
2048 (W)	28,000	10,000	540,000	580,000
2049 (W)	20,000	7,400	380,000	410,000
2050 (W)	17,000	6,100	320,000	340,000
2051 (W)	29,000	10,000	550,000	590,000
2052 (W)	13,000	4,800	250,000	270,000
2053 (AN)	18,000	6,500	330,000	350,000
2054 (D)	12,000	4,400	230,000	250,000
2055 (D)	13,000	4,600	240,000	260,000
2056 (AN)	18,000	6,700	360,000	380,000
2057 (BN)	17,000	6,000	310,000	330,000
2058 (AN)	17,000	6,100	330,000	350,000
2059 (W)	20,000	7,000	370,000	400,000
2060 (D)	10,000	3,600	180,000	190,000
2061 (C)	11,000	3,900	210,000	220,000
2062 (D)	11,000	3,900	200,000	210,000
2063 (BN)	16,000	5,500	290,000	310,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		17,000	6,000	320,000	340,000
2065 (BN)		11,000	3,800	200,000	210,000
2066 (D)		12,000	4,300	220,000	240,000
2067 (C)		9,800	3,500	170,000	180,000
2068 (C)		13,000	4,600	240,000	260,000
2069 (BN)		18,000	6,500	340,000	360,000
2070 (W)		21,000	7,600	390,000	420,000
2071 (BN)		9,800	3,500	180,000	190,000
2072 (W)		22,000	8,100	420,000	450,000
Average (2022-2072)		16,000	5,700	300,000	320,000
2022-2072	W	21,000	7,500	390,000	420,000
	AN	19,000	6,900	360,000	390,000
	BN	13,000	4,700	240,000	260,000
	D	12,000	4,200	220,000	240,000
	C	11,000	4,000	210,000	230,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

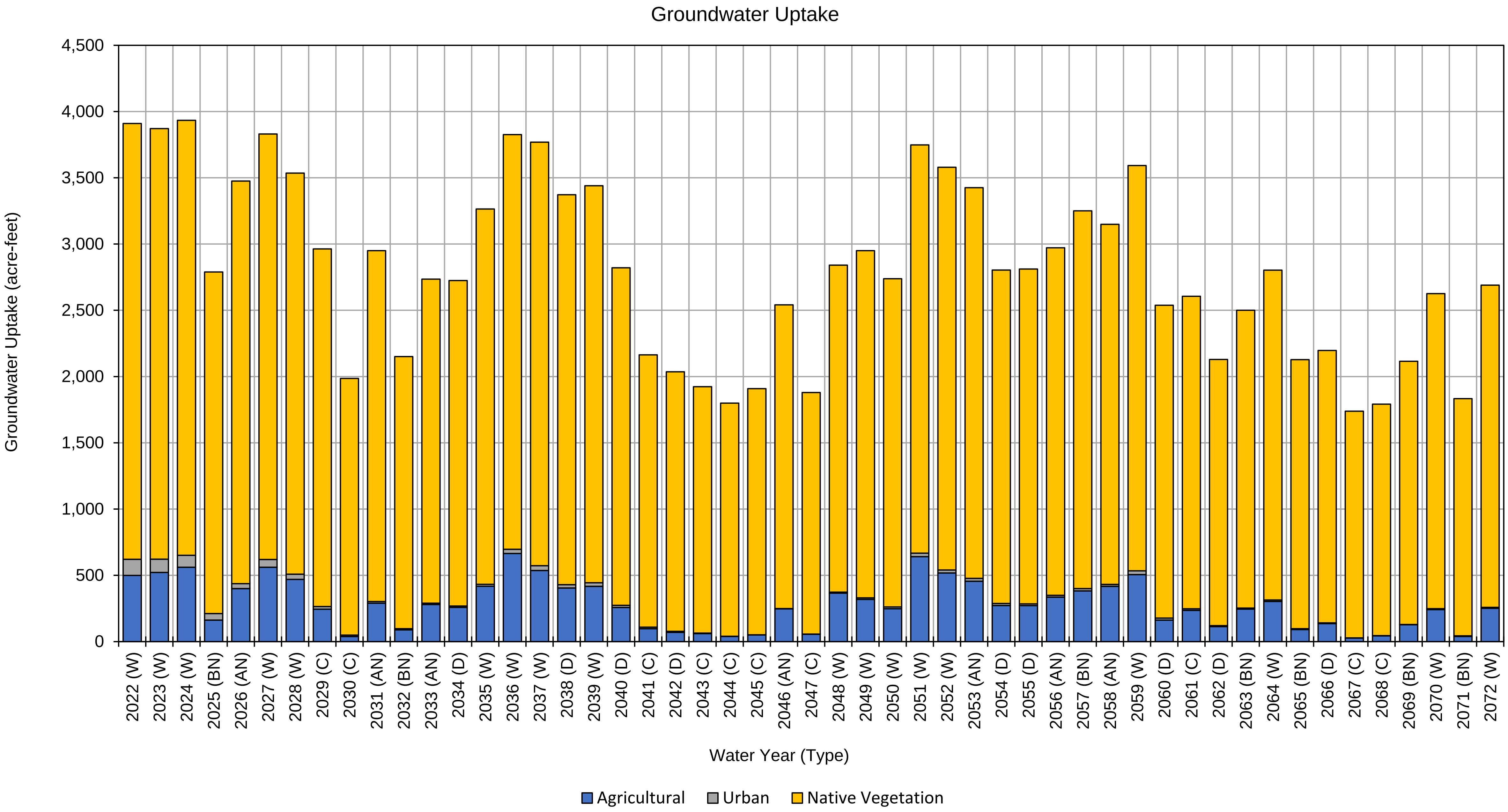
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	6,100	1,400	0	7,500
2023 (W)	5,800	1,400	0	7,200
2024 (W)	5,900	1,400	0	7,300
2025 (BN)	6,300	1,400	0	7,700
2026 (AN)	5,200	1,400	0	6,600
2027 (W)	4,200	1,400	0	5,600
2028 (W)	5,400	1,400	0	6,800
2029 (C)	7,400	1,400	0	8,800
2030 (C)	6,800	1,400	0	8,200
2031 (AN)	4,800	1,400	0	6,200
2032 (BN)	4,900	1,400	0	6,300
2033 (AN)	4,400	1,400	0	5,800
2034 (D)	6,700	1,400	0	8,100
2035 (W)	4,200	1,400	0	5,600
2036 (W)	3,900	1,400	0	5,300
2037 (W)	5,700	1,400	0	7,100
2038 (D)	6,700	1,400	0	8,100
2039 (W)	5,700	1,400	0	7,100
2040 (D)	5,500	1,400	0	6,900
2041 (C)	6,500	1,400	0	7,900
2042 (D)	5,900	1,400	0	7,300
2043 (C)	6,400	1,400	0	7,800
2044 (C)	6,700	1,400	0	8,100
2045 (C)	6,400	1,400	0	7,800
2046 (AN)	5,200	1,400	0	6,600
2047 (C)	6,600	1,400	0	8,000
2048 (W)	4,700	1,400	0	6,100
2049 (W)	5,700	1,400	0	7,100
2050 (W)	7,400	1,400	0	8,800
2051 (W)	3,900	1,400	0	5,300
2052 (W)	5,400	1,400	0	6,800
2053 (AN)	4,400	1,400	0	5,800
2054 (D)	5,700	1,400	0	7,100
2055 (D)	6,700	1,400	0	8,100
2056 (AN)	4,300	1,400	0	5,700
2057 (BN)	6,000	1,400	0	7,400
2058 (AN)	4,100	1,400	0	5,500
2059 (W)	4,200	1,400	0	5,600
2060 (D)	5,800	1,400	0	7,200
2061 (C)	7,200	1,400	0	8,600
2062 (D)	5,300	1,400	0	6,700
2063 (BN)	4,700	1,400	0	6,100

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		4,100	1,400	0	5,500
2065 (BN)		4,900	1,400	0	6,300
2066 (D)		7,500	1,400	0	8,900
2067 (C)		7,200	1,400	0	8,600
2068 (C)		8,500	1,400	0	9,900
2069 (BN)		6,400	1,400	0	7,800
2070 (W)		4,900	1,400	0	6,300
2071 (BN)		6,300	1,400	0	7,700
2072 (W)		5,600	1,400	0	7,000
Average (2022-2072)		5,700	1,400	0	7,100
2022-2072	W	5,100	1,400	0	6,500
	AN	4,600	1,400	0	6,000
	BN	5,700	1,400	0	7,100
	D	6,200	1,400	0	7,600
	C	7,000	1,400	0	8,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

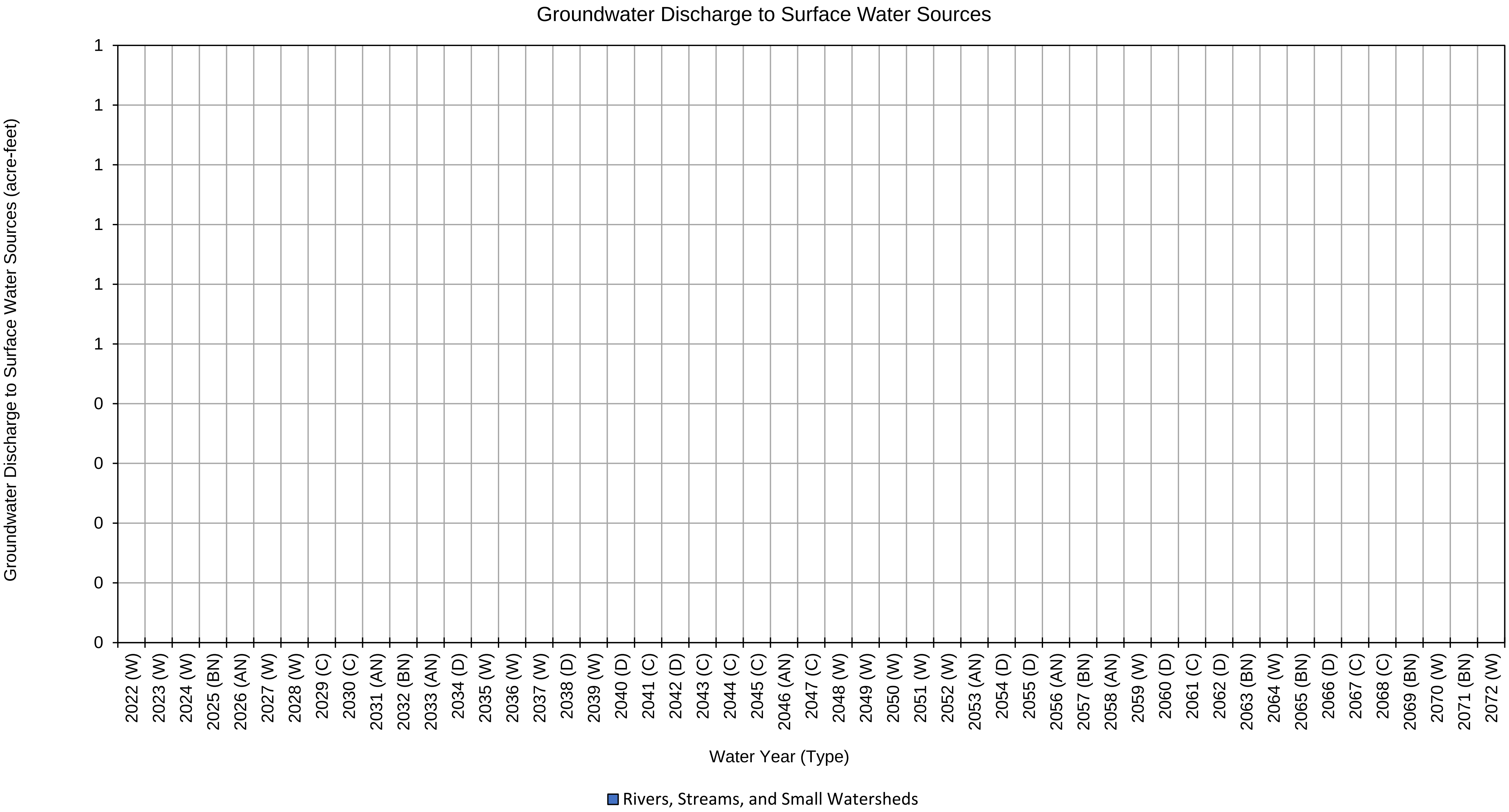
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	500	120	3,300	3,900
2023 (W)	520	100	3,200	3,800
2024 (W)	560	91	3,300	4,000
2025 (BN)	160	49	2,600	2,800
2026 (AN)	400	37	3,000	3,400
2027 (W)	560	58	3,200	3,800
2028 (W)	470	40	3,000	3,500
2029 (C)	240	20	2,700	3,000
2030 (C)	37	11	1,900	1,900
2031 (AN)	290	12	2,600	2,900
2032 (BN)	88	9	2,100	2,200
2033 (AN)	280	10	2,400	2,700
2034 (D)	260	10	2,500	2,800
2035 (W)	420	15	2,800	3,200
2036 (W)	660	31	3,100	3,800
2037 (W)	540	37	3,200	3,800
2038 (D)	400	25	2,900	3,300
2039 (W)	420	27	3,000	3,400
2040 (D)	260	16	2,500	2,800
2041 (C)	97	12	2,100	2,200
2042 (D)	70	8	2,000	2,100
2043 (C)	60	4	1,900	2,000
2044 (C)	39	1	1,800	1,800
2045 (C)	50	0	1,900	2,000
2046 (AN)	250	3	2,300	2,600
2047 (C)	55	1	1,800	1,900
2048 (W)	370	8	2,500	2,900
2049 (W)	320	11	2,600	2,900
2050 (W)	250	13	2,500	2,800
2051 (W)	640	26	3,100	3,800
2052 (W)	520	22	3,000	3,500
2053 (AN)	450	22	2,900	3,400
2054 (D)	270	16	2,500	2,800
2055 (D)	270	13	2,500	2,800
2056 (AN)	340	14	2,600	3,000
2057 (BN)	380	17	2,900	3,300
2058 (AN)	420	15	2,700	3,100
2059 (W)	510	29	3,100	3,600
2060 (D)	160	15	2,400	2,600
2061 (C)	240	12	2,400	2,700
2062 (D)	110	7	2,000	2,100
2063 (BN)	250	7	2,200	2,500

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		300	10	2,500	2,800
2065 (BN)		90	7	2,000	2,100
2066 (D)		140	6	2,100	2,200
2067 (C)		27	1	1,700	1,700
2068 (C)		43	1	1,700	1,700
2069 (BN)		130	1	2,000	2,100
2070 (W)		240	7	2,400	2,600
2071 (BN)		39	4	1,800	1,800
2072 (W)		250	8	2,400	2,700
Average (2022-2072)		280	20	2,500	2,800
2022-2072	W	450	36	2,900	3,400
	AN	350	16	2,700	3,100
	BN	160	14	2,200	2,400
	D	220	13	2,400	2,600
	C	89	6	2,000	2,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

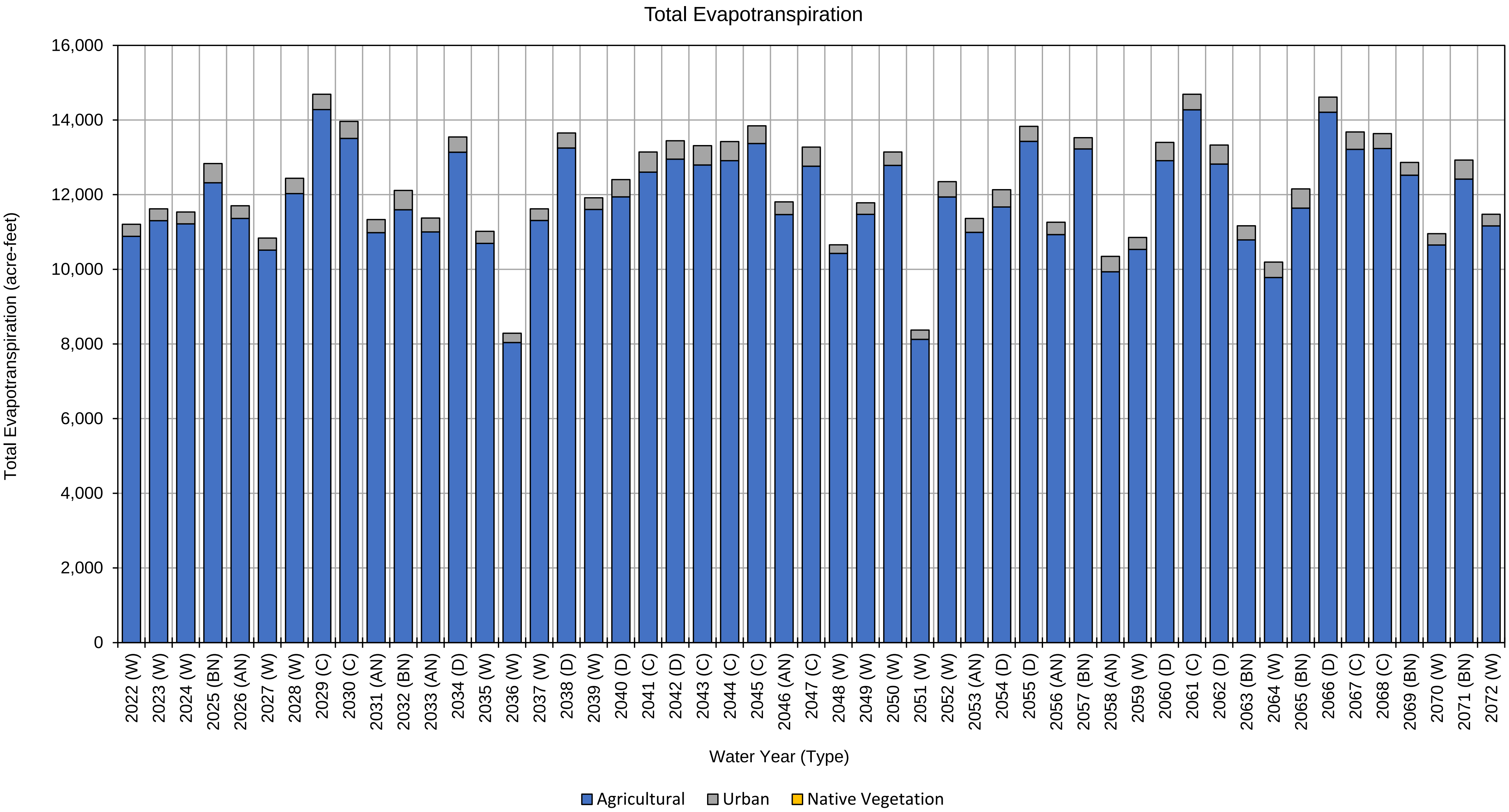
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	0
2023 (W)	0
2024 (W)	0
2025 (BN)	0
2026 (AN)	0
2027 (W)	0
2028 (W)	0
2029 (C)	0
2030 (C)	0
2031 (AN)	0
2032 (BN)	0
2033 (AN)	0
2034 (D)	0
2035 (W)	0
2036 (W)	0
2037 (W)	0
2038 (D)	0
2039 (W)	0
2040 (D)	0
2041 (C)	0
2042 (D)	0
2043 (C)	0
2044 (C)	0
2045 (C)	0
2046 (AN)	0
2047 (C)	0
2048 (W)	0
2049 (W)	0
2050 (W)	0
2051 (W)	0
2052 (W)	0
2053 (AN)	0
2054 (D)	0
2055 (D)	0
2056 (AN)	0
2057 (BN)	0
2058 (AN)	0
2059 (W)	0
2060 (D)	0
2061 (C)	0
2062 (D)	0
2063 (BN)	0

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		0
2066 (D)		0
2067 (C)		0
2068 (C)		0
2069 (BN)		0
2070 (W)		0
2071 (BN)		0
2072 (W)		0
Average (2022-2072)		0
2022-2072	W	0
	AN	0
	BN	0
	D	0
	C	0

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

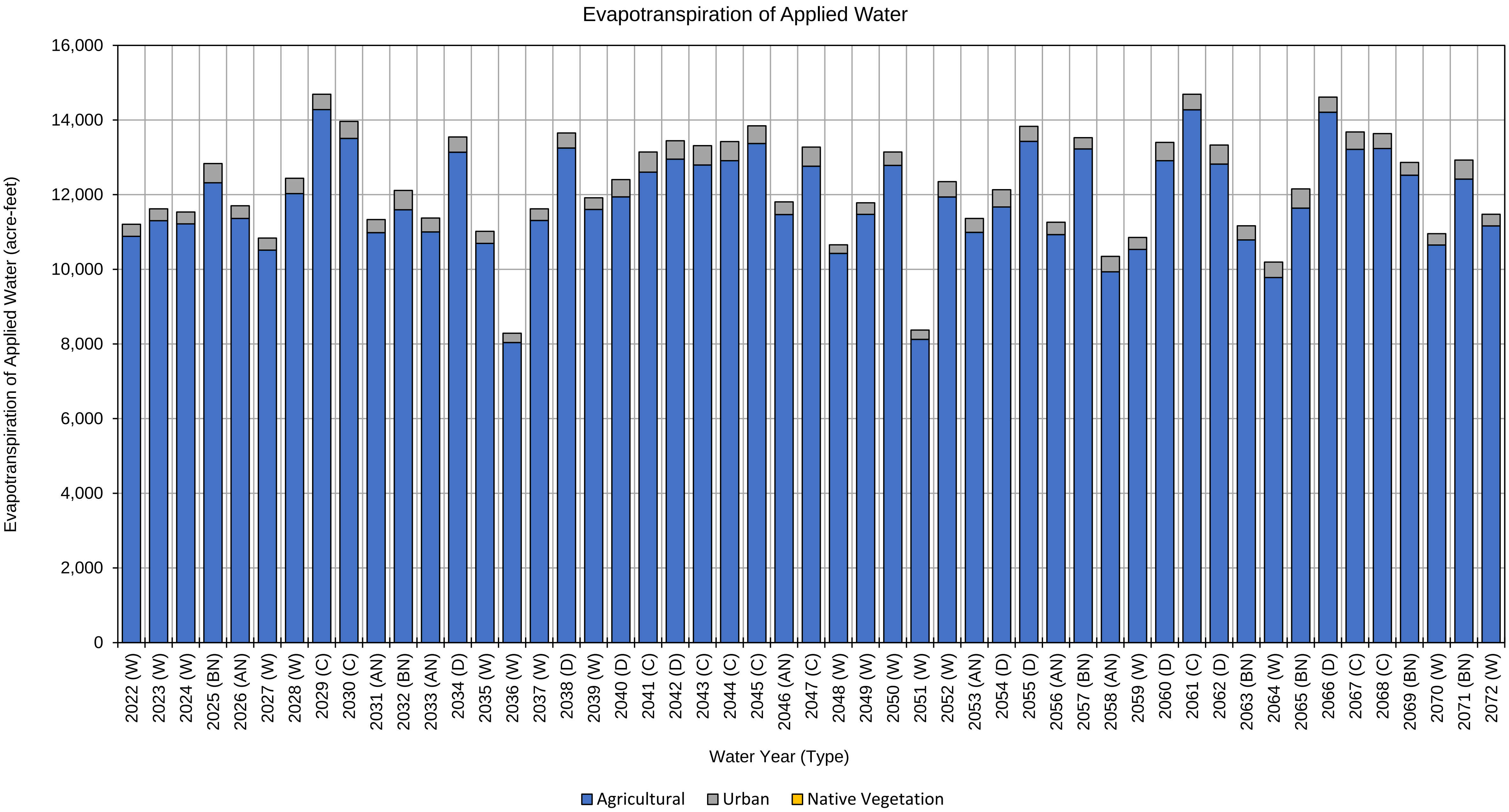
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	19,000	2,200	180,000	200,000
2023 (W)	19,000	2,000	160,000	180,000
2024 (W)	19,000	2,000	160,000	180,000
2025 (BN)	19,000	1,800	150,000	170,000
2026 (AN)	19,000	2,200	180,000	200,000
2027 (W)	18,000	1,900	160,000	180,000
2028 (W)	19,000	1,800	150,000	170,000
2029 (C)	19,000	1,600	130,000	150,000
2030 (C)	19,000	1,600	120,000	140,000
2031 (AN)	19,000	2,200	180,000	200,000
2032 (BN)	19,000	1,900	160,000	180,000
2033 (AN)	18,000	2,100	170,000	190,000
2034 (D)	19,000	1,700	150,000	170,000
2035 (W)	18,000	1,900	160,000	180,000
2036 (W)	17,000	2,100	170,000	190,000
2037 (W)	19,000	2,000	170,000	190,000
2038 (D)	19,000	1,700	150,000	170,000
2039 (W)	19,000	2,000	160,000	180,000
2040 (D)	19,000	1,900	160,000	180,000
2041 (C)	19,000	2,000	160,000	180,000
2042 (D)	18,000	1,700	140,000	160,000
2043 (C)	20,000	2,100	170,000	190,000
2044 (C)	19,000	2,000	160,000	180,000
2045 (C)	20,000	1,900	160,000	180,000
2046 (AN)	19,000	2,200	180,000	200,000
2047 (C)	19,000	2,000	170,000	190,000
2048 (W)	17,000	1,900	160,000	180,000
2049 (W)	19,000	2,000	160,000	180,000
2050 (W)	19,000	1,900	160,000	180,000
2051 (W)	17,000	2,100	170,000	190,000
2052 (W)	19,000	1,800	160,000	180,000
2053 (AN)	18,000	2,100	170,000	190,000
2054 (D)	19,000	1,900	160,000	180,000
2055 (D)	19,000	1,700	150,000	170,000
2056 (AN)	18,000	1,900	160,000	180,000
2057 (BN)	19,000	1,600	140,000	160,000
2058 (AN)	18,000	2,200	180,000	200,000
2059 (W)	18,000	1,900	160,000	180,000
2060 (D)	18,000	1,700	140,000	160,000
2061 (C)	19,000	1,600	130,000	150,000
2062 (D)	19,000	1,900	150,000	170,000
2063 (BN)	17,000	1,900	150,000	170,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		18,000	2,200	180,000	200,000
2065 (BN)		19,000	1,900	160,000	180,000
2066 (D)		19,000	1,600	140,000	160,000
2067 (C)		19,000	1,600	120,000	140,000
2068 (C)		19,000	1,700	140,000	160,000
2069 (BN)		19,000	1,900	160,000	180,000
2070 (W)		18,000	2,000	170,000	190,000
2071 (BN)		18,000	1,800	150,000	170,000
2072 (W)		19,000	2,100	180,000	200,000
Average (2022-2072)		19,000	1,900	160,000	180,000
2022-2072	W	18,000	2,000	170,000	190,000
	AN	18,000	2,100	170,000	190,000
	BN	18,000	1,800	150,000	170,000
	D	19,000	1,800	150,000	170,000
	C	19,000	1,800	150,000	170,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

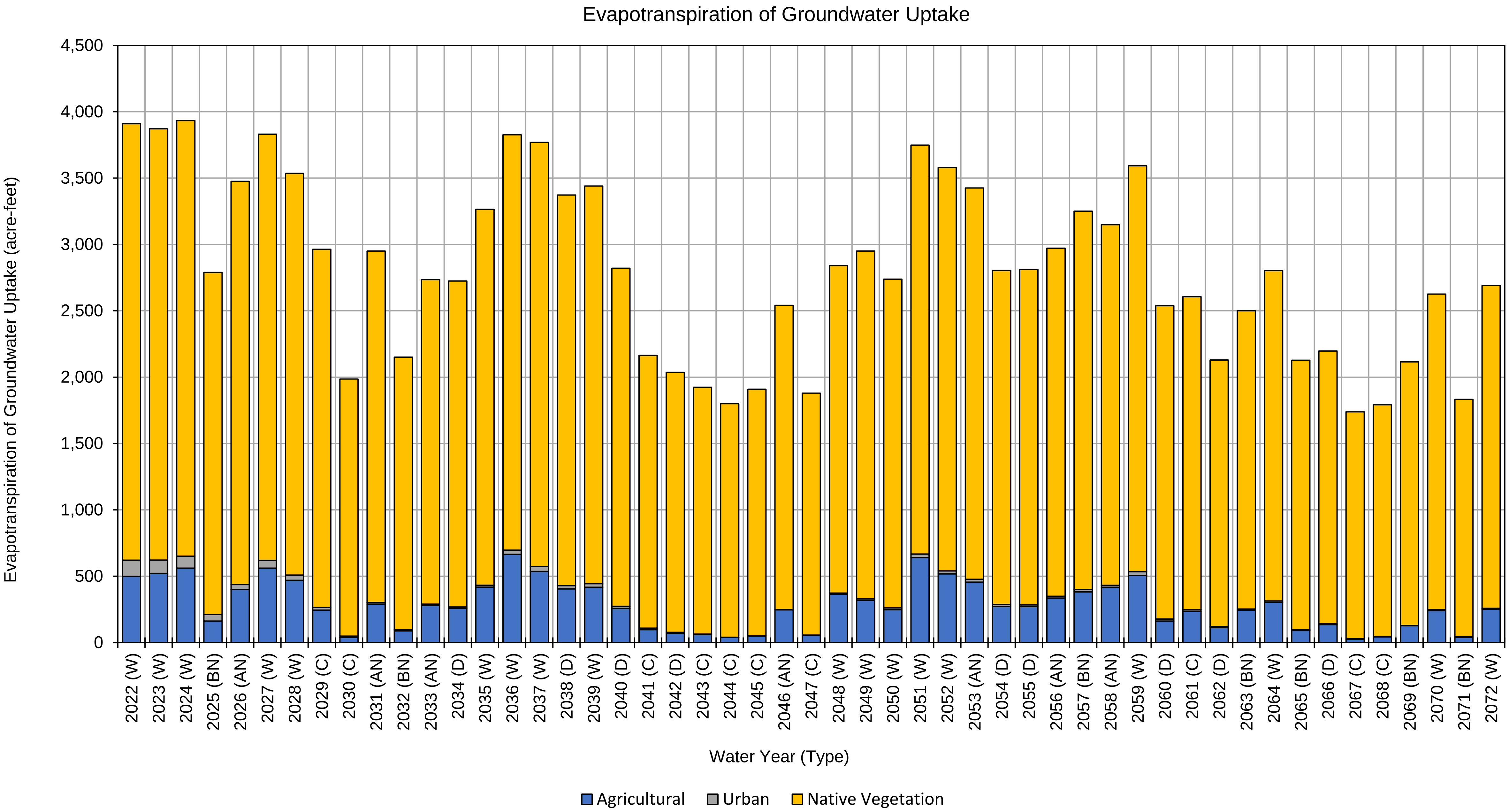
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	11,000	320	0	11,000
2023 (W)	11,000	320	0	11,000
2024 (W)	11,000	320	0	11,000
2025 (BN)	12,000	510	0	13,000
2026 (AN)	11,000	340	0	11,000
2027 (W)	11,000	320	0	11,000
2028 (W)	12,000	410	0	12,000
2029 (C)	14,000	410	0	14,000
2030 (C)	14,000	450	0	14,000
2031 (AN)	11,000	350	0	11,000
2032 (BN)	12,000	520	0	13,000
2033 (AN)	11,000	370	0	11,000
2034 (D)	13,000	410	0	13,000
2035 (W)	11,000	320	0	11,000
2036 (W)	8,000	250	0	8,300
2037 (W)	11,000	310	0	11,000
2038 (D)	13,000	400	0	13,000
2039 (W)	12,000	310	0	12,000
2040 (D)	12,000	460	0	12,000
2041 (C)	13,000	540	0	14,000
2042 (D)	13,000	490	0	13,000
2043 (C)	13,000	520	0	14,000
2044 (C)	13,000	510	0	14,000
2045 (C)	13,000	470	0	13,000
2046 (AN)	11,000	340	0	11,000
2047 (C)	13,000	510	0	14,000
2048 (W)	10,000	230	0	10,000
2049 (W)	11,000	310	0	11,000
2050 (W)	13,000	360	0	13,000
2051 (W)	8,100	250	0	8,400
2052 (W)	12,000	410	0	12,000
2053 (AN)	11,000	370	0	11,000
2054 (D)	12,000	460	0	12,000
2055 (D)	13,000	400	0	13,000
2056 (AN)	11,000	330	0	11,000
2057 (BN)	13,000	300	0	13,000
2058 (AN)	9,900	420	0	10,000
2059 (W)	11,000	320	0	11,000
2060 (D)	13,000	490	0	13,000
2061 (C)	14,000	420	0	14,000
2062 (D)	13,000	510	0	14,000
2063 (BN)	11,000	380	0	11,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		9,800	410	0	10,000
2065 (BN)		12,000	520	0	13,000
2066 (D)		14,000	400	0	14,000
2067 (C)		13,000	470	0	13,000
2068 (C)		13,000	400	0	13,000
2069 (BN)		13,000	340	0	13,000
2070 (W)		11,000	300	0	11,000
2071 (BN)		12,000	510	0	13,000
2072 (W)		11,000	310	0	11,000
Average (2022-2072)		12,000	390	0	12,000
2022-2072	W	11,000	320	0	11,000
	AN	11,000	360	0	11,000
	BN	12,000	440	0	12,000
	D	13,000	450	0	13,000
	C	13,000	470	0	13,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

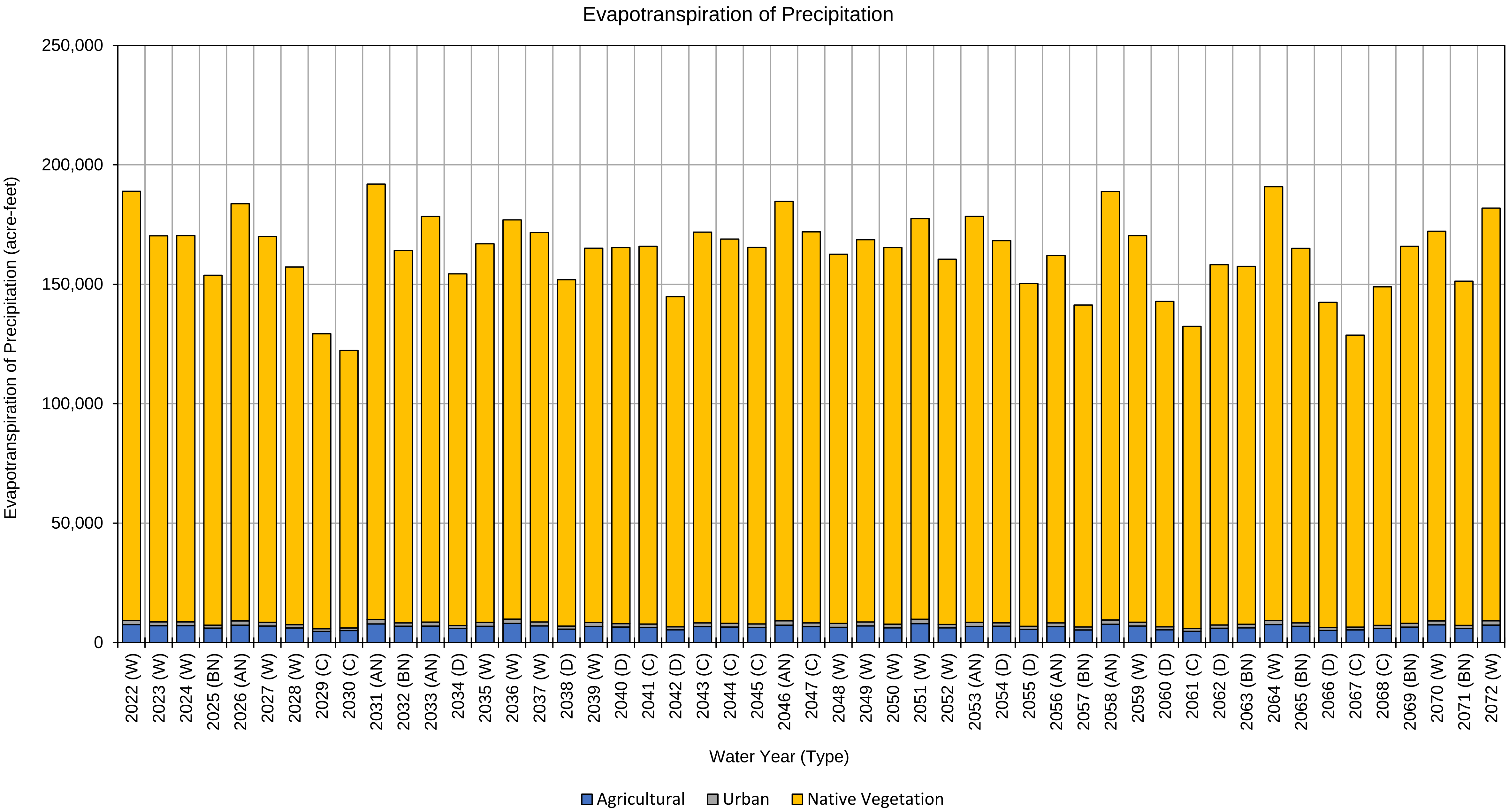
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	500	120	3,300	3,900
2023 (W)	520	100	3,200	3,800
2024 (W)	560	91	3,300	4,000
2025 (BN)	160	49	2,600	2,800
2026 (AN)	400	37	3,000	3,400
2027 (W)	560	58	3,200	3,800
2028 (W)	470	40	3,000	3,500
2029 (C)	240	20	2,700	3,000
2030 (C)	37	11	1,900	1,900
2031 (AN)	290	12	2,600	2,900
2032 (BN)	88	9	2,100	2,200
2033 (AN)	280	10	2,400	2,700
2034 (D)	260	10	2,500	2,800
2035 (W)	420	15	2,800	3,200
2036 (W)	660	31	3,100	3,800
2037 (W)	540	37	3,200	3,800
2038 (D)	400	25	2,900	3,300
2039 (W)	420	27	3,000	3,400
2040 (D)	260	16	2,500	2,800
2041 (C)	97	12	2,100	2,200
2042 (D)	70	8	2,000	2,100
2043 (C)	60	4	1,900	2,000
2044 (C)	39	1	1,800	1,800
2045 (C)	50	0	1,900	2,000
2046 (AN)	250	3	2,300	2,600
2047 (C)	55	1	1,800	1,900
2048 (W)	370	8	2,500	2,900
2049 (W)	320	11	2,600	2,900
2050 (W)	250	13	2,500	2,800
2051 (W)	640	26	3,100	3,800
2052 (W)	520	22	3,000	3,500
2053 (AN)	450	22	2,900	3,400
2054 (D)	270	16	2,500	2,800
2055 (D)	270	13	2,500	2,800
2056 (AN)	340	14	2,600	3,000
2057 (BN)	380	17	2,900	3,300
2058 (AN)	420	15	2,700	3,100
2059 (W)	510	29	3,100	3,600
2060 (D)	160	15	2,400	2,600
2061 (C)	240	12	2,400	2,700
2062 (D)	110	7	2,000	2,100
2063 (BN)	250	7	2,200	2,500

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		300	10	2,500	2,800
2065 (BN)		90	7	2,000	2,100
2066 (D)		140	6	2,100	2,200
2067 (C)		27	1	1,700	1,700
2068 (C)		43	1	1,700	1,700
2069 (BN)		130	1	2,000	2,100
2070 (W)		240	7	2,400	2,600
2071 (BN)		39	4	1,800	1,800
2072 (W)		250	8	2,400	2,700
Average (2022-2072)		280	20	2,500	2,800
2022-2072	W	450	36	2,900	3,400
	AN	350	16	2,700	3,100
	BN	160	14	2,200	2,400
	D	220	13	2,400	2,600
	C	89	6	2,000	2,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

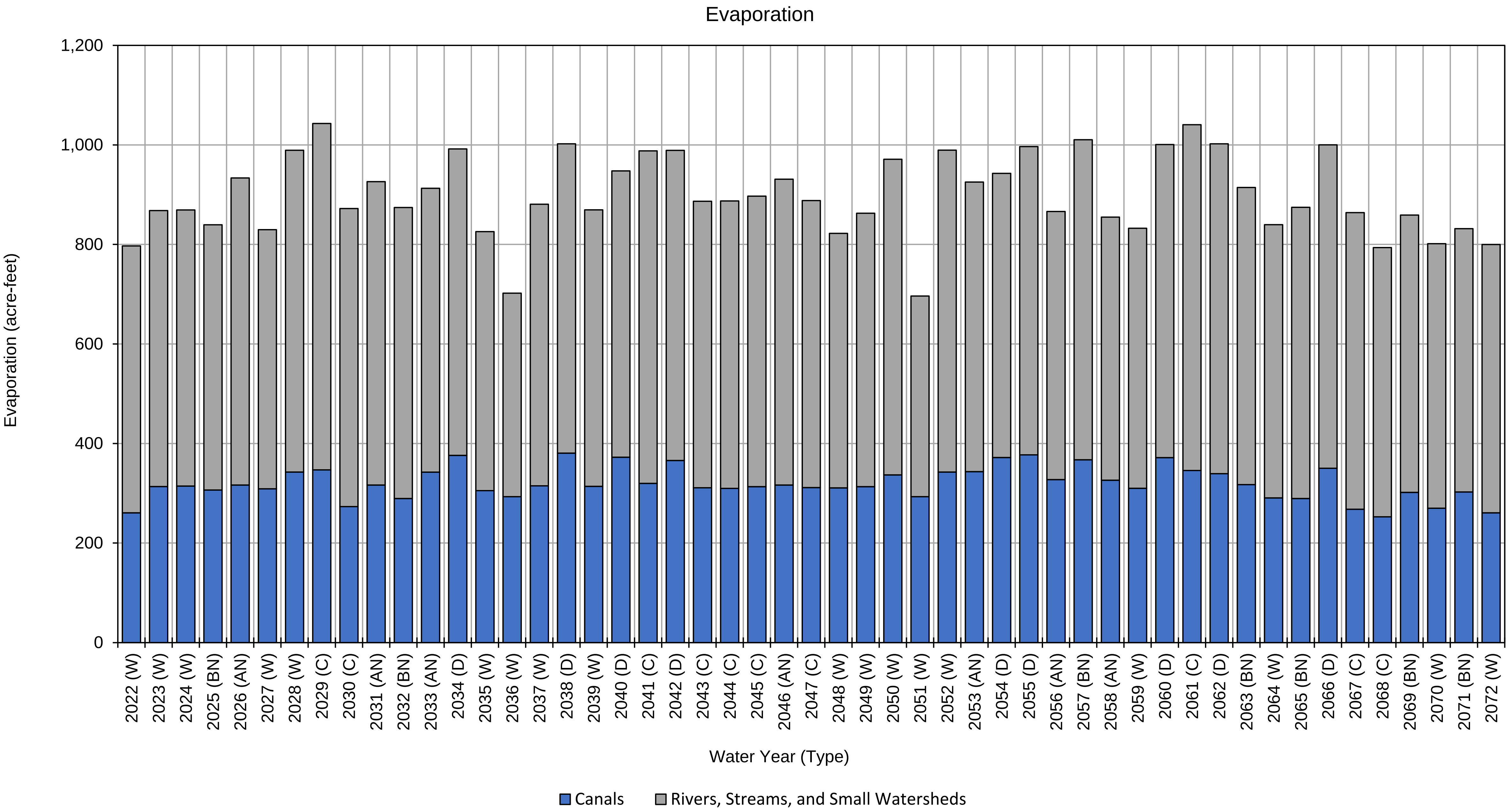
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	7,500	1,800	180,000	190,000
2023 (W)	7,000	1,600	160,000	170,000
2024 (W)	7,000	1,600	160,000	170,000
2025 (BN)	6,000	1,200	150,000	160,000
2026 (AN)	7,300	1,800	170,000	180,000
2027 (W)	6,900	1,600	160,000	170,000
2028 (W)	6,100	1,400	150,000	160,000
2029 (C)	4,700	1,100	120,000	130,000
2030 (C)	5,000	1,100	120,000	130,000
2031 (AN)	7,800	1,900	180,000	190,000
2032 (BN)	6,800	1,400	160,000	170,000
2033 (AN)	6,900	1,700	170,000	180,000
2034 (D)	5,800	1,300	150,000	160,000
2035 (W)	6,800	1,600	160,000	170,000
2036 (W)	8,000	1,800	170,000	180,000
2037 (W)	7,000	1,600	160,000	170,000
2038 (D)	5,600	1,300	140,000	150,000
2039 (W)	6,800	1,600	160,000	170,000
2040 (D)	6,500	1,400	160,000	170,000
2041 (C)	6,300	1,400	160,000	170,000
2042 (D)	5,300	1,200	140,000	150,000
2043 (C)	6,700	1,500	160,000	170,000
2044 (C)	6,500	1,500	160,000	170,000
2045 (C)	6,300	1,500	160,000	170,000
2046 (AN)	7,300	1,800	180,000	190,000
2047 (C)	6,700	1,500	160,000	170,000
2048 (W)	6,400	1,600	150,000	160,000
2049 (W)	7,000	1,600	160,000	170,000
2050 (W)	6,200	1,500	160,000	170,000
2051 (W)	7,900	1,800	170,000	180,000
2052 (W)	6,200	1,400	150,000	160,000
2053 (AN)	6,800	1,700	170,000	180,000
2054 (D)	6,800	1,400	160,000	170,000
2055 (D)	5,500	1,300	140,000	150,000
2056 (AN)	6,700	1,600	150,000	160,000
2057 (BN)	5,300	1,300	130,000	140,000
2058 (AN)	7,600	1,800	180,000	190,000
2059 (W)	6,900	1,600	160,000	170,000
2060 (D)	5,300	1,200	140,000	150,000
2061 (C)	4,700	1,100	130,000	140,000
2062 (D)	6,000	1,400	150,000	160,000
2063 (BN)	6,200	1,500	150,000	160,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		7,500	1,800	180,000	190,000
2065 (BN)		6,800	1,400	160,000	170,000
2066 (D)		5,000	1,200	140,000	150,000
2067 (C)		5,300	1,200	120,000	130,000
2068 (C)		5,900	1,300	140,000	150,000
2069 (BN)		6,500	1,600	160,000	170,000
2070 (W)		7,400	1,600	160,000	170,000
2071 (BN)		5,900	1,300	140,000	150,000
2072 (W)		7,300	1,800	170,000	180,000
Average (2022-2072)		6,500	1,500	160,000	170,000
2022-2072	W	7,000	1,600	160,000	170,000
	AN	7,200	1,800	170,000	180,000
	BN	6,200	1,400	150,000	160,000
	D	5,800	1,300	150,000	160,000
	C	5,800	1,300	140,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

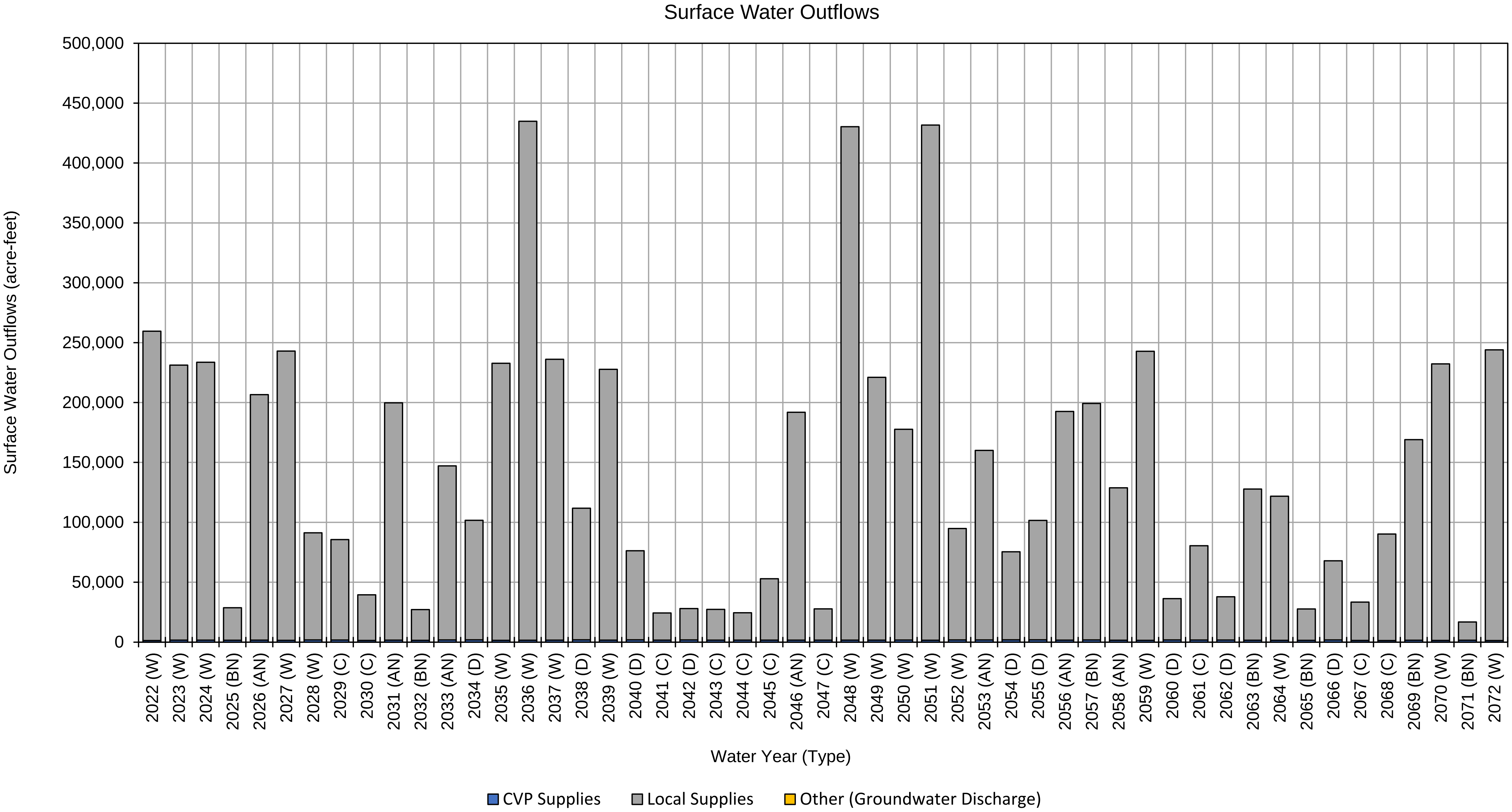
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	260	540	800
2023 (W)	310	550	860
2024 (W)	310	550	860
2025 (BN)	310	530	840
2026 (AN)	320	620	940
2027 (W)	310	520	830
2028 (W)	340	650	990
2029 (C)	350	700	1,100
2030 (C)	270	600	870
2031 (AN)	320	610	930
2032 (BN)	290	580	870
2033 (AN)	340	570	910
2034 (D)	380	620	1,000
2035 (W)	310	520	830
2036 (W)	290	410	700
2037 (W)	310	570	880
2038 (D)	380	620	1,000
2039 (W)	310	560	870
2040 (D)	370	580	950
2041 (C)	320	670	990
2042 (D)	370	620	990
2043 (C)	310	580	890
2044 (C)	310	580	890
2045 (C)	310	580	890
2046 (AN)	320	610	930
2047 (C)	310	580	890
2048 (W)	310	510	820
2049 (W)	310	550	860
2050 (W)	340	630	970
2051 (W)	290	400	690
2052 (W)	340	650	990
2053 (AN)	340	580	920
2054 (D)	370	570	940
2055 (D)	380	620	1,000
2056 (AN)	330	540	870
2057 (BN)	370	640	1,000
2058 (AN)	330	530	860
2059 (W)	310	520	830
2060 (D)	370	630	1,000
2061 (C)	350	690	1,000
2062 (D)	340	660	1,000
2063 (BN)	320	600	920

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		290	550	840
2065 (BN)		290	590	880
2066 (D)		350	650	1,000
2067 (C)		270	600	870
2068 (C)		250	540	790
2069 (BN)		300	560	860
2070 (W)		270	530	800
2071 (BN)		300	530	830
2072 (W)		260	540	800
Average (2022-2072)		320	580	900
2022-2072	W	310	540	850
	AN	330	580	910
	BN	310	580	890
	D	370	620	990
	C	310	610	920

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

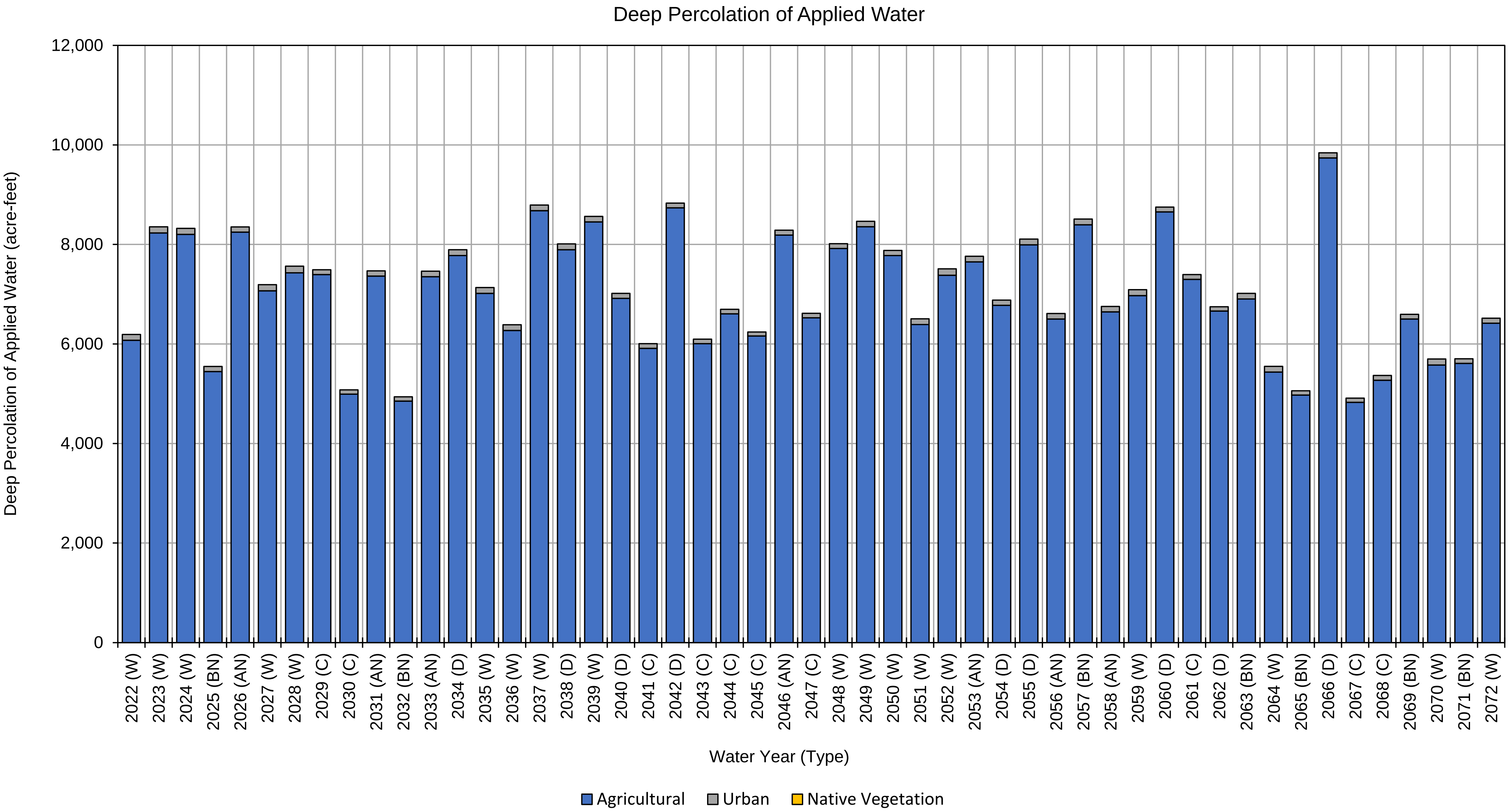
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	1,300	260,000	0	260,000
2023 (W)	1,600	230,000	0	230,000
2024 (W)	1,600	230,000	0	230,000
2025 (BN)	1,600	27,000	0	29,000
2026 (AN)	1,600	210,000	0	210,000
2027 (W)	1,500	240,000	0	240,000
2028 (W)	1,800	89,000	0	91,000
2029 (C)	1,700	84,000	0	86,000
2030 (C)	1,400	38,000	0	39,000
2031 (AN)	1,600	200,000	0	200,000
2032 (BN)	1,500	26,000	0	28,000
2033 (AN)	1,800	150,000	0	150,000
2034 (D)	1,900	100,000	0	100,000
2035 (W)	1,500	230,000	0	230,000
2036 (W)	1,500	430,000	0	430,000
2037 (W)	1,600	230,000	0	230,000
2038 (D)	1,900	110,000	0	110,000
2039 (W)	1,600	230,000	0	230,000
2040 (D)	1,900	74,000	0	76,000
2041 (C)	1,600	23,000	0	25,000
2042 (D)	1,800	26,000	0	28,000
2043 (C)	1,600	26,000	0	28,000
2044 (C)	1,600	23,000	0	25,000
2045 (C)	1,600	51,000	0	53,000
2046 (AN)	1,600	190,000	0	190,000
2047 (C)	1,600	26,000	0	28,000
2048 (W)	1,600	430,000	0	430,000
2049 (W)	1,600	220,000	0	220,000
2050 (W)	1,700	180,000	0	180,000
2051 (W)	1,500	430,000	0	430,000
2052 (W)	1,800	93,000	0	95,000
2053 (AN)	1,800	160,000	0	160,000
2054 (D)	1,900	73,000	0	75,000
2055 (D)	1,900	100,000	0	100,000
2056 (AN)	1,600	190,000	0	190,000
2057 (BN)	1,800	200,000	0	200,000
2058 (AN)	1,600	130,000	0	130,000
2059 (W)	1,500	240,000	0	240,000
2060 (D)	1,800	34,000	0	36,000
2061 (C)	1,700	79,000	0	81,000
2062 (D)	1,700	36,000	0	38,000
2063 (BN)	1,600	130,000	0	130,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		1,500	120,000	0	120,000
2065 (BN)		1,500	26,000	0	28,000
2066 (D)		1,800	66,000	0	68,000
2067 (C)		1,400	32,000	0	33,000
2068 (C)		1,300	89,000	0	90,000
2069 (BN)		1,500	170,000	0	170,000
2070 (W)		1,400	230,000	0	230,000
2071 (BN)		1,600	15,000	0	17,000
2072 (W)		1,300	240,000	0	240,000
Average (2022-2072)		1,600	140,000	0	140,000
2022-2072	W	1,600	240,000	0	240,000
	AN	1,600	170,000	0	170,000
	BN	1,600	84,000	0	86,000
	D	1,800	69,000	0	71,000
	C	1,500	47,000	0	49,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

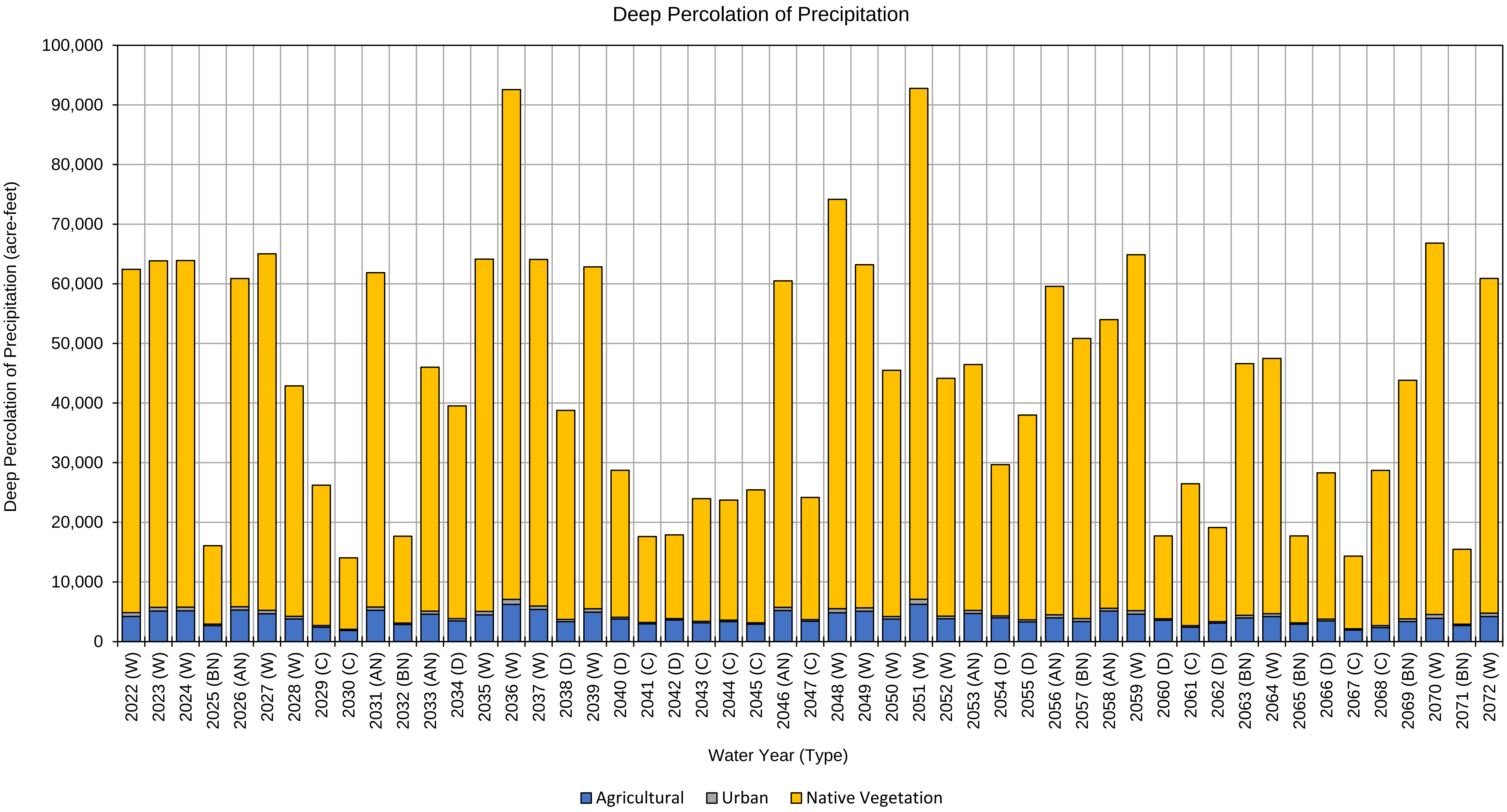
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	6,100	120	0	6,200
2023 (W)	8,200	120	0	8,300
2024 (W)	8,200	120	0	8,300
2025 (BN)	5,400	100	0	5,500
2026 (AN)	8,200	110	0	8,300
2027 (W)	7,100	120	0	7,200
2028 (W)	7,400	130	0	7,500
2029 (C)	7,400	97	0	7,500
2030 (C)	5,000	85	0	5,100
2031 (AN)	7,400	100	0	7,500
2032 (BN)	4,900	86	0	5,000
2033 (AN)	7,400	110	0	7,500
2034 (D)	7,800	120	0	7,900
2035 (W)	7,000	120	0	7,100
2036 (W)	6,300	120	0	6,400
2037 (W)	8,700	110	0	8,800
2038 (D)	7,900	120	0	8,000
2039 (W)	8,500	110	0	8,600
2040 (D)	6,900	100	0	7,000
2041 (C)	5,900	94	0	6,000
2042 (D)	8,700	94	0	8,800
2043 (C)	6,000	91	0	6,100
2044 (C)	6,600	89	0	6,700
2045 (C)	6,200	80	0	6,300
2046 (AN)	8,200	99	0	8,300
2047 (C)	6,500	89	0	6,600
2048 (W)	7,900	96	0	8,000
2049 (W)	8,400	110	0	8,500
2050 (W)	7,800	100	0	7,900
2051 (W)	6,400	120	0	6,500
2052 (W)	7,400	130	0	7,500
2053 (AN)	7,600	110	0	7,700
2054 (D)	6,800	100	0	6,900
2055 (D)	8,000	110	0	8,100
2056 (AN)	6,500	110	0	6,600
2057 (BN)	8,400	120	0	8,500
2058 (AN)	6,600	110	0	6,700
2059 (W)	7,000	120	0	7,100
2060 (D)	8,700	96	0	8,800
2061 (C)	7,300	97	0	7,400
2062 (D)	6,700	87	0	6,800
2063 (BN)	6,900	110	0	7,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		5,400	120	0	5,500
2065 (BN)		5,000	85	0	5,100
2066 (D)		9,700	100	0	9,800
2067 (C)		4,800	85	0	4,900
2068 (C)		5,300	97	0	5,400
2069 (BN)		6,500	95	0	6,600
2070 (W)		5,600	120	0	5,700
2071 (BN)		5,600	94	0	5,700
2072 (W)		6,400	99	0	6,500
Average (2022-2072)		7,000	110	0	7,100
2022-2072	W	7,200	120	0	7,300
	AN	7,400	110	0	7,500
	BN	6,100	99	0	6,200
	D	7,900	100	0	8,000
	C	6,100	90	0	6,200

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

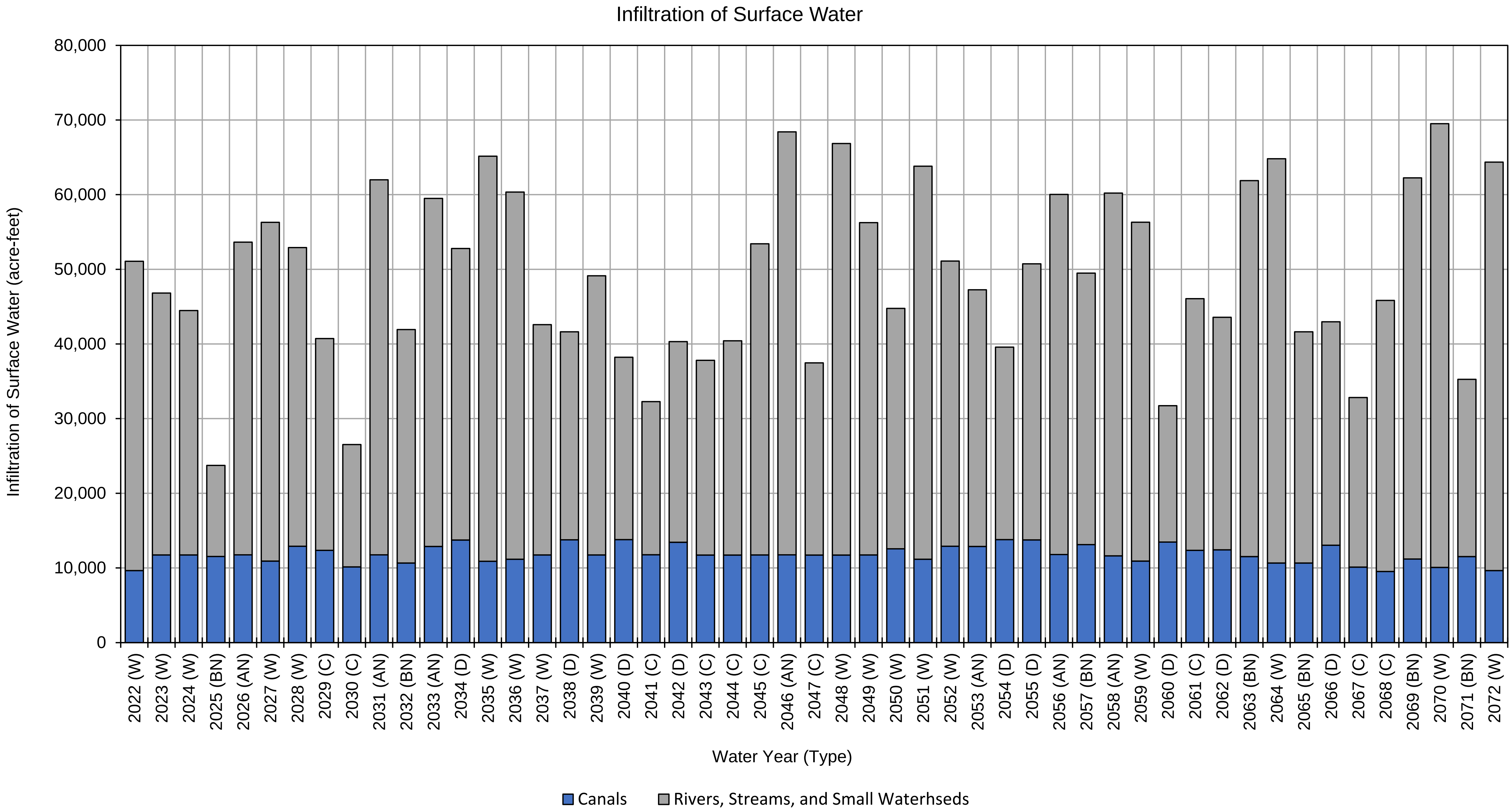
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,200	640	58,000	63,000
2023 (W)	5,100	610	58,000	64,000
2024 (W)	5,200	610	58,000	64,000
2025 (BN)	2,700	250	13,000	16,000
2026 (AN)	5,300	550	55,000	61,000
2027 (W)	4,600	600	60,000	65,000
2028 (W)	3,800	440	39,000	43,000
2029 (C)	2,400	260	24,000	27,000
2030 (C)	1,900	210	12,000	14,000
2031 (AN)	5,200	550	56,000	62,000
2032 (BN)	2,900	230	15,000	18,000
2033 (AN)	4,600	510	41,000	46,000
2034 (D)	3,500	380	36,000	40,000
2035 (W)	4,500	580	59,000	64,000
2036 (W)	6,200	840	85,000	92,000
2037 (W)	5,400	580	58,000	64,000
2038 (D)	3,300	380	35,000	39,000
2039 (W)	4,900	580	57,000	62,000
2040 (D)	3,800	310	25,000	29,000
2041 (C)	3,000	250	14,000	17,000
2042 (D)	3,600	240	14,000	18,000
2043 (C)	3,100	270	21,000	24,000
2044 (C)	3,300	270	20,000	24,000
2045 (C)	2,900	250	22,000	25,000
2046 (AN)	5,200	530	55,000	61,000
2047 (C)	3,400	270	20,000	24,000
2048 (W)	4,800	680	69,000	74,000
2049 (W)	5,100	570	58,000	64,000
2050 (W)	3,800	430	41,000	45,000
2051 (W)	6,200	840	86,000	93,000
2052 (W)	3,800	440	40,000	44,000
2053 (AN)	4,700	510	41,000	46,000
2054 (D)	4,000	320	25,000	29,000
2055 (D)	3,300	370	34,000	38,000
2056 (AN)	4,000	530	55,000	60,000
2057 (BN)	3,400	490	47,000	51,000
2058 (AN)	5,100	470	48,000	54,000
2059 (W)	4,600	580	60,000	65,000
2060 (D)	3,600	240	14,000	18,000
2061 (C)	2,400	270	24,000	27,000
2062 (D)	3,100	240	16,000	19,000
2063 (BN)	4,000	440	42,000	46,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		4,200	490	43,000	48,000
2065 (BN)		2,900	230	15,000	18,000
2066 (D)		3,500	310	25,000	29,000
2067 (C)		1,900	210	12,000	14,000
2068 (C)		2,300	320	26,000	29,000
2069 (BN)		3,400	440	40,000	44,000
2070 (W)		3,900	660	62,000	67,000
2071 (BN)		2,700	230	13,000	16,000
2072 (W)		4,200	570	56,000	61,000
Average (2022-2072)		3,900	430	39,000	43,000
2022-2072	W	4,700	600	58,000	63,000
	AN	4,900	520	50,000	55,000
	BN	3,100	330	26,000	29,000
	D	3,500	310	25,000	29,000
	C	2,700	260	20,000	23,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

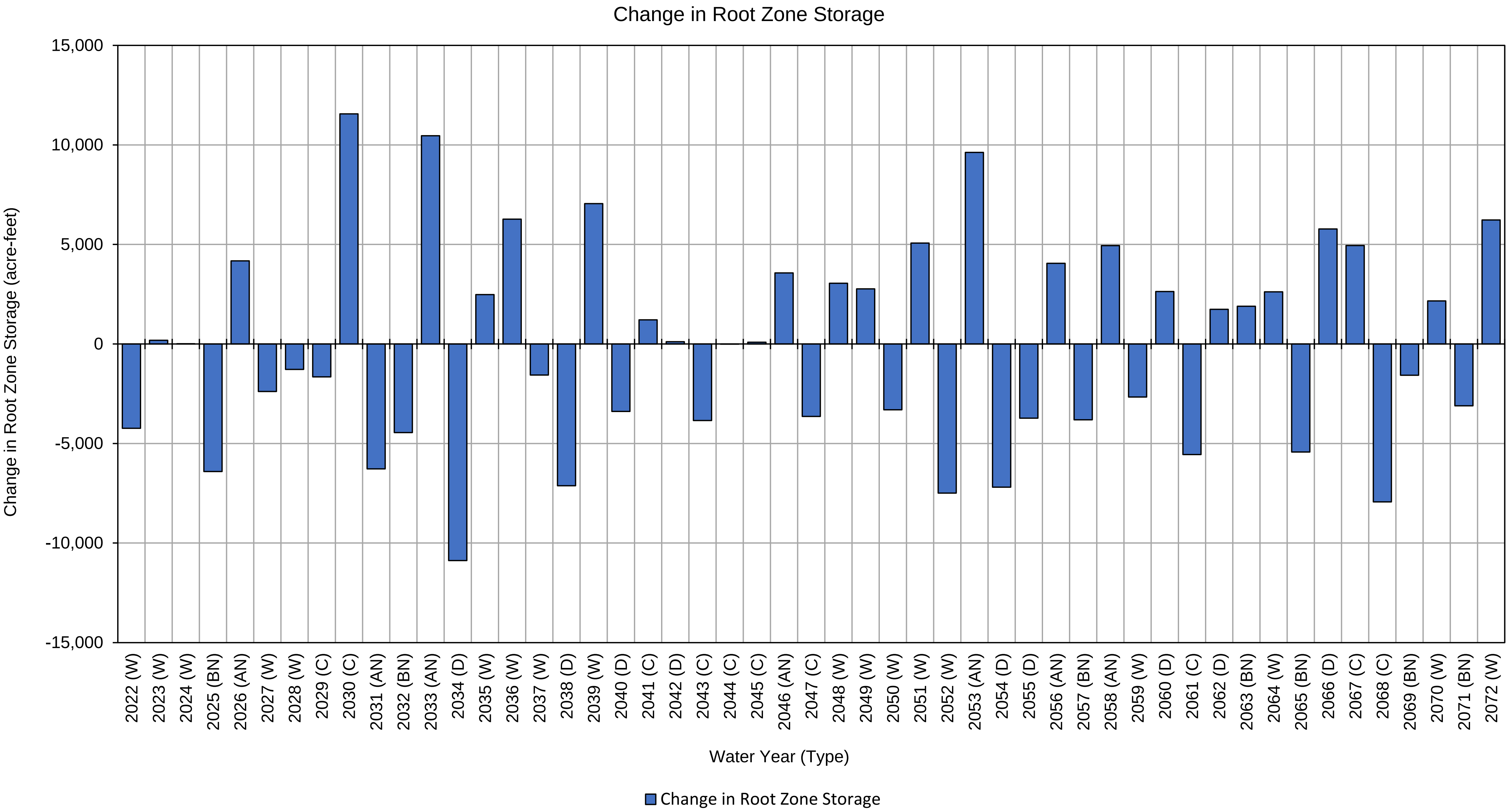
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	9,600	41,000	51,000
2023 (W)	12,000	35,000	47,000
2024 (W)	12,000	33,000	45,000
2025 (BN)	12,000	12,000	24,000
2026 (AN)	12,000	42,000	54,000
2027 (W)	11,000	45,000	56,000
2028 (W)	13,000	40,000	53,000
2029 (C)	12,000	28,000	40,000
2030 (C)	10,000	16,000	26,000
2031 (AN)	12,000	50,000	62,000
2032 (BN)	11,000	31,000	42,000
2033 (AN)	13,000	47,000	60,000
2034 (D)	14,000	39,000	53,000
2035 (W)	11,000	54,000	65,000
2036 (W)	11,000	49,000	60,000
2037 (W)	12,000	31,000	43,000
2038 (D)	14,000	28,000	42,000
2039 (W)	12,000	37,000	49,000
2040 (D)	14,000	24,000	38,000
2041 (C)	12,000	21,000	33,000
2042 (D)	13,000	27,000	40,000
2043 (C)	12,000	26,000	38,000
2044 (C)	12,000	29,000	41,000
2045 (C)	12,000	42,000	54,000
2046 (AN)	12,000	57,000	69,000
2047 (C)	12,000	26,000	38,000
2048 (W)	12,000	55,000	67,000
2049 (W)	12,000	45,000	57,000
2050 (W)	13,000	32,000	45,000
2051 (W)	11,000	53,000	64,000
2052 (W)	13,000	38,000	51,000
2053 (AN)	13,000	34,000	47,000
2054 (D)	14,000	26,000	40,000
2055 (D)	14,000	37,000	51,000
2056 (AN)	12,000	48,000	60,000
2057 (BN)	13,000	36,000	49,000
2058 (AN)	12,000	49,000	61,000
2059 (W)	11,000	45,000	56,000
2060 (D)	13,000	18,000	31,000
2061 (C)	12,000	34,000	46,000
2062 (D)	12,000	31,000	43,000
2063 (BN)	12,000	50,000	62,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		11,000	54,000	65,000
2065 (BN)		11,000	31,000	42,000
2066 (D)		13,000	30,000	43,000
2067 (C)		10,000	23,000	33,000
2068 (C)		9,500	36,000	46,000
2069 (BN)		11,000	51,000	62,000
2070 (W)		10,000	59,000	69,000
2071 (BN)		12,000	24,000	36,000
2072 (W)		9,600	55,000	65,000
Average (2022-2072)		12,000	37,000	49,000
2022-2072	W	11,000	45,000	56,000
	AN	12,000	47,000	59,000
	BN	11,000	34,000	45,000
	D	13,000	29,000	42,000
	C	11,000	28,000	39,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	-4,200
2023 (W)	190
2024 (W)	0
2025 (BN)	-6,400
2026 (AN)	4,200
2027 (W)	-2,400
2028 (W)	-1,300
2029 (C)	-1,700
2030 (C)	12,000
2031 (AN)	-6,300
2032 (BN)	-4,500
2033 (AN)	10,000
2034 (D)	-11,000
2035 (W)	2,500
2036 (W)	6,300
2037 (W)	-1,600
2038 (D)	-7,100
2039 (W)	7,100
2040 (D)	-3,400
2041 (C)	1,200
2042 (D)	110
2043 (C)	-3,800
2044 (C)	-9
2045 (C)	85
2046 (AN)	3,600
2047 (C)	-3,600
2048 (W)	3,000
2049 (W)	2,800
2050 (W)	-3,300
2051 (W)	5,100
2052 (W)	-7,500
2053 (AN)	9,600
2054 (D)	-7,200
2055 (D)	-3,700
2056 (AN)	4,000
2057 (BN)	-3,800
2058 (AN)	4,900
2059 (W)	-2,700
2060 (D)	2,600
2061 (C)	-5,600
2062 (D)	1,700
2063 (BN)	1,900

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		2,600
2065 (BN)		-5,400
2066 (D)		5,800
2067 (C)		4,900
2068 (C)		-7,900
2069 (BN)		-1,600
2070 (W)		2,200
2071 (BN)		-3,100
2072 (W)		6,200
Average (2022-2072)		-84
2022-2072	W	830
	AN	4,400
	BN	-3,300
	D	-2,400
	C	-480

Sacramento Valley Water Year Index and is classified into five types:

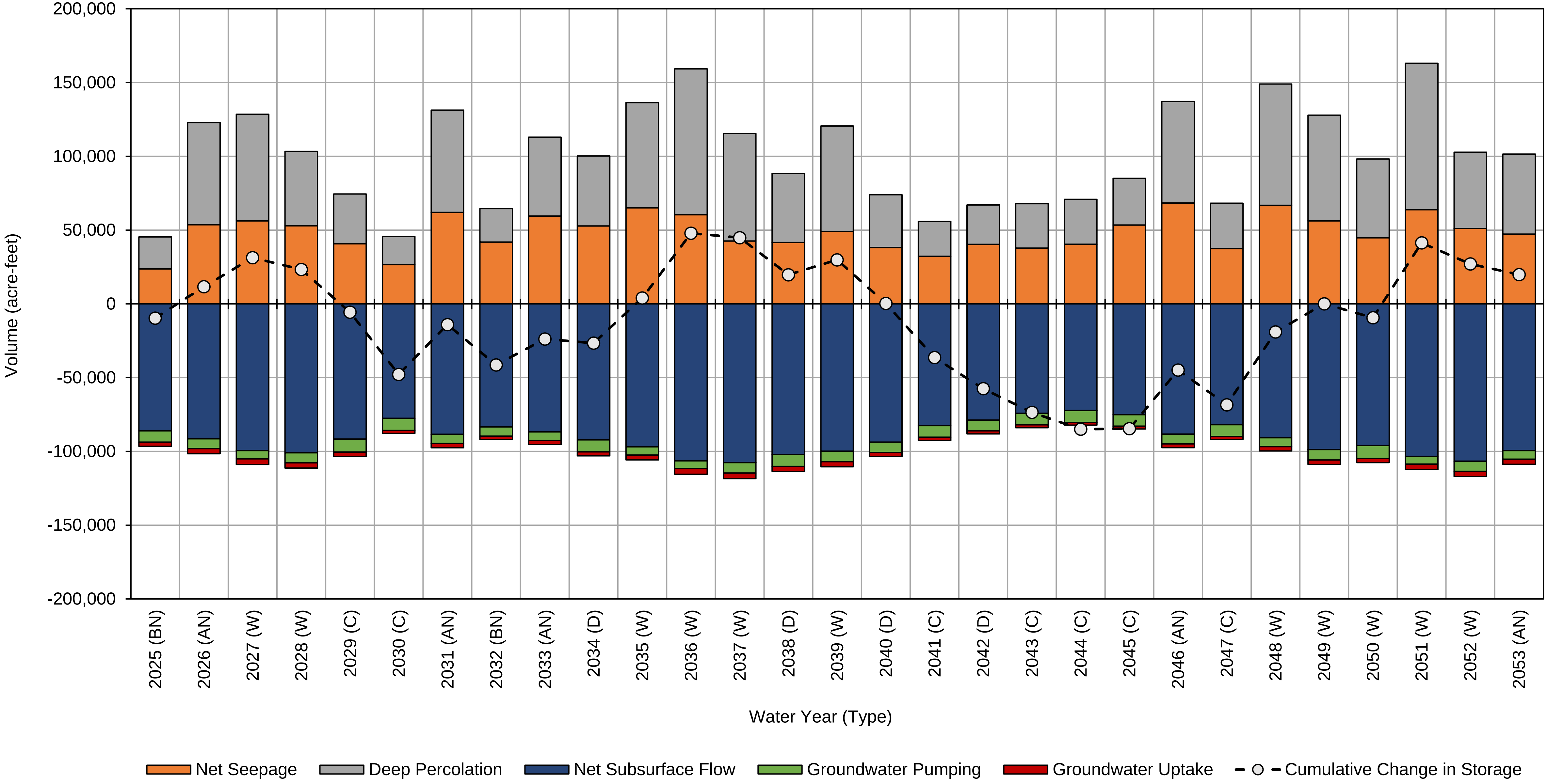
W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-7b

Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results – Groundwater System

Projected (Future Land Use) with Climate Change (2070) Water Budget
Bowman Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

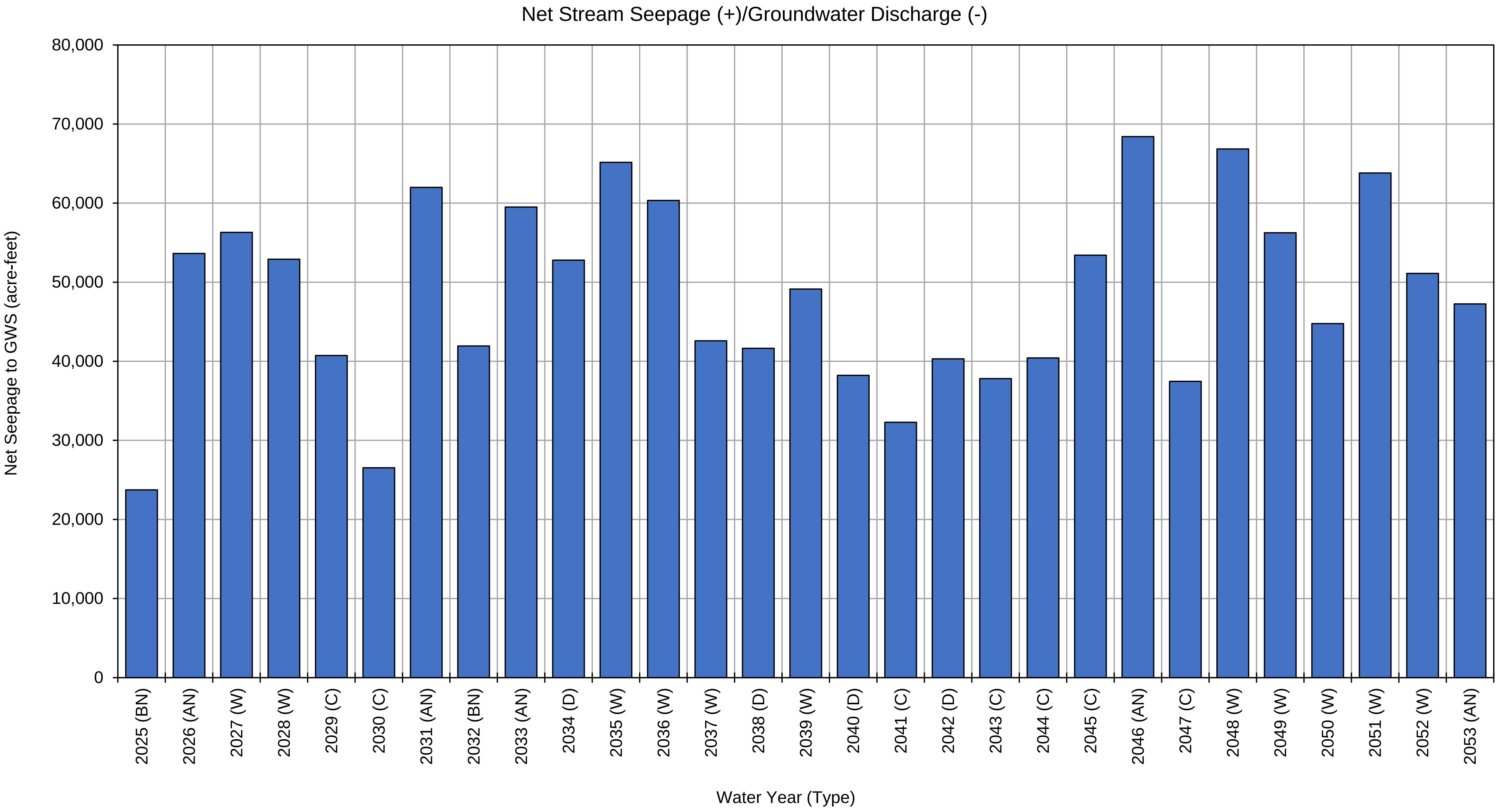
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	51,000	69,000	-7,500	-3,900	-86,000	23,000	23,000
2023 (W)	47,000	72,000	-7,200	-3,900	-95,000	13,000	36,000
2024 (W)	44,000	72,000	-7,300	-3,900	-99,000	6,000	42,000
2025 (BN)	24,000	22,000	-7,700	-2,800	-86,000	-51,000	-9,700
2026 (AN)	54,000	69,000	-6,600	-3,500	-91,000	21,000	12,000
2027 (W)	56,000	72,000	-5,600	-3,800	-99,000	20,000	31,000
2028 (W)	53,000	50,000	-6,800	-3,500	-100,000	-8,000	23,000
2029 (C)	41,000	34,000	-8,800	-3,000	-92,000	-29,000	-5,700
2030 (C)	27,000	19,000	-8,200	-2,000	-78,000	-42,000	-48,000
2031 (AN)	62,000	69,000	-6,200	-2,900	-88,000	34,000	-14,000
2032 (BN)	42,000	23,000	-6,300	-2,200	-83,000	-27,000	-41,000
2033 (AN)	60,000	53,000	-5,800	-2,700	-87,000	18,000	-24,000
2034 (D)	53,000	47,000	-8,100	-2,700	-92,000	-2,800	-27,000
2035 (W)	65,000	71,000	-5,600	-3,300	-97,000	31,000	4,000
2036 (W)	60,000	99,000	-5,300	-3,800	-110,000	44,000	48,000
2037 (W)	43,000	73,000	-7,100	-3,800	-110,000	-3,000	45,000
2038 (D)	42,000	47,000	-8,100	-3,400	-100,000	-25,000	20,000
2039 (W)	49,000	71,000	-7,100	-3,400	-100,000	10,000	30,000
2040 (D)	38,000	36,000	-6,900	-2,800	-94,000	-30,000	280
2041 (C)	32,000	24,000	-7,900	-2,200	-83,000	-37,000	-36,000
2042 (D)	40,000	27,000	-7,300	-2,000	-79,000	-21,000	-57,000
2043 (C)	38,000	30,000	-7,800	-1,900	-74,000	-16,000	-74,000
2044 (C)	40,000	30,000	-8,100	-1,800	-72,000	-11,000	-85,000
2045 (C)	53,000	32,000	-7,800	-1,900	-75,000	290	-85,000
2046 (AN)	68,000	69,000	-6,600	-2,500	-88,000	40,000	-45,000
2047 (C)	37,000	31,000	-8,000	-1,900	-82,000	-24,000	-68,000
2048 (W)	67,000	82,000	-6,100	-2,800	-91,000	49,000	-19,000
2049 (W)	56,000	72,000	-7,100	-2,900	-99,000	19,000	47
2050 (W)	45,000	53,000	-8,800	-2,700	-96,000	-9,400	-9,400
2051 (W)	64,000	99,000	-5,300	-3,700	-100,000	51,000	41,000
2052 (W)	51,000	52,000	-6,800	-3,600	-110,000	-14,000	27,000
2053 (AN)	47,000	54,000	-5,800	-3,400	-99,000	-7,200	20,000
2054 (D)	40,000	37,000	-7,100	-2,800	-92,000	-26,000	-6,400
2055 (D)	51,000	46,000	-8,100	-2,800	-93,000	-7,500	-14,000
2056 (AN)	60,000	66,000	-5,700	-3,000	-97,000	21,000	7,100
2057 (BN)	49,000	59,000	-7,400	-3,300	-99,000	-1,200	6,000
2058 (AN)	60,000	61,000	-5,500	-3,100	-100,000	11,000	17,000
2059 (W)	56,000	72,000	-5,600	-3,600	-100,000	15,000	32,000
2060 (D)	32,000	26,000	-7,200	-2,500	-92,000	-43,000	-11,000
2061 (C)	46,000	34,000	-8,600	-2,600	-86,000	-17,000	-28,000
2062 (D)	44,000	26,000	-6,800	-2,100	-81,000	-20,000	-48,000
2063 (BN)	62,000	54,000	-6,100	-2,500	-87,000	20,000	-28,000
2064 (W)	65,000	53,000	-5,500	-2,800	-94,000	16,000	-12,000
2065 (BN)	42,000	23,000	-6,300	-2,100	-85,000	-29,000	-41,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		43,000	38,000	-8,900	-2,200	-82,000	-12,000	-54,000
2067 (C)		33,000	19,000	-8,600	-1,700	-72,000	-30,000	-83,000
2068 (C)		46,000	34,000	-9,900	-1,800	-74,000	-5,800	-89,000
2069 (BN)		62,000	50,000	-7,800	-2,100	-80,000	23,000	-66,000
2070 (W)		70,000	73,000	-6,300	-2,600	-93,000	40,000	-26,000
2071 (BN)		35,000	21,000	-7,700	-1,800	-82,000	-35,000	-61,000
2072 (W)		64,000	67,000	-7,000	-2,700	-88,000	34,000	-27,000
Average (2022-2072)		49,000	51,000	-7,100	-2,800	-90,000	-530	
2022-2072	W	56,000	71,000	-6,500	-3,400	-98,000		
	AN	59,000	63,000	-6,000	-3,000	-93,000		
	BN	45,000	36,000	-7,100	-2,400	-86,000		
	D	42,000	37,000	-7,600	-2,600	-90,000		
	C	39,000	29,000	-8,400	-2,100	-79,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

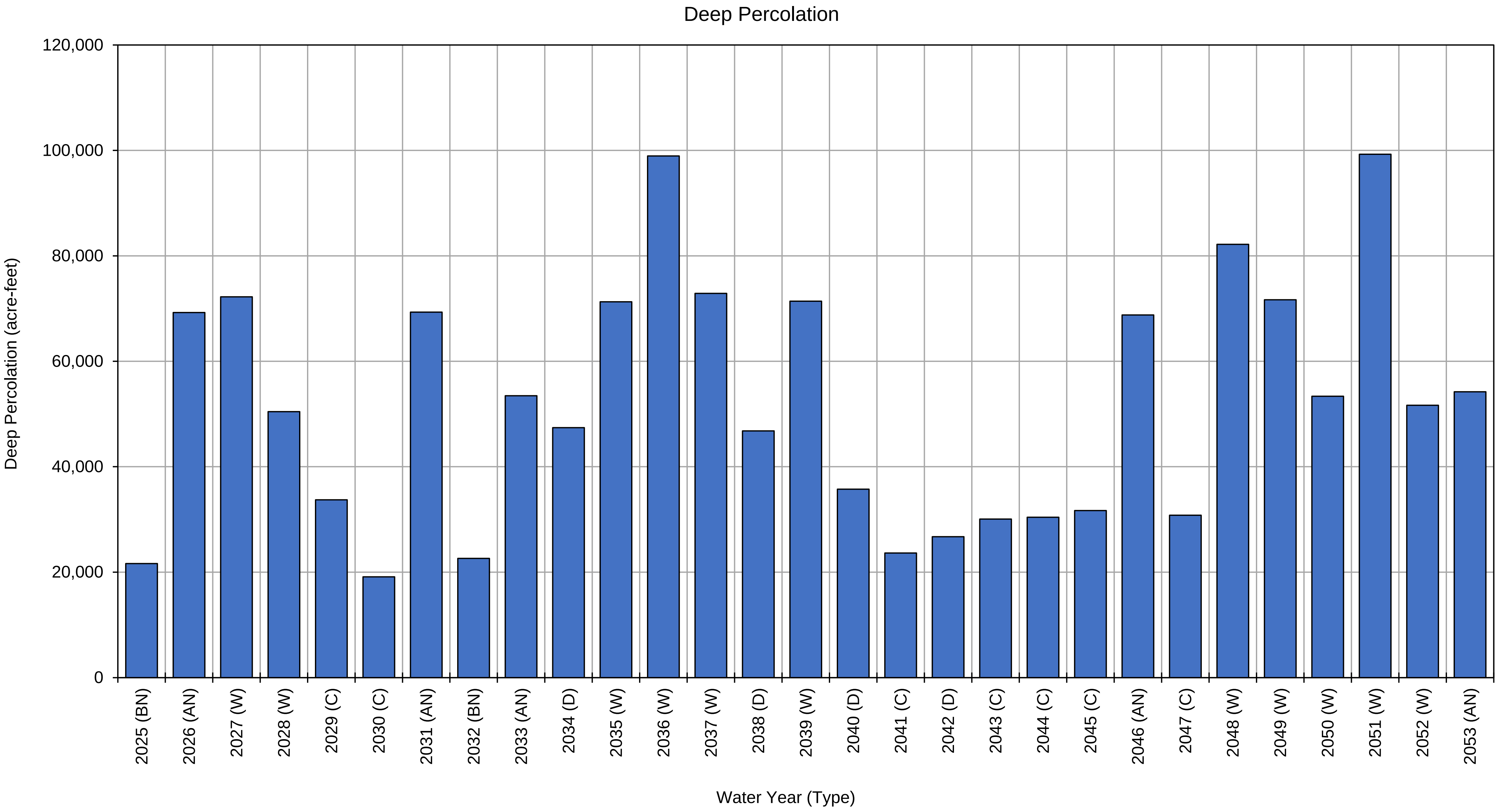
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	51,000
2023 (W)	47,000
2024 (W)	44,000
2025 (BN)	24,000
2026 (AN)	54,000
2027 (W)	56,000
2028 (W)	53,000
2029 (C)	41,000
2030 (C)	27,000
2031 (AN)	62,000
2032 (BN)	42,000
2033 (AN)	60,000
2034 (D)	53,000
2035 (W)	65,000
2036 (W)	60,000
2037 (W)	43,000
2038 (D)	42,000
2039 (W)	49,000
2040 (D)	38,000
2041 (C)	32,000
2042 (D)	40,000
2043 (C)	38,000
2044 (C)	40,000
2045 (C)	53,000
2046 (AN)	68,000
2047 (C)	37,000
2048 (W)	67,000
2049 (W)	56,000
2050 (W)	45,000
2051 (W)	64,000
2052 (W)	51,000
2053 (AN)	47,000
2054 (D)	40,000
2055 (D)	51,000
2056 (AN)	60,000
2057 (BN)	49,000
2058 (AN)	60,000
2059 (W)	56,000
2060 (D)	32,000
2061 (C)	46,000
2062 (D)	44,000
2063 (BN)	62,000
2064 (W)	65,000
2065 (BN)	42,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2066 (D)		43,000
2067 (C)		33,000
2068 (C)		46,000
2069 (BN)		62,000
2070 (W)		70,000
2071 (BN)		35,000
2072 (W)		64,000
Average (2022-2072)		49,000
2022-2072	W	56,000
	AN	59,000
	BN	45,000
	D	42,000
	C	39,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

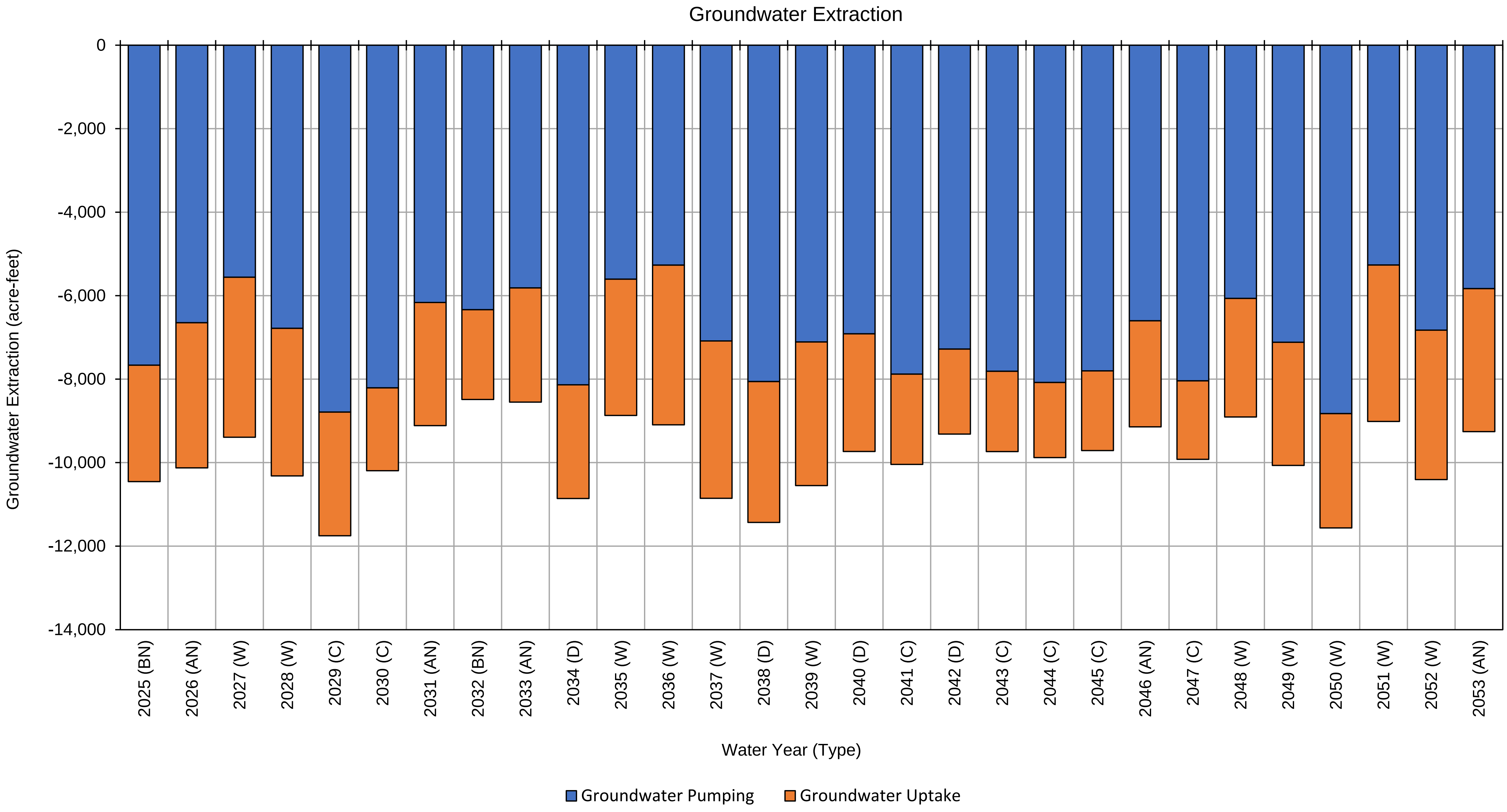
WY (Type)	Deep Percolation from the SWS
2022 (W)	69,000
2023 (W)	72,000
2024 (W)	72,000
2025 (BN)	22,000
2026 (AN)	69,000
2027 (W)	72,000
2028 (W)	50,000
2029 (C)	34,000
2030 (C)	19,000
2031 (AN)	69,000
2032 (BN)	23,000
2033 (AN)	53,000
2034 (D)	47,000
2035 (W)	71,000
2036 (W)	99,000
2037 (W)	73,000
2038 (D)	47,000
2039 (W)	71,000
2040 (D)	36,000
2041 (C)	24,000
2042 (D)	27,000
2043 (C)	30,000
2044 (C)	30,000
2045 (C)	32,000
2046 (AN)	69,000
2047 (C)	31,000
2048 (W)	82,000
2049 (W)	72,000
2050 (W)	53,000
2051 (W)	99,000
2052 (W)	52,000
2053 (AN)	54,000
2054 (D)	37,000
2055 (D)	46,000
2056 (AN)	66,000
2057 (BN)	59,000
2058 (AN)	61,000
2059 (W)	72,000
2060 (D)	26,000
2061 (C)	34,000
2062 (D)	26,000
2063 (BN)	54,000
2064 (W)	53,000
2065 (BN)	23,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2066 (D)		38,000
2067 (C)		19,000
2068 (C)		34,000
2069 (BN)		50,000
2070 (W)		73,000
2071 (BN)		21,000
2072 (W)		67,000
Average (2022-2072)		51,000
2022-2072	W	71,000
	AN	63,000
	BN	36,000
	D	37,000
	C	29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

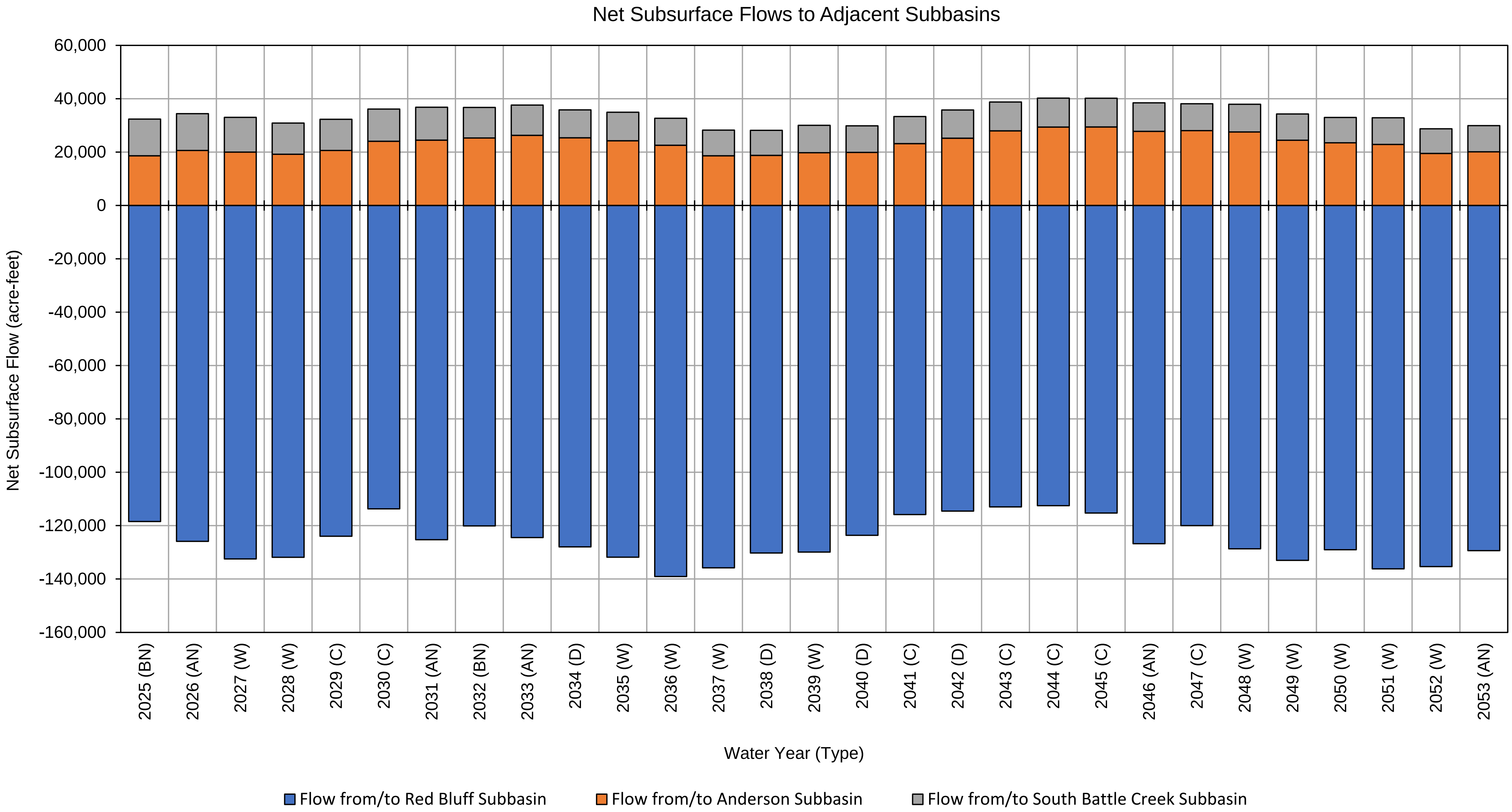
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-7,500	-3,900	-11,000
2023 (W)	-7,200	-3,900	-11,000
2024 (W)	-7,300	-3,900	-11,000
2025 (BN)	-7,700	-2,800	-10,000
2026 (AN)	-6,600	-3,500	-10,000
2027 (W)	-5,600	-3,800	-9,400
2028 (W)	-6,800	-3,500	-10,000
2029 (C)	-8,800	-3,000	-12,000
2030 (C)	-8,200	-2,000	-10,000
2031 (AN)	-6,200	-2,900	-9,100
2032 (BN)	-6,300	-2,200	-8,500
2033 (AN)	-5,800	-2,700	-8,600
2034 (D)	-8,100	-2,700	-11,000
2035 (W)	-5,600	-3,300	-8,900
2036 (W)	-5,300	-3,800	-9,100
2037 (W)	-7,100	-3,800	-11,000
2038 (D)	-8,100	-3,400	-11,000
2039 (W)	-7,100	-3,400	-11,000
2040 (D)	-6,900	-2,800	-9,700
2041 (C)	-7,900	-2,200	-10,000
2042 (D)	-7,300	-2,000	-9,300
2043 (C)	-7,800	-1,900	-9,700
2044 (C)	-8,100	-1,800	-9,900
2045 (C)	-7,800	-1,900	-9,700
2046 (AN)	-6,600	-2,500	-9,100
2047 (C)	-8,000	-1,900	-9,900
2048 (W)	-6,100	-2,800	-8,900
2049 (W)	-7,100	-2,900	-10,000
2050 (W)	-8,800	-2,700	-12,000
2051 (W)	-5,300	-3,700	-9,000
2052 (W)	-6,800	-3,600	-10,000
2053 (AN)	-5,800	-3,400	-9,300
2054 (D)	-7,100	-2,800	-9,900
2055 (D)	-8,100	-2,800	-11,000
2056 (AN)	-5,700	-3,000	-8,700
2057 (BN)	-7,400	-3,300	-11,000
2058 (AN)	-5,500	-3,100	-8,600
2059 (W)	-5,600	-3,600	-9,200
2060 (D)	-7,200	-2,500	-9,700
2061 (C)	-8,600	-2,600	-11,000
2062 (D)	-6,800	-2,100	-8,900
2063 (BN)	-6,100	-2,500	-8,600
2064 (W)	-5,500	-2,800	-8,300
2065 (BN)	-6,300	-2,100	-8,500

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2066 (D)		-8,900	-2,200	-11,000
2067 (C)		-8,600	-1,700	-10,000
2068 (C)		-9,900	-1,800	-12,000
2069 (BN)		-7,800	-2,100	-9,900
2070 (W)		-6,300	-2,600	-9,000
2071 (BN)		-7,700	-1,800	-9,600
2072 (W)		-7,000	-2,700	-9,700
Average (2022-2072)		-7,100	-2,800	-9,900
2022-2072	W	-6,500	-3,400	-9,900
	AN	-6,000	-3,000	-9,100
	BN	-7,100	-2,400	-9,500
	D	-7,600	-2,600	-10,000
	C	-8,400	-2,100	-10,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

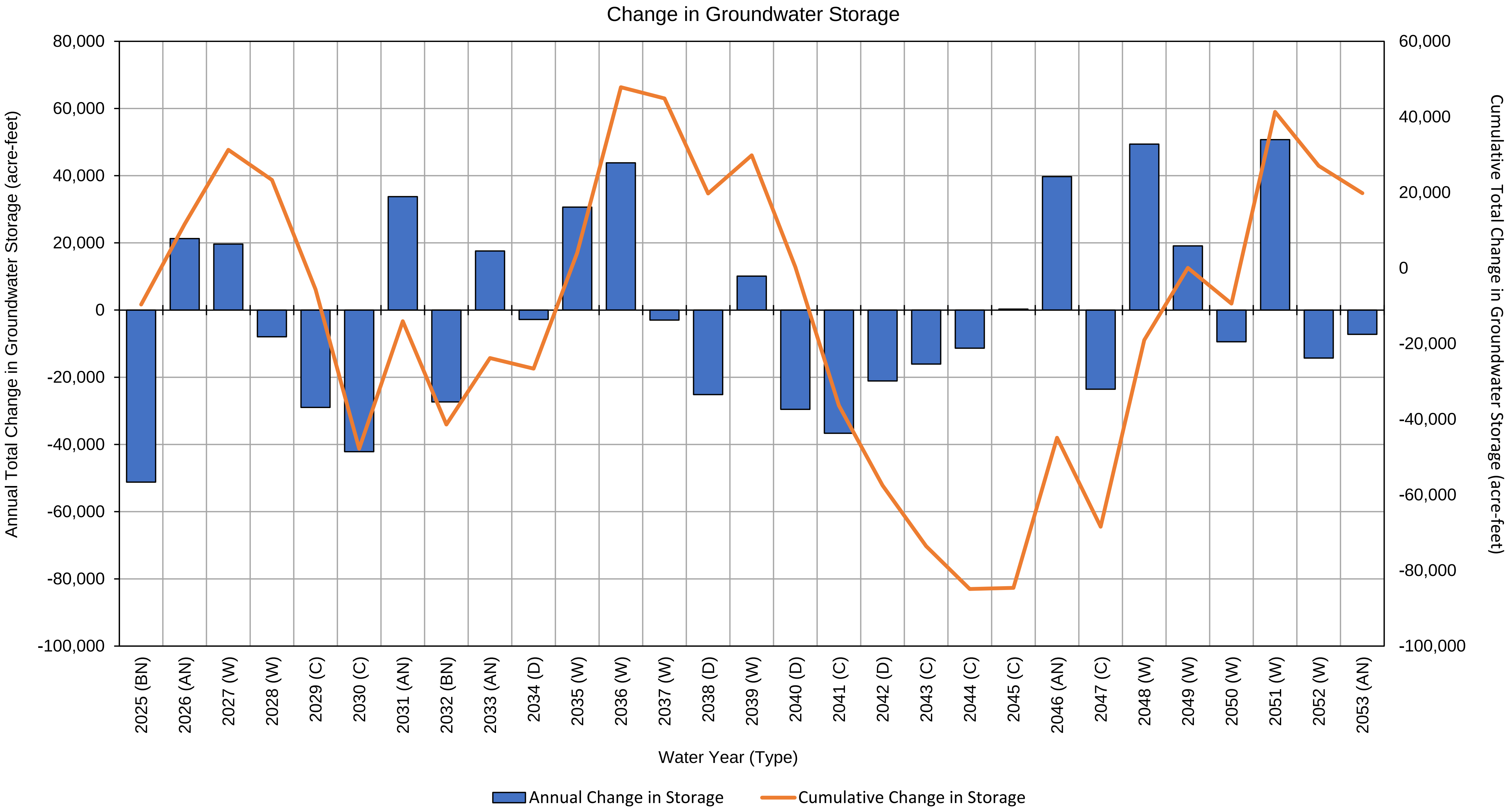
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-120,000	20,000	17,000	-86,000
2023 (W)	-130,000	18,000	16,000	-95,000
2024 (W)	-130,000	17,000	15,000	-99,000
2025 (BN)	-120,000	19,000	14,000	-86,000
2026 (AN)	-130,000	21,000	14,000	-91,000
2027 (W)	-130,000	20,000	13,000	-99,000
2028 (W)	-130,000	19,000	12,000	-100,000
2029 (C)	-120,000	21,000	12,000	-92,000
2030 (C)	-110,000	24,000	12,000	-78,000
2031 (AN)	-130,000	24,000	12,000	-88,000
2032 (BN)	-120,000	25,000	11,000	-83,000
2033 (AN)	-120,000	26,000	11,000	-87,000
2034 (D)	-130,000	25,000	10,000	-92,000
2035 (W)	-130,000	24,000	11,000	-97,000
2036 (W)	-140,000	23,000	10,000	-110,000
2037 (W)	-140,000	19,000	9,600	-110,000
2038 (D)	-130,000	19,000	9,400	-100,000
2039 (W)	-130,000	20,000	10,000	-100,000
2040 (D)	-120,000	20,000	10,000	-94,000
2041 (C)	-120,000	23,000	10,000	-83,000
2042 (D)	-110,000	25,000	11,000	-79,000
2043 (C)	-110,000	28,000	11,000	-74,000
2044 (C)	-110,000	29,000	11,000	-72,000
2045 (C)	-120,000	29,000	11,000	-75,000
2046 (AN)	-130,000	28,000	11,000	-88,000
2047 (C)	-120,000	28,000	10,000	-82,000
2048 (W)	-130,000	28,000	10,000	-91,000
2049 (W)	-130,000	24,000	9,800	-99,000
2050 (W)	-130,000	23,000	9,500	-96,000
2051 (W)	-140,000	23,000	10,000	-100,000
2052 (W)	-140,000	20,000	9,200	-110,000
2053 (AN)	-130,000	20,000	9,800	-99,000
2054 (D)	-120,000	21,000	10,000	-92,000
2055 (D)	-130,000	22,000	9,900	-93,000
2056 (AN)	-130,000	23,000	10,000	-97,000
2057 (BN)	-130,000	22,000	10,000	-99,000
2058 (AN)	-130,000	20,000	9,800	-100,000
2059 (W)	-130,000	20,000	9,800	-100,000
2060 (D)	-120,000	20,000	9,500	-92,000
2061 (C)	-120,000	23,000	10,000	-86,000
2062 (D)	-120,000	26,000	10,000	-81,000
2063 (BN)	-120,000	26,000	11,000	-87,000
2064 (W)	-130,000	26,000	10,000	-94,000
2065 (BN)	-120,000	26,000	10,000	-85,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2066 (D)		-120,000	27,000	10,000	-82,000
2067 (C)		-110,000	29,000	11,000	-72,000
2068 (C)		-120,000	31,000	11,000	-74,000
2069 (BN)		-120,000	30,000	11,000	-80,000
2070 (W)		-130,000	28,000	11,000	-93,000
2071 (BN)		-120,000	27,000	11,000	-82,000
2072 (W)		-130,000	28,000	11,000	-88,000
Average (2022-2072)		-130,000	24,000	11,000	-90,000
2022-2072	W	-130,000	22,000	11,000	-98,000
	AN	-130,000	23,000	11,000	-93,000
	BN	-120,000	25,000	11,000	-86,000
	D	-120,000	23,000	10,000	-90,000
	C	-120,000	27,000	11,000	-79,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	23,000	23,000
2023 (W)	13,000	36,000
2024 (W)	6,000	42,000
2025 (BN)	-51,000	-9,700
2026 (AN)	21,000	12,000
2027 (W)	20,000	31,000
2028 (W)	-8,000	23,000
2029 (C)	-29,000	-5,700
2030 (C)	-42,000	-48,000
2031 (AN)	34,000	-14,000
2032 (BN)	-27,000	-41,000
2033 (AN)	18,000	-24,000
2034 (D)	-2,800	-27,000
2035 (W)	31,000	4,000
2036 (W)	44,000	48,000
2037 (W)	-3,000	45,000
2038 (D)	-25,000	20,000
2039 (W)	10,000	30,000
2040 (D)	-30,000	280
2041 (C)	-37,000	-36,000
2042 (D)	-21,000	-57,000
2043 (C)	-16,000	-74,000
2044 (C)	-11,000	-85,000
2045 (C)	290	-85,000
2046 (AN)	40,000	-45,000
2047 (C)	-24,000	-68,000
2048 (W)	49,000	-19,000
2049 (W)	19,000	47
2050 (W)	-9,400	-9,400
2051 (W)	51,000	41,000
2052 (W)	-14,000	27,000
2053 (AN)	-7,200	20,000
2054 (D)	-26,000	-6,400
2055 (D)	-7,500	-14,000
2056 (AN)	21,000	7,100
2057 (BN)	-1,200	6,000
2058 (AN)	11,000	17,000
2059 (W)	15,000	32,000
2060 (D)	-43,000	-11,000
2061 (C)	-17,000	-28,000
2062 (D)	-20,000	-48,000
2063 (BN)	20,000	-28,000
2064 (W)	16,000	-12,000
2065 (BN)	-29,000	-41,000

Bowman Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-12,000	-54,000
2067 (C)		-30,000	-83,000
2068 (C)		-5,800	-89,000
2069 (BN)		23,000	-66,000
2070 (W)		40,000	-26,000
2071 (BN)		-35,000	-61,000
2072 (W)		34,000	-27,000
Average (2022-2072)		-530	
2022-2072	W		
	AN		
	BN		
	D		
	C		

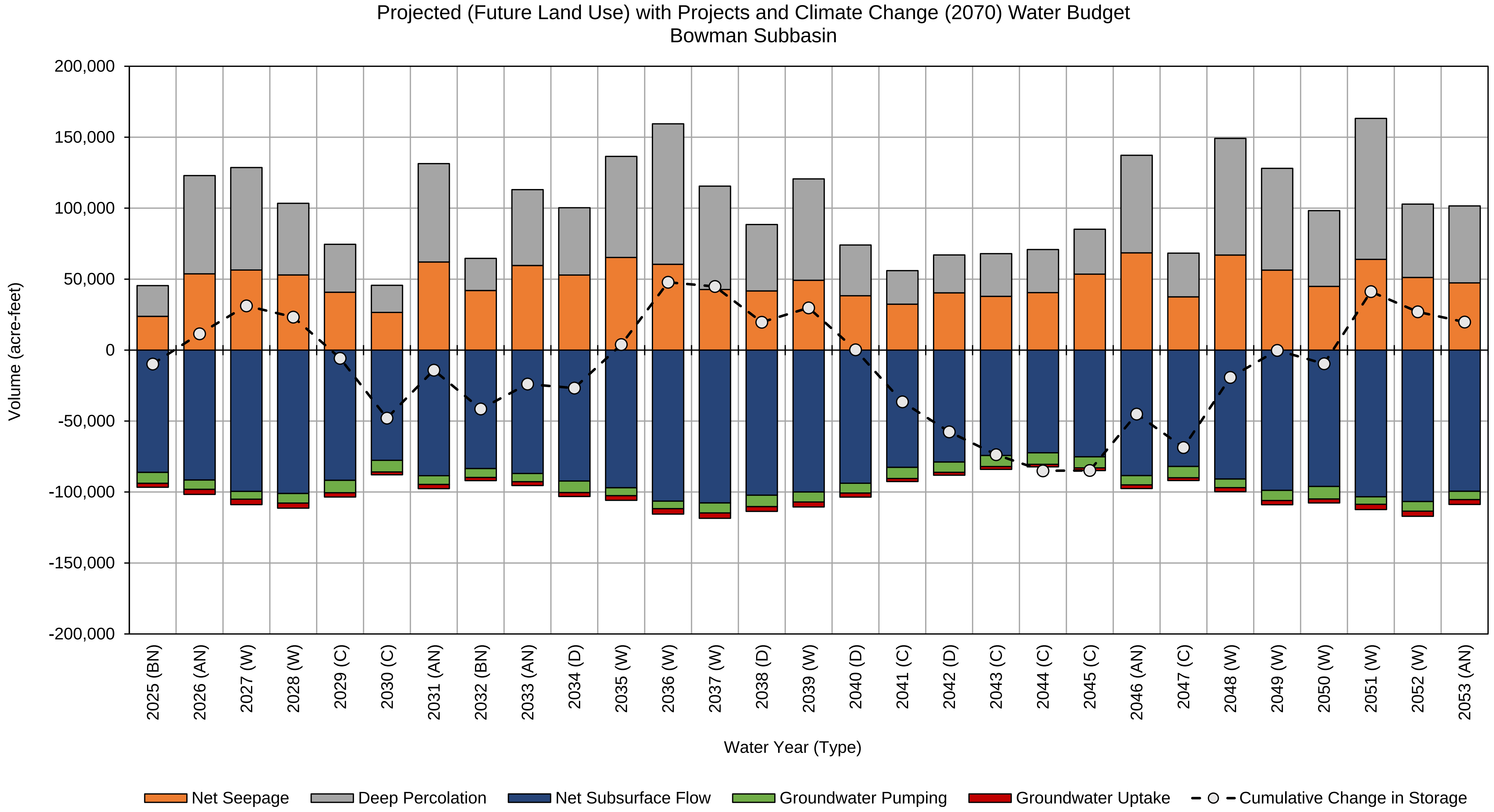
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX B-8

Detailed Bowman Subbasin Water Budget Results:

Projected (Future Land Use) with Projects and Climate Change (2070) Model Results



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

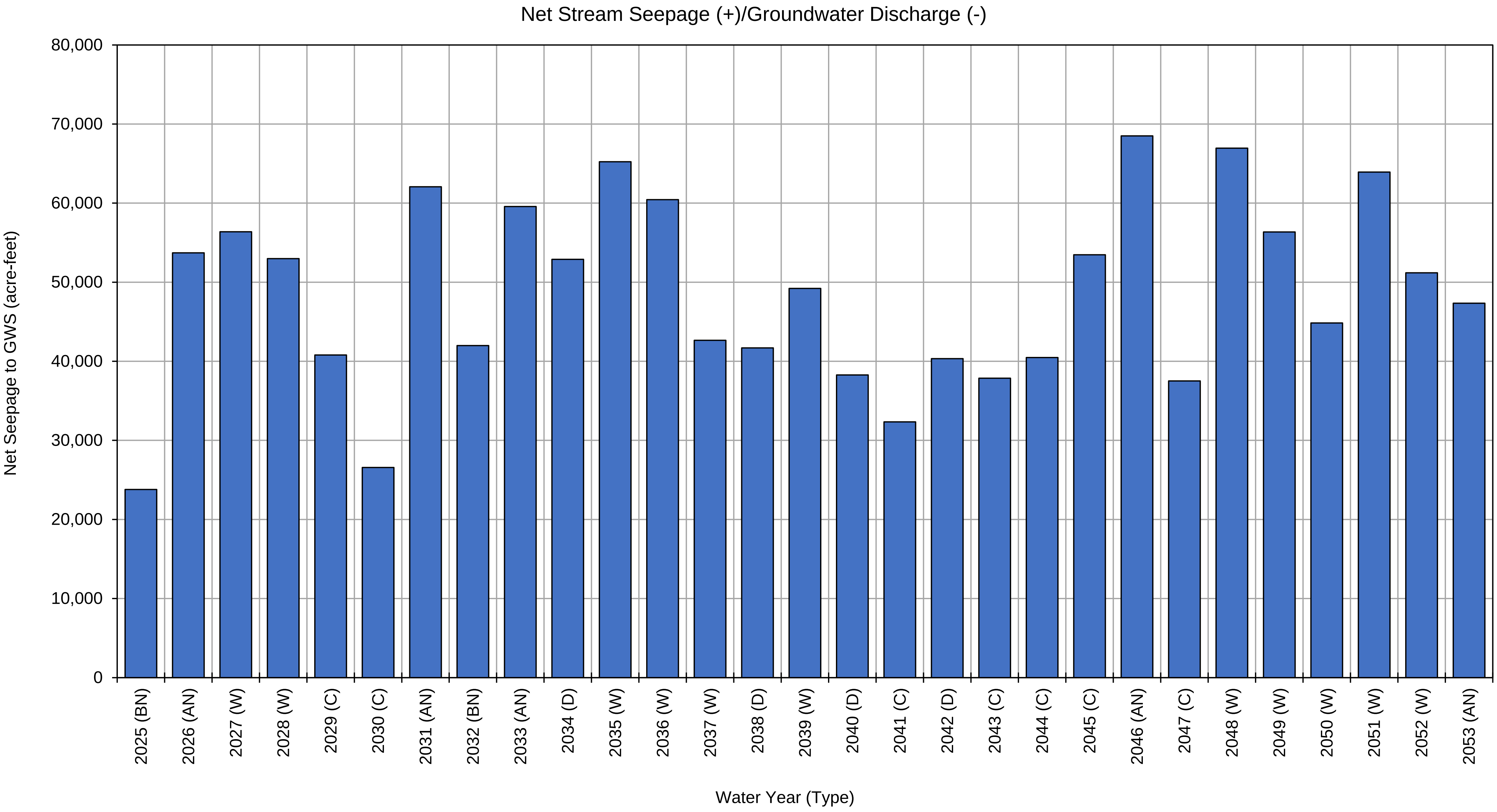
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	51,000	69,000	-7,500	-3,900	-86,000	23,000	23,000
2023 (W)	47,000	72,000	-7,200	-3,900	-95,000	13,000	35,000
2024 (W)	45,000	72,000	-7,300	-3,900	-100,000	6,000	41,000
2025 (BN)	24,000	22,000	-7,700	-2,800	-86,000	-51,000	-9,800
2026 (AN)	54,000	69,000	-6,600	-3,500	-92,000	21,000	12,000
2027 (W)	56,000	72,000	-5,600	-3,800	-100,000	20,000	31,000
2028 (W)	53,000	50,000	-6,800	-3,500	-100,000	-8,000	23,000
2029 (C)	41,000	34,000	-8,800	-3,000	-92,000	-29,000	-5,700
2030 (C)	27,000	19,000	-8,200	-2,000	-78,000	-42,000	-48,000
2031 (AN)	62,000	69,000	-6,200	-2,900	-89,000	34,000	-14,000
2032 (BN)	42,000	23,000	-6,300	-2,100	-83,000	-27,000	-41,000
2033 (AN)	60,000	53,000	-5,800	-2,700	-87,000	18,000	-24,000
2034 (D)	53,000	47,000	-8,100	-2,700	-92,000	-2,800	-27,000
2035 (W)	65,000	71,000	-5,600	-3,300	-97,000	31,000	3,900
2036 (W)	60,000	99,000	-5,300	-3,800	-110,000	44,000	48,000
2037 (W)	43,000	73,000	-7,100	-3,800	-110,000	-3,000	45,000
2038 (D)	42,000	47,000	-8,100	-3,400	-100,000	-25,000	20,000
2039 (W)	49,000	71,000	-7,100	-3,400	-100,000	10,000	30,000
2040 (D)	38,000	36,000	-6,900	-2,800	-94,000	-30,000	230
2041 (C)	32,000	24,000	-7,900	-2,200	-83,000	-37,000	-36,000
2042 (D)	40,000	27,000	-7,300	-2,000	-79,000	-21,000	-58,000
2043 (C)	38,000	30,000	-7,800	-1,900	-74,000	-16,000	-74,000
2044 (C)	40,000	30,000	-8,100	-1,800	-72,000	-11,000	-85,000
2045 (C)	53,000	32,000	-7,800	-1,900	-75,000	250	-85,000
2046 (AN)	68,000	69,000	-6,600	-2,500	-88,000	40,000	-45,000
2047 (C)	38,000	31,000	-8,000	-1,900	-82,000	-24,000	-69,000
2048 (W)	67,000	82,000	-6,100	-2,800	-91,000	49,000	-19,000
2049 (W)	56,000	72,000	-7,100	-2,900	-99,000	19,000	-170
2050 (W)	45,000	53,000	-8,800	-2,700	-96,000	-9,500	-9,600
2051 (W)	64,000	99,000	-5,300	-3,700	-100,000	51,000	41,000
2052 (W)	51,000	52,000	-6,800	-3,600	-110,000	-14,000	27,000
2053 (AN)	47,000	54,000	-5,800	-3,400	-99,000	-7,200	20,000
2054 (D)	40,000	37,000	-7,100	-2,800	-92,000	-26,000	-6,400
2055 (D)	51,000	46,000	-8,100	-2,800	-93,000	-7,500	-14,000
2056 (AN)	60,000	66,000	-5,700	-3,000	-97,000	21,000	7,100
2057 (BN)	50,000	59,000	-7,400	-3,200	-99,000	-1,200	5,900
2058 (AN)	60,000	61,000	-5,500	-3,100	-100,000	11,000	17,000
2059 (W)	56,000	72,000	-5,600	-3,600	-100,000	15,000	32,000
2060 (D)	32,000	26,000	-7,200	-2,500	-92,000	-44,000	-11,000
2061 (C)	46,000	34,000	-8,600	-2,600	-86,000	-17,000	-28,000
2062 (D)	44,000	26,000	-6,800	-2,100	-81,000	-20,000	-48,000
2063 (BN)	62,000	54,000	-6,100	-2,500	-87,000	20,000	-28,000
2064 (W)	65,000	53,000	-5,500	-2,800	-94,000	16,000	-12,000
2065 (BN)	42,000	23,000	-6,300	-2,100	-85,000	-29,000	-41,000

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		43,000	38,000	-8,900	-2,200	-82,000	-12,000	-54,000
2067 (C)		33,000	19,000	-8,600	-1,700	-72,000	-30,000	-83,000
2068 (C)		46,000	34,000	-9,900	-1,800	-74,000	-5,800	-89,000
2069 (BN)		62,000	50,000	-7,800	-2,100	-80,000	23,000	-67,000
2070 (W)		70,000	73,000	-6,300	-2,600	-93,000	40,000	-26,000
2071 (BN)		35,000	21,000	-7,700	-1,800	-82,000	-35,000	-61,000
2072 (W)		64,000	67,000	-7,000	-2,700	-88,000	34,000	-27,000
Average (2022-2072)		49,000	51,000	-7,100	-2,800	-91,000	-530	
2022-2072	W	56,000	71,000	-6,500	-3,400	-98,000		
	AN	59,000	63,000	-6,000	-3,000	-93,000		
	BN	45,000	36,000	-7,100	-2,400	-86,000		
	D	42,000	37,000	-7,600	-2,600	-90,000		
	C	39,000	29,000	-8,400	-2,100	-79,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

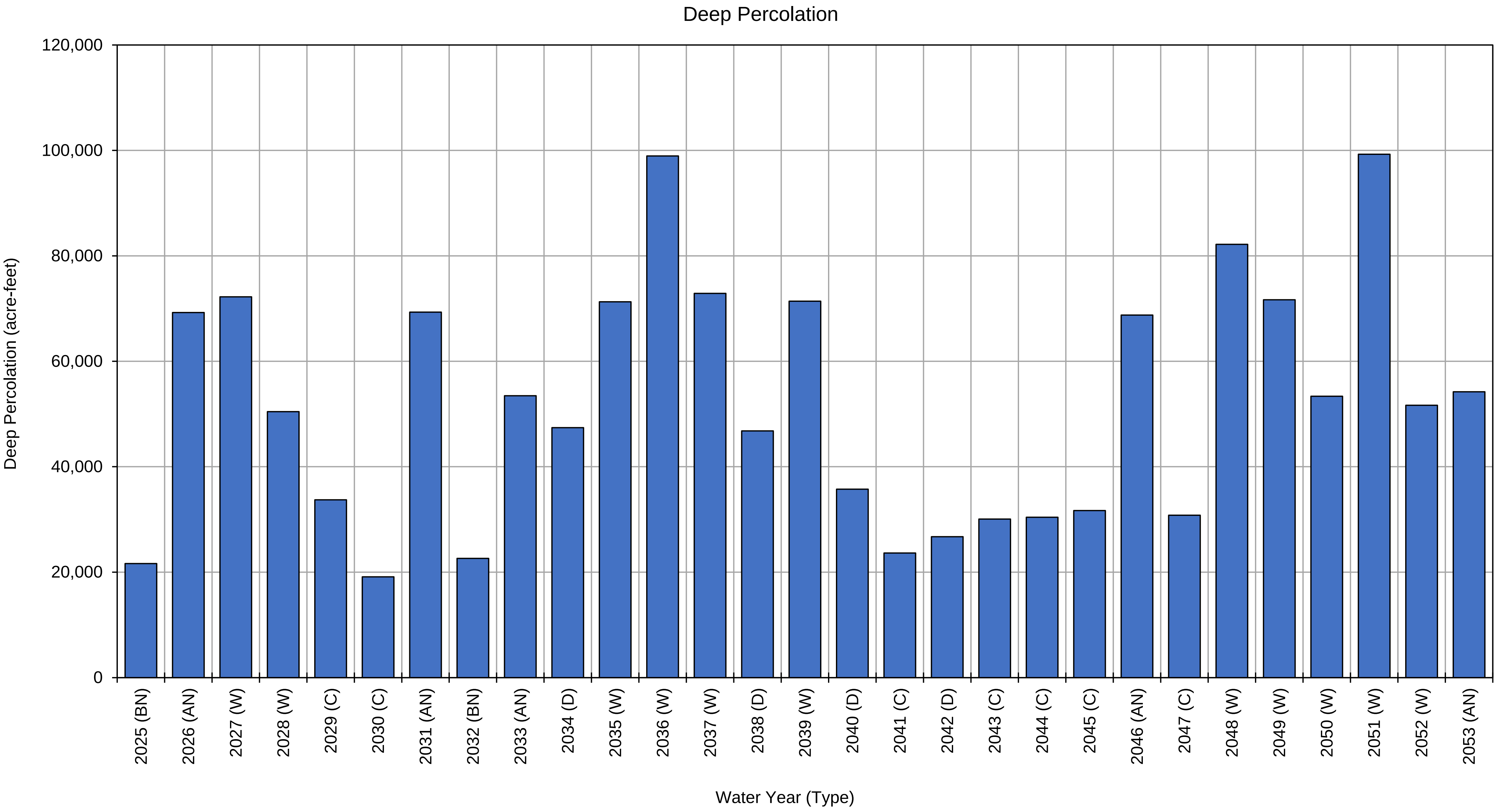
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	51,000
2023 (W)	47,000
2024 (W)	45,000
2025 (BN)	24,000
2026 (AN)	54,000
2027 (W)	56,000
2028 (W)	53,000
2029 (C)	41,000
2030 (C)	27,000
2031 (AN)	62,000
2032 (BN)	42,000
2033 (AN)	60,000
2034 (D)	53,000
2035 (W)	65,000
2036 (W)	60,000
2037 (W)	43,000
2038 (D)	42,000
2039 (W)	49,000
2040 (D)	38,000
2041 (C)	32,000
2042 (D)	40,000
2043 (C)	38,000
2044 (C)	40,000
2045 (C)	53,000
2046 (AN)	68,000
2047 (C)	38,000
2048 (W)	67,000
2049 (W)	56,000
2050 (W)	45,000
2051 (W)	64,000
2052 (W)	51,000
2053 (AN)	47,000
2054 (D)	40,000
2055 (D)	51,000
2056 (AN)	60,000
2057 (BN)	50,000
2058 (AN)	60,000
2059 (W)	56,000
2060 (D)	32,000
2061 (C)	46,000
2062 (D)	44,000
2063 (BN)	62,000
2064 (W)	65,000
2065 (BN)	42,000

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2066 (D)		43,000
2067 (C)		33,000
2068 (C)		46,000
2069 (BN)		62,000
2070 (W)		70,000
2071 (BN)		35,000
2072 (W)		64,000
Average (2022-2072)		49,000
2022-2072	W	56,000
	AN	59,000
	BN	45,000
	D	42,000
	C	39,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

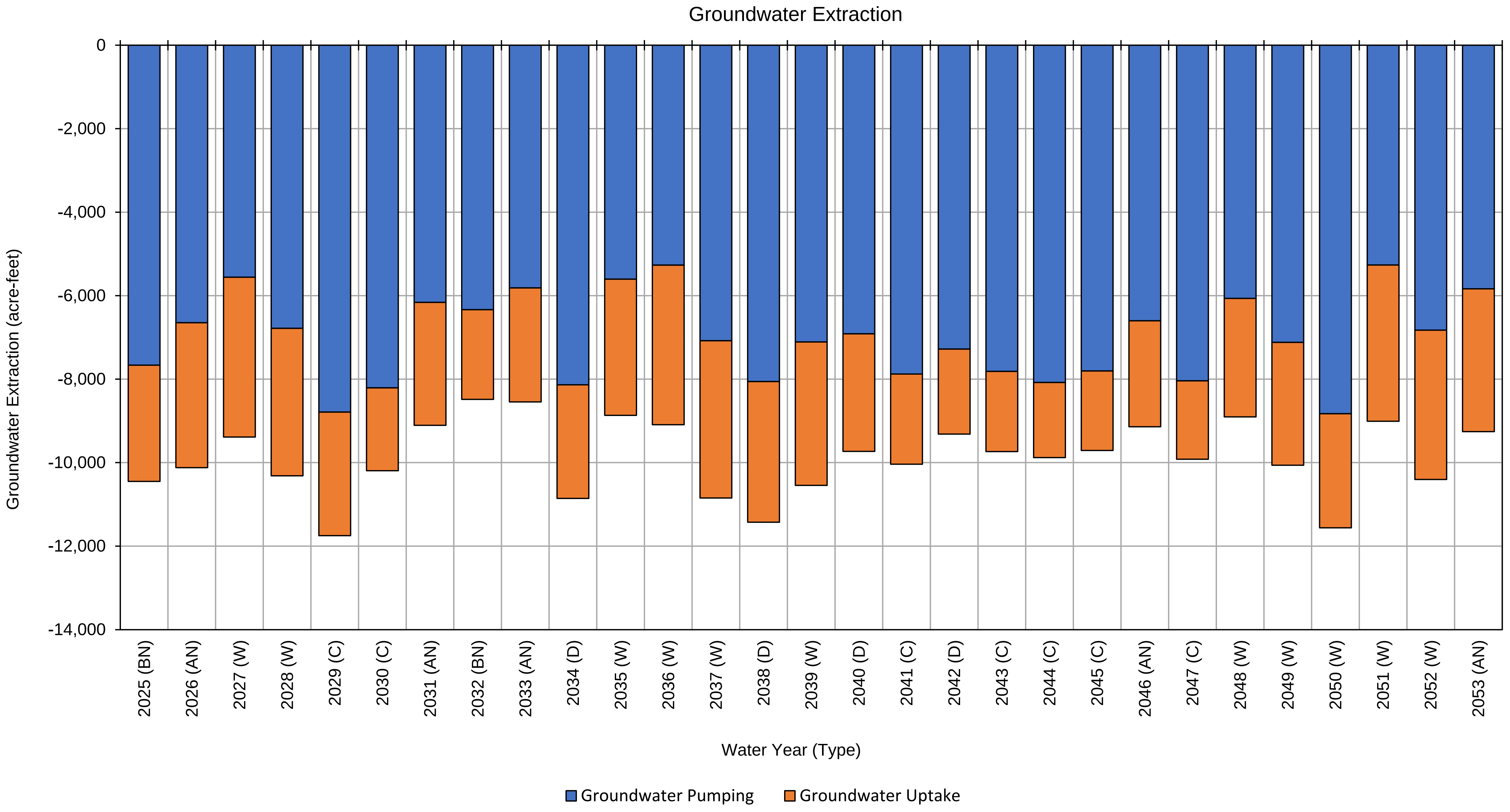
WY (Type)	Deep Percolation from the SWS
2022 (W)	69,000
2023 (W)	72,000
2024 (W)	72,000
2025 (BN)	22,000
2026 (AN)	69,000
2027 (W)	72,000
2028 (W)	50,000
2029 (C)	34,000
2030 (C)	19,000
2031 (AN)	69,000
2032 (BN)	23,000
2033 (AN)	53,000
2034 (D)	47,000
2035 (W)	71,000
2036 (W)	99,000
2037 (W)	73,000
2038 (D)	47,000
2039 (W)	71,000
2040 (D)	36,000
2041 (C)	24,000
2042 (D)	27,000
2043 (C)	30,000
2044 (C)	30,000
2045 (C)	32,000
2046 (AN)	69,000
2047 (C)	31,000
2048 (W)	82,000
2049 (W)	72,000
2050 (W)	53,000
2051 (W)	99,000
2052 (W)	52,000
2053 (AN)	54,000
2054 (D)	37,000
2055 (D)	46,000
2056 (AN)	66,000
2057 (BN)	59,000
2058 (AN)	61,000
2059 (W)	72,000
2060 (D)	26,000
2061 (C)	34,000
2062 (D)	26,000
2063 (BN)	54,000
2064 (W)	53,000
2065 (BN)	23,000

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2066 (D)		38,000
2067 (C)		19,000
2068 (C)		34,000
2069 (BN)		50,000
2070 (W)		73,000
2071 (BN)		21,000
2072 (W)		67,000
Average (2022-2072)		51,000
2022-2072	W	71,000
	AN	63,000
	BN	36,000
	D	37,000
	C	29,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

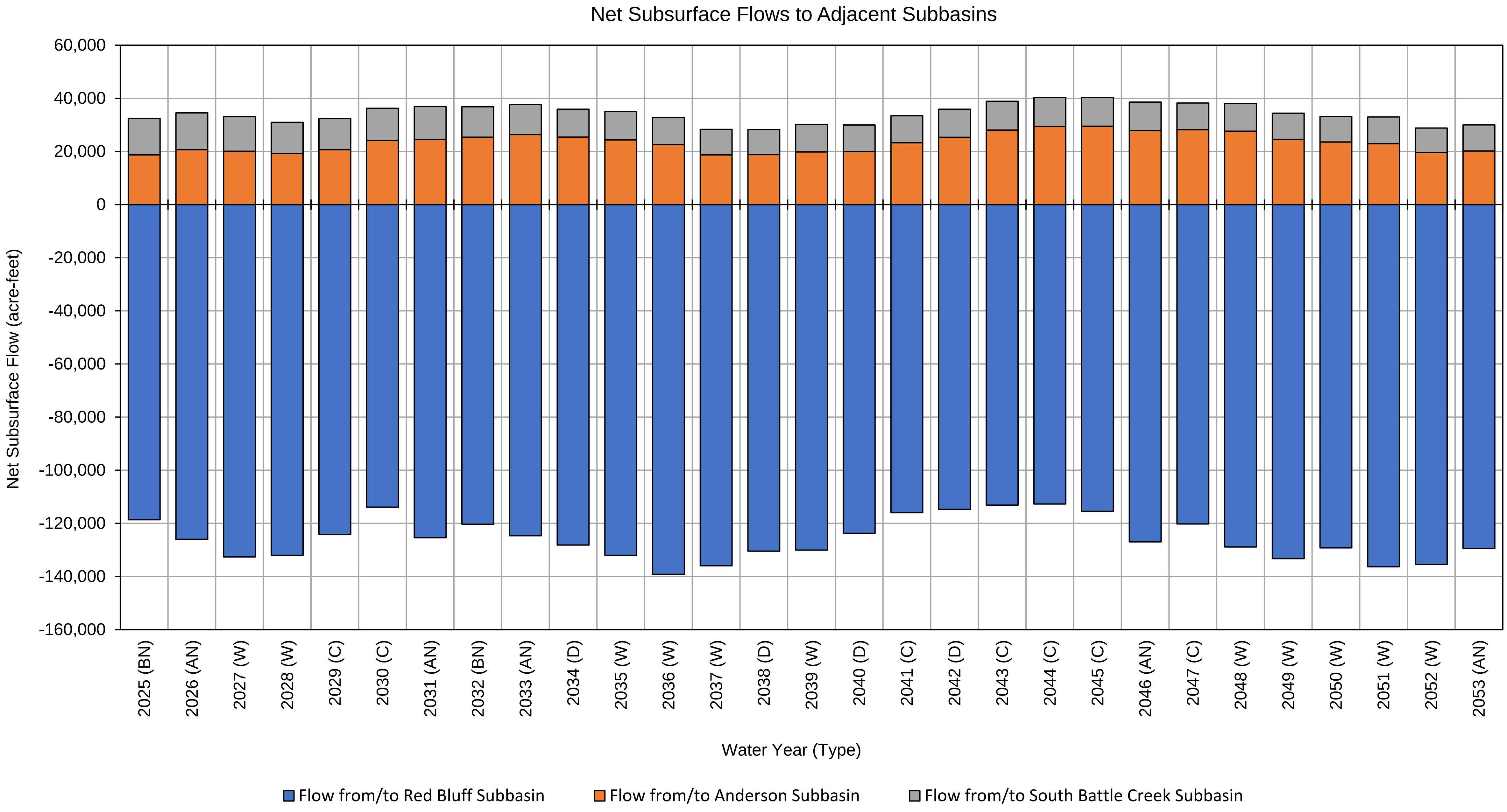
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-7,500	-3,900	-11,000
2023 (W)	-7,200	-3,900	-11,000
2024 (W)	-7,300	-3,900	-11,000
2025 (BN)	-7,700	-2,800	-10,000
2026 (AN)	-6,600	-3,500	-10,000
2027 (W)	-5,600	-3,800	-9,400
2028 (W)	-6,800	-3,500	-10,000
2029 (C)	-8,800	-3,000	-12,000
2030 (C)	-8,200	-2,000	-10,000
2031 (AN)	-6,200	-2,900	-9,100
2032 (BN)	-6,300	-2,100	-8,500
2033 (AN)	-5,800	-2,700	-8,500
2034 (D)	-8,100	-2,700	-11,000
2035 (W)	-5,600	-3,300	-8,900
2036 (W)	-5,300	-3,800	-9,100
2037 (W)	-7,100	-3,800	-11,000
2038 (D)	-8,100	-3,400	-11,000
2039 (W)	-7,100	-3,400	-11,000
2040 (D)	-6,900	-2,800	-9,700
2041 (C)	-7,900	-2,200	-10,000
2042 (D)	-7,300	-2,000	-9,300
2043 (C)	-7,800	-1,900	-9,700
2044 (C)	-8,100	-1,800	-9,900
2045 (C)	-7,800	-1,900	-9,700
2046 (AN)	-6,600	-2,500	-9,100
2047 (C)	-8,000	-1,900	-9,900
2048 (W)	-6,100	-2,800	-8,900
2049 (W)	-7,100	-2,900	-10,000
2050 (W)	-8,800	-2,700	-12,000
2051 (W)	-5,300	-3,700	-9,000
2052 (W)	-6,800	-3,600	-10,000
2053 (AN)	-5,800	-3,400	-9,300
2054 (D)	-7,100	-2,800	-9,900
2055 (D)	-8,100	-2,800	-11,000
2056 (AN)	-5,700	-3,000	-8,700
2057 (BN)	-7,400	-3,200	-11,000
2058 (AN)	-5,500	-3,100	-8,600
2059 (W)	-5,600	-3,600	-9,200
2060 (D)	-7,200	-2,500	-9,700
2061 (C)	-8,600	-2,600	-11,000
2062 (D)	-6,800	-2,100	-8,900
2063 (BN)	-6,100	-2,500	-8,600
2064 (W)	-5,500	-2,800	-8,300
2065 (BN)	-6,300	-2,100	-8,500

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2066 (D)		-8,900	-2,200	-11,000
2067 (C)		-8,600	-1,700	-10,000
2068 (C)		-9,900	-1,800	-12,000
2069 (BN)		-7,800	-2,100	-9,900
2070 (W)		-6,300	-2,600	-9,000
2071 (BN)		-7,700	-1,800	-9,600
2072 (W)		-7,000	-2,700	-9,700
Average (2022-2072)		-7,100	-2,800	-9,900
2022-2072	W	-6,500	-3,400	-9,900
	AN	-6,000	-3,000	-9,100
	BN	-7,100	-2,400	-9,500
	D	-7,600	-2,600	-10,000
	C	-8,400	-2,100	-10,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

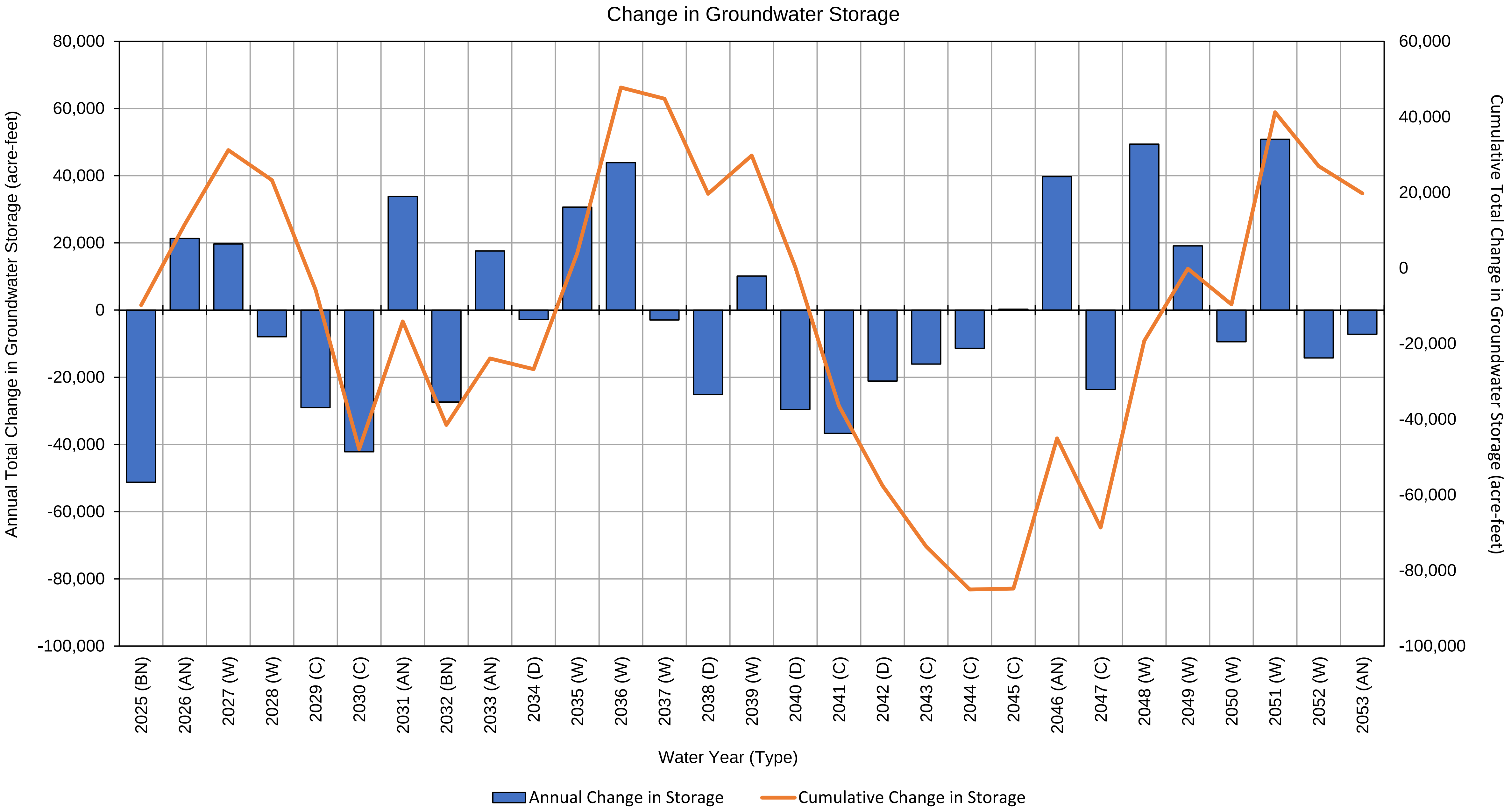
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-120,000	20,000	17,000	-86,000
2023 (W)	-130,000	19,000	16,000	-95,000
2024 (W)	-130,000	17,000	15,000	-100,000
2025 (BN)	-120,000	19,000	14,000	-86,000
2026 (AN)	-130,000	21,000	14,000	-92,000
2027 (W)	-130,000	20,000	13,000	-100,000
2028 (W)	-130,000	19,000	12,000	-100,000
2029 (C)	-120,000	21,000	12,000	-92,000
2030 (C)	-110,000	24,000	12,000	-78,000
2031 (AN)	-130,000	25,000	12,000	-89,000
2032 (BN)	-120,000	25,000	11,000	-83,000
2033 (AN)	-120,000	26,000	11,000	-87,000
2034 (D)	-130,000	25,000	10,000	-92,000
2035 (W)	-130,000	24,000	11,000	-97,000
2036 (W)	-140,000	23,000	10,000	-110,000
2037 (W)	-140,000	19,000	9,600	-110,000
2038 (D)	-130,000	19,000	9,400	-100,000
2039 (W)	-130,000	20,000	10,000	-100,000
2040 (D)	-120,000	20,000	10,000	-94,000
2041 (C)	-120,000	23,000	10,000	-83,000
2042 (D)	-110,000	25,000	11,000	-79,000
2043 (C)	-110,000	28,000	11,000	-74,000
2044 (C)	-110,000	29,000	11,000	-72,000
2045 (C)	-120,000	30,000	11,000	-75,000
2046 (AN)	-130,000	28,000	11,000	-88,000
2047 (C)	-120,000	28,000	10,000	-82,000
2048 (W)	-130,000	28,000	10,000	-91,000
2049 (W)	-130,000	25,000	9,900	-99,000
2050 (W)	-130,000	24,000	9,600	-96,000
2051 (W)	-140,000	23,000	10,000	-100,000
2052 (W)	-140,000	20,000	9,200	-110,000
2053 (AN)	-130,000	20,000	9,800	-99,000
2054 (D)	-120,000	21,000	10,000	-92,000
2055 (D)	-130,000	23,000	10,000	-93,000
2056 (AN)	-130,000	23,000	10,000	-97,000
2057 (BN)	-130,000	22,000	10,000	-99,000
2058 (AN)	-130,000	20,000	9,800	-100,000
2059 (W)	-130,000	20,000	9,800	-100,000
2060 (D)	-120,000	20,000	9,500	-92,000
2061 (C)	-120,000	23,000	10,000	-86,000
2062 (D)	-120,000	26,000	10,000	-81,000
2063 (BN)	-120,000	26,000	11,000	-87,000
2064 (W)	-130,000	26,000	10,000	-94,000
2065 (BN)	-120,000	26,000	10,000	-85,000

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Anderson Subbasin	Flow from/to South Battle Creek Subbasin	Net Subsurface Flow from Adjacent Subbasins
2066 (D)		-120,000	27,000	10,000	-82,000
2067 (C)		-110,000	29,000	11,000	-72,000
2068 (C)		-120,000	31,000	11,000	-74,000
2069 (BN)		-120,000	30,000	11,000	-80,000
2070 (W)		-130,000	28,000	11,000	-93,000
2071 (BN)		-120,000	28,000	11,000	-82,000
2072 (W)		-130,000	28,000	11,000	-88,000
Average (2022-2072)		-130,000	24,000	11,000	-91,000
2022-2072	W	-130,000	22,000	11,000	-98,000
	AN	-130,000	23,000	11,000	-93,000
	BN	-120,000	25,000	11,000	-86,000
	D	-120,000	23,000	10,000	-90,000
	C	-120,000	27,000	11,000	-79,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	23,000	23,000
2023 (W)	13,000	35,000
2024 (W)	6,000	41,000
2025 (BN)	-51,000	-9,800
2026 (AN)	21,000	12,000
2027 (W)	20,000	31,000
2028 (W)	-8,000	23,000
2029 (C)	-29,000	-5,700
2030 (C)	-42,000	-48,000
2031 (AN)	34,000	-14,000
2032 (BN)	-27,000	-41,000
2033 (AN)	18,000	-24,000
2034 (D)	-2,800	-27,000
2035 (W)	31,000	3,900
2036 (W)	44,000	48,000
2037 (W)	-3,000	45,000
2038 (D)	-25,000	20,000
2039 (W)	10,000	30,000
2040 (D)	-30,000	230
2041 (C)	-37,000	-36,000
2042 (D)	-21,000	-58,000
2043 (C)	-16,000	-74,000
2044 (C)	-11,000	-85,000
2045 (C)	250	-85,000
2046 (AN)	40,000	-45,000
2047 (C)	-24,000	-69,000
2048 (W)	49,000	-19,000
2049 (W)	19,000	-170
2050 (W)	-9,500	-9,600
2051 (W)	51,000	41,000
2052 (W)	-14,000	27,000
2053 (AN)	-7,200	20,000
2054 (D)	-26,000	-6,400
2055 (D)	-7,500	-14,000
2056 (AN)	21,000	7,100
2057 (BN)	-1,200	5,900
2058 (AN)	11,000	17,000
2059 (W)	15,000	32,000
2060 (D)	-44,000	-11,000
2061 (C)	-17,000	-28,000
2062 (D)	-20,000	-48,000
2063 (BN)	20,000	-28,000
2064 (W)	16,000	-12,000
2065 (BN)	-29,000	-41,000

Bowman Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-12,000	-54,000
2067 (C)		-30,000	-83,000
2068 (C)		-5,800	-89,000
2069 (BN)		23,000	-67,000
2070 (W)		40,000	-26,000
2071 (BN)		-35,000	-61,000
2072 (W)		34,000	-27,000
Average (2022-2072)		-530	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

Appendix C. Detailed Los Molinos Subbasin Water Budget Results

APPENDIX C

Detailed Los Molinos Subbasin Water Budget Results

C-1	Historical Model Results
C-2	Projected (Current Land Use) Model Results
C-3	Projected (Future Land Use) Model Results
C-4	Projected (Current Land Use) with Climate Change (2030) Model Results
C-5	Projected (Current Land Use) with Climate Change (2070) Model Results
C-6	Projected (Future Land Use) with Climate Change (2030) Model Results
C-7	Projected (Future Land Use) with Climate Change (2070) Model Results
C-8	Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

APPENDIX C-1

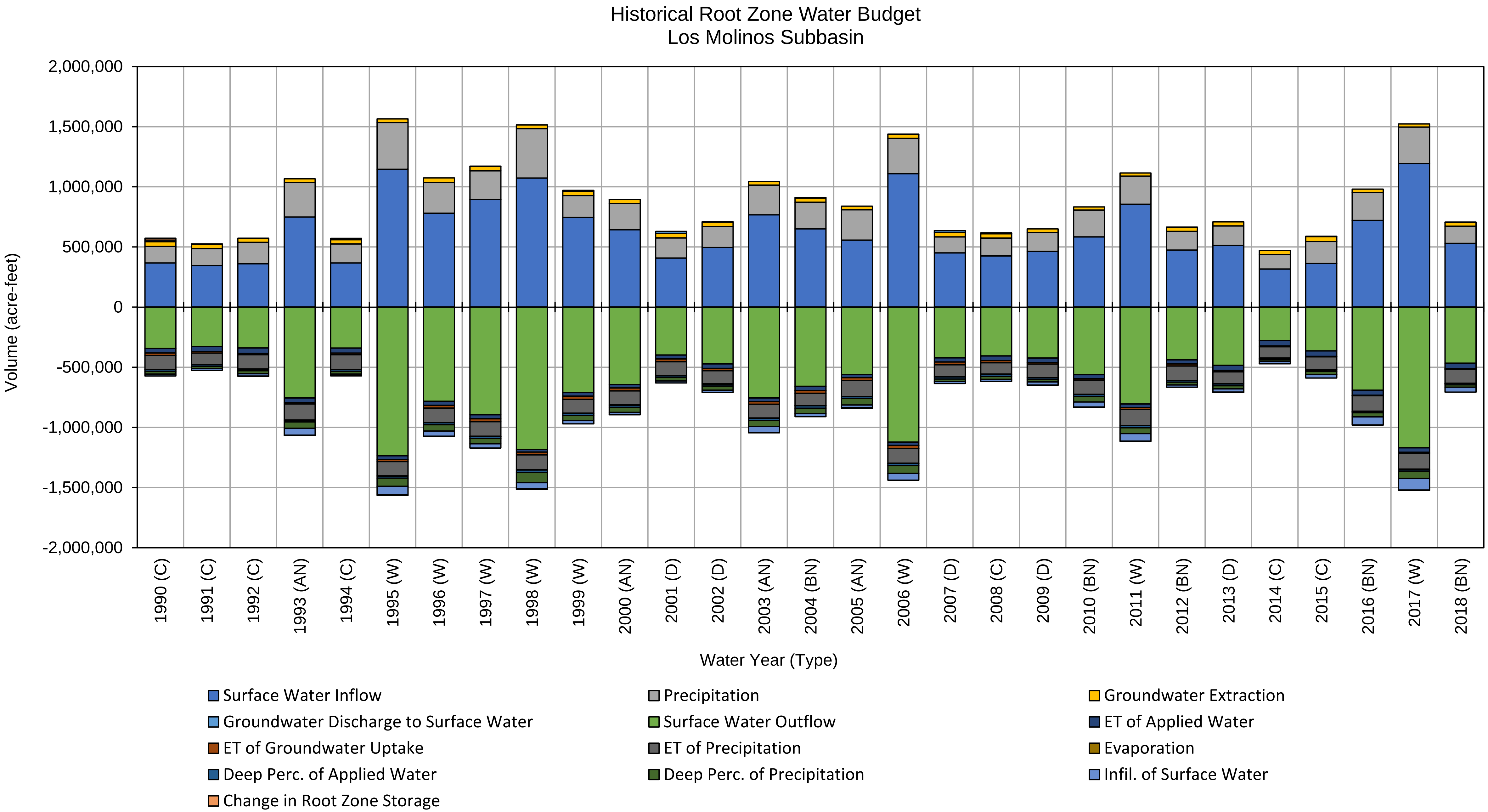
Detailed Los Molinos Subbasin Water Budget Results:

Historical Model Results

APPENDIX C-1a

Detailed Los Molinos Subbasin Water Budget Results:

Historical Model Results – Surface Water System



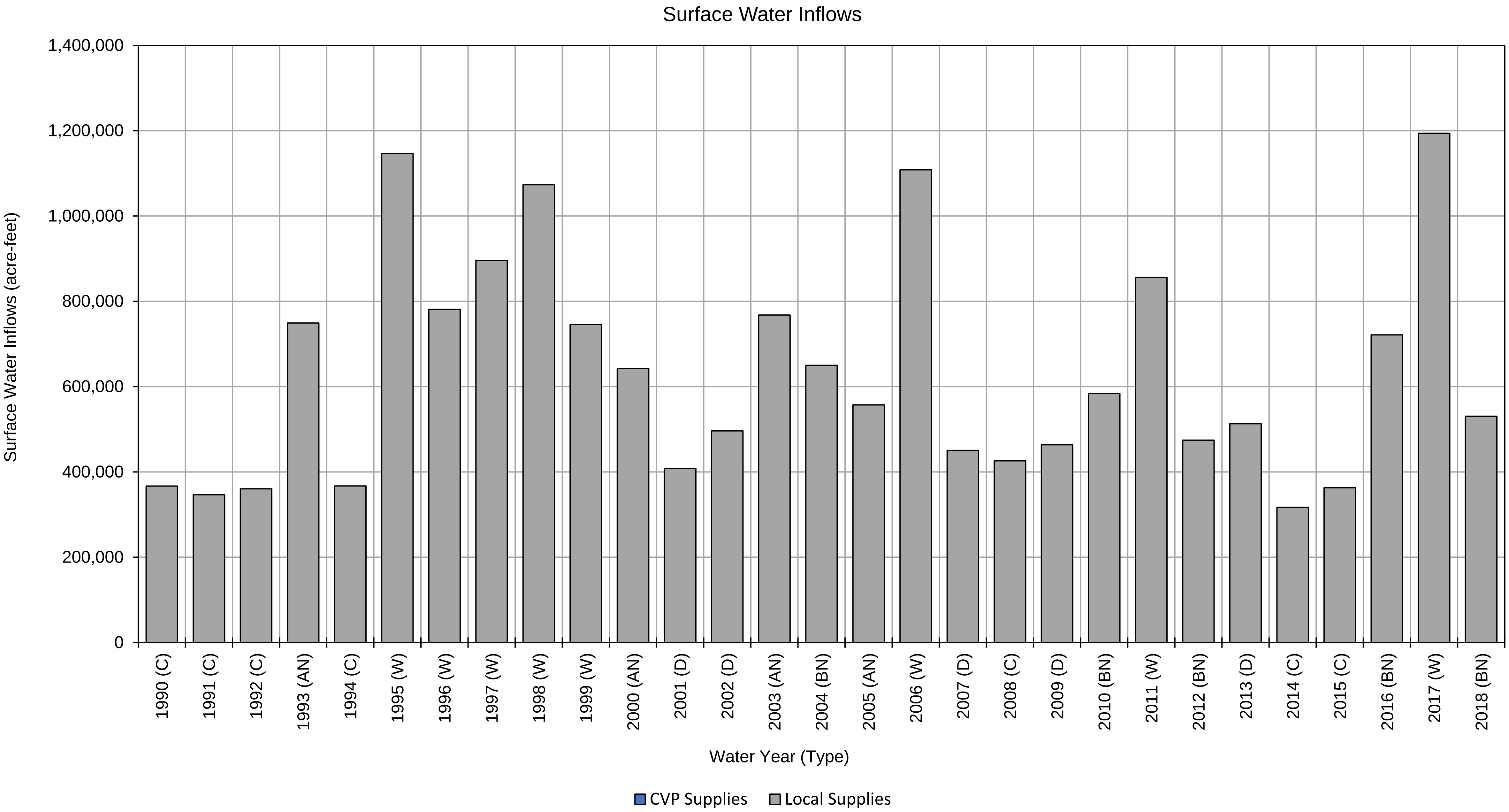
Tehama IHM - Historical

Los Molinos Subbasin Historical Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
1990 (C)		370,000	140,000	38,000	14,000	340,000	38,000	20,000	120,000	910	13,000	24,000	16,000	-16,000
1991 (C)		350,000	140,000	35,000	2,800	330,000	43,000	13,000	96,000	940	13,000	18,000	15,000	-1,400
1992 (C)		360,000	180,000	34,000	0	340,000	46,000	10,000	120,000	910	13,000	25,000	19,000	96
1993 (AN)		750,000	290,000	30,000	0	750,000	37,000	13,000	130,000	870	15,000	52,000	58,000	2,700
1994 (C)		370,000	160,000	35,000	8,100	340,000	41,000	14,000	120,000	840	13,000	24,000	15,000	-3,600
1995 (W)		1,100,000	390,000	30,000	0	1,200,000	31,000	17,000	120,000	1,100	18,000	68,000	71,000	4,000
1996 (W)		780,000	260,000	37,000	0	780,000	33,000	23,000	120,000	1,700	17,000	52,000	43,000	400
1997 (W)		900,000	240,000	38,000	0	890,000	34,000	24,000	120,000	2,300	17,000	44,000	35,000	-420
1998 (W)		1,100,000	410,000	32,000	0	1,200,000	23,000	24,000	120,000	1,600	19,000	86,000	52,000	3,900
1999 (W)		750,000	180,000	36,000	0	710,000	29,000	27,000	110,000	3,000	17,000	41,000	28,000	-7,100
2000 (AN)		640,000	220,000	34,000	820	640,000	29,000	25,000	120,000	2,700	17,000	42,000	16,000	3,300
2001 (D)		410,000	170,000	37,000	15,000	400,000	33,000	23,000	120,000	2,900	13,000	29,000	16,000	-2,800
2002 (D)		500,000	170,000	36,000	0	470,000	37,000	21,000	110,000	3,000	16,000	34,000	18,000	-3,100
2003 (AN)		770,000	250,000	31,000	0	760,000	31,000	21,000	120,000	2,400	17,000	52,000	48,000	4,300
2004 (BN)		650,000	220,000	36,000	0	660,000	35,000	23,000	100,000	2,800	19,000	45,000	26,000	-3,600
2005 (AN)		560,000	250,000	30,000	0	560,000	27,000	21,000	140,000	1,800	15,000	53,000	21,000	4,300
2006 (W)		1,100,000	300,000	34,000	0	1,100,000	27,000	25,000	120,000	2,100	18,000	64,000	56,000	-890
2007 (D)		450,000	130,000	36,000	16,000	420,000	34,000	23,000	99,000	2,700	16,000	21,000	17,000	-310
2008 (C)		430,000	150,000	35,000	2,200	410,000	39,000	18,000	94,000	2,900	15,000	26,000	16,000	-4,600
2009 (D)		460,000	160,000	29,000	0	420,000	37,000	13,000	110,000	2,500	12,000	22,000	26,000	2,100
2010 (BN)		580,000	220,000	26,000	0	560,000	32,000	13,000	120,000	2,100	16,000	46,000	42,000	1,800
2011 (W)		860,000	230,000	26,000	0	810,000	29,000	17,000	130,000	2,000	19,000	48,000	62,000	1,900
2012 (BN)		470,000	160,000	31,000	0	440,000	34,000	17,000	120,000	2,400	13,000	23,000	19,000	-4,400
2013 (D)		510,000	160,000	33,000	0	480,000	43,000	12,000	98,000	2,700	15,000	26,000	27,000	2,300
2014 (C)		320,000	120,000	34,000	0	280,000	46,000	6,400	94,000	2,800	10,000	13,000	19,000	2,200
2015 (C)		360,000	180,000	39,000	0	360,000	45,000	4,200	110,000	2,500	11,000	26,000	30,000	-4,900
2016 (BN)		720,000	230,000	27,000	0	690,000	42,000	4,100	130,000	2,300	11,000	35,000	67,000	1,400
2017 (W)		1,200,000	300,000	26,000	0	1,200,000	36,000	8,700	130,000	2,100	14,000	61,000	96,000	2,200
2018 (BN)		530,000	140,000	32,000	0	470,000	44,000	7,800	110,000	2,500	12,000	19,000	42,000	-2,300
Average (1990-2018)		630,000	210,000	33,000	2,000	620,000	36,000	17,000	120,000	2,100	15,000	39,000	35,000	-630
1990-2018	W	970,000	290,000	32,000	0	990,000	30,000	21,000	120,000	2,000	17,000	58,000	55,000	490
	AN	680,000	250,000	31,000	200	680,000	31,000	20,000	130,000	2,000	16,000	50,000	36,000	3,600
	BN	590,000	200,000	30,000	0	560,000	37,000	13,000	120,000	2,400	14,000	34,000	39,000	-1,400
	D	470,000	160,000	34,000	6,200	440,000	37,000	18,000	110,000	2,800	15,000	27,000	21,000	-360
	C	360,000	150,000	36,000	3,900	340,000	43,000	12,000	110,000	1,700	13,000	22,000	19,000	-4,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



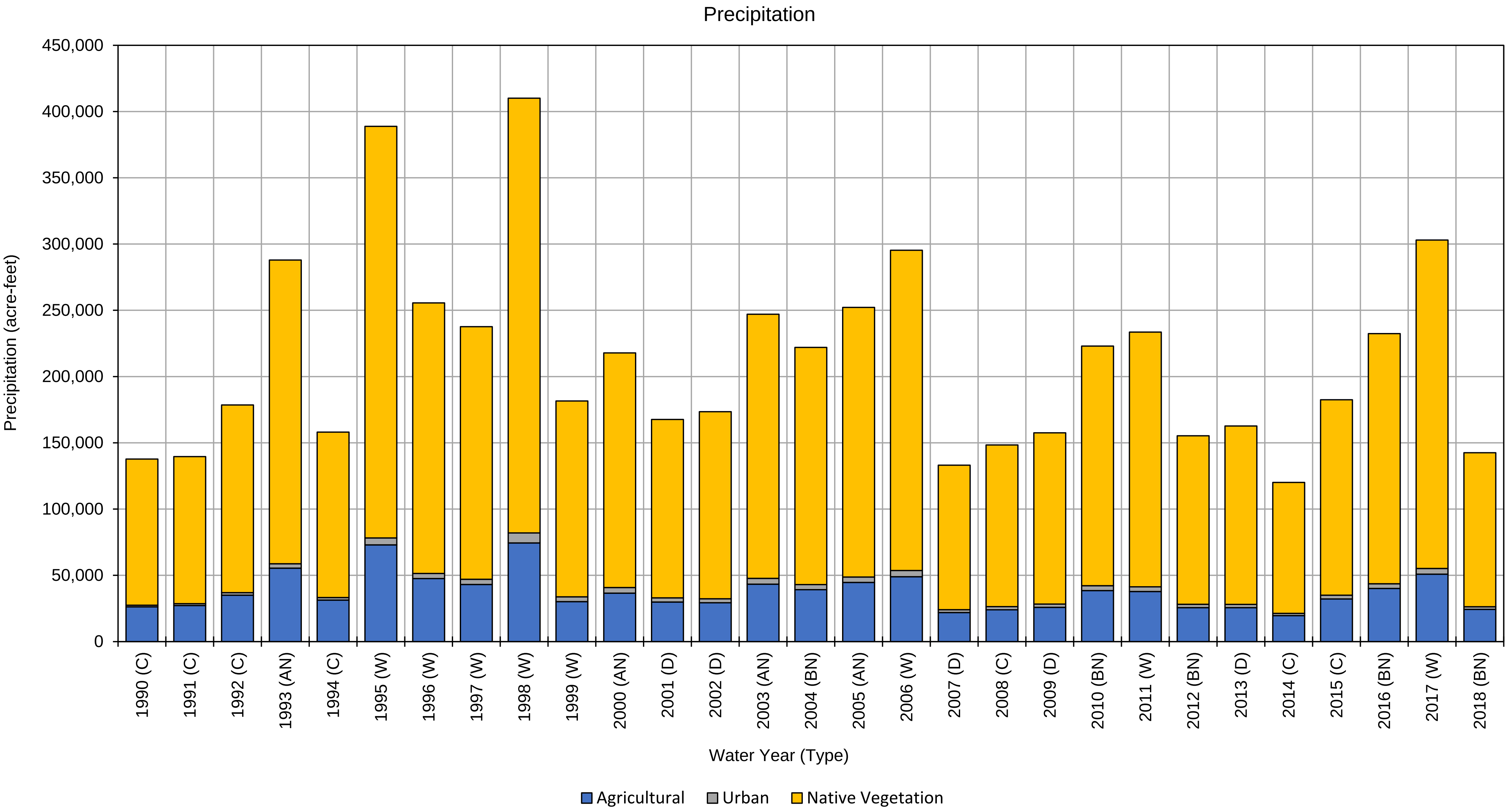
Tehama IHM - Historical

Los Molinos Subbasin Historical Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
1990 (C)		0	370,000	370,000
1991 (C)		0	350,000	350,000
1992 (C)		0	360,000	360,000
1993 (AN)		0	750,000	750,000
1994 (C)		0	370,000	370,000
1995 (W)		0	1,100,000	1,100,000
1996 (W)		0	780,000	780,000
1997 (W)		0	900,000	900,000
1998 (W)		0	1,100,000	1,100,000
1999 (W)		0	750,000	750,000
2000 (AN)		0	640,000	640,000
2001 (D)		0	410,000	410,000
2002 (D)		0	500,000	500,000
2003 (AN)		0	770,000	770,000
2004 (BN)		0	650,000	650,000
2005 (AN)		0	560,000	560,000
2006 (W)		0	1,100,000	1,100,000
2007 (D)		0	450,000	450,000
2008 (C)		0	430,000	430,000
2009 (D)		0	460,000	460,000
2010 (BN)		0	580,000	580,000
2011 (W)		0	860,000	860,000
2012 (BN)		0	470,000	470,000
2013 (D)		0	510,000	510,000
2014 (C)		0	320,000	320,000
2015 (C)		0	360,000	360,000
2016 (BN)		0	720,000	720,000
2017 (W)		0	1,200,000	1,200,000
2018 (BN)		0	530,000	530,000
Average (1990-2018)		0	630,000	630,000
1990-2018	W	0	970,000	970,000
	AN	0	680,000	680,000
	BN	0	590,000	590,000
	D	0	470,000	470,000
	C	0	360,000	360,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

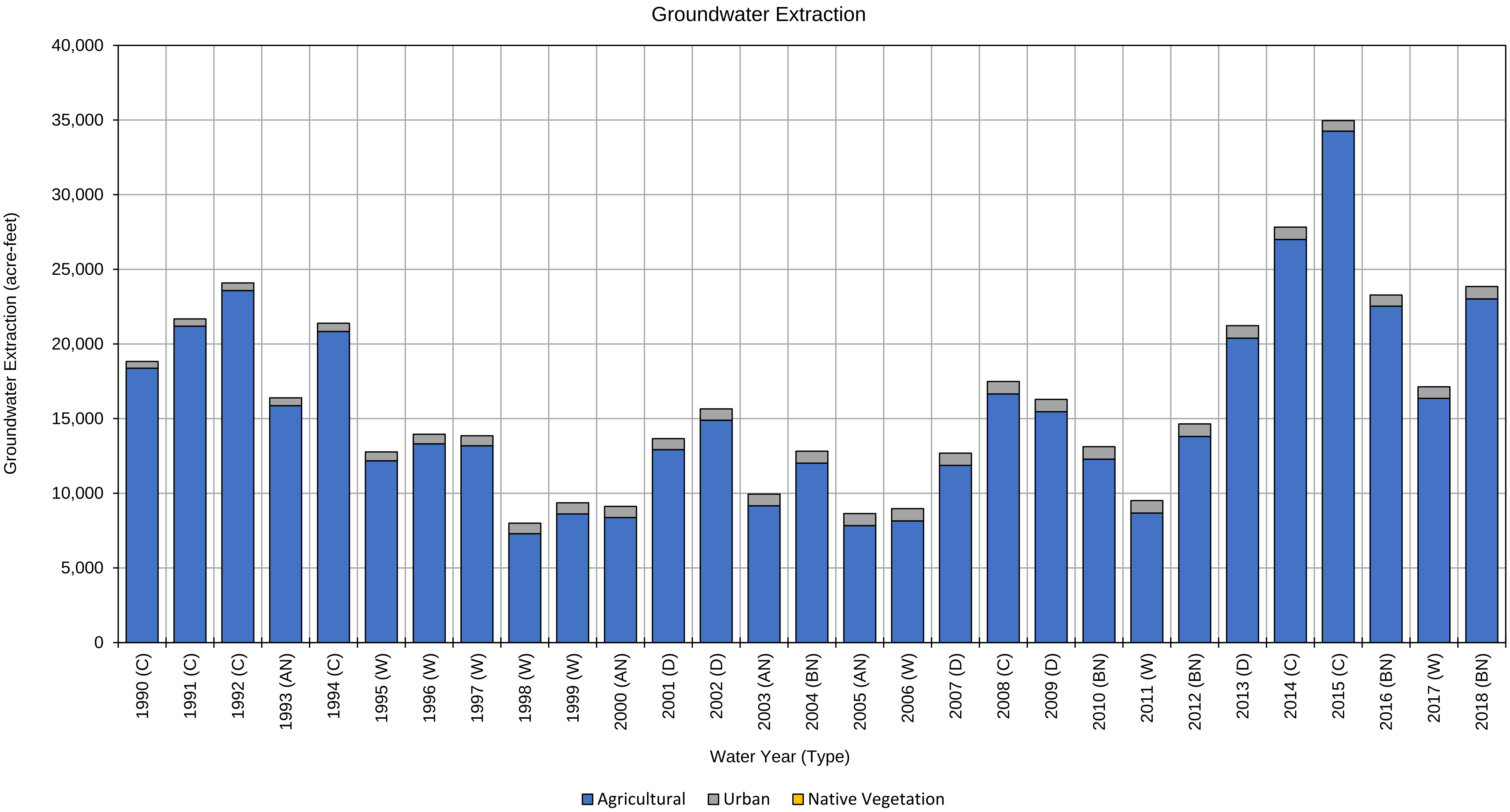

Precipitation
Precipitation (acre-feet)
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Agricultural
Urban
Native Vegetation

Los Molinos Subbasin Historical Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		26,000	1,300	110,000	140,000
1991 (C)		27,000	1,400	110,000	140,000
1992 (C)		35,000	1,900	140,000	180,000
1993 (AN)		55,000	3,300	230,000	290,000
1994 (C)		31,000	1,900	120,000	150,000
1995 (W)		73,000	5,300	310,000	390,000
1996 (W)		48,000	3,900	200,000	250,000
1997 (W)		43,000	3,900	190,000	240,000
1998 (W)		74,000	7,500	330,000	410,000
1999 (W)		30,000	3,600	150,000	180,000
2000 (AN)		36,000	4,300	180,000	220,000
2001 (D)		30,000	3,200	130,000	160,000
2002 (D)		29,000	3,000	140,000	170,000
2003 (AN)		43,000	4,400	200,000	250,000
2004 (BN)		39,000	3,800	180,000	220,000
2005 (AN)		45,000	4,100	200,000	250,000
2006 (W)		49,000	4,700	240,000	290,000
2007 (D)		22,000	2,100	110,000	130,000
2008 (C)		24,000	2,400	120,000	150,000
2009 (D)		26,000	2,500	130,000	160,000
2010 (BN)		38,000	3,700	180,000	220,000
2011 (W)		38,000	3,600	190,000	230,000
2012 (BN)		26,000	2,600	130,000	160,000
2013 (D)		26,000	2,400	130,000	160,000
2014 (C)		20,000	1,700	99,000	120,000
2015 (C)		32,000	2,800	150,000	180,000
2016 (BN)		40,000	3,500	190,000	230,000
2017 (W)		51,000	4,300	250,000	310,000
2018 (BN)		24,000	2,000	120,000	150,000
Average (1990-2018)		37,000	3,300	170,000	210,000
1990-2018	W	51,000	4,600	230,000	290,000
	AN	45,000	4,000	200,000	250,000
	BN	33,000	3,100	160,000	200,000
	D	26,000	2,600	130,000	160,000
	C	28,000	1,900	120,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



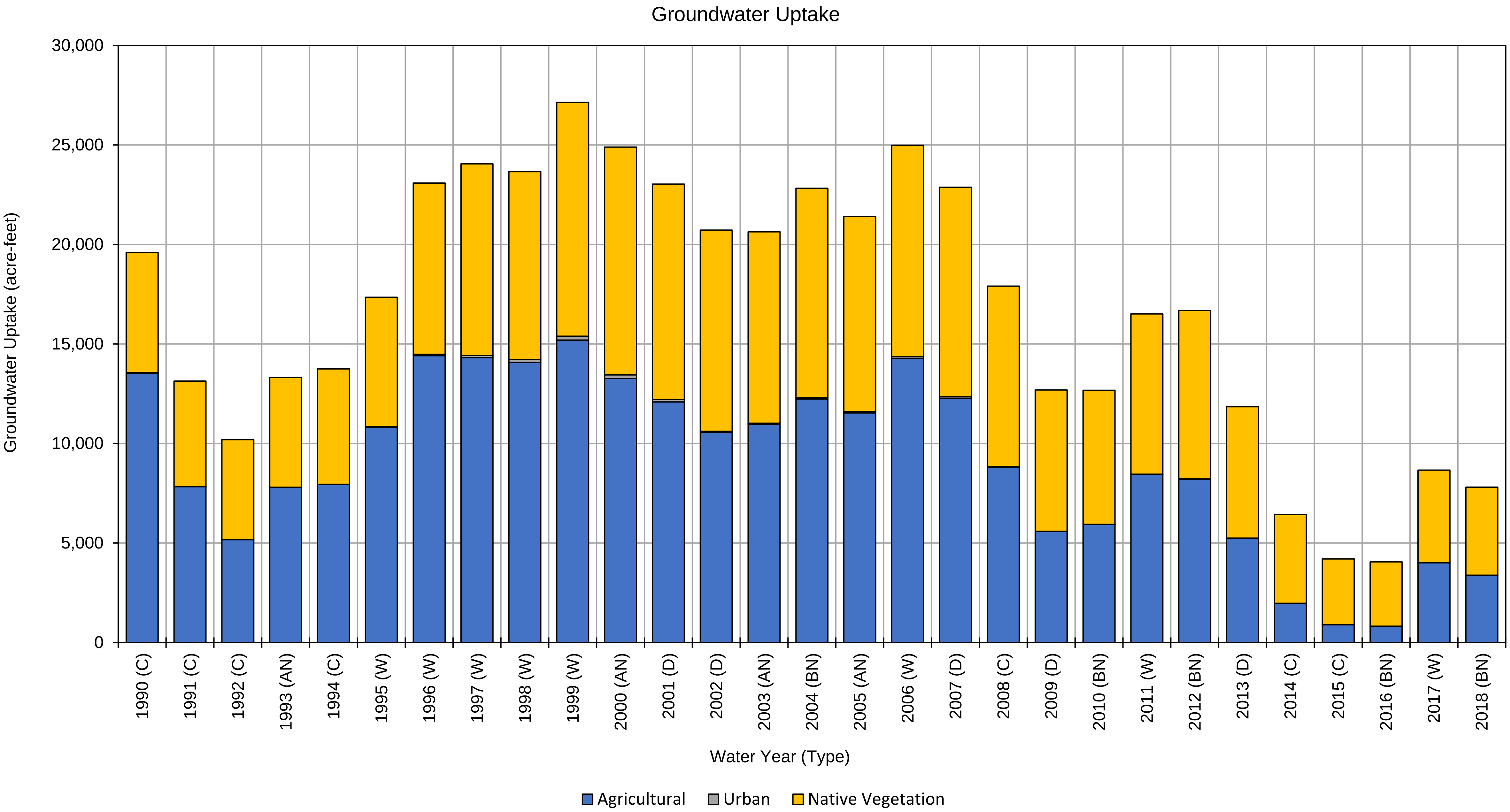
Tehama IHM - Historical

Los Molinos Subbasin Historical Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		18,000	450	0	18,000
1991 (C)		21,000	480	0	21,000
1992 (C)		24,000	510	0	25,000
1993 (AN)		16,000	530	0	17,000
1994 (C)		21,000	550	0	22,000
1995 (W)		12,000	600	0	13,000
1996 (W)		13,000	640	0	14,000
1997 (W)		13,000	670	0	14,000
1998 (W)		7,300	710	0	8,000
1999 (W)		8,600	740	0	9,300
2000 (AN)		8,400	740	0	9,100
2001 (D)		13,000	740	0	14,000
2002 (D)		15,000	760	0	16,000
2003 (AN)		9,200	780	0	10,000
2004 (BN)		12,000	800	0	13,000
2005 (AN)		7,800	810	0	8,600
2006 (W)		8,100	820	0	8,900
2007 (D)		12,000	820	0	13,000
2008 (C)		17,000	840	0	18,000
2009 (D)		15,000	830	0	16,000
2010 (BN)		12,000	840	0	13,000
2011 (W)		8,700	840	0	9,500
2012 (BN)		14,000	840	0	15,000
2013 (D)		20,000	830	0	21,000
2014 (C)		27,000	820	0	28,000
2015 (C)		34,000	700	0	35,000
2016 (BN)		23,000	740	0	24,000
2017 (W)		16,000	770	0	17,000
2018 (BN)		23,000	830	0	24,000
Average (1990-2018)		16,000	730	0	17,000
1990-2018	W	11,000	720	0	12,000
	AN	10,000	720	0	11,000
	BN	17,000	810	0	18,000
	D	15,000	800	0	16,000
	C	23,000	620	0	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



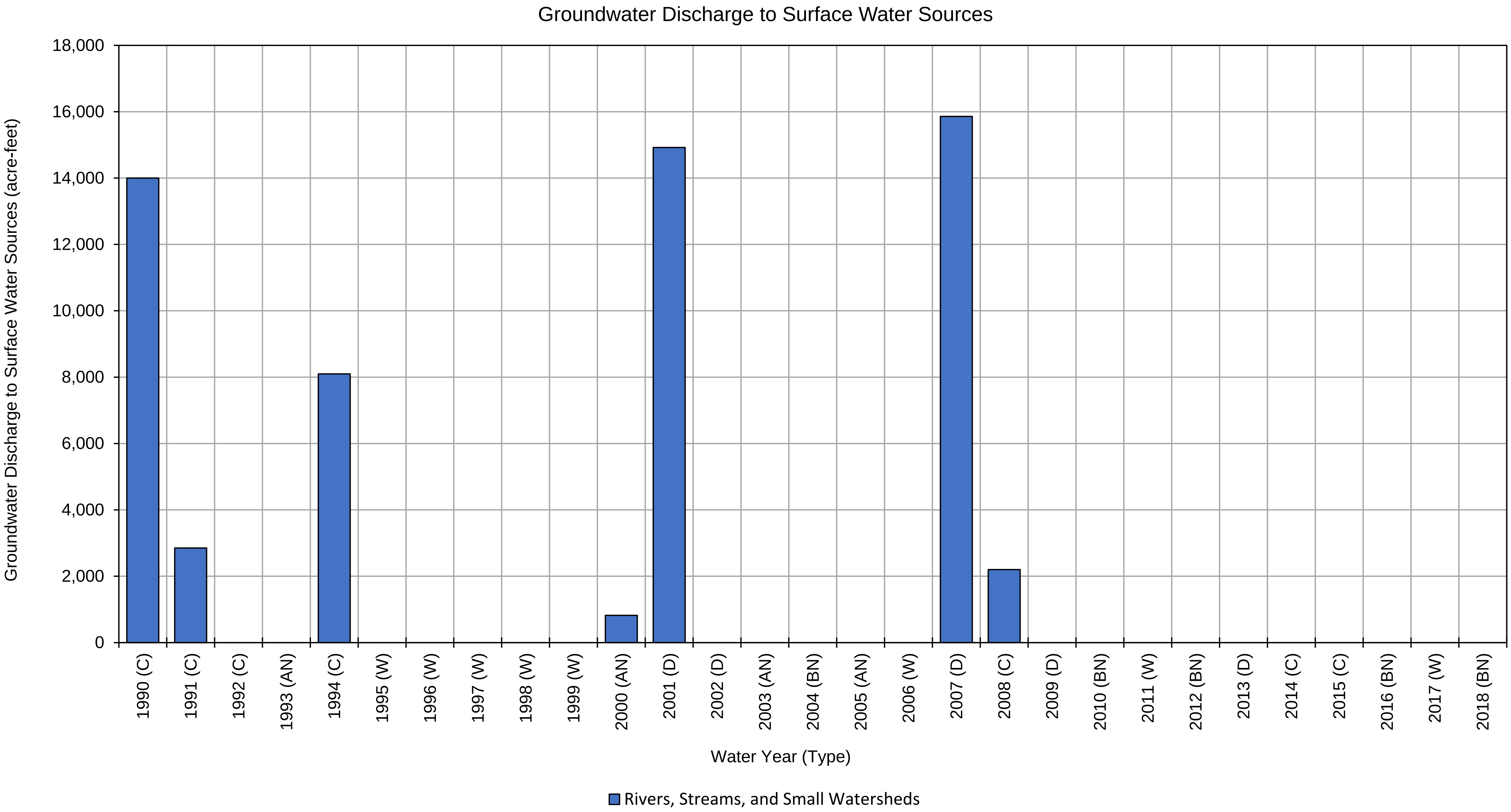
Tehama IHM - Historical

Los Molinos Subbasin Historical Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>14,000</td><td>14</td><td>6,000</td><td>20,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>7,800</td><td>9</td><td>5,300</td><td>13,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>5,200</td><td>9</td><td>5,000</td><td>10,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>7,800</td><td>8</td><td>5,500</td><td>13,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>7,900</td><td>9</td><td>5,800</td><td>14,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>11,000</td><td>18</td><td>6,500</td><td>18,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>14,000</td><td>65</td><td>8,600</td><td>23,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>14,000</td><td>100</td><td>9,600</td><td>24,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>14,000</td><td>140</td><td>9,400</td><td>24,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>15,000</td><td>200</td><td>12,000</td><td>27,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>13,000</td><td>180</td><td>11,000</td><td>24,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>12,000</td><td>110</td><td>11,000</td><td>23,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>11,000</td><td>48</td><td>10,000</td><td>21,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>11,000</td><td>51</td><td>9,600</td><td>21,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>12,000</td><td>68</td><td>11,000</td><td>23,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>12,000</td><td>63</td><td>9,800</td><td>22,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>14,000</td><td>90</td><td>11,000</td><td>25,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>12,000</td><td>76</td><td>11,000</td><td>23,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>8,800</td><td>23</td><td>9,100</td><td>18,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>5,600</td><td>5</td><td>7,100</td><td>13,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>5,900</td><td>7</td><td>6,700</td><td>13,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>8,400</td><td>19</td><td>8,100</td><td>17,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>8,200</td><td>20</td><td>8,500</td><td>17,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>5,200</td><td>6</td><td>6,600</td><td>12,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>2,000</td><td>3</td><td>4,500</td><td>6,500</td></tr>
<tr><td colspan="2">2015 (C)</td><td>890</td><td>3</td><td>3,300</td><td>4,200</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>820</td><td>2</td><td>3,200</td><td>4,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>4,000</td><td>4</td><td>4,700</td><td>8,700</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>3,400</td><td>4</td><td>4,400</td><td>7,800</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>9,000</td><td>47</td><td>7,700</td><td>17,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>12,000</td><td>80</td><td>8,700</td><td>21,000</td></tr>
<tr><td>AN</td><td>11,000</td><td>76</td><td>9,100</td><td>20,000</td></tr>
<tr><td>BN</td><td>6,100</td><td>20</td><td>6,700</td><td>13,000</td></tr>
<tr><td>D</td><td>9,200</td><td>50</td><td>9,000</td><td>18,000</td></tr>
<tr><td>C</td><td>6,600</td><td>10</td><td>5,600</td><td>12,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



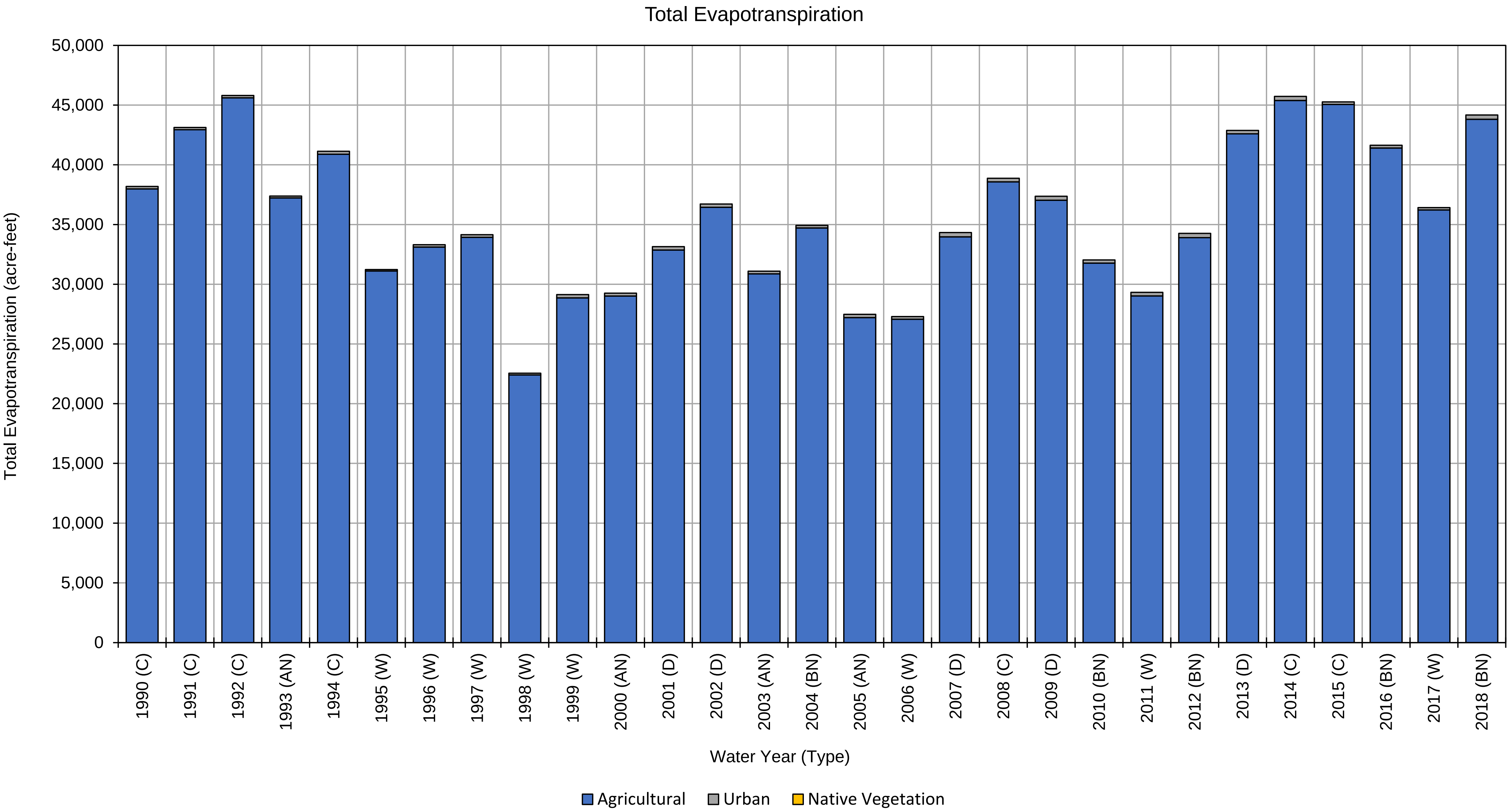
Tehama IHM - Historical

Los Molinos Subbasin Historical Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
1990 (C)		14,000
1991 (C)		2,800
1992 (C)		0
1993 (AN)		0
1994 (C)		8,100
1995 (W)		0
1996 (W)		0
1997 (W)		0
1998 (W)		0
1999 (W)		0
2000 (AN)		820
2001 (D)		15,000
2002 (D)		0
2003 (AN)		0
2004 (BN)		0
2005 (AN)		0
2006 (W)		0
2007 (D)		16,000
2008 (C)		2,200
2009 (D)		0
2010 (BN)		0
2011 (W)		0
2012 (BN)		0
2013 (D)		0
2014 (C)		0
2015 (C)		0
2016 (BN)		0
2017 (W)		0
2018 (BN)		0
Average (1990-2018)		2,000
1990-2018	W	0
	AN	200
	BN	0
	D	6,200
	C	3,900

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



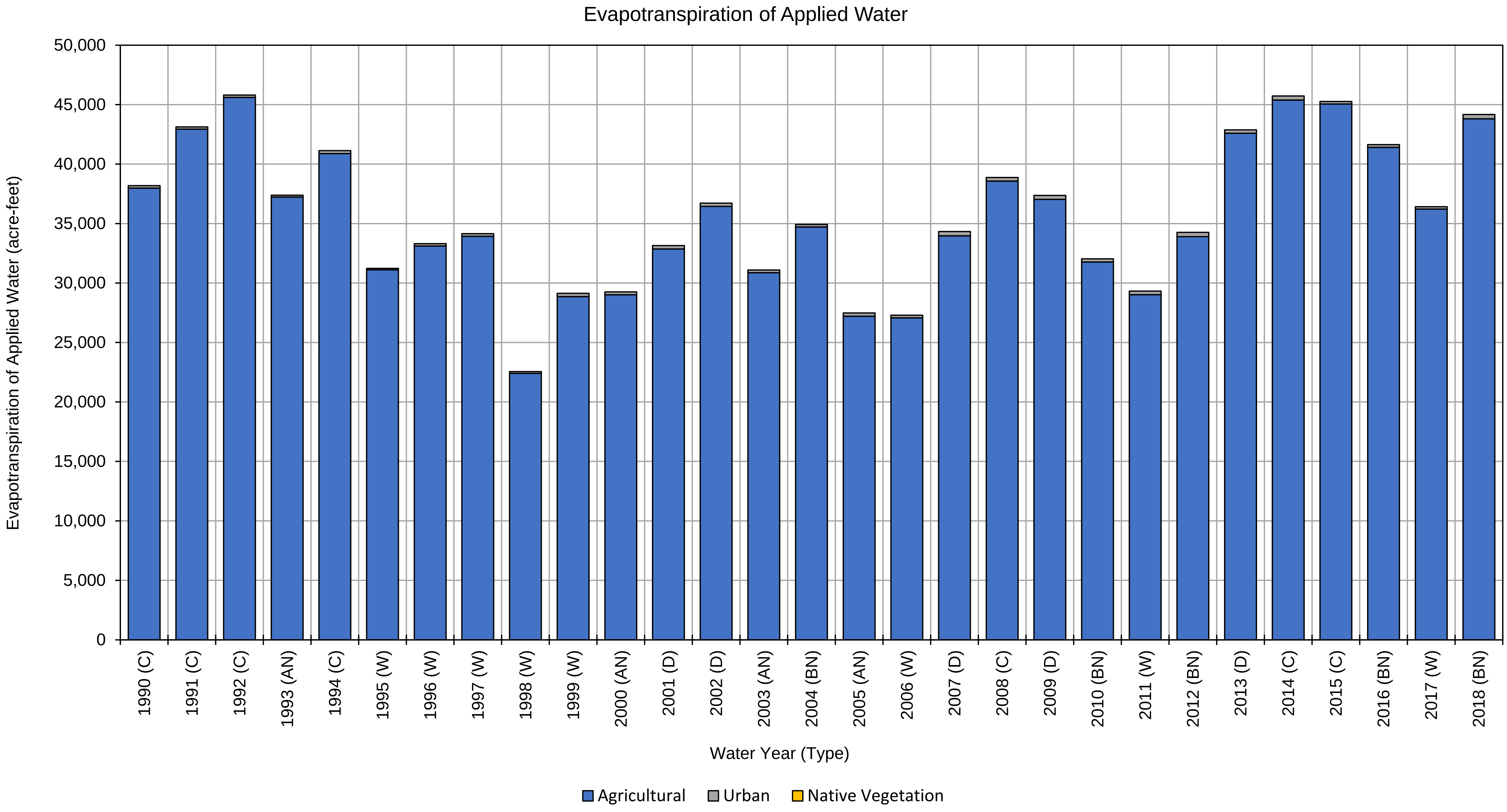
Tehama IHM - Historical

Los Molinos Subbasin Historical Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		70,000	800	100,000	170,000
1991 (C)		68,000	740	84,000	150,000
1992 (C)		71,000	950	100,000	170,000
1993 (AN)		68,000	1,100	120,000	190,000
1994 (C)		70,000	1,100	110,000	180,000
1995 (W)		60,000	1,200	110,000	170,000
1996 (W)		65,000	1,400	110,000	180,000
1997 (W)		65,000	1,500	110,000	180,000
1998 (W)		53,000	1,700	120,000	170,000
1999 (W)		58,000	1,700	110,000	170,000
2000 (AN)		56,000	1,700	110,000	170,000
2001 (D)		60,000	1,500	110,000	170,000
2002 (D)		61,000	1,300	100,000	160,000
2003 (AN)		57,000	1,500	110,000	170,000
2004 (BN)		60,000	1,200	99,000	160,000
2005 (AN)		56,000	1,600	130,000	190,000
2006 (W)		56,000	1,500	120,000	180,000
2007 (D)		58,000	1,300	97,000	160,000
2008 (C)		59,000	1,200	91,000	150,000
2009 (D)		58,000	1,400	100,000	160,000
2010 (BN)		55,000	1,400	110,000	170,000
2011 (W)		53,000	1,600	120,000	170,000
2012 (BN)		58,000	1,500	110,000	170,000
2013 (D)		61,000	1,100	91,000	150,000
2014 (C)		61,000	1,100	84,000	150,000
2015 (C)		61,000	1,100	94,000	160,000
2016 (BN)		62,000	1,300	110,000	170,000
2017 (W)		61,000	1,300	110,000	170,000
2018 (BN)		64,000	1,300	100,000	170,000
Average (1990-2018)		61,000	1,300	110,000	170,000
1990-2018	W	59,000	1,500	110,000	170,000
	AN	59,000	1,500	120,000	180,000
	BN	60,000	1,300	110,000	170,000
	D	60,000	1,300	100,000	160,000
	C	66,000	980	95,000	160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



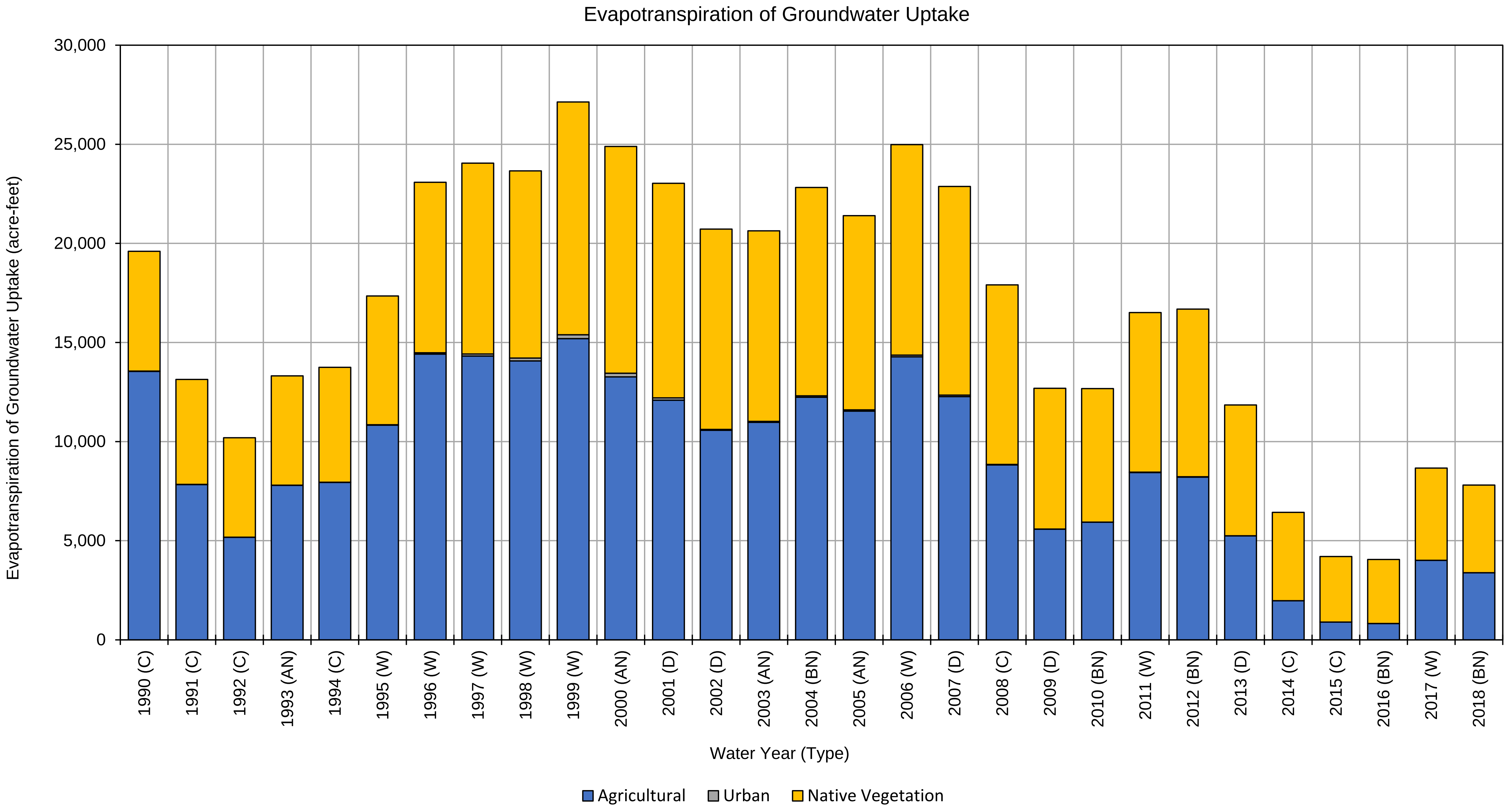
Tehama IHM - Historical

Los Molinos Subbasin Historical Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		38,000	210	0	38,000
1991 (C)		43,000	190	0	43,000
1992 (C)		46,000	200	0	46,000
1993 (AN)		37,000	160	0	37,000
1994 (C)		41,000	250	0	41,000
1995 (W)		31,000	120	0	31,000
1996 (W)		33,000	190	0	33,000
1997 (W)		34,000	220	0	34,000
1998 (W)		22,000	140	0	22,000
1999 (W)		29,000	270	0	29,000
2000 (AN)		29,000	240	0	29,000
2001 (D)		33,000	280	0	33,000
2002 (D)		36,000	270	0	36,000
2003 (AN)		31,000	220	0	31,000
2004 (BN)		35,000	210	0	35,000
2005 (AN)		27,000	270	0	27,000
2006 (W)		27,000	220	0	27,000
2007 (D)		34,000	360	0	34,000
2008 (C)		39,000	300	0	39,000
2009 (D)		37,000	340	0	37,000
2010 (BN)		32,000	260	0	32,000
2011 (W)		29,000	300	0	29,000
2012 (BN)		34,000	360	0	34,000
2013 (D)		43,000	280	0	43,000
2014 (C)		45,000	350	0	45,000
2015 (C)		45,000	210	0	45,000
2016 (BN)		41,000	230	0	41,000
2017 (W)		36,000	200	0	36,000
2018 (BN)		44,000	360	0	44,000
Average (1990-2018)		36,000	250	0	36,000
1990-2018	W	30,000	210	0	30,000
	AN	31,000	220	0	31,000
	BN	37,000	290	0	37,000
	D	37,000	300	0	37,000
	C	42,000	240	0	42,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



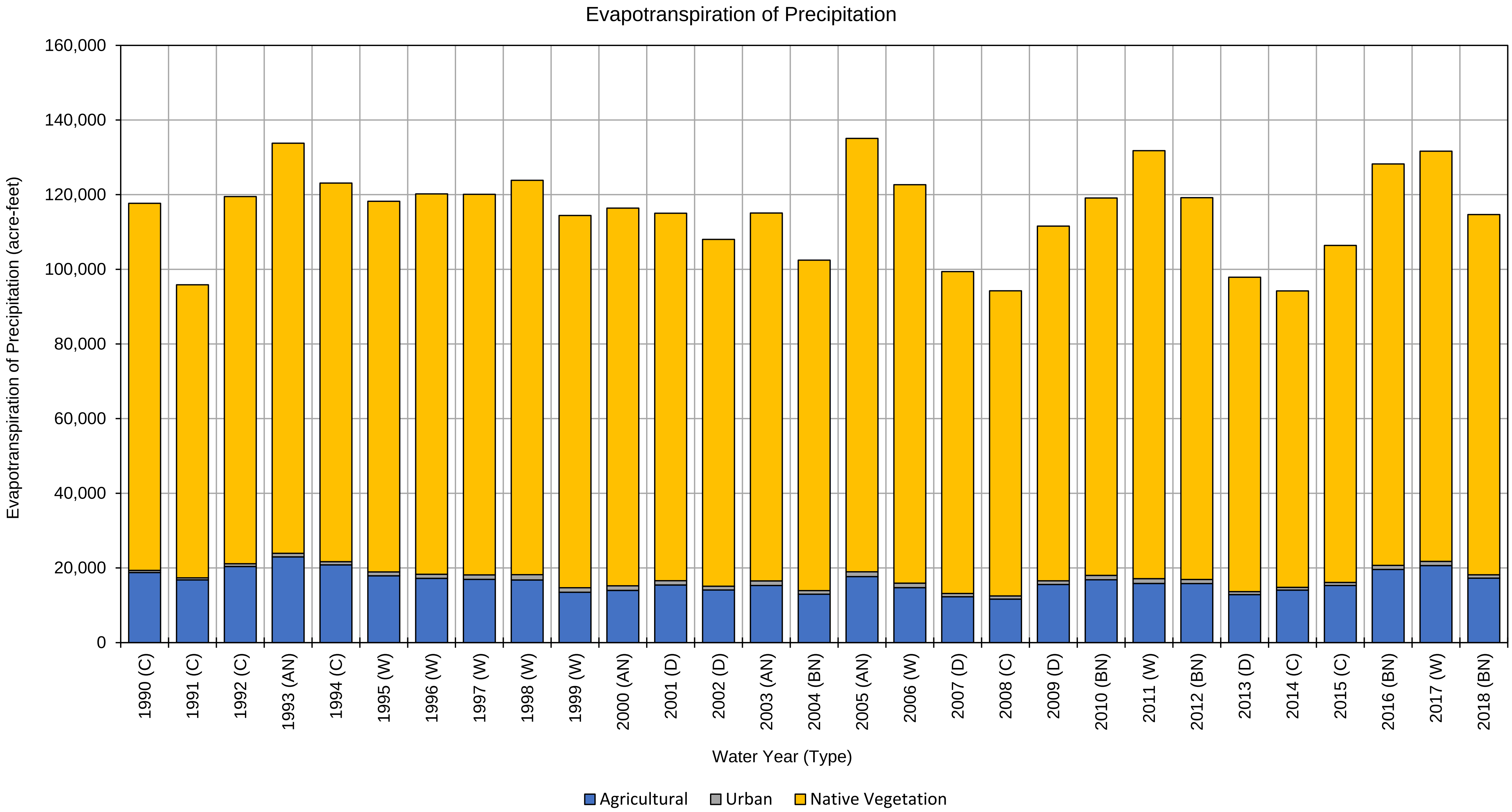
Tehama IHM - Historical

Los Molinos Subbasin Historical Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		14,000	14	6,000	20,000
1991 (C)		7,800	9	5,300	13,000
1992 (C)		5,200	9	5,000	10,000
1993 (AN)		7,800	8	5,500	13,000
1994 (C)		7,900	9	5,800	14,000
1995 (W)		11,000	18	6,500	18,000
1996 (W)		14,000	65	8,600	23,000
1997 (W)		14,000	100	9,600	24,000
1998 (W)		14,000	140	9,400	24,000
1999 (W)		15,000	200	12,000	27,000
2000 (AN)		13,000	180	11,000	24,000
2001 (D)		12,000	110	11,000	23,000
2002 (D)		11,000	48	10,000	21,000
2003 (AN)		11,000	51	9,600	21,000
2004 (BN)		12,000	68	11,000	23,000
2005 (AN)		12,000	63	9,800	22,000
2006 (W)		14,000	90	11,000	25,000
2007 (D)		12,000	76	11,000	23,000
2008 (C)		8,800	23	9,100	18,000
2009 (D)		5,600	5	7,100	13,000
2010 (BN)		5,900	7	6,700	13,000
2011 (W)		8,400	19	8,100	17,000
2012 (BN)		8,200	20	8,500	17,000
2013 (D)		5,200	6	6,600	12,000
2014 (C)		2,000	3	4,500	6,500
2015 (C)		890	3	3,300	4,200
2016 (BN)		820	2	3,200	4,000
2017 (W)		4,000	4	4,700	8,700
2018 (BN)		3,400	4	4,400	7,800
Average (1990-2018)		9,000	47	7,700	17,000
1990-2018	W	12,000	80	8,700	21,000
	AN	11,000	76	9,100	20,000
	BN	6,100	20	6,700	13,000
	D	9,200	50	9,000	18,000
	C	6,600	10	5,600	12,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



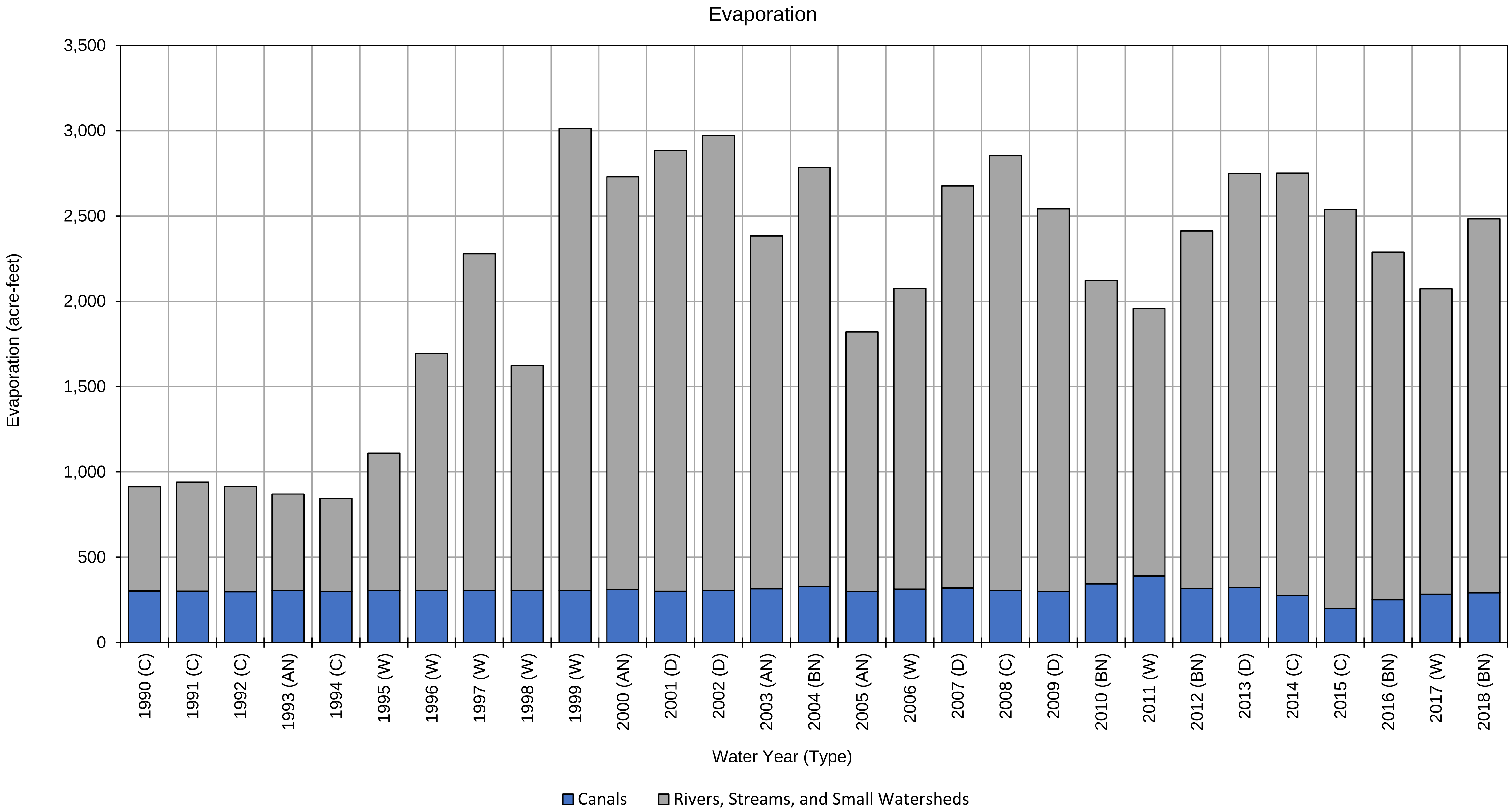
Tehama IHM - Historical

Los Molinos Subbasin Historical Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		19,000	570	98,000	120,000
1991 (C)		17,000	540	79,000	97,000
1992 (C)		20,000	740	98,000	120,000
1993 (AN)		23,000	950	110,000	130,000
1994 (C)		21,000	860	100,000	120,000
1995 (W)		18,000	1,000	99,000	120,000
1996 (W)		17,000	1,100	100,000	120,000
1997 (W)		17,000	1,200	100,000	120,000
1998 (W)		17,000	1,400	110,000	130,000
1999 (W)		13,000	1,200	100,000	110,000
2000 (AN)		14,000	1,300	100,000	120,000
2001 (D)		15,000	1,100	98,000	110,000
2002 (D)		14,000	1,000	93,000	110,000
2003 (AN)		15,000	1,200	99,000	120,000
2004 (BN)		13,000	960	89,000	100,000
2005 (AN)		18,000	1,300	120,000	140,000
2006 (W)		15,000	1,200	110,000	130,000
2007 (D)		12,000	890	86,000	99,000
2008 (C)		12,000	840	82,000	95,000
2009 (D)		16,000	1,000	95,000	110,000
2010 (BN)		17,000	1,200	100,000	120,000
2011 (W)		16,000	1,300	110,000	130,000
2012 (BN)		16,000	1,100	100,000	120,000
2013 (D)		13,000	810	84,000	98,000
2014 (C)		14,000	730	79,000	94,000
2015 (C)		15,000	840	90,000	110,000
2016 (BN)		20,000	1,100	110,000	130,000
2017 (W)		21,000	1,100	110,000	130,000
2018 (BN)		17,000	890	97,000	110,000
Average (1990-2018)		16,000	1,000	98,000	120,000
1990-2018	W	17,000	1,200	110,000	130,000
	AN	17,000	1,200	110,000	130,000
	BN	16,000	1,000	99,000	120,000
	D	14,000	970	91,000	110,000
	C	17,000	730	90,000	110,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



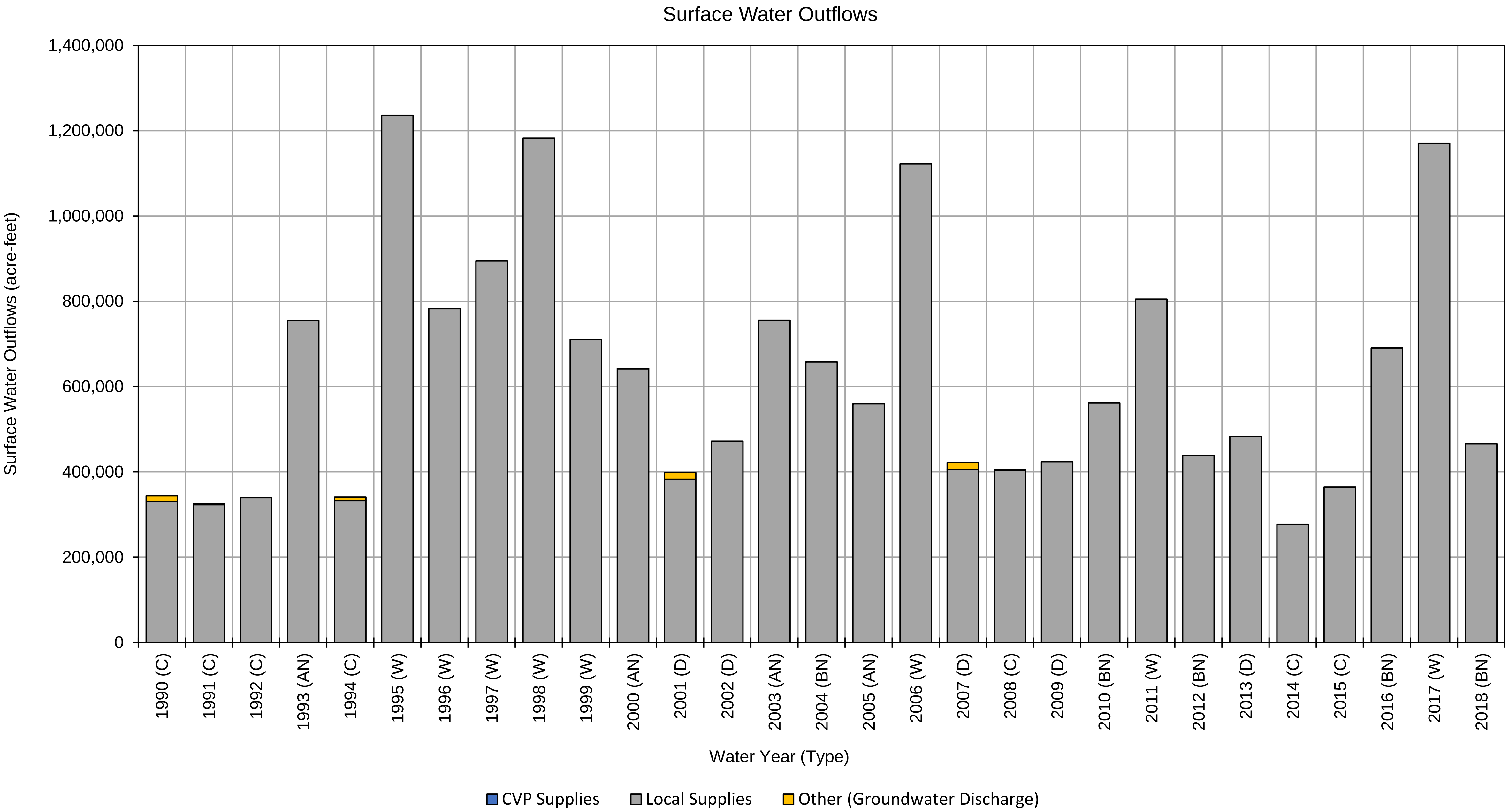
Tehama IHM - Historical

Los Molinos Subbasin Historical Evaporation (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Canals</th><th>Rivers, Streams, and Small Watersheds</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>300</td><td>610</td><td>910</td></tr>
<tr><td colspan="2">1991 (C)</td><td>300</td><td>640</td><td>940</td></tr>
<tr><td colspan="2">1992 (C)</td><td>300</td><td>620</td><td>920</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>300</td><td>570</td><td>870</td></tr>
<tr><td colspan="2">1994 (C)</td><td>300</td><td>550</td><td>850</td></tr>
<tr><td colspan="2">1995 (W)</td><td>300</td><td>810</td><td>1,100</td></tr>
<tr><td colspan="2">1996 (W)</td><td>300</td><td>1,400</td><td>1,700</td></tr>
<tr><td colspan="2">1997 (W)</td><td>300</td><td>2,000</td><td>2,300</td></tr>
<tr><td colspan="2">1998 (W)</td><td>300</td><td>1,300</td><td>1,600</td></tr>
<tr><td colspan="2">1999 (W)</td><td>300</td><td>2,700</td><td>3,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>310</td><td>2,400</td><td>2,700</td></tr>
<tr><td colspan="2">2001 (D)</td><td>300</td><td>2,600</td><td>2,900</td></tr>
<tr><td colspan="2">2002 (D)</td><td>310</td><td>2,700</td><td>3,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>320</td><td>2,100</td><td>2,400</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>330</td><td>2,500</td><td>2,800</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>300</td><td>1,500</td><td>1,800</td></tr>
<tr><td colspan="2">2006 (W)</td><td>310</td><td>1,800</td><td>2,100</td></tr>
<tr><td colspan="2">2007 (D)</td><td>320</td><td>2,400</td><td>2,700</td></tr>
<tr><td colspan="2">2008 (C)</td><td>310</td><td>2,500</td><td>2,800</td></tr>
<tr><td colspan="2">2009 (D)</td><td>300</td><td>2,200</td><td>2,500</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>340</td><td>1,800</td><td>2,100</td></tr>
<tr><td colspan="2">2011 (W)</td><td>390</td><td>1,600</td><td>2,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>320</td><td>2,100</td><td>2,400</td></tr>
<tr><td colspan="2">2013 (D)</td><td>320</td><td>2,400</td><td>2,700</td></tr>
<tr><td colspan="2">2014 (C)</td><td>280</td><td>2,500</td><td>2,800</td></tr>
<tr><td colspan="2">2015 (C)</td><td>200</td><td>2,300</td><td>2,500</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>250</td><td>2,000</td><td>2,300</td></tr>
<tr><td colspan="2">2017 (W)</td><td>280</td><td>1,800</td><td>2,100</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>290</td><td>2,200</td><td>2,500</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>300</td><td>1,800</td><td>2,100</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>310</td><td>1,700</td><td>2,000</td></tr>
<tr><td>AN</td><td>310</td><td>1,600</td><td>1,900</td></tr>
<tr><td>BN</td><td>310</td><td>2,100</td><td>2,400</td></tr>
<tr><td>D</td><td>310</td><td>2,500</td><td>2,800</td></tr>
<tr><td>C</td><td>280</td><td>1,400</td><td>1,700</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



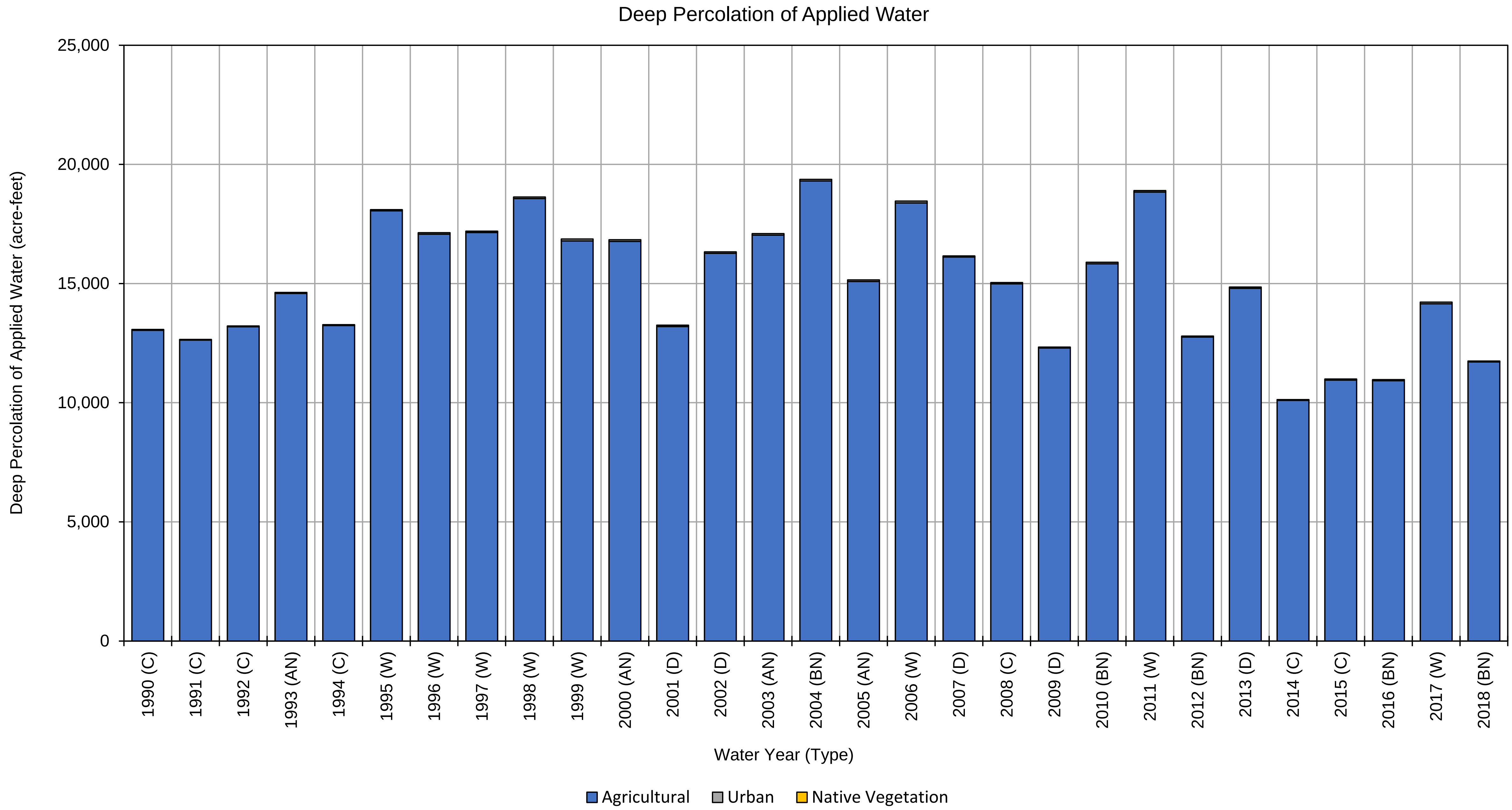
Tehama IHM - Historical

Los Molinos Subbasin Historical Surface Water Outflows, by Water Source Type (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>CVP Supplies</th><th>Local Supplies</th><th>Other (Groundwater Discharge)</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>0</td><td>330,000</td><td>14,000</td><td>340,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>0</td><td>320,000</td><td>2,800</td><td>320,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>0</td><td>340,000</td><td>0</td><td>340,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>0</td><td>750,000</td><td>0</td><td>750,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>0</td><td>330,000</td><td>8,100</td><td>340,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>0</td><td>1,200,000</td><td>0</td><td>1,200,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>0</td><td>780,000</td><td>0</td><td>780,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>0</td><td>890,000</td><td>0</td><td>890,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>0</td><td>1,200,000</td><td>0</td><td>1,200,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>0</td><td>710,000</td><td>0</td><td>710,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>0</td><td>640,000</td><td>820</td><td>640,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>0</td><td>380,000</td><td>15,000</td><td>400,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>0</td><td>470,000</td><td>0</td><td>470,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>0</td><td>760,000</td><td>0</td><td>760,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>0</td><td>660,000</td><td>0</td><td>660,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>0</td><td>560,000</td><td>0</td><td>560,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>0</td><td>1,100,000</td><td>0</td><td>1,100,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>0</td><td>410,000</td><td>16,000</td><td>430,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>0</td><td>400,000</td><td>2,200</td><td>400,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>0</td><td>420,000</td><td>0</td><td>420,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>0</td><td>560,000</td><td>0</td><td>560,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>0</td><td>810,000</td><td>0</td><td>810,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>0</td><td>440,000</td><td>0</td><td>440,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>0</td><td>480,000</td><td>0</td><td>480,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>0</td><td>280,000</td><td>0</td><td>280,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>0</td><td>360,000</td><td>0</td><td>360,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>0</td><td>690,000</td><td>0</td><td>690,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>0</td><td>1,200,000</td><td>0</td><td>1,200,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>0</td><td>470,000</td><td>0</td><td>470,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>0</td><td>620,000</td><td>2,000</td><td>620,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>0</td><td>990,000</td><td>0</td><td>990,000</td></tr>
<tr><td>AN</td><td>0</td><td>680,000</td><td>200</td><td>680,000</td></tr>
<tr><td>BN</td><td>0</td><td>560,000</td><td>0</td><td>560,000</td></tr>
<tr><td>D</td><td>0</td><td>430,000</td><td>6,200</td><td>440,000</td></tr>
<tr><td>C</td><td>0</td><td>340,000</td><td>3,900</td><td>340,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Los Molinos Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		13,000	34	0	13,000
1991 (C)		13,000	24	0	13,000
1992 (C)		13,000	30	0	13,000
1993 (AN)		15,000	39	0	15,000
1994 (C)		13,000	33	0	13,000
1995 (W)		18,000	48	0	18,000
1996 (W)		17,000	59	0	17,000
1997 (W)		17,000	54	0	17,000
1998 (W)		19,000	68	0	19,000
1999 (W)		17,000	82	0	17,000
2000 (AN)		17,000	68	0	17,000
2001 (D)		13,000	52	0	13,000
2002 (D)		16,000	60	0	16,000
2003 (AN)		17,000	63	0	17,000
2004 (BN)		19,000	68	0	19,000
2005 (AN)		15,000	64	0	15,000
2006 (W)		18,000	74	0	18,000
2007 (D)		16,000	43	0	16,000
2008 (C)		15,000	51	0	15,000
2009 (D)		12,000	38	0	12,000
2010 (BN)		16,000	63	0	16,000
2011 (W)		19,000	59	0	19,000
2012 (BN)		13,000	38	0	13,000
2013 (D)		15,000	53	0	15,000
2014 (C)		10,000	29	0	10,000
2015 (C)		11,000	41	0	11,000
2016 (BN)		11,000	45	0	11,000
2017 (W)		14,000	67	0	14,000
2018 (BN)		12,000	35	0	12,000
Average (1990-2018)		15,000	51	0	15,000
1990-2018	W	17,000	64	0	17,000
	AN	16,000	59	0	16,000
	BN	14,000	50	0	14,000
	D	15,000	49	0	15,000
	C	13,000	35	0	13,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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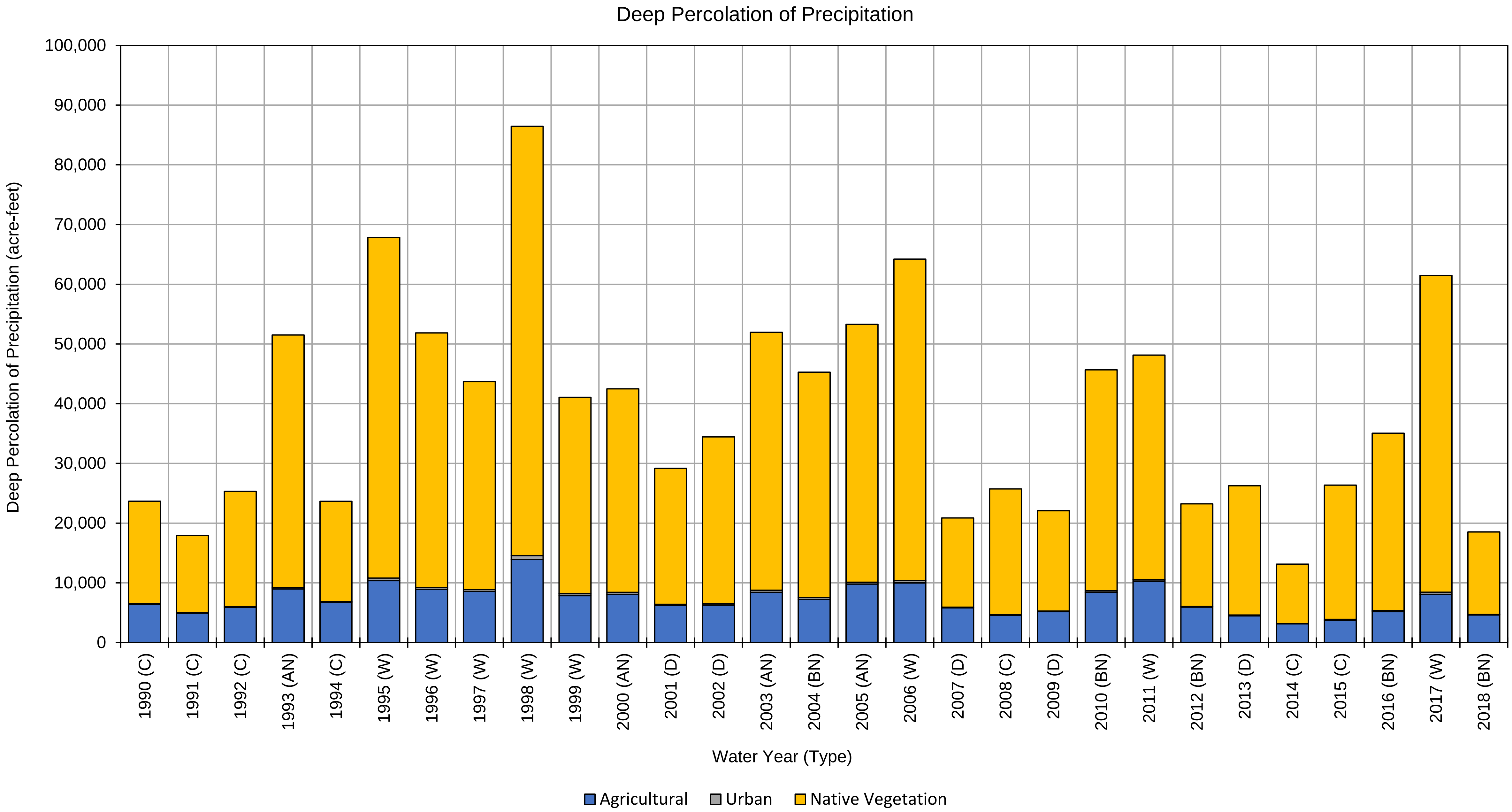
C	Critical



Tehama IHM - Historical

Los Molinos Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		6,400	93	17,000	23,000
1991 (C)		4,900	70	13,000	18,000
1992 (C)		5,900	110	19,000	25,000
1993 (AN)		9,000	240	42,000	51,000
1994 (C)		6,700	110	17,000	24,000
1995 (W)		10,000	420	57,000	67,000
1996 (W)		8,900	340	43,000	52,000
1997 (W)		8,600	300	35,000	44,000
1998 (W)		14,000	670	72,000	87,000
1999 (W)		7,800	350	33,000	41,000
2000 (AN)		8,100	360	34,000	42,000
2001 (D)		6,200	210	23,000	29,000
2002 (D)		6,300	230	28,000	35,000
2003 (AN)		8,400	340	43,000	52,000
2004 (BN)		7,200	310	38,000	46,000
2005 (AN)		9,800	310	43,000	53,000
2006 (W)		10,000	400	54,000	64,000
2007 (D)		5,800	110	15,000	21,000
2008 (C)		4,500	140	21,000	26,000
2009 (D)		5,200	110	17,000	22,000
2010 (BN)		8,400	280	37,000	46,000
2011 (W)		10,000	250	38,000	48,000
2012 (BN)		5,900	120	17,000	23,000
2013 (D)		4,500	150	22,000	27,000
2014 (C)		3,100	60	9,900	13,000
2015 (C)		3,700	170	22,000	26,000
2016 (BN)		5,200	210	30,000	35,000
2017 (W)		8,100	370	53,000	61,000
2018 (BN)		4,600	86	14,000	19,000
Average (1990-2018)		7,200	240	31,000	38,000
1990-2018	W	9,700	390	48,000	58,000
	AN	8,800	310	41,000	50,000
	BN	6,300	200	27,000	34,000
	D	5,600	160	21,000	27,000
	C	5,100	110	17,000	22,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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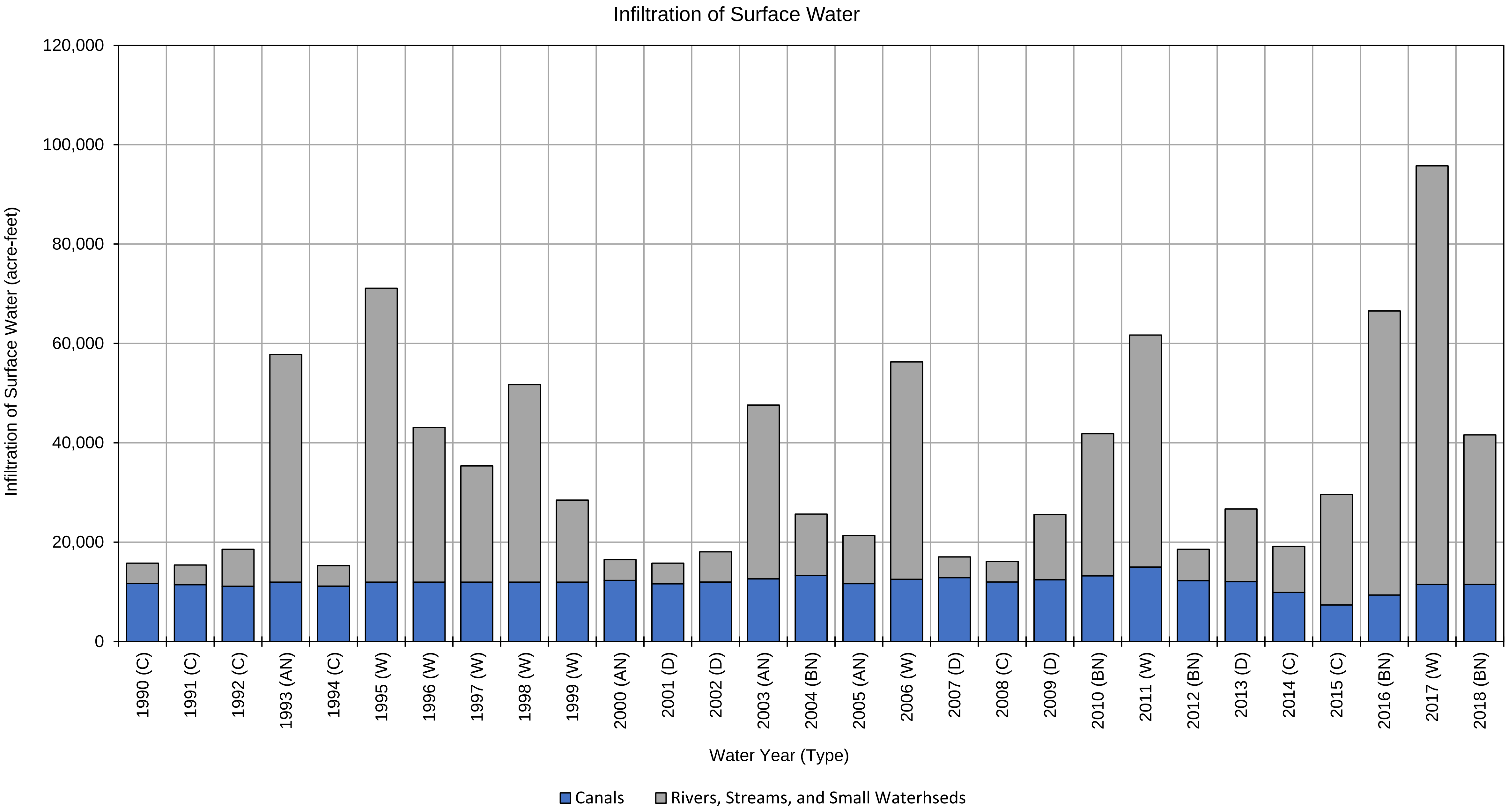


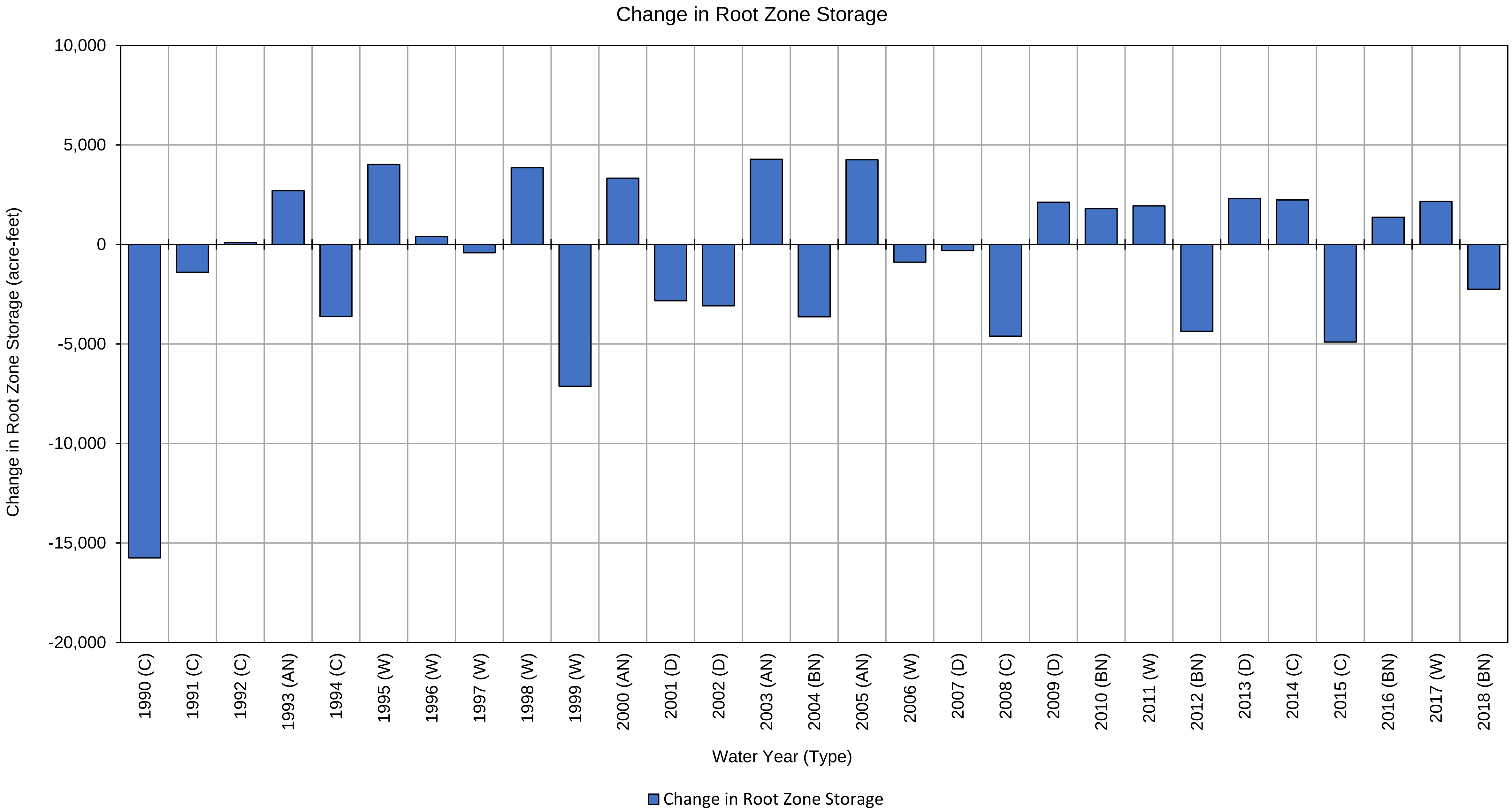
Tehama IHM - Historical

Los Molinos Subbasin Historical Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
1990 (C)		12,000	4,100	16,000
1991 (C)		11,000	4,000	15,000
1992 (C)		11,000	7,400	18,000
1993 (AN)		12,000	46,000	58,000
1994 (C)		11,000	4,100	15,000
1995 (W)		12,000	59,000	71,000
1996 (W)		12,000	31,000	43,000
1997 (W)		12,000	23,000	35,000
1998 (W)		12,000	40,000	52,000
1999 (W)		12,000	17,000	29,000
2000 (AN)		12,000	4,200	16,000
2001 (D)		12,000	4,100	16,000
2002 (D)		12,000	6,100	18,000
2003 (AN)		13,000	35,000	48,000
2004 (BN)		13,000	12,000	25,000
2005 (AN)		12,000	9,700	22,000
2006 (W)		13,000	44,000	57,000
2007 (D)		13,000	4,200	17,000
2008 (C)		12,000	4,100	16,000
2009 (D)		12,000	13,000	25,000
2010 (BN)		13,000	29,000	42,000
2011 (W)		15,000	47,000	62,000
2012 (BN)		12,000	6,300	18,000
2013 (D)		12,000	15,000	27,000
2014 (C)		9,900	9,300	19,000
2015 (C)		7,400	22,000	29,000
2016 (BN)		9,400	57,000	66,000
2017 (W)		12,000	84,000	96,000
2018 (BN)		12,000	30,000	42,000
Average (1990-2018)		12,000	23,000	35,000
1990-2018	W	12,000	43,000	55,000
	AN	12,000	24,000	36,000
	BN	12,000	27,000	39,000
	D	12,000	8,400	20,000
	C	11,000	7,900	19,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Los Molinos Subbasin Historical Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
1990 (C)		-16,000
1991 (C)		-1,400
1992 (C)		96
1993 (AN)		2,700
1994 (C)		-3,600
1995 (W)		4,000
1996 (W)		400
1997 (W)		-420
1998 (W)		3,900
1999 (W)		-7,100
2000 (AN)		3,300
2001 (D)		-2,800
2002 (D)		-3,100
2003 (AN)		4,300
2004 (BN)		-3,600
2005 (AN)		4,300
2006 (W)		-890
2007 (D)		-310
2008 (C)		-4,600
2009 (D)		2,100
2010 (BN)		1,800
2011 (W)		1,900
2012 (BN)		-4,400
2013 (D)		2,300
2014 (C)		2,200
2015 (C)		-4,900
2016 (BN)		1,400
2017 (W)		2,200
2018 (BN)		-2,300
Average (1990-2018)		-630
1990-2018	W	490
	AN	3,600
	BN	-1,400
	D	-360
	C	-4,000

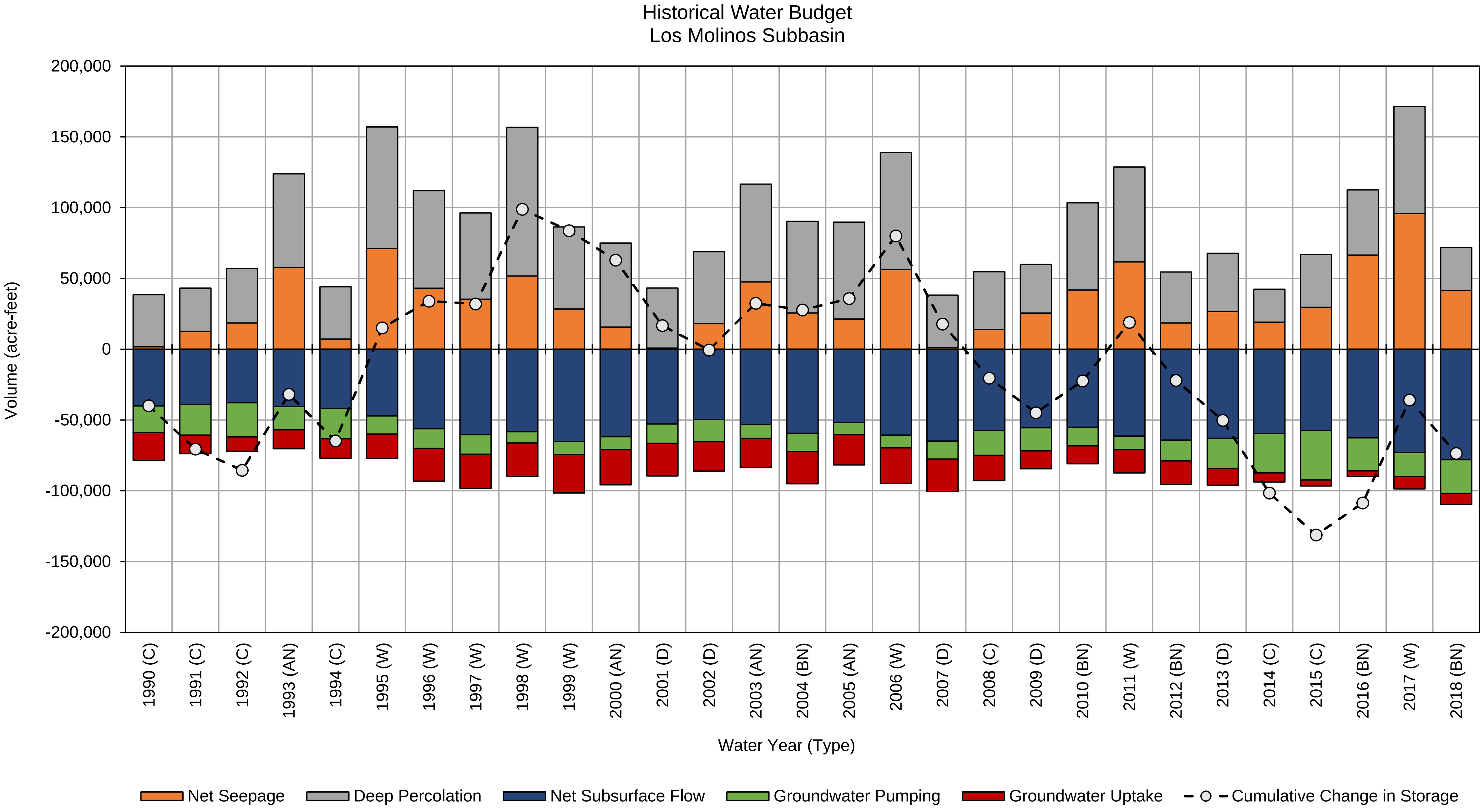
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-1b

Detailed Los Molinos Subbasin Water Budget Results:

Historical Model Results – Groundwater System



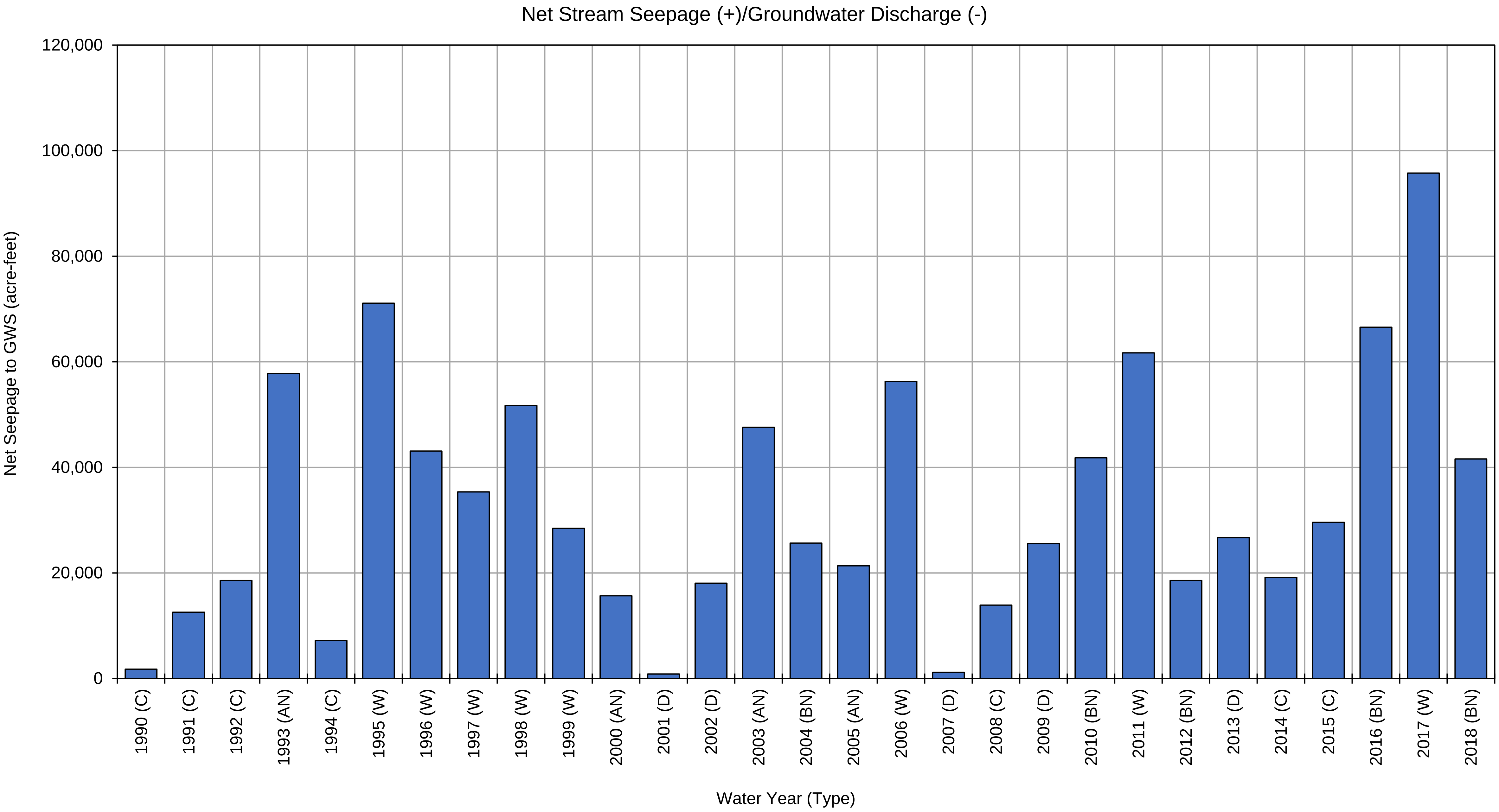
Tehama IHM - Historical

Los Molinos Subbasin Historical Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
1990 (C)		1,800	37,000	-19,000	-20,000	-40,000	-40,000	-40,000
1991 (C)		13,000	31,000	-22,000	-13,000	-39,000	-31,000	-71,000
1992 (C)		19,000	39,000	-24,000	-10,000	-38,000	-15,000	-86,000
1993 (AN)		58,000	66,000	-16,000	-13,000	-41,000	54,000	-32,000
1994 (C)		7,200	37,000	-21,000	-14,000	-42,000	-33,000	-65,000
1995 (W)		71,000	86,000	-13,000	-17,000	-47,000	80,000	15,000
1996 (W)		43,000	69,000	-14,000	-23,000	-56,000	19,000	34,000
1997 (W)		35,000	61,000	-14,000	-24,000	-60,000	-2,000	32,000
1998 (W)		52,000	110,000	-8,000	-24,000	-58,000	67,000	99,000
1999 (W)		28,000	58,000	-9,400	-27,000	-65,000	-15,000	84,000
2000 (AN)		16,000	59,000	-9,100	-25,000	-62,000	-21,000	63,000
2001 (D)		850	42,000	-14,000	-23,000	-53,000	-46,000	17,000
2002 (D)		18,000	51,000	-16,000	-21,000	-50,000	-17,000	-530
2003 (AN)		48,000	69,000	-9,900	-21,000	-53,000	33,000	32,000
2004 (BN)		26,000	65,000	-13,000	-23,000	-59,000	-4,700	28,000
2005 (AN)		21,000	68,000	-8,600	-21,000	-52,000	8,100	36,000
2006 (W)		56,000	83,000	-9,000	-25,000	-61,000	44,000	80,000
2007 (D)		1,200	37,000	-13,000	-23,000	-65,000	-62,000	18,000
2008 (C)		14,000	41,000	-17,000	-18,000	-57,000	-38,000	-20,000
2009 (D)		26,000	34,000	-16,000	-13,000	-55,000	-24,000	-45,000
2010 (BN)		42,000	62,000	-13,000	-13,000	-55,000	22,000	-22,000
2011 (W)		62,000	67,000	-9,500	-17,000	-61,000	41,000	19,000
2012 (BN)		19,000	36,000	-15,000	-17,000	-64,000	-41,000	-22,000
2013 (D)		27,000	41,000	-21,000	-12,000	-63,000	-28,000	-50,000
2014 (C)		19,000	23,000	-28,000	-6,400	-60,000	-51,000	-100,000
2015 (C)		30,000	37,000	-35,000	-4,200	-57,000	-30,000	-130,000
2016 (BN)		67,000	46,000	-23,000	-4,100	-63,000	23,000	-110,000
2017 (W)		96,000	76,000	-17,000	-8,700	-73,000	73,000	-36,000
2018 (BN)		42,000	30,000	-24,000	-7,800	-78,000	-38,000	-74,000
Average (1990-2018)		33,000	54,000	-16,000	-17,000	-56,000	-2,500	
1990-2018	W	55,000	76,000	-12,000	-21,000	-60,000		
	AN	36,000	66,000	-11,000	-20,000	-52,000		
	BN	39,000	48,000	-18,000	-13,000	-64,000		
	D	14,000	41,000	-16,000	-18,000	-57,000		
	C	15,000	35,000	-24,000	-12,000	-48,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



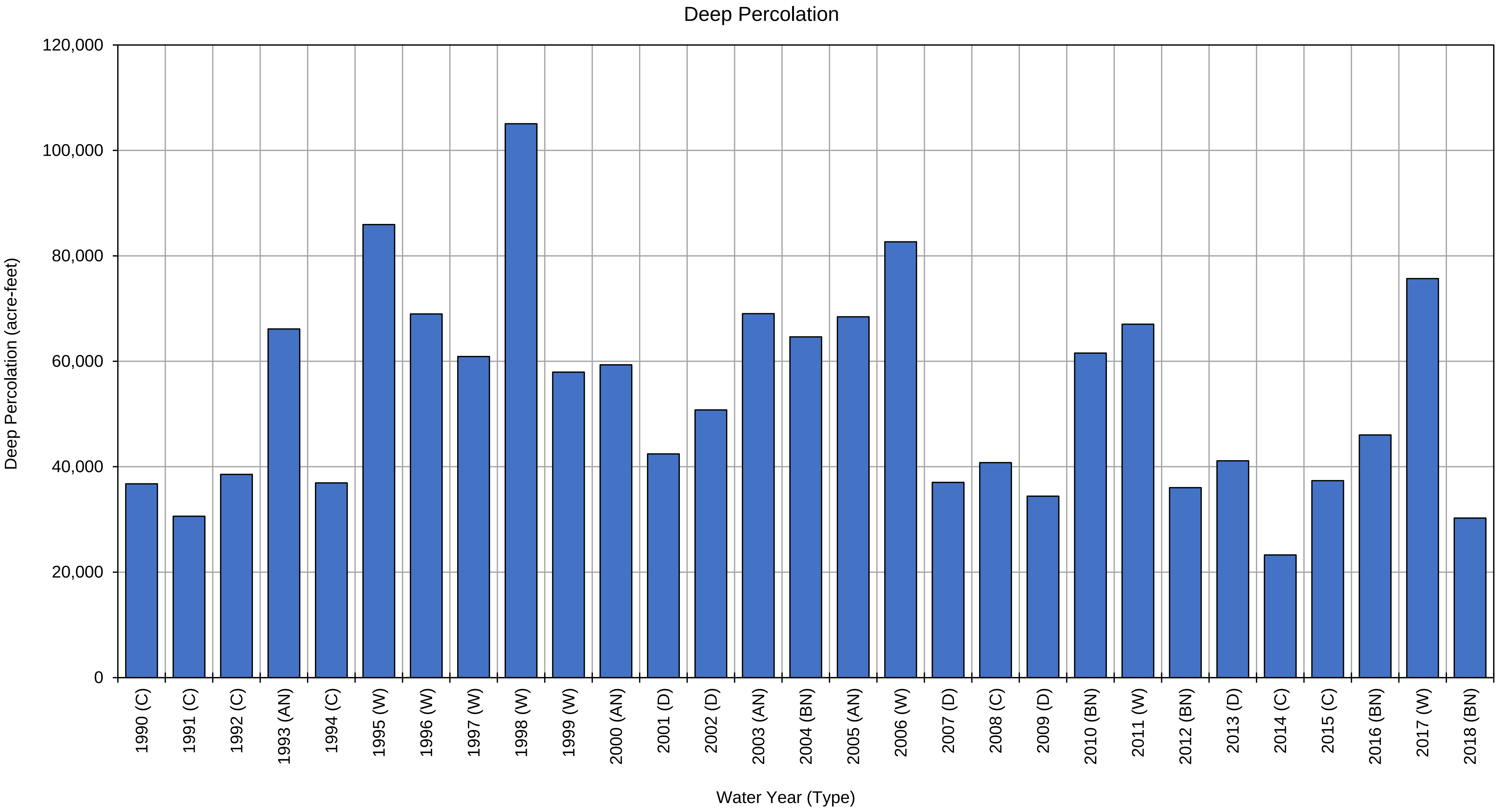
Tehama IHM - Historical

Los Molinos Subbasin Historical Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
1990 (C)		1,800
1991 (C)		13,000
1992 (C)		19,000
1993 (AN)		58,000
1994 (C)		7,200
1995 (W)		71,000
1996 (W)		43,000
1997 (W)		35,000
1998 (W)		52,000
1999 (W)		28,000
2000 (AN)		16,000
2001 (D)		850
2002 (D)		18,000
2003 (AN)		48,000
2004 (BN)		26,000
2005 (AN)		21,000
2006 (W)		56,000
2007 (D)		1,200
2008 (C)		14,000
2009 (D)		26,000
2010 (BN)		42,000
2011 (W)		62,000
2012 (BN)		19,000
2013 (D)		27,000
2014 (C)		19,000
2015 (C)		30,000
2016 (BN)		67,000
2017 (W)		96,000
2018 (BN)		42,000
Average (1990-2018)		33,000
1990-2018	W	55,000
	AN	36,000
	BN	39,000
	D	14,000
	C	15,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



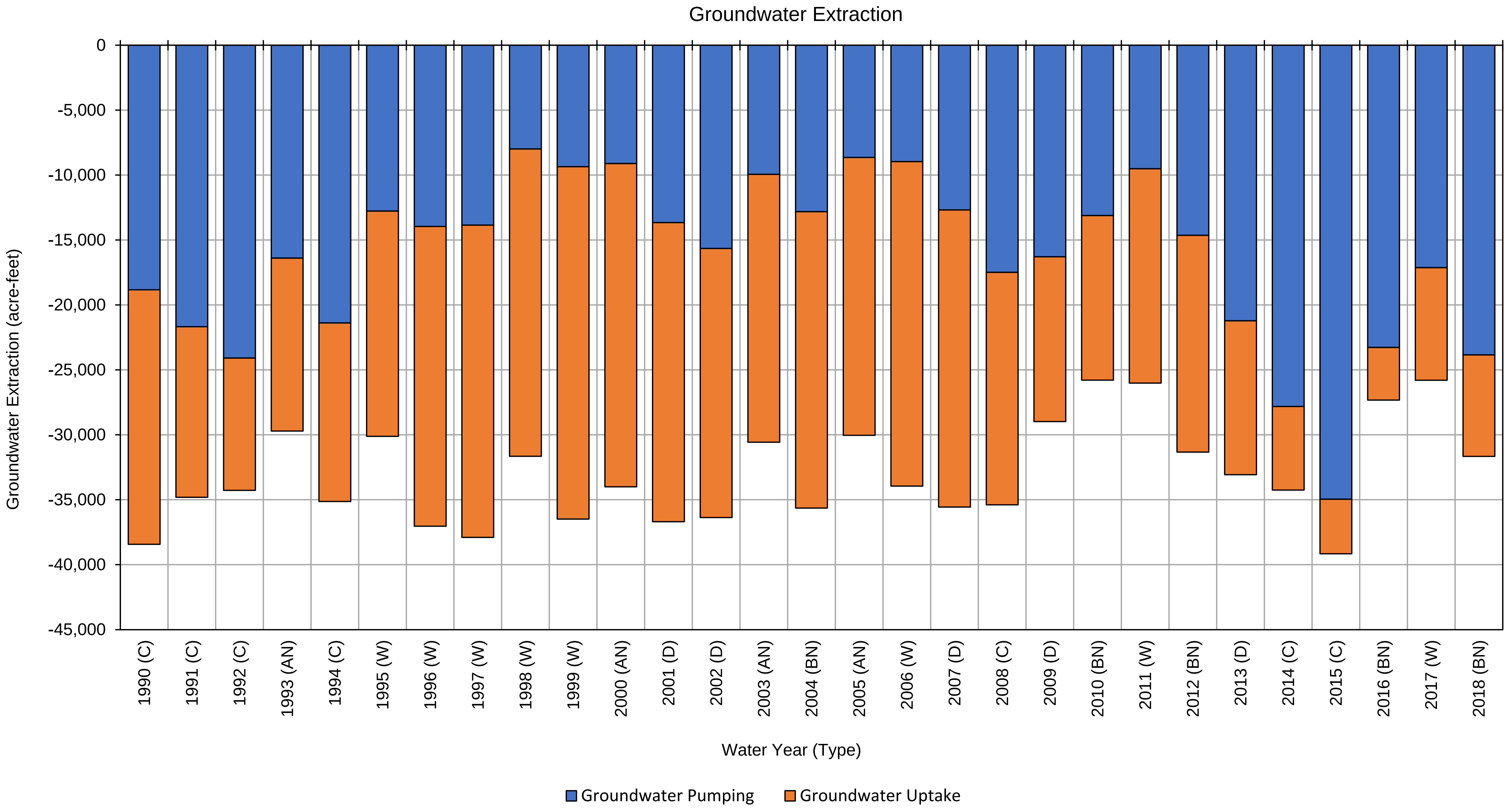
Tehama IHM - Historical

Los Molinos Subbasin Historical Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
1990 (C)		37,000
1991 (C)		31,000
1992 (C)		39,000
1993 (AN)		66,000
1994 (C)		37,000
1995 (W)		86,000
1996 (W)		69,000
1997 (W)		61,000
1998 (W)		110,000
1999 (W)		58,000
2000 (AN)		59,000
2001 (D)		42,000
2002 (D)		51,000
2003 (AN)		69,000
2004 (BN)		65,000
2005 (AN)		68,000
2006 (W)		83,000
2007 (D)		37,000
2008 (C)		41,000
2009 (D)		34,000
2010 (BN)		62,000
2011 (W)		67,000
2012 (BN)		36,000
2013 (D)		41,000
2014 (C)		23,000
2015 (C)		37,000
2016 (BN)		46,000
2017 (W)		76,000
2018 (BN)		30,000
Average (1990-2018)		54,000
1990-2018	W	76,000
	AN	66,000
	BN	48,000
	D	41,000
	C	35,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



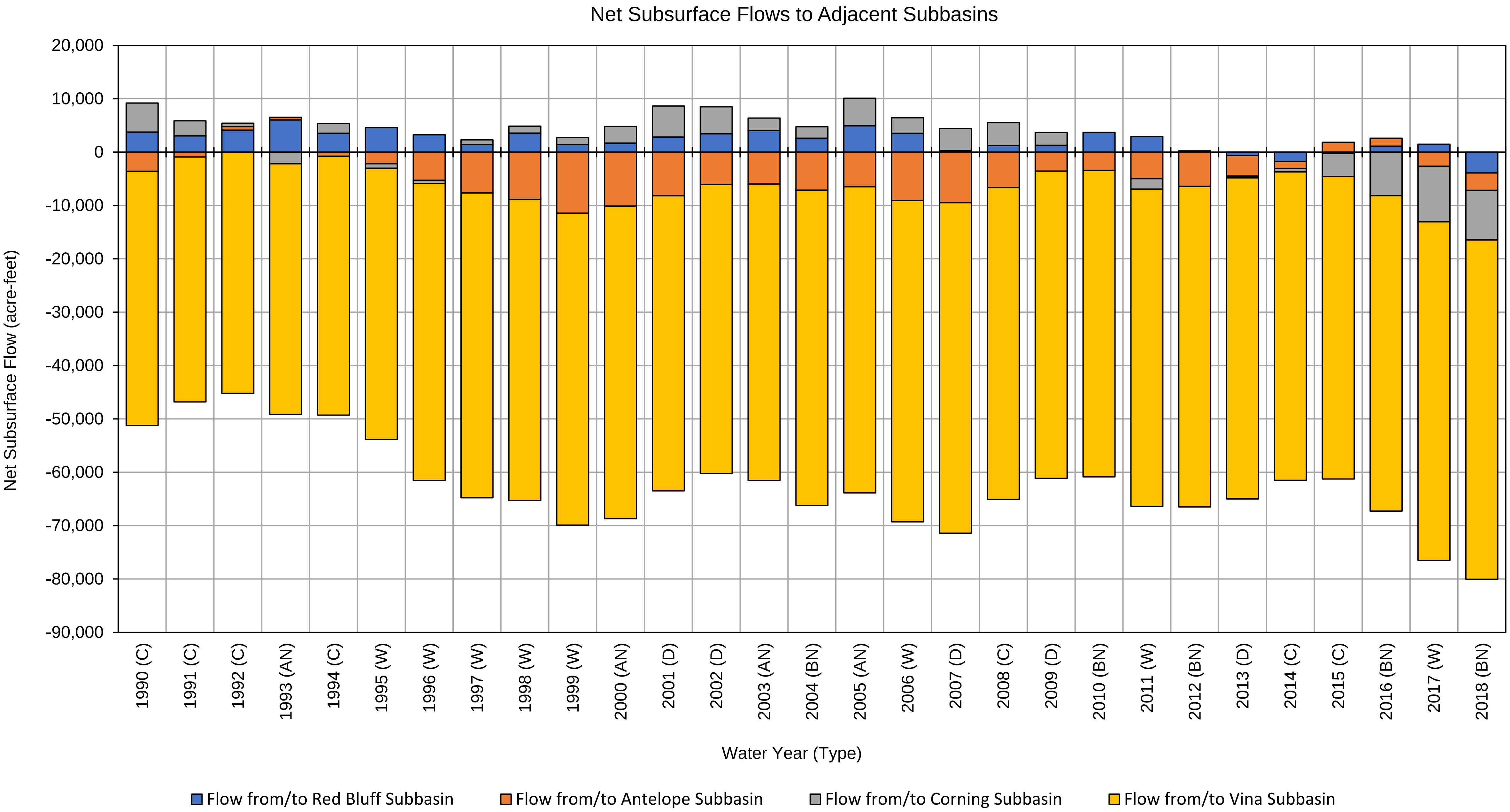
Tehama IHM - Historical

Los Molinos Subbasin Historical Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
1990 (C)		-19,000	-20,000	-38,000
1991 (C)		-22,000	-13,000	-35,000
1992 (C)		-24,000	-10,000	-34,000
1993 (AN)		-16,000	-13,000	-30,000
1994 (C)		-21,000	-14,000	-35,000
1995 (W)		-13,000	-17,000	-30,000
1996 (W)		-14,000	-23,000	-37,000
1997 (W)		-14,000	-24,000	-38,000
1998 (W)		-8,000	-24,000	-32,000
1999 (W)		-9,400	-27,000	-36,000
2000 (AN)		-9,100	-25,000	-34,000
2001 (D)		-14,000	-23,000	-37,000
2002 (D)		-16,000	-21,000	-36,000
2003 (AN)		-9,900	-21,000	-31,000
2004 (BN)		-13,000	-23,000	-36,000
2005 (AN)		-8,600	-21,000	-30,000
2006 (W)		-9,000	-25,000	-34,000
2007 (D)		-13,000	-23,000	-36,000
2008 (C)		-17,000	-18,000	-35,000
2009 (D)		-16,000	-13,000	-29,000
2010 (BN)		-13,000	-13,000	-26,000
2011 (W)		-9,500	-17,000	-26,000
2012 (BN)		-15,000	-17,000	-31,000
2013 (D)		-21,000	-12,000	-33,000
2014 (C)		-28,000	-6,400	-34,000
2015 (C)		-35,000	-4,200	-39,000
2016 (BN)		-23,000	-4,100	-27,000
2017 (W)		-17,000	-8,700	-26,000
2018 (BN)		-24,000	-7,800	-32,000
Average (1990-2018)		-16,000	-17,000	-33,000
1990-2018	W	-12,000	-21,000	-32,000
	AN	-11,000	-20,000	-31,000
	BN	-18,000	-13,000	-30,000
	D	-16,000	-18,000	-34,000
	C	-24,000	-12,000	-36,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W Wet
AN Above Normal
BN Below Normal
D Dry
C Critical



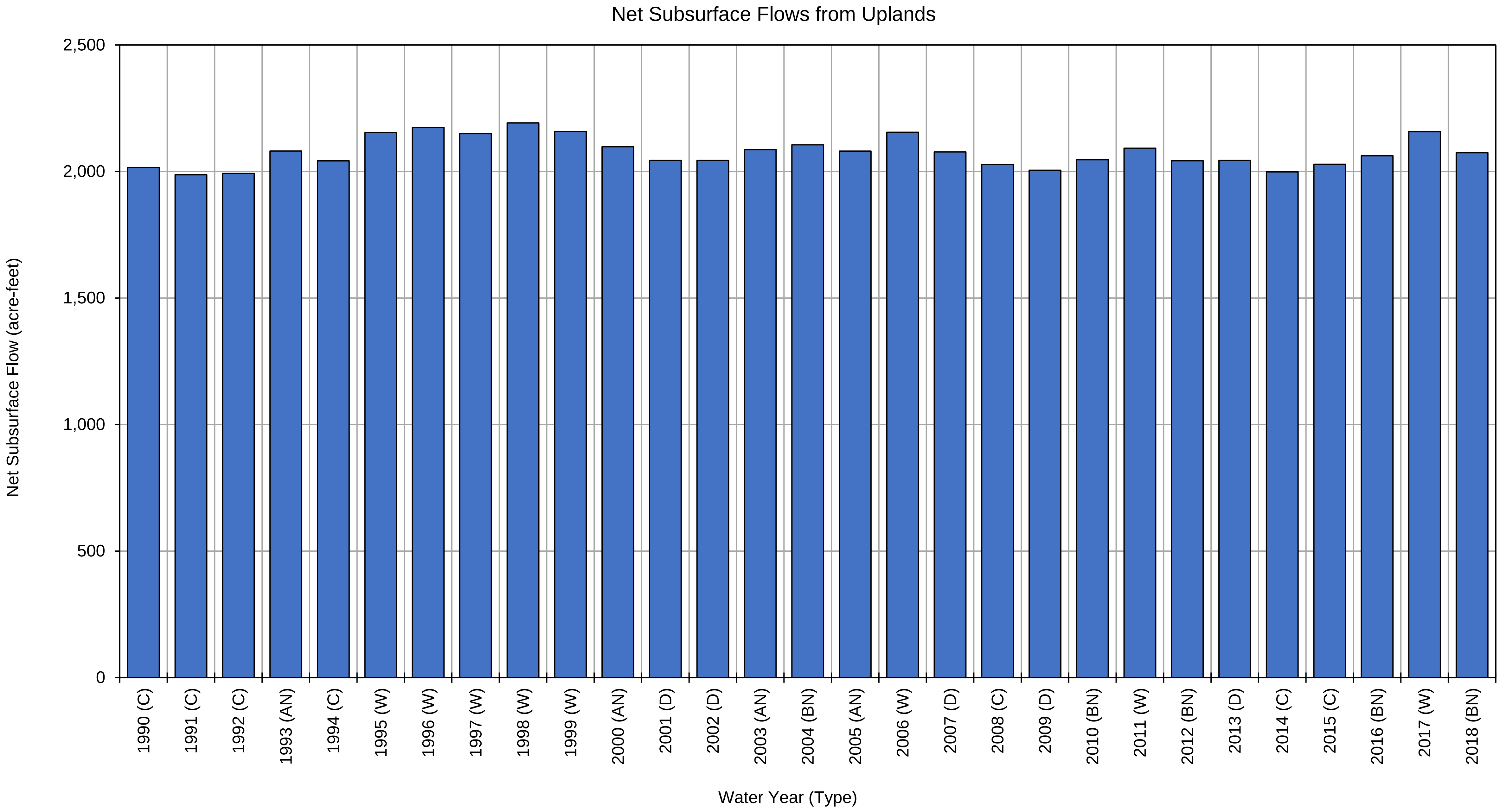
Tehama IHM - Historical

Los Molinos Subbasin Historical Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
1990 (C)		3,800	-3,600	5,400	-48,000	-42,000
1991 (C)		3,000	-930	2,800	-46,000	-41,000
1992 (C)		4,100	690	630	-45,000	-40,000
1993 (AN)		6,000	480	-2,200	-47,000	-43,000
1994 (C)		3,500	-770	1,800	-49,000	-44,000
1995 (W)		4,600	-2,200	-830	-51,000	-49,000
1996 (W)		3,200	-5,300	-580	-56,000	-58,000
1997 (W)		1,400	-7,700	900	-57,000	-62,000
1998 (W)		3,600	-8,800	1,300	-56,000	-60,000
1999 (W)		1,400	-11,000	1,300	-58,000	-67,000
2000 (AN)		1,700	-10,000	3,100	-59,000	-64,000
2001 (D)		2,800	-8,200	5,800	-55,000	-55,000
2002 (D)		3,400	-6,100	5,100	-54,000	-52,000
2003 (AN)		4,000	-6,000	2,400	-56,000	-55,000
2004 (BN)		2,600	-7,100	2,100	-59,000	-62,000
2005 (AN)		4,900	-6,500	5,200	-57,000	-54,000
2006 (W)		3,500	-9,100	2,900	-60,000	-63,000
2007 (D)		260	-9,500	4,200	-62,000	-67,000
2008 (C)		1,200	-6,700	4,400	-58,000	-60,000
2009 (D)		1,300	-3,600	2,400	-58,000	-57,000
2010 (BN)		3,700	-3,400	-6	-57,000	-57,000
2011 (W)		2,900	-5,000	-1,900	-59,000	-63,000
2012 (BN)		240	-6,400	-34	-60,000	-66,000
2013 (D)		-660	-3,800	-320	-60,000	-65,000
2014 (C)		-1,800	-1,300	-600	-58,000	-62,000
2015 (C)		-180	1,800	-4,400	-57,000	-59,000
2016 (BN)		1,100	1,500	-8,200	-59,000	-65,000
2017 (W)		1,500	-2,700	-10,000	-63,000	-75,000
2018 (BN)		-3,900	-3,300	-9,300	-64,000	-80,000
Average (1990-2018)		2,200	-4,700	450	-56,000	-58,000
1990-2018	W	2,800	-6,500	-920	-58,000	-62,000
	AN	4,200	-5,500	2,100	-55,000	-54,000
	BN	750	-3,700	-3,100	-60,000	-66,000
	D	1,400	-6,200	3,400	-58,000	-59,000
	C	2,000	-1,500	1,400	-51,000	-50,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



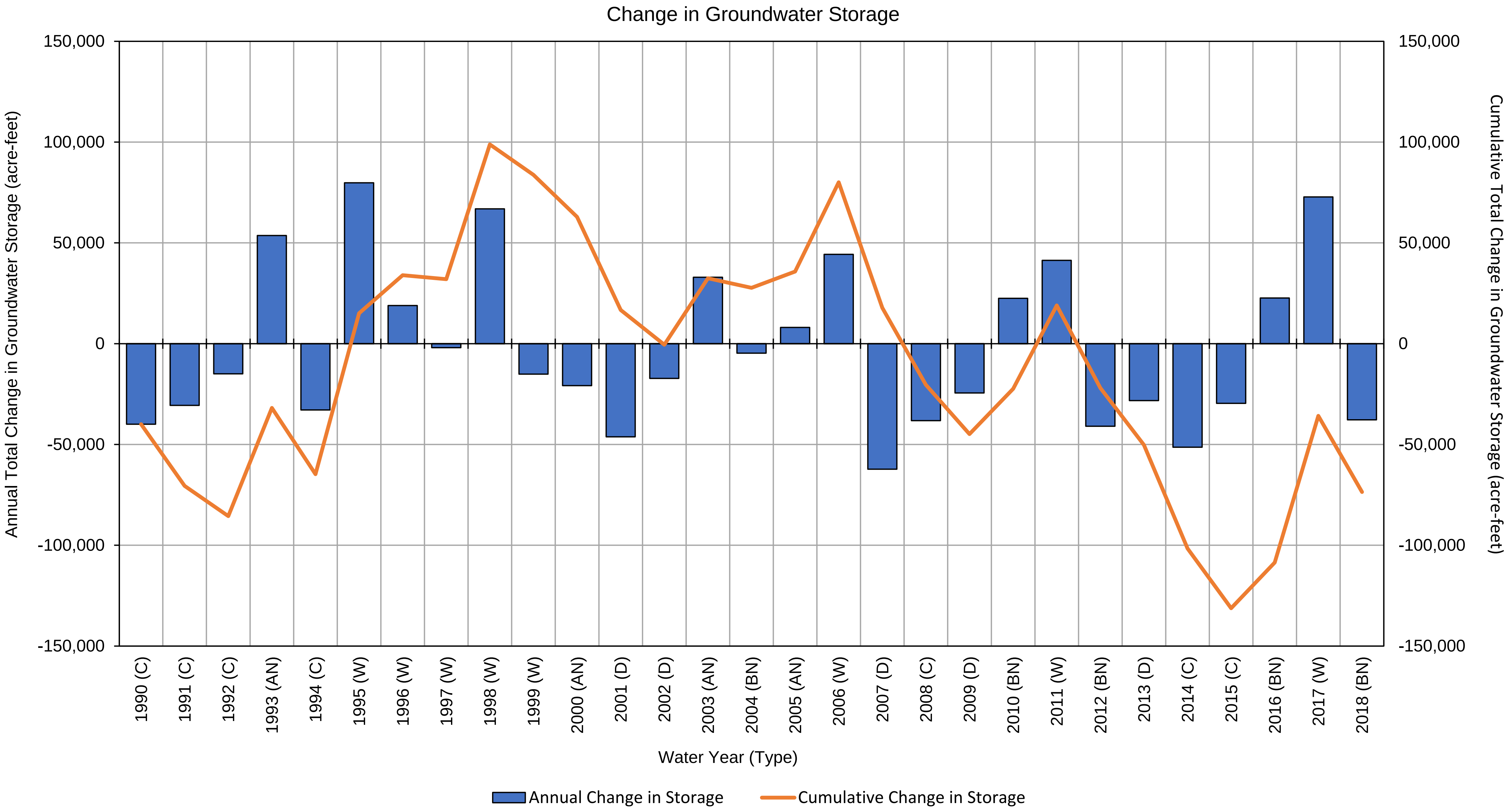
Tehama IHM - Historical

Los Molinos Subbasin Historical Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
1990 (C)		2,000
1991 (C)		2,000
1992 (C)		2,000
1993 (AN)		2,100
1994 (C)		2,000
1995 (W)		2,200
1996 (W)		2,200
1997 (W)		2,100
1998 (W)		2,200
1999 (W)		2,200
2000 (AN)		2,100
2001 (D)		2,000
2002 (D)		2,000
2003 (AN)		2,100
2004 (BN)		2,100
2005 (AN)		2,100
2006 (W)		2,200
2007 (D)		2,100
2008 (C)		2,000
2009 (D)		2,000
2010 (BN)		2,000
2011 (W)		2,100
2012 (BN)		2,000
2013 (D)		2,000
2014 (C)		2,000
2015 (C)		2,000
2016 (BN)		2,100
2017 (W)		2,200
2018 (BN)		2,100
Average (1990-2018)		2,100
1990-2018	W	2,200
	AN	2,100
	BN	2,100
	D	2,000
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Los Molinos Subbasin Historical Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">1990 (C)</td><td>-40,000</td><td>-40,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>-31,000</td><td>-71,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>-15,000</td><td>-86,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>54,000</td><td>-32,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>-33,000</td><td>-65,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>80,000</td><td>15,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>19,000</td><td>34,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>-2,000</td><td>32,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>67,000</td><td>99,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>-15,000</td><td>84,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>-21,000</td><td>63,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>-46,000</td><td>17,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>-17,000</td><td>-530</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>33,000</td><td>32,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>-4,700</td><td>28,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>8,100</td><td>36,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>44,000</td><td>80,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>-62,000</td><td>18,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>-38,000</td><td>-20,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>-24,000</td><td>-45,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>22,000</td><td>-22,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>41,000</td><td>19,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>-41,000</td><td>-22,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>-28,000</td><td>-50,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>-51,000</td><td>-100,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>-30,000</td><td>-130,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>23,000</td><td>-110,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>73,000</td><td>-36,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>-38,000</td><td>-74,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>-2,500</td><td></td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-2

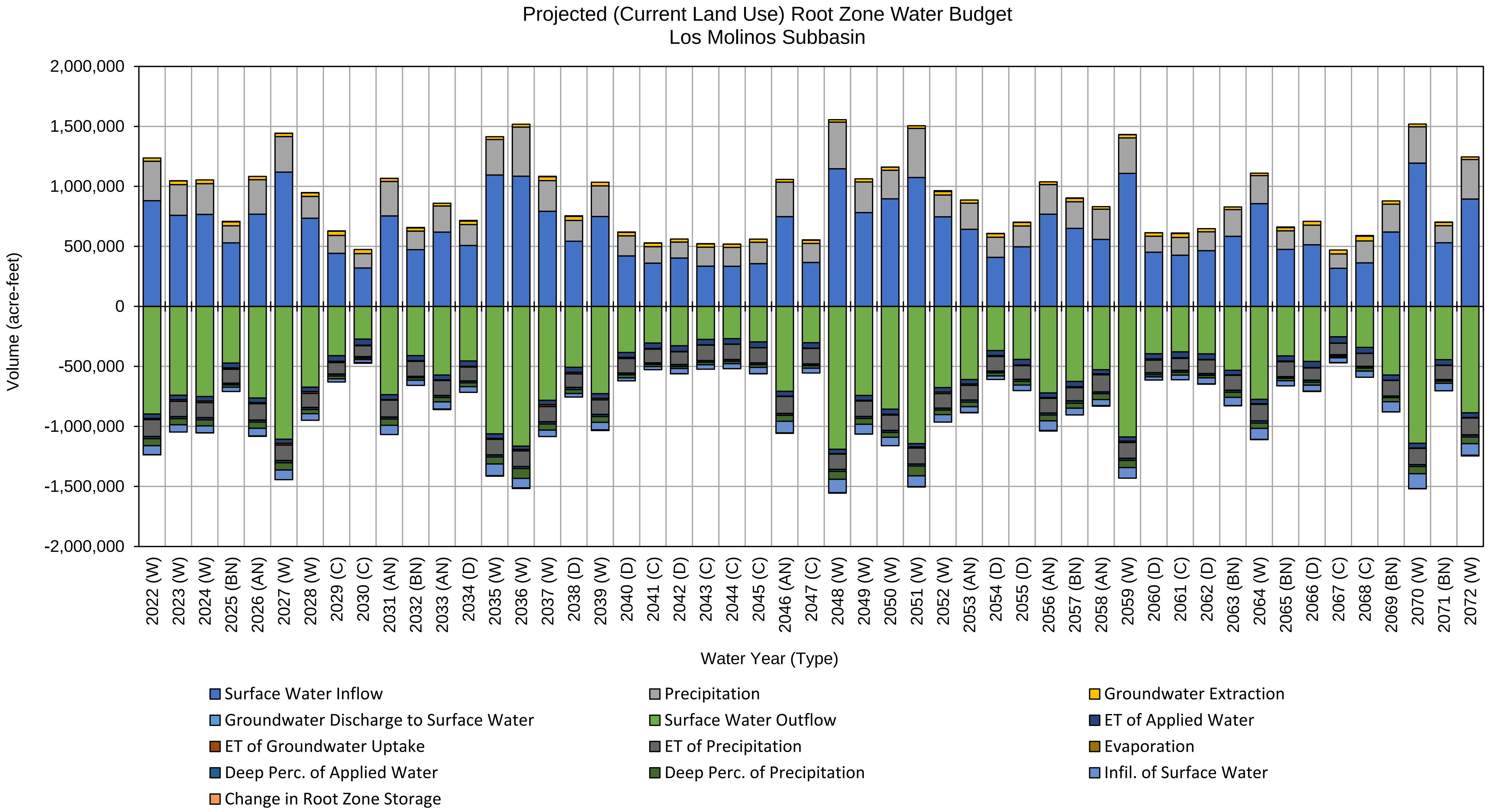
Detailed Los Molinos Subbasin Water Budget Results:

Projected (Current Land Use) Model Results

APPENDIX C-2a

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Surface Water System



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

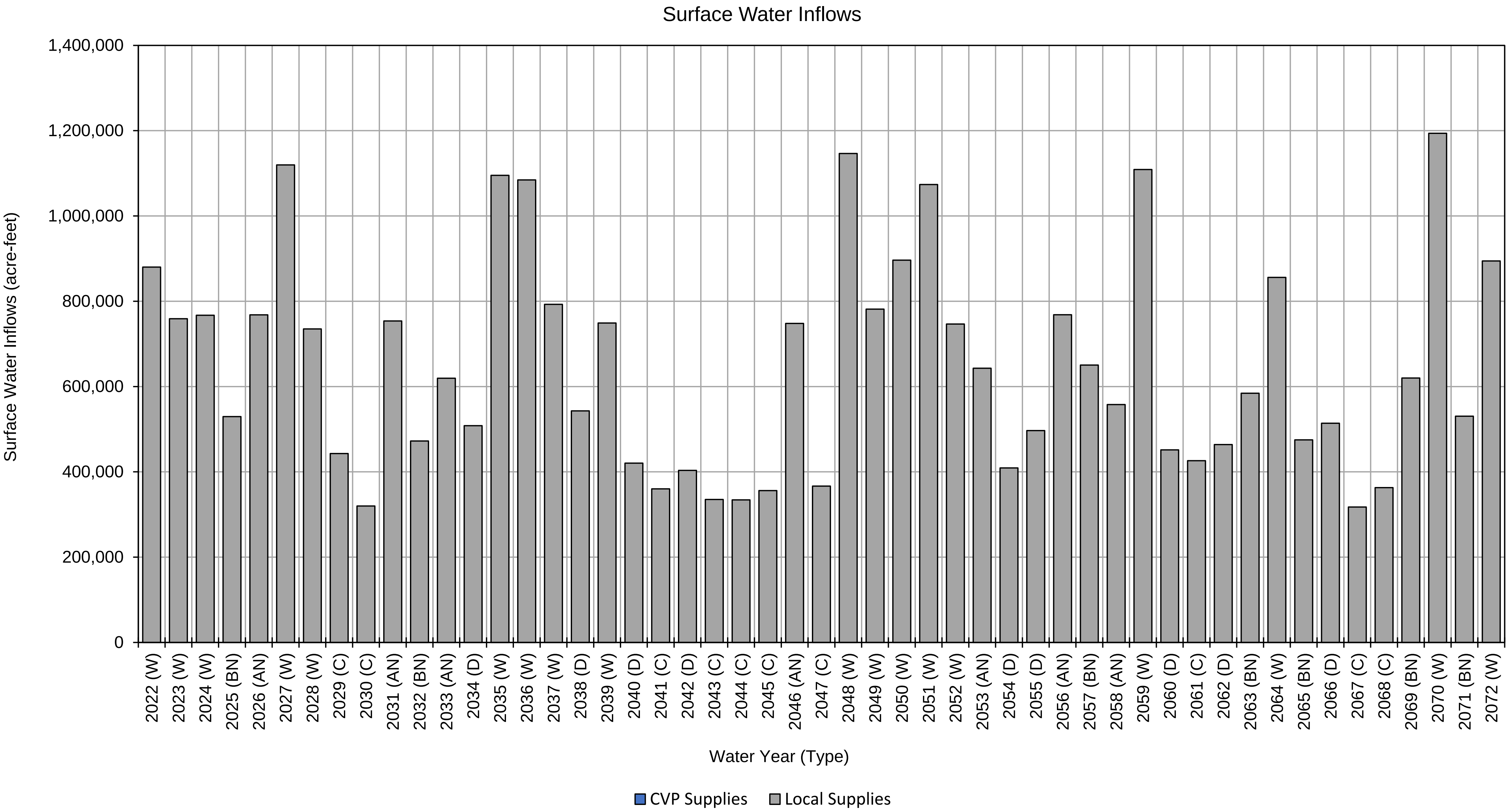
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	880,000	330,000	27,000	0	900,000	37,000	9,500	140,000	1,900	16,000	58,000	75,000	1,500
2023 (W)	760,000	260,000	31,000	0	740,000	38,000	13,000	130,000	2,200	15,000	50,000	61,000	-1,700
2024 (W)	770,000	260,000	31,000	0	750,000	38,000	14,000	120,000	2,200	16,000	50,000	58,000	190
2025 (BN)	530,000	140,000	32,000	0	470,000	42,000	11,000	120,000	2,400	12,000	19,000	36,000	-4,700
2026 (AN)	770,000	290,000	27,000	0	760,000	38,000	11,000	140,000	2,100	15,000	52,000	64,000	3,800
2027 (W)	1,100,000	300,000	28,000	0	1,100,000	35,000	14,000	130,000	1,900	17,000	60,000	80,000	-760
2028 (W)	740,000	180,000	30,000	0	670,000	37,000	15,000	120,000	2,200	15,000	35,000	55,000	-1,500
2029 (C)	440,000	150,000	35,000	0	410,000	45,000	11,000	96,000	2,700	14,000	24,000	25,000	-2,800
2030 (C)	320,000	120,000	34,000	0	270,000	50,000	5,200	90,000	2,800	10,000	12,000	24,000	5,900
2031 (AN)	750,000	290,000	25,000	0	740,000	40,000	5,300	140,000	2,100	15,000	52,000	77,000	-1,000
2032 (BN)	470,000	160,000	27,000	0	410,000	43,000	5,300	120,000	2,300	10,000	20,000	43,000	-3,800
2033 (AN)	620,000	220,000	23,000	0	570,000	41,000	5,100	120,000	2,200	14,000	37,000	60,000	5,000
2034 (D)	510,000	170,000	29,000	0	450,000	46,000	5,700	120,000	2,500	14,000	32,000	47,000	-5,400
2035 (W)	1,100,000	300,000	23,000	0	1,100,000	37,000	8,100	130,000	2,000	16,000	58,000	98,000	3,100
2036 (W)	1,100,000	410,000	23,000	0	1,200,000	26,000	13,000	130,000	1,400	16,000	82,000	79,000	5,700
2037 (W)	790,000	260,000	33,000	0	780,000	36,000	16,000	130,000	2,200	16,000	51,000	53,000	-3,100
2038 (D)	540,000	170,000	34,000	0	510,000	41,000	14,000	110,000	2,500	15,000	33,000	29,000	-5,400
2039 (W)	750,000	260,000	30,000	0	730,000	39,000	12,000	120,000	2,200	15,000	49,000	63,000	4,900
2040 (D)	420,000	170,000	29,000	0	380,000	40,000	10,000	120,000	2,300	12,000	26,000	25,000	-2,700
2041 (C)	360,000	140,000	30,000	0	310,000	45,000	5,700	110,000	2,500	11,000	17,000	26,000	-35
2042 (D)	400,000	130,000	25,000	0	330,000	47,000	3,200	110,000	2,600	13,000	17,000	43,000	680
2043 (C)	340,000	160,000	28,000	0	280,000	46,000	2,300	130,000	2,200	12,000	21,000	36,000	-2,100
2044 (C)	330,000	160,000	26,000	0	270,000	46,000	1,400	130,000	2,200	12,000	20,000	42,000	-60
2045 (C)	360,000	180,000	26,000	0	300,000	48,000	1,000	130,000	2,300	12,000	23,000	52,000	150
2046 (AN)	750,000	290,000	22,000	0	710,000	41,000	1,900	140,000	2,200	14,000	50,000	98,000	3,200
2047 (C)	370,000	160,000	27,000	0	300,000	45,000	2,100	130,000	2,200	12,000	21,000	40,000	-3,300
2048 (W)	1,100,000	390,000	21,000	0	1,200,000	37,000	3,200	130,000	1,900	16,000	65,000	110,000	3,600
2049 (W)	780,000	260,000	26,000	0	740,000	41,000	6,000	130,000	2,200	14,000	49,000	81,000	230
2050 (W)	900,000	240,000	26,000	0	860,000	41,000	7,600	130,000	2,400	14,000	40,000	70,000	-110
2051 (W)	1,100,000	410,000	21,000	0	1,100,000	27,000	11,000	130,000	1,400	15,000	82,000	90,000	3,700
2052 (W)	750,000	180,000	29,000	0	680,000	37,000	13,000	120,000	2,300	15,000	37,000	63,000	-6,500
2053 (AN)	640,000	220,000	26,000	0	610,000	37,000	12,000	120,000	2,100	15,000	38,000	47,000	3,700
2054 (D)	410,000	170,000	29,000	0	370,000	41,000	8,600	120,000	2,300	12,000	26,000	29,000	-3,200
2055 (D)	500,000	170,000	29,000	0	440,000	46,000	6,200	110,000	2,500	14,000	31,000	47,000	-2,500
2056 (AN)	770,000	250,000	23,000	0	720,000	39,000	6,800	120,000	2,100	15,000	48,000	80,000	4,200
2057 (BN)	650,000	220,000	28,000	0	630,000	44,000	8,600	110,000	2,500	18,000	42,000	56,000	-3,600
2058 (AN)	560,000	250,000	21,000	0	530,000	34,000	8,600	140,000	1,800	13,000	49,000	51,000	3,800
2059 (W)	1,100,000	300,000	27,000	0	1,100,000	35,000	12,000	130,000	1,900	16,000	60,000	88,000	-860
2060 (D)	450,000	130,000	29,000	0	390,000	43,000	9,900	100,000	2,600	14,000	18,000	26,000	-480
2061 (C)	430,000	150,000	33,000	0	380,000	49,000	5,800	99,000	2,700	14,000	23,000	39,000	-3,700
2062 (D)	460,000	160,000	26,000	0	400,000	46,000	3,600	110,000	2,500	12,000	20,000	51,000	2,200
2063 (BN)	580,000	220,000	21,000	0	530,000	38,000	3,800	120,000	2,100	14,000	43,000	69,000	1,800
2064 (W)	860,000	230,000	20,000	0	770,000	36,000	6,100	140,000	1,900	17,000	45,000	91,000	1,800
2065 (BN)	470,000	160,000	27,000	0	410,000	43,000	6,100	120,000	2,300	11,000	20,000	43,000	-4,700

Los Molinos Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		510,000	160,000	32,000	0	460,000	51,000	3,800	100,000	2,700	14,000	25,000	50,000	2,600
2067 (C)		320,000	120,000	33,000	0	250,000	51,000	1,800	96,000	2,800	11,000	12,000	40,000	2,100
2068 (C)		360,000	180,000	40,000	0	340,000	49,000	940	110,000	2,500	11,000	25,000	51,000	-5,000
2069 (BN)		620,000	230,000	27,000	0	570,000	44,000	870	130,000	2,300	11,000	34,000	84,000	980
2070 (W)		1,200,000	300,000	23,000	0	1,100,000	40,000	2,700	130,000	2,100	14,000	60,000	120,000	2,000
2071 (BN)		530,000	140,000	28,000	0	440,000	46,000	2,500	120,000	2,500	11,000	17,000	63,000	-2,500
2072 (W)		890,000	330,000	22,000	0	890,000	40,000	3,500	140,000	2,000	16,000	56,000	96,000	6,000
Average (2022-2072)		650,000	220,000	27,000	0	610,000	41,000	7,300	120,000	2,200	14,000	38,000	59,000	24
2022-2072	W	930,000	290,000	26,000	0	910,000	36,000	10,000	130,000	2,000	15,000	55,000	80,000	1,000
	AN	690,000	260,000	24,000	0	660,000	39,000	7,100	130,000	2,100	14,000	46,000	68,000	3,200
	BN	550,000	180,000	27,000	0	500,000	43,000	5,400	120,000	2,300	12,000	28,000	56,000	-2,300
	D	470,000	160,000	29,000	0	410,000	45,000	7,200	110,000	2,500	13,000	25,000	39,000	-1,600
	C	360,000	150,000	31,000	0	310,000	47,000	3,800	110,000	2,500	12,000	20,000	38,000	-880

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	0	880,000	880,000
2023 (W)	0	760,000	760,000
2024 (W)	0	770,000	770,000
2025 (BN)	0	530,000	530,000
2026 (AN)	0	770,000	770,000
2027 (W)	0	1,100,000	1,100,000
2028 (W)	0	740,000	740,000
2029 (C)	0	440,000	440,000
2030 (C)	0	320,000	320,000
2031 (AN)	0	750,000	750,000
2032 (BN)	0	470,000	470,000
2033 (AN)	0	620,000	620,000
2034 (D)	0	510,000	510,000
2035 (W)	0	1,100,000	1,100,000
2036 (W)	0	1,100,000	1,100,000
2037 (W)	0	790,000	790,000
2038 (D)	0	540,000	540,000
2039 (W)	0	750,000	750,000
2040 (D)	0	420,000	420,000
2041 (C)	0	360,000	360,000
2042 (D)	0	400,000	400,000
2043 (C)	0	340,000	340,000
2044 (C)	0	330,000	330,000
2045 (C)	0	360,000	360,000
2046 (AN)	0	750,000	750,000
2047 (C)	0	370,000	370,000
2048 (W)	0	1,100,000	1,100,000
2049 (W)	0	780,000	780,000
2050 (W)	0	900,000	900,000
2051 (W)	0	1,100,000	1,100,000
2052 (W)	0	750,000	750,000
2053 (AN)	0	640,000	640,000
2054 (D)	0	410,000	410,000
2055 (D)	0	500,000	500,000
2056 (AN)	0	770,000	770,000
2057 (BN)	0	650,000	650,000
2058 (AN)	0	560,000	560,000
2059 (W)	0	1,100,000	1,100,000
2060 (D)	0	450,000	450,000
2061 (C)	0	430,000	430,000
2062 (D)	0	460,000	460,000
2063 (BN)	0	580,000	580,000

Los Molinos Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		0	860,000	860,000
2065 (BN)		0	470,000	470,000
2066 (D)		0	510,000	510,000
2067 (C)		0	320,000	320,000
2068 (C)		0	360,000	360,000
2069 (BN)		0	620,000	620,000
2070 (W)		0	1,200,000	1,200,000
2071 (BN)		0	530,000	530,000
2072 (W)		0	890,000	890,000
Average (2022-2072)		0	650,000	650,000
2022-2072	W	0	930,000	930,000
	AN	0	690,000	690,000
	BN	0	550,000	550,000
	D	0	470,000	470,000
	C	0	360,000	360,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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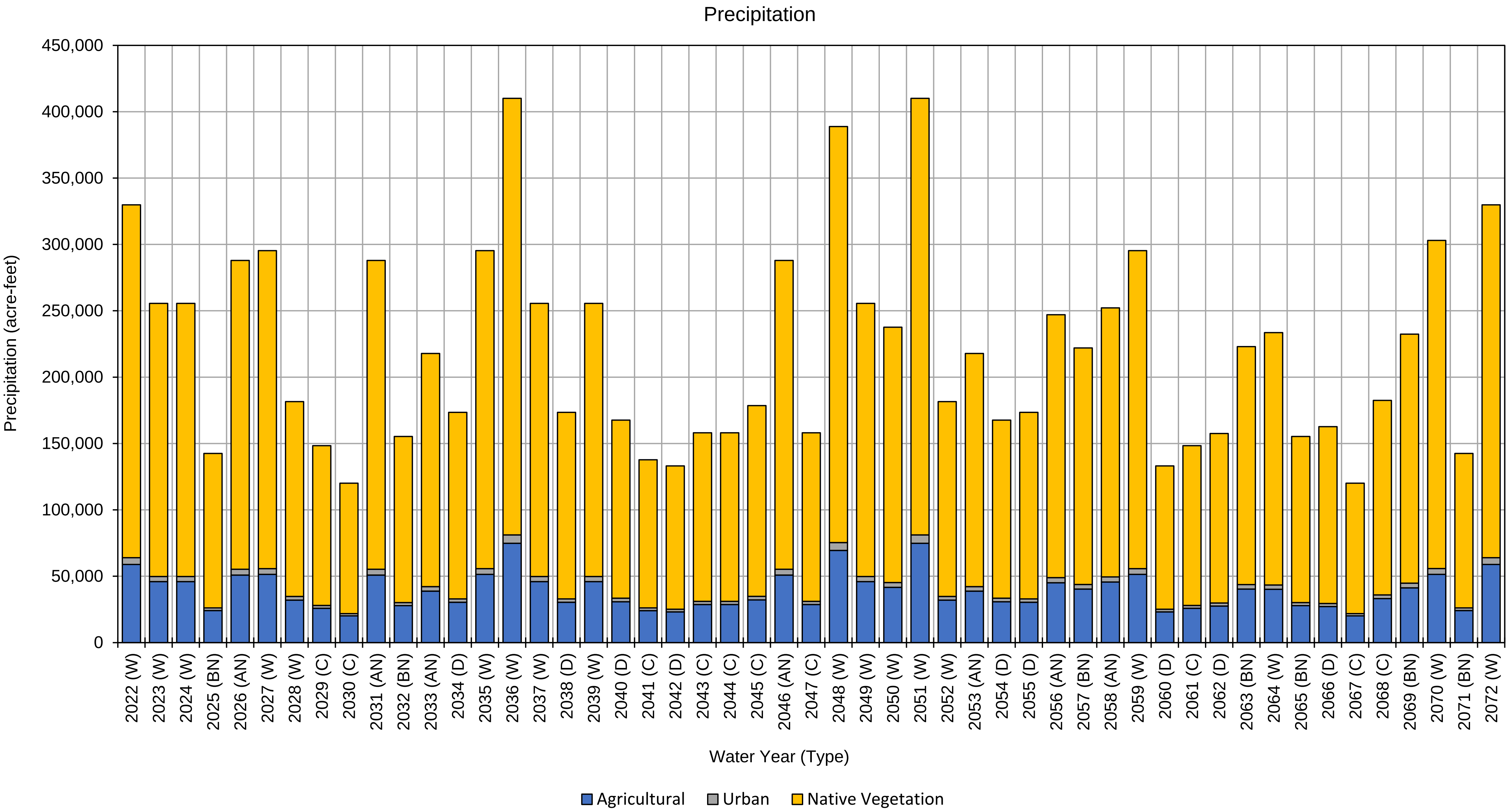
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	59,000	5,000	270,000	330,000
2023 (W)	46,000	3,800	210,000	260,000
2024 (W)	46,000	3,800	210,000	260,000
2025 (BN)	24,000	2,000	120,000	150,000
2026 (AN)	51,000	4,300	230,000	290,000
2027 (W)	51,000	4,300	240,000	300,000
2028 (W)	32,000	2,800	150,000	180,000
2029 (C)	26,000	2,200	120,000	150,000
2030 (C)	20,000	1,700	98,000	120,000
2031 (AN)	51,000	4,300	230,000	290,000
2032 (BN)	28,000	2,300	130,000	160,000
2033 (AN)	39,000	3,400	180,000	220,000
2034 (D)	30,000	2,600	140,000	170,000
2035 (W)	51,000	4,300	240,000	300,000
2036 (W)	75,000	6,400	330,000	410,000
2037 (W)	46,000	3,800	210,000	260,000
2038 (D)	30,000	2,600	140,000	170,000
2039 (W)	46,000	3,800	210,000	260,000
2040 (D)	31,000	2,600	130,000	160,000
2041 (C)	24,000	2,100	110,000	140,000
2042 (D)	23,000	2,000	110,000	140,000
2043 (C)	29,000	2,400	130,000	160,000
2044 (C)	29,000	2,400	130,000	160,000
2045 (C)	32,000	2,700	140,000	170,000
2046 (AN)	51,000	4,300	230,000	290,000
2047 (C)	29,000	2,400	130,000	160,000
2048 (W)	69,000	5,900	310,000	380,000
2049 (W)	46,000	3,800	210,000	260,000
2050 (W)	42,000	3,600	190,000	240,000
2051 (W)	75,000	6,400	330,000	410,000
2052 (W)	32,000	2,800	150,000	180,000
2053 (AN)	39,000	3,400	180,000	220,000
2054 (D)	31,000	2,600	130,000	160,000
2055 (D)	30,000	2,600	140,000	170,000
2056 (AN)	45,000	3,800	200,000	250,000
2057 (BN)	40,000	3,400	180,000	220,000
2058 (AN)	46,000	3,900	200,000	250,000
2059 (W)	51,000	4,300	240,000	300,000
2060 (D)	23,000	2,000	110,000	140,000
2061 (C)	26,000	2,200	120,000	150,000
2062 (D)	27,000	2,300	130,000	160,000
2063 (BN)	40,000	3,400	180,000	220,000

Los Molinos Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		40,000	3,300	190,000	230,000
2065 (BN)		28,000	2,300	130,000	160,000
2066 (D)		27,000	2,300	130,000	160,000
2067 (C)		20,000	1,700	98,000	120,000
2068 (C)		33,000	2,800	150,000	190,000
2069 (BN)		41,000	3,500	190,000	230,000
2070 (W)		51,000	4,400	250,000	310,000
2071 (BN)		24,000	2,000	120,000	150,000
2072 (W)		59,000	5,000	270,000	330,000
Average (2022-2072)		39,000	3,300	180,000	220,000
2022-2072	W	51,000	4,300	230,000	290,000
	AN	46,000	3,900	210,000	260,000
	BN	32,000	2,700	150,000	180,000
	D	28,000	2,400	130,000	160,000
	C	27,000	2,300	120,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
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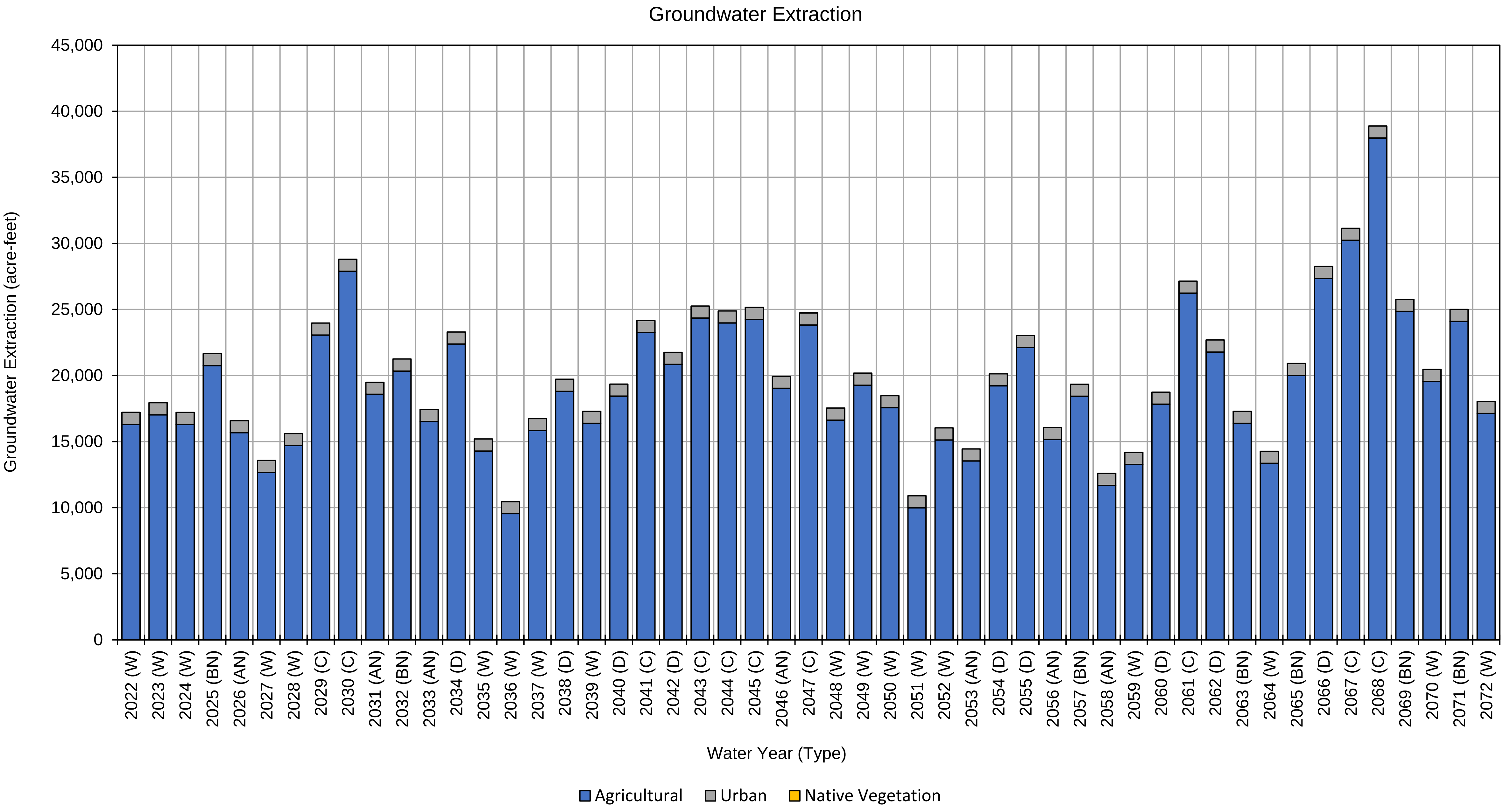
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	910	0	17,000
2023 (W)	17,000	910	0	18,000
2024 (W)	16,000	910	0	17,000
2025 (BN)	21,000	910	0	22,000
2026 (AN)	16,000	910	0	17,000
2027 (W)	13,000	910	0	14,000
2028 (W)	15,000	910	0	16,000
2029 (C)	23,000	910	0	24,000
2030 (C)	28,000	910	0	29,000
2031 (AN)	19,000	910	0	20,000
2032 (BN)	20,000	910	0	21,000
2033 (AN)	17,000	910	0	18,000
2034 (D)	22,000	910	0	23,000
2035 (W)	14,000	910	0	15,000
2036 (W)	9,500	910	0	10,000
2037 (W)	16,000	910	0	17,000
2038 (D)	19,000	910	0	20,000
2039 (W)	16,000	910	0	17,000
2040 (D)	18,000	910	0	19,000
2041 (C)	23,000	910	0	24,000
2042 (D)	21,000	910	0	22,000
2043 (C)	24,000	910	0	25,000
2044 (C)	24,000	910	0	25,000
2045 (C)	24,000	910	0	25,000
2046 (AN)	19,000	910	0	20,000
2047 (C)	24,000	910	0	25,000
2048 (W)	17,000	910	0	18,000
2049 (W)	19,000	910	0	20,000
2050 (W)	18,000	910	0	19,000
2051 (W)	10,000	910	0	11,000
2052 (W)	15,000	910	0	16,000
2053 (AN)	14,000	910	0	15,000
2054 (D)	19,000	910	0	20,000
2055 (D)	22,000	910	0	23,000
2056 (AN)	15,000	910	0	16,000
2057 (BN)	18,000	910	0	19,000
2058 (AN)	12,000	910	0	13,000
2059 (W)	13,000	910	0	14,000
2060 (D)	18,000	910	0	19,000
2061 (C)	26,000	910	0	27,000
2062 (D)	22,000	910	0	23,000
2063 (BN)	16,000	910	0	17,000

Los Molinos Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2064 (W)</td><td>13,000</td><td>910</td><td>0</td><td>14,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>20,000</td><td>910</td><td>0</td><td>21,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>27,000</td><td>910</td><td>0</td><td>28,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>30,000</td><td>910</td><td>0</td><td>31,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>38,000</td><td>910</td><td>0</td><td>39,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>25,000</td><td>910</td><td>0</td><td>26,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>20,000</td><td>910</td><td>0</td><td>21,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>24,000</td><td>910</td><td>0</td><td>25,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>17,000</td><td>910</td><td>0</td><td>18,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>19,000</td><td>910</td><td>0</td><td>20,000</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>15,000</td><td>910</td><td>0</td><td>16,000</td></tr>
<tr><td>AN</td><td>16,000</td><td>910</td><td>0</td><td>17,000</td></tr>
<tr><td>BN</td><td>21,000</td><td>910</td><td>0</td><td>22,000</td></tr>
<tr><td>D</td><td>21,000</td><td>910</td><td>0</td><td>22,000</td></tr>
<tr><td>C</td><td>27,000</td><td>910</td><td>0</td><td>28,000</td></tr>
</table>

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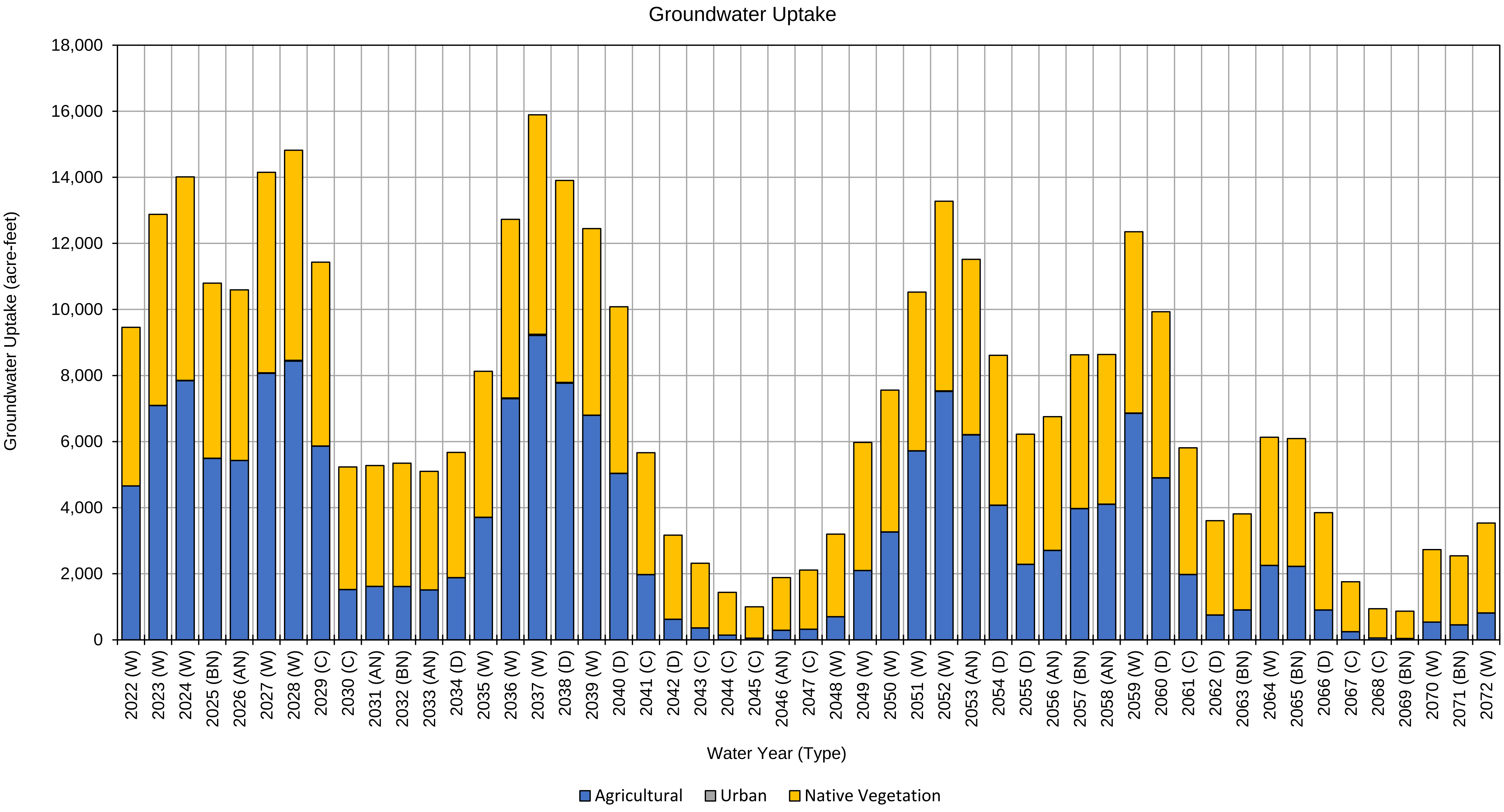
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

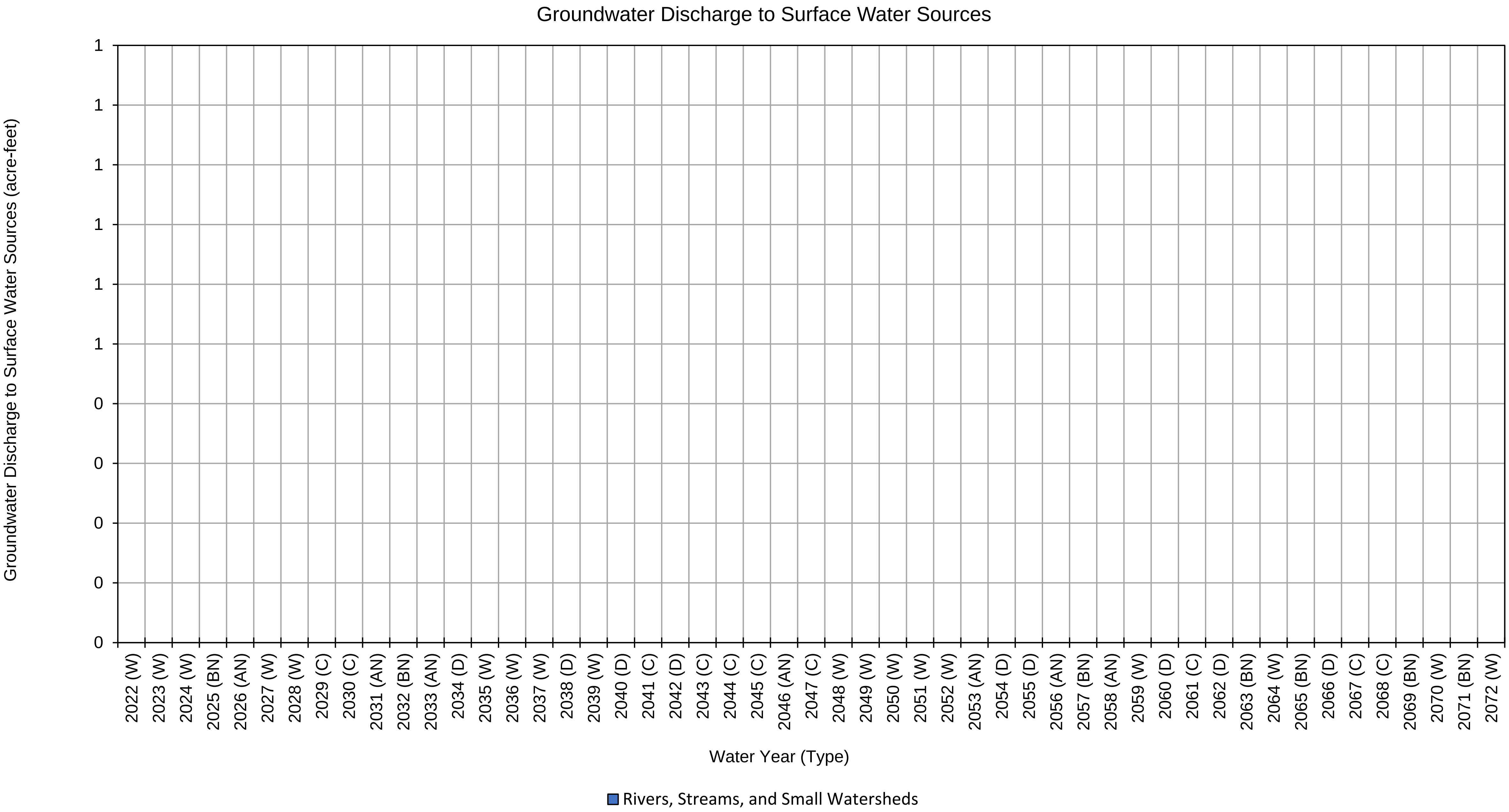
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,700	5	4,800	9,500
2023 (W)	7,100	9	5,800	13,000
2024 (W)	7,800	13	6,200	14,000
2025 (BN)	5,500	5	5,300	11,000
2026 (AN)	5,400	5	5,200	11,000
2027 (W)	8,100	16	6,100	14,000
2028 (W)	8,400	24	6,400	15,000
2029 (C)	5,900	7	5,600	12,000
2030 (C)	1,500	3	3,700	5,200
2031 (AN)	1,600	3	3,700	5,300
2032 (BN)	1,600	3	3,700	5,300
2033 (AN)	1,500	3	3,600	5,100
2034 (D)	1,900	4	3,800	5,700
2035 (W)	3,700	4	4,400	8,100
2036 (W)	7,300	21	5,400	13,000
2037 (W)	9,200	37	6,600	16,000
2038 (D)	7,800	24	6,100	14,000
2039 (W)	6,800	8	5,600	12,000
2040 (D)	5,000	6	5,000	10,000
2041 (C)	2,000	4	3,700	5,700
2042 (D)	620	3	2,500	3,100
2043 (C)	360	2	2,000	2,400
2044 (C)	140	1	1,300	1,400
2045 (C)	49	1	950	1,000
2046 (AN)	290	2	1,600	1,900
2047 (C)	320	2	1,800	2,100
2048 (W)	700	2	2,500	3,200
2049 (W)	2,100	4	3,900	6,000
2050 (W)	3,300	4	4,300	7,600
2051 (W)	5,700	7	4,800	11,000
2052 (W)	7,500	17	5,700	13,000
2053 (AN)	6,200	8	5,300	12,000
2054 (D)	4,100	5	4,500	8,600
2055 (D)	2,300	4	3,900	6,200
2056 (AN)	2,700	4	4,000	6,700
2057 (BN)	4,000	5	4,700	8,700
2058 (AN)	4,100	5	4,500	8,600
2059 (W)	6,900	9	5,500	12,000
2060 (D)	4,900	5	5,000	9,900
2061 (C)	2,000	4	3,800	5,800
2062 (D)	750	3	2,900	3,700
2063 (BN)	900	3	2,900	3,800

Los Molinos Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		2,200	4	3,900	6,100
2065 (BN)		2,200	4	3,900	6,100
2066 (D)		900	3	2,900	3,800
2067 (C)		240	1	1,500	1,700
2068 (C)		56	1	880	940
2069 (BN)		41	1	820	860
2070 (W)		530	2	2,200	2,700
2071 (BN)		450	2	2,100	2,600
2072 (W)		810	2	2,700	3,500
Average (2022-2072)		3,300	6	3,900	7,200
2022-2072	W	5,200	10	4,800	10,000
	AN	3,100	4	4,000	7,100
	BN	2,100	3	3,300	5,400
	D	3,100	6	4,100	7,200
	C	1,200	2	2,500	3,700

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

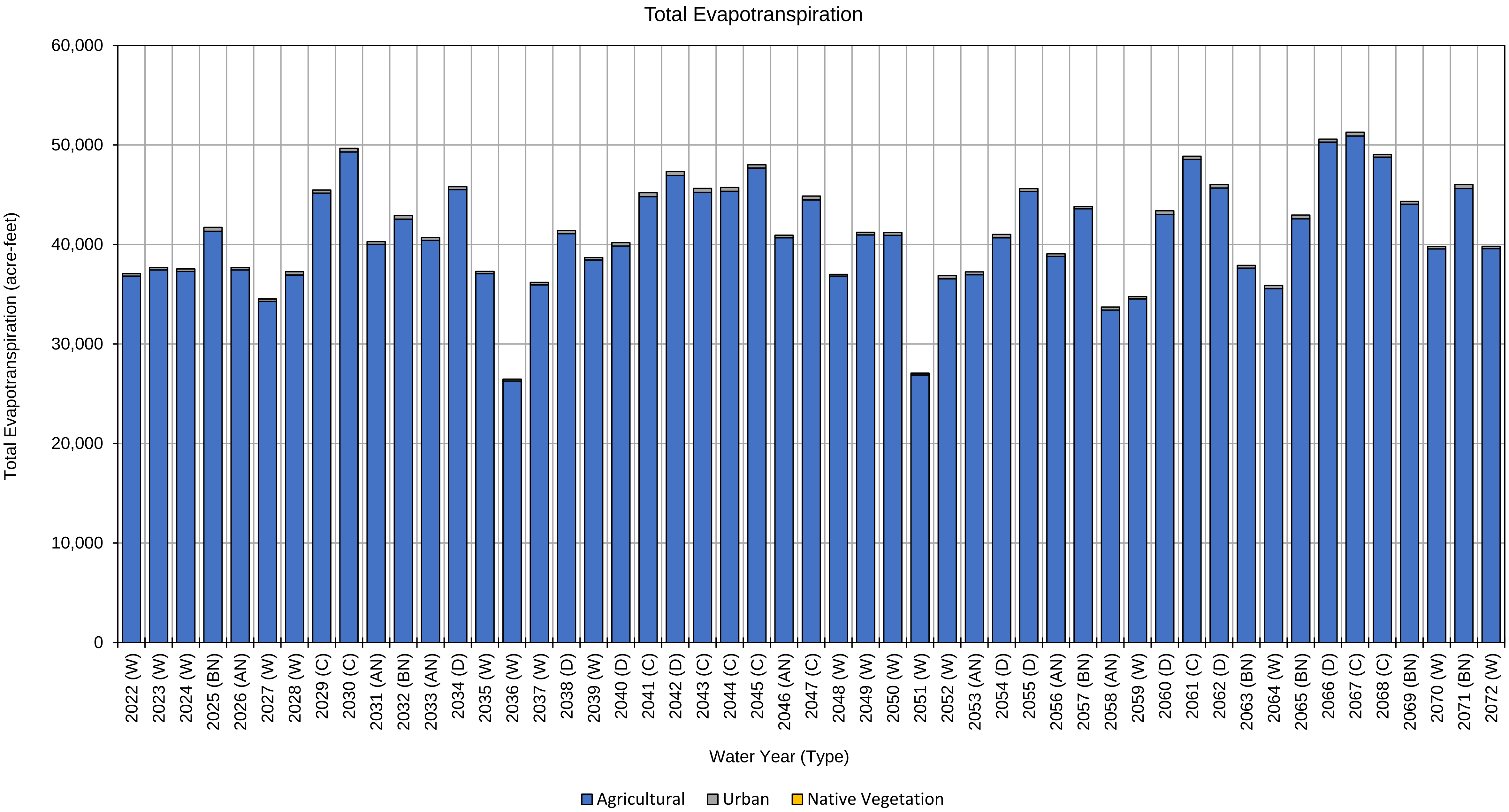
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	0
2023 (W)	0
2024 (W)	0
2025 (BN)	0
2026 (AN)	0
2027 (W)	0
2028 (W)	0
2029 (C)	0
2030 (C)	0
2031 (AN)	0
2032 (BN)	0
2033 (AN)	0
2034 (D)	0
2035 (W)	0
2036 (W)	0
2037 (W)	0
2038 (D)	0
2039 (W)	0
2040 (D)	0
2041 (C)	0
2042 (D)	0
2043 (C)	0
2044 (C)	0
2045 (C)	0
2046 (AN)	0
2047 (C)	0
2048 (W)	0
2049 (W)	0
2050 (W)	0
2051 (W)	0
2052 (W)	0
2053 (AN)	0
2054 (D)	0
2055 (D)	0
2056 (AN)	0
2057 (BN)	0
2058 (AN)	0
2059 (W)	0
2060 (D)	0
2061 (C)	0
2062 (D)	0
2063 (BN)	0

Los Molinos Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		0
2066 (D)		0
2067 (C)		0
2068 (C)		0
2069 (BN)		0
2070 (W)		0
2071 (BN)		0
2072 (W)		0
Average (2022-2072)		0
2022-2072	W	0
	AN	0
	BN	0
	D	0
	C	0

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

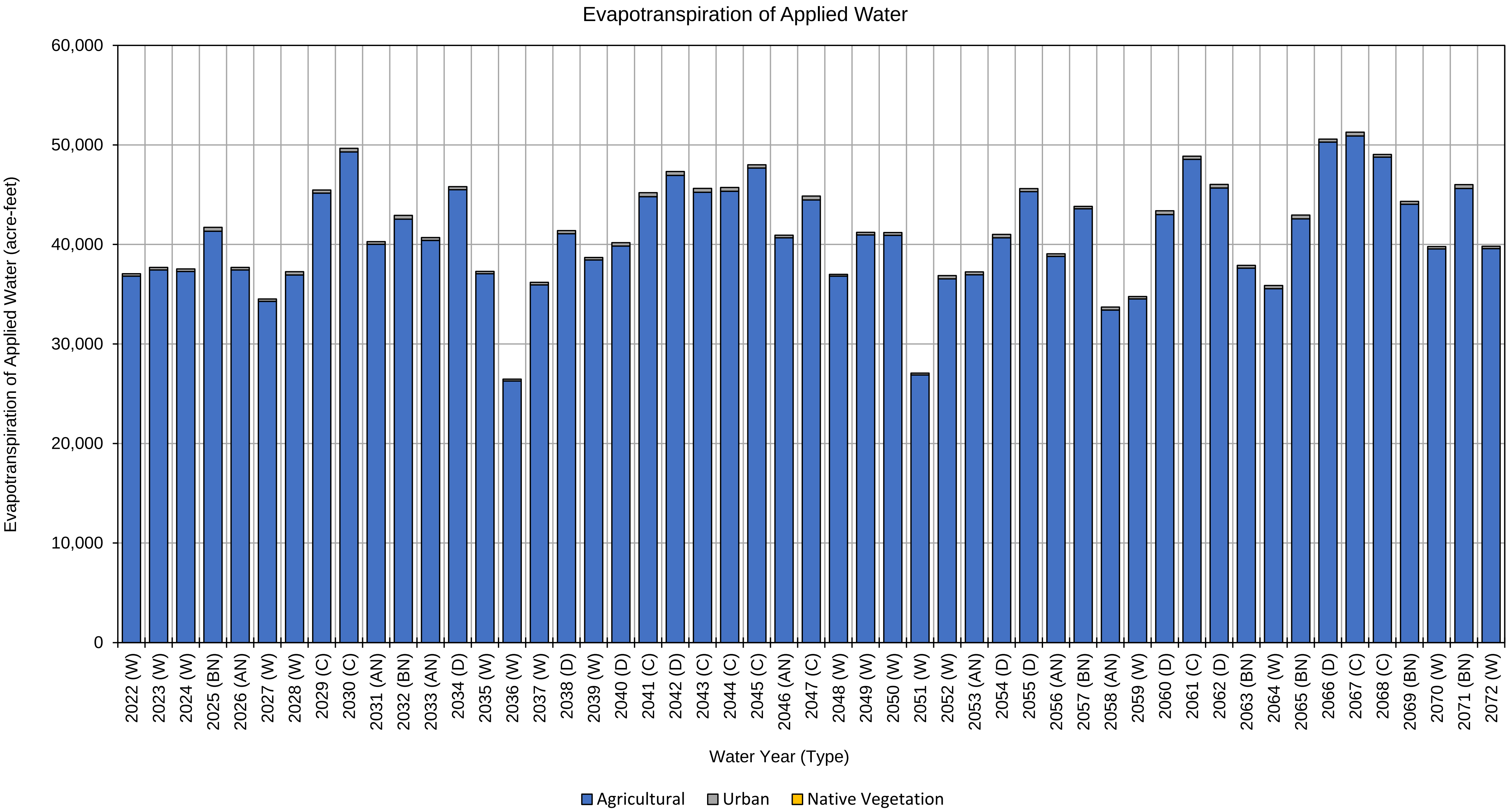
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	62,000	1,500	120,000	180,000
2023 (W)	64,000	1,400	110,000	180,000
2024 (W)	64,000	1,300	110,000	180,000
2025 (BN)	64,000	1,300	100,000	170,000
2026 (AN)	63,000	1,500	120,000	180,000
2027 (W)	61,000	1,400	110,000	170,000
2028 (W)	62,000	1,300	110,000	170,000
2029 (C)	65,000	1,100	86,000	150,000
2030 (C)	65,000	1,100	79,000	150,000
2031 (AN)	63,000	1,500	120,000	180,000
2032 (BN)	64,000	1,300	110,000	180,000
2033 (AN)	61,000	1,400	110,000	170,000
2034 (D)	65,000	1,200	100,000	170,000
2035 (W)	61,000	1,400	110,000	170,000
2036 (W)	54,000	1,400	110,000	170,000
2037 (W)	64,000	1,300	110,000	180,000
2038 (D)	65,000	1,200	100,000	170,000
2039 (W)	64,000	1,300	110,000	180,000
2040 (D)	64,000	1,300	110,000	180,000
2041 (C)	64,000	1,300	99,000	160,000
2042 (D)	63,000	1,200	92,000	160,000
2043 (C)	65,000	1,400	110,000	180,000
2044 (C)	65,000	1,400	110,000	180,000
2045 (C)	67,000	1,300	110,000	180,000
2046 (AN)	63,000	1,500	120,000	180,000
2047 (C)	65,000	1,400	110,000	180,000
2048 (W)	58,000	1,300	110,000	170,000
2049 (W)	64,000	1,300	110,000	180,000
2050 (W)	64,000	1,400	110,000	180,000
2051 (W)	54,000	1,400	110,000	170,000
2052 (W)	62,000	1,300	110,000	170,000
2053 (AN)	61,000	1,400	110,000	170,000
2054 (D)	64,000	1,300	110,000	180,000
2055 (D)	65,000	1,200	100,000	170,000
2056 (AN)	61,000	1,300	110,000	170,000
2057 (BN)	64,000	1,100	96,000	160,000
2058 (AN)	59,000	1,600	120,000	180,000
2059 (W)	61,000	1,400	110,000	170,000
2060 (D)	63,000	1,200	93,000	160,000
2061 (C)	65,000	1,100	87,000	150,000
2062 (D)	64,000	1,300	99,000	160,000
2063 (BN)	58,000	1,300	110,000	170,000

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		58,000	1,500	120,000	180,000
2065 (BN)		64,000	1,300	110,000	180,000
2066 (D)		66,000	1,100	89,000	160,000
2067 (C)		65,000	1,100	83,000	150,000
2068 (C)		65,000	1,100	93,000	160,000
2069 (BN)		65,000	1,400	110,000	180,000
2070 (W)		62,000	1,300	110,000	170,000
2071 (BN)		64,000	1,300	100,000	170,000
2072 (W)		62,000	1,500	120,000	180,000
Average (2022-2072)		63,000	1,300	110,000	170,000
2022-2072	W	61,000	1,400	110,000	170,000
	AN	62,000	1,400	120,000	180,000
	BN	63,000	1,300	100,000	160,000
	D	64,000	1,200	99,000	160,000
	C	65,000	1,200	96,000	160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

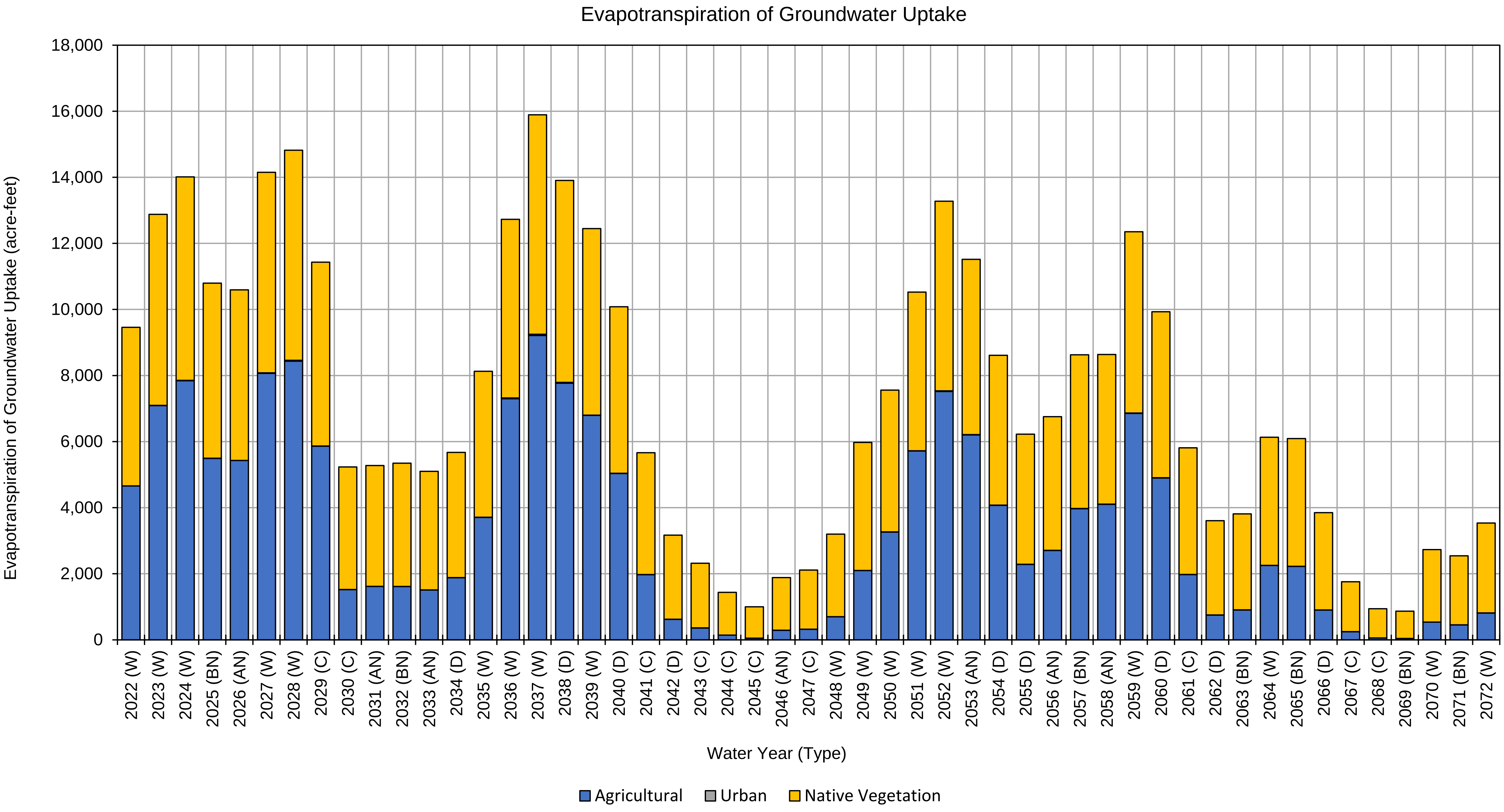
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	37,000	230	0	37,000
2023 (W)	37,000	260	0	37,000
2024 (W)	37,000	260	0	37,000
2025 (BN)	41,000	390	0	41,000
2026 (AN)	37,000	260	0	37,000
2027 (W)	34,000	240	0	34,000
2028 (W)	37,000	320	0	37,000
2029 (C)	45,000	310	0	45,000
2030 (C)	49,000	370	0	49,000
2031 (AN)	40,000	260	0	40,000
2032 (BN)	43,000	380	0	43,000
2033 (AN)	40,000	290	0	40,000
2034 (D)	45,000	310	0	45,000
2035 (W)	37,000	240	0	37,000
2036 (W)	26,000	180	0	26,000
2037 (W)	36,000	260	0	36,000
2038 (D)	41,000	310	0	41,000
2039 (W)	38,000	250	0	38,000
2040 (D)	40,000	340	0	40,000
2041 (C)	45,000	390	0	45,000
2042 (D)	47,000	390	0	47,000
2043 (C)	45,000	390	0	45,000
2044 (C)	45,000	390	0	45,000
2045 (C)	48,000	330	0	48,000
2046 (AN)	41,000	260	0	41,000
2047 (C)	44,000	390	0	44,000
2048 (W)	37,000	180	0	37,000
2049 (W)	41,000	250	0	41,000
2050 (W)	41,000	280	0	41,000
2051 (W)	27,000	180	0	27,000
2052 (W)	37,000	320	0	37,000
2053 (AN)	37,000	290	0	37,000
2054 (D)	41,000	340	0	41,000
2055 (D)	45,000	310	0	45,000
2056 (AN)	39,000	260	0	39,000
2057 (BN)	44,000	240	0	44,000
2058 (AN)	33,000	300	0	33,000
2059 (W)	35,000	240	0	35,000
2060 (D)	43,000	390	0	43,000
2061 (C)	49,000	320	0	49,000
2062 (D)	46,000	360	0	46,000
2063 (BN)	38,000	280	0	38,000

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		36,000	320	0	36,000
2065 (BN)		43,000	380	0	43,000
2066 (D)		50,000	300	0	50,000
2067 (C)		51,000	380	0	51,000
2068 (C)		49,000	270	0	49,000
2069 (BN)		44,000	290	0	44,000
2070 (W)		40,000	230	0	40,000
2071 (BN)		46,000	390	0	46,000
2072 (W)		40,000	230	0	40,000
Average (2022-2072)		41,000	300	0	41,000
2022-2072	W	36,000	250	0	36,000
	AN	38,000	270	0	38,000
	BN	42,000	330	0	42,000
	D	44,000	340	0	44,000
	C	47,000	350	0	47,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

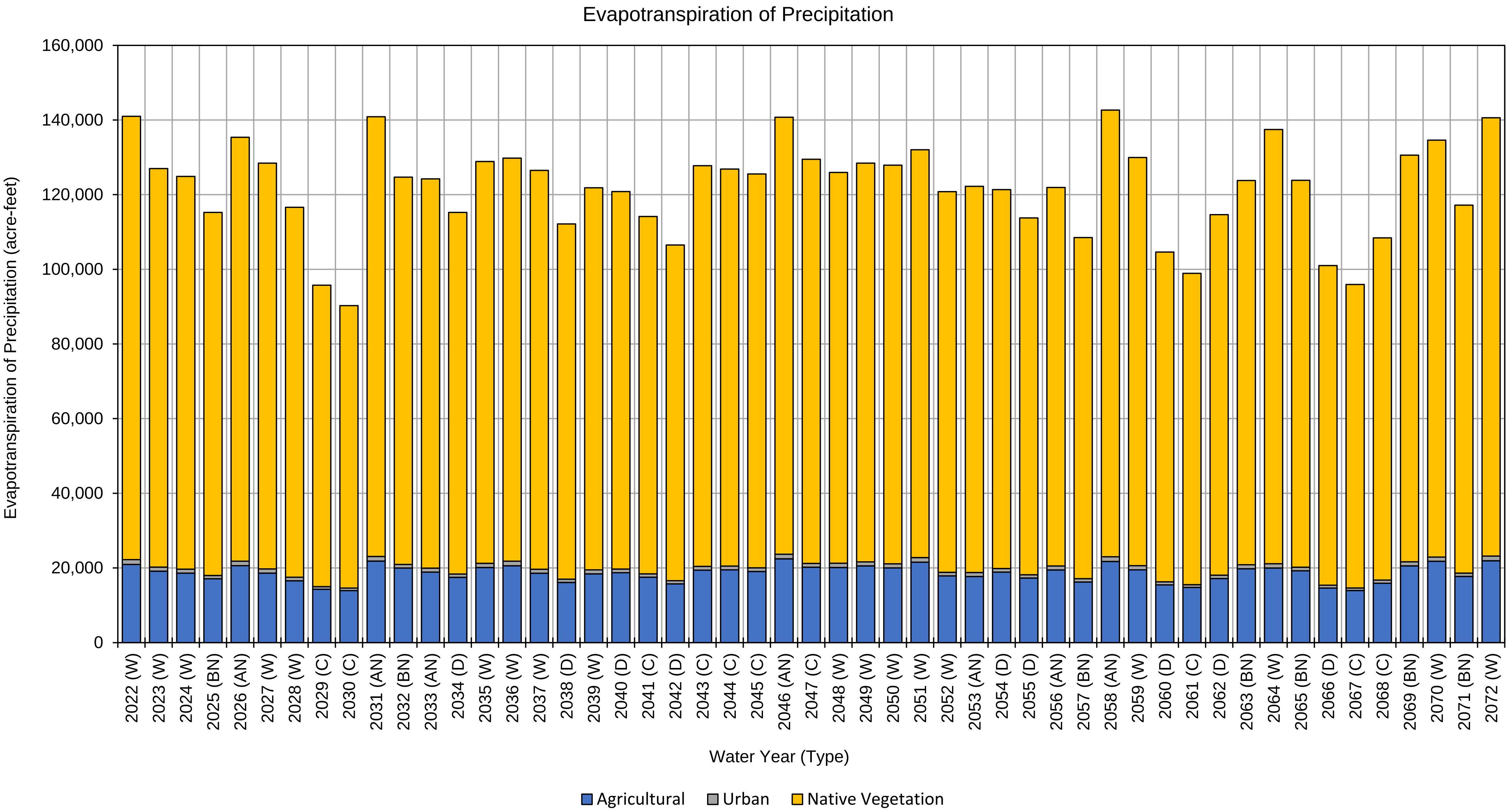
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,700	5	4,800	9,500
2023 (W)	7,100	9	5,800	13,000
2024 (W)	7,800	13	6,200	14,000
2025 (BN)	5,500	5	5,300	11,000
2026 (AN)	5,400	5	5,200	11,000
2027 (W)	8,100	16	6,100	14,000
2028 (W)	8,400	24	6,400	15,000
2029 (C)	5,900	7	5,600	12,000
2030 (C)	1,500	3	3,700	5,200
2031 (AN)	1,600	3	3,700	5,300
2032 (BN)	1,600	3	3,700	5,300
2033 (AN)	1,500	3	3,600	5,100
2034 (D)	1,900	4	3,800	5,700
2035 (W)	3,700	4	4,400	8,100
2036 (W)	7,300	21	5,400	13,000
2037 (W)	9,200	37	6,600	16,000
2038 (D)	7,800	24	6,100	14,000
2039 (W)	6,800	8	5,600	12,000
2040 (D)	5,000	6	5,000	10,000
2041 (C)	2,000	4	3,700	5,700
2042 (D)	620	3	2,500	3,100
2043 (C)	360	2	2,000	2,400
2044 (C)	140	1	1,300	1,400
2045 (C)	49	1	950	1,000
2046 (AN)	290	2	1,600	1,900
2047 (C)	320	2	1,800	2,100
2048 (W)	700	2	2,500	3,200
2049 (W)	2,100	4	3,900	6,000
2050 (W)	3,300	4	4,300	7,600
2051 (W)	5,700	7	4,800	11,000
2052 (W)	7,500	17	5,700	13,000
2053 (AN)	6,200	8	5,300	12,000
2054 (D)	4,100	5	4,500	8,600
2055 (D)	2,300	4	3,900	6,200
2056 (AN)	2,700	4	4,000	6,700
2057 (BN)	4,000	5	4,700	8,700
2058 (AN)	4,100	5	4,500	8,600
2059 (W)	6,900	9	5,500	12,000
2060 (D)	4,900	5	5,000	9,900
2061 (C)	2,000	4	3,800	5,800
2062 (D)	750	3	2,900	3,700
2063 (BN)	900	3	2,900	3,800

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		2,200	4	3,900	6,100
2065 (BN)		2,200	4	3,900	6,100
2066 (D)		900	3	2,900	3,800
2067 (C)		240	1	1,500	1,700
2068 (C)		56	1	880	940
2069 (BN)		41	1	820	860
2070 (W)		530	2	2,200	2,700
2071 (BN)		450	2	2,100	2,600
2072 (W)		810	2	2,700	3,500
Average (2022-2072)		3,300	6	3,900	7,200
2022-2072	W	5,200	10	4,800	10,000
	AN	3,100	4	4,000	7,100
	BN	2,100	3	3,300	5,400
	D	3,100	6	4,100	7,200
	C	1,200	2	2,500	3,700

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

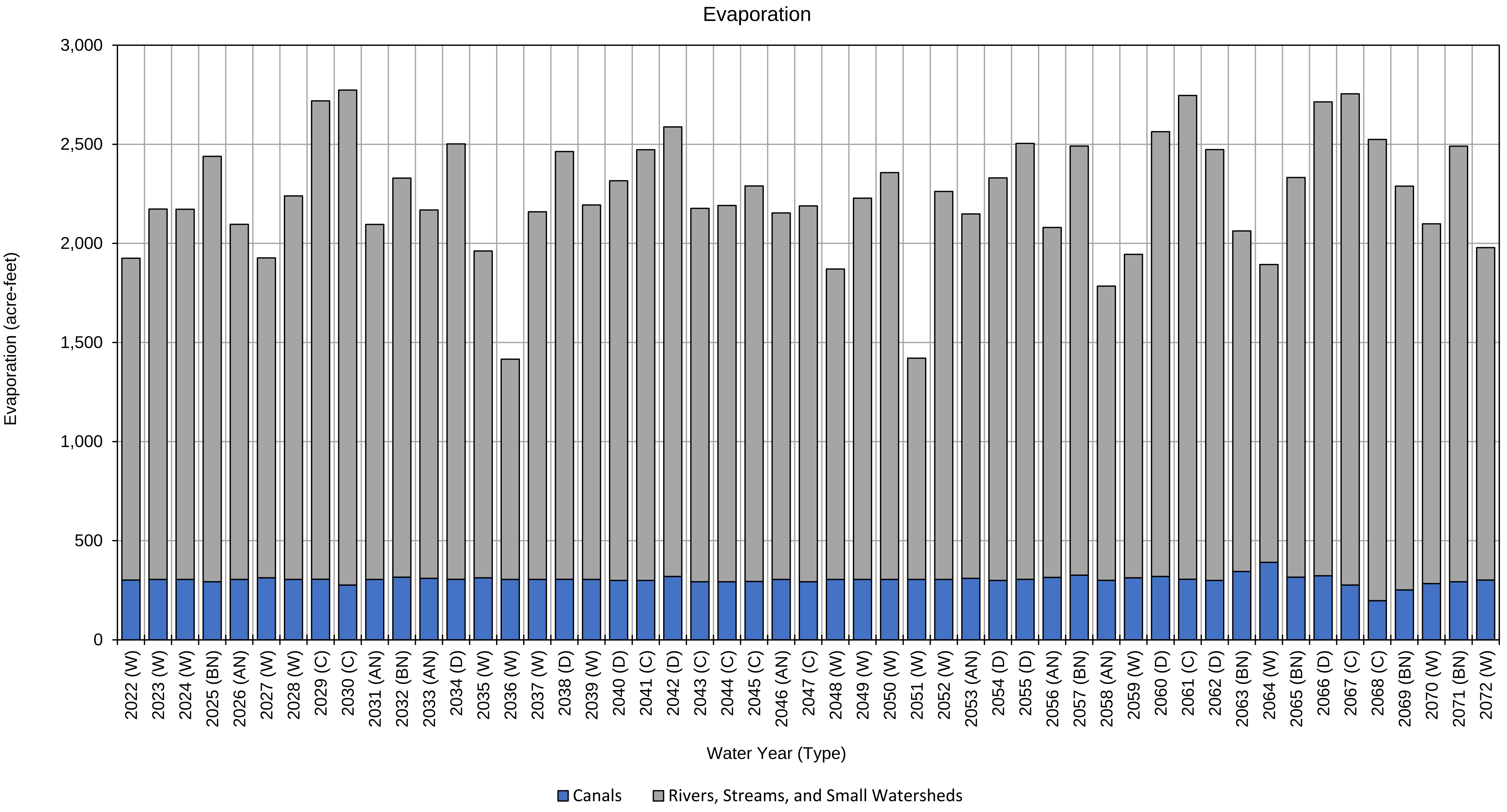
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	21,000	1,300	120,000	140,000
2023 (W)	19,000	1,100	110,000	130,000
2024 (W)	19,000	1,100	110,000	130,000
2025 (BN)	17,000	870	97,000	110,000
2026 (AN)	21,000	1,200	110,000	130,000
2027 (W)	19,000	1,100	110,000	130,000
2028 (W)	17,000	960	99,000	120,000
2029 (C)	14,000	730	81,000	96,000
2030 (C)	14,000	680	76,000	91,000
2031 (AN)	22,000	1,300	120,000	140,000
2032 (BN)	20,000	960	100,000	120,000
2033 (AN)	19,000	1,100	100,000	120,000
2034 (D)	17,000	880	97,000	110,000
2035 (W)	20,000	1,100	110,000	130,000
2036 (W)	21,000	1,200	110,000	130,000
2037 (W)	19,000	1,100	110,000	130,000
2038 (D)	16,000	870	95,000	110,000
2039 (W)	18,000	1,100	100,000	120,000
2040 (D)	19,000	970	100,000	120,000
2041 (C)	17,000	900	96,000	110,000
2042 (D)	16,000	840	90,000	110,000
2043 (C)	19,000	1,000	110,000	130,000
2044 (C)	19,000	1,000	110,000	130,000
2045 (C)	19,000	990	110,000	130,000
2046 (AN)	22,000	1,200	120,000	140,000
2047 (C)	20,000	1,000	110,000	130,000
2048 (W)	20,000	1,100	100,000	120,000
2049 (W)	21,000	1,100	110,000	130,000
2050 (W)	20,000	1,100	110,000	130,000
2051 (W)	22,000	1,300	110,000	130,000
2052 (W)	18,000	970	100,000	120,000
2053 (AN)	18,000	1,100	100,000	120,000
2054 (D)	19,000	970	100,000	120,000
2055 (D)	17,000	880	96,000	110,000
2056 (AN)	19,000	1,100	100,000	120,000
2057 (BN)	16,000	890	91,000	110,000
2058 (AN)	22,000	1,300	120,000	140,000
2059 (W)	19,000	1,100	110,000	130,000
2060 (D)	15,000	840	88,000	100,000
2061 (C)	15,000	750	83,000	99,000
2062 (D)	17,000	910	97,000	110,000
2063 (BN)	20,000	1,100	100,000	120,000

Los Molinos Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		20,000	1,200	120,000	140,000
2065 (BN)		19,000	960	100,000	120,000
2066 (D)		15,000	750	86,000	100,000
2067 (C)		14,000	710	81,000	96,000
2068 (C)		16,000	830	92,000	110,000
2069 (BN)		21,000	1,100	110,000	130,000
2070 (W)		22,000	1,100	110,000	130,000
2071 (BN)		18,000	870	99,000	120,000
2072 (W)		22,000	1,300	120,000	140,000
Average (2022-2072)		19,000	1,000	100,000	120,000
2022-2072	W	20,000	1,100	110,000	130,000
	AN	20,000	1,200	110,000	130,000
	BN	19,000	960	100,000	120,000
	D	17,000	880	95,000	110,000
	C	17,000	870	94,000	110,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

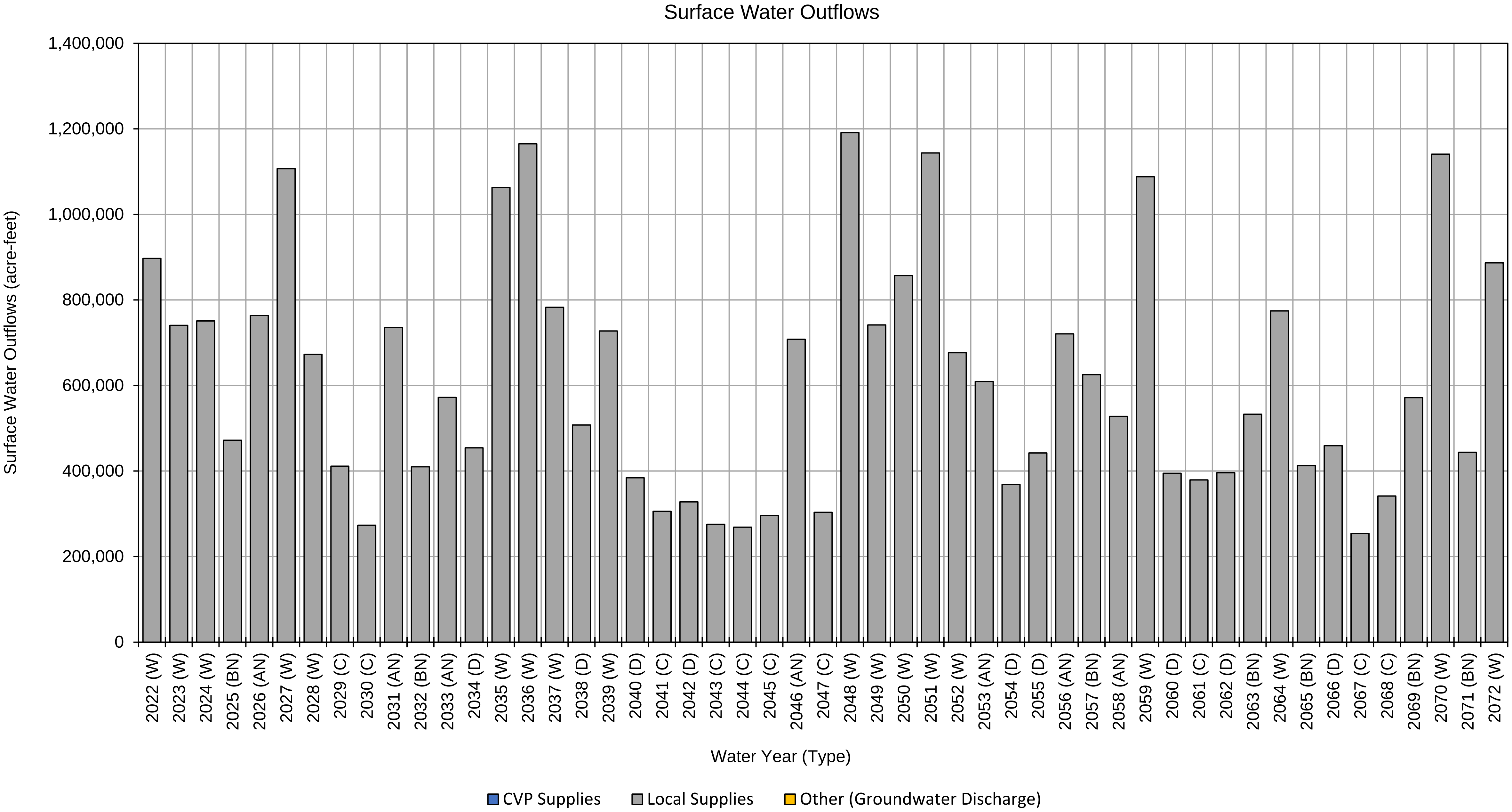
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	300	1,600	1,900
2023 (W)	300	1,900	2,200
2024 (W)	300	1,900	2,200
2025 (BN)	290	2,100	2,400
2026 (AN)	300	1,800	2,100
2027 (W)	310	1,600	1,900
2028 (W)	300	1,900	2,200
2029 (C)	310	2,400	2,700
2030 (C)	280	2,500	2,800
2031 (AN)	300	1,800	2,100
2032 (BN)	320	2,000	2,300
2033 (AN)	310	1,900	2,200
2034 (D)	310	2,200	2,500
2035 (W)	310	1,600	1,900
2036 (W)	300	1,100	1,400
2037 (W)	300	1,900	2,200
2038 (D)	310	2,200	2,500
2039 (W)	300	1,900	2,200
2040 (D)	300	2,000	2,300
2041 (C)	300	2,200	2,500
2042 (D)	320	2,300	2,600
2043 (C)	290	1,900	2,200
2044 (C)	290	1,900	2,200
2045 (C)	290	2,000	2,300
2046 (AN)	300	1,800	2,100
2047 (C)	290	1,900	2,200
2048 (W)	300	1,600	1,900
2049 (W)	300	1,900	2,200
2050 (W)	300	2,100	2,400
2051 (W)	300	1,100	1,400
2052 (W)	300	2,000	2,300
2053 (AN)	310	1,800	2,100
2054 (D)	300	2,000	2,300
2055 (D)	310	2,200	2,500
2056 (AN)	320	1,800	2,100
2057 (BN)	330	2,200	2,500
2058 (AN)	300	1,500	1,800
2059 (W)	310	1,600	1,900
2060 (D)	320	2,200	2,500
2061 (C)	310	2,400	2,700
2062 (D)	300	2,200	2,500
2063 (BN)	340	1,700	2,000

Los Molinos Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		390	1,500	1,900
2065 (BN)		320	2,000	2,300
2066 (D)		320	2,400	2,700
2067 (C)		280	2,500	2,800
2068 (C)		200	2,300	2,500
2069 (BN)		250	2,000	2,300
2070 (W)		280	1,800	2,100
2071 (BN)		290	2,200	2,500
2072 (W)		300	1,700	2,000
Average (2022-2072)		300	1,900	2,200
2022-2072	W	310	1,700	2,000
	AN	310	1,800	2,100
	BN	310	2,000	2,300
	D	310	2,200	2,500
	C	280	2,200	2,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

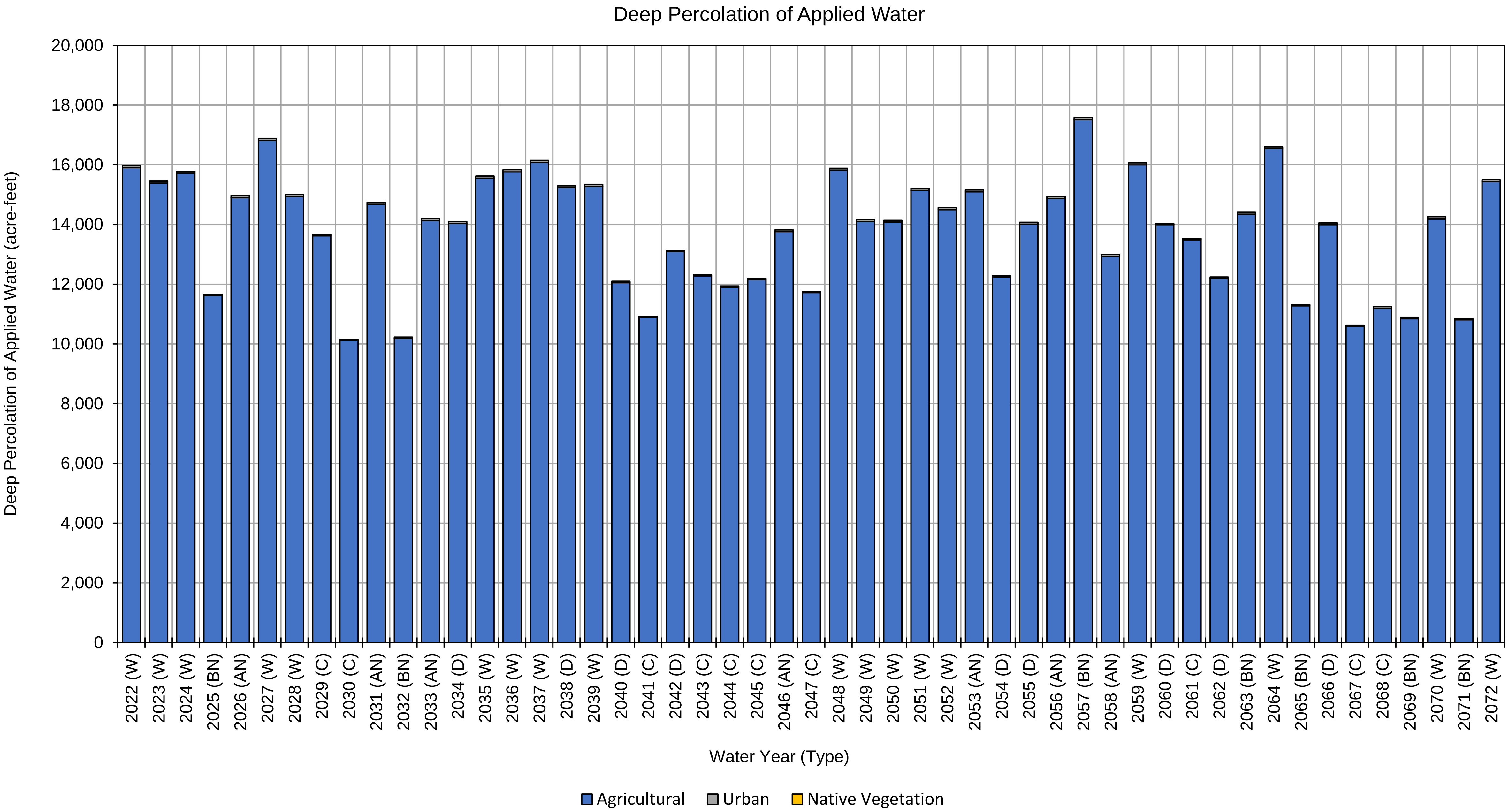
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	900,000	0	900,000
2023 (W)	0	740,000	0	740,000
2024 (W)	0	750,000	0	750,000
2025 (BN)	0	470,000	0	470,000
2026 (AN)	0	760,000	0	760,000
2027 (W)	0	1,100,000	0	1,100,000
2028 (W)	0	670,000	0	670,000
2029 (C)	0	410,000	0	410,000
2030 (C)	0	270,000	0	270,000
2031 (AN)	0	740,000	0	740,000
2032 (BN)	0	410,000	0	410,000
2033 (AN)	0	570,000	0	570,000
2034 (D)	0	450,000	0	450,000
2035 (W)	0	1,100,000	0	1,100,000
2036 (W)	0	1,200,000	0	1,200,000
2037 (W)	0	780,000	0	780,000
2038 (D)	0	510,000	0	510,000
2039 (W)	0	730,000	0	730,000
2040 (D)	0	380,000	0	380,000
2041 (C)	0	310,000	0	310,000
2042 (D)	0	330,000	0	330,000
2043 (C)	0	280,000	0	280,000
2044 (C)	0	270,000	0	270,000
2045 (C)	0	300,000	0	300,000
2046 (AN)	0	710,000	0	710,000
2047 (C)	0	300,000	0	300,000
2048 (W)	0	1,200,000	0	1,200,000
2049 (W)	0	740,000	0	740,000
2050 (W)	0	860,000	0	860,000
2051 (W)	0	1,100,000	0	1,100,000
2052 (W)	0	680,000	0	680,000
2053 (AN)	0	610,000	0	610,000
2054 (D)	0	370,000	0	370,000
2055 (D)	0	440,000	0	440,000
2056 (AN)	0	720,000	0	720,000
2057 (BN)	0	630,000	0	630,000
2058 (AN)	0	530,000	0	530,000
2059 (W)	0	1,100,000	0	1,100,000
2060 (D)	0	390,000	0	390,000
2061 (C)	0	380,000	0	380,000
2062 (D)	0	400,000	0	400,000
2063 (BN)	0	530,000	0	530,000

Los Molinos Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	770,000	0	770,000
2065 (BN)		0	410,000	0	410,000
2066 (D)		0	460,000	0	460,000
2067 (C)		0	250,000	0	250,000
2068 (C)		0	340,000	0	340,000
2069 (BN)		0	570,000	0	570,000
2070 (W)		0	1,100,000	0	1,100,000
2071 (BN)		0	440,000	0	440,000
2072 (W)		0	890,000	0	890,000
Average (2022-2072)		0	610,000	0	610,000
2022-2072	W	0	910,000	0	910,000
	AN	0	660,000	0	660,000
	BN	0	500,000	0	500,000
	D	0	410,000	0	410,000
	C	0	310,000	0	310,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

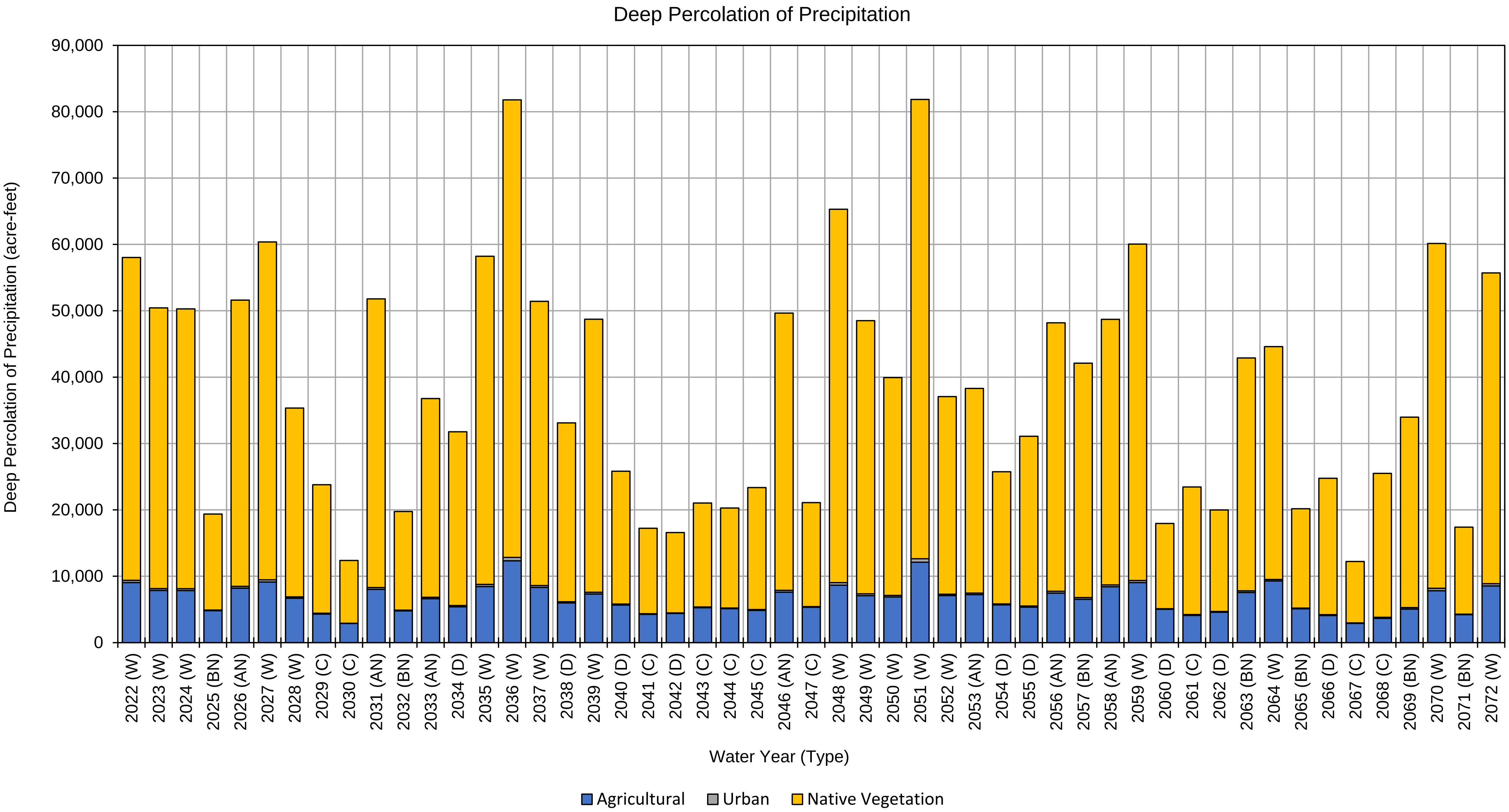
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	61	0	16,000
2023 (W)	15,000	65	0	15,000
2024 (W)	16,000	65	0	16,000
2025 (BN)	12,000	38	0	12,000
2026 (AN)	15,000	59	0	15,000
2027 (W)	17,000	71	0	17,000
2028 (W)	15,000	70	0	15,000
2029 (C)	14,000	49	0	14,000
2030 (C)	10,000	31	0	10,000
2031 (AN)	15,000	60	0	15,000
2032 (BN)	10,000	40	0	10,000
2033 (AN)	14,000	60	0	14,000
2034 (D)	14,000	64	0	14,000
2035 (W)	16,000	70	0	16,000
2036 (W)	16,000	74	0	16,000
2037 (W)	16,000	68	0	16,000
2038 (D)	15,000	66	0	15,000
2039 (W)	15,000	65	0	15,000
2040 (D)	12,000	51	0	12,000
2041 (C)	11,000	40	0	11,000
2042 (D)	13,000	36	0	13,000
2043 (C)	12,000	39	0	12,000
2044 (C)	12,000	39	0	12,000
2045 (C)	12,000	43	0	12,000
2046 (AN)	14,000	58	0	14,000
2047 (C)	12,000	39	0	12,000
2048 (W)	16,000	61	0	16,000
2049 (W)	14,000	64	0	14,000
2050 (W)	14,000	58	0	14,000
2051 (W)	15,000	73	0	15,000
2052 (W)	15,000	70	0	15,000
2053 (AN)	15,000	61	0	15,000
2054 (D)	12,000	51	0	12,000
2055 (D)	14,000	64	0	14,000
2056 (AN)	15,000	67	0	15,000
2057 (BN)	18,000	69	0	18,000
2058 (AN)	13,000	64	0	13,000
2059 (W)	16,000	70	0	16,000
2060 (D)	14,000	37	0	14,000
2061 (C)	13,000	49	0	13,000
2062 (D)	12,000	39	0	12,000
2063 (BN)	14,000	66	0	14,000

Los Molinos Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		17,000	62	0	17,000
2065 (BN)		11,000	40	0	11,000
2066 (D)		14,000	57	0	14,000
2067 (C)		11,000	31	0	11,000
2068 (C)		11,000	52	0	11,000
2069 (BN)		11,000	55	0	11,000
2070 (W)		14,000	79	0	14,000
2071 (BN)		11,000	38	0	11,000
2072 (W)		15,000	60	0	15,000
Average (2022-2072)		14,000	56	0	14,000
2022-2072	W	15,000	67	0	15,000
	AN	14,000	61	0	14,000
	BN	12,000	49	0	12,000
	D	13,000	52	0	13,000
	C	12,000	41	0	12,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

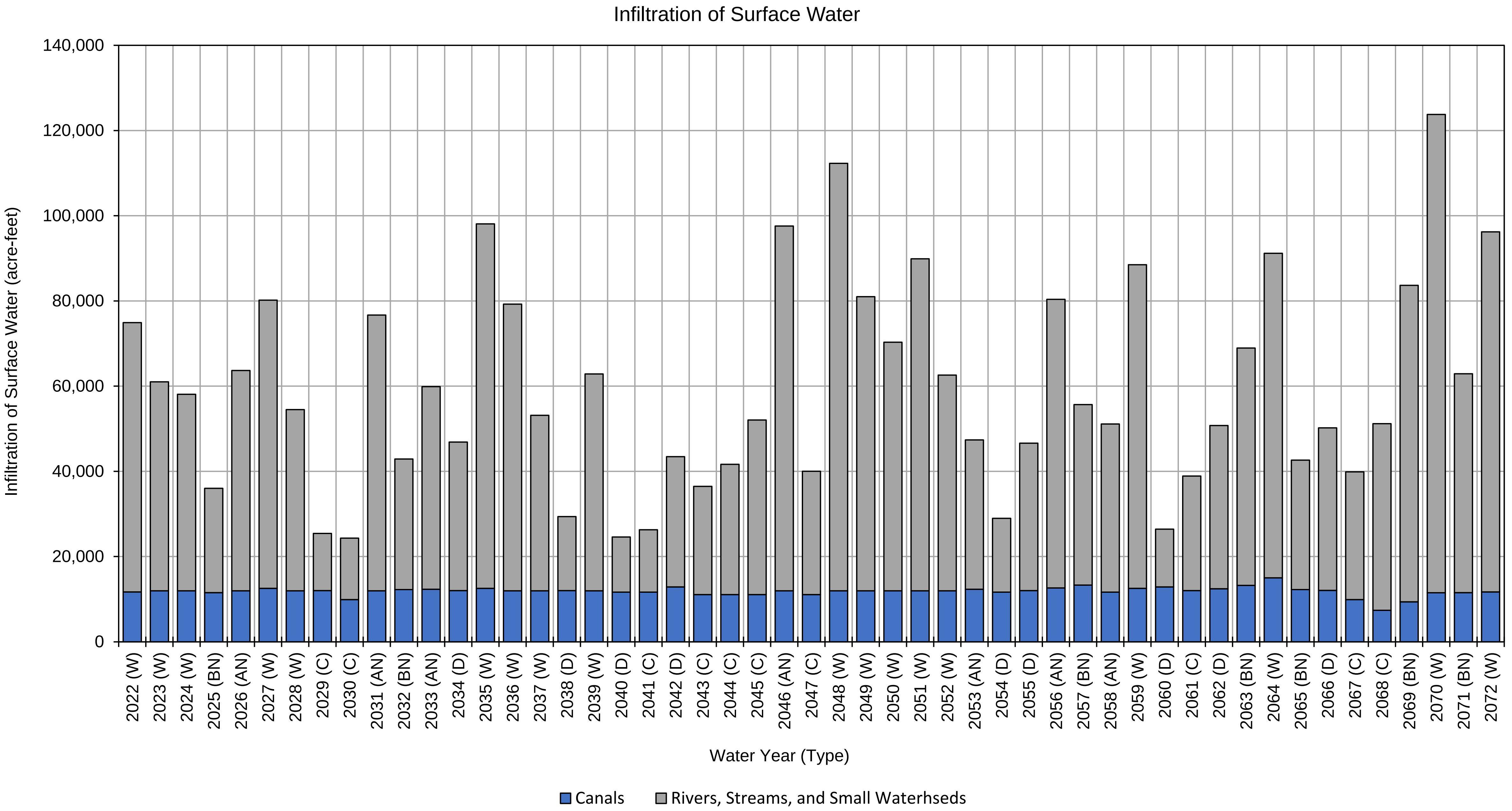
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	9,000	340	49,000	58,000
2023 (W)	7,900	270	42,000	50,000
2024 (W)	7,800	270	42,000	50,000
2025 (BN)	4,800	86	14,000	19,000
2026 (AN)	8,200	280	43,000	51,000
2027 (W)	9,100	330	51,000	60,000
2028 (W)	6,700	210	28,000	35,000
2029 (C)	4,300	120	19,000	23,000
2030 (C)	2,900	58	9,500	12,000
2031 (AN)	8,000	280	44,000	52,000
2032 (BN)	4,800	100	15,000	20,000
2033 (AN)	6,600	220	30,000	37,000
2034 (D)	5,400	180	26,000	32,000
2035 (W)	8,400	330	49,000	58,000
2036 (W)	12,000	510	69,000	82,000
2037 (W)	8,300	280	43,000	52,000
2038 (D)	6,000	180	27,000	33,000
2039 (W)	7,300	270	41,000	49,000
2040 (D)	5,700	150	20,000	26,000
2041 (C)	4,300	92	13,000	17,000
2042 (D)	4,400	79	12,000	16,000
2043 (C)	5,300	100	16,000	21,000
2044 (C)	5,100	100	15,000	20,000
2045 (C)	4,900	130	18,000	23,000
2046 (AN)	7,600	280	42,000	50,000
2047 (C)	5,300	100	16,000	21,000
2048 (W)	8,600	390	56,000	65,000
2049 (W)	7,100	270	41,000	48,000
2050 (W)	6,900	230	33,000	40,000
2051 (W)	12,000	510	69,000	82,000
2052 (W)	7,100	210	30,000	37,000
2053 (AN)	7,200	220	31,000	38,000
2054 (D)	5,700	150	20,000	26,000
2055 (D)	5,300	180	26,000	31,000
2056 (AN)	7,500	280	40,000	48,000
2057 (BN)	6,500	260	35,000	42,000
2058 (AN)	8,400	270	40,000	49,000
2059 (W)	9,000	330	51,000	60,000
2060 (D)	5,000	79	13,000	18,000
2061 (C)	4,100	120	19,000	23,000
2062 (D)	4,600	98	15,000	20,000
2063 (BN)	7,500	250	35,000	43,000

Los Molinos Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		9,300	230	35,000	45,000
2065 (BN)		5,100	100	15,000	20,000
2066 (D)		4,100	140	21,000	25,000
2067 (C)		2,900	58	9,300	12,000
2068 (C)		3,600	160	22,000	26,000
2069 (BN)		5,100	210	29,000	34,000
2070 (W)		7,800	380	52,000	60,000
2071 (BN)		4,200	86	13,000	17,000
2072 (W)		8,500	330	47,000	56,000
Average (2022-2072)		6,500	210	31,000	38,000
2022-2072	W	8,500	320	46,000	55,000
	AN	7,600	260	39,000	47,000
	BN	5,400	160	22,000	28,000
	D	5,100	140	20,000	25,000
	C	4,300	100	16,000	20,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

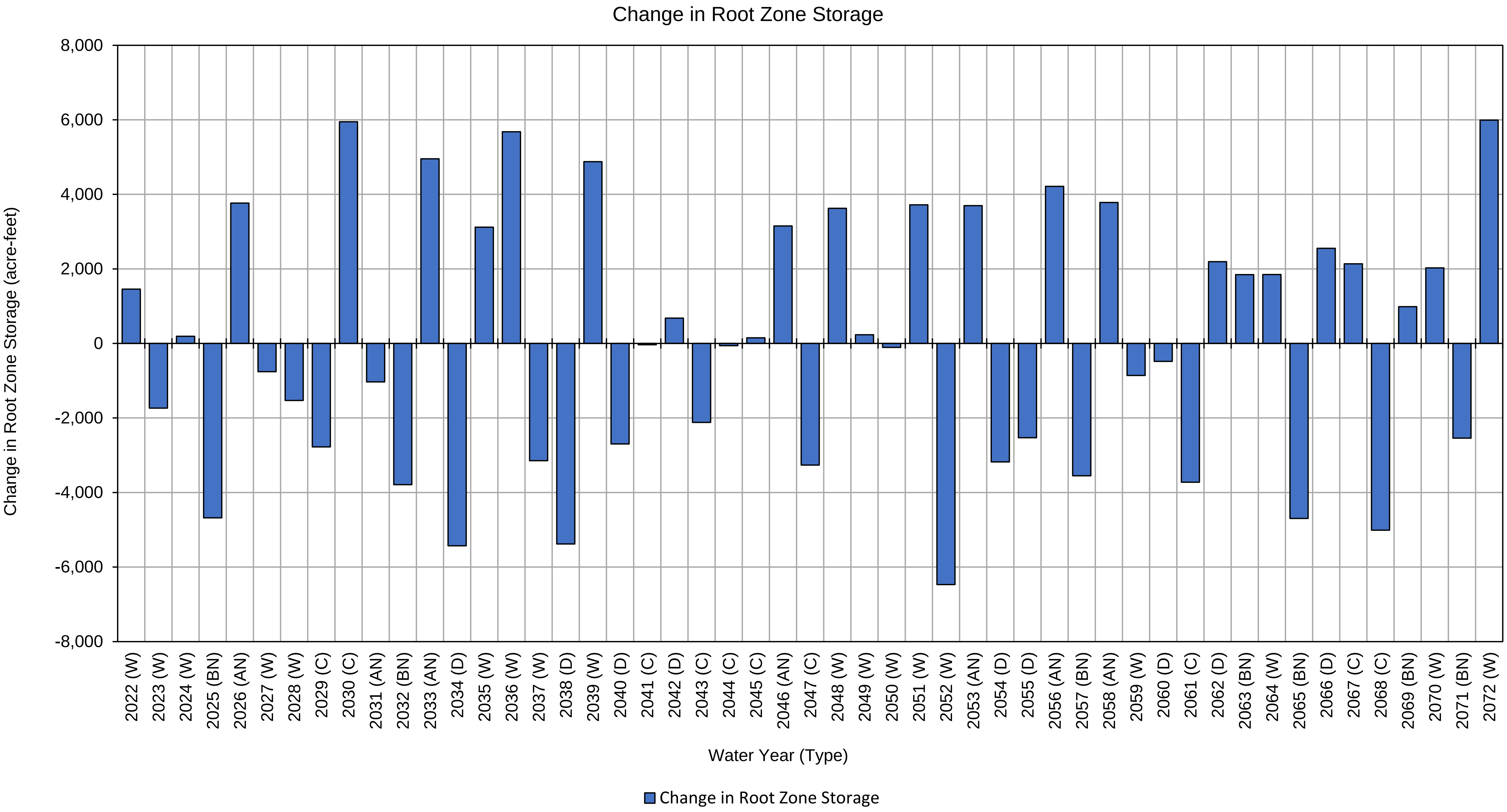
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	12,000	63,000	75,000
2023 (W)	12,000	49,000	61,000
2024 (W)	12,000	46,000	58,000
2025 (BN)	12,000	24,000	36,000
2026 (AN)	12,000	52,000	64,000
2027 (W)	13,000	68,000	81,000
2028 (W)	12,000	43,000	55,000
2029 (C)	12,000	13,000	25,000
2030 (C)	9,900	14,000	24,000
2031 (AN)	12,000	65,000	77,000
2032 (BN)	12,000	31,000	43,000
2033 (AN)	12,000	48,000	60,000
2034 (D)	12,000	35,000	47,000
2035 (W)	13,000	86,000	99,000
2036 (W)	12,000	67,000	79,000
2037 (W)	12,000	41,000	53,000
2038 (D)	12,000	17,000	29,000
2039 (W)	12,000	51,000	63,000
2040 (D)	12,000	13,000	25,000
2041 (C)	12,000	15,000	27,000
2042 (D)	13,000	31,000	44,000
2043 (C)	11,000	25,000	36,000
2044 (C)	11,000	31,000	42,000
2045 (C)	11,000	41,000	52,000
2046 (AN)	12,000	86,000	98,000
2047 (C)	11,000	29,000	40,000
2048 (W)	12,000	100,000	110,000
2049 (W)	12,000	69,000	81,000
2050 (W)	12,000	58,000	70,000
2051 (W)	12,000	78,000	90,000
2052 (W)	12,000	51,000	63,000
2053 (AN)	12,000	35,000	47,000
2054 (D)	12,000	17,000	29,000
2055 (D)	12,000	35,000	47,000
2056 (AN)	13,000	68,000	81,000
2057 (BN)	13,000	42,000	55,000
2058 (AN)	12,000	39,000	51,000
2059 (W)	13,000	76,000	89,000
2060 (D)	13,000	14,000	27,000
2061 (C)	12,000	27,000	39,000
2062 (D)	12,000	38,000	50,000
2063 (BN)	13,000	56,000	69,000

Los Molinos Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		15,000	76,000	91,000
2065 (BN)		12,000	30,000	42,000
2066 (D)		12,000	38,000	50,000
2067 (C)		9,900	30,000	40,000
2068 (C)		7,400	44,000	51,000
2069 (BN)		9,400	74,000	83,000
2070 (W)		12,000	110,000	120,000
2071 (BN)		12,000	51,000	63,000
2072 (W)		12,000	85,000	97,000
Average (2022-2072)		12,000	48,000	60,000
2022-2072	W	12,000	68,000	80,000
	AN	12,000	56,000	68,000
	BN	12,000	44,000	56,000
	D	12,000	26,000	38,000
	C	11,000	27,000	38,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	1,500
2023 (W)	-1,700
2024 (W)	190
2025 (BN)	-4,700
2026 (AN)	3,800
2027 (W)	-760
2028 (W)	-1,500
2029 (C)	-2,800
2030 (C)	5,900
2031 (AN)	-1,000
2032 (BN)	-3,800
2033 (AN)	5,000
2034 (D)	-5,400
2035 (W)	3,100
2036 (W)	5,700
2037 (W)	-3,100
2038 (D)	-5,400
2039 (W)	4,900
2040 (D)	-2,700
2041 (C)	-35
2042 (D)	680
2043 (C)	-2,100
2044 (C)	-60
2045 (C)	150
2046 (AN)	3,200
2047 (C)	-3,300
2048 (W)	3,600
2049 (W)	230
2050 (W)	-110
2051 (W)	3,700
2052 (W)	-6,500
2053 (AN)	3,700
2054 (D)	-3,200
2055 (D)	-2,500
2056 (AN)	4,200
2057 (BN)	-3,600
2058 (AN)	3,800
2059 (W)	-860
2060 (D)	-480
2061 (C)	-3,700
2062 (D)	2,200
2063 (BN)	1,800

Los Molinos Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		1,800
2065 (BN)		-4,700
2066 (D)		2,600
2067 (C)		2,100
2068 (C)		-5,000
2069 (BN)		980
2070 (W)		2,000
2071 (BN)		-2,500
2072 (W)		6,000
Average (2022-2072)		24
2022-2072	W	1,000
	AN	3,200
	BN	-2,300
	D	-1,600
	C	-880

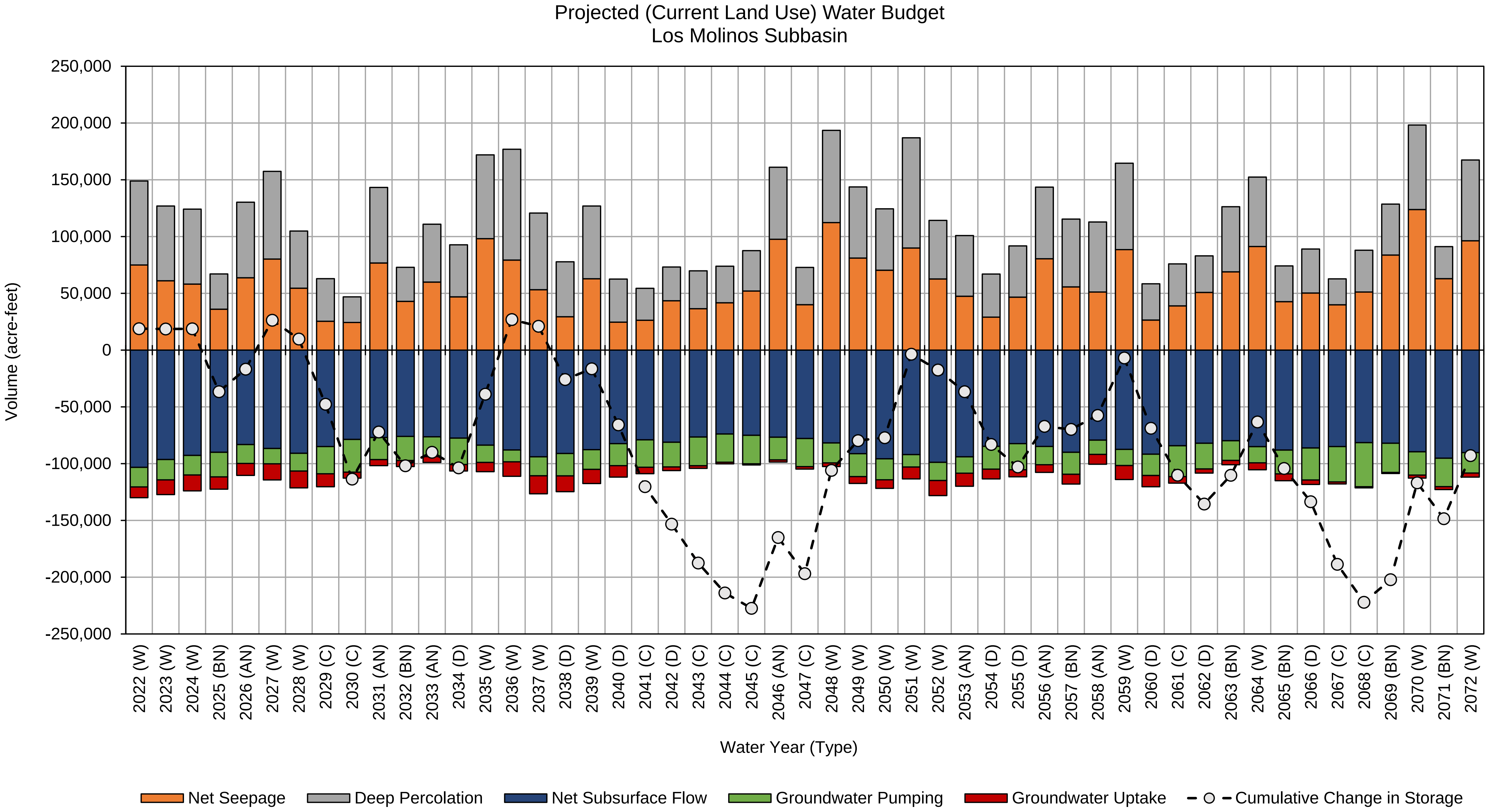
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-2b

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Groundwater System



Projected (Current Land Use) Water Budget
Los Molinos Subbasin

Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

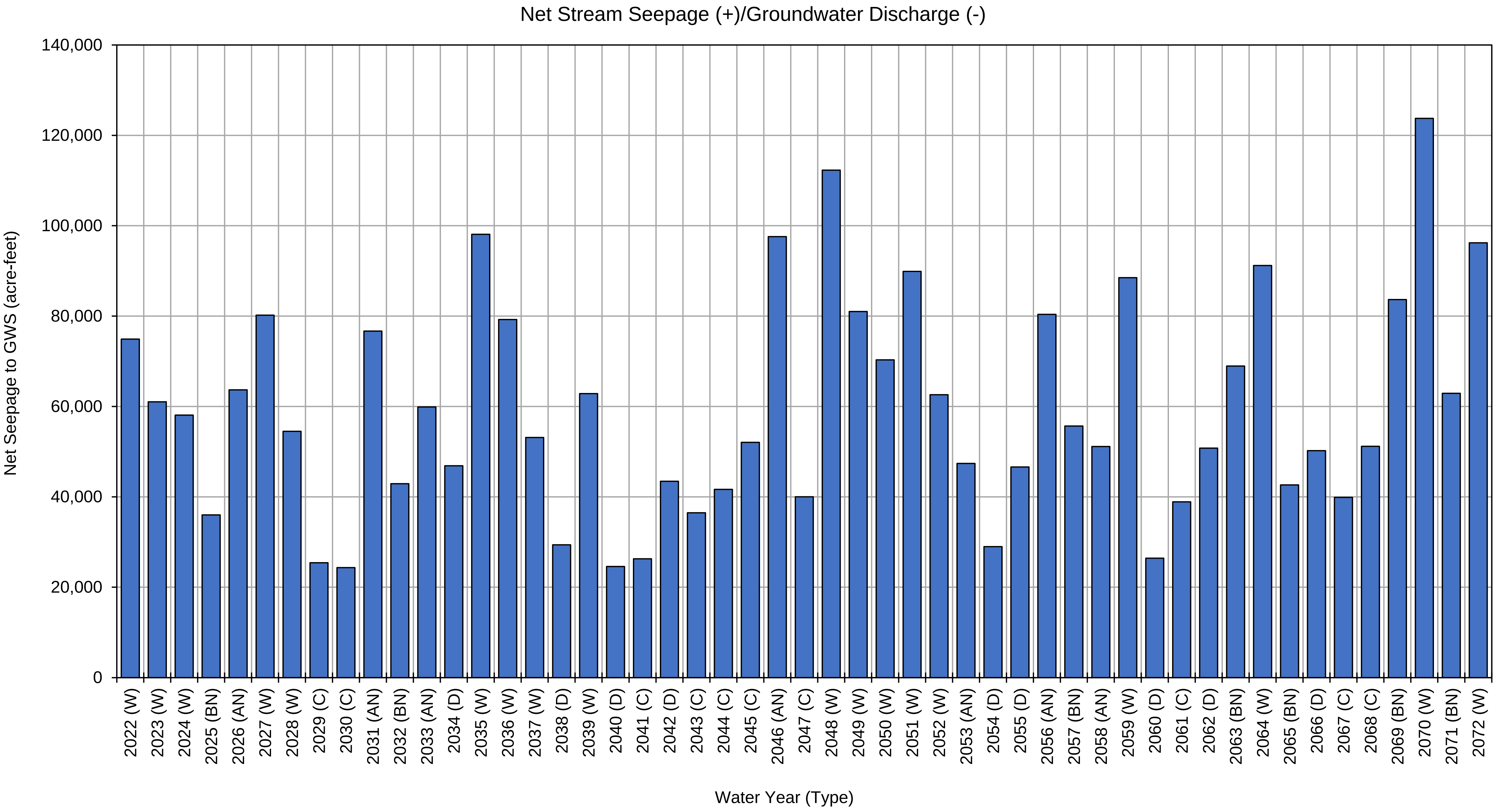
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	75,000	74,000	-17,000	-9,500	-100,000	19,000	19,000
2023 (W)	61,000	66,000	-18,000	-13,000	-96,000	-310	19,000
2024 (W)	58,000	66,000	-17,000	-14,000	-93,000	180	19,000
2025 (BN)	36,000	31,000	-22,000	-11,000	-90,000	-55,000	-37,000
2026 (AN)	64,000	67,000	-17,000	-11,000	-83,000	20,000	-17,000
2027 (W)	80,000	77,000	-14,000	-14,000	-87,000	43,000	26,000
2028 (W)	55,000	50,000	-16,000	-15,000	-91,000	-17,000	9,800
2029 (C)	25,000	37,000	-24,000	-11,000	-85,000	-57,000	-48,000
2030 (C)	24,000	23,000	-29,000	-5,200	-79,000	-66,000	-110,000
2031 (AN)	77,000	67,000	-19,000	-5,300	-77,000	41,000	-72,000
2032 (BN)	43,000	30,000	-21,000	-5,300	-76,000	-30,000	-100,000
2033 (AN)	60,000	51,000	-17,000	-5,100	-76,000	12,000	-90,000
2034 (D)	47,000	46,000	-23,000	-5,700	-78,000	-14,000	-100,000
2035 (W)	98,000	74,000	-15,000	-8,100	-84,000	65,000	-39,000
2036 (W)	79,000	98,000	-10,000	-13,000	-88,000	66,000	27,000
2037 (W)	53,000	68,000	-17,000	-16,000	-94,000	-5,900	21,000
2038 (D)	29,000	48,000	-20,000	-14,000	-91,000	-47,000	-26,000
2039 (W)	63,000	64,000	-17,000	-12,000	-88,000	9,400	-16,000
2040 (D)	25,000	38,000	-19,000	-10,000	-82,000	-49,000	-66,000
2041 (C)	26,000	28,000	-24,000	-5,700	-79,000	-54,000	-120,000
2042 (D)	43,000	30,000	-22,000	-3,200	-81,000	-33,000	-150,000
2043 (C)	36,000	33,000	-25,000	-2,300	-77,000	-34,000	-190,000
2044 (C)	42,000	32,000	-25,000	-1,400	-74,000	-26,000	-210,000
2045 (C)	52,000	36,000	-25,000	-1,000	-75,000	-14,000	-230,000
2046 (AN)	98,000	63,000	-20,000	-1,900	-77,000	62,000	-160,000
2047 (C)	40,000	33,000	-25,000	-2,100	-78,000	-32,000	-200,000
2048 (W)	110,000	81,000	-18,000	-3,200	-82,000	91,000	-110,000
2049 (W)	81,000	63,000	-20,000	-6,000	-91,000	26,000	-80,000
2050 (W)	70,000	54,000	-18,000	-7,600	-96,000	2,600	-77,000
2051 (W)	90,000	97,000	-11,000	-11,000	-92,000	73,000	-3,600
2052 (W)	63,000	52,000	-16,000	-13,000	-99,000	-14,000	-18,000
2053 (AN)	47,000	53,000	-14,000	-12,000	-94,000	-19,000	-37,000
2054 (D)	29,000	38,000	-20,000	-8,600	-85,000	-46,000	-83,000
2055 (D)	47,000	45,000	-23,000	-6,200	-82,000	-20,000	-100,000
2056 (AN)	80,000	63,000	-16,000	-6,800	-85,000	36,000	-67,000
2057 (BN)	56,000	60,000	-19,000	-8,600	-90,000	-2,700	-70,000
2058 (AN)	51,000	62,000	-13,000	-8,600	-79,000	12,000	-57,000
2059 (W)	88,000	76,000	-14,000	-12,000	-87,000	51,000	-6,900
2060 (D)	26,000	32,000	-19,000	-9,900	-92,000	-62,000	-69,000
2061 (C)	39,000	37,000	-27,000	-5,800	-84,000	-41,000	-110,000
2062 (D)	51,000	32,000	-23,000	-3,600	-82,000	-25,000	-140,000
2063 (BN)	69,000	57,000	-17,000	-3,800	-80,000	25,000	-110,000
2064 (W)	91,000	61,000	-14,000	-6,100	-85,000	47,000	-63,000
2065 (BN)	43,000	31,000	-21,000	-6,100	-88,000	-41,000	-100,000

Los Molinos Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		50,000	39,000	-28,000	-3,800	-86,000	-29,000	-130,000
2067 (C)		40,000	23,000	-31,000	-1,800	-85,000	-55,000	-190,000
2068 (C)		51,000	37,000	-39,000	-940	-82,000	-33,000	-220,000
2069 (BN)		84,000	45,000	-26,000	-870	-82,000	20,000	-200,000
2070 (W)		120,000	74,000	-20,000	-2,700	-90,000	85,000	-120,000
2071 (BN)		63,000	28,000	-25,000	-2,500	-95,000	-32,000	-150,000
2072 (W)		96,000	71,000	-18,000	-3,500	-90,000	56,000	-93,000
Average (2022-2072)		59,000	52,000	-20,000	-7,300	-86,000	-1,800	
2022-2072	W	80,000	70,000	-16,000	-10,000	-91,000		
	AN	68,000	61,000	-17,000	-7,100	-82,000		
	BN	56,000	40,000	-22,000	-5,400	-86,000		
	D	39,000	39,000	-22,000	-7,200	-84,000		
	C	38,000	32,000	-27,000	-3,800	-80,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	75,000
2023 (W)	61,000
2024 (W)	58,000
2025 (BN)	36,000
2026 (AN)	64,000
2027 (W)	80,000
2028 (W)	55,000
2029 (C)	25,000
2030 (C)	24,000
2031 (AN)	77,000
2032 (BN)	43,000
2033 (AN)	60,000
2034 (D)	47,000
2035 (W)	98,000
2036 (W)	79,000
2037 (W)	53,000
2038 (D)	29,000
2039 (W)	63,000
2040 (D)	25,000
2041 (C)	26,000
2042 (D)	43,000
2043 (C)	36,000
2044 (C)	42,000
2045 (C)	52,000
2046 (AN)	98,000
2047 (C)	40,000
2048 (W)	110,000
2049 (W)	81,000
2050 (W)	70,000
2051 (W)	90,000
2052 (W)	63,000
2053 (AN)	47,000
2054 (D)	29,000
2055 (D)	47,000
2056 (AN)	80,000
2057 (BN)	56,000
2058 (AN)	51,000
2059 (W)	88,000
2060 (D)	26,000
2061 (C)	39,000
2062 (D)	51,000
2063 (BN)	69,000

Los Molinos Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		91,000
2065 (BN)		43,000
2066 (D)		50,000
2067 (C)		40,000
2068 (C)		51,000
2069 (BN)		84,000
2070 (W)		120,000
2071 (BN)		63,000
2072 (W)		96,000
Average (2022-2072)		59,000
2022-2072	W	80,000
	AN	68,000
	BN	56,000
	D	39,000
	C	38,000

Sacramento Valley Water Year Index and is classified into five types:

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AN	Above Normal
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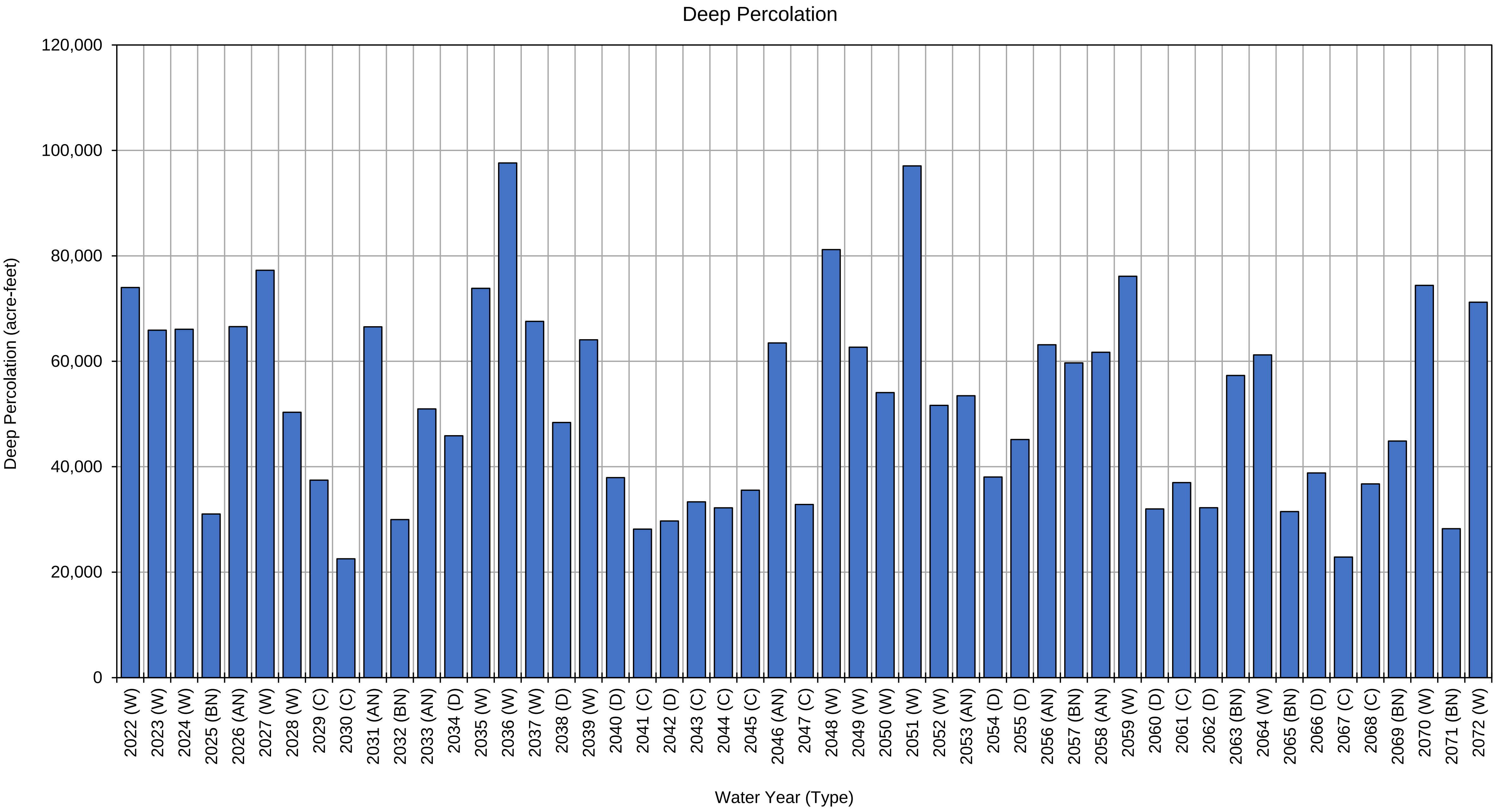
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)	Deep Percolation from the SWS
2022 (W)	74,000
2023 (W)	66,000
2024 (W)	66,000
2025 (BN)	31,000
2026 (AN)	67,000
2027 (W)	77,000
2028 (W)	50,000
2029 (C)	37,000
2030 (C)	23,000
2031 (AN)	67,000
2032 (BN)	30,000
2033 (AN)	51,000
2034 (D)	46,000
2035 (W)	74,000
2036 (W)	98,000
2037 (W)	68,000
2038 (D)	48,000
2039 (W)	64,000
2040 (D)	38,000
2041 (C)	28,000
2042 (D)	30,000
2043 (C)	33,000
2044 (C)	32,000
2045 (C)	36,000
2046 (AN)	63,000
2047 (C)	33,000
2048 (W)	81,000
2049 (W)	63,000
2050 (W)	54,000
2051 (W)	97,000
2052 (W)	52,000
2053 (AN)	53,000
2054 (D)	38,000
2055 (D)	45,000
2056 (AN)	63,000
2057 (BN)	60,000
2058 (AN)	62,000
2059 (W)	76,000
2060 (D)	32,000
2061 (C)	37,000
2062 (D)	32,000
2063 (BN)	57,000

Los Molinos Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		61,000
2065 (BN)		31,000
2066 (D)		39,000
2067 (C)		23,000
2068 (C)		37,000
2069 (BN)		45,000
2070 (W)		74,000
2071 (BN)		28,000
2072 (W)		71,000
Average (2022-2072)		52,000
2022-2072	W	70,000
	AN	61,000
	BN	40,000
	D	39,000
	C	32,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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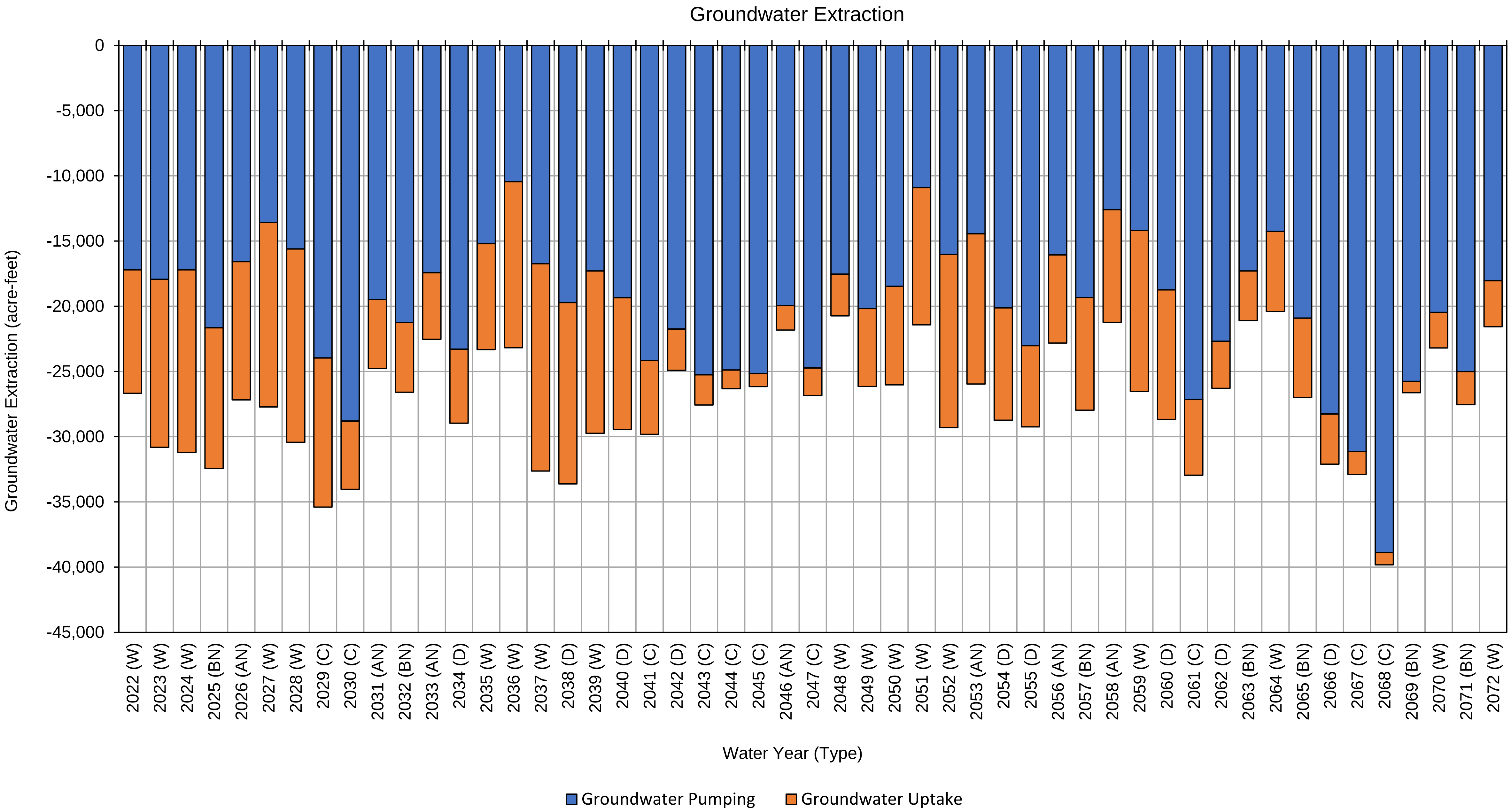
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-17,000	-9,500	-27,000
2023 (W)	-18,000	-13,000	-31,000
2024 (W)	-17,000	-14,000	-31,000
2025 (BN)	-22,000	-11,000	-32,000
2026 (AN)	-17,000	-11,000	-27,000
2027 (W)	-14,000	-14,000	-28,000
2028 (W)	-16,000	-15,000	-30,000
2029 (C)	-24,000	-11,000	-35,000
2030 (C)	-29,000	-5,200	-34,000
2031 (AN)	-19,000	-5,300	-25,000
2032 (BN)	-21,000	-5,300	-27,000
2033 (AN)	-17,000	-5,100	-23,000
2034 (D)	-23,000	-5,700	-29,000
2035 (W)	-15,000	-8,100	-23,000
2036 (W)	-10,000	-13,000	-23,000
2037 (W)	-17,000	-16,000	-33,000
2038 (D)	-20,000	-14,000	-34,000
2039 (W)	-17,000	-12,000	-30,000
2040 (D)	-19,000	-10,000	-29,000
2041 (C)	-24,000	-5,700	-30,000
2042 (D)	-22,000	-3,200	-25,000
2043 (C)	-25,000	-2,300	-28,000
2044 (C)	-25,000	-1,400	-26,000
2045 (C)	-25,000	-1,000	-26,000
2046 (AN)	-20,000	-1,900	-22,000
2047 (C)	-25,000	-2,100	-27,000
2048 (W)	-18,000	-3,200	-21,000
2049 (W)	-20,000	-6,000	-26,000
2050 (W)	-18,000	-7,600	-26,000
2051 (W)	-11,000	-11,000	-21,000
2052 (W)	-16,000	-13,000	-29,000
2053 (AN)	-14,000	-12,000	-26,000
2054 (D)	-20,000	-8,600	-29,000
2055 (D)	-23,000	-6,200	-29,000
2056 (AN)	-16,000	-6,800	-23,000
2057 (BN)	-19,000	-8,600	-28,000
2058 (AN)	-13,000	-8,600	-21,000
2059 (W)	-14,000	-12,000	-27,000
2060 (D)	-19,000	-9,900	-29,000
2061 (C)	-27,000	-5,800	-33,000
2062 (D)	-23,000	-3,600	-26,000
2063 (BN)	-17,000	-3,800	-21,000

Los Molinos Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-14,000	-6,100	-20,000
2065 (BN)		-21,000	-6,100	-27,000
2066 (D)		-28,000	-3,800	-32,000
2067 (C)		-31,000	-1,800	-33,000
2068 (C)		-39,000	-940	-40,000
2069 (BN)		-26,000	-870	-27,000
2070 (W)		-20,000	-2,700	-23,000
2071 (BN)		-25,000	-2,500	-28,000
2072 (W)		-18,000	-3,500	-22,000
Average (2022-2072)		-20,000	-7,300	-27,000
2022-2072	W	-16,000	-10,000	-26,000
	AN	-17,000	-7,100	-24,000
	BN	-22,000	-5,400	-27,000
	D	-22,000	-7,200	-29,000
	C	-27,000	-3,800	-31,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
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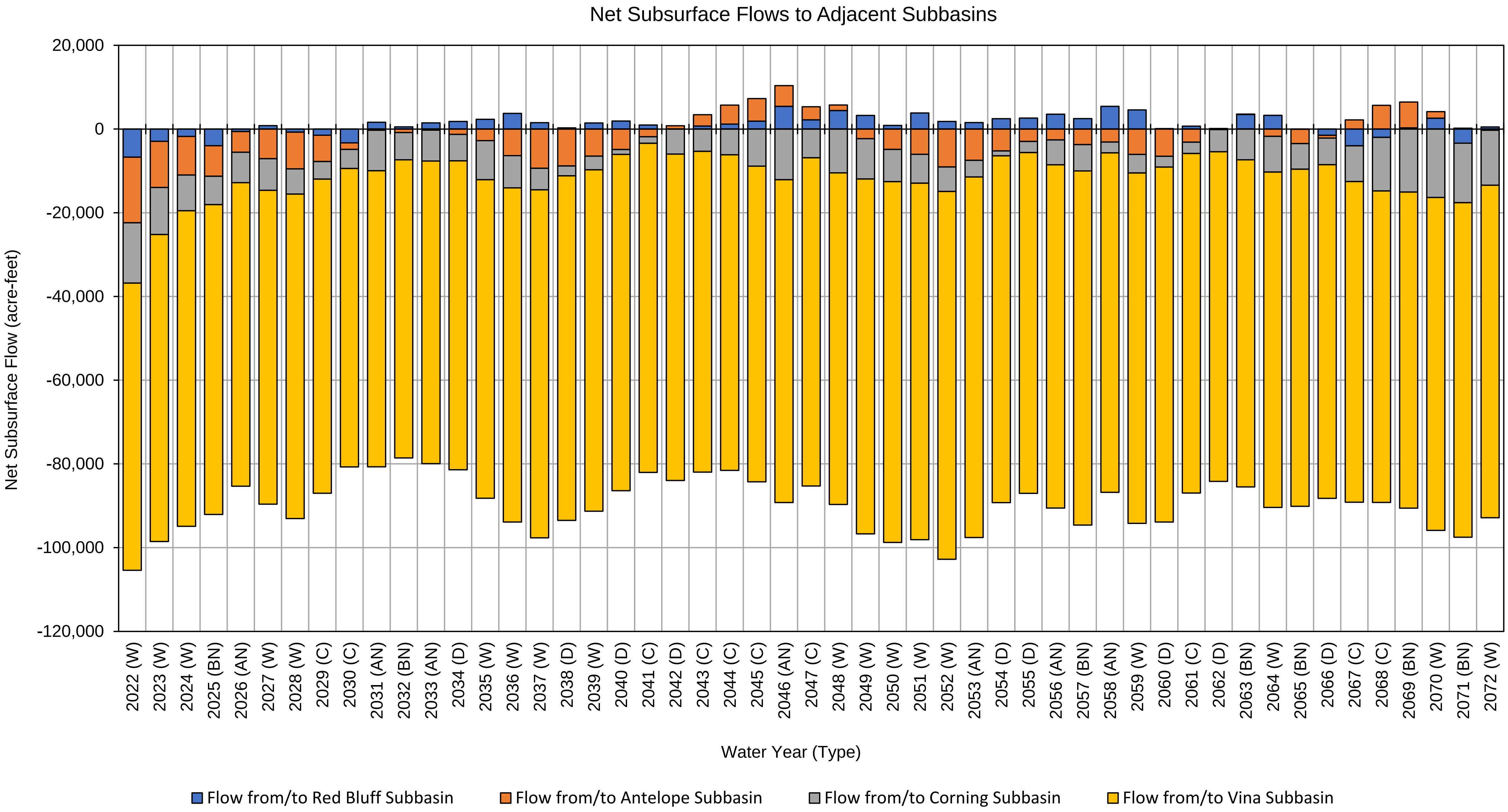
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

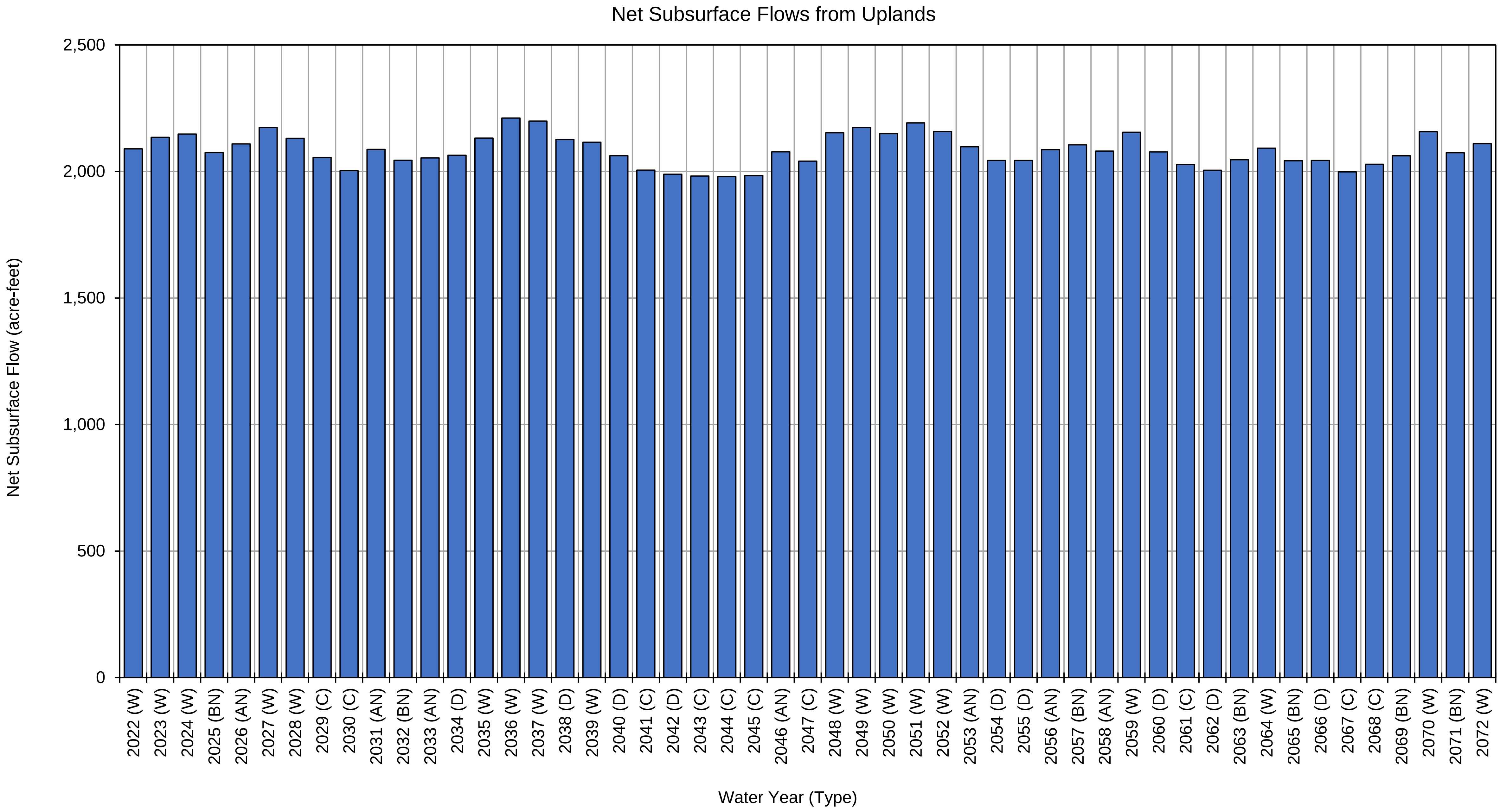
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-6,700	-16,000	-14,000	-69,000	-110,000
2023 (W)	-2,900	-11,000	-11,000	-73,000	-99,000
2024 (W)	-1,800	-9,200	-8,500	-75,000	-95,000
2025 (BN)	-4,000	-7,300	-6,800	-74,000	-92,000
2026 (AN)	-610	-4,900	-7,300	-73,000	-85,000
2027 (W)	820	-7,100	-7,600	-75,000	-89,000
2028 (W)	-760	-8,800	-6,000	-78,000	-93,000
2029 (C)	-1,500	-6,300	-4,200	-75,000	-87,000
2030 (C)	-3,300	-1,600	-4,500	-71,000	-81,000
2031 (AN)	1,600	-290	-9,700	-71,000	-79,000
2032 (BN)	510	-850	-6,500	-71,000	-78,000
2033 (AN)	1,500	-260	-7,400	-72,000	-78,000
2034 (D)	1,800	-1,300	-6,300	-74,000	-80,000
2035 (W)	2,300	-2,800	-9,300	-76,000	-86,000
2036 (W)	3,700	-6,400	-7,700	-80,000	-90,000
2037 (W)	1,500	-9,400	-5,100	-83,000	-96,000
2038 (D)	270	-8,800	-2,400	-82,000	-93,000
2039 (W)	1,400	-6,500	-3,300	-82,000	-90,000
2040 (D)	1,900	-4,900	-1,200	-80,000	-84,000
2041 (C)	960	-1,800	-1,600	-79,000	-81,000
2042 (D)	-5	780	-6,000	-78,000	-83,000
2043 (C)	710	2,700	-5,300	-77,000	-79,000
2044 (C)	1,200	4,500	-6,200	-75,000	-76,000
2045 (C)	1,900	5,400	-8,900	-75,000	-77,000
2046 (AN)	5,400	5,000	-12,000	-77,000	-79,000
2047 (C)	2,200	3,100	-6,900	-78,000	-80,000
2048 (W)	4,400	1,300	-10,000	-79,000	-84,000
2049 (W)	3,300	-2,300	-9,600	-85,000	-93,000
2050 (W)	850	-4,900	-7,700	-86,000	-98,000
2051 (W)	3,800	-6,000	-6,900	-85,000	-94,000
2052 (W)	1,800	-9,100	-5,800	-88,000	-100,000
2053 (AN)	1,500	-7,500	-4,000	-86,000	-96,000
2054 (D)	2,500	-5,200	-1,200	-83,000	-87,000
2055 (D)	2,600	-3,000	-2,700	-81,000	-84,000
2056 (AN)	3,500	-2,600	-5,900	-82,000	-87,000
2057 (BN)	2,500	-3,700	-6,300	-85,000	-92,000
2058 (AN)	5,400	-3,100	-2,600	-81,000	-81,000
2059 (W)	4,600	-6,100	-4,400	-84,000	-90,000
2060 (D)	110	-6,500	-2,600	-85,000	-94,000
2061 (C)	680	-3,100	-2,700	-81,000	-86,000
2062 (D)	120	-150	-5,300	-79,000	-84,000
2063 (BN)	3,500	110	-7,400	-78,000	-82,000

Los Molinos Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		3,300	-1,700	-8,500	-80,000	-87,000
2065 (BN)		-57	-3,400	-6,100	-81,000	-90,000
2066 (D)		-1,500	-650	-6,400	-80,000	-88,000
2067 (C)		-4,000	2,200	-8,600	-77,000	-87,000
2068 (C)		-2,000	5,700	-13,000	-74,000	-84,000
2069 (BN)		280	6,100	-15,000	-76,000	-84,000
2070 (W)		2,600	1,600	-16,000	-80,000	-92,000
2071 (BN)		-3,400	200	-14,000	-80,000	-97,000
2072 (W)		480	-290	-13,000	-79,000	-92,000
Average (2022-2072)		880	-2,900	-7,100	-79,000	-88,000
2022-2072	W	1,300	-5,800	-8,700	-80,000	-93,000
	AN	2,600	-2,000	-7,000	-77,000	-84,000
	BN	-100	-1,300	-8,900	-78,000	-88,000
	D	870	-3,300	-3,800	-80,000	-86,000
	C	-320	1,100	-6,200	-76,000	-82,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

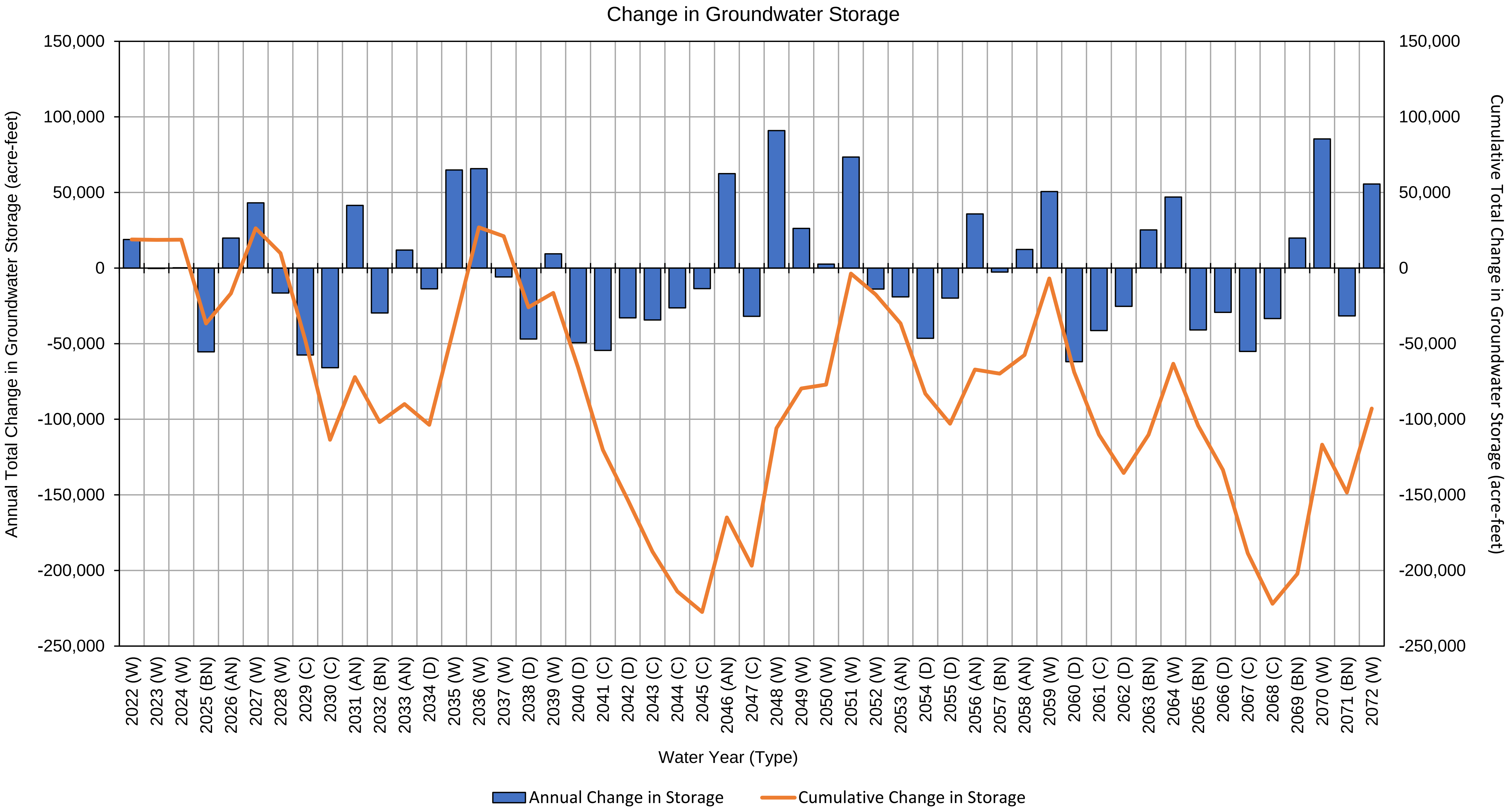
WY (Type)	Subsurface Flows from Uplands
2022 (W)	2,100
2023 (W)	2,100
2024 (W)	2,100
2025 (BN)	2,100
2026 (AN)	2,100
2027 (W)	2,200
2028 (W)	2,100
2029 (C)	2,100
2030 (C)	2,000
2031 (AN)	2,100
2032 (BN)	2,000
2033 (AN)	2,100
2034 (D)	2,100
2035 (W)	2,100
2036 (W)	2,200
2037 (W)	2,200
2038 (D)	2,100
2039 (W)	2,100
2040 (D)	2,100
2041 (C)	2,000
2042 (D)	2,000
2043 (C)	2,000
2044 (C)	2,000
2045 (C)	2,000
2046 (AN)	2,100
2047 (C)	2,000
2048 (W)	2,200
2049 (W)	2,200
2050 (W)	2,100
2051 (W)	2,200
2052 (W)	2,200
2053 (AN)	2,100
2054 (D)	2,000
2055 (D)	2,000
2056 (AN)	2,100
2057 (BN)	2,100
2058 (AN)	2,100
2059 (W)	2,200
2060 (D)	2,100
2061 (C)	2,000
2062 (D)	2,000
2063 (BN)	2,000

Los Molinos Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		2,100
2065 (BN)		2,000
2066 (D)		2,000
2067 (C)		2,000
2068 (C)		2,000
2069 (BN)		2,100
2070 (W)		2,200
2071 (BN)		2,100
2072 (W)		2,100
Average (2022-2072)		2,100
2022-2072	W	2,100
	AN	2,100
	BN	2,100
	D	2,100
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Los Molinos Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	19,000	19,000
2023 (W)	-310	19,000
2024 (W)	180	19,000
2025 (BN)	-55,000	-37,000
2026 (AN)	20,000	-17,000
2027 (W)	43,000	26,000
2028 (W)	-17,000	9,800
2029 (C)	-57,000	-48,000
2030 (C)	-66,000	-110,000
2031 (AN)	41,000	-72,000
2032 (BN)	-30,000	-100,000
2033 (AN)	12,000	-90,000
2034 (D)	-14,000	-100,000
2035 (W)	65,000	-39,000
2036 (W)	66,000	27,000
2037 (W)	-5,900	21,000
2038 (D)	-47,000	-26,000
2039 (W)	9,400	-16,000
2040 (D)	-49,000	-66,000
2041 (C)	-54,000	-120,000
2042 (D)	-33,000	-150,000
2043 (C)	-34,000	-190,000
2044 (C)	-26,000	-210,000
2045 (C)	-14,000	-230,000
2046 (AN)	62,000	-160,000
2047 (C)	-32,000	-200,000
2048 (W)	91,000	-110,000
2049 (W)	26,000	-80,000
2050 (W)	2,600	-77,000
2051 (W)	73,000	-3,600
2052 (W)	-14,000	-18,000
2053 (AN)	-19,000	-37,000
2054 (D)	-46,000	-83,000
2055 (D)	-20,000	-100,000
2056 (AN)	36,000	-67,000
2057 (BN)	-2,700	-70,000
2058 (AN)	12,000	-57,000
2059 (W)	51,000	-6,900
2060 (D)	-62,000	-69,000
2061 (C)	-41,000	-110,000
2062 (D)	-25,000	-140,000
2063 (BN)	25,000	-110,000

Los Molinos Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		47,000	-63,000
2065 (BN)		-41,000	-100,000
2066 (D)		-29,000	-130,000
2067 (C)		-55,000	-190,000
2068 (C)		-33,000	-220,000
2069 (BN)		20,000	-200,000
2070 (W)		85,000	-120,000
2071 (BN)		-32,000	-150,000
2072 (W)		56,000	-93,000
Average (2022-2072)		-1,800	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-3

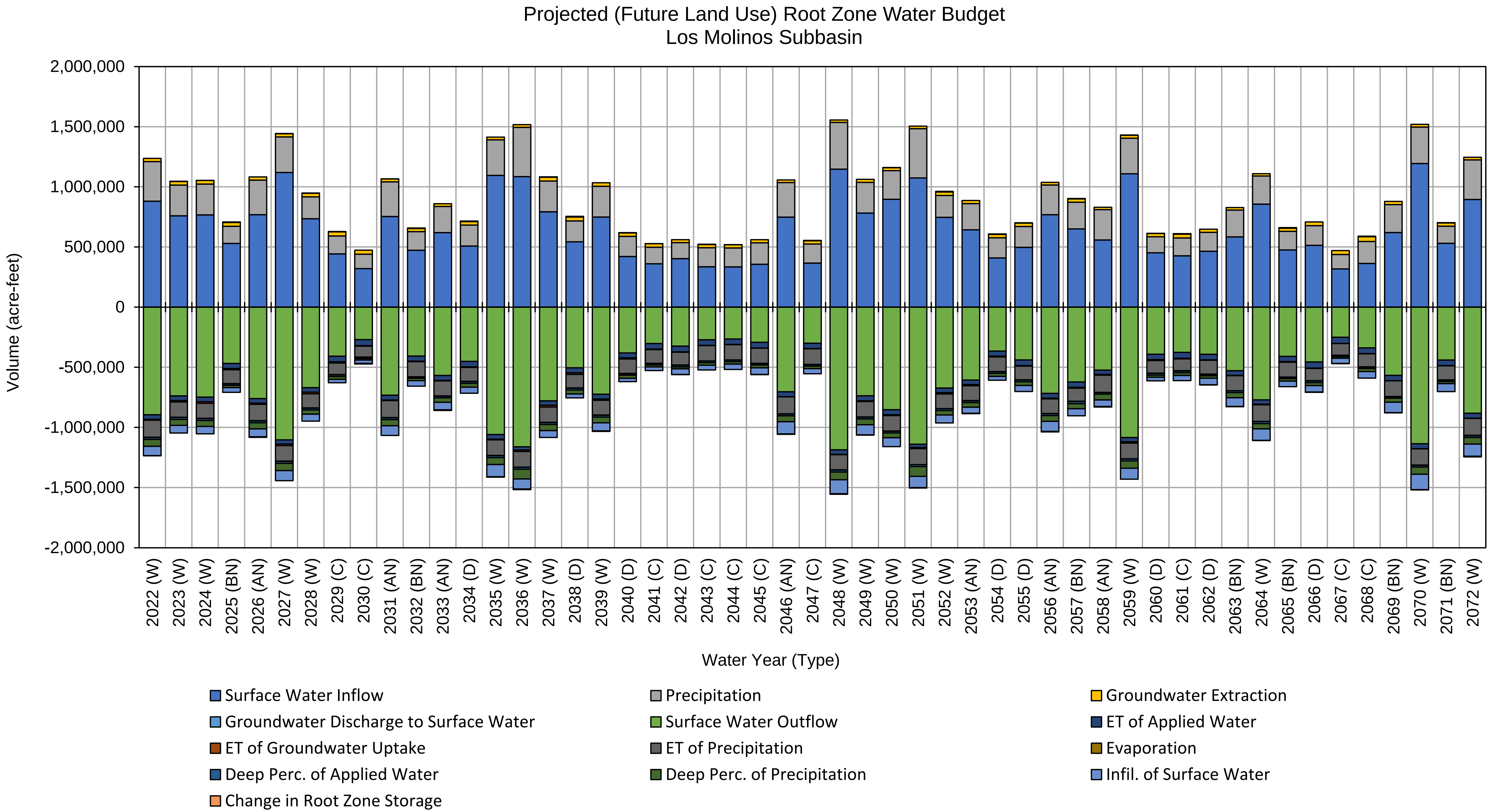
Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) Model Results

APPENDIX C-3a

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) Model Results– Surface Water System



Projected (Future Land Use) Root Zone Water Budget
Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

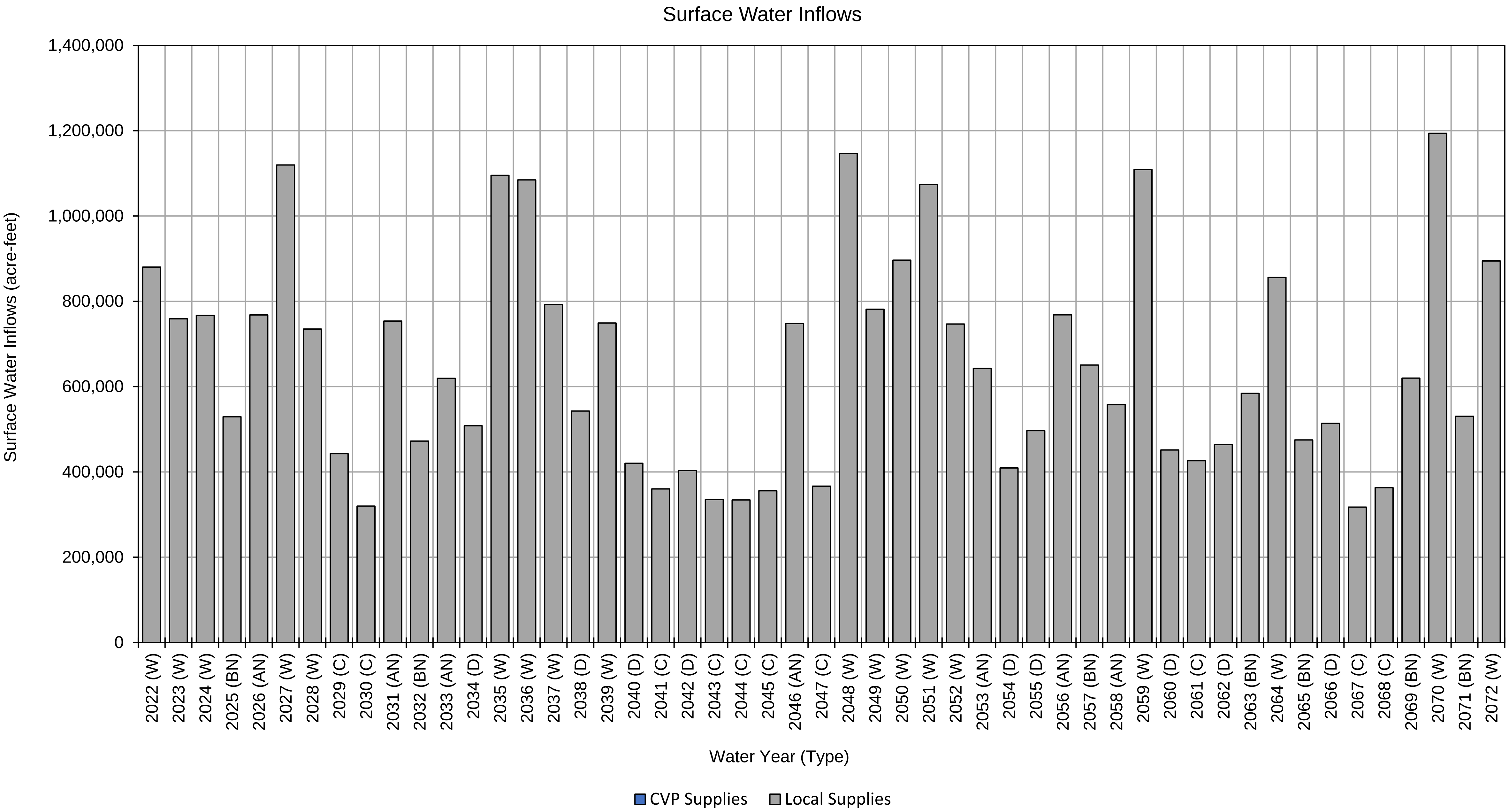
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	880,000	330,000	26,000	0	890,000	38,000	8,300	140,000	1,900	16,000	58,000	77,000	1,600
2023 (W)	760,000	260,000	30,000	0	740,000	38,000	12,000	130,000	2,200	15,000	50,000	63,000	-2,000
2024 (W)	770,000	260,000	31,000	0	750,000	38,000	13,000	130,000	2,200	16,000	50,000	61,000	-39
2025 (BN)	530,000	140,000	32,000	0	470,000	42,000	9,500	120,000	2,400	12,000	19,000	39,000	-4,000
2026 (AN)	770,000	290,000	26,000	0	760,000	39,000	8,900	140,000	2,100	15,000	51,000	67,000	3,400
2027 (W)	1,100,000	300,000	27,000	0	1,100,000	35,000	13,000	130,000	1,900	17,000	60,000	83,000	-770
2028 (W)	740,000	180,000	30,000	0	670,000	38,000	14,000	120,000	2,200	15,000	35,000	58,000	-1,600
2029 (C)	440,000	150,000	35,000	0	410,000	46,000	10,000	96,000	2,700	14,000	24,000	28,000	-2,600
2030 (C)	320,000	120,000	33,000	0	270,000	50,000	4,100	90,000	2,800	10,000	12,000	27,000	5,900
2031 (AN)	750,000	290,000	24,000	0	730,000	41,000	4,100	140,000	2,100	15,000	51,000	80,000	-990
2032 (BN)	470,000	160,000	26,000	0	410,000	43,000	4,200	130,000	2,300	10,000	19,000	46,000	-3,800
2033 (AN)	620,000	220,000	22,000	0	570,000	41,000	4,000	120,000	2,200	14,000	36,000	63,000	5,000
2034 (D)	510,000	170,000	29,000	0	450,000	46,000	4,400	120,000	2,500	14,000	32,000	50,000	-5,400
2035 (W)	1,100,000	300,000	23,000	0	1,100,000	38,000	6,500	130,000	2,000	15,000	58,000	100,000	3,100
2036 (W)	1,100,000	410,000	22,000	0	1,200,000	27,000	12,000	130,000	1,400	16,000	81,000	83,000	5,400
2037 (W)	790,000	260,000	32,000	0	780,000	37,000	15,000	130,000	2,200	16,000	51,000	57,000	-3,100
2038 (D)	540,000	170,000	33,000	0	500,000	42,000	12,000	110,000	2,500	15,000	33,000	32,000	-5,300
2039 (W)	750,000	260,000	29,000	0	720,000	39,000	11,000	120,000	2,200	15,000	48,000	66,000	4,800
2040 (D)	420,000	170,000	29,000	0	380,000	41,000	8,600	120,000	2,300	12,000	25,000	28,000	-2,400
2041 (C)	360,000	140,000	29,000	0	300,000	46,000	4,400	110,000	2,500	11,000	17,000	29,000	-84
2042 (D)	400,000	130,000	24,000	0	320,000	48,000	2,400	110,000	2,600	13,000	16,000	47,000	680
2043 (C)	340,000	160,000	27,000	0	270,000	46,000	1,600	130,000	2,200	12,000	21,000	40,000	-2,100
2044 (C)	330,000	160,000	26,000	0	270,000	46,000	920	130,000	2,200	12,000	20,000	45,000	-51
2045 (C)	360,000	180,000	26,000	0	290,000	48,000	670	130,000	2,300	12,000	23,000	55,000	160
2046 (AN)	750,000	290,000	22,000	0	700,000	41,000	1,300	140,000	2,200	14,000	49,000	100,000	3,100
2047 (C)	370,000	160,000	26,000	0	300,000	45,000	1,400	130,000	2,200	12,000	21,000	43,000	-3,300
2048 (W)	1,100,000	390,000	20,000	0	1,200,000	37,000	2,500	130,000	1,900	16,000	65,000	120,000	3,600
2049 (W)	780,000	260,000	26,000	0	740,000	42,000	4,600	130,000	2,200	14,000	48,000	85,000	220
2050 (W)	900,000	240,000	25,000	0	850,000	42,000	6,000	130,000	2,400	14,000	40,000	74,000	-120
2051 (W)	1,100,000	410,000	20,000	0	1,100,000	28,000	9,200	130,000	1,400	15,000	81,000	94,000	3,400
2052 (W)	750,000	180,000	29,000	0	670,000	37,000	12,000	120,000	2,300	14,000	37,000	66,000	-6,200
2053 (AN)	640,000	220,000	25,000	0	610,000	38,000	10,000	120,000	2,200	15,000	38,000	50,000	3,600
2054 (D)	410,000	170,000	28,000	0	370,000	42,000	7,200	120,000	2,300	12,000	25,000	32,000	-3,100
2055 (D)	500,000	170,000	29,000	0	440,000	46,000	4,900	110,000	2,500	14,000	31,000	50,000	-2,400
2056 (AN)	770,000	250,000	22,000	0	720,000	40,000	5,300	120,000	2,100	15,000	48,000	84,000	4,100
2057 (BN)	650,000	220,000	27,000	0	620,000	45,000	7,000	110,000	2,500	17,000	42,000	59,000	-3,500
2058 (AN)	560,000	250,000	21,000	0	520,000	35,000	6,900	140,000	1,800	13,000	48,000	54,000	4,100
2059 (W)	1,100,000	300,000	25,000	0	1,100,000	35,000	11,000	130,000	1,900	16,000	60,000	92,000	-1,200
2060 (D)	450,000	130,000	28,000	0	390,000	44,000	8,500	110,000	2,600	14,000	18,000	29,000	-290
2061 (C)	430,000	150,000	32,000	0	380,000	50,000	4,500	99,000	2,700	13,000	23,000	42,000	-3,700
2062 (D)	460,000	160,000	26,000	0	390,000	46,000	2,800	110,000	2,500	12,000	20,000	54,000	2,200
2063 (BN)	580,000	220,000	21,000	0	530,000	38,000	3,000	120,000	2,100	14,000	43,000	72,000	1,800
2064 (W)	860,000	230,000	20,000	0	770,000	36,000	4,800	140,000	1,900	16,000	44,000	95,000	1,800
2065 (BN)	470,000	160,000	26,000	0	410,000	44,000	4,800	120,000	2,300	11,000	20,000	46,000	-4,600

Los Molinos Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		510,000	160,000	32,000	0	460,000	51,000	3,000	100,000	2,700	14,000	25,000	53,000	2,600
2067 (C)		320,000	120,000	33,000	0	250,000	51,000	1,200	96,000	2,800	11,000	12,000	43,000	2,100
2068 (C)		360,000	180,000	40,000	0	340,000	49,000	620	110,000	2,500	11,000	25,000	54,000	-5,000
2069 (BN)		620,000	230,000	26,000	0	570,000	44,000	570	130,000	2,300	11,000	34,000	87,000	970
2070 (W)		1,200,000	300,000	23,000	0	1,100,000	40,000	2,000	130,000	2,100	14,000	60,000	130,000	2,000
2071 (BN)		530,000	140,000	27,000	0	440,000	46,000	1,700	120,000	2,500	11,000	17,000	66,000	-2,500
2072 (W)		890,000	330,000	21,000	0	880,000	40,000	2,600	140,000	2,000	15,000	55,000	100,000	6,000
Average (2022-2072)		650,000	220,000	27,000	0	610,000	42,000	6,100	120,000	2,200	14,000	38,000	63,000	25
2022-2072	W	930,000	290,000	26,000	0	910,000	37,000	8,800	130,000	2,000	15,000	55,000	83,000	940
	AN	690,000	260,000	23,000	0	660,000	39,000	5,800	130,000	2,100	14,000	46,000	71,000	3,200
	BN	550,000	180,000	27,000	0	490,000	43,000	4,400	120,000	2,400	12,000	28,000	59,000	-2,200
	D	470,000	160,000	29,000	0	410,000	45,000	6,000	110,000	2,500	13,000	25,000	42,000	-1,500
	C	360,000	150,000	31,000	0	310,000	48,000	2,900	110,000	2,500	12,000	20,000	41,000	-860

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

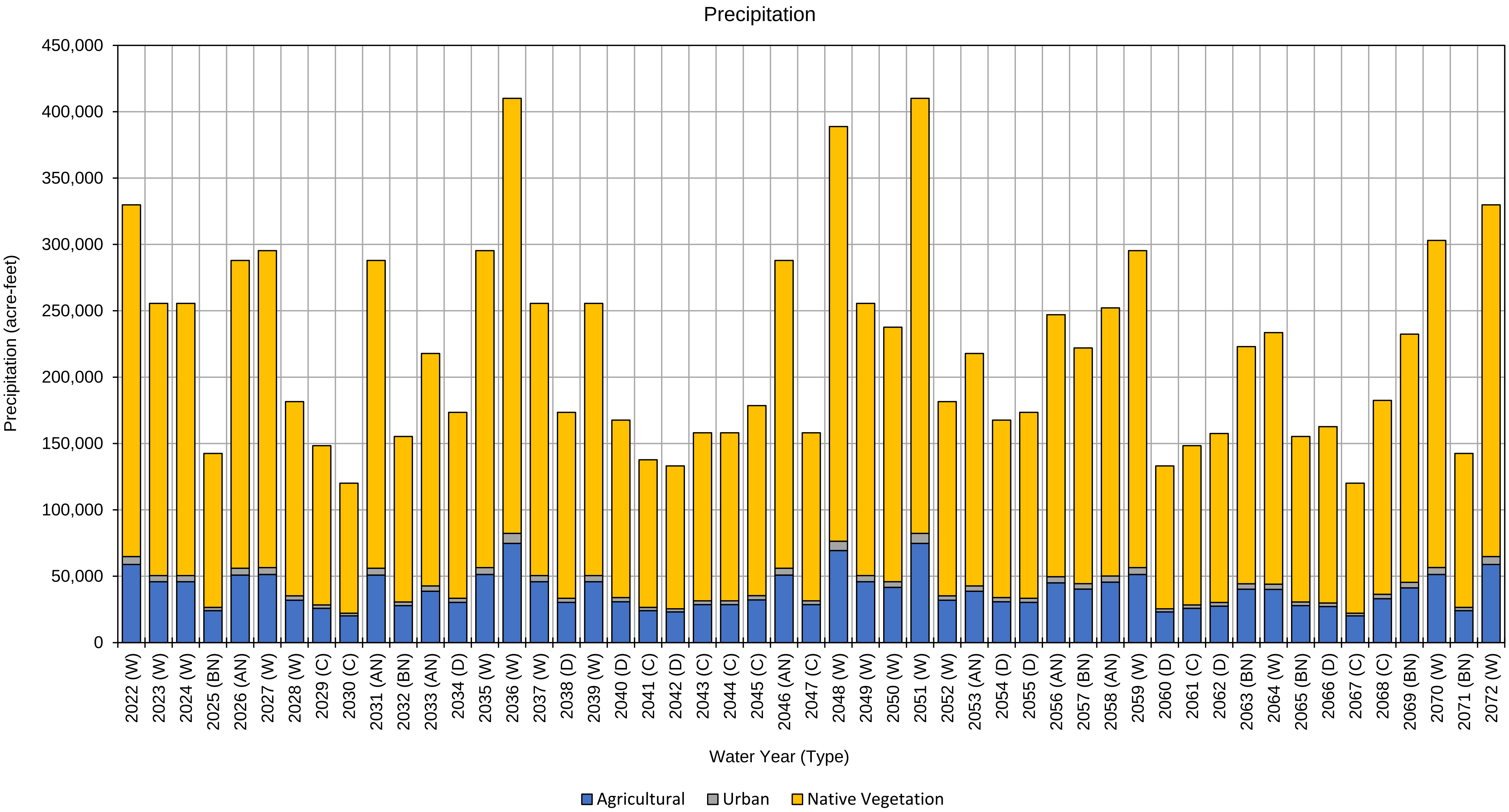
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	0	880,000	880,000
2023 (W)	0	760,000	760,000
2024 (W)	0	770,000	770,000
2025 (BN)	0	530,000	530,000
2026 (AN)	0	770,000	770,000
2027 (W)	0	1,100,000	1,100,000
2028 (W)	0	740,000	740,000
2029 (C)	0	440,000	440,000
2030 (C)	0	320,000	320,000
2031 (AN)	0	750,000	750,000
2032 (BN)	0	470,000	470,000
2033 (AN)	0	620,000	620,000
2034 (D)	0	510,000	510,000
2035 (W)	0	1,100,000	1,100,000
2036 (W)	0	1,100,000	1,100,000
2037 (W)	0	790,000	790,000
2038 (D)	0	540,000	540,000
2039 (W)	0	750,000	750,000
2040 (D)	0	420,000	420,000
2041 (C)	0	360,000	360,000
2042 (D)	0	400,000	400,000
2043 (C)	0	340,000	340,000
2044 (C)	0	330,000	330,000
2045 (C)	0	360,000	360,000
2046 (AN)	0	750,000	750,000
2047 (C)	0	370,000	370,000
2048 (W)	0	1,100,000	1,100,000
2049 (W)	0	780,000	780,000
2050 (W)	0	900,000	900,000
2051 (W)	0	1,100,000	1,100,000
2052 (W)	0	750,000	750,000
2053 (AN)	0	640,000	640,000
2054 (D)	0	410,000	410,000
2055 (D)	0	500,000	500,000
2056 (AN)	0	770,000	770,000
2057 (BN)	0	650,000	650,000
2058 (AN)	0	560,000	560,000
2059 (W)	0	1,100,000	1,100,000
2060 (D)	0	450,000	450,000
2061 (C)	0	430,000	430,000
2062 (D)	0	460,000	460,000
2063 (BN)	0	580,000	580,000

Los Molinos Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		0	860,000	860,000
2065 (BN)		0	470,000	470,000
2066 (D)		0	510,000	510,000
2067 (C)		0	320,000	320,000
2068 (C)		0	360,000	360,000
2069 (BN)		0	620,000	620,000
2070 (W)		0	1,200,000	1,200,000
2071 (BN)		0	530,000	530,000
2072 (W)		0	890,000	890,000
Average (2022-2072)		0	650,000	650,000
2022-2072	W	0	930,000	930,000
	AN	0	690,000	690,000
	BN	0	550,000	550,000
	D	0	470,000	470,000
	C	0	360,000	360,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

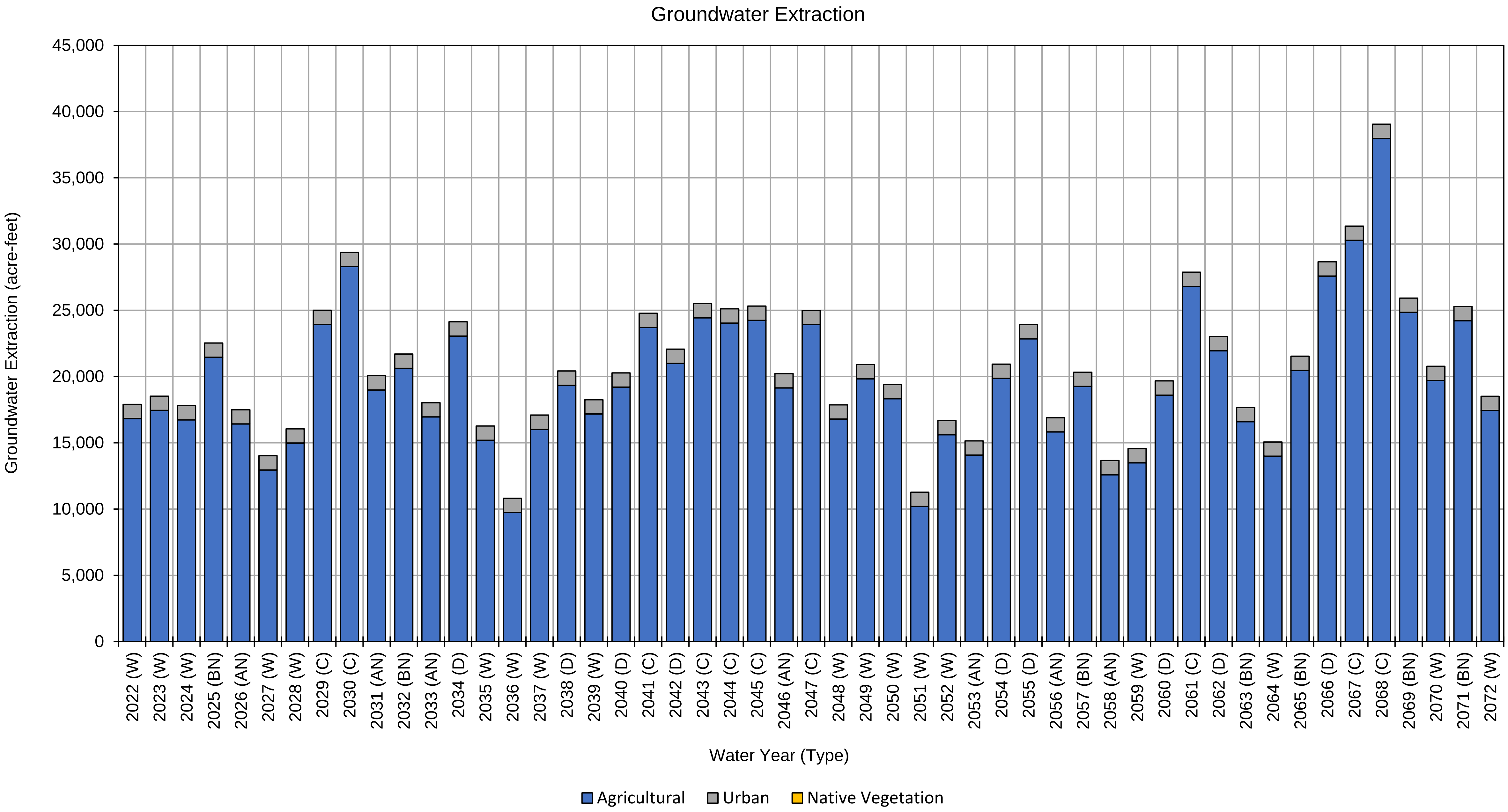
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	59,000	6,000	270,000	340,000
2023 (W)	46,000	4,600	210,000	260,000
2024 (W)	46,000	4,600	210,000	260,000
2025 (BN)	24,000	2,400	120,000	150,000
2026 (AN)	51,000	5,200	230,000	290,000
2027 (W)	51,000	5,100	240,000	300,000
2028 (W)	32,000	3,300	150,000	190,000
2029 (C)	26,000	2,600	120,000	150,000
2030 (C)	20,000	2,000	98,000	120,000
2031 (AN)	51,000	5,200	230,000	290,000
2032 (BN)	28,000	2,800	120,000	150,000
2033 (AN)	39,000	4,000	180,000	220,000
2034 (D)	30,000	3,100	140,000	170,000
2035 (W)	51,000	5,100	240,000	300,000
2036 (W)	75,000	7,600	330,000	410,000
2037 (W)	46,000	4,600	210,000	260,000
2038 (D)	30,000	3,100	140,000	170,000
2039 (W)	46,000	4,600	210,000	260,000
2040 (D)	31,000	3,100	130,000	160,000
2041 (C)	24,000	2,500	110,000	140,000
2042 (D)	23,000	2,400	110,000	140,000
2043 (C)	29,000	2,900	130,000	160,000
2044 (C)	29,000	2,900	130,000	160,000
2045 (C)	32,000	3,200	140,000	180,000
2046 (AN)	51,000	5,200	230,000	290,000
2047 (C)	29,000	2,900	130,000	160,000
2048 (W)	69,000	7,000	310,000	390,000
2049 (W)	46,000	4,600	210,000	260,000
2050 (W)	42,000	4,300	190,000	240,000
2051 (W)	75,000	7,600	330,000	410,000
2052 (W)	32,000	3,300	150,000	190,000
2053 (AN)	39,000	4,000	180,000	220,000
2054 (D)	31,000	3,100	130,000	160,000
2055 (D)	30,000	3,100	140,000	170,000
2056 (AN)	45,000	4,600	200,000	250,000
2057 (BN)	40,000	4,100	180,000	220,000
2058 (AN)	46,000	4,600	200,000	250,000
2059 (W)	51,000	5,100	240,000	300,000
2060 (D)	23,000	2,400	110,000	140,000
2061 (C)	26,000	2,600	120,000	150,000
2062 (D)	27,000	2,700	130,000	160,000
2063 (BN)	40,000	4,100	180,000	220,000

Los Molinos Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		40,000	3,900	190,000	230,000
2065 (BN)		28,000	2,800	120,000	150,000
2066 (D)		27,000	2,700	130,000	160,000
2067 (C)		20,000	2,000	98,000	120,000
2068 (C)		33,000	3,300	150,000	190,000
2069 (BN)		41,000	4,200	190,000	240,000
2070 (W)		51,000	5,200	250,000	310,000
2071 (BN)		24,000	2,400	120,000	150,000
2072 (W)		59,000	6,000	270,000	340,000
Average (2022-2072)		39,000	3,900	180,000	220,000
2022-2072	W	51,000	5,100	230,000	290,000
	AN	46,000	4,700	210,000	260,000
	BN	32,000	3,200	150,000	190,000
	D	28,000	2,800	130,000	160,000
	C	27,000	2,700	120,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

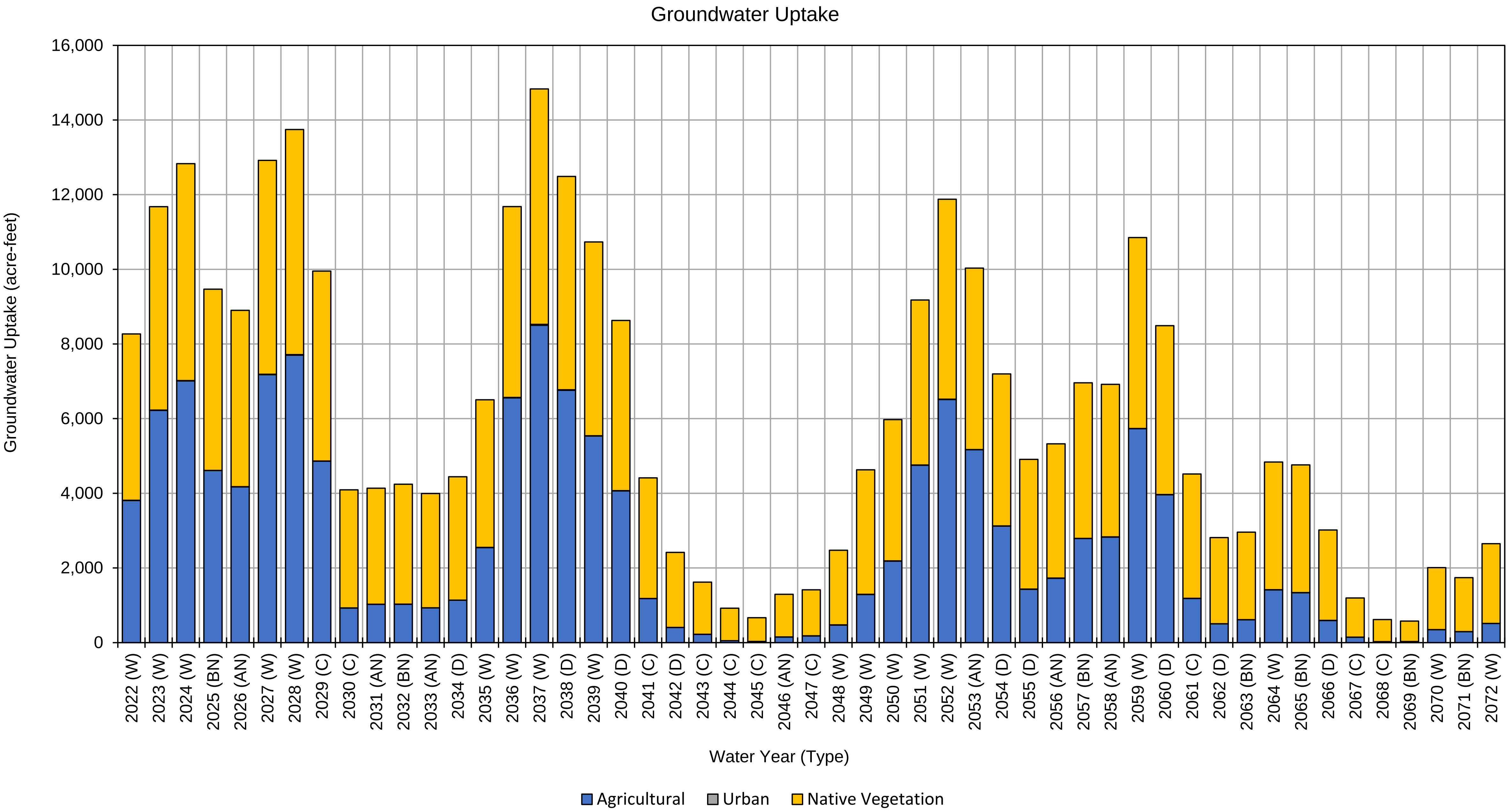
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	1,100	0	18,000
2023 (W)	17,000	1,100	0	18,000
2024 (W)	17,000	1,100	0	18,000
2025 (BN)	21,000	1,100	0	22,000
2026 (AN)	16,000	1,100	0	17,000
2027 (W)	13,000	1,100	0	14,000
2028 (W)	15,000	1,100	0	16,000
2029 (C)	24,000	1,100	0	25,000
2030 (C)	28,000	1,100	0	29,000
2031 (AN)	19,000	1,100	0	20,000
2032 (BN)	21,000	1,100	0	22,000
2033 (AN)	17,000	1,100	0	18,000
2034 (D)	23,000	1,100	0	24,000
2035 (W)	15,000	1,100	0	16,000
2036 (W)	9,700	1,100	0	11,000
2037 (W)	16,000	1,100	0	17,000
2038 (D)	19,000	1,100	0	20,000
2039 (W)	17,000	1,100	0	18,000
2040 (D)	19,000	1,100	0	20,000
2041 (C)	24,000	1,100	0	25,000
2042 (D)	21,000	1,100	0	22,000
2043 (C)	24,000	1,100	0	25,000
2044 (C)	24,000	1,100	0	25,000
2045 (C)	24,000	1,100	0	25,000
2046 (AN)	19,000	1,100	0	20,000
2047 (C)	24,000	1,100	0	25,000
2048 (W)	17,000	1,100	0	18,000
2049 (W)	20,000	1,100	0	21,000
2050 (W)	18,000	1,100	0	19,000
2051 (W)	10,000	1,100	0	11,000
2052 (W)	16,000	1,100	0	17,000
2053 (AN)	14,000	1,100	0	15,000
2054 (D)	20,000	1,100	0	21,000
2055 (D)	23,000	1,100	0	24,000
2056 (AN)	16,000	1,100	0	17,000
2057 (BN)	19,000	1,100	0	20,000
2058 (AN)	13,000	1,100	0	14,000
2059 (W)	13,000	1,100	0	14,000
2060 (D)	19,000	1,100	0	20,000
2061 (C)	27,000	1,100	0	28,000
2062 (D)	22,000	1,100	0	23,000
2063 (BN)	17,000	1,100	0	18,000

Los Molinos Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		14,000	1,100	0	15,000
2065 (BN)		20,000	1,100	0	21,000
2066 (D)		28,000	1,100	0	29,000
2067 (C)		30,000	1,100	0	31,000
2068 (C)		38,000	1,100	0	39,000
2069 (BN)		25,000	1,100	0	26,000
2070 (W)		20,000	1,100	0	21,000
2071 (BN)		24,000	1,100	0	25,000
2072 (W)		17,000	1,100	0	18,000
Average (2022-2072)		20,000	1,100	0	21,000
2022-2072	W	16,000	1,100	0	17,000
	AN	16,000	1,100	0	17,000
	BN	21,000	1,100	0	22,000
	D	21,000	1,100	0	22,000
	C	27,000	1,100	0	28,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

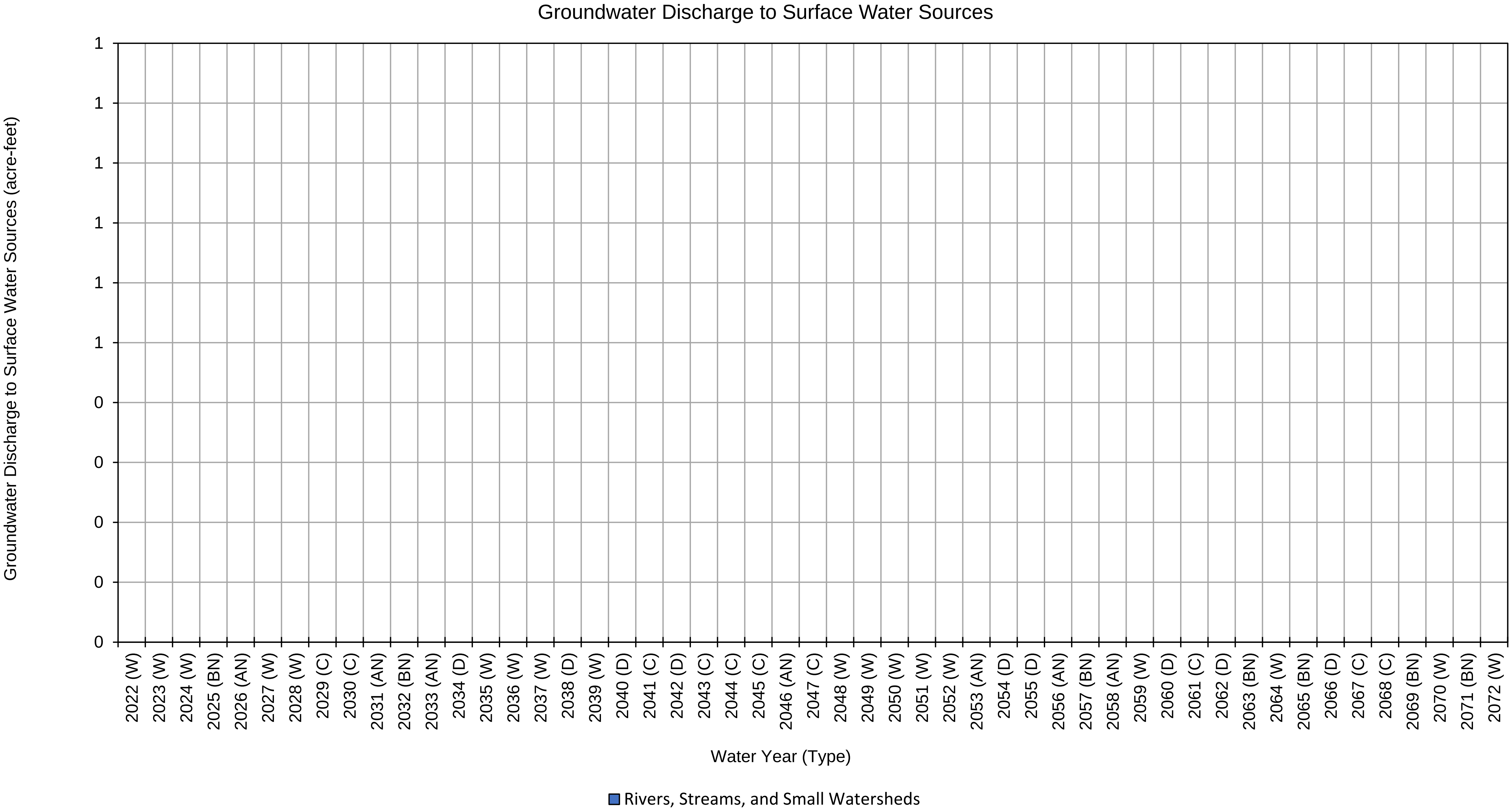
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	3,800	5	4,500	8,300
2023 (W)	6,200	6	5,400	12,000
2024 (W)	7,000	9	5,800	13,000
2025 (BN)	4,600	5	4,900	9,500
2026 (AN)	4,200	5	4,700	8,900
2027 (W)	7,200	10	5,700	13,000
2028 (W)	7,700	16	6,000	14,000
2029 (C)	4,900	6	5,100	10,000
2030 (C)	920	3	3,200	4,100
2031 (AN)	1,000	3	3,100	4,100
2032 (BN)	1,000	3	3,200	4,200
2033 (AN)	930	3	3,100	4,000
2034 (D)	1,100	4	3,300	4,400
2035 (W)	2,500	4	4,000	6,500
2036 (W)	6,600	12	5,100	12,000
2037 (W)	8,500	26	6,300	15,000
2038 (D)	6,800	15	5,700	13,000
2039 (W)	5,500	6	5,200	11,000
2040 (D)	4,100	5	4,600	8,700
2041 (C)	1,200	4	3,200	4,400
2042 (D)	400	2	2,000	2,400
2043 (C)	220	1	1,400	1,600
2044 (C)	50	0	870	920
2045 (C)	30	0	640	670
2046 (AN)	150	2	1,100	1,300
2047 (C)	180	1	1,200	1,400
2048 (W)	470	2	2,000	2,500
2049 (W)	1,300	4	3,300	4,600
2050 (W)	2,200	4	3,800	6,000
2051 (W)	4,800	6	4,400	9,200
2052 (W)	6,500	10	5,400	12,000
2053 (AN)	5,200	6	4,900	10,000
2054 (D)	3,100	5	4,100	7,200
2055 (D)	1,400	4	3,500	4,900
2056 (AN)	1,700	4	3,600	5,300
2057 (BN)	2,800	4	4,200	7,000
2058 (AN)	2,800	5	4,100	6,900
2059 (W)	5,700	7	5,100	11,000
2060 (D)	4,000	5	4,500	8,500
2061 (C)	1,200	4	3,300	4,500
2062 (D)	500	2	2,300	2,800
2063 (BN)	610	3	2,300	2,900

Los Molinos Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		1,400	4	3,400	4,800
2065 (BN)		1,300	4	3,400	4,700
2066 (D)		590	2	2,400	3,000
2067 (C)		140	0	1,100	1,200
2068 (C)		24	0	590	610
2069 (BN)		28	0	550	580
2070 (W)		350	2	1,700	2,100
2071 (BN)		290	1	1,400	1,700
2072 (W)		510	2	2,100	2,600
Average (2022-2072)		2,700	5	3,500	6,200
2022-2072	W	4,300	7	4,400	8,700
	AN	2,300	4	3,500	5,800
	BN	1,500	3	2,900	4,400
	D	2,400	5	3,600	6,000
	C	880	2	2,100	3,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

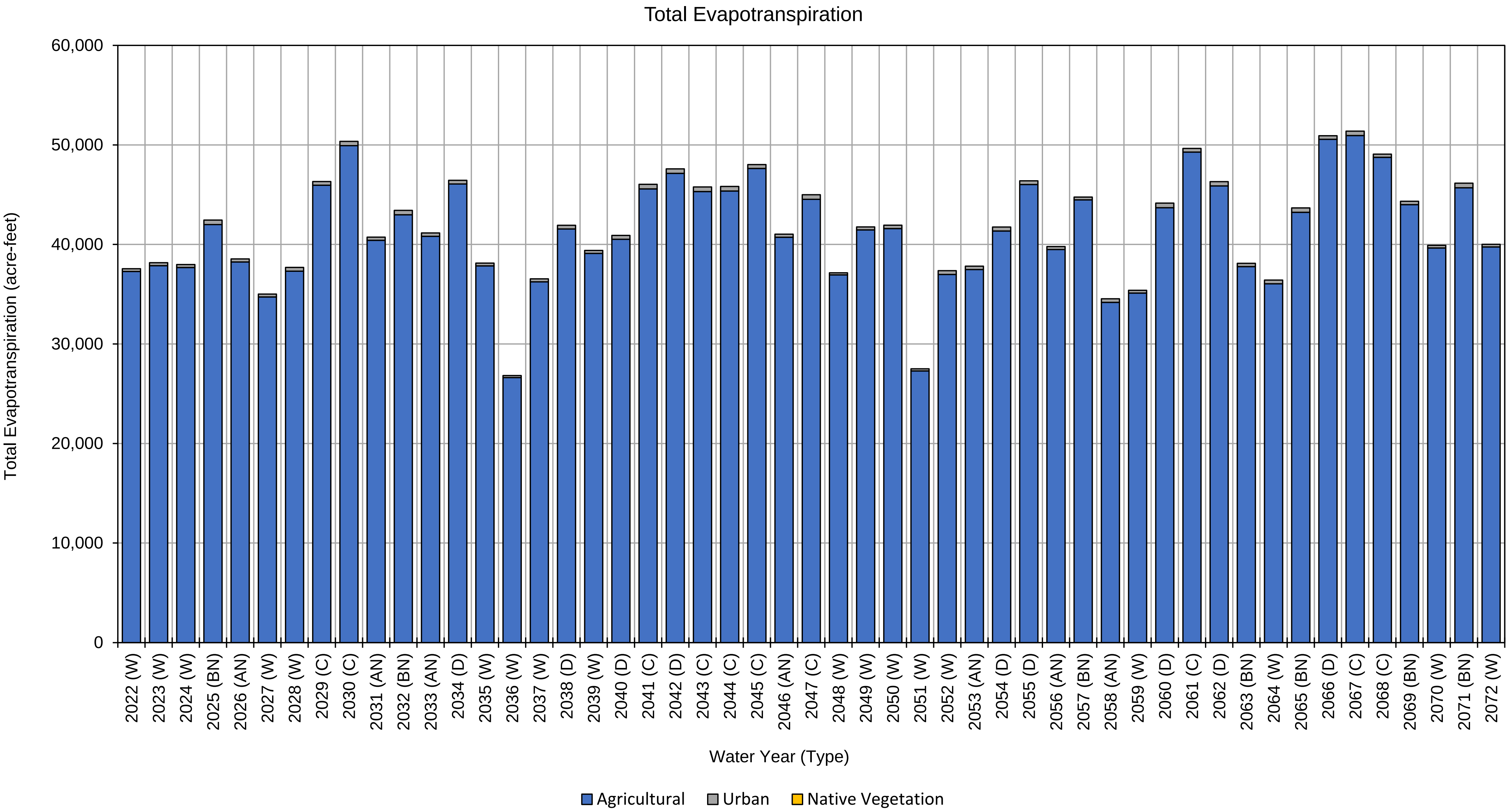
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	0
2023 (W)	0
2024 (W)	0
2025 (BN)	0
2026 (AN)	0
2027 (W)	0
2028 (W)	0
2029 (C)	0
2030 (C)	0
2031 (AN)	0
2032 (BN)	0
2033 (AN)	0
2034 (D)	0
2035 (W)	0
2036 (W)	0
2037 (W)	0
2038 (D)	0
2039 (W)	0
2040 (D)	0
2041 (C)	0
2042 (D)	0
2043 (C)	0
2044 (C)	0
2045 (C)	0
2046 (AN)	0
2047 (C)	0
2048 (W)	0
2049 (W)	0
2050 (W)	0
2051 (W)	0
2052 (W)	0
2053 (AN)	0
2054 (D)	0
2055 (D)	0
2056 (AN)	0
2057 (BN)	0
2058 (AN)	0
2059 (W)	0
2060 (D)	0
2061 (C)	0
2062 (D)	0
2063 (BN)	0

Los Molinos Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		0
2066 (D)		0
2067 (C)		0
2068 (C)		0
2069 (BN)		0
2070 (W)		0
2071 (BN)		0
2072 (W)		0
Average (2022-2072)		0
2022-2072	W	0
	AN	0
	BN	0
	D	0
	C	0

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

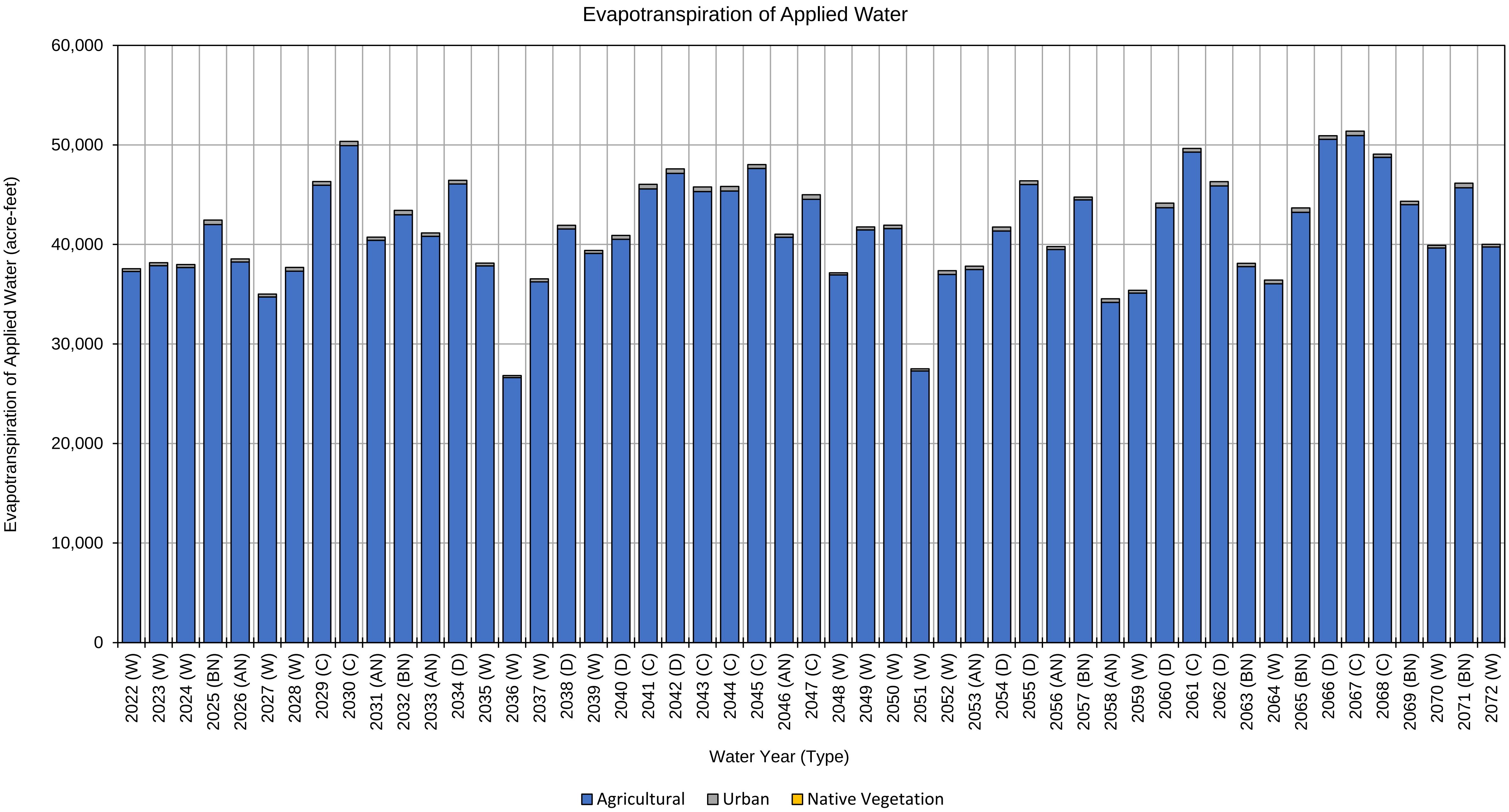
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	62,000	1,800	120,000	180,000
2023 (W)	64,000	1,600	110,000	180,000
2024 (W)	64,000	1,600	110,000	180,000
2025 (BN)	64,000	1,500	100,000	170,000
2026 (AN)	63,000	1,800	120,000	180,000
2027 (W)	61,000	1,600	110,000	170,000
2028 (W)	62,000	1,500	110,000	170,000
2029 (C)	65,000	1,200	86,000	150,000
2030 (C)	65,000	1,300	79,000	150,000
2031 (AN)	63,000	1,800	120,000	180,000
2032 (BN)	64,000	1,600	110,000	180,000
2033 (AN)	61,000	1,600	110,000	170,000
2034 (D)	65,000	1,400	100,000	170,000
2035 (W)	61,000	1,600	110,000	170,000
2036 (W)	54,000	1,700	110,000	170,000
2037 (W)	64,000	1,600	110,000	180,000
2038 (D)	65,000	1,400	100,000	170,000
2039 (W)	64,000	1,600	110,000	180,000
2040 (D)	63,000	1,600	110,000	170,000
2041 (C)	64,000	1,500	99,000	160,000
2042 (D)	63,000	1,500	92,000	160,000
2043 (C)	65,000	1,700	110,000	180,000
2044 (C)	65,000	1,700	110,000	180,000
2045 (C)	67,000	1,600	110,000	180,000
2046 (AN)	63,000	1,800	120,000	180,000
2047 (C)	65,000	1,700	110,000	180,000
2048 (W)	58,000	1,600	110,000	170,000
2049 (W)	64,000	1,600	110,000	180,000
2050 (W)	64,000	1,700	110,000	180,000
2051 (W)	54,000	1,700	110,000	170,000
2052 (W)	62,000	1,500	110,000	170,000
2053 (AN)	61,000	1,600	110,000	170,000
2054 (D)	64,000	1,600	110,000	180,000
2055 (D)	65,000	1,400	99,000	170,000
2056 (AN)	61,000	1,600	110,000	170,000
2057 (BN)	64,000	1,300	96,000	160,000
2058 (AN)	59,000	1,900	120,000	180,000
2059 (W)	61,000	1,600	110,000	170,000
2060 (D)	63,000	1,500	93,000	160,000
2061 (C)	65,000	1,300	87,000	150,000
2062 (D)	63,000	1,500	99,000	160,000
2063 (BN)	58,000	1,600	110,000	170,000

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		58,000	1,800	120,000	180,000
2065 (BN)		64,000	1,600	110,000	180,000
2066 (D)		66,000	1,200	88,000	160,000
2067 (C)		65,000	1,300	82,000	150,000
2068 (C)		65,000	1,300	92,000	160,000
2069 (BN)		65,000	1,600	110,000	180,000
2070 (W)		62,000	1,600	110,000	170,000
2071 (BN)		64,000	1,500	100,000	170,000
2072 (W)		62,000	1,800	120,000	180,000
Average (2022-2072)		63,000	1,600	110,000	170,000
2022-2072	W	61,000	1,600	110,000	170,000
	AN	62,000	1,700	110,000	170,000
	BN	63,000	1,500	100,000	160,000
	D	64,000	1,500	98,000	160,000
	C	65,000	1,500	96,000	160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

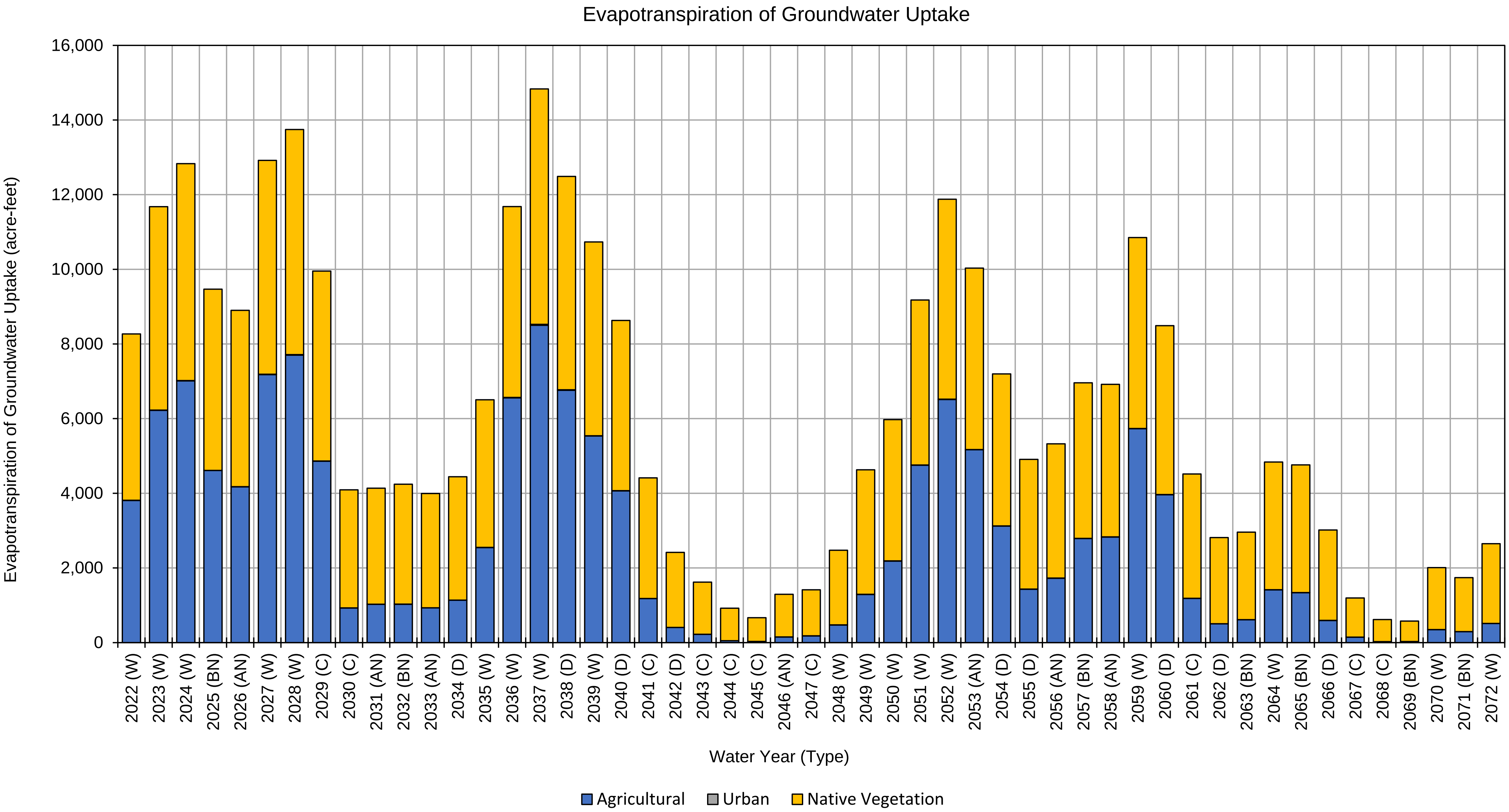
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	37,000	280	0	37,000
2023 (W)	38,000	310	0	38,000
2024 (W)	38,000	300	0	38,000
2025 (BN)	42,000	460	0	42,000
2026 (AN)	38,000	310	0	38,000
2027 (W)	35,000	280	0	35,000
2028 (W)	37,000	380	0	37,000
2029 (C)	46,000	370	0	46,000
2030 (C)	50,000	430	0	50,000
2031 (AN)	40,000	310	0	40,000
2032 (BN)	43,000	440	0	43,000
2033 (AN)	41,000	340	0	41,000
2034 (D)	46,000	370	0	46,000
2035 (W)	38,000	280	0	38,000
2036 (W)	27,000	210	0	27,000
2037 (W)	36,000	300	0	36,000
2038 (D)	42,000	370	0	42,000
2039 (W)	39,000	300	0	39,000
2040 (D)	41,000	400	0	41,000
2041 (C)	46,000	470	0	46,000
2042 (D)	47,000	460	0	47,000
2043 (C)	45,000	460	0	45,000
2044 (C)	45,000	460	0	45,000
2045 (C)	48,000	390	0	48,000
2046 (AN)	41,000	300	0	41,000
2047 (C)	45,000	460	0	45,000
2048 (W)	37,000	210	0	37,000
2049 (W)	41,000	300	0	41,000
2050 (W)	42,000	330	0	42,000
2051 (W)	27,000	210	0	27,000
2052 (W)	37,000	380	0	37,000
2053 (AN)	37,000	340	0	37,000
2054 (D)	41,000	400	0	41,000
2055 (D)	46,000	370	0	46,000
2056 (AN)	39,000	300	0	39,000
2057 (BN)	44,000	280	0	44,000
2058 (AN)	34,000	350	0	34,000
2059 (W)	35,000	280	0	35,000
2060 (D)	44,000	460	0	44,000
2061 (C)	49,000	370	0	49,000
2062 (D)	46,000	430	0	46,000
2063 (BN)	38,000	330	0	38,000

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		36,000	370	0	36,000
2065 (BN)		43,000	440	0	43,000
2066 (D)		51,000	350	0	51,000
2067 (C)		51,000	440	0	51,000
2068 (C)		49,000	320	0	49,000
2069 (BN)		44,000	340	0	44,000
2070 (W)		40,000	270	0	40,000
2071 (BN)		46,000	460	0	46,000
2072 (W)		40,000	270	0	40,000
Average (2022-2072)		41,000	350	0	41,000
2022-2072	W	37,000	290	0	37,000
	AN	39,000	320	0	39,000
	BN	43,000	390	0	43,000
	D	45,000	400	0	45,000
	C	47,000	420	0	47,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

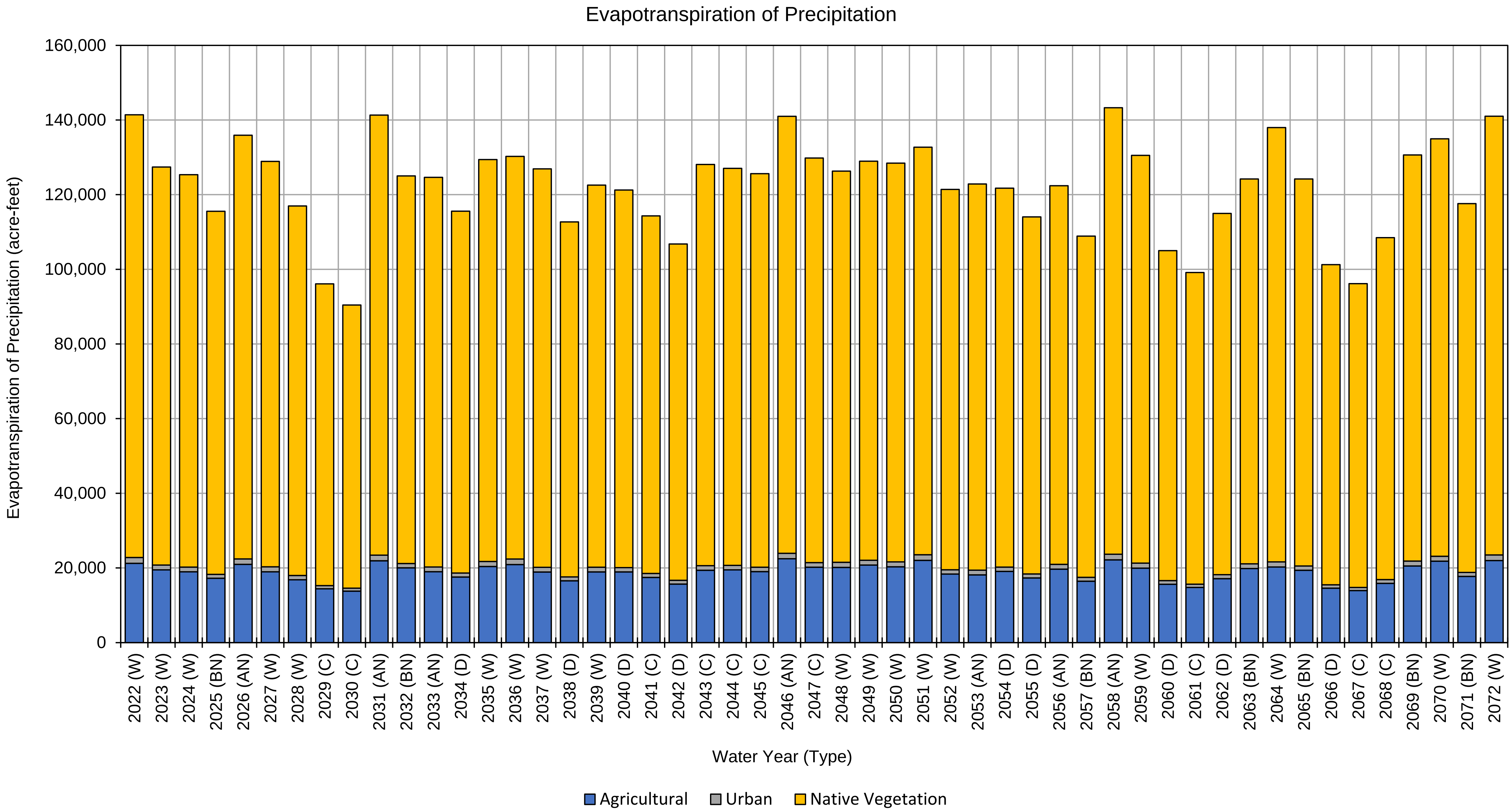
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	3,800	5	4,500	8,300
2023 (W)	6,200	6	5,400	12,000
2024 (W)	7,000	9	5,800	13,000
2025 (BN)	4,600	5	4,900	9,500
2026 (AN)	4,200	5	4,700	8,900
2027 (W)	7,200	10	5,700	13,000
2028 (W)	7,700	16	6,000	14,000
2029 (C)	4,900	6	5,100	10,000
2030 (C)	920	3	3,200	4,100
2031 (AN)	1,000	3	3,100	4,100
2032 (BN)	1,000	3	3,200	4,200
2033 (AN)	930	3	3,100	4,000
2034 (D)	1,100	4	3,300	4,400
2035 (W)	2,500	4	4,000	6,500
2036 (W)	6,600	12	5,100	12,000
2037 (W)	8,500	26	6,300	15,000
2038 (D)	6,800	15	5,700	13,000
2039 (W)	5,500	6	5,200	11,000
2040 (D)	4,100	5	4,600	8,700
2041 (C)	1,200	4	3,200	4,400
2042 (D)	400	2	2,000	2,400
2043 (C)	220	1	1,400	1,600
2044 (C)	50	0	870	920
2045 (C)	30	0	640	670
2046 (AN)	150	2	1,100	1,300
2047 (C)	180	1	1,200	1,400
2048 (W)	470	2	2,000	2,500
2049 (W)	1,300	4	3,300	4,600
2050 (W)	2,200	4	3,800	6,000
2051 (W)	4,800	6	4,400	9,200
2052 (W)	6,500	10	5,400	12,000
2053 (AN)	5,200	6	4,900	10,000
2054 (D)	3,100	5	4,100	7,200
2055 (D)	1,400	4	3,500	4,900
2056 (AN)	1,700	4	3,600	5,300
2057 (BN)	2,800	4	4,200	7,000
2058 (AN)	2,800	5	4,100	6,900
2059 (W)	5,700	7	5,100	11,000
2060 (D)	4,000	5	4,500	8,500
2061 (C)	1,200	4	3,300	4,500
2062 (D)	500	2	2,300	2,800
2063 (BN)	610	3	2,300	2,900

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		1,400	4	3,400	4,800
2065 (BN)		1,300	4	3,400	4,700
2066 (D)		590	2	2,400	3,000
2067 (C)		140	0	1,100	1,200
2068 (C)		24	0	590	610
2069 (BN)		28	0	550	580
2070 (W)		350	2	1,700	2,100
2071 (BN)		290	1	1,400	1,700
2072 (W)		510	2	2,100	2,600
Average (2022-2072)		2,700	5	3,500	6,200
2022-2072	W	4,300	7	4,400	8,700
	AN	2,300	4	3,500	5,800
	BN	1,500	3	2,900	4,400
	D	2,400	5	3,600	6,000
	C	880	2	2,100	3,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

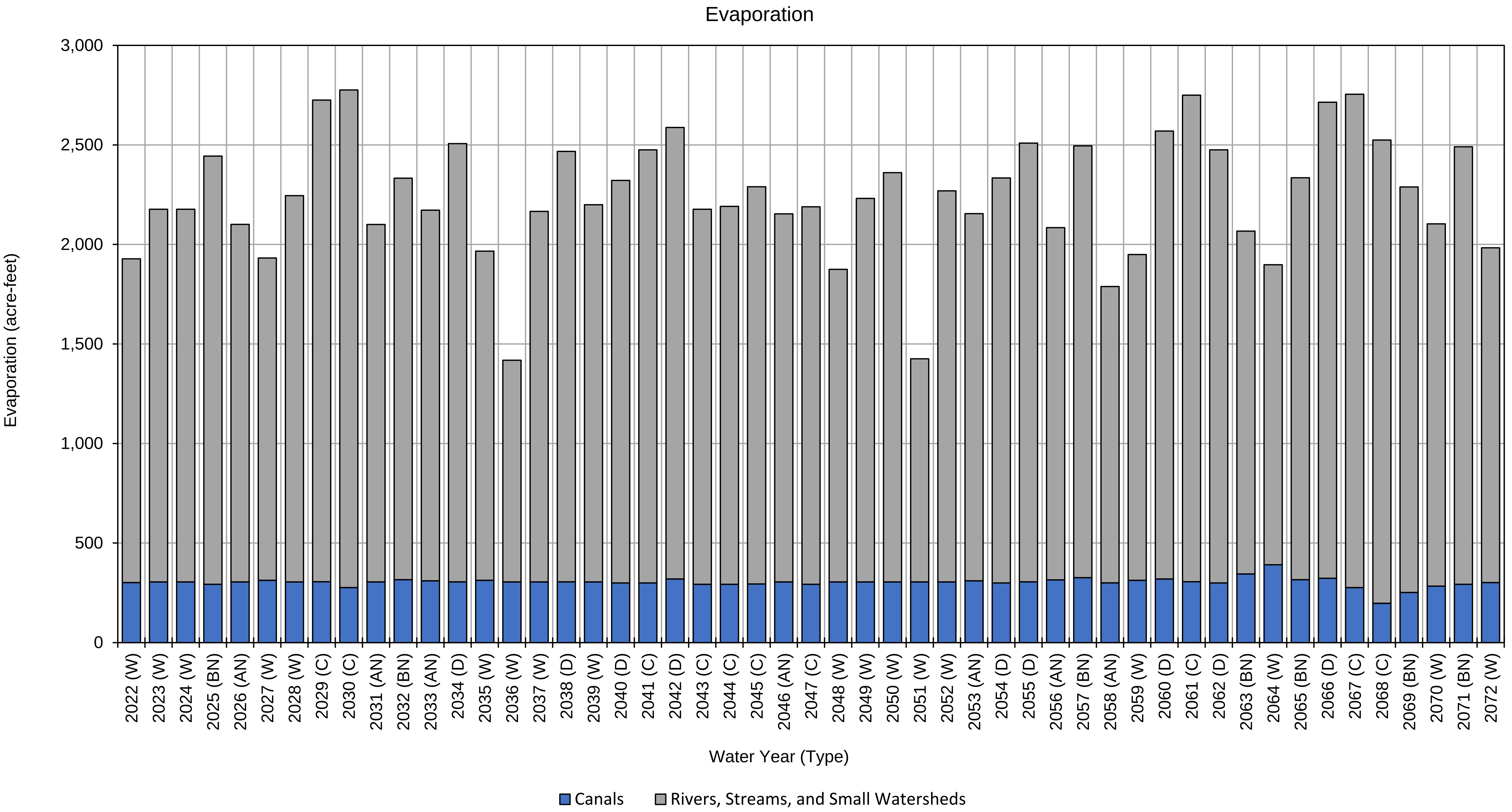
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	21,000	1,500	120,000	140,000
2023 (W)	19,000	1,300	110,000	130,000
2024 (W)	19,000	1,300	110,000	130,000
2025 (BN)	17,000	1,000	97,000	120,000
2026 (AN)	21,000	1,500	110,000	130,000
2027 (W)	19,000	1,300	110,000	130,000
2028 (W)	17,000	1,200	99,000	120,000
2029 (C)	14,000	870	81,000	96,000
2030 (C)	14,000	820	76,000	91,000
2031 (AN)	22,000	1,500	120,000	140,000
2032 (BN)	20,000	1,100	100,000	120,000
2033 (AN)	19,000	1,300	100,000	120,000
2034 (D)	18,000	1,000	97,000	120,000
2035 (W)	20,000	1,300	110,000	130,000
2036 (W)	21,000	1,500	110,000	130,000
2037 (W)	19,000	1,300	110,000	130,000
2038 (D)	17,000	1,000	95,000	110,000
2039 (W)	19,000	1,300	100,000	120,000
2040 (D)	19,000	1,200	100,000	120,000
2041 (C)	17,000	1,100	96,000	110,000
2042 (D)	16,000	1,000	90,000	110,000
2043 (C)	19,000	1,200	110,000	130,000
2044 (C)	19,000	1,200	110,000	130,000
2045 (C)	19,000	1,200	110,000	130,000
2046 (AN)	22,000	1,500	120,000	140,000
2047 (C)	20,000	1,200	110,000	130,000
2048 (W)	20,000	1,400	100,000	120,000
2049 (W)	21,000	1,300	110,000	130,000
2050 (W)	20,000	1,300	110,000	130,000
2051 (W)	22,000	1,500	110,000	130,000
2052 (W)	18,000	1,200	100,000	120,000
2053 (AN)	18,000	1,300	100,000	120,000
2054 (D)	19,000	1,200	100,000	120,000
2055 (D)	17,000	1,000	96,000	110,000
2056 (AN)	20,000	1,300	100,000	120,000
2057 (BN)	16,000	1,100	91,000	110,000
2058 (AN)	22,000	1,500	120,000	140,000
2059 (W)	20,000	1,300	110,000	130,000
2060 (D)	16,000	1,000	88,000	110,000
2061 (C)	15,000	890	84,000	100,000
2062 (D)	17,000	1,100	97,000	120,000
2063 (BN)	20,000	1,300	100,000	120,000

Los Molinos Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		20,000	1,400	120,000	140,000
2065 (BN)		19,000	1,100	100,000	120,000
2066 (D)		15,000	890	86,000	100,000
2067 (C)		14,000	840	81,000	96,000
2068 (C)		16,000	990	92,000	110,000
2069 (BN)		21,000	1,300	110,000	130,000
2070 (W)		22,000	1,300	110,000	130,000
2071 (BN)		18,000	1,000	99,000	120,000
2072 (W)		22,000	1,500	120,000	140,000
Average (2022-2072)		19,000	1,200	100,000	120,000
2022-2072	W	20,000	1,300	110,000	130,000
	AN	21,000	1,400	110,000	130,000
	BN	19,000	1,100	100,000	120,000
	D	17,000	1,000	95,000	110,000
	C	17,000	1,000	94,000	110,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

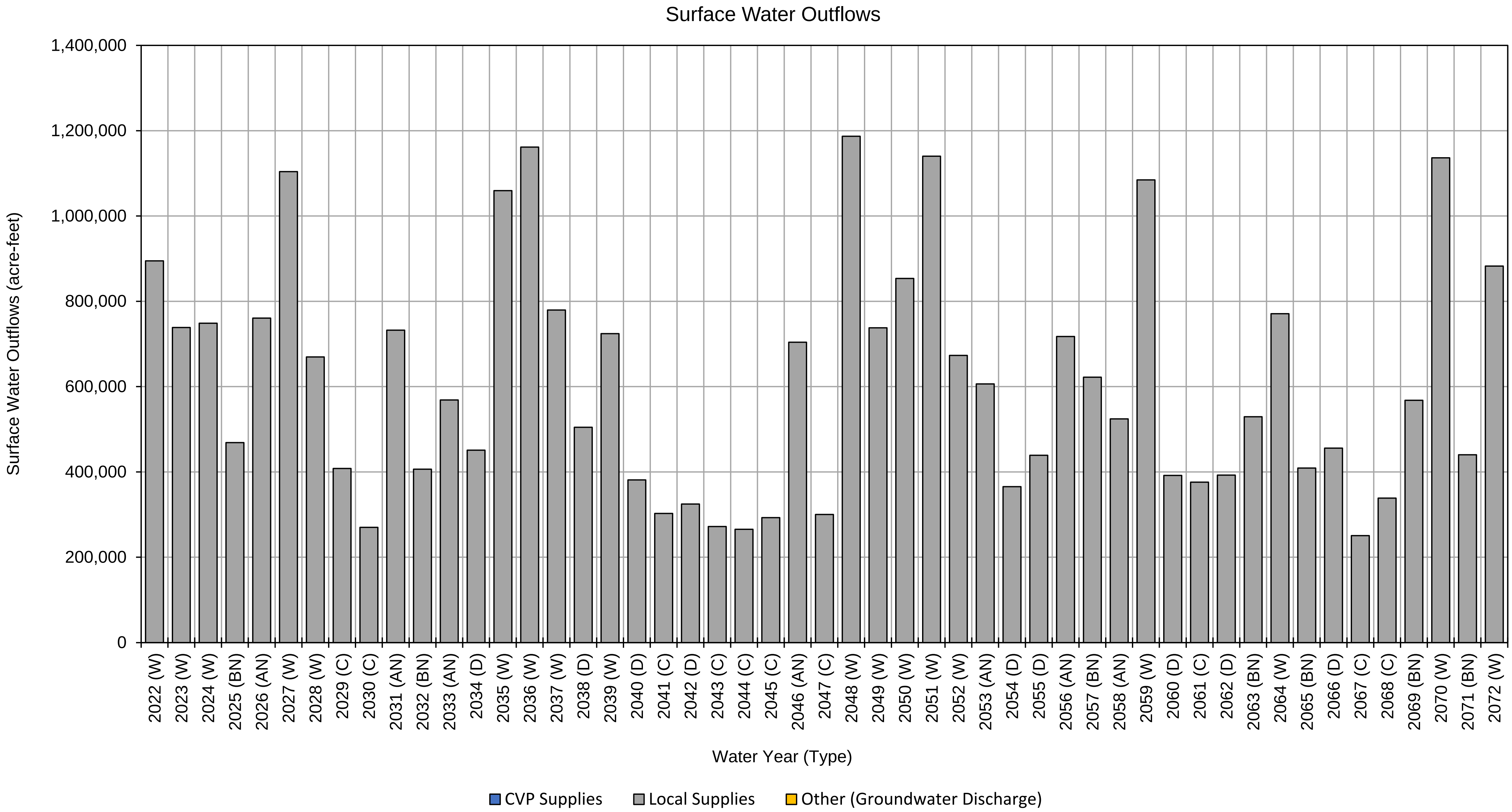
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	300	1,600	1,900
2023 (W)	300	1,900	2,200
2024 (W)	300	1,900	2,200
2025 (BN)	290	2,200	2,500
2026 (AN)	300	1,800	2,100
2027 (W)	310	1,600	1,900
2028 (W)	300	1,900	2,200
2029 (C)	310	2,400	2,700
2030 (C)	280	2,500	2,800
2031 (AN)	300	1,800	2,100
2032 (BN)	320	2,000	2,300
2033 (AN)	310	1,900	2,200
2034 (D)	310	2,200	2,500
2035 (W)	310	1,700	2,000
2036 (W)	300	1,100	1,400
2037 (W)	300	1,900	2,200
2038 (D)	310	2,200	2,500
2039 (W)	300	1,900	2,200
2040 (D)	300	2,000	2,300
2041 (C)	300	2,200	2,500
2042 (D)	320	2,300	2,600
2043 (C)	290	1,900	2,200
2044 (C)	290	1,900	2,200
2045 (C)	290	2,000	2,300
2046 (AN)	300	1,800	2,100
2047 (C)	290	1,900	2,200
2048 (W)	300	1,600	1,900
2049 (W)	300	1,900	2,200
2050 (W)	300	2,100	2,400
2051 (W)	300	1,100	1,400
2052 (W)	300	2,000	2,300
2053 (AN)	310	1,800	2,100
2054 (D)	300	2,000	2,300
2055 (D)	310	2,200	2,500
2056 (AN)	320	1,800	2,100
2057 (BN)	330	2,200	2,500
2058 (AN)	300	1,500	1,800
2059 (W)	310	1,600	1,900
2060 (D)	320	2,300	2,600
2061 (C)	310	2,400	2,700
2062 (D)	300	2,200	2,500
2063 (BN)	340	1,700	2,000

Los Molinos Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		390	1,500	1,900
2065 (BN)		320	2,000	2,300
2066 (D)		320	2,400	2,700
2067 (C)		280	2,500	2,800
2068 (C)		200	2,300	2,500
2069 (BN)		250	2,000	2,300
2070 (W)		280	1,800	2,100
2071 (BN)		290	2,200	2,500
2072 (W)		300	1,700	2,000
Average (2022-2072)		300	1,900	2,200
2022-2072	W	310	1,700	2,000
	AN	310	1,800	2,100
	BN	310	2,000	2,300
	D	310	2,200	2,500
	C	280	2,200	2,500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

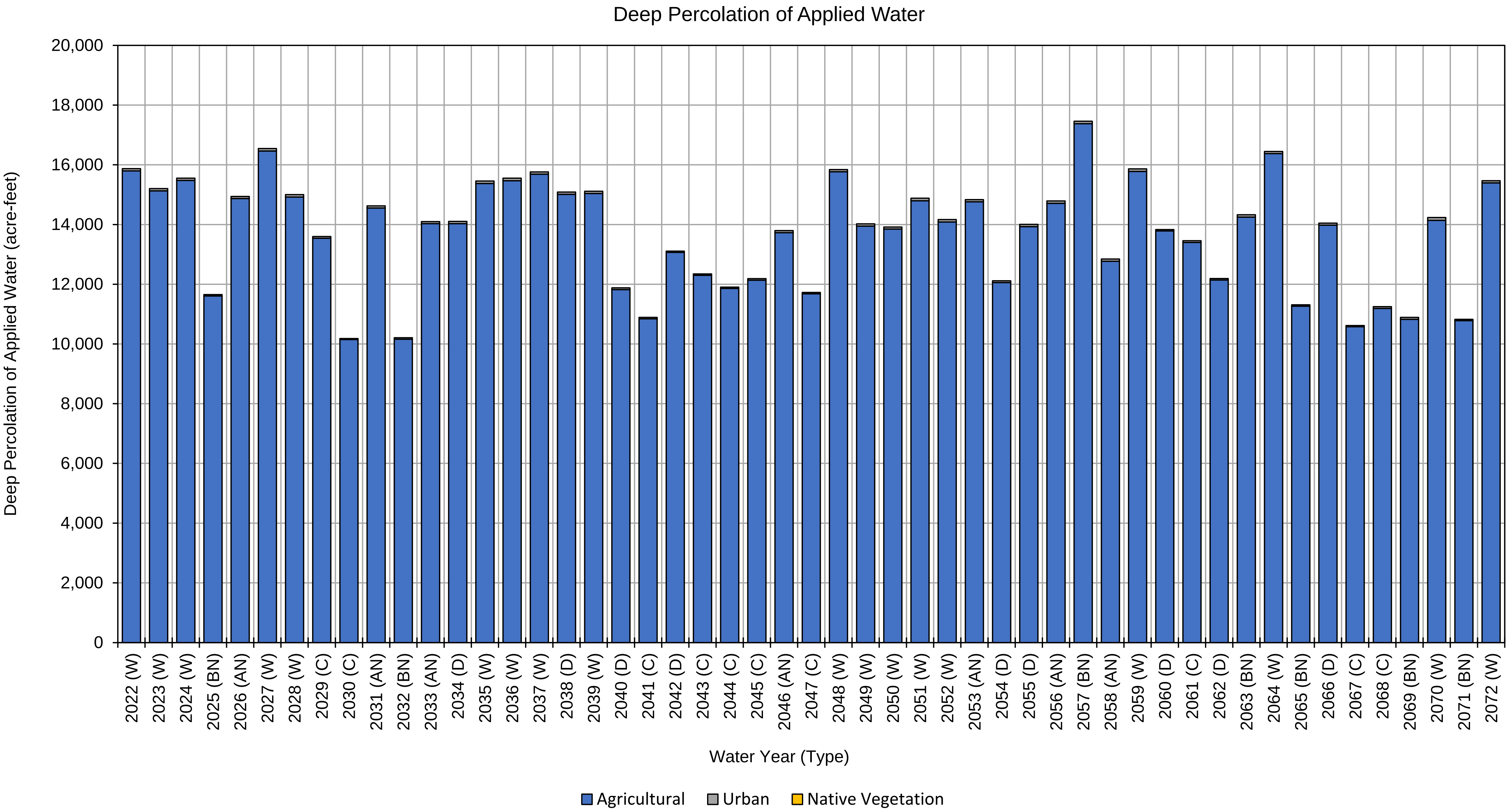
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	890,000	0	890,000
2023 (W)	0	740,000	0	740,000
2024 (W)	0	750,000	0	750,000
2025 (BN)	0	470,000	0	470,000
2026 (AN)	0	760,000	0	760,000
2027 (W)	0	1,100,000	0	1,100,000
2028 (W)	0	670,000	0	670,000
2029 (C)	0	410,000	0	410,000
2030 (C)	0	270,000	0	270,000
2031 (AN)	0	730,000	0	730,000
2032 (BN)	0	410,000	0	410,000
2033 (AN)	0	570,000	0	570,000
2034 (D)	0	450,000	0	450,000
2035 (W)	0	1,100,000	0	1,100,000
2036 (W)	0	1,200,000	0	1,200,000
2037 (W)	0	780,000	0	780,000
2038 (D)	0	500,000	0	500,000
2039 (W)	0	720,000	0	720,000
2040 (D)	0	380,000	0	380,000
2041 (C)	0	300,000	0	300,000
2042 (D)	0	320,000	0	320,000
2043 (C)	0	270,000	0	270,000
2044 (C)	0	270,000	0	270,000
2045 (C)	0	290,000	0	290,000
2046 (AN)	0	700,000	0	700,000
2047 (C)	0	300,000	0	300,000
2048 (W)	0	1,200,000	0	1,200,000
2049 (W)	0	740,000	0	740,000
2050 (W)	0	850,000	0	850,000
2051 (W)	0	1,100,000	0	1,100,000
2052 (W)	0	670,000	0	670,000
2053 (AN)	0	610,000	0	610,000
2054 (D)	0	370,000	0	370,000
2055 (D)	0	440,000	0	440,000
2056 (AN)	0	720,000	0	720,000
2057 (BN)	0	620,000	0	620,000
2058 (AN)	0	520,000	0	520,000
2059 (W)	0	1,100,000	0	1,100,000
2060 (D)	0	390,000	0	390,000
2061 (C)	0	380,000	0	380,000
2062 (D)	0	390,000	0	390,000
2063 (BN)	0	530,000	0	530,000

Los Molinos Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	770,000	0	770,000
2065 (BN)		0	410,000	0	410,000
2066 (D)		0	460,000	0	460,000
2067 (C)		0	250,000	0	250,000
2068 (C)		0	340,000	0	340,000
2069 (BN)		0	570,000	0	570,000
2070 (W)		0	1,100,000	0	1,100,000
2071 (BN)		0	440,000	0	440,000
2072 (W)		0	880,000	0	880,000
Average (2022-2072)		0	610,000	0	610,000
2022-2072	W	0	910,000	0	910,000
	AN	0	660,000	0	660,000
	BN	0	490,000	0	490,000
	D	0	410,000	0	410,000
	C	0	310,000	0	310,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

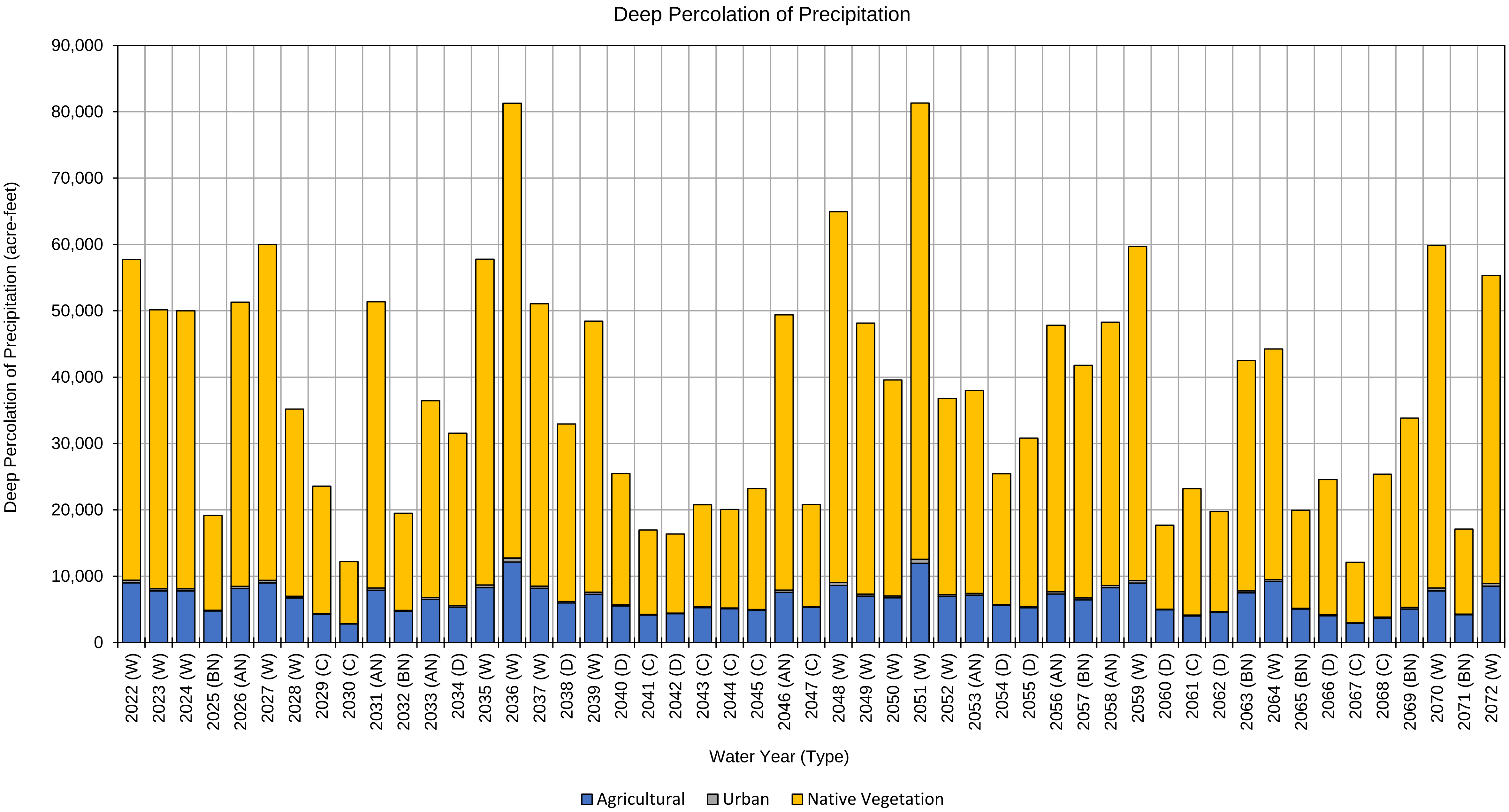
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	72	0	16,000
2023 (W)	15,000	76	0	15,000
2024 (W)	15,000	76	0	15,000
2025 (BN)	12,000	45	0	12,000
2026 (AN)	15,000	69	0	15,000
2027 (W)	16,000	83	0	16,000
2028 (W)	15,000	82	0	15,000
2029 (C)	14,000	58	0	14,000
2030 (C)	10,000	36	0	10,000
2031 (AN)	15,000	71	0	15,000
2032 (BN)	10,000	46	0	10,000
2033 (AN)	14,000	71	0	14,000
2034 (D)	14,000	75	0	14,000
2035 (W)	15,000	82	0	15,000
2036 (W)	15,000	86	0	15,000
2037 (W)	16,000	78	0	16,000
2038 (D)	15,000	76	0	15,000
2039 (W)	15,000	76	0	15,000
2040 (D)	12,000	59	0	12,000
2041 (C)	11,000	48	0	11,000
2042 (D)	13,000	43	0	13,000
2043 (C)	12,000	46	0	12,000
2044 (C)	12,000	46	0	12,000
2045 (C)	12,000	51	0	12,000
2046 (AN)	14,000	69	0	14,000
2047 (C)	12,000	46	0	12,000
2048 (W)	16,000	72	0	16,000
2049 (W)	14,000	76	0	14,000
2050 (W)	14,000	68	0	14,000
2051 (W)	15,000	86	0	15,000
2052 (W)	14,000	82	0	14,000
2053 (AN)	15,000	71	0	15,000
2054 (D)	12,000	60	0	12,000
2055 (D)	14,000	75	0	14,000
2056 (AN)	15,000	79	0	15,000
2057 (BN)	17,000	81	0	17,000
2058 (AN)	13,000	76	0	13,000
2059 (W)	16,000	83	0	16,000
2060 (D)	14,000	43	0	14,000
2061 (C)	13,000	58	0	13,000
2062 (D)	12,000	46	0	12,000
2063 (BN)	14,000	78	0	14,000

Los Molinos Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		16,000	74	0	16,000
2065 (BN)		11,000	47	0	11,000
2066 (D)		14,000	67	0	14,000
2067 (C)		11,000	37	0	11,000
2068 (C)		11,000	61	0	11,000
2069 (BN)		11,000	64	0	11,000
2070 (W)		14,000	93	0	14,000
2071 (BN)		11,000	45	0	11,000
2072 (W)		15,000	71	0	15,000
Average (2022-2072)		14,000	66	0	14,000
2022-2072	W	15,000	79	0	15,000
	AN	14,000	72	0	14,000
	BN	12,000	58	0	12,000
	D	13,000	60	0	13,000
	C	12,000	49	0	12,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

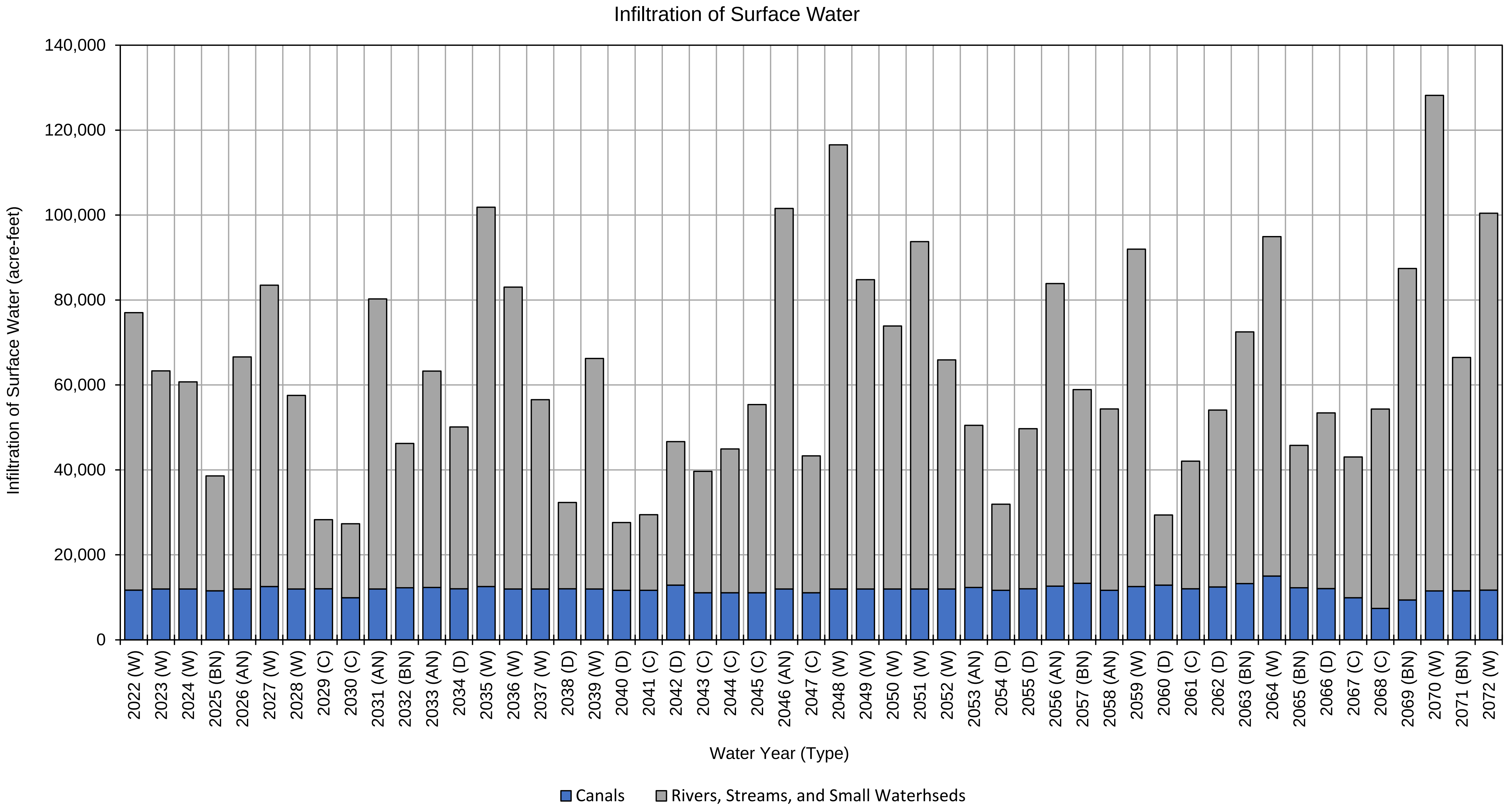
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	9,000	400	48,000	57,000
2023 (W)	7,800	320	42,000	50,000
2024 (W)	7,800	320	42,000	50,000
2025 (BN)	4,800	100	14,000	19,000
2026 (AN)	8,100	330	43,000	51,000
2027 (W)	9,000	400	51,000	60,000
2028 (W)	6,700	250	28,000	35,000
2029 (C)	4,200	140	19,000	23,000
2030 (C)	2,800	69	9,300	12,000
2031 (AN)	7,900	340	43,000	51,000
2032 (BN)	4,700	120	15,000	20,000
2033 (AN)	6,500	260	30,000	37,000
2034 (D)	5,300	210	26,000	32,000
2035 (W)	8,300	390	49,000	58,000
2036 (W)	12,000	600	69,000	82,000
2037 (W)	8,200	330	43,000	52,000
2038 (D)	6,000	220	27,000	33,000
2039 (W)	7,300	320	41,000	49,000
2040 (D)	5,500	170	20,000	26,000
2041 (C)	4,100	110	13,000	17,000
2042 (D)	4,300	94	12,000	16,000
2043 (C)	5,300	120	15,000	20,000
2044 (C)	5,100	120	15,000	20,000
2045 (C)	4,800	150	18,000	23,000
2046 (AN)	7,600	330	41,000	49,000
2047 (C)	5,300	120	15,000	20,000
2048 (W)	8,600	470	56,000	65,000
2049 (W)	7,000	320	41,000	48,000
2050 (W)	6,800	270	33,000	40,000
2051 (W)	12,000	610	69,000	82,000
2052 (W)	7,000	250	30,000	37,000
2053 (AN)	7,100	260	31,000	38,000
2054 (D)	5,600	170	20,000	26,000
2055 (D)	5,200	210	25,000	30,000
2056 (AN)	7,300	330	40,000	48,000
2057 (BN)	6,400	310	35,000	42,000
2058 (AN)	8,300	320	40,000	49,000
2059 (W)	9,000	400	50,000	59,000
2060 (D)	4,900	94	13,000	18,000
2061 (C)	4,000	140	19,000	23,000
2062 (D)	4,500	120	15,000	20,000
2063 (BN)	7,500	290	35,000	43,000

Los Molinos Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		9,200	270	35,000	44,000
2065 (BN)		5,000	120	15,000	20,000
2066 (D)		4,000	170	20,000	24,000
2067 (C)		2,900	69	9,100	12,000
2068 (C)		3,600	190	22,000	26,000
2069 (BN)		5,000	250	29,000	34,000
2070 (W)		7,800	450	52,000	60,000
2071 (BN)		4,200	100	13,000	17,000
2072 (W)		8,500	390	46,000	55,000
Average (2022-2072)		6,500	250	31,000	38,000
2022-2072	W	8,400	380	46,000	55,000
	AN	7,600	310	38,000	46,000
	BN	5,400	180	22,000	28,000
	D	5,100	160	20,000	25,000
	C	4,200	120	15,000	19,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

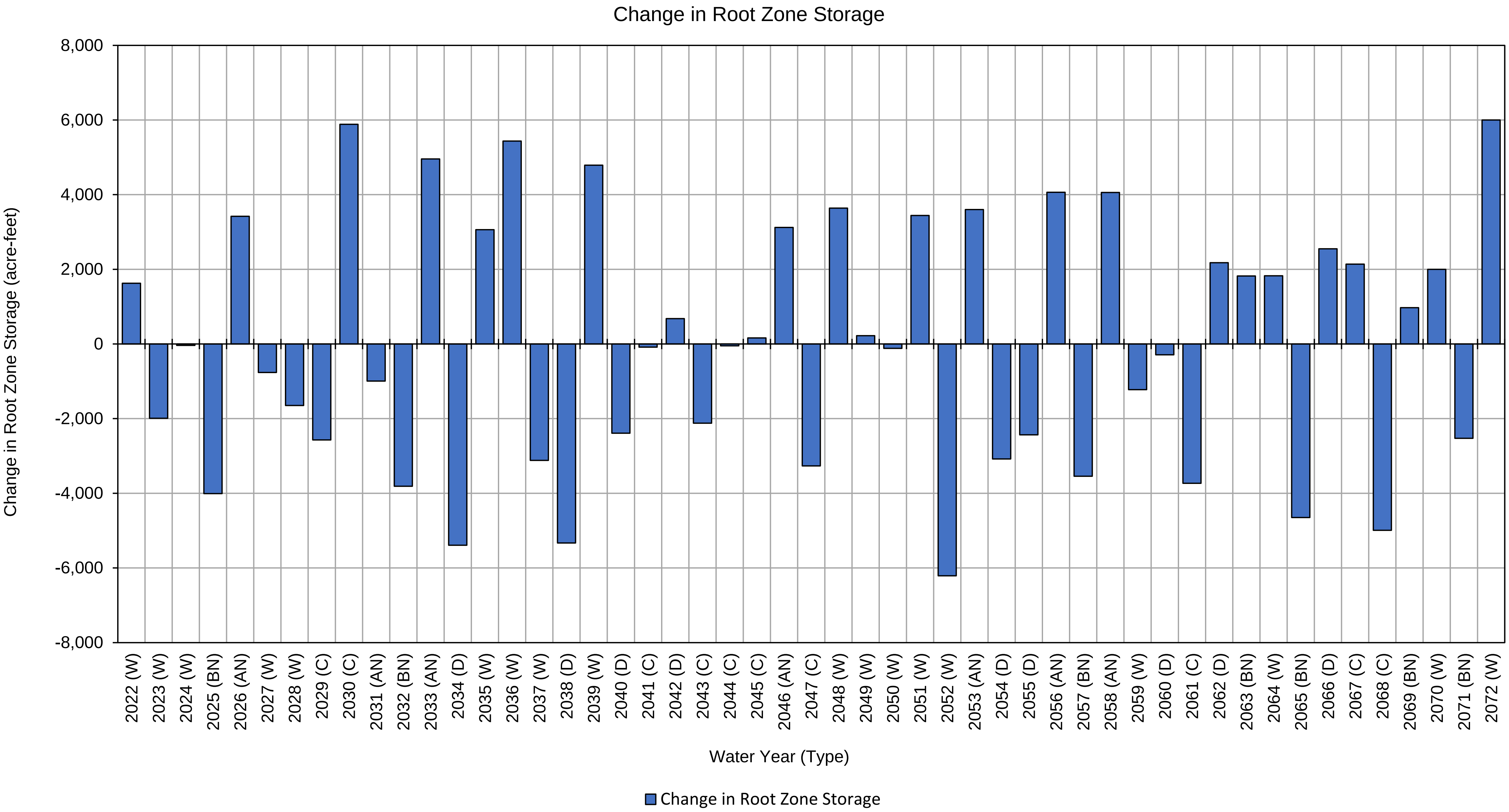
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	12,000	65,000	77,000
2023 (W)	12,000	51,000	63,000
2024 (W)	12,000	49,000	61,000
2025 (BN)	12,000	27,000	39,000
2026 (AN)	12,000	55,000	67,000
2027 (W)	13,000	71,000	84,000
2028 (W)	12,000	46,000	58,000
2029 (C)	12,000	16,000	28,000
2030 (C)	9,900	17,000	27,000
2031 (AN)	12,000	68,000	80,000
2032 (BN)	12,000	34,000	46,000
2033 (AN)	12,000	51,000	63,000
2034 (D)	12,000	38,000	50,000
2035 (W)	13,000	89,000	100,000
2036 (W)	12,000	71,000	83,000
2037 (W)	12,000	45,000	57,000
2038 (D)	12,000	20,000	32,000
2039 (W)	12,000	54,000	66,000
2040 (D)	12,000	16,000	28,000
2041 (C)	12,000	18,000	30,000
2042 (D)	13,000	34,000	47,000
2043 (C)	11,000	29,000	40,000
2044 (C)	11,000	34,000	45,000
2045 (C)	11,000	44,000	55,000
2046 (AN)	12,000	90,000	100,000
2047 (C)	11,000	32,000	43,000
2048 (W)	12,000	100,000	110,000
2049 (W)	12,000	73,000	85,000
2050 (W)	12,000	62,000	74,000
2051 (W)	12,000	82,000	94,000
2052 (W)	12,000	54,000	66,000
2053 (AN)	12,000	38,000	50,000
2054 (D)	12,000	20,000	32,000
2055 (D)	12,000	38,000	50,000
2056 (AN)	13,000	71,000	84,000
2057 (BN)	13,000	46,000	59,000
2058 (AN)	12,000	43,000	55,000
2059 (W)	13,000	79,000	92,000
2060 (D)	13,000	17,000	30,000
2061 (C)	12,000	30,000	42,000
2062 (D)	12,000	42,000	54,000
2063 (BN)	13,000	59,000	72,000

Los Molinos Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		15,000	80,000	95,000
2065 (BN)		12,000	34,000	46,000
2066 (D)		12,000	41,000	53,000
2067 (C)		9,900	33,000	43,000
2068 (C)		7,400	47,000	54,000
2069 (BN)		9,400	78,000	87,000
2070 (W)		12,000	120,000	130,000
2071 (BN)		12,000	55,000	67,000
2072 (W)		12,000	89,000	100,000
Average (2022-2072)		12,000	51,000	63,000
2022-2072	W	12,000	71,000	83,000
	AN	12,000	59,000	71,000
	BN	12,000	47,000	59,000
	D	12,000	30,000	42,000
	C	11,000	30,000	41,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	1,600
2023 (W)	-2,000
2024 (W)	-39
2025 (BN)	-4,000
2026 (AN)	3,400
2027 (W)	-770
2028 (W)	-1,600
2029 (C)	-2,600
2030 (C)	5,900
2031 (AN)	-990
2032 (BN)	-3,800
2033 (AN)	5,000
2034 (D)	-5,400
2035 (W)	3,100
2036 (W)	5,400
2037 (W)	-3,100
2038 (D)	-5,300
2039 (W)	4,800
2040 (D)	-2,400
2041 (C)	-84
2042 (D)	680
2043 (C)	-2,100
2044 (C)	-51
2045 (C)	160
2046 (AN)	3,100
2047 (C)	-3,300
2048 (W)	3,600
2049 (W)	220
2050 (W)	-120
2051 (W)	3,400
2052 (W)	-6,200
2053 (AN)	3,600
2054 (D)	-3,100
2055 (D)	-2,400
2056 (AN)	4,100
2057 (BN)	-3,500
2058 (AN)	4,100
2059 (W)	-1,200
2060 (D)	-290
2061 (C)	-3,700
2062 (D)	2,200
2063 (BN)	1,800

Los Molinos Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		1,800
2065 (BN)		-4,600
2066 (D)		2,600
2067 (C)		2,100
2068 (C)		-5,000
2069 (BN)		970
2070 (W)		2,000
2071 (BN)		-2,500
2072 (W)		6,000
Average (2022-2072)		25
2022-2072	W	940
	AN	3,200
	BN	-2,200
	D	-1,500
	C	-860

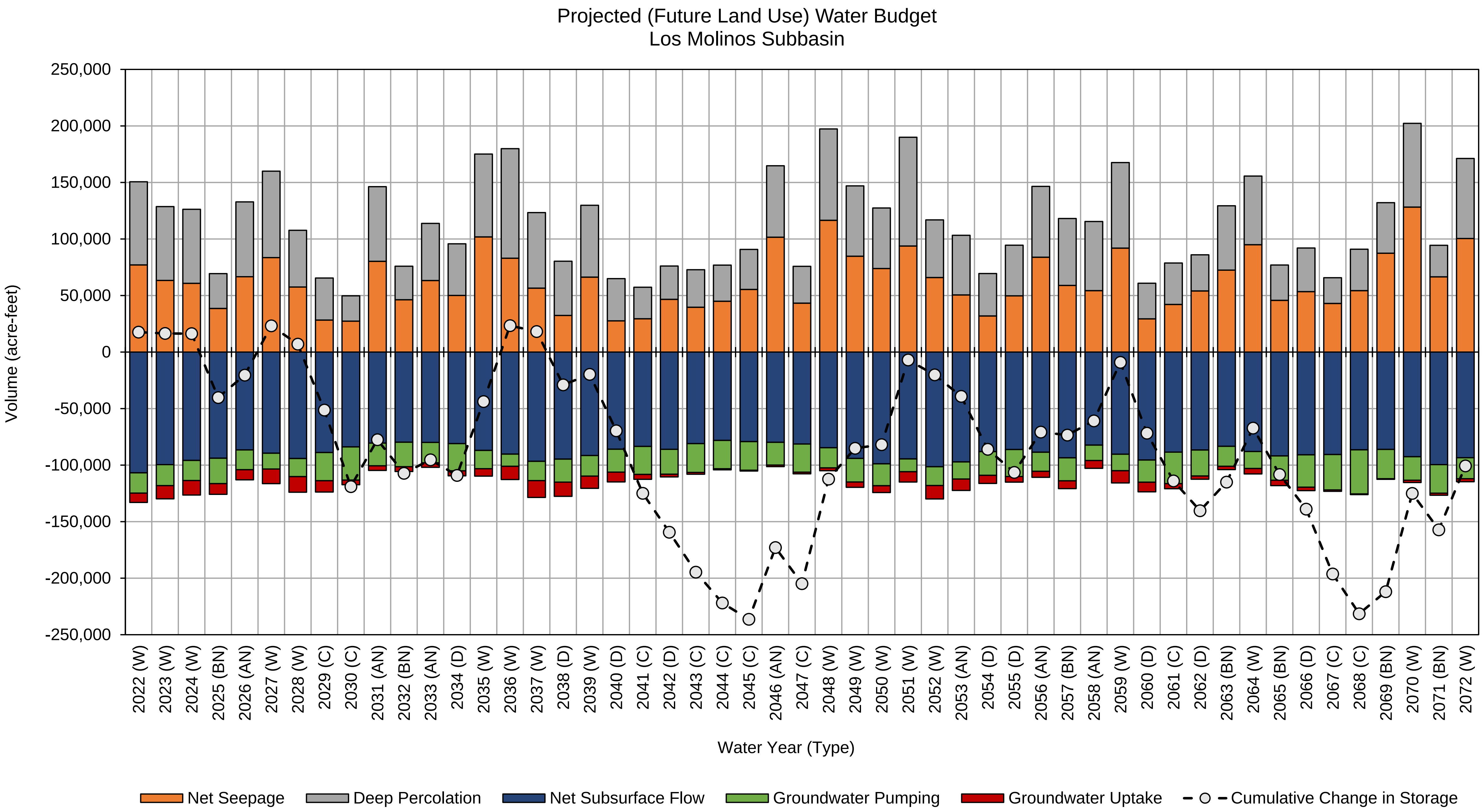
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-3b

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) Model Results – Groundwater System



Projected (Future Land Use) Water Budget
Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

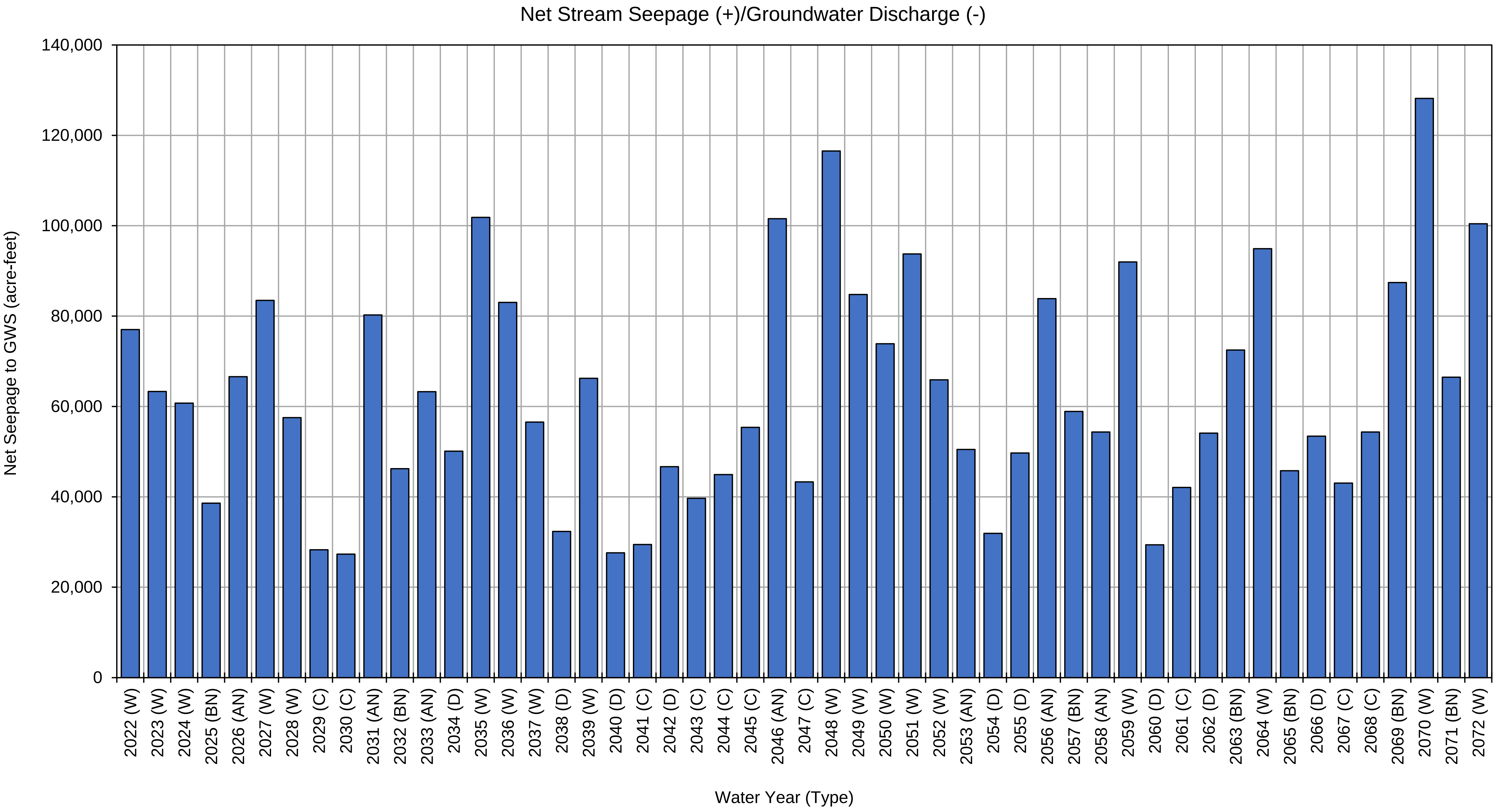
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	77,000	74,000	-18,000	-8,300	-110,000	18,000	18,000
2023 (W)	63,000	65,000	-19,000	-12,000	-100,000	-1,100	16,000
2024 (W)	61,000	66,000	-18,000	-13,000	-96,000	-200	16,000
2025 (BN)	39,000	31,000	-23,000	-9,500	-94,000	-56,000	-40,000
2026 (AN)	67,000	66,000	-17,000	-8,900	-87,000	20,000	-20,000
2027 (W)	83,000	77,000	-14,000	-13,000	-89,000	44,000	23,000
2028 (W)	58,000	50,000	-16,000	-14,000	-94,000	-16,000	7,000
2029 (C)	28,000	37,000	-25,000	-10,000	-89,000	-58,000	-51,000
2030 (C)	27,000	22,000	-29,000	-4,100	-84,000	-68,000	-120,000
2031 (AN)	80,000	66,000	-20,000	-4,100	-81,000	42,000	-77,000
2032 (BN)	46,000	30,000	-22,000	-4,200	-80,000	-30,000	-110,000
2033 (AN)	63,000	51,000	-18,000	-4,000	-80,000	12,000	-95,000
2034 (D)	50,000	46,000	-24,000	-4,400	-81,000	-14,000	-110,000
2035 (W)	100,000	73,000	-16,000	-6,500	-87,000	65,000	-44,000
2036 (W)	83,000	97,000	-11,000	-12,000	-90,000	67,000	23,000
2037 (W)	57,000	67,000	-17,000	-15,000	-97,000	-5,200	18,000
2038 (D)	32,000	48,000	-20,000	-12,000	-95,000	-47,000	-29,000
2039 (W)	66,000	64,000	-18,000	-11,000	-92,000	9,300	-20,000
2040 (D)	28,000	37,000	-20,000	-8,600	-86,000	-50,000	-70,000
2041 (C)	29,000	28,000	-25,000	-4,400	-83,000	-55,000	-120,000
2042 (D)	47,000	29,000	-22,000	-2,400	-86,000	-34,000	-160,000
2043 (C)	40,000	33,000	-26,000	-1,600	-81,000	-35,000	-190,000
2044 (C)	45,000	32,000	-25,000	-920	-78,000	-27,000	-220,000
2045 (C)	55,000	35,000	-25,000	-670	-79,000	-14,000	-240,000
2046 (AN)	100,000	63,000	-20,000	-1,300	-80,000	63,000	-170,000
2047 (C)	43,000	33,000	-25,000	-1,400	-81,000	-32,000	-200,000
2048 (W)	120,000	81,000	-18,000	-2,500	-85,000	92,000	-110,000
2049 (W)	85,000	62,000	-21,000	-4,600	-94,000	27,000	-85,000
2050 (W)	74,000	53,000	-19,000	-6,000	-99,000	3,100	-82,000
2051 (W)	94,000	96,000	-11,000	-9,200	-95,000	75,000	-7,000
2052 (W)	66,000	51,000	-17,000	-12,000	-100,000	-13,000	-20,000
2053 (AN)	50,000	53,000	-15,000	-10,000	-97,000	-19,000	-39,000
2054 (D)	32,000	38,000	-21,000	-7,200	-88,000	-47,000	-86,000
2055 (D)	50,000	45,000	-24,000	-4,900	-86,000	-21,000	-110,000
2056 (AN)	84,000	63,000	-17,000	-5,300	-89,000	36,000	-71,000
2057 (BN)	59,000	59,000	-20,000	-7,000	-94,000	-2,700	-73,000
2058 (AN)	54,000	61,000	-14,000	-6,900	-82,000	13,000	-61,000
2059 (W)	92,000	76,000	-15,000	-11,000	-90,000	52,000	-9,100
2060 (D)	29,000	32,000	-20,000	-8,500	-95,000	-63,000	-72,000
2061 (C)	42,000	37,000	-28,000	-4,500	-88,000	-42,000	-110,000
2062 (D)	54,000	32,000	-23,000	-2,800	-87,000	-26,000	-140,000
2063 (BN)	72,000	57,000	-18,000	-3,000	-83,000	25,000	-110,000
2064 (W)	95,000	61,000	-15,000	-4,800	-88,000	48,000	-67,000
2065 (BN)	46,000	31,000	-22,000	-4,800	-92,000	-41,000	-110,000

Los Molinos Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		53,000	39,000	-29,000	-3,000	-91,000	-31,000	-140,000
2067 (C)		43,000	23,000	-31,000	-1,200	-91,000	-57,000	-200,000
2068 (C)		54,000	37,000	-39,000	-620	-86,000	-35,000	-230,000
2069 (BN)		87,000	45,000	-26,000	-570	-86,000	20,000	-210,000
2070 (W)		130,000	74,000	-21,000	-2,000	-93,000	87,000	-130,000
2071 (BN)		66,000	28,000	-25,000	-1,700	-100,000	-32,000	-160,000
2072 (W)		100,000	71,000	-19,000	-2,600	-93,000	57,000	-100,000
Average (2022-2072)		63,000	51,000	-21,000	-6,100	-89,000	-2,000	
2022-2072	W	83,000	70,000	-17,000	-8,800	-94,000		
	AN	71,000	60,000	-17,000	-5,800	-85,000		
	BN	59,000	40,000	-22,000	-4,400	-90,000		
	D	42,000	38,000	-23,000	-6,000	-88,000		
	C	41,000	32,000	-28,000	-2,900	-84,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	77,000
2023 (W)	63,000
2024 (W)	61,000
2025 (BN)	39,000
2026 (AN)	67,000
2027 (W)	83,000
2028 (W)	58,000
2029 (C)	28,000
2030 (C)	27,000
2031 (AN)	80,000
2032 (BN)	46,000
2033 (AN)	63,000
2034 (D)	50,000
2035 (W)	100,000
2036 (W)	83,000
2037 (W)	57,000
2038 (D)	32,000
2039 (W)	66,000
2040 (D)	28,000
2041 (C)	29,000
2042 (D)	47,000
2043 (C)	40,000
2044 (C)	45,000
2045 (C)	55,000
2046 (AN)	100,000
2047 (C)	43,000
2048 (W)	120,000
2049 (W)	85,000
2050 (W)	74,000
2051 (W)	94,000
2052 (W)	66,000
2053 (AN)	50,000
2054 (D)	32,000
2055 (D)	50,000
2056 (AN)	84,000
2057 (BN)	59,000
2058 (AN)	54,000
2059 (W)	92,000
2060 (D)	29,000
2061 (C)	42,000
2062 (D)	54,000
2063 (BN)	72,000

Los Molinos Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		95,000
2065 (BN)		46,000
2066 (D)		53,000
2067 (C)		43,000
2068 (C)		54,000
2069 (BN)		87,000
2070 (W)		130,000
2071 (BN)		66,000
2072 (W)		100,000
Average (2022-2072)		63,000
2022-2072	W	83,000
	AN	71,000
	BN	59,000
	D	42,000
	C	41,000

Sacramento Valley Water Year Index and is classified into five types:

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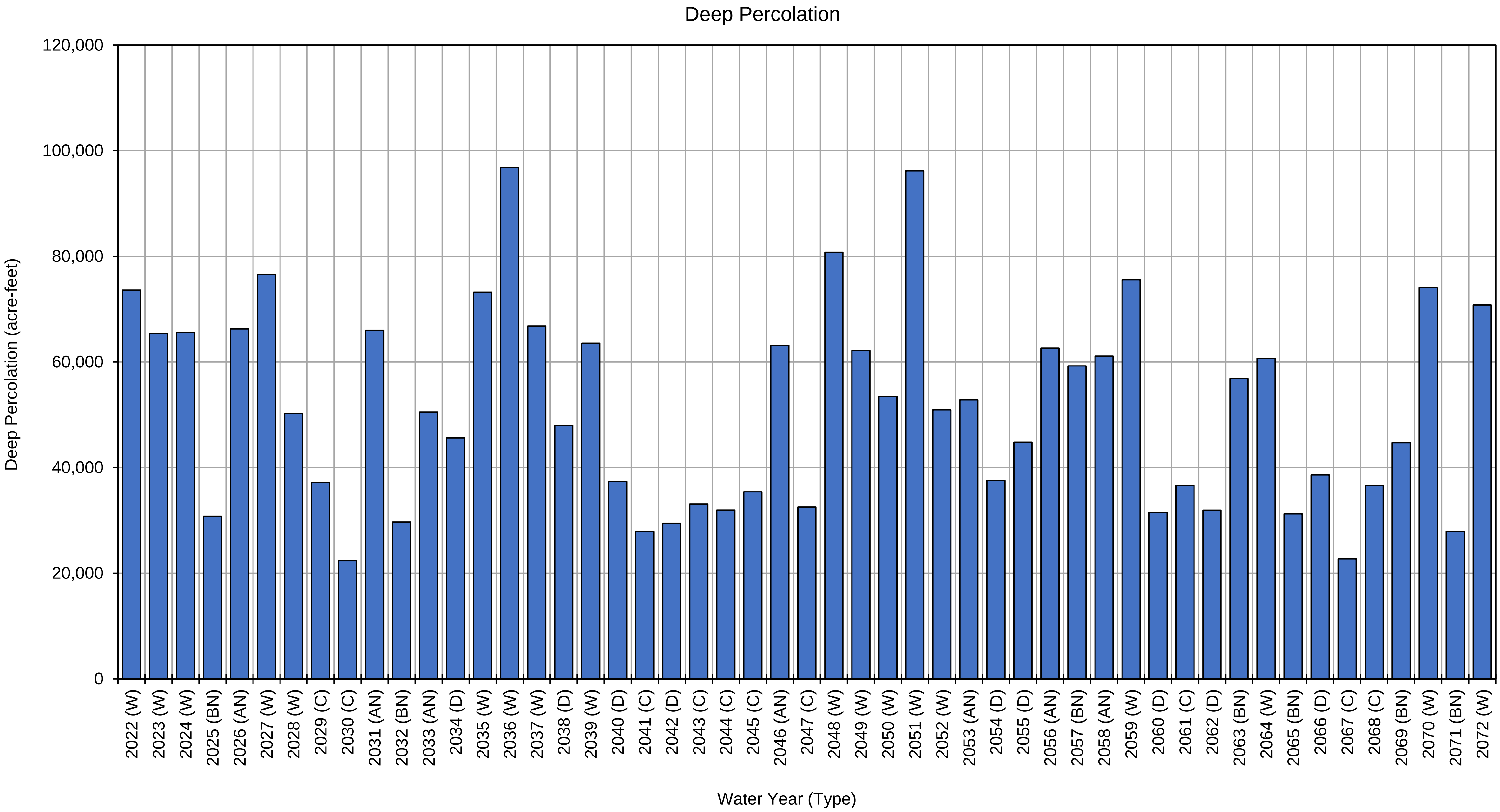
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

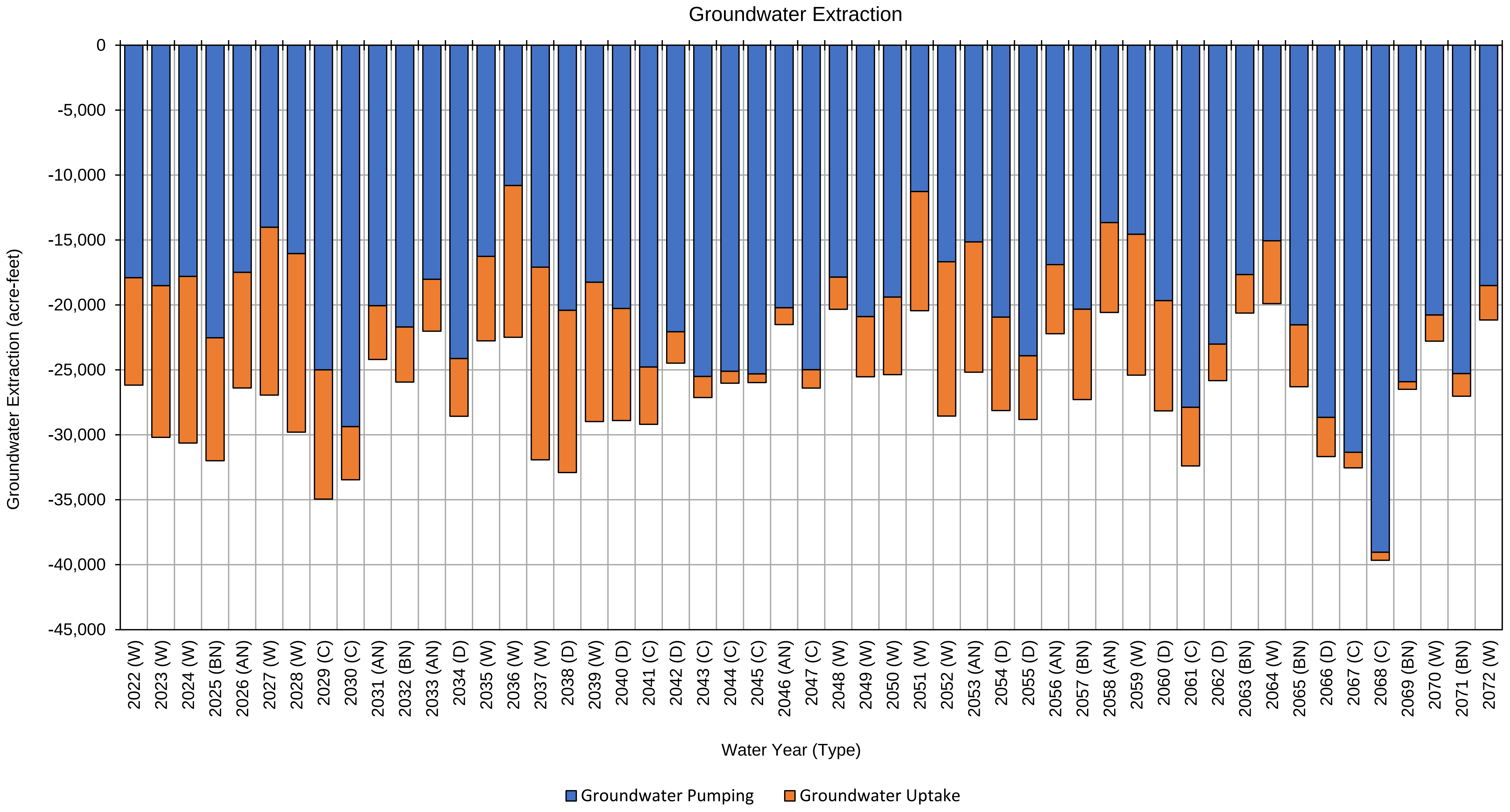
WY (Type)	Deep Percolation from the SWS
2022 (W)	74,000
2023 (W)	65,000
2024 (W)	66,000
2025 (BN)	31,000
2026 (AN)	66,000
2027 (W)	77,000
2028 (W)	50,000
2029 (C)	37,000
2030 (C)	22,000
2031 (AN)	66,000
2032 (BN)	30,000
2033 (AN)	51,000
2034 (D)	46,000
2035 (W)	73,000
2036 (W)	97,000
2037 (W)	67,000
2038 (D)	48,000
2039 (W)	64,000
2040 (D)	37,000
2041 (C)	28,000
2042 (D)	29,000
2043 (C)	33,000
2044 (C)	32,000
2045 (C)	35,000
2046 (AN)	63,000
2047 (C)	33,000
2048 (W)	81,000
2049 (W)	62,000
2050 (W)	53,000
2051 (W)	96,000
2052 (W)	51,000
2053 (AN)	53,000
2054 (D)	38,000
2055 (D)	45,000
2056 (AN)	63,000
2057 (BN)	59,000
2058 (AN)	61,000
2059 (W)	76,000
2060 (D)	32,000
2061 (C)	37,000
2062 (D)	32,000
2063 (BN)	57,000

Los Molinos Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		61,000
2065 (BN)		31,000
2066 (D)		39,000
2067 (C)		23,000
2068 (C)		37,000
2069 (BN)		45,000
2070 (W)		74,000
2071 (BN)		28,000
2072 (W)		71,000
Average (2022-2072)		51,000
2022-2072	W	70,000
	AN	60,000
	BN	40,000
	D	38,000
	C	32,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

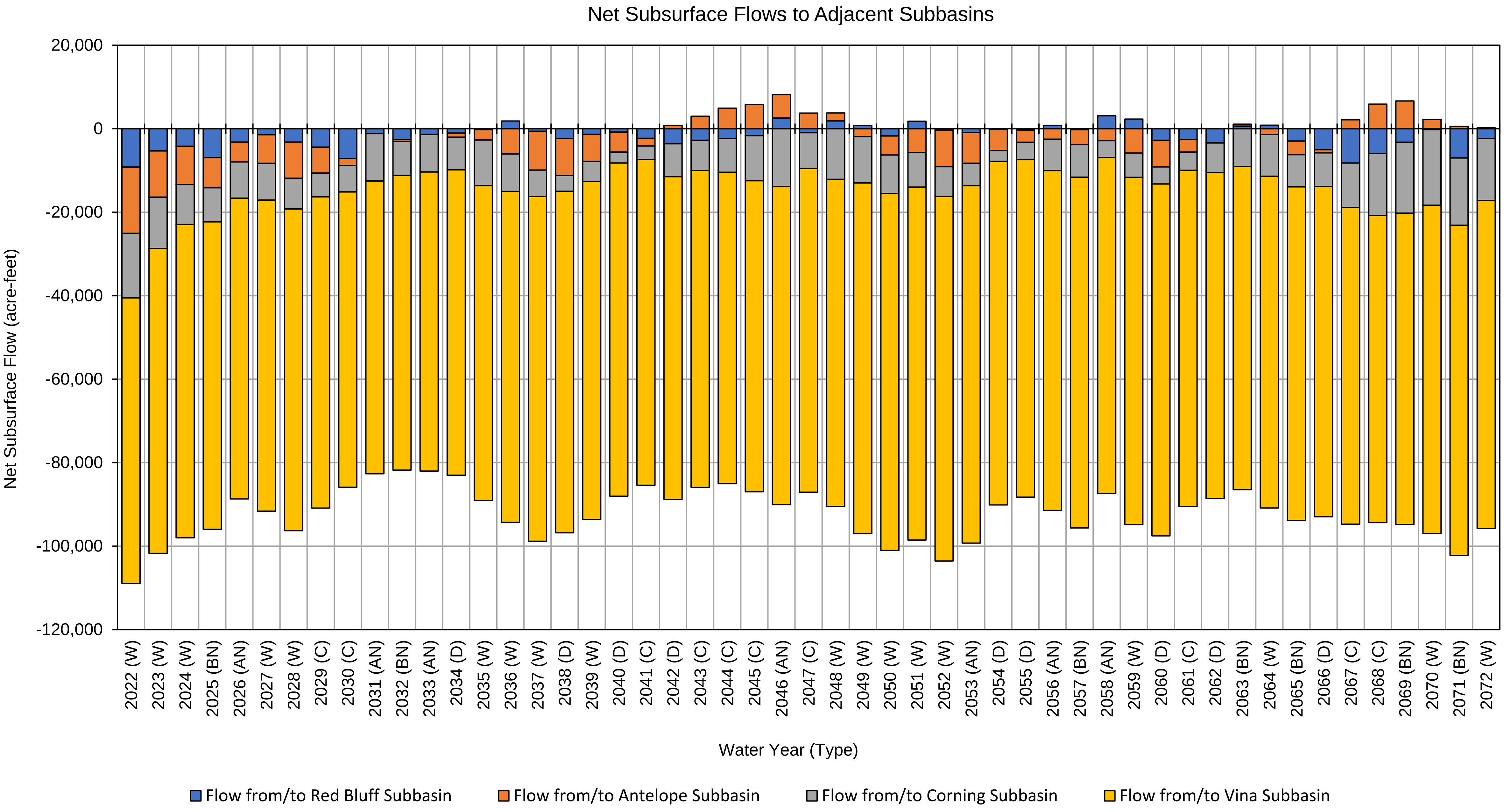
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-18,000	-8,300	-26,000
2023 (W)	-19,000	-12,000	-30,000
2024 (W)	-18,000	-13,000	-31,000
2025 (BN)	-23,000	-9,500	-32,000
2026 (AN)	-17,000	-8,900	-26,000
2027 (W)	-14,000	-13,000	-27,000
2028 (W)	-16,000	-14,000	-30,000
2029 (C)	-25,000	-10,000	-35,000
2030 (C)	-29,000	-4,100	-33,000
2031 (AN)	-20,000	-4,100	-24,000
2032 (BN)	-22,000	-4,200	-26,000
2033 (AN)	-18,000	-4,000	-22,000
2034 (D)	-24,000	-4,400	-29,000
2035 (W)	-16,000	-6,500	-23,000
2036 (W)	-11,000	-12,000	-22,000
2037 (W)	-17,000	-15,000	-32,000
2038 (D)	-20,000	-12,000	-33,000
2039 (W)	-18,000	-11,000	-29,000
2040 (D)	-20,000	-8,600	-29,000
2041 (C)	-25,000	-4,400	-29,000
2042 (D)	-22,000	-2,400	-24,000
2043 (C)	-26,000	-1,600	-27,000
2044 (C)	-25,000	-920	-26,000
2045 (C)	-25,000	-670	-26,000
2046 (AN)	-20,000	-1,300	-22,000
2047 (C)	-25,000	-1,400	-26,000
2048 (W)	-18,000	-2,500	-20,000
2049 (W)	-21,000	-4,600	-26,000
2050 (W)	-19,000	-6,000	-25,000
2051 (W)	-11,000	-9,200	-20,000
2052 (W)	-17,000	-12,000	-29,000
2053 (AN)	-15,000	-10,000	-25,000
2054 (D)	-21,000	-7,200	-28,000
2055 (D)	-24,000	-4,900	-29,000
2056 (AN)	-17,000	-5,300	-22,000
2057 (BN)	-20,000	-7,000	-27,000
2058 (AN)	-14,000	-6,900	-21,000
2059 (W)	-15,000	-11,000	-25,000
2060 (D)	-20,000	-8,500	-28,000
2061 (C)	-28,000	-4,500	-32,000
2062 (D)	-23,000	-2,800	-26,000
2063 (BN)	-18,000	-3,000	-21,000

Los Molinos Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-15,000	-4,800	-20,000
2065 (BN)		-22,000	-4,800	-26,000
2066 (D)		-29,000	-3,000	-32,000
2067 (C)		-31,000	-1,200	-33,000
2068 (C)		-39,000	-620	-40,000
2069 (BN)		-26,000	-570	-26,000
2070 (W)		-21,000	-2,000	-23,000
2071 (BN)		-25,000	-1,700	-27,000
2072 (W)		-19,000	-2,600	-21,000
Average (2022-2072)		-21,000	-6,100	-27,000
2022-2072	W	-17,000	-8,800	-26,000
	AN	-17,000	-5,800	-23,000
	BN	-22,000	-4,400	-27,000
	D	-23,000	-6,000	-29,000
	C	-28,000	-2,900	-31,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

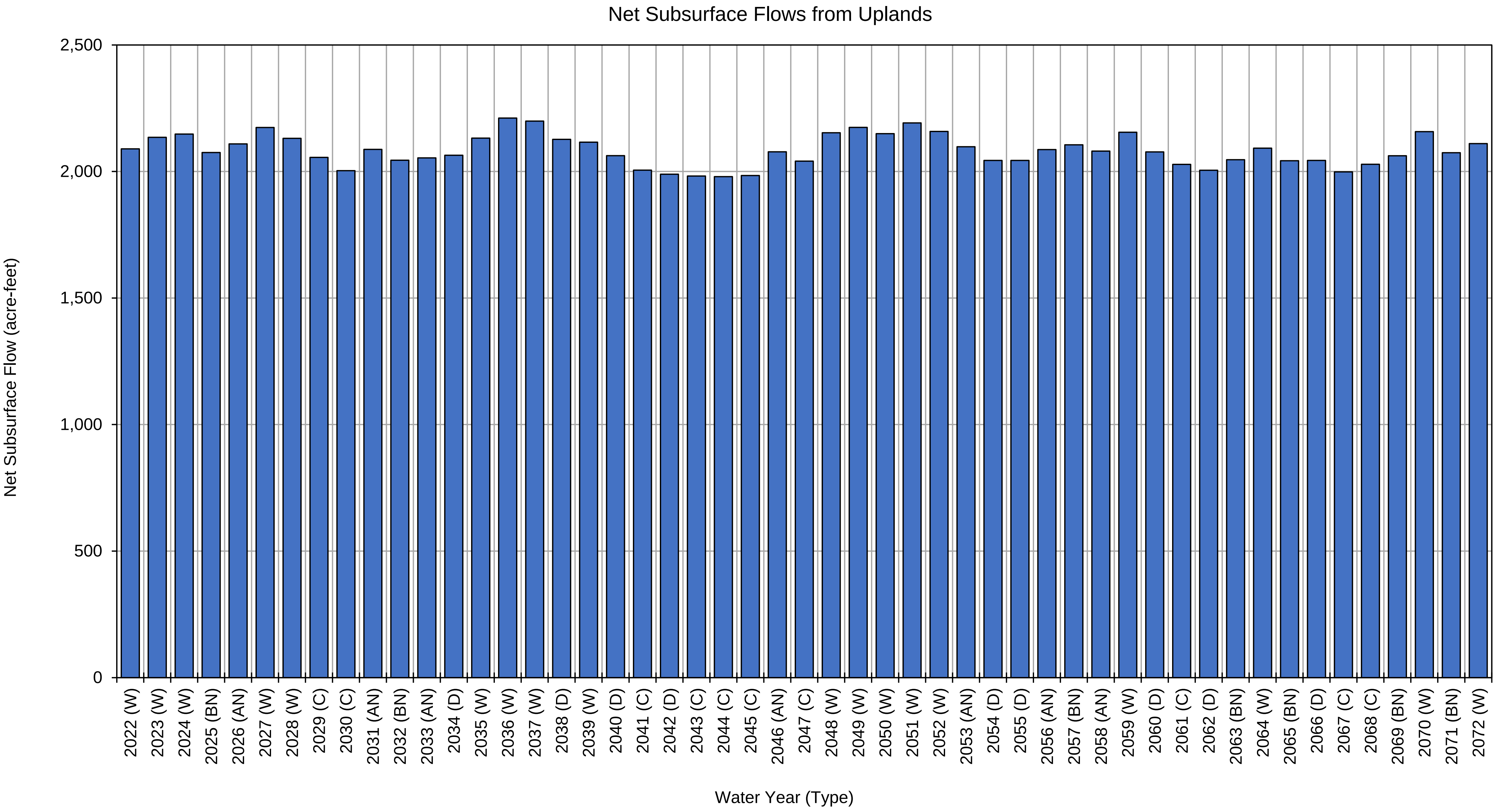
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-9,200	-16,000	-15,000	-68,000	-110,000
2023 (W)	-5,300	-11,000	-12,000	-73,000	-100,000
2024 (W)	-4,200	-9,200	-9,600	-75,000	-98,000
2025 (BN)	-6,900	-7,200	-8,200	-74,000	-96,000
2026 (AN)	-3,200	-4,800	-8,700	-72,000	-89,000
2027 (W)	-1,500	-6,800	-8,800	-74,000	-92,000
2028 (W)	-3,200	-8,700	-7,300	-77,000	-96,000
2029 (C)	-4,400	-6,200	-5,700	-75,000	-91,000
2030 (C)	-7,200	-1,600	-6,300	-71,000	-86,000
2031 (AN)	-1,200	53	-11,000	-70,000	-83,000
2032 (BN)	-2,600	-520	-8,100	-71,000	-82,000
2033 (AN)	-1,400	65	-9,000	-72,000	-82,000
2034 (D)	-1,100	-970	-7,800	-73,000	-83,000
2035 (W)	-240	-2,500	-11,000	-75,000	-89,000
2036 (W)	1,800	-6,100	-9,000	-79,000	-92,000
2037 (W)	-630	-9,300	-6,300	-83,000	-99,000
2038 (D)	-2,400	-8,800	-3,800	-82,000	-97,000
2039 (W)	-1,300	-6,500	-4,800	-81,000	-94,000
2040 (D)	-830	-4,800	-2,600	-80,000	-88,000
2041 (C)	-2,300	-1,800	-3,300	-78,000	-85,000
2042 (D)	-3,600	820	-7,900	-77,000	-88,000
2043 (C)	-2,800	3,000	-7,200	-76,000	-83,000
2044 (C)	-2,400	4,900	-8,100	-75,000	-80,000
2045 (C)	-1,700	5,800	-11,000	-75,000	-81,000
2046 (AN)	2,600	5,600	-14,000	-76,000	-82,000
2047 (C)	-970	3,700	-8,600	-78,000	-83,000
2048 (W)	1,900	1,900	-12,000	-78,000	-87,000
2049 (W)	770	-1,900	-11,000	-84,000	-96,000
2050 (W)	-1,700	-4,600	-9,200	-86,000	-100,000
2051 (W)	1,800	-5,700	-8,300	-85,000	-97,000
2052 (W)	-350	-8,800	-7,100	-87,000	-100,000
2053 (AN)	-940	-7,400	-5,400	-86,000	-99,000
2054 (D)	-180	-5,100	-2,600	-82,000	-90,000
2055 (D)	-330	-2,900	-4,200	-81,000	-88,000
2056 (AN)	800	-2,500	-7,500	-81,000	-91,000
2057 (BN)	-270	-3,600	-7,800	-84,000	-96,000
2058 (AN)	3,100	-2,900	-4,000	-81,000	-84,000
2059 (W)	2,300	-5,800	-5,900	-83,000	-93,000
2060 (D)	-2,800	-6,400	-4,100	-84,000	-98,000
2061 (C)	-2,500	-3,100	-4,400	-81,000	-91,000
2062 (D)	-3,400	-76	-7,100	-78,000	-89,000
2063 (BN)	620	450	-9,000	-77,000	-85,000

Los Molinos Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		840	-1,400	-10,000	-79,000	-90,000
2065 (BN)		-3,000	-3,300	-7,700	-80,000	-94,000
2066 (D)		-5,000	-760	-8,100	-79,000	-93,000
2067 (C)		-8,200	2,100	-11,000	-76,000	-93,000
2068 (C)		-6,000	5,900	-15,000	-74,000	-88,000
2069 (BN)		-3,200	6,600	-17,000	-75,000	-88,000
2070 (W)		-230	2,200	-18,000	-79,000	-95,000
2071 (BN)		-7,000	560	-16,000	-79,000	-100,000
2072 (W)		-2,400	200	-15,000	-79,000	-96,000
Average (2022-2072)		-2,000	-2,600	-8,700	-78,000	-91,000
2022-2072	W	-1,200	-5,500	-10,000	-79,000	-96,000
	AN	-44	-1,700	-8,500	-77,000	-87,000
	BN	-3,200	-990	-11,000	-77,000	-92,000
	D	-2,200	-3,200	-5,300	-80,000	-90,000
	C	-3,900	1,300	-8,000	-76,000	-86,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)	Subsurface Flows from Uplands
2022 (W)	2,100
2023 (W)	2,100
2024 (W)	2,100
2025 (BN)	2,100
2026 (AN)	2,100
2027 (W)	2,200
2028 (W)	2,100
2029 (C)	2,100
2030 (C)	2,000
2031 (AN)	2,100
2032 (BN)	2,000
2033 (AN)	2,100
2034 (D)	2,100
2035 (W)	2,100
2036 (W)	2,200
2037 (W)	2,200
2038 (D)	2,100
2039 (W)	2,100
2040 (D)	2,100
2041 (C)	2,000
2042 (D)	2,000
2043 (C)	2,000
2044 (C)	2,000
2045 (C)	2,000
2046 (AN)	2,100
2047 (C)	2,000
2048 (W)	2,200
2049 (W)	2,200
2050 (W)	2,100
2051 (W)	2,200
2052 (W)	2,200
2053 (AN)	2,100
2054 (D)	2,000
2055 (D)	2,000
2056 (AN)	2,100
2057 (BN)	2,100
2058 (AN)	2,100
2059 (W)	2,200
2060 (D)	2,100
2061 (C)	2,000
2062 (D)	2,000
2063 (BN)	2,000

Los Molinos Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		2,100
2065 (BN)		2,000
2066 (D)		2,000
2067 (C)		2,000
2068 (C)		2,000
2069 (BN)		2,100
2070 (W)		2,200
2071 (BN)		2,100
2072 (W)		2,100
Average (2022-2072)		2,100
2022-2072	W	2,100
	AN	2,100
	BN	2,100
	D	2,100
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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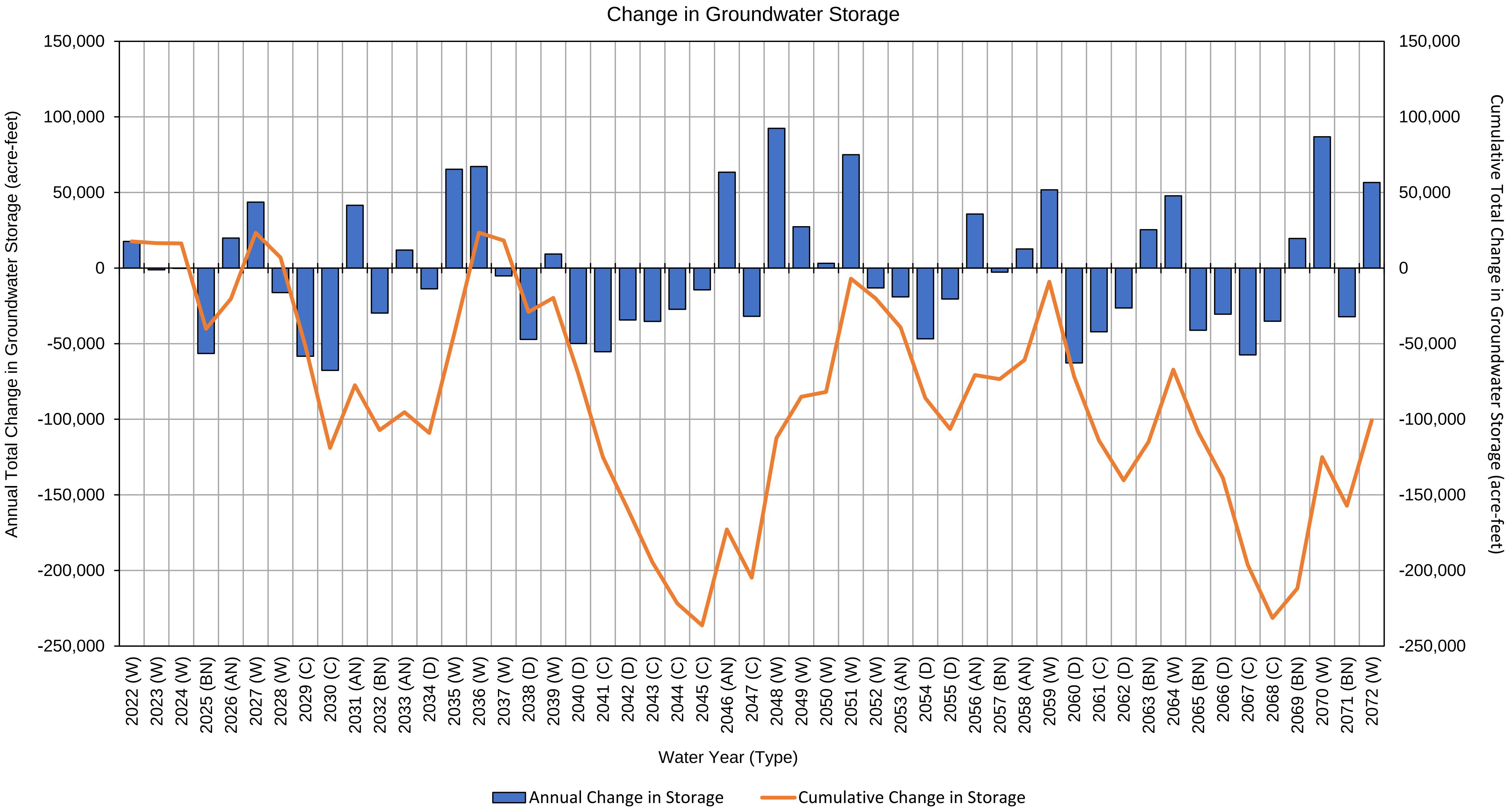
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Los Molinos Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	18,000	18,000
2023 (W)	-1,100	16,000
2024 (W)	-200	16,000
2025 (BN)	-56,000	-40,000
2026 (AN)	20,000	-20,000
2027 (W)	44,000	23,000
2028 (W)	-16,000	7,000
2029 (C)	-58,000	-51,000
2030 (C)	-68,000	-120,000
2031 (AN)	42,000	-77,000
2032 (BN)	-30,000	-110,000
2033 (AN)	12,000	-95,000
2034 (D)	-14,000	-110,000
2035 (W)	65,000	-44,000
2036 (W)	67,000	23,000
2037 (W)	-5,200	18,000
2038 (D)	-47,000	-29,000
2039 (W)	9,300	-20,000
2040 (D)	-50,000	-70,000
2041 (C)	-55,000	-120,000
2042 (D)	-34,000	-160,000
2043 (C)	-35,000	-190,000
2044 (C)	-27,000	-220,000
2045 (C)	-14,000	-240,000
2046 (AN)	63,000	-170,000
2047 (C)	-32,000	-200,000
2048 (W)	92,000	-110,000
2049 (W)	27,000	-85,000
2050 (W)	3,100	-82,000
2051 (W)	75,000	-7,000
2052 (W)	-13,000	-20,000
2053 (AN)	-19,000	-39,000
2054 (D)	-47,000	-86,000
2055 (D)	-21,000	-110,000
2056 (AN)	36,000	-71,000
2057 (BN)	-2,700	-73,000
2058 (AN)	13,000	-61,000
2059 (W)	52,000	-9,100
2060 (D)	-63,000	-72,000
2061 (C)	-42,000	-110,000
2062 (D)	-26,000	-140,000
2063 (BN)	25,000	-110,000

Los Molinos Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		48,000	-67,000
2065 (BN)		-41,000	-110,000
2066 (D)		-31,000	-140,000
2067 (C)		-57,000	-200,000
2068 (C)		-35,000	-230,000
2069 (BN)		20,000	-210,000
2070 (W)		87,000	-130,000
2071 (BN)		-32,000	-160,000
2072 (W)		57,000	-100,000
Average (2022-2072)		-2,000	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

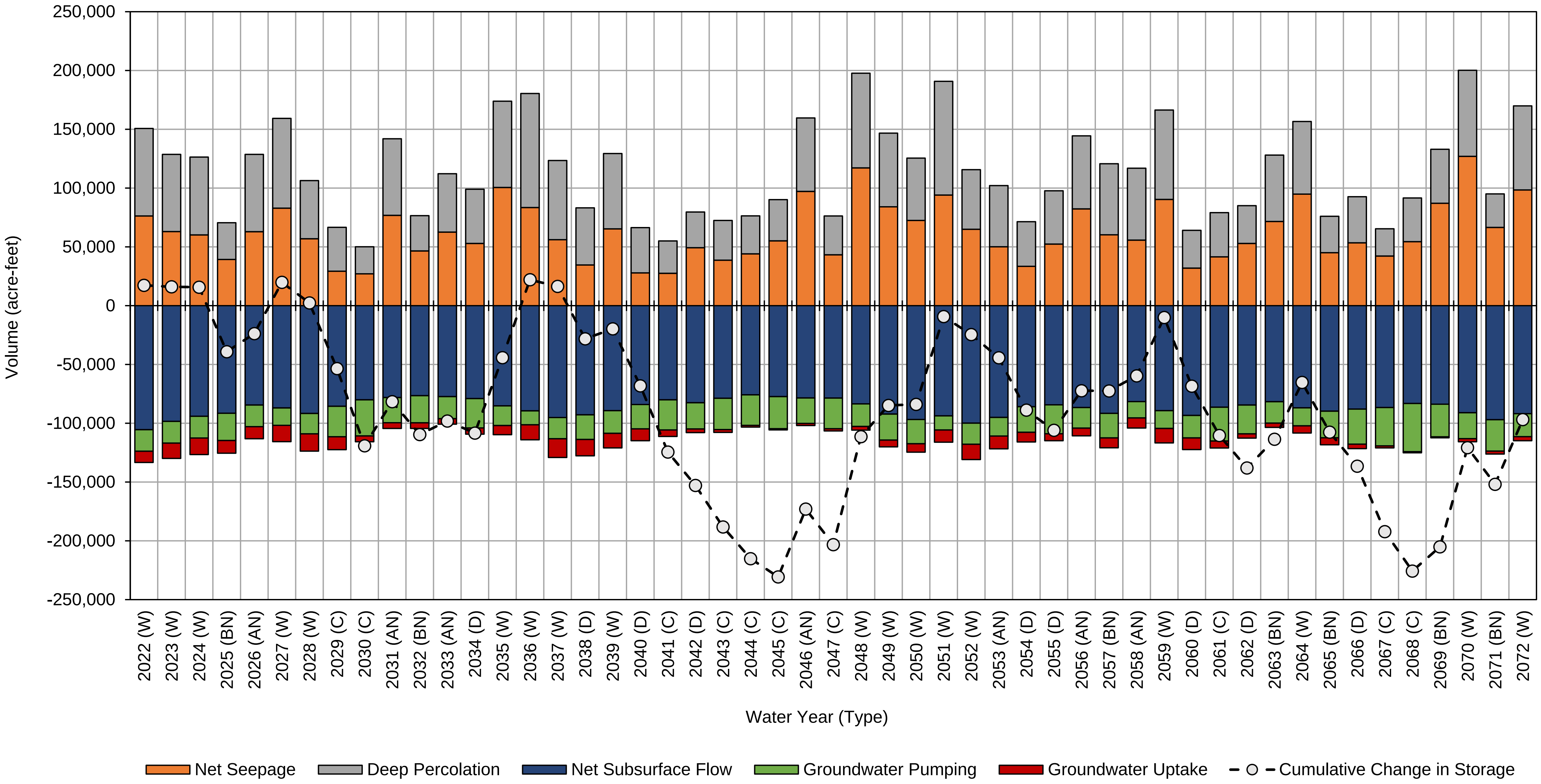
W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-4

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2030) Model Results

Projected (Current Land Use) with Climate Change (2030) Water Budget
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

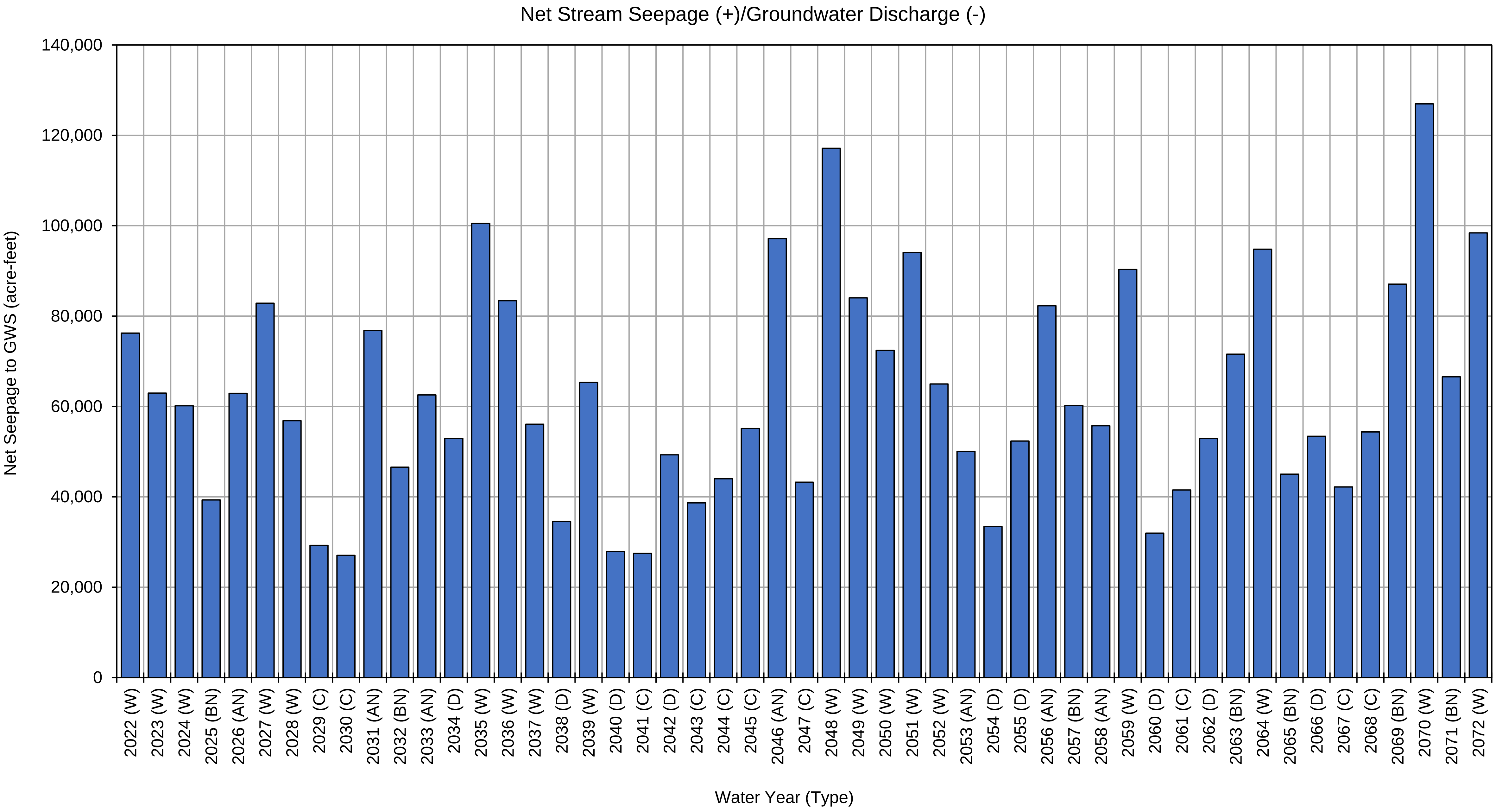
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	76,000	74,000	-18,000	-9,600	-110,000	17,000	17,000
2023 (W)	63,000	66,000	-19,000	-13,000	-98,000	-1,300	16,000
2024 (W)	60,000	66,000	-18,000	-14,000	-94,000	-320	16,000
2025 (BN)	39,000	31,000	-23,000	-11,000	-92,000	-55,000	-39,000
2026 (AN)	63,000	66,000	-18,000	-10,000	-84,000	15,000	-24,000
2027 (W)	83,000	76,000	-15,000	-14,000	-87,000	44,000	20,000
2028 (W)	57,000	49,000	-17,000	-15,000	-92,000	-17,000	2,400
2029 (C)	29,000	37,000	-26,000	-11,000	-86,000	-56,000	-54,000
2030 (C)	27,000	23,000	-31,000	-4,900	-80,000	-66,000	-120,000
2031 (AN)	77,000	65,000	-21,000	-4,900	-78,000	38,000	-82,000
2032 (BN)	47,000	30,000	-23,000	-4,800	-77,000	-28,000	-110,000
2033 (AN)	63,000	50,000	-19,000	-4,600	-77,000	11,000	-98,000
2034 (D)	53,000	46,000	-25,000	-5,300	-79,000	-10,000	-110,000
2035 (W)	100,000	73,000	-17,000	-7,800	-85,000	64,000	-44,000
2036 (W)	83,000	97,000	-12,000	-13,000	-89,000	66,000	22,000
2037 (W)	56,000	67,000	-18,000	-16,000	-95,000	-5,700	16,000
2038 (D)	35,000	49,000	-21,000	-14,000	-93,000	-45,000	-28,000
2039 (W)	65,000	64,000	-19,000	-12,000	-89,000	8,500	-20,000
2040 (D)	28,000	38,000	-21,000	-10,000	-84,000	-48,000	-68,000
2041 (C)	27,000	28,000	-26,000	-5,500	-80,000	-56,000	-120,000
2042 (D)	49,000	30,000	-22,000	-3,100	-83,000	-28,000	-150,000
2043 (C)	39,000	34,000	-27,000	-2,300	-79,000	-35,000	-190,000
2044 (C)	44,000	32,000	-26,000	-1,400	-76,000	-27,000	-220,000
2045 (C)	55,000	35,000	-27,000	-960	-77,000	-15,000	-230,000
2046 (AN)	97,000	62,000	-22,000	-1,700	-79,000	58,000	-170,000
2047 (C)	43,000	33,000	-26,000	-1,900	-79,000	-30,000	-200,000
2048 (W)	120,000	81,000	-19,000	-3,100	-84,000	92,000	-110,000
2049 (W)	84,000	63,000	-22,000	-5,700	-92,000	27,000	-85,000
2050 (W)	72,000	53,000	-21,000	-7,200	-97,000	860	-84,000
2051 (W)	94,000	97,000	-12,000	-10,000	-94,000	75,000	-9,300
2052 (W)	65,000	51,000	-18,000	-13,000	-100,000	-15,000	-25,000
2053 (AN)	50,000	52,000	-16,000	-11,000	-95,000	-20,000	-44,000
2054 (D)	33,000	38,000	-22,000	-8,200	-86,000	-45,000	-89,000
2055 (D)	52,000	45,000	-25,000	-5,900	-84,000	-17,000	-110,000
2056 (AN)	82,000	62,000	-18,000	-6,500	-87,000	34,000	-72,000
2057 (BN)	60,000	60,000	-21,000	-8,400	-92,000	-210	-73,000
2058 (AN)	56,000	61,000	-14,000	-8,600	-82,000	13,000	-60,000
2059 (W)	90,000	76,000	-15,000	-12,000	-89,000	50,000	-10,000
2060 (D)	32,000	32,000	-19,000	-9,900	-93,000	-58,000	-68,000
2061 (C)	42,000	38,000	-29,000	-5,900	-86,000	-42,000	-110,000
2062 (D)	53,000	32,000	-25,000	-3,600	-85,000	-28,000	-140,000
2063 (BN)	72,000	56,000	-18,000	-3,700	-82,000	24,000	-110,000
2064 (W)	95,000	62,000	-15,000	-6,100	-87,000	48,000	-65,000
2065 (BN)	45,000	31,000	-23,000	-5,900	-90,000	-42,000	-110,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		53,000	39,000	-30,000	-3,800	-88,000	-29,000	-140,000
2067 (C)		42,000	23,000	-33,000	-1,700	-87,000	-56,000	-190,000
2068 (C)		54,000	37,000	-41,000	-900	-83,000	-34,000	-230,000
2069 (BN)		87,000	46,000	-28,000	-840	-84,000	21,000	-210,000
2070 (W)		130,000	73,000	-22,000	-2,700	-91,000	84,000	-120,000
2071 (BN)		67,000	28,000	-27,000	-2,400	-97,000	-31,000	-150,000
2072 (W)		98,000	71,000	-20,000	-3,400	-92,000	55,000	-97,000
Average (2022-2072)		62,000	52,000	-22,000	-7,100	-87,000	-1,900	
2022-2072	W	83,000	70,000	-18,000	-9,900	-92,000		
	AN	70,000	60,000	-18,000	-6,800	-83,000		
	BN	59,000	40,000	-23,000	-5,300	-87,000		
	D	43,000	39,000	-23,000	-7,100	-86,000		
	C	40,000	32,000	-29,000	-3,600	-81,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	76,000
2023 (W)	63,000
2024 (W)	60,000
2025 (BN)	39,000
2026 (AN)	63,000
2027 (W)	83,000
2028 (W)	57,000
2029 (C)	29,000
2030 (C)	27,000
2031 (AN)	77,000
2032 (BN)	47,000
2033 (AN)	63,000
2034 (D)	53,000
2035 (W)	100,000
2036 (W)	83,000
2037 (W)	56,000
2038 (D)	35,000
2039 (W)	65,000
2040 (D)	28,000
2041 (C)	27,000
2042 (D)	49,000
2043 (C)	39,000
2044 (C)	44,000
2045 (C)	55,000
2046 (AN)	97,000
2047 (C)	43,000
2048 (W)	120,000
2049 (W)	84,000
2050 (W)	72,000
2051 (W)	94,000
2052 (W)	65,000
2053 (AN)	50,000
2054 (D)	33,000
2055 (D)	52,000
2056 (AN)	82,000
2057 (BN)	60,000
2058 (AN)	56,000
2059 (W)	90,000
2060 (D)	32,000
2061 (C)	42,000
2062 (D)	53,000
2063 (BN)	72,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		95,000
2065 (BN)		45,000
2066 (D)		53,000
2067 (C)		42,000
2068 (C)		54,000
2069 (BN)		87,000
2070 (W)		130,000
2071 (BN)		67,000
2072 (W)		98,000
Average (2022-2072)		62,000
2022-2072	W	83,000
	AN	70,000
	BN	59,000
	D	43,000
	C	40,000

Sacramento Valley Water Year Index and is classified into five types:

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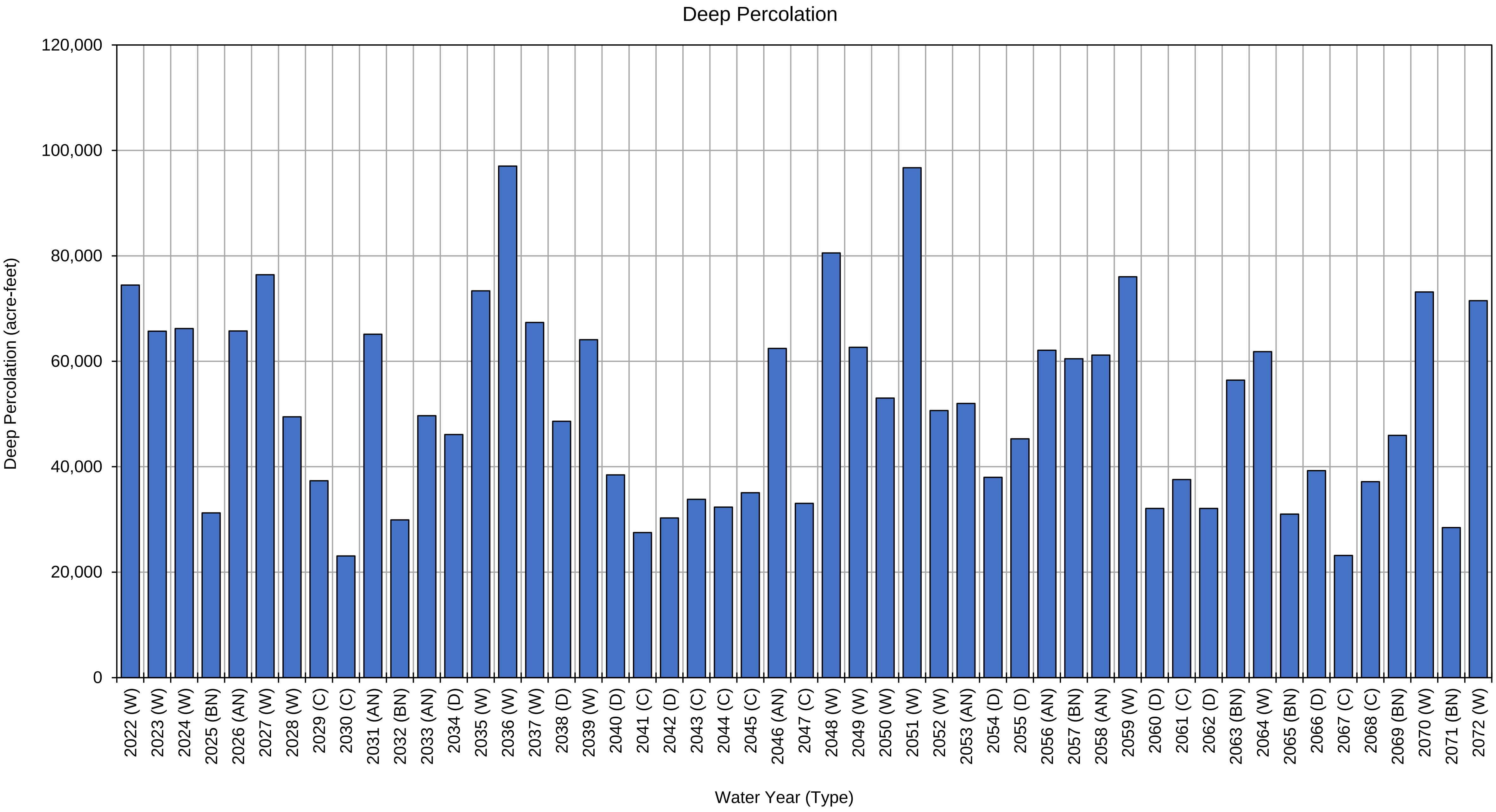
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)	Deep Percolation from the SWS
2022 (W)	74,000
2023 (W)	66,000
2024 (W)	66,000
2025 (BN)	31,000
2026 (AN)	66,000
2027 (W)	76,000
2028 (W)	49,000
2029 (C)	37,000
2030 (C)	23,000
2031 (AN)	65,000
2032 (BN)	30,000
2033 (AN)	50,000
2034 (D)	46,000
2035 (W)	73,000
2036 (W)	97,000
2037 (W)	67,000
2038 (D)	49,000
2039 (W)	64,000
2040 (D)	38,000
2041 (C)	28,000
2042 (D)	30,000
2043 (C)	34,000
2044 (C)	32,000
2045 (C)	35,000
2046 (AN)	62,000
2047 (C)	33,000
2048 (W)	81,000
2049 (W)	63,000
2050 (W)	53,000
2051 (W)	97,000
2052 (W)	51,000
2053 (AN)	52,000
2054 (D)	38,000
2055 (D)	45,000
2056 (AN)	62,000
2057 (BN)	60,000
2058 (AN)	61,000
2059 (W)	76,000
2060 (D)	32,000
2061 (C)	38,000
2062 (D)	32,000
2063 (BN)	56,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		62,000
2065 (BN)		31,000
2066 (D)		39,000
2067 (C)		23,000
2068 (C)		37,000
2069 (BN)		46,000
2070 (W)		73,000
2071 (BN)		28,000
2072 (W)		71,000
Average (2022-2072)		52,000
2022-2072	W	70,000
	AN	60,000
	BN	40,000
	D	39,000
	C	32,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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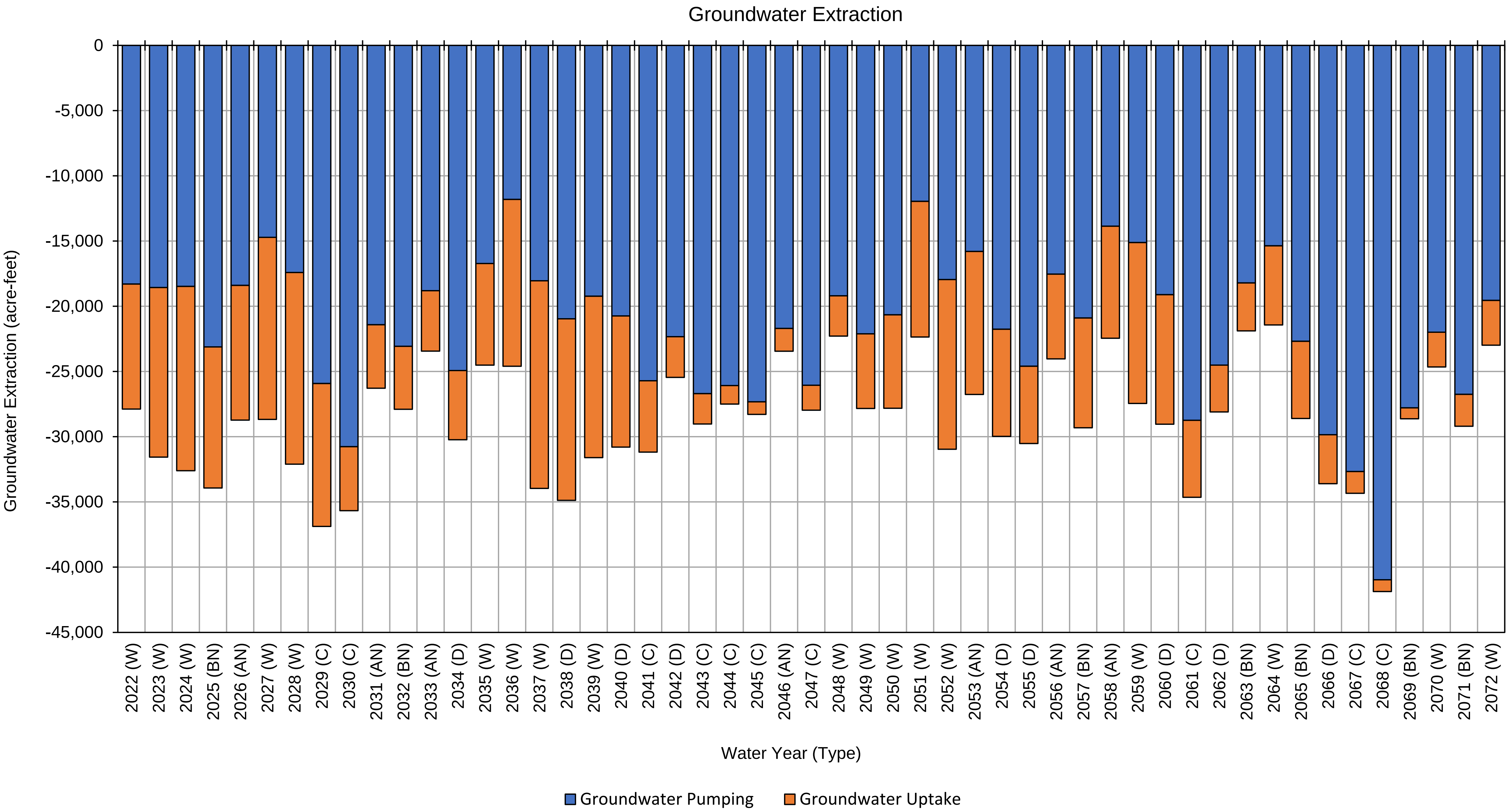
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

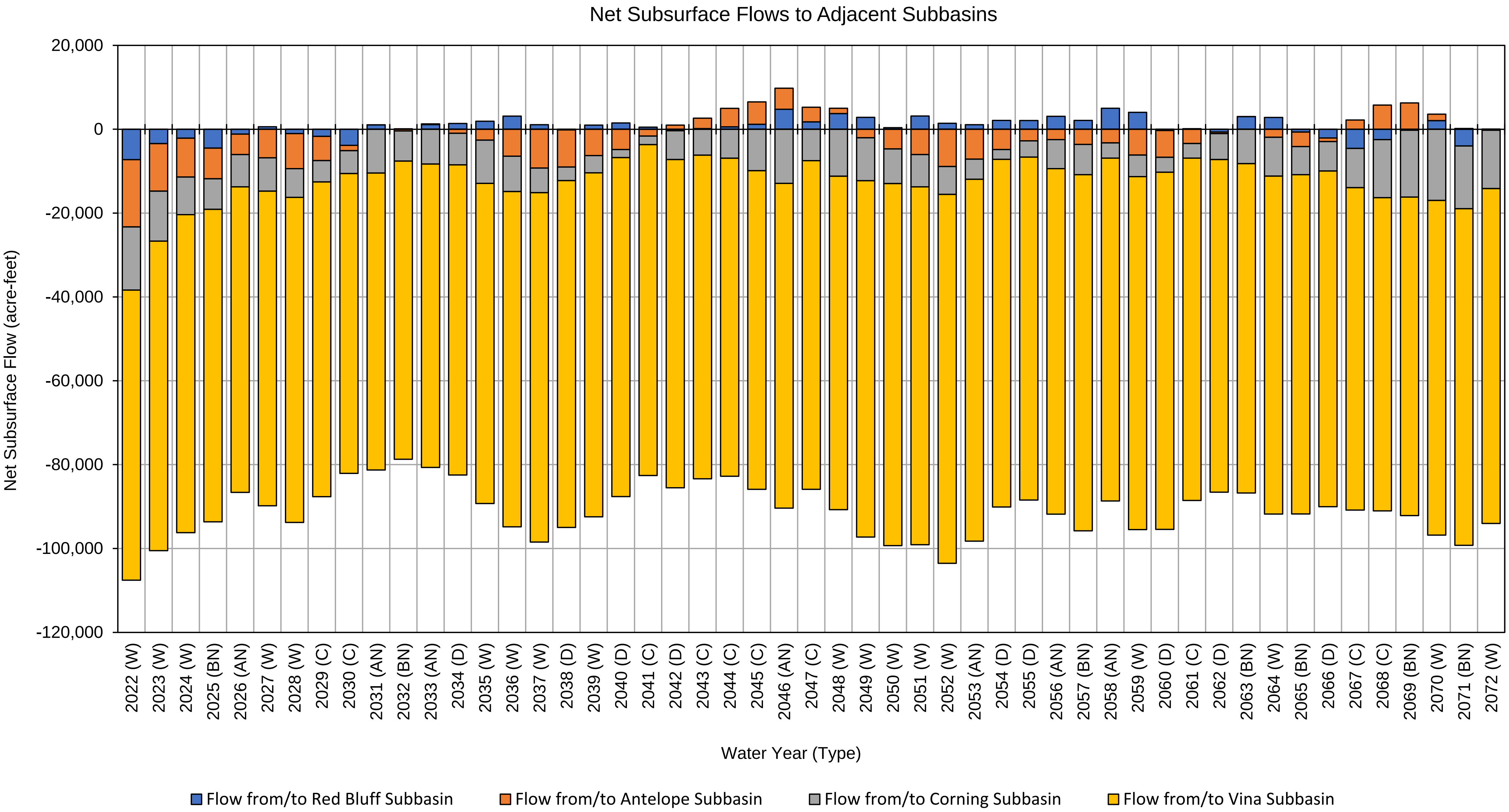
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-18,000	-9,600	-28,000
2023 (W)	-19,000	-13,000	-32,000
2024 (W)	-18,000	-14,000	-33,000
2025 (BN)	-23,000	-11,000	-34,000
2026 (AN)	-18,000	-10,000	-29,000
2027 (W)	-15,000	-14,000	-29,000
2028 (W)	-17,000	-15,000	-32,000
2029 (C)	-26,000	-11,000	-37,000
2030 (C)	-31,000	-4,900	-36,000
2031 (AN)	-21,000	-4,900	-26,000
2032 (BN)	-23,000	-4,800	-28,000
2033 (AN)	-19,000	-4,600	-23,000
2034 (D)	-25,000	-5,300	-30,000
2035 (W)	-17,000	-7,800	-25,000
2036 (W)	-12,000	-13,000	-25,000
2037 (W)	-18,000	-16,000	-34,000
2038 (D)	-21,000	-14,000	-35,000
2039 (W)	-19,000	-12,000	-32,000
2040 (D)	-21,000	-10,000	-31,000
2041 (C)	-26,000	-5,500	-31,000
2042 (D)	-22,000	-3,100	-25,000
2043 (C)	-27,000	-2,300	-29,000
2044 (C)	-26,000	-1,400	-27,000
2045 (C)	-27,000	-960	-28,000
2046 (AN)	-22,000	-1,700	-23,000
2047 (C)	-26,000	-1,900	-28,000
2048 (W)	-19,000	-3,100	-22,000
2049 (W)	-22,000	-5,700	-28,000
2050 (W)	-21,000	-7,200	-28,000
2051 (W)	-12,000	-10,000	-22,000
2052 (W)	-18,000	-13,000	-31,000
2053 (AN)	-16,000	-11,000	-27,000
2054 (D)	-22,000	-8,200	-30,000
2055 (D)	-25,000	-5,900	-31,000
2056 (AN)	-18,000	-6,500	-24,000
2057 (BN)	-21,000	-8,400	-29,000
2058 (AN)	-14,000	-8,600	-22,000
2059 (W)	-15,000	-12,000	-27,000
2060 (D)	-19,000	-9,900	-29,000
2061 (C)	-29,000	-5,900	-35,000
2062 (D)	-25,000	-3,600	-28,000
2063 (BN)	-18,000	-3,700	-22,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-15,000	-6,100	-21,000
2065 (BN)		-23,000	-5,900	-29,000
2066 (D)		-30,000	-3,800	-34,000
2067 (C)		-33,000	-1,700	-34,000
2068 (C)		-41,000	-900	-42,000
2069 (BN)		-28,000	-840	-29,000
2070 (W)		-22,000	-2,700	-25,000
2071 (BN)		-27,000	-2,400	-29,000
2072 (W)		-20,000	-3,400	-23,000
Average (2022-2072)		-22,000	-7,100	-29,000
2022-2072	W	-18,000	-9,900	-28,000
	AN	-18,000	-6,800	-25,000
	BN	-23,000	-5,300	-28,000
	D	-23,000	-7,100	-30,000
	C	-29,000	-3,600	-33,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

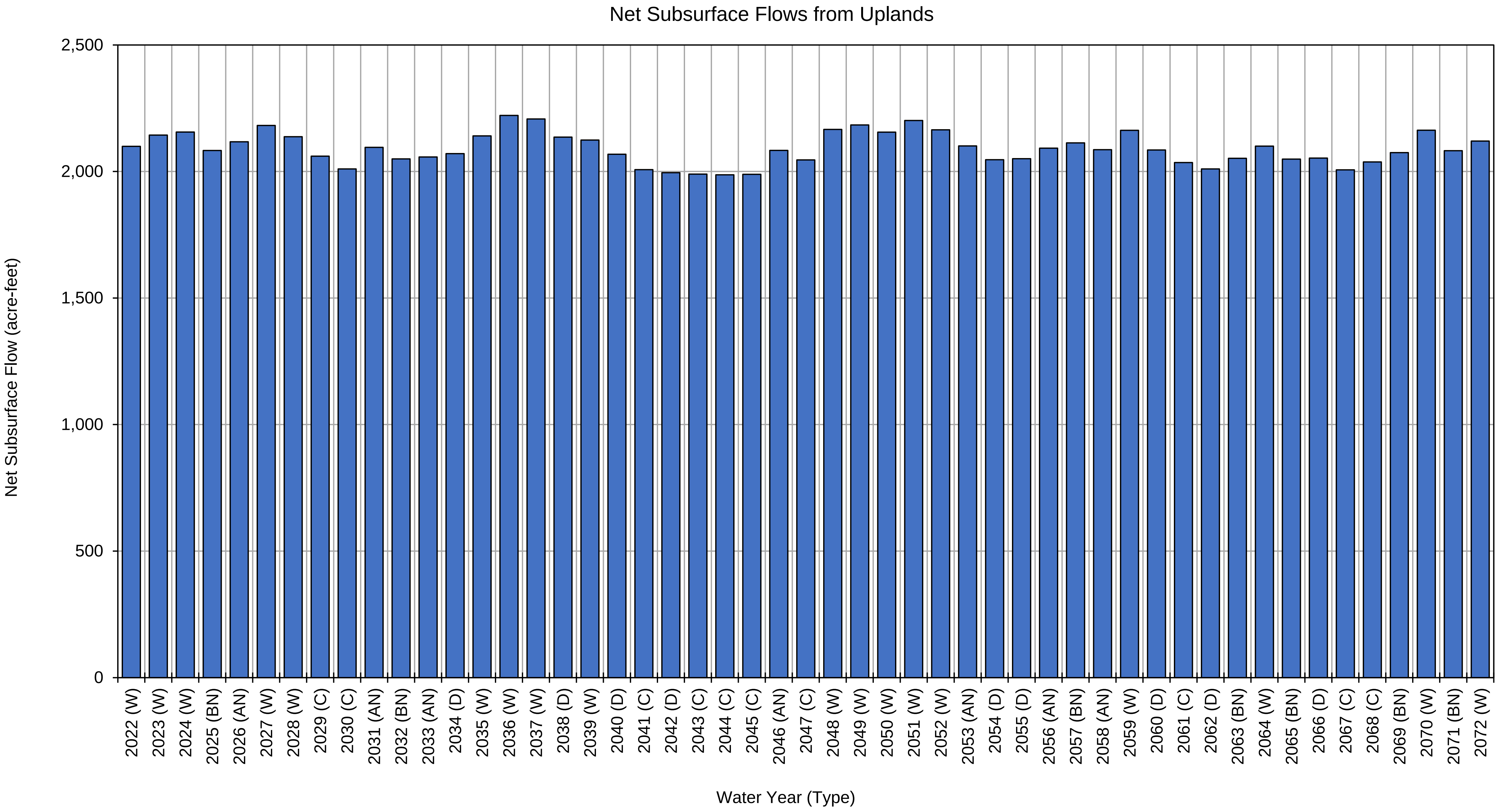
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-7,300	-16,000	-15,000	-69,000	-110,000
2023 (W)	-3,400	-11,000	-12,000	-74,000	-100,000
2024 (W)	-2,200	-9,300	-9,000	-76,000	-96,000
2025 (BN)	-4,500	-7,300	-7,300	-75,000	-94,000
2026 (AN)	-1,200	-4,900	-7,700	-73,000	-87,000
2027 (W)	590	-6,800	-8,000	-75,000	-89,000
2028 (W)	-1,100	-8,400	-6,800	-78,000	-94,000
2029 (C)	-1,700	-5,800	-5,100	-75,000	-88,000
2030 (C)	-3,900	-1,300	-5,500	-72,000	-82,000
2031 (AN)	1,000	8	-10,000	-71,000	-80,000
2032 (BN)	110	-400	-7,200	-71,000	-79,000
2033 (AN)	1,100	190	-8,300	-72,000	-79,000
2034 (D)	1,400	-970	-7,500	-74,000	-81,000
2035 (W)	1,900	-2,600	-10,000	-76,000	-87,000
2036 (W)	3,100	-6,400	-8,400	-80,000	-92,000
2037 (W)	1,100	-9,300	-5,900	-83,000	-97,000
2038 (D)	-170	-8,900	-3,200	-83,000	-95,000
2039 (W)	990	-6,300	-4,100	-82,000	-91,000
2040 (D)	1,500	-4,800	-1,900	-81,000	-86,000
2041 (C)	500	-1,600	-2,000	-79,000	-82,000
2042 (D)	-360	980	-6,900	-78,000	-85,000
2043 (C)	160	2,500	-6,200	-77,000	-81,000
2044 (C)	570	4,400	-6,900	-76,000	-78,000
2045 (C)	1,200	5,300	-9,900	-76,000	-79,000
2046 (AN)	4,700	5,000	-13,000	-77,000	-81,000
2047 (C)	1,800	3,500	-7,500	-78,000	-81,000
2048 (W)	3,700	1,300	-11,000	-80,000	-86,000
2049 (W)	2,800	-2,000	-10,000	-85,000	-94,000
2050 (W)	380	-4,700	-8,300	-86,000	-99,000
2051 (W)	3,100	-6,000	-7,700	-85,000	-96,000
2052 (W)	1,400	-8,900	-6,600	-88,000	-100,000
2053 (AN)	1,100	-7,100	-4,800	-86,000	-97,000
2054 (D)	2,100	-4,900	-2,300	-83,000	-88,000
2055 (D)	2,100	-2,800	-3,900	-82,000	-86,000
2056 (AN)	3,100	-2,500	-6,900	-82,000	-89,000
2057 (BN)	2,100	-3,600	-7,200	-85,000	-94,000
2058 (AN)	5,000	-3,300	-3,600	-82,000	-84,000
2059 (W)	4,000	-6,200	-5,100	-84,000	-91,000
2060 (D)	-300	-6,400	-3,600	-85,000	-95,000
2061 (C)	140	-3,400	-3,500	-82,000	-88,000
2062 (D)	-670	-370	-6,200	-79,000	-87,000
2063 (BN)	3,000	2	-8,200	-79,000	-84,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		2,800	-1,900	-9,300	-81,000	-89,000
2065 (BN)		-680	-3,500	-6,700	-81,000	-92,000
2066 (D)		-2,100	-840	-7,000	-80,000	-90,000
2067 (C)		-4,600	2,200	-9,400	-77,000	-89,000
2068 (C)		-2,500	5,800	-14,000	-75,000	-85,000
2069 (BN)		-240	6,300	-16,000	-76,000	-86,000
2070 (W)		2,000	1,500	-17,000	-80,000	-93,000
2071 (BN)		-4,000	180	-15,000	-80,000	-99,000
2072 (W)		23	-250	-14,000	-80,000	-94,000
Average (2022-2072)		390	-2,800	-7,900	-79,000	-89,000
2022-2072	W	790	-5,800	-9,400	-80,000	-94,000
	AN	2,100	-1,800	-7,800	-78,000	-85,000
	BN	-600	-1,200	-9,600	-78,000	-89,000
	D	380	-3,200	-4,700	-81,000	-88,000
	C	-830	1,200	-7,000	-77,000	-83,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

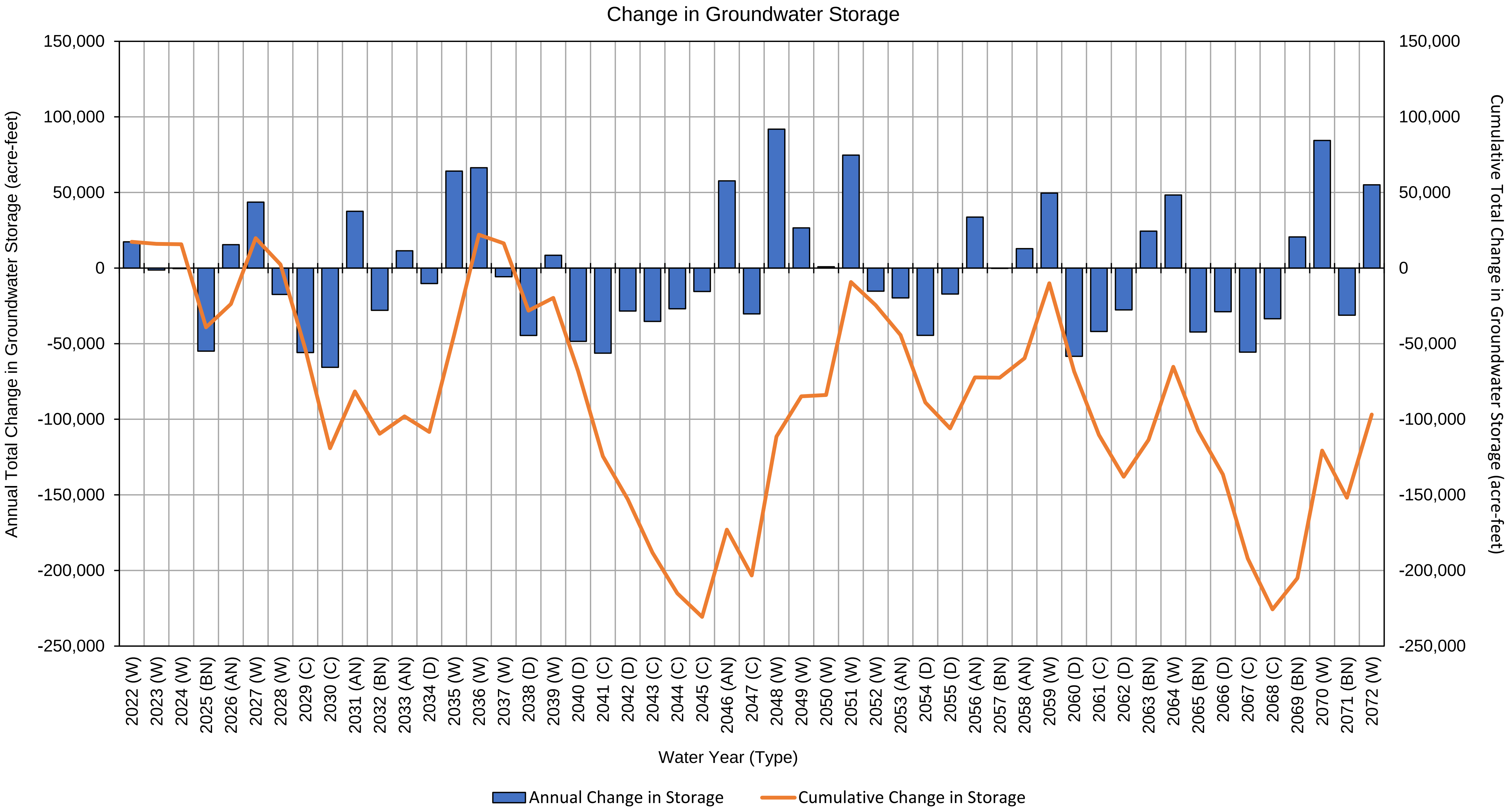
WY (Type)	Subsurface Flows from Uplands
2022 (W)	2,100
2023 (W)	2,100
2024 (W)	2,200
2025 (BN)	2,100
2026 (AN)	2,100
2027 (W)	2,200
2028 (W)	2,100
2029 (C)	2,100
2030 (C)	2,000
2031 (AN)	2,100
2032 (BN)	2,000
2033 (AN)	2,100
2034 (D)	2,100
2035 (W)	2,100
2036 (W)	2,200
2037 (W)	2,200
2038 (D)	2,100
2039 (W)	2,100
2040 (D)	2,100
2041 (C)	2,000
2042 (D)	2,000
2043 (C)	2,000
2044 (C)	2,000
2045 (C)	2,000
2046 (AN)	2,100
2047 (C)	2,000
2048 (W)	2,200
2049 (W)	2,200
2050 (W)	2,200
2051 (W)	2,200
2052 (W)	2,200
2053 (AN)	2,100
2054 (D)	2,000
2055 (D)	2,100
2056 (AN)	2,100
2057 (BN)	2,100
2058 (AN)	2,100
2059 (W)	2,200
2060 (D)	2,100
2061 (C)	2,000
2062 (D)	2,000
2063 (BN)	2,100

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		2,100
2065 (BN)		2,000
2066 (D)		2,100
2067 (C)		2,000
2068 (C)		2,000
2069 (BN)		2,100
2070 (W)		2,200
2071 (BN)		2,100
2072 (W)		2,100
Average (2022-2072)		2,100
2022-2072	W	2,200
	AN	2,100
	BN	2,100
	D	2,100
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	17,000	17,000
2023 (W)	-1,300	16,000
2024 (W)	-320	16,000
2025 (BN)	-55,000	-39,000
2026 (AN)	15,000	-24,000
2027 (W)	44,000	20,000
2028 (W)	-17,000	2,400
2029 (C)	-56,000	-54,000
2030 (C)	-66,000	-120,000
2031 (AN)	38,000	-82,000
2032 (BN)	-28,000	-110,000
2033 (AN)	11,000	-98,000
2034 (D)	-10,000	-110,000
2035 (W)	64,000	-44,000
2036 (W)	66,000	22,000
2037 (W)	-5,700	16,000
2038 (D)	-45,000	-28,000
2039 (W)	8,500	-20,000
2040 (D)	-48,000	-68,000
2041 (C)	-56,000	-120,000
2042 (D)	-28,000	-150,000
2043 (C)	-35,000	-190,000
2044 (C)	-27,000	-220,000
2045 (C)	-15,000	-230,000
2046 (AN)	58,000	-170,000
2047 (C)	-30,000	-200,000
2048 (W)	92,000	-110,000
2049 (W)	27,000	-85,000
2050 (W)	860	-84,000
2051 (W)	75,000	-9,300
2052 (W)	-15,000	-25,000
2053 (AN)	-20,000	-44,000
2054 (D)	-45,000	-89,000
2055 (D)	-17,000	-110,000
2056 (AN)	34,000	-72,000
2057 (BN)	-210	-73,000
2058 (AN)	13,000	-60,000
2059 (W)	50,000	-10,000
2060 (D)	-58,000	-68,000
2061 (C)	-42,000	-110,000
2062 (D)	-28,000	-140,000
2063 (BN)	24,000	-110,000

Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		48,000	-65,000
2065 (BN)		-42,000	-110,000
2066 (D)		-29,000	-140,000
2067 (C)		-56,000	-190,000
2068 (C)		-34,000	-230,000
2069 (BN)		21,000	-210,000
2070 (W)		84,000	-120,000
2071 (BN)		-31,000	-150,000
2072 (W)		55,000	-97,000
Average (2022-2072)		-1,900	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

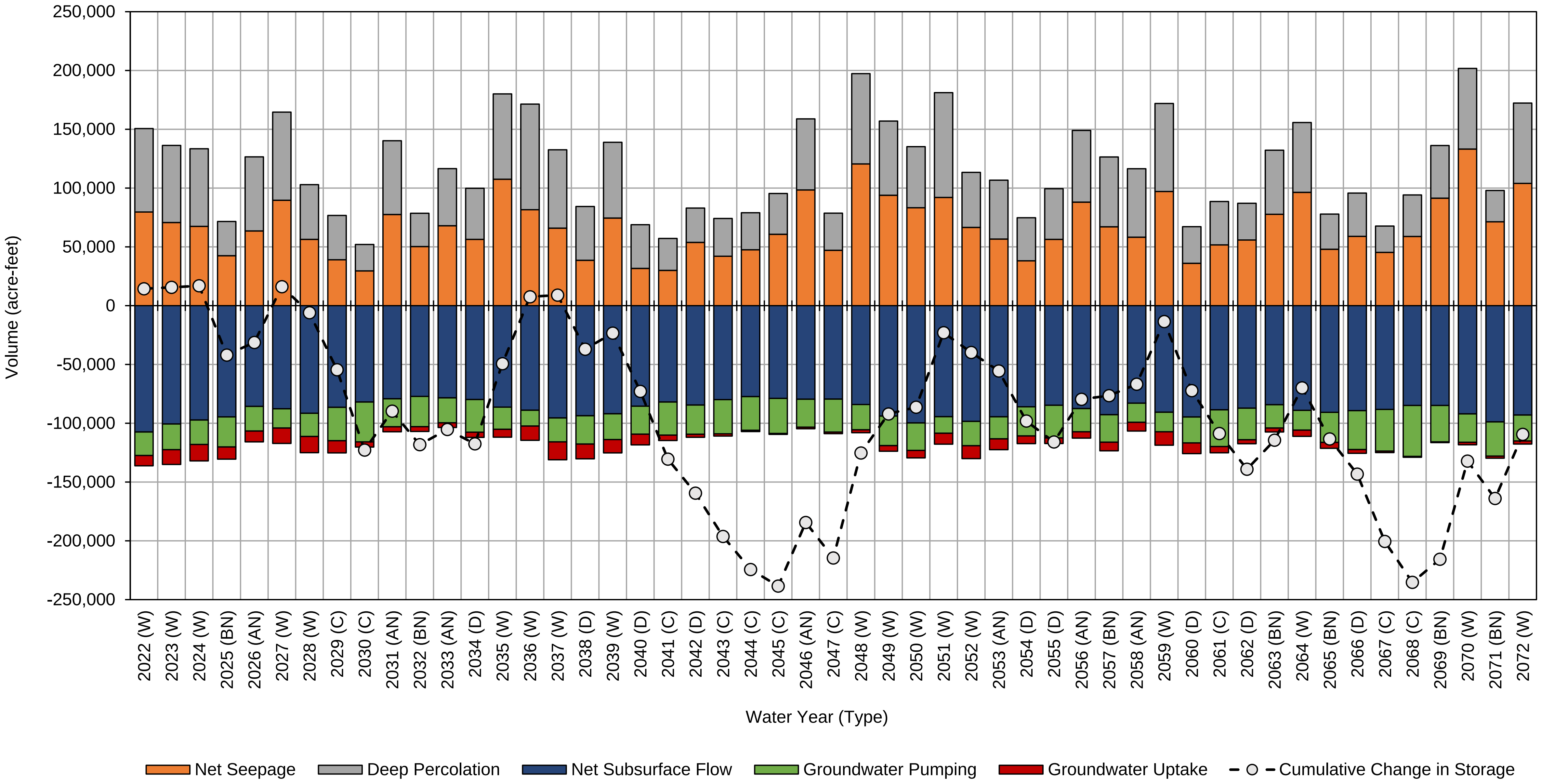
W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-5

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2070) Model Results

Projected (Current Land Use) with Climate Change (2070) Water Budget
Los Molinos Subbasin



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

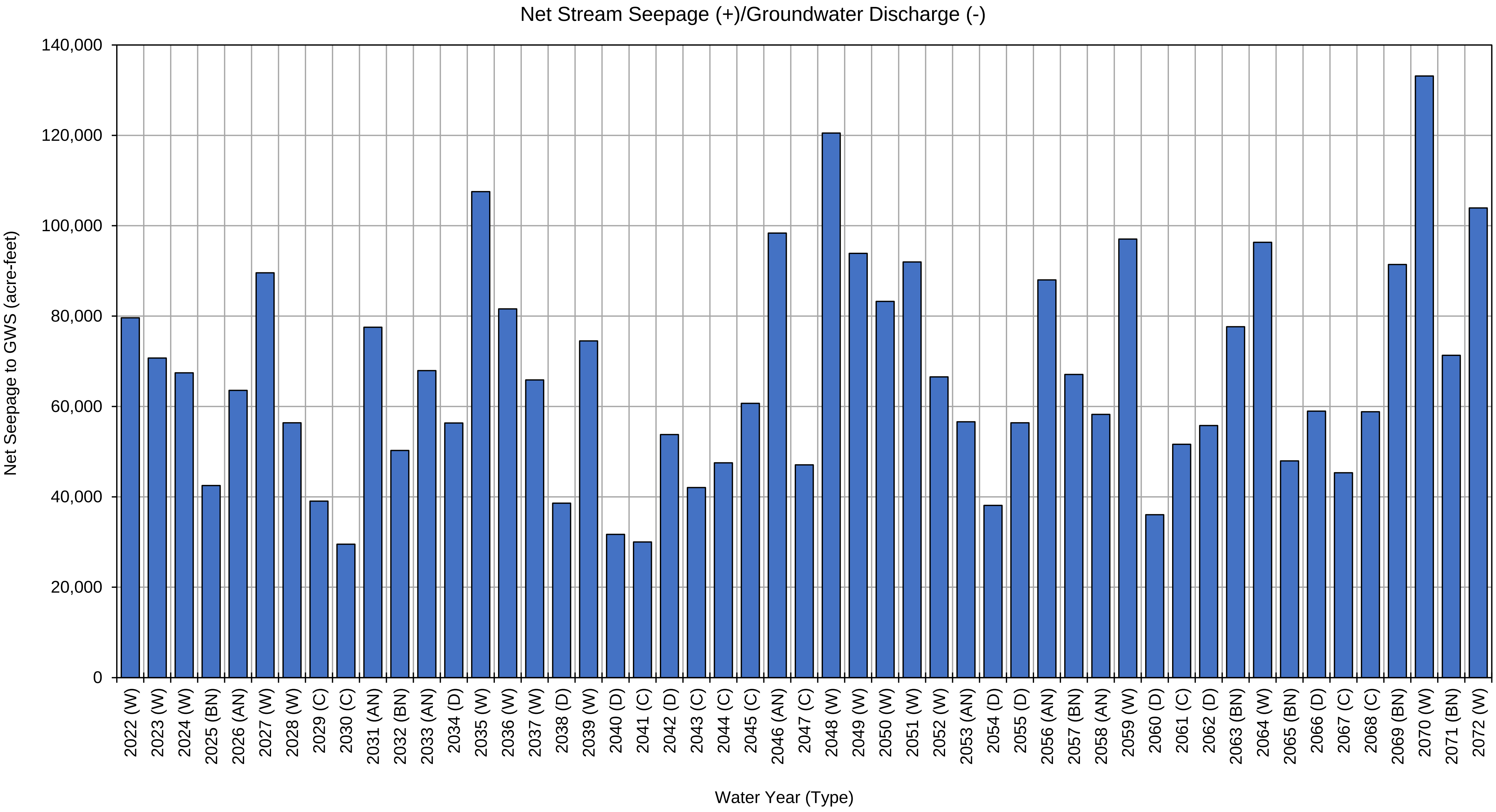
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	80,000	71,000	-20,000	-8,700	-110,000	14,000	14,000
2023 (W)	71,000	66,000	-22,000	-13,000	-100,000	1,200	16,000
2024 (W)	67,000	66,000	-21,000	-14,000	-97,000	1,300	17,000
2025 (BN)	42,000	29,000	-26,000	-10,000	-95,000	-59,000	-42,000
2026 (AN)	64,000	63,000	-21,000	-9,200	-86,000	11,000	-31,000
2027 (W)	90,000	75,000	-16,000	-13,000	-88,000	47,000	16,000
2028 (W)	56,000	47,000	-20,000	-14,000	-92,000	-22,000	-6,000
2029 (C)	39,000	38,000	-28,000	-10,000	-86,000	-48,000	-55,000
2030 (C)	30,000	23,000	-34,000	-4,400	-82,000	-68,000	-120,000
2031 (AN)	78,000	63,000	-24,000	-4,200	-79,000	33,000	-90,000
2032 (BN)	50,000	28,000	-26,000	-4,100	-77,000	-28,000	-120,000
2033 (AN)	68,000	49,000	-21,000	-4,000	-78,000	13,000	-110,000
2034 (D)	56,000	43,000	-28,000	-4,400	-80,000	-12,000	-120,000
2035 (W)	110,000	73,000	-19,000	-6,700	-86,000	68,000	-49,000
2036 (W)	82,000	90,000	-13,000	-12,000	-89,000	57,000	7,600
2037 (W)	66,000	67,000	-20,000	-15,000	-96,000	1,400	9,000
2038 (D)	39,000	46,000	-24,000	-13,000	-94,000	-46,000	-37,000
2039 (W)	75,000	64,000	-22,000	-11,000	-92,000	14,000	-23,000
2040 (D)	32,000	37,000	-24,000	-9,100	-86,000	-50,000	-73,000
2041 (C)	30,000	27,000	-28,000	-4,600	-82,000	-58,000	-130,000
2042 (D)	54,000	29,000	-25,000	-2,600	-85,000	-29,000	-160,000
2043 (C)	42,000	32,000	-29,000	-1,800	-80,000	-37,000	-200,000
2044 (C)	48,000	31,000	-29,000	-1,000	-77,000	-28,000	-220,000
2045 (C)	61,000	35,000	-30,000	-750	-79,000	-14,000	-240,000
2046 (AN)	98,000	60,000	-24,000	-1,300	-80,000	54,000	-180,000
2047 (C)	47,000	32,000	-28,000	-1,300	-79,000	-30,000	-210,000
2048 (W)	120,000	77,000	-21,000	-2,400	-84,000	89,000	-130,000
2049 (W)	94,000	63,000	-25,000	-4,800	-94,000	33,000	-92,000
2050 (W)	83,000	52,000	-23,000	-6,400	-100,000	5,700	-86,000
2051 (W)	92,000	89,000	-14,000	-9,300	-94,000	63,000	-23,000
2052 (W)	67,000	47,000	-21,000	-11,000	-98,000	-17,000	-40,000
2053 (AN)	57,000	50,000	-19,000	-9,200	-95,000	-16,000	-56,000
2054 (D)	38,000	37,000	-25,000	-6,600	-86,000	-43,000	-98,000
2055 (D)	56,000	43,000	-28,000	-4,800	-85,000	-18,000	-120,000
2056 (AN)	88,000	61,000	-20,000	-5,400	-88,000	36,000	-80,000
2057 (BN)	67,000	59,000	-23,000	-7,300	-93,000	3,000	-77,000
2058 (AN)	58,000	58,000	-16,000	-7,400	-83,000	9,700	-67,000
2059 (W)	97,000	75,000	-17,000	-11,000	-91,000	53,000	-14,000
2060 (D)	36,000	31,000	-22,000	-9,100	-95,000	-59,000	-72,000
2061 (C)	52,000	37,000	-31,000	-5,300	-89,000	-37,000	-110,000
2062 (D)	56,000	31,000	-27,000	-3,300	-87,000	-30,000	-140,000
2063 (BN)	78,000	55,000	-20,000	-3,400	-84,000	25,000	-110,000
2064 (W)	96,000	59,000	-17,000	-5,300	-89,000	45,000	-70,000
2065 (BN)	48,000	30,000	-26,000	-5,100	-91,000	-44,000	-110,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		59,000	37,000	-33,000	-3,200	-89,000	-30,000	-140,000
2067 (C)		45,000	22,000	-35,000	-1,300	-88,000	-57,000	-200,000
2068 (C)		59,000	35,000	-43,000	-700	-85,000	-35,000	-240,000
2069 (BN)		91,000	45,000	-31,000	-660	-85,000	20,000	-220,000
2070 (W)		130,000	69,000	-24,000	-2,100	-92,000	83,000	-130,000
2071 (BN)		71,000	27,000	-29,000	-1,800	-99,000	-32,000	-160,000
2072 (W)		100,000	68,000	-22,000	-2,700	-93,000	55,000	-110,000
Average (2022-2072)		67,000	50,000	-24,000	-6,400	-88,000	-2,100	
2022-2072	W	88,000	68,000	-20,000	-9,100	-93,000		
	AN	73,000	58,000	-21,000	-5,800	-84,000		
	BN	64,000	39,000	-26,000	-4,700	-89,000		
	D	47,000	37,000	-26,000	-6,200	-87,000		
	C	45,000	31,000	-32,000	-3,200	-83,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

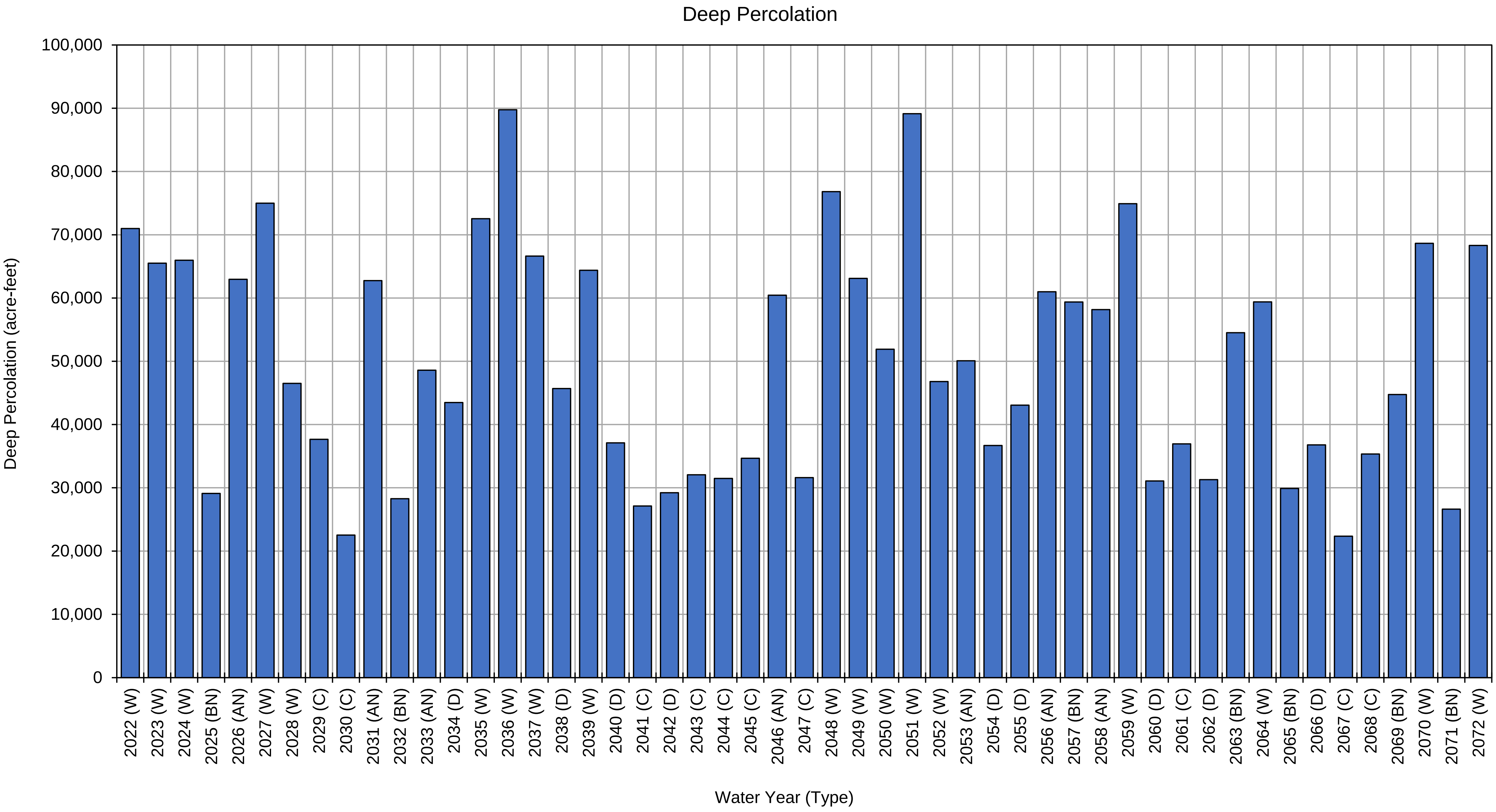
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	80,000
2023 (W)	71,000
2024 (W)	67,000
2025 (BN)	42,000
2026 (AN)	64,000
2027 (W)	90,000
2028 (W)	56,000
2029 (C)	39,000
2030 (C)	30,000
2031 (AN)	78,000
2032 (BN)	50,000
2033 (AN)	68,000
2034 (D)	56,000
2035 (W)	110,000
2036 (W)	82,000
2037 (W)	66,000
2038 (D)	39,000
2039 (W)	75,000
2040 (D)	32,000
2041 (C)	30,000
2042 (D)	54,000
2043 (C)	42,000
2044 (C)	48,000
2045 (C)	61,000
2046 (AN)	98,000
2047 (C)	47,000
2048 (W)	120,000
2049 (W)	94,000
2050 (W)	83,000
2051 (W)	92,000
2052 (W)	67,000
2053 (AN)	57,000
2054 (D)	38,000
2055 (D)	56,000
2056 (AN)	88,000
2057 (BN)	67,000
2058 (AN)	58,000
2059 (W)	97,000
2060 (D)	36,000
2061 (C)	52,000
2062 (D)	56,000
2063 (BN)	78,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		96,000
2065 (BN)		48,000
2066 (D)		59,000
2067 (C)		45,000
2068 (C)		59,000
2069 (BN)		91,000
2070 (W)		130,000
2071 (BN)		71,000
2072 (W)		100,000
Average (2022-2072)		67,000
2022-2072	W	88,000
	AN	73,000
	BN	64,000
	D	47,000
	C	45,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

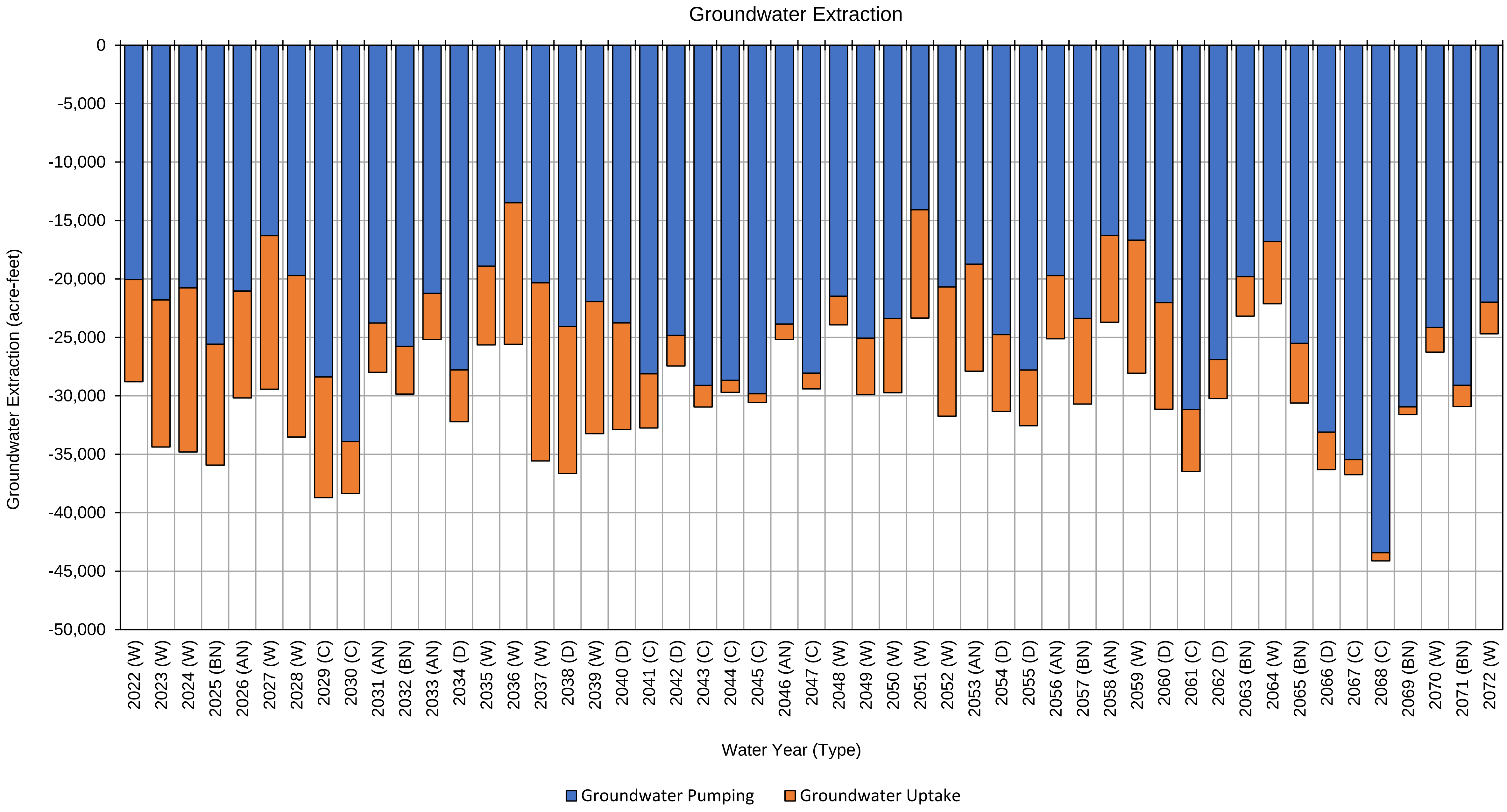
WY (Type)	Deep Percolation from the SWS
2022 (W)	71,000
2023 (W)	66,000
2024 (W)	66,000
2025 (BN)	29,000
2026 (AN)	63,000
2027 (W)	75,000
2028 (W)	47,000
2029 (C)	38,000
2030 (C)	23,000
2031 (AN)	63,000
2032 (BN)	28,000
2033 (AN)	49,000
2034 (D)	43,000
2035 (W)	73,000
2036 (W)	90,000
2037 (W)	67,000
2038 (D)	46,000
2039 (W)	64,000
2040 (D)	37,000
2041 (C)	27,000
2042 (D)	29,000
2043 (C)	32,000
2044 (C)	31,000
2045 (C)	35,000
2046 (AN)	60,000
2047 (C)	32,000
2048 (W)	77,000
2049 (W)	63,000
2050 (W)	52,000
2051 (W)	89,000
2052 (W)	47,000
2053 (AN)	50,000
2054 (D)	37,000
2055 (D)	43,000
2056 (AN)	61,000
2057 (BN)	59,000
2058 (AN)	58,000
2059 (W)	75,000
2060 (D)	31,000
2061 (C)	37,000
2062 (D)	31,000
2063 (BN)	55,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		59,000
2065 (BN)		30,000
2066 (D)		37,000
2067 (C)		22,000
2068 (C)		35,000
2069 (BN)		45,000
2070 (W)		69,000
2071 (BN)		27,000
2072 (W)		68,000
Average (2022-2072)		50,000
2022-2072	W	68,000
	AN	58,000
	BN	39,000
	D	37,000
	C	31,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

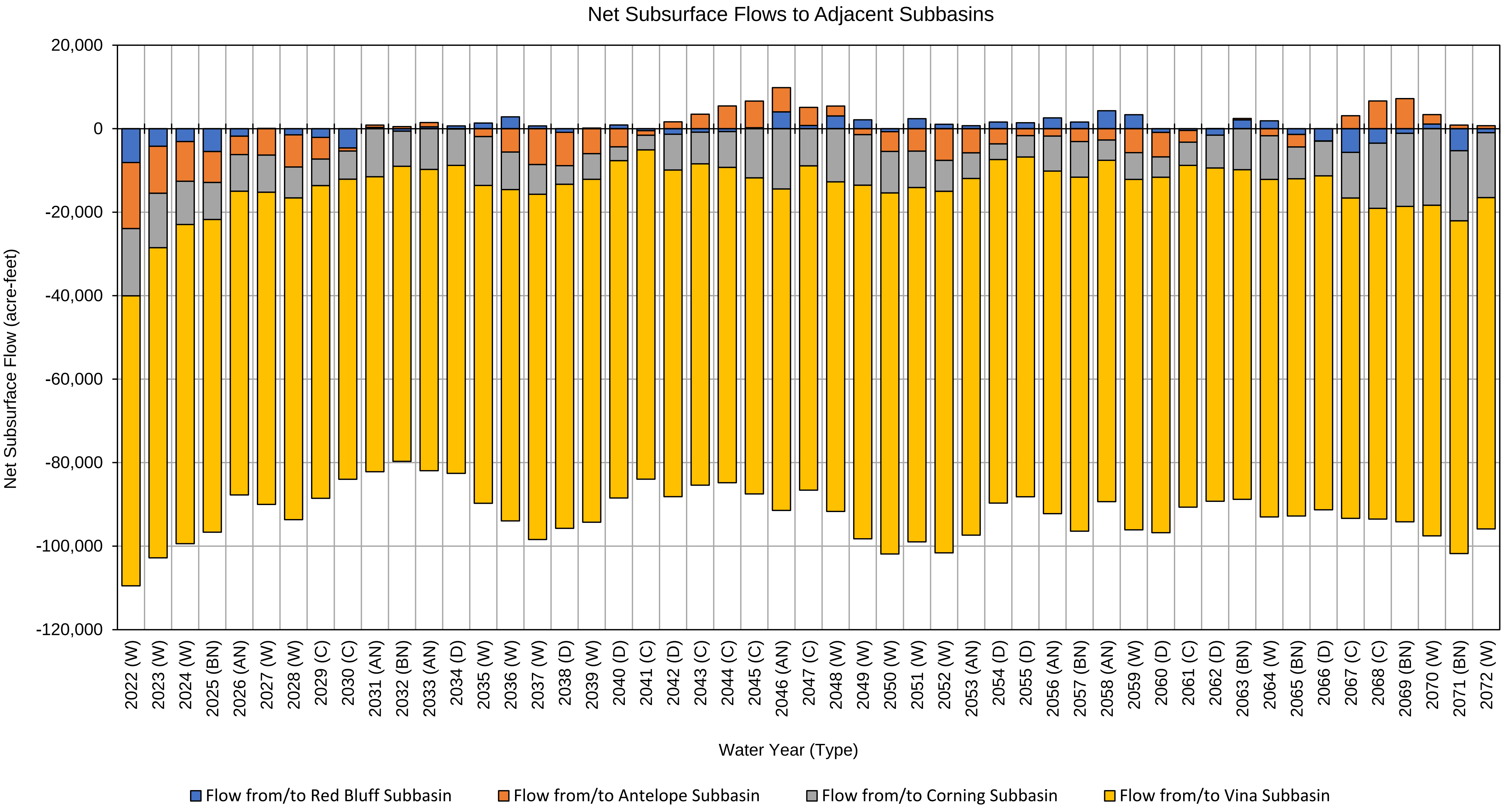
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-20,000	-8,700	-29,000
2023 (W)	-22,000	-13,000	-34,000
2024 (W)	-21,000	-14,000	-35,000
2025 (BN)	-26,000	-10,000	-36,000
2026 (AN)	-21,000	-9,200	-30,000
2027 (W)	-16,000	-13,000	-29,000
2028 (W)	-20,000	-14,000	-34,000
2029 (C)	-28,000	-10,000	-39,000
2030 (C)	-34,000	-4,400	-38,000
2031 (AN)	-24,000	-4,200	-28,000
2032 (BN)	-26,000	-4,100	-30,000
2033 (AN)	-21,000	-4,000	-25,000
2034 (D)	-28,000	-4,400	-32,000
2035 (W)	-19,000	-6,700	-26,000
2036 (W)	-13,000	-12,000	-26,000
2037 (W)	-20,000	-15,000	-36,000
2038 (D)	-24,000	-13,000	-37,000
2039 (W)	-22,000	-11,000	-33,000
2040 (D)	-24,000	-9,100	-33,000
2041 (C)	-28,000	-4,600	-33,000
2042 (D)	-25,000	-2,600	-27,000
2043 (C)	-29,000	-1,800	-31,000
2044 (C)	-29,000	-1,000	-30,000
2045 (C)	-30,000	-750	-31,000
2046 (AN)	-24,000	-1,300	-25,000
2047 (C)	-28,000	-1,300	-29,000
2048 (W)	-21,000	-2,400	-24,000
2049 (W)	-25,000	-4,800	-30,000
2050 (W)	-23,000	-6,400	-30,000
2051 (W)	-14,000	-9,300	-23,000
2052 (W)	-21,000	-11,000	-32,000
2053 (AN)	-19,000	-9,200	-28,000
2054 (D)	-25,000	-6,600	-31,000
2055 (D)	-28,000	-4,800	-33,000
2056 (AN)	-20,000	-5,400	-25,000
2057 (BN)	-23,000	-7,300	-31,000
2058 (AN)	-16,000	-7,400	-24,000
2059 (W)	-17,000	-11,000	-28,000
2060 (D)	-22,000	-9,100	-31,000
2061 (C)	-31,000	-5,300	-36,000
2062 (D)	-27,000	-3,300	-30,000
2063 (BN)	-20,000	-3,400	-23,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-17,000	-5,300	-22,000
2065 (BN)		-26,000	-5,100	-31,000
2066 (D)		-33,000	-3,200	-36,000
2067 (C)		-35,000	-1,300	-37,000
2068 (C)		-43,000	-700	-44,000
2069 (BN)		-31,000	-660	-32,000
2070 (W)		-24,000	-2,100	-26,000
2071 (BN)		-29,000	-1,800	-31,000
2072 (W)		-22,000	-2,700	-25,000
Average (2022-2072)		-24,000	-6,400	-31,000
2022-2072	W	-20,000	-9,100	-29,000
	AN	-21,000	-5,800	-26,000
	BN	-26,000	-4,700	-30,000
	D	-26,000	-6,200	-32,000
	C	-32,000	-3,200	-35,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

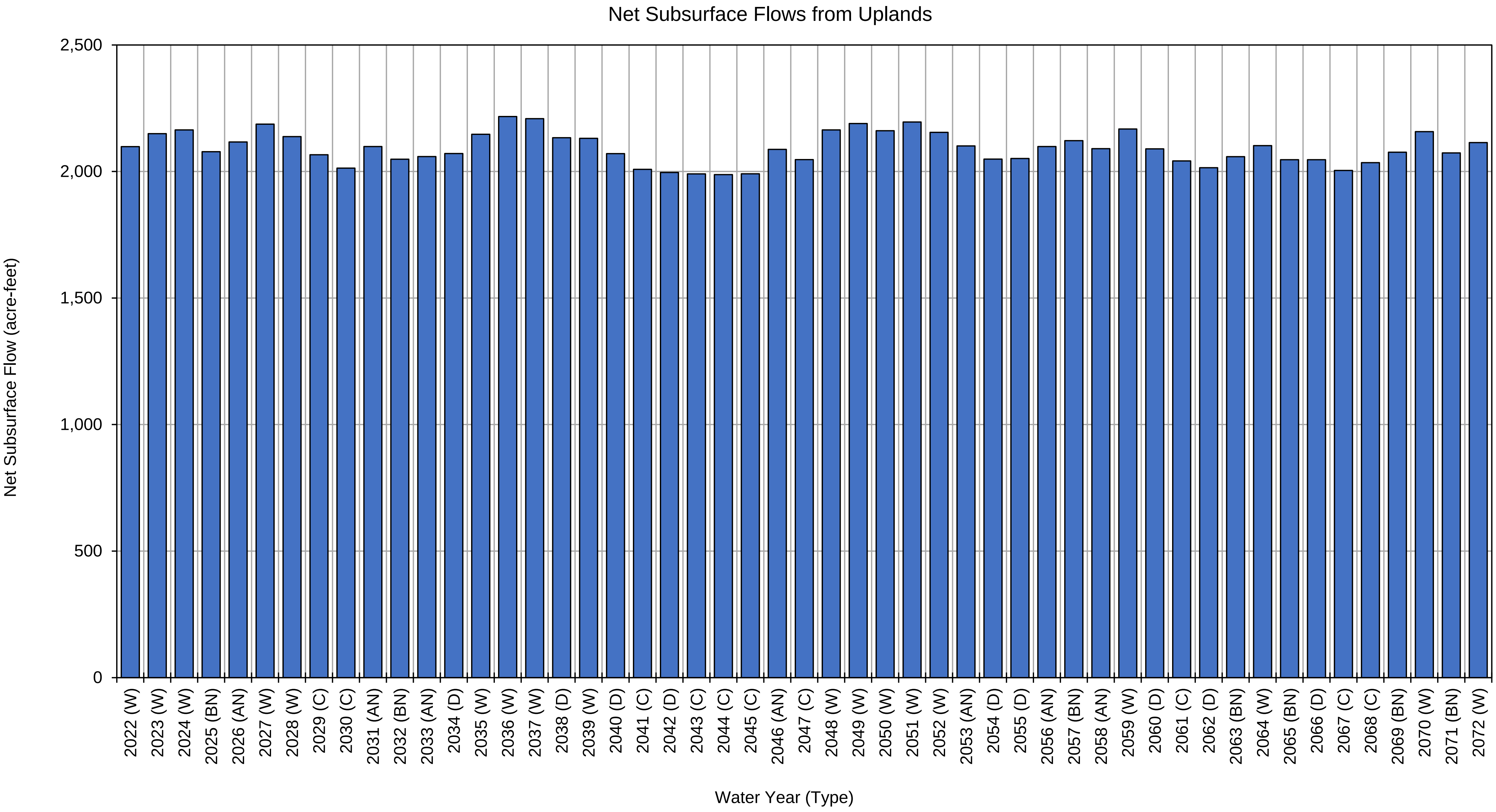
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-8,100	-16,000	-16,000	-69,000	-110,000
2023 (W)	-4,200	-11,000	-13,000	-74,000	-100,000
2024 (W)	-3,100	-9,500	-10,000	-76,000	-99,000
2025 (BN)	-5,500	-7,400	-8,900	-75,000	-97,000
2026 (AN)	-1,800	-4,400	-8,800	-73,000	-88,000
2027 (W)	75	-6,300	-8,900	-75,000	-90,000
2028 (W)	-1,500	-7,700	-7,400	-77,000	-94,000
2029 (C)	-2,100	-5,200	-6,400	-75,000	-89,000
2030 (C)	-4,600	-720	-6,800	-72,000	-84,000
2031 (AN)	290	550	-12,000	-71,000	-81,000
2032 (BN)	-610	500	-8,400	-71,000	-79,000
2033 (AN)	430	1,000	-9,800	-72,000	-80,000
2034 (D)	660	-92	-8,700	-74,000	-82,000
2035 (W)	1,300	-1,900	-12,000	-76,000	-88,000
2036 (W)	2,800	-5,600	-9,000	-79,000	-91,000
2037 (W)	670	-8,600	-7,100	-83,000	-98,000
2038 (D)	-870	-8,000	-4,500	-82,000	-96,000
2039 (W)	160	-6,000	-6,100	-82,000	-94,000
2040 (D)	890	-4,300	-3,300	-81,000	-88,000
2041 (C)	-490	-1,100	-3,500	-79,000	-84,000
2042 (D)	-1,300	1,600	-8,600	-78,000	-87,000
2043 (C)	-840	3,500	-7,600	-77,000	-82,000
2044 (C)	-710	5,400	-8,600	-76,000	-79,000
2045 (C)	220	6,400	-12,000	-76,000	-81,000
2046 (AN)	4,000	5,800	-14,000	-77,000	-82,000
2047 (C)	770	4,300	-8,900	-78,000	-81,000
2048 (W)	3,100	2,400	-13,000	-79,000	-86,000
2049 (W)	2,100	-1,400	-12,000	-85,000	-96,000
2050 (W)	-730	-4,700	-10,000	-86,000	-100,000
2051 (W)	2,400	-5,400	-8,700	-85,000	-97,000
2052 (W)	1,100	-7,600	-7,400	-87,000	-100,000
2053 (AN)	720	-5,800	-6,100	-85,000	-97,000
2054 (D)	1,600	-3,600	-3,800	-82,000	-88,000
2055 (D)	1,400	-1,700	-5,100	-81,000	-87,000
2056 (AN)	2,600	-1,800	-8,400	-82,000	-90,000
2057 (BN)	1,600	-3,100	-8,500	-85,000	-95,000
2058 (AN)	4,300	-2,700	-4,800	-82,000	-85,000
2059 (W)	3,400	-5,800	-6,400	-84,000	-93,000
2060 (D)	-900	-5,900	-4,900	-85,000	-97,000
2061 (C)	-440	-2,800	-5,500	-82,000	-91,000
2062 (D)	-1,600	38	-7,900	-80,000	-89,000
2063 (BN)	2,100	350	-9,800	-79,000	-86,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		1,900	-1,700	-10,000	-81,000	-91,000
2065 (BN)		-1,400	-3,000	-7,600	-81,000	-93,000
2066 (D)		-2,900	-41	-8,300	-80,000	-91,000
2067 (C)		-5,700	3,100	-11,000	-77,000	-90,000
2068 (C)		-3,500	6,600	-16,000	-74,000	-87,000
2069 (BN)		-1,100	7,200	-18,000	-76,000	-87,000
2070 (W)		1,100	2,300	-18,000	-79,000	-94,000
2071 (BN)		-5,300	860	-17,000	-80,000	-100,000
2072 (W)		-960	710	-16,000	-79,000	-95,000
Average (2022-2072)		-360	-2,100	-9,300	-79,000	-90,000
2022-2072	W	78	-5,200	-11,000	-80,000	-96,000
	AN	1,500	-1,000	-9,100	-77,000	-86,000
	BN	-1,500	-660	-11,000	-78,000	-91,000
	D	-340	-2,400	-6,100	-80,000	-89,000
	C	-1,700	2,000	-8,600	-76,000	-85,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)	Subsurface Flows from Uplands
2022 (W)	2,100
2023 (W)	2,100
2024 (W)	2,200
2025 (BN)	2,100
2026 (AN)	2,100
2027 (W)	2,200
2028 (W)	2,100
2029 (C)	2,100
2030 (C)	2,000
2031 (AN)	2,100
2032 (BN)	2,000
2033 (AN)	2,100
2034 (D)	2,100
2035 (W)	2,100
2036 (W)	2,200
2037 (W)	2,200
2038 (D)	2,100
2039 (W)	2,100
2040 (D)	2,100
2041 (C)	2,000
2042 (D)	2,000
2043 (C)	2,000
2044 (C)	2,000
2045 (C)	2,000
2046 (AN)	2,100
2047 (C)	2,000
2048 (W)	2,200
2049 (W)	2,200
2050 (W)	2,200
2051 (W)	2,200
2052 (W)	2,200
2053 (AN)	2,100
2054 (D)	2,000
2055 (D)	2,100
2056 (AN)	2,100
2057 (BN)	2,100
2058 (AN)	2,100
2059 (W)	2,200
2060 (D)	2,100
2061 (C)	2,000
2062 (D)	2,000
2063 (BN)	2,100

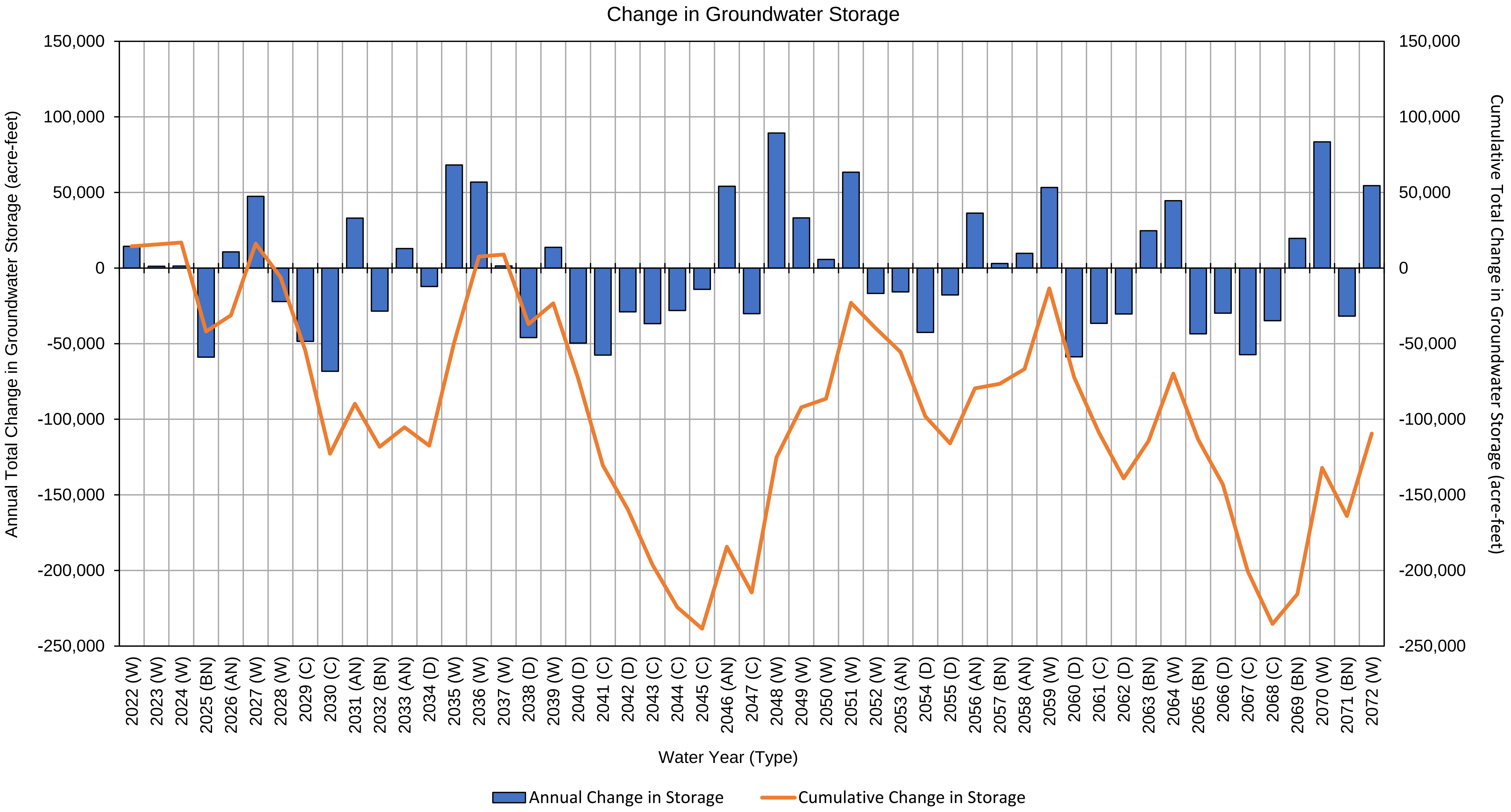
Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		2,100
2065 (BN)		2,000
2066 (D)		2,000
2067 (C)		2,000
2068 (C)		2,000
2069 (BN)		2,100
2070 (W)		2,200
2071 (BN)		2,100
2072 (W)		2,100
Average (2022-2072)		2,100
2022-2072	W	2,200
	AN	2,100
	BN	2,100
	D	2,100
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	14,000	14,000
2023 (W)	1,200	16,000
2024 (W)	1,300	17,000
2025 (BN)	-59,000	-42,000
2026 (AN)	11,000	-31,000
2027 (W)	47,000	16,000
2028 (W)	-22,000	-6,000
2029 (C)	-48,000	-55,000
2030 (C)	-68,000	-120,000
2031 (AN)	33,000	-90,000
2032 (BN)	-28,000	-120,000
2033 (AN)	13,000	-110,000
2034 (D)	-12,000	-120,000
2035 (W)	68,000	-49,000
2036 (W)	57,000	7,600
2037 (W)	1,400	9,000
2038 (D)	-46,000	-37,000
2039 (W)	14,000	-23,000
2040 (D)	-50,000	-73,000
2041 (C)	-58,000	-130,000
2042 (D)	-29,000	-160,000
2043 (C)	-37,000	-200,000
2044 (C)	-28,000	-220,000
2045 (C)	-14,000	-240,000
2046 (AN)	54,000	-180,000
2047 (C)	-30,000	-210,000
2048 (W)	89,000	-130,000
2049 (W)	33,000	-92,000
2050 (W)	5,700	-86,000
2051 (W)	63,000	-23,000
2052 (W)	-17,000	-40,000
2053 (AN)	-16,000	-56,000
2054 (D)	-43,000	-98,000
2055 (D)	-18,000	-120,000
2056 (AN)	36,000	-80,000
2057 (BN)	3,000	-77,000
2058 (AN)	9,700	-67,000
2059 (W)	53,000	-14,000
2060 (D)	-59,000	-72,000
2061 (C)	-37,000	-110,000
2062 (D)	-30,000	-140,000
2063 (BN)	25,000	-110,000

Los Molinos Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">2064 (W)</td><td>45,000</td><td>-70,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>-44,000</td><td>-110,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>-30,000</td><td>-140,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>-57,000</td><td>-200,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>-35,000</td><td>-240,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>20,000</td><td>-220,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>83,000</td><td>-130,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>-32,000</td><td>-160,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>55,000</td><td>-110,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>-2,100</td><td></td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

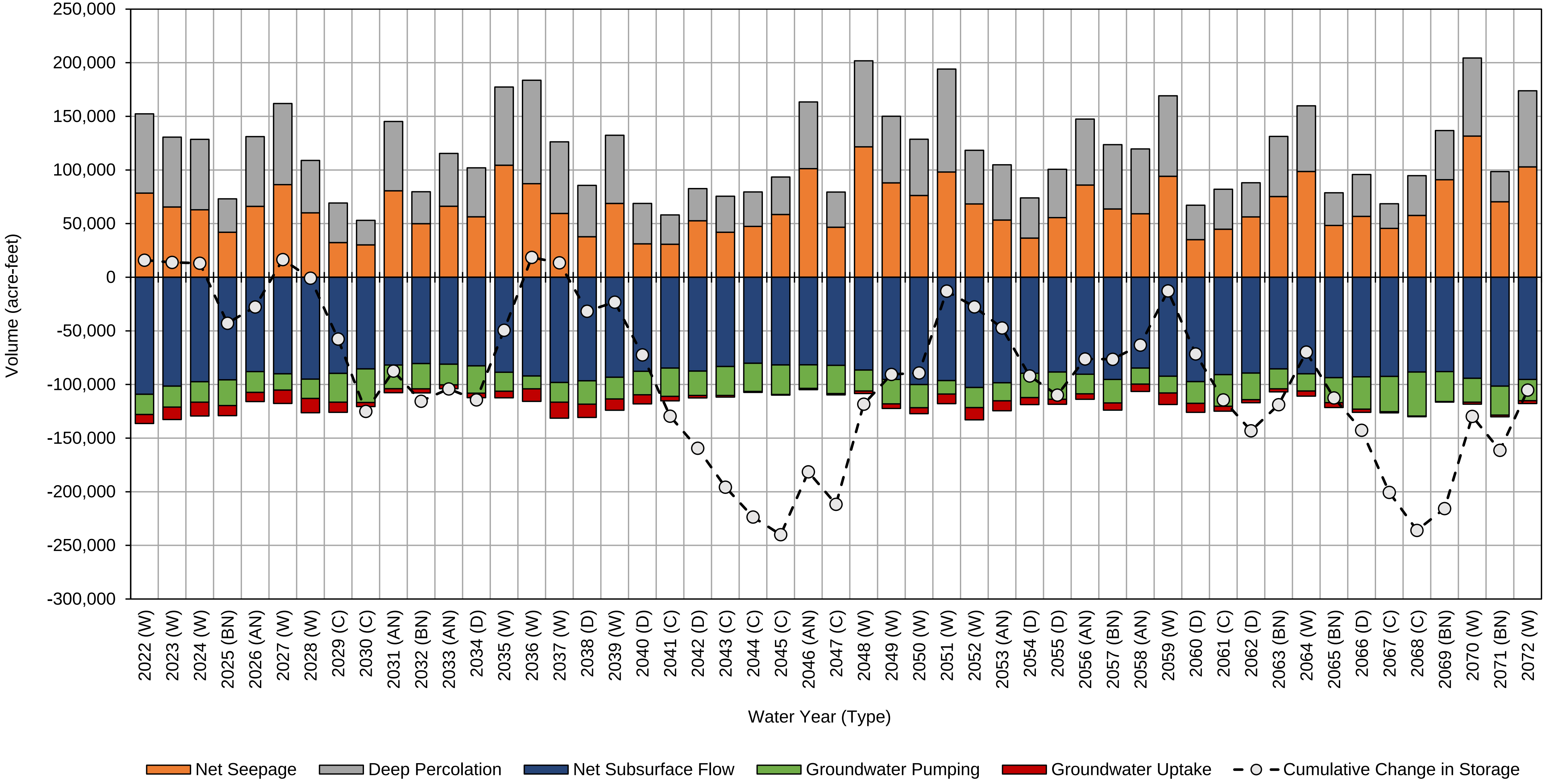
W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-6

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2030) Model Results

Projected (Future Land Use) with Climate Change (2030) Water Budget
Los Molinos Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

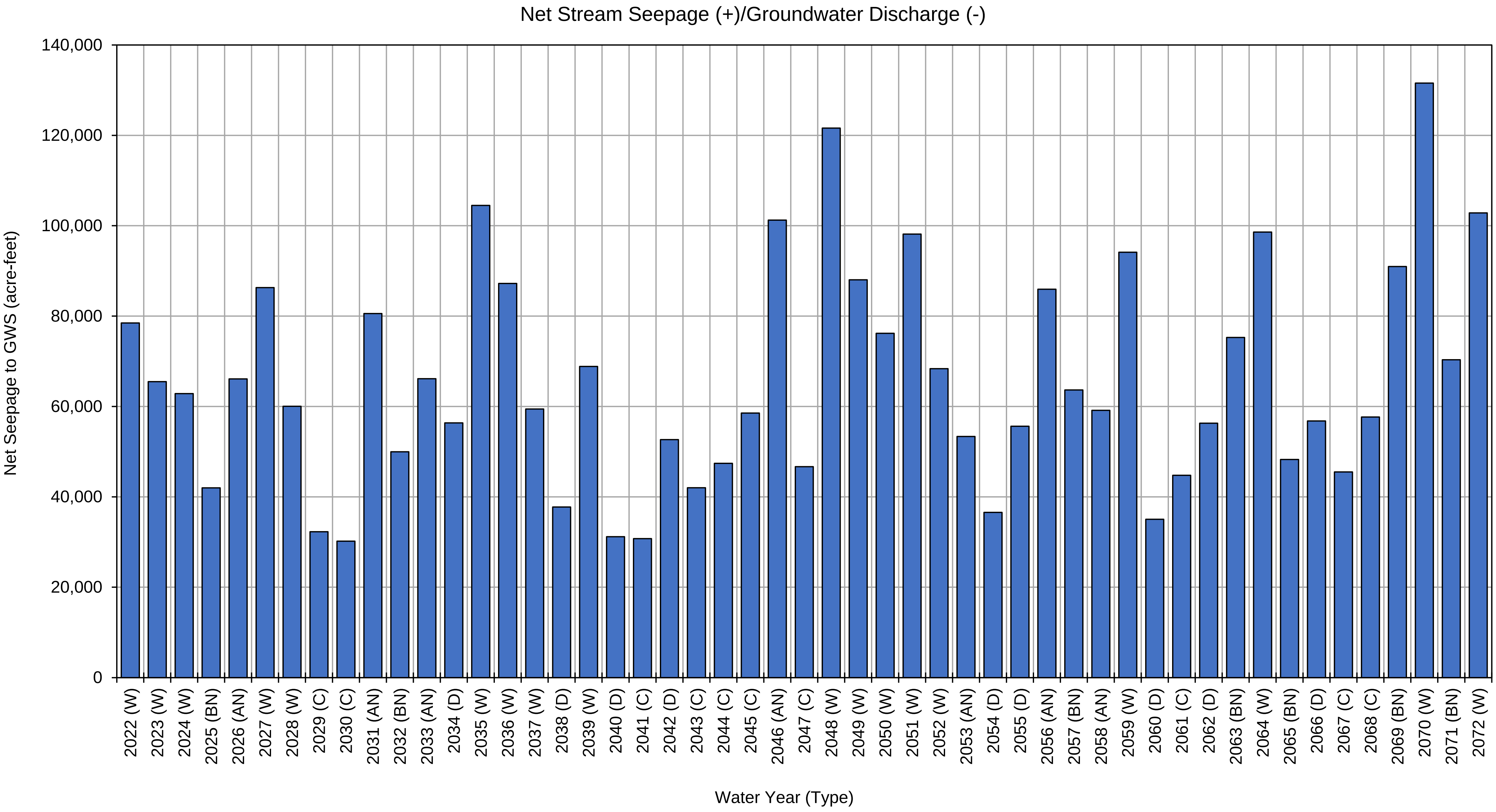
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	78,000	74,000	-19,000	-8,400	-110,000	16,000	16,000
2023 (W)	65,000	65,000	-20,000	-12,000	-100,000	-2,100	14,000
2024 (W)	63,000	66,000	-19,000	-13,000	-97,000	-760	13,000
2025 (BN)	42,000	31,000	-24,000	-9,400	-96,000	-56,000	-43,000
2026 (AN)	66,000	65,000	-19,000	-8,600	-88,000	15,000	-28,000
2027 (W)	86,000	76,000	-15,000	-12,000	-90,000	44,000	17,000
2028 (W)	60,000	49,000	-18,000	-13,000	-95,000	-17,000	-830
2029 (C)	32,000	37,000	-27,000	-9,400	-90,000	-57,000	-58,000
2030 (C)	30,000	23,000	-31,000	-3,800	-85,000	-67,000	-130,000
2031 (AN)	81,000	65,000	-22,000	-3,800	-82,000	38,000	-87,000
2032 (BN)	50,000	30,000	-24,000	-3,800	-81,000	-28,000	-120,000
2033 (AN)	66,000	49,000	-19,000	-3,600	-81,000	11,000	-100,000
2034 (D)	56,000	46,000	-26,000	-4,100	-83,000	-10,000	-110,000
2035 (W)	100,000	73,000	-18,000	-6,100	-89,000	65,000	-49,000
2036 (W)	87,000	97,000	-12,000	-12,000	-92,000	68,000	19,000
2037 (W)	59,000	67,000	-18,000	-15,000	-98,000	-5,100	13,000
2038 (D)	38,000	48,000	-22,000	-12,000	-97,000	-45,000	-32,000
2039 (W)	69,000	64,000	-20,000	-11,000	-93,000	8,500	-23,000
2040 (D)	31,000	38,000	-22,000	-8,500	-88,000	-49,000	-72,000
2041 (C)	31,000	27,000	-26,000	-4,200	-85,000	-57,000	-130,000
2042 (D)	53,000	30,000	-23,000	-2,300	-88,000	-30,000	-160,000
2043 (C)	42,000	34,000	-27,000	-1,600	-83,000	-36,000	-200,000
2044 (C)	47,000	32,000	-26,000	-900	-80,000	-28,000	-220,000
2045 (C)	59,000	35,000	-27,000	-640	-82,000	-16,000	-240,000
2046 (AN)	100,000	62,000	-22,000	-1,200	-82,000	59,000	-180,000
2047 (C)	47,000	33,000	-26,000	-1,200	-82,000	-30,000	-210,000
2048 (W)	120,000	80,000	-20,000	-2,300	-87,000	93,000	-120,000
2049 (W)	88,000	62,000	-23,000	-4,400	-95,000	28,000	-91,000
2050 (W)	76,000	52,000	-22,000	-5,600	-100,000	1,400	-89,000
2051 (W)	98,000	96,000	-13,000	-8,900	-96,000	76,000	-13,000
2052 (W)	68,000	50,000	-19,000	-11,000	-100,000	-15,000	-28,000
2053 (AN)	53,000	51,000	-17,000	-9,300	-98,000	-20,000	-47,000
2054 (D)	37,000	37,000	-23,000	-6,600	-90,000	-45,000	-92,000
2055 (D)	56,000	45,000	-25,000	-4,600	-88,000	-18,000	-110,000
2056 (AN)	86,000	62,000	-18,000	-5,100	-90,000	34,000	-76,000
2057 (BN)	64,000	60,000	-22,000	-6,700	-95,000	-250	-76,000
2058 (AN)	59,000	61,000	-15,000	-6,800	-85,000	13,000	-63,000
2059 (W)	94,000	75,000	-16,000	-11,000	-92,000	51,000	-13,000
2060 (D)	35,000	32,000	-20,000	-8,400	-97,000	-59,000	-71,000
2061 (C)	45,000	37,000	-29,000	-4,600	-91,000	-43,000	-110,000
2062 (D)	56,000	32,000	-25,000	-2,800	-89,000	-29,000	-140,000
2063 (BN)	75,000	56,000	-19,000	-2,800	-85,000	24,000	-120,000
2064 (W)	99,000	61,000	-16,000	-4,700	-90,000	49,000	-70,000
2065 (BN)	48,000	31,000	-23,000	-4,600	-94,000	-43,000	-110,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		57,000	39,000	-30,000	-2,900	-93,000	-30,000	-140,000
2067 (C)		46,000	23,000	-33,000	-1,100	-92,000	-58,000	-200,000
2068 (C)		58,000	37,000	-41,000	-580	-88,000	-35,000	-240,000
2069 (BN)		91,000	46,000	-28,000	-540	-88,000	20,000	-220,000
2070 (W)		130,000	73,000	-22,000	-1,900	-94,000	86,000	-130,000
2071 (BN)		70,000	28,000	-27,000	-1,600	-100,000	-32,000	-160,000
2072 (W)		100,000	71,000	-20,000	-2,500	-95,000	56,000	-110,000
Average (2022-2072)		66,000	51,000	-22,000	-5,900	-91,000	-2,100	
2022-2072	W	86,000	69,000	-18,000	-8,600	-95,000		
	AN	73,000	59,000	-19,000	-5,500	-87,000		
	BN	63,000	40,000	-24,000	-4,200	-91,000		
	D	46,000	39,000	-24,000	-5,800	-90,000		
	C	44,000	32,000	-30,000	-2,800	-86,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	78,000
2023 (W)	65,000
2024 (W)	63,000
2025 (BN)	42,000
2026 (AN)	66,000
2027 (W)	86,000
2028 (W)	60,000
2029 (C)	32,000
2030 (C)	30,000
2031 (AN)	81,000
2032 (BN)	50,000
2033 (AN)	66,000
2034 (D)	56,000
2035 (W)	100,000
2036 (W)	87,000
2037 (W)	59,000
2038 (D)	38,000
2039 (W)	69,000
2040 (D)	31,000
2041 (C)	31,000
2042 (D)	53,000
2043 (C)	42,000
2044 (C)	47,000
2045 (C)	59,000
2046 (AN)	100,000
2047 (C)	47,000
2048 (W)	120,000
2049 (W)	88,000
2050 (W)	76,000
2051 (W)	98,000
2052 (W)	68,000
2053 (AN)	53,000
2054 (D)	37,000
2055 (D)	56,000
2056 (AN)	86,000
2057 (BN)	64,000
2058 (AN)	59,000
2059 (W)	94,000
2060 (D)	35,000
2061 (C)	45,000
2062 (D)	56,000
2063 (BN)	75,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		99,000
2065 (BN)		48,000
2066 (D)		57,000
2067 (C)		46,000
2068 (C)		58,000
2069 (BN)		91,000
2070 (W)		130,000
2071 (BN)		70,000
2072 (W)		100,000
Average (2022-2072)		66,000
2022-2072	W	86,000
	AN	73,000
	BN	63,000
	D	46,000
	C	44,000

Sacramento Valley Water Year Index and is classified into five types:

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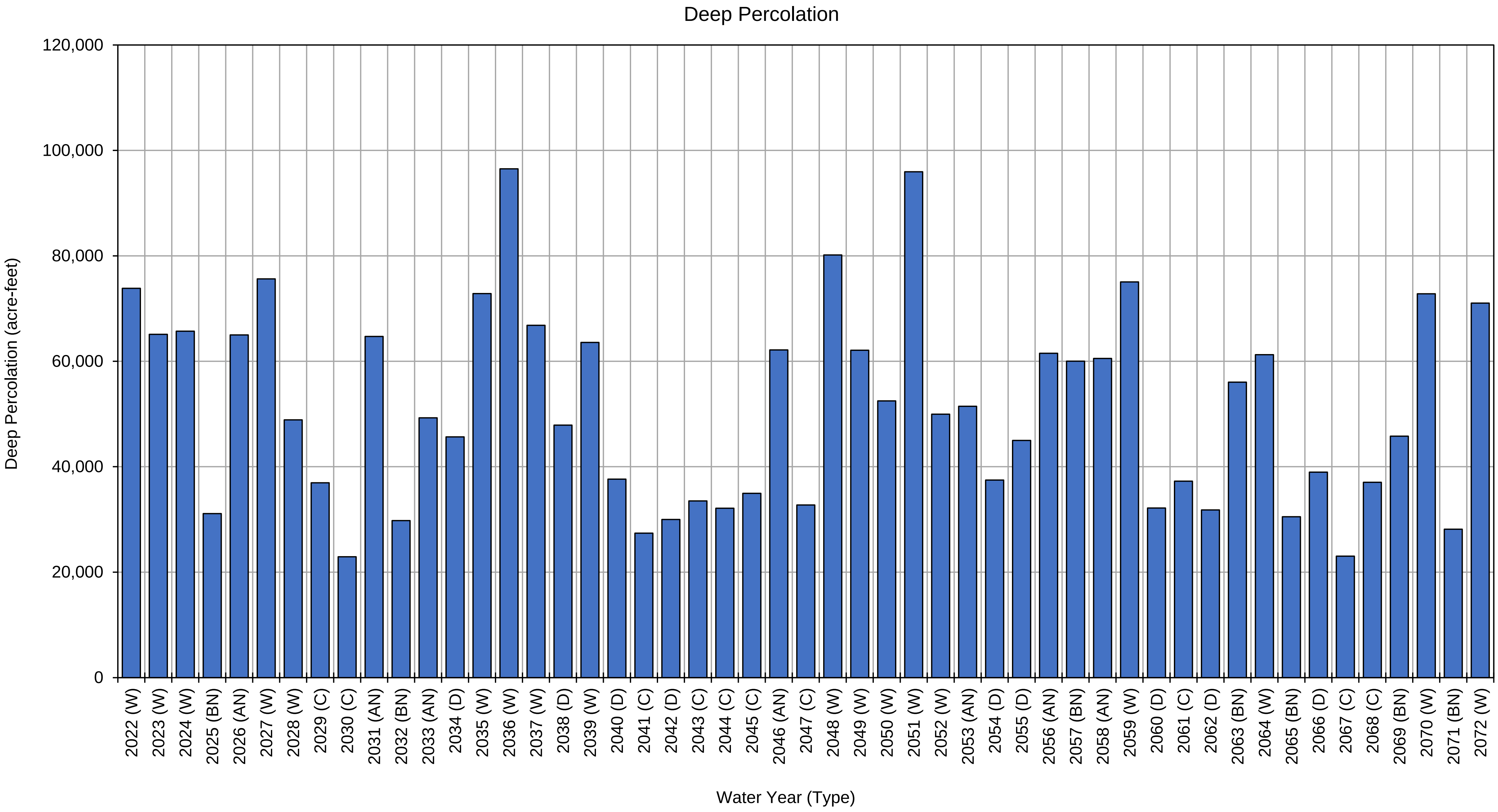
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)	Deep Percolation from the SWS
2022 (W)	74,000
2023 (W)	65,000
2024 (W)	66,000
2025 (BN)	31,000
2026 (AN)	65,000
2027 (W)	76,000
2028 (W)	49,000
2029 (C)	37,000
2030 (C)	23,000
2031 (AN)	65,000
2032 (BN)	30,000
2033 (AN)	49,000
2034 (D)	46,000
2035 (W)	73,000
2036 (W)	97,000
2037 (W)	67,000
2038 (D)	48,000
2039 (W)	64,000
2040 (D)	38,000
2041 (C)	27,000
2042 (D)	30,000
2043 (C)	34,000
2044 (C)	32,000
2045 (C)	35,000
2046 (AN)	62,000
2047 (C)	33,000
2048 (W)	80,000
2049 (W)	62,000
2050 (W)	52,000
2051 (W)	96,000
2052 (W)	50,000
2053 (AN)	51,000
2054 (D)	37,000
2055 (D)	45,000
2056 (AN)	62,000
2057 (BN)	60,000
2058 (AN)	61,000
2059 (W)	75,000
2060 (D)	32,000
2061 (C)	37,000
2062 (D)	32,000
2063 (BN)	56,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		61,000
2065 (BN)		31,000
2066 (D)		39,000
2067 (C)		23,000
2068 (C)		37,000
2069 (BN)		46,000
2070 (W)		73,000
2071 (BN)		28,000
2072 (W)		71,000
Average (2022-2072)		51,000
2022-2072	W	69,000
	AN	59,000
	BN	40,000
	D	39,000
	C	32,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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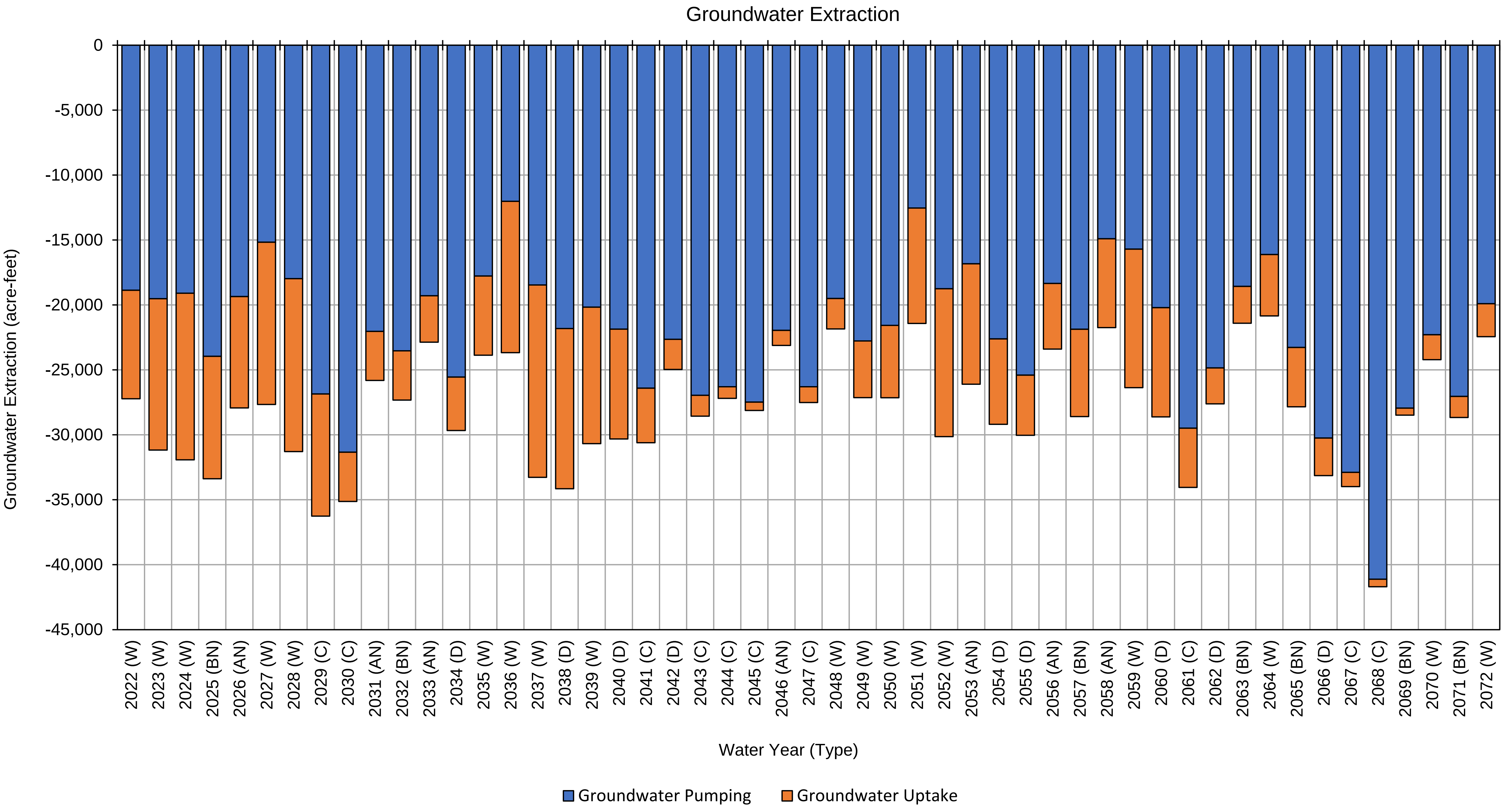
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-19,000	-8,400	-27,000
2023 (W)	-20,000	-12,000	-31,000
2024 (W)	-19,000	-13,000	-32,000
2025 (BN)	-24,000	-9,400	-33,000
2026 (AN)	-19,000	-8,600	-28,000
2027 (W)	-15,000	-12,000	-28,000
2028 (W)	-18,000	-13,000	-31,000
2029 (C)	-27,000	-9,400	-36,000
2030 (C)	-31,000	-3,800	-35,000
2031 (AN)	-22,000	-3,800	-26,000
2032 (BN)	-24,000	-3,800	-27,000
2033 (AN)	-19,000	-3,600	-23,000
2034 (D)	-26,000	-4,100	-30,000
2035 (W)	-18,000	-6,100	-24,000
2036 (W)	-12,000	-12,000	-24,000
2037 (W)	-18,000	-15,000	-33,000
2038 (D)	-22,000	-12,000	-34,000
2039 (W)	-20,000	-11,000	-31,000
2040 (D)	-22,000	-8,500	-30,000
2041 (C)	-26,000	-4,200	-31,000
2042 (D)	-23,000	-2,300	-25,000
2043 (C)	-27,000	-1,600	-29,000
2044 (C)	-26,000	-900	-27,000
2045 (C)	-27,000	-640	-28,000
2046 (AN)	-22,000	-1,200	-23,000
2047 (C)	-26,000	-1,200	-28,000
2048 (W)	-20,000	-2,300	-22,000
2049 (W)	-23,000	-4,400	-27,000
2050 (W)	-22,000	-5,600	-27,000
2051 (W)	-13,000	-8,900	-21,000
2052 (W)	-19,000	-11,000	-30,000
2053 (AN)	-17,000	-9,300	-26,000
2054 (D)	-23,000	-6,600	-29,000
2055 (D)	-25,000	-4,600	-30,000
2056 (AN)	-18,000	-5,100	-23,000
2057 (BN)	-22,000	-6,700	-29,000
2058 (AN)	-15,000	-6,800	-22,000
2059 (W)	-16,000	-11,000	-26,000
2060 (D)	-20,000	-8,400	-29,000
2061 (C)	-29,000	-4,600	-34,000
2062 (D)	-25,000	-2,800	-28,000
2063 (BN)	-19,000	-2,800	-21,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-16,000	-4,700	-21,000
2065 (BN)		-23,000	-4,600	-28,000
2066 (D)		-30,000	-2,900	-33,000
2067 (C)		-33,000	-1,100	-34,000
2068 (C)		-41,000	-580	-42,000
2069 (BN)		-28,000	-540	-28,000
2070 (W)		-22,000	-1,900	-24,000
2071 (BN)		-27,000	-1,600	-29,000
2072 (W)		-20,000	-2,500	-22,000
Average (2022-2072)		-22,000	-5,900	-28,000
2022-2072	W	-18,000	-8,600	-27,000
	AN	-19,000	-5,500	-24,000
	BN	-24,000	-4,200	-28,000
	D	-24,000	-5,800	-30,000
	C	-30,000	-2,800	-32,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
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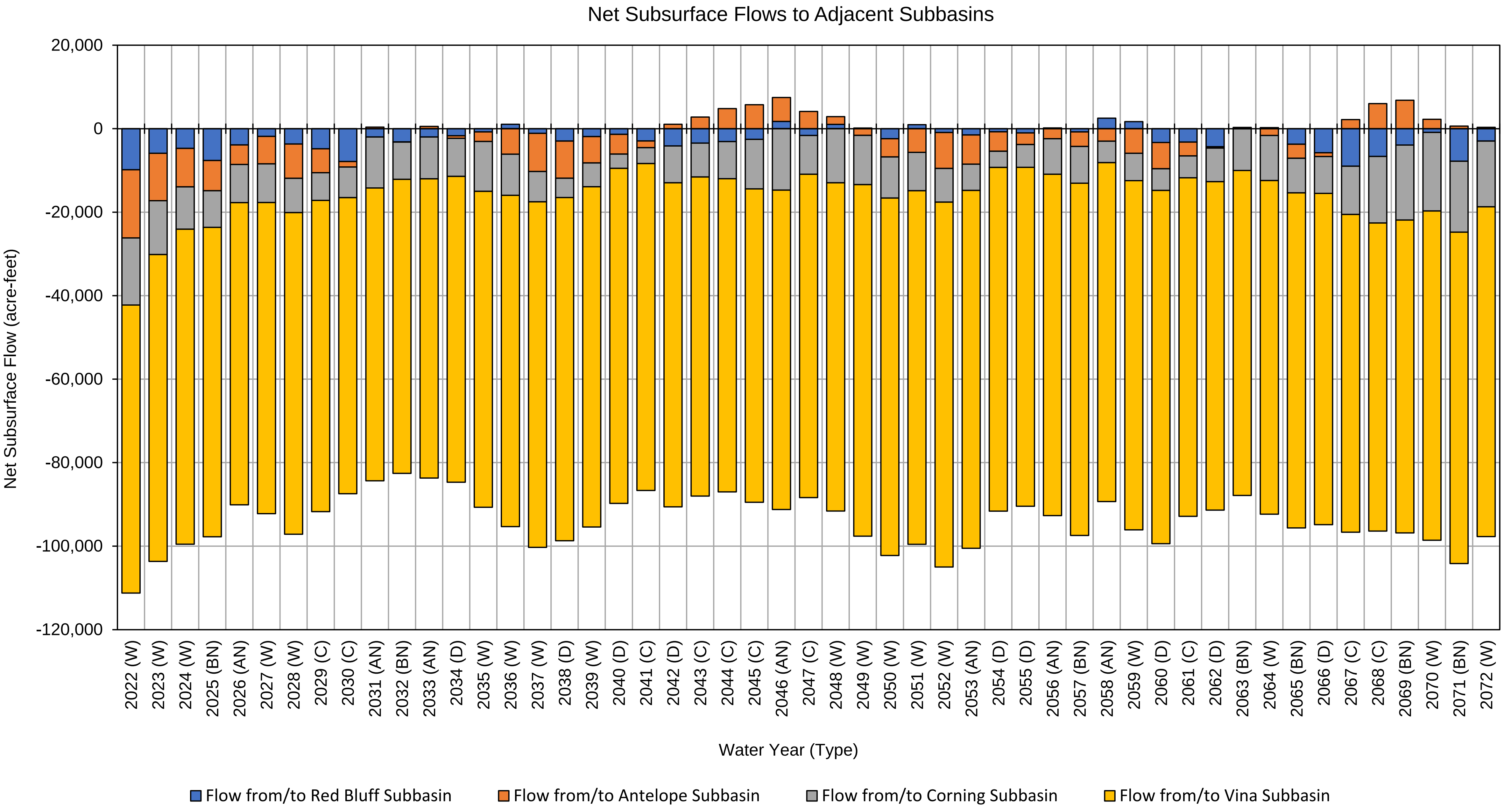
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-9,900	-16,000	-16,000	-69,000	-110,000
2023 (W)	-5,900	-11,000	-13,000	-74,000	-100,000
2024 (W)	-4,700	-9,200	-10,000	-75,000	-100,000
2025 (BN)	-7,600	-7,300	-8,800	-74,000	-98,000
2026 (AN)	-3,900	-4,700	-9,100	-72,000	-90,000
2027 (W)	-1,800	-6,600	-9,300	-75,000	-92,000
2028 (W)	-3,700	-8,200	-8,200	-77,000	-97,000
2029 (C)	-4,800	-5,700	-6,600	-75,000	-92,000
2030 (C)	-7,900	-1,300	-7,300	-71,000	-87,000
2031 (AN)	-2,000	370	-12,000	-70,000	-84,000
2032 (BN)	-3,200	-48	-8,900	-70,000	-83,000
2033 (AN)	-2,000	550	-10,000	-72,000	-83,000
2034 (D)	-1,700	-620	-9,100	-73,000	-85,000
2035 (W)	-780	-2,300	-12,000	-76,000	-91,000
2036 (W)	1,000	-6,100	-9,800	-79,000	-94,000
2037 (W)	-1,100	-9,200	-7,300	-83,000	-100,000
2038 (D)	-3,000	-8,900	-4,700	-82,000	-99,000
2039 (W)	-1,900	-6,300	-5,700	-82,000	-95,000
2040 (D)	-1,400	-4,700	-3,400	-80,000	-90,000
2041 (C)	-3,000	-1,600	-3,800	-78,000	-87,000
2042 (D)	-4,100	1,000	-8,800	-78,000	-90,000
2043 (C)	-3,400	2,800	-8,100	-76,000	-85,000
2044 (C)	-3,100	4,800	-8,900	-75,000	-82,000
2045 (C)	-2,600	5,700	-12,000	-75,000	-84,000
2046 (AN)	1,700	5,700	-15,000	-76,000	-84,000
2047 (C)	-1,600	4,100	-9,300	-77,000	-84,000
2048 (W)	1,000	1,800	-13,000	-79,000	-89,000
2049 (W)	160	-1,600	-12,000	-84,000	-97,000
2050 (W)	-2,400	-4,400	-9,800	-86,000	-100,000
2051 (W)	960	-5,700	-9,200	-85,000	-99,000
2052 (W)	-910	-8,600	-8,100	-87,000	-100,000
2053 (AN)	-1,500	-7,000	-6,300	-86,000	-100,000
2054 (D)	-740	-4,700	-3,900	-82,000	-92,000
2055 (D)	-1,000	-2,800	-5,500	-81,000	-90,000
2056 (AN)	180	-2,400	-8,500	-82,000	-93,000
2057 (BN)	-790	-3,500	-8,800	-84,000	-97,000
2058 (AN)	2,500	-3,000	-5,100	-81,000	-87,000
2059 (W)	1,700	-5,900	-6,600	-84,000	-94,000
2060 (D)	-3,300	-6,300	-5,200	-85,000	-99,000
2061 (C)	-3,200	-3,300	-5,200	-81,000	-93,000
2062 (D)	-4,300	-320	-8,100	-79,000	-91,000
2063 (BN)	-45	310	-10,000	-78,000	-88,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		260	-1,600	-11,000	-80,000	-92,000
2065 (BN)		-3,700	-3,400	-8,300	-80,000	-96,000
2066 (D)		-5,800	-890	-8,800	-79,000	-95,000
2067 (C)		-9,000	2,200	-12,000	-76,000	-95,000
2068 (C)		-6,600	6,000	-16,000	-74,000	-90,000
2069 (BN)		-3,900	6,800	-18,000	-75,000	-90,000
2070 (W)		-890	2,200	-19,000	-79,000	-96,000
2071 (BN)		-7,800	610	-17,000	-79,000	-100,000
2072 (W)		-3,000	320	-16,000	-79,000	-97,000
Average (2022-2072)		-2,600	-2,600	-9,600	-78,000	-93,000
2022-2072	W	-1,800	-5,500	-11,000	-79,000	-98,000
	AN	-710	-1,500	-9,400	-77,000	-89,000
	BN	-3,900	-910	-11,000	-77,000	-94,000
	D	-2,800	-3,100	-6,400	-80,000	-92,000
	C	-4,500	1,400	-8,900	-76,000	-88,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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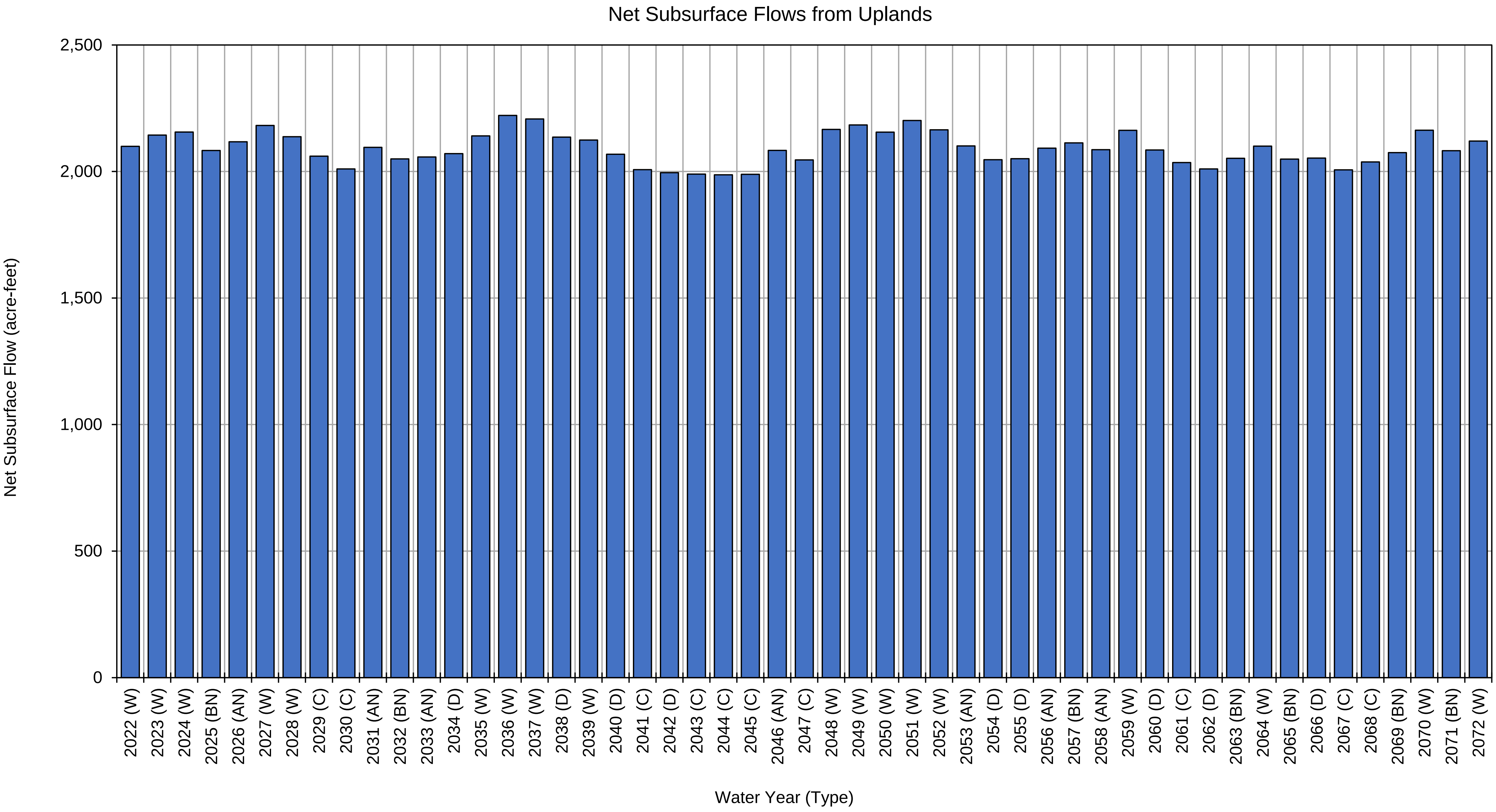
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

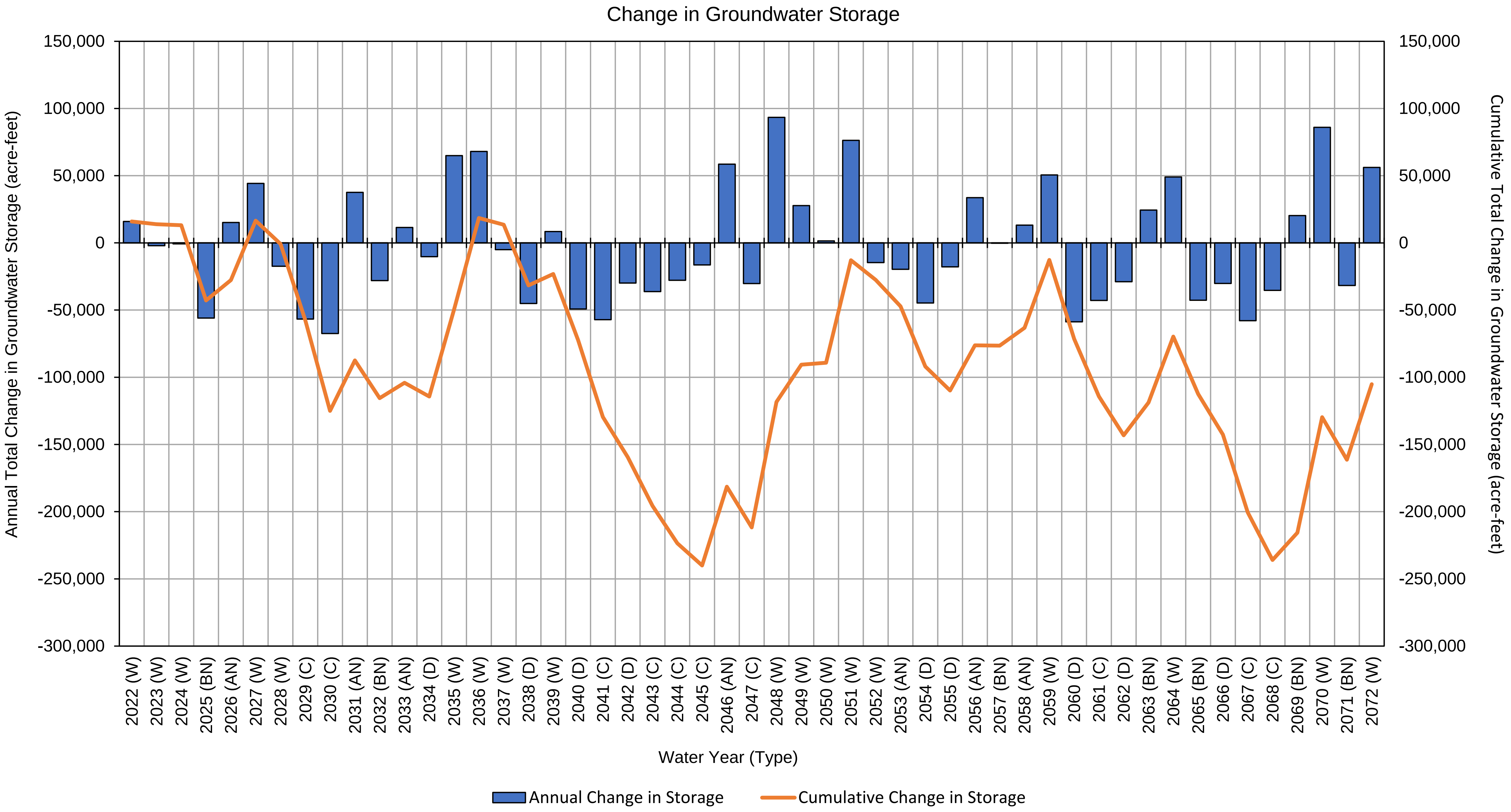
WY (Type)	Subsurface Flows from Uplands
2022 (W)	2,100
2023 (W)	2,100
2024 (W)	2,200
2025 (BN)	2,100
2026 (AN)	2,100
2027 (W)	2,200
2028 (W)	2,100
2029 (C)	2,100
2030 (C)	2,000
2031 (AN)	2,100
2032 (BN)	2,000
2033 (AN)	2,100
2034 (D)	2,100
2035 (W)	2,100
2036 (W)	2,200
2037 (W)	2,200
2038 (D)	2,100
2039 (W)	2,100
2040 (D)	2,100
2041 (C)	2,000
2042 (D)	2,000
2043 (C)	2,000
2044 (C)	2,000
2045 (C)	2,000
2046 (AN)	2,100
2047 (C)	2,000
2048 (W)	2,200
2049 (W)	2,200
2050 (W)	2,200
2051 (W)	2,200
2052 (W)	2,200
2053 (AN)	2,100
2054 (D)	2,000
2055 (D)	2,100
2056 (AN)	2,100
2057 (BN)	2,100
2058 (AN)	2,100
2059 (W)	2,200
2060 (D)	2,100
2061 (C)	2,000
2062 (D)	2,000
2063 (BN)	2,100

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		2,100
2065 (BN)		2,000
2066 (D)		2,100
2067 (C)		2,000
2068 (C)		2,000
2069 (BN)		2,100
2070 (W)		2,200
2071 (BN)		2,100
2072 (W)		2,100
Average (2022-2072)		2,100
2022-2072	W	2,200
	AN	2,100
	BN	2,100
	D	2,100
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	16,000	16,000
2023 (W)	-2,100	14,000
2024 (W)	-760	13,000
2025 (BN)	-56,000	-43,000
2026 (AN)	15,000	-28,000
2027 (W)	44,000	17,000
2028 (W)	-17,000	-830
2029 (C)	-57,000	-58,000
2030 (C)	-67,000	-130,000
2031 (AN)	38,000	-87,000
2032 (BN)	-28,000	-120,000
2033 (AN)	11,000	-100,000
2034 (D)	-10,000	-110,000
2035 (W)	65,000	-49,000
2036 (W)	68,000	19,000
2037 (W)	-5,100	13,000
2038 (D)	-45,000	-32,000
2039 (W)	8,500	-23,000
2040 (D)	-49,000	-72,000
2041 (C)	-57,000	-130,000
2042 (D)	-30,000	-160,000
2043 (C)	-36,000	-200,000
2044 (C)	-28,000	-220,000
2045 (C)	-16,000	-240,000
2046 (AN)	59,000	-180,000
2047 (C)	-30,000	-210,000
2048 (W)	93,000	-120,000
2049 (W)	28,000	-91,000
2050 (W)	1,400	-89,000
2051 (W)	76,000	-13,000
2052 (W)	-15,000	-28,000
2053 (AN)	-20,000	-47,000
2054 (D)	-45,000	-92,000
2055 (D)	-18,000	-110,000
2056 (AN)	34,000	-76,000
2057 (BN)	-250	-76,000
2058 (AN)	13,000	-63,000
2059 (W)	51,000	-13,000
2060 (D)	-59,000	-71,000
2061 (C)	-43,000	-110,000
2062 (D)	-29,000	-140,000
2063 (BN)	24,000	-120,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">2064 (W)</td><td>49,000</td><td>-70,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>-43,000</td><td>-110,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>-30,000</td><td>-140,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>-58,000</td><td>-200,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>-35,000</td><td>-240,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>20,000</td><td>-220,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>86,000</td><td>-130,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>-32,000</td><td>-160,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>56,000</td><td>-110,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>-2,100</td><td></td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-7

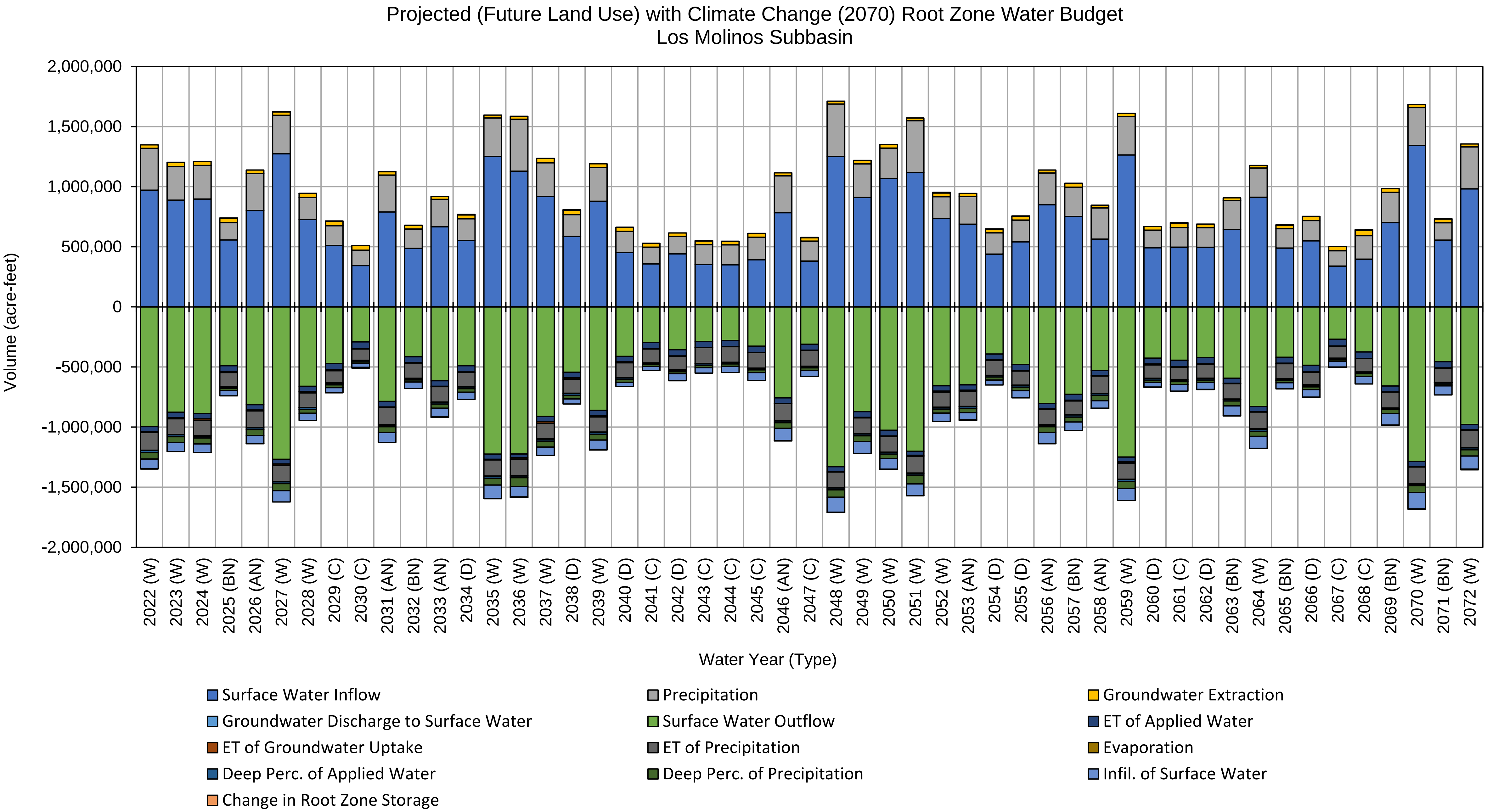
Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results

APPENDIX C-7a

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) with limate Change (2070) Model Results – Surface Water System


Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget
Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

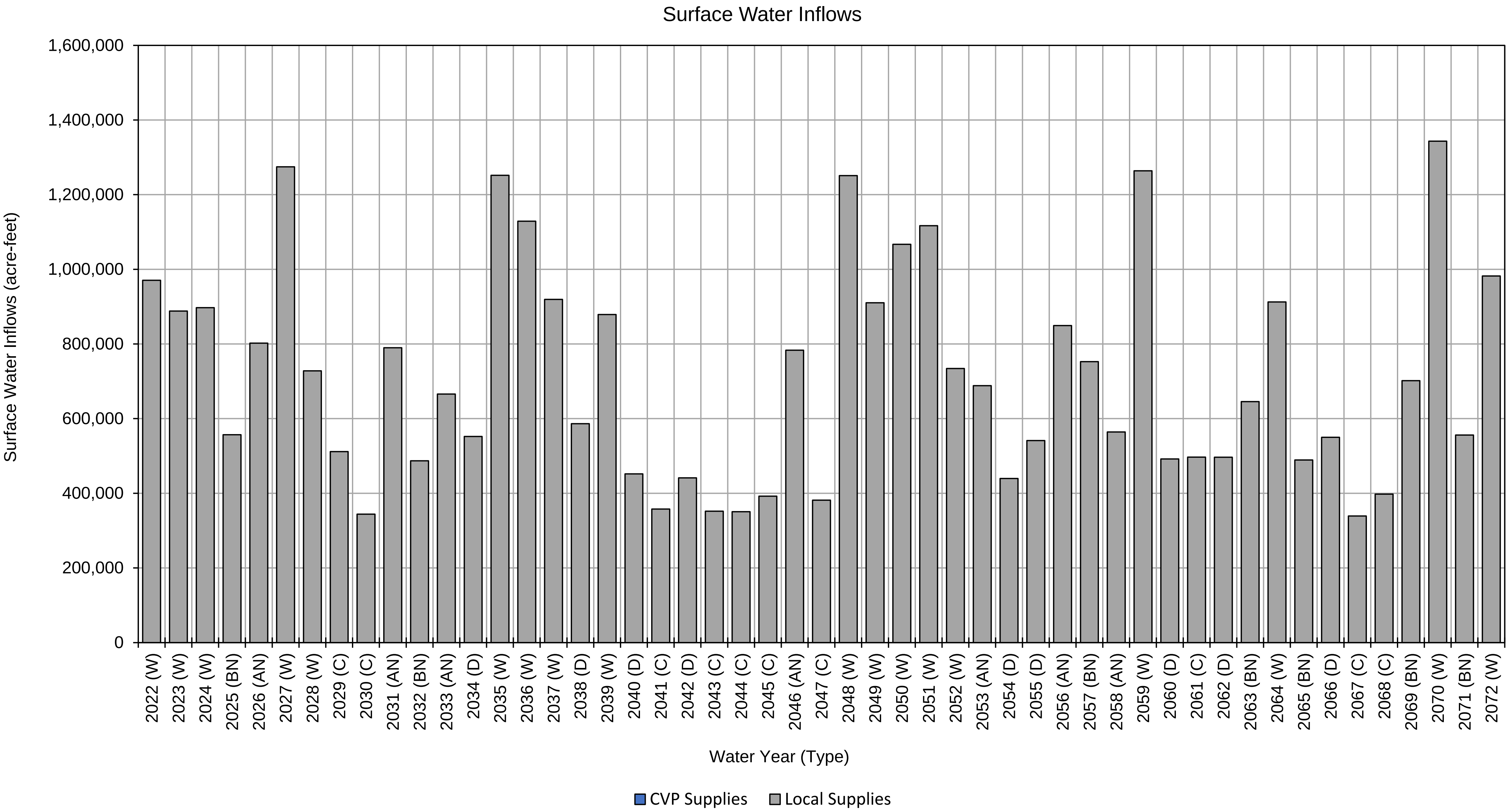
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	970,000	350,000	28,000	0	1,000,000	43,000	7,500	150,000	2,200	16,000	55,000	82,000	290
2023 (W)	890,000	280,000	34,000	0	880,000	44,000	11,000	130,000	2,500	16,000	49,000	73,000	-1,700
2024 (W)	900,000	280,000	34,000	0	890,000	44,000	13,000	130,000	2,500	16,000	49,000	70,000	150
2025 (BN)	560,000	140,000	35,000	0	490,000	48,000	8,800	120,000	2,700	11,000	17,000	45,000	-3,900
2026 (AN)	800,000	310,000	29,000	0	810,000	45,000	7,400	140,000	2,400	14,000	48,000	67,000	2,400
2027 (W)	1,300,000	320,000	28,000	0	1,300,000	40,000	11,000	130,000	2,100	16,000	59,000	93,000	-410
2028 (W)	730,000	180,000	33,000	0	660,000	43,000	12,000	120,000	2,500	14,000	32,000	60,000	-1,600
2029 (C)	510,000	160,000	38,000	0	470,000	52,000	8,600	100,000	3,000	14,000	24,000	42,000	-1,500
2030 (C)	340,000	130,000	38,000	0	290,000	56,000	3,400	94,000	3,000	10,000	12,000	33,000	6,100
2031 (AN)	790,000	310,000	27,000	0	790,000	46,000	3,200	140,000	2,400	14,000	48,000	81,000	-2,700
2032 (BN)	490,000	160,000	29,000	0	420,000	48,000	3,100	130,000	2,700	10,000	18,000	54,000	-2,400
2033 (AN)	670,000	230,000	25,000	0	610,000	46,000	3,000	130,000	2,400	14,000	35,000	72,000	4,500
2034 (D)	550,000	180,000	32,000	0	490,000	52,000	3,400	120,000	2,800	14,000	30,000	60,000	-5,100
2035 (W)	1,300,000	320,000	25,000	0	1,200,000	43,000	5,100	130,000	2,200	15,000	57,000	110,000	2,300
2036 (W)	1,100,000	430,000	25,000	0	1,200,000	32,000	11,000	140,000	1,700	15,000	74,000	86,000	5,000
2037 (W)	920,000	280,000	35,000	0	910,000	43,000	14,000	130,000	2,500	16,000	50,000	69,000	-2,500
2038 (D)	590,000	180,000	36,000	0	540,000	48,000	11,000	120,000	2,700	14,000	31,000	42,000	-4,600
2039 (W)	880,000	280,000	32,000	0	860,000	46,000	9,300	130,000	2,500	16,000	48,000	78,000	4,200
2040 (D)	450,000	180,000	32,000	0	410,000	46,000	7,400	120,000	2,600	12,000	25,000	35,000	-1,800
2041 (C)	360,000	140,000	32,000	0	300,000	51,000	3,500	120,000	2,700	11,000	16,000	33,000	65
2042 (D)	440,000	150,000	27,000	0	360,000	51,000	1,800	110,000	2,800	13,000	16,000	57,000	1,200
2043 (C)	350,000	170,000	31,000	0	290,000	51,000	1,200	130,000	2,400	12,000	20,000	46,000	-3,000
2044 (C)	350,000	170,000	30,000	0	280,000	51,000	660	130,000	2,400	12,000	20,000	51,000	-11
2045 (C)	390,000	190,000	30,000	0	330,000	53,000	480	130,000	2,400	12,000	23,000	64,000	-140
2046 (AN)	780,000	310,000	25,000	0	760,000	47,000	830	140,000	2,500	14,000	47,000	100,000	2,100
2047 (C)	380,000	170,000	29,000	0	310,000	50,000	820	130,000	2,400	11,000	20,000	51,000	-2,000
2048 (W)	1,300,000	440,000	23,000	0	1,300,000	42,000	1,700	130,000	2,200	16,000	61,000	130,000	2,500
2049 (W)	910,000	280,000	29,000	0	870,000	48,000	3,600	130,000	2,500	15,000	48,000	98,000	870
2050 (W)	1,100,000	250,000	29,000	0	1,000,000	48,000	4,800	130,000	2,700	13,000	38,000	87,000	160
2051 (W)	1,100,000	430,000	22,000	0	1,200,000	33,000	7,400	140,000	1,700	14,000	74,000	96,000	2,500
2052 (W)	730,000	180,000	31,000	0	660,000	44,000	9,200	130,000	2,600	13,000	33,000	70,000	-5,900
2053 (AN)	690,000	230,000	27,000	0	650,000	44,000	7,100	130,000	2,400	14,000	36,000	60,000	4,400
2054 (D)	440,000	180,000	31,000	0	390,000	48,000	5,100	120,000	2,600	12,000	24,000	41,000	-2,900
2055 (D)	540,000	180,000	32,000	0	480,000	53,000	3,700	120,000	2,800	14,000	29,000	60,000	-2,600
2056 (AN)	850,000	260,000	24,000	0	800,000	45,000	4,100	130,000	2,300	14,000	46,000	92,000	3,200
2057 (BN)	750,000	240,000	30,000	0	730,000	50,000	5,700	110,000	2,700	17,000	42,000	71,000	-2,700
2058 (AN)	560,000	260,000	23,000	0	530,000	40,000	5,800	150,000	2,100	13,000	45,000	62,000	3,000
2059 (W)	1,300,000	320,000	27,000	0	1,200,000	41,000	9,500	130,000	2,200	16,000	58,000	100,000	-1,000
2060 (D)	490,000	150,000	30,000	0	430,000	49,000	7,400	110,000	2,800	13,000	17,000	39,000	1,600
2061 (C)	500,000	160,000	36,000	0	440,000	54,000	4,100	100,000	3,000	13,000	23,000	55,000	-4,600
2062 (D)	500,000	160,000	30,000	0	420,000	52,000	2,500	120,000	2,700	12,000	19,000	59,000	1,700
2063 (BN)	650,000	240,000	23,000	0	590,000	43,000	2,500	130,000	2,300	14,000	41,000	82,000	2,100
2064 (W)	910,000	240,000	22,000	0	830,000	42,000	4,100	140,000	2,200	17,000	42,000	100,000	97
2065 (BN)	490,000	160,000	30,000	0	420,000	49,000	4,000	130,000	2,700	11,000	18,000	51,000	-2,900

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		550,000	170,000	36,000	0	490,000	56,000	2,400	100,000	3,000	14,000	23,000	62,000	2,600
2067 (C)		340,000	130,000	36,000	0	270,000	56,000	790	100,000	3,000	10,000	12,000	49,000	2,500
2068 (C)		400,000	190,000	44,000	0	370,000	54,000	430	110,000	2,700	11,000	24,000	62,000	-5,300
2069 (BN)		700,000	250,000	31,000	0	660,000	50,000	400	130,000	2,600	11,000	34,000	95,000	460
2070 (W)		1,300,000	310,000	26,000	0	1,300,000	45,000	1,400	140,000	2,400	14,000	55,000	140,000	2,400
2071 (BN)		560,000	140,000	30,000	0	460,000	52,000	1,100	120,000	2,800	11,000	16,000	75,000	-2,600
2072 (W)		980,000	350,000	24,000	0	980,000	46,000	1,900	150,000	2,300	16,000	52,000	110,000	5,500
Average (2022-2072)		710,000	230,000	30,000	0	670,000	47,000	5,100	130,000	2,500	13,000	36,000	71,000	5
2022-2072	W	1,000,000	310,000	28,000	0	1,000,000	43,000	7,600	130,000	2,300	15,000	52,000	92,000	710
	AN	730,000	270,000	26,000	0	710,000	45,000	4,500	140,000	2,400	14,000	43,000	77,000	2,400
	BN	600,000	190,000	30,000	0	540,000	49,000	3,700	120,000	2,600	12,000	26,000	68,000	-1,700
	D	510,000	170,000	32,000	0	450,000	51,000	4,900	120,000	2,800	13,000	24,000	51,000	-1,100
	C	390,000	160,000	34,000	0	340,000	53,000	2,400	120,000	2,700	12,000	19,000	49,000	-790

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

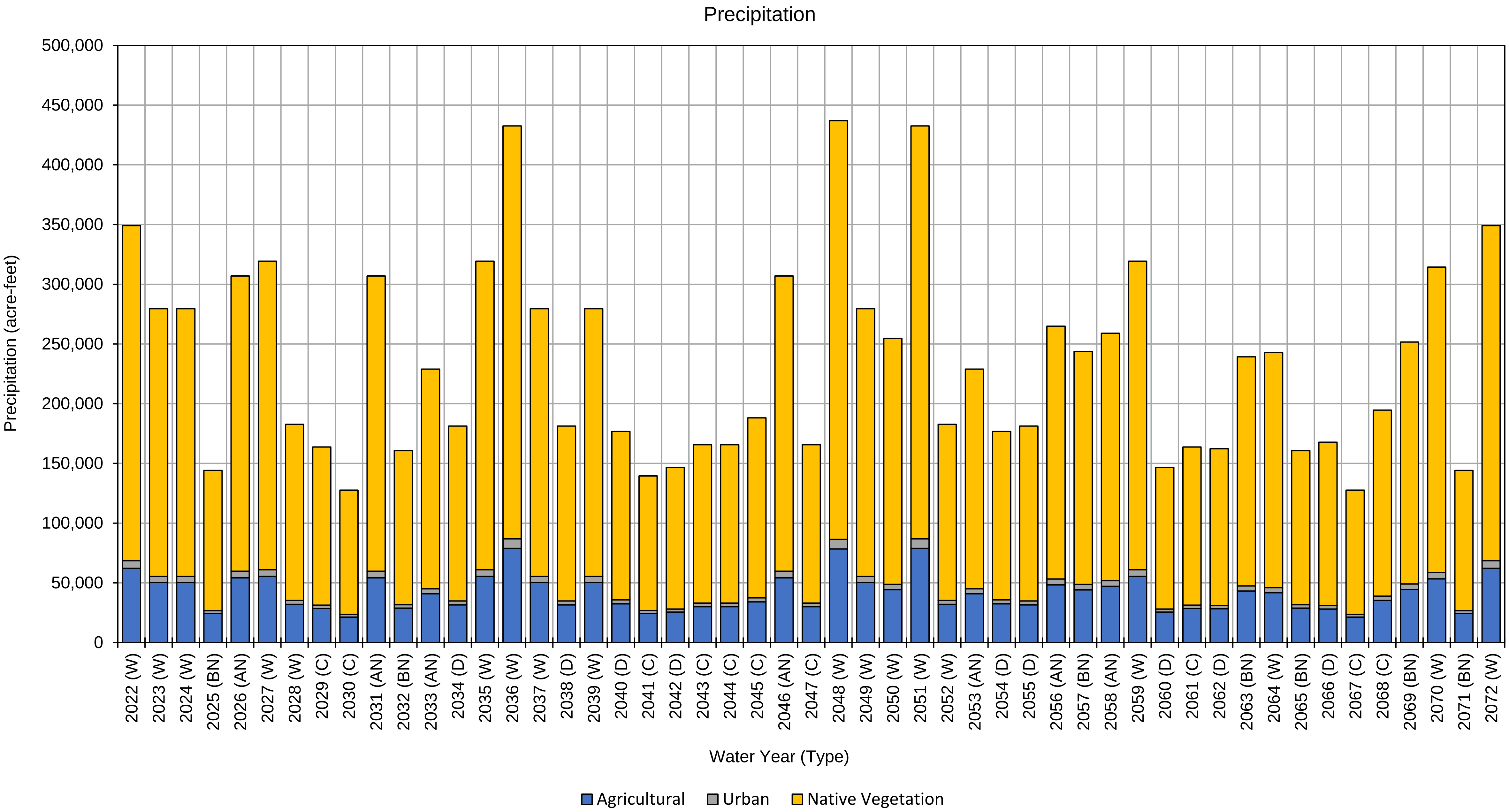
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	0	970,000	970,000
2023 (W)	0	890,000	890,000
2024 (W)	0	900,000	900,000
2025 (BN)	0	560,000	560,000
2026 (AN)	0	800,000	800,000
2027 (W)	0	1,300,000	1,300,000
2028 (W)	0	730,000	730,000
2029 (C)	0	510,000	510,000
2030 (C)	0	340,000	340,000
2031 (AN)	0	790,000	790,000
2032 (BN)	0	490,000	490,000
2033 (AN)	0	670,000	670,000
2034 (D)	0	550,000	550,000
2035 (W)	0	1,300,000	1,300,000
2036 (W)	0	1,100,000	1,100,000
2037 (W)	0	920,000	920,000
2038 (D)	0	590,000	590,000
2039 (W)	0	880,000	880,000
2040 (D)	0	450,000	450,000
2041 (C)	0	360,000	360,000
2042 (D)	0	440,000	440,000
2043 (C)	0	350,000	350,000
2044 (C)	0	350,000	350,000
2045 (C)	0	390,000	390,000
2046 (AN)	0	780,000	780,000
2047 (C)	0	380,000	380,000
2048 (W)	0	1,300,000	1,300,000
2049 (W)	0	910,000	910,000
2050 (W)	0	1,100,000	1,100,000
2051 (W)	0	1,100,000	1,100,000
2052 (W)	0	730,000	730,000
2053 (AN)	0	690,000	690,000
2054 (D)	0	440,000	440,000
2055 (D)	0	540,000	540,000
2056 (AN)	0	850,000	850,000
2057 (BN)	0	750,000	750,000
2058 (AN)	0	560,000	560,000
2059 (W)	0	1,300,000	1,300,000
2060 (D)	0	490,000	490,000
2061 (C)	0	500,000	500,000
2062 (D)	0	500,000	500,000
2063 (BN)	0	650,000	650,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		0	910,000	910,000
2065 (BN)		0	490,000	490,000
2066 (D)		0	550,000	550,000
2067 (C)		0	340,000	340,000
2068 (C)		0	400,000	400,000
2069 (BN)		0	700,000	700,000
2070 (W)		0	1,300,000	1,300,000
2071 (BN)		0	560,000	560,000
2072 (W)		0	980,000	980,000
Average (2022-2072)		0	710,000	710,000
2022-2072	W	0	1,000,000	1,000,000
	AN	0	730,000	730,000
	BN	0	600,000	600,000
	D	0	510,000	510,000
	C	0	390,000	390,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

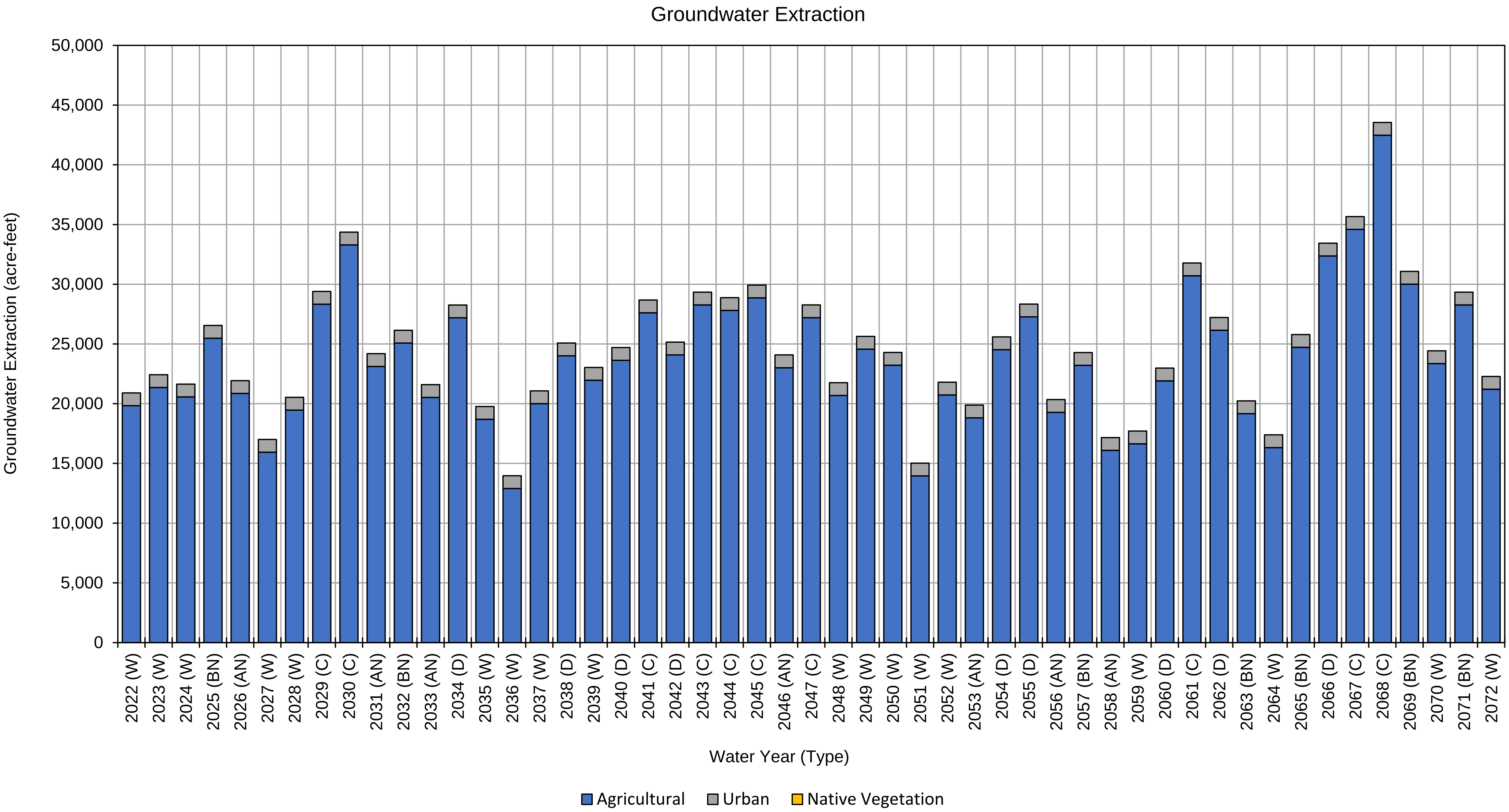
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	62,000	6,300	280,000	350,000
2023 (W)	50,000	5,000	220,000	280,000
2024 (W)	50,000	5,000	220,000	280,000
2025 (BN)	24,000	2,500	120,000	150,000
2026 (AN)	54,000	5,500	250,000	310,000
2027 (W)	56,000	5,600	260,000	320,000
2028 (W)	32,000	3,300	150,000	190,000
2029 (C)	29,000	2,800	130,000	160,000
2030 (C)	21,000	2,200	100,000	120,000
2031 (AN)	54,000	5,500	250,000	310,000
2032 (BN)	29,000	2,900	130,000	160,000
2033 (AN)	41,000	4,200	180,000	230,000
2034 (D)	32,000	3,200	150,000	190,000
2035 (W)	56,000	5,600	260,000	320,000
2036 (W)	79,000	8,000	350,000	440,000
2037 (W)	50,000	5,000	220,000	280,000
2038 (D)	32,000	3,200	150,000	190,000
2039 (W)	50,000	5,000	220,000	280,000
2040 (D)	32,000	3,300	140,000	180,000
2041 (C)	24,000	2,500	110,000	140,000
2042 (D)	25,000	2,600	120,000	150,000
2043 (C)	30,000	3,000	130,000	160,000
2044 (C)	30,000	3,000	130,000	160,000
2045 (C)	34,000	3,400	150,000	190,000
2046 (AN)	54,000	5,500	250,000	310,000
2047 (C)	30,000	3,000	130,000	160,000
2048 (W)	78,000	8,000	350,000	440,000
2049 (W)	50,000	5,000	220,000	280,000
2050 (W)	44,000	4,600	210,000	260,000
2051 (W)	79,000	8,000	350,000	440,000
2052 (W)	32,000	3,300	150,000	190,000
2053 (AN)	41,000	4,200	180,000	230,000
2054 (D)	32,000	3,300	140,000	180,000
2055 (D)	32,000	3,200	150,000	190,000
2056 (AN)	48,000	4,900	210,000	260,000
2057 (BN)	44,000	4,500	200,000	250,000
2058 (AN)	47,000	4,700	210,000	260,000
2059 (W)	56,000	5,600	260,000	320,000
2060 (D)	25,000	2,600	120,000	150,000
2061 (C)	29,000	2,800	130,000	160,000
2062 (D)	28,000	2,800	130,000	160,000
2063 (BN)	43,000	4,300	190,000	240,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		42,000	4,100	200,000	250,000
2065 (BN)		29,000	2,900	130,000	160,000
2066 (D)		28,000	2,800	140,000	170,000
2067 (C)		21,000	2,200	100,000	120,000
2068 (C)		35,000	3,600	160,000	200,000
2069 (BN)		45,000	4,500	200,000	250,000
2070 (W)		53,000	5,400	260,000	320,000
2071 (BN)		24,000	2,500	120,000	150,000
2072 (W)		62,000	6,300	280,000	350,000
Average (2022-2072)		41,000	4,200	190,000	240,000
2022-2072	W	55,000	5,500	250,000	310,000
	AN	49,000	5,000	220,000	270,000
	BN	34,000	3,400	150,000	190,000
	D	30,000	3,000	140,000	170,000
	C	28,000	2,800	130,000	160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

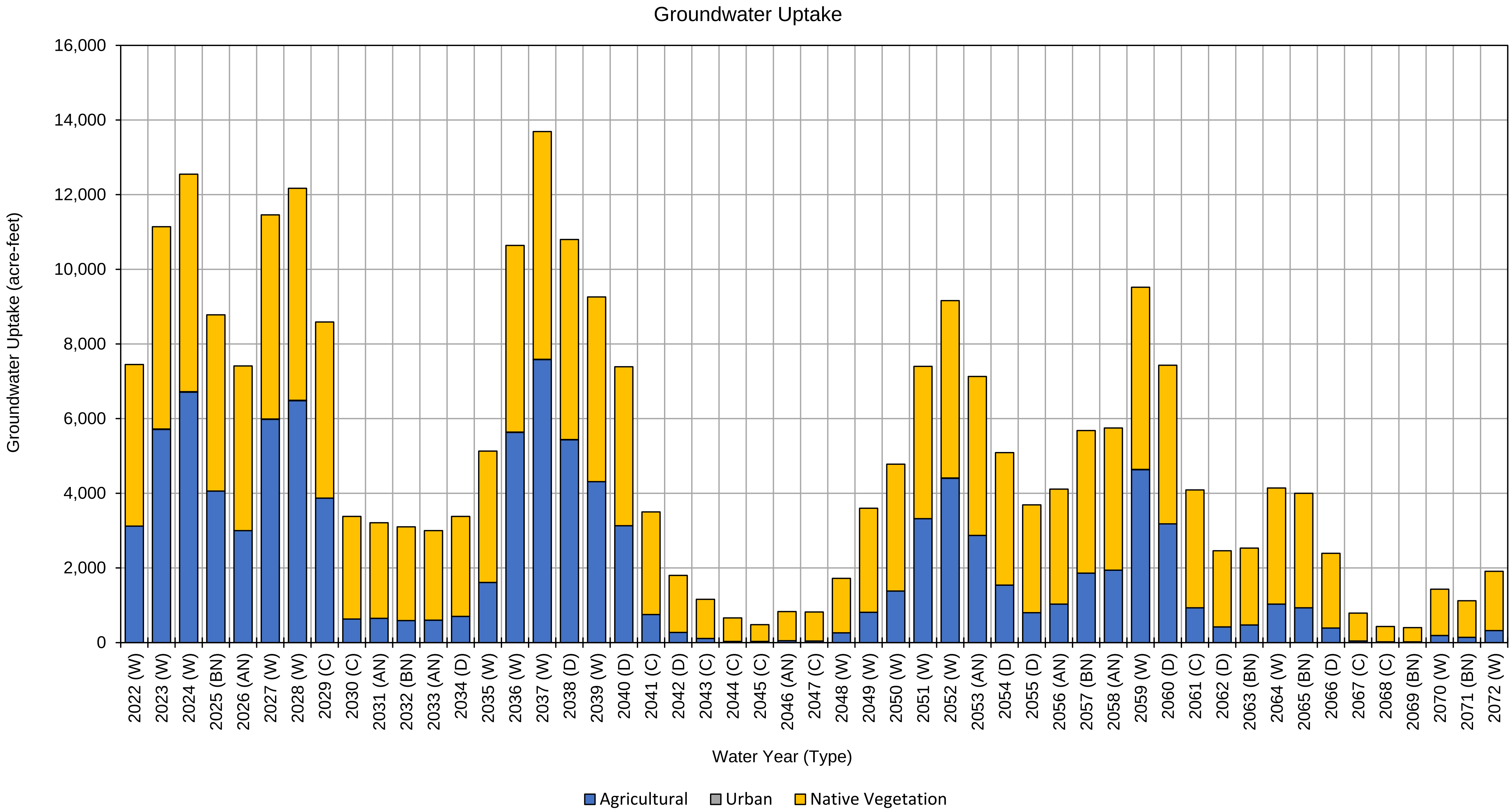
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	20,000	1,100	0	21,000
2023 (W)	21,000	1,100	0	22,000
2024 (W)	21,000	1,100	0	22,000
2025 (BN)	25,000	1,100	0	26,000
2026 (AN)	21,000	1,100	0	22,000
2027 (W)	16,000	1,100	0	17,000
2028 (W)	19,000	1,100	0	20,000
2029 (C)	28,000	1,100	0	29,000
2030 (C)	33,000	1,100	0	34,000
2031 (AN)	23,000	1,100	0	24,000
2032 (BN)	25,000	1,100	0	26,000
2033 (AN)	21,000	1,100	0	22,000
2034 (D)	27,000	1,100	0	28,000
2035 (W)	19,000	1,100	0	20,000
2036 (W)	13,000	1,100	0	14,000
2037 (W)	20,000	1,100	0	21,000
2038 (D)	24,000	1,100	0	25,000
2039 (W)	22,000	1,100	0	23,000
2040 (D)	24,000	1,100	0	25,000
2041 (C)	28,000	1,100	0	29,000
2042 (D)	24,000	1,100	0	25,000
2043 (C)	28,000	1,100	0	29,000
2044 (C)	28,000	1,100	0	29,000
2045 (C)	29,000	1,100	0	30,000
2046 (AN)	23,000	1,100	0	24,000
2047 (C)	27,000	1,100	0	28,000
2048 (W)	21,000	1,100	0	22,000
2049 (W)	25,000	1,100	0	26,000
2050 (W)	23,000	1,100	0	24,000
2051 (W)	14,000	1,100	0	15,000
2052 (W)	21,000	1,100	0	22,000
2053 (AN)	19,000	1,100	0	20,000
2054 (D)	25,000	1,100	0	26,000
2055 (D)	27,000	1,100	0	28,000
2056 (AN)	19,000	1,100	0	20,000
2057 (BN)	23,000	1,100	0	24,000
2058 (AN)	16,000	1,100	0	17,000
2059 (W)	17,000	1,100	0	18,000
2060 (D)	22,000	1,100	0	23,000
2061 (C)	31,000	1,100	0	32,000
2062 (D)	26,000	1,100	0	27,000
2063 (BN)	19,000	1,100	0	20,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		16,000	1,100	0	17,000
2065 (BN)		25,000	1,100	0	26,000
2066 (D)		32,000	1,100	0	33,000
2067 (C)		35,000	1,100	0	36,000
2068 (C)		42,000	1,100	0	43,000
2069 (BN)		30,000	1,100	0	31,000
2070 (W)		23,000	1,100	0	24,000
2071 (BN)		28,000	1,100	0	29,000
2072 (W)		21,000	1,100	0	22,000
Average (2022-2072)		24,000	1,100	0	25,000
2022-2072	W	20,000	1,100	0	21,000
	AN	20,000	1,100	0	21,000
	BN	25,000	1,100	0	26,000
	D	26,000	1,100	0	27,000
	C	31,000	1,100	0	32,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

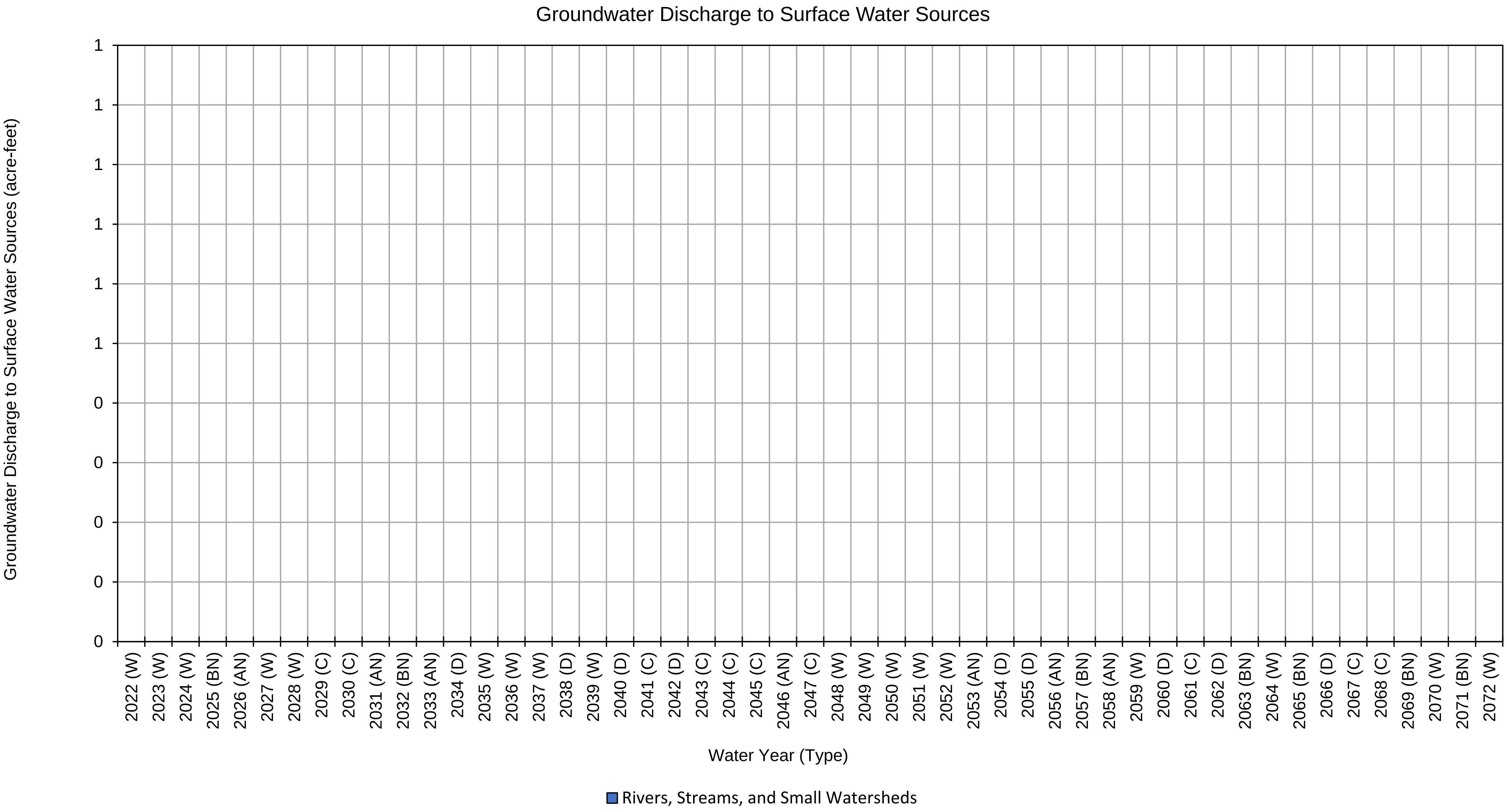
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	3,100	0	4,300	7,400
2023 (W)	5,700	10	5,400	11,000
2024 (W)	6,700	10	5,800	13,000
2025 (BN)	4,100	0	4,700	8,800
2026 (AN)	3,000	0	4,400	7,400
2027 (W)	6,000	10	5,500	12,000
2028 (W)	6,500	10	5,700	12,000
2029 (C)	3,900	0	4,700	8,600
2030 (C)	630	0	2,800	3,400
2031 (AN)	650	0	2,600	3,300
2032 (BN)	590	0	2,500	3,100
2033 (AN)	600	0	2,400	3,000
2034 (D)	700	0	2,700	3,400
2035 (W)	1,600	0	3,500	5,100
2036 (W)	5,600	10	5,000	11,000
2037 (W)	7,600	10	6,100	14,000
2038 (D)	5,400	10	5,400	11,000
2039 (W)	4,300	0	5,000	9,300
2040 (D)	3,100	0	4,300	7,400
2041 (C)	750	0	2,800	3,600
2042 (D)	270	0	1,500	1,800
2043 (C)	110	0	1,100	1,200
2044 (C)	30	0	630	660
2045 (C)	30	0	450	480
2046 (AN)	50	0	780	830
2047 (C)	40	0	780	820
2048 (W)	260	0	1,500	1,800
2049 (W)	810	0	2,800	3,600
2050 (W)	1,400	0	3,400	4,800
2051 (W)	3,300	0	4,100	7,400
2052 (W)	4,400	10	4,800	9,200
2053 (AN)	2,900	0	4,300	7,200
2054 (D)	1,500	0	3,600	5,100
2055 (D)	800	0	2,900	3,700
2056 (AN)	1,000	0	3,100	4,100
2057 (BN)	1,900	0	3,800	5,700
2058 (AN)	1,900	0	3,800	5,700
2059 (W)	4,600	10	4,900	9,500
2060 (D)	3,200	0	4,300	7,500
2061 (C)	930	0	3,200	4,100
2062 (D)	420	0	2,000	2,400
2063 (BN)	470	0	2,100	2,600

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		1,000	0	3,100	4,100
2065 (BN)		930	0	3,100	4,000
2066 (D)		390	0	2,000	2,400
2067 (C)		40	0	750	790
2068 (C)		20	0	410	430
2069 (BN)		20	0	380	400
2070 (W)		190	0	1,200	1,400
2071 (BN)		140	0	980	1,100
2072 (W)		320	0	1,600	1,900
Average (2022-2072)		2,000	2	3,100	5,100
2022-2072	W	3,500	4	4,100	7,600
	AN	1,400	0	3,000	4,400
	BN	1,200	0	2,500	3,700
	D	1,800	1	3,200	5,000
	C	650	0	1,700	2,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

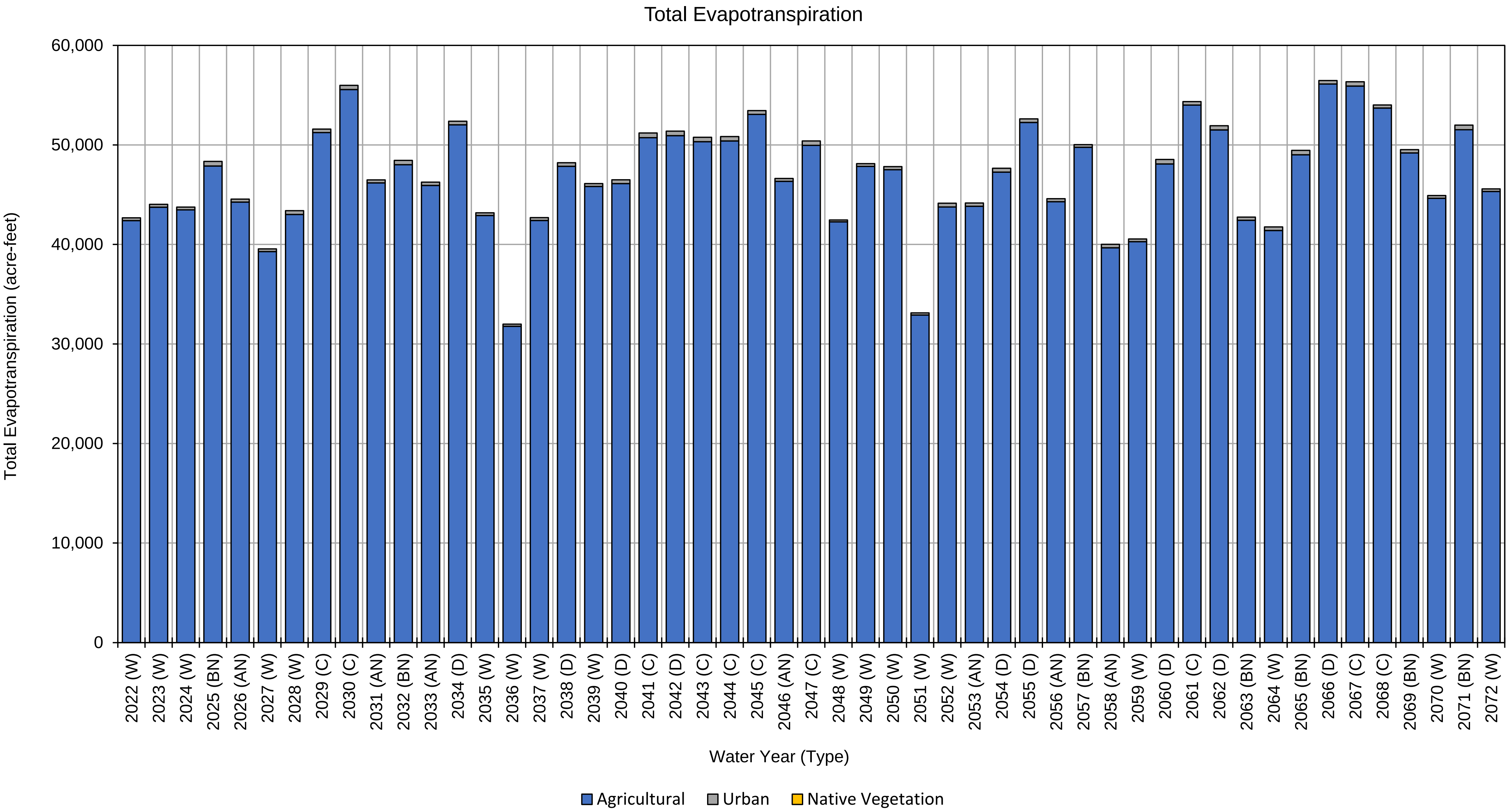
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	0
2023 (W)	0
2024 (W)	0
2025 (BN)	0
2026 (AN)	0
2027 (W)	0
2028 (W)	0
2029 (C)	0
2030 (C)	0
2031 (AN)	0
2032 (BN)	0
2033 (AN)	0
2034 (D)	0
2035 (W)	0
2036 (W)	0
2037 (W)	0
2038 (D)	0
2039 (W)	0
2040 (D)	0
2041 (C)	0
2042 (D)	0
2043 (C)	0
2044 (C)	0
2045 (C)	0
2046 (AN)	0
2047 (C)	0
2048 (W)	0
2049 (W)	0
2050 (W)	0
2051 (W)	0
2052 (W)	0
2053 (AN)	0
2054 (D)	0
2055 (D)	0
2056 (AN)	0
2057 (BN)	0
2058 (AN)	0
2059 (W)	0
2060 (D)	0
2061 (C)	0
2062 (D)	0
2063 (BN)	0

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		0
2066 (D)		0
2067 (C)		0
2068 (C)		0
2069 (BN)		0
2070 (W)		0
2071 (BN)		0
2072 (W)		0
Average (2022-2072)		0
2022-2072	W	0
	AN	0
	BN	0
	D	0
	C	0

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

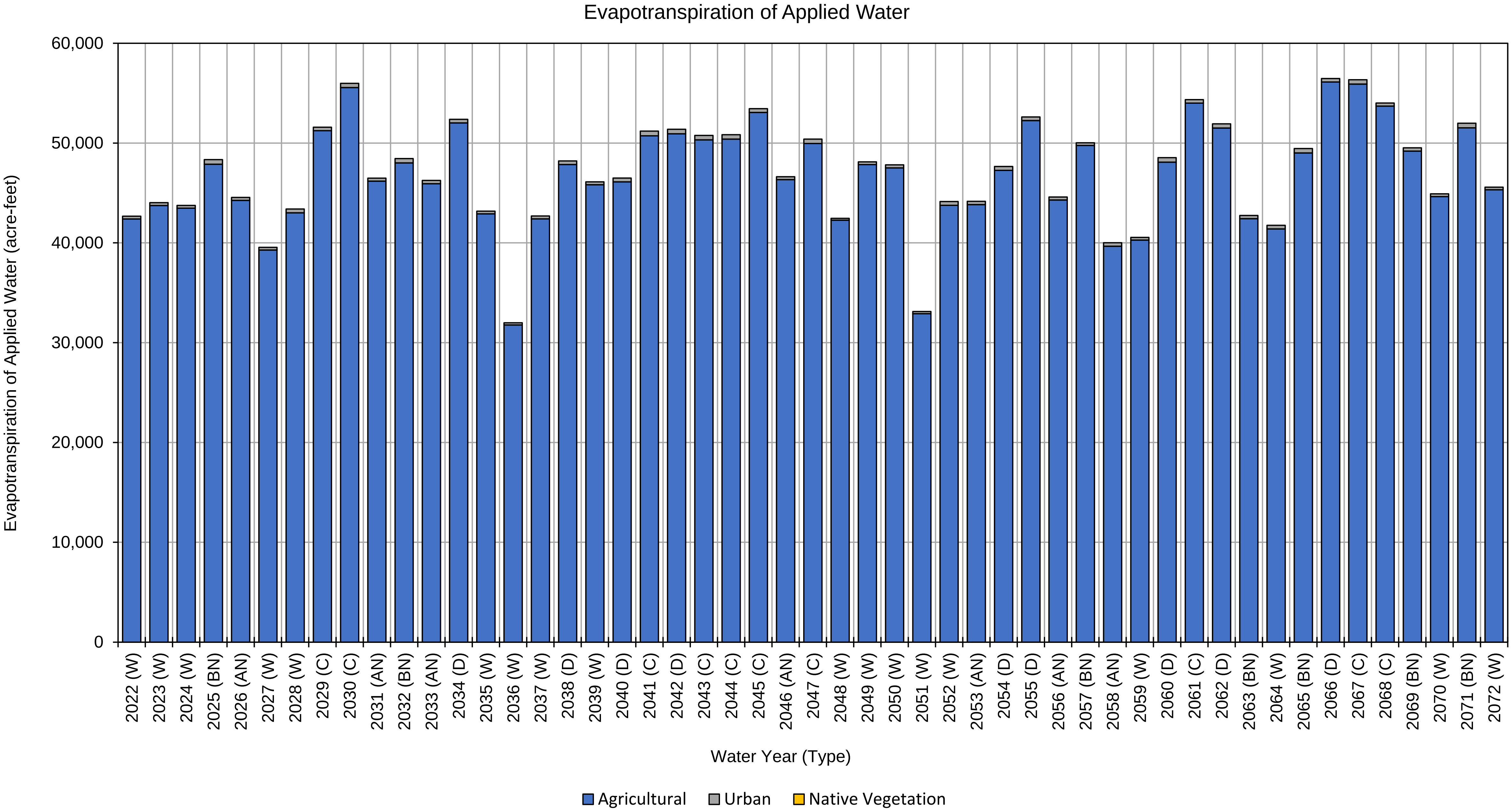
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	68,000	1,900	130,000	200,000
2023 (W)	69,000	1,600	120,000	190,000
2024 (W)	69,000	1,600	110,000	180,000
2025 (BN)	69,000	1,500	100,000	170,000
2026 (AN)	69,000	1,800	120,000	190,000
2027 (W)	66,000	1,700	120,000	190,000
2028 (W)	68,000	1,600	110,000	180,000
2029 (C)	70,000	1,300	89,000	160,000
2030 (C)	70,000	1,300	82,000	150,000
2031 (AN)	69,000	1,800	120,000	190,000
2032 (BN)	69,000	1,600	110,000	180,000
2033 (AN)	66,000	1,700	110,000	180,000
2034 (D)	70,000	1,400	100,000	170,000
2035 (W)	66,000	1,700	120,000	190,000
2036 (W)	59,000	1,800	120,000	180,000
2037 (W)	69,000	1,600	120,000	190,000
2038 (D)	70,000	1,400	100,000	170,000
2039 (W)	69,000	1,600	110,000	180,000
2040 (D)	68,000	1,600	110,000	180,000
2041 (C)	69,000	1,600	100,000	170,000
2042 (D)	68,000	1,500	98,000	170,000
2043 (C)	71,000	1,700	110,000	180,000
2044 (C)	71,000	1,700	110,000	180,000
2045 (C)	73,000	1,600	110,000	180,000
2046 (AN)	69,000	1,800	120,000	190,000
2047 (C)	71,000	1,700	110,000	180,000
2048 (W)	63,000	1,600	110,000	170,000
2049 (W)	69,000	1,600	110,000	180,000
2050 (W)	70,000	1,600	110,000	180,000
2051 (W)	59,000	1,800	120,000	180,000
2052 (W)	68,000	1,600	110,000	180,000
2053 (AN)	66,000	1,700	110,000	180,000
2054 (D)	68,000	1,600	110,000	180,000
2055 (D)	70,000	1,400	100,000	170,000
2056 (AN)	66,000	1,600	110,000	180,000
2057 (BN)	69,000	1,400	99,000	170,000
2058 (AN)	65,000	1,900	130,000	200,000
2059 (W)	66,000	1,700	120,000	190,000
2060 (D)	68,000	1,500	98,000	170,000
2061 (C)	70,000	1,300	91,000	160,000
2062 (D)	69,000	1,500	100,000	170,000
2063 (BN)	63,000	1,600	110,000	170,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		63,000	1,800	120,000	180,000
2065 (BN)		70,000	1,600	110,000	180,000
2066 (D)		71,000	1,300	91,000	160,000
2067 (C)		70,000	1,300	85,000	160,000
2068 (C)		70,000	1,300	95,000	170,000
2069 (BN)		70,000	1,600	110,000	180,000
2070 (W)		67,000	1,700	120,000	190,000
2071 (BN)		69,000	1,500	100,000	170,000
2072 (W)		68,000	1,800	120,000	190,000
Average (2022-2072)		68,000	1,600	110,000	180,000
2022-2072	W	66,000	1,700	120,000	190,000
	AN	67,000	1,700	120,000	190,000
	BN	69,000	1,600	110,000	180,000
	D	69,000	1,500	100,000	170,000
	C	71,000	1,500	98,000	170,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

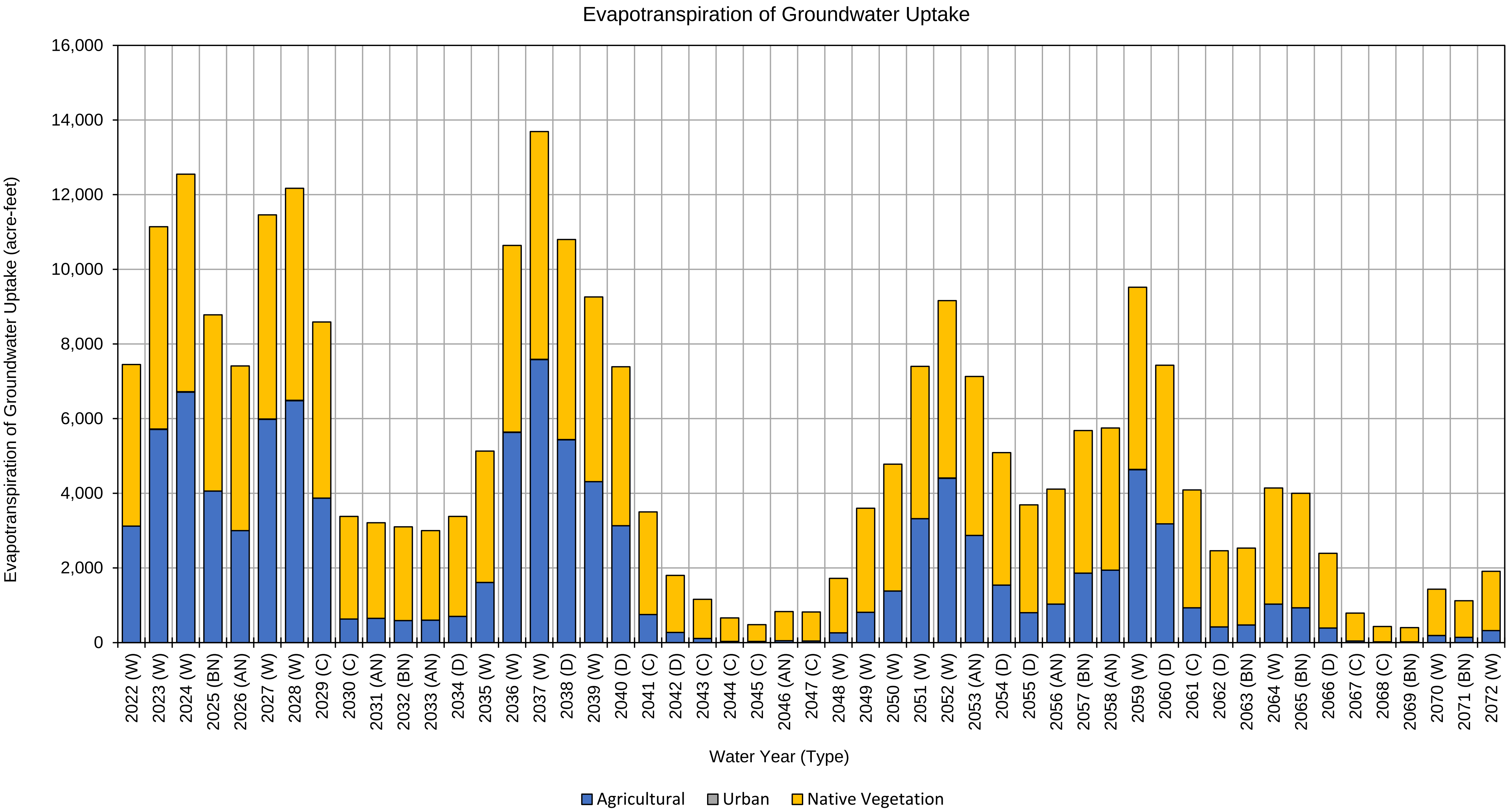
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	42,000	270	0	42,000
2023 (W)	44,000	290	0	44,000
2024 (W)	43,000	280	0	43,000
2025 (BN)	48,000	460	0	48,000
2026 (AN)	44,000	290	0	44,000
2027 (W)	39,000	270	0	39,000
2028 (W)	43,000	380	0	43,000
2029 (C)	51,000	350	0	51,000
2030 (C)	56,000	420	0	56,000
2031 (AN)	46,000	290	0	46,000
2032 (BN)	48,000	440	0	48,000
2033 (AN)	46,000	330	0	46,000
2034 (D)	52,000	360	0	52,000
2035 (W)	43,000	270	0	43,000
2036 (W)	32,000	210	0	32,000
2037 (W)	42,000	280	0	42,000
2038 (D)	48,000	360	0	48,000
2039 (W)	46,000	280	0	46,000
2040 (D)	46,000	380	0	46,000
2041 (C)	51,000	470	0	51,000
2042 (D)	51,000	450	0	51,000
2043 (C)	50,000	450	0	50,000
2044 (C)	50,000	440	0	50,000
2045 (C)	53,000	380	0	53,000
2046 (AN)	46,000	290	0	46,000
2047 (C)	50,000	440	0	50,000
2048 (W)	42,000	190	0	42,000
2049 (W)	48,000	280	0	48,000
2050 (W)	48,000	310	0	48,000
2051 (W)	33,000	210	0	33,000
2052 (W)	44,000	380	0	44,000
2053 (AN)	44,000	330	0	44,000
2054 (D)	47,000	390	0	47,000
2055 (D)	52,000	360	0	52,000
2056 (AN)	44,000	290	0	44,000
2057 (BN)	50,000	270	0	50,000
2058 (AN)	40,000	350	0	40,000
2059 (W)	40,000	270	0	40,000
2060 (D)	48,000	450	0	48,000
2061 (C)	54,000	350	0	54,000
2062 (D)	52,000	420	0	52,000
2063 (BN)	42,000	320	0	42,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		41,000	360	0	41,000
2065 (BN)		49,000	440	0	49,000
2066 (D)		56,000	350	0	56,000
2067 (C)		56,000	430	0	56,000
2068 (C)		54,000	310	0	54,000
2069 (BN)		49,000	320	0	49,000
2070 (W)		45,000	270	0	45,000
2071 (BN)		52,000	460	0	52,000
2072 (W)		45,000	260	0	45,000
Average (2022-2072)		47,000	340	0	47,000
2022-2072	W	42,000	280	0	42,000
	AN	44,000	310	0	44,000
	BN	48,000	390	0	48,000
	D	50,000	390	0	50,000
	C	52,000	400	0	52,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

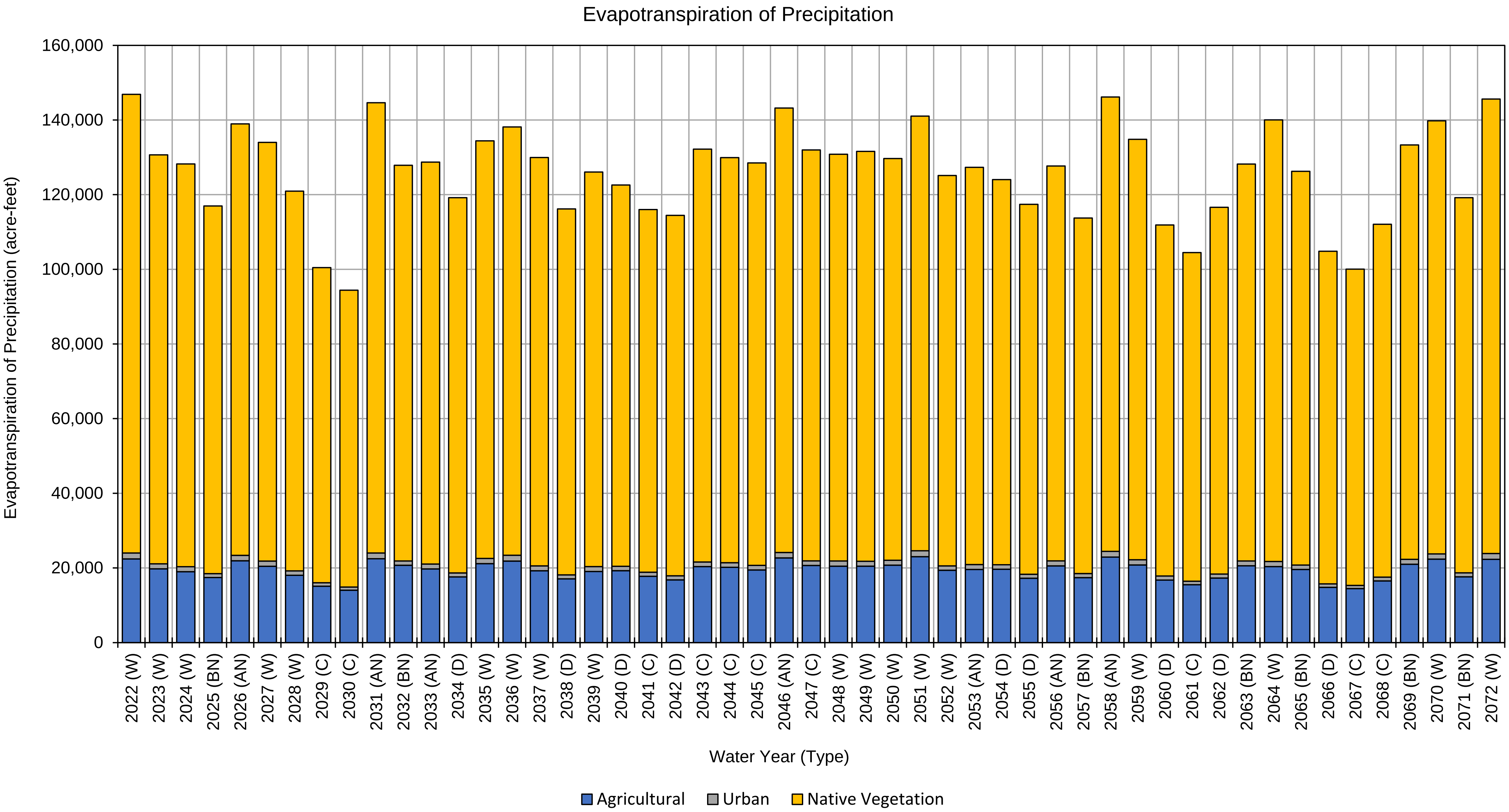
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	3,100	0	4,300	7,400
2023 (W)	5,700	10	5,400	11,000
2024 (W)	6,700	10	5,800	13,000
2025 (BN)	4,100	0	4,700	8,800
2026 (AN)	3,000	0	4,400	7,400
2027 (W)	6,000	10	5,500	12,000
2028 (W)	6,500	10	5,700	12,000
2029 (C)	3,900	0	4,700	8,600
2030 (C)	630	0	2,800	3,400
2031 (AN)	650	0	2,600	3,300
2032 (BN)	590	0	2,500	3,100
2033 (AN)	600	0	2,400	3,000
2034 (D)	700	0	2,700	3,400
2035 (W)	1,600	0	3,500	5,100
2036 (W)	5,600	10	5,000	11,000
2037 (W)	7,600	10	6,100	14,000
2038 (D)	5,400	10	5,400	11,000
2039 (W)	4,300	0	5,000	9,300
2040 (D)	3,100	0	4,300	7,400
2041 (C)	750	0	2,800	3,600
2042 (D)	270	0	1,500	1,800
2043 (C)	110	0	1,100	1,200
2044 (C)	30	0	630	660
2045 (C)	30	0	450	480
2046 (AN)	50	0	780	830
2047 (C)	40	0	780	820
2048 (W)	260	0	1,500	1,800
2049 (W)	810	0	2,800	3,600
2050 (W)	1,400	0	3,400	4,800
2051 (W)	3,300	0	4,100	7,400
2052 (W)	4,400	10	4,800	9,200
2053 (AN)	2,900	0	4,300	7,200
2054 (D)	1,500	0	3,600	5,100
2055 (D)	800	0	2,900	3,700
2056 (AN)	1,000	0	3,100	4,100
2057 (BN)	1,900	0	3,800	5,700
2058 (AN)	1,900	0	3,800	5,700
2059 (W)	4,600	10	4,900	9,500
2060 (D)	3,200	0	4,300	7,500
2061 (C)	930	0	3,200	4,100
2062 (D)	420	0	2,000	2,400
2063 (BN)	470	0	2,100	2,600

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		1,000	0	3,100	4,100
2065 (BN)		930	0	3,100	4,000
2066 (D)		390	0	2,000	2,400
2067 (C)		40	0	750	790
2068 (C)		20	0	410	430
2069 (BN)		20	0	380	400
2070 (W)		190	0	1,200	1,400
2071 (BN)		140	0	980	1,100
2072 (W)		320	0	1,600	1,900
Average (2022-2072)		2,000	2	3,100	5,100
2022-2072	W	3,500	4	4,100	7,600
	AN	1,400	0	3,000	4,400
	BN	1,200	0	2,500	3,700
	D	1,800	1	3,200	5,000
	C	650	0	1,700	2,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

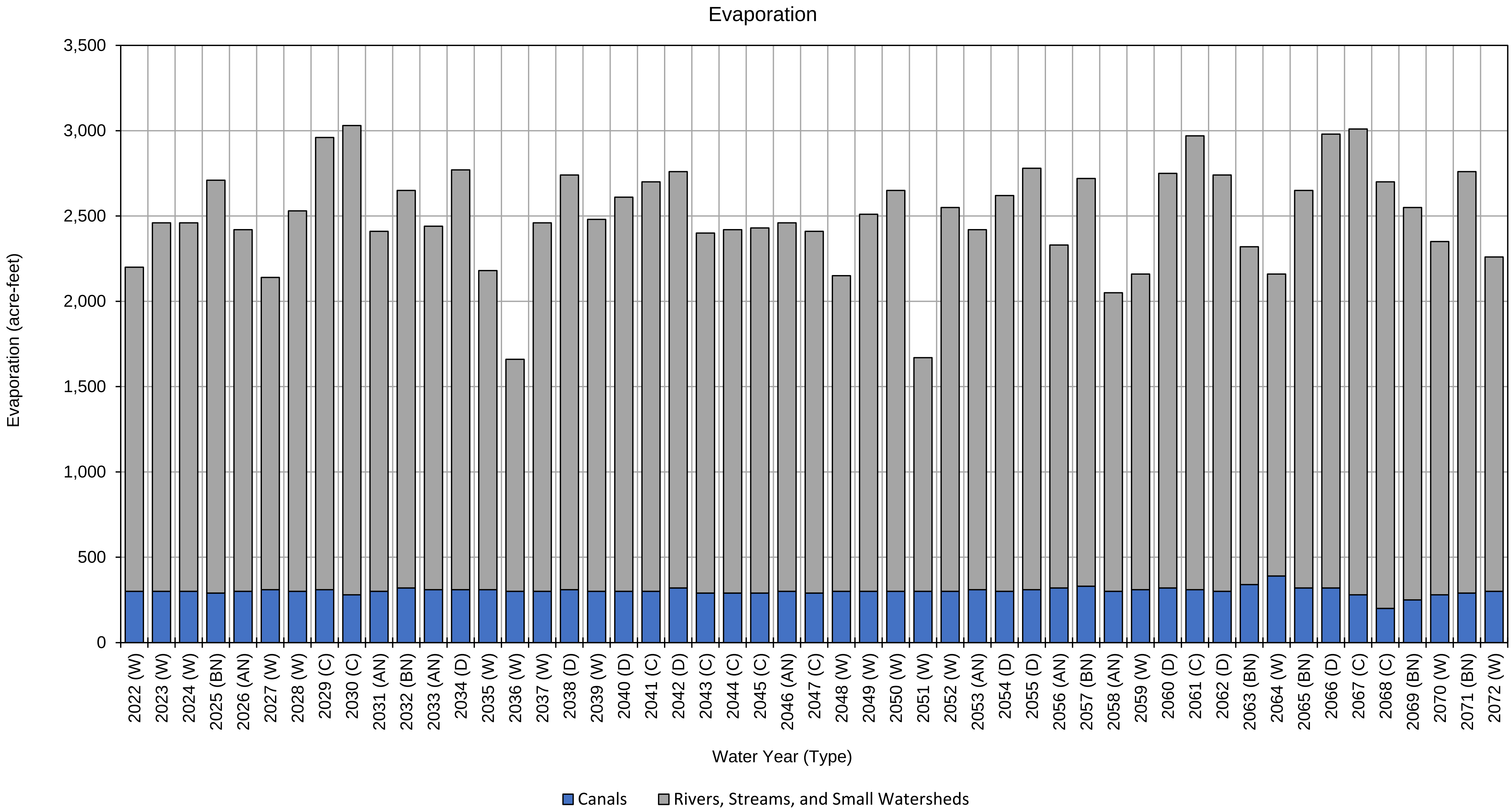
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	22,000	1,600	120,000	140,000
2023 (W)	20,000	1,300	110,000	130,000
2024 (W)	19,000	1,300	110,000	130,000
2025 (BN)	17,000	1,000	99,000	120,000
2026 (AN)	22,000	1,500	120,000	140,000
2027 (W)	20,000	1,400	110,000	130,000
2028 (W)	18,000	1,200	100,000	120,000
2029 (C)	15,000	920	84,000	100,000
2030 (C)	14,000	850	80,000	95,000
2031 (AN)	22,000	1,500	120,000	140,000
2032 (BN)	21,000	1,200	110,000	130,000
2033 (AN)	20,000	1,300	110,000	130,000
2034 (D)	18,000	1,100	100,000	120,000
2035 (W)	21,000	1,400	110,000	130,000
2036 (W)	22,000	1,600	110,000	130,000
2037 (W)	19,000	1,300	110,000	130,000
2038 (D)	17,000	1,100	98,000	120,000
2039 (W)	19,000	1,300	110,000	130,000
2040 (D)	19,000	1,200	100,000	120,000
2041 (C)	18,000	1,100	97,000	120,000
2042 (D)	17,000	1,100	97,000	120,000
2043 (C)	20,000	1,300	110,000	130,000
2044 (C)	20,000	1,200	110,000	130,000
2045 (C)	19,000	1,200	110,000	130,000
2046 (AN)	23,000	1,500	120,000	140,000
2047 (C)	21,000	1,200	110,000	130,000
2048 (W)	20,000	1,400	110,000	130,000
2049 (W)	20,000	1,300	110,000	130,000
2050 (W)	21,000	1,300	110,000	130,000
2051 (W)	23,000	1,600	120,000	140,000
2052 (W)	19,000	1,200	100,000	120,000
2053 (AN)	20,000	1,300	110,000	130,000
2054 (D)	20,000	1,200	100,000	120,000
2055 (D)	17,000	1,100	99,000	120,000
2056 (AN)	21,000	1,300	110,000	130,000
2057 (BN)	17,000	1,100	95,000	110,000
2058 (AN)	23,000	1,500	120,000	140,000
2059 (W)	21,000	1,400	110,000	130,000
2060 (D)	17,000	1,100	94,000	110,000
2061 (C)	16,000	940	88,000	100,000
2062 (D)	17,000	1,100	98,000	120,000
2063 (BN)	21,000	1,300	110,000	130,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		20,000	1,400	120,000	140,000
2065 (BN)		20,000	1,200	110,000	130,000
2066 (D)		15,000	930	89,000	100,000
2067 (C)		14,000	870	85,000	100,000
2068 (C)		17,000	1,000	95,000	110,000
2069 (BN)		21,000	1,300	110,000	130,000
2070 (W)		22,000	1,400	120,000	140,000
2071 (BN)		18,000	1,100	100,000	120,000
2072 (W)		22,000	1,600	120,000	140,000
Average (2022-2072)		19,000	1,200	110,000	130,000
2022-2072	W	21,000	1,400	110,000	130,000
	AN	21,000	1,400	110,000	130,000
	BN	19,000	1,200	100,000	120,000
	D	17,000	1,100	98,000	120,000
	C	17,000	1,100	97,000	120,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

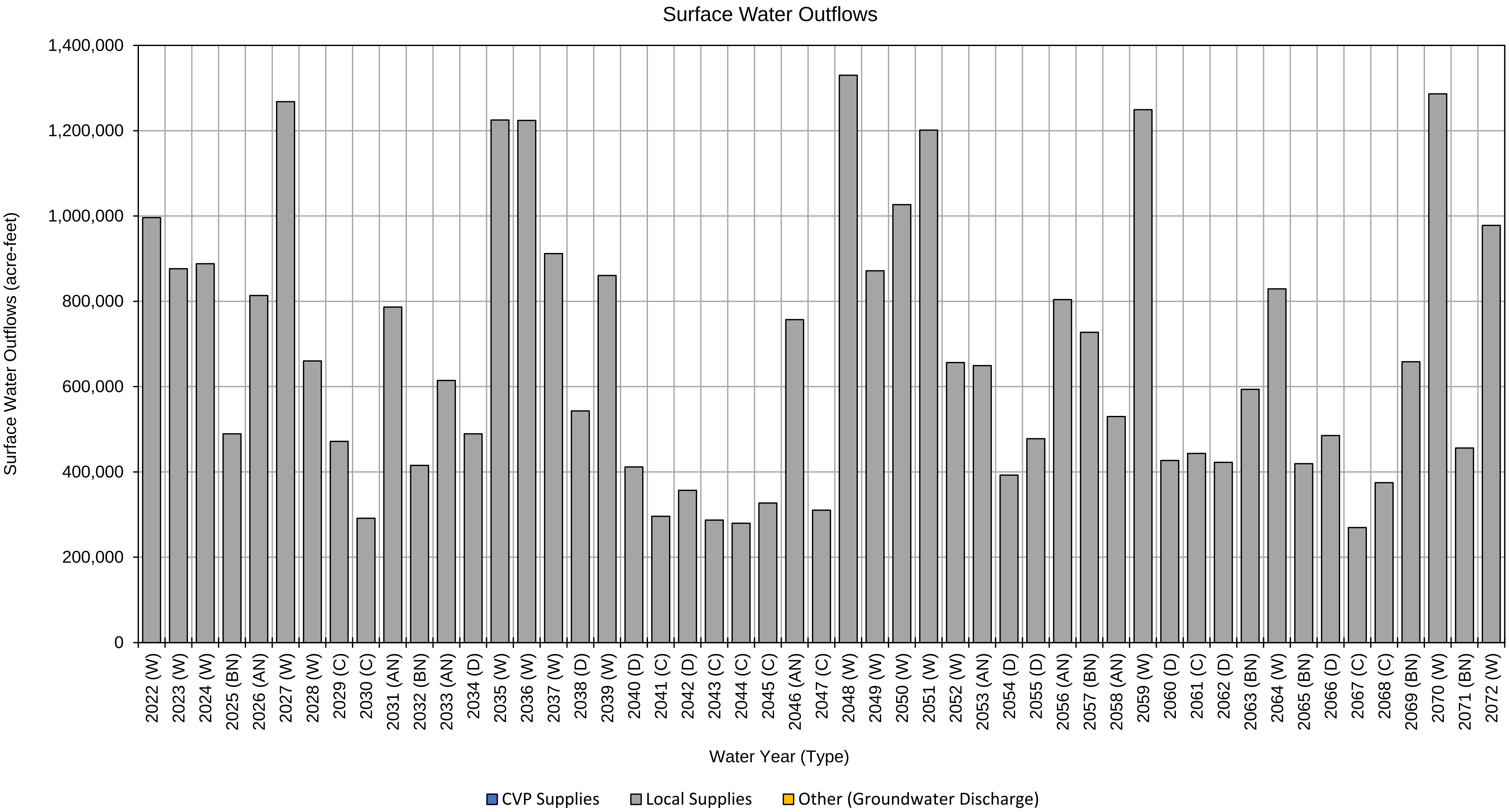
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	300	1,900	2,200
2023 (W)	300	2,200	2,500
2024 (W)	300	2,200	2,500
2025 (BN)	290	2,400	2,700
2026 (AN)	300	2,100	2,400
2027 (W)	310	1,800	2,100
2028 (W)	300	2,200	2,500
2029 (C)	310	2,700	3,000
2030 (C)	280	2,800	3,100
2031 (AN)	300	2,100	2,400
2032 (BN)	320	2,300	2,600
2033 (AN)	310	2,100	2,400
2034 (D)	310	2,500	2,800
2035 (W)	310	1,900	2,200
2036 (W)	300	1,400	1,700
2037 (W)	300	2,200	2,500
2038 (D)	310	2,400	2,700
2039 (W)	300	2,200	2,500
2040 (D)	300	2,300	2,600
2041 (C)	300	2,400	2,700
2042 (D)	320	2,400	2,700
2043 (C)	290	2,100	2,400
2044 (C)	290	2,100	2,400
2045 (C)	290	2,100	2,400
2046 (AN)	300	2,200	2,500
2047 (C)	290	2,100	2,400
2048 (W)	300	1,900	2,200
2049 (W)	300	2,200	2,500
2050 (W)	300	2,400	2,700
2051 (W)	300	1,400	1,700
2052 (W)	300	2,300	2,600
2053 (AN)	310	2,100	2,400
2054 (D)	300	2,300	2,600
2055 (D)	310	2,500	2,800
2056 (AN)	320	2,000	2,300
2057 (BN)	330	2,400	2,700
2058 (AN)	300	1,800	2,100
2059 (W)	310	1,900	2,200
2060 (D)	320	2,400	2,700
2061 (C)	310	2,700	3,000
2062 (D)	300	2,400	2,700
2063 (BN)	340	2,000	2,300

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		390	1,800	2,200
2065 (BN)		320	2,300	2,600
2066 (D)		320	2,700	3,000
2067 (C)		280	2,700	3,000
2068 (C)		200	2,500	2,700
2069 (BN)		250	2,300	2,600
2070 (W)		280	2,100	2,400
2071 (BN)		290	2,500	2,800
2072 (W)		300	2,000	2,300
Average (2022-2072)		300	2,200	2,500
2022-2072	W	310	2,000	2,300
	AN	310	2,100	2,400
	BN	310	2,300	2,600
	D	310	2,400	2,700
	C	280	2,400	2,700

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

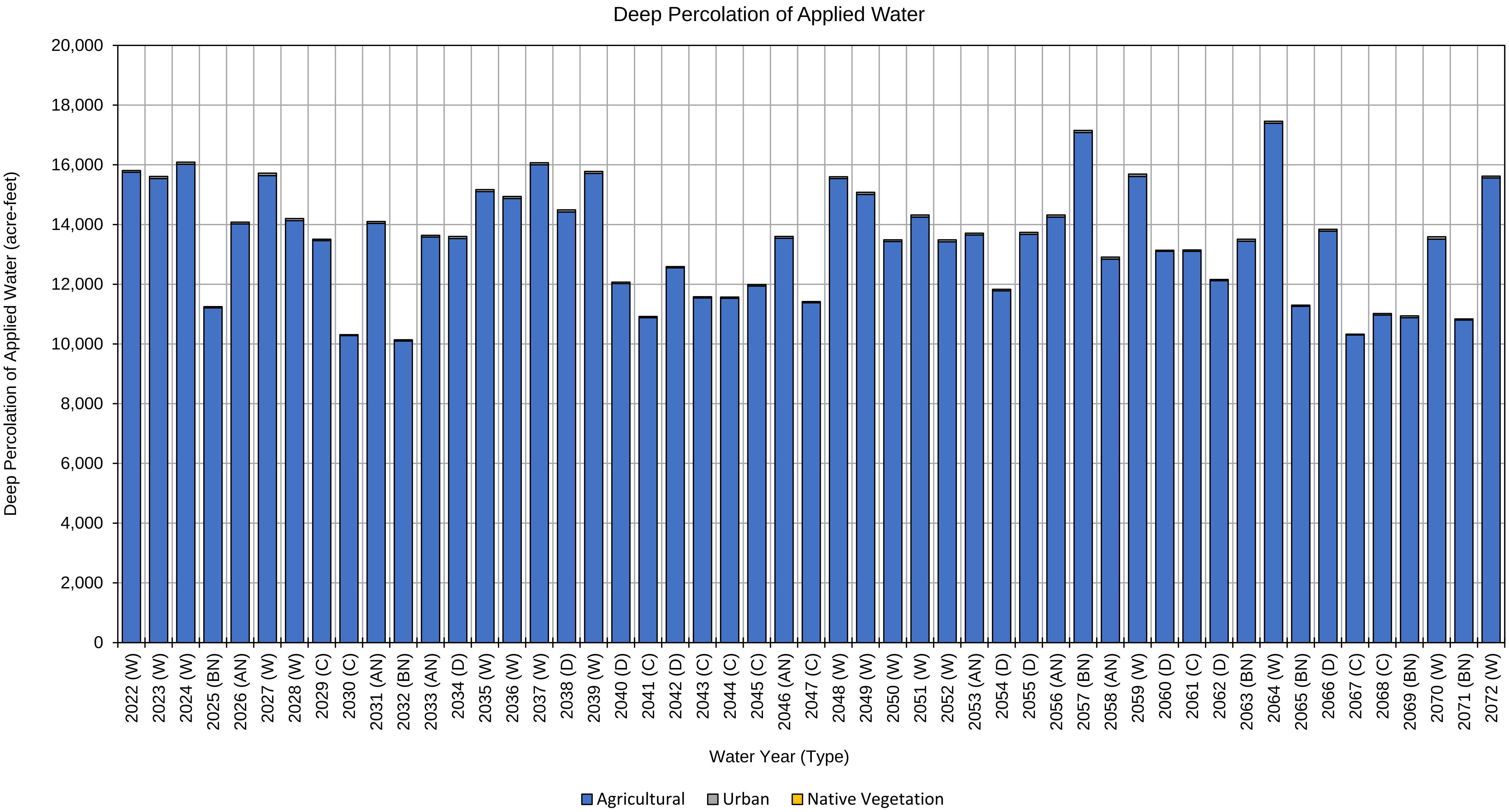
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	1,000,000	0	1,000,000
2023 (W)	0	880,000	0	880,000
2024 (W)	0	890,000	0	890,000
2025 (BN)	0	490,000	0	490,000
2026 (AN)	0	810,000	0	810,000
2027 (W)	0	1,300,000	0	1,300,000
2028 (W)	0	660,000	0	660,000
2029 (C)	0	470,000	0	470,000
2030 (C)	0	290,000	0	290,000
2031 (AN)	0	790,000	0	790,000
2032 (BN)	0	420,000	0	420,000
2033 (AN)	0	610,000	0	610,000
2034 (D)	0	490,000	0	490,000
2035 (W)	0	1,200,000	0	1,200,000
2036 (W)	0	1,200,000	0	1,200,000
2037 (W)	0	910,000	0	910,000
2038 (D)	0	540,000	0	540,000
2039 (W)	0	860,000	0	860,000
2040 (D)	0	410,000	0	410,000
2041 (C)	0	300,000	0	300,000
2042 (D)	0	360,000	0	360,000
2043 (C)	0	290,000	0	290,000
2044 (C)	0	280,000	0	280,000
2045 (C)	0	330,000	0	330,000
2046 (AN)	0	760,000	0	760,000
2047 (C)	0	310,000	0	310,000
2048 (W)	0	1,300,000	0	1,300,000
2049 (W)	0	870,000	0	870,000
2050 (W)	0	1,000,000	0	1,000,000
2051 (W)	0	1,200,000	0	1,200,000
2052 (W)	0	660,000	0	660,000
2053 (AN)	0	650,000	0	650,000
2054 (D)	0	390,000	0	390,000
2055 (D)	0	480,000	0	480,000
2056 (AN)	0	800,000	0	800,000
2057 (BN)	0	730,000	0	730,000
2058 (AN)	0	530,000	0	530,000
2059 (W)	0	1,200,000	0	1,200,000
2060 (D)	0	430,000	0	430,000
2061 (C)	0	440,000	0	440,000
2062 (D)	0	420,000	0	420,000
2063 (BN)	0	590,000	0	590,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	830,000	0	830,000
2065 (BN)		0	420,000	0	420,000
2066 (D)		0	490,000	0	490,000
2067 (C)		0	270,000	0	270,000
2068 (C)		0	370,000	0	370,000
2069 (BN)		0	660,000	0	660,000
2070 (W)		0	1,300,000	0	1,300,000
2071 (BN)		0	460,000	0	460,000
2072 (W)		0	980,000	0	980,000
Average (2022-2072)		0	670,000	0	670,000
2022-2072	W	0	1,000,000	0	1,000,000
	AN	0	710,000	0	710,000
	BN	0	540,000	0	540,000
	D	0	450,000	0	450,000
	C	0	340,000	0	340,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

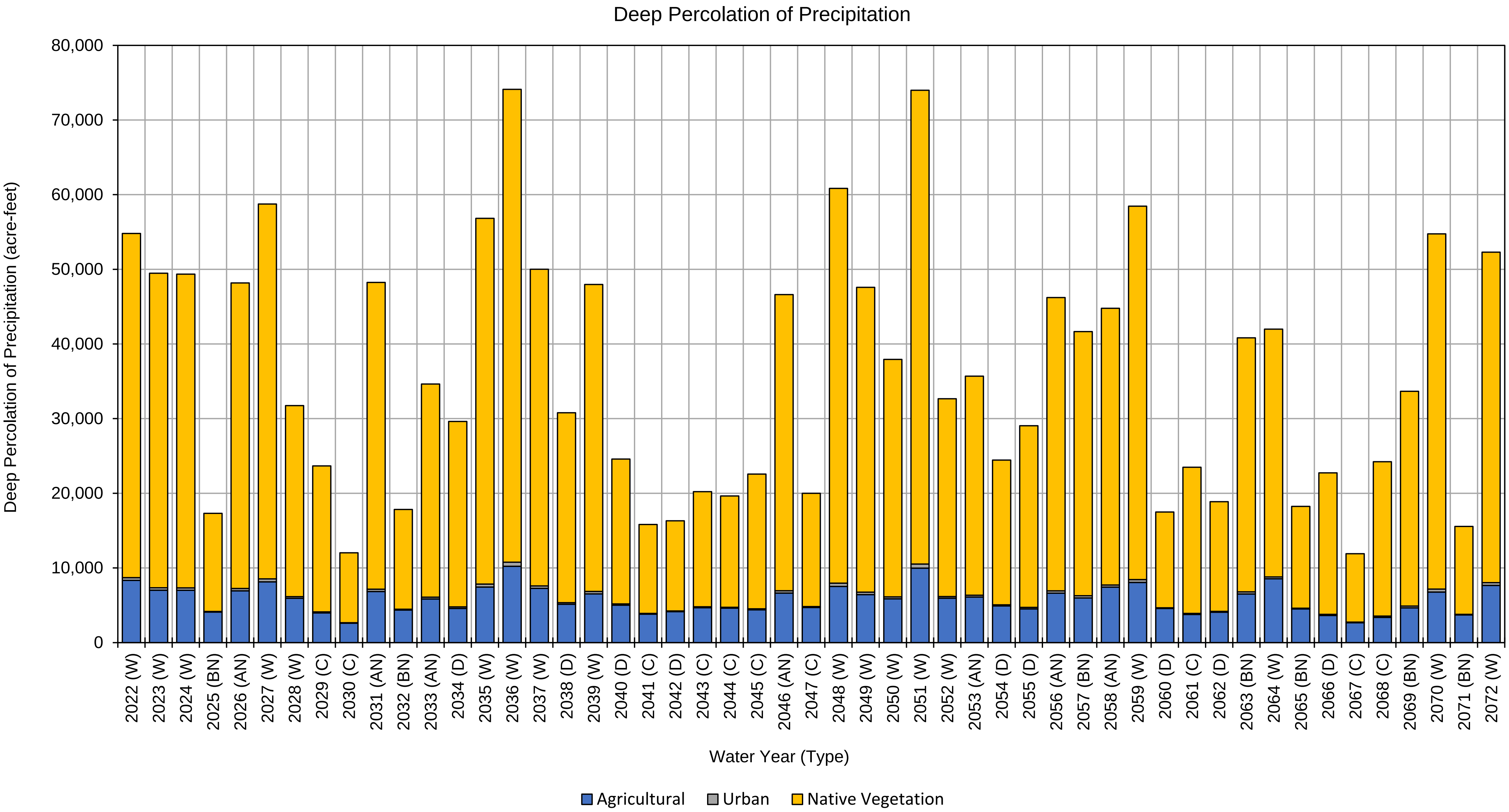
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	60	0	16,000
2023 (W)	16,000	70	0	16,000
2024 (W)	16,000	70	0	16,000
2025 (BN)	11,000	40	0	11,000
2026 (AN)	14,000	60	0	14,000
2027 (W)	16,000	80	0	16,000
2028 (W)	14,000	70	0	14,000
2029 (C)	13,000	50	0	13,000
2030 (C)	10,000	30	0	10,000
2031 (AN)	14,000	60	0	14,000
2032 (BN)	10,000	40	0	10,000
2033 (AN)	14,000	60	0	14,000
2034 (D)	14,000	70	0	14,000
2035 (W)	15,000	70	0	15,000
2036 (W)	15,000	70	0	15,000
2037 (W)	16,000	70	0	16,000
2038 (D)	14,000	70	0	14,000
2039 (W)	16,000	70	0	16,000
2040 (D)	12,000	50	0	12,000
2041 (C)	11,000	40	0	11,000
2042 (D)	13,000	40	0	13,000
2043 (C)	12,000	40	0	12,000
2044 (C)	12,000	40	0	12,000
2045 (C)	12,000	50	0	12,000
2046 (AN)	14,000	60	0	14,000
2047 (C)	11,000	40	0	11,000
2048 (W)	16,000	60	0	16,000
2049 (W)	15,000	70	0	15,000
2050 (W)	13,000	60	0	13,000
2051 (W)	14,000	70	0	14,000
2052 (W)	13,000	70	0	13,000
2053 (AN)	14,000	60	0	14,000
2054 (D)	12,000	50	0	12,000
2055 (D)	14,000	70	0	14,000
2056 (AN)	14,000	70	0	14,000
2057 (BN)	17,000	70	0	17,000
2058 (AN)	13,000	70	0	13,000
2059 (W)	16,000	80	0	16,000
2060 (D)	13,000	40	0	13,000
2061 (C)	13,000	50	0	13,000
2062 (D)	12,000	40	0	12,000
2063 (BN)	13,000	70	0	13,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		17,000	70	0	17,000
2065 (BN)		11,000	40	0	11,000
2066 (D)		14,000	60	0	14,000
2067 (C)		10,000	30	0	10,000
2068 (C)		11,000	50	0	11,000
2069 (BN)		11,000	60	0	11,000
2070 (W)		14,000	80	0	14,000
2071 (BN)		11,000	40	0	11,000
2072 (W)		16,000	60	0	16,000
Average (2022-2072)		13,000	58	0	13,000
2022-2072	W	15,000	69	0	15,000
	AN	14,000	63	0	14,000
	BN	12,000	51	0	12,000
	D	13,000	54	0	13,000
	C	12,000	42	0	12,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

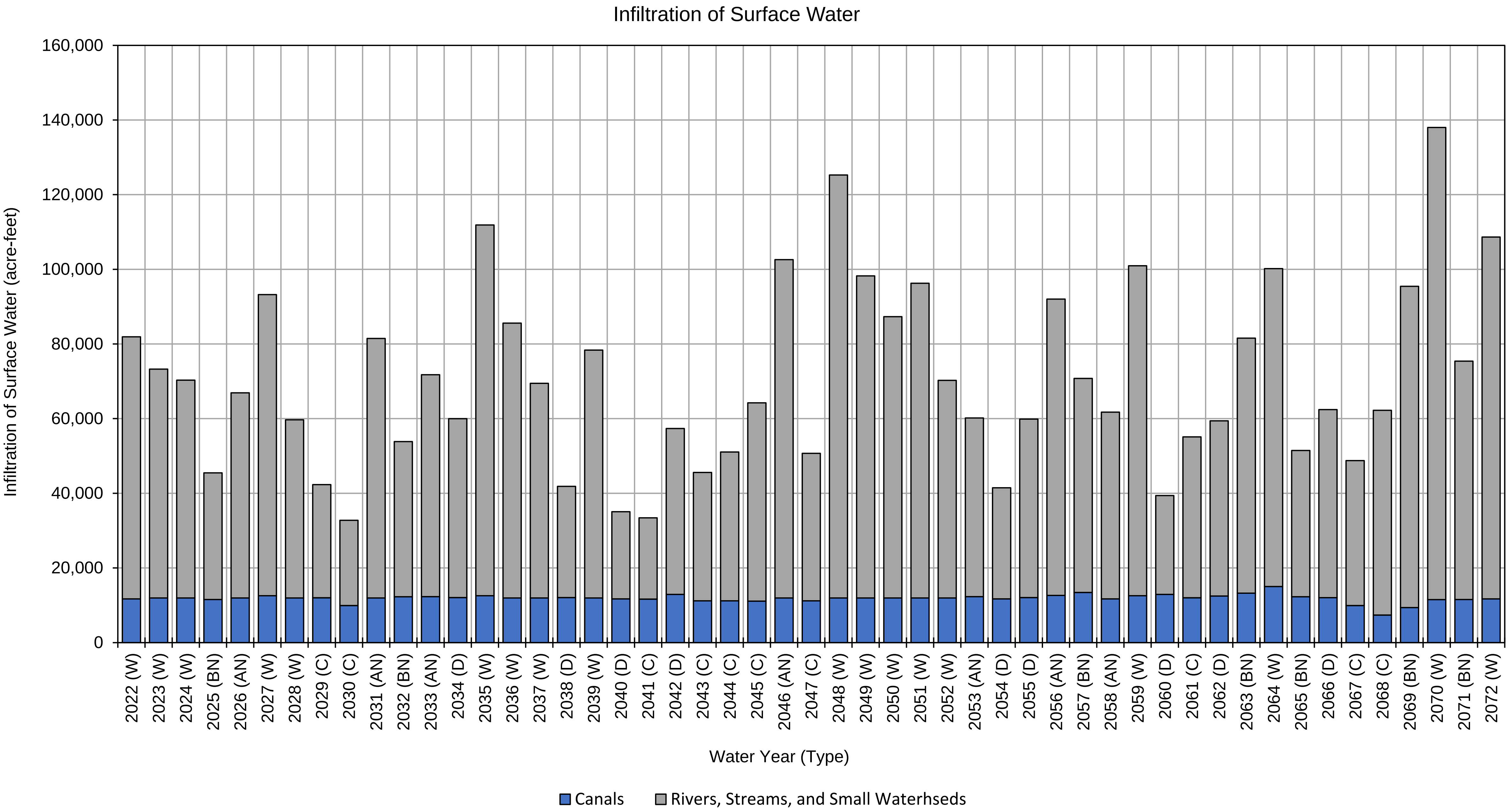
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	8,300	370	46,000	55,000
2023 (W)	7,000	330	42,000	49,000
2024 (W)	7,000	330	42,000	49,000
2025 (BN)	4,100	93	13,000	17,000
2026 (AN)	6,900	310	41,000	48,000
2027 (W)	8,100	390	50,000	58,000
2028 (W)	5,900	220	26,000	32,000
2029 (C)	4,000	140	20,000	24,000
2030 (C)	2,600	69	9,400	12,000
2031 (AN)	6,800	320	41,000	48,000
2032 (BN)	4,400	100	13,000	18,000
2033 (AN)	5,800	250	29,000	35,000
2034 (D)	4,600	200	25,000	30,000
2035 (W)	7,400	390	49,000	57,000
2036 (W)	10,000	540	63,000	74,000
2037 (W)	7,300	330	42,000	50,000
2038 (D)	5,100	200	25,000	30,000
2039 (W)	6,500	330	41,000	48,000
2040 (D)	5,000	160	19,000	24,000
2041 (C)	3,800	96	12,000	16,000
2042 (D)	4,100	95	12,000	16,000
2043 (C)	4,700	120	15,000	20,000
2044 (C)	4,600	120	15,000	20,000
2045 (C)	4,400	150	18,000	23,000
2046 (AN)	6,600	310	40,000	47,000
2047 (C)	4,700	120	15,000	20,000
2048 (W)	7,500	440	53,000	61,000
2049 (W)	6,400	330	41,000	48,000
2050 (W)	5,900	260	32,000	38,000
2051 (W)	10,000	550	63,000	74,000
2052 (W)	5,900	220	26,000	32,000
2053 (AN)	6,100	250	29,000	35,000
2054 (D)	4,900	160	19,000	24,000
2055 (D)	4,500	200	24,000	29,000
2056 (AN)	6,600	320	39,000	46,000
2057 (BN)	6,000	300	35,000	41,000
2058 (AN)	7,400	290	37,000	45,000
2059 (W)	8,100	390	50,000	58,000
2060 (D)	4,600	95	13,000	18,000
2061 (C)	3,800	140	20,000	24,000
2062 (D)	4,100	110	15,000	19,000
2063 (BN)	6,500	280	34,000	41,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		8,500	260	33,000	42,000
2065 (BN)		4,500	100	14,000	19,000
2066 (D)		3,600	160	19,000	23,000
2067 (C)		2,700	70	9,200	12,000
2068 (C)		3,400	180	21,000	25,000
2069 (BN)		4,600	250	29,000	34,000
2070 (W)		6,800	400	48,000	55,000
2071 (BN)		3,700	92	12,000	16,000
2072 (W)		7,700	370	44,000	52,000
Average (2022-2072)		5,800	240	30,000	36,000
2022-2072	W	7,500	360	44,000	52,000
	AN	6,600	290	37,000	44,000
	BN	4,800	180	21,000	26,000
	D	4,500	150	19,000	24,000
	C	3,900	120	15,000	19,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

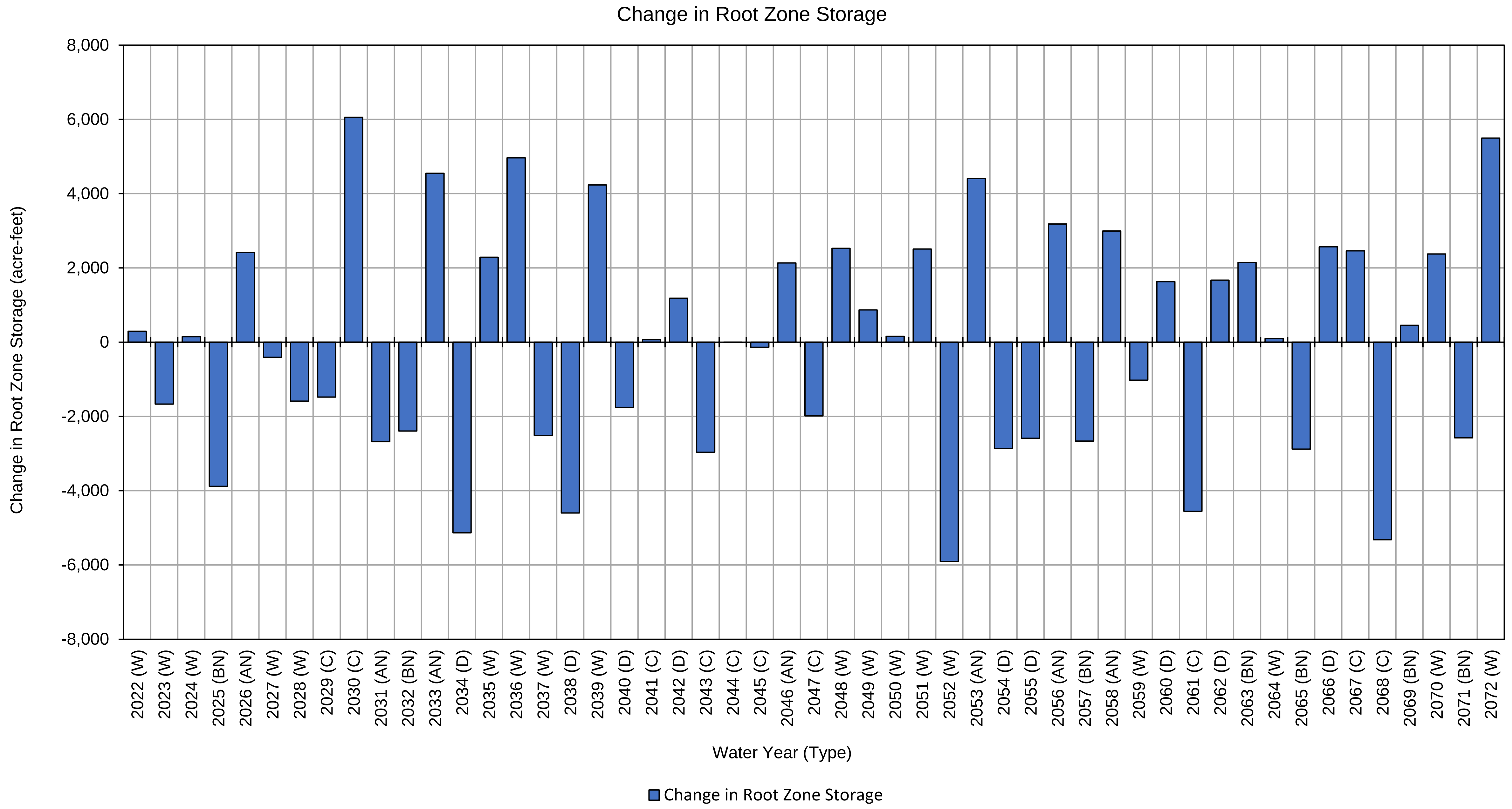
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	12,000	70,000	82,000
2023 (W)	12,000	61,000	73,000
2024 (W)	12,000	58,000	70,000
2025 (BN)	12,000	34,000	46,000
2026 (AN)	12,000	55,000	67,000
2027 (W)	13,000	81,000	94,000
2028 (W)	12,000	48,000	60,000
2029 (C)	12,000	30,000	42,000
2030 (C)	9,900	23,000	33,000
2031 (AN)	12,000	70,000	82,000
2032 (BN)	12,000	42,000	54,000
2033 (AN)	12,000	59,000	71,000
2034 (D)	12,000	48,000	60,000
2035 (W)	13,000	99,000	110,000
2036 (W)	12,000	74,000	86,000
2037 (W)	12,000	58,000	70,000
2038 (D)	12,000	30,000	42,000
2039 (W)	12,000	66,000	78,000
2040 (D)	12,000	23,000	35,000
2041 (C)	12,000	22,000	34,000
2042 (D)	13,000	44,000	57,000
2043 (C)	11,000	34,000	45,000
2044 (C)	11,000	40,000	51,000
2045 (C)	11,000	53,000	64,000
2046 (AN)	12,000	91,000	100,000
2047 (C)	11,000	40,000	51,000
2048 (W)	12,000	110,000	120,000
2049 (W)	12,000	86,000	98,000
2050 (W)	12,000	75,000	87,000
2051 (W)	12,000	84,000	96,000
2052 (W)	12,000	58,000	70,000
2053 (AN)	12,000	48,000	60,000
2054 (D)	12,000	30,000	42,000
2055 (D)	12,000	48,000	60,000
2056 (AN)	13,000	79,000	92,000
2057 (BN)	13,000	57,000	70,000
2058 (AN)	12,000	50,000	62,000
2059 (W)	13,000	88,000	100,000
2060 (D)	13,000	26,000	39,000
2061 (C)	12,000	43,000	55,000
2062 (D)	12,000	47,000	59,000
2063 (BN)	13,000	68,000	81,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		15,000	85,000	100,000
2065 (BN)		12,000	39,000	51,000
2066 (D)		12,000	50,000	62,000
2067 (C)		9,900	39,000	49,000
2068 (C)		7,400	55,000	62,000
2069 (BN)		9,400	86,000	95,000
2070 (W)		12,000	130,000	140,000
2071 (BN)		12,000	64,000	76,000
2072 (W)		12,000	97,000	110,000
Average (2022-2072)		12,000	59,000	71,000
2022-2072	W	12,000	79,000	91,000
	AN	12,000	65,000	77,000
	BN	12,000	56,000	68,000
	D	12,000	39,000	51,000
	C	11,000	38,000	49,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	290
2023 (W)	-1,700
2024 (W)	150
2025 (BN)	-3,900
2026 (AN)	2,400
2027 (W)	-410
2028 (W)	-1,600
2029 (C)	-1,500
2030 (C)	6,100
2031 (AN)	-2,700
2032 (BN)	-2,400
2033 (AN)	4,500
2034 (D)	-5,100
2035 (W)	2,300
2036 (W)	5,000
2037 (W)	-2,500
2038 (D)	-4,600
2039 (W)	4,200
2040 (D)	-1,800
2041 (C)	65
2042 (D)	1,200
2043 (C)	-3,000
2044 (C)	-11
2045 (C)	-140
2046 (AN)	2,100
2047 (C)	-2,000
2048 (W)	2,500
2049 (W)	870
2050 (W)	160
2051 (W)	2,500
2052 (W)	-5,900
2053 (AN)	4,400
2054 (D)	-2,900
2055 (D)	-2,600
2056 (AN)	3,200
2057 (BN)	-2,700
2058 (AN)	3,000
2059 (W)	-1,000
2060 (D)	1,600
2061 (C)	-4,600
2062 (D)	1,700
2063 (BN)	2,100

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		97
2065 (BN)		-2,900
2066 (D)		2,600
2067 (C)		2,500
2068 (C)		-5,300
2069 (BN)		460
2070 (W)		2,400
2071 (BN)		-2,600
2072 (W)		5,500
Average (2022-2072)		5
2022-2072	W	710
	AN	2,400
	BN	-1,700
	D	-1,100
	C	-790

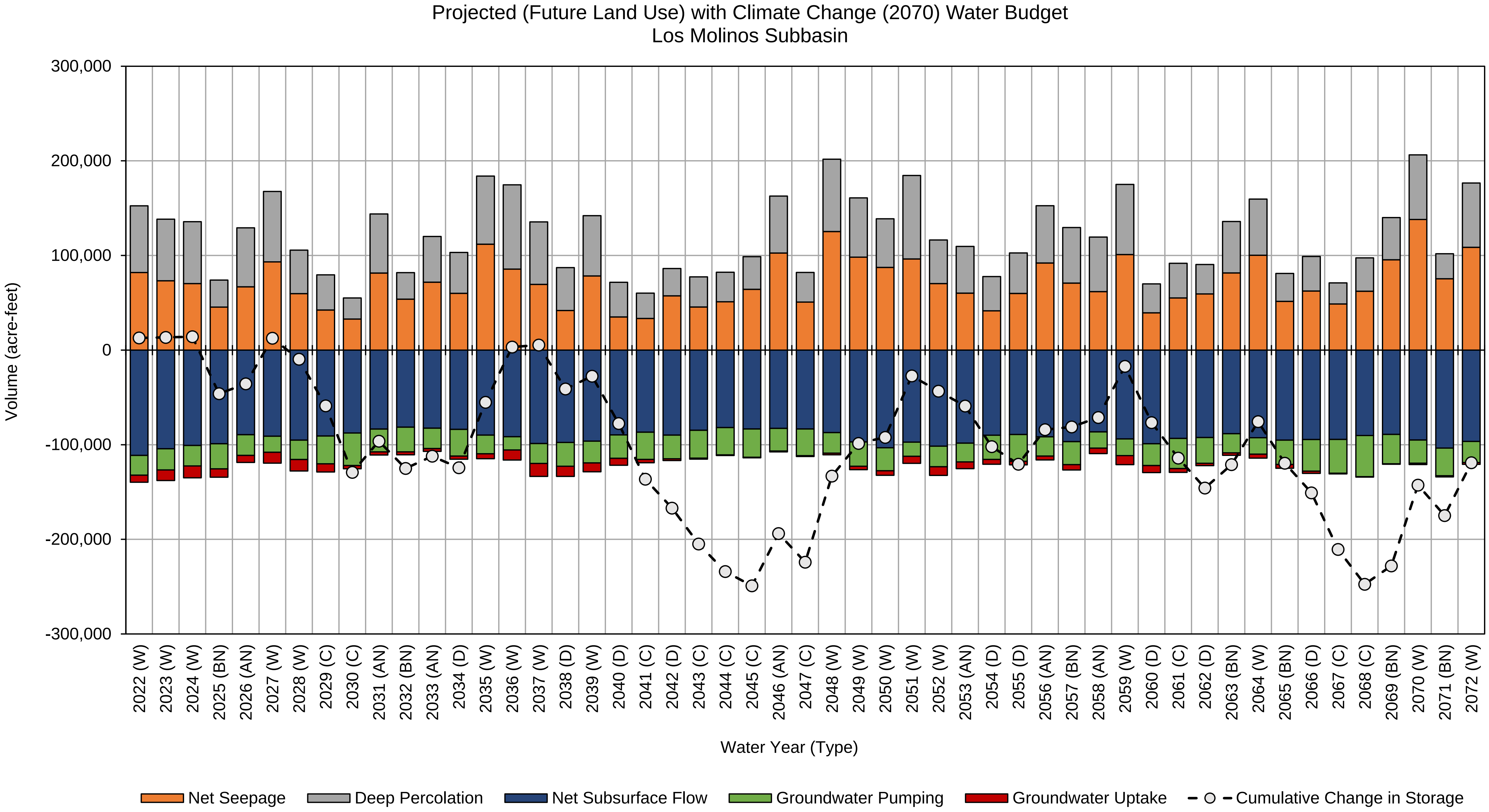
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-7b

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results – Groundwater System


Projected (Future Land Use) with Climate Change (2070) Water Budget
Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

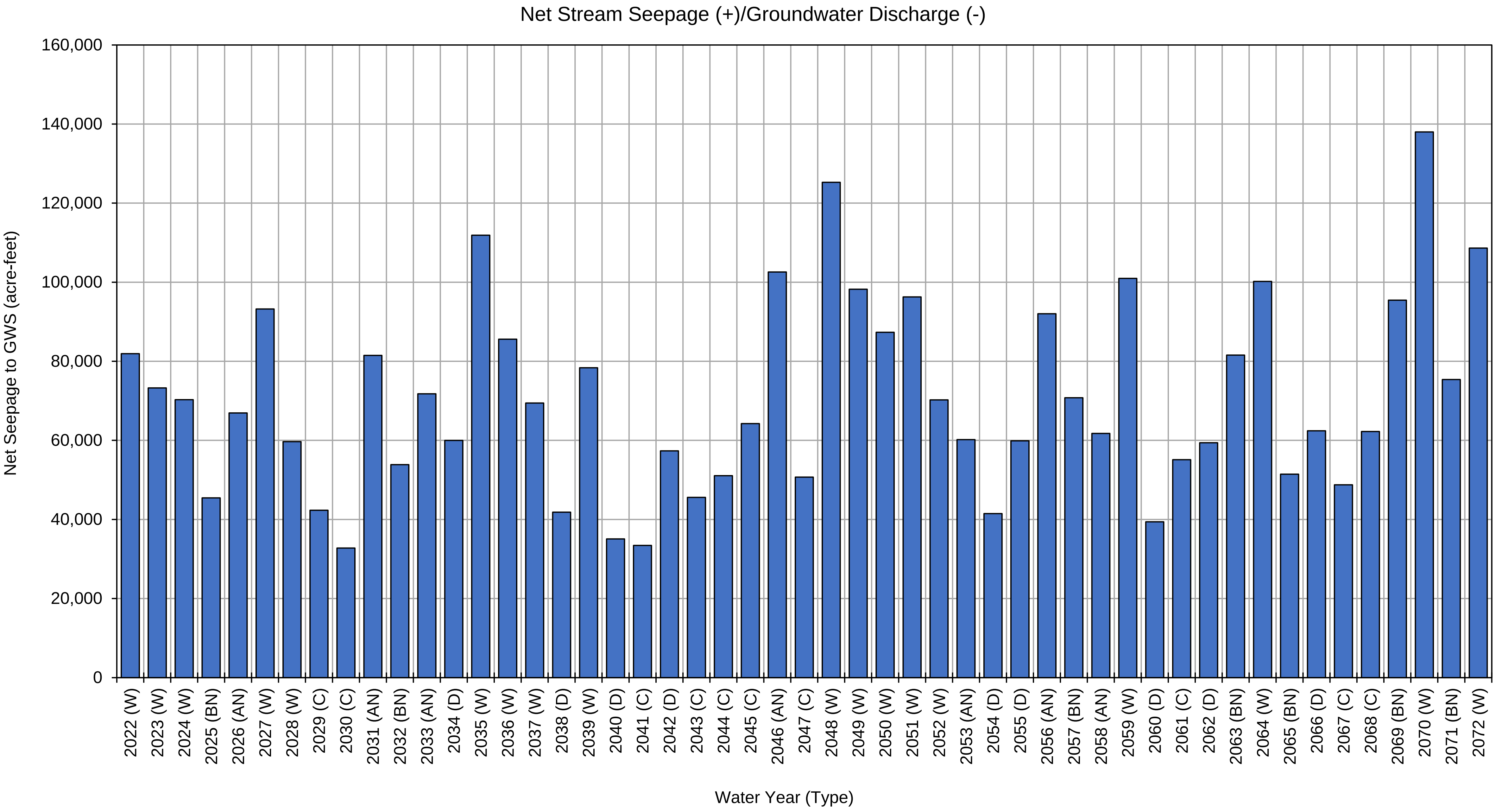
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	82,000	71,000	-21,000	-7,500	-110,000	13,000	13,000
2023 (W)	73,000	65,000	-22,000	-11,000	-100,000	560	13,000
2024 (W)	70,000	65,000	-22,000	-13,000	-100,000	770	14,000
2025 (BN)	45,000	29,000	-27,000	-8,800	-99,000	-60,000	-46,000
2026 (AN)	67,000	62,000	-22,000	-7,400	-89,000	10,000	-36,000
2027 (W)	93,000	74,000	-17,000	-11,000	-91,000	48,000	13,000
2028 (W)	60,000	46,000	-21,000	-12,000	-95,000	-22,000	-9,600
2029 (C)	42,000	37,000	-29,000	-8,600	-91,000	-49,000	-59,000
2030 (C)	33,000	22,000	-34,000	-3,400	-88,000	-70,000	-130,000
2031 (AN)	81,000	62,000	-24,000	-3,200	-83,000	33,000	-96,000
2032 (BN)	54,000	28,000	-26,000	-3,100	-81,000	-29,000	-130,000
2033 (AN)	72,000	48,000	-22,000	-3,000	-82,000	13,000	-110,000
2034 (D)	60,000	43,000	-28,000	-3,400	-84,000	-12,000	-120,000
2035 (W)	110,000	72,000	-20,000	-5,100	-90,000	69,000	-55,000
2036 (W)	86,000	89,000	-14,000	-11,000	-92,000	58,000	3,300
2037 (W)	69,000	66,000	-21,000	-14,000	-99,000	2,000	5,300
2038 (D)	42,000	45,000	-25,000	-11,000	-98,000	-46,000	-41,000
2039 (W)	78,000	64,000	-23,000	-9,300	-96,000	14,000	-28,000
2040 (D)	35,000	37,000	-25,000	-7,400	-90,000	-50,000	-78,000
2041 (C)	33,000	27,000	-29,000	-3,500	-87,000	-59,000	-140,000
2042 (D)	57,000	29,000	-25,000	-1,800	-90,000	-31,000	-170,000
2043 (C)	46,000	32,000	-29,000	-1,200	-85,000	-38,000	-200,000
2044 (C)	51,000	31,000	-29,000	-660	-82,000	-29,000	-230,000
2045 (C)	64,000	35,000	-30,000	-480	-83,000	-15,000	-250,000
2046 (AN)	100,000	60,000	-24,000	-830	-83,000	55,000	-190,000
2047 (C)	51,000	31,000	-28,000	-820	-83,000	-30,000	-220,000
2048 (W)	130,000	76,000	-22,000	-1,700	-87,000	91,000	-130,000
2049 (W)	98,000	63,000	-26,000	-3,600	-97,000	35,000	-99,000
2050 (W)	87,000	51,000	-24,000	-4,800	-100,000	6,400	-92,000
2051 (W)	96,000	88,000	-15,000	-7,400	-97,000	65,000	-27,000
2052 (W)	70,000	46,000	-22,000	-9,200	-100,000	-16,000	-43,000
2053 (AN)	60,000	49,000	-20,000	-7,100	-98,000	-16,000	-59,000
2054 (D)	41,000	36,000	-26,000	-5,100	-90,000	-43,000	-100,000
2055 (D)	60,000	43,000	-28,000	-3,700	-89,000	-19,000	-120,000
2056 (AN)	92,000	61,000	-20,000	-4,100	-92,000	36,000	-84,000
2057 (BN)	71,000	59,000	-24,000	-5,700	-97,000	2,900	-81,000
2058 (AN)	62,000	58,000	-17,000	-5,800	-86,000	10,000	-71,000
2059 (W)	100,000	74,000	-18,000	-9,500	-94,000	54,000	-17,000
2060 (D)	39,000	31,000	-23,000	-7,400	-99,000	-59,000	-77,000
2061 (C)	55,000	37,000	-32,000	-4,100	-93,000	-37,000	-110,000
2062 (D)	59,000	31,000	-27,000	-2,500	-92,000	-32,000	-150,000
2063 (BN)	82,000	54,000	-20,000	-2,500	-88,000	25,000	-120,000
2064 (W)	100,000	59,000	-17,000	-4,100	-93,000	45,000	-76,000
2065 (BN)	51,000	30,000	-26,000	-4,000	-95,000	-44,000	-120,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		62,000	37,000	-33,000	-2,400	-94,000	-31,000	-150,000
2067 (C)		49,000	22,000	-36,000	-800	-94,000	-60,000	-210,000
2068 (C)		62,000	35,000	-44,000	-430	-90,000	-37,000	-250,000
2069 (BN)		95,000	45,000	-31,000	-400	-89,000	19,000	-230,000
2070 (W)		140,000	68,000	-24,000	-1,400	-95,000	85,000	-140,000
2071 (BN)		75,000	26,000	-29,000	-1,100	-100,000	-32,000	-170,000
2072 (W)		110,000	68,000	-22,000	-1,900	-97,000	56,000	-120,000
Average (2022-2072)		71,000	49,000	-25,000	-5,100	-92,000	-2,300	
2022-2072	W	92,000	67,000	-21,000	-7,600	-97,000		
	AN	77,000	57,000	-21,000	-4,500	-88,000		
	BN	68,000	39,000	-26,000	-3,700	-93,000		
	D	51,000	37,000	-27,000	-4,900	-92,000		
	C	49,000	31,000	-32,000	-2,400	-88,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

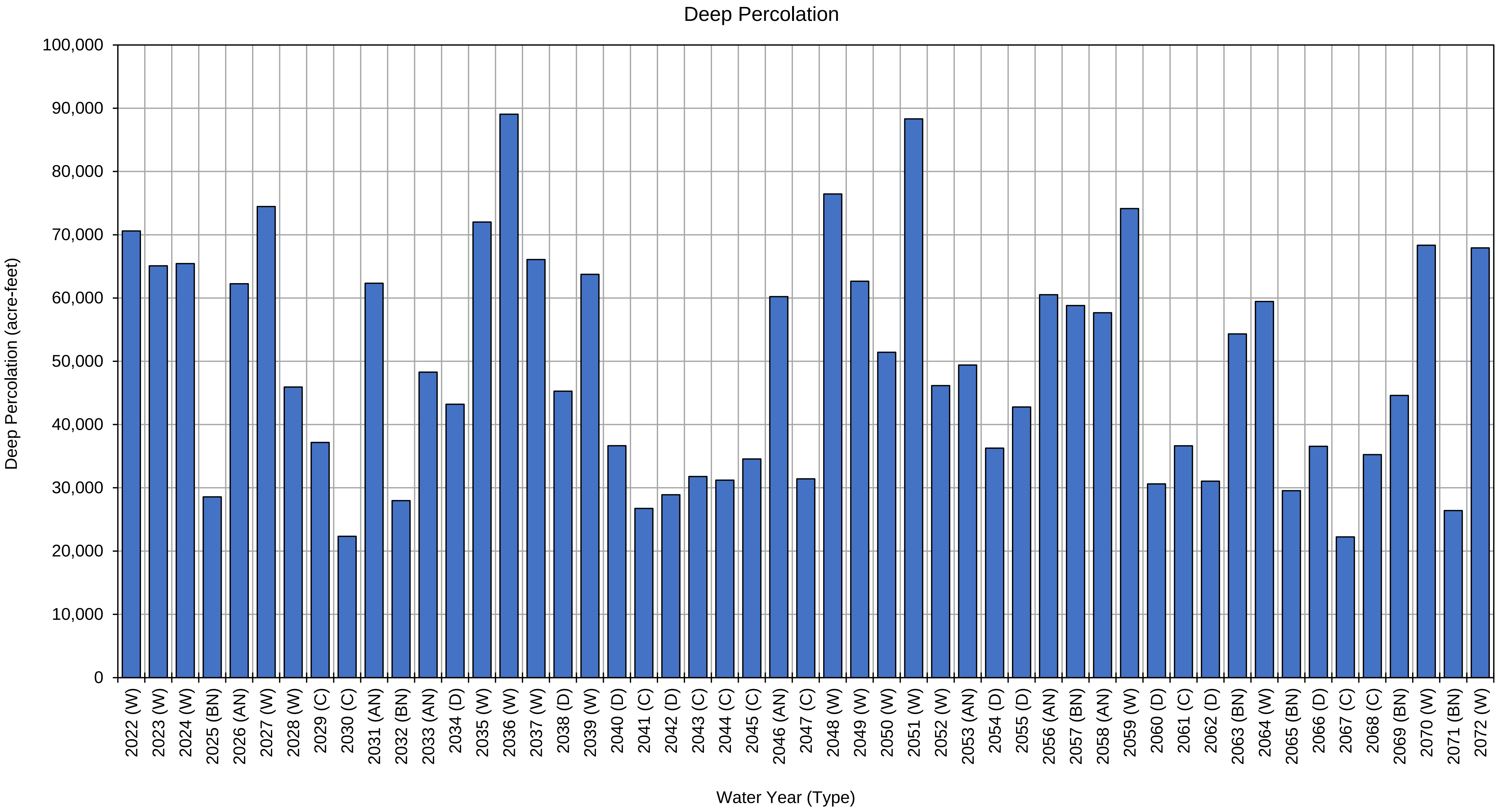
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	82,000
2023 (W)	73,000
2024 (W)	70,000
2025 (BN)	45,000
2026 (AN)	67,000
2027 (W)	93,000
2028 (W)	60,000
2029 (C)	42,000
2030 (C)	33,000
2031 (AN)	81,000
2032 (BN)	54,000
2033 (AN)	72,000
2034 (D)	60,000
2035 (W)	110,000
2036 (W)	86,000
2037 (W)	69,000
2038 (D)	42,000
2039 (W)	78,000
2040 (D)	35,000
2041 (C)	33,000
2042 (D)	57,000
2043 (C)	46,000
2044 (C)	51,000
2045 (C)	64,000
2046 (AN)	100,000
2047 (C)	51,000
2048 (W)	130,000
2049 (W)	98,000
2050 (W)	87,000
2051 (W)	96,000
2052 (W)	70,000
2053 (AN)	60,000
2054 (D)	41,000
2055 (D)	60,000
2056 (AN)	92,000
2057 (BN)	71,000
2058 (AN)	62,000
2059 (W)	100,000
2060 (D)	39,000
2061 (C)	55,000
2062 (D)	59,000
2063 (BN)	82,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		100,000
2065 (BN)		51,000
2066 (D)		62,000
2067 (C)		49,000
2068 (C)		62,000
2069 (BN)		95,000
2070 (W)		140,000
2071 (BN)		75,000
2072 (W)		110,000
Average (2022-2072)		71,000
2022-2072	W	92,000
	AN	77,000
	BN	68,000
	D	51,000
	C	49,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

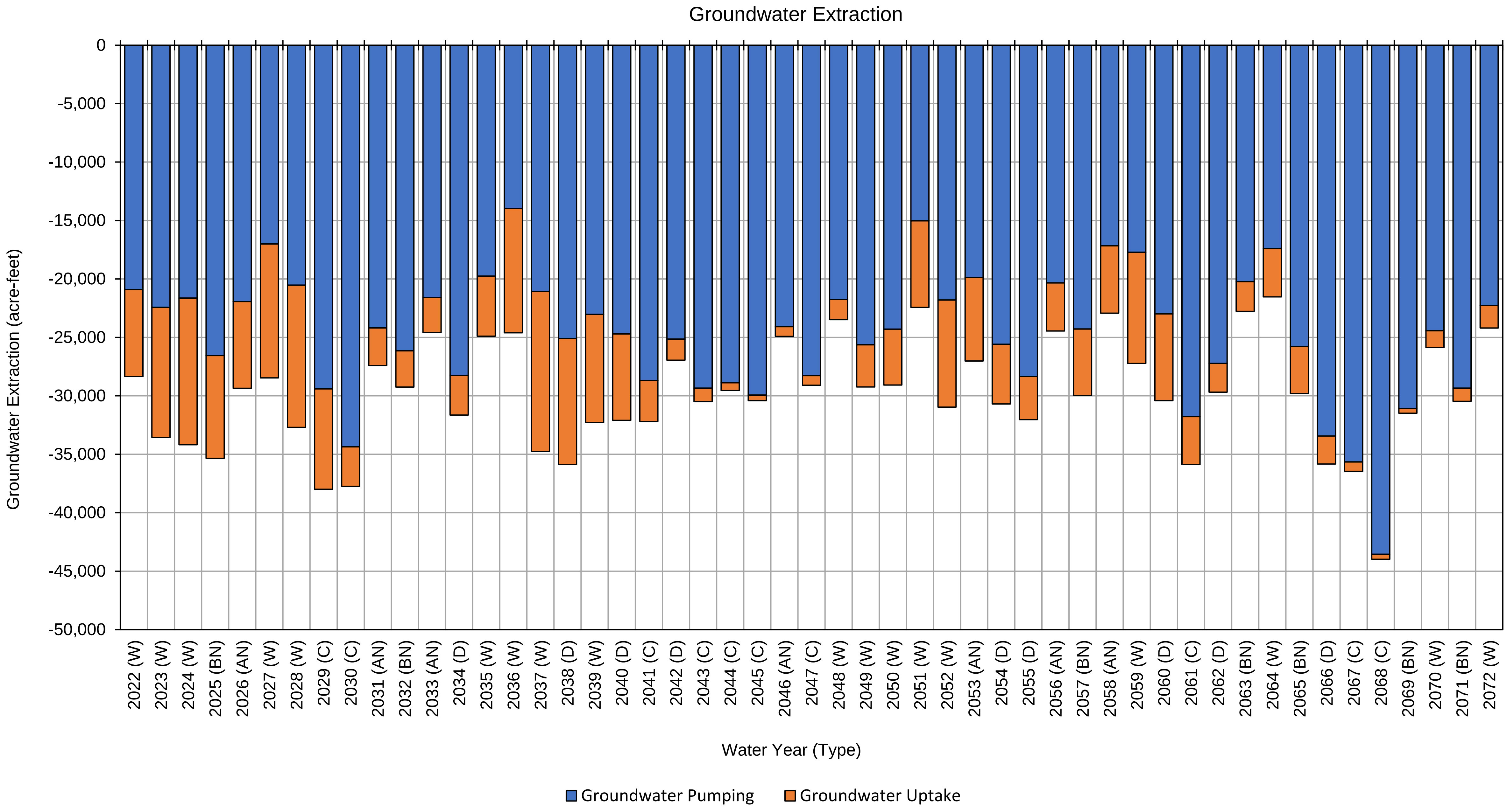
WY (Type)	Deep Percolation from the SWS
2022 (W)	71,000
2023 (W)	65,000
2024 (W)	65,000
2025 (BN)	29,000
2026 (AN)	62,000
2027 (W)	74,000
2028 (W)	46,000
2029 (C)	37,000
2030 (C)	22,000
2031 (AN)	62,000
2032 (BN)	28,000
2033 (AN)	48,000
2034 (D)	43,000
2035 (W)	72,000
2036 (W)	89,000
2037 (W)	66,000
2038 (D)	45,000
2039 (W)	64,000
2040 (D)	37,000
2041 (C)	27,000
2042 (D)	29,000
2043 (C)	32,000
2044 (C)	31,000
2045 (C)	35,000
2046 (AN)	60,000
2047 (C)	31,000
2048 (W)	76,000
2049 (W)	63,000
2050 (W)	51,000
2051 (W)	88,000
2052 (W)	46,000
2053 (AN)	49,000
2054 (D)	36,000
2055 (D)	43,000
2056 (AN)	61,000
2057 (BN)	59,000
2058 (AN)	58,000
2059 (W)	74,000
2060 (D)	31,000
2061 (C)	37,000
2062 (D)	31,000
2063 (BN)	54,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		59,000
2065 (BN)		30,000
2066 (D)		37,000
2067 (C)		22,000
2068 (C)		35,000
2069 (BN)		45,000
2070 (W)		68,000
2071 (BN)		26,000
2072 (W)		68,000
Average (2022-2072)		49,000
2022-2072	W	67,000
	AN	57,000
	BN	39,000
	D	37,000
	C	31,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

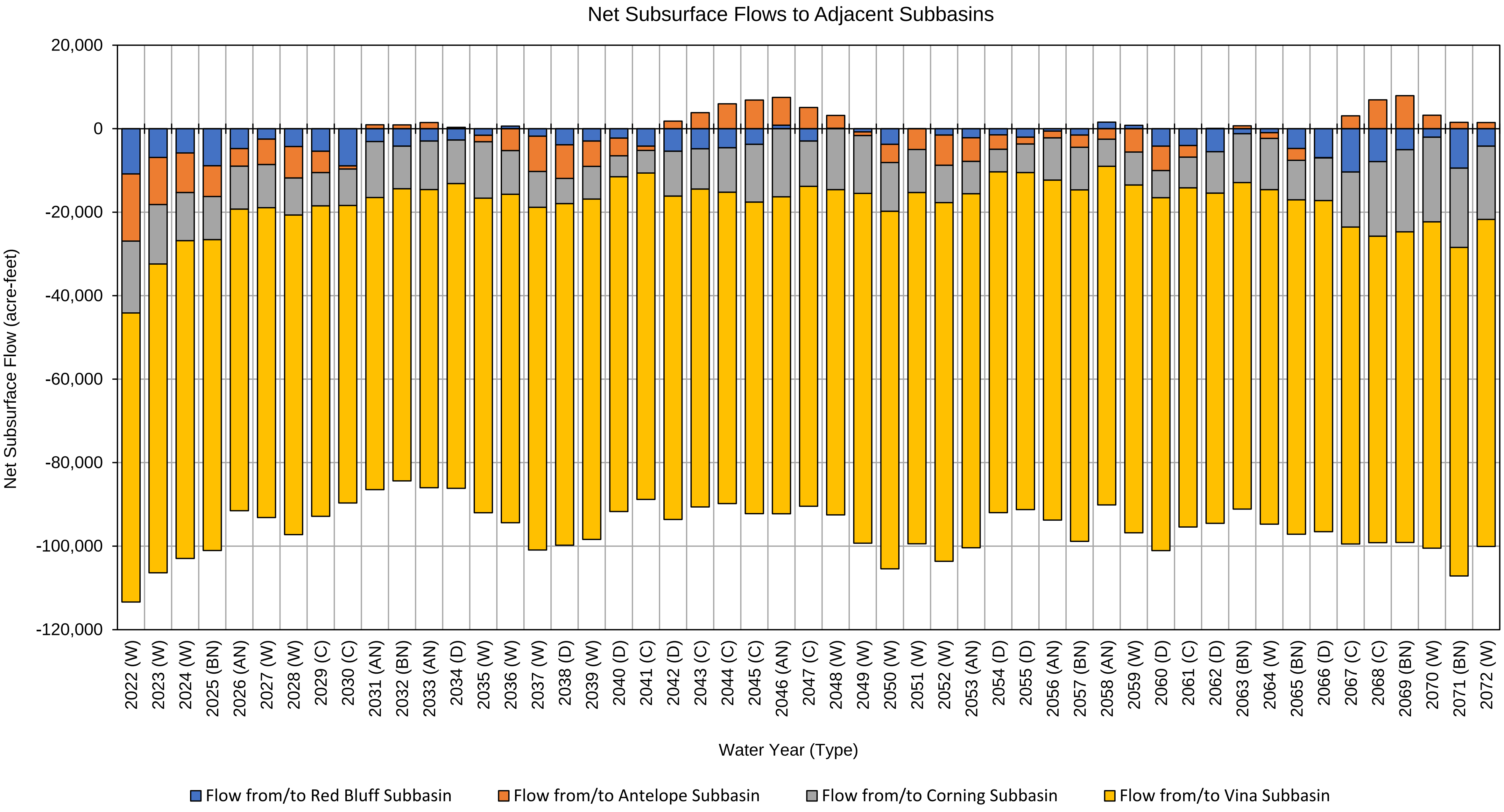
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-21,000	-7,500	-28,000
2023 (W)	-22,000	-11,000	-34,000
2024 (W)	-22,000	-13,000	-34,000
2025 (BN)	-27,000	-8,800	-35,000
2026 (AN)	-22,000	-7,400	-29,000
2027 (W)	-17,000	-11,000	-28,000
2028 (W)	-21,000	-12,000	-33,000
2029 (C)	-29,000	-8,600	-38,000
2030 (C)	-34,000	-3,400	-38,000
2031 (AN)	-24,000	-3,200	-27,000
2032 (BN)	-26,000	-3,100	-29,000
2033 (AN)	-22,000	-3,000	-25,000
2034 (D)	-28,000	-3,400	-32,000
2035 (W)	-20,000	-5,100	-25,000
2036 (W)	-14,000	-11,000	-25,000
2037 (W)	-21,000	-14,000	-35,000
2038 (D)	-25,000	-11,000	-36,000
2039 (W)	-23,000	-9,300	-32,000
2040 (D)	-25,000	-7,400	-32,000
2041 (C)	-29,000	-3,500	-32,000
2042 (D)	-25,000	-1,800	-27,000
2043 (C)	-29,000	-1,200	-31,000
2044 (C)	-29,000	-660	-30,000
2045 (C)	-30,000	-480	-30,000
2046 (AN)	-24,000	-830	-25,000
2047 (C)	-28,000	-820	-29,000
2048 (W)	-22,000	-1,700	-23,000
2049 (W)	-26,000	-3,600	-29,000
2050 (W)	-24,000	-4,800	-29,000
2051 (W)	-15,000	-7,400	-22,000
2052 (W)	-22,000	-9,200	-31,000
2053 (AN)	-20,000	-7,100	-27,000
2054 (D)	-26,000	-5,100	-31,000
2055 (D)	-28,000	-3,700	-32,000
2056 (AN)	-20,000	-4,100	-24,000
2057 (BN)	-24,000	-5,700	-30,000
2058 (AN)	-17,000	-5,800	-23,000
2059 (W)	-18,000	-9,500	-27,000
2060 (D)	-23,000	-7,400	-30,000
2061 (C)	-32,000	-4,100	-36,000
2062 (D)	-27,000	-2,500	-30,000
2063 (BN)	-20,000	-2,500	-23,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-17,000	-4,100	-22,000
2065 (BN)		-26,000	-4,000	-30,000
2066 (D)		-33,000	-2,400	-36,000
2067 (C)		-36,000	-800	-36,000
2068 (C)		-44,000	-430	-44,000
2069 (BN)		-31,000	-400	-31,000
2070 (W)		-24,000	-1,400	-26,000
2071 (BN)		-29,000	-1,100	-30,000
2072 (W)		-22,000	-1,900	-24,000
Average (2022-2072)		-25,000	-5,100	-30,000
2022-2072	W	-21,000	-7,600	-28,000
	AN	-21,000	-4,500	-26,000
	BN	-26,000	-3,700	-30,000
	D	-27,000	-4,900	-32,000
	C	-32,000	-2,400	-34,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

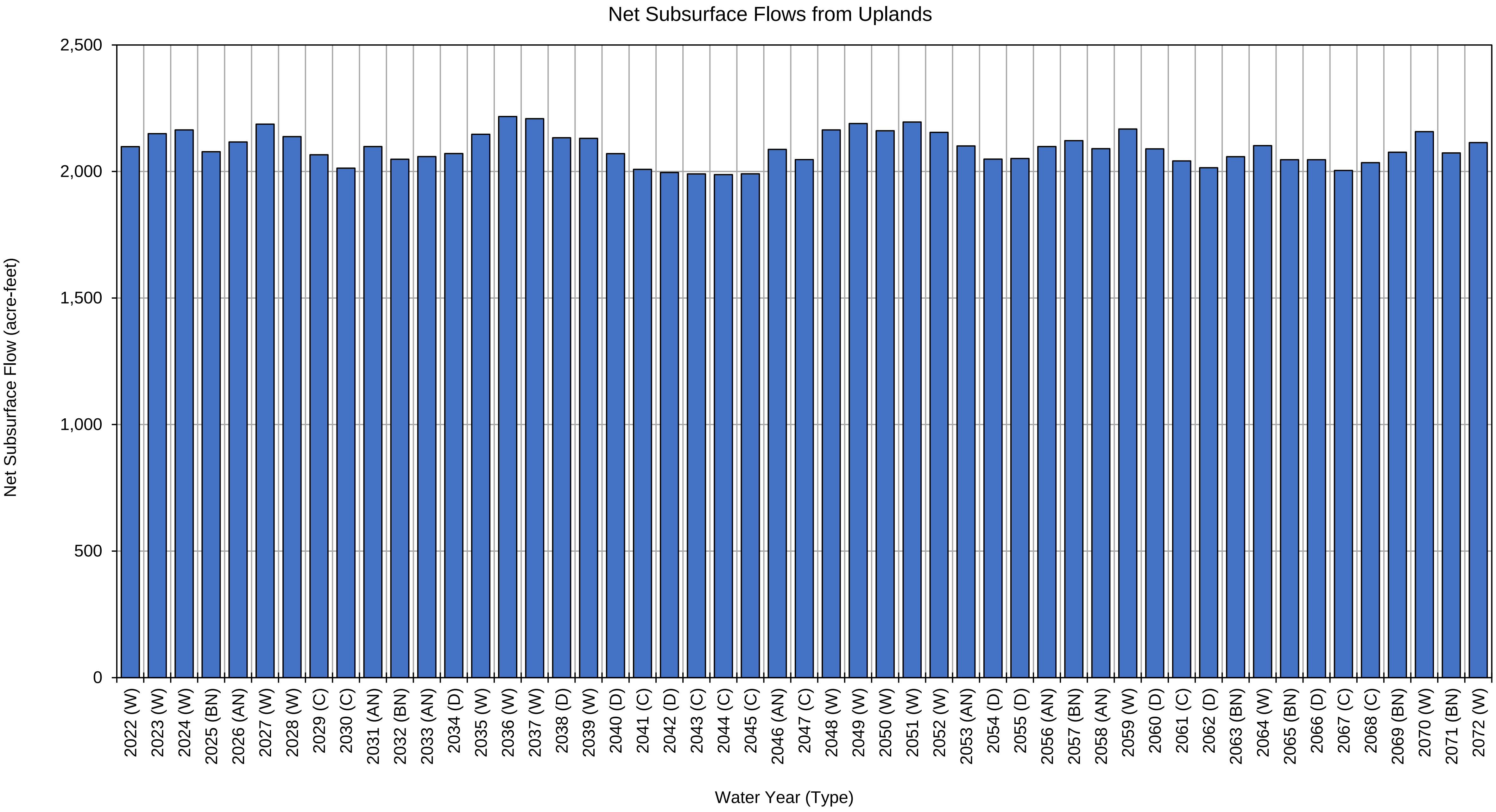
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-11,000	-16,000	-17,000	-69,000	-110,000
2023 (W)	-6,900	-11,000	-14,000	-74,000	-110,000
2024 (W)	-5,800	-9,500	-12,000	-76,000	-100,000
2025 (BN)	-8,900	-7,400	-10,000	-74,000	-100,000
2026 (AN)	-4,800	-4,200	-10,000	-72,000	-92,000
2027 (W)	-2,500	-6,100	-10,000	-74,000	-93,000
2028 (W)	-4,300	-7,500	-8,900	-77,000	-97,000
2029 (C)	-5,400	-5,100	-8,000	-74,000	-93,000
2030 (C)	-8,900	-760	-8,700	-71,000	-90,000
2031 (AN)	-3,100	930	-13,000	-70,000	-86,000
2032 (BN)	-4,200	900	-10,000	-70,000	-83,000
2033 (AN)	-3,000	1,500	-12,000	-71,000	-85,000
2034 (D)	-2,700	330	-10,000	-73,000	-86,000
2035 (W)	-1,600	-1,600	-14,000	-75,000	-92,000
2036 (W)	610	-5,300	-10,000	-79,000	-94,000
2037 (W)	-1,800	-8,500	-8,600	-82,000	-100,000
2038 (D)	-3,900	-8,000	-6,000	-82,000	-100,000
2039 (W)	-3,000	-6,100	-7,800	-82,000	-98,000
2040 (D)	-2,300	-4,200	-5,000	-80,000	-92,000
2041 (C)	-4,200	-1,000	-5,400	-78,000	-89,000
2042 (D)	-5,400	1,800	-11,000	-77,000	-92,000
2043 (C)	-4,800	3,800	-9,700	-76,000	-87,000
2044 (C)	-4,600	6,000	-11,000	-75,000	-84,000
2045 (C)	-3,700	6,900	-14,000	-75,000	-85,000
2046 (AN)	830	6,600	-16,000	-76,000	-85,000
2047 (C)	-3,000	5,100	-11,000	-77,000	-85,000
2048 (W)	110	3,100	-15,000	-78,000	-89,000
2049 (W)	-760	-890	-14,000	-84,000	-99,000
2050 (W)	-3,800	-4,400	-12,000	-86,000	-110,000
2051 (W)	-17	-5,000	-10,000	-84,000	-99,000
2052 (W)	-1,500	-7,200	-8,900	-86,000	-100,000
2053 (AN)	-2,200	-5,700	-7,800	-85,000	-100,000
2054 (D)	-1,500	-3,500	-5,400	-82,000	-92,000
2055 (D)	-2,000	-1,600	-6,800	-81,000	-91,000
2056 (AN)	-570	-1,600	-10,000	-81,000	-94,000
2057 (BN)	-1,500	-2,900	-10,000	-84,000	-99,000
2058 (AN)	1,600	-2,500	-6,500	-81,000	-89,000
2059 (W)	810	-5,600	-7,900	-83,000	-96,000
2060 (D)	-4,200	-5,800	-6,500	-85,000	-100,000
2061 (C)	-4,000	-2,800	-7,400	-81,000	-95,000
2062 (D)	-5,500	88	-9,900	-79,000	-94,000
2063 (BN)	-1,200	690	-12,000	-78,000	-90,000

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		-960	-1,400	-12,000	-80,000	-95,000
2065 (BN)		-4,800	-2,800	-9,500	-80,000	-97,000
2066 (D)		-6,900	-58	-10,000	-79,000	-97,000
2067 (C)		-10,000	3,100	-13,000	-76,000	-96,000
2068 (C)		-7,900	6,900	-18,000	-73,000	-92,000
2069 (BN)		-5,000	7,900	-20,000	-74,000	-91,000
2070 (W)		-2,100	3,200	-20,000	-78,000	-97,000
2071 (BN)		-9,500	1,500	-19,000	-79,000	-110,000
2072 (W)		-4,200	1,500	-18,000	-78,000	-99,000
Average (2022-2072)		-3,700	-1,900	-11,000	-78,000	-95,000
2022-2072	W	-2,700	-4,900	-12,000	-79,000	-99,000
	AN	-1,600	-720	-11,000	-77,000	-90,000
	BN	-5,000	-300	-13,000	-77,000	-95,000
	D	-3,800	-2,300	-7,900	-80,000	-94,000
	C	-5,700	2,200	-11,000	-76,000	-90,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)	Subsurface Flows from Uplands
2022 (W)	2,100
2023 (W)	2,100
2024 (W)	2,200
2025 (BN)	2,100
2026 (AN)	2,100
2027 (W)	2,200
2028 (W)	2,100
2029 (C)	2,100
2030 (C)	2,000
2031 (AN)	2,100
2032 (BN)	2,000
2033 (AN)	2,100
2034 (D)	2,100
2035 (W)	2,100
2036 (W)	2,200
2037 (W)	2,200
2038 (D)	2,100
2039 (W)	2,100
2040 (D)	2,100
2041 (C)	2,000
2042 (D)	2,000
2043 (C)	2,000
2044 (C)	2,000
2045 (C)	2,000
2046 (AN)	2,100
2047 (C)	2,000
2048 (W)	2,200
2049 (W)	2,200
2050 (W)	2,200
2051 (W)	2,200
2052 (W)	2,200
2053 (AN)	2,100
2054 (D)	2,000
2055 (D)	2,100
2056 (AN)	2,100
2057 (BN)	2,100
2058 (AN)	2,100
2059 (W)	2,200
2060 (D)	2,100
2061 (C)	2,000
2062 (D)	2,000
2063 (BN)	2,100

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		2,100
2065 (BN)		2,000
2066 (D)		2,000
2067 (C)		2,000
2068 (C)		2,000
2069 (BN)		2,100
2070 (W)		2,200
2071 (BN)		2,100
2072 (W)		2,100
Average (2022-2072)		2,100
2022-2072	W	2,200
	AN	2,100
	BN	2,100
	D	2,100
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
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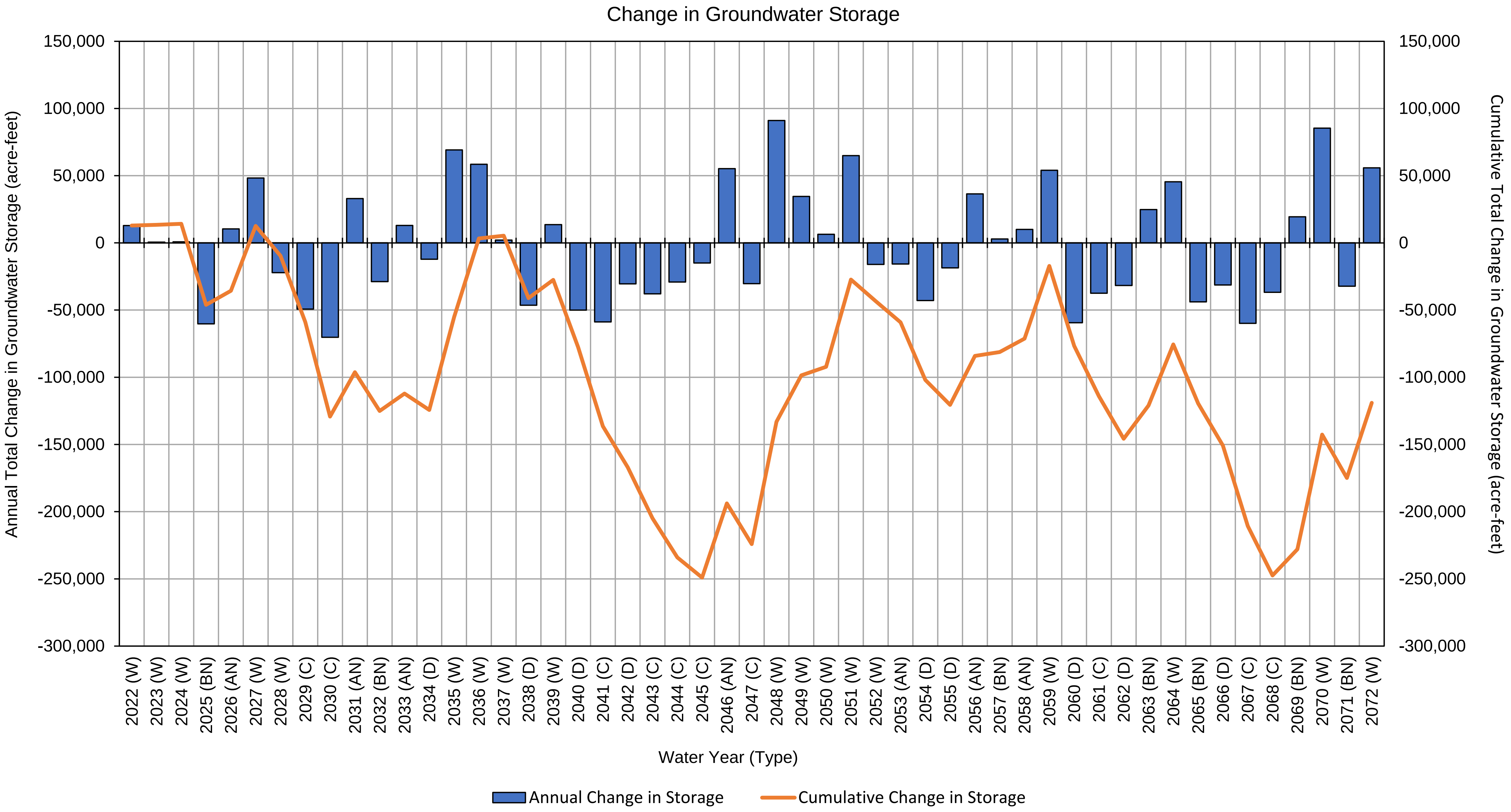
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	13,000	13,000
2023 (W)	560	13,000
2024 (W)	770	14,000
2025 (BN)	-60,000	-46,000
2026 (AN)	10,000	-36,000
2027 (W)	48,000	13,000
2028 (W)	-22,000	-9,600
2029 (C)	-49,000	-59,000
2030 (C)	-70,000	-130,000
2031 (AN)	33,000	-96,000
2032 (BN)	-29,000	-130,000
2033 (AN)	13,000	-110,000
2034 (D)	-12,000	-120,000
2035 (W)	69,000	-55,000
2036 (W)	58,000	3,300
2037 (W)	2,000	5,300
2038 (D)	-46,000	-41,000
2039 (W)	14,000	-28,000
2040 (D)	-50,000	-78,000
2041 (C)	-59,000	-140,000
2042 (D)	-31,000	-170,000
2043 (C)	-38,000	-200,000
2044 (C)	-29,000	-230,000
2045 (C)	-15,000	-250,000
2046 (AN)	55,000	-190,000
2047 (C)	-30,000	-220,000
2048 (W)	91,000	-130,000
2049 (W)	35,000	-99,000
2050 (W)	6,400	-92,000
2051 (W)	65,000	-27,000
2052 (W)	-16,000	-43,000
2053 (AN)	-16,000	-59,000
2054 (D)	-43,000	-100,000
2055 (D)	-19,000	-120,000
2056 (AN)	36,000	-84,000
2057 (BN)	2,900	-81,000
2058 (AN)	10,000	-71,000
2059 (W)	54,000	-17,000
2060 (D)	-59,000	-77,000
2061 (C)	-37,000	-110,000
2062 (D)	-32,000	-150,000
2063 (BN)	25,000	-120,000

Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		45,000	-76,000
2065 (BN)		-44,000	-120,000
2066 (D)		-31,000	-150,000
2067 (C)		-60,000	-210,000
2068 (C)		-37,000	-250,000
2069 (BN)		19,000	-230,000
2070 (W)		85,000	-140,000
2071 (BN)		-32,000	-170,000
2072 (W)		56,000	-120,000
Average (2022-2072)		-2,300	
2022-2072	W		
	AN		
	BN		
	D		
	C		

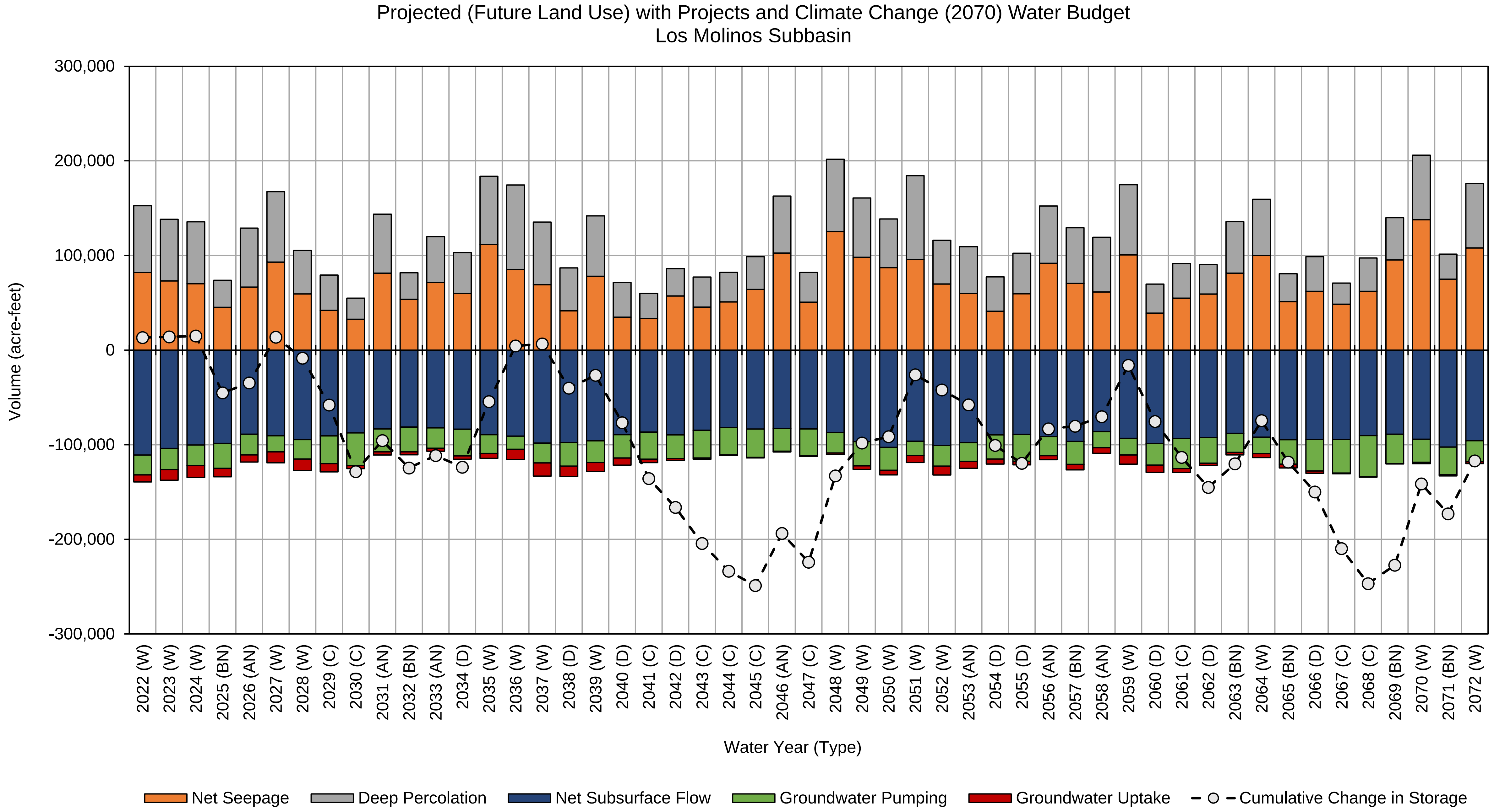
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX C-8

Detailed Los Molinos Subbasin Water Budget Results:

Projected (Future Land Use) with Projects and Climate Change (2070) Model Results


Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget
Los Molinos Subbasin

Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

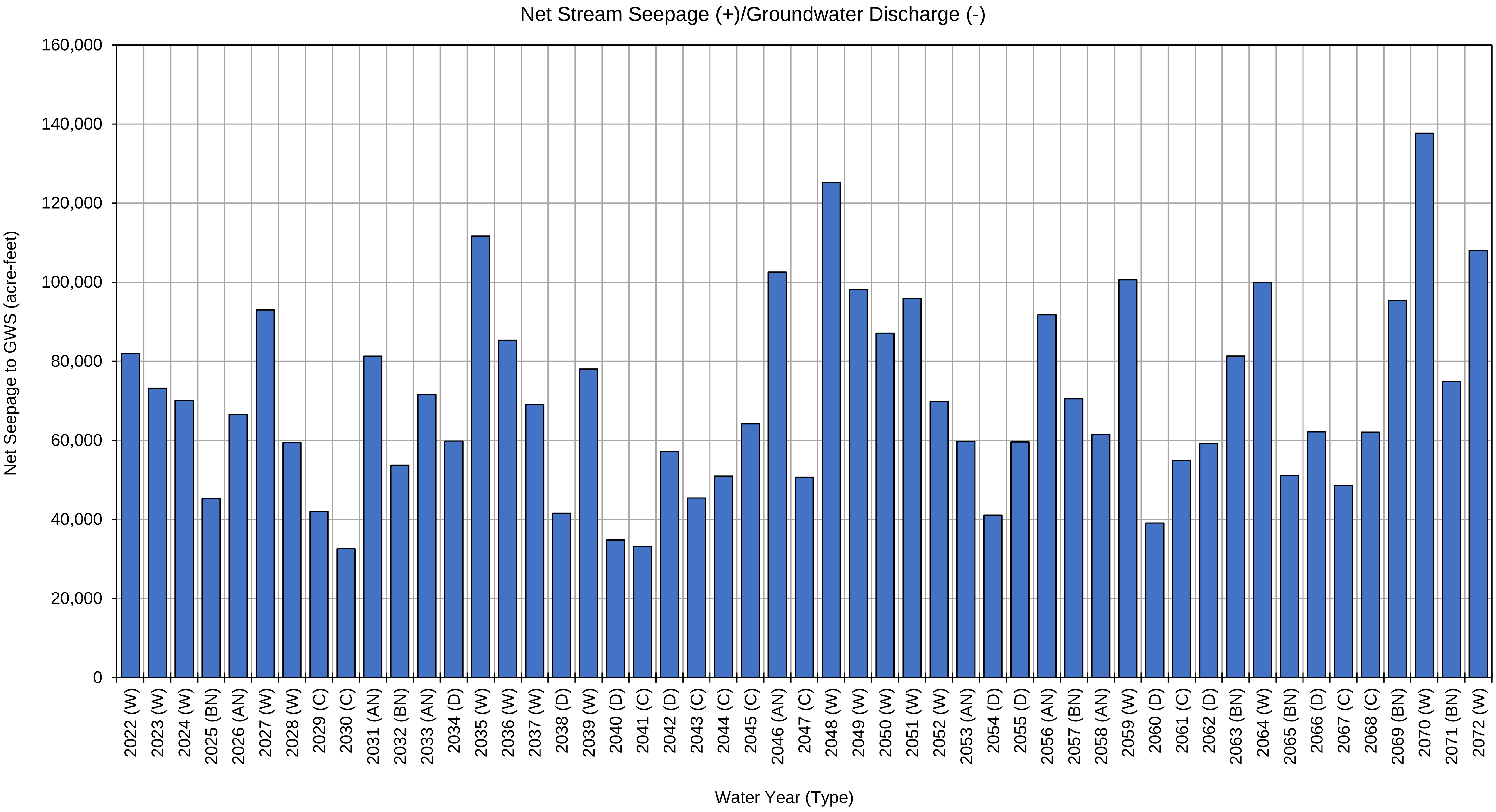
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	82,000	71,000	-21,000	-7,500	-110,000	13,000	13,000
2023 (W)	73,000	65,000	-22,000	-11,000	-100,000	780	14,000
2024 (W)	70,000	65,000	-22,000	-13,000	-100,000	950	15,000
2025 (BN)	45,000	29,000	-26,000	-8,900	-99,000	-60,000	-45,000
2026 (AN)	67,000	62,000	-22,000	-7,600	-89,000	11,000	-35,000
2027 (W)	93,000	74,000	-17,000	-12,000	-91,000	48,000	14,000
2028 (W)	59,000	46,000	-20,000	-12,000	-95,000	-22,000	-8,600
2029 (C)	42,000	37,000	-29,000	-8,700	-91,000	-49,000	-58,000
2030 (C)	33,000	22,000	-34,000	-3,500	-87,000	-70,000	-130,000
2031 (AN)	81,000	62,000	-24,000	-3,300	-83,000	33,000	-96,000
2032 (BN)	54,000	28,000	-26,000	-3,200	-81,000	-29,000	-120,000
2033 (AN)	72,000	48,000	-22,000	-3,000	-82,000	13,000	-110,000
2034 (D)	60,000	43,000	-28,000	-3,400	-84,000	-12,000	-120,000
2035 (W)	110,000	72,000	-20,000	-5,200	-89,000	69,000	-54,000
2036 (W)	85,000	89,000	-14,000	-11,000	-91,000	59,000	4,400
2037 (W)	69,000	66,000	-21,000	-14,000	-98,000	2,100	6,500
2038 (D)	42,000	45,000	-25,000	-11,000	-98,000	-47,000	-40,000
2039 (W)	78,000	64,000	-23,000	-9,400	-96,000	14,000	-27,000
2040 (D)	35,000	37,000	-25,000	-7,500	-89,000	-50,000	-77,000
2041 (C)	33,000	27,000	-29,000	-3,600	-87,000	-59,000	-140,000
2042 (D)	57,000	29,000	-25,000	-1,800	-90,000	-31,000	-170,000
2043 (C)	45,000	32,000	-29,000	-1,200	-85,000	-38,000	-200,000
2044 (C)	51,000	31,000	-29,000	-670	-82,000	-29,000	-230,000
2045 (C)	64,000	35,000	-30,000	-490	-83,000	-15,000	-250,000
2046 (AN)	100,000	60,000	-24,000	-840	-83,000	55,000	-190,000
2047 (C)	51,000	31,000	-28,000	-820	-83,000	-30,000	-220,000
2048 (W)	130,000	76,000	-22,000	-1,800	-87,000	91,000	-130,000
2049 (W)	98,000	63,000	-26,000	-3,700	-97,000	35,000	-98,000
2050 (W)	87,000	51,000	-24,000	-4,900	-100,000	6,700	-92,000
2051 (W)	96,000	88,000	-15,000	-7,600	-96,000	65,000	-26,000
2052 (W)	70,000	46,000	-22,000	-9,400	-100,000	-16,000	-42,000
2053 (AN)	60,000	49,000	-20,000	-7,300	-98,000	-16,000	-58,000
2054 (D)	41,000	36,000	-26,000	-5,300	-90,000	-43,000	-100,000
2055 (D)	60,000	43,000	-28,000	-3,800	-89,000	-19,000	-120,000
2056 (AN)	92,000	61,000	-20,000	-4,200	-91,000	36,000	-83,000
2057 (BN)	71,000	59,000	-24,000	-5,800	-97,000	2,800	-80,000
2058 (AN)	62,000	58,000	-17,000	-5,900	-86,000	10,000	-70,000
2059 (W)	100,000	74,000	-18,000	-9,700	-93,000	54,000	-16,000
2060 (D)	39,000	31,000	-23,000	-7,600	-99,000	-59,000	-76,000
2061 (C)	55,000	37,000	-32,000	-4,200	-93,000	-38,000	-110,000
2062 (D)	59,000	31,000	-27,000	-2,500	-92,000	-32,000	-150,000
2063 (BN)	81,000	54,000	-20,000	-2,600	-88,000	25,000	-120,000
2064 (W)	100,000	60,000	-17,000	-4,300	-92,000	46,000	-75,000
2065 (BN)	51,000	30,000	-26,000	-4,100	-95,000	-44,000	-120,000

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		62,000	37,000	-33,000	-2,500	-94,000	-31,000	-150,000
2067 (C)		49,000	22,000	-36,000	-820	-94,000	-60,000	-210,000
2068 (C)		62,000	35,000	-44,000	-440	-90,000	-37,000	-250,000
2069 (BN)		95,000	45,000	-31,000	-420	-89,000	20,000	-230,000
2070 (W)		140,000	68,000	-24,000	-1,500	-94,000	86,000	-140,000
2071 (BN)		75,000	26,000	-29,000	-1,200	-100,000	-32,000	-170,000
2072 (W)		110,000	68,000	-22,000	-2,000	-96,000	56,000	-120,000
Average (2022-2072)		70,000	49,000	-25,000	-5,200	-92,000	-2,300	
2022-2072	W	91,000	67,000	-21,000	-7,700	-96,000		
	AN	76,000	57,000	-21,000	-4,600	-88,000		
	BN	67,000	39,000	-26,000	-3,700	-93,000		
	D	50,000	37,000	-27,000	-5,000	-92,000		
	C	48,000	31,000	-32,000	-2,400	-88,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

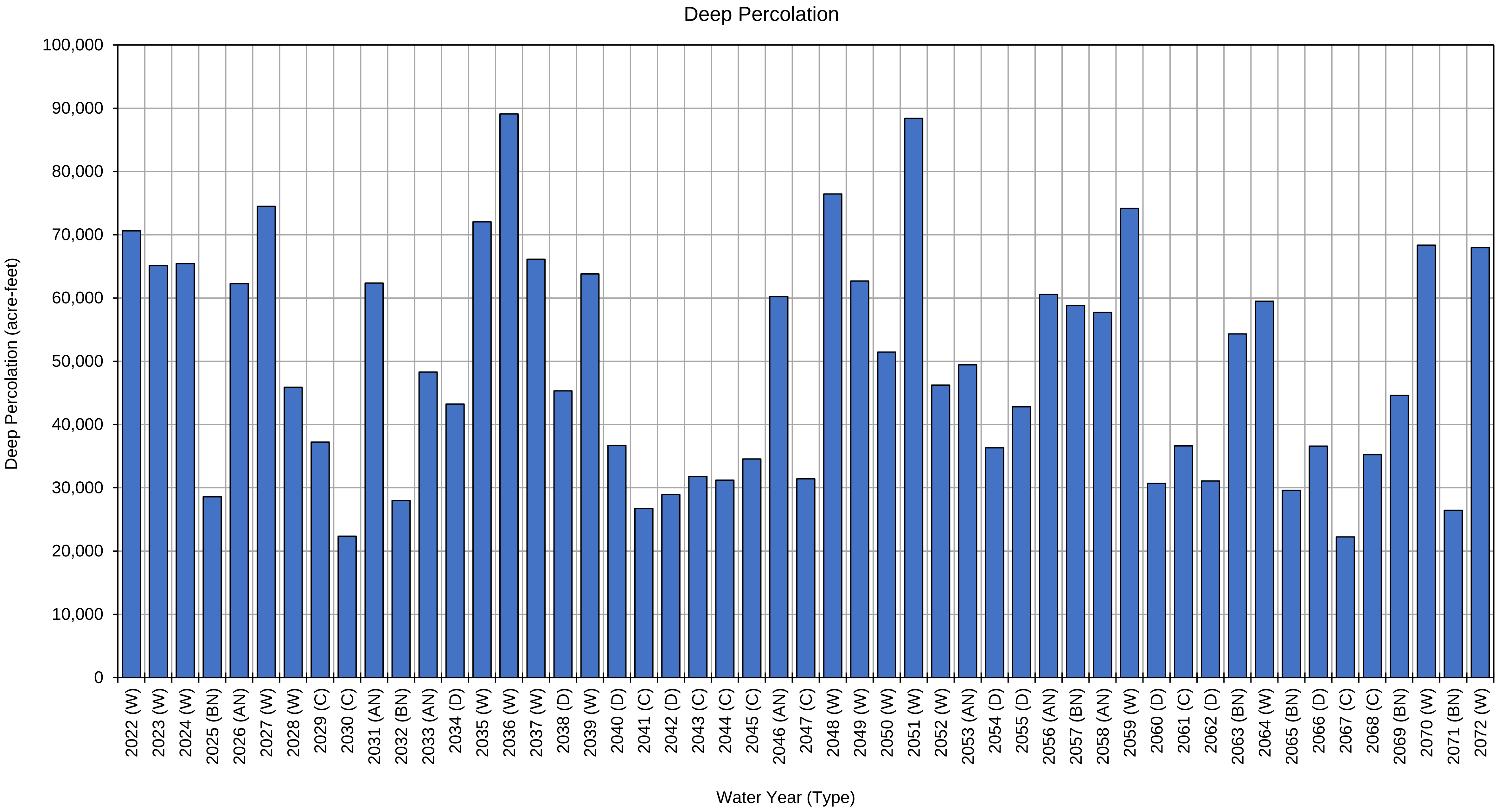
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	82,000
2023 (W)	73,000
2024 (W)	70,000
2025 (BN)	45,000
2026 (AN)	67,000
2027 (W)	93,000
2028 (W)	59,000
2029 (C)	42,000
2030 (C)	33,000
2031 (AN)	81,000
2032 (BN)	54,000
2033 (AN)	72,000
2034 (D)	60,000
2035 (W)	110,000
2036 (W)	85,000
2037 (W)	69,000
2038 (D)	42,000
2039 (W)	78,000
2040 (D)	35,000
2041 (C)	33,000
2042 (D)	57,000
2043 (C)	45,000
2044 (C)	51,000
2045 (C)	64,000
2046 (AN)	100,000
2047 (C)	51,000
2048 (W)	130,000
2049 (W)	98,000
2050 (W)	87,000
2051 (W)	96,000
2052 (W)	70,000
2053 (AN)	60,000
2054 (D)	41,000
2055 (D)	60,000
2056 (AN)	92,000
2057 (BN)	71,000
2058 (AN)	62,000
2059 (W)	100,000
2060 (D)	39,000
2061 (C)	55,000
2062 (D)	59,000
2063 (BN)	81,000

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		100,000
2065 (BN)		51,000
2066 (D)		62,000
2067 (C)		49,000
2068 (C)		62,000
2069 (BN)		95,000
2070 (W)		140,000
2071 (BN)		75,000
2072 (W)		110,000
Average (2022-2072)		70,000
2022-2072	W	91,000
	AN	76,000
	BN	67,000
	D	50,000
	C	48,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

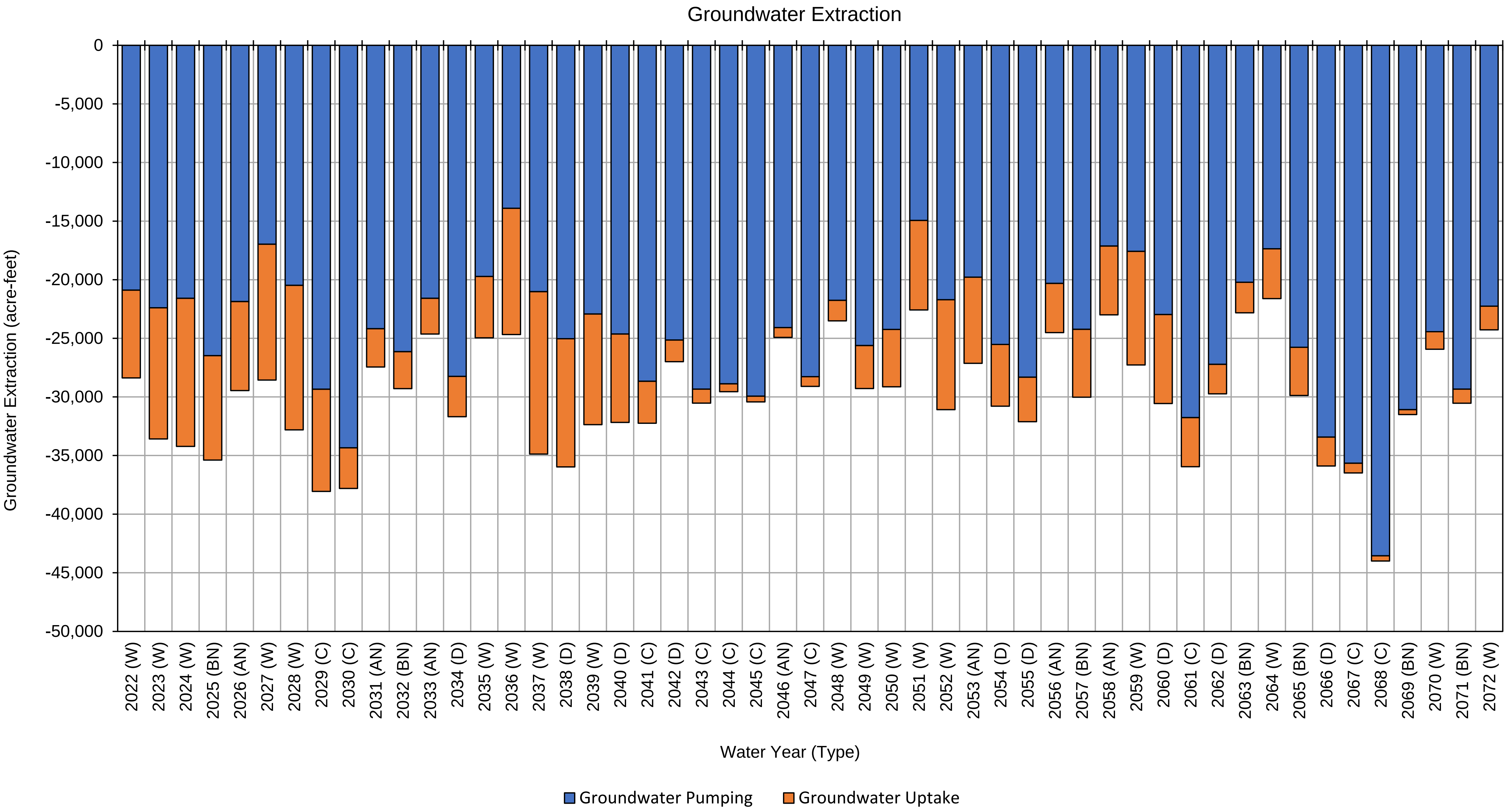
WY (Type)	Deep Percolation from the SWS
2022 (W)	71,000
2023 (W)	65,000
2024 (W)	65,000
2025 (BN)	29,000
2026 (AN)	62,000
2027 (W)	74,000
2028 (W)	46,000
2029 (C)	37,000
2030 (C)	22,000
2031 (AN)	62,000
2032 (BN)	28,000
2033 (AN)	48,000
2034 (D)	43,000
2035 (W)	72,000
2036 (W)	89,000
2037 (W)	66,000
2038 (D)	45,000
2039 (W)	64,000
2040 (D)	37,000
2041 (C)	27,000
2042 (D)	29,000
2043 (C)	32,000
2044 (C)	31,000
2045 (C)	35,000
2046 (AN)	60,000
2047 (C)	31,000
2048 (W)	76,000
2049 (W)	63,000
2050 (W)	51,000
2051 (W)	88,000
2052 (W)	46,000
2053 (AN)	49,000
2054 (D)	36,000
2055 (D)	43,000
2056 (AN)	61,000
2057 (BN)	59,000
2058 (AN)	58,000
2059 (W)	74,000
2060 (D)	31,000
2061 (C)	37,000
2062 (D)	31,000
2063 (BN)	54,000

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		60,000
2065 (BN)		30,000
2066 (D)		37,000
2067 (C)		22,000
2068 (C)		35,000
2069 (BN)		45,000
2070 (W)		68,000
2071 (BN)		26,000
2072 (W)		68,000
Average (2022-2072)		49,000
2022-2072	W	67,000
	AN	57,000
	BN	39,000
	D	37,000
	C	31,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

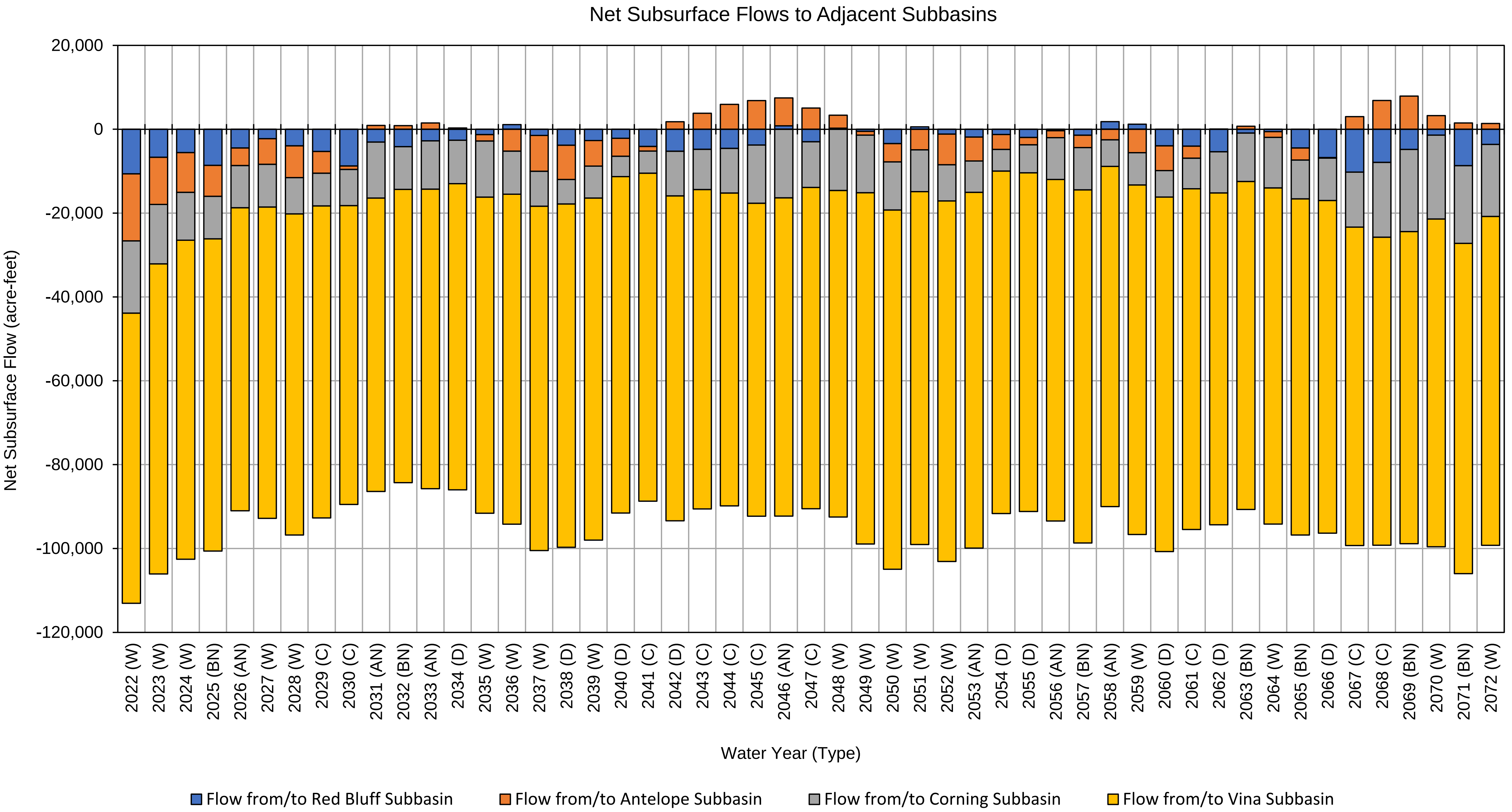
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-21,000	-7,500	-28,000
2023 (W)	-22,000	-11,000	-34,000
2024 (W)	-22,000	-13,000	-34,000
2025 (BN)	-26,000	-8,900	-35,000
2026 (AN)	-22,000	-7,600	-29,000
2027 (W)	-17,000	-12,000	-29,000
2028 (W)	-20,000	-12,000	-33,000
2029 (C)	-29,000	-8,700	-38,000
2030 (C)	-34,000	-3,500	-38,000
2031 (AN)	-24,000	-3,300	-27,000
2032 (BN)	-26,000	-3,200	-29,000
2033 (AN)	-22,000	-3,000	-25,000
2034 (D)	-28,000	-3,400	-32,000
2035 (W)	-20,000	-5,200	-25,000
2036 (W)	-14,000	-11,000	-25,000
2037 (W)	-21,000	-14,000	-35,000
2038 (D)	-25,000	-11,000	-36,000
2039 (W)	-23,000	-9,400	-32,000
2040 (D)	-25,000	-7,500	-32,000
2041 (C)	-29,000	-3,600	-32,000
2042 (D)	-25,000	-1,800	-27,000
2043 (C)	-29,000	-1,200	-31,000
2044 (C)	-29,000	-670	-30,000
2045 (C)	-30,000	-490	-30,000
2046 (AN)	-24,000	-840	-25,000
2047 (C)	-28,000	-820	-29,000
2048 (W)	-22,000	-1,800	-24,000
2049 (W)	-26,000	-3,700	-29,000
2050 (W)	-24,000	-4,900	-29,000
2051 (W)	-15,000	-7,600	-23,000
2052 (W)	-22,000	-9,400	-31,000
2053 (AN)	-20,000	-7,300	-27,000
2054 (D)	-26,000	-5,300	-31,000
2055 (D)	-28,000	-3,800	-32,000
2056 (AN)	-20,000	-4,200	-25,000
2057 (BN)	-24,000	-5,800	-30,000
2058 (AN)	-17,000	-5,900	-23,000
2059 (W)	-18,000	-9,700	-27,000
2060 (D)	-23,000	-7,600	-31,000
2061 (C)	-32,000	-4,200	-36,000
2062 (D)	-27,000	-2,500	-30,000
2063 (BN)	-20,000	-2,600	-23,000

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-17,000	-4,300	-22,000
2065 (BN)		-26,000	-4,100	-30,000
2066 (D)		-33,000	-2,500	-36,000
2067 (C)		-36,000	-820	-36,000
2068 (C)		-44,000	-440	-44,000
2069 (BN)		-31,000	-420	-32,000
2070 (W)		-24,000	-1,500	-26,000
2071 (BN)		-29,000	-1,200	-31,000
2072 (W)		-22,000	-2,000	-24,000
Average (2022-2072)		-25,000	-5,200	-30,000
2022-2072	W	-21,000	-7,700	-28,000
	AN	-21,000	-4,600	-26,000
	BN	-26,000	-3,700	-30,000
	D	-27,000	-5,000	-32,000
	C	-32,000	-2,400	-34,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

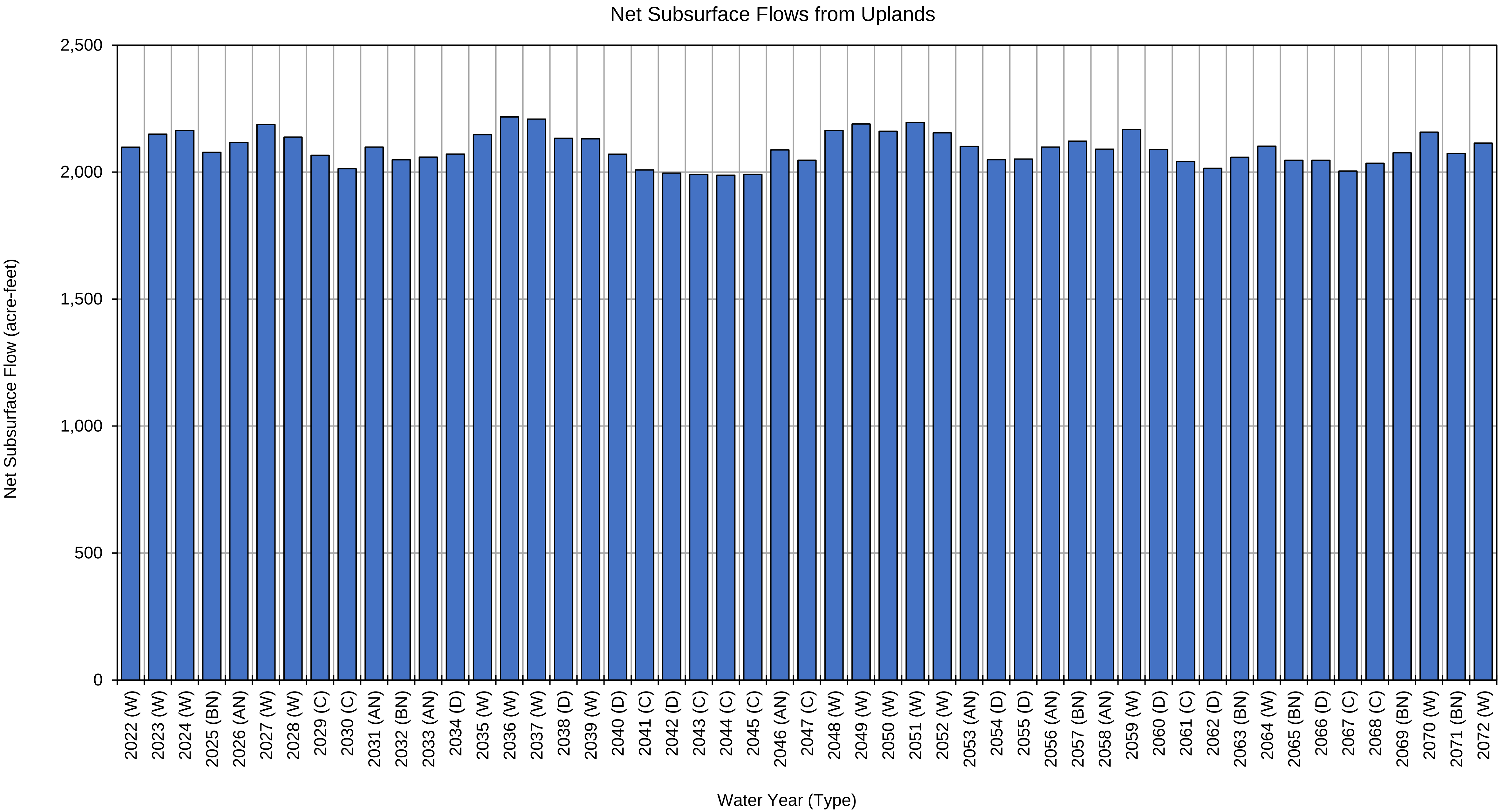
WY (Type)	Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-11,000	-16,000	-17,000	-69,000	-110,000
2023 (W)	-6,700	-11,000	-14,000	-74,000	-110,000
2024 (W)	-5,600	-9,500	-11,000	-76,000	-100,000
2025 (BN)	-8,600	-7,400	-10,000	-74,000	-100,000
2026 (AN)	-4,500	-4,200	-10,000	-72,000	-91,000
2027 (W)	-2,300	-6,100	-10,000	-74,000	-93,000
2028 (W)	-4,000	-7,600	-8,700	-77,000	-97,000
2029 (C)	-5,300	-5,200	-7,800	-74,000	-93,000
2030 (C)	-8,800	-820	-8,600	-71,000	-90,000
2031 (AN)	-3,100	910	-13,000	-70,000	-85,000
2032 (BN)	-4,200	860	-10,000	-70,000	-83,000
2033 (AN)	-2,800	1,500	-12,000	-71,000	-84,000
2034 (D)	-2,600	300	-10,000	-73,000	-86,000
2035 (W)	-1,300	-1,500	-13,000	-75,000	-92,000
2036 (W)	1,100	-5,200	-10,000	-79,000	-93,000
2037 (W)	-1,500	-8,500	-8,300	-82,000	-100,000
2038 (D)	-3,800	-8,200	-5,900	-82,000	-100,000
2039 (W)	-2,700	-6,100	-7,600	-82,000	-98,000
2040 (D)	-2,200	-4,300	-4,800	-80,000	-92,000
2041 (C)	-4,100	-1,100	-5,300	-78,000	-89,000
2042 (D)	-5,300	1,800	-11,000	-77,000	-92,000
2043 (C)	-4,800	3,800	-9,600	-76,000	-87,000
2044 (C)	-4,600	5,900	-11,000	-75,000	-84,000
2045 (C)	-3,800	6,800	-14,000	-75,000	-85,000
2046 (AN)	800	6,700	-16,000	-76,000	-85,000
2047 (C)	-3,000	5,100	-11,000	-77,000	-85,000
2048 (W)	260	3,100	-15,000	-78,000	-89,000
2049 (W)	-510	-890	-14,000	-84,000	-99,000
2050 (W)	-3,400	-4,400	-11,000	-86,000	-100,000
2051 (W)	560	-4,900	-10,000	-84,000	-98,000
2052 (W)	-1,200	-7,300	-8,600	-86,000	-100,000
2053 (AN)	-1,900	-5,700	-7,500	-85,000	-100,000
2054 (D)	-1,300	-3,600	-5,200	-82,000	-92,000
2055 (D)	-2,000	-1,700	-6,700	-81,000	-91,000
2056 (AN)	-370	-1,600	-10,000	-81,000	-93,000
2057 (BN)	-1,400	-3,000	-10,000	-84,000	-99,000
2058 (AN)	1,800	-2,500	-6,300	-81,000	-88,000
2059 (W)	1,200	-5,600	-7,700	-83,000	-95,000
2060 (D)	-4,000	-5,900	-6,300	-85,000	-100,000
2061 (C)	-4,000	-2,900	-7,300	-81,000	-95,000
2062 (D)	-5,400	63	-9,800	-79,000	-94,000
2063 (BN)	-910	710	-12,000	-78,000	-90,000

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Red Bluff Subbasin	Flow from/to Antelope Subbasin	Flow from/to Corning Subbasin	Flow from/to Vina Subbasin	Net Subsurface Flow from Adjacent Subbasins
2064 (W)		-570	-1,400	-12,000	-80,000	-94,000
2065 (BN)		-4,500	-2,900	-9,300	-80,000	-97,000
2066 (D)		-6,800	-140	-10,000	-79,000	-96,000
2067 (C)		-10,000	3,000	-13,000	-76,000	-96,000
2068 (C)		-7,900	6,800	-18,000	-73,000	-92,000
2069 (BN)		-4,800	7,900	-20,000	-74,000	-91,000
2070 (W)		-1,400	3,300	-20,000	-78,000	-96,000
2071 (BN)		-8,700	1,500	-19,000	-79,000	-100,000
2072 (W)		-3,600	1,400	-17,000	-78,000	-98,000
Average (2022-2072)		-3,400	-1,900	-11,000	-78,000	-94,000
2022-2072	W	-2,300	-4,900	-12,000	-79,000	-99,000
	AN	-1,400	-720	-11,000	-77,000	-90,000
	BN	-4,700	-320	-13,000	-77,000	-95,000
	D	-3,700	-2,400	-7,800	-80,000	-94,000
	C	-5,700	2,100	-11,000	-76,000	-90,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

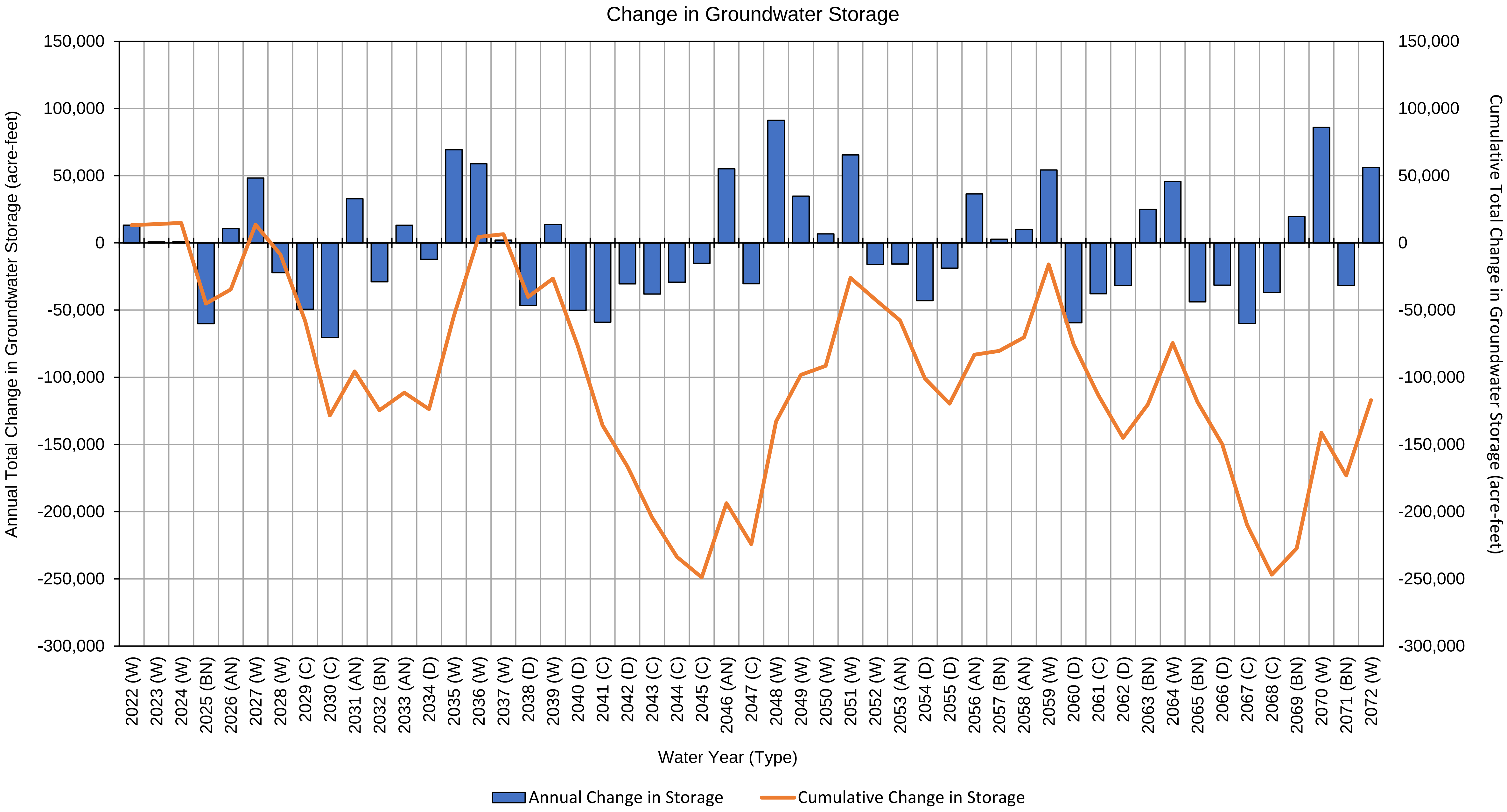
WY (Type)	Subsurface Flows from Uplands
2022 (W)	2,100
2023 (W)	2,100
2024 (W)	2,200
2025 (BN)	2,100
2026 (AN)	2,100
2027 (W)	2,200
2028 (W)	2,100
2029 (C)	2,100
2030 (C)	2,000
2031 (AN)	2,100
2032 (BN)	2,000
2033 (AN)	2,100
2034 (D)	2,100
2035 (W)	2,100
2036 (W)	2,200
2037 (W)	2,200
2038 (D)	2,100
2039 (W)	2,100
2040 (D)	2,100
2041 (C)	2,000
2042 (D)	2,000
2043 (C)	2,000
2044 (C)	2,000
2045 (C)	2,000
2046 (AN)	2,100
2047 (C)	2,000
2048 (W)	2,200
2049 (W)	2,200
2050 (W)	2,200
2051 (W)	2,200
2052 (W)	2,200
2053 (AN)	2,100
2054 (D)	2,000
2055 (D)	2,100
2056 (AN)	2,100
2057 (BN)	2,100
2058 (AN)	2,100
2059 (W)	2,200
2060 (D)	2,100
2061 (C)	2,000
2062 (D)	2,000
2063 (BN)	2,100

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		2,100
2065 (BN)		2,000
2066 (D)		2,000
2067 (C)		2,000
2068 (C)		2,000
2069 (BN)		2,100
2070 (W)		2,200
2071 (BN)		2,100
2072 (W)		2,100
Average (2022-2072)		2,100
2022-2072	W	2,200
	AN	2,100
	BN	2,100
	D	2,100
	C	2,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	13,000	13,000
2023 (W)	780	14,000
2024 (W)	950	15,000
2025 (BN)	-60,000	-45,000
2026 (AN)	11,000	-35,000
2027 (W)	48,000	14,000
2028 (W)	-22,000	-8,600
2029 (C)	-49,000	-58,000
2030 (C)	-70,000	-130,000
2031 (AN)	33,000	-96,000
2032 (BN)	-29,000	-120,000
2033 (AN)	13,000	-110,000
2034 (D)	-12,000	-120,000
2035 (W)	69,000	-54,000
2036 (W)	59,000	4,400
2037 (W)	2,100	6,500
2038 (D)	-47,000	-40,000
2039 (W)	14,000	-27,000
2040 (D)	-50,000	-77,000
2041 (C)	-59,000	-140,000
2042 (D)	-31,000	-170,000
2043 (C)	-38,000	-200,000
2044 (C)	-29,000	-230,000
2045 (C)	-15,000	-250,000
2046 (AN)	55,000	-190,000
2047 (C)	-30,000	-220,000
2048 (W)	91,000	-130,000
2049 (W)	35,000	-98,000
2050 (W)	6,700	-92,000
2051 (W)	65,000	-26,000
2052 (W)	-16,000	-42,000
2053 (AN)	-16,000	-58,000
2054 (D)	-43,000	-100,000
2055 (D)	-19,000	-120,000
2056 (AN)	36,000	-83,000
2057 (BN)	2,800	-80,000
2058 (AN)	10,000	-70,000
2059 (W)	54,000	-16,000
2060 (D)	-59,000	-76,000
2061 (C)	-38,000	-110,000
2062 (D)	-32,000	-150,000
2063 (BN)	25,000	-120,000

Los Molinos Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		46,000	-75,000
2065 (BN)		-44,000	-120,000
2066 (D)		-31,000	-150,000
2067 (C)		-60,000	-210,000
2068 (C)		-37,000	-250,000
2069 (BN)		20,000	-230,000
2070 (W)		86,000	-140,000
2071 (BN)		-32,000	-170,000
2072 (W)		56,000	-120,000
Average (2022-2072)		-2,300	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

Appendix D. Detailed Red Bluff Subbasin Water Budget Results

APPENDIX D

Detailed Red Bluff Subbasin Water Budget Results

D-1	Historical Model Results
D-2	Projected (Current Land Use) Model Results
D-3	Projected (Future Land Use) Model Results
D-4	Projected (Current Land Use) with Climate Change (2030) Model Results
D-5	Projected (Current Land Use) with Climate Change (2070) Model Results
D-6	Projected (Future Land Use) with Climate Change (2030) Model Results
D-7	Projected (Future Land Use) with Climate Change (2070) Model Results
D-8	Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

APPENDIX D-1

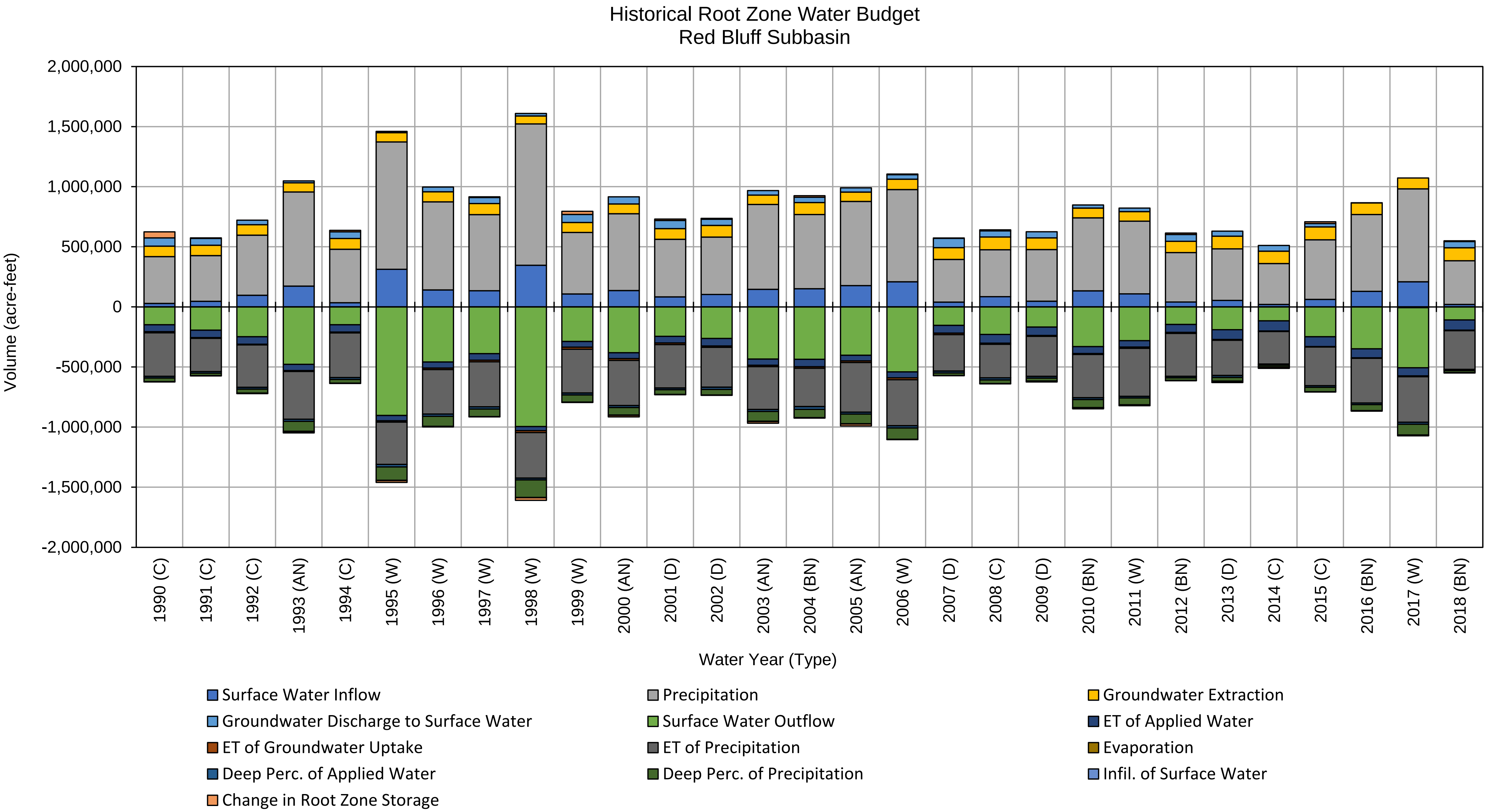
Detailed Red Bluff Subbasin Water Budget Results:

Historical Model Results

APPENDIX D-1a

Detailed Red Bluff Subbasin Water Budget Results:

Historical Model Results – Surface Water System



Historical Root Zone Water Budget
Red Bluff Subbasin

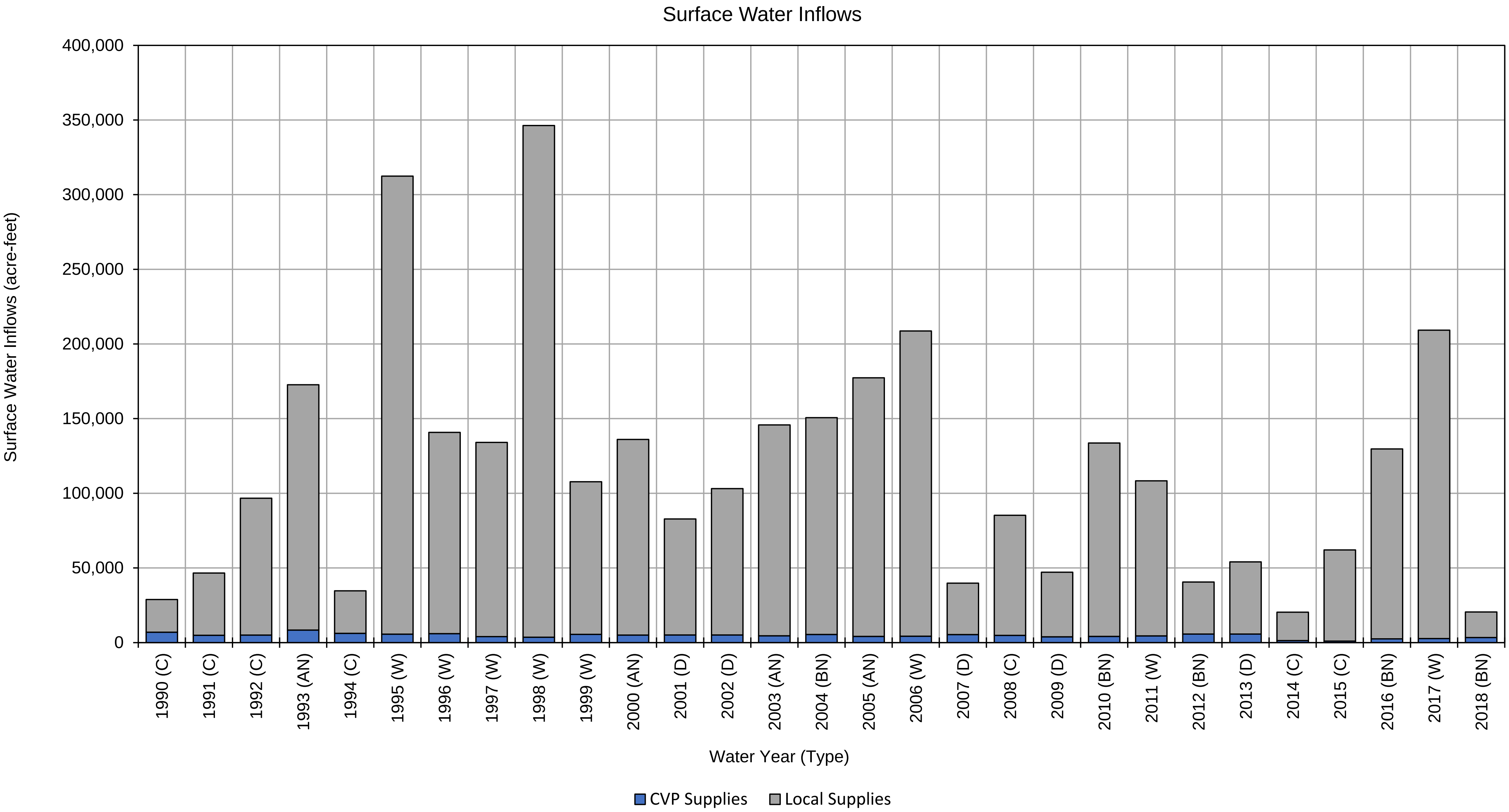
Tehama IHM - Historical

Red Bluff Subbasin Historical Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
1990 (C)		29,000	390,000	87,000	69,000	150,000	58,000	9,400	360,000	240	13,000	31,000	2,100	-50,000
1991 (C)		47,000	380,000	87,000	57,000	190,000	62,000	6,300	280,000	330	13,000	21,000	2,000	-4,200
1992 (C)		97,000	500,000	87,000	38,000	250,000	62,000	5,800	350,000	380	14,000	34,000	2,200	1,600
1993 (AN)		170,000	780,000	76,000	15,000	480,000	52,000	7,900	400,000	280	17,000	83,000	2,800	10,000
1994 (C)		35,000	440,000	90,000	55,000	150,000	60,000	7,200	370,000	290	15,000	31,000	2,100	-12,000
1995 (W)		310,000	1,100,000	76,000	11,000	900,000	45,000	10,000	350,000	290	20,000	110,000	2,900	14,000
1996 (W)		140,000	730,000	84,000	40,000	460,000	51,000	13,000	370,000	440	18,000	84,000	2,800	310
1997 (W)		130,000	630,000	92,000	50,000	390,000	55,000	13,000	370,000	570	17,000	63,000	2,400	-6,100
1998 (W)		350,000	1,200,000	66,000	21,000	1,000,000	35,000	16,000	380,000	390	15,000	150,000	2,900	21,000
1999 (W)		110,000	510,000	83,000	67,000	290,000	48,000	17,000	360,000	690	16,000	59,000	2,800	-26,000
2000 (AN)		140,000	640,000	81,000	59,000	380,000	48,000	15,000	380,000	640	16,000	63,000	2,800	13,000
2001 (D)		83,000	480,000	89,000	68,000	250,000	55,000	13,000	360,000	700	14,000	39,000	2,400	-11,000
2002 (D)		100,000	480,000	97,000	51,000	260,000	62,000	11,000	330,000	750	17,000	48,000	2,600	-7,300
2003 (AN)		150,000	710,000	79,000	37,000	430,000	51,000	12,000	360,000	700	15,000	82,000	2,600	13,000
2004 (BN)		150,000	620,000	100,000	44,000	440,000	62,000	13,000	320,000	920	21,000	70,000	3,000	-13,000
2005 (AN)		180,000	700,000	77,000	35,000	400,000	47,000	13,000	410,000	590	15,000	80,000	2,600	16,000
2006 (W)		210,000	770,000	87,000	37,000	540,000	49,000	16,000	380,000	640	18,000	95,000	3,000	-5,100
2007 (D)		40,000	350,000	98,000	78,000	150,000	64,000	12,000	300,000	790	15,000	21,000	2,300	-2,500
2008 (C)		85,000	390,000	110,000	51,000	230,000	73,000	9,400	280,000	1,000	16,000	31,000	2,400	-8,400
2009 (D)		47,000	430,000	97,000	51,000	170,000	70,000	6,900	330,000	910	14,000	24,000	2,100	6,000
2010 (BN)		130,000	610,000	82,000	26,000	330,000	58,000	7,900	360,000	780	15,000	67,000	2,400	7,500
2011 (W)		110,000	600,000	80,000	29,000	280,000	54,000	9,900	400,000	680	13,000	57,000	2,500	4,500
2012 (BN)		41,000	410,000	93,000	57,000	150,000	66,000	8,800	360,000	800	11,000	22,000	2,300	-12,000
2013 (D)		54,000	430,000	110,000	41,000	190,000	81,000	6,500	290,000	1,100	15,000	31,000	2,500	9,200
2014 (C)		20,000	340,000	100,000	48,000	120,000	85,000	3,800	270,000	940	8,800	13,000	1,600	11,000
2015 (C)		62,000	500,000	110,000	28,000	250,000	82,000	3,200	320,000	900	13,000	37,000	1,700	-14,000
2016 (BN)		130,000	640,000	96,000	2,100	350,000	76,000	3,400	370,000	1,100	13,000	50,000	2,200	830
2017 (W)		210,000	770,000	91,000	-6,300	500,000	68,000	6,600	380,000	950	16,000	90,000	2,500	4,200
2018 (BN)		20,000	360,000	110,000	51,000	110,000	85,000	4,200	320,000	840	9,700	17,000	2,000	-6,100
Average (1990-2018)		120,000	580,000	90,000	42,000	340,000	61,000	9,700	350,000	680	15,000	55,000	2,400	-1,600
1990-2018	W	200,000	780,000	82,000	31,000	540,000	51,000	13,000	380,000	580	17,000	88,000	2,700	930
	AN	160,000	710,000	78,000	37,000	420,000	49,000	12,000	390,000	550	16,000	77,000	2,700	13,000
	BN	95,000	530,000	96,000	36,000	270,000	69,000	7,500	350,000	890	14,000	45,000	2,400	-4,500
	D	65,000	430,000	97,000	58,000	200,000	67,000	10,000	320,000	840	15,000	32,000	2,400	-1,200
	C	53,000	420,000	95,000	50,000	190,000	69,000	6,400	320,000	580	13,000	28,000	2,000	-11,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Red Bluff Subbasin Historical Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
1990 (C)		6,900	22,000	29,000
1991 (C)		4,900	42,000	47,000
1992 (C)		5,000	92,000	97,000
1993 (AN)		8,400	160,000	170,000
1994 (C)		6,100	29,000	35,000
1995 (W)		5,600	310,000	320,000
1996 (W)		5,900	130,000	140,000
1997 (W)		4,000	130,000	130,000
1998 (W)		3,600	340,000	340,000
1999 (W)		5,500	100,000	110,000
2000 (AN)		5,000	130,000	140,000
2001 (D)		5,000	78,000	83,000
2002 (D)		5,100	98,000	100,000
2003 (AN)		4,500	140,000	140,000
2004 (BN)		5,400	150,000	160,000
2005 (AN)		4,100	170,000	170,000
2006 (W)		4,200	200,000	200,000
2007 (D)		5,400	34,000	39,000
2008 (C)		4,800	80,000	85,000
2009 (D)		3,800	43,000	47,000
2010 (BN)		4,100	130,000	130,000
2011 (W)		4,500	100,000	100,000
2012 (BN)		5,700	35,000	41,000
2013 (D)		5,700	48,000	54,000
2014 (C)		1,300	19,000	20,000
2015 (C)		930	61,000	62,000
2016 (BN)		2,500	130,000	130,000
2017 (W)		2,700	210,000	210,000
2018 (BN)		3,400	17,000	20,000
Average (1990-2018)		4,600	110,000	110,000
1990-2018	W	4,500	190,000	190,000
	AN	5,500	150,000	160,000
	BN	4,200	91,000	95,000
	D	5,000	60,000	65,000
	C	4,300	49,000	53,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
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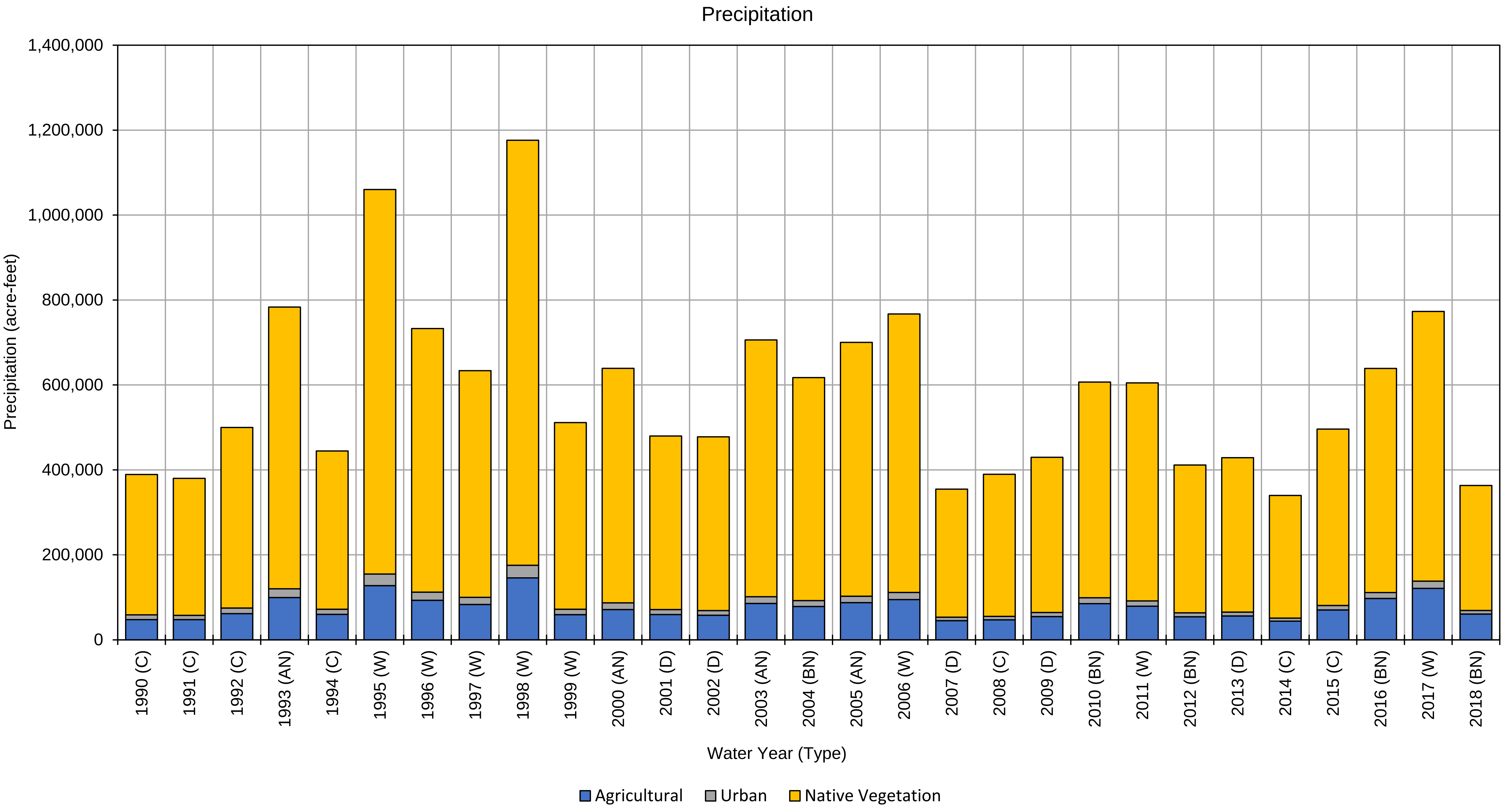
C	Critical



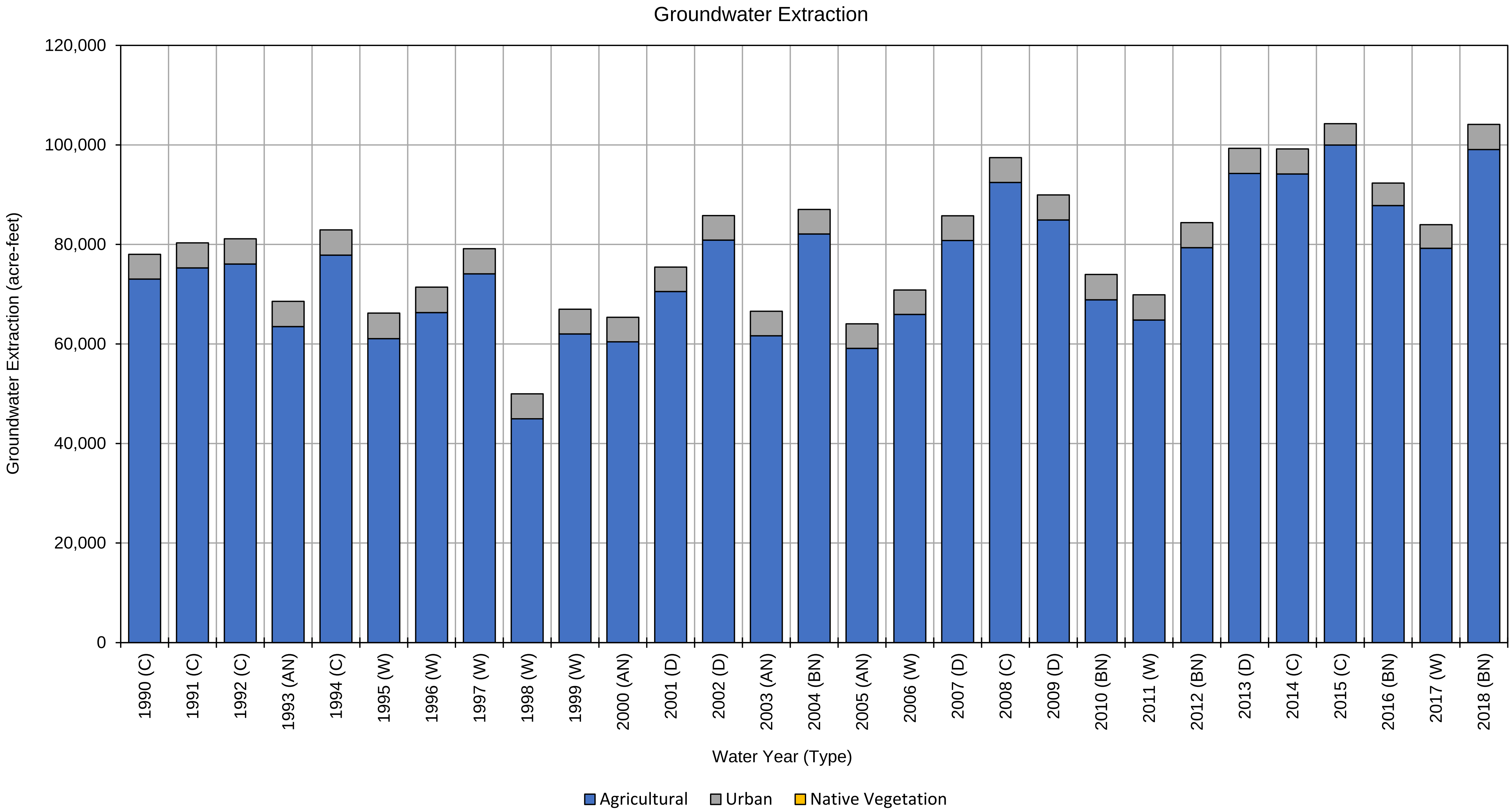
Tehama IHM - Historical

Red Bluff Subbasin Historical Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		48,000	11,000	330,000	390,000
1991 (C)		47,000	10,000	320,000	380,000
1992 (C)		62,000	13,000	430,000	510,000
1993 (AN)		99,000	21,000	660,000	780,000
1994 (C)		60,000	12,000	370,000	440,000
1995 (W)		130,000	27,000	910,000	1,100,000
1996 (W)		93,000	19,000	620,000	730,000
1997 (W)		83,000	17,000	530,000	630,000
1998 (W)		150,000	30,000	1,000,000	1,200,000
1999 (W)		59,000	13,000	440,000	510,000
2000 (AN)		71,000	16,000	550,000	640,000
2001 (D)		59,000	12,000	410,000	480,000
2002 (D)		58,000	11,000	410,000	480,000
2003 (AN)		86,000	16,000	600,000	700,000
2004 (BN)		78,000	14,000	520,000	610,000
2005 (AN)		88,000	15,000	600,000	700,000
2006 (W)		95,000	17,000	660,000	770,000
2007 (D)		45,000	8,000	300,000	350,000
2008 (C)		47,000	8,100	330,000	390,000
2009 (D)		55,000	9,500	370,000	430,000
2010 (BN)		85,000	14,000	510,000	610,000
2011 (W)		79,000	12,000	510,000	600,000
2012 (BN)		54,000	9,200	350,000	410,000
2013 (D)		56,000	9,100	360,000	430,000
2014 (C)		44,000	7,300	290,000	340,000
2015 (C)		70,000	11,000	420,000	500,000
2016 (BN)		97,000	14,000	530,000	640,000
2017 (W)		120,000	17,000	640,000	780,000
2018 (BN)		61,000	8,300	290,000	360,000
Average (1990-2018)		75,000	14,000	490,000	580,000
1990-2018	W	100,000	19,000	660,000	780,000
	AN	86,000	17,000	600,000	700,000
	BN	75,000	12,000	440,000	530,000
	D	55,000	9,900	370,000	430,000
	C	54,000	10,000	360,000	420,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



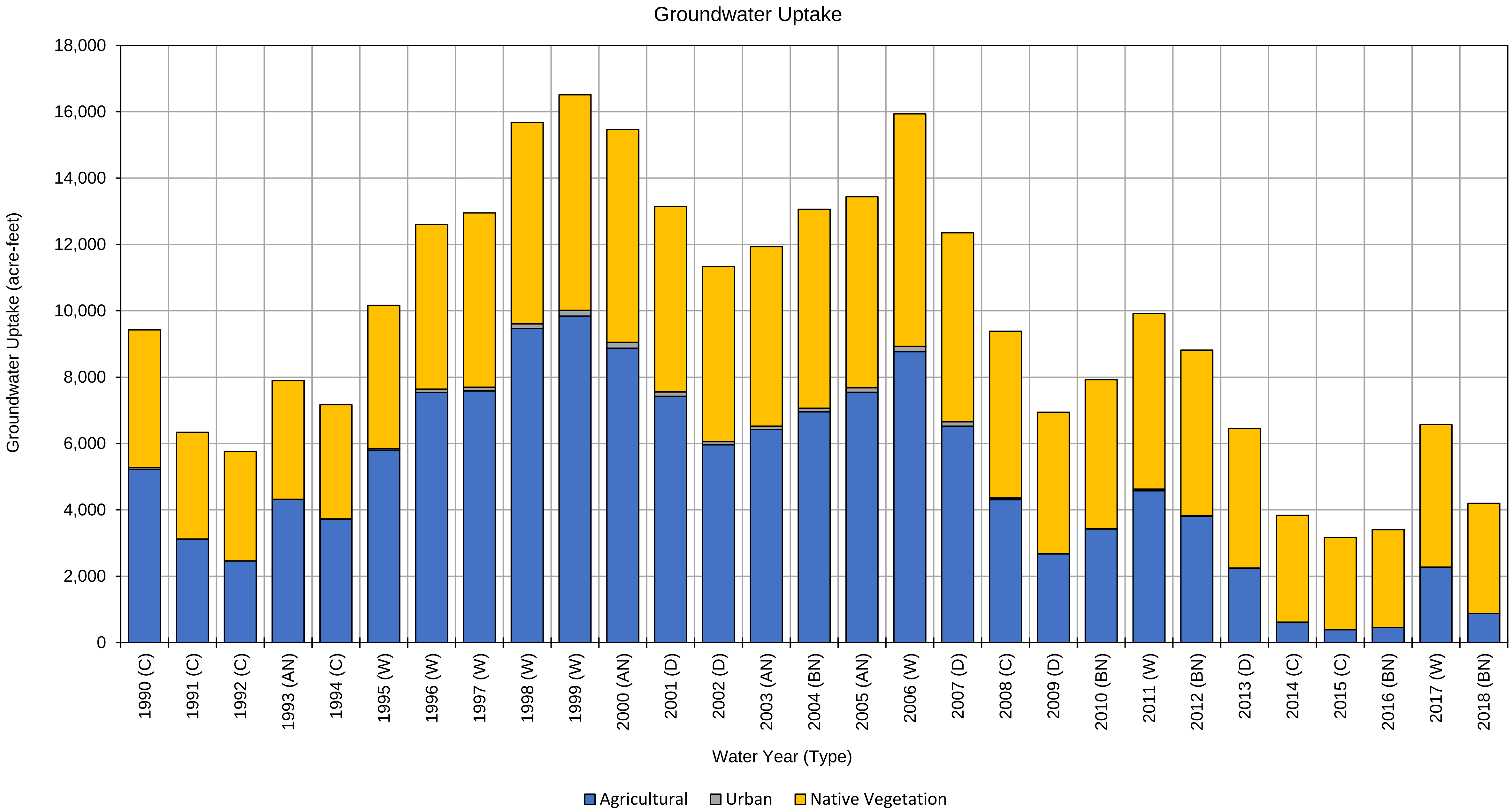
Tehama IHM - Historical

Red Bluff Subbasin Historical Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>73,000</td><td>5,000</td><td>0</td><td>78,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>75,000</td><td>5,000</td><td>0</td><td>80,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>76,000</td><td>5,100</td><td>0</td><td>81,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>63,000</td><td>5,100</td><td>0</td><td>68,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>78,000</td><td>5,100</td><td>0</td><td>83,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>61,000</td><td>5,100</td><td>0</td><td>66,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>66,000</td><td>5,100</td><td>0</td><td>71,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>74,000</td><td>5,000</td><td>0</td><td>79,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>45,000</td><td>5,000</td><td>0</td><td>50,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>62,000</td><td>5,000</td><td>0</td><td>67,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>60,000</td><td>4,900</td><td>0</td><td>65,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>71,000</td><td>4,900</td><td>0</td><td>76,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>81,000</td><td>4,900</td><td>0</td><td>86,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>62,000</td><td>4,900</td><td>0</td><td>67,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>82,000</td><td>4,900</td><td>0</td><td>87,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>59,000</td><td>4,900</td><td>0</td><td>64,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>66,000</td><td>4,900</td><td>0</td><td>71,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>81,000</td><td>5,000</td><td>0</td><td>86,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>92,000</td><td>5,000</td><td>0</td><td>97,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>85,000</td><td>5,000</td><td>0</td><td>90,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>69,000</td><td>5,100</td><td>0</td><td>74,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>65,000</td><td>5,100</td><td>0</td><td>70,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>79,000</td><td>5,000</td><td>0</td><td>84,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>94,000</td><td>5,100</td><td>0</td><td>99,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>94,000</td><td>5,000</td><td>0</td><td>99,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>100,000</td><td>4,300</td><td>0</td><td>100,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>88,000</td><td>4,500</td><td>0</td><td>93,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>79,000</td><td>4,700</td><td>0</td><td>84,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>99,000</td><td>5,100</td><td>0</td><td>100,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>75,000</td><td>5,000</td><td>0</td><td>80,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>65,000</td><td>5,000</td><td>0</td><td>70,000</td></tr>
<tr><td>AN</td><td>61,000</td><td>5,000</td><td>0</td><td>66,000</td></tr>
<tr><td>BN</td><td>83,000</td><td>4,900</td><td>0</td><td>88,000</td></tr>
<tr><td>D</td><td>82,000</td><td>5,000</td><td>0</td><td>87,000</td></tr>
<tr><td>C</td><td>84,000</td><td>4,900</td><td>0</td><td>89,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



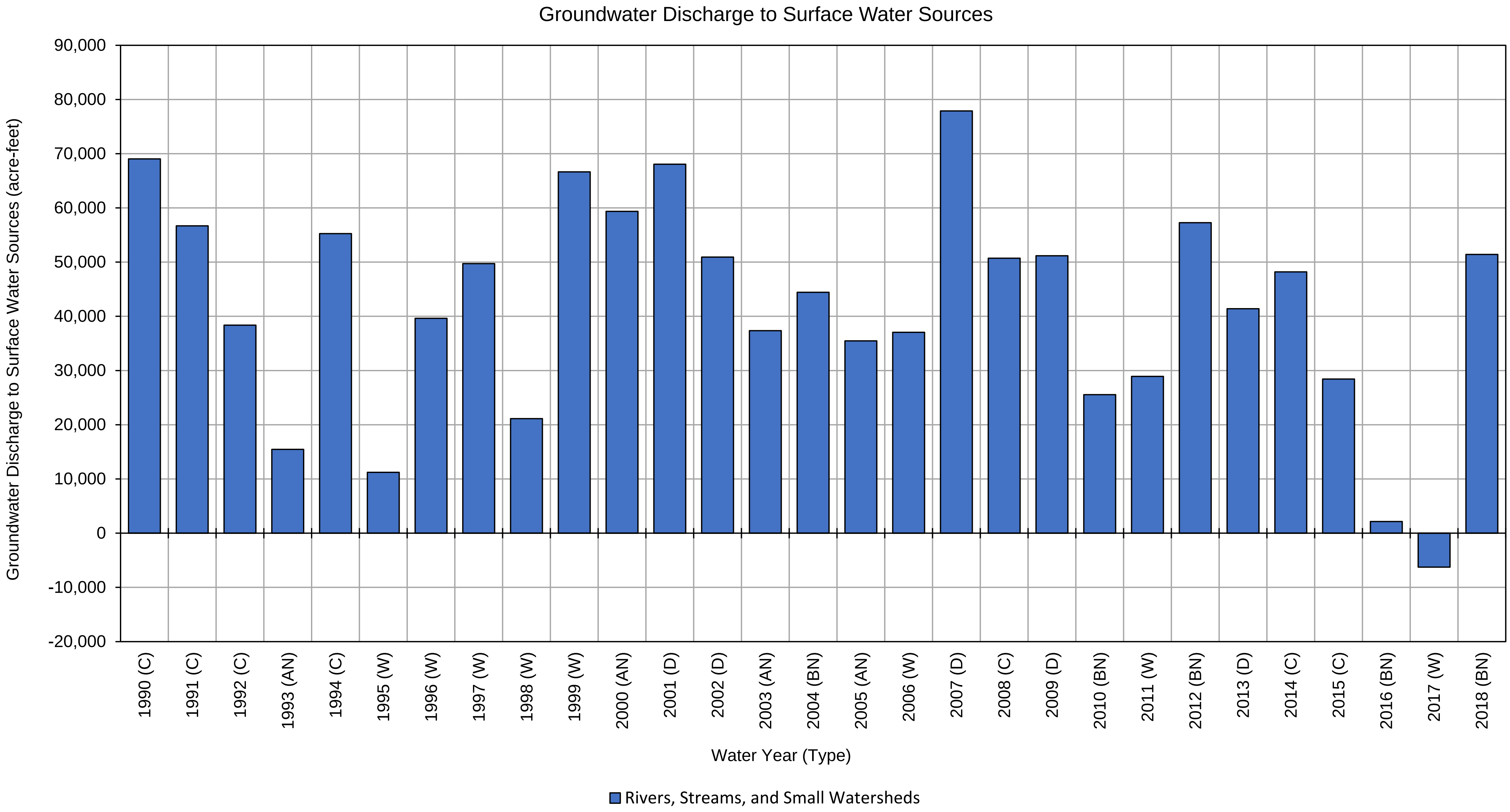
Tehama IHM - Historical

Red Bluff Subbasin Historical Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>5,200</td><td>53</td><td>4,100</td><td>9,400</td></tr>
<tr><td colspan="2">1991 (C)</td><td>3,100</td><td>2</td><td>3,200</td><td>6,300</td></tr>
<tr><td colspan="2">1992 (C)</td><td>2,500</td><td>1</td><td>3,300</td><td>5,800</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>4,300</td><td>5</td><td>3,600</td><td>7,900</td></tr>
<tr><td colspan="2">1994 (C)</td><td>3,700</td><td>5</td><td>3,400</td><td>7,100</td></tr>
<tr><td colspan="2">1995 (W)</td><td>5,800</td><td>49</td><td>4,300</td><td>10,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>7,500</td><td>98</td><td>5,000</td><td>13,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>7,600</td><td>110</td><td>5,300</td><td>13,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>9,500</td><td>140</td><td>6,100</td><td>16,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>9,800</td><td>170</td><td>6,500</td><td>16,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>8,900</td><td>170</td><td>6,400</td><td>15,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>7,400</td><td>140</td><td>5,600</td><td>13,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>6,000</td><td>95</td><td>5,300</td><td>11,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>6,400</td><td>97</td><td>5,400</td><td>12,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>7,000</td><td>110</td><td>6,000</td><td>13,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>7,500</td><td>130</td><td>5,800</td><td>13,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>8,800</td><td>160</td><td>7,000</td><td>16,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>6,500</td><td>130</td><td>5,700</td><td>12,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>4,300</td><td>50</td><td>5,000</td><td>9,400</td></tr>
<tr><td colspan="2">2009 (D)</td><td>2,700</td><td>4</td><td>4,300</td><td>7,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>3,400</td><td>12</td><td>4,500</td><td>7,900</td></tr>
<tr><td colspan="2">2011 (W)</td><td>4,600</td><td>51</td><td>5,300</td><td>10,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>3,800</td><td>34</td><td>5,000</td><td>8,800</td></tr>
<tr><td colspan="2">2013 (D)</td><td>2,200</td><td>4</td><td>4,200</td><td>6,400</td></tr>
<tr><td colspan="2">2014 (C)</td><td>620</td><td>0</td><td>3,200</td><td>3,800</td></tr>
<tr><td colspan="2">2015 (C)</td><td>390</td><td>0</td><td>2,800</td><td>3,200</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>450</td><td>0</td><td>3,000</td><td>3,500</td></tr>
<tr><td colspan="2">2017 (W)</td><td>2,300</td><td>2</td><td>4,300</td><td>6,600</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>880</td><td>0</td><td>3,300</td><td>4,200</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>4,900</td><td>63</td><td>4,700</td><td>9,700</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>7,000</td><td>98</td><td>5,500</td><td>13,000</td></tr>
<tr><td>AN</td><td>6,800</td><td>100</td><td>5,300</td><td>12,000</td></tr>
<tr><td>BN</td><td>3,100</td><td>32</td><td>4,300</td><td>7,400</td></tr>
<tr><td>D</td><td>5,000</td><td>74</td><td>5,000</td><td>10,000</td></tr>
<tr><td>C</td><td>2,800</td><td>16</td><td>3,600</td><td>6,400</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



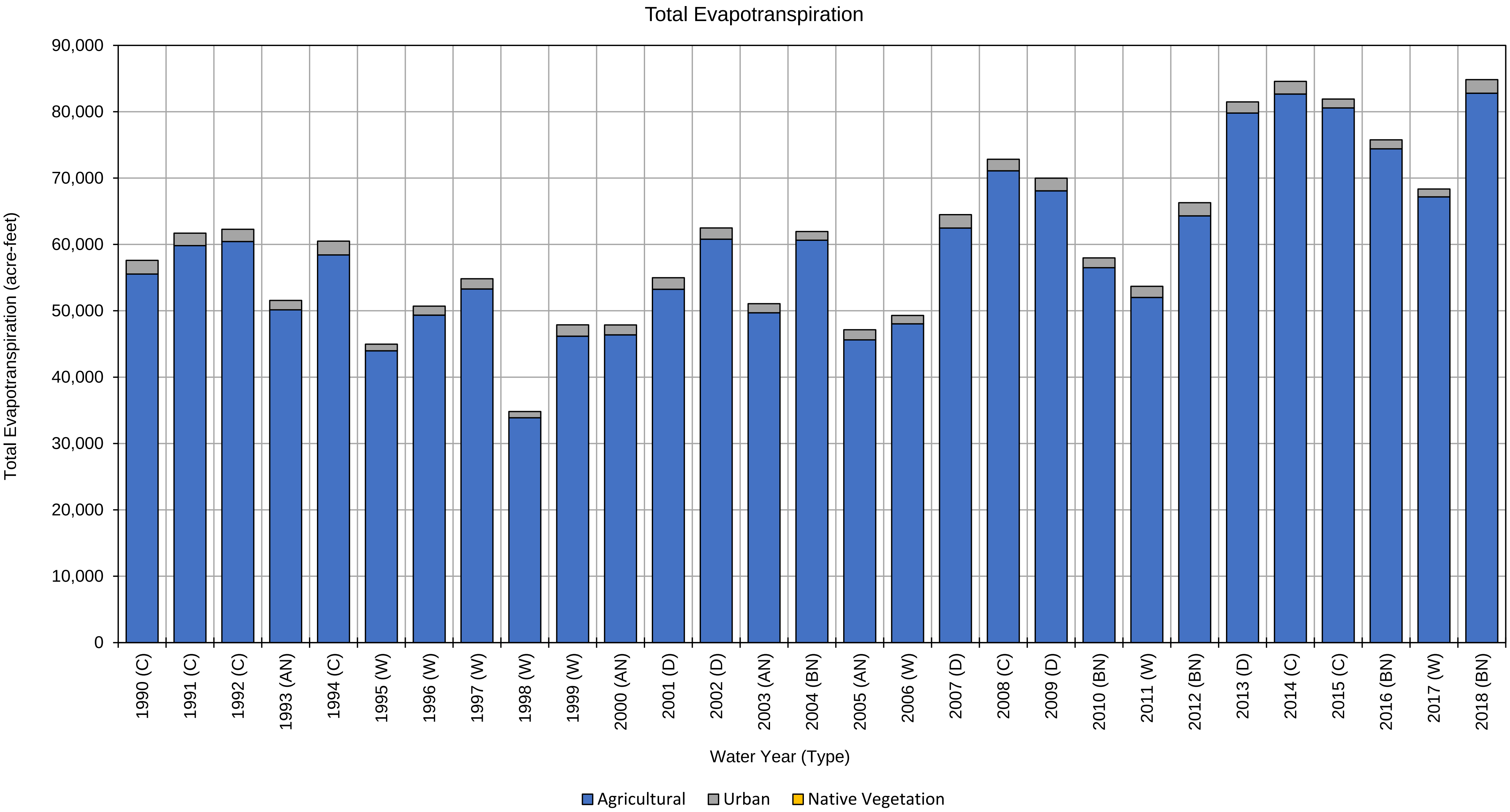
Tehama IHM - Historical

Red Bluff Subbasin Historical Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
1990 (C)		69,000
1991 (C)		57,000
1992 (C)		38,000
1993 (AN)		15,000
1994 (C)		55,000
1995 (W)		11,000
1996 (W)		40,000
1997 (W)		50,000
1998 (W)		21,000
1999 (W)		67,000
2000 (AN)		59,000
2001 (D)		68,000
2002 (D)		51,000
2003 (AN)		37,000
2004 (BN)		44,000
2005 (AN)		35,000
2006 (W)		37,000
2007 (D)		78,000
2008 (C)		51,000
2009 (D)		51,000
2010 (BN)		26,000
2011 (W)		29,000
2012 (BN)		57,000
2013 (D)		41,000
2014 (C)		48,000
2015 (C)		28,000
2016 (BN)		2,100
2017 (W)		-6,300
2018 (BN)		51,000
Average (1990-2018)		42,000
1990-2018	W	31,000
	AN	37,000
	BN	36,000
	D	58,000
	C	50,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



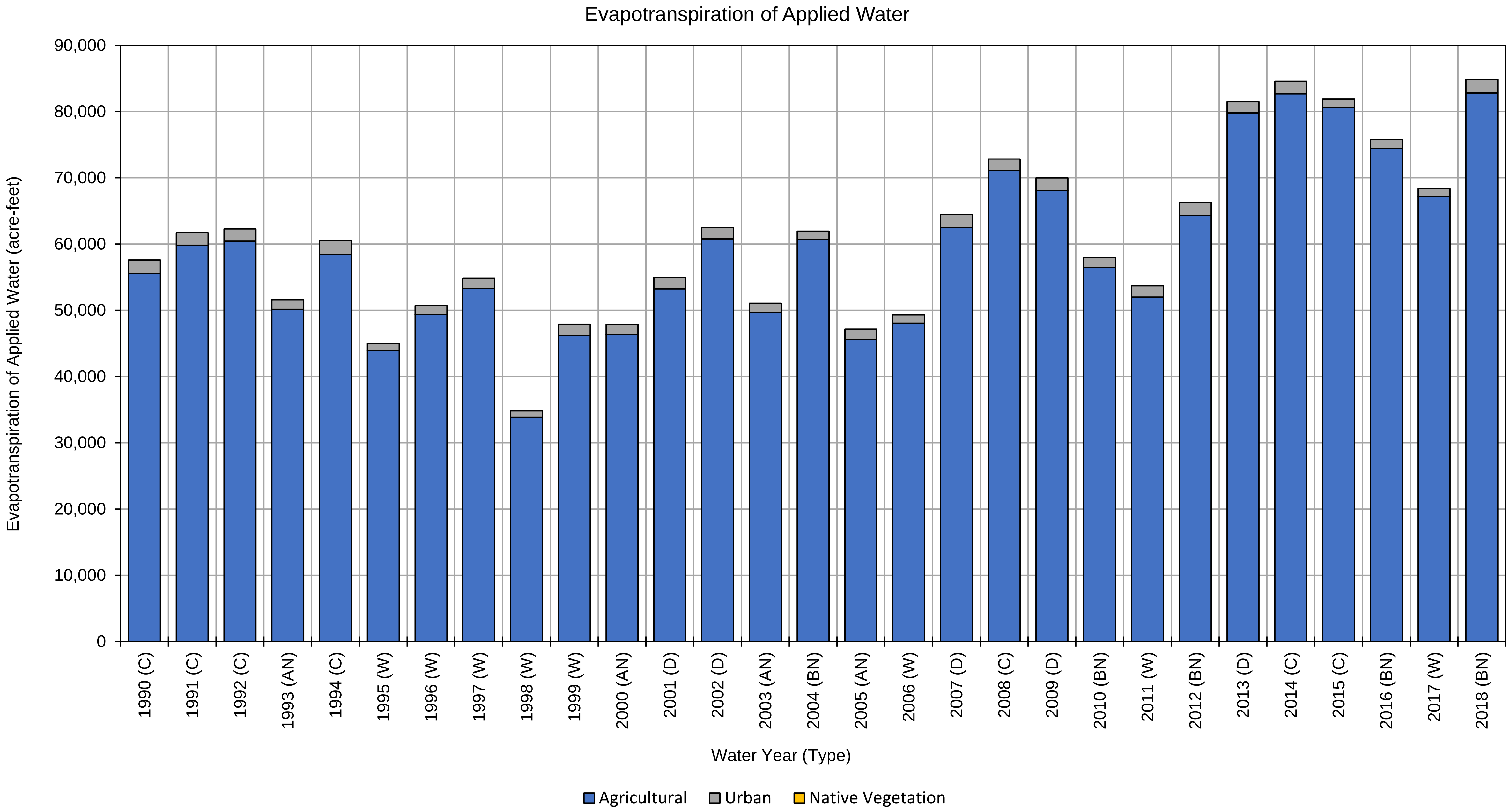
Tehama IHM - Historical

Red Bluff Subbasin Historical Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>99,000</td><td>6,700</td><td>320,000</td><td>430,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>93,000</td><td>5,700</td><td>250,000</td><td>350,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>100,000</td><td>6,600</td><td>310,000</td><td>420,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>99,000</td><td>7,200</td><td>350,000</td><td>460,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>100,000</td><td>7,000</td><td>330,000</td><td>440,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>87,000</td><td>6,300</td><td>310,000</td><td>400,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>97,000</td><td>6,500</td><td>330,000</td><td>430,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>100,000</td><td>6,700</td><td>330,000</td><td>440,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>87,000</td><td>6,600</td><td>340,000</td><td>430,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>91,000</td><td>6,100</td><td>330,000</td><td>430,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>91,000</td><td>6,300</td><td>340,000</td><td>440,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>99,000</td><td>6,000</td><td>320,000</td><td>430,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>100,000</td><td>5,600</td><td>300,000</td><td>410,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>94,000</td><td>5,800</td><td>320,000</td><td>420,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>100,000</td><td>5,000</td><td>290,000</td><td>400,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>98,000</td><td>6,200</td><td>370,000</td><td>470,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>96,000</td><td>5,600</td><td>350,000</td><td>450,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>100,000</td><td>5,300</td><td>270,000</td><td>380,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>100,000</td><td>4,600</td><td>250,000</td><td>350,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>110,000</td><td>5,500</td><td>300,000</td><td>420,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>100,000</td><td>5,600</td><td>310,000</td><td>420,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>100,000</td><td>5,900</td><td>350,000</td><td>460,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>110,000</td><td>5,700</td><td>320,000</td><td>440,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>120,000</td><td>4,700</td><td>260,000</td><td>380,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>120,000</td><td>4,700</td><td>240,000</td><td>360,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>120,000</td><td>4,700</td><td>280,000</td><td>400,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>120,000</td><td>5,500</td><td>320,000</td><td>450,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>120,000</td><td>5,400</td><td>320,000</td><td>450,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>130,000</td><td>5,400</td><td>270,000</td><td>410,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>100,000</td><td>5,800</td><td>310,000</td><td>420,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>99,000</td><td>6,100</td><td>330,000</td><td>440,000</td></tr>
<tr><td>AN</td><td>95,000</td><td>6,400</td><td>350,000</td><td>450,000</td></tr>
<tr><td>BN</td><td>110,000</td><td>5,400</td><td>300,000</td><td>420,000</td></tr>
<tr><td>D</td><td>100,000</td><td>5,400</td><td>290,000</td><td>400,000</td></tr>
<tr><td>C</td><td>110,000</td><td>5,700</td><td>280,000</td><td>400,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

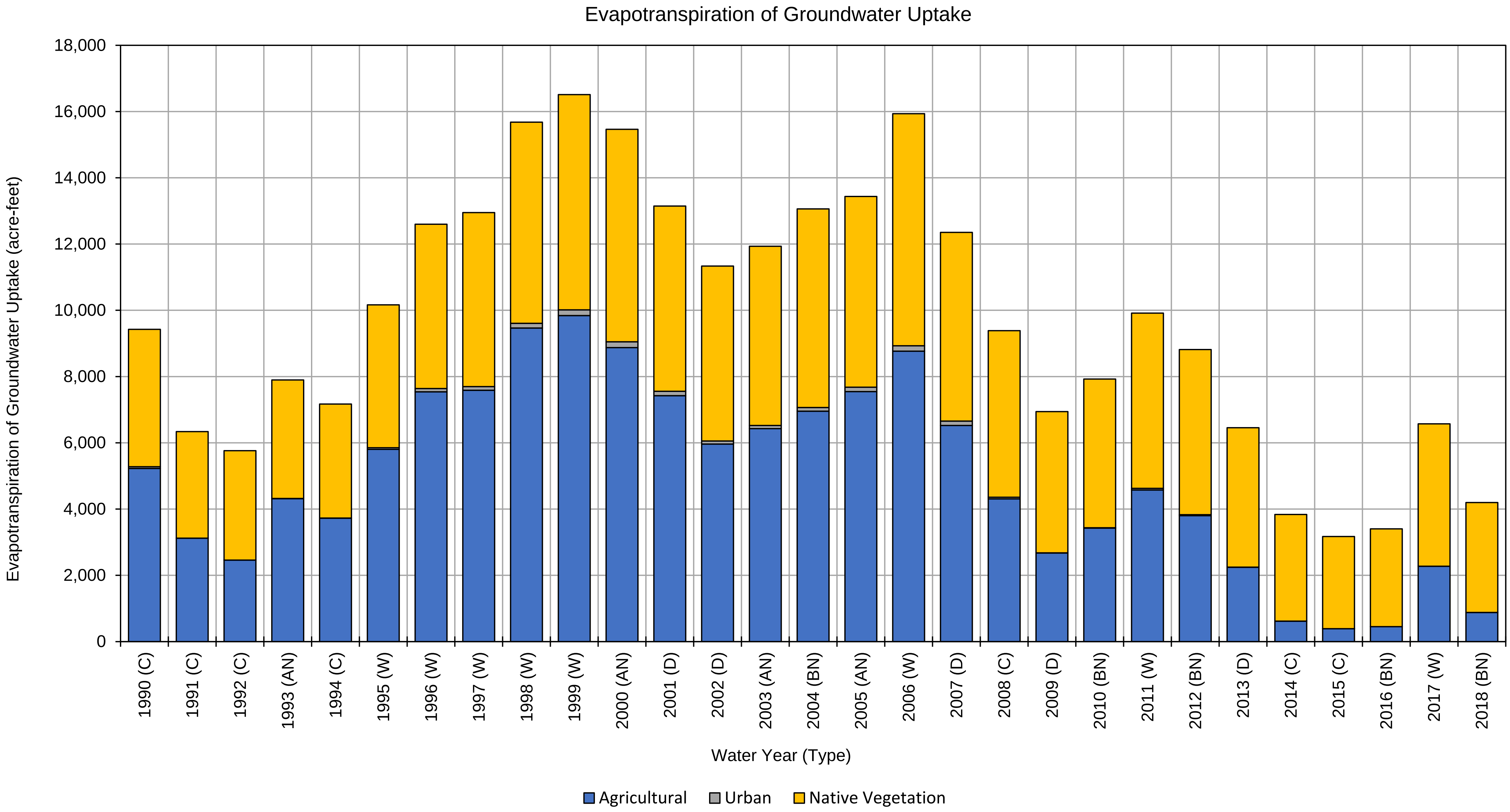

Evapotranspiration of Applied Water
Evapotranspiration of Applied Water (acre-feet)
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Agricultural
Urban
Native Vegetation

Red Bluff Subbasin Historical Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>56,000</td><td>2,100</td><td>0</td><td>58,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>60,000</td><td>1,900</td><td>0</td><td>62,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>60,000</td><td>1,900</td><td>0</td><td>62,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>50,000</td><td>1,400</td><td>0</td><td>51,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>58,000</td><td>2,100</td><td>0</td><td>60,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>44,000</td><td>1,000</td><td>0</td><td>45,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>49,000</td><td>1,400</td><td>0</td><td>50,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>53,000</td><td>1,500</td><td>0</td><td>55,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>34,000</td><td>940</td><td>0</td><td>35,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>46,000</td><td>1,700</td><td>0</td><td>48,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>46,000</td><td>1,500</td><td>0</td><td>48,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>53,000</td><td>1,700</td><td>0</td><td>55,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>61,000</td><td>1,700</td><td>0</td><td>63,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>50,000</td><td>1,400</td><td>0</td><td>51,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>61,000</td><td>1,300</td><td>0</td><td>62,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>46,000</td><td>1,500</td><td>0</td><td>48,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>48,000</td><td>1,300</td><td>0</td><td>49,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>62,000</td><td>2,000</td><td>0</td><td>64,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>71,000</td><td>1,700</td><td>0</td><td>73,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>68,000</td><td>1,900</td><td>0</td><td>70,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>56,000</td><td>1,500</td><td>0</td><td>58,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>52,000</td><td>1,700</td><td>0</td><td>54,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>64,000</td><td>2,000</td><td>0</td><td>66,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>80,000</td><td>1,700</td><td>0</td><td>82,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>83,000</td><td>1,900</td><td>0</td><td>85,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>81,000</td><td>1,300</td><td>0</td><td>82,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>74,000</td><td>1,400</td><td>0</td><td>75,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>67,000</td><td>1,200</td><td>0</td><td>68,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>83,000</td><td>2,000</td><td>0</td><td>85,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>59,000</td><td>1,600</td><td>0</td><td>61,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>49,000</td><td>1,300</td><td>0</td><td>50,000</td></tr>
<tr><td>AN</td><td>48,000</td><td>1,500</td><td>0</td><td>50,000</td></tr>
<tr><td>BN</td><td>68,000</td><td>1,600</td><td>0</td><td>70,000</td></tr>
<tr><td>D</td><td>65,000</td><td>1,800</td><td>0</td><td>67,000</td></tr>
<tr><td>C</td><td>67,000</td><td>1,800</td><td>0</td><td>69,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



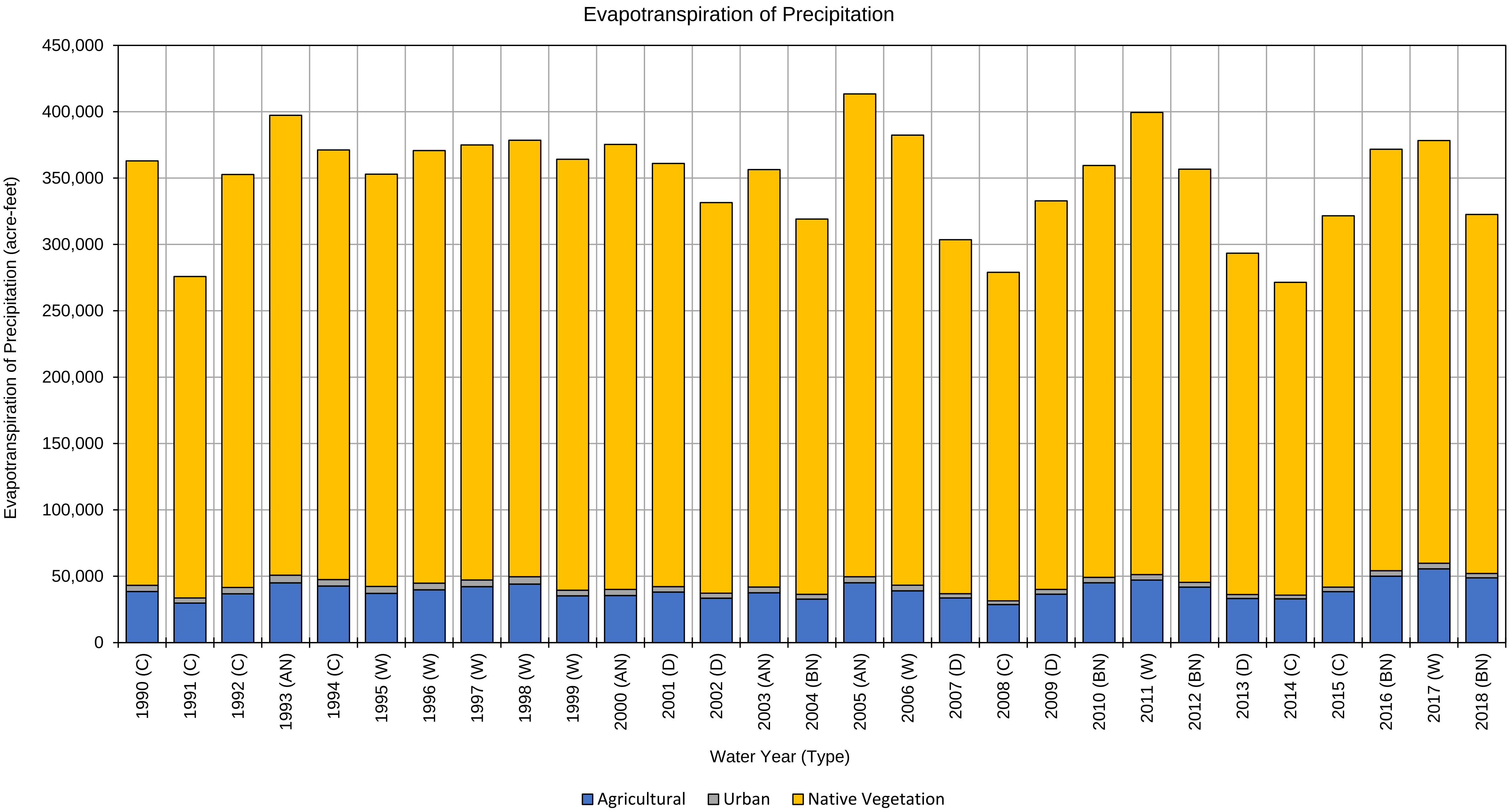
Tehama IHM - Historical

Red Bluff Subbasin Historical Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>5,200</td><td>53</td><td>4,100</td><td>9,400</td></tr>
<tr><td colspan="2">1991 (C)</td><td>3,100</td><td>2</td><td>3,200</td><td>6,300</td></tr>
<tr><td colspan="2">1992 (C)</td><td>2,500</td><td>1</td><td>3,300</td><td>5,800</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>4,300</td><td>5</td><td>3,600</td><td>7,900</td></tr>
<tr><td colspan="2">1994 (C)</td><td>3,700</td><td>5</td><td>3,400</td><td>7,100</td></tr>
<tr><td colspan="2">1995 (W)</td><td>5,800</td><td>49</td><td>4,300</td><td>10,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>7,500</td><td>98</td><td>5,000</td><td>13,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>7,600</td><td>110</td><td>5,300</td><td>13,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>9,500</td><td>140</td><td>6,100</td><td>16,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>9,800</td><td>170</td><td>6,500</td><td>16,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>8,900</td><td>170</td><td>6,400</td><td>15,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>7,400</td><td>140</td><td>5,600</td><td>13,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>6,000</td><td>95</td><td>5,300</td><td>11,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>6,400</td><td>97</td><td>5,400</td><td>12,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>7,000</td><td>110</td><td>6,000</td><td>13,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>7,500</td><td>130</td><td>5,800</td><td>13,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>8,800</td><td>160</td><td>7,000</td><td>16,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>6,500</td><td>130</td><td>5,700</td><td>12,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>4,300</td><td>50</td><td>5,000</td><td>9,400</td></tr>
<tr><td colspan="2">2009 (D)</td><td>2,700</td><td>4</td><td>4,300</td><td>7,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>3,400</td><td>12</td><td>4,500</td><td>7,900</td></tr>
<tr><td colspan="2">2011 (W)</td><td>4,600</td><td>51</td><td>5,300</td><td>10,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>3,800</td><td>34</td><td>5,000</td><td>8,800</td></tr>
<tr><td colspan="2">2013 (D)</td><td>2,200</td><td>4</td><td>4,200</td><td>6,400</td></tr>
<tr><td colspan="2">2014 (C)</td><td>620</td><td>0</td><td>3,200</td><td>3,800</td></tr>
<tr><td colspan="2">2015 (C)</td><td>390</td><td>0</td><td>2,800</td><td>3,200</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>450</td><td>0</td><td>3,000</td><td>3,500</td></tr>
<tr><td colspan="2">2017 (W)</td><td>2,300</td><td>2</td><td>4,300</td><td>6,600</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>880</td><td>0</td><td>3,300</td><td>4,200</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>4,900</td><td>63</td><td>4,700</td><td>9,700</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>7,000</td><td>98</td><td>5,500</td><td>13,000</td></tr>
<tr><td>AN</td><td>6,800</td><td>100</td><td>5,300</td><td>12,000</td></tr>
<tr><td>BN</td><td>3,100</td><td>32</td><td>4,300</td><td>7,400</td></tr>
<tr><td>D</td><td>5,000</td><td>74</td><td>5,000</td><td>10,000</td></tr>
<tr><td>C</td><td>2,800</td><td>16</td><td>3,600</td><td>6,400</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



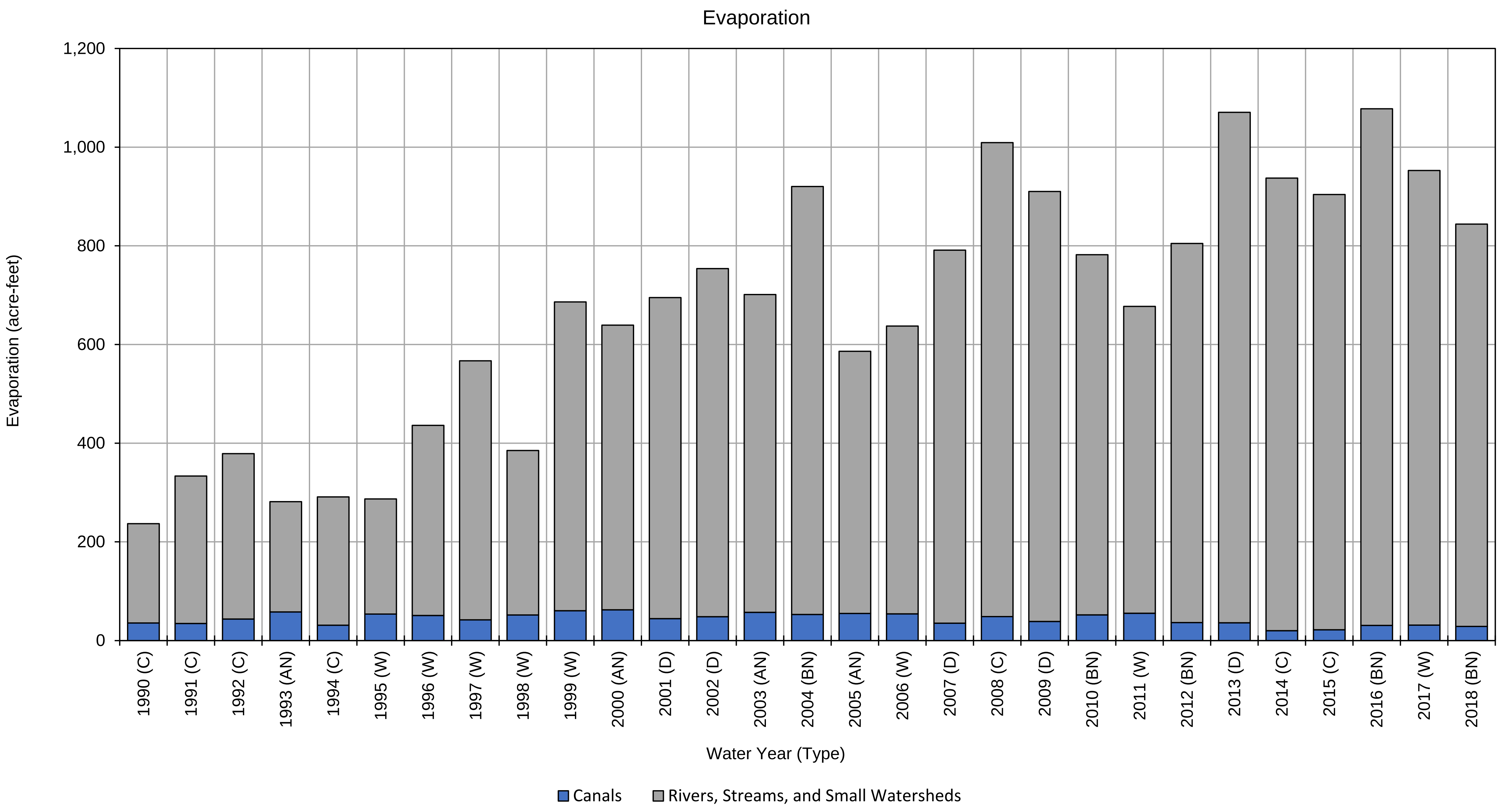
Tehama IHM - Historical

Red Bluff Subbasin Historical Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>38,000</td><td>4,600</td><td>320,000</td><td>360,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>30,000</td><td>3,800</td><td>240,000</td><td>270,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>37,000</td><td>4,700</td><td>310,000</td><td>350,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>45,000</td><td>5,800</td><td>350,000</td><td>400,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>43,000</td><td>4,900</td><td>320,000</td><td>370,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>37,000</td><td>5,200</td><td>310,000</td><td>350,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>40,000</td><td>5,000</td><td>330,000</td><td>380,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>42,000</td><td>5,000</td><td>330,000</td><td>380,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>44,000</td><td>5,500</td><td>330,000</td><td>380,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>35,000</td><td>4,200</td><td>320,000</td><td>360,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>35,000</td><td>4,700</td><td>340,000</td><td>380,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>38,000</td><td>4,100</td><td>320,000</td><td>360,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>33,000</td><td>3,800</td><td>290,000</td><td>330,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>38,000</td><td>4,300</td><td>310,000</td><td>350,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>33,000</td><td>3,600</td><td>280,000</td><td>320,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>45,000</td><td>4,600</td><td>360,000</td><td>410,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>39,000</td><td>4,200</td><td>340,000</td><td>380,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>34,000</td><td>3,200</td><td>270,000</td><td>310,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>29,000</td><td>2,800</td><td>250,000</td><td>280,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>36,000</td><td>3,600</td><td>290,000</td><td>330,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>45,000</td><td>4,100</td><td>310,000</td><td>360,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>47,000</td><td>4,100</td><td>350,000</td><td>400,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>42,000</td><td>3,600</td><td>310,000</td><td>360,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>33,000</td><td>3,000</td><td>260,000</td><td>300,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>33,000</td><td>2,800</td><td>240,000</td><td>280,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>38,000</td><td>3,300</td><td>280,000</td><td>320,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>50,000</td><td>4,200</td><td>320,000</td><td>370,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>56,000</td><td>4,300</td><td>320,000</td><td>380,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>49,000</td><td>3,300</td><td>270,000</td><td>320,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>39,000</td><td>4,200</td><td>310,000</td><td>350,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>42,000</td><td>4,700</td><td>330,000</td><td>380,000</td></tr>
<tr><td>AN</td><td>41,000</td><td>4,800</td><td>340,000</td><td>390,000</td></tr>
<tr><td>BN</td><td>44,000</td><td>3,800</td><td>300,000</td><td>350,000</td></tr>
<tr><td>D</td><td>35,000</td><td>3,500</td><td>290,000</td><td>330,000</td></tr>
<tr><td>C</td><td>35,000</td><td>3,800</td><td>280,000</td><td>320,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

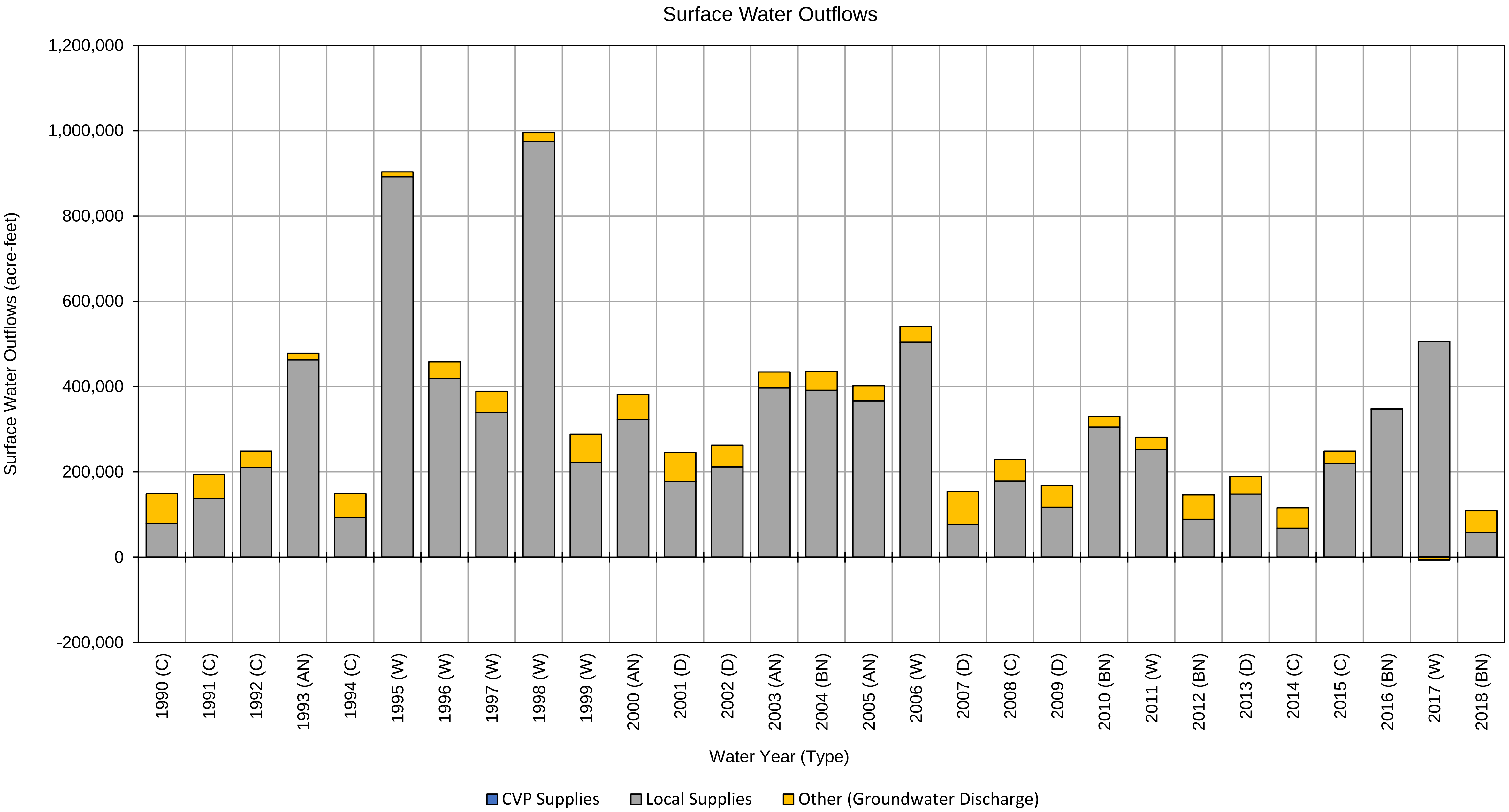

Evaporation
1,200
1,000
800
600
400
200
0
Evaporation (acre-feet)
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Canals
Rivers, Streams, and Small Watersheds

Red Bluff Subbasin Historical Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
1990 (C)		36	200	240
1991 (C)		35	300	340
1992 (C)		44	340	380
1993 (AN)		58	220	280
1994 (C)		31	260	290
1995 (W)		54	230	280
1996 (W)		51	390	440
1997 (W)		42	520	560
1998 (W)		52	330	380
1999 (W)		60	630	690
2000 (AN)		62	580	640
2001 (D)		44	650	690
2002 (D)		48	710	760
2003 (AN)		57	640	700
2004 (BN)		53	870	920
2005 (AN)		55	530	590
2006 (W)		54	580	630
2007 (D)		35	760	800
2008 (C)		48	960	1,000
2009 (D)		39	870	910
2010 (BN)		52	730	780
2011 (W)		55	620	680
2012 (BN)		36	770	810
2013 (D)		36	1,000	1,000
2014 (C)		20	920	940
2015 (C)		22	880	900
2016 (BN)		31	1,000	1,000
2017 (W)		31	920	950
2018 (BN)		29	820	850
Average (1990-2018)		44	630	670
1990-2018	W	50	530	580
	AN	58	490	550
	BN	40	850	890
	D	40	800	840
	C	34	550	580

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



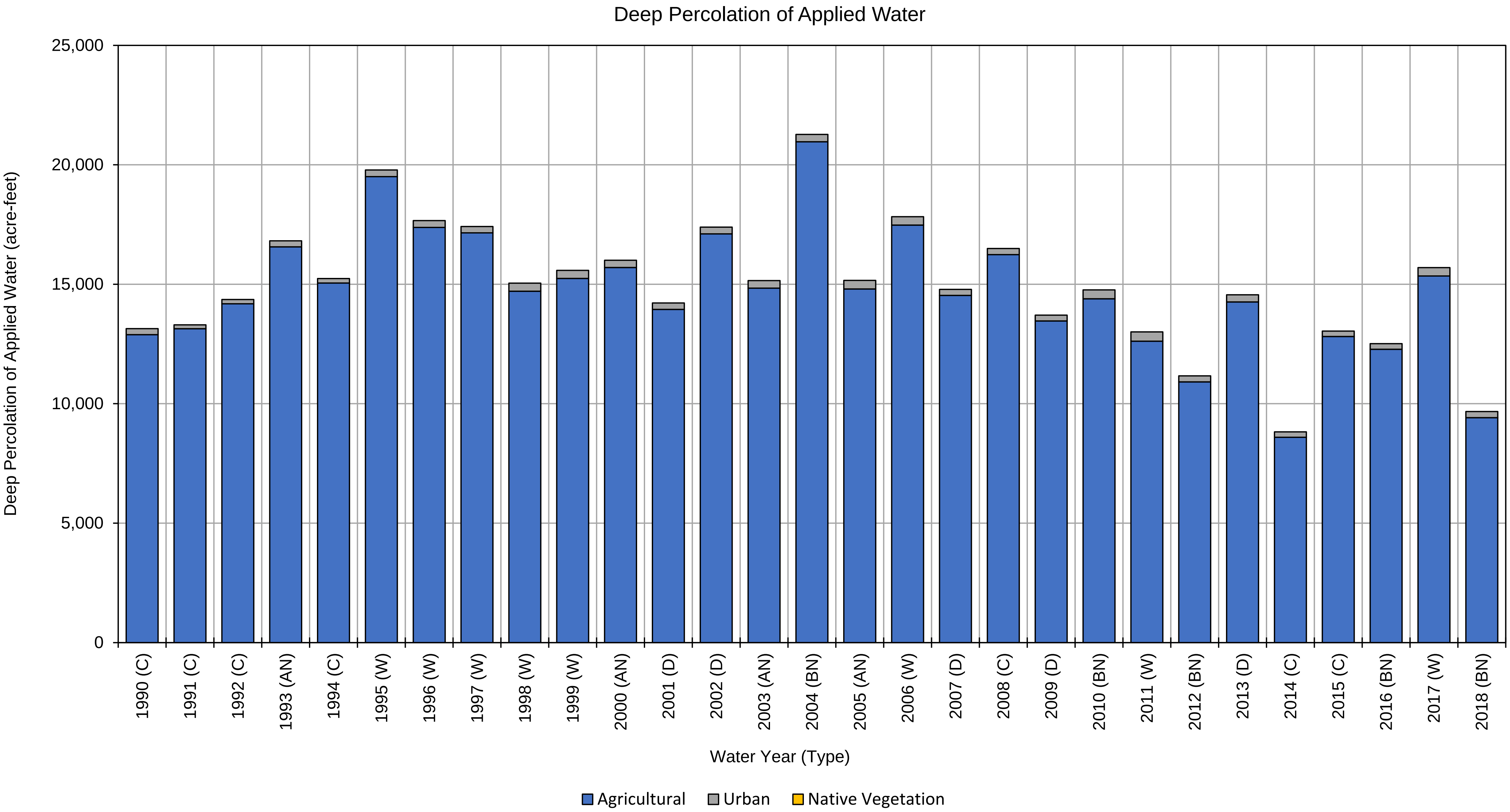
Tehama IHM - Historical

Red Bluff Subbasin Historical Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
1990 (C)		0	80,000	69,000	150,000
1991 (C)		0	140,000	57,000	200,000
1992 (C)		0	210,000	38,000	250,000
1993 (AN)		0	460,000	15,000	480,000
1994 (C)		0	94,000	55,000	150,000
1995 (W)		0	890,000	11,000	900,000
1996 (W)		0	420,000	40,000	460,000
1997 (W)		0	340,000	50,000	390,000
1998 (W)		0	970,000	21,000	990,000
1999 (W)		0	220,000	67,000	290,000
2000 (AN)		0	320,000	59,000	380,000
2001 (D)		0	180,000	68,000	250,000
2002 (D)		0	210,000	51,000	260,000
2003 (AN)		0	400,000	37,000	440,000
2004 (BN)		0	390,000	44,000	430,000
2005 (AN)		0	370,000	35,000	410,000
2006 (W)		0	500,000	37,000	540,000
2007 (D)		0	76,000	78,000	150,000
2008 (C)		0	180,000	51,000	230,000
2009 (D)		0	120,000	51,000	170,000
2010 (BN)		0	300,000	26,000	330,000
2011 (W)		0	250,000	29,000	280,000
2012 (BN)		0	89,000	57,000	150,000
2013 (D)		0	150,000	41,000	190,000
2014 (C)		0	68,000	48,000	120,000
2015 (C)		0	220,000	28,000	250,000
2016 (BN)		0	350,000	2,100	350,000
2017 (W)		0	510,000	-6,300	500,000
2018 (BN)		0	57,000	51,000	110,000
Average (1990-2018)		0	300,000	42,000	340,000
1990-2018	W	0	510,000	31,000	540,000
	AN	0	390,000	37,000	430,000
	BN	0	240,000	36,000	280,000
	D	0	150,000	58,000	210,000
	C	0	140,000	50,000	190,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



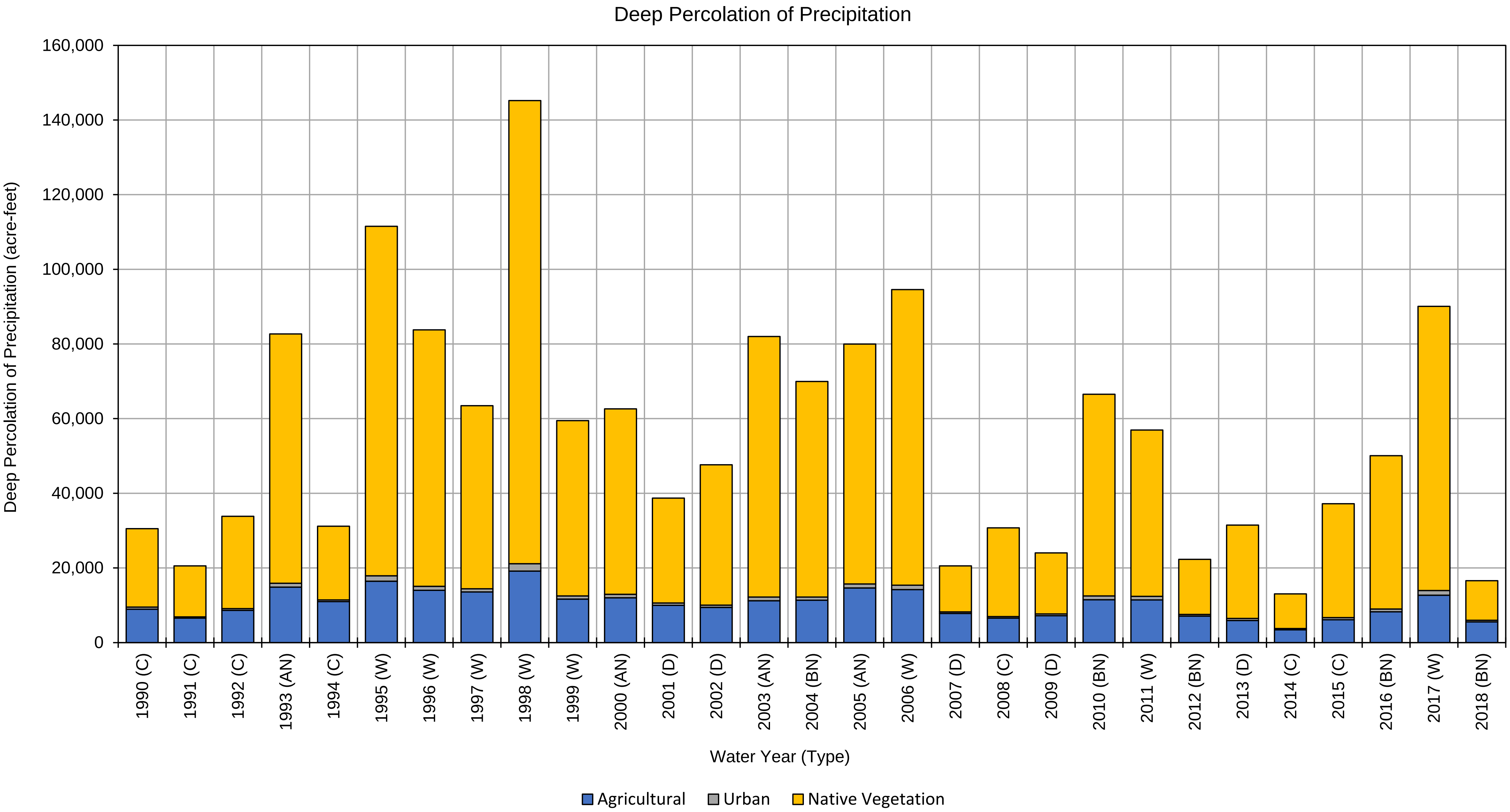
Tehama IHM - Historical

Red Bluff Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		13,000	250	0	13,000
1991 (C)		13,000	160	0	13,000
1992 (C)		14,000	180	0	14,000
1993 (AN)		17,000	250	0	17,000
1994 (C)		15,000	190	0	15,000
1995 (W)		20,000	280	0	20,000
1996 (W)		17,000	290	0	17,000
1997 (W)		17,000	260	0	17,000
1998 (W)		15,000	340	0	15,000
1999 (W)		15,000	340	0	15,000
2000 (AN)		16,000	300	0	16,000
2001 (D)		14,000	270	0	14,000
2002 (D)		17,000	280	0	17,000
2003 (AN)		15,000	320	0	15,000
2004 (BN)		21,000	310	0	21,000
2005 (AN)		15,000	360	0	15,000
2006 (W)		17,000	350	0	17,000
2007 (D)		15,000	260	0	15,000
2008 (C)		16,000	260	0	16,000
2009 (D)		13,000	240	0	13,000
2010 (BN)		14,000	370	0	14,000
2011 (W)		13,000	390	0	13,000
2012 (BN)		11,000	250	0	11,000
2013 (D)		14,000	300	0	14,000
2014 (C)		8,600	230	0	8,800
2015 (C)		13,000	230	0	13,000
2016 (BN)		12,000	240	0	12,000
2017 (W)		15,000	350	0	15,000
2018 (BN)		9,400	250	0	9,700
Average (1990-2018)		15,000	280	0	15,000
1990-2018	W	16,000	330	0	16,000
	AN	15,000	310	0	15,000
	BN	14,000	280	0	14,000
	D	15,000	270	0	15,000
	C	13,000	210	0	13,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W Wet
AN Above Normal
BN Below Normal
D Dry
C Critical



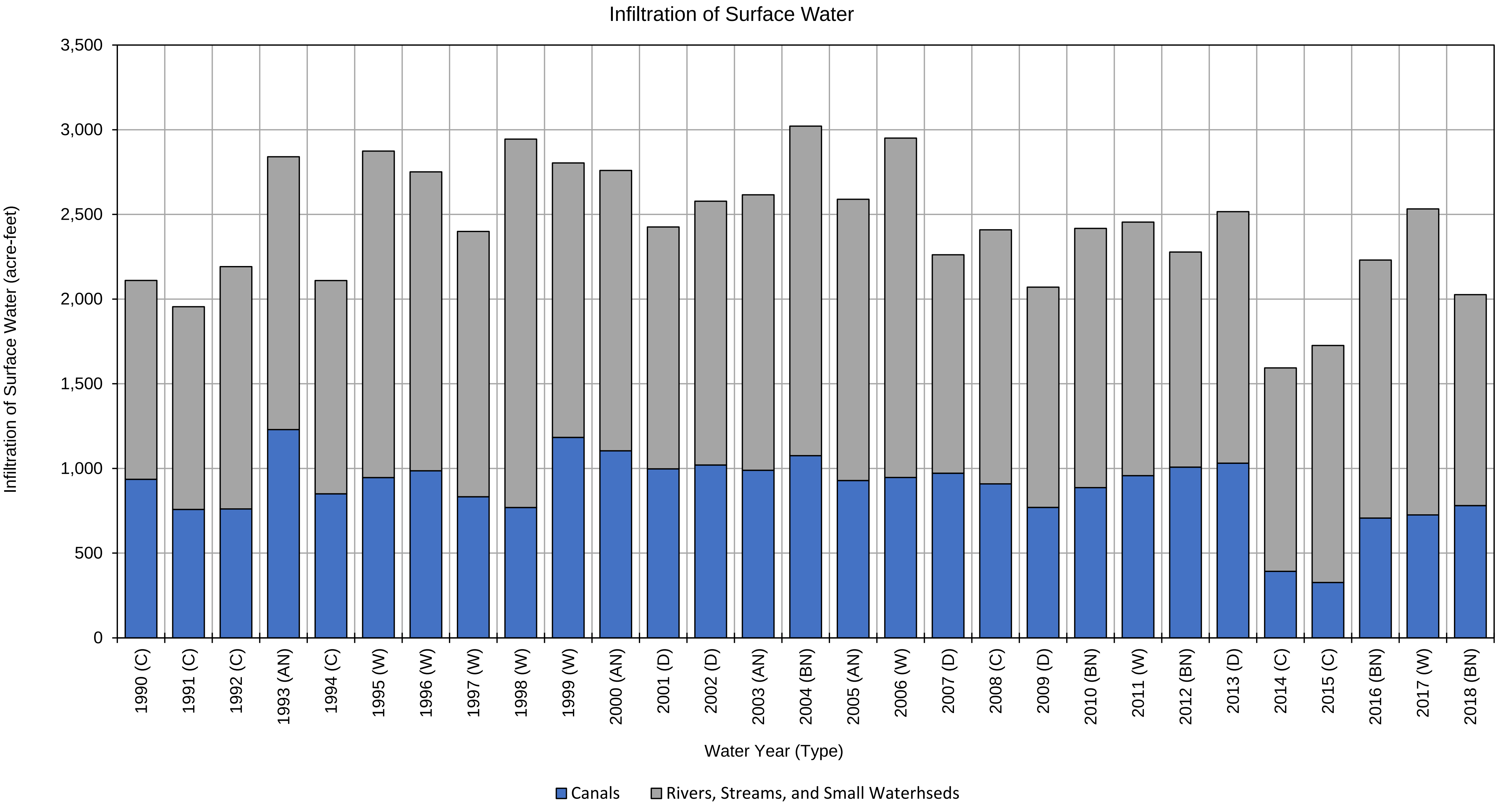
Tehama IHM - Historical

Red Bluff Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		8,900	570	21,000	30,000
1991 (C)		6,500	330	14,000	21,000
1992 (C)		8,600	450	25,000	34,000
1993 (AN)		15,000	1,000	67,000	83,000
1994 (C)		11,000	440	20,000	31,000
1995 (W)		16,000	1,500	94,000	110,000
1996 (W)		14,000	1,100	69,000	84,000
1997 (W)		14,000	860	49,000	64,000
1998 (W)		19,000	2,000	120,000	140,000
1999 (W)		12,000	840	47,000	60,000
2000 (AN)		12,000	950	50,000	63,000
2001 (D)		10,000	630	28,000	39,000
2002 (D)		9,400	620	38,000	48,000
2003 (AN)		11,000	1,000	70,000	82,000
2004 (BN)		11,000	850	58,000	70,000
2005 (AN)		15,000	1,100	64,000	80,000
2006 (W)		14,000	1,200	79,000	94,000
2007 (D)		7,800	400	12,000	20,000
2008 (C)		6,500	420	24,000	31,000
2009 (D)		7,200	460	16,000	24,000
2010 (BN)		11,000	1,000	54,000	66,000
2011 (W)		11,000	950	45,000	57,000
2012 (BN)		7,100	460	15,000	23,000
2013 (D)		5,900	540	25,000	31,000
2014 (C)		3,400	330	9,300	13,000
2015 (C)		6,100	570	31,000	38,000
2016 (BN)		8,300	730	41,000	50,000
2017 (W)		13,000	1,300	76,000	90,000
2018 (BN)		5,500	420	11,000	17,000
Average (1990-2018)		10,000	790	44,000	55,000
1990-2018	W	14,000	1,200	73,000	88,000
	AN	13,000	1,000	63,000	77,000
	BN	8,700	690	36,000	45,000
	D	8,100	530	24,000	33,000
	C	7,300	440	20,000	28,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

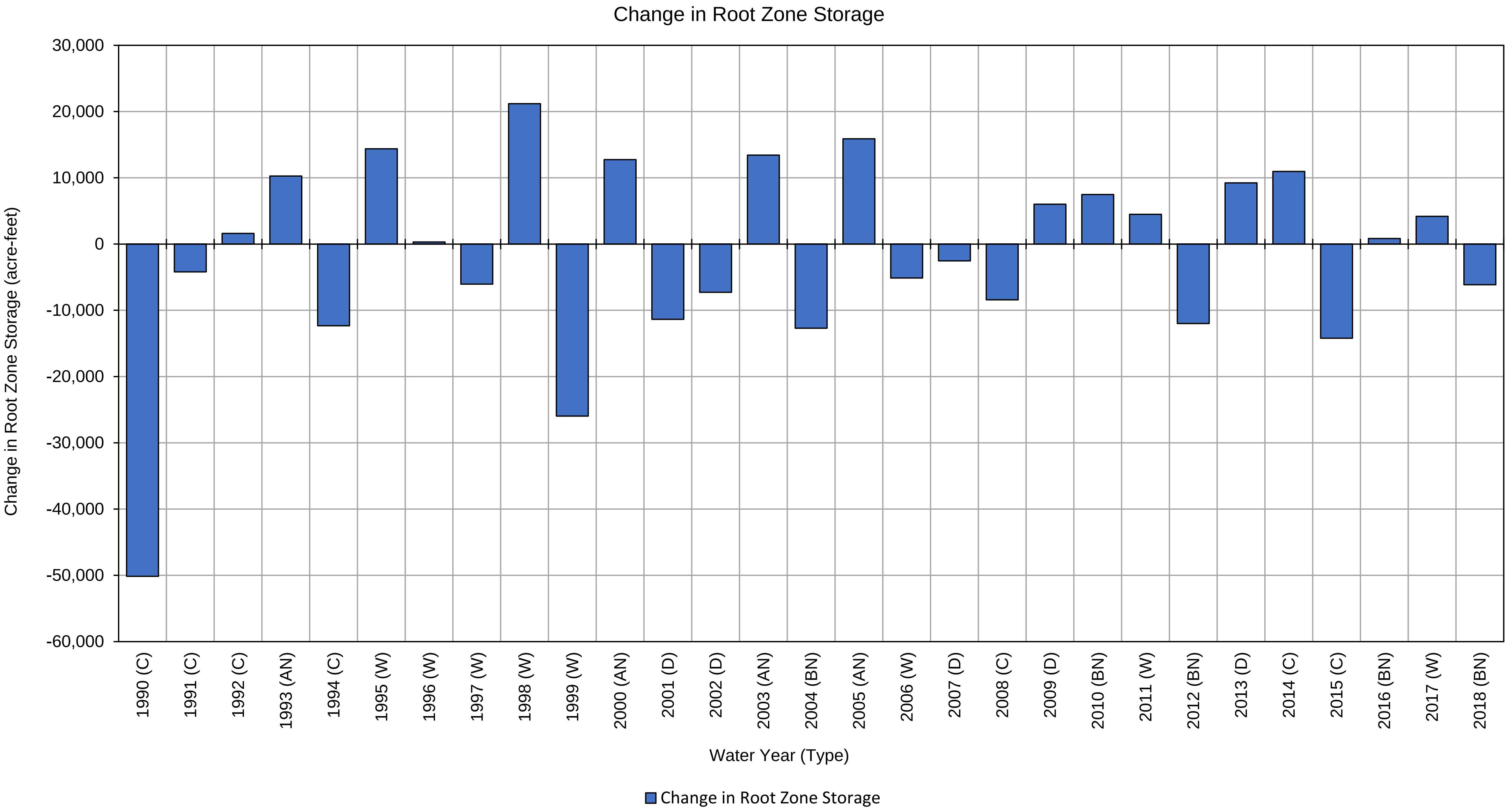

Infiltration of Surface Water
Infiltration of Surface Water (acre-feet)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Canals
Rivers, Streams, and Small Waterhseds

Red Bluff Subbasin Historical Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
1990 (C)		940	1,200	2,100
1991 (C)		760	1,200	2,000
1992 (C)		760	1,400	2,200
1993 (AN)		1,200	1,600	2,800
1994 (C)		850	1,300	2,200
1995 (W)		950	1,900	2,900
1996 (W)		990	1,800	2,800
1997 (W)		830	1,600	2,400
1998 (W)		770	2,200	3,000
1999 (W)		1,200	1,600	2,800
2000 (AN)		1,100	1,700	2,800
2001 (D)		1,000	1,400	2,400
2002 (D)		1,000	1,600	2,600
2003 (AN)		990	1,600	2,600
2004 (BN)		1,100	1,900	3,000
2005 (AN)		930	1,700	2,600
2006 (W)		950	2,000	3,000
2007 (D)		970	1,300	2,300
2008 (C)		910	1,500	2,400
2009 (D)		770	1,300	2,100
2010 (BN)		890	1,500	2,400
2011 (W)		960	1,500	2,500
2012 (BN)		1,000	1,300	2,300
2013 (D)		1,000	1,500	2,500
2014 (C)		390	1,200	1,600
2015 (C)		330	1,400	1,700
2016 (BN)		710	1,500	2,200
2017 (W)		730	1,800	2,500
2018 (BN)		780	1,200	2,000
Average (1990-2018)		890	1,500	2,400
1990-2018	W	920	1,800	2,700
	AN	1,100	1,600	2,700
	BN	890	1,500	2,400
	D	960	1,400	2,400
	C	700	1,300	2,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Red Bluff Subbasin Historical Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
1990 (C)		-50,000
1991 (C)		-4,200
1992 (C)		1,600
1993 (AN)		10,000
1994 (C)		-12,000
1995 (W)		14,000
1996 (W)		310
1997 (W)		-6,100
1998 (W)		21,000
1999 (W)		-26,000
2000 (AN)		13,000
2001 (D)		-11,000
2002 (D)		-7,300
2003 (AN)		13,000
2004 (BN)		-13,000
2005 (AN)		16,000
2006 (W)		-5,100
2007 (D)		-2,500
2008 (C)		-8,400
2009 (D)		6,000
2010 (BN)		7,500
2011 (W)		4,500
2012 (BN)		-12,000
2013 (D)		9,200
2014 (C)		11,000
2015 (C)		-14,000
2016 (BN)		830
2017 (W)		4,200
2018 (BN)		-6,100
Average (1990-2018)		-1,600
1990-2018	W	930
	AN	13,000
	BN	-4,500
	D	-1,200
	C	-11,000

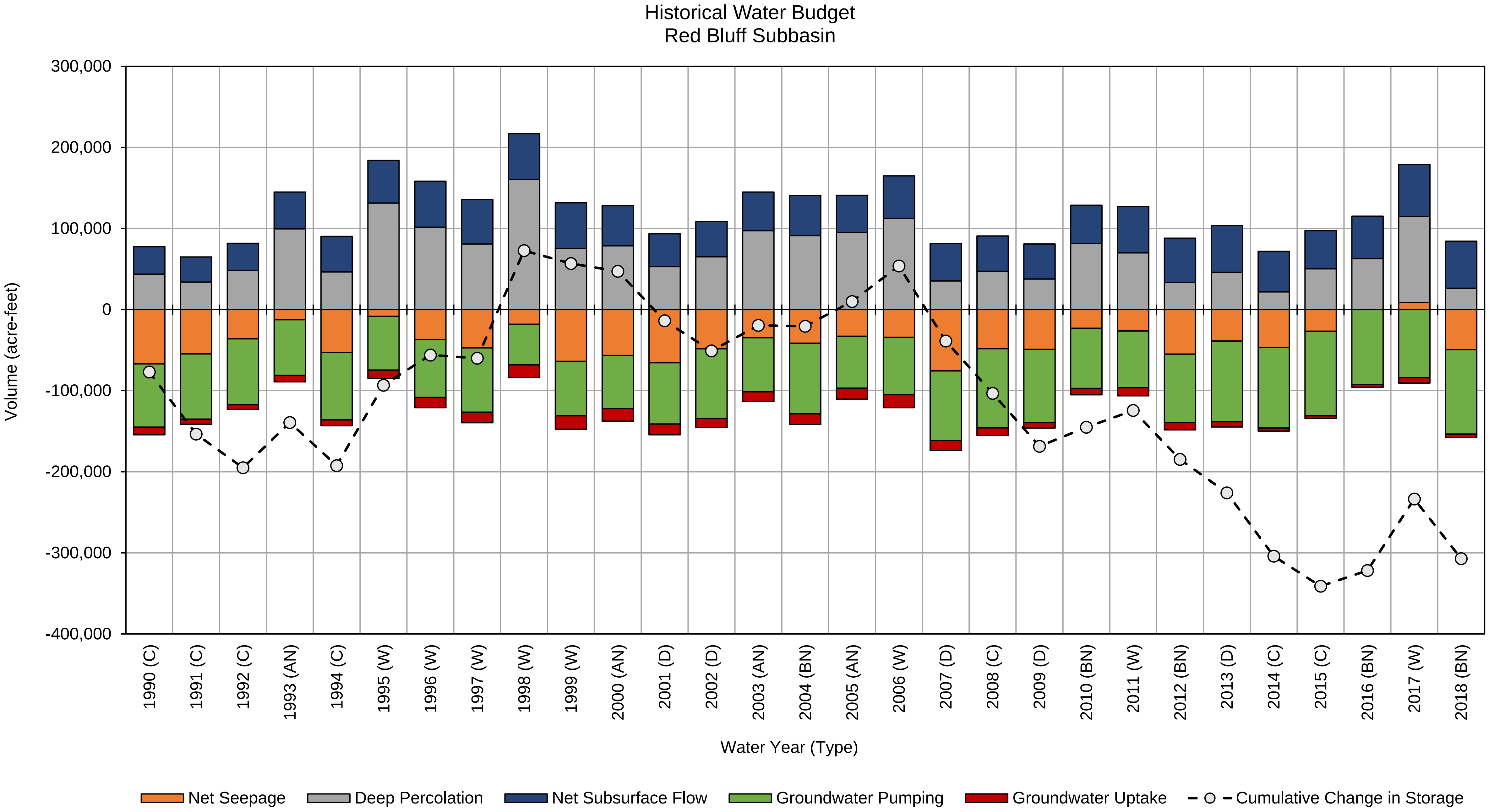
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-1b

Detailed Red Bluff Subbasin Water Budget Results:

Historical Model Results – Groundwater System



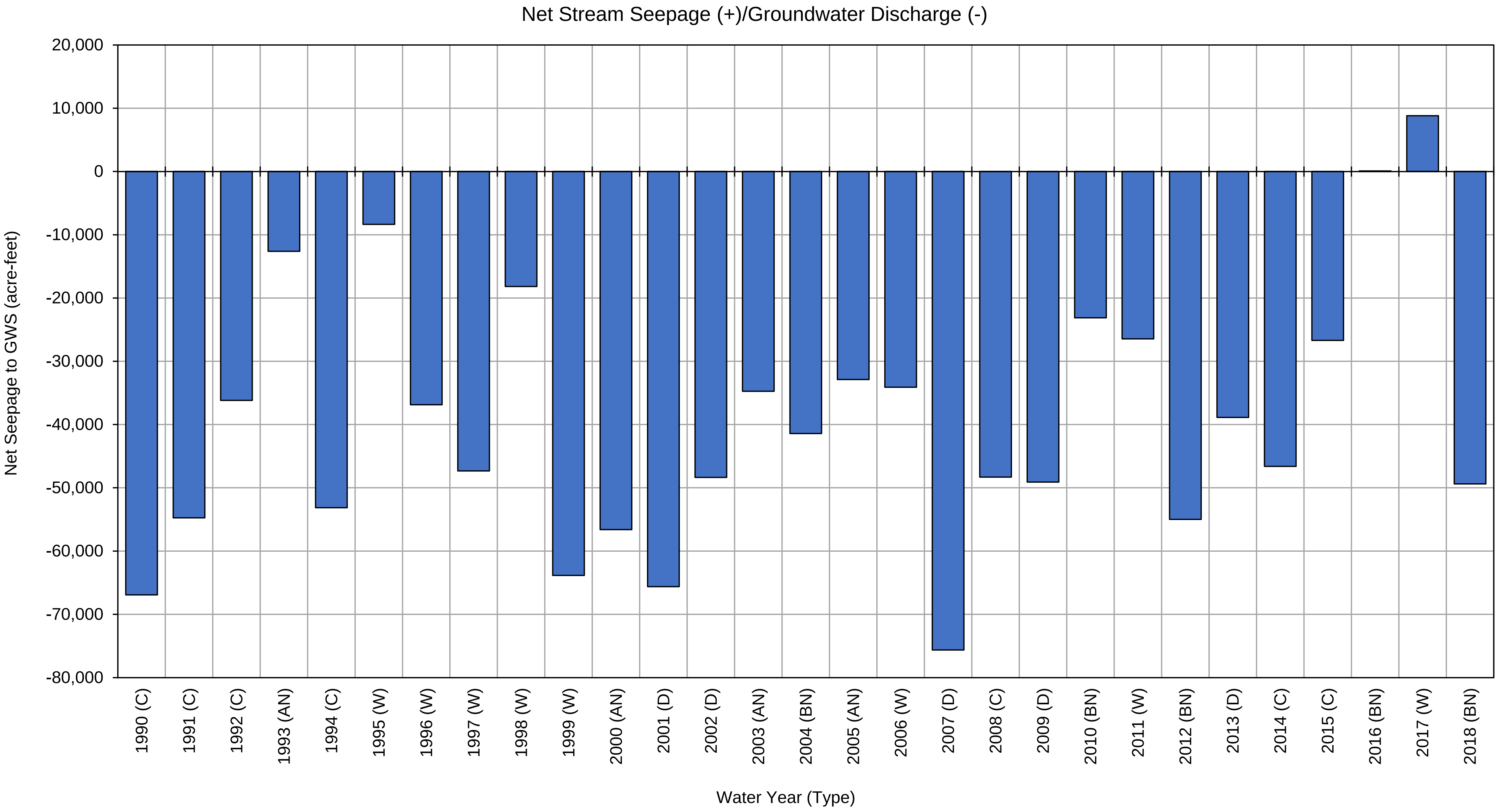
Tehama IHM - Historical

Red Bluff Subbasin Historical Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
1990 (C)		-67,000	44,000	-78,000	-9,400	34,000	-77,000	-77,000
1991 (C)		-55,000	34,000	-80,000	-6,300	31,000	-77,000	-150,000
1992 (C)		-36,000	48,000	-81,000	-5,800	33,000	-41,000	-200,000
1993 (AN)		-13,000	100,000	-69,000	-7,900	45,000	56,000	-140,000
1994 (C)		-53,000	46,000	-83,000	-7,200	44,000	-53,000	-190,000
1995 (W)		-8,300	130,000	-66,000	-10,000	53,000	99,000	-93,000
1996 (W)		-37,000	100,000	-72,000	-13,000	57,000	37,000	-56,000
1997 (W)		-47,000	81,000	-79,000	-13,000	55,000	-3,900	-60,000
1998 (W)		-18,000	160,000	-50,000	-16,000	56,000	130,000	73,000
1999 (W)		-64,000	75,000	-67,000	-17,000	57,000	-16,000	57,000
2000 (AN)		-57,000	79,000	-66,000	-15,000	49,000	-9,500	47,000
2001 (D)		-66,000	53,000	-76,000	-13,000	40,000	-61,000	-14,000
2002 (D)		-48,000	65,000	-86,000	-11,000	44,000	-37,000	-51,000
2003 (AN)		-35,000	97,000	-67,000	-12,000	48,000	31,000	-20,000
2004 (BN)		-41,000	91,000	-87,000	-13,000	49,000	-1,000	-21,000
2005 (AN)		-33,000	95,000	-64,000	-13,000	46,000	30,000	9,900
2006 (W)		-34,000	110,000	-71,000	-16,000	52,000	44,000	54,000
2007 (D)		-76,000	35,000	-86,000	-12,000	46,000	-93,000	-39,000
2008 (C)		-48,000	47,000	-98,000	-9,400	44,000	-65,000	-100,000
2009 (D)		-49,000	38,000	-90,000	-6,900	43,000	-65,000	-170,000
2010 (BN)		-23,000	81,000	-74,000	-7,900	47,000	23,000	-150,000
2011 (W)		-26,000	70,000	-70,000	-9,900	57,000	21,000	-120,000
2012 (BN)		-55,000	33,000	-85,000	-8,800	55,000	-60,000	-180,000
2013 (D)		-39,000	46,000	-99,000	-6,500	58,000	-41,000	-230,000
2014 (C)		-47,000	22,000	-99,000	-3,800	50,000	-78,000	-300,000
2015 (C)		-27,000	50,000	-100,000	-3,200	47,000	-37,000	-340,000
2016 (BN)		82	63,000	-92,000	-3,400	52,000	19,000	-320,000
2017 (W)		8,800	110,000	-84,000	-6,600	64,000	88,000	-230,000
2018 (BN)		-49,000	26,000	-100,000	-4,200	58,000	-74,000	-310,000
Average (1990-2018)		-39,000	70,000	-80,000	-9,700	49,000	-11,000	
1990-2018	W	-28,000	100,000	-70,000	-13,000	56,000		
	AN	-34,000	93,000	-66,000	-12,000	47,000		
	BN	-34,000	59,000	-88,000	-7,500	52,000		
	D	-56,000	47,000	-87,000	-10,000	46,000		
	C	-48,000	42,000	-89,000	-6,400	40,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



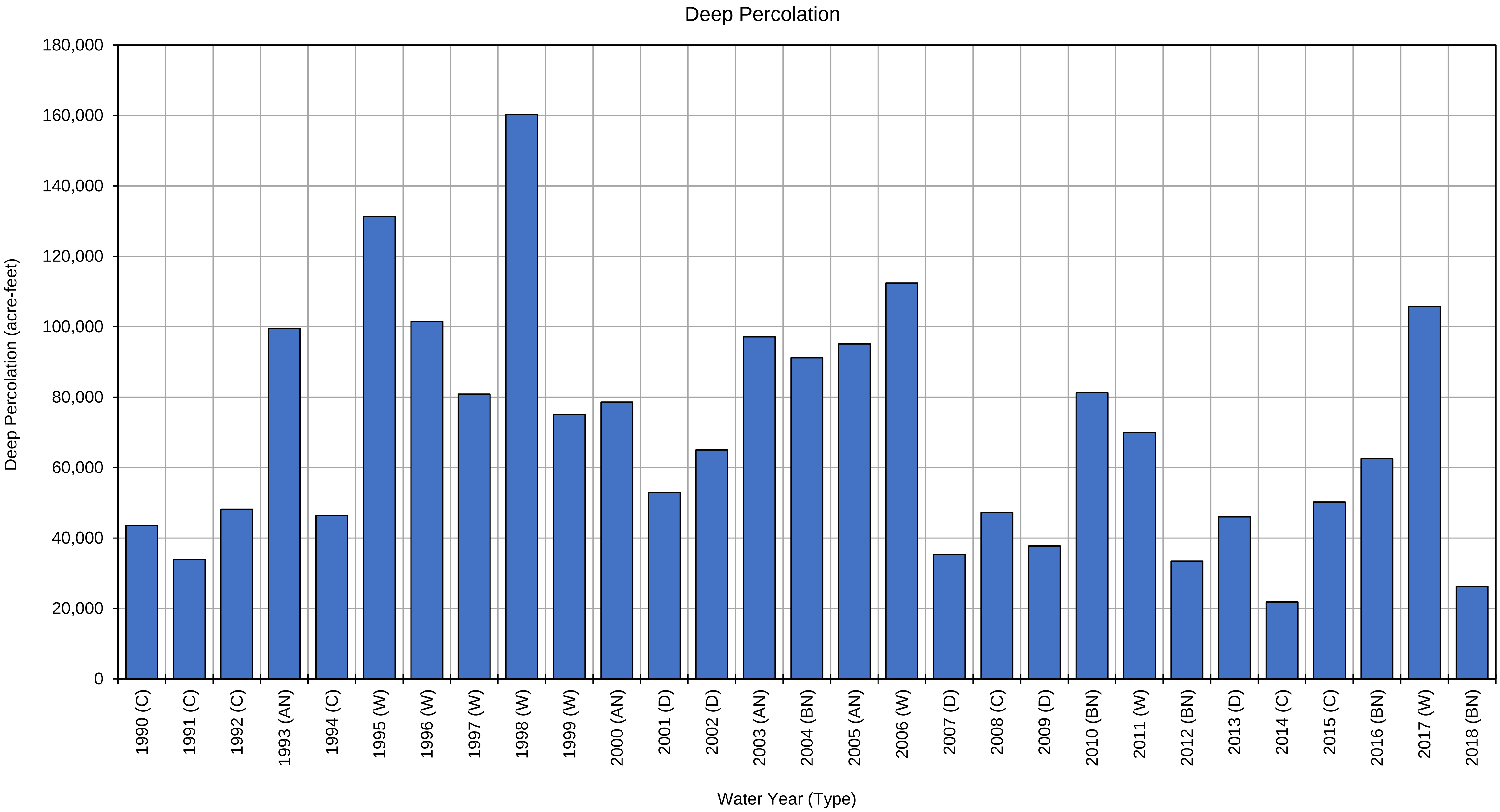
Tehama IHM - Historical

Red Bluff Subbasin Historical Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
1990 (C)		-67,000
1991 (C)		-55,000
1992 (C)		-36,000
1993 (AN)		-13,000
1994 (C)		-53,000
1995 (W)		-8,300
1996 (W)		-37,000
1997 (W)		-47,000
1998 (W)		-18,000
1999 (W)		-64,000
2000 (AN)		-57,000
2001 (D)		-66,000
2002 (D)		-48,000
2003 (AN)		-35,000
2004 (BN)		-41,000
2005 (AN)		-33,000
2006 (W)		-34,000
2007 (D)		-76,000
2008 (C)		-48,000
2009 (D)		-49,000
2010 (BN)		-23,000
2011 (W)		-26,000
2012 (BN)		-55,000
2013 (D)		-39,000
2014 (C)		-47,000
2015 (C)		-27,000
2016 (BN)		82
2017 (W)		8,800
2018 (BN)		-49,000
Average (1990-2018)		-39,000
1990-2018	W	-28,000
	AN	-34,000
	BN	-34,000
	D	-56,000
	C	-48,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



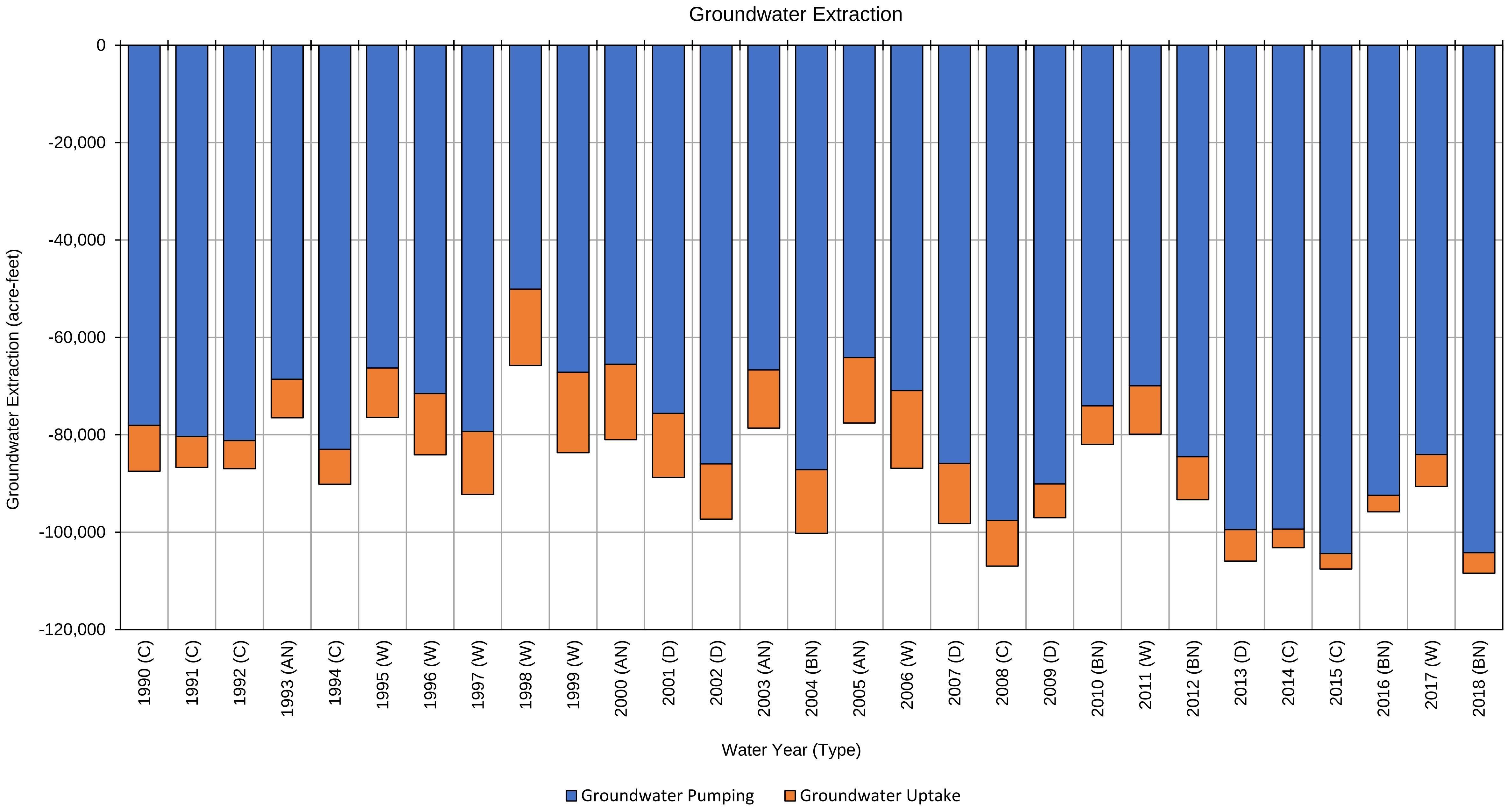
Tehama IHM - Historical

Red Bluff Subbasin Historical Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
1990 (C)		44,000
1991 (C)		34,000
1992 (C)		48,000
1993 (AN)		100,000
1994 (C)		46,000
1995 (W)		130,000
1996 (W)		100,000
1997 (W)		81,000
1998 (W)		160,000
1999 (W)		75,000
2000 (AN)		79,000
2001 (D)		53,000
2002 (D)		65,000
2003 (AN)		97,000
2004 (BN)		91,000
2005 (AN)		95,000
2006 (W)		110,000
2007 (D)		35,000
2008 (C)		47,000
2009 (D)		38,000
2010 (BN)		81,000
2011 (W)		70,000
2012 (BN)		33,000
2013 (D)		46,000
2014 (C)		22,000
2015 (C)		50,000
2016 (BN)		63,000
2017 (W)		110,000
2018 (BN)		26,000
Average (1990-2018)		70,000
1990-2018	W	100,000
	AN	93,000
	BN	59,000
	D	47,000
	C	42,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



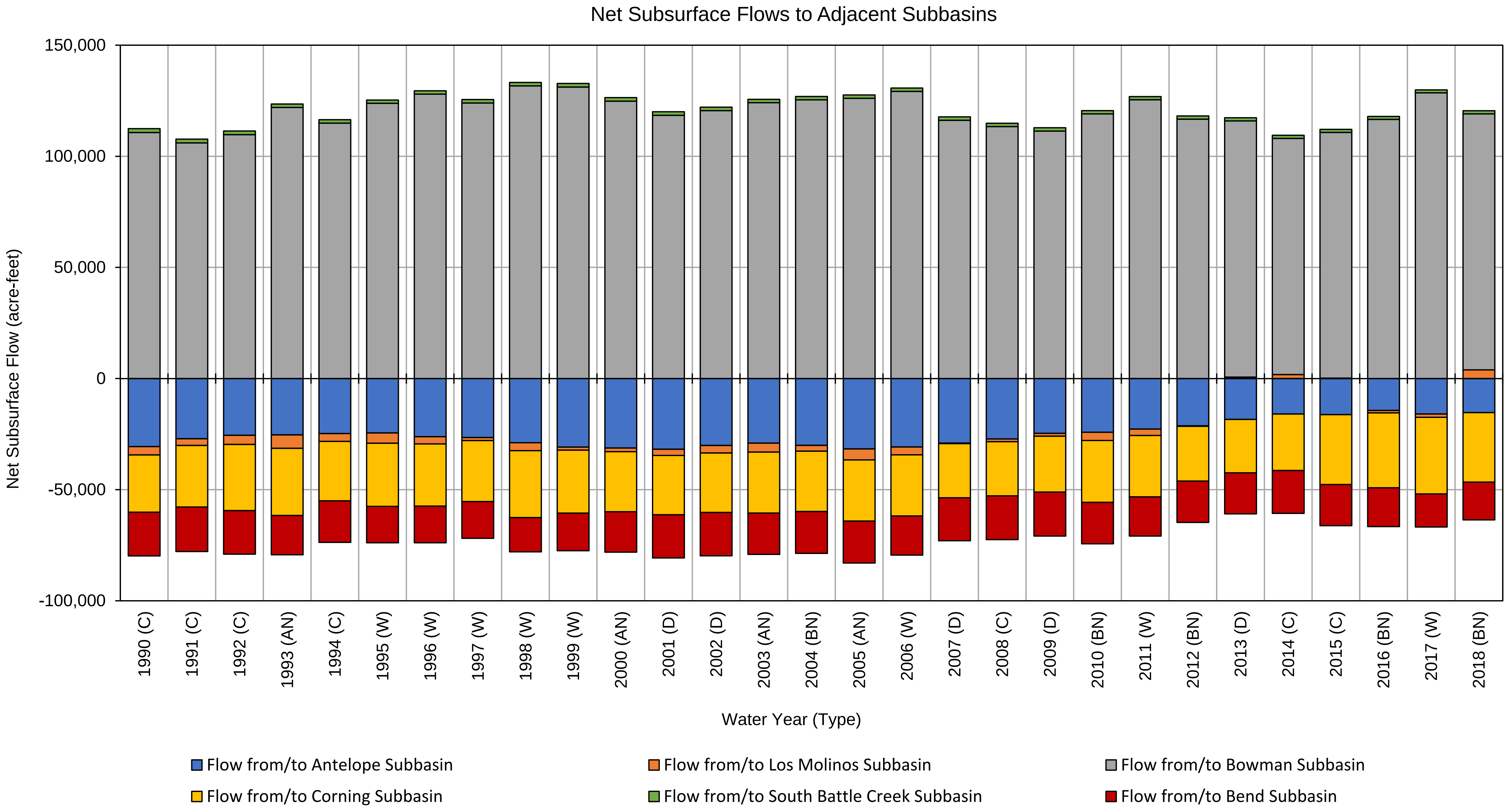
Tehama IHM - Historical

Red Bluff Subbasin Historical Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
1990 (C)		-78,000	-9,400	-87,000
1991 (C)		-80,000	-6,300	-87,000
1992 (C)		-81,000	-5,800	-87,000
1993 (AN)		-69,000	-7,900	-77,000
1994 (C)		-83,000	-7,200	-90,000
1995 (W)		-66,000	-10,000	-76,000
1996 (W)		-72,000	-13,000	-84,000
1997 (W)		-79,000	-13,000	-92,000
1998 (W)		-50,000	-16,000	-66,000
1999 (W)		-67,000	-17,000	-84,000
2000 (AN)		-66,000	-15,000	-81,000
2001 (D)		-76,000	-13,000	-89,000
2002 (D)		-86,000	-11,000	-97,000
2003 (AN)		-67,000	-12,000	-79,000
2004 (BN)		-87,000	-13,000	-100,000
2005 (AN)		-64,000	-13,000	-78,000
2006 (W)		-71,000	-16,000	-87,000
2007 (D)		-86,000	-12,000	-98,000
2008 (C)		-98,000	-9,400	-110,000
2009 (D)		-90,000	-6,900	-97,000
2010 (BN)		-74,000	-7,900	-82,000
2011 (W)		-70,000	-9,900	-80,000
2012 (BN)		-85,000	-8,800	-93,000
2013 (D)		-99,000	-6,500	-110,000
2014 (C)		-99,000	-3,800	-100,000
2015 (C)		-100,000	-3,200	-110,000
2016 (BN)		-92,000	-3,400	-96,000
2017 (W)		-84,000	-6,600	-91,000
2018 (BN)		-100,000	-4,200	-110,000
Average (1990-2018)		-80,000	-9,700	-90,000
1990-2018	W	-70,000	-13,000	-82,000
	AN	-66,000	-12,000	-78,000
	BN	-88,000	-7,500	-96,000
	D	-87,000	-10,000	-97,000
	C	-89,000	-6,400	-96,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



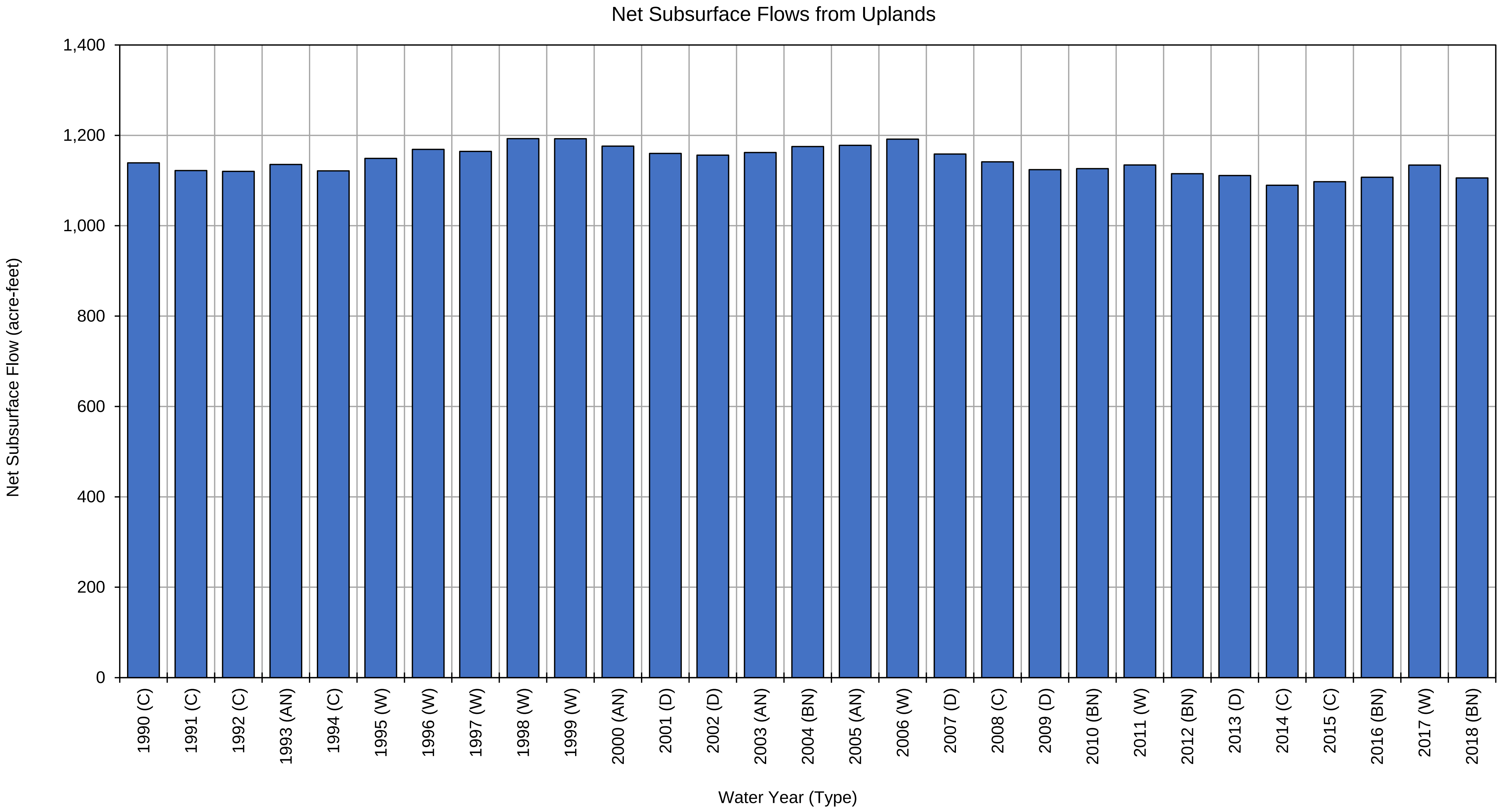
Tehama IHM - Historical

Red Bluff Subbasin Historical Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
1990 (C)		-31,000	-3,800	110,000	-26,000	1,700	-20,000	33,000
1991 (C)		-27,000	-3,000	110,000	-28,000	1,700	-20,000	30,000
1992 (C)		-26,000	-4,100	110,000	-30,000	1,600	-20,000	32,000
1993 (AN)		-25,000	-6,000	120,000	-30,000	1,600	-18,000	44,000
1994 (C)		-25,000	-3,500	110,000	-27,000	1,600	-19,000	43,000
1995 (W)		-25,000	-4,600	120,000	-28,000	1,500	-16,000	51,000
1996 (W)		-26,000	-3,200	130,000	-28,000	1,500	-17,000	56,000
1997 (W)		-27,000	-1,400	120,000	-27,000	1,500	-17,000	54,000
1998 (W)		-29,000	-3,600	130,000	-30,000	1,500	-15,000	55,000
1999 (W)		-31,000	-1,400	130,000	-28,000	1,600	-17,000	55,000
2000 (AN)		-31,000	-1,700	120,000	-27,000	1,600	-18,000	48,000
2001 (D)		-32,000	-2,800	120,000	-27,000	1,600	-19,000	39,000
2002 (D)		-30,000	-3,400	120,000	-27,000	1,600	-20,000	42,000
2003 (AN)		-29,000	-4,000	120,000	-27,000	1,500	-19,000	46,000
2004 (BN)		-30,000	-2,600	130,000	-27,000	1,500	-19,000	48,000
2005 (AN)		-32,000	-4,900	130,000	-28,000	1,500	-19,000	45,000
2006 (W)		-31,000	-3,500	130,000	-28,000	1,500	-18,000	51,000
2007 (D)		-29,000	-260	120,000	-24,000	1,500	-19,000	45,000
2008 (C)		-27,000	-1,200	110,000	-24,000	1,500	-20,000	42,000
2009 (D)		-25,000	-1,300	110,000	-25,000	1,500	-20,000	42,000
2010 (BN)		-24,000	-3,700	120,000	-28,000	1,400	-19,000	46,000
2011 (W)		-23,000	-2,900	130,000	-28,000	1,400	-18,000	56,000
2012 (BN)		-21,000	-240	120,000	-25,000	1,400	-19,000	53,000
2013 (D)		-18,000	660	120,000	-24,000	1,400	-18,000	56,000
2014 (C)		-16,000	1,800	110,000	-25,000	1,400	-19,000	49,000
2015 (C)		-16,000	180	110,000	-31,000	1,400	-19,000	46,000
2016 (BN)		-14,000	-1,100	120,000	-34,000	1,300	-17,000	51,000
2017 (W)		-16,000	-1,500	130,000	-35,000	1,300	-15,000	63,000
2018 (BN)		-15,000	3,900	120,000	-31,000	1,400	-17,000	57,000
Average (1990-2018)		-25,000	-2,200	120,000	-28,000	1,500	-18,000	48,000
1990-2018	W	-26,000	-2,800	130,000	-29,000	1,500	-16,000	55,000
	AN	-29,000	-4,200	120,000	-28,000	1,500	-18,000	46,000
	BN	-21,000	-750	120,000	-29,000	1,400	-18,000	51,000
	D	-27,000	-1,400	120,000	-25,000	1,500	-19,000	45,000
	C	-24,000	-2,000	110,000	-27,000	1,600	-19,000	39,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



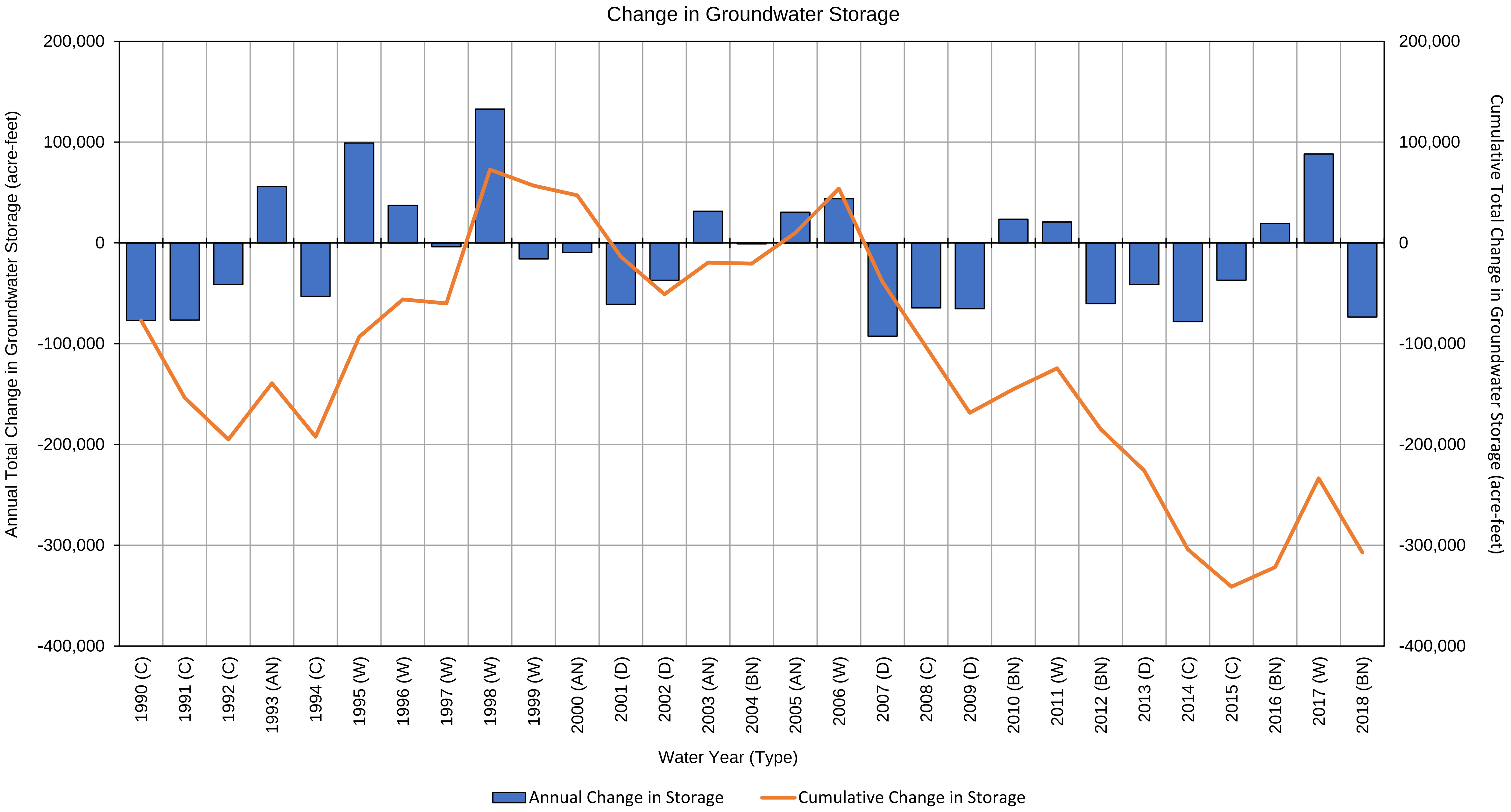
Tehama IHM - Historical

Red Bluff Subbasin Historical Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
1990 (C)		1,100
1991 (C)		1,100
1992 (C)		1,100
1993 (AN)		1,100
1994 (C)		1,100
1995 (W)		1,100
1996 (W)		1,200
1997 (W)		1,200
1998 (W)		1,200
1999 (W)		1,200
2000 (AN)		1,200
2001 (D)		1,200
2002 (D)		1,200
2003 (AN)		1,200
2004 (BN)		1,200
2005 (AN)		1,200
2006 (W)		1,200
2007 (D)		1,200
2008 (C)		1,100
2009 (D)		1,100
2010 (BN)		1,100
2011 (W)		1,100
2012 (BN)		1,100
2013 (D)		1,100
2014 (C)		1,100
2015 (C)		1,100
2016 (BN)		1,100
2017 (W)		1,100
2018 (BN)		1,100
Average (1990-2018)		1,100
1990-2018	W	1,200
	AN	1,200
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Historical

Red Bluff Subbasin Historical Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">1990 (C)</td><td>-77,000</td><td>-77,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>-77,000</td><td>-150,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>-41,000</td><td>-200,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>56,000</td><td>-140,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>-53,000</td><td>-190,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>99,000</td><td>-93,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>37,000</td><td>-56,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>-3,900</td><td>-60,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>130,000</td><td>73,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>-16,000</td><td>57,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>-9,500</td><td>47,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>-61,000</td><td>-14,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>-37,000</td><td>-51,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>31,000</td><td>-20,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>-1,000</td><td>-21,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>30,000</td><td>9,900</td></tr>
<tr><td colspan="2">2006 (W)</td><td>44,000</td><td>54,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>-93,000</td><td>-39,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>-65,000</td><td>-100,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>-65,000</td><td>-170,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>23,000</td><td>-150,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>21,000</td><td>-120,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>-60,000</td><td>-180,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>-41,000</td><td>-230,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>-78,000</td><td>-300,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>-37,000</td><td>-340,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>19,000</td><td>-320,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>88,000</td><td>-230,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>-74,000</td><td>-310,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>-11,000</td><td></td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-2

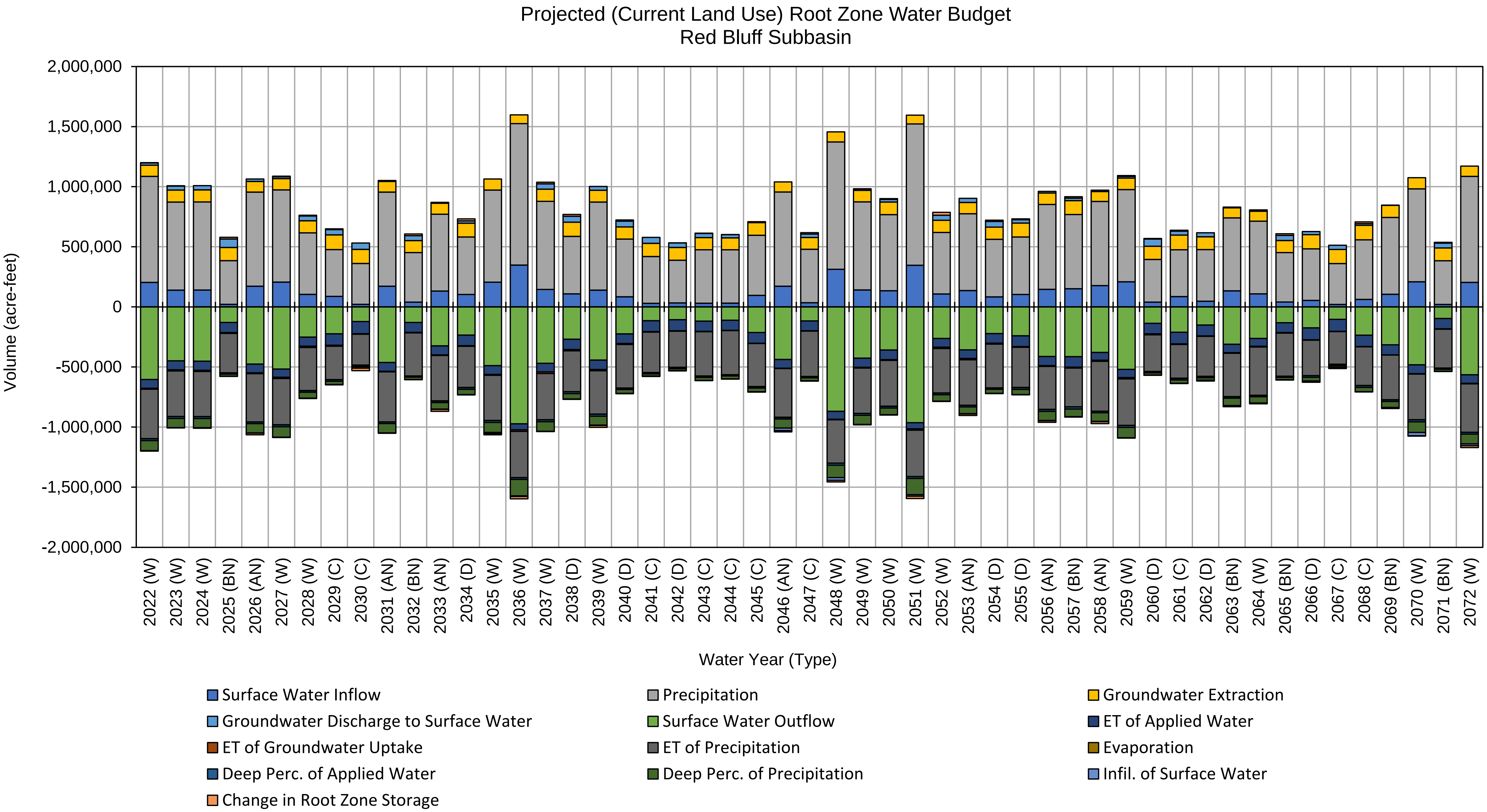
Detailed Red Bluff Subbasin Water Budget Results:

Projected (Current Land Use) Model Results

APPENDIX D-2a

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Surface Water System


Projected (Current Land Use) Root Zone Water Budget
Red Bluff Subbasin

Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

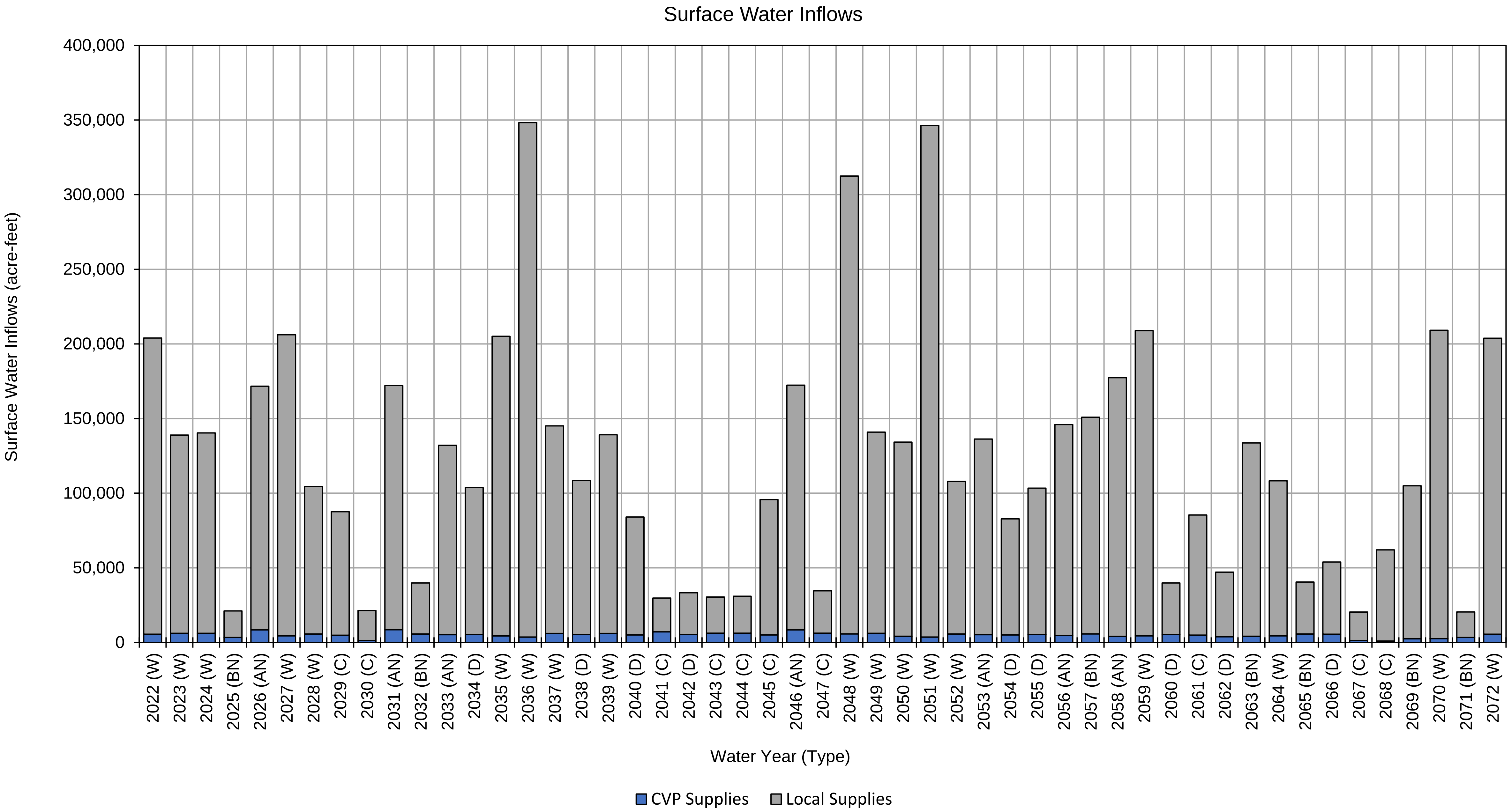
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	200,000	880,000	93,000	19,000	600,000	73,000	7,300	410,000	760	16,000	84,000	2,700	-2,000
2023 (W)	140,000	730,000	100,000	34,000	450,000	75,000	9,300	380,000	890	15,000	78,000	2,700	-2,100
2024 (W)	140,000	730,000	100,000	36,000	450,000	75,000	10,000	380,000	870	15,000	77,000	2,800	63
2025 (BN)	21,000	360,000	110,000	70,000	130,000	85,000	6,700	330,000	910	10,000	17,000	2,000	-14,000
2026 (AN)	170,000	780,000	89,000	20,000	480,000	72,000	7,600	400,000	890	13,000	77,000	2,900	13,000
2027 (W)	210,000	770,000	94,000	15,000	520,000	68,000	11,000	390,000	720	15,000	87,000	2,900	-4,800
2028 (W)	100,000	510,000	100,000	41,000	250,000	75,000	11,000	360,000	880	13,000	49,000	2,700	-5,500
2029 (C)	88,000	390,000	120,000	44,000	220,000	95,000	7,800	280,000	1,200	13,000	28,000	2,500	-6,200
2030 (C)	21,000	340,000	120,000	52,000	120,000	100,000	3,700	260,000	1,000	10,000	13,000	1,700	21,000
2031 (AN)	170,000	780,000	89,000	2,700	460,000	73,000	4,900	420,000	990	13,000	78,000	2,900	-4,700
2032 (BN)	40,000	410,000	100,000	41,000	130,000	83,000	4,200	360,000	810	8,800	20,000	2,300	-14,000
2033 (AN)	130,000	640,000	91,000	7,300	320,000	75,000	4,800	380,000	910	13,000	54,000	2,600	16,000
2034 (D)	100,000	480,000	110,000	20,000	230,000	88,000	5,000	340,000	1,000	14,000	44,000	2,600	-17,000
2035 (W)	210,000	770,000	92,000	0	490,000	73,000	7,200	380,000	850	15,000	84,000	9,500	10,000
2036 (W)	350,000	1,200,000	73,000	0	970,000	50,000	12,000	380,000	470	15,000	140,000	5,600	20,000
2037 (W)	150,000	730,000	100,000	45,000	470,000	71,000	14,000	390,000	780	15,000	79,000	2,900	-14,000
2038 (D)	110,000	480,000	120,000	49,000	270,000	85,000	11,000	340,000	1,100	15,000	45,000	2,700	-16,000
2039 (W)	140,000	730,000	99,000	32,000	440,000	78,000	9,900	360,000	890	15,000	75,000	2,800	15,000
2040 (D)	84,000	480,000	100,000	48,000	220,000	79,000	8,300	360,000	980	11,000	33,000	2,500	-9,500
2041 (C)	30,000	390,000	110,000	49,000	120,000	90,000	4,700	340,000	910	9,900	18,000	2,100	570
2042 (D)	33,000	350,000	110,000	37,000	110,000	92,000	3,000	300,000	920	11,000	16,000	1,800	-830
2043 (C)	30,000	440,000	100,000	34,000	120,000	86,000	2,500	370,000	800	10,000	25,000	1,800	-2,800
2044 (C)	31,000	440,000	99,000	27,000	110,000	85,000	1,900	370,000	830	9,800	24,000	1,900	-77
2045 (C)	96,000	500,000	110,000	8,000	210,000	90,000	1,700	360,000	1,100	11,000	30,000	2,100	1,200
2046 (AN)	170,000	780,000	84,000	0	440,000	73,000	2,600	410,000	1,100	13,000	76,000	21,000	10,000
2047 (C)	35,000	440,000	98,000	29,000	120,000	82,000	2,400	380,000	890	9,600	26,000	2,100	-12,000
2048 (W)	310,000	1,100,000	84,000	0	870,000	66,000	4,300	360,000	840	16,000	100,000	23,000	13,000
2049 (W)	140,000	730,000	96,000	11,000	430,000	76,000	6,200	380,000	1,000	14,000	76,000	2,700	-510
2050 (W)	130,000	630,000	100,000	23,000	360,000	80,000	6,800	380,000	1,100	14,000	57,000	2,400	-5,200
2051 (W)	350,000	1,200,000	72,000	0	960,000	51,000	11,000	390,000	480	15,000	140,000	13,000	19,000
2052 (W)	110,000	510,000	100,000	42,000	260,000	72,000	12,000	370,000	860	13,000	54,000	2,800	-25,000
2053 (AN)	140,000	640,000	93,000	35,000	360,000	72,000	10,000	380,000	810	13,000	56,000	2,800	12,000
2054 (D)	83,000	480,000	100,000	46,000	220,000	79,000	7,900	360,000	970	11,000	33,000	2,400	-11,000
2055 (D)	100,000	480,000	120,000	29,000	240,000	89,000	6,200	330,000	1,000	15,000	43,000	2,600	-6,100
2056 (AN)	150,000	710,000	95,000	14,000	410,000	76,000	6,600	360,000	910	15,000	76,000	2,600	13,000
2057 (BN)	150,000	620,000	120,000	22,000	410,000	87,000	7,800	320,000	1,200	18,000	64,000	3,000	-12,000
2058 (AN)	180,000	700,000	82,000	12,000	380,000	65,000	8,700	420,000	670	12,000	72,000	2,600	15,000
2059 (W)	210,000	770,000	96,000	14,000	520,000	68,000	12,000	390,000	720	15,000	87,000	3,000	-6,100
2060 (D)	40,000	350,000	110,000	60,000	140,000	88,000	7,800	300,000	1,000	11,000	17,000	2,300	-4,200
2061 (C)	85,000	390,000	120,000	32,000	210,000	97,000	5,100	280,000	1,100	13,000	28,000	2,400	-7,700
2062 (D)	47,000	430,000	110,000	34,000	150,000	91,000	3,300	330,000	980	10,000	21,000	2,100	4,800
2063 (BN)	130,000	610,000	84,000	6,100	310,000	70,000	4,000	360,000	910	12,000	61,000	2,400	6,900
2064 (W)	110,000	600,000	83,000	11,000	260,000	65,000	5,500	400,000	810	11,000	52,000	2,500	4,200
2065 (BN)	40,000	410,000	100,000	42,000	130,000	82,000	4,700	360,000	800	8,800	20,000	2,300	-14,000

Red Bluff Subbasin Projected (Current Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		54,000	430,000	120,000	26,000	170,000	99,000	3,400	290,000	1,000	13,000	30,000	2,500	8,400
2067 (C)		20,000	340,000	120,000	35,000	100,000	100,000	1,900	270,000	940	9,900	13,000	1,600	10,000
2068 (C)		62,000	500,000	120,000	14,000	240,000	95,000	1,500	320,000	940	14,000	36,000	1,700	-14,000
2069 (BN)		100,000	640,000	100,000	0	320,000	84,000	1,600	370,000	1,200	13,000	49,000	9,100	-56
2070 (W)		210,000	770,000	93,000	0	480,000	74,000	3,400	380,000	1,100	16,000	89,000	27,000	3,300
2071 (BN)		20,000	360,000	110,000	40,000	97,000	86,000	2,400	320,000	890	9,800	16,000	2,000	-7,000
2072 (W)		200,000	880,000	85,000	0	560,000	72,000	3,900	400,000	890	14,000	81,000	15,000	16,000
Average (2022-2072)		120,000	600,000	100,000	26,000	330,000	80,000	6,300	360,000	910	13,000	54,000	4,500	-46
2022-2072	W	190,000	790,000	93,000	18,000	520,000	70,000	8,700	380,000	830	15,000	82,000	7,000	2,000
	AN	160,000	720,000	89,000	13,000	410,000	72,000	6,500	390,000	900	13,000	70,000	5,300	11,000
	BN	73,000	490,000	100,000	32,000	220,000	82,000	4,500	350,000	950	11,000	35,000	3,300	-7,700
	D	73,000	440,000	110,000	39,000	200,000	88,000	6,200	330,000	1,000	12,000	31,000	2,400	-5,700
	C	50,000	420,000	110,000	32,000	160,000	92,000	3,300	320,000	970	11,000	24,000	2,000	-910

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

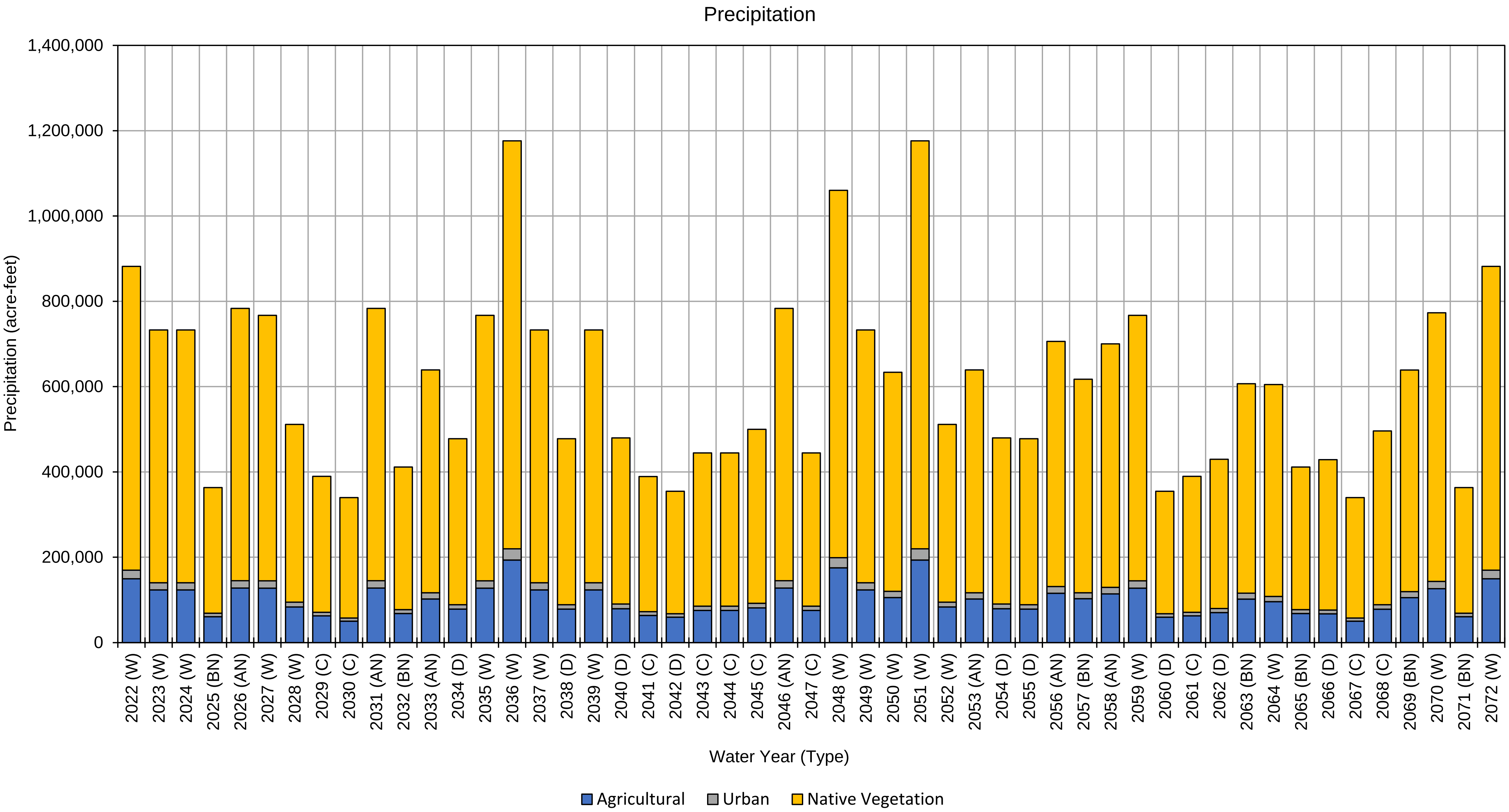
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	5,500	200,000	210,000
2023 (W)	6,100	130,000	140,000
2024 (W)	6,100	130,000	140,000
2025 (BN)	3,400	18,000	21,000
2026 (AN)	8,400	160,000	170,000
2027 (W)	4,400	200,000	200,000
2028 (W)	5,700	99,000	100,000
2029 (C)	4,800	83,000	88,000
2030 (C)	1,300	20,000	21,000
2031 (AN)	8,600	160,000	170,000
2032 (BN)	5,700	34,000	40,000
2033 (AN)	5,200	130,000	140,000
2034 (D)	5,300	98,000	100,000
2035 (W)	4,400	200,000	200,000
2036 (W)	3,600	340,000	340,000
2037 (W)	6,100	140,000	150,000
2038 (D)	5,300	100,000	110,000
2039 (W)	6,100	130,000	140,000
2040 (D)	5,100	79,000	84,000
2041 (C)	7,100	23,000	30,000
2042 (D)	5,400	28,000	33,000
2043 (C)	6,200	24,000	30,000
2044 (C)	6,200	25,000	31,000
2045 (C)	5,000	91,000	96,000
2046 (AN)	8,400	160,000	170,000
2047 (C)	6,200	28,000	34,000
2048 (W)	5,800	310,000	320,000
2049 (W)	6,100	130,000	140,000
2050 (W)	4,100	130,000	130,000
2051 (W)	3,600	340,000	340,000
2052 (W)	5,700	100,000	110,000
2053 (AN)	5,200	130,000	140,000
2054 (D)	5,100	78,000	83,000
2055 (D)	5,300	98,000	100,000
2056 (AN)	4,700	140,000	140,000
2057 (BN)	5,700	150,000	160,000
2058 (AN)	4,100	170,000	170,000
2059 (W)	4,400	200,000	200,000
2060 (D)	5,400	34,000	39,000
2061 (C)	4,900	80,000	85,000
2062 (D)	3,800	43,000	47,000
2063 (BN)	4,100	130,000	130,000

Red Bluff Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		4,400	100,000	100,000
2065 (BN)		5,700	35,000	41,000
2066 (D)		5,500	48,000	54,000
2067 (C)		1,400	19,000	20,000
2068 (C)		930	61,000	62,000
2069 (BN)		2,500	100,000	100,000
2070 (W)		2,600	210,000	210,000
2071 (BN)		3,400	17,000	20,000
2072 (W)		5,500	200,000	210,000
Average (2022-2072)		5,000	120,000	130,000
2022-2072	W	5,000	180,000	190,000
	AN	6,400	150,000	160,000
	BN	4,300	69,000	73,000
	D	5,100	68,000	73,000
	C	4,400	45,000	49,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

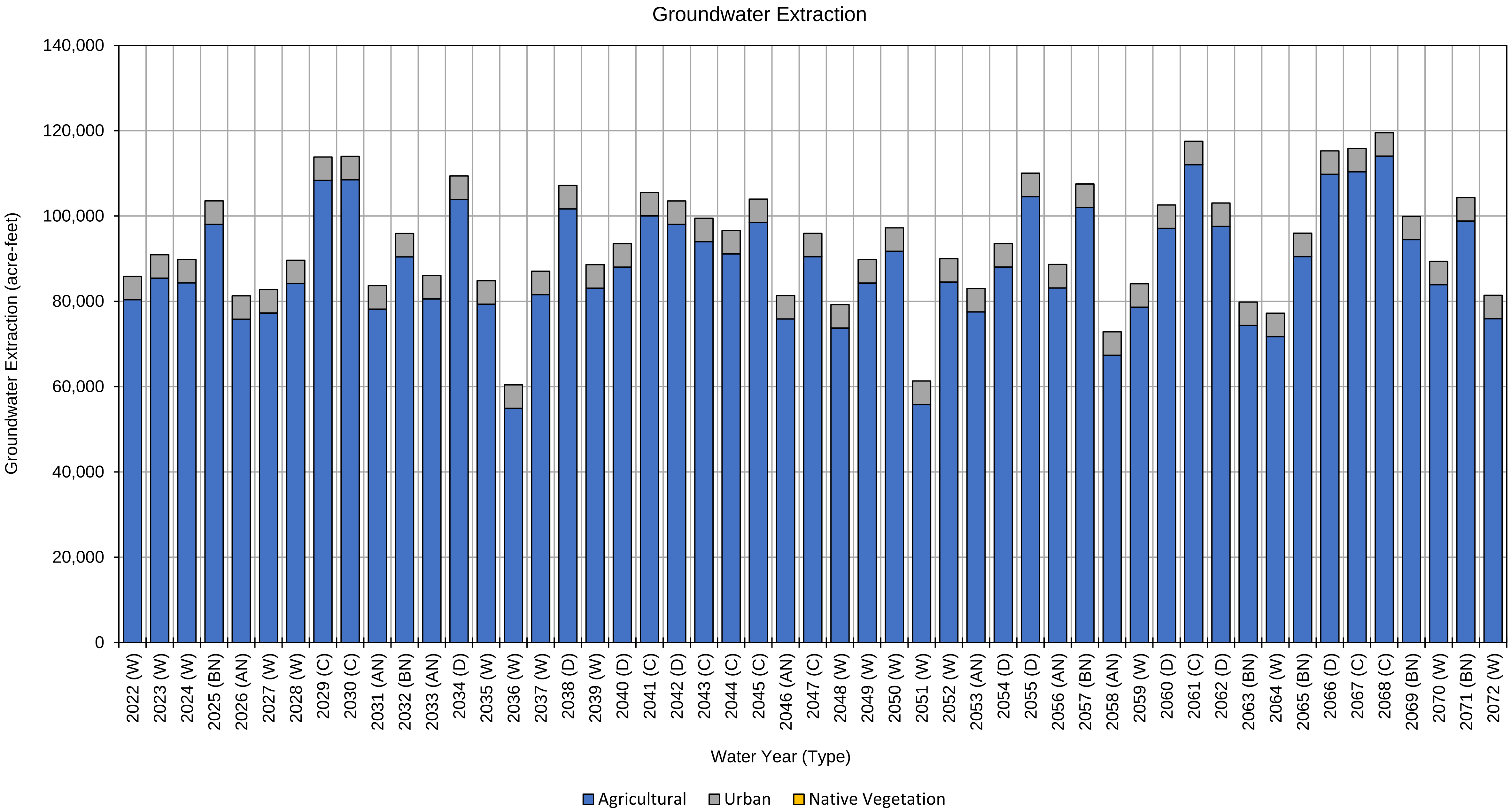
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	150,000	20,000	710,000	880,000
2023 (W)	120,000	17,000	590,000	730,000
2024 (W)	120,000	17,000	590,000	730,000
2025 (BN)	61,000	8,200	290,000	360,000
2026 (AN)	130,000	17,000	640,000	790,000
2027 (W)	130,000	17,000	620,000	770,000
2028 (W)	83,000	11,000	420,000	510,000
2029 (C)	63,000	8,300	320,000	390,000
2030 (C)	50,000	7,300	280,000	340,000
2031 (AN)	130,000	17,000	640,000	790,000
2032 (BN)	68,000	9,100	330,000	410,000
2033 (AN)	100,000	15,000	520,000	640,000
2034 (D)	78,000	11,000	390,000	480,000
2035 (W)	130,000	17,000	620,000	770,000
2036 (W)	190,000	26,000	960,000	1,200,000
2037 (W)	120,000	17,000	590,000	730,000
2038 (D)	78,000	11,000	390,000	480,000
2039 (W)	120,000	17,000	590,000	730,000
2040 (D)	79,000	11,000	390,000	480,000
2041 (C)	63,000	9,000	320,000	390,000
2042 (D)	59,000	8,200	290,000	360,000
2043 (C)	75,000	10,000	360,000	450,000
2044 (C)	75,000	10,000	360,000	450,000
2045 (C)	81,000	11,000	410,000	500,000
2046 (AN)	130,000	17,000	640,000	790,000
2047 (C)	75,000	10,000	360,000	450,000
2048 (W)	180,000	24,000	860,000	1,100,000
2049 (W)	120,000	17,000	590,000	730,000
2050 (W)	110,000	15,000	510,000	640,000
2051 (W)	190,000	26,000	960,000	1,200,000
2052 (W)	83,000	11,000	420,000	510,000
2053 (AN)	100,000	15,000	520,000	640,000
2054 (D)	79,000	11,000	390,000	480,000
2055 (D)	78,000	11,000	390,000	480,000
2056 (AN)	120,000	16,000	570,000	710,000
2057 (BN)	100,000	14,000	500,000	610,000
2058 (AN)	110,000	15,000	570,000	700,000
2059 (W)	130,000	17,000	620,000	770,000
2060 (D)	59,000	8,200	290,000	360,000
2061 (C)	63,000	8,300	320,000	390,000
2062 (D)	70,000	9,500	350,000	430,000
2063 (BN)	100,000	14,000	490,000	600,000

Red Bluff Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		96,000	12,000	500,000	610,000
2065 (BN)		68,000	9,100	330,000	410,000
2066 (D)		67,000	9,100	350,000	430,000
2067 (C)		50,000	7,300	280,000	340,000
2068 (C)		78,000	11,000	410,000	500,000
2069 (BN)		110,000	14,000	520,000	640,000
2070 (W)		130,000	17,000	630,000	780,000
2071 (BN)		61,000	8,200	290,000	360,000
2072 (W)		150,000	20,000	710,000	880,000
Average (2022-2072)		99,000	13,000	490,000	600,000
2022-2072	W	130,000	18,000	640,000	790,000
	AN	120,000	16,000	590,000	730,000
	BN	81,000	11,000	400,000	490,000
	D	72,000	9,800	360,000	440,000
	C	67,000	9,200	340,000	420,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

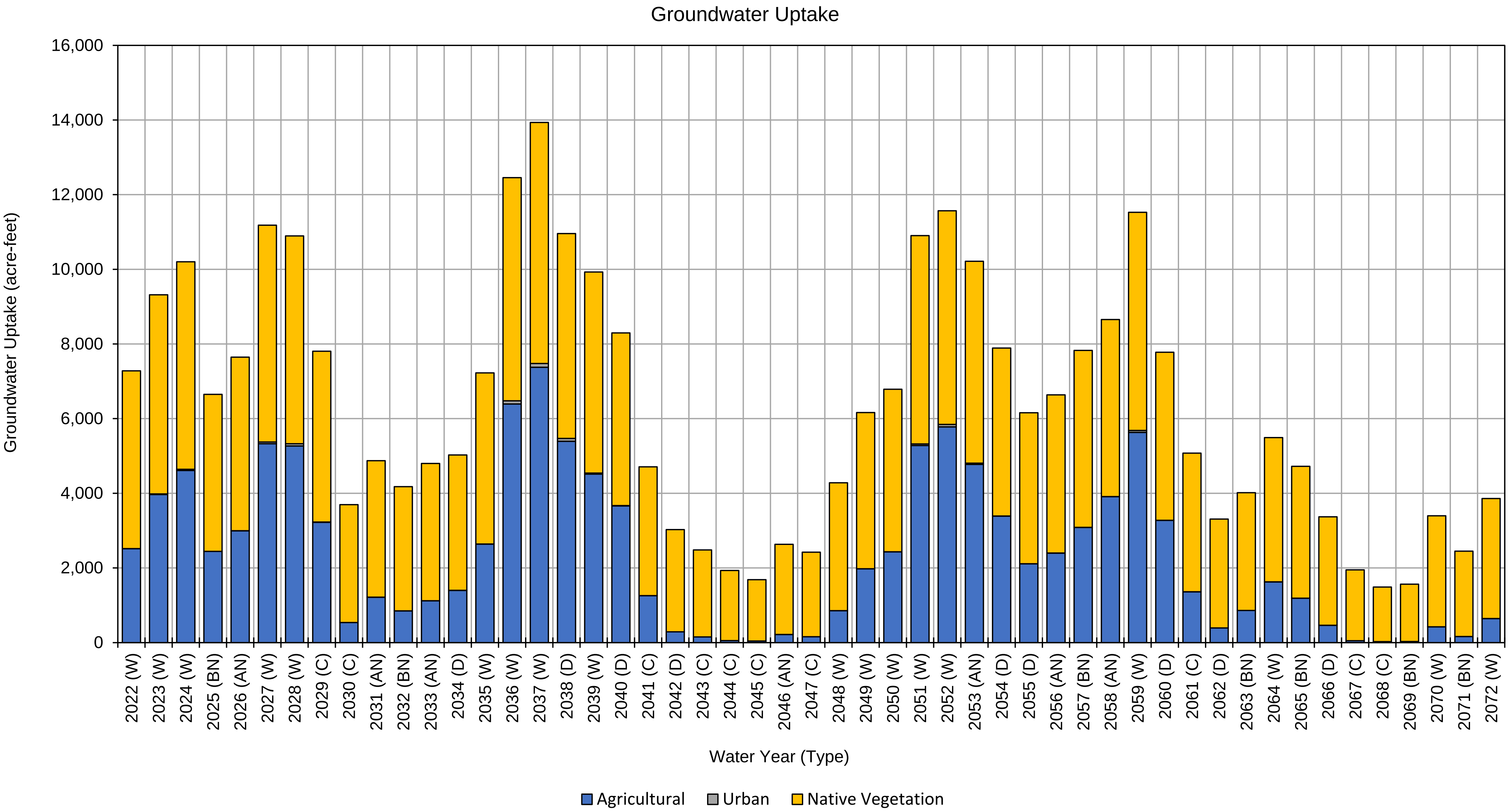
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	80,000	5,500	0	86,000
2023 (W)	85,000	5,500	0	91,000
2024 (W)	84,000	5,500	0	90,000
2025 (BN)	98,000	5,500	0	100,000
2026 (AN)	76,000	5,500	0	82,000
2027 (W)	77,000	5,500	0	83,000
2028 (W)	84,000	5,500	0	90,000
2029 (C)	110,000	5,500	0	120,000
2030 (C)	110,000	5,500	0	120,000
2031 (AN)	78,000	5,500	0	84,000
2032 (BN)	90,000	5,500	0	96,000
2033 (AN)	81,000	5,500	0	87,000
2034 (D)	100,000	5,500	0	110,000
2035 (W)	79,000	5,500	0	85,000
2036 (W)	55,000	5,500	0	61,000
2037 (W)	82,000	5,500	0	88,000
2038 (D)	100,000	5,500	0	110,000
2039 (W)	83,000	5,500	0	89,000
2040 (D)	88,000	5,500	0	94,000
2041 (C)	100,000	5,500	0	110,000
2042 (D)	98,000	5,500	0	100,000
2043 (C)	94,000	5,500	0	100,000
2044 (C)	91,000	5,500	0	97,000
2045 (C)	98,000	5,500	0	100,000
2046 (AN)	76,000	5,500	0	82,000
2047 (C)	90,000	5,500	0	96,000
2048 (W)	74,000	5,500	0	80,000
2049 (W)	84,000	5,500	0	90,000
2050 (W)	92,000	5,500	0	98,000
2051 (W)	56,000	5,500	0	62,000
2052 (W)	85,000	5,500	0	91,000
2053 (AN)	78,000	5,500	0	84,000
2054 (D)	88,000	5,500	0	94,000
2055 (D)	100,000	5,500	0	110,000
2056 (AN)	83,000	5,500	0	89,000
2057 (BN)	100,000	5,500	0	110,000
2058 (AN)	67,000	5,500	0	73,000
2059 (W)	79,000	5,500	0	85,000
2060 (D)	97,000	5,500	0	100,000
2061 (C)	110,000	5,500	0	120,000
2062 (D)	98,000	5,500	0	100,000
2063 (BN)	74,000	5,500	0	80,000

Red Bluff Subbasin Projected (Current Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		72,000	5,500	0	78,000
2065 (BN)		90,000	5,500	0	96,000
2066 (D)		110,000	5,500	0	120,000
2067 (C)		110,000	5,500	0	120,000
2068 (C)		110,000	5,500	0	120,000
2069 (BN)		94,000	5,500	0	100,000
2070 (W)		84,000	5,500	0	90,000
2071 (BN)		99,000	5,500	0	100,000
2072 (W)		76,000	5,500	0	82,000
Average (2022-2072)		89,000	5,500	0	95,000
2022-2072	W	78,000	5,500	0	84,000
	AN	77,000	5,500	0	83,000
	BN	93,000	5,500	0	99,000
	D	99,000	5,500	0	100,000
	C	100,000	5,500	0	110,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

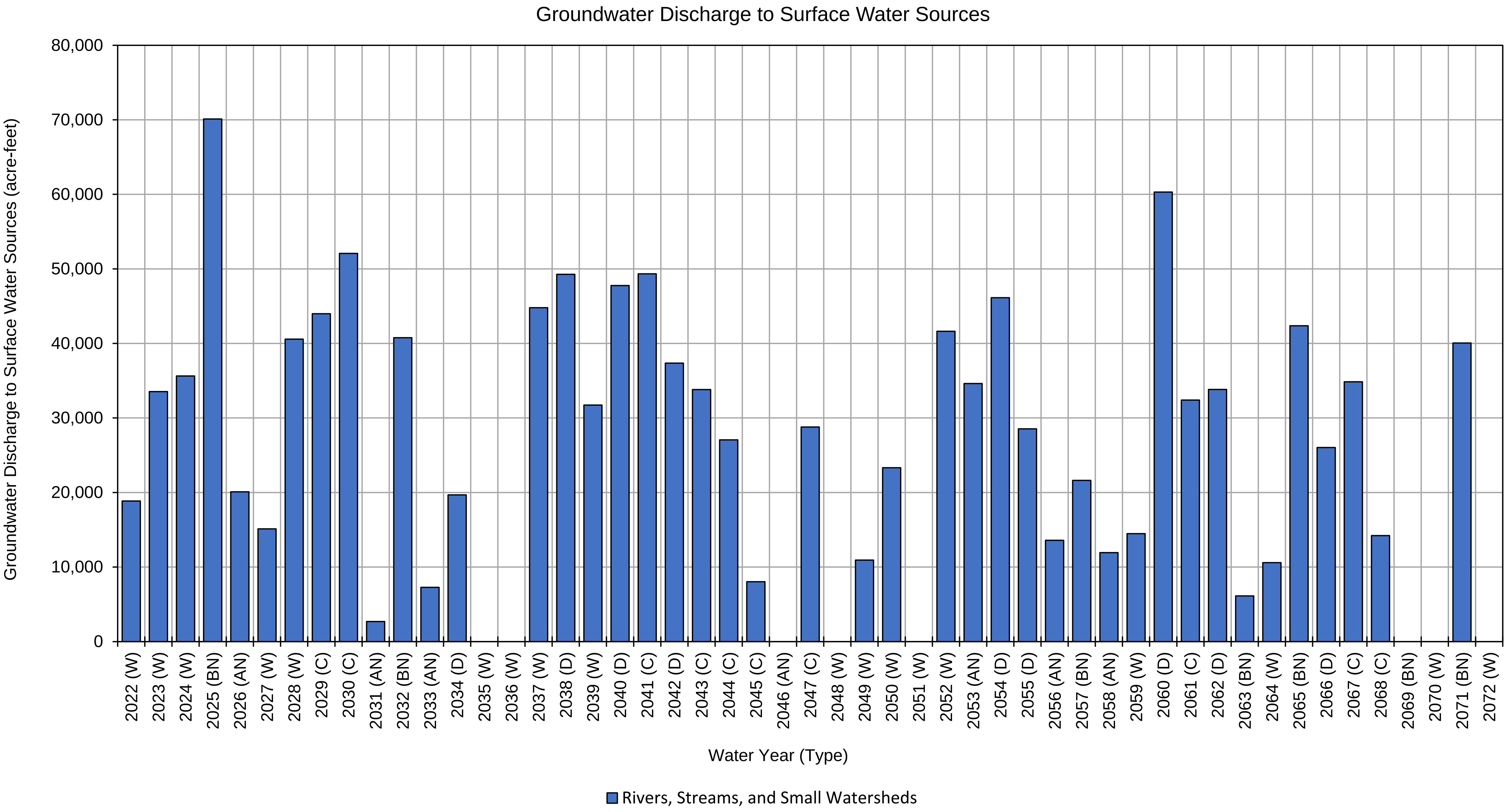
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	2,500	2	4,800	7,300
2023 (W)	4,000	14	5,300	9,300
2024 (W)	4,600	34	5,600	10,000
2025 (BN)	2,400	3	4,200	6,600
2026 (AN)	3,000	2	4,600	7,600
2027 (W)	5,300	48	5,800	11,000
2028 (W)	5,300	59	5,600	11,000
2029 (C)	3,200	8	4,600	7,800
2030 (C)	540	0	3,200	3,700
2031 (AN)	1,200	0	3,700	4,900
2032 (BN)	850	0	3,300	4,200
2033 (AN)	1,100	1	3,700	4,800
2034 (D)	1,400	0	3,600	5,000
2035 (W)	2,600	2	4,600	7,200
2036 (W)	6,400	84	6,000	12,000
2037 (W)	7,400	100	6,500	14,000
2038 (D)	5,400	76	5,500	11,000
2039 (W)	4,500	27	5,400	9,900
2040 (D)	3,700	11	4,600	8,300
2041 (C)	1,300	1	3,500	4,800
2042 (D)	290	0	2,700	3,000
2043 (C)	150	0	2,300	2,500
2044 (C)	52	0	1,900	2,000
2045 (C)	42	0	1,600	1,600
2046 (AN)	220	0	2,400	2,600
2047 (C)	160	0	2,300	2,500
2048 (W)	850	1	3,400	4,300
2049 (W)	2,000	1	4,200	6,200
2050 (W)	2,400	2	4,400	6,800
2051 (W)	5,300	41	5,600	11,000
2052 (W)	5,800	68	5,700	12,000
2053 (AN)	4,800	31	5,400	10,000
2054 (D)	3,400	5	4,500	7,900
2055 (D)	2,100	1	4,000	6,100
2056 (AN)	2,400	1	4,200	6,600
2057 (BN)	3,100	3	4,700	7,800
2058 (AN)	3,900	3	4,700	8,600
2059 (W)	5,600	50	5,800	11,000
2060 (D)	3,300	5	4,500	7,800
2061 (C)	1,400	0	3,700	5,100
2062 (D)	390	0	2,900	3,300
2063 (BN)	860	0	3,200	4,100

Red Bluff Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		1,600	1	3,900	5,500
2065 (BN)		1,200	0	3,500	4,700
2066 (D)		460	0	2,900	3,400
2067 (C)		49	0	1,900	1,900
2068 (C)		25	0	1,500	1,500
2069 (BN)		27	0	1,500	1,500
2070 (W)		420	1	3,000	3,400
2071 (BN)		160	0	2,300	2,500
2072 (W)		640	0	3,200	3,800
Average (2022-2072)		2,300	13	4,000	6,300
2022-2072	W	3,700	30	4,900	8,600
	AN	2,400	6	4,100	6,500
	BN	1,200	1	3,300	4,500
	D	2,300	11	3,900	6,200
	C	680	1	2,600	3,300

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

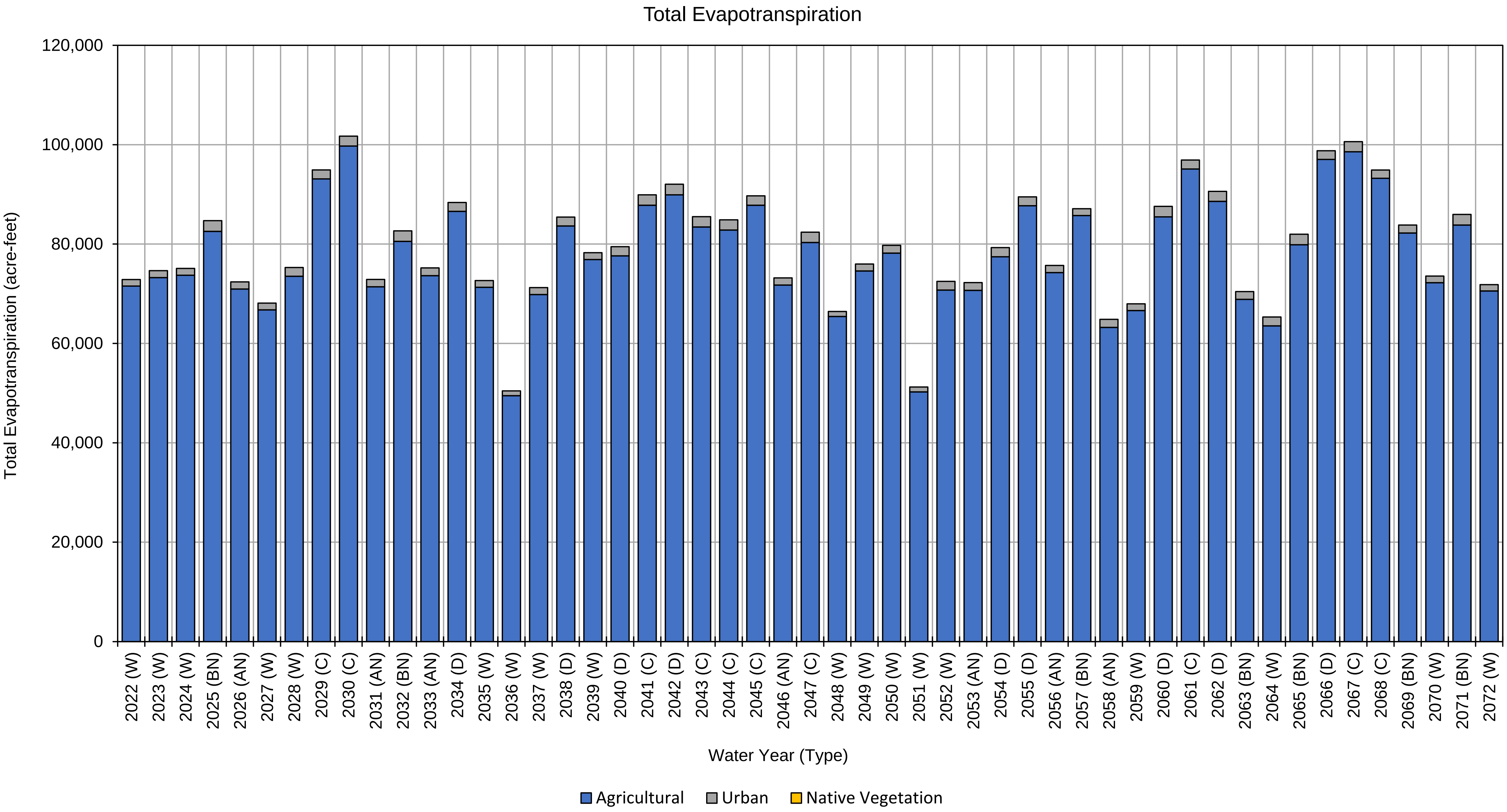
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	19,000
2023 (W)	34,000
2024 (W)	36,000
2025 (BN)	70,000
2026 (AN)	20,000
2027 (W)	15,000
2028 (W)	41,000
2029 (C)	44,000
2030 (C)	52,000
2031 (AN)	2,700
2032 (BN)	41,000
2033 (AN)	7,300
2034 (D)	20,000
2035 (W)	0
2036 (W)	0
2037 (W)	45,000
2038 (D)	49,000
2039 (W)	32,000
2040 (D)	48,000
2041 (C)	49,000
2042 (D)	37,000
2043 (C)	34,000
2044 (C)	27,000
2045 (C)	8,000
2046 (AN)	0
2047 (C)	29,000
2048 (W)	0
2049 (W)	11,000
2050 (W)	23,000
2051 (W)	0
2052 (W)	42,000
2053 (AN)	35,000
2054 (D)	46,000
2055 (D)	29,000
2056 (AN)	14,000
2057 (BN)	22,000
2058 (AN)	12,000
2059 (W)	14,000
2060 (D)	60,000
2061 (C)	32,000
2062 (D)	34,000
2063 (BN)	6,100

Red Bluff Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		11,000
2065 (BN)		42,000
2066 (D)		26,000
2067 (C)		35,000
2068 (C)		14,000
2069 (BN)		0
2070 (W)		0
2071 (BN)		40,000
2072 (W)		0
Average (2022-2072)		26,000
2022-2072	W	18,000
	AN	13,000
	BN	32,000
	D	39,000
	C	32,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

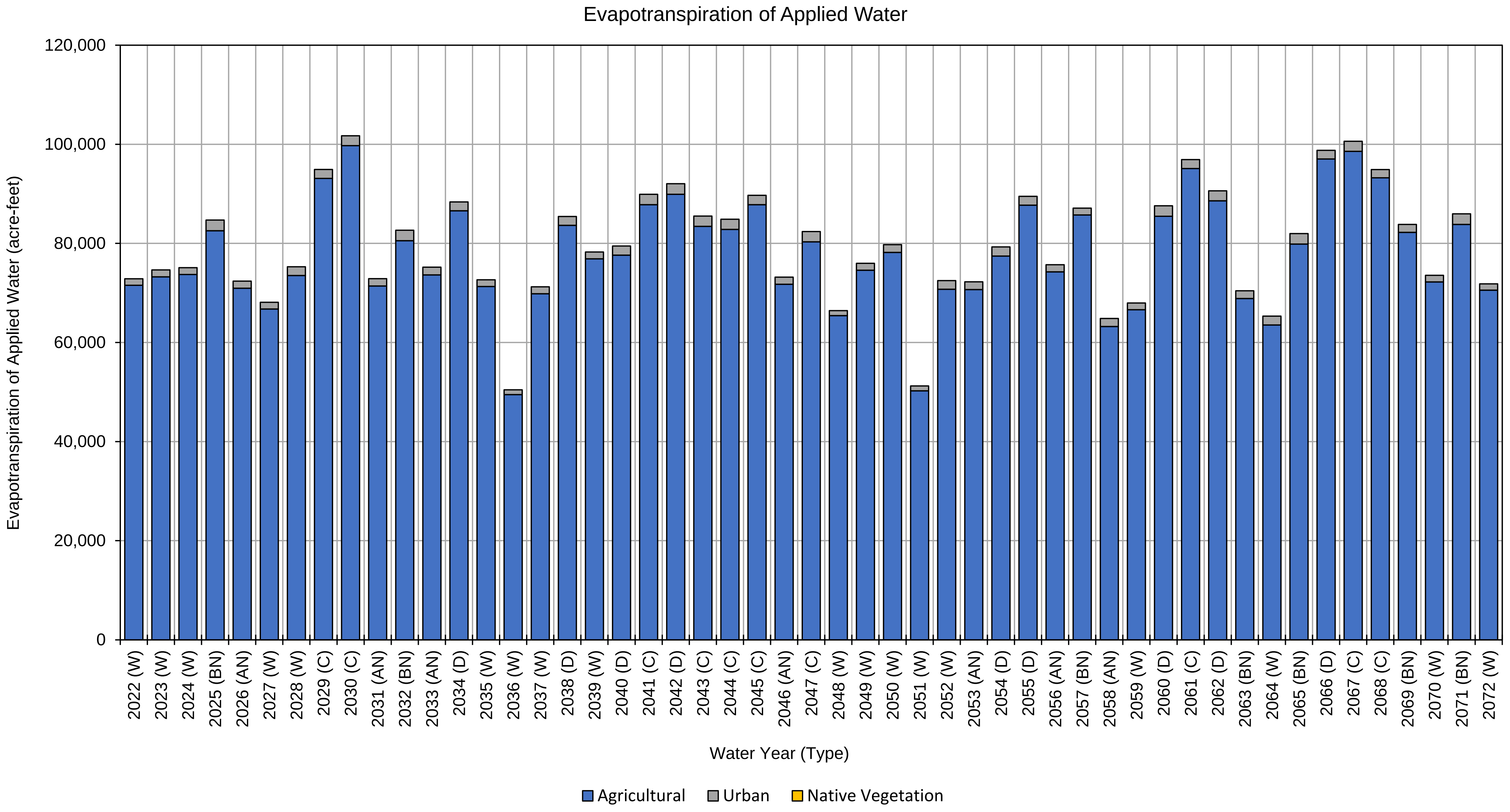
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	130,000	6,100	350,000	490,000
2023 (W)	140,000	5,700	320,000	470,000
2024 (W)	140,000	5,600	320,000	470,000
2025 (BN)	130,000	5,300	280,000	420,000
2026 (AN)	140,000	6,000	340,000	490,000
2027 (W)	130,000	5,600	330,000	470,000
2028 (W)	130,000	5,400	310,000	450,000
2029 (C)	140,000	4,500	240,000	380,000
2030 (C)	140,000	4,700	220,000	360,000
2031 (AN)	140,000	6,200	350,000	500,000
2032 (BN)	140,000	5,600	300,000	450,000
2033 (AN)	130,000	5,700	320,000	460,000
2034 (D)	140,000	5,200	290,000	440,000
2035 (W)	130,000	5,600	320,000	460,000
2036 (W)	120,000	5,700	320,000	450,000
2037 (W)	140,000	5,600	330,000	480,000
2038 (D)	140,000	5,200	290,000	440,000
2039 (W)	140,000	5,600	310,000	460,000
2040 (D)	140,000	5,500	310,000	460,000
2041 (C)	140,000	5,500	290,000	440,000
2042 (D)	130,000	5,300	260,000	400,000
2043 (C)	140,000	5,900	310,000	460,000
2044 (C)	140,000	5,900	310,000	460,000
2045 (C)	140,000	5,600	310,000	460,000
2046 (AN)	140,000	6,000	340,000	490,000
2047 (C)	140,000	5,900	320,000	470,000
2048 (W)	120,000	5,300	300,000	430,000
2049 (W)	140,000	5,600	320,000	470,000
2050 (W)	140,000	5,700	320,000	470,000
2051 (W)	120,000	5,700	320,000	450,000
2052 (W)	130,000	5,400	320,000	460,000
2053 (AN)	130,000	5,700	330,000	470,000
2054 (D)	140,000	5,500	310,000	460,000
2055 (D)	140,000	5,200	290,000	440,000
2056 (AN)	130,000	5,500	310,000	450,000
2057 (BN)	140,000	4,900	280,000	420,000
2058 (AN)	130,000	6,200	350,000	490,000
2059 (W)	130,000	5,600	330,000	470,000
2060 (D)	140,000	5,300	260,000	410,000
2061 (C)	140,000	4,600	240,000	380,000
2062 (D)	140,000	5,500	280,000	430,000
2063 (BN)	120,000	5,500	300,000	430,000

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		130,000	5,800	340,000	480,000
2065 (BN)		140,000	5,600	300,000	450,000
2066 (D)		140,000	4,700	250,000	390,000
2067 (C)		140,000	4,800	230,000	370,000
2068 (C)		140,000	4,900	280,000	420,000
2069 (BN)		140,000	5,700	320,000	470,000
2070 (W)		130,000	5,500	320,000	460,000
2071 (BN)		130,000	5,300	270,000	410,000
2072 (W)		130,000	6,000	340,000	480,000
Average (2022-2072)		130,000	5,500	300,000	440,000
2022-2072	W	130,000	5,600	320,000	460,000
	AN	130,000	5,900	330,000	470,000
	BN	130,000	5,400	290,000	430,000
	D	140,000	5,300	280,000	430,000
	C	140,000	5,200	270,000	420,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

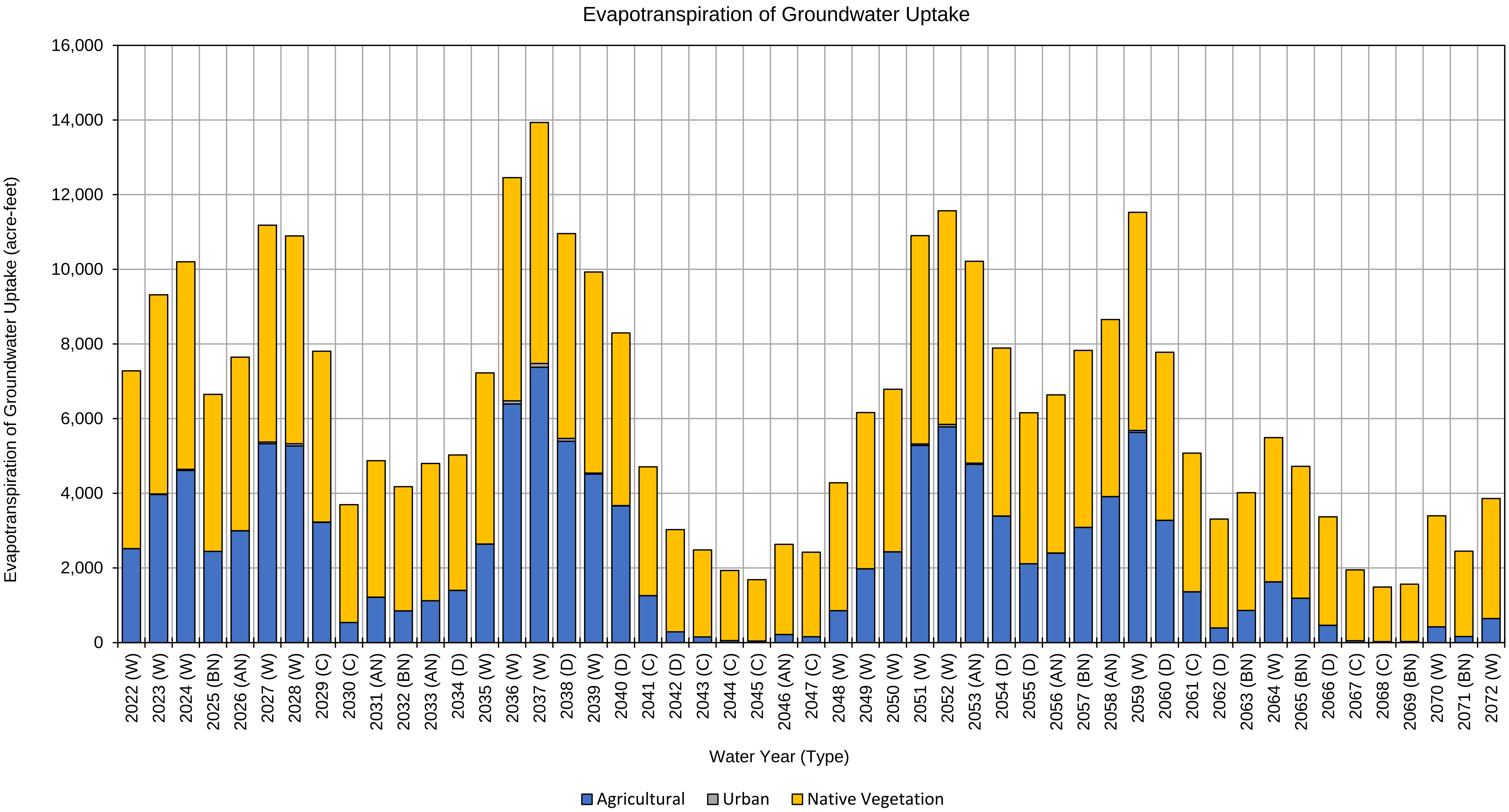
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	72,000	1,300	0	73,000
2023 (W)	73,000	1,400	0	74,000
2024 (W)	74,000	1,400	0	75,000
2025 (BN)	83,000	2,100	0	85,000
2026 (AN)	71,000	1,400	0	72,000
2027 (W)	67,000	1,400	0	68,000
2028 (W)	74,000	1,800	0	76,000
2029 (C)	93,000	1,800	0	95,000
2030 (C)	100,000	2,000	0	100,000
2031 (AN)	71,000	1,500	0	73,000
2032 (BN)	81,000	2,100	0	83,000
2033 (AN)	74,000	1,600	0	76,000
2034 (D)	87,000	1,800	0	89,000
2035 (W)	71,000	1,400	0	72,000
2036 (W)	49,000	980	0	50,000
2037 (W)	70,000	1,400	0	71,000
2038 (D)	84,000	1,800	0	86,000
2039 (W)	77,000	1,400	0	78,000
2040 (D)	78,000	1,800	0	80,000
2041 (C)	88,000	2,100	0	90,000
2042 (D)	90,000	2,100	0	92,000
2043 (C)	83,000	2,100	0	85,000
2044 (C)	83,000	2,100	0	85,000
2045 (C)	88,000	1,900	0	90,000
2046 (AN)	72,000	1,400	0	73,000
2047 (C)	80,000	2,100	0	82,000
2048 (W)	65,000	1,000	0	66,000
2049 (W)	75,000	1,400	0	76,000
2050 (W)	78,000	1,600	0	80,000
2051 (W)	50,000	980	0	51,000
2052 (W)	71,000	1,800	0	73,000
2053 (AN)	71,000	1,600	0	73,000
2054 (D)	77,000	1,800	0	79,000
2055 (D)	88,000	1,800	0	90,000
2056 (AN)	74,000	1,400	0	75,000
2057 (BN)	86,000	1,400	0	87,000
2058 (AN)	63,000	1,600	0	65,000
2059 (W)	67,000	1,400	0	68,000
2060 (D)	85,000	2,100	0	87,000
2061 (C)	95,000	1,800	0	97,000
2062 (D)	89,000	2,000	0	91,000
2063 (BN)	69,000	1,600	0	71,000

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		64,000	1,800	0	66,000
2065 (BN)		80,000	2,100	0	82,000
2066 (D)		97,000	1,800	0	99,000
2067 (C)		99,000	2,000	0	100,000
2068 (C)		93,000	1,700	0	95,000
2069 (BN)		82,000	1,600	0	84,000
2070 (W)		72,000	1,300	0	73,000
2071 (BN)		84,000	2,100	0	86,000
2072 (W)		71,000	1,300	0	72,000
Average (2022-2072)		78,000	1,700	0	80,000
2022-2072	W	69,000	1,400	0	70,000
	AN	71,000	1,500	0	73,000
	BN	81,000	1,900	0	83,000
	D	86,000	1,900	0	88,000
	C	90,000	2,000	0	92,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	2,500	2	4,800	7,300
2023 (W)	4,000	14	5,300	9,300
2024 (W)	4,600	34	5,600	10,000
2025 (BN)	2,400	3	4,200	6,600
2026 (AN)	3,000	2	4,600	7,600
2027 (W)	5,300	48	5,800	11,000
2028 (W)	5,300	59	5,600	11,000
2029 (C)	3,200	8	4,600	7,800
2030 (C)	540	0	3,200	3,700
2031 (AN)	1,200	0	3,700	4,900
2032 (BN)	850	0	3,300	4,200
2033 (AN)	1,100	1	3,700	4,800
2034 (D)	1,400	0	3,600	5,000
2035 (W)	2,600	2	4,600	7,200
2036 (W)	6,400	84	6,000	12,000
2037 (W)	7,400	100	6,500	14,000
2038 (D)	5,400	76	5,500	11,000
2039 (W)	4,500	27	5,400	9,900
2040 (D)	3,700	11	4,600	8,300
2041 (C)	1,300	1	3,500	4,800
2042 (D)	290	0	2,700	3,000
2043 (C)	150	0	2,300	2,500
2044 (C)	52	0	1,900	2,000
2045 (C)	42	0	1,600	1,600
2046 (AN)	220	0	2,400	2,600
2047 (C)	160	0	2,300	2,500
2048 (W)	850	1	3,400	4,300
2049 (W)	2,000	1	4,200	6,200
2050 (W)	2,400	2	4,400	6,800
2051 (W)	5,300	41	5,600	11,000
2052 (W)	5,800	68	5,700	12,000
2053 (AN)	4,800	31	5,400	10,000
2054 (D)	3,400	5	4,500	7,900
2055 (D)	2,100	1	4,000	6,100
2056 (AN)	2,400	1	4,200	6,600
2057 (BN)	3,100	3	4,700	7,800
2058 (AN)	3,900	3	4,700	8,600
2059 (W)	5,600	50	5,800	11,000
2060 (D)	3,300	5	4,500	7,800
2061 (C)	1,400	0	3,700	5,100
2062 (D)	390	0	2,900	3,300
2063 (BN)	860	0	3,200	4,100

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		1,600	1	3,900	5,500
2065 (BN)		1,200	0	3,500	4,700
2066 (D)		460	0	2,900	3,400
2067 (C)		49	0	1,900	1,900
2068 (C)		25	0	1,500	1,500
2069 (BN)		27	0	1,500	1,500
2070 (W)		420	1	3,000	3,400
2071 (BN)		160	0	2,300	2,500
2072 (W)		640	0	3,200	3,800
Average (2022-2072)		2,300	13	4,000	6,300
2022-2072	W	3,700	30	4,900	8,600
	AN	2,400	6	4,100	6,500
	BN	1,200	1	3,300	4,500
	D	2,300	11	3,900	6,200
	C	680	1	2,600	3,300

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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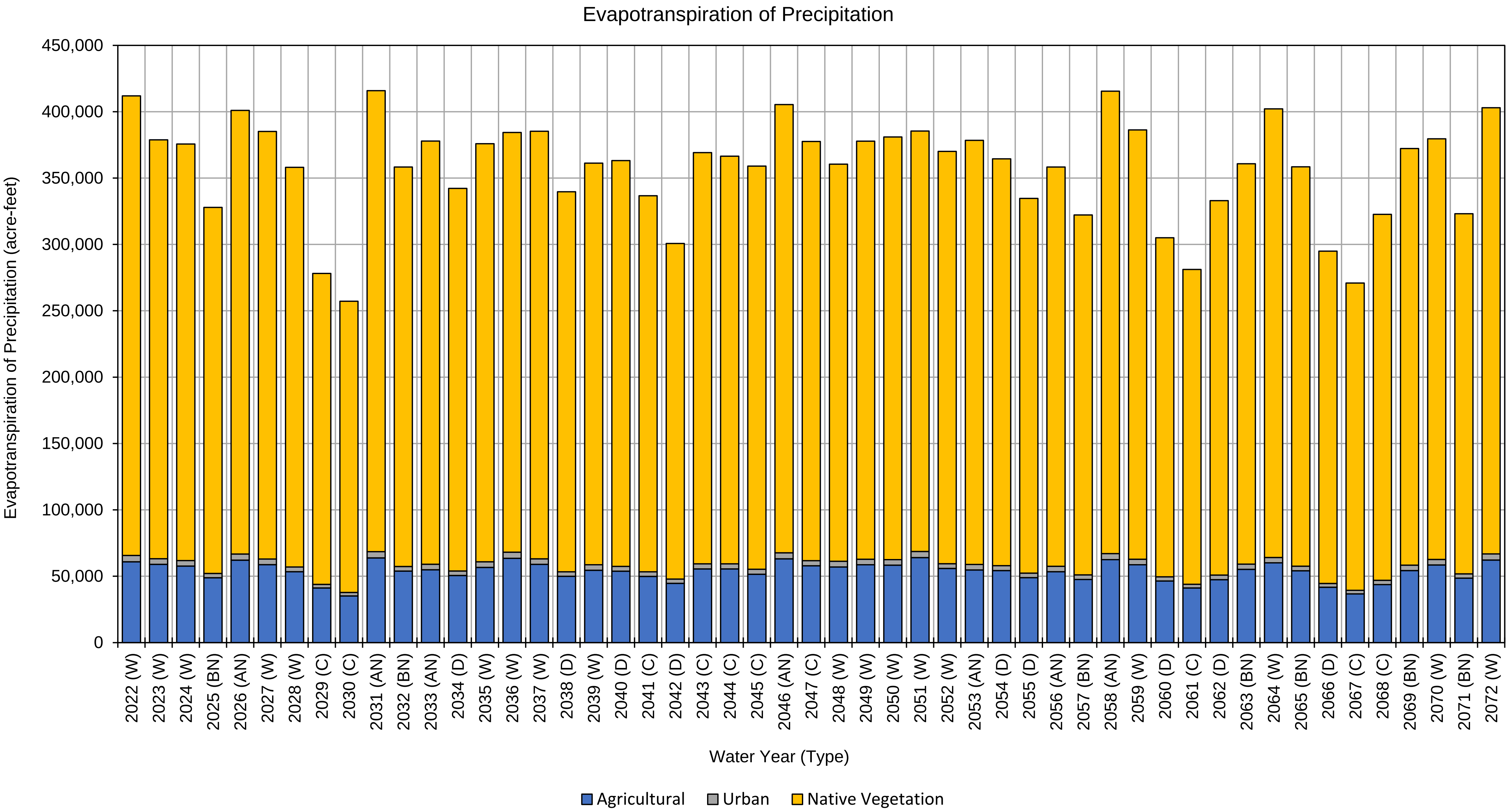
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

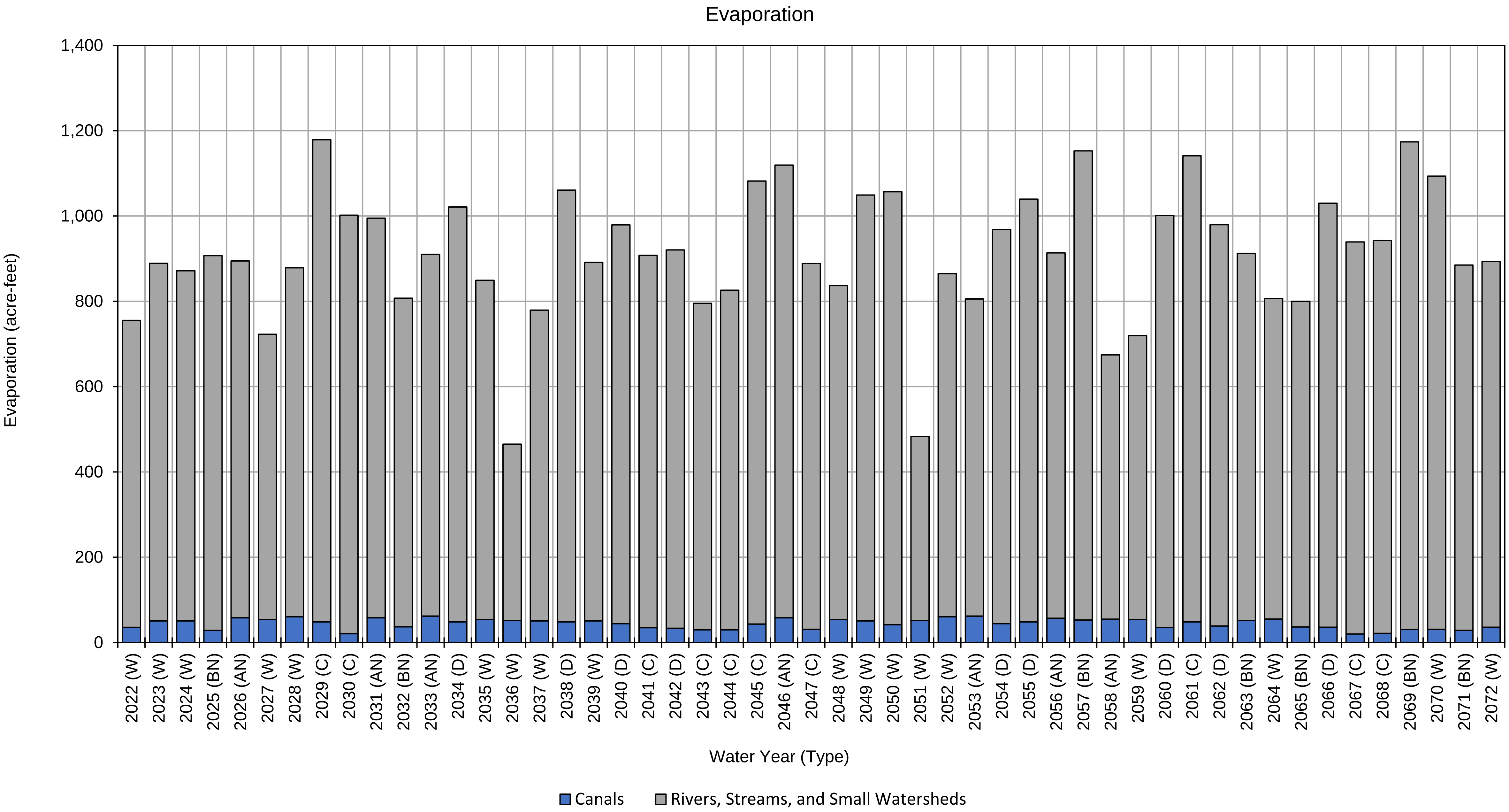
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	61,000	4,800	350,000	420,000
2023 (W)	59,000	4,200	320,000	380,000
2024 (W)	58,000	4,200	310,000	370,000
2025 (BN)	49,000	3,200	280,000	330,000
2026 (AN)	62,000	4,600	330,000	400,000
2027 (W)	59,000	4,200	320,000	380,000
2028 (W)	53,000	3,600	300,000	360,000
2029 (C)	41,000	2,700	230,000	270,000
2030 (C)	35,000	2,700	220,000	260,000
2031 (AN)	64,000	4,700	350,000	420,000
2032 (BN)	54,000	3,500	300,000	360,000
2033 (AN)	55,000	4,100	320,000	380,000
2034 (D)	51,000	3,400	290,000	340,000
2035 (W)	57,000	4,200	320,000	380,000
2036 (W)	64,000	4,600	320,000	390,000
2037 (W)	59,000	4,100	320,000	380,000
2038 (D)	50,000	3,400	290,000	340,000
2039 (W)	54,000	4,200	300,000	360,000
2040 (D)	54,000	3,700	310,000	370,000
2041 (C)	50,000	3,400	280,000	330,000
2042 (D)	45,000	3,200	250,000	300,000
2043 (C)	55,000	3,900	310,000	370,000
2044 (C)	55,000	3,800	310,000	370,000
2045 (C)	51,000	3,700	300,000	350,000
2046 (AN)	63,000	4,600	340,000	410,000
2047 (C)	58,000	3,800	320,000	380,000
2048 (W)	57,000	4,300	300,000	360,000
2049 (W)	59,000	4,200	310,000	370,000
2050 (W)	58,000	4,200	320,000	380,000
2051 (W)	64,000	4,700	320,000	390,000
2052 (W)	56,000	3,600	310,000	370,000
2053 (AN)	55,000	4,100	320,000	380,000
2054 (D)	54,000	3,700	310,000	370,000
2055 (D)	49,000	3,400	280,000	330,000
2056 (AN)	53,000	4,100	300,000	360,000
2057 (BN)	48,000	3,500	270,000	320,000
2058 (AN)	62,000	4,600	350,000	420,000
2059 (W)	59,000	4,200	320,000	380,000
2060 (D)	46,000	3,200	260,000	310,000
2061 (C)	41,000	2,800	240,000	280,000
2062 (D)	47,000	3,500	280,000	330,000
2063 (BN)	55,000	3,900	300,000	360,000

Red Bluff Subbasin Projected (Current Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		60,000	4,000	340,000	400,000
2065 (BN)		54,000	3,500	300,000	360,000
2066 (D)		42,000	2,900	250,000	290,000
2067 (C)		37,000	2,700	230,000	270,000
2068 (C)		44,000	3,300	280,000	330,000
2069 (BN)		54,000	4,100	310,000	370,000
2070 (W)		58,000	4,100	320,000	380,000
2071 (BN)		49,000	3,200	270,000	320,000
2072 (W)		62,000	4,700	340,000	410,000
Average (2022-2072)		54,000	3,800	300,000	360,000
2022-2072	W	59,000	4,200	320,000	380,000
	AN	59,000	4,400	330,000	390,000
	BN	52,000	3,600	290,000	350,000
	D	49,000	3,400	280,000	330,000
	C	47,000	3,300	270,000	320,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	36	720	760
2023 (W)	51	840	890
2024 (W)	51	820	870
2025 (BN)	29	880	910
2026 (AN)	58	840	900
2027 (W)	54	670	720
2028 (W)	60	820	880
2029 (C)	48	1,100	1,100
2030 (C)	21	980	1,000
2031 (AN)	58	940	1,000
2032 (BN)	37	770	810
2033 (AN)	62	850	910
2034 (D)	48	970	1,000
2035 (W)	54	800	850
2036 (W)	52	410	460
2037 (W)	51	730	780
2038 (D)	48	1,000	1,000
2039 (W)	51	840	890
2040 (D)	44	930	970
2041 (C)	35	870	910
2042 (D)	34	890	920
2043 (C)	30	770	800
2044 (C)	30	800	830
2045 (C)	43	1,000	1,000
2046 (AN)	58	1,100	1,200
2047 (C)	31	860	890
2048 (W)	54	780	830
2049 (W)	51	1,000	1,100
2050 (W)	42	1,000	1,000
2051 (W)	52	430	480
2052 (W)	60	800	860
2053 (AN)	62	740	800
2054 (D)	44	920	960
2055 (D)	48	990	1,000
2056 (AN)	57	860	920
2057 (BN)	53	1,100	1,200
2058 (AN)	55	620	680
2059 (W)	54	670	720
2060 (D)	35	970	1,000
2061 (C)	48	1,100	1,100
2062 (D)	39	940	980
2063 (BN)	52	860	910

Red Bluff Subbasin Projected (Current Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		55	750	810
2065 (BN)		37	760	800
2066 (D)		36	990	1,000
2067 (C)		20	920	940
2068 (C)		22	920	940
2069 (BN)		31	1,100	1,100
2070 (W)		31	1,100	1,100
2071 (BN)		29	860	890
2072 (W)		36	860	900
Average (2022-2072)		45	870	920
2022-2072	W	50	780	830
	AN	59	840	900
	BN	38	910	950
	D	42	960	1,000
	C	33	940	970

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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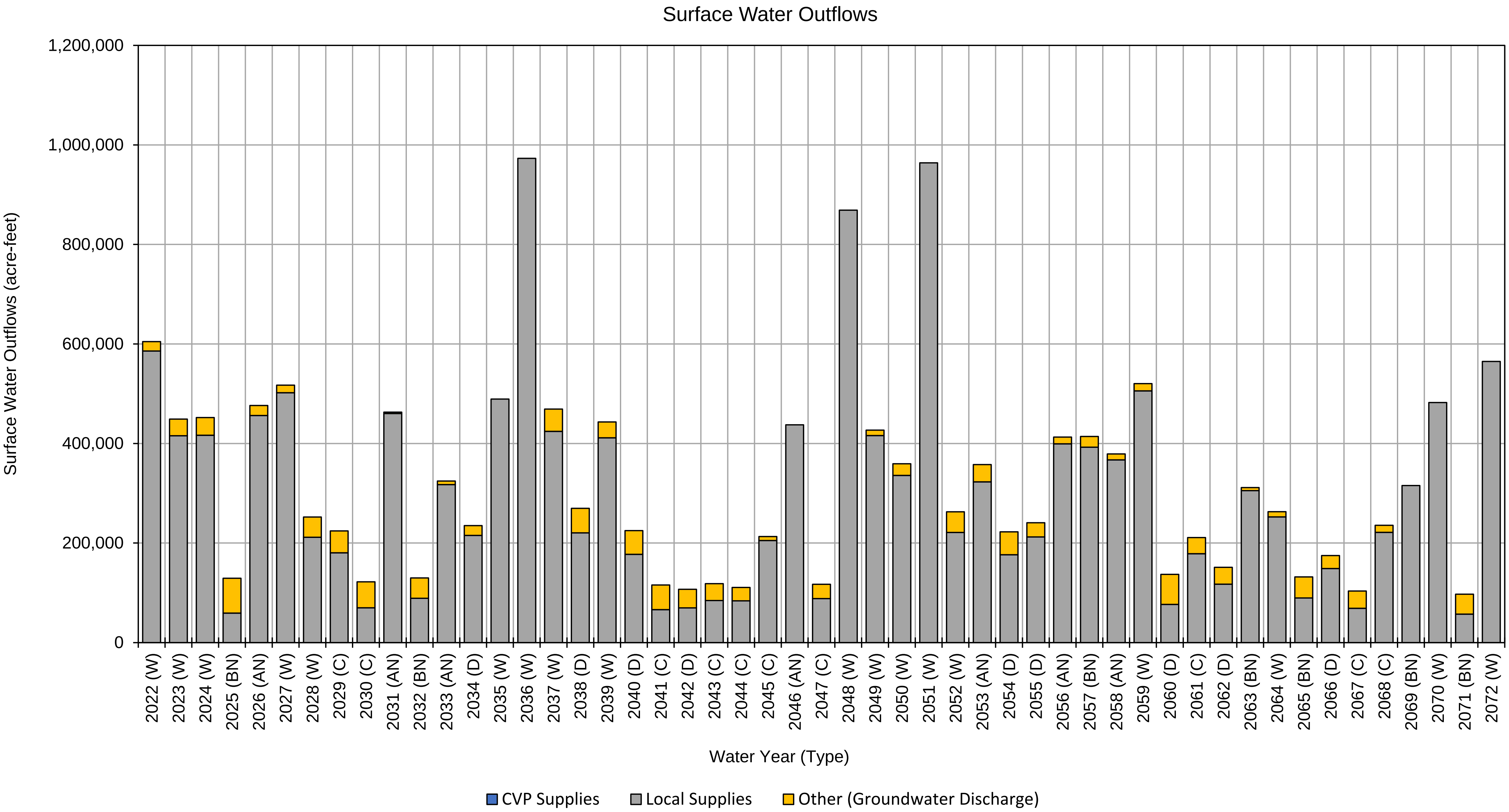

Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	590,000	19,000	610,000
2023 (W)	0	420,000	34,000	450,000
2024 (W)	0	420,000	36,000	460,000
2025 (BN)	0	59,000	70,000	130,000
2026 (AN)	0	460,000	20,000	480,000
2027 (W)	0	500,000	15,000	520,000
2028 (W)	0	210,000	41,000	250,000
2029 (C)	0	180,000	44,000	220,000
2030 (C)	0	70,000	52,000	120,000
2031 (AN)	0	460,000	2,700	460,000
2032 (BN)	0	89,000	41,000	130,000
2033 (AN)	0	320,000	7,300	330,000
2034 (D)	0	220,000	20,000	240,000
2035 (W)	0	490,000	0	490,000
2036 (W)	0	970,000	0	970,000
2037 (W)	0	420,000	45,000	470,000
2038 (D)	0	220,000	49,000	270,000
2039 (W)	0	410,000	32,000	440,000
2040 (D)	0	180,000	48,000	230,000
2041 (C)	0	66,000	49,000	120,000
2042 (D)	0	70,000	37,000	110,000
2043 (C)	0	85,000	34,000	120,000
2044 (C)	0	84,000	27,000	110,000
2045 (C)	0	200,000	8,000	210,000
2046 (AN)	0	440,000	0	440,000
2047 (C)	0	88,000	29,000	120,000
2048 (W)	0	870,000	0	870,000
2049 (W)	0	420,000	11,000	430,000
2050 (W)	0	340,000	23,000	360,000
2051 (W)	0	960,000	0	960,000
2052 (W)	0	220,000	42,000	260,000
2053 (AN)	0	320,000	35,000	360,000
2054 (D)	0	180,000	46,000	230,000
2055 (D)	0	210,000	29,000	240,000
2056 (AN)	0	400,000	14,000	410,000
2057 (BN)	0	390,000	22,000	410,000
2058 (AN)	0	370,000	12,000	380,000
2059 (W)	0	510,000	14,000	520,000
2060 (D)	0	77,000	60,000	140,000
2061 (C)	0	180,000	32,000	210,000
2062 (D)	0	120,000	34,000	150,000
2063 (BN)	0	310,000	6,100	320,000

Red Bluff Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	250,000	11,000	260,000
2065 (BN)		0	90,000	42,000	130,000
2066 (D)		0	150,000	26,000	180,000
2067 (C)		0	69,000	35,000	100,000
2068 (C)		0	220,000	14,000	230,000
2069 (BN)		0	320,000	0	320,000
2070 (W)		0	480,000	0	480,000
2071 (BN)		0	57,000	40,000	97,000
2072 (W)		0	560,000	0	560,000
Average (2022-2072)		0	310,000	26,000	340,000
2022-2072	W	0	500,000	18,000	520,000
	AN	0	390,000	13,000	400,000
	BN	0	190,000	32,000	220,000
	D	0	160,000	39,000	200,000
	C	0	120,000	32,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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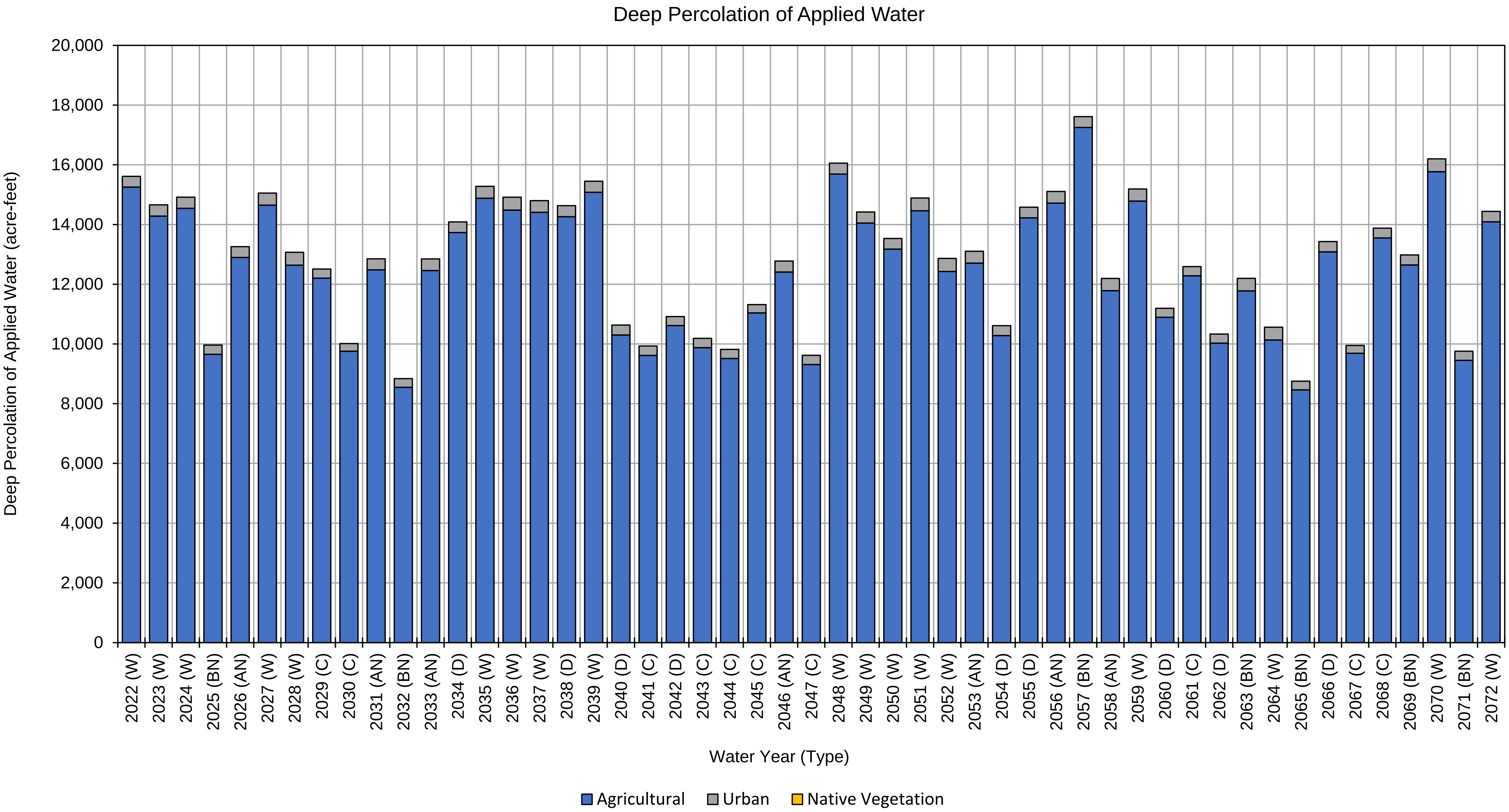
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	15,000	360	0	15,000
2023 (W)	14,000	370	0	14,000
2024 (W)	15,000	380	0	15,000
2025 (BN)	9,700	310	0	10,000
2026 (AN)	13,000	360	0	13,000
2027 (W)	15,000	410	0	15,000
2028 (W)	13,000	430	0	13,000
2029 (C)	12,000	300	0	12,000
2030 (C)	9,800	260	0	10,000
2031 (AN)	12,000	370	0	12,000
2032 (BN)	8,500	290	0	8,800
2033 (AN)	12,000	390	0	12,000
2034 (D)	14,000	360	0	14,000
2035 (W)	15,000	400	0	15,000
2036 (W)	14,000	430	0	14,000
2037 (W)	14,000	390	0	14,000
2038 (D)	14,000	370	0	14,000
2039 (W)	15,000	370	0	15,000
2040 (D)	10,000	330	0	10,000
2041 (C)	9,600	320	0	9,900
2042 (D)	11,000	300	0	11,000
2043 (C)	9,900	310	0	10,000
2044 (C)	9,500	310	0	9,800
2045 (C)	11,000	280	0	11,000
2046 (AN)	12,000	360	0	12,000
2047 (C)	9,300	310	0	9,600
2048 (W)	16,000	370	0	16,000
2049 (W)	14,000	370	0	14,000
2050 (W)	13,000	360	0	13,000
2051 (W)	14,000	430	0	14,000
2052 (W)	12,000	440	0	12,000
2053 (AN)	13,000	400	0	13,000
2054 (D)	10,000	330	0	10,000
2055 (D)	14,000	360	0	14,000
2056 (AN)	15,000	390	0	15,000
2057 (BN)	17,000	360	0	17,000
2058 (AN)	12,000	410	0	12,000
2059 (W)	15,000	410	0	15,000
2060 (D)	11,000	300	0	11,000
2061 (C)	12,000	310	0	12,000
2062 (D)	10,000	310	0	10,000
2063 (BN)	12,000	420	0	12,000

Red Bluff Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		10,000	430	0	10,000
2065 (BN)		8,500	290	0	8,800
2066 (D)		13,000	350	0	13,000
2067 (C)		9,700	260	0	10,000
2068 (C)		14,000	330	0	14,000
2069 (BN)		13,000	330	0	13,000
2070 (W)		16,000	430	0	16,000
2071 (BN)		9,500	300	0	9,800
2072 (W)		14,000	350	0	14,000
Average (2022-2072)		12,000	350	0	12,000
2022-2072	W	14,000	400	0	14,000
	AN	13,000	380	0	13,000
	BN	11,000	330	0	11,000
	D	12,000	330	0	12,000
	C	11,000	300	0	11,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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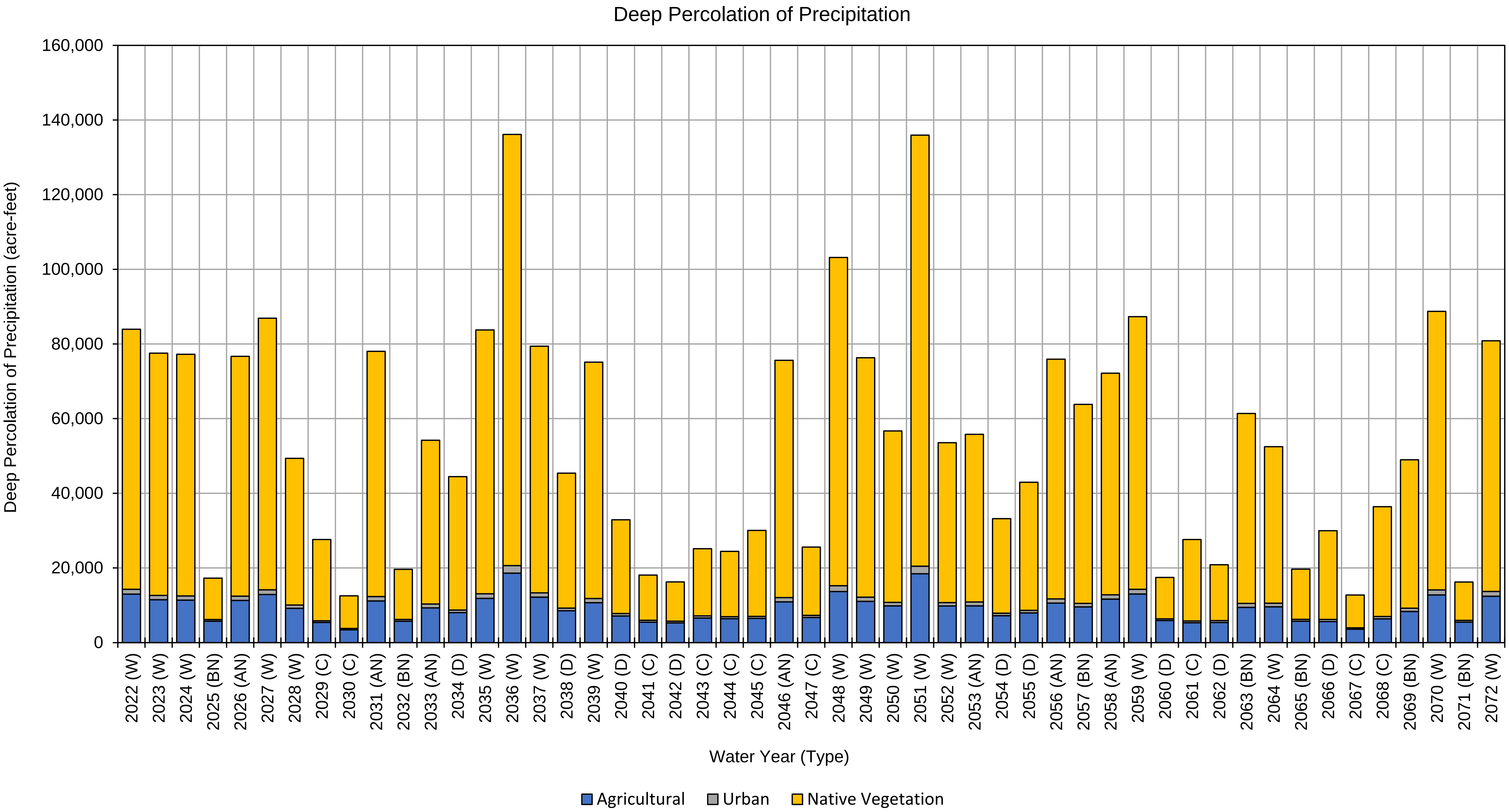
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

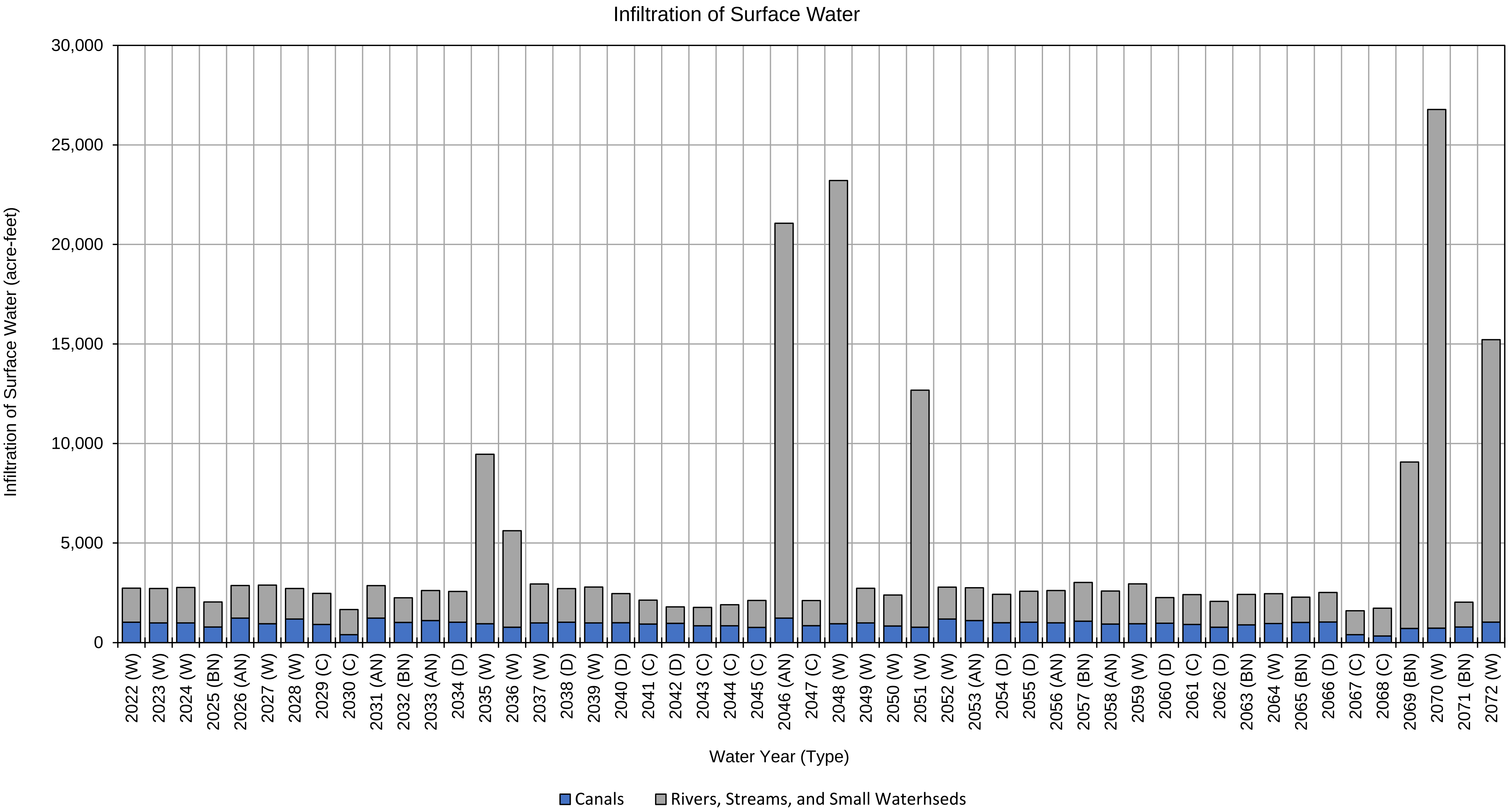
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,300	70,000	84,000
2023 (W)	11,000	1,100	65,000	77,000
2024 (W)	11,000	1,100	65,000	77,000
2025 (BN)	5,700	460	11,000	17,000
2026 (AN)	11,000	1,200	64,000	76,000
2027 (W)	13,000	1,300	73,000	87,000
2028 (W)	9,200	880	39,000	49,000
2029 (C)	5,400	460	22,000	28,000
2030 (C)	3,400	340	8,700	12,000
2031 (AN)	11,000	1,200	66,000	78,000
2032 (BN)	5,700	480	13,000	19,000
2033 (AN)	9,300	1,000	44,000	54,000
2034 (D)	8,000	690	36,000	45,000
2035 (W)	12,000	1,200	71,000	84,000
2036 (W)	19,000	2,000	120,000	140,000
2037 (W)	12,000	1,200	66,000	79,000
2038 (D)	8,500	700	36,000	45,000
2039 (W)	11,000	1,100	63,000	75,000
2040 (D)	7,100	660	25,000	33,000
2041 (C)	5,500	520	12,000	18,000
2042 (D)	5,300	450	11,000	17,000
2043 (C)	6,600	580	18,000	25,000
2044 (C)	6,400	570	18,000	25,000
2045 (C)	6,500	550	23,000	30,000
2046 (AN)	11,000	1,200	64,000	76,000
2047 (C)	6,700	570	18,000	25,000
2048 (W)	14,000	1,600	88,000	100,000
2049 (W)	11,000	1,100	64,000	76,000
2050 (W)	9,800	950	46,000	57,000
2051 (W)	18,000	2,000	120,000	140,000
2052 (W)	9,800	890	43,000	54,000
2053 (AN)	9,800	1,000	45,000	56,000
2054 (D)	7,200	660	25,000	33,000
2055 (D)	7,900	680	34,000	43,000
2056 (AN)	11,000	1,100	64,000	76,000
2057 (BN)	9,600	920	53,000	64,000
2058 (AN)	12,000	1,100	59,000	72,000
2059 (W)	13,000	1,300	73,000	87,000
2060 (D)	5,900	450	11,000	17,000
2061 (C)	5,300	460	22,000	28,000
2062 (D)	5,400	530	15,000	21,000
2063 (BN)	9,400	1,100	51,000	62,000

Red Bluff Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		9,600	970	42,000	53,000
2065 (BN)		5,700	480	13,000	19,000
2066 (D)		5,600	570	24,000	30,000
2067 (C)		3,600	350	8,800	13,000
2068 (C)		6,300	640	29,000	36,000
2069 (BN)		8,300	860	40,000	49,000
2070 (W)		13,000	1,300	75,000	89,000
2071 (BN)		5,500	450	10,000	16,000
2072 (W)		12,000	1,300	67,000	80,000
Average (2022-2072)		9,100	900	44,000	54,000
2022-2072	W	12,000	1,300	69,000	82,000
	AN	11,000	1,100	58,000	70,000
	BN	7,100	670	27,000	35,000
	D	6,800	600	24,000	31,000
	C	5,600	500	18,000	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

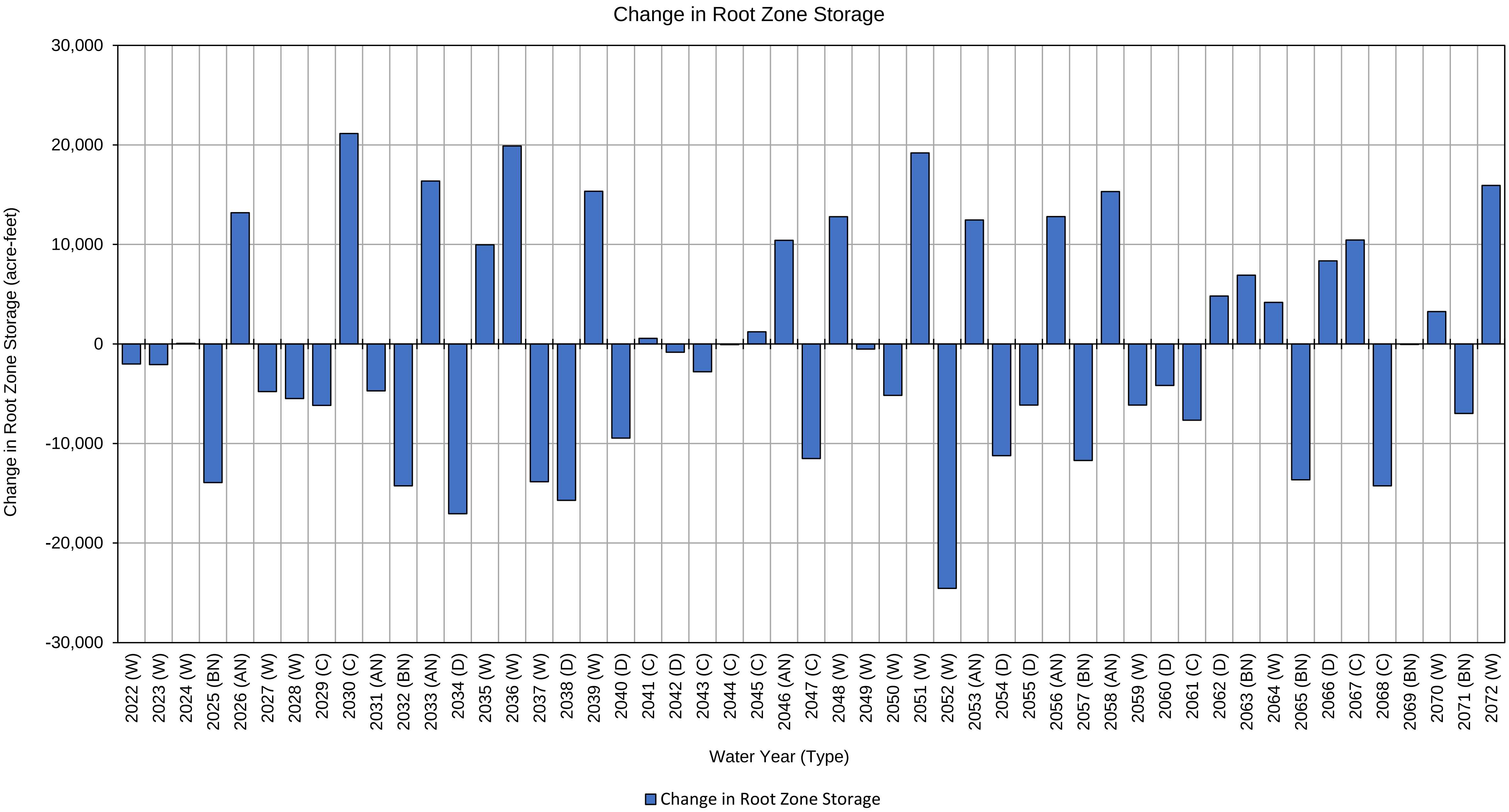
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	1,000	1,700	2,700
2023 (W)	990	1,700	2,700
2024 (W)	990	1,800	2,800
2025 (BN)	780	1,300	2,100
2026 (AN)	1,200	1,600	2,800
2027 (W)	950	1,900	2,900
2028 (W)	1,200	1,500	2,700
2029 (C)	910	1,600	2,500
2030 (C)	400	1,300	1,700
2031 (AN)	1,200	1,600	2,800
2032 (BN)	1,000	1,200	2,200
2033 (AN)	1,100	1,500	2,600
2034 (D)	1,000	1,600	2,600
2035 (W)	950	8,500	9,500
2036 (W)	770	4,800	5,600
2037 (W)	990	2,000	3,000
2038 (D)	1,000	1,700	2,700
2039 (W)	990	1,800	2,800
2040 (D)	1,000	1,500	2,500
2041 (C)	930	1,200	2,100
2042 (D)	960	830	1,800
2043 (C)	840	920	1,800
2044 (C)	840	1,100	1,900
2045 (C)	760	1,400	2,200
2046 (AN)	1,200	20,000	21,000
2047 (C)	850	1,300	2,200
2048 (W)	950	22,000	23,000
2049 (W)	990	1,700	2,700
2050 (W)	830	1,600	2,400
2051 (W)	770	12,000	13,000
2052 (W)	1,200	1,600	2,800
2053 (AN)	1,100	1,700	2,800
2054 (D)	1,000	1,400	2,400
2055 (D)	1,000	1,600	2,600
2056 (AN)	990	1,600	2,600
2057 (BN)	1,100	1,900	3,000
2058 (AN)	930	1,700	2,600
2059 (W)	950	2,000	3,000
2060 (D)	970	1,300	2,300
2061 (C)	910	1,500	2,400
2062 (D)	770	1,300	2,100
2063 (BN)	890	1,500	2,400

Red Bluff Subbasin Projected (Current Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		960	1,500	2,500
2065 (BN)		1,000	1,300	2,300
2066 (D)		1,000	1,500	2,500
2067 (C)		390	1,200	1,600
2068 (C)		330	1,400	1,700
2069 (BN)		710	8,400	9,100
2070 (W)		730	26,000	27,000
2071 (BN)		780	1,200	2,000
2072 (W)		1,000	14,000	15,000
Average (2022-2072)		930	3,500	4,400
2022-2072	W	950	6,000	7,000
	AN	1,100	4,200	5,300
	BN	890	2,400	3,300
	D	980	1,400	2,400
	C	720	1,300	2,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	-2,000
2023 (W)	-2,100
2024 (W)	63
2025 (BN)	-14,000
2026 (AN)	13,000
2027 (W)	-4,800
2028 (W)	-5,500
2029 (C)	-6,200
2030 (C)	21,000
2031 (AN)	-4,700
2032 (BN)	-14,000
2033 (AN)	16,000
2034 (D)	-17,000
2035 (W)	10,000
2036 (W)	20,000
2037 (W)	-14,000
2038 (D)	-16,000
2039 (W)	15,000
2040 (D)	-9,500
2041 (C)	570
2042 (D)	-830
2043 (C)	-2,800
2044 (C)	-77
2045 (C)	1,200
2046 (AN)	10,000
2047 (C)	-12,000
2048 (W)	13,000
2049 (W)	-510
2050 (W)	-5,200
2051 (W)	19,000
2052 (W)	-25,000
2053 (AN)	12,000
2054 (D)	-11,000
2055 (D)	-6,100
2056 (AN)	13,000
2057 (BN)	-12,000
2058 (AN)	15,000
2059 (W)	-6,100
2060 (D)	-4,200
2061 (C)	-7,700
2062 (D)	4,800
2063 (BN)	6,900

Red Bluff Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		4,200
2065 (BN)		-14,000
2066 (D)		8,400
2067 (C)		10,000
2068 (C)		-14,000
2069 (BN)		-56
2070 (W)		3,300
2071 (BN)		-7,000
2072 (W)		16,000
Average (2022-2072)		-46
2022-2072	W	2,000
	AN	11,000
	BN	-7,700
	D	-5,700
	C	-910

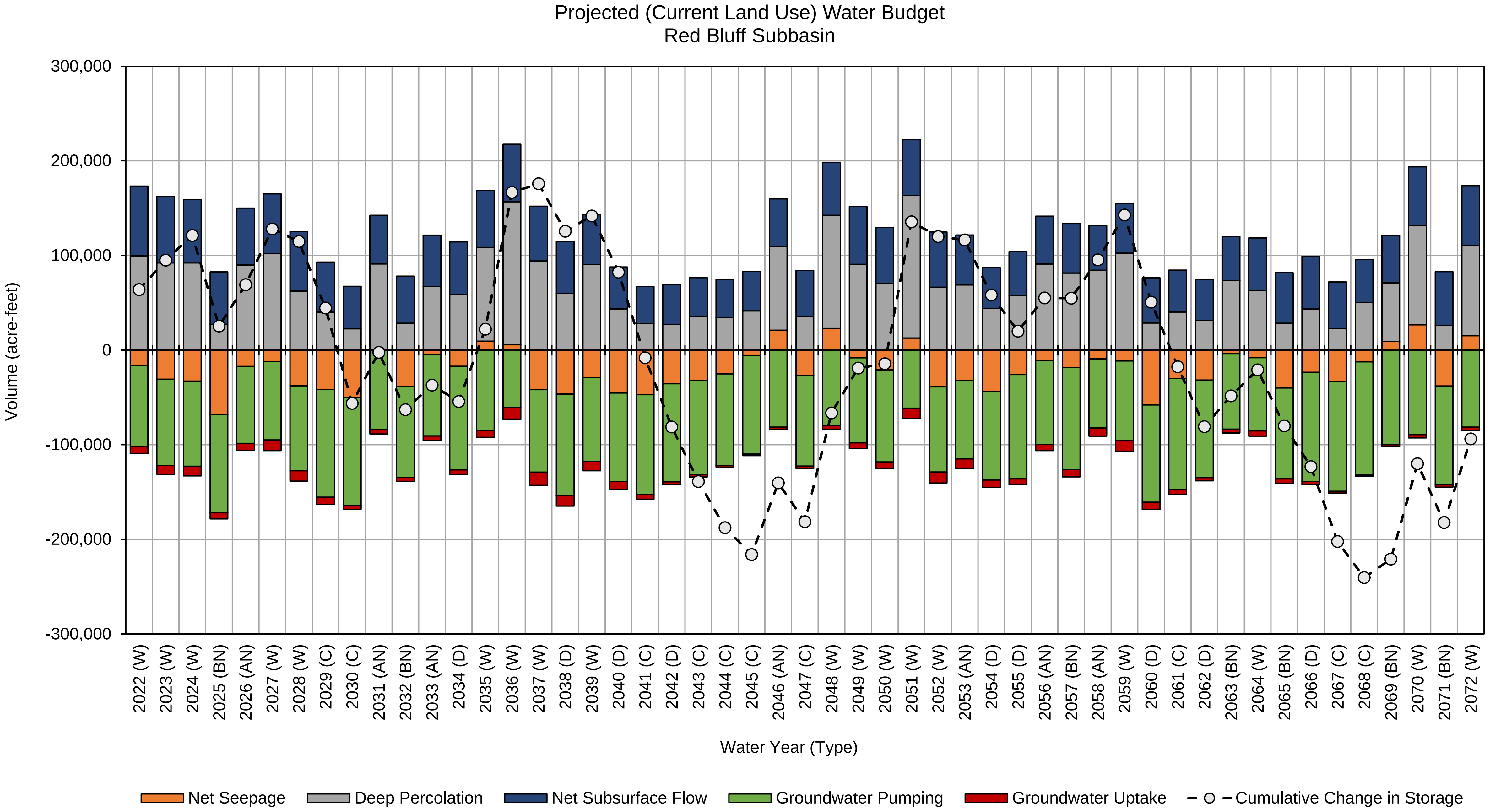
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-2b

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Current Land Use) Model Results – Groundwater System



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

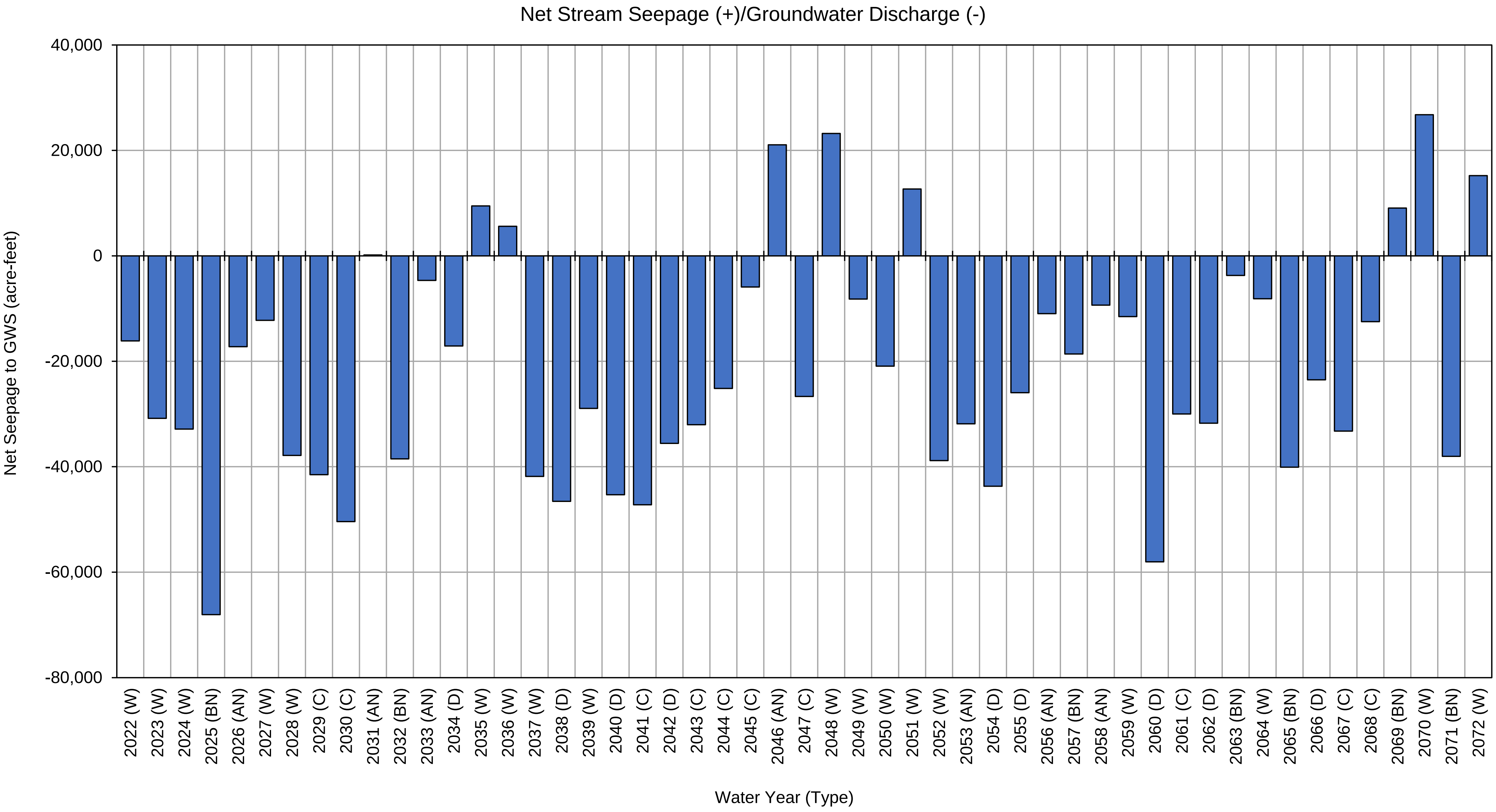
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-16,000	100,000	-86,000	-7,300	74,000	64,000	64,000
2023 (W)	-31,000	92,000	-91,000	-9,300	70,000	31,000	95,000
2024 (W)	-33,000	92,000	-90,000	-10,000	67,000	26,000	120,000
2025 (BN)	-68,000	27,000	-100,000	-6,700	55,000	-96,000	25,000
2026 (AN)	-17,000	90,000	-81,000	-7,600	60,000	44,000	69,000
2027 (W)	-12,000	100,000	-83,000	-11,000	63,000	59,000	130,000
2028 (W)	-38,000	62,000	-90,000	-11,000	63,000	-13,000	110,000
2029 (C)	-42,000	40,000	-110,000	-7,800	53,000	-70,000	45,000
2030 (C)	-50,000	23,000	-110,000	-3,700	45,000	-100,000	-56,000
2031 (AN)	170	91,000	-84,000	-4,900	51,000	54,000	-2,400
2032 (BN)	-39,000	28,000	-96,000	-4,200	50,000	-61,000	-63,000
2033 (AN)	-4,700	67,000	-86,000	-4,800	54,000	26,000	-37,000
2034 (D)	-17,000	59,000	-110,000	-5,000	56,000	-17,000	-54,000
2035 (W)	9,500	99,000	-85,000	-7,200	60,000	76,000	22,000
2036 (W)	5,600	150,000	-60,000	-12,000	61,000	140,000	170,000
2037 (W)	-42,000	94,000	-87,000	-14,000	58,000	9,200	180,000
2038 (D)	-47,000	60,000	-110,000	-11,000	55,000	-50,000	130,000
2039 (W)	-29,000	91,000	-89,000	-9,900	53,000	16,000	140,000
2040 (D)	-45,000	44,000	-94,000	-8,300	44,000	-59,000	82,000
2041 (C)	-47,000	28,000	-110,000	-4,700	39,000	-90,000	-8,100
2042 (D)	-36,000	27,000	-100,000	-3,000	42,000	-73,000	-81,000
2043 (C)	-32,000	35,000	-100,000	-2,500	41,000	-58,000	-140,000
2044 (C)	-25,000	34,000	-97,000	-1,900	41,000	-49,000	-190,000
2045 (C)	-5,900	41,000	-100,000	-1,700	42,000	-28,000	-220,000
2046 (AN)	21,000	88,000	-81,000	-2,600	50,000	76,000	-140,000
2047 (C)	-27,000	35,000	-96,000	-2,400	49,000	-41,000	-180,000
2048 (W)	23,000	120,000	-79,000	-4,300	56,000	110,000	-66,000
2049 (W)	-8,200	91,000	-90,000	-6,200	61,000	47,000	-19,000
2050 (W)	-21,000	70,000	-97,000	-6,800	59,000	4,600	-14,000
2051 (W)	13,000	150,000	-61,000	-11,000	59,000	150,000	140,000
2052 (W)	-39,000	66,000	-90,000	-12,000	58,000	-16,000	120,000
2053 (AN)	-32,000	69,000	-83,000	-10,000	53,000	-3,600	120,000
2054 (D)	-44,000	44,000	-94,000	-7,900	43,000	-58,000	58,000
2055 (D)	-26,000	58,000	-110,000	-6,200	47,000	-38,000	20,000
2056 (AN)	-11,000	91,000	-89,000	-6,600	51,000	35,000	55,000
2057 (BN)	-19,000	81,000	-110,000	-7,800	52,000	-380	55,000
2058 (AN)	-9,300	84,000	-73,000	-8,700	47,000	41,000	95,000
2059 (W)	-12,000	100,000	-84,000	-12,000	52,000	47,000	140,000
2060 (D)	-58,000	29,000	-100,000	-7,800	48,000	-92,000	51,000
2061 (C)	-30,000	40,000	-120,000	-5,100	44,000	-68,000	-18,000
2062 (D)	-32,000	31,000	-100,000	-3,300	44,000	-63,000	-81,000
2063 (BN)	-3,700	74,000	-80,000	-4,000	47,000	32,000	-48,000
2064 (W)	-8,100	63,000	-77,000	-5,500	55,000	28,000	-21,000
2065 (BN)	-40,000	28,000	-96,000	-4,700	53,000	-59,000	-80,000

Red Bluff Subbasin Projected (Current Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-24,000	43,000	-120,000	-3,400	56,000	-43,000	-120,000
2067 (C)		-33,000	23,000	-120,000	-1,900	49,000	-79,000	-200,000
2068 (C)		-12,000	50,000	-120,000	-1,500	45,000	-38,000	-240,000
2069 (BN)		9,100	62,000	-100,000	-1,600	50,000	20,000	-220,000
2070 (W)		27,000	100,000	-89,000	-3,400	62,000	100,000	-120,000
2071 (BN)		-38,000	26,000	-100,000	-2,400	57,000	-62,000	-180,000
2072 (W)		15,000	95,000	-81,000	-3,900	63,000	88,000	-94,000
Average (2022-2072)		-21,000	67,000	-94,000	-6,300	53,000	-1,800	
2022-2072	W	-11,000	97,000	-84,000	-8,700	61,000		
	AN	-7,500	83,000	-83,000	-6,500	52,000		
	BN	-28,000	47,000	-98,000	-4,500	52,000		
	D	-36,000	44,000	-100,000	-6,200	48,000		
	C	-30,000	35,000	-110,000	-3,300	45,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

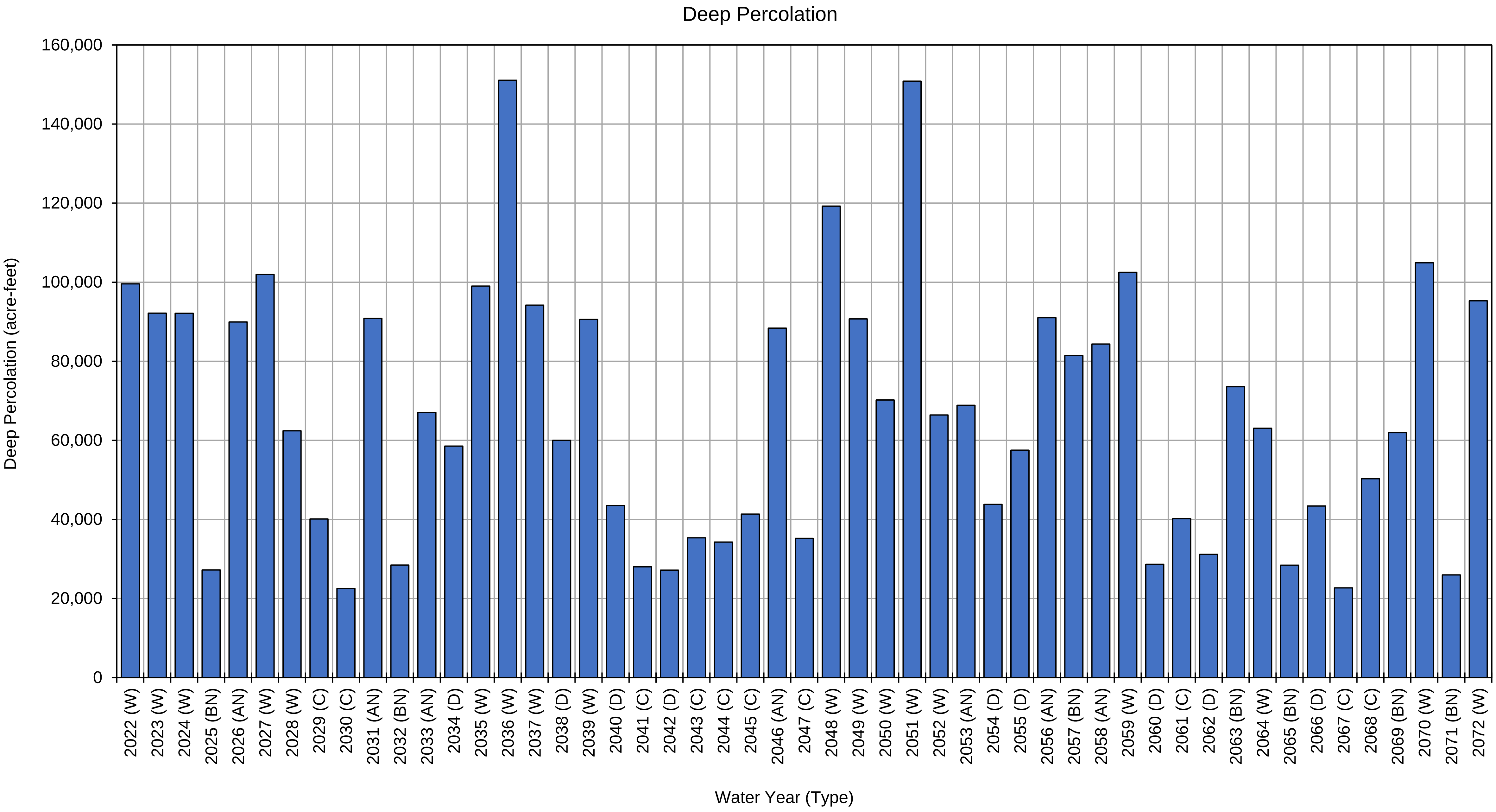
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-16,000
2023 (W)	-31,000
2024 (W)	-33,000
2025 (BN)	-68,000
2026 (AN)	-17,000
2027 (W)	-12,000
2028 (W)	-38,000
2029 (C)	-42,000
2030 (C)	-50,000
2031 (AN)	170
2032 (BN)	-39,000
2033 (AN)	-4,700
2034 (D)	-17,000
2035 (W)	9,500
2036 (W)	5,600
2037 (W)	-42,000
2038 (D)	-47,000
2039 (W)	-29,000
2040 (D)	-45,000
2041 (C)	-47,000
2042 (D)	-36,000
2043 (C)	-32,000
2044 (C)	-25,000
2045 (C)	-5,900
2046 (AN)	21,000
2047 (C)	-27,000
2048 (W)	23,000
2049 (W)	-8,200
2050 (W)	-21,000
2051 (W)	13,000
2052 (W)	-39,000
2053 (AN)	-32,000
2054 (D)	-44,000
2055 (D)	-26,000
2056 (AN)	-11,000
2057 (BN)	-19,000
2058 (AN)	-9,300
2059 (W)	-12,000
2060 (D)	-58,000
2061 (C)	-30,000
2062 (D)	-32,000
2063 (BN)	-3,700

Red Bluff Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-8,100
2065 (BN)		-40,000
2066 (D)		-24,000
2067 (C)		-33,000
2068 (C)		-12,000
2069 (BN)		9,100
2070 (W)		27,000
2071 (BN)		-38,000
2072 (W)		15,000
Average (2022-2072)		-21,000
2022-2072	W	-11,000
	AN	-7,500
	BN	-28,000
	D	-36,000
	C	-30,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)	Deep Percolation from the SWS
2022 (W)	100,000
2023 (W)	92,000
2024 (W)	92,000
2025 (BN)	27,000
2026 (AN)	90,000
2027 (W)	100,000
2028 (W)	62,000
2029 (C)	40,000
2030 (C)	23,000
2031 (AN)	91,000
2032 (BN)	28,000
2033 (AN)	67,000
2034 (D)	59,000
2035 (W)	99,000
2036 (W)	150,000
2037 (W)	94,000
2038 (D)	60,000
2039 (W)	91,000
2040 (D)	44,000
2041 (C)	28,000
2042 (D)	27,000
2043 (C)	35,000
2044 (C)	34,000
2045 (C)	41,000
2046 (AN)	88,000
2047 (C)	35,000
2048 (W)	120,000
2049 (W)	91,000
2050 (W)	70,000
2051 (W)	150,000
2052 (W)	66,000
2053 (AN)	69,000
2054 (D)	44,000
2055 (D)	58,000
2056 (AN)	91,000
2057 (BN)	81,000
2058 (AN)	84,000
2059 (W)	100,000
2060 (D)	29,000
2061 (C)	40,000
2062 (D)	31,000
2063 (BN)	74,000

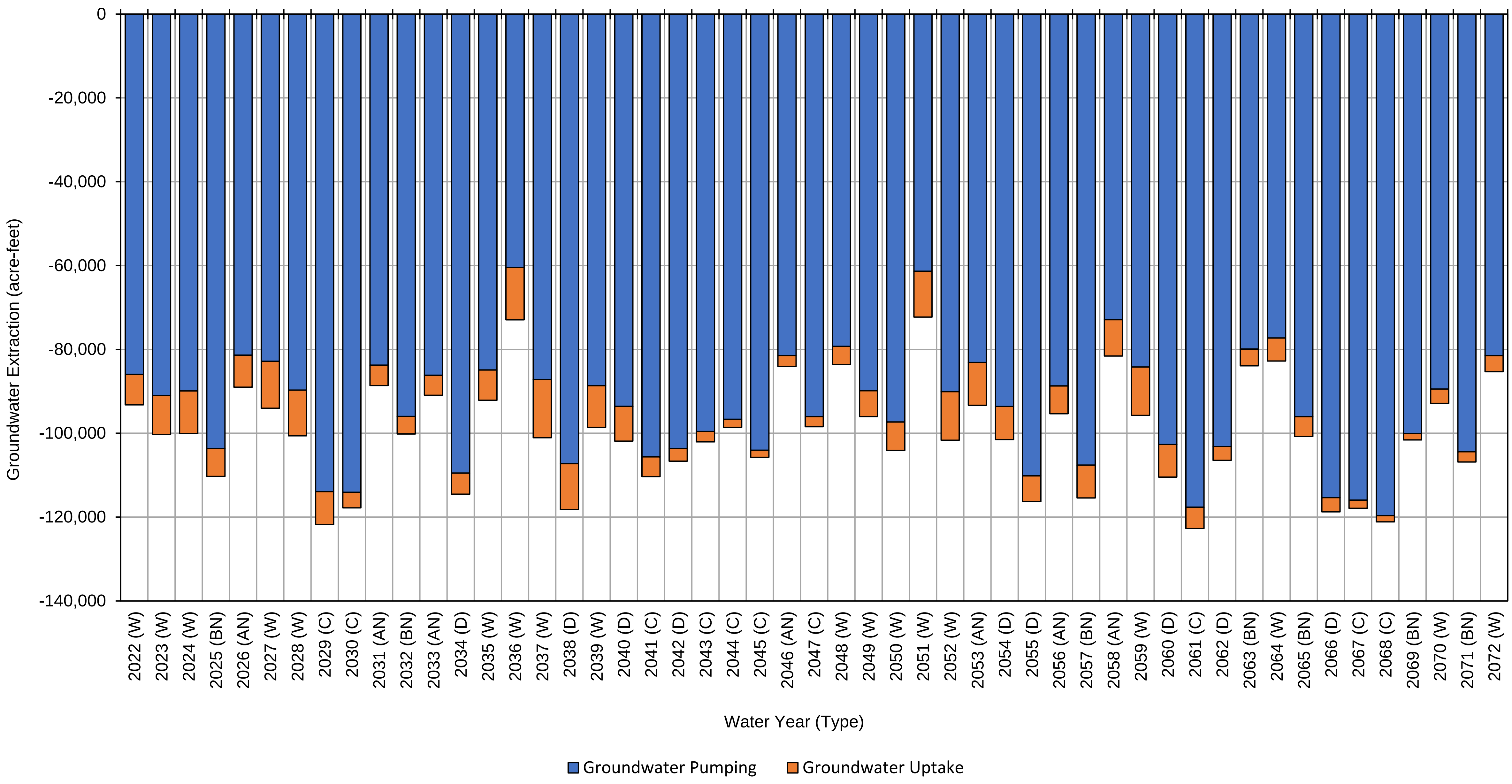
Red Bluff Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		63,000
2065 (BN)		28,000
2066 (D)		43,000
2067 (C)		23,000
2068 (C)		50,000
2069 (BN)		62,000
2070 (W)		100,000
2071 (BN)		26,000
2072 (W)		95,000
Average (2022-2072)		67,000
2022-2072	W	97,000
	AN	83,000
	BN	47,000
	D	44,000
	C	35,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

Groundwater Extraction



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

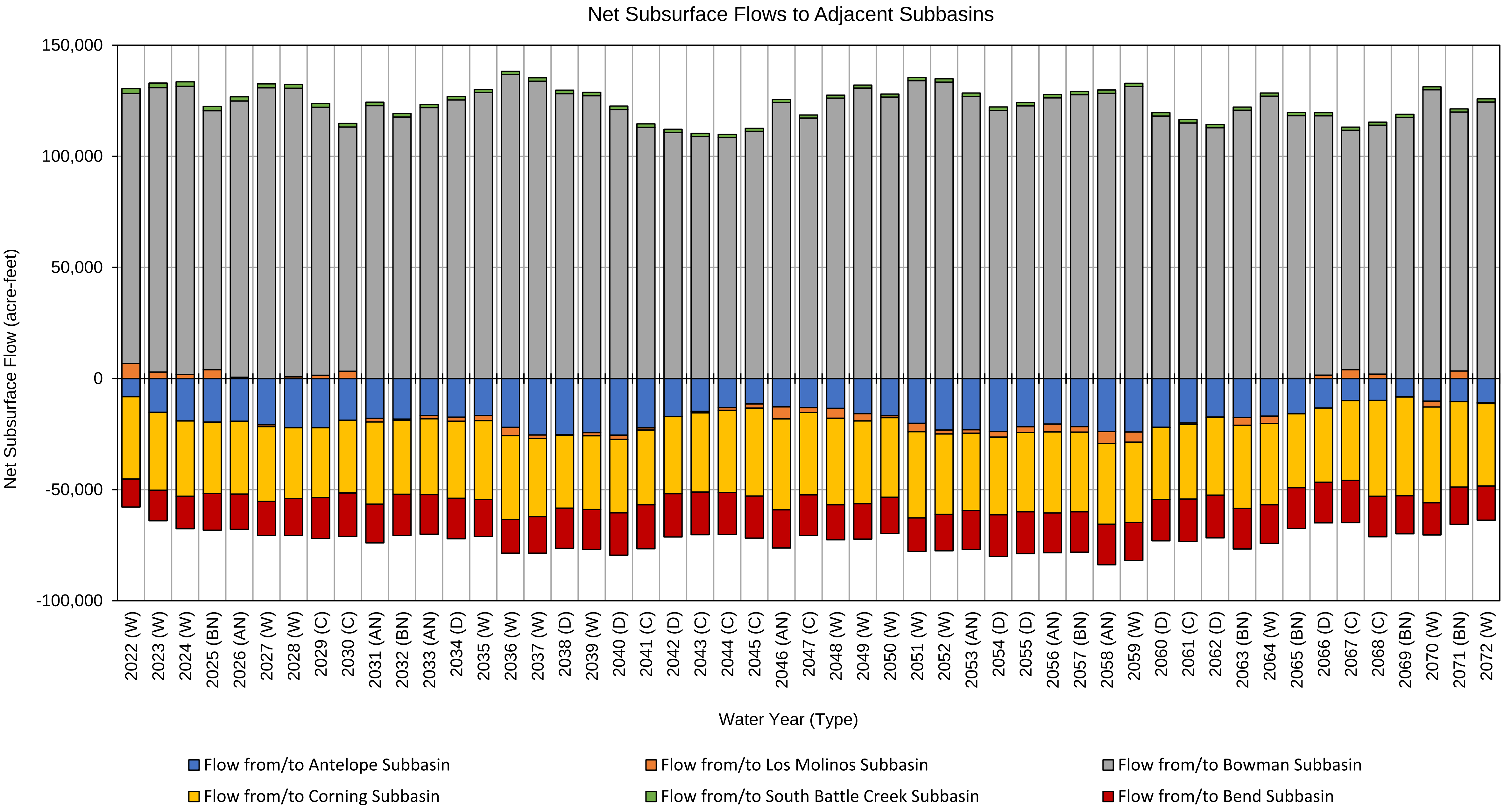
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-86,000	-7,300	-93,000
2023 (W)	-91,000	-9,300	-100,000
2024 (W)	-90,000	-10,000	-100,000
2025 (BN)	-100,000	-6,700	-110,000
2026 (AN)	-81,000	-7,600	-89,000
2027 (W)	-83,000	-11,000	-94,000
2028 (W)	-90,000	-11,000	-100,000
2029 (C)	-110,000	-7,800	-120,000
2030 (C)	-110,000	-3,700	-120,000
2031 (AN)	-84,000	-4,900	-89,000
2032 (BN)	-96,000	-4,200	-100,000
2033 (AN)	-86,000	-4,800	-91,000
2034 (D)	-110,000	-5,000	-110,000
2035 (W)	-85,000	-7,200	-92,000
2036 (W)	-60,000	-12,000	-73,000
2037 (W)	-87,000	-14,000	-100,000
2038 (D)	-110,000	-11,000	-120,000
2039 (W)	-89,000	-9,900	-99,000
2040 (D)	-94,000	-8,300	-100,000
2041 (C)	-110,000	-4,700	-110,000
2042 (D)	-100,000	-3,000	-110,000
2043 (C)	-100,000	-2,500	-100,000
2044 (C)	-97,000	-1,900	-99,000
2045 (C)	-100,000	-1,700	-110,000
2046 (AN)	-81,000	-2,600	-84,000
2047 (C)	-96,000	-2,400	-98,000
2048 (W)	-79,000	-4,300	-84,000
2049 (W)	-90,000	-6,200	-96,000
2050 (W)	-97,000	-6,800	-100,000
2051 (W)	-61,000	-11,000	-72,000
2052 (W)	-90,000	-12,000	-100,000
2053 (AN)	-83,000	-10,000	-93,000
2054 (D)	-94,000	-7,900	-100,000
2055 (D)	-110,000	-6,200	-120,000
2056 (AN)	-89,000	-6,600	-95,000
2057 (BN)	-110,000	-7,800	-120,000
2058 (AN)	-73,000	-8,700	-82,000
2059 (W)	-84,000	-12,000	-96,000
2060 (D)	-100,000	-7,800	-110,000
2061 (C)	-120,000	-5,100	-120,000
2062 (D)	-100,000	-3,300	-110,000
2063 (BN)	-80,000	-4,000	-84,000

Red Bluff Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-77,000	-5,500	-83,000
2065 (BN)		-96,000	-4,700	-100,000
2066 (D)		-120,000	-3,400	-120,000
2067 (C)		-120,000	-1,900	-120,000
2068 (C)		-120,000	-1,500	-120,000
2069 (BN)		-100,000	-1,600	-100,000
2070 (W)		-89,000	-3,400	-93,000
2071 (BN)		-100,000	-2,400	-110,000
2072 (W)		-81,000	-3,900	-85,000
Average (2022-2072)		-94,000	-6,300	-100,000
2022-2072	W	-84,000	-8,700	-93,000
	AN	-83,000	-6,500	-89,000
	BN	-98,000	-4,500	-100,000
	D	-100,000	-6,200	-110,000
	C	-110,000	-3,300	-110,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

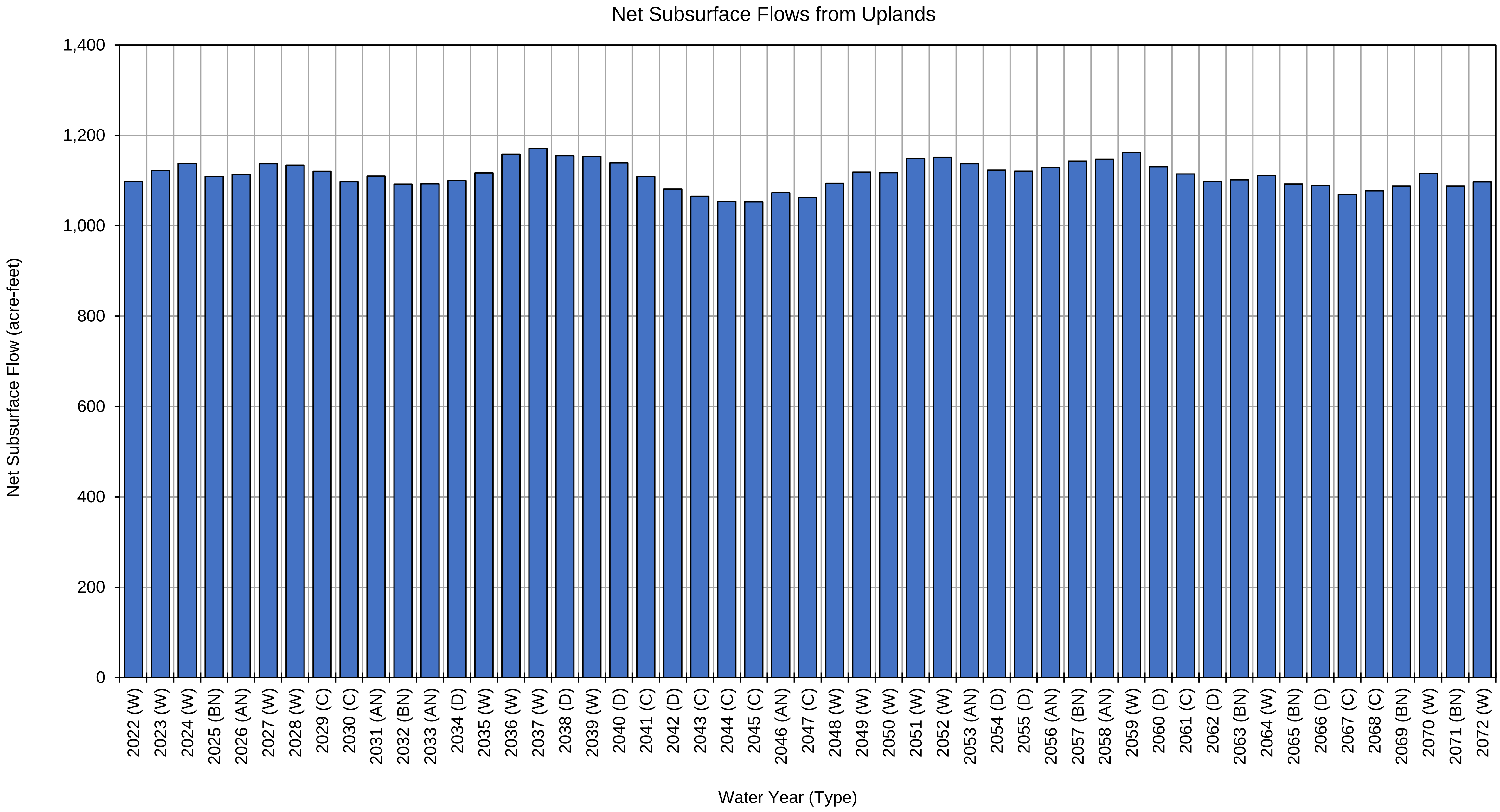
WY (Type)	Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-8,200	6,700	120,000	-37,000	2,200	-13,000	73,000
2023 (W)	-15,000	2,900	130,000	-35,000	2,100	-14,000	69,000
2024 (W)	-19,000	1,800	130,000	-34,000	2,000	-15,000	66,000
2025 (BN)	-20,000	4,000	120,000	-32,000	1,900	-16,000	54,000
2026 (AN)	-19,000	610	120,000	-33,000	1,800	-16,000	59,000
2027 (W)	-21,000	-820	130,000	-34,000	1,800	-15,000	62,000
2028 (W)	-22,000	760	130,000	-32,000	1,700	-17,000	62,000
2029 (C)	-22,000	1,500	120,000	-31,000	1,700	-18,000	52,000
2030 (C)	-19,000	3,300	110,000	-33,000	1,700	-20,000	44,000
2031 (AN)	-18,000	-1,600	120,000	-37,000	1,600	-17,000	50,000
2032 (BN)	-18,000	-510	120,000	-33,000	1,600	-19,000	49,000
2033 (AN)	-17,000	-1,500	120,000	-34,000	1,500	-18,000	53,000
2034 (D)	-17,000	-1,800	130,000	-35,000	1,500	-18,000	55,000
2035 (W)	-17,000	-2,300	130,000	-36,000	1,400	-17,000	59,000
2036 (W)	-22,000	-3,700	140,000	-38,000	1,400	-15,000	60,000
2037 (W)	-25,000	-1,500	130,000	-35,000	1,500	-16,000	57,000
2038 (D)	-25,000	-270	130,000	-33,000	1,600	-18,000	53,000
2039 (W)	-24,000	-1,400	130,000	-33,000	1,600	-18,000	52,000
2040 (D)	-25,000	-1,900	120,000	-33,000	1,600	-19,000	43,000
2041 (C)	-22,000	-960	110,000	-34,000	1,500	-20,000	38,000
2042 (D)	-17,000	5	110,000	-35,000	1,500	-19,000	41,000
2043 (C)	-15,000	-710	110,000	-36,000	1,400	-19,000	40,000
2044 (C)	-13,000	-1,200	110,000	-37,000	1,400	-19,000	40,000
2045 (C)	-11,000	-1,900	110,000	-40,000	1,400	-19,000	41,000
2046 (AN)	-13,000	-5,400	120,000	-41,000	1,300	-17,000	49,000
2047 (C)	-13,000	-2,200	120,000	-37,000	1,300	-18,000	48,000
2048 (W)	-13,000	-4,400	130,000	-39,000	1,300	-16,000	55,000
2049 (W)	-16,000	-3,300	130,000	-37,000	1,400	-16,000	60,000
2050 (W)	-17,000	-850	130,000	-36,000	1,400	-16,000	58,000
2051 (W)	-20,000	-3,800	130,000	-39,000	1,400	-15,000	58,000
2052 (W)	-23,000	-1,800	130,000	-36,000	1,500	-16,000	57,000
2053 (AN)	-23,000	-1,500	130,000	-35,000	1,500	-18,000	52,000
2054 (D)	-24,000	-2,500	120,000	-35,000	1,600	-19,000	42,000
2055 (D)	-22,000	-2,600	120,000	-36,000	1,500	-19,000	45,000
2056 (AN)	-21,000	-3,500	130,000	-36,000	1,500	-18,000	49,000
2057 (BN)	-22,000	-2,500	130,000	-36,000	1,500	-18,000	51,000
2058 (AN)	-24,000	-5,400	130,000	-36,000	1,500	-18,000	46,000
2059 (W)	-24,000	-4,600	130,000	-36,000	1,500	-17,000	51,000
2060 (D)	-22,000	-110	120,000	-32,000	1,500	-19,000	47,000
2061 (C)	-20,000	-680	110,000	-34,000	1,500	-19,000	43,000
2062 (D)	-17,000	-120	110,000	-35,000	1,500	-19,000	43,000
2063 (BN)	-18,000	-3,500	120,000	-37,000	1,400	-18,000	45,000
2064 (W)	-17,000	-3,300	130,000	-37,000	1,400	-17,000	54,000
2065 (BN)	-16,000	57	120,000	-33,000	1,400	-18,000	52,000
2066 (D)	-13,000	1,500	120,000	-33,000	1,400	-18,000	55,000
2067 (C)	-9,900	4,000	110,000	-36,000	1,400	-19,000	48,000
2068 (C)	-9,800	2,000	110,000	-43,000	1,400	-18,000	44,000
2069 (BN)	-8,000	-280	120,000	-44,000	1,300	-17,000	49,000
2070 (W)	-10,000	-2,600	130,000	-43,000	1,300	-14,000	61,000
2071 (BN)	-10,000	3,400	120,000	-38,000	1,400	-17,000	56,000
2072 (W)	-11,000	-480	120,000	-37,000	1,400	-15,000	62,000

Red Bluff Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
Average (2022-2072)		-18,000	-880	120,000	-36,000	1,500	-17,000	52,000
2022-2072	W	-18,000	-1,300	130,000	-36,000	1,600	-16,000	60,000
	AN	-19,000	-2,600	120,000	-36,000	1,500	-17,000	51,000
	BN	-16,000	100	120,000	-36,000	1,500	-18,000	51,000
	D	-20,000	-870	120,000	-34,000	1,500	-19,000	47,000
	C	-16,000	320	110,000	-36,000	1,500	-19,000	44,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

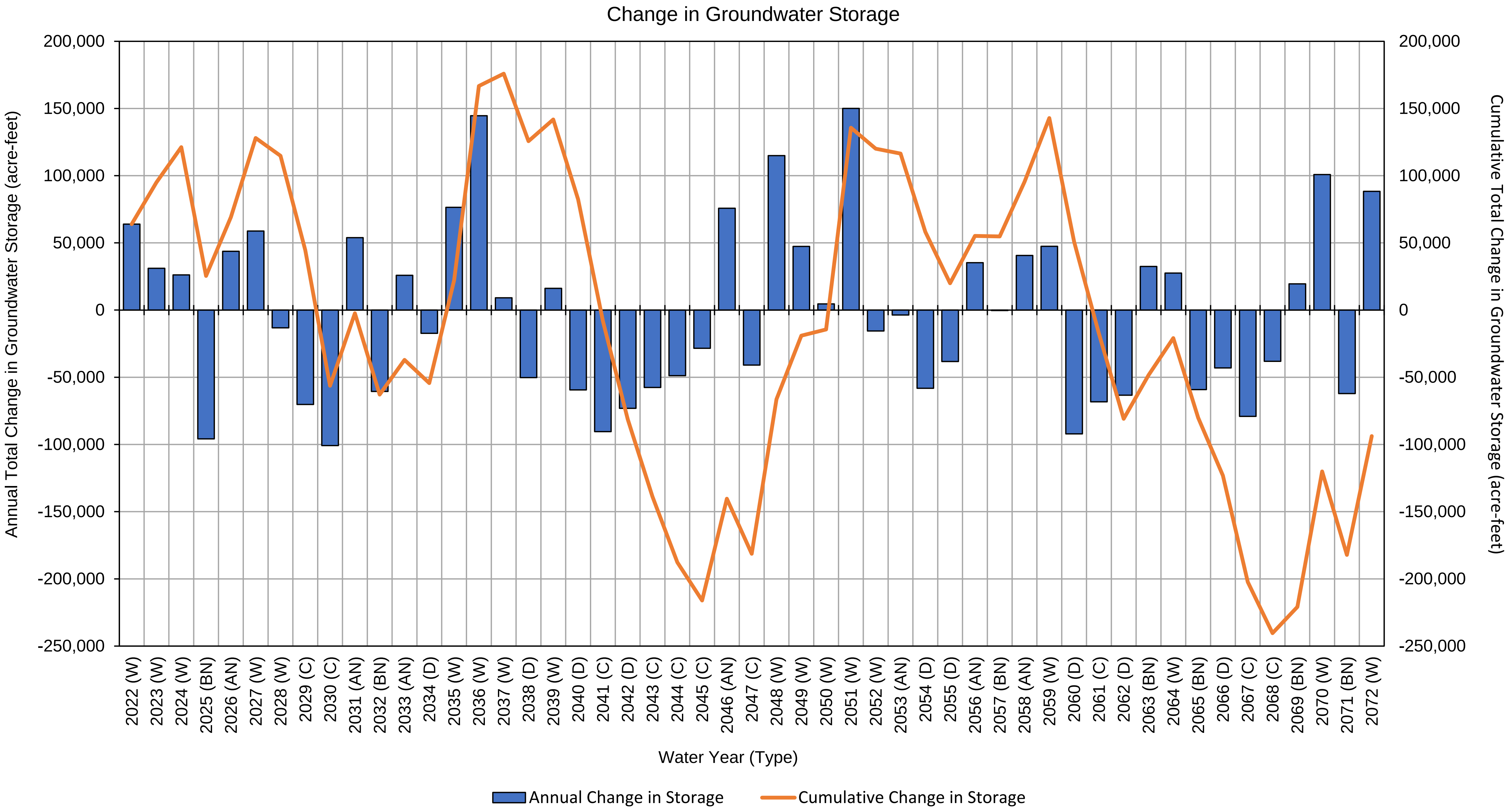
WY (Type)	Subsurface Flows from Uplands
2022 (W)	1,100
2023 (W)	1,100
2024 (W)	1,100
2025 (BN)	1,100
2026 (AN)	1,100
2027 (W)	1,100
2028 (W)	1,100
2029 (C)	1,100
2030 (C)	1,100
2031 (AN)	1,100
2032 (BN)	1,100
2033 (AN)	1,100
2034 (D)	1,100
2035 (W)	1,100
2036 (W)	1,200
2037 (W)	1,200
2038 (D)	1,200
2039 (W)	1,200
2040 (D)	1,100
2041 (C)	1,100
2042 (D)	1,100
2043 (C)	1,100
2044 (C)	1,100
2045 (C)	1,100
2046 (AN)	1,100
2047 (C)	1,100
2048 (W)	1,100
2049 (W)	1,100
2050 (W)	1,100
2051 (W)	1,100
2052 (W)	1,200
2053 (AN)	1,100
2054 (D)	1,100
2055 (D)	1,100
2056 (AN)	1,100
2057 (BN)	1,100
2058 (AN)	1,100
2059 (W)	1,200
2060 (D)	1,100
2061 (C)	1,100
2062 (D)	1,100
2063 (BN)	1,100

Red Bluff Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		1,100
2065 (BN)		1,100
2066 (D)		1,100
2067 (C)		1,100
2068 (C)		1,100
2069 (BN)		1,100
2070 (W)		1,100
2071 (BN)		1,100
2072 (W)		1,100
Average (2022-2072)		1,100
2022-2072	W	1,100
	AN	1,100
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use)

Red Bluff Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	64,000	64,000
2023 (W)	31,000	95,000
2024 (W)	26,000	120,000
2025 (BN)	-96,000	25,000
2026 (AN)	44,000	69,000
2027 (W)	59,000	130,000
2028 (W)	-13,000	110,000
2029 (C)	-70,000	45,000
2030 (C)	-100,000	-56,000
2031 (AN)	54,000	-2,400
2032 (BN)	-61,000	-63,000
2033 (AN)	26,000	-37,000
2034 (D)	-17,000	-54,000
2035 (W)	76,000	22,000
2036 (W)	140,000	170,000
2037 (W)	9,200	180,000
2038 (D)	-50,000	130,000
2039 (W)	16,000	140,000
2040 (D)	-59,000	82,000
2041 (C)	-90,000	-8,100
2042 (D)	-73,000	-81,000
2043 (C)	-58,000	-140,000
2044 (C)	-49,000	-190,000
2045 (C)	-28,000	-220,000
2046 (AN)	76,000	-140,000
2047 (C)	-41,000	-180,000
2048 (W)	110,000	-66,000
2049 (W)	47,000	-19,000
2050 (W)	4,600	-14,000
2051 (W)	150,000	140,000
2052 (W)	-16,000	120,000
2053 (AN)	-3,600	120,000
2054 (D)	-58,000	58,000
2055 (D)	-38,000	20,000
2056 (AN)	35,000	55,000
2057 (BN)	-380	55,000
2058 (AN)	41,000	95,000
2059 (W)	47,000	140,000
2060 (D)	-92,000	51,000
2061 (C)	-68,000	-18,000
2062 (D)	-63,000	-81,000
2063 (BN)	32,000	-48,000

Red Bluff Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		28,000	-21,000
2065 (BN)		-59,000	-80,000
2066 (D)		-43,000	-120,000
2067 (C)		-79,000	-200,000
2068 (C)		-38,000	-240,000
2069 (BN)		20,000	-220,000
2070 (W)		100,000	-120,000
2071 (BN)		-62,000	-180,000
2072 (W)		88,000	-94,000
Average (2022-2072)		-1,800	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-3

Detailed Red Bluff Subbasin Water Budget Results:

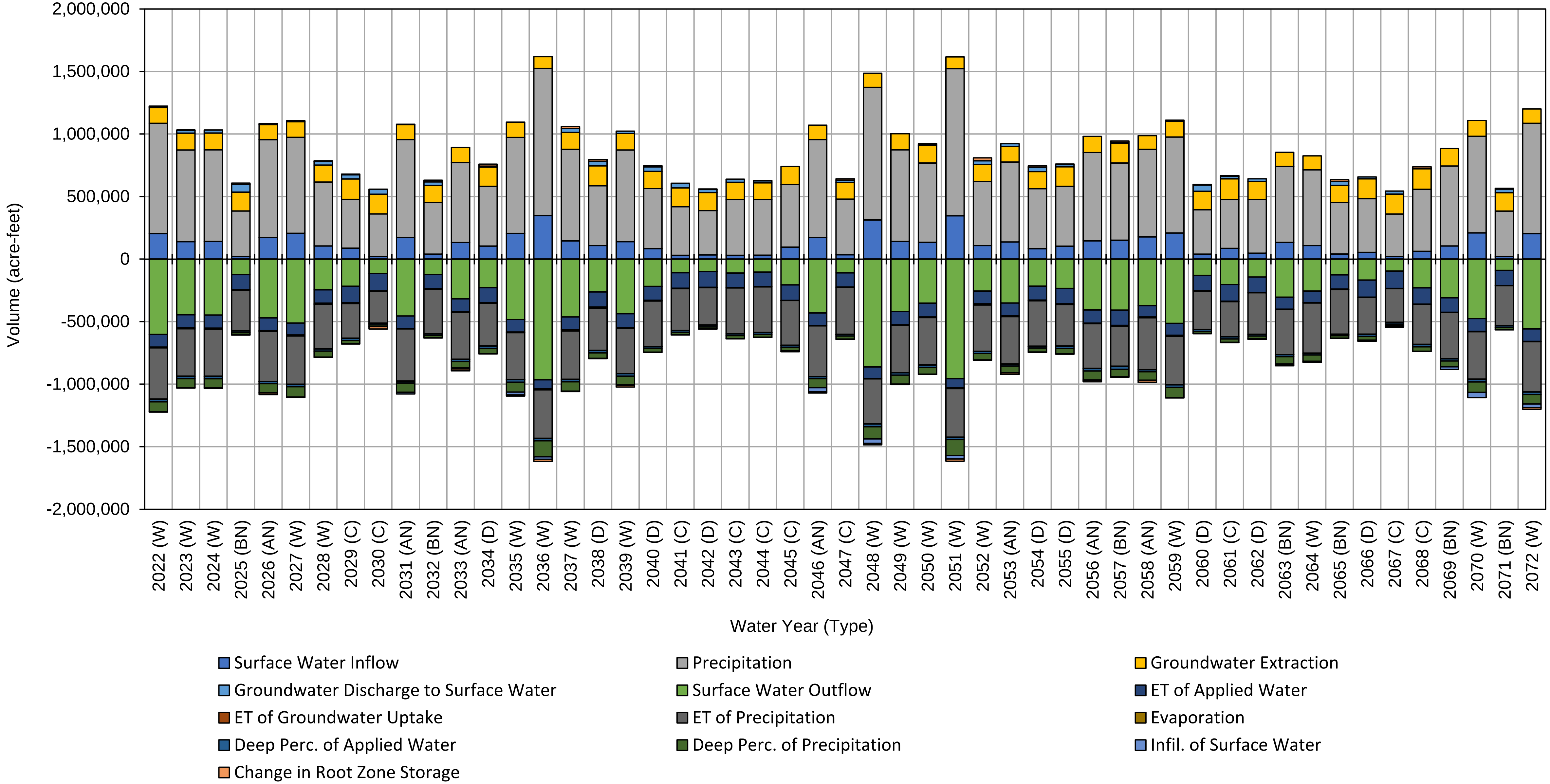
Projected (Future Land Use) Model Results

APPENDIX D-3a

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Future Land Use) Model Results– Surface Water System

Projected (Future Land Use) Root Zone Water Budget
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	200,000	880,000	130,000	9,800	600,000	100,000	5,900	410,000	800	21,000	79,000	2,700	-2,300
2023 (W)	140,000	730,000	140,000	24,000	450,000	100,000	7,600	380,000	950	19,000	73,000	2,700	-1,100
2024 (W)	140,000	730,000	130,000	25,000	450,000	110,000	8,200	380,000	940	19,000	73,000	2,800	24
2025 (BN)	21,000	360,000	150,000	60,000	120,000	120,000	4,900	330,000	880	13,000	17,000	2,000	-12,000
2026 (AN)	170,000	780,000	120,000	8,500	470,000	100,000	5,800	400,000	970	17,000	72,000	2,900	13,000
2027 (W)	210,000	770,000	130,000	2,900	510,000	95,000	8,900	390,000	780	19,000	82,000	2,900	-4,500
2028 (W)	100,000	510,000	140,000	29,000	250,000	110,000	8,500	360,000	950	17,000	47,000	2,700	-5,200
2029 (C)	88,000	390,000	160,000	32,000	220,000	130,000	5,800	280,000	1,200	16,000	26,000	2,500	-5,700
2030 (C)	21,000	340,000	160,000	41,000	110,000	140,000	2,900	260,000	1,100	13,000	12,000	1,700	18,000
2031 (AN)	170,000	780,000	120,000	0	460,000	100,000	3,500	420,000	1,000	16,000	74,000	13,000	-3,200
2032 (BN)	40,000	410,000	140,000	30,000	120,000	110,000	3,100	360,000	890	12,000	19,000	2,300	-13,000
2033 (AN)	130,000	640,000	120,000	0	320,000	100,000	3,500	380,000	950	17,000	51,000	7,600	15,000
2034 (D)	100,000	480,000	150,000	7,800	230,000	120,000	3,700	340,000	1,000	18,000	43,000	2,600	-16,000
2035 (W)	210,000	770,000	120,000	0	480,000	100,000	5,400	380,000	910	20,000	79,000	23,000	9,300
2036 (W)	350,000	1,200,000	94,000	0	970,000	71,000	10,000	390,000	490	19,000	130,000	19,000	18,000
2037 (W)	150,000	730,000	130,000	33,000	460,000	100,000	11,000	390,000	830	19,000	75,000	2,900	-13,000
2038 (D)	110,000	480,000	160,000	37,000	260,000	120,000	8,600	340,000	1,100	19,000	43,000	2,700	-14,000
2039 (W)	140,000	730,000	130,000	19,000	440,000	110,000	7,600	360,000	980	20,000	70,000	2,800	14,000
2040 (D)	84,000	480,000	140,000	36,000	220,000	110,000	6,100	360,000	1,000	14,000	31,000	2,500	-8,900
2041 (C)	30,000	390,000	150,000	38,000	110,000	120,000	3,400	330,000	1,000	13,000	18,000	2,100	1,500
2042 (D)	33,000	350,000	140,000	26,000	100,000	130,000	2,300	300,000	1,000	15,000	16,000	1,800	-2,500
2043 (C)	31,000	440,000	140,000	23,000	110,000	120,000	1,800	370,000	860	14,000	24,000	1,800	-1,100
2044 (C)	31,000	440,000	130,000	16,000	100,000	120,000	1,400	360,000	870	13,000	24,000	1,900	-40
2045 (C)	96,000	500,000	150,000	0	210,000	120,000	1,200	360,000	1,100	15,000	29,000	5,300	1,300
2046 (AN)	170,000	780,000	120,000	0	430,000	100,000	1,900	410,000	1,200	17,000	71,000	34,000	9,700
2047 (C)	35,000	440,000	130,000	18,000	110,000	110,000	1,800	380,000	960	13,000	25,000	2,100	-11,000
2048 (W)	310,000	1,100,000	110,000	0	860,000	92,000	3,100	360,000	900	21,000	97,000	36,000	12,000
2049 (W)	140,000	730,000	130,000	0	420,000	110,000	4,400	380,000	1,100	19,000	72,000	4,400	-1,300
2050 (W)	130,000	630,000	140,000	11,000	350,000	110,000	5,000	380,000	1,100	18,000	54,000	2,400	-4,400
2051 (W)	350,000	1,200,000	94,000	0	960,000	71,000	8,700	390,000	510	19,000	130,000	26,000	18,000
2052 (W)	110,000	510,000	140,000	30,000	260,000	100,000	9,000	370,000	930	17,000	51,000	2,800	-23,000
2053 (AN)	140,000	640,000	120,000	23,000	350,000	100,000	7,800	380,000	870	17,000	53,000	2,800	11,000
2054 (D)	83,000	480,000	140,000	35,000	220,000	110,000	5,800	360,000	1,000	14,000	32,000	2,400	-11,000
2055 (D)	100,000	480,000	160,000	17,000	230,000	120,000	4,500	330,000	1,000	19,000	41,000	2,600	-4,800
2056 (AN)	150,000	710,000	130,000	810	410,000	110,000	4,800	360,000	980	20,000	72,000	2,600	12,000
2057 (BN)	150,000	620,000	160,000	8,800	410,000	120,000	5,800	320,000	1,200	23,000	61,000	3,000	-11,000
2058 (AN)	180,000	700,000	110,000	0	370,000	91,000	6,400	410,000	740	16,000	68,000	3,700	14,000
2059 (W)	210,000	770,000	130,000	1,700	510,000	96,000	9,000	390,000	780	20,000	82,000	3,000	-5,500
2060 (D)	40,000	350,000	150,000	49,000	130,000	120,000	5,500	300,000	1,000	15,000	17,000	2,300	-5,400
2061 (C)	86,000	390,000	170,000	21,000	200,000	130,000	3,700	280,000	1,200	17,000	26,000	2,400	-5,500
2062 (D)	47,000	430,000	140,000	22,000	140,000	120,000	2,500	330,000	1,100	14,000	20,000	2,100	4,400
2063 (BN)	130,000	610,000	110,000	0	300,000	97,000	2,900	360,000	950	16,000	58,000	8,600	6,000
2064 (W)	110,000	600,000	110,000	0	260,000	91,000	4,000	400,000	880	14,000	50,000	3,600	4,500
2065 (BN)	41,000	410,000	140,000	32,000	130,000	110,000	3,500	360,000	850	12,000	19,000	2,300	-13,000

Red Bluff Subbasin Projected (Future Land Use) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		54,000	430,000	160,000	15,000	170,000	140,000	2,600	290,000	1,100	18,000	29,000	2,500	6,600
2067 (C)		20,000	340,000	160,000	24,000	96,000	140,000	1,400	270,000	1,000	13,000	13,000	1,600	10,000
2068 (C)		62,000	500,000	160,000	2,800	230,000	130,000	1,000	320,000	1,000	19,000	35,000	1,700	-13,000
2069 (BN)		110,000	640,000	140,000	0	310,000	120,000	1,100	370,000	1,200	17,000	47,000	21,000	820
2070 (W)		210,000	770,000	130,000	0	480,000	100,000	2,500	380,000	1,200	22,000	84,000	40,000	2,100
2071 (BN)		21,000	360,000	150,000	29,000	90,000	120,000	1,800	320,000	950	13,000	16,000	2,000	-5,700
2072 (W)		200,000	880,000	110,000	0	560,000	100,000	2,800	400,000	970	19,000	76,000	28,000	13,000
Average (2022-2072)		120,000	600,000	140,000	16,000	330,000	110,000	4,800	360,000	970	17,000	51,000	7,100	-50
2022-2072	W	190,000	790,000	120,000	10,000	510,000	98,000	6,800	380,000	890	19,000	78,000	12,000	1,700
	AN	160,000	720,000	120,000	4,600	400,000	100,000	4,800	390,000	960	17,000	66,000	9,400	10,000
	BN	73,000	490,000	140,000	23,000	210,000	110,000	3,300	340,000	990	15,000	34,000	5,900	-7,000
	D	73,000	440,000	150,000	27,000	190,000	120,000	4,600	330,000	1,100	16,000	30,000	2,400	-5,700
	C	50,000	420,000	150,000	22,000	150,000	130,000	2,400	320,000	1,000	15,000	23,000	2,300	-500

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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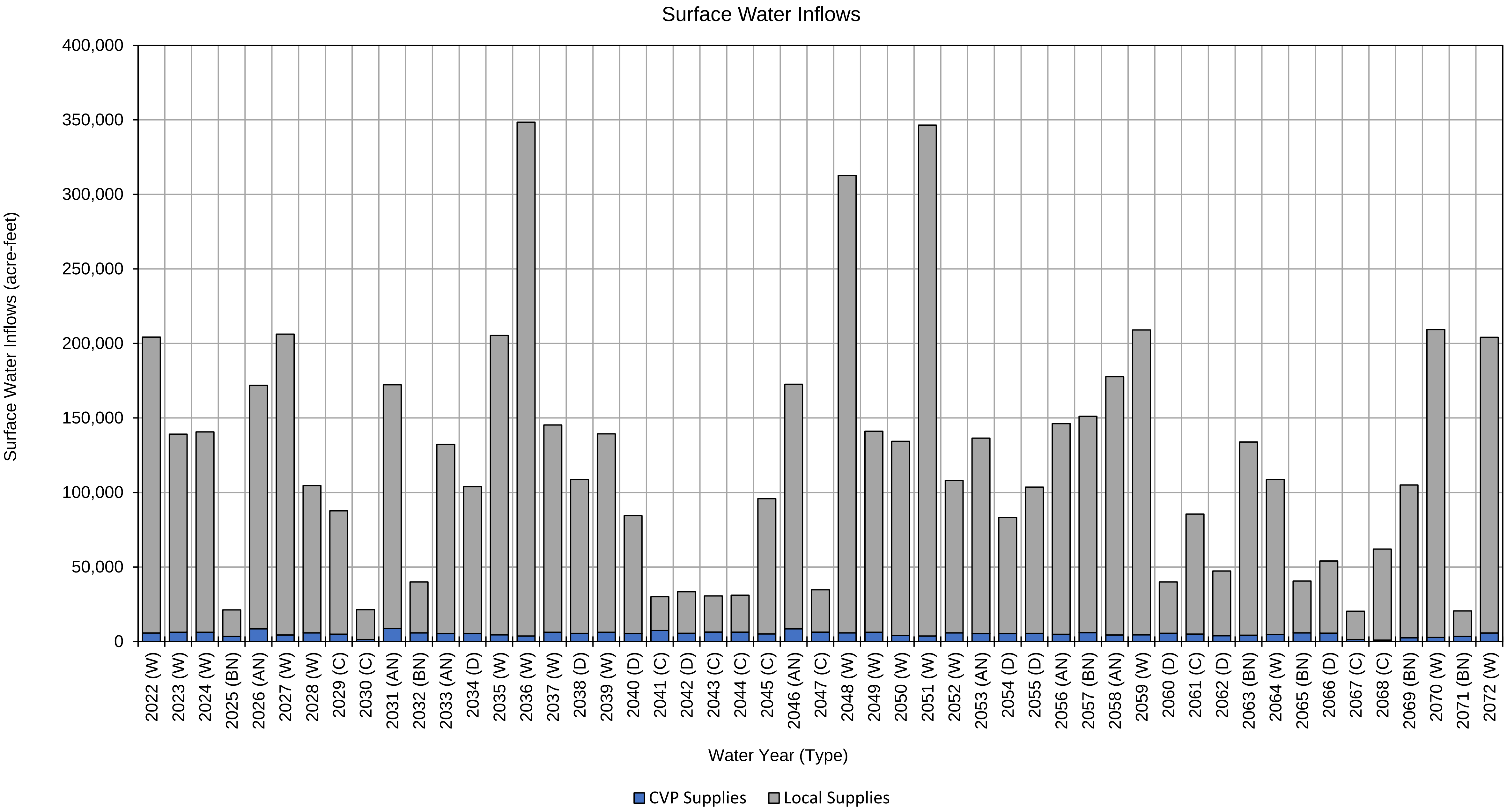
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	5,800	200,000	210,000
2023 (W)	6,200	130,000	140,000
2024 (W)	6,200	130,000	140,000
2025 (BN)	3,400	18,000	21,000
2026 (AN)	8,600	160,000	170,000
2027 (W)	4,400	200,000	200,000
2028 (W)	5,800	99,000	100,000
2029 (C)	4,900	83,000	88,000
2030 (C)	1,400	20,000	21,000
2031 (AN)	8,700	160,000	170,000
2032 (BN)	5,800	34,000	40,000
2033 (AN)	5,300	130,000	140,000
2034 (D)	5,400	98,000	100,000
2035 (W)	4,500	200,000	200,000
2036 (W)	3,700	340,000	340,000
2037 (W)	6,200	140,000	150,000
2038 (D)	5,500	100,000	110,000
2039 (W)	6,200	130,000	140,000
2040 (D)	5,400	79,000	84,000
2041 (C)	7,400	23,000	30,000
2042 (D)	5,600	28,000	34,000
2043 (C)	6,400	24,000	30,000
2044 (C)	6,300	25,000	31,000
2045 (C)	5,100	91,000	96,000
2046 (AN)	8,600	160,000	170,000
2047 (C)	6,300	28,000	34,000
2048 (W)	5,900	310,000	320,000
2049 (W)	6,200	130,000	140,000
2050 (W)	4,200	130,000	130,000
2051 (W)	3,700	340,000	340,000
2052 (W)	5,800	100,000	110,000
2053 (AN)	5,300	130,000	140,000
2054 (D)	5,400	78,000	83,000
2055 (D)	5,500	98,000	100,000
2056 (AN)	4,900	140,000	140,000
2057 (BN)	5,900	150,000	160,000
2058 (AN)	4,400	170,000	170,000
2059 (W)	4,500	200,000	200,000
2060 (D)	5,600	34,000	40,000
2061 (C)	5,000	80,000	85,000
2062 (D)	3,900	43,000	47,000
2063 (BN)	4,300	130,000	130,000

Red Bluff Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		4,700	100,000	100,000
2065 (BN)		5,800	35,000	41,000
2066 (D)		5,700	48,000	54,000
2067 (C)		1,400	19,000	20,000
2068 (C)		950	61,000	62,000
2069 (BN)		2,500	100,000	100,000
2070 (W)		2,700	210,000	210,000
2071 (BN)		3,400	17,000	20,000
2072 (W)		5,700	200,000	210,000
Average (2022-2072)		5,100	120,000	130,000
2022-2072	W	5,100	180,000	190,000
	AN	6,500	150,000	160,000
	BN	4,500	69,000	74,000
	D	5,300	68,000	73,000
	C	4,500	45,000	50,000

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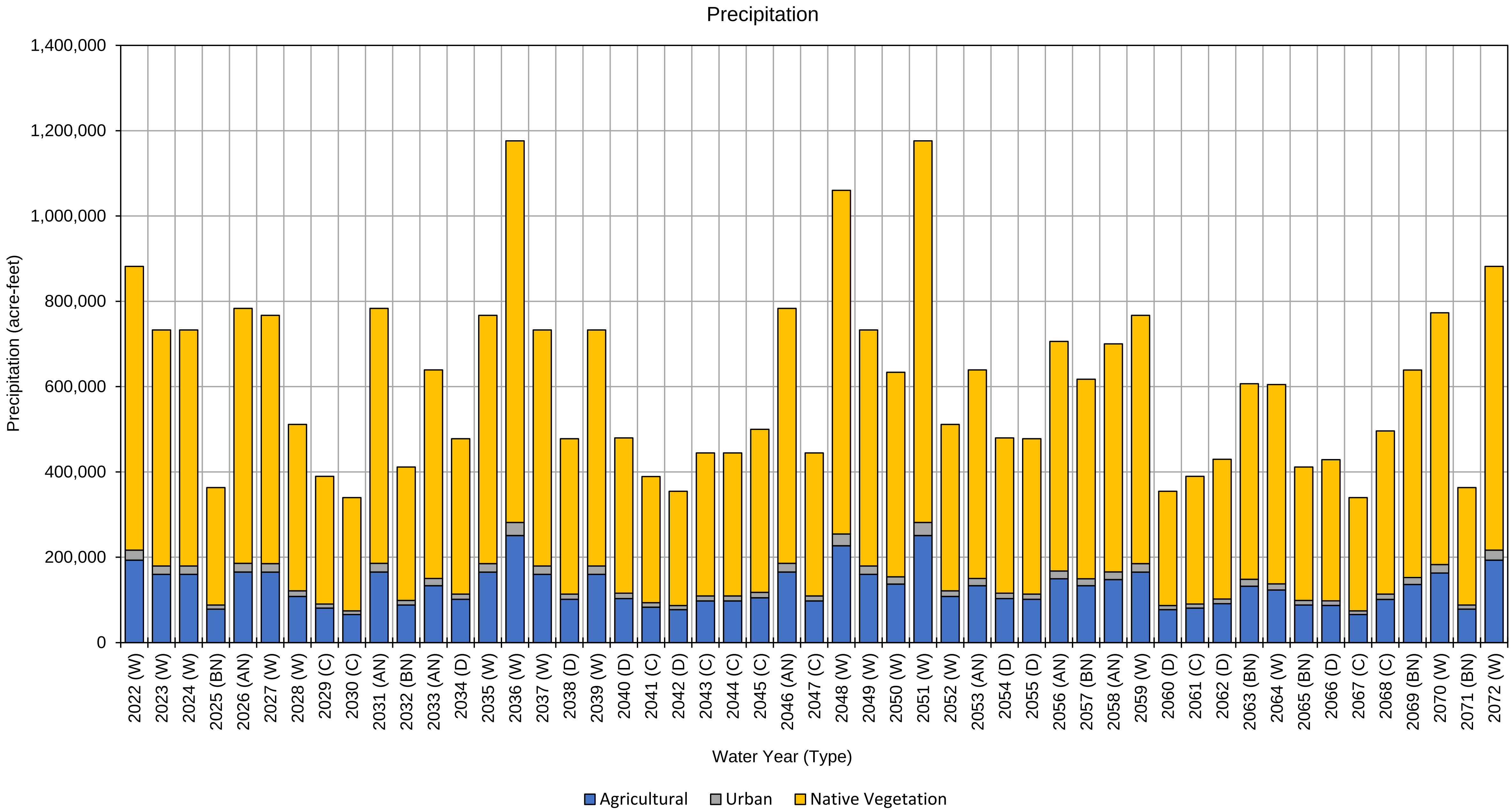

Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	190,000	23,000	670,000	880,000
2023 (W)	160,000	19,000	550,000	730,000
2024 (W)	160,000	19,000	550,000	730,000
2025 (BN)	78,000	9,600	280,000	370,000
2026 (AN)	170,000	20,000	600,000	790,000
2027 (W)	170,000	20,000	580,000	770,000
2028 (W)	110,000	13,000	390,000	510,000
2029 (C)	81,000	9,700	300,000	390,000
2030 (C)	66,000	8,500	270,000	340,000
2031 (AN)	170,000	20,000	600,000	790,000
2032 (BN)	88,000	11,000	310,000	410,000
2033 (AN)	130,000	17,000	490,000	640,000
2034 (D)	100,000	12,000	360,000	470,000
2035 (W)	170,000	20,000	580,000	770,000
2036 (W)	250,000	31,000	890,000	1,200,000
2037 (W)	160,000	19,000	550,000	730,000
2038 (D)	100,000	12,000	360,000	470,000
2039 (W)	160,000	19,000	550,000	730,000
2040 (D)	100,000	13,000	360,000	470,000
2041 (C)	83,000	11,000	300,000	390,000
2042 (D)	77,000	9,600	270,000	360,000
2043 (C)	98,000	12,000	340,000	450,000
2044 (C)	98,000	12,000	340,000	450,000
2045 (C)	100,000	13,000	380,000	490,000
2046 (AN)	170,000	20,000	600,000	790,000
2047 (C)	98,000	12,000	340,000	450,000
2048 (W)	230,000	28,000	810,000	1,100,000
2049 (W)	160,000	19,000	550,000	730,000
2050 (W)	140,000	17,000	480,000	640,000
2051 (W)	250,000	31,000	890,000	1,200,000
2052 (W)	110,000	13,000	390,000	510,000
2053 (AN)	130,000	17,000	490,000	640,000
2054 (D)	100,000	13,000	360,000	470,000
2055 (D)	100,000	12,000	360,000	470,000
2056 (AN)	150,000	18,000	540,000	710,000
2057 (BN)	130,000	16,000	470,000	620,000
2058 (AN)	150,000	18,000	530,000	700,000
2059 (W)	170,000	20,000	580,000	770,000
2060 (D)	77,000	9,600	270,000	360,000
2061 (C)	81,000	9,700	300,000	390,000
2062 (D)	91,000	11,000	330,000	430,000
2063 (BN)	130,000	16,000	460,000	610,000

Red Bluff Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		120,000	14,000	470,000	600,000
2065 (BN)		88,000	11,000	310,000	410,000
2066 (D)		87,000	11,000	330,000	430,000
2067 (C)		66,000	8,500	270,000	340,000
2068 (C)		100,000	13,000	380,000	490,000
2069 (BN)		140,000	16,000	490,000	650,000
2070 (W)		160,000	20,000	590,000	770,000
2071 (BN)		78,000	9,600	280,000	370,000
2072 (W)		190,000	23,000	670,000	880,000
Average (2022-2072)		130,000	16,000	460,000	610,000
2022-2072	W	170,000	21,000	600,000	790,000
	AN	150,000	19,000	550,000	720,000
	BN	100,000	13,000	370,000	480,000
	D	94,000	11,000	340,000	450,000
	C	87,000	11,000	320,000	420,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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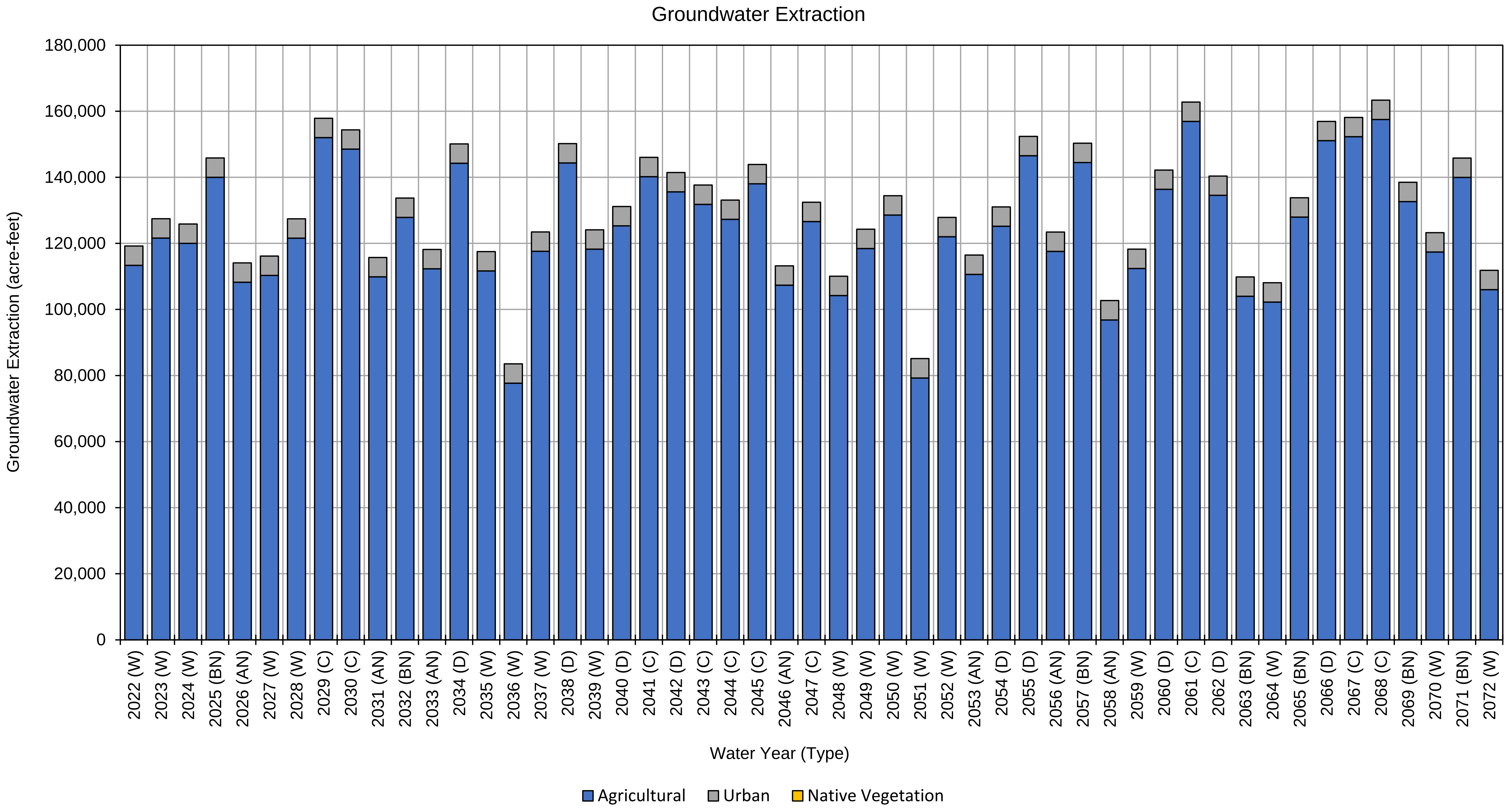
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	110,000	5,900	0	120,000
2023 (W)	120,000	5,900	0	130,000
2024 (W)	120,000	5,900	0	130,000
2025 (BN)	140,000	5,900	0	150,000
2026 (AN)	110,000	5,900	0	120,000
2027 (W)	110,000	5,900	0	120,000
2028 (W)	120,000	5,900	0	130,000
2029 (C)	150,000	5,900	0	160,000
2030 (C)	150,000	5,800	0	160,000
2031 (AN)	110,000	5,900	0	120,000
2032 (BN)	130,000	5,800	0	140,000
2033 (AN)	110,000	5,900	0	120,000
2034 (D)	140,000	5,800	0	150,000
2035 (W)	110,000	5,900	0	120,000
2036 (W)	78,000	5,900	0	84,000
2037 (W)	120,000	5,900	0	130,000
2038 (D)	140,000	5,900	0	150,000
2039 (W)	120,000	5,900	0	130,000
2040 (D)	130,000	5,900	0	140,000
2041 (C)	140,000	5,900	0	150,000
2042 (D)	140,000	5,800	0	150,000
2043 (C)	130,000	5,800	0	140,000
2044 (C)	130,000	5,800	0	140,000
2045 (C)	140,000	5,800	0	150,000
2046 (AN)	110,000	5,800	0	120,000
2047 (C)	130,000	5,800	0	140,000
2048 (W)	100,000	5,900	0	110,000
2049 (W)	120,000	5,900	0	130,000
2050 (W)	130,000	5,900	0	140,000
2051 (W)	79,000	5,900	0	85,000
2052 (W)	120,000	5,900	0	130,000
2053 (AN)	110,000	5,900	0	120,000
2054 (D)	130,000	5,900	0	140,000
2055 (D)	150,000	5,900	0	160,000
2056 (AN)	120,000	5,900	0	130,000
2057 (BN)	140,000	5,900	0	150,000
2058 (AN)	97,000	5,900	0	100,000
2059 (W)	110,000	5,900	0	120,000
2060 (D)	140,000	5,900	0	150,000
2061 (C)	160,000	5,800	0	170,000
2062 (D)	130,000	5,800	0	140,000
2063 (BN)	100,000	5,900	0	110,000

Red Bluff Subbasin Projected (Future Land Use) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2064 (W)</td><td>100,000</td><td>5,900</td><td>0</td><td>110,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>130,000</td><td>5,800</td><td>0</td><td>140,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>150,000</td><td>5,800</td><td>0</td><td>160,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>150,000</td><td>5,800</td><td>0</td><td>160,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>160,000</td><td>5,800</td><td>0</td><td>170,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>130,000</td><td>5,800</td><td>0</td><td>140,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>120,000</td><td>5,800</td><td>0</td><td>130,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>140,000</td><td>5,800</td><td>0</td><td>150,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>110,000</td><td>5,800</td><td>0</td><td>120,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>120,000</td><td>5,900</td><td>0</td><td>130,000</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>110,000</td><td>5,900</td><td>0</td><td>120,000</td></tr>
<tr><td>AN</td><td>110,000</td><td>5,900</td><td>0</td><td>120,000</td></tr>
<tr><td>BN</td><td>130,000</td><td>5,800</td><td>0</td><td>140,000</td></tr>
<tr><td>D</td><td>140,000</td><td>5,800</td><td>0</td><td>150,000</td></tr>
<tr><td>C</td><td>140,000</td><td>5,800</td><td>0</td><td>150,000</td></tr>
</table>

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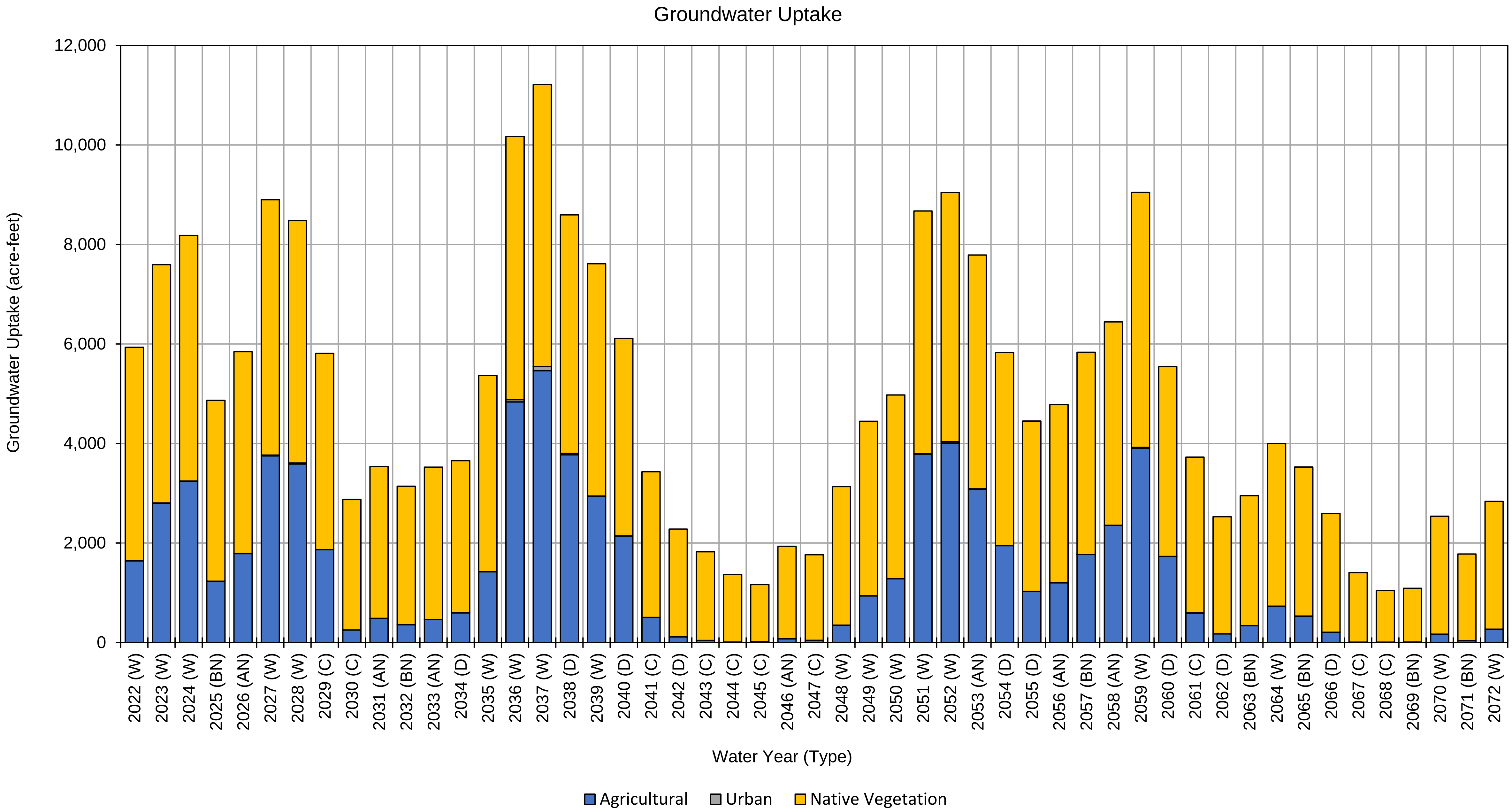

Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	1,600	1	4,300	5,900
2023 (W)	2,800	3	4,800	7,600
2024 (W)	3,200	6	4,900	8,100
2025 (BN)	1,200	1	3,600	4,800
2026 (AN)	1,800	1	4,100	5,900
2027 (W)	3,700	18	5,100	8,800
2028 (W)	3,600	22	4,900	8,500
2029 (C)	1,900	2	3,900	5,800
2030 (C)	250	0	2,600	2,900
2031 (AN)	490	0	3,100	3,600
2032 (BN)	360	0	2,800	3,200
2033 (AN)	460	0	3,100	3,600
2034 (D)	600	0	3,100	3,700
2035 (W)	1,400	1	3,900	5,300
2036 (W)	4,800	46	5,300	10,000
2037 (W)	5,500	83	5,700	11,000
2038 (D)	3,800	29	4,800	8,600
2039 (W)	2,900	4	4,700	7,600
2040 (D)	2,100	2	4,000	6,100
2041 (C)	510	0	2,900	3,400
2042 (D)	110	0	2,200	2,300
2043 (C)	44	0	1,800	1,800
2044 (C)	9	0	1,400	1,400
2045 (C)	14	0	1,200	1,200
2046 (AN)	75	0	1,900	2,000
2047 (C)	46	0	1,700	1,700
2048 (W)	350	1	2,800	3,200
2049 (W)	940	0	3,500	4,400
2050 (W)	1,300	1	3,700	5,000
2051 (W)	3,800	8	4,900	8,700
2052 (W)	4,000	29	5,000	9,000
2053 (AN)	3,100	5	4,700	7,800
2054 (D)	1,900	1	3,900	5,800
2055 (D)	1,000	0	3,400	4,400
2056 (AN)	1,200	0	3,600	4,800
2057 (BN)	1,800	1	4,100	5,900
2058 (AN)	2,400	1	4,100	6,500
2059 (W)	3,900	18	5,100	9,000
2060 (D)	1,700	2	3,800	5,500
2061 (C)	600	0	3,100	3,700
2062 (D)	170	0	2,400	2,600
2063 (BN)	340	0	2,600	2,900

Red Bluff Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		730	0	3,300	4,000
2065 (BN)		530	0	3,000	3,500
2066 (D)		210	0	2,400	2,600
2067 (C)		9	0	1,400	1,400
2068 (C)		8	0	1,000	1,000
2069 (BN)		11	0	1,100	1,100
2070 (W)		170	1	2,400	2,600
2071 (BN)		37	0	1,700	1,700
2072 (W)		270	0	2,600	2,900
Average (2022-2072)		1,400	6	3,400	4,800
2022-2072	W	2,500	13	4,300	6,800
	AN	1,400	1	3,500	4,900
	BN	610	0	2,700	3,300
	D	1,300	4	3,300	4,600
	C	340	0	2,100	2,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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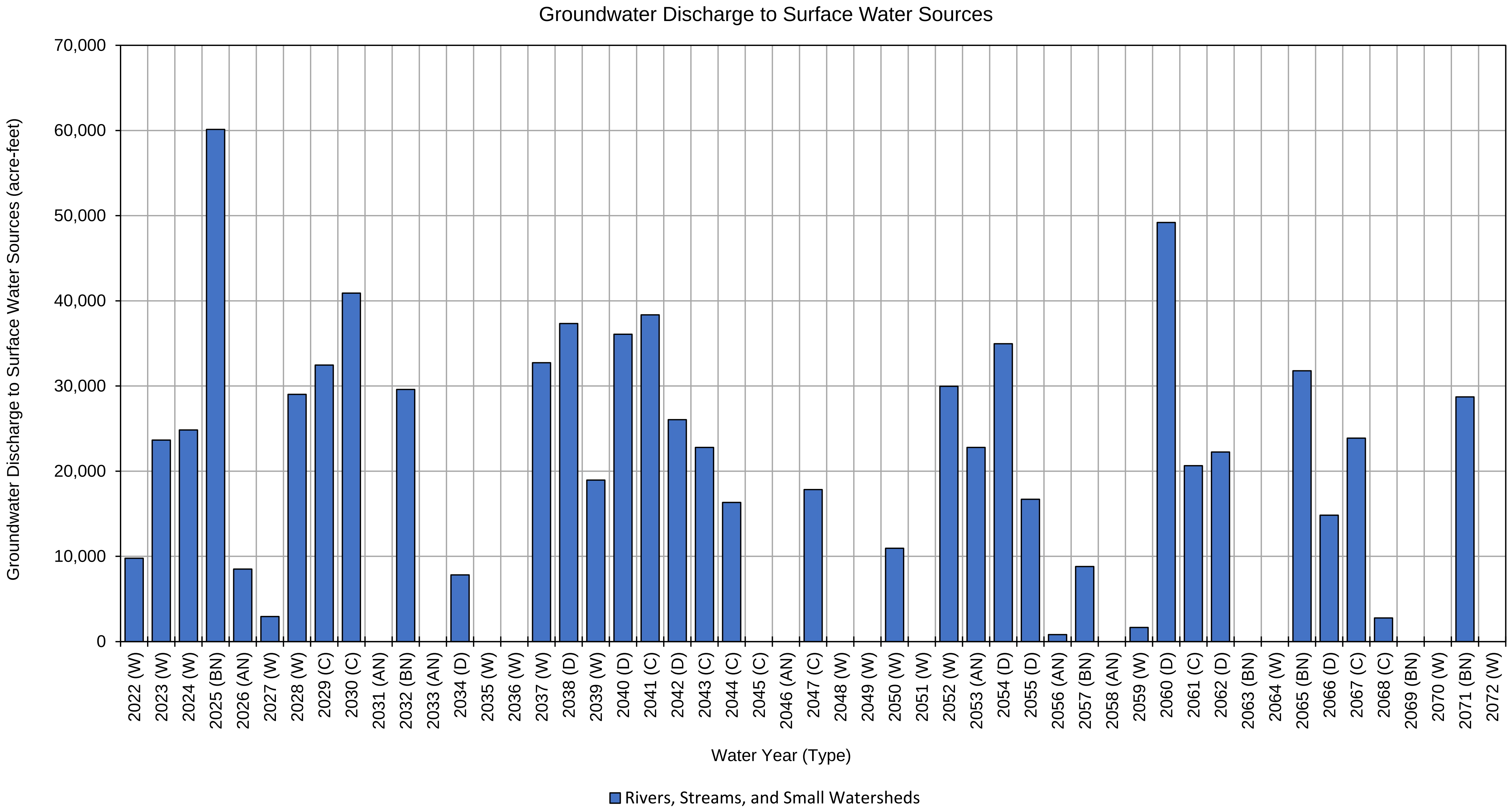
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

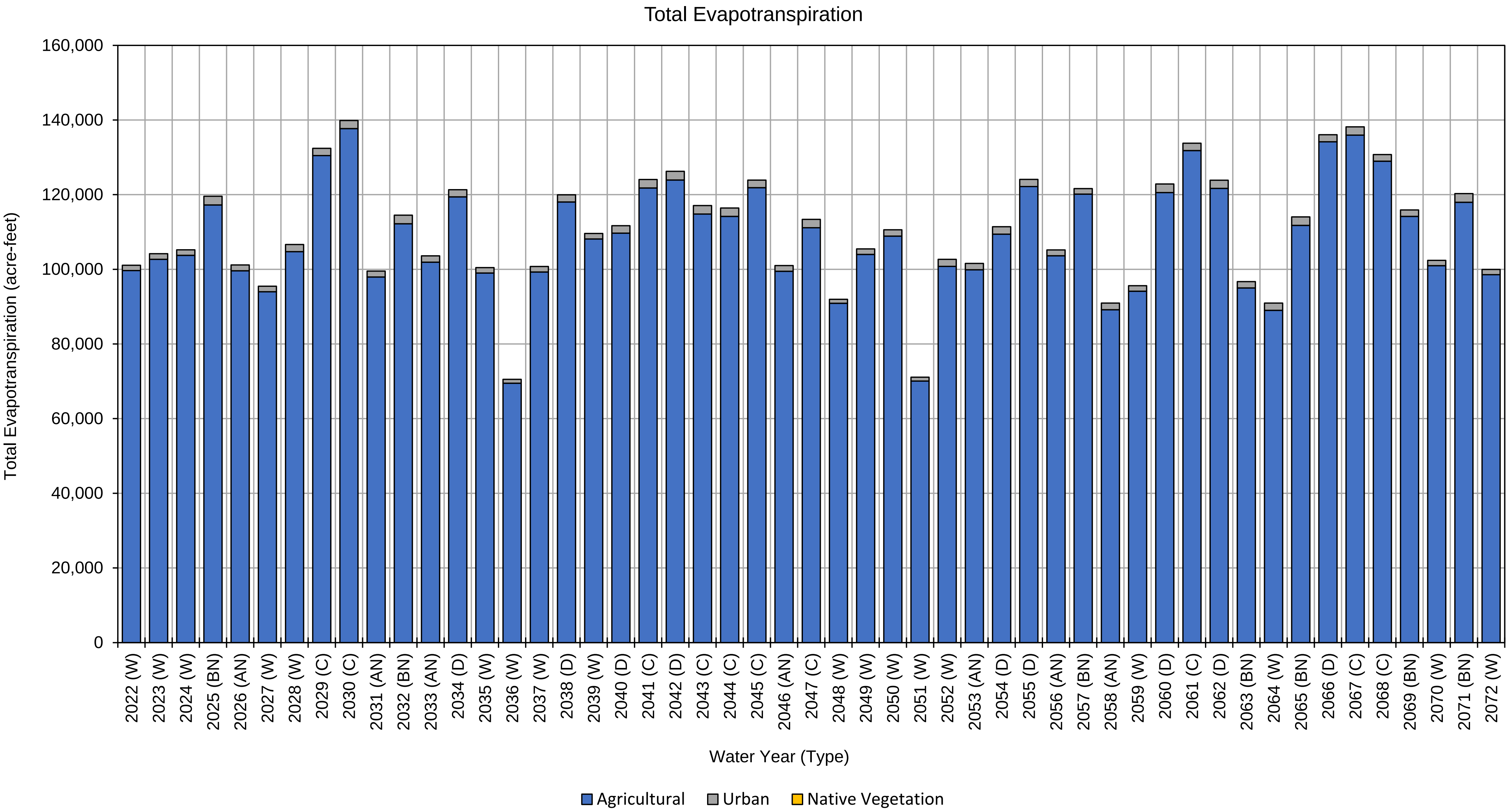
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	9,800
2023 (W)	24,000
2024 (W)	25,000
2025 (BN)	60,000
2026 (AN)	8,500
2027 (W)	2,900
2028 (W)	29,000
2029 (C)	32,000
2030 (C)	41,000
2031 (AN)	0
2032 (BN)	30,000
2033 (AN)	0
2034 (D)	7,800
2035 (W)	0
2036 (W)	0
2037 (W)	33,000
2038 (D)	37,000
2039 (W)	19,000
2040 (D)	36,000
2041 (C)	38,000
2042 (D)	26,000
2043 (C)	23,000
2044 (C)	16,000
2045 (C)	0
2046 (AN)	0
2047 (C)	18,000
2048 (W)	0
2049 (W)	0
2050 (W)	11,000
2051 (W)	0
2052 (W)	30,000
2053 (AN)	23,000
2054 (D)	35,000
2055 (D)	17,000
2056 (AN)	810
2057 (BN)	8,800
2058 (AN)	0
2059 (W)	1,700
2060 (D)	49,000
2061 (C)	21,000
2062 (D)	22,000
2063 (BN)	0

Red Bluff Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		32,000
2066 (D)		15,000
2067 (C)		24,000
2068 (C)		2,800
2069 (BN)		0
2070 (W)		0
2071 (BN)		29,000
2072 (W)		0
Average (2022-2072)		16,000
2022-2072	W	10,000
	AN	4,600
	BN	23,000
	D	27,000
	C	22,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

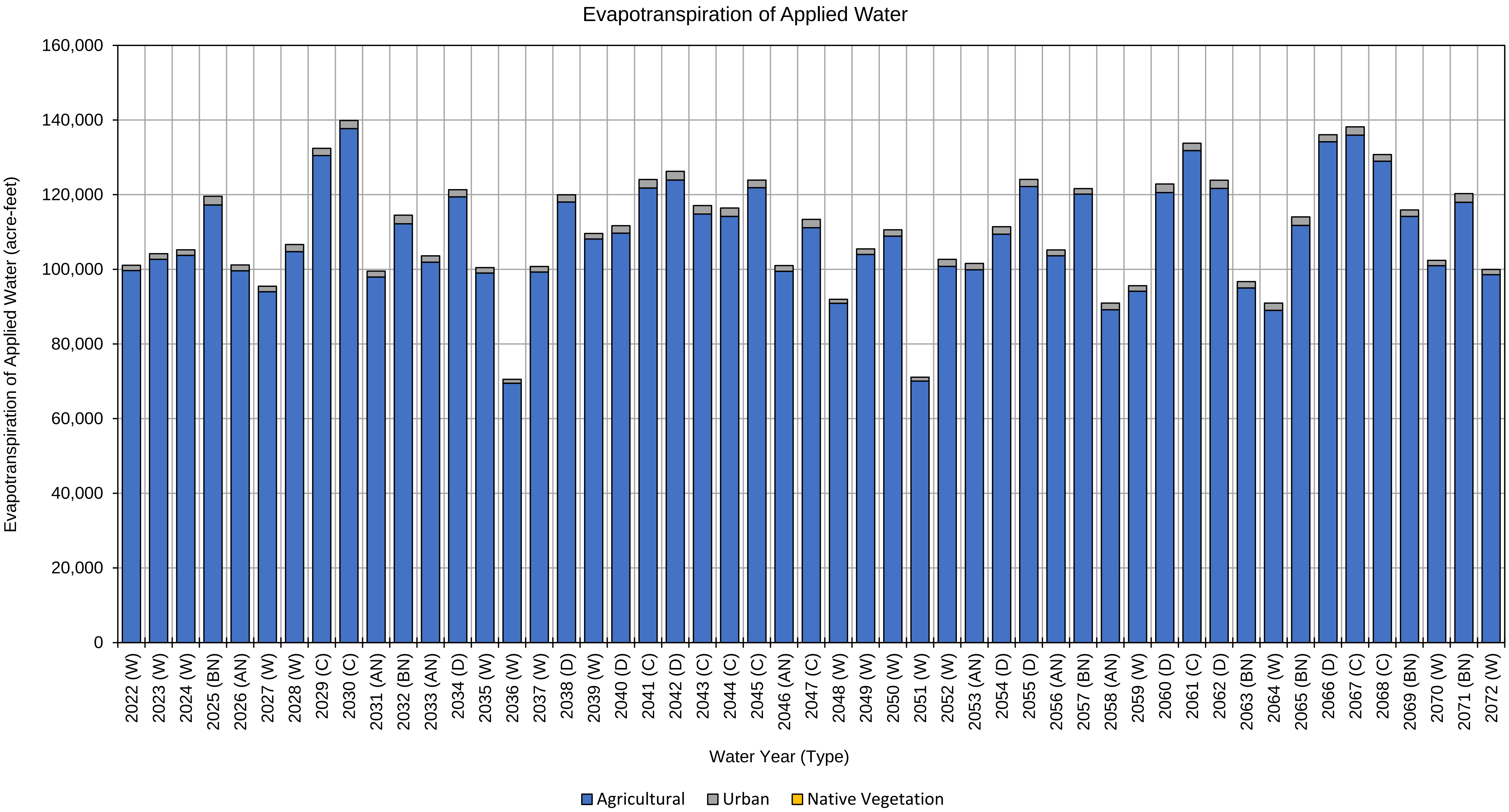
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	180,000	7,100	330,000	520,000
2023 (W)	180,000	6,500	300,000	490,000
2024 (W)	180,000	6,500	300,000	490,000
2025 (BN)	180,000	6,100	260,000	450,000
2026 (AN)	180,000	7,000	320,000	510,000
2027 (W)	180,000	6,500	310,000	500,000
2028 (W)	180,000	6,200	290,000	480,000
2029 (C)	190,000	5,200	220,000	420,000
2030 (C)	180,000	5,300	210,000	400,000
2031 (AN)	180,000	7,100	330,000	520,000
2032 (BN)	180,000	6,500	290,000	480,000
2033 (AN)	170,000	6,600	300,000	480,000
2034 (D)	190,000	6,000	270,000	470,000
2035 (W)	170,000	6,500	300,000	480,000
2036 (W)	160,000	6,600	300,000	470,000
2037 (W)	180,000	6,500	310,000	500,000
2038 (D)	190,000	6,000	270,000	470,000
2039 (W)	180,000	6,400	290,000	480,000
2040 (D)	180,000	6,300	290,000	480,000
2041 (C)	190,000	6,400	270,000	470,000
2042 (D)	180,000	6,100	240,000	430,000
2043 (C)	190,000	6,900	290,000	490,000
2044 (C)	190,000	6,800	290,000	490,000
2045 (C)	190,000	6,500	290,000	490,000
2046 (AN)	180,000	7,000	320,000	510,000
2047 (C)	190,000	6,800	300,000	500,000
2048 (W)	170,000	6,200	280,000	460,000
2049 (W)	180,000	6,400	300,000	490,000
2050 (W)	190,000	6,600	300,000	500,000
2051 (W)	160,000	6,600	300,000	470,000
2052 (W)	180,000	6,200	300,000	490,000
2053 (AN)	180,000	6,600	310,000	500,000
2054 (D)	180,000	6,300	290,000	480,000
2055 (D)	190,000	6,000	270,000	470,000
2056 (AN)	170,000	6,400	290,000	470,000
2057 (BN)	180,000	5,600	260,000	450,000
2058 (AN)	170,000	7,200	330,000	510,000
2059 (W)	180,000	6,500	310,000	500,000
2060 (D)	180,000	6,100	240,000	430,000
2061 (C)	190,000	5,200	230,000	430,000
2062 (D)	180,000	6,300	270,000	460,000
2063 (BN)	170,000	6,300	290,000	470,000

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		170,000	6,800	320,000	500,000
2065 (BN)		180,000	6,500	290,000	480,000
2066 (D)		190,000	5,300	240,000	440,000
2067 (C)		180,000	5,400	220,000	410,000
2068 (C)		190,000	5,600	260,000	460,000
2069 (BN)		180,000	6,600	300,000	490,000
2070 (W)		180,000	6,300	300,000	490,000
2071 (BN)		180,000	6,100	260,000	450,000
2072 (W)		180,000	6,900	320,000	510,000
Average (2022-2072)		180,000	6,300	290,000	480,000
2022-2072	W	180,000	6,500	300,000	490,000
	AN	180,000	6,800	310,000	500,000
	BN	180,000	6,200	280,000	470,000
	D	180,000	6,000	270,000	460,000
	C	190,000	6,000	260,000	460,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

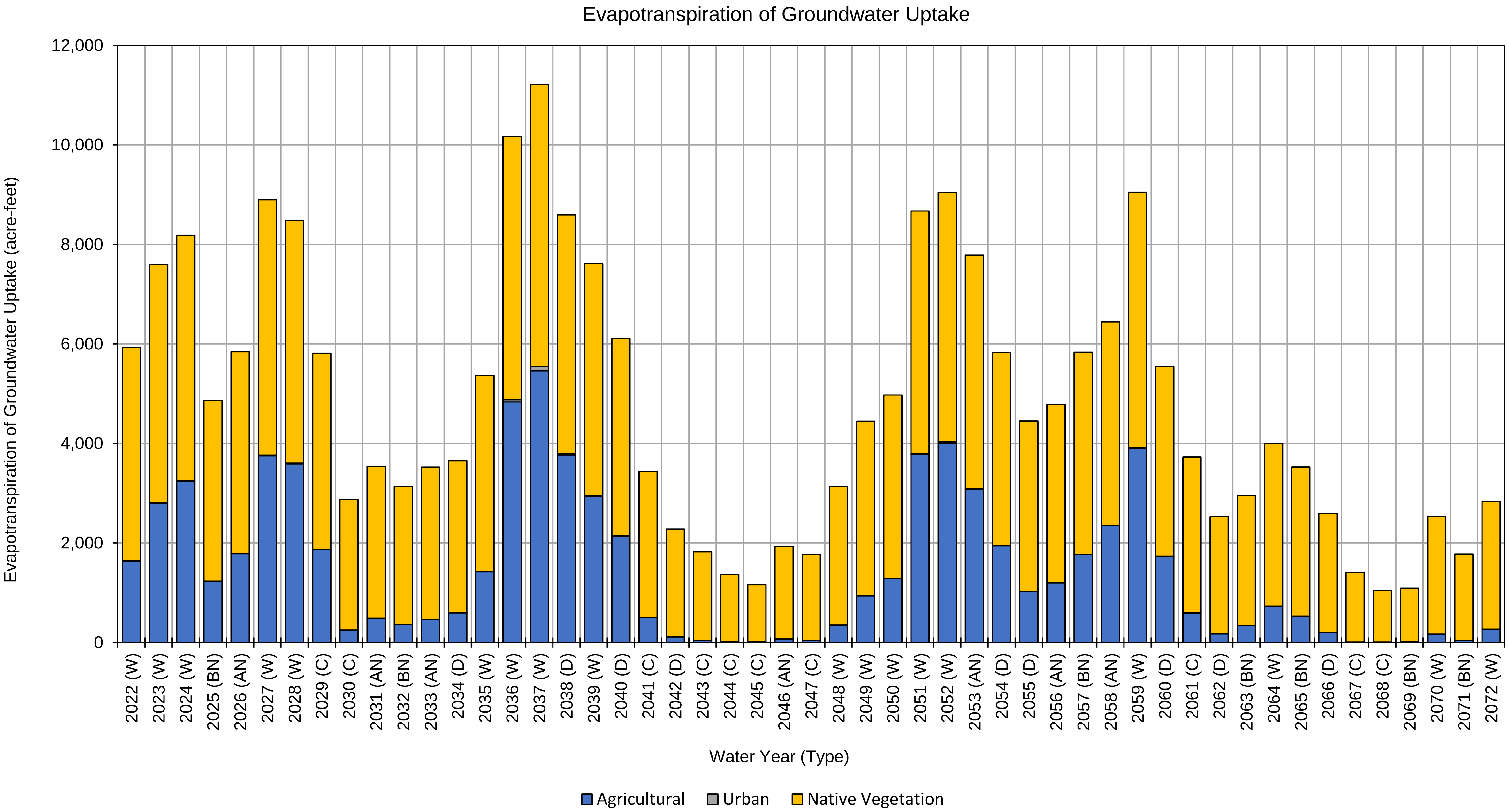
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	100,000	1,400	0	100,000
2023 (W)	100,000	1,500	0	100,000
2024 (W)	100,000	1,500	0	100,000
2025 (BN)	120,000	2,300	0	120,000
2026 (AN)	100,000	1,600	0	100,000
2027 (W)	94,000	1,500	0	96,000
2028 (W)	100,000	1,900	0	100,000
2029 (C)	130,000	1,900	0	130,000
2030 (C)	140,000	2,200	0	140,000
2031 (AN)	98,000	1,600	0	100,000
2032 (BN)	110,000	2,300	0	110,000
2033 (AN)	100,000	1,700	0	100,000
2034 (D)	120,000	1,900	0	120,000
2035 (W)	99,000	1,500	0	100,000
2036 (W)	69,000	1,100	0	70,000
2037 (W)	99,000	1,500	0	100,000
2038 (D)	120,000	1,900	0	120,000
2039 (W)	110,000	1,500	0	110,000
2040 (D)	110,000	2,000	0	110,000
2041 (C)	120,000	2,300	0	120,000
2042 (D)	120,000	2,300	0	120,000
2043 (C)	110,000	2,300	0	110,000
2044 (C)	110,000	2,200	0	110,000
2045 (C)	120,000	2,000	0	120,000
2046 (AN)	99,000	1,600	0	100,000
2047 (C)	110,000	2,200	0	110,000
2048 (W)	91,000	1,100	0	92,000
2049 (W)	100,000	1,500	0	100,000
2050 (W)	110,000	1,700	0	110,000
2051 (W)	70,000	1,100	0	71,000
2052 (W)	100,000	1,900	0	100,000
2053 (AN)	100,000	1,700	0	100,000
2054 (D)	110,000	2,000	0	110,000
2055 (D)	120,000	1,900	0	120,000
2056 (AN)	100,000	1,600	0	100,000
2057 (BN)	120,000	1,500	0	120,000
2058 (AN)	89,000	1,800	0	91,000
2059 (W)	94,000	1,500	0	96,000
2060 (D)	120,000	2,300	0	120,000
2061 (C)	130,000	2,000	0	130,000
2062 (D)	120,000	2,200	0	120,000
2063 (BN)	95,000	1,700	0	97,000

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		89,000	1,900	0	91,000
2065 (BN)		110,000	2,300	0	110,000
2066 (D)		130,000	1,900	0	130,000
2067 (C)		140,000	2,200	0	140,000
2068 (C)		130,000	1,800	0	130,000
2069 (BN)		110,000	1,700	0	110,000
2070 (W)		100,000	1,400	0	100,000
2071 (BN)		120,000	2,300	0	120,000
2072 (W)		99,000	1,400	0	100,000
Average (2022-2072)		110,000	1,800	0	110,000
2022-2072	W	97,000	1,500	0	99,000
	AN	99,000	1,600	0	100,000
	BN	110,000	2,000	0	110,000
	D	120,000	2,100	0	120,000
	C	120,000	2,100	0	120,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	1,600	1	4,300	5,900
2023 (W)	2,800	3	4,800	7,600
2024 (W)	3,200	6	4,900	8,100
2025 (BN)	1,200	1	3,600	4,800
2026 (AN)	1,800	1	4,100	5,900
2027 (W)	3,700	18	5,100	8,800
2028 (W)	3,600	22	4,900	8,500
2029 (C)	1,900	2	3,900	5,800
2030 (C)	250	0	2,600	2,900
2031 (AN)	490	0	3,100	3,600
2032 (BN)	360	0	2,800	3,200
2033 (AN)	460	0	3,100	3,600
2034 (D)	600	0	3,100	3,700
2035 (W)	1,400	1	3,900	5,300
2036 (W)	4,800	46	5,300	10,000
2037 (W)	5,500	83	5,700	11,000
2038 (D)	3,800	29	4,800	8,600
2039 (W)	2,900	4	4,700	7,600
2040 (D)	2,100	2	4,000	6,100
2041 (C)	510	0	2,900	3,400
2042 (D)	110	0	2,200	2,300
2043 (C)	44	0	1,800	1,800
2044 (C)	9	0	1,400	1,400
2045 (C)	14	0	1,200	1,200
2046 (AN)	75	0	1,900	2,000
2047 (C)	46	0	1,700	1,700
2048 (W)	350	1	2,800	3,200
2049 (W)	940	0	3,500	4,400
2050 (W)	1,300	1	3,700	5,000
2051 (W)	3,800	8	4,900	8,700
2052 (W)	4,000	29	5,000	9,000
2053 (AN)	3,100	5	4,700	7,800
2054 (D)	1,900	1	3,900	5,800
2055 (D)	1,000	0	3,400	4,400
2056 (AN)	1,200	0	3,600	4,800
2057 (BN)	1,800	1	4,100	5,900
2058 (AN)	2,400	1	4,100	6,500
2059 (W)	3,900	18	5,100	9,000
2060 (D)	1,700	2	3,800	5,500
2061 (C)	600	0	3,100	3,700
2062 (D)	170	0	2,400	2,600
2063 (BN)	340	0	2,600	2,900

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		730	0	3,300	4,000
2065 (BN)		530	0	3,000	3,500
2066 (D)		210	0	2,400	2,600
2067 (C)		9	0	1,400	1,400
2068 (C)		8	0	1,000	1,000
2069 (BN)		11	0	1,100	1,100
2070 (W)		170	1	2,400	2,600
2071 (BN)		37	0	1,700	1,700
2072 (W)		270	0	2,600	2,900
Average (2022-2072)		1,400	6	3,400	4,800
2022-2072	W	2,500	13	4,300	6,800
	AN	1,400	1	3,500	4,900
	BN	610	0	2,700	3,300
	D	1,300	4	3,300	4,600
	C	340	0	2,100	2,400

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

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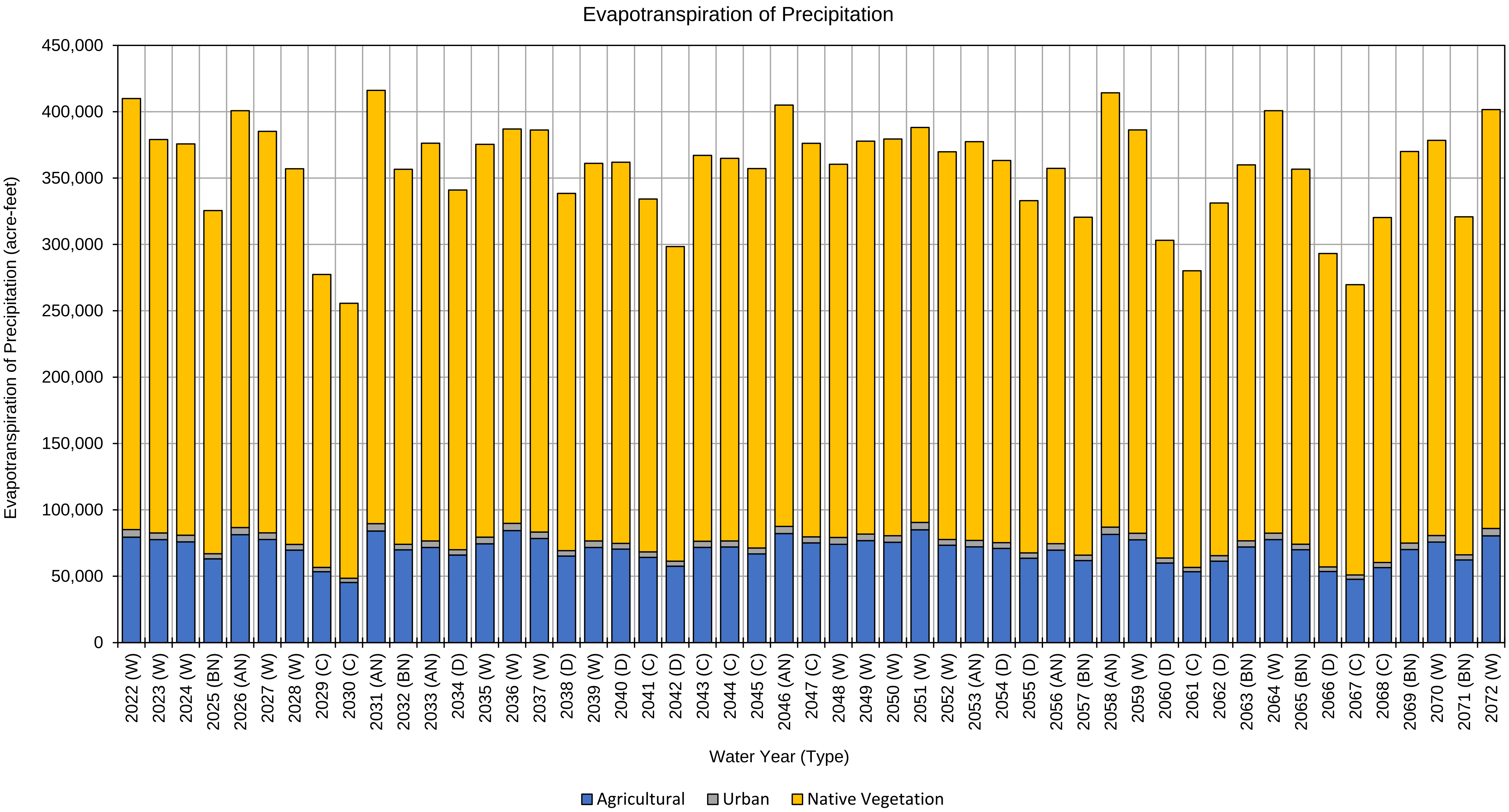


Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

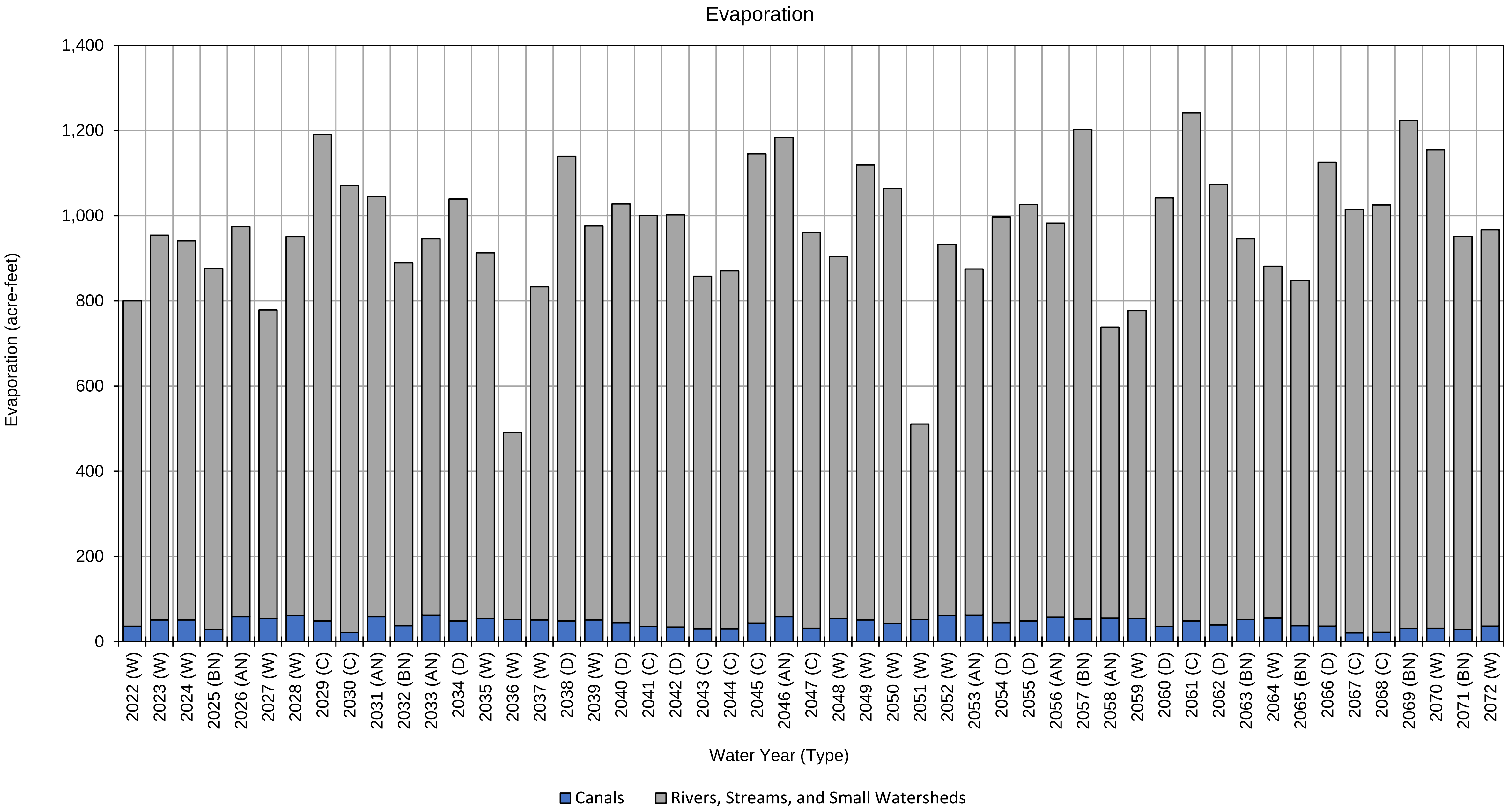
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	79,000	5,600	320,000	400,000
2023 (W)	78,000	5,000	300,000	380,000
2024 (W)	76,000	5,000	290,000	370,000
2025 (BN)	63,000	3,800	260,000	330,000
2026 (AN)	81,000	5,400	310,000	400,000
2027 (W)	78,000	5,000	300,000	380,000
2028 (W)	70,000	4,300	280,000	350,000
2029 (C)	53,000	3,200	220,000	280,000
2030 (C)	45,000	3,200	210,000	260,000
2031 (AN)	84,000	5,500	330,000	420,000
2032 (BN)	70,000	4,200	280,000	350,000
2033 (AN)	72,000	4,900	300,000	380,000
2034 (D)	66,000	4,000	270,000	340,000
2035 (W)	74,000	5,000	300,000	380,000
2036 (W)	84,000	5,500	300,000	390,000
2037 (W)	78,000	4,900	300,000	380,000
2038 (D)	65,000	4,000	270,000	340,000
2039 (W)	72,000	4,900	280,000	360,000
2040 (D)	70,000	4,300	290,000	360,000
2041 (C)	64,000	4,100	270,000	340,000
2042 (D)	58,000	3,800	240,000	300,000
2043 (C)	72,000	4,600	290,000	370,000
2044 (C)	72,000	4,600	290,000	370,000
2045 (C)	67,000	4,400	290,000	360,000
2046 (AN)	82,000	5,400	320,000	410,000
2047 (C)	75,000	4,600	300,000	380,000
2048 (W)	74,000	5,100	280,000	360,000
2049 (W)	77,000	4,900	300,000	380,000
2050 (W)	76,000	4,900	300,000	380,000
2051 (W)	85,000	5,500	300,000	390,000
2052 (W)	73,000	4,300	290,000	370,000
2053 (AN)	72,000	4,900	300,000	380,000
2054 (D)	71,000	4,300	290,000	370,000
2055 (D)	64,000	4,000	270,000	340,000
2056 (AN)	70,000	4,800	280,000	350,000
2057 (BN)	62,000	4,100	250,000	320,000
2058 (AN)	82,000	5,400	330,000	420,000
2059 (W)	77,000	5,000	300,000	380,000
2060 (D)	60,000	3,800	240,000	300,000
2061 (C)	53,000	3,300	220,000	280,000
2062 (D)	61,000	4,100	270,000	340,000
2063 (BN)	72,000	4,600	280,000	360,000

Red Bluff Subbasin Projected (Future Land Use) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2064 (W)</td><td>78,000</td><td>4,800</td><td>320,000</td><td>400,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>70,000</td><td>4,200</td><td>280,000</td><td>350,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>54,000</td><td>3,400</td><td>240,000</td><td>300,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>48,000</td><td>3,200</td><td>220,000</td><td>270,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>56,000</td><td>3,800</td><td>260,000</td><td>320,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>70,000</td><td>4,900</td><td>300,000</td><td>370,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>76,000</td><td>4,900</td><td>300,000</td><td>380,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>62,000</td><td>3,800</td><td>250,000</td><td>320,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>80,000</td><td>5,500</td><td>320,000</td><td>410,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>70,000</td><td>4,500</td><td>280,000</td><td>350,000</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>77,000</td><td>5,000</td><td>300,000</td><td>380,000</td></tr>
<tr><td>AN</td><td>77,000</td><td>5,200</td><td>310,000</td><td>390,000</td></tr>
<tr><td>BN</td><td>67,000</td><td>4,200</td><td>270,000</td><td>340,000</td></tr>
<tr><td>D</td><td>63,000</td><td>4,000</td><td>260,000</td><td>330,000</td></tr>
<tr><td>C</td><td>61,000</td><td>3,900</td><td>260,000</td><td>320,000</td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

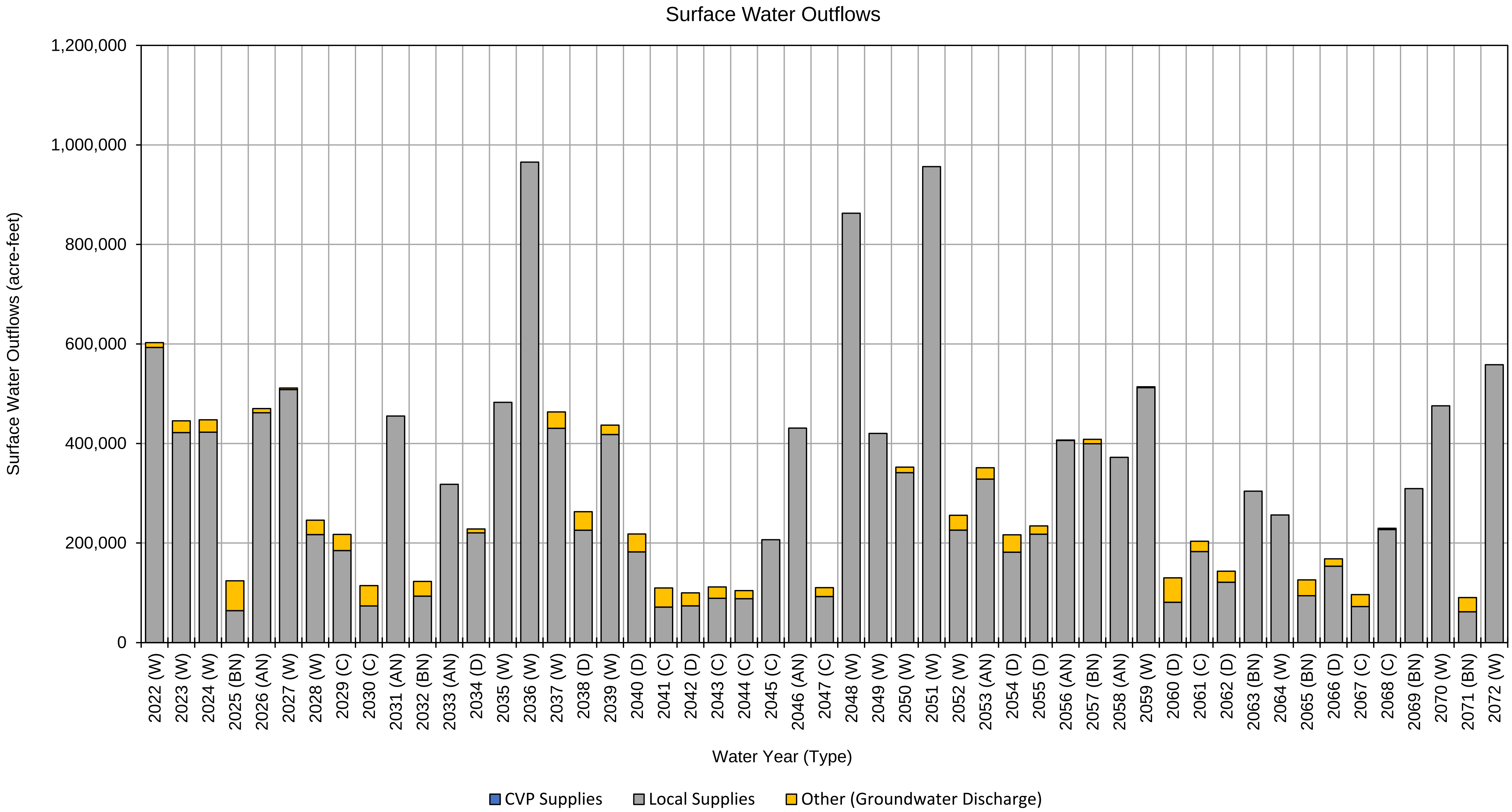
WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	36	760	800
2023 (W)	51	900	950
2024 (W)	51	890	940
2025 (BN)	29	850	880
2026 (AN)	58	920	980
2027 (W)	54	720	770
2028 (W)	60	890	950
2029 (C)	48	1,100	1,100
2030 (C)	21	1,100	1,100
2031 (AN)	58	990	1,000
2032 (BN)	37	850	890
2033 (AN)	62	880	940
2034 (D)	48	990	1,000
2035 (W)	54	860	910
2036 (W)	52	440	490
2037 (W)	51	780	830
2038 (D)	48	1,100	1,100
2039 (W)	51	920	970
2040 (D)	44	980	1,000
2041 (C)	35	970	1,000
2042 (D)	34	970	1,000
2043 (C)	30	830	860
2044 (C)	30	840	870
2045 (C)	43	1,100	1,100
2046 (AN)	58	1,100	1,200
2047 (C)	31	930	960
2048 (W)	54	850	900
2049 (W)	51	1,100	1,200
2050 (W)	42	1,000	1,000
2051 (W)	52	460	510
2052 (W)	60	870	930
2053 (AN)	62	810	870
2054 (D)	44	950	990
2055 (D)	48	980	1,000
2056 (AN)	57	930	990
2057 (BN)	53	1,100	1,200
2058 (AN)	55	680	740
2059 (W)	54	720	770
2060 (D)	35	1,000	1,000
2061 (C)	48	1,200	1,200
2062 (D)	39	1,000	1,000
2063 (BN)	52	890	940

Red Bluff Subbasin Projected (Future Land Use) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		55	830	890
2065 (BN)		37	810	850
2066 (D)		36	1,100	1,100
2067 (C)		20	990	1,000
2068 (C)		22	1,000	1,000
2069 (BN)		31	1,200	1,200
2070 (W)		31	1,100	1,100
2071 (BN)		29	920	950
2072 (W)		36	930	970
Average (2022-2072)		45	930	980
2022-2072	W	50	840	890
	AN	59	910	970
	BN	38	950	990
	D	42	1,000	1,000
	C	33	1,000	1,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

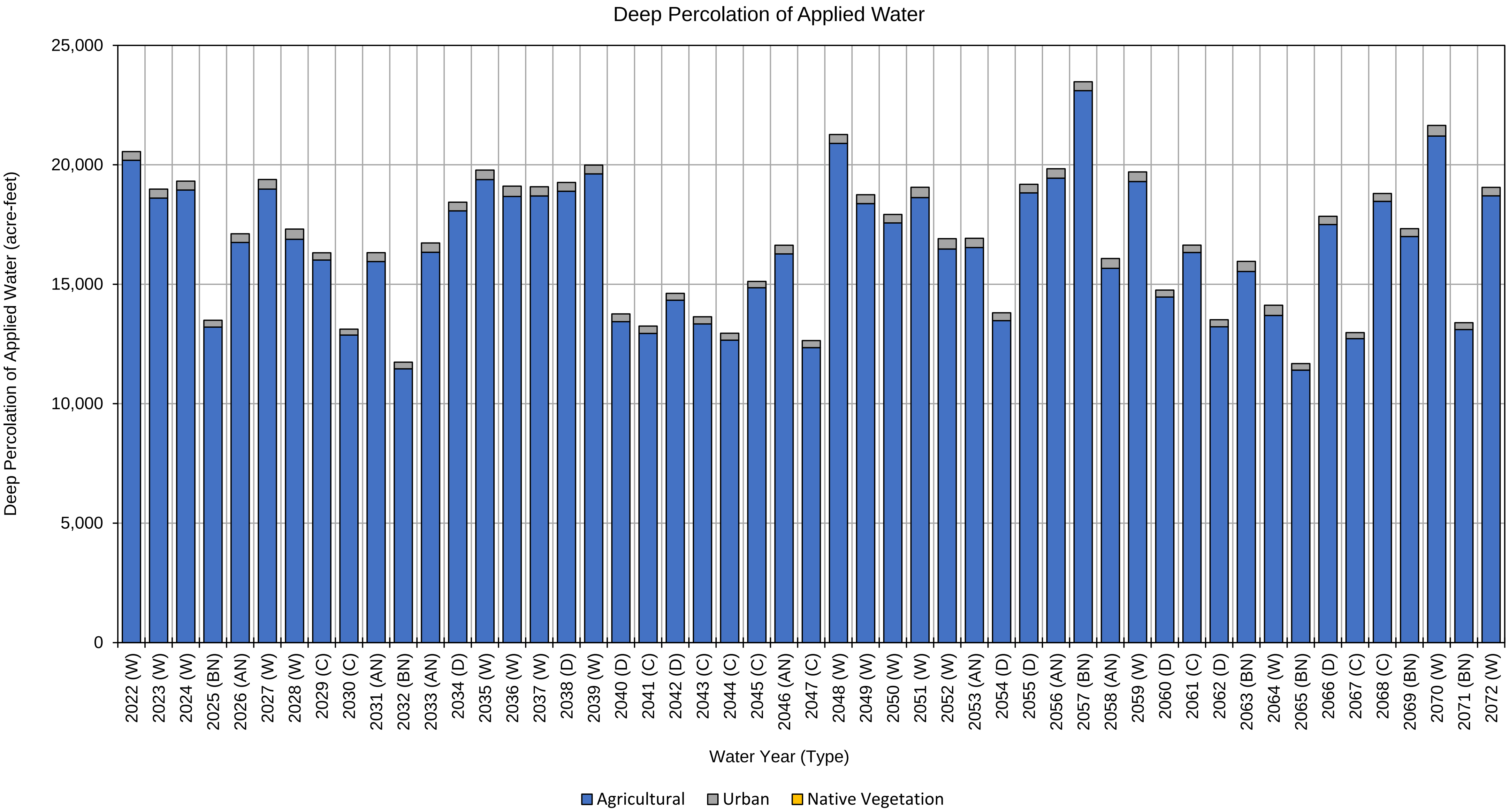
WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	590,000	9,800	600,000
2023 (W)	0	420,000	24,000	440,000
2024 (W)	0	420,000	25,000	450,000
2025 (BN)	0	64,000	60,000	120,000
2026 (AN)	0	460,000	8,500	470,000
2027 (W)	0	510,000	2,900	510,000
2028 (W)	0	220,000	29,000	250,000
2029 (C)	0	180,000	32,000	210,000
2030 (C)	0	73,000	41,000	110,000
2031 (AN)	0	460,000	0	460,000
2032 (BN)	0	93,000	30,000	120,000
2033 (AN)	0	320,000	0	320,000
2034 (D)	0	220,000	7,800	230,000
2035 (W)	0	480,000	0	480,000
2036 (W)	0	970,000	0	970,000
2037 (W)	0	430,000	33,000	460,000
2038 (D)	0	230,000	37,000	270,000
2039 (W)	0	420,000	19,000	440,000
2040 (D)	0	180,000	36,000	220,000
2041 (C)	0	71,000	38,000	110,000
2042 (D)	0	74,000	26,000	100,000
2043 (C)	0	89,000	23,000	110,000
2044 (C)	0	88,000	16,000	100,000
2045 (C)	0	210,000	0	210,000
2046 (AN)	0	430,000	0	430,000
2047 (C)	0	92,000	18,000	110,000
2048 (W)	0	860,000	0	860,000
2049 (W)	0	420,000	0	420,000
2050 (W)	0	340,000	11,000	350,000
2051 (W)	0	960,000	0	960,000
2052 (W)	0	230,000	30,000	260,000
2053 (AN)	0	330,000	23,000	350,000
2054 (D)	0	180,000	35,000	220,000
2055 (D)	0	220,000	17,000	240,000
2056 (AN)	0	410,000	810	410,000
2057 (BN)	0	400,000	8,800	410,000
2058 (AN)	0	370,000	0	370,000
2059 (W)	0	510,000	1,700	510,000
2060 (D)	0	81,000	49,000	130,000
2061 (C)	0	180,000	21,000	200,000
2062 (D)	0	120,000	22,000	140,000
2063 (BN)	0	300,000	0	300,000

Red Bluff Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	260,000	0	260,000
2065 (BN)		0	94,000	32,000	130,000
2066 (D)		0	150,000	15,000	170,000
2067 (C)		0	72,000	24,000	96,000
2068 (C)		0	230,000	2,800	230,000
2069 (BN)		0	310,000	0	310,000
2070 (W)		0	480,000	0	480,000
2071 (BN)		0	62,000	29,000	91,000
2072 (W)		0	560,000	0	560,000
Average (2022-2072)		0	310,000	16,000	330,000
2022-2072	W	0	500,000	10,000	510,000
	AN	0	400,000	4,600	400,000
	BN	0	190,000	23,000	210,000
	D	0	160,000	27,000	190,000
	C	0	130,000	22,000	150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

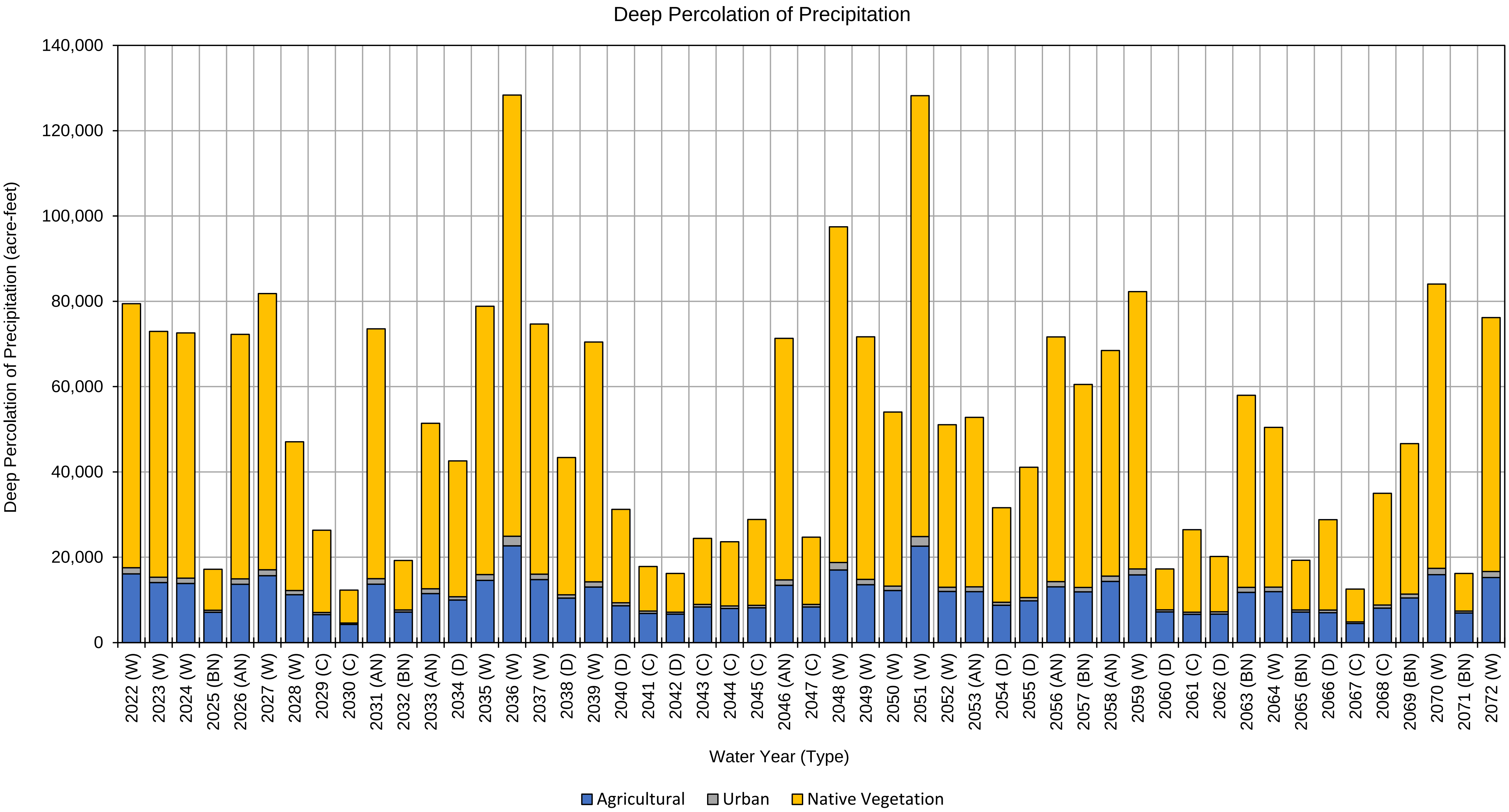
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	20,000	360	0	20,000
2023 (W)	19,000	380	0	19,000
2024 (W)	19,000	370	0	19,000
2025 (BN)	13,000	290	0	13,000
2026 (AN)	17,000	360	0	17,000
2027 (W)	19,000	400	0	19,000
2028 (W)	17,000	430	0	17,000
2029 (C)	16,000	300	0	16,000
2030 (C)	13,000	240	0	13,000
2031 (AN)	16,000	370	0	16,000
2032 (BN)	11,000	280	0	11,000
2033 (AN)	16,000	390	0	16,000
2034 (D)	18,000	360	0	18,000
2035 (W)	19,000	400	0	19,000
2036 (W)	19,000	430	0	19,000
2037 (W)	19,000	390	0	19,000
2038 (D)	19,000	370	0	19,000
2039 (W)	20,000	370	0	20,000
2040 (D)	13,000	330	0	13,000
2041 (C)	13,000	310	0	13,000
2042 (D)	14,000	290	0	14,000
2043 (C)	13,000	300	0	13,000
2044 (C)	13,000	290	0	13,000
2045 (C)	15,000	270	0	15,000
2046 (AN)	16,000	360	0	16,000
2047 (C)	12,000	290	0	12,000
2048 (W)	21,000	370	0	21,000
2049 (W)	18,000	370	0	18,000
2050 (W)	18,000	360	0	18,000
2051 (W)	19,000	430	0	19,000
2052 (W)	16,000	430	0	16,000
2053 (AN)	17,000	390	0	17,000
2054 (D)	13,000	330	0	13,000
2055 (D)	19,000	360	0	19,000
2056 (AN)	19,000	390	0	19,000
2057 (BN)	23,000	370	0	23,000
2058 (AN)	16,000	410	0	16,000
2059 (W)	19,000	410	0	19,000
2060 (D)	14,000	290	0	14,000
2061 (C)	16,000	310	0	16,000
2062 (D)	13,000	290	0	13,000
2063 (BN)	16,000	420	0	16,000

Red Bluff Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		14,000	430	0	14,000
2065 (BN)		11,000	280	0	11,000
2066 (D)		17,000	350	0	17,000
2067 (C)		13,000	250	0	13,000
2068 (C)		18,000	330	0	18,000
2069 (BN)		17,000	330	0	17,000
2070 (W)		21,000	440	0	21,000
2071 (BN)		13,000	290	0	13,000
2072 (W)		19,000	350	0	19,000
Average (2022-2072)		16,000	350	0	16,000
2022-2072	W	19,000	400	0	19,000
	AN	17,000	380	0	17,000
	BN	15,000	320	0	15,000
	D	16,000	330	0	16,000
	C	14,000	290	0	14,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

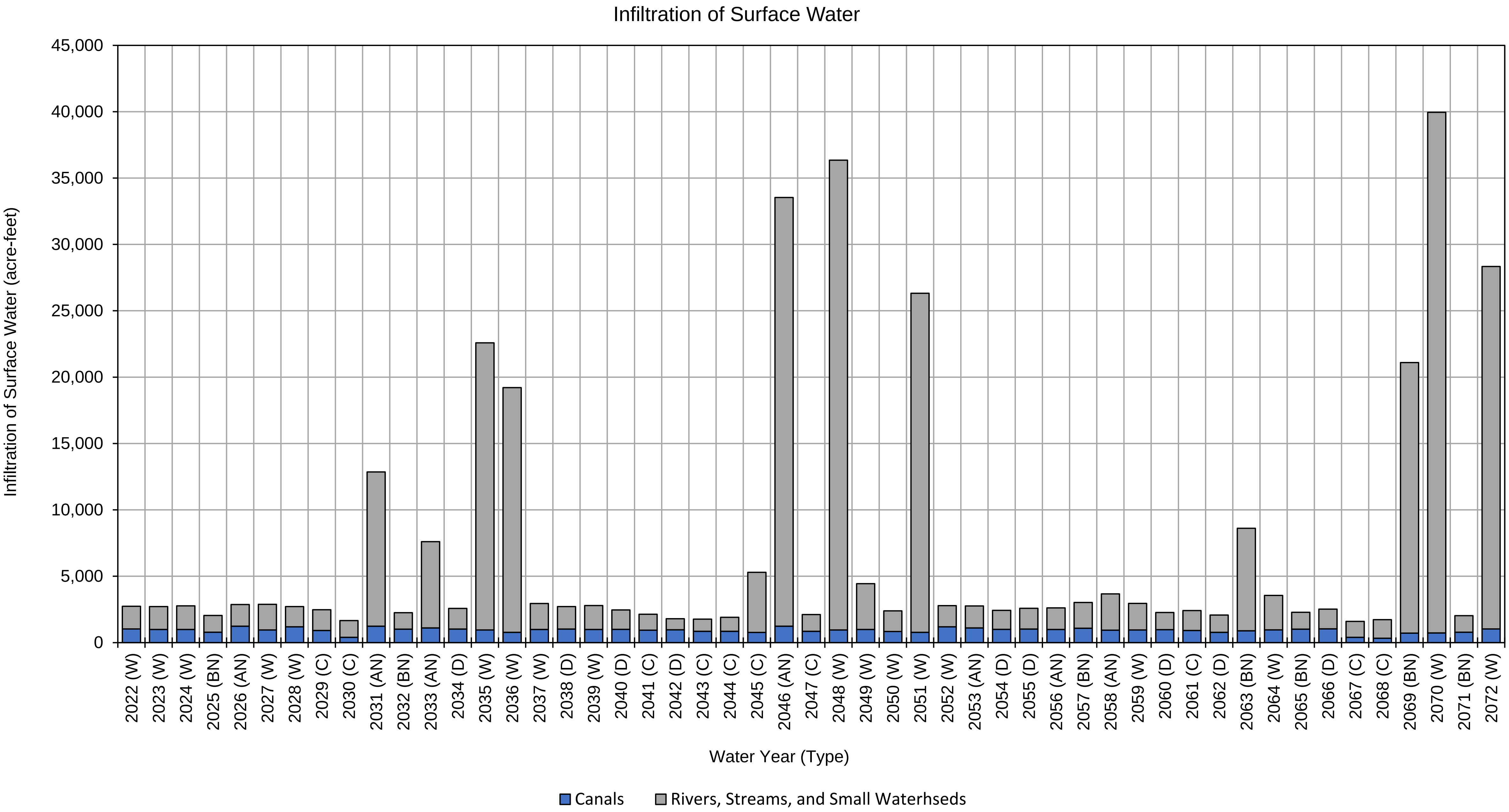
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	1,400	62,000	79,000
2023 (W)	14,000	1,200	58,000	73,000
2024 (W)	14,000	1,200	57,000	72,000
2025 (BN)	7,100	470	9,600	17,000
2026 (AN)	14,000	1,300	57,000	72,000
2027 (W)	16,000	1,400	65,000	82,000
2028 (W)	11,000	960	35,000	47,000
2029 (C)	6,600	500	19,000	26,000
2030 (C)	4,200	360	7,700	12,000
2031 (AN)	14,000	1,300	59,000	74,000
2032 (BN)	7,100	510	12,000	20,000
2033 (AN)	11,000	1,100	39,000	51,000
2034 (D)	10,000	760	32,000	43,000
2035 (W)	15,000	1,400	63,000	79,000
2036 (W)	23,000	2,300	100,000	130,000
2037 (W)	15,000	1,300	59,000	75,000
2038 (D)	10,000	760	32,000	43,000
2039 (W)	13,000	1,200	56,000	70,000
2040 (D)	8,600	710	22,000	31,000
2041 (C)	6,800	550	10,000	17,000
2042 (D)	6,700	470	9,100	16,000
2043 (C)	8,300	610	15,000	24,000
2044 (C)	8,000	590	15,000	24,000
2045 (C)	8,100	580	20,000	29,000
2046 (AN)	13,000	1,300	57,000	71,000
2047 (C)	8,300	600	16,000	25,000
2048 (W)	17,000	1,700	79,000	98,000
2049 (W)	14,000	1,200	57,000	72,000
2050 (W)	12,000	1,000	41,000	54,000
2051 (W)	23,000	2,300	100,000	130,000
2052 (W)	12,000	970	38,000	51,000
2053 (AN)	12,000	1,100	40,000	53,000
2054 (D)	8,700	710	22,000	31,000
2055 (D)	9,800	760	31,000	42,000
2056 (AN)	13,000	1,200	57,000	71,000
2057 (BN)	12,000	1,000	48,000	61,000
2058 (AN)	14,000	1,300	53,000	68,000
2059 (W)	16,000	1,400	65,000	82,000
2060 (D)	7,200	470	9,600	17,000
2061 (C)	6,600	510	19,000	26,000
2062 (D)	6,700	560	13,000	20,000
2063 (BN)	12,000	1,200	45,000	58,000

Red Bluff Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		12,000	1,100	37,000	50,000
2065 (BN)		7,100	510	12,000	20,000
2066 (D)		7,000	630	21,000	29,000
2067 (C)		4,500	370	7,700	13,000
2068 (C)		8,100	710	26,000	35,000
2069 (BN)		10,000	930	35,000	46,000
2070 (W)		16,000	1,500	67,000	85,000
2071 (BN)		6,900	470	8,800	16,000
2072 (W)		15,000	1,400	60,000	76,000
Average (2022-2072)		11,000	980	39,000	51,000
2022-2072	W	15,000	1,400	61,000	77,000
	AN	13,000	1,200	52,000	66,000
	BN	8,900	730	24,000	34,000
	D	8,300	650	21,000	30,000
	C	7,000	540	16,000	24,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

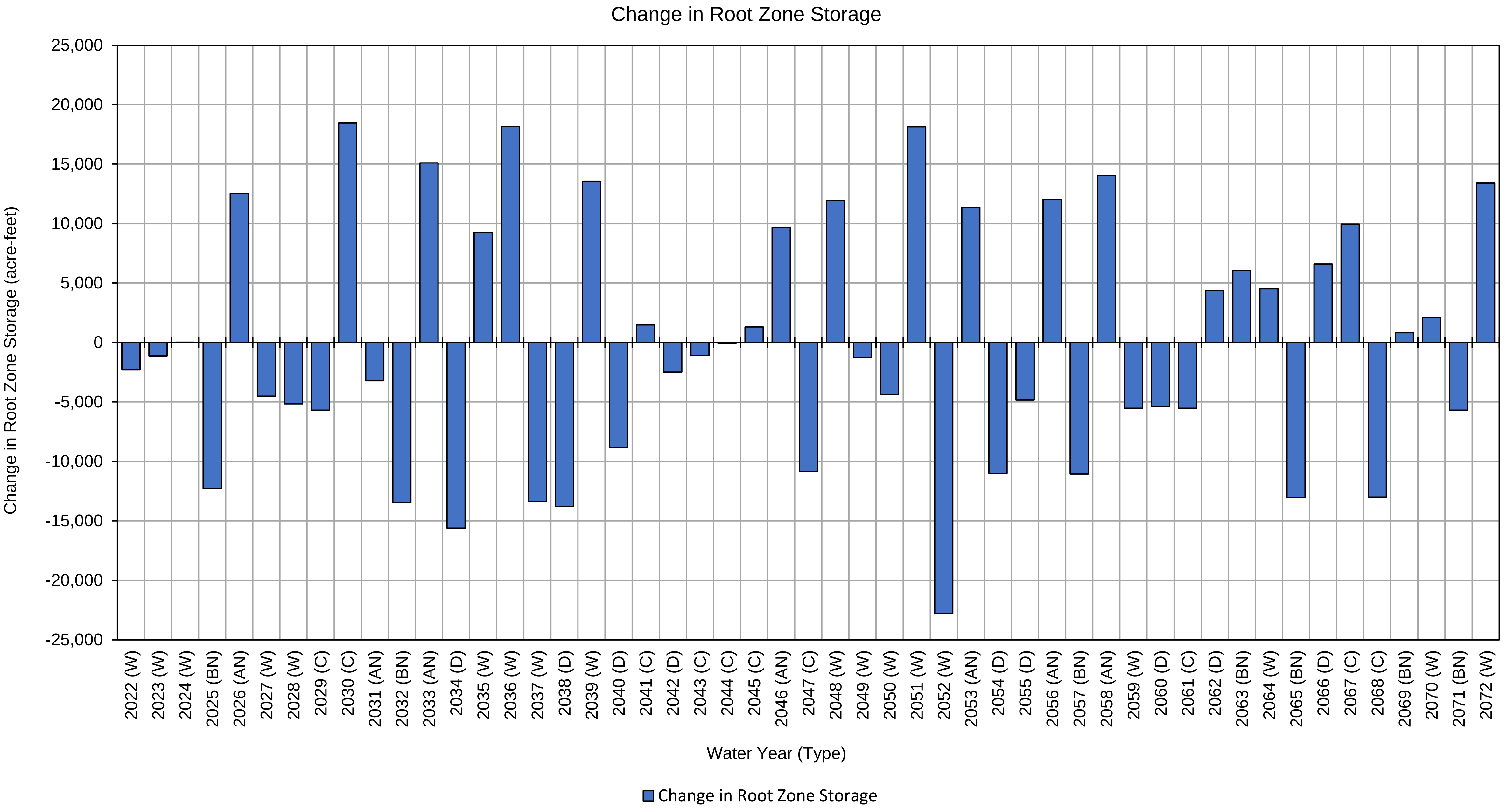
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	1,000	1,700	2,700
2023 (W)	990	1,700	2,700
2024 (W)	990	1,800	2,800
2025 (BN)	780	1,300	2,100
2026 (AN)	1,200	1,600	2,800
2027 (W)	950	1,900	2,900
2028 (W)	1,200	1,500	2,700
2029 (C)	910	1,600	2,500
2030 (C)	400	1,300	1,700
2031 (AN)	1,200	12,000	13,000
2032 (BN)	1,000	1,200	2,200
2033 (AN)	1,100	6,500	7,600
2034 (D)	1,000	1,600	2,600
2035 (W)	950	22,000	23,000
2036 (W)	770	18,000	19,000
2037 (W)	990	2,000	3,000
2038 (D)	1,000	1,700	2,700
2039 (W)	990	1,800	2,800
2040 (D)	1,000	1,500	2,500
2041 (C)	930	1,200	2,100
2042 (D)	960	830	1,800
2043 (C)	840	920	1,800
2044 (C)	840	1,100	1,900
2045 (C)	760	4,500	5,300
2046 (AN)	1,200	32,000	33,000
2047 (C)	850	1,300	2,200
2048 (W)	950	35,000	36,000
2049 (W)	990	3,500	4,500
2050 (W)	830	1,600	2,400
2051 (W)	770	26,000	27,000
2052 (W)	1,200	1,600	2,800
2053 (AN)	1,100	1,700	2,800
2054 (D)	1,000	1,400	2,400
2055 (D)	1,000	1,600	2,600
2056 (AN)	990	1,600	2,600
2057 (BN)	1,100	1,900	3,000
2058 (AN)	930	2,700	3,600
2059 (W)	950	2,000	3,000
2060 (D)	970	1,300	2,300
2061 (C)	910	1,500	2,400
2062 (D)	770	1,300	2,100
2063 (BN)	890	7,700	8,600

Red Bluff Subbasin Projected (Future Land Use) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		960	2,600	3,600
2065 (BN)		1,000	1,300	2,300
2066 (D)		1,000	1,500	2,500
2067 (C)		390	1,200	1,600
2068 (C)		330	1,400	1,700
2069 (BN)		710	20,000	21,000
2070 (W)		730	39,000	40,000
2071 (BN)		780	1,200	2,000
2072 (W)		1,000	27,000	28,000
Average (2022-2072)		930	6,100	7,000
2022-2072	W	950	11,000	12,000
	AN	1,100	8,300	9,400
	BN	890	5,000	5,900
	D	980	1,400	2,400
	C	720	1,600	2,300

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	-2,300
2023 (W)	-1,100
2024 (W)	24
2025 (BN)	-12,000
2026 (AN)	13,000
2027 (W)	-4,500
2028 (W)	-5,200
2029 (C)	-5,700
2030 (C)	18,000
2031 (AN)	-3,200
2032 (BN)	-13,000
2033 (AN)	15,000
2034 (D)	-16,000
2035 (W)	9,300
2036 (W)	18,000
2037 (W)	-13,000
2038 (D)	-14,000
2039 (W)	14,000
2040 (D)	-8,900
2041 (C)	1,500
2042 (D)	-2,500
2043 (C)	-1,100
2044 (C)	-40
2045 (C)	1,300
2046 (AN)	9,700
2047 (C)	-11,000
2048 (W)	12,000
2049 (W)	-1,300
2050 (W)	-4,400
2051 (W)	18,000
2052 (W)	-23,000
2053 (AN)	11,000
2054 (D)	-11,000
2055 (D)	-4,800
2056 (AN)	12,000
2057 (BN)	-11,000
2058 (AN)	14,000
2059 (W)	-5,500
2060 (D)	-5,400
2061 (C)	-5,500
2062 (D)	4,400
2063 (BN)	6,000

Red Bluff Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		4,500
2065 (BN)		-13,000
2066 (D)		6,600
2067 (C)		10,000
2068 (C)		-13,000
2069 (BN)		820
2070 (W)		2,100
2071 (BN)		-5,700
2072 (W)		13,000
Average (2022-2072)		-50
2022-2072	W	1,700
	AN	10,000
	BN	-7,000
	D	-5,700
	C	-500

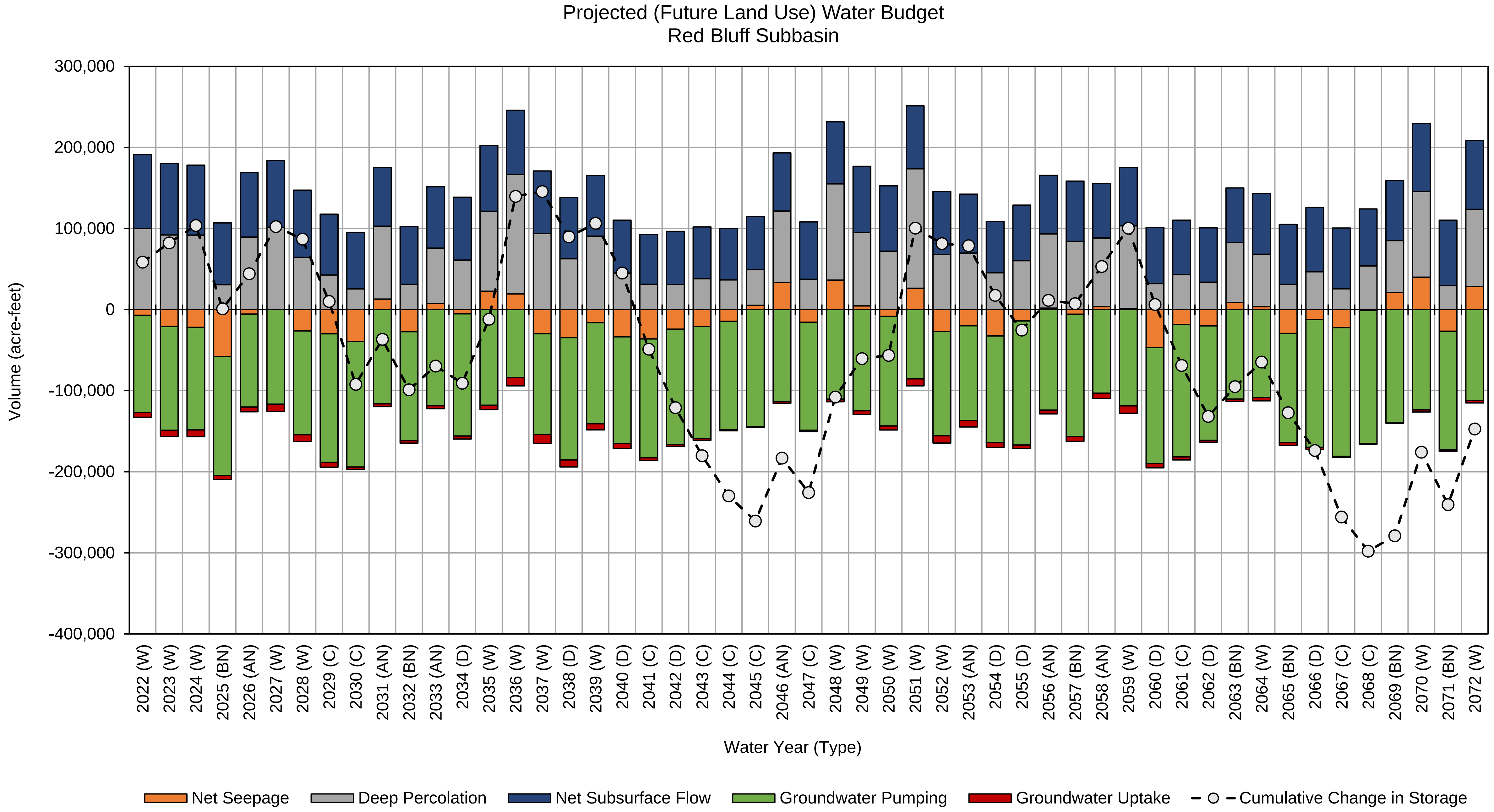
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-3b

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Future Land Use) Model Results – Groundwater System



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

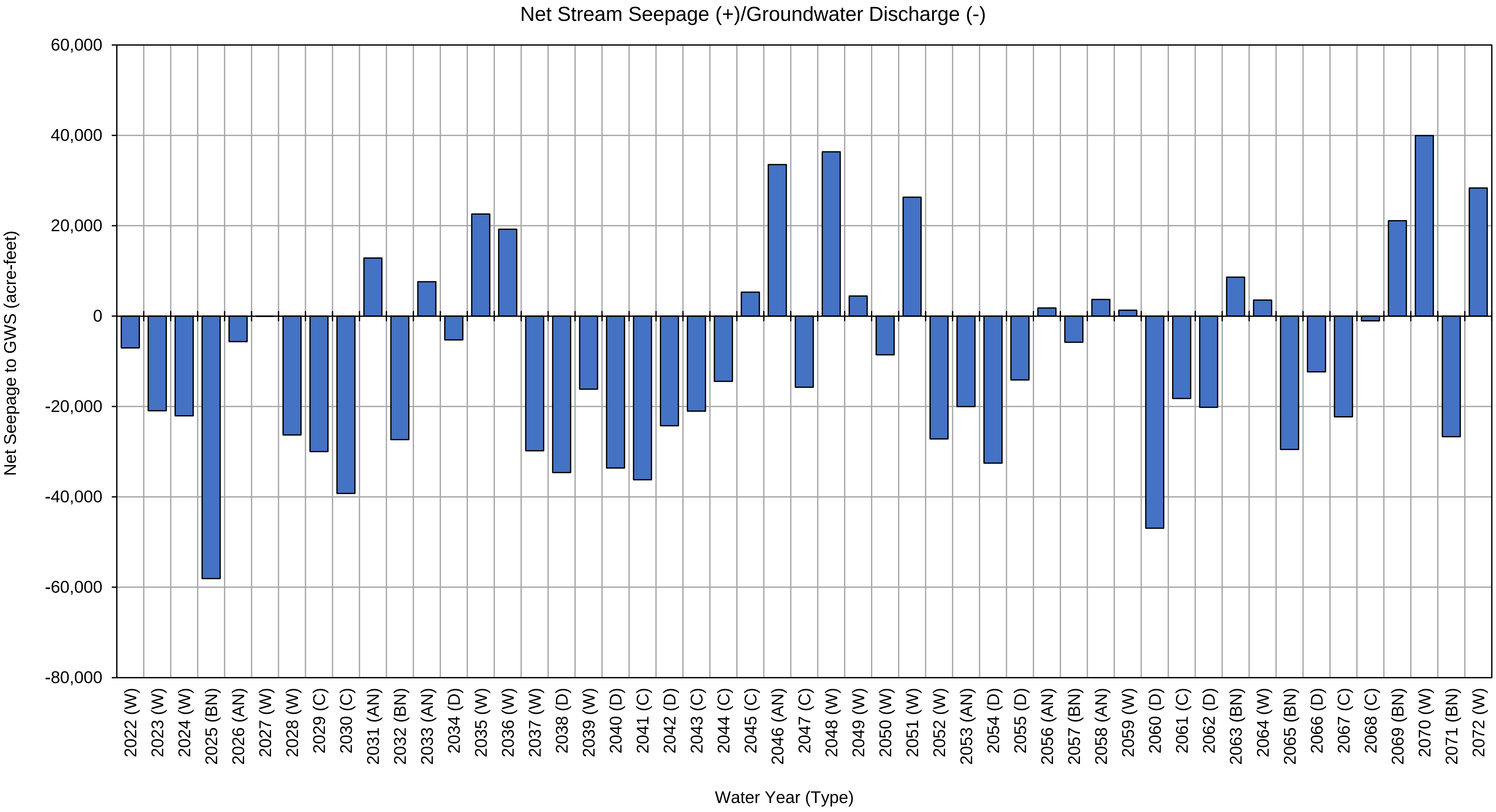
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-7,000	100,000	-120,000	-5,900	91,000	58,000	58,000
2023 (W)	-21,000	92,000	-130,000	-7,600	88,000	24,000	82,000
2024 (W)	-22,000	92,000	-130,000	-8,200	86,000	21,000	100,000
2025 (BN)	-58,000	31,000	-150,000	-4,900	76,000	-100,000	1,000
2026 (AN)	-5,600	89,000	-110,000	-5,800	80,000	43,000	44,000
2027 (W)	-47	100,000	-120,000	-8,900	83,000	58,000	100,000
2028 (W)	-26,000	64,000	-130,000	-8,500	83,000	-16,000	87,000
2029 (C)	-30,000	43,000	-160,000	-5,800	75,000	-77,000	10,000
2030 (C)	-39,000	25,000	-160,000	-2,900	69,000	-100,000	-92,000
2031 (AN)	13,000	90,000	-120,000	-3,500	73,000	56,000	-37,000
2032 (BN)	-27,000	31,000	-130,000	-3,100	72,000	-62,000	-99,000
2033 (AN)	7,600	68,000	-120,000	-3,500	76,000	29,000	-70,000
2034 (D)	-5,300	61,000	-150,000	-3,700	77,000	-21,000	-91,000
2035 (W)	23,000	99,000	-120,000	-5,400	81,000	79,000	-12,000
2036 (W)	19,000	150,000	-84,000	-10,000	79,000	150,000	140,000
2037 (W)	-30,000	94,000	-120,000	-11,000	77,000	5,900	150,000
2038 (D)	-35,000	63,000	-150,000	-8,600	76,000	-56,000	90,000
2039 (W)	-16,000	90,000	-120,000	-7,600	75,000	17,000	110,000
2040 (D)	-34,000	45,000	-130,000	-6,100	65,000	-61,000	45,000
2041 (C)	-36,000	31,000	-150,000	-3,400	61,000	-94,000	-49,000
2042 (D)	-24,000	31,000	-140,000	-2,300	66,000	-72,000	-120,000
2043 (C)	-21,000	38,000	-140,000	-1,800	64,000	-59,000	-180,000
2044 (C)	-14,000	37,000	-130,000	-1,400	63,000	-50,000	-230,000
2045 (C)	5,300	44,000	-140,000	-1,200	65,000	-31,000	-260,000
2046 (AN)	34,000	88,000	-110,000	-1,900	72,000	78,000	-180,000
2047 (C)	-16,000	37,000	-130,000	-1,800	71,000	-42,000	-230,000
2048 (W)	36,000	120,000	-110,000	-3,100	76,000	120,000	-110,000
2049 (W)	4,400	90,000	-120,000	-4,400	82,000	47,000	-60,000
2050 (W)	-8,600	72,000	-130,000	-5,000	81,000	4,000	-56,000
2051 (W)	26,000	150,000	-85,000	-8,700	78,000	160,000	100,000
2052 (W)	-27,000	68,000	-130,000	-9,000	78,000	-19,000	81,000
2053 (AN)	-20,000	70,000	-120,000	-7,800	73,000	-2,600	79,000
2054 (D)	-33,000	45,000	-130,000	-5,800	63,000	-61,000	18,000
2055 (D)	-14,000	60,000	-150,000	-4,500	69,000	-43,000	-25,000
2056 (AN)	1,800	91,000	-120,000	-4,800	72,000	37,000	11,000
2057 (BN)	-5,800	84,000	-150,000	-5,800	74,000	-4,100	7,200
2058 (AN)	3,700	85,000	-100,000	-6,400	67,000	46,000	53,000
2059 (W)	1,300	100,000	-120,000	-9,000	72,000	47,000	100,000
2060 (D)	-47,000	32,000	-140,000	-5,500	69,000	-94,000	6,300
2061 (C)	-18,000	43,000	-160,000	-3,700	67,000	-75,000	-69,000
2062 (D)	-20,000	34,000	-140,000	-2,500	67,000	-63,000	-130,000
2063 (BN)	8,600	74,000	-110,000	-2,900	67,000	37,000	-95,000
2064 (W)	3,600	65,000	-110,000	-4,000	75,000	30,000	-65,000
2065 (BN)	-30,000	31,000	-130,000	-3,500	74,000	-62,000	-130,000

Red Bluff Subbasin Projected (Future Land Use) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-12,000	47,000	-160,000	-2,600	79,000	-47,000	-170,000
2067 (C)		-22,000	26,000	-160,000	-1,400	75,000	-82,000	-260,000
2068 (C)		-1,000	54,000	-160,000	-1,000	70,000	-42,000	-300,000
2069 (BN)		21,000	64,000	-140,000	-1,100	74,000	19,000	-280,000
2070 (W)		40,000	110,000	-120,000	-2,500	84,000	100,000	-180,000
2071 (BN)		-27,000	30,000	-150,000	-1,800	81,000	-65,000	-240,000
2072 (W)		28,000	95,000	-110,000	-2,800	85,000	93,000	-150,000
Average (2022-2072)		-9,300	68,000	-130,000	-4,800	74,000	-2,900	
2022-2072	W	1,300	97,000	-120,000	-6,800	81,000		
	AN	4,800	83,000	-120,000	-4,800	73,000		
	BN	-17,000	49,000	-140,000	-3,300	74,000		
	D	-25,000	46,000	-140,000	-4,600	70,000		
	C	-19,000	38,000	-150,000	-2,400	68,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-7,000
2023 (W)	-21,000
2024 (W)	-22,000
2025 (BN)	-58,000
2026 (AN)	-5,600
2027 (W)	-47
2028 (W)	-26,000
2029 (C)	-30,000
2030 (C)	-39,000
2031 (AN)	13,000
2032 (BN)	-27,000
2033 (AN)	7,600
2034 (D)	-5,300
2035 (W)	23,000
2036 (W)	19,000
2037 (W)	-30,000
2038 (D)	-35,000
2039 (W)	-16,000
2040 (D)	-34,000
2041 (C)	-36,000
2042 (D)	-24,000
2043 (C)	-21,000
2044 (C)	-14,000
2045 (C)	5,300
2046 (AN)	34,000
2047 (C)	-16,000
2048 (W)	36,000
2049 (W)	4,400
2050 (W)	-8,600
2051 (W)	26,000
2052 (W)	-27,000
2053 (AN)	-20,000
2054 (D)	-33,000
2055 (D)	-14,000
2056 (AN)	1,800
2057 (BN)	-5,800
2058 (AN)	3,700
2059 (W)	1,300
2060 (D)	-47,000
2061 (C)	-18,000
2062 (D)	-20,000
2063 (BN)	8,600

Red Bluff Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		3,600
2065 (BN)		-30,000
2066 (D)		-12,000
2067 (C)		-22,000
2068 (C)		-1,000
2069 (BN)		21,000
2070 (W)		40,000
2071 (BN)		-27,000
2072 (W)		28,000
Average (2022-2072)		-9,300
2022-2072	W	1,300
	AN	4,800
	BN	-17,000
	D	-25,000
	C	-19,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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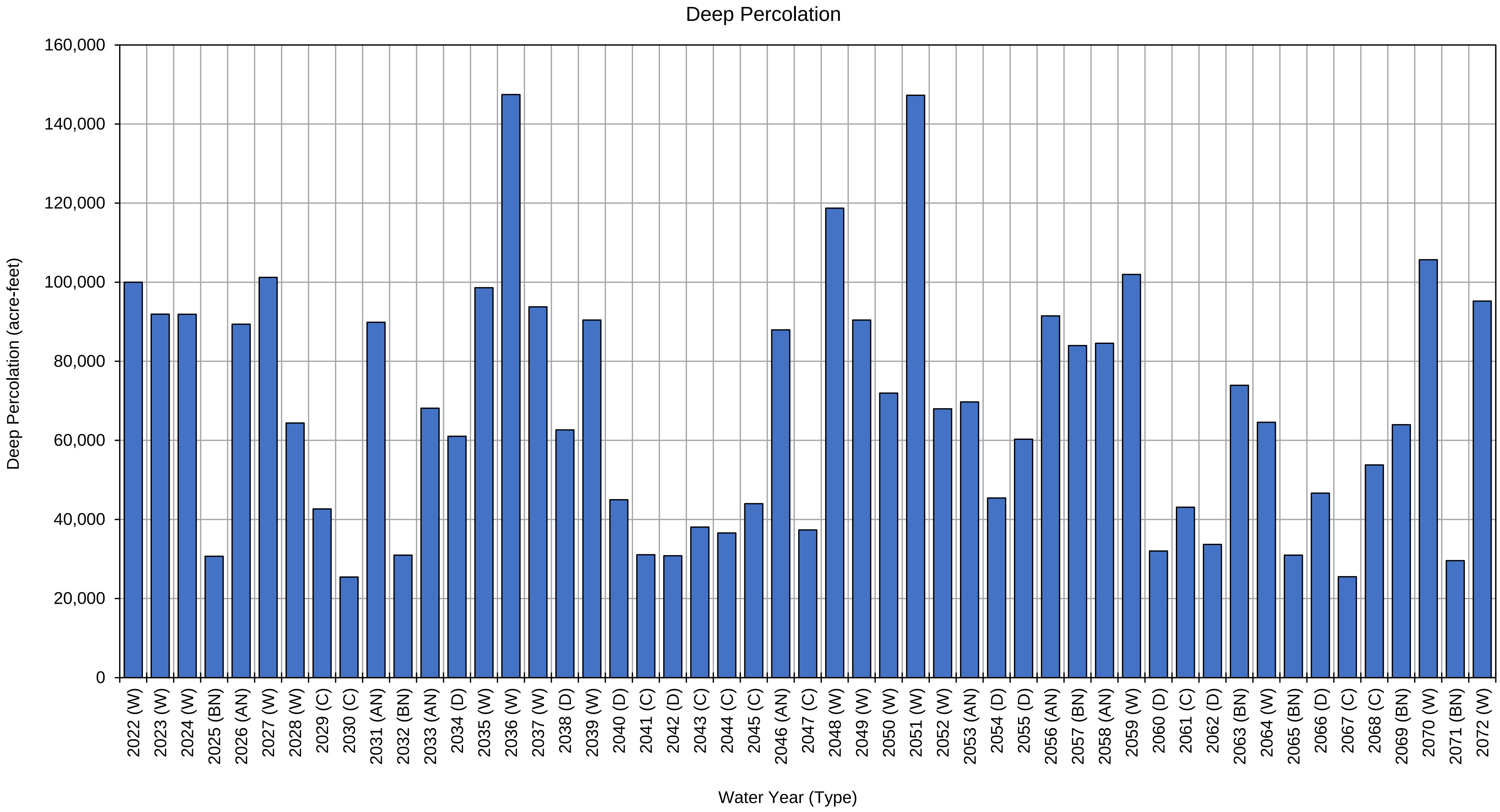

Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)	Deep Percolation from the SWS
2022 (W)	100,000
2023 (W)	92,000
2024 (W)	92,000
2025 (BN)	31,000
2026 (AN)	89,000
2027 (W)	100,000
2028 (W)	64,000
2029 (C)	43,000
2030 (C)	25,000
2031 (AN)	90,000
2032 (BN)	31,000
2033 (AN)	68,000
2034 (D)	61,000
2035 (W)	99,000
2036 (W)	150,000
2037 (W)	94,000
2038 (D)	63,000
2039 (W)	90,000
2040 (D)	45,000
2041 (C)	31,000
2042 (D)	31,000
2043 (C)	38,000
2044 (C)	37,000
2045 (C)	44,000
2046 (AN)	88,000
2047 (C)	37,000
2048 (W)	120,000
2049 (W)	90,000
2050 (W)	72,000
2051 (W)	150,000
2052 (W)	68,000
2053 (AN)	70,000
2054 (D)	45,000
2055 (D)	60,000
2056 (AN)	91,000
2057 (BN)	84,000
2058 (AN)	85,000
2059 (W)	100,000
2060 (D)	32,000
2061 (C)	43,000
2062 (D)	34,000
2063 (BN)	74,000

Red Bluff Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		65,000
2065 (BN)		31,000
2066 (D)		47,000
2067 (C)		26,000
2068 (C)		54,000
2069 (BN)		64,000
2070 (W)		110,000
2071 (BN)		30,000
2072 (W)		95,000
Average (2022-2072)		68,000
2022-2072	W	97,000
	AN	83,000
	BN	49,000
	D	46,000
	C	38,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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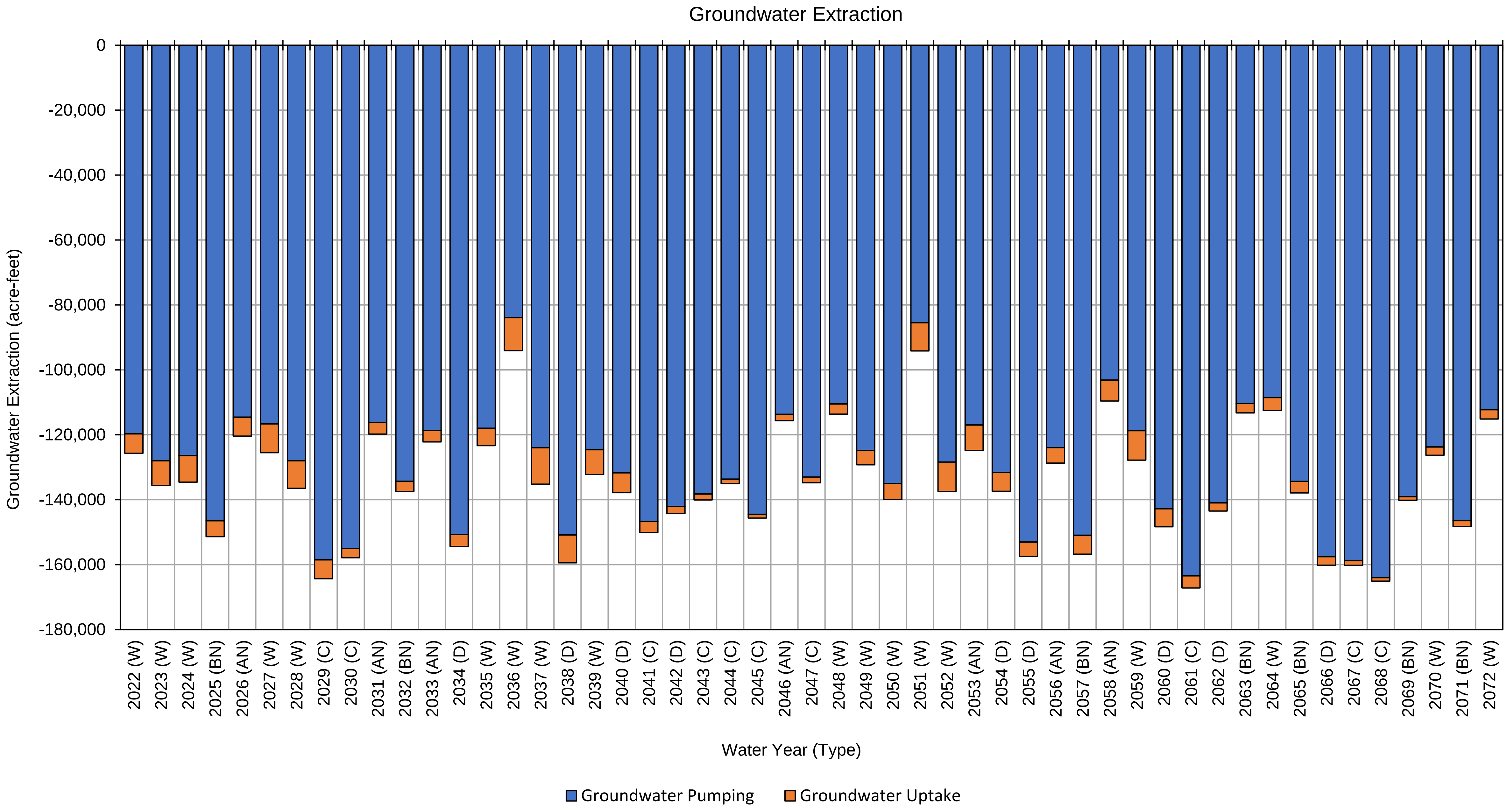
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-120,000	-5,900	-130,000
2023 (W)	-130,000	-7,600	-140,000
2024 (W)	-130,000	-8,200	-130,000
2025 (BN)	-150,000	-4,900	-150,000
2026 (AN)	-110,000	-5,800	-120,000
2027 (W)	-120,000	-8,900	-130,000
2028 (W)	-130,000	-8,500	-140,000
2029 (C)	-160,000	-5,800	-160,000
2030 (C)	-160,000	-2,900	-160,000
2031 (AN)	-120,000	-3,500	-120,000
2032 (BN)	-130,000	-3,100	-140,000
2033 (AN)	-120,000	-3,500	-120,000
2034 (D)	-150,000	-3,700	-150,000
2035 (W)	-120,000	-5,400	-120,000
2036 (W)	-84,000	-10,000	-94,000
2037 (W)	-120,000	-11,000	-140,000
2038 (D)	-150,000	-8,600	-160,000
2039 (W)	-120,000	-7,600	-130,000
2040 (D)	-130,000	-6,100	-140,000
2041 (C)	-150,000	-3,400	-150,000
2042 (D)	-140,000	-2,300	-140,000
2043 (C)	-140,000	-1,800	-140,000
2044 (C)	-130,000	-1,400	-140,000
2045 (C)	-140,000	-1,200	-150,000
2046 (AN)	-110,000	-1,900	-120,000
2047 (C)	-130,000	-1,800	-130,000
2048 (W)	-110,000	-3,100	-110,000
2049 (W)	-120,000	-4,400	-130,000
2050 (W)	-130,000	-5,000	-140,000
2051 (W)	-85,000	-8,700	-94,000
2052 (W)	-130,000	-9,000	-140,000
2053 (AN)	-120,000	-7,800	-120,000
2054 (D)	-130,000	-5,800	-140,000
2055 (D)	-150,000	-4,500	-160,000
2056 (AN)	-120,000	-4,800	-130,000
2057 (BN)	-150,000	-5,800	-160,000
2058 (AN)	-100,000	-6,400	-110,000
2059 (W)	-120,000	-9,000	-130,000
2060 (D)	-140,000	-5,500	-150,000
2061 (C)	-160,000	-3,700	-170,000
2062 (D)	-140,000	-2,500	-140,000
2063 (BN)	-110,000	-2,900	-110,000

Red Bluff Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-110,000	-4,000	-110,000
2065 (BN)		-130,000	-3,500	-140,000
2066 (D)		-160,000	-2,600	-160,000
2067 (C)		-160,000	-1,400	-160,000
2068 (C)		-160,000	-1,000	-170,000
2069 (BN)		-140,000	-1,100	-140,000
2070 (W)		-120,000	-2,500	-130,000
2071 (BN)		-150,000	-1,800	-150,000
2072 (W)		-110,000	-2,800	-120,000
Average (2022-2072)		-130,000	-4,800	-140,000
2022-2072	W	-120,000	-6,800	-120,000
	AN	-120,000	-4,800	-120,000
	BN	-140,000	-3,300	-140,000
	D	-140,000	-4,600	-150,000
	C	-150,000	-2,400	-150,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
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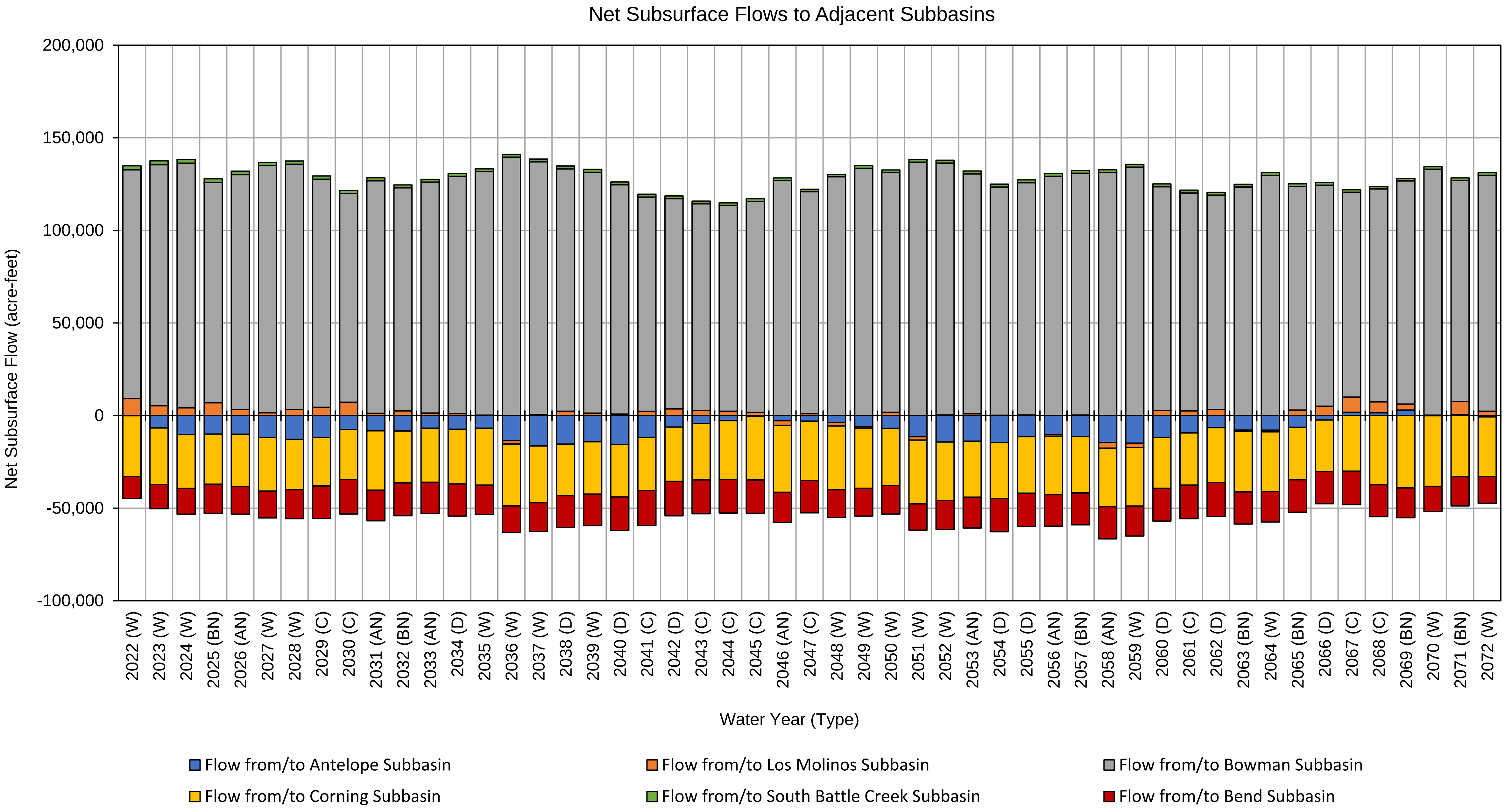
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

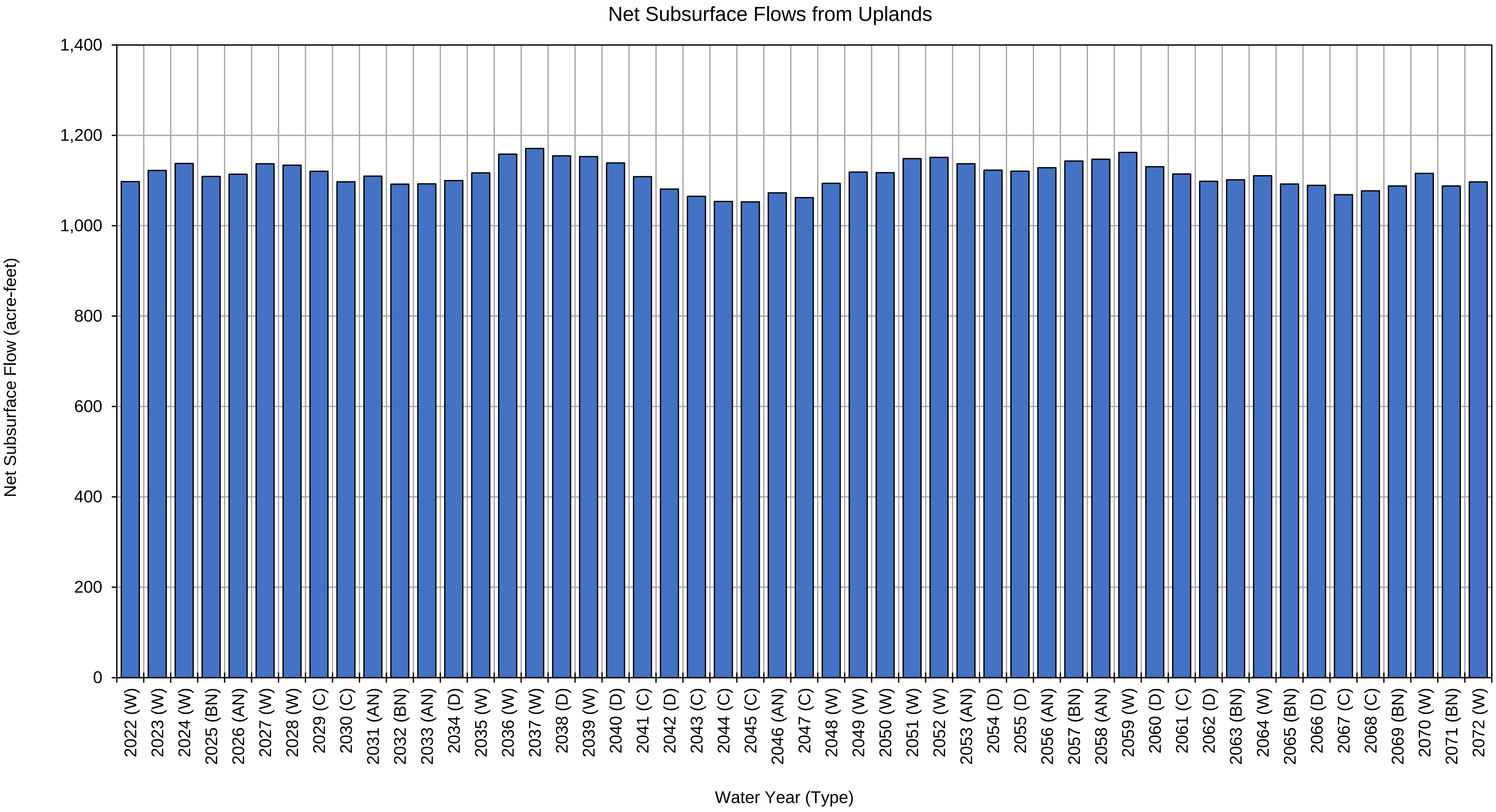
WY (Type)	Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-88	9,200	120,000	-33,000	2,200	-12,000	90,000
2023 (W)	-6,700	5,300	130,000	-30,000	2,100	-13,000	87,000
2024 (W)	-10,000	4,200	130,000	-29,000	2,000	-14,000	85,000
2025 (BN)	-10,000	6,900	120,000	-27,000	2,000	-16,000	75,000
2026 (AN)	-10,000	3,200	130,000	-28,000	1,900	-15,000	79,000
2027 (W)	-12,000	1,500	130,000	-29,000	1,800	-15,000	81,000
2028 (W)	-13,000	3,200	130,000	-27,000	1,700	-16,000	82,000
2029 (C)	-12,000	4,400	120,000	-26,000	1,700	-18,000	74,000
2030 (C)	-7,500	7,200	110,000	-27,000	1,700	-19,000	68,000
2031 (AN)	-8,200	1,200	130,000	-32,000	1,600	-17,000	72,000
2032 (BN)	-8,300	2,600	120,000	-28,000	1,600	-18,000	70,000
2033 (AN)	-6,900	1,400	120,000	-29,000	1,500	-17,000	75,000
2034 (D)	-7,400	1,100	130,000	-29,000	1,500	-17,000	76,000
2035 (W)	-6,900	240	130,000	-31,000	1,400	-16,000	80,000
2036 (W)	-14,000	-1,800	140,000	-33,000	1,500	-14,000	78,000
2037 (W)	-16,000	630	140,000	-31,000	1,500	-16,000	76,000
2038 (D)	-15,000	2,400	130,000	-28,000	1,600	-17,000	74,000
2039 (W)	-14,000	1,300	130,000	-28,000	1,600	-17,000	74,000
2040 (D)	-16,000	830	120,000	-28,000	1,600	-18,000	64,000
2041 (C)	-12,000	2,300	120,000	-29,000	1,500	-19,000	60,000
2042 (D)	-6,200	3,600	110,000	-29,000	1,500	-19,000	64,000
2043 (C)	-4,300	2,800	110,000	-30,000	1,400	-18,000	63,000
2044 (C)	-2,700	2,400	110,000	-32,000	1,400	-18,000	62,000
2045 (C)	-590	1,700	110,000	-34,000	1,400	-18,000	64,000
2046 (AN)	-2,800	-2,600	130,000	-36,000	1,300	-16,000	71,000
2047 (C)	-3,000	970	120,000	-32,000	1,300	-17,000	70,000
2048 (W)	-3,800	-1,900	130,000	-34,000	1,300	-15,000	75,000
2049 (W)	-6,100	-770	130,000	-32,000	1,400	-15,000	81,000
2050 (W)	-6,900	1,700	130,000	-31,000	1,400	-15,000	79,000
2051 (W)	-11,000	-1,800	140,000	-34,000	1,400	-14,000	76,000
2052 (W)	-14,000	350	140,000	-32,000	1,500	-16,000	76,000
2053 (AN)	-14,000	940	130,000	-30,000	1,500	-17,000	71,000
2054 (D)	-15,000	180	120,000	-30,000	1,600	-18,000	62,000
2055 (D)	-11,000	330	130,000	-31,000	1,500	-18,000	67,000
2056 (AN)	-10,000	-800	130,000	-32,000	1,500	-17,000	71,000
2057 (BN)	-11,000	270	130,000	-31,000	1,500	-17,000	73,000
2058 (AN)	-15,000	-3,100	130,000	-32,000	1,500	-17,000	66,000
2059 (W)	-15,000	-2,300	130,000	-32,000	1,500	-16,000	71,000
2060 (D)	-12,000	2,800	120,000	-27,000	1,500	-18,000	68,000
2061 (C)	-9,400	2,500	120,000	-28,000	1,500	-18,000	66,000
2062 (D)	-6,500	3,400	120,000	-30,000	1,500	-18,000	66,000
2063 (BN)	-7,900	-620	120,000	-33,000	1,400	-17,000	66,000
2064 (W)	-7,900	-840	130,000	-32,000	1,400	-17,000	74,000
2065 (BN)	-6,400	3,000	120,000	-28,000	1,400	-18,000	73,000
2066 (D)	-2,400	5,000	120,000	-28,000	1,400	-17,000	78,000
2067 (C)	1,800	8,200	110,000	-30,000	1,400	-18,000	74,000
2068 (C)	1,500	6,000	110,000	-37,000	1,400	-17,000	69,000
2069 (BN)	3,000	3,200	120,000	-39,000	1,400	-16,000	73,000
2070 (W)	-83	230	130,000	-38,000	1,300	-14,000	83,000
2071 (BN)	500	7,000	120,000	-33,000	1,400	-16,000	80,000
2072 (W)	-710	2,400	130,000	-32,000	1,400	-14,000	84,000

Red Bluff Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
Average (2022-2072)		-8,000	2,000	130,000	-31,000	1,500	-16,000	73,000
2022-2072	W	-8,800	1,200	130,000	-32,000	1,600	-15,000	80,000
	AN	-9,500	44	130,000	-31,000	1,500	-17,000	72,000
	BN	-5,800	3,200	120,000	-31,000	1,500	-17,000	73,000
	D	-10,000	2,200	120,000	-29,000	1,500	-18,000	69,000
	C	-4,800	3,900	120,000	-31,000	1,500	-18,000	67,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

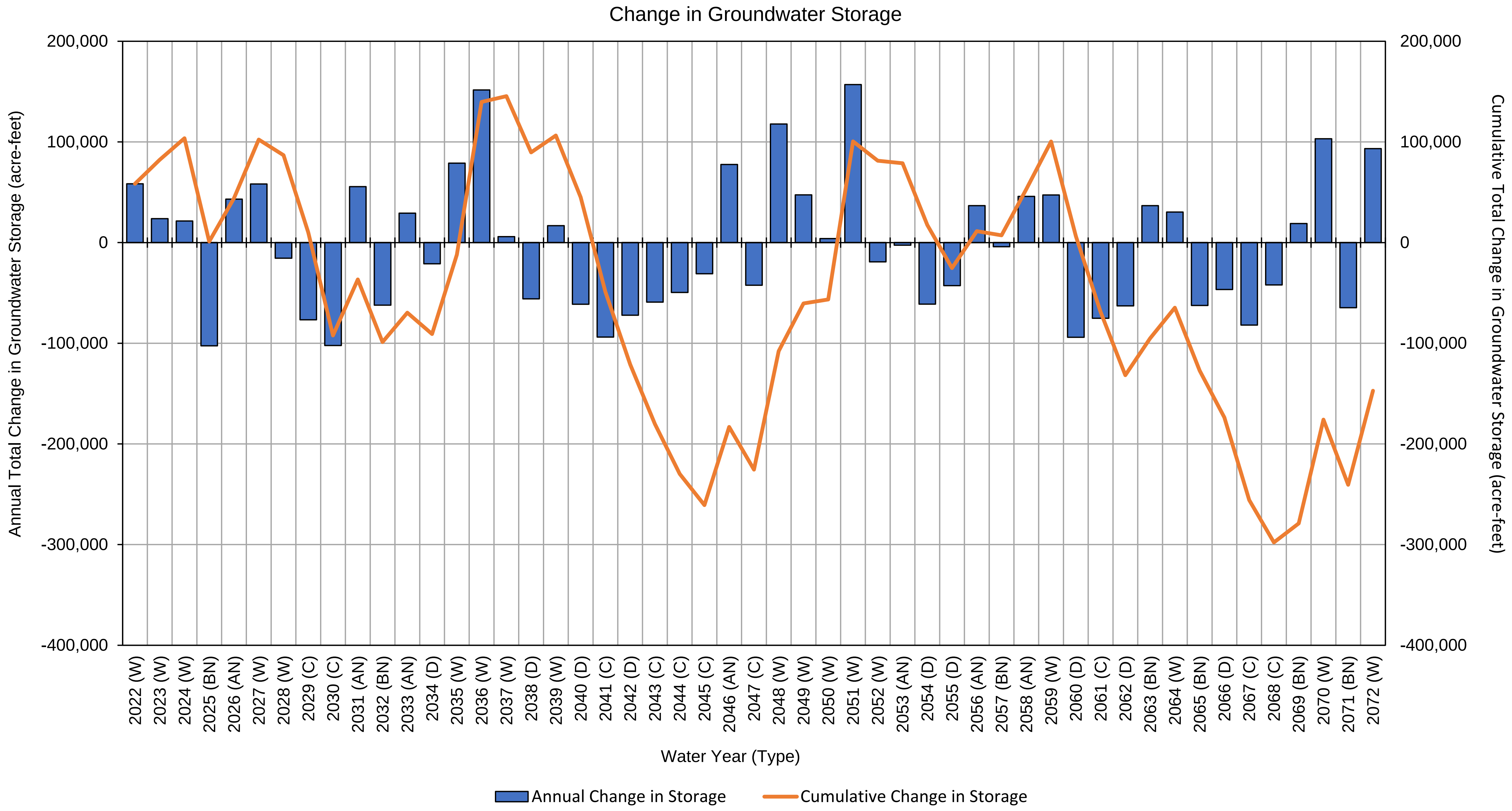
WY (Type)	Subsurface Flows from Uplands
2022 (W)	1,100
2023 (W)	1,100
2024 (W)	1,100
2025 (BN)	1,100
2026 (AN)	1,100
2027 (W)	1,100
2028 (W)	1,100
2029 (C)	1,100
2030 (C)	1,100
2031 (AN)	1,100
2032 (BN)	1,100
2033 (AN)	1,100
2034 (D)	1,100
2035 (W)	1,100
2036 (W)	1,200
2037 (W)	1,200
2038 (D)	1,200
2039 (W)	1,200
2040 (D)	1,100
2041 (C)	1,100
2042 (D)	1,100
2043 (C)	1,100
2044 (C)	1,100
2045 (C)	1,100
2046 (AN)	1,100
2047 (C)	1,100
2048 (W)	1,100
2049 (W)	1,100
2050 (W)	1,100
2051 (W)	1,100
2052 (W)	1,200
2053 (AN)	1,100
2054 (D)	1,100
2055 (D)	1,100
2056 (AN)	1,100
2057 (BN)	1,100
2058 (AN)	1,100
2059 (W)	1,200
2060 (D)	1,100
2061 (C)	1,100
2062 (D)	1,100
2063 (BN)	1,100

Red Bluff Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		1,100
2065 (BN)		1,100
2066 (D)		1,100
2067 (C)		1,100
2068 (C)		1,100
2069 (BN)		1,100
2070 (W)		1,100
2071 (BN)		1,100
2072 (W)		1,100
Average (2022-2072)		1,100
2022-2072	W	1,100
	AN	1,100
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use)

Red Bluff Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	58,000	58,000
2023 (W)	24,000	82,000
2024 (W)	21,000	100,000
2025 (BN)	-100,000	1,000
2026 (AN)	43,000	44,000
2027 (W)	58,000	100,000
2028 (W)	-16,000	87,000
2029 (C)	-77,000	10,000
2030 (C)	-100,000	-92,000
2031 (AN)	56,000	-37,000
2032 (BN)	-62,000	-99,000
2033 (AN)	29,000	-70,000
2034 (D)	-21,000	-91,000
2035 (W)	79,000	-12,000
2036 (W)	150,000	140,000
2037 (W)	5,900	150,000
2038 (D)	-56,000	90,000
2039 (W)	17,000	110,000
2040 (D)	-61,000	45,000
2041 (C)	-94,000	-49,000
2042 (D)	-72,000	-120,000
2043 (C)	-59,000	-180,000
2044 (C)	-50,000	-230,000
2045 (C)	-31,000	-260,000
2046 (AN)	78,000	-180,000
2047 (C)	-42,000	-230,000
2048 (W)	120,000	-110,000
2049 (W)	47,000	-60,000
2050 (W)	4,000	-56,000
2051 (W)	160,000	100,000
2052 (W)	-19,000	81,000
2053 (AN)	-2,600	79,000
2054 (D)	-61,000	18,000
2055 (D)	-43,000	-25,000
2056 (AN)	37,000	11,000
2057 (BN)	-4,100	7,200
2058 (AN)	46,000	53,000
2059 (W)	47,000	100,000
2060 (D)	-94,000	6,300
2061 (C)	-75,000	-69,000
2062 (D)	-63,000	-130,000
2063 (BN)	37,000	-95,000

Red Bluff Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">2064 (W)</td><td>30,000</td><td>-65,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>-62,000</td><td>-130,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>-47,000</td><td>-170,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>-82,000</td><td>-260,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>-42,000</td><td>-300,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>19,000</td><td>-280,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>100,000</td><td>-180,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>-65,000</td><td>-240,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>93,000</td><td>-150,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>-2,900</td><td></td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

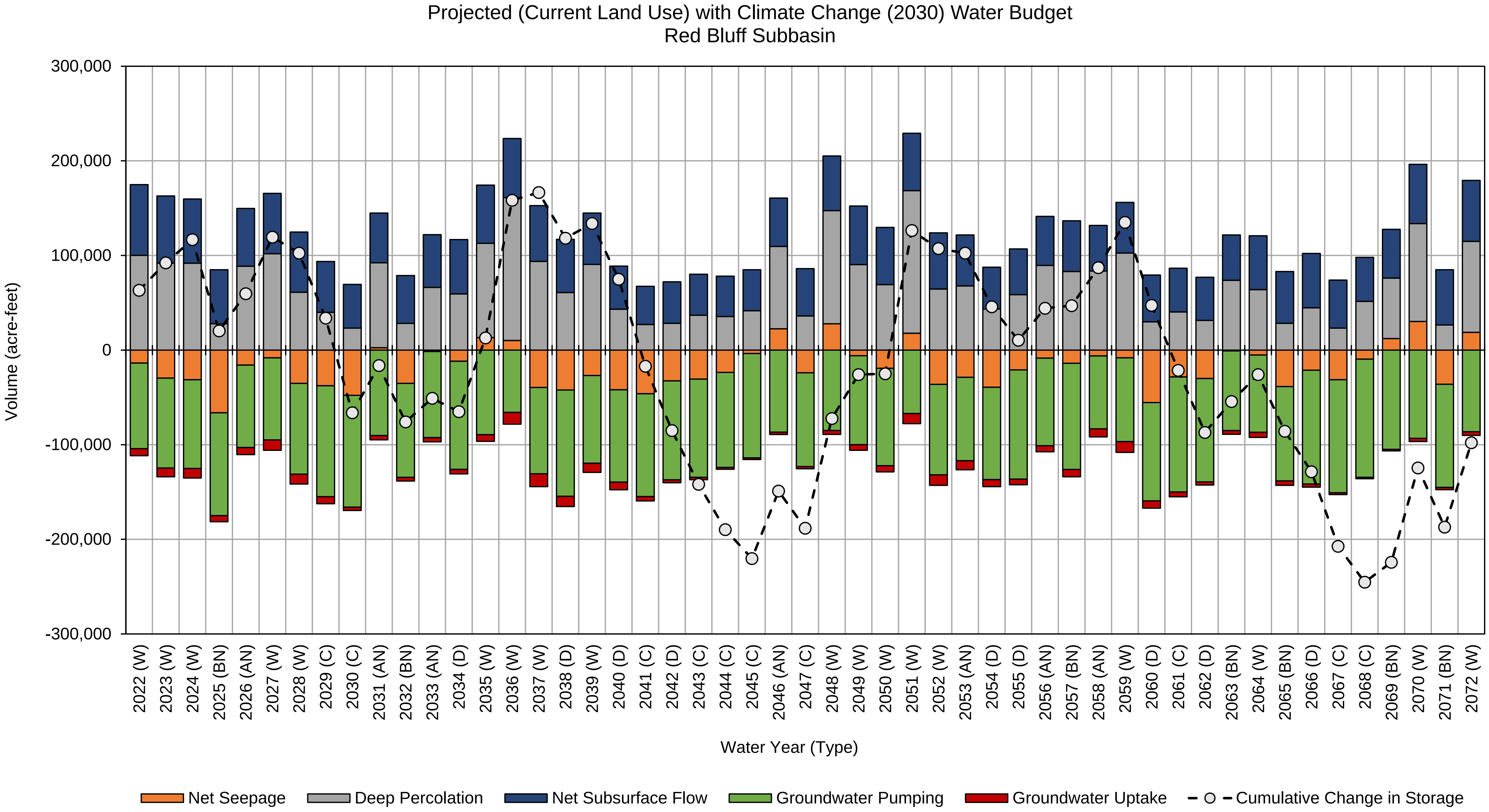
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-4

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2030) Model Results



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

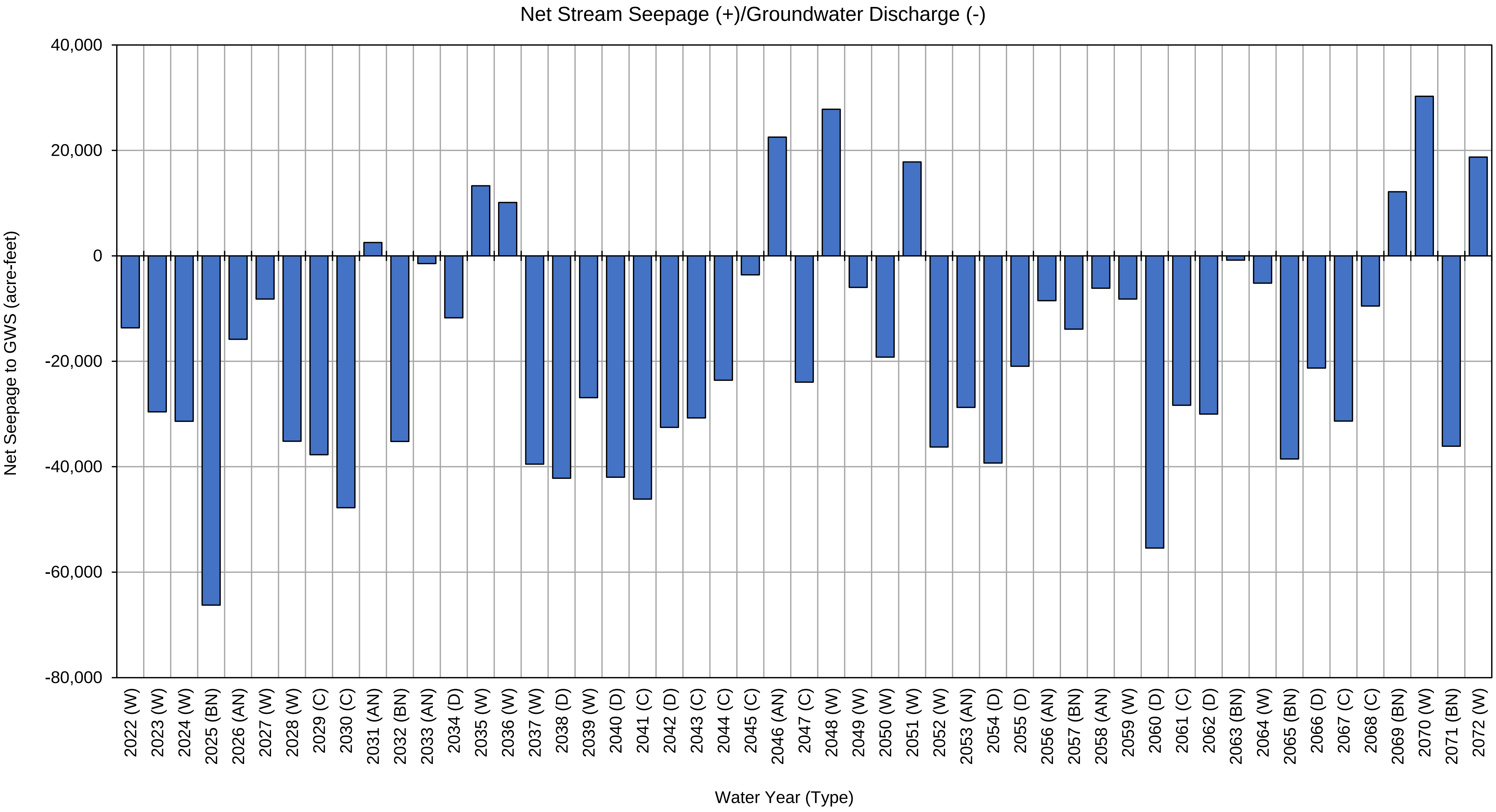
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-14,000	100,000	-91,000	-7,400	75,000	63,000	63,000
2023 (W)	-30,000	92,000	-95,000	-9,300	71,000	29,000	92,000
2024 (W)	-31,000	92,000	-94,000	-10,000	68,000	25,000	120,000
2025 (BN)	-66,000	28,000	-110,000	-6,500	57,000	-96,000	20,000
2026 (AN)	-16,000	89,000	-87,000	-7,400	61,000	39,000	60,000
2027 (W)	-8,200	100,000	-87,000	-11,000	64,000	60,000	120,000
2028 (W)	-35,000	61,000	-96,000	-10,000	64,000	-17,000	100,000
2029 (C)	-38,000	40,000	-120,000	-7,400	54,000	-69,000	34,000
2030 (C)	-48,000	23,000	-120,000	-3,600	46,000	-100,000	-66,000
2031 (AN)	2,500	90,000	-90,000	-4,600	53,000	50,000	-16,000
2032 (BN)	-35,000	28,000	-99,000	-3,900	51,000	-60,000	-76,000
2033 (AN)	-1,500	66,000	-91,000	-4,500	56,000	25,000	-51,000
2034 (D)	-12,000	59,000	-110,000	-4,800	57,000	-14,000	-65,000
2035 (W)	13,000	100,000	-89,000	-7,000	62,000	78,000	13,000
2036 (W)	10,000	150,000	-66,000	-12,000	63,000	150,000	160,000
2037 (W)	-40,000	94,000	-91,000	-14,000	59,000	8,300	170,000
2038 (D)	-42,000	61,000	-110,000	-11,000	56,000	-48,000	120,000
2039 (W)	-27,000	91,000	-93,000	-9,700	54,000	16,000	130,000
2040 (D)	-42,000	43,000	-98,000	-8,100	45,000	-59,000	75,000
2041 (C)	-46,000	27,000	-110,000	-4,500	40,000	-92,000	-17,000
2042 (D)	-33,000	28,000	-100,000	-3,000	44,000	-68,000	-85,000
2043 (C)	-31,000	37,000	-100,000	-2,500	43,000	-57,000	-140,000
2044 (C)	-24,000	35,000	-100,000	-1,900	43,000	-48,000	-190,000
2045 (C)	-3,600	42,000	-110,000	-1,700	43,000	-31,000	-220,000
2046 (AN)	23,000	87,000	-87,000	-2,500	51,000	71,000	-150,000
2047 (C)	-24,000	36,000	-99,000	-2,300	50,000	-39,000	-190,000
2048 (W)	28,000	120,000	-85,000	-4,200	58,000	120,000	-72,000
2049 (W)	-6,000	90,000	-94,000	-5,900	62,000	46,000	-26,000
2050 (W)	-19,000	69,000	-100,000	-6,500	60,000	890	-25,000
2051 (W)	18,000	150,000	-67,000	-11,000	61,000	150,000	130,000
2052 (W)	-36,000	65,000	-96,000	-11,000	59,000	-19,000	110,000
2053 (AN)	-29,000	68,000	-88,000	-9,500	54,000	-4,800	100,000
2054 (D)	-39,000	43,000	-98,000	-7,400	44,000	-57,000	46,000
2055 (D)	-21,000	59,000	-120,000	-5,900	48,000	-35,000	10,000
2056 (AN)	-8,500	90,000	-93,000	-6,300	52,000	34,000	44,000
2057 (BN)	-14,000	83,000	-110,000	-7,700	54,000	2,700	47,000
2058 (AN)	-6,100	84,000	-77,000	-8,500	48,000	40,000	87,000
2059 (W)	-8,200	100,000	-89,000	-11,000	53,000	48,000	140,000
2060 (D)	-55,000	30,000	-100,000	-7,600	50,000	-88,000	47,000
2061 (C)	-28,000	40,000	-120,000	-5,100	46,000	-69,000	-21,000
2062 (D)	-30,000	31,000	-110,000	-3,300	46,000	-66,000	-87,000
2063 (BN)	-810	74,000	-84,000	-3,900	48,000	33,000	-54,000
2064 (W)	-5,200	64,000	-82,000	-5,400	57,000	28,000	-26,000
2065 (BN)	-39,000	28,000	-100,000	-4,700	55,000	-60,000	-86,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-21,000	45,000	-120,000	-3,300	57,000	-43,000	-130,000
2067 (C)		-31,000	23,000	-120,000	-1,900	51,000	-79,000	-210,000
2068 (C)		-9,500	52,000	-120,000	-1,500	46,000	-38,000	-250,000
2069 (BN)		12,000	64,000	-100,000	-1,600	51,000	21,000	-220,000
2070 (W)		30,000	100,000	-93,000	-3,400	63,000	100,000	-120,000
2071 (BN)		-36,000	27,000	-110,000	-2,400	58,000	-63,000	-190,000
2072 (W)		19,000	96,000	-86,000	-3,800	65,000	89,000	-98,000
Average (2022-2072)		-18,000	67,000	-99,000	-6,200	54,000	-1,900	
2022-2072	W	-7,800	97,000	-89,000	-8,500	62,000		
	AN	-5,100	82,000	-88,000	-6,200	53,000		
	BN	-26,000	47,000	-100,000	-4,400	53,000		
	D	-33,000	44,000	-110,000	-6,000	50,000		
	C	-28,000	36,000	-110,000	-3,200	46,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

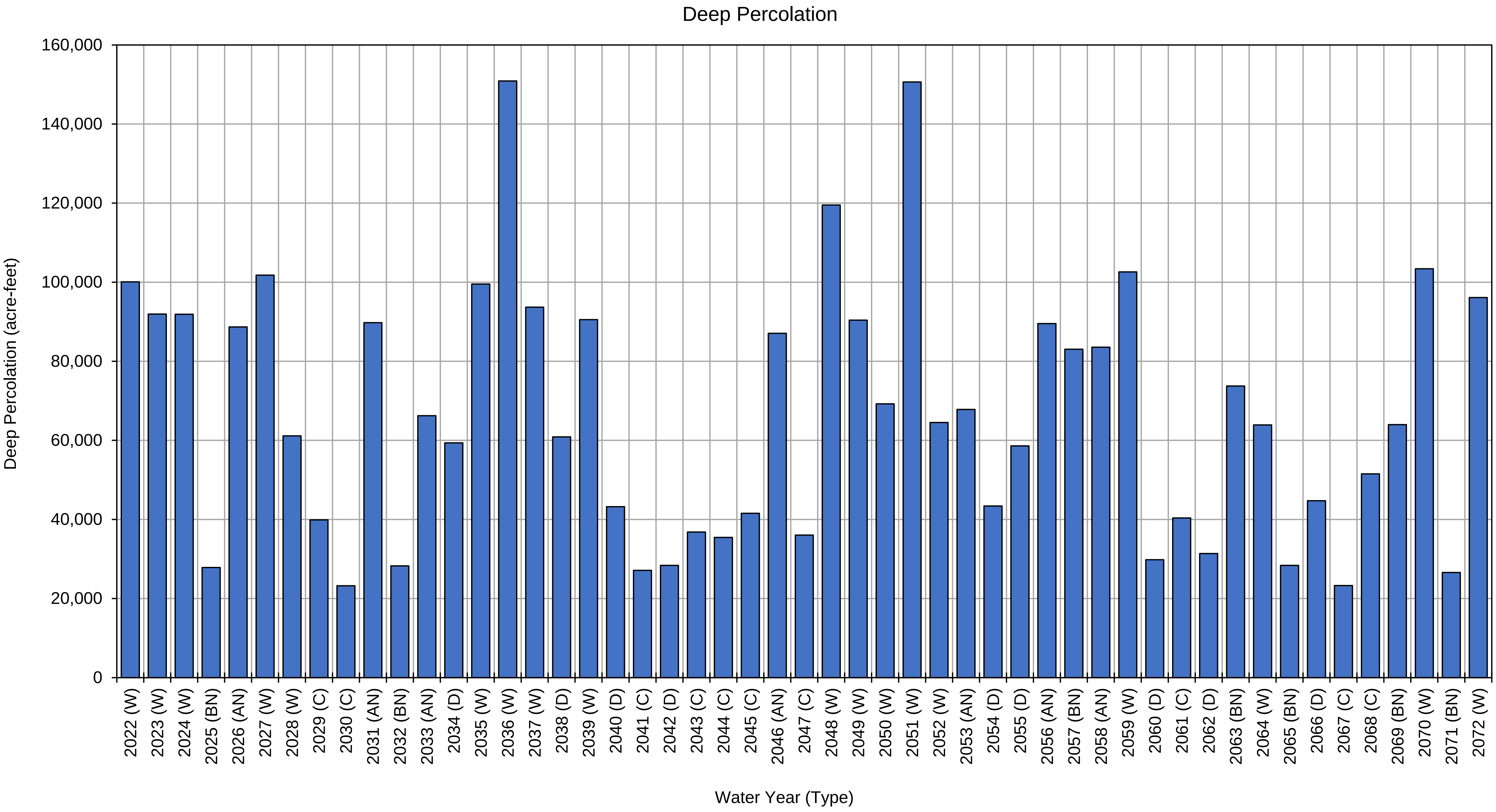
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-14,000
2023 (W)	-30,000
2024 (W)	-31,000
2025 (BN)	-66,000
2026 (AN)	-16,000
2027 (W)	-8,200
2028 (W)	-35,000
2029 (C)	-38,000
2030 (C)	-48,000
2031 (AN)	2,500
2032 (BN)	-35,000
2033 (AN)	-1,500
2034 (D)	-12,000
2035 (W)	13,000
2036 (W)	10,000
2037 (W)	-40,000
2038 (D)	-42,000
2039 (W)	-27,000
2040 (D)	-42,000
2041 (C)	-46,000
2042 (D)	-33,000
2043 (C)	-31,000
2044 (C)	-24,000
2045 (C)	-3,600
2046 (AN)	23,000
2047 (C)	-24,000
2048 (W)	28,000
2049 (W)	-6,000
2050 (W)	-19,000
2051 (W)	18,000
2052 (W)	-36,000
2053 (AN)	-29,000
2054 (D)	-39,000
2055 (D)	-21,000
2056 (AN)	-8,500
2057 (BN)	-14,000
2058 (AN)	-6,100
2059 (W)	-8,200
2060 (D)	-55,000
2061 (C)	-28,000
2062 (D)	-30,000
2063 (BN)	-810

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-5,200
2065 (BN)		-39,000
2066 (D)		-21,000
2067 (C)		-31,000
2068 (C)		-9,500
2069 (BN)		12,000
2070 (W)		30,000
2071 (BN)		-36,000
2072 (W)		19,000
Average (2022-2072)		-18,000
2022-2072	W	-7,800
	AN	-5,100
	BN	-26,000
	D	-33,000
	C	-28,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)	Deep Percolation from the SWS
2022 (W)	100,000
2023 (W)	92,000
2024 (W)	92,000
2025 (BN)	28,000
2026 (AN)	89,000
2027 (W)	100,000
2028 (W)	61,000
2029 (C)	40,000
2030 (C)	23,000
2031 (AN)	90,000
2032 (BN)	28,000
2033 (AN)	66,000
2034 (D)	59,000
2035 (W)	100,000
2036 (W)	150,000
2037 (W)	94,000
2038 (D)	61,000
2039 (W)	91,000
2040 (D)	43,000
2041 (C)	27,000
2042 (D)	28,000
2043 (C)	37,000
2044 (C)	35,000
2045 (C)	42,000
2046 (AN)	87,000
2047 (C)	36,000
2048 (W)	120,000
2049 (W)	90,000
2050 (W)	69,000
2051 (W)	150,000
2052 (W)	65,000
2053 (AN)	68,000
2054 (D)	43,000
2055 (D)	59,000
2056 (AN)	90,000
2057 (BN)	83,000
2058 (AN)	84,000
2059 (W)	100,000
2060 (D)	30,000
2061 (C)	40,000
2062 (D)	31,000
2063 (BN)	74,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		64,000
2065 (BN)		28,000
2066 (D)		45,000
2067 (C)		23,000
2068 (C)		52,000
2069 (BN)		64,000
2070 (W)		100,000
2071 (BN)		27,000
2072 (W)		96,000
Average (2022-2072)		67,000
2022-2072	W	97,000
	AN	82,000
	BN	47,000
	D	44,000
	C	36,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
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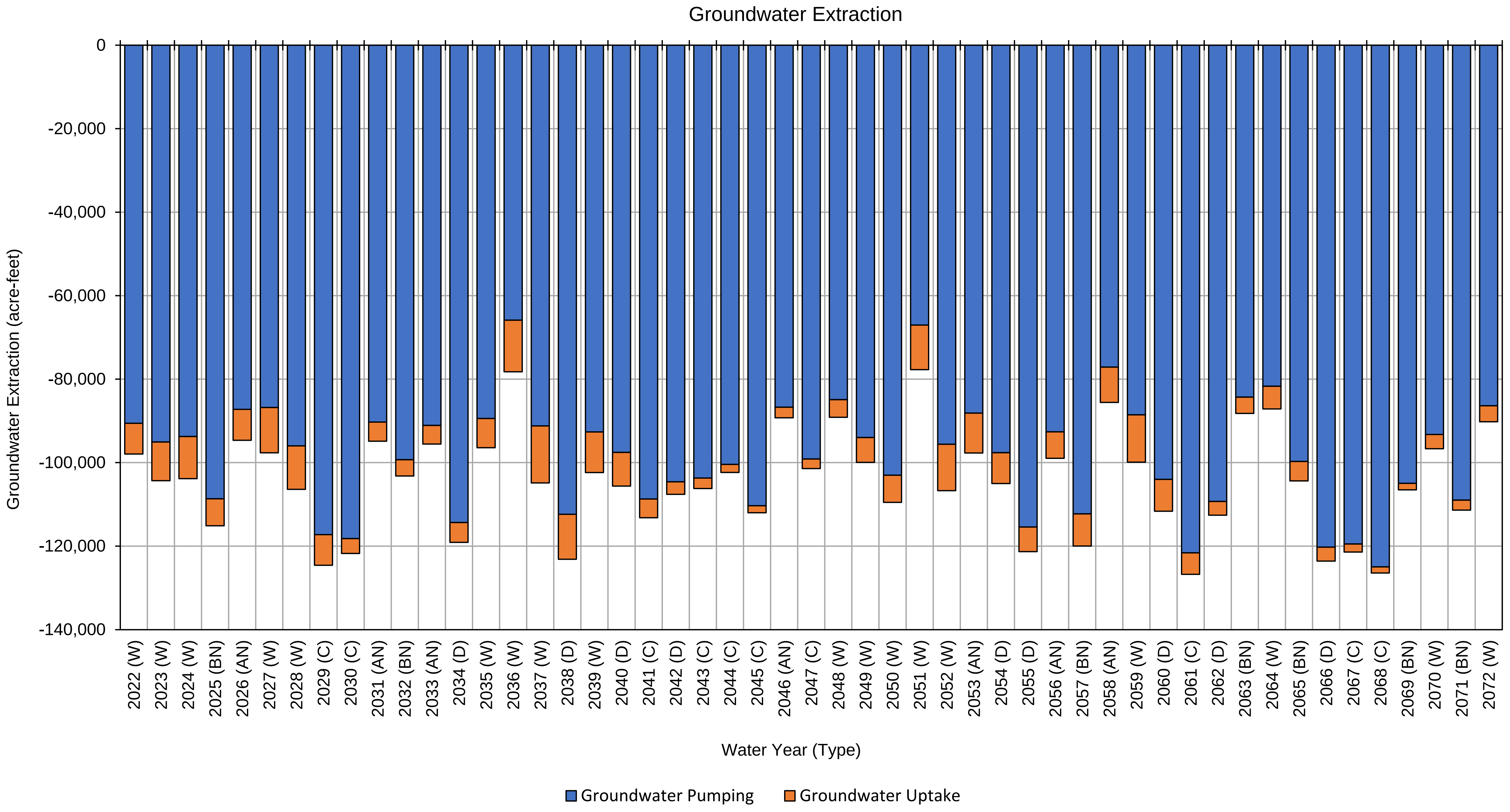
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

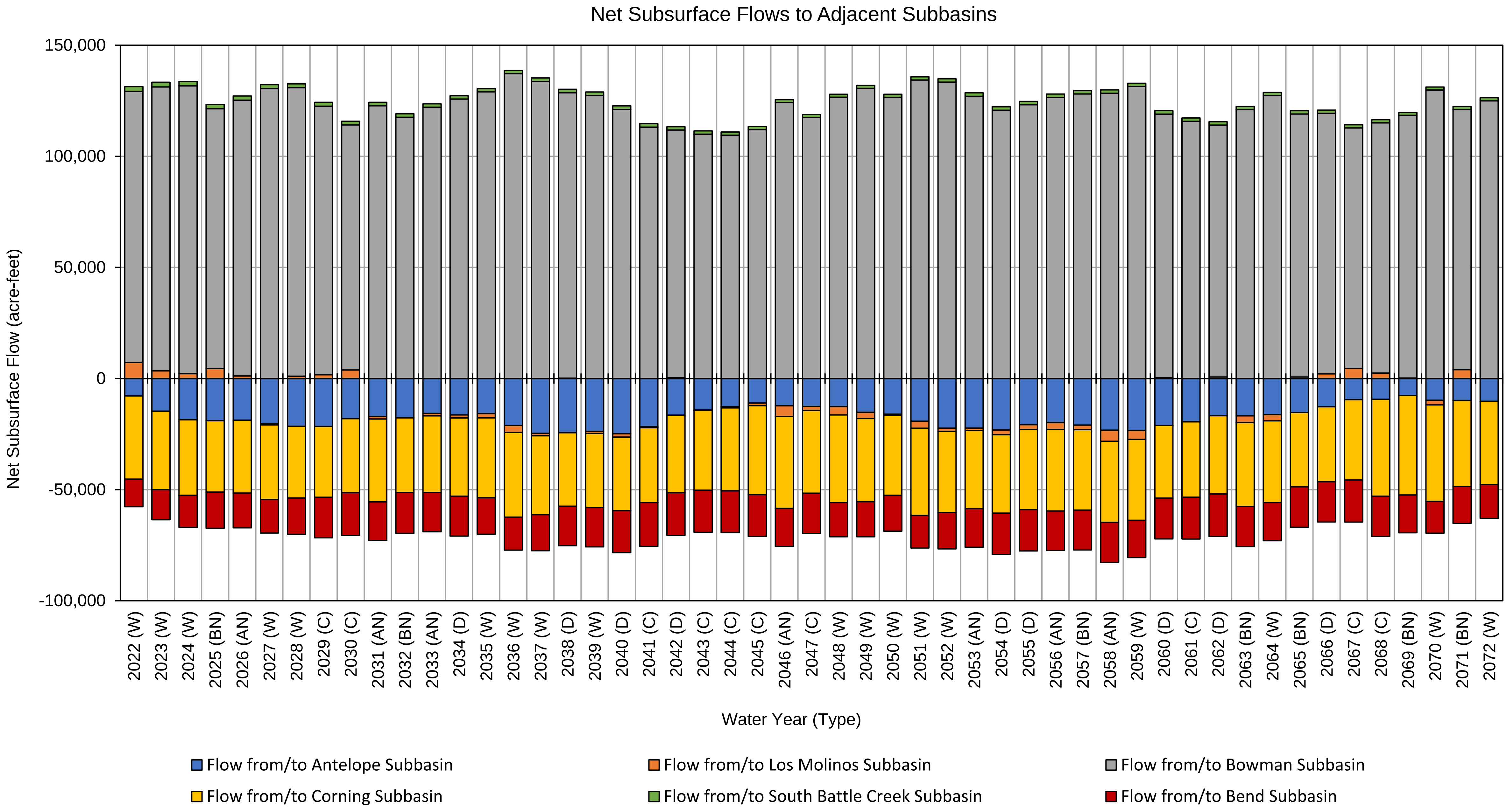
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-91,000	-7,400	-98,000
2023 (W)	-95,000	-9,300	-100,000
2024 (W)	-94,000	-10,000	-100,000
2025 (BN)	-110,000	-6,500	-120,000
2026 (AN)	-87,000	-7,400	-95,000
2027 (W)	-87,000	-11,000	-98,000
2028 (W)	-96,000	-10,000	-110,000
2029 (C)	-120,000	-7,400	-120,000
2030 (C)	-120,000	-3,600	-120,000
2031 (AN)	-90,000	-4,600	-95,000
2032 (BN)	-99,000	-3,900	-100,000
2033 (AN)	-91,000	-4,500	-96,000
2034 (D)	-110,000	-4,800	-120,000
2035 (W)	-89,000	-7,000	-96,000
2036 (W)	-66,000	-12,000	-78,000
2037 (W)	-91,000	-14,000	-100,000
2038 (D)	-110,000	-11,000	-120,000
2039 (W)	-93,000	-9,700	-100,000
2040 (D)	-98,000	-8,100	-110,000
2041 (C)	-110,000	-4,500	-110,000
2042 (D)	-100,000	-3,000	-110,000
2043 (C)	-100,000	-2,500	-110,000
2044 (C)	-100,000	-1,900	-100,000
2045 (C)	-110,000	-1,700	-110,000
2046 (AN)	-87,000	-2,500	-89,000
2047 (C)	-99,000	-2,300	-100,000
2048 (W)	-85,000	-4,200	-89,000
2049 (W)	-94,000	-5,900	-100,000
2050 (W)	-100,000	-6,500	-110,000
2051 (W)	-67,000	-11,000	-78,000
2052 (W)	-96,000	-11,000	-110,000
2053 (AN)	-88,000	-9,500	-98,000
2054 (D)	-98,000	-7,400	-110,000
2055 (D)	-120,000	-5,900	-120,000
2056 (AN)	-93,000	-6,300	-99,000
2057 (BN)	-110,000	-7,700	-120,000
2058 (AN)	-77,000	-8,500	-86,000
2059 (W)	-89,000	-11,000	-100,000
2060 (D)	-100,000	-7,600	-110,000
2061 (C)	-120,000	-5,100	-130,000
2062 (D)	-110,000	-3,300	-110,000
2063 (BN)	-84,000	-3,900	-88,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-82,000	-5,400	-87,000
2065 (BN)		-100,000	-4,700	-100,000
2066 (D)		-120,000	-3,300	-120,000
2067 (C)		-120,000	-1,900	-120,000
2068 (C)		-120,000	-1,500	-130,000
2069 (BN)		-100,000	-1,600	-110,000
2070 (W)		-93,000	-3,400	-97,000
2071 (BN)		-110,000	-2,400	-110,000
2072 (W)		-86,000	-3,800	-90,000
Average (2022-2072)		-99,000	-6,200	-100,000
2022-2072	W	-89,000	-8,500	-97,000
	AN	-88,000	-6,200	-94,000
	BN	-100,000	-4,400	-110,000
	D	-110,000	-6,000	-110,000
	C	-110,000	-3,200	-120,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

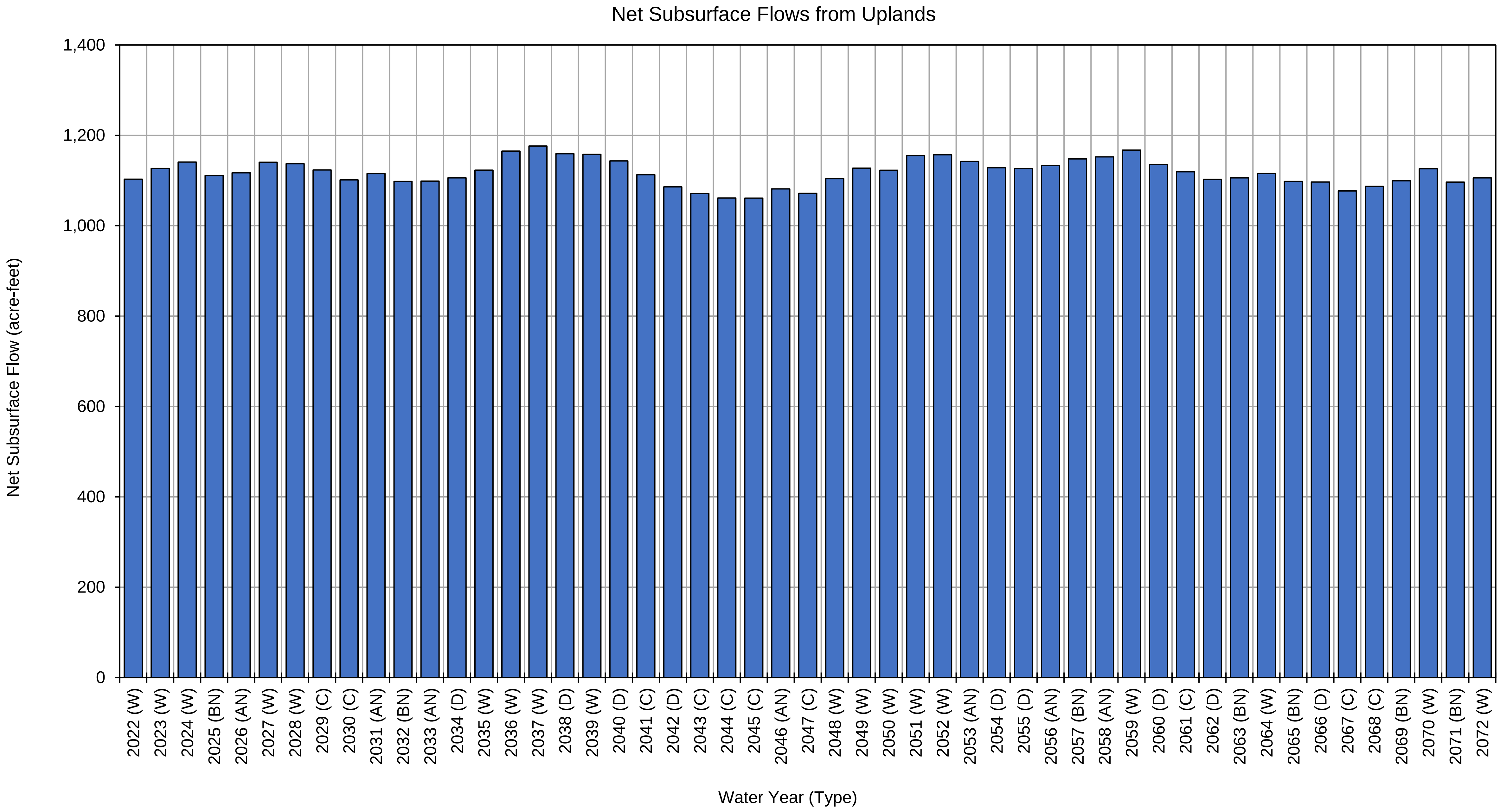
WY (Type)	Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-7,800	7,300	120,000	-37,000	2,200	-12,000	74,000
2023 (W)	-15,000	3,400	130,000	-35,000	2,100	-14,000	70,000
2024 (W)	-19,000	2,200	130,000	-34,000	2,000	-14,000	67,000
2025 (BN)	-19,000	4,500	120,000	-32,000	2,000	-16,000	56,000
2026 (AN)	-19,000	1,200	120,000	-33,000	1,900	-16,000	60,000
2027 (W)	-20,000	-590	130,000	-34,000	1,800	-15,000	63,000
2028 (W)	-21,000	1,100	130,000	-32,000	1,700	-16,000	62,000
2029 (C)	-22,000	1,700	120,000	-32,000	1,700	-18,000	53,000
2030 (C)	-18,000	3,900	110,000	-33,000	1,700	-19,000	45,000
2031 (AN)	-17,000	-1,000	120,000	-37,000	1,600	-17,000	51,000
2032 (BN)	-18,000	-110	120,000	-34,000	1,600	-18,000	49,000
2033 (AN)	-16,000	-1,100	120,000	-34,000	1,500	-18,000	55,000
2034 (D)	-16,000	-1,400	130,000	-35,000	1,500	-18,000	56,000
2035 (W)	-16,000	-1,900	130,000	-36,000	1,400	-16,000	60,000
2036 (W)	-21,000	-3,100	140,000	-38,000	1,400	-15,000	61,000
2037 (W)	-25,000	-1,100	130,000	-35,000	1,500	-16,000	58,000
2038 (D)	-24,000	170	130,000	-33,000	1,600	-18,000	55,000
2039 (W)	-24,000	-990	130,000	-33,000	1,600	-18,000	53,000
2040 (D)	-25,000	-1,500	120,000	-33,000	1,600	-19,000	44,000
2041 (C)	-22,000	-500	110,000	-34,000	1,500	-20,000	39,000
2042 (D)	-16,000	360	110,000	-35,000	1,500	-19,000	43,000
2043 (C)	-14,000	-160	110,000	-36,000	1,400	-19,000	42,000
2044 (C)	-13,000	-570	110,000	-37,000	1,400	-19,000	42,000
2045 (C)	-11,000	-1,200	110,000	-40,000	1,400	-19,000	42,000
2046 (AN)	-12,000	-4,700	120,000	-41,000	1,300	-17,000	50,000
2047 (C)	-13,000	-1,800	120,000	-37,000	1,300	-18,000	49,000
2048 (W)	-13,000	-3,700	130,000	-39,000	1,300	-15,000	57,000
2049 (W)	-15,000	-2,800	130,000	-37,000	1,400	-16,000	61,000
2050 (W)	-16,000	-380	130,000	-36,000	1,400	-16,000	59,000
2051 (W)	-19,000	-3,100	130,000	-39,000	1,400	-15,000	60,000
2052 (W)	-22,000	-1,400	130,000	-37,000	1,500	-16,000	58,000
2053 (AN)	-22,000	-1,100	130,000	-35,000	1,500	-17,000	53,000
2054 (D)	-23,000	-2,100	120,000	-35,000	1,600	-19,000	43,000
2055 (D)	-21,000	-2,100	120,000	-36,000	1,500	-19,000	47,000
2056 (AN)	-20,000	-3,100	130,000	-37,000	1,500	-18,000	51,000
2057 (BN)	-21,000	-2,100	130,000	-36,000	1,500	-18,000	52,000
2058 (AN)	-23,000	-5,000	130,000	-36,000	1,500	-18,000	47,000
2059 (W)	-23,000	-4,000	130,000	-36,000	1,500	-17,000	52,000
2060 (D)	-21,000	300	120,000	-33,000	1,500	-18,000	48,000
2061 (C)	-19,000	-140	120,000	-34,000	1,500	-19,000	45,000
2062 (D)	-17,000	670	110,000	-35,000	1,500	-19,000	44,000
2063 (BN)	-17,000	-3,000	120,000	-38,000	1,400	-18,000	47,000
2064 (W)	-16,000	-2,800	130,000	-37,000	1,400	-17,000	56,000
2065 (BN)	-15,000	680	120,000	-33,000	1,400	-18,000	54,000
2066 (D)	-13,000	2,100	120,000	-34,000	1,400	-18,000	56,000
2067 (C)	-9,500	4,600	110,000	-36,000	1,400	-19,000	50,000
2068 (C)	-9,300	2,500	110,000	-44,000	1,400	-18,000	45,000
2069 (BN)	-7,600	240	120,000	-45,000	1,400	-17,000	50,000
2070 (W)	-9,800	-2,000	130,000	-43,000	1,300	-14,000	62,000
2071 (BN)	-9,800	4,000	120,000	-39,000	1,400	-17,000	57,000
2072 (W)	-10,000	-23	120,000	-37,000	1,400	-15,000	63,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
Average (2022-2072)		-17,000	-390	120,000	-36,000	1,500	-17,000	53,000
2022-2072	W	-17,000	-790	130,000	-37,000	1,600	-15,000	61,000
	AN	-18,000	-2,100	130,000	-36,000	1,500	-17,000	52,000
	BN	-15,000	600	120,000	-37,000	1,500	-17,000	52,000
	D	-20,000	-380	120,000	-34,000	1,500	-19,000	49,000
	C	-15,000	830	110,000	-36,000	1,500	-19,000	45,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

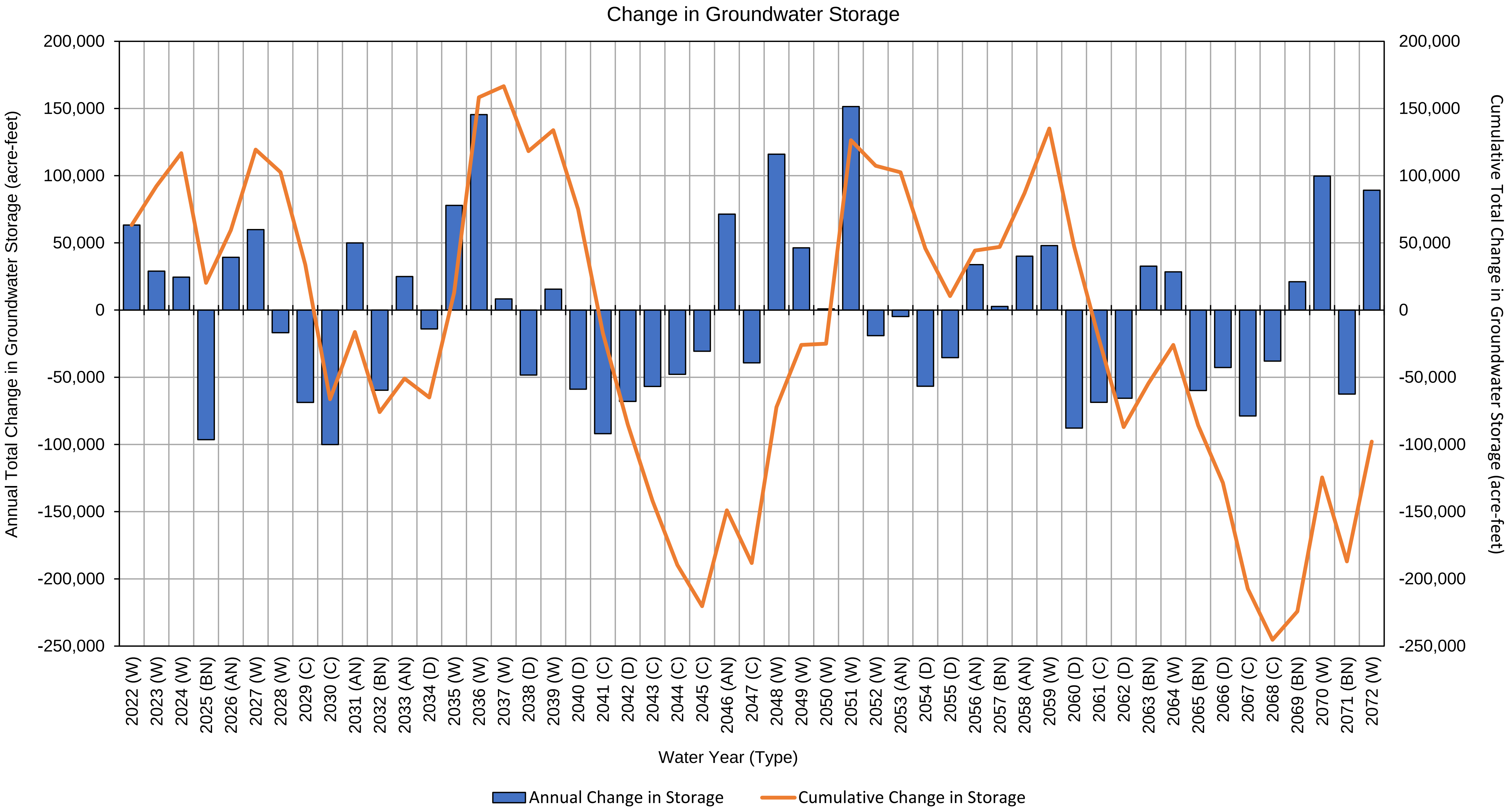
WY (Type)	Subsurface Flows from Uplands
2022 (W)	1,100
2023 (W)	1,100
2024 (W)	1,100
2025 (BN)	1,100
2026 (AN)	1,100
2027 (W)	1,100
2028 (W)	1,100
2029 (C)	1,100
2030 (C)	1,100
2031 (AN)	1,100
2032 (BN)	1,100
2033 (AN)	1,100
2034 (D)	1,100
2035 (W)	1,100
2036 (W)	1,200
2037 (W)	1,200
2038 (D)	1,200
2039 (W)	1,200
2040 (D)	1,100
2041 (C)	1,100
2042 (D)	1,100
2043 (C)	1,100
2044 (C)	1,100
2045 (C)	1,100
2046 (AN)	1,100
2047 (C)	1,100
2048 (W)	1,100
2049 (W)	1,100
2050 (W)	1,100
2051 (W)	1,200
2052 (W)	1,200
2053 (AN)	1,100
2054 (D)	1,100
2055 (D)	1,100
2056 (AN)	1,100
2057 (BN)	1,100
2058 (AN)	1,200
2059 (W)	1,200
2060 (D)	1,100
2061 (C)	1,100
2062 (D)	1,100
2063 (BN)	1,100

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		1,100
2065 (BN)		1,100
2066 (D)		1,100
2067 (C)		1,100
2068 (C)		1,100
2069 (BN)		1,100
2070 (W)		1,100
2071 (BN)		1,100
2072 (W)		1,100
Average (2022-2072)		1,100
2022-2072	W	1,100
	AN	1,100
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	63,000	63,000
2023 (W)	29,000	92,000
2024 (W)	25,000	120,000
2025 (BN)	-96,000	20,000
2026 (AN)	39,000	60,000
2027 (W)	60,000	120,000
2028 (W)	-17,000	100,000
2029 (C)	-69,000	34,000
2030 (C)	-100,000	-66,000
2031 (AN)	50,000	-16,000
2032 (BN)	-60,000	-76,000
2033 (AN)	25,000	-51,000
2034 (D)	-14,000	-65,000
2035 (W)	78,000	13,000
2036 (W)	150,000	160,000
2037 (W)	8,300	170,000
2038 (D)	-48,000	120,000
2039 (W)	16,000	130,000
2040 (D)	-59,000	75,000
2041 (C)	-92,000	-17,000
2042 (D)	-68,000	-85,000
2043 (C)	-57,000	-140,000
2044 (C)	-48,000	-190,000
2045 (C)	-31,000	-220,000
2046 (AN)	71,000	-150,000
2047 (C)	-39,000	-190,000
2048 (W)	120,000	-72,000
2049 (W)	46,000	-26,000
2050 (W)	890	-25,000
2051 (W)	150,000	130,000
2052 (W)	-19,000	110,000
2053 (AN)	-4,800	100,000
2054 (D)	-57,000	46,000
2055 (D)	-35,000	10,000
2056 (AN)	34,000	44,000
2057 (BN)	2,700	47,000
2058 (AN)	40,000	87,000
2059 (W)	48,000	140,000
2060 (D)	-88,000	47,000
2061 (C)	-69,000	-21,000
2062 (D)	-66,000	-87,000
2063 (BN)	33,000	-54,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">2064 (W)</td><td>28,000</td><td>-26,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>-60,000</td><td>-86,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>-43,000</td><td>-130,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>-79,000</td><td>-210,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>-38,000</td><td>-250,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>21,000</td><td>-220,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>100,000</td><td>-120,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>-63,000</td><td>-190,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>89,000</td><td>-98,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>-1,900</td><td></td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

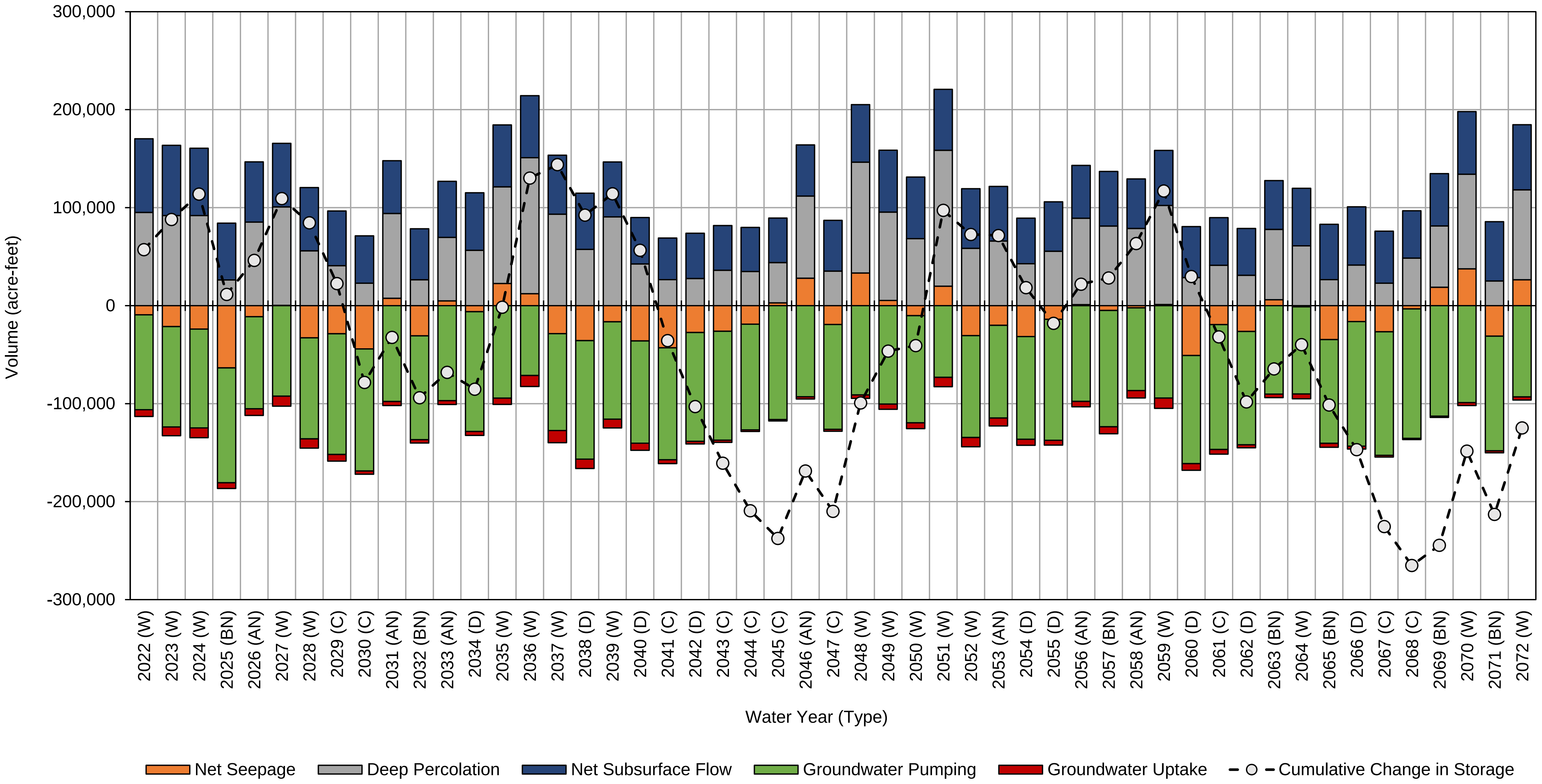
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-5

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Current Land Use) with Climate Change (2070) Model Results



Projected (Current Land Use) with Climate Change (2070) Water Budget
Red Bluff Subbasin

Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

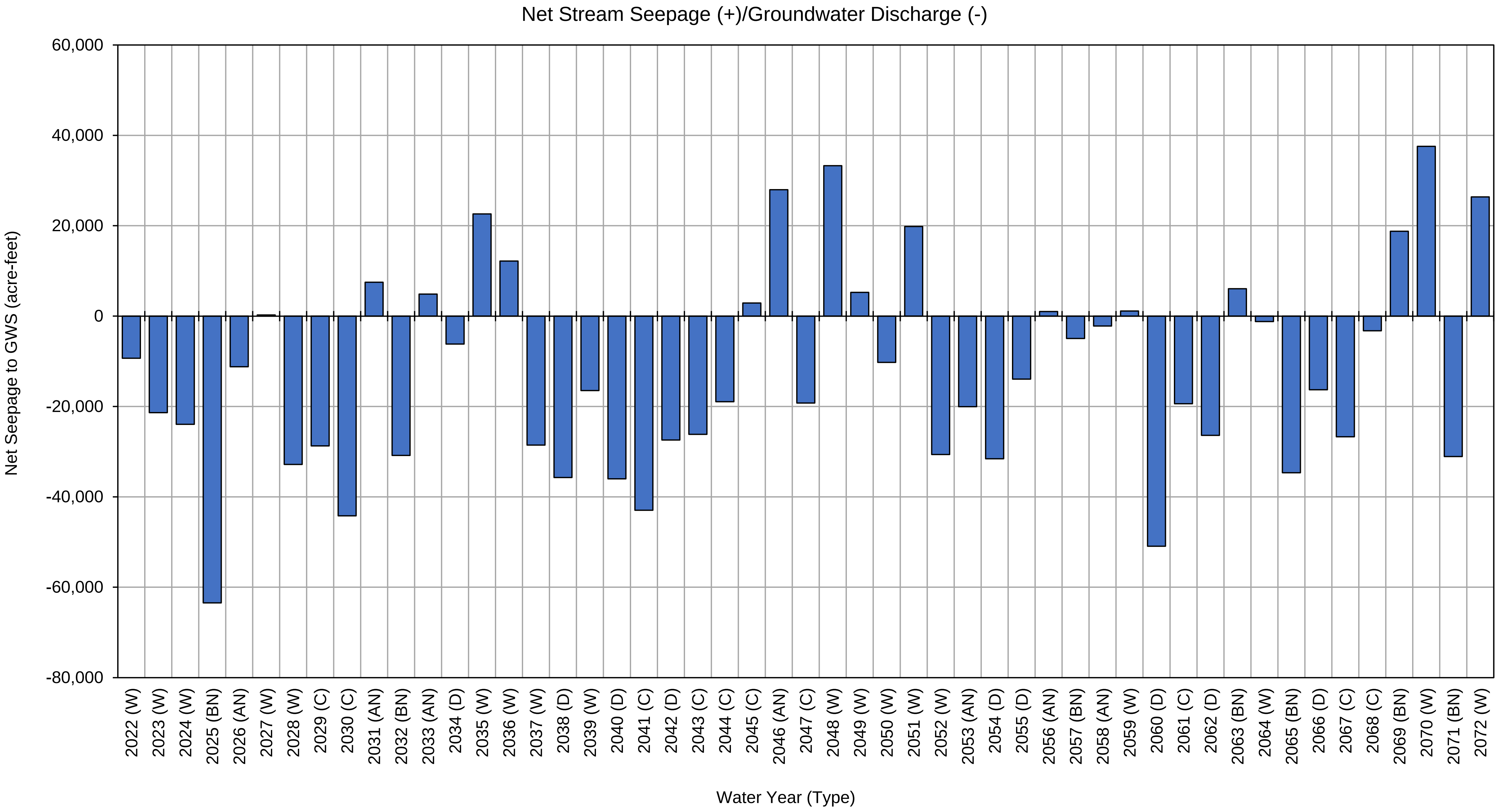
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-9,300	95,000	-97,000	-6,900	75,000	57,000	57,000
2023 (W)	-21,000	92,000	-100,000	-9,000	72,000	31,000	88,000
2024 (W)	-24,000	92,000	-100,000	-9,900	69,000	26,000	110,000
2025 (BN)	-63,000	26,000	-120,000	-5,900	58,000	-100,000	12,000
2026 (AN)	-11,000	85,000	-94,000	-6,700	61,000	35,000	46,000
2027 (W)	250	100,000	-92,000	-10,000	65,000	63,000	110,000
2028 (W)	-33,000	56,000	-100,000	-9,400	65,000	-25,000	85,000
2029 (C)	-29,000	41,000	-120,000	-6,800	56,000	-62,000	23,000
2030 (C)	-44,000	23,000	-120,000	-3,300	48,000	-100,000	-78,000
2031 (AN)	7,500	87,000	-98,000	-4,100	54,000	46,000	-32,000
2032 (BN)	-31,000	26,000	-110,000	-3,400	52,000	-62,000	-94,000
2033 (AN)	4,900	65,000	-97,000	-3,900	57,000	26,000	-68,000
2034 (D)	-6,200	57,000	-120,000	-4,100	59,000	-17,000	-85,000
2035 (W)	23,000	99,000	-94,000	-6,400	63,000	84,000	-1,600
2036 (W)	12,000	140,000	-71,000	-11,000	63,000	130,000	130,000
2037 (W)	-29,000	93,000	-99,000	-13,000	60,000	14,000	140,000
2038 (D)	-36,000	57,000	-120,000	-9,600	57,000	-51,000	92,000
2039 (W)	-16,000	91,000	-99,000	-9,000	56,000	22,000	110,000
2040 (D)	-36,000	43,000	-100,000	-7,300	47,000	-58,000	57,000
2041 (C)	-43,000	27,000	-110,000	-3,900	42,000	-92,000	-36,000
2042 (D)	-27,000	28,000	-110,000	-2,700	46,000	-67,000	-100,000
2043 (C)	-26,000	36,000	-110,000	-2,200	46,000	-58,000	-160,000
2044 (C)	-19,000	35,000	-110,000	-1,600	45,000	-49,000	-210,000
2045 (C)	2,900	41,000	-120,000	-1,400	45,000	-28,000	-240,000
2046 (AN)	28,000	84,000	-93,000	-2,200	52,000	69,000	-170,000
2047 (C)	-19,000	35,000	-110,000	-1,900	52,000	-41,000	-210,000
2048 (W)	33,000	110,000	-91,000	-3,500	59,000	110,000	-99,000
2049 (W)	5,300	90,000	-100,000	-5,300	63,000	53,000	-46,000
2050 (W)	-10,000	68,000	-110,000	-6,000	63,000	5,700	-41,000
2051 (W)	20,000	140,000	-73,000	-9,500	62,000	140,000	97,000
2052 (W)	-31,000	59,000	-100,000	-9,400	61,000	-25,000	73,000
2053 (AN)	-20,000	66,000	-95,000	-8,000	56,000	-1,100	72,000
2054 (D)	-32,000	43,000	-100,000	-6,200	47,000	-53,000	18,000
2055 (D)	-14,000	56,000	-120,000	-4,900	50,000	-36,000	-18,000
2056 (AN)	1,000	88,000	-98,000	-5,500	54,000	40,000	22,000
2057 (BN)	-5,000	81,000	-120,000	-7,000	56,000	6,300	28,000
2058 (AN)	-2,200	79,000	-84,000	-7,500	51,000	35,000	63,000
2059 (W)	1,100	100,000	-94,000	-10,000	56,000	54,000	120,000
2060 (D)	-51,000	29,000	-110,000	-6,700	52,000	-87,000	30,000
2061 (C)	-19,000	41,000	-130,000	-4,800	49,000	-62,000	-32,000
2062 (D)	-26,000	31,000	-120,000	-3,100	48,000	-66,000	-98,000
2063 (BN)	6,100	72,000	-90,000	-3,600	50,000	34,000	-65,000
2064 (W)	-1,200	61,000	-89,000	-4,900	59,000	25,000	-40,000
2065 (BN)	-35,000	27,000	-110,000	-4,100	57,000	-62,000	-100,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-16,000	41,000	-130,000	-3,000	59,000	-46,000	-150,000
2067 (C)		-27,000	23,000	-130,000	-1,700	53,000	-78,000	-230,000
2068 (C)		-3,300	49,000	-130,000	-1,300	48,000	-40,000	-270,000
2069 (BN)		19,000	63,000	-110,000	-1,300	53,000	21,000	-240,000
2070 (W)		38,000	97,000	-99,000	-3,000	64,000	96,000	-150,000
2071 (BN)		-31,000	25,000	-120,000	-2,000	61,000	-65,000	-210,000
2072 (W)		26,000	92,000	-93,000	-3,200	66,000	88,000	-120,000
Average (2022-2072)		-12,000	64,000	-110,000	-5,500	56,000	-2,400	
2022-2072	W	-890	93,000	-95,000	-7,800	63,000		
	AN	1,100	79,000	-94,000	-5,400	55,000		
	BN	-20,000	46,000	-110,000	-3,900	55,000		
	D	-27,000	43,000	-120,000	-5,300	52,000		
	C	-23,000	35,000	-120,000	-2,900	48,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W Wet
AN Above Normal
BN Below Normal
D Dry
C Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

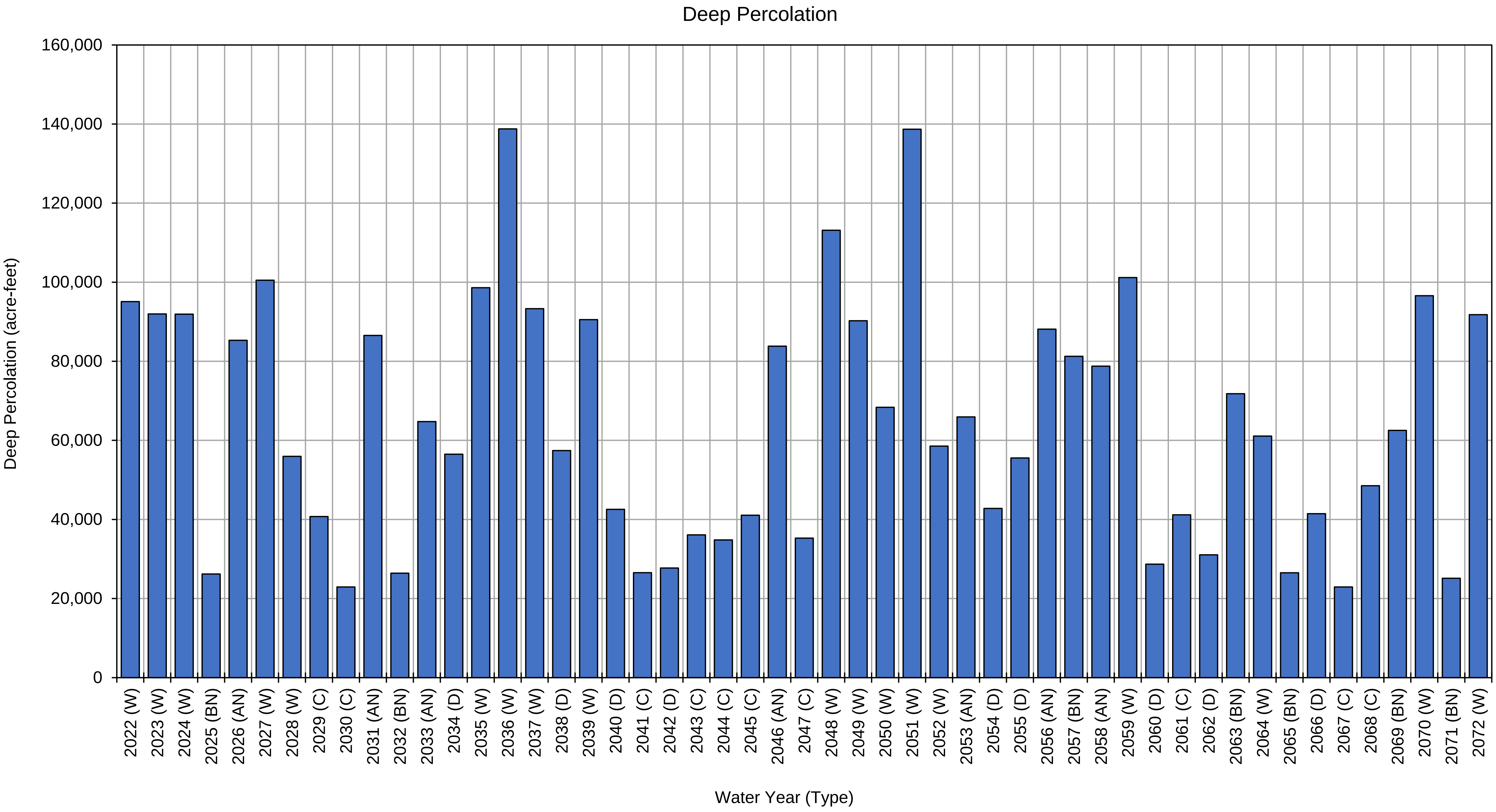
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-9,300
2023 (W)	-21,000
2024 (W)	-24,000
2025 (BN)	-63,000
2026 (AN)	-11,000
2027 (W)	250
2028 (W)	-33,000
2029 (C)	-29,000
2030 (C)	-44,000
2031 (AN)	7,500
2032 (BN)	-31,000
2033 (AN)	4,900
2034 (D)	-6,200
2035 (W)	23,000
2036 (W)	12,000
2037 (W)	-29,000
2038 (D)	-36,000
2039 (W)	-16,000
2040 (D)	-36,000
2041 (C)	-43,000
2042 (D)	-27,000
2043 (C)	-26,000
2044 (C)	-19,000
2045 (C)	2,900
2046 (AN)	28,000
2047 (C)	-19,000
2048 (W)	33,000
2049 (W)	5,300
2050 (W)	-10,000
2051 (W)	20,000
2052 (W)	-31,000
2053 (AN)	-20,000
2054 (D)	-32,000
2055 (D)	-14,000
2056 (AN)	1,000
2057 (BN)	-5,000
2058 (AN)	-2,200
2059 (W)	1,100
2060 (D)	-51,000
2061 (C)	-19,000
2062 (D)	-26,000
2063 (BN)	6,100

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		-1,200
2065 (BN)		-35,000
2066 (D)		-16,000
2067 (C)		-27,000
2068 (C)		-3,300
2069 (BN)		19,000
2070 (W)		38,000
2071 (BN)		-31,000
2072 (W)		26,000
Average (2022-2072)		-12,000
2022-2072	W	-890
	AN	1,100
	BN	-20,000
	D	-27,000
	C	-23,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

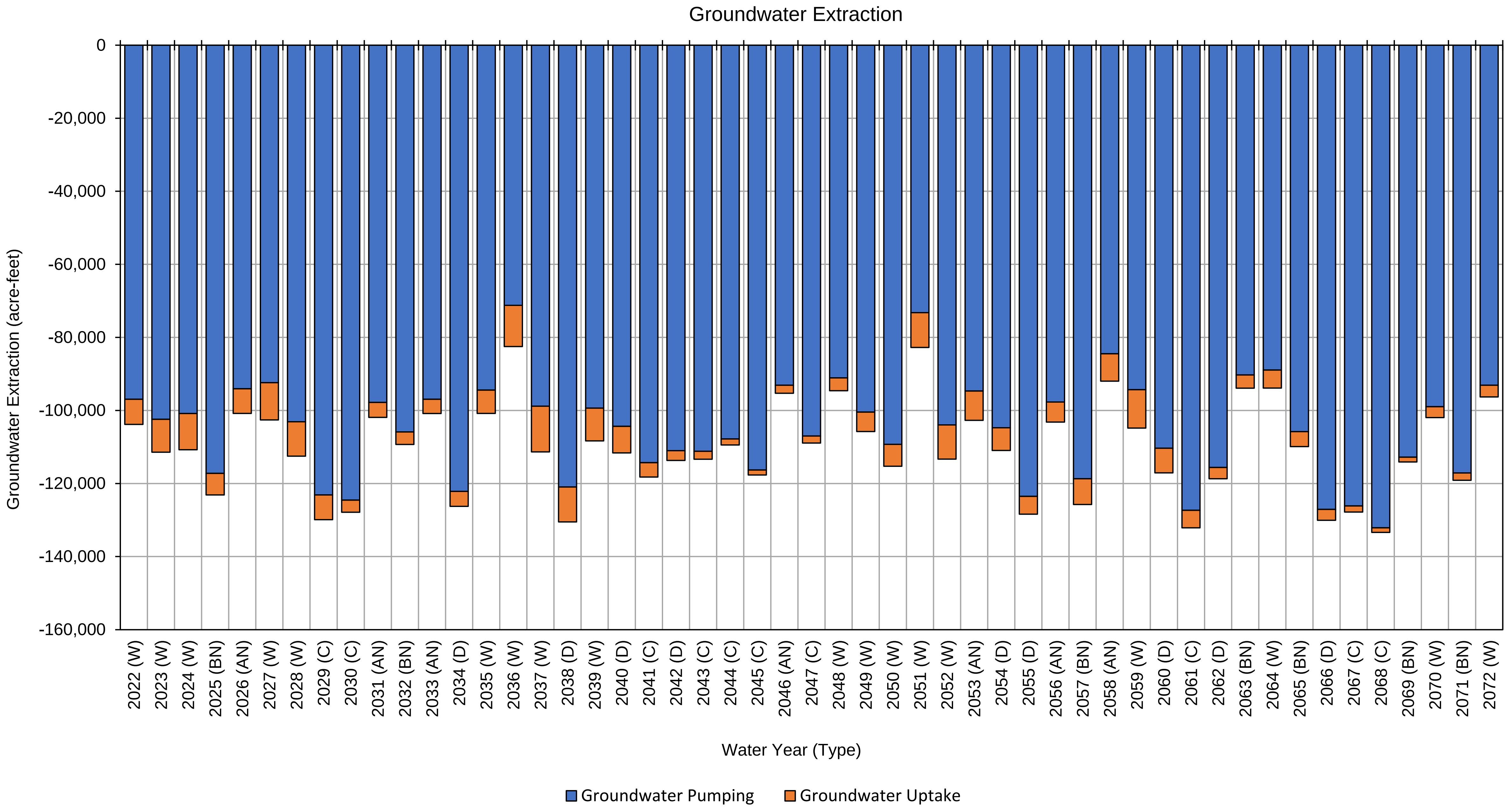
WY (Type)	Deep Percolation from the SWS
2022 (W)	95,000
2023 (W)	92,000
2024 (W)	92,000
2025 (BN)	26,000
2026 (AN)	85,000
2027 (W)	100,000
2028 (W)	56,000
2029 (C)	41,000
2030 (C)	23,000
2031 (AN)	87,000
2032 (BN)	26,000
2033 (AN)	65,000
2034 (D)	57,000
2035 (W)	99,000
2036 (W)	140,000
2037 (W)	93,000
2038 (D)	57,000
2039 (W)	91,000
2040 (D)	43,000
2041 (C)	27,000
2042 (D)	28,000
2043 (C)	36,000
2044 (C)	35,000
2045 (C)	41,000
2046 (AN)	84,000
2047 (C)	35,000
2048 (W)	110,000
2049 (W)	90,000
2050 (W)	68,000
2051 (W)	140,000
2052 (W)	59,000
2053 (AN)	66,000
2054 (D)	43,000
2055 (D)	56,000
2056 (AN)	88,000
2057 (BN)	81,000
2058 (AN)	79,000
2059 (W)	100,000
2060 (D)	29,000
2061 (C)	41,000
2062 (D)	31,000
2063 (BN)	72,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		61,000
2065 (BN)		27,000
2066 (D)		41,000
2067 (C)		23,000
2068 (C)		49,000
2069 (BN)		63,000
2070 (W)		97,000
2071 (BN)		25,000
2072 (W)		92,000
Average (2022-2072)		64,000
2022-2072	W	93,000
	AN	79,000
	BN	46,000
	D	43,000
	C	35,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

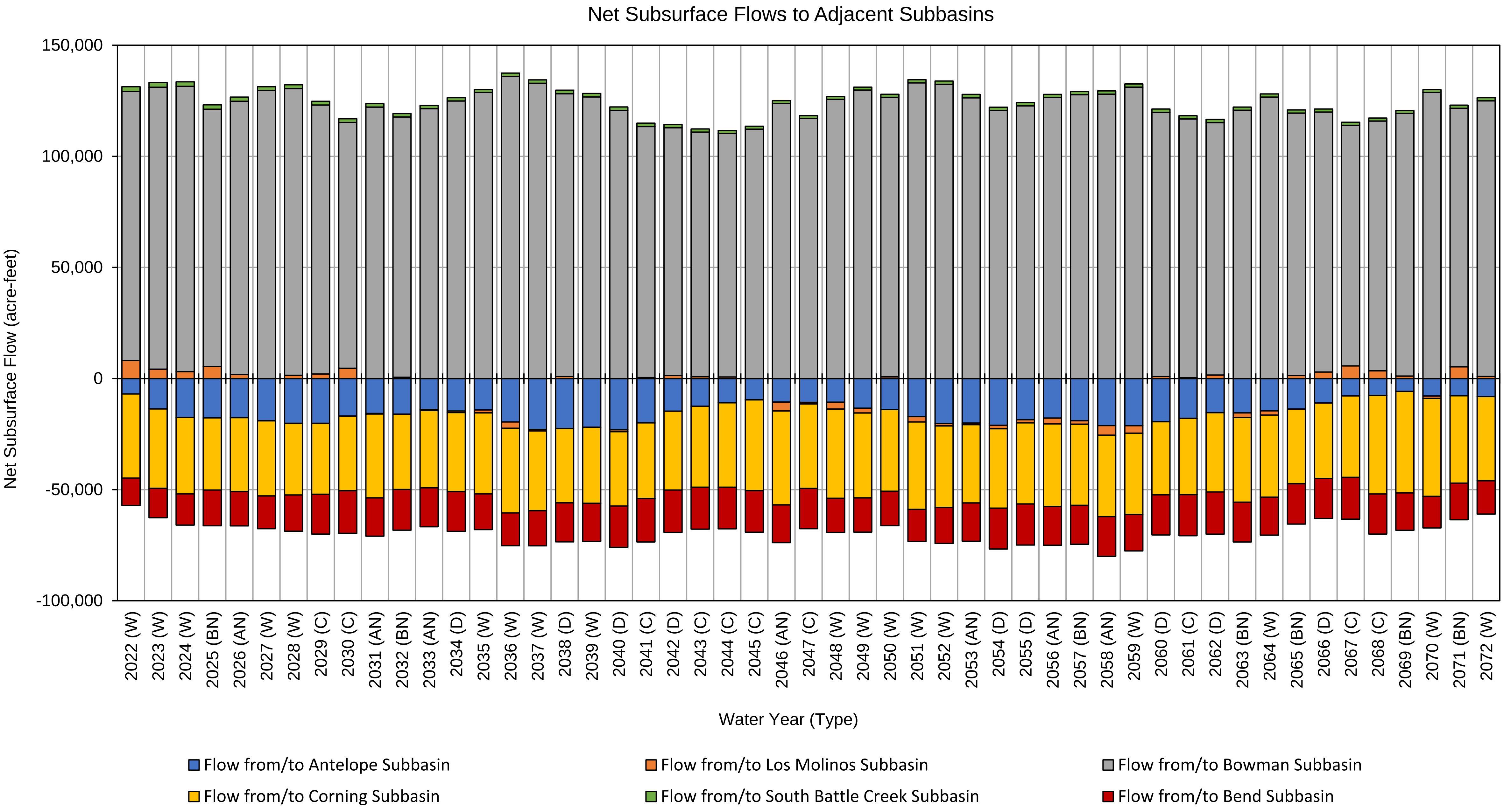
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-97,000	-6,900	-100,000
2023 (W)	-100,000	-9,000	-110,000
2024 (W)	-100,000	-9,900	-110,000
2025 (BN)	-120,000	-5,900	-120,000
2026 (AN)	-94,000	-6,700	-100,000
2027 (W)	-92,000	-10,000	-100,000
2028 (W)	-100,000	-9,400	-110,000
2029 (C)	-120,000	-6,800	-130,000
2030 (C)	-120,000	-3,300	-130,000
2031 (AN)	-98,000	-4,100	-100,000
2032 (BN)	-110,000	-3,400	-110,000
2033 (AN)	-97,000	-3,900	-100,000
2034 (D)	-120,000	-4,100	-130,000
2035 (W)	-94,000	-6,400	-100,000
2036 (W)	-71,000	-11,000	-83,000
2037 (W)	-99,000	-13,000	-110,000
2038 (D)	-120,000	-9,600	-130,000
2039 (W)	-99,000	-9,000	-110,000
2040 (D)	-100,000	-7,300	-110,000
2041 (C)	-110,000	-3,900	-120,000
2042 (D)	-110,000	-2,700	-110,000
2043 (C)	-110,000	-2,200	-110,000
2044 (C)	-110,000	-1,600	-110,000
2045 (C)	-120,000	-1,400	-120,000
2046 (AN)	-93,000	-2,200	-95,000
2047 (C)	-110,000	-1,900	-110,000
2048 (W)	-91,000	-3,500	-95,000
2049 (W)	-100,000	-5,300	-110,000
2050 (W)	-110,000	-6,000	-120,000
2051 (W)	-73,000	-9,500	-83,000
2052 (W)	-100,000	-9,400	-110,000
2053 (AN)	-95,000	-8,000	-100,000
2054 (D)	-100,000	-6,200	-110,000
2055 (D)	-120,000	-4,900	-130,000
2056 (AN)	-98,000	-5,500	-100,000
2057 (BN)	-120,000	-7,000	-130,000
2058 (AN)	-84,000	-7,500	-92,000
2059 (W)	-94,000	-10,000	-100,000
2060 (D)	-110,000	-6,700	-120,000
2061 (C)	-130,000	-4,800	-130,000
2062 (D)	-120,000	-3,100	-120,000
2063 (BN)	-90,000	-3,600	-94,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-89,000	-4,900	-94,000
2065 (BN)		-110,000	-4,100	-110,000
2066 (D)		-130,000	-3,000	-130,000
2067 (C)		-130,000	-1,700	-130,000
2068 (C)		-130,000	-1,300	-130,000
2069 (BN)		-110,000	-1,300	-110,000
2070 (W)		-99,000	-3,000	-100,000
2071 (BN)		-120,000	-2,000	-120,000
2072 (W)		-93,000	-3,200	-96,000
Average (2022-2072)		-110,000	-5,500	-110,000
2022-2072	W	-95,000	-7,800	-100,000
	AN	-94,000	-5,400	-100,000
	BN	-110,000	-3,900	-110,000
	D	-120,000	-5,300	-120,000
	C	-120,000	-2,900	-120,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

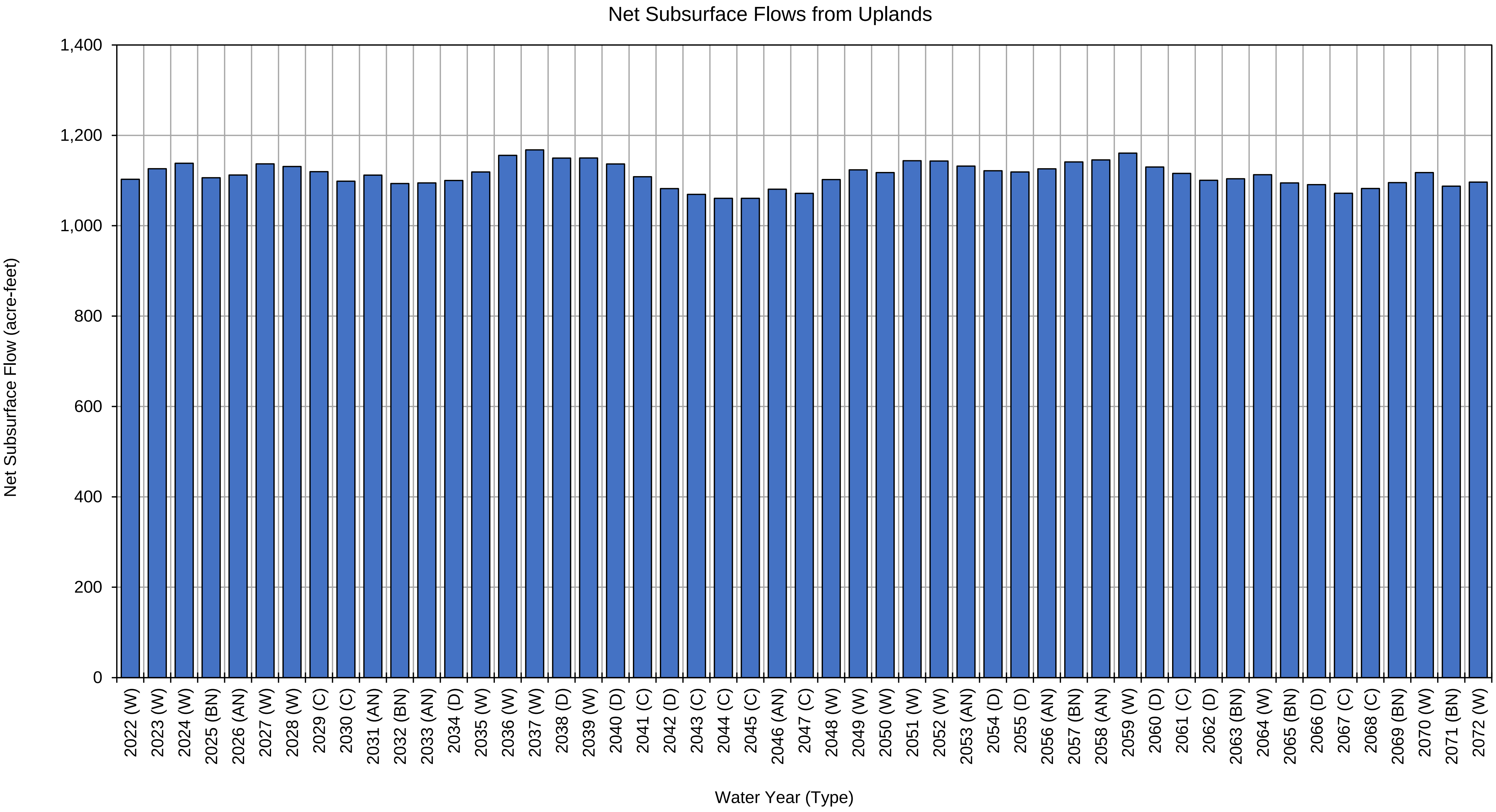
WY (Type)	Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	-6,900	8,100	120,000	-38,000	2,200	-12,000	74,000
2023 (W)	-14,000	4,200	130,000	-36,000	2,100	-13,000	71,000
2024 (W)	-17,000	3,100	130,000	-34,000	2,000	-14,000	68,000
2025 (BN)	-18,000	5,500	120,000	-32,000	2,000	-16,000	57,000
2026 (AN)	-18,000	1,800	120,000	-33,000	1,900	-15,000	60,000
2027 (W)	-19,000	-75	130,000	-34,000	1,800	-15,000	64,000
2028 (W)	-20,000	1,500	130,000	-32,000	1,700	-16,000	63,000
2029 (C)	-20,000	2,100	120,000	-32,000	1,700	-18,000	55,000
2030 (C)	-17,000	4,600	110,000	-34,000	1,700	-19,000	47,000
2031 (AN)	-16,000	-290	120,000	-38,000	1,600	-17,000	53,000
2032 (BN)	-16,000	610	120,000	-34,000	1,500	-18,000	51,000
2033 (AN)	-14,000	-430	120,000	-35,000	1,500	-18,000	56,000
2034 (D)	-15,000	-660	120,000	-36,000	1,500	-18,000	58,000
2035 (W)	-14,000	-1,300	130,000	-36,000	1,400	-16,000	62,000
2036 (W)	-20,000	-2,800	140,000	-38,000	1,400	-15,000	62,000
2037 (W)	-23,000	-670	130,000	-36,000	1,500	-16,000	59,000
2038 (D)	-22,000	870	130,000	-33,000	1,600	-18,000	56,000
2039 (W)	-22,000	-160	130,000	-34,000	1,500	-17,000	55,000
2040 (D)	-23,000	-890	120,000	-33,000	1,600	-19,000	46,000
2041 (C)	-20,000	490	110,000	-34,000	1,500	-20,000	41,000
2042 (D)	-15,000	1,300	110,000	-35,000	1,500	-19,000	45,000
2043 (C)	-13,000	840	110,000	-36,000	1,400	-19,000	45,000
2044 (C)	-11,000	710	110,000	-38,000	1,400	-19,000	44,000
2045 (C)	-9,400	-220	110,000	-41,000	1,400	-19,000	44,000
2046 (AN)	-11,000	-4,000	120,000	-42,000	1,300	-17,000	51,000
2047 (C)	-11,000	-770	120,000	-38,000	1,300	-18,000	51,000
2048 (W)	-11,000	-3,100	130,000	-40,000	1,300	-15,000	58,000
2049 (W)	-13,000	-2,100	130,000	-38,000	1,300	-15,000	62,000
2050 (W)	-14,000	730	130,000	-37,000	1,400	-15,000	62,000
2051 (W)	-17,000	-2,400	130,000	-39,000	1,400	-14,000	61,000
2052 (W)	-20,000	-1,100	130,000	-37,000	1,500	-16,000	60,000
2053 (AN)	-20,000	-720	130,000	-35,000	1,500	-17,000	55,000
2054 (D)	-21,000	-1,600	120,000	-36,000	1,500	-18,000	45,000
2055 (D)	-19,000	-1,400	120,000	-37,000	1,500	-18,000	49,000
2056 (AN)	-18,000	-2,600	130,000	-37,000	1,500	-17,000	53,000
2057 (BN)	-19,000	-1,600	130,000	-36,000	1,500	-18,000	55,000
2058 (AN)	-21,000	-4,300	130,000	-37,000	1,500	-18,000	49,000
2059 (W)	-21,000	-3,400	130,000	-37,000	1,400	-16,000	55,000
2060 (D)	-19,000	900	120,000	-33,000	1,500	-18,000	51,000
2061 (C)	-18,000	440	120,000	-34,000	1,500	-18,000	48,000
2062 (D)	-15,000	1,600	110,000	-36,000	1,500	-19,000	47,000
2063 (BN)	-15,000	-2,100	120,000	-38,000	1,400	-18,000	49,000
2064 (W)	-15,000	-1,900	130,000	-37,000	1,400	-17,000	58,000
2065 (BN)	-14,000	1,400	120,000	-34,000	1,400	-18,000	55,000
2066 (D)	-11,000	2,900	120,000	-34,000	1,400	-18,000	58,000
2067 (C)	-7,800	5,700	110,000	-37,000	1,400	-19,000	52,000
2068 (C)	-7,600	3,500	110,000	-44,000	1,400	-18,000	47,000
2069 (BN)	-5,800	1,100	120,000	-46,000	1,300	-17,000	52,000
2070 (W)	-7,900	-1,100	130,000	-44,000	1,300	-14,000	63,000
2071 (BN)	-7,800	5,300	120,000	-39,000	1,400	-16,000	59,000
2072 (W)	-8,100	960	120,000	-38,000	1,400	-15,000	65,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
Average (2022-2072)		-15,000	360	120,000	-37,000	1,500	-17,000	55,000
2022-2072	W	-16,000	-78	130,000	-37,000	1,600	-15,000	62,000
	AN	-17,000	-1,500	120,000	-37,000	1,500	-17,000	54,000
	BN	-14,000	1,500	120,000	-37,000	1,500	-17,000	54,000
	D	-18,000	340	120,000	-35,000	1,500	-18,000	51,000
	C	-13,000	1,700	110,000	-37,000	1,500	-19,000	47,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

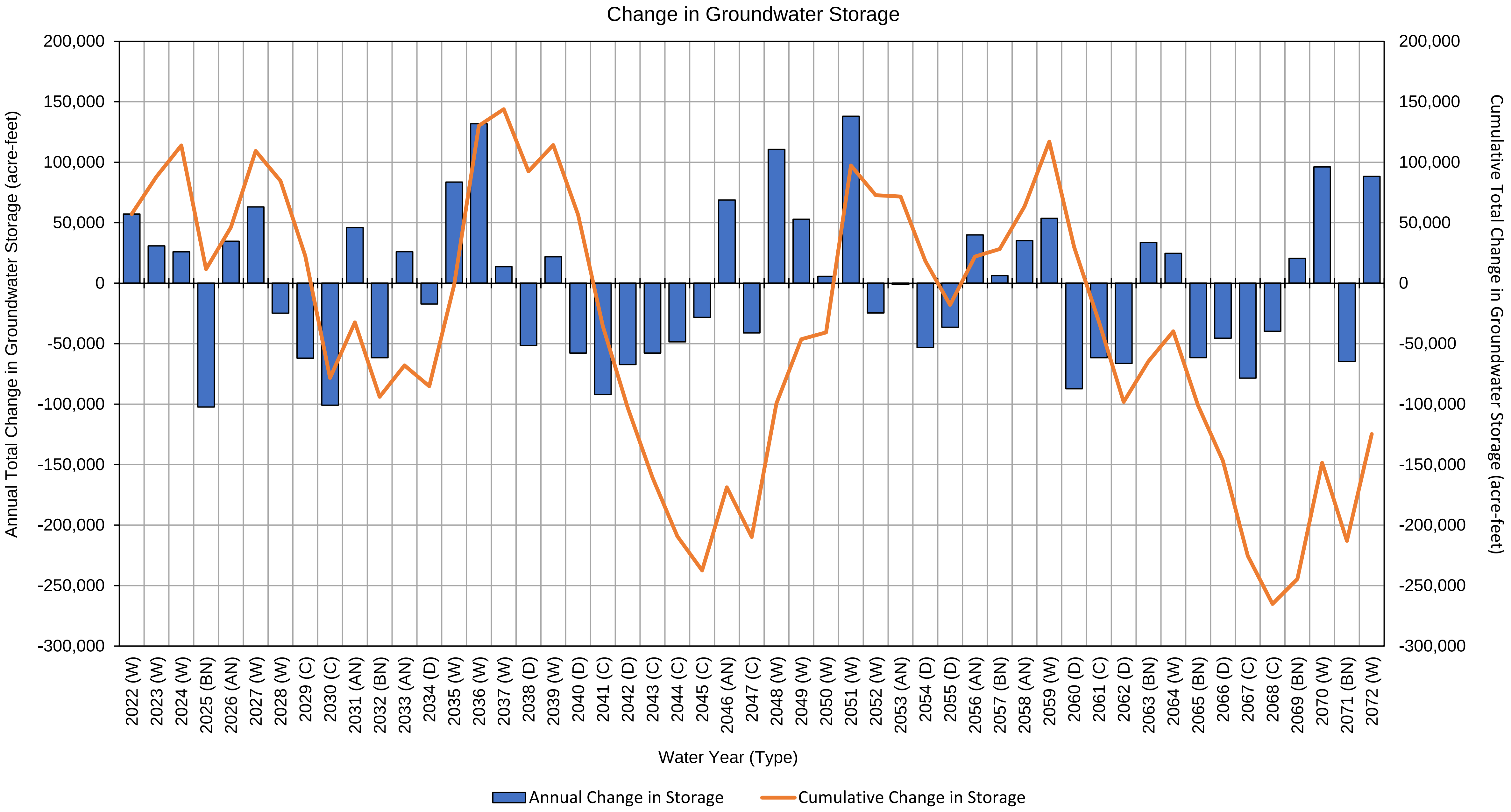
WY (Type)	Subsurface Flows from Uplands
2022 (W)	1,100
2023 (W)	1,100
2024 (W)	1,100
2025 (BN)	1,100
2026 (AN)	1,100
2027 (W)	1,100
2028 (W)	1,100
2029 (C)	1,100
2030 (C)	1,100
2031 (AN)	1,100
2032 (BN)	1,100
2033 (AN)	1,100
2034 (D)	1,100
2035 (W)	1,100
2036 (W)	1,200
2037 (W)	1,200
2038 (D)	1,100
2039 (W)	1,100
2040 (D)	1,100
2041 (C)	1,100
2042 (D)	1,100
2043 (C)	1,100
2044 (C)	1,100
2045 (C)	1,100
2046 (AN)	1,100
2047 (C)	1,100
2048 (W)	1,100
2049 (W)	1,100
2050 (W)	1,100
2051 (W)	1,100
2052 (W)	1,100
2053 (AN)	1,100
2054 (D)	1,100
2055 (D)	1,100
2056 (AN)	1,100
2057 (BN)	1,100
2058 (AN)	1,100
2059 (W)	1,200
2060 (D)	1,100
2061 (C)	1,100
2062 (D)	1,100
2063 (BN)	1,100

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		1,100
2065 (BN)		1,100
2066 (D)		1,100
2067 (C)		1,100
2068 (C)		1,100
2069 (BN)		1,100
2070 (W)		1,100
2071 (BN)		1,100
2072 (W)		1,100
Average (2022-2072)		1,100
2022-2072	W	1,100
	AN	1,100
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Current Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	57,000	57,000
2023 (W)	31,000	88,000
2024 (W)	26,000	110,000
2025 (BN)	-100,000	12,000
2026 (AN)	35,000	46,000
2027 (W)	63,000	110,000
2028 (W)	-25,000	85,000
2029 (C)	-62,000	23,000
2030 (C)	-100,000	-78,000
2031 (AN)	46,000	-32,000
2032 (BN)	-62,000	-94,000
2033 (AN)	26,000	-68,000
2034 (D)	-17,000	-85,000
2035 (W)	84,000	-1,600
2036 (W)	130,000	130,000
2037 (W)	14,000	140,000
2038 (D)	-51,000	92,000
2039 (W)	22,000	110,000
2040 (D)	-58,000	57,000
2041 (C)	-92,000	-36,000
2042 (D)	-67,000	-100,000
2043 (C)	-58,000	-160,000
2044 (C)	-49,000	-210,000
2045 (C)	-28,000	-240,000
2046 (AN)	69,000	-170,000
2047 (C)	-41,000	-210,000
2048 (W)	110,000	-99,000
2049 (W)	53,000	-46,000
2050 (W)	5,700	-41,000
2051 (W)	140,000	97,000
2052 (W)	-25,000	73,000
2053 (AN)	-1,100	72,000
2054 (D)	-53,000	18,000
2055 (D)	-36,000	-18,000
2056 (AN)	40,000	22,000
2057 (BN)	6,300	28,000
2058 (AN)	35,000	63,000
2059 (W)	54,000	120,000
2060 (D)	-87,000	30,000
2061 (C)	-62,000	-32,000
2062 (D)	-66,000	-98,000
2063 (BN)	34,000	-65,000

Red Bluff Subbasin Projected (Current Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		25,000	-40,000
2065 (BN)		-62,000	-100,000
2066 (D)		-46,000	-150,000
2067 (C)		-78,000	-230,000
2068 (C)		-40,000	-270,000
2069 (BN)		21,000	-240,000
2070 (W)		96,000	-150,000
2071 (BN)		-65,000	-210,000
2072 (W)		88,000	-120,000
Average (2022-2072)		-2,400	
2022-2072	W		
	AN		
	BN		
	D		
	C		

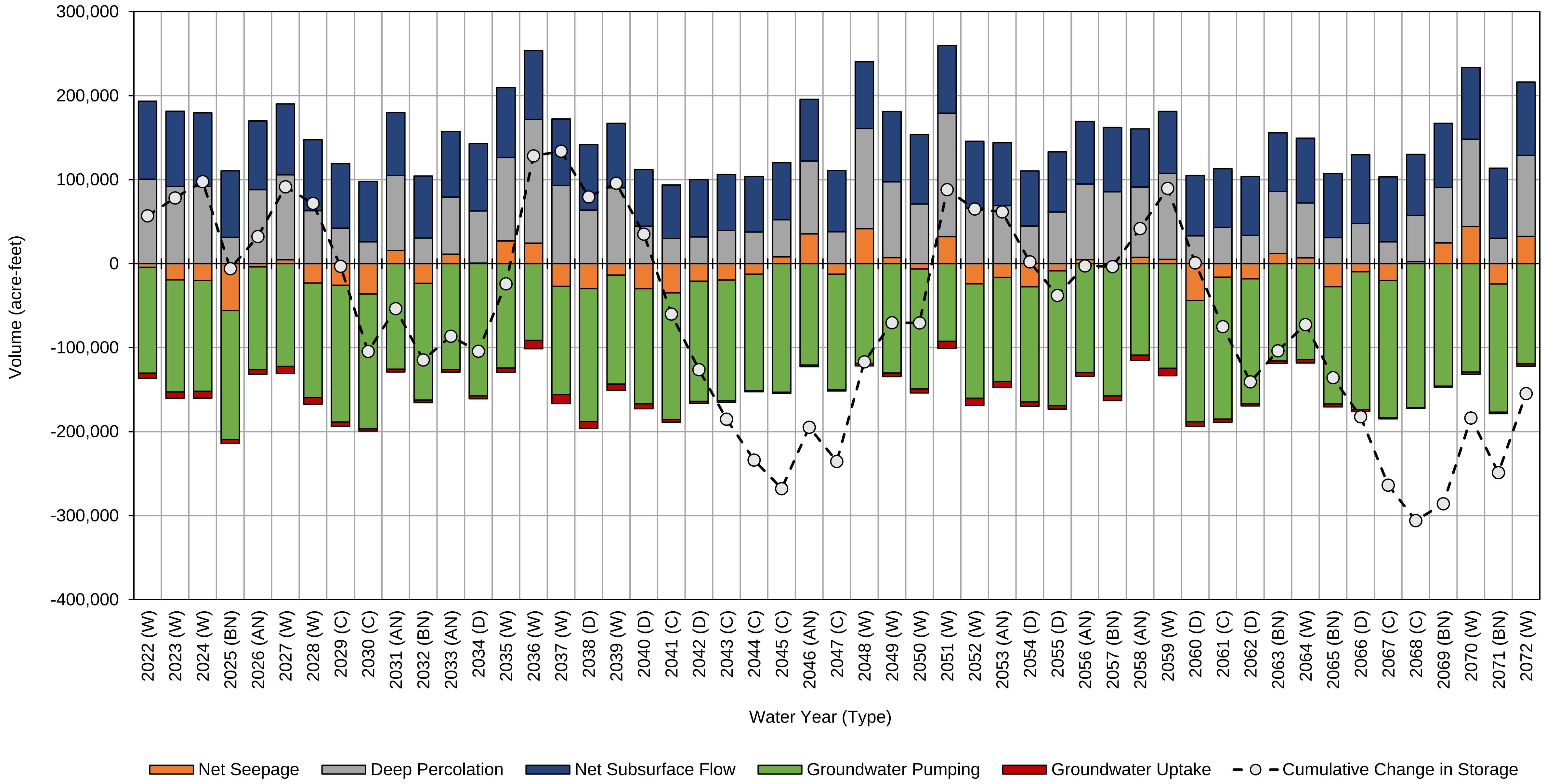
Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-6

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2030) Model Results



Projected (Future Land Use) with Climate Change (2030) Water Budget
Red Bluff Subbasin

Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

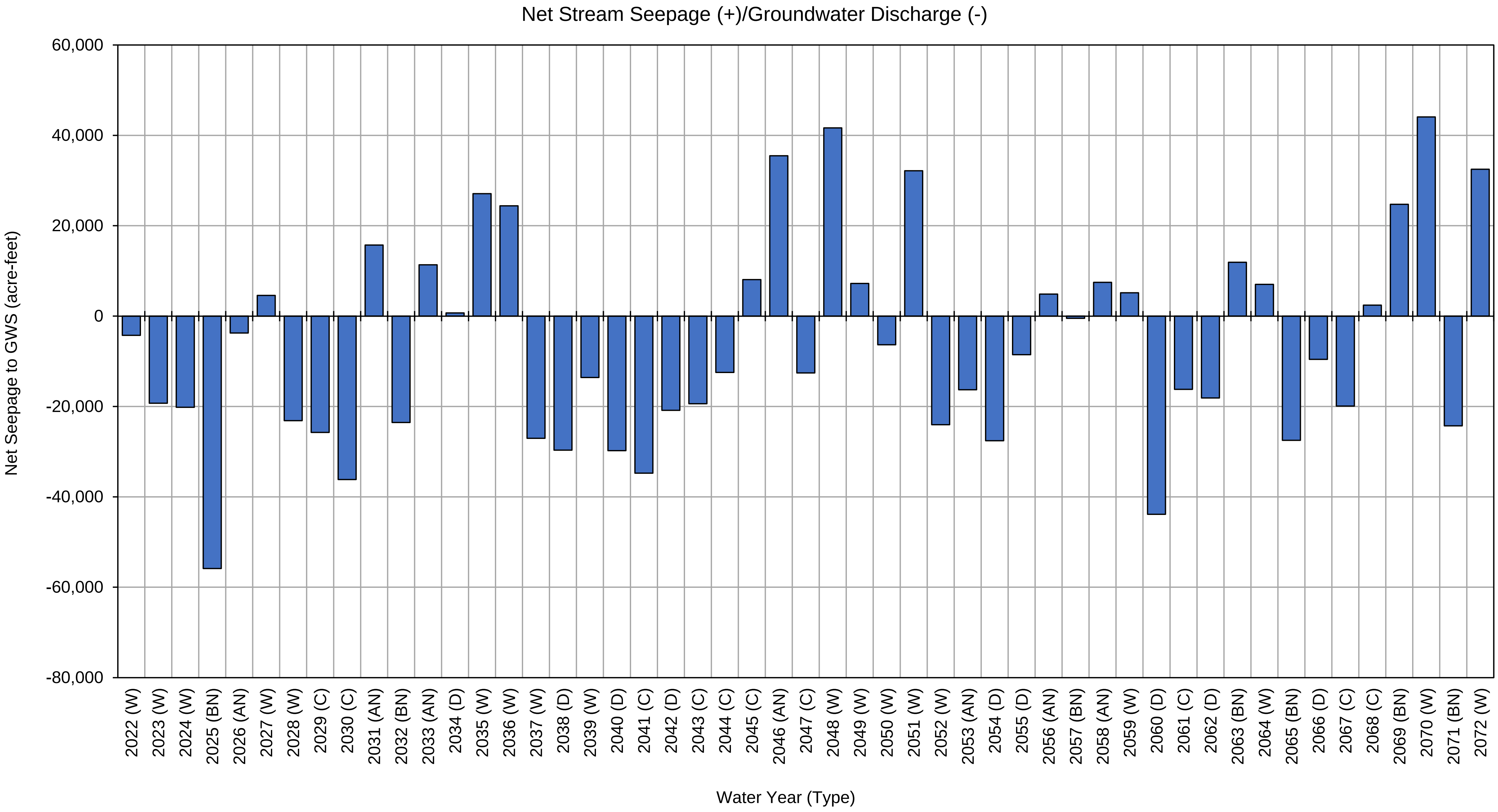
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	-4,300	100,000	-130,000	-6,000	93,000	57,000	57,000
2023 (W)	-19,000	92,000	-130,000	-7,500	90,000	21,000	78,000
2024 (W)	-20,000	92,000	-130,000	-8,100	88,000	19,000	98,000
2025 (BN)	-56,000	31,000	-150,000	-4,700	79,000	-100,000	-5,900
2026 (AN)	-3,700	88,000	-120,000	-5,600	82,000	38,000	32,000
2027 (W)	4,600	100,000	-120,000	-8,500	84,000	59,000	91,000
2028 (W)	-23,000	63,000	-140,000	-8,000	85,000	-20,000	72,000
2029 (C)	-26,000	42,000	-160,000	-5,400	77,000	-75,000	-3,100
2030 (C)	-36,000	26,000	-160,000	-2,700	72,000	-100,000	-100,000
2031 (AN)	16,000	89,000	-130,000	-3,300	75,000	51,000	-54,000
2032 (BN)	-24,000	31,000	-140,000	-2,900	74,000	-61,000	-110,000
2033 (AN)	11,000	68,000	-130,000	-3,300	78,000	28,000	-86,000
2034 (D)	710	62,000	-160,000	-3,400	80,000	-18,000	-100,000
2035 (W)	27,000	99,000	-120,000	-5,200	83,000	80,000	-24,000
2036 (W)	24,000	150,000	-91,000	-10,000	82,000	150,000	130,000
2037 (W)	-27,000	93,000	-130,000	-11,000	79,000	5,600	130,000
2038 (D)	-30,000	64,000	-160,000	-8,300	78,000	-54,000	80,000
2039 (W)	-14,000	90,000	-130,000	-7,400	77,000	16,000	96,000
2040 (D)	-30,000	45,000	-140,000	-5,900	67,000	-61,000	35,000
2041 (C)	-35,000	30,000	-150,000	-3,300	63,000	-95,000	-60,000
2042 (D)	-21,000	32,000	-140,000	-2,200	68,000	-66,000	-130,000
2043 (C)	-19,000	39,000	-140,000	-1,800	67,000	-59,000	-190,000
2044 (C)	-12,000	38,000	-140,000	-1,400	66,000	-49,000	-230,000
2045 (C)	8,100	44,000	-150,000	-1,100	68,000	-34,000	-270,000
2046 (AN)	35,000	87,000	-120,000	-1,800	74,000	73,000	-190,000
2047 (C)	-13,000	38,000	-140,000	-1,600	73,000	-41,000	-240,000
2048 (W)	42,000	120,000	-120,000	-3,100	79,000	120,000	-120,000
2049 (W)	7,200	90,000	-130,000	-4,200	84,000	47,000	-70,000
2050 (W)	-6,300	71,000	-140,000	-4,700	83,000	-280	-71,000
2051 (W)	32,000	150,000	-93,000	-8,300	80,000	160,000	88,000
2052 (W)	-24,000	66,000	-140,000	-8,600	80,000	-23,000	65,000
2053 (AN)	-16,000	69,000	-120,000	-7,200	75,000	-3,500	62,000
2054 (D)	-28,000	45,000	-140,000	-5,400	66,000	-59,000	2,200
2055 (D)	-8,500	62,000	-160,000	-4,200	71,000	-40,000	-38,000
2056 (AN)	4,900	90,000	-130,000	-4,500	74,000	35,000	-2,600
2057 (BN)	-490	85,000	-160,000	-5,700	77,000	-880	-3,500
2058 (AN)	7,500	84,000	-110,000	-6,200	69,000	45,000	42,000
2059 (W)	5,200	100,000	-120,000	-8,800	74,000	48,000	90,000
2060 (D)	-44,000	33,000	-140,000	-5,400	72,000	-89,000	910
2061 (C)	-16,000	43,000	-170,000	-3,700	70,000	-76,000	-75,000
2062 (D)	-18,000	34,000	-150,000	-2,500	70,000	-66,000	-140,000
2063 (BN)	12,000	74,000	-120,000	-2,900	70,000	37,000	-100,000
2064 (W)	7,000	65,000	-110,000	-4,000	77,000	31,000	-72,000
2065 (BN)	-27,000	31,000	-140,000	-3,500	76,000	-63,000	-140,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-9,600	48,000	-160,000	-2,500	82,000	-47,000	-180,000
2067 (C)		-20,000	26,000	-160,000	-1,400	77,000	-81,000	-260,000
2068 (C)		2,400	55,000	-170,000	-1,000	73,000	-42,000	-310,000
2069 (BN)		25,000	66,000	-150,000	-1,100	76,000	20,000	-290,000
2070 (W)		44,000	100,000	-130,000	-2,500	86,000	100,000	-180,000
2071 (BN)		-24,000	30,000	-150,000	-1,700	83,000	-65,000	-250,000
2072 (W)		32,000	96,000	-120,000	-2,800	87,000	94,000	-150,000
Average (2022-2072)		-6,000	68,000	-140,000	-4,600	77,000	-3,000	
2022-2072	W	4,900	97,000	-120,000	-6,600	83,000		
	AN	7,800	82,000	-120,000	-4,600	75,000		
	BN	-14,000	50,000	-140,000	-3,200	77,000		
	D	-21,000	47,000	-150,000	-4,400	73,000		
	C	-17,000	38,000	-160,000	-2,400	71,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-4,300
2023 (W)	-19,000
2024 (W)	-20,000
2025 (BN)	-56,000
2026 (AN)	-3,700
2027 (W)	4,600
2028 (W)	-23,000
2029 (C)	-26,000
2030 (C)	-36,000
2031 (AN)	16,000
2032 (BN)	-24,000
2033 (AN)	11,000
2034 (D)	710
2035 (W)	27,000
2036 (W)	24,000
2037 (W)	-27,000
2038 (D)	-30,000
2039 (W)	-14,000
2040 (D)	-30,000
2041 (C)	-35,000
2042 (D)	-21,000
2043 (C)	-19,000
2044 (C)	-12,000
2045 (C)	8,100
2046 (AN)	35,000
2047 (C)	-13,000
2048 (W)	42,000
2049 (W)	7,200
2050 (W)	-6,300
2051 (W)	32,000
2052 (W)	-24,000
2053 (AN)	-16,000
2054 (D)	-28,000
2055 (D)	-8,500
2056 (AN)	4,900
2057 (BN)	-490
2058 (AN)	7,500
2059 (W)	5,200
2060 (D)	-44,000
2061 (C)	-16,000
2062 (D)	-18,000
2063 (BN)	12,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		7,000
2065 (BN)		-27,000
2066 (D)		-9,600
2067 (C)		-20,000
2068 (C)		2,400
2069 (BN)		25,000
2070 (W)		44,000
2071 (BN)		-24,000
2072 (W)		32,000
Average (2022-2072)		-6,000
2022-2072	W	4,900
	AN	7,800
	BN	-14,000
	D	-21,000
	C	-17,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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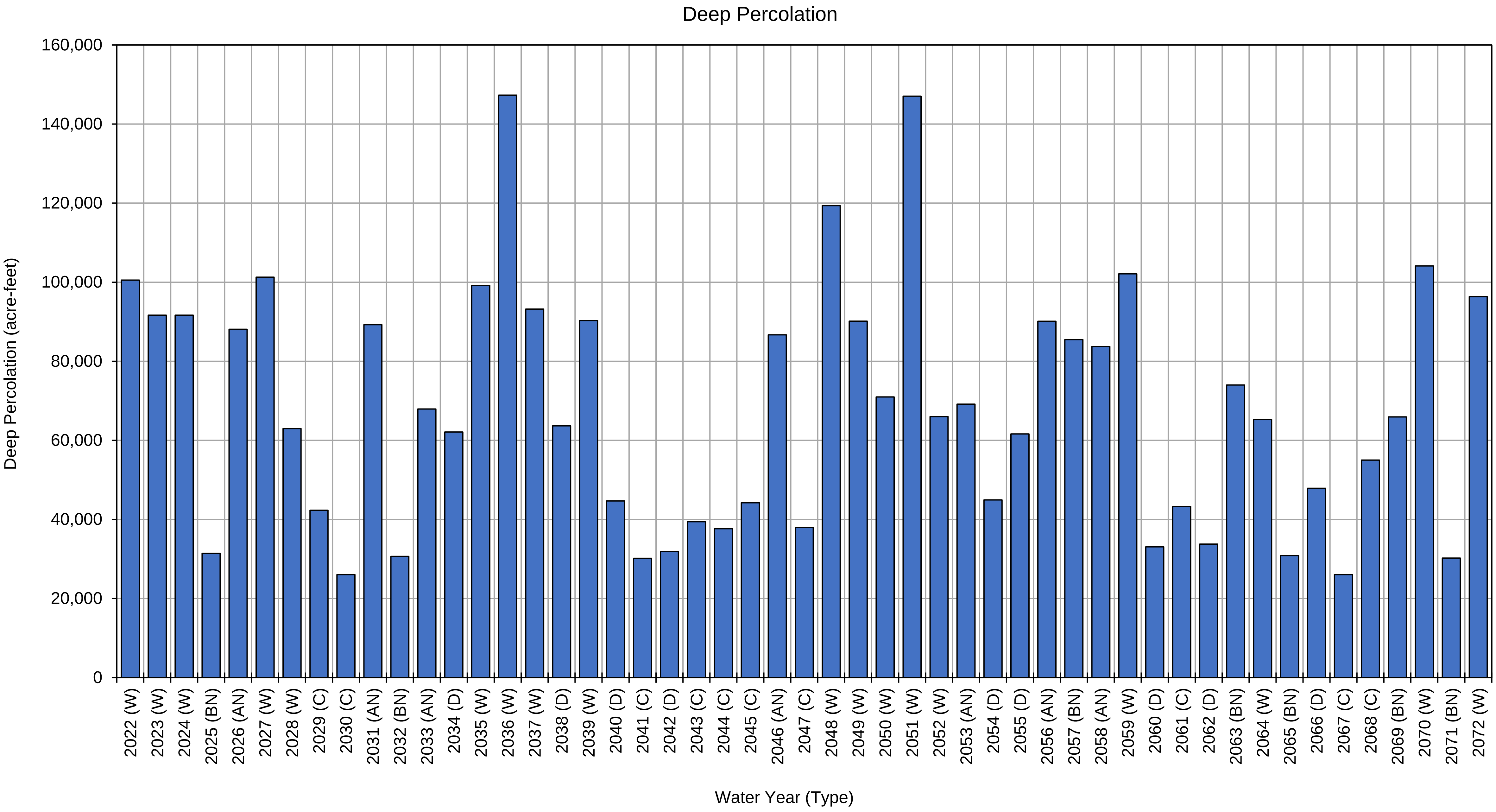

Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)	Deep Percolation from the SWS
2022 (W)	100,000
2023 (W)	92,000
2024 (W)	92,000
2025 (BN)	31,000
2026 (AN)	88,000
2027 (W)	100,000
2028 (W)	63,000
2029 (C)	42,000
2030 (C)	26,000
2031 (AN)	89,000
2032 (BN)	31,000
2033 (AN)	68,000
2034 (D)	62,000
2035 (W)	99,000
2036 (W)	150,000
2037 (W)	93,000
2038 (D)	64,000
2039 (W)	90,000
2040 (D)	45,000
2041 (C)	30,000
2042 (D)	32,000
2043 (C)	39,000
2044 (C)	38,000
2045 (C)	44,000
2046 (AN)	87,000
2047 (C)	38,000
2048 (W)	120,000
2049 (W)	90,000
2050 (W)	71,000
2051 (W)	150,000
2052 (W)	66,000
2053 (AN)	69,000
2054 (D)	45,000
2055 (D)	62,000
2056 (AN)	90,000
2057 (BN)	85,000
2058 (AN)	84,000
2059 (W)	100,000
2060 (D)	33,000
2061 (C)	43,000
2062 (D)	34,000
2063 (BN)	74,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		65,000
2065 (BN)		31,000
2066 (D)		48,000
2067 (C)		26,000
2068 (C)		55,000
2069 (BN)		66,000
2070 (W)		100,000
2071 (BN)		30,000
2072 (W)		96,000
Average (2022-2072)		68,000
2022-2072	W	97,000
	AN	82,000
	BN	50,000
	D	47,000
	C	38,000

Sacramento Valley Water Year Index and is classified into five types:

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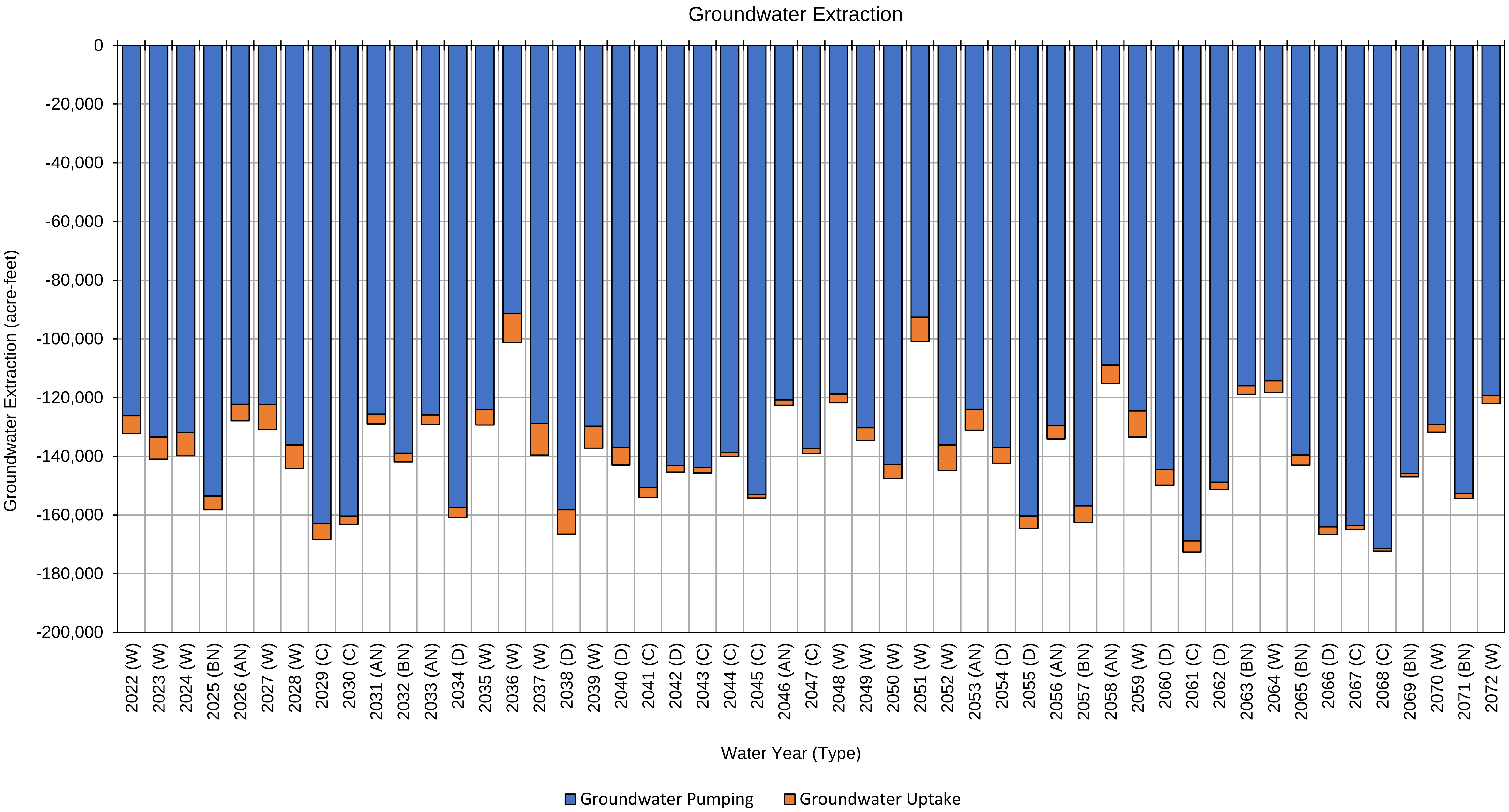
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-130,000	-6,000	-130,000
2023 (W)	-130,000	-7,500	-140,000
2024 (W)	-130,000	-8,100	-140,000
2025 (BN)	-150,000	-4,700	-160,000
2026 (AN)	-120,000	-5,600	-130,000
2027 (W)	-120,000	-8,500	-130,000
2028 (W)	-140,000	-8,000	-140,000
2029 (C)	-160,000	-5,400	-170,000
2030 (C)	-160,000	-2,700	-160,000
2031 (AN)	-130,000	-3,300	-130,000
2032 (BN)	-140,000	-2,900	-140,000
2033 (AN)	-130,000	-3,300	-130,000
2034 (D)	-160,000	-3,400	-160,000
2035 (W)	-120,000	-5,200	-130,000
2036 (W)	-91,000	-10,000	-100,000
2037 (W)	-130,000	-11,000	-140,000
2038 (D)	-160,000	-8,300	-170,000
2039 (W)	-130,000	-7,400	-140,000
2040 (D)	-140,000	-5,900	-140,000
2041 (C)	-150,000	-3,300	-150,000
2042 (D)	-140,000	-2,200	-150,000
2043 (C)	-140,000	-1,800	-150,000
2044 (C)	-140,000	-1,400	-140,000
2045 (C)	-150,000	-1,100	-150,000
2046 (AN)	-120,000	-1,800	-120,000
2047 (C)	-140,000	-1,600	-140,000
2048 (W)	-120,000	-3,100	-120,000
2049 (W)	-130,000	-4,200	-130,000
2050 (W)	-140,000	-4,700	-150,000
2051 (W)	-93,000	-8,300	-100,000
2052 (W)	-140,000	-8,600	-140,000
2053 (AN)	-120,000	-7,200	-130,000
2054 (D)	-140,000	-5,400	-140,000
2055 (D)	-160,000	-4,200	-160,000
2056 (AN)	-130,000	-4,500	-130,000
2057 (BN)	-160,000	-5,700	-160,000
2058 (AN)	-110,000	-6,200	-120,000
2059 (W)	-120,000	-8,800	-130,000
2060 (D)	-140,000	-5,400	-150,000
2061 (C)	-170,000	-3,700	-170,000
2062 (D)	-150,000	-2,500	-150,000
2063 (BN)	-120,000	-2,900	-120,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-110,000	-4,000	-120,000
2065 (BN)		-140,000	-3,500	-140,000
2066 (D)		-160,000	-2,500	-170,000
2067 (C)		-160,000	-1,400	-160,000
2068 (C)		-170,000	-1,000	-170,000
2069 (BN)		-150,000	-1,100	-150,000
2070 (W)		-130,000	-2,500	-130,000
2071 (BN)		-150,000	-1,700	-150,000
2072 (W)		-120,000	-2,800	-120,000
Average (2022-2072)		-140,000	-4,600	-140,000
2022-2072	W	-120,000	-6,600	-130,000
	AN	-120,000	-4,600	-130,000
	BN	-140,000	-3,200	-150,000
	D	-150,000	-4,400	-150,000
	C	-160,000	-2,400	-160,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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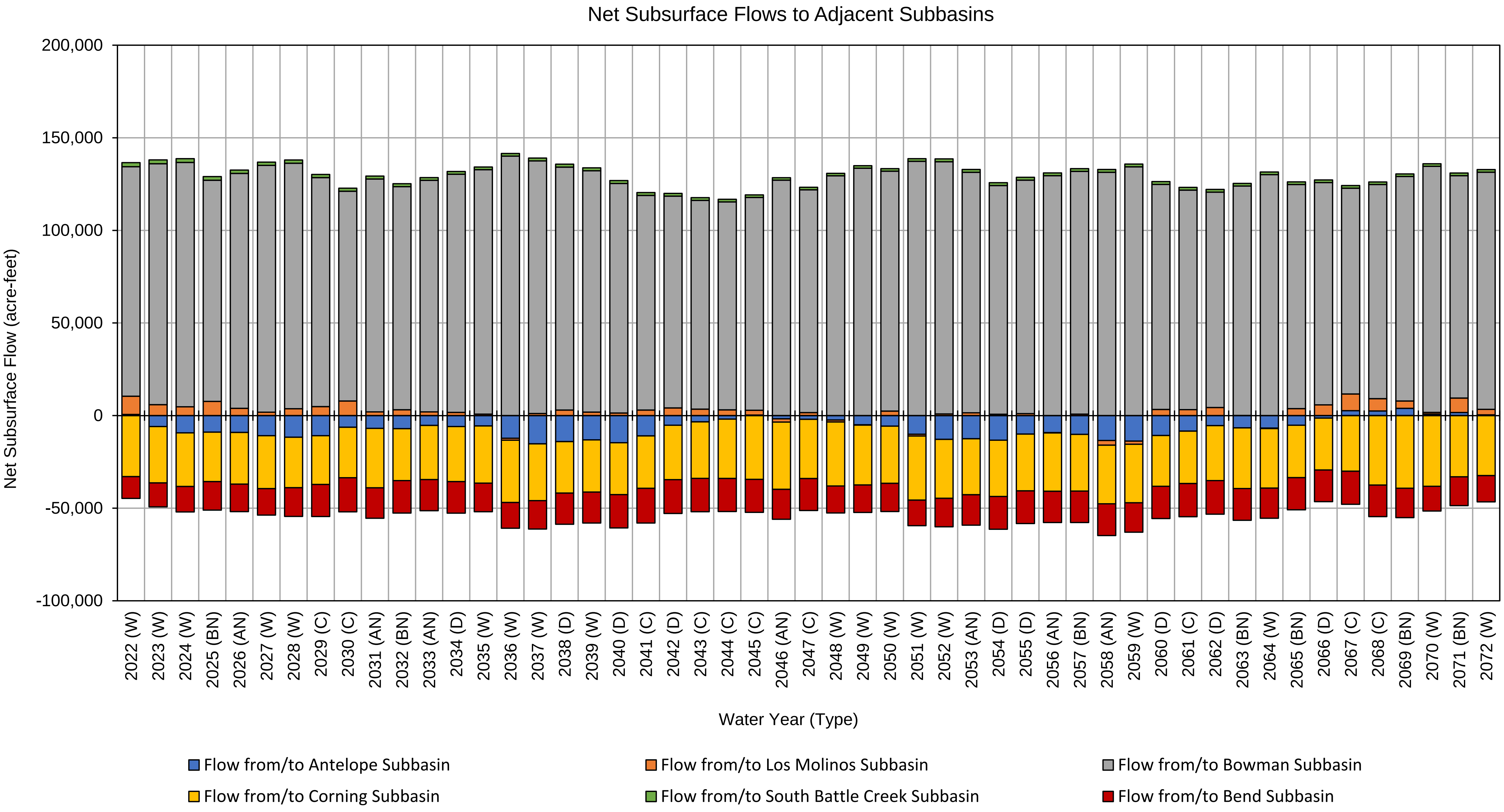
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)	Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	590	9,900	120,000	-33,000	2,200	-12,000	92,000
2023 (W)	-5,900	5,900	130,000	-30,000	2,100	-13,000	89,000
2024 (W)	-9,400	4,700	130,000	-29,000	2,000	-14,000	87,000
2025 (BN)	-9,000	7,600	120,000	-27,000	2,000	-15,000	78,000
2026 (AN)	-9,100	3,900	130,000	-28,000	1,900	-15,000	81,000
2027 (W)	-11,000	1,800	130,000	-29,000	1,800	-14,000	83,000
2028 (W)	-12,000	3,700	130,000	-27,000	1,800	-16,000	84,000
2029 (C)	-11,000	4,800	120,000	-26,000	1,700	-17,000	76,000
2030 (C)	-6,300	7,900	110,000	-27,000	1,700	-18,000	71,000
2031 (AN)	-6,900	2,000	130,000	-32,000	1,600	-16,000	74,000
2032 (BN)	-7,100	3,200	120,000	-28,000	1,600	-18,000	73,000
2033 (AN)	-5,300	2,000	130,000	-29,000	1,500	-17,000	77,000
2034 (D)	-5,900	1,700	130,000	-30,000	1,500	-17,000	79,000
2035 (W)	-5,600	780	130,000	-31,000	1,400	-15,000	82,000
2036 (W)	-12,000	-1,000	140,000	-34,000	1,500	-14,000	81,000
2037 (W)	-15,000	1,100	140,000	-31,000	1,500	-15,000	78,000
2038 (D)	-14,000	3,000	130,000	-28,000	1,600	-17,000	77,000
2039 (W)	-13,000	1,900	130,000	-28,000	1,600	-17,000	76,000
2040 (D)	-15,000	1,400	120,000	-28,000	1,600	-18,000	66,000
2041 (C)	-11,000	3,000	120,000	-28,000	1,500	-19,000	62,000
2042 (D)	-5,200	4,100	110,000	-29,000	1,500	-18,000	67,000
2043 (C)	-3,400	3,400	110,000	-31,000	1,400	-18,000	66,000
2044 (C)	-1,900	3,100	110,000	-32,000	1,400	-18,000	65,000
2045 (C)	300	2,600	110,000	-34,000	1,400	-18,000	67,000
2046 (AN)	-1,800	-1,700	130,000	-36,000	1,300	-16,000	72,000
2047 (C)	-2,000	1,600	120,000	-32,000	1,300	-17,000	72,000
2048 (W)	-2,400	-1,000	130,000	-35,000	1,300	-15,000	78,000
2049 (W)	-5,000	-160	130,000	-32,000	1,400	-15,000	83,000
2050 (W)	-5,700	2,400	130,000	-31,000	1,400	-15,000	82,000
2051 (W)	-10,000	-960	140,000	-35,000	1,400	-14,000	79,000
2052 (W)	-13,000	910	140,000	-32,000	1,500	-15,000	79,000
2053 (AN)	-12,000	1,500	130,000	-30,000	1,500	-16,000	74,000
2054 (D)	-13,000	740	120,000	-30,000	1,600	-18,000	64,000
2055 (D)	-10,000	1,000	130,000	-31,000	1,500	-18,000	70,000
2056 (AN)	-9,200	-180	130,000	-32,000	1,500	-17,000	73,000
2057 (BN)	-10,000	790	130,000	-31,000	1,500	-17,000	76,000
2058 (AN)	-13,000	-2,500	130,000	-32,000	1,500	-17,000	68,000
2059 (W)	-14,000	-1,700	130,000	-32,000	1,500	-16,000	73,000
2060 (D)	-11,000	3,300	120,000	-27,000	1,500	-17,000	71,000
2061 (C)	-8,400	3,200	120,000	-28,000	1,500	-18,000	69,000
2062 (D)	-5,400	4,300	120,000	-30,000	1,500	-18,000	69,000
2063 (BN)	-6,700	45	120,000	-33,000	1,400	-17,000	69,000
2064 (W)	-6,800	-260	130,000	-32,000	1,400	-16,000	76,000
2065 (BN)	-5,200	3,700	120,000	-28,000	1,400	-17,000	75,000
2066 (D)	-1,300	5,800	120,000	-28,000	1,400	-17,000	81,000
2067 (C)	2,600	9,000	110,000	-30,000	1,400	-18,000	76,000
2068 (C)	2,500	6,600	120,000	-38,000	1,400	-17,000	72,000
2069 (BN)	3,900	3,900	120,000	-39,000	1,400	-16,000	75,000
2070 (W)	820	890	130,000	-38,000	1,300	-13,000	84,000
2071 (BN)	1,600	7,800	120,000	-33,000	1,400	-16,000	82,000
2072 (W)	380	3,000	130,000	-32,000	1,400	-14,000	86,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
Average (2022-2072)		-6,800	2,600	130,000	-31,000	1,500	-16,000	76,000
2022-2072	W	-7,700	1,800	130,000	-32,000	1,600	-15,000	82,000
	AN	-8,300	710	130,000	-31,000	1,500	-16,000	74,000
	BN	-4,700	3,900	120,000	-31,000	1,500	-17,000	75,000
	D	-9,000	2,800	120,000	-29,000	1,500	-18,000	72,000
	C	-3,800	4,500	120,000	-31,000	1,500	-18,000	69,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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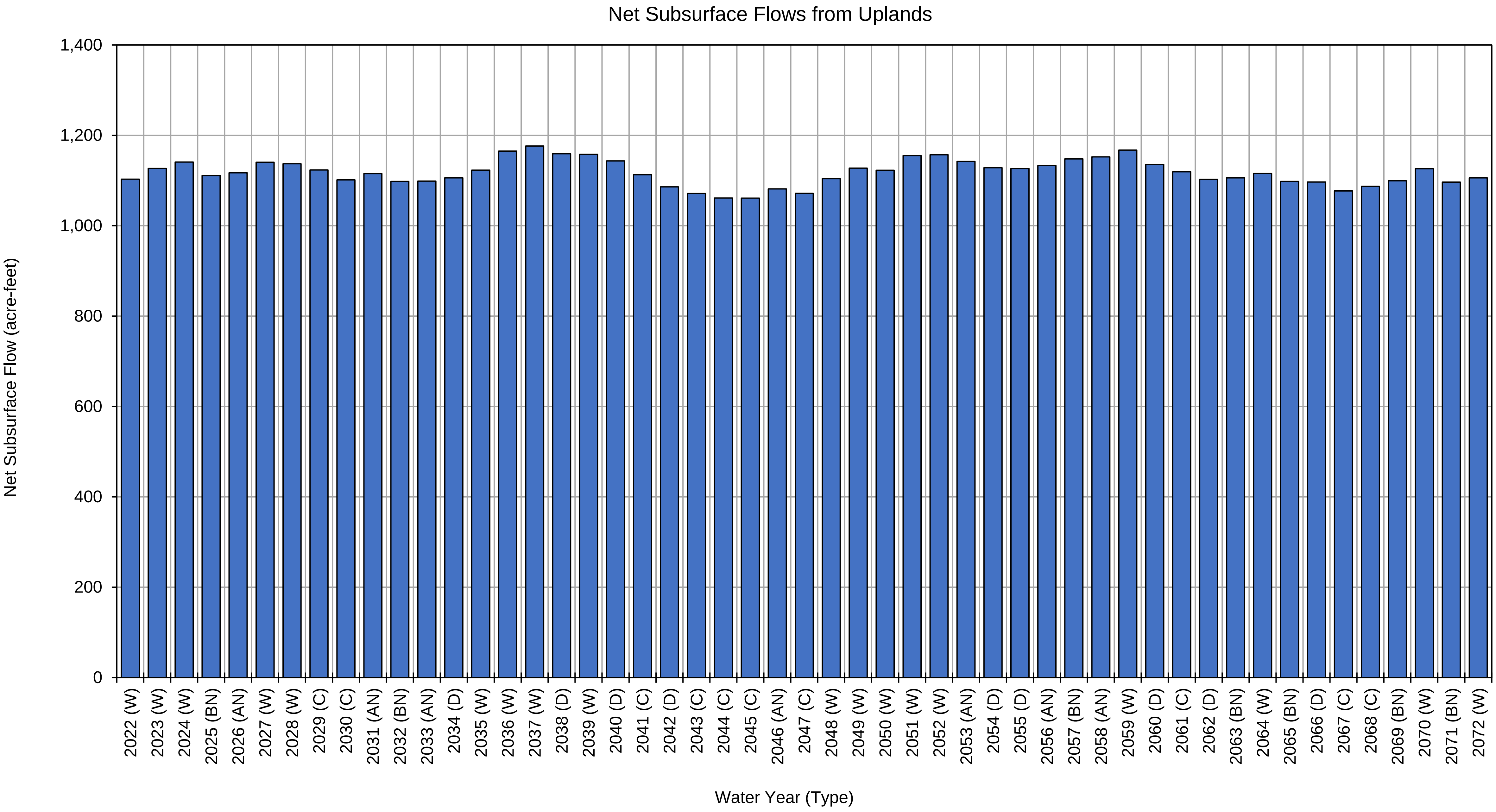
BN	Below Normal
D	Dry
C	Critical



Net Subsurface Flows from Uplands

Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

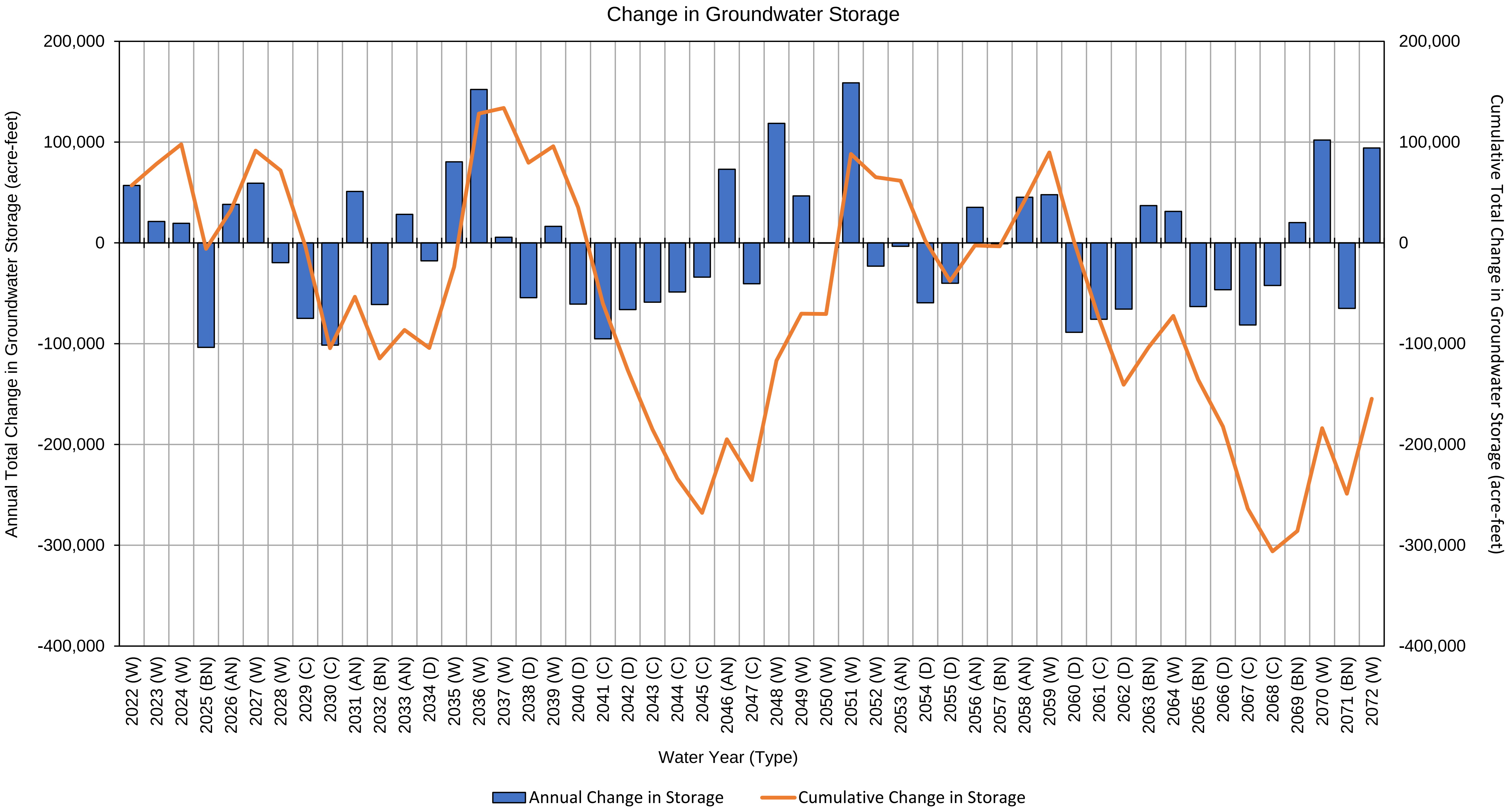
WY (Type)	Subsurface Flows from Uplands
2022 (W)	1,100
2023 (W)	1,100
2024 (W)	1,100
2025 (BN)	1,100
2026 (AN)	1,100
2027 (W)	1,100
2028 (W)	1,100
2029 (C)	1,100
2030 (C)	1,100
2031 (AN)	1,100
2032 (BN)	1,100
2033 (AN)	1,100
2034 (D)	1,100
2035 (W)	1,100
2036 (W)	1,200
2037 (W)	1,200
2038 (D)	1,200
2039 (W)	1,200
2040 (D)	1,100
2041 (C)	1,100
2042 (D)	1,100
2043 (C)	1,100
2044 (C)	1,100
2045 (C)	1,100
2046 (AN)	1,100
2047 (C)	1,100
2048 (W)	1,100
2049 (W)	1,100
2050 (W)	1,100
2051 (W)	1,200
2052 (W)	1,200
2053 (AN)	1,100
2054 (D)	1,100
2055 (D)	1,100
2056 (AN)	1,100
2057 (BN)	1,100
2058 (AN)	1,200
2059 (W)	1,200
2060 (D)	1,100
2061 (C)	1,100
2062 (D)	1,100
2063 (BN)	1,100

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		1,100
2065 (BN)		1,100
2066 (D)		1,100
2067 (C)		1,100
2068 (C)		1,100
2069 (BN)		1,100
2070 (W)		1,100
2071 (BN)		1,100
2072 (W)		1,100
Average (2022-2072)		1,100
2022-2072	W	1,100
	AN	1,100
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2030)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	57,000	57,000
2023 (W)	21,000	78,000
2024 (W)	19,000	98,000
2025 (BN)	-100,000	-5,900
2026 (AN)	38,000	32,000
2027 (W)	59,000	91,000
2028 (W)	-20,000	72,000
2029 (C)	-75,000	-3,100
2030 (C)	-100,000	-100,000
2031 (AN)	51,000	-54,000
2032 (BN)	-61,000	-110,000
2033 (AN)	28,000	-86,000
2034 (D)	-18,000	-100,000
2035 (W)	80,000	-24,000
2036 (W)	150,000	130,000
2037 (W)	5,600	130,000
2038 (D)	-54,000	80,000
2039 (W)	16,000	96,000
2040 (D)	-61,000	35,000
2041 (C)	-95,000	-60,000
2042 (D)	-66,000	-130,000
2043 (C)	-59,000	-190,000
2044 (C)	-49,000	-230,000
2045 (C)	-34,000	-270,000
2046 (AN)	73,000	-190,000
2047 (C)	-41,000	-240,000
2048 (W)	120,000	-120,000
2049 (W)	47,000	-70,000
2050 (W)	-280	-71,000
2051 (W)	160,000	88,000
2052 (W)	-23,000	65,000
2053 (AN)	-3,500	62,000
2054 (D)	-59,000	2,200
2055 (D)	-40,000	-38,000
2056 (AN)	35,000	-2,600
2057 (BN)	-880	-3,500
2058 (AN)	45,000	42,000
2059 (W)	48,000	90,000
2060 (D)	-89,000	910
2061 (C)	-76,000	-75,000
2062 (D)	-66,000	-140,000
2063 (BN)	37,000	-100,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2030) Change in Groundwater Storage (acre-feet, rounded)

<table>
<tr><th colspan="2">WY (Type)</th><th>Annual Change in Groundwater Storage</th><th>Cumulative Change in Groundwater Storage</th></tr>
<tr><td colspan="2">2064 (W)</td><td>31,000</td><td>-72,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>-63,000</td><td>-140,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>-47,000</td><td>-180,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>-81,000</td><td>-260,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>-42,000</td><td>-310,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>20,000</td><td>-290,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>100,000</td><td>-180,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>-65,000</td><td>-250,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>94,000</td><td>-150,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>-3,000</td><td></td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td></td><td></td></tr>
<tr><td>AN</td><td></td><td></td></tr>
<tr><td>BN</td><td></td><td></td></tr>
<tr><td>D</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td></tr>
</table>

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-7

Detailed Red Bluff Subbasin Water Budget Results:

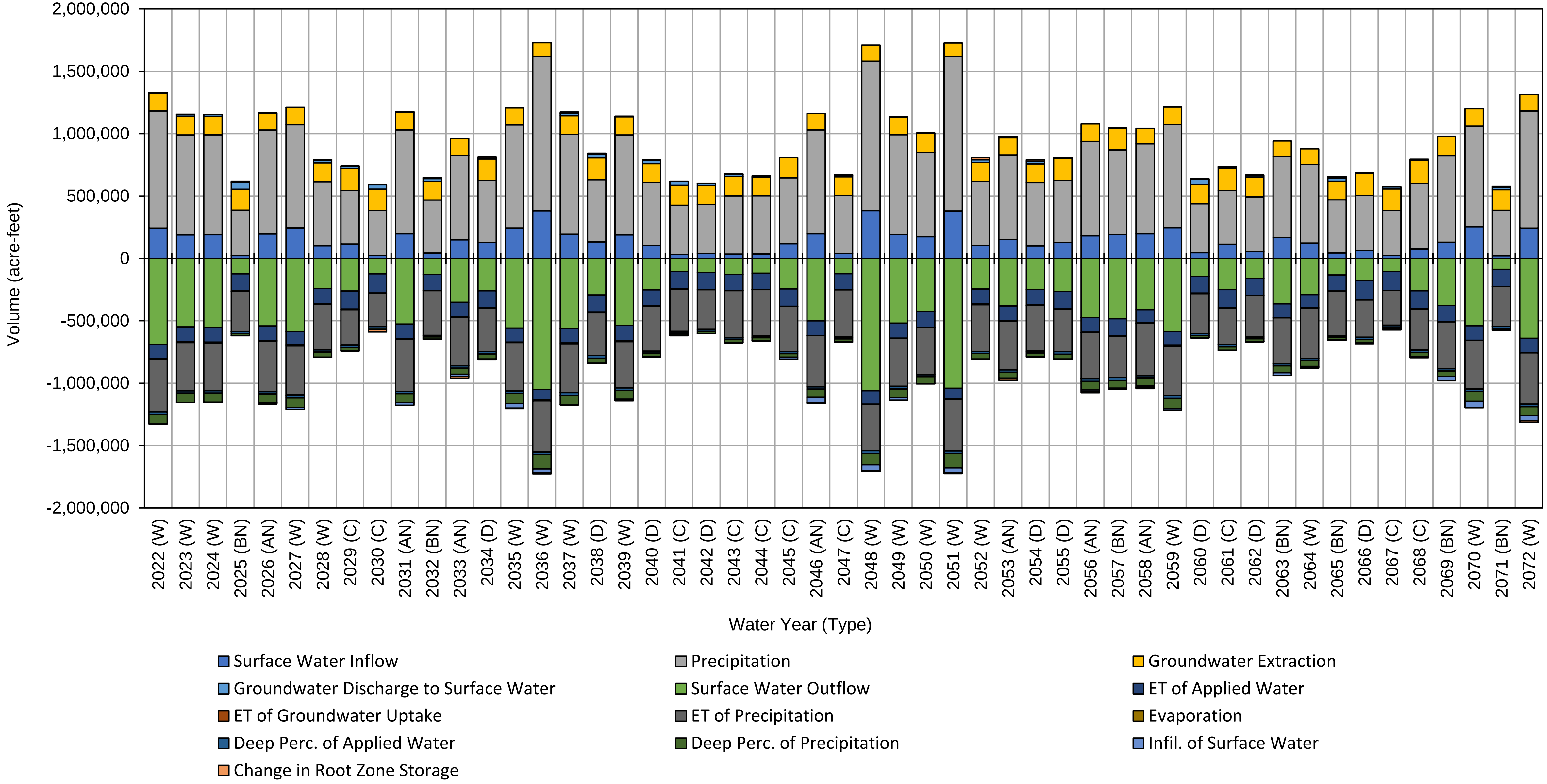
Projected (Future Land Use) with Climate Change (2070) Model Results

APPENDIX D-7a

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results – Surface Water System

Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

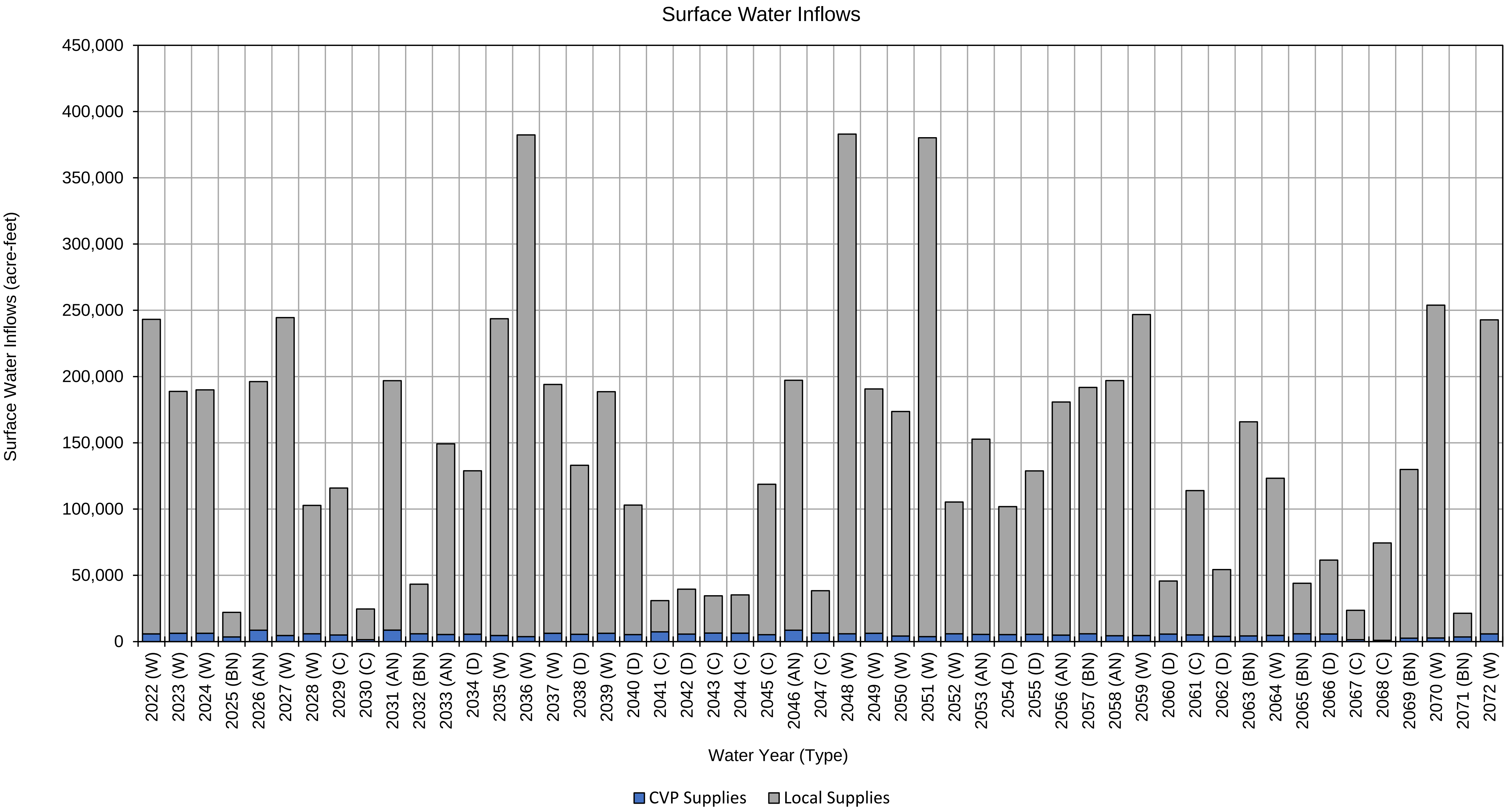
WY (Type)	Inflows				Outflows								Change in Root Zone Storage
	Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2022 (W)	240,000	940,000	140,000	2,200	690,000	110,000	5,600	420,000	970	21,000	75,000	2,800	-4,600
2023 (W)	190,000	800,000	150,000	13,000	550,000	120,000	7,300	390,000	1,100	20,000	72,000	2,800	-1,900
2024 (W)	190,000	800,000	150,000	15,000	550,000	120,000	7,900	380,000	1,100	21,000	71,000	2,900	15
2025 (BN)	22,000	360,000	170,000	55,000	120,000	140,000	4,300	320,000	950	14,000	16,000	2,000	-9,500
2026 (AN)	200,000	830,000	140,000	1,300	540,000	120,000	5,000	410,000	1,200	18,000	67,000	2,900	9,100
2027 (W)	240,000	830,000	140,000	0	590,000	110,000	7,900	390,000	950	20,000	80,000	14,000	-2,200
2028 (W)	100,000	510,000	150,000	23,000	240,000	120,000	7,100	360,000	1,200	17,000	41,000	2,700	-4,200
2029 (C)	120,000	430,000	170,000	19,000	260,000	150,000	5,000	290,000	1,400	16,000	27,000	2,500	-4,300
2030 (C)	25,000	360,000	170,000	34,000	120,000	150,000	2,500	260,000	1,200	13,000	12,000	1,700	17,000
2031 (AN)	200,000	830,000	140,000	0	530,000	120,000	3,000	420,000	1,300	18,000	69,000	21,000	-6,900
2032 (BN)	43,000	430,000	150,000	21,000	130,000	130,000	2,500	360,000	1,000	12,000	17,000	2,300	-9,500
2033 (AN)	150,000	680,000	140,000	0	350,000	120,000	2,900	390,000	1,200	18,000	49,000	18,000	15,000
2034 (D)	130,000	500,000	170,000	0	260,000	140,000	3,000	350,000	1,100	20,000	40,000	6,900	-15,000
2035 (W)	240,000	830,000	140,000	0	560,000	110,000	4,600	390,000	1,100	21,000	78,000	37,000	7,300
2036 (W)	380,000	1,200,000	110,000	0	1,000,000	83,000	8,800	410,000	640	20,000	120,000	27,000	14,000
2037 (W)	190,000	800,000	150,000	18,000	560,000	120,000	9,700	390,000	1,100	20,000	73,000	3,000	-11,000
2038 (D)	130,000	500,000	180,000	25,000	290,000	140,000	7,200	340,000	1,300	20,000	40,000	2,700	-10,000
2039 (W)	190,000	800,000	150,000	5,100	540,000	120,000	6,700	370,000	1,200	21,000	70,000	2,900	9,900
2040 (D)	100,000	510,000	150,000	26,000	250,000	130,000	5,200	360,000	1,100	14,000	30,000	2,600	-5,300
2041 (C)	31,000	400,000	160,000	33,000	110,000	140,000	2,900	340,000	1,200	13,000	16,000	2,100	2,200
2042 (D)	39,000	390,000	150,000	17,000	110,000	140,000	1,900	320,000	1,100	15,000	17,000	1,900	-1,200
2043 (C)	35,000	470,000	150,000	16,000	130,000	130,000	1,500	380,000	990	14,000	25,000	2,000	-3,700
2044 (C)	35,000	470,000	150,000	9,300	120,000	130,000	1,100	370,000	1,000	13,000	24,000	2,100	-33
2045 (C)	120,000	530,000	160,000	0	240,000	140,000	930	360,000	1,300	16,000	28,000	15,000	860
2046 (AN)	200,000	830,000	130,000	0	500,000	120,000	1,600	410,000	1,400	17,000	66,000	42,000	6,600
2047 (C)	38,000	470,000	150,000	9,500	120,000	130,000	1,300	380,000	1,100	13,000	24,000	2,200	-7,400
2048 (W)	380,000	1,200,000	130,000	0	1,100,000	110,000	2,500	370,000	1,100	22,000	91,000	48,000	7,900
2049 (W)	190,000	800,000	140,000	0	520,000	120,000	3,800	380,000	1,300	20,000	70,000	19,000	-68
2050 (W)	170,000	680,000	150,000	0	430,000	130,000	4,300	380,000	1,200	18,000	52,000	3,500	-1,800
2051 (W)	380,000	1,200,000	110,000	0	1,000,000	84,000	7,100	410,000	660	20,000	120,000	35,000	13,000
2052 (W)	110,000	510,000	150,000	21,000	250,000	120,000	7,000	370,000	1,200	17,000	44,000	2,800	-18,000
2053 (AN)	150,000	680,000	140,000	9,600	380,000	120,000	5,900	390,000	1,100	18,000	50,000	2,700	12,000
2054 (D)	100,000	510,000	150,000	22,000	250,000	120,000	4,500	370,000	1,100	14,000	31,000	2,600	-11,000
2055 (D)	130,000	500,000	170,000	3,600	270,000	140,000	3,500	340,000	1,100	20,000	39,000	2,600	-4,700
2056 (AN)	180,000	760,000	140,000	0	470,000	120,000	3,900	370,000	1,100	20,000	69,000	15,000	9,400
2057 (BN)	190,000	680,000	170,000	0	480,000	130,000	5,100	330,000	1,300	24,000	60,000	9,200	-8,300
2058 (AN)	200,000	720,000	120,000	0	410,000	110,000	5,300	420,000	980	17,000	63,000	12,000	9,000
2059 (W)	250,000	830,000	140,000	0	590,000	110,000	8,000	400,000	950	21,000	80,000	15,000	-2,600
2060 (D)	46,000	390,000	160,000	41,000	140,000	130,000	4,700	320,000	1,100	15,000	17,000	2,300	-1,500
2061 (C)	110,000	430,000	180,000	8,900	250,000	150,000	3,500	290,000	1,400	17,000	27,000	2,500	-7,100
2062 (D)	54,000	440,000	160,000	16,000	160,000	140,000	2,300	330,000	1,200	14,000	19,000	2,200	2,900
2063 (BN)	170,000	650,000	130,000	0	360,000	110,000	2,700	370,000	1,100	16,000	56,000	19,000	5,500
2064 (W)	120,000	630,000	130,000	0	290,000	100,000	3,600	400,000	1,000	15,000	48,000	12,000	2,300
2065 (BN)	44,000	430,000	150,000	25,000	130,000	130,000	3,100	360,000	1,000	12,000	18,000	2,300	-9,600

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Root Zone Water Budget Summary (acre-feet, rounded)

WY (Type)		Inflows				Outflows								Change in Root Zone Storage
		Surface Water Inflow	Precipitation	Groundwater Extraction	Groundwater Discharge to Surface Water	Surface Water Outflow	ET of Applied Water	ET of Groundwater Uptake	ET of Precipitation	Evaporation	Deep Perc. of Applied Water	Deep Perc. of Precipitation	Infil. of Surface Water	
2066 (D)		61,000	440,000	180,000	6,600	180,000	150,000	2,200	300,000	1,200	18,000	27,000	2,500	6,700
2067 (C)		24,000	360,000	170,000	16,000	110,000	150,000	1,100	280,000	1,100	13,000	12,000	1,600	9,600
2068 (C)		74,000	530,000	180,000	0	260,000	150,000	830	330,000	1,100	19,000	33,000	9,400	-12,000
2069 (BN)		130,000	690,000	160,000	0	380,000	130,000	890	370,000	1,400	18,000	46,000	32,000	-1,500
2070 (W)		250,000	810,000	140,000	0	540,000	120,000	2,200	390,000	1,300	21,000	76,000	52,000	2,900
2071 (BN)		21,000	360,000	160,000	21,000	87,000	140,000	1,400	320,000	980	14,000	15,000	2,000	-5,800
2072 (W)		240,000	940,000	130,000	0	640,000	120,000	2,300	410,000	1,200	20,000	72,000	41,000	11,000
Average (2022-2072)		140,000	640,000	150,000	10,000	380,000	120,000	4,100	360,000	1,100	17,000	48,000	11,000	-95
2022-2072	W	230,000	840,000	140,000	5,400	590,000	110,000	5,900	390,000	1,100	20,000	74,000	18,000	1,300
	AN	180,000	760,000	130,000	1,600	460,000	120,000	3,900	400,000	1,200	18,000	62,000	16,000	7,800
	BN	88,000	510,000	150,000	17,000	240,000	130,000	2,800	350,000	1,100	16,000	32,000	9,900	-5,500
	D	88,000	460,000	160,000	17,000	210,000	140,000	3,800	340,000	1,200	17,000	29,000	2,900	-4,400
	C	61,000	440,000	170,000	15,000	170,000	140,000	2,100	330,000	1,200	15,000	23,000	4,100	-410

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

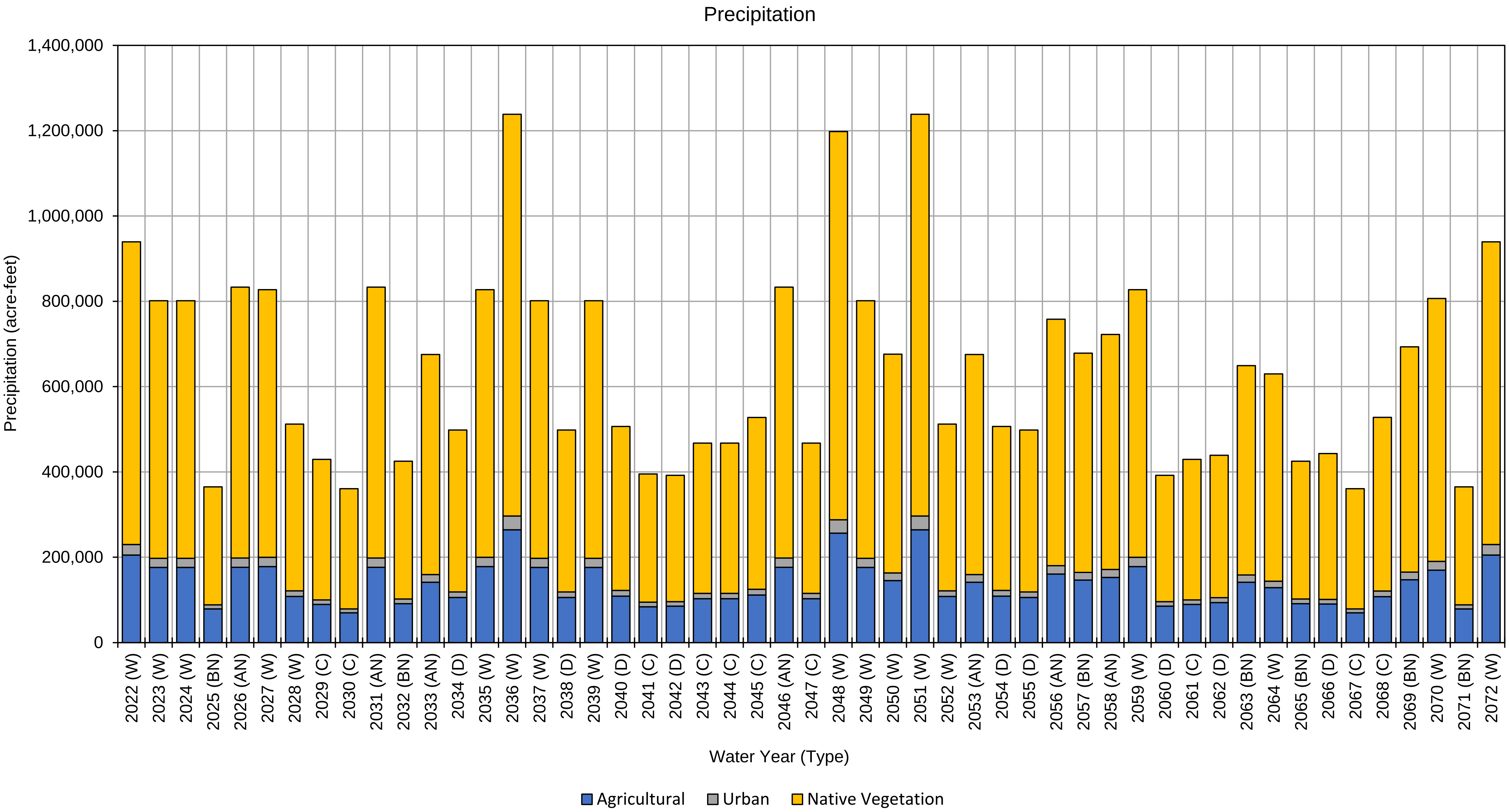
WY (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	5,800	240,000	250,000
2023 (W)	6,300	180,000	190,000
2024 (W)	6,200	180,000	190,000
2025 (BN)	3,400	19,000	22,000
2026 (AN)	8,500	190,000	200,000
2027 (W)	4,600	240,000	240,000
2028 (W)	5,900	97,000	100,000
2029 (C)	5,000	110,000	120,000
2030 (C)	1,400	23,000	24,000
2031 (AN)	8,600	190,000	200,000
2032 (BN)	5,900	37,000	43,000
2033 (AN)	5,400	140,000	150,000
2034 (D)	5,500	120,000	130,000
2035 (W)	4,600	240,000	240,000
2036 (W)	3,700	380,000	380,000
2037 (W)	6,200	190,000	200,000
2038 (D)	5,500	130,000	140,000
2039 (W)	6,200	180,000	190,000
2040 (D)	5,200	98,000	100,000
2041 (C)	7,300	24,000	31,000
2042 (D)	5,600	34,000	40,000
2043 (C)	6,400	28,000	34,000
2044 (C)	6,300	29,000	35,000
2045 (C)	5,200	110,000	120,000
2046 (AN)	8,500	190,000	200,000
2047 (C)	6,400	32,000	38,000
2048 (W)	5,900	380,000	390,000
2049 (W)	6,200	180,000	190,000
2050 (W)	4,100	170,000	170,000
2051 (W)	3,700	380,000	380,000
2052 (W)	5,800	99,000	100,000
2053 (AN)	5,400	150,000	160,000
2054 (D)	5,300	97,000	100,000
2055 (D)	5,500	120,000	130,000
2056 (AN)	4,900	180,000	180,000
2057 (BN)	5,900	190,000	200,000
2058 (AN)	4,400	190,000	190,000
2059 (W)	4,500	240,000	240,000
2060 (D)	5,600	40,000	46,000
2061 (C)	5,000	110,000	120,000
2062 (D)	3,900	50,000	54,000
2063 (BN)	4,200	160,000	160,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Inflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Total
2064 (W)		4,700	120,000	120,000
2065 (BN)		5,800	38,000	44,000
2066 (D)		5,700	56,000	62,000
2067 (C)		1,400	22,000	23,000
2068 (C)		950	73,000	74,000
2069 (BN)		2,500	130,000	130,000
2070 (W)		2,700	250,000	250,000
2071 (BN)		3,400	18,000	21,000
2072 (W)		5,700	240,000	250,000
Average (2022-2072)		5,200	140,000	150,000
2022-2072	W	5,200	220,000	230,000
	AN	6,500	170,000	180,000
	BN	4,500	84,000	89,000
	D	5,300	83,000	88,000
	C	4,500	56,000	61,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

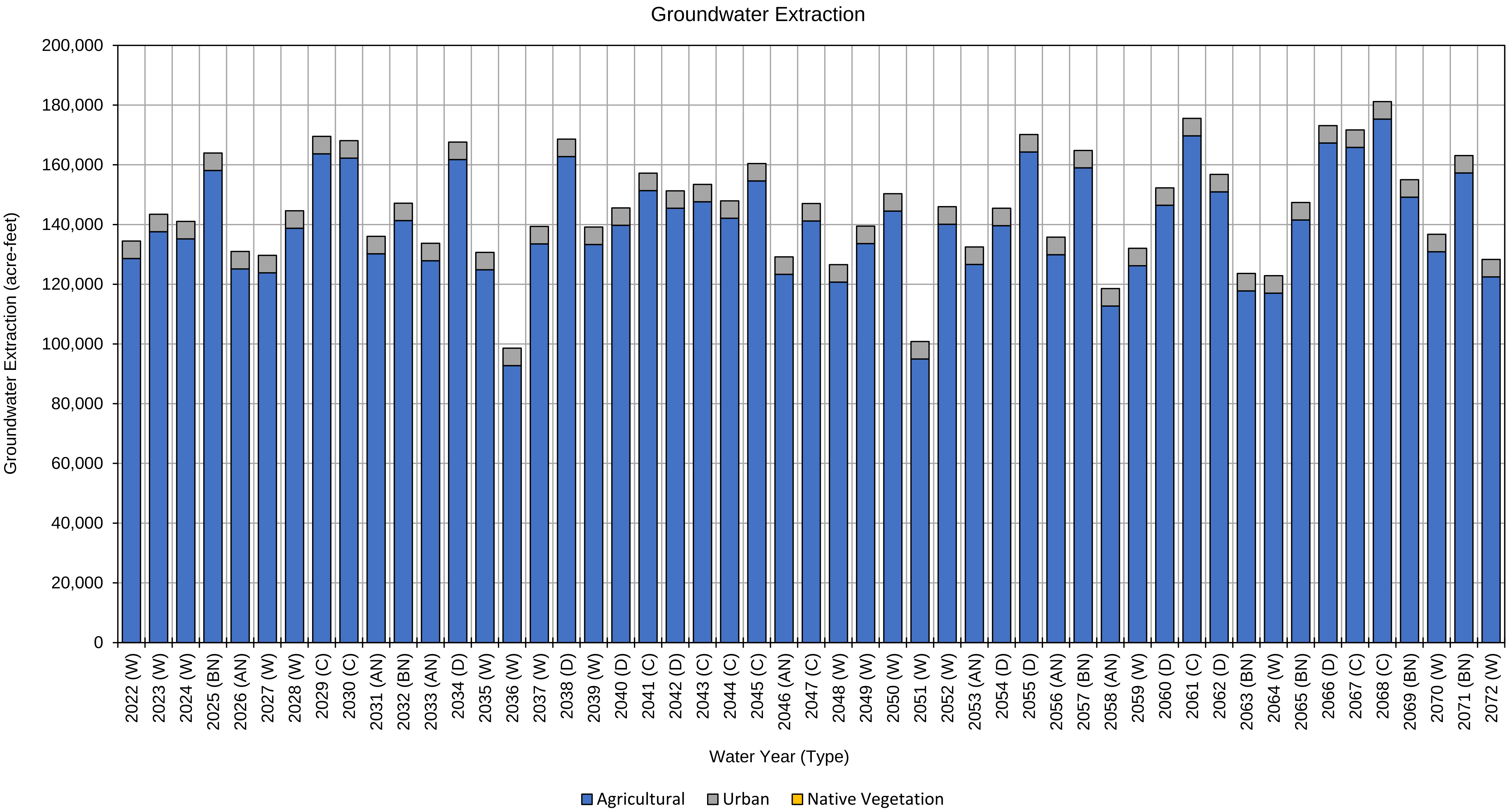
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	210,000	25,000	710,000	950,000
2023 (W)	180,000	21,000	600,000	800,000
2024 (W)	180,000	21,000	600,000	800,000
2025 (BN)	79,000	9,600	280,000	370,000
2026 (AN)	180,000	22,000	640,000	840,000
2027 (W)	180,000	22,000	630,000	830,000
2028 (W)	110,000	13,000	390,000	510,000
2029 (C)	89,000	11,000	330,000	430,000
2030 (C)	70,000	9,100	280,000	360,000
2031 (AN)	180,000	22,000	640,000	840,000
2032 (BN)	91,000	11,000	320,000	420,000
2033 (AN)	140,000	18,000	520,000	680,000
2034 (D)	110,000	13,000	380,000	500,000
2035 (W)	180,000	22,000	630,000	830,000
2036 (W)	260,000	32,000	940,000	1,200,000
2037 (W)	180,000	21,000	600,000	800,000
2038 (D)	110,000	13,000	380,000	500,000
2039 (W)	180,000	21,000	600,000	800,000
2040 (D)	110,000	13,000	380,000	500,000
2041 (C)	84,000	11,000	300,000	400,000
2042 (D)	85,000	11,000	300,000	400,000
2043 (C)	100,000	13,000	350,000	460,000
2044 (C)	100,000	13,000	350,000	460,000
2045 (C)	110,000	14,000	400,000	520,000
2046 (AN)	180,000	22,000	640,000	840,000
2047 (C)	100,000	13,000	350,000	460,000
2048 (W)	260,000	31,000	910,000	1,200,000
2049 (W)	180,000	21,000	600,000	800,000
2050 (W)	150,000	18,000	510,000	680,000
2051 (W)	260,000	32,000	940,000	1,200,000
2052 (W)	110,000	13,000	390,000	510,000
2053 (AN)	140,000	18,000	520,000	680,000
2054 (D)	110,000	13,000	380,000	500,000
2055 (D)	110,000	13,000	380,000	500,000
2056 (AN)	160,000	20,000	580,000	760,000
2057 (BN)	150,000	18,000	510,000	680,000
2058 (AN)	150,000	19,000	550,000	720,000
2059 (W)	180,000	22,000	630,000	830,000
2060 (D)	85,000	11,000	300,000	400,000
2061 (C)	89,000	11,000	330,000	430,000
2062 (D)	94,000	11,000	330,000	440,000
2063 (BN)	140,000	17,000	490,000	650,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		130,000	15,000	490,000	640,000
2065 (BN)		91,000	11,000	320,000	420,000
2066 (D)		90,000	11,000	340,000	440,000
2067 (C)		70,000	9,100	280,000	360,000
2068 (C)		110,000	13,000	410,000	530,000
2069 (BN)		150,000	18,000	530,000	700,000
2070 (W)		170,000	21,000	620,000	810,000
2071 (BN)		79,000	9,600	280,000	370,000
2072 (W)		210,000	25,000	710,000	950,000
Average (2022-2072)		140,000	17,000	490,000	650,000
2022-2072	W	180,000	22,000	640,000	840,000
	AN	160,000	20,000	580,000	760,000
	BN	110,000	13,000	390,000	510,000
	D	99,000	12,000	350,000	460,000
	C	93,000	11,000	340,000	440,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

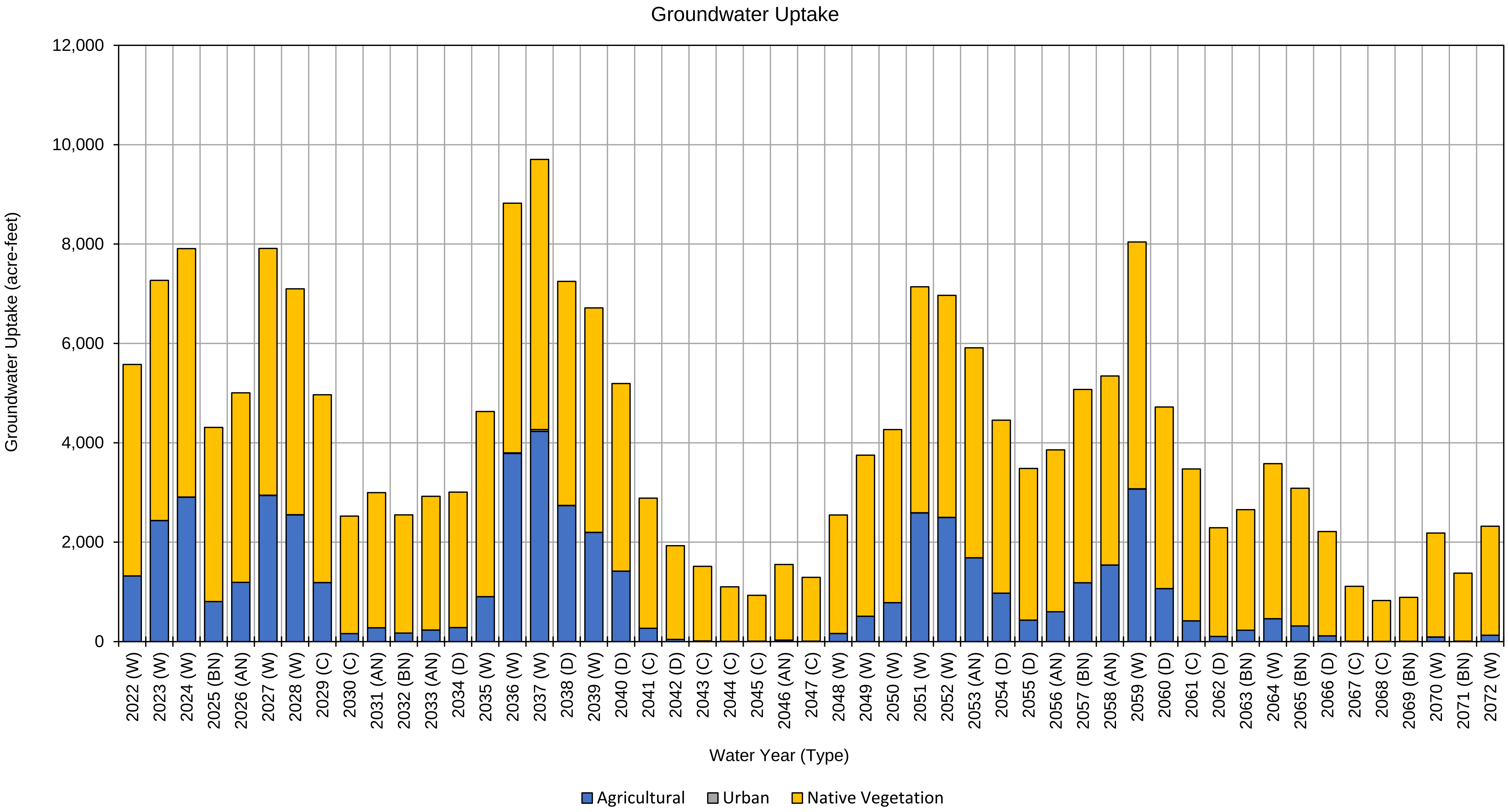
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	130,000	5,900	0	140,000
2023 (W)	140,000	5,900	0	150,000
2024 (W)	140,000	5,900	0	150,000
2025 (BN)	160,000	5,900	0	170,000
2026 (AN)	130,000	5,900	0	140,000
2027 (W)	120,000	5,900	0	130,000
2028 (W)	140,000	5,900	0	150,000
2029 (C)	160,000	5,900	0	170,000
2030 (C)	160,000	5,800	0	170,000
2031 (AN)	130,000	5,900	0	140,000
2032 (BN)	140,000	5,800	0	150,000
2033 (AN)	130,000	5,900	0	140,000
2034 (D)	160,000	5,800	0	170,000
2035 (W)	120,000	5,900	0	130,000
2036 (W)	93,000	5,900	0	99,000
2037 (W)	130,000	5,900	0	140,000
2038 (D)	160,000	5,900	0	170,000
2039 (W)	130,000	5,900	0	140,000
2040 (D)	140,000	5,900	0	150,000
2041 (C)	150,000	5,900	0	160,000
2042 (D)	150,000	5,800	0	160,000
2043 (C)	150,000	5,800	0	160,000
2044 (C)	140,000	5,800	0	150,000
2045 (C)	150,000	5,800	0	160,000
2046 (AN)	120,000	5,900	0	130,000
2047 (C)	140,000	5,800	0	150,000
2048 (W)	120,000	5,900	0	130,000
2049 (W)	130,000	5,900	0	140,000
2050 (W)	140,000	5,900	0	150,000
2051 (W)	95,000	5,900	0	100,000
2052 (W)	140,000	5,900	0	150,000
2053 (AN)	130,000	5,900	0	140,000
2054 (D)	140,000	5,900	0	150,000
2055 (D)	160,000	5,900	0	170,000
2056 (AN)	130,000	5,900	0	140,000
2057 (BN)	160,000	5,900	0	170,000
2058 (AN)	110,000	5,900	0	120,000
2059 (W)	130,000	5,900	0	140,000
2060 (D)	150,000	5,900	0	160,000
2061 (C)	170,000	5,900	0	180,000
2062 (D)	150,000	5,800	0	160,000
2063 (BN)	120,000	5,900	0	130,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extraction, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		120,000	5,900	0	130,000
2065 (BN)		140,000	5,800	0	150,000
2066 (D)		170,000	5,800	0	180,000
2067 (C)		170,000	5,800	0	180,000
2068 (C)		180,000	5,800	0	190,000
2069 (BN)		150,000	5,800	0	160,000
2070 (W)		130,000	5,900	0	140,000
2071 (BN)		160,000	5,800	0	170,000
2072 (W)		120,000	5,900	0	130,000
Average (2022-2072)		140,000	5,800	0	150,000
2022-2072	W	130,000	5,900	0	140,000
	AN	130,000	5,900	0	140,000
	BN	150,000	5,800	0	160,000
	D	150,000	5,800	0	160,000
	C	160,000	5,800	0	170,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

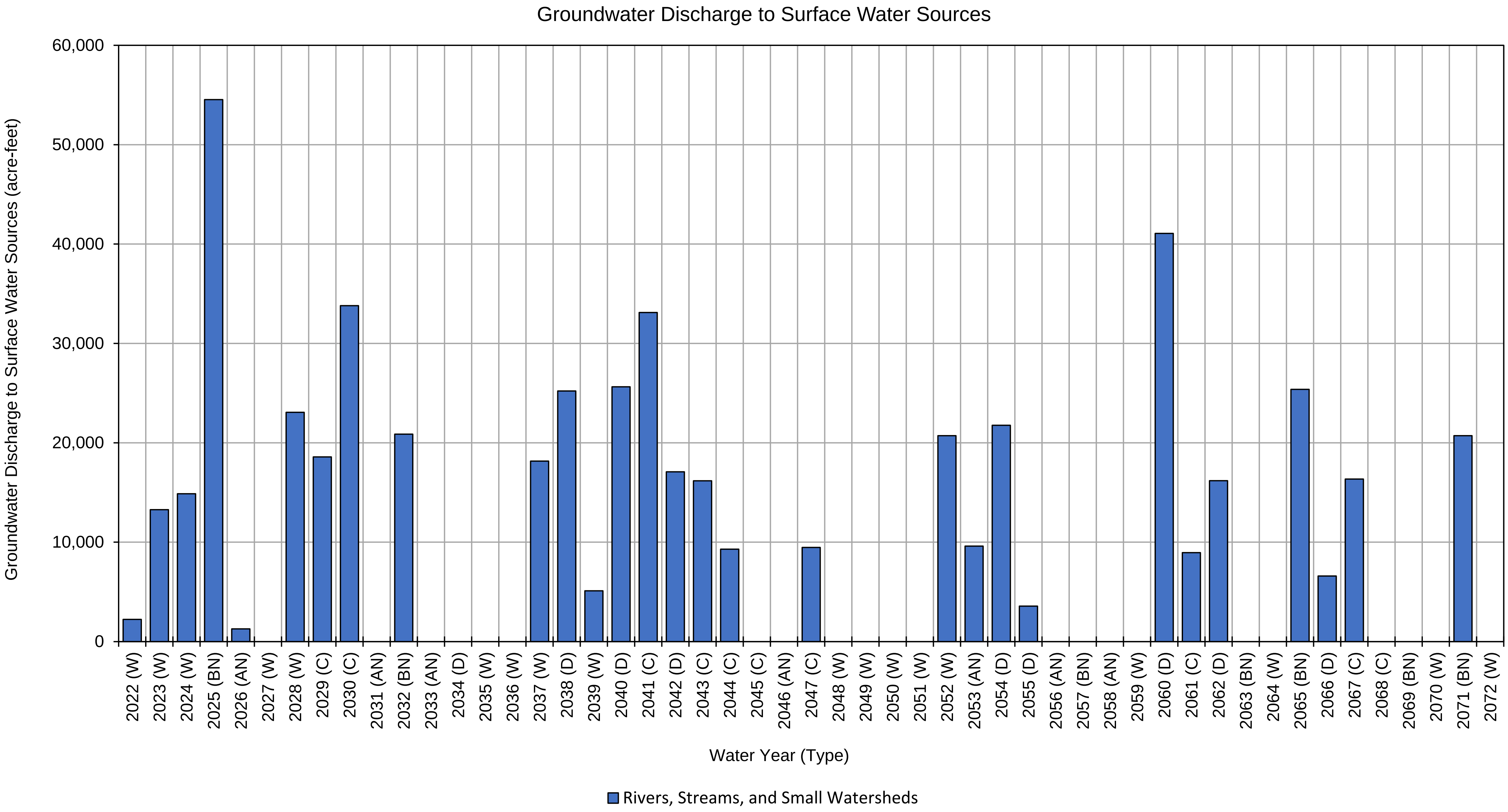
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	1,300	1	4,300	5,600
2023 (W)	2,400	3	4,800	7,200
2024 (W)	2,900	4	5,000	7,900
2025 (BN)	810	0	3,500	4,300
2026 (AN)	1,200	0	3,800	5,000
2027 (W)	2,900	5	5,000	7,900
2028 (W)	2,500	4	4,500	7,000
2029 (C)	1,200	1	3,800	5,000
2030 (C)	160	0	2,400	2,600
2031 (AN)	280	0	2,700	3,000
2032 (BN)	170	0	2,400	2,600
2033 (AN)	230	0	2,700	2,900
2034 (D)	280	0	2,700	3,000
2035 (W)	900	1	3,700	4,600
2036 (W)	3,800	11	5,000	8,800
2037 (W)	4,200	37	5,400	9,600
2038 (D)	2,700	3	4,500	7,200
2039 (W)	2,200	2	4,500	6,700
2040 (D)	1,400	1	3,800	5,200
2041 (C)	270	0	2,600	2,900
2042 (D)	43	0	1,900	1,900
2043 (C)	13	0	1,500	1,500
2044 (C)	6	0	1,100	1,100
2045 (C)	8	0	920	930
2046 (AN)	30	0	1,500	1,500
2047 (C)	9	0	1,300	1,300
2048 (W)	160	1	2,400	2,600
2049 (W)	510	1	3,200	3,700
2050 (W)	780	1	3,500	4,300
2051 (W)	2,600	3	4,500	7,100
2052 (W)	2,500	3	4,500	7,000
2053 (AN)	1,700	2	4,200	5,900
2054 (D)	970	0	3,500	4,500
2055 (D)	430	0	3,100	3,500
2056 (AN)	600	0	3,300	3,900
2057 (BN)	1,200	1	3,900	5,100
2058 (AN)	1,500	0	3,800	5,300
2059 (W)	3,100	5	5,000	8,100
2060 (D)	1,100	0	3,700	4,800
2061 (C)	420	0	3,100	3,500
2062 (D)	100	0	2,200	2,300
2063 (BN)	230	0	2,400	2,600

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		460	0	3,100	3,600
2065 (BN)		310	0	2,800	3,100
2066 (D)		120	0	2,100	2,200
2067 (C)		6	0	1,100	1,100
2068 (C)		4	0	820	820
2069 (BN)		7	0	880	890
2070 (W)		91	1	2,100	2,200
2071 (BN)		9	0	1,400	1,400
2072 (W)		130	0	2,200	2,300
Average (2022-2072)		1,000	2	3,100	4,100
2022-2072	W	1,900	5	4,000	5,900
	AN	790	0	3,100	3,900
	BN	390	0	2,500	2,900
	D	800	1	3,000	3,800
	C	210	0	1,900	2,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

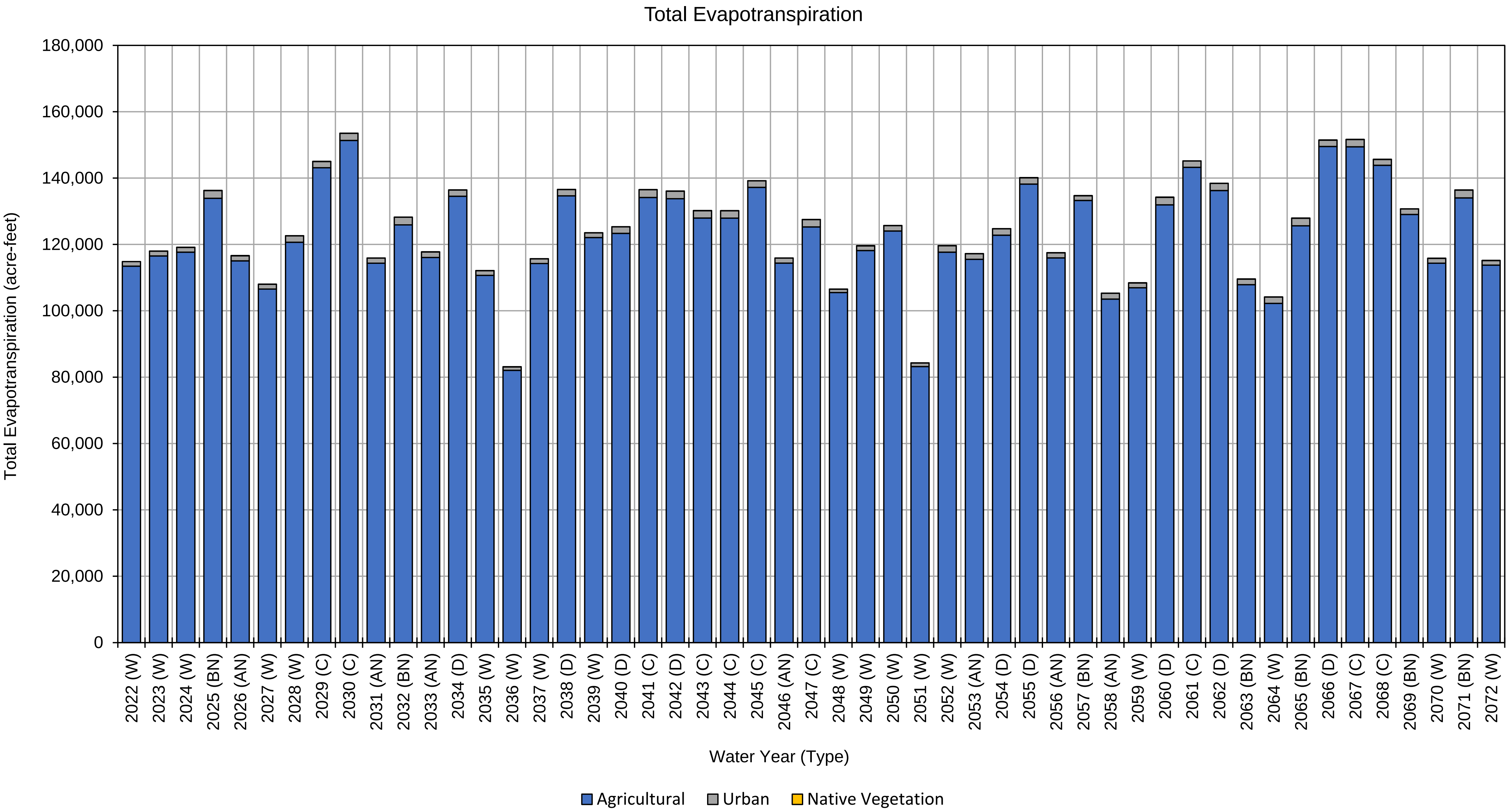
WY (Type)	Rivers, Streams, and Small Watersheds
2022 (W)	2,200
2023 (W)	13,000
2024 (W)	15,000
2025 (BN)	55,000
2026 (AN)	1,300
2027 (W)	0
2028 (W)	23,000
2029 (C)	19,000
2030 (C)	34,000
2031 (AN)	0
2032 (BN)	21,000
2033 (AN)	0
2034 (D)	0
2035 (W)	0
2036 (W)	0
2037 (W)	18,000
2038 (D)	25,000
2039 (W)	5,100
2040 (D)	26,000
2041 (C)	33,000
2042 (D)	17,000
2043 (C)	16,000
2044 (C)	9,300
2045 (C)	0
2046 (AN)	0
2047 (C)	9,500
2048 (W)	0
2049 (W)	0
2050 (W)	0
2051 (W)	0
2052 (W)	21,000
2053 (AN)	9,600
2054 (D)	22,000
2055 (D)	3,600
2056 (AN)	0
2057 (BN)	0
2058 (AN)	0
2059 (W)	0
2060 (D)	41,000
2061 (C)	8,900
2062 (D)	16,000
2063 (BN)	0

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Discharge to Surface Water Sources (acre-feet, rounded)

WY (Type)		Rivers, Streams, and Small Watersheds
2064 (W)		0
2065 (BN)		25,000
2066 (D)		6,600
2067 (C)		16,000
2068 (C)		0
2069 (BN)		0
2070 (W)		0
2071 (BN)		21,000
2072 (W)		0
Average (2022-2072)		10,000
2022-2072	W	5,400
	AN	1,600
	BN	17,000
	D	17,000
	C	15,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

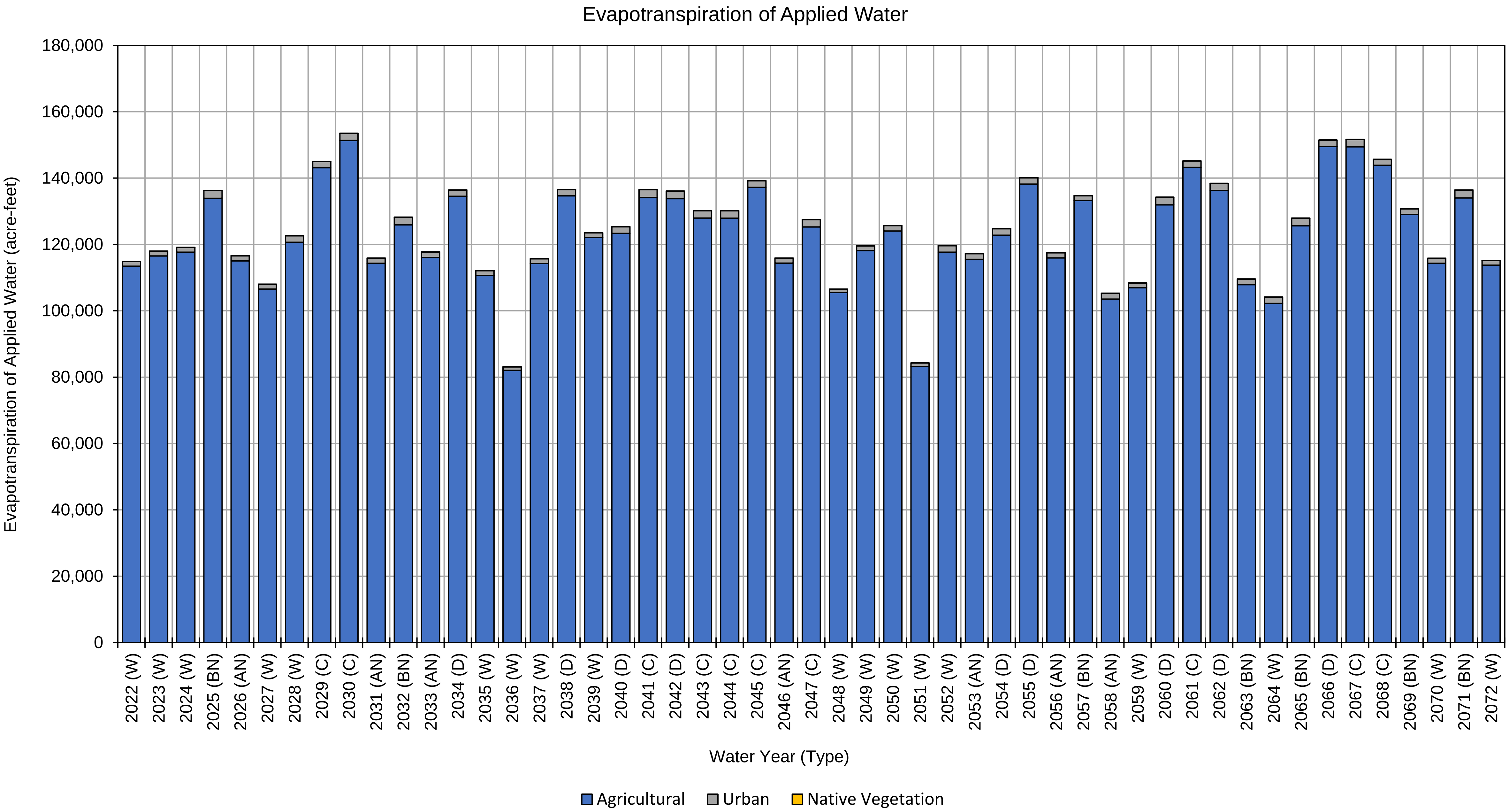
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	200,000	7,300	340,000	550,000
2023 (W)	200,000	6,700	310,000	520,000
2024 (W)	200,000	6,600	300,000	510,000
2025 (BN)	200,000	6,200	260,000	470,000
2026 (AN)	200,000	7,100	320,000	530,000
2027 (W)	190,000	6,700	320,000	520,000
2028 (W)	190,000	6,300	290,000	490,000
2029 (C)	200,000	5,300	230,000	440,000
2030 (C)	200,000	5,400	220,000	430,000
2031 (AN)	200,000	7,300	340,000	550,000
2032 (BN)	200,000	6,600	290,000	500,000
2033 (AN)	190,000	6,900	310,000	510,000
2034 (D)	200,000	6,100	280,000	490,000
2035 (W)	190,000	6,700	310,000	510,000
2036 (W)	170,000	6,900	320,000	500,000
2037 (W)	200,000	6,600	310,000	520,000
2038 (D)	200,000	6,100	280,000	490,000
2039 (W)	200,000	6,600	300,000	510,000
2040 (D)	200,000	6,400	290,000	500,000
2041 (C)	200,000	6,600	270,000	480,000
2042 (D)	190,000	6,400	250,000	450,000
2043 (C)	200,000	7,000	300,000	510,000
2044 (C)	200,000	7,000	290,000	500,000
2045 (C)	210,000	6,600	290,000	510,000
2046 (AN)	200,000	7,100	320,000	530,000
2047 (C)	200,000	7,000	300,000	510,000
2048 (W)	180,000	6,400	290,000	480,000
2049 (W)	200,000	6,600	300,000	510,000
2050 (W)	200,000	6,700	300,000	510,000
2051 (W)	170,000	7,000	320,000	500,000
2052 (W)	190,000	6,300	300,000	500,000
2053 (AN)	190,000	6,900	310,000	510,000
2054 (D)	200,000	6,500	290,000	500,000
2055 (D)	200,000	6,100	270,000	480,000
2056 (AN)	190,000	6,600	300,000	500,000
2057 (BN)	200,000	5,800	270,000	480,000
2058 (AN)	190,000	7,400	340,000	540,000
2059 (W)	190,000	6,700	320,000	520,000
2060 (D)	200,000	6,400	260,000	470,000
2061 (C)	200,000	5,400	240,000	450,000
2062 (D)	200,000	6,400	270,000	480,000
2063 (BN)	180,000	6,500	290,000	480,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		180,000	6,900	320,000	510,000
2065 (BN)		200,000	6,600	290,000	500,000
2066 (D)		200,000	5,500	240,000	450,000
2067 (C)		200,000	5,600	230,000	440,000
2068 (C)		200,000	5,800	270,000	480,000
2069 (BN)		200,000	6,700	300,000	510,000
2070 (W)		190,000	6,600	310,000	510,000
2071 (BN)		200,000	6,200	260,000	470,000
2072 (W)		190,000	7,200	330,000	530,000
Average (2022-2072)		190,000	6,500	290,000	490,000
2022-2072	W	190,000	6,700	310,000	510,000
	AN	190,000	7,000	320,000	520,000
	BN	190,000	6,400	280,000	480,000
	D	200,000	6,200	270,000	480,000
	C	200,000	6,200	260,000	470,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

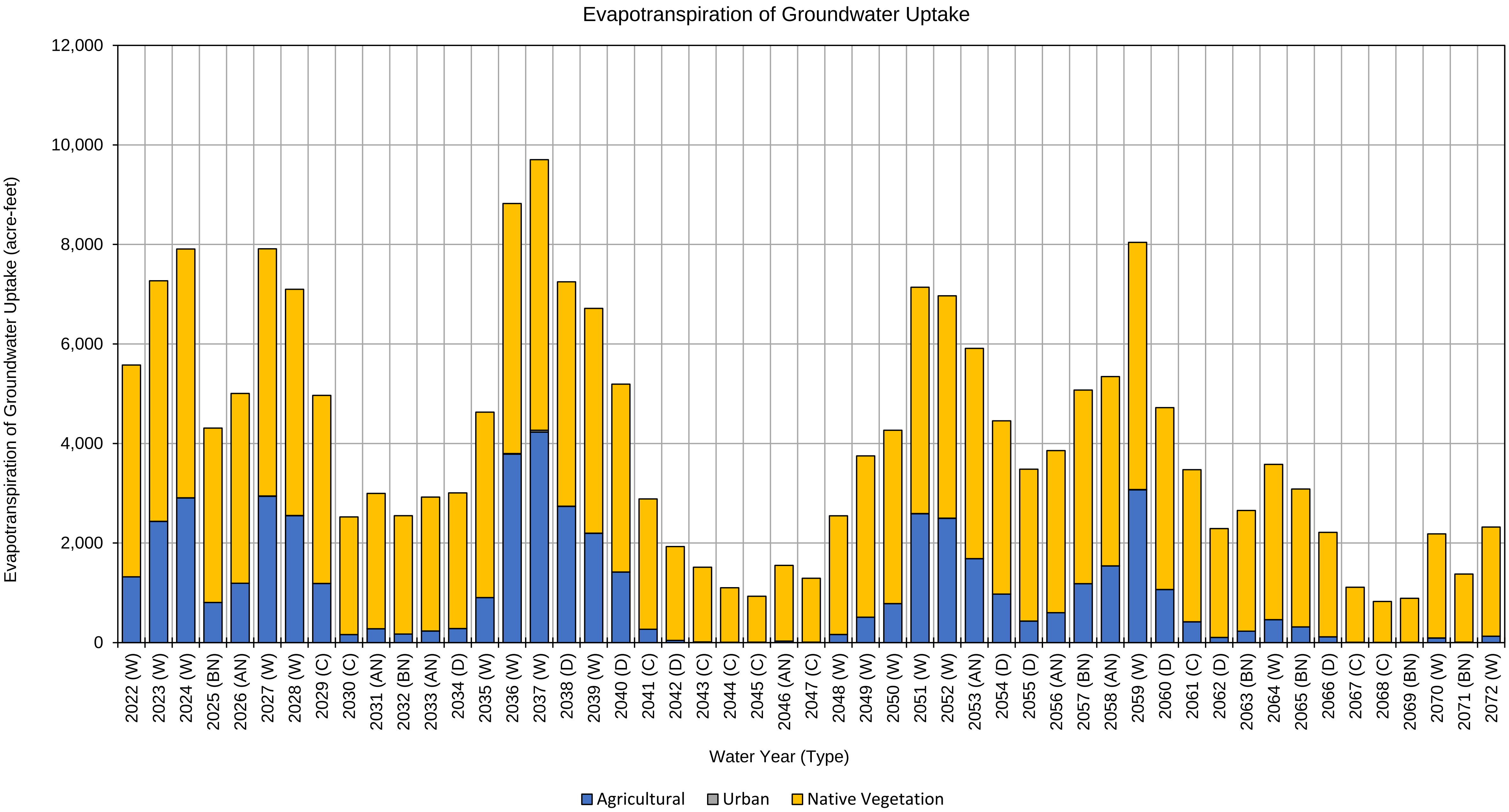
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	110,000	1,400	0	110,000
2023 (W)	120,000	1,400	1	120,000
2024 (W)	120,000	1,400	2	120,000
2025 (BN)	130,000	2,400	3	130,000
2026 (AN)	120,000	1,500	4	120,000
2027 (W)	110,000	1,400	5	110,000
2028 (W)	120,000	1,900	6	120,000
2029 (C)	140,000	1,900	7	140,000
2030 (C)	150,000	2,100	8	150,000
2031 (AN)	110,000	1,500	9	110,000
2032 (BN)	130,000	2,300	10	130,000
2033 (AN)	120,000	1,700	11	120,000
2034 (D)	130,000	1,900	12	130,000
2035 (W)	110,000	1,400	13	110,000
2036 (W)	82,000	1,100	14	83,000
2037 (W)	110,000	1,400	15	110,000
2038 (D)	130,000	1,900	16	130,000
2039 (W)	120,000	1,400	17	120,000
2040 (D)	120,000	2,000	18	120,000
2041 (C)	130,000	2,300	19	130,000
2042 (D)	130,000	2,300	20	130,000
2043 (C)	130,000	2,200	21	130,000
2044 (C)	130,000	2,200	22	130,000
2045 (C)	140,000	2,000	23	140,000
2046 (AN)	110,000	1,500	24	110,000
2047 (C)	130,000	2,200	25	130,000
2048 (W)	110,000	1,000	26	110,000
2049 (W)	120,000	1,400	27	120,000
2050 (W)	120,000	1,600	28	120,000
2051 (W)	83,000	1,100	29	84,000
2052 (W)	120,000	1,900	30	120,000
2053 (AN)	120,000	1,700	31	120,000
2054 (D)	120,000	2,000	32	120,000
2055 (D)	140,000	1,900	33	140,000
2056 (AN)	120,000	1,500	34	120,000
2057 (BN)	130,000	1,400	35	130,000
2058 (AN)	100,000	1,800	36	100,000
2059 (W)	110,000	1,400	37	110,000
2060 (D)	130,000	2,300	38	130,000
2061 (C)	140,000	1,900	39	140,000
2062 (D)	140,000	2,100	40	140,000
2063 (BN)	110,000	1,700	41	110,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		100,000	1,900	42	100,000
2065 (BN)		130,000	2,300	43	130,000
2066 (D)		150,000	1,900	44	150,000
2067 (C)		150,000	2,200	45	150,000
2068 (C)		140,000	1,800	46	140,000
2069 (BN)		130,000	1,600	47	130,000
2070 (W)		110,000	1,500	48	110,000
2071 (BN)		130,000	2,400	49	130,000
2072 (W)		110,000	1,400	50	110,000
Average (2022-2072)		120,000	1,800	25	120,000
2022-2072	W	110,000	1,500	22	110,000
	AN	110,000	1,600	21	110,000
	BN	130,000	2,000	33	130,000
	D	130,000	2,000	28	130,000
	C	140,000	2,100	26	140,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

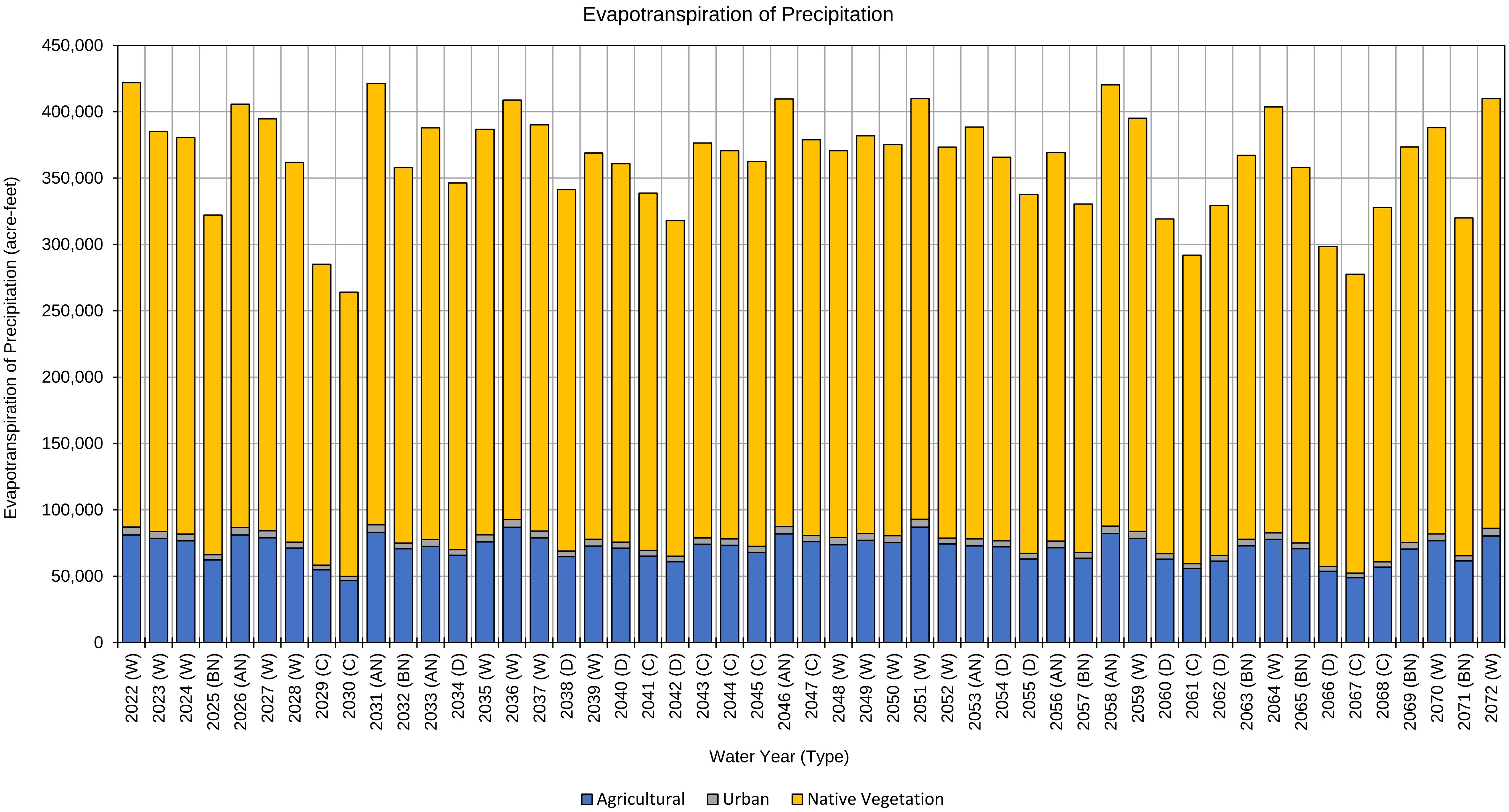
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	1,300	1	4,300	5,600
2023 (W)	2,400	3	4,800	7,200
2024 (W)	2,900	4	5,000	7,900
2025 (BN)	810	0	3,500	4,300
2026 (AN)	1,200	0	3,800	5,000
2027 (W)	2,900	5	5,000	7,900
2028 (W)	2,500	4	4,500	7,000
2029 (C)	1,200	1	3,800	5,000
2030 (C)	160	0	2,400	2,600
2031 (AN)	280	0	2,700	3,000
2032 (BN)	170	0	2,400	2,600
2033 (AN)	230	0	2,700	2,900
2034 (D)	280	0	2,700	3,000
2035 (W)	900	1	3,700	4,600
2036 (W)	3,800	11	5,000	8,800
2037 (W)	4,200	37	5,400	9,600
2038 (D)	2,700	3	4,500	7,200
2039 (W)	2,200	2	4,500	6,700
2040 (D)	1,400	1	3,800	5,200
2041 (C)	270	0	2,600	2,900
2042 (D)	43	0	1,900	1,900
2043 (C)	13	0	1,500	1,500
2044 (C)	6	0	1,100	1,100
2045 (C)	8	0	920	930
2046 (AN)	30	0	1,500	1,500
2047 (C)	9	0	1,300	1,300
2048 (W)	160	1	2,400	2,600
2049 (W)	510	1	3,200	3,700
2050 (W)	780	1	3,500	4,300
2051 (W)	2,600	3	4,500	7,100
2052 (W)	2,500	3	4,500	7,000
2053 (AN)	1,700	2	4,200	5,900
2054 (D)	970	0	3,500	4,500
2055 (D)	430	0	3,100	3,500
2056 (AN)	600	0	3,300	3,900
2057 (BN)	1,200	1	3,900	5,100
2058 (AN)	1,500	0	3,800	5,300
2059 (W)	3,100	5	5,000	8,100
2060 (D)	1,100	0	3,700	4,800
2061 (C)	420	0	3,100	3,500
2062 (D)	100	0	2,200	2,300
2063 (BN)	230	0	2,400	2,600

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		460	0	3,100	3,600
2065 (BN)		310	0	2,800	3,100
2066 (D)		120	0	2,100	2,200
2067 (C)		6	0	1,100	1,100
2068 (C)		4	0	820	820
2069 (BN)		7	0	880	890
2070 (W)		91	1	2,100	2,200
2071 (BN)		9	0	1,400	1,400
2072 (W)		130	0	2,200	2,300
Average (2022-2072)		1,000	2	3,100	4,100
2022-2072	W	1,900	5	4,000	5,900
	AN	790	0	3,100	3,900
	BN	390	0	2,500	2,900
	D	800	1	3,000	3,800
	C	210	0	1,900	2,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

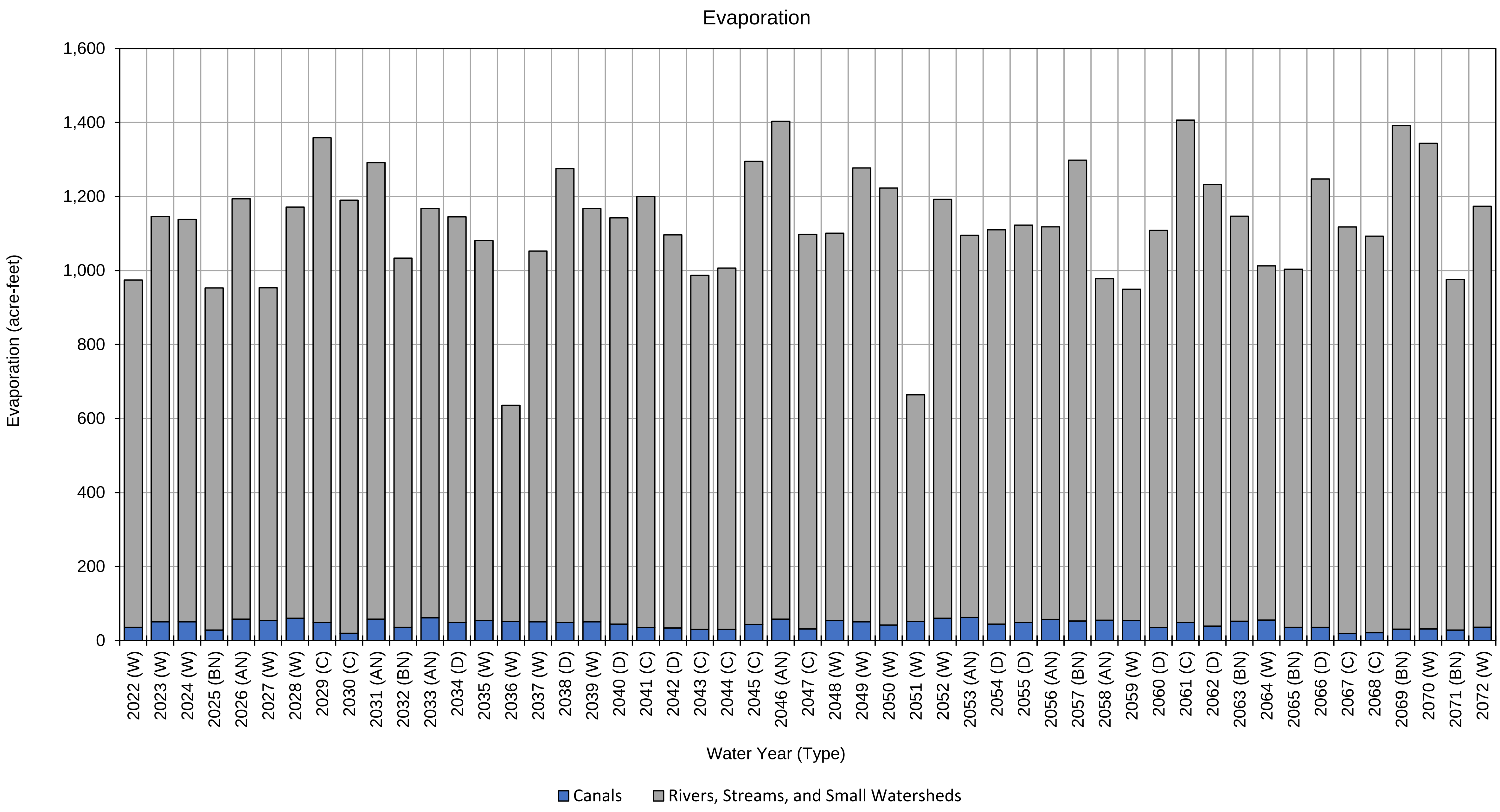
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	81,000	5,900	330,000	420,000
2023 (W)	78,000	5,300	300,000	380,000
2024 (W)	77,000	5,200	300,000	380,000
2025 (BN)	62,000	3,900	260,000	330,000
2026 (AN)	81,000	5,600	320,000	410,000
2027 (W)	79,000	5,300	310,000	390,000
2028 (W)	71,000	4,400	290,000	370,000
2029 (C)	55,000	3,400	230,000	290,000
2030 (C)	47,000	3,300	210,000	260,000
2031 (AN)	83,000	5,700	330,000	420,000
2032 (BN)	71,000	4,300	280,000	360,000
2033 (AN)	72,000	5,200	310,000	390,000
2034 (D)	66,000	4,200	280,000	350,000
2035 (W)	76,000	5,300	310,000	390,000
2036 (W)	87,000	5,900	320,000	410,000
2037 (W)	79,000	5,200	310,000	390,000
2038 (D)	65,000	4,200	270,000	340,000
2039 (W)	73,000	5,200	290,000	370,000
2040 (D)	71,000	4,500	290,000	370,000
2041 (C)	65,000	4,300	270,000	340,000
2042 (D)	61,000	4,100	250,000	320,000
2043 (C)	74,000	4,800	300,000	380,000
2044 (C)	73,000	4,700	290,000	370,000
2045 (C)	68,000	4,600	290,000	360,000
2046 (AN)	82,000	5,600	320,000	410,000
2047 (C)	76,000	4,700	300,000	380,000
2048 (W)	74,000	5,400	290,000	370,000
2049 (W)	77,000	5,200	300,000	380,000
2050 (W)	75,000	5,000	290,000	370,000
2051 (W)	87,000	5,900	320,000	410,000
2052 (W)	74,000	4,400	290,000	370,000
2053 (AN)	73,000	5,200	310,000	390,000
2054 (D)	72,000	4,500	290,000	370,000
2055 (D)	63,000	4,200	270,000	340,000
2056 (AN)	71,000	5,100	290,000	370,000
2057 (BN)	64,000	4,300	260,000	330,000
2058 (AN)	82,000	5,600	330,000	420,000
2059 (W)	78,000	5,300	310,000	390,000
2060 (D)	63,000	4,100	250,000	320,000
2061 (C)	56,000	3,500	230,000	290,000
2062 (D)	61,000	4,200	260,000	330,000
2063 (BN)	73,000	4,900	290,000	370,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Total Evapotranspiration of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		78,000	5,000	320,000	400,000
2065 (BN)		71,000	4,300	280,000	360,000
2066 (D)		54,000	3,600	240,000	300,000
2067 (C)		49,000	3,400	230,000	280,000
2068 (C)		57,000	4,000	270,000	330,000
2069 (BN)		70,000	5,000	300,000	380,000
2070 (W)		77,000	5,100	310,000	390,000
2071 (BN)		62,000	3,900	250,000	320,000
2072 (W)		80,000	5,800	320,000	410,000
Average (2022-2072)		71,000	4,700	290,000	370,000
2022-2072	W	78,000	5,300	310,000	390,000
	AN	78,000	5,400	320,000	400,000
	BN	67,000	4,400	280,000	350,000
	D	64,000	4,200	270,000	340,000
	C	62,000	4,100	260,000	330,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

WY (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	36	940	980
2023 (W)	51	1,100	1,200
2024 (W)	51	1,100	1,200
2025 (BN)	28	920	950
2026 (AN)	58	1,100	1,200
2027 (W)	54	900	950
2028 (W)	60	1,100	1,200
2029 (C)	48	1,300	1,300
2030 (C)	19	1,200	1,200
2031 (AN)	58	1,200	1,300
2032 (BN)	36	1,000	1,000
2033 (AN)	62	1,100	1,200
2034 (D)	48	1,100	1,100
2035 (W)	54	1,000	1,100
2036 (W)	52	580	630
2037 (W)	51	1,000	1,100
2038 (D)	48	1,200	1,200
2039 (W)	51	1,100	1,200
2040 (D)	44	1,100	1,100
2041 (C)	35	1,200	1,200
2042 (D)	34	1,100	1,100
2043 (C)	30	960	990
2044 (C)	30	980	1,000
2045 (C)	43	1,300	1,300
2046 (AN)	58	1,300	1,400
2047 (C)	31	1,100	1,100
2048 (W)	54	1,000	1,100
2049 (W)	51	1,200	1,300
2050 (W)	42	1,200	1,200
2051 (W)	52	610	660
2052 (W)	60	1,100	1,200
2053 (AN)	62	1,000	1,100
2054 (D)	44	1,100	1,100
2055 (D)	48	1,100	1,100
2056 (AN)	57	1,100	1,200
2057 (BN)	53	1,200	1,300
2058 (AN)	55	920	980
2059 (W)	54	900	950
2060 (D)	35	1,100	1,100
2061 (C)	48	1,400	1,400
2062 (D)	39	1,200	1,200
2063 (BN)	52	1,100	1,200

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Evaporation (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2064 (W)		55	960	1,000
2065 (BN)		36	970	1,000
2066 (D)		36	1,200	1,200
2067 (C)		19	1,100	1,100
2068 (C)		21	1,100	1,100
2069 (BN)		31	1,400	1,400
2070 (W)		31	1,300	1,300
2071 (BN)		28	950	980
2072 (W)		36	1,100	1,100
Average (2022-2072)		45	1,100	1,100
2022-2072	W	50	1,000	1,100
	AN	58	1,100	1,200
	BN	38	1,100	1,100
	D	42	1,100	1,100
	C	33	1,100	1,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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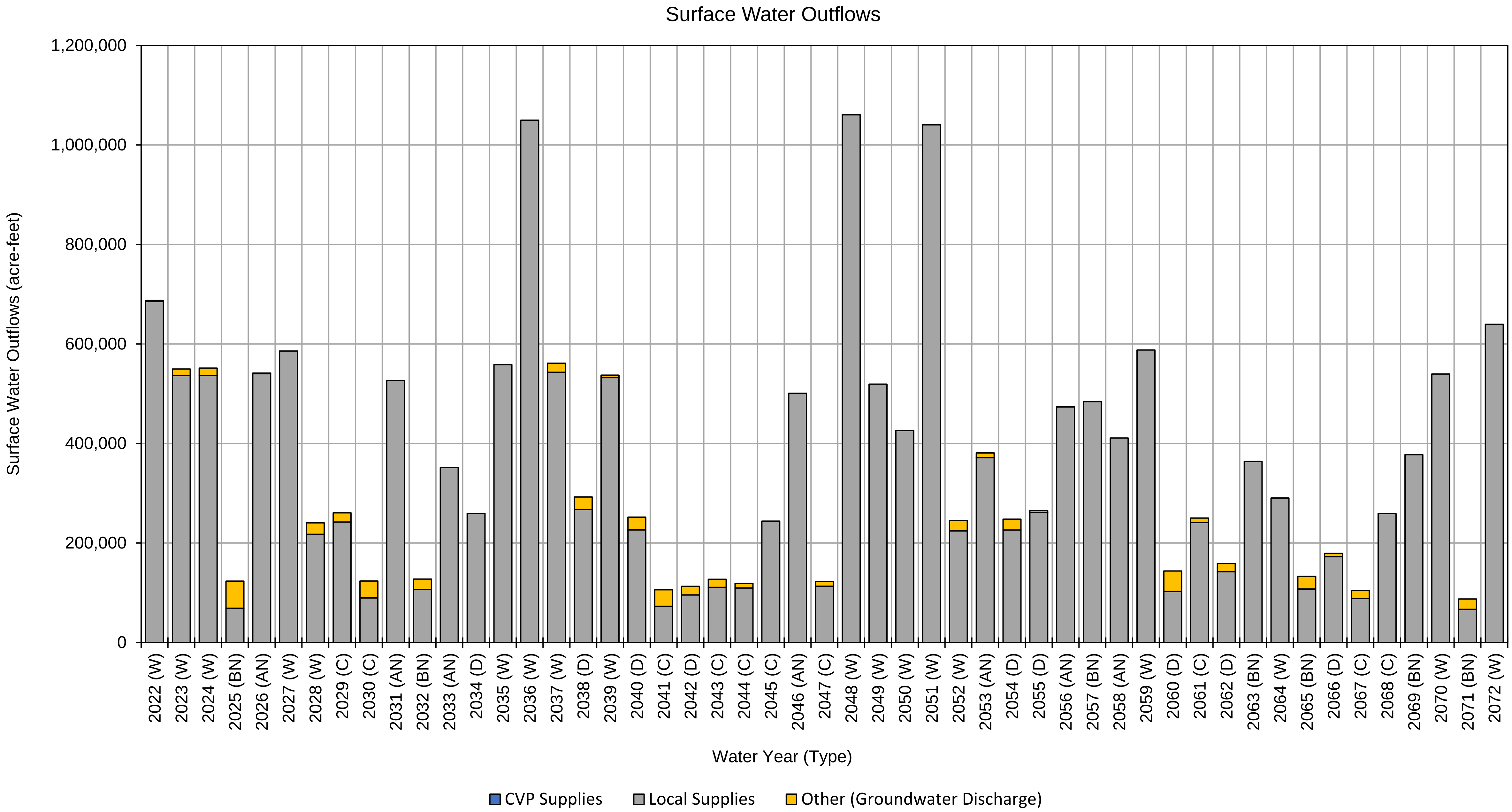
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	690,000	2,200	690,000
2023 (W)	0	540,000	13,000	550,000
2024 (W)	0	540,000	15,000	560,000
2025 (BN)	0	69,000	55,000	120,000
2026 (AN)	0	540,000	1,300	540,000
2027 (W)	0	590,000	0	590,000
2028 (W)	0	220,000	23,000	240,000
2029 (C)	0	240,000	19,000	260,000
2030 (C)	0	90,000	34,000	120,000
2031 (AN)	0	530,000	0	530,000
2032 (BN)	0	110,000	21,000	130,000
2033 (AN)	0	350,000	0	350,000
2034 (D)	0	260,000	0	260,000
2035 (W)	0	560,000	0	560,000
2036 (W)	0	1,000,000	0	1,000,000
2037 (W)	0	540,000	18,000	560,000
2038 (D)	0	270,000	25,000	300,000
2039 (W)	0	530,000	5,100	540,000
2040 (D)	0	230,000	26,000	260,000
2041 (C)	0	73,000	33,000	110,000
2042 (D)	0	96,000	17,000	110,000
2043 (C)	0	110,000	16,000	130,000
2044 (C)	0	110,000	9,300	120,000
2045 (C)	0	240,000	0	240,000
2046 (AN)	0	500,000	0	500,000
2047 (C)	0	110,000	9,500	120,000
2048 (W)	0	1,100,000	0	1,100,000
2049 (W)	0	520,000	0	520,000
2050 (W)	0	430,000	0	430,000
2051 (W)	0	1,000,000	0	1,000,000
2052 (W)	0	220,000	21,000	240,000
2053 (AN)	0	370,000	9,600	380,000
2054 (D)	0	230,000	22,000	250,000
2055 (D)	0	260,000	3,600	260,000
2056 (AN)	0	470,000	0	470,000
2057 (BN)	0	480,000	0	480,000
2058 (AN)	0	410,000	0	410,000
2059 (W)	0	590,000	0	590,000
2060 (D)	0	100,000	41,000	140,000
2061 (C)	0	240,000	8,900	250,000
2062 (D)	0	140,000	16,000	160,000
2063 (BN)	0	360,000	0	360,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Surface Water Outflows, by Water Source Type (acre-feet, rounded)

WY (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2064 (W)		0	290,000	0	290,000
2065 (BN)		0	110,000	25,000	140,000
2066 (D)		0	170,000	6,600	180,000
2067 (C)		0	89,000	16,000	110,000
2068 (C)		0	260,000	0	260,000
2069 (BN)		0	380,000	0	380,000
2070 (W)		0	540,000	0	540,000
2071 (BN)		0	67,000	21,000	88,000
2072 (W)		0	640,000	0	640,000
Average (2022-2072)		0	370,000	10,000	380,000
2022-2072	W	0	590,000	5,400	600,000
	AN	0	450,000	1,600	450,000
	BN	0	230,000	17,000	250,000
	D	0	190,000	17,000	210,000
	C	0	160,000	15,000	180,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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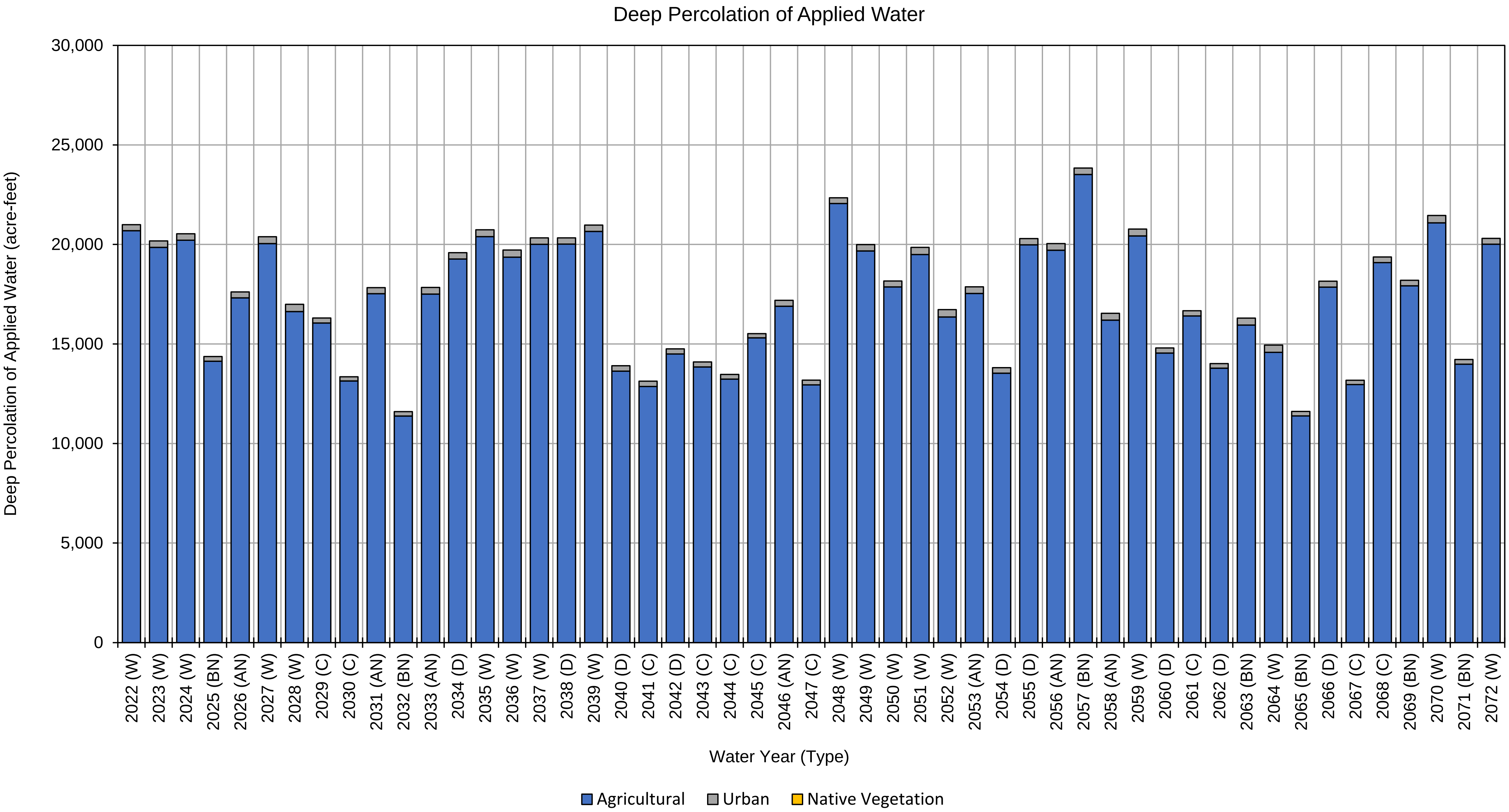
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	21,000	300	0	21,000
2023 (W)	20,000	320	0	20,000
2024 (W)	20,000	320	0	20,000
2025 (BN)	14,000	240	0	14,000
2026 (AN)	17,000	300	0	17,000
2027 (W)	20,000	350	0	20,000
2028 (W)	17,000	360	0	17,000
2029 (C)	16,000	250	0	16,000
2030 (C)	13,000	210	0	13,000
2031 (AN)	18,000	300	0	18,000
2032 (BN)	11,000	220	0	11,000
2033 (AN)	18,000	330	0	18,000
2034 (D)	19,000	320	0	19,000
2035 (W)	20,000	340	0	20,000
2036 (W)	19,000	360	0	19,000
2037 (W)	20,000	330	0	20,000
2038 (D)	20,000	310	0	20,000
2039 (W)	21,000	320	0	21,000
2040 (D)	14,000	270	0	14,000
2041 (C)	13,000	270	0	13,000
2042 (D)	14,000	260	0	14,000
2043 (C)	14,000	250	0	14,000
2044 (C)	13,000	240	0	13,000
2045 (C)	15,000	210	0	15,000
2046 (AN)	17,000	300	0	17,000
2047 (C)	13,000	240	0	13,000
2048 (W)	22,000	290	0	22,000
2049 (W)	20,000	320	0	20,000
2050 (W)	18,000	300	0	18,000
2051 (W)	19,000	360	0	19,000
2052 (W)	16,000	370	0	16,000
2053 (AN)	18,000	330	0	18,000
2054 (D)	14,000	280	0	14,000
2055 (D)	20,000	310	0	20,000
2056 (AN)	20,000	330	0	20,000
2057 (BN)	24,000	320	0	24,000
2058 (AN)	16,000	340	0	16,000
2059 (W)	20,000	350	0	20,000
2060 (D)	15,000	260	0	15,000
2061 (C)	16,000	260	0	16,000
2062 (D)	14,000	230	0	14,000
2063 (BN)	16,000	350	0	16,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Applied Water, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		15,000	370	0	15,000
2065 (BN)		11,000	220	0	11,000
2066 (D)		18,000	290	0	18,000
2067 (C)		13,000	220	0	13,000
2068 (C)		19,000	280	0	19,000
2069 (BN)		18,000	280	0	18,000
2070 (W)		21,000	370	0	21,000
2071 (BN)		14,000	230	0	14,000
2072 (W)		20,000	300	0	20,000
Average (2022-2072)		17,000	300	0	17,000
2022-2072	W	19,000	330	0	19,000
	AN	18,000	320	0	18,000
	BN	15,000	270	0	15,000
	D	16,000	280	0	16,000
	C	15,000	240	0	15,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
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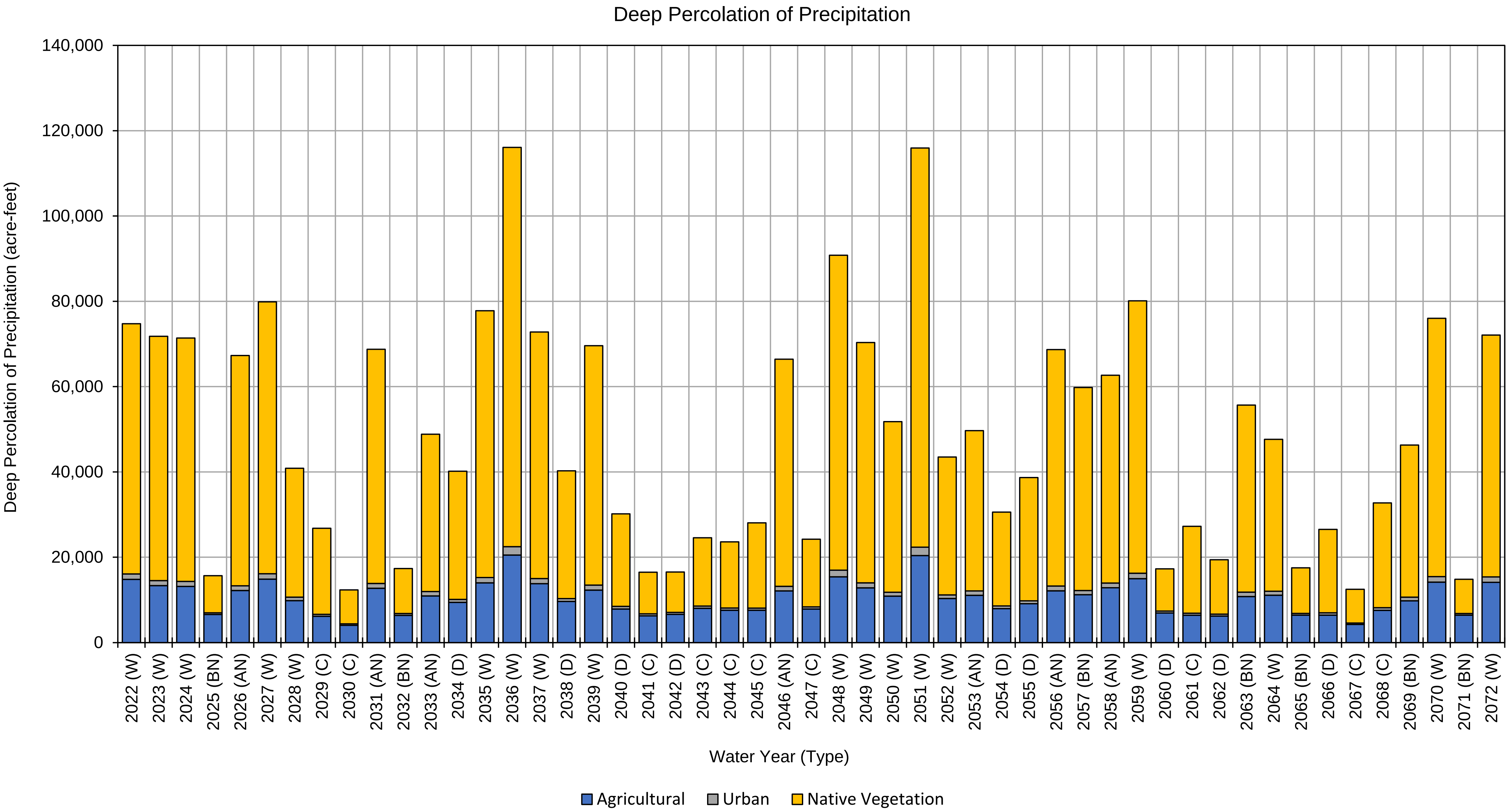
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

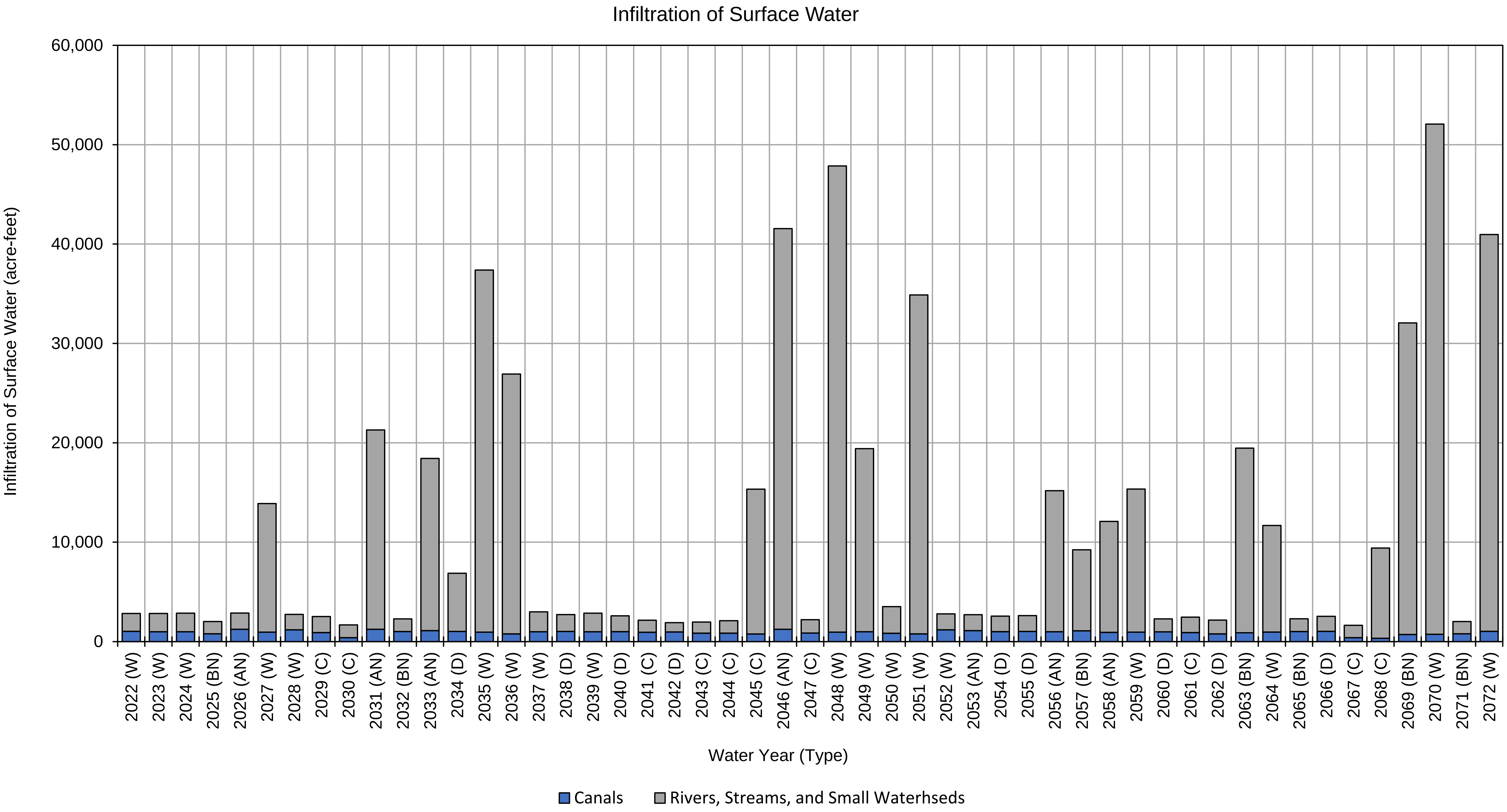
WY (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	15,000	1,300	59,000	75,000
2023 (W)	13,000	1,200	57,000	71,000
2024 (W)	13,000	1,200	57,000	71,000
2025 (BN)	6,600	390	8,700	16,000
2026 (AN)	12,000	1,100	54,000	67,000
2027 (W)	15,000	1,300	64,000	80,000
2028 (W)	9,800	820	30,000	41,000
2029 (C)	6,100	460	20,000	27,000
2030 (C)	4,000	330	8,000	12,000
2031 (AN)	13,000	1,100	55,000	69,000
2032 (BN)	6,400	420	11,000	18,000
2033 (AN)	11,000	1,000	37,000	49,000
2034 (D)	9,400	690	30,000	40,000
2035 (W)	14,000	1,300	63,000	78,000
2036 (W)	21,000	2,000	94,000	120,000
2037 (W)	14,000	1,200	58,000	73,000
2038 (D)	9,600	690	30,000	40,000
2039 (W)	12,000	1,200	56,000	69,000
2040 (D)	7,900	630	22,000	31,000
2041 (C)	6,300	490	9,800	17,000
2042 (D)	6,600	460	9,500	17,000
2043 (C)	8,000	530	16,000	25,000
2044 (C)	7,600	510	16,000	24,000
2045 (C)	7,600	500	20,000	28,000
2046 (AN)	12,000	1,100	53,000	66,000
2047 (C)	7,900	520	16,000	24,000
2048 (W)	15,000	1,600	74,000	91,000
2049 (W)	13,000	1,200	56,000	70,000
2050 (W)	11,000	930	40,000	52,000
2051 (W)	20,000	2,000	94,000	120,000
2052 (W)	10,000	830	32,000	43,000
2053 (AN)	11,000	1,000	38,000	50,000
2054 (D)	8,000	630	22,000	31,000
2055 (D)	9,100	680	29,000	39,000
2056 (AN)	12,000	1,100	55,000	68,000
2057 (BN)	11,000	980	48,000	60,000
2058 (AN)	13,000	1,100	49,000	63,000
2059 (W)	15,000	1,300	64,000	80,000
2060 (D)	6,900	460	9,900	17,000
2061 (C)	6,400	480	20,000	27,000
2062 (D)	6,200	460	13,000	20,000
2063 (BN)	11,000	1,000	44,000	56,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation of Precipitation, by Water Use Sector (acre-feet, rounded)

WY (Type)		Agricultural	Urban	Native Vegetation	Total
2064 (W)		11,000	950	36,000	48,000
2065 (BN)		6,400	420	11,000	18,000
2066 (D)		6,400	550	20,000	27,000
2067 (C)		4,200	340	7,900	12,000
2068 (C)		7,500	640	25,000	33,000
2069 (BN)		9,800	840	36,000	47,000
2070 (W)		14,000	1,300	61,000	76,000
2071 (BN)		6,400	380	8,000	15,000
2072 (W)		14,000	1,200	57,000	72,000
Average (2022-2072)		10,000	880	37,000	48,000
2022-2072	W	14,000	1,300	58,000	73,000
	AN	12,000	1,100	49,000	62,000
	BN	8,200	640	24,000	33,000
	D	7,800	580	20,000	28,000
	C	6,600	480	16,000	23,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

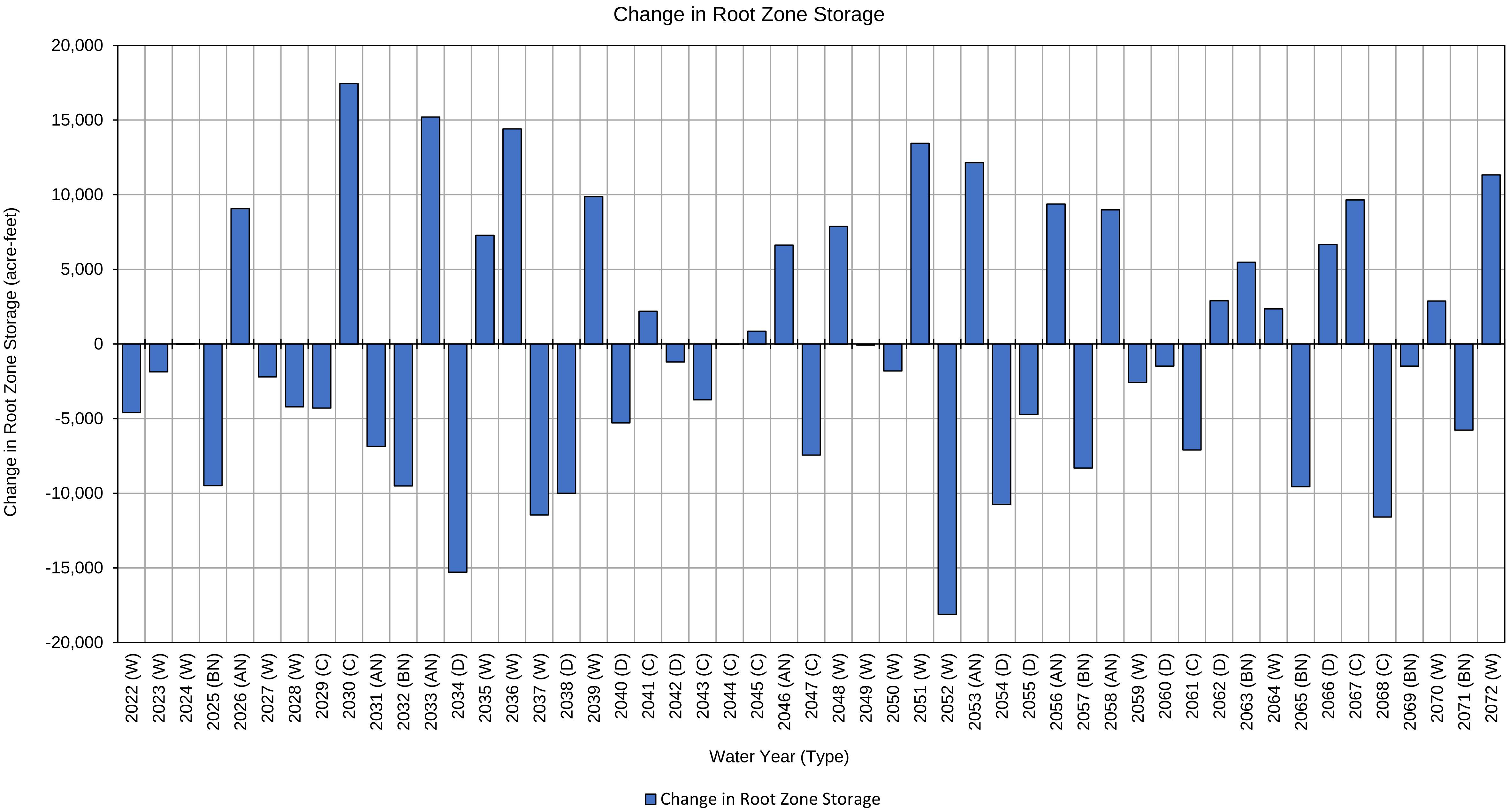
WY (Type)	Canals	Rivers, Streams, and Small Waterhseds	Total
2022 (W)	1,000	1,800	2,800
2023 (W)	990	1,800	2,800
2024 (W)	990	1,900	2,900
2025 (BN)	780	1,200	2,000
2026 (AN)	1,200	1,600	2,800
2027 (W)	950	13,000	14,000
2028 (W)	1,200	1,500	2,700
2029 (C)	910	1,600	2,500
2030 (C)	390	1,300	1,700
2031 (AN)	1,200	20,000	21,000
2032 (BN)	1,000	1,300	2,300
2033 (AN)	1,100	17,000	18,000
2034 (D)	1,000	5,900	6,900
2035 (W)	950	36,000	37,000
2036 (W)	770	26,000	27,000
2037 (W)	990	2,000	3,000
2038 (D)	1,000	1,700	2,700
2039 (W)	990	1,900	2,900
2040 (D)	1,000	1,600	2,600
2041 (C)	930	1,200	2,100
2042 (D)	970	940	1,900
2043 (C)	850	1,100	2,000
2044 (C)	850	1,300	2,200
2045 (C)	760	15,000	16,000
2046 (AN)	1,200	40,000	41,000
2047 (C)	850	1,400	2,300
2048 (W)	950	47,000	48,000
2049 (W)	990	18,000	19,000
2050 (W)	830	2,700	3,500
2051 (W)	770	34,000	35,000
2052 (W)	1,200	1,600	2,800
2053 (AN)	1,100	1,600	2,700
2054 (D)	1,000	1,600	2,600
2055 (D)	1,000	1,600	2,600
2056 (AN)	990	14,000	15,000
2057 (BN)	1,100	8,200	9,300
2058 (AN)	930	11,000	12,000
2059 (W)	950	14,000	15,000
2060 (D)	970	1,300	2,300
2061 (C)	910	1,600	2,500
2062 (D)	770	1,400	2,200
2063 (BN)	890	19,000	20,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Infiltration of Surface Water (acre-feet, rounded)

WY (Type)		Canals	Rivers, Streams, and Small Waterhseds	Total
2064 (W)		960	11,000	12,000
2065 (BN)		1,000	1,300	2,300
2066 (D)		1,000	1,500	2,500
2067 (C)		390	1,200	1,600
2068 (C)		320	9,100	9,400
2069 (BN)		710	31,000	32,000
2070 (W)		730	51,000	52,000
2071 (BN)		780	1,200	2,000
2072 (W)		1,000	40,000	41,000
Average (2022-2072)		930	10,000	11,000
2022-2072	W	950	17,000	18,000
	AN	1,100	15,000	16,000
	BN	890	9,000	9,900
	D	980	1,900	2,900
	C	720	3,400	4,100

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)	Change in Root Zone Storage
2022 (W)	-4,600
2023 (W)	-1,900
2024 (W)	15
2025 (BN)	-9,500
2026 (AN)	9,100
2027 (W)	-2,200
2028 (W)	-4,200
2029 (C)	-4,300
2030 (C)	17,000
2031 (AN)	-6,900
2032 (BN)	-9,500
2033 (AN)	15,000
2034 (D)	-15,000
2035 (W)	7,300
2036 (W)	14,000
2037 (W)	-11,000
2038 (D)	-10,000
2039 (W)	9,900
2040 (D)	-5,300
2041 (C)	2,200
2042 (D)	-1,200
2043 (C)	-3,700
2044 (C)	-33
2045 (C)	860
2046 (AN)	6,600
2047 (C)	-7,400
2048 (W)	7,900
2049 (W)	-68
2050 (W)	-1,800
2051 (W)	13,000
2052 (W)	-18,000
2053 (AN)	12,000
2054 (D)	-11,000
2055 (D)	-4,700
2056 (AN)	9,400
2057 (BN)	-8,300
2058 (AN)	9,000
2059 (W)	-2,600
2060 (D)	-1,500
2061 (C)	-7,100
2062 (D)	2,900
2063 (BN)	5,500

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Root Zone Storage (acre-feet, rounded)

WY (Type)		Change in Root Zone Storage
2064 (W)		2,300
2065 (BN)		-9,600
2066 (D)		6,700
2067 (C)		9,600
2068 (C)		-12,000
2069 (BN)		-1,500
2070 (W)		2,900
2071 (BN)		-5,800
2072 (W)		11,000
Average (2022-2072)		-95
2022-2072	W	1,300
	AN	7,800
	BN	-5,500
	D	-4,400
	C	-410

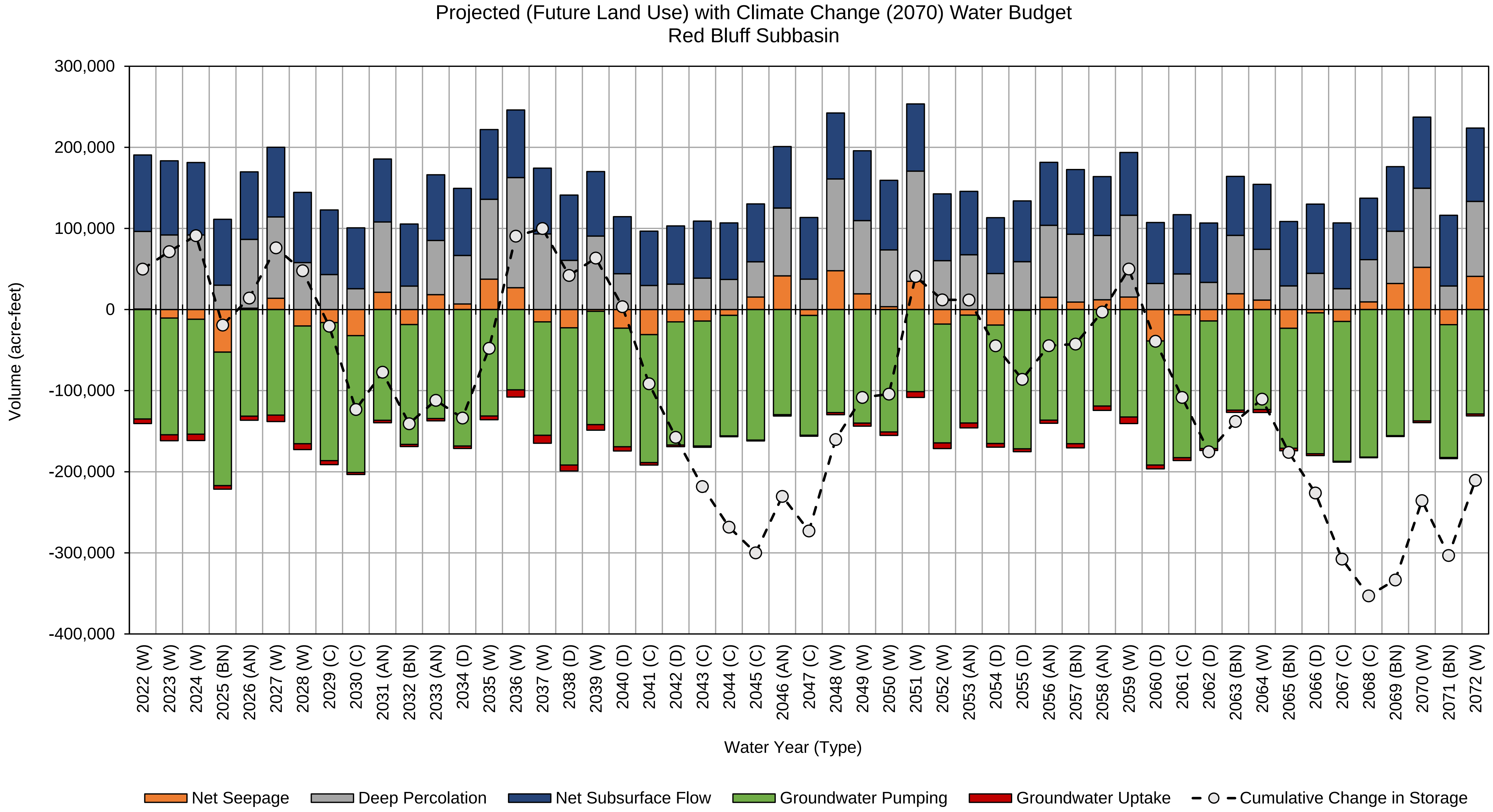
Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-7b

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Future Land Use) with Climate Change (2070) Model Results – Groundwater System



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

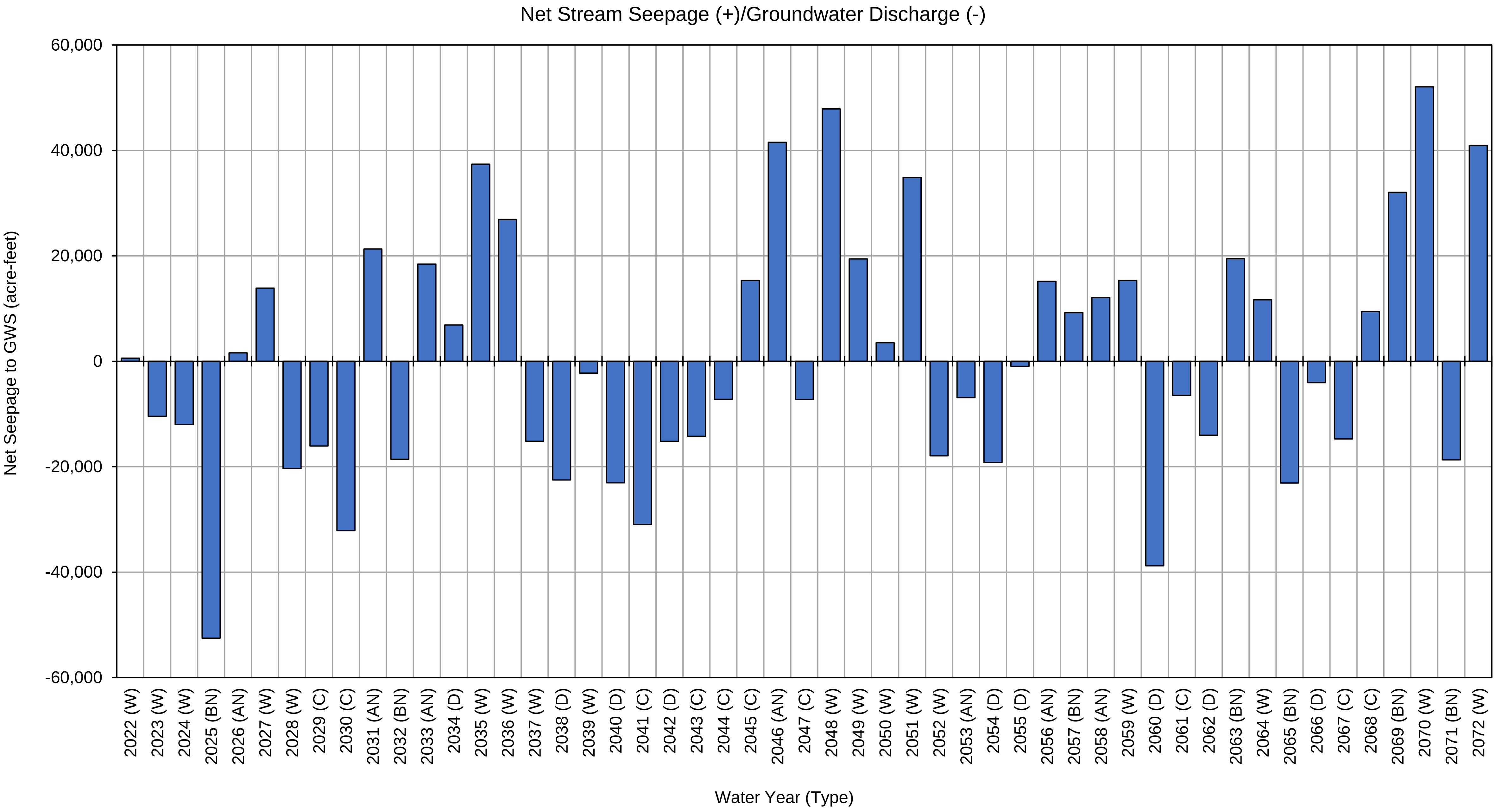
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	600	96,000	-140,000	-5,600	94,000	50,000	50,000
2023 (W)	-10,000	92,000	-140,000	-7,300	91,000	22,000	72,000
2024 (W)	-12,000	92,000	-140,000	-7,900	89,000	20,000	91,000
2025 (BN)	-53,000	30,000	-160,000	-4,300	81,000	-110,000	-19,000
2026 (AN)	1,600	85,000	-130,000	-5,000	83,000	33,000	14,000
2027 (W)	14,000	100,000	-130,000	-7,900	86,000	62,000	76,000
2028 (W)	-20,000	58,000	-150,000	-7,100	87,000	-28,000	48,000
2029 (C)	-16,000	43,000	-170,000	-5,000	80,000	-68,000	-21,000
2030 (C)	-32,000	26,000	-170,000	-2,500	75,000	-100,000	-120,000
2031 (AN)	21,000	87,000	-140,000	-3,000	78,000	46,000	-77,000
2032 (BN)	-19,000	29,000	-150,000	-2,500	76,000	-64,000	-140,000
2033 (AN)	18,000	67,000	-130,000	-2,900	81,000	29,000	-110,000
2034 (D)	6,900	60,000	-170,000	-3,000	83,000	-22,000	-130,000
2035 (W)	37,000	99,000	-130,000	-4,600	86,000	86,000	-48,000
2036 (W)	27,000	140,000	-99,000	-8,800	83,000	140,000	91,000
2037 (W)	-15,000	93,000	-140,000	-9,700	81,000	9,500	100,000
2038 (D)	-23,000	61,000	-170,000	-7,200	81,000	-58,000	42,000
2039 (W)	-2,200	91,000	-140,000	-6,700	80,000	21,000	64,000
2040 (D)	-23,000	44,000	-150,000	-5,200	70,000	-60,000	3,600
2041 (C)	-31,000	30,000	-160,000	-2,900	67,000	-95,000	-92,000
2042 (D)	-15,000	31,000	-150,000	-1,900	72,000	-66,000	-160,000
2043 (C)	-14,000	39,000	-150,000	-1,500	70,000	-61,000	-220,000
2044 (C)	-7,200	37,000	-150,000	-1,100	70,000	-50,000	-270,000
2045 (C)	15,000	44,000	-160,000	-930	71,000	-32,000	-300,000
2046 (AN)	42,000	84,000	-130,000	-1,600	76,000	70,000	-230,000
2047 (C)	-7,300	37,000	-150,000	-1,300	76,000	-43,000	-270,000
2048 (W)	48,000	110,000	-130,000	-2,500	81,000	110,000	-160,000
2049 (W)	19,000	90,000	-140,000	-3,800	86,000	52,000	-110,000
2050 (W)	3,500	70,000	-150,000	-4,300	86,000	4,100	-100,000
2051 (W)	35,000	140,000	-100,000	-7,100	83,000	150,000	41,000
2052 (W)	-18,000	60,000	-150,000	-7,000	82,000	-29,000	12,000
2053 (AN)	-6,900	68,000	-130,000	-5,900	78,000	-180	12,000
2054 (D)	-19,000	44,000	-150,000	-4,500	69,000	-56,000	-45,000
2055 (D)	-960	59,000	-170,000	-3,500	75,000	-41,000	-86,000
2056 (AN)	15,000	89,000	-140,000	-3,900	78,000	41,000	-45,000
2057 (BN)	9,200	84,000	-170,000	-5,100	80,000	2,000	-43,000
2058 (AN)	12,000	79,000	-120,000	-5,300	73,000	40,000	-3,000
2059 (W)	15,000	100,000	-130,000	-8,000	77,000	53,000	50,000
2060 (D)	-39,000	32,000	-150,000	-4,700	75,000	-89,000	-39,000
2061 (C)	-6,500	44,000	-180,000	-3,500	73,000	-69,000	-110,000
2062 (D)	-14,000	33,000	-160,000	-2,300	73,000	-67,000	-180,000
2063 (BN)	19,000	72,000	-120,000	-2,700	73,000	37,000	-140,000
2064 (W)	12,000	63,000	-120,000	-3,600	80,000	28,000	-110,000
2065 (BN)	-23,000	29,000	-150,000	-3,100	79,000	-66,000	-180,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-4,100	45,000	-170,000	-2,200	85,000	-50,000	-230,000
2067 (C)		-15,000	26,000	-170,000	-1,100	81,000	-81,000	-310,000
2068 (C)		9,400	52,000	-180,000	-830	76,000	-45,000	-350,000
2069 (BN)		32,000	65,000	-160,000	-890	80,000	20,000	-330,000
2070 (W)		52,000	97,000	-140,000	-2,200	88,000	98,000	-240,000
2071 (BN)		-19,000	29,000	-160,000	-1,400	87,000	-68,000	-300,000
2072 (W)		41,000	92,000	-130,000	-2,300	90,000	93,000	-210,000
Average (2022-2072)		830	66,000	-150,000	-4,100	80,000	-4,100	
2022-2072	W	13,000	93,000	-130,000	-5,900	85,000		
	AN	15,000	80,000	-130,000	-3,900	78,000		
	BN	-7,400	48,000	-150,000	-2,800	79,000		
	D	-15,000	45,000	-160,000	-3,800	76,000		
	C	-10,000	38,000	-160,000	-2,100	74,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

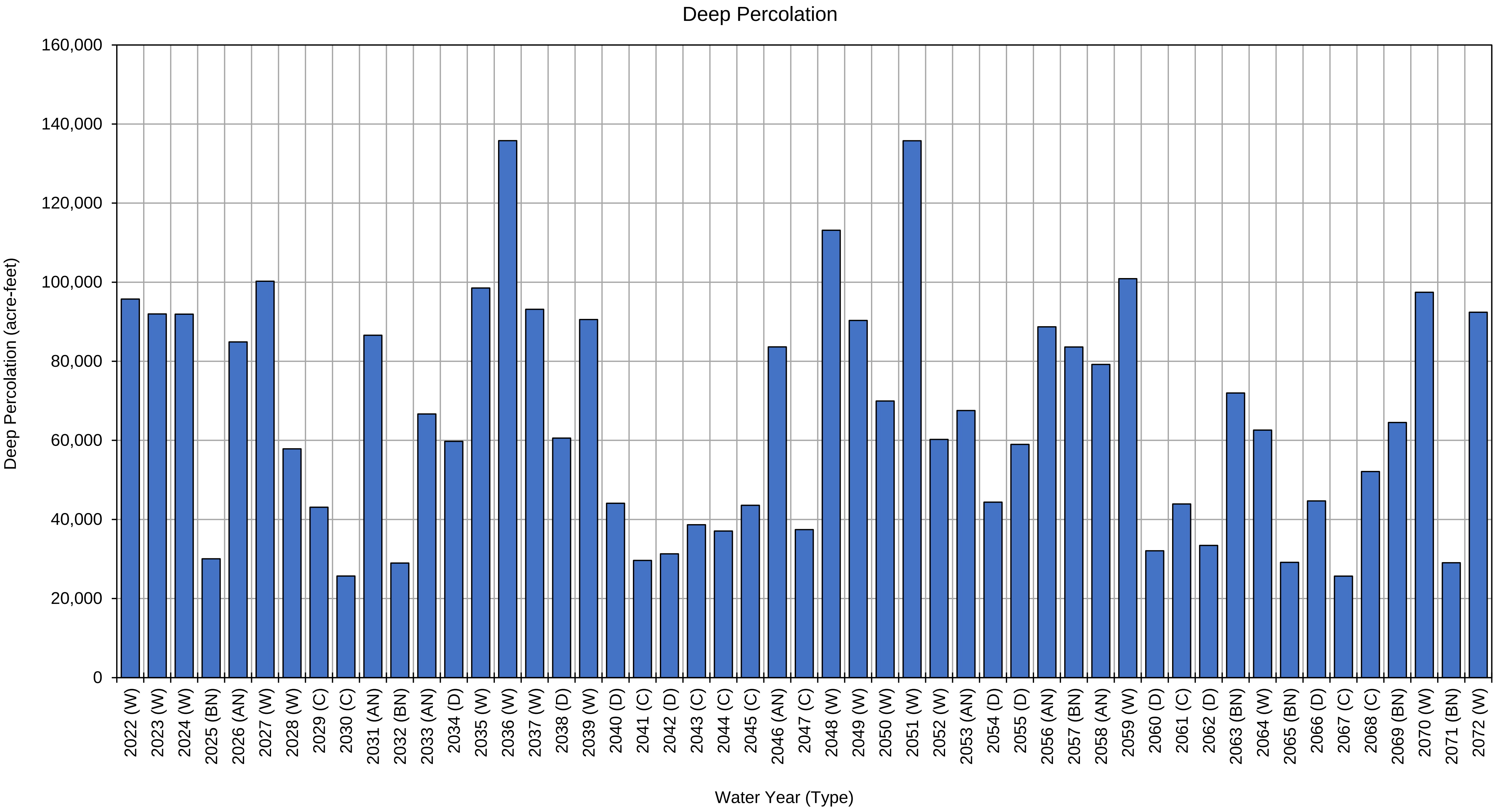
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	600
2023 (W)	-10,000
2024 (W)	-12,000
2025 (BN)	-53,000
2026 (AN)	1,600
2027 (W)	14,000
2028 (W)	-20,000
2029 (C)	-16,000
2030 (C)	-32,000
2031 (AN)	21,000
2032 (BN)	-19,000
2033 (AN)	18,000
2034 (D)	6,900
2035 (W)	37,000
2036 (W)	27,000
2037 (W)	-15,000
2038 (D)	-23,000
2039 (W)	-2,200
2040 (D)	-23,000
2041 (C)	-31,000
2042 (D)	-15,000
2043 (C)	-14,000
2044 (C)	-7,200
2045 (C)	15,000
2046 (AN)	42,000
2047 (C)	-7,300
2048 (W)	48,000
2049 (W)	19,000
2050 (W)	3,500
2051 (W)	35,000
2052 (W)	-18,000
2053 (AN)	-6,900
2054 (D)	-19,000
2055 (D)	-960
2056 (AN)	15,000
2057 (BN)	9,200
2058 (AN)	12,000
2059 (W)	15,000
2060 (D)	-39,000
2061 (C)	-6,500
2062 (D)	-14,000
2063 (BN)	19,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		12,000
2065 (BN)		-23,000
2066 (D)		-4,100
2067 (C)		-15,000
2068 (C)		9,400
2069 (BN)		32,000
2070 (W)		52,000
2071 (BN)		-19,000
2072 (W)		41,000
Average (2022-2072)		830
2022-2072	W	13,000
	AN	15,000
	BN	-7,400
	D	-15,000
	C	-10,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

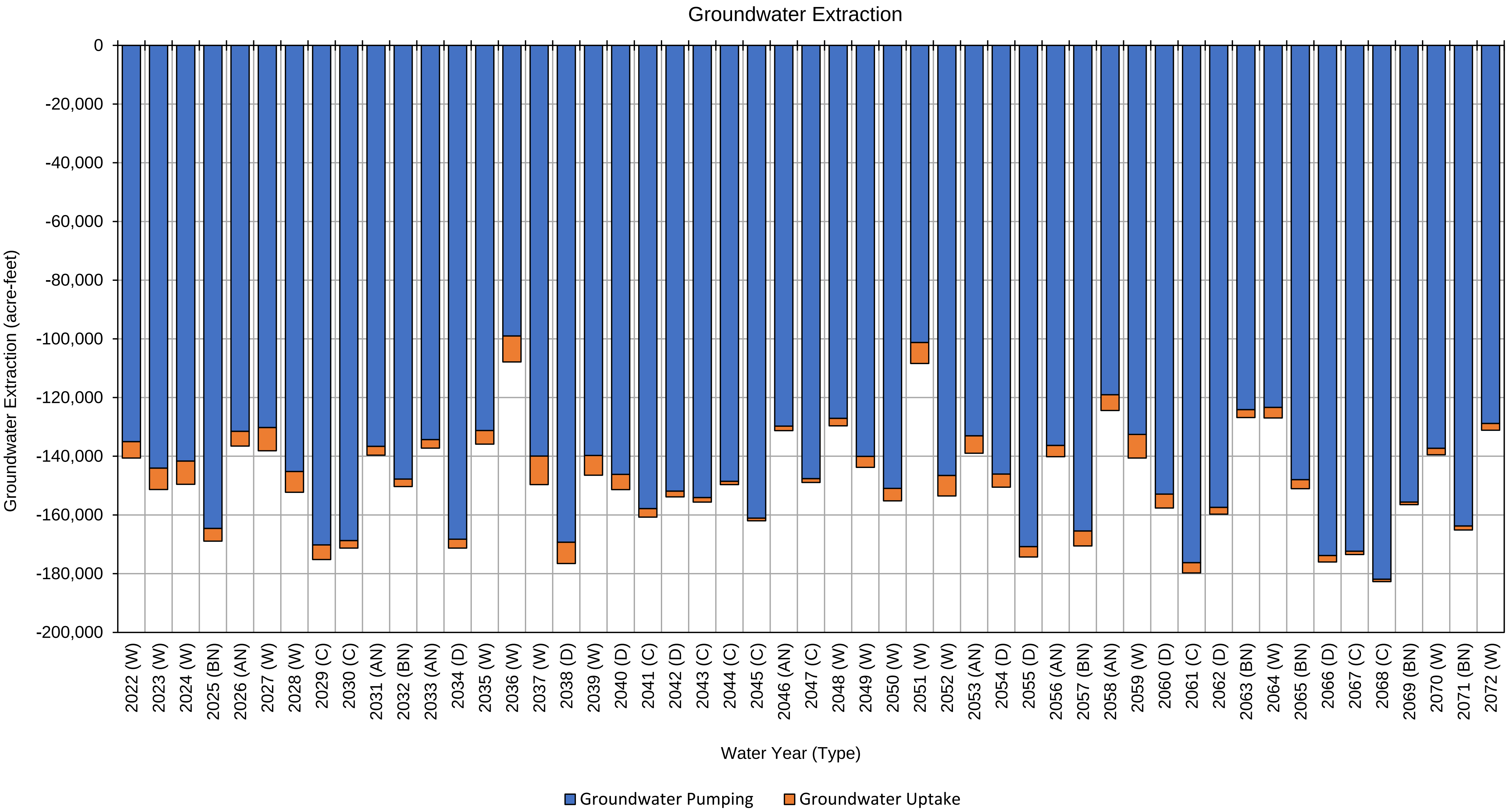
WY (Type)	Deep Percolation from the SWS
2022 (W)	96,000
2023 (W)	92,000
2024 (W)	92,000
2025 (BN)	30,000
2026 (AN)	85,000
2027 (W)	100,000
2028 (W)	58,000
2029 (C)	43,000
2030 (C)	26,000
2031 (AN)	87,000
2032 (BN)	29,000
2033 (AN)	67,000
2034 (D)	60,000
2035 (W)	99,000
2036 (W)	140,000
2037 (W)	93,000
2038 (D)	61,000
2039 (W)	91,000
2040 (D)	44,000
2041 (C)	30,000
2042 (D)	31,000
2043 (C)	39,000
2044 (C)	37,000
2045 (C)	44,000
2046 (AN)	84,000
2047 (C)	37,000
2048 (W)	110,000
2049 (W)	90,000
2050 (W)	70,000
2051 (W)	140,000
2052 (W)	60,000
2053 (AN)	68,000
2054 (D)	44,000
2055 (D)	59,000
2056 (AN)	89,000
2057 (BN)	84,000
2058 (AN)	79,000
2059 (W)	100,000
2060 (D)	32,000
2061 (C)	44,000
2062 (D)	33,000
2063 (BN)	72,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		63,000
2065 (BN)		29,000
2066 (D)		45,000
2067 (C)		26,000
2068 (C)		52,000
2069 (BN)		65,000
2070 (W)		97,000
2071 (BN)		29,000
2072 (W)		92,000
Average (2022-2072)		66,000
2022-2072	W	93,000
	AN	80,000
	BN	48,000
	D	45,000
	C	38,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

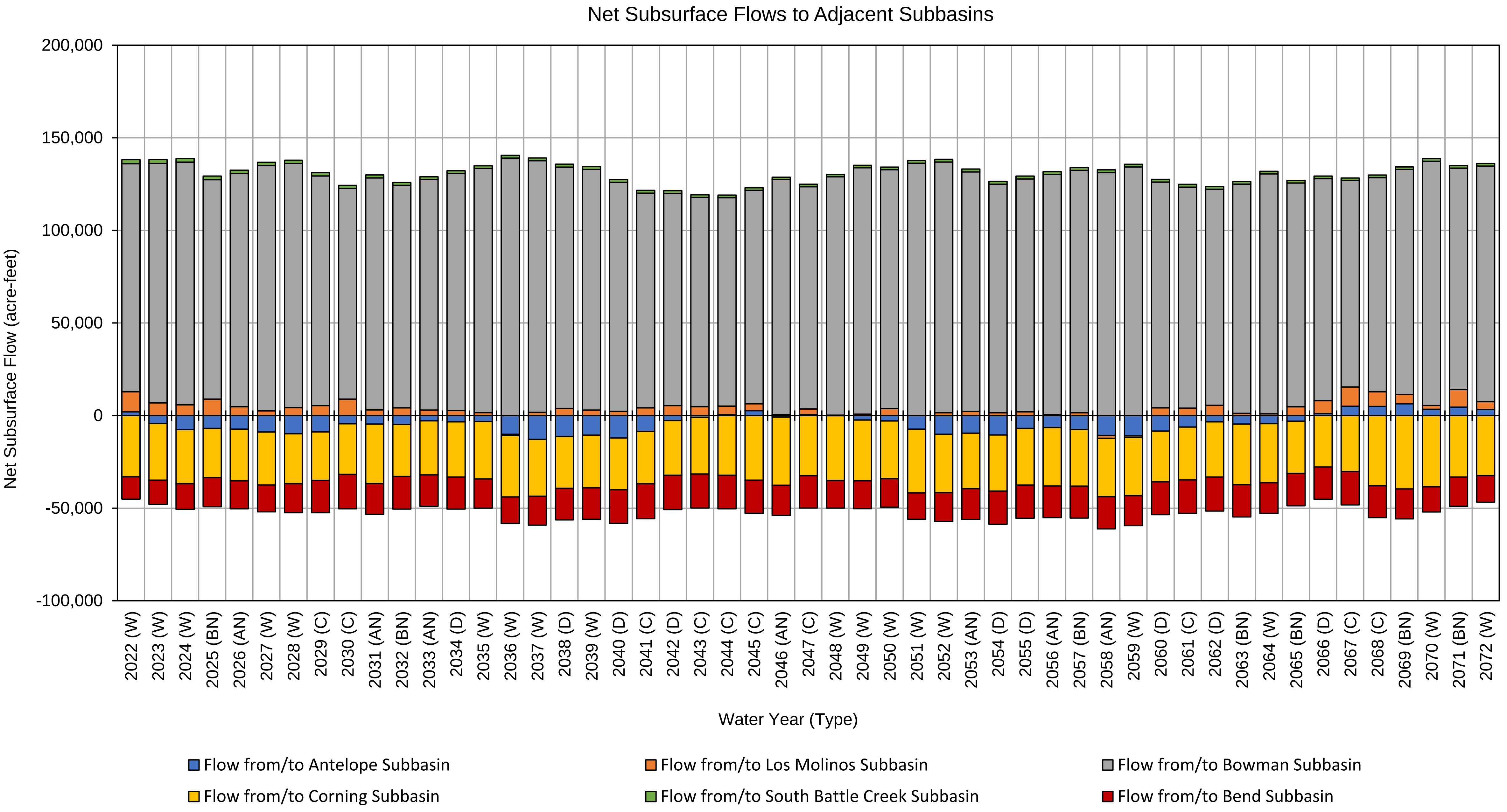
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-140,000	-5,600	-140,000
2023 (W)	-140,000	-7,300	-150,000
2024 (W)	-140,000	-7,900	-150,000
2025 (BN)	-160,000	-4,300	-170,000
2026 (AN)	-130,000	-5,000	-140,000
2027 (W)	-130,000	-7,900	-140,000
2028 (W)	-150,000	-7,100	-150,000
2029 (C)	-170,000	-5,000	-180,000
2030 (C)	-170,000	-2,500	-170,000
2031 (AN)	-140,000	-3,000	-140,000
2032 (BN)	-150,000	-2,500	-150,000
2033 (AN)	-130,000	-2,900	-140,000
2034 (D)	-170,000	-3,000	-170,000
2035 (W)	-130,000	-4,600	-140,000
2036 (W)	-99,000	-8,800	-110,000
2037 (W)	-140,000	-9,700	-150,000
2038 (D)	-170,000	-7,200	-180,000
2039 (W)	-140,000	-6,700	-150,000
2040 (D)	-150,000	-5,200	-150,000
2041 (C)	-160,000	-2,900	-160,000
2042 (D)	-150,000	-1,900	-150,000
2043 (C)	-150,000	-1,500	-160,000
2044 (C)	-150,000	-1,100	-150,000
2045 (C)	-160,000	-930	-160,000
2046 (AN)	-130,000	-1,600	-130,000
2047 (C)	-150,000	-1,300	-150,000
2048 (W)	-130,000	-2,500	-130,000
2049 (W)	-140,000	-3,800	-140,000
2050 (W)	-150,000	-4,300	-160,000
2051 (W)	-100,000	-7,100	-110,000
2052 (W)	-150,000	-7,000	-150,000
2053 (AN)	-130,000	-5,900	-140,000
2054 (D)	-150,000	-4,500	-150,000
2055 (D)	-170,000	-3,500	-170,000
2056 (AN)	-140,000	-3,900	-140,000
2057 (BN)	-170,000	-5,100	-170,000
2058 (AN)	-120,000	-5,300	-120,000
2059 (W)	-130,000	-8,000	-140,000
2060 (D)	-150,000	-4,700	-160,000
2061 (C)	-180,000	-3,500	-180,000
2062 (D)	-160,000	-2,300	-160,000
2063 (BN)	-120,000	-2,700	-130,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-120,000	-3,600	-130,000
2065 (BN)		-150,000	-3,100	-150,000
2066 (D)		-170,000	-2,200	-180,000
2067 (C)		-170,000	-1,100	-170,000
2068 (C)		-180,000	-830	-180,000
2069 (BN)		-160,000	-890	-160,000
2070 (W)		-140,000	-2,200	-140,000
2071 (BN)		-160,000	-1,400	-170,000
2072 (W)		-130,000	-2,300	-130,000
Average (2022-2072)		-150,000	-4,100	-150,000
2022-2072	W	-130,000	-5,900	-140,000
	AN	-130,000	-3,900	-140,000
	BN	-150,000	-2,800	-160,000
	D	-160,000	-3,800	-160,000
	C	-160,000	-2,100	-170,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

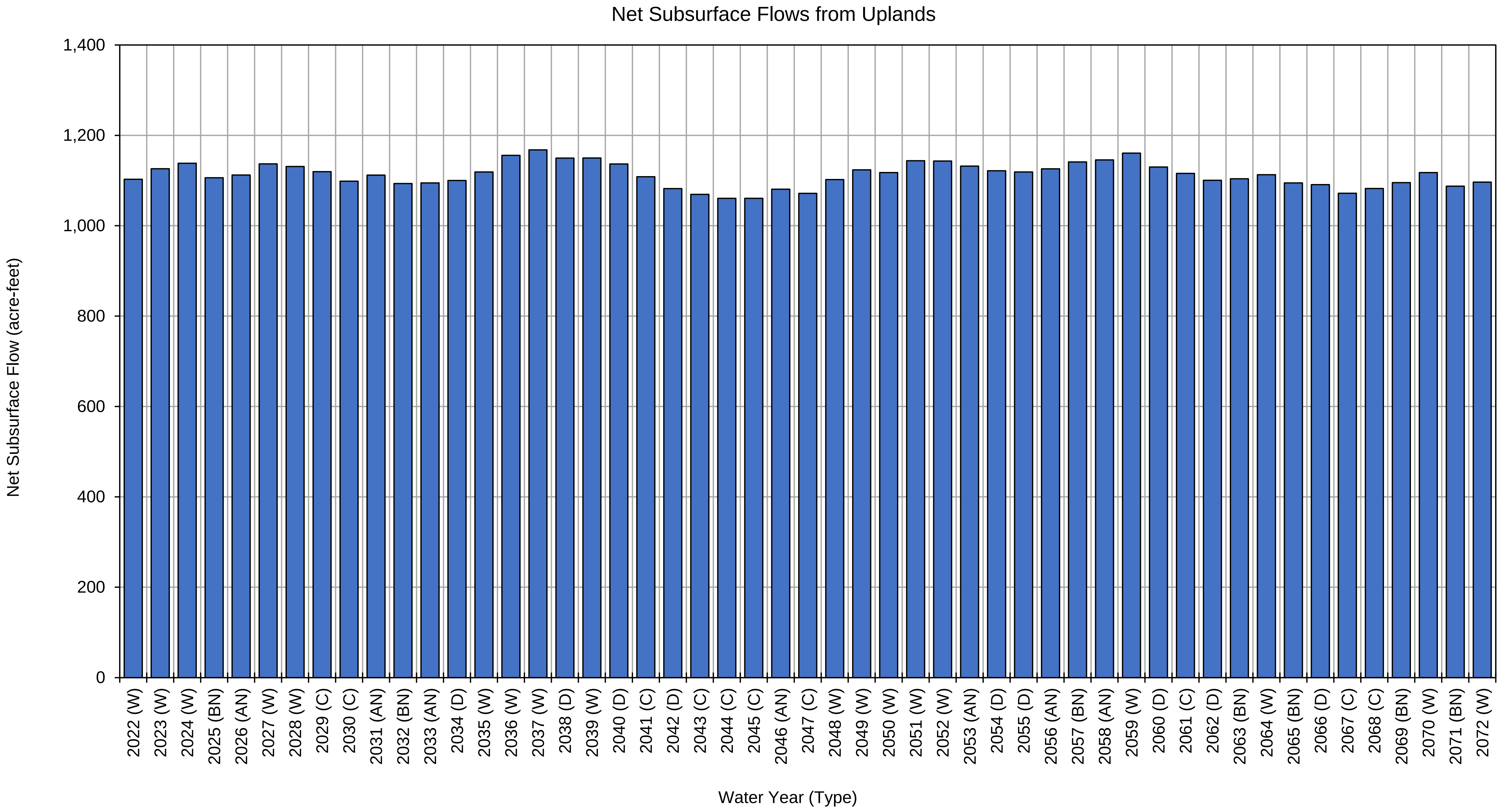
WY (Type)	Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	2,000	11,000	120,000	-33,000	2,200	-12,000	93,000
2023 (W)	-4,400	6,900	130,000	-31,000	2,100	-13,000	90,000
2024 (W)	-7,600	5,800	130,000	-29,000	2,000	-14,000	88,000
2025 (BN)	-6,900	8,900	120,000	-27,000	2,000	-16,000	80,000
2026 (AN)	-7,400	4,800	130,000	-28,000	1,900	-15,000	82,000
2027 (W)	-8,900	2,500	130,000	-29,000	1,800	-15,000	85,000
2028 (W)	-9,800	4,300	130,000	-27,000	1,700	-16,000	85,000
2029 (C)	-8,800	5,400	120,000	-26,000	1,700	-18,000	79,000
2030 (C)	-4,500	8,900	110,000	-27,000	1,700	-19,000	74,000
2031 (AN)	-4,600	3,100	130,000	-32,000	1,600	-17,000	77,000
2032 (BN)	-4,800	4,200	120,000	-28,000	1,600	-18,000	75,000
2033 (AN)	-2,900	3,000	120,000	-29,000	1,500	-17,000	80,000
2034 (D)	-3,400	2,700	130,000	-30,000	1,500	-17,000	82,000
2035 (W)	-3,200	1,600	130,000	-31,000	1,400	-16,000	85,000
2036 (W)	-10,000	-610	140,000	-33,000	1,500	-14,000	82,000
2037 (W)	-13,000	1,800	140,000	-31,000	1,500	-16,000	80,000
2038 (D)	-11,000	3,900	130,000	-28,000	1,600	-17,000	79,000
2039 (W)	-11,000	3,000	130,000	-28,000	1,600	-17,000	78,000
2040 (D)	-12,000	2,300	120,000	-28,000	1,600	-18,000	69,000
2041 (C)	-8,500	4,200	120,000	-28,000	1,500	-19,000	66,000
2042 (D)	-2,700	5,400	110,000	-30,000	1,500	-19,000	71,000
2043 (C)	-1,000	4,800	110,000	-31,000	1,400	-18,000	69,000
2044 (C)	550	4,600	110,000	-32,000	1,400	-18,000	69,000
2045 (C)	2,600	3,700	120,000	-35,000	1,400	-18,000	70,000
2046 (AN)	590	-830	130,000	-37,000	1,300	-16,000	75,000
2047 (C)	620	3,000	120,000	-32,000	1,300	-17,000	75,000
2048 (W)	250	-110	130,000	-35,000	1,300	-15,000	80,000
2049 (W)	-2,400	760	130,000	-33,000	1,400	-15,000	85,000
2050 (W)	-2,900	3,800	130,000	-31,000	1,400	-15,000	85,000
2051 (W)	-7,300	17	140,000	-34,000	1,400	-14,000	82,000
2052 (W)	-10,000	1,500	140,000	-31,000	1,500	-16,000	81,000
2053 (AN)	-9,500	2,200	130,000	-30,000	1,500	-17,000	77,000
2054 (D)	-10,000	1,500	120,000	-30,000	1,600	-18,000	68,000
2055 (D)	-6,900	2,000	130,000	-31,000	1,500	-18,000	74,000
2056 (AN)	-6,500	570	130,000	-32,000	1,500	-17,000	77,000
2057 (BN)	-7,500	1,500	130,000	-31,000	1,500	-17,000	79,000
2058 (AN)	-11,000	-1,600	130,000	-32,000	1,500	-17,000	72,000
2059 (W)	-11,000	-810	130,000	-31,000	1,500	-16,000	76,000
2060 (D)	-8,400	4,200	120,000	-27,000	1,500	-18,000	74,000
2061 (C)	-6,200	4,000	120,000	-29,000	1,500	-18,000	72,000
2062 (D)	-3,400	5,500	120,000	-30,000	1,500	-18,000	72,000
2063 (BN)	-4,600	1,200	120,000	-33,000	1,400	-17,000	72,000
2064 (W)	-4,400	960	130,000	-32,000	1,400	-17,000	79,000
2065 (BN)	-3,000	4,800	120,000	-28,000	1,400	-18,000	78,000
2066 (D)	1,100	6,900	120,000	-28,000	1,400	-17,000	84,000
2067 (C)	5,100	10,000	110,000	-30,000	1,400	-18,000	80,000
2068 (C)	5,000	7,900	120,000	-38,000	1,400	-17,000	75,000
2069 (BN)	6,400	5,000	120,000	-40,000	1,400	-16,000	78,000
2070 (W)	3,400	2,100	130,000	-38,000	1,300	-14,000	87,000
2071 (BN)	4,500	9,500	120,000	-33,000	1,400	-16,000	86,000
2072 (W)	3,300	4,200	130,000	-32,000	1,400	-14,000	89,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
Average (2022-2072)		-4,400	3,700	130,000	-31,000	1,500	-16,000	78,000
2022-2072	W	-5,400	2,700	130,000	-32,000	1,600	-15,000	84,000
	AN	-5,800	1,600	130,000	-31,000	1,500	-17,000	77,000
	BN	-2,300	5,000	120,000	-31,000	1,500	-17,000	78,000
	D	-6,400	3,800	120,000	-29,000	1,500	-18,000	75,000
	C	-1,500	5,700	120,000	-31,000	1,500	-18,000	73,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

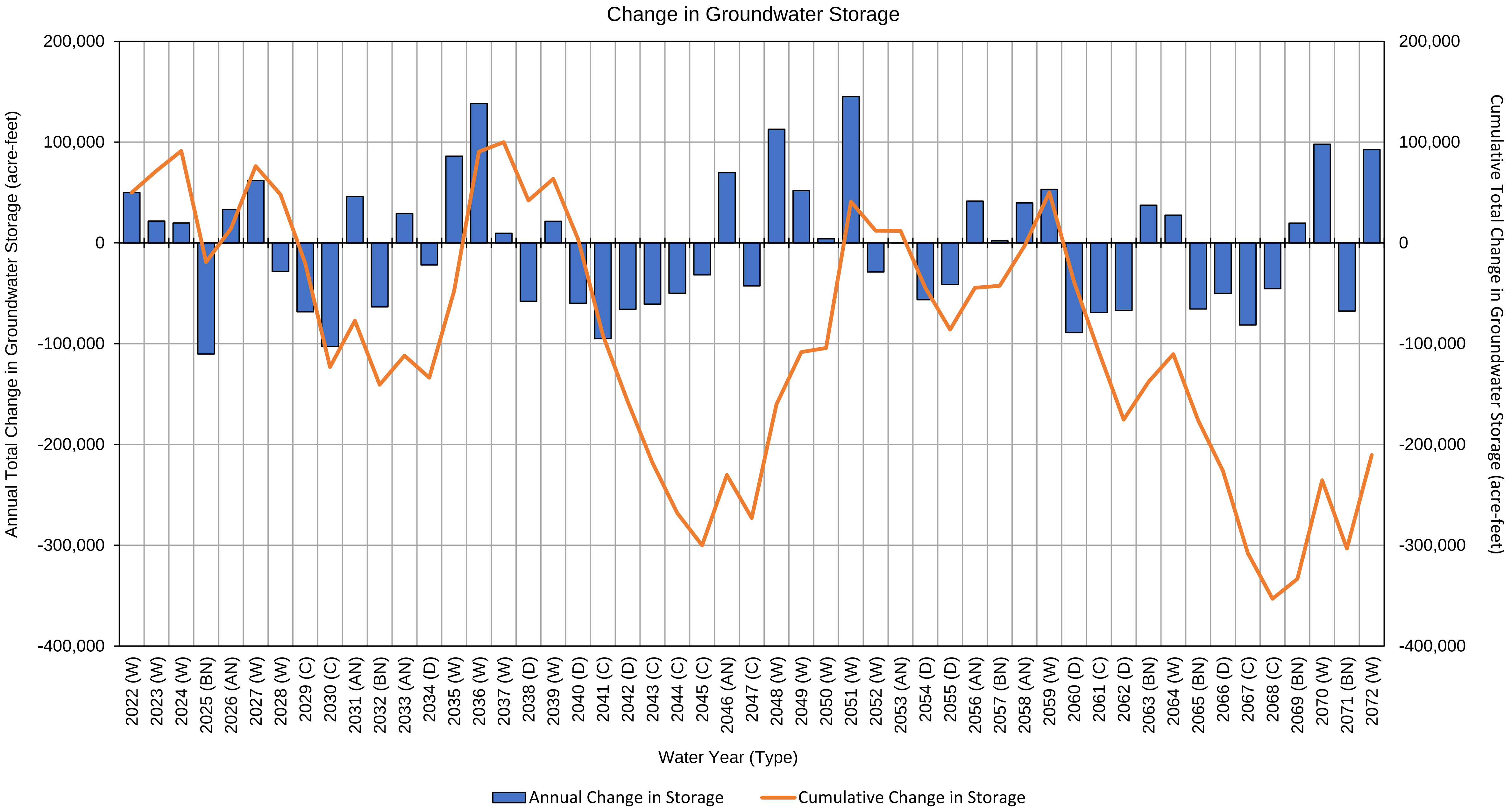
WY (Type)	Subsurface Flows from Uplands
2022 (W)	1,100
2023 (W)	1,100
2024 (W)	1,100
2025 (BN)	1,100
2026 (AN)	1,100
2027 (W)	1,100
2028 (W)	1,100
2029 (C)	1,100
2030 (C)	1,100
2031 (AN)	1,100
2032 (BN)	1,100
2033 (AN)	1,100
2034 (D)	1,100
2035 (W)	1,100
2036 (W)	1,200
2037 (W)	1,200
2038 (D)	1,100
2039 (W)	1,100
2040 (D)	1,100
2041 (C)	1,100
2042 (D)	1,100
2043 (C)	1,100
2044 (C)	1,100
2045 (C)	1,100
2046 (AN)	1,100
2047 (C)	1,100
2048 (W)	1,100
2049 (W)	1,100
2050 (W)	1,100
2051 (W)	1,100
2052 (W)	1,100
2053 (AN)	1,100
2054 (D)	1,100
2055 (D)	1,100
2056 (AN)	1,100
2057 (BN)	1,100
2058 (AN)	1,100
2059 (W)	1,200
2060 (D)	1,100
2061 (C)	1,100
2062 (D)	1,100
2063 (BN)	1,100

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		1,100
2065 (BN)		1,100
2066 (D)		1,100
2067 (C)		1,100
2068 (C)		1,100
2069 (BN)		1,100
2070 (W)		1,100
2071 (BN)		1,100
2072 (W)		1,100
Average (2022-2072)		1,100
2022-2072	W	1,100
	AN	1,100
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	50,000	50,000
2023 (W)	22,000	72,000
2024 (W)	20,000	91,000
2025 (BN)	-110,000	-19,000
2026 (AN)	33,000	14,000
2027 (W)	62,000	76,000
2028 (W)	-28,000	48,000
2029 (C)	-68,000	-21,000
2030 (C)	-100,000	-120,000
2031 (AN)	46,000	-77,000
2032 (BN)	-64,000	-140,000
2033 (AN)	29,000	-110,000
2034 (D)	-22,000	-130,000
2035 (W)	86,000	-48,000
2036 (W)	140,000	91,000
2037 (W)	9,500	100,000
2038 (D)	-58,000	42,000
2039 (W)	21,000	64,000
2040 (D)	-60,000	3,600
2041 (C)	-95,000	-92,000
2042 (D)	-66,000	-160,000
2043 (C)	-61,000	-220,000
2044 (C)	-50,000	-270,000
2045 (C)	-32,000	-300,000
2046 (AN)	70,000	-230,000
2047 (C)	-43,000	-270,000
2048 (W)	110,000	-160,000
2049 (W)	52,000	-110,000
2050 (W)	4,100	-100,000
2051 (W)	150,000	41,000
2052 (W)	-29,000	12,000
2053 (AN)	-180	12,000
2054 (D)	-56,000	-45,000
2055 (D)	-41,000	-86,000
2056 (AN)	41,000	-45,000
2057 (BN)	2,000	-43,000
2058 (AN)	40,000	-3,000
2059 (W)	53,000	50,000
2060 (D)	-89,000	-39,000
2061 (C)	-69,000	-110,000
2062 (D)	-67,000	-180,000
2063 (BN)	37,000	-140,000

Red Bluff Subbasin Projected (Future Land Use) with Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		28,000	-110,000
2065 (BN)		-66,000	-180,000
2066 (D)		-50,000	-230,000
2067 (C)		-81,000	-310,000
2068 (C)		-45,000	-350,000
2069 (BN)		20,000	-330,000
2070 (W)		98,000	-240,000
2071 (BN)		-68,000	-300,000
2072 (W)		93,000	-210,000
Average (2022-2072)		-4,100	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

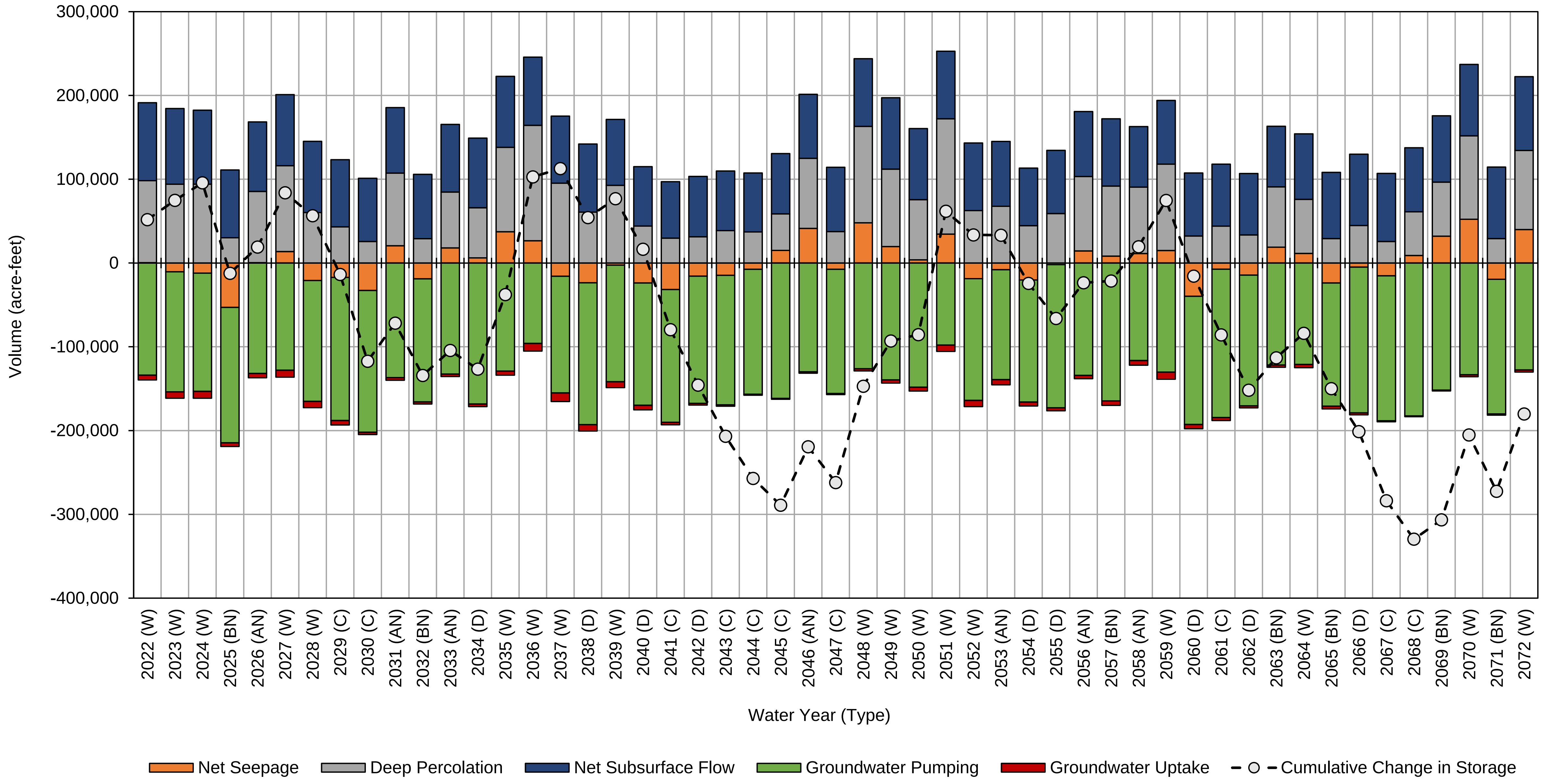
W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

APPENDIX D-8

Detailed Red Bluff Subbasin Water Budget Results:

Projected (Future Land Use) with Projects and Climate Change (2070) Model Results

Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget
Red Bluff Subbasin



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

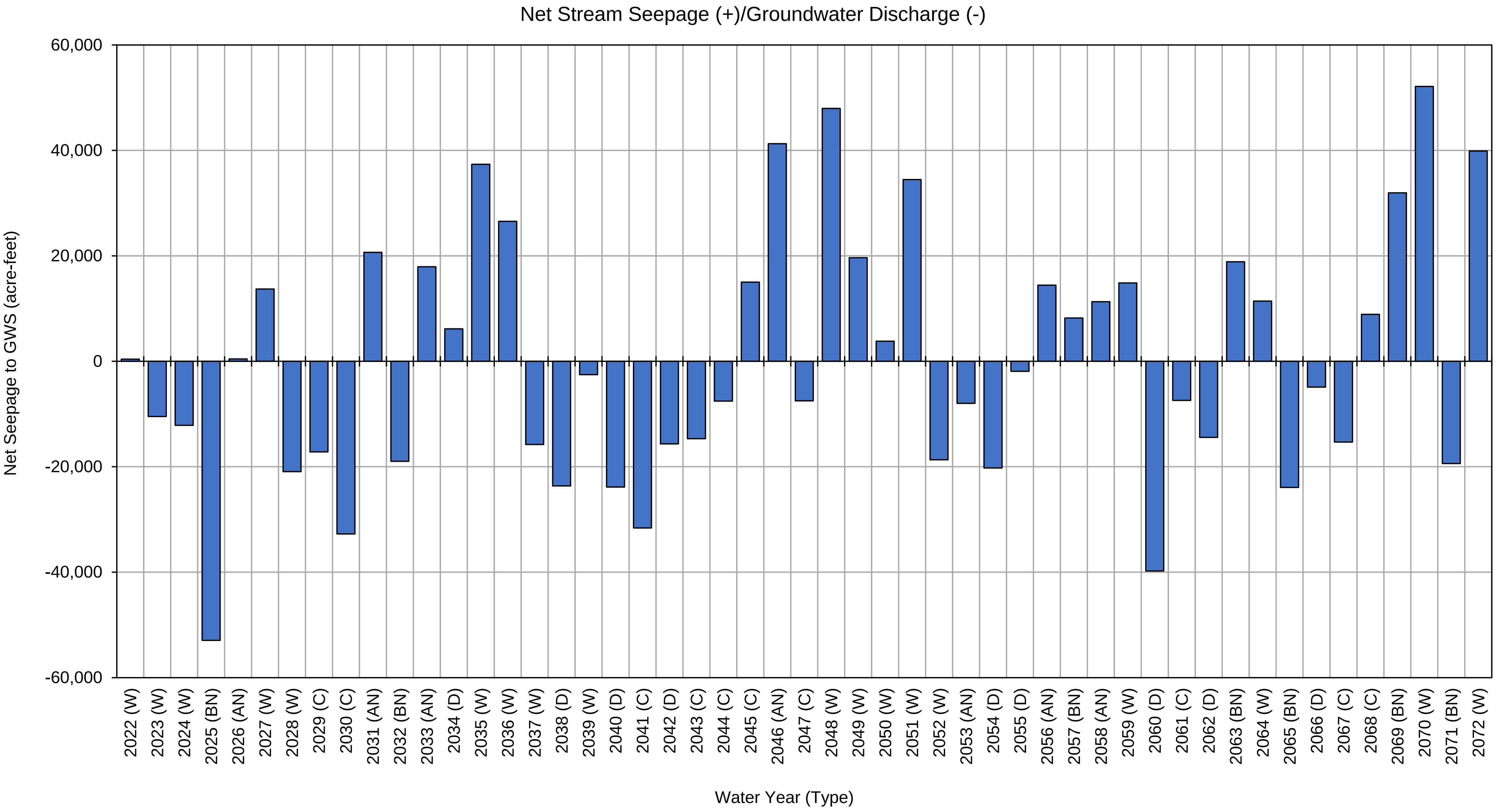
WY (Type)	Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	400	98,000	-130,000	-5,800	93,000	52,000	52,000
2023 (W)	-10,000	94,000	-140,000	-7,600	90,000	23,000	75,000
2024 (W)	-12,000	94,000	-140,000	-8,300	88,000	21,000	96,000
2025 (BN)	-53,000	30,000	-160,000	-4,500	81,000	-110,000	-12,000
2026 (AN)	450	85,000	-130,000	-5,300	83,000	31,000	19,000
2027 (W)	14,000	100,000	-130,000	-8,300	85,000	65,000	84,000
2028 (W)	-21,000	60,000	-140,000	-7,600	85,000	-27,000	56,000
2029 (C)	-17,000	43,000	-170,000	-5,300	80,000	-70,000	-14,000
2030 (C)	-33,000	26,000	-170,000	-2,600	75,000	-100,000	-120,000
2031 (AN)	21,000	87,000	-140,000	-3,100	78,000	46,000	-72,000
2032 (BN)	-19,000	29,000	-150,000	-2,600	77,000	-63,000	-130,000
2033 (AN)	18,000	67,000	-130,000	-3,000	81,000	30,000	-100,000
2034 (D)	6,100	60,000	-170,000	-3,100	83,000	-22,000	-130,000
2035 (W)	37,000	100,000	-130,000	-4,800	85,000	89,000	-38,000
2036 (W)	27,000	140,000	-96,000	-9,200	81,000	140,000	100,000
2037 (W)	-16,000	95,000	-140,000	-10,000	80,000	10,000	110,000
2038 (D)	-24,000	61,000	-170,000	-7,700	81,000	-59,000	54,000
2039 (W)	-2,500	93,000	-140,000	-7,100	79,000	23,000	77,000
2040 (D)	-24,000	44,000	-150,000	-5,500	71,000	-60,000	16,000
2041 (C)	-32,000	30,000	-160,000	-3,000	67,000	-96,000	-80,000
2042 (D)	-16,000	31,000	-150,000	-2,000	72,000	-66,000	-150,000
2043 (C)	-15,000	39,000	-150,000	-1,600	71,000	-61,000	-210,000
2044 (C)	-7,600	37,000	-150,000	-1,100	70,000	-50,000	-260,000
2045 (C)	15,000	44,000	-160,000	-950	72,000	-32,000	-290,000
2046 (AN)	41,000	84,000	-130,000	-1,600	76,000	70,000	-220,000
2047 (C)	-7,500	37,000	-150,000	-1,300	77,000	-43,000	-260,000
2048 (W)	48,000	120,000	-130,000	-2,600	81,000	110,000	-150,000
2049 (W)	20,000	92,000	-140,000	-3,900	85,000	54,000	-93,000
2050 (W)	3,800	72,000	-150,000	-4,500	85,000	7,600	-85,000
2051 (W)	34,000	140,000	-98,000	-7,600	81,000	150,000	62,000
2052 (W)	-19,000	63,000	-150,000	-7,500	81,000	-28,000	34,000
2053 (AN)	-8,000	68,000	-130,000	-6,300	77,000	-400	33,000
2054 (D)	-20,000	44,000	-150,000	-4,700	69,000	-57,000	-24,000
2055 (D)	-1,900	59,000	-170,000	-3,700	75,000	-42,000	-66,000
2056 (AN)	14,000	89,000	-130,000	-4,000	78,000	43,000	-24,000
2057 (BN)	8,200	84,000	-160,000	-5,300	80,000	2,200	-21,000
2058 (AN)	11,000	79,000	-120,000	-5,600	72,000	41,000	19,000
2059 (W)	15,000	100,000	-130,000	-8,500	76,000	55,000	75,000
2060 (D)	-40,000	32,000	-150,000	-5,100	75,000	-90,000	-16,000
2061 (C)	-7,400	44,000	-180,000	-3,600	74,000	-70,000	-86,000
2062 (D)	-14,000	33,000	-160,000	-2,400	73,000	-66,000	-150,000
2063 (BN)	19,000	72,000	-120,000	-2,800	72,000	39,000	-110,000
2064 (W)	11,000	65,000	-120,000	-3,800	78,000	29,000	-84,000
2065 (BN)	-24,000	29,000	-150,000	-3,200	79,000	-66,000	-150,000

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Water Budget Summary (acre-feet, rounded)

WY (Type)		Total Net Seepage	Deep Percolation	Groundwater Pumping	Groundwater Uptake	Total Net Subsurface Flows	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2066 (D)		-4,900	45,000	-170,000	-2,300	85,000	-51,000	-200,000
2067 (C)		-15,000	26,000	-170,000	-1,200	81,000	-82,000	-280,000
2068 (C)		8,900	52,000	-180,000	-850	76,000	-46,000	-330,000
2069 (BN)		32,000	65,000	-150,000	-910	79,000	23,000	-310,000
2070 (W)		52,000	100,000	-130,000	-2,300	85,000	100,000	-210,000
2071 (BN)		-19,000	29,000	-160,000	-1,500	85,000	-67,000	-270,000
2072 (W)		40,000	94,000	-130,000	-2,500	88,000	92,000	-180,000
Average (2022-2072)		300	67,000	-150,000	-4,300	79,000	-3,500	
2022-2072	W	12,000	95,000	-130,000	-6,200	84,000		
	AN	14,000	80,000	-130,000	-4,100	78,000		
	BN	-8,000	48,000	-150,000	-3,000	79,000		
	D	-15,000	46,000	-160,000	-4,000	76,000		
	C	-11,000	38,000	-160,000	-2,200	75,000		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

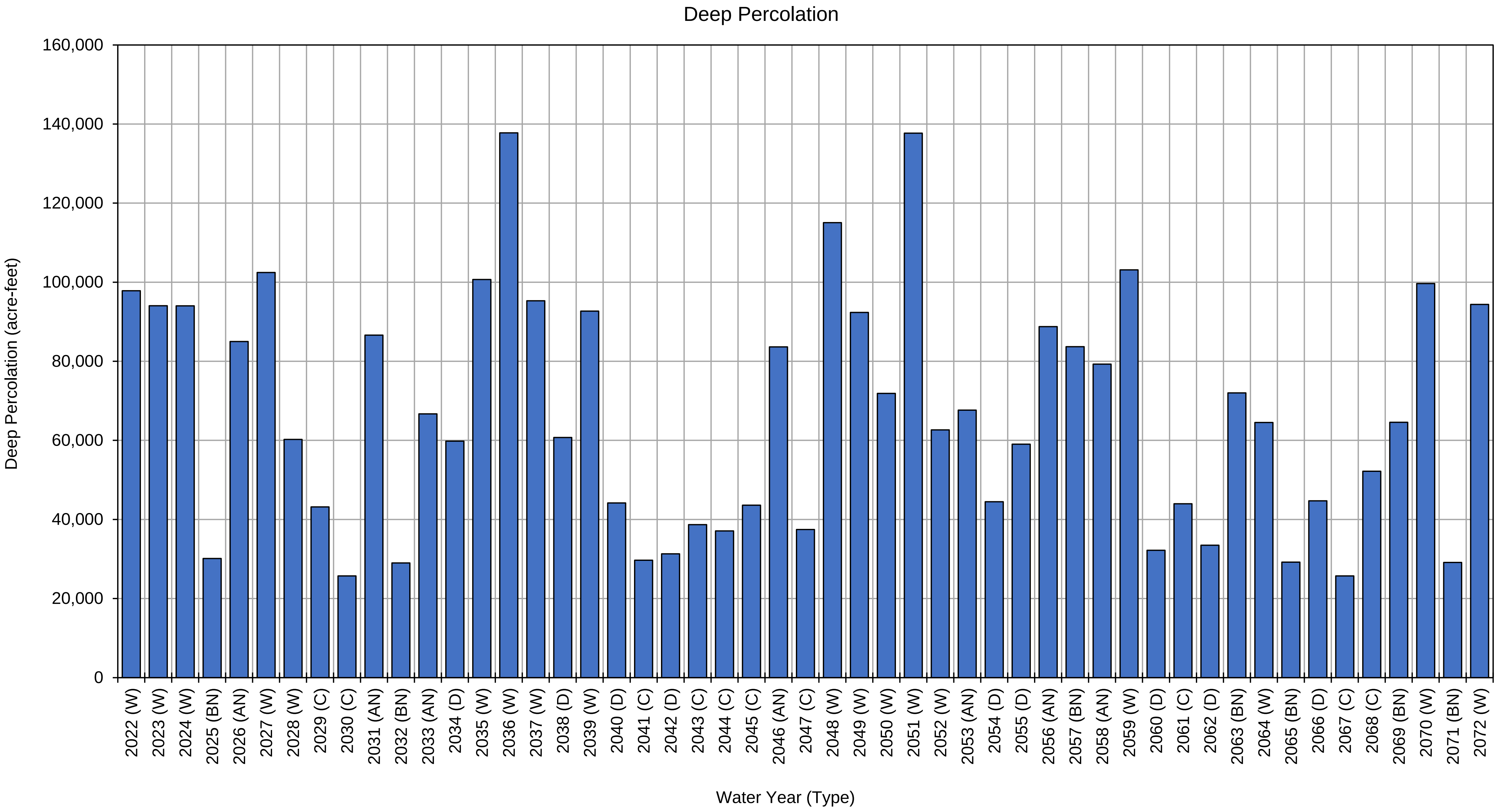
WY (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	400
2023 (W)	-10,000
2024 (W)	-12,000
2025 (BN)	-53,000
2026 (AN)	450
2027 (W)	14,000
2028 (W)	-21,000
2029 (C)	-17,000
2030 (C)	-33,000
2031 (AN)	21,000
2032 (BN)	-19,000
2033 (AN)	18,000
2034 (D)	6,100
2035 (W)	37,000
2036 (W)	27,000
2037 (W)	-16,000
2038 (D)	-24,000
2039 (W)	-2,500
2040 (D)	-24,000
2041 (C)	-32,000
2042 (D)	-16,000
2043 (C)	-15,000
2044 (C)	-7,600
2045 (C)	15,000
2046 (AN)	41,000
2047 (C)	-7,500
2048 (W)	48,000
2049 (W)	20,000
2050 (W)	3,800
2051 (W)	34,000
2052 (W)	-19,000
2053 (AN)	-8,000
2054 (D)	-20,000
2055 (D)	-1,900
2056 (AN)	14,000
2057 (BN)	8,200
2058 (AN)	11,000
2059 (W)	15,000
2060 (D)	-40,000
2061 (C)	-7,400
2062 (D)	-14,000
2063 (BN)	19,000

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Net Stream Seepage (net flows as acre-feet, rounded)

WY (Type)		Total Net Seepage from Surface Waterways and Canals
2064 (W)		11,000
2065 (BN)		-24,000
2066 (D)		-4,900
2067 (C)		-15,000
2068 (C)		8,900
2069 (BN)		32,000
2070 (W)		52,000
2071 (BN)		-19,000
2072 (W)		40,000
Average (2022-2072)		300
2022-2072	W	12,000
	AN	14,000
	BN	-8,000
	D	-15,000
	C	-11,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

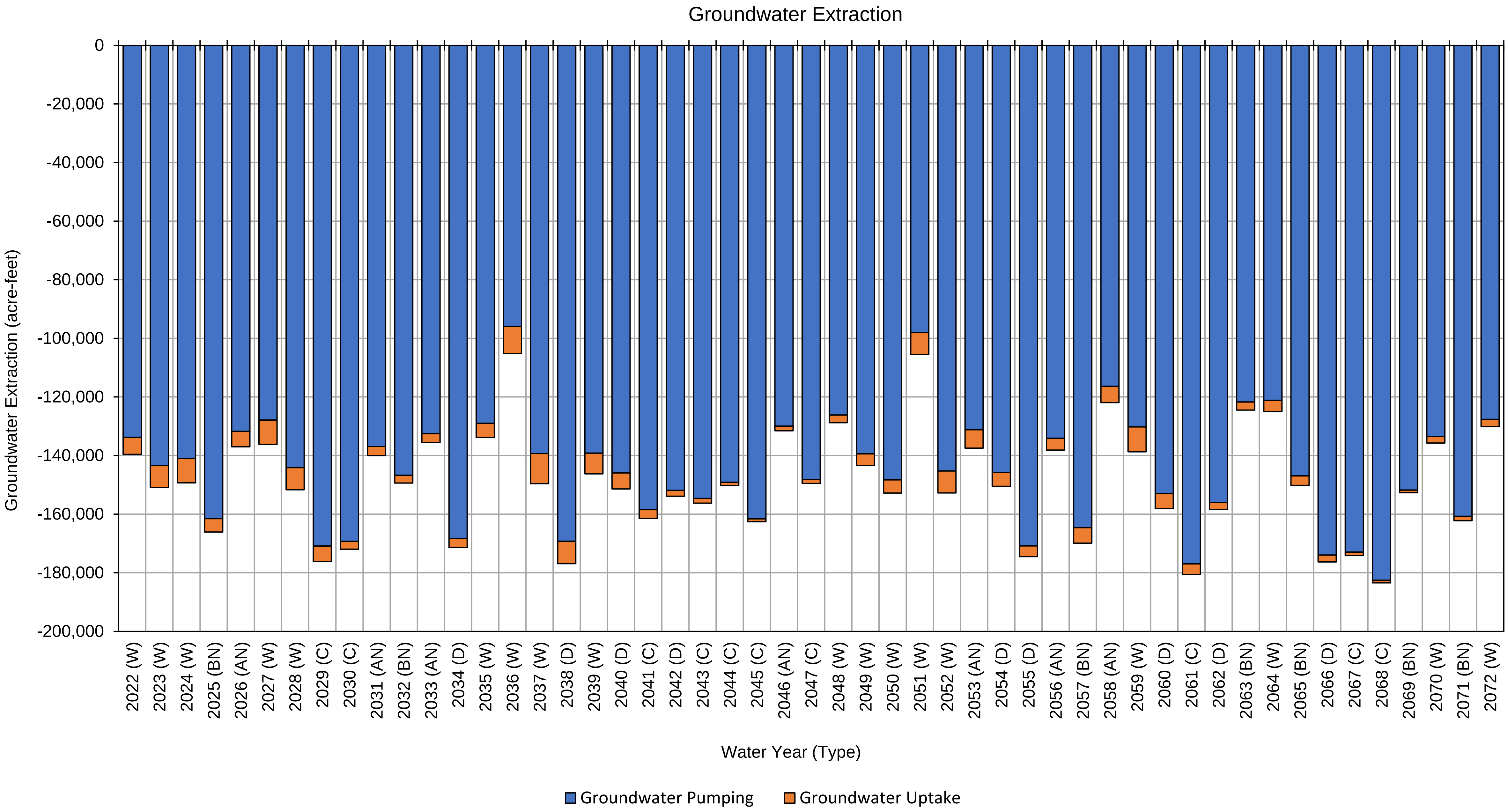
WY (Type)	Deep Percolation from the SWS
2022 (W)	98,000
2023 (W)	94,000
2024 (W)	94,000
2025 (BN)	30,000
2026 (AN)	85,000
2027 (W)	100,000
2028 (W)	60,000
2029 (C)	43,000
2030 (C)	26,000
2031 (AN)	87,000
2032 (BN)	29,000
2033 (AN)	67,000
2034 (D)	60,000
2035 (W)	100,000
2036 (W)	140,000
2037 (W)	95,000
2038 (D)	61,000
2039 (W)	93,000
2040 (D)	44,000
2041 (C)	30,000
2042 (D)	31,000
2043 (C)	39,000
2044 (C)	37,000
2045 (C)	44,000
2046 (AN)	84,000
2047 (C)	37,000
2048 (W)	120,000
2049 (W)	92,000
2050 (W)	72,000
2051 (W)	140,000
2052 (W)	63,000
2053 (AN)	68,000
2054 (D)	44,000
2055 (D)	59,000
2056 (AN)	89,000
2057 (BN)	84,000
2058 (AN)	79,000
2059 (W)	100,000
2060 (D)	32,000
2061 (C)	44,000
2062 (D)	33,000
2063 (BN)	72,000

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Deep Percolation from the SWS (acre-feet, rounded)

WY (Type)		Deep Percolation from the SWS
2064 (W)		65,000
2065 (BN)		29,000
2066 (D)		45,000
2067 (C)		26,000
2068 (C)		52,000
2069 (BN)		65,000
2070 (W)		100,000
2071 (BN)		29,000
2072 (W)		94,000
Average (2022-2072)		67,000
2022-2072	W	95,000
	AN	80,000
	BN	48,000
	D	46,000
	C	38,000

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

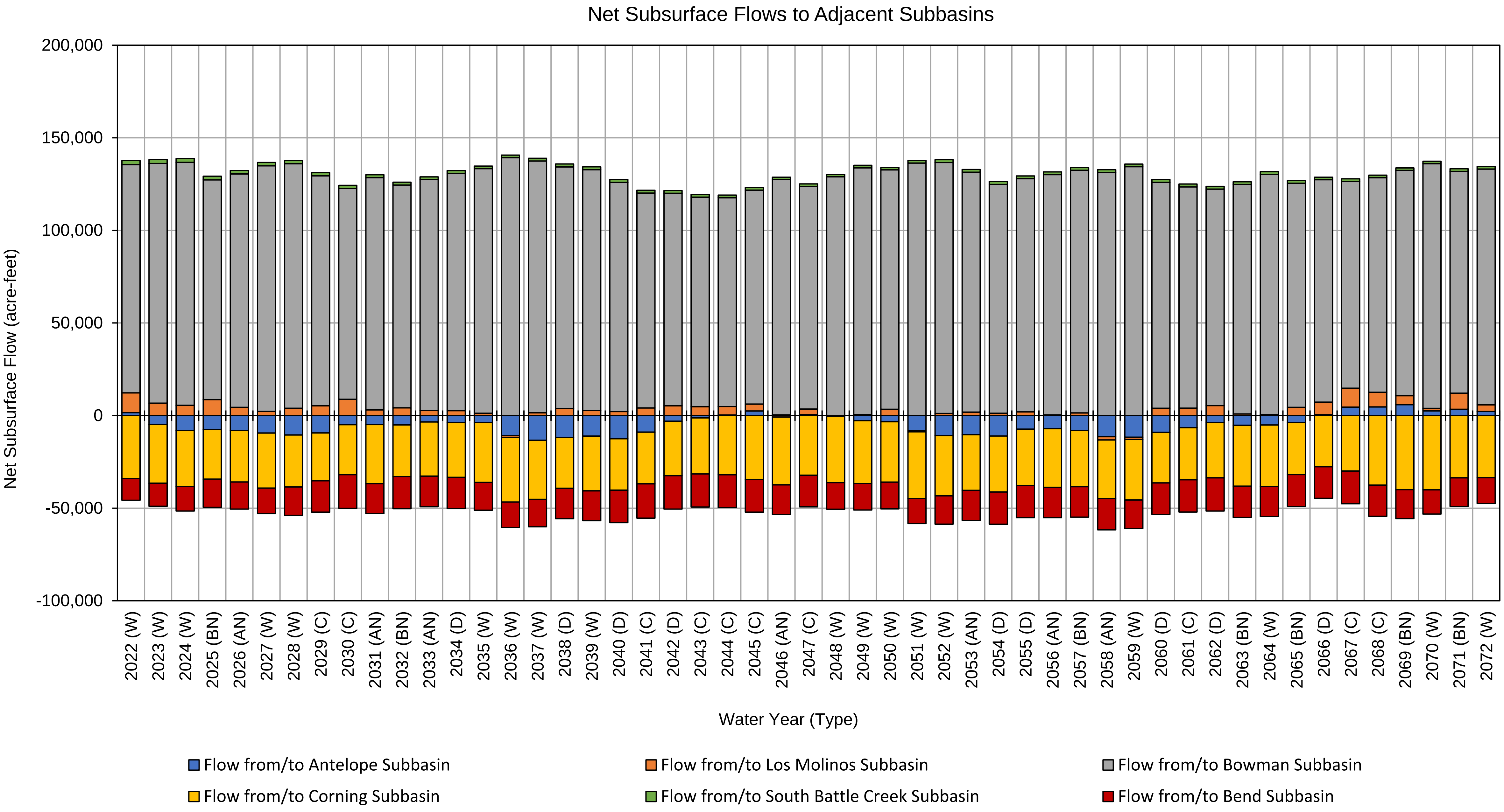
WY (Type)	Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2022 (W)	-130,000	-5,800	-140,000
2023 (W)	-140,000	-7,600	-150,000
2024 (W)	-140,000	-8,300	-150,000
2025 (BN)	-160,000	-4,500	-170,000
2026 (AN)	-130,000	-5,300	-140,000
2027 (W)	-130,000	-8,300	-140,000
2028 (W)	-140,000	-7,600	-150,000
2029 (C)	-170,000	-5,300	-180,000
2030 (C)	-170,000	-2,600	-170,000
2031 (AN)	-140,000	-3,100	-140,000
2032 (BN)	-150,000	-2,600	-150,000
2033 (AN)	-130,000	-3,000	-140,000
2034 (D)	-170,000	-3,100	-170,000
2035 (W)	-130,000	-4,800	-130,000
2036 (W)	-96,000	-9,200	-110,000
2037 (W)	-140,000	-10,000	-150,000
2038 (D)	-170,000	-7,700	-180,000
2039 (W)	-140,000	-7,100	-150,000
2040 (D)	-150,000	-5,500	-150,000
2041 (C)	-160,000	-3,000	-160,000
2042 (D)	-150,000	-2,000	-150,000
2043 (C)	-150,000	-1,600	-160,000
2044 (C)	-150,000	-1,100	-150,000
2045 (C)	-160,000	-950	-160,000
2046 (AN)	-130,000	-1,600	-130,000
2047 (C)	-150,000	-1,300	-150,000
2048 (W)	-130,000	-2,600	-130,000
2049 (W)	-140,000	-3,900	-140,000
2050 (W)	-150,000	-4,500	-150,000
2051 (W)	-98,000	-7,600	-110,000
2052 (W)	-150,000	-7,500	-150,000
2053 (AN)	-130,000	-6,300	-140,000
2054 (D)	-150,000	-4,700	-150,000
2055 (D)	-170,000	-3,700	-170,000
2056 (AN)	-130,000	-4,000	-140,000
2057 (BN)	-160,000	-5,300	-170,000
2058 (AN)	-120,000	-5,600	-120,000
2059 (W)	-130,000	-8,500	-140,000
2060 (D)	-150,000	-5,100	-160,000
2061 (C)	-180,000	-3,600	-180,000
2062 (D)	-160,000	-2,400	-160,000
2063 (BN)	-120,000	-2,800	-120,000

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Groundwater Extractions (acre-feet, rounded)

WY (Type)		Groundwater Pumping	Groundwater (Root Water) Uptake	Total Groundwater Extraction
2064 (W)		-120,000	-3,800	-120,000
2065 (BN)		-150,000	-3,200	-150,000
2066 (D)		-170,000	-2,300	-180,000
2067 (C)		-170,000	-1,200	-170,000
2068 (C)		-180,000	-850	-180,000
2069 (BN)		-150,000	-910	-150,000
2070 (W)		-130,000	-2,300	-140,000
2071 (BN)		-160,000	-1,500	-160,000
2072 (W)		-130,000	-2,500	-130,000
Average (2022-2072)		-150,000	-4,300	-150,000
2022-2072	W	-130,000	-6,200	-140,000
	AN	-130,000	-4,100	-130,000
	BN	-150,000	-3,000	-150,000
	D	-160,000	-4,000	-160,000
	C	-160,000	-2,200	-170,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

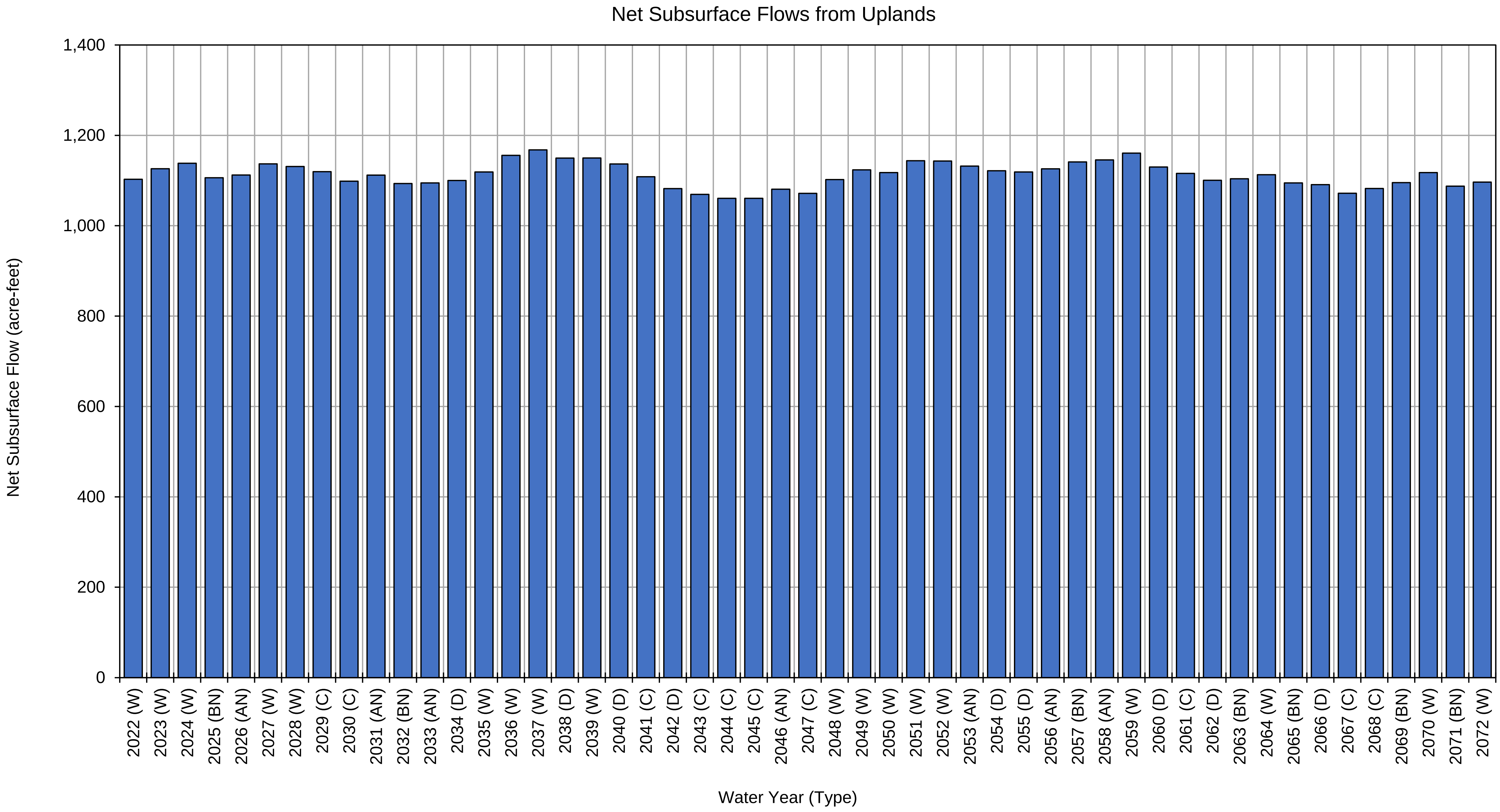
WY (Type)	Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
2022 (W)	1,600	11,000	120,000	-34,000	2,200	-12,000	92,000
2023 (W)	-4,800	6,700	130,000	-32,000	2,100	-12,000	89,000
2024 (W)	-8,100	5,600	130,000	-30,000	2,000	-13,000	87,000
2025 (BN)	-7,500	8,600	120,000	-27,000	2,000	-15,000	80,000
2026 (AN)	-8,100	4,500	130,000	-28,000	1,900	-15,000	82,000
2027 (W)	-9,400	2,300	130,000	-30,000	1,800	-14,000	84,000
2028 (W)	-10,000	4,000	130,000	-28,000	1,700	-15,000	84,000
2029 (C)	-9,400	5,300	120,000	-26,000	1,700	-17,000	79,000
2030 (C)	-4,900	8,800	110,000	-27,000	1,700	-18,000	74,000
2031 (AN)	-4,900	3,100	130,000	-32,000	1,600	-16,000	77,000
2032 (BN)	-5,000	4,200	120,000	-28,000	1,600	-17,000	76,000
2033 (AN)	-3,400	2,800	120,000	-29,000	1,500	-17,000	80,000
2034 (D)	-3,800	2,600	130,000	-30,000	1,500	-17,000	82,000
2035 (W)	-3,800	1,300	130,000	-32,000	1,400	-15,000	84,000
2036 (W)	-11,000	-1,100	140,000	-35,000	1,400	-14,000	80,000
2037 (W)	-13,000	1,500	140,000	-32,000	1,500	-15,000	79,000
2038 (D)	-12,000	3,800	130,000	-28,000	1,600	-16,000	80,000
2039 (W)	-11,000	2,700	130,000	-30,000	1,500	-16,000	78,000
2040 (D)	-13,000	2,200	120,000	-28,000	1,600	-18,000	70,000
2041 (C)	-8,900	4,100	120,000	-28,000	1,500	-19,000	66,000
2042 (D)	-3,100	5,300	110,000	-29,000	1,500	-18,000	71,000
2043 (C)	-1,300	4,800	110,000	-30,000	1,400	-18,000	70,000
2044 (C)	330	4,600	110,000	-32,000	1,400	-18,000	69,000
2045 (C)	2,500	3,800	120,000	-35,000	1,400	-18,000	71,000
2046 (AN)	420	-800	130,000	-37,000	1,300	-16,000	75,000
2047 (C)	520	3,000	120,000	-32,000	1,300	-17,000	76,000
2048 (W)	26	-260	130,000	-36,000	1,300	-14,000	80,000
2049 (W)	-2,700	510	130,000	-34,000	1,400	-14,000	84,000
2050 (W)	-3,300	3,400	130,000	-33,000	1,400	-14,000	84,000
2051 (W)	-8,200	-560	140,000	-36,000	1,400	-14,000	79,000
2052 (W)	-11,000	1,200	140,000	-33,000	1,500	-15,000	80,000
2053 (AN)	-10,000	1,900	130,000	-30,000	1,500	-16,000	76,000
2054 (D)	-11,000	1,300	120,000	-30,000	1,500	-17,000	68,000
2055 (D)	-7,400	2,000	130,000	-30,000	1,500	-17,000	74,000
2056 (AN)	-7,100	370	130,000	-32,000	1,500	-16,000	76,000
2057 (BN)	-8,100	1,400	130,000	-30,000	1,500	-16,000	79,000
2058 (AN)	-11,000	-1,800	130,000	-32,000	1,500	-17,000	71,000
2059 (W)	-12,000	-1,200	130,000	-33,000	1,500	-15,000	75,000
2060 (D)	-9,100	4,000	120,000	-27,000	1,500	-17,000	74,000
2061 (C)	-6,600	4,000	120,000	-28,000	1,500	-17,000	73,000
2062 (D)	-3,900	5,400	120,000	-30,000	1,500	-18,000	72,000
2063 (BN)	-5,200	910	120,000	-33,000	1,400	-17,000	71,000
2064 (W)	-5,100	570	130,000	-33,000	1,400	-16,000	77,000
2065 (BN)	-3,700	4,500	120,000	-28,000	1,400	-17,000	78,000
2066 (D)	520	6,800	120,000	-28,000	1,400	-17,000	84,000
2067 (C)	4,600	10,000	110,000	-30,000	1,400	-18,000	80,000
2068 (C)	4,700	7,900	120,000	-38,000	1,400	-17,000	75,000
2069 (BN)	5,900	4,800	120,000	-40,000	1,300	-16,000	78,000
2070 (W)	2,500	1,400	130,000	-40,000	1,300	-13,000	84,000
2071 (BN)	3,400	8,700	120,000	-34,000	1,400	-15,000	84,000
2072 (W)	2,200	3,600	130,000	-34,000	1,400	-14,000	87,000

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet, rounded)

WY (Type)		Flow from/to Antelope Subbasin	Flow from/to Los Molinos Subbasin	Flow from/to Bowman Subbasin	Flow from/to Corning Subbasin	Flow from/to South Battle Creek Subbasin	Flow from/to Bend Subbasin	Net Subsurface Flow from Adjacent Subbasins
Average (2022-2072)		-5,000	3,400	130,000	-31,000	1,500	-16,000	78,000
2022-2072	W	-6,000	2,300	130,000	-33,000	1,600	-14,000	83,000
	AN	-6,400	1,400	130,000	-31,000	1,500	-16,000	77,000
	BN	-2,900	4,700	120,000	-31,000	1,500	-16,000	78,000
	D	-6,900	3,700	120,000	-29,000	1,500	-17,000	75,000
	C	-1,900	5,700	120,000	-31,000	1,500	-18,000	73,000

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

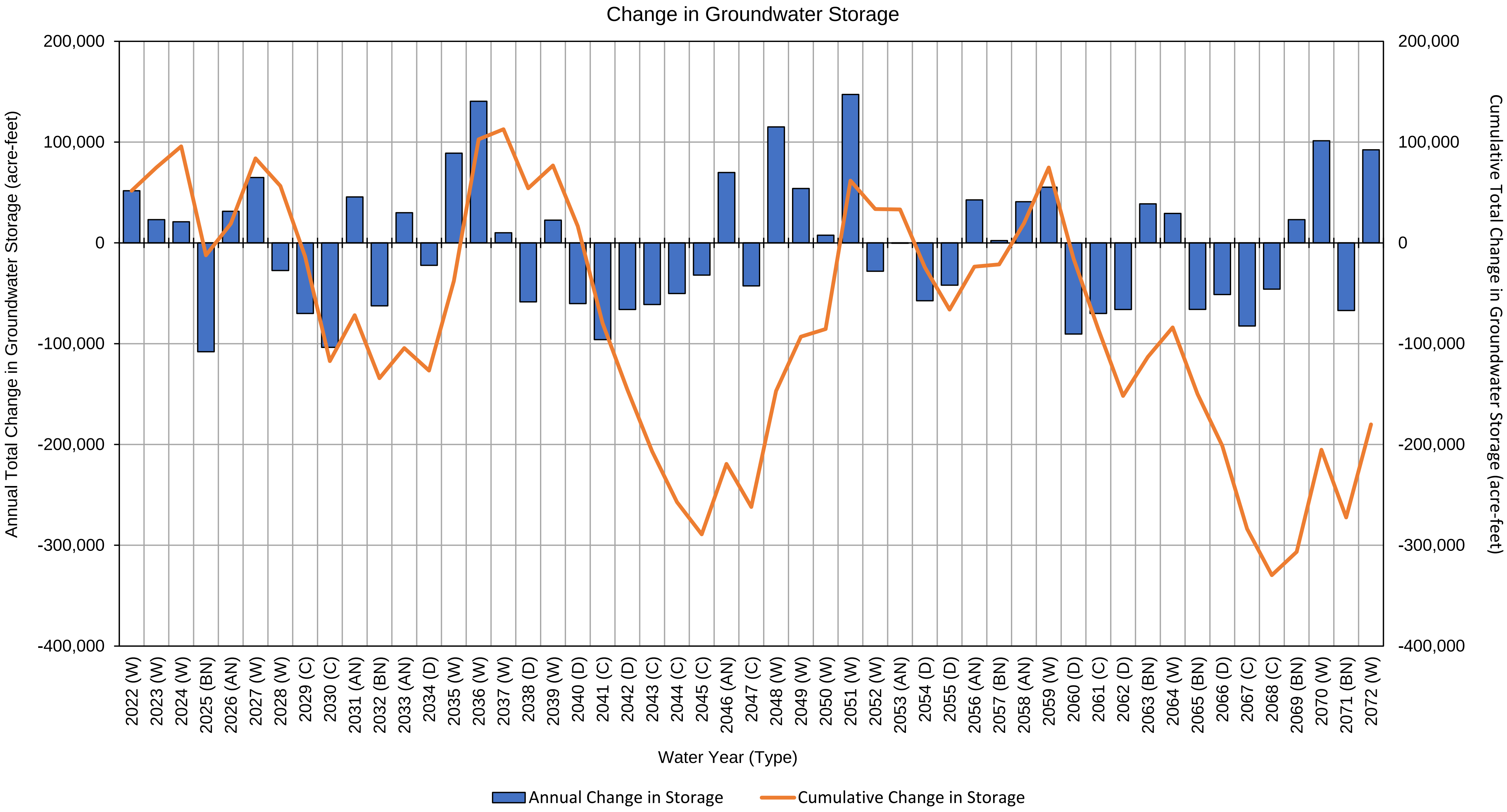
WY (Type)	Subsurface Flows from Uplands
2022 (W)	1,100
2023 (W)	1,100
2024 (W)	1,100
2025 (BN)	1,100
2026 (AN)	1,100
2027 (W)	1,100
2028 (W)	1,100
2029 (C)	1,100
2030 (C)	1,100
2031 (AN)	1,100
2032 (BN)	1,100
2033 (AN)	1,100
2034 (D)	1,100
2035 (W)	1,100
2036 (W)	1,200
2037 (W)	1,200
2038 (D)	1,100
2039 (W)	1,100
2040 (D)	1,100
2041 (C)	1,100
2042 (D)	1,100
2043 (C)	1,100
2044 (C)	1,100
2045 (C)	1,100
2046 (AN)	1,100
2047 (C)	1,100
2048 (W)	1,100
2049 (W)	1,100
2050 (W)	1,100
2051 (W)	1,100
2052 (W)	1,100
2053 (AN)	1,100
2054 (D)	1,100
2055 (D)	1,100
2056 (AN)	1,100
2057 (BN)	1,100
2058 (AN)	1,100
2059 (W)	1,200
2060 (D)	1,100
2061 (C)	1,100
2062 (D)	1,100
2063 (BN)	1,100

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet, rounded)

WY (Type)		Subsurface Flows from Uplands
2064 (W)		1,100
2065 (BN)		1,100
2066 (D)		1,100
2067 (C)		1,100
2068 (C)		1,100
2069 (BN)		1,100
2070 (W)		1,100
2071 (BN)		1,100
2072 (W)		1,100
Average (2022-2072)		1,100
2022-2072	W	1,100
	AN	1,100
	BN	1,100
	D	1,100
	C	1,100

Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical



Tehama IHM - Projected (Future Land Use) with Projects and Climate Change (2070)

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070) Change in Groundwater Storage (acre-feet, rounded)

WY (Type)	Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2022 (W)	52,000	52,000
2023 (W)	23,000	75,000
2024 (W)	21,000	96,000
2025 (BN)	-110,000	-12,000
2026 (AN)	31,000	19,000
2027 (W)	65,000	84,000
2028 (W)	-27,000	56,000
2029 (C)	-70,000	-14,000
2030 (C)	-100,000	-120,000
2031 (AN)	46,000	-72,000
2032 (BN)	-63,000	-130,000
2033 (AN)	30,000	-100,000
2034 (D)	-22,000	-130,000
2035 (W)	89,000	-38,000
2036 (W)	140,000	100,000
2037 (W)	10,000	110,000
2038 (D)	-59,000	54,000
2039 (W)	23,000	77,000
2040 (D)	-60,000	16,000
2041 (C)	-96,000	-80,000
2042 (D)	-66,000	-150,000
2043 (C)	-61,000	-210,000
2044 (C)	-50,000	-260,000
2045 (C)	-32,000	-290,000
2046 (AN)	70,000	-220,000
2047 (C)	-43,000	-260,000
2048 (W)	110,000	-150,000
2049 (W)	54,000	-93,000
2050 (W)	7,600	-85,000
2051 (W)	150,000	62,000
2052 (W)	-28,000	34,000
2053 (AN)	-400	33,000
2054 (D)	-57,000	-24,000
2055 (D)	-42,000	-66,000
2056 (AN)	43,000	-24,000
2057 (BN)	2,200	-21,000
2058 (AN)	41,000	19,000
2059 (W)	55,000	75,000
2060 (D)	-90,000	-16,000
2061 (C)	-70,000	-86,000
2062 (D)	-66,000	-150,000
2063 (BN)	39,000	-110,000

Red Bluff Subbasin Projected (Future Land Use) with Projects and Climate Change (2070)
Change in Groundwater Storage (acre-feet, rounded)

WY (Type)		Annual Change in Groundwater Storage	Cumulative Change in Groundwater Storage
2064 (W)		29,000	-84,000
2065 (BN)		-66,000	-150,000
2066 (D)		-51,000	-200,000
2067 (C)		-82,000	-280,000
2068 (C)		-46,000	-330,000
2069 (BN)		23,000	-310,000
2070 (W)		100,000	-210,000
2071 (BN)		-67,000	-270,000
2072 (W)		92,000	-180,000
Average (2022-2072)		-3,500	
2022-2072	W		
	AN		
	BN		
	D		
	C		

Note: Water Year Type is based on the Sacramento Valley Water Year Index and is classified into five types:

W	Wet
AN	Above Normal
BN	Below Normal
D	Dry
C	Critical

Appendix 2-K

Detailed Water Budget Details

Antelope Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan Appendix 2-K Detailed Water Budget Results - Draft

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini, Consulting Engineers

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1 DETAILED HISTORICAL WATER BUDGET

1.1 Surface Water System Water Budget Results

1.1.1 Inflows

1.1.1.1 *Surface Water Inflow by Water Source Type*

Per the GSP Regulations, surface inflows must be reported by water source type. According to the Regulations (23 CCR § 351(ak)):

> *"Water source type" represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.*

Major surface water inflows to the Antelope Subbasin are summarized below according to water source type.

1.1.1.1.1 Local Supplies

Local supply inflows to the Antelope Subbasin predominantly include runoff from upgradient small watersheds adjacent to the Subbasin and surface inflows along Sacramento River, Antelope Creek, Salt Creek, Craig Creek, and New Creek. A portion of these local supplies are diverted by local water rights users for beneficial use within the Subbasin.

1.1.1.1.2 Central Valley Project

Central Valley Project (CVP) inflows to the Antelope Subbasin include surface water diverted by small CVP contractors to irrigated land along the Sacramento River.

1.1.1.1.3 Summary of Surface Inflows

The annual volume of surface water inflows is summarized by water source type in **Table 1** and **Figure 1**. Between 1990 and 2018, total surface inflows from all sources averaged approximately 43 thousand acre-feet (taf) per year. Of this total, local supplies averaged approximately 42 taf per year, while CVP supplies averaged 610 acre-feet per year.

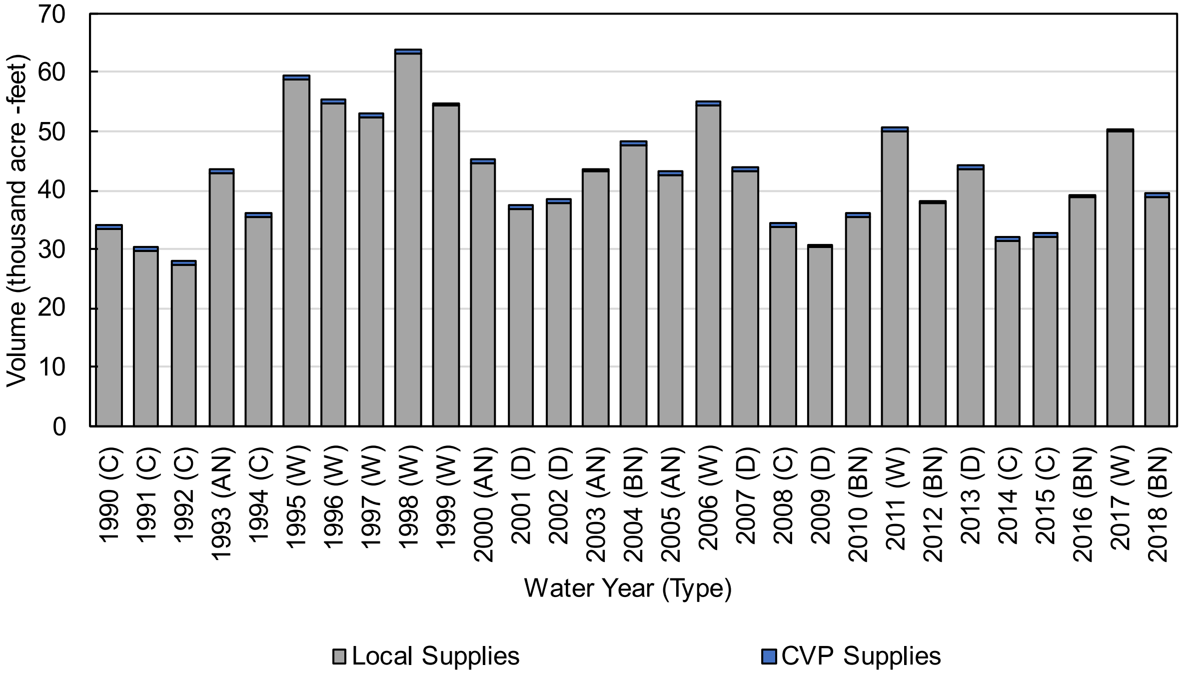
Volume (thousand acre -feet)
0
10
20
30
40
50
60
70
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Local Supplies
CVP Supplies

Table 1. Antelope Subbasin Historical Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)		CVP Supplies	Local Supplies	Total
1990 (C)		610	34,000	34,000
1991 (C)		610	30,000	30,000
1992 (C)		610	28,000	28,000
1993 (AN)		610	43,000	44,000
1994 (C)		610	36,000	36,000
1995 (W)		610	59,000	60,000
1996 (W)		610	55,000	55,000
1997 (W)		610	52,000	53,000
1998 (W)		610	63,000	64,000
1999 (W)		620	54,000	55,000
2000 (AN)		580	45,000	45,000
2001 (D)		600	37,000	38,000
2002 (D)		640	38,000	38,000
2003 (AN)		580	43,000	44,000
2004 (BN)		620	48,000	48,000
2005 (AN)		600	43,000	43,000
2006 (W)		610	55,000	55,000
2007 (D)		650	43,000	44,000
2008 (C)		600	34,000	34,000
2009 (D)		620	30,000	31,000
2010 (BN)		610	36,000	36,000
2011 (W)		630	50,000	51,000
2012 (BN)		560	38,000	38,000
2013 (D)		650	44,000	44,000
2014 (C)		640	32,000	32,000
2015 (C)		610	32,000	33,000
2016 (BN)		580	39,000	39,000
2017 (W)		580	50,000	50,000
Average (1990-2018)		610	42,000	43,000
1990-2018	W	610	55,000	55,000
	AN	590	43,000	44,000
	BN	600	40,000	40,000
	D	630	38,000	39,000
	C	610	32,000	33,000

1.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Table 2** and **Figure 2** by water use sector. Total precipitation is highly variable between years in the study area, ranging from approximately 24 taf (14.9 inches) during average critically dry years to over 81 taf (50.22 inches) during average wet years.

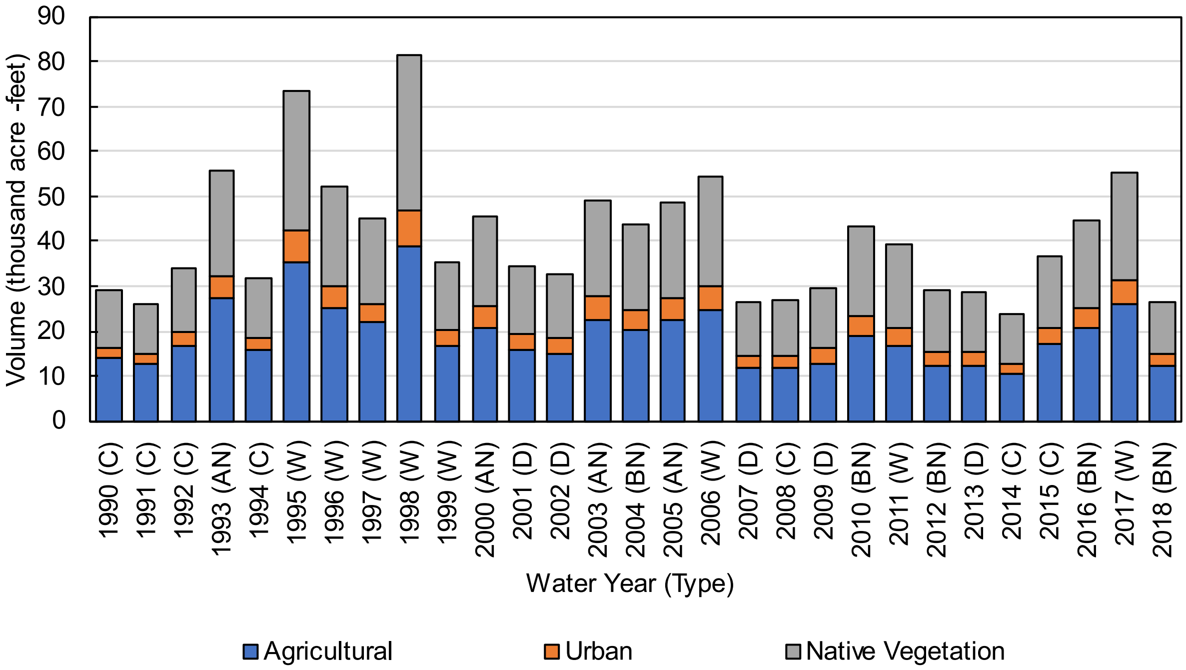

Figure 2. Antelope Subbasin Historical Precipitation, by Water Use Sector

Table 2. Antelope Subbasin Historical Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		14,000	2,400	13,000	29,000
1991 (C)		13,000	2,200	11,000	26,000
1992 (C)		17,000	2,900	14,000	34,000
1993 (AN)		27,000	4,900	23,000	56,000
1994 (C)		16,000	2,900	13,000	32,000
1995 (W)		35,000	7,000	31,000	74,000
1996 (W)		25,000	5,000	22,000	52,000
1997 (W)		22,000	4,400	19,000	45,000
1998 (W)		39,000	8,000	35,000	81,000
1999 (W)		17,000	3,500	15,000	36,000
2000 (AN)		21,000	4,700	20,000	45,000
2001 (D)		16,000	3,500	15,000	34,000
2002 (D)		15,000	3,300	14,000	33,000
2003 (AN)		23,000	5,100	21,000	49,000
2004 (BN)		20,000	4,600	19,000	44,000
2005 (AN)		22,000	5,100	21,000	49,000
2006 (W)		24,000	5,700	24,000	55,000
2007 (D)		12,000	2,700	12,000	26,000
2008 (C)		12,000	2,800	12,000	27,000
2009 (D)		13,000	3,100	14,000	30,000
2010 (BN)		19,000	4,600	20,000	43,000
2011 (W)		17,000	4,100	19,000	39,000
2012 (BN)		12,000	3,100	14,000	29,000
2013 (D)		12,000	2,900	14,000	29,000
2014 (C)		10,000	2,400	11,000	24,000
2015 (C)		17,000	3,600	16,000	37,000
2016 (BN)		20,000	4,500	20,000	45,000
2017 (W)		26,000	5,400	24,000	56,000
2018 (BN)		12,000	2,600	12,000	27,000
Average (1990-2018)		19,000	4,000	18,000	41,000
1990-2018	W	26,000	5,400	24,000	55,000
	AN	23,000	5,000	22,000	50,000
	BN	17,000	3,900	17,000	38,000
	D	14,000	3,100	14,000	30,000
	C	14,000	2,700	13,000	30,000

1.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 3** and **Table 3**. The majority of groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 12 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 11 taf in above-normal years to 16 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 4** and **Table 4**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, totaling 0.50 taf and 0.970 taf per year, on average.

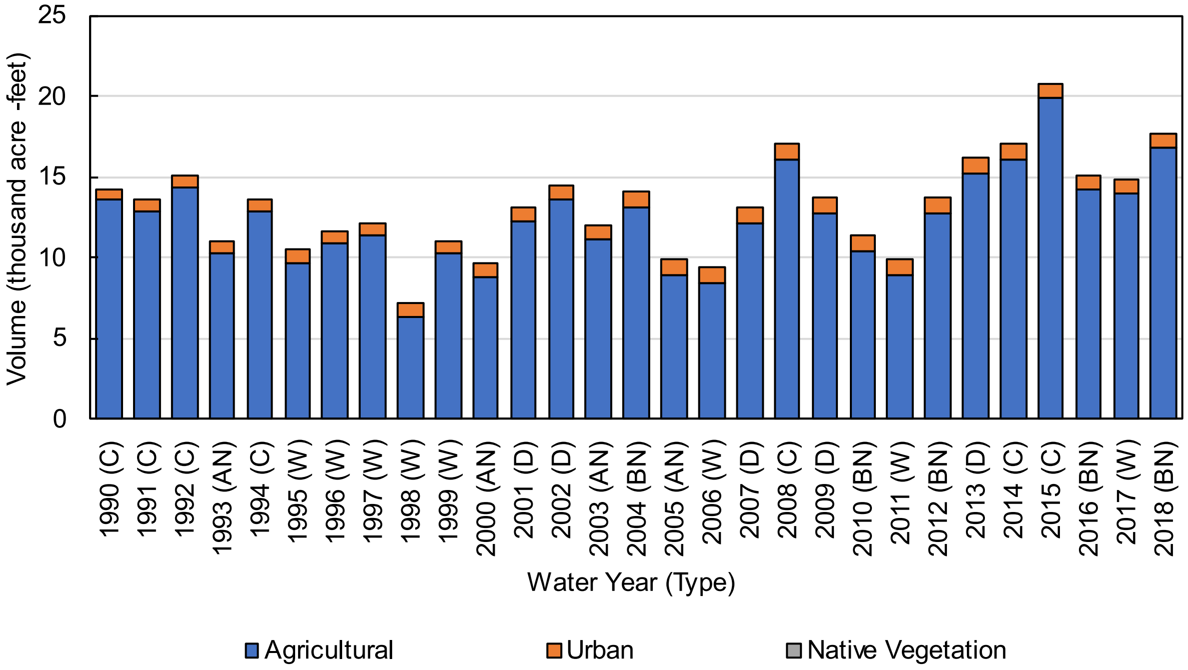

Figure 3. Antelope Subbasin Historical Groundwater Pumping, by Water Use Sector

Table 3. Antelope Subbasin Historical Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		14,000	660	0	14,000
1991 (C)		13,000	700	0	14,000
1992 (C)		14,000	730	0	15,000
1993 (AN)		10,000	750	0	11,000
1994 (C)		13,000	770	0	14,000
1995 (W)		9,700	820	0	11,000
1996 (W)		11,000	810	0	12,000
1997 (W)		11,000	810	0	12,000
1998 (W)		6,400	820	0	7,200
1999 (W)		10,000	830	0	11,000
2000 (AN)		8,700	860	0	9,600
2001 (D)		12,000	850	0	13,000
2002 (D)		14,000	870	0	14,000
2003 (AN)		11,000	890	0	12,000
2004 (BN)		13,000	910	0	14,000
2005 (AN)		9,000	920	0	9,900
2006 (W)		8,400	930	0	9,400
2007 (D)		12,000	930	0	13,000
2008 (C)		16,000	960	0	17,000
2009 (D)		13,000	960	0	14,000
2010 (BN)		10,000	970	0	11,000
2011 (W)		9,000	980	0	9,900
2012 (BN)		13,000	980	0	14,000
2013 (D)		15,000	980	0	16,000
2014 (C)		16,000	960	0	17,000
2015 (C)		20,000	820	0	21,000
2016 (BN)		14,000	860	0	15,000
2017 (W)		14,000	880	0	15,000
2018 (BN)		17,000	930	0	18,000
Average (1990-2018)		12,000	870	0	13,000
1990-2018	W	10,000	860	0	11,000
	AN	9,800	860	0	11,000
	BN	13,000	930	0	14,000
	D	13,000	920	0	14,000
	C	15,000	800	0	16,000

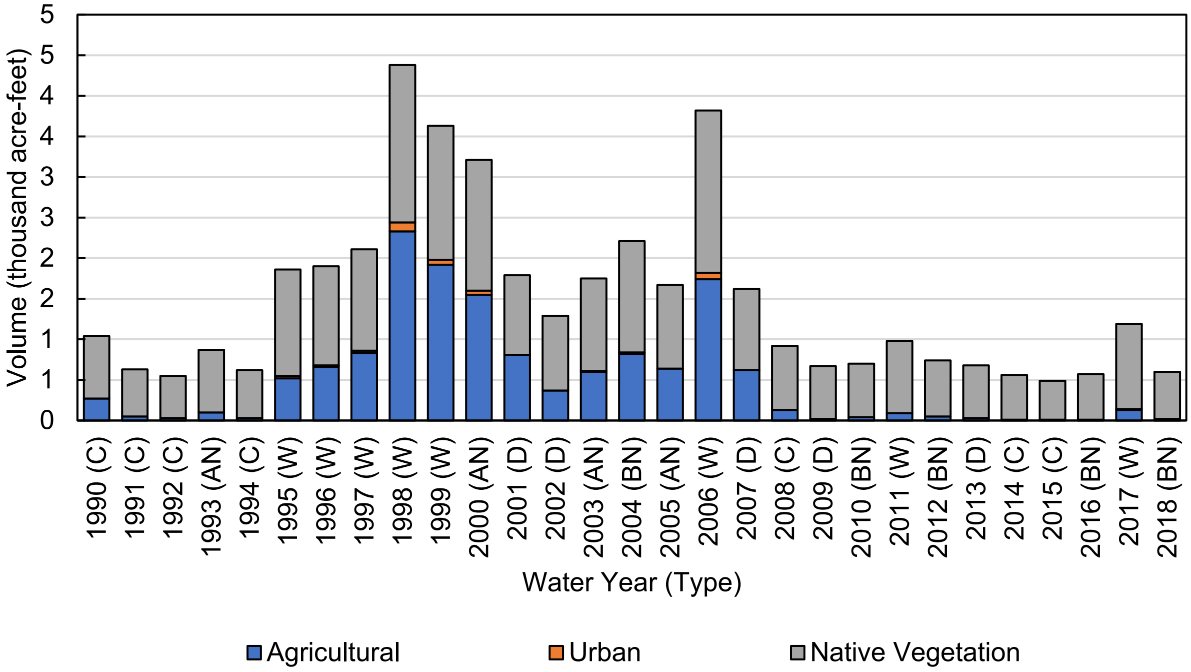

Figure 1. Antelope Subbasin Groundwater Uptake, by Water Use Sector

Table 1. Antelope Subbasin Historical Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		270	0	770	1,000
1991 (C)		50	0	580	630
1992 (C)		30	0	520	550
1993 (AN)		100	0	770	870
1994 (C)		30	0	590	620
1995 (W)		520	30	1,300	1,900
1996 (W)		660	20	1,200	1,900
1997 (W)		830	30	1,300	2,100
1998 (W)		2,300	110	1,900	4,400
1999 (W)		1,900	60	1,700	3,600
2000 (AN)		1,600	50	1,600	3,200
2001 (D)		810	0	980	1,800
2002 (D)		370	0	920	1,300
2003 (AN)		600	10	1,100	1,800
2004 (BN)		820	20	1,400	2,200
2005 (AN)		640	0	1,000	1,700
2006 (W)		1,700	80	2,000	3,800
2007 (D)		620	0	1,000	1,600
2008 (C)		130	0	790	920
2009 (D)		20	0	650	670
2010 (BN)		40	0	660	700
2011 (W)		90	0	890	980
2012 (BN)		50	0	690	740
2013 (D)		30	0	650	680
2014 (C)		10	0	550	560
2015 (C)		10	0	480	490
2016 (BN)		10	0	560	570
2017 (W)		130	10	1,100	1,200
2018 (BN)		20	0	580	600
Average (1990-2018)		500	10	970	1,500
1990-2018	W	1,000	40	1,400	2,500
	AN	720	20	1,100	1,900
	BN	190	0	770	960
	D	370	0	840	1,200
	C	80	0	610	690

1.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 5** and **Table 5**, averaging approximately 53 taf per year.

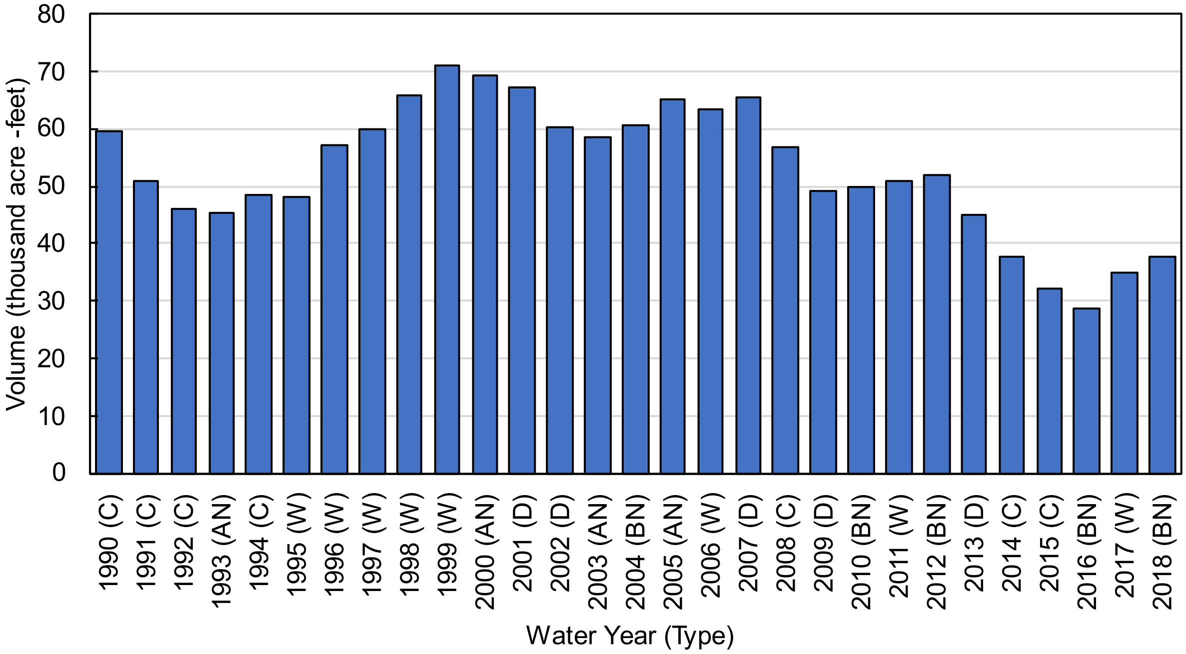

Figure 5. Antelope Subbasin Historical Groundwater Discharge to Surface Water

Table 5. Antelope Subbasin Historical Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)		Groundwater Discharge to Surface Water
1990 (C)		60,000
1991 (C)		51,000
1992 (C)		46,000
1993 (AN)		45,000
1994 (C)		48,000
1995 (W)		48,000
1996 (W)		57,000
1997 (W)		60,000
1998 (W)		66,000
1999 (W)		71,000
2000 (AN)		69,000
2001 (D)		67,000
2002 (D)		60,000
2003 (AN)		58,000
2004 (BN)		61,000
2005 (AN)		65,000
2006 (W)		63,000
2007 (D)		65,000
2008 (C)		57,000
2009 (D)		49,000
2010 (BN)		50,000
2011 (W)		51,000
2012 (BN)		52,000
2013 (D)		45,000
2014 (C)		38,000
2015 (C)		32,000
2016 (BN)		29,000
2017 (W)		35,000
2018 (BN)		38,000
Average (1990-2018)		53,000
1990-2018	W	56,000
	AN	60,000
	BN	46,000
	D	57,000
	C	47,000

1.1.2 Outflows

1.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 6 through Figure 9**, and **Table 6 through Table 9**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest observed in 1998, at approximately 42 taf, and greatest in 1990, at approximately 48 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 16 taf in above-normal and wet years and about 20 to 21 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and relatively constant between years, averaging about 0.4 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to meet a portion of their consumptive use requirements. ET of groundwater uptake by native vegetation and agricultural crops and totals 0.970 and 0.50 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 26 and 27 taf in wet and above-normal years, respectively and 24 taf in dry and critical water years. Much of the total ET of precipitation results from the large acreage of native vegetation in the Antelope Subbasin, though significant volumes result from agricultural and urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 10** and **Table 2K-10**. The total volume is relatively small and constant between years, averaging about 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

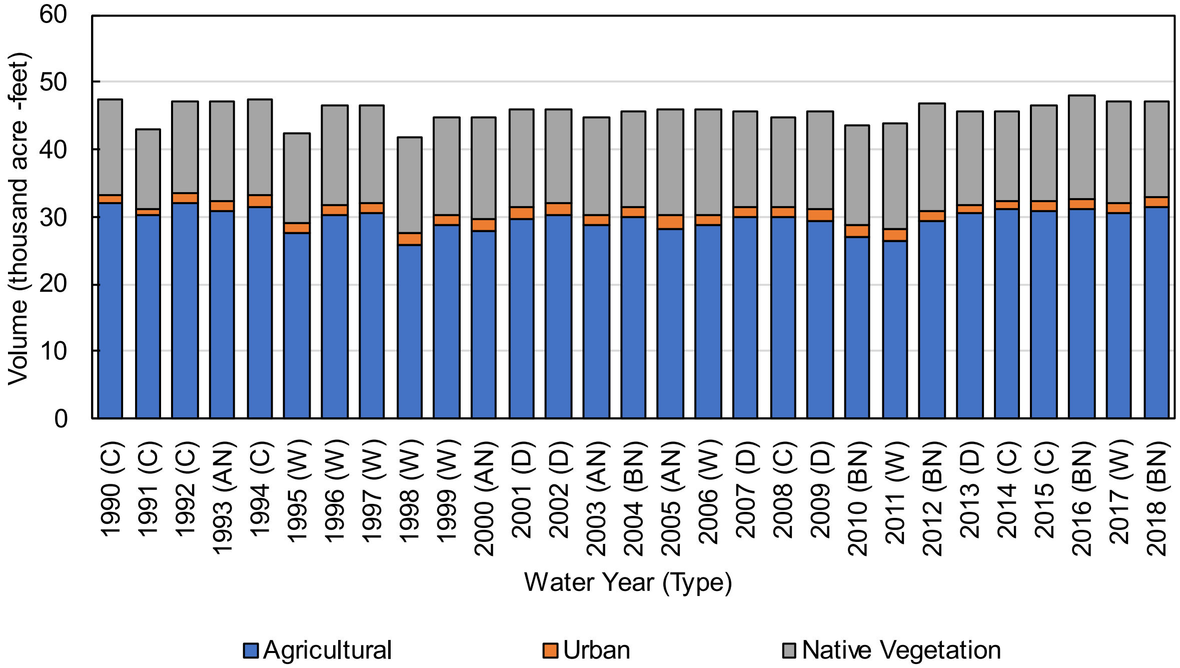

Figure 6. Antelope Subbasin Historical Total Evapotranspiration, by Water Use Sector

Table 6. Antelope Subbasin Historical Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		32,000	1,300	14,000	48,000
1991 (C)		30,000	1,100	12,000	43,000
1992 (C)		32,000	1,400	14,000	47,000
1993 (AN)		31,000	1,600	15,000	47,000
1994 (C)		32,000	1,600	14,000	47,000
1995 (W)		28,000	1,500	13,000	42,000
1996 (W)		30,000	1,600	15,000	46,000
1997 (W)		31,000	1,600	14,000	46,000
1998 (W)		26,000	1,700	14,000	42,000
1999 (W)		29,000	1,500	14,000	45,000
2000 (AN)		28,000	1,800	15,000	45,000
2001 (D)		30,000	1,600	15,000	46,000
2002 (D)		30,000	1,500	14,000	46,000
2003 (AN)		29,000	1,700	14,000	45,000
2004 (BN)		30,000	1,500	14,000	46,000
2005 (AN)		28,000	2,000	16,000	46,000
2006 (W)		29,000	1,800	15,000	46,000
2007 (D)		30,000	1,600	14,000	46,000
2008 (C)		30,000	1,300	14,000	45,000
2009 (D)		29,000	1,700	15,000	46,000
2010 (BN)		27,000	1,700	15,000	44,000
2011 (W)		26,000	1,800	16,000	44,000
2012 (BN)		29,000	1,700	16,000	47,000
2013 (D)		30,000	1,400	14,000	46,000
2014 (C)		31,000	1,300	13,000	46,000
2015 (C)		31,000	1,400	14,000	46,000
2016 (BN)		31,000	1,700	15,000	48,000
2017 (W)		31,000	1,600	15,000	47,000
2018 (BN)		32,000	1,500	14,000	47,000
Average (1990-2018)		30,000	1,600	14,000	46,000
1990-2018	W	29,000	1,600	15,000	45,000
	AN	29,000	1,800	15,000	46,000
	BN	30,000	1,600	15,000	46,000
	D	30,000	1,500	14,000	46,000
	C	31,000	1,400	14,000	46,000

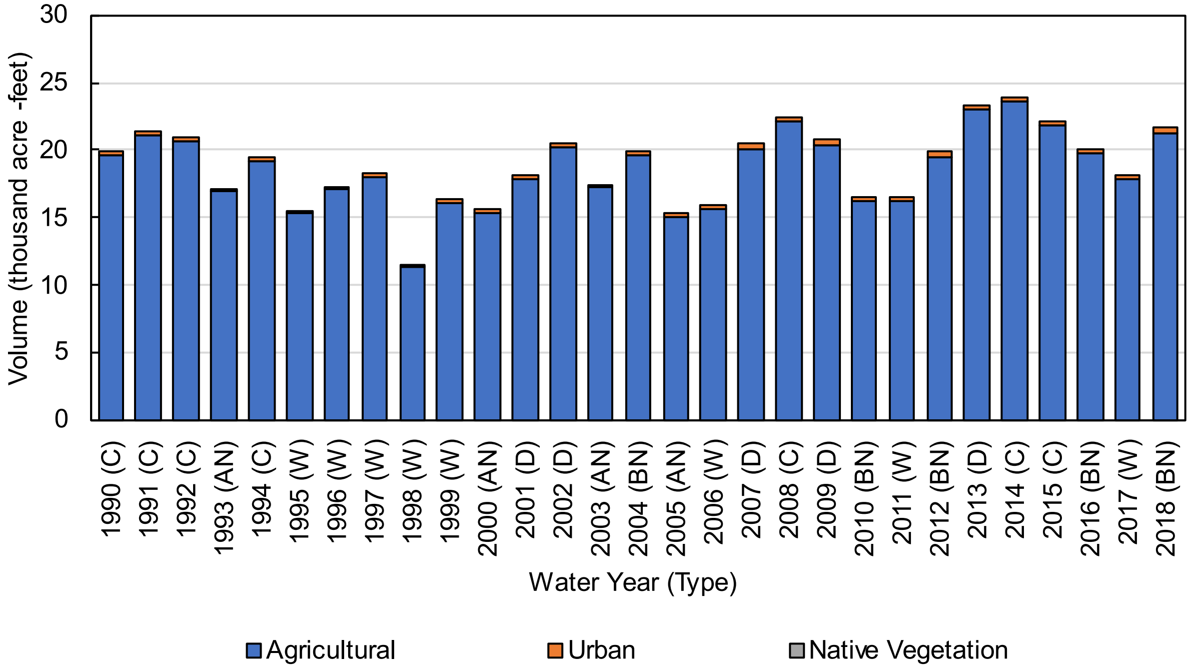

Figure 7. Antelope Subbasin Historical Evapotranspiration of Applied Water, by Water Use Sector

Table 7. Antelope Subbasin Historical Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		20,000	290	0	20,000
1991 (C)		21,000	270	0	21,000
1992 (C)		21,000	270	0	21,000
1993 (AN)		17,000	210	0	17,000
1994 (C)		19,000	330	0	19,000
1995 (W)		15,000	160	0	15,000
1996 (W)		17,000	220	0	17,000
1997 (W)		18,000	250	0	18,000
1998 (W)		11,000	150	0	11,000
1999 (W)		16,000	290	0	16,000
2000 (AN)		15,000	270	0	16,000
2001 (D)		18,000	310	0	18,000
2002 (D)		20,000	310	0	21,000
2003 (AN)		17,000	250	0	17,000
2004 (BN)		20,000	240	0	20,000
2005 (AN)		15,000	300	0	15,000
2006 (W)		16,000	240	0	16,000
2007 (D)		20,000	400	0	20,000
2008 (C)		22,000	340	0	22,000
2009 (D)		20,000	390	0	21,000
2010 (BN)		16,000	300	0	17,000
2011 (W)		16,000	350	0	17,000
2012 (BN)		20,000	420	0	20,000
2013 (D)		23,000	350	0	23,000
2014 (C)		24,000	380	0	24,000
2015 (C)		22,000	260	0	22,000
2016 (BN)		20,000	270	0	20,000
2017 (W)		18,000	220	0	18,000
2018 (BN)		21,000	400	0	22,000
Average (1990-2018)		19,000	290	0	19,000
1990-2018	W	16,000	240	0	16,000
	AN	16,000	260	0	16,000
	BN	19,000	330	0	20,000
	D	20,000	350	0	21,000
	C	21,000	310	0	21,000

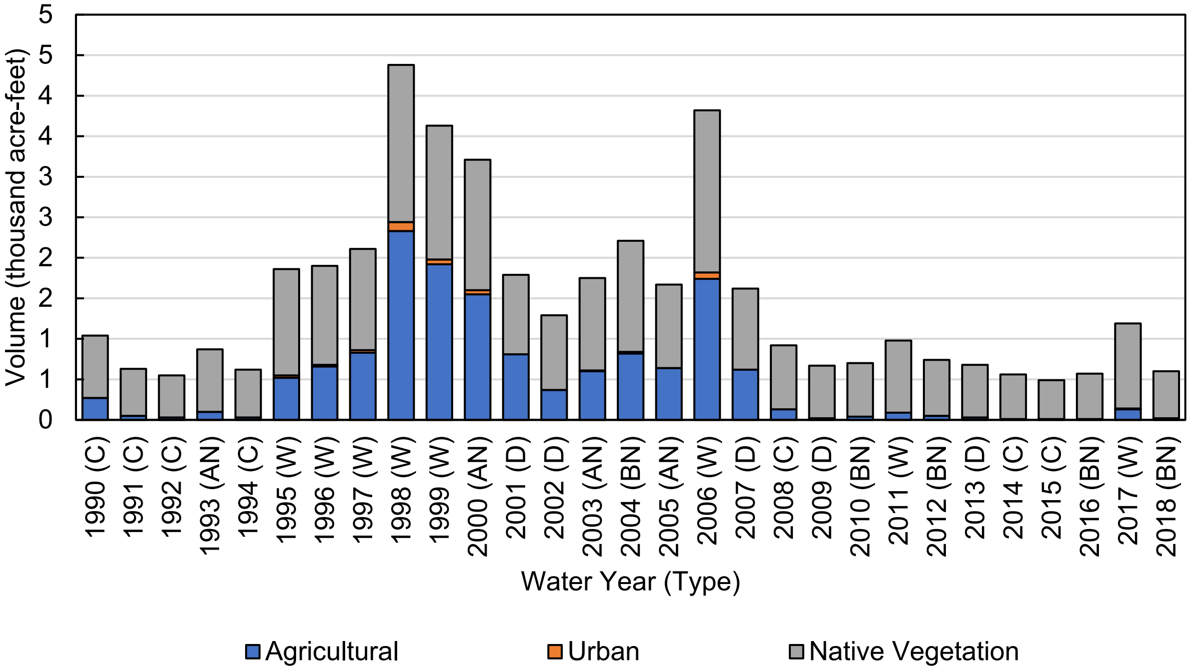

Figure 2. Antelope Subbasin Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 2. Antelope Subbasin Historical Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		270	0	770	1,000
1991 (C)		50	0	580	630
1992 (C)		30	0	520	550
1993 (AN)		100	0	770	870
1994 (C)		30	0	590	620
1995 (W)		520	30	1,300	1,900
1996 (W)		660	20	1,200	1,900
1997 (W)		830	30	1,300	2,100
1998 (W)		2,300	110	1,900	4,400
1999 (W)		1,900	60	1,700	3,600
2000 (AN)		1,600	50	1,600	3,200
2001 (D)		810	0	980	1,800
2002 (D)		370	0	920	1,300
2003 (AN)		600	10	1,100	1,800
2004 (BN)		820	20	1,400	2,200
2005 (AN)		640	0	1,000	1,700
2006 (W)		1,700	80	2,000	3,800
2007 (D)		620	0	1,000	1,600
2008 (C)		130	0	790	920
2009 (D)		20	0	650	670
2010 (BN)		40	0	660	700
2011 (W)		90	0	890	980
2012 (BN)		50	0	690	740
2013 (D)		30	0	650	680
2014 (C)		10	0	550	560
2015 (C)		10	0	480	490
2016 (BN)		10	0	560	570
2017 (W)		130	10	1,100	1,200
2018 (BN)		20	0	580	600
Average (1990-2018)		500	10	970	1,500
1990-2018	W	1,000	40	1,400	2,500
	AN	720	20	1,100	1,900
	BN	190	0	770	960
	D	370	0	840	1,200
	C	80	0	610	690

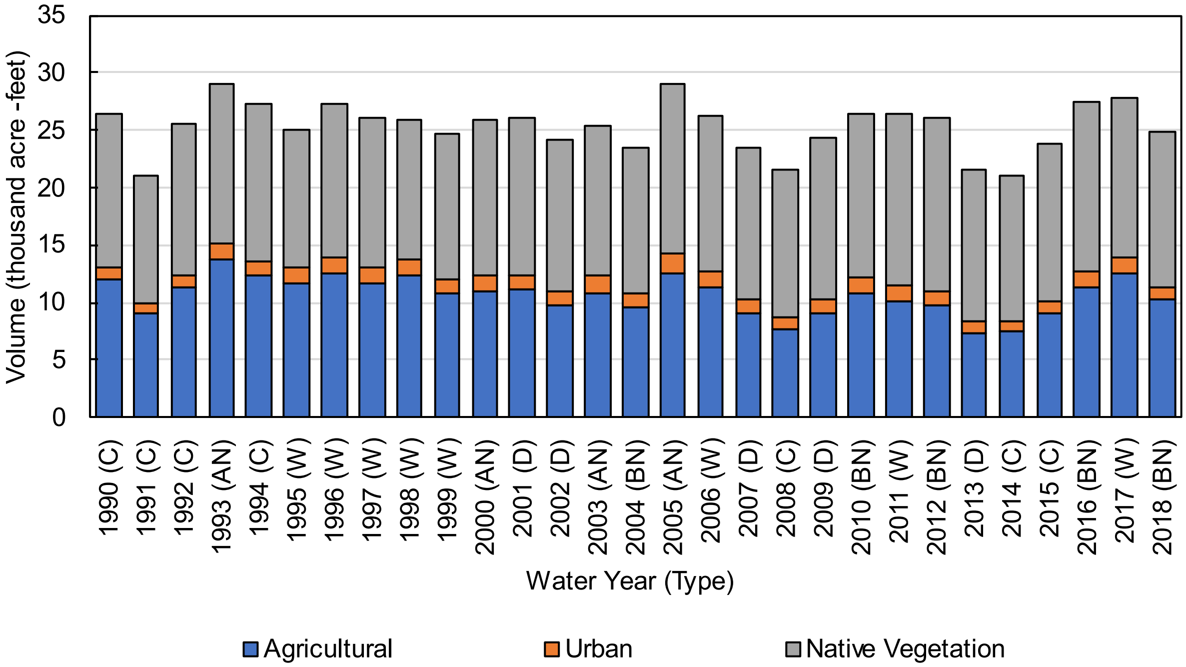

Figure 9. Antelope Subbasin Historical Evapotranspiration of Precipitation, by Water Use Sector

Table 9. Antelope Subbasin Historical Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		12,000	1,000	13,000	26,000
1991 (C)		9,000	850	11,000	21,000
1992 (C)		11,000	1,100	13,000	25,000
1993 (AN)		14,000	1,400	14,000	29,000
1994 (C)		12,000	1,200	14,000	27,000
1995 (W)		12,000	1,300	12,000	25,000
1996 (W)		13,000	1,300	13,000	27,000
1997 (W)		12,000	1,300	13,000	26,000
1998 (W)		12,000	1,400	12,000	26,000
1999 (W)		11,000	1,200	13,000	25,000
2000 (AN)		11,000	1,500	14,000	26,000
2001 (D)		11,000	1,300	14,000	26,000
2002 (D)		9,800	1,200	13,000	24,000
2003 (AN)		11,000	1,400	13,000	25,000
2004 (BN)		9,600	1,200	13,000	24,000
2005 (AN)		13,000	1,700	15,000	29,000
2006 (W)		11,000	1,400	13,000	26,000
2007 (D)		9,100	1,200	13,000	23,000
2008 (C)		7,700	1,000	13,000	22,000
2009 (D)		9,100	1,300	14,000	24,000
2010 (BN)		11,000	1,400	14,000	26,000
2011 (W)		10,000	1,500	15,000	26,000
2012 (BN)		9,700	1,300	15,000	26,000
2013 (D)		7,400	1,000	13,000	22,000
2014 (C)		7,500	940	13,000	21,000
2015 (C)		9,000	1,200	14,000	24,000
2016 (BN)		11,000	1,400	15,000	27,000
2017 (W)		12,000	1,400	14,000	28,000
2018 (BN)		10,000	1,100	13,000	25,000
Average (1990-2018)		11,000	1,300	13,000	25,000
1990-2018	W	12,000	1,400	13,000	26,000
	AN	12,000	1,500	14,000	27,000
	BN	10,000	1,300	14,000	26,000
	D	9,300	1,200	13,000	24,000
	C	9,900	1,000	13,000	24,000

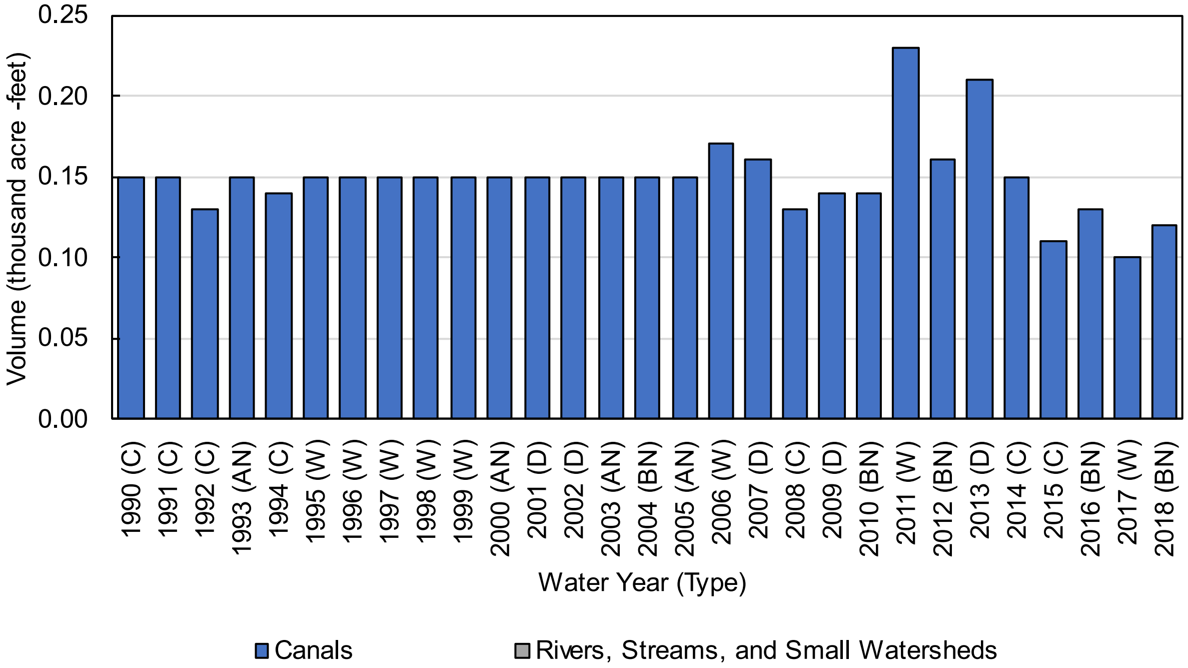

Figure 10. Antelope Subbasin Historical Evaporation of Surface Water Sources

Table 10. Antelope Subbasin Historical Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
1990 (C)		150	0	150
1991 (C)		150	0	150
1992 (C)		130	0	130
1993 (AN)		150	0	150
1994 (C)		140	0	140
1995 (W)		150	0	150
1996 (W)		150	0	150
1997 (W)		150	0	150
1998 (W)		150	0	150
1999 (W)		150	0	150
2000 (AN)		150	0	150
2001 (D)		150	0	150
2002 (D)		150	0	150
2003 (AN)		150	0	150
2004 (BN)		150	0	150
2005 (AN)		150	0	150
2006 (W)		170	0	170
2007 (D)		160	0	160
2008 (C)		130	0	130
2009 (D)		140	0	140
2010 (BN)		140	0	140
2011 (W)		230	0	230
2012 (BN)		160	0	160
2013 (D)		210	0	210
2014 (C)		150	0	150
2015 (C)		110	0	110
2016 (BN)		130	0	130
2017 (W)		100	0	100
2018 (BN)		120	0	120
Average (1990-2018)		150	0	150
1990-2018	W	160	0	160
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

1.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 11** and **Table 11** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 39 taf per year and range from 29 taf or less in dry years up to 86 taf in 1998. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

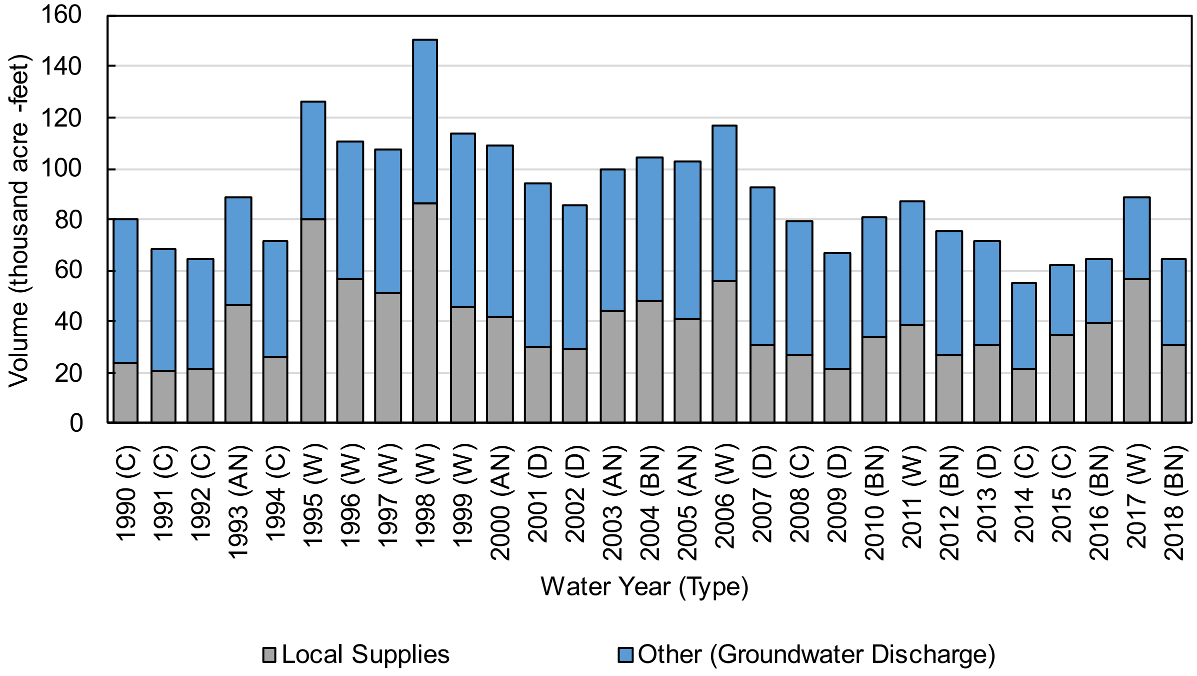

Figure 11. Antelope Subbasin Historical Surface Water Outflows, by Water Source Type

Table 11. Antelope Subbasin Historical Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)		CVP	Local Supplies	Other (Groundwater Discharge)	Total
1990 (C)		0	24,000	57,000	80,000
1991 (C)		0	20,000	48,000	68,000
1992 (C)		0	22,000	43,000	64,000
1993 (AN)		0	46,000	43,000	89,000
1994 (C)		0	26,000	45,000	72,000
1995 (W)		0	80,000	46,000	130,000
1996 (W)		0	57,000	54,000	110,000
1997 (W)		0	51,000	57,000	110,000
1998 (W)		0	86,000	64,000	150,000
1999 (W)		0	46,000	68,000	110,000
2000 (AN)		0	42,000	67,000	110,000
2001 (D)		0	30,000	64,000	94,000
2002 (D)		0	29,000	56,000	86,000
2003 (AN)		0	44,000	55,000	100,000
2004 (BN)		0	48,000	57,000	100,000
2005 (AN)		0	41,000	62,000	100,000
2006 (W)		0	56,000	61,000	120,000
2007 (D)		0	31,000	62,000	93,000
2008 (C)		0	27,000	52,000	79,000
2009 (D)		0	22,000	45,000	67,000
2010 (BN)		0	34,000	47,000	81,000
2011 (W)		0	39,000	48,000	87,000
2012 (BN)		0	27,000	48,000	75,000
2013 (D)		0	31,000	41,000	71,000
2014 (C)		0	22,000	33,000	55,000
2015 (C)		0	35,000	28,000	62,000
2016 (BN)		0	40,000	25,000	65,000
2017 (W)		0	57,000	32,000	89,000
2018 (BN)		0	31,000	34,000	65,000
Average (1990-2018)		0	39,000	50,000	89,000
1990-2018	W	0	59,000	54,000	110,000
	AN	0	43,000	57,000	100,000
	BN	0	36,000	42,000	78,000
	D	0	29,000	54,000	82,000
	C	0	25,000	44,000	69,000

1.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 12** and **Table 12** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

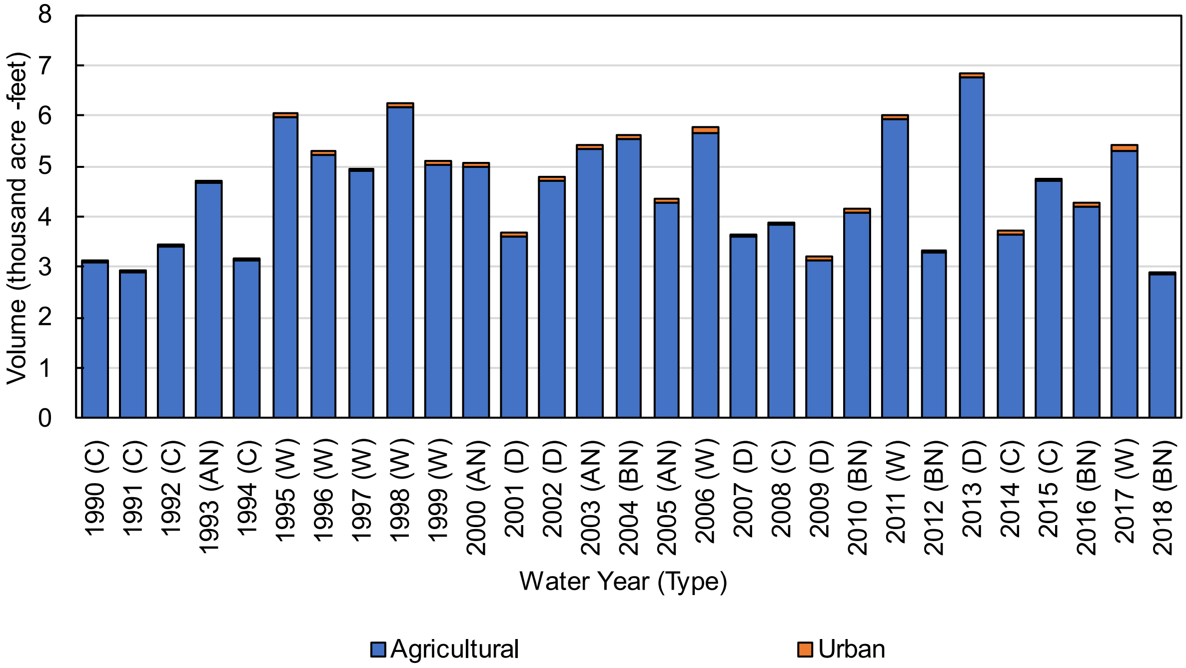

Figure 12. Antelope Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector

Table 12. Antelope Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		3,100	50	0	3,100
1991 (C)		2,900	40	0	2,900
1992 (C)		3,400	50	0	3,500
1993 (AN)		4,700	60	0	4,700
1994 (C)		3,100	50	0	3,200
1995 (W)		6,000	70	0	6,000
1996 (W)		5,200	80	0	5,300
1997 (W)		4,900	70	0	5,000
1998 (W)		6,200	90	0	6,300
1999 (W)		5,000	90	0	5,100
2000 (AN)		5,000	80	0	5,100
2001 (D)		3,600	60	0	3,700
2002 (D)		4,700	70	0	4,800
2003 (AN)		5,300	80	0	5,400
2004 (BN)		5,500	90	0	5,600
2005 (AN)		4,300	80	0	4,400
2006 (W)		5,700	100	0	5,800
2007 (D)		3,600	50	0	3,700
2008 (C)		3,800	70	0	3,900
2009 (D)		3,100	50	0	3,200
2010 (BN)		4,100	90	0	4,200
2011 (W)		5,900	90	0	6,000
2012 (BN)		3,300	50	0	3,300
2013 (D)		6,800	70	0	6,800
2014 (C)		3,700	50	0	3,700
2015 (C)		4,700	60	0	4,800
2016 (BN)		4,200	60	0	4,300
2017 (W)		5,300	90	0	5,400
2018 (BN)		2,900	50	0	2,900
Average (1990-2018)		4,500	70	0	4,600
1990-2018	W	5,500	90	0	5,600
	AN	4,800	80	0	4,900
	BN	4,000	70	0	4,100
	D	4,400	60	0	4,400
	C	3,500	50	0	3,600

1.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 13** and **Table 13** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from less than 4.6 taf annually during some critical and dry years to about 18 taf in 1998.

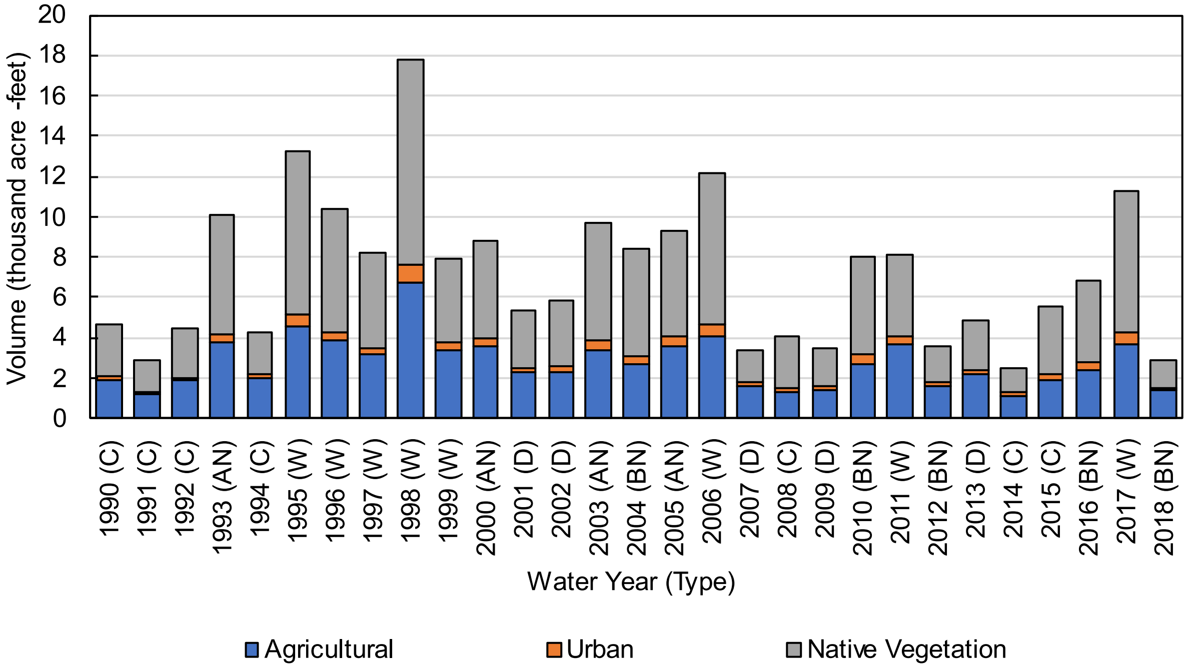

Figure 13. Antelope Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector

Table 13. Antelope Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		1,900	190	2,600	4,700
1991 (C)		1,200	110	1,500	2,900
1992 (C)		1,900	180	2,500	4,500
1993 (AN)		3,800	410	5,900	10,000
1994 (C)		2,000	170	2,100	4,300
1995 (W)		4,600	610	8,100	13,000
1996 (W)		3,900	460	6,100	10,000
1997 (W)		3,200	360	4,700	8,300
1998 (W)		6,800	860	10,000	18,000
1999 (W)		3,400	380	4,200	7,900
2000 (AN)		3,600	440	4,800	8,800
2001 (D)		2,300	250	2,900	5,400
2002 (D)		2,300	280	3,300	5,900
2003 (AN)		3,400	470	5,900	9,700
2004 (BN)		2,700	430	5,300	8,400
2005 (AN)		3,600	450	5,300	9,300
2006 (W)		4,100	600	7,500	12,000
2007 (D)		1,600	140	1,600	3,400
2008 (C)		1,300	200	2,500	4,100
2009 (D)		1,400	180	1,900	3,500
2010 (BN)		2,700	440	4,900	8,000
2011 (W)		3,700	360	4,000	8,100
2012 (BN)		1,600	170	1,800	3,600
2013 (D)		2,200	210	2,500	4,900
2014 (C)		1,200	130	1,200	2,500
2015 (C)		2,000	260	3,400	5,600
2016 (BN)		2,400	340	4,100	6,800
2017 (W)		3,700	570	7,000	11,000
2018 (BN)		1,400	140	1,400	2,900
Average (1990-2018)		2,700	340	4,100	7,200
1990-2018	W	4,100	530	6,500	11,000
	AN	3,600	440	5,500	9,500
	BN	2,200	300	3,500	6,000
	D	2,000	210	2,400	4,600
	C	1,600	180	2,300	4,100

1.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 14** and **Table 14.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than four (4) taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.1 taf per year.

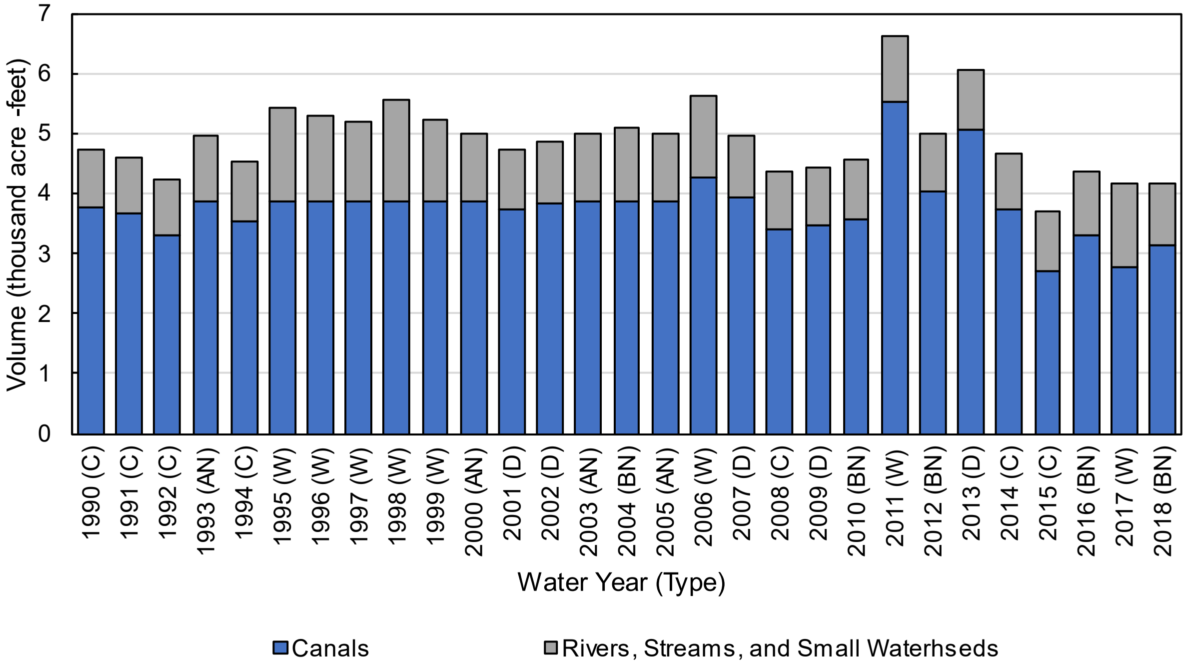

Figure 14. Antelope Subbasin Historical Infiltration of Surface Water, by Water Use Sector

Table 14. Antelope Subbasin Historical Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
1990 (C)		3,800	960	4,700
1991 (C)		3,700	920	4,600
1992 (C)		3,300	930	4,200
1993 (AN)		3,900	1,100	5,000
1994 (C)		3,500	980	4,500
1995 (W)		3,900	1,500	5,400
1996 (W)		3,900	1,400	5,300
1997 (W)		3,900	1,300	5,200
1998 (W)		3,900	1,700	5,600
1999 (W)		3,900	1,400	5,200
2000 (AN)		3,900	1,100	5,000
2001 (D)		3,700	1,000	4,700
2002 (D)		3,800	1,000	4,900
2003 (AN)		3,900	1,100	5,000
2004 (BN)		3,900	1,200	5,100
2005 (AN)		3,900	1,100	5,000
2006 (W)		4,300	1,400	5,600
2007 (D)		3,900	1,100	5,000
2008 (C)		3,400	980	4,400
2009 (D)		3,500	950	4,400
2010 (BN)		3,600	990	4,600
2011 (W)		5,500	1,100	6,600
2012 (BN)		4,000	980	5,000
2013 (D)		5,100	1,000	6,100
2014 (C)		3,700	940	4,700
2015 (C)		2,700	980	3,700
2016 (BN)		3,300	1,100	4,400
2017 (W)		2,800	1,400	4,200
2018 (BN)		3,200	1,000	4,200
Average (1990-2018)		3,800	1,100	4,900
1990-2018	W	4,000	1,400	5,400
	AN	3,900	1,100	5,000
	BN	3,600	1,100	4,600
	D	4,000	1,000	5,000
	C	3,400	960	4,400

1.1.3 Change in Root Zone Storage

Estimates of change in root zone storage are provided in **Figure 15** and **Table 15**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average below 0.10 taf over many years.

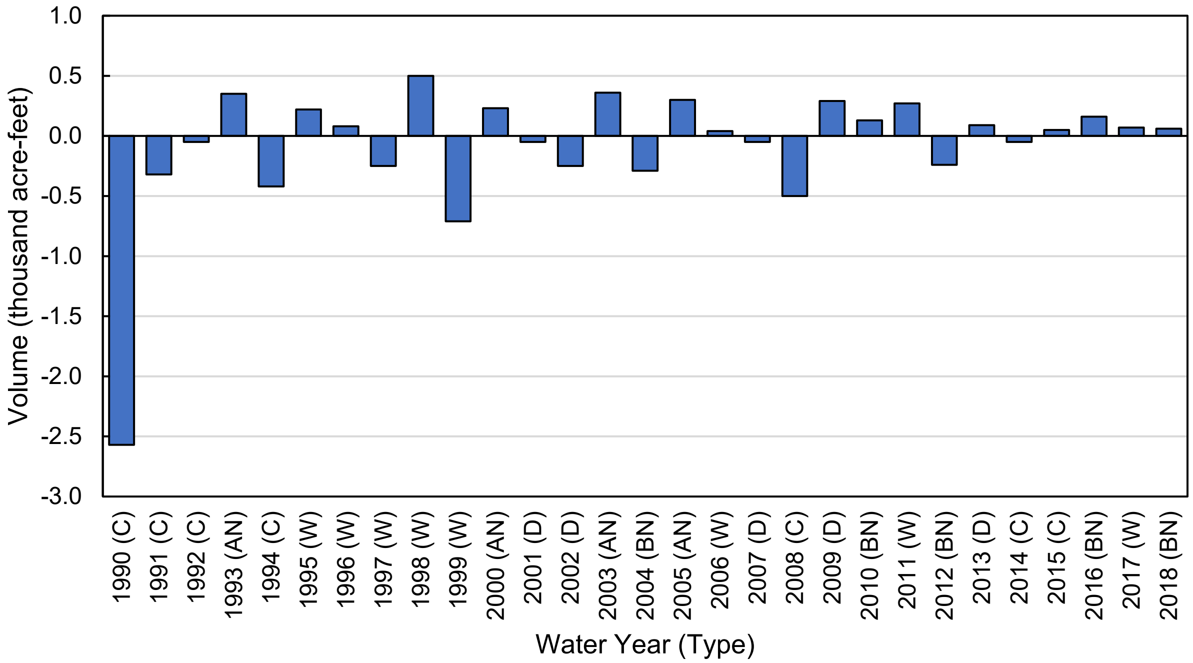

Figure 15. Antelope Subbasin Historical Change in Root Zone Storage

Table 15. Antelope Subbasin Historical Change in Root Zone Storage (acre-feet)

Water Year (Type)		Change in Root Zone Storage
1990 (C)		-2,600
1991 (C)		-320
1992 (C)		-50
1993 (AN)		350
1994 (C)		-420
1995 (W)		220
1996 (W)		80
1997 (W)		-250
1998 (W)		500
1999 (W)		-710
2000 (AN)		230
2001 (D)		-50
2002 (D)		-250
2003 (AN)		360
2004 (BN)		-290
2005 (AN)		300
2006 (W)		40
2007 (D)		-50
2008 (C)		-500
2009 (D)		290
2010 (BN)		130
2011 (W)		270
2012 (BN)		-240
2013 (D)		90
2014 (C)		-50
2015 (C)		50
2016 (BN)		160
2017 (W)		70
2018 (BN)		60
Average (1990-2018)		-90
1990-2018	W	30
	AN	310
	BN	-40
	D	10
	C	-550

1.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction and uptake. When calculated for the historical water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from historical cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, Groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the historical water budget period are presented below for the Antelope Subbasin. **Figure 16** and **Table 16** show the average net recharge from the SWS over 1990-2018 based on the historical water budget results. Historically, the average net recharge in the Antelope Subbasin was approximately two (2) taf per year between 1990-2018, indicating net outflows from the SWS to the GWS during the historical water budget period. As illustrated on the cumulative net recharge plot in **Figure 16**, this results in a cumulative net positive recharge (i.e., net discharge from the SWS to the GWS) of about 60 taf over the 29-year historical water budget period. Although this means there has historically been more recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage is increasing or that the Subbasin groundwater system has been sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

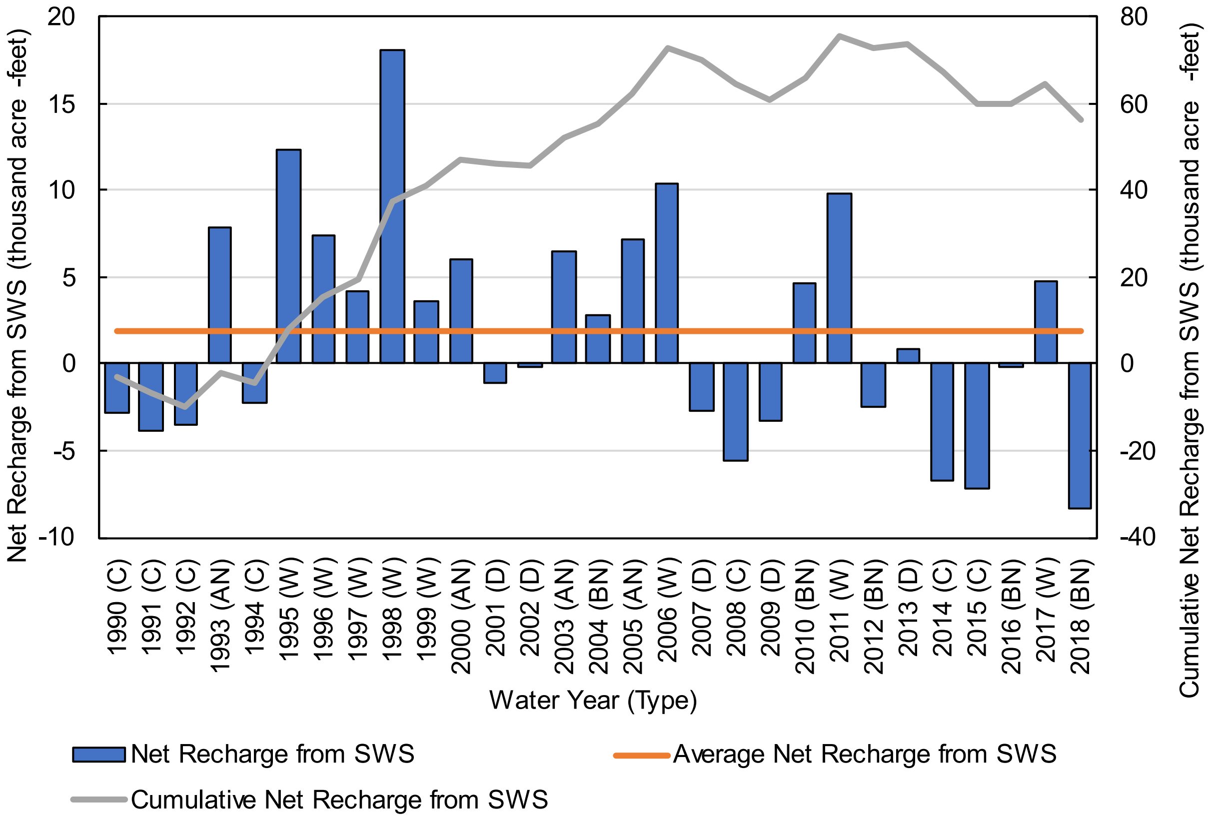

Figure 16. Antelope Subbasin Historical Net Recharge Overview, 1990-2018

Table 16. Antelope Subbasin Historical Water Budget: Average Net Recharge from SWS by Water Year Type (acre-feet)

Year Type	Number of Years	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	8	5,600	11,000	5,400	13,000	9,000
AN	4	4,900	9,500	5,000	12,000	7,400
BN	5	4,100	6,000	4,600	15,000	-300
D	5	4,400	4,600	5,000	15,000	-1,000
C	7	3,600	4,100	4,400	17,000	-4,900
Annual Average (1990-2018)	29	4,600	7,200	4,900	15,000	2,000

1.2 Groundwater System Water Budget Results

Historical water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

1.1.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

1.1.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Historical lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 17** and **Table 17**. The total historical net subsurface flows to and from all adjacent subbasins averages about 50 taf per year occurring as inflow to the Antelope Subbasin. The largest historical subsurface flows occur across the boundary with the Red Bluff Subbasin with somewhat less subsurface flow occurring across the boundaries with the Bend Subbasin although these flows are still considerable. Much smaller flows occur across the boundaries with the Los Molinos Subbasin.

Historical subsurface flows with the Red Bluff Subbasin average about 25 taf occurring as inflows to the Antelope Subbasin. This makes up about half of the subsurface inflows occurring to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Bend Subbasin to the Antelope Subbasin average about 4.7 and 20 taf, respectively. The magnitudes of the subsurface inflows from the Bend Subbasin and Red Bluff Subbasins are relatively consistent from year to year; however, the inflows/outflows with the

Los Molinos Subbasin are somewhat variable. Historical subsurface flows across the boundary with the Los Molinos Subbasin generally occur as inflows with some smaller volumes of outflows occurring in 1992, 1993, 2015, and 2016.

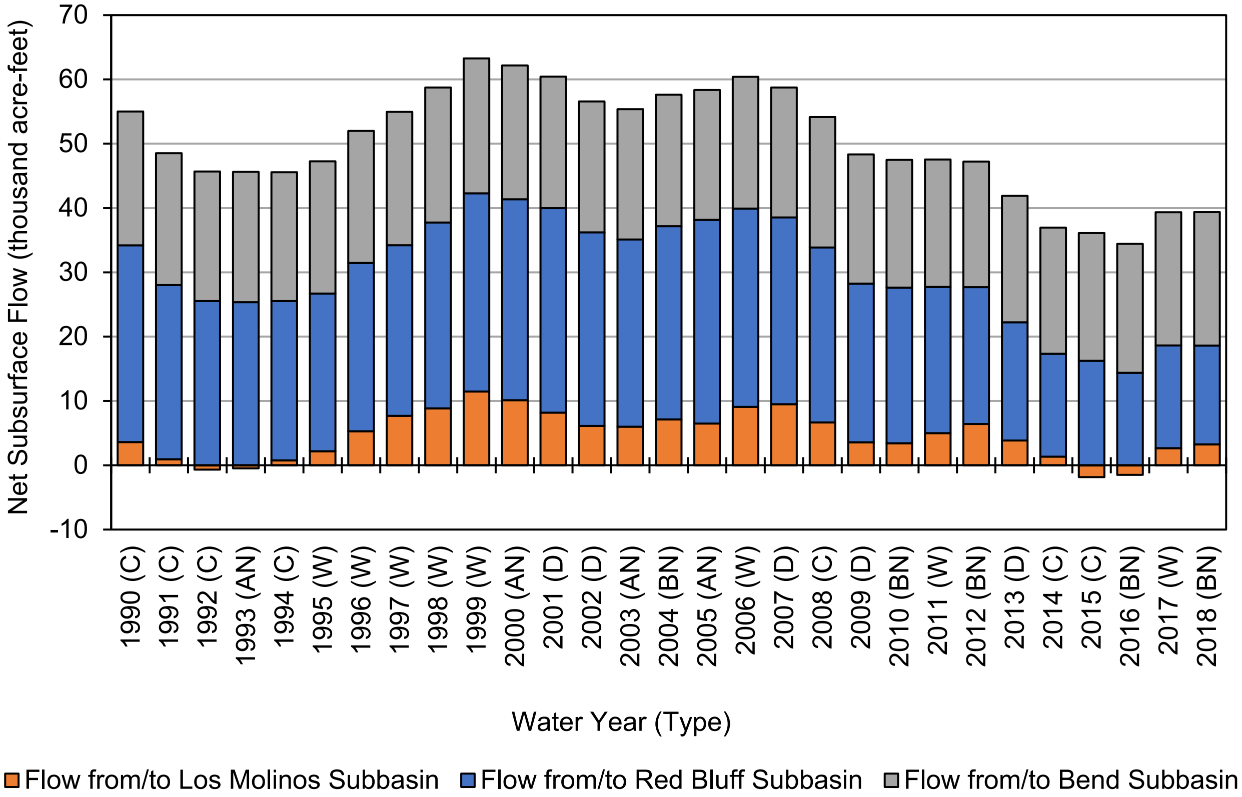

Figure 17. Antelope Subbasin Historical Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 17. Antelope Subbasin Historical Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Bend</th><th>Red Bluff</th><th>Los Molinos</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>31,000</td><td>3,600</td><td>21,000</td><td>55,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>27,000</td><td>930</td><td>21,000</td><td>49,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>26,000</td><td>-690</td><td>20,000</td><td>45,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>25,000</td><td>-480</td><td>20,000</td><td>45,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>25,000</td><td>770</td><td>20,000</td><td>46,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>25,000</td><td>2,200</td><td>21,000</td><td>47,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>26,000</td><td>5,300</td><td>21,000</td><td>52,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>27,000</td><td>7,700</td><td>21,000</td><td>55,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>29,000</td><td>8,800</td><td>21,000</td><td>59,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>31,000</td><td>11,000</td><td>21,000</td><td>63,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>31,000</td><td>10,000</td><td>21,000</td><td>62,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>32,000</td><td>8,200</td><td>20,000</td><td>60,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>30,000</td><td>6,100</td><td>20,000</td><td>57,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>29,000</td><td>6,000</td><td>20,000</td><td>55,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>30,000</td><td>7,100</td><td>20,000</td><td>58,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>32,000</td><td>6,500</td><td>20,000</td><td>58,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>31,000</td><td>9,100</td><td>21,000</td><td>60,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>29,000</td><td>9,500</td><td>20,000</td><td>59,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>27,000</td><td>6,700</td><td>20,000</td><td>54,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>25,000</td><td>3,600</td><td>20,000</td><td>48,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>24,000</td><td>3,400</td><td>20,000</td><td>47,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>23,000</td><td>5,000</td><td>20,000</td><td>48,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>21,000</td><td>6,400</td><td>19,000</td><td>47,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>18,000</td><td>3,800</td><td>20,000</td><td>42,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>16,000</td><td>1,300</td><td>20,000</td><td>37,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>16,000</td><td>-1,800</td><td>20,000</td><td>34,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>14,000</td><td>-1,500</td><td>20,000</td><td>33,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>16,000</td><td>2,700</td><td>21,000</td><td>39,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>15,000</td><td>3,300</td><td>21,000</td><td>39,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>25,000</td><td>4,700</td><td>20,000</td><td>50,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>26,000</td><td>6,500</td><td>21,000</td><td>53,000</td></tr>
<tr><td>AN</td><td>29,000</td><td>4,000</td><td>20,000</td><td>53,000</td></tr>
<tr><td>BN</td><td>20,000</td><td>2,900</td><td>20,000</td><td>43,000</td></tr>
<tr><td>D</td><td>27,000</td><td>6,200</td><td>20,000</td><td>53,000</td></tr>
<tr><td>C</td><td>24,000</td><td>1,500</td><td>20,000</td><td>46,000</td></tr>
</table>

1.1.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Historical lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 18** and **Table 18**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average historical subsurface inflow from the upland areas is about 0.3 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

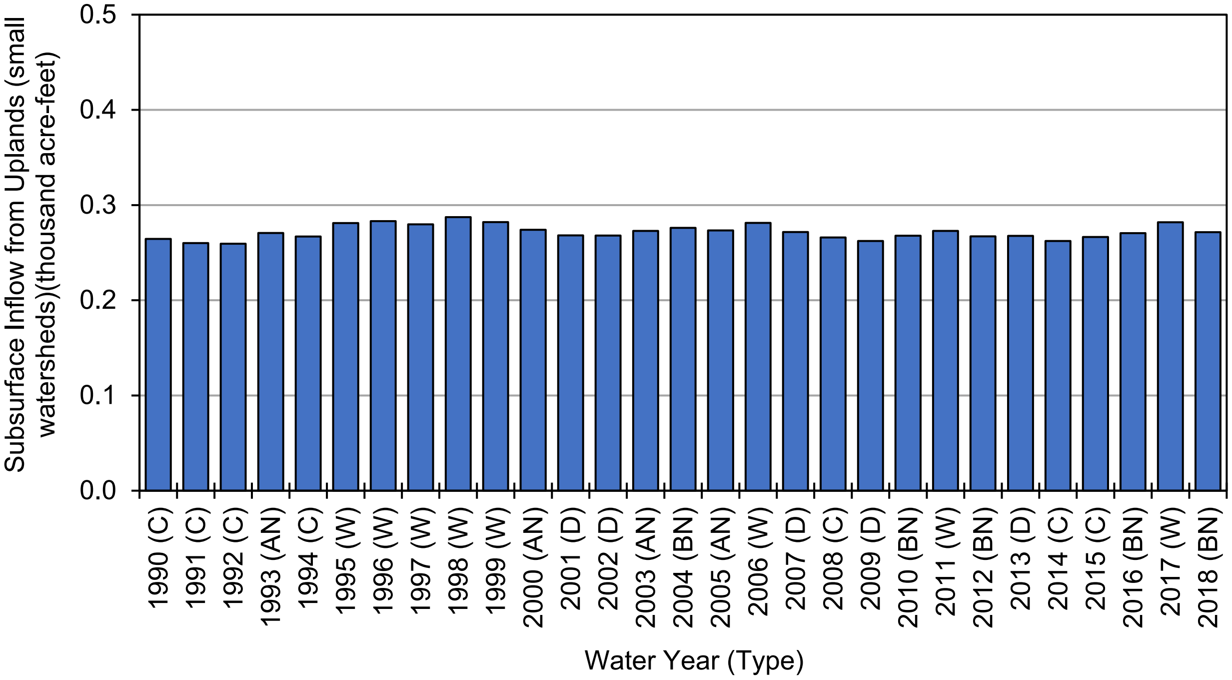

Figure 18. Antelope Subbasin Historical Subsurface Groundwater Inflows from Upland Areas

Table 18. Antelope Subbasin Historical Subsurface Groundwater Inflows from Adjacent Uplands (Small Watersheds) (acre-feet)

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Subsurface Inflow from Uplands</th></tr>
<tr><td colspan="2">1990 (C)</td><td>260</td></tr>
<tr><td colspan="2">1991 (C)</td><td>260</td></tr>
<tr><td colspan="2">1992 (C)</td><td>260</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>270</td></tr>
<tr><td colspan="2">1994 (C)</td><td>270</td></tr>
<tr><td colspan="2">1995 (W)</td><td>280</td></tr>
<tr><td colspan="2">1996 (W)</td><td>280</td></tr>
<tr><td colspan="2">1997 (W)</td><td>280</td></tr>
<tr><td colspan="2">1998 (W)</td><td>290</td></tr>
<tr><td colspan="2">1999 (W)</td><td>280</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>270</td></tr>
<tr><td colspan="2">2001 (D)</td><td>270</td></tr>
<tr><td colspan="2">2002 (D)</td><td>270</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>270</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>280</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>270</td></tr>
<tr><td colspan="2">2006 (W)</td><td>280</td></tr>
<tr><td colspan="2">2007 (D)</td><td>270</td></tr>
<tr><td colspan="2">2008 (C)</td><td>270</td></tr>
<tr><td colspan="2">2009 (D)</td><td>260</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>270</td></tr>
<tr><td colspan="2">2011 (W)</td><td>270</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>270</td></tr>
<tr><td colspan="2">2013 (D)</td><td>270</td></tr>
<tr><td colspan="2">2014 (C)</td><td>260</td></tr>
<tr><td colspan="2">2015 (C)</td><td>270</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>270</td></tr>
<tr><td colspan="2">2017 (W)</td><td>280</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>270</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>270</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>280</td></tr>
<tr><td>AN</td><td>270</td></tr>
<tr><td>BN</td><td>270</td></tr>
<tr><td>D</td><td>270</td></tr>
<tr><td>C</td><td>260</td></tr>
</table>

1.1.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 19** and **Table 19**. The average annual deep percolation from the SWS over the historical water budget period is approximately 12 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

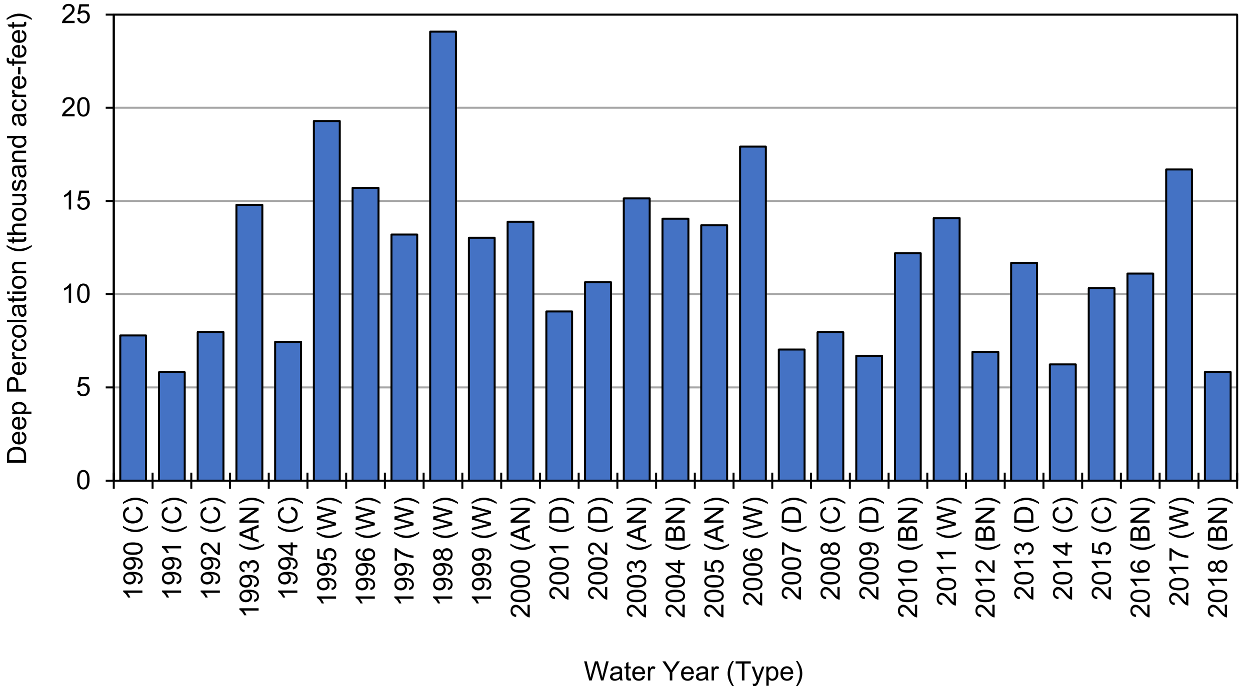

Figure 19. Antelope Subbasin Historical Deep Percolation

Table 19. Antelope Subbasin Historical Deep Percolation from the SWS (acre-feet)

Water Year (Type)		Deep Percolation from the SWS
1990 (C)		7,800
1991 (C)		5,800
1992 (C)		8,000
1993 (AN)		15,000
1994 (C)		7,400
1995 (W)		19,000
1996 (W)		16,000
1997 (W)		13,000
1998 (W)		24,000
1999 (W)		13,000
2000 (AN)		14,000
2001 (D)		9,100
2002 (D)		11,000
2003 (AN)		15,000
2004 (BN)		14,000
2005 (AN)		14,000
2006 (W)		18,000
2007 (D)		7,000
2008 (C)		8,000
2009 (D)		6,700
2010 (BN)		12,000
2011 (W)		14,000
2012 (BN)		6,900
2013 (D)		12,000
2014 (C)		6,200
2015 (C)		10,000
2016 (BN)		11,000
2017 (W)		17,000
2018 (BN)		5,800
Average (1990-2018)		12,000
1990-2018	W	17,000
	AN	15,000
	BN	10,000
	D	9,000
	C	7,700

1.1.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 20** and **Table 20**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the historical annual net seepage values are always highly negative with an average annual net stream seepage value of -55 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

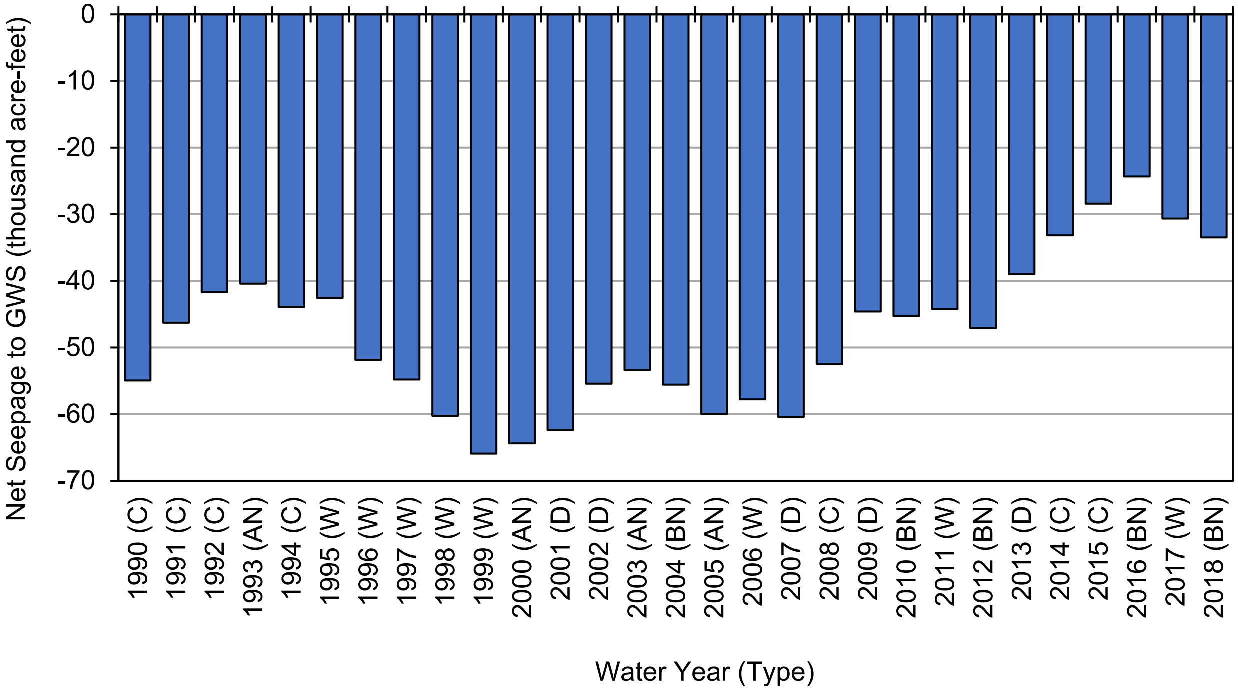

Figure 20. Antelope Subbasin Historical Net Stream Seepage to GWS/ Discharge to Surface Water

Table 20. Antelope Subbasin Historical Net Stream Seepage (net flows as acre-feet)

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
1990 (C)		-52,000
1991 (C)		-83,000
1992 (C)		-77,000
1993 (AN)		-68,000
1994 (C)		-59,000
1995 (W)		-55,000
1996 (W)		-46,000
1997 (W)		-42,000
1998 (W)		-40,000
1999 (W)		-44,000
2000 (AN)		-43,000
2001 (D)		-52,000
2002 (D)		-55,000
2003 (AN)		-60,000
2004 (BN)		-66,000
2005 (AN)		-64,000
2006 (W)		-62,000
2007 (D)		-55,000
2008 (C)		-53,000
2009 (D)		-56,000
2010 (BN)		-60,000
2011 (W)		-58,000
2012 (BN)		-60,000
2013 (D)		-53,000
2014 (C)		-45,000
2015 (C)		-45,000
2016 (BN)		-44,000
2017 (W)		-47,000
2018 (BN)		-39,000
Average (1990-2018)		-55,000
1990-2018	W	32,000
	AN	33,000
	BN	23,000
	D	33,000
	C	25,000

Note: negative values indicate net groundwater discharge to surface water

1.1.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Historical groundwater extractions are summarized in **Figure 21** and **Table 21** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the historical water budget period average about -15 taf per year. Overall, groundwater pumping represents a larger fraction (about eight times) of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -13 taf over the historical period and groundwater uptake averaged about -1.5 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

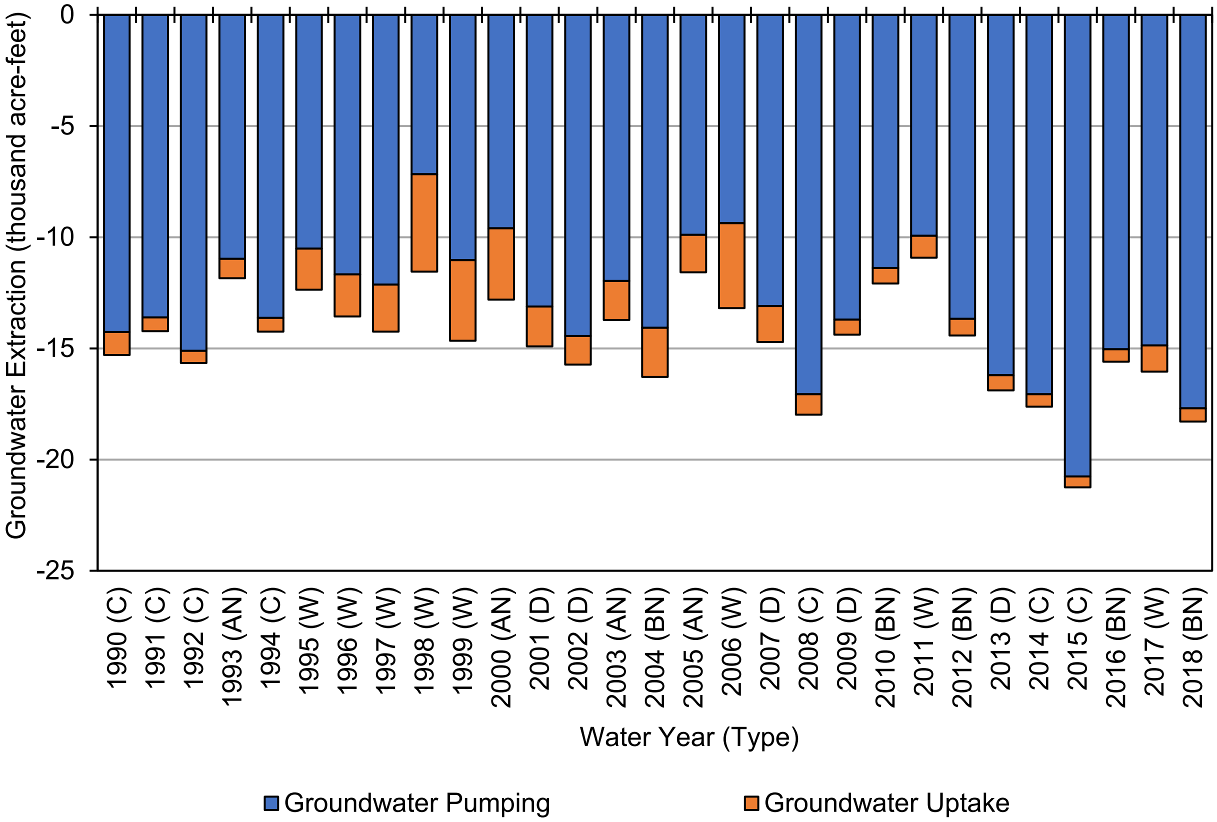

Figure 21. Antelope Subbasin Historical Groundwater Extractions

Table 21. Antelope Subbasin Historical Groundwater Extractions (acre-feet)

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Groundwater Pumping</th><th>Groundwater Uptake</th><th>Total</th></tr>
<tr><td colspan="2">1990 (C)</td><td>-14,000</td><td>-1,000</td><td>-15,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>-14,000</td><td>-620</td><td>-14,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>-15,000</td><td>-550</td><td>-16,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>-11,000</td><td>-870</td><td>-12,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>-14,000</td><td>-620</td><td>-14,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>-11,000</td><td>-1,900</td><td>-12,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>-12,000</td><td>-1,900</td><td>-14,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>-12,000</td><td>-2,100</td><td>-14,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>-7,200</td><td>-4,400</td><td>-12,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>-11,000</td><td>-3,600</td><td>-15,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>-9,600</td><td>-3,200</td><td>-13,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>-13,000</td><td>-1,800</td><td>-15,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>-14,000</td><td>-1,300</td><td>-16,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>-12,000</td><td>-1,800</td><td>-14,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>-14,000</td><td>-2,200</td><td>-16,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>-9,900</td><td>-1,700</td><td>-12,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>-9,400</td><td>-3,800</td><td>-13,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>-13,000</td><td>-1,600</td><td>-15,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>-17,000</td><td>-920</td><td>-18,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>-14,000</td><td>-670</td><td>-14,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>-11,000</td><td>-700</td><td>-12,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>-9,900</td><td>-980</td><td>-11,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>-14,000</td><td>-740</td><td>-14,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>-16,000</td><td>-680</td><td>-17,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>-17,000</td><td>-560</td><td>-18,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>-21,000</td><td>-490</td><td>-21,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>-15,000</td><td>-570</td><td>-16,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>-15,000</td><td>-1,200</td><td>-16,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>-18,000</td><td>-600</td><td>-18,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>-13,000</td><td>-1,500</td><td>-15,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>-11,000</td><td>-2,500</td><td>-13,000</td></tr>
<tr><td>AN</td><td>-11,000</td><td>-1,400</td><td>-12,000</td></tr>
<tr><td>BN</td><td>-14,000</td><td>-900</td><td>-15,000</td></tr>
<tr><td>D</td><td>-14,000</td><td>-1,200</td><td>-15,000</td></tr>
<tr><td>C</td><td>-16,000</td><td>-690</td><td>-17,000</td></tr>
</table>

1.1.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Historical vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 22** and **Table 22** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 34 taf per year over the historical water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

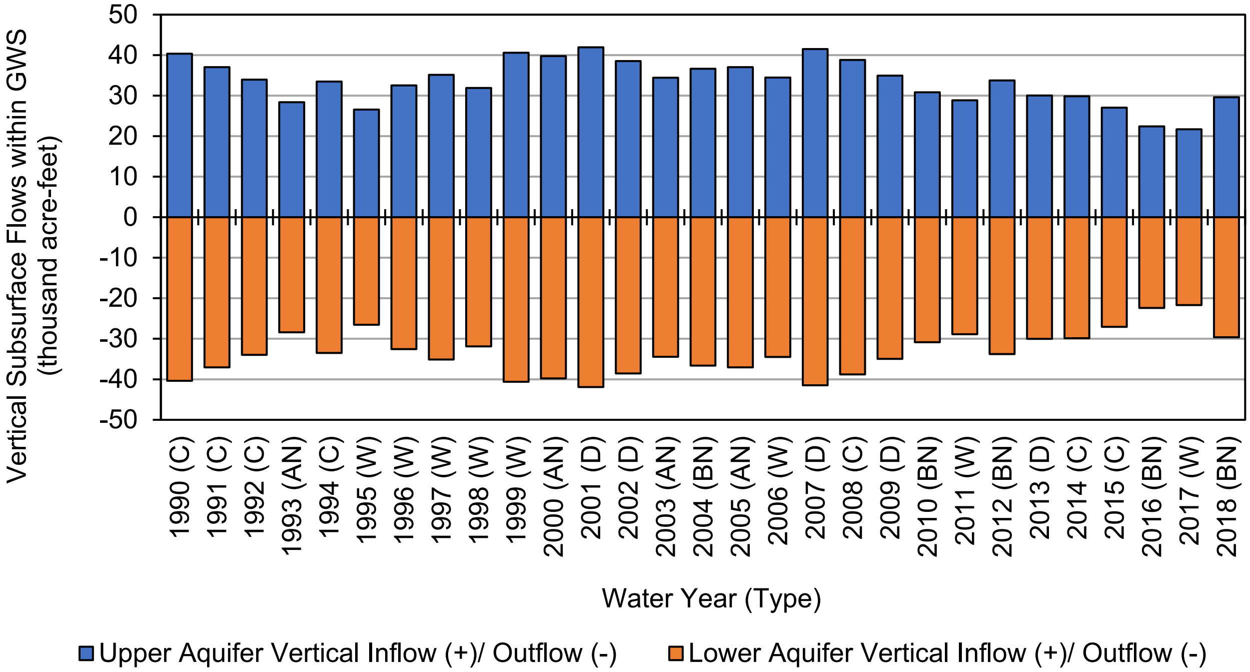

Figure 3. Antelope Subbasin Historical Vertical Subsurface Flow within the GWS

Table 3. Antelope Subbasin Historical Vertical Subsurface Flows within the GWS (acre-feet)

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Upper Aquifer to (-) / from (+) Lower Aquifer</th></tr>
<tr><td colspan="2">1990 (C)</td><td>35,000</td></tr>
<tr><td colspan="2">1991 (C)</td><td>51,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>53,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>47,000</td></tr>
<tr><td colspan="2">1994 (C)</td><td>42,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>40,000</td></tr>
<tr><td colspan="2">1996 (W)</td><td>37,000</td></tr>
<tr><td colspan="2">1997 (W)</td><td>34,000</td></tr>
<tr><td colspan="2">1998 (W)</td><td>28,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>33,000</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>27,000</td></tr>
<tr><td colspan="2">2001 (D)</td><td>33,000</td></tr>
<tr><td colspan="2">2002 (D)</td><td>35,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>32,000</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>41,000</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>40,000</td></tr>
<tr><td colspan="2">2006 (W)</td><td>42,000</td></tr>
<tr><td colspan="2">2007 (D)</td><td>39,000</td></tr>
<tr><td colspan="2">2008 (C)</td><td>34,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>37,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>37,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>34,000</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>41,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>39,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>35,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>31,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>29,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>34,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>30,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>34,000</td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>31,000</td></tr>
<tr><td>AN</td><td>35,000</td></tr>
<tr><td>BN</td><td>31,000</td></tr>
<tr><td>D</td><td>37,000</td></tr>
<tr><td>C</td><td>34,000</td></tr>
</table>

1.1.6 Change in Groundwater Storage

Historical change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 23** and **Figure 24,** and **Table 23**. Values for total change in storage in the GWS and cumulative change in storage over the historical water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the 29-year historical period, the average total annual change in groundwater storage is about -0.610 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the historical period is about -18 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are higher in the Lower Aquifer (average -7.1 taf per year) compared to the Upper Aquifer (average -3.5 taf per year).

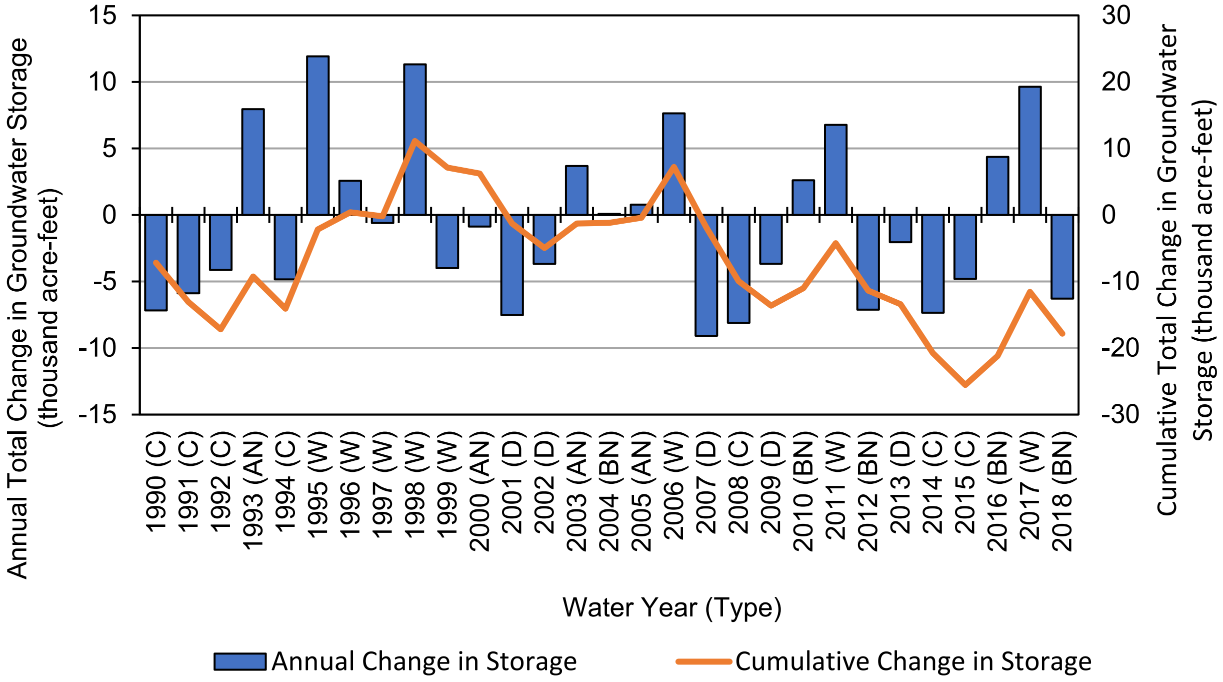

Figure 23. Antelope Subbasin Historical Total Change in Storage within the GWS

Table 4. Antelope Subbasin Historical Change in Groundwater Storage (acre-feet)

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Upper Aquifer</th><th>Lower Aquifer</th><th>Total Annual Change</th><th>Total Cumulative Change</th></tr>
<tr><td colspan="2">1990 (C)</td><td>-4,500</td><td>-2,600</td><td>-7,200</td><td>-7,200</td></tr>
<tr><td colspan="2">1991 (C)</td><td>-3,400</td><td>-2,500</td><td>-5,900</td><td>-13,000</td></tr>
<tr><td colspan="2">1992 (C)</td><td>-2,400</td><td>-1,800</td><td>-4,100</td><td>-17,000</td></tr>
<tr><td colspan="2">1993 (AN)</td><td>5,300</td><td>2,600</td><td>8,000</td><td>-9,200</td></tr>
<tr><td colspan="2">1994 (C)</td><td>-3,100</td><td>-1,800</td><td>-4,800</td><td>-14,000</td></tr>
<tr><td colspan="2">1995 (W)</td><td>7,500</td><td>4,400</td><td>12,000</td><td>-2,200</td></tr>
<tr><td colspan="2">1996 (W)</td><td>1,500</td><td>1,100</td><td>2,600</td><td>400</td></tr>
<tr><td colspan="2">1997 (W)</td><td>-620</td><td>19</td><td>-600</td><td>-200</td></tr>
<tr><td colspan="2">1998 (W)</td><td>6,900</td><td>4,400</td><td>11,000</td><td>11,000</td></tr>
<tr><td colspan="2">1999 (W)</td><td>-2,900</td><td>-1,100</td><td>-4,000</td><td>7,100</td></tr>
<tr><td colspan="2">2000 (AN)</td><td>-500</td><td>-370</td><td>-880</td><td>6,200</td></tr>
<tr><td colspan="2">2001 (D)</td><td>-4,600</td><td>-2,900</td><td>-7,500</td><td>-1,300</td></tr>
<tr><td colspan="2">2002 (D)</td><td>-2,200</td><td>-1,500</td><td>-3,700</td><td>-5,000</td></tr>
<tr><td colspan="2">2003 (AN)</td><td>2,400</td><td>1,300</td><td>3,700</td><td>-1,300</td></tr>
<tr><td colspan="2">2004 (BN)</td><td>-8</td><td>89</td><td>81</td><td>-1,200</td></tr>
<tr><td colspan="2">2005 (AN)</td><td>570</td><td>200</td><td>780</td><td>-410</td></tr>
<tr><td colspan="2">2006 (W)</td><td>4,600</td><td>3,000</td><td>7,600</td><td>7,200</td></tr>
<tr><td colspan="2">2007 (D)</td><td>-5,600</td><td>-3,500</td><td>-9,100</td><td>-1,800</td></tr>
<tr><td colspan="2">2008 (C)</td><td>-5,000</td><td>-3,100</td><td>-8,100</td><td>-10,000</td></tr>
<tr><td colspan="2">2009 (D)</td><td>-1,900</td><td>-1,800</td><td>-3,700</td><td>-14,000</td></tr>
<tr><td colspan="2">2010 (BN)</td><td>1,900</td><td>750</td><td>2,600</td><td>-11,000</td></tr>
<tr><td colspan="2">2011 (W)</td><td>4,500</td><td>2,300</td><td>6,800</td><td>-4,200</td></tr>
<tr><td colspan="2">2012 (BN)</td><td>-4,700</td><td>-2,500</td><td>-7,100</td><td>-11,000</td></tr>
<tr><td colspan="2">2013 (D)</td><td>-970</td><td>-1,100</td><td>-2,000</td><td>-13,000</td></tr>
<tr><td colspan="2">2014 (C)</td><td>-4,300</td><td>-3,100</td><td>-7,300</td><td>-21,000</td></tr>
<tr><td colspan="2">2015 (C)</td><td>-2,900</td><td>-1,900</td><td>-4,800</td><td>-26,000</td></tr>
<tr><td colspan="2">2016 (BN)</td><td>3,000</td><td>1,400</td><td>4,400</td><td>-21,000</td></tr>
<tr><td colspan="2">2017 (W)</td><td>5,700</td><td>3,900</td><td>9,600</td><td>-12,000</td></tr>
<tr><td colspan="2">2018 (BN)</td><td>-3,900</td><td>-2,400</td><td>-6,300</td><td>-18,000</td></tr>
<tr><td colspan="2">Average (1990-2018)</td><td>-330</td><td>-290</td><td>-610</td><td></td></tr>
<tr><td rowspan="5">1990-2018</td><td>W</td><td>3,400</td><td>2,300</td><td>5,700</td><td></td></tr>
<tr><td>AN</td><td>1,800</td><td>820</td><td>4,100</td><td></td></tr>
<tr><td>BN</td><td>-740</td><td>-520</td><td>-330</td><td></td></tr>
<tr><td>D</td><td>-3,100</td><td>-2,100</td><td>-5,200</td><td></td></tr>
<tr><td>C</td><td>-3,700</td><td>-2,400</td><td>-6,000</td><td></td></tr>
</table>

Note: positive values indicate increases in groundwater storage, negative values indicate decreases in groundwater storage.

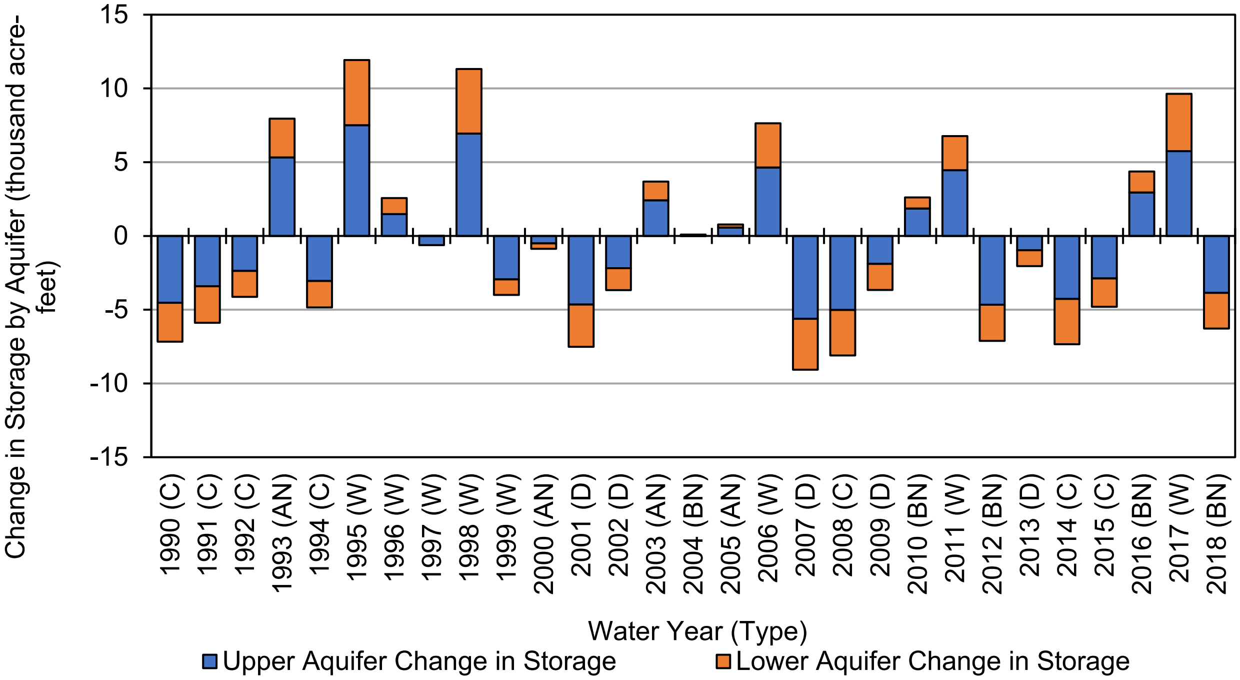

Figure 4. Antelope Subbasin Historical Change in Groundwater Storage by Aquifer

2 DETAILED PROJECTED (CURRENT LAND USE) WATER BUDGET

This section presents the results of the Projected (Current Land Use) scenario. The Current Land Use scenario assumes constant land use conditions based on 2018 conditions.

2.1 Surface Water System Water Budget Results

2.1.1 Inflows

2.1.1.1 *Surface Water Inflow by Water Source Type*

The projected annual volume of surface water inflows is summarized by water source type in **Figure 25** and **Table 24**. Over the projected (current land use) period, surface water inflows average about 43 taf per year. Virtually, all inflows of the SWS are local supplies. The CVP supplies are very small and average about 0.610 taf per year.

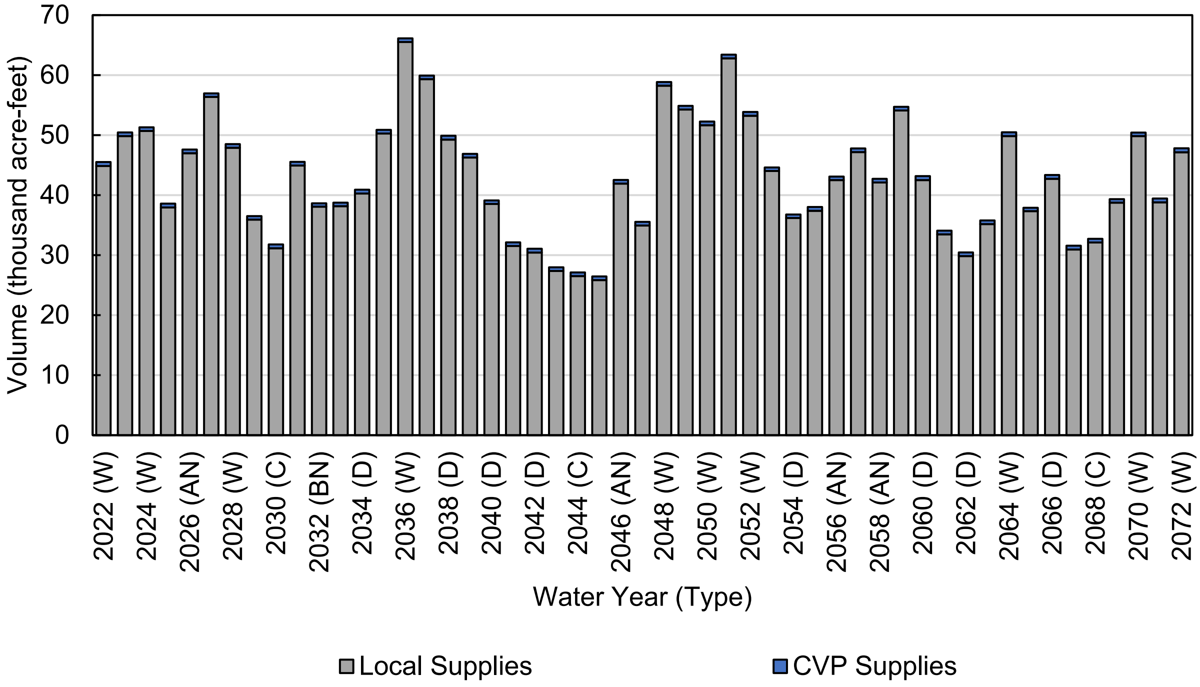

Figure 25. Antelope Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type

Table 24. Antelope Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	45,000	46,000
2023 (W)	610	50,000	50,000
2024 (W)	610	51,000	51,000
2025 (BN)	630	38,000	39,000
2026 (AN)	610	47,000	48,000
2027 (W)	610	56,000	57,000
2028 (W)	620	48,000	49,000
2029 (C)	600	36,000	37,000
2030 (C)	640	31,000	32,000
2031 (AN)	610	45,000	46,000
2032 (BN)	560	38,000	39,000
2033 (AN)	580	38,000	39,000
2034 (D)	640	40,000	41,000
2035 (W)	610	50,000	51,000
2036 (W)	610	66,000	66,000
2037 (W)	610	59,000	60,000
2038 (D)	640	49,000	50,000
2039 (W)	610	46,000	47,000
2040 (D)	600	39,000	39,000
2041 (C)	610	32,000	32,000
2042 (D)	650	30,000	31,000
2043 (C)	610	27,000	28,000
2044 (C)	610	27,000	27,000
2045 (C)	610	26,000	26,000
2046 (AN)	610	42,000	43,000
2047 (C)	610	35,000	36,000
2048 (W)	610	58,000	59,000
2049 (W)	610	54,000	55,000
2050 (W)	610	52,000	52,000
2051 (W)	610	63,000	63,000
2052 (W)	620	53,000	54,000
2053 (AN)	580	44,000	45,000
2054 (D)	600	36,000	37,000
2055 (D)	640	37,000	38,000
2056 (AN)	580	43,000	43,000
2057 (BN)	620	47,000	48,000

Water Year (Type)		CVP Supplies	Local Supplies	Total
2058 (AN)		600	42,000	43,000
2059 (W)		610	54,000	55,000
2060 (D)		650	43,000	43,000
2061 (C)		600	33,000	34,000
2062 (D)		620	30,000	30,000
2063 (BN)		610	35,000	36,000
2064 (W)		630	50,000	50,000
2065 (BN)		560	37,000	38,000
2066 (D)		650	43,000	43,000
2067 (C)		640	31,000	32,000
2068 (C)		610	32,000	33,000
2069 (BN)		580	39,000	39,000
2070 (W)		580	50,000	50,000
2071 (BN)		630	39,000	39,000
2072 (W)		650	47,000	48,000
Average (2022-2072)		610	43,000	43,000
2022-2072	W	620	53,000	54,000
	AN	600	43,000	44,000
	BN	600	39,000	40,000
	D	630	39,000	39,000
	C	610	31,000	32,000

2.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Figure 26** and **Table 25**. Total precipitation is highly variable between years in the study area, ranging from approximately 30 taf (18.6 inches) during average critically dry years to 56 taf (34.72 inches) during average wet years.

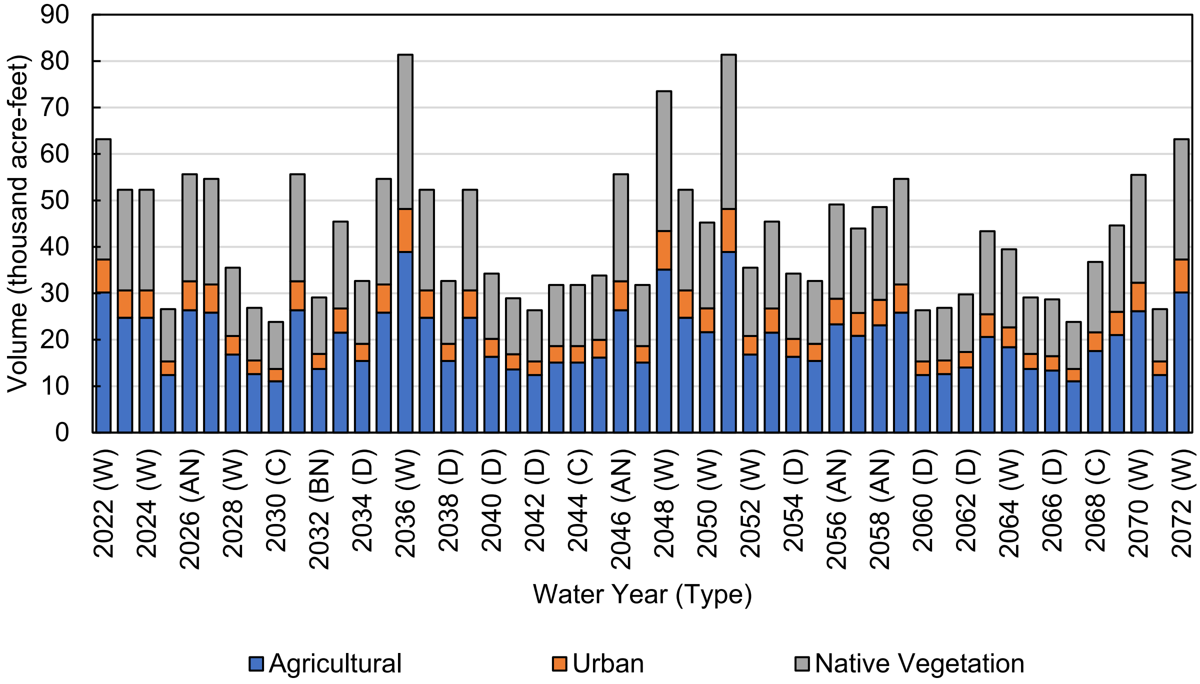

Figure 26. Antelope Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector

Table 25. Antelope Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	30,000	7,100	26,000	63,000
2023 (W)	25,000	5,900	22,000	52,000
2024 (W)	25,000	5,900	22,000	52,000
2025 (BN)	12,000	2,900	11,000	27,000
2026 (AN)	26,000	6,200	23,000	56,000
2027 (W)	26,000	6,100	23,000	55,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	13,000	2,900	11,000	27,000
2030 (C)	11,000	2,700	10,000	24,000
2031 (AN)	26,000	6,200	23,000	56,000
2032 (BN)	14,000	3,200	12,000	29,000
2033 (AN)	22,000	5,200	19,000	45,000
2034 (D)	15,000	3,700	14,000	33,000
2035 (W)	26,000	6,100	23,000	55,000
2036 (W)	39,000	9,300	33,000	81,000
2037 (W)	25,000	5,900	22,000	52,000
2038 (D)	15,000	3,700	14,000	33,000
2039 (W)	25,000	5,900	22,000	52,000
2040 (D)	16,000	3,900	14,000	34,000
2041 (C)	14,000	3,300	12,000	29,000
2042 (D)	12,000	2,900	11,000	26,000
2043 (C)	15,000	3,600	13,000	32,000
2044 (C)	15,000	3,600	13,000	32,000
2045 (C)	16,000	3,800	14,000	34,000
2046 (AN)	26,000	6,200	23,000	56,000
2047 (C)	15,000	3,600	13,000	32,000
2048 (W)	35,000	8,300	30,000	74,000
2049 (W)	25,000	5,900	22,000	52,000
2050 (W)	22,000	5,100	18,000	45,000
2051 (W)	39,000	9,300	33,000	81,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	22,000	5,200	19,000	45,000
2054 (D)	16,000	3,900	14,000	34,000
2055 (D)	15,000	3,700	14,000	33,000
2056 (AN)	23,000	5,500	20,000	49,000
2057 (BN)	21,000	4,900	18,000	44,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		23,000	5,500	20,000	49,000
2059 (W)		26,000	6,100	23,000	55,000
2060 (D)		12,000	2,900	11,000	26,000
2061 (C)		13,000	2,900	11,000	27,000
2062 (D)		14,000	3,300	12,000	30,000
2063 (BN)		21,000	4,900	18,000	43,000
2064 (W)		18,000	4,300	17,000	39,000
2065 (BN)		14,000	3,200	12,000	29,000
2066 (D)		13,000	3,100	12,000	29,000
2067 (C)		11,000	2,700	10,000	24,000
2068 (C)		18,000	4,000	15,000	37,000
2069 (BN)		21,000	5,000	19,000	45,000
2070 (W)		26,000	6,100	23,000	56,000
2071 (BN)		12,000	2,900	11,000	27,000
2072 (W)		30,000	7,100	26,000	63,000
Average (2022-2072)		20,000	4,800	18,000	43,000
2022-2072	W	26,000	6,200	23,000	56,000
	AN	24,000	5,700	21,000	51,000
	BN	16,000	3,900	15,000	35,000
	D	15,000	3,500	13,000	31,000
	C	14,000	3,300	12,000	30,000

2.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 27** and **Table 26**. Virtually all groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 14 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 13 taf in above-normal years to 18 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 28** and **Table 27**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, totaling 0.290 taf and 0.880 taf per year, on average.

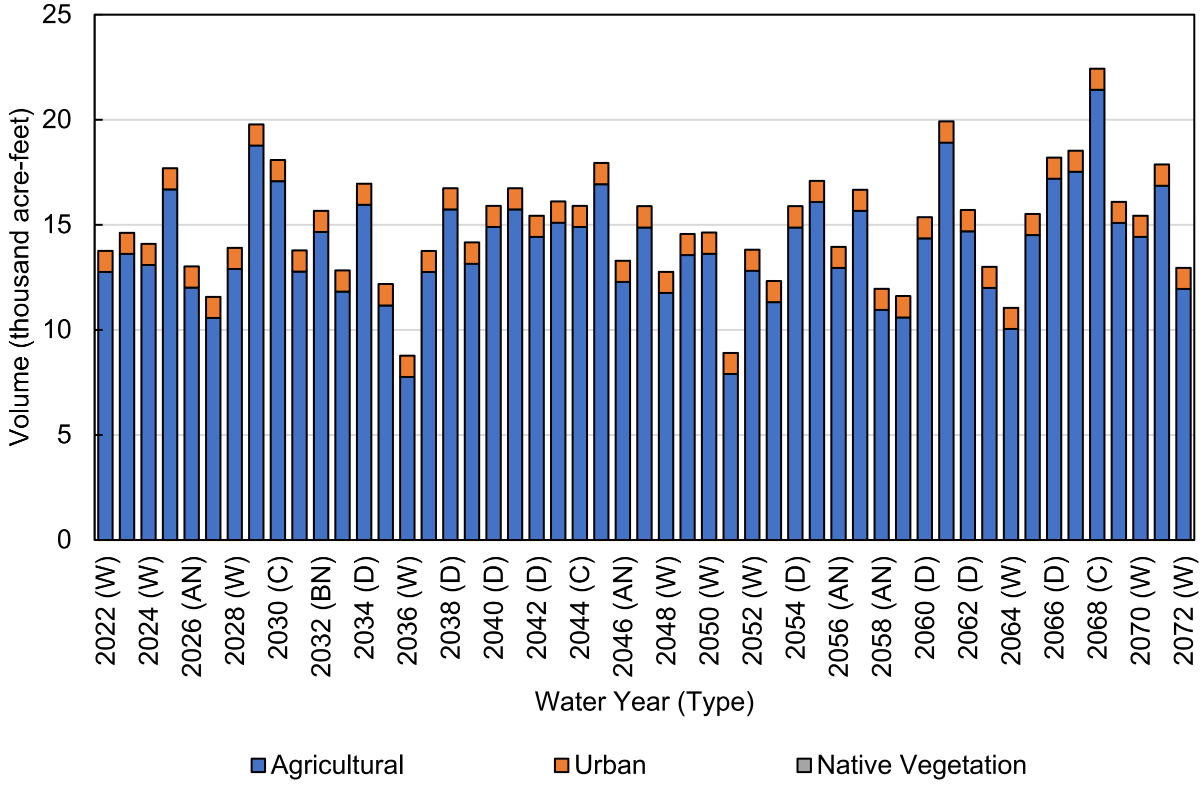

Figure 27. Antelope Subbasin Projected (Current Land Use) Groundwater Pumping, by Water Use Sector

Table 26. Antelope Subbasin Projected (Current Land Use) Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,100	0	14,000
2023 (W)	14,000	1,100	0	15,000
2024 (W)	14,000	1,100	0	15,000
2025 (BN)	17,000	1,100	0	18,000
2026 (AN)	12,000	1,100	0	13,000
2027 (W)	11,000	1,100	0	12,000
2028 (W)	13,000	1,100	0	15,000
2029 (C)	19,000	1,100	0	20,000
2030 (C)	17,000	1,100	0	18,000
2031 (AN)	13,000	1,100	0	14,000
2032 (BN)	15,000	1,100	0	16,000
2033 (AN)	12,000	1,100	0	13,000
2034 (D)	16,000	1,100	0	17,000
2035 (W)	11,000	1,100	0	13,000
2036 (W)	8,400	1,100	0	9,500
2037 (W)	13,000	1,100	0	15,000
2038 (D)	16,000	1,100	0	17,000
2039 (W)	14,000	1,100	0	15,000
2040 (D)	15,000	1,100	0	16,000
2041 (C)	16,000	1,100	0	17,000
2042 (D)	15,000	1,100	0	16,000
2043 (C)	15,000	1,100	0	16,000
2044 (C)	15,000	1,100	0	16,000
2045 (C)	17,000	1,100	0	18,000
2046 (AN)	12,000	1,100	0	14,000
2047 (C)	15,000	1,100	0	16,000
2048 (W)	12,000	1,100	0	13,000
2049 (W)	14,000	1,100	0	15,000
2050 (W)	14,000	1,100	0	15,000
2051 (W)	8,500	1,100	0	9,600
2052 (W)	13,000	1,100	0	14,000
2053 (AN)	12,000	1,100	0	13,000
2054 (D)	15,000	1,100	0	16,000
2055 (D)	16,000	1,100	0	17,000
2056 (AN)	13,000	1,100	0	14,000
2057 (BN)	16,000	1,100	0	17,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		11,000	1,100	0	12,000
2059 (W)		11,000	1,100	0	12,000
2060 (D)		15,000	1,100	0	16,000
2061 (C)		19,000	1,100	0	20,000
2062 (D)		15,000	1,100	0	16,000
2063 (BN)		12,000	1,100	0	13,000
2064 (W)		10,000	1,100	0	11,000
2065 (BN)		15,000	1,100	0	16,000
2066 (D)		17,000	1,100	0	18,000
2067 (C)		18,000	1,100	0	19,000
2068 (C)		22,000	1,100	0	23,000
2069 (BN)		15,000	1,100	0	16,000
2070 (W)		15,000	1,100	0	16,000
2071 (BN)		17,000	1,100	0	18,000
2072 (W)		12,000	1,100	0	13,000
Average (2022-2072)		14,000	1,100	0	15,000
2022-2072	W	12,000	1,100	0	13,000
	AN	12,000	1,100	0	13,000
	BN	15,000	1,100	0	16,000
	D	16,000	1,100	0	17,000
	C	17,000	1,100	0	18,000

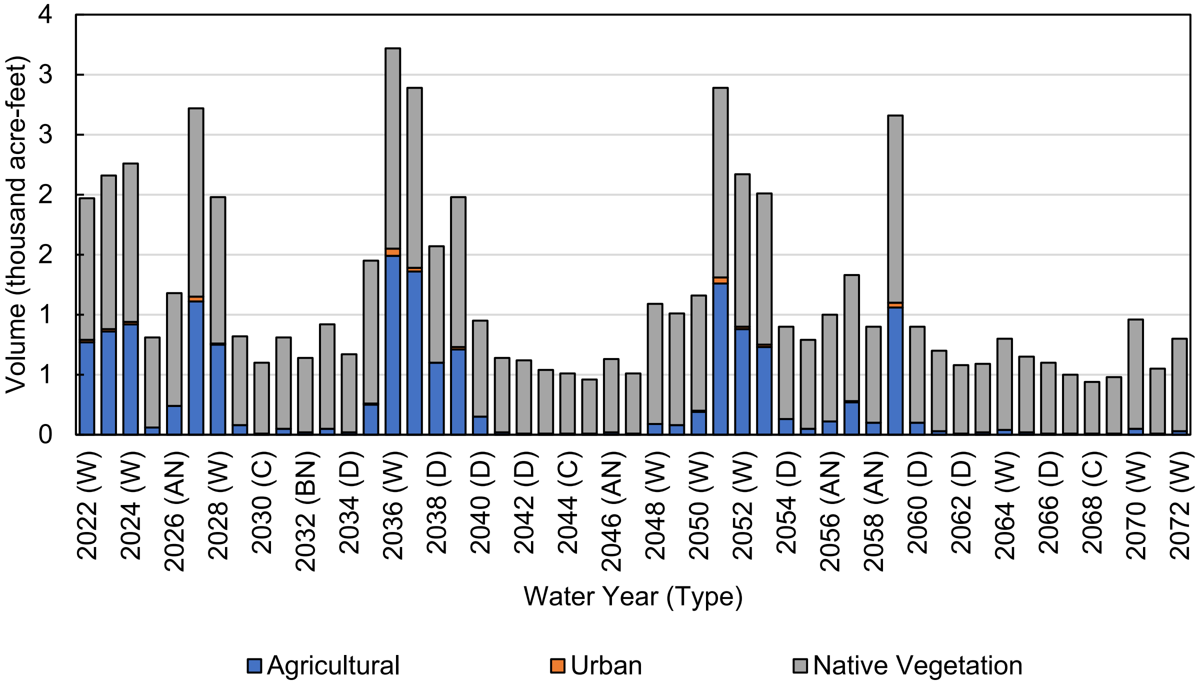

Figure 5. Antelope Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector

Table 5. Antelope Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (BN)	770	20	1,200	2,000
2023 (W)	860	20	1,300	2,200
2024 (W)	920	20	1,300	2,300
2025 (W)	60	0	750	810
2026 (BN)	240	0	940	1,200
2027 (AN)	1,100	40	1,600	2,700
2028 (W)	750	10	1,200	2,000
2029 (W)	80	0	740	820
2030 (C)	10	0	590	600
2031 (C)	50	0	760	810
2032 (AN)	20	0	620	640
2033 (BN)	50	0	870	920
2034 (AN)	20	0	650	670
2035 (D)	250	10	1,200	1,500
2036 (W)	1,500	60	1,700	3,200
2037 (W)	1,400	30	1,500	2,900
2038 (W)	600	0	970	1,600
2039 (D)	710	20	1,300	2,000
2040 (W)	150	0	800	950
2041 (D)	20	0	620	640
2042 (C)	10	0	610	620
2043 (D)	10	0	530	540
2044 (C)	10	0	500	510
2045 (C)	10	0	450	460
2046 (C)	20	0	610	630
2047 (AN)	10	0	500	510
2048 (C)	90	0	1,000	1,100
2049 (W)	80	0	930	1,000
2050 (W)	190	10	960	1,200
2051 (W)	1,300	50	1,600	2,900
2052 (W)	880	20	1,300	2,200
2053 (W)	730	20	1,300	2,000
2054 (AN)	130	0	770	900
2055 (D)	50	0	740	790
2056 (D)	110	0	890	1,000
2057 (AN)	270	10	1,100	1,300

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2058 (BN)</td><td>100</td><td>0</td><td>800</td><td>900</td></tr>
<tr><td colspan="2">2059 (AN)</td><td>1,100</td><td>40</td><td>1,600</td><td>2,700</td></tr>
<tr><td colspan="2">2060 (W)</td><td>100</td><td>0</td><td>800</td><td>900</td></tr>
<tr><td colspan="2">2061 (D)</td><td>30</td><td>0</td><td>670</td><td>700</td></tr>
<tr><td colspan="2">2062 (C)</td><td>10</td><td>0</td><td>570</td><td>580</td></tr>
<tr><td colspan="2">2063 (D)</td><td>20</td><td>0</td><td>570</td><td>590</td></tr>
<tr><td colspan="2">2064 (BN)</td><td>40</td><td>0</td><td>760</td><td>800</td></tr>
<tr><td colspan="2">2065 (W)</td><td>20</td><td>0</td><td>630</td><td>650</td></tr>
<tr><td colspan="2">2066 (BN)</td><td>10</td><td>0</td><td>590</td><td>600</td></tr>
<tr><td colspan="2">2067 (D)</td><td>10</td><td>0</td><td>490</td><td>500</td></tr>
<tr><td colspan="2">2068 (C)</td><td>10</td><td>0</td><td>430</td><td>440</td></tr>
<tr><td colspan="2">2069 (C)</td><td>10</td><td>0</td><td>470</td><td>480</td></tr>
<tr><td colspan="2">2070 (BN)</td><td>50</td><td>0</td><td>910</td><td>960</td></tr>
<tr><td colspan="2">2071 (W)</td><td>10</td><td>0</td><td>540</td><td>550</td></tr>
<tr><td colspan="2">2072 (W)</td><td>30</td><td>0</td><td>770</td><td>800</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>290</td><td>10</td><td>880</td><td>1,200</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>660</td><td>20</td><td>1,200</td><td>1,900</td></tr>
<tr><td>AN</td><td>190</td><td>0</td><td>880</td><td>1,100</td></tr>
<tr><td>BN</td><td>60</td><td>0</td><td>660</td><td>720</td></tr>
<tr><td>D</td><td>120</td><td>0</td><td>720</td><td>840</td></tr>
<tr><td>C</td><td>20</td><td>0</td><td>550</td><td>570</td></tr>
</table>

2.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 29** and **Table 28**, averaging approximately 33 taf per year.

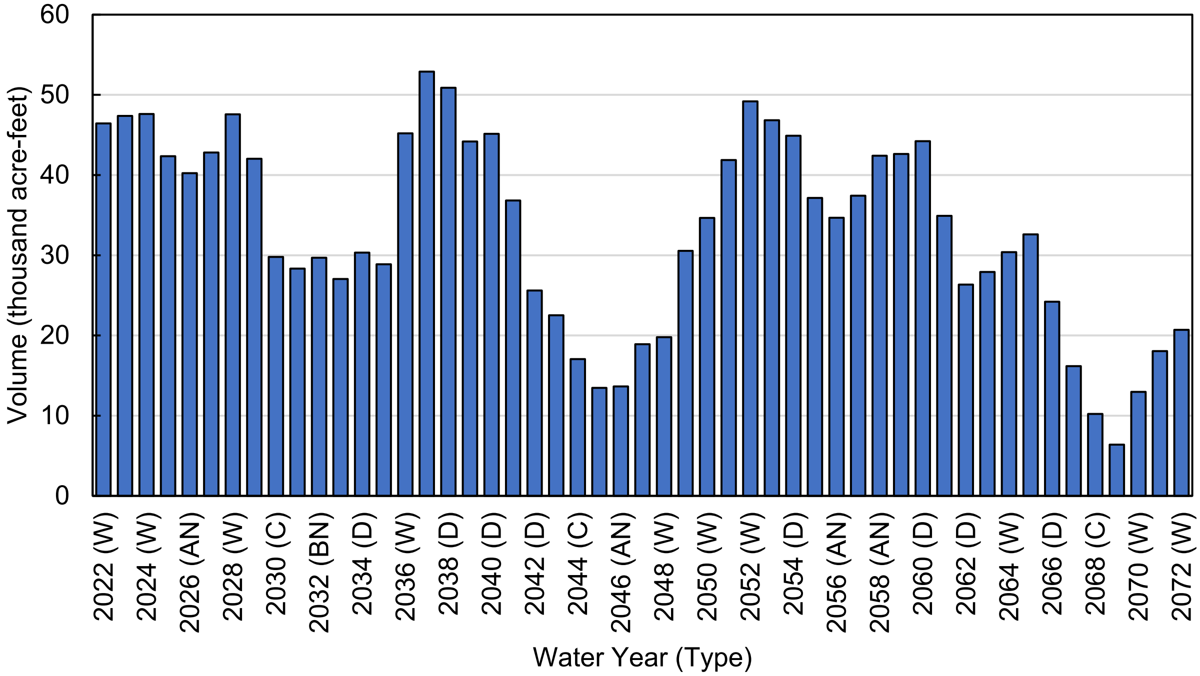

Figure 29. Antelope Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water

Table 28. Antelope Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)	Groundwater Discharge to Surface Water
2022 (W)	46,000
2023 (W)	47,000
2024 (W)	48,000
2025 (BN)	42,000
2026 (AN)	40,000
2027 (W)	43,000
2028 (W)	48,000
2029 (C)	42,000
2030 (C)	30,000
2031 (AN)	28,000
2032 (BN)	30,000
2033 (AN)	27,000
2034 (D)	30,000
2035 (W)	29,000
2036 (W)	45,000
2037 (W)	53,000
2038 (D)	51,000
2039 (W)	44,000
2040 (D)	45,000
2041 (C)	37,000
2042 (D)	26,000
2043 (C)	23,000
2044 (C)	17,000
2045 (C)	13,000
2046 (AN)	14,000
2047 (C)	19,000
2048 (W)	20,000
2049 (W)	31,000
2050 (W)	35,000
2051 (W)	42,000
2052 (W)	49,000
2053 (AN)	47,000
2054 (D)	45,000
2055 (D)	37,000
2056 (AN)	35,000
2057 (BN)	37,000

Water Year (Type)		Groundwater Discharge to Surface Water
2058 (AN)		42,000
2059 (W)		43,000
2060 (D)		44,000
2061 (C)		35,000
2062 (D)		26,000
2063 (BN)		28,000
2064 (W)		30,000
2065 (BN)		33,000
2066 (D)		24,000
2067 (C)		16,000
2068 (C)		10,000
2069 (BN)		6,400
2070 (W)		13,000
2071 (BN)		18,000
2072 (W)		21,000
Average (2022-2072)		33,000
2022-2072	W	38,000
	AN	33,000
	BN	28,000
	D	37,000
	C	24,000

2.1.2 Outflows

2.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 30** through **Figure 33**, and **Table 29** through **Table 32**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest projected in 2036, at approximately 43 taf, and greatest in multiple years, at approximately 49 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 18 taf in above-normal and wet years and about 20 to 22 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and relatively constant between years, averaging less than 0.320 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to meet a portion of their consumptive use requirements. ET of groundwater uptake by native vegetation and agricultural crops and totals 0.80 and 0.290 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 56 taf in wet years and 30 taf in critical water years. Much of the total ET of precipitation results from the large acreage of native vegetation and Agricultural land in the Antelope Subbasin, though some contribution is from urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 34** and **Table 33**. The total volume is relatively small and constant between years, averaging less than 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

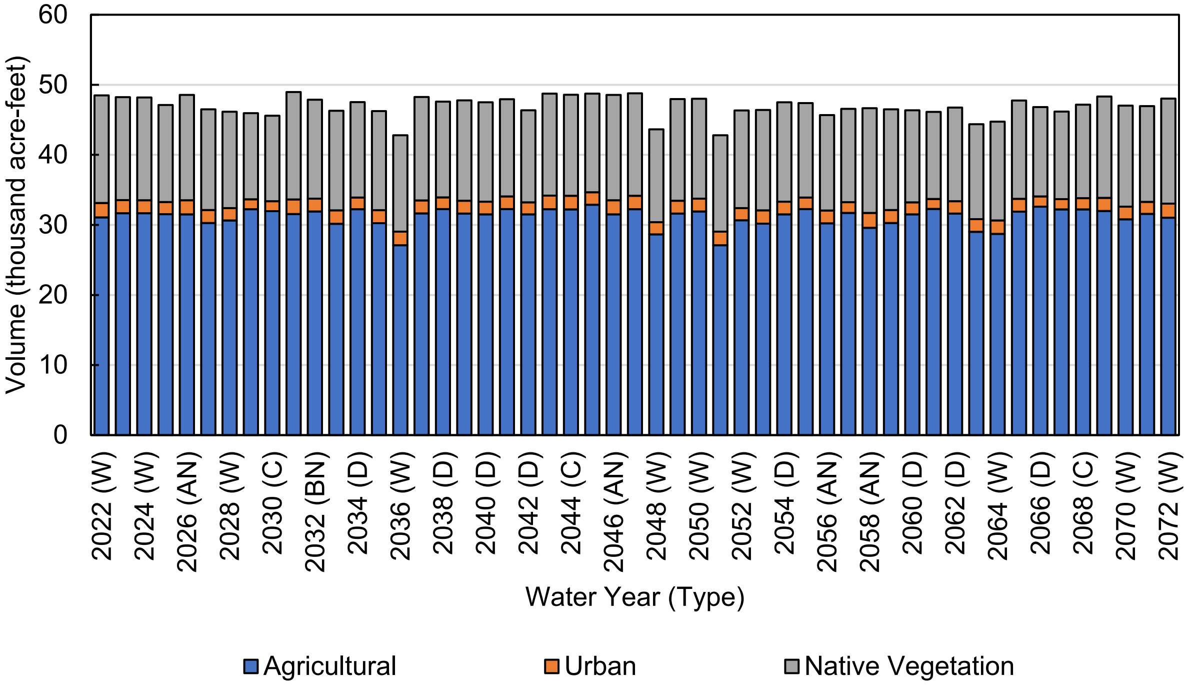

Figure 30. Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector

Table 29. Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	31,000	2,100	15,000	48,000
2023 (W)	32,000	1,900	15,000	48,000
2024 (W)	32,000	1,900	15,000	48,000
2025 (BN)	32,000	1,700	14,000	47,000
2026 (AN)	32,000	2,000	15,000	49,000
2027 (W)	30,000	1,900	14,000	47,000
2028 (W)	31,000	1,700	14,000	46,000
2029 (C)	32,000	1,400	12,000	46,000
2030 (C)	32,000	1,400	12,000	46,000
2031 (AN)	32,000	2,100	15,000	49,000
2032 (BN)	32,000	1,800	14,000	48,000
2033 (AN)	30,000	1,900	14,000	46,000
2034 (D)	32,000	1,700	14,000	48,000
2035 (W)	30,000	1,800	14,000	46,000
2036 (W)	27,000	1,900	14,000	43,000
2037 (W)	32,000	1,900	15,000	48,000
2038 (D)	32,000	1,700	14,000	48,000
2039 (W)	32,000	1,800	14,000	48,000
2040 (D)	32,000	1,800	14,000	48,000
2041 (C)	32,000	1,800	14,000	48,000
2042 (D)	32,000	1,700	13,000	46,000
2043 (C)	32,000	2,000	15,000	49,000
2044 (C)	32,000	1,900	14,000	49,000
2045 (C)	33,000	1,800	14,000	49,000
2046 (AN)	32,000	2,000	15,000	49,000
2047 (C)	32,000	1,900	15,000	49,000
2048 (W)	29,000	1,700	13,000	44,000
2049 (W)	32,000	1,800	15,000	48,000
2050 (W)	32,000	1,900	14,000	48,000
2051 (W)	27,000	1,900	14,000	43,000
2052 (W)	31,000	1,800	14,000	46,000
2053 (AN)	30,000	1,900	14,000	46,000
2054 (D)	32,000	1,800	14,000	48,000
2055 (D)	32,000	1,700	13,000	47,000
2056 (AN)	30,000	1,800	14,000	46,000
2057 (BN)	32,000	1,500	13,000	47,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		30,000	2,100	15,000	47,000
2059 (W)		30,000	1,900	14,000	46,000
2060 (D)		32,000	1,700	13,000	46,000
2061 (C)		32,000	1,400	12,000	46,000
2062 (D)		32,000	1,800	13,000	47,000
2063 (BN)		29,000	1,800	14,000	44,000
2064 (W)		29,000	1,900	14,000	45,000
2065 (BN)		32,000	1,800	14,000	48,000
2066 (D)		33,000	1,500	13,000	47,000
2067 (C)		32,000	1,500	12,000	46,000
2068 (C)		32,000	1,600	13,000	47,000
2069 (BN)		32,000	1,900	14,000	48,000
2070 (W)		31,000	1,800	14,000	47,000
2071 (BN)		32,000	1,700	14,000	47,000
2072 (W)		31,000	2,000	15,000	48,000
Average (2022-2072)		31,000	1,800	14,000	47,000
2022-2072	W	30,000	1,900	14,000	47,000
	AN	31,000	2,000	15,000	47,000
	BN	31,000	1,800	14,000	47,000
	D	32,000	1,700	14,000	47,000
	C	32,000	1,700	13,000	47,000

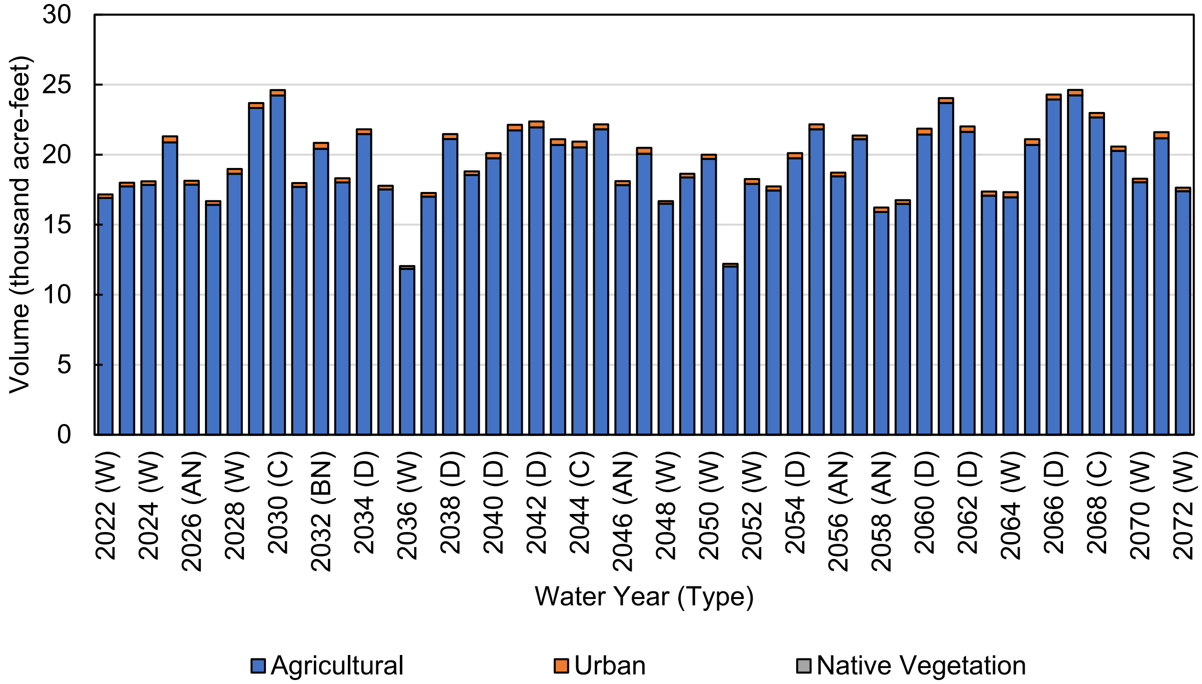

Figure 31. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Applied Water, by Water Use Sector

Table 30. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	250	0	17,000
2023 (W)	18,000	270	0	18,000
2024 (W)	18,000	260	0	18,000
2025 (BN)	21,000	430	0	21,000
2026 (AN)	18,000	280	0	18,000
2027 (W)	16,000	260	0	17,000
2028 (W)	19,000	340	0	19,000
2029 (C)	23,000	350	0	24,000
2030 (C)	24,000	380	0	25,000
2031 (AN)	18,000	280	0	18,000
2032 (BN)	20,000	420	0	21,000
2033 (AN)	18,000	300	0	18,000
2034 (D)	21,000	350	0	22,000
2035 (W)	18,000	260	0	18,000
2036 (W)	12,000	190	0	12,000
2037 (W)	17,000	260	0	17,000
2038 (D)	21,000	350	0	21,000
2039 (W)	19,000	260	0	19,000
2040 (D)	20,000	360	0	20,000
2041 (C)	22,000	410	0	22,000
2042 (D)	22,000	430	0	22,000
2043 (C)	21,000	420	0	21,000
2044 (C)	21,000	410	0	21,000
2045 (C)	22,000	360	0	22,000
2046 (AN)	18,000	280	0	18,000
2047 (C)	20,000	420	0	20,000
2048 (W)	17,000	190	0	17,000
2049 (W)	18,000	260	0	19,000
2050 (W)	20,000	300	0	20,000
2051 (W)	12,000	190	0	12,000
2052 (W)	18,000	340	0	18,000
2053 (AN)	17,000	300	0	18,000
2054 (D)	20,000	360	0	20,000
2055 (D)	22,000	350	0	22,000
2056 (AN)	18,000	270	0	19,000
2057 (BN)	21,000	260	0	21,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		16,000	320	0	16,000
2059 (W)		16,000	260	0	17,000
2060 (D)		21,000	420	0	22,000
2061 (C)		24,000	350	0	24,000
2062 (D)		22,000	390	0	22,000
2063 (BN)		17,000	300	0	17,000
2064 (W)		17,000	360	0	17,000
2065 (BN)		21,000	420	0	21,000
2066 (D)		24,000	350	0	24,000
2067 (C)		24,000	390	0	25,000
2068 (C)		23,000	320	0	23,000
2069 (BN)		20,000	310	0	21,000
2070 (W)		18,000	250	0	18,000
2071 (BN)		21,000	430	0	22,000
2072 (W)		17,000	250	0	18,000
Average (2022-2072)		19,000	320	0	20,000
2022-2072	W	17,000	260	0	17,000
	AN	18,000	290	0	18,000
	BN	20,000	370	0	21,000
	D	21,000	370	0	22,000
	C	22,000	380	0	23,000

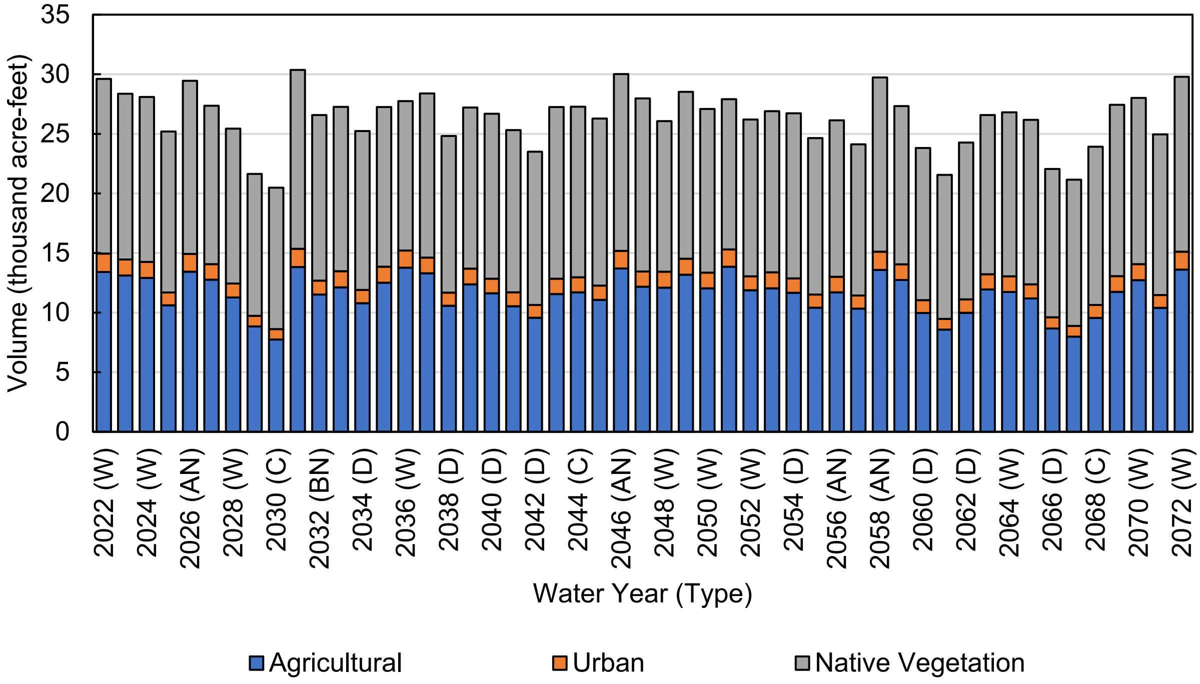

Figure 32. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 31. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	770	20	1,200	2,000
2023 (W)	860	20	1,300	2,200
2024 (W)	920	20	1,300	2,300
2025 (BN)	60	0	750	810
2026 (AN)	240	0	940	1,200
2027 (W)	1,100	40	1,600	2,700
2028 (W)	750	10	1,200	2,000
2029 (C)	80	0	740	820
2030 (C)	10	0	590	600
2031 (AN)	50	0	760	810
2032 (BN)	20	0	620	640
2033 (AN)	50	0	870	920
2034 (D)	20	0	650	670
2035 (W)	250	10	1,200	1,500
2036 (W)	1,500	60	1,700	3,200
2037 (W)	1,400	30	1,500	2,900
2038 (D)	600	0	970	1,600
2039 (W)	710	20	1,300	2,000
2040 (D)	150	0	800	950
2041 (C)	20	0	620	640
2042 (D)	10	0	610	620
2043 (C)	10	0	530	540
2044 (C)	10	0	500	510
2045 (C)	10	0	450	460
2046 (AN)	20	0	610	630
2047 (C)	10	0	500	510
2048 (W)	90	0	1,000	1,100
2049 (W)	80	0	930	1,000
2050 (W)	190	10	960	1,200
2051 (W)	1,300	50	1,600	2,900
2052 (W)	880	20	1,300	2,200
2053 (AN)	730	20	1,300	2,000
2054 (D)	130	0	770	900
2055 (D)	50	0	740	790
2056 (AN)	110	0	890	1,000
2057 (BN)	270	10	1,100	1,300

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		100	0	800	900
2059 (W)		1,100	40	1,600	2,700
2060 (D)		100	0	800	900
2061 (C)		30	0	670	700
2062 (D)		10	0	570	580
2063 (BN)		20	0	570	590
2064 (W)		40	0	760	800
2065 (BN)		20	0	630	650
2066 (D)		10	0	590	600
2067 (C)		10	0	490	500
2068 (C)		10	0	430	440
2069 (BN)		10	0	470	480
2070 (W)		50	0	910	960
2071 (BN)		10	0	540	550
2072 (W)		30	0	770	800
Average (2022-2072)		290	10	880	1,200
2022-2072	W	660	20	1,200	1,900
	AN	190	0	880	1,100
	BN	60	0	660	720
	D	120	0	720	840
	C	20	0	550	570

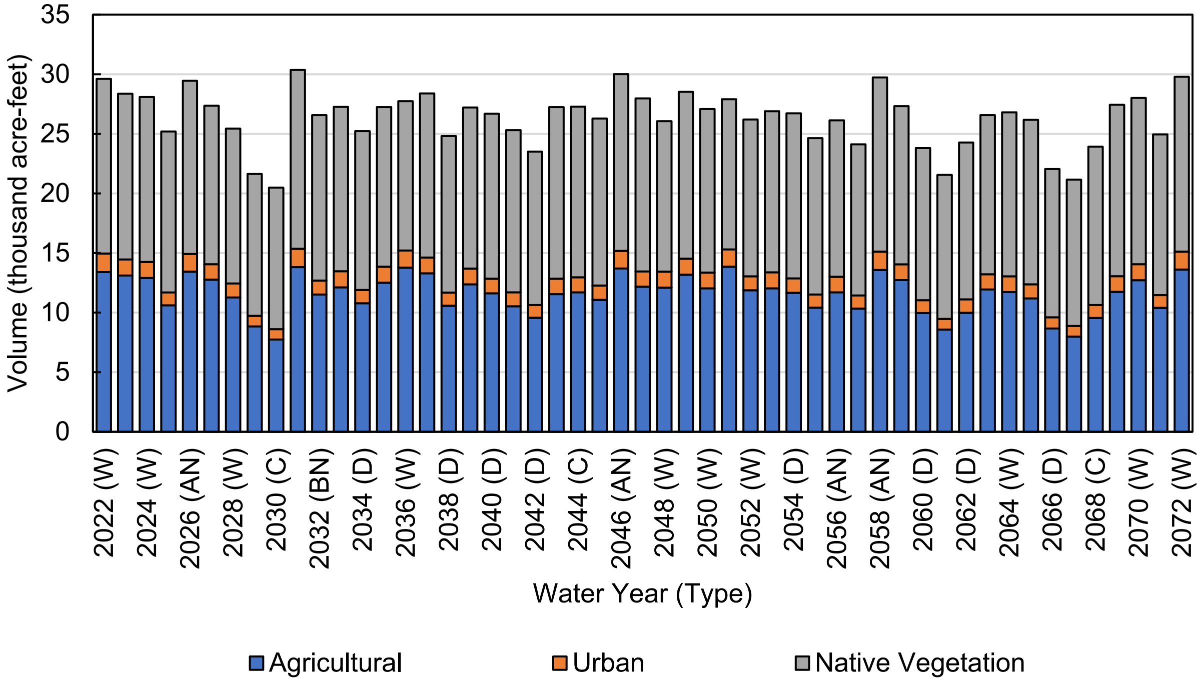

Figure 33. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Precipitation, by Water Use Sector

Table 32. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,500	15,000	30,000
2023 (W)	13,000	1,400	14,000	28,000
2024 (W)	13,000	1,300	14,000	28,000
2025 (BN)	11,000	1,100	14,000	25,000
2026 (AN)	13,000	1,500	15,000	29,000
2027 (W)	13,000	1,300	13,000	27,000
2028 (W)	11,000	1,200	13,000	25,000
2029 (C)	8,900	880	12,000	22,000
2030 (C)	7,700	870	12,000	20,000
2031 (AN)	14,000	1,500	15,000	30,000
2032 (BN)	12,000	1,200	14,000	27,000
2033 (AN)	12,000	1,400	14,000	27,000
2034 (D)	11,000	1,100	13,000	25,000
2035 (W)	13,000	1,300	13,000	27,000
2036 (W)	14,000	1,400	13,000	28,000
2037 (W)	13,000	1,300	14,000	28,000
2038 (D)	11,000	1,100	13,000	25,000
2039 (W)	12,000	1,300	14,000	27,000
2040 (D)	12,000	1,200	14,000	27,000
2041 (C)	11,000	1,200	14,000	25,000
2042 (D)	9,600	1,100	13,000	24,000
2043 (C)	12,000	1,300	14,000	27,000
2044 (C)	12,000	1,300	14,000	27,000
2045 (C)	11,000	1,200	14,000	26,000
2046 (AN)	14,000	1,500	15,000	30,000
2047 (C)	12,000	1,300	15,000	28,000
2048 (W)	12,000	1,300	13,000	26,000
2049 (W)	13,000	1,300	14,000	29,000
2050 (W)	12,000	1,300	14,000	27,000
2051 (W)	14,000	1,500	13,000	28,000
2052 (W)	12,000	1,200	13,000	26,000
2053 (AN)	12,000	1,300	14,000	27,000
2054 (D)	12,000	1,200	14,000	27,000
2055 (D)	10,000	1,100	13,000	25,000
2056 (AN)	12,000	1,300	13,000	26,000
2057 (BN)	10,000	1,100	13,000	24,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		14,000	1,500	15,000	30,000
2059 (W)		13,000	1,300	13,000	27,000
2060 (D)		10,000	1,100	13,000	24,000
2061 (C)		8,600	890	12,000	22,000
2062 (D)		10,000	1,100	13,000	24,000
2063 (BN)		12,000	1,300	13,000	27,000
2064 (W)		12,000	1,300	14,000	27,000
2065 (BN)		11,000	1,200	14,000	26,000
2066 (D)		8,700	940	12,000	22,000
2067 (C)		8,000	890	12,000	21,000
2068 (C)		9,600	1,100	13,000	24,000
2069 (BN)		12,000	1,300	14,000	27,000
2070 (W)		13,000	1,300	14,000	28,000
2071 (BN)		10,000	1,100	13,000	25,000
2072 (W)		14,000	1,500	15,000	30,000
Average (2022-2072)		12,000	1,200	14,000	26,000
2022-2072	W	13,000	1,300	14,000	28,000
	AN	13,000	1,400	14,000	29,000
	BN	11,000	1,200	14,000	26,000
	D	10,000	1,100	13,000	25,000
	C	10,000	1,100	13,000	24,000

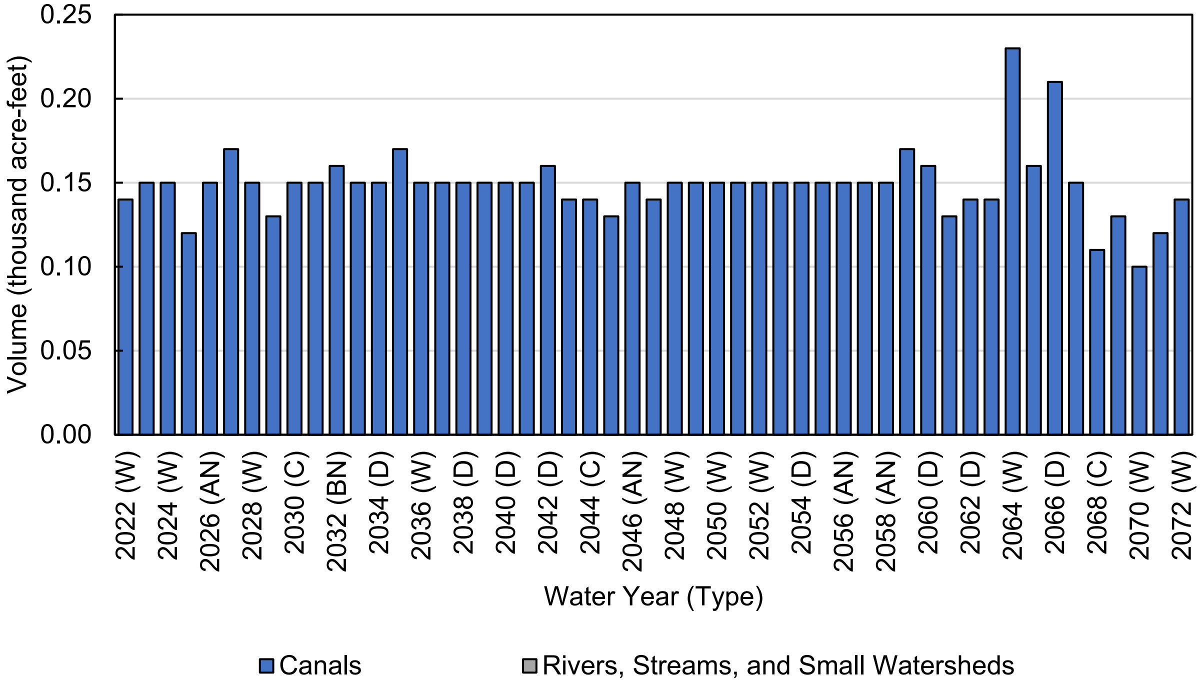

Figure 34. Antelope Subbasin Projected (Current Land Use) Evaporation of Surface Water Sources

Table 33. Antelope Subbasin Projected (Current Land Use) Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds[1]	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	160	0	160
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
2059 (W)		170	0	170
2060 (D)		160	0	160
2061 (C)		130	0	130
2062 (D)		140	0	140
2063 (BN)		140	0	140
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	150	0	150
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

2.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 35** and **Table 34** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 81 taf per year, and range on average from 55 taf in critical years up to 100 taf in wet years. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

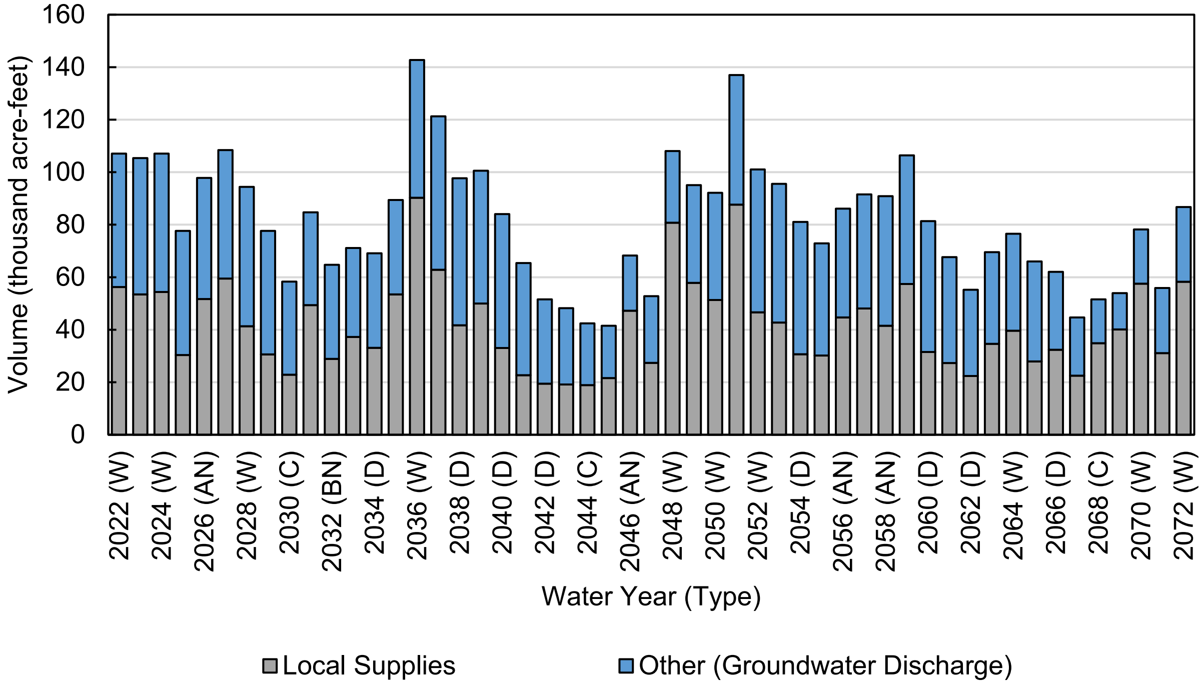

Figure 35. Antelope Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type

Table 34. Antelope Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	56,000	51,000	110,000
2023 (W)	0	53,000	52,000	110,000
2024 (W)	0	54,000	53,000	110,000
2025 (BN)	0	30,000	47,000	78,000
2026 (AN)	0	52,000	46,000	98,000
2027 (W)	0	59,000	49,000	110,000
2028 (W)	0	41,000	53,000	94,000
2029 (C)	0	31,000	47,000	78,000
2030 (C)	0	23,000	35,000	58,000
2031 (AN)	0	49,000	35,000	85,000
2032 (BN)	0	29,000	36,000	65,000
2033 (AN)	0	37,000	34,000	71,000
2034 (D)	0	33,000	36,000	69,000
2035 (W)	0	53,000	36,000	89,000
2036 (W)	0	90,000	52,000	140,000
2037 (W)	0	63,000	58,000	120,000
2038 (D)	0	42,000	56,000	98,000
2039 (W)	0	50,000	51,000	100,000
2040 (D)	0	33,000	51,000	84,000
2041 (C)	0	23,000	43,000	65,000
2042 (D)	0	19,000	32,000	52,000
2043 (C)	0	19,000	29,000	48,000
2044 (C)	0	19,000	24,000	42,000
2045 (C)	0	22,000	20,000	41,000
2046 (AN)	0	47,000	21,000	68,000
2047 (C)	0	27,000	25,000	53,000
2048 (W)	0	81,000	27,000	110,000
2049 (W)	0	58,000	37,000	95,000
2050 (W)	0	51,000	41,000	92,000
2051 (W)	0	88,000	49,000	140,000
2052 (W)	0	47,000	54,000	100,000
2053 (AN)	0	43,000	53,000	96,000
2054 (D)	0	31,000	50,000	81,000
2055 (D)	0	30,000	43,000	73,000
2056 (AN)	0	45,000	41,000	86,000

Water Year (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2057 (BN)		0	48,000	43,000	92,000
2058 (AN)		0	42,000	49,000	91,000
2059 (W)		0	57,000	49,000	110,000
2060 (D)		0	32,000	50,000	81,000
2061 (C)		0	27,000	40,000	68,000
2062 (D)		0	22,000	33,000	55,000
2063 (BN)		0	35,000	35,000	70,000
2064 (W)		0	40,000	37,000	77,000
2065 (BN)		0	28,000	38,000	66,000
2066 (D)		0	32,000	30,000	62,000
2067 (C)		0	23,000	22,000	45,000
2068 (C)		0	35,000	17,000	52,000
2069 (BN)		0	40,000	14,000	54,000
2070 (W)		0	58,000	21,000	78,000
2071 (BN)		0	31,000	25,000	56,000
2072 (W)		0	58,000	28,000	87,000
Average (2022-2072)		0	42,000	39,000	81,000
2022-2072	W	0	59,000	44,000	100,000
	AN	0	45,000	40,000	85,000
	BN	0	34,000	34,000	68,000
	D	0	30,000	42,000	73,000
	C	0	25,000	30,000	55,000

2.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 36** and **Table 35** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

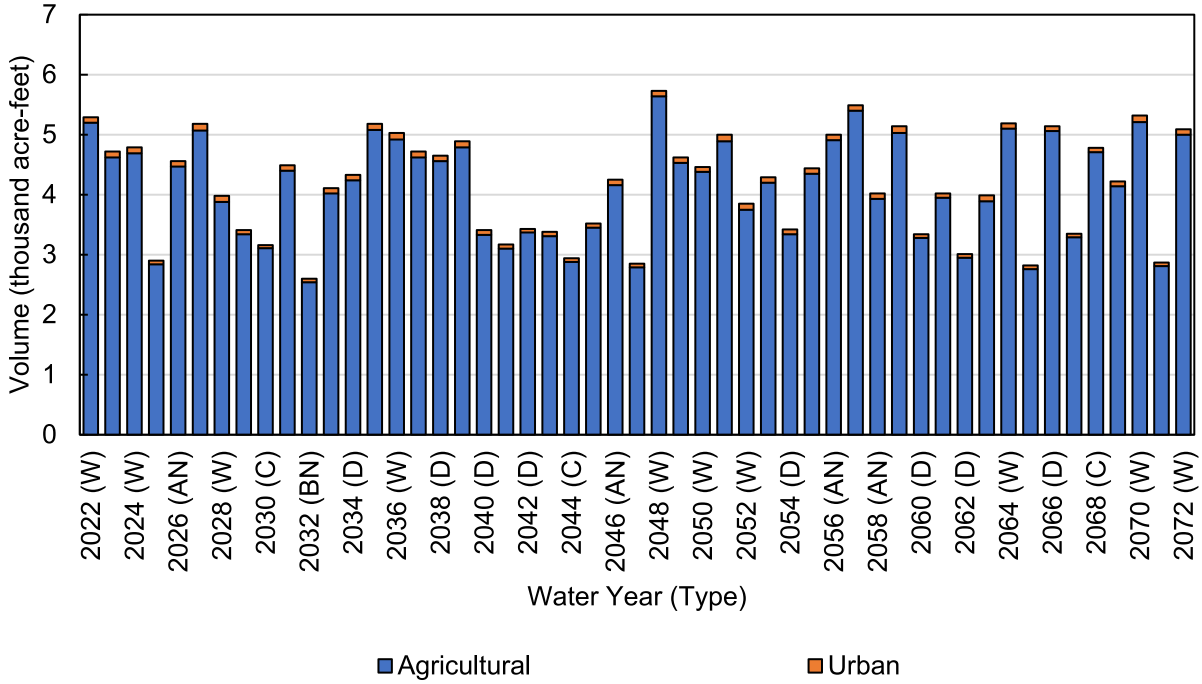

Figure 36. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector

Table 35. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	90	0	5,300
2023 (W)	4,600	100	0	4,700
2024 (W)	4,700	100	0	4,800
2025 (BN)	2,800	60	0	2,900
2026 (AN)	4,500	90	0	4,600
2027 (W)	5,100	110	0	5,200
2028 (W)	3,900	100	0	4,000
2029 (C)	3,300	70	0	3,400
2030 (C)	3,100	50	0	3,200
2031 (AN)	4,400	90	0	4,500
2032 (BN)	2,500	60	0	2,600
2033 (AN)	4,000	90	0	4,100
2034 (D)	4,200	90	0	4,300
2035 (W)	5,100	100	0	5,200
2036 (W)	4,900	110	0	5,000
2037 (W)	4,600	100	0	4,700
2038 (D)	4,600	90	0	4,700
2039 (W)	4,800	100	0	4,900
2040 (D)	3,300	80	0	3,400
2041 (C)	3,100	70	0	3,200
2042 (D)	3,400	60	0	3,400
2043 (C)	3,300	70	0	3,400
2044 (C)	2,900	60	0	2,900
2045 (C)	3,500	70	0	3,500
2046 (AN)	4,200	90	0	4,300
2047 (C)	2,800	60	0	2,900
2048 (W)	5,600	90	0	5,700
2049 (W)	4,500	90	0	4,600
2050 (W)	4,400	80	0	4,500
2051 (W)	4,900	110	0	5,000
2052 (W)	3,800	100	0	3,900
2053 (AN)	4,200	90	0	4,300
2054 (D)	3,300	80	0	3,400
2055 (D)	4,400	90	0	4,400
2056 (AN)	4,900	90	0	5,000
2057 (BN)	5,400	90	0	5,500

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,900	90	0	4,000
2059 (W)		5,000	110	0	5,100
2060 (D)		3,300	60	0	3,300
2061 (C)		4,000	70	0	4,000
2062 (D)		3,000	60	0	3,000
2063 (BN)		3,900	100	0	4,000
2064 (W)		5,100	90	0	5,200
2065 (BN)		2,800	60	0	2,800
2066 (D)		5,100	80	0	5,100
2067 (C)		3,300	60	0	3,400
2068 (C)		4,700	70	0	4,800
2069 (BN)		4,100	80	0	4,200
2070 (W)		5,200	110	0	5,300
2071 (BN)		2,800	60	0	2,900
2072 (W)		5,000	90	0	5,100
Average (2022-2072)		4,100	80	0	4,200
2022-2072	W	4,800	100	0	4,900
	AN	4,300	90	0	4,400
	BN	3,500	70	0	3,600
	D	3,800	80	0	3,900
	C	3,400	70	0	3,500

2.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 37** and **Table 36** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from less than 3 taf annually during some critical and dry years to about 17 taf in 2036.

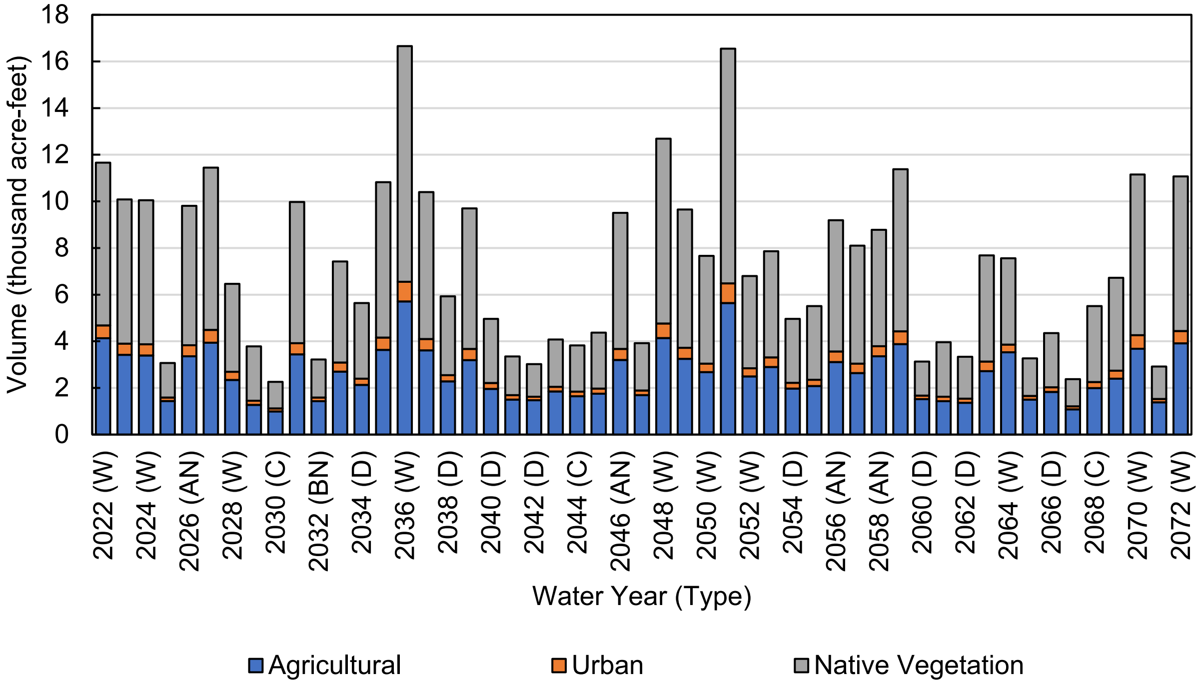

Figure 37. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector

Table 36. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,100	550	7,000	12,000
2023 (W)	3,400	480	6,200	10,000
2024 (W)	3,400	480	6,200	10,000
2025 (BN)	1,400	150	1,500	3,100
2026 (AN)	3,400	470	6,000	9,800
2027 (W)	3,900	550	7,000	11,000
2028 (W)	2,300	350	3,800	6,500
2029 (C)	1,300	180	2,300	3,800
2030 (C)	990	130	1,100	2,300
2031 (AN)	3,400	480	6,100	10,000
2032 (BN)	1,400	160	1,600	3,200
2033 (AN)	2,700	390	4,300	7,400
2034 (D)	2,100	270	3,200	5,600
2035 (W)	3,600	530	6,700	11,000
2036 (W)	5,700	840	10,000	17,000
2037 (W)	3,600	490	6,300	10,000
2038 (D)	2,300	270	3,400	5,900
2039 (W)	3,200	480	6,000	9,700
2040 (D)	2,000	250	2,800	5,000
2041 (C)	1,500	190	1,700	3,400
2042 (D)	1,500	150	1,400	3,000
2043 (C)	1,900	200	2,000	4,100
2044 (C)	1,600	200	2,000	3,800
2045 (C)	1,800	220	2,400	4,400
2046 (AN)	3,200	470	5,800	9,500
2047 (C)	1,700	200	2,000	3,900
2048 (W)	4,100	620	7,900	13,000
2049 (W)	3,300	470	5,900	9,700
2050 (W)	2,700	360	4,600	7,700
2051 (W)	5,600	840	10,000	17,000
2052 (W)	2,500	350	4,000	6,800
2053 (AN)	2,900	410	4,600	7,900
2054 (D)	2,000	250	2,700	5,000
2055 (D)	2,100	270	3,200	5,500
2056 (AN)	3,100	450	5,600	9,200
2057 (BN)	2,600	400	5,100	8,100

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,400	430	5,000	8,800
2059 (W)		3,900	550	7,000	11,000
2060 (D)		1,500	150	1,500	3,100
2061 (C)		1,400	190	2,300	4,000
2062 (D)		1,400	180	1,800	3,300
2063 (BN)		2,700	410	4,600	7,700
2064 (W)		3,500	330	3,700	7,600
2065 (BN)		1,500	160	1,600	3,300
2066 (D)		1,800	200	2,300	4,400
2067 (C)		1,100	130	1,200	2,400
2068 (C)		2,000	260	3,300	5,500
2069 (BN)		2,400	340	4,000	6,700
2070 (W)		3,700	580	6,900	11,000
2071 (BN)		1,400	150	1,400	2,900
2072 (W)		3,900	530	6,600	11,000
Average (2022-2072)		2,600	350	4,200	7,100
2022-2072	W	3,700	520	6,400	11,000
	AN	3,200	440	5,300	8,900
	BN	1,900	250	2,800	5,000
	D	1,800	220	2,500	4,500
	C	1,500	190	2,000	3,700

2.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 38** and **Table 37.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts, as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than 4 taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.1 taf per year.

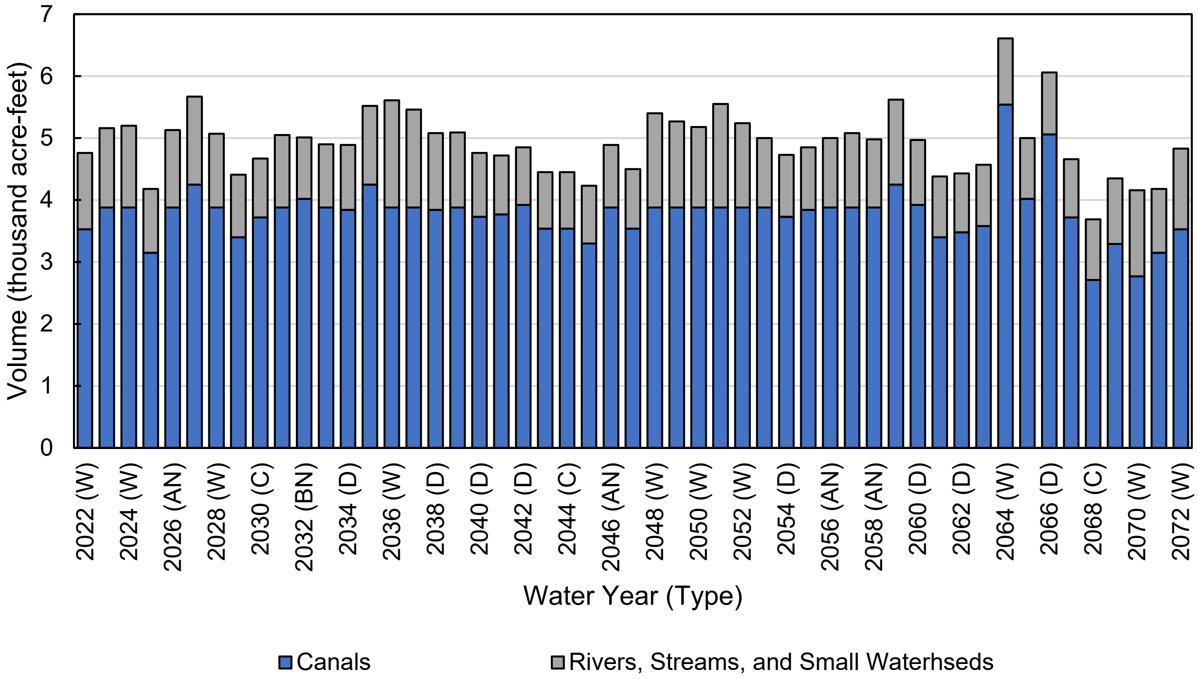

Figure 38. Antelope Subbasin Projected (Current Land Use) Infiltration of Surface Water, by Water Use Sector

Table 37. Antelope Subbasin Projected (Current Land Use) Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	3,500	1,200	4,800
2023 (W)	3,900	1,300	5,200
2024 (W)	3,900	1,300	5,200
2025 (BN)	3,200	1,000	4,200
2026 (AN)	3,900	1,300	5,100
2027 (W)	4,300	1,400	5,700
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	950	4,700
2031 (AN)	3,900	1,200	5,100
2032 (BN)	4,000	990	5,000
2033 (AN)	3,900	1,000	4,900
2034 (D)	3,800	1,100	4,900
2035 (W)	4,300	1,300	5,500
2036 (W)	3,900	1,700	5,600
2037 (W)	3,900	1,600	5,500
2038 (D)	3,800	1,200	5,100
2039 (W)	3,900	1,200	5,100
2040 (D)	3,700	1,000	4,800
2041 (C)	3,800	950	4,700
2042 (D)	3,900	930	4,900
2043 (C)	3,500	910	4,500
2044 (C)	3,500	910	4,500
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,000	4,900
2047 (C)	3,500	960	4,500
2048 (W)	3,900	1,500	5,400
2049 (W)	3,900	1,400	5,300
2050 (W)	3,900	1,300	5,200
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,200
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,700	1,000	4,700
2055 (D)	3,800	1,000	4,900
2056 (AN)	3,900	1,100	5,000
2057 (BN)	3,900	1,200	5,100

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2058 (AN)		3,900	1,100	5,000
2059 (W)		4,300	1,400	5,600
2060 (D)		3,900	1,100	5,000
2061 (C)		3,400	980	4,400
2062 (D)		3,500	950	4,400
2063 (BN)		3,600	990	4,600
2064 (W)		5,500	1,100	6,600
2065 (BN)		4,000	980	5,000
2066 (D)		5,100	1,000	6,100
2067 (C)		3,700	940	4,700
2068 (C)		2,700	980	3,700
2069 (BN)		3,300	1,100	4,400
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,300	4,800
Average (2022-2072)		3,800	1,200	4,900
2022-2072	W	3,900	1,400	5,300
	AN	3,900	1,100	5,000
	BN	3,600	1,000	4,600
	D	3,900	1,000	5,000
	C	3,500	950	4,400

2.1.3 Change in Root Zone Storage

Estimates of projected change in root zone storage are provided in **Figure 39** and **Table 38**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average near zero over many years.

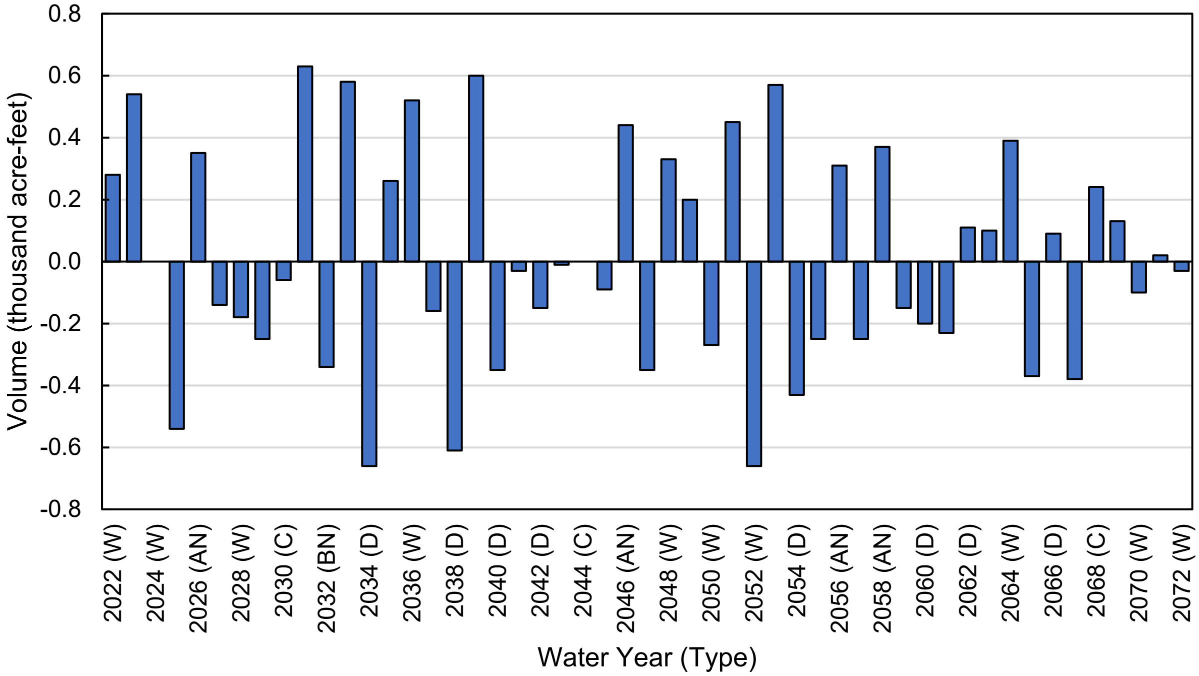

Figure 39. Antelope Subbasin Projected (Current Land Use) Change in Root Zone Storage

Table 38. Antelope Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet)

Water Year (Type)	Change in Root Zone Storage
2022 (W)	280
2023 (W)	540
2024 (W)	0
2025 (BN)	-540
2026 (AN)	350
2027 (W)	-140
2028 (W)	-180
2029 (C)	-250
2030 (C)	-60
2031 (AN)	630
2032 (BN)	-340
2033 (AN)	580
2034 (D)	-660
2035 (W)	260
2036 (W)	520
2037 (W)	-160
2038 (D)	-610
2039 (W)	600
2040 (D)	-350
2041 (C)	-30
2042 (D)	-150
2043 (C)	-10
2044 (C)	0
2045 (C)	-90
2046 (AN)	440
2047 (C)	-350
2048 (W)	330
2049 (W)	200
2050 (W)	-270
2051 (W)	450
2052 (W)	-660
2053 (AN)	570
2054 (D)	-430
2055 (D)	-250
2056 (AN)	310
2057 (BN)	-250

Water Year (Type)		Change in Root Zone Storage
2058 (AN)		370
2059 (W)		-150
2060 (D)		-200
2061 (C)		-230
2062 (D)		110
2063 (BN)		100
2064 (W)		390
2065 (BN)		-370
2066 (D)		90
2067 (C)		-380
2068 (C)		240
2069 (BN)		130
2070 (W)		-100
2071 (BN)		20
2072 (W)		-30
Average (2022-2072)		10
2022-2072	W	100
	AN	460
	BN	-180
	D	-270
	C	-120

2.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction. When calculated for the projected (current land use) water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from projected cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the projected (current land use) water budget period are presented below for the Antelope Subbasin. **Figure 40** and **Table 39** show the average net recharge from the

SWS over 2022-2072 based on the projected (current land use) water budget results. Under current land use conditions, the average net recharge in the Antelope Subbasin was projected as approximately 0.70 taf per year between 2022-2072, indicating net inflows to the GWS from the SWS during the projected (current land use) water budget period. As illustrated on the cumulative net recharge plot in **Figure 40**, this results in a cumulative net positive recharge (i.e., net recharge to the GWS from the SWS) of about eight (8) taf over the 51-year projected (current land use) water budget period. Although this means there is projected to be more recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage will increase or that the Subbasin groundwater system will be sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

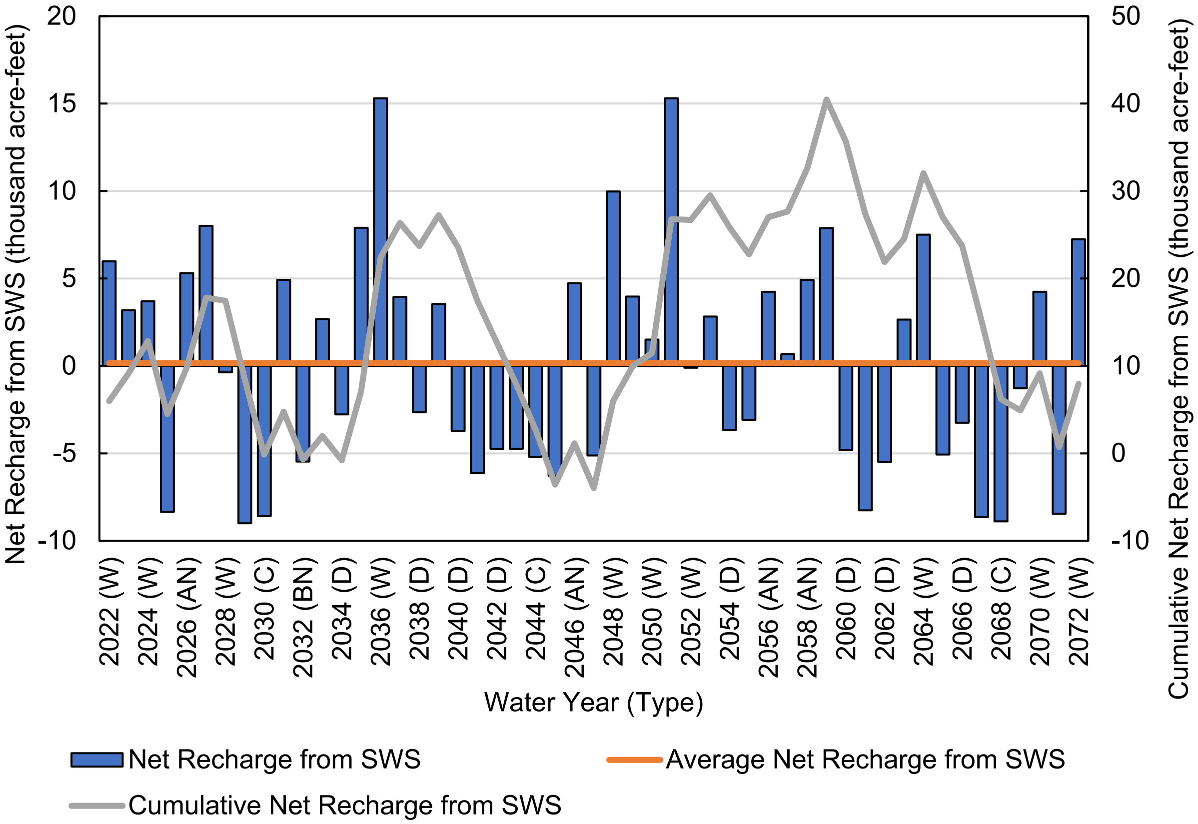

Figure 40. Antelope Subbasin Projected (Current Land Use) Net Recharge Overview, 2022-2072

Table 39. Antelope Subbasin Projected (Current Land Use) Water Budget: Average Net Recharge from SWS, by Water Year Type (acre-feet)

Year Type	Number of Years	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	18	4,900	10,660	5,300	14,810	6,050
AN	7	4,390	8,930	4,990	14,090	4,220
BN	7	3,560	5,000	4,620	16,790	-3,610
D	9	3,910	4,540	4,960	17,200	-3,790
C	10	3,460	3,740	4,420	18,700	-7,080
Annual Average (2022-2072)	51	4,190	7,120	4,930	16,170	70

2.2 Groundwater System Water Budget Results

Projected (Current Land Use) water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

2.2.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin are projected to occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows are projected to occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

2.2.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Projected lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 41** and **Table 40**. The total projected net subsurface flows to and from all adjacent subbasins averages about 42 taf per year occurring as inflow to the Antelope Subbasin. The largest projected subsurface flows occur across the boundary with the Bend Subbasin with somewhat less subsurface flow occurring across the boundaries with the Red Bluff Subbasin although these flows are still considerable. Much smaller flows occur across the boundaries with the Los Molinos Subbasin.

Projected subsurface flows with the Bend Subbasin average about 21 taf occurring as inflows to the Antelope Subbasin. This makes up about half of the projected subsurface inflows to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Red Bluff Subbasin to the Antelope Subbasin are projected to average about 2.9 and 418 taf, respectively. The projected magnitudes of the subsurface inflows from the Bend Subbasin are relatively consistent from year to year; however, the inflows/outflows with the

Red Bluff and Los Molinos Subbasins are somewhat variable. Projected subsurface flows across the boundary with the Los Molinos Subbasin generally occur as inflows with some smaller volumes of outflows occurring periodically.

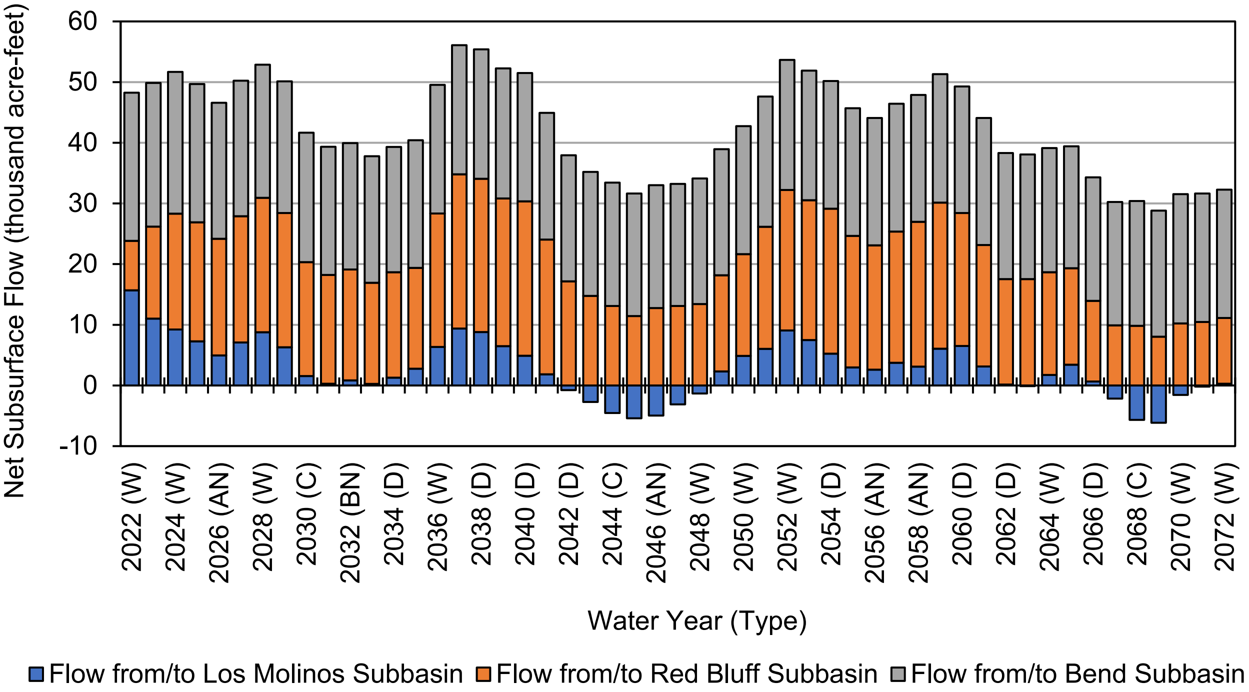

Figure 41. Antelope Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 40. Antelope Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

Water Year (Type)	Red Bluff	Los Molinos	Bend	Total
2022 (BN)	8,200	16,000	24,000	49,000
2023 (W)	15,000	11,000	24,000	50,000
2024 (W)	19,000	9,200	23,000	52,000
2025 (W)	20,000	7,300	23,000	50,000
2026 (BN)	19,000	4,900	22,000	47,000
2027 (AN)	21,000	7,100	22,000	51,000
2028 (W)	22,000	8,800	22,000	53,000
2029 (W)	22,000	6,300	22,000	50,000
2030 (C)	19,000	1,600	21,000	42,000
2031 (C)	18,000	290	21,000	40,000
2032 (AN)	18,000	850	21,000	40,000
2033 (BN)	17,000	260	21,000	38,000
2034 (AN)	17,000	1,300	21,000	40,000
2035 (D)	17,000	2,800	21,000	41,000
2036 (W)	22,000	6,400	21,000	50,000
2037 (W)	25,000	9,400	21,000	56,000
2038 (W)	25,000	8,800	21,000	56,000
2039 (D)	24,000	6,500	21,000	53,000
2040 (W)	25,000	4,900	21,000	52,000
2041 (D)	22,000	1,800	21,000	45,000
2042 (C)	17,000	-780	21,000	37,000
2043 (D)	15,000	-2,700	20,000	33,000
2044 (C)	13,000	-4,500	20,000	29,000
2045 (C)	11,000	-5,400	20,000	27,000
2046 (C)	13,000	-5,000	20,000	28,000
2047 (AN)	13,000	-3,100	20,000	30,000
2048 (C)	13,000	-1,300	21,000	33,000
2049 (W)	16,000	2,300	21,000	39,000
2050 (W)	17,000	4,900	21,000	43,000
2051 (W)	20,000	6,000	21,000	48,000
2052 (W)	23,000	9,100	21,000	54,000
2053 (W)	23,000	7,500	21,000	52,000
2054 (AN)	24,000	5,200	21,000	50,000
2055 (D)	22,000	3,000	21,000	46,000
2056 (D)	21,000	2,600	21,000	44,000
2057 (AN)	22,000	3,700	21,000	47,000
2058 (BN)	24,000	3,100	21,000	48,000
2059 (AN)	24,000	6,100	21,000	52,000

Water Year (Type)		Red Bluff	Los Molinos	Bend	Total
2060 (W)		22,000	6,500	21,000	50,000
2061 (D)		20,000	3,100	21,000	44,000
2062 (C)		17,000	150	21,000	39,000
2063 (D)		18,000	-110	21,000	38,000
2064 (BN)		17,000	1,700	20,000	39,000
2065 (W)		16,000	3,400	20,000	40,000
2066 (BN)		13,000	650	20,000	35,000
2067 (D)		9,900	-2,200	20,000	28,000
2068 (C)		9,800	-5,700	21,000	25,000
2069 (C)		8,000	-6,100	21,000	23,000
2070 (BN)		10,000	-1,600	21,000	30,000
2071 (W)		10,000	-200	21,000	32,000
2072 (W)		11,000	290	21,000	33,000
Average (2022-2072)		18,000	2,900	21,000	42,000
2022-2072	W	18,000	5,800	22,000	46,000
	AN	19,000	2,000	21,000	43,000
	BN	16,000	1,300	21,000	38,000
	D	20,000	3,300	21,000	45,000
	C	14,000	1,700	21,000	37,000

Note: positive values represent net inflows to Antelope Subbasin, negative values represent net outflows from Antelope Subbasin.

2.2.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Projected lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 42** and **Table 41**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average projected subsurface inflow from the upland areas is about 0.270 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

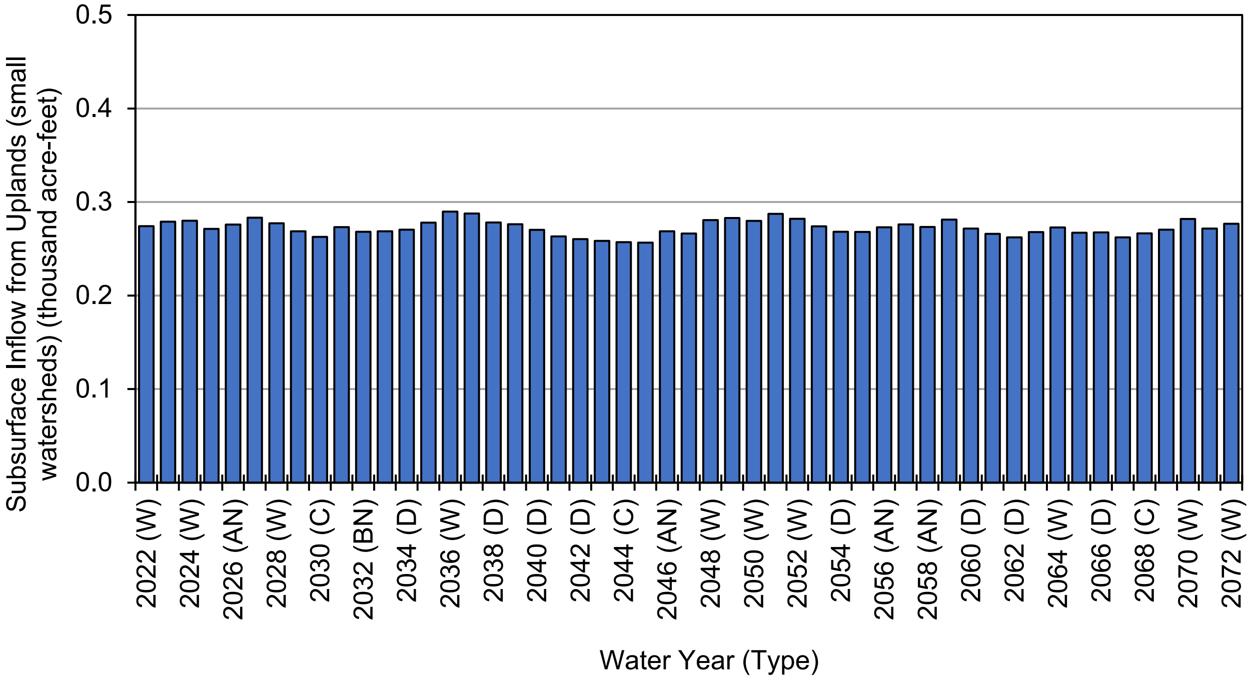

Figure 42. Antelope Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Upland Areas

Table 41. Antelope Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (Small Watersheds) (acre-feet)

Water Year (Type)	Subsurface Inflow from Uplands
2022 (W)	270
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280

Water Year (Type)		Subsurface Inflow from Uplands
2060 (D)		270
2061 (C)		270
2062 (D)		260
2063 (BN)		270
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

2.2.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 43** and **Table 42**. The average annual deep percolation from the SWS over the projected water budget period is approximately 11 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

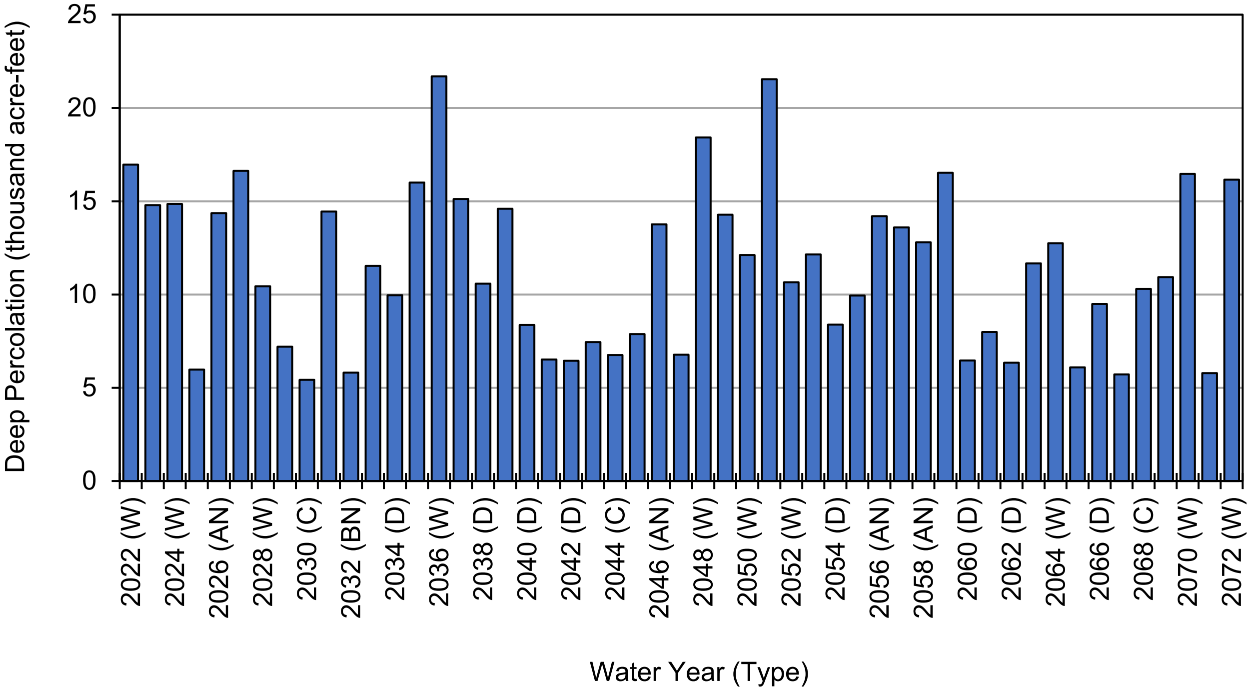

Figure 43. Antelope Subbasin Projected (Current Land Use) Deep Percolation

Table 42. Antelope Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet)

Water Year (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	6,000
2026 (AN)	14,000
2027 (W)	17,000
2028 (W)	10,000
2029 (C)	7,200
2030 (C)	5,400
2031 (AN)	14,000
2032 (BN)	5,800
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	22,000
2037 (W)	15,000
2038 (D)	11,000
2039 (W)	15,000
2040 (D)	8,400
2041 (C)	6,500
2042 (D)	6,400
2043 (C)	7,500
2044 (C)	6,800
2045 (C)	7,900
2046 (AN)	14,000
2047 (C)	6,800
2048 (W)	18,000
2049 (W)	14,000
2050 (W)	12,000
2051 (W)	22,000
2052 (W)	11,000
2053 (AN)	12,000
2054 (D)	8,400
2055 (D)	9,900
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	17,000

Water Year (Type)		Deep Percolation from the SWS
2060 (D)		6,500
2061 (C)		8,000
2062 (D)		6,300
2063 (BN)		12,000
2064 (W)		13,000
2065 (BN)		6,100
2066 (D)		9,500
2067 (C)		5,700
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,800
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	16,000
	AN	13,000
	BN	8,600
	D	8,400
	C	7,100

2.2.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 44** and **Table 43**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the projected annual net seepage values are always highly negative with an average annual net stream seepage value of -38 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

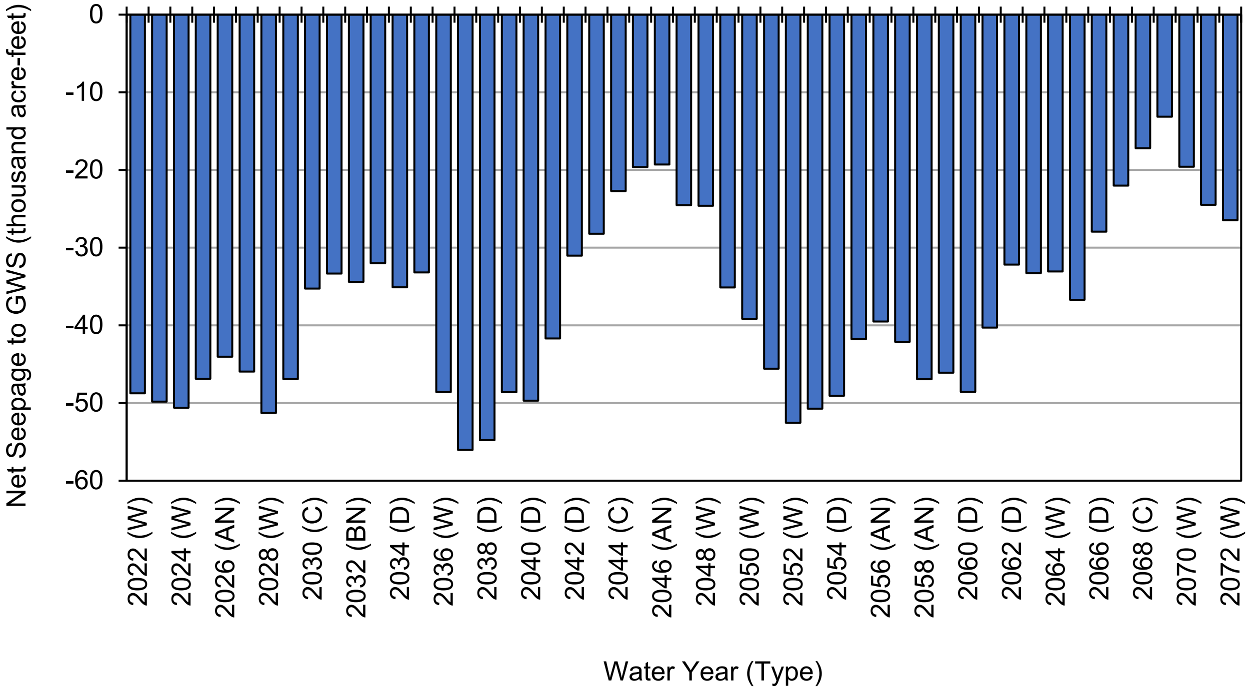

Figure 44. Antelope Subbasin Projected (Current Land Use) Net Stream Seepage to GWS/Discharge to Surface Water

Table 43. Antelope Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet)

Water Year (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-49,000
2023 (W)	-50,000
2024 (W)	-51,000
2025 (BN)	-47,000
2026 (AN)	-44,000
2027 (W)	-46,000
2028 (W)	-51,000
2029 (C)	-47,000
2030 (C)	-35,000
2031 (AN)	-33,000
2032 (BN)	-34,000
2033 (AN)	-32,000
2034 (D)	-35,000
2035 (W)	-33,000
2036 (W)	-49,000
2037 (W)	-56,000
2038 (D)	-55,000
2039 (W)	-49,000
2040 (D)	-50,000
2041 (C)	-42,000
2042 (D)	-31,000
2043 (C)	-28,000
2044 (C)	-23,000
2045 (C)	-20,000
2046 (AN)	-19,000
2047 (C)	-25,000
2048 (W)	-25,000
2049 (W)	-35,000
2050 (W)	-39,000
2051 (W)	-46,000
2052 (W)	-53,000
2053 (AN)	-51,000
2054 (D)	-49,000
2055 (D)	-42,000
2056 (AN)	-40,000
2057 (BN)	-42,000
2058 (AN)	-47,000
2059 (W)	-46,000

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
2060 (D)		-49,000
2061 (C)		-40,000
2062 (D)		-32,000
2063 (BN)		-33,000
2064 (W)		-33,000
2065 (BN)		-37,000
2066 (D)		-28,000
2067 (C)		-22,000
2068 (C)		-17,000
2069 (BN)		-13,000
2070 (W)		-20,000
2071 (BN)		-24,000
2072 (W)		-26,000
Average (2022-2072)		-38,000
2022-2072	W	-42,000
	AN	-38,000
	BN	-33,000
	D	-41,000
	C	-32,000

Note: negative values indicate net groundwater discharge to surface water

2.2.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Projected groundwater extractions are summarized in **Figure 45** and **Table 44** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the projected water budget period average about -15 taf per year. Overall, groundwater pumping represents a larger fraction (about eight times) of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -15 taf over the projected period and groundwater uptake averaged about -1.2 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

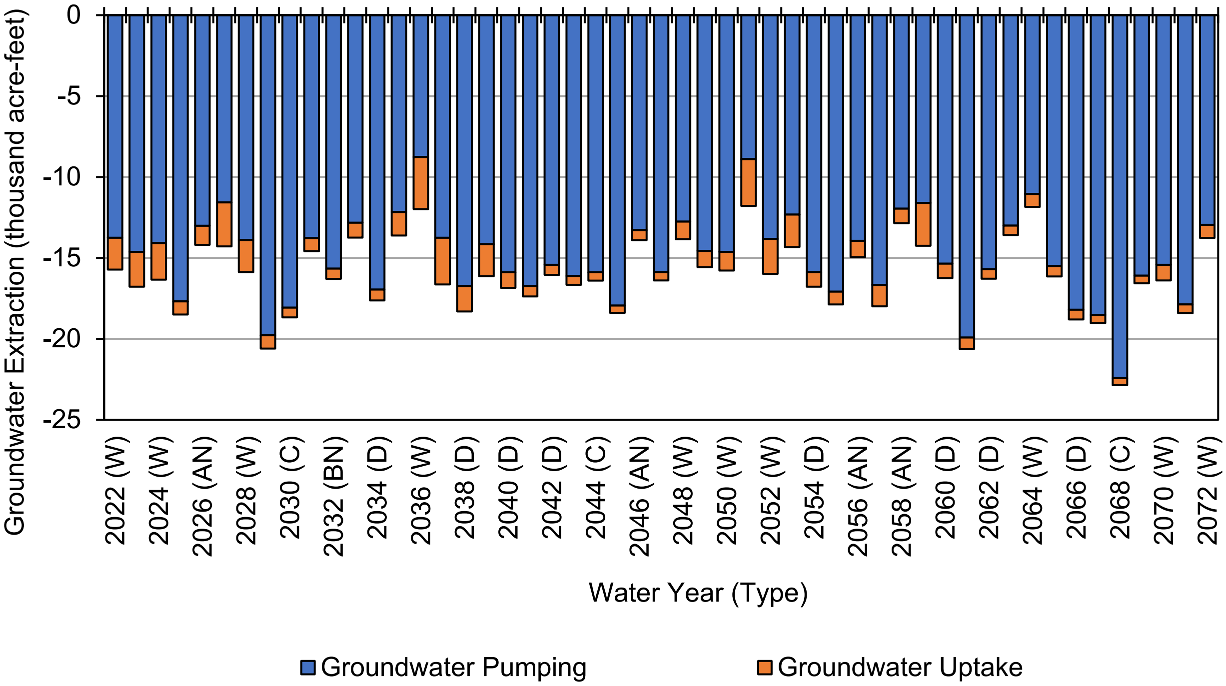

Figure 45. Antelope Subbasin Projected (Current Land Use) Groundwater Extractions

Table 44. Antelope Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet)

Water Year (Type)	Groundwater Pumping
2022 (W)	-14,000
2023 (W)	-15,000
2024 (W)	-14,000
2025 (BN)	-18,000
2026 (AN)	-13,000
2027 (W)	-12,000
2028 (W)	-14,000
2029 (C)	-20,000
2030 (C)	-18,000
2031 (AN)	-14,000
2032 (BN)	-16,000
2033 (AN)	-13,000
2034 (D)	-17,000
2035 (W)	-12,000
2036 (W)	-8,800
2037 (W)	-14,000
2038 (D)	-17,000
2039 (W)	-14,000
2040 (D)	-16,000
2041 (C)	-17,000
2042 (D)	-15,000
2043 (C)	-16,000
2044 (C)	-16,000
2045 (C)	-18,000
2046 (AN)	-13,000
2047 (C)	-16,000
2048 (W)	-13,000
2049 (W)	-15,000
2050 (W)	-15,000
2051 (W)	-8,900
2052 (W)	-14,000
2053 (AN)	-12,000
2054 (D)	-16,000
2055 (D)	-17,000
2056 (AN)	-14,000
2057 (BN)	-17,000
2058 (AN)	-12,000
2059 (W)	-12,000

Water Year (Type)		Groundwater Pumping
2060 (D)		-15,000
2061 (C)		-20,000
2062 (D)		-16,000
2063 (BN)		-13,000
2064 (W)		-11,000
2065 (BN)		-16,000
2066 (D)		-18,000
2067 (C)		-19,000
2068 (C)		-22,000
2069 (BN)		-16,000
2070 (W)		-15,000
2071 (BN)		-18,000
2072 (W)		-13,000
Average (2022-2072)		-15,000
2022-2072	W	-13,000
	AN	-13,000
	BN	-16,000
	D	-16,000
	C	-18,000

2.2.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Projected vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 46** and **Table 45** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 29 taf per year over the projected water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

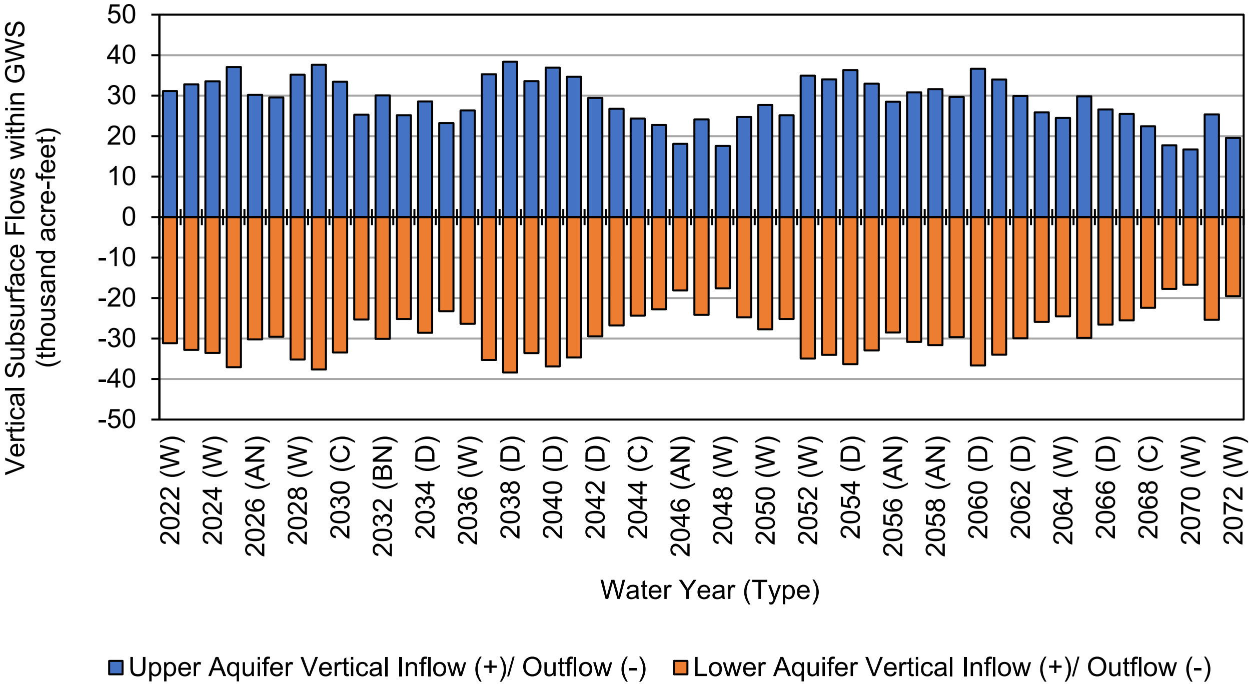

Figure 46. Antelope Subbasin Projected (Current Land Use) Vertical Subsurface Flow within the GWS

Table 45. Antelope Subbasin Projected (Current Land Use) Vertical Subsurface Flows within the GWS (acre-feet)

Water Year (Type)	Upper Aquifer to (-) / from (+) Lower Aquifer
2022 (W)	31,000
2023 (W)	33,000
2024 (W)	34,000
2025 (BN)	37,000
2026 (AN)	30,000
2027 (W)	30,000
2028 (W)	35,000
2029 (C)	38,000
2030 (C)	33,000
2031 (AN)	25,000
2032 (BN)	30,000
2033 (AN)	25,000
2034 (D)	29,000
2035 (W)	23,000
2036 (W)	26,000
2037 (W)	35,000
2038 (D)	38,000
2039 (W)	34,000
2040 (D)	37,000
2041 (C)	35,000
2042 (D)	29,000
2043 (C)	27,000
2044 (C)	24,000
2045 (C)	23,000
2046 (AN)	18,000
2047 (C)	24,000
2048 (W)	18,000
2049 (W)	25,000
2050 (W)	28,000
2051 (W)	25,000
2052 (W)	35,000
2053 (AN)	34,000
2054 (D)	36,000
2055 (D)	33,000
2056 (AN)	28,000
2057 (BN)	31,000
2058 (AN)	32,000
2059 (W)	30,000

Water Year (Type)		Upper Aquifer to (-) / from (+) Lower Aquifer
2060 (D)		37,000
2061 (C)		34,000
2062 (D)		30,000
2063 (BN)		26,000
2064 (W)		25,000
2065 (BN)		30,000
2066 (D)		27,000
2067 (C)		25,000
2068 (C)		22,000
2069 (BN)		18,000
2070 (W)		17,000
2071 (BN)		25,000
2072 (W)		20,000
Average (2022-2072)		29,000
2022-2072	W	28,000
	AN	28,000
	BN	28,000
	D	33,000
	C	29,000

2.2.6 Change in Groundwater Storage

Projected change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 47** and **Figure 48,** and **Table 46**. Values for total change in storage in the GWS and cumulative change in storage over the historical water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the projected period, the average total annual change in groundwater storage is about -0.290 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the projected period is about -15 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are lower in the Lower Aquifer (average -0.130 taf per year) compared to the Upper Aquifer (average -0.160 taf per year).

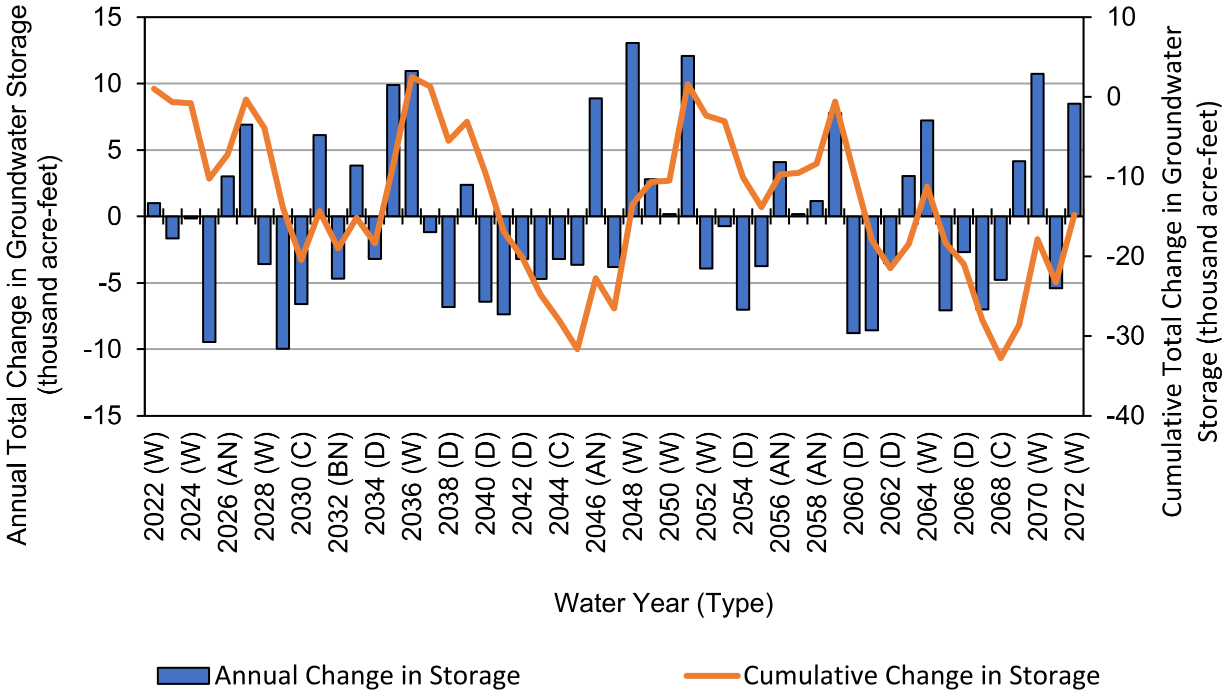

Figure 47. Antelope Subbasin Projected (Current Land Use) Total Change in Storage within the GWS

Table 46. Antelope Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet)

Water Year (Type)	Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2022 (BN)	590	420	1,000	1,000
2023 (W)	-1,300	-340	-1,700	-650
2024 (W)	-210	63	-150	-800
2025 (W)	-5,900	-3,600	-9,500	-10,000
2026 (BN)	2,000	1,000	3,000	-7,200
2027 (AN)	4,200	2,700	6,900	-330
2028 (W)	-2,400	-1,200	-3,600	-3,900
2029 (W)	-6,100	-3,800	-9,900	-14,000
2030 (C)	-3,400	-3,200	-6,600	-20,000
2031 (C)	3,900	2,200	6,100	-14,000
2032 (AN)	-2,900	-1,800	-4,700	-19,000
2033 (BN)	2,500	1,300	3,800	-15,000
2034 (AN)	-2,000	-1,200	-3,200	-18,000
2035 (D)	6,200	3,700	9,900	-8,500
2036 (W)	6,500	4,500	11,000	2,500
2037 (W)	-1,100	-57	-1,200	1,300
2038 (W)	-4,400	-2,400	-6,800	-5,500
2039 (D)	1,700	690	2,400	-3,100
2040 (W)	-4,000	-2,400	-6,400	-9,500
2041 (D)	-4,400	-3,000	-7,400	-17,000
2042 (C)	-1,500	-1,700	-3,200	-20,000
2043 (D)	-2,800	-1,900	-4,700	-25,000
2044 (C)	-1,700	-1,500	-3,200	-28,000
2045 (C)	-2,100	-1,500	-3,600	-32,000
2046 (C)	5,800	3,100	8,900	-23,000
2047 (AN)	-2,400	-1,400	-3,800	-27,000
2048 (C)	8,100	5,000	13,000	-13,000
2049 (W)	1,500	1,300	2,800	-11,000
2050 (W)	-250	430	190	-10,000
2051 (W)	7,300	4,800	12,000	1,600
2052 (W)	-3,000	-940	-3,900	-2,300
2053 (W)	-470	-270	-740	-3,100
2054 (AN)	-4,300	-2,700	-7,000	-10,000
2055 (D)	-2,200	-1,500	-3,800	-14,000
2056 (D)	2,700	1,400	4,100	-9,700
2057 (AN)	22	160	190	-9,500
2058 (BN)	770	400	1,200	-8,400

Water Year (Type)		Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2059 (AN)		4,700	3,100	7,800	-600
2060 (W)		-5,400	-3,400	-8,800	-9,400
2061 (D)		-5,300	-3,300	-8,600	-18,000
2062 (C)		-1,800	-1,800	-3,500	-21,000
2063 (D)		2,100	960	3,000	-18,000
2064 (BN)		4,700	2,600	7,200	-11,000
2065 (W)		-4,600	-2,400	-7,100	-18,000
2066 (BN)		-1,400	-1,300	-2,700	-21,000
2067 (D)		-4,000	-3,000	-7,000	-28,000
2068 (C)		-2,800	-1,900	-4,800	-33,000
2069 (C)		2,900	1,300	4,200	-29,000
2070 (BN)		6,400	4,300	11,000	-18,000
2071 (W)		-3,400	-2,100	-5,400	-23,000
2072 (W)		5,300	3,100	8,500	-15,000
Average (2022-2072)		-160	-130	-290	
2022-2072	W	2,700	1,900	4,600	
	AN	2,500	1,300	3,800	
	BN	-1,700	-1,100	-2,700	
	D	-3,000	-2,100	-5,000	
	C	-3,500	-2,400	-6,800	

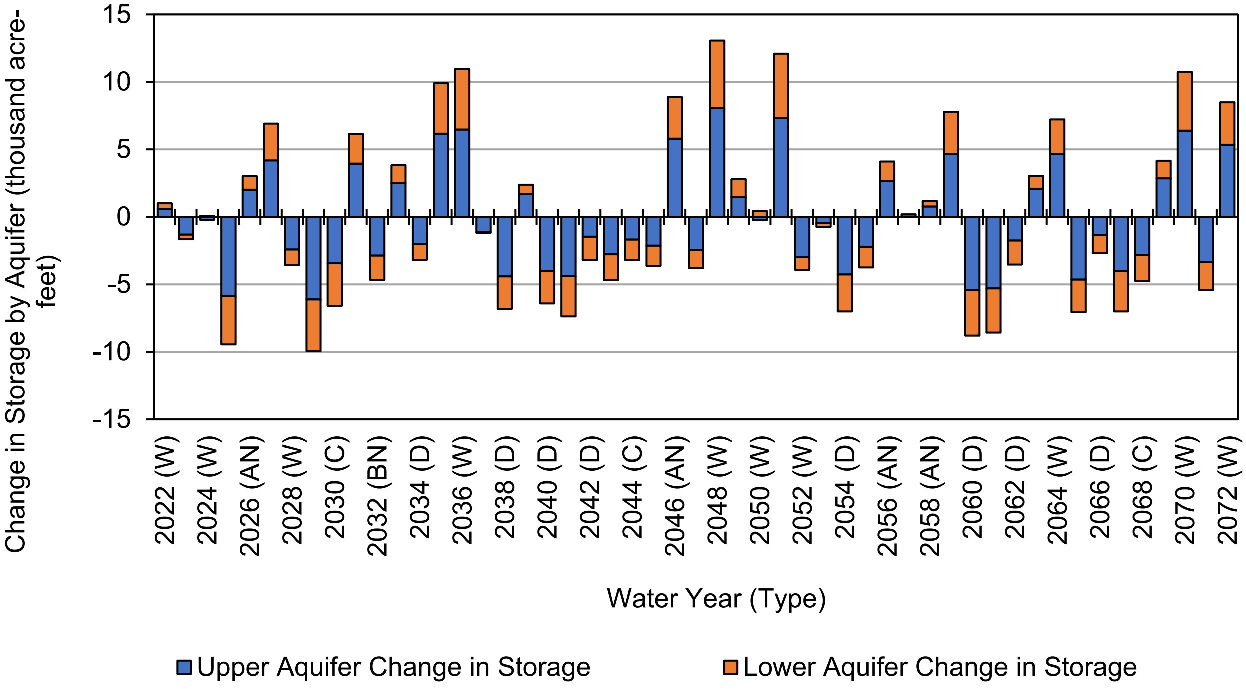

Figure 48. Antelope Subbasin Projected (Current Land Use) Change in Groundwater Storage by Aquifer

3 DETAILED PROJECTED (FUTURE LAND USE) WATER BUDGET

This section presents the results of the Projected (Future Land Use) scenario. The Future Land Use scenario assumes transient land use conditions based on assumed projected development within the Antelope Subbasin.

3.1 Surface Water System Water Budget Results

3.1.1 Inflows

3.1.1.1 *Surface Water Inflow by Water Source Type*

The projected annual volume of surface water inflows is summarized by water source type in **Figure 49** and **Table 47**. Over the projected (future land use) period, surface water inflows average about 43 taf per year. Virtually, all inflows of the SWS are local supplies. The CVP supplies are very small and average about 0.610 taf per year.

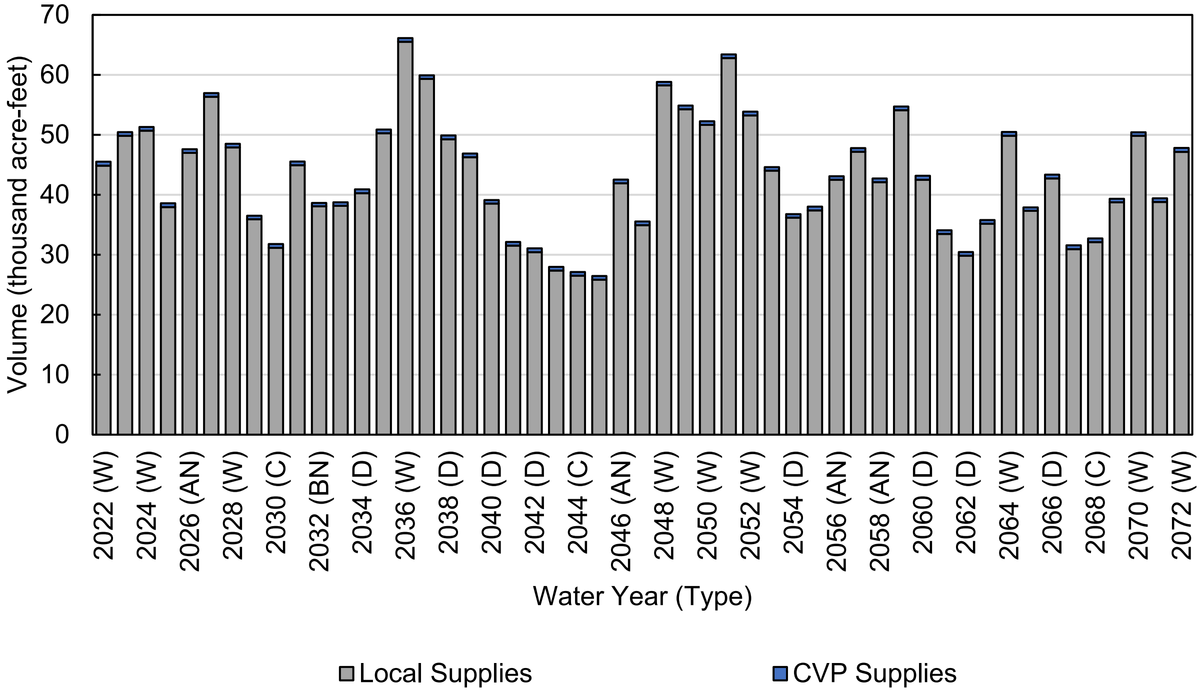

Figure 49. Antelope Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type

Table 47. Antelope Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	45,000	46,000
2023 (W)	610	50,000	50,000
2024 (W)	610	51,000	51,000
2025 (BN)	630	38,000	39,000
2026 (AN)	610	47,000	48,000
2027 (W)	610	56,000	57,000
2028 (W)	620	48,000	49,000
2029 (C)	600	36,000	37,000
2030 (C)	640	31,000	32,000
2031 (AN)	610	45,000	46,000
2032 (BN)	560	38,000	39,000
2033 (AN)	580	38,000	39,000
2034 (D)	640	40,000	41,000
2035 (W)	610	50,000	51,000
2036 (W)	610	66,000	66,000
2037 (W)	610	59,000	60,000
2038 (D)	640	49,000	50,000
2039 (W)	610	46,000	47,000
2040 (D)	600	39,000	39,000
2041 (C)	610	32,000	32,000
2042 (D)	650	30,000	31,000
2043 (C)	610	27,000	28,000
2044 (C)	610	27,000	27,000
2045 (C)	610	26,000	26,000
2046 (AN)	610	42,000	43,000
2047 (C)	610	35,000	36,000
2048 (W)	610	58,000	59,000
2049 (W)	610	54,000	55,000
2050 (W)	610	52,000	52,000
2051 (W)	610	63,000	63,000
2052 (W)	620	53,000	54,000
2053 (AN)	580	44,000	45,000
2054 (D)	600	36,000	37,000
2055 (D)	640	37,000	38,000
2056 (AN)	580	43,000	43,000
2057 (BN)	620	47,000	48,000

Water Year (Type)		CVP Supplies	Local Supplies	Total
2058 (AN)		600	42,000	43,000
2059 (W)		610	54,000	55,000
2060 (D)		650	43,000	43,000
2061 (C)		600	33,000	34,000
2062 (D)		620	30,000	30,000
2063 (BN)		610	35,000	36,000
2064 (W)		630	50,000	50,000
2065 (BN)		560	37,000	38,000
2066 (D)		650	43,000	43,000
2067 (C)		640	31,000	32,000
2068 (C)		610	32,000	33,000
2069 (BN)		580	39,000	39,000
2070 (W)		580	50,000	50,000
2071 (BN)		630	39,000	39,000
2072 (W)		650	47,000	48,000
Average (2022-2072)		610	43,000	43,000
2022-2072	W	620	53,000	54,000
	AN	600	43,000	44,000
	BN	600	39,000	40,000
	D	630	39,000	39,000
	C	610	31,000	32,000

3.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Figure 50** and **Table 48**. Total precipitation is highly variable between years in the study area, ranging from approximately 30 taf (18.6 inches) during average critically dry years to 56 taf (34.7 inches) during average wet years.

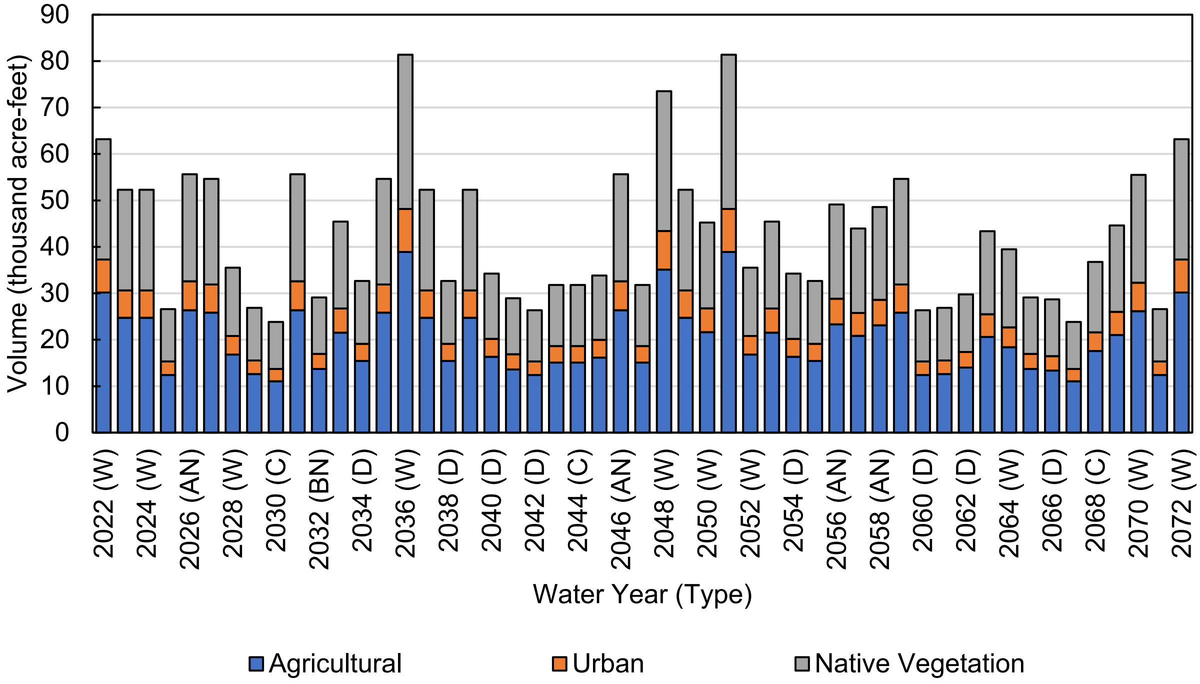

Figure 50. Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector

Table 48. Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	30,000	7,100	26,000	63,000
2023 (W)	25,000	5,900	22,000	52,000
2024 (W)	25,000	5,900	22,000	52,000
2025 (BN)	12,000	2,900	11,000	27,000
2026 (AN)	26,000	6,200	23,000	56,000
2027 (W)	26,000	6,100	23,000	55,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	13,000	2,900	11,000	27,000
2030 (C)	11,000	2,700	10,000	24,000
2031 (AN)	26,000	6,200	23,000	56,000
2032 (BN)	14,000	3,200	12,000	29,000
2033 (AN)	22,000	5,200	19,000	45,000
2034 (D)	15,000	3,700	14,000	33,000
2035 (W)	26,000	6,100	23,000	55,000
2036 (W)	39,000	9,300	33,000	81,000
2037 (W)	25,000	5,900	22,000	52,000
2038 (D)	15,000	3,700	14,000	33,000
2039 (W)	25,000	5,900	22,000	52,000
2040 (D)	16,000	3,900	14,000	34,000
2041 (C)	14,000	3,300	12,000	29,000
2042 (D)	12,000	2,900	11,000	26,000
2043 (C)	15,000	3,600	13,000	32,000
2044 (C)	15,000	3,600	13,000	32,000
2045 (C)	16,000	3,800	14,000	34,000
2046 (AN)	26,000	6,200	23,000	56,000
2047 (C)	15,000	3,600	13,000	32,000
2048 (W)	35,000	8,300	30,000	74,000
2049 (W)	25,000	5,900	22,000	52,000
2050 (W)	22,000	5,100	18,000	45,000
2051 (W)	39,000	9,300	33,000	81,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	22,000	5,200	19,000	45,000
2054 (D)	16,000	3,900	14,000	34,000
2055 (D)	15,000	3,700	14,000	33,000
2056 (AN)	23,000	5,500	20,000	49,000
2057 (BN)	21,000	4,900	18,000	44,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		23,000	5,500	20,000	49,000
2059 (W)		26,000	6,100	23,000	55,000
2060 (D)		12,000	2,900	11,000	26,000
2061 (C)		13,000	2,900	11,000	27,000
2062 (D)		14,000	3,300	12,000	30,000
2063 (BN)		21,000	4,900	18,000	43,000
2064 (W)		18,000	4,300	17,000	39,000
2065 (BN)		14,000	3,200	12,000	29,000
2066 (D)		13,000	3,100	12,000	29,000
2067 (C)		11,000	2,700	10,000	24,000
2068 (C)		18,000	4,000	15,000	37,000
2069 (BN)		21,000	5,000	19,000	45,000
2070 (W)		26,000	6,100	23,000	56,000
2071 (BN)		12,000	2,900	11,000	27,000
2072 (W)		30,000	7,100	26,000	63,000
Average (2022-2072)		20,000	4,800	18,000	43,000
2022-2072	W	26,000	6,200	23,000	56,000
	AN	24,000	5,700	21,000	51,000
	BN	16,000	3,900	15,000	35,000
	D	15,000	3,500	13,000	31,000
	C	14,000	3,300	12,000	30,000

3.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 51** and **Table 49**. Virtually all groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 15 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 13 taf in wet years to 18 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 52** and **Table 50**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, totaling 0.1 taf and 0.790 taf per year, on average.

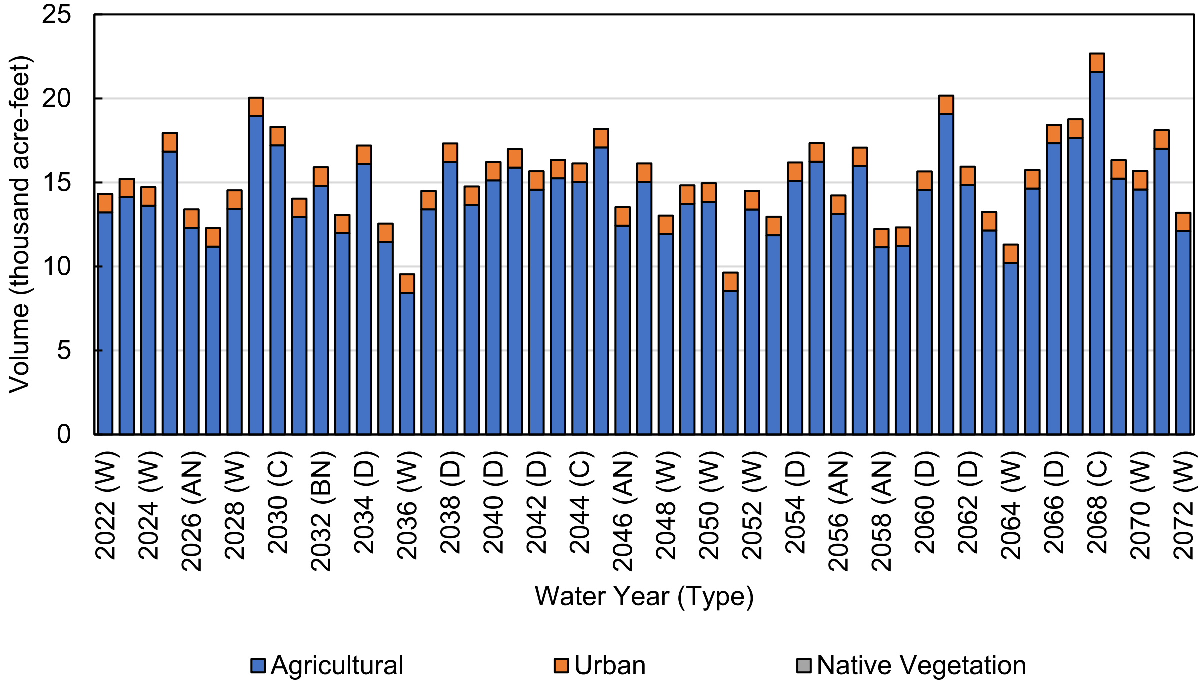

Figure 51. Antelope Subbasin Projected (Future Land Use) Groundwater Pumping, by Water Use Sector

Table 49. Antelope Subbasin Projected (Future Land Use) Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,100	0	14,000
2023 (W)	14,000	1,100	0	15,000
2024 (W)	14,000	1,100	0	15,000
2025 (BN)	17,000	1,100	0	18,000
2026 (AN)	12,000	1,100	0	13,000
2027 (W)	11,000	1,100	0	12,000
2028 (W)	13,000	1,100	0	15,000
2029 (C)	19,000	1,100	0	20,000
2030 (C)	17,000	1,100	0	18,000
2031 (AN)	13,000	1,100	0	14,000
2032 (BN)	15,000	1,100	0	16,000
2033 (AN)	12,000	1,100	0	13,000
2034 (D)	16,000	1,100	0	17,000
2035 (W)	11,000	1,100	0	13,000
2036 (W)	8,400	1,100	0	9,500
2037 (W)	13,000	1,100	0	15,000
2038 (D)	16,000	1,100	0	17,000
2039 (W)	14,000	1,100	0	15,000
2040 (D)	15,000	1,100	0	16,000
2041 (C)	16,000	1,100	0	17,000
2042 (D)	15,000	1,100	0	16,000
2043 (C)	15,000	1,100	0	16,000
2044 (C)	15,000	1,100	0	16,000
2045 (C)	17,000	1,100	0	18,000
2046 (AN)	12,000	1,100	0	14,000
2047 (C)	15,000	1,100	0	16,000
2048 (W)	12,000	1,100	0	13,000
2049 (W)	14,000	1,100	0	15,000
2050 (W)	14,000	1,100	0	15,000
2051 (W)	8,500	1,100	0	9,600
2052 (W)	13,000	1,100	0	14,000
2053 (AN)	12,000	1,100	0	13,000
2054 (D)	15,000	1,100	0	16,000
2055 (D)	16,000	1,100	0	17,000
2056 (AN)	13,000	1,100	0	14,000
2057 (BN)	16,000	1,100	0	17,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		11,000	1,100	0	12,000
2059 (W)		11,000	1,100	0	12,000
2060 (D)		15,000	1,100	0	16,000
2061 (C)		19,000	1,100	0	20,000
2062 (D)		15,000	1,100	0	16,000
2063 (BN)		12,000	1,100	0	13,000
2064 (W)		10,000	1,100	0	11,000
2065 (BN)		15,000	1,100	0	16,000
2066 (D)		17,000	1,100	0	18,000
2067 (C)		18,000	1,100	0	19,000
2068 (C)		22,000	1,100	0	23,000
2069 (BN)		15,000	1,100	0	16,000
2070 (W)		15,000	1,100	0	16,000
2071 (BN)		17,000	1,100	0	18,000
2072 (W)		12,000	1,100	0	13,000
Average (2022-2072)		14,000	1,100	0	15,000
2022-2072	W	12,000	1,100	0	13,000
	AN	12,000	1,100	0	13,000
	BN	15,000	1,100	0	16,000
	D	16,000	1,100	0	17,000
	C	17,000	1,100	0	18,000

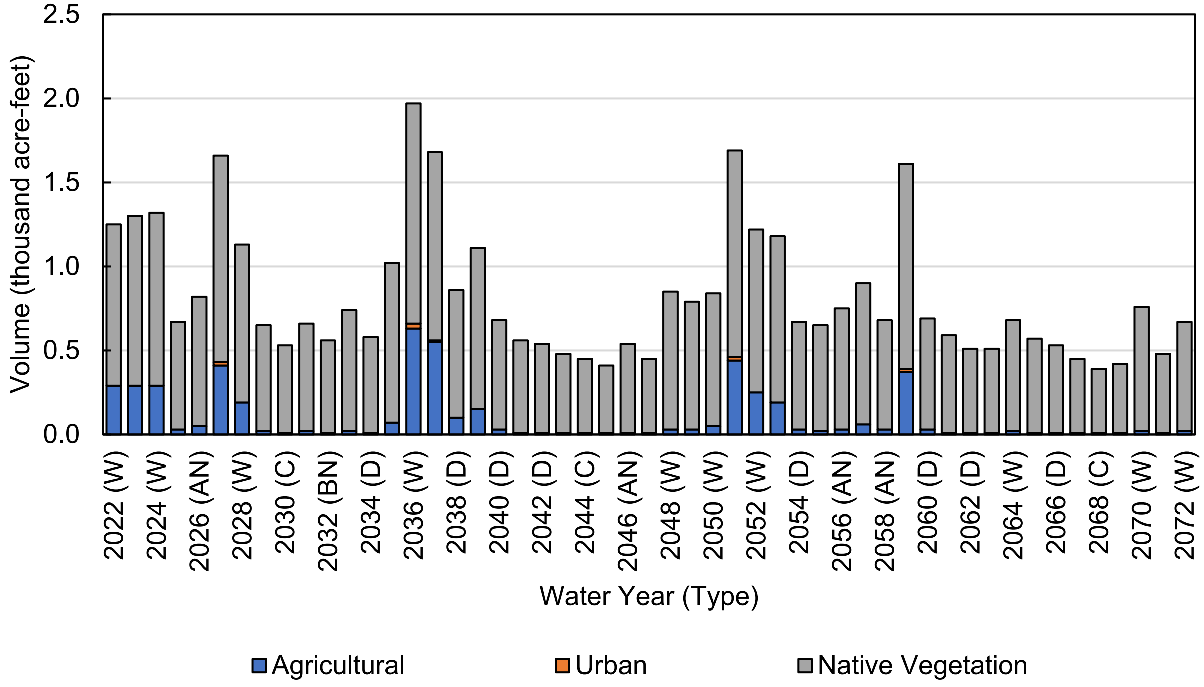

Figure 52 Antelope Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector

Table 50. Antelope Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (BN)	290	0	960	1,300
2023 (W)	290	0	1,000	1,300
2024 (W)	290	0	1,000	1,300
2025 (W)	30	0	640	670
2026 (BN)	50	0	770	820
2027 (AN)	410	20	1,200	1,700
2028 (W)	190	0	940	1,100
2029 (W)	20	0	630	650
2030 (C)	10	0	520	530
2031 (C)	20	0	640	660
2032 (AN)	10	0	550	560
2033 (BN)	20	0	720	740
2034 (AN)	10	0	570	580
2035 (D)	70	0	950	1,000
2036 (W)	630	30	1,300	2,000
2037 (W)	550	10	1,100	1,700
2038 (W)	100	0	760	860
2039 (D)	150	0	960	1,100
2040 (W)	30	0	650	680
2041 (D)	10	0	550	560
2042 (C)	10	0	530	540
2043 (D)	10	0	470	480
2044 (C)	10	0	440	450
2045 (C)	10	0	400	410
2046 (C)	10	0	530	540
2047 (AN)	10	0	440	450
2048 (C)	30	0	820	850
2049 (W)	30	0	760	790
2050 (W)	50	0	790	840
2051 (W)	440	20	1,200	1,700
2052 (W)	250	0	970	1,200
2053 (W)	190	0	990	1,200
2054 (AN)	30	0	640	670
2055 (D)	20	0	630	650
2056 (D)	30	0	720	750
2057 (AN)	60	0	840	900

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (BN)		30	0	650	680
2059 (AN)		370	20	1,200	1,600
2060 (W)		30	0	660	690
2061 (D)		10	0	580	590
2062 (C)		10	0	500	510
2063 (D)		10	0	500	510
2064 (BN)		20	0	660	680
2065 (W)		10	0	560	570
2066 (BN)		10	0	520	530
2067 (D)		10	0	440	450
2068 (C)		10	0	380	390
2069 (C)		10	0	410	420
2070 (BN)		20	0	740	760
2071 (W)		10	0	470	480
2072 (W)		20	0	650	670
Average (2022-2072)		100	0	720	820
2022-2072	W	230	10	960	1,200
	AN	50	0	720	770
	BN	20	0	570	590
	D	30	0	610	630
	C	10	0	490	500

3.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 53** and **Table 51**, averaging approximately 33 taf per year.

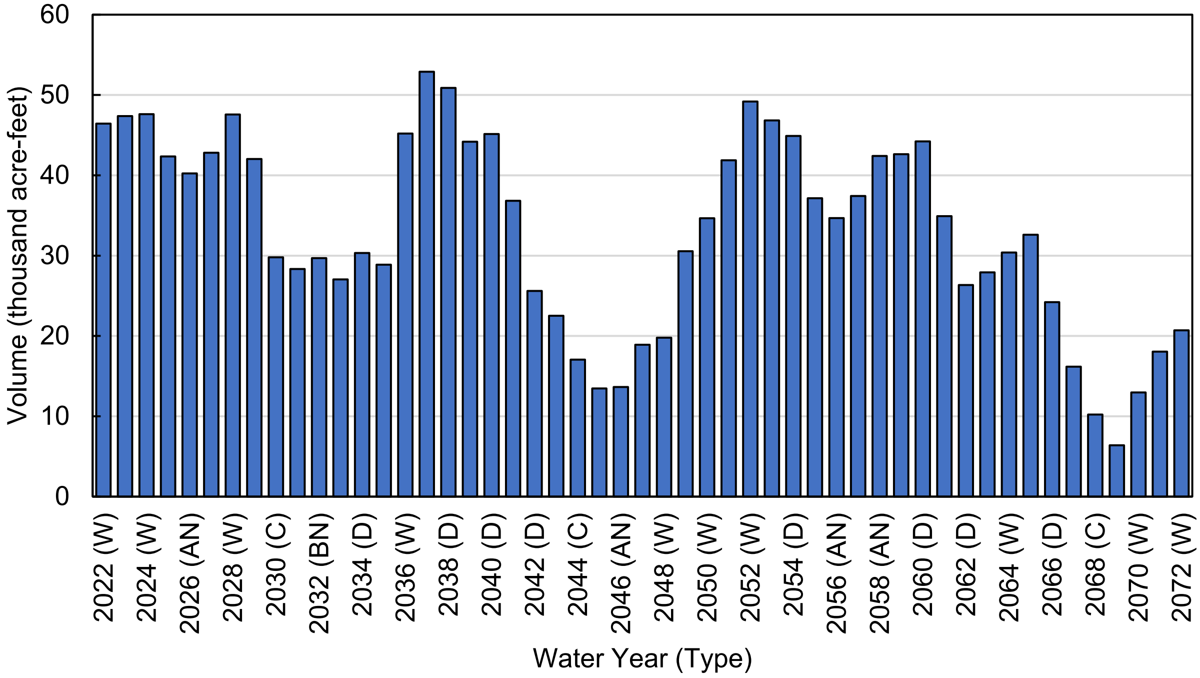

Figure 53. Antelope Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water

Table 51. Antelope Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)	Groundwater Discharge to Surface Water
2022 (W)	46,000
2023 (W)	47,000
2024 (W)	48,000
2025 (BN)	42,000
2026 (AN)	40,000
2027 (W)	43,000
2028 (W)	48,000
2029 (C)	42,000
2030 (C)	30,000
2031 (AN)	28,000
2032 (BN)	30,000
2033 (AN)	27,000
2034 (D)	30,000
2035 (W)	29,000
2036 (W)	45,000
2037 (W)	53,000
2038 (D)	51,000
2039 (W)	44,000
2040 (D)	45,000
2041 (C)	37,000
2042 (D)	26,000
2043 (C)	23,000
2044 (C)	17,000
2045 (C)	13,000
2046 (AN)	14,000
2047 (C)	19,000
2048 (W)	20,000
2049 (W)	31,000
2050 (W)	35,000
2051 (W)	42,000
2052 (W)	49,000
2053 (AN)	47,000
2054 (D)	45,000
2055 (D)	37,000
2056 (AN)	35,000
2057 (BN)	37,000

Water Year (Type)		Groundwater Discharge to Surface Water
2058 (AN)		42,000
2059 (W)		43,000
2060 (D)		44,000
2061 (C)		35,000
2062 (D)		26,000
2063 (BN)		28,000
2064 (W)		30,000
2065 (BN)		33,000
2066 (D)		24,000
2067 (C)		16,000
2068 (C)		10,000
2069 (BN)		6,400
2070 (W)		13,000
2071 (BN)		18,000
2072 (W)		21,000
Average (2022-2072)		33,000
2022-2072	W	38,000
	AN	33,000
	BN	28,000
	D	37,000
	C	24,000

3.1.2 Outflows

3.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 53** through **Figure 56**, and **Table 51** through **Table 54**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest projected in 2036, at approximately 43 taf, and greatest in multiple years, at approximately 49 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 18 taf in above-normal and wet years and about 20 to 22 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and averages less than 0.360 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to meet a portion of their consumptive use requirements. ET of groundwater uptake by native vegetation and agricultural crops totals 0.720 and 0.100 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 28 taf in wet years and 24 taf in critical water years. Much of the total ET of precipitation results from the large acreage of native vegetation and Agricultural land in the Antelope Subbasin, though some contribution is from urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 57** and **Table 55**. The total volume is relatively small and constant between years, averaging less than 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

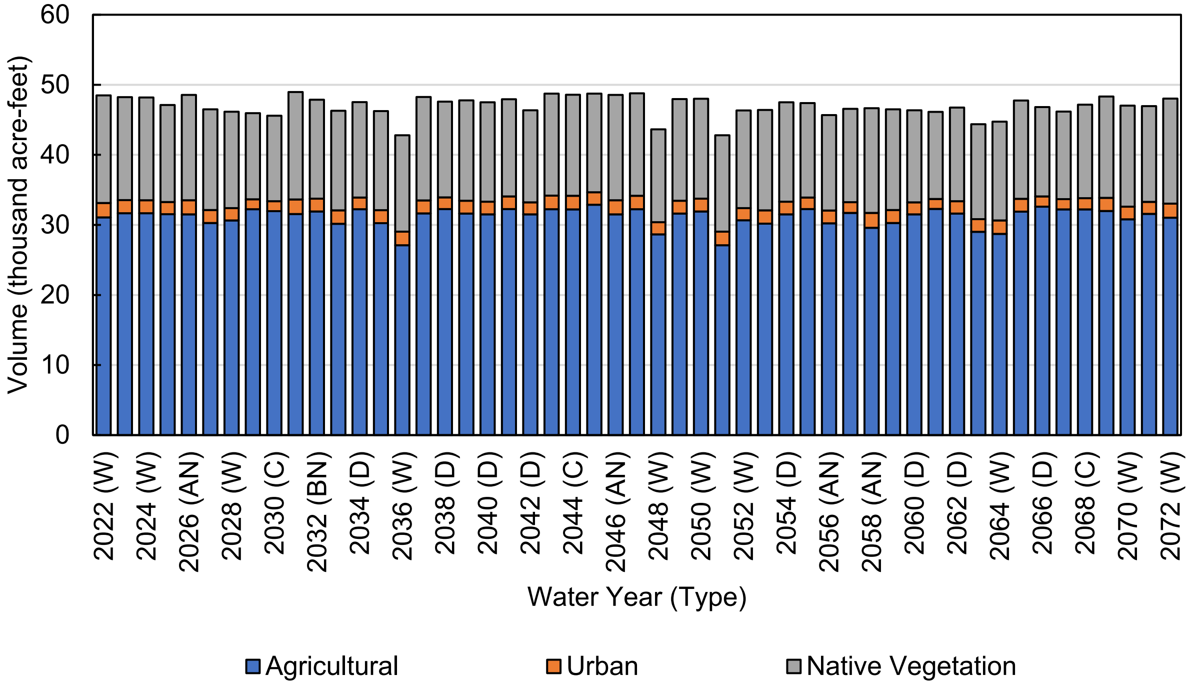

Figure 53. Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector

Table 51. Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	31,000	2,100	15,000	48,000
2023 (W)	32,000	1,900	15,000	48,000
2024 (W)	32,000	1,900	15,000	48,000
2025 (BN)	32,000	1,700	14,000	47,000
2026 (AN)	32,000	2,000	15,000	49,000
2027 (W)	30,000	1,900	14,000	47,000
2028 (W)	31,000	1,700	14,000	46,000
2029 (C)	32,000	1,400	12,000	46,000
2030 (C)	32,000	1,400	12,000	46,000
2031 (AN)	32,000	2,100	15,000	49,000
2032 (BN)	32,000	1,800	14,000	48,000
2033 (AN)	30,000	1,900	14,000	46,000
2034 (D)	32,000	1,700	14,000	48,000
2035 (W)	30,000	1,800	14,000	46,000
2036 (W)	27,000	1,900	14,000	43,000
2037 (W)	32,000	1,900	15,000	48,000
2038 (D)	32,000	1,700	14,000	48,000
2039 (W)	32,000	1,800	14,000	48,000
2040 (D)	32,000	1,800	14,000	48,000
2041 (C)	32,000	1,800	14,000	48,000
2042 (D)	32,000	1,700	13,000	46,000
2043 (C)	32,000	2,000	15,000	49,000
2044 (C)	32,000	1,900	14,000	49,000
2045 (C)	33,000	1,800	14,000	49,000
2046 (AN)	32,000	2,000	15,000	49,000
2047 (C)	32,000	1,900	15,000	49,000
2048 (W)	29,000	1,700	13,000	44,000
2049 (W)	32,000	1,800	15,000	48,000
2050 (W)	32,000	1,900	14,000	48,000
2051 (W)	27,000	1,900	14,000	43,000
2052 (W)	31,000	1,800	14,000	46,000
2053 (AN)	30,000	1,900	14,000	46,000
2054 (D)	32,000	1,800	14,000	48,000
2055 (D)	32,000	1,700	13,000	47,000
2056 (AN)	30,000	1,800	14,000	46,000
2057 (BN)	32,000	1,500	13,000	47,000

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2058 (AN)</td><td>30,000</td><td>2,100</td><td>15,000</td><td>47,000</td></tr>
<tr><td colspan="2">2059 (W)</td><td>30,000</td><td>1,900</td><td>14,000</td><td>46,000</td></tr>
<tr><td colspan="2">2060 (D)</td><td>32,000</td><td>1,700</td><td>13,000</td><td>46,000</td></tr>
<tr><td colspan="2">2061 (C)</td><td>32,000</td><td>1,400</td><td>12,000</td><td>46,000</td></tr>
<tr><td colspan="2">2062 (D)</td><td>32,000</td><td>1,800</td><td>13,000</td><td>47,000</td></tr>
<tr><td colspan="2">2063 (BN)</td><td>29,000</td><td>1,800</td><td>14,000</td><td>44,000</td></tr>
<tr><td colspan="2">2064 (W)</td><td>29,000</td><td>1,900</td><td>14,000</td><td>45,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>32,000</td><td>1,800</td><td>14,000</td><td>48,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>33,000</td><td>1,500</td><td>13,000</td><td>47,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>32,000</td><td>1,500</td><td>12,000</td><td>46,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>32,000</td><td>1,600</td><td>13,000</td><td>47,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>32,000</td><td>1,900</td><td>14,000</td><td>48,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>31,000</td><td>1,800</td><td>14,000</td><td>47,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>32,000</td><td>1,700</td><td>14,000</td><td>47,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>31,000</td><td>2,000</td><td>15,000</td><td>48,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>31,000</td><td>1,800</td><td>14,000</td><td>47,000</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>30,000</td><td>1,900</td><td>14,000</td><td>47,000</td></tr>
<tr><td>AN</td><td>31,000</td><td>2,000</td><td>15,000</td><td>47,000</td></tr>
<tr><td>BN</td><td>31,000</td><td>1,800</td><td>14,000</td><td>47,000</td></tr>
<tr><td>D</td><td>32,000</td><td>1,700</td><td>14,000</td><td>47,000</td></tr>
<tr><td>C</td><td>32,000</td><td>1,700</td><td>13,000</td><td>47,000</td></tr>
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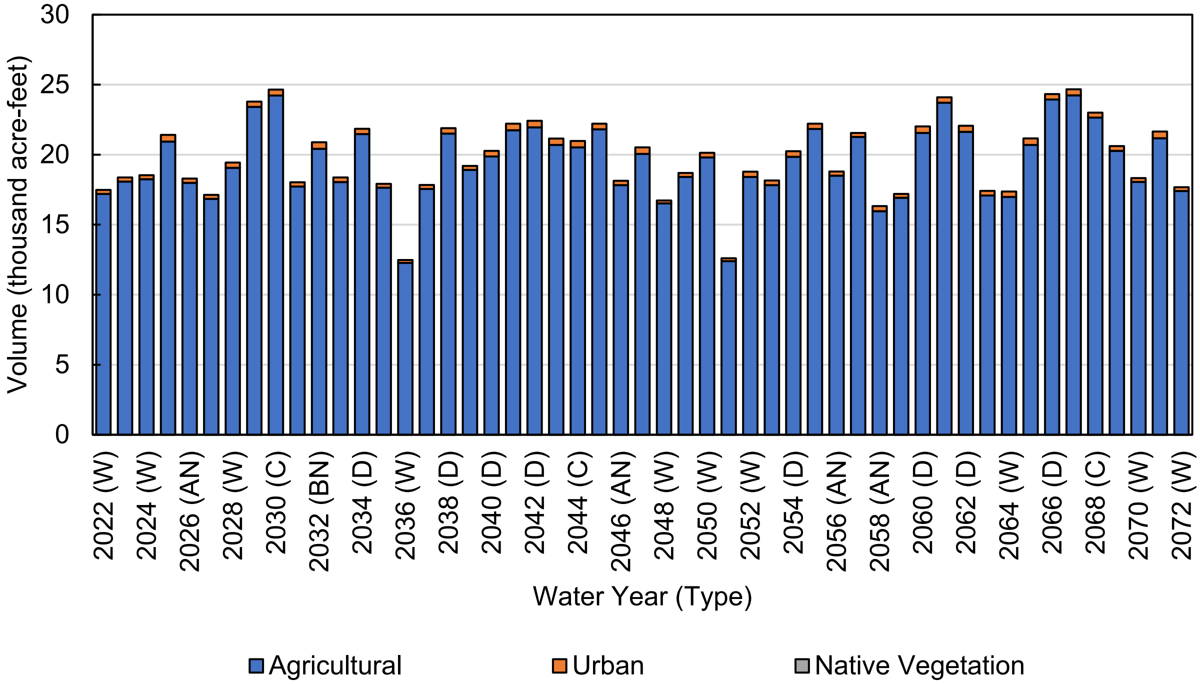

Figure 54. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Applied Water, by Water Use Sector

Table 52. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	280	0	17,000
2023 (W)	18,000	290	0	18,000
2024 (W)	18,000	290	0	19,000
2025 (BN)	21,000	470	0	21,000
2026 (AN)	18,000	300	0	18,000
2027 (W)	17,000	280	0	17,000
2028 (W)	19,000	380	0	19,000
2029 (C)	23,000	380	0	24,000
2030 (C)	24,000	420	0	25,000
2031 (AN)	18,000	310	0	18,000
2032 (BN)	20,000	470	0	21,000
2033 (AN)	18,000	330	0	18,000
2034 (D)	21,000	380	0	22,000
2035 (W)	18,000	280	0	18,000
2036 (W)	12,000	210	0	12,000
2037 (W)	18,000	290	0	18,000
2038 (D)	22,000	380	0	22,000
2039 (W)	19,000	290	0	19,000
2040 (D)	20,000	400	0	20,000
2041 (C)	22,000	460	0	22,000
2042 (D)	22,000	470	0	22,000
2043 (C)	21,000	460	0	21,000
2044 (C)	21,000	460	0	21,000
2045 (C)	22,000	400	0	22,000
2046 (AN)	18,000	300	0	18,000
2047 (C)	20,000	460	0	21,000
2048 (W)	17,000	200	0	17,000
2049 (W)	18,000	290	0	19,000
2050 (W)	20,000	330	0	20,000
2051 (W)	12,000	210	0	13,000
2052 (W)	18,000	380	0	19,000
2053 (AN)	18,000	330	0	18,000
2054 (D)	20,000	400	0	20,000
2055 (D)	22,000	380	0	22,000
2056 (AN)	19,000	300	0	19,000
2057 (BN)	21,000	280	0	22,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		16,000	360	0	16,000
2059 (W)		17,000	280	0	17,000
2060 (D)		22,000	470	0	22,000
2061 (C)		24,000	390	0	24,000
2062 (D)		22,000	440	0	22,000
2063 (BN)		17,000	340	0	17,000
2064 (W)		17,000	390	0	17,000
2065 (BN)		21,000	470	0	21,000
2066 (D)		24,000	390	0	24,000
2067 (C)		24,000	430	0	25,000
2068 (C)		23,000	350	0	23,000
2069 (BN)		20,000	340	0	21,000
2070 (W)		18,000	280	0	18,000
2071 (BN)		21,000	470	0	22,000
2072 (W)		17,000	270	0	18,000
Average (2022-2072)		19,000	360	0	20,000
2022-2072	W	17,000	290	0	18,000
	AN	18,000	320	0	18,000
	BN	20,000	410	0	21,000
	D	22,000	410	0	22,000
	C	22,000	420	0	23,000

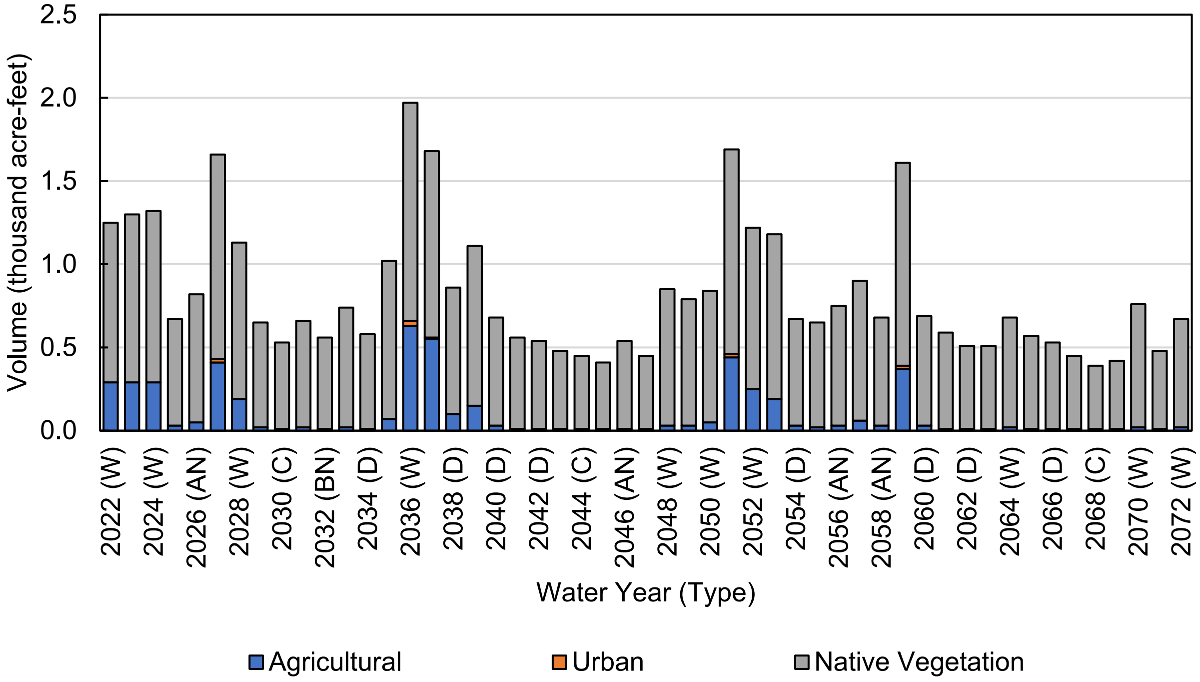

Figure 55. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 53. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	290	0	960	1,300
2023 (W)	290	0	1,000	1,300
2024 (W)	290	0	1,000	1,300
2025 (BN)	30	0	640	670
2026 (AN)	50	0	770	820
2027 (W)	410	20	1,200	1,700
2028 (W)	190	0	940	1,100
2029 (C)	20	0	630	650
2030 (C)	10	0	520	530
2031 (AN)	20	0	640	660
2032 (BN)	10	0	550	560
2033 (AN)	20	0	720	740
2034 (D)	10	0	570	580
2035 (W)	70	0	950	1,000
2036 (W)	630	30	1,300	2,000
2037 (W)	550	10	1,100	1,700
2038 (D)	100	0	760	860
2039 (W)	150	0	960	1,100
2040 (D)	30	0	650	680
2041 (C)	10	0	550	560
2042 (D)	10	0	530	540
2043 (C)	10	0	470	480
2044 (C)	10	0	440	450
2045 (C)	10	0	400	410
2046 (AN)	10	0	530	540
2047 (C)	10	0	440	450
2048 (W)	30	0	820	850
2049 (W)	30	0	760	790
2050 (W)	50	0	790	840
2051 (W)	440	20	1,200	1,700
2052 (W)	250	0	970	1,200
2053 (AN)	190	0	990	1,200
2054 (D)	30	0	640	670
2055 (D)	20	0	630	650
2056 (AN)	30	0	720	750
2057 (BN)	60	0	840	900

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		30	0	650	680
2059 (W)		370	20	1,200	1,600
2060 (D)		30	0	660	690
2061 (C)		10	0	580	590
2062 (D)		10	0	500	510
2063 (BN)		10	0	500	510
2064 (W)		20	0	660	680
2065 (BN)		10	0	560	570
2066 (D)		10	0	520	530
2067 (C)		10	0	440	450
2068 (C)		10	0	380	390
2069 (BN)		10	0	410	420
2070 (W)		20	0	740	760
2071 (BN)		10	0	470	480
2072 (W)		20	0	650	670
Average (2022-2072)		100	0	720	820
2022-2072	W	230	10	960	1,200
	AN	50	0	720	770
	BN	20	0	570	590
	D	30	0	610	630
	C	10	0	490	500

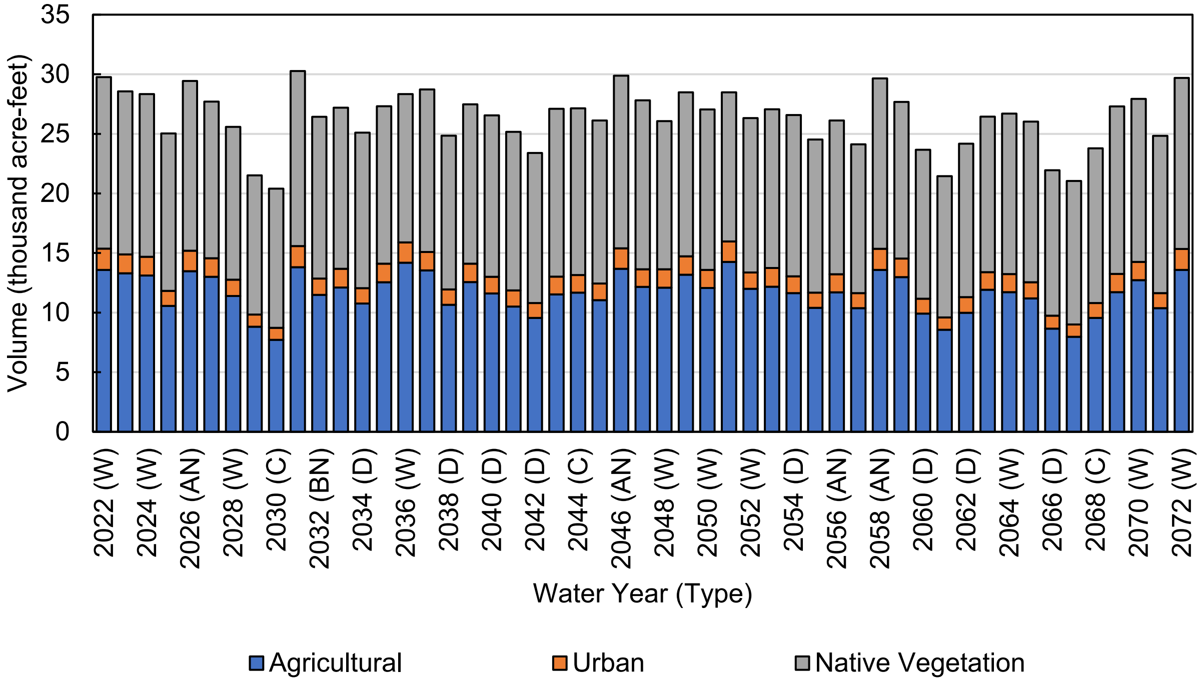

Figure 56. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Precipitation, by Water Use Sector

Table 54. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	14,000	1,800	14,000	30,000
2023 (W)	13,000	1,600	14,000	29,000
2024 (W)	13,000	1,600	14,000	28,000
2025 (BN)	11,000	1,300	13,000	25,000
2026 (AN)	13,000	1,700	14,000	29,000
2027 (W)	13,000	1,600	13,000	28,000
2028 (W)	11,000	1,400	13,000	26,000
2029 (C)	8,800	1,000	12,000	22,000
2030 (C)	7,700	1,000	12,000	20,000
2031 (AN)	14,000	1,800	15,000	30,000
2032 (BN)	11,000	1,400	14,000	26,000
2033 (AN)	12,000	1,600	14,000	27,000
2034 (D)	11,000	1,300	13,000	25,000
2035 (W)	13,000	1,600	13,000	27,000
2036 (W)	14,000	1,700	12,000	28,000
2037 (W)	14,000	1,600	14,000	29,000
2038 (D)	11,000	1,300	13,000	25,000
2039 (W)	13,000	1,600	13,000	27,000
2040 (D)	12,000	1,400	14,000	27,000
2041 (C)	11,000	1,400	13,000	25,000
2042 (D)	9,600	1,300	13,000	23,000
2043 (C)	12,000	1,500	14,000	27,000
2044 (C)	12,000	1,500	14,000	27,000
2045 (C)	11,000	1,400	14,000	26,000
2046 (AN)	14,000	1,700	14,000	30,000
2047 (C)	12,000	1,500	14,000	28,000
2048 (W)	12,000	1,500	12,000	26,000
2049 (W)	13,000	1,600	14,000	28,000
2050 (W)	12,000	1,500	13,000	27,000
2051 (W)	14,000	1,700	13,000	28,000
2052 (W)	12,000	1,400	13,000	26,000
2053 (AN)	12,000	1,600	13,000	27,000
2054 (D)	12,000	1,400	14,000	27,000
2055 (D)	10,000	1,300	13,000	25,000
2056 (AN)	12,000	1,500	13,000	26,000
2057 (BN)	10,000	1,300	12,000	24,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		14,000	1,800	14,000	30,000
2059 (W)		13,000	1,600	13,000	28,000
2060 (D)		9,900	1,300	12,000	24,000
2061 (C)		8,600	1,000	12,000	21,000
2062 (D)		10,000	1,300	13,000	24,000
2063 (BN)		12,000	1,500	13,000	26,000
2064 (W)		12,000	1,500	13,000	27,000
2065 (BN)		11,000	1,400	13,000	26,000
2066 (D)		8,700	1,100	12,000	22,000
2067 (C)		8,000	1,000	12,000	21,000
2068 (C)		9,600	1,300	13,000	24,000
2069 (BN)		12,000	1,500	14,000	27,000
2070 (W)		13,000	1,500	14,000	28,000
2071 (BN)		10,000	1,300	13,000	25,000
2072 (W)		14,000	1,800	14,000	30,000
Average (2022-2072)		12,000	1,400	13,000	26,000
2022-2072	W	13,000	1,600	13,000	28,000
	AN	13,000	1,700	14,000	29,000
	BN	11,000	1,400	13,000	26,000
	D	10,000	1,300	13,000	25,000
	C	10,000	1,300	13,000	24,000

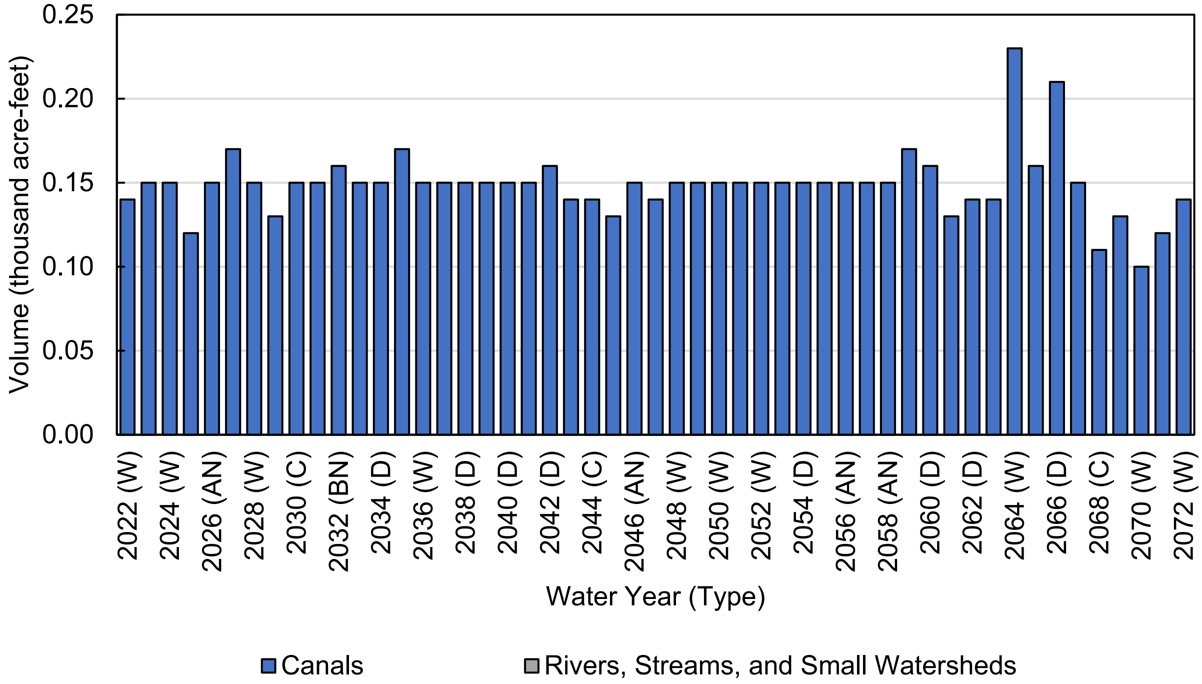

Figure 57. Antelope Subbasin Projected (Future Land Use) Evaporation of Surface Water Sources

Table 55. Antelope Subbasin Projected (Future Land Use) Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds[1]	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	160	0	160
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
2059 (W)		170	0	170
2060 (D)		160	0	160
2061 (C)		130	0	130
2062 (D)		140	0	140
2063 (BN)		140	0	140
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	150	0	150
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

3.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 58** and **Table 56** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 72 taf per year, and range on average from 45 taf in critically dry years up to 94 taf in wet years. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

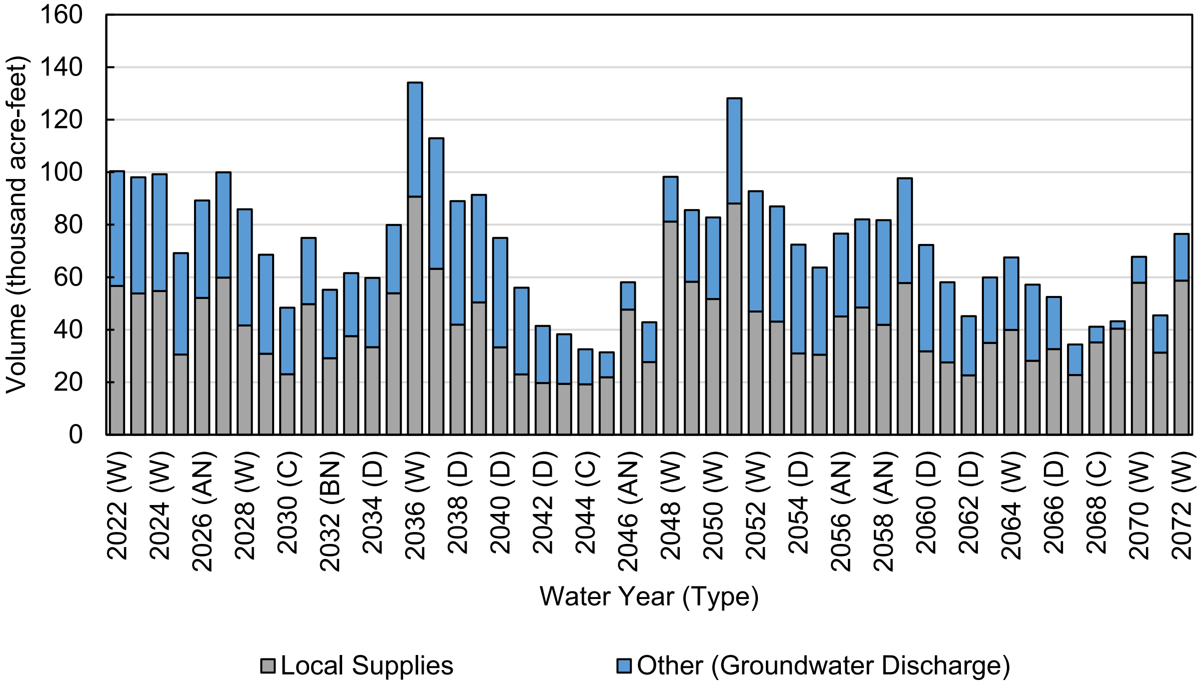

Figure 58. Antelope Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type

Table 56. Antelope Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (BN)	0	57,000	44,000	100,000
2023 (W)	0	54,000	44,000	98,000
2024 (W)	0	55,000	44,000	99,000
2025 (W)	0	31,000	39,000	69,000
2026 (BN)	0	52,000	37,000	89,000
2027 (AN)	0	60,000	40,000	100,000
2028 (W)	0	42,000	44,000	86,000
2029 (W)	0	31,000	38,000	69,000
2030 (C)	0	23,000	25,000	48,000
2031 (C)	0	50,000	25,000	75,000
2032 (AN)	0	29,000	26,000	55,000
2033 (BN)	0	38,000	24,000	62,000
2034 (AN)	0	33,000	26,000	60,000
2035 (D)	0	54,000	26,000	80,000
2036 (W)	0	91,000	43,000	130,000
2037 (W)	0	63,000	50,000	110,000
2038 (W)	0	42,000	47,000	89,000
2039 (D)	0	50,000	41,000	91,000
2040 (W)	0	33,000	42,000	75,000
2041 (D)	0	23,000	33,000	56,000
2042 (C)	0	20,000	22,000	41,000
2043 (D)	0	19,000	19,000	38,000
2044 (C)	0	19,000	13,000	33,000
2045 (C)	0	22,000	9,500	31,000
2046 (C)	0	48,000	10,000	58,000
2047 (AN)	0	28,000	15,000	43,000
2048 (C)	0	81,000	17,000	98,000
2049 (W)	0	58,000	27,000	86,000
2050 (W)	0	52,000	31,000	83,000
2051 (W)	0	88,000	40,000	130,000
2052 (W)	0	47,000	46,000	93,000
2053 (W)	0	43,000	44,000	87,000
2054 (AN)	0	31,000	41,000	72,000
2055 (D)	0	30,000	33,000	64,000
2056 (D)	0	45,000	32,000	77,000

Water Year (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2057 (AN)		0	48,000	34,000	82,000
2058 (BN)		0	42,000	40,000	82,000
2059 (AN)		0	58,000	40,000	98,000
2060 (W)		0	32,000	41,000	72,000
2061 (D)		0	28,000	31,000	58,000
2062 (C)		0	23,000	23,000	45,000
2063 (D)		0	35,000	25,000	60,000
2064 (BN)		0	40,000	28,000	68,000
2065 (W)		0	28,000	29,000	57,000
2066 (BN)		0	33,000	20,000	52,000
2067 (D)		0	23,000	12,000	34,000
2068 (C)		0	35,000	6,000	41,000
2069 (C)		0	40,000	2,800	43,000
2070 (BN)		0	58,000	9,800	68,000
2071 (W)		0	31,000	14,000	45,000
2072 (W)		0	59,000	18,000	77,000
Average (2022-2072)		0	42,000	30,000	72,000
2022-2072	W	0	59,000	35,000	94,000
	AN	0	45,000	30,000	76,000
	BN	0	35,000	24,000	59,000
	D	0	31,000	33,000	63,000
	C	0	25,000	20,000	45,000

3.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 59** and **Table 57** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

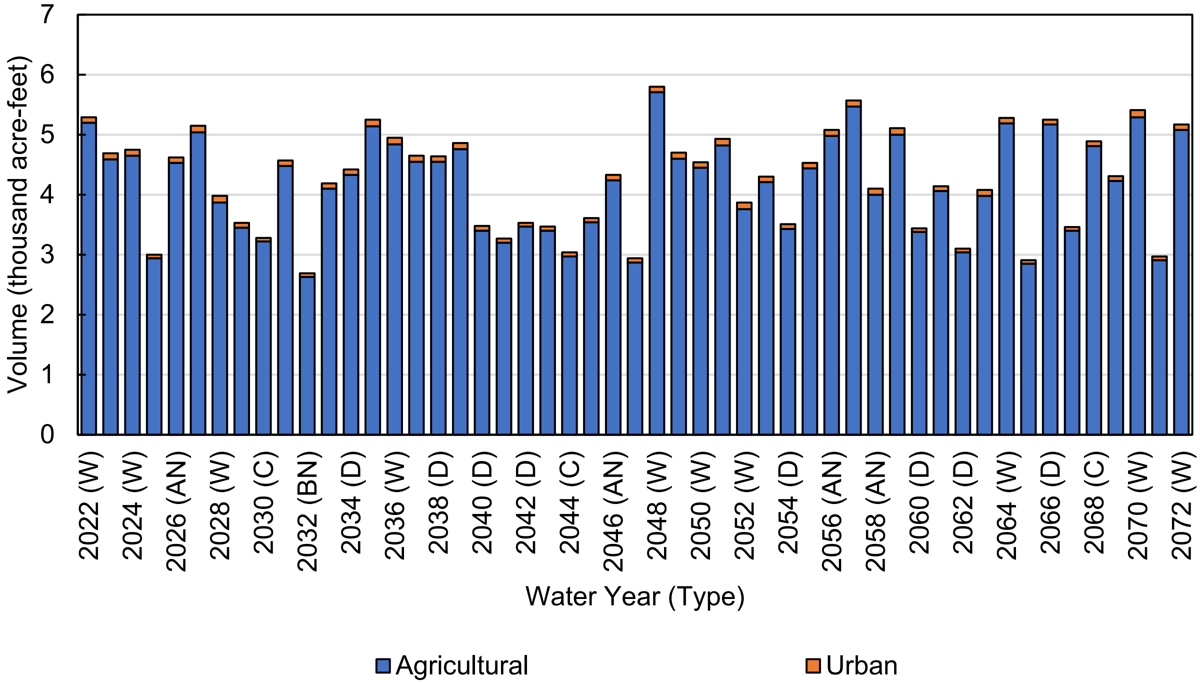

Figure 59. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector

Table 57. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	90	0	5,300
2023 (W)	4,600	100	0	4,700
2024 (W)	4,700	100	0	4,800
2025 (BN)	2,900	60	0	3,000
2026 (AN)	4,500	90	0	4,600
2027 (W)	5,000	110	0	5,200
2028 (W)	3,900	110	0	4,000
2029 (C)	3,500	80	0	3,500
2030 (C)	3,200	60	0	3,300
2031 (AN)	4,500	90	0	4,600
2032 (BN)	2,600	60	0	2,700
2033 (AN)	4,100	90	0	4,200
2034 (D)	4,300	90	0	4,400
2035 (W)	5,100	110	0	5,300
2036 (W)	4,800	110	0	5,000
2037 (W)	4,600	100	0	4,700
2038 (D)	4,600	90	0	4,600
2039 (W)	4,800	100	0	4,900
2040 (D)	3,400	80	0	3,500
2041 (C)	3,200	70	0	3,300
2042 (D)	3,500	60	0	3,500
2043 (C)	3,400	70	0	3,500
2044 (C)	3,000	70	0	3,000
2045 (C)	3,500	70	0	3,600
2046 (AN)	4,200	90	0	4,300
2047 (C)	2,900	70	0	2,900
2048 (W)	5,700	90	0	5,800
2049 (W)	4,600	100	0	4,700
2050 (W)	4,500	90	0	4,500
2051 (W)	4,800	110	0	4,900
2052 (W)	3,800	110	0	3,900
2053 (AN)	4,200	90	0	4,300
2054 (D)	3,400	80	0	3,500
2055 (D)	4,400	90	0	4,500
2056 (AN)	5,000	100	0	5,100
2057 (BN)	5,500	100	0	5,600

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		4,000	100	0	4,100
2059 (W)		5,000	110	0	5,100
2060 (D)		3,400	60	0	3,400
2061 (C)		4,100	80	0	4,100
2062 (D)		3,000	60	0	3,100
2063 (BN)		4,000	100	0	4,100
2064 (W)		5,200	90	0	5,300
2065 (BN)		2,900	60	0	2,900
2066 (D)		5,200	80	0	5,300
2067 (C)		3,400	60	0	3,500
2068 (C)		4,800	80	0	4,900
2069 (BN)		4,200	80	0	4,300
2070 (W)		5,300	120	0	5,400
2071 (BN)		2,900	60	0	3,000
2072 (W)		5,100	90	0	5,200
Average (2022-2072)		4,200	90	0	4,300
2022-2072	W	4,800	100	0	4,900
	AN	4,400	90	0	4,500
	BN	3,600	70	0	3,700
	D	3,900	80	0	4,000
	C	3,500	70	0	3,600

3.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 60** and **Table 58** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from less than 3 taf annually during some critical and dry years to about 16 taf in 2036.

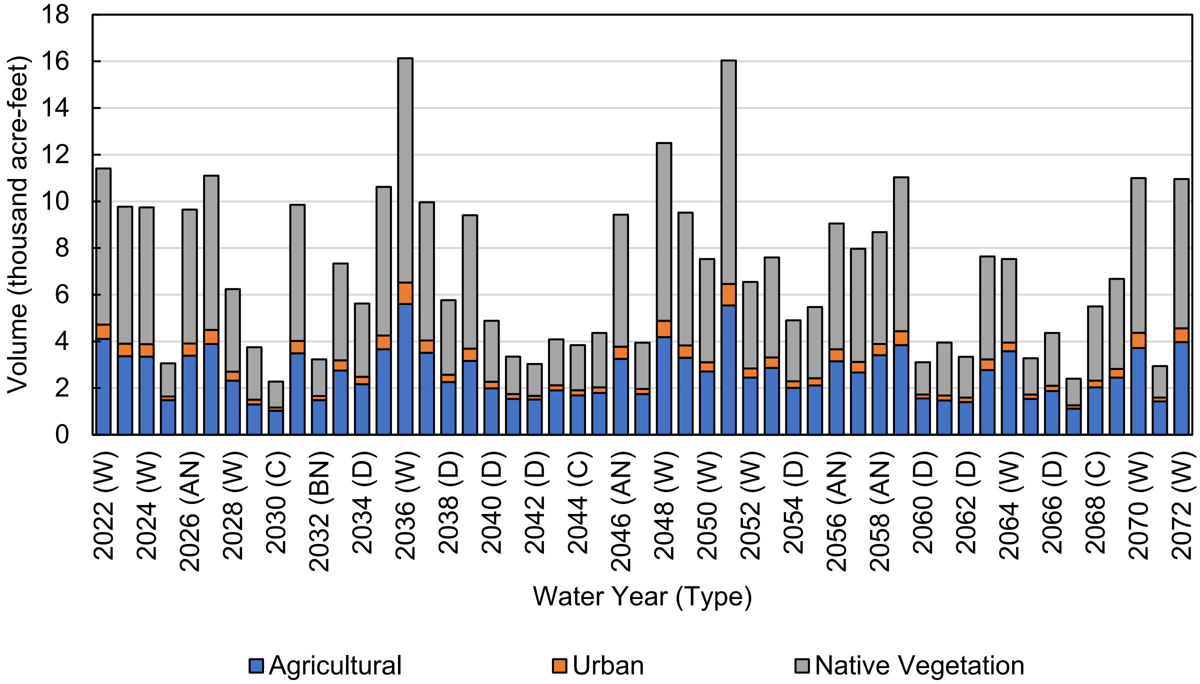

Figure 60. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector

Table 58. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,100	610	6,700	11,000
2023 (W)	3,400	530	5,900	9,800
2024 (W)	3,400	530	5,900	9,700
2025 (BN)	1,500	160	1,400	3,100
2026 (AN)	3,400	520	5,700	9,700
2027 (W)	3,900	600	6,600	11,000
2028 (W)	2,300	380	3,500	6,200
2029 (C)	1,300	200	2,300	3,800
2030 (C)	1,000	140	1,100	2,300
2031 (AN)	3,500	530	5,800	9,900
2032 (BN)	1,500	180	1,600	3,200
2033 (AN)	2,800	440	4,200	7,300
2034 (D)	2,200	310	3,100	5,600
2035 (W)	3,700	590	6,400	11,000
2036 (W)	5,600	920	9,600	16,000
2037 (W)	3,500	530	5,900	10,000
2038 (D)	2,300	310	3,200	5,800
2039 (W)	3,200	530	5,700	9,400
2040 (D)	2,000	280	2,600	4,900
2041 (C)	1,500	200	1,600	3,400
2042 (D)	1,500	160	1,400	3,000
2043 (C)	1,900	220	2,000	4,100
2044 (C)	1,700	220	1,900	3,800
2045 (C)	1,800	240	2,300	4,400
2046 (AN)	3,300	520	5,700	9,400
2047 (C)	1,700	220	2,000	3,900
2048 (W)	4,200	700	7,600	13,000
2049 (W)	3,300	530	5,700	9,500
2050 (W)	2,700	400	4,400	7,500
2051 (W)	5,500	920	9,600	16,000
2052 (W)	2,500	390	3,700	6,600
2053 (AN)	2,900	440	4,300	7,600
2054 (D)	2,000	280	2,600	4,900
2055 (D)	2,100	310	3,100	5,500
2056 (AN)	3,200	510	5,400	9,100
2057 (BN)	2,700	450	4,900	8,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,400	480	4,800	8,700
2059 (W)		3,800	600	6,600	11,000
2060 (D)		1,600	160	1,400	3,100
2061 (C)		1,500	210	2,300	4,000
2062 (D)		1,400	190	1,800	3,300
2063 (BN)		2,800	460	4,400	7,600
2064 (W)		3,600	370	3,600	7,500
2065 (BN)		1,500	180	1,600	3,300
2066 (D)		1,900	230	2,300	4,400
2067 (C)		1,100	140	1,100	2,400
2068 (C)		2,000	290	3,200	5,500
2069 (BN)		2,500	370	3,900	6,700
2070 (W)		3,700	650	6,600	11,000
2071 (BN)		1,400	160	1,400	2,900
2072 (W)		4,000	590	6,400	11,000
Average (2022-2072)		2,600	390	4,000	7,000
2022-2072	W	3,700	570	6,100	10,000
	AN	3,200	490	5,100	8,800
	BN	2,000	280	2,700	5,000
	D	1,900	250	2,400	4,500
	C	1,600	210	2,000	3,800

3.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 61**and **Table 59.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts, as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than four (4) taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.1 taf per year.

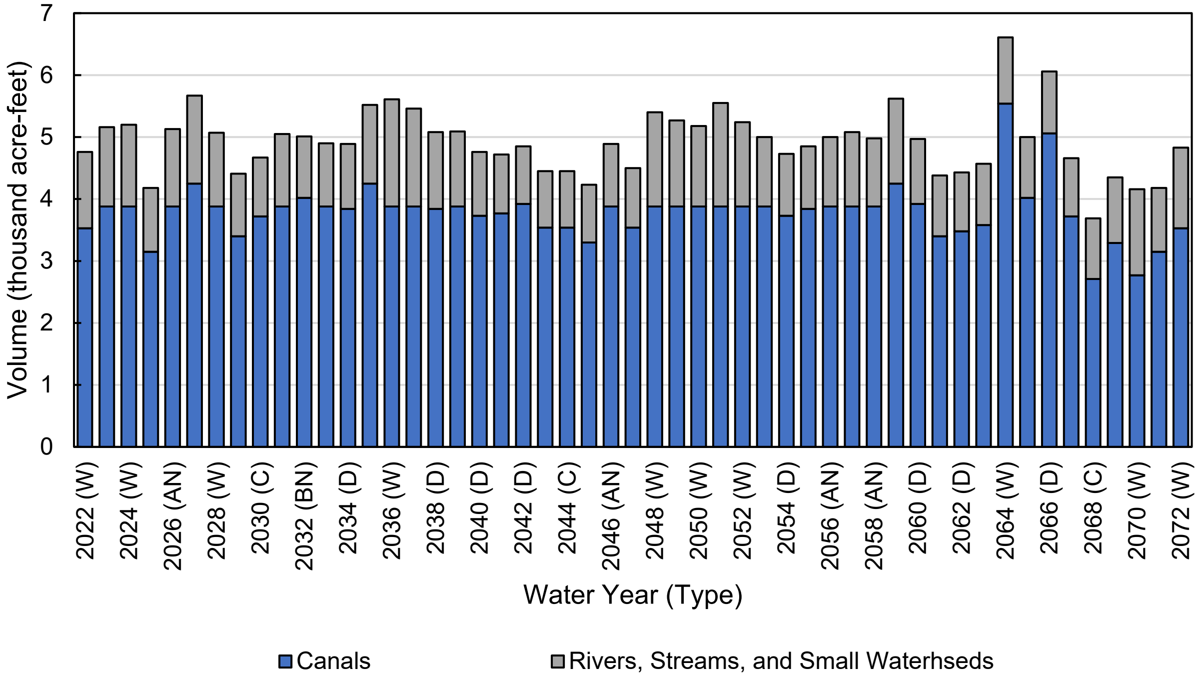

Figure 61. Antelope Subbasin Projected (Future Land Use) Infiltration of Surface Water, by Water Use Sector

Table 59. Antelope Subbasin Projected (Future Land Use) Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	3,500	1,200	4,800
2023 (W)	3,900	1,300	5,200
2024 (W)	3,900	1,300	5,200
2025 (BN)	3,200	1,000	4,200
2026 (AN)	3,900	1,300	5,100
2027 (W)	4,300	1,400	5,700
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	950	4,700
2031 (AN)	3,900	1,200	5,100
2032 (BN)	4,000	990	5,000
2033 (AN)	3,900	1,000	4,900
2034 (D)	3,800	1,100	4,900
2035 (W)	4,300	1,300	5,500
2036 (W)	3,900	1,700	5,600
2037 (W)	3,900	1,600	5,500
2038 (D)	3,800	1,200	5,100
2039 (W)	3,900	1,200	5,100
2040 (D)	3,700	1,000	4,800
2041 (C)	3,800	950	4,700
2042 (D)	3,900	930	4,900
2043 (C)	3,500	910	4,500
2044 (C)	3,500	910	4,500
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,000	4,900
2047 (C)	3,500	960	4,500
2048 (W)	3,900	1,500	5,400
2049 (W)	3,900	1,400	5,300
2050 (W)	3,900	1,300	5,200
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,200
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,700	1,000	4,700
2055 (D)	3,800	1,000	4,900
2056 (AN)	3,900	1,100	5,000
2057 (BN)	3,900	1,200	5,100

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2058 (AN)		3,900	1,100	5,000
2059 (W)		4,300	1,400	5,600
2060 (D)		3,900	1,100	5,000
2061 (C)		3,400	980	4,400
2062 (D)		3,500	950	4,400
2063 (BN)		3,600	990	4,600
2064 (W)		5,500	1,100	6,600
2065 (BN)		4,000	980	5,000
2066 (D)		5,100	1,000	6,100
2067 (C)		3,700	940	4,700
2068 (C)		2,700	980	3,700
2069 (BN)		3,300	1,100	4,400
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,300	4,800
Average (2022-2072)		3,800	1,200	4,900
2022-2072	W	3,900	1,400	5,300
	AN	3,900	1,100	5,000
	BN	3,600	1,000	4,600
	D	3,900	1,000	5,000
	C	3,500	950	4,400

3.1.3 Change in Root Zone Storage

Estimates of projected change in root zone storage are provided in **Figure 62** and **Table 60**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average near zero over many years.

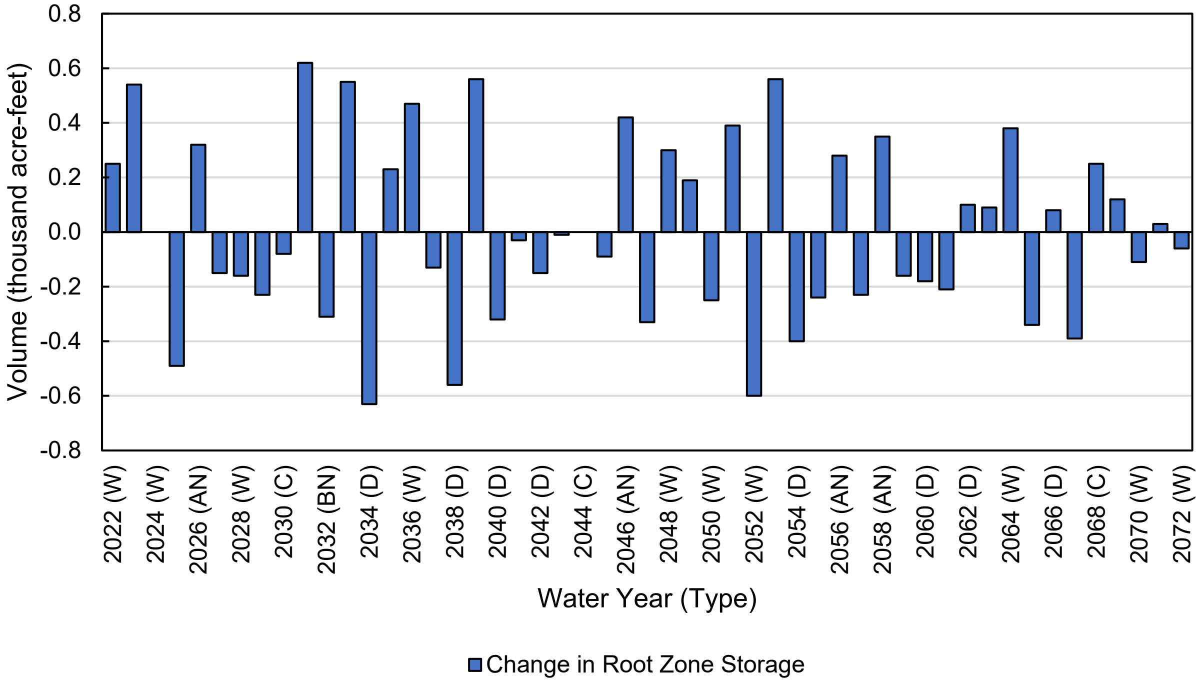

Figure 62. Antelope Subbasin Projected (Future Land Use) Change in Root Zone Storage

Table 60. Antelope Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet)

Water Year (Type)	Change in Root Zone Storage
2022 (W)	250
2023 (W)	540
2024 (W)	0
2025 (BN)	-490
2026 (AN)	320
2027 (W)	-150
2028 (W)	-160
2029 (C)	-230
2030 (C)	-80
2031 (AN)	620
2032 (BN)	-310
2033 (AN)	550
2034 (D)	-630
2035 (W)	230
2036 (W)	470
2037 (W)	-130
2038 (D)	-560
2039 (W)	560
2040 (D)	-320
2041 (C)	-30
2042 (D)	-150
2043 (C)	-10
2044 (C)	0
2045 (C)	-90
2046 (AN)	420
2047 (C)	-330
2048 (W)	300
2049 (W)	190
2050 (W)	-250
2051 (W)	390
2052 (W)	-600
2053 (AN)	560
2054 (D)	-400
2055 (D)	-240
2056 (AN)	280
2057 (BN)	-230

Water Year (Type)		Change in Root Zone Storage
2058 (AN)		350
2059 (W)		-160
2060 (D)		-180
2061 (C)		-210
2062 (D)		100
2063 (BN)		90
2064 (W)		380
2065 (BN)		-340
2066 (D)		80
2067 (C)		-390
2068 (C)		250
2069 (BN)		120
2070 (W)		-110
2071 (BN)		30
2072 (W)		-60
Average (2022-2072)		0
2022-2072	W	90
	AN	440
	BN	-160
	D	-260
	C	-110

3.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction. When calculated for the projected (future land use) water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from projected cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the projected (current land use) water budget period are presented below for the Antelope Subbasin. **Figure 63** and **Table 61** show the average net recharge from the

SWS over 2022-2072 based on the projected (future land use) water budget results. Under future land use conditions, the average net recharge in the Antelope Subbasin was projected as approximately 0.087 taf per year between 2022-2072, indicating net inflows to the GWS from the SWS during the projected (current land use) water budget period. As illustrated on the cumulative net recharge plot in **Figure 63**, this results in a cumulative net positive recharge (i.e., net recharge to the GWS from the SWS) of about 4.4 taf over the 51-year projected (future land use) water budget period. Although this means there is projected to be more recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage will increase or that the Subbasin groundwater system will be sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

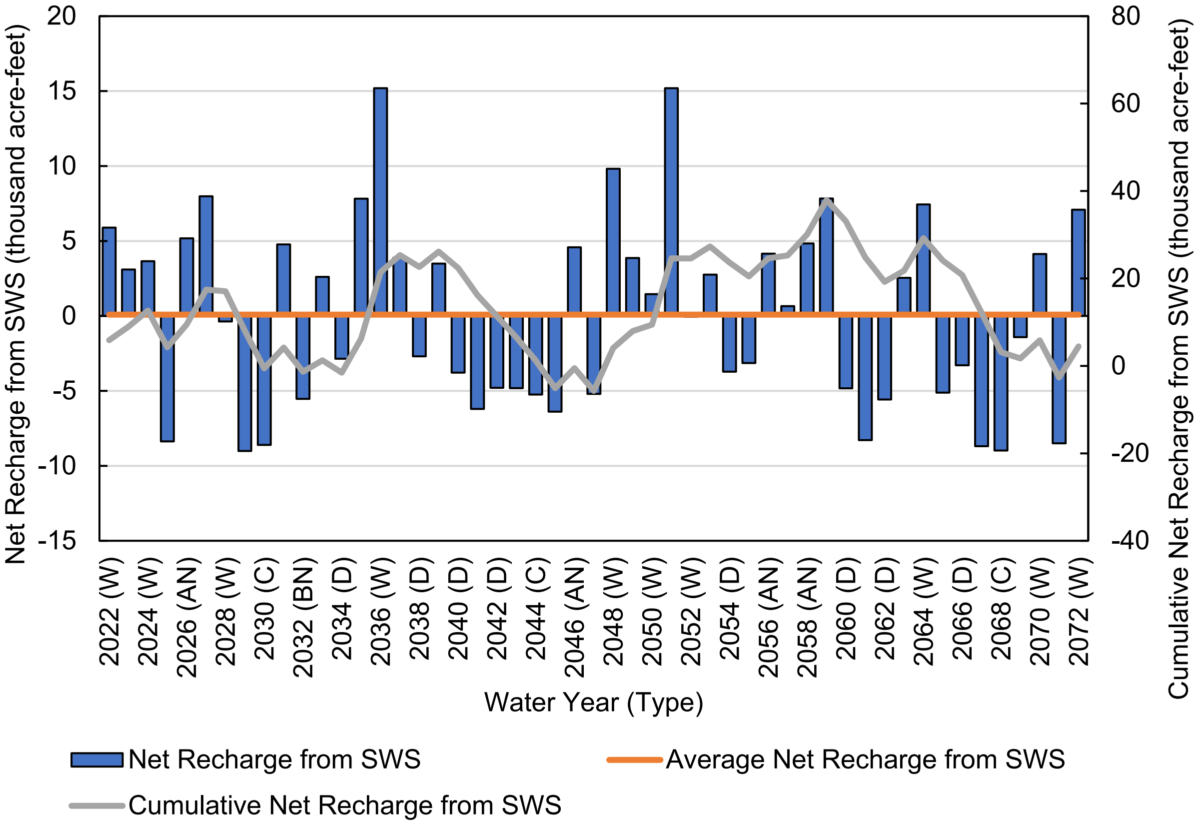

Figure 63. Antelope Subbasin Projected (Future Land Use) Net Recharge Overview

Table 61. Antelope Subbasin Projected (Future Land Use) Water Budget: Average Net Recharge from SWS, by Water Year Type (acre-feet)

Year Type	Number of Years	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	18	4,900	10,400	5,300	15,000	6,000
AN	7	4,500	8,800	5,000	14,000	4,100
BN	7	3,700	5,000	4,600	17,000	-3,700
D	9	4,000	4,500	5,000	17,000	-3,900
C	10	3,600	3,800	4,400	19,000	-7,100
Annual Average (2022-2072)	51	4,300	7,000	5,000	16,000	0

3.2 Groundwater System Water Budget Results

Projected (Future Land Use) water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

3.2.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin are projected to occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows are projected to occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

3.2.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Projected lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 64** and **Table 62**. The total projected net subsurface flows to and from all adjacent subbasins averages about 42 taf per year occurring as inflow to the Antelope Subbasin. The largest projected subsurface flows occur across the boundary with the Bend Subbasin with somewhat less subsurface flow occurring across the boundaries with the Los Molinos and Red Bluff Subbasins although these flows are still considerable.

Projected subsurface flows with the Bend Subbasin average about 22 taf occurring as inflows to the Antelope Subbasin. This makes up about two-thirds of the projected subsurface inflows to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Red Bluff Subbasin to the Antelope Subbasin are projected to average about 2.6 and eight (8) taf, respectively. The projected magnitudes of the subsurface inflows from the Bend Subbasin are relatively consistent from year to year; however, the inflows/outflows with the Red Bluff and Los Molinos Subbasins are somewhat variable. Projected subsurface flows across the boundary with the Los Molinos and Red Bluff Subbasins generally occur as inflows with some volumes of outflows occurring periodically.

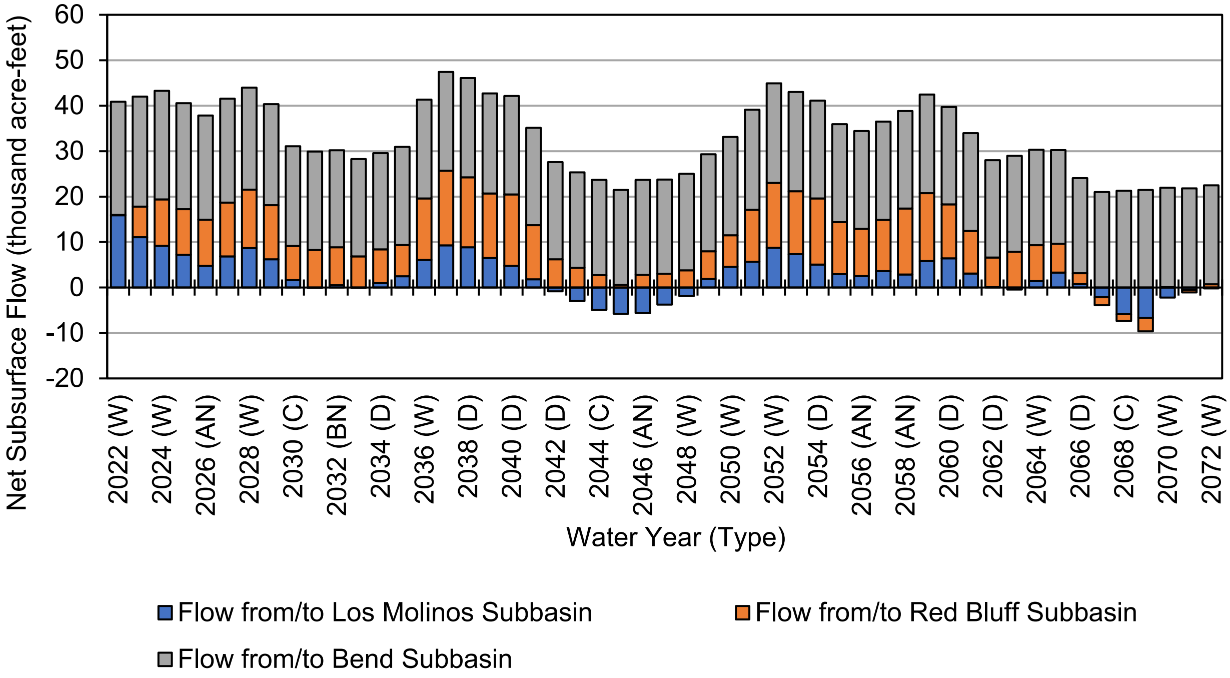

Figure 64. Antelope Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 62. Antelope Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

Water Year (Type)	Red Bluff	Los Molinos	Bend	Total
2022 (W)	88	16,000	25,000	41,000
2023 (W)	6,700	11,000	24,000	42,000
2024 (W)	10,000	9,200	24,000	44,000
2025 (BN)	10,000	7,200	23,000	41,000
2026 (AN)	10,000	4,800	23,000	38,000
2027 (W)	12,000	6,800	23,000	42,000
2028 (W)	13,000	8,700	22,000	44,000
2029 (C)	12,000	6,200	22,000	41,000
2030 (C)	7,500	1,600	22,000	31,000
2031 (AN)	8,200	-53	22,000	30,000
2032 (BN)	8,300	520	21,000	30,000
2033 (AN)	6,900	-65	21,000	28,000
2034 (D)	7,400	970	21,000	30,000
2035 (W)	6,900	2,500	22,000	31,000
2036 (W)	14,000	6,100	22,000	42,000
2037 (W)	16,000	9,300	22,000	48,000
2038 (D)	15,000	8,800	22,000	46,000
2039 (W)	14,000	6,500	22,000	43,000
2040 (D)	16,000	4,800	22,000	42,000
2041 (C)	12,000	1,800	21,000	35,000
2042 (D)	6,200	-820	21,000	27,000
2043 (C)	4,300	-3,000	21,000	23,000
2044 (C)	2,700	-4,900	21,000	19,000
2045 (C)	590	-5,800	21,000	16,000
2046 (AN)	2,800	-5,600	21,000	18,000
2047 (C)	3,000	-3,700	21,000	20,000
2048 (W)	3,800	-1,900	21,000	23,000
2049 (W)	6,100	1,900	21,000	30,000
2050 (W)	6,900	4,600	22,000	33,000
2051 (W)	11,000	5,700	22,000	39,000
2052 (W)	14,000	8,800	22,000	45,000
2053 (AN)	14,000	7,400	22,000	43,000
2054 (D)	15,000	5,100	22,000	41,000
2055 (D)	11,000	2,900	22,000	36,000
2056 (AN)	10,000	2,500	22,000	35,000
2057 (BN)	11,000	3,600	22,000	37,000
2058 (AN)	15,000	2,900	21,000	39,000
2059 (W)	15,000	5,800	22,000	43,000

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Red Bluff</th><th>Los Molinos</th><th>Bend</th><th>Total</th></tr>
<tr><td colspan="2">2060 (D)</td><td>12,000</td><td>6,400</td><td>21,000</td><td>40,000</td></tr>
<tr><td colspan="2">2061 (C)</td><td>9,400</td><td>3,100</td><td>22,000</td><td>34,000</td></tr>
<tr><td colspan="2">2062 (D)</td><td>6,500</td><td>76</td><td>21,000</td><td>28,000</td></tr>
<tr><td colspan="2">2063 (BN)</td><td>7,900</td><td>-450</td><td>21,000</td><td>29,000</td></tr>
<tr><td colspan="2">2064 (W)</td><td>7,900</td><td>1,400</td><td>21,000</td><td>31,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>6,400</td><td>3,300</td><td>21,000</td><td>31,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>2,400</td><td>760</td><td>21,000</td><td>24,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>-1,800</td><td>-2,100</td><td>21,000</td><td>17,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>-1,500</td><td>-5,900</td><td>21,000</td><td>14,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>-3,000</td><td>-6,600</td><td>21,000</td><td>12,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>83</td><td>-2,200</td><td>22,000</td><td>20,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>-500</td><td>-560</td><td>22,000</td><td>21,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>710</td><td>-200</td><td>22,000</td><td>23,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>8,000</td><td>2,600</td><td>22,000</td><td>33,000</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>8,800</td><td>5,500</td><td>22,000</td><td>37,000</td></tr>
<tr><td>AN</td><td>9,500</td><td>1,700</td><td>22,000</td><td>33,000</td></tr>
<tr><td>BN</td><td>5,800</td><td>990</td><td>22,000</td><td>29,000</td></tr>
<tr><td>D</td><td>10,000</td><td>3,200</td><td>21,000</td><td>35,000</td></tr>
<tr><td>C</td><td>4,800</td><td>-1,300</td><td>21,000</td><td>25,000</td></tr>
</table>

Note: positive values represent net inflows to Antelope Subbasin, negative values represent net outflows from Antelope Subbasin.

3.2.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Projected lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 65** and **Table 63**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average projected subsurface inflow from the upland areas is about 0.270 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

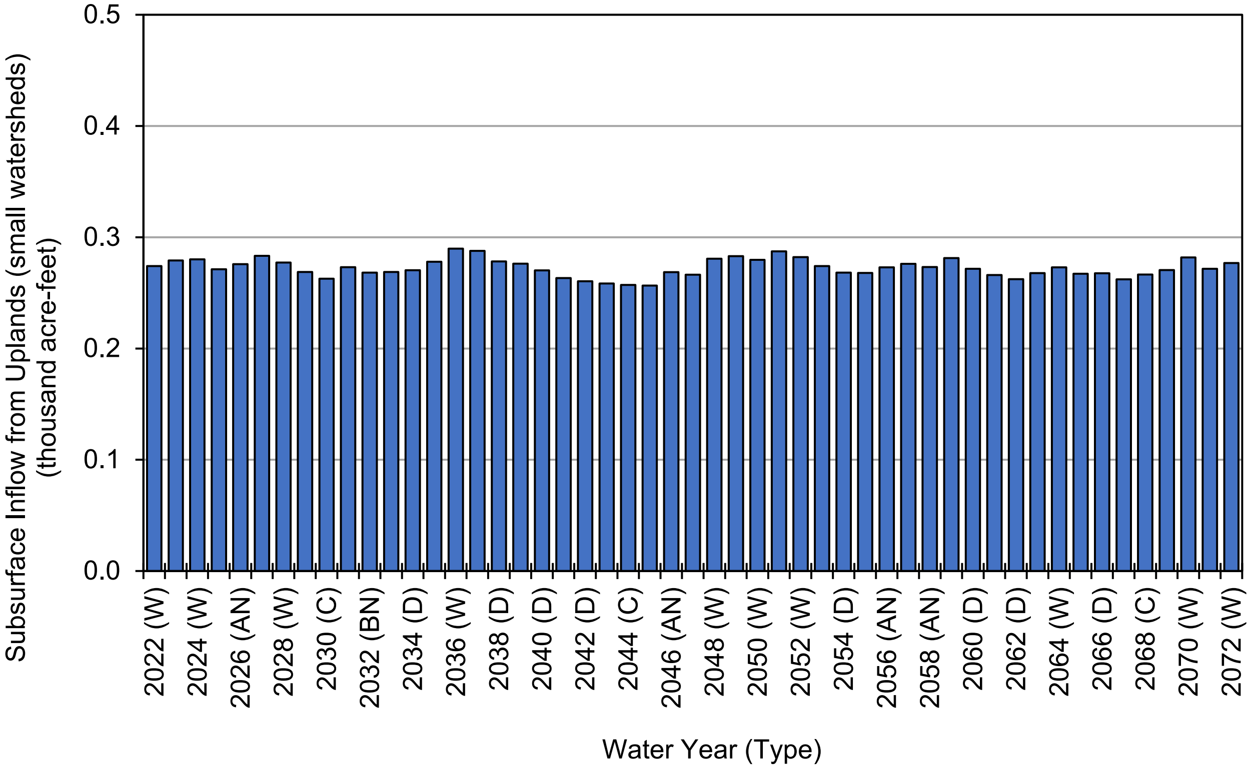

Figure 65. Antelope Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Upland Areas

Table 63. Antelope Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet)

Water Year (Type)	Subsurface Inflow from Uplands
2022 (W)	270
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280

Water Year (Type)		Subsurface Inflow from Uplands
2060 (D)		270
2061 (C)		270
2062 (D)		260
2063 (BN)		270
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

3.2.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 66** and **Table 64**. The average annual deep percolation from the SWS over the projected water budget period is approximately 11 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

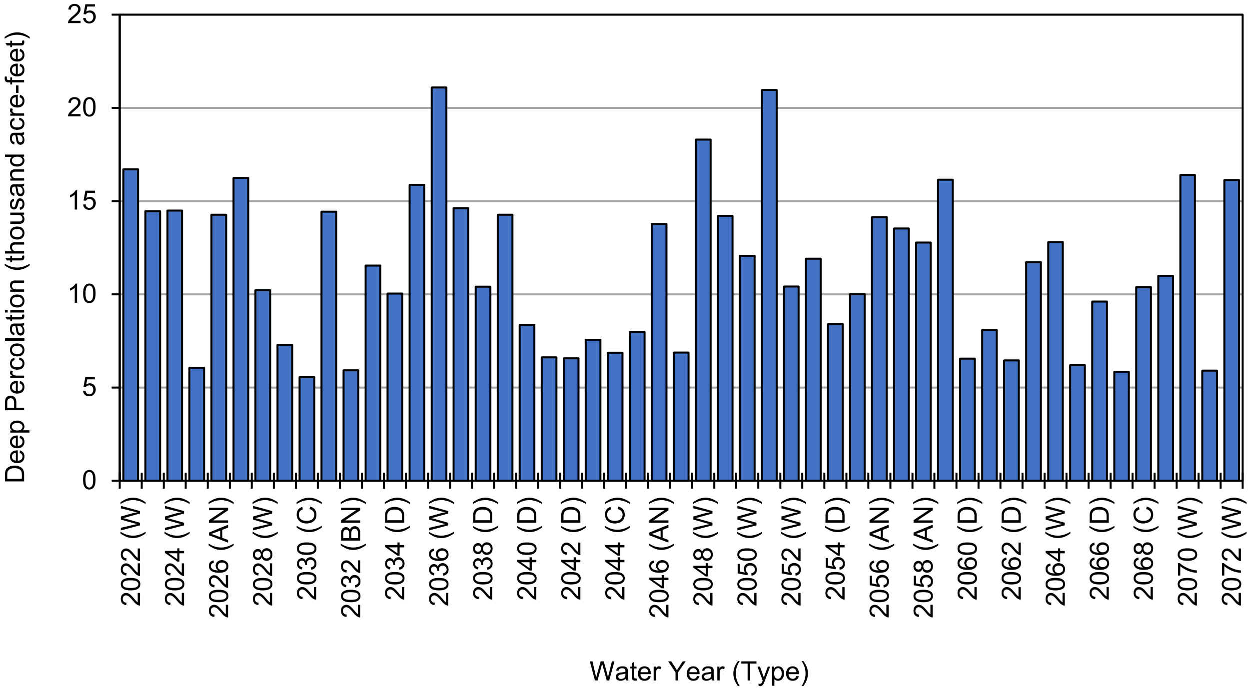

Figure 66. Antelope Subbasin Projected (Future Land Use) Deep Percolation

Table 64. Antelope Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet)

Water Year (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	14,000
2024 (W)	14,000
2025 (BN)	6,100
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	10,000
2029 (C)	7,300
2030 (C)	5,600
2031 (AN)	14,000
2032 (BN)	5,900
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	21,000
2037 (W)	15,000
2038 (D)	10,000
2039 (W)	14,000
2040 (D)	8,400
2041 (C)	6,600
2042 (D)	6,600
2043 (C)	7,600
2044 (C)	6,900
2045 (C)	8,000
2046 (AN)	14,000
2047 (C)	6,900
2048 (W)	18,000
2049 (W)	14,000
2050 (W)	12,000
2051 (W)	21,000
2052 (W)	10,000
2053 (AN)	12,000
2054 (D)	8,400
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000

Water Year (Type)		Deep Percolation from the SWS
2060 (D)		6,500
2061 (C)		8,100
2062 (D)		6,500
2063 (BN)		12,000
2064 (W)		13,000
2065 (BN)		6,200
2066 (D)		9,600
2067 (C)		5,800
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,900
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,600
	D	8,500
	C	7,300

3.2.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 67** and Table **65**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the projected annual net seepage values are always highly negative with an average annual net stream seepage value of -28 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

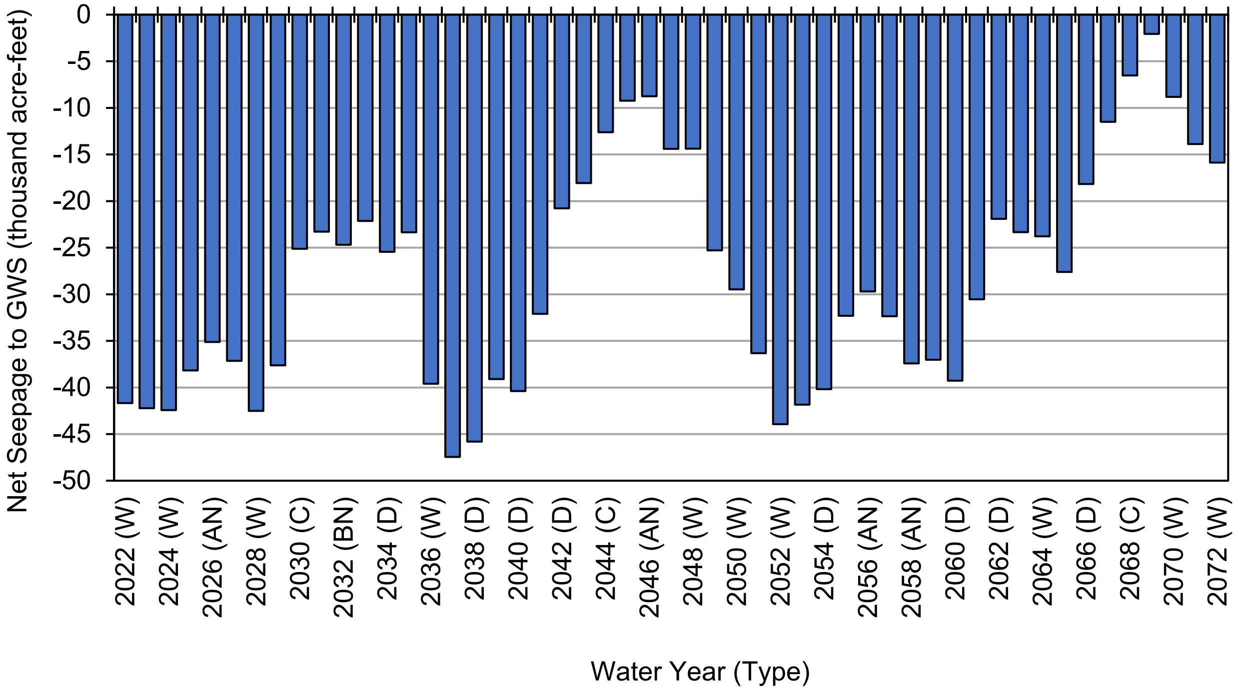

Figure 67. Antelope Subbasin Projected (Future Land Use) Net Stream Seepage to GWS/Discharge to Surface Water

Table 65. Antelope Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet)

Water Year (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-42,000
2023 (W)	-42,000
2024 (W)	-42,000
2025 (BN)	-38,000
2026 (AN)	-35,000
2027 (W)	-37,000
2028 (W)	-43,000
2029 (C)	-38,000
2030 (C)	-25,000
2031 (AN)	-23,000
2032 (BN)	-25,000
2033 (AN)	-22,000
2034 (D)	-25,000
2035 (W)	-23,000
2036 (W)	-40,000
2037 (W)	-47,000
2038 (D)	-46,000
2039 (W)	-39,000
2040 (D)	-40,000
2041 (C)	-32,000
2042 (D)	-21,000
2043 (C)	-18,000
2044 (C)	-13,000
2045 (C)	-9,200
2046 (AN)	-8,800
2047 (C)	-14,000
2048 (W)	-14,000
2049 (W)	-25,000
2050 (W)	-29,000
2051 (W)	-36,000
2052 (W)	-44,000
2053 (AN)	-42,000
2054 (D)	-40,000
2055 (D)	-32,000
2056 (AN)	-30,000
2057 (BN)	-32,000
2058 (AN)	-37,000
2059 (W)	-37,000

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
2060 (D)		-39,000
2061 (C)		-31,000
2062 (D)		-22,000
2063 (BN)		-23,000
2064 (W)		-24,000
2065 (BN)		-28,000
2066 (D)		-18,000
2067 (C)		-12,000
2068 (C)		-6,500
2069 (BN)		-2,100
2070 (W)		-8,800
2071 (BN)		-14,000
2072 (W)		-16,000
Average (2022-2072)		-28,000
2022-2072	W	-33,000
	AN	-28,000
	BN	-23,000
	D	-32,000
	C	-20,000

Note: negative values indicate net groundwater discharge to surface water

3.2.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Projected groundwater extractions are summarized in **Figure 69** and **Table 66** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the projected water budget period average about -16 taf per year. Overall, groundwater pumping represents a majority of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -15 taf over the projected period and groundwater uptake averaged about -0.820 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

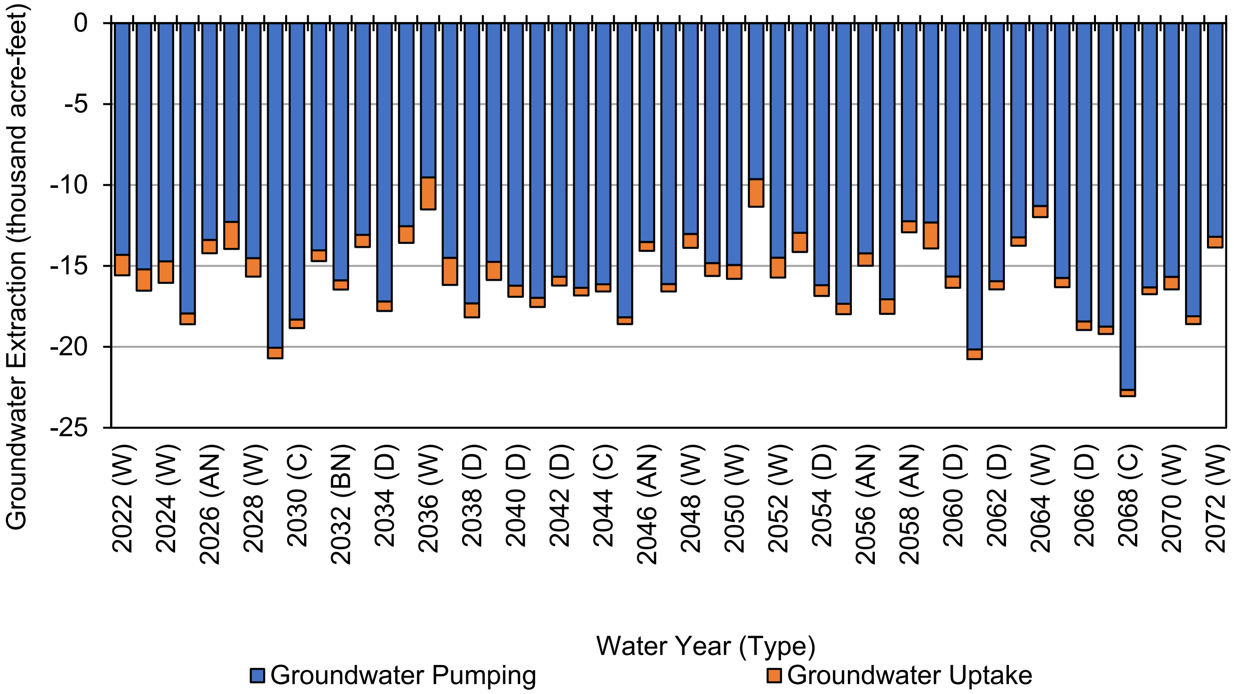

Figure 69. Antelope Subbasin Projected (Future Land Use) Groundwater Extractions

Table 66. Antelope Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet)

Water Year (Type)	Groundwater Pumping	Groundwater Uptake	Total
2022 (W)	-14,000	-1,300	-16,000
2023 (W)	-15,000	-1,300	-17,000
2024 (W)	-15,000	-1,300	-16,000
2025 (BN)	-18,000	-660	-19,000
2026 (AN)	-13,000	-820	-14,000
2027 (W)	-12,000	-1,700	-14,000
2028 (W)	-15,000	-1,100	-16,000
2029 (C)	-20,000	-660	-21,000
2030 (C)	-18,000	-530	-19,000
2031 (AN)	-14,000	-660	-15,000
2032 (BN)	-16,000	-560	-16,000
2033 (AN)	-13,000	-750	-14,000
2034 (D)	-17,000	-580	-18,000
2035 (W)	-13,000	-1,000	-14,000
2036 (W)	-9,500	-2,000	-12,000
2037 (W)	-15,000	-1,700	-16,000
2038 (D)	-17,000	-860	-18,000
2039 (W)	-15,000	-1,100	-16,000
2040 (D)	-16,000	-680	-17,000
2041 (C)	-17,000	-560	-18,000
2042 (D)	-16,000	-540	-16,000
2043 (C)	-16,000	-480	-17,000
2044 (C)	-16,000	-440	-17,000
2045 (C)	-18,000	-410	-19,000
2046 (AN)	-14,000	-540	-14,000
2047 (C)	-16,000	-450	-17,000
2048 (W)	-13,000	-850	-14,000
2049 (W)	-15,000	-800	-16,000
2050 (W)	-15,000	-840	-16,000
2051 (W)	-9,600	-1,700	-11,000
2052 (W)	-14,000	-1,200	-16,000
2053 (AN)	-13,000	-1,200	-14,000
2054 (D)	-16,000	-670	-17,000
2055 (D)	-17,000	-650	-18,000
2056 (AN)	-14,000	-750	-15,000
2057 (BN)	-17,000	-900	-18,000
2058 (AN)	-12,000	-680	-13,000
2059 (W)	-12,000	-1,600	-14,000

Water Year (Type)		Groundwater Pumping	Groundwater Uptake	Total
2060 (D)		-16,000	-690	-16,000
2061 (C)		-20,000	-590	-21,000
2062 (D)		-16,000	-510	-16,000
2063 (BN)		-13,000	-510	-14,000
2064 (W)		-11,000	-680	-12,000
2065 (BN)		-16,000	-570	-16,000
2066 (D)		-18,000	-530	-19,000
2067 (C)		-19,000	-450	-19,000
2068 (C)		-23,000	-380	-23,000
2069 (BN)		-16,000	-410	-17,000
2070 (W)		-16,000	-770	-16,000
2071 (BN)		-18,000	-480	-19,000
2072 (W)		-13,000	-660	-14,000
Average (2022-2072)		-15,000	-820	-16,000
2022-2072	W	-13,000	-1,200	-15,000
	AN	-13,000	-770	-14,000
	BN	-16,000	-590	-17,000
	D	-17,000	-640	-17,000
	C	-18,000	-500	-19,000

3.2.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Projected vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 70** and **Table 67** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 24 taf per year over the projected water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

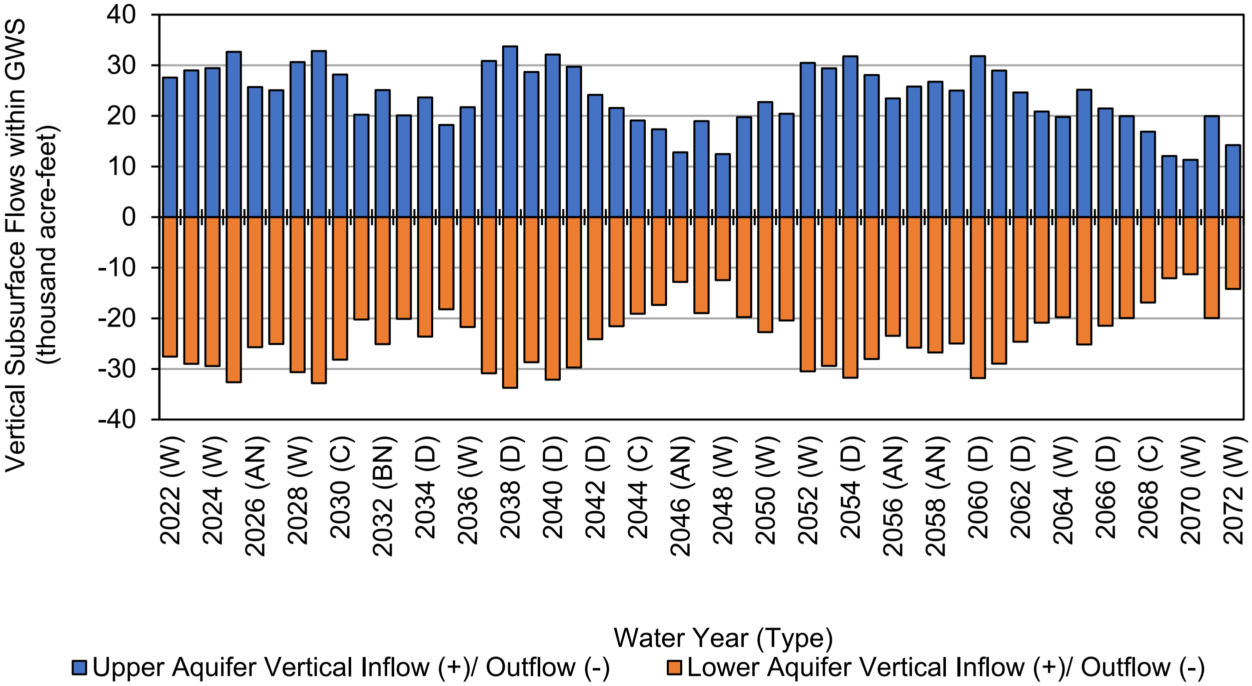

Figure 70. Antelope Subbasin Projected (Future Land Use) Vertical Subsurface Flow within the GWS

Table 67. Antelope Subbasin Projected (Future Land Use) Vertical Subsurface Flows within the GWS (acre-feet)

Water Year (Type)	Upper Aquifer to (-) / from (+) Lower Aquifer
2022 (W)	27,600
2023 (W)	29,000
2024 (W)	29,400
2025 (BN)	32,600
2026 (AN)	25,700
2027 (W)	25,100
2028 (W)	30,600
2029 (C)	32,800
2030 (C)	28,200
2031 (AN)	20,200
2032 (BN)	25,100
2033 (AN)	20,100
2034 (D)	23,600
2035 (W)	18,200
2036 (W)	21,700
2037 (W)	30,900
2038 (D)	33,700
2039 (W)	28,700
2040 (D)	32,100
2041 (C)	29,700
2042 (D)	24,100
2043 (C)	21,500
2044 (C)	19,100
2045 (C)	17,400
2046 (AN)	12,800
2047 (C)	19,000
2048 (W)	12,400
2049 (W)	19,700
2050 (W)	22,700
2051 (W)	20,400
2052 (W)	30,500
2053 (AN)	29,400
2054 (D)	31,800
2055 (D)	28,100
2056 (AN)	23,500
2057 (BN)	25,800
2058 (AN)	26,700
2059 (W)	25,000

Water Year (Type)		Upper Aquifer to (-) / from (+) Lower Aquifer
2060 (D)		31,800
2061 (C)		29,000
2062 (D)		24,600
2063 (BN)		20,900
2064 (W)		19,800
2065 (BN)		25,200
2066 (D)		21,500
2067 (C)		20,000
2068 (C)		16,900
2069 (BN)		12,100
2070 (W)		11,300
2071 (BN)		19,900
2072 (W)		14,200
Average (2022-2072)		24,000
2022-2072	W	23,000
	AN	23,000
	BN	23,000
	D	28,000
	C	23,000

3.2.6 Change in Groundwater Storage

Projected change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 71** and **Figure 72,** and **Table 68**. Values for total change in storage in the GWS and cumulative change in storage over the historical water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the projected period, the average total annual change in groundwater storage is about -0.330 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the projected period is about -17 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are generally the same in the Lower Aquifer (average -0.200 taf per year) compared to the Upper Aquifer (average -0.200 taf per year).

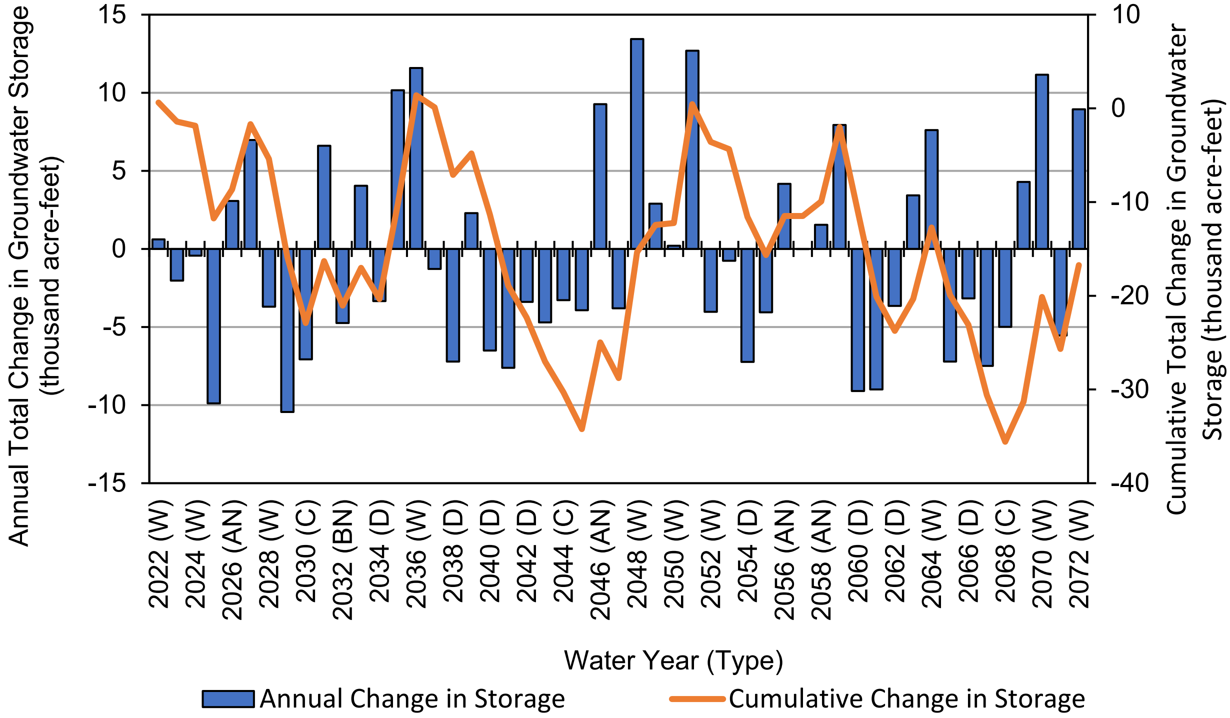

Figure 71. Antelope Subbasin Projected (Future Land Use) Total Change in Storage within the GWS

Table 68. Antelope Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet)

Water Year (Type)	Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2022 (W)	370	240	620	620
2023 (W)	-1,500	-530	-2,000	-1,400
2024 (W)	-350	-83	-440	-1,800
2025 (BN)	-6,100	-3,800	-9,900	-12,000
2026 (AN)	2,000	1,000	3,100	-8,700
2027 (W)	4,200	2,700	7,000	-1,700
2028 (W)	-2,500	-1,200	-3,700	-5,400
2029 (C)	-6,400	-4,100	-10,000	-16,000
2030 (C)	-3,700	-3,400	-7,100	-23,000
2031 (AN)	4,200	2,400	6,600	-16,000
2032 (BN)	-2,900	-1,900	-4,700	-21,000
2033 (AN)	2,600	1,400	4,000	-17,000
2034 (D)	-2,100	-1,300	-3,300	-20,000
2035 (W)	6,300	3,900	10,000	-10,000
2036 (W)	6,800	4,800	12,000	1,400
2037 (W)	-1,200	-98	-1,300	120
2038 (D)	-4,600	-2,600	-7,200	-7,100
2039 (W)	1,600	670	2,300	-4,800
2040 (D)	-4,000	-2,500	-6,500	-11,000
2041 (C)	-4,500	-3,100	-7,600	-19,000
2042 (D)	-1,600	-1,800	-3,400	-22,000
2043 (C)	-2,800	-1,900	-4,700	-27,000
2044 (C)	-1,700	-1,500	-3,300	-30,000
2045 (C)	-2,300	-1,600	-3,900	-34,000
2046 (AN)	6,000	3,200	9,300	-25,000
2047 (C)	-2,400	-1,400	-3,800	-29,000
2048 (W)	8,300	5,200	13,000	-15,000
2049 (W)	1,500	1,300	2,900	-12,000
2050 (W)	-230	420	200	-12,000
2051 (W)	7,600	5,100	13,000	440
2052 (W)	-3,000	-980	-4,000	-3,600
2053 (AN)	-510	-250	-760	-4,300
2054 (D)	-4,400	-2,900	-7,200	-12,000
2055 (D)	-2,400	-1,700	-4,100	-16,000
2056 (AN)	2,700	1,500	4,200	-11,000
2057 (BN)	-67	66	-1	-11,000
2058 (AN)	950	590	1,500	-9,900

Water Year (Type)		Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2059 (W)		4,700	3,200	7,900	-2,000
2060 (D)		-5,600	-3,500	-9,100	-11,000
2061 (C)		-5,500	-3,500	-9,000	-20,000
2062 (D)		-1,800	-1,800	-3,700	-24,000
2063 (BN)		2,300	1,100	3,400	-20,000
2064 (W)		4,900	2,700	7,600	-13,000
2065 (BN)		-4,700	-2,500	-7,200	-20,000
2066 (D)		-1,600	-1,600	-3,200	-23,000
2067 (C)		-4,300	-3,200	-7,500	-31,000
2068 (C)		-2,900	-2,000	-5,000	-36,000
2069 (BN)		2,900	1,400	4,300	-31,000
2070 (W)		6,600	4,500	11,000	-20,000
2071 (BN)		-3,400	-2,100	-5,500	-26,000
2072 (W)		5,600	3,300	8,900	-17,000
Average (2022-2072)		-170	-160	-330	
2022-2072	W	2,800	2,000	4,700	
	AN	2,600	1,400	4,000	
	BN	-1,700	-1,100	-2,800	
	D	-3,100	-2,200	-5,300	
	C	2,800	-2,600	-6,200	

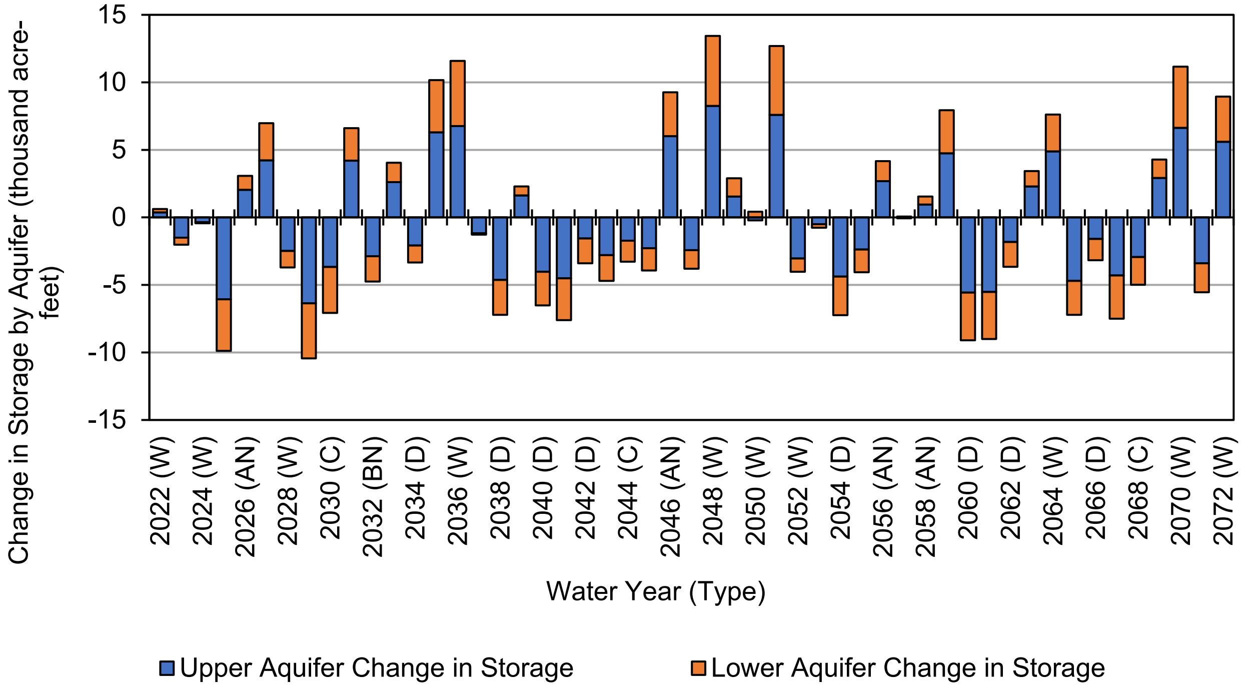

Figure 72. Antelope Subbasin Projected (Future Land Use) Change in Groundwater Storage by Aquifer

4 DETAILED PROJECTED (FUTURE LAND USE WITH CLIMATE CHANGE) WATER BUDGET

This section presents the results of the Projected (Future Land Use with Climate Change) scenario. The Future Land Use with Climate Change scenario assumes transient land use conditions based on assumed projected development and assumed projected climate change within the Antelope Subbasin.

4.1 Surface Water System Water Budget Results

4.1.1 Inflows

4.1.1.1 *Surface Water Inflow by Water Source Type*

The projected annual volume of surface water inflows is summarized by water source type in **Figure 73** and **Table 69**. Over the projected (future land use with climate change) period, surface water inflows average about 46 taf per year. Virtually, all inflows of the SWS are local supplies. The CVP supplies are very small and average about 0.610 taf per year.

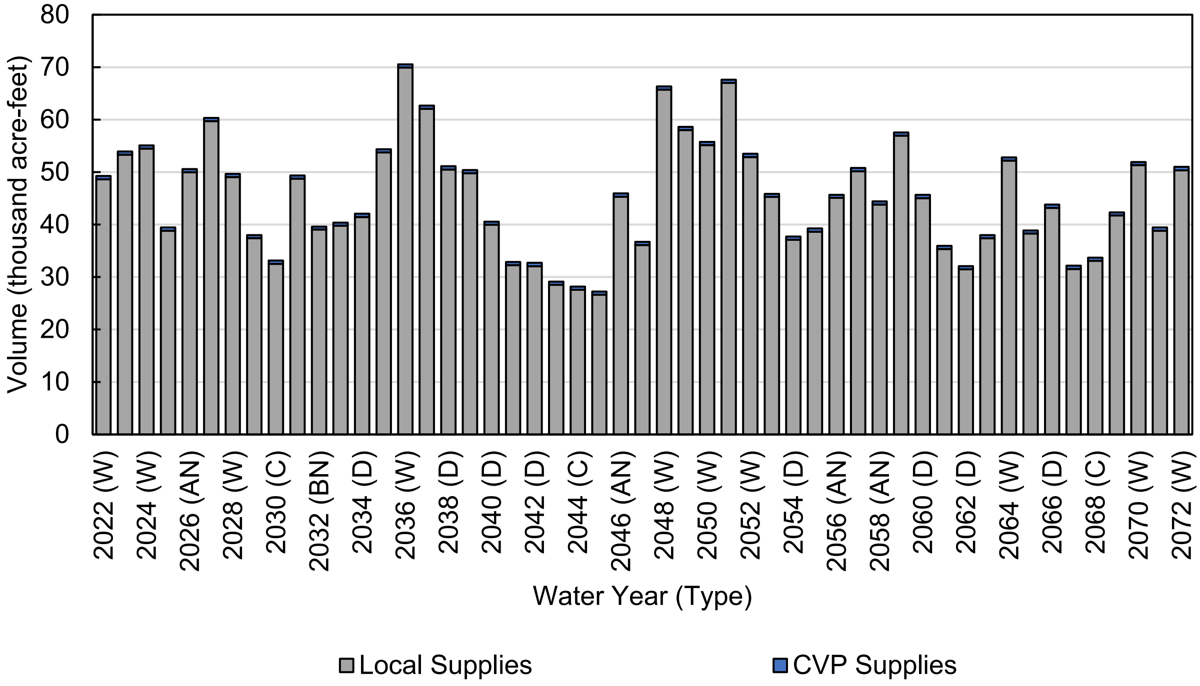

Figure 73. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Inflows, by Water Source Type

Table 69. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	49,000	49,000
2023 (W)	610	53,000	54,000
2024 (W)	610	54,000	55,000
2025 (BN)	630	39,000	39,000
2026 (AN)	610	50,000	51,000
2027 (W)	610	60,000	60,000
2028 (W)	620	49,000	50,000
2029 (C)	600	37,000	38,000
2030 (C)	640	33,000	33,000
2031 (AN)	610	49,000	49,000
2032 (BN)	560	39,000	40,000
2033 (AN)	580	40,000	40,000
2034 (D)	640	41,000	42,000
2035 (W)	610	54,000	54,000
2036 (W)	610	70,000	71,000
2037 (W)	610	62,000	63,000
2038 (D)	640	50,000	51,000
2039 (W)	610	50,000	50,000
2040 (D)	600	40,000	41,000
2041 (C)	610	32,000	33,000
2042 (D)	650	32,000	33,000
2043 (C)	610	29,000	29,000
2044 (C)	610	28,000	28,000
2045 (C)	610	27,000	27,000
2046 (AN)	610	45,000	46,000
2047 (C)	610	36,000	37,000
2048 (W)	610	66,000	66,000
2049 (W)	610	58,000	59,000
2050 (W)	610	55,000	56,000
2051 (W)	610	67,000	68,000
2052 (W)	620	53,000	53,000
2053 (AN)	580	45,000	46,000
2054 (D)	600	37,000	38,000
2055 (D)	640	39,000	39,000
2056 (AN)	580	45,000	46,000
2057 (BN)	620	50,000	51,000

Water Year (Type)		CVP Supplies	Local Supplies	Total
2058 (AN)		600	44,000	44,000
2059 (W)		610	57,000	58,000
2060 (D)		650	45,000	46,000
2061 (C)		600	35,000	36,000
2062 (D)		620	31,000	32,000
2063 (BN)		610	37,000	38,000
2064 (W)		630	52,000	53,000
2065 (BN)		560	38,000	39,000
2066 (D)		650	43,000	44,000
2067 (C)		640	32,000	32,000
2068 (C)		610	33,000	34,000
2069 (BN)		580	42,000	42,000
2070 (W)		580	51,000	52,000
2071 (BN)		630	39,000	39,000
2072 (W)		650	50,000	51,000
Average (2022-2072)		610	45,000	46,000
2022-2072	W	620	56,000	57,000
	AN	600	45,000	46,000
	BN	600	41,000	41,000
	D	630	40,000	41,000
	C	610	32,000	33,000

4.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Figure 74** and **Table 70**. Total precipitation is highly variable between years in the study area, ranging from approximately 31 taf (19.22 inches) during average critically dry years to 60 taf (37.2 inches) during average wet years.

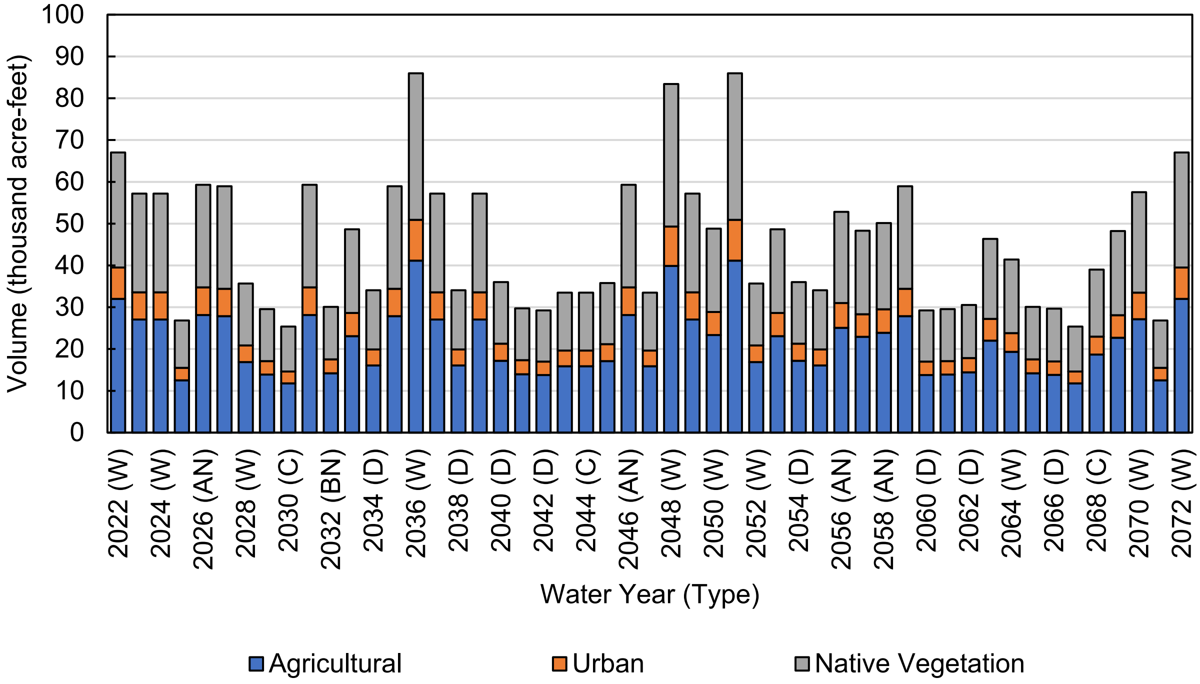

Figure 74. Antelope Subbasin Projected (Future Land Use with Climate Change) Precipitation, by Water Use Sector

Table 70. Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	32,000	7,500	28,000	67,000
2023 (W)	27,000	6,500	24,000	57,000
2024 (W)	27,000	6,500	24,000	57,000
2025 (BN)	13,000	3,000	11,000	27,000
2026 (AN)	28,000	6,700	25,000	59,000
2027 (W)	28,000	6,600	25,000	59,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	14,000	3,200	12,000	30,000
2030 (C)	12,000	2,800	11,000	25,000
2031 (AN)	28,000	6,700	25,000	59,000
2032 (BN)	14,000	3,300	13,000	30,000
2033 (AN)	23,000	5,600	20,000	49,000
2034 (D)	16,000	3,800	14,000	34,000
2035 (W)	28,000	6,600	25,000	59,000
2036 (W)	41,000	9,800	35,000	86,000
2037 (W)	27,000	6,500	24,000	57,000
2038 (D)	16,000	3,800	14,000	34,000
2039 (W)	27,000	6,500	24,000	57,000
2040 (D)	17,000	4,100	15,000	36,000
2041 (C)	14,000	3,400	12,000	30,000
2042 (D)	14,000	3,300	12,000	29,000
2043 (C)	16,000	3,800	14,000	33,000
2044 (C)	16,000	3,800	14,000	33,000
2045 (C)	17,000	4,100	15,000	36,000
2046 (AN)	28,000	6,700	25,000	59,000
2047 (C)	16,000	3,800	14,000	33,000
2048 (W)	40,000	9,400	34,000	83,000
2049 (W)	27,000	6,500	24,000	57,000
2050 (W)	23,000	5,500	20,000	49,000
2051 (W)	41,000	9,800	35,000	86,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	23,000	5,600	20,000	49,000
2054 (D)	17,000	4,100	15,000	36,000
2055 (D)	16,000	3,800	14,000	34,000
2056 (AN)	25,000	5,900	22,000	53,000
2057 (BN)	23,000	5,400	20,000	48,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		24,000	5,600	21,000	50,000
2059 (W)		28,000	6,600	25,000	59,000
2060 (D)		14,000	3,300	12,000	29,000
2061 (C)		14,000	3,200	12,000	30,000
2062 (D)		14,000	3,400	13,000	31,000
2063 (BN)		22,000	5,200	19,000	46,000
2064 (W)		19,000	4,500	18,000	41,000
2065 (BN)		14,000	3,300	13,000	30,000
2066 (D)		14,000	3,200	13,000	30,000
2067 (C)		12,000	2,800	11,000	25,000
2068 (C)		19,000	4,300	16,000	39,000
2069 (BN)		23,000	5,400	20,000	48,000
2070 (W)		27,000	6,400	24,000	58,000
2071 (BN)		13,000	3,000	11,000	27,000
2072 (W)		32,000	7,500	28,000	67,000
Average (2022-2072)		21,000	5,100	19,000	45,000
2022-2072	W	28,000	6,700	25,000	60,000
	AN	26,000	6,100	22,000	54,000
	BN	17,000	4,100	15,000	37,000
	D	15,000	3,600	14,000	33,000
	C	15,000	3,500	13,000	31,000

4.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 75** and **Table 71**. Virtually all groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 16 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 16 taf in wet years to 21 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 76** and **Table 72**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, averaging 0.8 taf and 0.730 taf per year, respectively.

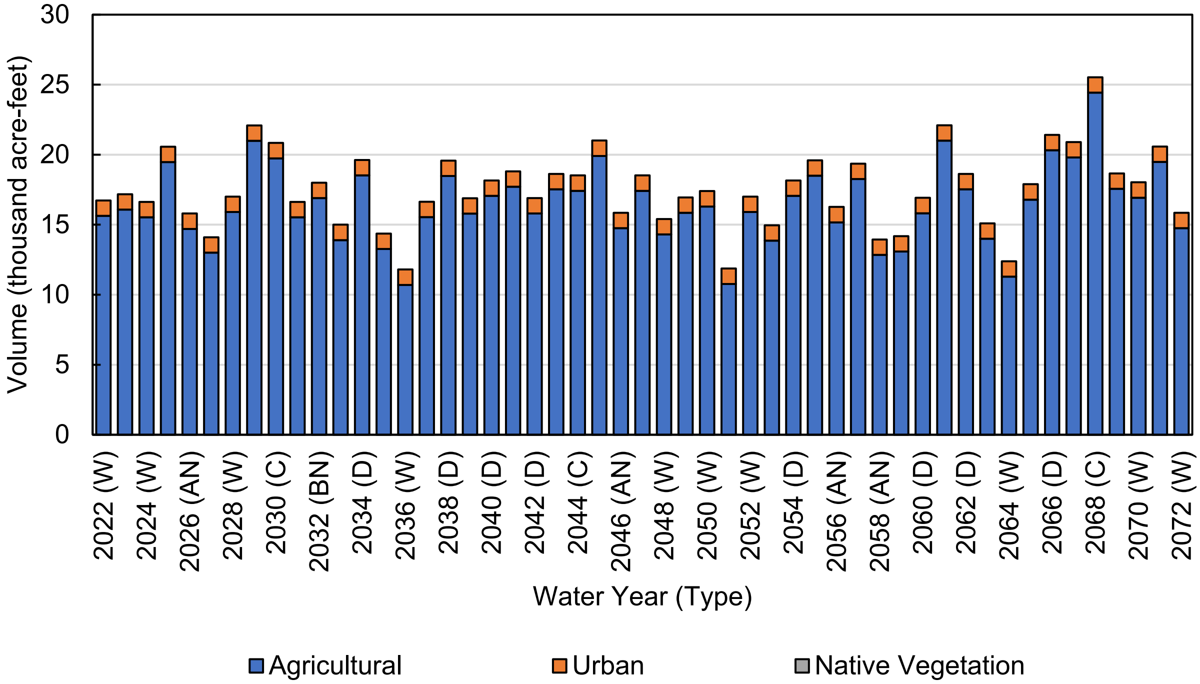

Figure 75. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Pumping, by Water Use Sector

Table 71. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	1,100	0	17,000
2023 (W)	16,000	1,100	0	17,000
2024 (W)	16,000	1,100	0	17,000
2025 (BN)	19,000	1,100	0	21,000
2026 (AN)	15,000	1,100	0	16,000
2027 (W)	13,000	1,100	0	14,000
2028 (W)	16,000	1,100	0	17,000
2029 (C)	21,000	1,100	0	22,000
2030 (C)	20,000	1,100	0	21,000
2031 (AN)	16,000	1,100	0	17,000
2032 (BN)	17,000	1,100	0	18,000
2033 (AN)	14,000	1,100	0	15,000
2034 (D)	19,000	1,100	0	20,000
2035 (W)	13,000	1,100	0	14,000
2036 (W)	11,000	1,100	0	12,000
2037 (W)	16,000	1,100	0	17,000
2038 (D)	18,000	1,100	0	20,000
2039 (W)	16,000	1,100	0	17,000
2040 (D)	17,000	1,100	0	18,000
2041 (C)	18,000	1,100	0	19,000
2042 (D)	16,000	1,100	0	17,000
2043 (C)	18,000	1,100	0	19,000
2044 (C)	17,000	1,100	0	19,000
2045 (C)	20,000	1,100	0	21,000
2046 (AN)	15,000	1,100	0	16,000
2047 (C)	17,000	1,100	0	19,000
2048 (W)	14,000	1,100	0	15,000
2049 (W)	16,000	1,100	0	17,000
2050 (W)	16,000	1,100	0	17,000
2051 (W)	11,000	1,100	0	12,000
2052 (W)	16,000	1,100	0	17,000
2053 (AN)	14,000	1,100	0	15,000
2054 (D)	17,000	1,100	0	18,000
2055 (D)	19,000	1,100	0	20,000
2056 (AN)	15,000	1,100	0	16,000
2057 (BN)	18,000	1,100	0	19,000

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Agricultural</th><th>Urban</th><th>Native Vegetation</th><th>Total</th></tr>
<tr><td colspan="2">2058 (AN)</td><td>13,000</td><td>1,100</td><td>0</td><td>14,000</td></tr>
<tr><td colspan="2">2059 (W)</td><td>13,000</td><td>1,100</td><td>0</td><td>14,000</td></tr>
<tr><td colspan="2">2060 (D)</td><td>16,000</td><td>1,100</td><td>0</td><td>17,000</td></tr>
<tr><td colspan="2">2061 (C)</td><td>21,000</td><td>1,100</td><td>0</td><td>22,000</td></tr>
<tr><td colspan="2">2062 (D)</td><td>18,000</td><td>1,100</td><td>0</td><td>19,000</td></tr>
<tr><td colspan="2">2063 (BN)</td><td>14,000</td><td>1,100</td><td>0</td><td>15,000</td></tr>
<tr><td colspan="2">2064 (W)</td><td>11,000</td><td>1,100</td><td>0</td><td>12,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>17,000</td><td>1,100</td><td>0</td><td>18,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>20,000</td><td>1,100</td><td>0</td><td>21,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>20,000</td><td>1,100</td><td>0</td><td>21,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>24,000</td><td>1,100</td><td>0</td><td>26,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>18,000</td><td>1,100</td><td>0</td><td>19,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>17,000</td><td>1,100</td><td>0</td><td>18,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>19,000</td><td>1,100</td><td>0</td><td>21,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>15,000</td><td>1,100</td><td>0</td><td>16,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>16,000</td><td>1,100</td><td>0</td><td>18,000</td></tr>
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<tr><td>AN</td><td>14,000</td><td>1,100</td><td>0</td><td>15,000</td></tr>
<tr><td>BN</td><td>17,000</td><td>1,100</td><td>0</td><td>19,000</td></tr>
<tr><td>D</td><td>18,000</td><td>1,100</td><td>0</td><td>19,000</td></tr>
<tr><td>C</td><td>20,000</td><td>1,100</td><td>0</td><td>21,000</td></tr>
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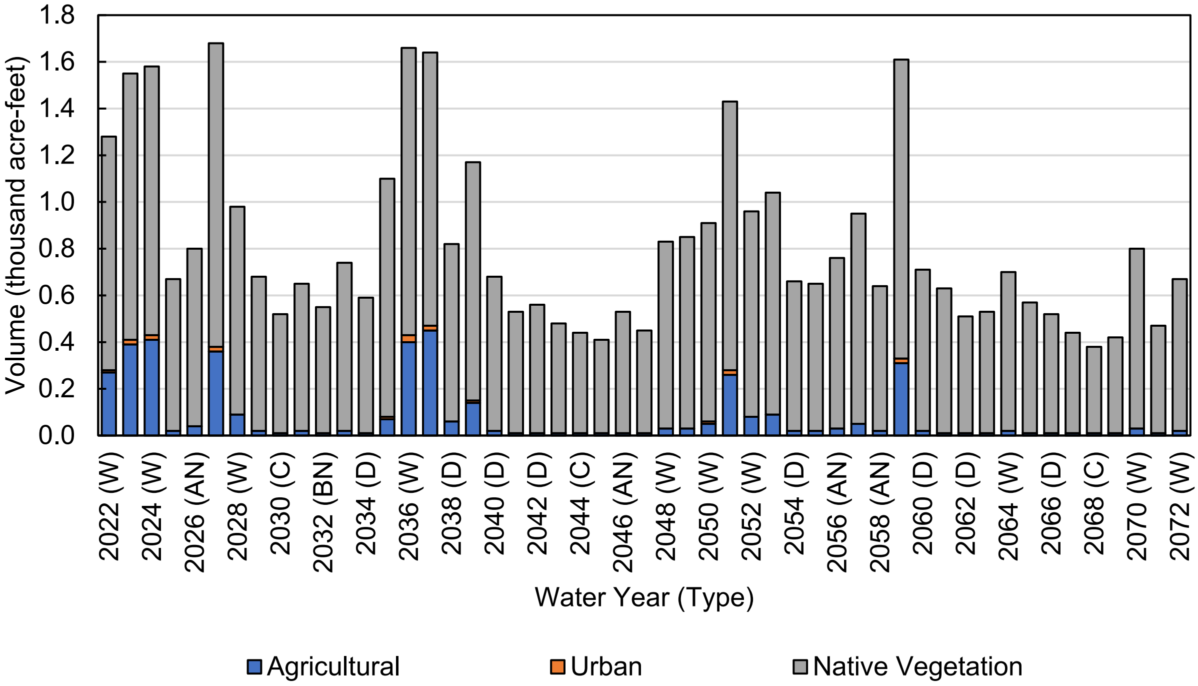


Figure 76. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Uptake, by Water Use Sector

Table 72. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (BN)	270	10	1,000	1,300
2023 (W)	390	20	1,100	1,600
2024 (W)	410	20	1,200	1,600
2025 (W)	20	0	650	670
2026 (BN)	40	0	760	800
2027 (AN)	360	20	1,300	1,700
2028 (W)	90	0	890	980
2029 (W)	20	0	660	680
2030 (C)	10	0	510	520
2031 (C)	20	0	630	650
2032 (AN)	10	0	540	550
2033 (BN)	20	0	720	740
2034 (AN)	10	0	580	590
2035 (D)	70	10	1,000	1,100
2036 (W)	400	30	1,200	1,700
2037 (W)	450	20	1,200	1,600
2038 (W)	60	0	760	820
2039 (D)	140	10	1,000	1,200
2040 (W)	20	0	660	680
2041 (D)	10	0	520	530
2042 (C)	10	0	550	560
2043 (D)	10	0	470	480
2044 (C)	10	0	430	440
2045 (C)	10	0	400	410
2046 (C)	10	0	520	530
2047 (AN)	10	0	440	450
2048 (C)	30	0	800	830
2049 (W)	30	0	820	850
2050 (W)	50	10	850	910
2051 (W)	260	20	1,200	1,400
2052 (W)	80	0	880	960
2053 (W)	90	0	950	1,000
2054 (AN)	20	0	640	660
2055 (D)	20	0	630	650
2056 (D)	30	0	730	760
2057 (AN)	50	0	900	950

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (BN)		20	0	620	640
2059 (AN)		310	20	1,300	1,600
2060 (W)		20	0	690	710
2061 (D)		10	0	620	630
2062 (C)		10	0	500	510
2063 (D)		10	0	520	530
2064 (BN)		20	0	680	700
2065 (W)		10	0	560	570
2066 (BN)		10	0	510	520
2067 (D)		10	0	430	440
2068 (C)		10	0	370	380
2069 (C)		10	0	410	420
2070 (BN)		30	0	770	800
2071 (W)		10	0	460	470
2072 (W)		20	0	650	670
Average (2022-2072)		80	0	730	810
2022-2072	W	190	10	990	1,200
	AN	30	0	700	740
	BN	20	0	580	590
	D	20	0	610	630
	C	10	0	490	500

4.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 77** and **Table 73**, averaging approximately 27 taf per year.

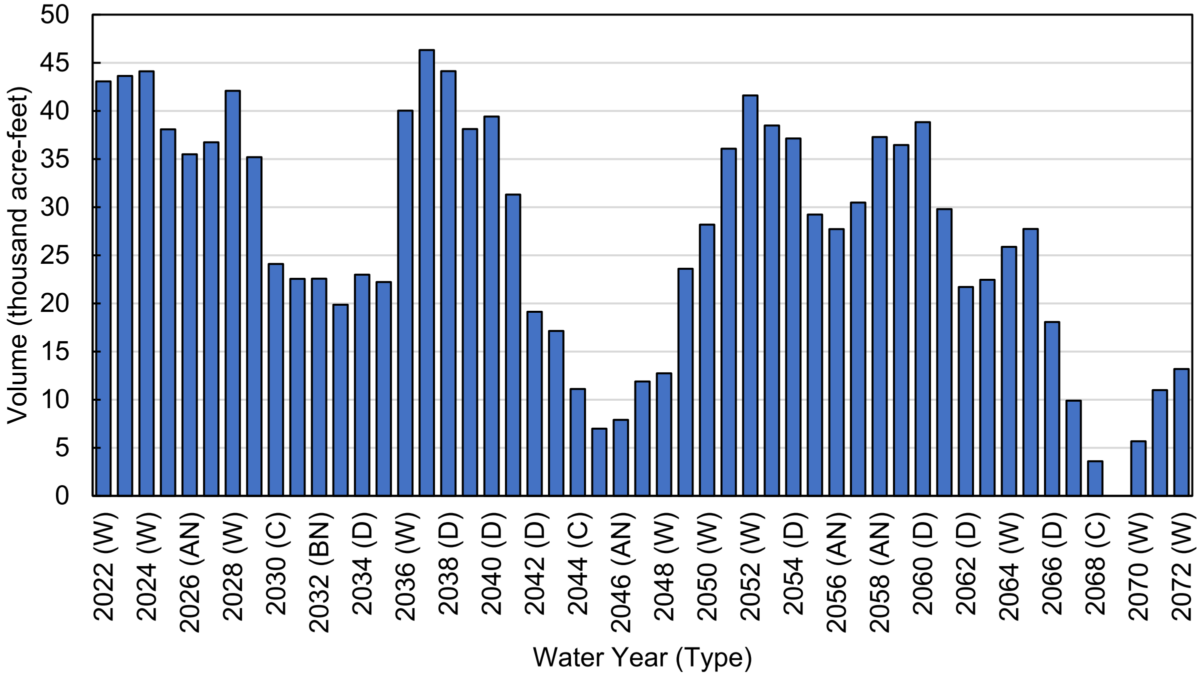


Figure 77. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Discharge to Surface Water

Table 73. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)	Groundwater Discharge to Surface Water
2022 (W)	43,000
2023 (W)	44,000
2024 (W)	44,000
2025 (BN)	38,000
2026 (AN)	35,000
2027 (W)	37,000
2028 (W)	42,000
2029 (C)	35,000
2030 (C)	24,000
2031 (AN)	23,000
2032 (BN)	23,000
2033 (AN)	20,000
2034 (D)	23,000
2035 (W)	22,000
2036 (W)	40,000
2037 (W)	46,000
2038 (D)	44,000
2039 (W)	38,000
2040 (D)	39,000
2041 (C)	31,000
2042 (D)	19,000
2043 (C)	17,000
2044 (C)	11,000
2045 (C)	7,000
2046 (AN)	7,900
2047 (C)	12,000
2048 (W)	13,000
2049 (W)	24,000
2050 (W)	28,000
2051 (W)	36,000
2052 (W)	42,000
2053 (AN)	38,000
2054 (D)	37,000
2055 (D)	29,000
2056 (AN)	28,000
2057 (BN)	30,000

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Groundwater Discharge to Surface Water</th></tr>
<tr><td colspan="2">2058 (AN)</td><td>37,000</td></tr>
<tr><td colspan="2">2059 (W)</td><td>36,000</td></tr>
<tr><td colspan="2">2060 (D)</td><td>39,000</td></tr>
<tr><td colspan="2">2061 (C)</td><td>30,000</td></tr>
<tr><td colspan="2">2062 (D)</td><td>22,000</td></tr>
<tr><td colspan="2">2063 (BN)</td><td>22,000</td></tr>
<tr><td colspan="2">2064 (W)</td><td>26,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>28,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>18,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>9,900</td></tr>
<tr><td colspan="2">2068 (C)</td><td>3,600</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>0</td></tr>
<tr><td colspan="2">2070 (W)</td><td>5,700</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>11,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>13,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>27,000</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>32,000</td></tr>
<tr><td>AN</td><td>27,000</td></tr>
<tr><td>BN</td><td>22,000</td></tr>
<tr><td>D</td><td>30,000</td></tr>
<tr><td>C</td><td>18,000</td></tr>
</table>

4.1.2 Outflows

4.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 78** through **Figure 81**, and **Table 74** through **Table 77**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest projected in 2036 and 2051, at approximately 46 taf, and greatest 2031, at approximately 53 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 20 taf in above-normal and wet years and about 23 to 25 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and averages less than 0.350 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to meet a portion of their consumptive use requirements. ET of groundwater uptake by native vegetation and agricultural crops totals 0.730 and 0.080 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 29 taf in wet years and 25 taf in critically dry water years. Much of the total ET of precipitation results from the large acreage of native vegetation and Agricultural land in the Antelope Subbasin, though some contribution is from urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 82** and **Table 75**. The total volume is relatively small and constant between years, averaging 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

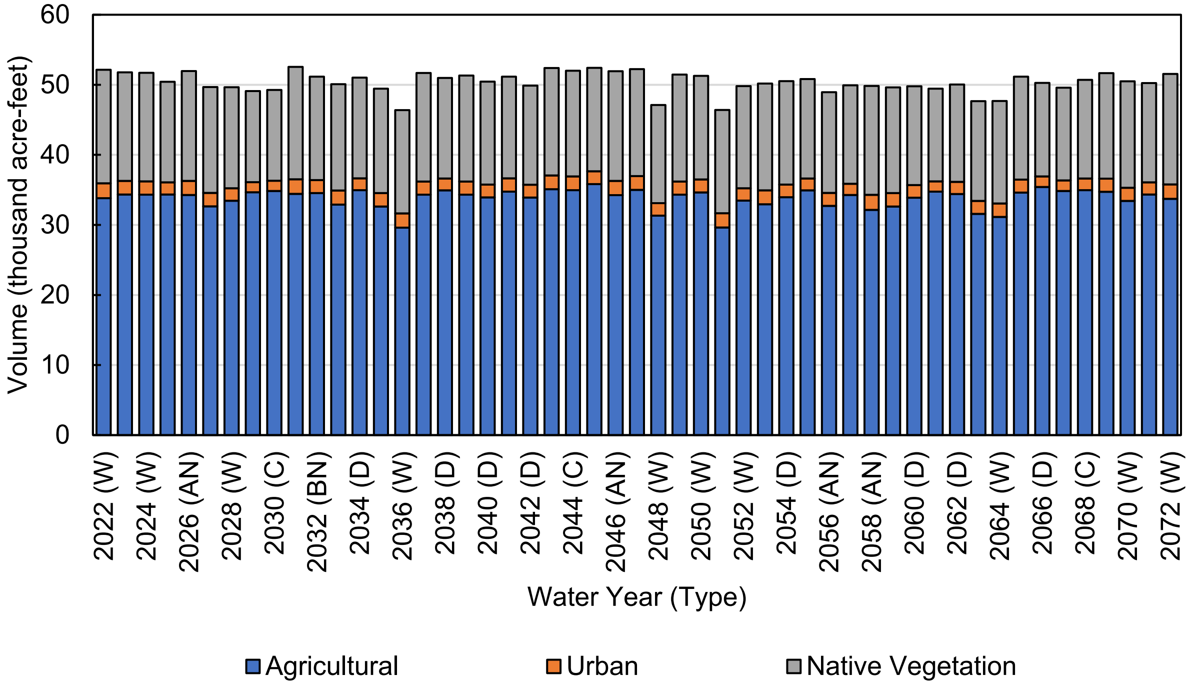


Figure 78. Antelope Subbasin Projected (Future Land Use with Climate Change) Total Evapotranspiration, by Water Use Sector

Table 74. Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	34,000	2,100	16,000	52,000
2023 (W)	34,000	1,900	16,000	52,000
2024 (W)	34,000	1,900	15,000	52,000
2025 (BN)	34,000	1,700	14,000	50,000
2026 (AN)	34,000	2,000	16,000	52,000
2027 (W)	33,000	1,900	15,000	50,000
2028 (W)	33,000	1,800	14,000	50,000
2029 (C)	35,000	1,400	13,000	49,000
2030 (C)	35,000	1,500	13,000	49,000
2031 (AN)	34,000	2,100	16,000	53,000
2032 (BN)	35,000	1,900	15,000	51,000
2033 (AN)	33,000	2,000	15,000	50,000
2034 (D)	35,000	1,700	14,000	51,000
2035 (W)	33,000	1,900	15,000	49,000
2036 (W)	30,000	2,000	15,000	46,000
2037 (W)	34,000	1,900	15,000	52,000
2038 (D)	35,000	1,700	14,000	51,000
2039 (W)	34,000	1,900	15,000	51,000
2040 (D)	34,000	1,800	15,000	50,000
2041 (C)	35,000	1,900	15,000	51,000
2042 (D)	34,000	1,800	14,000	50,000
2043 (C)	35,000	2,000	15,000	52,000
2044 (C)	35,000	2,000	15,000	52,000
2045 (C)	36,000	1,800	15,000	52,000
2046 (AN)	34,000	2,000	16,000	52,000
2047 (C)	35,000	2,000	15,000	52,000
2048 (W)	31,000	1,800	14,000	47,000
2049 (W)	34,000	1,900	15,000	51,000
2050 (W)	35,000	1,900	15,000	51,000
2051 (W)	30,000	2,000	15,000	46,000
2052 (W)	33,000	1,800	15,000	50,000
2053 (AN)	33,000	2,000	15,000	50,000
2054 (D)	34,000	1,800	15,000	51,000
2055 (D)	35,000	1,700	14,000	51,000
2056 (AN)	33,000	1,900	14,000	49,000
2057 (BN)	34,000	1,600	14,000	50,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		32,000	2,100	16,000	50,000
2059 (W)		33,000	1,900	15,000	50,000
2060 (D)		34,000	1,800	14,000	50,000
2061 (C)		35,000	1,500	13,000	49,000
2062 (D)		34,000	1,700	14,000	50,000
2063 (BN)		32,000	1,900	14,000	48,000
2064 (W)		31,000	1,900	15,000	48,000
2065 (BN)		35,000	1,900	15,000	51,000
2066 (D)		35,000	1,500	13,000	50,000
2067 (C)		35,000	1,500	13,000	50,000
2068 (C)		35,000	1,700	14,000	51,000
2069 (BN)		35,000	1,900	15,000	52,000
2070 (W)		33,000	1,900	15,000	51,000
2071 (BN)		34,000	1,700	14,000	50,000
2072 (W)		34,000	2,100	16,000	52,000
Average (2022-2072)		34,000	1,800	15,000	50,000
2022-2072	W	33,000	1,900	15,000	50,000
	AN	33,000	2,000	15,000	51,000
	BN	34,000	1,800	14,000	50,000
	D	34,000	1,700	14,000	50,000
	C	35,000	1,700	14,000	51,000

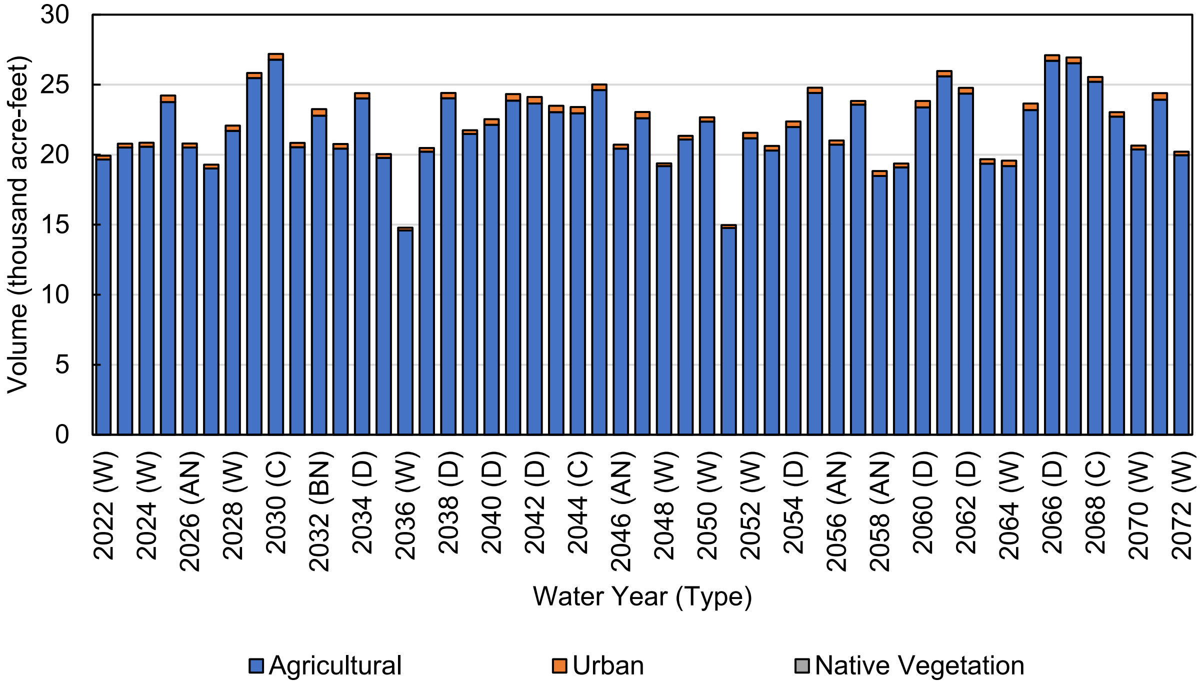


Figure 79. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Applied Water, by Water Use Sector

Table 75. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	20,000	270	0	20,000
2023 (W)	21,000	280	0	21,000
2024 (W)	21,000	280	0	21,000
2025 (BN)	24,000	470	0	24,000
2026 (AN)	21,000	290	0	21,000
2027 (W)	19,000	280	0	19,000
2028 (W)	22,000	380	0	22,000
2029 (C)	25,000	370	0	26,000
2030 (C)	27,000	410	0	27,000
2031 (AN)	21,000	300	0	21,000
2032 (BN)	23,000	460	0	23,000
2033 (AN)	20,000	330	0	21,000
2034 (D)	24,000	380	0	24,000
2035 (W)	20,000	270	0	20,000
2036 (W)	15,000	200	0	15,000
2037 (W)	20,000	270	0	20,000
2038 (D)	24,000	380	0	24,000
2039 (W)	21,000	270	0	22,000
2040 (D)	22,000	390	0	23,000
2041 (C)	24,000	470	0	24,000
2042 (D)	24,000	460	0	24,000
2043 (C)	23,000	450	0	23,000
2044 (C)	23,000	440	0	23,000
2045 (C)	25,000	390	0	25,000
2046 (AN)	20,000	290	0	21,000
2047 (C)	23,000	450	0	23,000
2048 (W)	19,000	190	0	19,000
2049 (W)	21,000	270	0	21,000
2050 (W)	22,000	310	0	23,000
2051 (W)	15,000	210	0	15,000
2052 (W)	21,000	380	0	22,000
2053 (AN)	20,000	330	0	21,000
2054 (D)	22,000	390	0	22,000
2055 (D)	24,000	380	0	25,000
2056 (AN)	21,000	290	0	21,000
2057 (BN)	24,000	270	0	24,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		18,000	350	0	19,000
2059 (W)		19,000	280	0	19,000
2060 (D)		23,000	460	0	24,000
2061 (C)		26,000	370	0	26,000
2062 (D)		24,000	420	0	25,000
2063 (BN)		19,000	320	0	20,000
2064 (W)		19,000	380	0	20,000
2065 (BN)		23,000	460	0	24,000
2066 (D)		27,000	390	0	27,000
2067 (C)		27,000	420	0	27,000
2068 (C)		25,000	340	0	26,000
2069 (BN)		23,000	320	0	23,000
2070 (W)		20,000	280	0	21,000
2071 (BN)		24,000	470	0	24,000
2072 (W)		20,000	260	0	20,000
Average (2022-2072)		20,000	270	0	20,000
2022-2072	W	20,000	270	0	20,000
	AN	21,000	280	0	21,000
	BN	21,000	280	0	21,000
	D	24,000	470	0	24,000
	C	21,000	290	0	21,000

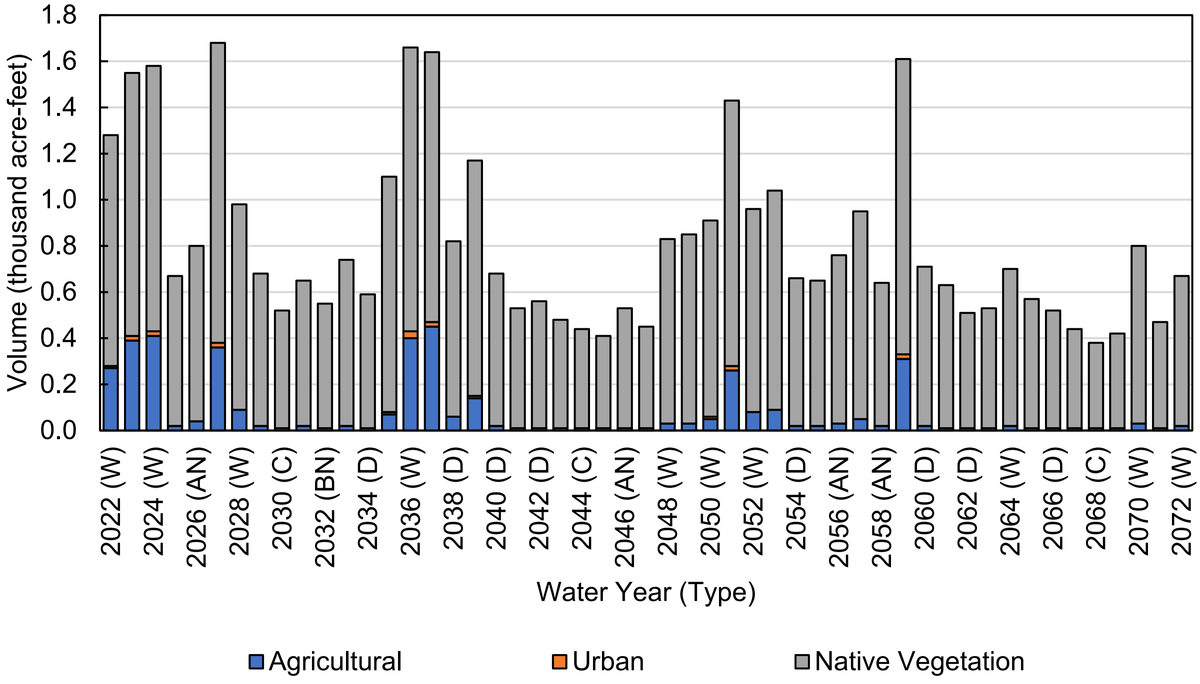


Figure 80. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 76. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	270	10	1,000	1,300
2023 (W)	390	20	1,100	1,600
2024 (W)	410	20	1,200	1,600
2025 (BN)	20	0	650	670
2026 (AN)	40	0	760	800
2027 (W)	360	20	1,300	1,700
2028 (W)	90	0	890	980
2029 (C)	20	0	660	680
2030 (C)	10	0	510	520
2031 (AN)	20	0	630	650
2032 (BN)	10	0	540	550
2033 (AN)	20	0	720	740
2034 (D)	10	0	580	590
2035 (W)	70	10	1,000	1,100
2036 (W)	400	30	1,200	1,700
2037 (W)	450	20	1,200	1,600
2038 (D)	60	0	760	820
2039 (W)	140	10	1,000	1,200
2040 (D)	20	0	660	680
2041 (C)	10	0	520	530
2042 (D)	10	0	550	560
2043 (C)	10	0	470	480
2044 (C)	10	0	430	440
2045 (C)	10	0	400	410
2046 (AN)	10	0	520	530
2047 (C)	10	0	440	450
2048 (W)	30	0	800	830
2049 (W)	30	0	820	850
2050 (W)	50	10	850	910
2051 (W)	260	20	1,200	1,400
2052 (W)	80	0	880	960
2053 (AN)	90	0	950	1,000
2054 (D)	20	0	640	660
2055 (D)	20	0	630	650
2056 (AN)	30	0	730	760
2057 (BN)	50	0	900	950

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		20	0	620	640
2059 (W)		310	20	1,300	1,600
2060 (D)		20	0	690	710
2061 (C)		10	0	620	630
2062 (D)		10	0	500	510
2063 (BN)		10	0	520	530
2064 (W)		20	0	680	700
2065 (BN)		10	0	560	570
2066 (D)		10	0	510	520
2067 (C)		10	0	430	440
2068 (C)		10	0	370	380
2069 (BN)		10	0	410	420
2070 (W)		30	0	770	800
2071 (BN)		10	0	460	470
2072 (W)		20	0	650	670
Average (2022-2072)		80	0	730	810
2022-2072	W	190	10	990	1,200
	AN	30	0	700	740
	BN	20	0	580	590
	D	20	0	610	630
	C	10	0	490	500

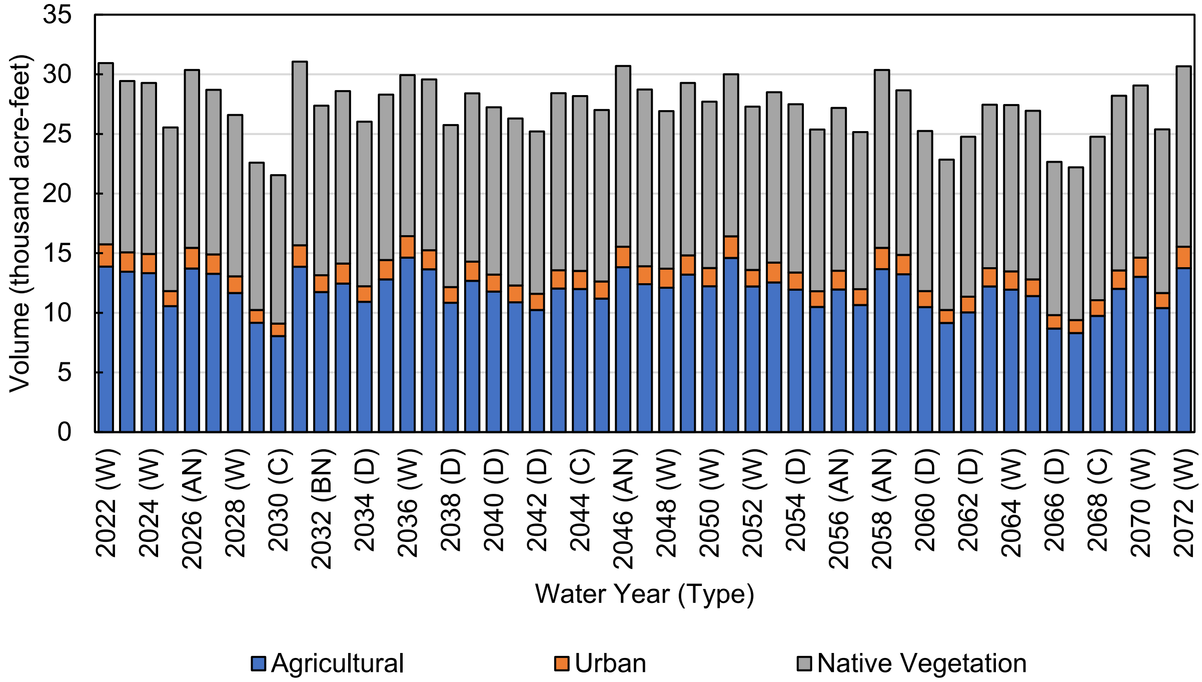


Figure 81. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Precipitation, by Water Use Sector

Table 77. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	14,000	1,900	15,000	31,000
2023 (W)	13,000	1,600	14,000	29,000
2024 (W)	13,000	1,600	14,000	29,000
2025 (BN)	11,000	1,300	14,000	26,000
2026 (AN)	14,000	1,700	15,000	30,000
2027 (W)	13,000	1,600	14,000	29,000
2028 (W)	12,000	1,400	14,000	27,000
2029 (C)	9,200	1,100	12,000	23,000
2030 (C)	8,100	1,100	12,000	22,000
2031 (AN)	14,000	1,800	15,000	31,000
2032 (BN)	12,000	1,400	14,000	27,000
2033 (AN)	12,000	1,700	14,000	29,000
2034 (D)	11,000	1,300	14,000	26,000
2035 (W)	13,000	1,600	14,000	28,000
2036 (W)	15,000	1,800	14,000	30,000
2037 (W)	14,000	1,600	14,000	30,000
2038 (D)	11,000	1,300	14,000	26,000
2039 (W)	13,000	1,600	14,000	28,000
2040 (D)	12,000	1,400	14,000	27,000
2041 (C)	11,000	1,400	14,000	26,000
2042 (D)	10,000	1,400	14,000	25,000
2043 (C)	12,000	1,500	15,000	28,000
2044 (C)	12,000	1,500	15,000	28,000
2045 (C)	11,000	1,400	14,000	27,000
2046 (AN)	14,000	1,700	15,000	31,000
2047 (C)	12,000	1,500	15,000	29,000
2048 (W)	12,000	1,600	13,000	27,000
2049 (W)	13,000	1,600	14,000	29,000
2050 (W)	12,000	1,500	14,000	28,000
2051 (W)	15,000	1,800	14,000	30,000
2052 (W)	12,000	1,400	14,000	27,000
2053 (AN)	13,000	1,700	14,000	29,000
2054 (D)	12,000	1,400	14,000	27,000
2055 (D)	11,000	1,300	14,000	25,000
2056 (AN)	12,000	1,600	14,000	27,000
2057 (BN)	11,000	1,300	13,000	25,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		14,000	1,800	15,000	30,000
2059 (W)		13,000	1,600	14,000	29,000
2060 (D)		10,000	1,400	13,000	25,000
2061 (C)		9,200	1,100	13,000	23,000
2062 (D)		10,000	1,300	13,000	25,000
2063 (BN)		12,000	1,500	14,000	27,000
2064 (W)		12,000	1,500	14,000	27,000
2065 (BN)		11,000	1,400	14,000	27,000
2066 (D)		8,700	1,100	13,000	23,000
2067 (C)		8,300	1,100	13,000	22,000
2068 (C)		9,800	1,300	14,000	25,000
2069 (BN)		12,000	1,600	15,000	28,000
2070 (W)		13,000	1,600	14,000	29,000
2071 (BN)		10,000	1,300	14,000	25,000
2072 (W)		14,000	1,800	15,000	31,000
Average (2022-2072)		12,000	1,500	14,000	27,000
2022-2072	W	13,000	1,600	14,000	29,000
	AN	13,000	1,700	15,000	30,000
	BN	11,000	1,400	14,000	27,000
	D	11,000	1,300	14,000	26,000
	C	10,000	1,300	14,000	25,000

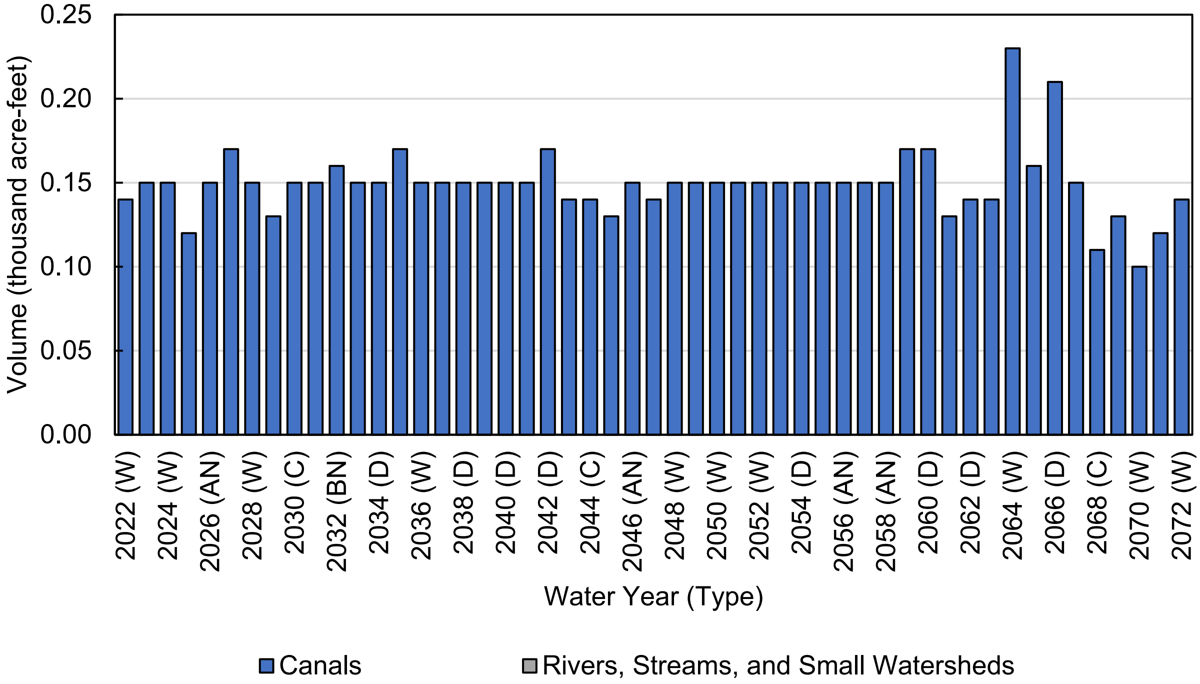


Figure 82. Antelope Subbasin Projected (Future Land Use with Climate Change) Evaporation of Surface Water Sources

Table 78. Antelope Subbasin Projected (Future Land Use with Climate Change) Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds[1]	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	170	0	170
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
2059 (W)		170	0	170
2060 (D)		170	0	170
2061 (C)		130	0	130
2062 (D)		140	0	140
2063 (BN)		140	0	140
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	150	0	150
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

4.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 83** and **Table 79** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 46 taf per year, and range on average from 27 taf in critically dry years up to 66 taf in wet years. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

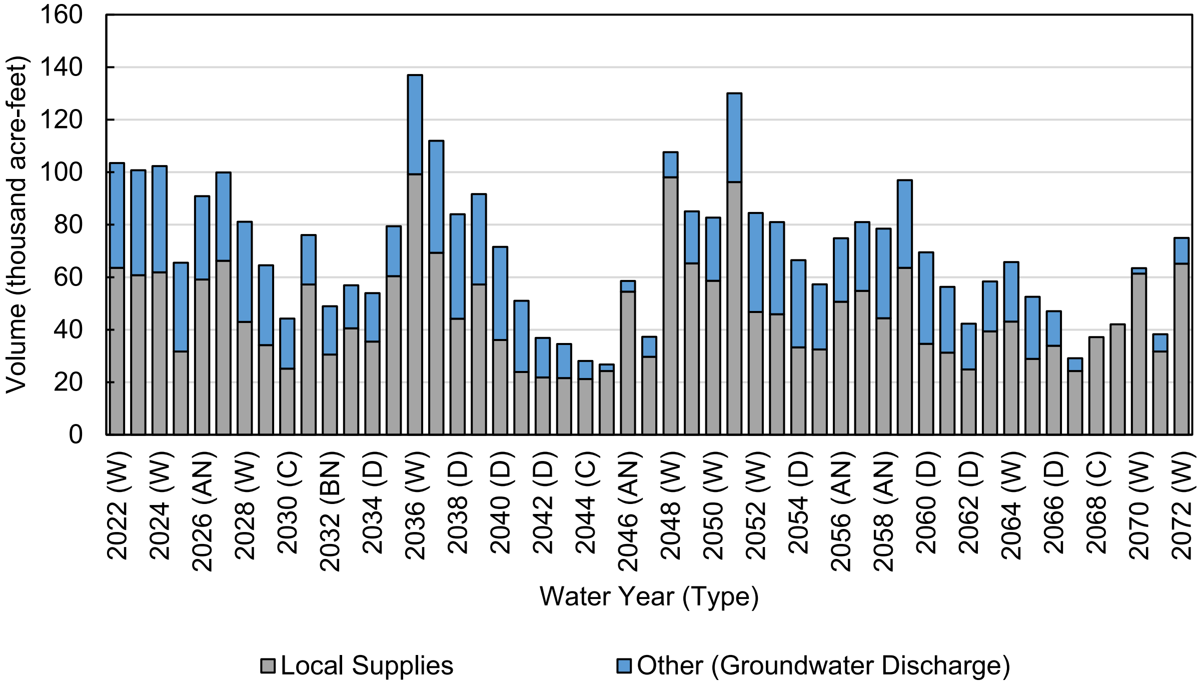


Figure 83. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Outflows, by Water Source Type

Table 79. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	64,000	40,000	100,000
2023 (W)	0	61,000	40,000	100,000
2024 (W)	0	62,000	40,000	100,000
2025 (BN)	0	32,000	34,000	66,000
2026 (AN)	0	59,000	32,000	91,000
2027 (W)	0	66,000	34,000	100,000
2028 (W)	0	43,000	38,000	81,000
2029 (C)	0	34,000	30,000	65,000
2030 (C)	0	25,000	19,000	44,000
2031 (AN)	0	57,000	19,000	76,000
2032 (BN)	0	31,000	18,000	49,000
2033 (AN)	0	41,000	16,000	57,000
2034 (D)	0	35,000	19,000	54,000
2035 (W)	0	60,000	19,000	79,000
2036 (W)	0	99,000	38,000	140,000
2037 (W)	0	69,000	43,000	110,000
2038 (D)	0	44,000	40,000	84,000
2039 (W)	0	57,000	34,000	92,000
2040 (D)	0	36,000	35,000	72,000
2041 (C)	0	24,000	27,000	51,000
2042 (D)	0	22,000	15,000	37,000
2043 (C)	0	22,000	13,000	35,000
2044 (C)	0	21,000	6,900	28,000
2045 (C)	0	24,000	2,500	27,000
2046 (AN)	0	55,000	4,100	59,000
2047 (C)	0	30,000	7,700	37,000
2048 (W)	0	98,000	9,500	110,000
2049 (W)	0	65,000	20,000	85,000
2050 (W)	0	59,000	24,000	83,000
2051 (W)	0	96,000	34,000	130,000
2052 (W)	0	47,000	38,000	84,000
2053 (AN)	0	46,000	35,000	81,000
2054 (D)	0	33,000	33,000	66,000
2055 (D)	0	32,000	25,000	57,000
2056 (AN)	0	51,000	24,000	75,000

Water Year (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2057 (BN)		0	55,000	26,000	81,000
2058 (AN)		0	44,000	34,000	78,000
2059 (W)		0	64,000	33,000	97,000
2060 (D)		0	35,000	35,000	69,000
2061 (C)		0	31,000	25,000	56,000
2062 (D)		0	25,000	17,000	42,000
2063 (BN)		0	39,000	19,000	58,000
2064 (W)		0	43,000	23,000	66,000
2065 (BN)		0	29,000	24,000	53,000
2066 (D)		0	34,000	13,000	47,000
2067 (C)		0	24,000	4,900	29,000
2068 (C)		0	37,000	0	37,000
2069 (BN)		0	42,000	0	42,000
2070 (W)		0	61,000	2,100	63,000
2071 (BN)		0	32,000	6,600	38,000
2072 (W)		0	65,000	9,800	75,000
Average (2022-2072)		0	46,000	23,000	69,000
2022-2072	W	0	66,000	29,000	94,000
	AN	0	50,000	24,000	74,000
	BN	0	37,000	18,000	55,000
	D	0	33,000	26,000	59,000
	C	0	27,000	14,000	41,000

4.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 84** and **Table 80** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

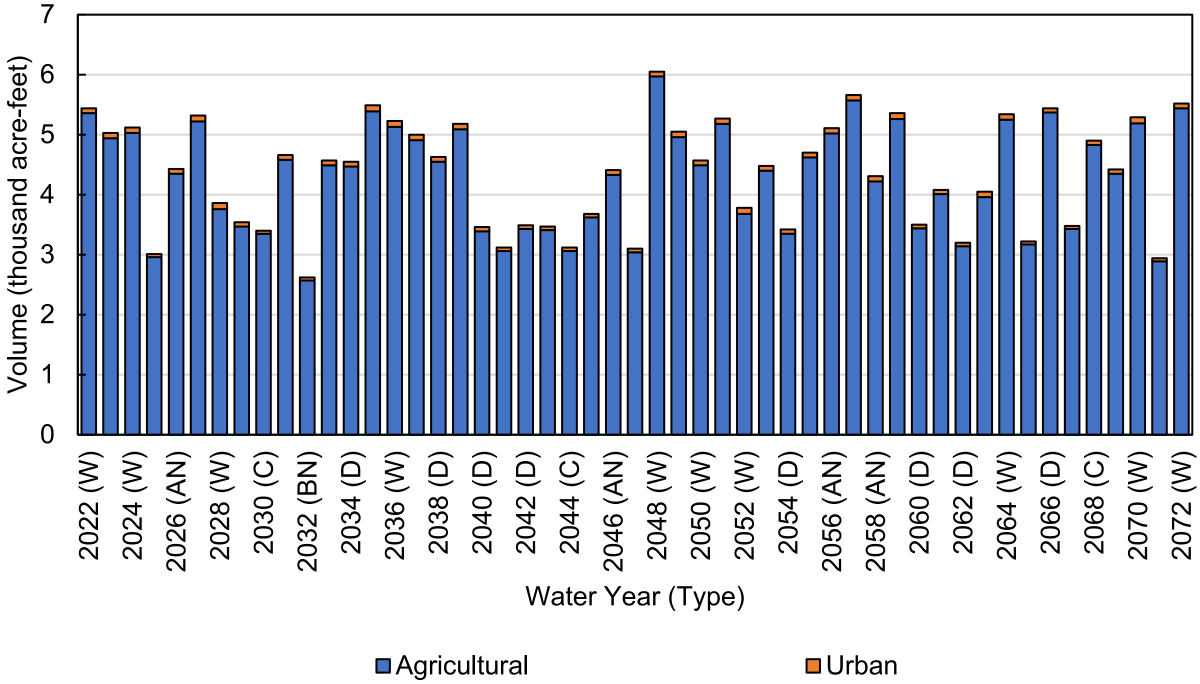


Figure 84. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Applied Water, by Water Use Sector

Table 80. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,400	80	0	5,400
2023 (W)	4,900	90	0	5,000
2024 (W)	5,000	90	0	5,100
2025 (BN)	3,000	50	0	3,000
2026 (AN)	4,400	80	0	4,400
2027 (W)	5,200	100	0	5,300
2028 (W)	3,800	100	0	3,900
2029 (C)	3,500	70	0	3,500
2030 (C)	3,400	50	0	3,400
2031 (AN)	4,600	80	0	4,700
2032 (BN)	2,600	50	0	2,600
2033 (AN)	4,500	80	0	4,600
2034 (D)	4,500	80	0	4,600
2035 (W)	5,400	100	0	5,500
2036 (W)	5,100	100	0	5,200
2037 (W)	4,900	90	0	5,000
2038 (D)	4,600	80	0	4,600
2039 (W)	5,100	90	0	5,200
2040 (D)	3,400	70	0	3,500
2041 (C)	3,100	60	0	3,100
2042 (D)	3,400	60	0	3,500
2043 (C)	3,400	60	0	3,500
2044 (C)	3,100	60	0	3,100
2045 (C)	3,600	60	0	3,700
2046 (AN)	4,300	80	0	4,400
2047 (C)	3,000	60	0	3,100
2048 (W)	6,000	80	0	6,100
2049 (W)	5,000	90	0	5,100
2050 (W)	4,500	80	0	4,600
2051 (W)	5,200	90	0	5,300
2052 (W)	3,700	100	0	3,800
2053 (AN)	4,400	80	0	4,500
2054 (D)	3,400	70	0	3,400
2055 (D)	4,600	80	0	4,700
2056 (AN)	5,000	90	0	5,100
2057 (BN)	5,600	90	0	5,700

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		4,200	90	0	4,300
2059 (W)		5,300	100	0	5,400
2060 (D)		3,400	60	0	3,500
2061 (C)		4,000	70	0	4,100
2062 (D)		3,100	60	0	3,200
2063 (BN)		4,000	90	0	4,100
2064 (W)		5,300	90	0	5,300
2065 (BN)		3,200	50	0	3,200
2066 (D)		5,400	70	0	5,400
2067 (C)		3,400	50	0	3,500
2068 (C)		4,800	70	0	4,900
2069 (BN)		4,400	70	0	4,400
2070 (W)		5,200	100	0	5,300
2071 (BN)		2,900	50	0	2,900
2072 (W)		5,400	80	0	5,500
Average (2022-2072)		4,300	80	0	4,400
2022-2072	W	5,000	90	0	5,100
	AN	4,500	80	0	4,600
	BN	3,600	60	0	3,700
	D	4,000	70	0	4,000
	C	3,500	60	0	3,600

4.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 85** and **Table 81** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from less than four (4) taf annually during some critical and dry years to about 10 taf in wet years.

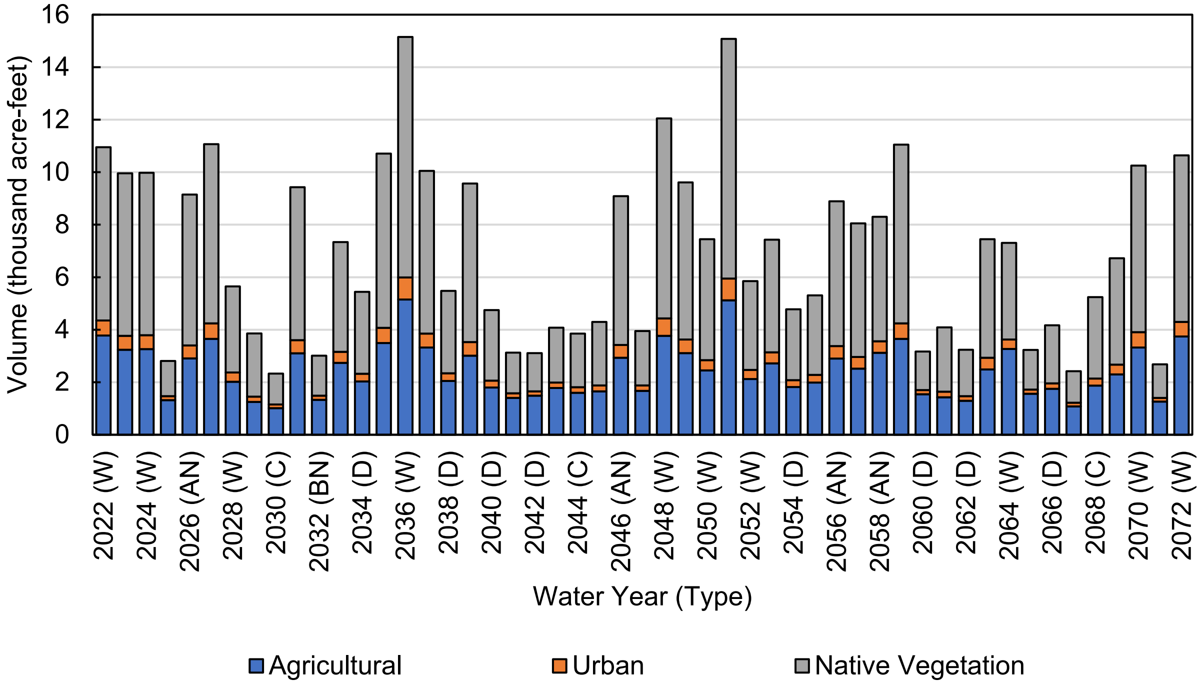


Figure 85. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Precipitation, by Water Use Sector

Table 81. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	3,800	570	6,600	11,000
2023 (W)	3,200	530	6,200	10,000
2024 (W)	3,300	530	6,200	10,000
2025 (BN)	1,300	150	1,300	2,800
2026 (AN)	2,900	490	5,800	9,200
2027 (W)	3,700	590	6,800	11,000
2028 (W)	2,000	350	3,300	5,700
2029 (C)	1,300	200	2,400	3,900
2030 (C)	1,000	140	1,200	2,300
2031 (AN)	3,100	500	5,800	9,400
2032 (BN)	1,300	160	1,500	3,000
2033 (AN)	2,700	420	4,200	7,300
2034 (D)	2,000	290	3,100	5,400
2035 (W)	3,500	580	6,600	11,000
2036 (W)	5,200	840	9,200	15,000
2037 (W)	3,300	530	6,200	10,000
2038 (D)	2,100	290	3,100	5,500
2039 (W)	3,000	520	6,000	9,600
2040 (D)	1,800	260	2,700	4,800
2041 (C)	1,400	180	1,600	3,100
2042 (D)	1,500	160	1,500	3,100
2043 (C)	1,800	210	2,100	4,100
2044 (C)	1,600	210	2,000	3,900
2045 (C)	1,700	230	2,400	4,300
2046 (AN)	2,900	490	5,700	9,100
2047 (C)	1,700	210	2,100	4,000
2048 (W)	3,800	660	7,600	12,000
2049 (W)	3,100	520	6,000	9,600
2050 (W)	2,500	390	4,600	7,500
2051 (W)	5,100	830	9,100	15,000
2052 (W)	2,100	350	3,400	5,900
2053 (AN)	2,700	420	4,300	7,400
2054 (D)	1,800	260	2,700	4,800
2055 (D)	2,000	290	3,000	5,300
2056 (AN)	2,900	480	5,500	8,900
2057 (BN)	2,500	440	5,100	8,100

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,100	440	4,700	8,300
2059 (W)		3,700	590	6,800	11,000
2060 (D)		1,500	160	1,500	3,200
2061 (C)		1,400	210	2,500	4,100
2062 (D)		1,300	180	1,800	3,200
2063 (BN)		2,500	440	4,500	7,500
2064 (W)		3,300	360	3,700	7,300
2065 (BN)		1,600	160	1,500	3,200
2066 (D)		1,800	210	2,200	4,200
2067 (C)		1,100	140	1,200	2,400
2068 (C)		1,900	270	3,100	5,200
2069 (BN)		2,300	370	4,100	6,700
2070 (W)		3,300	590	6,300	10,000
2071 (BN)		1,300	140	1,300	2,700
2072 (W)		3,700	560	6,300	11,000
Average (2022-2072)		2,400	370	4,000	6,800
2022-2072	W	3,400	550	6,100	10,000
	AN	2,900	460	5,100	8,500
	BN	1,800	270	2,800	4,900
	D	1,800	230	2,400	4,400
	C	1,500	200	2,100	3,700

4.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 86**and **Table 82.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than four (4) taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.2 taf per year.

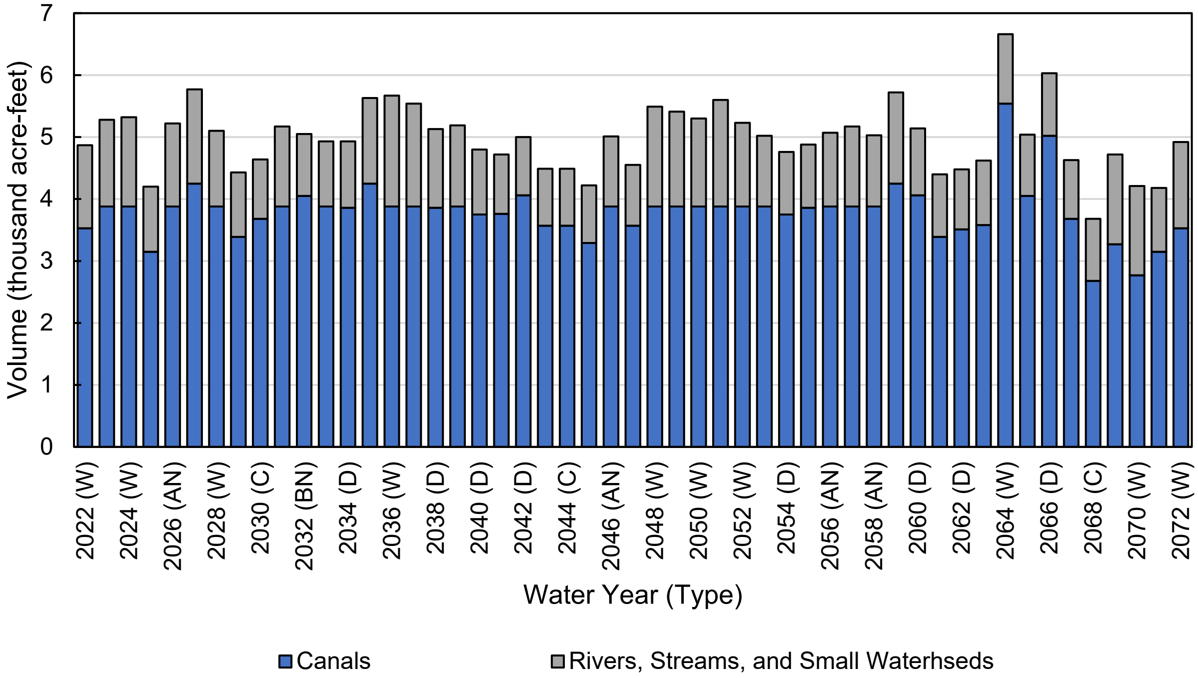


Figure 86. Antelope Subbasin Projected (Future Land Use with Climate Change) Infiltration of Surface Water, by Water Use Sector

Table 82. Antelope Subbasin Projected (Future Land Use with Climate Change) Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	3,500	1,300	4,900
2023 (W)	3,900	1,400	5,300
2024 (W)	3,900	1,400	5,300
2025 (BN)	3,200	1,100	4,200
2026 (AN)	3,900	1,300	5,200
2027 (W)	4,300	1,500	5,800
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	960	4,600
2031 (AN)	3,900	1,300	5,200
2032 (BN)	4,100	1,000	5,100
2033 (AN)	3,900	1,100	4,900
2034 (D)	3,900	1,100	4,900
2035 (W)	4,300	1,400	5,600
2036 (W)	3,900	1,800	5,700
2037 (W)	3,900	1,700	5,500
2038 (D)	3,900	1,300	5,100
2039 (W)	3,900	1,300	5,200
2040 (D)	3,800	1,100	4,800
2041 (C)	3,800	960	4,700
2042 (D)	4,100	940	5,000
2043 (C)	3,600	920	4,500
2044 (C)	3,600	920	4,500
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,100	5,000
2047 (C)	3,600	980	4,600
2048 (W)	3,900	1,600	5,500
2049 (W)	3,900	1,500	5,400
2050 (W)	3,900	1,400	5,300
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,200
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,800	1,000	4,800
2055 (D)	3,900	1,000	4,900
2056 (AN)	3,900	1,200	5,100
2057 (BN)	3,900	1,300	5,200

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2058 (AN)		3,900	1,200	5,000
2059 (W)		4,300	1,500	5,700
2060 (D)		4,100	1,100	5,100
2061 (C)		3,400	1,000	4,400
2062 (D)		3,500	970	4,500
2063 (BN)		3,600	1,000	4,600
2064 (W)		5,500	1,100	6,700
2065 (BN)		4,100	990	5,000
2066 (D)		5,000	1,000	6,000
2067 (C)		3,700	950	4,600
2068 (C)		2,700	1,000	3,700
2069 (BN)		3,300	1,500	4,700
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,400	4,900
Average (2022-2072)		3,800	1,200	5,000
2022-2072	W	3,900	1,500	5,400
	AN	3,900	1,200	5,100
	BN	3,600	1,100	4,700
	D	4,000	1,100	5,000
	C	3,500	970	4,400

4.1.3 Change in Root Zone Storage

Estimates of projected change in root zone storage are provided in **Figure 87** and **Table 83**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average near zero over many years.

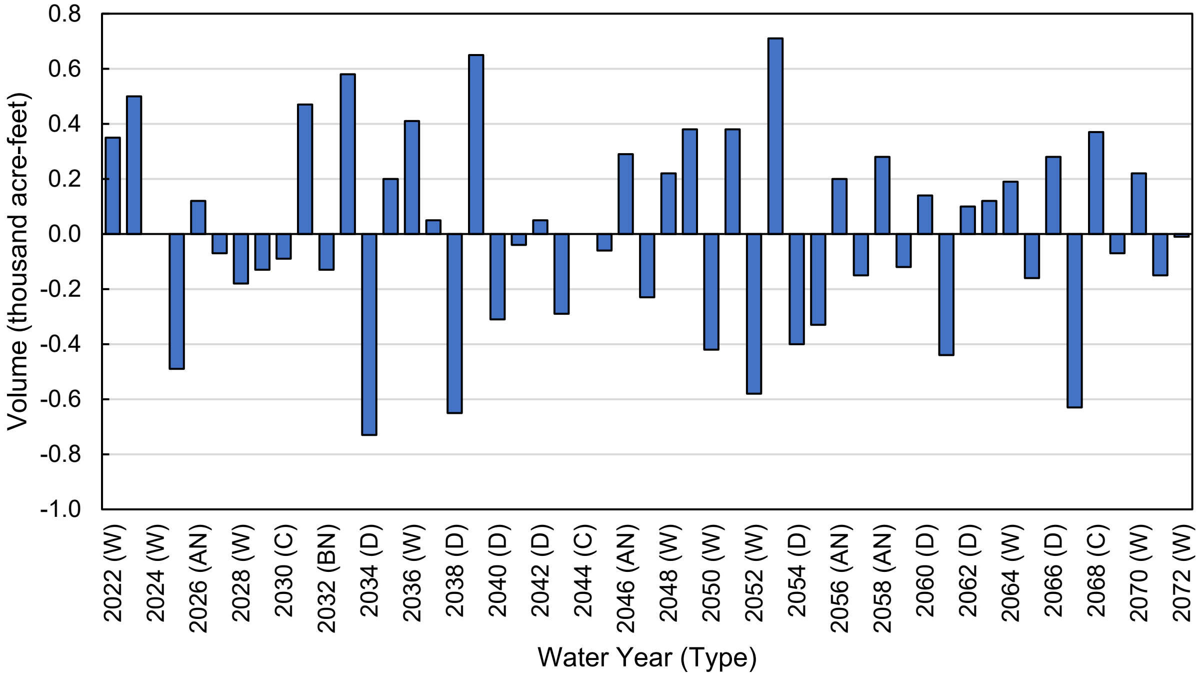


Figure 87. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Root Zone Storage

Table 83. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Root Zone Storage (acre-feet)

Water Year (Type)	Change in Root Zone Storage
2022 (W)	350
2023 (W)	500
2024 (W)	0
2025 (BN)	-490
2026 (AN)	120
2027 (W)	-70
2028 (W)	-180
2029 (C)	-130
2030 (C)	-90
2031 (AN)	470
2032 (BN)	-130
2033 (AN)	580
2034 (D)	-730
2035 (W)	200
2036 (W)	410
2037 (W)	50
2038 (D)	-650
2039 (W)	650
2040 (D)	-310
2041 (C)	-40
2042 (D)	50
2043 (C)	-290
2044 (C)	0
2045 (C)	-60
2046 (AN)	290
2047 (C)	-230
2048 (W)	220
2049 (W)	380
2050 (W)	-420
2051 (W)	380
2052 (W)	-580
2053 (AN)	710
2054 (D)	-400
2055 (D)	-330
2056 (AN)	200
2057 (BN)	-150

Water Year (Type)		Change in Root Zone Storage
2058 (AN)		280
2059 (W)		-120
2060 (D)		140
2061 (C)		-440
2062 (D)		100
2063 (BN)		120
2064 (W)		190
2065 (BN)		-160
2066 (D)		280
2067 (C)		-630
2068 (C)		370
2069 (BN)		-70
2070 (W)		220
2071 (BN)		-150
2072 (W)		-10
Average (2022-2072)		10
2022-2072	W	120
	AN	380
	BN	-150
	D	-210
	C	-150

4.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction. When calculated for the projected (future land use with climate change) water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from projected cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the projected (future land use with climate change) water budget period are presented below for the Antelope Subbasin. **Figure 88** and **Table 84** show the average net recharge from the SWS over 2022-2072 based on the projected (future land use with climate change) water budget results. Under future land use conditions, the average net recharge in the Antelope Subbasin was projected as approximately -2.2 taf per year between 2022-2072, indicating net outflows from the GWS to the SWS during the projected (future land use with climate change) water budget period. As illustrated on the cumulative net recharge plot in **Figure 88**, this results in a cumulative net negative recharge (i.e., net loss from the GWS to the SWS) of about 107 taf over the 51-year projected (future land use with climate change) water budget period. Although this means there is projected to be less recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage will decrease or that the Subbasin groundwater system will not be sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

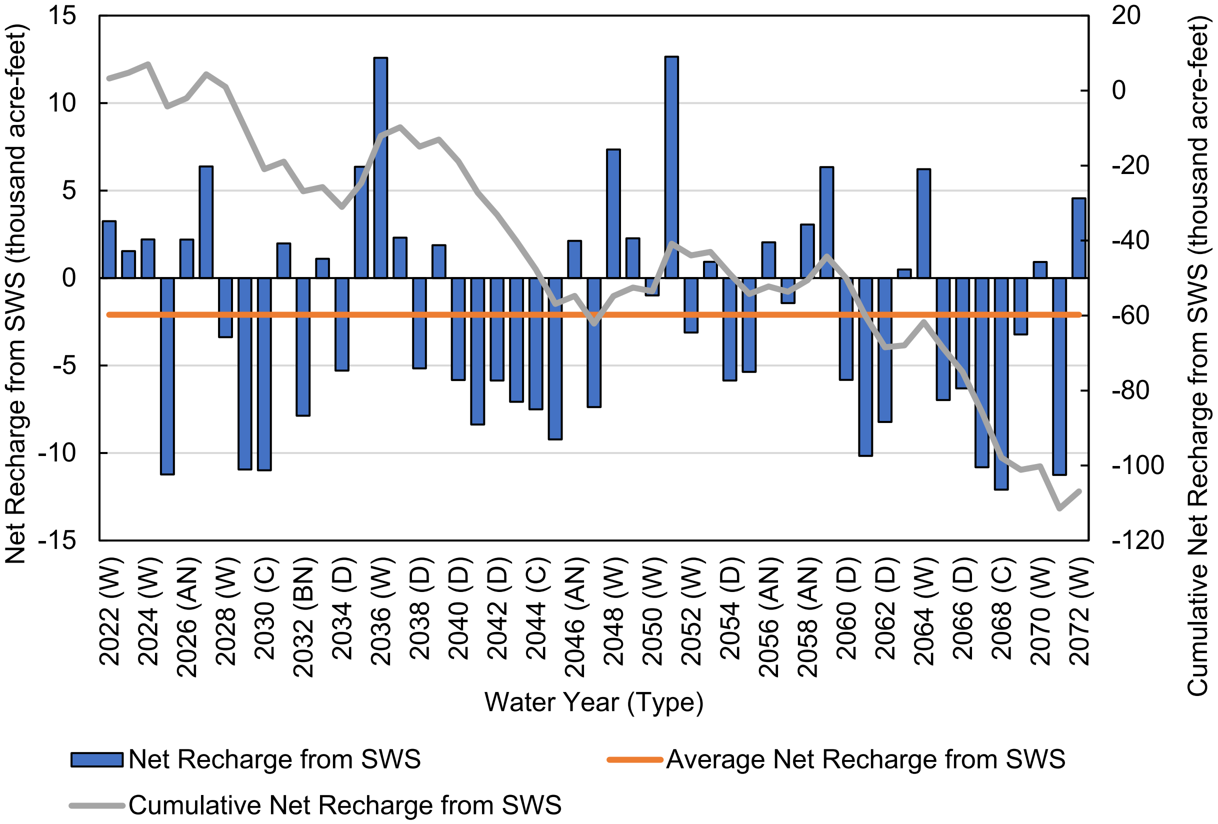


Figure 88. Antelope Subbasin Projected (Future Land Use with Climate Change) Net Recharge Overview, 2022-2072

Table 84. Antelope Subbasin Projected (Future Land Use with Climate Change) Water Budget: Average Net Recharge from SWS, by Water Year Type (acre-feet)

Year Type	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	5,100	10,100	5,400	17,000	4,000
AN	4,600	8,500	5,100	16,000	1,900
BN	3,700	4,900	4,700	19,000	-5,900
D	4,000	4,400	5,000	19,000	-5,900
C	3,600	3,700	4,400	21,000	-9,400
Annual Average (2022-2072)	4,400	6,800	5,000	18,000	-2,200

4.2 Groundwater System Water Budget Results

Projected (Future Land Use with climate change) water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

4.2.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin are projected to occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows are projected to occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

4.2.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Projected lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 89** and **Table 85**. The total projected net subsurface flows to and from all adjacent subbasins averages about 28 taf per year occurring as inflow to the Antelope Subbasin. The largest projected subsurface flows occur across the boundary with the Bend Subbasin with somewhat less subsurface flow occurring across the boundaries with the Los Molinos and Red Bluff Subbasins although these flows are still considerable.

Projected subsurface flows with the Bend Subbasin average about 22 taf occurring as inflows to the Antelope Subbasin. This makes up a majority of the projected subsurface inflows to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Red Bluff Subbasin to the Antelope Subbasin are projected to average about 1.9 and 4.4 taf, respectively. The projected magnitudes of the subsurface inflows from the Bend Subbasin are relatively consistent from year to year; however, the inflows/outflows with the Red Bluff and Los Molinos Subbasins are somewhat variable. Projected subsurface flows across the boundary with the Los Molinos and Red Bluff Subbasins generally occur as inflows with some volumes of outflows occurring periodically.

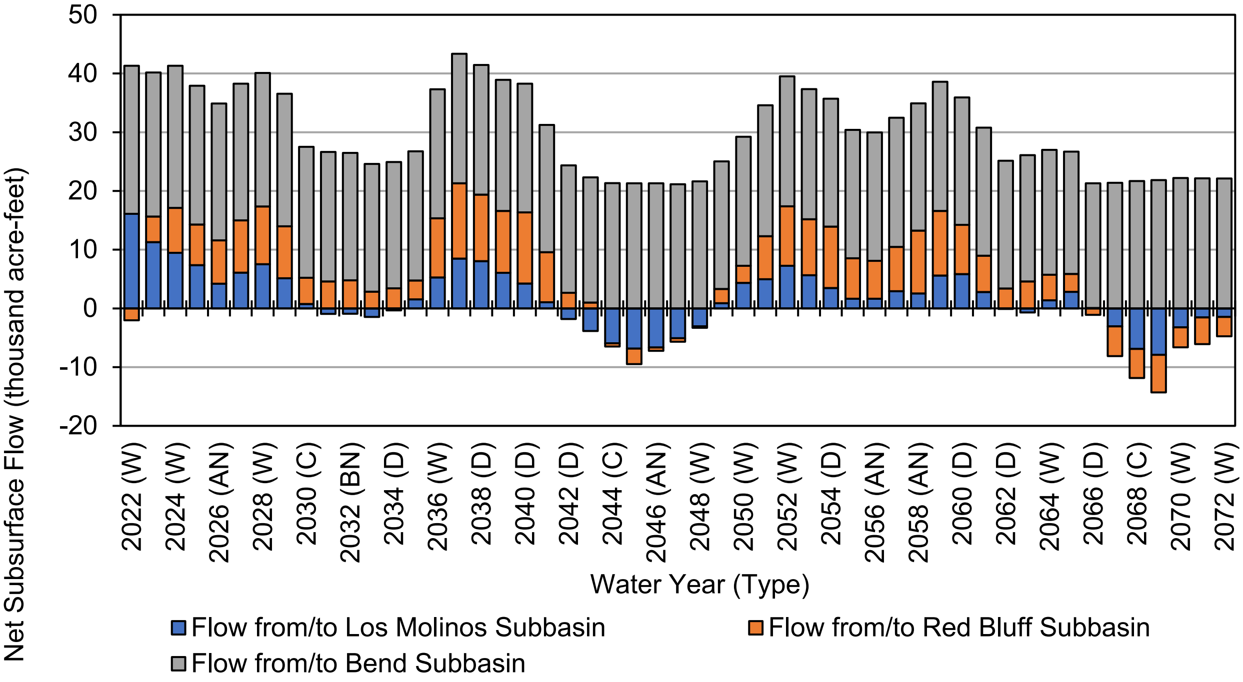


Figure 89. Antelope Subbasin Projected (Future Land Use with Climate Change) Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 85. Antelope Subbasin Projected (Future Land Use with Climate Change) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

Water Year (Type)	Red Bluff	Los Molinos	Bend	Total
2022 (W)	-2,000	16,000	25,000	39,000
2023 (W)	4,400	11,000	25,000	40,000
2024 (W)	7,600	9,500	24,000	41,000
2025 (BN)	6,900	7,400	24,000	38,000
2026 (AN)	7,400	4,200	23,000	35,000
2027 (W)	8,900	6,100	23,000	38,000
2028 (W)	9,800	7,500	23,000	40,000
2029 (C)	8,800	5,100	23,000	37,000
2030 (C)	4,500	760	22,000	28,000
2031 (AN)	4,600	-930	22,000	26,000
2032 (BN)	4,800	-900	22,000	26,000
2033 (AN)	2,900	-1,500	22,000	23,000
2034 (D)	3,400	-330	21,000	25,000
2035 (W)	3,200	1,600	22,000	27,000
2036 (W)	10,000	5,300	22,000	37,000
2037 (W)	13,000	8,500	22,000	43,000
2038 (D)	11,000	8,000	22,000	41,000
2039 (W)	11,000	6,100	22,000	39,000
2040 (D)	12,000	4,200	22,000	38,000
2041 (C)	8,500	1,000	22,000	31,000
2042 (D)	2,700	-1,800	22,000	23,000
2043 (C)	1,000	-3,800	21,000	18,000
2044 (C)	-550	-6,000	21,000	15,000
2045 (C)	-2,600	-6,900	21,000	12,000
2046 (AN)	-590	-6,600	21,000	14,000
2047 (C)	-620	-5,100	21,000	15,000
2048 (W)	-250	-3,100	22,000	18,000
2049 (W)	2,400	890	22,000	25,000
2050 (W)	2,900	4,400	22,000	29,000
2051 (W)	7,300	5,000	22,000	35,000
2052 (W)	10,000	7,200	22,000	40,000
2053 (AN)	9,500	5,700	22,000	37,000
2054 (D)	10,000	3,500	22,000	36,000
2055 (D)	6,900	1,600	22,000	30,000
2056 (AN)	6,500	1,600	22,000	30,000
2057 (BN)	7,500	2,900	22,000	32,000
2058 (AN)	11,000	2,500	22,000	35,000
2059 (W)	11,000	5,600	22,000	39,000

Water Year (Type)		Red Bluff	Los Molinos	Bend	Total
2060 (D)		8,400	5,800	22,000	36,000
2061 (C)		6,200	2,800	22,000	31,000
2062 (D)		3,400	-88	22,000	25,000
2063 (BN)		4,600	-690	21,000	25,000
2064 (W)		4,400	1,400	21,000	27,000
2065 (BN)		3,000	2,800	21,000	27,000
2066 (D)		-1,100	58	21,000	20,000
2067 (C)		-5,100	-3,100	21,000	13,000
2068 (C)		-5,000	-6,900	22,000	9,800
2069 (BN)		-6,400	-7,900	22,000	7,500
2070 (W)		-3,400	-3,200	22,000	16,000
2071 (BN)		-4,500	-1,500	22,000	16,000
2072 (W)		-3,300	-1,500	22,000	17,000
Average (2022-2072)		4,400	1,900	22,000	4,400
2022-2072	W	5,400	4,900	23,000	5,400
	AN	5,800	720	22,000	5,800
	BN	2,300	300	22,000	2,300
	D	6,400	2,300	22,000	6,400
	C	1,500	-2,200	22,000	1,500

Note: positive values represent net inflows to Antelope Subbasin, negative values represent net outflows from Antelope Subbasin.

4.2.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Projected lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 90** and **Table 86**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average projected subsurface inflow from the upland areas is about 0.270 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

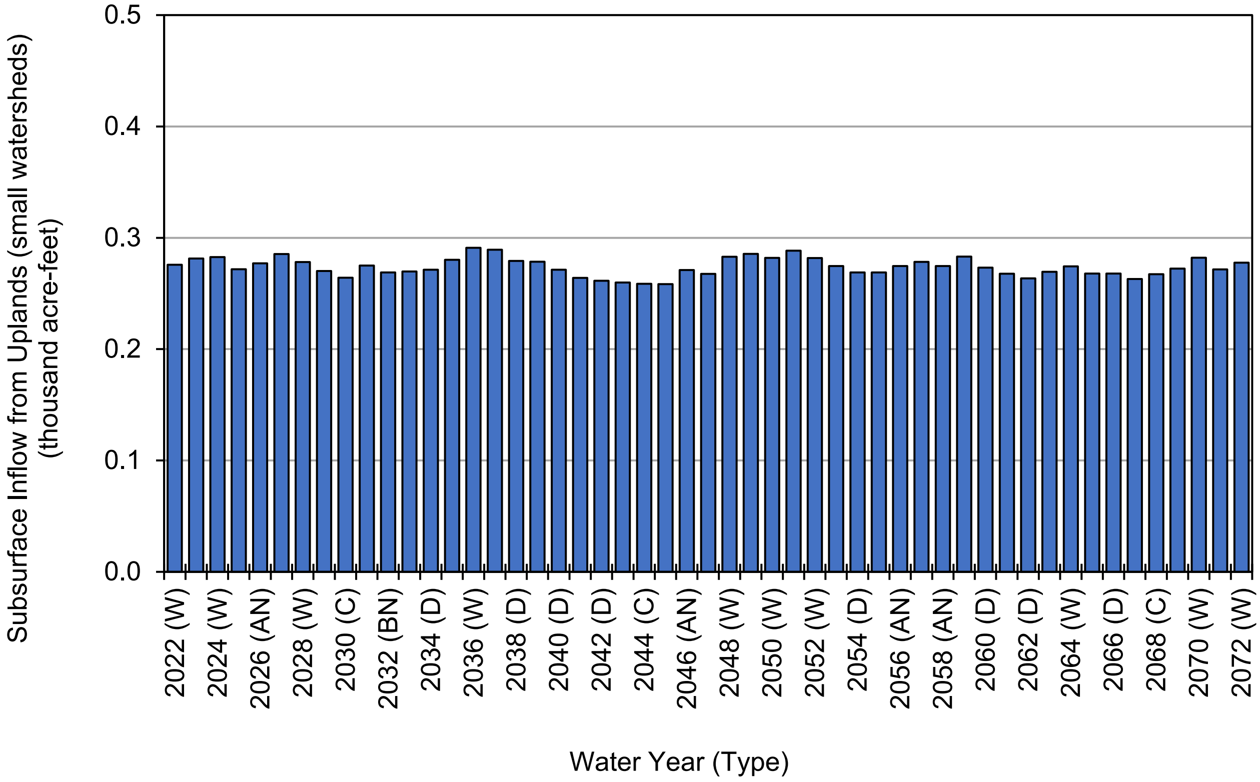


Figure 90. Antelope Subbasin Projected (Future Land Use with Climate Change) Subsurface Groundwater Inflows from Upland Areas

Table 86. Antelope Subbasin Projected (Future Land Use with Climate Change) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet)

Water Year (Type)	Subsurface Inflow from Uplands
2022 (W)	280
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	290
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	280
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	290
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Subsurface Inflow from Uplands</th></tr>
<tr><td colspan="2">2060 (D)</td><td>270</td></tr>
<tr><td colspan="2">2061 (C)</td><td>270</td></tr>
<tr><td colspan="2">2062 (D)</td><td>260</td></tr>
<tr><td colspan="2">2063 (BN)</td><td>270</td></tr>
<tr><td colspan="2">2064 (W)</td><td>270</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>270</td></tr>
<tr><td colspan="2">2066 (D)</td><td>270</td></tr>
<tr><td colspan="2">2067 (C)</td><td>260</td></tr>
<tr><td colspan="2">2068 (C)</td><td>270</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>270</td></tr>
<tr><td colspan="2">2070 (W)</td><td>280</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>270</td></tr>
<tr><td colspan="2">2072 (W)</td><td>280</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>270</td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>280</td></tr>
<tr><td>AN</td><td>270</td></tr>
<tr><td>BN</td><td>270</td></tr>
<tr><td>D</td><td>270</td></tr>
<tr><td>C</td><td>260</td></tr>
</table>

4.2.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 91** and **Table 87**. The average annual deep percolation from the SWS over the projected water budget period is approximately 11 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

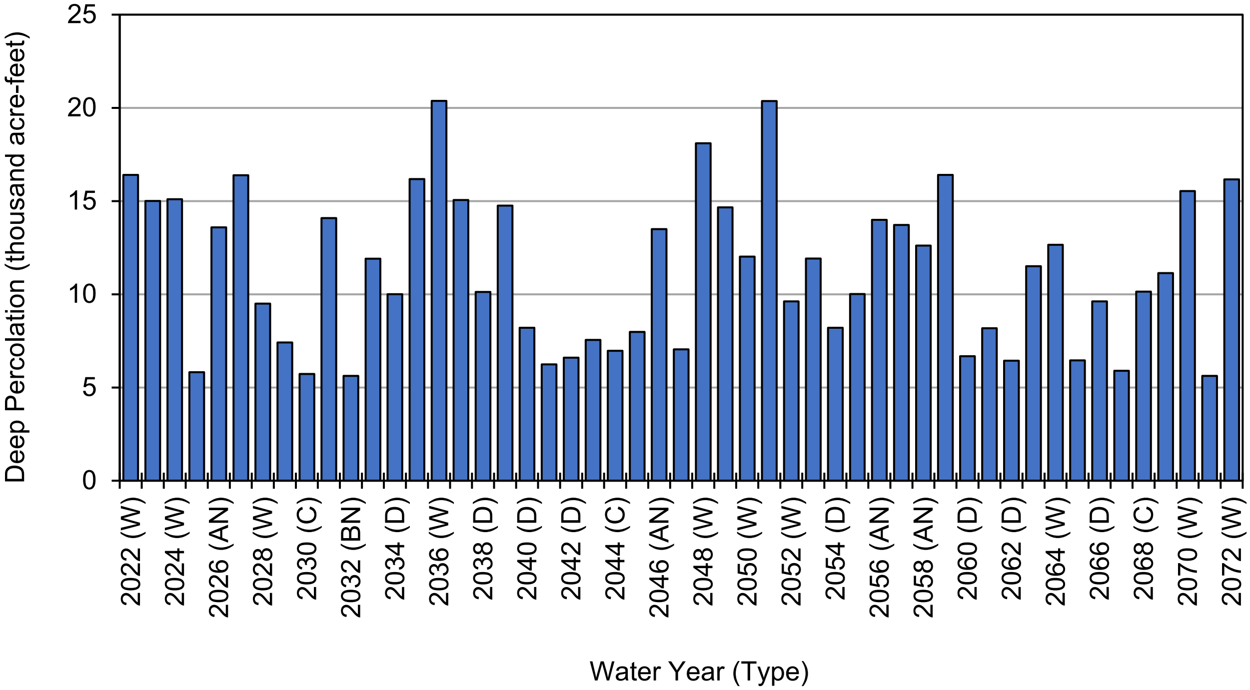


Figure 91. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation

Table 87. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation from the SWS (acre-feet)

Water Year (Type)	Deep Percolation from the SWS
2022 (W)	16,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	5,800
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	9,500
2029 (C)	7,400
2030 (C)	5,700
2031 (AN)	14,000
2032 (BN)	5,600
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	20,000
2037 (W)	15,000
2038 (D)	10,000
2039 (W)	15,000
2040 (D)	8,200
2041 (C)	6,200
2042 (D)	6,600
2043 (C)	7,600
2044 (C)	7,000
2045 (C)	8,000
2046 (AN)	13,000
2047 (C)	7,000
2048 (W)	18,000
2049 (W)	15,000
2050 (W)	12,000
2051 (W)	20,000
2052 (W)	9,600
2053 (AN)	12,000
2054 (D)	8,200
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000

Water Year (Type)		Deep Percolation from the SWS
2060 (D)		6,700
2061 (C)		8,200
2062 (D)		6,400
2063 (BN)		12,000
2064 (W)		13,000
2065 (BN)		6,500
2066 (D)		9,600
2067 (C)		5,900
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,600
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,600
	D	8,400
	C	7,300

4.2.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 92** and **Table 88**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the projected annual net seepage values are always highly negative with an average annual net stream seepage value of -22 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

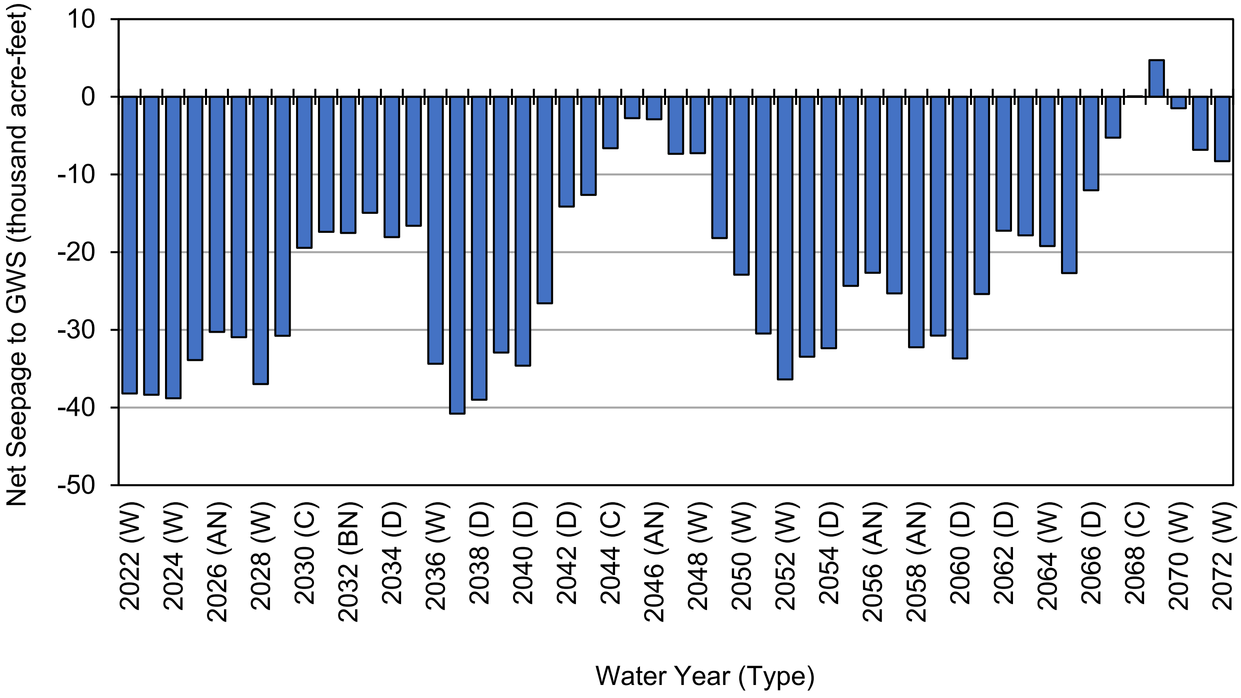


Figure 92. Antelope Subbasin Projected (Future Land Use with Climate Change) Net Stream Seepage to GWS/Discharge to Surface Water

Table 88. Antelope Subbasin Projected (Future Land Use with Climate Change) Net Stream Seepage (net flows as acre-feet)

Water Year (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-38,000
2023 (W)	-38,000
2024 (W)	-39,000
2025 (BN)	-34,000
2026 (AN)	-30,000
2027 (W)	-31,000
2028 (W)	-37,000
2029 (C)	-31,000
2030 (C)	-19,000
2031 (AN)	-17,000
2032 (BN)	-18,000
2033 (AN)	-15,000
2034 (D)	-18,000
2035 (W)	-17,000
2036 (W)	-34,000
2037 (W)	-41,000
2038 (D)	-39,000
2039 (W)	-33,000
2040 (D)	-35,000
2041 (C)	-27,000
2042 (D)	-14,000
2043 (C)	-13,000
2044 (C)	-6,600
2045 (C)	-2,800
2046 (AN)	-2,900
2047 (C)	-7,300
2048 (W)	-7,200
2049 (W)	-18,000
2050 (W)	-23,000
2051 (W)	-30,000
2052 (W)	-36,000
2053 (AN)	-33,000
2054 (D)	-32,000
2055 (D)	-24,000
2056 (AN)	-23,000
2057 (BN)	-25,000
2058 (AN)	-32,000
2059 (W)	-31,000

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
2060 (D)		-34,000
2061 (C)		-25,000
2062 (D)		-17,000
2063 (BN)		-18,000
2064 (W)		-19,000
2065 (BN)		-23,000
2066 (D)		-12,000
2067 (C)		-5,300
2068 (C)		81
2069 (BN)		4,700
2070 (W)		-1,500
2071 (BN)		-6,800
2072 (W)		-8,300
Average (2022-2072)		-22,000
2022-2072	W	-27,000
	AN	-22,000
	BN	-17,000
	D	-25,000
	C	-14,000

Note: negative values indicate net groundwater discharge to surface water

4.2.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Projected groundwater extractions are summarized in **Figure 93** and **Table 89** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the projected water budget period average about -18 taf per year. Overall, groundwater pumping represents a majority of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -18 taf over the projected period and groundwater uptake averaged about -0.810 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

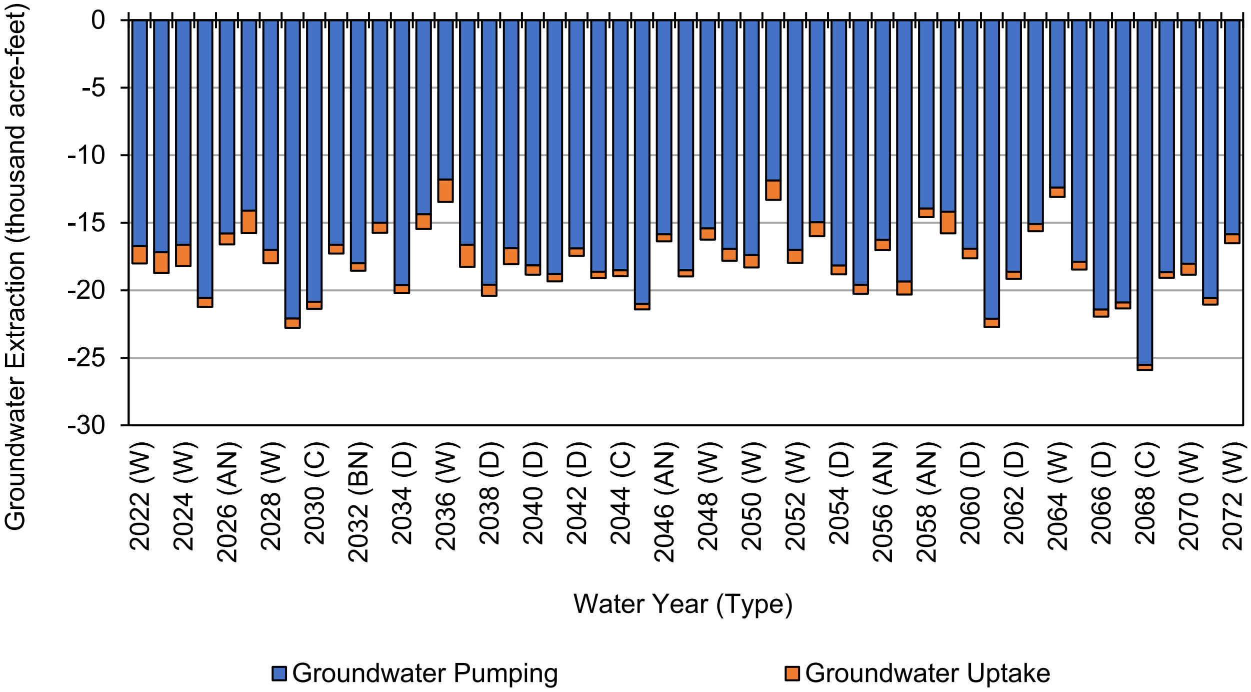


Figure 93. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Extractions

Table 89. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Extractions (acre-feet)

Water Year (Type)	Groundwater Pumping	Groundwater Uptake	Total
2022 (W)	-17,000	-1,300	-18,000
2023 (W)	-17,000	-1,500	-19,000
2024 (W)	-17,000	-1,600	-18,000
2025 (BN)	-21,000	-670	-21,000
2026 (AN)	-16,000	-810	-17,000
2027 (W)	-14,000	-1,700	-16,000
2028 (W)	-17,000	-980	-18,000
2029 (C)	-22,000	-680	-23,000
2030 (C)	-21,000	-520	-21,000
2031 (AN)	-17,000	-650	-17,000
2032 (BN)	-18,000	-550	-19,000
2033 (AN)	-15,000	-750	-16,000
2034 (D)	-20,000	-590	-20,000
2035 (W)	-14,000	-1,100	-15,000
2036 (W)	-12,000	-1,700	-13,000
2037 (W)	-17,000	-1,600	-18,000
2038 (D)	-20,000	-820	-20,000
2039 (W)	-17,000	-1,200	-18,000
2040 (D)	-18,000	-680	-19,000
2041 (C)	-19,000	-530	-19,000
2042 (D)	-17,000	-560	-17,000
2043 (C)	-19,000	-480	-19,000
2044 (C)	-19,000	-440	-19,000
2045 (C)	-21,000	-400	-21,000
2046 (AN)	-16,000	-530	-16,000
2047 (C)	-19,000	-450	-19,000
2048 (W)	-15,000	-830	-16,000
2049 (W)	-17,000	-860	-18,000
2050 (W)	-17,000	-920	-18,000
2051 (W)	-12,000	-1,400	-13,000
2052 (W)	-17,000	-960	-18,000
2053 (AN)	-15,000	-1,000	-16,000
2054 (D)	-18,000	-650	-19,000
2055 (D)	-20,000	-650	-20,000
2056 (AN)	-16,000	-750	-17,000
2057 (BN)	-19,000	-960	-20,000
2058 (AN)	-14,000	-640	-15,000
2059 (W)	-14,000	-1,600	-16,000

Water Year (Type)		Groundwater Pumping	Groundwater Uptake	Total
2060 (D)		-17,000	-710	-18,000
2061 (C)		-22,000	-640	-23,000
2062 (D)		-19,000	-510	-19,000
2063 (BN)		-15,000	-530	-16,000
2064 (W)		-12,000	-700	-13,000
2065 (BN)		-18,000	-570	-18,000
2066 (D)		-21,000	-520	-22,000
2067 (C)		-21,000	-440	-21,000
2068 (C)		-26,000	-370	-26,000
2069 (BN)		-19,000	-420	-19,000
2070 (W)		-18,000	-800	-19,000
2071 (BN)		-21,000	-470	-21,000
2072 (W)		-16,000	-660	-17,000
Average (2022-2072)		-18,000	-810	-18,000
2022-2072	W	-16,000	-1,200	-17,000
	AN	-15,000	-740	-16,000
	BN	-19,000	-600	-19,000
	D	-19,000	-630	-19,000
	C	-21,000	-500	-21,000

4.2.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Projected vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 94** and **Table 90** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 22 taf per year over the projected water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

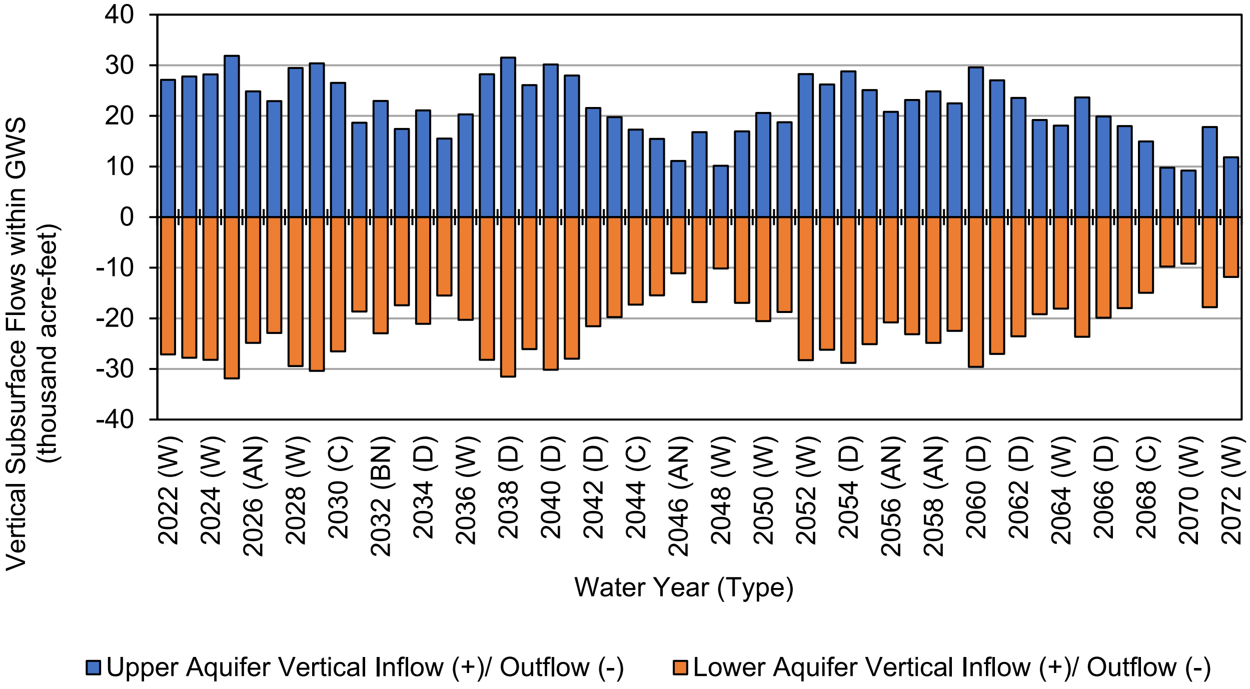


Figure 94. Antelope Subbasin Projected (Future Land Use with Climate Change) Vertical Subsurface Flow within the GWS

Table 90. Antelope Subbasin Projected (Future Land Use with Climate Change) Vertical Subsurface Flows within the GWS (acre-feet)

Water Year (Type)	Upper Aquifer to (-) / from (+) Lower Aquifer
2022 (W)	27,100
2023 (W)	27,800
2024 (W)	28,200
2025 (BN)	31,900
2026 (AN)	24,900
2027 (W)	22,900
2028 (W)	29,400
2029 (C)	30,400
2030 (C)	26,500
2031 (AN)	18,700
2032 (BN)	22,900
2033 (AN)	17,400
2034 (D)	21,100
2035 (W)	15,500
2036 (W)	20,300
2037 (W)	28,200
2038 (D)	31,500
2039 (W)	26,100
2040 (D)	30,200
2041 (C)	28,000
2042 (D)	21,600
2043 (C)	19,800
2044 (C)	17,300
2045 (C)	15,400
2046 (AN)	11,100
2047 (C)	16,800
2048 (W)	10,200
2049 (W)	16,900
2050 (W)	20,600
2051 (W)	18,700
2052 (W)	28,300
2053 (AN)	26,200
2054 (D)	28,800
2055 (D)	25,100
2056 (AN)	20,800
2057 (BN)	23,100
2058 (AN)	24,900
2059 (W)	22,500

Water Year (Type)		Upper Aquifer to (-) / from (+) Lower Aquifer
2060 (D)		29,600
2061 (C)		27,000
2062 (D)		23,500
2063 (BN)		19,200
2064 (W)		18,100
2065 (BN)		23,600
2066 (D)		19,900
2067 (C)		18,000
2068 (C)		15,000
2069 (BN)		9,800
2070 (W)		9,200
2071 (BN)		17,800
2072 (W)		11,800
Average (2022-2072)		22,000
2022-2072	W	21,000
	AN	21,000
	BN	21,000
	D	26,000
	C	21,000

4.2.6 Change in Groundwater Storage

Projected change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 95** and **Figure 96,** and **Table 90**. Values for total change in storage in the GWS and cumulative change in storage over the projected water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the projected period, the average total annual change in groundwater storage is about -0.390 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the projected period is about -20 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are generally the same in the Lower Aquifer (average -0.200 taf per year) compared to the Upper Aquifer (average -0.200 taf per year).

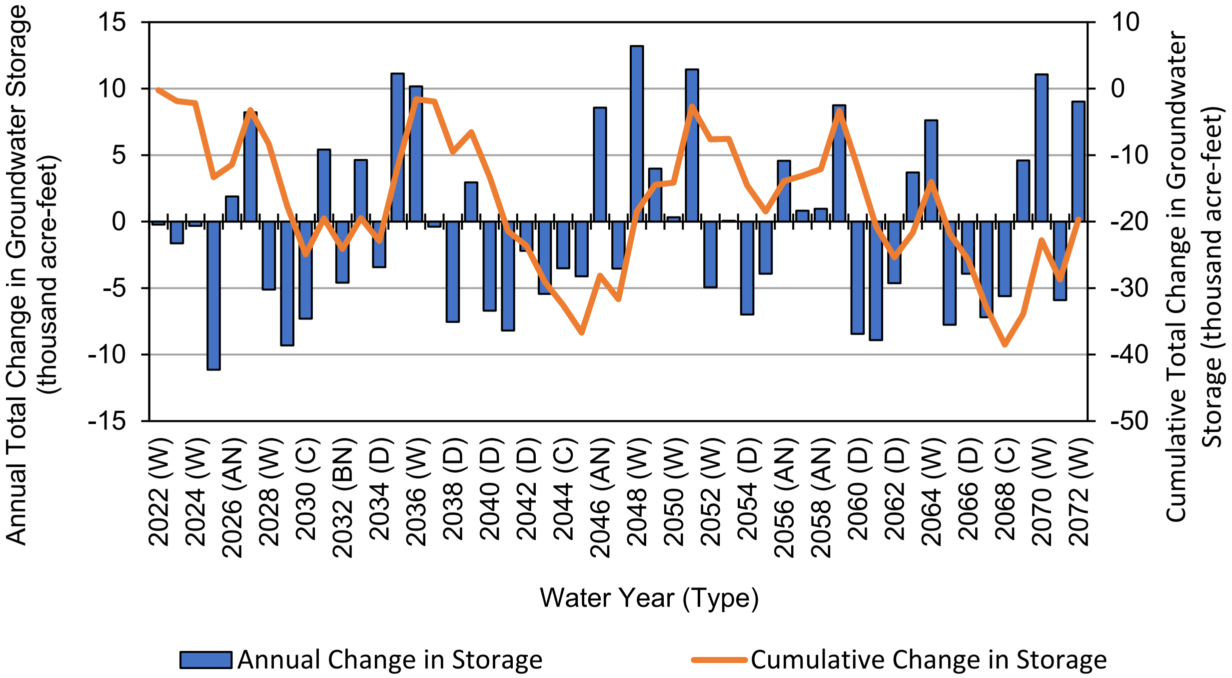


Figure 95. Antelope Subbasin Projected (Future Land Use with Climate Change) Total Change in Storage within the GWS

Table 90. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Groundwater Storage (acre-feet)

Water Year (Type)	Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2022 (W)	-180	-49	-230	-230
2023 (W)	-1,300	-370	-1,600	-1,900
2024 (W)	-280	-42	-320	-2,200
2025 (BN)	-6,800	-4,400	-11,000	-13,000
2026 (AN)	1,400	540	1,900	-11,000
2027 (W)	5,000	3,200	8,200	-3,200
2028 (W)	-3,300	-1,800	-5,100	-8,300
2029 (C)	-5,700	-3,700	-9,300	-18,000
2030 (C)	-3,800	-3,500	-7,300	-25,000
2031 (AN)	3,400	2,000	5,400	-20,000
2032 (BN)	-2,700	-1,900	-4,600	-24,000
2033 (AN)	3,000	1,600	4,600	-19,000
2034 (D)	-2,100	-1,300	-3,400	-23,000
2035 (W)	6,900	4,300	11,000	-12,000
2036 (W)	5,900	4,300	10,000	-1,600
2037 (W)	-630	250	-380	-2,000
2038 (D)	-4,800	-2,800	-7,500	-9,500
2039 (W)	2,000	980	2,900	-6,500
2040 (D)	-4,100	-2,600	-6,700	-13,000
2041 (C)	-4,800	-3,300	-8,200	-21,000
2042 (D)	-780	-1,400	-2,200	-24,000
2043 (C)	-3,300	-2,100	-5,400	-29,000
2044 (C)	-1,900	-1,600	-3,500	-33,000
2045 (C)	-2,400	-1,700	-4,100	-37,000
2046 (AN)	5,600	3,000	8,600	-28,000
2047 (C)	-2,200	-1,300	-3,500	-32,000
2048 (W)	8,100	5,100	13,000	-18,000
2049 (W)	2,200	1,800	4,000	-14,000
2050 (W)	-140	480	330	-14,000
2051 (W)	6,800	4,600	11,000	-2,700
2052 (W)	-3,500	-1,400	-4,900	-7,600
2053 (AN)	51	9	60	-7,600
2054 (D)	-4,300	-2,700	-7,000	-15,000
2055 (D)	-2,300	-1,600	-3,900	-18,000
2056 (AN)	2,900	1,700	4,600	-14,000
2057 (BN)	420	410	830	-13,000
2058 (AN)	580	380	970	-12,000

<table>
<tr><th colspan="2">Water Year (Type)</th><th>Upper Aquifer</th><th>Lower Aquifer</th><th>Total Annual Change</th><th>Total Cumulative Change</th></tr>
<tr><td colspan="2">2059 (W)</td><td>5,200</td><td>3,500</td><td>8,700</td><td>-3,400</td></tr>
<tr><td colspan="2">2060 (D)</td><td>-5,100</td><td>-3,300</td><td>-8,400</td><td>-12,000</td></tr>
<tr><td colspan="2">2061 (C)</td><td>-5,500</td><td>-3,400</td><td>-8,900</td><td>-21,000</td></tr>
<tr><td colspan="2">2062 (D)</td><td>-2,400</td><td>-2,200</td><td>-4,600</td><td>-25,000</td></tr>
<tr><td colspan="2">2063 (BN)</td><td>2,500</td><td>1,200</td><td>3,700</td><td>-22,000</td></tr>
<tr><td colspan="2">2064 (W)</td><td>4,900</td><td>2,700</td><td>7,600</td><td>-14,000</td></tr>
<tr><td colspan="2">2065 (BN)</td><td>-5,000</td><td>-2,800</td><td>-7,800</td><td>-22,000</td></tr>
<tr><td colspan="2">2066 (D)</td><td>-2,100</td><td>-1,800</td><td>-3,900</td><td>-26,000</td></tr>
<tr><td colspan="2">2067 (C)</td><td>-4,000</td><td>-3,200</td><td>-7,200</td><td>-33,000</td></tr>
<tr><td colspan="2">2068 (C)</td><td>-3,400</td><td>-2,200</td><td>-5,600</td><td>-38,000</td></tr>
<tr><td colspan="2">2069 (BN)</td><td>3,100</td><td>1,500</td><td>4,600</td><td>-34,000</td></tr>
<tr><td colspan="2">2070 (W)</td><td>6,500</td><td>4,500</td><td>11,000</td><td>-23,000</td></tr>
<tr><td colspan="2">2071 (BN)</td><td>-3,600</td><td>-2,300</td><td>-5,900</td><td>-29,000</td></tr>
<tr><td colspan="2">2072 (W)</td><td>5,700</td><td>3,400</td><td>9,000</td><td>-20,000</td></tr>
<tr><td colspan="2">Average (2022-2072)</td><td>-200</td><td>-180</td><td>-390</td><td></td></tr>
<tr><td rowspan="5">2022-2072</td><td>W</td><td>2,800</td><td>2,000</td><td>4,700</td><td>-8,600</td></tr>
<tr><td>AN</td><td>2,400</td><td>1,300</td><td>3,700</td><td>-16,000</td></tr>
<tr><td>BN</td><td>-1,700</td><td>-1,200</td><td>-2,900</td><td>-22,000</td></tr>
<tr><td>D</td><td>-3,100</td><td>-2,200</td><td>-5,300</td><td>-18,000</td></tr>
<tr><td>C</td><td>-3,700</td><td>-2,600</td><td>-6,300</td><td>-29,000</td></tr>
</table>

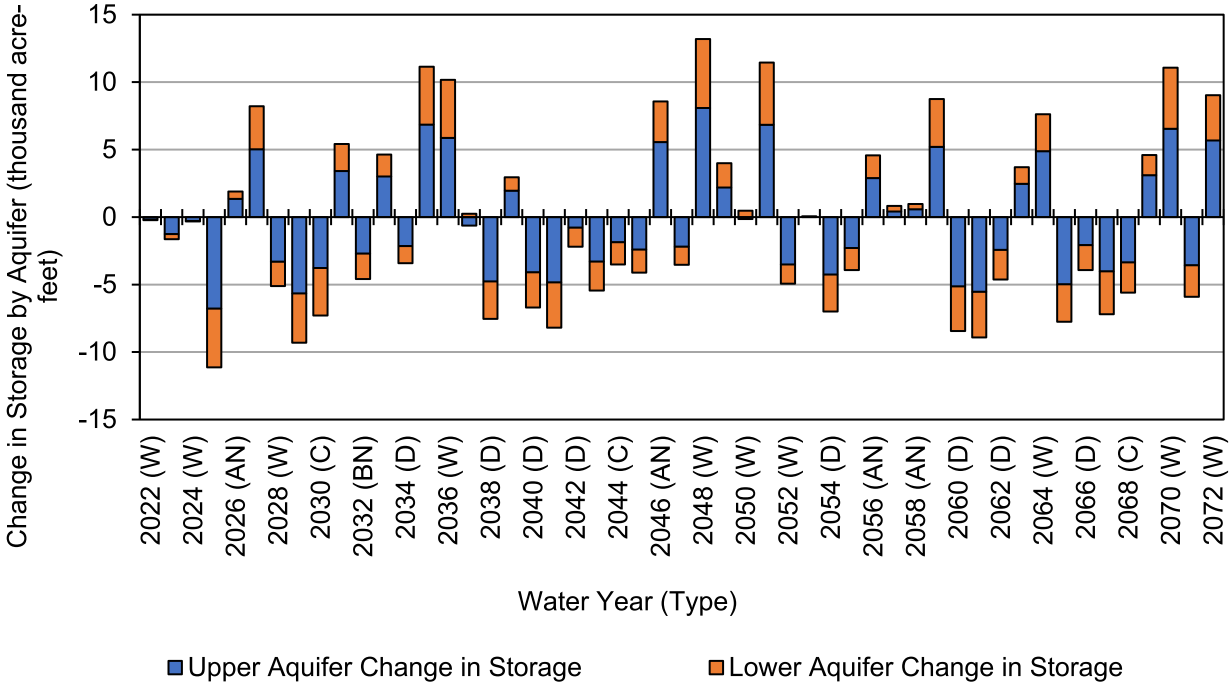


Figure 96. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Groundwater Storage by Aquifer

Appendix 3-A

DMS Summary

Introduction

The Tehama County Flood Control and Water Conservation District retained LSCE to provide a Data Management System (DMS). The DMS is a SGMA requirement as well as good business practice. The DMS is an asset, that like a physical asset should be maintained to properly perform. The DMS was created to manage data related to monitoring, analysis, and reporting on groundwater conditions and related information and meet the requirements of the GSP Regulations, including § 352.4, § 352.6, and § 354.4. GSP Regulations state that “Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the Plan and monitoring of the basin.”

The Tehama County DMS has five key attributes:

1) Flexibility for importing data from various software platforms and systems,
2) Sufficient capacity to store existing (qualified) historical data and additional future data,
3) Ability to export data to numerous software formats (i.e., ESRI, Tableau),
4) Capability to grow and evolve as part of a larger DMS in the future, and
5) Capability to provide an interactive graphical platform.

This DMS incorporates both the database (data stored within related digital tables) for data storage accompanied by an interface to manipulate, query, and manage that data. Web components can be coupled with this system to allow for online viewing of data in the form of maps and graphs. The DMS has functionality to enable importing of data from and exporting data to other commercially available software programs for data visualization or to an enterprise level database for multi-user needs or both. This DMS consists of a Microsoft database, and visualization is possible with an ESRI webhosted map and webhosted Tableau graphics. The Tehama County DMS User Manual provides additional information about the DMS structure, data import and export procedures, quality control processes, and data analysis queries.

Data Types and GSP Indicators

Public agencies collect and maintain data applicable to GSP development and implementation, including DWR, United States Geological Survey (USGS), State Water Resources Control Board (SWRCB) comprising data from GeoTracker, GAMA, and Division of Drinking Water (DDW), NASA Jet Propulsion Laboratory (JPL), and National Oceanic and Atmospheric Administration (NOAA). The Tehama County Flood Control and Conservation District also conducts groundwater monitoring. These monitoring programs and available data are continually evolving to expand and merge to create a more useful and powerful network of information. Data collection methods and sources will likely change in the future.

The DMS contains a variety of data types, including well location and construction details, groundwater level and quality, land subsidence elevation, stream flow, and septic and well permits. The table below identifies the five applicable sustainability indicators and data maintained in the DMS for monitoring each.

Table 1. Sustainability Indicators and Applicable Monitoring Data

Sustainability Indicator	Ground-water Levels	Ground-water Quality	InSAR Subsidence	Stream Stage and Flow
Chronic Lowering of Groundwater Levels	✓			
Reduction of Groundwater Storage	✓			
Degraded Water Quality		✓		
Land Subsidence			✓	
Depletion of Interconnected Surface Water	✓			✓

DMS Database Structure

The database has a similar structure to common datasets developed by the USGS, SWRCB, and DWR. All data in the DMS are identified by data source. Each site or station is uniquely identified by a Site ID depending on the data source the Site ID could be the State Well Number (SWN), Station ID, or site-specific name. To ensure user flexibility, the DMS was designed using the Microsoft Access 2007-2016 software platform and the *.accdb* database format. The figure below illustrates different relationships that exist in the database. There are three main tables, several smaller tables, and many "lookup tables." The three main tables are:
T_Well = well information
T_WL = water level information related to wells
T_WQ = water level information related to wells

While the Tehama County Flood Control and Conservation District GSA values transparency, several components of the DMS contain confidential information and such information will not be made publicly available. Well owner and contact information, certain well construction information and permit information will be treated in a confidential manner. Other types of information may also be considered confidential and access to such information will be restricted accordingly. Content of the DMS (structure, data, queries, and relationships between tables) is expected to evolve over time to increase the utility and functionality of the DMS.

Table Relationships, part one of two

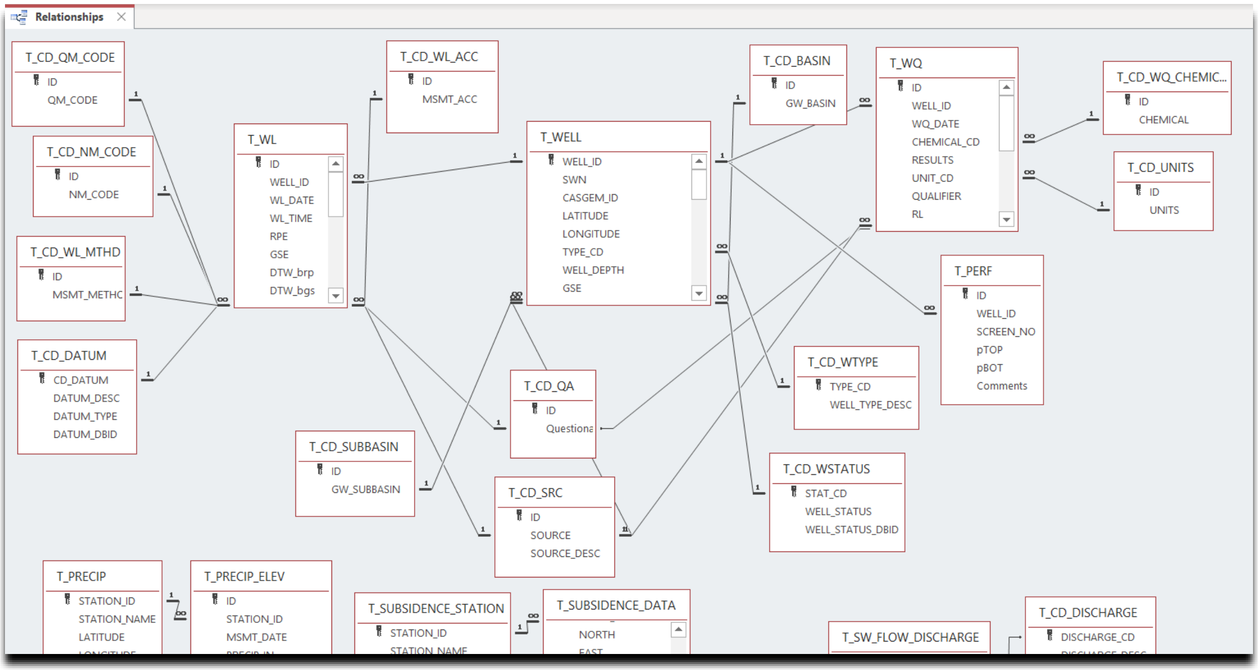
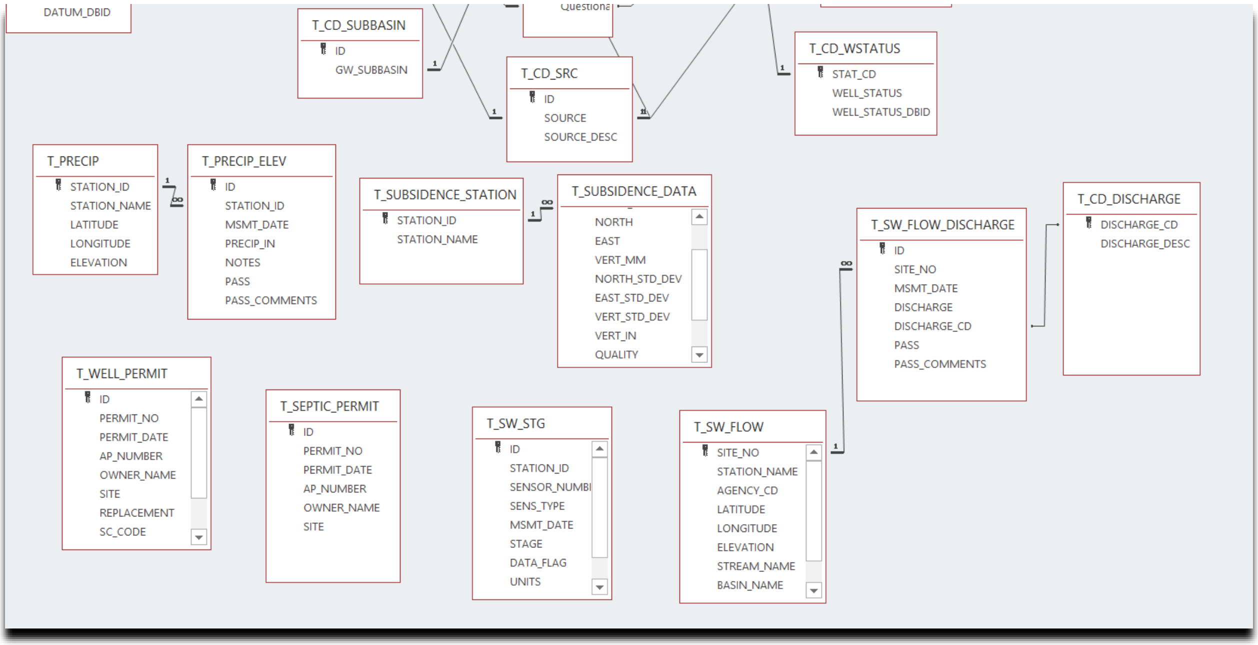


Table Relationships, part two of two

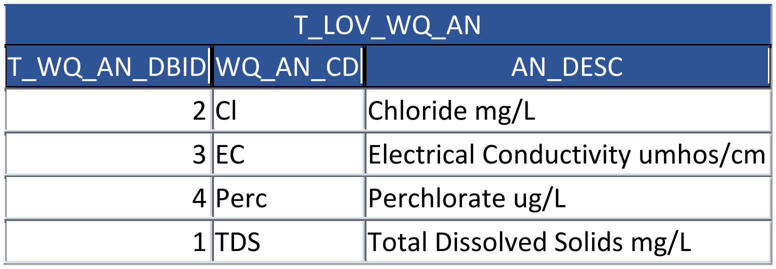


Database Schema and Data Fields

Proper creation of tables and table relationships, also known as schema, will avoid errors in query results and improve database efficiency. All tables in the DMS have a unique primary key (a special key (field) used to uniquely identify records) that serves as the common link between tables. The primary key maintains structural integrity of the relational database, prohibits duplicate entries in a field that requires unique information, and it is a useful field for linking tables with a defined relationship. Tables may also have foreign keys (a key or field used to establish a relationship between two tables) to help association with other tables and their fields. The process of creating proper table construction and relationship definitions makes inconsistent data more obvious and helps with quality control. All tables are normalized to at least the 3rd normal form. Normalization is a database design technique, to modify existing tables and their schema to minimize data redundancy and dependency.

Data standardization is important to avoid mixing definitions, units or other references that make data non-equivalent. Examples include elevation data that is referenced by a datum. There are generally two different vertical datums commonly used in reporting elevations: NGVD29 and NAVD88. NGVD29 is the older vertical datum that is referenced on USGS Quadrangles, and in California it is basically equivalent to mean sea level. Equating the NAVD88 datum to the NGVD29 datum varies by location. The datum in this DMS is all NAVD88. Water quality parameters are also standardized for example nitrate as nitrogen versus nitrate as nitrate, and should have consistent concentration units (e.g., mg/l, ug/l).

Use of List of Values tables. These can help in data standardization and keep track of the allowable values for each table filed (column). These can be referenced by other data tables. For example, T_LOV_WQ_AN which contains list of analytes. These are “lookup tables.”



T_LOV_WQ_AN		
T_WQ_AN_DBID	WQ_AN_CD	AN_DESC
2	Cl	Chloride mg/L
3	EC	Electrical Conductivity umhos/cm
4	Perc	Perchlorate ug/L
1	TDS	Total Dissolved Solids mg/L

The well site is uniquely identified by a “Well ID”, usually corresponding to the DWR-assigned State Well Number (SWN), USGS Site ID, or local Source Name. It is important to ensure this field is unique as State Well Numbers are not the unique identification that they were intended to be.

Quality Assurance and Quality Control

The DMS users should follow quality assurance and quality control processes to identify inconsistencies with data and common problems that occur through data entry. The most important component of quality control in the DMS is the preparation and review of data before entry in the DMS. These data are technical and should be scrutinized for inconsistencies and completely described before data entry. Tools have been established in the DMS for troubleshooting and error checking. Automatic reports (described in the user manual) have been constructed for presenting data in graphical and tabular format. These reports can be reviewed by a technical person with a conceptual understanding of the data to identify any questionable data or functional problems of the DMS (should they arise).

Additional quality assurance and quality control queries have been established to identify conflicting or inconsistent records or information (e.g., inconsistent units of measure for a water quality parameter, multiple reference point elevations for a well or groundwater pumping during water level collection). Despite efforts to minimize inaccurate data in the DMS inaccurate data does exists and is corrected on an ongoing basis.

It is important to remove redundancy in data. This can occur when two sources of information provide identical or similar data for the same well. The well records with redundant data need to be identified and flagged. Then the duplicated data (water level/quality entry) need to be examined and appropriate steps taken to remove the redundancy. One well ID should be used for each physical well. Nested wells (multiple wells within the same casing) should be uniquely identified.

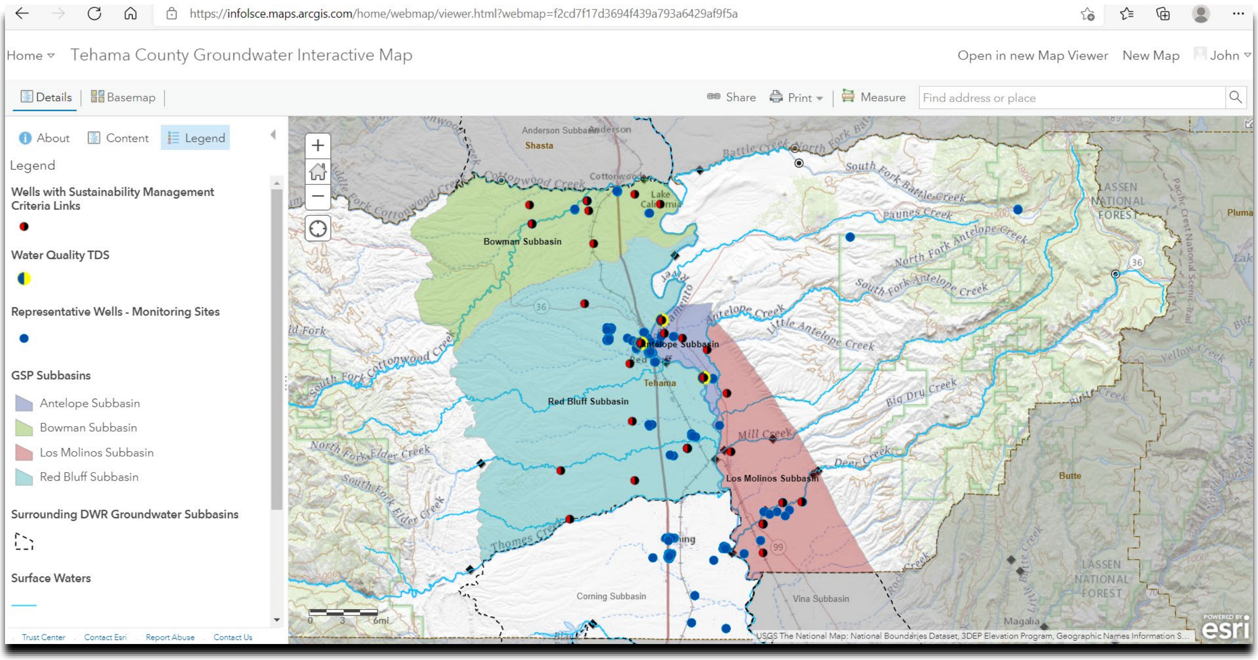
Groundwater level data may contain measuring point discrepancies and/or changes over time. These differences may arise when a well gets modified, re-surveyed or the measuring point changes. There might also be errors in the reference point elevations, in which case the reporting agency should be notified to resolve the error. Other differences in reference point elevations should be considered when making interpretations of water level changes and should, therefore, be rectified. Differences in elevation datum (between the older NGVD29 and more recent NAVD88) should be carefully observed and considered in order to interpret groundwater elevations. Lastly, significant subsidence over time may make the reference point elevation no longer representative.

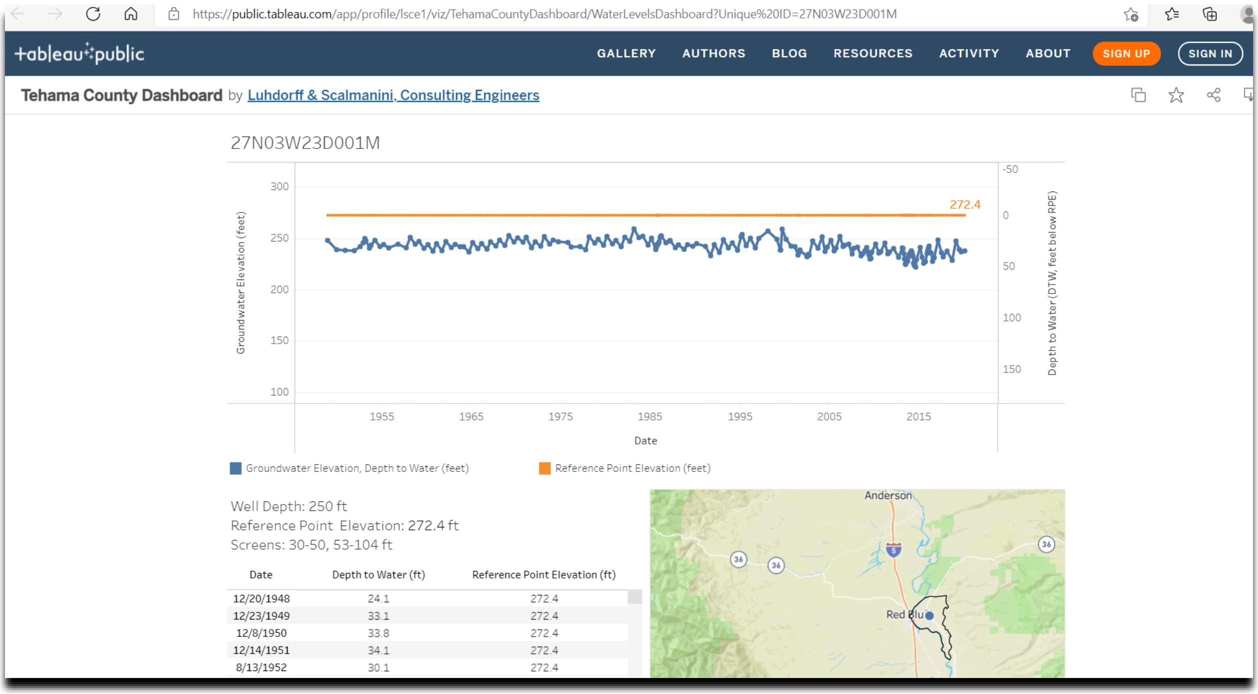
Numeric entries, such as *Depth to Water* field and *water quality value fields* should contain only numeric values. No text, spacing, or punctuation is allowed in numeric data. Data in fields should be consistent and logical. The use of numerical flags, like 999 or -9999 should be avoided as a separate field can perform this function. Also, these comment type numbers can bias mathematical functions, like mean or median. The correct data type and field standards for each table in the DMS are maintained in an Excel spreadsheet and are listed below.

Online Visualization

The data within the database is also presented in front-end software, an interactive ESRI web interface, and graphically in Tableau. Both programs allow users to view and interact with data from a DMS without specific knowledge of DMS software and structure. Below is a figure illustrating an example of an interactive web map in which, after clicking on a site location, site information is presented such as groundwater levels or water sample results for Total Dissolved Solids.

Interactive ESRI Map and Tableau Graph Examples





Well Depth: 250 ft
Reference Point Elevation: 272.4 ft
Screens: 30-50, 53-104 ft

Date	Depth to Water (ft)	Reference Point Elevation (ft)
12/20/1948	24.1	272.4
12/23/1949	33.1	272.4
12/8/1950	33.8	272.4
12/14/1951	34.1	272.4
8/13/1952	30.1	272.4

Reporting

DWR Submittals

Data submittals to DWR, as part of regular reporting, will include data contained in the DMS and be contained in forms (Excel files) provided by DWR through the SGMA Portal[1]. The DMS has the capability to conduct queries for extracting the appropriate reporting data in a format compatible for submittal in accordance with DWR reporting requirements.

Annual CASGEM Reporting

After the submittal of the GSP, the Subbasin will no longer need to update the CASGEM site with data and will instead report groundwater level monitoring data for Representative Monitoring Sites through uploads to the SGMA Monitoring Network Module[2].

GSP Annual Report

GSP Regulation §356.2 requires GSAs to submit GSP annual reports covering the previous water year (October 1 to September 30) every April 1 after submitting the GSP. GSP Regulations require that GSP annual reports include the following content:

- Executive Summary and location map §356.2(a).
- Groundwater elevation data, including groundwater contours and hydrographs for each principal aquifer §356.2(b).
- Total water use including groundwater extraction (general location and volume) for the preceding water year and surface water supply used or available for use (including the volume and sources) for the preceding water year §356.2(b).
- Change in groundwater storage for each principal aquifer §356.2(b).
- A graph illustrating cumulative change in groundwater storage, water year type, annual change in groundwater storage §356.2(b).
- Progress on Plan Implementation including achieving interim milestones, and implementation of projects and management actions §356.2(c).

There is no required template for GSP annual reports, although DWR provides a spreadsheet-based template, that it refers to as an elements guide, intended to accompany each annual report and provide a cross-reference between the content required by the GSP Regulations and the location of the required content in that annual report. Additionally, DWR has released spreadsheet-based templates to use for submitting and uploading data on groundwater extraction, groundwater extraction methods, surface water supply, and total water use required as part of GSP annual reports.

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[1] https://sgma.water.ca.gov/portal/
[2] https://sgma.water.ca.gov/SgmaWell/

GSP Five-Year Report

SGMA and the GSP Regulations require GSAs in medium-priority and high-priority basins to conduct a periodic review and assessment of GSPs at least every five years and whenever a GSP is amended. The Five-Year Report will be due by April 1 of every fifth year starting in 2027. The Five-Year Report includes a more comprehensive evaluation compared to the annual report and it will include elements of the annual reports, GSP implementation progress, and progress toward meeting the Subbasin sustainability goal. DWR has not yet released any guidance documents related to the preparation of the GSP Five-Year Report. The content of the Five-Year Report will follow any forthcoming guidance documentation or template provided by DWR.

Appendix 3-B

Groundwater Level Hydrographs, Measurable Objectives (MO) and Minimum Thresholds (MT) of Groundwater Level Sustainability Indicator Wells

Appendix 3-B

Groundwater Level Hydrographs, Measurable Objectives (MO) and Minimum Thresholds (MT) of Groundwater Level Sustainability Indicator Wells

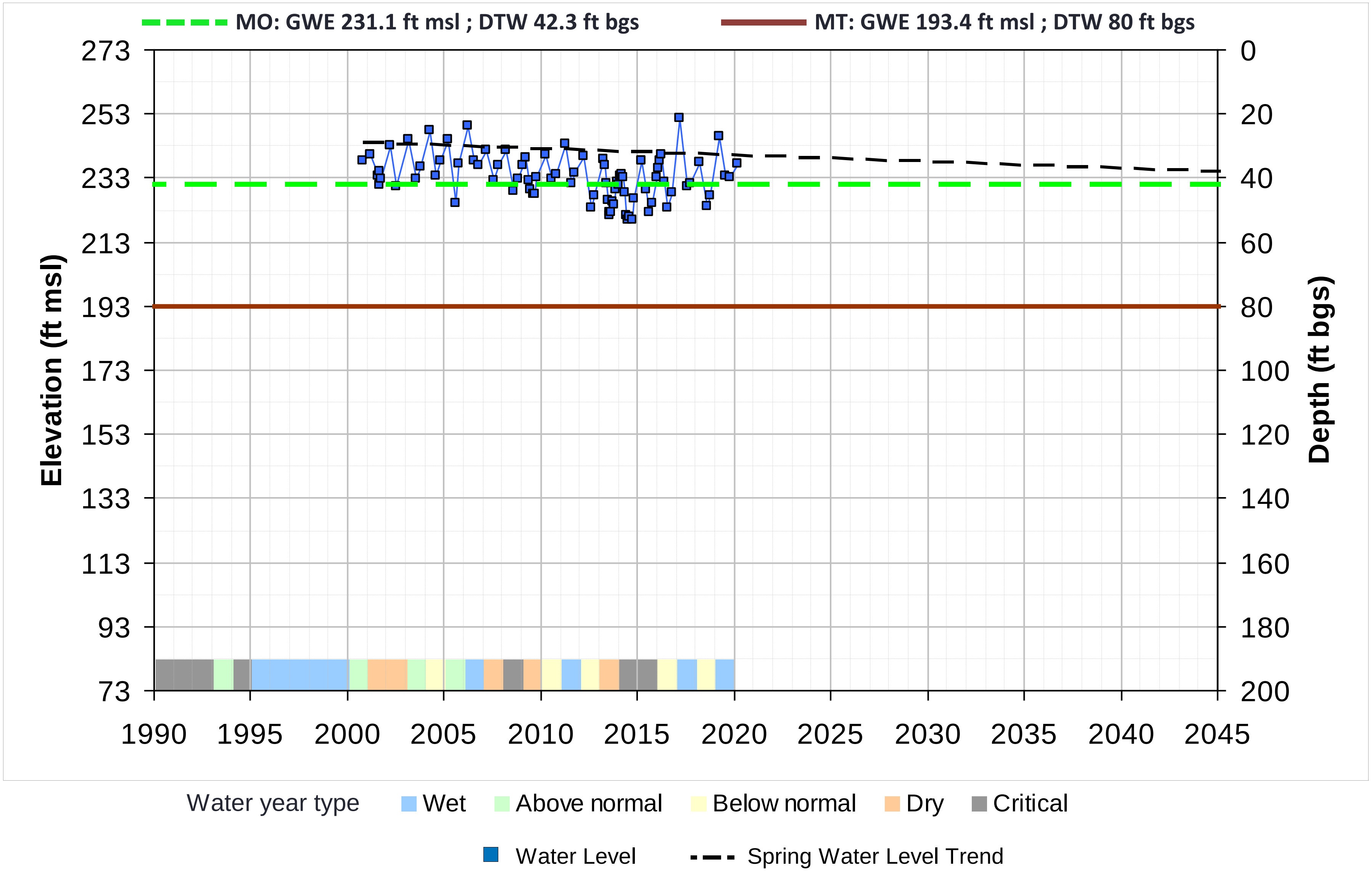
Antelope Subbasin

Ant-1U SWN: 27N03W16K003M

MO = Spring 2042 DTW + 5 ft

Well Depth (ft): 137; Screens (ft bgs): 117 - 137

Aquifer: Upper; Well Type: Domestic

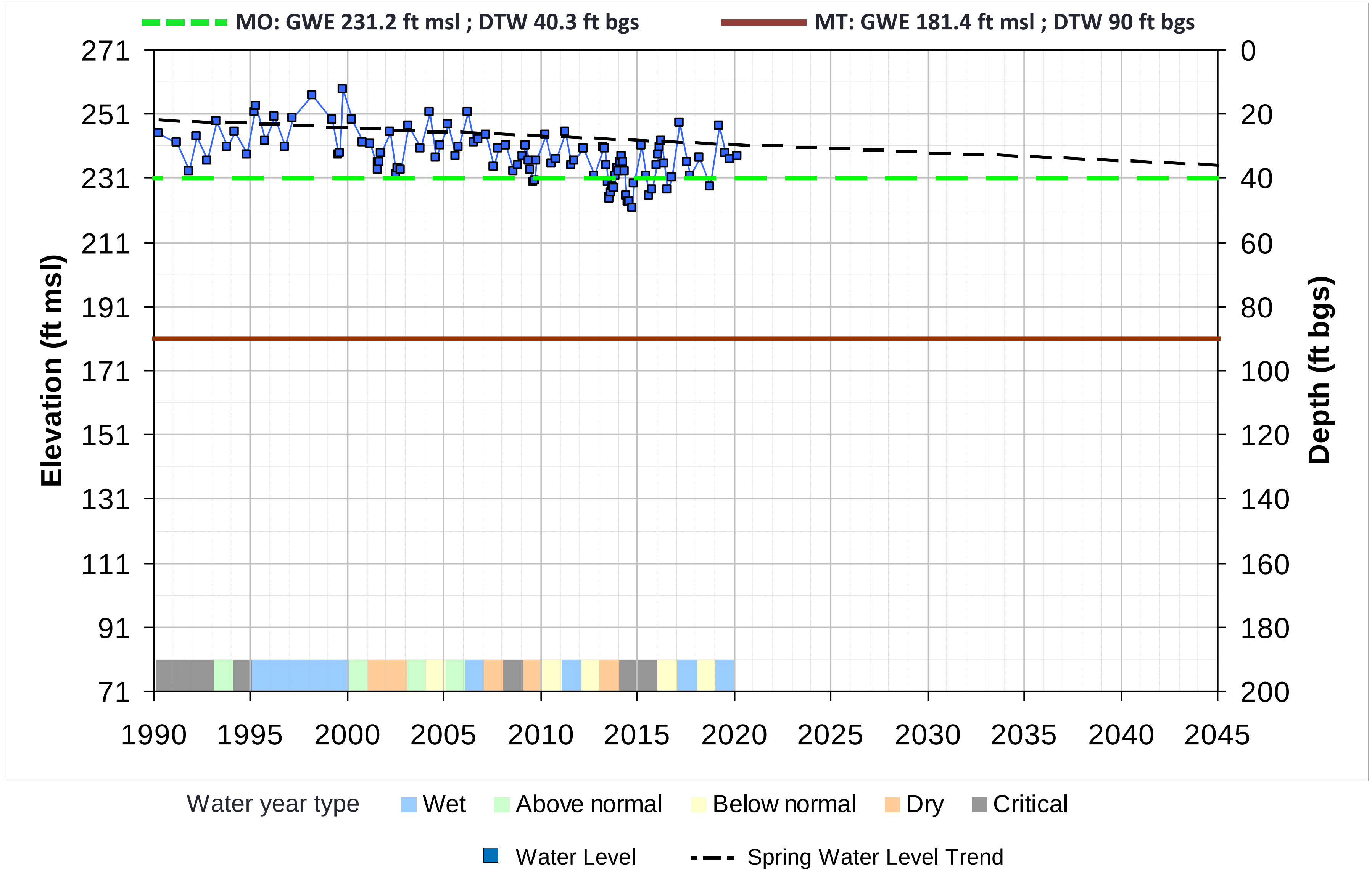


Ant-2U **SWN: 27N03W23D001M**

Well Depth (ft): 250; Screens (ft bgs): 30 - 155

MO = Spring 2042 DTW + 5 ft

Aquifer: Upper; Well Type: Irrigation

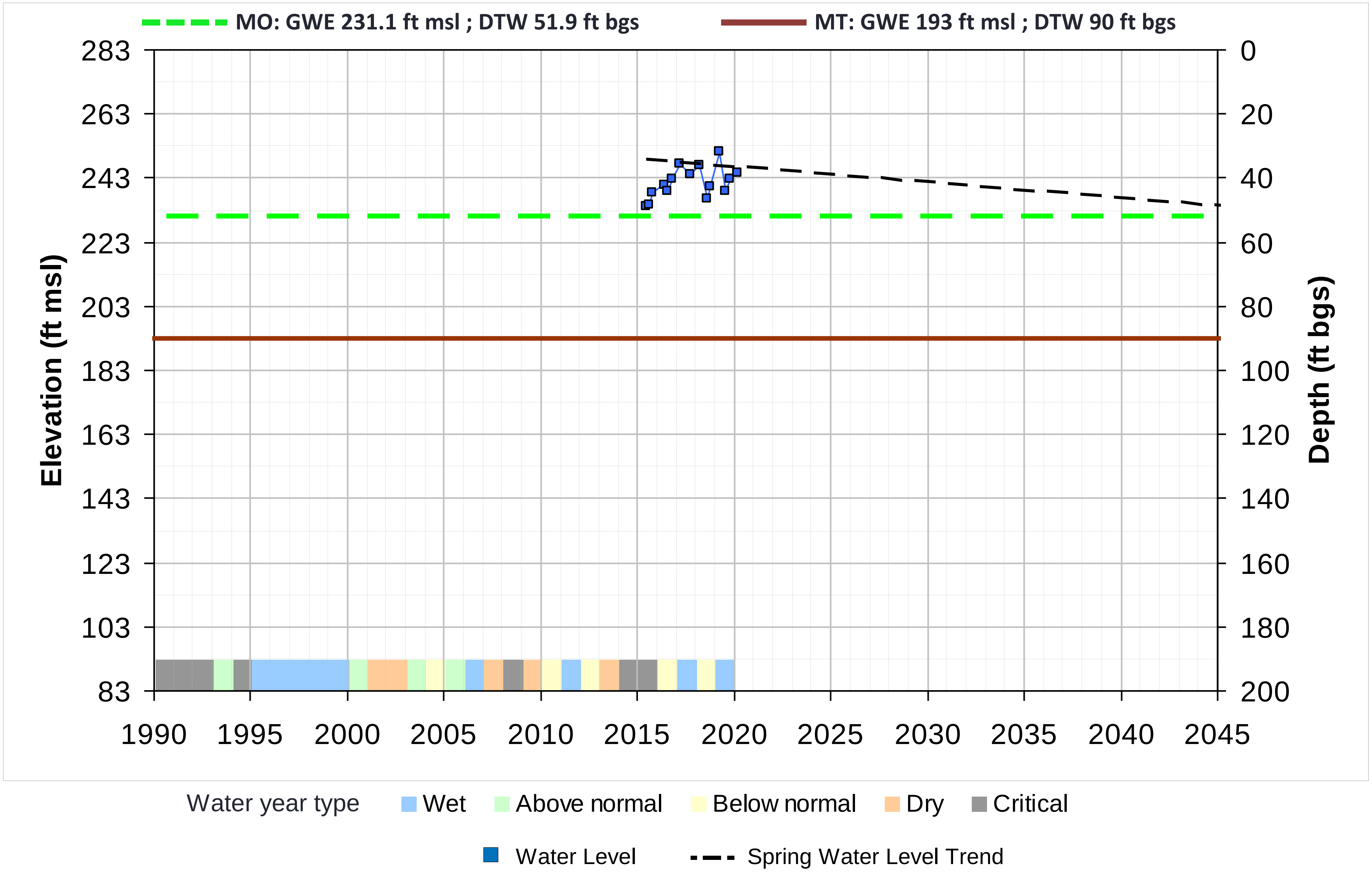


Ant-3U **SWN: 27N02W30C003M**

Well Depth (ft): 170; Screens (ft bgs): 157 - 170

MO = Spring 2042 DTW + 5 ft

Aquifer: Upper; Well Type: Irrigation



Appendix 3-C

InSAR Subsidence Time Series Graphics

Antelope Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan Appendix 3-C InSAR Subsidence Timeseries Data - Draft

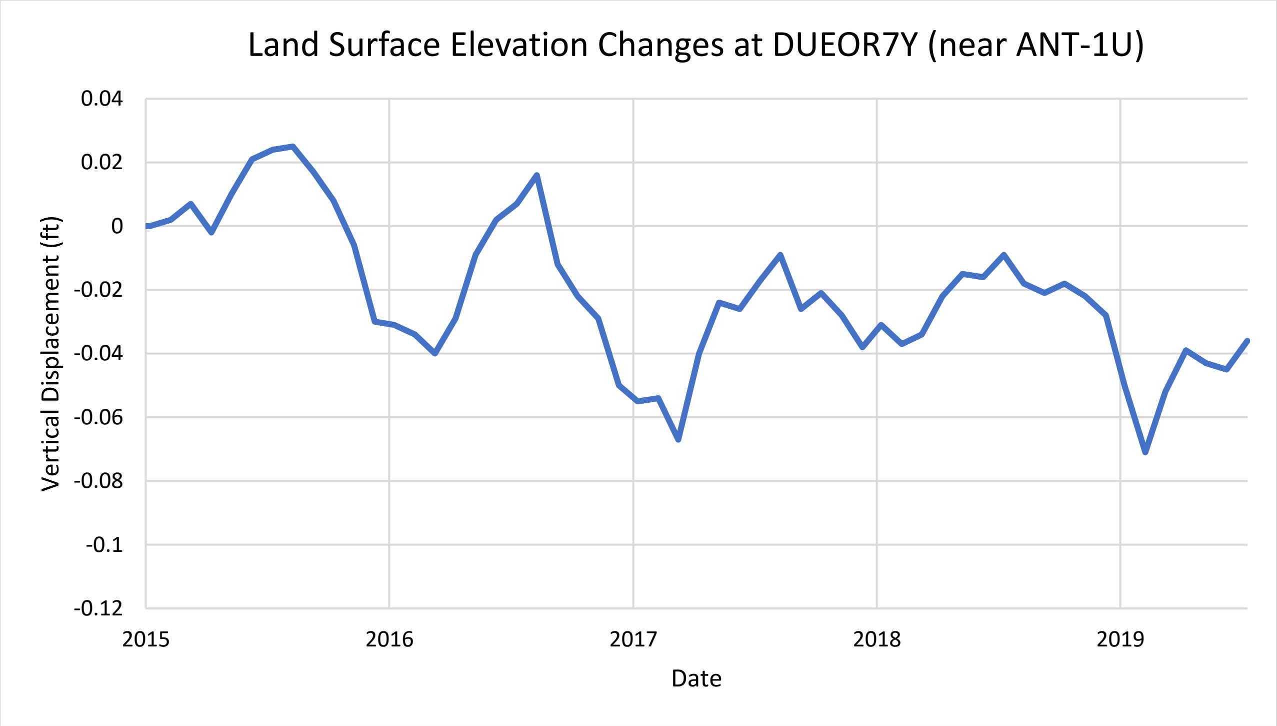
January 2022

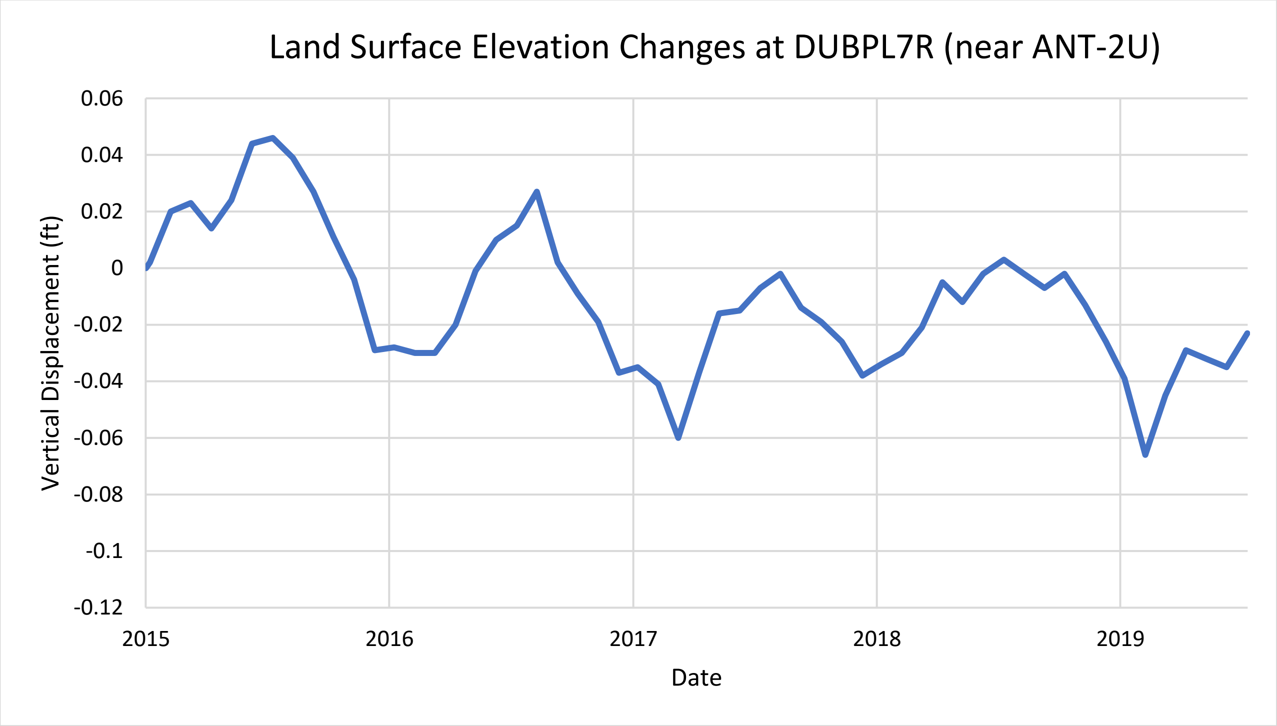
Prepared For:

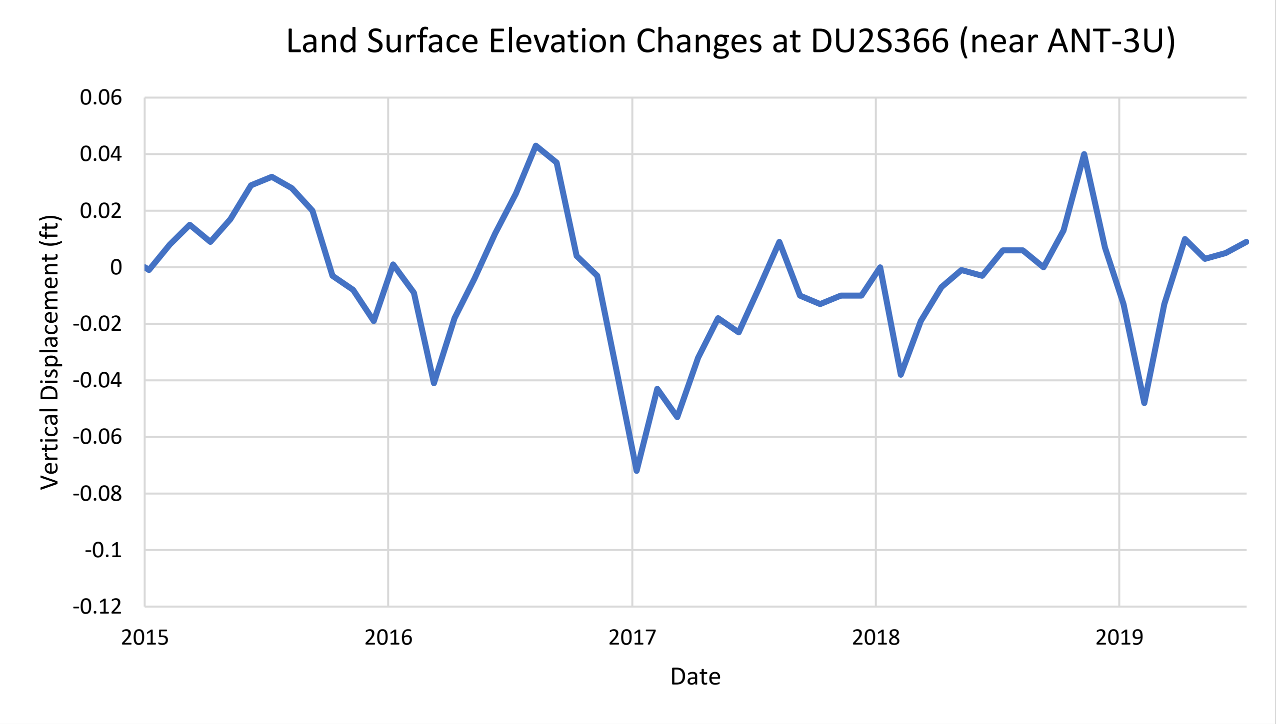
Tehama County Flood Control and Water Conservation District

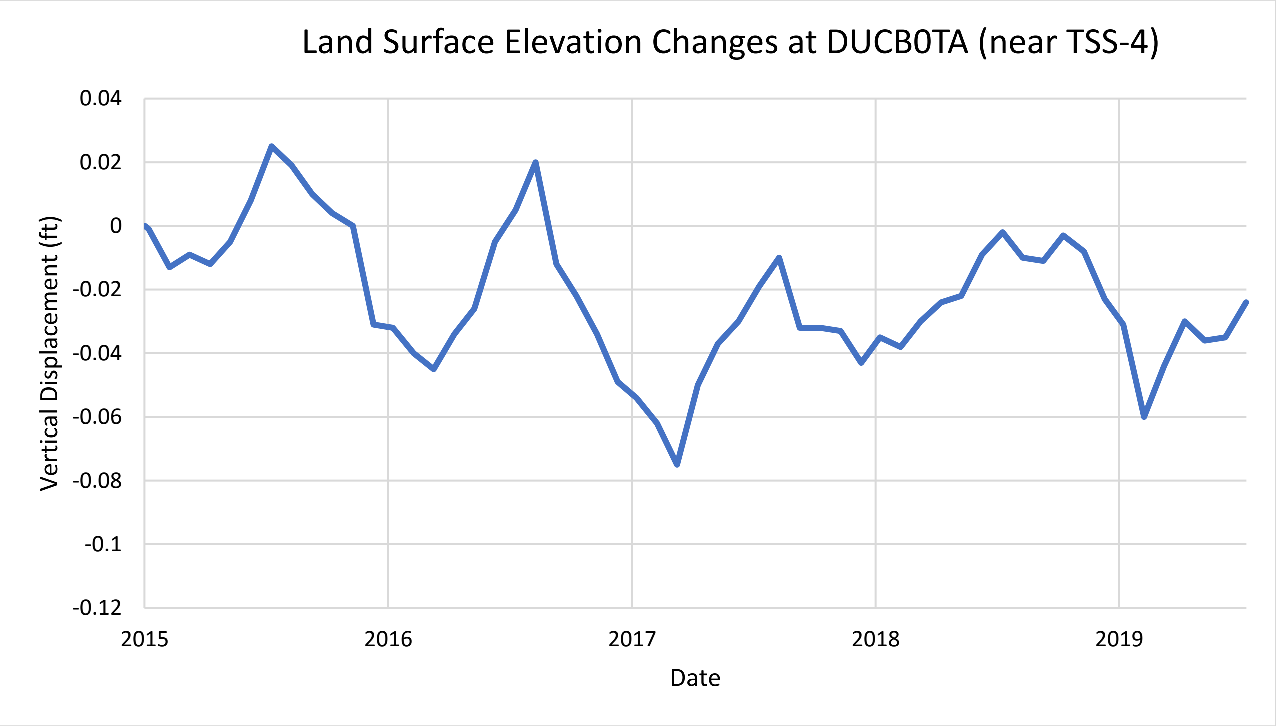
Prepared By:

Luhdorff & Scalmanini, Consulting Engineers


Land Surface Elevation Changes at DUEOR7Y (near ANT-1U)
Vertical Displacement (ft)
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
2015
2016
2017
2018
2019
Date


Land Surface Elevation Changes at DUBPL7R (near ANT-2U)
Vertical Displacement (ft)
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
2015
2016
2017
2018
2019
Date


Land Surface Elevation Changes at DU2S366 (near ANT-3U)
Vertical Displacement (ft)
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
2015
2016
2017
2018
2019
Date


Land Surface Elevation Changes at DUCB0TA (near TSS-4)
Vertical Displacement (ft)
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
2015
2016
2017
2018
2019
Date

Appendix 3-D

Baseline Water Quality Sampling Documentation

Antelope Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan Appendix 3-D Water Quality Sampling Results - Draft

January 2022

Prepared For:

Tehama County Flood Control and Water Conservation District

Prepared By:

Luhdorff & Scalmanini, Consulting Engineers

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LIST OF TABLES

1 WATER QUALITY SAMPLING

1.1 Summary

This appendix outlines the methodology and results of a Tehama County FCWCD examination of groundwater quality within the Antelope Subbasin in Tehama County, California. Groundwater samples were collected from two wells in the Antelope Subbasin and analyzed for TDS. TDS results were below the California recommended secondary MCL (500 mg/L) in all samples.

1.2 Introduction

Recent groundwater quality data has been identified as a data gap within the Antelope Subbasin. To fill this data gap, water quality samples were collected from wells within the Subbasin. These data support the development and implementation of the Antelope Subbasin GSP to comply with SGMA and achieve sustainable groundwater management by 2042.

The sampled wells are part of the representative monitoring network for groundwater quality for management under the GSP. The primary purpose of testing these samples is to provide a baseline for water quality within the Subbasin for comparison with future repeated sampling events, which are necessary to track temporal trends in groundwater quality. These data will be used to calculate interim milestones to reach MOs at each well over the projected period.

1.3 Methods

On August 19, 2021, two wells were sampled for groundwater quality. Both wells are part of a groundwater elevation network monitored by the Tehama County FCWCD/DWR for the Subbasin's California Statewide Groundwater Elevation Monitoring (CASGEM) Program. Field sampling was conducted by LSCE coordinated with both DWR and Tehama County FCWCD. Sampled wells consisted of agricultural wells, domestic wells, and monitoring wells. To ensure the samples are representative of the water quality, a large volume of water was purged from agricultural and domestic wells prior to sampling and samples were collected at the closest point of distribution from the well. Standard purge volume of three well casings were targeted however, flow meters were not installed on all wells. Wells without flow meters were purged for a time calculated using the pump rate listed on the well completion report to achieve the three casing volumes. For monitor wells, passive Hydrasleeve samplers were installed and allowed to equilibrate in the well for a minimum of one week. Samples were collected in laboratory supplied plastic bottles and placed on ice before delivery to Basic Labs in Chico, CA. Samples were analyzed for TDS by method SM 2540C. To ensure the validity of laboratory results, sample duplicates were collected from 10% of the wells and analyzed by Basic Labs.

Groundwater quality data were compared to published California Code of Regulations, Title 22, Secondary Drinking Water Standards.

Prior to sampling, property owners were contacted to secure permission for LSCE to access and sample the wells. Some owners were unable to be contacted to secure access agreements. LSCE will continue to attempt to reach property owners where samples could not be collected and, if access is denied, identify a suitable replacement well for future WQ sampling events.

1.4 Results and Conclusion

Samples collected from the RMS wells had TDS detections ranging from 181 mg/L in sample Ant-3 to 286 in sample Ant-1 (**Table 1**). All the collected samples are below the California Recommended Secondary MCL for TDS (**Table 1**).

Lab results indicate that there are no widespread water quality concerns relating to TDS within the Subbasin. These samples represent a baseline condition for the start of the GSP implementation period and will be used to compare future results to evaluate if water quality is changing over the GSP implementation period.

Table 1. Antelope Water Quality Sampling Results

Well Name	State Well Number (SWN)	Date Sampled	TDS (mg/L)	Secondary Maximum Contaminant Levels	
				Recommended (TDS mg/L)	Upper Secondary MCL (TDS mg/L)
Ant-1U	27N03W16K003M	08/19/2021	286	500	1,000
Ant-2U[1]	27N03W23D001M	TBD	TBD	500	1,000
Ant-3U	27N02W30C003M	08/19/2021	181	500	1,000
TSS-4	TBD	TBD	TBD	500	1,000

1. Access has yet to be secured

Appendix 4-A

Projects and Management Actions Matrix

Appendix 4-A.

Overview of Projects and Management Actions

Introduction

Projects and management actions (PMAs) are included in the Groundwater Sustainability Plans (GSPs) for the Antelope, Bowman, Los Molinos, and Red Bluff Subbasins to achieve and maintain sustainable groundwater conditions in each Subbasin. In accordance with 23 CCR §354.44(a), these PMAs will support ongoing sustainability and adapt to potential future changes in conditions in each Subbasin. PMAs are categorized and presented in this appendix as follows:

- **Projects and Management Actions Developed for Implementation** are PMAs that the GSA or other project proponents are planning to implement or are currently implementing in the Subbasins. These PMAs have been developed to achieve and maintain groundwater sustainability while supporting other local goals.
- **Portfolio of Other Potential Projects and Management Actions** are PMAs that could be implemented, as needed, to achieve and maintain long-term sustainable groundwater management across the Subbasins. These potential PMAs would be further evaluated and selected for implementation depending on funding, interest among stakeholders, and whether Subbasin conditions have changed such that additional PMAs would be necessary to maintain groundwater sustainability. These PMAs may have been studied by the project proponent or in earlier regional water planning documents, but most project design, cost estimates, and planning work have yet to be completed, and would only be initiated if the project is eventually triggered for implementation as a result of continued monitoring of groundwater conditions.

The compilation of PMAS presented in this appendix are designed to support the long-term sustainability of groundwater resources in the Subbasins. The information currently available for each of these PMAs is provided in Tables 1 through 6 below. These tables summarize the following information:

- Table 1. Brief Description of all Projects and Management Actions
- Table 2. Project Type, Proponent, and Location for all Projects and Management Actions.
- Table 3. Implementation Criteria, Notice Process, Permitting and Regulatory Process, and Timeline for all Projects and Management Actions.
- Table 4. Anticipated Benefits of all Projects and Management Actions.
- Table 5. Benefit Evaluation and Water Source for all Projects and Management Actions.
- Table 6. Legal Authority Requirements, Estimated Cost, and Potential Funding Sources for all Projects and Management Actions.

The fields in these tables have been designed to meet the requirements for PMAs as described in the California Code of Regulations (CCR); when applicable, a reference to a specific location in the GSP regulations is provided as the first row of each table.

Table 1. Brief Description of all Projects and Management Actions.

	23 CCR § 354.44		23 CCR §354.44(a)
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
Projects and Management Actions Developed for Implementation			
All	Grower Education	Northern Sacramento Valley Mobile Irrigation Lab	Grower education on topics that support groundwater sustainability is proposed for all areas of Tehama County. Grower education would be accomplished through onsite irrigation system evaluations, workshop education, and irrigation water management and scheduling assistance. This project will continue and expand the irrigation evaluation service that has been in place for ten years. In 2002, Tehama County Resource Conservation District began the operation of a Mobile Irrigation Lab (MIL) in Tehama County with funding from the California Department of Water Resources and the Bureau of Reclamation. Since then, the program has expanded to include other funding sources and the areas serviced by the Butte, Glenn and Western Shasta Resource Conservation Districts (RCDs), and it could be expanded to service the entire Northern Sacramento Valley Integrated Regional Water Management Plan (NSVIRWMP) area.
All	Multi-Benefit Recharge	Multi-Agency / Jurisdictions	The Nature Conservancy (TNC) has prepared guidance to assist GSAs in planning on-farm, multi-benefit groundwater recharge programs. A multi-benefit recharge program will provide groundwater recharge through normal farming operations while also providing critical wetland habitat for shorebirds migrating along the Pacific Flyway. Fields with soil and cropping conditions conducive to groundwater recharge will be flooded and maintained with shallow depths. Water will be sourced from existing water rights contracts, depending on availability. The GSA may also consider financial compensation for participating offsetting field preparation, irrigation, and water costs.
Bowman	Cottonwood Creek Invasives Control Follow Up	Tehama County Resource Conservation District	The objective of this project is to permanently control known invasive plant species occurrences within portions of Cottonwood Creek's South Fork located in Tehama County. Through the control of these plants, the threat of their spreading into the Sacramento River's main stem is reduced as is their impacts on those portions of the Creek's riparian zone that now contain infestations. Project work entails the removal of giant reed (Arundo donax), salt cedar (Tamarisk), black locust, tree-of-heaven, pampas grass, and scotch broom. Herbicide and manual removal methods will be employed. It is anticipated that initial project work which has already been funded will begin in September 2012 and will continue for a total of five years. Due to the growth characteristics of Arundo donax and Tamarisk, in particular, follow up treatments would be required in order to attain control of infested sites and to treat missed areas of infestation. It is anticipated that three follow up treatments will be required over a five year period in order to assure control. Once formerly infested sites are free of infestations, native plants need to be reestablished in

	23 CCR § 354.44		**23 CCR §354.44(a)**
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
			order to expedite the development of the Creek's riparian corridor and to prevent erosion of creek banks where plants have been removed.
Bowman	Cottonwood Creek Riparian Habitat Restoration	Tehama County Resource Conservation District	This project would implement riparian restoration activities in the Cottonwood Creek Watershed. This project would enhance existing riparian habitat (fill in fragmented areas), implement riparian fencing, and/or obtain conservation easements to protect riparian resources.
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 1	Deer Creek Watershed Conservancy	The overall Lower Deer Creek Project, as described in the 2011 feasibility study, is anticipated to include five (5) phases along Deer Creek from the Sacramento River to approximately River mile 8. This project includes the first phase that will result in a complete project that locally achieves the dual purposes of the Lower Deer Creek Restoration and Flood Management project to implement actions that lead to improved ecosystem health and reliable flood protection. The first phase of the Lower Deer Creek Project covers planning for floodplain habitat, improvements to fish passage and aquatic habitat, widening floodplains and enhancing natural flood channels, and enhancing fish passage at the Stanford Vina Irrigation Dam. Since there are five phases to the overall project, it is anticipated the USACE and State Regulatory Agencies will require one California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) document to support permitting. Anticipated permitting requirements include a 404 permit from the US Army Corps of Engineers (USACE), and a Central Valley Flood Protection Board (CVFPB) encroachment permit. USACE 408 authorization is also expected to address all phases of the project.
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 3	Deer Creek Watershed Conservancy	This project covers Phase 3 of the Lower Deer Creek Levee Improvements and Habitat Restoration project, which will include the final design and construction of a new 4,620 linear foot (LF) levee. The new levee will be setback (566 LF at the largest point). The existing Deer Creek Project Levee 2 will be removed. The Levee setback will create approximately 40 acres of new floodway with floodway and migration easements, which will be contoured and improved to greatly assist fish passage (e.g. salmonids). The new floodway would be incorporated into the current DWR floodway maintenance program.
Los Molinos	Deer Creek Instream Flow Planning and Design Project	Trout Unlimited	This project would improve conjunctive use management at Deer Creek Irrigation District (DCID) by designing improved groundwater systems at Sheep Camp Ditch and Cone-Kimball Ditch and exploring opportunities to increase total water use efficiency within DCID and the Stanford-Vina Ranch Irrigation Company (SVRIC), including tailwater recovery and seasonal groundwater recharge.

	23 CCR § 354.44		**23 CCR §354.44(a)**
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
Los Molinos	DCID Diversion Automation Project	Trout Unlimited	This project would improve the efficiency of water delivery within DCID by automating the main diversion and north main and south main ditch flow rates and provide real-time monitoring of spills.
Red Bluff	El Camino Restoration Project	El Camino Irrigation District	This project would identify and fix the most inefficient pumps in the El Camino Irrigation District system. Other improvements would include: replacement of concrete pipe with more durable PVC pipe, replacement of hub gates, and installation of flowmeters on each discharge pipe from every pump
Red Bluff	Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District	Proberta Water District, Thomes Creek Water District	This project would incentivize expanded use of Central Valley Project (CVP) contract supply by irrigators in Proberta Water District (PWD) and Thomes Creek Water District (TCWD), with the goal of using the full contract supply available to each district. By encouraging irrigators to use more surface water, this project would offset groundwater demand and provide in-lieu recharge benefits to Red Bluff Subbasin
Red Bluff	Elder Creek Non-Native Invasive Species Plant Control	Tehama County Resource Conservation District	This project would identify and remove non-native invasive species (NIS) plants in the Elder Creek watershed, with a focus on Arundo donax and Tamarisk. Additional coordination and permitting work would be required of the USACE levee systems on Elder Creek.
Red Bluff	Tehama West Non-Native Invasive Species Plant Control	Tehama County Resource Conservation District	This project would identify and remove NIS plants in the Tehama County westside watersheds (excluding Elder Creek), with a focus on Arundo donax and Tamarisk.
Red Bluff	Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge	Multi-Agency / Jurisdictions	Thomes and Elder Creek originate to the west of the Red Bluff Subbasin and flow eastward into the Red Bluff Subbasin. During periods of flow in the winter and spring, a portion of these flows could be diverted for either (1) off-stream storage and subsequent use for irrigation or (2) direct groundwater recharge through Flood-MAR, dedicated recharge basins, or modified stream beds.
Portfolio of Other Potential Projects and Management Actions			
All	Direct Groundwater Recharge of Stormwater and Flood Water – Groundwater Recharge of Stormwater through Unlined Canals, Natural Drainages, Recharge Basins, and ASR Wells	Multi-Agency / Jurisdictions	Supply groundwater recharge with excess surface water in wet years for use in dry years. Recharge may be done in conveyance structures such as unlined canal and laterals, natural drainages such as creek beds, recharge basins, agricultural fields, and aquifer storage and recovery (ASR) wells. Areas identified for recharge should have suitable recharge surficial geology, low enough water levels to support recharge, and access to surface water.

	23 CCR § 354.44		23 CCR §354.44(a)
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
All	Direct Groundwater Recharge of Stormwater and Flood Water – Off-Stream Temporary Storage of Flood Water on Private Lands	Multi-Agency / Jurisdictions	Divert floodwater for off-stream temporary storage on private lands, providing direct recharge and potentially in-lieu recharge.
All	Stormwater Management Improvements	Multi-Agency / Jurisdictions	Improve stormwater management facilities to enhance groundwater recharge of stormwater. Maintain stormwater pumps and ensure stormwater holding basins are of adequate size for retention.
All	Stormwater Management Improvements – Watershed Restoration to Reduce Runoff	Multi-Agency / Jurisdictions	Restore watersheds burned in wildfires and restore unused grazing land to reduce runoff and improve recharge.
All	Levee Setback and Stream Channel Restoration	Multi-Agency / Jurisdictions	Restore stream channel and levee setback to increase groundwater recharge, provide wildlife habitat, lower water temperatures in the Sacramento River, and improve the overall riparian ecosystem.
All	Recycled Water Program	Multi-Agency / Jurisdictions	Facilitate use recycled water of suitable quality (e.g., treated wastewater) for groundwater recharge and for urban or agricultural irrigation.
All	Recycled Water Program – Treated Wastewater Recycling to Support Wetlands	Multi-Agency / Jurisdictions	Construct and operate wetlands as a discharge site for treated wastewater (e.g., the Rio Alto Water District Wastewater Treatment Plant & Constructed Wetlands Project). Creation of constructed wetlands would enhance the surrounding community by increasing natural habitat for waterfowl and wildlife, while offering educational and recreational opportunities for local schools and community residents through the development of walking trails and informational kiosks.
All	Recycled Water Program – Wastewater Treatment Facility Construction to Supply Recycled Water for Irrigation	Multi-Agency / Jurisdictions	Enhance wastewater treatment facilities to supply tertiary-treated Title-22 effluent for use as irrigation water.
All	Inter-Basin Surface Water Transfers or Exchanges – Increase Inter-Basin Surface Water Transfers or Exchanges to Promote Surface Water Use	Multi-Agency / Jurisdictions	Promote inter-basin surface water transfers or exchanges and potentially subsidize surface water costs so that it is less expensive than groundwater.

	23 CCR § 354.44		**23 CCR §354.44(a)**
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
All	Inter-Basin Surface Water Transfers or Exchanges – Surface Water Imports from Other Tehama County Subbasins	Multi-Agency / Jurisdictions	Import underutilized surface water and other supplies from other subbasins in Tehama County, and use for direct recharge or in lieu of groundwater pumping. Potential opportunities include: 1. Treated wastewater from the City of Red Bluff 2. Trout Unlimited Groundwater substitution transfers 3. Groundwater substitution transfers.
All	Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	Multi-Agency / Jurisdictions	Remove invasive plants from creeks and irrigation conveyance canals (e.g., Arundo donax, tamarisk, Himalayan blackberry). Many small tributaries in the watersheds of Tehama County have decreased conveyance, high levels of siltation, and diminished flood-carrying capacity due to invasive vegetation overgrowth. Debris-clearing is a challenge due to environmental permitting restrictions. Plant removal would reduce conveyance issues, reduce evapotranspiration (ET), and allow for more water in the shallow groundwater area, restoring conditions for GDEs and native riparian species.
All	Water Supply Reservoir Construction, Renovation, or Conversion	Multi-Agency / Jurisdictions	Construct, renovate, or convert flood control facilities to a water supply reservoir.
All	Enhanced Boundary Flow Measurement	Multi-Agency / Jurisdictions	Enhance measurement of boundary outflows resulting from precipitation runoff and irrigation return flows, which are believed to be a substantial component of the water budget. These outflows can vary substantially from year to year based on precipitation and (in critically dry years) surface water availability.
All	Well Metering	Multi-Agency / Jurisdictions	Meter larger agricultural wells to better assess the total volume of groundwater pumped in the Subbasin. Data will help to better manage continued sustainability of the Subbasin within its sustainable yield.
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Residential Water Use Efficiency Improvements	Multi-Agency / Jurisdictions	Offer incentives for urban, residential, and commercial projects that improve water use efficiency, such as high efficiency appliance rebates and incentives for lawn removal, low-water landscape installation, rain barrels, graywater reuse, etc.
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Municipal Water System Efficiency Improvements	Multi-Agency / Jurisdictions	Evaluate municipal water system operation and reduce losses to reduce municipal groundwater pumping demand.

	23 CCR § 354.44		**23 CCR §354.44(a)**
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Irrigation Efficiency Improvements	Multi-Agency / Jurisdictions	Assist growers with conversion to efficient and dual-source irrigation systems. Related efforts may include soil mapping to customize irrigation timing and duration and grower education to encourage soil management to improve moisture retention.
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Surface Water Conveyance and Irrigation Infrastructure Improvements for Dual-Source Systems	Multi-Agency / Jurisdictions	Irrigation system improvements needed to utilize surface water for drip irrigation of orchards. Typical system components required for a dual source system are a surface water irrigation “turnout” or point of delivery to the field, a pipeline or ditch to convey water from the turnout to a pump station, a pump or pumps for pressurization, and filtration. Improvements in the Subbasin may include installation of regulating reservoirs, filters or treatment (for algae), and pressurize systems for drip irrigation. SCADA improvements and install VFDs on pumps to improve and maintain delivery pressures.
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Assistance for Capital Improvements	Multi-Agency / Jurisdictions	Assist growers with capital improvements to irrigation infrastructure, from use of groundwater to use of surface water or dual-source systems.
All	Water Market for Surface Water and Groundwater Exchange	Multi-Agency / Jurisdictions	Create a water market for exchanging surface water and groundwater, allowing for flexibility in water use to meet irrigation demands in the Subbasin while remaining within the overall sustainable yield.
All	Demand Management – Conversion to Less Water Intensive Crops	Multi-Agency / Jurisdictions	Promote conversion of agricultural lands to less water intensive crops to reduce water use while continuing to promote agriculture land use. Would be considered if other planned PMAs are insufficient to maintain sustainability.
All	Demand Management – Pumping Fees	Multi-Agency / Jurisdictions	Implement tiered fee structure for groundwater extractions to incentivize reduced groundwater use. Would be considered if other planned PMAs are insufficient to maintain sustainability.
All	Demand Management – Groundwater Extraction Allocation Program	Multi-Agency / Jurisdictions	Curtail and/or restrict groundwater extractions through a groundwater extraction allocation program. Would be considered if other planned PMAs are insufficient to maintain sustainability.
All	Demand Management – Land Fallowing Program	Multi-Agency / Jurisdictions	Curtail and/or restrict groundwater extractions through a land fallowing program. Would be considered if other planned PMAs are insufficient to maintain sustainability.
All	Demand Management – County Water Use Ordinance and Conservation Efforts	Multi-Agency / Jurisdictions	Coordinate with counties to develop policies that align with sustainable groundwater management goals. Possible ordinances include regulations and limits for groundwater use, export, and illegal diversion of surface water. Counties could create additional

	23 CCR § 354.44		23 CCR §354.44(a)
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
			guidelines during the well permitting process to reduce nearby competition between wells (i.e. well spacing or suggestions regarding total well depth, depth of well perforations, and location of a new well relation to existing wells). Efforts could be designed to be protective of domestic wells. Would be considered if other planned PMAs are insufficient to maintain sustainability.
All	Demand Management – Management and Restrictions of Land Use Changes	Multi-Agency / Jurisdictions	Coordinate with counties to restrict land use changes that increase water demand in the Subbasin. Management would primarily focus on development of new agricultural land, and to restrict growth in areas with no surface water supply. Would be considered if other planned PMAs are insufficient to maintain sustainability.
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Surface Water	Multi-Agency / Jurisdictions	Incentivize use of surface water for irrigation when available to allow groundwater levels to recover in between drought years when surface water is not available.
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Recycled Water	Multi-Agency / Jurisdictions	Provide incentives for use of recycled water of suitable quality (e.g., treated wastewater) for groundwater recharge and for urban or agricultural irrigation to decrease groundwater demand.
All	Tehama County Domestic Well Tracking and Outreach Program – Provide Information and Resources for Protection of Domestic Wells	Multi-Agency / Jurisdictions	Provide domestic well owners with resources and funding for well testing, inspection, and replacement. Target well owners in locations where domestic wells are known to go dry or have water quality impacts.
All	Tehama County Domestic Well Tracking and Outreach Program – Tehama County Dry Domestic Well Tracking System	Multi-Agency / Jurisdictions	Create county-wide system to track dry domestic wells. Information will allow Tehama County to better manage assistance to domestic well owners when water levels drop and wells go dry, identify if wells need to be replaced, and provide information on well replacement
All	Well Deepening or Replacement Program	Multi-Agency / Jurisdictions	Create program to deepen or replace shallow wells and/or wells that go dry. Fewer shallow domestic and irrigation wells allows for deeper acceptable water levels in some parts of Subbasin.
All	Review of County Well Permitting Ordinances	Multi-Agency / Jurisdictions	Review existing ordinances and assess if additional well permitting requirements are warranted. Follow updated DWR well construction recommendations (Bulletin 74), as

	23 CCR § 354.44		23 CCR §354.44(a)
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
			needed. Improve the well permitting and installation program to help protect water quality, allow for better screening, and avoid interference or impacts on neighboring wells.
All	Coordination and Development of Public Data Portals	Multi-Agency / Jurisdictions	Continue coordination with member units and other water purveyors to develop shared public data portals. Coordination would determine the types of data and data formats available, and establish standard methods for receiving, storing, and sharing data with the public, DWR, other agencies.
All	Coordination and Development of Public Data Portals – Ongoing Coordination and Information Sharing	Multi-Agency / Jurisdictions	Continue coordination and information sharing among agencies in Tehama County and with agencies in neighboring subbasins. Coordination would include holding regular public meetings, attending meetings in neighboring subbasin, coordination with land use planning entities, and fostering relationships with relevant agencies and organizations.
All	Coordination and Development of Public Data Portals – Data Sharing for Monitoring Contaminant Plumes	Multi-Agency / Jurisdictions	Continue and improve sharing of contaminant data across organizations, including data to track and monitor contaminant plumes.
All	Tehama County Well Inventory and Registration Program – Well Registration Program	Multi-Agency / Jurisdictions	Create well registration program to collect well locations, screening information, and pumping data for use in GSP updates.
All	Tehama County Well Inventory and Registration Program – Tehama County Well Inventory	Multi-Agency / Jurisdictions	Create county-wide well inventory to compile all available information on active wells in Tehama County and improve understanding of well distribution, construction, and hydrogeology. Inventory will potentially be useful for filling monitoring data gaps.
All	Maintain and Expand Groundwater Level Monitoring Network	Multi-Agency / Jurisdictions	Maintain existing monitoring network to improve the understanding of aquifer conditions and dynamics and to monitor groundwater conditions related to sustainable management criteria.
All	Maintain and Expand Groundwater Level Monitoring Network – Maintain Coordination with Other Monitoring Entities	Multi-Agency / Jurisdictions	Maintain existing coordination with other monitoring entities to support the use of identified monitoring locations as part of the monitoring network and to share relevant collected data.
All	Maintain and Expand Groundwater Level	Multi-Agency / Jurisdictions	Identify existing wells that may be incorporated into the groundwater level monitoring network. Wells may be used to fill data gaps and improve understanding of aquifer

	23 CCR § 354.44		**23 CCR §354.44(a)**
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
	Monitoring Network – Identify Existing Wells for Incorporation into the Groundwater Level Monitoring Network		conditions and dynamics, and groundwater conditions related to GDEs and surface water depletions.
All	Maintain and Expand Groundwater Level Monitoring Network – Identify New Wells for Incorporation into the Groundwater Level Monitoring Network	Multi-Agency / Jurisdictions	Identify new monitoring sites that may be added to the groundwater level monitoring network. Wells may be used to fill data gaps and improve understanding of aquifer conditions and dynamics, and groundwater conditions related to GDEs and surface water depletions.
All	One-Time Groundwater Quality Snapshot and Evaluation – One-Time Groundwater Quality Snapshot	Multi-Agency / Jurisdictions	Conduct a one-time sampling of groundwater quality parameters over a wide range of wells in Tehama County. Data will improve understanding of groundwater quality conditions and provide a basis for refinement of monitoring networks.
All	One-Time Groundwater Quality Snapshot and Evaluation – Evaluation of Groundwater Quality Monitoring Options	Multi-Agency / Jurisdictions	Evaluate groundwater quality monitoring options, potentially informed by the one-time groundwater quality snapshot. Consider options to better characterize widespread groundwater quality conditions and address localized groundwater quality concerns.
All	Install Additional Agroclimate Stations	Multi-Agency / Jurisdictions	Install additional stations that monitor agriculture-related weather and climate parameters. Improved data will inform agricultural water use practices and potentially enhance water conservation. Data can also improve the accuracy of the Tehama Integrated Hydrologic Model (Tehama IHM).
All	Expanded Subbasin Monitoring and Aquifer Testing – Aquifer Testing	Multi-Agency / Jurisdictions	Aquifer testing will improve the understanding of aquifer conditions, particularly the level of confinement, connectivity between depths, connectivity with surface water bodies, and the understanding of hydraulic properties needed for simulation within the Tehama IHM and an estimation of recharge entering the Subbasin.
All	Expanded Subbasin Monitoring and Aquifer Testing – Identify Locations Vulnerable to Damage from Subsidence	Multi-Agency / Jurisdictions	Identify locations in the Subbasin that are potentially vulnerable to damage from subsidence, should subsidence become considered more of a threat in the future .

	23 CCR § 354.44		23 CCR §354.44(a)
Subbasin	**Project/ Management Action Name – Component**	**Proponent**	**Brief Project Description**
All	Expanded Subbasin Monitoring and Aquifer Testing – Groundwater Subbasin LIDAR	Multi-Agency / Jurisdictions	Collect LIDAR (Light Detection and Ranging) data across the Subbasin to supports monitoring all sustainability indicators.
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze the Relationship between Groundwater Levels and GDE Health	Multi-Agency / Jurisdictions	Analyze the relationship between groundwater levels and GDE health to improve the understanding of how GDEs are affected by conditions in the groundwater aquifer accessed by pumping.
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze Water Supplies Accessed by Potential GDEs	Multi-Agency / Jurisdictions	Analyze the water supplies accessed by potential GDEs, potentially using a combination of surface water data, shallow groundwater level data, and remote sensing data related to vegetative cover.
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Evaluate the Need for Additional Groundwater - Surface Water Interaction Studies or Monitoring	Multi-Agency / Jurisdictions	Evaluate the need for additional studies or monitoring of groundwater-surface water interactions. Additional information would improve the understanding of how GDEs relate to the groundwater aquifer accessed by pumping, and may allow for refinement of how GDEs and their water supply needs are monitored.

Table 2. Project Type, Proponent, and Location for all Projects and Management Actions.

	23 CCR § 354.44			
Subbasin	**Project/ Management Action Name**	**Project Proponent**	**Project Type**	**Project Location**
Projects and Management Actions Developed for Implementation				
All	Grower Education	Northern Sacramento Valley Mobile Irrigation Lab	Management Action	Subbasin-wide
All	Multi-Benefit Recharge	Multi-Agency / Jurisdictions	Direct Groundwater Recharge	Lands suitable for spreading and recharge
Bowman	Cottonwood Creek Invasives Control Follow Up	Tehama County Resource Conservation District	Groundwater Demand Reduction	Cottonwood Creek
Bowman	Cottonwood Creek Riparian Habitat Restoration	Tehama County Resource Conservation District	Groundwater Demand Reduction	Cottonwood Creek
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 1	Deer Creek Watershed Conservancy	Direct Groundwater Recharge	Deer Creek
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 3	Deer Creek Watershed Conservancy	Direct Groundwater Recharge	Deer Creek
Los Molinos	Deer Creek Instream Flow Planning and Design Project	Trout Unlimited	Surface Water Conveyance Improvements	Deer Creek
Los Molinos	DCID Diversion Automation Project	Trout Unlimited	Surface Water Conveyance Improvements	Deer Creek Irrigation District
Red Bluff	El Camino Restoration Project	El Camino Irrigation District	System Modernization	El Camino Irrigation District
Red Bluff	Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District	Proberta Water District, Thomes Creek Water District	In-lieu Groundwater Recharge	Proberta Water District, Thomes Creek Water District
Red Bluff	Elder Creek Non-Native Invasive Species Plant Control	Tehama County Resource Conservation District	Surface Water Conveyance Improvements	Elder Creek

	23 CCR § 354.44			
Subbasin	**Project/ Management Action Name**	**Project Proponent**	**Project Type**	**Project Location**
Red Bluff	Tehama West Non-Native Invasive Species Plant Control	Tehama County Resource Conservation District	Surface Water Conveyance Improvements	Tehama West watersheds
Red Bluff	Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge	Multi-Agency / Jurisdictions	Direct or In-Lieu Groundwater Recharge	Lands adjacent to creeks suitable for recharge
Portfolio of Other Potential Projects and Management Actions				
All	Direct Groundwater Recharge of Stormwater and Flood Water – Groundwater Recharge of Stormwater through Unlined Canals, Natural Drainages, Recharge Basins, and ASR Wells	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Direct Groundwater Recharge of Stormwater and Flood Water – Off-Stream Temporary Storage of Flood Water on Private Lands	Multi-Agency / Jurisdictions	Project	Lands adjacent to channels that convey flood water
All	Stormwater Management Improvements	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Stormwater Management Improvements – Watershed Restoration to Reduce Runoff	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Levee Setback and Stream Channel Restoration	Multi-Agency / Jurisdictions	Project	Stream channels
All	Recycled Water Program	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Recycled Water Program – Treated Wastewater Recycling to Support Wetlands	Multi-Agency / Jurisdictions	Project	Rio Alto Water District
All	Recycled Water Program – Wastewater Treatment Facility Construction to Supply Recycled Water for Irrigation	Multi-Agency / Jurisdictions	Project	Wastewater treatment facilities
All	Inter-Basin Surface Water Transfers or Exchanges – Increase Inter-Basin Surface Water Transfers or Exchanges to Promote Surface Water Use	Multi-Agency / Jurisdictions	Project	Subbasin-wide

	23 CCR § 354.44			
Subbasin	**Project/ Management Action Name**	**Project Proponent**	**Project Type**	**Project Location**
All	Inter-Basin Surface Water Transfers or Exchanges – Surface Water Imports from Other Tehama County Subbasins	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Water Supply Reservoir Construction, Renovation, or Conversion	Multi-Agency / Jurisdictions	Project	TBD
All	Enhanced Boundary Flow Measurement	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Well Metering	Multi-Agency / Jurisdictions	Project	Subbasin-wide
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Residential Water Use Efficiency Improvements	Multi-Agency / Jurisdictions	Management Action	Residential areas
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Municipal Water System Efficiency Improvements	Multi-Agency / Jurisdictions	Management Action	Municipal service areas
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Irrigation Efficiency Improvements	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Surface Water Conveyance and Irrigation Infrastructure Improvements for Dual-Source Systems	Multi-Agency / Jurisdictions	Management Action	Surface Water Supplier Service Areas
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Assistance for Capital Improvements	Multi-Agency / Jurisdictions	Management Action	Lands with access to surface water
All	Water Market for Surface Water and Groundwater Exchange	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Demand Management – Conversion to Less Water Intensive Crops	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide

	23 CCR § 354.44			
Subbasin	**Project/ Management Action Name**	**Project Proponent**	**Project Type**	**Project Location**
All	Demand Management – Pumping Fees	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Demand Management – Groundwater Extraction Allocation Program	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Demand Management – Land Fallowing Program	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Demand Management – County Water Use Ordinance and Conservation Efforts	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Demand Management – Management and Restrictions of Land Use Changes	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Surface Water	Multi-Agency / Jurisdictions	Management Action	Surface Water Supplier Service Areas
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Recycled Water	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Tehama County Domestic Well Tracking and Outreach Program – Provide Information and Resources for Protection of Domestic Wells	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Tehama County Domestic Well Tracking and Outreach Program – Tehama County Dry Domestic Well Tracking System	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Well Deepening or Replacement Program	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Review of County Well Permitting Ordinances	Multi-Agency / Jurisdictions	Management Action	Subbasin-wide
All	Coordination and Development of Public Data Portals	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Coordination and Development of Public Data Portals – Ongoing Coordination and Information Sharing	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide

	23 CCR § 354.44			
Subbasin	**Project/ Management Action Name**	**Project Proponent**	**Project Type**	**Project Location**
All	Coordination and Development of Public Data Portals – Data Sharing for Monitoring Contaminant Plumes	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Tehama County Well Inventory and Registration Program – Well Registration Program	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Tehama County Well Inventory and Registration Program – Tehama County Well Inventory	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Maintain and Expand Groundwater Level Monitoring Network	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Maintain and Expand Groundwater Level Monitoring Network – Maintain Coordination with Other Monitoring Entities	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Maintain and Expand Groundwater Level Monitoring Network – Identify Existing Wells for Incorporation into the Groundwater Level Monitoring Network	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Maintain and Expand Groundwater Level Monitoring Network – Identify New Wells for Incorporation into the Groundwater Level Monitoring Network	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	One-Time Groundwater Quality Snapshot and Evaluation – One-Time Groundwater Quality Snapshot	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	One-Time Groundwater Quality Snapshot and Evaluation – Evaluation of Groundwater Quality Monitoring Options	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Install Additional Agroclimate Stations	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Expanded Subbasin Monitoring and Aquifer Testing – Aquifer Testing	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide

	23 CCR § 354.44			
Subbasin	**Project/ Management Action Name**	**Project Proponent**	**Project Type**	**Project Location**
All	Expanded Subbasin Monitoring and Aquifer Testing – Identify Locations Vulnerable to Damage from Subsidence	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Expanded Subbasin Monitoring and Aquifer Testing – Groundwater Subbasin LIDAR	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Subbasin-wide
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze the Relationship between Groundwater Levels and GDE Health	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Stream channels near GDEs
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze Water Supplies Accessed by Potential GDEs	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Stream channels near GDEs
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Evaluate the Need for Additional Groundwater - Surface Water Interaction Studies or Monitoring	Multi-Agency / Jurisdictions	Other (Monitoring/Studies)	Stream channels near GDEs

Table 3. Implementation Criteria, Notice Process, Permitting and Regulatory Process, and Timeline for all Projects and Management Actions.

	23 CCR § 354.44	23 CCR §354.44(b)(1)(A)	23 CCR §354.44(b)(1)(B)	23 CCR §354.44(b)(3)	23 CCR §354.44(b)(4)		
Subbasin	**Project/Management Action Name**	**Implementation and Termination Timing/ Criteria for Implementation**	**Public and/or Inter-Agency Notice Process**	**Required Permitting and Regulatory Process or Status of Permitting**	**Current Status**	**Anticipated Start Date (Year)**	**Anticipated Completion Date (Year)**
Projects and Management Actions Developed for Implementation							
All	Grower Education	Currently in implementation / construction phase	See Note 2	None anticipated	Ongoing	Ongoing	Ongoing
All	Multi-Benefit Recharge	See Note 1	See Note 2	See Note 3	Planned	See Note 4	See Note 4
Bowman	Cottonwood Creek Invasives Control Follow Up	Currently in implementation / construction, maintenance, monitoring phase	See Note 2	See Note 3	Ongoing	Ongoing	Not indicated
Bowman	Cottonwood Creek Riparian Habitat Restoration	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 1	Currently in Environmental Documentation & CEQA, Permitting, Implementation / Construction	See Note 2	CEQA and NEPA process, 404 permit, CVFPB encroachment permit, USACE 408 authorization that addresses all phases of the project.	Ongoing	Ongoing	Not indicated
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 3	Currently in implementation/construction phase	See Note 2	Same as phase 1, above	Ongoing	Ongoing	Not indicated
Los Molinos	Deer Creek Instream Flow Planning and Design Project	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4
Los Molinos	DCID Diversion Automation Project	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4
Red Bluff	El Camino Restoration Project	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4

	23 CCR § 354.44	23 CCR §354.44(b)(1)(A)	23 CCR §354.44(b)(1)(B)	23 CCR §354.44(b)(3)	23 CCR §354.44(b)(4)		
Subbasin	**Project/Management Action Name**	**Implementation and Termination Timing/ Criteria for Implementation**	**Public and/or Inter-Agency Notice Process**	**Required Permitting and Regulatory Process or Status of Permitting**	**Current Status**	**Anticipated Start Date (Year)**	**Anticipated Completion Date (Year)**
Red Bluff	Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4
Red Bluff	Elder Creek Non-Native Invasive Species Plant Control	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4
Red Bluff	Tehama West Non-Native Invasive Species Plant Control	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4
Red Bluff	Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge	See Note 1	See Note 2	See Note 3	Potential	See Note 4	See Note 4
Portfolio of Other Potential Projects and Management Actions							
All	Direct Groundwater Recharge of Stormwater and Flood Water – Groundwater Recharge of Stormwater through Unlined Canals, Natural Drainages, Recharge Basins, and ASR Wells	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Direct Groundwater Recharge of Stormwater and Flood Water – Off-Stream Temporary Storage of Flood Water on Private Lands	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Stormwater Management Improvements	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Stormwater Management Improvements – Watershed Restoration to Reduce Runoff	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Levee Setback and Stream Channel Restoration	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Recycled Water Program	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4

	23 CCR § 354.44	23 CCR §354.44(b)(1)(A)	23 CCR §354.44(b)(1)(B)	23 CCR §354.44(b)(3)	23 CCR §354.44(b)(4)		
Subbasin	**Project/Management Action Name**	**Implementation and Termination Timing/ Criteria for Implementation**	**Public and/or Inter-Agency Notice Process**	**Required Permitting and Regulatory Process or Status of Permitting**	**Current Status**	**Anticipated Start Date (Year)**	**Anticipated Completion Date (Year)**
All	Recycled Water Program – Treated Wastewater Recycling to Support Wetlands	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Recycled Water Program – Wastewater Treatment Facility Construction to Supply Recycled Water for Irrigation	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Inter-Basin Surface Water Transfers or Exchanges – Increase Inter-Basin Surface Water Transfers or Exchanges to Promote Surface Water Use	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Inter-Basin Surface Water Transfers or Exchanges – Surface Water Imports from Other Tehama County Subbasins	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Water Supply Reservoir Construction, Renovation, or Conversion	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Enhanced Boundary Flow Measurement	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Well Metering	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Residential Water Use Efficiency Improvements	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Municipal Water System Efficiency Improvements	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Irrigation Efficiency Improvements	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4

	23 CCR § 354.44	23 CCR §354.44(b)(1)(A)	23 CCR §354.44(b)(1)(B)	23 CCR §354.44(b)(3)	23 CCR §354.44(b)(4)		
Subbasin	**Project/Management Action Name**	**Implementation and Termination Timing/ Criteria for Implementation**	**Public and/or Inter-Agency Notice Process**	**Required Permitting and Regulatory Process or Status of Permitting**	**Current Status**	**Anticipated Start Date (Year)**	**Anticipated Completion Date (Year)**
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Surface Water Conveyance and Irrigation Infrastructure Improvements for Dual-Source Systems	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Assistance for Capital Improvements	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Water Market for Surface Water and Groundwater Exchange	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Demand Management – Conversion to Less Water Intensive Crops	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Demand Management – Pumping Fees	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Demand Management – Groundwater Extraction Allocation Program	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Demand Management – Land Fallowing Program	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Demand Management – County Water Use Ordinance and Conservation Efforts	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Demand Management – Management and Restrictions of Land Use Changes	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Surface Water	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Recycled Water	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Tehama County Domestic Well Tracking and Outreach Program –	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4

	23 CCR § 354.44	23 CCR §354.44(b)(1)(A)	23 CCR §354.44(b)(1)(B)	23 CCR §354.44(b)(3)	23 CCR §354.44(b)(4)		
Subbasin	**Project/Management Action Name**	**Implementation and Termination Timing/ Criteria for Implementation**	**Public and/or Inter-Agency Notice Process**	**Required Permitting and Regulatory Process or Status of Permitting**	**Current Status**	**Anticipated Start Date (Year)**	**Anticipated Completion Date (Year)**
	Provide Information and Resources for Protection of Domestic Wells						
All	Tehama County Domestic Well Tracking and Outreach Program – Tehama County Dry Domestic Well Tracking System	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Well Deepening or Replacement Program	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Review of County Well Permitting Ordinances	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Coordination and Development of Public Data Portals	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Coordination and Development of Public Data Portals – Ongoing Coordination and Information Sharing	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Coordination and Development of Public Data Portals – Data Sharing for Monitoring Contaminant Plumes	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Tehama County Well Inventory and Registration Program – Well Registration Program	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Tehama County Well Inventory and Registration Program – Tehama County Well Inventory	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Maintain and Expand Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Maintain and Expand Groundwater Level Monitoring Network – Maintain Coordination with Other Monitoring Entities	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4

	23 CCR § 354.44	23 CCR §354.44(b)(1)(A)	23 CCR §354.44(b)(1)(B)	23 CCR §354.44(b)(3)	23 CCR §354.44(b)(4)		
Subbasin	**Project/Management Action Name**	**Implementation and Termination Timing/ Criteria for Implementation**	**Public and/or Inter-Agency Notice Process**	**Required Permitting and Regulatory Process or Status of Permitting**	**Current Status**	**Anticipated Start Date (Year)**	**Anticipated Completion Date (Year)**
All	Maintain and Expand Groundwater Level Monitoring Network – Identify Existing Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Maintain and Expand Groundwater Level Monitoring Network – Identify New Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	One-Time Groundwater Quality Snapshot and Evaluation – One-Time Groundwater Quality Snapshot	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	One-Time Groundwater Quality Snapshot and Evaluation – Evaluation of Groundwater Quality Monitoring Options	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Install Additional Agroclimate Stations	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Expanded Subbasin Monitoring and Aquifer Testing – Aquifer Testing	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Expanded Subbasin Monitoring and Aquifer Testing – Identify Locations Vulnerable to Damage from Subsidence	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Expanded Subbasin Monitoring and Aquifer Testing – Groundwater Subbasin LIDAR	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze the Relationship between Groundwater Levels and GDE Health	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4

	23 CCR § 354.44	**23 CCR §354.44(b)(1)(A)**	**23 CCR §354.44(b)(1)(B)**	**23 CCR §354.44(b)(3)**	**23 CCR §354.44(b)(4)**		
Subbasin	**Project/Management Action Name**	**Implementation and Termination Timing/ Criteria for Implementation**	**Public and/or Inter-Agency Notice Process**	**Required Permitting and Regulatory Process or Status of Permitting**	**Current Status**	**Anticipated Start Date (Year)**	**Anticipated Completion Date (Year)**
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze Water Supplies Accessed by Potential GDEs	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Evaluate the Need for Additional Groundwater - Surface Water Interaction Studies or Monitoring	See Note 1	See Note 2	See Note 3	Concept	See Note 4	See Note 4

Notes:

1. This PMA is currently in the early planning or conceptual stage. Thus the implementation and termination dates have yet to be determined. Criteria for implementation may, among other factors, be linked to the sustainability indicators and will be provided in GSP annual reports and five-year updates when known.
2. Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA and/or cooperating agency newsletters, inter-basin coordination meetings, agency governing body public meetings, GSP annual reports and five-year updates, public scoping meetings and environmental/regulatory permitting notification.
3. Required permitting and regulatory review will be project-specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but are not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, Tehama County, and CARB.
4. This PMA is currently in the early planning or conceptual stage. Thus, the start and completion dates for this activity have yet to be determined and will be provided in GSP annual reports and five-year updates when known.

Table 4. Anticipated Benefits of all Projects and Management Actions.

	23 CCR § 354.44	**23 CCR §354.44(b)(5)**			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
Projects and Management Actions Developed for Implementation					
All	Grower Education	Groundwater levels, groundwater storage, depletions of interconnected surface water, water quality		See Note 2	See Note 4
All	Multi-Benefit Recharge	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Wildlife habitat	See Note 2	See Note 4
Bowman	Cottonwood Creek Invasives Control Follow Up	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Increased native vegetation / habitat; decreased sediment trapping	See Note 2	See Note 4
Bowman	Cottonwood Creek Riparian Habitat Restoration	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Increased native vegetation / habitat; decreased sediment trapping	See Note 2	See Note 3
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 1	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 4
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 3	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Fish passage; riparian habitat	See Note 2	See Note 4
Los Molinos	Deer Creek Instream Flow Planning and Design Project	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
Los Molinos	DCID Diversion Automation Project	Groundwater levels, groundwater storage, and		See Note 2	See Note 3

	23 CCR § 354.44	23 CCR §354.44(b)(5)			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
		depletions of interconnected surface water			
Red Bluff	El Camino Restoration Project	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
Red Bluff	Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
Red Bluff	Elder Creek Non-Native Invasive Species Plant Control	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Increased native vegetation / habitat; decreased sediment trapping	See Note 2	See Note 3
Red Bluff	Tehama West Non-Native Invasive Species Plant Control	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Increased native vegetation / habitat; decreased sediment trapping	See Note 2	See Note 3
Red Bluff	Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
Portfolio of Other Potential Projects and Management Actions					
All	Direct Groundwater Recharge of Stormwater and Flood Water – Groundwater Recharge of Stormwater through Unlined Canals, Natural Drainages, Recharge Basins, and ASR Wells	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Direct Groundwater Recharge of Stormwater and Flood Water – Off-	Groundwater levels, groundwater storage, and		See Note 2	See Note 3

	23 CCR § 354.44	**23 CCR §354.44(b)(5)**			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
	Stream Temporary Storage of Flood Water on Private Lands	depletions of interconnected surface water			
All	Stormwater Management Improvements	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Stormwater Management Improvements – Watershed Restoration to Reduce Runoff	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Reduced runoff and erosion	See Note 2	See Note 3
All	Levee Setback and Stream Channel Restoration	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Wildlife habitat creation	See Note 2	See Note 3
All	Recycled Water Program	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Recycled Water Program – Treated Wastewater Recycling to Support Wetlands	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Wetland habitat creation; recreation; Sacramento River water quality improvement	See Note 2	See Note 3
All	Recycled Water Program – Wastewater Treatment Facility Construction to Supply Recycled Water for Irrigation	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Inter-Basin Surface Water Transfers or Exchanges – Increase Inter-Basin Surface Water Transfers or Exchanges to Promote Surface Water Use	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3

	23 CCR § 354.44	23 CCR §354.44(b)(5)			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
All	Inter-Basin Surface Water Transfers or Exchanges – Surface Water Imports from Other Tehama County Subbasins	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Increased native vegetation / habitat; decreased sediment trapping	See Note 2	See Note 3
All	Water Supply Reservoir Construction, Renovation, or Conversion	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Enhanced Boundary Flow Measurement	See Note 1		See Note 2	See Note 3
All	Well Metering	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Residential Water Use Efficiency Improvements	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Municipal Water System Efficiency Improvements	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Irrigation Efficiency Improvements	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Assistance and Incentives for On-Farm Irrigation Infrastructure	Groundwater levels, groundwater storage, and		See Note 2	See Note 3

	23 CCR § 354.44	23 CCR §354.44(b)(5)			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
	Improvements – Surface Water Conveyance and Irrigation Infrastructure Improvements for Dual-Source Systems	depletions of interconnected surface water			
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Assistance for Capital Improvements	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Water Market for Surface Water and Groundwater Exchange	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Demand Management – Conversion to Less Water Intensive Crops	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Demand Management – Pumping Fees	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Demand Management – Groundwater Extraction Allocation Program	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Demand Management – Land Fallowing Program	Groundwater levels, groundwater storage, and depletions of interconnected surface water	Potential for multi-benefits on temporarily idled lands, depending on program design	See Note 2	See Note 3
All	Demand Management – County Water Use Ordinance and Conservation Efforts	Groundwater levels, groundwater storage, and		See Note 2	See Note 3

	23 CCR § 354.44	23 CCR §354.44(b)(5)			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
		depletions of interconnected surface water			
All	Demand Management – Management and Restrictions of Land Use Changes	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Surface Water	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Recycled Water	Groundwater levels, groundwater storage, and depletions of interconnected surface water		See Note 2	See Note 3
All	Tehama County Domestic Well Tracking and Outreach Program – Provide Information and Resources for Protection of Domestic Wells	Water quality		See Note 2	See Note 3
All	Tehama County Domestic Well Tracking and Outreach Program – Tehama County Dry Domestic Well Tracking System	See Note 1		See Note 2	See Note 3
All	Well Deepening or Replacement Program	See Note 1		See Note 2	See Note 3
All	Review of County Well Permitting Ordinances	Groundwater levels, groundwater storage, depletions of interconnected surface water, water quality		See Note 2	See Note 3
All	Coordination and Development of Public Data Portals	See Note 1		See Note 2	See Note 3

	23 CCR § 354.44	23 CCR §354.44(b)(5)			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
All	Coordination and Development of Public Data Portals – Ongoing Coordination and Information Sharing	See Note 1		See Note 2	See Note 3
All	Coordination and Development of Public Data Portals – Data Sharing for Monitoring Contaminant Plumes	See Note 1		See Note 2	See Note 3
All	Tehama County Well Inventory and Registration Program – Well Registration Program	See Note 1		See Note 2	See Note 3
All	Tehama County Well Inventory and Registration Program – Tehama County Well Inventory	See Note 1		See Note 2	See Note 3
All	Maintain and Expand Groundwater Level Monitoring Network	See Note 1		See Note 2	See Note 3
All	Maintain and Expand Groundwater Level Monitoring Network – Maintain Coordination with Other Monitoring Entities	See Note 1		See Note 2	See Note 3
All	Maintain and Expand Groundwater Level Monitoring Network – Identify Existing Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1		See Note 2	See Note 3
All	Maintain and Expand Groundwater Level Monitoring Network – Identify New Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1		See Note 2	See Note 3
All	One-Time Groundwater Quality Snapshot and Evaluation – One-Time Groundwater Quality Snapshot	See Note 1		See Note 2	See Note 3

	23 CCR § 354.44	23 CCR §354.44(b)(5)			
Subbasin	**Project/Management Action Name**	**Sustainability Indicators Expected to Benefit**	**Specific Multi-Benefits Expected**	**Serves Disadvantaged Community (If so, which one?)**	**Expected Yield**
All	One-Time Groundwater Quality Snapshot and Evaluation – Evaluation of Groundwater Quality Monitoring Options	See Note 1		See Note 2	See Note 3
All	Install Additional Agroclimate Stations	See Note 1		See Note 2	See Note 3
All	Expanded Subbasin Monitoring and Aquifer Testing – Aquifer Testing	See Note 1		See Note 2	See Note 3
All	Expanded Subbasin Monitoring and Aquifer Testing – Identify Locations Vulnerable to Damage from Subsidence	See Note 1		See Note 2	See Note 3
All	Expanded Subbasin Monitoring and Aquifer Testing – Groundwater Subbasin LIDAR	See Note 1		See Note 2	See Note 3
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze the Relationship between Groundwater Levels and GDE Health	See Note 1		See Note 2	See Note 3
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze Water Supplies Accessed by Potential GDEs	See Note 1		See Note 2	See Note 3
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Evaluate the Need for Additional Groundwater - Surface Water Interaction Studies or Monitoring	See Note 1		See Note 2	See Note 3

Notes

1. Coordination, data sharing, and additional monitoring are beneficial to GSP implementation and tracking progress toward the Subbasin sustainability goal. However, there are no anticipated direct benefits to specific sustainability indicators.

2. The majority of areas, especially population centers, within the Subbasins are classified as either Severely Disadvantaged Communities, Disadvantaged Communities, or Economically Distressed Areas (based on 2018 census block groups, tracts, and places).
3. This PMA is currently in the early planning or conceptual stage. Thus the expected yield of this PMA has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Benefits are generally expected to accrue in all years beginning the first year of implementation for most PMAs.
4. All available information is provided in the corresponding Subbasin GSP chapter.

Table 5. Benefit Evaluation and Water Source for all Projects and Management Actions.

	23 CCR § 354.44	23 CCR §354.44(b)(5)	23 CCR §354.44(b)(6)	
Subbasin	**Project/Management Action Name**	**Benefit Evaluation Methodology**	**Water Source**	**Water Source Reliability**
Projects and Management Actions Developed for Implementation				
All	Grower Education	See Note 1	See Note 2	See Note 2
All	Multi-Benefit Recharge	See Note 1	See Note 3	See Note 3
Bowman	Cottonwood Creek Invasives Control Follow Up	See Note 1	See Note 2	See Note 2
Bowman	Cottonwood Creek Riparian Habitat Restoration	See Note 1	See Note 2	See Note 2
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 1	See Note 1	See Note 2	See Note 2
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 3	See Note 1	See Note 2	See Note 2
Los Molinos	Deer Creek Instream Flow Planning and Design Project	See Note 1	See Note 2	See Note 2
Los Molinos	DCID Diversion Automation Project	See Note 1	See Note 2	See Note 2
Red Bluff	El Camino Restoration Project	See Note 1	See Note 2	See Note 2
Red Bluff	Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District	See Note 1	See Note 3	See Note 3
Red Bluff	Elder Creek Non-Native Invasive Species Plant Control	See Note 1	See Note 2	See Note 2
Red Bluff	Tehama West Non-Native Invasive Species Plant Control	See Note 1	See Note 2	See Note 2
Red Bluff	Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge	See Note 1	See Note 3	See Note 3
Portfolio of Other Potential Projects and Management Actions				
All	Direct Groundwater Recharge of Stormwater and Flood Water – Groundwater Recharge of Stormwater through Unlined Canals, Natural Drainages, Recharge Basins, and ASR Wells	See Note 1	See Note 3	See Note 3
All	Direct Groundwater Recharge of Stormwater and Flood Water – Off-Stream Temporary Storage of Flood Water on Private Lands	See Note 1	See Note 3	See Note 3
All	Stormwater Management Improvements	See Note 1	See Note 2	See Note 2

	23 CCR § 354.44	23 CCR §354.44(b)(5)	23 CCR §354.44(b)(6)	
Subbasin	**Project/Management Action Name**	**Benefit Evaluation Methodology**	**Water Source**	**Water Source Reliability**
All	Stormwater Management Improvements – Watershed Restoration to Reduce Runoff	See Note 1	See Note 2	See Note 2
All	Levee Setback and Stream Channel Restoration	See Note 1	See Note 2	See Note 2
All	Recycled Water Program	See Note 1	See Note 3	See Note 3
All	Recycled Water Program – Treated Wastewater Recycling to Support Wetlands	See Note 1	See Note 3	See Note 3
All	Recycled Water Program – Wastewater Treatment Facility Construction to Supply Recycled Water for Irrigation	See Note 1	See Note 3	See Note 3
All	Inter-Basin Surface Water Transfers or Exchanges – Increase Inter-Basin Surface Water Transfers or Exchanges to Promote Surface Water Use	See Note 1	See Note 3	See Note 3
All	Inter-Basin Surface Water Transfers or Exchanges – Surface Water Imports from Other Tehama County Subbasins	See Note 1	See Note 3	See Note 3
All	Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	See Note 1	See Note 2	See Note 2
All	Water Supply Reservoir Construction, Renovation, or Conversion	See Note 1	See Note 2	See Note 2
All	Enhanced Boundary Flow Measurement	See Note 1	See Note 2	See Note 2
All	Well Metering	See Note 1	See Note 2	See Note 2
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Residential Water Use Efficiency Improvements	See Note 1	See Note 2	See Note 2
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Municipal Water System Efficiency Improvements	See Note 1	See Note 2	See Note 2
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Irrigation Efficiency Improvements	See Note 1	See Note 2	See Note 2
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Surface Water	See Note 1	See Note 2	See Note 2

	23 CCR § 354.44	23 CCR §354.44(b)(5)	23 CCR §354.44(b)(6)	
Subbasin	Project/Management Action Name	Benefit Evaluation Methodology	Water Source	Water Source Reliability
	Conveyance and Irrigation Infrastructure Improvements for Dual-Source Systems			
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Assistance for Capital Improvements	See Note 1	See Note 2	See Note 2
All	Water Market for Surface Water and Groundwater Exchange	See Note 1	See Note 2	See Note 2
All	Demand Management – Conversion to Less Water Intensive Crops	See Note 1	See Note 2	See Note 2
All	Demand Management – Pumping Fees	See Note 1	See Note 2	See Note 2
All	Demand Management – Groundwater Extraction Allocation Program	See Note 1	See Note 2	See Note 2
All	Demand Management – Land Fallowing Program	See Note 1	See Note 2	See Note 2
All	Demand Management – County Water Use Ordinance and Conservation Efforts	See Note 1	See Note 2	See Note 2
All	Demand Management – Management and Restrictions of Land Use Changes	See Note 1	See Note 2	See Note 2
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Surface Water	See Note 1	See Note 2	See Note 2
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Recycled Water	See Note 1	See Note 3	See Note 3
All	Tehama County Domestic Well Tracking and Outreach Program – Provide Information and Resources for Protection of Domestic Wells	See Note 1	See Note 2	See Note 2
All	Tehama County Domestic Well Tracking and Outreach Program – Tehama County Dry Domestic Well Tracking System	See Note 1	See Note 2	See Note 2
All	Well Deepening or Replacement Program	See Note 1	See Note 2	See Note 2
All	Review of County Well Permitting Ordinances	See Note 1	See Note 2	See Note 2
All	Coordination and Development of Public Data Portals	See Note 1	See Note 2	See Note 2

	23 CCR § 354.44	23 CCR §354.44(b)(5)	23 CCR §354.44(b)(6)	
Subbasin	**Project/Management Action Name**	**Benefit Evaluation Methodology**	**Water Source**	**Water Source Reliability**
All	Coordination and Development of Public Data Portals – Ongoing Coordination and Information Sharing	See Note 1	See Note 2	See Note 2
All	Coordination and Development of Public Data Portals – Data Sharing for Monitoring Contaminant Plumes	See Note 1	See Note 2	See Note 2
All	Tehama County Well Inventory and Registration Program – Well Registration Program	See Note 1	See Note 2	See Note 2
All	Tehama County Well Inventory and Registration Program – Tehama County Well Inventory	See Note 1	See Note 2	See Note 2
All	Maintain and Expand Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 2
All	Maintain and Expand Groundwater Level Monitoring Network – Maintain Coordination with Other Monitoring Entities	See Note 1	See Note 2	See Note 2
All	Maintain and Expand Groundwater Level Monitoring Network – Identify Existing Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 2
All	Maintain and Expand Groundwater Level Monitoring Network – Identify New Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 2
All	One-Time Groundwater Quality Snapshot and Evaluation – One-Time Groundwater Quality Snapshot	See Note 1	See Note 2	See Note 2
All	One-Time Groundwater Quality Snapshot and Evaluation – Evaluation of Groundwater Quality Monitoring Options	See Note 1	See Note 2	See Note 2
All	Install Additional Agroclimate Stations	See Note 1	See Note 2	See Note 2
All	Expanded Subbasin Monitoring and Aquifer Testing – Aquifer Testing	See Note 1	See Note 2	See Note 2
All	Expanded Subbasin Monitoring and Aquifer Testing – Identify Locations Vulnerable to Damage from Subsidence	See Note 1	See Note 2	See Note 2
All	Expanded Subbasin Monitoring and Aquifer Testing – Groundwater Subbasin LIDAR	See Note 1	See Note 2	See Note 2

	23 CCR § 354.44	23 CCR §354.44(b)(5)	23 CCR §354.44(b)(6)	
Subbasin	**Project/Management Action Name**	**Benefit Evaluation Methodology**	**Water Source**	**Water Source Reliability**
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze the Relationship between Groundwater Levels and GDE Health	See Note 1	See Note 2	See Note 2
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze Water Supplies Accessed by Potential GDEs	See Note 1	See Note 2	See Note 2
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Evaluate the Need for Additional Groundwater - Surface Water Interaction Studies or Monitoring	See Note 1	See Note 2	See Note 2

Notes:

1. Evaluation of benefits may be quantified through with-project monitoring. With-project monitoring would be compared to without-project data as a means of quantifying the PMA benefit. With-project monitoring may include, but is not limited to; flow measurement consistent with state regulations, consumptive use analysis, reductions in GW use, well monitoring, determination of infiltration rates, water balance analysis, as-built drawings and stream gaging.
2. This PMA does not rely on a particular water source from outside the Subbasin, but may be useful for managing existing water resources.
3. The water source and reliability is described in the corresponding Subbasin GSP chapter.

Table 6. Legal Authority Requirements, Estimated Cost, and Potential Funding Sources for all Projects and Management Actions.

	23 CCR § 354.44	23 CCR §354.44(b)(7)	23 CCR §354.44(b)(8)	
Subbasin	**Project/Management Action Name**	**Legal Authority Required**	**Estimated Cost**	**Potential Funding Sources**
Projects and Management Actions Developed for Implementation				
All	Grower Education	See Note 1	See Note 3	See Note 4
All	Multi-Benefit Recharge	See Note 1	See Note 3	See Note 4
Bowman	Cottonwood Creek Invasives Control Follow Up	See Note 1	See Note 3	See Note 4
Bowman	Cottonwood Creek Riparian Habitat Restoration	See Note 1	See Note 2	See Note 4
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 1	See Note 1	See Note 3	See Note 4
Los Molinos	Lower Deer Creek Levee Improvements & Habitat Restoration Phase 3	See Note 1	See Note 3	See Note 4
Los Molinos	Deer Creek Instream Flow Planning and Design Project	See Note 1	See Note 2	See Note 4
Los Molinos	DCID Diversion Automation Project	See Note 1	See Note 2	See Note 4
Red Bluff	El Camino Restoration Project	See Note 1	See Note 2	See Note 4
Red Bluff	Expanded Use of CVP Contract Supplies in Proberta Water District and Thomes Creek Water District	See Note 1	See Note 2	See Note 4
Red Bluff	Elder Creek Non-Native Invasive Species Plant Control	See Note 1	See Note 2	See Note 4
Red Bluff	Tehama West Non-Native Invasive Species Plant Control	See Note 1	See Note 2	See Note 4
Red Bluff	Thomes Creek and Elder Creek Diversion for Direct or In-Lieu Groundwater Recharge	See Note 1	See Note 2	See Note 4
Portfolio of Other Potential Projects and Management Actions				
All	Direct Groundwater Recharge of Stormwater and Flood Water – Groundwater Recharge of Stormwater through Unlined Canals, Natural Drainages, Recharge Basins, and ASR Wells	See Note 1	See Note 2	See Note 4
All	Direct Groundwater Recharge of Stormwater and Flood Water – Off-Stream Temporary Storage of Flood Water on Private Lands	See Note 1	See Note 2	See Note 4
All	Stormwater Management Improvements	See Note 1	See Note 2	See Note 4
All	Stormwater Management Improvements – Watershed Restoration to Reduce Runoff	See Note 1	See Note 2	See Note 4

	23 CCR § 354.44	23 CCR §354.44(b)(7)	23 CCR §354.44(b)(8)	
Subbasin	**Project/Management Action Name**	**Legal Authority Required**	**Estimated Cost**	**Potential Funding Sources**
All	Levee Setback and Stream Channel Restoration	See Note 1	See Note 2	See Note 4
All	Recycled Water Program	See Note 1	See Note 2	See Note 4
All	Recycled Water Program – Treated Wastewater Recycling to Support Wetlands	See Note 1	See Note 2	See Note 4
All	Recycled Water Program – Wastewater Treatment Facility Construction to Supply Recycled Water for Irrigation	See Note 1	See Note 2	See Note 4
All	Inter-Basin Surface Water Transfers or Exchanges – Increase Inter-Basin Surface Water Transfers or Exchanges to Promote Surface Water Use	See Note 1	See Note 2	See Note 4
All	Inter-Basin Surface Water Transfers or Exchanges – Surface Water Imports from Other Tehama County Subbasins	See Note 1	See Note 2	See Note 4
All	Invasive Plant Removal from Creeks and Irrigation Conveyance Canals	See Note 1	See Note 2	See Note 4
All	Water Supply Reservoir Construction, Renovation, or Conversion	See Note 1	See Note 2	See Note 4
All	Enhanced Boundary Flow Measurement	See Note 1	See Note 2	See Note 4
All	Well Metering	See Note 1	See Note 2	See Note 4
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Residential Water Use Efficiency Improvements	See Note 1	See Note 2	See Note 4
All	Incentivize Residential and Municipal Water Use Efficiency Improvements – Municipal Water System Efficiency Improvements	See Note 1	See Note 2	See Note 4
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Irrigation Efficiency Improvements	See Note 1	See Note 2	See Note 4
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Surface Water Conveyance and Irrigation Infrastructure Improvements for Dual-Source Systems	See Note 1	See Note 2	See Note 4
All	Assistance and Incentives for On-Farm Irrigation Infrastructure Improvements – Assistance for Capital Improvements	See Note 1	See Note 2	See Note 4
All	Water Market for Surface Water and Groundwater Exchange	See Note 1	See Note 2	See Note 4

	23 CCR § 354.44	**23 CCR §354.44(b)(7)**	**23 CCR §354.44(b)(8)**	
Subbasin	**Project/Management Action Name**	**Legal Authority Required**	**Estimated Cost**	**Potential Funding Sources**
All	Demand Management – Conversion to Less Water Intensive Crops	See Note 1	See Note 2	See Note 4
All	Demand Management – Pumping Fees	See Note 1	See Note 2	See Note 4
All	Demand Management – Groundwater Extraction Allocation Program	See Note 1	See Note 2	See Note 4
All	Demand Management – Land Fallowing Program	See Note 1	See Note 2	See Note 4
All	Demand Management – County Water Use Ordinance and Conservation Efforts	See Note 1	See Note 2	See Note 4
All	Demand Management – Management and Restrictions of Land Use Changes	See Note 1	See Note 2	See Note 4
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Surface Water	See Note 1	See Note 2	See Note 4
All	Incentivize Use of Available Surface Water and Recycled Water – Incentivize Use of Recycled Water	See Note 1	See Note 2	See Note 4
All	Tehama County Domestic Well Tracking and Outreach Program – Provide Information and Resources for Protection of Domestic Wells	See Note 1	See Note 2	See Note 4
All	Tehama County Domestic Well Tracking and Outreach Program – Tehama County Dry Domestic Well Tracking System	See Note 1	See Note 2	See Note 4
All	Well Deepening or Replacement Program	See Note 1	See Note 2	See Note 4
All	Review of County Well Permitting Ordinances	See Note 1	See Note 2	See Note 4
All	Coordination and Development of Public Data Portals	See Note 1	See Note 2	See Note 4
All	Coordination and Development of Public Data Portals – Ongoing Coordination and Information Sharing	See Note 1	See Note 2	See Note 4
All	Coordination and Development of Public Data Portals – Data Sharing for Monitoring Contaminant Plumes	See Note 1	See Note 2	See Note 4
All	Tehama County Well Inventory and Registration Program – Well Registration Program	See Note 1	See Note 2	See Note 4
All	Tehama County Well Inventory and Registration Program – Tehama County Well Inventory	See Note 1	See Note 2	See Note 4
All	Maintain and Expand Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 4

	23 CCR § 354.44	23 CCR §354.44(b)(7)	23 CCR §354.44(b)(8)	
Subbasin	**Project/Management Action Name**	**Legal Authority Required**	**Estimated Cost**	**Potential Funding Sources**
All	Maintain and Expand Groundwater Level Monitoring Network – Maintain Coordination with Other Monitoring Entities	See Note 1	See Note 2	See Note 4
All	Maintain and Expand Groundwater Level Monitoring Network – Identify Existing Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 4
All	Maintain and Expand Groundwater Level Monitoring Network – Identify New Wells for Incorporation into the Groundwater Level Monitoring Network	See Note 1	See Note 2	See Note 4
All	One-Time Groundwater Quality Snapshot and Evaluation – One-Time Groundwater Quality Snapshot	See Note 1	See Note 2	See Note 4
All	One-Time Groundwater Quality Snapshot and Evaluation – Evaluation of Groundwater Quality Monitoring Options	See Note 1	See Note 2	See Note 4
All	Install Additional Agroclimate Stations	See Note 1	See Note 2	See Note 4
All	Expanded Subbasin Monitoring and Aquifer Testing – Aquifer Testing	See Note 1	See Note 2	See Note 4
All	Expanded Subbasin Monitoring and Aquifer Testing – Identify Locations Vulnerable to Damage from Subsidence	See Note 1	See Note 2	See Note 4
All	Expanded Subbasin Monitoring and Aquifer Testing – Groundwater Subbasin LIDAR	See Note 1	See Note 2	See Note 4
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze the Relationship between Groundwater Levels and GDE Health	See Note 1	See Note 2	See Note 4
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Analyze Water Supplies Accessed by Potential GDEs	See Note 1	See Note 2	See Note 4
All	Additional Studies of GDEs and Groundwater - Surface Water Interactions – Evaluate the Need for Additional Groundwater - Surface Water Interaction Studies or Monitoring	See Note 1	See Note 2	See Note 4

Notes:

1. GSAs, Districts and individual proponents have the authority to plan and implement projects, including surveys, studies, and other monitoring efforts.
2. This PMA is currently in the early planning or conceptual stage. Thus the anticipated costs of this PMA have yet to be determined and will be reported in GSP annual reports and five-year updates when known.

3. Available information on estimated costs is provided in the corresponding Subbasin GSP chapter.
4. Potential funding sources are being evaluated as PMA planning continues; they include, but are not limited to, the following: grants, loans, bonds, assessment fees, and cost-sharing programs. Potential funding sources will be reported in GSP annual reports and five-year updates when known.