From: Jerry Brown [jbrown@sitesproject.org]
Sent: 12/1/2022 9:56:13 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Re: Press Inquiries

I like your response as it is.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Date: Tuesday, November 29, 2022 at 7:56 PM
To: Sandra Yarbrough <syarbrough@sitesproject.org>, Lori Jones <ljones@brwncald.com>, Cheyanne Harris <CHarris@BrwnCald.com>, Kevin Spesert <kspesert@sitesproject.org>
Cc: Joe Trapasso <jtrapasso@sitesproject.org>, Jerry Brown <jbrown@sitesproject.org>
Subject: RE: Press Inquiries

Hi all – Below is a proposed response for your review and input. This does not include providing them the comment letters as these are typically provided with the release of the Final EIR/EIS – and typically not made available earlier than the release. Let me check with Jerry tomorrow on his thoughts on this and we can send the response later this week.

Ali

Katherine – Thank you for your email. The Sites Authority and the Bureau of Reclamation released a Revised Draft Environmental Impact Report / Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS) in November 2021. The public comment period closed in January 2022. Based on your email, I think you have found the link to the document, but just in case, it is available here (scroll to the bottom of the page): Environmental Review - Sites Reservoir (sitesproject.org). As part of the environmental review process, the Authority and Reclamation are reviewing all of the comments received, preparing responses to those comments and revising the document. The responses to comments and any revisions to the document will be released in the Final Environment Impact Report/Environmental Impact Statement (Final EIR/EIS). We expect to complete and release the Final EIR/EIS in May 2023. This Final EIR/EIS will include all of the comment letters received with the responses to the comments.

In general, a Statement of Overriding Considerations is required under the California Environmental Quality Act when an agency approves a project that includes significant and unavoidable environmental impacts. The Statement of Overriding Considerations is made when the agency approves the project – which happens after issuance and certification of the Final EIR. If the Authority Board chooses to approve the project, the Board will also need to make a Statement of Overriding Considerations as the RDEIR/SDEIS had, and Final EIR/EIS is expected to continue to have significant and unavoidable environmental impacts. We expect the Authority Board to consider approving the project and making a Statement of Overriding Considerations shortly after release of the Final EIR/EIS.

I will also note that the Statement of Overriding Considerations does not overcome wildlife protections or water quality regulations – meaning it does not waive statutory requirements or regulations. It would provide justification, in the view of the Authority, on how the benefits of the project outweigh the significant and unavoidable environmental impacts. However, the Authority will continue to meet all applicable statutory requirements and regulations for the project and obtain all necessary permits and approvals.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

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From: Sandra Yarbrough <syarbrough@sitesproject.org>
Sent: Tuesday, November 29, 2022 8:47 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Lori Jones <ljones@brwncald.com>; Cheyanne Harris <charris@brwncald.com>
Cc: Joe Trapasso <jtrapasso@sitesproject.org>; Jerry Brown <jbrown@sitesproject.org>
Subject: FW: Press Inquiries

Good morning,

Please see the email below that I received. I know we can send the link to the EIR/EIS from our website, but I wasn't sure about the last paragraph.

Thank You,
Sandra

From: Katherine Li <katherine_li@berkeley.edu>
Sent: Monday, November 28, 2022 8:00 AM
To: Board Clerk <boardclerk@sitesproject.org>
Cc: Hanisha Harjani <hharjani@berkeley.edu>
Subject: Press Inquiries

Dear Sites Authority Board,

Hello, my name is Katherine Li, and I'm a journalism graduate student at UC Berkeley. We are currently working on a research project regarding water sustainability and droughts in Northern California.

We are aware that the Sites Reservoir has been on the drawing board for decades, and that multiple state and federal agencies, especially the USEPA, CDFW, and CWC, are responsible for making comments and recommendations on your most recent 2020 draft and 2021 revised draft environmental impact report (EIS/EIR). We would like to ask if there is one place where we could view these recommendation documents, or if you know where to find them. Some of the recommendation and comment documents we have located are regarding the original EIR from back in 2018, but plenty has changed regarding the size and design of your project since then. It would be great if you could show us these new documents so we could have the most accurate and updated information.

We would also love to know if a Statement of Overriding Considerations (SOOC) has been prepared for the Sites, or if there is a plan to do so. The California Water Commission had recommended that the Sites prepare such a statement as the lead agency under CEQA, to overcome wildlife protection and water quality regulations. This recommendation was mentioned in a December 2021 CWC continuing eligibility and feasibility determination document, and we would like to know if the Sites have taken action regarding this recommendation.

Thank you so much!

Regards,
Katherine Li

Katherine Li (she/her)
UC Berkeley Graduate School of Journalism
(510) 365 6496
https://twitter.com/Katherineli_

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 12/1/2022 11:19:29 AM
To: Joe Trapasso [jtrapasso@sitesproject.org]; Sandra Yarbrough [syarbrough@sitesproject.org]; Lori Jones [ljones@brwncald.com]; Cheyanne Harris [charris@brwncald.com]; Kevin Spesert [kspesert@sitesproject.org]
CC: Jerry Brown [jbrown@sitesproject.org]
Subject: RE: Press Inquiries

Hi all – Thanks for the comments. I will coordinate with Kevin and get back to Katherine.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

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From: Joe Trapasso <jtrapasso@sitesproject.org>
Sent: Wednesday, November 30, 2022 2:15 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Sandra Yarbrough <syarbrough@sitesproject.org>; Lori Jones <ljones@brwncald.com>; Cheyanne Harris <charris@brwncald.com>; Kevin Spesert <kspesert@sitesproject.org>
Cc: Jerry Brown <jbrown@sitesproject.org>
Subject: RE: Press Inquiries

Ali,

Lori and I were in a meeting today and she let me know her comments to your draft Katherine response. I also suggest removing in the second paragraph "…… is expected to continue to have significant and unavoidable environmental impacts."

Also is the last paragraph needed to respond to her comments (i.e., keep it to a brief and simple response)?

Joe

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, November 29, 2022 7:57 PM
To: Sandra Yarbrough <syarbrough@sitesproject.org>; Lori Jones <ljones@brwncald.com>; Cheyanne Harris <charris@brwncald.com>; Kevin Spesert <kspesert@sitesproject.org>
Cc: Joe Trapasso <jtrapasso@sitesproject.org>; Jerry Brown <jbrown@sitesproject.org>
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From: Katherine Li <katherine_li@berkeley.edu>
Sent: Monday, November 28, 2022 8:00 AM
To: Board Clerk <boardclerk@sitesproject.org>
Cc: Hanisha Harjani <hharjani@berkeley.edu>
Subject: Press Inquiries

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Thank you so much!

Regards,
Katherine Li

Katherine Li (she/her)
UC Berkeley Graduate School of Journalism
(510) 365 6496
https://twitter.com/Katherineli_

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 12/1/2022 3:56:21 PM
To: Spranza, John [John.Spranza@hdrinc.com]
Subject: RE: Salmon Paper
Attachments: Sites Salmon Net Benefit Blog-Technical_2022_1028_Ali.docx

Hey John – I am finally getting to this. Attached are some comment and changes to the paper. I am struggling with our lead in and I think its too long and boring. People are going to stop reading. I am not sure how to fix this yet and you'll see that I started a new intro but stopped as I wasn't sure that I like that either.

Lets skip continuing to fuss with the intro for now and write up what Sites can do to benefit salmon. Can you take a stab at this with the new winter-run life cycle model and some of our modeling results? Then I think we can revisit the intro and how best to do that part.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, October 28, 2022 3:19 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Subject: Salmon Paper

Hi,
As promised, here is the current draft of the document. It is running long, but I'd like to get your opinion on if it's content and style is close to what you were envisioning.
Thanks.
John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist

HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916.679.8858 M 818.640.2487
john.spranza@hdrinc.com

hdrinc.com/follow-us
hdrinc.com/follow-us

Sites Reservoir and Salmon Effects: Thinking Long-term at a Population Level

Water is the ~~cornerstone~~ lifeblood of California's ~~ADD WORD~~human and natural environment. It provides drinking water to our communities, supports our agricultural and rural economies, sustains our state's ecosystems and fish and wildlife populations, and provides places to recreate and appreciate nature.

Drought and hydrologic variability are a way of life in California as the State's climate and hydrology are unlike any other in the nation. ~~; w~~With a frequently extreme version of a Mediterranean Climate representing dry summers and wet winters, the state's climate is highly ~~characterized by dramatic~~ variable from year to year and within a year~~ility and uncertainty~~. ~~One example of this variability is annual precipitation, where a relatively small number of storms comprise the majority of annual precipitation, resulting in annual rainfall ranging from 100 million acre-feet in a dry year to more than 250 million acre-feet during a wet year base. As rainfall relies on climate, climate change continues will continue to play a major role in the future of California's water supply and add to that uncertainty as~~Climate change models predict ~~growing~~ increased variability in weather patterns throughout California, which is expected to results in ~~can lead to~~ longer and increasingly severe droughts, more intense ~~fires and~~ floods, and higher air and water temperatures~~, poor water quality, and large-scale ecosystem decline or even collapse~~. The increased variability will push the already stressed water resources of the state to the brink with far reaching consequences for our human and natural environment.

In 2020 Governor Newsome released the State's Water Resilience Portfolio which detailed the Administration's plan to ~~equip~~ equip California for the water challenges it faces today and prepare for the increasing challenges the State will face in the future. ~~to contend with more extreme droughts and floods, rising temperatures, declining fish populations, lack of safe drinking water, over-reliance on groundwater and other water-related challenges. Emphasizing that n~~No one solution can adequately address all of the state's water challenges and the Portfolio calls for a four-pronged approach of: 1) ~~Maintain~~ maintaining and diversifying water supplies~~,~~; (2) ~~Protect~~ protecting and enhancinge natural ecosystems~~,~~; (3) ~~Improve~~ improving physical infrastructure to store, move, and share water more flexibly~~,~~; and, (4) ~~Prepare~~ preparing for new and emerging water and climate threats. Key actions identified within the four categories are the creation of 4 million additional acre-feet of water storage, recycling and reuse of at least 2.5 million acre-feet of water per year by 2030, the creation of desalination and storm-water-capture systems, flood risk reduction actions, managing water infrastructure to capture of water when it is available in increasingly intense bursts and to provide water supplies and protect the environment during prolonged dry periods, and provide for the funding and protection of fish, wildlife, habitat, and water quality.

Commented [AF1]: I kind of wonder if we need this, but I've left it in for now.

~~The Cost of Doing Nothing~~

~~The implications of inaction in preparing for future climate conditions and not wholistically addressing water planning in the state would have significant implications to human health, food supply, the state's economy, and California's diverse natural resources. For example, t~~The Sacramento Valley is home to four distinct runs of Chinook salmon: spring-run, fall-run, late-fall run and winter-run. Each run is ~~that are~~ ecologically, culturally, and commercially important to the state. The ~~reason for this is that the~~ Sacramento River and its tributaries have undergone extensive changes in the last hundred years, including development of the flood control system, on-stream dams, water diversions, stream channelization, and watershed modification such as mining, urbanization, logging, and an increase in catastrophic fires. The resulting changes in hydrology and habitat have greatly reduced the amount of suitable ~~aquatic~~ habitat for salmon, limiting their distribution and reproduction to a fraction of their historical distribution. On the Sacramento River, chinook salmon lost approximately half of their historic spawning grounds in the Sacramento River basin when the ~~U.S.~~ Bureau of Reclamation completed ~~'s~~ Shasta and Keswick dams ~~were completed~~ in the mid-1940s, forcing salmon to spawn only in areas downstream from Keswick Dam ~~where suitable water temperatures and spawning gravel were located~~. With the numerous pressures and changes~~quantity and quality of available habitat diminished~~, all Sacramento River salmon runs have substantially declined from their historical numbers ~~of fish and spawning adults~~, resulting in the listing of spring-run and winter-run Chinook salmon as endangered under the Endangered Species Act.

~~As described above, drought and weather extremes brought on by climate change have greatly affected our state. As Karla Nemeth, Director of the California Department of Water Resources recently stated, "This is our new climate reality, and we must adapt. As California transitions to a hotter, drier future, our extreme swings from wet and dry conditions will continue," and that, "We are preparing now for continued extreme drought and working with our federal, state, local, and academic partners to plan for a future where we see less overall precipitation and more rain than snow." The effects of this are still being assessed, but without planning for a shift in precipitation patterns and more precipitation falling as rain and not snow, the anticipated reduction in river and stream flows and increase air and water temperatures are expected to have mounting effects on the state's runs of salmon, and increasing their likelihood of further population decline and potential extinction. For the endangered winter-run salmon, 2014 and 2015 provided a preview of one potential future scenario demonstrating the effects climate change~~

~~All runs of~~ Chinook salmon are a cold water species and need cold water ~~and stable water level and flows~~ to ~~complete their lifecycle~~survive. For example, keeping water temperatures cooler than 56°F (ideally 53.5 °F) are critical to both spawning adults and rearing juvenile winter-run and spring-run Chinook salmon~~, which are only found in the Sacramento River~~. Juvenile winter run emerge from the river gravel from July to mid-October and feed for five to 10 months before migrating downstream in January through April during the first high flows of the rainy season (Caltrout 2015). ~~The Bureau of~~ Reclamation manages Shasta Lake, which controls flows and water temperatures in the upper Sacramento River, where the entire population of winter run salmon spawn. However, in 2014 and 2015, high water temperatures and low Sacramento River water levels resulting from historically low rainfall and poor cold water storage in Shasta Reservoir brought about the complete failure of the 2014 winter run brood class and 85 percent mortality of the 2015 brood class (NMFS 2015, 2016).

What the Sites Reservoir Project Means for Salmon

Sites Reservoir would be operated to work with Reclamation's management of Shasta Lake, with Sites releasing its water in spring, instead of Reclamation releasing water from Shasta Lake to preserve the cold water stored within Shasta Lake so that it can then be released in late summer and fall when river temperatures become lethal for young salmon.

Salmon are an amazing species. They are born in the cold waters of our rivers, emerge from the gravel substrate that protected them as tiny eggs and proceed to grow and feed and swim hundreds of miles as functionally pre-teens (in human terms) to the ocean. Once in the ocean, they continue to grow and feed and in anywhere from 2 to 5 years, find their way back to their native stream and return as adults to spawn in the river they were born in.

Scientists can explain the mechanisms that we humans think allows these fish to find their way from their natal streams to the ocean and back to the same stream (and yes, a number do stray, but generally, they return to their native stream). No GPS, no helicopter parent helping them, no smart phone to guide the way. I just find this amazing.

But like all species, including us humans, as amazing as salmon are, they aren't immune from challenges that threaten their survival as individuals and as species. Our rivers have undergone extensive changes in the last hundred years – levees, flood control projects, on-stream dams, water diversions, stream channelization, and watershed modification such as mining, urbanization, logging, and an increase in catastrophic fires. The resulting changes in hydrology and habitat have greatly reduced the amount of suitable habitat for salmon, limiting their distribution and reproduction to a fraction of their historical distribution.

And our system is so fundamentally changed that restoration of historical conditions is not an option – assuming us humans aren't willing to become extinct instead. We have a future of coexistence – where we have the incredibly difficult job of trying to figure out the right range of conditions – habitat, water temperatures, food sources – that allow salmon to not only exist, but thrive, while humans also exist and thrive. Finding this is incredibly challenging and we clearly aren't there yet.

1. Introductory Paragraphs – ¾ pg
    a. California's climate crisis
        i. California's water resilience goals
        ~~ii. CA 30x30 goals~~
    b. Problem Statement: The Cost of Doing Nothing for Salmonids –
        i. Explain what effects to salmon are anticipated
            a. Drought is the norm…future is here (graphic and reference)
            b. Variability associated with climate change
                i. Effect to storage and salmon reproduction
                ii. Effect salmon habitat capacity (spawning/rearing)
                iii. Flow survival and floodplain accessibility

10/28/2022

c. Extinction: 2015 water year and WR as example (provide reference)

2. What Sites Means for Salmon– 1 pg
    a. Intro and context– why are we building Sites
        i. Need for storage and flexibility
        ii. Population level thinking
    b. Impacts to salmon
        i. Generalized effects from CEQA – short paragraphs or bullets
            1. Reduction in rearing habitat
            2. Stranding
            3. Migration flow
            4. Floodplain
            5. Water quality
    c. Benefits to salmon – 1 pg
        i. Generalized benefits from CEQA
            1. ? Use FEIR modeling for Alt 1 and 3?
        ii. Specific benefits supported by peer review relationships
            1. Explain what more stored water could help with (supported with refs and graphics)
                a. Cold water storage effect
                b. Spring pulse effect
                c. Fall flow stabilization effect
                d. Outmigration, Pulse protection and access to floodplain (Yolo)
            2. Michel et al 2021 flow relationship
            3. 2017 water year and storage and relate to how it could have been used in 2021-22 (Hassrick et al 2022)
3. General Ending Statement/Conclusion – ¼ pg

References

NMFS 2016 : https://media.fisheries.noaa.gov/2022-01/jpe-letter-2016.pdf

NMFS 2015: https://media.fisheries.noaa.gov/2022-01/jpe-letter-2015.pdf

Caltrout 2015 https://caltrout.org/sos/species-accounts/salmon/chinook-salmon

Stone Corral Creek and Funks Creek Aquatic Study Plan

November 15, 2022

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Contents

Tables

Figures

Draft_0021021

Acronyms and Abbreviations

°F	degrees Fahrenheit
ADCP	acoustic Doppler current profiler
AFDM	ash-free dry mass
Aquatic Study Plan	Stone Corral Creek and Funks Creeks Aquatic Study Plan
ASCI	Algae Stream Condition Index
Authority	Sites Project Authority
cfs	cubic feet per second
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
Chico ABL	Chico Aquatic Bioassessment Laboratory
CPUE	catch per unit effort
CSCI	California Stream Condition Index
CVRWQCB	Central Valley Regional Water Quality Control Board
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
GCID	Glenn-Colusa Irrigation District
GIS	geographic information system
GPS	global positioning system
LiDAR	light detection and ranging
MPSL-MLML	Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories
PHAB	physical habitat
Project	Sites Reservoir Project
QA/QC	quality assurance/quality control
SQL	Structured Query Language
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TC Canal	Tehama-Colusa Canal
TCCA	Tehama-Colusa Canal Authority
USGS	U.S. Geological Survey

1.0 Introduction and Purpose

1.1 Introduction

This Stone Corral Creek and Funks Creek Aquatic Study Plan (Aquatic Study Plan) has been prepared for the Sites Project Authority (Authority) to guide fisheries technical studies to be conducted prior to and during operation of the Sites Reservoir Project (Project), as well as ongoing monitoring during Project operations. The Project is a proposed offstream storage project located on the west side of the Sacramento Valley in Glenn and Colusa Counties, approximately 10 miles west of the community of Maxwell. It is designed to store unappropriated water from winter and spring storm events in the northern Sacramento River watershed. The Project would impound a maximum of 1.5 million acre-feet of water in a reservoir. The reservoir would be created by building Sites Dam on Stone Corral Creek, Golden Gate Dam on Funks Creek, and a series of saddle dams on the northeastern rims of Antelope Valley. While a portion of naturally occurring seasonal flows in Stone Corral Creek and Funks Creek would be retained in the reservoir, the primary source of water for the reservoir would be diversions from the Sacramento River. These diversions would be up to 4,200 cubic feet per second (cfs) via two existing facilities: the Red Bluff fish screen and pumping plant (operated by the Tehama-Colusa Canal Authority [TCCA]) and the Glenn-Colusa Irrigation District's (GCID) fish screen and pumping plant near Hamilton City.

1.2 Purpose of Aquatic Study Plan

As part of the Project alternatives development, the Authority has committed in the Project's Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS), as well as in the Project's application to appropriate water, to prepare this Aquatic Study Plan and conduct technical studies on Stone Corral Creek and Funks Creek.[2] The Authority is proposing the following special water right term to be included in its water right permit.

Within 1 year of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek under this permit, Permittee shall develop a Technical Studies Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's RDEIR/SDEIS to guide studies in Stone Corral Creek and Funks Creek that shall be implemented prior to and during construction activities to collect information necessary to address California Fish and Game Code Section (CFGC) 5937. The Technical Studies Plan shall include, but may not be limited to, assessment of fish assemblage and available habitat, flow characteristics, water temperatures, bioassessment monitoring, and method for reporting data. The Technical Studies Plan shall be developed in consultation with the California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS), and Colusa County. Permittee shall implement the Technical Studies Plan.

Using the results of the technical studies, within 5 years of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek under this permit, the Permittee shall develop a Stone Corral Creek and Funks Creek Operations Plan (Operations Plan) in

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[1] See Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS.

accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Authority is proposing the following special water right term to be included in its water right permit.

The Operations Plan shall describe Permittee's approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from those creeks under this permit, while also ensuring that the Project's flood protection benefits are realized. The Operations Plan shall include, but may not be limited to, the approach for reservoir releases into Stone Corral Creek and Funks Creek, including release schedules and volumes and a monitoring plan. The Operations Plan shall be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

Together, these studies would document the two creeks' existing hydrology, assess flow levels needed to maintain fluvial geomorphic processes, and update information on aquatic species presence and habitat use in the reaches downstream of the dams to establish aquatic baseline information that would be used to determine and subsequently manage environmental releases from the Project into the creeks. As part of the Aquatic Study Plan, studies would be initiated once access permission to the creeks through private property is obtained. The studies would also be used to inform final design for the proposed Sites Dam and Golden Gate Dam release facilities and operational requirements. The Aquatic Study Plan includes fish monitoring, a Surface Water Ambient Monitoring Program (SWAMP) bioassessment study, a hydrogeomorphic study, and a temperature study. Specific details for the field studies would be designed and conducted in collaboration with CDFW, USFWS and Colusa County.

The objectives of these studies are as follows.

- Determine existing fish assemblages in these creeks, including fish species presence and habitat use.
- Characterize habitats available (e.g., spawning, rearing, foraging, and sheltering habitats) at varying flow levels, including the presence or absence of pools that persist through summer.
- Characterize flows, including assessing the baseflow during summer and conducting a fluvial geomorphologic study to characterize habitat conditions, substrate compositions, and flow levels.
- Conduct a SWAMP technical study (i.e., a stream bioassessment) that focuses on relationships between physical habitat (PHAB), water quality, and benthic macroinvertebrates.
- Implement hydrological studies to define flow temperature relationships.

This Aquatic Study Plan summarizes the methods and reporting strategies for the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. Using information obtained from these field studies, along with currently available information, the Authority would develop a schedule of releases for Stone Corral Creek and Funks Creek to be incorporated into the Operations Plan. Flow releases into these creeks would be made to maintain flood control benefits of the Project and would not overtop streambanks or flood downstream areas. The release schedule would also account for meeting demands of senior water right holders on Stone Corral Creek and Funks Creek that are downstream from the proposed dams. Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies* of the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) describes the purpose, objectives, content, and timing of the field studies identified above.

Furthermore, if flows in Stone Corral Creek and Funks Creek are needed to maintain fish in good condition in compliance with CFGC Section 5937, then the Authority would adapt this study program into an operations monitoring program with a duration of 5 to 10 years to document and adaptively manage the timing and magnitude of flow releases to maintain fish in good condition below the dams along with the habitats upon which they depend. Performance standards would be developed in conjunction with the Authority and the relevant agencies (CDFW, USFWS, and Colusa County) prior to the start of operations monitoring.

1.2.1 Integration of Fish Monitoring with Aquatic Habitat Survey Methods

Aquatic habitat survey methods for sampling are described below. Note that the field observations and results from other studies (i.e., the stream bioassessment study and hydrogeomorphic study) would aid in the assessment of aquatic habitat and are referenced where applicable.

An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat. Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.

As part of the pre-operation sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study.

- **Fish community.** Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)
- **Substrate composition.** Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)
- **Riparian vegetation cover.** Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)
- **Benthic macroinvertebrate presence.** A SWAMP bioassessment that focuses on the relationships between PHAB, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. The bioassessment study would be conducted using the methods described in the SWRCB's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study)
- **Water quality.** Monitoring for general water quality parameters (e.g., temperature, turbidity, pH, conductivity, salinity, dissolved oxygen) would be conducted to assess surface water quality. Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)
- **Water temperature.** Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles in Funks Creek.

1.3 Applicable Methods for Determining Operational Streamflows

After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP Bioassessment Study), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program,[3] the California Environmental Flows Framework,[4] and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on Stone Corral Creek and Funks Creek to maintain fish in good condition. Coordination with CDFW, USFWS, and Colusa County would be required before a method is selected.

[3] https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow

[4] https://ceff.ucdavis.edu/

2.0 Environmental Setting

2.1 Environmental Setting of Stone Corral Creek and Funks Creek

Stone Corral Creek and Funks Creek are both small watersheds originating below the snowline on the eastern foothills of the California Coast Range at elevations of 700 to 850 feet. Consequently, they do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flow intermittently, mostly during winter and early spring. From their origins, they flow through low foothills, across Antelope Valley (the proposed location of Sites Reservoir), through a series of shallow canyons and eventually spill onto the Sacramento Valley floor (Figure 1). For much of their course on the valley floor, they are confined to narrow channels between berms along the edge of agricultural fields and road prisms. While the stream channels of these creeks are not actively managed, their straight alignment and angular turns around agricultural fields and along roads indicate that they were modified from their natural historic channels. In the upper parts of the watersheds just above the dam locations, these streams are largely devoid of riparian cover resulting from livestock use (Bureau of Reclamation and California Department of Water Resources 2008:3-20). In the lower reaches where the streams run through and around agricultural fields, shaded riparian habitat is sparse and consists mostly of low shrubs, grasses, and occasional oaks (*Quercus* sp.) and cottonwood (*Populus* sp.) trees.

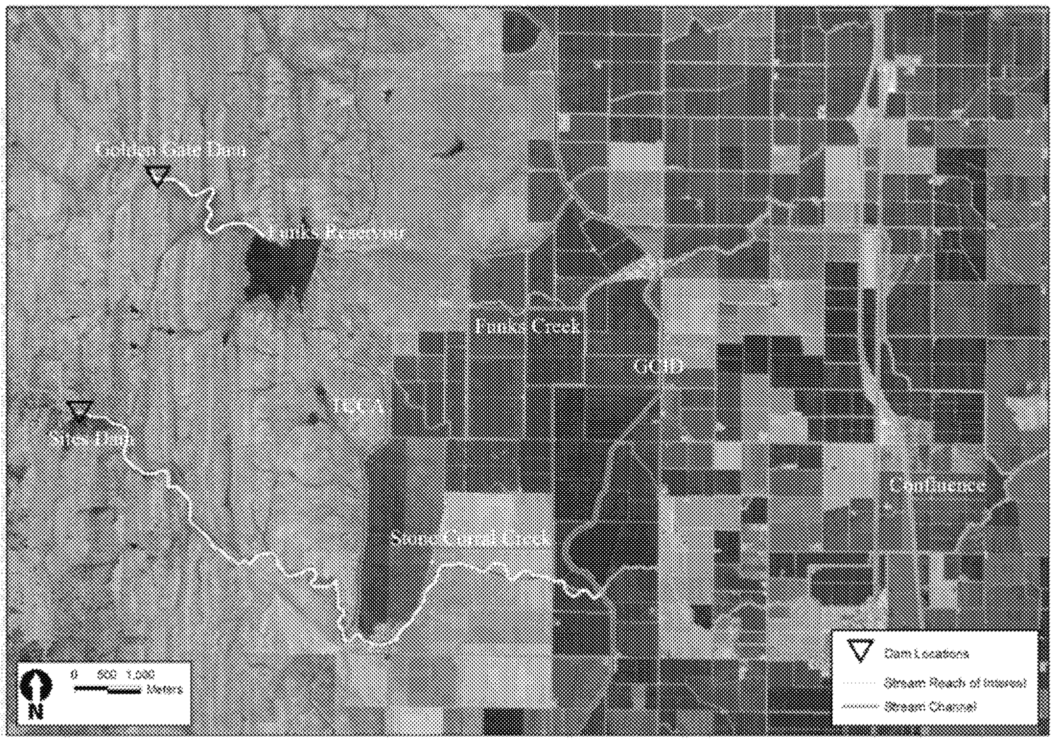

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Figure 1. Stone Corral Creek and Funks Creek Reaches of Interest and Downstream Reaches

2.1.1 Stone Corral Creek

Stone Corral Creek has a drainage area of 38 square miles upstream of the proposed Sites Dam. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal (TC Canal) and begins to travel through agricultural lands. About 3 miles below the TC Canal siphon, Stone Corral Creek crosses the GCID Main Canal. Although most of the water in the canal passes under Stone Corral Creek in a siphon, GCID releases water from the canal into Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below the GCID Main Canal, Funks Creek flows into Stone Corral Creek, and then Stone Corral Creek flows an additional 5 miles to the Colusa Basin Drain. Refer to Figure 2 for a figure showing these various elements.

The U.S. Geological Survey (USGS) collected 27 years of discharge measurements at USGS Gage No. 11390672, in Stone Corral Creek near the community of Sites, California, from 1958 through 1985 (Figure 3). The data demonstrate a high variability of flow over the period of record, and there were 3 years of zero flow: 1972, 1976, and 1977 (Figure 4). Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. The maximum annual discharge during the period of record was 39.9 thousand acre-feet (TAF) in 1983. Based on the USGS period of record, mean annual daily discharge for the period of record was calculated as 9.02 cfs (SD of 67.5, median is 0) and annual average discharge was 6.5 TAF per year.

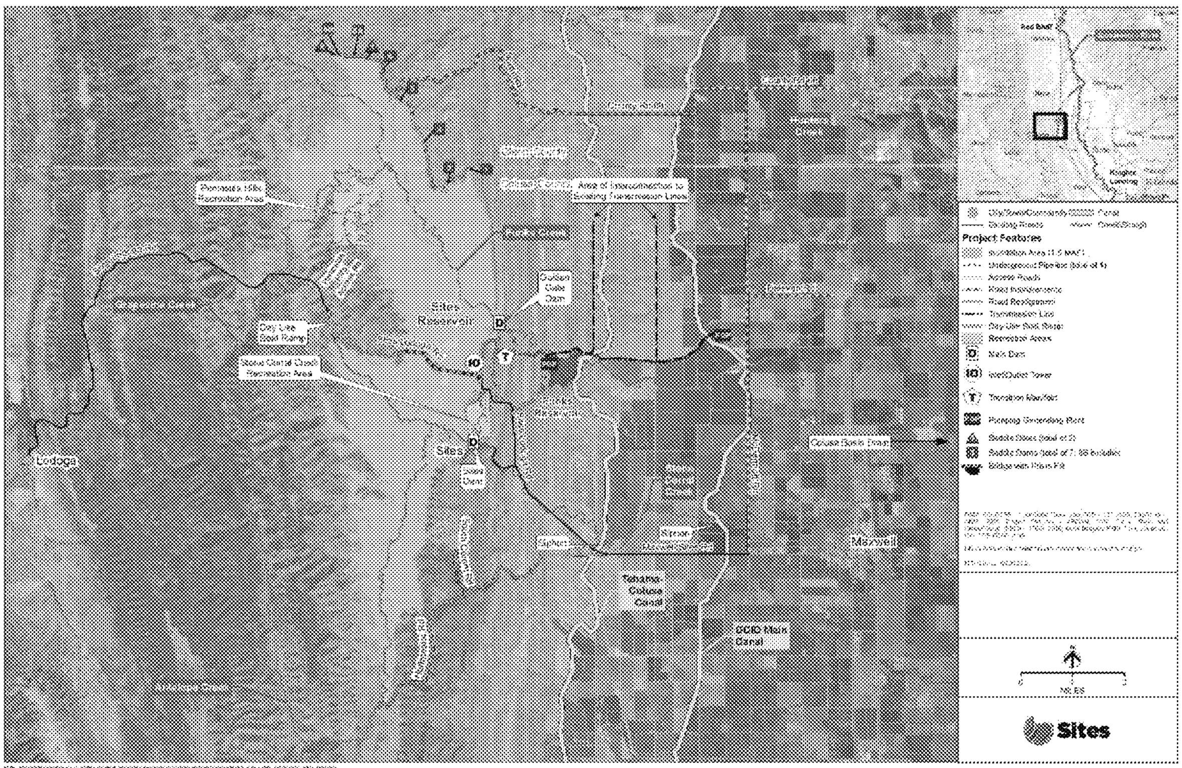


Figure 2. Project Area Overview

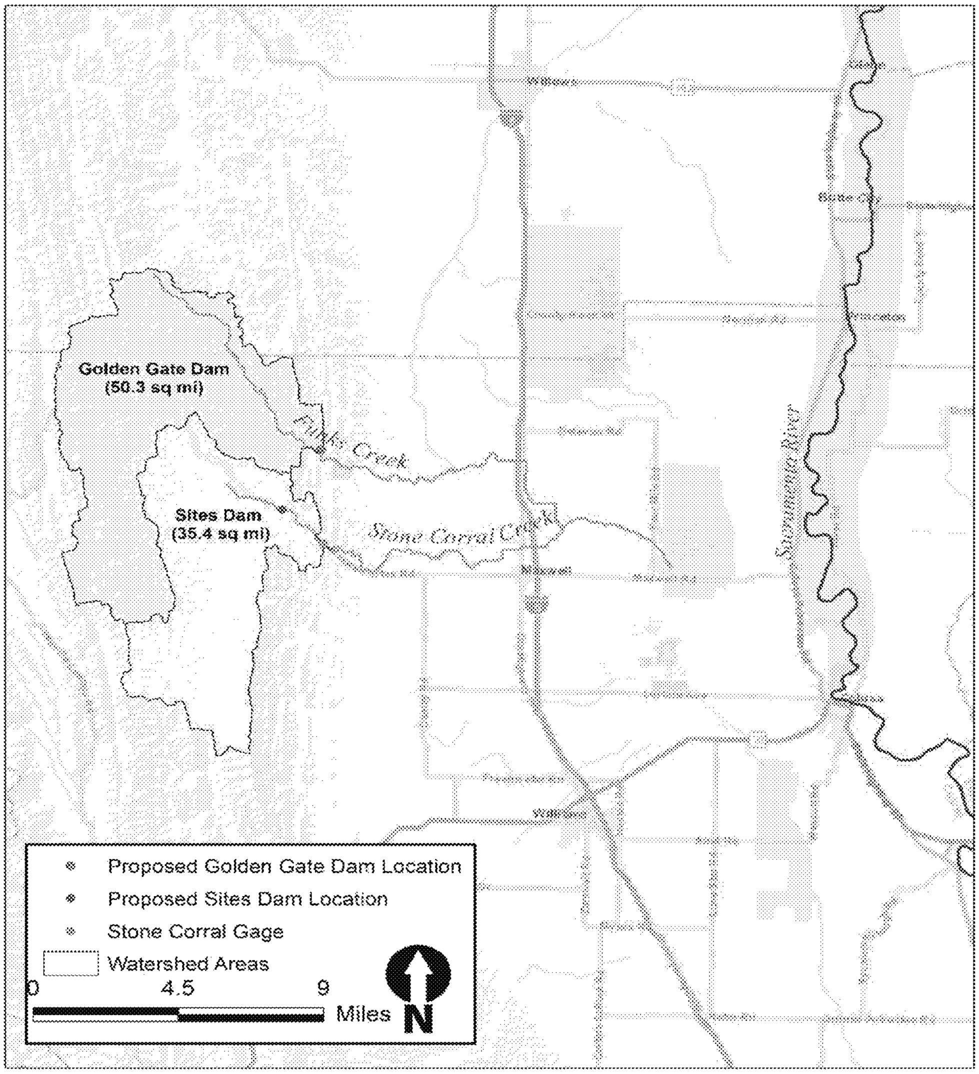
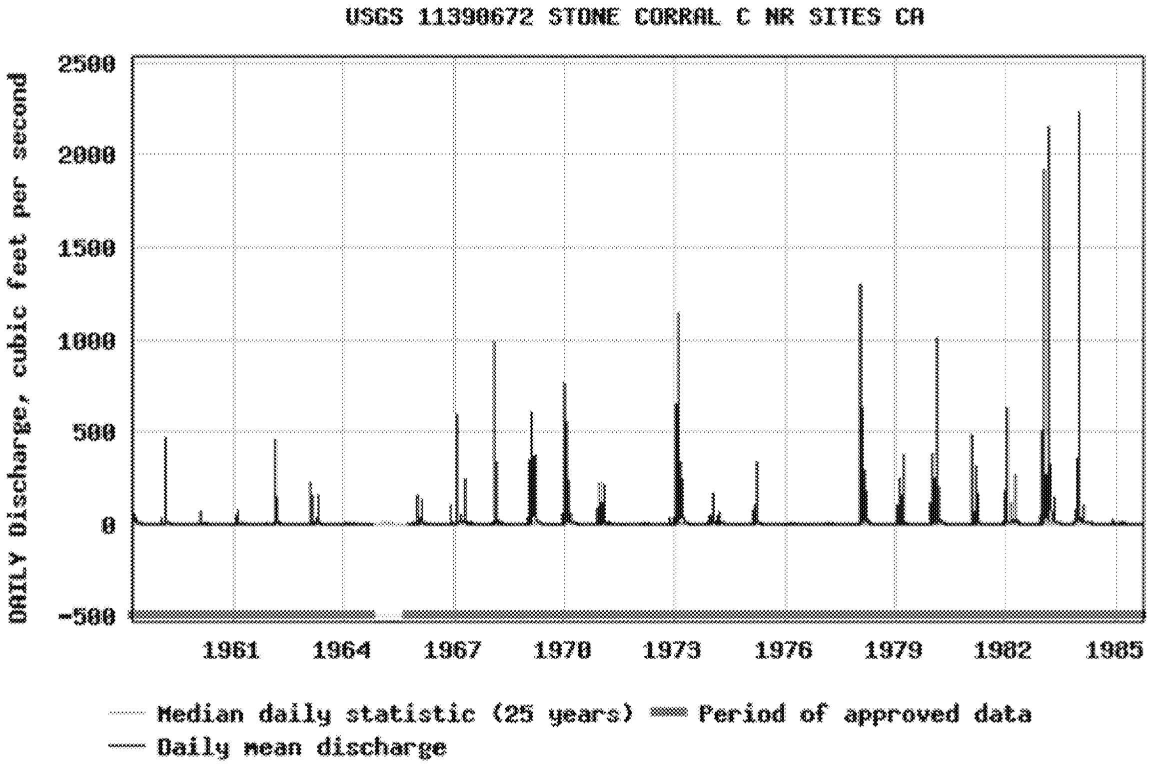


Figure 3. Stone Corral Creek and Funks Creek Watersheds Upstream of Proposed Sites Dam and Golden Gate Dam Locations. The Stone Corral Creek Gage Location captures the entire Sites Dam watershed (35.4 sq mi) upstream.



Source: U.S. Geological Survey stream gage 11390672

Figure 4. Mean Daily Flow in Stone Corral Creek near Sites (cfs)

Because the historical gage record for Stone Corral Creek is limited and Funks Creek is not gaged, historical stream gage data from Elder Creek was used to produce a longer-term estimate of streamflow on Stone Corral Creek and Funks Creek. The Elder Creek gage was chosen because it was the nearest gage on the valley floor with a long record of data available. It was assumed that Elder Creek has relatively similar precipitation and runoff patterns to Stone Corral Creek and Funks Creek. The streamflow of Elder Creek, located in Tehama County, has been measured since 1948 (USGS Gage No. 11379500). The gage site is approximately 49 miles northwest of the proposed Sites Reservoir, and has a drainage area upstream of the gage of 92.4 square miles (Attachment 1- MBK Engineers 2022). The overlapping period of gage records for Stone Corral Creek and Elder Creek (1958–1985) was used to determine a logarithmic correlation between the two gages for each month of the year. The developed streamflow timeseries was then further adjusted to account for the difference in watershed areas upstream of the old USGS Stone Corral Creek gage and the proposed location of Sites Dam. Tables 1a and 1b provide the results of this analysis, which shows the average monthly flow volume in acre feet per year and cubic feet per second for each water year type (MBK Engineers 2022). The average monthly volumes are calculated using the gage record for October 1958 through August 1985 with logarithmic monthly correlations for September 1985 through September 2021. Results are summarized by Sacramento Valley Water Year Type: wet, above normal, below normal, dry, and critical.

Table 1a. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	42	11	2	5	0	17
Dec	872	242	29	47	54	336
Jan	3,365	2,825	711	345	171	1,663
Feb	4,487	4,667	1,283	135	307	2,317
Mar	2,135	1,522	407	264	179	1,039
Apr	901	319	114	25	35	375
May	136	119	15	7	9	65
Jun	20	8	2	1	1	8
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	**11,959**	**9,713**	**2,562**	**828**	**757**	**5,827**

Table 1b. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	0.7	0.2	0	0.1	0	0.3
Dec	14.2	3.9	0.5	0.8	0.9	5.5
Jan	54.7	45.9	11.6	5.6	2.8	27
Feb	80.8	84	23.1	2.4	5.5	41.7
Mar	34.7	24.8	6.6	4.3	2.9	16.9
Apr	15.1	5.4	1.9	0.4	0.6	6.3
May	2.2	1.9	0.2	0.1	0.1	1.1
Jun	0.3	0.1	0	0	0	0.1
Jul	0	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Average	**17**	**14**	**4**	**1**	**1**	**8**

2.1.2 Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 50.3 square miles upstream of the proposed Golden Gate Dam. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir

is a re-regulating reservoir on the TC Canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA to manage water levels within the TC Canal. The Funks Dam gates are opened during large storm events to pass flood waters through Funks Reservoir and down Funks Creek to avoid compromising the TC Canal and its operations. With the exception of passing flood waters, the Funks Dam gates are operated in the closed position, but seepage through the dam gates maintains perennial flow for a short distance below the dam in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID Main Canal. While the GCID Main Canal passes under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek. Similar to Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.

There is no flow record for Funks Creek, but given the comparable size, geology, and topography of the two watersheds and their proximity to each other, Funks Creek seasonal flow patterns and flow magnitudes are likely similar to Stone Corral Creek.

The same correlation approach used to estimate streamflow in Stone Corral Creek cannot be followed to estimate streamflow in Funks Creek because there are no streamflow data available for Funks Creek. Therefore, flow in Funks Creek was estimated by prorating monthly Stone Corral Creek streamflow data by the ratio of Stone Corral Creek's and Funks Creek's watershed areas upstream of the proposed dam locations (MBK Engineers 2022). Tables 2a and 2b provide the results of this analysis and identify the average monthly flow volume in acre feet per year and cubic feet per second foreach water year type.

Table 2a. Funks Creek Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	60	16	3	7	1	24
Dec	1,239	343	41	66	77	485
Jan	4,778	4,011	1,010	489	243	2,362
Feb	6,372	6,628	1,822	192	436	3,290
Mar	3,031	2,161	578	375	255	1,475
Apr	1,280	453	162	36	49	553
May	193	169	21	9	13	93
Jun	28	11	2	1	2	12
Jul	2	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	**16,984**	**13,793**	**3,638**	**1,176**	**1,075**	**8,275**

Table 2b. Funks Creek Average Monthly Flow (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	1.0	0.3	0.1	0.1	0	0.4
Dec	20.2	5.6	0.7	1.1	1.3	7.9
Jan	77.7	65.2	16.4	8.0	4.0	38.4
Feb	114.7	119.3	32.8	3.5	7.9	59.2
Mar	49.3	35.1	9.4	6.1	4.1	24.0
Apr	21.5	7.6	2.7	0.6	0.8	9.3
May	3.1	2.7	0.3	0.1	0.2	1.5
Jun	0.5	0.2	0	0	0	0.2
Jul	0	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Average	**24**	**20**	**5**	**2**	**2**	**12**

2.1.3 Physical Characteristics

The only drainages that exit Antelope Valley are Stone Corral Creek and Funks Creek. Each creek continues through the steeper, foothill environments and then transitions to the Sacramento Valley floor, where each is generally shallow and highly altered, primarily for water conveyance and agricultural purposes. Straight channels and angular turns associated with agricultural fields and roads indicate that natural channels have been at least partially modified. Along their reaches on the valley floor, these creeks are mostly confined to narrow channels between berms adjacent to agricultural fields and road prisms.

Stone Corral Creek and Funks Creek are largely devoid of riparian habitat in their upper reaches (foothill environments) due to heavy livestock use. In the lower reaches where the creeks run through and around agricultural fields, riparian habitat is variable and consists mostly of low shrubs, grasses, and occasional oak and cottonwood trees; however, some segments of Stone Corral Creek possess dense stands of mature riparian vegetation.

Although the reaches of interest have been modified by livestock grazing, channelization, irrigation conveyance systems and minor diversions, they are still expected to have available aquatic habitat (i.e., benthic macroinvertebrate [BMI]). They also both experience much of their natural hydrograph (albeit altered due to local conveyance) and fluvial geomorphic processes and provide water and sediment that ultimately flows into the Colusa Basin Drain during rain events.

3.0 Fish Monitoring

3.1 Purpose of Fish Monitoring Program

The purpose of a fish monitoring program in Stone Corral Creek and Funks Creek downstream of Sites Reservoir is to establish a pre-project baseline and post-operation assessment of the fish species present to determine the existing state of the fish population and whether it is maintained in good condition consistent with CFGC Section 5937 after project construction and operation.

3.2 Overview of Proposed Methods

Assessment of the goal to maintain fish in good condition in these ephemeral creeks consistent with CFGC Section 5937 would be made using a Before-After-Control-Impact experimental study design, using the reach with perennial flow below Funks Reservoir as a control. Sampling would be conducted to assess fish community and habitat present in the study area for up to 5 years prior to operation of the Project. Following completion of the pre-operation survey, fish communities and aquatic habitats in the study area would be monitored in a similar fashion for a 5-to-10-year period after the Project is operational. Fish community and habitat data that showed statistically significant negative departures from baseline data would trigger reassessment of downstream flow management under a proposed adaptive management plan.

3.2.1 Pre-operation Baseline Monitoring

Pre-operation baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (Chapter 4, *SWAMP Bioassessment Study Designs and Methodology*), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-operation sampling.

The pre-operation surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-operation efforts would be summarized into yearly reports and a final pre-operation baseline report to the Authority at the end of the pre-operation survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-operation conditions.

3.2.2 Operations Monitoring

Operations monitoring would occur periodically at the intervals specified herein. Operations sampling would document fish abundance, condition, and distribution and compare the results with data collected on habitat area, location, and changes in habitat characteristics over time. Data from the fish study would be used in documenting compliance with CFGC Section 5937 with data from the SWAMP assessments providing additional details on overall stream status.

Operations sampling methods would be identical to the pre-operation sampling, including returning to established stations and tracking fish abundance, diversity, and distribution through time. Threats and stressors identified in the pre-operation survey would be assessed during operations surveys to differentiate changes in habitat or fish communities not related to the operation of the Project. Data collected as part of the operations sampling effort would be compared against the baseline data, as well as previous years' data and summarized into interim and final reports.

3.2.3 Fish Sampling Methods

Beach Seining

Seining is a low cost, low impact method for capturing aquatic organisms. The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species, and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.

Circumstances that may affect efficacy include the amount or type of benthic structure, presence/absence of aquatic vegetation, water clarity, flow rate, and water depth. Seining is most effective in smooth bottom habitats free of aquatic debris or vegetation, with elevated turbidity, and are shallow enough for biologists to wade in. When benthic structure is complex, water clarity is high, and habitats contain extremely deep, shallow, or rapidly moving water that may exclude biologists from deploying nets, efficacy is dramatically decreased.

Seines with a "bag" to minimize aquatic organism handling stress are preferred. Seines with a bag are also preferred where obstructions make access to the water (or deployment/retrieval of the seine) difficult (U.S. Fish and Wildlife Service 2012). Blocking nets typically improve efficacy by reducing opportunities for target species to move out of the area being seined. Where the area to be isolated for sampling includes culverts, deep pools, undercut banks, or other cover attractive to fish (e.g., thick overhanging vegetation, root wads, logjams) it may be appropriate to isolate a portion or portions of the study area in phases, rather than attempting to herd fish from the entirety of the work area in a single downstream pass.

Electrofishing with Block Nets

Previous work in Stone Corral Creek and Funks Creek indicates that total dissolved solids are high enough to prevent the use of electrofishing as a means of sampling (California Department of Fish and Game and California Department of Water Resources 2000). During reconnaissance surveys, basic water quality measurements would be taken to confirm this observation. If total dissolved solids values are above levels known to interfere with electrofishing, the method would be curtailed in favor of seining. If employed, electrofishing would be done with a Smith-Root type backpack electrofisher. Sections of creeks would be isolated using blocking nets before biologists wade into them, starting from the upstream net and moving downstream. Captured specimens would be held in buckets, floating net pens, or large aerated containers prior to being identified and measured as above for seine sampling. Effort

would be calculated using shock time. If fish exhibit signs of stress, including symptoms of tetany or bruising, electrofisher settings would be adjusted accordingly to reduce impacts.

Visual Surveys

Any visual observations by biologists during reconnaissance and sampling of stream fauna would be systematically recorded based on pre-determined reach locations. This would include documenting amphibians and reptiles that may be observed incidentally during fish sampling efforts.

General Water Quality

Water quality data would be measured at every fish sampling location using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the 2016 version of the SWAMP *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (SWAMP 2016 SOP) (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and pH.

3.2.4 Fish Response

Abundance

All sampling efforts would be quantified using catch per unit effort (CPUE). The CPUE would be computed for each sample method and assessed once multiple data sets are available for comparison. Numbers of individuals, weight, and area sampled would be recorded. A decline in CPUE, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Condition

Condition factor (K) would be calculated for all fish specimens for which length and weight have been recorded. The condition factor of fish reflects environmental and biological circumstances and fluctuations in feeding conditions and physiological factors (Le Cren 1951). The condition factor also indicates changes in food reserves and can be used as an indicator of the general condition of aquatic organisms. Therefore, information on condition factor can be used to assess biological health of monitored organisms because the measure provides information about the specific condition under which organisms are developing (Araneda et al. 2008).

A decline in condition factor, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Distribution

Fish presence would be recorded and tracked through the study area. Fish distribution would be determined through reconnaissance and pre-operation surveys, known distributions, and incidental observations made during other sampling efforts. Records may be kept as count data and volumetric data but would ultimately be provided as presence or absence of fish species within sampling reaches.

3.3 Timing and Frequency

The schedule and effort for the pre-operation and operation portions of the proposed study are detailed below. The pre-operation surveys would be five consecutive annual visits staged at any point prior to

start of operation and within the seasonal restrictions indicated below. Monitoring efforts would be one-per-year visits each year following initiation of operation up to a 5- or 10-year timeline as determined by the Authority. For the purposes of this Aquatic Study Plan, it is assumed that sufficient access to the study area would be available in 2023.

Pre-Project implementation:

- Desktop scoping effort: lay out sampling reaches using geographic information system (GIS) data overlaid on aerial imagery, organize data sheets, and coordinate with water quality and SWAMP efforts. Spring 2022
- Initial reconnaissance: 2 days with 2-person crew; ideal timing would be when water levels are most restricted, which is typically in autumn.
- Pre-operation effort 1: 14 days with 4-person crew. 2023
- Pre-operation effort 2: 14 days with 4-person crew. 2024
- Pre-operation effort 3: 14 days with 4-person crew. 2025
- Pre-operation effort 4: 14 days with 4-person crew. 2026
- Pre-operation effort 5: 14 days with 4-person crew. 2027

Post-Project implementation:

- Operation effort 1: 14 days with 4-person crew. 2030
- Operation effort 2: 14 days with 4-person crew. 2031
- Operation effort 3: 14 days with 4-person crew. 2032
- Operation effort 4: 14 days with 4-person crew. 2033
- Operation effort 5: 14 days with 4-person crew. 2034
- Additional efforts up to 10 years after initial operation would be determined by the Authority.

The post-Project implementation schedule may be adjusted based on the Project construction schedule and construction completion.

Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only collected species.

4.0 SWAMP Bioassessment Study Designs and Methods

4.1 Purpose of Bioassessment Monitoring Program

Stream bioassessment monitoring is a method of evaluating and monitoring the environmental health and integrity of freshwater wadeable streams by using BMI, water quality parameters, and PHAB conditions indicators of stream condition. Bioassessments are especially useful in tracking the aquatic conditions before and after a project is implemented to determine the project effects on aquatic communities. A SWAMP bioassessment that focuses on the relationships between PHAB, water quality, BMI, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek.

This information, along with the other studies (i.e., Fish Monitoring and Hydrogeomorphic Study), would help to inform the type of flow releases that should be made to the creeks under various operating conditions.

4.2 Overview of Proposed Methods

The bioassessment effort would be conducted using the methods described in the SWAMP 2016 SOP (Ode et al. 2016a, 2016b), or any updated version thereof. The reach-wide benthos method, which requires collection from each of 11 designated major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, pool), would be employed.

The ultimate number of individual sites, herein referred to as sampling reaches, on each creek would be based on access and safety; however, it is anticipated that five sampling reaches would be located on Funks Creek and that six sampling reaches would be located on Stone Corral Creek (Figure 5). Since there is no stringent guidance on establishing the number of bioassessment sampling reaches for a project such as this (Rehn pers. comm.), the number of sampling reaches was chosen to both best capture and quantify the two different elevational gradients within the study area (i.e., foothill and valley floor environments), and to have adequate spacing/distance between the sampling reaches (approximately 500 meters apart on Funks Creek above Funks Reservoir and approximately 2 kilometers apart elsewhere). Field and laboratory methods would be fully described in an associated Quality Assurance Project Plan.

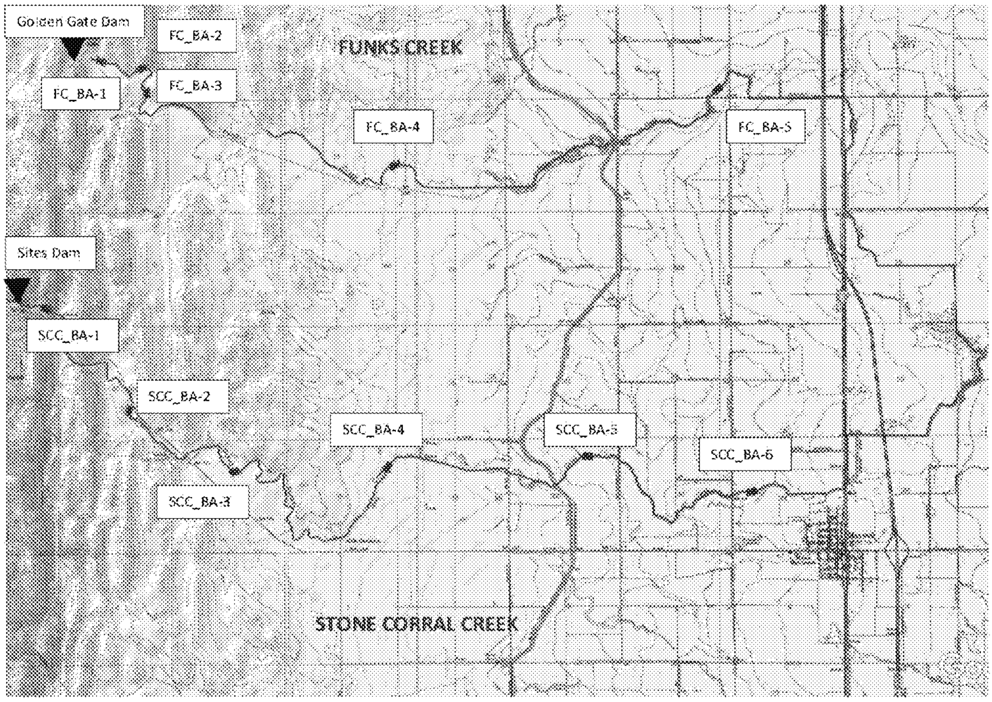


Figure 5. Potential Bioassessment Sampling Reaches, Stone Corral Creek and Funks Creek

4.3 Field Methods

This section summarizes the methods that would be used to collect all bioassessment data. All surveys would be performed by a qualified team of a biologist or biologists and a geomorphologist with expertise in benthic macroinvertebrate and algae collection, water quality monitoring, and PHAB data collection.

4.3.1 Sampling Reach Delineation

As described in Chapter 2 of the SWAMP 2016 SOP, the average wetted width of each sampling reach would be used to determine the sampling reach length (Ode et al. 2016a). The SWAMP 2016 SOP specifies standard sampling reach lengths that are based on wetted width (150 meters for sampling reaches with average wetted widths less than or equal to 10 meters, and 250 meters for sampling reaches with average wetted widths greater than 10 meters).

After the sampling reach length is determined, it would be laid out using marked surveyor's flags for transect identification and transects would be labeled according to the SWAMP 2016 SOP (main transects A–K and inter-transects AB, BC, etc.) for a total of 11 main transects and 10 inter-transects.

4.3.2 Basic Data Collection

Basic information collected at each sampling site would include project name, sampling reach name, time and date of survey, stream/watershed name, global positioning system (GPS) coordinates, and the names of the survey crew members. GPS coordinates would be recorded with an appropriate collection device (e.g., hand-held GPS receiver or iPad). Data collected at the sampling reaches would include water quality and stream discharge measurements, PHAB, and BMI and algae sample collections. The most recent version of the SWAMP *Stream Habitat Characterization Form Full Version* field forms would be used to enter data in the field.

4.3.3 Water Quality and Discharge Measurements

Water quality data would be measured using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the SWAMP 2016 SOP (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, alkalinity, turbidity, and pH.

To determine alkalinity (which is a standard YSI is not capable of doing), a water sample would be collected at each sampling reach. The sample would be taken at approximately 10 to 15 centimeters below the water surface. Using gloves, collectors would fill the water sample bottles to the brim to ensure that air bubbles would not get trapped in the sample bottle. The bottle would then be placed on ice in a cooler until all field data collections were completed. In the evening following each day's sample collection, the water samples would be removed from the coolers and allowed to warm to room temperature. Alkalinity would then be determined by the double endpoint titration method using a Hach Digital Titrator.

Stream discharge would be measured using a Marsh-McBirney Flo-Mate Model 2000 flow meter and following the Velocity Area Method (Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b). Efforts would be made to select a stream transect with a relatively uniform cross section and laminar flow, and at least 20 equally spaced data points would be used to estimate streamflow.

4.3.4 Physical Habitat Assessment and Photo-Documentation

As required by the SWAMP 2016 SOP, PHAB information would be collected at the sampling reaches at each transect and inter-transect location. At the 11 main transects, the full measurements listed in Chapter 6 of the SWAMP 2016 SOP would be taken (Ode et al. 2016a, 2016b). At the 10 inter-transects, fewer measurements would be taken per the SWAMP *Stream Habitat Characterization Form Full Version* field forms.

Digital photo documentation for each sampling reach would consist of upstream and downstream views at transects A, F, and K (i.e., the downstream, middle, and upstream portions of the sampling reach). Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded.

At each sampling reach, reach-wide PHAB conditions relative to three Rapid Bioassessment Protocol (RBP) habitat parameters would be evaluated based on visual observations. These observations would include epifaunal substrate/cover, sediment deposition, and channel alteration. Each of these parameters would be scored using the following numeric value and ranked using the following 20-point scale, per the SWAMP 2016 SOP.

- 1–5 rank as poor
- 6–10 rank as marginal
- 11–15 rank as suboptimal
- 16–20 rank as optimal

4.3.5 Benthic Macroinvertebrate Sample Collection

BMI collection would be conducted according to the SWAMP 2016 SOP, using the reach-wide benthos method, which requires collection from each of the 11 major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, and pool). The BMI samples would be collected 1 meter downstream of each major transect by sampling a 1-foot-square area using a D-frame net. The sampling would begin at transect A (the downstream end) and continue upstream to transect K, with the sample location alternating from left (25% of width), to center (50% of width), to right (75% of width) on each subsequent transect.

All collections from the 11 major transects would be composited into a single sample and transferred into a 1-liter, wide-mouth plastic jar and preserved with 95% ethanol, following the SWAMP 2016 SOP. Samples would be labeled with collection site, time, and collector's name; and a chain-of-custody form would be filled out to accompany the samples on their way to the laboratory for identification. Replicate samples would be collected according to the SWAMP 2016 SOP at one sampling reach for quality assurance/quality control (QA/QC) purposes.

4.3.6 Algae Sample Collection

Algae would be collected in the same manner as the BMI samples, except that the algae would be collected 25 centimeters above the location where the BMI sample would be located. Algae samples would be collected using the sampling tools identified in the SWAMP 2016 SOP, which vary according to the substrate being sampled. A rubber delimiter would be used for large gravel and cobble; a PVC delimiter would be used for fines and gravels; and a syringe scrubber would be used for bedrock and large boulders (if present).

Similar to the BMI sampling, each algae sample collected at the 11 major transects would be composited into a single sample for processing. The processing of the algae would follow the SWAMP 2016 SOP, which would involve removal of algae from the substrates collected and processing the sample for the four algae analyses: quantitative soft-bodied algae, quantitative diatoms, ash-free dry mass (AFDM), and chlorophyll a. A soft-bodied algae qualitative sample would also be collected from each sampling reach by collecting a composite of all types of soft-bodied algae observed within the sampling reach into a single sample. This sample would aid in the identification of soft-bodied algae in the quantitative sample and would be used in the calculation of some of the algae metrics. Replicate algae samples would be collected at the same sampling reaches where replicate BMI samples would be collected.

4.4 Laboratory Processing

This section summarizes the methods that would be used to process all bioassessment data.

4.4.1 Water Quality

Water samples would be collected at each sampling reach to determine total nitrogen and total phosphorus, constituents necessary for helping to determine algal results. Samples would be sent to a local water quality processing laboratory in northern California. The water quality analyses would be consistent with SWAMP protocols for water chemistry. Total nitrogen would be analyzed according to U.S. Environmental Protection Agency Method 351.2, and total phosphorous would be analyzed according to Standard Methods 4500-P B and 4500-P E.

4.4.2 Benthic Macroinvertebrate Sample Processing

BMI sample taxa identification would be conducted by an outside laboratory (most likely by the Chico Aquatic Bioassessment Laboratory [Chico ABL] in Chico, California). BMI samples would be picked, sorted, and identified completely or until a 600 count (SAFIT Level 2) is reached. Chico ABL follows QA/QC procedures developed under the SWAMP program.

4.4.3 Algae Sample Processing

Five types of algae would be collected and processed: qualitative grab, soft-bodied algae, diatoms, AFDM, and chlorophyll a. The qualitative grab, soft algae, and diatom samples would be sent to the CDFW Group at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL-MLML). MPSL-MLML would report the data in SWAMP template formats. MPSL-MLML would calculate the Algae Stream Condition Index (ASCI) from the data. The samples of AFDM and chlorophyll a would also be sent to MPSL-MLML, who would report the data in California Environmental Data Exchange Network template formats. PSL-MLML follows the QA/QC procedures developed under the SWAMP.

4.5 Data Analysis

PHAB information would be entered using the SWAMP Version 2.5 bioassessment data entry forms (Marine Pollution Studies Laboratory 2022) and then loaded into the Microsoft Structured Query Language (SQL) Server database of the MPSL-MLML. BMI and algae taxonomy data, as well as water chemistry data would be loaded from Microsoft Excel templates into the same Microsoft SQL Server database. The data entry forms and templates would be obtained from the MPSL-MLML Data Center website. All data would be verified and checked for completeness after input into the database.

4.5.1 Physical Habitat Information

PHAB data would be entered by the MPSL-MLML using the SWAMP Bioassessment Field Form Microsoft Access database, and then loaded into the MPSL-MLML's Microsoft SQL Server database. After loading, additional error and completeness checks would be run following SWAMP business rules. The data would be sent to the California Environmental Data Exchange Network, where it would be available to the public for viewing and download.

PHAB metrics would be calculated using the SWAMP Bioassessment Reporting Module. The SWAMP protocol contains a subset of parameters measured within the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program for freshwater wadeable streams; therefore, many of their metrics described in Kaufmann et al. (1999) form the basis of the SWAMP Bioassessment Reporting Module output.

SWAMP has developed a PHAB Index similar to the California Stream Condition Index (CSCI) (Section 4.5.3, *Benthic Macroinvertebrates*) for BMI data. The PHAB Index (called the *IPI*) combines eight GIS-calculated metrics with 12 PHAB metrics to produce one IPI value (Rehn et al. 2018). For the purposes of statewide assessments, the IPI has thresholds of physical condition: greater than or equal to 0.94 indicates likely intact condition; 0.93 to 0.84 indicates possibly altered condition; 0.83 to 0.71 indicates likely altered condition; and less than or equal to 0.70 indicates very likely altered condition.

In addition, the results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream*

Assessment (PSA) (2000–2007) (Ode et al. 2011). These select stressor thresholds are not regulatory limits set by SWRCB; rather, they are biology-based stressor thresholds developed by researchers as an objective means to set meaningful, regionally appropriate water quality standards. Two statewide and regional PHAB biological stressor thresholds, the Percent Fines and Sand and Mean Embeddedness thresholds, are examples of biological stressor thresholds that would be appropriate to analyze for this Project.

4.5.2 Water Quality

Similar to the PHAB analysis described above, water quality results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011).

4.5.3 Benthic Macroinvertebrates

MPSL-MLML would be contracted to assist in the analysis of the BMI data. MPSL-MLML would use the BMI taxonomic data obtained from Chico ABL to calculate CSCI scores for each sampling reach. The CSCI is a statewide biological scoring tool that translates complex data about individual BMIs found living in a stream into an overall measure of stream health (Rehn et al. 2015).

CSCI scores and output would be calculated using R scripts defined in Mazor et al. (2017). CSCI score categories would be applied as defined in Rehn et al. (2015).

- Less than or equal to 0.62: very likely altered
- 0.63–0.79: likely altered
- 0.80–0.91: possibly altered
- Greater than or equal to 0.92: likely intact

MPSL-MLML would also calculate several BMI metrics from the taxonomic data for each sampling reach. These individual metrics would be reviewed to discuss the individual results for each sampling reach and event. Representative metrics may include measures of taxa richness, composition, tolerance, functional feeding groups, and habit measures. These other metrics may be more insightful for determining the biological integrity of the BMI communities than the CSCI scores alone (at least in the valley floor sampling reaches), as valley floor reference sites (the sites used in the CSCI calculations) are relatively limited in abundance (Rehn pers. Comm.).

4.5.4 Algae

Diatoms and Soft Algae

MPSL-MLML would be contracted to calculate the statewide diatom, soft algae, and hybrid ASCI and associated metrics. These predictive biological indices replace past regional indices with a statewide index allowing for improved comparisons across diverse landscapes in a consistent and comparable manner. While ASCI can be calculated for soft algae and diatoms separately, the hybrid ASCI produces stronger species distribution models for more accurate and integrative assessments of biological condition.

Chlorophyll *a* and Ash-Free Dry Mass

Ode et al. (2011) in their analysis of the results from the statewide Perennial Stream Assessment between 2000 and 2007, have included stressor thresholds for chlorophyll *a* and AFDM. These thresholds are more protective than levels proposed by previous authors, which were 100 milligrams per square meter for chlorophyll *a* and 50 grams per square meter for AFDM (Barbour et al. 1999, Welch et al. 1988, Dodds et al. 1998, Sosiak 2002, Dodds and Welch 2000, U.S. Environmental Protection Agency 2000, Biggs 2000). The thresholds proposed by Ode et al. (2011) are not regulatory limits or requirements but rather recommendations. The chlorophyll *a* and AFDM stressor thresholds (statewide and regional) would be evaluated for each sampling reach by MPSL-MLML.

4.6 Timing and Frequency

The bioassessment surveys would be conducted during the appropriate index period for Central Valley streams (June through August), which is typically 4 to 6 weeks following the last winter storm event. Depending on stream conditions, however, bioassessment surveys may need to be performed prior to the appropriate index period to ensure adequate flow for benthic and algal sampling is present. Baseline (pre-operation monitoring) would occur in the spring for (possibly) 5 years prior to project operation. Follow-up (baseline) surveys would be conducted on an annual basis during the same period for up to 10 years after operation activities are initiated. The Authority and the relevant agencies (CDFW, USFWS, and Colusa County) would be consulted if the frequency of monitoring would be shortened after 5 years.

4.6.1 Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only collected species.

4.7 Additional Water Quality Measurements

In addition to the standard water quality measurements included in the SWAMP bioassessment as described above, samples would be collected for additional laboratory measurements. The objectives for taking these additional measurements would be to compare pre-Project and Project values, determine any effect of operational adjustments on sampled water quality constituents, and compare measurement values to key stressor thresholds. These additional measurements include:

- **A suite of total and dissolved metals and metalloids**. The suite includes aluminum, arsenic, cadmium, chromium (total), chromium, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc.
- **Cyanobacteria and cyanotoxins**. The cyanobacteria water samples would be collected for the purpose of laboratory analysis for cyanobacteria presence and density and the presence of cyanotoxins (specifically microcystins, anatoxin-a, and cylindrospermopsin).
- **Methymercury in fish tissue**. Level I trophic level fish would likely be more abundant than higher trophic level fish, so the measurements of methylmercury concentrations in fish tissue would focus on these fish. Higher trophic level fish would be sampled intermittently as available. To assess methylmercury in fish tissue, sampling would be conducted using the SWAMP protocol for California rivers and streams (California Water Boards 2011 or most current).

When these additional water quality samples and fish are collected, the following basic survey information and data described above would be collected: project name, sampling reach name, time and date of survey, stream/watershed name, and the names of the survey crew members. Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded. Basic data collected at the sampling sites would include stream discharge measurements, temperature, specific conductivity, dissolved oxygen, turbidity, pH, and water samples for total nitrogen and total phosphorus laboratory measurements. In addition, water samples would be collected for laboratory measurements of dissolved organic carbon and hardness as these parameters influence water quality standards for aquatic life protection for some metals.

These measurements would be taken twice a year, once during a high flow period and once during a low flow period, at the upstream and downstream bioassessment sampling locations on each creek. Sampling would occur during the same years as the rest of the bioassessment studies.

5.0 Hydrogeomorphic Study

5.1 Purpose of Study

The overall purpose of the Hydrogeomorphic Study would be to characterize historical and present-day streamflows, including baseflow during the spring and summer months, on Stone Corral Creek and Funks Creek; the relevant geomorphic characteristics of each creek (herein called *geomorphic indicators*); and flow levels necessary for channel maintenance of geomorphic processes required to maintain the channels in their current condition.

A Hydrogeomorphic Study with quantitative and qualitative monitoring data to fully characterize the existing hydrologic regime of Stone Corral Creek and Funks Creek, as well as the overall type and abundance of sediment available for aquatic organisms, would be developed. To inform the appropriate streamflows for the creeks under inquiry, a geomorphic assessment of the reaches of interest (i.e., the stream reaches below the dams) would constitute the first step in the analysis. The channel segments upstream of the dams would also be rapidly assessed to provide a greater understanding of the local watershed geomorphic characteristics. The focus of the geomorphic assessment would be to determine the dominant geomorphic processes, document the surrounding landforms and channel bed topography, and to determine how the observed morphology of each creek is influenced by the hydrologic regime and the surrounding land uses. Likewise, collection of geomorphic information would aid in the determination of overall channel stability for each creek, which has important implications for the proposed releases.

The Hydrogeomorphic Study to examine the hydrologic regime of Stone Corral Creek and Funks Creek would include a desktop modeling exercise, as well as installation of stilling wells, staff gages, and real-time water surface level collection devices. The goal of the Hydrogeomorphic Study would be to evaluate the physical and hydrologic condition of the reaches of interest within both Stone Corral Creek and Funks Creek. This information, along with the other required studies as discussed in previous chapters (i.e., Fish Assemblage Study and SWAMP bioassessment study), would help to inform the type of flow releases that should be made to the creeks under various Project operating conditions.

After completion of the baseline studies, consideration would be given to when and how flows would be released and whether a portion of these flows are needed to maintain fluvial geomorphic processes (based on the findings from the geomorphic assessment).

5.2 Study Design

The (baseline) Hydrogeomorphic Study components are discussed below. *Field site locations* are applicable to the geomorphic component of the Hydrogeomorphic Study; *hydrologic monitoring locations* represent the potential locations where stilling wells, staff gages, and real-time water surface level collection devices would be installed (i.e., the hydrologic component of the Hydrogeomorphic Study). The ultimate number of field site locations on each creek would be based on access and safety; however, it is anticipated that five sites would be located on Funks Creek and that six would be located on Stone Corral Creek. The locations for the geomorphic component of the Hydrogeomorphic Study would presumably be the same as the bioassessment sampling reaches as part of the SWAMP bioassessment study as described in Chapter 4 (Figure 5). The ultimate number of hydrologic monitoring locations on each creek would primarily be based on access, due to the need for monitoring during and after precipitation events. It is anticipated that two sites would be located on each creek: one in the foothills and one on the valley floor as shown on Figure 6.

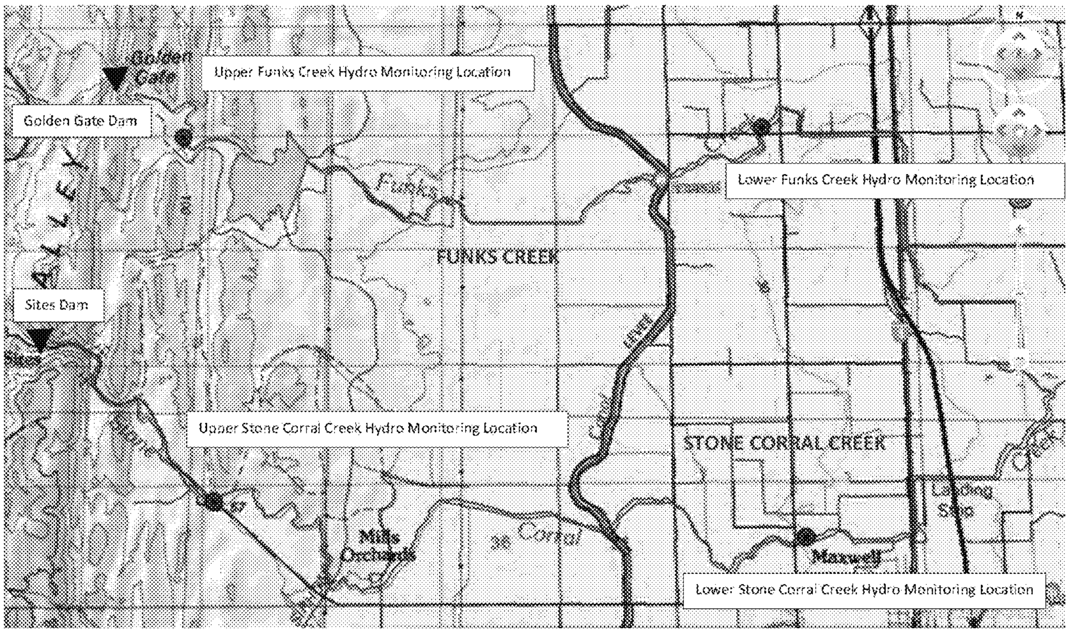


Figure 6. Potential Hydrologic Monitoring Locations, Stone Corral Creek and Funks Creek

5.2.1 Geomorphic Conditions

Data collected during the geomorphic component of the Hydrogeomorphic Study (geomorphic assessment) would include a host of geomorphic attributes, or indicators, as described below. Topographic data (longitudinal profile and cross sections) needed for the hydrologic model (further described below) would also be collected during the geomorphic assessment. The geomorphic assessment would be conducted by a geomorphologist with expertise in channel and floodplain dynamics, channel stability analyses, and topographic surveying techniques.

The geomorphic assessment would include evaluation of the following indicators.

- Channel classification
- Local watershed inputs
- Hydrologic and flow patterns
- Riparian vegetation condition
- Bankfull width and depth and wetted width
- Bank instability and bank characteristics
- Channel bed substrate composition and embeddedness
- Channel complexity
- Degree of channel incision
- Stage of channel evolution

- Cross section and longitudinal profile surveys

These indicators would be assessed for each field site location (Figure 5). In addition, at least three permanent cross sections would be established within each field site location and within each hydrologic monitoring location (Figure 6) for collection of quantitative channel morphology information and required modeling input. Evaluation methods for these indicators are described below.

Channel Classification

Stream and river segments can be grouped into three generalized classifications based on their position in the watershed and the relative balance of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source areas are typically transport-limited (often due to limited channel runoff) but do offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events. Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, and step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

Based on field observations and the stream classification methodology of Montgomery and Buffington (1998), each field site location would be classified accordingly. The classification would aid in the determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of each field site location on the reaches of interest.

Local Watershed Inputs

Any major inputs of sediment and runoff into the field site locations (e.g., landslides or other mass wasting features, recent burn scars) would be summarized. The objective would be to identify any land use changes that could alter the balance of sediment supply and runoff that could lead to future instability (e.g., channel aggradation of degradation) within the reaches of interest. This would aid in the determination of channel stability and the potential for available habitat to be disrupted or altered in the vicinity of the field site locations.

Hydrologic and Flow Patterns

The hydrologic pattern would be determined throughout the length of the field site locations and would include identification of whether streamflow is perennial, intermittent, or ephemeral. Perennial streams are those which flow year-round; intermittent streams are those which flow for only certain times of the year and receive water from both surface water and groundwater; and ephemeral streams are those which have their channels above the water table year-round and only receive water from surface runoff. This geomorphic indicator would rely on the field-based hydrologic component of the overall Hydrogeomorphic Study, as described below.

Riparian Vegetation Condition

Riparian vegetation is an important indicator for overall stream habitat and function as it serves to stabilize streambanks and allows for canopy cover to create suitable water temperatures for aquatic species. Riparian condition refers to a description of the general health of the riparian area, focusing on the amount and type of vegetative cover.

Within each field site location, riparian condition would be described as low (0–25 % vegetative cover), moderate (25–50 % vegetative cover), high (50–75 % vegetative cover), or very high (75–100 %

vegetative cover). The size and approximate age of any riparian vegetation growing in the channel bed would be documented because this is evidence of channel adjustment and possible re-stabilization from a prior disturbance.

Bankfull Width and Depth and Wetted Width

Bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channel in the field site locations. Specifically, a geomorphic or effective bankfull surface would be identified in the field. The geomorphic bankfull or effective surface is the surface that gets inundated by the discharge that performs the most geomorphic work on a system, typically a flow that occurs every 1.5 to 2 years (Knighton 1999). This discharge, known as the geomorphic bankfull discharge, is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface would be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996). Once this surface is recognized, width and depth measurements would be recorded.

Like bankfull width and depth measurements, wetted width and depth measurements would be recorded. Specifically, the wetted surface would be identified in the field and width and depth measurements would be recorded.

Bankfull and wetted width and depth data collection would help to determine the size of the channel, which would help in assessing overall available habitat conditions in the field site locations and reaches of interest.

In addition, the “active channel” width would be identified, which typically represents a typical low to moderate flow regime and is usually bounded by the width of the in-channel vegetation.

Bank Instability and Bank Characteristics

The term *bank instability* refers to streambanks that are either actively retreating or have the potential to retreat soon. In brief, weakening processes are any bank or near-bank processes that act to erode or prepare streambanks for further erosion (Lawler 1992). The purpose of assessing this indicator would be to identify fluvial erosion (erosion associated with flowing water) and bank failure (erosion associated with gravitational forces and weakening processes). Fluvial erosion is closely related to boundary shear stress, which can be loosely approximated by unit stream power variations, and bank failure is collapse of all or part of the streambank in situ (Lawler 1995).

Bank stability would be defined as the natural streambank that has stable groundcover. Stable ground cover includes rooted trees, shrubs, herbaceous plants, and naturally occurring rocky substrates. Bank composition and bank height/angle would also be determined. The results, in conjunction with the other indicators, can be used to detect where the channel may be downcutting as suggested by over-steepened banks, and can also be used to describe the potential for the channel to potentially laterally migrate and increase the risk of bank instability.

Bank stability analyses would aid in determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of the field site locations, as well as the determination of channel stability and the potential for available habitat to be disrupted or altered in the field site locations.

Channel Bed Substrate Composition and Embeddedness

Substrate composition and embeddedness refer to the size of the substrate materials on the channel bed, and the degree to which these materials are embedded. These conditions indicate how frequently the channel substrate is mobilized. Substrate composition and embeddedness would be measured using the methods described by Bunte and Abt (2001). Substrate composition would identify the available substrate (overall type and abundance) for aquatic species in the vicinity of each field site location.

Channel Complexity

The presence or absence of gravel bar development and evidence of scour and/or deposition would be determined throughout the length of each field site location. Pool and riffle habitats containing in-channel structures (e.g., instream woody material) that create complexity and habitat niches for aquatic organisms would also be documented. Basic channel or habitat units (e.g., pool, riffle, and flatwater) would be delineated according to standard habitat mapping descriptions in each field site location. A rough proportion of unit types would be calculated.

Channel or habitat units would be defined as follows.

- **Pool.** Slow water, length, and width at least one-half the bankfull channel width, and a 10-inch minimum residual pool depth. Subcategories define the general type of pool and include scour (lateral, channel, channel confluence, plunge), dam, and backwater, as defined by Overton et al. (1997).
- **Riffle.** Swiftly flowing, turbulent water, some partially exposed substrate, substrate cobble, and/or boulder dominated (McCain et al. 1990).
- **Flatwater.** Wide, uniform channel bottom, low to moderate water velocity, and little surface agitation. Encompasses any areas that do not qualify as pool or riffle (McCain et al. 1990).

If appropriate (i.e., if the habitat diversity merits such a method), the field site locations would be habitat typed to provide a more detailed stream habitat inventory. Stream habitats would be delineated into one of the six Level-III habitat classification types (Flosi et al. 2010) based on morphological characteristics. These include overall channel gradient, water velocity and depth, substrate, and, where applicable, the channel features (e.g., boulder, bedrock, woody material, converging flow) causing the formation of the habitat unit through scour and sediment deposition (Flosi et al. 2010). Channel/habitat type determination would allow for identification of available habitat types for aquatic species.

Degree of Channel Incision

The degree to which the channel is incised would be recorded as negligible, low, moderate, high, or very high. The degree of incision would be qualitatively analyzed using the following criteria.

- **Identification of any Quaternary landforms on the floodplain (e.g., terraces, low floodplain, fan, etc.).** Terraces typically have steep streambanks, and the channel may not necessarily be incised. Steep, unstable streambanks adjacent to a low floodplain surface, however, typically indicate incision.
- **Identification of bedforms downstream of the site where and if the channel is less incised.** Bed and streambank material from incised channels would typically be deposited downstream in somewhat uncharacteristically large deposits on the channel bed (downstream aggradation).

- **Recognition of base level changes downstream.** Dams and other barriers can create upstream changes in channel bed elevation (i.e., headward migration of incision).
- **Visual survey of channel bed at the field site location.** Channel or habitat sequences, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited time intervals. Additionally, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization.
- **Determination of the health of the riparian and floodplain plant species.** Plants that are found in similar, un-incised reaches are usually not present in incised reaches. No vegetation at all is an indicator of no hydrologic interaction between the floodplain and the channel and, therefore, incision.
- **Identification of recent evidence of overbank deposition of fine sediment, plant debris, or other organic matter.** A channel that floods its streambanks frequently would typically have splay (i.e., sand) deposits and vegetation with a smoothed, flooded appearance in the downstream direction. Natural levee development is also an indication of frequent flooding.

Stage of Channel Evolution

A stream evolution model (Cluer and Thorne 2013) would be applied to the entirety of the reaches of interest on Stone Corral Creek and Funks Creek to provide a template for understanding geomorphic responses and processes within the immediate watershed. The stream evolution model of Cluer and Thorne (2013) revisits and updates two well-established channel evolution models (Schumm et al. 1984, Simon and Hupp 1987) in light of recent research and the authors' practical experiences.

In addition, a channel stability analysis would be conducted at each field site location. The chosen methodology would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2010), or other applicable method. The stream evolution model and the channel stability analyses would aid in the determination of how on Stone Corral Creek and Funks Creek may evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus, having implications for the available habitat within the channels.

Cross Section and Longitudinal Profile Surveys

As mentioned above, at least three permanent cross sections would be established within each field site location (Figure 5) and within each hydrologic monitoring location (Figure 6) for collection of quantitative channel morphology information and required modeling input. Permanent cross sections would be established perpendicular to the primary channel following the methodology of Harrelson et al. (1994). Each transect would be surveyed using ground-based surveying equipment to capture and track channel morphology. Elevations along the cross sections would be collected at intervals close enough to capture slope breaks and distinct morphological features within the floodplain (if present), and along the channel sides and bottom.

The location of each cross section would be permanently marked in the field using 4-foot-tall metal t-posts or wooden lathes (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for each transect would be placed in a stable location above the active channel on the left and right (as viewed facing downstream) banks or terraces of the channel. Transect endpoints (i.e., the permanent

monuments) would be documented using a GPS receiver. Representative photographs would be taken at each cross section.

In addition to the cross sections, a longitudinal profile would be surveyed throughout the length of the channel within a field site location. The spacing between channel bed data points would vary depending on the complexity of the channel bed characteristics. Digital photographs would be taken in the upstream and downstream directions at various locations throughout the longitudinal profile. The location(s) of each cross section would be surveyed on the longitudinal profile for graphical plotting purposes.

Channel Geometry Metrics

As mentioned previously, bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channels. This would be completed at the cross sections measured in the field. In addition to bankfull, wetted, and active channel width and depth measurements, the bankfull and entire channel width-to-depth ratio would be calculated for each cross section, and sinuosity and gradient of the longitudinal profile would be determined.

5.2.2 Hydrologic Conditions

The hydrologic component of the Hydrogeomorphic Study would consist of both desktop (modeling and historical conditions review) and field-based efforts (generation of stage-discharge relationships), both of which are summarized below. The desktop effort would provide detailed information on various (modeled) flows of interest (i.e., the 2-year, 5-year, 10-year, 50-year, and 100-year flow events), while the field-based efforts would validate/calibrate the modeling results via collection of real-time streamflow data, especially for smaller streamflow events (the flows that are expected to occur most of the time on each creek).

Summary of Modeling Approach

A HEC-HMS rainfall-runoff-routing watershed hydrology model would be created to generate hydrographs for both Stone Corral Creek and Funks Creek. Inputs into the hydrology model would include watershed land use, percent impervious inputs, soil types, precipitation and evapotranspiration, drainage network characteristics, and topography (which would be generated from available light detection and ranging [LiDAR] technology).

The topographic surveys as described above would also serve to augment the existing LiDAR data with on-the-ground data to better capture topography in areas requiring additional detail (such as densely vegetated areas). The topographic surveys would be tied into the State Plane Coordinate System and would be sufficient to generate contours at a 1-foot interval. The data collected via the topographic surveys would also be required for generation of stage discharge relationships, as described below.

It should be noted that HEC-HMS rainfall-runoff-routing watershed hydrology model constitutes the first (somewhat exploratory) step in the hydrologic analysis. As discussed in the RDEIR/SDEIS, any releases into Funks Creek would be made through the transition manifold at the base of Golden Gate Dam and a new pipeline that terminates at Funks Creek below the dam. These facilities would carry up to 100 cfs with a release range of 0 to 100 cfs into Funks Creek. Any releases into Stone Corral Creek would be made through the permanent outlet at Sites Dam. This outlet would have a release range of 0 to 100 cfs, with an emergency release capacity of up to 2,500 cfs. The modeling effort would be the first step in determining if a range in flows, as described in the RDEIR/SDEIS, would be needed to meet the purpose of CFGC Section 5937 given the modeled hydrology.

Summary of Field-Based Analysis

The primary objective of the field investigation would be to provide an accurate description of the existing watershed hydrology and variations in streamflow and water surface elevations (i.e., stage) on both Stone Corral Creek and Funks Creek. Periodic streamflow measurements (depth and velocity measurements) would be taken to develop stage-discharge relationships (rating curves) to translate the continuous water depth measurements measured with continuous stage recorders (i.e., HOBO water level loggers [Onset Computer Corporation]) into continuous estimates of flow. These measurements would occur at the hydrologic monitoring locations as shown on Figure 6.

To determine continuous estimates for streamflow, the stage recorders, which measure water temperature and pressure, and vertical stilling wells would be installed in relatively deep portions of the creeks at the locations as shown on Figure 6. The HOBO water level loggers would be set to monitor water depth every 15 or 30 minutes. Additional HOBO water level loggers would also be installed to monitor barometric pressure every 15 or 30 minutes for the purpose of calibrating the depth (water pressure) measurements, which are also affected by barometric pressure. These additional data loggers would be secured to upland surfaces (e.g., trees). Streamflow measurements would be collected to develop equations to convert the continuous stage recorder data into estimated streamflows (discharge). During variable discharge conditions, streamflows would be estimated using a Marsh-McBirney Flo-Mate Model 2000 flow meter and top-setting rod following the procedures described in Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b).

Daily precipitation data obtained from the California Data Exchange Center or the PRISM Climate Group would be used to characterize the rainfall patterns during the study period. Rainfall patterns would be displayed concurrently with the measured streamflow data.

If necessary, acoustic Doppler current profiler (ADCP) technology could be used to capture high flow events. ADCP equipment is particularly useful for collecting accurate and precise water depth and 2-D/3-D velocity data, especially at high flows when other standard surveying techniques as described above are impractical or unsafe. ADCP technology also offers the advantage of detecting bed elevation change resulting from high flow events that would be useful for evaluating sediment mobility in the reaches of interest. The applicability of ADCP would be investigated during the first season of hydrologic monitoring (once field conditions at the field site locations are ascertained).

5.3 Timing, Frequency, and Operation Monitoring

5.3.1 Pre-Operations Monitoring

The baseline geomorphic component of the Hydrogeomorphic Study would first be conducted during the winter/spring of 2023. It is anticipated that all relevant geomorphic indicators could be collected during one field trip. Additional baseline geomorphic data collection during subsequent years would be conducted if high precipitation patterns/high flow events occur during the pre-operation period.

The desktop hydrologic component of the Hydrogeomorphic Study would occur during 2023. The field-based hydrologic component of the Hydrogeomorphic Study would occur at the locations as shown on Figure 6 until the dams are constructed.

5.3.2 Operations Monitoring

Follow-up geomorphic and hydrologic surveys would be conducted on a regular (pre-approved) basis for up to 10 years after operations begin. The Authority would consult with the relevant agencies (CDFW, USFWS, and Colusa County) if the frequency of monitoring would be shortened after 5 years. Additional information on each component of is provided below.

Geomorphic Stability Monitoring Plan

Operations geomorphic monitoring would generally be like the pre-operation efforts, including returning to established field site locations and collecting information on geomorphic indicators by performing a geomorphic assessment as described above. Data collected as part of the operations geomorphic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The focus of the operations geomorphic monitoring effort, however, would be geomorphic stability monitoring. As such, the primary survey components of monitoring would include cross section and longitudinal profile surveys, channel bed substrate composition determination, and channel stability evaluations. All methods for these efforts would be identical to those described above. The objectives of these monitoring elements and their relevance to geomorphic stability are summarized below.

Cross Section and Longitudinal Profile Surveys

The objectives of collecting data at the cross sections would be to collect primarily lateral stability information to determine the rate of lateral migration through bank erosion and overall cross-sectional area change. The rate, magnitude, and direction of lateral change and area change would be determined over time using repeat longitudinal profile surveys.

The objective of collecting data at the longitudinal profiles would be to collect primarily vertical stability information to determine rates of aggradation or degradation (whether the stream is downcutting [degrading], filling [aggrading], or remaining static). The rate, magnitude, and direction of vertical change would be determined over time using repeat longitudinal profile surveys.

Channel Bed Substrate Composition and Embeddedness

The objectives of collecting channel bed substrate composition and embeddedness information would be to observe potential shifts in bed material size-frequency distribution, which can be determined over time. Collected grain size information would aid in interpretation in specific geomorphic changes if they occur (such as any changes identified via the cross-sectional and longitudinal profile analyses above).

Channel Stability Evaluations

The chosen methodology for channel stability evaluations would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. Together with the stream evolution model (Cluer and Thorne 2013), the channel stability analyses would aid in the determination of how Stone Corral Creek and Funks Creek may continue to evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Hydrologic Monitoring Plan

Operations hydrologic monitoring would be like the pre-operation field-based efforts, including returning to established hydrologic monitoring locations, monitoring stage and stream discharge over time. Data collected as part of the operation hydrologic monitoring effort would be compared against the baseline data and summarized into interim and final reports.

The level of effort of the operations Hydrologic Monitoring Plan, however, would be considerably less than for the pre-operation effort because, depending on the streamflow and precipitation patterns during the pre-operation time-period, there would presumably already be numerous years of pre-operations hydrologic monitoring data at the hydrologic monitoring locations (in other words, a robust data set with multiple discharge measurements and associated stages would be available). The operation hydrologic monitoring effort would, therefore, primarily consist of measuring streamflow values that were not obtained during the pre-operation monitoring effort (presumably higher flow events) and conducting routine field maintenance activities such as periodic downloads of the HOBO water level loggers and upkeep of field equipment.

6.0 Temperature Study Design and Methods

6.1 Overview of Proposed Methods

A temperature study would be conducted to characterize temperatures under existing conditions and determine flow and storage effects on temperature in Stone Corral Creek and Funks Creek under operating conditions. The study would involve evaluating temperatures in the creeks before and after initiation of Project operation and would include consideration of the effects of creek flow and reservoir storage on temperature.

The study would assess the following.

- The temperatures that support the aquatic community under existing conditions.
- Reservoir discharge needed to maintain appropriate temperatures to maintain fish in good condition in Stone Corral Creek and Funks Creek downstream of Sites Reservoir after the start of operation.

6.2 Study Design

Once access to Stone Corral Creek is obtained, a temperature probe would be installed in Stone Corral Creek at the location of Sites Dam release, and four additional probes would be installed downstream by approximately 0.5 mile, 1 mile, 2.4 miles (near where Stone Corral Creek goes under Maxwell Sites Road), and 4.4 miles (near where TC Canal goes under Stone Corral Creek).

Once access to Funks Creek is obtained, a temperature probe would be installed in Funks Creek at the location of the I/O tower release to Funks Creek, and two additional probes would be installed downstream by approximately 0.5 mile and 1 mile (far enough upstream of Funks Reservoir to be unaffected by it). In addition, probes would be installed at the TC Canal inlet to Funks Reservoir, at the TC Canal outlet from Funks Reservoir, and at the Funks Creek outlet from Funks Reservoir.

As described in the draft Reservoir Management Plan included in Appendix 2D of the RDEIR/SDEIS, once operation has commenced, water temperature profiles would be measured near Golden Gate Dam once every 2 weeks at 5-feet depth intervals to inform decisions about which ports of the I/O tower to use for any required flow releases under 5937. The temperature probes in the creeks would continuously record hourly temperatures. These temperatures would be used along with specific fish requirements to develop target temperature ranges for operation conditions.

Temperatures recorded after Sites Reservoir is operational would be used in conjunction with flow and storage data to determine flow and storage effects on creek temperatures. If creek temperatures cannot be accurately estimated with flow, storage, meteorology, and the reservoir temperature profiles, water temperature modeling could be performed for Sites Reservoir, Stone Corral Creek, and Funks Creek. If modeling is necessary, models would be calibrated with the measured flow, storage, and temperature data.

Water released into Stone Corral Creek would originate from the lower half of Sites Reservoir and would likely be cooler than equilibrium values during months when the reservoir is stratified. The biggest differential between release temperatures and equilibrium values would occur when the reservoir is full and ambient air temperature conditions are high. If it is determined that flow should be maintained in Stone Corral Creek at times when releases would be relatively cool compared to temperatures under existing conditions, lower flows would allow the water to warm farther upstream than higher flows.

Water released to Funks Creek would originate from the I/O tower and, when the reservoir is stratified, would be warmer than the water released to Stone Corral Creek. The temperatures would be warmer because the withdrawals would come from higher in the reservoir and, as described in the Reservoir Management Plan, the I/O tower port openings would be chosen to provide 65 degrees Fahrenheit (°F) or higher water temperatures during the rice growing season (May through September).

6.3 Timing and Frequency

Water temperature measurements would occur before and during operation. Measurements during the initial fill period would be useful for evaluating water temperature under low-storage conditions. Reservoir profile measurements and measurements at the Stone Corral Creek and Funks Creek releases may need to continue in the long term.

Measurements downstream of the release locations could be discontinued if the following conditions are met.

- Sites Reservoir has made releases for at least 2 years when the reservoir was at least 75% full.
- Temperature effects are found to have little effect on native fish (e.g., if only short sections of the creeks below the dams experience temperature effects) or if flow and storage effects on creek temperatures are understood well enough that average daily creek temperatures can be estimated within 3°F based on meteorological conditions, flow, reservoir storage, and reservoir temperature profiles.

7.0 Reporting and Permit Requirements

7.1 Annual Reporting Requirements

Reporting requirements would be met through the preparation and submittal of annual and final reports as part of the Aquatic Study Plan that would be implemented as a part of the Authority's commitments and responsibilities to maintain fish in good condition consistent with CFGC Section 5937.

The first five annual reports would summarize the first 5 years of baseline conditions. All future (operation) reporting efforts would compare the conditions at that time to those collected during the baseline conditions.

The following information would be addressed in comprehensive annual reports with multiple chapters covering fish, bioassessment, hydrogeomorphic, and temperature study results.

- **Fish Study Results.** The annual report would include descriptions and locations of fish communities in Stone Corral Creek and Funks Creek, summarizing monitoring results in the study area. The report would document monitoring results and link results to objectives. The report would identify new or ongoing management issues, threats and stressors, and provide recommendations for future monitoring and management.
- **Bioassessment Results.** The annual reports would include BMI, algae, water quality, and PHAB output and results and a summary of each of these indicators. The most recent version of the SWAMP *Stream Habitat Characterization Form, Full Version* field forms would be provided in appendix format, along with representative photography of the sampling reaches.
- **Hydrogeomorphic Results.** The annual reports would include a summary of the monitoring methods; a summary and analysis of the hydrogeomorphic monitoring results, including an evaluation of site conditions in the context of the performance standards; a discussion of the monitoring results; a discussion of any modifications made to the monitoring methods; a discussion of the previous year's monitoring efforts; and photographs taken from the cross sections and longitudinal profiles.
- **Temperature Results.** The annual reports would include a summary of temperatures that support the aquatic community under existing conditions, and a recommendation of reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam and Funks Creek downstream of Golden Gate Dam after operation has commenced.
- **Monitoring Program Evaluation.** The annual reports would evaluate the Aquatic Study Plan to ensure that data (1) are collected efficiently, (2) address information needs, and (3) adequately assess resource responses to management actions. Changes in monitoring methods, protocols, or frequency would be summarized in the annual reports.
- **Objective Criteria Evaluation.** Annual reports during operations would evaluate whether management actions are meeting project objectives or performance standards (described below). An assessment would be made as to causal factors of observed declines, including the potential role of external stressors outside the parameters of Project effects.
- **Adaptive Management Thresholds.** The link between the technical and decision-making steps requires regular interaction and exchange of information between technical staff and decision-makers. This would be accomplished by annual meetings involving the Authority and the agencies where both regulatory and technical expertise can be integrated into revising goals and objectives,

adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed such that any new information discussed assists with the planning of upcoming seasonal work.

7.2 Performance Standards

Performance standards for the Aquatic Study Plan would be based on quantitative metrics. These performance standards would be designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the study reaches.

Fish community performance standards would include measures of community diversity and percent area occupied for both available and total reach distance within the study areas. BMI performance standards would likely include three main indicators—PHAB IPI scores, BMI CSCI scores, and algae ASCI scores. Geomorphic performance standards would focus on channel stability evaluations such as:(1) evidence of significant and detrimental morphologic changes at any of the cross sections; (2) evidence of channel headcutting; (3) significant loss of gravels via dam impoundment; and (4) significant decrease in the channel stability score during the duration of monitoring activities.

Performance standards would be developed in conjunction with the Authority and the relevant agencies (CDFW, USFWS, and Colusa County) prior to the start of operation monitoring.

7.3 Operations Plan

The Authority would use information from the results of implementation of this Aquatic Study Plan, including field studies described herein, to prepare the Operations Plan. The Operations Plan would describe the approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from Stone Corral Creek and Funks Creek, while also ensuring that the Project's flood protection benefits are realized. Further, the Operations Plan would include, but would not be limited to, the approach for reservoir releases into Stone Corral Creek and Funks Creek, including release schedules and volumes. As stated in the Authority's application to appropriate water, the Operations Plan would be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

7.4 Anticipated Schedule

The following schedule is anticipated to result in a reduced workload once a range of flows is encountered with representative variability of environmental conditions (Table 3). For example, the field-based Hydrologic Study could possibly occur over the course of the 5 years leading up to dam construction and could terminate once a suitable range of flows has been measured and analyzed. This could occur within 1 year if flow conditions are variable enough, but more than likely it will occur over a series of years.

Table 3. Anticipated years that each study will be needed to acquire a representative range of environmental conditions for baseline and post operation periods.

Year	Fish Community	Bioassessment Study	Water Quality	Water Temp.	Geomorphic Study	Hydrologic Study (desktop)	Hydrologic Study (field)
Baseline							
2023	√	√	√	√	√	√	√
2024	√		√	√			√
2025	√	√	√	√			√
2026	√		√	√			√
2027	√	√	√	√			√
Post Operation							
2030	√	√	√	√	√		√
2031	√		√	√			
2032	√	√	√	√	√		√
2033	√		√	√			
2034	√	√	√	√	√		√

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8.2 Personal Communications

Rehn, Andrew. Biologist, California Department of Fish and Wildlife. April 6, 2022—Phone conversation with Jeff Peters of ICF and Marco Sigala at Moss Landing Marine Laboratories regarding a suitable number of bioassessment sampling reaches on Funks Creek and Stone Corral Creek for the Sites Reservoir Project.

From: Janis Offermann [janis@horizonh2o.com]
Sent: 12/1/2022 5:31:25 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Kevin Spesert [kspesert@sitesproject.org]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Risse, Danielle [Danielle.Risse@hdrinc.com]
Subject: RE: [EXTERNAL] RE: first draft TWG letter

Thanks for the update, Ali. It is great that the Board is comfortable with the idea of a MOA. Let's hope that Yocha Dehe is, too!
janis

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Thursday, December 1, 2022 5:10 PM
To: Janis Offermann <janis@horizonh2o.com>; Kevin Spesert <kspesert@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Risse, Danielle <Danielle.Risse@hdrinc.com>
Subject: RE: [EXTERNAL] RE: first draft TWG letter

Thank you Janis! Two things – first, the Board is comfortable with the concept of a MOA. We need to bring more details back to them in mid-2023 on what we are proposing to agree to, but they are comfortable with us discussing both "required items" (impacts) and "aspirational items" (future partnership on things). And second, I just sent the draft letter to Jerry for his review/input. Once I have his input, I'll format it and get it to Fritz to sign (Kevin, I might need some help with this).

Thanks all and thanks Janis for the reminder!

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Janis Offermann <janis@horizonh2o.com>
Sent: Wednesday, November 30, 2022 9:14 AM
To: Kevin Spesert <kspesert@sitesproject.org>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Risse, Danielle <Danielle.Risse@hdrinc.com>
Subject: RE: [EXTERNAL] RE: first draft TWG letter

Hi, Ali
I am following up on the status of this letter. I know you are swamped, but did it get sent up the chain for approvals yet? As a reminder, we have a meeting with Yocha Dehe coming up on December 9 and we had hoped to have this out to the other tribes by then.

Thanks
Janis

Janis Offermann, MA, RPA

Cultural Resources Practice Lead
Horizon Water and Environment
1801 7th Street, Suite 100
Sacramento, CA 95811
530.220.4918

From: Janis Offermann <janis@horizonh2o.com>
Sent: Tuesday, November 15, 2022 4:34 PM
To: 'Kevin Spesert' <kspesert@sitesproject.org>; 'Alicia Forsythe' <aforsythe@sitesproject.org>; 'Laurie Warner Herson' <laurie.warner.herson@phenixenv.com>; 'Risse, Danielle' <Danielle.Risse@hdrinc.com>
Subject: RE: [EXTERNAL] RE: first draft TWG letter

Thanks for all of the comments and edits. I have accepted the changes, as attached. **Ali**, will you take it up the chain for further review and approvals?

Also, I wanted to let you know that I heard from Laverne today; he was in the process of reviewing the MOA brief that we provided to him. However, his question for me was about the status of Section 106 consultation. I reminded him that Reclamation is responsible for Section 106 and that Yocha Dehe had received an invitation to consult from them some months ago. I also told him that the SHPO is currently reviewing the PA and that Reclamation had also sent the PA to the Tribe for review. He was able to locate both the letter and the draft PA in his files. He said he "would have to take care of that," so I expect Reclamation will be hearing from Yocha Dehe soon, with a request to consult under Section 106. I am happy to see this, as the Tribe now appears to be more fully engaged in the project.

Ali, at our last Section 106 meeting we mentioned that we were moving forward with the TWG and Mark Carper mentioned that he would like to attend, just to listen, not to participate, so that he would be familiar with issues that might carry over into the PA and Section 106 issues. Not sure how you feel about that. We said we would bring his request to your attention, and this seems to be the perfect opportunity to do that.

Thanks, all
janis

From: Kevin Spesert <kspesert@sitesproject.org>
Sent: Tuesday, November 15, 2022 10:36 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Janis Offermann <janis@horizonh2o.com>; Risse, Danielle <Danielle.Risse@hdrinc.com>
Subject: [EXTERNAL] RE: first draft TWG letter

The letter looks good...no changes on my end

I think the bullets are good...and cover the topics that I think the tribes can really help us with.

Kevin

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, November 15, 2022 10:21 AM
To: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Janis Offermann <janis@horizonh2o.com>; Kevin Spesert <kspesert@sitesproject.org>; Risse, Danielle <Danielle.Risse@hdrinc.com>
Subject: RE: first draft TWG letter

Hi all – Attached are some minor changes to the letter. Once we have a final document, I'll put this into the Sites template.

Kevin, take a close look at the bullets. We should characterize these carefully and make sure we are really willing to talk about these items in a meaningful way. Let me know what you think.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Sent: Monday, November 14, 2022 4:33 PM
To: Janis Offermann <janis@horizonh2o.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Kevin Spesert <kspesert@sitesproject.org>; Risse, Danielle <Danielle.Risse@hdrinc.com>
Subject: RE: first draft TWG letter

Hi all –

I have reviewed the draft letter and provided a few comments/suggested edits to content. I think Kevin and Ali will have to review for style and tone since it will be signed by Fritz.

Thanks,

Laurie

From: Janis Offermann <janis@horizonh2o.com>
Sent: Tuesday, November 8, 2022 12:07 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Kevin Spesert <kspesert@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Risse, Danielle <Danielle.Risse@hdrinc.com>
Subject: first draft TWG letter

Hi, All
Here is my first stab at a letter to send out about the Tribal Working Group. I expect that you will have quite a few edits. I wasn't sure how much detail you wanted to include. ☺

Kevin, did you find the charter for the other working group you are working with? I would be interested in seeing that.

Thanks
janis

Janis Offermann, MA, RPA
Cultural Resources Practice Lead
Horizon Water and Environment
1801 7th Street, Suite 100
Sacramento, CA 95811
530.220.4918

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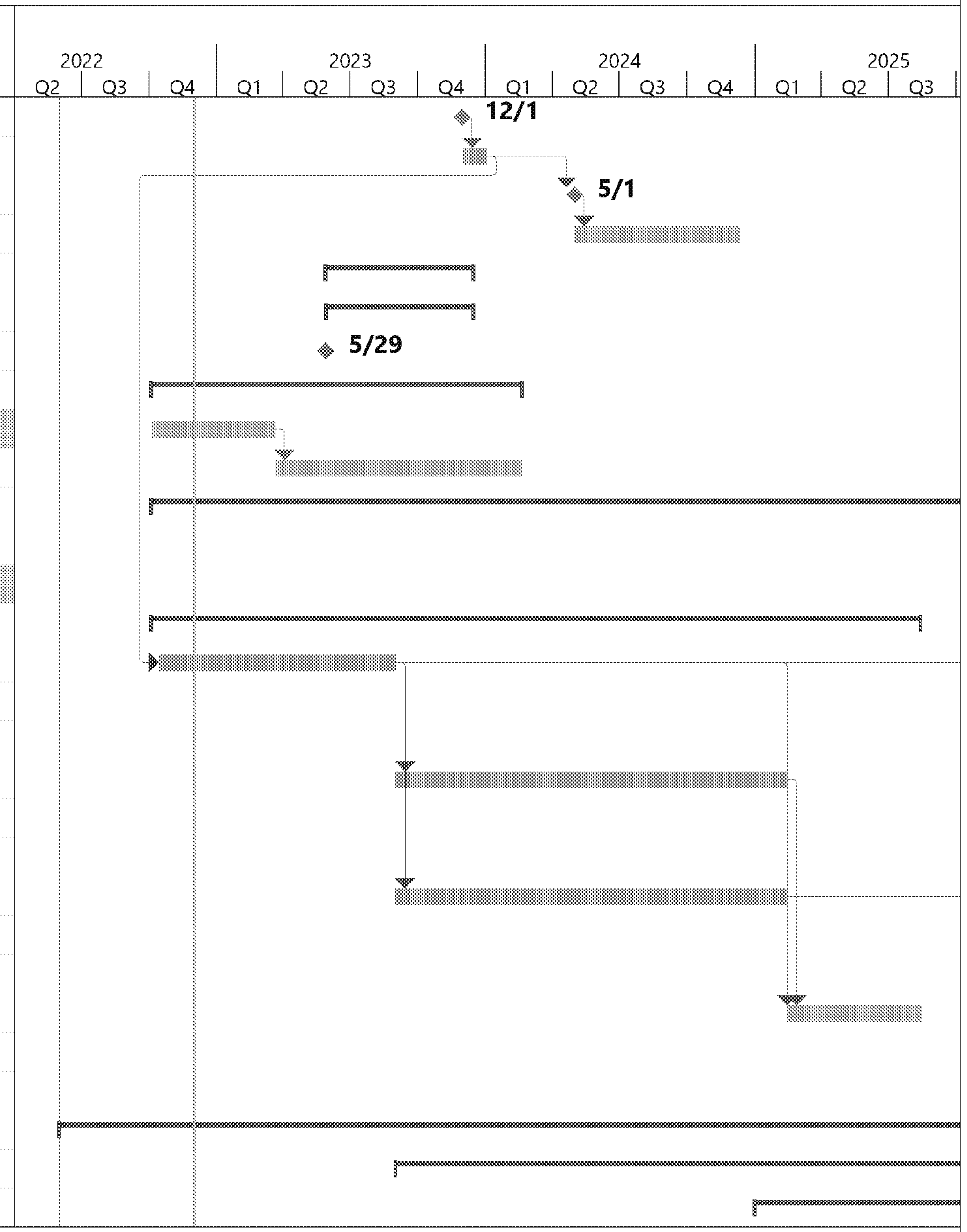
Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration	Start	Finish	Predecessors
1			CWC Award of Funds	0 days	Fri 12/1/23	Fri 12/1/23	
2			Sites Board Approval/NTP for Phase 3	23 days	Fri 12/1/23	Tue 1/2/24	1
3			Determine Engineering Procurement & Delivery Method	0 days	Wed 5/1/24	Wed 5/1/24	2
4			CMAR Solicitation and Procurement	8 mons	Wed 5/1/24	Tue 12/10/24	3
5			**Real Estate**	**145 days**	**Mon 5/29/23**	**Fri 12/15/23**	
6			**Land Access and Acquisition**	**144 days**	**Tue 5/30/23**	**Fri 12/15/23**	
10			**Land Use**	**0 days**	**Mon 5/29/23**	**Mon 5/29/23**	
12			**Environmental**	**360 days**	**Tue 10/4/22**	**Mon 2/19/24**	
13			Environmental Surveys	6 mons	Tue 10/4/22	Mon 3/20/23	
14			Environmental Permitting and Certification	12 mons	Tue 3/21/23	Mon 2/19/24	13
15			**Water**	**852 days?**	**Tue 10/4/22**	**Wed 1/7/26**	
16			Water Rights Acquisition (Permanent)	1 day?	Tue 10/4/22	Tue 10/4/22	
17			**Construction Water**	**30 days**	**Wed 11/26/25**	**Wed 1/7/26**	**329,210,405**
20			**Sites Reservoir Geotechnical Investigations**	**748 days?**	**Tue 10/4/22**	**Thu 8/14/25**	
21			P1 Geotech Investigation (30% Cutoff)	230 days	Fri 10/14/22	Thu 8/31/23	2,11,8
22			**Land Access**	1 day?	Tue 10/4/22	Tue 10/4/22	
23			<New Task>	1 day?	Tue 10/4/22	Tue 10/4/22	
24			P2a Geotech Investigation (Dam Foundations & Grouting)	76 wks	Fri 9/1/23	Thu 2/13/25	21,7
25			**Land Access**	1 day?	Tue 10/4/22	Tue 10/4/22	
26			<New Task>	1 day?	Tue 10/4/22	Tue 10/4/22	
27			P2a Geotech Investigation (Roads)	76 wks	Fri 9/1/23	Thu 2/13/25	21,8
28			**Land Access**	1 day?	Tue 10/4/22	Tue 10/4/22	
29			<New Task>	1 day?	Tue 10/4/22	Tue 10/4/22	
30			P2b Geotech Investigation (Dam Embankments)	26 wks	Fri 2/14/25	Thu 8/14/25	21,24,9
31			**Land Access**	1 day?	Tue 10/4/22	Tue 10/4/22	
32			<New Task>	1 day?	Tue 10/4/22	Tue 10/4/22	
33			**Reservoir Facilities**	**2341 days?**	**Wed 6/1/22**	**Wed 5/21/31**	
34			**Engineering - Dams**	**1215 days**	**Fri 9/1/23**	**Thu 4/27/28**	
120			**CMAR Procurement**	**356 days**	**Wed 1/1/25**	**Wed 5/13/26**	



Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Critical | Critical Split | Progress | Manual Progress

The dates, durations and sequencing shown are based on limited project information.

Additional information aquired, CMAR's approach to the work and other factors will result in a different approach to the work, sequencing, durations and dates.

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Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Tasl Mo(	Constructio Package	Task Name	Duration	Start	Finish	Predecessors
125			**Roads, Bridges, Access, and Site Development**	**2131 days?**	**Wed 6/1/22**	**Wed 7/31/30**	**329,210,405**
126			**Land Access**	1 day?	Thu 11/27/25	Thu 11/27/25	
127			**Land Aqquisition (for cultural and misc bio)**	1 day?	Thu 11/27/25	Thu 11/27/25	
128			**Permitting (Working Conceptual Draft)**	**911 days**	**Wed 6/1/22**	**Wed 11/26/2!**	
129			**Bio**	**614 days**	**Wed 6/1/22**	**Mon 10/7/24**	
160			**Secure Mitigation**	**305 days**	**Wed 6/1/22**	**Tue 8/1/23**	
161			Precon Avoidance (GGS, Avian, mammal, other CEQA spp)	20 days	Wed 6/1/22	Tue 6/28/22	
162			Secure LOC/Implement Mitigation Prior to Take	1 day	Wed 6/1/22	Wed 6/1/22	
163			**Cultural Work**	**905 days**	**Thu 6/9/22**	**Wed 11/26/2!**	
164			Cultural Survey	154 days	Thu 6/9/22	Tue 1/10/23	131
165			Evaluation	174 days	Wed 1/11/23	Mon 9/11/23	164
166			Final PA and PHPMP	345 days	Thu 6/9/22	Wed 10/4/23	164SS
167			Finding of No Adverse Effect	40 days	Thu 10/5/23	Wed 11/29/23	166
168			Finding of Adverse Effect	40 days	Thu 10/5/23	Wed 11/29/23	166
169			Develop Treatment Plan	260 days	Thu 11/30/23	Wed 11/27/24	168
170			Implement Treatment Plan	260 days	Thu 11/28/24	Wed 11/26/25	169
171			[redacted]	100 days	Thu 11/27/25	Wed 4/15/26	124SS
172			**Northern Construction Access Roads (CR 68, CR 69, N. Rd)**	**569 days?**	**Wed 11/26/25**	**Tue 2/1/28**	
173			Preliminary Design	1 day?	Thu 11/27/25	Thu 11/27/25	
174			Geotechnical Data	0 days	Wed 11/26/25	Wed 11/26/25	27,8
175			Final Design	39 wks	Thu 11/27/25	Wed 8/26/26	174
176			Procurement and NTP	90 days	Thu 8/27/26	Wed 12/30/26	124,175
177		C1-RB1	[redacted]	284 days	Thu 12/31/26	Tue 2/1/28	176
178			**County Roads F, D, McDermott, Delevan**	**550 days**	**Wed 11/26/25**	**Wed 1/5/28**	
179			Geotechnical Data	0 days	Wed 11/26/25	Wed 11/26/25	27,8
180			Final Design	52 wks	Thu 11/27/25	Wed 11/25/26	179
181			Procurement and NTP	90 days	Thu 11/26/26	Wed 3/31/27	124,180
182		C1-RB2	[redacted]	200 days	Thu 4/1/27	Wed 1/5/28	181
183			**Southern Construction Access Roads (Maxwell-Sites, Shoo-fly, A-1)**	**480 days**	**Wed 11/26/25**	**Wed 9/29/27**	

Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Critical
Critical Split
Progress
Manual Progress

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Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
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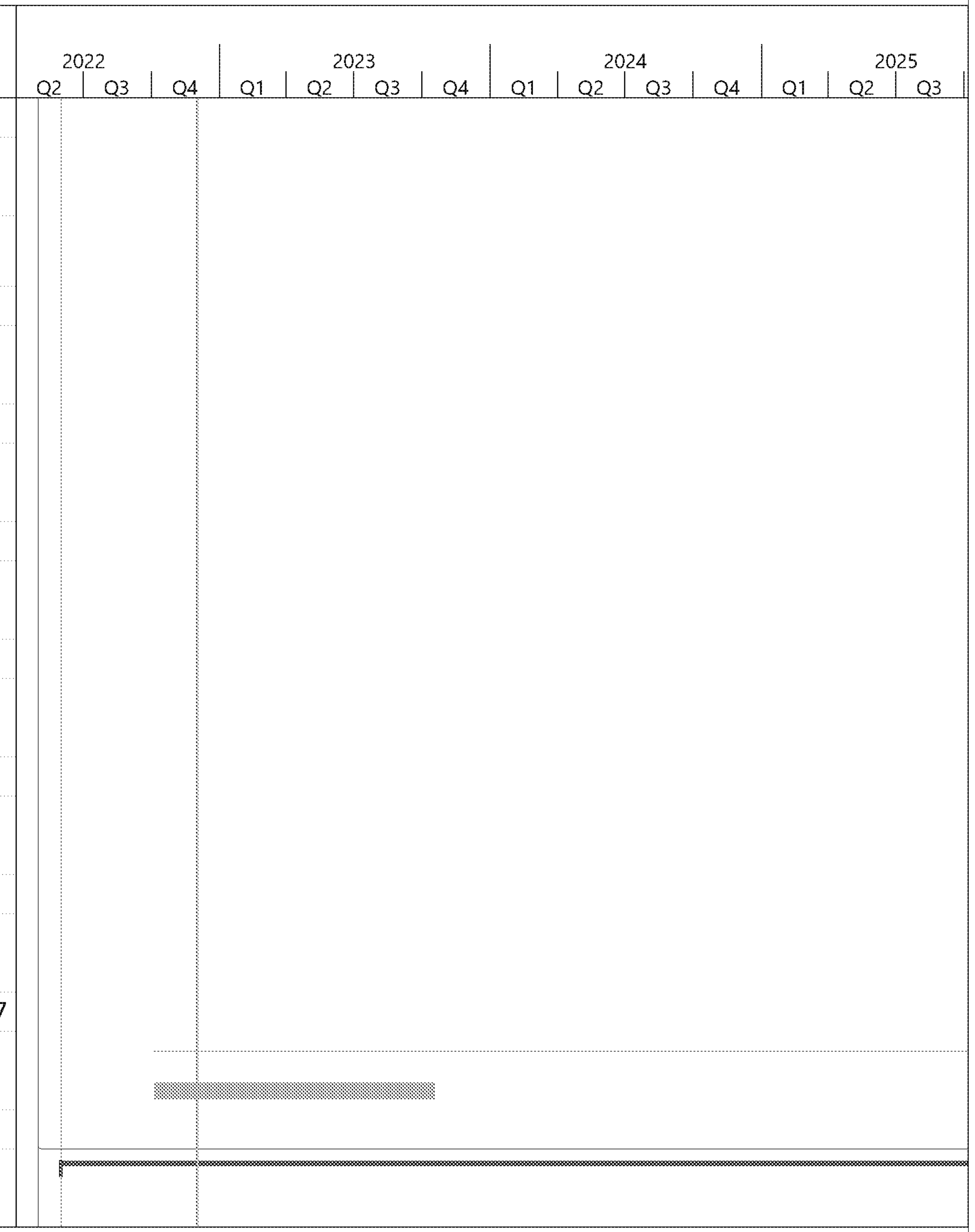
October 2022

ID	Task Mode	Construction Package	Task Name	Duration	Start	Finish	Predecessors
184			Geotechnical Data	0 days	Wed 11/26/25	Wed 11/26/25	27,8
185			Final Design	39 wks	Thu 11/27/25	Wed 8/26/26	184
186			Procurement and NTP	90 days	Thu 8/27/26	Wed 12/30/26	124,185
187		C1-RB3	[redacted]	195 days	Thu 12/31/26	Wed 9/29/27	186
188			**Ancillary Roads B1, B2, C1, C2, Comm N., Comm South**	**505 days**	**Wed 11/26/25**	**Wed 11/3/27**	
189			Geotechnical Data	0 days	Wed 11/26/25	Wed 11/26/25	27,8
190			Final Design	39 wks	Thu 11/27/25	Wed 8/26/26	189
191			Procurement and NTP	90 days	Thu 8/27/26	Wed 12/30/26	124,190
192		C1-RB4	[redacted]	220 days	Thu 12/31/26	Wed 11/3/27	191
193			**Stone Corral Recreation Road to Sites Dam**	**405 days**	**Wed 11/26/25**	**Wed 6/16/27**	
194			Geotechnical Data	0 days	Wed 11/26/25	Wed 11/26/25	27,8
195			Final Design	39 wks	Thu 11/27/25	Wed 8/26/26	194
196			Procurement and NTP	90 days	Thu 8/27/26	Wed 12/30/26	124,195
197		C1-RB5	[redacted]	120 days	Thu 12/31/26	Wed 6/16/27	196
198			**Sites Lodoga Road Realignment and Bridge**	**1220 days**	**Wed 11/26/25**	**Wed 7/31/30**	
199			Geotechnical Data	0 days	Wed 11/26/25	Wed 11/26/25	27,8
200			Final Design	78 wks	Thu 11/27/25	Wed 5/26/27	199
201			Procurement and NTP	150 days	Thu 5/27/27	Wed 12/22/27	124,200
202		C1-RB6	[redacted]	680 days	Thu 12/23/27	Wed 7/31/30	201
203			**Process and Haul Filter Materials to Project**	**1229 days**	**Fri 5/15/26**	**Wed 1/29/31**	
204			Offsite Quarry Development	50 days	Fri 5/15/26	Thu 7/23/26	21,64,124
205			Process Filter Materials	800 days	Fri 7/24/26	Thu 8/16/29	123,204
206		C1-FM1	[redacted]	800 days	Thu 1/6/28	Wed 1/29/31	205SS+30 days,182,187
207			**Saddle Dams Construction**	1 day?	Tue 10/4/22	Tue 10/4/22	
208			**Land Acquisition**	270 days	Tue 10/4/22	Mon 10/16/23	
209			**Land Fee title Aqquisition (for cultural)**	720 days	Wed 12/17/25	Tue 9/19/28	260FF-30 days
210			**Permitting (Working Conceptual Draft)**	**911 days**	**Wed 6/1/22**	**Wed 11/26/25**	
253			**Saddle Dam 3**	**803 days**	**Fri 1/22/27**	**Tue 2/19/30**	



Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Critical, Critical Split, Progress, Manual Progress

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Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration	Start	Finish	Predecessors
254			[redacted]	50 days	Wed 2/2/28	Tue 4/11/28	119,124,172
255			Erosion and Sediment Control	50 days	Wed 2/2/28	Tue 4/11/28	254SS
256			Clearing / Grubbing Topsoil Salvage from Work Areas	50 days	Wed 2/2/28	Tue 4/11/28	254SS
257			Demolition	5 days	Wed 2/16/28	Tue 2/22/28	254SS+10 days
258		C1-SD3.1	Saddle Dam 3 - Foundation Excavation (Dbl Shift)	110 days	Wed 5/10/28	Tue 10/10/28	254SS+20 days,255SS+2
259		C1-SD3.2	**Saddle Dam 3 - Foundation Preparation and Grouting**	**175 days**	**Wed 6/14/28**	**Tue 2/13/29**	
260			Foundation Cleaning	100 days	Wed 6/14/28	Tue 10/31/28	258FF+15 days
261			Dental Excavation and Concrete	50 days	Wed 8/30/28	Tue 11/7/28	258FF+20 days
262			Grout Cap	80 days	Wed 9/27/28	Tue 1/16/29	261SS+20 days
263			Curtain Grouting	90 days	Wed 10/11/28	Tue 2/13/29	262SS+10 days
264		C1-SD3.3	**Saddle Dam 3 - Embankment**	**485 days**	**Wed 4/12/28**	**Tue 2/19/30**	
265			[redacted]	40 days	Wed 4/12/28	Tue 6/6/28	254,255,256
266			[redacted]	100 days	Wed 4/12/28	Tue 8/29/28	254,255,256
267			Place Zone 1 - Core	260 days	Wed 1/3/29	Tue 1/1/30	265SS+20 days,263SS+6
268			Place Zone 2A & 2B - Filters, Drains and Transitions	260 days	Wed 1/3/29	Tue 1/1/30	267SS,206SS+30 days,17
269			Place Zone 3 - Rockfill	260 days	Wed 1/3/29	Tue 1/1/30	268SS,266,119
270			Place Zone 4 - Random	260 days	Wed 1/3/29	Tue 1/1/30	269SS,266,119
271			Place Rip Rap	200 days	Wed 4/18/29	Tue 1/22/30	270FF+15 days
272			Site Reclamation and Topsoil Replacement	60 days	Wed 11/28/29	Tue 2/19/30	271FF+20 days
273			**Saddle Dam 5**	**250 days**	**Wed 2/2/28**	**Tue 1/16/29**	
274			[redacted]	30 days	Wed 2/2/28	Tue 3/14/28	119,124,172
275			Erosion and Sediment Control	30 days	Wed 2/2/28	Tue 3/14/28	274SS
276			Clearing / Grubbing Topsoil Salvage from Work Areas	30 days	Wed 2/2/28	Tue 3/14/28	274SS
277			Demolition	5 days	Wed 2/16/28	Tue 2/22/28	274SS+10 days
278		C1-SD5.1	Saddle Dam 5 - Foundation Excavation	50 days	Wed 3/1/28	Tue 5/9/28	274SS+20 days,275SS+2
279		C1-SD5.2	**Saddle Dam 5 - Foundation Preparation and Grouting**	**100 days**	**Wed 3/8/28**	**Tue 7/25/28**	
280			Foundation Cleaning	60 days	Wed 3/8/28	Tue 5/30/28	278FF+15 days
281			Dental Excavation and Concrete	60 days	Wed 3/8/28	Tue 5/30/28	278FF+15 days
282			Grout Cap	40 days	Wed 4/5/28	Tue 5/30/28	281SS+20 days

2022: Q2 Q3 Q4 | 2023: Q1 Q2 Q3 Q4 | 2024: Q1 Q2 Q3 Q4 | 2025: Q1 Q2 Q3

Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task	Inactive Milestone	Start-only	Critical Split
Split	Inactive Summary	Finish-only	Progress
Milestone	Manual Task	External Tasks	Manual Progress
Summary	Duration-only	External Milestone	
Project Summary	Manual Summary Rollup	Deadline	
Inactive Task	Manual Summary	Critical	

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Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration	Start	Finish	Predecessors
283			Curtain Grouting	70 days	Wed 4/19/28	Tue 7/25/28	282SS+10 days
284		C1-SD5.3	**Saddle Dam 5 - Embankment**	**220 days**	**Wed 3/15/28**	**Tue 1/16/29**	
285			[redacted]	40 days	Wed 3/15/28	Tue 5/9/28	274
286			[redacted]	100 days	Wed 3/15/28	Tue 8/1/28	274
287			Place Zone 1 - Core	100 days	Wed 7/12/28	Tue 11/28/28	283SS+60 days,285SS+2
288			Place Zone 2A & 2B - Filters, Drains and Transitions	100 days	Wed 7/12/28	Tue 11/28/28	287SS,206SS+30 days,17
289			Place Zone 3 - Rockfill	100 days	Wed 7/12/28	Tue 11/28/28	288SS
290			Place Zone 4 - Random	100 days	Wed 7/12/28	Tue 11/28/28	289SS
291			Place Rip Rap	70 days	Wed 9/13/28	Tue 12/19/28	290FF+15 days
292			Site Reclamation and Topsoil Replacement	60 days	Wed 10/25/28	Tue 1/16/29	291FF+20 days
293			**Minor Saddle Dams (SD1,SD2,SD6,SD8A, Dike 1, and Dike 2)**	**473 days**	**Fri 1/22/27**	**Tue 11/14/28**	
294			**Minor Saddle Dams Preliminary Work**	**30 days**	**Fri 1/22/27**	**Thu 3/4/27**	
295			[redacted]	30 days	Fri 1/22/27	Thu 3/4/27	119,124
296			Erosion and Sediment Control	30 days	Fri 1/22/27	Thu 3/4/27	295SS
297			Clearing / Grubbing Topsoil Salvage from Work Areas	30 days	Fri 1/22/27	Thu 3/4/27	295SS
298			Demolition	5 days	Fri 2/5/27	Thu 2/11/27	295SS+10 days
299		C1-SDM.1	Minor Saddle Dams - Foundation Excavation	100 days	Fri 2/19/27	Thu 7/8/27	295SS+20 days,296SS+2
300		C1-SDM.2	**Minor Saddle Dams - Foundation Preparation and Grouting**	**185 days**	**Fri 3/12/27**	**Thu 11/25/27**	
301			Foundation Cleaning	100 days	Fri 3/12/27	Thu 7/29/27	299FF+15 days
302			Dental Excavation and Concrete	100 days	Fri 3/19/27	Thu 8/5/27	299FF+20 days
303			Grout Cap	80 days	Fri 4/30/27	Thu 8/19/27	302SS+30 days
304			Curtain Grouting	140 days	Fri 5/14/27	Thu 11/25/27	303SS+10 days
305		C1-SDM.3	**Minor Saddle Dams - Embankment**	**443 days**	**Fri 3/5/27**	**Tue 11/14/28**	
306			[redacted]	40 days	Fri 3/5/27	Thu 4/29/27	295,296,297
307			[redacted]	120 days	Fri 3/5/27	Thu 8/19/27	295,296,297
308			Place Zone 1 - Core	175 days	Fri 8/6/27	Thu 4/6/28	304SS+60 days,306SS+2
309			Place Zone 2A & 2B - Filters, Drains and Transitions	175 days	Wed 2/2/28	Tue 10/3/28	308SS,177,181,119
310			Place Zone 3 - Rockfill	175 days	Wed 2/2/28	Tue 10/3/28	309SS,119,307
311			Place Zone 4 - Random	175 days	Wed 2/2/28	Tue 10/3/28	310SS,119,307

2022 Q2 Q3 Q4 | 2023 Q1 Q2 Q3 Q4 | 2024 Q1 Q2 Q3 Q4 | 2025 Q1 Q2 Q3

Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Critical | Critical Split | Progress | Manual Progress

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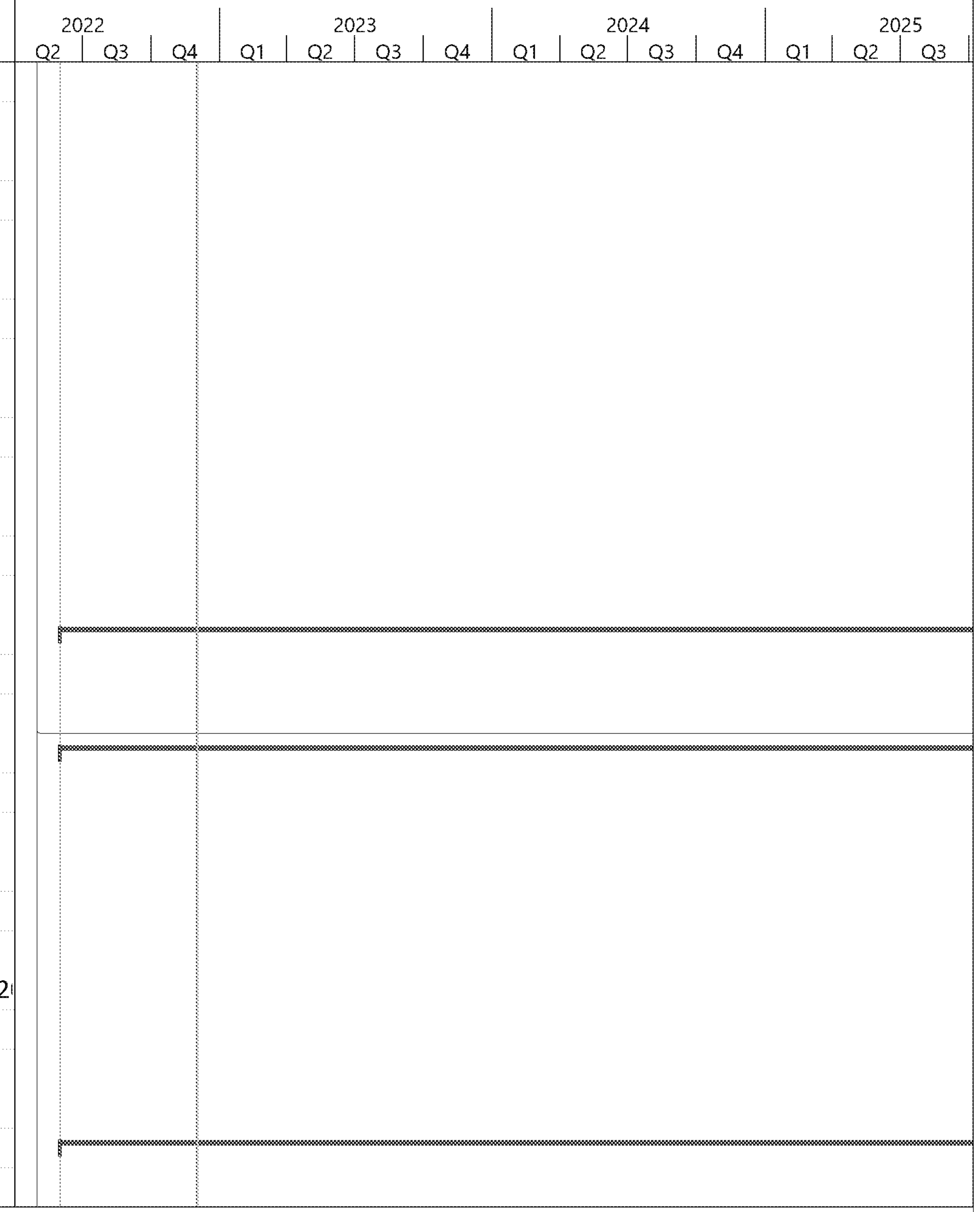
Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration	Start	Finish	Predecessors
312			Place Rip Rap	145 days	Wed 3/29/28	Tue 10/17/28	311FF+10 days
313			Site Reclamation and Topsoil Replacement	60 days	Wed 8/23/28	Tue 11/14/28	312FF+20 days
314		C1-SD8B.1	**Saddle Dam 8B - Spillway**	**257 days**	**Fri 3/5/27**	**Mon 2/28/28**	**295**
315			[redacted]	50 days	Fri 3/5/27	Thu 5/13/27	295,119
316			[redacted]	20 days	Fri 3/5/27	Thu 4/1/27	295,296,297,119
317			SD 8B - Foundation Cleaning	20 days	Fri 4/2/27	Thu 4/29/27	316
318			SD 8B - Dental Excavation and Concrete	20 days	Fri 4/16/27	Thu 5/13/27	317SS+10 days
319			SD 8B - Grout Cap	12 days	Fri 5/14/27	Mon 5/31/27	318,315
320			SD 8B - Foundation Grouting	45 days	Tue 6/1/27	Mon 8/2/27	319
321			SD 8B - Mass Concrete	120 days	Tue 8/3/27	Mon 1/17/28	320
322			SD 8B - Bridge	30 days	Tue 1/18/28	Mon 2/28/28	321
323			SD 8B - Clay Backfill	20 days	Tue 10/26/27	Mon 11/22/27	321SS+60 days
324			SD 8B - Riprap and Drain Gravel	3 days	Tue 11/23/27	Thu 11/25/27	323
325			Rim Grouting	171 days	Fri 3/5/27	Fri 10/29/27	171
326			**Sites Dam Construction**	**1997 days?**	**Wed 6/1/22**	**Thu 1/24/30**	
327			**Land Acquisition**	1 day?	Tue 10/4/22	Tue 10/4/22	
328			**Land Fee title Aqquisition (for cultural)**	1 day?	Tue 10/4/22	Tue 10/4/22	
329			**Permitting (Working Conceptual Draft)**	**911 days**	**Wed 6/1/22**	**Wed 11/26/2**	
372			**Sites Dam Preliminary Work**	**100 days**	**Fri 10/29/27**	**Thu 3/16/28**	
373			[redacted]	100 days	Fri 10/29/27	Thu 3/16/28	187,83,124,8
374			Erosion and Sediment Control	100 days	Fri 10/29/27	Thu 3/16/28	373SS
375			Clearing / Grubbing Topsoil Salvage from Work Areas	100 days	Fri 10/29/27	Thu 3/16/28	373SS
376			Demolition	50 days	Fri 11/12/27	Thu 1/20/28	373SS+10 days
377		C1-Sites.1	Sites Dam - Foundation Excavation	200 days	Fri 12/10/27	Thu 9/14/28	373SS+20 days,374SS+2
378		**C1-Sites.2**	**Sites Diversion Outlet Facility**	**570 days**	**Fri 11/19/27**	**Thu 1/24/30**	
387		**C1-Sites.3**	**Sites Dam - Foundation Preparation and Grouting**	**165 days**	**Fri 4/21/28**	**Thu 12/7/28**	
393		**C1-Sites.4**	**Sites Dam - Embankment**	**435 days**	**Fri 3/17/28**	**Thu 11/15/29**	
402			**Golden Gate Dam Construction**	**2251 days?**	**Wed 6/1/22**	**Wed 1/15/31**	
403			**Land Acquisition**	1 day?	Tue 10/4/22	Tue 10/4/22	



Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task	Inactive Milestone	Start-only	Critical Split
Split	Inactive Summary	Finish-only	Progress
Milestone	Manual Task	External Tasks	Manual Progress
Summary	Duration-only	External Milestone	
Project Summary	Manual Summary Rollup	Deadline	
Inactive Task	Manual Summary	Critical	

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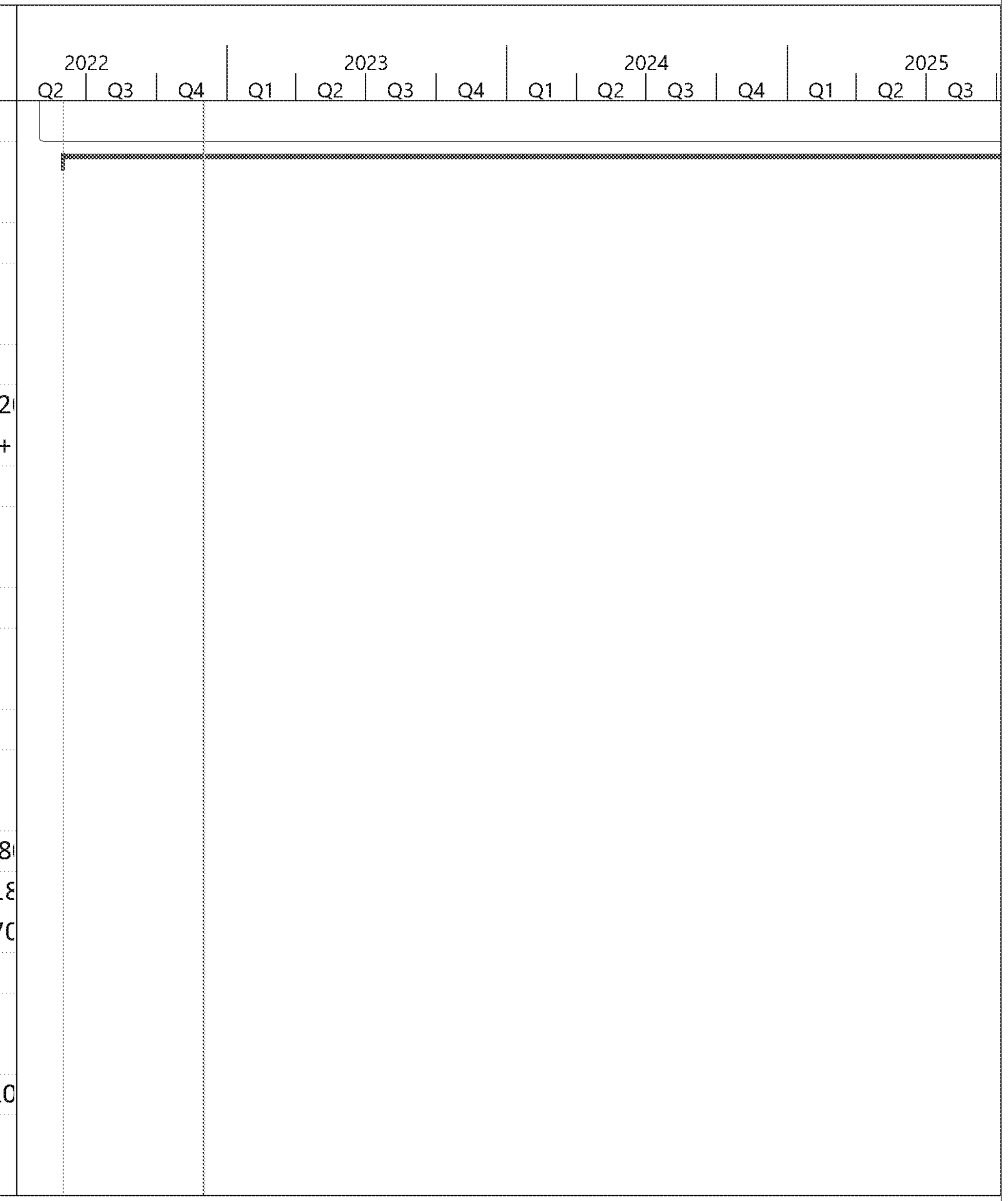
Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration	Start	Finish	Predecessors
404			**Land Fee title Aqquisition (for cultural)**	1 day?	Tue 10/4/22	Tue 10/4/22	
405			**Permitting (Working Conceptual Draft)**	**911 days**	**Wed 6/1/22**	**Wed 11/26/2**	
448			**GG Dam Preliminary Work**	**100 days**	**Thu 9/30/27**	**Wed 2/16/28**	
449			[redacted]	100 days	Thu 9/30/27	Wed 2/16/28	124,47,8,183
450			Erosion and Sediment Control	100 days	Thu 9/30/27	Wed 2/16/28	449SS
451			Clearing / Grubbing Topsoil Salvage from Work Areas	100 days	Thu 9/30/27	Wed 2/16/28	449SS
452			Demolition	50 days	Thu 10/14/27	Wed 12/22/27	449SS+10 days
453		C1-GG.1	GG Dam - Foundation Excavation (Some Dbl Shift)	200 days	Thu 11/11/27	Wed 8/16/28	449SS+20 days,450SS+2
454		C1-GG.2	GG Dam - Bypass Pipeline and U/S Cofferdam	70 days	Thu 3/30/28	Wed 7/5/28	449SS+100 days,450SS+
455		**C1-GG.3**	**GG Dam - Foundation Preparation and Grouting**	**215 days**	**Thu 4/20/28**	**Wed 2/14/29**	
456			Foundation Cleaning	100 days	Thu 4/20/28	Wed 9/6/28	453FF+15 days
457			Dental Excavation and Concrete	80 days	Thu 5/25/28	Wed 9/13/28	453FF+20 days
458			Grout Cap	100 days	Thu 6/22/28	Wed 11/8/28	457SS+20 days,58
459			Consolidation Grouting	125 days	Thu 7/6/28	Wed 12/27/2	458SS+10 days
460			Curtain Grouting	150 days	Thu 7/20/28	Wed 2/14/29	459SS+10 days
461		**C1-GG.4**	**GG Dam - Embankment**	**660 days**	**Thu 7/6/28**	**Wed 1/15/31**	**454**
462			[redacted]	40 days	Thu 7/6/28	Wed 8/30/28	449,450,451
463			[redacted]	120 days	Thu 7/6/28	Wed 12/20/2	449,450,451
464			Place Zone 1 - Core	525 days	Thu 11/9/28	Wed 11/13/3	462SS+20 days,460SS+8
465			Place Zone 2A & 2B - Filters, Drains and Transitions	525 days	Thu 11/9/28	Wed 11/13/3	464SS,206SS+30 days,18
466			Place Zone 3 - Rockfill (Some Dbl Shift)	525 days	Thu 11/9/28	Wed 11/13/3	465SS,463SS+40 days,70
467			Place Zone 4 - Random (Some Dbl Shift)	525 days	Thu 11/9/28	Wed 11/13/3	466SS,70
468			Place Rip Rap	475 days	Thu 2/8/29	Wed 12/4/30	467FF+15 days
469			Site Reclamation and Topsoil Replacement	120 days	Thu 8/1/30	Wed 1/15/31	468FF+30 days
470			Dams Ready for Commissioning	0 days	Wed 1/15/31	Wed 1/15/31	125,207,402,326,325,20
471			Dams Startup and Commissioning	90 days	Thu 1/16/31	Wed 5/21/31	470
472			Substantial Completion	0 days	Wed 5/21/31	Wed 5/21/31	471



Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
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Critical
Critical Split
Progress
Manual Progress

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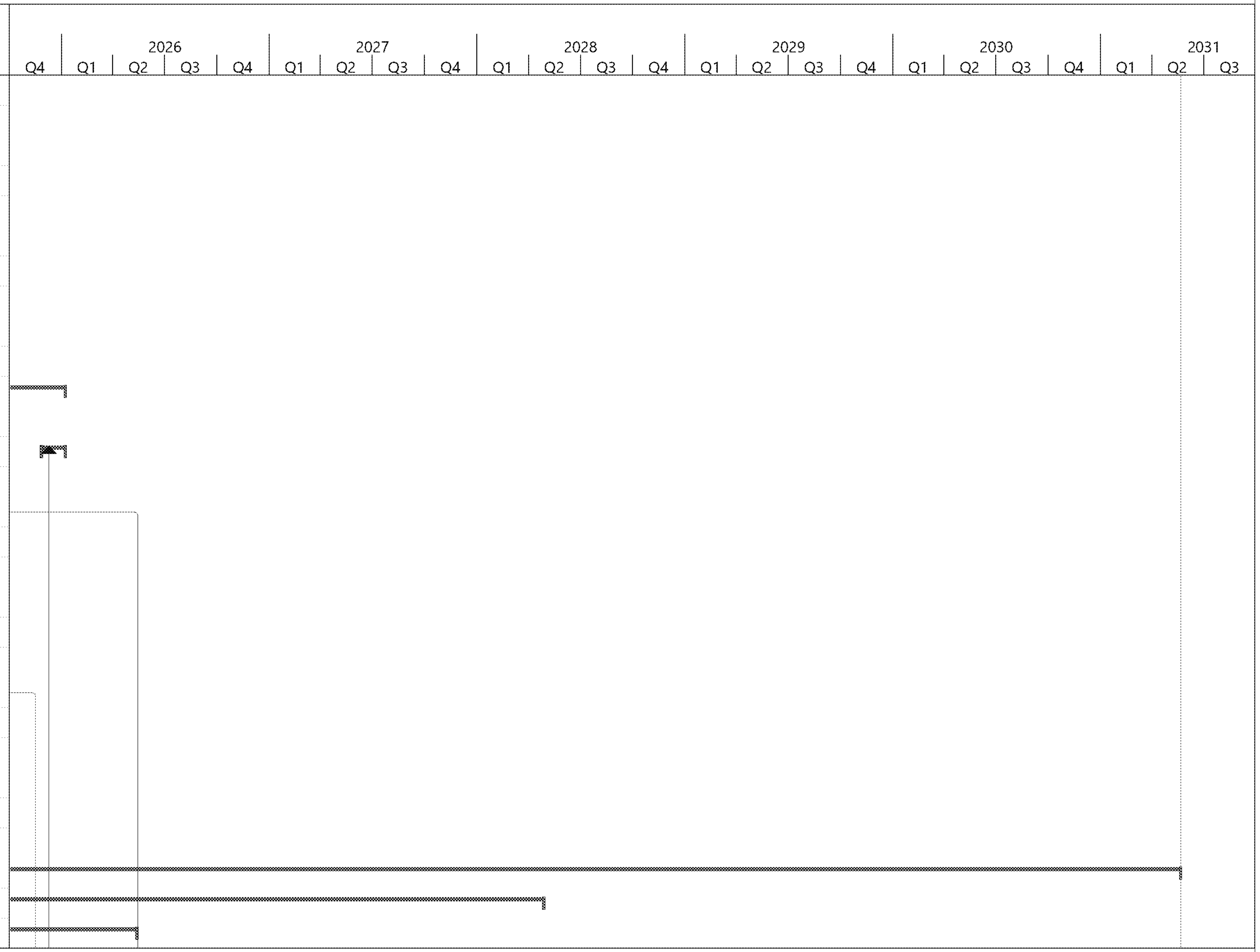
Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration
1			CWC Award of Funds	0 days
2			Sites Board Approval/NTP for Phase 3	23 days
3			Determine Engineering Procurement & Delivery Method	0 days
4			CMAR Solicitation and Procurement	8 mons
5			**Real Estate**	**145 days**
6			**Land Access and Acquisition**	**144 days**
10			**Land Use**	**0 days**
12			**Environmental**	**360 days**
13			Environmental Surveys	6 mons
14			Environmental Permitting and Certification	12 mons
15			**Water**	**852 days?**
16			Water Rights Acquisition (Permanent)	1 day?
17			**Construction Water**	**30 days**
20			**Sites Reservoir Geotechnical Investigations**	**748 days?**
21			P1 Geotech Investigation (30% Cutoff)	230 days
22			**Land Access**	1 day?
23			<New Task>	1 day?
24			[redacted]	76 wks
25			**Land Access**	1 day?
26			<New Task>	1 day?
27			[redacted]	76 wks
28			**Land Access**	1 day?
29			<New Task>	1 day?
30			[redacted]	26 wks
31			**Land Access**	1 day?
32			<New Task>	1 day?
33			**Reservoir Facilities**	**2341 days?**
34			**Engineering - Dams**	**1215 days**
120			**CMAR Procurement**	**356 days**



Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task; Split; Milestone; Summary; Project Summary; Inactive Task; Inactive Milestone; Inactive Summary; Manual Task; Duration-only; Manual Summary Rollup; Manual Summary; Start-only; Finish-only; External Tasks; External Milestone; Deadline; Critical; Critical Split; Progress; Manual Progress

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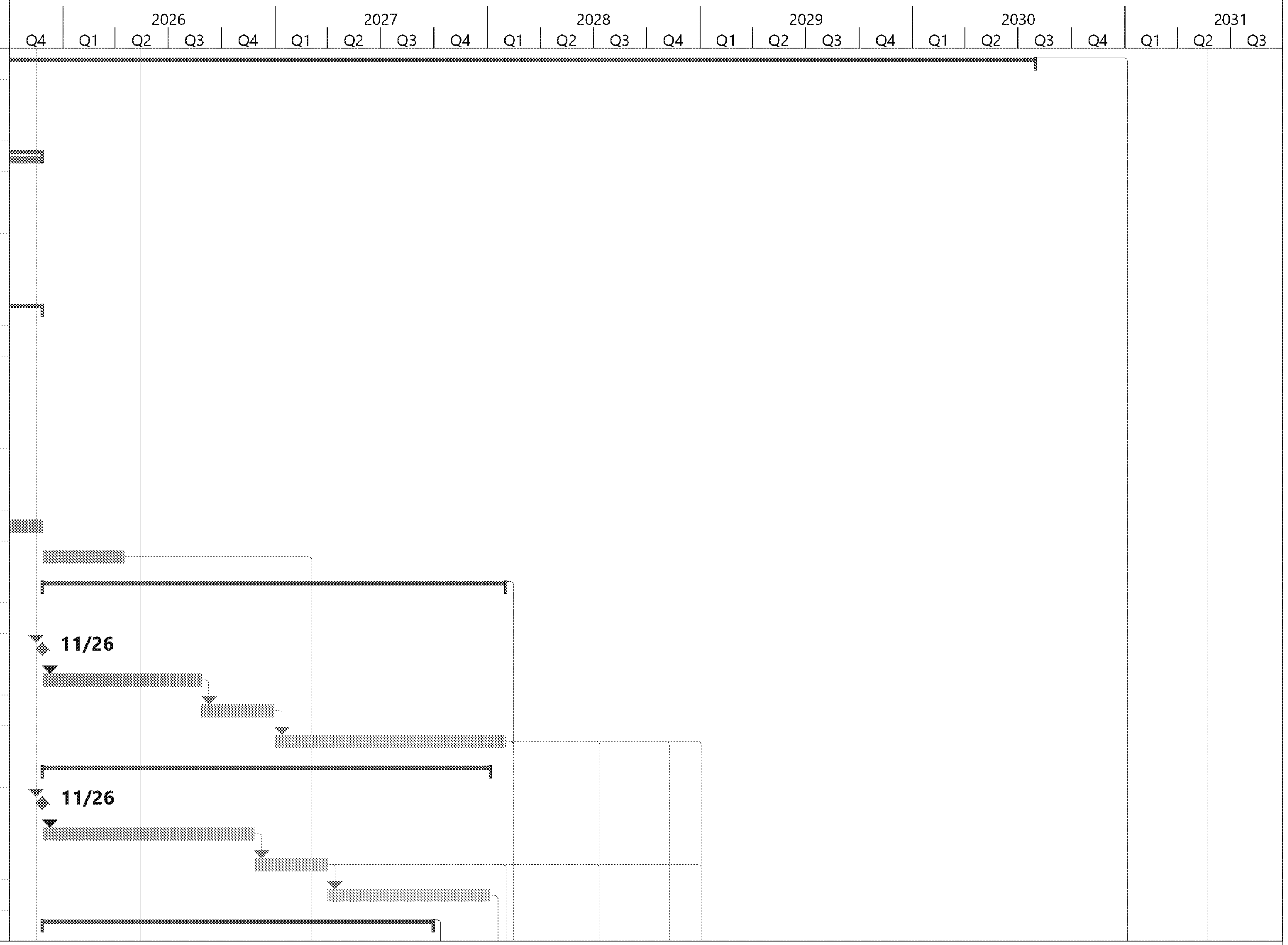
Sites Reservoir
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration
125			**Roads, Bridges, Access, and Site Development**	**2131 days?**
126			**Land Access**	1 day?
127			**Land Aqquisition (for cultural and misc bio)**	1 day?
128			**Permitting (Working Conceptual Draft)**	**911 days**
129			**Bio**	**614 days**
160			**Secure Mitigation**	**305 days**
161			Precon Avoidance (GGS, Avian, mammal, other CEQA spp)	20 days
162			Secure LOC/Implement Mitigation Prior to Take	1 day
163			**Cultural Work**	**905 days**
164			Cultural Survey	154 days
165			Evaluation	174 days
166			Final PA and PHPMP	345 days
167			Finding of No Adverse Effect	40 days
168			Finding of Adverse Effect	40 days
169			Develop Treatment Plan	260 days
170			Implement Treatment Plan	260 days
171			[redacted]	100 days
172			**Northern Construction Access Roads (CR 68, CR 69, N. Rd)**	**569 days?**
173			Preliminary Design	1 day?
174			Geotechnical Data	0 days
175			Final Design	39 wks
176			Procurement and NTP	90 days
177		C1-RB1	[redacted]	284 days
178			**County Roads F, D, McDermott, Delevan**	**550 days**
179			Geotechnical Data	0 days
180			Final Design	52 wks
181			Procurement and NTP	90 days
182		C1-RB2	[redacted]	200 days
183			**Southern Construction Access Roads (Maxwell-Sites, Shoo-fly, A-1)**	**480 days**



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Split	Inactive Summary	Finish-only	Progress
Milestone	Manual Task	External Tasks	Manual Progress
Summary	Duration-only	External Milestone	
Project Summary	Manual Summary Rollup	Deadline	
Inactive Task	Manual Summary	Critical	

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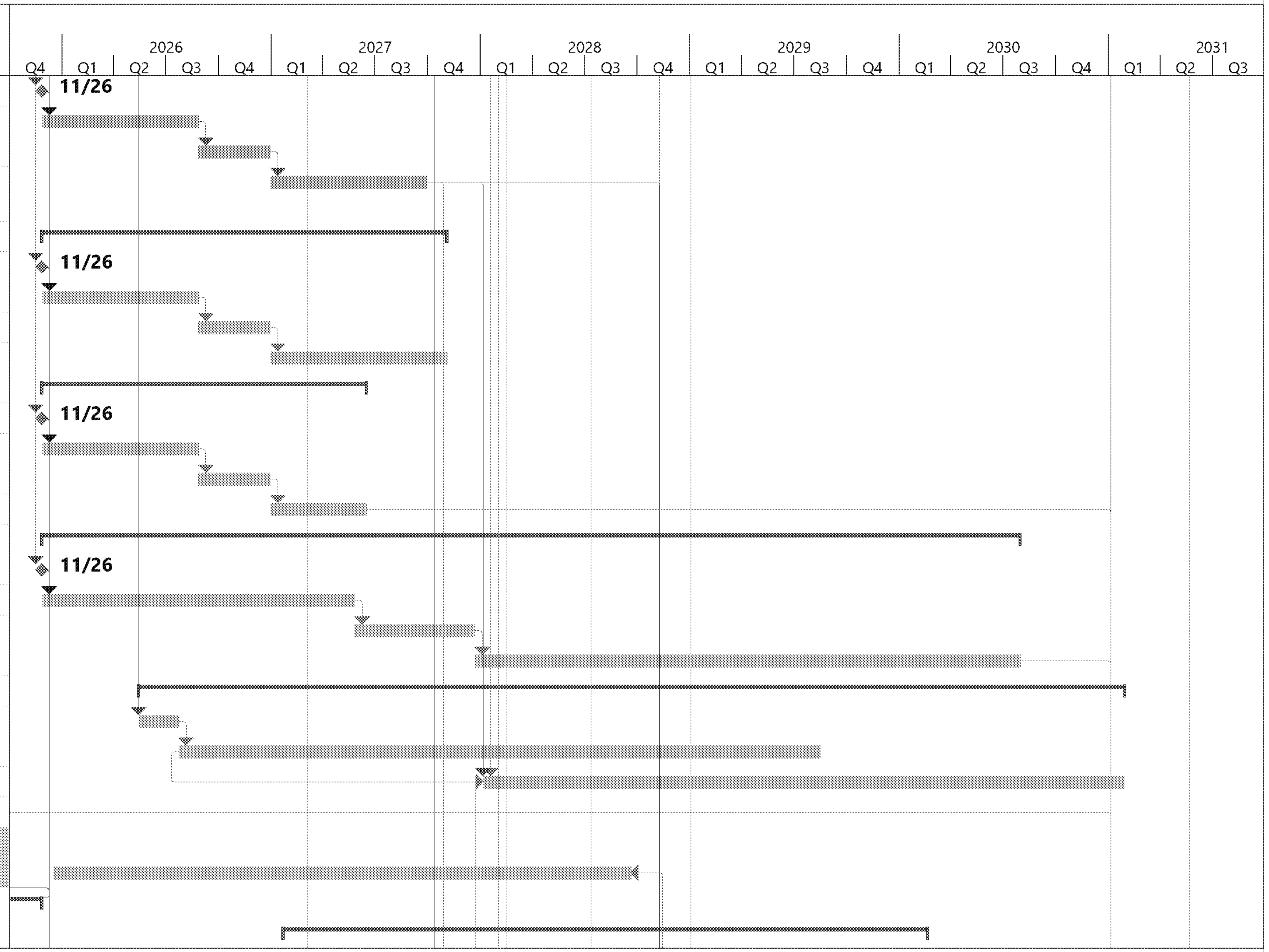
DRAFT Preliminary Construction Schedule
HR Facilities Alt 2 - 1.5 MAF
Roadways, Dams, and I/O Facilities
October 2022

ID	Task Mode	Construction Package	Task Name	Duration
184			Geotechnical Data	0 days
185			Final Design	39 wks
186			Procurement and NTP	90 days
187		C1-RB3	[redacted]	195 days
188			**Ancillary Roads B1, B2, C1, C2, Comm N., Comm South**	**505 days**
189			Geotechnical Data	0 days
190			Final Design	39 wks
191			Procurement and NTP	90 days
192		C1-RB4	[redacted]	220 days
193			**Stone Corral Recreation Road to Sites Dam**	**405 days**
194			Geotechnical Data	0 days
195			Final Design	39 wks
196			Procurement and NTP	90 days
197		C1-RB5	[redacted]	120 days
198			**Sites Lodoga Road Realignment and Bridge**	**1220 days**
199			Geotechnical Data	0 days
200			Final Design	78 wks
201			Procurement and NTP	150 days
202		C1-RB6	[redacted]	680 days
203			**Process and Haul Filter Materials to Project**	**1229 days**
204			Offsite Quarry Development	50 days
205			Process Filter Materials	800 days
206		C1-FM1	[redacted]	800 days
207			**Saddle Dams Construction**	1 day?
208			**Land Acquisition**	270 days
209			**Land Fee title Aqquisition (for cultural)**	720 days
210			**Permitting (Working Conceptual Draft)**	**911 days**
253			**Saddle Dam 3**	**803 days**



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HR Facilities Alt 2 - 1.5 MAF
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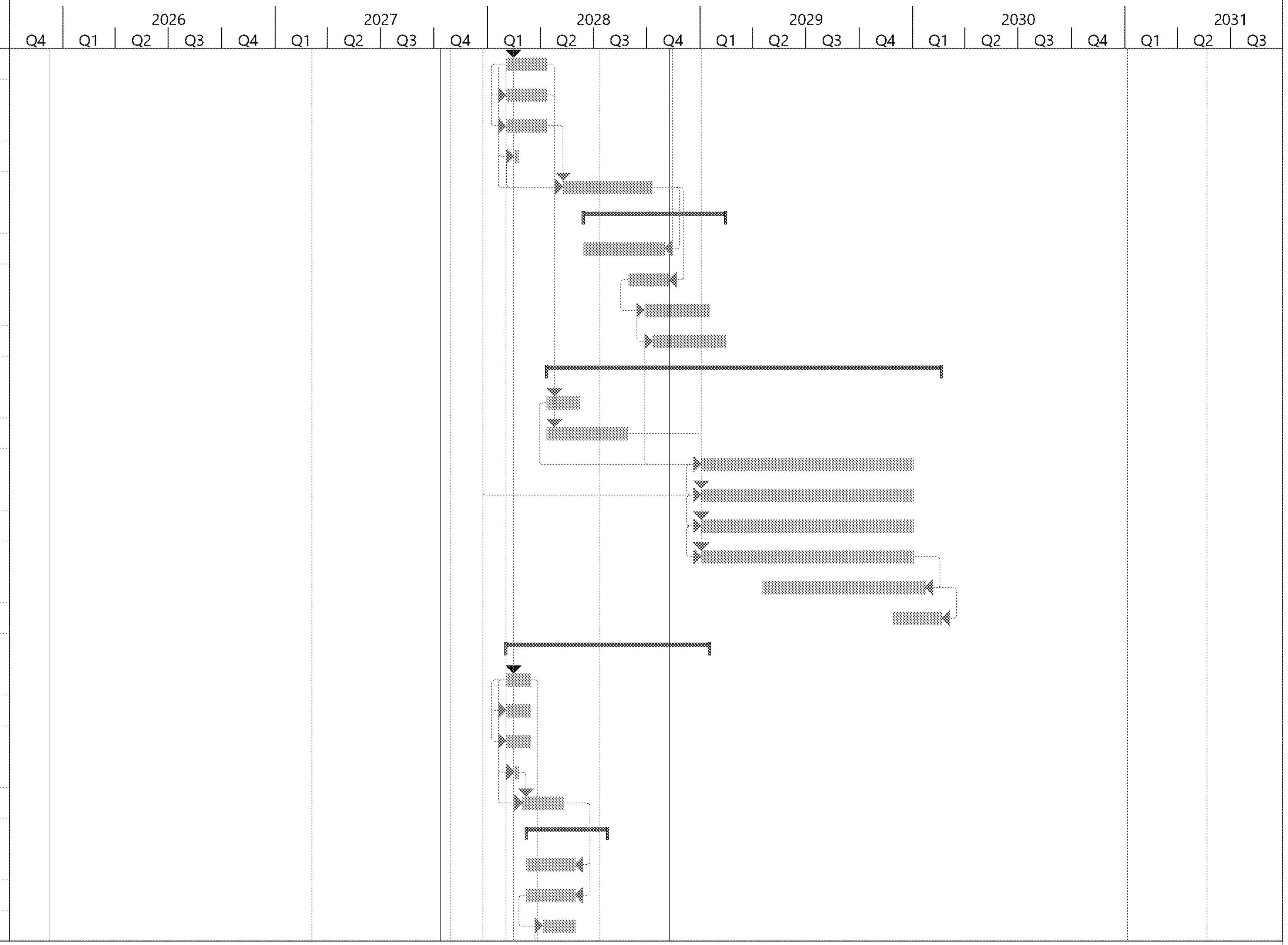
October 2022

ID	Task Mode	Construction Package	Task Name	Duration
254			[redacted]	50 days
255			Erosion and Sediment Control	50 days
256			Clearing / Grubbing Topsoil Salvage from Work Areas	50 days
257			Demolition	5 days
258		C1-SD3.1	Saddle Dam 3 - Foundation Excavation (Dbl Shift)	110 days
259		C1-SD3.2	**Saddle Dam 3 - Foundation Preparation and Grouting**	**175 days**
260			Foundation Cleaning	100 days
261			Dental Excavation and Concrete	50 days
262			Grout Cap	80 days
263			Curtain Grouting	90 days
264		C1-SD3.3	**Saddle Dam 3 - Embankment**	**485 days**
265			[redacted]	40 days
266			[redacted]	100 days
267			Place Zone 1 - Core	260 days
268			Place Zone 2A & 2B - Filters, Drains and Transitions	260 days
269			Place Zone 3 - Rockfill	260 days
270			Place Zone 4 - Random	260 days
271			Place Rip Rap	200 days
272			Site Reclamation and Topsoil Replacement	60 days
273			**Saddle Dam 5**	**250 days**
274			[redacted]	30 days
275			Erosion and Sediment Control	30 days
276			Clearing / Grubbing Topsoil Salvage from Work Areas	30 days
277			Demolition	5 days
278		C1-SD5.1	Saddle Dam 5 - Foundation Excavation	50 days
279		C1-SD5.2	**Saddle Dam 5 - Foundation Preparation and Grouting**	**100 days**
280			Foundation Cleaning	60 days
281			Dental Excavation and Concrete	60 days
282			Grout Cap	40 days



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HR Facilities Alt 2 - 1.5 MAF
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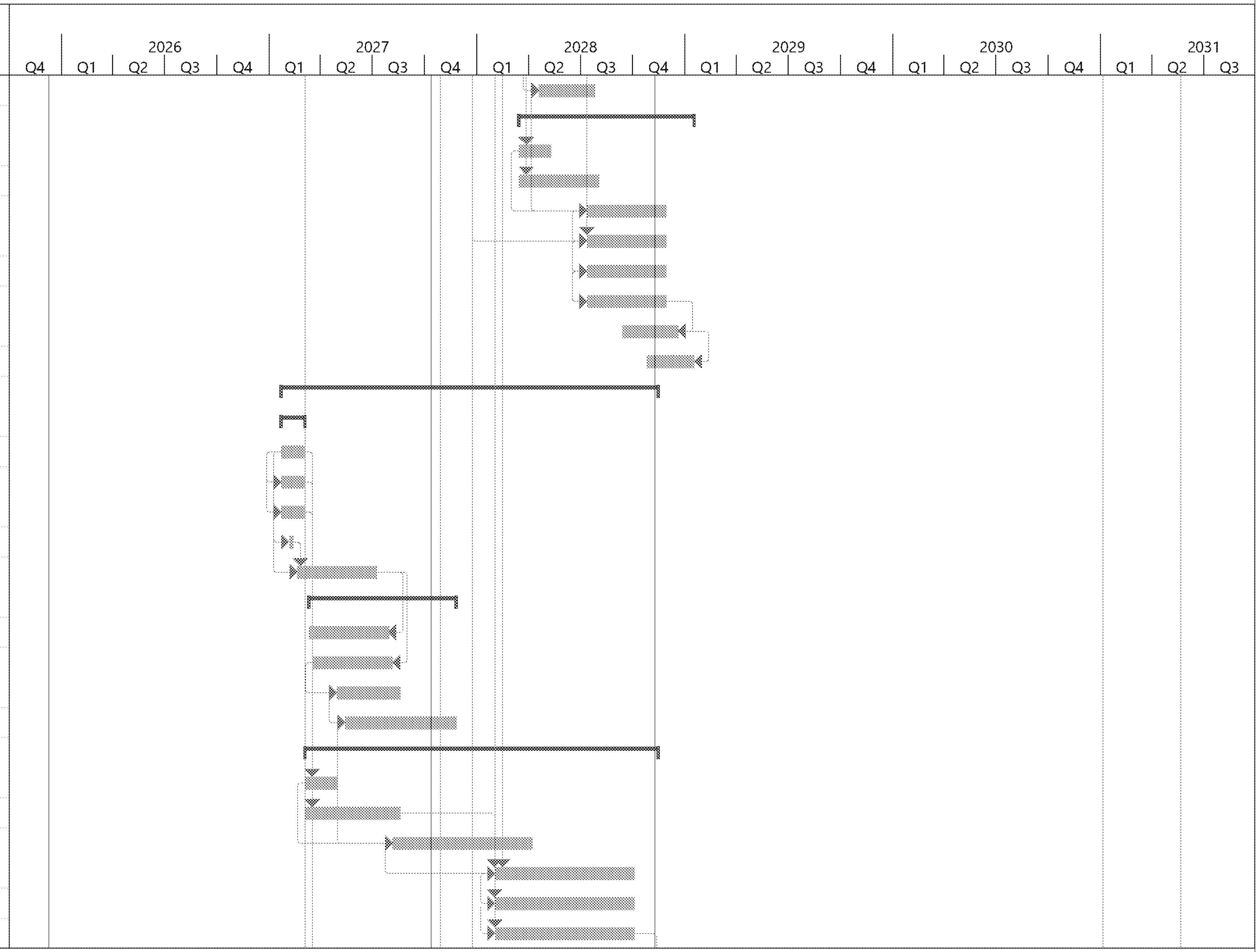
ID	Task Mode	Construction Package	Task Name	Duration
283			Curtain Grouting	70 days
284		C1-SD5.3	**Saddle Dam 5 - Embankment**	**220 days**
285			[redacted]	40 days
286			[redacted]	100 days
287			Place Zone 1 - Core	100 days
288			Place Zone 2A & 2B - Filters, Drains and Transitions	100 days
289			Place Zone 3 - Rockfill	100 days
290			Place Zone 4 - Random	100 days
291			Place Rip Rap	70 days
292			Site Reclamation and Topsoil Replacement	60 days
293			**Minor Saddle Dams (SD1,SD2,SD6,SD8A, Dike 1, and Dike 2)**	**473 days**
294			**Minor Saddle Dams Preliminary Work**	**30 days**
295			[redacted]	30 days
296			Erosion and Sediment Control	30 days
297			Clearing / Grubbing Topsoil Salvage from Work Areas	30 days
298			Demolition	5 days
299		C1-SDM.1	Minor Saddle Dams - Foundation Excavation	100 days
300		C1-SDM.2	**Minor Saddle Dams - Foundation Preparation and Grouting**	**185 days**
301			Foundation Cleaning	100 days
302			Dental Excavation and Concrete	100 days
303			Grout Cap	80 days
304			Curtain Grouting	140 days
305		C1-SDM.3	**Minor Saddle Dams - Embankment**	**443 days**
306			[redacted]	40 days
307			[redacted]	120 days
308			Place Zone 1 - Core	175 days
309			Place Zone 2A & 2B - Filters, Drains and Transitions	175 days
310			Place Zone 3 - Rockfill	175 days
311			Place Zone 4 - Random	175 days



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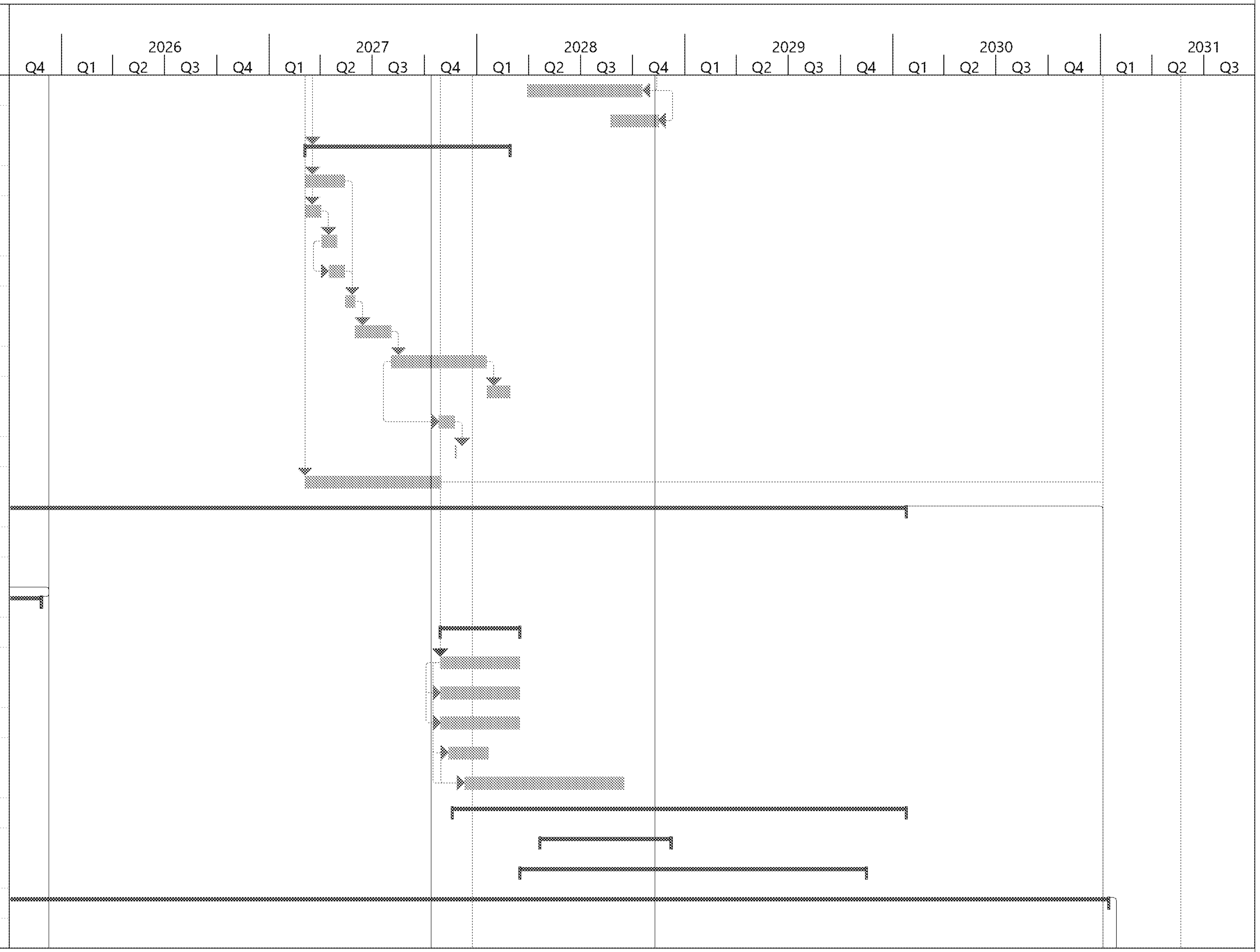
ID	Task Mode	Construction Package	Task Name	Duration
312			Place Rip Rap	145 days
313			Site Reclamation and Topsoil Replacement	60 days
314		C1-SD8B.1	**Saddle Dam 8B - Spillway**	**257 days**
315			[redacted]	50 days
316			[redacted]	20 days
317			SD 8B - Foundation Cleaning	20 days
318			SD 8B - Dental Excavation and Concrete	20 days
319			SD 8B - Grout Cap	12 days
320			SD 8B - Foundation Grouting	45 days
321			SD 8B - Mass Concrete	120 days
322			SD 8B - Bridge	30 days
323			SD 8B - Clay Backfill	20 days
324			SD 8B - Riprap and Drain Gravel	3 days
325			Rim Grouting	171 days
326			**Sites Dam Construction**	**1997 days?**
327			**Land Acquisition**	1 day?
328			**Land Fee title Aqquisition (for cultural)**	1 day?
329			**Permitting (Working Conceptual Draft)**	**911 days**
372			**Sites Dam Preliminary Work**	**100 days**
373			[redacted]	100 days
374			Erosion and Sediment Control	100 days
375			Clearing / Grubbing Topsoil Salvage from Work Areas	100 days
376			Demolition	50 days
377		C1-Sites.1	Sites Dam - Foundation Excavation	200 days
378		**C1-Sites.2**	**Sites Diversion Outlet Facility**	**570 days**
387		**C1-Sites.3**	**Sites Dam - Foundation Preparation and Grouting**	**165 days**
393		**C1-Sites.4**	**Sites Dam - Embankment**	**435 days**
402			**Golden Gate Dam Construction**	**2251 days?**
403			**Land Acquisition**	1 day?



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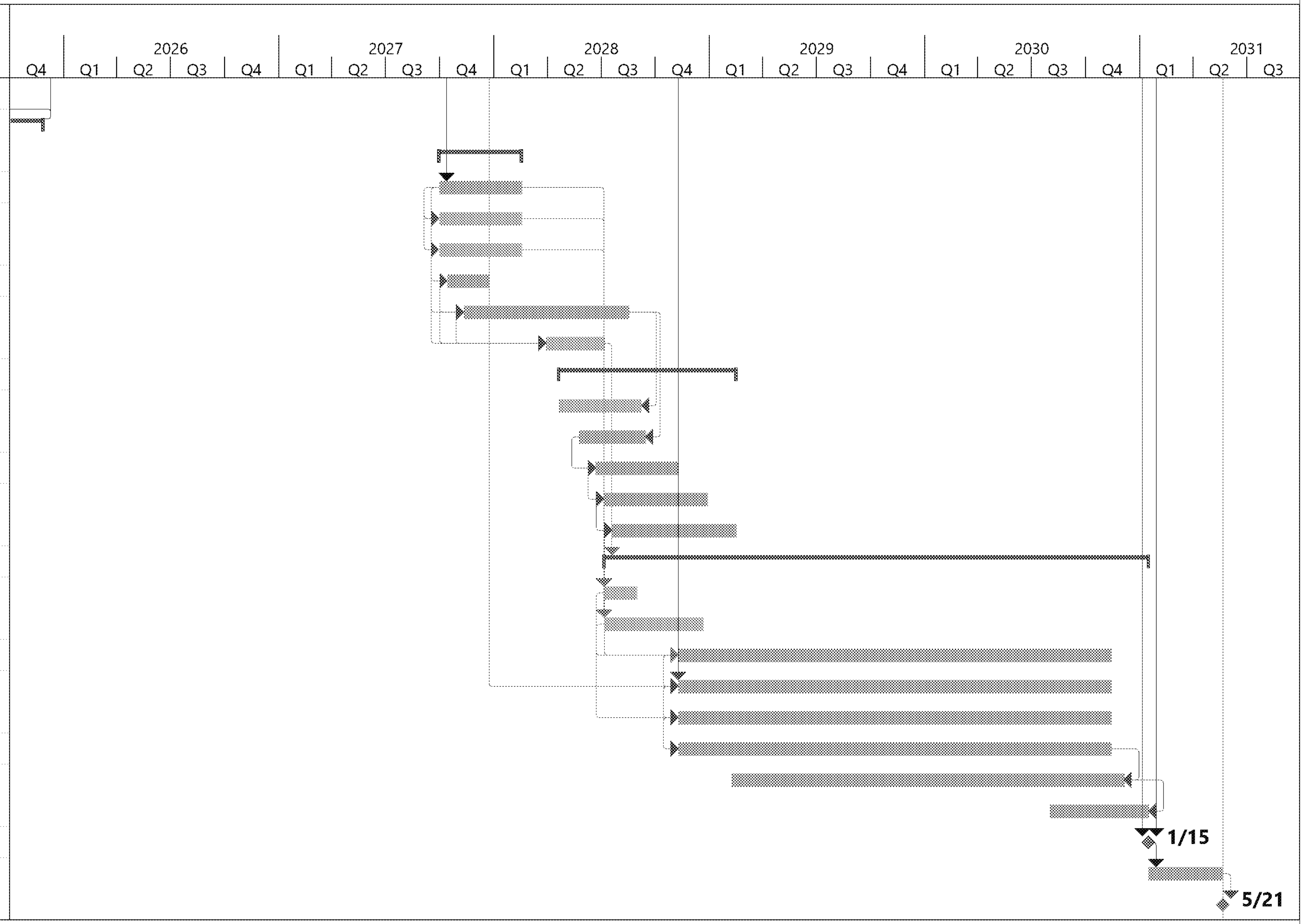
October 2022

ID	Task Mode	Construction Package	Task Name	Duration
404			**Land Fee title Aqquisition (for cultural)**	1 day?
405			**Permitting (Working Conceptual Draft)**	**911 days**
448			**GG Dam Preliminary Work**	**100 days**
449			[redacted]	100 days
450			Erosion and Sediment Control	100 days
451			Clearing / Grubbing Topsoil Salvage from Work Areas	100 days
452			Demolition	50 days
453		C1-GG.1	GG Dam - Foundation Excavation (Some Dbl Shift)	200 days
454		C1-GG.2	GG Dam - Bypass Pipeline and U/S Cofferdam	70 days
455		**C1-GG.3**	**GG Dam - Foundation Preparation and Grouting**	**215 days**
456			Foundation Cleaning	100 days
457			Dental Excavation and Concrete	80 days
458			Grout Cap	100 days
459			Consolidation Grouting	125 days
460			Curtain Grouting	150 days
461		**C1-GG.4**	**GG Dam - Embankment**	**660 days**
462			[redacted]	40 days
463			[redacted]	120 days
464			Place Zone 1 - Core	525 days
465			Place Zone 2A & 2B - Filters, Drains and Transitions	525 days
466			Place Zone 3 - Rockfill (Some Dbl Shift)	525 days
467			Place Zone 4 - Random (Some Dbl Shift)	525 days
468			Place Rip Rap	475 days
469			Site Reclamation and Topsoil Replacement	120 days
470			Dams Ready for Commissioning	0 days
471			Dams Startup and Commissioning	90 days
472			Substantial Completion	0 days



Draft Preliminary Sites 1.5 MAF Alt 2 Construction Schedule - Potential Early Start Dates - ES-10-28-2022

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Critical | Critical Split | Progress | Manual Progress

The dates, durations and sequencing shown are based on limited project information.
Additional information aquired, CMAR's approach to the work and other factors will result in a different approach to the work, sequencing, durations and dates.

From: Newens, Richard [Richard.Newens@hdrinc.com]
Sent: 12/5/2022 4:39:07 PM
To: JP Robinette [jrobinette@sitesproject.org]; Cheyanne Harris [CHarris@BrwnCald.com]
Subject: CBD Expanded Discussion
Attachments: CBD_Toolbox_Working_2022_1101.docx

Hi JP and Cheyanne:

Hope you're well and had a good holiday break. Below are some points for discussion tomorrow morning (in no particular order):

- Toolbox Update(s)
  - Toolbox document is attached (for reference, no new material since last discussion).
  - I need to update summaries for constituents of concern, develop a visual/timeline showing when monitoring in the CBD occurs along with other relevant activity (e.g. Sites releases), brainstorm more useful maps/visuals

- CBD Project Management/Additional Tasks
  - In concluding our previous discussion, JP mentioned I may be able to help with additional components and/or process pertaining to the CBD. It was left fairly vague with the intention of clarification during this discussion

- Next Steps/Milestones

Please let me know if you have any questions or would like to add anything.

Richard Newens, M.S.

HDR
2379 Gateway Oaks Dr., #200
Sacramento, CA 95833
D 916-679-8883 M 916-719-7800
Richard.Newens@hdrinc.com

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Sites

Next Steps

- LOCAL → Water quality improvements in CBD and ridge cut due to Sites releases
    - Improvements only occurs if Sites conveys water through CBD
    - Local stakeholders must report and monitor for pesticides
- REGIONAL → Sites releases could benefit broader Central Valley water quality management efforts if timing coincides (if planned operations naturally overlap)

Toolbox (working)

Goal to develop "toolbox" to use for communicating with Sites project area stakeholders regarding water quality in the region and Colusa Basin Drain (CBD).

CBD Constituents of Concern

- The CBD is a man-made channel in Glenn, Colusa, and Yolo counties designed to convey agricultural return flows and storm runoff from the Colusa Basin to the Sacramento River at the Knights Landing Outfall Gates (KLOG).
- The CBD receives inflow from local creeks (inc. Funks and Stone Corral Creeks) and discharge and runoff from the Colusa agricultural basin.

Table 1. Summary of Sites Release Impacts on Constituents of Concern in CBD.

Constituent	Significance	Summary
Metals		Sites releases expected to decrease metals concentrations in CBD.
Mercury		
Pesticides		
Dissolved Oxygen		
Nutrients		
Salinity		
Temperature		

Commented [NR1]: ICF has done thorough analyses for the final EIR/EIS. RN needs to work with ICF/John Spranza to accurately translate summaries for various stakeholders.

Commented [NR2]: Pesticides in EIR/EIS selected from 303d list. There may be more recent pesticides of concern.

Next steps:
*look at Pesticide Use Report (PUR) data in study area to determine most relevant pesticides
*provide crosswalk of pesticide chemical name with common product names.

Landowners/growers will not know chemical names (e.g. lambda cyhalothrin) but will know common product names (e.g. Warrior XL).

Valley-Wide Water Quality Initiatives

Goal is to explore various water quality initiatives that may be affected by Sites releases and/or operations.

CV- SALTS

The Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) is a Central Valley Regional Water Quality Control Board (CVRWQCB) initiative to successfully develop and implement a viable salinity and nutrient management plan for CA.

Prioritization and Optimization Salt Management Study (LWA and GEI Consultants)

- CV Salts is working to develop salinity targets for the entire Central Valley
- Next step is to work on identifying study area(s) that represent different Central Valley hydrologic regions – factors include willingness of local stakeholder participation, cropping, water supply source, rainfall, soil characteristics, local water quality
- November 2022 Executive Committee meeting will include presentation to Committee regarding proposed selection criteria

P.O. Box 517
Maxwell, CA 95955
530.438.2309

Sites

Sites Operations

Goal is to inform stakeholders of high-level operations: diversions, releases, exchanges that can affect water quality.

Table 2. Sites Operations Overview.

Diversions	Releases	Exchanges
Red Bluff Pumping Plant	Tehama Colusa Canal	Bureau of Reclamation
Hamilton City Pumping Plant	Glenn Colusa Irrigation District Canal	DWR
	North of Delta (Yolo Bypass)	
	South Delta	

Figure 1. Sites Annual Operations Schedule.

Commented [NR3]: Indicate when monitoring is occurring/relevant activity → visual representation

P.O. Box 517
Maxwell, CA 95955
530.438.2309

Maps

Goal is to provide visual(s) for areas of interest and monitoring sites in study area.

Table 3. Monitoring Sites for Rice Commission and SVWQC:

Site Name	Lat	Long	EIS/EIR*	SVWQC	Cal Rice
CBD above Knights Landing	38.81248	-121.77429	x	x	x
CBD No. 5	39.18354	-122.05136		x	x
Butte Slough at Lower Pass Road	39.18717	-121.90833		x	x
Sacramento Slough Bridge near Karnak	38.78518	-121.65439		x	x
Sacramento River near Hamilton City			x		
Sacramento River below Red Bluff			x		
Sacramento River at Colusa Basin Drain			x		
Yolo Bypass Toe Drain near Babel Slough			x		

*Monitoring site was used in EIS/EIR water quality assessment.

SharePoint Links to Maps:
RiceCommissionMonitoringLocations.pdf
SVWQC_MonitoringLocations.pdf

Commented [NR4]: Preliminary maps – need to get input on what can be added to improve usability.

Currently only mapped Sacramento Valley Water Quality Coalition (SVWQC) and Rice Commission. Need to confirm if there are other parties in the study area.

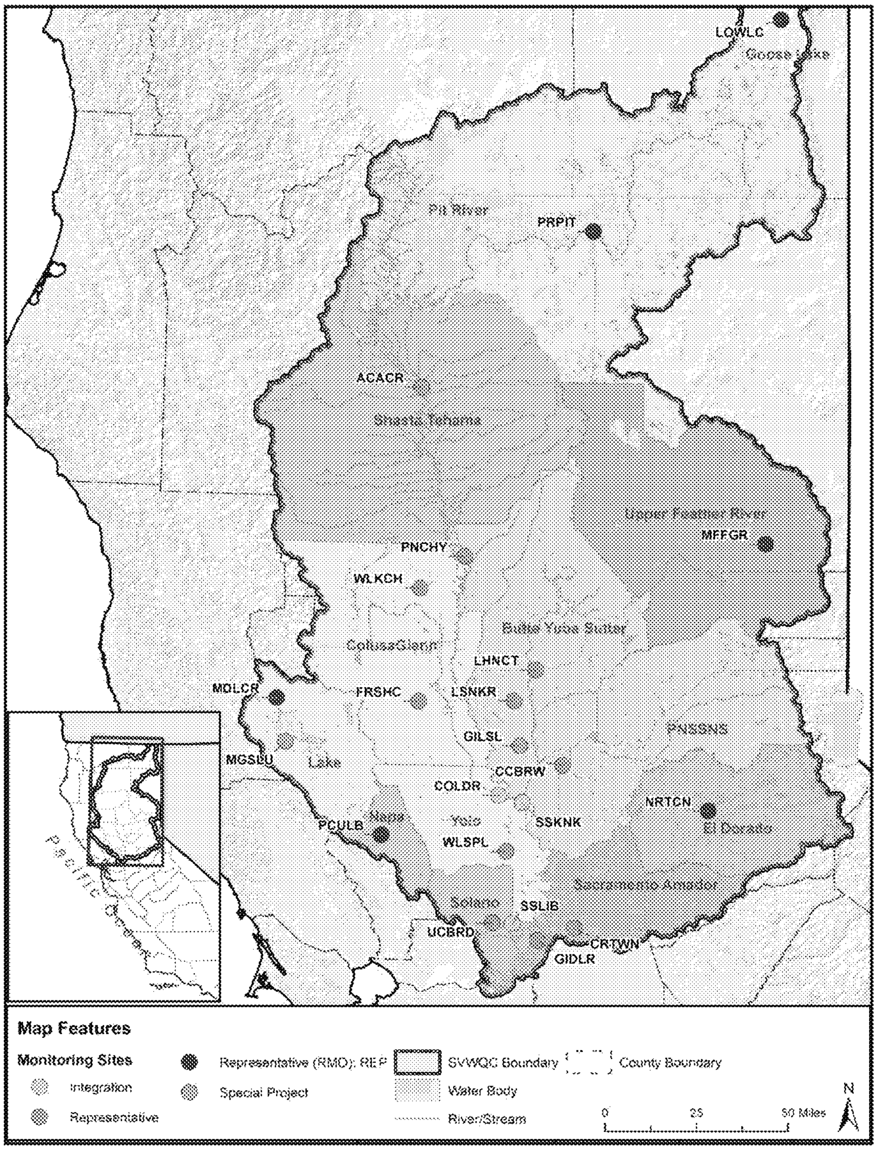
*Add monitoring sites from EIS/EIR into a map showing all monitoring sites associated with Sites?

*Create map of parcels with land use/crop types? Similar to rice parcel map but include other crops and summary.

- SVWQC monitoring sites and drainage areas within study area

Sites

- SVWQC Coalition Boundary



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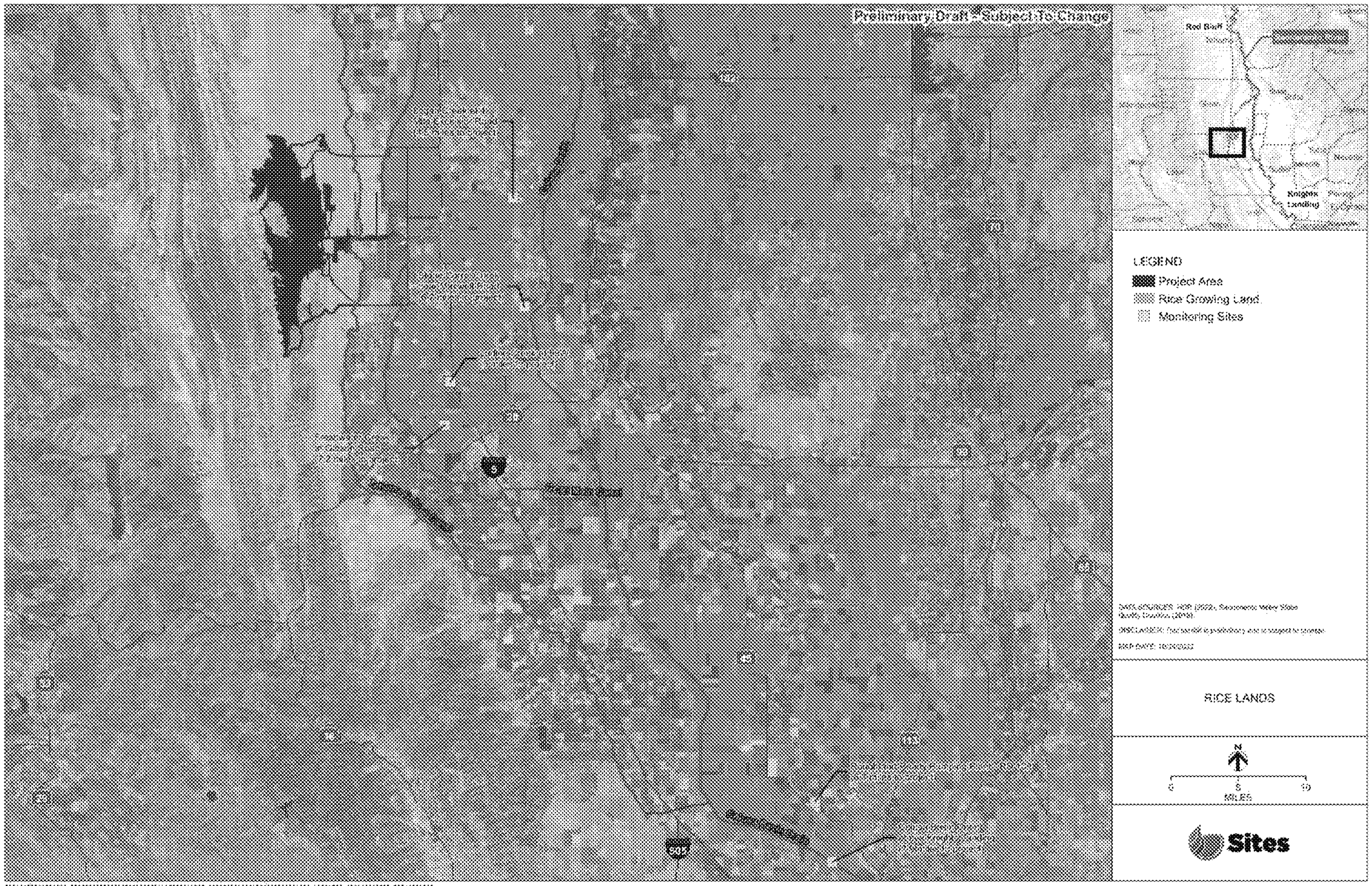
- Rice Coalition monitoring sites and parcels



Contacts of Interest (working)

Commented [NR5]: Need to confirm contact information and add new folks as they are identified.

Goal is to compile list of key contacts to eventually communicate benefits of Sites releases (or key contacts to help facilitate communication with local landowners/farmers).

Name	Agency	Title	Phone	Email
Bruce Houdesheldt	SVWQC	Director of Water Quality	916-442-8333; 916-952-1287 (m)	BruceH@norcalwater.org
Tim Johnson	Cal Rice	CEO		
Paul Buttner	Cal Rice	Environmental Affairs Manager		
Bruce Linquist	UC Davis	Rice Specialist	530-752-3125	balinquist@ucdavis.edu
Lewis Bair	RC108	General Manager		lbair@rd108.org

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Maxwell, CA 95955
530.438.2309

From: JP Robinette [jrobinette@sitesproject.org]
Sent: 12/6/2022 7:39:55 AM
To: Newens, Richard [Richard.Newens@hdrinc.com]
CC: Cheyanne Harris [CHarris@BrwnCald.com]
Subject: Re: CBD Expanded Discussion

Richard,

In preparation for our discussion today (and related to your bullet 2), I wanted to share an outline I had developed for the type of support it will take to work through issues around the CBD relative to the Sites Project. I would be interested to discuss with you where and how you might fit into this given your experience and interests.

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    1. Costs and risks of alternatives
        1. Risk-adjusted cost of "pipeline to river" option
    2. Allocation of costs and risks to Storage Partners
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    2. RD108 as Facility Partner (target cooperative agreement in Feb 2023, step 1)
    3. Approach to state agencies DWR/CDFW/EWM
    4. Organizing stakeholders
        1. Landowner "groups" for CBD and Ridge Cut?
    5. Benefits provided by Sites
        1. Water quality benefits
        2. Winter flood control
        3. Water availability
        4. Channel maintenance
    6. Water right holder concerns (along the CBD and Ridge Cut)
        1. Enforcement of water rights for taking of Sites previously stored water
        2. Accounting for contributions of other streams and water sources
        3. Groundwater recharge reduction due to impoundment of Funks and Stone Corral Creeks
    7. Impacts from Sites to be mitigated
        1. Water surface elevation during releases (localized flooding), supported by hydraulic modeling by Jacobs
            1. Seepage
            2. Flooding
3. Capital Improvements
    1. Environmental planning and permitting approach

2. Acquisitions, fee title and easements
3. Cost estimate
4. Schedule
4. Operations and Maintenance
1. Which agency performs maintenance (self-perform or contract)
2. Under what Authority is maintenance performed (i.e. delegated from CBDD or other?)
3. Changing set-points of KLOG and Wallace Weir
4. Estimated annual costs
5. Replacement costs
5. Measurement
1. Flow
2. Water Quality
3. Water Surface Elevation
6. Coordination and communication
1. Sites operations
2. Crop planning

Thanks,

JP Robinette, PE
Engineering and Construction Manager | Sites Project Authority
801-819-4306
jrobinette@sitesproject.org
www.sitesproject.org

On Dec 5, 2022, at 4:39 PM, Newens, Richard <Richard.Newens@hdrinc.com> wrote:

Hi JP and Cheyanne:

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Please let me know if you have any questions or would like to add anything.

Richard Newens, M.S.

HDR
2379 Gateway Oaks Dr., #200
Sacramento, CA 95833
D 916-679-8883 M 916-719-7800
Richard.Newens@hdrinc.com

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<CBD_Toolbox_Working_2022_1101.docx>

From: Newens, Richard [Richard.Newens@hdrinc.com]
Sent: 12/6/2022 8:30:06 AM
To: JP Robinette [jrobinette@sitesproject.org]
CC: Cheyanne Harris [CHarris@BrwnCald.com]
Subject: RE: CBD Expanded Discussion

Great – thanks JP!

Richard Newens
D 916.679.8883 M 916.719.7800

hdrinc.com/follow-us

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Tuesday, December 6, 2022 7:40 AM
To: Newens, Richard <Richard.Newens@hdrinc.com>
Cc: Cheyanne Harris <CHarris@BrwnCald.com>
Subject: Re: CBD Expanded Discussion

Richard,

In preparation for our discussion today (and related to your bullet 2), I wanted to share an outline I had developed for the type of support it will take to work through issues around the CBD relative to the Sites Project. I would be interested to discuss with you where and how you might fit into this given your experience and interests.

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1. Sites operations

2. Crop planning

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Richard Newens, M.S.

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Sacramento, CA 95833
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<CBD_Toolbox_Working_2022_1101.docx>

Biweekly EIR/EIS Meeting - Agenda

Sites

Affordable Water, Sustainably Managed

Our Core Values – Safety, Trust and Integrity, Respect for Local Communities, Environmental Stewardship, Shared Responsibility and Shared Benefits, Accountability and Transparency, Proactive Innovation, Diversity and Inclusivity
Our Commitment – To live up to these values in everything we do

Meeting Information:

Date:	December 7, 2022	**Location:**	Webex
Start Time:	11:00 a.m.	**Finish Time:**	12:00 p.m.
Purpose:	RDEIR/SDEIS Status and Coordination		

Meeting Participants:

Monique Briard, ICF	Melissa Harris, ICF
Ali Forsythe, Sites Authority	Laurie Warner Herson, Integration

Agenda:

Discussion Topic	Topic Leader	Time Allotted
1. Outstanding Questions a. Comment 72-127, add protections that will be in place to ensure implementation of mitigation before ground disturbance (suggest referencing the MMRP and any preconstruction requirements) b. Comment 77-55, revise mitigation measure VEG-1.1 to commit to plant surveys over multiple growing seasons (John S has indicated no, not at this time but he will discuss this with CDFW)	Melissa	10 min
2. Integration Tasks – Status/Questions a. Master Response 8, Trinity b. Update project description in Chapter 2 and MR2 c. 2017 RTCs	Laurie	10 min
3. Reclamation Coordination a. Status of FPPA data b. Additional of Chinese mystery snail to Final EIR/EIS c. Next NEPA meeting – need to reschedule due to David's absence; have suggested agenda items: • Any progress in discussing GHG approach with EPA • Preferred project (OMB report)	Laurie	15 min

	• Coordination with NEPA cooperating agencies for review of the Final EIR/EIS • Schedule for concurrent review of Administrative Final EIR/EIR		
4.	Schedule – Only revised next steps, need to revisit	Laurie	10 min

From: Angela Bezzone [bezzone@mbkengineers.com]
Sent: 12/7/2022 9:23:56 AM
To: 'Brian Grubbs' [grubbs@montaguederose.com]; Cheyanne Harris [CHarris@brwncald.com]
CC: JP Robinette [jrobinette@sitesproject.org]; Corey McCullough [mccullough@montaguederose.com]; Doug Montague [montague@montaguederose.com]; Josepha Miller [miller@montaguederose.com]
Subject: RE: Sites: water operational data
Attachments: SitesMetrics_rev28_2scn__ALT3A_041122_2035CT_ALT3B_041122_2035CT.pdf

Hi Brian,

Thanks for the additional explanation! You might be able to find what you need in the attached tables. I also have a call with Jacobs at 10 and will ask about the spreadsheet you shared yesterday. It may be as simple as inputting the correct CalSim outputs, but I need to confirm with Steve Micko before moving forward.

The 16% Reclamation scenario is Alternative 3B in the attached tables. It is important to note that the CalSim model runs for Alt 3B rely on a 2035 CT climate change hydrology, whereas other model runs have relied upon historical hydrology. Please let me know if you have any questions. My number is 775-450-6408 if you would like to discuss.

Angela

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Wednesday, December 7, 2022 8:59 AM
To: Angela Bezzone <bezzone@mbkengineers.com>; Cheyanne Harris <CHarris@brwncald.com>
Cc: JP Robinette <jrobinette@sitesproject.org>; Corey McCullough <mccullough@montaguederose.com>; Doug Montague <montague@montaguederose.com>; Josepha Miller <miller@montaguederose.com>
Subject: RE: Sites: water operational data

Angela,
I understand that other output I provided is not available with the new 16% Reclamation scenario.

The financial model takes the fill and releases for each partner category (Fed, State, NOD, SOD) to determine their portion of the costs to fill and release. I also understand that the Feds fill and releases more often than other partners simply due to how they use the water. The more detailed output I provided has that more active use by the Feds modeled.

So…absent a new run of this operational data, it looks like the participant storage is now 93% of what it was (col I / col C in your spreadsheet). As a temporary fix, I'll propose that I'll simply shift 7% of the fills and releases from the NOD and SOD participant and put them into the Fed bucket, and then let the costs fall out of that.
Thoughts?

Going forward, if you could find the proforma that created that data I sent you, that is the type of info the financial model needs for cost allocation. Can that be recreated…at some point in the future?

Brian Grubbs | Managing Director
Montague DeRose and Associates
916-712-1747

From: Angela Bezzone <bezzone@mbkengineers.com>
Sent: Tuesday, December 6, 2022 5:31 PM
To: 'Cheyanne Harris' <CHarris@BrwnCald.com>; 'Brian Grubbs' <grubbs@montaguederose.com>
Cc: 'JP Robinette' <jrobinette@sitesproject.org>
Subject: RE: Sites: water operational data

Here you go. The 16% Reclamation scenario using Amendment 3 participation starts in Column G. Please let me know if you need anything else.

Angela

From: Angela Bezzone
Sent: Tuesday, December 6, 2022 5:24 PM
To: 'Cheyanne Harris' <CHarris@BrwnCald.com>; Brian Grubbs <grubbs@montaguederose.com>
Cc: JP Robinette <jrobinette@sitesproject.org>
Subject: RE: Sites: water operational data

Hi Cheyanne –

Carter MWC has already been removed from the 16% and 25% scenarios in the spreadsheet. Is Colusa County the participant that adjusted their amount? It looks like their annualized participation decreased from 10,073 AF to 9,256 AF. Is that correct?

Angela

From: Cheyanne Harris <CHarris@BrwnCald.com>
Sent: Tuesday, December 6, 2022 5:19 PM
To: Angela Bezzone <bezzone@mbkengineers.com>; Brian Grubbs <grubbs@montaguederose.com>
Cc: JP Robinette <jrobinette@sitesproject.org>
Subject: RE: Sites: water operational data

Angela: not sure if it puts a wrench in your analysis, but we'll need to update the table to reflect the current A3 participation (e.g, Carter Mutual dropped out & one participant adjusted their amount) – see the new tab in the attached to reflect what I'm referring to

Brian: given the short turn-around time, I don't think we're going to get the updated info on the storage/fills/releases at this time so I imagine you can use what Erin previously provided (and we can revisit if/when needed at a later date)

Thanks.

Cheyanne Harris, P.E.*
Brown and Caldwell | Sacramento, CA
T 916.853.5349 | C 916.628.2352 | CHarris@brwncald.com
Pronouns: she/her/hers
*Professional Registration in California

From: Angela Bezzone <bezzone@mbkengineers.com>
Sent: Tuesday, December 6, 2022 4:35 PM
To: Cheyanne Harris <CHarris@BrwnCald.com>; Brian Grubbs <grubbs@montaguederose.com>
Subject: RE: Sites: water operational data

Hi Brian & Cheyanne –

Attached is a working spreadsheet which shows participants taking a proportionate reduction in storage allocation to make room for Reclamation at 16%.

In regard to the other spreadsheet re: storage/fills/releases. That looks like it came from a Proforma modeling exercise and is not a spreadsheet that has been produced. Is there specific information that is needed? The Reclamation at 16% scenario has been modeled, and information is available in other formats. But it might take a little time to pull together what is needed. Please let me know!

Thanks,
Angela

From: Cheyanne Harris <CHarris@BrwnCald.com>
Sent: Tuesday, December 6, 2022 3:19 PM
To: Angela Bezzone <bezzone@mbkengineers.com>
Cc: Brian Grubbs <grubbs@montaguederose.com>
Subject: RE: Sites: water operational data

Angela,

To clarify, I don't know if you have the water storage/fills/releases info readily available; however, Jerry mentioned that you have a table showing Participation levels (with Reclamation at 16% storage allocation) and (potentially a second table) showing the existing Participants taking a proportionate reduction in participation to account for Reclamation's increase – which would be helpful to have to inform the variable O&M portion of the Financial model for the Indicative Rating.

Thanks.

Cheyanne Harris, P.E.*
Brown and Caldwell | Sacramento, CA
T 916.853.5349 | C 916.628.2352 | CHarris@brwncald.com
Pronouns: she/her/hers
*Professional Registration in California

From: Brian Grubbs <grubbs@montaguederose.com>
Sent: Tuesday, December 6, 2022 3:05 PM
To: Angela Bezzone <bezzone@mbkengineers.com>
Cc: Cheyanne Harris <CHarris@BrwnCald.com>
Subject: Sites: water operational data

Angela,
Attached is a data set of water storage/fills/releases that was provided to me (by Erin Heydinger) as the "Base Case" with Federal participation at 7%. For some analysis I need one with Fed participation at 16%. I understand you have already run that case. Can you provide me that output in this same format?

This is somewhat urgent due to support the Indicative Rating with S&P. Could you send it today or early tomorrow morning?

Brian

Brian Grubbs | Managing Director
Montague DeRose and Associates
916-712-1747

From: Cheyanne Harris [CHarris@BrwnCald.com]
Sent: 12/7/2022 4:23:16 PM
To: Newens, Richard [Richard.Newens@hdrinc.com]
CC: JP Robinette [jrobinette@sitesproject.org]
Subject: RE: CBD Expanded Discussion
Attachments: RD-108 Partnership Matrix.docx

Richard,

Follow up from yesterday's meeting with the following:

1. **RD-108 Partnership Matrix:** JP visited RD-108 earlier this year (I think in April) and the team did a whiteboarding exercise to evaluate potential items to consider as the partnership evolves. The summary of the exercise is included in the attached.

2. Financing Smartsheet: I shared with you our financing smartsheet – detailed schedule for the various financing related activities for the project. Sounds like we'll start tracking the (higher priority/near term) CBD related items in this Smartsheet.

a. It might be easier for us to strategize on a future call how to input the CBD items as a separate section (because there's A LOT going on in here). For reference, we did add an item for the potential RD-108 cooperative agreement (starting in row 232).

Thanks.

Cheyanne Harris, P.E.*
Brown and Caldwell | Sacramento, CA
T 916.853.5349 | C 916.628.2352 | CHarris@brwncald.com
Pronouns: she/her/hers
*Professional Registration in California

From: Newens, Richard <Richard.Newens@hdrinc.com>
Sent: Tuesday, December 6, 2022 3:04 PM
To: JP Robinette <jrobinette@sitesproject.org>
Cc: Cheyanne Harris <CHarris@BrwnCald.com>
Subject: RE: CBD Expanded Discussion

Hi JP and Cheyanne:

Action items from our discussion are listed below:

- Richard to check with Mike C regarding tasks/budget reallocation or contract adjustment requirements based on planned new level of effort
  - **DONE 12/6/2022** = a new task is going to be created to track this process and no reallocation or adjustments required at this time.
- Richard to schedule follow up meeting
  - **DONE** = scheduled for 12/13/2022

- JP to reach out to Joe T about scope/budget and contractual firewall for Richard
- Cheyanne to provide Richard access to Smartsheet

Please let me know if I missed anything.

Thanks,
Richard

Richard Newens
D 916.679.8863 M 916.719.7800

hdrinc.com/follow-us

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Tuesday, December 6, 2022 7:40 AM
To: Newens, Richard <Richard.Newens@hdrinc.com>
Cc: Cheyanne Harris <CHarris@BrwnCald.com>
Subject: Re: CBD Expanded Discussion

Richard,

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1. Water quality benefits
2. Winter flood control
3. Water availability
4. Channel maintenance
6. Water right holder concerns (along the CBD and Ridge Cut)
1. Enforcement of water rights for taking of Sites previously stored water

2. Accounting for contributions of other streams and water sources

3. Groundwater recharge reduction due to impoundment of Funks and Stone Corral Creeks

7. Impacts from Sites to be mitigated

1. Water surface elevation during releases (localized flooding), supported by hydraulic modeling by Jacobs

1. Seepage

2. Flooding

3. Capital Improvements

1. Environmental planning and permitting approach

2. Acquisitions, fee title and easements

3. Cost estimate

4. Schedule

4. Operations and Maintenance

1. Which agency performs maintenance (self-perform or contract)

2. Under what Authority is maintenance performed (i.e. delegated from CBDD or other?)

3. Changing set-points of KLOG and Wallace Weir

4. Estimated annual costs

5. Replacement costs

5. Measurement

1. Flow

2. Water Quality

3. Water Surface Elevation

6. Coordination and communication

1. Sites operations

2. Crop planning

Thanks,

JP Robinette, PE
Engineering and Construction Manager | Sites Project Authority
801-819-4306
jrobinette@sitesproject.org
www.sitesproject.org

On Dec 5, 2022, at 4:39 PM, Newens, Richard <Richard.Newens@hdrinc.com> wrote:

Hi JP and Cheyanne:

Hope you're well and had a good holiday break. Below are some points for discussion tomorrow morning (in no particular order):

- Toolbox Update(s)

- Toolbox document is attached (for reference, no new material since last discussion).
- I need to update summaries for constituents of concern, develop a visual/timeline showing when monitoring in the CBD occurs along with other relevant activity (e.g. Sites releases), brainstorm more useful maps/visuals

- CBD Project Management/Additional Tasks
  - In concluding our previous discussion, JP mentioned I may be able to help with additional components and/or process pertaining to the CBD. It was left fairly vague with the intention of clarification during this discussion

- Next Steps/Milestones

Please let me know if you have any questions or would like to add anything.

Richard Newens, M.S.

HDR
2379 Gateway Oaks Dr., #200
Sacramento, CA 95833
D 916-679-8883 M 916-719-7800
Richard.Newens@hdrinc.com

hdrinc.com/follow-us

<CBD_Toolbox_Working_2022_1101.docx>

RD-108 Partnership Matrix

	What do we want out of this partnership?	Gaps	Opportunities	Risks	Activities
Shared		∞ Maintenance	∞ Regional Groundwater ∞ Flood Plain Improvement ∞ Increase Capacity	∞ Agency Scope Creep ∞ DWR letting go	∞ Improve communications ∞ Measurement & Control
RD108	∞ Organization ∞ Offset Costs (Net Positive) ∞ Avoid pipeline to river ∞ Drain quicker (Levee Relief) ∞ Not become a distraction		∞ Flood Control	∞ Labor (union)	∞ Operations and Maintenance ∞ Build Improvements ∞ Water Master
Sites	∞ Reliability ∞ Community Support ∞ Cost Certainty ∞ Operations Expertise	∞ Water Master Duties ∞ Flow Control	∞ Water Quality Responsiveness ∞ Environmental Mitigation ∞ More Dynamic Operations	∞ Diverters of Sites Water	∞ Raise capital ∞ Cash flow

Meeting: **Sites Reservoir Committee Operations & Engineering Workgroup**

Locations: Maxwell Project Office, 122 Old Highway 99W, Maxwell, CA 95955
See below for alternate meeting locations.

Call in: **1-213-379-5743** Code: **223 227 280#** Click here to join the meeting

Workgroup Chair: Robert Kunde (Wheeler Ridge Maricopa WSD)
Workgroup Vice Chair: Mike Azevedo (Colusa County)
Staff Lead: JP Robinette (Engineering & Construction Manager)

AGENDA

Wednesday, January 11, 2023, 1:30 – 3:30 pm

NO ACTION or DECISION WILL BE TAKEN

ROLL CALL & CALL TO ORDER:

- Introductions
- Period for Public Comment

Any person may speak about any subject of concern, provided it is within the workgroup's jurisdiction and a public comment card is submitted. The time allotted for receiving such public communication shall be limited to 3 minutes per person. Note: No action shall be taken on comments made during this period.

1. Discussion and Information Items:

1.1 Review considerations for establishing a Project Baseline Schedule.

1.2 Review process and considerations for converting to storage-based allocations.

2. Engineering and Construction Manager's Report:

- Advancing preliminary engineering activities
- FERC qualifying facility application

3. Upcoming Meetings:

Joint Reservoir Committee and Authority Board
Friday, January 20, 2023 (9:00 AM – 12:00 PM)

Environmental Planning & Permitting Workgroup
Wednesday, February 8, 2023 (10:00 AM – 11:00 AM)

Engineering & Operations Workgroup
Wednesday, February 8, 2023 (1:30 PM – 3:30 PM)

Virtual Information will be provided before all meetings at Sitesproject.org.

ADJOURN

ADA COMPLIANCE: Upon request, agendas will be made available in alternative formats to accommodate persons with disabilities. In addition, any person with a disability who requires a modification or accommodation to participate or attend this meeting may request necessary accommodation. Please make your request to the Board Clerk, specifying your disability, the format in which you would like to receive this Agenda and any other accommodation required no later than 24 hours before the start of the meeting.

Alternate Meeting Locations:

Coachella Valley Water District, 51501 Tyler Street, Coachella, CA 92236

Glenn-Colusa Irrigation District, 344 East Laurel Street, Willows, CA 95988

Metropolitan Water District, 700 North Alameda Street, Los Angeles, CA 90012

Reclamation District 108/Dunnigan WD, 975 Wilson Bend Road, Grimes, CA 95950

San Bernardino Valley Municipal WD, 380 E. Vanderbuilt Way, San Bernardino, CA 92408

Wheeler Ridge-Maricopa Water Storage District, 12109 Hwy 166, Bakersfield, CA 93313

Westside Water District, 5005 State Hwy 20, Williams, CA 95987

Santa Clarita Valley Water Agency, 27235 Bouquet Canyon Road, Santa Clarita, CA 91551
Zone 7 Water Agency, 100 North Canyons Parkway, Livermore, CA 94551

From: Okita, David@DWR [David.Okita@water.ca.gov]
Sent: 12/8/2022 8:18:27 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Fw: 12/19 SWP Workshop
Attachments: SWC Sites presentation.pptx

Ali - checking to see if you are still willing to do a high level overview in the context of the agenda below.

David Okita, PE
Department of Water Resources
530 902-7588

From: Okita, David@DWR
Sent: Tuesday, December 6, 2022 3:12 PM
To: Miller, Aaron@DWR <Aaron.Miller@water.ca.gov>; Cooke, Robert@DWR <Robert.Cooke@water.ca.gov>; 'Rob Kunde (rkunde@wrmwsd.com)' <rkunde@wrmwsd.com>
Cc: Leahigh, John@DWR <John.Leahigh@water.ca.gov>; Chilmakuri, Chandra@SWC <cchilmakuri@swc.org>
Subject: 12/19 SWP Workshop

As we discussed The State Water Contractors are having a 2 hour workshop in Sites on 12/19 10-noon. The focus of this meeting is Sites operations. The prior meeting was on Sites contracting issues. Below is an tentative agenda - Chandra and Rob Kunde please confirm that this is appropriate.

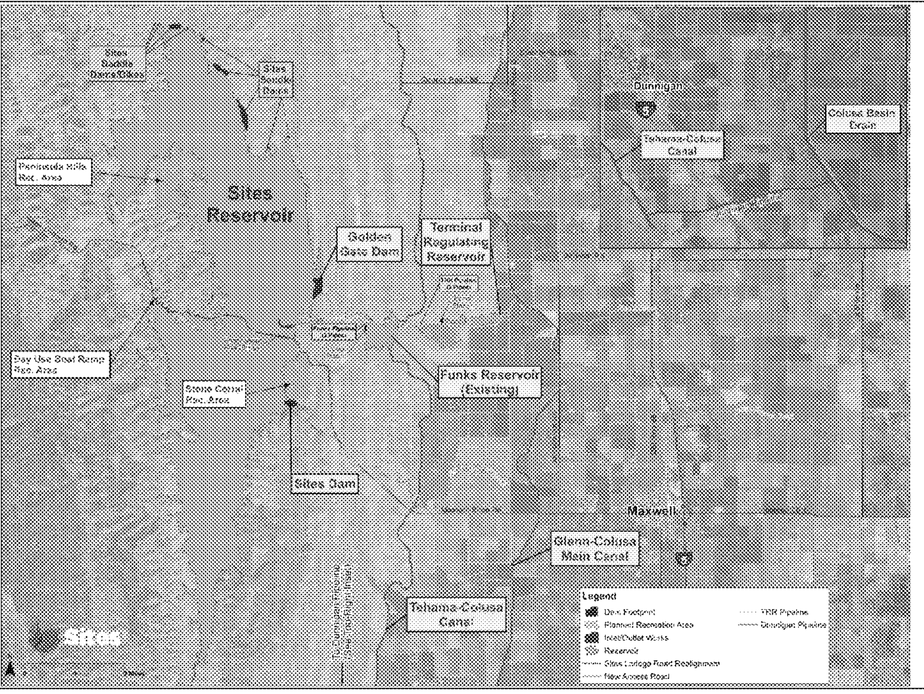
Rob Cooke if time allows you should give an update on contracting matters.

Attached is a draft incomplete PowerPoint that I put together when I thought we were having one meeting on Sites. We will rely on Ali's presentation for graphics showing layout of Sites Facilities. The latter slides are contracting issues that we already covered in the prior meeting. Aaron if you want to use any of these slides feel free to do so.

I will confirm with Ali Forsyth that she will do the Introduction.

Introduction - Sites Operations (high level): Ali Forsythe
Basic Sites operations from SWP standpoint - diversions and deliveries: Aaron Miller
Outline of SPA/DWR/USBR Operations agreement: Aaron Miller
Sites/Oroville exchange (describe/magnitude) including power and scheduling: Aaron Miller
Coordination with SWP/CVP - Aaron Miller

David Okita, PE
Department of Water Resources
530 902-7588


Sites Saddle Dams/Dikes
Sites Saddle Dams
Peninsula Hills Rec. Area
Sites Reservoir
Golden Gate Dam
Terminal Regulating Reservoir
Day Use Boat Ramp Rec. Area
Stone Corral Rec. Area
Funks Reservoir (Existing)
Sites Dam
Dunnigan
Tehama-Colusa Canal
Colusa Basin Drain
Maxwell
Glenn-Colusa Main Canal
Tehama-Colusa Canal
Sites
Legend
Dam Footprint
Planned Recreation Area
Inlet/Outlet Works
Reservoir
Sites Lodoga Road Realignment
New Access Road
TRR Pipeline
Dunnigan Pipeline

Status

- Revised Final EIR/EIS pending
- Biological Opinions and Incidental Take Permit pending
- Water Rights petition submitted (not complete)
- DWR/USBR Operations Agreement in negotiation

Operations Agreement

- 3-way agreement - DWR/USBR/SPA for Coordinated Operations

- Late Winter/Spring
  - Fill reservoir under excess conditions
  - Retain cold water in Federal and State reservoirs by exchanges
- Balanced Conditions – Late Winter/Spring
  - Ecosystem deliveries to Yolo Bypass and Refuges
  - Reservoir temperature management exchanges
- Balanced Conditions - Transfer Window (July-November)
  - Deliveries to Participants
  - Reservoir Temperature Mangement
  - Deliveries to Yolo Bypass and Refuges

Deliveries

- From Reservoir to TC Canal
- New Dunnigan Pipeline to Colusa Basin Drain
- Colusa Basin Drain to Sacramento River and Yolo Bypass

Sites Oroville Exchange

SWP Contractor Participants

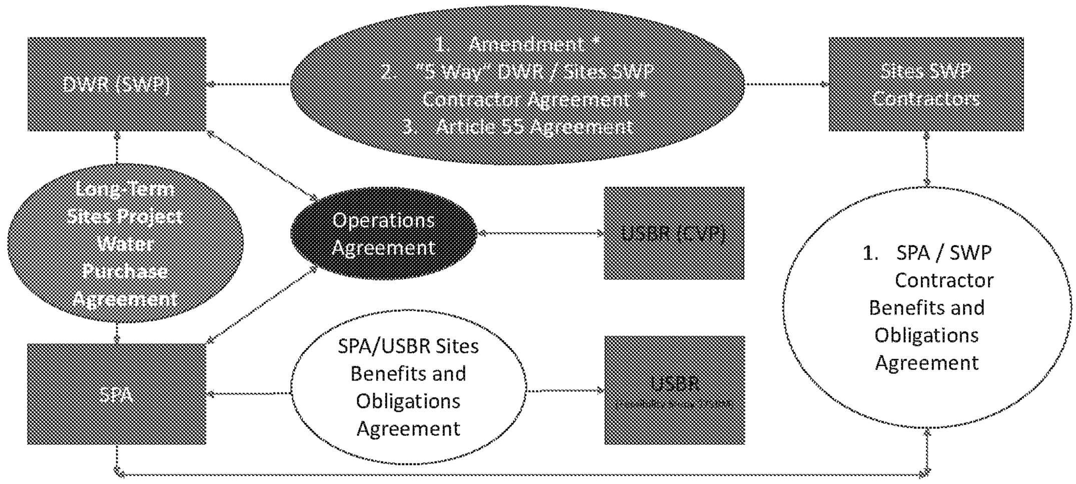
- San Gorgonio Pass Water Agency
- Coachella Valley Water District
- Antelope Valley-East Kern Water Agency
- Zone 7 Water Agency
- Valley Water
- Desert Water Agency
- Metropolitan Water District of Southern California
- San Bernadino Valley Municipal Water District

SWP Member Agency Participants

- City of American Canyon
- Santa Clarita Valley Water District
- Rosedale-Rio Bravo Water Storage District
- Irvine Ranch Water Distirct

Sites Reservoir Agreement Structure
Sites Project Authority – Sites SWP Contractors – DWR – USBR

12/2021



* Only SWP Contractors Requesting DWR Purchase Sites Water on their Behalf

Agreements

- SWP deliveries - Article 12 (f) fifth priority (non-Project water)
- Article 56 – delivery contracts
- All SWP costs reimbursed
- Some Contractors - Statement of Charges billing - TBD

Statement of Charges Billing

- DWR will purchase water supply from SRA
- DWR contract amendment with Contractors
- Step up (paymnet) provisions to protect SWP
- Same conveyance priorities as other SWP Contractor participants – non- Project priority – Article 12(f) fifth priority (non-project water)

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 12/8/2022 10:25:35 AM
To: Spranza, John [john.spranza@hdrinc.com]
Subject: FW: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review
Attachments: Sites Project_Draft Aquatic Study Plan_11_16_2022 mja&gje.pdf

John – A number of these comments seem really straightforward. A few we should talk about.

Can you have ICF start on the straightforward ones and have them identify the ones that we should talk more about? I'd like to have a call with ICF, you and me to walk through those that need more discussion and we can give ICF direction on how to proceed.

Because review by the County is a requirement in our water right, I would like ICF to prepare a comment/response to every comment. We need to document the comments and how we responded to each and every comment. This will be part of the record.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Michael Azevedo <mjazevedo@countyofcolusa.com>
Sent: Wednesday, December 7, 2022 8:45 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Ali/John,

Attached are comments and questions from Gary and myself.

Michael J Azevedo

Colusa County Public Works
530.458.0466

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, December 6, 2022 10:04 AM
To: Michael Azevedo <mjazevedo@countyofcolusa.com>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Sounds good Mike. We will hold off on sending to TCCA and GCID for now.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Michael Azevedo <mjazevedo@countyofcolusa.com>
Sent: Tuesday, December 6, 2022 8:37 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: Re: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Ali, we would prefer completing our review prior to distribution to districts. I've given my comments to Gary this morning... his review should be fairly expeditious

Get Outlook for Android

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Monday, December 5, 2022 1:16:03 PM
To: Michael Azevedo <mjazevedo@countyofcolusa.com>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Sounds good. Thanks much Mike.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Michael Azevedo <mjazevedo@countyofcolusa.com>
Sent: Monday, December 5, 2022 1:10 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Appreciate the consideration. Let me check in with Sup Evans tomorrow and I'll get back to you folks.

Michael J Azevedo

Colusa County Public Works
530.458.0466

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Monday, December 5, 2022 1:06 PM
To: Michael Azevedo <mjazevedo@countyofcolusa.com>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Thanks Mike. I was going to have TCCA and GCID review also as their operations touch/are connected to these creeks. I think I am going to have them review at the same time as Colusa County but I have not sent them the document yet. Let me know if you would prefer that I have them review after the County and I can hold off on sending them the document until later.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Michael Azevedo <mjazevedo@countyofcolusa.com>
Sent: Monday, December 5, 2022 6:40 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Gary Evans <gevans@countyofcolusa.com>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: RE: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Thanks for the opportunity to review and comment Ali. We'll kick this around internally and get back to you folks.

Michael J Azevedo
Colusa County Public Works
530.458.0466

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Thursday, December 1, 2022 4:40 PM
To: Michael Azevedo <mjazevedo@countyofcolusa.com>; Gary Evans <gevans@countyofcolusa.com>
Cc: Spranza, John <john.spranza@hdrinc.com>
Subject: Sites Project - Draft Funks and Stone Corral Creeks Study Plan for Your Review

Gary and Mike – Attached is the draft Funks and Stone Corral creeks study plan for your review and comment. This plan is called for in our environmental document and in one of our special terms in our water right application.

We would appreciate your review and comment on the study plan. We're happy to meet to provide an overview of the plan and the study approach. Let me know if you think this would be helpful and I'll work to get something scheduled.

Once we have your comments and have addressed them, we will send a revised study plan to CDFW and USFWS to review prior to finalizing as their review is also called for in the special term in our water right application.

We look forward to your review and input. If possible, it would be great to have your comments by December 16. Please let me know if you need more time.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

Stone Corral Creek and Funks Creek Aquatic Study Plan

November 15, 2022

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Red Text box MJA Comment

Blue Text Box GJE Comment

Contents

Tables

Figures

Acronyms and Abbreviations

°F	degrees Fahrenheit
ADCP	acoustic Doppler current profiler
AFDM	ash-free dry mass
Aquatic Study Plan	Stone Corral Creek and Funks Creeks Aquatic Study Plan
ASCI	Algae Stream Condition Index
Authority	Sites Project Authority
cfs	cubic feet per second
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
Chico ABL	Chico Aquatic Bioassessment Laboratory
CPUE	catch per unit effort
CSCI	California Stream Condition Index
CVRWQCB	Central Valley Regional Water Quality Control Board
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
GCID	Glenn-Colusa Irrigation District
GIS	geographic information system
GPS	global positioning system
LiDAR	light detection and ranging
MPSL-MLML	Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories
PHAB	physical habitat
Project	Sites Reservoir Project
QA/QC	quality assurance/quality control
SQL	Structured Query Language
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TC Canal	Tehama-Colusa Canal
TCCA	Tehama-Colusa Canal Authority
USGS	U.S. Geological Survey

1.0 Introduction and Purpose

1.1 Introduction

if necessary

is limitation necessary?

This Stone Corral Creek and Funks Creek Aquatic Study Plan (Aquatic Study Plan) has been prepared for the Sites Project Authority (Authority) to guide fisheries technical studies to be conducted prior to and during operation of the Sites Reservoir Project (Project), as well as ongoing monitoring during Project operations. The Project is a proposed offstream storage project located on the west side of the Sacramento Valley in Glenn and Colusa Counties, approximately 10 miles west of the community of Maxwell. It is designed to store unappropriated water from winter and spring storm events in the northern Sacramento River watershed. The Project would impound a maximum of 1.5 million acre-feet of water in a reservoir. The reservoir would be created by building Sites Dam on Stone Corral Creek, Golden Gate Dam on Funks Creek, and a series of saddle dams on the northeastern rims of Antelope Valley. While a portion of naturally occurring seasonal flows in Stone Corral Creek and Funks Creek would be retained in the reservoir, the primary source of water for the reservoir would be diversions from the Sacramento River. These diversions would be up to 4,200 cubic feet per second (cfs) via two existing facilities: the Red Bluff fish screen and pumping plant (operated by the Tehama-Colusa Canal Authority [TCCA]) and the Glenn-Colusa Irrigation District's (GCID) fish screen and pumping plant near Hamilton City.

1.2 Purpose of Aquatic Study Plan

what is the difference btw plans?

As part of the Project alternatives development, the Authority has committed in the Project's Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS), as well as in the Project's application to appropriate water, to prepare this Aquatic Study Plan and conduct technical studies on Stone Corral Creek and Funks Creek.[2] The Authority is proposing the following special water right term to be included in its water right permit.

Within 1 year of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek under this permit, Permittee shall develop a Technical Studies Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's RDEIR/SDEIS to guide studies in Stone Corral Creek and Funks Creek that shall be implemented prior to and during construction activities to collect information necessary to address California Fish and Game Code Section (CFGC) 5937. The Technical Studies Plan shall include, but may not be limited to, assessment of fish assemblage and available habitat, flow characteristics, water temperatures, bioassessment monitoring, and method for reporting data. The Technical Studies Plan shall be developed in consultation with the California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS), and Colusa County. Permittee shall implement the Technical Studies Plan.

Using the results of the technical studies, within 5 years of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek under this permit, the Permittee shall develop a Stone Corral Creek and Funks Creek Operations Plan (Operations Plan) in

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[1] See Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS.

accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Authority is proposing the following special water right term to be included in its water right permit.

The Operations Plan shall describe Permittee's approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from those creeks under this permit, while also ensuring that the Project's flood protection benefits are realized. The Operations Plan shall include, but may not be limited to, the approach for reservoir releases into Stone Corral Creek and Funks Creek, including release schedules and volumes and a monitoring plan. The Operations Plan shall be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

Together, these studies would document the two creeks' existing hydrology, assess flow levels needed to maintain fluvial geomorphic processes, and update information on aquatic species presence and habitat use in the reaches downstream of the dams to establish aquatic baseline information that would be used to determine and subsequently manage environmental releases from the Project into the creeks. As part of the Aquatic Study Plan, studies would be initiated once access permission to the creeks through private property is obtained. The studies would also be used to inform final design for the proposed Sites Dam and Golden Gate Dam release facilities and operational requirements. The Aquatic Study Plan includes fish monitoring, a Surface Water Ambient Monitoring Program (SWAMP) bioassessment study, a hydrogeomorphic study, and a temperature study. Specific details for the field studies would be designed and conducted in collaboration with CDFW, USFWS and Colusa County.

The objectives of these studies are as follows. currently available

locations of

- Determine existing fish assemblages in these creeks, including fish species presence and habitat use.
- Characterize habitats available (e.g., spawning, rearing, foraging, and sheltering habitats) at varying flow levels, including the presence or absence of pools that persist through summer.
- Characterize flows, including assessing the baseflow during summer and conducting a fluvial geomorphologic study to characterize habitat conditions, substrate compositions, and flow levels.
- Conduct a SWAMP technical study (i.e., a stream bioassessment) that focuses on relationships between physical habitat (PHAB), water quality, and benthic macroinvertebrates.
- Implement hydrological studies to define flow temperature relationships.

consistent with the 'timing' of the existing water right

This Aquatic Study Plan summarizes the methods and reporting strategies for the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. Using information obtained from these field studies, along with currently available information, the Authority would develop a schedule of releases for Stone Corral Creek and Funks Creek to be incorporated into the Operations Plan. Flow releases into these creeks would be made to maintain flood control benefits of the Project and would not overtop streambanks or flood downstream areas. The release schedule would also account for meeting demands of senior water right holders on Stone Corral Creek and Funks Creek that are downstream from the proposed dams. Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies* of the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) describes the purpose, objectives, content, and timing of the field studies identified above.

Furthermore, if flows in Stone Corral Creek and Funks Creek are needed to maintain fish in good condition in compliance with CFGC Section 5937, then the Authority would adapt this study program into an operations monitoring program with a duration of 5 to 10 years to document and adaptively manage the timing and magnitude of flow releases to maintain fish in good condition below the dams along with the habitats upon which they depend. Performance standards would be developed in conjunction with the Authority and the relevant agencies (CDFW, USFWS, and Colusa County) prior to the start of operations monitoring. County requests participation in location selection

1.2.1 Integration of Fish Monitoring with Aquatic Habitat Survey Methods

Aquatic habitat survey methods for sampling are described below. Note that the field observations and results from other studies (i.e., the stream bioassessment study and hydrogeomorphic study) would aid in the assessment of aquatic habitat and are referenced where applicable.

Why?

An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat. Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.

As part of the pre-operation sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study.

- **Fish community.** Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)
- **Substrate composition.** Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study) how does this apply to fish?
- **Riparian vegetation cover.** Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)
- **Benthic macroinvertebrate presence.** A SWAMP bioassessment that focuses on the relationships between PHAB, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. The bioassessment study would be conducted using the methods described in the SWRCB's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study)
- **Water quality.** Monitoring for general water quality parameters (e.g., temperature, turbidity, pH, conductivity, salinity, dissolved oxygen) would be conducted to assess surface water quality. Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)
- **Water temperature.** Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles in Funks Creek.

I/O does not release into Stone Corral Creek

1.3 Applicable Methods for Determining Operational Streamflows

After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP Bioassessment Study), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program,[3] the California Environmental Flows Framework,[4] and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on Stone Corral Creek and Funks Creek to maintain fish in good condition. Coordination with CDFW, USFWS, and Colusa County would be required before a method is selected.

[3] https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow

[4] https://ceff.ucdavis.edu/

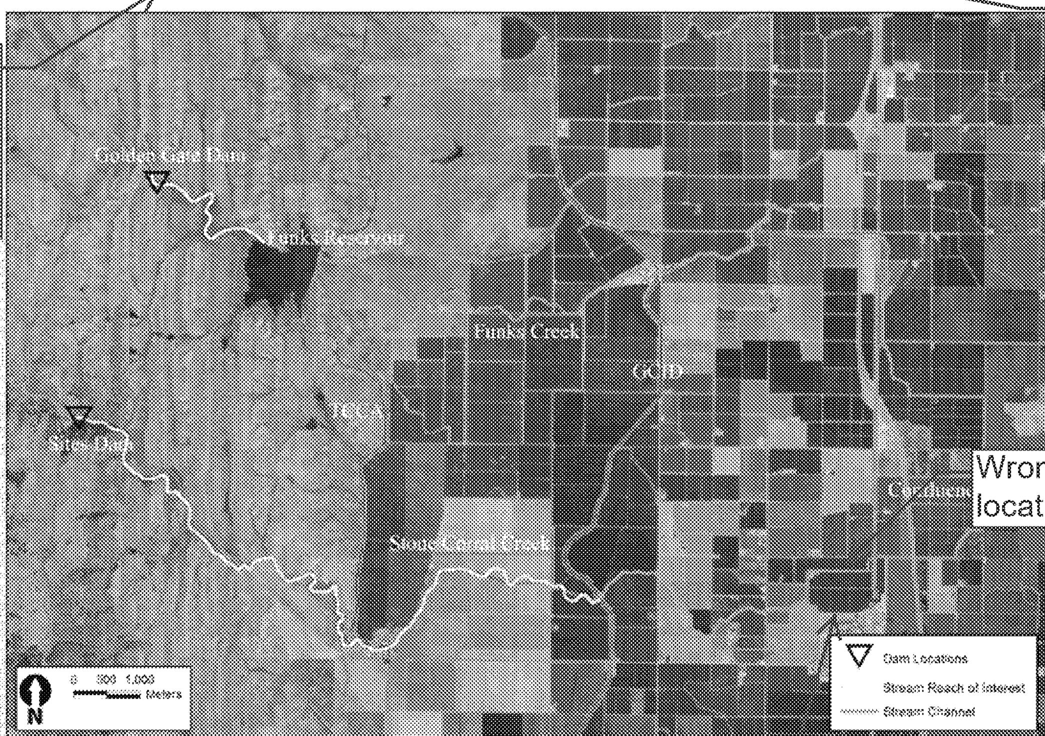
2.0 Environmental Setting

2.1 Environmental Setting of Stone Corral Creek and Funks Creek

Stone Corral Creek and Funks Creek are both small watersheds originating below the snowline on the eastern foothills of the California Coast Range at elevations of 700 to 850 feet. Consequently, they do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flow intermittently, mostly during winter and early spring. From their origins, they flow through low foothills, across Antelope Valley (the proposed location of Sites Reservoir), through a series of shallow canyons and eventually spill onto the Sacramento Valley floor (Figure 1). For much of their course on the valley floor, they are confined to narrow channels between berms along the edge of agricultural fields and road prisms. While the stream channels of these creeks are not actively managed, their straight alignment and angular turns around agricultural fields and along roads indicate that they were modified from their natural historic channels. In the upper parts of the watersheds just above the dam locations, these streams are largely devoid of riparian cover resulting from livestock use (Bureau of Reclamation and California Department of Water Resources 2008:3-20). In the lower reaches where the streams run through and around agricultural fields, shaded riparian habitat is sparse and consists mostly of low shrubs, grasses, and occasional oaks (*Quercus* sp.) and cottonwood (*Populus* sp.) trees.

Willow is more abundant than cottonwood

Not east of Mills Orchard RD on SC nor approx 1.4 miles E/O Funks Res.



Wrong channel location

Correct channel location

Figure 1. Stone Corral Creek and Funks Creek Reaches of Interest and Downstream Reaches

2.1.1 Stone Corral Creek

Stone Corral Creek has a drainage area of 38 square miles upstream of the proposed Sites Dam. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal (TC Canal) and begins to travel through agricultural lands. About 3 miles below the TC Canal siphon, Stone Corral Creek crosses the GCID Main Canal. Although most of the water in the canal passes under Stone Corral Creek in a siphon, GCID releases water from the canal into Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below the GCID Main Canal, Funks Creek flows into Stone Corral Creek, and then Stone Corral Creek flows an additional 5 miles to the Colusa Basin Drain. Refer to Figure 2 for a figure showing these various elements.

The U.S. Geological Survey (USGS) collected 27 years of discharge measurements at USGS Gage No. 11390672, in Stone Corral Creek near the community of Sites, California, from 1958 through 1985 (Figure 3). The data demonstrate a high variability of flow over the period of record, and there were 3 years of zero flow: 1972, 1976, and 1977 (Figure 4). Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. The maximum annual discharge during the period of record was 39.9 thousand acre-feet (TAF) in 1983. Based on the USGS period of record, mean annual daily discharge for the period of record was calculated as 9.02 cfs (SD of 67.5, median is 0) and annual average discharge was 6.5 TAF per year.

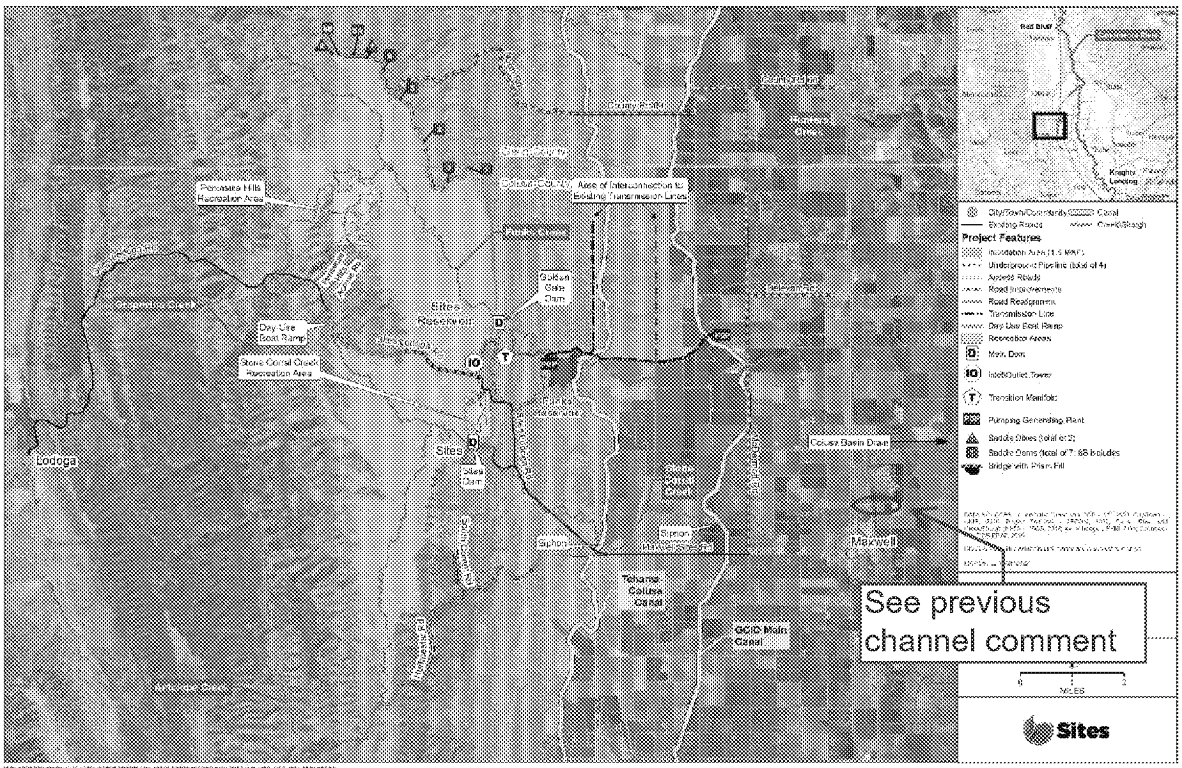


Figure 2. Project Area Overview

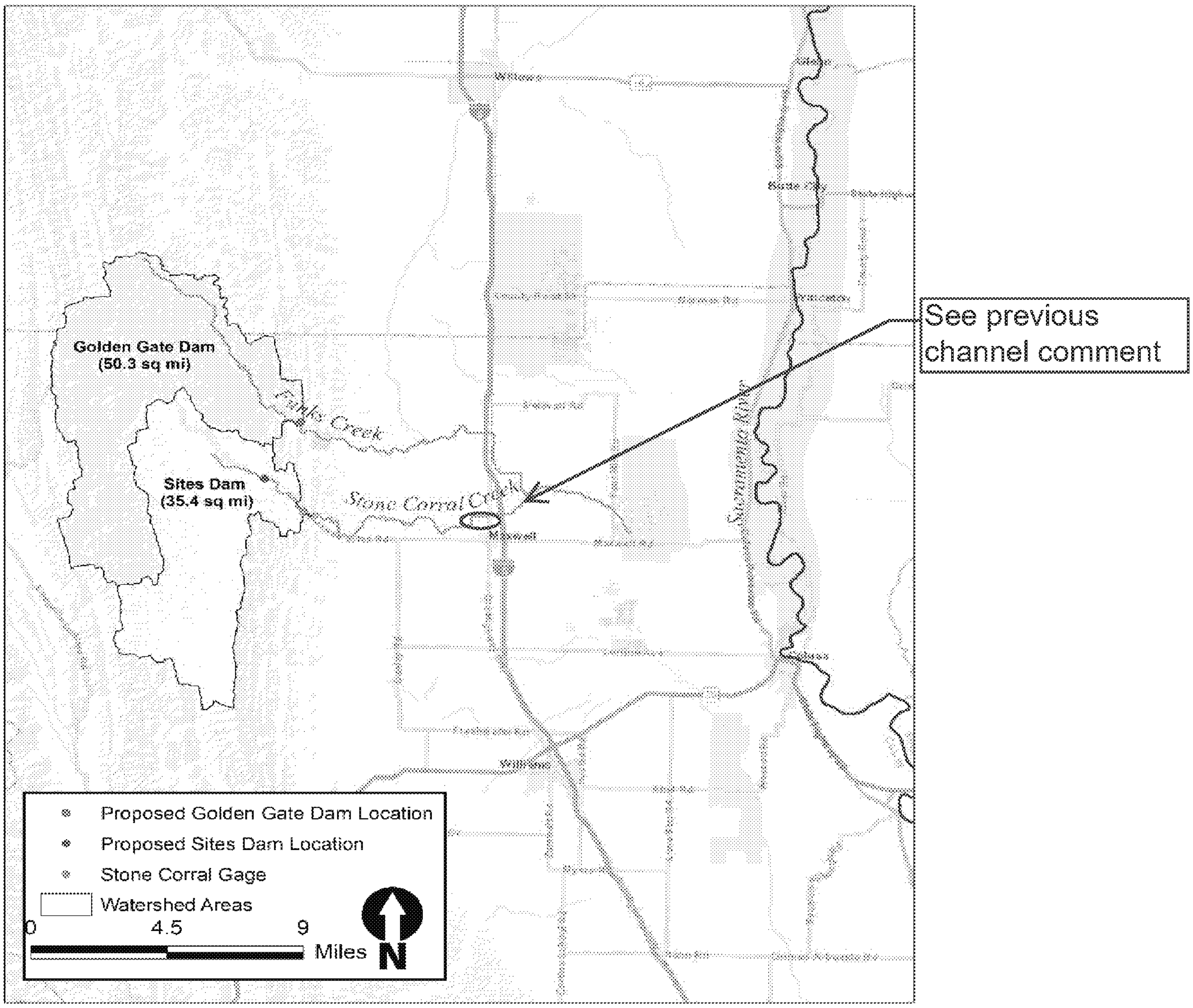
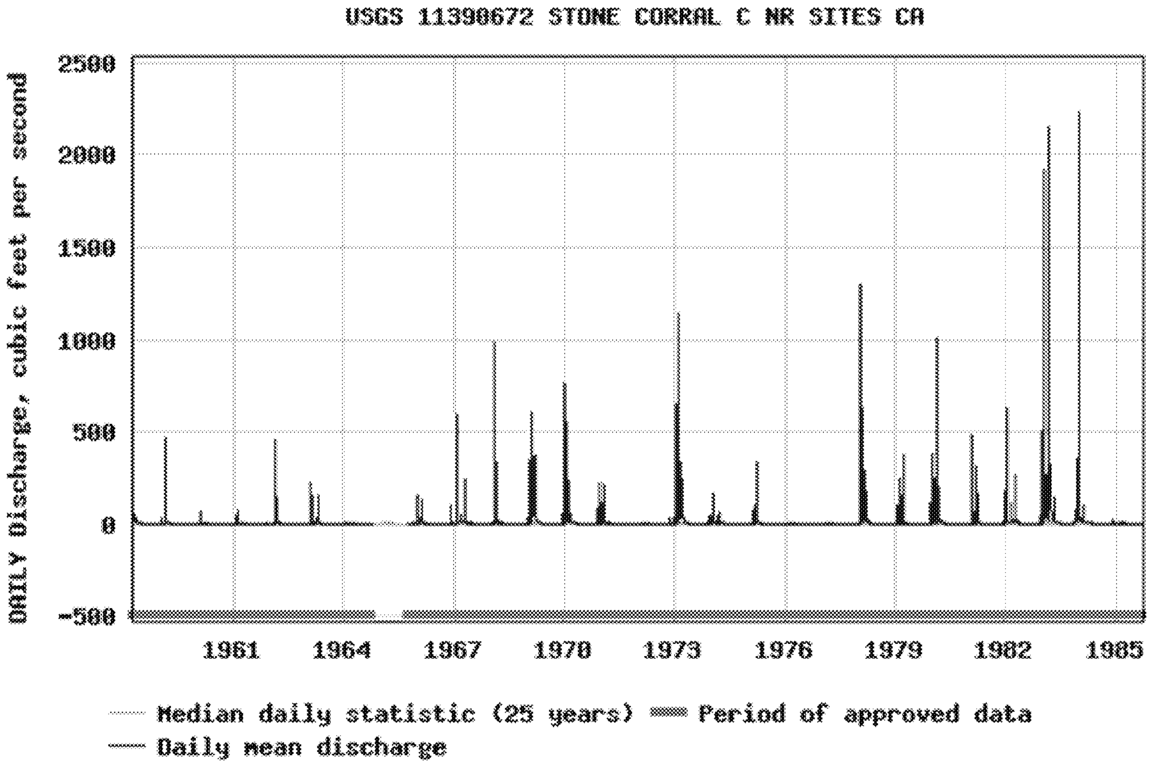


Figure 3. Stone Corral Creek and Funks Creek Watersheds Upstream of Proposed Sites Dam and Golden Gate Dam Locations. The Stone Corral Creek Gage Location captures the entire Sites Dam watershed (35.4 sq mi) upstream.



Source: U.S. Geological Survey stream gage 11390672

Figure 4. Mean Daily Flow in Stone Corral Creek near Sites (cfs)

Because the historical gage record for Stone Corral Creek is limited and Funks Creek is not gaged, historical stream gage data from Elder Creek was used to produce a longer-term estimate of streamflow on Stone Corral Creek and Funks Creek. The Elder Creek gage was chosen because it was the nearest gage on the valley floor with a long record of data available. It was assumed that Elder Creek has relatively similar precipitation and runoff patterns to Stone Corral Creek and Funks Creek. The streamflow of Elder Creek, located in Tehama County, has been measured since 1948 (USGS Gage No. 11379500). The gage site is approximately 49 miles northwest of the proposed Sites Reservoir, and has a drainage area upstream of the gage of 92.4 square miles (Attachment 1- MBK Engineers 2022). The overlapping period of gage records for Stone Corral Creek and Elder Creek (1958–1985) was used to determine a logarithmic correlation between the two gages for each month of the year. The developed streamflow timeseries was then further adjusted to account for the difference in watershed areas upstream of the old USGS Stone Corral Creek gage and the proposed location of Sites Dam. Tables 1a and 1b provide the results of this analysis, which shows the average monthly flow volume in acre feet per year and cubic feet per second for each water year type (MBK Engineers 2022). The average monthly volumes are calculated using the gage record for October 1958 through August 1985 with logarithmic monthly correlations for September 1985 through September 2021. Results are summarized by Sacramento Valley Water Year Type: wet, above normal, below normal, dry, and critical.

Table 1a. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	42	11	2	5	0	17
Dec	872	242	29	47	54	336
Jan	3,365	2,825	711	345	171	1,663
Feb	4,487	4,667	1,283	135	307	2,317
Mar	2,135	1,522	407	264	179	1,039
Apr	901	319	114	25	35	375
May	136	119	15	7	9	65
Jun	20	8	2	1	1	8
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	**11,959**	**9,713**	**2,562**	**828**	**757**	**5,827**

Table 1b. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	0.7	0.2	0	0.1	0	0.3
Dec	14.2	3.9	0.5	0.8	0.9	5.5
Jan	54.7	45.9	11.6	5.6	2.8	27
Feb	80.8	84	23.1	2.4	5.5	41.7
Mar	34.7	24.8	6.6	4.3	2.9	16.9
Apr	15.1	5.4	1.9	0.4	0.6	6.3
May	2.2	1.9	0.2	0.1	0.1	1.1
Jun	0.3	0.1	0	0	0	0.1
Jul	0	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Average	**17**	**14**	**4**	**1**	**1**	**8**

2.1.2 Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 50.3 square miles upstream of the proposed Golden Gate Dam. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir

is a re-regulating reservoir on the TC Canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA to manage water levels within the TC Canal. The Funks Dam gates are opened during large storm events to pass flood waters through Funks Reservoir and down Funks Creek to avoid compromising the TC Canal and its operations. With the exception of passing flood waters, the Funks Dam gates are operated in the closed position, but seepage through the dam gates maintains perennial flow for a short distance below the dam in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID Main Canal. While the GCID Main Canal passes under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek. Similar to Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.

There is no flow record for Funks Creek, but given the comparable size, geology, and topography of the two watersheds and their proximity to each other, Funks Creek seasonal flow patterns and flow magnitudes are likely similar to Stone Corral Creek.

The same correlation approach used to estimate streamflow in Stone Corral Creek cannot be followed to estimate streamflow in Funks Creek because there are no streamflow data available for Funks Creek. Therefore, flow in Funks Creek was estimated by prorating monthly Stone Corral Creek streamflow data by the ratio of Stone Corral Creek's and Funks Creek's watershed areas upstream of the proposed dam locations (MBK Engineers 2022). Tables 2a and 2b provide the results of this analysis and identify the average monthly flow volume in acre feet per year and cubic feet per second foreach water year type.

Table 2a. Funks Creek Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	60	16	3	7	1	24
Dec	1,239	343	41	66	77	485
Jan	4,778	4,011	1,010	489	243	2,362
Feb	6,372	6,628	1,822	192	436	3,290
Mar	3,031	2,161	578	375	255	1,475
Apr	1,280	453	162	36	49	553
May	193	169	21	9	13	93
Jun	28	11	2	1	2	12
Jul	2	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	**16,984**	**13,793**	**3,638**	**1,176**	**1,075**	**8,275**

Table 2b. Funks Creek Average Monthly Flow (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	1.0	0.3	0.1	0.1	0	0.4
Dec	20.2	5.6	0.7	1.1	1.3	7.9
Jan	77.7	65.2	16.4	8.0	4.0	38.4
Feb	114.7	119.3	32.8	3.5	7.9	59.2
Mar	49.3	35.1	9.4	6.1	4.1	24.0
Apr	21.5	7.6	2.7	0.6	0.8	9.3
May	3.1	2.7	0.3	0.1	0.2	1.5
Jun	0.5	0.2	0	0	0	0.2
Jul	0	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Average	**24**	**20**	**5**	**2**	**2**	**12**

2.1.3 Physical Characteristics

in

The only drainages that exit Antelope Valley are Stone Corral Creek and Funks Creek. Each creek continues through the steeper, foothill environments and then transitions to the Sacramento Valley floor, where each is generally shallow and highly altered, primarily for water conveyance and agricultural purposes. Straight channels and angular turns associated with agricultural fields and roads indicate that natural channels have been at least partially modified. Along their reaches on the valley floor, these creeks are mostly confined to narrow channels between berms adjacent to agricultural fields and road prisms.

Stone Corral Creek and Funks Creek are largely devoid of riparian habitat in their upper reaches (foothill environments) due to heavy livestock use. In the lower reaches where the creeks run through and around agricultural fields, riparian habitat is variable and consists mostly of low shrubs, grasses, and occasional oak and cottonwood trees; however, some segments of Stone Corral Creek possess dense stands of mature riparian vegetation. See previous comment pg 11

Although the reaches of interest have been modified by livestock grazing, channelization, irrigation conveyance systems and minor diversions, they are still expected to have available aquatic habitat (i.e., benthic macroinvertebrate [BMI]). They also both experience much of their natural hydrograph (albeit altered due to local conveyance) and fluvial geomorphic processes and provide water and sediment that ultimately flows into the Colusa Basin Drain during rain events.

3.0 Fish Monitoring

3.1 Purpose of Fish Monitoring Program

The purpose of a fish monitoring program in Stone Corral Creek and Funks Creek downstream of Sites Reservoir is to establish a pre-project baseline and post-operation assessment of the fish species present to determine the existing state of the fish population and whether it is maintained in good condition consistent with CFGC Section 5937 after project construction and operation.

3.2 Overview of Proposed Methods

Assessment of the goal to maintain fish in good condition in these ephemeral creeks consistent with CFGC Section 5937 would be made using a Before-After-Control-Impact experimental study design, using the reach with perennial flow below Funks Reservoir as a control. Sampling would be conducted to assess fish community and habitat present in the study area for up to 5 years prior to operation of the Project. Following completion of the pre-operation survey, fish communities and aquatic habitats in the study area would be monitored in a similar fashion for a 5-to-10-year period after the Project is operational. Fish community and habitat data that showed statistically significant negative departures from baseline data would trigger reassessment of downstream flow management under a proposed adaptive management plan.

3.2.1 Pre-operation Baseline Monitoring

Pre-operation baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (Chapter 4, *SWAMP Bioassessment Study Designs and Methodology*), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-operation sampling.

The pre-operation surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-operation efforts would be summarized into yearly reports and a final pre-operation baseline report to the Authority at the end of the pre-operation survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-operation conditions.

3.2.2 Operations Monitoring

Operations monitoring would occur periodically at the intervals specified herein. Operations sampling would document fish abundance, condition, and distribution and compare the results with data collected on habitat area, location, and changes in habitat characteristics over time. Data from the fish study would be used in documenting compliance with CFGC Section 5937 with data from the SWAMP assessments providing additional details on overall stream status.

this would likely not occur naturally

Operations sampling methods would be identical to the pre-operation sampling, including returning to established stations and tracking fish abundance, diversity, and distribution through time. Threats and stressors identified in the pre-operation survey would be assessed during operations surveys to differentiate changes in habitat or fish communities not related to the operation of the Project. Data collected as part of the operations sampling effort would be compared against the baseline data, as well as previous years' data and summarized into interim and final reports.

3.2.3 Fish Sampling Methods

Beach Seining

Seining is a low cost, low impact method for capturing aquatic organisms. The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species, and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.

Circumstances that may affect efficacy include the amount or type of benthic structure, presence/absence of aquatic vegetation, water clarity, flow rate, and water depth. Seining is most effective in smooth bottom habitats free of aquatic debris or vegetation, with elevated turbidity, and are shallow enough for biologists to wade in. When benthic structure is complex, water clarity is high, and habitats contain extremely deep, shallow, or rapidly moving water that may exclude biologists from deploying nets, efficacy is dramatically decreased.

Seines with a "bag" to minimize aquatic organism handling stress are preferred. Seines with a bag are also preferred where obstructions make access to the water (or deployment/retrieval of the seine) difficult (U.S. Fish and Wildlife Service 2012). Blocking nets typically improve efficacy by reducing opportunities for target species to move out of the area being seined. Where the area to be isolated for sampling includes culverts, deep pools, undercut banks, or other cover attractive to fish (e.g., thick overhanging vegetation, root wads, logjams) it may be appropriate to isolate a portion or portions of the study area in phases, rather than attempting to herd fish from the entirety of the work area in a single downstream pass.

Electrofishing with Block Nets

Previous work in Stone Corral Creek and Funks Creek indicates that total dissolved solids are high enough to prevent the use of electrofishing as a means of sampling (California Department of Fish and Game and California Department of Water Resources 2000). During reconnaissance surveys, basic water quality measurements would be taken to confirm this observation. If total dissolved solids values are above levels known to interfere with electrofishing, the method would be curtailed in favor of seining. If employed, electrofishing would be done with a Smith-Root type backpack electrofisher. Sections of creeks would be isolated using blocking nets before biologists wade into them, starting from the upstream net and moving downstream. Captured specimens would be held in buckets, floating net pens, or large aerated containers prior to being identified and measured as above for seine sampling. Effort

would be calculated using shock time. If fish exhibit signs of stress, including symptoms of tetany or bruising, electrofisher settings would be adjusted accordingly to reduce impacts.

Visual Surveys

Any visual observations by biologists during reconnaissance and sampling of stream fauna would be systematically recorded based on pre-determined reach locations. This would include documenting amphibians and reptiles that may be observed incidentally during fish sampling efforts.

General Water Quality

Water quality data would be measured at every fish sampling location using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the 2016 version of the SWAMP *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (SWAMP 2016 SOP) (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and pH.

3.2.4 Fish Response

Abundance

All sampling efforts would be quantified using catch per unit effort (CPUE). The CPUE would be computed for each sample method and assessed once multiple data sets are available for comparison. Numbers of individuals, weight, and area sampled would be recorded. A decline in CPUE, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Condition

Condition factor (K) would be calculated for all fish specimens for which length and weight have been recorded. The condition factor of fish reflects environmental and biological circumstances and fluctuations in feeding conditions and physiological factors (Le Cren 1951). The condition factor also indicates changes in food reserves and can be used as an indicator of the general condition of aquatic organisms. Therefore, information on condition factor can be used to assess biological health of monitored organisms because the measure provides information about the specific condition under which organisms are developing (Araneda et al. 2008).

A decline in condition factor, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Distribution

Fish presence would be recorded and tracked through the study area. Fish distribution would be determined through reconnaissance and pre-operation surveys, known distributions, and incidental observations made during other sampling efforts. Records may be kept as count data and volumetric data but would ultimately be provided as presence or absence of fish species within sampling reaches.

3.3 Timing and Frequency

The schedule and effort for the pre-operation and operation portions of the proposed study are detailed below. The pre-operation surveys would be five consecutive annual visits staged at any point prior to

start of operation and within the seasonal restrictions indicated below. Monitoring efforts would be one-per-year visits each year following initiation of operation up to a 5- or 10-year timeline as determined by the Authority. For the purposes of this Aquatic Study Plan, it is assumed that sufficient access to the study area would be available in 2023.

Pre-Project implementation:

- Desktop scoping effort: lay out sampling reaches using geographic information system (GIS) data overlaid on aerial imagery, organize data sheets, and coordinate with water quality and SWAMP efforts. Spring 2022
- Initial reconnaissance: 2 days with 2-person crew; ideal timing would be when water levels are most restricted, which is typically in autumn.
- Pre-operation effort 1: 14 days with 4-person crew. 2023
- Pre-operation effort 2: 14 days with 4-person crew. 2024
- Pre-operation effort 3: 14 days with 4-person crew. 2025
- Pre-operation effort 4: 14 days with 4-person crew. 2026
- Pre-operation effort 5: 14 days with 4-person crew. 2027

Labor estimate to review +/- 30 locations in mostly dry channel seems excessive

Post-Project implementation:

- Operation effort 1: 14 days with 4-person crew. 2030
- Operation effort 2: 14 days with 4-person crew. 2031
- Operation effort 3: 14 days with 4-person crew. 2032
- Operation effort 4: 14 days with 4-person crew. 2033
- Operation effort 5: 14 days with 4-person crew. 2034
- Additional efforts up to 10 years after initial operation would be determined by the Authority.

The post-Project implementation schedule may be adjusted based on the Project construction schedule and construction completion.

Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only collected species.

4.0 SWAMP Bioassessment Study Designs and Methods

4.1 Purpose of Bioassessment Monitoring Program

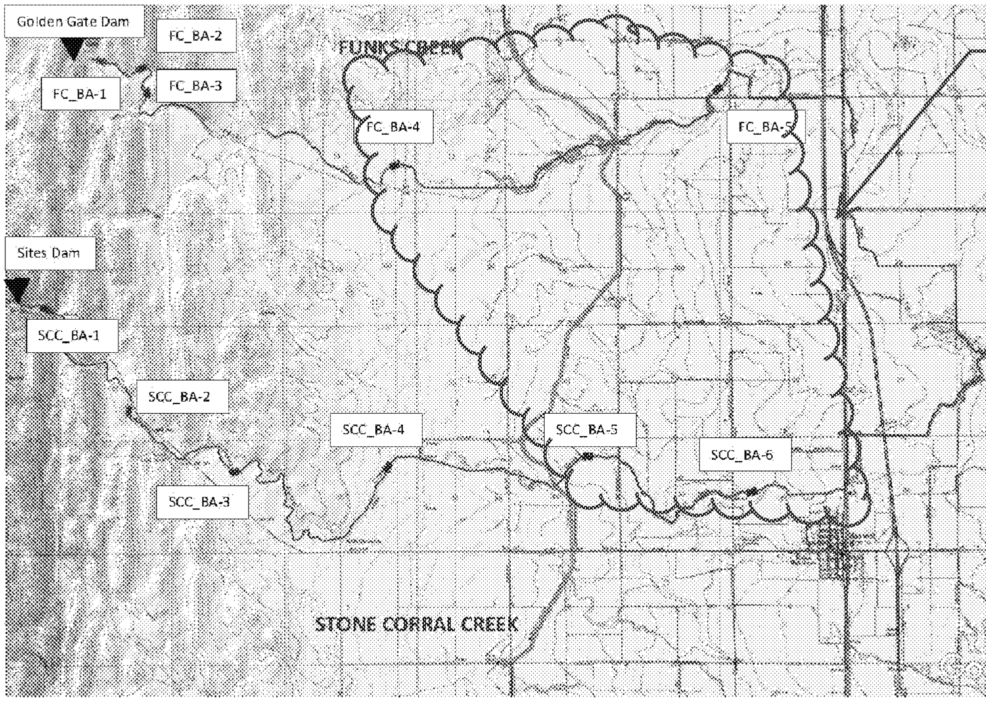
Stream bioassessment monitoring is a method of evaluating and monitoring the environmental health and integrity of freshwater wadeable streams by using BMI, water quality parameters, and PHAB conditions indicators of stream condition. Bioassessments are especially useful in tracking the aquatic conditions before and after a project is implemented to determine the project effects on aquatic communities. A SWAMP bioassessment that focuses on the relationships between PHAB, water quality, BMI, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek.

This information, along with the other studies (i.e., Fish Monitoring and Hydrogeomorphic Study), would help to inform the type of flow releases that should be made to the creeks under various operating conditions.

4.2 Overview of Proposed Methods

The bioassessment effort would be conducted using the methods described in the SWAMP 2016 SOP (Ode et al. 2016a, 2016b), or any updated version thereof. The reach-wide benthos method, which requires collection from each of 11 designated major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, pool), would be employed.

The ultimate number of individual sites, herein referred to as sampling reaches, on each creek would be based on access and safety; however, it is anticipated that five sampling reaches would be located on Funks Creek and that six sampling reaches would be located on Stone Corral Creek (Figure 5). Since there is no stringent guidance on establishing the number of bioassessment sampling reaches for a project such as this (Rehn pers. comm.), the number of sampling reaches was chosen to both best capture and quantify the two different elevational gradients within the study area (i.e., foothill and valley floor environments), and to have adequate spacing/distance between the sampling reaches (approximately 500 meters apart on Funks Creek above Funks Reservoir and approximately 2 kilometers apart elsewhere). Field and laboratory methods would be fully described in an associated Quality Assurance Project Plan.



Why sample outside of "reach of interest"?

Figure 5. Potential Bioassessment Sampling Reaches, Stone Corral Creek and Funks Creek

4.3 Field Methods

This section summarizes the methods that would be used to collect all bioassessment data. All surveys would be performed by a qualified team of a biologist or biologists and a geomorphologist with expertise in benthic macroinvertebrate and algae collection, water quality monitoring, and PHAB data collection.

4.3.1 Sampling Reach Delineation

As described in Chapter 2 of the SWAMP 2016 SOP, the average wetted width of each sampling reach would be used to determine the sampling reach length (Ode et al. 2016a). The SWAMP 2016 SOP specifies standard sampling reach lengths that are based on wetted width (150 meters for sampling reaches with average wetted widths less than or equal to 10 meters, and 250 meters for sampling reaches with average wetted widths greater than 10 meters).

After the sampling reach length is determined, it would be laid out using marked surveyor's flags for transect identification and transects would be labeled according to the SWAMP 2016 SOP (main transects A–K and inter-transects AB, BC, etc.) for a total of 11 main transects and 10 inter-transects.

4.3.2 Basic Data Collection

Basic information collected at each sampling site would include project name, sampling reach name, time and date of survey, stream/watershed name, global positioning system (GPS) coordinates, and the names of the survey crew members. GPS coordinates would be recorded with an appropriate collection device (e.g., hand-held GPS receiver or iPad). Data collected at the sampling reaches would include water quality and stream discharge measurements, PHAB, and BMI and algae sample collections. The most recent version of the SWAMP *Stream Habitat Characterization Form Full Version* field forms would be used to enter data in the field.

4.3.3 Water Quality and Discharge Measurements

Water quality data would be measured using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the SWAMP 2016 SOP (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, alkalinity, turbidity, and pH.

To determine alkalinity (which is a standard YSI is not capable of doing), a water sample would be collected at each sampling reach. The sample would be taken at approximately 10 to 15 centimeters below the water surface. Using gloves, collectors would fill the water sample bottles to the brim to ensure that air bubbles would not get trapped in the sample bottle. The bottle would then be placed on ice in a cooler until all field data collections were completed. In the evening following each day's sample collection, the water samples would be removed from the coolers and allowed to warm to room temperature. Alkalinity would then be determined by the double endpoint titration method using a Hach Digital Titrator.

Stream discharge would be measured using a Marsh-McBirney Flo-Mate Model 2000 flow meter and following the Velocity Area Method (Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b). Efforts would be made to select a stream transect with a relatively uniform cross section and laminar flow, and at least 20 equally spaced data points would be used to estimate streamflow.

4.3.4 Physical Habitat Assessment and Photo-Documentation

As required by the SWAMP 2016 SOP, PHAB information would be collected at the sampling reaches at each transect and inter-transect location. At the 11 main transects, the full measurements listed in Chapter 6 of the SWAMP 2016 SOP would be taken (Ode et al. 2016a, 2016b). At the 10 inter-transects, fewer measurements would be taken per the SWAMP *Stream Habitat Characterization Form Full Version* field forms.

Digital photo documentation for each sampling reach would consist of upstream and downstream views at transects A, F, and K (i.e., the downstream, middle, and upstream portions of the sampling reach). Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded.

At each sampling reach, reach-wide PHAB conditions relative to three Rapid Bioassessment Protocol (RBP) habitat parameters would be evaluated based on visual observations. These observations would include epifaunal substrate/cover, sediment deposition, and channel alteration. Each of these parameters would be scored using the following numeric value and ranked using the following 20-point scale, per the SWAMP 2016 SOP.

- 1–5 rank as poor
- 6–10 rank as marginal
- 11–15 rank as suboptimal
- 16–20 rank as optimal

4.3.5 Benthic Macroinvertebrate Sample Collection

BMI collection would be conducted according to the SWAMP 2016 SOP, using the reach-wide benthos method, which requires collection from each of the 11 major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, and pool). The BMI samples would be collected 1 meter downstream of each major transect by sampling a 1-foot-square area using a D-frame net. The sampling would begin at transect A (the downstream end) and continue upstream to transect K, with the sample location alternating from left (25% of width), to center (50% of width), to right (75% of width) on each subsequent transect.

All collections from the 11 major transects would be composited into a single sample and transferred into a 1-liter, wide-mouth plastic jar and preserved with 95% ethanol, following the SWAMP 2016 SOP. Samples would be labeled with collection site, time, and collector's name; and a chain-of-custody form would be filled out to accompany the samples on their way to the laboratory for identification. Replicate samples would be collected according to the SWAMP 2016 SOP at one sampling reach for quality assurance/quality control (QA/QC) purposes.

4.3.6 Algae Sample Collection

Algae would be collected in the same manner as the BMI samples, except that the algae would be collected 25 centimeters above the location where the BMI sample would be located. Algae samples would be collected using the sampling tools identified in the SWAMP 2016 SOP, which vary according to the substrate being sampled. A rubber delimiter would be used for large gravel and cobble; a PVC delimiter would be used for fines and gravels; and a syringe scrubber would be used for bedrock and large boulders (if present).

Similar to the BMI sampling, each algae sample collected at the 11 major transects would be composited into a single sample for processing. The processing of the algae would follow the SWAMP 2016 SOP, which would involve removal of algae from the substrates collected and processing the sample for the four algae analyses: quantitative soft-bodied algae, quantitative diatoms, ash-free dry mass (AFDM), and chlorophyll a. A soft-bodied algae qualitative sample would also be collected from each sampling reach by collecting a composite of all types of soft-bodied algae observed within the sampling reach into a single sample. This sample would aid in the identification of soft-bodied algae in the quantitative sample and would be used in the calculation of some of the algae metrics. Replicate algae samples would be collected at the same sampling reaches where replicate BMI samples would be collected.

4.4 Laboratory Processing

This section summarizes the methods that would be used to process all bioassessment data.

4.4.1 Water Quality

Water samples would be collected at each sampling reach to determine total nitrogen and total phosphorus, constituents necessary for helping to determine algal results. Samples would be sent to a local water quality processing laboratory in northern California. The water quality analyses would be consistent with SWAMP protocols for water chemistry. Total nitrogen would be analyzed according to U.S. Environmental Protection Agency Method 351.2, and total phosphorous would be analyzed according to Standard Methods 4500-P B and 4500-P E.

4.4.2 Benthic Macroinvertebrate Sample Processing

BMI sample taxa identification would be conducted by an outside laboratory (most likely by the Chico Aquatic Bioassessment Laboratory [Chico ABL] in Chico, California). BMI samples would be picked, sorted, and identified completely or until a 600 count (SAFIT Level 2) is reached. Chico ABL follows QA/QC procedures developed under the SWAMP program.

4.4.3 Algae Sample Processing

Five types of algae would be collected and processed: qualitative grab, soft-bodied algae, diatoms, AFDM, and chlorophyll a. The qualitative grab, soft algae, and diatom samples would be sent to the CDFW Group at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL-MLML). MPSL-MLML would report the data in SWAMP template formats. MPSL-MLML would calculate the Algae Stream Condition Index (ASCI) from the data. The samples of AFDM and chlorophyll a would also be sent to MPSL-MLML, who would report the data in California Environmental Data Exchange Network template formats. PSL-MLML follows the QA/QC procedures developed under the SWAMP.

4.5 Data Analysis

PHAB information would be entered using the SWAMP Version 2.5 bioassessment data entry forms (Marine Pollution Studies Laboratory 2022) and then loaded into the Microsoft Structured Query Language (SQL) Server database of the MPSL-MLML. BMI and algae taxonomy data, as well as water chemistry data would be loaded from Microsoft Excel templates into the same Microsoft SQL Server database. The data entry forms and templates would be obtained from the MPSL-MLML Data Center website. All data would be verified and checked for completeness after input into the database.

4.5.1 Physical Habitat Information

PHAB data would be entered by the MPSL-MLML using the SWAMP Bioassessment Field Form Microsoft Access database, and then loaded into the MPSL-MLML's Microsoft SQL Server database. After loading, additional error and completeness checks would be run following SWAMP business rules. The data would be sent to the California Environmental Data Exchange Network, where it would be available to the public for viewing and download.

PHAB metrics would be calculated using the SWAMP Bioassessment Reporting Module. The SWAMP protocol contains a subset of parameters measured within the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program for freshwater wadeable streams; therefore, many of their metrics described in Kaufmann et al. (1999) form the basis of the SWAMP Bioassessment Reporting Module output.

SWAMP has developed a PHAB Index similar to the California Stream Condition Index (CSCI) (Section 4.5.3, *Benthic Macroinvertebrates*) for BMI data. The PHAB Index (called the *IPI*) combines eight GIS-calculated metrics with 12 PHAB metrics to produce one IPI value (Rehn et al. 2018). For the purposes of statewide assessments, the IPI has thresholds of physical condition: greater than or equal to 0.94 indicates likely intact condition; 0.93 to 0.84 indicates possibly altered condition; 0.83 to 0.71 indicates likely altered condition; and less than or equal to 0.70 indicates very likely altered condition.

In addition, the results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream*

Assessment (PSA) (2000–2007) (Ode et al. 2011). These select stressor thresholds are not regulatory limits set by SWRCB; rather, they are biology-based stressor thresholds developed by researchers as an objective means to set meaningful, regionally appropriate water quality standards. Two statewide and regional PHAB biological stressor thresholds, the Percent Fines and Sand and Mean Embeddedness thresholds, are examples of biological stressor thresholds that would be appropriate to analyze for this Project.

4.5.2 Water Quality

Similar to the PHAB analysis described above, water quality results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011).

4.5.3 Benthic Macroinvertebrates

MPSL-MLML would be contracted to assist in the analysis of the BMI data. MPSL-MLML would use the BMI taxonomic data obtained from Chico ABL to calculate CSCI scores for each sampling reach. The CSCI is a statewide biological scoring tool that translates complex data about individual BMIs found living in a stream into an overall measure of stream health (Rehn et al. 2015).

CSCI scores and output would be calculated using R scripts defined in Mazor et al. (2017). CSCI score categories would be applied as defined in Rehn et al. (2015).

- Less than or equal to 0.62: very likely altered
- 0.63–0.79: likely altered
- 0.80–0.91: possibly altered
- Greater than or equal to 0.92: likely intact

MPSL-MLML would also calculate several BMI metrics from the taxonomic data for each sampling reach. These individual metrics would be reviewed to discuss the individual results for each sampling reach and event. Representative metrics may include measures of taxa richness, composition, tolerance, functional feeding groups, and habit measures. These other metrics may be more insightful for determining the biological integrity of the BMI communities than the CSCI scores alone (at least in the valley floor sampling reaches), as valley floor reference sites (the sites used in the CSCI calculations) are relatively limited in abundance (Rehn pers. Comm.).

4.5.4 Algae

Diatoms and Soft Algae

MPSL-MLML would be contracted to calculate the statewide diatom, soft algae, and hybrid ASCI and associated metrics. These predictive biological indices replace past regional indices with a statewide index allowing for improved comparisons across diverse landscapes in a consistent and comparable manner. While ASCI can be calculated for soft algae and diatoms separately, the hybrid ASCI produces stronger species distribution models for more accurate and integrative assessments of biological condition.

Chlorophyll *a* and Ash-Free Dry Mass

Ode et al. (2011) in their analysis of the results from the statewide Perennial Stream Assessment between 2000 and 2007, have included stressor thresholds for chlorophyll *a* and AFDM. These thresholds are more protective than levels proposed by previous authors, which were 100 milligrams per square meter for chlorophyll *a* and 50 grams per square meter for AFDM (Barbour et al. 1999, Welch et al. 1988, Dodds et al. 1998, Sosiak 2002, Dodds and Welch 2000, U.S. Environmental Protection Agency 2000, Biggs 2000). The thresholds proposed by Ode et al. (2011) are not regulatory limits or requirements but rather recommendations. The chlorophyll *a* and AFDM stressor thresholds (statewide and regional) would be evaluated for each sampling reach by MPSL-MLML.

4.6 Timing and Frequency

The bioassessment surveys would be conducted during the appropriate index period for Central Valley streams (June through August), which is typically 4 to 6 weeks following the last winter storm event. Depending on stream conditions, however, bioassessment surveys may need to be performed prior to the appropriate index period to ensure adequate flow for benthic and algal sampling is present. Baseline (pre-operation monitoring) would occur in the spring for (possibly) 5 years prior to project operation. Follow-up (baseline) surveys would be conducted on an annual basis during the same period for up to 10 years after operation activities are initiated. The Authority and the relevant agencies (CDFW, USFWS, and Colusa County) would be consulted if the frequency of monitoring would be shortened after 5 years.

4.6.1 Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only collected species.

4.7 Additional Water Quality Measurements

In addition to the standard water quality measurements included in the SWAMP bioassessment as described above, samples would be collected for additional laboratory measurements. The objectives for taking these additional measurements would be to compare pre-Project and Project values, determine any effect of operational adjustments on sampled water quality constituents, and compare measurement values to key stressor thresholds. These additional measurements include:

- **A suite of total and dissolved metals and metalloids**. The suite includes aluminum, arsenic, cadmium, chromium (total), chromium, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc.
- **Cyanobacteria and cyanotoxins**. The cyanobacteria water samples would be collected for the purpose of laboratory analysis for cyanobacteria presence and density and the presence of cyanotoxins (specifically microcystins, anatoxin-a, and cylindrospermopsin).
- **Methymercury in fish tissue**. Level I trophic level fish would likely be more abundant than higher trophic level fish, so the measurements of methylmercury concentrations in fish tissue would focus on these fish. Higher trophic level fish would be sampled intermittently as available. To assess methylmercury in fish tissue, sampling would be conducted using the SWAMP protocol for California rivers and streams (California Water Boards 2011 or most current).

When these additional water quality samples and fish are collected, the following basic survey information and data described above would be collected: project name, sampling reach name, time and date of survey, stream/watershed name, and the names of the survey crew members. Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded. Basic data collected at the sampling sites would include stream discharge measurements, temperature, specific conductivity, dissolved oxygen, turbidity, pH, and water samples for total nitrogen and total phosphorus laboratory measurements. In addition, water samples would be collected for laboratory measurements of dissolved organic carbon and hardness as these parameters influence water quality standards for aquatic life protection for some metals.

These measurements would be taken twice a year, once during a high flow period and once during a low flow period, at the upstream and downstream bioassessment sampling locations on each creek. Sampling would occur during the same years as the rest of the bioassessment studies.

5.0 Hydrogeomorphic Study

5.1 Purpose of Study

The overall purpose of the Hydrogeomorphic Study would be to characterize historical and present-day streamflows, including baseflow during the spring and summer months, on Stone Corral Creek and Funks Creek; the relevant geomorphic characteristics of each creek (herein called *geomorphic indicators*); and flow levels necessary for channel maintenance of geomorphic processes required to maintain the channels in their current condition.

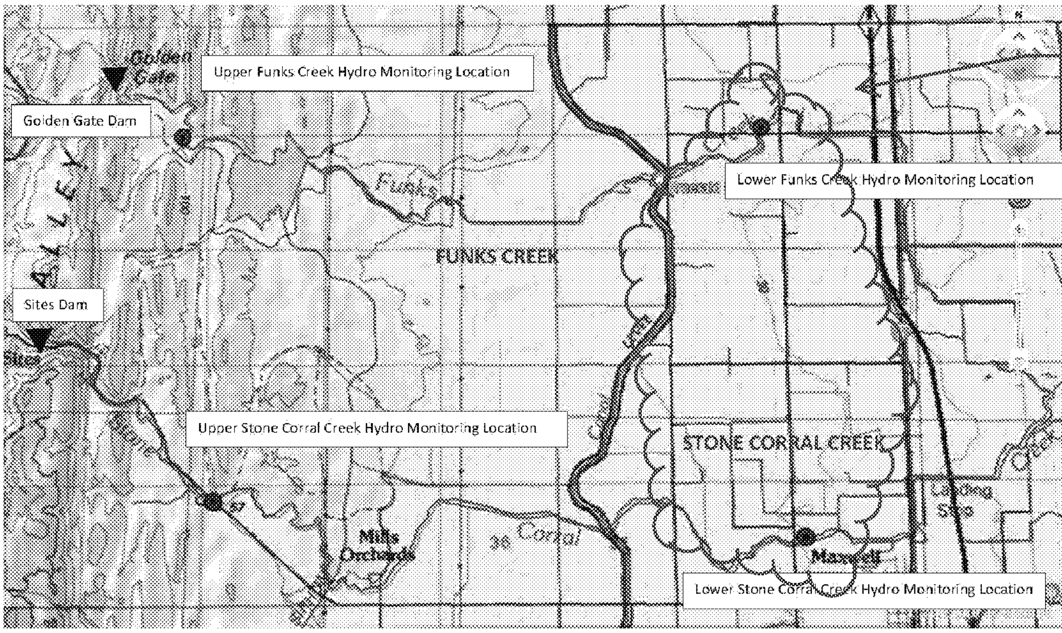
A Hydrogeomorphic Study with quantitative and qualitative monitoring data to fully characterize the existing hydrologic regime of Stone Corral Creek and Funks Creek, as well as the overall type and abundance of sediment available for aquatic organisms, would be developed. To inform the appropriate streamflows for the creeks under inquiry, a geomorphic assessment of the reaches of interest (i.e., the stream reaches below the dams) would constitute the first step in the analysis. The channel segments upstream of the dams would also be rapidly assessed to provide a greater understanding of the local watershed geomorphic characteristics. The focus of the geomorphic assessment would be to determine the dominant geomorphic processes, document the surrounding landforms and channel bed topography, and to determine how the observed morphology of each creek is influenced by the hydrologic regime and the surrounding land uses. Likewise, collection of geomorphic information would aid in the determination of overall channel stability for each creek, which has important implications for the proposed releases.

The Hydrogeomorphic Study to examine the hydrologic regime of Stone Corral Creek and Funks Creek would include a desktop modeling exercise, as well as installation of stilling wells, staff gages, and real-time water surface level collection devices. The goal of the Hydrogeomorphic Study would be to evaluate the physical and hydrologic condition of the reaches of interest within both Stone Corral Creek and Funks Creek. This information, along with the other required studies as discussed in previous chapters (i.e., Fish Assemblage Study and SWAMP bioassessment study), would help to inform the type of flow releases that should be made to the creeks under various Project operating conditions.

After completion of the baseline studies, consideration would be given to when and how flows would be released and whether a portion of these flows are needed to maintain fluvial geomorphic processes (based on the findings from the geomorphic assessment).

5.2 Study Design

The (baseline) Hydrogeomorphic Study components are discussed below. *Field site locations* are applicable to the geomorphic component of the Hydrogeomorphic Study; *hydrologic monitoring locations* represent the potential locations where stilling wells, staff gages, and real-time water surface level collection devices would be installed (i.e., the hydrologic component of the Hydrogeomorphic Study). The ultimate number of field site locations on each creek would be based on access and safety; however, it is anticipated that five sites would be located on Funks Creek and that six would be located on Stone Corral Creek. The locations for the geomorphic component of the Hydrogeomorphic Study would presumably be the same as the bioassessment sampling reaches as part of the SWAMP bioassessment study as described in Chapter 4 (Figure 5). The ultimate number of hydrologic monitoring locations on each creek would primarily be based on access, due to the need for monitoring during and after precipitation events. It is anticipated that two sites would be located on each creek: one in the foothills and one on the valley floor as shown on Figure 6.



Why monitor outside of "reach of interest"?

Figure 6. Potential Hydrologic Monitoring Locations, Stone Corral Creek and Funks Creek

5.2.1 Geomorphic Conditions

Data collected during the geomorphic component of the Hydrogeomorphic Study (geomorphic assessment) would include a host of geomorphic attributes, or indicators, as described below. Topographic data (longitudinal profile and cross sections) needed for the hydrologic model (further described below) would also be collected during the geomorphic assessment. The geomorphic assessment would be conducted by a geomorphologist with expertise in channel and floodplain dynamics, channel stability analyses, and topographic surveying techniques.

The geomorphic assessment would include evaluation of the following indicators.

- Channel classification
- Local watershed inputs
- Hydrologic and flow patterns
- Riparian vegetation condition
- Bankfull width and depth and wetted width
- Bank instability and bank characteristics
- Channel bed substrate composition and embeddedness
- Channel complexity
- Degree of channel incision
- Stage of channel evolution

- Cross section and longitudinal profile surveys

These indicators would be assessed for each field site location (Figure 5). In addition, at least three permanent cross sections would be established within each field site location and within each hydrologic monitoring location (Figure 6) for collection of quantitative channel morphology information and required modeling input. Evaluation methods for these indicators are described below.

Channel Classification

Stream and river segments can be grouped into three generalized classifications based on their position in the watershed and the relative balance of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source areas are typically transport-limited (often due to limited channel runoff) but do offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events. Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, and step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

Based on field observations and the stream classification methodology of Montgomery and Buffington (1998), each field site location would be classified accordingly. The classification would aid in the determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of each field site location on the reaches of interest.

Local Watershed Inputs

Any major inputs of sediment and runoff into the field site locations (e.g., landslides or other mass wasting features, recent burn scars) would be summarized. The objective would be to identify any land use changes that could alter the balance of sediment supply and runoff that could lead to future instability (e.g., channel aggradation of degradation) within the reaches of interest. This would aid in the determination of channel stability and the potential for available habitat to be disrupted or altered in the vicinity of the field site locations.

Hydrologic and Flow Patterns

The hydrologic pattern would be determined throughout the length of the field site locations and would include identification of whether streamflow is perennial, intermittent, or ephemeral. Perennial streams are those which flow year-round; intermittent streams are those which flow for only certain times of the year and receive water from both surface water and groundwater; and ephemeral streams are those which have their channels above the water table year-round and only receive water from surface runoff. This geomorphic indicator would rely on the field-based hydrologic component of the overall Hydrogeomorphic Study, as described below.

Riparian Vegetation Condition

Riparian vegetation is an important indicator for overall stream habitat and function as it serves to stabilize streambanks and allows for canopy cover to create suitable water temperatures for aquatic species. Riparian condition refers to a description of the general health of the riparian area, focusing on the amount and type of vegetative cover.

Within each field site location, riparian condition would be described as low (0–25 % vegetative cover), moderate (25–50 % vegetative cover), high (50–75 % vegetative cover), or very high (75–100 %

vegetative cover). The size and approximate age of any riparian vegetation growing in the channel bed would be documented because this is evidence of channel adjustment and possible re-stabilization from a prior disturbance.

Bankfull Width and Depth and Wetted Width

Bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channel in the field site locations. Specifically, a geomorphic or effective bankfull surface would be identified in the field. The geomorphic bankfull or effective surface is the surface that gets inundated by the discharge that performs the most geomorphic work on a system, typically a flow that occurs every 1.5 to 2 years (Knighton 1999). This discharge, known as the geomorphic bankfull discharge, is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface would be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996). Once this surface is recognized, width and depth measurements would be recorded.

Like bankfull width and depth measurements, wetted width and depth measurements would be recorded. Specifically, the wetted surface would be identified in the field and width and depth measurements would be recorded.

Bankfull and wetted width and depth data collection would help to determine the size of the channel, which would help in assessing overall available habitat conditions in the field site locations and reaches of interest.

In addition, the “active channel” width would be identified, which typically represents a typical low to moderate flow regime and is usually bounded by the width of the in-channel vegetation.

Bank Instability and Bank Characteristics

The term *bank instability* refers to streambanks that are either actively retreating or have the potential to retreat soon. In brief, weakening processes are any bank or near-bank processes that act to erode or prepare streambanks for further erosion (Lawler 1992). The purpose of assessing this indicator would be to identify fluvial erosion (erosion associated with flowing water) and bank failure (erosion associated with gravitational forces and weakening processes). Fluvial erosion is closely related to boundary shear stress, which can be loosely approximated by unit stream power variations, and bank failure is collapse of all or part of the streambank in situ (Lawler 1995).

Bank stability would be defined as the natural streambank that has stable groundcover. Stable ground cover includes rooted trees, shrubs, herbaceous plants, and naturally occurring rocky substrates. Bank composition and bank height/angle would also be determined. The results, in conjunction with the other indicators, can be used to detect where the channel may be downcutting as suggested by over-steepened banks, and can also be used to describe the potential for the channel to potentially laterally migrate and increase the risk of bank instability.

Bank stability analyses would aid in determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of the field site locations, as well as the determination of channel stability and the potential for available habitat to be disrupted or altered in the field site locations.

Channel Bed Substrate Composition and Embeddedness

Substrate composition and embeddedness refer to the size of the substrate materials on the channel bed, and the degree to which these materials are embedded. These conditions indicate how frequently the channel substrate is mobilized. Substrate composition and embeddedness would be measured using the methods described by Bunte and Abt (2001). Substrate composition would identify the available substrate (overall type and abundance) for aquatic species in the vicinity of each field site location.

Channel Complexity

The presence or absence of gravel bar development and evidence of scour and/or deposition would be determined throughout the length of each field site location. Pool and riffle habitats containing in-channel structures (e.g., instream woody material) that create complexity and habitat niches for aquatic organisms would also be documented. Basic channel or habitat units (e.g., pool, riffle, and flatwater) would be delineated according to standard habitat mapping descriptions in each field site location. A rough proportion of unit types would be calculated.

Channel or habitat units would be defined as follows.

- **Pool.** Slow water, length, and width at least one-half the bankfull channel width, and a 10-inch minimum residual pool depth. Subcategories define the general type of pool and include scour (lateral, channel, channel confluence, plunge), dam, and backwater, as defined by Overton et al. (1997).
- **Riffle.** Swiftly flowing, turbulent water, some partially exposed substrate, substrate cobble, and/or boulder dominated (McCain et al. 1990).
- **Flatwater.** Wide, uniform channel bottom, low to moderate water velocity, and little surface agitation. Encompasses any areas that do not qualify as pool or riffle (McCain et al. 1990).

If appropriate (i.e., if the habitat diversity merits such a method), the field site locations would be habitat typed to provide a more detailed stream habitat inventory. Stream habitats would be delineated into one of the six Level-III habitat classification types (Flosi et al. 2010) based on morphological characteristics. These include overall channel gradient, water velocity and depth, substrate, and, where applicable, the channel features (e.g., boulder, bedrock, woody material, converging flow) causing the formation of the habitat unit through scour and sediment deposition (Flosi et al. 2010). Channel/habitat type determination would allow for identification of available habitat types for aquatic species.

Degree of Channel Incision

The degree to which the channel is incised would be recorded as negligible, low, moderate, high, or very high. The degree of incision would be qualitatively analyzed using the following criteria.

- **Identification of any Quaternary landforms on the floodplain (e.g., terraces, low floodplain, fan, etc.).** Terraces typically have steep streambanks, and the channel may not necessarily be incised. Steep, unstable streambanks adjacent to a low floodplain surface, however, typically indicate incision.
- **Identification of bedforms downstream of the site where and if the channel is less incised.** Bed and streambank material from incised channels would typically be deposited downstream in somewhat uncharacteristically large deposits on the channel bed (downstream aggradation).

- **Recognition of base level changes downstream.** Dams and other barriers can create upstream changes in channel bed elevation (i.e., headward migration of incision).
- **Visual survey of channel bed at the field site location.** Channel or habitat sequences, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited time intervals. Additionally, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization.
- **Determination of the health of the riparian and floodplain plant species.** Plants that are found in similar, un-incised reaches are usually not present in incised reaches. No vegetation at all is an indicator of no hydrologic interaction between the floodplain and the channel and, therefore, incision.
- **Identification of recent evidence of overbank deposition of fine sediment, plant debris, or other organic matter.** A channel that floods its streambanks frequently would typically have splay (i.e., sand) deposits and vegetation with a smoothed, flooded appearance in the downstream direction. Natural levee development is also an indication of frequent flooding.

Stage of Channel Evolution

A stream evolution model (Cluer and Thorne 2013) would be applied to the entirety of the reaches of interest on Stone Corral Creek and Funks Creek to provide a template for understanding geomorphic responses and processes within the immediate watershed. The stream evolution model of Cluer and Thorne (2013) revisits and updates two well-established channel evolution models (Schumm et al. 1984, Simon and Hupp 1987) in light of recent research and the authors' practical experiences.

In addition, a channel stability analysis would be conducted at each field site location. The chosen methodology would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2010), or other applicable method. The stream evolution model and the channel stability analyses would aid in the determination of how on Stone Corral Creek and Funks Creek may evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus, having implications for the available habitat within the channels.

Cross Section and Longitudinal Profile Surveys

As mentioned above, at least three permanent cross sections would be established within each field site location (Figure 5) and within each hydrologic monitoring location (Figure 6) for collection of quantitative channel morphology information and required modeling input. Permanent cross sections would be established perpendicular to the primary channel following the methodology of Harrelson et al. (1994). Each transect would be surveyed using ground-based surveying equipment to capture and track channel morphology. Elevations along the cross sections would be collected at intervals close enough to capture slope breaks and distinct morphological features within the floodplain (if present), and along the channel sides and bottom.

The location of each cross section would be permanently marked in the field using 4-foot-tall metal t-posts or wooden lathes (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for each transect would be placed in a stable location above the active channel on the left and right (as viewed facing downstream) banks or terraces of the channel. Transect endpoints (i.e., the permanent

monuments) would be documented using a GPS receiver. Representative photographs would be taken at each cross section.

In addition to the cross sections, a longitudinal profile would be surveyed throughout the length of the channel within a field site location. The spacing between channel bed data points would vary depending on the complexity of the channel bed characteristics. Digital photographs would be taken in the upstream and downstream directions at various locations throughout the longitudinal profile. The location(s) of each cross section would be surveyed on the longitudinal profile for graphical plotting purposes.

Channel Geometry Metrics

As mentioned previously, bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channels. This would be completed at the cross sections measured in the field. In addition to bankfull, wetted, and active channel width and depth measurements, the bankfull and entire channel width-to-depth ratio would be calculated for each cross section, and sinuosity and gradient of the longitudinal profile would be determined.

5.2.2 Hydrologic Conditions

The hydrologic component of the Hydrogeomorphic Study would consist of both desktop (modeling and historical conditions review) and field-based efforts (generation of stage-discharge relationships), both of which are summarized below. The desktop effort would provide detailed information on various (modeled) flows of interest (i.e., the 2-year, 5-year, 10-year, 50-year, and 100-year flow events), while the field-based efforts would validate/calibrate the modeling results via collection of real-time streamflow data, especially for smaller streamflow events (the flows that are expected to occur most of the time on each creek).

Summary of Modeling Approach

A HEC-HMS rainfall-runoff-routing watershed hydrology model would be created to generate hydrographs for both Stone Corral Creek and Funks Creek. Inputs into the hydrology model would include watershed land use, percent impervious inputs, soil types, precipitation and evapotranspiration, drainage network characteristics, and topography (which would be generated from available light detection and ranging [LiDAR] technology).

The topographic surveys as described above would also serve to augment the existing LiDAR data with on-the-ground data to better capture topography in areas requiring additional detail (such as densely vegetated areas). The topographic surveys would be tied into the State Plane Coordinate System and would be sufficient to generate contours at a 1-foot interval. The data collected via the topographic surveys would also be required for generation of stage discharge relationships, as described below.

It should be noted that HEC-HMS rainfall-runoff-routing watershed hydrology model constitutes the first (somewhat exploratory) step in the hydrologic analysis. As discussed in the RDEIR/SDEIS, any releases into Funks Creek would be made through the transition manifold at the base of Golden Gate Dam and a new pipeline that terminates at Funks Creek below the dam. These facilities would carry up to 100 cfs with a release range of 0 to 100 cfs into Funks Creek. Any releases into Stone Corral Creek would be made through the permanent outlet at Sites Dam. This outlet would have a release range of 0 to 100 cfs, with an emergency release capacity of up to 2,500 cfs. The modeling effort would be the first step in determining if a range in flows, as described in the RDEIR/SDEIS, would be needed to meet the purpose of CFGC Section 5937 given the modeled hydrology.

Summary of Field-Based Analysis

The primary objective of the field investigation would be to provide an accurate description of the existing watershed hydrology and variations in streamflow and water surface elevations (i.e., stage) on both Stone Corral Creek and Funks Creek. Periodic streamflow measurements (depth and velocity measurements) would be taken to develop stage-discharge relationships (rating curves) to translate the continuous water depth measurements measured with continuous stage recorders (i.e., HOBO water level loggers [Onset Computer Corporation]) into continuous estimates of flow. These measurements would occur at the hydrologic monitoring locations as shown on Figure 6.

To determine continuous estimates for streamflow, the stage recorders, which measure water temperature and pressure, and vertical stilling wells would be installed in relatively deep portions of the creeks at the locations as shown on Figure 6. The HOBO water level loggers would be set to monitor water depth every 15 or 30 minutes. Additional HOBO water level loggers would also be installed to monitor barometric pressure every 15 or 30 minutes for the purpose of calibrating the depth (water pressure) measurements, which are also affected by barometric pressure. These additional data loggers would be secured to upland surfaces (e.g., trees). Streamflow measurements would be collected to develop equations to convert the continuous stage recorder data into estimated streamflows (discharge). During variable discharge conditions, streamflows would be estimated using a Marsh-McBirney Flo-Mate Model 2000 flow meter and top-setting rod following the procedures described in Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b).

Daily precipitation data obtained from the California Data Exchange Center or the PRISM Climate Group would be used to characterize the rainfall patterns during the study period. Rainfall patterns would be displayed concurrently with the measured streamflow data.

If necessary, acoustic Doppler current profiler (ADCP) technology could be used to capture high flow events. ADCP equipment is particularly useful for collecting accurate and precise water depth and 2-D/3-D velocity data, especially at high flows when other standard surveying techniques as described above are impractical or unsafe. ADCP technology also offers the advantage of detecting bed elevation change resulting from high flow events that would be useful for evaluating sediment mobility in the reaches of interest. The applicability of ADCP would be investigated during the first season of hydrologic monitoring (once field conditions at the field site locations are ascertained).

5.3 Timing, Frequency, and Operation Monitoring

5.3.1 Pre-Operations Monitoring

The baseline geomorphic component of the Hydrogeomorphic Study would first be conducted during the winter/spring of 2023. It is anticipated that all relevant geomorphic indicators could be collected during one field trip. Additional baseline geomorphic data collection during subsequent years would be conducted if high precipitation patterns/high flow events occur during the pre-operation period.

The desktop hydrologic component of the Hydrogeomorphic Study would occur during 2023. The field-based hydrologic component of the Hydrogeomorphic Study would occur at the locations as shown on Figure 6 until the dams are constructed.

5.3.2 Operations Monitoring

Follow-up geomorphic and hydrologic surveys would be conducted on a regular (pre-approved) basis for up to 10 years after operations begin. The Authority would consult with the relevant agencies (CDFW, USFWS, and Colusa County) if the frequency of monitoring would be shortened after 5 years. Additional information on each component of is provided below.

Geomorphic Stability Monitoring Plan

Operations geomorphic monitoring would generally be like the pre-operation efforts, including returning to established field site locations and collecting information on geomorphic indicators by performing a geomorphic assessment as described above. Data collected as part of the operations geomorphic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The focus of the operations geomorphic monitoring effort, however, would be geomorphic stability monitoring. As such, the primary survey components of monitoring would include cross section and longitudinal profile surveys, channel bed substrate composition determination, and channel stability evaluations. All methods for these efforts would be identical to those described above. The objectives of these monitoring elements and their relevance to geomorphic stability are summarized below.

Cross Section and Longitudinal Profile Surveys

The objectives of collecting data at the cross sections would be to collect primarily lateral stability information to determine the rate of lateral migration through bank erosion and overall cross-sectional area change. The rate, magnitude, and direction of lateral change and area change would be determined over time using repeat longitudinal profile surveys.

The objective of collecting data at the longitudinal profiles would be to collect primarily vertical stability information to determine rates of aggradation or degradation (whether the stream is downcutting [degrading], filling [aggrading], or remaining static). The rate, magnitude, and direction of vertical change would be determined over time using repeat longitudinal profile surveys.

Channel Bed Substrate Composition and Embeddedness

The objectives of collecting channel bed substrate composition and embeddedness information would be to observe potential shifts in bed material size-frequency distribution, which can be determined over time. Collected grain size information would aid in interpretation in specific geomorphic changes if they occur (such as any changes identified via the cross-sectional and longitudinal profile analyses above).

Channel Stability Evaluations

The chosen methodology for channel stability evaluations would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. Together with the stream evolution model (Cluer and Thorne 2013), the channel stability analyses would aid in the determination of how Stone Corral Creek and Funks Creek may continue to evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Hydrologic Monitoring Plan

Operations hydrologic monitoring would be like the pre-operation field-based efforts, including returning to established hydrologic monitoring locations, monitoring stage and stream discharge over time. Data collected as part of the operation hydrologic monitoring effort would be compared against the baseline data and summarized into interim and final reports.

The level of effort of the operations Hydrologic Monitoring Plan, however, would be considerably less than for the pre-operation effort because, depending on the streamflow and precipitation patterns during the pre-operation time-period, there would presumably already be numerous years of pre-operations hydrologic monitoring data at the hydrologic monitoring locations (in other words, a robust data set with multiple discharge measurements and associated stages would be available). The operation hydrologic monitoring effort would, therefore, primarily consist of measuring streamflow values that were not obtained during the pre-operation monitoring effort (presumably higher flow events) and conducting routine field maintenance activities such as periodic downloads of the HOBO water level loggers and upkeep of field equipment.

6.0 Temperature Study Design and Methods

6.1 Overview of Proposed Methods

A temperature study would be conducted to characterize temperatures under existing conditions and determine flow and storage effects on temperature in Stone Corral Creek and Funks Creek under operating conditions. The study would involve evaluating temperatures in the creeks before and after initiation of Project operation and would include consideration of the effects of creek flow and reservoir storage on temperature.

The study would assess the following.

- The temperatures that support the aquatic community under existing conditions.
- Reservoir discharge needed to maintain appropriate temperatures to maintain fish in good condition in Stone Corral Creek and Funks Creek downstream of Sites Reservoir after the start of operation.

Add third bullet to allow for documentation of no existing perennial flow,as confirmed by field study

6.2 Study Design

Once access to Stone Corral Creek is obtained, a temperature probe would be installed in Stone Corral Creek at the location of Sites Dam release, and four additional probes would be installed downstream by approximately 0.5 mile, 1 mile, 2.4 miles (near where Stone Corral Creek goes under Maxwell Sites Road), and 4.4 miles (near where TC Canal goes under Stone Corral Creek).

Once access to Funks Creek is obtained, a temperature probe would be installed in Funks Creek at the location of the I/O tower release to Funks Creek, and two additional probes would be installed downstream by approximately 0.5 mile and 1 mile (far enough upstream of Funks Reservoir to be unaffected by it). In addition, probes would be installed at the TC Canal inlet to Funks Reservoir, at the TC Canal outlet from Funks Reservoir, and at the Funks Creek outlet from Funks Reservoir.

As described in the draft Reservoir Management Plan included in Appendix 2D of the RDEIR/SDEIS, once operation has commenced, water temperature profiles would be measured near Golden Gate Dam once every 2 weeks at 5-feet depth intervals to inform decisions about which ports of the I/O tower to use for any required flow releases under 5937. The temperature probes in the creeks would continuously record hourly temperatures. These temperatures would be used along with specific fish requirements to develop target temperature ranges for operation conditions.

Temperatures recorded after Sites Reservoir is operational would be used in conjunction with flow and storage data to determine flow and storage effects on creek temperatures. If creek temperatures cannot be accurately estimated with flow, storage, meteorology, and the reservoir temperature profiles, water temperature modeling could be performed for Sites Reservoir, Stone Corral Creek, and Funks Creek. If modeling is necessary, models would be calibrated with the measured flow, storage, and temperature data.

Water released into Stone Corral Creek would originate from the lower half of Sites Reservoir and would likely be cooler than equilibrium values during months when the reservoir is stratified. The biggest differential between release temperatures and equilibrium values would occur when the reservoir is full and ambient air temperature conditions are high. If it is determined that flow should be maintained in Stone Corral Creek at times when releases would be relatively cool compared to temperatures under existing conditions, lower flows would allow the water to warm farther upstream than higher flows.

Water released to Funks Creek would originate from the I/O tower and, when the reservoir is stratified, would be warmer than the water released to Stone Corral Creek. The temperatures would be warmer because the withdrawals would come from higher in the reservoir and, as described in the Reservoir Management Plan, the I/O tower port openings would be chosen to provide 65 degrees Fahrenheit (°F) or higher water temperatures during the rice growing season (May through September).

6.3 Timing and Frequency

Water temperature measurements would occur before and during operation. Measurements during the initial fill period would be useful for evaluating water temperature under low-storage conditions. Reservoir profile measurements and measurements at the Stone Corral Creek and Funks Creek releases may need to continue in the long term.

Measurements downstream of the release locations could be discontinued if the following conditions are met.

- Sites Reservoir has made releases for at least 2 years when the reservoir was at least 75% full.
- Temperature effects are found to have little effect on native fish (e.g., if only short sections of the creeks below the dams experience temperature effects) or if flow and storage effects on creek temperatures are understood well enough that average daily creek temperatures can be estimated within 3°F based on meteorological conditions, flow, reservoir storage, and reservoir temperature profiles.

Seems to assume water and fish presence.... isn't the purpose of this study to determine Absence/presence?

No release if reservoir is less than 75% full?

7.0 Reporting and Permit Requirements

throughout the year?

7.1 Annual Reporting Requirements

Reporting requirements would be met through the preparation and submittal of annual and final reports as part of the Aquatic Study Plan that would be implemented as a part of the Authority's commitments and responsibilities to maintain fish in good condition consistent with CFGC Section 5937.

The first five annual reports would summarize the first 5 years of baseline conditions. All future (operation) reporting efforts would compare the conditions at that time to those collected during the baseline conditions.

The following information would be addressed in comprehensive annual reports with multiple chapters covering fish, bioassessment, hydrogeomorphic, and temperature study results.

- **Fish Study Results.** The annual report would include descriptions and locations of fish communities in Stone Corral Creek and Funks Creek, summarizing monitoring results in the study area. The report would document monitoring results and link results to objectives. The report would identify new or ongoing management issues, threats and stressors, and provide recommendations for future monitoring and management.
- **Bioassessment Results.** The annual reports would include BMI, algae, water quality, and PHAB output and results and a summary of each of these indicators. The most recent version of the SWAMP *Stream Habitat Characterization Form, Full Version* field forms would be provided in appendix format, along with representative photography of the sampling reaches.
- **Hydrogeomorphic Results.** The annual reports would include a summary of the monitoring methods; a summary and analysis of the hydrogeomorphic monitoring results, including an evaluation of site conditions in the context of the performance standards; a discussion of the monitoring results; a discussion of any modifications made to the monitoring methods; a discussion of the previous year's monitoring efforts; and photographs taken from the cross sections and longitudinal profiles.
- **Temperature Results.** The annual reports would include a summary of temperatures that support the aquatic community under existing conditions, and a recommendation of reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam and Funks Creek downstream of Golden Gate Dam after operation has commenced.
- **Monitoring Program Evaluation.** The annual reports would evaluate the Aquatic Study Plan to ensure that data (1) are collected efficiently, (2) address information needs, and (3) adequately assess resource responses to management actions. Changes in monitoring methods, protocols, or frequency would be summarized in the annual reports.
- **Objective Criteria Evaluation.** Annual reports during operations would evaluate whether management actions are meeting project objectives or performance standards (described below). An assessment would be made as to causal factors of observed declines, including the potential role of external stressors outside the parameters of Project effects.
- **Adaptive Management Thresholds.** The link between the technical and decision-making steps requires regular interaction and exchange of information between technical staff and decision-makers. This would be accomplished by annual meetings involving the Authority and the agencies where both regulatory and technical expertise can be integrated into revising goals and objectives,

uncomfortable with inference

adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed such that any new information discussed assists with the planning of upcoming seasonal work.

7.2 Performance Standards

Performance standards for the Aquatic Study Plan would be based on quantitative metrics. These performance standards would be designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the study reaches.

Fish community performance standards would include measures of community diversity and percent area occupied for both available and total reach distance within the study areas. BMI performance standards would likely include three main indicators—PHAB IPI scores, BMI CSCI scores, and algae ASCI scores. Geomorphic performance standards would focus on channel stability evaluations such as:(1) evidence of significant and detrimental morphologic changes at any of the cross sections; (2) evidence of channel headcutting; (3) significant loss of gravels via dam impoundment; and (4) significant decrease in the channel stability score during the duration of monitoring activities.

Performance standards would be developed in conjunction with the Authority and the relevant agencies (CDFW, USFWS, and Colusa County) prior to the start of operation monitoring.

7.3 Operations Plan

The Authority would use information from the results of implementation of this Aquatic Study Plan, including field studies described herein, to prepare the Operations Plan. The Operations Plan would describe the approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from Stone Corral Creek and Funks Creek, while also ensuring that the Project's flood protection benefits are realized. Further, the Operations Plan would include, but would not be limited to, the approach for reservoir releases into Stone Corral Creek and Funks Creek, including release schedules and volumes. As stated in the Authority's application to appropriate water, the Operations Plan would be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

7.4 Anticipated Schedule

The following schedule is anticipated to result in a reduced workload once a range of flows is encountered with representative variability of environmental conditions (Table 3). For example, the field-based Hydrologic Study could possibly occur over the course of the 5 years leading up to dam construction and could terminate once a suitable range of flows has been measured and analyzed. This could occur within 1 year if flow conditions are variable enough, but more than likely it will occur over a series of years.

Table 3. Anticipated years that each study will be needed to acquire a representative range of environmental conditions for baseline and post operation periods.

Year	Fish Community	Bioassessment Study	Water Quality	Water Temp.	Geomorphic Study	Hydrologic Study (desktop)	Hydrologic Study (field)
Baseline							
2023	√	√	√	√	√	√	√
2024	√		√	√			√
2025	√	√	√	√			√
2026	√		√	√			√
2027	√	√	√	√			√
Post Operation							
2030	√	√	√	√	√		√
2031	√		√	√			
2032	√	√	√	√	√		√
2033	√		√	√			
2034	√	√	√	√	√		√

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8.2 Personal Communications

Rehn, Andrew. Biologist, California Department of Fish and Wildlife. April 6, 2022—Phone conversation with Jeff Peters of ICF and Marco Sigala at Moss Landing Marine Laboratories regarding a suitable number of bioassessment sampling reaches on Funks Creek and Stone Corral Creek for the Sites Reservoir Project.

Sites Reservoir Project - Yocha Dehe Meeting Agenda

Sites
Affordable Water, Sustainably Managed

Our Core Values – Safety, Trust and Integrity, Respect for Local Communities, Environmental Stewardship, Shared Responsibility and Shared Benefits, Accountability and Transparency, Proactive Innovation, Diversity and Inclusivity
Our Commitment – To live up to these values in everything we do

Meeting Information:

Date:	December 8, 2022	**Location:**	https://bluejeans.com/819967613/6109
Start Time:	11:00 a.m.	**Finish Time:**	11:30 a.m.
Purpose:	Ongoing AB 52 Consultation with Representatives of the Yocha Dehe Wintun Nation		

Meeting Participants:

Laverne Bill, Yocha Dehe
Yvonne Perkins, THPO, Yocha Dehe
Diamond Lomeli, Yocha Dehe
Paula Lorenzo Tackett, Yocha Dehe
Eric Hernandez, Yocha Dehe
J Socorro Reyes-Gutierrez, Yocha Dehe
Ali Forsythe, Sites Authority
Janis Offermann, Horizon
Laurie Warner Herson, Sites Integration

Agenda:

Discussion Topic	Topic Leader	Time Allotted
1. Welcome	All	5 mins
2. RDEIR/SDEIS Comments	Ali	5 min
3. Proposed MOA	Janis/Ali	5 min
4. Tribal Working Group	Ali	5 min
5. Geotechnical Work	Ali	5 min
6. Action Items/Follow Up	All	5 min

From: Sara M. Katz [skatz@katzandassociates.com]
Sent: 12/8/2022 3:12:54 PM
To: Kevin Spesert [kspesert@sitesproject.org]
Subject: RE: L&O Cmte Prep

Received, thank you.

Sara M. Katz
Founder/CEO
mobile: 619.813.9551
San Diego · Los Angeles · San Francisco

From: Kevin Spesert <kspesert@sitesproject.org>
Sent: Thursday, December 8, 2022 3:09 PM
To: Sara M. Katz <skatz@katzandassociates.com>
Subject: FW: L&O Cmte Prep

Per our conversation....

From: Kevin Spesert
Sent: Thursday, December 8, 2022 2:42 PM
To: Jerry Brown <jbrown@sitesproject.org>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: L&O Cmte Prep

Agreed...my thoughts in red...

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, December 8, 2022 12:50 PM
To: Kevin Spesert <kspesert@sitesproject.org>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: L&O Cmte Prep

A couple of items to incorporate into the planning of the January meeting of this group where we are going to cover, among other things, the comms budget issue:

1. Please ensure in our scheduling of this meeting next month that we schedule around and ensure we include the RC members that expressed interest in the extra outreach activities. My recollection is this includes Heather Dyer, Robert Cheng, and Mark Krause. Should also include those that spoke out against the placeholder on the AB vote – Jeff and Gary. Since Valerie was present at the Nov L&O she should be present for this meeting.

I believe that it was Heather and Jason Holly at the October RC meeting who expressed an interest in the extra activities. I was not at the meeting (Lisa had her surgery that day) and don't know if Robert and Mark also made comments.

Robert, Mark, and Jason are not part of the L&O Committee. The "official" committee is Jeff, Fritz, Gary, and Logan. Over the past couple of years we have invited RC members to participate (Thad, Valerie, Heather, and Nina) and we invite Sean Bigley from City of Roseville per his request.

I will work and try to schedule the meeting around the folks who typically participate...we should discuss how to address the "non-committee members" at our 1x1 next week.

2. The discussion of this item should include an opportunity for RC members to express what they see the need being from their perspective which I understand to be 1) educate constituents of all 22 participants and legislators on the importance of this project to the state, 2) shore up support from home boards with critical communication coming from the Sites authority to their constituents.

Agree. The focus will be on receiving feedback from the members. Once these needs are defined and agreed to by the committee...we can identify the appropriate tactics...and scope and budget...for any "extra outreach" that may be needed.

3. I think we should generally structure the meeting to be forward looking on this issue. Maybe we spend a few minutes talking about how we got here, but only needed to the extent that it helps us work through this conflict.

Agree.

4. Keep in mind that the 'extra outreach' is related to communicating on the water rights process primarily so we have a need for a quick timeline to turn this around and get going on the extra outreach.

Agree. I would add any communication that become necessary due to the final EIR/EIS (particularly if there are any lawsuits)

You mentioned you were meeting with Jeff on this topic this week. Please share what you heard on this subject from him.

Did not get a chance to talk with Jeff about it during the Farm Credit tour...Trying to get on his calendar

thanks

From: Micko, Steve [Steve.Micko@jacobs.com]
Sent: 12/8/2022 4:32:39 PM
To: Angela Bezzone [bezzone@mbkengineers.com]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Leaf, Rob [Rob.Leaf@jacobs.com]; Thayer, Reed [Reed.Thayer@jacobs.com]
Subject: RE: [EXTERNAL] RE: Sites: water operational data

Hi Angela,

I'll post a few notes on this. It may be easier to talk through.

This assumption was incorporated by Reclamation when they updated the Benchmark CalSim II model in Nov 2021 (between RDEIR/SDEIS and Final EIR/EIS).
Reclamation increased the assumed settlement contractor demand and delivery in the model to more closely reflect their full contract amount.
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Sent: Thursday, December 8, 2022 3:23 PM
To: Micko, Steve <Steve.Micko@jacobs.com>
Cc: Alicia Forsythe <aforsythe@sitesproject.org>; Leaf, Rob <Rob.Leaf@jacobs.com>; Thayer, Reed <Reed.Thayer@jacobs.com>
Subject: RE: [EXTERNAL] RE: Sites: water operational data

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Sent: Wednesday, December 7, 2022 4:43 PM
To: Brian Grubbs <grubbs@montaguederose.com>
Cc: Alicia Forsythe <aforsythe@sitesproject.org>; Leaf, Rob <Rob.Leaf@jacobs.com>; Thayer, Reed <Reed.Thayer@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>; Cheyanne Harris <CHarris@brwncald.com>; JP Robinette <jrobinette@sitesproject.org>; Corey McCullough <mccullough@montaguederose.com>
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Brian Grubbs | Managing Director
Montague DeRose and Associates

916-712-1747

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Sent: Wednesday, December 7, 2022 11:57 AM
To: 'Micko, Steve' <Steve.Micko@jacobs.com>
Cc: 'Alicia Forsythe' <aforsythe@sitesproject.org>; 'Leaf, Rob' <Rob.Leaf@jacobs.com>; 'Thayer, Reed' <Reed.Thayer@jacobs.com>; 'Angela Bezzone' <bezzone@mbkengineers.com>; 'Cheyanne Harris' <CHarris@brwncald.com>; JP Robinette (jrobinette@sitesproject.org) <jrobinette@sitesproject.org>
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Steve,
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Sent: Tuesday, December 6, 2022 3:05 PM

To: Angela Bezzone <bezzone@mbkengineers.com>
Cc: Cheyanne Harris <CHarris@brwncald.com>
Subject: Sites: water operational data

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This is somewhat urgent due to support the Indicative Rating with S&P. Could you send it today or early tomorrow morning?

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Sent: 12/8/2022 4:58:46 PM
To: JP Robinette [jrobinette@sitesproject.org]; Cheyanne Harris [CHarris@BrwnCald.com]
Subject: FW: [EXTERNAL] RE: Sites: water operational data

Hello! Just wanted to follow up on this item – see email from Steve below. Sounds like this assumption was at the direction of Reclamation and is focused on the SRSCs (GCID and RD 108). Please let me know if you have any follow up questions.

Angela

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From: Jerry Brown [jbrown@sitesproject.org]
Sent: 12/9/2022 6:12:34 AM
To: Marcia Kivett [MKivett@sitesproject.org]
Subject: Re: L&O Cmte Prep

Make sure Kevin has the roster list for this cmte. His list of members is short a few. thanks

From: Kevin Spesert <kspesert@sitesproject.org>
Date: Thursday, December 8, 2022 at 2:42 PM
To: Jerry Brown <jbrown@sitesproject.org>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: L&O Cmte Prep

Agreed…my thoughts in red…

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, December 8, 2022 12:50 PM
To: Kevin Spesert <kspesert@sitesproject.org>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: L&O Cmte Prep

A couple of items to incorporate into the planning of the January meeting of this group where we are going to cover, among other things, the comms budget issue:

1. Please ensure in our scheduling of this meeting next month that we schedule around and ensure we include the RC members that expressed interest in the extra outreach activities. My recollection is this includes Heather Dyer, Robert Cheng, and Mark Krause. Should also include those that spoke out against the placeholder on the AB vote – Jeff and Gary. Since Valerie was present at the Nov L&O she should be present for this meeting.

I believe that it was Heather and Jason Holly at the October RC meeting who expressed an interest in the extra activities. I was not at the meeting (Lisa had her surgery that day) and don't know if Robert and Mark also made comments.

Robert, Mark, and Jason are not part of the L&O Committee. The "official" committee is Jeff, Fritz, Gary, and Logan. Over the past couple of years we have invited RC members to participate (Thad, Valerie, Heather, and Nina) and we invite Sean Bigley from City of Roseville per his request.

I will work and try to schedule the meeting around the folks who typically participate…we should discuss how to address the "non-committee members" at our 1x1 next week.

2. The discussion of this item should include an opportunity for RC members to express what they see the need being from their perspective which I understand to be 1) educate constituents of all 22 participants and legislators on the importance of this project to the state, 2) shore up support from home boards with critical communication coming from the Sites authority to their constituents.

Agree. The focus will be on receiving feedback from the members. Once these needs are defined and agreed to by the committee…we can identify the appropriate tactics…and scope and budget…for any "extra outreach" that may be needed.

3. I think we should generally structure the meeting to be forward looking on this issue. Maybe we spend a few minutes talking about how we got here, but only needed to the extent that it helps us work through this conflict.

Agree.

4. Keep in mind that the 'extra outreach' is related to communicating on the water rights process primarily so we have a need for a quick timeline to turn this around and get going on the extra outreach.

Agree. I would add any communication that become necessary due to the final EIR/EIS (particularly if there are any lawsuits)

You mentioned you were meeting with Jeff on this topic this week. Please share what you heard on this subject from him.

Did not get a chance to talk with Jeff about it during the Farm Credit tour...Trying to get on his calendar

thanks

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 12/9/2022 8:46:24 AM
To: steve.micko@jacobs.com; Angela Bezzone [bezzone@mbkengineers.com]
CC: Leaf, Rob [Rob.Leaf@jacobs.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Next steps for WRLCM

Including Ali on this.

What level of effort are you looking at for development of the CalSim II 2070 1B?

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Thursday, December 8, 2022 11:52 AM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
Subject: RE: Next steps for WRLCM

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

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Alternative 3B (Reclamation at 16% federal investment) was only included in the BA/ITP, which were focused to 2035 climate.

Hope this helps,
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Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
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Thanks,
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John Spranza, MS, CCN
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He/Him

HDR
2379 Gateway Oaks Drive, Suite 200
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hdrinc.com/follow-us
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CC: Leaf, Rob [Rob.Leaf@jacobs.com]; Alicia Forsythe [aforsythe@sitesproject.org]
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Okay. Angela with reach out to coordinate the details.

Does the Science Center have the information they need to run a 2035 model run with the revised bend bridge flows?

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He/Him

HDR
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From: Micko, Steve [Steve.Micko@jacobs.com]
Sent: 12/9/2022 1:35:28 PM
To: Spranza, John [john.spranza@hdrinc.com]; Angela Bezzone [bezzone@mbkengineers.com]
CC: Leaf, Rob [Rob.Leaf@jacobs.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Next steps for WRLCM

Not yet – I can have modified Bend Bridge flows for Alt 3B at 2035CT ready by COB Monday.

Best,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, December 9, 2022 1:28 PM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: [EXTERNAL] RE: Next steps for WRLCM

Okay. Angela with reach out to coordinate the details.

Does the Science Center have the information they need to run a 2035 model run with the revised bend bridge flows?

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Friday, December 9, 2022 12:32 PM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: RE: Next steps for WRLCM

Hi John,

We'll need a few weeks to put together a CalSim II model of Alt 3B at WSIP 2070 conditions.
It requires a thorough review of CalSim II results to assure it's properly informing secondary models.

Let me know if you'd like more details or if you'd like to discuss.

Best,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, December 9, 2022 8:46 AM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: [EXTERNAL] RE: Next steps for WRLCM

Including Ali on this.

What level of effort are you looking at for development of the CalSim II 2070 1B?

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Thursday, December 8, 2022 11:52 AM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
Subject: RE: Next steps for WRLCM

Hi John,

We'll need to develop a CalSim II for Alternative 3B at 2070, run DSM2 and conduct temperature modeling.

We developed CalSim II models with Sites at 2070 climate for the Final EIR/EIS alternatives.
Alternative 3B (Reclamation at 16% federal investment) was only included in the BA/ITP, which were focused to 2035 climate.

Hope this helps,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, December 8, 2022 8:35 AM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
Subject: [EXTERNAL] Next steps for WRLCM

Hi Steve and Angela,
Attached is the results from the Alt 3A run with the modified flows that incorporate Sites Diversions on flows below Bend Bridge. Ali and I discussed next steps and given that Reclamation has settled on a 16% investment, we will be asking Anne-Marie to run Alt 3B with the revised flows and then with 2070 hydrology and revised flows.

I think we need to run DSM2 and Temp for the 2070 run prior to them doing that, is thee anything else they would need from you?

Thanks,
John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist
He/Him

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From: Joe Trapasso [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D38ACFCF2D414E8F84F4921FE20C1D91-JTRAPASSO00]
Sent: 12/11/2022 11:58:58 AM
To: Gary Dubin [gdubin@brwncald.com]; Kim Stubblefield (KStubblefield@brwncald.com) [kstubblefield@brwncald.com]
CC: Marcus Maltby [mmaltby@brwncald.com]
Subject: Executed Amendment #1 to Yocha Dehe Wintun Nation Standard Monitoring Agreement
Attachments: Executed Amendment #1 to Yocha Dehe Wintun Nation Standard Monitoring Agreement With Sites.pdf

Executed Amendment No. 1 to Yocha Dehe Wintun Nation Standard Monitoring Agreement.

Joe

Joe Trapasso
Program Operations Manager
Sites Reservoir Project
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P.O. Box 517
122 Old Highway 99 West
Maxwell, CA 95955

From: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
Sent: 12/12/2022 2:34:43 PM
To: Kevin Spesert [kspesert@sitesproject.org]
Subject: FW: Sites EIR/EIS Question - Local Community Working Group

Hi Kevin - do we have a write-up on the Local Community Work Group that I can share with ICF? I couldn't find anything on SharePoint.

From: Harris, Melissa <Melissa.Harris@icf.com>
Sent: Wednesday, December 7, 2022 1:26 PM
To: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Cc: Unsworth, Ellen <Ellen.Unsworth@icf.com>; Wolf, Barbara <Barbara.Wolf@icf.com>; Briard, Monique <Monique.Briard@icf.com>
Subject: Sites EIR/EIS Question - Local Community Working Group

Laurie,

Can you please provide a description of the Local Community Working Group? We need to add a description to MR 1 because of the text referring to it in MR 7. Alternatively, we could remove the reference to the Local Community Working Group in MR 7.

Melissa

Melissa Harris, PMP
916.210.5916 (direct)
980 9th Street Suite 1200, Sacramento, CA, 95814, USA

From: Kevin Spesert [kspesert@sitesproject.org]
Sent: 12/12/2022 4:45:16 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Re: Press Inquiries

I would see if we can hold off until January...invite them to do a tour and discussion...I am afraid there is just too much going on for the board meeting...

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Monday, December 12, 2022 4:18 PM
To: Kevin Spesert <kspesert@sitesproject.org>
Subject: FW: FW: Press Inquiries

See below. I'd like to have you also in this discussion. I am booked after the RC/AB on Friday. I could talk from noon to 1 PM, but that assumes the meeting ends on schedule.

What do you think – try to schedule from noon to 1 PM or see if they can hold off until the January meeting?

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

---

From: Katherine Li <katherine_li@berkeley.edu>
Sent: Monday, December 12, 2022 8:00 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Cc: hharjani@berkeley.edu; Kevin Spesert <kspesert@sitesproject.org>
Subject: Re: FW: Press Inquiries

Hello Alicia,

Thank you so much for getting back to us with a detailed explanation regarding the SOOC and when the Final EIR will be released.

Since it is visible on the Sites Reservoir schedule that a meeting will be held on Friday December 16 this week, we're wondering if this meeting will be in person, and if so, if it would it be a good opportunity for us to drop by in person to talk to you and understand more about this project. We have long been wanting to visit what will potentially be the Sites in person, so we would like to know if Friday would be a good time for us to listen to the meeting in person (if it will be in person), and to chat with you and others who are spending an immense amount of time trying to actualize this project. It would be great if you could let us know. Thank you so much!

Regards,
Katherine Li

Katherine Li (she/her)
UC Berkeley Graduate School of Journalism
(510) 365 6496
https://twitter.com/Katherineli_

On Thu, Dec 1, 2022 at 11:24 AM Alicia Forsythe <aforsythe@sitesproject.org> wrote:

Katherine – Thank you for your email. The Sites Authority and the Bureau of Reclamation released a Revised Draft Environmental Impact Report / Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS) in November 2021. The public comment period closed in January 2022. Based on your email, I think you have found the link to the document, but just in case, it is available here (scroll to the bottom of the page): Environmental Review - Sites Reservoir (sitesproject.org). As part of the environmental review process, the Authority and Reclamation are reviewing all of the comments received, preparing responses to those comments and revising the document. The responses to comments and any revisions to the document will be released in the Final Environment Impact Report/Environmental Impact Statement (Final EIR/EIS). We expect to complete and release the Final EIR/EIS in May 2023. This Final EIR/EIS will include all of the comment letters received with the responses to the comments.

In general, a Statement of Overriding Considerations is required under the California Environmental Quality Act when an agency approves a project that includes significant and unavoidable environmental impacts. The Statement of Overriding Considerations is made when the agency approves the project – which happens after issuance and certification of the Final EIR. If the Authority Board chooses to approve the project, the Board will also need to make a Statement of Overriding Considerations as the RDEIR/SDEIS had, and Final EIR/EIS is expected to continue to have significant and unavoidable environmental impacts. We expect the Authority Board to consider approving the project and making a Statement of Overriding Considerations shortly after release of the Final EIR/EIS.

I will also note that the Statement of Overriding Considerations does not overcome wildlife protections or water quality regulations – meaning it does not waive statutory requirements or regulations. It would provide justification, in the view of the Authority, on how the benefits of the project outweigh the significant and unavoidable environmental impacts. However, the Authority will continue to meet all applicable statutory requirements and regulations for the project and obtain all necessary permits and approvals.

I hope this helps and happy to chat further or answer any additional questions.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Katherine Li <katherine_li@berkeley.edu>
Sent: Monday, November 28, 2022 8:00 AM
To: Board Clerk <boardclerk@sitesproject.org>

Cc: Hanisha Harjani <hharjani@berkeley.edu>
Subject: Press Inquiries

Dear Sites Authority Board,

Hello, my name is Katherine Li, and I'm a journalism graduate student at UC Berkeley. We are currently working on a research project regarding water sustainability and droughts in Northern California.

We are aware that the Sites Reservoir has been on the drawing board for decades, and that multiple state and federal agencies, especially the USEPA, CDFW, and CWC, are responsible for making comments and recommendations on your most recent 2020 draft and 2021 revised draft environmental impact report (EIS/EIR). We would like to ask if there is one place where we could view these recommendation documents, or if you know where to find them. Some of the recommendation and comment documents we have located are regarding the original EIR from back in 2018, but plenty has changed regarding the size and design of your project since then. It would be great if you could show us these new documents so we could have the most accurate and updated information.

We would also love to know if a Statement of Overriding Considerations (SOOC) has been prepared for the Sites, or if there is a plan to do so. The California Water Commission had recommended that the Sites prepare such a statement as the lead agency under CEQA, to overcome wildlife protection and water quality regulations. This recommendation was mentioned in a December 2021 CWC continuing eligibility and feasibility determination document, and we would like to know if the Sites have taken action regarding this recommendation.

Thank you so much!

Regards,
Katherine Li

Katherine Li (she/her)
UC Berkeley Graduate School of Journalism
(510) 365 6496
https://twitter.com/Katherineli_

EVALUATION OF SITES RESERVOIR POTENTIAL IMPACT ON YOLO BYPASS BNP

TUFLOW MODELING APPROACH

INITIALLY SUBMITTED: FEBRUARY 2, 2022

RESUBMITTED: MARCH 1, 2022

Situation

The California Department of Water Resources (DWR) recently completed the 95% design of the Yolo Bypass Big Notch Project (BNP). The purpose of the BNP is to provide floodplain rearing habitat and entrainment for young salmon and upstream fish passage for adult salmon and sturgeon. To support the BNP Environmental Impact Report/Environmental Impact Statement (EIR/EIS), DWR developed a 1D/2D TUFLOW hydraulic model. The EIR/EIS TUFLOW model includes the Yolo Bypass, a portion of the Sutter Bypass, and adjacent rivers and streams. The TUFLOW model was originally developed in 2017 to evaluate the ability of BNP alternatives to create floodplain habitat and improve fish passage within the Yolo Bypass, and to evaluate the relative differences between the alternatives' impacts to the environment (DWR, 2017a). Recently, the TUFLOW model was updated to the latest version (2020-10-AB-Beta1) and modified to take advantage of new functionality within the software.

Sites Reservoir is a planned reservoir approximately 10 miles west of Maxwell, California in Glenn and Colusa Counties. Sites would be an off-river reservoir that will capture excess water and reserve it for periods of drier weather. Flows from the Sacramento River would be diverted at Red Bluff and Hamilton City and conveyed to Sites Reservoir. Releases from Sites would enter into the Colusa Basin Drain near Dunnigan and re-enter the Sacramento River at Knights Landing or south of the Yolo Bypass near Rio Vista. It would create an additional 1.3 to 1.5 million acre-feet of storage (Sites Reservoir Authority, 2021a).

HDR is engineer of record for various components of the Yolo Bypass Big Notch Project (BNP) and the Integration Manager for the Sites Reservoir Project.

Task

DWR requested modeling and analysis to quantify the potential hydraulic impact of Sites Reservoir Diversions on Yolo Bypass Big Notch Project (BNP) entrainment for various scenarios, as shown in Table 1. Diversion discharges were specified from the Daily Divertible and Storable Flow Tool, developed as part of the Sites Reservoir Environment Impact Report (Sites Reservoir Authority, 2021b). This information was provided to HDR by DWR. Scenario 1 includes the full Sites Reservoir diversions without any decreases to protect the BNP. The other scenarios decrease Sites Reservoir diversions to limit the impact on the BNP.

Estimated changes in entrainment were predicted using insights from the fish entrainment modeling performed for the EIR/EIS (DWR, 2017b).

Table 1. TUFLOW Evaluation Scenarios

Scenario	Description	Time Window	Specifications*
Baseline	Unmodified TUFLOW baseline scenario	No Diversions	No Diversions
1	Full Sites Reservoir Diversions without BNP Protection	November to March 15	Sites Reservoir diversions are restricted by Bend Br. Pulse Protection, Wilkins Minimum Bypass (10,700 Mar-May), and Delta Conditions.
2	Sites-Proposed Percent Impact Limits	November to March 15	If predicted BNP flows 0-600 cfs, Sites diversion must decrease BNP flow less than 1%
			If predicted BNP flows 600-6,000 cfs, Sites diversion must decrease BNP flow less than 10%
3	CDFW**-Proposed Stage/Percent of Verona Flow	November to March 15	FRE*** stage 15-21 ft, no diversions
			FRE stage 21-28 ft, allow diversion up to 2% of Verona flow
			FRE stage 28-32 ft, allow diversion up to 5% of Verona flow
			FRE stage 32-33.25 ft, pause diversion for up to 7 days
4	CDFW-Proposed Stage, up to 29 ft	November to March 15	FRE stage 15-21 ft, no diversions
			FRE stage 21-28 ft, allow diversion up to 2% of Verona flow
			FRE stage 28-29 ft, allow diversion up to 5% of Verona flow
			FRE stage 29-32 ft, no restrictions on diversions
			FRE stage 32-33.25 ft, pause diversion for up to 7 days

*All references to stages and water surface elevations (WSE) are referenced to the North American Vertical Datum of 1988 (NAVD88).
**California Department of Fish and Wildlife
***FRE = Sacramento River channel stage at Fremont Weir

Analysis

Sites Reservoir discharges from the Daily Divertible and Storable Flow Tool include water years 2009-2018. These data could be used as input to the TUFLOW model for this analysis. However, the TUFLOW model is currently setup for water years 1997-2012, therefore, only the subset of water years where Sites Reservoir discharges were available (2009-2012) were used as input. The baseline scenario was run for the original TUFLOW modeling period (October 2 through June 30). Sites Reservoir planned diversions would only occur in limited periods of each water year because of all the constraints that must be met. The alternatives were only modeled for periods when diversions occur because the model is identical when no diversions are occurring.

The periods in each water year modeled for the alternative simulations include:

- 2009 – February 1 through April 1
- 2010 – January 1 through April 1
- 2011 – Full modeled period (October 2 through June 30)
- 2012 – October 2 through April 15

The baseline scenario for this analysis is consistent with the baseline scenario used in evaluation of the BNP. The baseline scenario includes other projects in the Yolo Bypass region, such as the Adult Fish Passage project at the Fremont Weir, constructed in 2019; the Lower Elkhorn Basin Levee Setback (LEBLS) project, currently under construction; and the Sacramento Weir Widening and Fish Passage projects, currently going through 95% design and slated for construction in 2022. To model the other scenarios, the TUFLOW boundary conditions were modified to reflect the Sites Reservoir discharges. The Sacramento River change at Wilkins Slough was used to modify the TUFLOW inflow boundary on the Sacramento River. The inflow boundary condition for the Sutter Bypass was decreased by total discharge of the diversions at the Moulton, Colusa, and Tisdale weirs delayed 1 day for travel time similar to what was used when deriving the original TUFLOW boundary conditions. Figure 1 shows the Sites Diversions and Yolo Bypass Model inflow boundaries.

Figures 2 through 5 show the discharges at the TUFLOW Sacramento River Boundary for each scenario in the top pane and the discharge difference for each of the scenarios in the bottom pane. Figures 6 through 9 show the same information for the Sutter Bypass boundary condition.

TUFLOW model results were evaluated by comparing the WSE for the baseline to each evaluation scenario at three locations within the Sacramento River:

- Near Knights Landing
- Near the west side of the Fremont Weir
- Near the BNP

Entrainment percentages were predicted using WSE results from TUFLOW at Sacramento River near the BNP and a rating curve developed for the EIR/EIS (DWR, 2017b). The entrainment percentage was linearly interpolated from the rating curve. For WSEs below the rating curve, a value of 0.0% entrainment was used. For values above the rating curve, a value of 13.8%, which is the highest value in the rating curve, was used. The entrainment rating curve was applied to the full model simulation window and did not consider BNP gate closures. As such, the entrainment best represents the adaptive management scenario where gates are left open. Incorporating gate closures into the entrainment analysis, would make entrainment 0% for non-overtopping periods when the gates are closed and there is no flow through the BNP. Because this change would affect both baseline and alternative scenarios, the overall impact on the results is likely small. Figure 10 shows the Entrainment percent vs WSE.

Daily catch data was analyzed from Acierto et al. Juvenile Knights Landing Rotary Screw Trap Salmon catch data. The California Department of Fish and Wildlife (CDFW) operates two rotary screw traps at this location, which they check for juvenile salmon every one to six days. As with any sampling regime, the number of fish caught in these traps is not representative of the entire population of juvenile salmon in the Sacramento River and should be considered a sample. Additionally, the traps may have reduced efficiency during high flow events when juvenile salmon are most likely to be present. The fish count data only included water years 2009-2011, so TUFLOW results for 2012 are not used to estimate entrainment. As CDFW would often fish the traps for multiple days, sample hours varied widely from day to day which made a simple daily fish count comparison impossible. For this reason, fish counts were standardized as a daily catch per unit effort (CPUE). Because of this, fish CPUE was not provided for every day of the simulation period, and these data were only used for the dates provided (gaps were not filled). However, there were likely juvenile salmon present on these gap days, which means entrainment is underestimated in this analysis.

For periods that were not modeled for the alternatives (No Sites Reservoir diversions), the baseline discharges and entrainment were used for the alternatives.

Results

Figures 11 through 22 show the WSE results through time near Knight's Landing, the west side of Fremont Weir, and the Sacramento River near BNP for the water years modeled.

Figures 23 through 26 show the predicted entrainment percentage for water years 2009, 2010, and 2011 respectively.

Table 2 Shows the overall change in entrainment between the baseline and scenarios utilizing fish count data. The change in entrainment is weighted based upon the fish count data so the results are relative to when fish are in the river.

Table 2. Change in Entrainment from Baseline Scenario under Adaptive Management Operations Based upon Fish Counts

	Change in Spring Run Percent Entrained				Change in Winter Run Percent Entrained			
Water Year	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 1	Scenario 2	Scenario 3	Scenario 4
2009	-41%	-21%	-19%	-20%	-42%	-21%	-19%	-20%
2010	-14%	-6%	-5%	-5%	-7%	-3%	-3%	-3%
2011	-5%	-2%	-2%	-2%	-16%	-5%	-3%	-3%

Discussion

Due to the decrease in river discharges (and therefore stages), all the evaluation scenarios suggest some decrease in the entrainment of juvenile salmon into the Yolo Bypass with Sites diversions. As shown in Table 2 the decrease in entrainment (as a percentage) for the 2009 water year is significantly higher than for the 2010 and 2011 water years. This decrease is likely due to the timing, duration, and magnitude of the 2009 flows and resulting stages. For 2009, the WSE at the entrance to the BNP exceeds 20 feet for about a month between mid-February and mid-March, but does not overtop the Fremont Weir. Entrainment is most sensitive to changes in discharge and stage during non-overtopping periods when the WSE exceeds 20 feet. This combination of non-overtopping and WSE over 20 feet for a month-long period coincides with when fish were identified in the system. This is likely the reason model results show a higher impact due to Sites diversions in the 2009 water year.

Limitations of Analysis and Use of Results

The largest limitation in the analysis is the short amount of overlap between the time-periods in data availability. Specifically, overlap in data is needed for: 1) data input modeled in TUFLOW, 2) potential Sites Reservoir diversions, and 3) sampled fish count data. Due to limited data availability, the analysis only included 3 years out of the 16 water years evaluated in the TUFLOW model for BNP design. The largest limiting factor was dates when fish count data were available. The BNP TUFLOW analysis only included days with available fish count data and no interpolation was performed.

The provided fish entrainment curve was provided by DWR based upon separate investigations conducted for the EIR/EIS. The EIR/EIS investigation and analyses include their own assumptions and uncertainties that were not quantified for this TUFLOW model analysis. Most notably, the fish entrainment curve did not account for overtopping periods.

Due to the limitations of this analysis, particularly the limited period of record used, an expanded analysis is suggested that uses additional water years, any recent refinements to Sites Reservoir diversions, and additional fish count data.

References

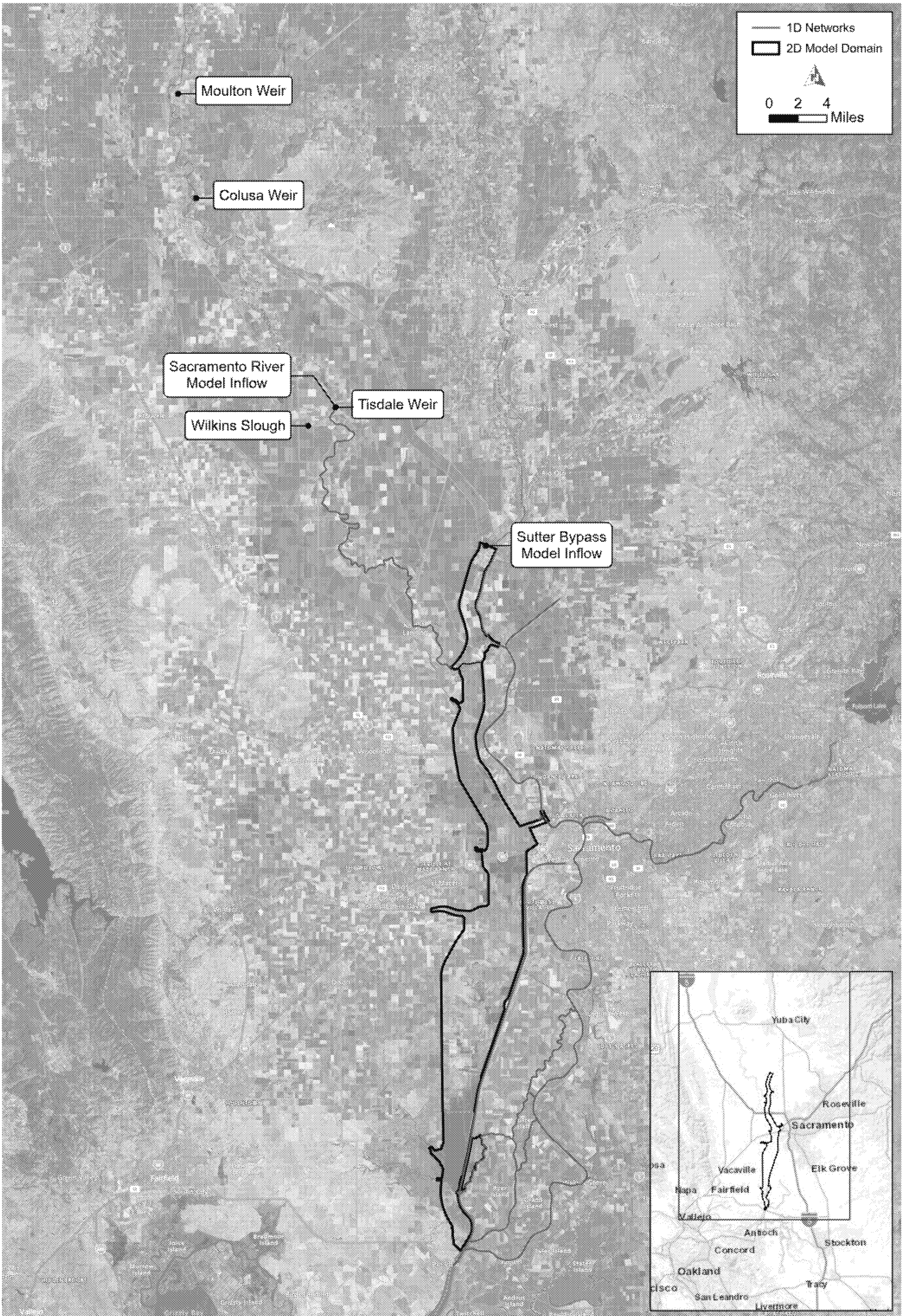
California Department of Water Resources. 2017a. Yolo Bypass Salmonid Habitat Restoration and Fish Passage Hydrodynamic Modeling Report. Prepared by HDR and cbec. June 2017.

California Department of Water Resources. 2017b. Yolo Bypass Salmonid Habitat Restoration and Fish Passage Environmental Impact Report/Environmental Impact Statement, Appendix G1 Scenario Analysis of Fremont Weir Notch – integration of engineering designs, telemetry, and flow fields.

Sites Reservoir Authority. 2021a. Sites Reservoir Project Preliminary Project Description and Alternatives. Maxwell, CA.

Sites Reservoir Authority. 2021b. Sites Reservoir Project Revised Draft Environment Impact Report/Supplemental Draft Environmental Impact Statement. Appendix 11P, Attachment 11P-1.

Figures

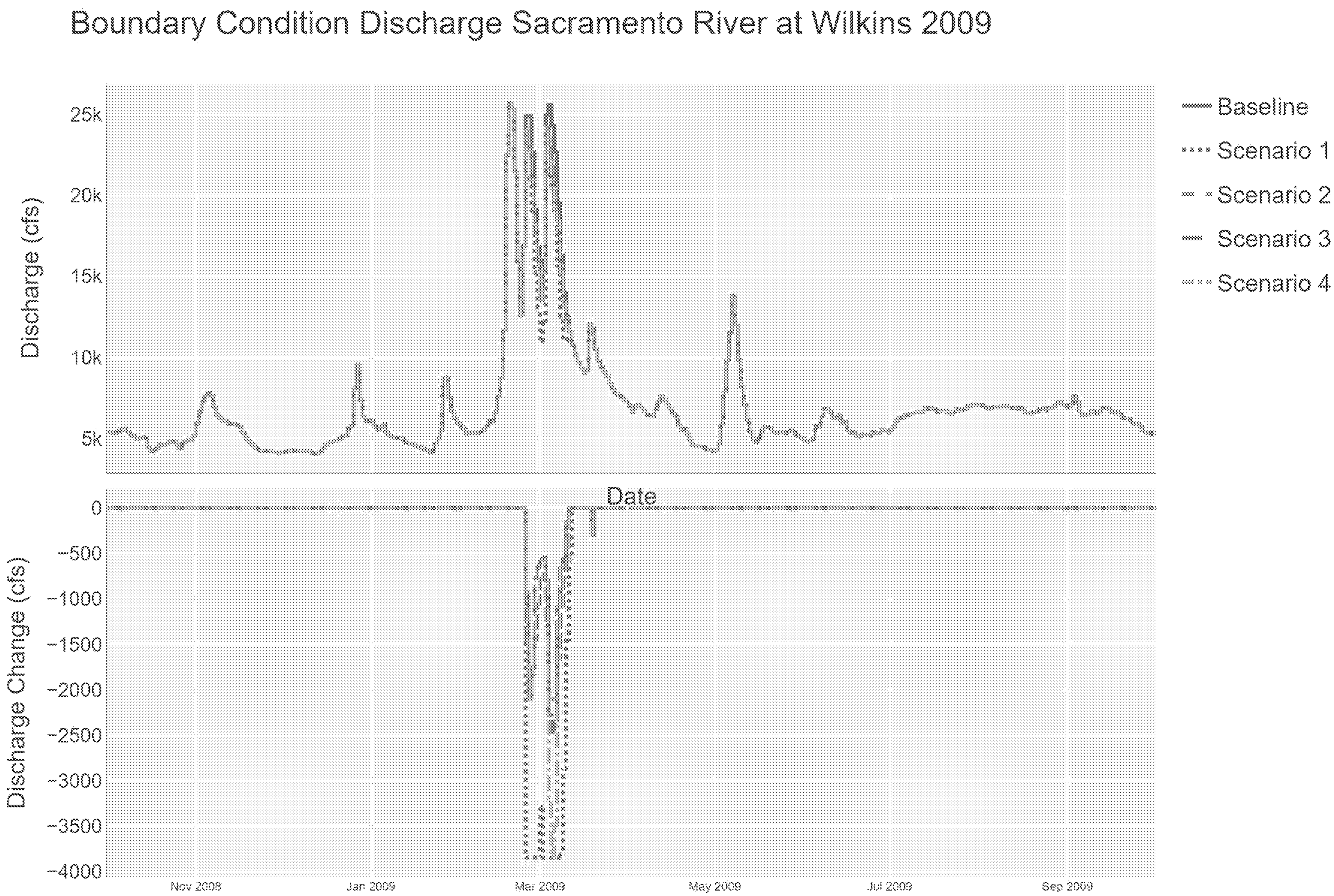


SITES DIVERSION LOCATIONS AND TUFLOW INFLOW BOUNDARY LOCATIONS

MODEL 2D AREA AND 1D CHANNELS ALSO SHOWN

FIGURE 1

YOLO BYPASS BNP SITES RESERVOIR IMPACT



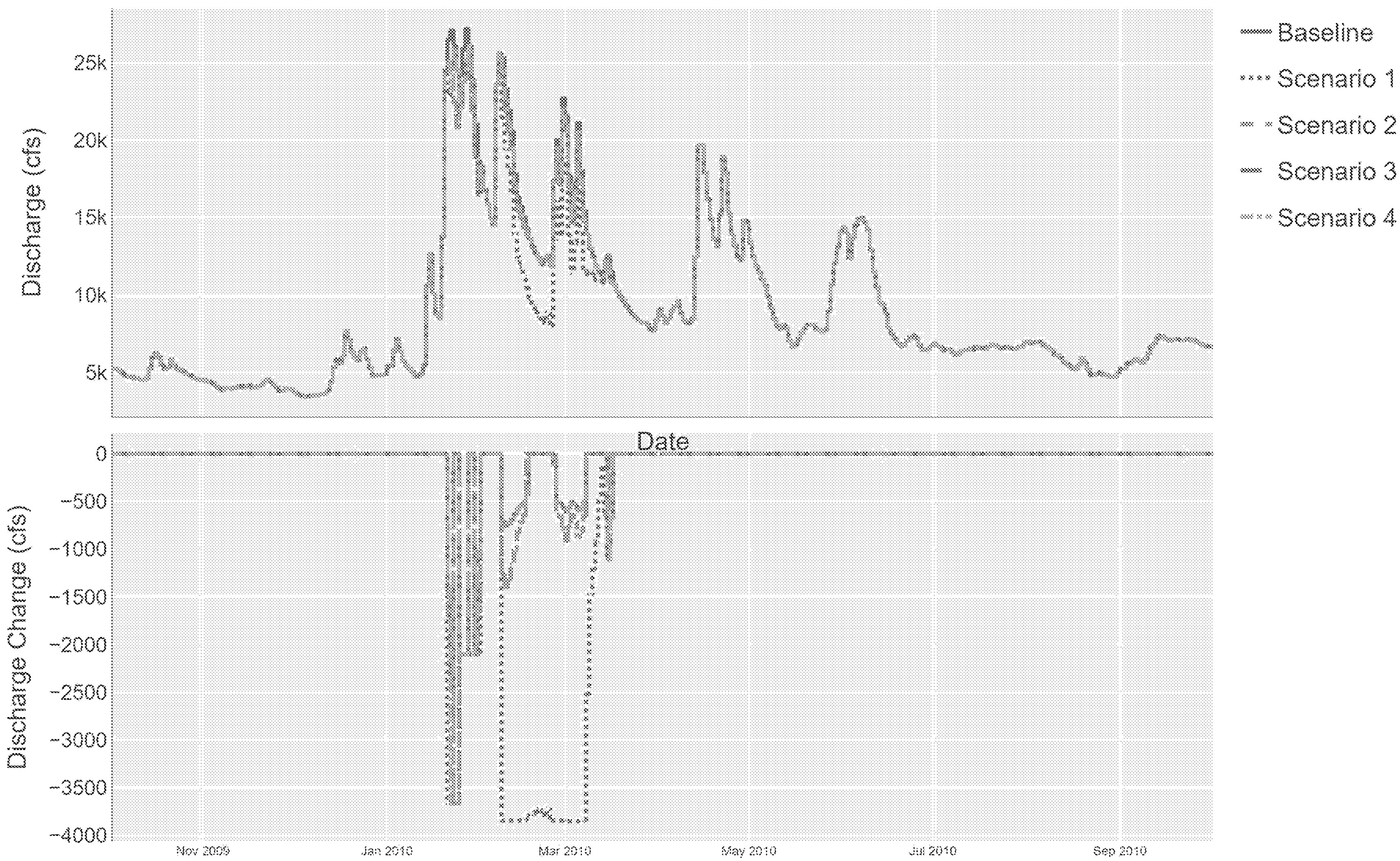
TUFLOW BC DISCHARGES

SACRAMENTO RIVER NEAR WILKINS SLOUGH 2009

FIGURE 2

YOLO BYPASS BNP SITES RESERVOIR IMPACT

Boundary Condition Discharge Sacramento River at Wilkins 2010



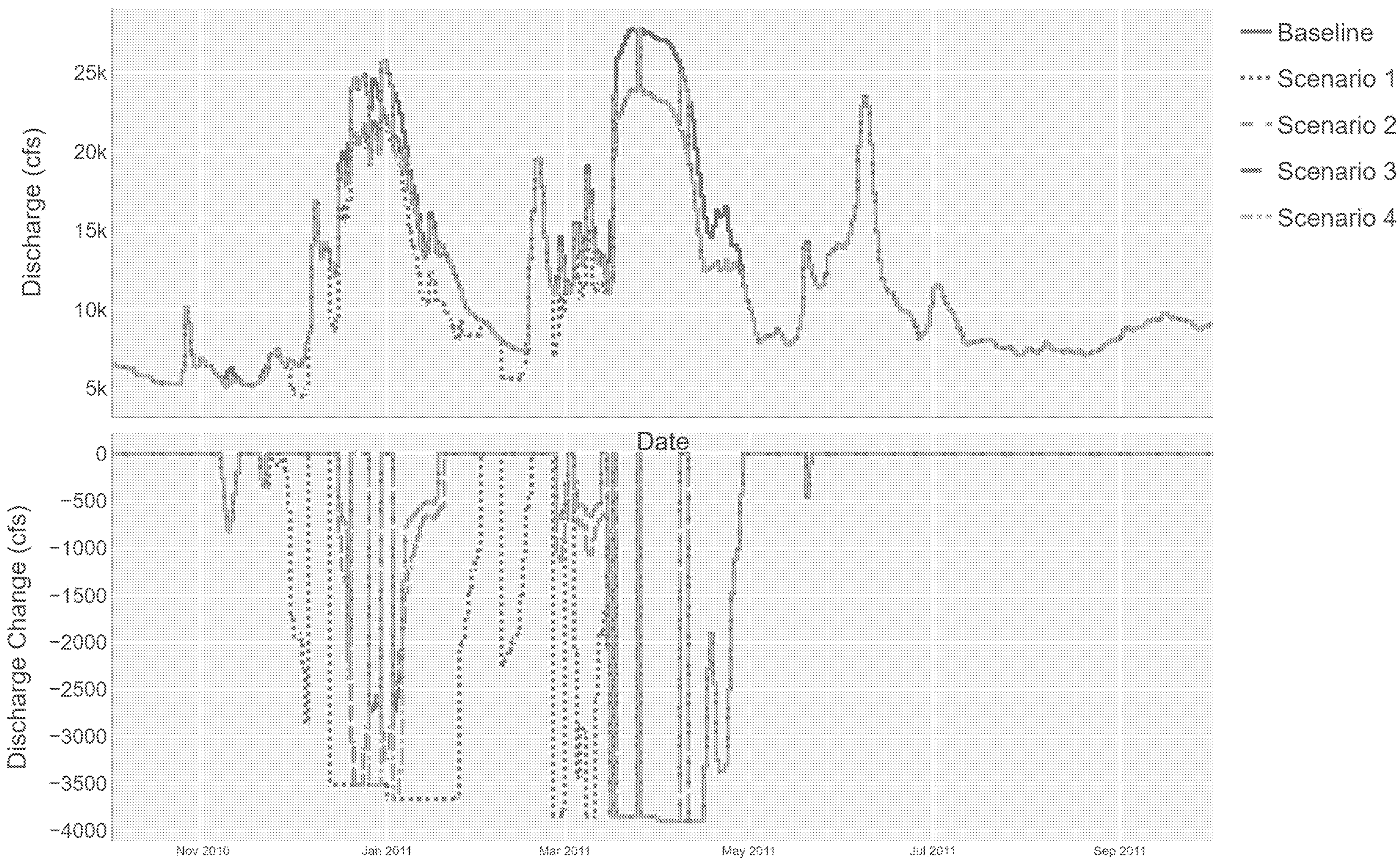
TUFLOW BC DISCHARGES

SACRAMENTO RIVER NEAR WILKINS SLOUGH 2010

FIGURE 3

YOLO BYPASS BNP SITES RESERVOIR IMPACT

Boundary Condition Discharge Sacramento River at Wilkins 2011

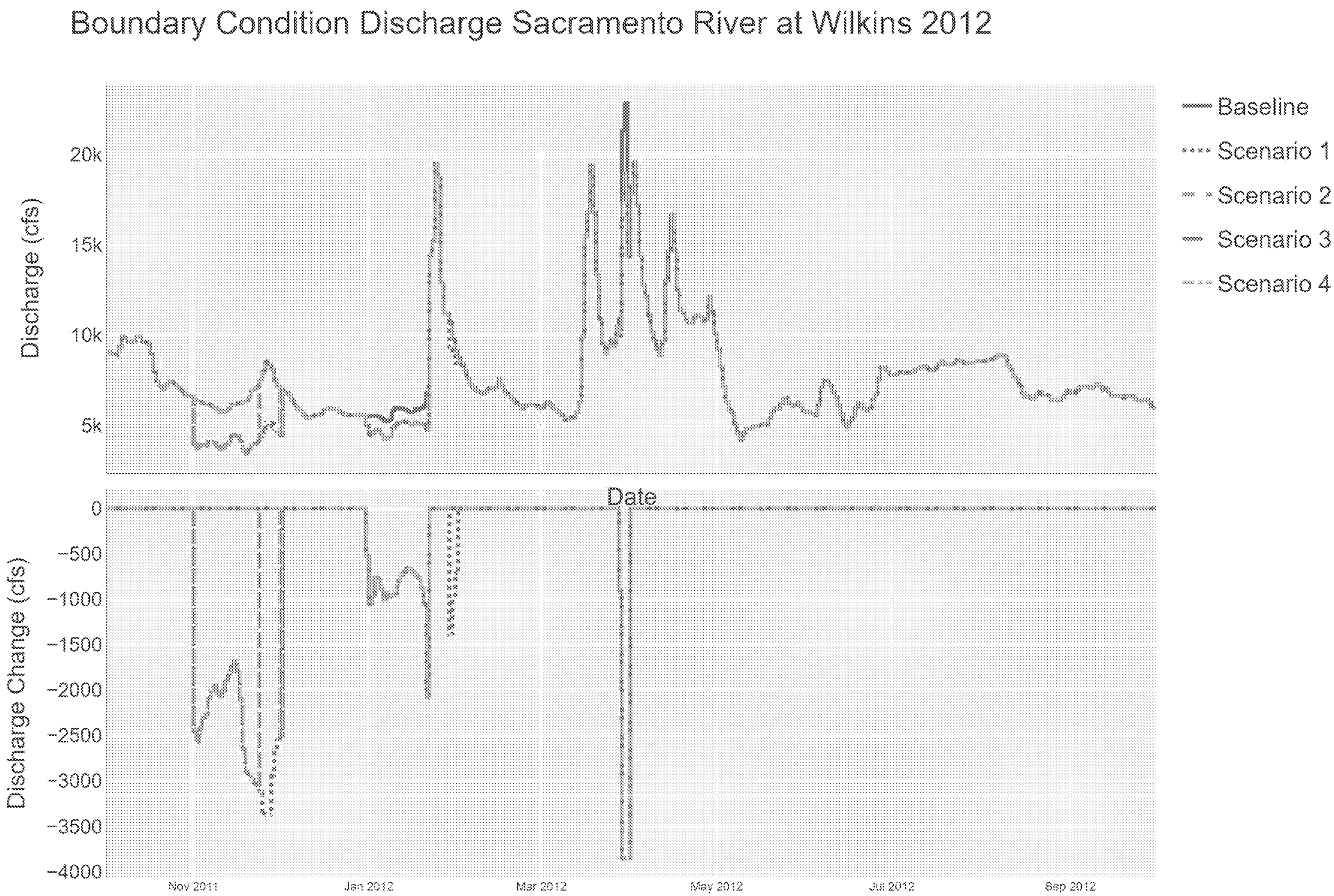


TUFLOW BC DISCHARGES

SACRAMENTO RIVER NEAR WILKINS SLOUGH 2011

FIGURE 4

YOLO BYPASS BNP SITES RESERVOIR IMPACT

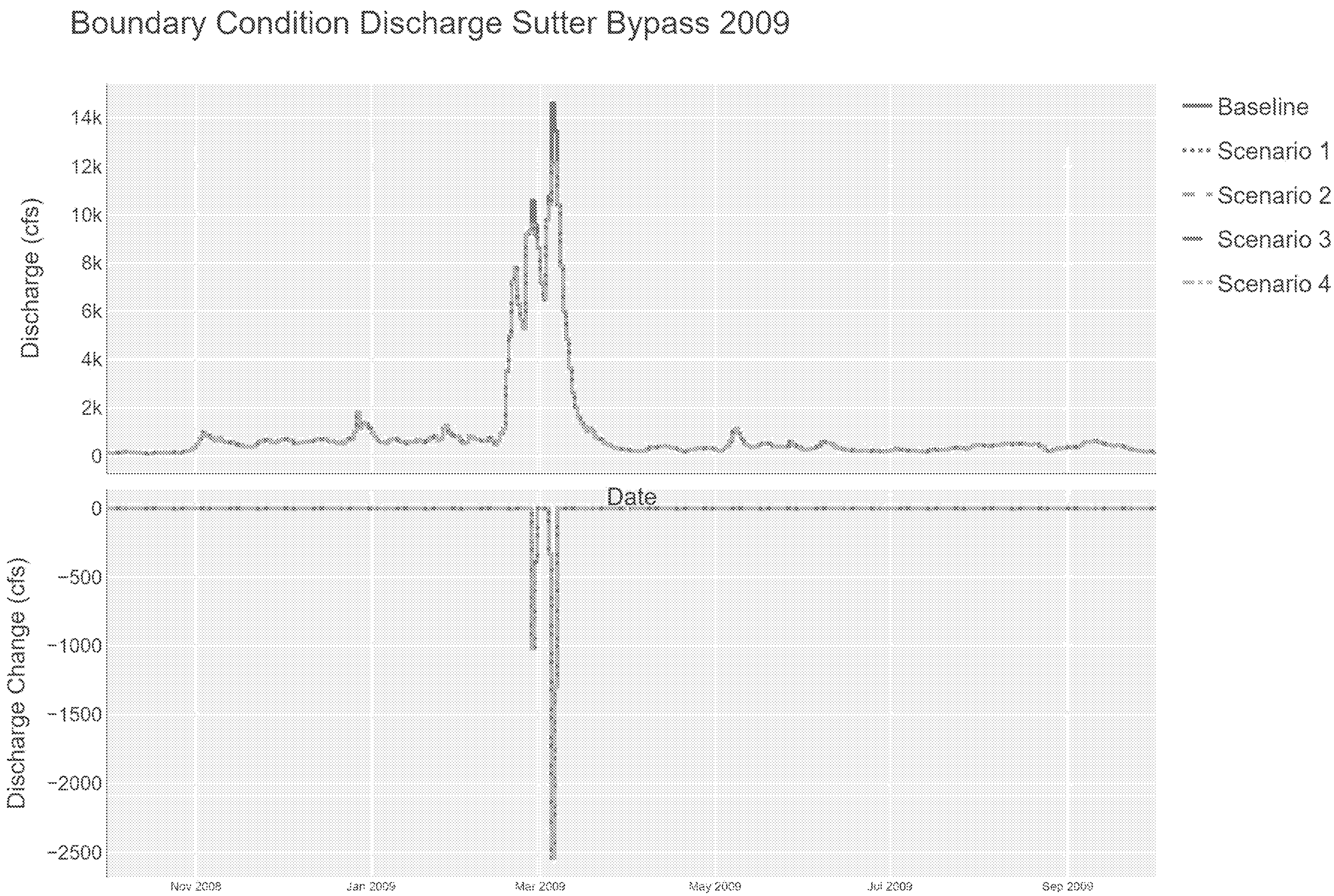


TUFLOW BC DISCHARGES

SACRAMENTO RIVER NEAR WILKINS SLOUGH 2012

FIGURE 5

YOLO BYPASS BNP SITES RESERVOIR IMPACT



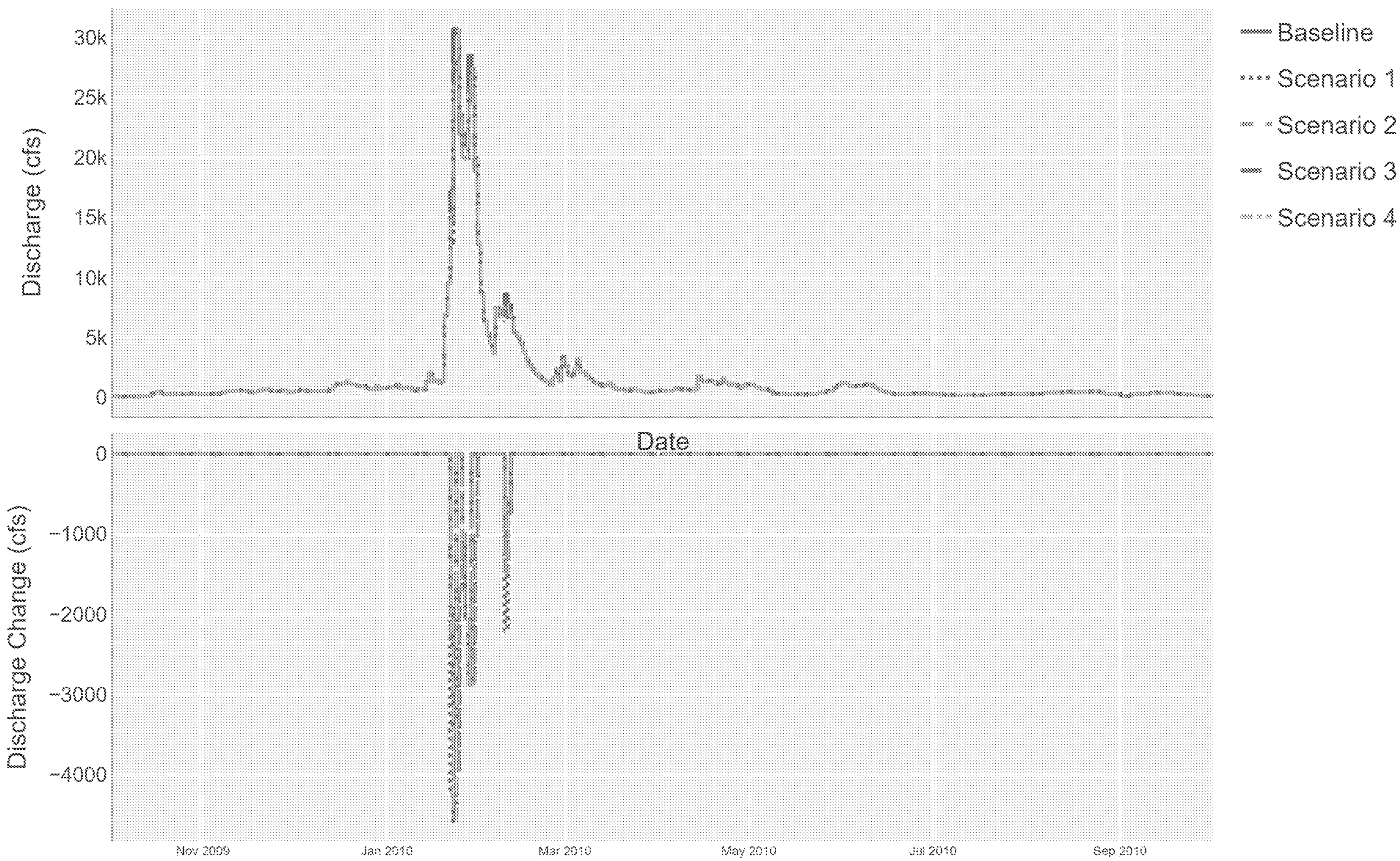
TUFLOW BC DISCHARGES

SUTTER BYPASS INFLOW 2009

FIGURE 6

YOLO BYPASS BNP SITES RESERVOIR IMPACT

Boundary Condition Discharge Sutter Bypass 2010



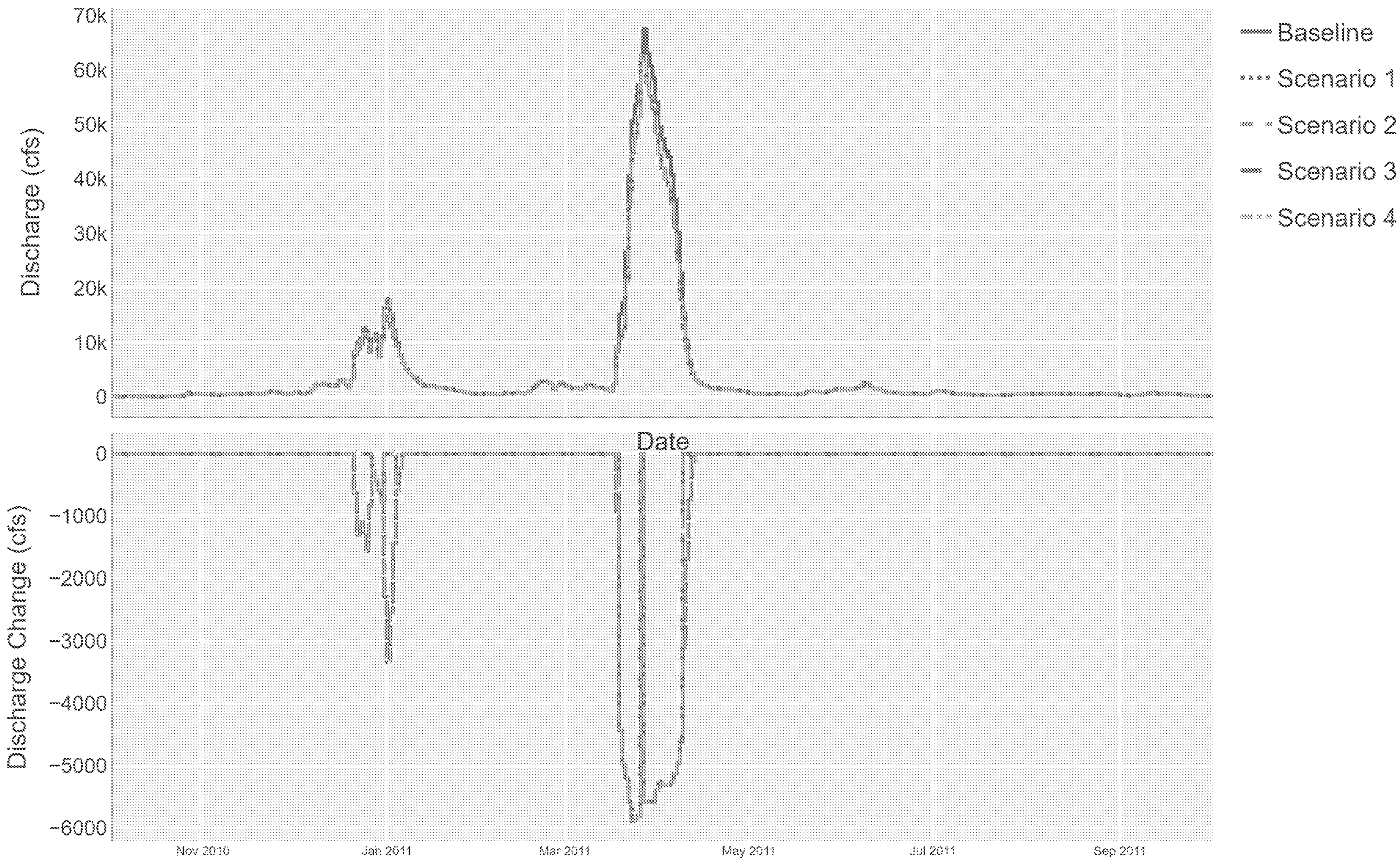
TUFLOW BC DISCHARGES

SUTTER BYPASS INFLOW 2010

FIGURE 7

YOLO BYPASS BNP SITES RESERVOIR IMPACT

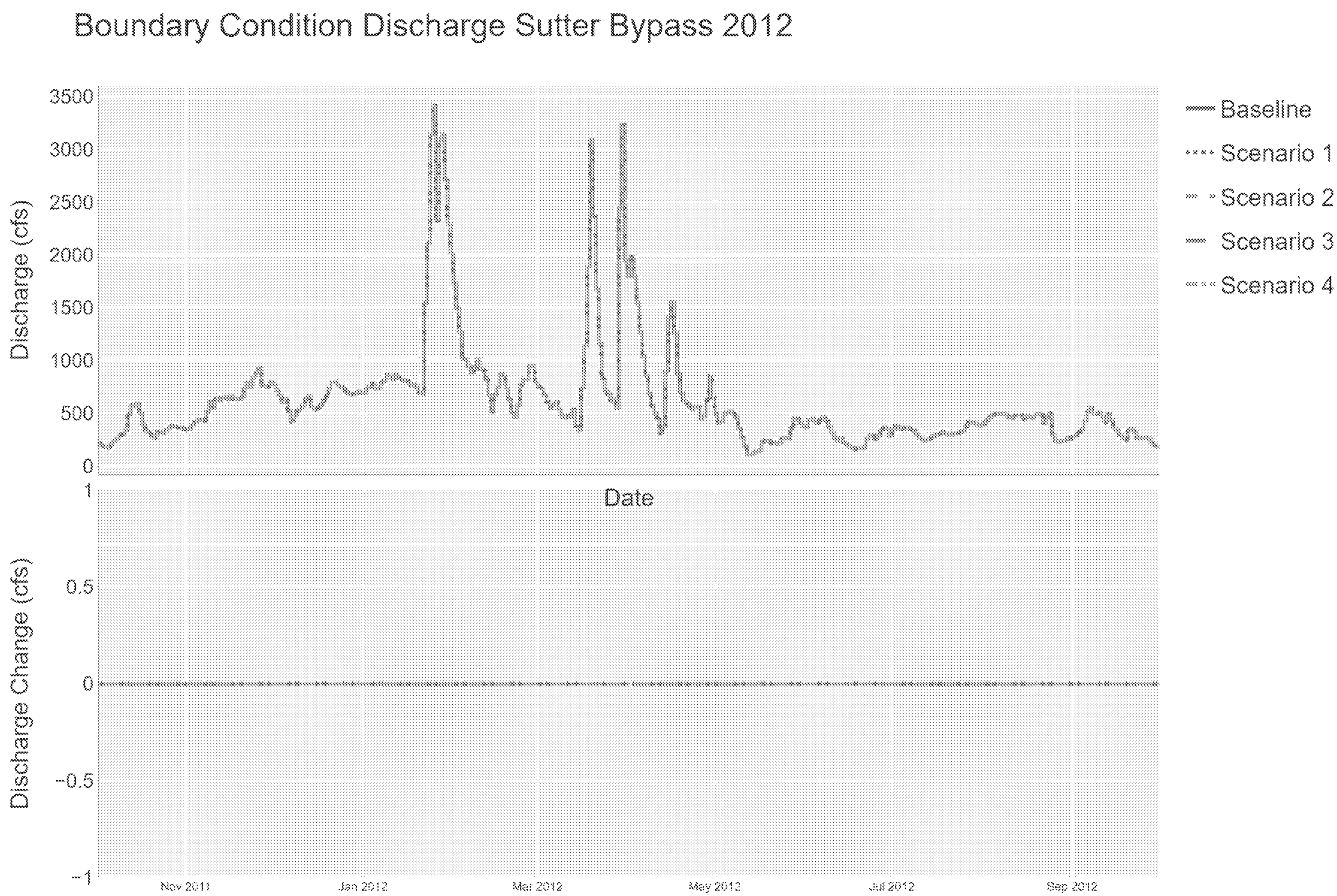
Boundary Condition Discharge Sutter Bypass 2011



TUFLOW BC DISCHARGES

SUTTER BYPASS INFLOW 2011

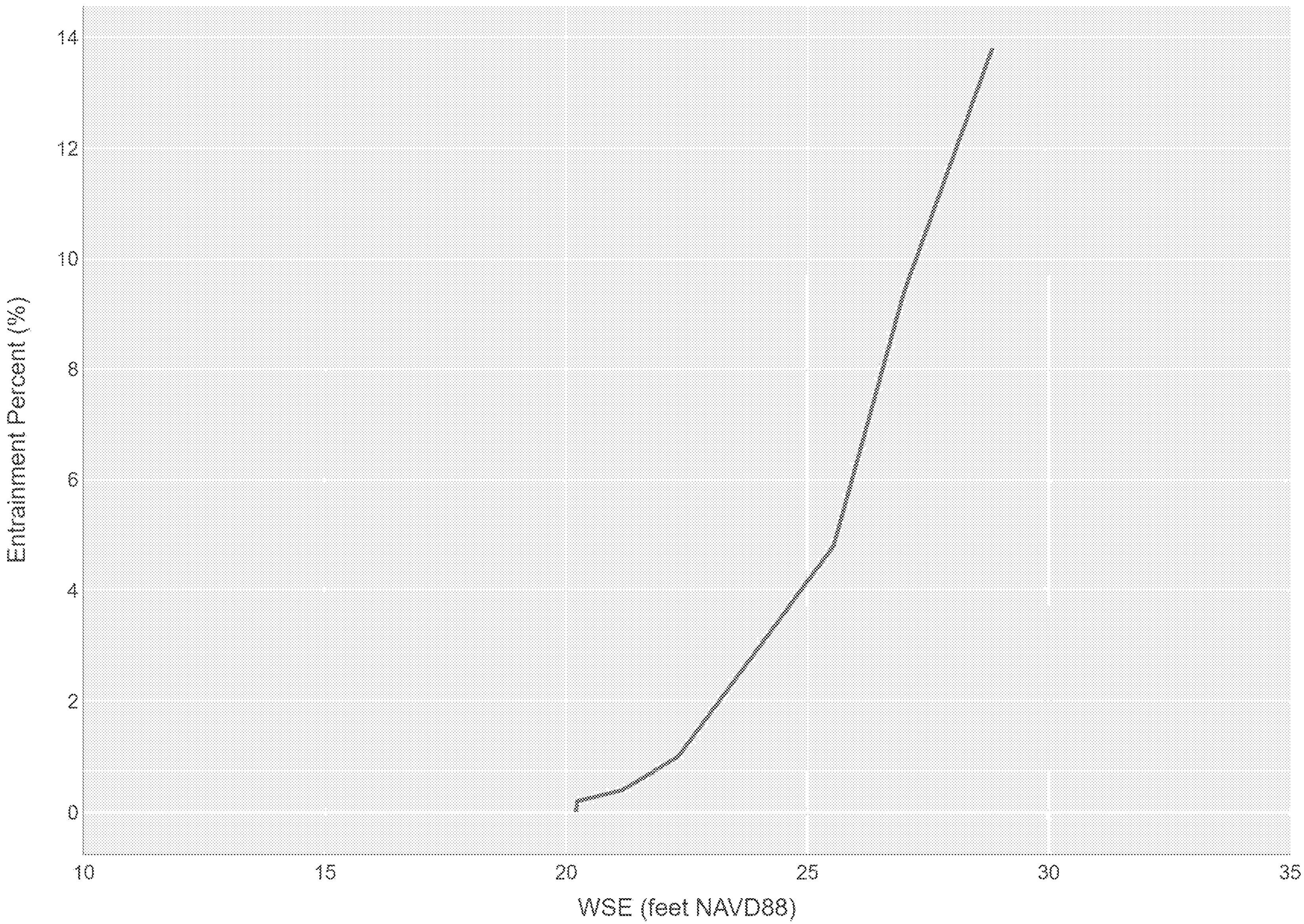
FIGURE 8



TUFLOW BC DISCHARGES

SUTTER BYPASS INFLOW 2012

FIGURE 9

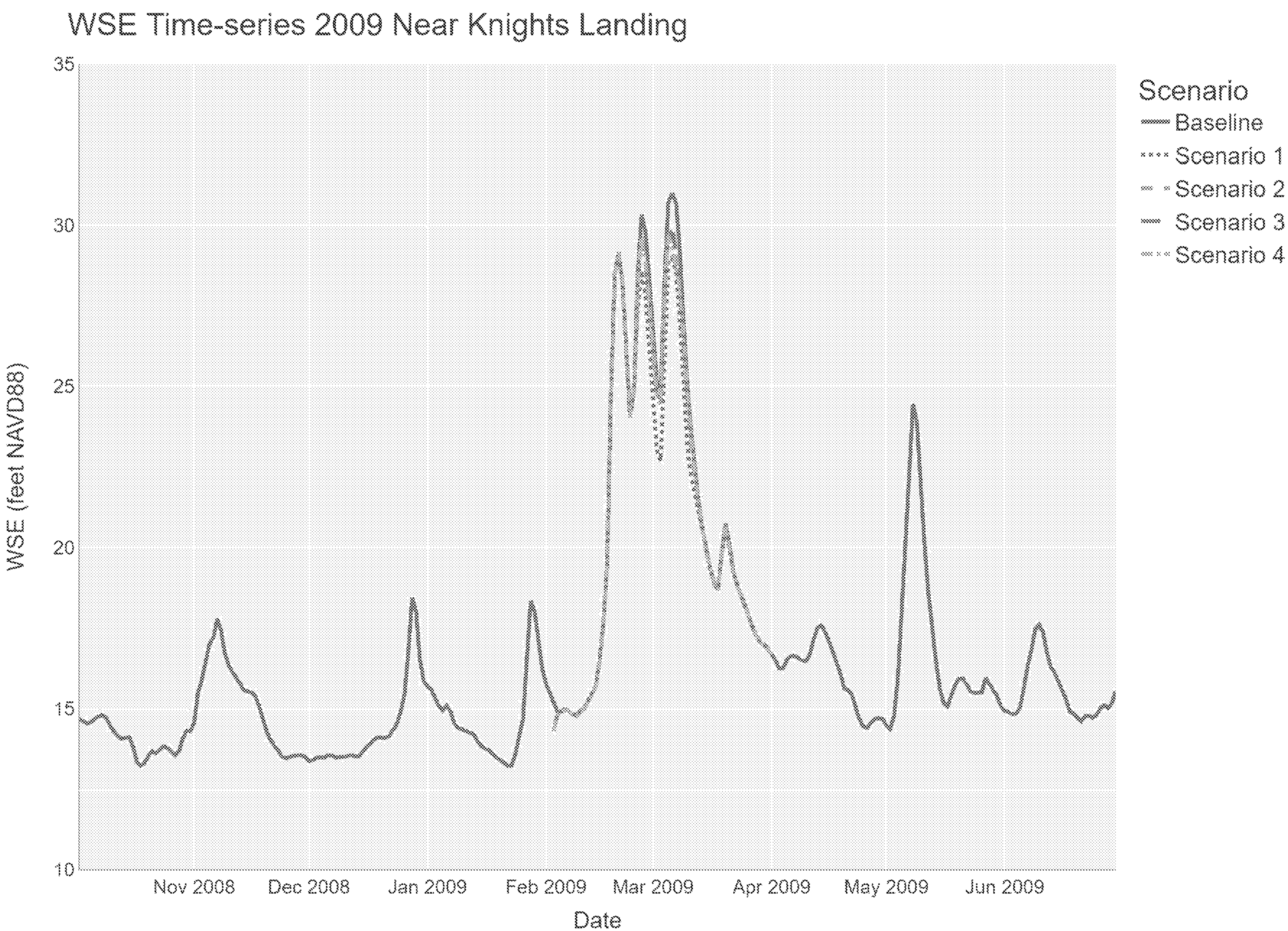


ENTRAINMENT PERCENTAGE VS WSE FOR BNP

FROM BNP EIR/EIS ANALYSIS

FIGURE 10

YOLO BYPASS BNP SITES RESERVOIR IMPACT

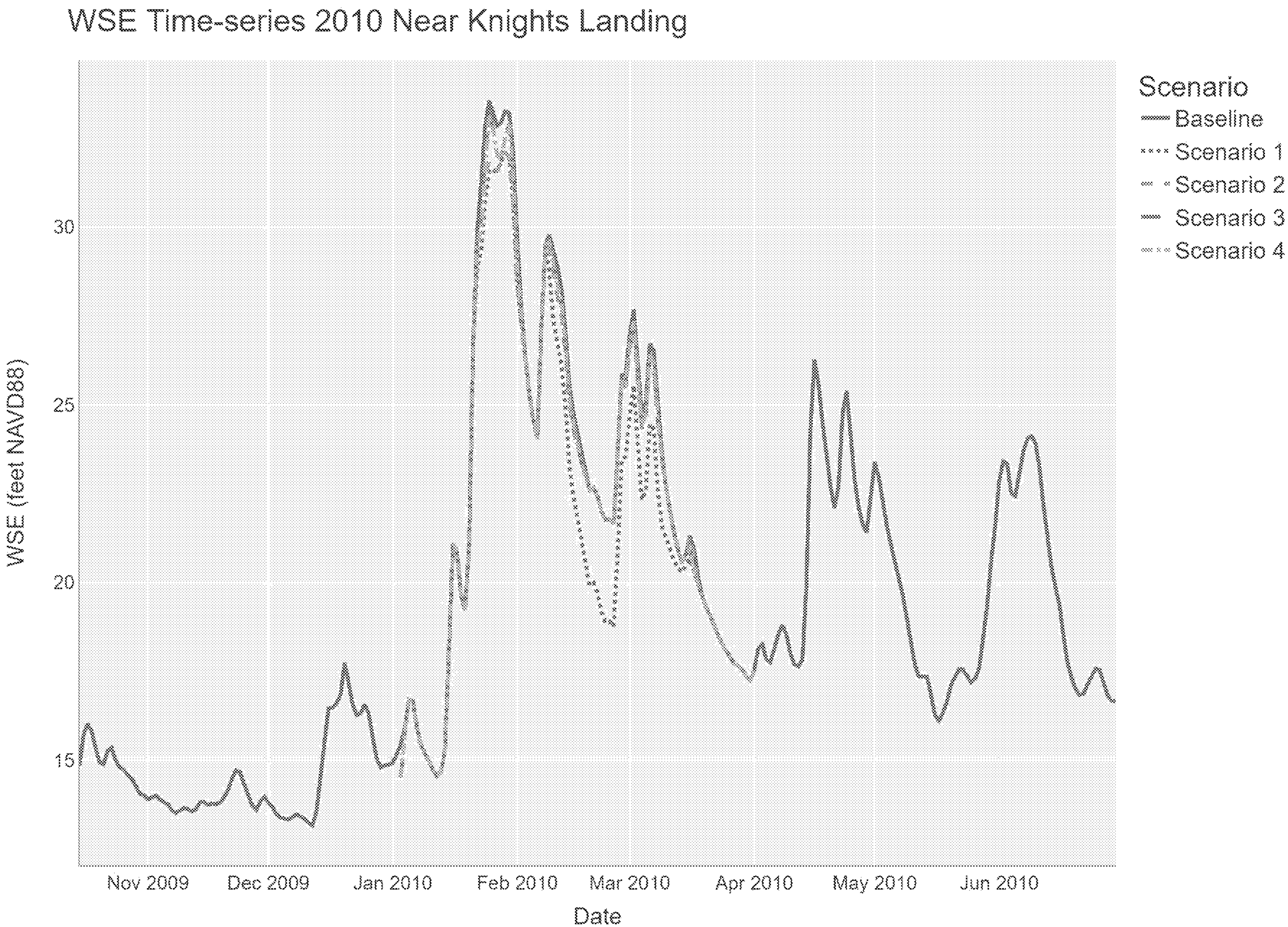


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR KNIGHTS LANDING 2009

FIGURE 11

YOLO BYPASS BNP SITES RESERVOIR IMPACT

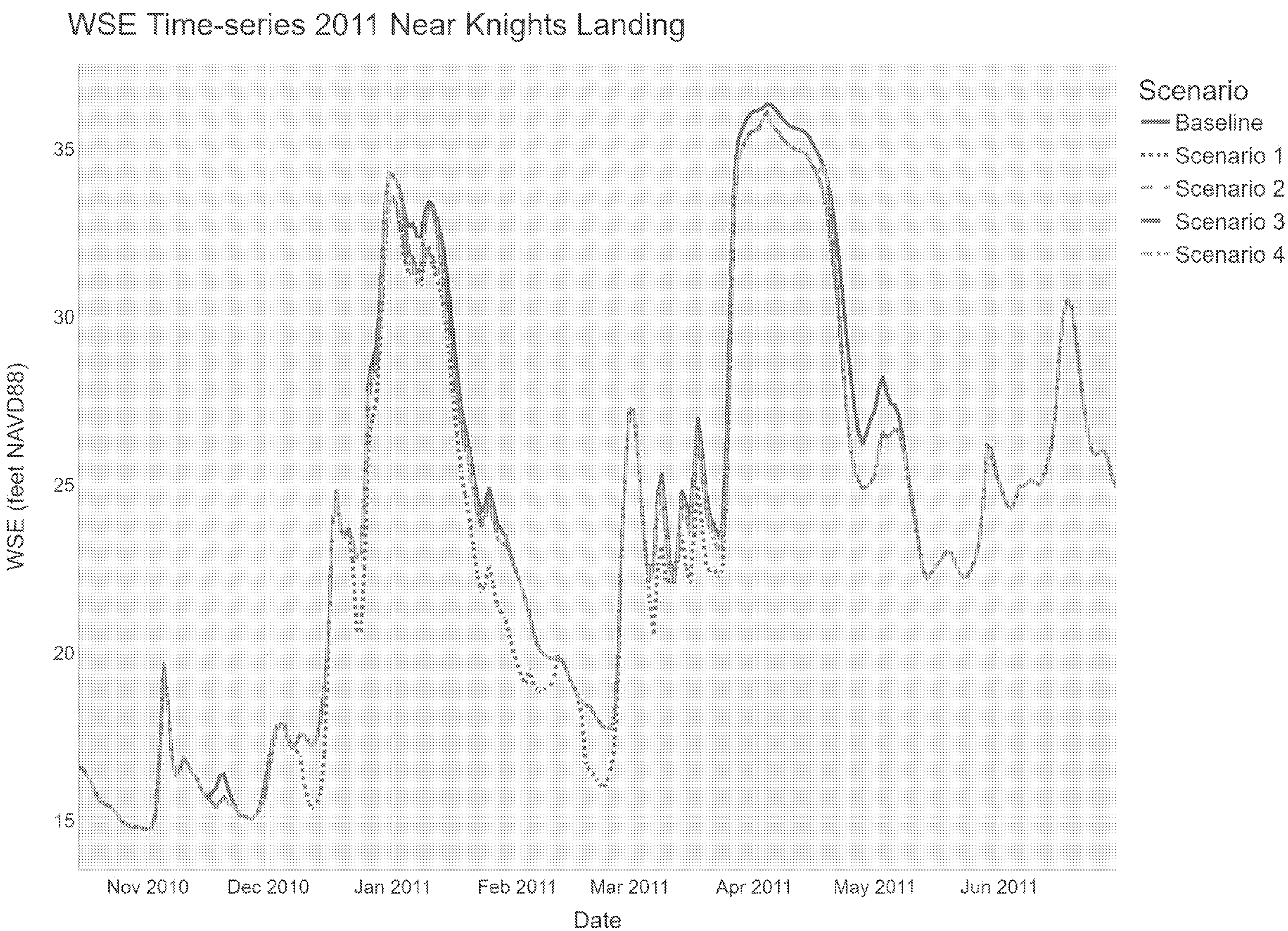


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR KNIGHTS LANDING 2010

FIGURE 12

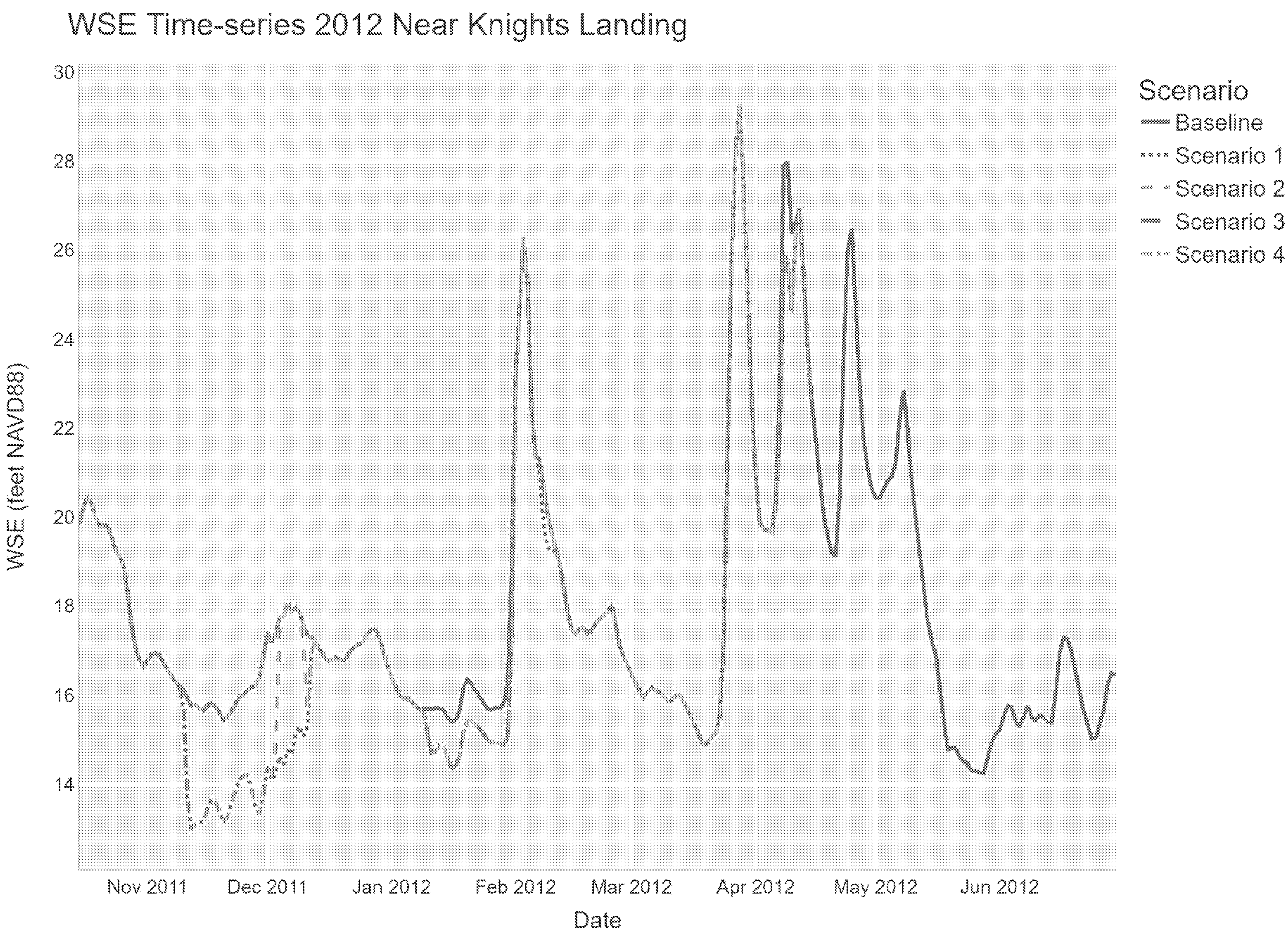
YOLO BYPASS BNP SITES RESERVOIR IMPACT



TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR KNIGHTS LANDING 2011

FIGURE 13

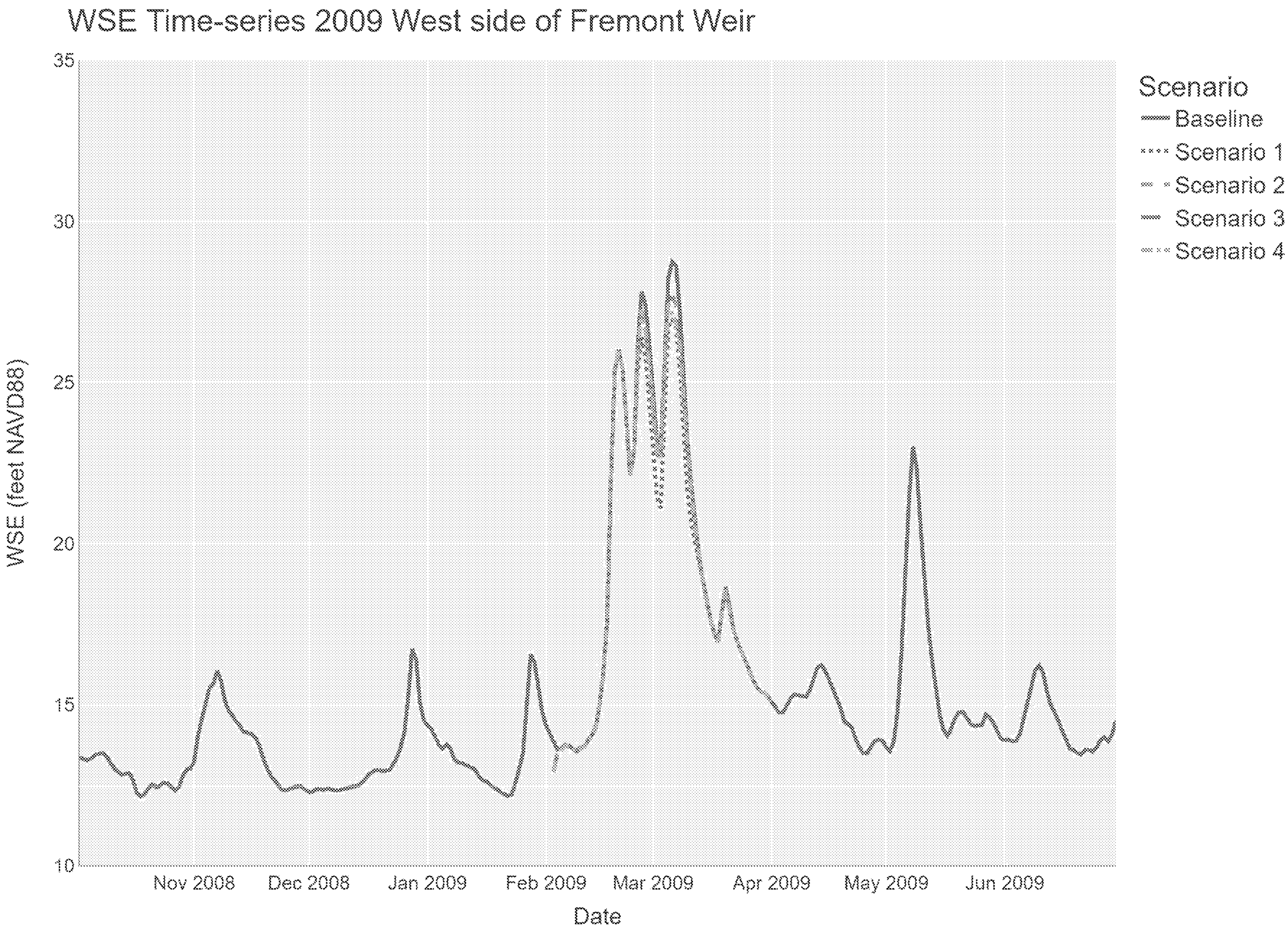


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR KNIGHTS LANDING 2012

FIGURE 14

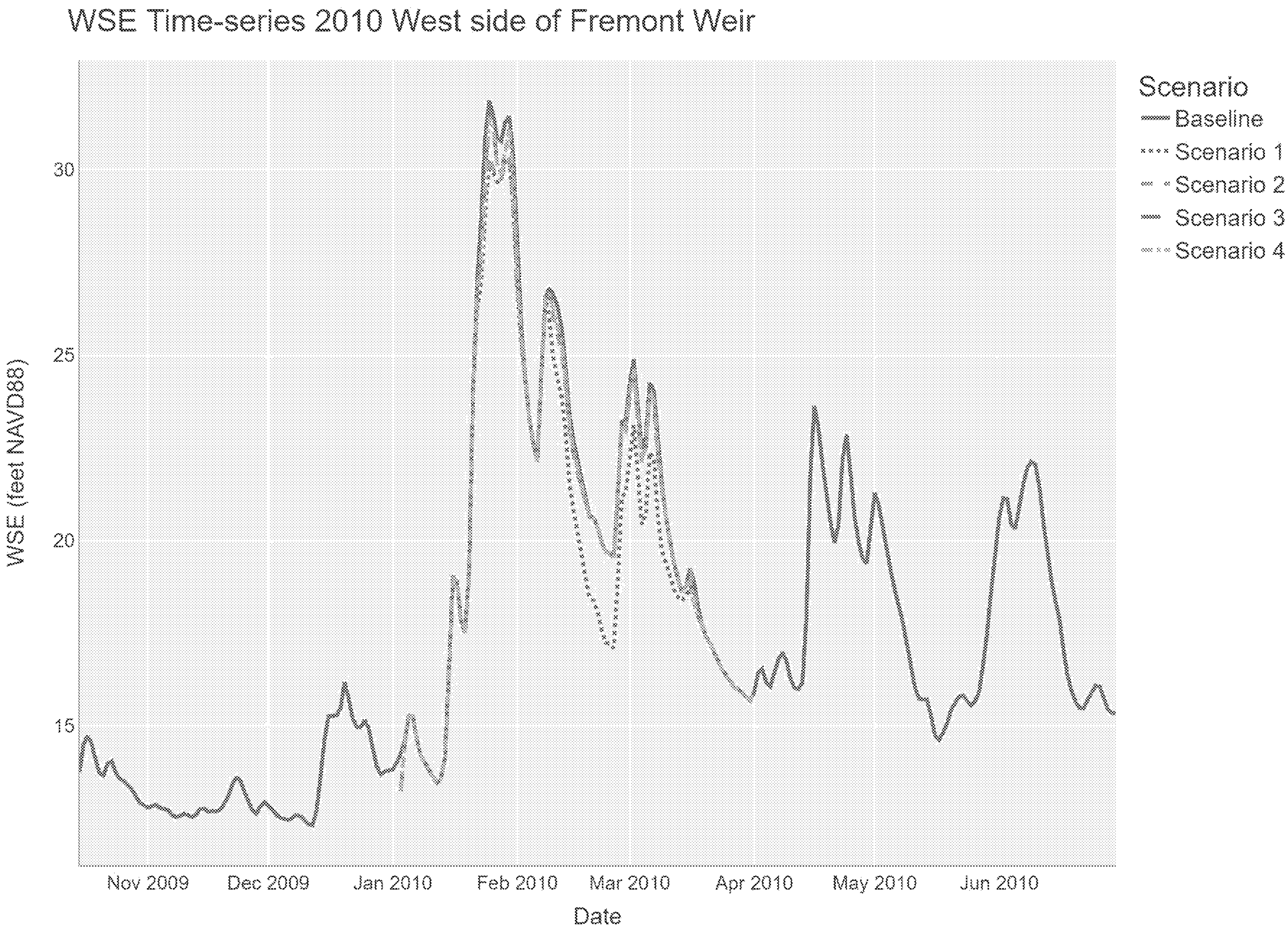
YOLO BYPASS BNP SITES RESERVOIR IMPACT



TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR WEST SIDE OF FREMONT WEIR 2009

FIGURE 15

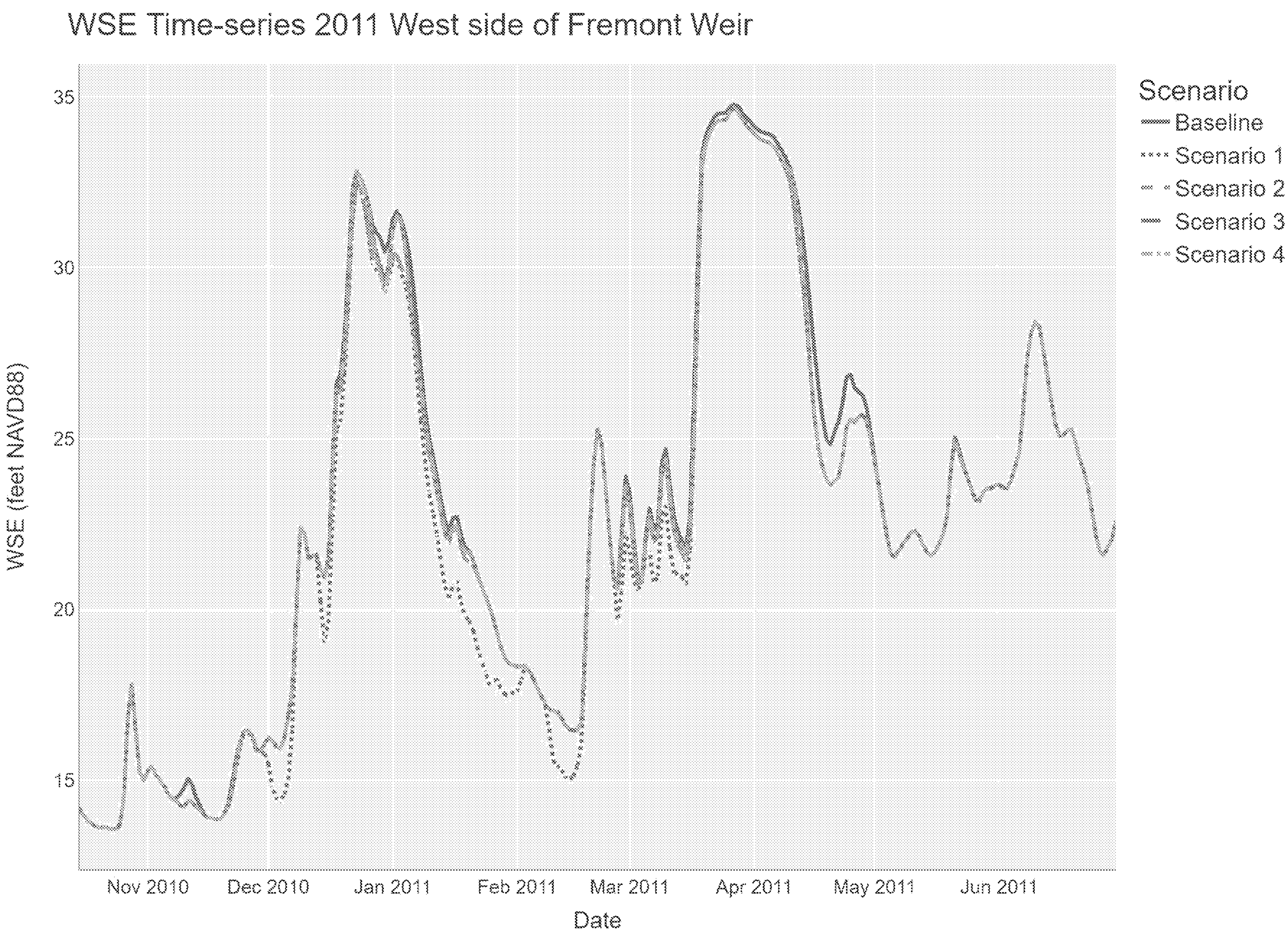


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR WEST SIDE OF FREMONT WEIR 2010

FIGURE 16

YOLO BYPASS BNP SITES RESERVOIR IMPACT

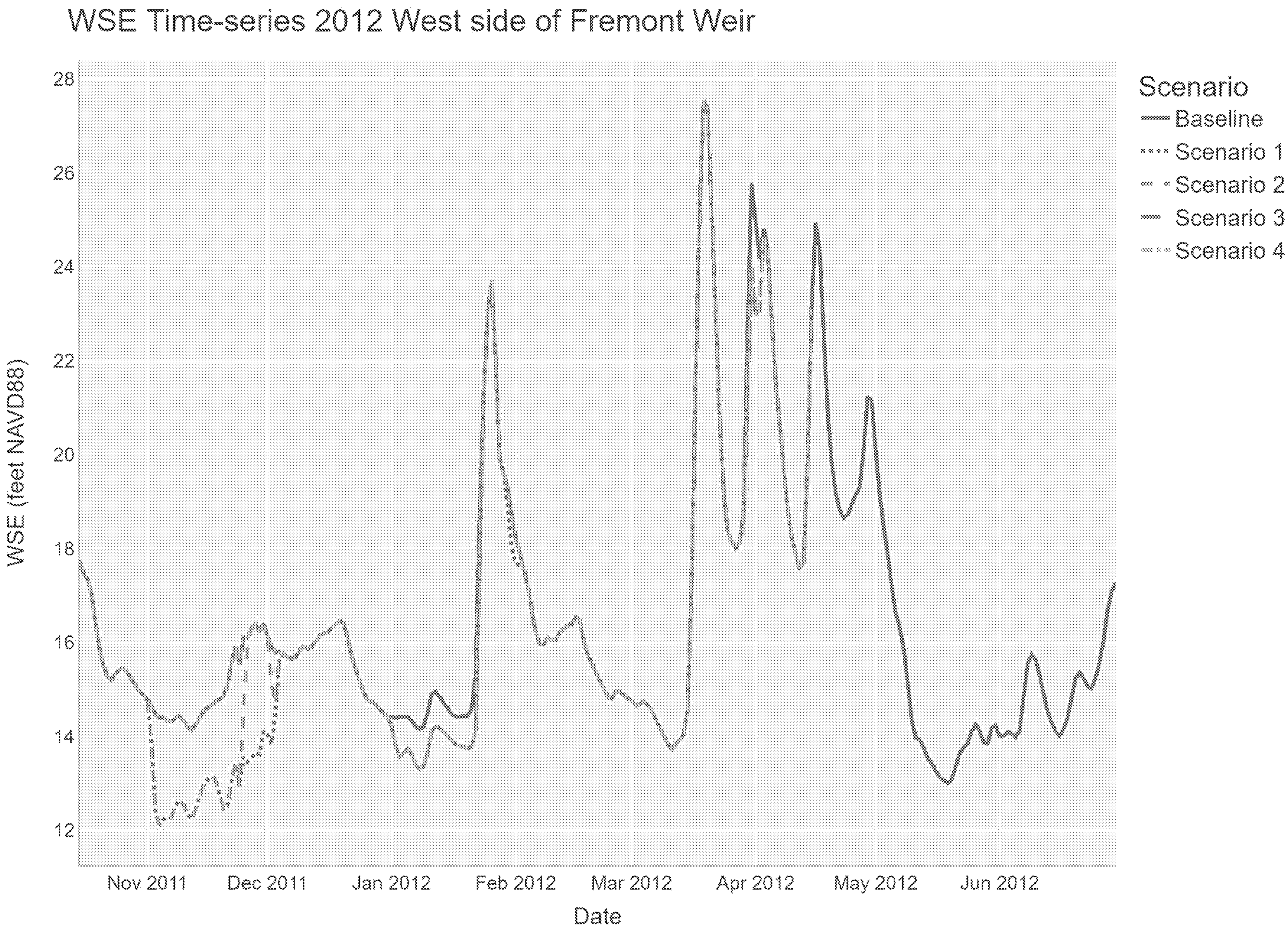


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR WEST SIDE OF FREMONT WEIR 2011

FIGURE 17

YOLO BYPASS BNP SITES RESERVOIR IMPACT

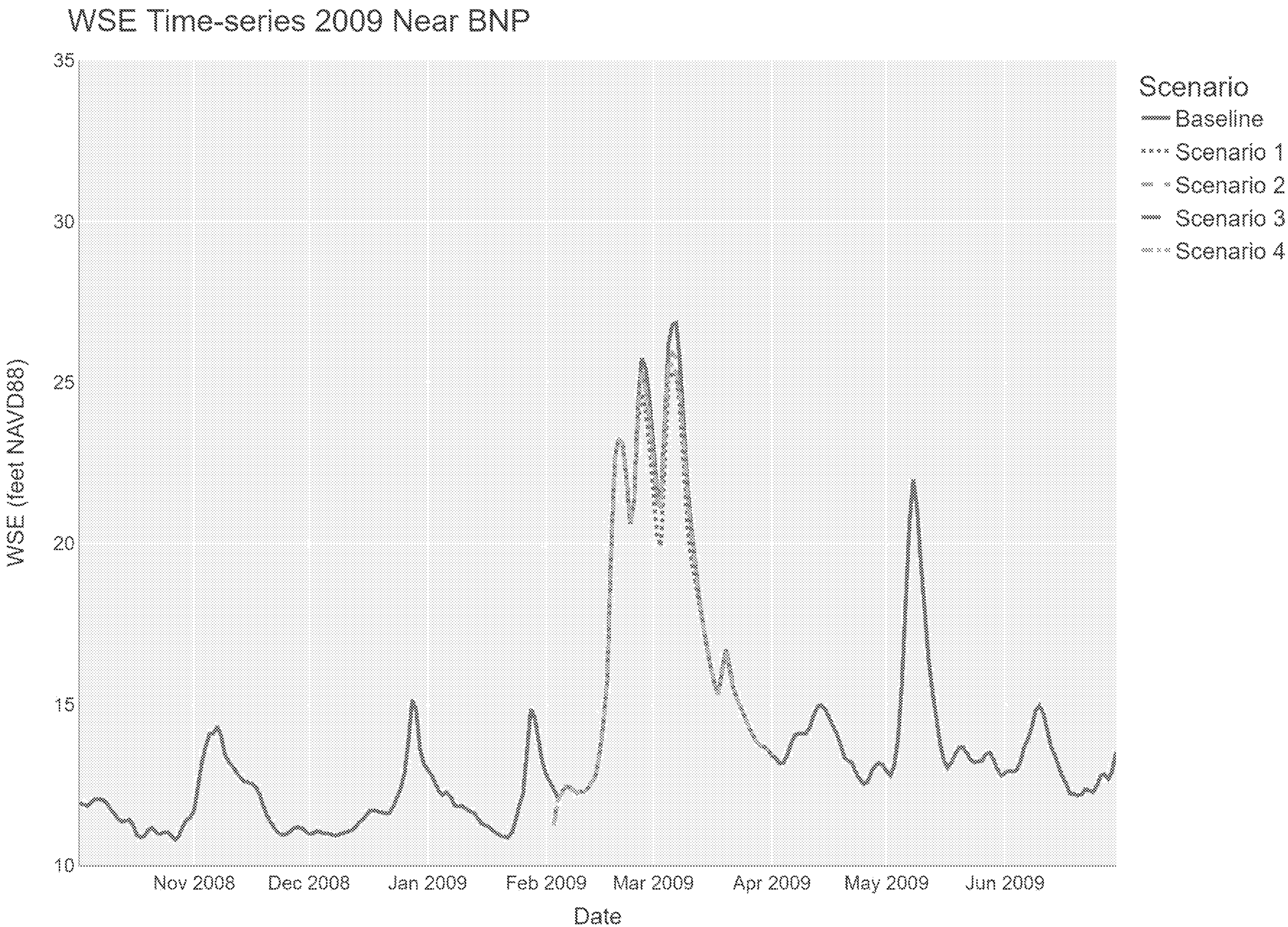


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR WEST SIDE OF FREMONT WEIR 2012

FIGURE 18

YOLO BYPASS BNP SITES RESERVOIR IMPACT

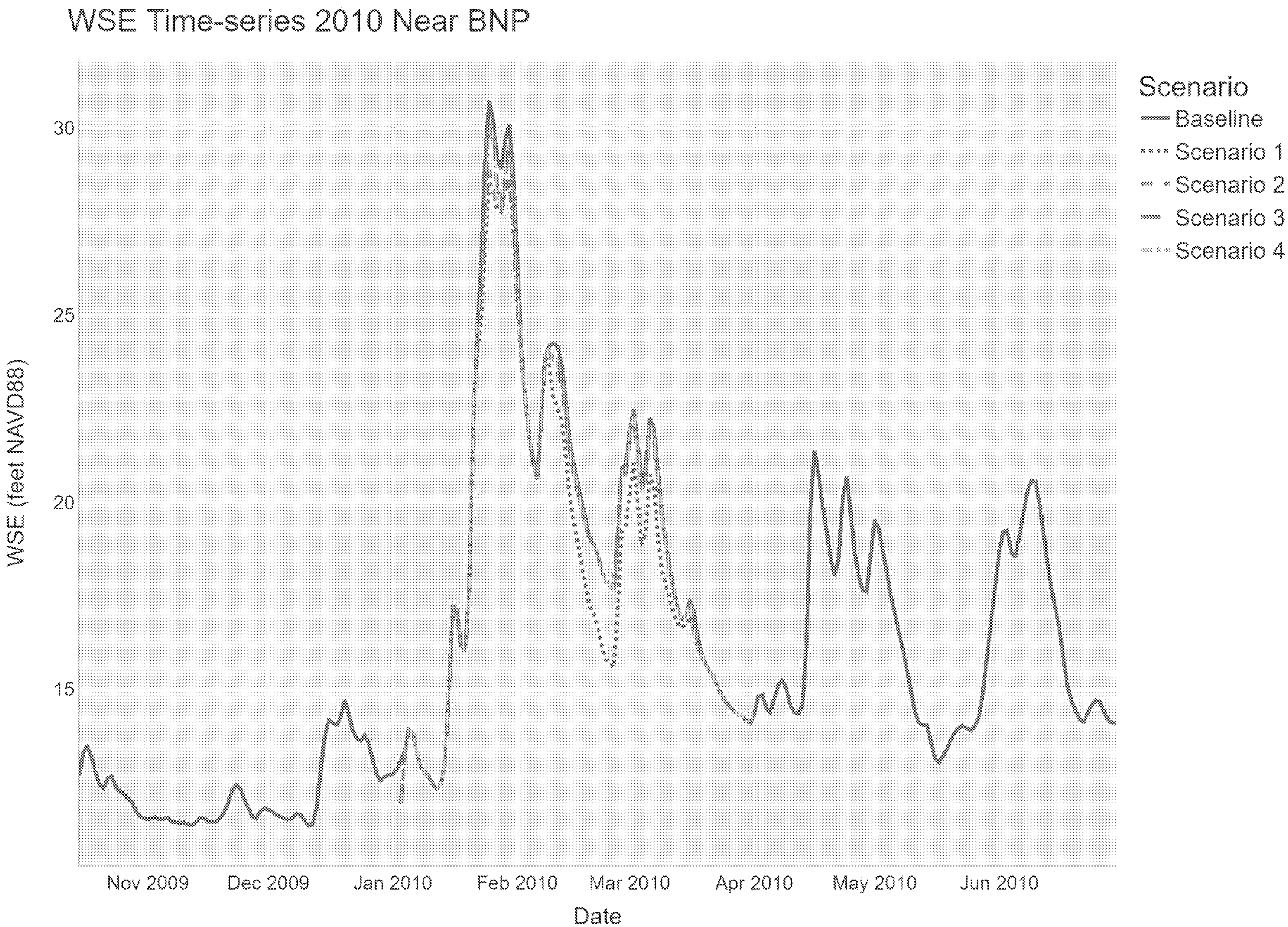


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR BNP 2009

FIGURE 19

YOLO BYPASS BNP SITES RESERVOIR IMPACT

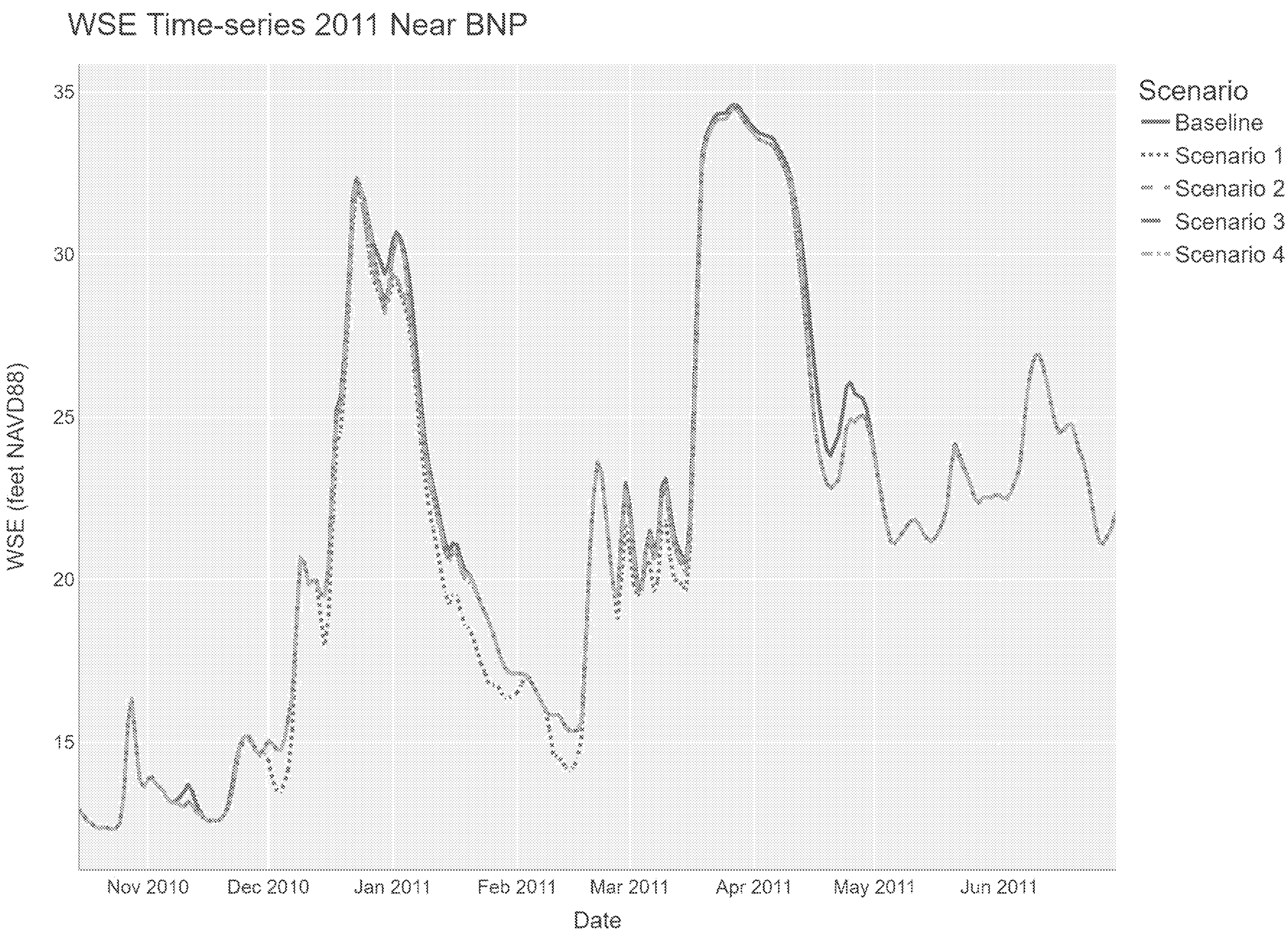


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR BNP 2010

FIGURE 20

YOLO BYPASS BNP SITES RESERVOIR IMPACT

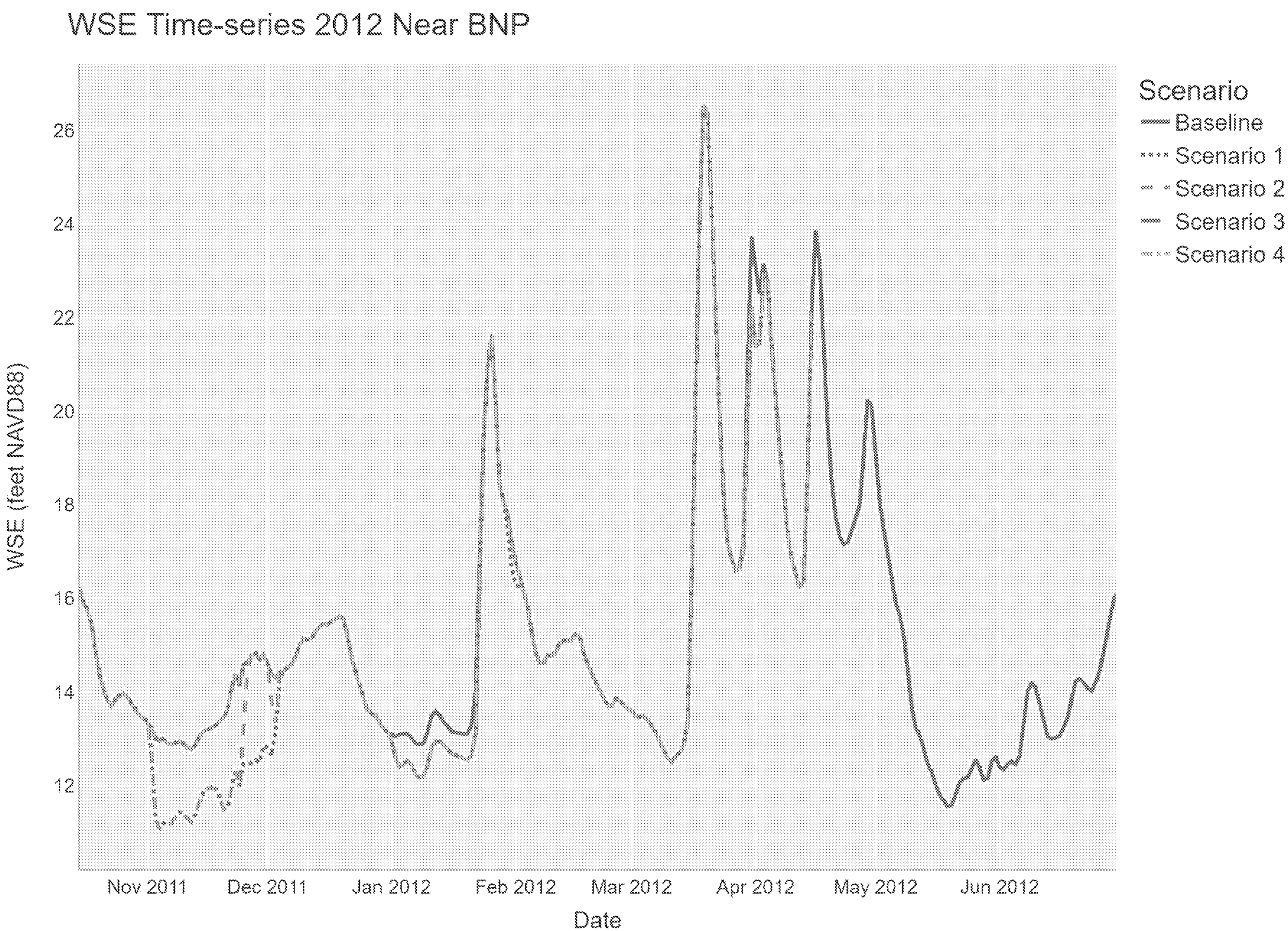


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR BNP 2011

FIGURE 21

YOLO BYPASS BNP SITES RESERVOIR IMPACT

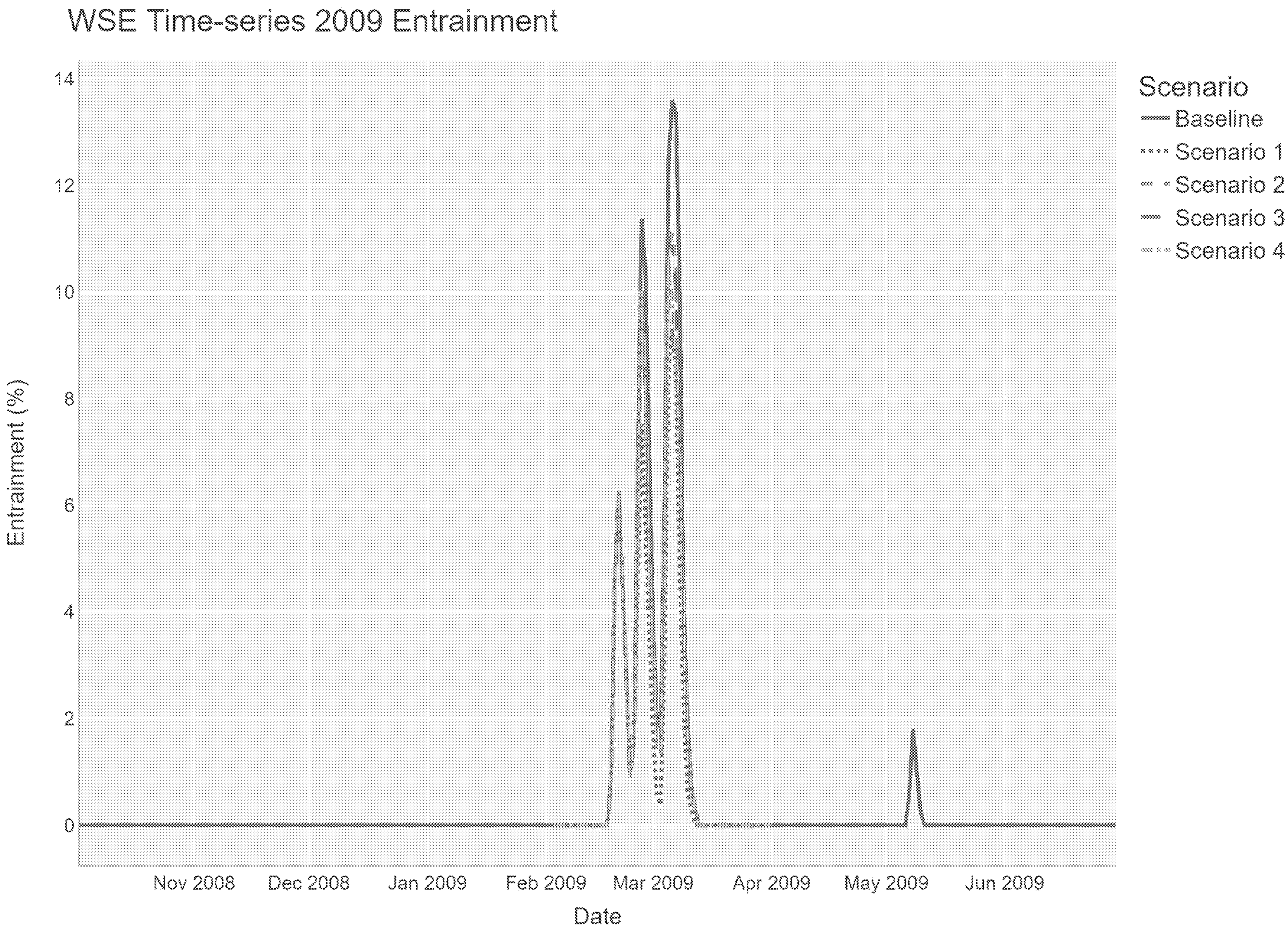


TUFLOW WSE VS TIME

SACRAMENTO RIVER NEAR BNP 2012

FIGURE 22

YOLO BYPASS BNP SITES RESERVOIR IMPACT

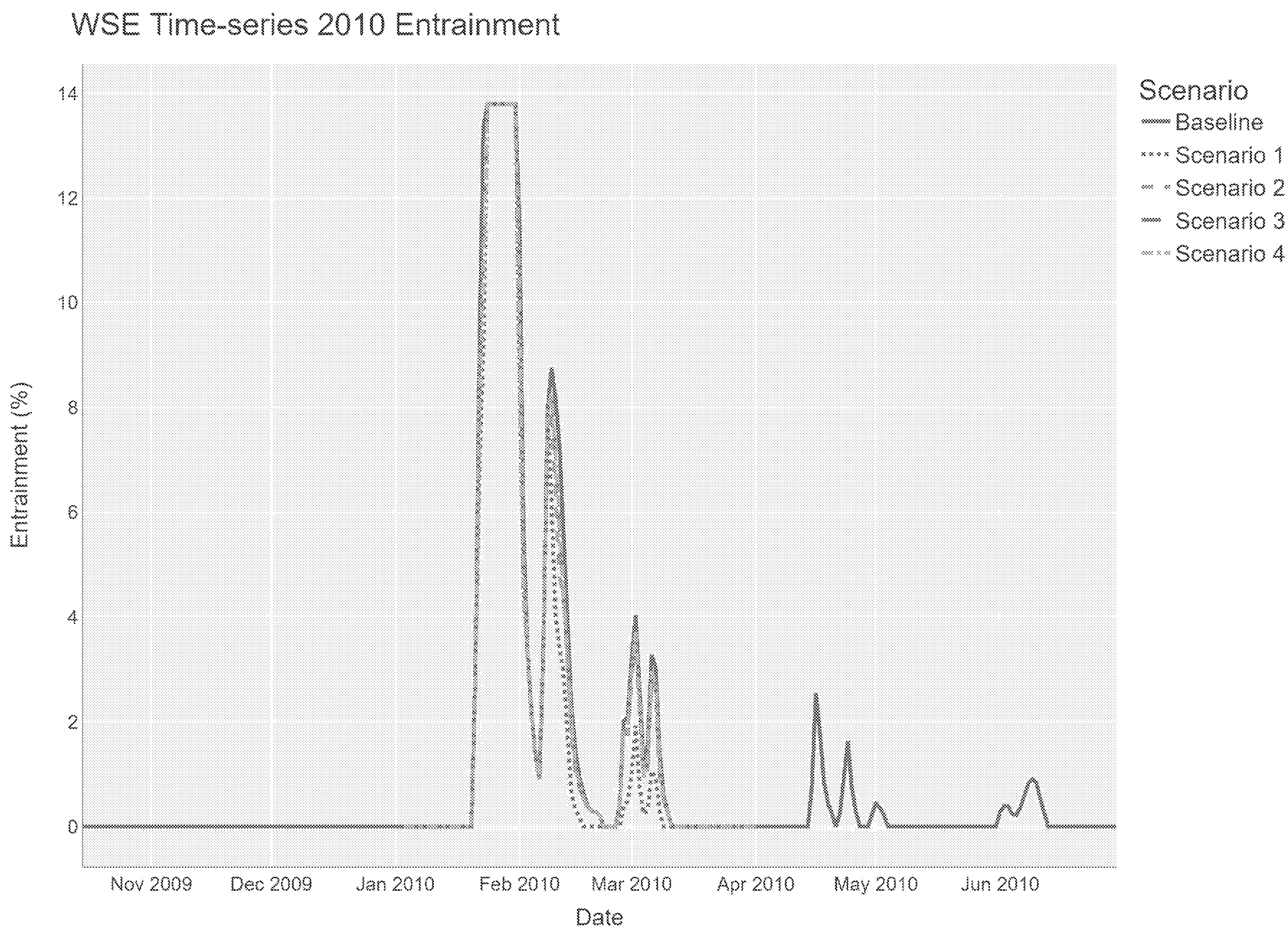


BNP ENTRAINMENT PERCENT VS TIME

2009

FIGURE 23

YOLO BYPASS BNP SITES RESERVOIR IMPACT

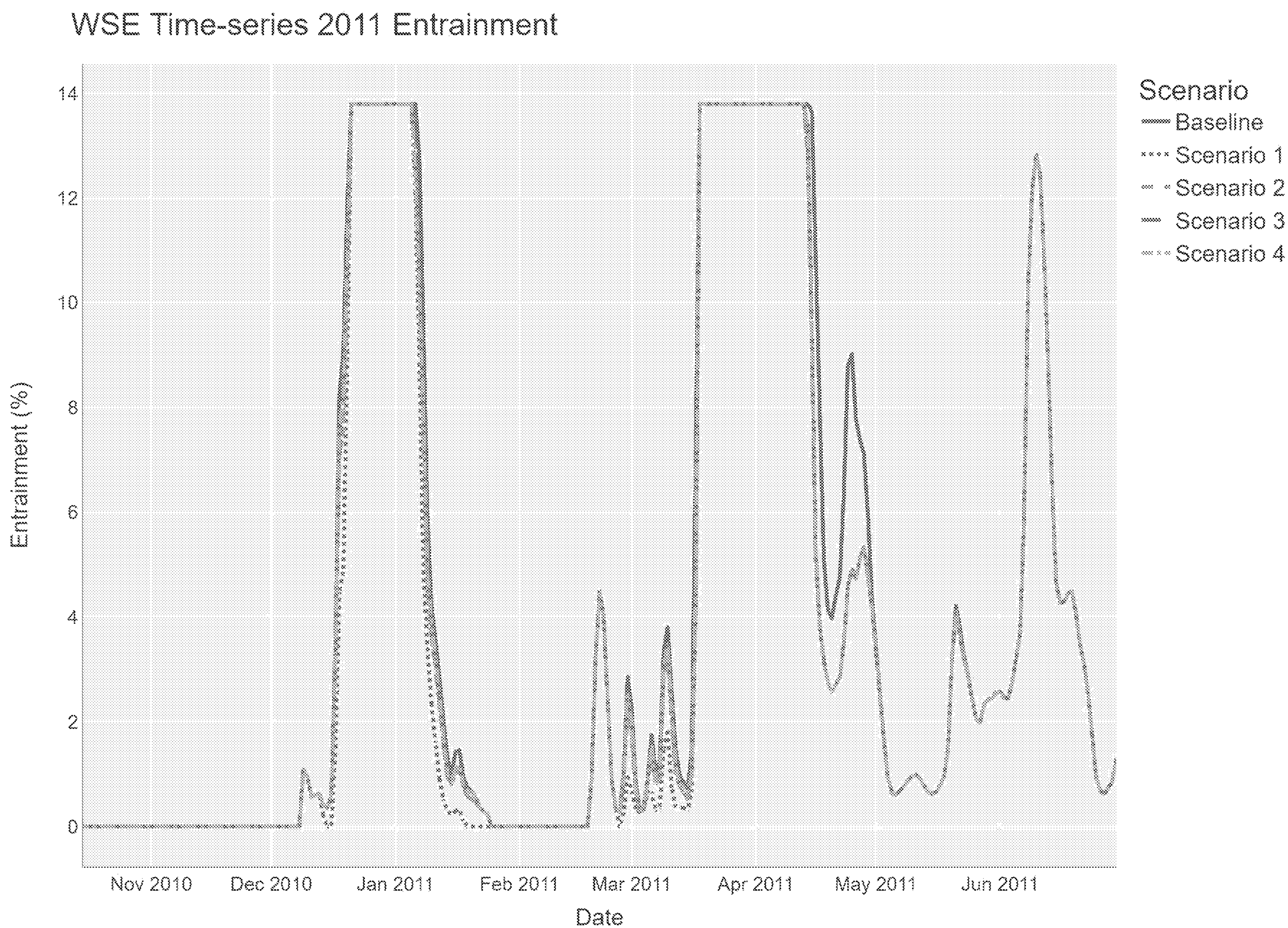


BNP ENTRAINMENT PERCENT VS TIME

2010

FIGURE 24

YOLO BYPASS BNP SITES RESERVOIR IMPACT

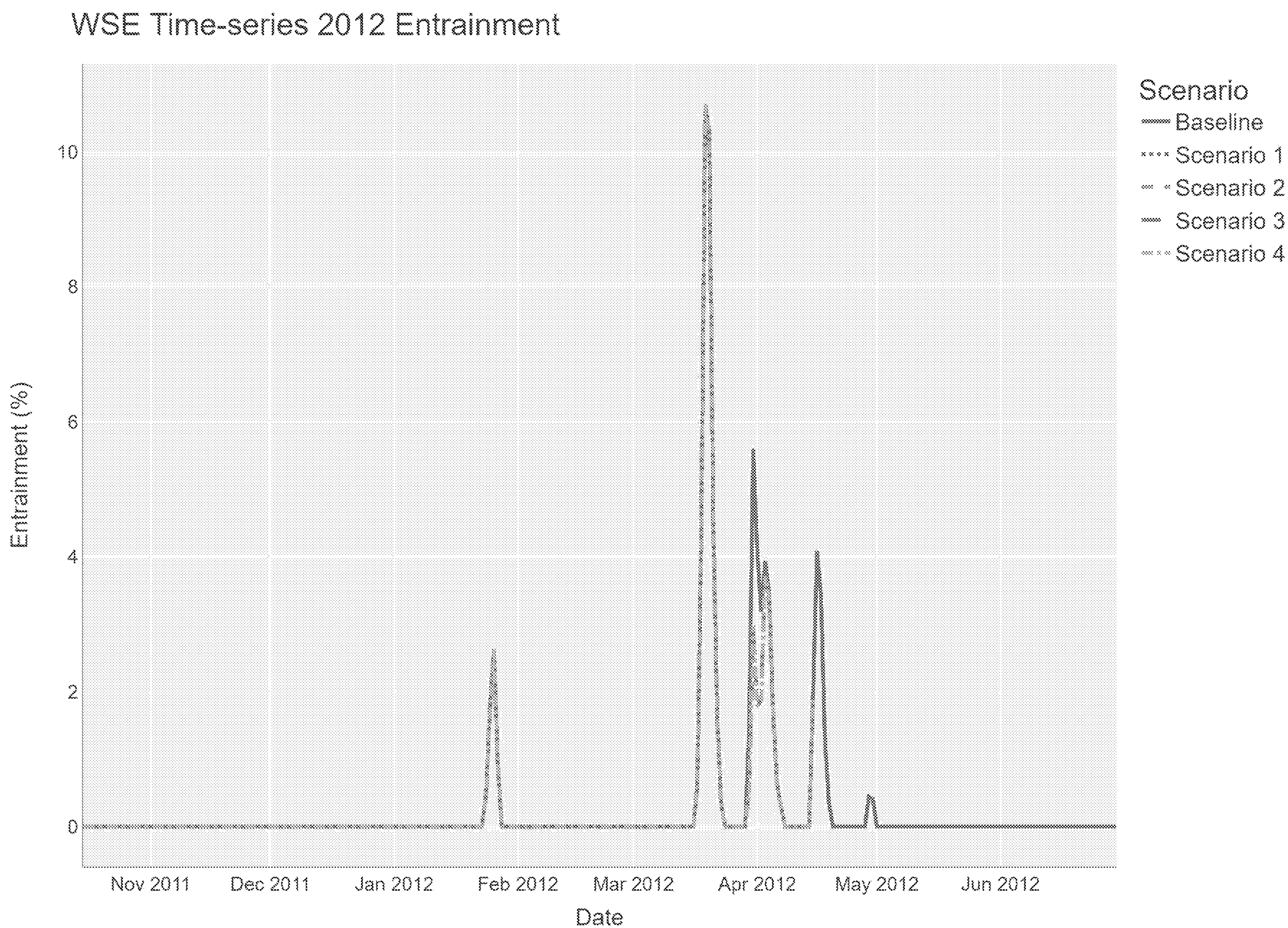


BNP ENTRAINMENT PERCENT VS TIME

2011

FIGURE 25

YOLO BYPASS BNP SITES RESERVOIR IMPACT



BNP ENTRAINMENT PERCENT VS TIME

2012

FIGURE 26

YOLO BYPASS BNP SITES RESERVOIR IMPACT

From: Marcia Kivett [MKivett@sitesproject.org]
Sent: 12/13/2022 7:49:44 AM
To: mmaltby@brwncald.com
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Let's go with 11:30 in case it runs a little long. I will set this up in a minute. Do you need me to call you back?

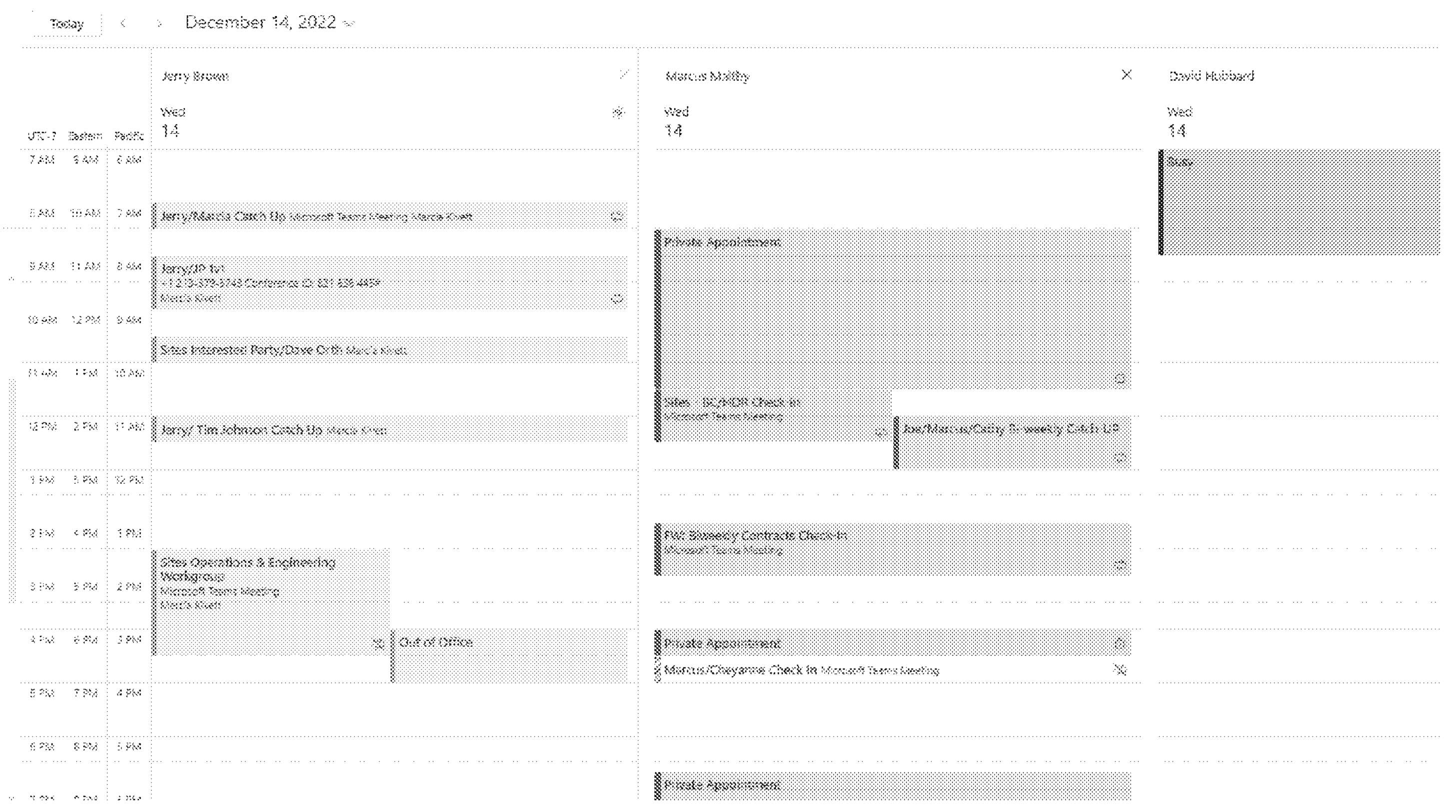
Marcia Kivett
Sites Project Coordinator
561.843.9740
mkivett@sitesproject.org
P.O. Box 517
122 Old Hwy 99W
Maxwell, CA 95955

From: Marcus Maltby <mmaltby@BrwnCald.com>
Sent: Tuesday, December 13, 2022 7:48 AM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

If you don't see any issue with Jerry's schedule, either 1030-11am or 1130-noon both Pacific time would work best for me. Thank you!

From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Tuesday, December 13, 2022 8:37 AM
To: Marcus Maltby <mmaltby@BrwnCald.com>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

This is the best way to show you the availability.



From: Marcus Maltby <mmaltby@BrwnCald.com>
Sent: Monday, December 12, 2022 9:41 PM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: FW: Sites Reservoir Project Schedule Updates December 2022

Do you think you could send me a couple options (if there are options) for this Wednesday meeting before sending it out? I have a couple things I need to take care of before my flight out Wednesday evening and if possible I'd like to see what my options are for moving some things around.

I know....i'm high maintenance haha

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Monday, December 12, 2022 5:31 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

I've received a request from the State to provide a special schedule report for the Sites Project that will allow them to monitor and engage in activities that would benefit from State administration intervention. I went through our Nov22 update and have highlighted the activity IDs that I believe would best meet the request (see attached). I would like you to prepare this report so that we can provide it to them with our monthly updates. Start with my highlights and expand/contract as needed to get the coverage that makes sense for sr mgr review as part of their strike team and something they can use for reports to the Governor. Report can be no more than 1 page and should be easy to read with not a lot of detail but should allow them to quickly identify the agency's and milestones of greatest concern for expediting the project. I have told them that water rights will likely be most significant for the foreseeable future. This is acknowledged but they still need other activities.

I'd like to meet with you both on Wed to review what you've put together (Marcia – pls get 30 min on the calendar for the 3 of us for Wed). I need to provide a 1st cut to my state contact before 10a Thurs. He needs a final to the Secretary by noon Friday.

Find below the items that were identified in the request to give a flavor of the kind of information they are looking for.

Thanks
Jerry

- The JPA in January 2022 submitted to the California Department of Fish and Wildlife an application for an incidental take permit (ITP) under the California Endangered Species Act for the *construction* of the project. This permit is slated to be completed by XXXX. The JPA has yet to submit an application for an ITP for the *operation* of the project – a process that could take at least six months after the final EIR is issued. This permit is slated to be completed by XXXX.
- To establish the public benefits for the project, which enables Prop 1 funding:
  - The JPA must secure a public benefits contract with CDFW and DWR for environmental flows, recreation, and incidental flood public benefits. This contract is slated to be completed by XXX.
  - The JPA must obtain agreements with the U.S. Bureau of Reclamation to deliver water to wildlife refuges north and south of the Sacramento-San Joaquin Delta. This agreement is slated to be completed by XXX.

- Arrangements must be made to cover costs that remain after Prop. 1 funding is taken into account. The JPA estimates this will be finished by June 2023.

- The JPA and Reclamation continue to prepare the draft Biological Assessment, a plan to protect species covered by the federal Endangered Species Act. This Biological Assessment is slated to be completed by XXX.

- The project needs a permit from the California State Historic Preservation Office. This permit application is anticipated by JPA to be submitted by XXXX, and then considered by XXX date

- The project needs a Section 404 permit from the U.S. Army Corps of Engineers. The JPA anticipates submitting the application by XXX, with consideration completed by XXX.

- The JPA gave the State Water Resources Control Board a draft Clean Water Act Section 401 permit in summer 2022 and revisions to the application are underway. Consideration of this permit is slated to be completed by XXXX.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Monday, December 12, 2022 at 7:28 AM
To: "mmaltby@brwncald.com" <mmaltby@brwncald.com>, Cheyanne Harris <CHarris@BrwnCald.com>, Benjamin Orsak <BOrsak@BrwnCald.com>, "bezzone@mbkengineers.com" <bezzone@mbkengineers.com>, Justin Davies <JDavies@BrwnCald.com>, JP Robinette <jrobinette@sitesproject.org>, Alicia Forsythe <aforsythe@sitesproject.org>, conner <conner@cmdwest.com>, "Risse, Danielle" <danielle.risse@hdrinc.com>, "Edwards, Dawn" <Dawn.Edwards@hdrinc.com>, "Luu, Henry"

<henry.luu@hdrinc.com>, "Westcot, Cathy" <cathy.westcot@hdrinc.com>, "jelica.arsenijevic" <jelica.arsenijevic@hdrinc.com>, Joe Trapasso <jtrapasso@sitesproject.org>, Marcia Kivett <MKivett@sitesproject.org>, "laurie.warner.herson" <laurie.warner.herson@phenixenv.com>, Kevin Spesert <kspesert@sitesproject.org>, "Spranza, John" <john.spranza@hdrinc.com>, Jerry Brown <jbrown@sitesproject.org>
Subject: Sites Reservoir Project Schedule Updates December 2022

Howdy Sites Team – below link to the December folder with updated Schedules having Data Date of December 4, 2022. Should you have any questions or need to make changes, please reach out to me.

2022.12_December '22

Contents:

Schedules Library > Schedules - Amendment 3 > **2022.12_December '22**

Name

- Sites Work Plan Progress Reporting_2022.12.08.pdf
- Sites Work Plan Progress Reporting_Compare to Prior_2022.12.08.pdf
- Sites Full Schedule Comparison to Last Month_2022.12.12.pdf
- Sites Full Schedule_2022.12.12.pdf
- Sites Key Deliverables_2022.12.12.pdf
- Sites Milestones_2022.12.12.pdf
- Sites Reclamation Schedule_2022.12.12.pdf
- Sites Full Schedule with Predecessors & Successors_2022.12.12.pdf

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

Sites Reservoir Project

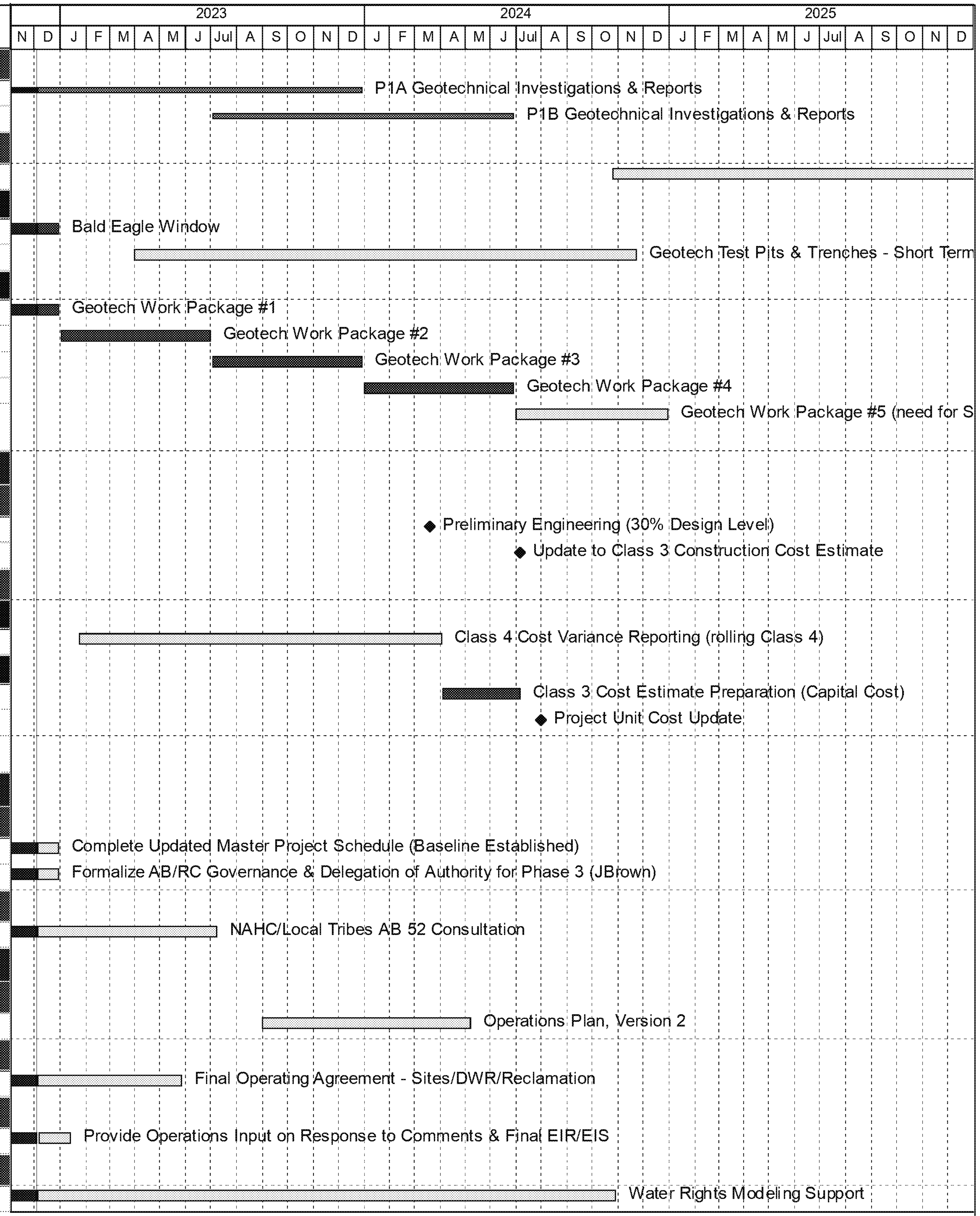
Schedule

#	Activity ID	Activity Name	Remaining Duration	Start	Finish
1		**Sites Reservoir Project DD: 04-Dec-2022**	3639	01-Sep-20 A	16-Dec-36
2		**Project Milestones**	442	05-May-23	10-Feb-25
3	MS-1200	Final EIR / EIS	0		05-May-23
4	MS-1320	CESA ITP Permit for Operations Received	0		31-Aug-23
5	MS-1340	CESA ITP Permit for Construction Received	0		31-Aug-23
6	MS-1300	ROD Signed	0		31-Oct-23
7	MS-1150	USFWS / NMFS Biological Opinions Received	0		31-Oct-23
8	MS-1700	Class 3 Estimate Complete	0		05-Jul-24
9	MS-1450	Project Unit Cost Update Complete	0		30-Jul-24
10	MS-1400	Water Right Permit Issued	0		26-Sep-24
11	MS-1500	Investor Commitment	0		24-Oct-24*
12	MS-1600	WIFIA Loan Closed	0		31-Oct-24
13	MS-5000	Phase 2 Amendment 3 Complete	0		31-Dec-24*
14	MS-3000	Construction Groundbreaking	0	10-Feb-25	
15		**Geotech Program**	976	22-Mar-22 A	30-Sep-26
16		**Environmental**	15	20-Jun-22 A	27-Dec-22
17		**Geotech Initial Study**	15	20-Jun-22 A	27-Dec-22
18	IS-205	Geotech Trench & Test Pits Initial Study	15	20-Jun-22 A	27-Dec-22
19		**Real Estate**	373	22-Mar-22 A	30-May-24
20		**Land Access Agreements**	373	22-Mar-22 A	30-May-24
21	A1250	Landowners Access Agreements for Geotech	373	22-Mar-22 A	30-May-24
22		**Colusa County**	377	22-Mar-22 A	30-May-24
23	LAAC-1200	Colusa Co. Landowners Access Agreements for Geotech Work Pkg #2	17	22-Mar-22 A	29-Dec-22
24	LAAC-1300	Colusa Co. Landowners Access Agreements for Geotech Work Pkg #3	120	30-Dec-22	19-Jun-23
25	LAAC-1400	Colusa Co. Landowners Access Agreements for Geotech Work Pkg #4	120	20-Jun-23	08-Dec-23
26	LAAC-1500	Colusa Co. Landowners Access Agreements for Geotech Work Pkg #5	120	11-Dec-23	30-May-24
27		**Yolo County**	257	22-Mar-22 A	08-Dec-23
28	LAAY-1200	Yolo Co. Landowners Access Agreements for Geotech Work Pkg #2	17	22-Mar-22 A	29-Dec-22
29	LAAY-1300	Yolo Co. Landowners Access Agreements for Geotech Work Pkg #3	120	30-Dec-22	19-Jun-23
30	LAAY-1400	Yolo Co. Landowners Access Agreements for Geotech Work Pkg #4	120	20-Jun-23	08-Dec-23
31		**Glenn County**	377	22-Mar-22 A	30-May-24
32	LAAG-1200	Glenn Co. Landowners Access Agreements for Geotech Work Pkg #2	17	22-Mar-22 A	29-Dec-22
33	LAAG-1300	Glenn Co. Landowners Access Agreements for Geotech Work Pkg #3	120	30-Dec-22	19-Jun-23
34	LAAG-1400	Glenn Co. Landowners Access Agreements for Geotech Work Pkg #4	120	20-Jun-23	08-Dec-23
35	LAAG-1500	Glenn Co. Landowners Access Agreements for Geotech Work Pkg #5	120	11-Dec-23	30-May-24
36		**Geotechnical Engineering**	976	06-Sep-22 A	30-Sep-26

Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Project ID: Sites December 2022 / Project Name: Sites Reservoir Project DD: 04-Dec-2022
Layout Name: Sites WBS / TASK filter: Less than 100%.
Data Date: 04-Dec-22 / Print Date: 12-Dec-22

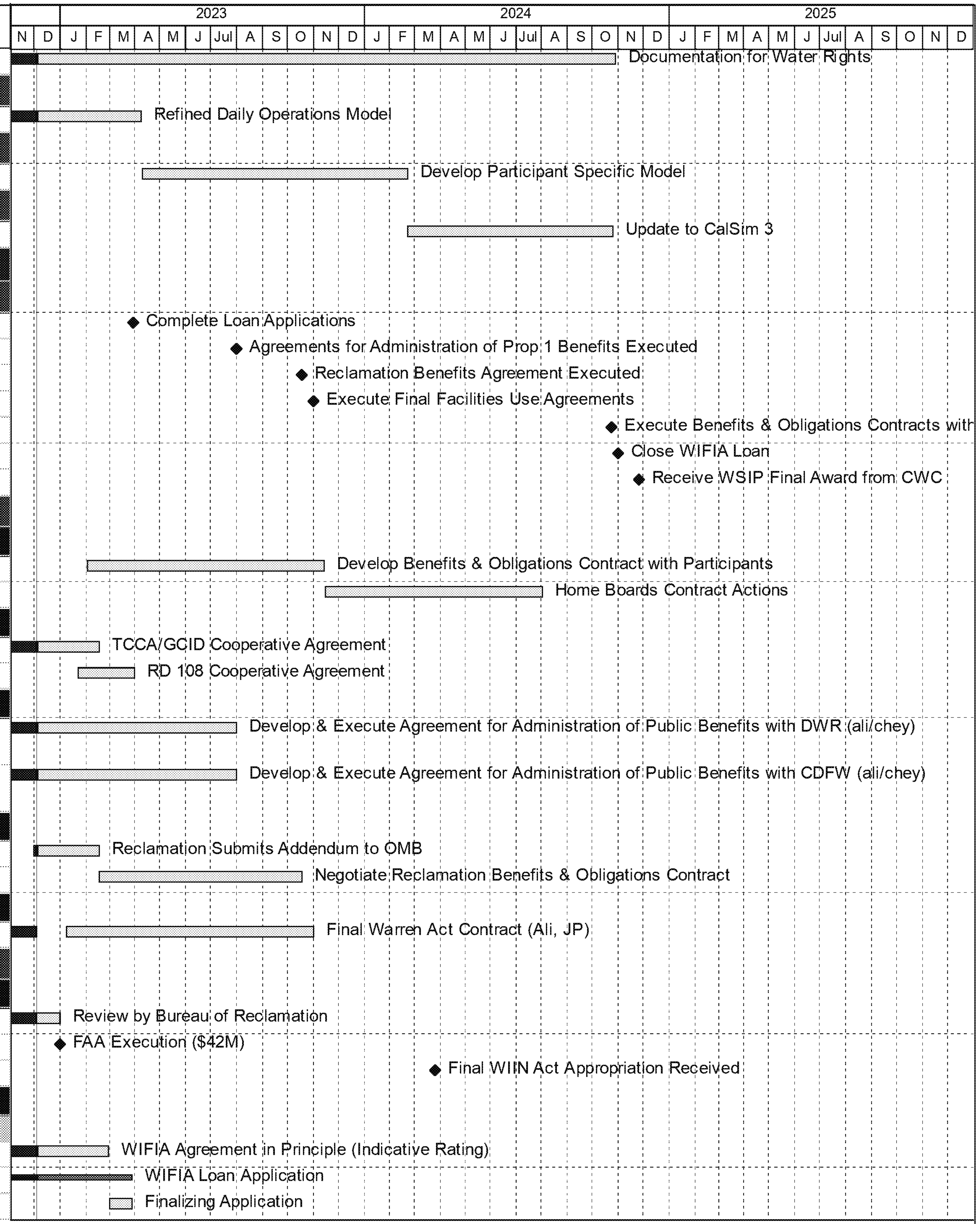
#	Activity ID	Activity Name	Remaining Duration	Start	Finish
37		**Key Deliverables**	398	06-Sep-22 A	28-Jun-24
38	KD-2015	P1A Geotechnical Investigations & Reports	270	06-Sep-22 A	29-Dec-23
39	KD-2025	P1B Geotechnical Investigations & Reports	252	03-Jul-23	28-Jun-24
40		**Geotechnical Investigations**	976	06-Sep-22 A	30-Sep-26
41	A1560	P2 Geotech for Final Design	500	25-Oct-24	30-Sep-26
42		**Test Pits & Trenches**	501	06-Sep-22 A	22-Nov-24
43	TPT-1100	Bald Eagle Window	18	06-Sep-22 A	30-Dec-22
44	TPT-1200	Geotech Test Pits & Trenches - Short Term Pemit Window	420	31-Mar-23	22-Nov-24
45		**Work Packages**	523	06-Sep-22 A	30-Dec-24
46	GWP-1100	Geotech Work Package #1	18	06-Sep-22 A	30-Dec-22
47	GWP-1200	Geotech Work Package #2	128	03-Jan-23	30-Jun-23
48	GWP-1300	Geotech Work Package #3	124	03-Jul-23	29-Dec-23
49	GWP-1400	Geotech Work Package #4	128	02-Jan-24	28-Jun-24
50	GWP-1500	Geotech Work Package #5 (need for Sites Lodoga Rd. Realignment Cost Certainty)	125	01-Jul-24	30-Dec-24
51		**Preliminary Engineering**	386	24-Jan-23	30-Jul-24
52		**Key Deliverables**	75	20-Mar-24	05-Jul-24
53	KD-1180	Preliminary Engineering (30% Design Level)	0		20-Mar-24
54	KD-1190	Update to Class 3 Construction Cost Estimate	0		05-Jul-24
55		**Cost Estimate**	386	24-Jan-23	30-Jul-24
56		**Class 4 Cost Estimate Variance Reporting**	304	24-Jan-23	03-Apr-24
57	C4E-1000	Class 4 Cost Variance Reporting (rolling Class 4)	304	24-Jan-23	03-Apr-24
58		**Class 3 Cost Estimate**	82	04-Apr-24	30-Jul-24
59	C3E-1000	Class 3 Cost Estimate Preparation (Capital Cost)	65	04-Apr-24	05-Jul-24
60	CU-1000	Project Unit Cost Update	0		30-Jul-24
61		**Project Development**	1648	01-Sep-20 A	27-Apr-29
62		**Planning**	150	01-Sep-20 A	07-Jul-23
63		**Key Deliverables**	18	24-Jan-22 A	30-Dec-22
64	KD-1130	Complete Updated Master Project Schedule (Baseline Established)	18	24-Jan-22 A	30-Dec-22
65	KD-1290	Formalize AB/RC Governance & Delegation of Authority for Phase 3 (JBrov	18	06-Sep-22 A	30-Dec-22
66		**NAHC/Local Tribes AB 52 Consultation**	150	01-Sep-20 A	07-Jul-23
67	STA-120	NAHC/Local Tribes AB 52 Consultation	150	01-Sep-20 A	07-Jul-23
68		**Reservoir Operations & Modeling**	482	03-Jan-22 A	28-Oct-24
69		**Operations Plan - Version 2**	172	01-Sep-23	07-May-24
70	KD-1510	Operations Plan, Version 2	172	01-Sep-23	07-May-24
71		**Final Sites DWR/Reclamation Operating Agreement**	122	19-Apr-22 A	26-May-23
72	OP-1005	Final Operating Agreement - Sites/DWR/Reclamation	122	19-Apr-22 A	26-May-23
73		**Provide Operations Input on Response to Comments & Final EIR/EIS**	25	24-May-22 A	13-Jan-23
74	FO-1080	Provide Operations Input on Response to Comments & Final EIR/EIS	25	24-May-22 A	13-Jan-23
75		**Water Rights Modeling**	482	03-Jan-22 A	28-Oct-24
76	A1200	Water Rights Modeling Support	482	03-Jan-22 A	28-Oct-24



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Project ID: Sites December 2022 / Project Name: Sites Reservoir Project DD: 04-Dec-2022
Layout Name: Sites WBS / TASK filter: Less than 100%.
Data Date: 04-Dec-22 / Print Date: 12-Dec-22

#	Activity ID	Activity Name	Remaining Duration	Start	Finish
77	A1210	Documentation for Water Rights	482	03-Jan-22 A	28-Oct-24
78	**Refined Daily Operations Model**		87	03-Oct-22 A	07-Apr-23
79	A1220	Refined Daily Operations Model	87	03-Oct-22 A	07-Apr-23
80	**Sites Specific Model**		220	10-Apr-23	21-Feb-24
81	OS-1150	Develop Participant Specific Model	220	10-Apr-23	21-Feb-24
82	**Update to CalSim 3**		174	22-Feb-24	25-Oct-24
83	A1230	Update to CalSim 3	174	22-Feb-24	25-Oct-24
84	**Project Agreements & Funding**		557	01-Jun-21 A	20-Feb-25
85	**Key Deliverables**		422	29-Mar-23	25-Nov-24
86	KD-1255	Complete Loan Applications	0		29-Mar-23
87	KD-1520	Agreements for Administration of Prop 1 Benefits Executed	0		31-Jul-23
88	KD-1260	Reclamation Benefits Agreement Executed	0		17-Oct-23
89	KD-1230	Execute Final Facilities Use Agreements	0		31-Oct-23
90	KD-1300	Execute Benefits & Obligations Contracts with Participants	0		24-Oct-24
91	KD-2600	Close WIFIA Loan	0		31-Oct-24
92	KD-1310	Receive WSIP Final Award from CWC	0		25-Nov-24
93	**Inter-Agency Agreements**		418	01-Jun-21 A	02-Aug-24
94	**Benefits & Obligations Contract with Participants**		377	03-Feb-23	02-Aug-24
95	BO-1300	Develop Benefits & Obligations Contract with Participants	200	03-Feb-23	14-Nov-23
96	BO-1400	Home Boards Contract Actions	180	15-Nov-23	02-Aug-24
97	**Facility Use Agreeements**		82	27-Aug-21 A	31-Mar-23
98	FO-1020	TCCA/GCID Cooperative Agreement	52	27-Aug-21 A	17-Feb-23
99	FO-1040	RD 108 Cooperative Agreement	50	23-Jan-23	31-Mar-23
100	**Agreements for Administration of Public Benefits**		166	31-Mar-22 A	31-Jul-23
101	PB-1100	Develop & Execute Agreement for Administration of Public Benefits with DWR (ali/chey)	166	31-Mar-22 A	31-Jul-23
102	PB-1200	Develop & Execute Agreement for Administration of Public Benefits with CDFW (ali/chey)	166	31-Mar-22 A	31-Jul-23
103	**Federal Funding Committment**		221	01-Dec-22 A	17-Oct-23
104	WIIN-1180	Reclamation Submits Addendum to OMB	51	01-Dec-22 A	16-Feb-23
105	WIIN-1170	Negotiate Reclamation Benefits & Obligations Contract	170	17-Feb-23	17-Oct-23
106	**US Bureau of Reclamation Warren Act**		209	01-Jun-21 A	31-Oct-23
107	FED-090	Final Warren Act Contract (Ali, JP)	209	01-Jun-21 A	31-Oct-23
108	**Federal Funding**		399	10-Jun-22 A	08-Jul-24
109	**WIIN Act FAA**		326	10-Jun-22 A	25-Mar-24
110	WIIN-1190	Review by Bureau of Reclamation	28	10-Jun-22 A	31-Dec-22
111	WIIN-1210	FAA Execution ($42M)	0		31-Dec-22
112	WIIN-1200	Final WIIN Act Appropriation Received	0		25-Mar-24
113	**WIFIA Loan**		326	05-Jul-22 A	25-Mar-24
114	**Application**		79	05-Jul-22 A	29-Mar-23
115	WIFIA-110	WIFIA Agreement in Principle (Indicative Rating)	59	05-Jul-22 A	28-Feb-23
116	WIFIA-300	WIFIA Loan Application	78	05-Jul-22 A	28-Mar-23
117	WIFIA-130	Finalizing Application	20	01-Mar-23	28-Mar-23



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Actual Work
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Milestone

Project ID: Sites December 2022 / Project Name: Sites Reservoir Project DD: 04-Dec-2022
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Data Date: 04-Dec-22 / Print Date: 12-Dec-22

#	Activity ID	Activity Name	Remaining Duration	Start	Finish
118	WIFIA-140	Submittal of Final WIFIA Application	0		29-Mar-23
119	Negotiation		247	30-Mar-23	25-Mar-24
120	WIFIA-210	Term Sheet & Document Development	250	30-Mar-23	25-Mar-24
121	WIFIA-220	Final Rating Assessment (Depends on Final Rebalancing)	250	30-Mar-23	25-Mar-24
122	WIFIA-240	WIFIA Loan Negotiation	247	30-Mar-23	25-Mar-24
123	WIFIA-230	WIFIA Loan Ready to Close	0		25-Mar-24
124	USDA Loan		399	02-Sep-22 A	08-Jul-24
125	USDA-1060	Satisfy Loan Conditions	398	02-Sep-22 A	28-Jun-24
126	USDA-1080	2nd Update to Letter of Conditions	50	01-Sep-23	14-Nov-23
127	USDA-1070	Close USDA Loan	0		08-Jul-24
128	State Funding (Water Storage Investment Program, WSIP)		144	03-Jan-23	25-Jul-23
129	WSIP Early Funding Administration		144	03-Jan-23	25-Jul-23
130	WSIP-1240	WSIP Quarterly Report (Period October 1, 2022 through December 31, 202	15	03-Jan-23	23-Jan-23
131	WSIP-1250	WSIP Quarterly Report (Period Jan 1, 2023 through March 31, 2023)	15	03-Apr-23	21-Apr-23
132	WSIP-1260	WSIP Quarterly Report (Period April 1, 2023 through June 30, 2023)	15	05-Jul-23	25-Jul-23
133	Local Funding		538	03-Jan-23	20-Feb-25
134	Finance Check-Ins		105	02-Feb-23	03-Jul-23
135	FC-1270	Financing Check-In Q4-2022	0		02-Feb-23
136	FC-1280	Financing Check-In Q1-2023	0		03-Apr-23
137	FC-1290	Participants Ready for Finance	0		03-Jul-23
138	Acre/Feet Participation (Reservoir Committee Cash Calls)		283	26-Jul-23	05-Sep-24
139	AF-1200	Annual Check-In & Budget Update for 2024	30	26-Jul-23	06-Sep-23
140	AF-1300	Annual Check-In & Budget Update for 2025	30	25-Jul-24	05-Sep-24
141	Authority Board (Dues)		253	03-Jan-23	02-Jan-24
142	AB-2200	2023 Invoice Due Date 1/3/2023	1	03-Jan-23	03-Jan-23*
143	AB-2300	2024 Invoice Due Date 1/2/2024	1	02-Jan-24	02-Jan-24*
144	Phase 3 Participation Agreement (if needed)		80	25-Oct-24	20-Feb-25
145	PA-1100	Develop Phase 3 Participation Agreement	30	25-Oct-24	09-Dec-24
146	PA-1200	Home Board Execution & Final Rebalancing	50	10-Dec-24	20-Feb-25
147	Bank Financing (if needed)		50	30-Mar-23	08-Jun-23
148	BF-1100	Prepare & Issue RFP to Prospective Lenders	15	30-Mar-23	19-Apr-23
149	BF-1200	Review & Select Lender(s)	20	20-Apr-23	17-May-23
150	BF-1300	Execute Bank Financing Loan Documents	15	18-May-23	08-Jun-23
151	Permitting		517	04-Jan-21 A	26-Dec-24
152	Key Deliverables		521	21-Nov-22 A	26-Dec-24
153	KD-1460	Develop Mitigation Strategy (version 1 of living document)	59	21-Nov-22 A	28-Feb-23
154	KD-1430	Eagle Permit - Short Term & Nest Permit Issued	0		30-Mar-23
155	KD-1240	Execute Federal & State Operations Agreement	0		26-May-23
156	KD-1390	CWA 404 / 401 - Submit Final Permit Applications	0		31-May-23
157	KD-1420	Streambed Alteration Agreement	0		21-Jul-23
158	KD-1350	Section 106 - Final Programmatic Agreement	0		01-Aug-23
159	KD-1360	Section 106 - Programmatic Historic Properties Management Plan Development	0		01-Aug-23

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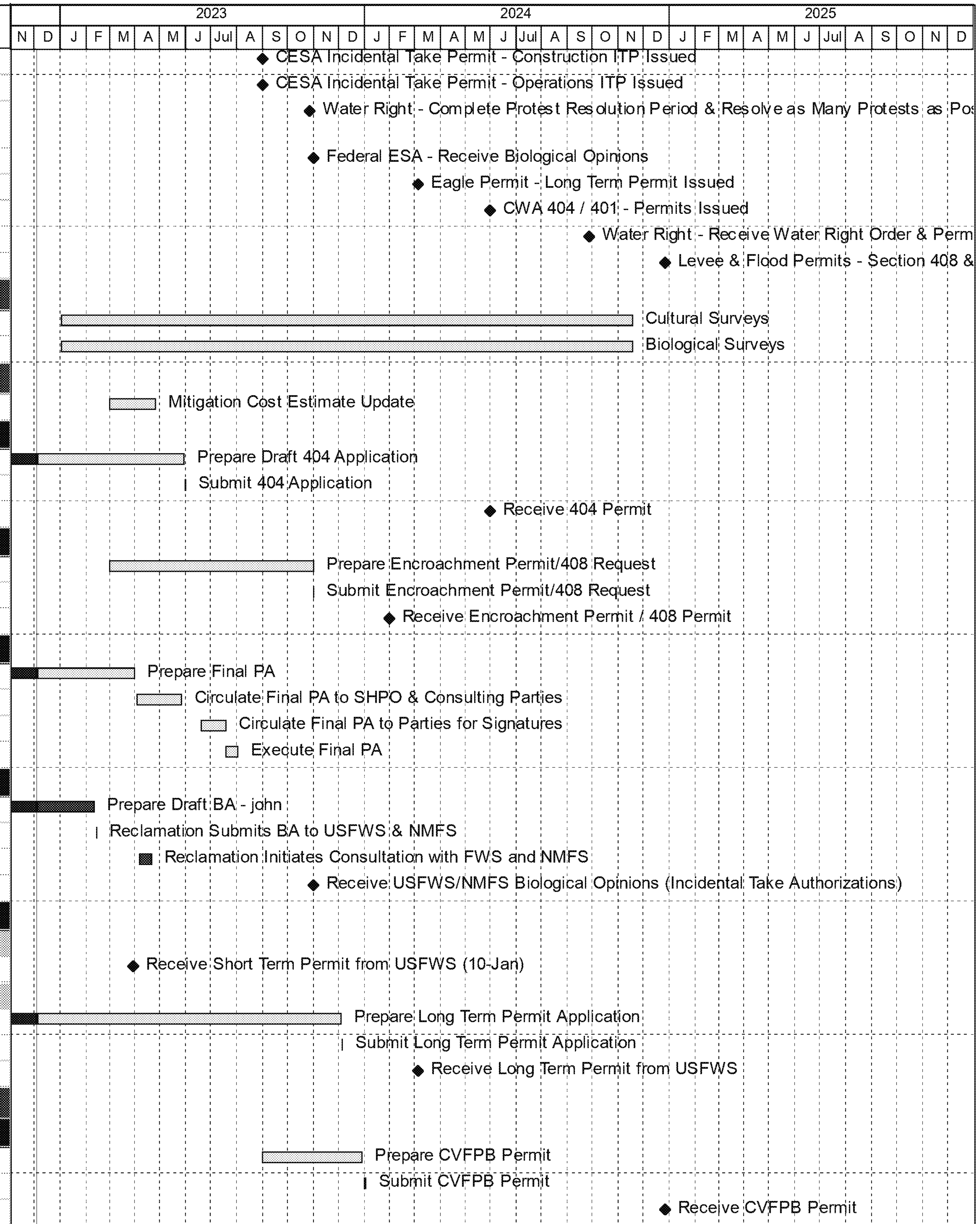
#	Activity ID	Activity Name	Remaining Duration	Start	Finish
160	KD-1370	CESA Incidental Take Permit - Construction ITP Issued	0		31-Aug-23
161	KD-1380	CESA Incidental Take Permit - Operations ITP Issued	0		31-Aug-23
162	KD-1320	Water Right - Complete Protest Resolution Period & Resolve as Many Protests as Possible	0		27-Oct-23
163	KD-1340	Federal ESA - Receive Biological Opinions	0		31-Oct-23
164	KD-1440	Eagle Permit - Long Term Permit Issued	0		06-Mar-24
165	KD-1400	CWA 404 / 401 - Permits Issued	0		31-May-24
166	KD-1330	Water Right - Receive Water Right Order & Permit	0		26-Sep-24
167	KD-1410	Levee & Flood Permits - Section 408 & CVFPB Encroachment Permits Iss	0		26-Dec-24
168	**Field Surveys**		479	03-Jan-23	18-Nov-24
169	RE-1030	Cultural Surveys	479	03-Jan-23	18-Nov-24
170	RE-1040	Biological Surveys	479	03-Jan-23	18-Nov-24
171	**Federal Agency Agreements & Permits**		378	11-Jan-21 A	31-May-24
172	CE-1570	Mitigation Cost Estimate Update	40	01-Mar-23	25-Apr-23
173	**Clean Water Act Section 404**		378	04-Feb-21 A	31-May-24
174	404-050	Prepare Draft 404 Application	123	04-Feb-21 A	30-May-23
175	404-120	Submit 404 Application	1	31-May-23	31-May-23
176	404-130	Receive 404 Permit	0		31-May-24
177	**US Army Corps of Engineers Rivers & Harbors Act Section 14, Section 408**		233	01-Mar-23	31-Jan-24
178	408-150	Prepare Encroachment Permit/408 Request	172	01-Mar-23	31-Oct-23
179	408-160	Submit Encroachment Permit/408 Request	1	01-Nov-23	01-Nov-23
180	408-170	Receive Encroachment Permit / 408 Permit	0		31-Jan-24
181	**Advisory Council on Historic Preservation NHPA Section 106**		167	14-Mar-22 A	01-Aug-23
182	106-081	Prepare Final PA	82	14-Mar-22 A	31-Mar-23
183	106-092	Circulate Final PA to SHPO & Consulting Parties	40	03-Apr-23	26-May-23
184	106-096	Circulate Final PA to Parties for Signatures	20	20-Jun-23	18-Jul-23
185	106-102	Execute Final PA	10	19-Jul-23	01-Aug-23
186	**USFWS & NMFS Endangered Species Act Section 7**		231	11-Jan-21 A	31-Oct-23
187	BA-200	Prepare Draft BA - john	47	11-Jan-21 A	10-Feb-23
188	BA-210	Reclamation Submits BA to USFWS & NMFS	1	13-Feb-23	13-Feb-23
189	BA-215	Reclamation Initiates Consultation with FWS and NMFS	10	07-Apr-23	20-Apr-23
190	BA-220	Receive USFWS/NMFS Biological Opinions (Incidental Take Authorizations)	0		31-Oct-23
191	**USFWS Bald Eagle Protection Act**		317	27-Jul-22 A	06-Mar-24
192	**Short Term Permit**		0	30-Mar-23	30-Mar-23
193	USFWS-130	Receive Short Term Permit from USFWS (10-Jan)	0		30-Mar-23
194	**Long Terrm Permit**		317	27-Jul-22 A	06-Mar-24
195	USFWS-140	Prepare Long Term Permit Application	253	27-Jul-22 A	04-Dec-23
196	USFWS-150	Submit Long Term Permit Application	1	05-Dec-23	05-Dec-23
197	USFWS-160	Receive Long Term Permit from USFWS	0		06-Mar-24
198	**State Agency Agreements & Permits**		517	04-Jan-21 A	26-Dec-24
199	**Central Valley Flood Protection Board (CVFPB) Levee Encroachment**		332	01-Sep-23	26-Dec-24
200	CVFPB-200	Prepare CVFPB Permit	81	01-Sep-23	29-Dec-23
201	CVFPB-210	Submit CVFPB Permit	1	02-Jan-24	02-Jan-24
202	CVFPB-220	Receive CVFPB Permit	0		26-Dec-24



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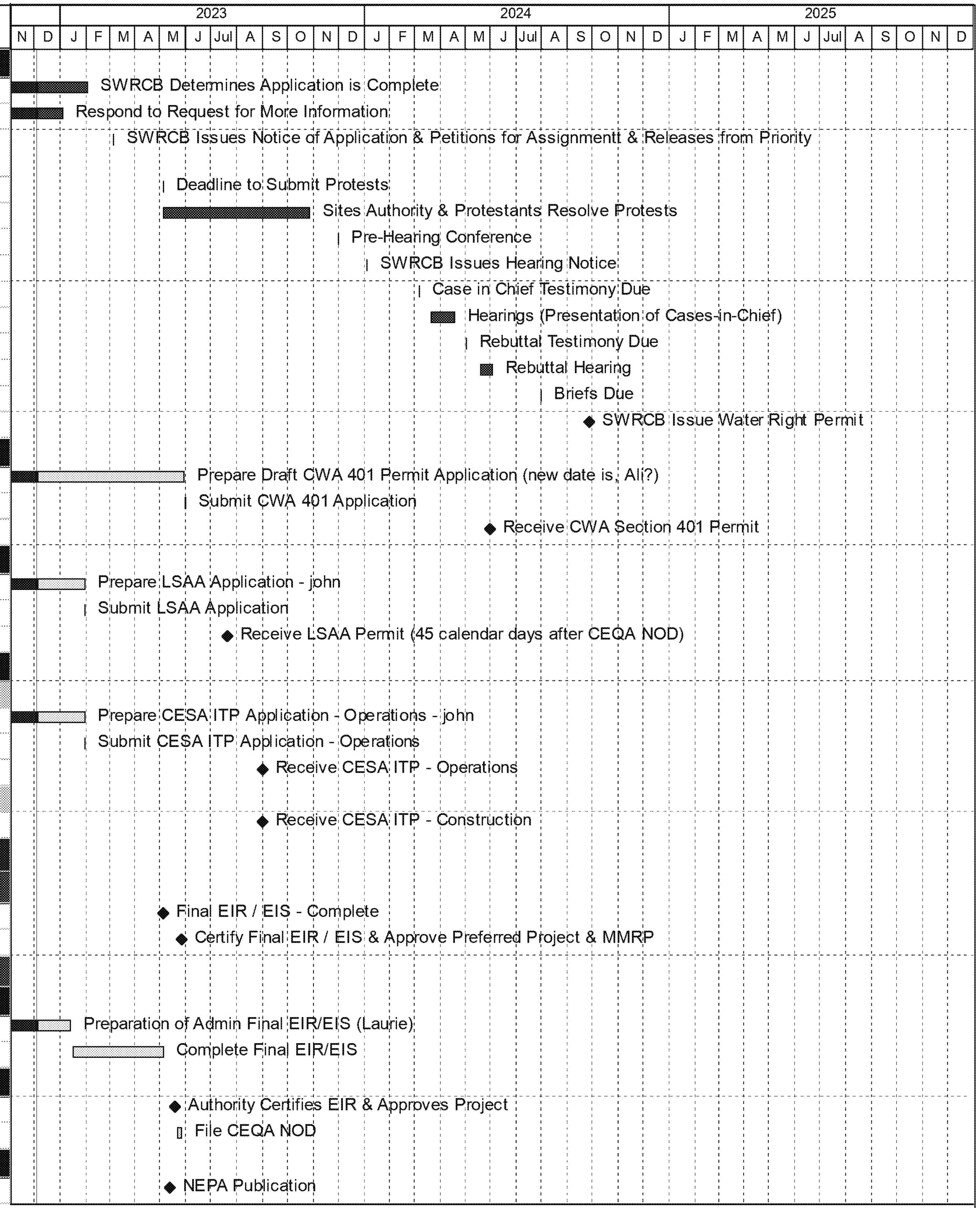
#	Activity ID	Activity Name	Remaining Duration	Start	Finish
203		SWRCB Water Right Permit	456	12-May-22 A	26-Sep-24
204	WRP-115a	SWRCB Determines Application is Complete	41	12-May-22 A	02-Feb-23
205	WRP-115ac	Respond to Request for More Information	20	29-Aug-22 A	03-Jan-23
206	WRP-115b	SWRCB Issues Notice of Application & Petitions for Assignmentt & Releases from Priority	1	06-Mar-23	06-Mar-23
207	WRP-115c	Deadline to Submit Protests	1	04-May-23	04-May-23
208	WRP-116	Sites Authority & Protestants Resolve Protests	122	05-May-23	27-Oct-23
209	WRP-117a	Pre-Hearing Conference	1	01-Dec-23	01-Dec-23
210	WRP-117b	SWRCB Issues Hearing Notice	1	04-Jan-24	04-Jan-24
211	WRP-117c	Case in Chief Testimony Due	1	07-Mar-24	07-Mar-24
212	WRP-117d	Hearings (Presentation of Cases-in-Chief)	20	22-Mar-24	18-Apr-24
213	WRP-117e	Rebuttal Testimony Due	1	03-May-24	03-May-24
214	WRP-117f	Rebuttal Hearing	10	20-May-24	03-Jun-24
215	WRP-117g	Briefs Due	1	31-Jul-24	31-Jul-24
216	WRP-120	SWRCB Issue Water Right Permit	0		26-Sep-24
217		SWB CWA Section 401 Water Quality Certification	378	04-Jan-21 A	31-May-24
218	401-200	Prepare Draft CWA 401 Permit Application (new date is, Ali?)	123	04-Jan-21 A	30-May-23
219	401-210	Submit CWA 401 Application	1	31-May-23	31-May-23
220	401-220	Receive CWA Section 401 Permit	0		31-May-24
221		CDFW Streambed Alteration Agreements	160	10-Jan-22 A	21-Jul-23
222	1600-200	Prepare LSAA Application - john	38	10-Jan-22 A	30-Jan-23
223	1600-210	Submit LSAA Application	1	31-Jan-23	31-Jan-23
224	1600-220	Receive LSAA Permit (45 calendar days after CEQA NOD)	0		21-Jul-23
225		CDFW Incidental Take Permits	189	11-Jan-21 A	31-Aug-23
226		ITP - CESA (Se 2081) Operations	189	11-Jan-21 A	31-Aug-23
227	2081-100	Prepare CESA ITP Application - Operations - john	38	11-Jan-21 A	30-Jan-23
228	2081-110	Submit CESA ITP Application - Operations	1	31-Jan-23	31-Jan-23
229	2081-120	Receive CESA ITP - Operations	0		31-Aug-23
230		ITP - CESA (Se 2081) Construction	0	31-Aug-23	31-Aug-23
231	2081-220	Receive CESA ITP - Construction	0		31-Aug-23
232		Environmental	231	03-Jan-22 A	31-Oct-23
233		Key Deliverables	15	05-May-23	26-May-23
234	KD-1470	Final EIR / EIS - Complete	0		05-May-23
235	KD-1480	Certify Final EIR / EIS & Approve Preferred Project & MMRP	0		26-May-23
236		EIR/EIS	231	03-Jan-22 A	31-Oct-23
237		Final EIR/Final EIS	107	03-Jan-22 A	05-May-23
238	EIR-210	Preparation of Admin Final EIR/EIS (Laurie)	27	03-Jan-22 A	13-Jan-23
239	EIR-250	Complete Final EIR/EIS	80	16-Jan-23	05-May-23
240		Authority Certifies EIR & Approves Project & File NOD	5	19-May-23	26-May-23
241	EIR-370	Authority Certifies EIR & Approves Project	0		19-May-23
242	EIR-380	File CEQA NOD	5	22-May-23	26-May-23
243		ROD	119	12-May-23	31-Oct-23
244	EIR-440	NEPA Publication	0		12-May-23



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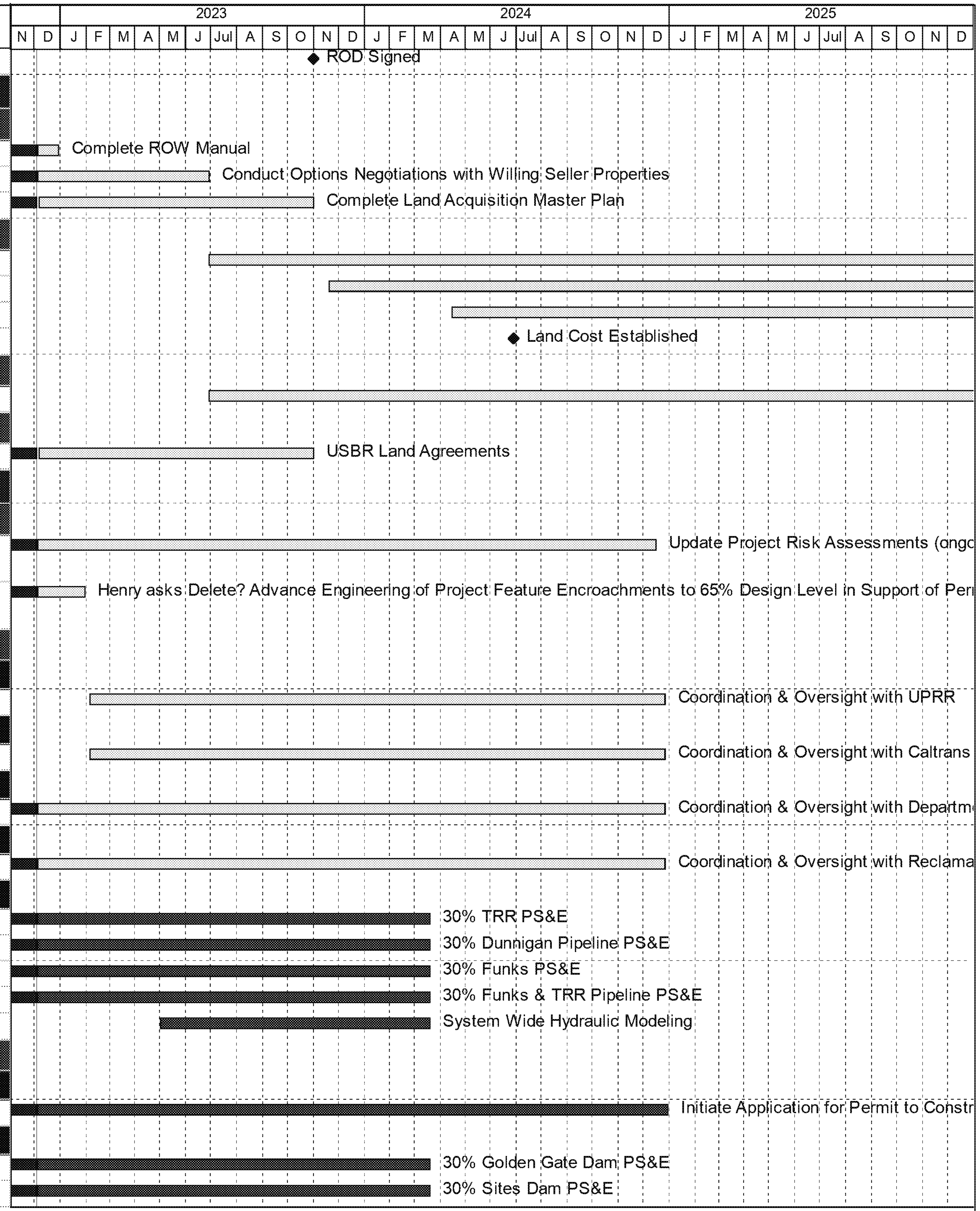
#	Activity ID	Activity Name	Remaining Duration	Start	Finish
245	EIR-450	ROD Signed	0		31-Oct-23
246	**Real Estate**		1644	02-Nov-20 A	27-Apr-29
247	**Key Deliverables**		231	03-Jan-22 A	31-Oct-23
248	KD-1495	Complete ROW Manual	18	03-Jan-22 A	30-Dec-22
249	KD-1500	Conduct Options Negotiations with Willing Seller Properties	144	01-Jul-22 A	28-Jun-23
250	KD-1490	Complete Land Acquisition Master Plan	229	03-Oct-22 A	31-Oct-23
251	**Land Acquisition**		1500	29-Jun-23	27-Apr-29
252	RE-1060	Construction Package 1 - Land Acquisition	1500	29-Jun-23	27-Apr-29
253	RE-1070	Construction Package 2 - Land Acquisition	1400	20-Nov-23	27-Apr-29
254	RE-1080	Construction Package 3 - Land Acquisition	1300	15-Apr-24	27-Apr-29
255	RE-1050	Land Cost Established	0		27-Jun-24
256	**Relocation**		1500	29-Jun-23	27-Apr-29
257	RE-1100	Relocation Assistance, as Needed	1500	29-Jun-23	27-Apr-29
258	**USBR - Land Agreement**		230	02-Nov-20 A	31-Oct-23
259	FED-100	USBR Land Agreements	230	02-Nov-20 A	31-Oct-23
260	**Preliminary Engineering**		523	03-Jan-22 A	30-Dec-24
261	**Key Deliverables**		515	31-Oct-22 A	16-Dec-24
262	KD-1210	Update Project Risk Assessments (ongoing) (Risk Mgr Bob Beduhn & Henry Luu)	515	31-Oct-22 A	16-Dec-24
263	KD-1110	Henry asks Delete? Advance Engineering of Project Feature Encroachments to 65% Design Level in Support of Permitting	38	01-Nov-22 A	30-Jan-23
264	**Conveyance (Pipelines, Pump Stations, Canals)**		522	03-Jan-22 A	27-Dec-24
265	**UPRR Oversight & Review**		480	06-Feb-23	27-Dec-24
266	A1110	Coordination & Oversight with UPRR	480	06-Feb-23	27-Dec-24
267	**Caltrans Oversight & Review**		480	06-Feb-23	27-Dec-24
268	A1120	Coordination & Oversight with Caltrans	480	06-Feb-23	27-Dec-24
269	**DWR Operations Oversight & Review (KLOG)**		522	03-Jan-22 A	27-Dec-24
270	A1130	Coordination & Oversight with Department of Water Resources	522	03-Jan-22 A	27-Dec-24
271	**RD 108 Oversight & Review**		522	03-Jan-22 A	27-Dec-24
272	A1140	Coordination & Oversight with Reclamation District 108	522	03-Jan-22 A	27-Dec-24
273	**Design & Analyses**		327	18-Oct-22 A	20-Mar-24
274	KD-2020	30% TRR PS&E	327	18-Oct-22 A	20-Mar-24
275	KD-1630	30% Dunnigan Pipeline PS&E	327	31-Oct-22 A	20-Mar-24
276	KD-2010	30% Funks PS&E	327	31-Oct-22 A	20-Mar-24
277	KD-2030	30% Funks & TRR Pipeline PS&E	327	31-Oct-22 A	20-Mar-24
278	KD-2080	System Wide Hydraulic Modeling	225	01-May-23	20-Mar-24
279	**Reservoir (Dams, Tunnels)**		523	01-Feb-22 A	30-Dec-24
280	**DSOD Oversight & Review**		523	01-Feb-22 A	30-Dec-24
281	KD-1100	Initiate Application for Permit to Construct from DSOD	523	01-Feb-22 A	30-Dec-24
282	**Design & Analyses**		327	31-Oct-22 A	20-Mar-24
283	KD-1660	30% Golden Gate Dam PS&E	327	31-Oct-22 A	20-Mar-24
284	KD-2040	30% Sites Dam PS&E	327	31-Oct-22 A	20-Mar-24



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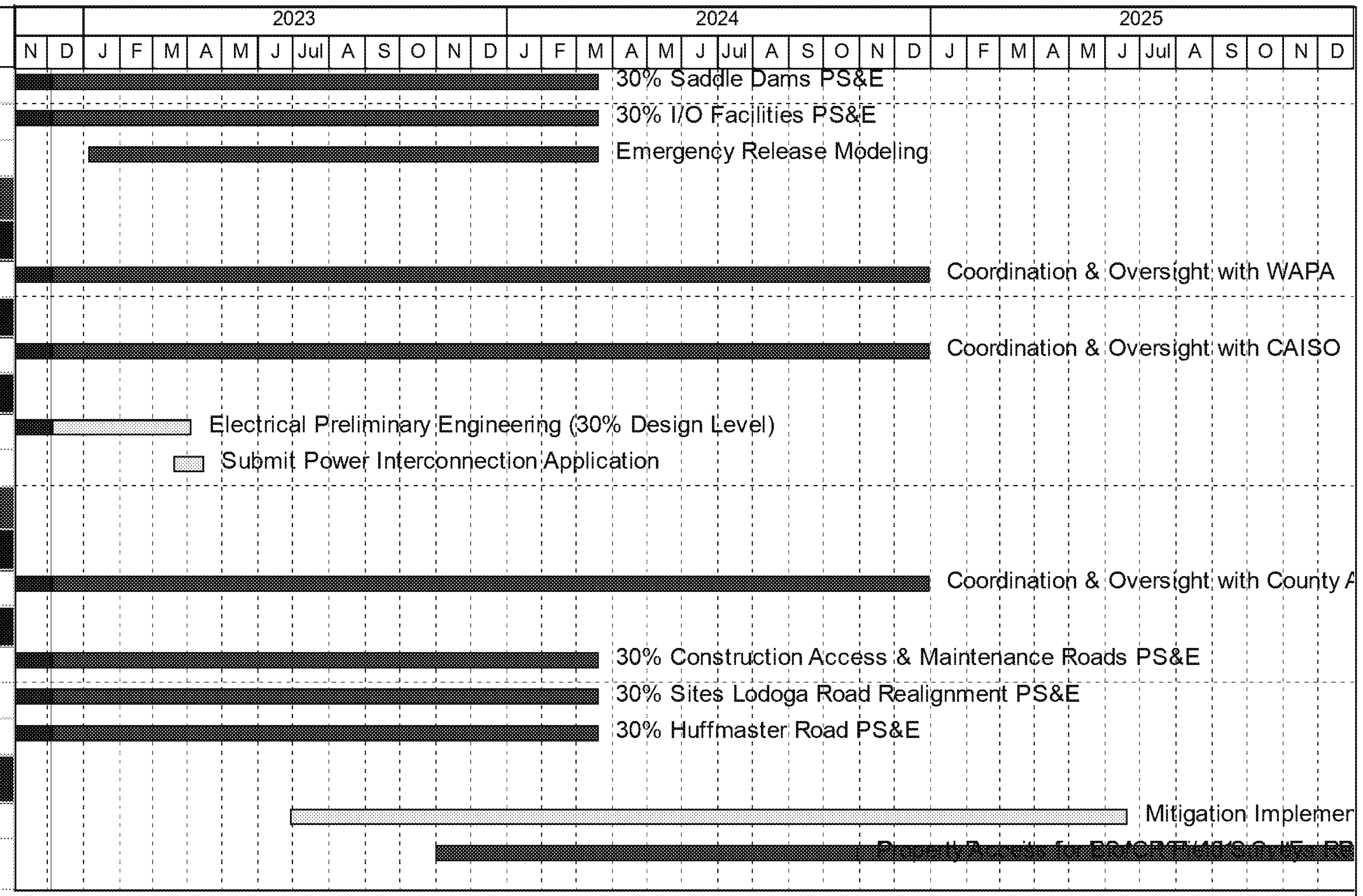
#	Activity ID	Activity Name	Remaining Duration	Start	Finish
285	KD-2050	30% Saddle Dams PS&E	327	31-Oct-22 A	20-Mar-24
286	KD-2060	30% I/O Facilities PS&E	327	31-Oct-22 A	20-Mar-24
287	KD-2070	Emergency Release Modeling	307	05-Jan-23	20-Mar-24
288	**Electrical (Substation, Switchyard, Transmission Line)**		523	03-Jan-22 A	30-Dec-24
289	**WAPA Oversight & Review**		523	03-Jan-22 A	30-Dec-24
290	A1150	Coordination & Oversight with WAPA	523	03-Jan-22 A	30-Dec-24
291	**CAISO Oversight & Review**		523	03-Jan-22 A	30-Dec-24
292	A1160	Coordination & Oversight with CAISO	523	03-Jan-22 A	30-Dec-24
293	**Design & Analyses**		92	31-Oct-22 A	14-Apr-23
294	KD-1640	Electrical Preliminary Engineering (30% Design Level)	83	31-Oct-22 A	03-Apr-23
295	KD-1200	Submit Power Interconnection Application	20	20-Mar-23	14-Apr-23
296	**Roads & Bridges**		523	03-Jan-22 A	30-Dec-24
297	**County Oversight & Review**		523	03-Jan-22 A	30-Dec-24
298	A1170	Coordination & Oversight with County Authorities	523	03-Jan-22 A	30-Dec-24
299	**Design & Analyses**		327	31-Oct-22 A	20-Mar-24
300	KD-1650	30% Construction Access & Maintenance Roads PS&E	327	31-Oct-22 A	20-Mar-24
301	KD-2090	30% Sites Lodoga Road Realignment PS&E	327	31-Oct-22 A	20-Mar-24
302	KD-2100	30% Huffmaster Road PS&E	327	31-Oct-22 A	20-Mar-24
303	**Mitigation Implementation**		500	29-Jun-23	19-Jun-25
304	MI-1100	Mitigation Implementation (more information needed to expand detail)	500	29-Jun-23	19-Jun-25
305	**Project Delivery**		3639	03-Jan-22 A	16-Dec-36



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From: Marcus Maltby [mmaltby@BrwnCald.com]
Sent: 12/13/2022 7:57:07 AM
To: Marcia Kivett [MKivett@sitesproject.org]
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Thank you! And no I don't, I was calling you back in case you wanted to share more info then what was in your email

From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Tuesday, December 13, 2022 8:50 AM
To: Marcus Maltby <mmaltby@BrwnCald.com>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Let's go with 11:30 in case it runs a little long. I will set this up in a minute. Do you need me to call you back?

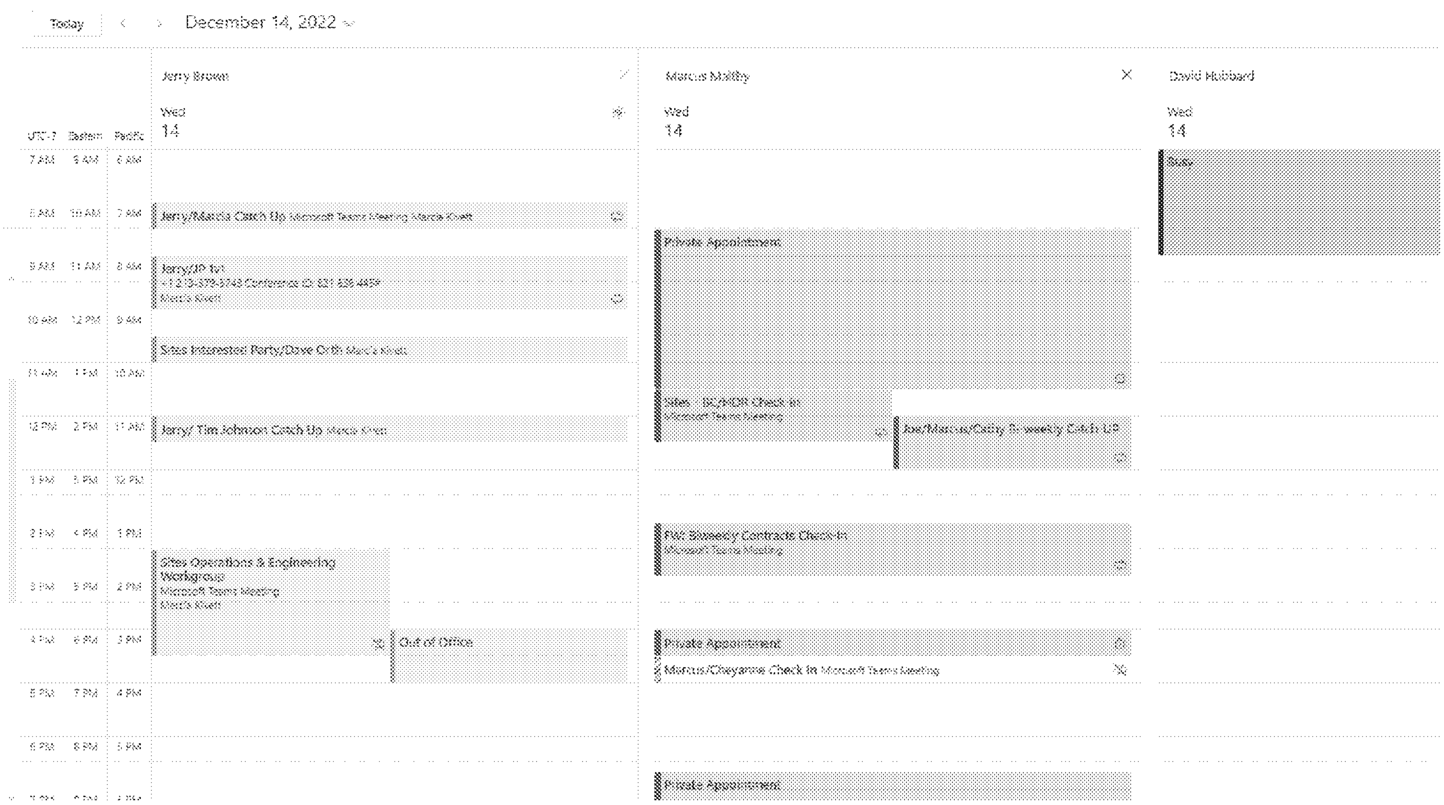
Marcia Kivett
Sites Project Coordinator
561.843.9740
mkivett@sitesproject.org
P.O. Box 517
122 Old Hwy 99W
Maxwell, CA 95955

From: Marcus Maltby <mmaltby@BrwnCald.com>
Sent: Tuesday, December 13, 2022 7:48 AM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

If you don't see any issue with Jerry's schedule, either 1030-11am or 1130-noon both Pacific time would work best for me. Thank you!

From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Tuesday, December 13, 2022 8:37 AM
To: Marcus Maltby <mmaltby@BrwnCald.com>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

This is the best way to show you the availability.



From: Marcus Maltby <mmaltby@BrwnCald.com>
Sent: Monday, December 12, 2022 9:41 PM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: FW: Sites Reservoir Project Schedule Updates December 2022

Do you think you could send me a couple options (if there are options) for this Wednesday meeting before sending it out? I have a couple things I need to take care of before my flight out Wednesday evening and if possible I'd like to see what my options are for moving some things around.

I know....i'm high maintenance haha

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Monday, December 12, 2022 5:31 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

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From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Monday, December 12, 2022 at 7:28 AM
To: "mmaltby@brwncald.com" <mmaltby@brwncald.com>, Cheyanne Harris <CHarris@BrwnCald.com>, Benjamin Orsak <BOrsak@BrwnCald.com>, "bezzone@mbkengineers.com" <bezzone@mbkengineers.com>, Justin Davies <JDavies@BrwnCald.com>, JP Robinette <jrobinette@sitesproject.org>, Alicia Forsythe <aforsythe@sitesproject.org>, conner <conner@cmdwest.com>, "Risse, Danielle" <danielle.risse@hdrinc.com>, "Edwards, Dawn" <Dawn.Edwards@hdrinc.com>, "Luu, Henry"

<henry.luu@hdrinc.com>, "Westcot, Cathy" <cathy.westcot@hdrinc.com>, "jelica.arsenijevic" <jelica.arsenijevic@hdrinc.com>, Joe Trapasso <jtrapasso@sitesproject.org>, Marcia Kivett <MKivett@sitesproject.org>, "laurie.warner.herson" <laurie.warner.herson@phenixenv.com>, Kevin Spesert <kspesert@sitesproject.org>, "Spranza, John" <john.spranza@hdrinc.com>, Jerry Brown <jbrown@sitesproject.org>
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Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

YOCHA DEHE
CULTURAL RESOURCES

December 9, 2022

Sites Project Authority
Attn: Alicia Forsythe, Environmental Planning & Permitting Manager
P.O. Box 517
Maxwell, CA 95955

RE: Sites Reservoir Project YD-04142017-03

Dear Ms. Forsythe:

Thank you for the project notification dated November 1, 2022, regarding cultural information on or near the proposed Sites Reservoir Project. We appreciate your effort to contact us and wish to respond.

The Cultural Resources Department has reviewed the study and concluded that the project is within the aboriginal territories of the Yocha Dehe Wintun Nation. Therefore, we have a cultural interest and authority in the proposed project area.

Based on the information provided, the Tribe has concerns that the project could impact known cultural resources. Yocha Dehe Wintun Nation concurs with amendments, and highly recommends including cultural monitors during development and ground disturbance.

To setup a monitoring agreement, please contact:

Eric Hernandez, Site Protection Manager
Yocha Dehe Wintun Nation
Phone: (530) 723-3313
Email: ehernandez@yochadehe-nsn.gov

Please refer to identification number YD–04142017-03 in any correspondence concerning this project.

Thank you for providing us the opportunity to comment.

Sincerely,

DocuSigned by:
Yvonne Perkins
8DD0BD089ED6438...

Tribal Historic Preservation Officer

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 12/13/2022 3:49:14 PM
To: David Hubbard [Dhubbard@BrwnCald.com]; mmaltby@brwncald.com
CC: Marcia Kivett [MKivett@sitesproject.org]
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Excellent! I need your help removing the clutter and the water rights sequence needs to jump off the page as the focal point. We can discuss tomorrow.

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- Sites_Governor's View-7P_2022.12.13.pdf
- Sites_Governor's View-7PW_2022.12.13.pdf
- Sites_Governor's View-7_2022.12.13.pdf
- Sites_Governor's View-7W_2022.12.13.pdf

Dave Hubbard
Project Controls
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Cell: 832.840.1789

dhubbard@brwncald.com

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To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
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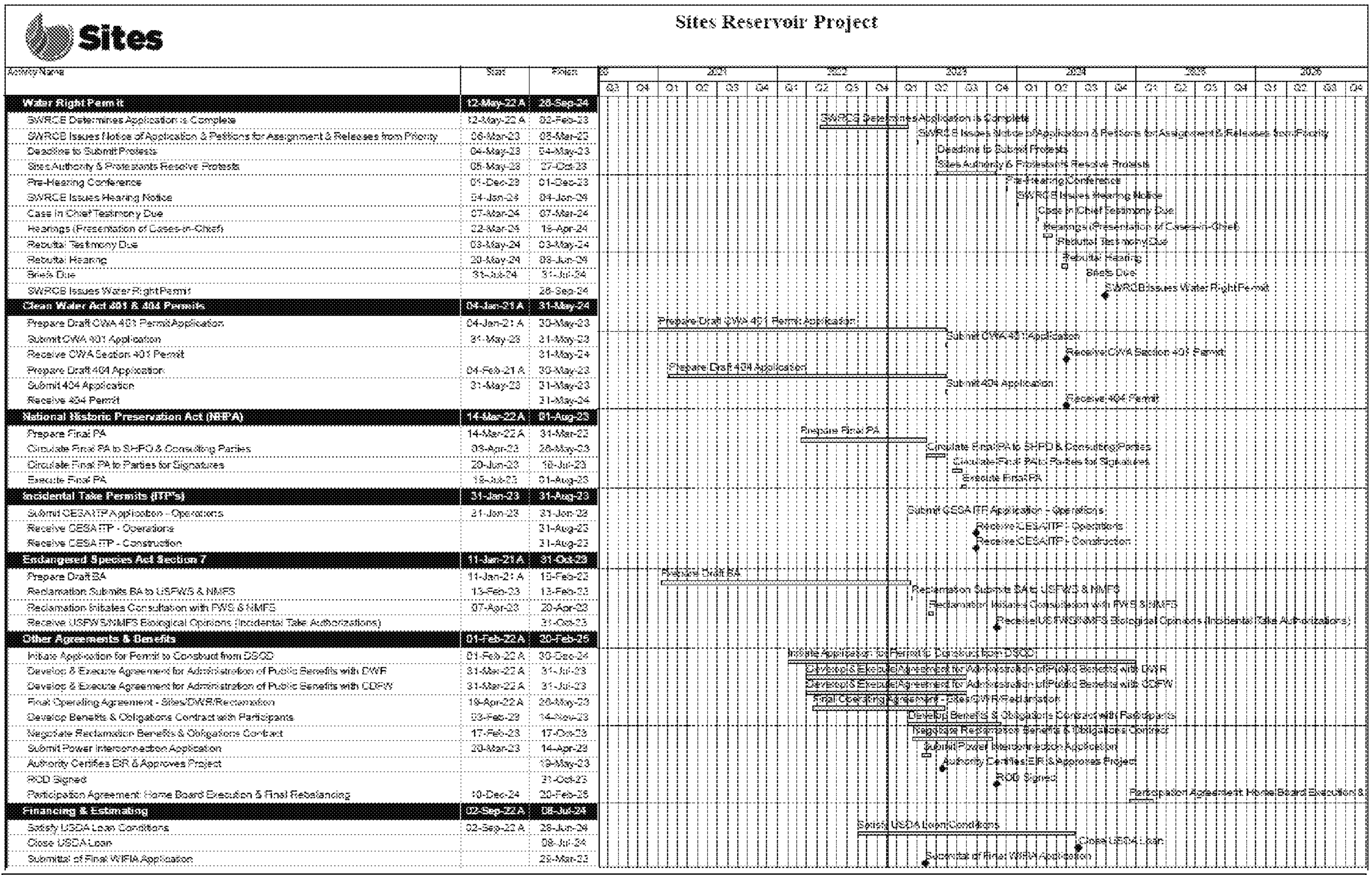
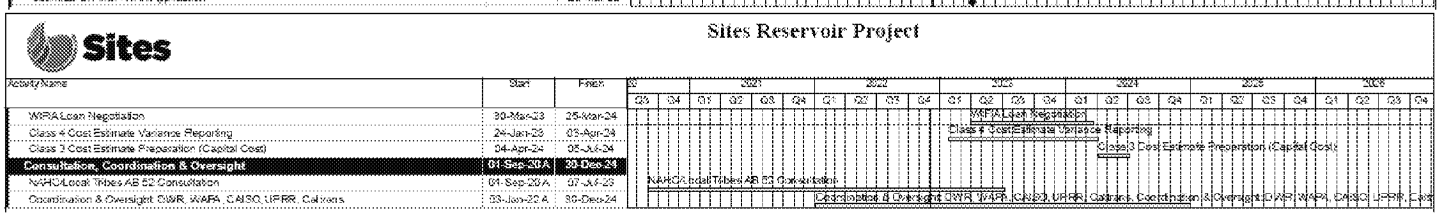
Sent: 12/14/2022 8:20:34 AM
To: Jerry Brown [jbrown@sitesproject.org]; mmaltby@brwncald.com
CC: Marcia Kivett [MKivett@sitesproject.org]
Subject: RE: Sites Reservoir Project Schedule Updates December 2022
Attachments: Sites_Governor's View-8_2022.12.14.pdf

Added some codes for grouping and order and to get the WRP up top.
Also combined all of the Coordination & Oversight activities into one to reduce some of the clutter.
We can discuss whether to remove more activities in order to keep at one page landscape view or this can go to portrait view and make it on one page.
See attached, below.





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Brown AND Caldwell 75

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From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 12/14/2022 8:38:45 AM
To: steve.micko@jacobs.com; Angela Bezzone [bezzone@mbkengineers.com]
CC: Leaf, Rob [Rob.Leaf@jacobs.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Next steps for WRLCM

Hi Steve, just checking in on this.

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Friday, December 9, 2022 1:35 PM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: RE: Next steps for WRLCM

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Not yet – I can have modified Bend Bridge flows for Alt 3B at 2035CT ready by COB Monday.

Best,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, December 9, 2022 1:28 PM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: [EXTERNAL] RE: Next steps for WRLCM

Okay. Angela with reach out to coordinate the details.

Does the Science Center have the information they need to run a 2035 model run with the revised bend bridge flows?

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Friday, December 9, 2022 12:32 PM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
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Hi John,

We'll need a few weeks to put together a CalSim II model of Alt 3B at WSIP 2070 conditions.
It requires a thorough review of CalSim II results to assure it's properly informing secondary models.

Let me know if you'd like more details or if you'd like to discuss.

Best,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, December 9, 2022 8:46 AM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: [EXTERNAL] RE: Next steps for WRLCM

Including Ali on this.

What level of effort are you looking at for development of the CalSim II 2070 1B?

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Thursday, December 8, 2022 11:52 AM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
Subject: RE: Next steps for WRLCM

Hi John,

We'll need to develop a CalSim II for Alternative 3B at 2070, run DSM2 and conduct temperature modeling.

We developed CalSim II models with Sites at 2070 climate for the Final EIR/EIS alternatives.
Alternative 3B (Reclamation at 16% federal investment) was only included in the BA/ITP, which were focused to 2035 climate.

Hope this helps,
Steve

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Sent: Thursday, December 8, 2022 8:35 AM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
Subject: [EXTERNAL] Next steps for WRLCM

Hi Steve and Angela,

Attached is the results from the Alt 3A run with the modified flows that incorporate Sites Diversions on flows below Bend Bridge. Ali and I discussed next steps and given that Reclamation has settled on a 16% investment, we will be asking Anne-Marie to run Alt 3B with the revised flows and then with 2070 hydrology and revised flows.

I think we need to run DSM2 and Temp for the 2070 run prior to them doing that, is thee anything else they would need from you?

Thanks,
John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist
He/Him

HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
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john.spranza@hdrinc.com

hdrinc.com/follow-us
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Subject: RE: Next steps for WRLCM
Attachments:SPJPA_Sites_WRLCM_EffectiveSacramentoRiverAtBendBridgeFlow_rev02_20221019__ALT3B_041122_2035CT_result.xlsx

Hi John – Thank you for the reminder! I have them prepared (in attached spreadsheet). Let me know if you'd like me to send to Ann Marie.

Best,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Wednesday, December 14, 2022 8:39 AM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
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From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Friday, December 9, 2022 1:35 PM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: RE: Next steps for WRLCM

Not yet – I can have modified Bend Bridge flows for Alt 3B at 2035CT ready by COB Monday.

Best,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, December 9, 2022 1:28 PM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: [EXTERNAL] RE: Next steps for WRLCM

Okay. Angela with reach out to coordinate the details.

Does the Science Center have the information they need to run a 2035 model run with the revised bend bridge flows?

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Friday, December 9, 2022 12:32 PM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: RE: Next steps for WRLCM

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi John,

We'll need a few weeks to put together a CalSim II model of Alt 3B at WSIP 2070 conditions.
It requires a thorough review of CalSim II results to assure it's properly informing secondary models.

Let me know if you'd like more details or if you'd like to discuss.

Best,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, December 9, 2022 8:46 AM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>; Alicia Forsythe <aforsythe@sitesproject.org>
Subject: [EXTERNAL] RE: Next steps for WRLCM

Including Ali on this.

What level of effort are you looking at for development of the CalSim II 2070 1B?

John Spranza

D 916.679.8858 M 818.640.2487

From: Micko, Steve <Steve.Micko@jacobs.com>
Sent: Thursday, December 8, 2022 11:52 AM
To: Spranza, John <john.spranza@hdrinc.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
Subject: RE: Next steps for WRLCM

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi John,

We'll need to develop a CalSim II for Alternative 3B at 2070, run DSM2 and conduct temperature modeling.

We developed CalSim II models with Sites at 2070 climate for the Final EIR/EIS alternatives.

Alternative 3B (Reclamation at 16% federal investment) was only included in the BA/ITP, which were focused to 2035 climate.

Hope this helps,
Steve

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, December 8, 2022 8:35 AM
To: Micko, Steve <Steve.Micko@jacobs.com>; Angela Bezzone <bezzone@mbkengineers.com>
Cc: Leaf, Rob <Rob.Leaf@jacobs.com>
Subject: [EXTERNAL] Next steps for WRLCM

Hi Steve and Angela,
Attached is the results from the Alt 3A run with the modified flows that incorporate Sites Diversions on flows below Bend Bridge. Ali and I discussed next steps and given that Reclamation has settled on a 16% investment, we will be asking Anne-Marie to run Alt 3B with the revised flows and then with 2070 hydrology and revised flows.

I think we need to run DSM2 and Temp for the 2070 run prior to them doing that, is thee anything else they would need from you?

Thanks,
John

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist
He/Him

HDR
2379 Gateway Oaks Drive, Suite 200
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D 916.679.8858 M 818.640.2487
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NOTICE - This communication may contain confidential and privileged information that is for the sole use of the intended recipient. Any viewing, copying or distribution of, or reliance on this message by unintended recipients is strictly prohibited. If you have received this message in error, please notify us immediately by replying to the message and deleting it from your computer.

From: David Hubbard [Dhubbard@BrwnCald.com]
Sent: 12/14/2022 9:58:00 AM
To: Jerry Brown [jbrown@sitesproject.org]; mmaltby@brwncald.com
CC: Marcia Kivett [MKivett@sitesproject.org]
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

I'll try but I think the font will shrink so much that folks may need magnifying glasses to read.

Get Outlook for iOS

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Wednesday, December 14, 2022 11:31:04 AM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Thanks - Is this enough to get us to one 8 ½ x 11 page?

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Wednesday, December 14, 2022 at 8:21 AM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Added some codes for grouping and order and to get the WRP up top.
Also combined all of the Coordination & Oversight activities into one to reduce some of the clutter.
We can discuss whether to remove more activities in order to keep at one page landscape view or this can go to portrait view and make it on one page.
See attached, below.

Sites Reservoir Project

Activity Name	Start	Finish
Water Right Permit	**12-May-22 A**	**26-Sep-24**
SWRCB Determines Application is Complete	12-May-22 A	02-Feb-23
SWRCB Issues Notice of Application & Petitions for Assignment & Releases from Priority	06-Mar-23	06-Mar-23
Deadline to Submit Protests	04-May-23	04-May-23
Sites Authority & Protestants Resolve Protests	05-May-23	27-Oct-23
Pre-Hearing Conference	01-Dec-23	01-Dec-23
SWRCB Issues Hearing Notice	04-Jan-24	04-Jan-24
Case in Chief Testimony Due	07-Mar-24	07-Mar-24
Hearings (Presentation of Cases-in-Chief)	22-Mar-24	19-Apr-24
Rebuttal Testimony Due	03-May-24	03-May-24
Rebuttal Hearing	29-May-24	03-Jun-24
Briefs Due	31-Jul-24	31-Jul-24
SWRCB Issues Water Right Permit		26-Sep-24
Clean Water Act 401 & 404 Permits	**04-Jan-21 A**	**31-May-24**
Prepare Draft CWA 401 Permit Application	04-Jan-21 A	30-May-23
Submit CWA 401 Application	31-May-23	31-May-23
Receive CWA Section 401 Permit		31-May-24
Prepare Draft 404 Application	04-Feb-21 A	30-May-23
Submit 404 Application	31-May-23	31-May-23
Receive 404 Permit		31-May-24
National Historic Preservation Act (NHPA)	**14-Mar-22 A**	**01-Aug-23**
Prepare Final PA	14-Mar-22 A	31-Mar-23
Circulate Final PA to SHPO & Consulting Parties	03-Apr-23	26-May-23
Circulate Final PA to Parties for Signatures	20-Jun-23	18-Jul-23
Execute Final PA	18-Jul-23	01-Aug-23
Incidental Take Permits (ITP's)	**31-Jan-23**	**31-Aug-23**
Submit CESA ITP Application - Operations	31-Jan-22	31-Jan-23
Receive CESA ITP - Operations		31-Aug-23
Receive CESA ITP - Construction		31-Aug-23
Endangered Species Act Section 7	**11-Jan-21 A**	**31-Oct-23**
Prepare Draft BA	11-Jan-21 A	10-Feb-23
Reclamation Submits BA to USFWS & NMFS	13-Feb-23	13-Feb-23
Reclamation Initiates Consultation with FWS & NMFS	07-Apr-23	28-Apr-23
Receive USFWS/NMFS Biological Opinions (Incidental Take Authorizations)		31-Oct-23
Other Agreements & Benefits	**01-Feb-22 A**	**20-Feb-25**
Initiate Application for Permit to Construct from DSOD	01-Feb-22 A	20-Dec-24
Develop & Execute Agreement for Administration of Public Benefits with DWR	31-Mar-22 A	31-Jul-23
Develop & Execute Agreement for Administration of Public Benefits with CDFW	31-Mar-22 A	31-Jul-23
Final Operating Agreement – Sites/DWR/Reclamation	19-Apr-22 A	30-May-23
Develop Benefits & Obligations Contract with Participants	03-Feb-23	14-Nov-23
Negotiate Reclamation Benefits & Obligations Contract	17-Feb-23	17-Oct-23
Submit Power Interconnection Application	29-Mar-23	14-Apr-23
Authority Certifies EIR & Approves Project		19-May-23
ROD Signed		31-Oct-23
Participation Agreement: Home Board Execution & Final Rebalancing	19-Dec-24	20-Feb-25
Financing & Estimating	**02-Sep-22 A**	**08-Jul-24**
Satisfy USDA Loan Conditions	02-Sep-22 A	25-Jun-24
Close USDA Loan		08-Jul-24
Submittal of Final WIFIA Application		28-Mar-23

Sites Reservoir Project

Activity Name	Start	Finish
WIFIA Loan Negotiation	30-Mar-23	25-Mar-24
Class 4 Cost Estimate Variance Reporting	24-Jan-23	03-Apr-24
Class 3 Cost Estimate Preparation (Capital Cost)	04-Apr-24	05-Jul-24
Consultation, Coordination & Oversight	**01-Sep-20 A**	**30-Dec-24**
NAHC/Local Tribes AB 52 Consultation	01-Sep-20 A	07-Jul-21
Coordination & Oversight: DWR, WAPA, CAISO, UPRR, Caltrans	03-Jan-22 A	30-Dec-24

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

Brown AND Caldwell 75

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Tuesday, December 13, 2022 5:49 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Excellent! I need your help removing the clutter and the water rights sequence needs to jump off the page as the focal point. We can discuss tomorrow.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Tuesday, December 13, 2022 at 2:18 PM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>

Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Have come up with some options to review if time allows before we meet tomorrow.
Getting this to one page requires a "portrait view" on 11x17.
Versions are in this SharePoint folder:

Governor's Office

Schedules Library > Schedules - Amendment 3 > **Governor's Office**

Name

Sites_Governor's View-5_2022.12.13.pdf

Sites_Governor's View-5L_2022.12.13.pdf

Sites_Governor's View-6_2022.12.13.pdf

Sites_Governor's View-6P_2022.12.13.pdf

Sites_Governor's View-7P_2022.12.13.pdf

Sites_Governor's View-7PW_2022.12.13.pdf

Sites_Governor's View-7_2022.12.13.pdf

Sites_Governor's View-7W_2022.12.13.pdf

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Monday, December 12, 2022 6:31 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

I've received a request from the State to provide a special schedule report for the Sites Project that will allow them to monitor and engage in activities that would benefit from State administration intervention. I went through our Nov22 update and have highlighted the activity IDs that I believe would best meet the request (see attached). I would like you to prepare this report so that we can provide it to them with our monthly updates. Start with my highlights and expand/contract as needed to get the coverage that makes sense for sr mgr review as part of their strike team and something they can use for reports to the Governor. Report can be no more than 1 page and should be easy to read with not a lot of detail but should allow them to quickly identify the agency's and milestones of greatest concern for expediting the project. I have told them that water rights will likely be most significant for the foreseeable future. This is acknowledged but they still need other activities.

I'd like to meet with you both on Wed to review what you've put together (Marcia – pls get 30 min on the calendar for the 3 of us for Wed). I need to provide a 1st cut to my state contact before 10a Thurs. He needs a final to the Secretary by noon Friday.

Find below the items that were identified in the request to give a flavor of the kind of information they are looking for.

Thanks
Jerry

- The JPA in January 2022 submitted to the California Department of Fish and Wildlife an application for an incidental take permit (ITP) under the California Endangered Species Act for the *construction* of the project. This permit is slated to be completed by XXXX. The JPA has yet to submit an application for an ITP for the *operation* of the project – a process that could take at least six months after the final EIR is issued. This permit is slated to be completed by XXXX.
- To establish the public benefits for the project, which enables Prop 1 funding:
  - The JPA must secure a public benefits contract with CDFW and DWR for environmental flows, recreation, and incidental flood public benefits. This contract is slated to be completed by XXX.
  - The JPA must obtain agreements with the U.S. Bureau of Reclamation to deliver water to wildlife refuges north and south of the Sacramento-San Joaquin Delta. This agreement is slated to be completed by XXX.

- Arrangements must be made to cover costs that remain after Prop. 1 funding is taken into account. The JPA estimates this will be finished by June 2023.

- The JPA and Reclamation continue to prepare the draft Biological Assessment, a plan to protect species covered by the federal Endangered Species Act. This Biological Assessment is slated to be completed by XXX.

- The project needs a permit from the California State Historic Preservation Office. This permit application is anticipated by JPA to be submitted by XXXX, and then considered by XXX date

- The project needs a Section 404 permit from the U.S. Army Corps of Engineers. The JPA anticipates submitting the application by XXX, with consideration completed by XXX.

- The JPA gave the State Water Resources Control Board a draft Clean Water Act Section 401 permit in summer 2022 and revisions to the application are underway. Consideration of this permit is slated to be completed by XXXX.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Monday, December 12, 2022 at 7:28 AM
To: "mmaltby@brwncald.com" <mmaltby@brwncald.com>, Cheyanne Harris <CHarris@BrwnCald.com>, Benjamin Orsak <BOrsak@BrwnCald.com>, "bezzone@mbkengineers.com" <bezzone@mbkengineers.com>, Justin Davies <JDavies@BrwnCald.com>, JP Robinette <jrobinette@sitesproject.org>, Alicia Forsythe <aforsythe@sitesproject.org>, conner <conner@cmdwest.com>, "Risse, Danielle" <danielle.risse@hdrinc.com>, "Edwards, Dawn" <Dawn.Edwards@hdrinc.com>, "Luu, Henry" <henry.luu@hdrinc.com>, "Westcot, Cathy" <cathy.westcot@hdrinc.com>, "jelica.arsenijevic" <jelica.arsenijevic@hdrinc.com>, Joe Trapasso <jtrapasso@sitesproject.org>, Marcia Kivett <MKivett@sitesproject.org>, "laurie.warner.herson" <laurie.warner.herson@phenixenv.com>, Kevin Spesert <kspesert@sitesproject.org>, "Spranza, John" <john.spranza@hdrinc.com>, Jerry Brown <jbrown@sitesproject.org>
Subject: Sites Reservoir Project Schedule Updates December 2022

Howdy Sites Team – below link to the December folder with updated Schedules having Data Date of December 4, 2022. Should you have any questions or need to make changes, please reach out to me.

2022.12_December '22

Contents:

Schedules Library > Schedules - Amendment 3 > **2022.12_December '22**

Name

- Sites Work Plan Progress Reporting_2022.12.08.pdf
- Sites Work Plan Progress Reporting_Compare to Prior_2022.12.08.pdf
- Sites Full Schedule Comparison to Last Month_2022.12.12.pdf
- Sites Full Schedule_2022.12.12.pdf
- Sites Key Deliverables_2022.12.12.pdf
- Sites Milestones_2022.12.12.pdf
- Sites Reclamation Schedule_2022.12.12.pdf
- Sites Full Schedule with Predecessors & Successors_2022.12.12.pdf

Dave Hubbard
Project Controls

Brown and Caldwell
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dhubbard@brwncald.com

Style Definition: Heading 2

Stone Corral Creek and Funks Creek Aquatic Study Plan

Commented [AF1]: Good job on this. One global comment -- Colusa County is not yet comfortable that we WILL have to release flows into the creeks. In a number of places in the plan, we assume this to be a given and/or maybe insert personal thoughts on those flows or what the future looks like for these creeks. I've tried to take most of this out. Please scrub again and take all of this out. This should simply be a study plan to collect data that will be used in XYZ way. We want to be very careful to not put in our views of what may happen on these creeks in the future, but simply lay out the facts and details of the study plan.

Commented [JH2R1]: Noted.

~~September 20~~~~November 15~~December 14~~October 31~~, 2022

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Contents

Tables

Figures

Acronyms and Abbreviations

°F	degrees Fahrenheit
ADCP	acoustic Doppler current profiler
AFDM	ash-free dry mass
Aquatic Study Plan	Stone Corral Creek and Funks Creeks Aquatic Study Plan
ASCI	Algae Stream Condition Index
Authority	Sites Project Authority
cfs	cubic feet per second
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
Chico ABL	Chico Aquatic Bioassessment Laboratory
CPUE	catch per unit effort
CSCI	California Stream Condition Index
CVRWQCB	Central Valley Regional Water Quality Control Board
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
GCID	Glenn-Colusa Irrigation District
GIS	geographic information system
GPS	global positioning system
LiDAR	light detection and ranging
MPSL-MLML	Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories
PHAB	physical habitat
Project	Sites Reservoir Project
QA/QC	quality assurance/quality control
SQL	Structured Query Language
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TC Canal	Tehama-Colusa Canal
TCCA	Tehama-Colusa Canal Authority
USGS	U.S. Geological Survey

1.0 Introduction and Purpose

1.1 Introduction

This Stone Corral Creek and Funks Creek~~s~~ Aquatic Study Plan (Aquatic Study Plan) has been prepared for the Sites Project Authority (Authority) to guide fisheries technical studies to be conducted prior to and during operation of the Sites Reservoir Project (Project), as well as ongoing monitoring during Project operations, if necessary. The Project is a proposed offstream storage project located on the west side of the Sacramento Valley in Glenn and Colusa Counties, approximately 10 miles west of the community of Maxwell ~~in Glenn and Colusa Counties~~. It is designed to store unappropriated water from winter and spring storm events in the northern Sacramento River watershed. The Project would impound ~~a maximum of~~ 1.5 million acre-feet of water in a reservoir. The reservoir would be created by building Sites Dam on Stone Corral Creek, Golden Gate Dam on Funks Creek, and a series of saddle dams on the northeastern rims of Antelope Valley. While a portion of naturally occurring seasonal flows in Stone Corral Creek and Funks Creek~~s~~ would be retained in the reservoir, the primary source of water for the reservoir would be diversions from the Sacramento River. These diversions would be up to 4,200 cubic feet per second (cfs) via two existing facilities: the Red Bluff fish screen and pumping plant (operated by the Tehama-Colusa Canal Authority [TCCA]) and the Glenn-Colusa Irrigation District's (GCID) fish screen and pumping plant near Hamilton City.

1.2 Purpose of Aquatic~~s~~ Study Plan

As part of the Project alternatives development, the Authority has committed in the Project's Revised Draft ~~Final~~ Environmental Impact Report/Supplemental Draft ~~(RDEIR/SDEIS) and~~ Environmental Impact Statement (RDEIR/SDEIS)~~(EIS)~~, as well as in the Project's application to appropriate water, to prepare this ~~technical study plan~~Aquatic Study Plan and conduct technical studies on Stone Corral Creek and Funks Creek in the reaches of interest (i.e., the stream reaches below the dams) as well as the downstream reaches[3]. ~~The Authority is proposing the following special water right term to be included in its water right permit:~~

~~[2] See Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS.~~

[2] See Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS.

~~[3] The Authority is proposing the following special water right term to be included in its water right permit:~~

~~Within one year of issuance of this permit and prior to impoundments to storage of flows from Funks Creek and Stone Corral Creek under this permit, Permittee shall develop a Technical Studies Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's Revised Draft Environmental Impact Report to guide studies in Funks Creek and Stone Corral Creeks that shall be implemented prior to and during construction activities to collect information necessary to address California Fish and Game Code Section 5937. The Technical Studies Plan shall include, but may not be limited to, assessment of fish assemblage and available habitat, flow characteristics, water temperatures, bioassessment monitoring, losses, and method for reporting data. The Technical Studies Plan shall be developed in consultation with CDFW, and USFWS, and Colusa County, and Colusa County. Permittee shall implement the Technical Studies Plan.~~

~~Using the results of the Technical Studies, within five years of issuance of this permit and prior to impoundments to storage of flows from Funks Creek and Stone Corral Creek under this permit, Permittee shall develop a Funks~~

Commented [AF3]: Global - sometimes we use Stone Corral Creek and Funks Creek and sometimes we use Stone Corral and Funks Creek. I don't have a preference, but lets just make it consistent.

Commented [JH4R3]: We will go with the former.

Commented [AF5]: Lets cite the draft for now as the final has not yet been released.

Also, now that we have drafted this plan, please double check the EIR/EIS text in Ch 2 and the appendix to make sure we are doing what we said we would do. If we need to change the EIR/EIS text and commitments, now is the time to do that. I am going to ask Melissa to remove mention of NMFS in the appendix as a reviewer as they don't have any jurisdictional species in this play so I don't see the need for them to review.

Commented [JH6R5]: @Hendrick, Mike, could you check on this?

Commented [HM7R5]: Is there a separate Funks and Stone Corral Creek Operations plan being proposed? I am only familiar with the Reservoir Operations Plan

Commented [JH8R5]: No, just the Reservoir Ops plan

Commented [AF9]: I know this footnote is a lot. We can move it out of a footnote and into the text if that is better. But I want is very clearly in this document that this document meets the study plan commitments we made in the RDEIR/SDEIS and in the water right permit term. I don't want there to be any question on this.

Commented [JH10R9]: @Hughes, Jessica, how best to accommodate this request?

Commented [JH11]: Update footnotes

Commented [JH12R11]: @editor

Within 1~~one~~ year of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek ~~and Stone Corral Creek~~ under this permit, Permittee shall finalize this draft Aquatic Studies Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's RDEIR/SDEIS~~Revised Draft Environmental Impact Report~~ to guide studies in ~~Funks Creek and~~ Stone Corral Creek~~s~~ and Funks Creek that shall be implemented prior to and during construction activities to collect information necessary to address California Fish and Game Code Section (CFGC) 5937. This Aquatic Studies Plan includes an assessment of fish assemblage and available habitat, flow characteristics, water temperatures, bioassessment monitoring, and method for reporting data. This Aquatic Studies Plan shall be finalized in consultation with the California Department of Fish and Wildlife (CDFW), ~~and~~ the U.S. Fish and Wildlife Service (USFWS), and Colusa County. Permittee shall implement the Technical Studies Plan.

Using the results of the ~~T~~technical ~~S~~studies, within 5~~five~~ years of issuance of this permit and prior to impoundments to storage of flows from ~~Funks Creek and~~ Stone Corral Creek and Funks Creek under this permit, the Permittee shall develop a ~~Funks Creek and~~ Stone Corral Creek and Funks Creek Operations Plan (Operations Plan) in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of ~~T~~the RDEIR/SDEIS. The Authority is proposing the following special water right term to be included in its water right permit.~~:~~

~~the Project's Revised Draft Environmental Impact Report.~~ The Operations Plan shall describe Permittee's approach to address CFGC~~California Fish and Game Code~~ Section 5937 requirements, if any, resulting from impoundments to storage of flows from those creeks under this permit, while also ensuring that the Project's flood protection benefits are realized. The Operations Plan shall include, but may not be limited to, the approach for reservoir releases into ~~Funks Creek and~~ Stone Corral Creek and Funks Creek, including release schedules and volumes and a monitoring plan. The ~~Funks Creek and Stone Corral Creek~~ Operations Plan shall be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

Together, these studies would document the two creeks' existing hydrology, assess flow levels needed to maintain fluvial geomorphic processes, and update information on aquatic species presence and habitat use in the reaches downstream of the dams ~~to the streams confluence with each other~~ to establish aquatic baseline information that would be used to determine and subsequently manage environmental releases from the Project into the creeks. As part of the~~is~~ ~~Technical~~Aquatic Stud~~iesy~~ Plan ~~for Funks and Stone Corral Creeks~~~~Aquatic Study Plan, these~~ studies would be initiated once access permission to the creeks through private property is obtained. The studies would also be used to inform final design for the proposed Sites Dam and Golden Gate Dam release facilities and operational requirements. The ~~Technical~~Aquatic Stud~~y~~ies Plan ~~for Funks and Stone Corral Creeks~~ ~~Aquatic Study Plan~~ includes fish ~~and habitat~~ monitoring, a Surface Water Ambient Monitoring Program (SWAMP) bioassessment study, a hydrogeomorphic study, and a temperature study. Specific details for the field studies would be designed and conducted in collaboration with ~~the California Department of Fish and~~

~~Creek and Stone Corral Creek Operations Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's Revised Draft Environmental Impact Report. The Operations Plan shall describe Permittee's approach to address California Fish and Game Code Section 5937 requirements, if any, resulting from impoundments to storage of flows from those creeks under this permit, while also ensuring that the Project's flood protection benefits are realized. The Operations Plan shall include, but may not be limited to, the approach for reservoir releases into Funks Creek and Stone Corral Creek, including release schedules and volumes and a monitoring plan. The Funks Creek and Stone Corral Creek Operations Plan shall be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.~~

~~Wildlife~~ ~~(~~CDFW~~)~~, ~~U.S. Fish and Wildlife Service (~~USFWS~~)~~ and Colusa County. ~~State Water Resources Control Board (SWRCB).~~

The objectives of these studies are as follows.

- Determine existing fish assemblages in these creeks, including locations of fish species presence and habitat use.
- Characterize currently available habitats ~~available~~ (e.g., spawning, rearing, foraging, and sheltering habitats) at varying flow levels, including the presence or absence of pools that persist through summer~~, which may require some supplemental flow~~.
- Characterize flows, including assessing the baseflow during summer and conducting a fluvial geomorphologic study to characterize habitat conditions, substrate compositions, and flow levels ~~necessary for protection of aquatic habitat and sediment mobilization~~.
- Conduct a SWAMP technical study (i.e., a stream bioassessment) that focuses on relationships between physical habitat (PHAB), water quality, and benthic macroinvertebrates.
- Implement hydrological studies to define flow temperature relationships.

~~The Authority would use information from the results of implementation of this Aquatic Study Plan, including field studies described below, to prepare an Reservoir Operations Plan for Stone Corral Creek and Funks Creek. The Reservoir Operations Plan would identify the approach for flow releases, including release schedule and volumes, and an adaptive management plan to maintain fish in good condition consistent with California Fish and Game Code (CFGC) Section 5937 in the creek reaches of interest.. These reaches are below the locations of Sites and Golden Gate Dams and upstream of the confluence of Stone Corral Creek and Funks Creek. The information would be integrated to focus on aquatic species of concern in the lower portions of the two creeks with an emphasis on maintaining existing community structure and habitat conditions. It is expected that flow releases from Sites Reservoir into these creeks would mimic the seasonal pattern of their natural discharge, but that releases would be lower during Sacramento River Index Dry and Critically Dry Water Years and higher during Above Normal Water Years.~~

This Aquatic~~s~~ Study Plan summarizes the methods and reporting strategies for the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. Using information obtained from these field studies, along with currently available information, the Authority would develop a schedule of releases for Stone Corral Creek and Funks Creek to be incorporated into the ~~Reservoir~~ Operations Plan. Flow releases into these creeks would be made to maintain flood control benefits of the Project and would not overtop streambanks or flood downstream areas. The release schedule would also account for meeting demands of senior water right holders on ~~Funks and~~ Stone Corral ~~c~~Creek~~s~~ and Funks Creek consistent with the timing of the existing water right that are downstream from the proposed dams. Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies* of the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) describes the purpose, objectives, content, and timing of the field studies identified above.

Furthermore, if flows in Stone Corral Creek and Funks Creek are needed to maintain fish in good condition in compliance with CFGC Section 5937, then the Authority ~~has~~ would ~~proposed to~~ adapt this study program into an operations monitoring program with a duration of 5 to 10 years to document and adaptively manage the timing and magnitude of flow releases to maintain fish in good condition below the dams ~~and~~ along with the habitats upon which they depend. Performance standards would be developed in conjunction with the Authority and the relevant ~~permitting~~ agencies (CDFW, USFWS, and

Commented [AF13]: I have changed this to mimic the water right term language in that the study plan is coordinated with these three agencies.

Once we share the draft plan with these agencies, we should incorporate a section into the final study plan that describes our outreach to the agencies and then include their comments and responses to those comments in an appendix.

Commented [JH14R13]: Noted.

Commented [AF15]: Please make the second line of the bullets indented by 0.25 throughout

Commented [JH16R15]: [illegible] please adjust accordingly.

Commented [AF17]: I have deleted a lot of these statements throughout. Colusa County will be very sensitive to use assuming/conceding that flows are necessary. So please be careful in these statements and lets just lay out the study plan and see where it takes us.

Commented [PJ18]: This was text that was identified in the EIR and in the response to comments in the EIR. I am not sure if it should be deleted here...

Commented [SJ19R18]: In this case, yes. See Ali's first comment for rational.

Commented [AF20]: This paragraph seems to repeat the information from the paragraph above in a slightly different way. Please review the two and delete this one if it is in fact repetitive.

Colusa County~~SWRCB and the Central Valley Regional Water Quality Control Board [CVRWQCB]~~) prior to the start of operations monitoring.

1.2.1 Integration of Fish Monitoring with Aquatic Habitat Survey Methods

Aquatic habitat survey methods for sampling are described below. Note that the field observations and results from other studies (i.e., the stream bioassessment study and hydrogeomorphic study) would aid in the assessment of aquatic habitat and are referenced where applicable.

An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat and final locations would be discussed with CDFW and Colusa County to ensure appropriate placement . Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.

As part of the pre-operation sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study.:

- **Fish community.** – Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)
- **Substrate composition.** – Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)
- **Riparian vegetation cover.** – Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)
- **Benthic macroinvertebrate presence.** – To better understand the entire aquatic community currently present in these creeks, Aa SWAMP bioassessment that focuses on the relationships between PHAB~~physical habitat~~, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on ~~Funks Creek and~~ Stone Corral Creek and Funks Creek. The bioassessment study would be conducted using the methods described in the SWRCB's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study)
- **Water quality.** – Monitoring for general water quality parameters (e.g., temperature, turbidity, pH, conductivity, salinity, and dissolved oxygen~~, contaminants~~ would be conducted to assess surface water quality. Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)
- **Water temperature.** – Water temperature profiles for Stone Corral Creek and Funks Creek and ~~Funks Creek~~ would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into

Commented [AF21]: This section feels like intro text and not fish monitoring text. Should this be moved to the end of Chapter 1? Also, can we order these in the same order (generally) as the subsequent chapters?

Commented [HJ22R21]: Moved

Commented [JM23]: Check that addition is valid.

Commented [HJ24R23]: @Moderan, Julien, we are only measuring for general water quality parameters, as stated, so no.

Commented [MJ25R23]: Noted. Only general WQ variables at fish sampling stations. Additional WQ constituents from 4.7 only collected at 2 stations twice a year so not directly possible to integrate with fish study. Might still be relevant as potential explanatory variables for any changes in Fish response before vs after construction and operation.

Commented [WM26]: Can't make this bulleted, but I think it needs to be.

Commented [PJ27R26]: Bulleted now☺

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Funks Creek and intake levels for the release to Stone Corral Creek.~~into downstream water bodies.~~ The goal would be to mimic existing temperature profiles ~~to benefit native fish~~ in Funks Creek~~, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study)~~.

- ~~**Water temperature** – Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles to benefit native fish in Funks Creek, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study).~~

Commented [WM28]: Can't make this bulleted, but I think it needs to be.

1.3 Applicable Methods for Determining Operational Streamflows

Commented [AF29]: This section here makes it sound like the operations plans would be based solely on the data collected in Chapter 5. I think the operations plan would be based on all of these studies. So we should consider moving this to Chapter 1 so that its not in a specific study chapter.

Commented [PJ30R29]: This used to be in Chapter 5 and has been moved up here per the comment request.

After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP bBioassessment sStudy), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program,[4] the California Environmental Flows Framework,[5] and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on ~~Funks and~~ Stone Corral Creeks and Funks Creek to maintain fish in good condition. Coordination with ~~the~~ CDFW, USFWS, and Colusa County ~~permitting agencies~~ would be required before a ~~chosen~~ method is selected.

[4] https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow

[5] https://ceff.ucdavis.edu/

2.0 Environmental Setting

2.1 Environmental Setting of Stone Corral Creek and Funks Creek~~s~~

Stone Corral Creek and Funks Creek are both small watersheds originating below the snowline on the eastern foothills of the California Coast Range at elevations of 700 to 850 feet. Consequently, they do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flow intermittently, mostly during winter and early spring. From their origins, they flow through low foothills, across Antelope Valley (the proposed ~~site~~ location of Sites Reservoir), through a series of shallow canyons and eventually spill onto the Sacramento Valley floor (Figure 1). For much of their course on the valley floor, they are confined to narrow channels between berms along the edge of agricultural fields and road prisms. While the stream channels of these creeks are not actively managed, their straight alignment and angular turns around agricultural fields and along roads indicate that they were modified from their natural historic channels. In the upper parts of the watersheds just above the dam locations, these streams are largely devoid of riparian cover resulting from livestock use (Bureau of Reclamation and California Department of Water Resources 2008:3-20). In the lower reaches where the streams run through and around agricultural fields, shaded riparian habitat is sparse and consists mostly of low shrubs, grasses, ~~and~~ occasional oaks[6] (*Quercus* sp.), willows (*Salix* sp.), and cottonwood (*Populus* sp.) trees.

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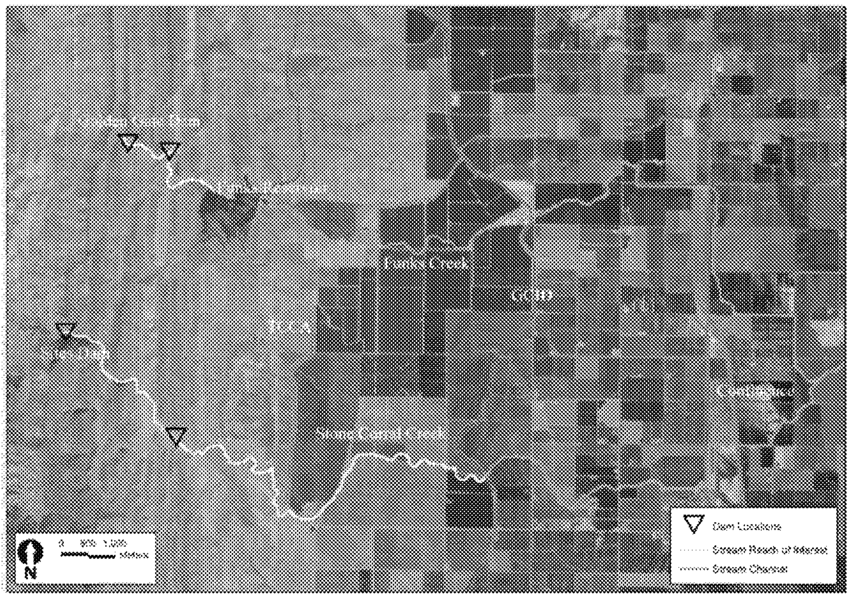
[6] According to Colusa County, there are no oaks east of Mills Orchard Rd. east of Stone Corral Creek nor approximately east of Funks Reservoir.



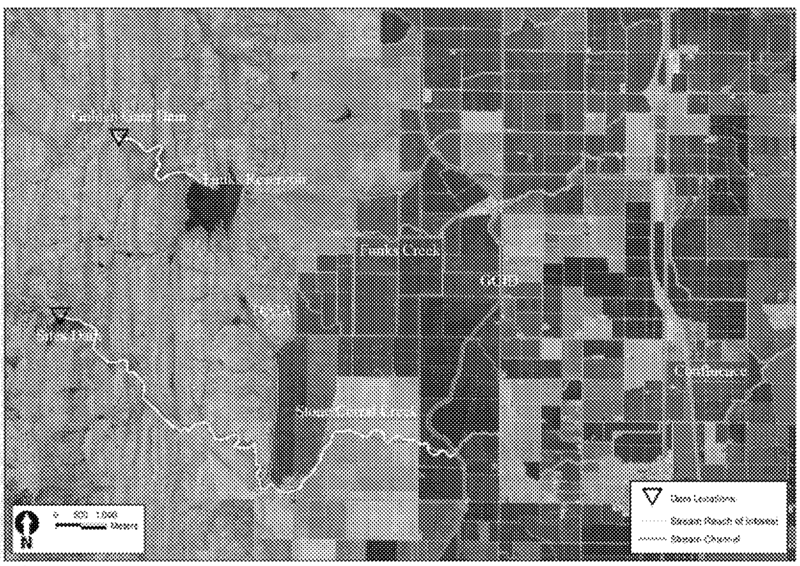


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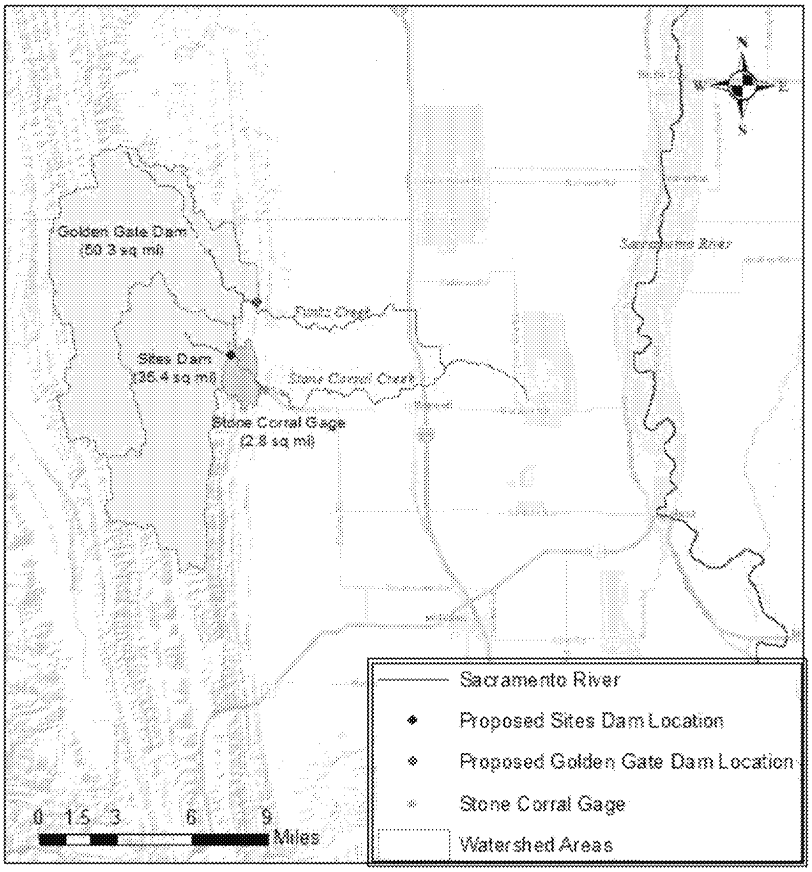
Figure 1. Stone Corral Creek and Funks Creek Reaches of Interest and Downstream Reaches.

2.1.1 Stone Corral Creek

Stone Corral Creek has a drainage area of 38 square miles ~~at~~ upstream of the proposed Sites Dam. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal (TC Canal) and begins to travel through agricultural lands. About 3 miles below the TC Canal siphon, Stone Corral Creek crosses the GCID Main Canal. Although most of the water in the canal passes under Stone Corral Creek in a siphon, GCID releases water from the canal into Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below the GCID Main Canal, Funks Creek flows into Stone Corral Creek, and then Stone Corral Creek flows an additional 5 miles to the Colusa Basin Drain. Refer to Figure 2 for a figure showing these various elements.

Commented [AF31]: A detailed map showing all of these points along with a separate one for Funks Creek would be helpful. We should try to label all of these points on the map so the reader can understand the area.

Commented [PJ32R31]: Inserted new figure accordingly.

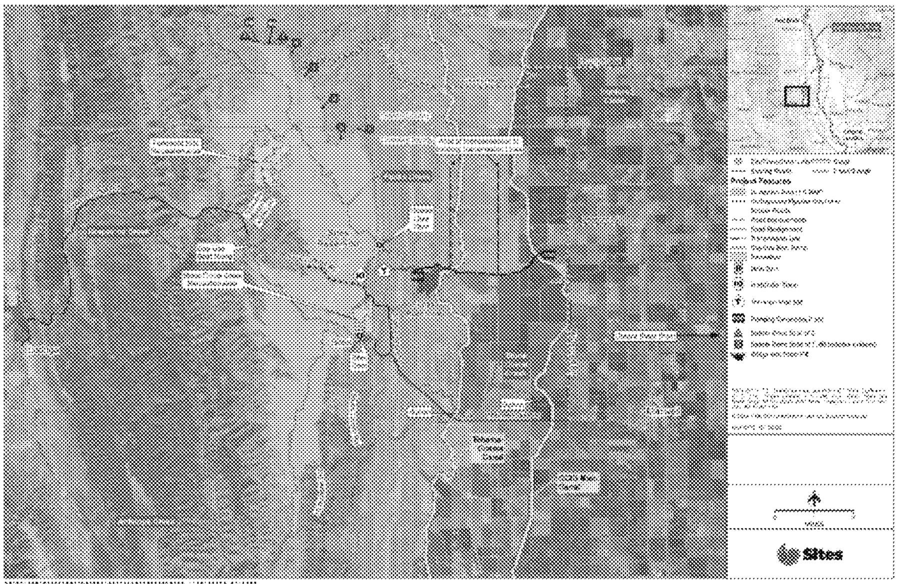


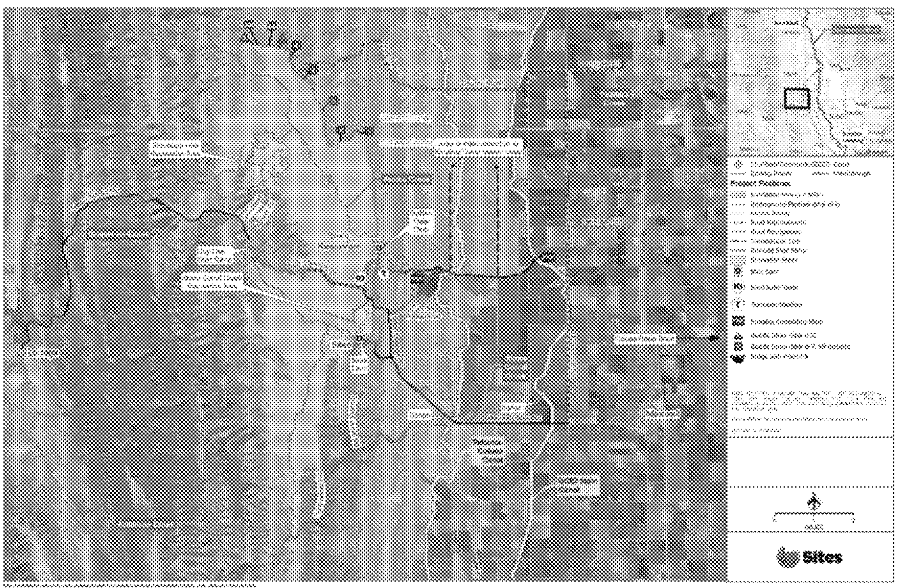
~~Figure 2. Stone Corral Creek and Funks Creek Watersheds Upstream of Proposed Sites Dam and Golden Gate Dam Locations and Stone Corral Creek Gage Location~~

The U.S. Geological Survey (USGS) collected 27 years of discharge measurements at USGS Gage No. 11390672, in Stone Corral Creek near the community of Sites, California, from 1958 through 1985 (Figure ~~2~~3). The data demonstrate a high variability of flow over the period of record, and there were 3 years of zero flow: 1972, 1976, and 1977 (Figure ~~3~~4). Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. The maximum annual discharge during the period of record was 39.9 thousand acre-feet (TAF) in 1983. Based on the USGS period of record, mean annual daily discharge for the period of record was calculated as 9.02 cfs (SD of 67.5, median is 0) and annual average discharge ~~through the creek~~ was 6.5 TAF per year.

Commented [AF33]: This map isnt referenced until later and thus, should be moved back in the text. Also, it's a little confusing to note the Stone Corral Gage as only a 2.8 sq mi watershed. Maybe hatch or similar color the Sites Dam and Stone Corral drainage to make it clear that the Stone Corral Gage watershed includes the entire Sites Dam watershed. And adjust the area (2.8 sq mi) to include the whole watershed and not just the part downstream of the gage.

Commented [PJ34R33]: I moved the Figure below, but I believe MBK provided us with this figure so they would have to make the suggested changes.





Commented [JM35]: The labels and legend font sizes are really small. Consider giving that figure 2 a whole page in landscape orientation for readability.

Figure 2. Project Area Overview

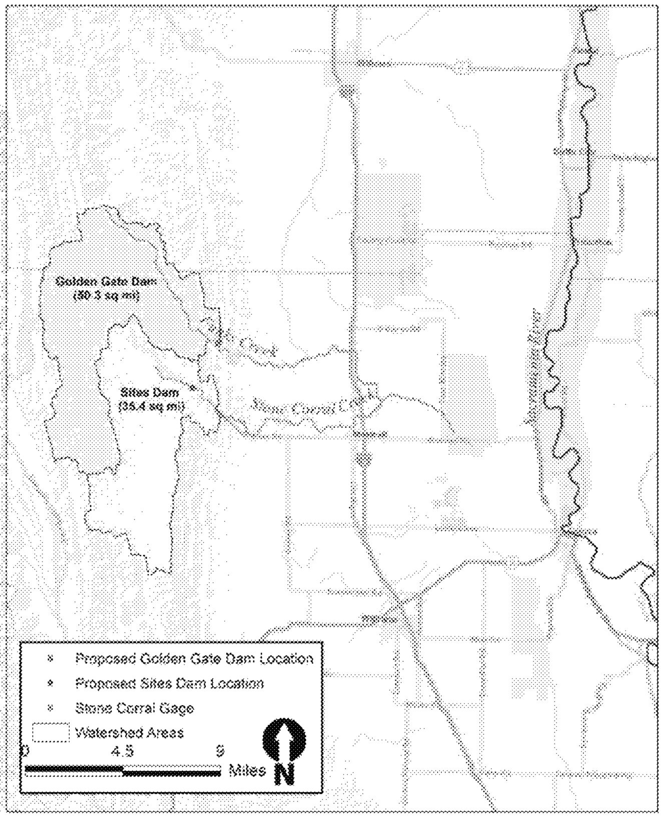
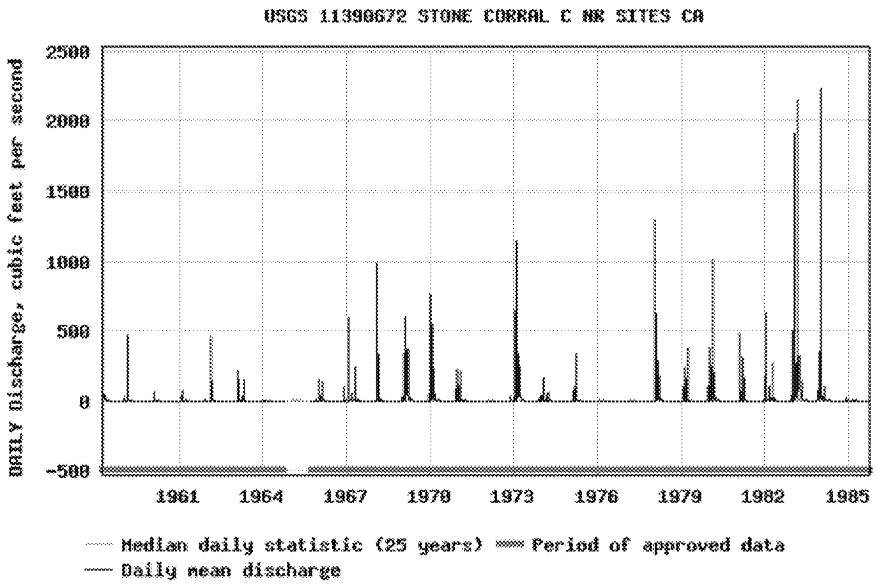


Figure 23. Stone Corral Creek and Funks Creek ~~and Funks Creek~~ Watersheds Upstream of Proposed Sites Dam and Golden Gate Dam Locations. The ~~and~~ Stone Corral Creek Gage Location captures the entire Sites Dam watershed (35.4 sq mi) upstream.

Commented [AF36]: This map isnt referenced until later and thus, should be moved back in the text. Also, it's a little confusing to note the Stone Corral Gage as only a 2.8 sq mi watershed. Maybe hatch or similar color the Sites Dam and Stone Corral drainage to make it clear that the Stone Corral Gage watershed includes the entire Sites Dam watershed. And adjust the area (2.8 sq mi) to include the whole watershed and not just the part downstream of the gage.

Commented [PJ37R36]: I moved the Figure below, but I believe MBK provided us with this figure so they would have to make the suggested changes.

Commented [HJ38R36]: MBK did not change their figure, so I changed the caption to try to clarify Ali's point.



Source: U.S. Geological Survey stream gage 11390672

Figure 4. Mean Daily Flow in Stone Corral Creek near Sites (cfs)

Because the historical gage record for Stone Corral Creek is limited and Funks Creek is not gaged, historical stream gage data from Elder Creek was used to produce a longer-term estimate of streamflow on Stone Corral Creek and Funks Creek. The Elder Creek gage was chosen because it was the nearest gage on the valley floor with a long record of data available. It was assumed that Elder Creek has relatively similar precipitation and runoff patterns to Stone Corral Creek and Funks Creek. The streamflow of Elder Creek, located in Tehama County, has been measured since 1948 (USGS Gage No. 11379500). The gage site is approximately 49 miles northwest of the proposed Sites Reservoir, and has a drainage area upstream of the gage of 92.4 square miles (Attachment 1- MBK Engineers 2022). The overlapping period of gage records for Stone Corral Creek and Elder Creek (1958–1985) was used to determine a logarithmic correlation between the two gages for each month of the year. The developed streamflow timeseries was then further adjusted to account for the difference in watershed areas upstream of the old USGS Stone Corral Creek gage and the proposed location of Sites Dam. Tables 1a and 1b provide the results of this analysis, which shows the average monthly flow volume in acre feet per year and cubic feet per second for each water year type (MBK Engineers 2022). The average monthly volumes are calculated using the gage record for October 1958 through August 1985 with logarithmic monthly correlations for September 1985 through September 2021. Results are summarized by Sacramento Valley Water Year Type: wet, above normal, below normal, dry, and critical.

Table 1Aa. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	42	11	2	5	0	17
Dec	872	242	29	47	54	336
Jan	3,365	2,825	711	345	171	1,663
Feb	4,487	4,667	1,283	135	307	2,317
Mar	2,135	1,522	407	264	179	1,039
Apr	901	319	114	25	35	375
May	136	119	15	7	9	65
Jun	20	8	2	1	1	8
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	11,959	9,713	2,562	828	757	5,827

Commented [AF39]: This is all interesting, but AF arent really relevant to fish species. Can we also include tables on cfs? Average per month or min/average/max per month? Same with Funks below.

Commented [HJ40R39]: @Spranza, John - Please change.

Table 1b. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	21	6	1	3	0	9
Dec	436	121	15	24	27	168
Jan	1,683	1,413	356	173	86	832
Feb	2,244	2,334	642	68	154	1,159
Mar	1,068	761	204	132	90	520
Apr	451	160	57	13	18	188
May	68	60	8	4	5	33
Jun	10	4	1	1	1	4
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	5,980	4,857	1,282	415	378	2,910

Commented [AF41]: This is all interesting, but AF arent really relevant to fish species. Can we also include tables on cfs? Average per month or min/average/max per month? Same with Funks below.

Commented [HJ42R41]: @Spranza, John - Please change.

Commented [SJ43R41]: Done

2.1.2 Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 50.3 square miles upstream of the proposed Golden Gate Dam. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir is a re-regulating reservoir on the TC Canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA to manage water levels within the TC Canal. ~~However, t~~The Funks Dam gates are opened during large storm events to pass flood waters through Funks Reservoir and down Funks Creek to avoid compromising the TC Canal and its operations. With the exception of passing flood waters, the Funks Dam gates are operated in the closed position~~There are no requirements to maintain flows in Funks Creek below Funks Reservoir~~, but seepage through the dam gates maintains perennial flow for a short distance below the dam in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID Main Canal. While the GCID Main Canal passes under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek. Similar to Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.

There is no flow record for Funks Creek, but given the comparable size, geology, and topography of the two watersheds and their proximity to each other, Funks Creek seasonal flow patterns and flow magnitudes are likely similar to Stone Corral Creek.

The same correlation approach used to estimate streamflow in Stone Corral ~~c~~Creek cannot be followed to estimate streamflow in Funks Creek because there are no streamflow data available for Funks Creek. Therefore, flow in Funks Creek was estimated by prorating monthly Stone Corral Creek streamflow data by the ratio of Stone Corral Creek's and Funks ~~and Stone Corral~~ Creek's watershed areas upstream of the proposed dam locations (MBK Engineers 2022). Tables 2a and 2b provide~~s~~ the results of this analysis and identify~~ies~~ the average monthly flow volume in acre feet per year and cubic feet per second ~~for each~~ for ~~by~~each water year type.

Commented [SJ44]: Note: there is an updated August version of the TM that I will send. I have updated the reference section

Table 2a. Funks Creek Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years ~~3-Year Average~~
Oct	0	0	0	0	0	0
Nov	60	16	3	7	1	24
Dec	1,239	343	41	66	77	485
Jan	4,778	4,011	1,010	489	243	2,362
Feb	6,372	6,628	1,822	192	436	3,290
Mar	3,031	2,161	578	375	255	1,475
Apr	1,280	453	162	36	49	553
May	193	169	21	9	13	93
Jun	28	11	2	1	2	12
Jul	2	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	16,984	13,793	3,638	1,176	1,075	8,275

Commented [AF45]: Why 3 year average here where other table had just average?

Commented [PJ46R45]: Can't recall who provided this table...MBK??

Commented [SJ47R45]: It's an incorrect column title

Table 2b. Funks Creek Average Monthly Flow Volume (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	30	8	2	4	1	12
Dec	620	172	21	33	39	243
Jan	2,389	2,006	505	245	122	1,181
Feb	3,186	3,314	911	96	218	1,645
Mar	1,516	1,081	289	188	128	738
Apr	640	227	81	18	25	277
May	97	85	11	5	7	47
Jun	14	6	1	1	1	6
Jul	1	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	8,492	6,896	1,820	588	538	4,148

Commented [AF48]: Why 3 year average here where other table had just average?

Commented [PJ49R48]: Can't recall who provided this table...MBK??

Commented [SJ50R48]: It's an incorrect column title

2.1.3 Physical Characteristics

The only drainages that exit Antelope Valley are Stone Corral Creek and Funks Creek. Each creek continues through the steeper, foothill environments and then transitions to the Sacramento Valley floor, where each is generally shallow and highly altered, primarily for water conveyance and agricultural purposes. Straight channels and angular turns associated with agricultural fields and roads indicate that natural channels have been at least partially modified. Along their reaches on the valley floor, these creeks are mostly confined to narrow channels between berms adjacent to agricultural fields and road prisms.

Stone Corral Creek and Funks Creek are largely devoid of riparian habitat in their upper reaches (foothill environments) due to heavy livestock use. In the lower reaches where the creeks run through and around agricultural fields, riparian habitat is variable and consists mostly of low shrubs, grasses, ~~and~~ occasional oak, willows and cottonwood trees; however, some segments of Stone Corral Creek possess dense stands of mature riparian vegetation.

Although the reaches of interest have been modified by livestock grazing, channelization, irrigation conveyance systems and minor diversions, they are still expected to have available aquatic habitat (i.e., benthic macroinvertebrate [BMI]). They also both experience much of their natural hydrograph (albeit altered due to local conveyance) and fluvial geomorphic processes and provide water and sediment that ultimately flows into the Colusa Basin Drain during rain events. ~~Some of the larger flow events may be important for water (and sediment) contributions to the Colusa National Wildlife Refuge.~~

Commented [AF51]: This statement is going to raise concern with Colusa County. Do we know this for sure? If not, then delete and we can assess this as part of the study efforts.

Commented [PJ52R51]: This was included in part to response to comments. It is fine to delete it here I guess.

3.0 Fish Monitoring

3.1 Purpose of Fish Monitoring Program

The purpose of a fish monitoring program in ~~Funks Creek and~~ Stone Corral Creek and Funks Creek downstream of Sites Reservoir is to establish a pre-project baseline and post--operation assessment of the ~~diversity and abundance estimatesof~~ fish species present to determine the existing state of the fish population and whether it is ~~fish are~~ maintained in good condition consistent with CFGC Section~~California Fish and Game code~~ 5937 after project construction and operation. ~~Sites Dam and Golden Gate Dam will be impassable barriers, designed to store diversions from the Sacramento River and retain flows into Funks Creek and Stone Corral Creek. A fish monitoring program will assist the Sites Authority with information that will help determine whether flow releases designed to mimic the ephemeral nature of these creeks are sufficient to maintain fish in good condition.~~

3.2 Overview of Proposed Methods

~~3.1 Study Design~~

Assessment of the goal to maintain fish in good condition in these ephemeral creeks consistent with CFGC Section 5937 would be made using a Before-After-Control-Impact experimental study design, using the reach with perennial flow below Funks Reservoir as a control. Sampling would be conducted to assess fish community and habitat present in the study area for up to 5 years prior to operation of the Project. Following completion of the pre-operation survey, fish communities and aquatic habitats in the study area would be monitored in a similar fashion for a 5-to-10-year period after the Project is operational. Fish community and habitat data that showed statistically significant negative departures from baseline data would trigger reassessment of downstream flow management under a proposed adaptive management plan.

Commented [JM53]: Maybe delete "ephemeral" since it does not seem it adds anything here and is actually a proper hydrology term with a slightly different meaning than intermittent (as the creeks are qualified earlier, despite one of the goals of the study plan being to characterize their status between ephemeral, intermittent or perennial).

Commented [AF54]: Should we explain why we are using this as a control?

Commented [HJ55R54]: @Warburton, Manna, please check this to verify accuracy.

Commented [WM56R54]: Looks good. Alicia may also be requesting that we explain why we are using the downstream reach as the control. The perennial reach below Funks Reservoir is the only nearby waterway appropriate for use as a control.

~~3.1.1~~3.2.1 Pre-operation Baseline Monitoring

Pre-operation baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (Chapter 4, *SWAMP Bioassessment Study Designs and Methodology*), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-operation sampling.

The pre-operation surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-operation efforts would be summarized into yearly reports and a final pre-operation baseline report to the Authority at the end of the pre-operation survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-operation conditions.

~~3.1.2~~3.2.2 Operations Monitoring

Operations monitoring would occur periodically at ~~appropriate~~ the intervals specified herein~~, or as required by other plans and programs, or as established by the Authority~~. Operations sampling would document fish abundance, condition, and distribution and compare the results with data collected on habitat area, location, and ~~changes in~~ climate-driven changes in habitat characteristics over time. Data from the fish study would be used in documenting compliance with CFGC Section 5937 with data from the SWAMP assessments providing additional details on overall stream status.

Operations sampling methods would be identical to the pre-operation sampling, including returning to established stations and tracking fish abundance, diversity, and distribution through time. Threats and stressors identified in the pre-operation survey would be assessed during operations surveys to differentiate changes in habitat or fish communities not related to the operation of the Project. Data collected as part of the operations sampling effort would be compared against the baseline data, as well as previous years' data and summarized into interim and final reports~~ to the Authority~~.

~~3.1.3 Integration with Aquatic Habitat Survey Methods~~

~~3.1.4 Aquatic habitat survey methods for sampling are described below. Note that the field observations and results from other studies (i.e., the stream bioassessment study and hydrogeomorphic study) would aid in the assessment of aquatic habitat and are referenced where applicable.~~

~~3.1.5 An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat. Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.~~

~~3.1.6 As part of the pre-operation sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study:~~

~~3.1.7 Fish community – Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey~~

Commented [AF57]: This section feels like intro text and not fish monitoring text. Should this be moved to the end of Chapter 1? Also, can we order these in the same order (generally) as the subsequent chapters?

~~efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)~~

~~3.1.8 Substrate composition – Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)~~

~~3.1.9 Riparian vegetation cover – Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)~~

~~3.1.10 Benthic macroinvertebrate presence – A SWAMP bioassessment that focuses on the relationships between physical habitat, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Funks Creek and Stone Corral Creek. The bioassessment study would be conducted using the methods described in the SWRCB's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study)~~

~~3.1.11 Water quality – Monitoring for general water quality parameters (e.g., temperature, turbidity, pH, conductivity, salinity, dissolved oxygen) would be conducted to assess surface water quality. Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)~~

~~3.1.12 Water temperature: – Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles to benefit native fish in Funks Creek, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study).~~

~~3.1.13~~3.2.3 Fish Sampling Methods

Beach Seining

Seining is a low cost, low impact method for capturing aquatic organisms. The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species, and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.

Circumstances that may affect efficacy include the amount or type of benthic structure, presence/absence of aquatic vegetation, water clarity, flow rate, and water depth. Seining is most effective in smooth bottom habitats free of aquatic debris or vegetation, with elevated turbidity, and are shallow enough for biologists to wade in. When benthic structure is complex, water clarity is high, and habitats contain extremely deep, shallow, or rapidly moving water that may exclude biologists from deploying nets, efficacy is dramatically decreased.

Seines with a "bag" to minimize aquatic organism handling stress are preferred. Seines with a bag are also preferred where obstructions make access to the water (or deployment/retrieval of the seine) difficult (U.S. Fish and Wildlife Service 2012). Blocking nets typically improve efficacy by reducing opportunities for target species to move out of the area being seined. Where the area to be isolated for sampling includes culverts, deep pools, undercut banks, or other cover attractive to fish (e.g., thick overhanging vegetation, root wads, logjams) it may be appropriate to isolate a portion or portions of the study area in phases, rather than attempting to herd fish from the entirety of the work area in a single downstream pass.

~~The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.~~

Electrofishing with Block Nets

~~The effects of electrofishing are typically short-term and limited to fish in the area immediately surrounding the electrical field. However, electrofishing has limited use in deeper water and in low and high conductivity water (Beauchamp 1995). Additionally, not all species are easily targeted by electrofishing (e.g., benthic species may be under-represented) (Beauchamp 1995), and capture may be biased towards larger fish.~~

Previous work in Stone Corral Creek and Funks Creek~~s~~ indicates that total dissolved solids are high enough to prevent the use of electrofishing as a means of sampling (California Department of Fish and Game and California Department of Water Resources 2000). During reconnaissance surveys, basic water quality measurements would be taken to confirm this observation. If total dissolved solids values are above levels known to interfere with electrofishing, the method would be curtailed in favor of seining. If employed, electrofishing would be done with a Smith-Root type backpack electrofisher. Sections of creeks would be isolated using blocking nets before biologists wade into them, starting from the upstream net and moving downstream. Captured specimens would be held in buckets, floating net pens, or large aerated containers prior to being identified and measured as above for seine sampling. Effort would be calculated using shock time. If fish exhibit signs of stress, including symptoms of tetany or bruising, electrofisher settings would be adjusted accordingly to reduce impacts.

Visual Surveys

Any visual observations by biologists during reconnaissance and sampling of stream fauna would be systematically recorded based on pre-determined reach locations. This would include documenting amphibians and reptiles that may be observed incidentally during fish sampling efforts.

General Water Quality

Water quality data would be measured at every ~~station~~ fish sampling location using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the 2016 version of the SWAMP *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (SWAMP 2016 SOP) (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and pH.

~~3.1.14~~3.2.4 Fish Response

Abundance and diversity

All sampling efforts would be quantified using catch per unit effort (CPUE). ~~Catch metrics would be computed based on the CPUE for a specific sampling method. Tracking CPUE by sites would be organized into charts or tables that accurately portray the CPUE for a given site and control effort. When a negative response in the CPUE of a target fish community for a given method is observed across sites or across sampling periods, investigators would assess whether the decline exceeded the threshold for triggering reassessment of flows under the proposed Adaptive Management Plan. If declines were observed to exceed thresholds, the Authority would be notified.~~

The CPUE would be computed for each sample method and assessed once multiple data sets are available for comparison. Numbers of individuals, weight, and area sampled would be recorded. A decline in CPUE, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Condition

Condition factor (K) would be calculated for all fish specimens for which length and weight have been recorded. The condition factor of fish reflects environmental and biological circumstances and fluctuations in feeding conditions and physiological factors (Le Cren 1951). The condition factor also indicates changes in food reserves and can be used as an indicator of the general condition of aquatic organisms. Therefore, information on condition factor can be used to assess biological health of monitored organisms because the measure provides information about the specific condition under which organisms are developing (Araneda et al. 2008).

A decline in condition factor, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Distribution

Fish presence would be recorded and tracked through the study area. Fish distribution would be determined through reconnaissance and pre-operation surveys, known distributions, and incidental observations made during other sampling efforts. Records may be kept as count data and volumetric data but would ultimately be provided as presence or absence of fish species within sampling reaches.

~~3.2~~3.3 Timing and Frequency

The schedule and effort for the pre-operation and operation portions of the proposed study are detailed below. The pre-operation surveys would be five consecutive annual visits staged at any point prior to start of operation and within the seasonal restrictions indicated below. Monitoring efforts would be one-per-year visits each year following initiation of operation up to a 5- or 10-year timeline as determined by the Authority. For the purposes of this Aquatic Study Plan, it is assumed that sufficient access to the study area would be available in 2023.

Pre-Project implementation:

- Desktop scoping effort: lay out sampling reaches using geographic information system (GIS) data overlaid on aerial imagery, organize data sheets, and coordinate with water quality and SWAMP efforts. Spring 2022
- Initial reconnaissance: 2 days with 2-person crew; ideal timing would be when water levels are most restricted, which is typically in autumn.
- Pre-operation effort 1: 14 days with 4-person crew. 2023
- Pre-operation effort 2: 14 days with 4-person crew. 2024
- Pre-operation effort 3: 14 days with 4-person crew. 2025
- Pre-operation effort 4: 14 days with 4-person crew. 2026
- Pre-operation effort 5: 14 days with 4-person crew. 2027

Post-Project implementation:

- Operation effort 1: 14 days with 4-person crew. ~~2028~~2030
- Operation effort 2: 14 days with 4-person crew. ~~2029~~2031
- Operation effort 3: 14 days with 4-person crew. ~~2030~~2032
- Operation effort 4: 14 days with 4-person crew. ~~2031~~2033
- Operation effort 5: 14 days with 4-person crew. ~~2032~~2034
- Additional efforts up to 10 years after initial operation would be determined by the Authority.

The post-Project implementation schedule may be adjusted based on the Project construction schedule and construction completion.

Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum of Understanding permit would be required to complete the study design as proposed. ~~Benthic Macroinvertebrates (~~BMI~~)~~ ~~s~~samples would be the only ~~sacrificed~~ collected species.

Commented [AF58]: Have we defined this acronym yet?

Commented [AF59]: Can we use another word other than sacrificed? This comes up a few times in the document

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4.0 SWAMP Bioassessment Study Designs and Methods

Commented [AF60]: I like this format in this section -- Purpose, then Overview, then Field Methods, etc. Can we have all these chapters follow this same general outline?

Commented [PJ61R60]: Seems like this has been ironed out...

4.1 Purpose of Bioassessment Monitoring Program

Stream bioassessment monitoring is a method of evaluating and monitoring the environmental health and integrity of freshwater wadeable streams by using BMI, water quality parameters, and ~~physical habitat (~~PHAB~~)~~ conditions indicators of stream condition. Bioassessments are especially useful in tracking the aquatic conditions before and after a project is implemented to determine the project effects on aquatic communities. A SWAMP bioassessment that focuses on the relationships between PHAB~~physical habitat~~, water quality, BMI, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek.

This information, along with the other ~~required~~ studies (i.e., Fish ~~Assemblage Study~~Monitoring and Hydrogeomorphic Study), would help to inform the type of flow releases that should be made to the creeks under various operating conditions.

4.2 Overview of Proposed Methods

The bioassessment effort would be conducted using the methods described in the SWAMP 2016 SOP (Ode et al. 2016a, 2016b), or any updated version thereof. The reach-wide benthos method, which requires collection from each of 11 designated major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, pool), would be employed.

Commented [AF62]: Have we defined this term yet?

Commented [PJ63R62]: Yes, see the General Water Quality section in Section 3.2.2 Operations Monitoring

The ultimate number of individual sites, herein referred to as sampling reaches, on each creek would be based on access and safety; however, it is anticipated that five sampling reaches would be located on Funks Creek and that six sampling reaches would be located on Stone Corral Creek (Figure 54). Since there is no stringent guidance on establishing the number of bioassessment sampling reaches for a project such as this (Rehn pers. comm.), the number of sampling reaches was chosen to both best capture and quantify the two different elevational gradients within the study area (i.e., foothill and valley floor environments), and to have adequate spacing/distance between the sampling reaches (approximately 500 meters apart on Funks Creek above Funks Reservoir and approximately 2 kilometers apart elsewhere). Field and laboratory methods would be fully described in an associated Quality Assurance Project Plan.

Commented [AF64]: I feel like this should be an attachment to this plan. Can we develop this now?

Commented [PJ65R64]: The Quality Assurance Project Plan takes quite some time to develop and we really need to know which sampling reaches will be part of the overall study, so we need access to be worked out first before we develop this plan. Let's keep this on our radar for a future submittal once access is determined.

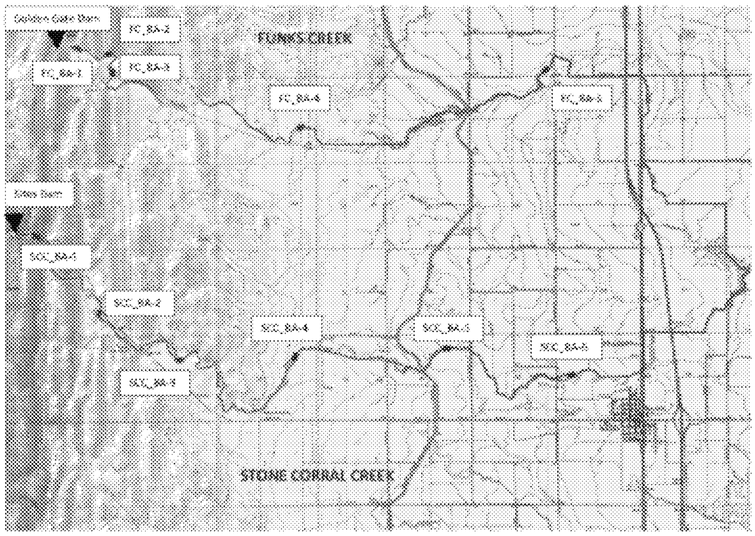

Figure 45. Potential Bioassessment Sampling Reaches, Stone Corral Creek and Funks Creeks

4.3 Field Methods

This section summarizes the methods that would be used to collect all bioassessment data. All surveys would be performed by a qualified team of a biologist or biologists and a geomorphologist with expertise in benthic macroinvertebrate and algae collection, water quality monitoring, and PHAB~~physical habitat~~ data collection.

4.3.1 Sampling Reach Delineation

As described in Chapter 2 of the SWAMP 2016 SOP, the average wetted width of each sampling reach would be used to determine the sampling reach length (Ode et al. 2016a). The SWAMP 2016 SOP specifies standard sampling reach lengths that are based on wetted width (150 meters for sampling reaches with average wetted widths less than or equal to 10 meters, and 250 meters for sampling reaches with average wetted widths greater than 10 meters).

After the sampling reach length is determined, it would be laid out using marked surveyor's flags for transect identification and transects would be labeled according to the SWAMP 2016 SOP (main transects A–K and inter-transects AB, BC, etc.) for a total of 11 main transects and 10 inter-transects.

4.3.2 Basic Data Collection

Basic information collected at each sampling site would include project name, sampling reach name, time and date of survey, stream/watershed name, global positioning system (GPS) coordinates, and the names of the survey crew members. GPS coordinates would be recorded with an appropriate collection device (e.g., hand-held GPS receiver or iPad). Data collected at the sampling reaches would include water quality and stream discharge measurements, PHAB~~physical habitat information~~, and BMI and algae sample collections. The most recent version of the SWAMP *Stream Habitat Characterization Form Full Version* field forms would be used to enter data in the field.

4.3.3 Water Quality and Discharge Measurements

Water quality data would be measured using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the SWAMP 2016 SOP (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, alkalinity, turbidity, and pH.

To determine alkalinity (which is a standard YSI is not capable of doing), a water sample would be collected at each sampling reach. The sample would be taken at approximately 10 to 15 centimeters below the water surface. Using gloves, collectors would fill the water sample bottles to the brim to ensure that air bubbles would not get trapped in the sample bottle. The bottle would then be placed on ice in a cooler until all field data collections were completed. In the evening following each day's sample collection, the water samples would be removed from the coolers and allowed to warm to room temperature. Alkalinity would then be determined by the double endpoint titration method using a Hach Digital Titrator.

Stream discharge would be measured using a Marsh-McBirney Flo-Mate Model 2000 flow meter and following the Velocity Area Method (Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b). E~~very e~~fforts would be made to select a stream transect with a relatively uniform cross section and laminar flow, and at least 20 equally spaced data points would be used to estimate streamflow.

4.3.4 Physical Habitat Assessment and Photo-Documentation

As required by the SWAMP 2016 SOP, ~~physical habitat (~~PHAB~~)~~ information would be collected at the sampling reaches at each transect and inter-transect location. At the 11 main transects, the full measurements listed in Chapter 6 of the SWAMP 2016 SOP would be taken (Ode et al. 2016a, 2016b). At the 10 inter-transects, fewer measurements would be taken per the SWAMP *Stream Habitat Characterization Form Full Version* field forms.

Digital photo documentation for each sampling reach would consist of upstream and downstream views at transects A, F, and K (i.e., the downstream, middle, and upstream portions of the sampling reach). Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded.

At each sampling reach, reach-wide PHAB conditions relative to three Rapid Bioassessment Protocol (RBP) habitat parameters would be evaluated based on visual observations. These observations would include epifaunal substrate/cover, sediment deposition, and channel alteration. Each of these parameters would be scored using the following numeric value and ranked using the following 20-point scale, per the SWAMP 2016 SOP.

- 1–5 rank as poor
- 6–10 rank as marginal
- 11–15 rank as suboptimal
- 16–20 rank as optimal

4.3.5 Benthic Macroinvertebrate Sample Collection

BMI collection would be conducted according to the SWAMP 2016 SOP, using the reach-wide benthos method, which requires collection from each of the 11 major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, and pool). The BMI samples would be collected 1 meter downstream of each major transect by sampling a 1-foot-square area using a D-frame net. The sampling would begin at transect A (the downstream end) and continue upstream to transect K, with the sample location alternating from left (25% of width), to center (50% of width), to right (75% of width) on each subsequent transect.

All collections from the 11 major transects would be composited into a single sample and transferred into a 1-liter, wide-mouth plastic jar and preserved with 95% ethanol, following the SWAMP 2016 SOP. Samples would be labeled with collection site, time, and collector's name; and a chain-of-custody form would be filled out to accompany the samples on their way to the laboratory for identification. Replicate samples would be collected according to the SWAMP 2016 SOP at one sampling reach for quality assurance/quality control (QA/QC) purposes.

4.3.6 Algae Sample Collection

Algae would be collected in the same manner as the BMI samples, except that the algae would be collected 25 centimeters above the location where the BMI sample would be located. Algae samples would be collected using the sampling tools identified in the SWAMP 2016 SOP, which vary according to the substrate being sampled. A rubber delimiter would be used for large gravel and cobble; a PVC delimiter would be used for fines and gravels; and a syringe scrubber would be used for bedrock and large boulders (if present).

Similar to the BMI sampling, each algae sample collected at the 11 major transects would be composited into a single sample for processing. The processing of the algae would follow the SWAMP 2016 SOP, which would involve removal of algae from the substrates collected and processing the sample for the four algae analyses: quantitative soft-bodied algae, quantitative diatoms, ash-free dry mass (AFDM), and chlorophyll a. A soft-bodied algae qualitative sample would also be collected from each sampling reach by collecting a composite of all types of soft-bodied algae observed within the sampling reach into a single sample. This sample would aid in the identification of soft-bodied algae in the quantitative sample and would be used in the calculation of some of the algae metrics. Replicate algae samples would be collected at the same sampling reaches where replicate BMI samples would be collected.

4.4 Laboratory Processing

This section summarizes the methods that would be used to process all bioassessment data.

4.4.1 Water Quality

Water samples would be collected at each sampling reach to determine total nitrogen and total phosphorus, constituents necessary for helping to determine algal results. Samples would be sent to a local water quality processing laboratory in northern California. The water quality analyses would be consistent with SWAMP protocols for water chemistry. Total nitrogen would be analyzed according to U.S. Environmental Protection Agency Method 351.2, and total phosphorous would be analyzed according to Standard Methods 4500-P B and 4500-P E.

4.4.2 Benthic Macroinvertebrate Sample Processing

BMI sample taxa identification would be conducted by an outside laboratory (most likely by the Chico Aquatic Bioassessment Laboratory [Chico ABL] in Chico, California). BMI samples would be picked, sorted, and identified completely or until a 600 count (SAFIT Level 2) is reached. Chico ABL follows QA/QC procedures developed under the SWAMP program.

4.4.3 Algae Sample Processing

Five types of algae would be collected and processed: qualitative grab, soft-bodied algae, diatoms, AFDM, and chlorophyll a. The qualitative grab, soft algae, and diatom samples would be sent to the CDFW Group at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL-MLML). MPSL-MLML would report the data ~~to Marco Sigala at Moss Landing~~ in SWAMP template formats. ~~Mr. Sigala~~~~oss Landing~~MPSL-MLML would calculate the Algae Stream Condition Index (ASCI) from the data. The samples of AFDM and chlorophyll a would also be sent to MPSL-MLML, who would report the data in California Environmental Data Exchange Network template formats. PSL-MLML follows the QA/QC procedures developed under the SWAMP.

Commented [AF66]: Is this an individual? Should this instead be referencing the laboratory?

Commented [PJ67R66]: Updated accordingly.

4.5 Data Analysis

PHAB information would be entered using the SWAMP Version 2.5 bioassessment data entry forms (Marine Pollution Studies Laboratory 2022) and then loaded into the Microsoft Structured Query Language (SQL) Server database of the MPSL-MLML. BMI and algae taxonomy data, as well as water chemistry data would be loaded from Microsoft Excel templates into the same Microsoft SQL Server database. The data entry forms and templates would be obtained from the MPSL-MLML Data Center website. All data would be verified and checked for completeness after input into the database.

4.5.1 Physical Habitat Information

PHAB data would be entered by the MPSL-MLML using the SWAMP Bioassessment Field Form Microsoft Access database, and then loaded into the MPSL-MLML's Microsoft SQL Server database. After loading, additional error and completeness checks would be run following SWAMP business rules. The data would be sent to the California Environmental Data Exchange Network, where it would be available to the public for viewing and download.

PHAB metrics would be calculated using the SWAMP Bioassessment Reporting Module. The SWAMP protocol contains a subset of parameters measured within the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program for freshwater wadeable streams; therefore, many of their metrics described in Kaufmann et al. (1999) form the basis of the SWAMP Bioassessment Reporting Module output.

SWAMP has developed a PHAB Index similar to the California Stream Condition Index (CSCI) (Section 4.5.3, *Benthic Macroinvertebrates*) for BMI data. The PHAB Index (called the *IPI*) combines eight GIS-calculated metrics with 12 PHAB metrics to produce one IPI value (Rehn et al. 2018). For the purposes of statewide assessments, the IPI has thresholds of physical condition: greater than or equal to 0.94 indicates likely intact condition; 0.93 to 0.84 indicates possibly altered condition; 0.83 to 0.71 indicates likely altered condition; and less than or equal to 0.70 indicates very likely altered condition.

In addition, the results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable*

Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007) (Ode et al. 2011). These select stressor thresholds are not regulatory limits set by SWRCB; rather, they are biology-based stressor thresholds developed by researchers as an objective means to set meaningful, regionally appropriate water quality standards. Two statewide and regional ~~physical habitat~~PHAB biological stressor thresholds, the Percent Fines and Sand and Mean Embeddedness thresholds, are examples of biological stressor thresholds that would be appropriate to analyze for this Project.

4.5.2 Water Quality

Similar to the PHAB analysis described above, water quality results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011).

4.5.3 Benthic Macroinvertebrates

MPSL-MLML would be contracted to assist in the analysis of the BMI data. MPSL-MLML would use the BMI taxonomic data obtained from Chico ABL to calculate CSCI scores for each sampling reach. The CSCI is a statewide biological scoring tool that translates complex data about individual BMIs found living in a stream into an overall measure of stream health (Rehn et al. 2015).

CSCI scores and output would be calculated using R scripts defined in Mazor et al. (2017). CSCI score categories would be applied as defined in Rehn et al. (2015).

- Less than or equal to 0.62: very likely altered
- 0.63–0.79: likely altered
- 0.80–0.91: possibly altered
- Greater than or equal to 0.92: likely intact

MPSL-MLML would also calculate several BMI metrics from the taxonomic data for each sampling reach. These individual metrics would be reviewed to discuss the individual results for each sampling reach and event. Representative metrics may include measures of taxa richness, composition, tolerance, functional feeding groups, and habit measures. These other metrics may be more insightful for determining the biological integrity of the BMI communities than the CSCI scores alone (at least in the valley floor sampling reaches), as valley floor reference sites (the sites used in the CSCI calculations) are relatively limited in abundance (Rehn pers. Comm.).

4.5.4 Algae

Diatoms and Soft Algae

MPSL-MLML would be contracted to calculate the statewide diatom, soft algae, and hybrid ASCI and associated metrics. These predictive biological indices replace past regional indices with a statewide index allowing for improved comparisons across diverse landscapes in a consistent and comparable manner. While ASCI can be calculated for soft algae and diatoms separately, the hybrid ASCI produces stronger species distribution models for more accurate and integrative assessments of biological condition.

Chlorophyll a and Ash-Free Dry Mass

Ode et al. (2011) in their analysis of the results from the statewide Perennial Stream Assessment between 2000 and 2007, have included stressor thresholds for chlorophyll a and AFDM. These thresholds are more protective than levels proposed by previous authors, which were 100 milligrams per square meter for chlorophyll a and 50 grams per square meter for AFDM (Barbour et al. 1999, Welch et al. 1988, Dodds et al. 1998, Sosiak 2002, Dodds and Welch 2000, U.S. Environmental Protection Agency 2000, Biggs 2000). The thresholds proposed by Ode et al. (2011) are not regulatory limits or requirements but rather recommendations. The chlorophyll a and AFDM stressor thresholds (statewide and regional) would be evaluated for each sampling reach by MPSL-MLML.

4.6 Timing and Frequency

The bioassessment surveys would be conducted during the appropriate index period for Central Valley streams (June through August), which is typically 4 to 6 weeks following the last winter storm event. Depending on stream conditions, however, bioassessment surveys may need to be performed prior to the appropriate index period to ensure adequate flow for benthic and algal sampling is present. Baseline (pre-operation monitoring) would occur in the spring for (possibly) 5 years prior to project operation. Follow-up (baseline) surveys would be conducted on an annual basis during the same period for up to 10 years after operation activities are initiated. The Authority and the relevant ~~permitting~~ agencies (CDFW, USFWS, and Colusa County~~SWRCB and the CVRWQCB~~) would be consulted if the frequency of monitoring would be shortened after 5 years.

4.6.1 Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum Of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only ~~sacrificed~~ collected species.

Commented [PJ68]: This (the word "sacrificed") was highlighted but I un-highlighted it because there was no associated comment.

Commented [JH69R68]: We need to use a different word.

4.7 Additional Water Quality Measurements

In addition to the standard water quality measurements included in the SWAMP bioassessment as described above, samples would be collected for additional laboratory measurements. The objectives for taking these additional measurements would be to compare pre-Project and Project values, determine any effect of operational adjustments on sampled water quality constituents, and compare measurement values to key stressor thresholds. These additional measurements include:

- **A suite of total and dissolved metals and metalloids**. The suite includes aluminum, arsenic, cadmium, chromium (total), chromium, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc.
- **Cyanobacteria and cyanotoxins**. The cyanobacteria water samples would be collected for the purpose of laboratory analysis for cyanobacteria presence and density and the presence of cyanotoxins (specifically microcystins, anatoxin-a, and cylindrospermopsin).
- **Methymercury in fish tissue**. Level I trophic level fish would likely be more abundant than higher trophic level fish, so the measurements of methylmercury concentrations in fish tissue would focus on these fish. Higher trophic level fish would be sampled intermittently as available. To assess methylmercury in fish tissue, sampling would be conducted using the SWAMP protocol for California rivers and streams (California Water Boards 2011 or most current).

When these additional water quality samples and fish are collected, the following basic survey information and data described above would be collected: project name, sampling reach name, time and date of survey, stream/watershed name, and the names of the survey crew members. Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded. Basic data collected at the sampling sites would include stream discharge measurements, temperature, specific conductivity, dissolved oxygen, turbidity, pH, and water samples for total nitrogen and total phosphorus laboratory measurements. In addition, water samples would be collected for laboratory measurements of dissolved organic carbon and hardness as these parameters influence water quality standards for aquatic life protection for some metals.

These measurements would be taken twice a year, once during a high flow period and once during a low flow period, at the upstream and downstream bioassessment sampling locations on each creek. Sampling would occur during the same years as the rest of the bioassessment studies.

5.0 Hydrogeomorphic Study

5.1 Purpose of Study

The overall purpose of the Hydrogeomorphic Study would be to characterize historical and present-day streamflows, including baseflow during the spring and summer months, on ~~Funks and~~ Stone Corral Creek and Funks Creek~~s~~; the relevant geomorphic characteristics of each creek (herein called *geomorphic indicators*); and flow levels necessary for channel maintenance of geomorphic processes required to maintain the channels in their current condition.

A Hydrogeomorphic Study with quantitative and qualitative monitoring data to fully characterize the existing hydrologic regime of ~~Funks Creek and~~ Stone Corral Creek and Funks Creek~~s~~, as well as the overall type and abundance of sediment available for aquatic organisms, would be developed. To inform the appropriate streamflows for the creeks under inquiry, a geomorphic assessment ~~of the reaches of interest (i.e., the stream reaches below the dams)~~ would constitute the first step in the analysis. The channel segments upstream of the dams would also be rapidly assessed to provide a greater understanding of the local watershed geomorphic characteristics. The focus of the geomorphic assessment would be to determine the dominant geomorphic processes, document the surrounding landforms and channel bed topography, and to determine how the observed morphology of each creek is influenced by the hydrologic regime and the surrounding land uses. Likewise, collection of geomorphic information would aid in the determination of overall channel stability for each creek, which has important implications for the proposed releases.

The Hydrogeomorphic Study to examine the hydrologic regime of ~~Funks and~~ Stone Corral Creek~~s~~ and Funks Creek would include a desktop modeling exercise, as well as installation of stilling wells, staff gages, and real-time water surface level collection devices. The goal of the Hydrogeomorphic Study would be to evaluate the physical and hydrologic condition of the reaches of interest within both Stone Corral Creek and Funks Creek. This information, along with the other required studies as discussed in previous chapters (i.e., Fish Assemblage Study and SWAMP bioassessment study), would help to inform the type of flow releases that should be made to the creeks under various Project operating conditions.

After completion of the baseline studies, consideration would be given to when and how flows would be released and whether a portion of these flows are needed to maintain fluvial geomorphic processes (based on the findings from the geomorphic assessment).

5.2 Study Design

The (baseline) Hydrogeomorphic Study components are discussed below. *Field site locations* are applicable to the geomorphic component of the Hydrogeomorphic Study; *hydrologic monitoring locations* represent the potential locations where stilling wells, staff gages, and real-time water surface level collection devices would be installed (i.e., the hydrologic component of the Hydrogeomorphic Study). The ultimate number of field site locations on each creek would be based on access and safety; however, it is anticipated that five sites would be located on Funks Creek and that six would be located on Stone Corral Creek. The locations for the geomorphic component of the Hydrogeomorphic Study would presumably be the same as the bioassessment sampling reaches as part of the SWAMP bioassessment study as described in Chapter 4 (Figure 45).

The ultimate number of hydrologic monitoring locations on each creek would primarily be based on access, due to the need for monitoring during and after precipitation events. It is anticipated that two sites would be located on each creek: one in the foothills and one on the valley floor as shown on Figure ~~5~~6.

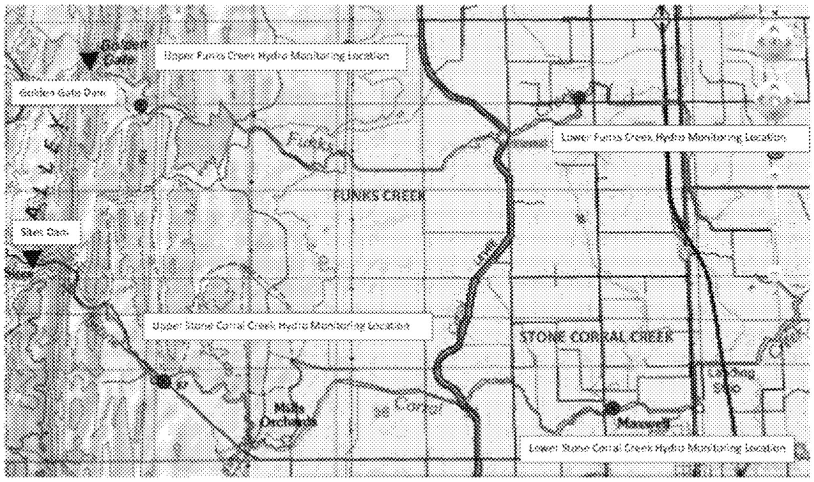

Figure ~~5~~6. Potential Hydrologic Monitoring Locations, Stone Corral Creek and Funks Creek~~s~~

5.2.1 Geomorphic Conditions

Data collected during the geomorphic component of the Hydrogeomorphic Study (geomorphic assessment) would include a host of geomorphic attributes, or indicators, as described below. Topographic data (longitudinal profile and cross sections) needed for the hydrologic model (further described below) would also be collected during the geomorphic assessment. The geomorphic assessment would be conducted by a geomorphologist with expertise in channel and floodplain dynamics, channel stability analyses, and topographic surveying techniques.

The geomorphic assessment would include evaluation of the following indicators.

- Channel classification
- Local watershed inputs
- Hydrologic and flow patterns
- Riparian vegetation condition
- Bankfull width and depth and wetted width
- Bank instability and bank characteristics
- Channel bed substrate composition and embeddedness
- Channel complexity
- Degree of channel incision
- Stage of channel evolution

- Cross section and longitudinal profile surveys

These indicators would be assessed for each field site location (Figure ~~4~~5). In addition, at least three permanent cross sections would be established within each field site location and within each hydrologic monitoring location (Figure ~~5~~6) for collection of quantitative channel morphology information and required modeling input. Evaluation methods for these indicators are described below.

Channel Classification

Stream and r~~R~~iver segments can be grouped into three generalized classifications based on their position in the watershed and the relative balance of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source areas are typically transport-limited (often due to limited channel runoff) but do offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events. Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, and step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

Based on field observations and the stream classification methodology of Montgomery and Buffington (1998), each field site location would be classified accordingly. The classification would aid in the determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of each field site location on the reaches of interest.

Local Watershed Inputs

Any major inputs of sediment and runoff into the field site locations (e.g., landslides or other mass wasting features, recent burn scars) would be summarized. The objective would be to identify any land use changes that could alter the balance of sediment supply and runoff that could lead to future instability (e.g., channel aggradation of degradation) within the reaches of interest. This would aid in the determination of channel stability and the potential for available habitat to be disrupted or altered in the vicinity of the field site locations.

Hydrologic and Flow Patterns

The hydrologic pattern would be determined throughout the length of the field site locations and would include identification of whether streamflow is perennial, intermittent, or ephemeral. Perennial streams are those which flow year-round; intermittent streams are those which flow for only certain times of the year and receive water from both surface water and groundwater; and ephemeral streams are those which have their channels above the water table year-round and only receive water from surface runoff. This geomorphic indicator would rely on the field-based hydrologic component of the overall Hydrogeomorphic Study, as described below.

Riparian Vegetation Condition

Riparian vegetation is an important indicator for overall stream habitat and function as it serves to stabilize streambanks and allows for canopy cover to create suitable water temperatures for aquatic species. Riparian condition refers to a description of the general health of the riparian area, focusing on the amount and type of vegetative cover.

Within each field site location, riparian condition would be described as low (0–25 % vegetative cover), moderate (25–50 % vegetative cover), high (50–75 % vegetative cover), or very high (75–100 %

vegetative cover). The size and approximate age of any riparian vegetation growing in the channel bed would be documented because this is evidence of channel adjustment and possible re-stabilization from a prior disturbance.

Bankfull Width and Depth and Wetted Width

Bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channel in the field site locations. Specifically, a geomorphic or effective bankfull surface would be identified in the field. The geomorphic bankfull or effective surface is the surface that gets inundated by the discharge that performs the most geomorphic work on a system, typically a flow that occurs every 1.5 to ~~-~~ 2 years (Knighton 1999). This discharge, known as the geomorphic bankfull discharge, is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface would be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996). Once this surface is recognized, width and depth measurements would be recorded.

Like bankfull width and depth measurements, wetted width and depth measurements would be recorded. Specifically, the wetted surface would be ~~determined~~ identified in the field and width and depth measurements would be recorded.

Bankfull and wetted width and depth data collection would help to determine the size of the channel, which would help in assessing overall available habitat conditions in the field site locations and reaches of interest.

In addition, the "active channel" width would be identified, which typically represents a typical low to moderate flow regime and is usually bounded by the width of the in-channel vegetation.

Bank Instability and Bank Characteristics

The term *bank instability* refers to streambanks that are either actively retreating or have the potential to retreat soon. In brief, weakening processes are any bank or near-bank processes that act to erode or prepare streambanks for further erosion (Lawler 1992). The purpose of assessing this indicator would be to identify fluvial erosion (erosion associated with flowing water) and bank failure (erosion associated with gravitational forces and weakening processes). Fluvial erosion is closely related to boundary shear stress, which can be loosely approximated by unit stream power variations, and bank failure is collapse of all or part of the streambank in situ (Lawler 1995).

Bank stability would be defined as the natural streambank that has stable groundcover. Stable ground cover includes rooted trees, shrubs, herbaceous plants, and naturally occurring rocky substrates. Bank composition and bank height/angle would also be determined. The results, in conjunction with the other indicators, can be used to detect where the channel may be downcutting as suggested by over-steepened banks, and can also be used to describe the potential for the channel to potentially laterally migrate and increase the risk of bank instability.

Bank stability analyses would aid in determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of the field site locations, as well as the determination of channel stability and the potential for available habitat to be disrupted or altered in the field site locations.

Channel Bed Substrate Composition and Embeddedness

Substrate composition and embeddedness refer to the size of the substrate materials on the channel bed, and the degree to which these materials are embedded. These conditions indicate how frequently the channel substrate is mobilized. Substrate composition and embeddedness would be measured using the methods described by Bunte and Abt (2001). Substrate composition would identify the available substrate (overall type and abundance) for aquatic species in the vicinity of each field site location ~~and would allow for determination as to whether the Reservoir Operations Plan would require gravel augmentation in the reaches of interest~~.

Commented [PJ70]: This was specifically called out in the EIR, and in our response to comments to the EIR, so not sure if it should be deleted here...

Commented [SJ71R70]: Understood, leave it out here please.

Channel Complexity

The presence or absence of gravel bar development and evidence of scour and/or deposition would be determined throughout the length of each field site location. Pool and riffle habitats containing in-channel structures (e.g., instream woody material) that create complexity and habitat niches for aquatic organisms would also be documented. Basic channel or habitat units (e.g., pool, riffle, and flatwater) would be delineated according to standard habitat mapping descriptions in each field site location. A rough proportion of unit types would be calculated.

Channel or habitat units would be defined as follows.

- **Pool**.~~:~~ Slow water, length, and width at least one-half the bankfull channel width, and a 10-inch minimum residual pool depth. Subcategories define the general type of pool and include scour (lateral, channel, channel confluence, plunge), dam, and backwater, as defined by Overton et al. (1997).
- **Riffle**.~~:~~ Swiftly flowing, turbulent water, some partially exposed substrate, substrate cobble, and/or boulder dominated (McCain et al. 1990).
- **Flatwater**.~~:~~ Wide, uniform channel bottom, low to moderate water velocity, and little surface agitation. Encompasses any areas that do not qualify as pool or riffle (McCain et al. 1990).

If appropriate (i.e., if the habitat diversity merits such a method), the field site locations would be habitat typed to provide a more detailed stream habitat inventory. Stream habitats would be delineated into one of the six Level-III habitat classification types (~~per~~ Flosi et al. 2010) based on morphological characteristics. These include overall channel gradient, water velocity and depth, substrate, and, where applicable, the channel features (e.g., boulder, bedrock, woody material, converging flow) causing the formation of the habitat unit through scour and sediment deposition (Flosi et al. 2010). Channel/habitat type determination would allow for identification of available habitat types for aquatic species.

Degree of Channel Incision

The degree to which the channel is incised would be recorded as negligible, low, moderate, high, or very high. The degree of incision would be qualitatively analyzed using the following criteria.

- **Identification of any Quaternary landforms on the floodplain (e.g., terraces, low floodplain, fan, etc.).** Terraces typically have steep ~~streambanks~~streambanks, and the channel may not necessarily be incised. Steep, unstable streambanks adjacent to a ~~low floodplain surfaces~~low floodplain surface, however, typically indicate incision.
- **Identification of bedforms downstream of the site where and if the channel is less incised.** Bed and streambank material from incised channels would typically be deposited downstream in somewhat uncharacteristically large deposits on the channel bed (downstream aggradation).

- **Recognition of base level changes downstream.** Dams and other barriers can create upstream changes in channel bed elevation (i.e., headward migration of incision).
- **Visual survey of channel bed at the field site location.** Channel or habitat sequences, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited time intervals. Additionally, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization.
- **Determination of the health of the riparian and floodplain plant species.** Plants that are found in similar, un-incised reaches are usually not present in incised reaches. No vegetation at all is an indicator of no hydrologic interaction between the floodplain and the channel and, therefore, incision.
- **Identification of recent evidence of overbank deposition of fine sediment, plant debris, or other organic matter.** A channel that floods its streambanks frequently would typically have splay (i.e., sand) deposits and vegetation with a smoothed, flooded appearance in the downstream direction. Natural levee development is also an indication of frequent flooding.

Stage of Channel Evolution

A stream evolution model (Cluer and Thorne 2013) would be applied to the entirety of the reaches of interest on ~~Funks and~~ Stone Corral Creek~~s~~ and Funks Creek to provide a template for understanding geomorphic responses and processes within the immediate watershed. The stream evolution model of Cluer and Thorne (2013) revisits and updates two well-established channel evolution models (Schumm et al. 1984, Simon and Hupp 1987) in light of recent research and the authors' practical experiences.

In addition, a channel stability analysis would be conducted at each field site location. The chosen methodology would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2010), or other applicable method. The stream evolution model and the channel stability analyses would aid in the determination of how on ~~Funks and~~ Stone Corral Creek~~s~~ and Funks Creek may evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus, having implications for the available habitat within the channels.

Cross Section and Longitudinal Profile Surveys

As mentioned above, at least three permanent cross sections would be established within each field site location (Figure ~~4~~5) and within each hydrologic monitoring location (Figure ~~5~~6) for collection of quantitative channel morphology information and required modeling input. Permanent cross sections would be established perpendicular to the primary channel following the methodology of Harrelson et al. (1994). Each transect would be surveyed using ground-based surveying equipment to capture and track channel morphology. Elevations along the cross sections would be collected at intervals close enough to capture slope breaks and distinct morphological features within the floodplain (if present), and along the channel sides and bottom.

The location of each cross section would be permanently marked in the field using 4-foo~~ee~~t-tall metal t-posts or wooden lathes (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for each transect would be placed in a stable location above the active channel on the left and right (as viewed facing downstream) banks or terraces of the channel. Transect endpoints (i.e., the permanent

monuments) would be documented using a GPS receiver. Representative photographs would be taken at each cross section.

In addition to the cross sections, a longitudinal profile would be surveyed throughout the length of the channel within a field site location. The spacing between channel bed data points would vary depending on the complexity of the channel bed characteristics. Digital photographs would be taken in the upstream and downstream directions at various locations throughout the longitudinal profile. The location(s) of each cross section would be surveyed on the longitudinal profile for graphical plotting purposes.

Channel Geometry Metrics

As mentioned previously, bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channels. This would be completed at the cross sections measured in the field. In addition to bankfull, wetted, and active channel width and depth measurements, the bankfull and entire channel width-to-depth ratio would be calculated for each cross section, and sinuosity and gradient of the longitudinal profile would be determined.

5.2.2 Hydrologic Conditions

The hydrologic component of the Hydrogeomorphic Study would consist of both desktop (modeling and historical conditions review) and field-based efforts (generation of stage-discharge relationships), both of which are summarized below. The desktop effort would provide detailed information on various (modeled) flows of interest (i.e., the 2-year, 5-year, 10-year, 50-year, and 100-year flow events), while the field-based efforts would validate/calibrate the modeling results via collection of real-time streamflow data, especially for smaller streamflow events (the flows that are expected to occur most of the time on each creek).

Summary of Modeling Approach

A HEC-HMS rainfall-runoff-routing watershed hydrology model would be created to generate hydrographs for both Stone Corral Creek and Funks Creek. Inputs into the hydrology model would include watershed land use, percent impervious inputs, soil types, precipitation and evapotranspiration, drainage network characteristics, and topography (which would be generated from available light detection and ranging [LiDAR] technology).

The topographic surveys as described above would also serve to augment the existing LiDAR data with on-the-ground data to better capture topography in areas requiring additional detail (such as densely vegetated areas). The topographic surveys would be tied into the State Plane Coordinate System and would be sufficient to generate contours at a 1-foot interval. The data collected via the topographic surveys would also be required for generation of stage discharge relationships, as described below.

It should be noted that HEC-HMS rainfall-runoff-routing watershed hydrology model constitutes the first (somewhat exploratory) step in the hydrologic analysis. As discussed in the RDEIR/SDEIS, any ~~R~~releases into Funks Creek would be made through the transition manifold at the base of Golden Gate Dam and a new pipeline that terminates at Funks Creek below the dam. These facilities would carry up to 100 cfs with a release range of 0 to 100 cfs into Funks Creek. Any ~~R~~releases into Stone Corral Creek would be made through the permanent outlet at Sites Dam. This outlet would have a release range of 0 to 100 cfs, with an emergency release capacity of up to 2,500 cfs. The modeling effort would be the first step in determining if a ~~verifying that this proposed~~ range in flows, as described in the RDEIR/SDEIS, would be needed to~~is adequate to address~~ meet the purpose of CFGC Section 5937 given the modeled hydrology.

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Summary of Field-Based Analysis

The primary objective of the field investigation would be to provide an accurate description of the existing watershed hydrology and variations in streamflow and water surface elevations (i.e., stage) on both Stone Corral Creek and Funks Creek. Periodic streamflow measurements (depth and velocity measurements) would be taken to develop stage-discharge relationships (rating curves) to translate the continuous water depth measurements measured with continuous stage recorders (i.e., HOBO water level loggers [Onset Computer Corporation]) into continuous estimates of flow. These measurements would occur at the hydrologic monitoring locations as shown on Figure ~~5~~6.

To determine continuous estimates for streamflow, the stage recorders, which measure water temperature and pressure, and vertical stilling wells would be installed in relatively deep portions of the creeks at the locations as shown on Figure ~~5~~6. The HOBO water level loggers would be set to monitor water depth every 15 or 30 minutes. Additional HOBO water level loggers would also be installed to monitor barometric pressure every 15 or 30 minutes for the purpose of calibrating the depth (water pressure) measurements, which are also affected by barometric pressure. These additional data loggers would be secured to upland surfaces (e.g., trees). Streamflow measurements would be collected to develop equations to convert the continuous stage recorder data into estimated streamflows (discharge). During variable discharge conditions, streamflows would be estimated using a Marsh-McBirney Flo-Mate Model 2000 flow meter and top-setting rod following the procedures described in Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b).

Daily precipitation data ~~from~~ obtained from the California Data Exchange Center or the PRISM Climate Group would be used to characterize the rainfall patterns during the study period. Rainfall patterns would be displayed concurrently with the measured streamflow data.

If necessary, acoustic Doppler current profiler (ADCP) technology could be used to capture high flow events. ADCP equipment is particularly useful for collecting accurate and precise water depth and 2-D/3-D velocity data, especially at high flows when other standard surveying techniques as described above are impractical or unsafe. ADCP technology also offers the advantage of detecting bed elevation change resulting from high flow events that would be useful for evaluating sediment mobility in the reaches of interest. The applicability of ADCP would be investigated during the first season of hydrologic monitoring (once ~~biologists ascertain the~~ field conditions at the field site locations are ascertained).

5.3 Timing, Frequency, and Operation Monitoring

5.3.1 Pre-Operations Monitoring

The baseline geomorphic component of the Hydrogeomorphic Study would first be conducted during the winter/spring of 2023. It is anticipated that all relevant geomorphic indicators could be collected during one field trip. Additional baseline geomorphic data collection during subsequent years would be conducted if high ~~necessary if~~ precipitation patterns/high flow events occur during ~~are highly variable during~~ the pre-operation period.

The desktop hydrologic component of the Hydrogeomorphic Study would occur during 2023. The field-based hydrologic component of the Hydrogeomorphic Study would occur at the locations as shown on Figure ~~5~~ 6 until the dams are constructed.

5.3.2 Operations Monitoring

Follow-up geomorphic and hydrologic surveys would be conducted on ~~an annual basis~~a regular (pre-approved) basis for up to 10 years after operations begin. The Authority would consult with the relevant ~~permitting~~ agencies (CDFW, USFWS, and Colusa County~~SWRCB and the CVRWQCB~~) if the frequency of monitoring would be shortened after 5 years. Additional information on each component of is provided below.

Commented [AF72]: Do we really need to do this annually? Or every other year? It seems like the channel isnt going to change that much after we start operations so wondering if we can reduce the frequency.

Commented [PJ73R72]: Updated accordingly.

Geomorphic Stability Monitoring Plan

Operations geomorphic monitoring would generally be like the pre-operation efforts, including returning to established field site locations and collecting information on geomorphic indicators by performing a geomorphic assessment as described above. Data collected as part of the operations geomorphic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The focus of the operations geomorphic monitoring effort, however, would be geomorphic stability monitoring. As such, the primary survey components of ~~the Geomorphic Stability M~~monitoring ~~Plan~~ would include cross section and longitudinal profile surveys, channel bed substrate composition determination, and channel stability evaluations. All methods for these efforts would be identical to those described above. The objectives of these monitoring elements and their relevance to geomorphic stability are summarized below.

Cross Section and Longitudinal Profile Surveys

The objectives of collecting data at the cross sections would be to collect primarily lateral stability information to determine the rate of lateral migration through bank erosion and overall cross-sectional area change. The rate, magnitude, and direction of lateral change and area change would be determined over time using repeat longitudinal profile surveys.

The objective of collecting data at the longitudinal profiles would be to collect primarily vertical stability information to determine rates of aggradation or degradation (whether the stream is downcutting [degrading], filling [aggrading], or remaining static). The rate, magnitude, and direction of vertical change would be determined over time using repeat longitudinal profile surveys.

Channel Bed Substrate Composition and Embeddedness

The objectives of collecting channel bed substrate composition and embeddedness information would be to observe potential shifts in bed material size-frequency distribution, which can be determined over time. Collected grain size information would aid in interpretation in specific geomorphic changes if they occur (such as any changes identified via the cross-sectional and longitudinal profile analyses above).

Channel Stability Evaluations

The chosen methodology for channel stability evaluations would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. Together with the stream evolution model (Cluer and Thorne 2013), the channel stability analyses would aid in the determination of how ~~on Funks and~~ Stone Corral Creeks and Funks Creek may continue to evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Hydrologic Monitoring Plan

Operations hydrologic monitoring would be like the pre-operation field-based efforts, including returning to established hydrologic monitoring locations, monitoring stage and stream discharge over time. Data collected as part of the operation hydrologic monitoring effort would be compared against the baseline data and summarized into interim and final reports~~ to the Authority~~.

The level of effort of the operations Hydrologic Monitoring Plan, however, would be considerably less than for the pre-operation effort because, depending on the streamflow and precipitation patterns during the pre-operation time-period, there would presumably already be numerous years of pre-operations hydrologic monitoring data at the hydrologic monitoring locations (in other words, a robust data set with multiple discharge measurements and associated stages would be available). The operation hydrologic monitoring effort would, therefore, primarily consist of measuring streamflow values that were not obtained during the pre-operation monitoring effort (presumably higher flow events) and conducting routine field maintenance activities such as periodic downloads of the HOBO water level loggers and upkeep of field equipment.

~~5.4 Applicable Methods for Maintaining Determining Operational Streamflows~~

Commented [AF74]: This section here makes it sound like the operations plans would be based solely on the data collected in Chapter 5. I think the operations plan would be based on all of these studies. So we should consider moving this to Chapter 1 so that its not in a specific study chapter.

~~After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP bioassessment study), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarneli et al. (2015), the Instream Flow Incremental Methodology (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program,[7] the California Environmental Flows Framework,[8] and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on Funks and Stone Corral Creeks to maintain fish in good condition. Coordination with the permitting agencies would be required before a chosen method is selected.~~

[7] ~~https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow~~

[8] ~~https://ceff.ucdavis.edu/~~

6.0 Temperature Study Design and Methods

6.1 Overview of Proposed Methods

A temperature study would be conducted to characterize temperatures under existing conditions and determine flow and storage effects on temperature in Stone Corral Creek and Funks Creeks under operating conditions. The study would involve evaluating temperatures in the creeks before and after initiation of Project operation ~~and would be conducted in combination with the Hydrogeomorphic Study (Appendix 2D, Section 2D.4.2 in the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) and Sites Reservoir storage data~~ and would include consideration of the effects of creek flow and reservoir storage on temperature.

The study would assess the following.

- The temperatures that support the aquatic community under existing conditions.
- Reservoir discharge needed to ~~establish~~ maintain ~~suitable~~ appropriate temperatures to maintain fish in good condition in ~~Funks and~~ Stone Corral Creeks and Funks Creek downstream of Sites ~~Dam~~ Reservoir after the start of operation.
- Documentation of hydrologic and flow patterns (as described in Section 5.2.1, *Geomorphic Conditions*)

~~6.2 Reservoir discharge needed to establish temperatures suitable for native fish in Funks Creek downstream of Golden Gate Dam after operation begin.~~

~~6.3~~6.2 Study Design

Once access to Stone Corral Creek is obtained, a temperature probe would be installed in Stone Corral Creek at the location of Sites Dam release, and four additional probes would be installed downstream by approximately 0.5 mile, 1 mile, 2.4 miles (near where Stone Corral Creek goes under Maxwell Sites Road), and 4.4 miles (near where TC Canal goes under Stone Corral Creek).

Once access to Funks Creek is obtained, a temperature probe would be installed in Funks Creek at the location of the I/O tower release to Funks Creek, and two additional probes would be installed downstream by approximately 0.5 mile and 1 mile (far enough upstream of Funks Reservoir to be unaffected by it). In addition, probes would be installed at the TC Canal inlet to Funks Reservoir, at the TC Canal outlet from Funks Reservoir, and at the Funks Creek outlet from Funks Reservoir.

As described in the draft Reservoir Management Plan included in Appendix 2D of the RDEIR/SDEIS, once operation has commenced, water temperature profiles would be measured near Golden Gate Dam once every 2 weeks at 5-feet depth intervals to inform decisions about which ports of the I/O tower to use during March through October. The temperature probes in the creeks would continuously record hourly temperatures. These temperatures would be used along with specific fish requirements to develop target temperature ranges for operation conditions.

Commented [AF75]: These 2 bullets say the same thing for Funks and Stone Corral creeks, but say it slightly differently. Please make consistent. I would prefer to just mimic the 5937 language of fish in good condition. One HUGE criticism of 5937 is that its doesn't say native fish. We have interpruted it that way, but the language doesn't specify native fish

Commented [AH76R75]: I don't think I wrote this and not sure why there are two bullets here. Question for Jason, Manna, or Jim?

Commented [WM77R75]: Edited to respond to Alicia and Anne's input.

Commented [AF78]: We use May to September on the next page. Please verify and make consistent

Commented [AH79R78]: These time periods represent two different things:
Rice growing season = May – Sep, and
Reservoir profile monitoring = Mar – Oct.

The reservoir monitoring period is longer than the rice growing season because water temperature of the reservoir releases could affect more than rice (i.e., it could affect creek habitat).

Draft_0021319

Temperatures recorded after Sites Reservoir is operational would be used in conjunction with flow and storage data to determine flow and storage effects on creek temperatures. If creek temperatures cannot be accurately estimated with flow, storage, meteorology, and the reservoir temperature profiles, water temperature modeling could be performed for ~~both~~ Sites Reservoir, ~~and Funks and~~ Stone Corral Creek~~s~~, and Funks Creek. If modeling is necessary, models would be calibrated with the measured flow, storage, and temperature data.

Water released into Stone Corral Creek would originate from the lower half of Sites Reservoir and would likely be cooler than equilibrium values during months when the reservoir is stratified. The biggest differential between release temperatures and equilibrium values would occur when the reservoir is full and ambient air temperature conditions are high. If it is determined that flow should be maintained in Stone Corral Creek at times when releases would be relatively cool compared to temperatures under existing conditions, lower flows would allow the water to warm farther upstream than higher flows.

Water released to Funks Creek would originate from the I/O tower and, when the reservoir is stratified, would be warmer than the water released to Stone Corral Creek. The temperatures would be warmer because the withdrawals would come from higher in the reservoir and, as described in the Reservoir Management Plan, the I/O tower port openings would be chosen to provide 65 degrees Fahrenheit (°F) or higher water temperatures during the rice growing season (May through~~to~~ September).

~~6.4~~6.3 Timing and Frequency

Water temperature measurements would occur before and during operation. Measurements during the initial fill period would be useful for evaluating water temperature under low-storage conditions. Reservoir profile measurements and measurements at the Stone Corral Creek and Funks Creek releases may need to continue in the long term.

Measurements downstream of the release locations could be discontinued if the following conditions are met.

- Sites Reservoir has made releases for at least 2 years when the reservoir was at least 75% full.
- If native fish are found and ~~T~~temperature effects are determined~~found~~ to have little effect on ~~native fish~~the population(s) (e.g., if only short sections of the creeks below the dams experience temperature effects) or if flow and storage effects on creek temperatures are understood well enough that average daily creek temperatures can be estimated within 3°F based on meteorological conditions, flow, reservoir storage, and reservoir temperature profiles.

7.0 Reporting and Permit Requirements

7.1 Annual Reporting Requirements

Reporting requirements would be met through the preparation and submittal of annual and final reports as part of the ~~Stone Corral and Funks Creeks~~ Aquatics Study Plan that would be implemented as a part of the Authority's commitments and responsibilities to maintain fish in good condition consistent with CFGC Section 5937.

The first five annual reports would summarize the first 5 years of baseline conditions. All future (operation) reporting efforts would compare the conditions at that time to those collected during the baseline conditions.

~~Annual and Final Reports:~~ The following information would be addressed in comprehensive annual reports with multiple chapters covering fish, bioassessment, hydrogeomorphic, and temperature study results.

- **Fish Study Results**.: The annual report would include descriptions and locations of fish communities in Stone Corral Creek and Funks cCreeks, summarizing monitoring results in the study area. The report would document monitoring results and link results to objectives. The report would identify new or ongoing management issues, threats and stressors, and provide recommendations for future monitoring and management.
- **Bioassessment Results**.: The annual reports would include BMI, algae, water quality, and PHAB output and results and a summary of each of these indicators. The most recent version of the SWAMP *Stream Habitat Characterization Form, Full Version* field forms would be provided in appendix format, along with representative photography of the sampling reaches.
- **Hydrogeomorphic Results**.: The annual reports would include a summary of the monitoring methods; a summary and analysis of the hydrogeomorphic monitoring results, including an evaluation of site conditions in the context of the performance standards; a discussion of the monitoring results; a discussion of any modifications made to the monitoring methods; a discussion of the previous year's monitoring efforts; and photographs taken from the cross sections and longitudinal profiles.
- **Temperature Results**.: The annual reports would include a summary of temperatures that support the aquatic community under existing conditions, and a recommendation of reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam and Funks Creek downstream of Golden Gate Dam after operation has commenced.
- **Monitoring Program Evaluation**.: The annual reports would evaluate the Aquatic Study Plan to ensure that data (1) are collected efficiently, (2) address information needs, and (3) adequately assess resource responses to management actions. Changes in monitoring methods, protocols, or frequency would be summarized in the annual reports.
- **Objective Criteria Evaluation**.: Annual reports during operations would evaluate whether management actions are meeting project objectives or performance standards (described below). ~~Where the cause of fish and BMI community declines is understood, corrective actions would be recommended based on monitoring data or other scientifically defensible sources of information.~~ An assessment would be made as to causal factors of observed declines, including the potential role of external stressors outside the parameters of Project effects.

- **Adaptive Management Thresholds**.~~:~~ The link between the technical and decision-making steps requires regular interaction and exchange of information between technical staff and decision-makers. This would be accomplished by ~~bi-~~annual meetings ~~(approximately every 6 months)~~ involving the Authority and the ~~permitting~~ agencies where if necessary, both regulatory and technical expertise can be integrated into revising goals and objectives, adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed such that any new information discussed assists with the planning of upcoming seasonal work.

7.2 Performance Standards

Performance standards for the Aquatic Study Plan would be based on quantitative metrics. These performance standards would be designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the study reaches.

Fish community performance standards would include measures of community diversity and percent area occupied for both available and total reach distance within the study areas. BMI performance standards would likely include three main indicators—PHAB IPI scores, BMI CSCI scores, and algae ASCI scores. Geomorphic performance standards would focus on channel stability evaluations such as:(1) evidence of significant and detrimental morphologic changes at any of the cross sections; (2) evidence of channel headcutting; (3) significant loss of gravels via dam impoundment; and (4) significant decrease in the channel stability score during the duration of monitoring activities.

Performance standards would be developed in conjunction with the Authority and the relevant ~~permitting~~ agencies (CDFW, USFWS, and Colusa County ~~and the CVRWQCB~~) prior to the start of operation monitoring.

7.3 ~~Creek~~ Operations Plan

The Authority would use information from the results of implementation of this Aquatic Study Plan, including field studies described ~~below~~herein, to prepare the ~~Funks Creek and Stone Corral Creek~~ Operations Plan. The ~~Funks Creek and Stone Corral Creek~~ Operations Plan would describe the approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from Stone Corral Creek and Funks Creek, while also ensuring that the Project's flood protection benefits are realized. Further, the ~~Creek~~ Operations Plan would include, but would not be limited to, the approach for reservoir releases into ~~Funks Creek and~~ Stone Corral Creek and Funks Creek, including release schedules and volumes. As stated in the Authority's application to appropriate water, the ~~Creek~~ Operations Plan would be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

7.4 Anticipated Schedule

The following schedule is anticipated to result in a reduced workload once ~~after the initial year of sampling~~a range of flows is~~are~~ encountered with representative variability of environmental conditions (Table 3). For example, the field-based Hydrologic Study could possibly occur over the course of the 5 years leading up to dam construction and could terminate once a suitable range of flows has~~ve~~ been measured and analyzed. This~~ese~~ could ~~all~~ occur within 1 year if flow conditions are variable enough, but more than likely it will occur over a series of years.

Table 3. Anticipated years that each study will be needed to acquire a representative range of environmental conditions for baseline and post operation periods.

Year	Fish Community	Bioassessment Study	Water Quality	Water Temp.	Geomorphic Study	Hydrologic Study (desktop)	Hydrologic Study (field) *
Baseline							
2023	√	√	√	√	√	√	√
2024	√		√	√			√
2025	√	√	√	√			√
2026	√		√	√			√
2027	√	√	√	√			√
Post Operation							
2030	√	√	√	√	√		√
2031	√		√	√			
2032	√	√	√	√	√		√
2033	√		√	√			
2034	√	√	√	√	√		√

8.0 References

Commented [C80]: Red = no citation found in text for this reference.
Yellow = citation listed in text, but no matching reference listed in this section.

Commented [PJB1R80]: [illegible]

Commented [JH02R80]: [illegible]

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8.2 Personal Communications

Rehn, Andrew. Biologist, California Department of Fish and Wildlife. April 6, 2022—Phone conversation with Jeff Peters of ICF and Marco Sigala at Moss Landing Marine Laboratories regarding a suitable number of bioassessment sampling reaches on Funks Creek and Stone Corral Creek for the Sites Reservoir Project.

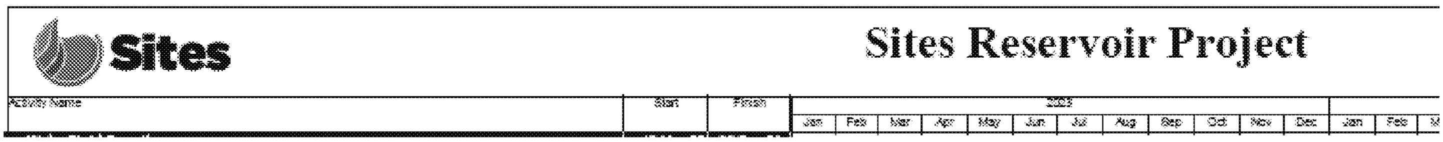
From: Jerry Brown [jbrown@sitesproject.org]
Sent: 12/14/2022 1:36:14 PM
To: David Hubbard [Dhubbard@BrwnCald.com]; mmaltby@brwncald.com
CC: Marcia Kivett [MKivett@sitesproject.org]
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

This looks great! Yes, please add a subtitle "Coordination Activities with State and Federal Agencies" and add a date to the document. Once I get the pdf and excel I'll provide that to my contact and we'll meet tomorrow to review. Thanks

---

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Wednesday, December 14, 2022 at 12:04 PM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Okay, a few more tweaks and we're at 8.5x11. Let me know if you'd like to add a header ***subtitle*** under "Sites Reservoir Project" or something like "confidential" or whatnot.



Excel file included with same activities and dates.

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

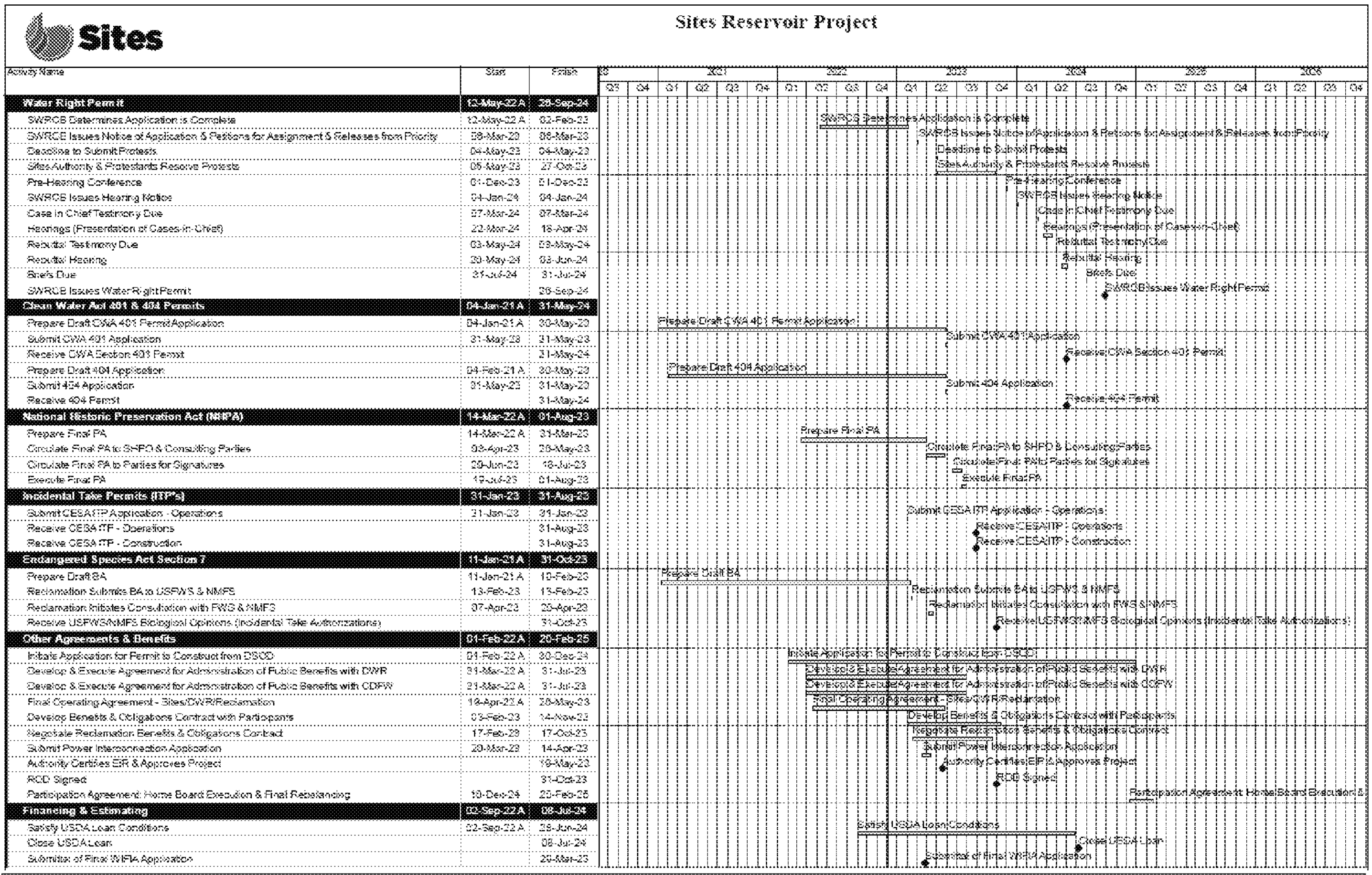
From: Jerry Brown <jbrown@sitesproject.org>
Sent: Wednesday, December 14, 2022 11:31 AM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Thanks - Is this enough to get us to one 8 ½ x 11 page?

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Wednesday, December 14, 2022 at 8:21 AM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

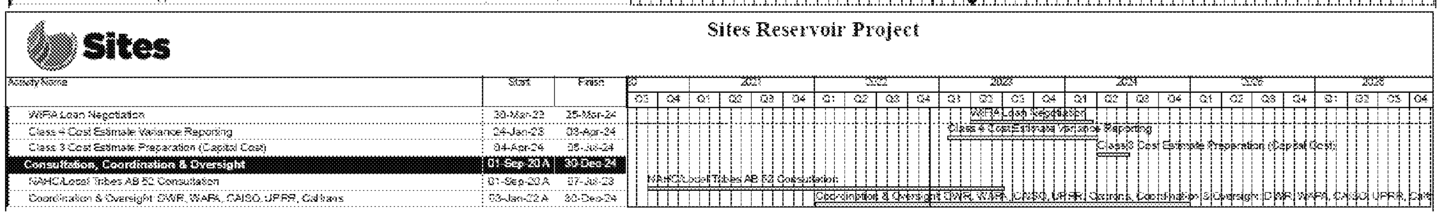
Added some codes for grouping and order and to get the WRP up top.
Also combined all of the Coordination & Oversight activities into one to reduce some of the clutter.

We can discuss whether to remove more activities in order to keep at one page landscape view or this can go to portrait view and make it on one page.
See attached, below.



Sites Reservoir Project

Activity Name	Start	Finish
Water Right Permit	**12-May-22 A**	**26-Sep-24**
SWRCB Determines Application is Complete	12-May-22 A	02-Feb-23
SWRCB Issues Notice of Application & Petitions for Assignment & Releases from Priority	08-Mar-23	08-Mar-23
Deadline to Submit Protests	04-May-23	04-May-23
Sites Authority & Protestants Resolve Protests	05-May-23	27-Oct-23
Pre-Hearing Conference	01-Dec-23	01-Dec-23
SWRCB Issues Hearing Notice	04-Jan-24	04-Jan-24
Case in Chief Testimony Due	07-Mar-24	07-Mar-24
Hearings (Presentation of Cases-in-Chief)	22-Mar-24	18-Apr-24
Rebuttal Testimony Due	03-May-24	03-May-24
Rebuttal Hearing	20-May-24	03-Jun-24
Briefs Due	31-Jul-24	31-Jul-24
SWRCB Issues Water Right Permit		26-Sep-24
Clean Water Act 401 & 404 Permits	**04-Jan-21 A**	**31-May-24**
Prepare Draft CWA 401 Permit Application	04-Jan-21 A	30-May-23
Submit CWA 401 Application	31-May-23	31-May-23
Receive CWA Section 401 Permit		31-May-24
Prepare Draft 404 Application	04-Feb-21 A	30-May-23
Submit 404 Application	31-May-23	31-May-23
Receive 404 Permit		31-May-24
National Historic Preservation Act (NHPA)	**14-Mar-22 A**	**01-Aug-23**
Prepare Final PA	14-Mar-22 A	31-Mar-23
Circulate Final PA to SHPO & Consulting Parties	03-Apr-23	28-May-23
Circulate Final PA to Parties for Signatures	20-Jun-23	18-Jul-23
Execute Final PA	19-Jul-23	01-Aug-23
Incidental Take Permits (ITP's)	**31-Jan-23**	**31-Aug-23**
Submit CESA ITP Application - Operations	31-Jan-23	31-Jan-23
Receive CESA ITP - Operations		31-Aug-23
Receive CESA ITP - Construction		31-Aug-23
Endangered Species Act Section 7	**11-Jan-21 A**	**31-Oct-23**
Prepare Draft BA	11-Jan-21 A	10-Feb-23
Reclamation Submits BA to USFWS & NMFS	13-Feb-23	13-Feb-23
Reclamation Initiates Consultation with FWS & NMFS	07-Apr-23	20-Apr-23
Receive USFWS/NMFS Biological Opinions (Incidental Take Authorizations)		31-Oct-23
Other Agreements & Benefits	**01-Feb-22 A**	**20-Feb-25**
Initiate Application for Permit to Construct from DSOD	01-Feb-22 A	30-Dec-24
Develop & Execute Agreement for Administration of Public Benefits with DWR	21-Mar-22 A	31-Jul-23
Develop & Execute Agreement for Administration of Public Benefits with CDFW	21-Mar-22 A	31-Jul-23
Final Operating Agreement - Sites/DWR/Reclamation	18-Apr-22 A	28-May-23
Develop Benefits & Obligations Contract with Participants	03-Feb-23	14-Nov-23
Negotiate Reclamation Benefits & Obligations Contract	17-Feb-23	17-Oct-23
Submit Power Interconnection Application	20-Mar-23	14-Apr-23
Authority Certifies EIR & Approves Project		19-May-23
ROD Signed		31-Oct-23
Participation Agreement: Home Board Execution & Final Rebalancing	10-Dec-24	20-Feb-25
Financing & Estimating	**02-Sep-22 A**	**08-Jul-24**
Satisfy USDA Loan Conditions	02-Sep-22 A	28-Jun-24
Close USDA Loan		08-Jul-24
Submittal of Final WIFIA Application		20-Mar-23



Sites Reservoir Project

Activity Name	Start	Finish
WIFIA Loan Negotiation	30-Mar-23	25-Mar-24
Class 4 Cost Estimate Variance Reporting	24-Jan-23	03-Apr-24
Class 3 Cost Estimate Preparation (Capital Cost)	04-Apr-24	05-Jul-24
Consultation, Coordination & Oversight	**01-Sep-20 A**	**30-Dec-24**
NAHC/Local Tribes AB 52 Consultation	01-Sep-20 A	07-Jul-23
Coordination & Oversight: DWR, WAPA, CAISO, UPRR, Caltrans	03-Jan-22 A	30-Dec-24

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

Brown AND Caldwell 75

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Tuesday, December 13, 2022 5:49 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Excellent! I need your help removing the clutter and the water rights sequence needs to jump off the page as the focal point. We can discuss tomorrow.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Tuesday, December 13, 2022 at 2:18 PM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Have come up with some options to review if time allows before we meet tomorrow.
Getting this to one page requires a "portrait view" on 11x17.
Versions are in this SharePoint folder:

Governor's Office

Schedules Library > Schedules - Amendment 3 > **Governor's Office**

Name

- Sites_Governor's View-5_2022.12.13.pdf
- Sites_Governor's View-5L_2022.12.13.pdf
- Sites_Governor's View-6_2022.12.13.pdf
- Sites_Governor's View-6P_2022.12.13.pdf
- Sites_Governor's View-7P_2022.12.13.pdf
- Sites_Governor's View-7PW_2022.12.13.pdf
- Sites_Governor's View-7_2022.12.13.pdf
- Sites_Governor's View-7W_2022.12.13.pdf

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

Brown and Caldwell 75

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Monday, December 12, 2022 6:31 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>

Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

I've received a request from the State to provide a special schedule report for the Sites Project that will allow them to monitor and engage in activities that would benefit from State administration intervention. I went through our Nov22 update and have highlighted the activity IDs that I believe would best meet the request (see attached). I would like you to prepare this report so that we can provide it to them with our monthly updates. Start with my highlights and expand/contract as needed to get the coverage that makes sense for sr mgr review as part of their strike team and something they can use for reports to the Governor. Report can be no more than 1 page and should be easy to read with not a lot of detail but should allow them to quickly identify the agency's and milestones of greatest concern for expediting the project. I have told them that water rights will likely be most significant for the foreseeable future. This is acknowledged but they still need other activities.

I'd like to meet with you both on Wed to review what you've put together (Marcia – pls get 30 min on the calendar for the 3 of us for Wed). I need to provide a 1st cut to my state contact before 10a Thurs. He needs a final to the Secretary by noon Friday.

Find below the items that were identified in the request to give a flavor of the kind of information they are looking for.

Thanks
Jerry

- The JPA in January 2022 submitted to the California Department of Fish and Wildlife an application for an incidental take permit (ITP) under the California Endangered Species Act for the *construction* of the project. This permit is slated to be completed by XXXX. The JPA has yet to submit an application for an ITP for the *operation* of the project – a process that could take at least six months after the final EIR is issued. This permit is slated to be completed by XXXX.
- To establish the public benefits for the project, which enables Prop 1 funding:
  - The JPA must secure a public benefits contract with CDFW and DWR for environmental flows, recreation, and incidental flood public benefits. This contract is slated to be completed by XXX.
  - The JPA must obtain agreements with the U.S. Bureau of Reclamation to deliver water to wildlife refuges north and south of the Sacramento-San Joaquin Delta. This agreement is slated to be completed by XXX.

- Arrangements must be made to cover costs that remain after Prop. 1 funding is taken into account. The JPA estimates this will be finished by June 2023.

- The JPA and Reclamation continue to prepare the draft Biological Assessment, a plan to protect species covered by the federal Endangered Species Act. This Biological Assessment is slated to be completed by XXX.

- The project needs a permit from the California State Historic Preservation Office. This permit application is anticipated by JPA to be submitted by XXXX, and then considered by XXX date

- The project needs a Section 404 permit from the U.S. Army Corps of Engineers. The JPA anticipates submitting the application by XXX, with consideration completed by XXX.

- The JPA gave the State Water Resources Control Board a draft Clean Water Act Section 401 permit in summer 2022 and revisions to the application are underway. Consideration of this permit is slated to be completed by XXXX.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Monday, December 12, 2022 at 7:28 AM
To: "mmaltby@brwncald.com" <mmaltby@brwncald.com>, Cheyanne Harris <CHarris@BrwnCald.com>, Benjamin Orsak <BOrsak@BrwnCald.com>, "bezzone@mbkengineers.com" <bezzone@mbkengineers.com>, Justin Davies <JDavies@BrwnCald.com>, JP Robinette <jrobinette@sitesproject.org>, Alicia Forsythe <aforsythe@sitesproject.org>, conner <conner@cmdwest.com>, "Risse, Danielle" <danielle.risse@hdrinc.com>, "Edwards, Dawn" <Dawn.Edwards@hdrinc.com>, "Luu, Henry" <henry.luu@hdrinc.com>, "Westcot, Cathy" <cathy.westcot@hdrinc.com>, "jelica.arsenijevic" <jelica.arsenijevic@hdrinc.com>, Joe Trapasso <jtrapasso@sitesproject.org>, Marcia Kivett <MKivett@sitesproject.org>, "laurie.warner.herson" <laurie.warner.herson@phenixenv.com>, Kevin Spesert <kspesert@sitesproject.org>, "Spranza, John" <john.spranza@hdrinc.com>, Jerry Brown <jbrown@sitesproject.org>
Subject: Sites Reservoir Project Schedule Updates December 2022

Howdy Sites Team – below link to the December folder with updated Schedules having Data Date of December 4, 2022. Should you have any questions or need to make changes, please reach out to me.

2022.12_December '22

Contents:

Schedules Library > Schedules - Amendment 3 > **2022.12_December '22**

Name

Sites Work Plan Progress Reporting_2022.12.08.pdf

Sites Work Plan Progress Reporting_Compare to Prior_2022.12.08.pdf

Sites Full Schedule Comparison to Last Month_2022.12.12.pdf

Sites Full Schedule_2022.12.12.pdf

Sites Key Deliverables_2022.12.12.pdf

Sites Milestones_2022.12.12.pdf

Sites Reclamation Schedule_2022.12.12.pdf

Sites Full Schedule with Predecessors & Successors_2022.12.12.pdf

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
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Sites

Meeting: **Joint Sites Reservoir Committee & Authority Board Agenda Item 2.1** **December 16, 2022**

Subject: **2023 – 2024 Proposed Sites Reservoir Test Pits, Fault Studies and Quarry Studies Final Initial Study and Mitigated Negative Declaration, Mitigation Monitoring and Reporting Program and Project Approval, Revised Staff Report as of December 14, 2022**

Requested Action:

Approve the following actions for the 2023 – 2024 Proposed Sites Reservoir Test Pits, Fault Studies and Quarry Studies (Project): (1) adoption of the CEQA Initial Study/Mitigated Negative Declaration (as revised); (2) adoption of the Mitigation Monitoring and Reporting Program; (3) approval of the Project; and (4) authorize the Executive Director to file all related notices and pay all related fees.

Detailed Description/Background:

Additional field investigations in Glenn, Colusa, and Yolo counties are being proposed to support the ongoing engineering evaluations and design development for the proposed Sites Reservoir and its associated facilities. These field investigations include test pits, fault studies, and quarry studies. Table 1 summarizes the type and number of studies by location. The following provides a brief description of each investigation type:

- Test Pits – Test pits would be used at proposed quarry locations to gather information regarding the quantity and quality of borrow materials proposed for dam and reservoir feature construction fill. In addition, test pits at other locations would provide information regarding pipeline trench stability analysis. Proposed test pit work areas[1], including equipment and vehicle staging areas and any overnight storage areas, would be up to approximately 50 feet wide by 50 feet long.

- Fault Studies – Fault trenches would be used to gather information regarding the location and stratigraphy of suspected and known fault traces/zones and to further evaluate the areas for evidence of last movement. Fault trenches have been sited at specific existing and suspected fault line locations in proximity to proposed Sites Reservoir features. Work areas for fault trenches would be up to approximately 40 feet wide and range from 100 to 1,000 feet long.

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[1] For the purposes of this report, work areas are inclusive of equipment and vehicle staging areas along with overnight equipment and vehicle storage areas.

- Quarry Studies – Quarry study trenches would be used to gather information regarding the quantity and quality of borrow materials proposed for dam and reservoir feature construction fill and to assess the means and methods needed to remove overburden and rock materials during construction. These investigations would be conducted by trenching in areas of planned quarries for the proposed Sites Reservoir. Work areas for the quarry studies, including equipment and vehicle staging areas, would be approximately 40 feet wide and range from 1,000 to 2,300 feet long.

Table 1. Investigation Types, Approximate Numbers and Depths, and Primary Access Routes by Proposed Sites Reservoir Feature

Proposed Sites Reservoir Feature	Approximate Numbers, Investigation Types, and Approximate Depths	Primary Access Route(s)
Sites Reservoir	Up to 76 test pits, 18 to 20 feet below grade Up to 9 fault studies, 10 to 15 feet below grade Up to 7 quarry studies, 15 to 20 feet below grade	Maxwell-Sites Road, Peterson Road, and overland travel
Near Funks Reservoir	Up to 3 test pits, 18 to 20 feet below grade Up to 2 fault studies, 10 to 15 feet below grade	Tehama Colusa Canal access road, existing gravel roads west of Funks Reservoir, overland travel
Terminal Regulating Reservoir and Pipeline	Up to 4 test pits, 18 to 20 feet below grade	Tehama Colusa Canal access road, existing gravel roads east of Funks Reservoir, overland travel. If needed, PG&E easement road
Dunnigan Pipeline	Up to 1 test pit, 18 to 20 feet below grade	Road 8, Road 90B, overland travel
Total	**Up to 84 test pits, 18 to 20 feet below grade** **Up to 11 fault studies, 10 to 15 feet below grade** **Up to 7 quarry studies, 15 to 20 feet below grade**	**N/A**
Note: There are no study locations on federal property. Some study locations may be accessed through federal property using access agreements in place between landowners and the Federal government.		

Upon completion of work, each area would be returned to pre-project or better conditions. The investigations are scheduled to occur between January 2023 and December 2024. The sequence would depend on site and seasonal conditions and landowner access. Each investigation would take 1-2 days to complete for a test pit, up to 4 days for a quarry study, and up to 25 days for a fault study. All activities would be performed on willing landowner parcels and public right of way.

California Environmental Quality Act

The Authority prepared a Draft Initial Study (IS) consistent with the State California Environmental Quality Act (CEQA) Guidelines which, along with a draft Mitigated Negative Declaration (MND), was circulated for public review and comment for a 30-day period between September 23 and October 22, 2022. The Draft IS considers two alternatives – the No Project and the proposed Project. The No Project reflects existing and reasonably foreseeable future conditions without the Project.

The IS identifies several standard protocols and procedures that are incorporated as part of the proposed Project and would be implemented before and throughout the investigations. The IS also identifies mitigation measures that would be implemented to avoid and minimize the potential for significant environmental impacts (see Attachment 1).

During the public review period, letters were received from the following: California Department of Fish and Wildlife (CDFW), California Department of Toxic Substances Control, and Central Valley Regional Water Quality Control Board. The comments received were mostly advisory in nature or required minor clarifications. Minor changes to mitigation measures have been made in response to CDFW comments (which are reflected in the Final IS). These changes result in equivalent or more effective mitigation when compared to the originally proposed measures. The Authority is not seeking reimbursement from Reclamation for this effort and thus, there is no federal involvement and no federal nexus for this effort.

The IS analysis concludes that the Project would not have significant impacts on the environment because:

- The Project would not impact several environmental resources due to the temporary, minimal and short-term nature of the Project activities and a lack of certain resources within or near the Project area. Resources with no impacts include the following: aesthetics and visual resources; minerals; population and housing; public services; fluvial geomorphology; flood control and management; recreation; forestry resources; utilities and service systems; and power production/energy.

- The Project would result in less-than-significant impacts on the following: land use and agriculture; water resources and water quality; air quality, climate change, and greenhouse gas emissions; transportation and traffic; noise and vibration; hazards and hazardous materials; and wildfire.
- With implementation of mitigation measures, the Project would result in less than significant impacts to biological resources, paleontological resources, cultural resources, and tribal cultural resources. A summary of required mitigation is provided in Attachment 1. These mitigation measures include adjustments to investigation locations to avoid known impacts or reduce known impacts to less than significant levels. Any location where known impacts cannot be avoided or reduced to less than significant levels will not be studied at this time. Measures are also included that will address the possibility of discovery of currently unknown resources during work efforts.

Based on agency comments and through discussion with tribes, three mitigation measures were improved after the issuance of the Draft IS and Draft MND. These included Mitigation Measure Bio-6, Giant Garter Snake; Mitigation Measure Cul-4 Conduct Archaeological and Tribal Sensitivity Training; and Mitigation Measure Cul-5 Conduct Archaeological and Tribal Monitoring. Each of these measures, as revised, is equivalent or more effective in mitigating environmental impacts as compared to the prior draft measures, and none of the changed measures themselves cause any potentially significant effect. A revised MND is included in Attachment C to this staff report. The revised MND was updated to reflect the required finding that each of these mitigation measures, as revised, are equivalent or more effective and do not cause any potentially significant effect.

A Final IS has been prepared to incorporate responses to the comments received and to update the Draft IS and appendices with minor changes. The Final IS and Mitigated Negative Declaration, which includes the Mitigation Monitoring and Reporting Program as an attachment are included as Attachment B to this staff report. Upon Project approval[2], the Authority will file a Notice of Determination with Glenn, Colusa, and Yolo Counties. Minor fees are required for filing this Notice, including a CDFW filing fee.

No environmental permits are required for the investigation efforts.

Prior Authority Board Action:

[2] The currently proposed geotechnical investigations constitute a set of preparatory actions to obtain requisite data to inform project design, engineering cost estimates, and permit requirements for the proposed future Sites Reservoir Project. These initial pre-project investigatory actions would not in any way commit the Authority or any other party to any definite course of action or decision regarding the proposed future Sites Reservoir Project, which currently is undergoing a comprehensive CEQA and NEPA review in an Environmental Impact Report/Environmental Impact Statement.

September 2022: The Authority Board and Reservoir Committee authorized the following activities related to the 2023 – 2024 Proposed Sites Reservoir Test Pits, Fault Studies and Quarry Studies: (1) the release of the Draft IS/MND including authorizing the Executive Director to file a Notice of Completion with the State Clearinghouse and complete other noticing requirements to initiate the public review process; and (2) the Executive Director to sign and submit the necessary permit applications including associated application fees, if any.

Fiscal Impact/Funding Source:

Actual costs to complete the CEQA compliance effort are within the amounts budgeted in the Amendment 3 Work Plan. At this time, no additional costs are anticipated beyond those budgeted for Amendment 3 to implement the proposed mitigation measures.

Staff Contact:

Ali Forsythe

Primary Service Provider:

HDR

Attachments:

Attachment A – Summary of Mitigation Measures in the Final IS

Attachment B – 2023 – 2024 Proposed Sites Reservoir Test Pits, Fault Studies and Quarry Studies Final Initial Study/Mitigated Negative Declaration

Attachment C – 2023 – 2024 Proposed Sites Reservoir Test Pits, Fault Studies and Quarry Studies Mitigated Negative Declaration, Revised as of December 14, 2022

Attachment A

Summary of Mitigation Measures in the Final Initial Study

Resource Area	**Summary of Mitigation Measures**
General	Conduct pre-investigation siting survey for biological, cultural, and Tribal resources; reprioritize or postpone proposed investigations if sensitive resources cannot be avoided.
Biological Resources	Conduct mandatory biological resources awareness training; general measures to avoid and minimize effects on sensitive biological resources; measures to avoid and minimize effects on waters of the U.S./State; species-specific measures for state and federally listed plant and animal species along with migratory birds and eagles; and decontamination of equipment for aquatic invasive species. Adjust work locations as needed to avoid known resources.
Paleontological Resources	Consult with qualified paleontologist if paleontological resources are discovered. Adjust work locations as needed to avoid known resources.
Cultural Resources	Avoid impacts on known cultural resources; conduct pre-activity pedestrian survey; prepare a post-review Discovery Plan; conduct archeological and tribal sensitivity training; conduct archeological and tribal monitoring, and immediately halt ground-disturbing activities if cultural resources or human remains are found and implement appropriate plans. Adjust work locations as needed to avoid known resources.
Tribal Cultural Resources	Avoid or preserve in place; treat resources with culturally appropriate dignity, and implement permanent conservation easements for any resources found. Adjust work locations as needed to avoid known resources.

LCMWC Long-term Planning Committee

Subject: **Sites Project Questions & Responses** Date: **December 2, 2022**

Summary:

The following is a list of questions developed in conjunction with LCMWC staff regarding the potential participation in the Sites Project and responses from the Sites Project staff. These questions and responses are intended to assist the LTPC to provide a recommendation to the Board should LCMWC be invited to participate in the Sites Project.

Questions/Clarifications:

We have received informal information regarding the timing of permit actions, construction and initial operations of the Sites Project (ref: 20220906.pdf). Are there important updates, including –

ITP and Water Right process, schedule and anticipated outcome?

Response: All actions are proceeding. Monthly updates are available in the staff report section of the Sites Project Board meeting minutes. In general, the Construction ITP application has been received by CDFW. Sites is working to provide CDFW will additional information before ~~and~~ a draft permit ~~is being~~ developed. Sites anticipates submitting an Operations ITP application to CDFW in early 2023. The water rights application has been accepted by the State Water Board and is being processed. Sites anticipates the issuance of the ITPs in the spring of 2023 and a water right hearing beginning in late 2023 / ~~the summer of~~early ~~2023~~2024.

Funding, loans, grants, … that would materially change the cost to participants?

Response: The funding portion of the financial position remains positive. Monthly updates are available in the staff report section of the Sites Project Board meeting minutes.

Reclamation participation?

Response: Reclamation is considering its participation level. Sites anticipates a formal declaration on this matter in the spring of 2023. For planning purposes, Sites is using a 16% participation level for Reclamation.

Please help us better understand the difference between participation with 'storage allocation' and participation with 'exchange'.

Response: CalAm Water has requested the 'exchange' position due to its regulatory issues as a large mutual water company that is regulated by the CA PUC.

Should LCMWC be invited to participate, does Sites anticipate that there is a potential to increase (or decrease) participation amounts in the future? In the current rebalancing period?

Response: Sites staff encourages all participants and those requesting participation to evaluate their needs and request the most accurate value. You will note at current participants (e.g.; The Valley District and Wheeler-Ridge Maricopa Water Storage District) have modified their request during the summer of 2022. Due to the potential for 'over participation requests' it is more likely to reduce participation request levels than increase request levels in the future.

If our needs change, how will participants acquire more share or reduce their participation in the Project?

Response: All such activities are addressed in the recently approved 'Guiding Principles' and their attachments, especially Attachment A.

Would the Sites Board/ Reservoir Committee consider increasing the LCMWC request to 1,000 AF? Would that be an advantage in our ability to be considered for participation?

Response: Sites would accept this request, if provided in writing. Please see the response above regarding increasing or decreasing participation level.

Use of SWP facilities is critical to LCMWC's participation. Central Coast Water Authority (CCWA) & Santa Barbara County Flood Control are our link to the SWP. They are not part of DCP. How would this limit or constrain our ability to move Sites water through the delta?

Response: Sites expects to use existing SWP facilities to convey water south of the Delta – generally during the 'transfer window'. The proposed DCP should not directly impact such conveyance activities.

Has DWR and participating SWP contractors made further progress on confirming the use of SWP permits, facilities (when otherwise available and within the transfer window) and accounting/billing agreements?

Response: Yes. ~~Sites water may be conveyed as SWP water or as non-project water depending on the desires of the Sites participant.~~ Four SWP contractors have expressed a desire to have all charges for Sites water to appear on their SWP bill so that such charges may be leveed on their region's property tax bills. Other SWP contractors do not have this need and would, therefore be billed directly for power and other conveyance cost. This interaction with DWR is being handled directly by the ~~leadership of the Reservoir Committee.~~ Participants and not being directed by the Authority.

Commented [JR1]: Ali to confirm.

Commented [AF2R1]: I deleted this as I don't think its technically SWP water as it wasn't developed under a SWP water right. Its some other weird category that I am not super familiar with. But some SWP contractors will have issue calling this SWP water, so deleted the text.

Draft_0021341

Should LCMWC be invited to participate, please confirm when invoices would be sent and payments required including initial 'catch-up' payments and then future normal cycle payments.

Response: Participation preliminary "soft call" decisions are not expected until ~~spring~~ mid-2023. Invitations for waitlisted agencies to participate would likely follow in late 2023. Invoices would follow those decisions.

Has the current re-balancing requests and plans changed Board policy regarding Sacramento Valley/south of the Delta goal? Is that goal likely to be modified to allow the increase in South of the Delta share?

Response: The 25% goal for Sacramento Valley participation remains in place.

Please confirm amounts the current operational plans/permit applications are using for:

- Fill rate and frequency
- Release capacity for conveyance across the Delta and for use by urban interests
- Storage and delivery ratios (participation to reservoir storage volume)

Response: The Project's water right application requests to fill the full 1.5 MAF reservoir at a rate of up to 4,200 cfs in any given year. There is no limitation or specification for release for conveyance across the Delta. Generally, the Project's Dunnigan Pipeline capacity is 1,000 cfs; however Sites can also release previously exchanged water from Shasta or Oroville for conveyance to members. The Authority is planning to convert the current yield-based participation to a storage-based participation. The current ratio is 6.234. ~~JP/Aly – please fill in this info or point us to the correct portion of a Board package~~

Commented [JR3]: Ali to take a cut at this.

Please confirm that participants in reservoir storage are expected to be able 'manage' the water stored within their allocate reservoir volume (with Board confirmation) to meet their needs. What are the constraints to allow others to utilize water stored in a participant's share of the reservoir?

Response: This is correct. Please see Appendix A of the "Benefits and Obligations Contract Final Guiding Principles and Preliminary Terms" for details

Considering the wide range of factors, including requests from Reclamation, potential legal actions for those requesting participation to assist in their GSPs, dates of requests, modified request levels, ..., what process will Sites use to determine participation and levels (amounts) for this rebalancing effort?

Response: This process has not been formalized

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 12/15/2022 11:52:31 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
CC: Arsenijevic, Jelica [jelica.arsenijevic@hdrinc.com]; Risse, Danielle [danielle.risse@hdrinc.com]; Lloyd, John [John.Lloyd@hdrinc.com]; Edwards, Dawn [Dawn.Edwards@hdrinc.com]; Conner McDonald [conner@cmdwest.com]; Kevin Spesert [kspesert@sitesproject.org]
Subject: Schedule for today's meeting
Attachments: Early Start_2022-10-28_with Clear for Construction)_2022-1215.mpp

I asked our scheduling folks to put the bio/cultural schedule into the original 10/28 file that Henry provided us and fix all of the broken logic. I started our "access" with 60% design which is an estimate of when we would get fee title.

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist
He/Him

HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916.679.8858 M 818.640.2487
john.spranza@hdrinc.com

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hdrinc.com/follow-us

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 12/15/2022 2:44:12 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]
CC: Arsenijevic, Jelica [jelica.arsenijevic@hdrinc.com]; Risse, Danielle [danielle.risse@hdrinc.com]; Lloyd, John [John.Lloyd@hdrinc.com]; Edwards, Dawn [Dawn.Edwards@hdrinc.com]; Conner McDonald [conner@cmdwest.com]; Kevin Spesert [kspesert@sitesproject.org]
Subject: RE: Schedule for today's meeting
Attachments: Early Start_2022-10-28_with Clear for Construction)_2022-1215.mpp

Fixed it. There was a few "start no sooner than" that did not belong

John Spranza

D 916.679.8858 M 818.640.2487

From: Spranza, John
Sent: Thursday, December 15, 2022 11:53 AM
To: aforsythe (aforsythe@sitesproject.org) <aforsythe@sitesproject.org>
Cc: Arsenijevic, Jelica <jelica.arsenijevic@hdrinc.com>; Risse, Danielle <danielle.risse@hdrinc.com>; Lloyd, John <John.Lloyd@hdrinc.com>; Edwards, Dawn <Dawn.Edwards@hdrinc.com>; Conner McDonald <conner@cmdwest.com>; Kevin Spesert <kspesert@sitesproject.org>
Subject: Schedule for today's meeting

I asked our scheduling folks to put the bio/cultural schedule into the original 10/28 file that Henry provided us and fix all of the broken logic. I started our "access" with 60% design which is an estimate of when we would get fee title.

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist
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From: JP Robinette [jrobinette@sitesproject.org]
Sent: 12/16/2022 8:05:59 AM
To: Tapia, Sharon@DWR [sharon.tapia@water.ca.gov]
Subject: Re: Sites request for DSOD engagement

Good morning, Sharon. I wanted to reach out and see if you had a few minutes to chat on the phone (or via Teams) before we get too far into the new year. I thought it might be good for us to talk a bit about the upcoming year at a high level. If you are willing to do that, I have listed some available times below. I think a half hour should be plenty. If these don't work, I can look further out.

Dec 28, 9am-2pm
Dec 29, 11:30am-3pm
Jan 4, 11:30am-2pm
Jan 5, 1pm-2:30pm
Jan 6, 10am-2pm

Thanks and Happy Holidays!

JP Robinette, P.E.
Engineering and Construction Manager | Sites Reservoir Project
801-819-4306
www.sitesproject.org

From: Tapia, Sharon@DWR <Sharon.Tapia@water.ca.gov>
Sent: Wednesday, February 16, 2022 12:05 PM
To: JP Robinette <jrobinette@sitesproject.org>
Cc: Henry.luu@hdrinc.com <Henry.luu@hdrinc.com>; Malvick, Erik@DWR <Erik.Malvick@water.ca.gov>
Subject: RE: Sites request for DSOD engagement

Hi JP,

Thanks for reaching out to start coordinating a meeting for Sites Reservoir. We had been anticipating that our involvement in the project was forthcoming this year.

Erik Malvick, who is cc'd on this email, is the Branch Manager of the Design Engineering Branch. He oversees all application work through the design and application approval processes. He is the best person to contact to start coordination efforts.

I look forward to the upcoming meeting and establishing an effective working relationship between DSOD and your team on this project.

Sharon

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Wednesday, February 16, 2022 11:37 AM
To: Tapia, Sharon@DWR <Sharon.Tapia@water.ca.gov>
Cc: Henry.luu@hdrinc.com
Subject: Sites request for DSOD engagement

Hello Sharon,

I am reaching out to you to provide an update on the Sites Reservoir Project. Members of our project team last met with you and other DSOD staff in early 2019 to discuss the Sites team, the project description, site conditions, project features, schedule and the path forward. Progress has been made since then on the project feasibility evaluation, and we are developing our approach for establishing project design criteria, engineering analyses, an extensive geotechnical investigation program, and preliminary designs that will be completed over the next couple of years.

We would like to request a briefing with you and your team on the Sites Reservoir Project sometime within the next two months, if possible. In advance of that meeting we would like to hold a call with DSOD's point of contact for the Sites Reservoir Project to discuss DSOD engagement, communication protocols, schedule, and the agenda for the briefing. We would also like to discuss DSOD fees for the project and the anticipated payment schedule.

Please let me know who is best to coordinate with at DSOD – we look forward to working with you and your team to advance this project.

Thank you,

JP Robinette, PE
Engineering and Construction Manager | Sites Project Authority
801-819-4306

From: David Hubbard [Dhubbard@BrwnCald.com]
Sent: 12/16/2022 8:23:05 AM
To: Jerry Brown [jbrown@sitesproject.org]; mmaltby@brwncald.com
CC: Marcia Kivett [MKivett@sitesproject.org]
Subject: RE: Sites Reservoir Project Schedule Updates December 2022
Attachments: Sites_Schedule Coordination State & Federal_2022.12.16.pdf; Sites Schedule Coordination State & Federal_2022.12.16.xlsx

Thanks for the clarifications, Jerry.
Attached new PDF and updated Excel file with activities and dates.

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, December 15, 2022 6:05 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Just off the call with State. See attached requested changes. Let me know if we need to discuss. Would like these complete tomorrow morning. Much appreciated.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Wednesday, December 14, 2022 at 1:56 PM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

You're welcome Jerry, and glad to help.
Okay, added header subtitle and date. New PDF and excel file are attached.

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Wednesday, December 14, 2022 3:36 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>

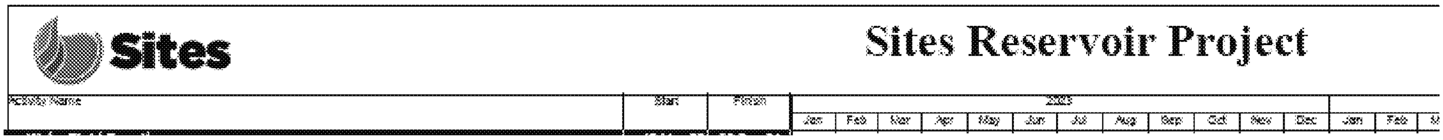
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

This looks great! Yes, please add a subtitle "Coordination Activities with State and Federal Agencies" and add a date to the document. Once I get the pdf and excel I'll provide that to my contact and we'll meet tomorrow to review. Thanks

---

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Wednesday, December 14, 2022 at 12:04 PM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Okay, a few more tweaks and we're at 8.5x11. Let me know if you'd like to add a header ***subtitle*** under "Sites Reservoir Project" or something like "confidential" or whatnot.



Excel file included with same activities and dates.

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Wednesday, December 14, 2022 11:31 AM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Thanks - Is this enough to get us to one 8 ½ x 11 page?

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Wednesday, December 14, 2022 at 8:21 AM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Added some codes for grouping and order and to get the WRP up top.
Also combined all of the Coordination & Oversight activities into one to reduce some of the clutter.
We can discuss whether to remove more activities in order to keep at one page landscape view or this can go to portrait view and make it on one page.
See attached, below.

Sites Reservoir Project

Activity Name	Start	Finish
Water Right Permit	**12-May-22 A**	**26-Sep-24**
SWRCB Determines Application is Complete	12-May-22 A	02-Feb-23
SWRCB Issues Notice of Application & Petitions for Assignment & Releases from Priority	06-Mar-23	06-Mar-23
Deadline to Submit Protests	04-May-23	04-May-23
Sites Authority & Protestants Resolve Protests	05-May-23	27-Oct-23
Pre-Hearing Conference	01-Dec-23	01-Dec-23
SWRCB Issues Hearing Notice	04-Jan-24	04-Jan-24
Case in Chief Testimony Due	07-Mar-24	07-Mar-24
Hearings (Presentation of Cases-in-Chief)	22-Mar-24	18-Apr-24
Rebuttal Testimony Due	03-May-24	03-May-24
Rebuttal Hearing	20-May-24	03-Jun-24
Briefs Due	31-Jul-24	31-Jul-24
SWRCB Issues Water Right Permit		26-Sep-24
Clean Water Act 401 & 404 Permits	**04-Jan-21 A**	**31-May-24**
Prepare Draft CWA 401 Permit Application	04-Jan-21 A	30-May-23
Submit CWA 401 Application	31-May-23	31-May-23
Receive CWA Section 401 Permit		31-May-24
Prepare Draft 404 Application	04-Feb-21 A	30-May-23
Submit 404 Application	31-May-23	31-May-23
Receive 404 Permit		31-May-24
National Historic Preservation Act (NHPA)	**14-Mar-22 A**	**01-Aug-23**
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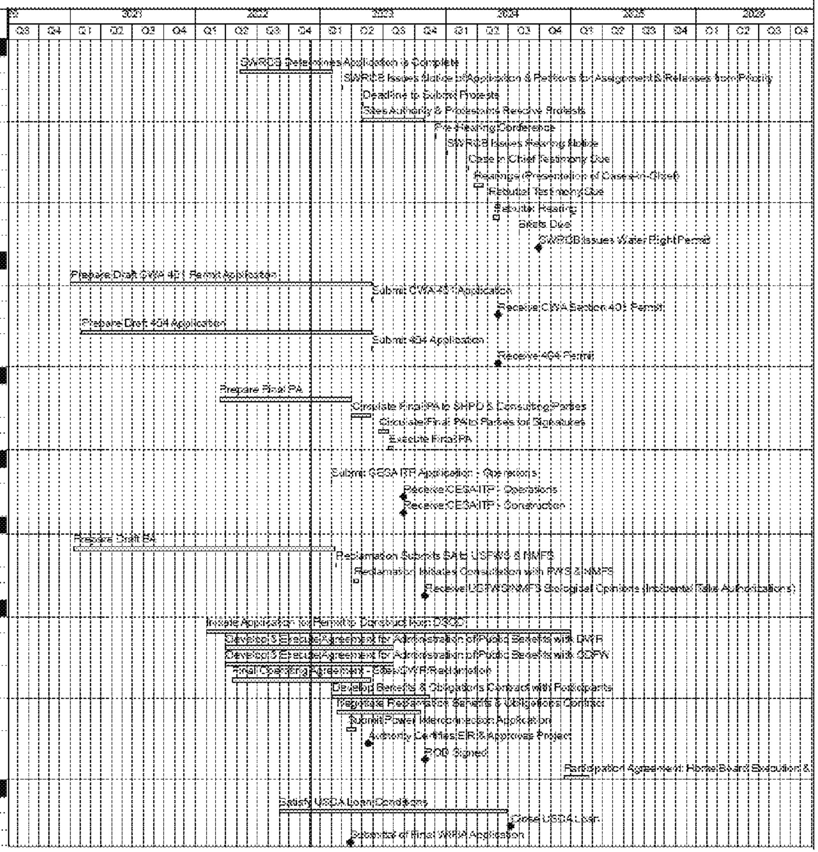
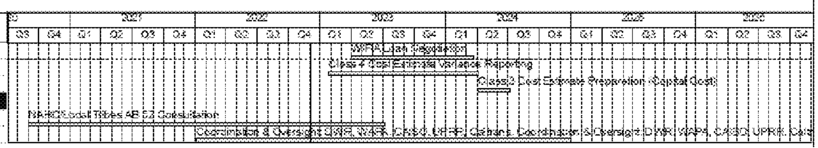
Circulate Final PA to SHPO & Consulting Parties	03-Apr-23	26-May-23
Circulate Final PA to Parties for Signatures	20-Jun-23	18-Jul-23
Execute Final PA	19-Jul-23	01-Aug-23
Incidental Take Permits (ITP's)	**31-Jan-23**	**31-Aug-23**
Submit CESA ITP Application - Operations	31-Jan-23	31-Jan-23
Receive CESA ITP - Operations		31-Aug-23
Receive CESA ITP - Construction		31-Aug-23
Endangered Species Act Section 7	**11-Jan-21 A**	**31-Oct-23**
Prepare Draft BA	11-Jan-21 A	10-Feb-23
Reclamation Submits BA to USFWS & NMFS	13-Feb-23	13-Feb-23
Reclamation Initiates Consultation with FWS & NMFS	07-Apr-23	20-Apr-23
Receive USFWS/NMFS Biological Opinions (Incidental Take Authorizations)		31-Oct-23
Other Agreements & Benefits	**01-Feb-22 A**	**20-Feb-25**
Initiate Application for Permit to Construct from DSOD	01-Feb-22 A	20-Dec-24
Develop & Execute Agreement for Administration of Public Benefits with DWR	31-Mar-22 A	31-Jul-23
Develop & Execute Agreement for Administration of Public Benefits with CDFW	31-Mar-22 A	31-Jul-23
Final Operating Agreement – Sites/DWR/Reclamation	19-Apr-22 A	26-May-23
Develop Benefits & Obligations Contract with Participants	23-Feb-23	14-Nov-23
Negotiate Reclamation Benefits & Obligations Contract	17-Feb-23	17-Oct-23
Submit Power Interconnection Application	20-Mar-23	14-Apr-23
Authority Certifies EIR & Approves Project		19-May-23
ROD Signed		31-Oct-23
Participation Agreement: Home Board Execution & Final Rebalancing	10-Dec-24	20-Feb-25
Financing & Estimating	**02-Sep-22 A**	**08-Jul-24**
Satisfy USDA Loan Conditions	02-Sep-22 A	25-Jun-24
Close USDA Loan		08-Jul-24
Submittal of Final WIFIA Application		29-Mar-23



Sites Reservoir Project

Activity Name	Start	Finish
WIFIA Loan Negotiation	30-Mar-23	25-Mar-24
Class 4 Cost Estimate Variance Reporting	24-Jan-23	03-Apr-24
Class 3 Cost Estimate Preparation (Capital Cost)	04-Apr-24	05-Jul-24
Consultation, Coordination & Oversight	**01-Sep-20 A**	**30-Dec-24**
NAHC/Local Tribes AB 52 Consultation	01-Sep-20 A	07-Jul-23
Coordination & Oversight: DWR, WAPA, CAISO, UPRR, Caltrans	03-Jan-22 A	30-Dec-24



Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

Brown AND Caldwell 75

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Tuesday, December 13, 2022 5:49 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

Excellent! I need your help removing the clutter and the water rights sequence needs to jump off the page as the focal point. We can discuss tomorrow.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Tuesday, December 13, 2022 at 2:18 PM
To: Jerry Brown <jbrown@sitesproject.org>, "mmaltby@brwncald.com" <mmaltby@brwncald.com>

Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: RE: Sites Reservoir Project Schedule Updates December 2022

Have come up with some options to review if time allows before we meet tomorrow.
Getting this to one page requires a "portrait view" on 11x17.
Versions are in this SharePoint folder:

Governor's Office

Schedules Library > Schedules - Amendment 3 > **Governor's Office**

Name

Sites_Governor's View-5_2022.12.13.pdf

Sites_Governor's View-5L_2022.12.13.pdf

Sites_Governor's View-6_2022.12.13.pdf

Sites_Governor's View-6P_2022.12.13.pdf

Sites_Governor's View-7P_2022.12.13.pdf

Sites_Governor's View-7PW_2022.12.13.pdf

Sites_Governor's View-7_2022.12.13.pdf

Sites_Governor's View-7W_2022.12.13.pdf

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Monday, December 12, 2022 6:31 PM
To: David Hubbard <Dhubbard@BrwnCald.com>; Marcus Maltby <mmaltby@BrwnCald.com>
Cc: Marcia Kivett <MKivett@sitesproject.org>
Subject: Re: Sites Reservoir Project Schedule Updates December 2022

I've received a request from the State to provide a special schedule report for the Sites Project that will allow them to monitor and engage in activities that would benefit from State administration intervention. I went through our Nov22 update and have highlighted the activity IDs that I believe would best meet the request (see attached). I would like you to prepare this report so that we can provide it to them with our monthly updates. Start with my highlights and expand/contract as needed to get the coverage that makes sense for sr mgr review as part of their strike team and something they can use for reports to the Governor. Report can be no more than 1 page and should be easy to read with not a lot of detail but should allow them to quickly identify the agency's and milestones of greatest concern for expediting the project. I have told them that water rights will likely be most significant for the foreseeable future. This is acknowledged but they still need other activities.

I'd like to meet with you both on Wed to review what you've put together (Marcia – pls get 30 min on the calendar for the 3 of us for Wed). I need to provide a 1st cut to my state contact before 10a Thurs. He needs a final to the Secretary by noon Friday.

Find below the items that were identified in the request to give a flavor of the kind of information they are looking for.

Thanks
Jerry

- The JPA in January 2022 submitted to the California Department of Fish and Wildlife an application for an incidental take permit (ITP) under the California Endangered Species Act for the *construction* of the project. This permit is slated to be completed by XXXX. The JPA has yet to submit an application for an ITP for the *operation* of the project – a process that could take at least six months after the final EIR is issued. This permit is slated to be completed by XXXX.
- To establish the public benefits for the project, which enables Prop 1 funding:
  - The JPA must secure a public benefits contract with CDFW and DWR for environmental flows, recreation, and incidental flood public benefits. This contract is slated to be completed by XXX.
  - The JPA must obtain agreements with the U.S. Bureau of Reclamation to deliver water to wildlife refuges north and south of the Sacramento-San Joaquin Delta. This agreement is slated to be completed by XXX.

- Arrangements must be made to cover costs that remain after Prop. 1 funding is taken into account. The JPA estimates this will be finished by June 2023.

- The JPA and Reclamation continue to prepare the draft Biological Assessment, a plan to protect species covered by the federal Endangered Species Act. This Biological Assessment is slated to be completed by XXX.

- The project needs a permit from the California State Historic Preservation Office. This permit application is anticipated by JPA to be submitted by XXXX, and then considered by XXX date

- The project needs a Section 404 permit from the U.S. Army Corps of Engineers. The JPA anticipates submitting the application by XXX, with consideration completed by XXX.

- The JPA gave the State Water Resources Control Board a draft Clean Water Act Section 401 permit in summer 2022 and revisions to the application are underway. Consideration of this permit is slated to be completed by XXXX.

From: David Hubbard <Dhubbard@BrwnCald.com>
Date: Monday, December 12, 2022 at 7:28 AM
To: "mmaltby@brwncald.com" <mmaltby@brwncald.com>, Cheyanne Harris <CHarris@BrwnCald.com>, Benjamin Orsak <BOrsak@BrwnCald.com>, "bezzone@mbkengineers.com" <bezzone@mbkengineers.com>, Justin Davies <JDavies@BrwnCald.com>, JP Robinette <jrobinette@sitesproject.org>, Alicia Forsythe <aforsythe@sitesproject.org>, conner <conner@cmdwest.com>, "Risse, Danielle" <danielle.risse@hdrinc.com>, "Edwards, Dawn" <Dawn.Edwards@hdrinc.com>, "Luu, Henry" <henry.luu@hdrinc.com>, "Westcot, Cathy" <cathy.westcot@hdrinc.com>, "jelica.arsenijevic" <jelica.arsenijevic@hdrinc.com>, Joe Trapasso <jtrapasso@sitesproject.org>, Marcia Kivett <MKivett@sitesproject.org>, "laurie.warner.herson" <laurie.warner.herson@phenixenv.com>, Kevin Spesert <kspesert@sitesproject.org>, "Spranza, John" <john.spranza@hdrinc.com>, Jerry Brown <jbrown@sitesproject.org>
Subject: Sites Reservoir Project Schedule Updates December 2022

Howdy Sites Team – below link to the December folder with updated Schedules having Data Date of December 4, 2022. Should you have any questions or need to make changes, please reach out to me.

2022.12_December '22

Contents:

Schedules Library > Schedules - Amendment 3 > **2022.12_December '22**

Name

- Sites Work Plan Progress Reporting_2022.12.08.pdf
- Sites Work Plan Progress Reporting_Compare to Prior_2022.12.08.pdf
- Sites Full Schedule Comparison to Last Month_2022.12.12.pdf
- Sites Full Schedule_2022.12.12.pdf
- Sites Key Deliverables_2022.12.12.pdf
- Sites Milestones_2022.12.12.pdf
- Sites Reclamation Schedule_2022.12.12.pdf
- Sites Full Schedule with Predecessors & Successors_2022.12.12.pdf

Dave Hubbard
Project Controls
Brown and Caldwell
Cell: 832.840.1789
dhubbard@brwncald.com

Brown AND Caldwell

From: Tapia, Sharon@DWR [Sharon.Tapia@water.ca.gov]
Sent: 12/16/2022 8:57:53 AM
To: JP Robinette [jrobinette@sitesproject.org]
Subject: RE: Sites request for DSOD engagement

Great!

Happy Holidays to you, too!

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Friday, December 16, 2022 8:55 AM
To: Tapia, Sharon@DWR <Sharon.Tapia@water.ca.gov>
Subject: Re: Sites request for DSOD engagement

That sounds good, Sharon. I will send an invite for Jan 5 at 1:30pm and will include Erik and Mikhail.

Happy Holidays!
JP

From: Tapia, Sharon@DWR <Sharon.Tapia@water.ca.gov>
Sent: Friday, December 16, 2022 8:36 AM
To: JP Robinette <jrobinette@sitesproject.org>
Subject: RE: Sites request for DSOD engagement

Hi JP,

Good to hear from you and thank you for offering to set up a short meeting. If you don't mind, I'd like to have Erik Malvick and Mikhail Ermakovich on the call as it would benefit them as well to hear any updates. With that and given the holdiays, the best time that would work is Jan. 5 or 6, but Jan. 5 is preferred.

Thanks,
Sharon

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Friday, December 16, 2022 8:06 AM
To: Tapia, Sharon@DWR <Sharon.Tapia@water.ca.gov>
Subject: Re: Sites request for DSOD engagement

You don't often get email from jrobinette@sitesproject.org. Learn why this is important

Good morning, Sharon. I wanted to reach out and see if you had a few minutes to chat on the phone (or via Teams) before we get too far into the new year. I thought it might be good for us to talk a bit about the upcoming year at a high level. If you are willing to do that, I have listed some available times below. I think a half hour should be plenty. If these don't work, I can look further out.

Dec 28, 9am-2pm
Dec 29, 11:30am-3pm
Jan 4, 11:30am-2pm
Jan 5, 1pm-2:30pm
Jan 6, 10am-2pm

Thanks and Happy Holidays!

JP Robinette, P.E.
Engineering and Construction Manager | Sites Reservoir Project
801-819-4306
www.sitesproject.org

From: Tapia, Sharon@DWR <Sharon.Tapia@water.ca.gov>
Sent: Wednesday, February 16, 2022 12:05 PM
To: JP Robinette <jrobinette@sitesproject.org>
Cc: Henry.luu@hdrinc.com <Henry.luu@hdrinc.com>; Malvick, Erik@DWR <Erik.Malvick@water.ca.gov>
Subject: RE: Sites request for DSOD engagement

Hi JP,

Thanks for reaching out to start coordinating a meeting for Sites Reservoir. We had been anticipating that our involvement in the project was forthcoming this year.

Erik Malvick, who is cc'd on this email, is the Branch Manager of the Design Engineering Branch. He oversees all application work through the design and application approval processes. He is the best person to contact to start coordination efforts.

I look forward to the upcoming meeting and establishing an effective working relationship between DSOD and your team on this project.

Sharon

From: JP Robinette <jrobinette@sitesproject.org>
Sent: Wednesday, February 16, 2022 11:37 AM
To: Tapia, Sharon@DWR <Sharon.Tapia@water.ca.gov>
Cc: Henry.luu@hdrinc.com
Subject: Sites request for DSOD engagement

Hello Sharon,

I am reaching out to you to provide an update on the Sites Reservoir Project. Members of our project team last met with you and other DSOD staff in early 2019 to discuss the Sites team, the project description, site conditions, project features, schedule and the path forward. Progress has been made since then on the project feasibility evaluation, and we are developing our approach for establishing project design criteria, engineering analyses, an extensive geotechnical investigation program, and preliminary designs that will be completed over the next couple of years.

We would like to request a briefing with you and your team on the Sites Reservoir Project sometime within the next two months, if possible. In advance of that meeting we would like to hold a call with DSOD's point of contact for the Sites Reservoir Project to discuss DSOD engagement, communication protocols, schedule, and the agenda for the briefing. We would also like to discuss DSOD fees for the project and the anticipated payment schedule.

Please let me know who is best to coordinate with at DSOD – we look forward to working with you and your team to advance this project.

Thank you,

JP Robinette, PE
Engineering and Construction Manager | Sites Project Authority
801-819-4306

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 12/16/2022 12:40:27 PM
To: Cohen, Ariel [Ariel.Cohen@hdrinc.com]; Patel, Trishna [Trishna.Patel@hdrinc.com]
Subject: Sites - Test Pits NOD
Attachments: Sites Test Pits_NOD_Signed.pdf

Importance: High

Heres the signed NOD. Sorry about the delay.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

---

From: Cohen, Ariel <Ariel.Cohen@hdrinc.com>
Sent: Friday, December 16, 2022 10:14 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Patel, Trishna <Trishna.Patel@hdrinc.com>
Subject: RE: State Clearinghouse CEQA Submit Role Request

Thanks for the update. Whenever it comes through is fine on my end!

Ariel Cohen
Environmental Planner
M 925.528.9929

hdrinc.com/follow-us

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Friday, December 16, 2022 10:13 AM
To: Cohen, Ariel <Ariel.Cohen@hdrinc.com>; Patel, Trishna <Trishna.Patel@hdrinc.com>
Subject: RE: State Clearinghouse CEQA Submit Role Request

Awesome. I am waiting on the file from Jerry. I ended up not going to the meeting in person today, so I am not there to get his hardcopy signature quickly. We might not get his signature until between noon and 1 PM.

Including Trishna also so she knows the slight schedule change.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Cohen, Ariel <Ariel.Cohen@hdrinc.com>
Sent: Friday, December 16, 2022 10:09 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Subject: RE: State Clearinghouse CEQA Submit Role Request

Hi Ali,

Yes, it went through. Thank you!
I can post the NOD to CEQAnet whenever you can send the signed file.

Ariel Cohen
Environmental Planner
M 925.528.9929

hdrinc.com/follow-us

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Friday, December 16, 2022 10:06 AM
To: Cohen, Ariel <Ariel.Cohen@hdrinc.com>
Subject: FW: State Clearinghouse CEQA Submit Role Request

I think I just approved this. Let me know if you did not get an email.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

CONFIDENTIALITY NOTICE: This communication with its contents may contain confidential and/or legally privileged information. It is solely for the use of the intended recipient(s). Unauthorized interception, review, use or disclosure is prohibited and may violate applicable laws including the Electronic Communications Privacy Act. If you are not the intended recipient, please contact the sender and destroy all copies of the communication.

From: CEQA Submit <noreply@state.ca.gov>
Sent: Friday, December 16, 2022 9:15 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Subject: State Clearinghouse CEQA Submit Role Request

The following CEQA Submit Registered User has requested a role, your approval is required.

If a role request is from a Responsible Agency, no action is required by the Lead Agency; SCH staff will approve or reject this request.

Name: Ariel Cohen
Work Email: ariel.cohen@hdrinc.com
Phone Number: 925-528-9929
Agency Name: Site Project Authority
Role Type: Submitter

Click Here to view the request

Sites

TO:	Ad Hoc Legislative & Outreach Committee
DATE:	March 18, 2022
SUBJECT:	State Government Affairs/Legislative Priorities

The Government Affairs Team have developed the following state government affairs/legislative priorities to focus our activities to align with key Amendment 3 milestones and align in a coordinated manner with our federal government affairs/legislative activities. This document covers the revised priorities thru December 31, 2022.

STATE FUNDING

Proposition 1/CWC

- Pursue opportunities to secure additional WSIP funding should additional funding become available
  - Approximately **$64 million** in unallocated WSIP funds are remaining that may be available to increase funding for Sites which is the only Rank 3 project that has not been fully funded.
  - Work with other Prop 1 Storage project proponents to secure inflation adjustments and coverage of State O&M cost.
  - Explore the potential for increasing the WSIP Early Funding that was awarded to the project from 5% to something greater. The current 5% allocation is scheduled to be expended by end of 2022.

Other State Appropriations/Bonds/Grants

- Pursue opportunities from potential **state bond measures** or **budget surplus funding** to offset project costs or to achieve beneficial financing mechanisms related to climate change adaptation, infrastructure development, drought resiliency, water resources and flood control.
- Potentially apply for loan funding through the **California Infrastructure and Economic Development Bank (IBank)** or other state programs for appropriate/eligible project components.
- Continue to track and pursue opportunities for state appropriations/grants to 1) offset project cost as appropriate for transportation, economic/workforce development, flood control, infrastructure planning, operations & maintenance, etc. 2) assist other local development through the use of Sites funding as cost share match for their grant assistance efforts.

STATE AGENCY COORDINATION

- Seek legislative assistance where needed to support
  - Development of the **DWR/SWP Coordinated Operations Agreement**.
  - Monitor activities of Sites/SWP Participants in their efforts to achieve agreement in principle (AIP) with DWR and other SWC's regarding the coordination of Sites into water management
  - Completion of the **Final** Draft Environmental Impact Report (EIR).
  - Coordinate with USBR's development of the Recirculated Draft Environmental Impact Statement (EIS).
  - Advance the Authority's **water rights application.**
  - Submit permit applications for CDFW for **ITP**.
  - Initiate coordination with Division of Safety of Dams (DSOD) in developing plan for geotechnical investigations at dam site.
  - Coordinate with other Prop 1 storage project proponents on general benefit agreement development to ensure terms and conditions of the Sites contracts are acceptable.

ELECTED OFFICIAL ENGAGMENT & NGO OUTREACH

- Ongoing engagement with state elected officials and their staff, administration officials and state agency leadership.
  - Planning for a State Legislative Day in **2nd Quarter 2022**. (In-person or virtual)
- Ongoing engagement with regional/local elected officials (Supervisors & City Council) and local government agencies.
  - Presentations to regional/local electeds (Counties, Cities, Special Districts).
- Ongoing engagement with public policy NGOs and Associations. Continued development of a state-wide project coalition.

Other items that do not require legislative/government affairs action but are administrative in nature are listed below. We will need to keep our legislators informed on progress of these items so that they can step in when/if needed to assist in keeping them on the timeline required to support the project schedule.

State Permitting - Ongoing consultation with state agencies to secure required state permits and agreements to advance the project.

Regional/Local Permitting & Agreements – Ongoing consultation and coordination with regional and local governmental agencies to advance necessary permits and agreements to advance the project.

EIR Public Outreach - Coordinate with appropriate state agencies on any public outreach activities associated with a recirculated EIR. AB 52 engagement with tribes and continued consultation activities. General community relations activities with the local community, project stakeholders, and the general public.

Sites Reservoir Project

Coordination Activities with State and Federal Agencies

16-Dec-22

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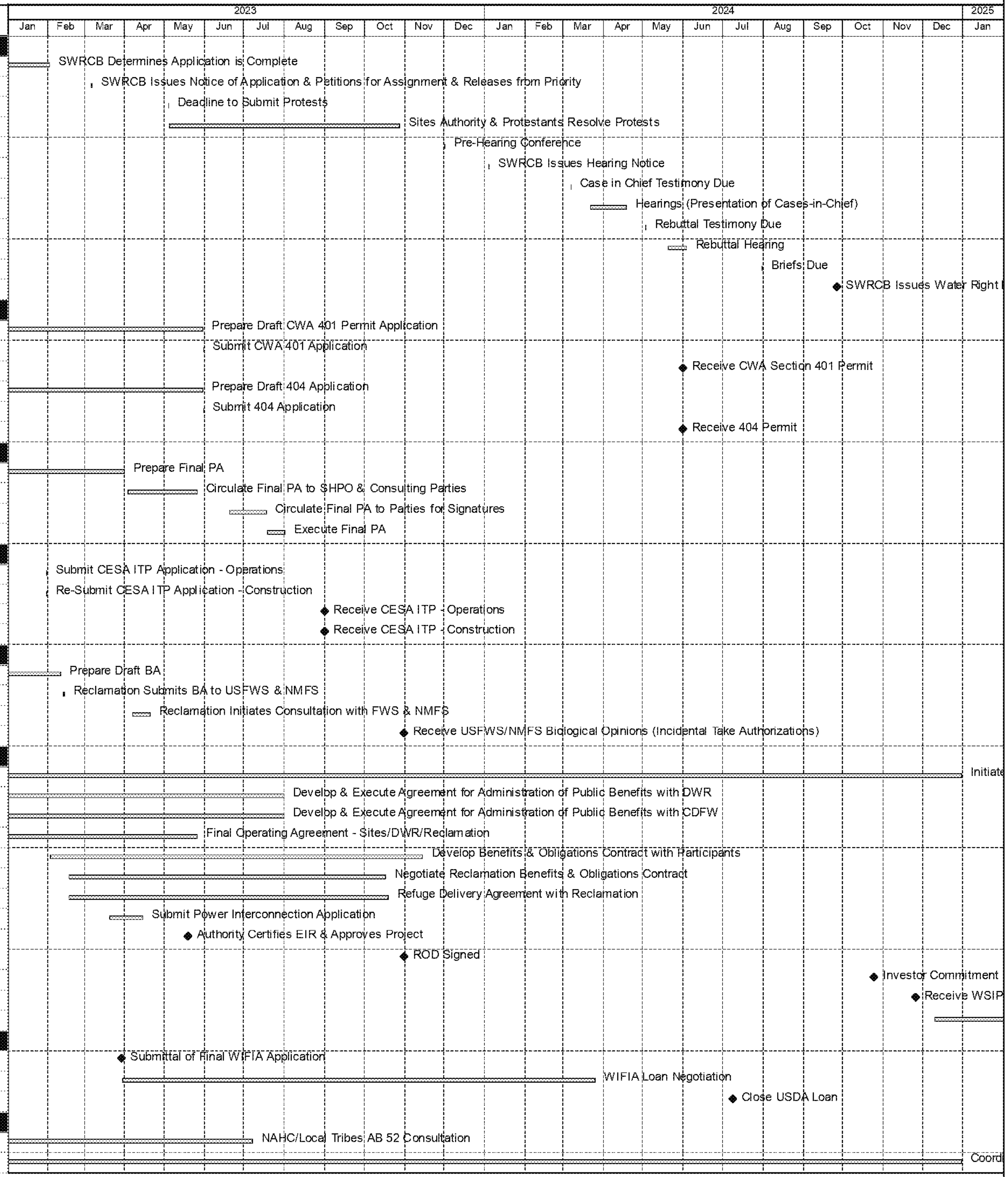
Re-Submit CESA ITP Application - Construction	31-Jan-23	31-Jan-23
Receive CESA ITP - Operations		31-Aug-23
Receive CESA ITP - Construction		31-Aug-23
Endangered Species Act Section 7	**11-Jan-21 A**	**31-Oct-23**
Prepare Draft BA	11-Jan-21 A	10-Feb-23
Reclamation Submits BA to USFWS & NMFS	13-Feb-23	13-Feb-23
Reclamation Initiates Consultation with FWS & NMFS	07-Apr-23	20-Apr-23
Receive USFWS/NMFS Biological Opinions (Incidental Take Authorizations)		31-Oct-23
Other Agreements & Benefits	**01-Feb-22 A**	**20-Feb-25**
Initiate Application for Permit to Construct from DSOD	01-Feb-22 A	30-Dec-24
Develop & Execute Agreement for Administration of Public Benefits with DWR	31-Mar-22 A	31-Jul-23
Develop & Execute Agreement for Administration of Public Benefits with CDFW	31-Mar-22 A	31-Jul-23
Final Operating Agreement - Sites/DWR/Reclamation	19-Apr-22 A	26-May-23
Develop Benefits & Obligations Contract with Participants	03-Feb-23	14-Nov-23
Negotiate Reclamation Benefits & Obligations Contract	17-Feb-23	17-Oct-23
Refuge Delivery Agreement with Reclamation	17-Feb-23	19-Oct-23
Submit Power Interconnection Application	20-Mar-23	14-Apr-23
Authority Certifies EIR & Approves Project		19-May-23
ROD Signed		31-Oct-23
Investor Commitment		24-Oct-24*
Receive WSIP Final Award from CWC		25-Nov-24
Participation Agreement: Home Board Execution & Final Rebalancing	10-Dec-24	20-Feb-25
Financing & Estimating	**29-Mar-23**	**08-Jul-24**
Submittal of Final WIFIA Application		29-Mar-23
WIFIA Loan Negotiation	30-Mar-23	25-Mar-24
Close USDA Loan		08-Jul-24
Consultation, Coordination & Oversight	**01-Sep-20 A**	**30-Dec-24**
NAHC/Local Tribes AB 52 Consultation	01-Sep-20 A	07-Jul-23
Coordination & Oversight: DWR, WAPA, CAISO, UPRR, Caltrans	03-Jan-22 A	30-Dec-24



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From: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
Sent: 12/19/2022 12:51:40 PM
To: Harris, Melissa [Melissa.Harris@icf.com]; Monique.Briard@icf.com
CC: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Sites Biweekly EIR/EIS Meeting

Hi Melissa and Monique,

Rather than cancel today, I have a scheduled a ½ meeting today without a specific agenda. Let's check in on the items I uploaded on Thursday (MR2, tables and Ch 2). I didn't have a chance to check in with Ali so don't have an update on MR8.

Thanks,

Laurie

-----Original Appointment-----
From: Laurie Warner Herson
Sent: Saturday, January 1, 2022 9:24 AM
To: Laurie Warner Herson; Harris, Melissa; Monique.Briard@icf.com; aforsythe@sitesproject.org
Subject: Sites Biweekly EIR/EIS Meeting
When: Monday, December 19, 2022 3:30 PM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Webex

Happy New Year !! Restarting our series of EIR/EIS coordination meetings in 2022.

-- Do not delete or change any of the following text. --

When it's time, join your Webex meeting here.

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Meeting number (access code): 2557 736 4173
Meeting password: UXsQvifd535 (89778433 from phones and video systems)

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Real Estate Team
Weekly Check-In – Agenda

Sites
Affordable Water, Sustainably Managed

Our Core Values – Safety, Trust and Integrity, Respect for Local Communities, Environmental Stewardship, Shared Responsibility and Shared Benefits, Accountability and Transparency, Proactive Innovation, Diversity and Inclusivity
Our Commitment – To live up to these values in everything we do

Meeting Information:

Date:	December 19, 2022	**Location:**	Virtual – Microsoft Teams
Start Time:	2:00 p.m.	**Finish Time:**	3:00 p.m.
Purpose:	Real Estate Team – Weekly Check-In		

Meeting Participants:

Kevin Spesert	Jeff Mathews	Trishna Patel
Conner McDonald	Caitlin Nielsen	

Agenda:

Discussion Topic	**Topic Leader**
1. Overview and Opening Comments	Kevin
2. Field Work – Previous Week Recap a. Geologic Outcrop Photography – Sites Canyon b. Geologic Outcrop Mapping – Sites Canyon c. Hot AC Asphalt Sealing - Colusa County d. Glenn County – Pavement Cores / North Access Road e. Storage Container Sealing	Conner / All
3. Field Work – Current and Upcoming a. Glenn County Road 69 Boring -- Northern Portion by Owens Ranch spoke with Mr Owens b. December 23 -- Funks Field Visit -- 9a at Office c. January 4 to 6 -- One Day -- TBD -- Funks Pre-Investigation d. January 9 -- Funks Work	Conner / All
4. Landowner Engagement – Recap, Current Engagement, Look-Ahead a. Red Stick Merge Piezometer R/E with Overall R/E b. Wells Ranch c. Banyan -- Signed Agreement; County Permits; Conner working with John and Jelica for specific Environmental Scope, Schedule, Locations, Expectations	Conner / Jeff / All

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d. Owens	
5. Local Coordination – Recap, Current Engagement, Look-Ahead a. USBR / TCCA – Funks Coordinated with Don Babb – 12/23 – Preliminary Visit Further Discussion with Don – January 4 to 6 – Funks Pre-Siting Field Work proposed for January d. GCID Coordination – Geotech Work Package 2 e. County Permits – Borings – Environmental Health Department 30 to 45 Days Colusa County – Banyan Glenn County – Owens Ranch – Landowner Signature	Conner / Jeff / All
6. Right-of-Way Manual a. Week of 12/19 – Conner and Jeff continued efforts towards 60%	Conner / Trishna
7. Project Team – Interdisciplinary Coordination a. Monthly Meeting – Charter Oaks Farm – Debrief b. Project Schedule Meeting – HR – Debrief c. Environmental Team – Tour – Water Board and USACE -- January 27? McDermott Road Turn-Out, Peterson Road, Funks d. Engineering Team -- HC -- Request to visit Funks while de-watered -- Mid to Late January e. Geotech Reporting – JP Request from Participants – ACWA Jelica working with Marcus to create reporting e. Construction Traffic -- Truck Circulation f. Mitigation Team – Meeting – January 23 Brad scheduled to join Pre-Meeting – 11:00am – Tentative g. Land Survey - Field Work - Georeferenced Locations -- Sutton Road, Wadleigh Road, Maxwell-Sites, Old Highway 99, I-5 -- pending Controls approval -- Field Work in late Winter / early Spring?	Conner / All
8. Administrative a. Bemmerly Ranch – Tom Butler – W-9 – Payment Request b. Banyan Ranch -- W-9 c. HDR Holidays -- 12/26 and 1/2	Conner
9. Open Discussion	All
10. Action-Item Recap	Caitlin

11. Next Steps	Kevin / Conner / All
12. Closing Thoughts	Kevin

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LEGEND
Sites Reservoir - 1.5 MAF Inundation Area
Existing Road
Construction
Current Year (1,347 acres)
Continuation (411 acres)
Completed (768 acres)
CONSTRUCTION YEAR 3
MILES
Sites
Preliminary Draft - Subject To Change
Maxwell Sites Rd


LEGEND
Sites Reservoir - 1.5 MAF Inundation Area
Existing Road
Construction
Current Year (683 acres)
Continuation (1,347 acres)
Completed (1,199 acres)
CONSTRUCTION YEAR 4
Maxwell Sites Rd
Sites
Preliminary Draft - Subject To Change

Number	Owner	County	Schedule Work Package 2-1/23 to 6/30/23
1	USA TCCA Government	Colusa	Work Package 2.01 - Start Timeframe of January 2023
2	GCID Canal APN, Owner Unknown	Colusa	Work Package 2.02 - Start Timeframe of February 2023
3	Owens, Glenn County	Glenn	Work Package 2.02 - Start Timeframe of February 2023
4	Banyan Transport Systems, Colusa County	Colusa	Work Package 2.03 - Start Timeframe of March 2023
5	Colusa County Road	Colusa	Work Package 2.03 - Start Timeframe of March 2023
6	Wells, Colusa County	Colusa	Work Package 2.06 - Start Timeframe of June 2023

Number	Owner	County	Schedule Work Package 3 - 7/1/23 to 12/31/23
1	Holthouse, Colusa County	Colusa	Work Package 3.07 - Start Timeframe of
3	Red Stick Farms, Colusa County	Colusa	Work Package 3.07 - Start Timeframe of
6	Cody Arnold, Colusa County	Colusa	Work Package 3.09 - Start Timeframe of
7	Jensen, Colusa County	Colusa	Work Package 3.09 - Start Timeframe of
8	GCID Canal APN, Owner Unknown	Colusa	Work Package 3.nov - Start Timeframe of
9	Mumma, Yolo County	Yolo	Work Package 3.x - Start Timeframe of
10	Tays Frank P & Marilyn E Family 15 Revoc Tr, Colusa County	Colusa	Work Package 3.x - Start Timeframe of
11	Todd M Hartill TBD, Red Stick, Colusa County 011-200-006 (011-200-013)	Colusa	Work Package 3.x - Start Timeframe of
12	USA TCCA Government	Yolo	Work Package 3.x - Start Timeframe of
13	Yolo County Bird Creek Drainage	Yolo	Work Package 3.x - Start Timeframe of

Number	Owner	County	Schedule Work Package 4-1/24 to 12/31/24
1	Aulman LLC, Yolo County	Yolo	Work Package 4 - Start Timeframe of
2	B&G Ranches, Colusa County	Colusa	Work Package 4 - Start Timeframe of
3	Brothers Doherty, Yolo County	Yolo	Work Package 4 - Start Timeframe of
4	Butler, Yolo County	Yolo	Work Package 4 - Start Timeframe of
5	C & H ORCHARDS III FARMING VENTURE LP, Yolo County	Yolo	Work Package 4 - Start Timeframe of
6	Christy Lee Snelgrove, Colusa County	Colusa	Work Package 4 - Start Timeframe of
7	Douglas Parker, Colusa County	Colusa	Work Package 4 - Start Timeframe of
8	Dunn Family Trust , Yolo County	Yolo	Work Package 4 - Start Timeframe of
9	Giutere Vineyard , Yolo County	Yolo	Work Package 4 - Start Timeframe of
10	Holthouse, Colusa County	Colusa	Work Package 4 - Start Timeframe of
11	Jensen, Colusa County	Colusa	Work Package 4 - Start Timeframe of
12	LaGrande, Brett, Glenn County	Glenn	Work Package 4 - Start Timeframe of
13	LaGrande, Colusa County	Colusa	Work Package 4 - Start Timeframe of
14	Mathis Family, Colusa County	Colusa	Work Package 4 - Start Timeframe of
15	Maureen Doherty, Colusa County	Colusa	Work Package 4 - Start Timeframe of
16	Morgan Twin Holdings LLC, Yolo County	Yolo	Work Package 4 - Start Timeframe of
17	MOUNTANOS TRUST / MICHAEL S MOUNTANOS TR & MORGAN TWIN HOLDINGS LLC ETAL / ATTN STEVE MORGAN, Yolo County	Yolo	Work Package 4 - Start Timeframe of
18	P Doherty, Yolo County	Yolo	Work Package 4 - Start Timeframe of
19	P Doherty, Yolo County	Yolo	Work Package 4 - Start Timeframe of
20	Richard Riolo, Yolo County	Yolo	Work Package 4 - Start Timeframe of
21	Ritchie Bros, Yolo County	Yolo	Work Package 4 - Start Timeframe of

Stone Corral Creek and Funks Creek Aquatic Study Plan

December 19, 2022

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Contents

Tables

Figures

Acronyms and Abbreviations

°F	degrees Fahrenheit
ADCP	acoustic Doppler current profiler
AFDM	ash-free dry mass
Aquatic Study Plan	Stone Corral Creek and Funks Creeks Aquatic Study Plan
ASCI	Algae Stream Condition Index
Authority	Sites Project Authority
BMI	benthic macroinvertebrate
cfs	cubic feet per second
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
Chico ABL	Chico Aquatic Bioassessment Laboratory
CPUE	catch per unit effort
CSCI	California Stream Condition Index
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
GCID	Glenn-Colusa Irrigation District
GIS	geographic information system
GPS	global positioning system
LiDAR	light detection and ranging
MPSL-MLML	Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories
Operations Plan	Stone Corral Creek and Funks Creek Operations Plan
PHAB	physical habitat
Project	Sites Reservoir Project
QA/QC	quality assurance/quality control
RBP	Rapid Bioassessment Protocol
REDEI/SDEIS	Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement
SQL	Structured Query Language
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TC Canal	Tehama-Colusa Canal
TCCA	Tehama-Colusa Canal Authority
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 Introduction and Purpose

1.1 Introduction

This Stone Corral Creek and Funks Creek Aquatic Study Plan (Aquatic Study Plan) has been prepared for the Sites Project Authority (Authority) to guide fisheries technical studies to be conducted prior to and during operation of the Sites Reservoir Project (Project), as well as ongoing monitoring during Project operations, if necessary. The Project is a proposed offstream storage project located on the west side of the Sacramento Valley in Glenn and Colusa Counties, approximately 10 miles west of the community of Maxwell. It is designed to store unappropriated water from winter and spring storm events in the northern Sacramento River watershed. The Project would impound 1.5 million acre-feet of water in a reservoir. The reservoir would be created by building Sites Dam on Stone Corral Creek, Golden Gate Dam on Funks Creek, and a series of saddle dams on the northeastern rims of Antelope Valley. While a portion of naturally occurring seasonal flows in Stone Corral Creek and Funks Creek would be retained in the reservoir, the primary source of water for the reservoir would be diversions from the Sacramento River. These diversions would be up to 4,200 cubic feet per second (cfs) via two existing facilities: the Red Bluff fish screen and pumping plant (operated by the Tehama-Colusa Canal Authority [TCCA]) and the Glenn-Colusa Irrigation District's (GCID) fish screen and pumping plant near Hamilton City.

1.2 Purpose of Aquatic Study Plan

As part of the Project alternatives development, the Authority has committed in the Project's Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (RDEIR/SDEIS), as well as in the Project's application to appropriate water, to prepare this Aquatic Study Plan and conduct technical studies on Stone Corral Creek and Funks Creek in the reaches of interest (i.e., the stream reaches below the dams), as well as the downstream reaches. The Authority is proposing the following special water right term to be included in its water right permit.

Within 1 year of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek under this permit, Permittee shall finalize this draft Aquatic Study Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's RDEIR/SDEIS to guide studies in Stone Corral Creek and Funks Creek that shall be implemented prior to and during construction activities to collect information necessary to address California Fish and Game Code Section (CFGC) 5937. This Aquatic Study Plan includes an assessment of fish assemblage and available habitat, flow characteristics, water temperatures, bioassessment monitoring, and method for reporting data. This Aquatic Study Plan shall be finalized in consultation with the California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS), and Colusa County. Permittee shall implement the Technical Studies Plan.

Using the results of the technical studies, within 5 years of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek under this permit, the Permittee shall develop a Stone Corral Creek and Funks Creek Operations Plan (Operations Plan) in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS. The Authority is proposing the following special water right term to be included in its water right permit.

---

[1] See Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS.

The Operations Plan shall describe Permittee's approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from those creeks under this permit, while also ensuring that the Project's flood protection benefits are realized. The Operations Plan shall include, but may not be limited to, the approach for reservoir releases into Stone Corral Creek and Funks Creek, including release schedules and volumes and a monitoring plan. The Operations Plan shall be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

Together, these studies would document the two creeks' existing hydrology, assess flow levels needed to maintain fluvial geomorphic processes, and update information on aquatic species presence and habitat use in the reaches downstream of the dams to establish aquatic baseline information that would be used to determine and subsequently manage environmental releases from the Project into the creeks. As part of the Aquatic Study Plan, studies would be initiated once access permission to the creeks through private property is obtained. The studies would also be used to inform final design for the proposed Sites Dam and Golden Gate Dam release facilities and operational requirements. The Aquatic Study Plan includes fish monitoring, a Surface Water Ambient Monitoring Program (SWAMP) bioassessment study, a hydrogeomorphic study, and a temperature study. Specific details for the field studies would be designed and conducted in collaboration with CDFW, USFWS and Colusa County.

The objectives of these studies are as follows.

- Determine existing fish assemblages in these creeks, including locations of fish species presence and habitat use.
- Characterize currently available habitats (e.g., spawning, rearing, foraging, and sheltering habitats) at varying flow levels, including the presence or absence of pools that persist through summer.
- Characterize flows, including assessing the baseflow during summer and conducting a fluvial geomorphologic study to characterize habitat conditions, substrate compositions, and flow levels.
- Conduct a SWAMP technical study (i.e., a stream bioassessment) that focuses on relationships between physical habitat (PHAB), water quality, and benthic macroinvertebrates.
- Implement hydrological studies to define flow temperature relationships.

This Aquatic Study Plan summarizes the methods and reporting strategies for the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. Using information obtained from these field studies, along with currently available information, the Authority would develop a schedule of releases for Stone Corral Creek and Funks Creek to be incorporated into the Operations Plan. Flow releases into these creeks would be made to maintain flood control benefits of the Project and would not overtop streambanks or flood downstream areas. The release schedule would also account for meeting demands of senior water right holders on Stone Corral Creek and Funks Creek consistent with the timing of the existing water right that are downstream from the proposed dams. Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies* of the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) describes the purpose, objectives, content, and timing of the field studies identified above.

Furthermore, if flows in Stone Corral Creek and Funks Creek are needed to maintain fish in good condition in compliance with CFGC Section 5937, then the Authority would adapt this study program into an operations monitoring program with a duration of 5 to 10 years to document and adaptively manage the timing and magnitude of flow releases to maintain fish in good condition below the dams along with the habitats upon which they depend. Performance standards would be developed in conjunction with the Authority and the relevant agencies (CDFW, USFWS, and Colusa County) prior to the start of operations monitoring.

1.2.1 Integration of Fish Monitoring with Aquatic Habitat Survey Methods

Aquatic habitat survey methods for sampling are described below. Note that the field observations and results from other studies (i.e., the stream bioassessment study and hydrogeomorphic study) would aid in the assessment of aquatic habitat and are referenced where applicable.

An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat and final locations would be discussed with CDFW and Colusa County to ensure appropriate placement. Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.

As part of the pre-operation sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study.

- **Fish community.** Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)
- **Substrate composition.** Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)
- **Riparian vegetation cover.** Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)
- **Benthic macroinvertebrate presence.** To better understand the entire aquatic community currently present in these creeks, an SWAMP bioassessment that focuses on the relationships between PHAB, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. The bioassessment study would be conducted using the methods described in the SWRCB's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study)
- **Water quality.** Monitoring for general water quality parameters (e.g., temperature, turbidity, pH, conductivity, salinity, and dissolved oxygen would be conducted to assess surface water quality. Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)
- **Water temperature.** Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into Funks Creek and intake levels for the release to Stone Corral Creek. The goal would be to mimic existing temperature profiles in Funks Creek.

1.3 Applicable Methods for Determining Operational Streamflows

After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP Bioassessment Study), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program,[2] the California Environmental Flows Framework,[3] and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on Stone Corral Creek and Funks Creek to maintain fish in good condition. Coordination with CDFW, USFWS, and Colusa County would be required before a method is selected.

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[2] https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow

[3] https://ceff.ucdavis.edu/

2.0 Environmental Setting

2.1 Environmental Setting of Stone Corral Creek and Funks Creek

Stone Corral Creek and Funks Creek are both small watersheds originating below the snowline on the eastern foothills of the California Coast Range at elevations of 700 to 850 feet. Consequently, they do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flow intermittently, mostly during winter and early spring. From their origins, they flow through low foothills, across Antelope Valley (the proposed location of Sites Reservoir), through a series of shallow canyons and eventually spill onto the Sacramento Valley floor (Figure 1). For much of their course on the valley floor, they are confined to narrow channels between berms along the edge of agricultural fields and road prisms. While the stream channels of these creeks are not actively managed, their straight alignment and angular turns around agricultural fields and along roads indicate that they were modified from their natural historic channels. In the upper parts of the watersheds just above the dam locations, these streams are largely devoid of riparian cover resulting from livestock use (Bureau of Reclamation and California Department of Water Resources 2008:3-20). In the lower reaches where the streams run through and around agricultural fields, shaded riparian habitat is sparse and consists mostly of low shrubs, grasses, occasional oaks[4] (*Quercus* sp.), willows (*Salix* sp.), and cottonwood (*Populus* sp.) trees.

2.1.1 Stone Corral Creek

Stone Corral Creek has a drainage area of 38 square miles upstream of the proposed Sites Dam. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal (TC Canal) and begins to travel through agricultural lands. About 3 miles below the TC Canal siphon, Stone Corral Creek crosses the GCID Main Canal. Although most of the water in the canal passes under Stone Corral Creek in a siphon, GCID releases water from the canal into Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below the GCID Main Canal, Funks Creek flows into Stone Corral Creek, and then Stone Corral Creek flows an additional 5 miles to the Colusa Basin Drain. Figure 2 shows these various elements.

The U.S. Geological Survey (USGS) collected 27 years of discharge measurements at USGS Gage No. 11390672, in Stone Corral Creek near the community of Sites, California, from 1958 through 1985 (Figure 3). The data demonstrate a high variability of flow over the period of record, and there were 3 years of zero flow: 1972, 1976, and 1977 (Figure 4). Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. The maximum annual discharge during the period of record was 39.9 thousand acre-feet (TAF) in 1983. Based on the USGS period of record, mean annual daily discharge for the period of record was calculated as 9.02 cfs (SD of 67.5, median is 0) and annual average discharge was 6.5 TAF per year.

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[4] According to Colusa County, there are no oaks east of Mills Orchard Road east of Stone Corral Creek nor approximately east of Funks Reservoir.

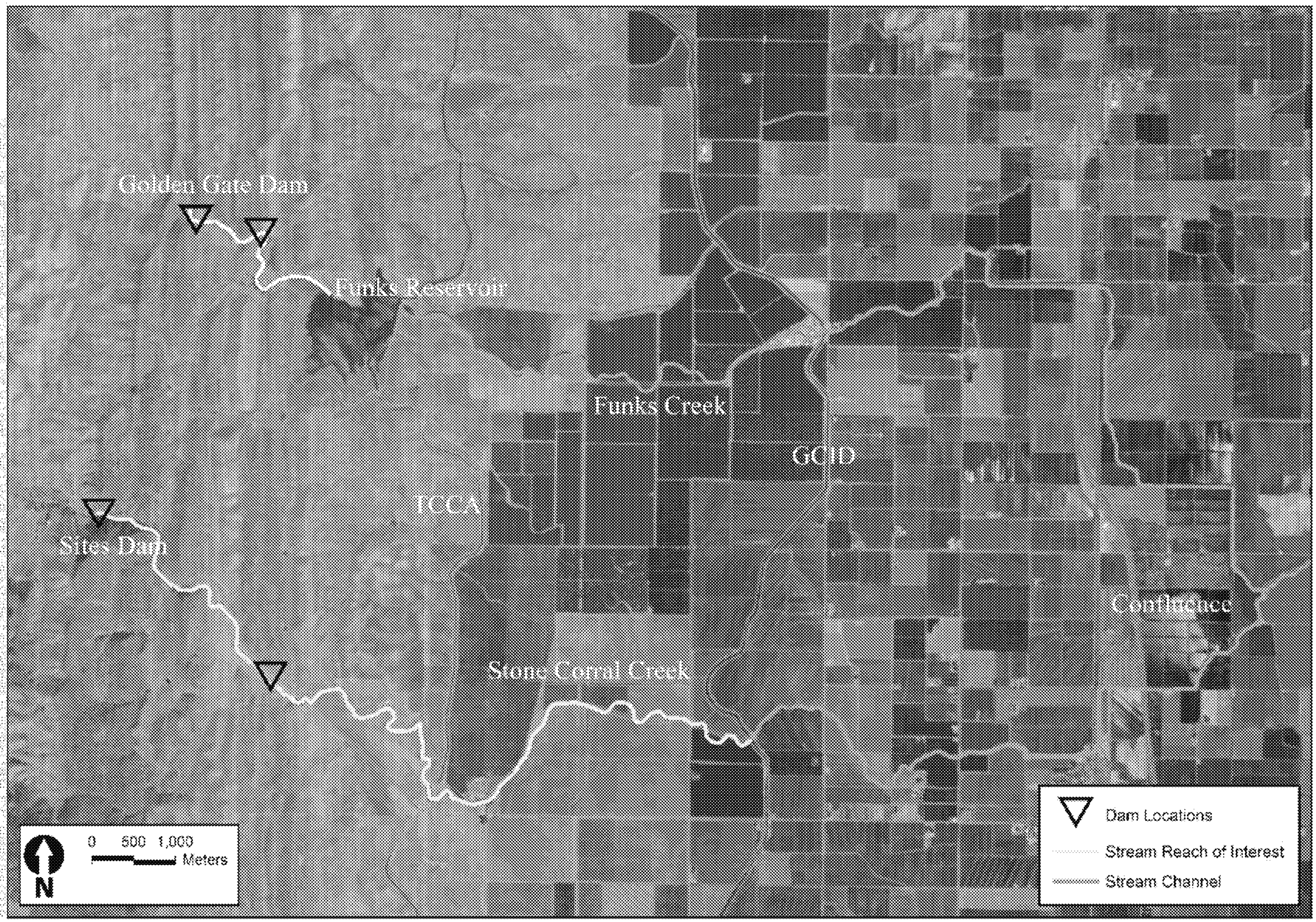


Figure 1. Stone Corral Creek and Funks Creek Reaches of Interest and Downstream Reaches

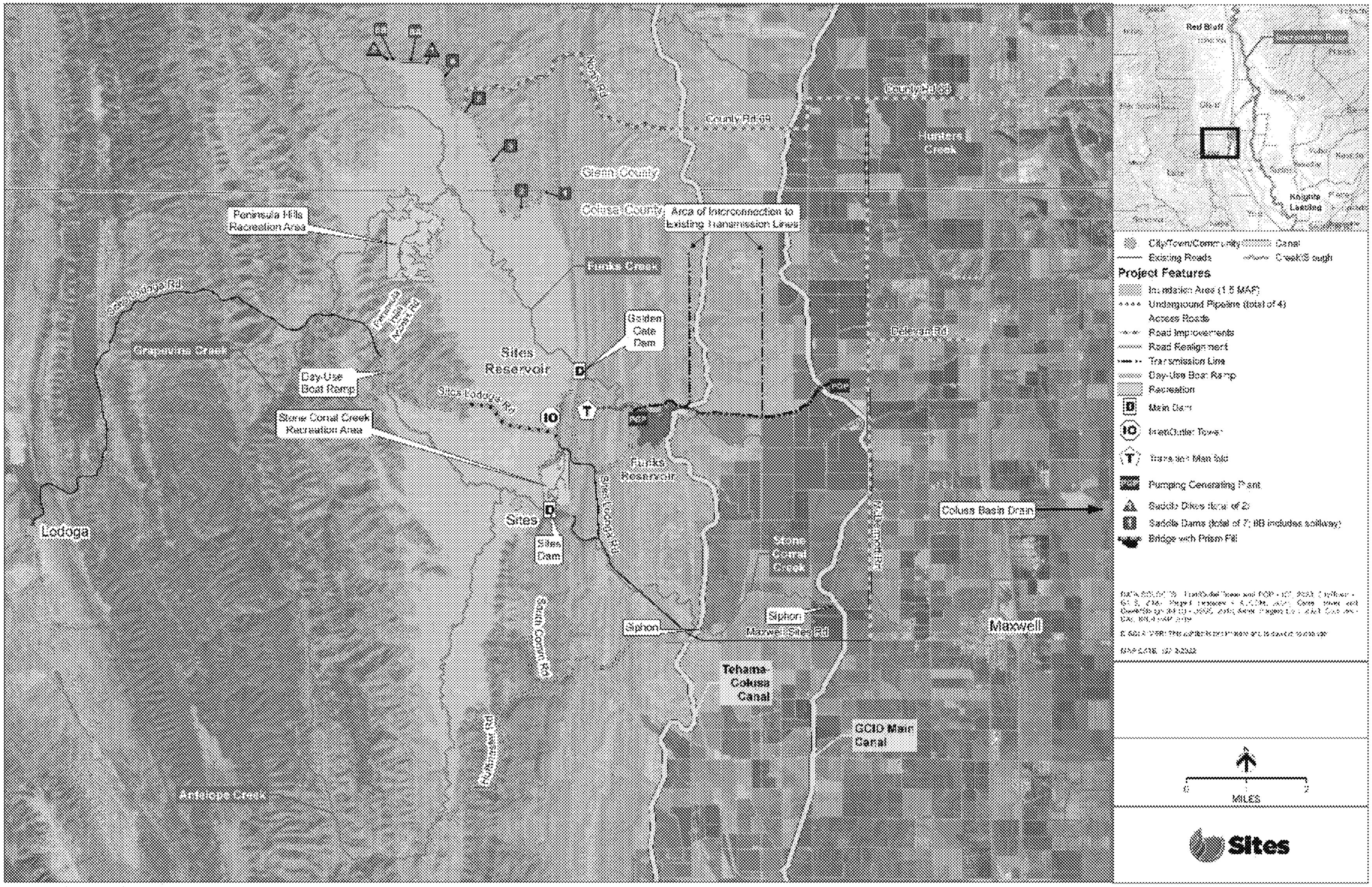


Figure 2. Project Area Overview

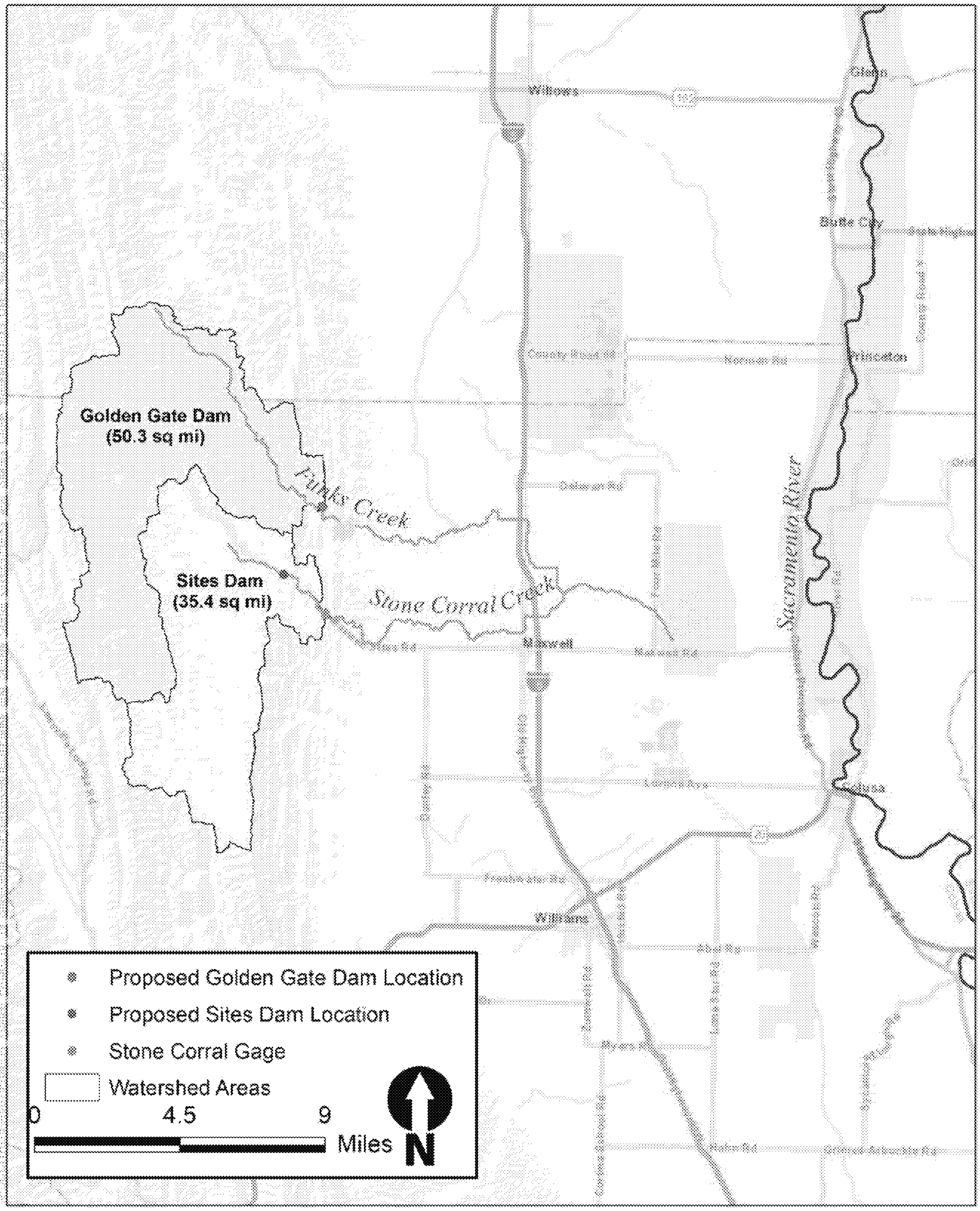
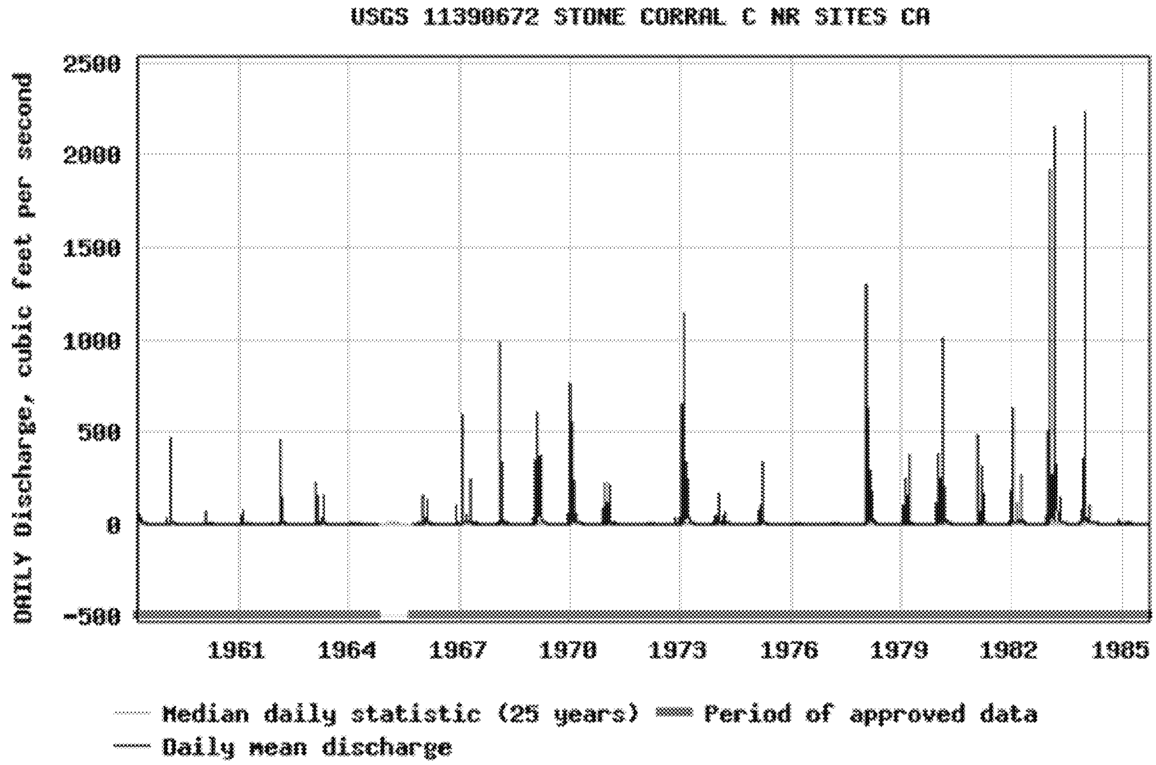


Figure 3. Stone Corral Creek and Funks Creek Watersheds Upstream of Proposed Sites Dam and Golden Gate Dam Locations. The Stone Corral Creek Gage Location captures the entire Sites Dam watershed (35.4 sq mi) upstream.



Source: U.S. Geological Survey stream gage 11390672

Figure 4. Mean Daily Flow in Stone Corral Creek near Sites (cfs)

Because the historical gage record for Stone Corral Creek is limited and Funks Creek is not gaged, historical stream gage data from Elder Creek was used to produce a longer-term estimate of streamflow on Stone Corral Creek and Funks Creek. The Elder Creek gage was chosen because it was the nearest gage on the valley floor with a long record of data available. It was assumed that Elder Creek has relatively similar precipitation and runoff patterns to Stone Corral Creek and Funks Creek. The streamflow of Elder Creek, located in Tehama County, has been measured since 1948 (USGS Gage No. 11379500). The gage site is approximately 49 miles northwest of the proposed Sites Reservoir, and has a drainage area upstream of the gage of 92.4 square miles (Attachment 1- MBK Engineers 2022). The overlapping period of gage records for Stone Corral Creek and Elder Creek (1958–1985) was used to determine a logarithmic correlation between the two gages for each month of the year. The developed streamflow timeseries was then further adjusted to account for the difference in watershed areas upstream of the old USGS Stone Corral Creek gage and the proposed location of Sites Dam. Tables 1a and 1b provide the results of this analysis, which shows the average monthly flow volume in acre-feet per year and cubic feet per second for each water year type (MBK Engineers 2022). The average monthly volumes are calculated using the gage record for October 1958 through August 1985 with logarithmic monthly correlations for September 1985 through September 2021. Results are summarized by Sacramento Valley Water Year Type: wet, above normal, below normal, dry, and critical.

Table 1a. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	42	11	2	5	0	17
Dec	872	242	29	47	54	336
Jan	3,365	2,825	711	345	171	1,663
Feb	4,487	4,667	1,283	135	307	2,317
Mar	2,135	1,522	407	264	179	1,039
Apr	901	319	114	25	35	375
May	136	119	15	7	9	65
Jun	20	8	2	1	1	8
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	11,959	9,713	2,562	828	757	5,827

Table 1b. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	21	6	1	3	0	9
Dec	436	121	15	24	27	168
Jan	1,683	1,413	356	173	86	832
Feb	2,244	2,334	642	68	154	1,159
Mar	1,068	761	204	132	90	520
Apr	451	160	57	13	18	188
May	68	60	8	4	5	33
Jun	10	4	1	1	1	4
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	5,980	4,857	1,282	415	378	2,910

2.1.2 Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 50.3 square miles upstream of the proposed Golden Gate Dam. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir

is a re-regulating reservoir on the TC Canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA to manage water levels within the TC Canal. The Funks Dam gates are opened during large storm events to pass flood waters through Funks Reservoir and down Funks Creek to avoid compromising the TC Canal and its operations. With the exception of passing flood waters, the Funks Dam gates are operated in the closed position, but seepage through the dam gates maintains perennial flow for a short distance below the dam in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID Main Canal. While the GCID Main Canal passes under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek. Similar to Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.

There is no flow record for Funks Creek, but given the comparable size, geology, and topography of the two watersheds and their proximity to each other, Funks Creek seasonal flow patterns and flow magnitudes are likely similar to Stone Corral Creek.

The same correlation approach used to estimate streamflow in Stone Corral Creek cannot be followed to estimate streamflow in Funks Creek because there are no streamflow data available for Funks Creek. Therefore, flow in Funks Creek was estimated by prorating monthly Stone Corral Creek streamflow data by the ratio of Stone Corral Creek's and Funks Creek's watershed areas upstream of the proposed dam locations (MBK Engineers 2022). Tables 2a and 2b provide the results of this analysis and identify the average monthly flow volume in acre feet per year and cubic feet per second for each water year type.

Table 2a. Funks Creek Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	60	16	3	7	1	24
Dec	1,239	343	41	66	77	485
Jan	4,778	4,011	1,010	489	243	2,362
Feb	6,372	6,628	1,822	192	436	3,290
Mar	3,031	2,161	578	375	255	1,475
Apr	1,280	453	162	36	49	553
May	193	169	21	9	13	93
Jun	28	11	2	1	2	12
Jul	2	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	16,984	13,793	3,638	1,176	1,075	8,275

Table 2b. Funks Creek Average Monthly Flow Volume (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	30	8	2	4	1	12
Dec	620	172	21	33	39	243
Jan	2,389	2,006	505	245	122	1,181
Feb	3,186	3,314	911	96	218	1,645
Mar	1,516	1,081	289	188	128	738
Apr	640	227	81	18	25	277
May	97	85	11	5	7	47
Jun	14	6	1	1	1	6
Jul	1	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	8,492	6,896	1,820	588	538	4,148

2.1.3 Physical Characteristics

The only drainages that exit Antelope Valley are Stone Corral Creek and Funks Creek. Each creek continues through the steeper, foothill environments and then transitions to the Sacramento Valley floor, where each is generally shallow and highly altered, primarily for water conveyance and agricultural purposes. Straight channels and angular turns associated with agricultural fields and roads indicate that natural channels have been at least partially modified. Along their reaches on the valley floor, these creeks are mostly confined to narrow channels between berms adjacent to agricultural fields and road prisms.

Stone Corral Creek and Funks Creek are largely devoid of riparian habitat in their upper reaches (foothill environments) due to heavy livestock use. In the lower reaches where the creeks run through and around agricultural fields, riparian habitat is variable and consists mostly of low shrubs, grasses, occasional oak, willows and cottonwood trees; however, some segments of Stone Corral Creek possess dense stands of mature riparian vegetation.

Although the reaches of interest have been modified by livestock grazing, channelization, irrigation conveyance systems and minor diversions, they are still expected to have available aquatic habitat (i.e., benthic macroinvertebrate [BMI]). They also both experience much of their natural hydrograph (albeit altered due to local conveyance) and fluvial geomorphic processes and provide water and sediment that ultimately flows into the Colusa Basin Drain during rain events.

3.0 Fish Monitoring

3.1 Purpose of Fish Monitoring Program

The purpose of a fish monitoring program in Stone Corral Creek and Funks Creek downstream of Sites Reservoir is to establish a pre-project baseline and post-operation assessment of the fish species present to determine the existing state of the fish population and whether it is maintained in good condition consistent with CFGC Section 5937 after project construction and operation.

3.2 Overview of Proposed Methods

Assessment of the goal to maintain fish in good condition in these ephemeral creeks consistent with CFGC Section 5937 would be made using a Before-After-Control-Impact experimental study design, using the reach with perennial flow below Funks Reservoir as a control. Sampling would be conducted to assess fish community and habitat present in the study area for up to 5 years prior to operation of the Project. Following completion of the pre-operation survey, fish communities and aquatic habitats in the study area would be monitored in a similar fashion for a 5-to-10-year period after the Project is operational. Fish community and habitat data that showed statistically significant negative departures from baseline data would trigger reassessment of downstream flow management under a proposed adaptive management plan.

3.2.1 Pre-operation Baseline Monitoring

Pre-operation baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (Chapter 4, *SWAMP Bioassessment Study Designs and Methodology*), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-operation sampling.

The pre-operation surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-operation efforts would be summarized into yearly reports and a final pre-operation baseline report to the Authority at the end of the pre-operation survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-operation conditions.

3.2.2 Operations Monitoring

Operations monitoring would occur periodically at the intervals specified herein. Operations sampling would document fish abundance, condition, and distribution and compare the results with data collected on habitat area, location, and climate-driven changes in habitat characteristics over time. Data from the fish study would be used in documenting compliance with CFGC Section 5937 with data from the SWAMP assessments providing additional details on overall stream status.

Operations sampling methods would be identical to the pre-operation sampling, including returning to established stations and tracking fish abundance, diversity, and distribution through time. Threats and stressors identified in the pre-operation survey would be assessed during operations surveys to differentiate changes in habitat or fish communities not related to the operation of the Project. Data collected as part of the operations sampling effort would be compared against the baseline data, as well as previous years' data and summarized into interim and final reports.

3.2.3 Fish Sampling Methods

Beach Seining

Seining is a low cost, low impact method for capturing aquatic organisms. The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species, and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.

Circumstances that may affect efficacy include the amount or type of benthic structure, presence/absence of aquatic vegetation, water clarity, flow rate, and water depth. Seining is most effective in smooth bottom habitats free of aquatic debris or vegetation, with elevated turbidity, and are shallow enough for biologists to wade in. When benthic structure is complex, water clarity is high, and habitats contain extremely deep, shallow, or rapidly moving water that may exclude biologists from deploying nets, efficacy is dramatically decreased.

Seines with a "bag" to minimize aquatic organism handling stress are preferred. Seines with a bag are also preferred where obstructions make access to the water (or deployment/retrieval of the seine) difficult (U.S. Fish and Wildlife Service 2012). Blocking nets typically improve efficacy by reducing opportunities for target species to move out of the area being seined. Where the area to be isolated for sampling includes culverts, deep pools, undercut banks, or other cover attractive to fish (e.g., thick overhanging vegetation, root wads, logjams) it may be appropriate to isolate a portion or portions of the study area in phases, rather than attempting to herd fish from the entirety of the work area in a single downstream pass.

Electrofishing with Block Nets

Previous work in Stone Corral Creek and Funks Creek indicates that total dissolved solids are high enough to prevent the use of electrofishing as a means of sampling (California Department of Fish and Game and California Department of Water Resources 2000). During reconnaissance surveys, basic water quality measurements would be taken to confirm this observation. If total dissolved solids values are above levels known to interfere with electrofishing, the method would be curtailed in favor of seining. If employed, electrofishing would be done with a Smith-Root type backpack electrofisher. Sections of creeks would be isolated using blocking nets before biologists wade into them, starting from the upstream net and moving downstream. Captured specimens would be held in buckets, floating net pens, or large aerated containers prior to being identified and measured as above for seine sampling. Effort

would be calculated using shock time. If fish exhibit signs of stress, including symptoms of tetany or bruising, electrofisher settings would be adjusted accordingly to reduce impacts.

Visual Surveys

Any visual observations by biologists during reconnaissance and sampling of stream fauna would be systematically recorded based on pre-determined reach locations. This would include documenting amphibians and reptiles that may be observed incidentally during fish sampling efforts.

General Water Quality

Water quality data would be measured at every fish sampling location using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the 2016 version of the SWAMP *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (SWAMP 2016 SOP) (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and pH.

3.2.4 Fish Response

Abundance and Diversity

All sampling efforts would be quantified using catch per unit effort (CPUE). The CPUE would be computed for each sample method and assessed once multiple data sets are available for comparison. Numbers of individuals, weight, and area sampled would be recorded. A decline in CPUE, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Condition

Condition factor (K) would be calculated for all fish specimens for which length and weight have been recorded. The condition factor of fish reflects environmental and biological circumstances and fluctuations in feeding conditions and physiological factors (Le Cren 1951). The condition factor also indicates changes in food reserves and can be used as an indicator of the general condition of aquatic organisms. Therefore, information on condition factor can be used to assess biological health of monitored organisms because the measure provides information about the specific condition under which organisms are developing (Araneda et al. 2008).

A decline in condition factor, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Distribution

Fish presence would be recorded and tracked through the study area. Fish distribution would be determined through reconnaissance and pre-operation surveys, known distributions, and incidental observations made during other sampling efforts. Records may be kept as count data and volumetric data but would ultimately be provided as presence or absence of fish species within sampling reaches.

3.3 Timing and Frequency

The schedule and effort for the pre-operation and operation portions of the proposed study are detailed below. The pre-operation surveys would be five consecutive annual visits staged at any point prior to

start of operation and within the seasonal restrictions indicated below. Monitoring efforts would be one-per-year visits each year following initiation of operation up to a 5- or 10-year timeline as determined by the Authority. For the purposes of this Aquatic Study Plan, it is assumed that sufficient access to the study area would be available in 2023.

Pre-Project implementation:

- Desktop scoping effort: lay out sampling reaches using geographic information system (GIS) data overlaid on aerial imagery, organize data sheets, and coordinate with water quality and SWAMP efforts. Spring 2022
- Initial reconnaissance: 2 days with 2-person crew; ideal timing would be when water levels are most restricted, which is typically in autumn.
- Pre-operation effort 1: 14 days with 4-person crew. 2023
- Pre-operation effort 2: 14 days with 4-person crew. 2024
- Pre-operation effort 3: 14 days with 4-person crew. 2025
- Pre-operation effort 4: 14 days with 4-person crew. 2026
- Pre-operation effort 5: 14 days with 4-person crew. 2027

Post-Project implementation:

- Operation effort 1: 14 days with 4-person crew. 2030
- Operation effort 2: 14 days with 4-person crew. 2031
- Operation effort 3: 14 days with 4-person crew. 2032
- Operation effort 4: 14 days with 4-person crew. 2033
- Operation effort 5: 14 days with 4-person crew. 2034
- Additional efforts up to 10 years after initial operation would be determined by the Authority.

The post-Project implementation schedule may be adjusted based on the Project construction schedule and construction completion.

Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only collected species.

4.0 SWAMP Bioassessment Study Designs and Methods

4.1 Purpose of Bioassessment Monitoring Program

Stream bioassessment monitoring is a method of evaluating and monitoring the environmental health and integrity of freshwater wadeable streams by using BMI, water quality parameters, and PHAB conditions indicators of stream condition. Bioassessments are especially useful in tracking the aquatic conditions before and after a project is implemented to determine the project effects on aquatic communities. A SWAMP bioassessment that focuses on the relationships between PHAB, water quality, BMI, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek.

This information, along with the other studies (i.e., Fish Monitoring and Hydrogeomorphic Study), would help to inform the type of flow releases that should be made to the creeks under various operating conditions.

4.2 Overview of Proposed Methods

The bioassessment effort would be conducted using the methods described in the SWAMP 2016 SOP (Ode et al. 2016a, 2016b), or any updated version thereof. The reach-wide benthos method, which requires collection from each of 11 designated major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, pool), would be employed.

The ultimate number of individual sites, herein referred to as sampling reaches, on each creek would be based on access and safety; however, it is anticipated that five sampling reaches would be located on Funks Creek and that six sampling reaches would be located on Stone Corral Creek (Figure 5). Since there is no stringent guidance on establishing the number of bioassessment sampling reaches for a project such as this (Rehn pers. comm.), the number of sampling reaches was chosen to both best capture and quantify the two different elevational gradients within the study area (i.e., foothill and valley floor environments), and to have adequate spacing/distance between the sampling reaches (approximately 500 meters apart on Funks Creek above Funks Reservoir and approximately 2 kilometers apart elsewhere). Field and laboratory methods would be fully described in an associated Quality Assurance Project Plan.

4.3 Field Methods

This section summarizes the methods that would be used to collect all bioassessment data. All surveys would be performed by a qualified team of a biologist or biologists and a geomorphologist with expertise in benthic macroinvertebrate and algae collection, water quality monitoring, and PHAB data collection.

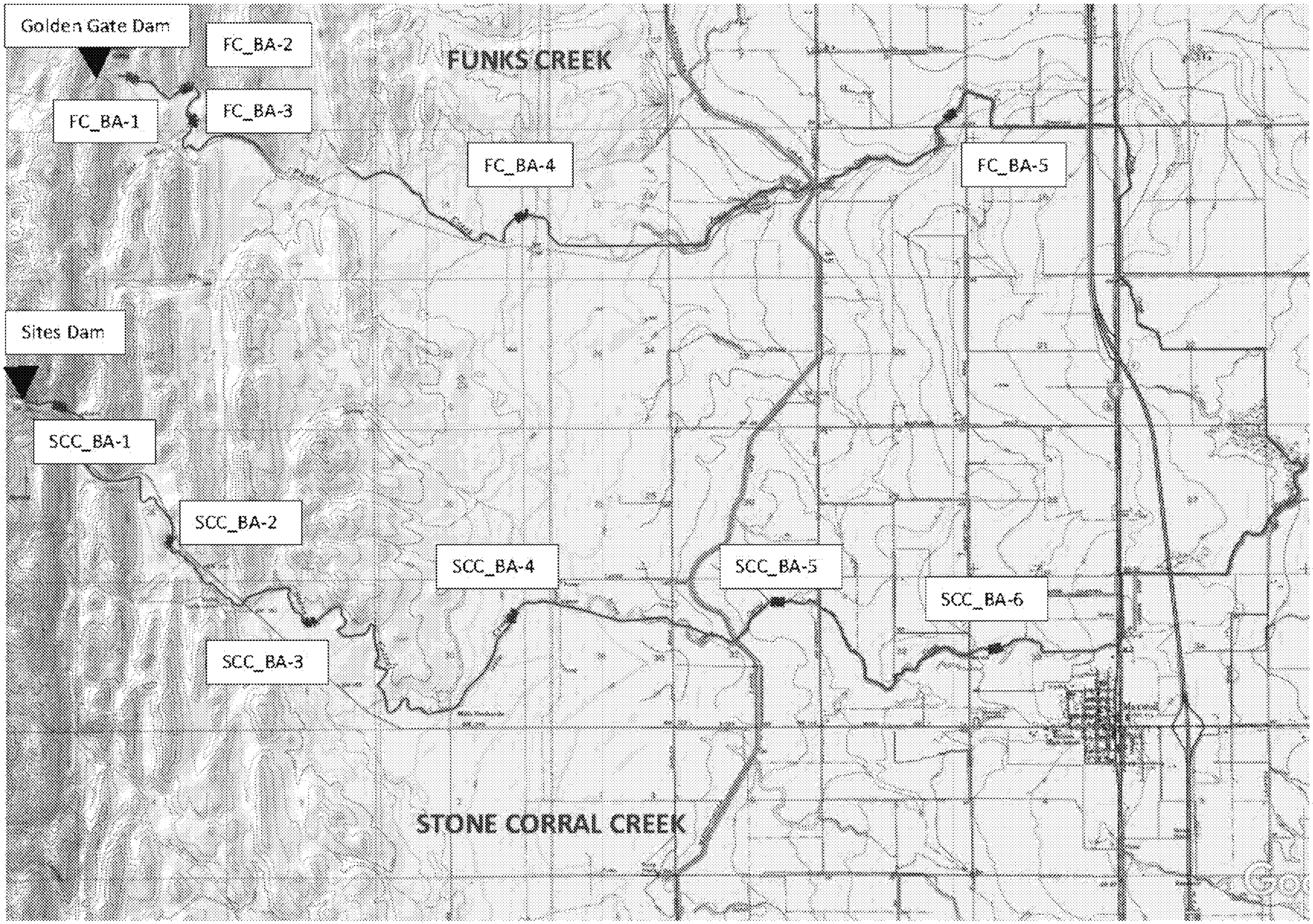


Figure 5. Potential Bioassessment Sampling Reaches, Stone Corral Creek and Funks Creek

4.3.1 Sampling Reach Delineation

As described in Chapter 2 of the SWAMP 2016 SOP, the average wetted width of each sampling reach would be used to determine the sampling reach length (Ode et al. 2016a). The SWAMP 2016 SOP specifies standard sampling reach lengths that are based on wetted width (150 meters for sampling reaches with average wetted widths less than or equal to 10 meters, and 250 meters for sampling reaches with average wetted widths greater than 10 meters).

After the sampling reach length is determined, it would be laid out using marked surveyor's flags for transect identification and transects would be labeled according to the SWAMP 2016 SOP (main transects A–K and inter-transects AB, BC, etc.) for a total of 11 main transects and 10 inter-transects.

4.3.2 Basic Data Collection

Basic information collected at each sampling site would include project name, sampling reach name, time and date of survey, stream/watershed name, global positioning system (GPS) coordinates, and the names of the survey crew members. GPS coordinates would be recorded with an appropriate collection device (e.g., hand-held GPS receiver or iPad). Data collected at the sampling reaches would include water quality and stream discharge measurements, PHAB, and BMI and algae sample collections. The most recent version of the SWAMP *Stream Habitat Characterization Form Full Version* field forms would be used to enter data in the field.

4.3.3 Water Quality and Discharge Measurements

Water quality data would be measured using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the SWAMP 2016 SOP (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, alkalinity, turbidity, and pH.

To determine alkalinity (which is a standard YSI is not capable of doing), a water sample would be collected at each sampling reach. The sample would be taken at approximately 10 to 15 centimeters below the water surface. Using gloves, collectors would fill the water sample bottles to the brim to ensure that air bubbles would not get trapped in the sample bottle. The bottle would then be placed on ice in a cooler until all field data collections were completed. In the evening following each day's sample collection, the water samples would be removed from the coolers and allowed to warm to room temperature. Alkalinity would then be determined by the double endpoint titration method using a Hach Digital Titrator.

Stream discharge would be measured using a Marsh-McBirney Flo-Mate Model 2000 flow meter and following the Velocity Area Method (Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b). Efforts would be made to select a stream transect with a relatively uniform cross section and laminar flow, and at least 20 equally spaced data points would be used to estimate streamflow.

4.3.4 Physical Habitat Assessment and Photo-Documentation

As required by the SWAMP 2016 SOP, PHAB information would be collected at the sampling reaches at each transect and inter-transect location. At the 11 main transects, the full measurements listed in Chapter 6 of the SWAMP 2016 SOP would be taken (Ode et al. 2016a, 2016b). At the 10 inter-transects, fewer measurements would be taken per the SWAMP *Stream Habitat Characterization Form Full Version* field forms.

Digital photo documentation for each sampling reach would consist of upstream and downstream views at transects A, F, and K (i.e., the downstream, middle, and upstream portions of the sampling reach). Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded.

At each sampling reach, reach-wide PHAB conditions relative to three Rapid Bioassessment Protocol (RBP) habitat parameters would be evaluated based on visual observations. These observations would include epifaunal substrate/cover, sediment deposition, and channel alteration. Each of these parameters would be scored using the following numeric value and ranked using the following 20-point scale, per the SWAMP 2016 SOP.

- 1–5 rank as poor
- 6–10 rank as marginal
- 11–15 rank as suboptimal
- 16–20 rank as optimal

4.3.5 Benthic Macroinvertebrate Sample Collection

BMI collection would be conducted according to the SWAMP 2016 SOP, using the reach-wide benthos method, which requires collection from each of the 11 major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, and pool). The BMI samples would be collected 1 meter downstream of each major transect by sampling a 1-foot-square area using a D-frame net. The sampling would begin at transect A (the downstream end) and continue upstream to transect K, with the sample location alternating from left (25% of width), to center (50% of width), to right (75% of width) on each subsequent transect.

All collections from the 11 major transects would be composited into a single sample and transferred into a 1-liter, wide-mouth plastic jar and preserved with 95% ethanol, following the SWAMP 2016 SOP. Samples would be labeled with collection site, time, and collector's name; and a chain-of-custody form would be filled out to accompany the samples on their way to the laboratory for identification. Replicate samples would be collected according to the SWAMP 2016 SOP at one sampling reach for quality assurance/quality control (QA/QC) purposes.

4.3.6 Algae Sample Collection

Algae would be collected in the same manner as the BMI samples, except that the algae would be collected 25 centimeters above the location where the BMI sample would be located. Algae samples would be collected using the sampling tools identified in the SWAMP 2016 SOP, which vary according to the substrate being sampled. A rubber delimiter would be used for large gravel and cobble; a PVC delimiter would be used for fines and gravels; and a syringe scrubber would be used for bedrock and large boulders (if present).

Similar to the BMI sampling, each algae sample collected at the 11 major transects would be composited into a single sample for processing. The processing of the algae would follow the SWAMP 2016 SOP, which would involve removal of algae from the substrates collected and processing the sample for the four algae analyses: quantitative soft-bodied algae, quantitative diatoms, ash-free dry mass (AFDM), and chlorophyll a. A soft-bodied algae qualitative sample would also be collected from each sampling reach by collecting a composite of all types of soft-bodied algae observed within the sampling reach into a single sample. This sample would aid in the identification of soft-bodied algae in the quantitative sample and would be used in the calculation of some of the algae metrics. Replicate algae samples would be collected at the same sampling reaches where replicate BMI samples would be collected.

4.4 Laboratory Processing

This section summarizes the methods that would be used to process all bioassessment data.

4.4.1 Water Quality

Water samples would be collected at each sampling reach to determine total nitrogen and total phosphorus, constituents necessary for helping to determine algal results. Samples would be sent to a local water quality processing laboratory in northern California. The water quality analyses would be consistent with SWAMP protocols for water chemistry. Total nitrogen would be analyzed according to U.S. Environmental Protection Agency Method 351.2, and total phosphorous would be analyzed according to Standard Methods 4500-P B and 4500-P E.

4.4.2 Benthic Macroinvertebrate Sample Processing

BMI sample taxa identification would be conducted by an outside laboratory (most likely by the Chico Aquatic Bioassessment Laboratory [Chico ABL] in Chico, California). BMI samples would be picked, sorted, and identified completely or until a 600 count (SAFIT Level 2) is reached. Chico ABL follows QA/QC procedures developed under the SWAMP program.

4.4.3 Algae Sample Processing

Five types of algae would be collected and processed: qualitative grab, soft-bodied algae, diatoms, AFDM, and chlorophyll a. The qualitative grab, soft algae, and diatom samples would be sent to the CDFW Group at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL-MLML). MPSL-MLML would report the data in SWAMP template formats. MPSL-MLML would calculate the Algae Stream Condition Index (ASCI) from the data. The samples of AFDM and chlorophyll a would also be sent to MPSL-MLML, who would report the data in California Environmental Data Exchange Network template formats. PSL-MLML follows the QA/QC procedures developed under the SWAMP.

4.5 Data Analysis

PHAB information would be entered using the SWAMP Version 2.5 bioassessment data entry forms (Marine Pollution Studies Laboratory 2022) and then loaded into the Microsoft Structured Query Language (SQL) Server database of the MPSL-MLML. BMI and algae taxonomy data, as well as water chemistry data would be loaded from Microsoft Excel templates into the same Microsoft SQL Server database. The data entry forms and templates would be obtained from the MPSL-MLML Data Center website. All data would be verified and checked for completeness after input into the database.

4.5.1 Physical Habitat Information

PHAB data would be entered by the MPSL-MLML using the SWAMP Bioassessment Field Form Microsoft Access database, and then loaded into the MPSL-MLML's Microsoft SQL Server database. After loading, additional error and completeness checks would be run following SWAMP business rules. The data would be sent to the California Environmental Data Exchange Network, where it would be available to the public for viewing and download.

PHAB metrics would be calculated using the SWAMP Bioassessment Reporting Module. The SWAMP protocol contains a subset of parameters measured within the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program for freshwater wadeable streams; therefore, many of their metrics described in Kaufmann et al. (1999) form the basis of the SWAMP Bioassessment Reporting Module output.

SWAMP has developed a PHAB Index similar to the California Stream Condition Index (CSCI) (Section 4.5.3, *Benthic Macroinvertebrates*) for BMI data. The PHAB Index (called the *IPI*) combines eight GIS-calculated metrics with 12 PHAB metrics to produce one IPI value (Rehn et al. 2018). For the purposes of statewide assessments, the IPI has thresholds of physical condition: greater than or equal to 0.94 indicates likely intact condition; 0.93 to 0.84 indicates possibly altered condition; 0.83 to 0.71 indicates likely altered condition; and less than or equal to 0.70 indicates very likely altered condition.

In addition, the results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011). These select stressor thresholds are not regulatory limits set by SWRCB; rather, they are biology-based stressor thresholds developed by researchers as an objective means to set meaningful, regionally appropriate water quality standards. Two statewide and regional PHAB biological stressor thresholds, the Percent Fines and Sand and Mean Embeddedness thresholds, are examples of biological stressor thresholds that would be appropriate to analyze for this Project.

4.5.2 Water Quality

Similar to the PHAB analysis described above, water quality results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011).

4.5.3 Benthic Macroinvertebrates

MPSL-MLML would be contracted to assist in the analysis of the BMI data. MPSL-MLML would use the BMI taxonomic data obtained from Chico ABL to calculate CSCI scores for each sampling reach. The CSCI is a statewide biological scoring tool that translates complex data about individual BMIs found living in a stream into an overall measure of stream health (Rehn et al. 2015).

CSCI scores and output would be calculated using R scripts defined in Mazor et al. (2017). CSCI score categories would be applied as defined in Rehn et al. (2015).

- Less than or equal to 0.62: very likely altered
- 0.63–0.79: likely altered
- 0.80–0.91: possibly altered
- Greater than or equal to 0.92: likely intact

MPSL-MLML would also calculate several BMI metrics from the taxonomic data for each sampling reach. These individual metrics would be reviewed to discuss the individual results for each sampling reach and event. Representative metrics may include measures of taxa richness, composition, tolerance, functional feeding groups, and habit measures. These other metrics may be more insightful for determining the biological integrity of the BMI communities than the CSCI scores alone (at least in the valley floor sampling reaches), as valley floor reference sites (the sites used in the CSCI calculations) are relatively limited in abundance (Rehn pers. Comm.).

4.5.4 Algae

Diatoms and Soft Algae

MPSL-MLML would be contracted to calculate the statewide diatom, soft algae, and hybrid ASCI and associated metrics. These predictive biological indices replace past regional indices with a statewide index allowing for improved comparisons across diverse landscapes in a consistent and comparable manner. While ASCI can be calculated for soft algae and diatoms separately, the hybrid ASCI produces stronger species distribution models for more accurate and integrative assessments of biological condition.

Chlorophyll a and Ash-Free Dry Mass

Ode et al. (2011) in their analysis of the results from the statewide Perennial Stream Assessment between 2000 and 2007, have included stressor thresholds for chlorophyll a and AFDM. These thresholds are more protective than levels proposed by previous authors, which were 100 milligrams per square meter for chlorophyll a and 50 grams per square meter for AFDM (Barbour et al. 1999, Welch et al. 1988, Dodds et al. 1998, Sosiak 2002, Dodds and Welch 2000, U.S. Environmental Protection Agency 2000, Biggs 2000). The thresholds proposed by Ode et al. (2011) are not regulatory limits or requirements but rather recommendations. The chlorophyll a and AFDM stressor thresholds (statewide and regional) would be evaluated for each sampling reach by MPSL-MLML.

4.6 Timing and Frequency

The bioassessment surveys would be conducted during the appropriate index period for Central Valley streams (June through August), which is typically 4 to 6 weeks following the last winter storm event. Depending on stream conditions, however, bioassessment surveys may need to be performed prior to the appropriate index period to ensure adequate flow for benthic and algal sampling is present. Baseline (pre-operation monitoring) would occur in the spring for (possibly) 5 years prior to project operation. Follow-up (baseline) surveys would be conducted on an annual basis during the same period for up to 10 years after operation activities are initiated. The Authority and the relevant agencies (CDFW, USFWS, and Colusa County) would be consulted if the frequency of monitoring would be shortened after 5 years.

4.6.1 Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum Of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only collected species.

4.7 Additional Water Quality Measurements

In addition to the standard water quality measurements included in the SWAMP bioassessment as described above, samples would be collected for additional laboratory measurements. The objectives for taking these additional measurements would be to compare pre-Project and Project values, determine any effect of operational adjustments on sampled water quality constituents, and compare measurement values to key stressor thresholds. These additional measurements include:

- **A suite of total and dissolved metals and metalloids**. The suite includes aluminum, arsenic, cadmium, chromium (total), chromium, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc.
- **Cyanobacteria and cyanotoxins**. The cyanobacteria water samples would be collected for the purpose of laboratory analysis for cyanobacteria presence and density and the presence of cyanotoxins (specifically microcystins, anatoxin-a, and cylindrospermopsin).
- **Methymercury in fish tissue**. Level I trophic level fish would likely be more abundant than higher trophic level fish, so the measurements of methylmercury concentrations in fish tissue would focus on these fish. Higher trophic level fish would be sampled intermittently as available. To assess methylmercury in fish tissue, sampling would be conducted using the SWAMP protocol for California rivers and streams (California Water Boards 2011 or most current).

When these additional water quality samples and fish are collected, the following basic survey information and data described above would be collected: project name, sampling reach name, time and date of survey, stream/watershed name, and the names of the survey crew members. Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded. Basic data collected at the sampling sites would include stream discharge measurements, temperature, specific conductivity, dissolved oxygen, turbidity, pH, and water samples for total nitrogen and total phosphorus laboratory measurements. In addition, water samples would be collected for laboratory measurements of dissolved organic carbon and hardness as these parameters influence water quality standards for aquatic life protection for some metals.

These measurements would be taken twice a year, once during a high flow period and once during a low flow period, at the upstream and downstream bioassessment sampling locations on each creek. Sampling would occur during the same years as the rest of the bioassessment studies.

5.0 Hydrogeomorphic Study

5.1 Purpose of Study

The overall purpose of the Hydrogeomorphic Study would be to characterize historical and present-day streamflows, including baseflow during the spring and summer months, on Stone Corral Creek and Funks Creek; the relevant geomorphic characteristics of each creek (herein called *geomorphic indicators*); and flow levels necessary for channel maintenance of geomorphic processes required to maintain the channels in their current condition.

A Hydrogeomorphic Study with quantitative and qualitative monitoring data to fully characterize the existing hydrologic regime of Stone Corral Creek and Funks Creek, as well as the overall type and abundance of sediment available for aquatic organisms, would be developed. To inform the appropriate streamflows for the creeks under inquiry, a geomorphic assessment would constitute the first step in the analysis. The channel segments upstream of the dams would also be rapidly assessed to provide a greater understanding of the local watershed geomorphic characteristics. The focus of the geomorphic assessment would be to determine the dominant geomorphic processes, document the surrounding landforms and channel bed topography, and to determine how the observed morphology of each creek is influenced by the hydrologic regime and the surrounding land uses. Likewise, collection of geomorphic information would aid in the determination of overall channel stability for each creek, which has important implications for the proposed releases.

The Hydrogeomorphic Study to examine the hydrologic regime of Stone Corral Creek and Funks Creek would include a desktop modeling exercise, as well as installation of stilling wells, staff gages, and real-time water surface level collection devices. The goal of the Hydrogeomorphic Study would be to evaluate the physical and hydrologic condition of the reaches of interest within both Stone Corral Creek and Funks Creek. This information, along with the other required studies as discussed in previous chapters (i.e., Fish Assemblage Study and SWAMP bioassessment study), would help to inform the type of flow releases that should be made to the creeks under various Project operating conditions.

After completion of the baseline studies, consideration would be given to when and how flows would be released and whether a portion of these flows are needed to maintain fluvial geomorphic processes (based on the findings from the geomorphic assessment).

5.2 Study Design

The (baseline) Hydrogeomorphic Study components are discussed below. *Field site locations* are applicable to the geomorphic component of the Hydrogeomorphic Study; *hydrologic monitoring locations* represent the potential locations where stilling wells, staff gages, and real-time water surface level collection devices would be installed (i.e., the hydrologic component of the Hydrogeomorphic Study). The ultimate number of field site locations on each creek would be based on access and safety; however, it is anticipated that five sites would be located on Funks Creek and that six would be located on Stone Corral Creek. The locations for the geomorphic component of the Hydrogeomorphic Study would presumably be the same as the bioassessment sampling reaches as part of the SWAMP bioassessment study as described in Chapter 4 (Figure 5). The ultimate number of hydrologic monitoring locations on each creek would primarily be based on access, due to the need for monitoring during and after precipitation events. It is anticipated that two sites would be located on each creek: one in the foothills and one on the valley floor as shown on Figure 6.

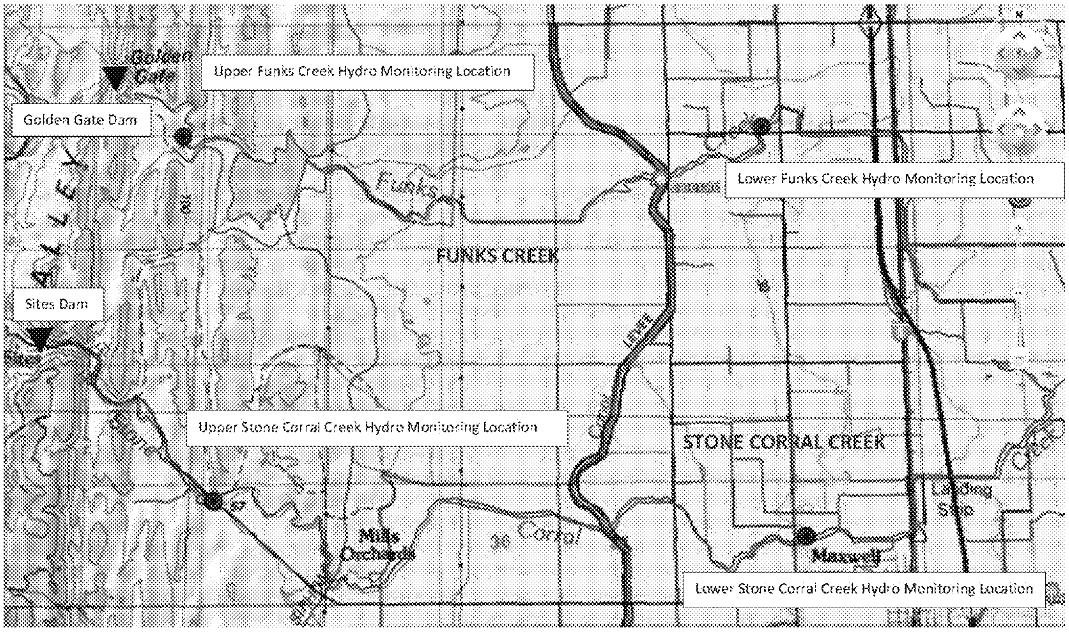


Figure 6. Potential Hydrologic Monitoring Locations, Stone Corral Creek and Funks Creek

5.2.1 Geomorphic Conditions

Data collected during the geomorphic component of the Hydrogeomorphic Study (geomorphic assessment) would include a host of geomorphic attributes, or indicators, as described below. Topographic data (longitudinal profile and cross sections) needed for the hydrologic model (further described below) would also be collected during the geomorphic assessment. The geomorphic assessment would be conducted by a geomorphologist with expertise in channel and floodplain dynamics, channel stability analyses, and topographic surveying techniques.

The geomorphic assessment would include evaluation of the following indicators.

- Channel classification
- Local watershed inputs
- Hydrologic and flow patterns
- Riparian vegetation condition
- Bankfull width and depth and wetted width
- Bank instability and bank characteristics
- Channel bed substrate composition and embeddedness
- Channel complexity
- Degree of channel incision
- Stage of channel evolution
- Cross section and longitudinal profile surveys

These indicators would be assessed for each field site location (Figure 5). In addition, at least three permanent cross sections would be established within each field site location and within each hydrologic monitoring location (Figure 6) for collection of quantitative channel morphology information and required modeling input. Evaluation methods for these indicators are described below.

Channel Classification

Stream and river segments can be grouped into three generalized classifications based on their position in the watershed and the relative balance of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source areas are typically transport-limited (often due to limited channel runoff) but do offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events. Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, and step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

Based on field observations and the stream classification methodology of Montgomery and Buffington (1998), each field site location would be classified accordingly. The classification would aid in the determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of each field site location on the reaches of interest.

Local Watershed Inputs

Any major inputs of sediment and runoff into the field site locations (e.g., landslides or other mass wasting features, recent burn scars) would be summarized. The objective would be to identify any land use changes that could alter the balance of sediment supply and runoff that could lead to future instability (e.g., channel aggradation of degradation) within the reaches of interest. This would aid in the determination of channel stability and the potential for available habitat to be disrupted or altered in the vicinity of the field site locations.

Hydrologic and Flow Patterns

The hydrologic pattern would be determined throughout the length of the field site locations and would include identification of whether streamflow is perennial, intermittent, or ephemeral. Perennial streams are those which flow year-round; intermittent streams are those which flow for only certain times of the year and receive water from both surface water and groundwater; and ephemeral streams are those which have their channels above the water table year-round and only receive water from surface runoff. This geomorphic indicator would rely on the field-based hydrologic component of the overall Hydrogeomorphic Study, as described below.

Riparian Vegetation Condition

Riparian vegetation is an important indicator for overall stream habitat and function as it serves to stabilize streambanks and allows for canopy cover to create suitable water temperatures for aquatic species. Riparian condition refers to a description of the general health of the riparian area, focusing on the amount and type of vegetative cover.

Within each field site location, riparian condition would be described as low (0–25 % vegetative cover), moderate (25–50 % vegetative cover), high (50–75 % vegetative cover), or very high (75–100 % vegetative cover). The size and approximate age of any riparian vegetation growing in the channel bed would be documented because this is evidence of channel adjustment and possible re-stabilization from a prior disturbance.

Bankfull Width and Depth and Wetted Width

Bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channel in the field site locations. Specifically, a geomorphic or effective bankfull surface would be identified in the field. The geomorphic bankfull or effective surface is the surface that gets inundated by the discharge that performs the most geomorphic work on a system, typically a flow that occurs every 1.5 to 2 years (Knighton 1999). This discharge, known as the geomorphic bankfull discharge, is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface would be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996). Once this surface is recognized, width and depth measurements would be recorded.

Like bankfull width and depth measurements, wetted width and depth measurements would be recorded. Specifically, the wetted surface would be identified in the field and width and depth measurements would be recorded.

Bankfull and wetted width and depth data collection would help to determine the size of the channel, which would help in assessing overall available habitat conditions in the field site locations and reaches of interest.

In addition, the “active channel” width would be identified, which typically represents a typical low to moderate flow regime and is usually bounded by the width of the in-channel vegetation.

Bank Instability and Bank Characteristics

The term *bank instability* refers to streambanks that are either actively retreating or have the potential to retreat soon. In brief, weakening processes are any bank or near-bank processes that act to erode or prepare streambanks for further erosion (Lawler 1992). The purpose of assessing this indicator would be to identify fluvial erosion (erosion associated with flowing water) and bank failure (erosion associated with gravitational forces and weakening processes). Fluvial erosion is closely related to boundary shear stress, which can be loosely approximated by unit stream power variations, and bank failure is collapse of all or part of the streambank in situ (Lawler 1995).

Bank stability would be defined as the natural streambank that has stable groundcover. Stable ground cover includes rooted trees, shrubs, herbaceous plants, and naturally occurring rocky substrates. Bank composition and bank height/angle would also be determined. The results, in conjunction with the other indicators, can be used to detect where the channel may be downcutting as suggested by over-steepened banks, and can also be used to describe the potential for the channel to potentially laterally migrate and increase the risk of bank instability.

Bank stability analyses would aid in determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of the field site locations, as well as the determination of channel stability and the potential for available habitat to be disrupted or altered in the field site locations.

Channel Bed Substrate Composition and Embeddedness

Substrate composition and embeddedness refer to the size of the substrate materials on the channel bed, and the degree to which these materials are embedded. These conditions indicate how frequently the channel substrate is mobilized. Substrate composition and embeddedness would be measured using the methods described by Bunte and Abt (2001). Substrate composition would identify the available substrate (overall type and abundance) for aquatic species in the vicinity of each field site location.

Channel Complexity

The presence or absence of gravel bar development and evidence of scour and/or deposition would be determined throughout the length of each field site location. Pool and riffle habitats containing in-channel structures (e.g., instream woody material) that create complexity and habitat niches for aquatic organisms would also be documented. Basic channel or habitat units (e.g., pool, riffle, and flatwater) would be delineated according to standard habitat mapping descriptions in each field site location. A rough proportion of unit types would be calculated.

Channel or habitat units would be defined as follows.

- **Pool.** Slow water, length, and width at least one-half the bankfull channel width, and a 10-inch minimum residual pool depth. Subcategories define the general type of pool and include scour (lateral, channel, channel confluence, plunge), dam, and backwater, as defined by Overton et al. (1997).
- **Riffle.** Swiftly flowing, turbulent water, some partially exposed substrate, substrate cobble, and/or boulder dominated (McCain et al. 1990).
- **Flatwater.** Wide, uniform channel bottom, low to moderate water velocity, and little surface agitation. Encompasses any areas that do not qualify as pool or riffle (McCain et al. 1990).

If appropriate (i.e., if the habitat diversity merits such a method), the field site locations would be habitat typed to provide a more detailed stream habitat inventory. Stream habitats would be delineated into one of the six Level-III habitat classification types (Flosi et al. 2010) based on morphological characteristics. These include overall channel gradient, water velocity and depth, substrate, and, where applicable, the channel features (e.g., boulder, bedrock, woody material, converging flow) causing the formation of the habitat unit through scour and sediment deposition (Flosi et al. 2010). Channel/habitat type determination would allow for identification of available habitat types for aquatic species.

Degree of Channel Incision

The degree to which the channel is incised would be recorded as negligible, low, moderate, high, or very high. The degree of incision would be qualitatively analyzed using the following criteria.

- **Identification of any Quaternary landforms on the floodplain (e.g., terraces, low floodplain, fan, etc.).** Terraces typically have steep streambanks, and the channel may not necessarily be incised. Steep, unstable streambanks adjacent to a low floodplain surface, however, typically indicate incision.
- **Identification of bedforms downstream of the site where and if the channel is less incised.** Bed and streambank material from incised channels would typically be deposited downstream in somewhat uncharacteristically large deposits on the channel bed (downstream aggradation).
- **Recognition of base level changes downstream.** Dams and other barriers can create upstream changes in channel bed elevation (i.e., headward migration of incision).
- **Visual survey of channel bed at the field site location.** Channel or habitat sequences, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited time

intervals. Additionally, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization.

- **Determination of the health of the riparian and floodplain plant species.** Plants that are found in similar, un-incised reaches are usually not present in incised reaches. No vegetation at all is an indicator of no hydrologic interaction between the floodplain and the channel and, therefore, incision.
- **Identification of recent evidence of overbank deposition of fine sediment, plant debris, or other organic matter.** A channel that floods its streambanks frequently would typically have splay (i.e., sand) deposits and vegetation with a smoothed, flooded appearance in the downstream direction. Natural levee development is also an indication of frequent flooding.

Stage of Channel Evolution

A stream evolution model (Cluer and Thorne 2013) would be applied to the entirety of the reaches of interest on Stone Corral Creek and Funks Creek to provide a template for understanding geomorphic responses and processes within the immediate watershed. The stream evolution model of Cluer and Thorne (2013) revisits and updates two well-established channel evolution models (Schumm et al. 1984, Simon and Hupp 1987) in light of recent research and the authors' practical experiences.

In addition, a channel stability analysis would be conducted at each field site location. The chosen methodology would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2010), or other applicable method. The stream evolution model and the channel stability analyses would aid in the determination of how on Stone Corral Creek and Funks Creek may evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus, having implications for the available habitat within the channels.

Cross Section and Longitudinal Profile Surveys

As mentioned above, at least three permanent cross sections would be established within each field site location (Figure 5) and within each hydrologic monitoring location (Figure 6) for collection of quantitative channel morphology information and required modeling input. Permanent cross sections would be established perpendicular to the primary channel following the methodology of Harrelson et al. (1994). Each transect would be surveyed using ground-based surveying equipment to capture and track channel morphology. Elevations along the cross sections would be collected at intervals close enough to capture slope breaks and distinct morphological features within the floodplain (if present), and along the channel sides and bottom.

The location of each cross section would be permanently marked in the field using 4-foot-tall metal t-posts or wooden lathes (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for each transect would be placed in a stable location above the active channel on the left and right (as viewed facing downstream) banks or terraces of the channel. Transect endpoints (i.e., the permanent monuments) would be documented using a GPS receiver. Representative photographs would be taken at each cross section.

In addition to the cross sections, a longitudinal profile would be surveyed throughout the length of the channel within a field site location. The spacing between channel bed data points would vary depending on the complexity of the channel bed characteristics. Digital photographs would be taken in the upstream and downstream directions at various locations throughout the longitudinal profile. The location(s) of each cross section would be surveyed on the longitudinal profile for graphical plotting purposes.

Channel Geometry Metrics

As mentioned previously, bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channels. This would be completed at the cross sections measured in the field. In addition to bankfull, wetted, and active channel width and depth measurements, the bankfull and entire channel width-to-depth ratio would be calculated for each cross section, and sinuosity and gradient of the longitudinal profile would be determined.

5.2.2 Hydrologic Conditions

The hydrologic component of the Hydrogeomorphic Study would consist of both desktop (modeling and historical conditions review) and field-based efforts (generation of stage-discharge relationships), both of which are summarized below. The desktop effort would provide detailed information on various (modeled) flows of interest (i.e., the 2-year, 5-year, 10-year, 50-year, and 100-year flow events), while the field-based efforts would validate/calibrate the modeling results via collection of real-time streamflow data, especially for smaller streamflow events (the flows that are expected to occur most of the time on each creek).

Summary of Modeling Approach

A HEC-HMS rainfall-runoff-routing watershed hydrology model would be created to generate hydrographs for both Stone Corral Creek and Funks Creek. Inputs into the hydrology model would include watershed land use, percent impervious inputs, soil types, precipitation and evapotranspiration, drainage network characteristics, and topography (which would be generated from available light detection and ranging [LiDAR] technology).

The topographic surveys as described above would also serve to augment the existing LiDAR data with on-the-ground data to better capture topography in areas requiring additional detail (such as densely vegetated areas). The topographic surveys would be tied into the State Plane Coordinate System and would be sufficient to generate contours at a 1-foot interval. The data collected via the topographic surveys would also be required for generation of stage discharge relationships, as described below.

It should be noted that HEC-HMS rainfall-runoff-routing watershed hydrology model constitutes the first (somewhat exploratory) step in the hydrologic analysis. As discussed in the RDEIR/SDEIS, any releases into Funks Creek would be made through the transition manifold at the base of Golden Gate Dam and a new pipeline that terminates at Funks Creek below the dam. These facilities would carry up to 100 cfs with a release range of 0 to 100 cfs into Funks Creek. Any releases into Stone Corral Creek would be made through the permanent outlet at Sites Dam. This outlet would have a release range of 0 to 100 cfs, with an emergency release capacity of up to 2,500 cfs. The modeling effort would be the first step in determining if a range in flows, as described in the RDEIR/SDEIS, would be needed to meet the purpose of CFGC Section 5937 given the modeled hydrology.

Summary of Field-Based Analysis

The primary objective of the field investigation would be to provide an accurate description of the existing watershed hydrology and variations in streamflow and water surface elevations (i.e., stage) on both Stone Corral Creek and Funks Creek. Periodic streamflow measurements (depth and velocity measurements) would be taken to develop stage-discharge relationships (rating curves) to translate the continuous water depth measurements measured with continuous stage recorders (i.e., HOBO water level loggers [Onset Computer Corporation]) into continuous estimates of flow. These measurements would occur at the hydrologic monitoring locations as shown on Figure 6.

To determine continuous estimates for streamflow, the stage recorders, which measure water temperature and pressure, and vertical stilling wells would be installed in relatively deep portions of the creeks at the locations as shown on Figure 6. The HOBO water level loggers would be set to monitor water depth every 15 or 30 minutes. Additional HOBO water level loggers would also be installed to monitor barometric pressure every 15 or 30 minutes for the purpose of calibrating the depth (water pressure) measurements, which are also affected by barometric pressure. These additional data loggers would be secured to upland surfaces (e.g., trees). Streamflow measurements would be collected to develop equations to convert the continuous stage recorder data into estimated streamflows (discharge). During variable discharge conditions, streamflows would be estimated using a Marsh-McBirney Flo-Mate Model 2000 flow meter and top-setting rod following the procedures described in Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b).

Daily precipitation data obtained from the California Data Exchange Center or the PRISM Climate Group would be used to characterize the rainfall patterns during the study period. Rainfall patterns would be displayed concurrently with the measured streamflow data.

If necessary, acoustic Doppler current profiler (ADCP) technology could be used to capture high flow events. ADCP equipment is particularly useful for collecting accurate and precise water depth and 2-D/3-D velocity data, especially at high flows when other standard surveying techniques as described above are impractical or unsafe. ADCP technology also offers the advantage of detecting bed elevation change resulting from high flow events that would be useful for evaluating sediment mobility in the reaches of interest. The applicability of ADCP would be investigated during the first season of hydrologic monitoring (once field conditions at the field site locations are ascertained).

5.3 Timing, Frequency, and Operation Monitoring

5.3.1 Pre-Operations Monitoring

The baseline geomorphic component of the Hydrogeomorphic Study would first be conducted during the winter/spring of 2023. It is anticipated that all relevant geomorphic indicators could be collected during one field trip. Additional baseline geomorphic data collection during subsequent years would be conducted if high precipitation patterns/high flow events occur during the pre-operation period.

The desktop hydrologic component of the Hydrogeomorphic Study would occur during 2023. The field-based hydrologic component of the Hydrogeomorphic Study would occur at the locations as shown on Figure 6 until the dams are constructed.

5.3.2 Operations Monitoring

Follow-up geomorphic and hydrologic surveys would be conducted on a regular (pre-approved) basis for up to 10 years after operations begin. The Authority would consult with the relevant agencies (CDFW, USFWS, and Colusa County) if the frequency of monitoring would be shortened after 5 years. Additional information on each component of is provided below.

Geomorphic Stability Monitoring Plan

Operations geomorphic monitoring would generally be like the pre-operation efforts, including returning to established field site locations and collecting information on geomorphic indicators by performing a geomorphic assessment as described above. Data collected as part of the operations geomorphic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The focus of the operations geomorphic monitoring effort, however, would be geomorphic stability monitoring. As such, the primary survey components of monitoring would include cross section and longitudinal profile surveys, channel bed substrate composition determination, and channel stability evaluations. All methods for these efforts would be identical to those described above. The objectives of these monitoring elements and their relevance to geomorphic stability are summarized below.

Cross Section and Longitudinal Profile Surveys

The objectives of collecting data at the cross sections would be to collect primarily lateral stability information to determine the rate of lateral migration through bank erosion and overall cross-sectional area change. The rate, magnitude, and direction of lateral change and area change would be determined over time using repeat longitudinal profile surveys.

The objective of collecting data at the longitudinal profiles would be to collect primarily vertical stability information to determine rates of aggradation or degradation (whether the stream is downcutting [degrading], filling [aggrading], or remaining static). The rate, magnitude, and direction of vertical change would be determined over time using repeat longitudinal profile surveys.

Channel Bed Substrate Composition and Embeddedness

The objectives of collecting channel bed substrate composition and embeddedness information would be to observe potential shifts in bed material size-frequency distribution, which can be determined over time. Collected grain size information would aid in interpretation in specific geomorphic changes if they occur (such as any changes identified via the cross-sectional and longitudinal profile analyses above).

Channel Stability Evaluations

The chosen methodology for channel stability evaluations would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. Together with the stream evolution model (Cluer and Thorne 2013), the channel stability analyses would aid in the determination of how Stone Corral Creek and Funks Creek may continue to evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Hydrologic Monitoring Plan

Operations hydrologic monitoring would be like the pre-operation field-based efforts, including returning to established hydrologic monitoring locations, monitoring stage and stream discharge over time. Data collected as part of the operation hydrologic monitoring effort would be compared against the baseline data and summarized into interim and final reports.

The level of effort of the operations Hydrologic Monitoring Plan, however, would be considerably less than for the pre-operation effort because, depending on the streamflow and precipitation patterns during the pre-operation time-period, there would presumably already be numerous years of pre-operations hydrologic monitoring data at the hydrologic monitoring locations (in other words, a robust data set with multiple discharge measurements and associated stages would be available). The operation hydrologic monitoring effort would, therefore, primarily consist of measuring streamflow values that were not obtained during the pre-operation monitoring effort (presumably higher flow events) and conducting routine field maintenance activities such as periodic downloads of the HOBO water level loggers and upkeep of field equipment.

6.0 Temperature Study Design and Methods

6.1 Overview of Proposed Methods

A temperature study would be conducted to characterize temperatures under existing conditions and determine flow and storage effects on temperature in Stone Corral Creek and Funks Creek under operating conditions. The study would involve evaluating temperatures in the creeks before and after initiation of Project operation and would include consideration of the effects of creek flow and reservoir storage on temperature.

The study would assess the following.

- The temperatures that support the aquatic community under existing conditions.
- Reservoir discharge needed to maintain appropriate temperatures to maintain fish in good condition in Stone Corral Creek and Funks Creek downstream of Sites Reservoir after the start of operation.
- Documentation of hydrologic and flow patterns (as described in Section 5.2.1, *Geomorphic Conditions*)

6.2 Study Design

Once access to Stone Corral Creek is obtained, a temperature probe would be installed in Stone Corral Creek at the location of Sites Dam release, and four additional probes would be installed downstream by approximately 0.5 mile, 1 mile, 2.4 miles (near where Stone Corral Creek goes under Maxwell Sites Road), and 4.4 miles (near where TC Canal goes under Stone Corral Creek).

Once access to Funks Creek is obtained, a temperature probe would be installed in Funks Creek at the location of the I/O tower release to Funks Creek, and two additional probes would be installed downstream by approximately 0.5 mile and 1 mile (far enough upstream of Funks Reservoir to be unaffected by it). In addition, probes would be installed at the TC Canal inlet to Funks Reservoir, at the TC Canal outlet from Funks Reservoir, and at the Funks Creek outlet from Funks Reservoir.

As described in the draft Reservoir Management Plan included in Appendix 2D of the RDEIR/SDEIS, once operation has commenced, water temperature profiles would be measured near Golden Gate Dam once every 2 weeks at 5-feet depth intervals to inform decisions about which ports of the I/O tower to use during March through October. The temperature probes in the creeks would continuously record hourly temperatures. These temperatures would be used along with specific fish requirements to develop target temperature ranges for operation conditions.

Temperatures recorded after Sites Reservoir is operational would be used in conjunction with flow and storage data to determine flow and storage effects on creek temperatures. If creek temperatures cannot be accurately estimated with flow, storage, meteorology, and the reservoir temperature profiles, water temperature modeling could be performed for Sites Reservoir, Stone Corral Creek, and Funks Creek. If modeling is necessary, models would be calibrated with the measured flow, storage, and temperature data.

Water released into Stone Corral Creek would originate from the lower half of Sites Reservoir and would likely be cooler than equilibrium values during months when the reservoir is stratified. The biggest differential between release temperatures and equilibrium values would occur when the reservoir is full and ambient air temperature conditions are high. If it is determined that flow should be maintained in Stone Corral Creek at times when releases would be relatively cool compared to temperatures under existing conditions, lower flows would allow the water to warm farther upstream than higher flows.

Water released to Funks Creek would originate from the I/O tower and, when the reservoir is stratified, would be warmer than the water released to Stone Corral Creek. The temperatures would be warmer because the withdrawals would come from higher in the reservoir and, as described in the Reservoir Management Plan, the I/O tower port openings would be chosen to provide 65 degrees Fahrenheit (°F) or higher water temperatures during the rice growing season (May through September).

6.3 Timing and Frequency

Water temperature measurements would occur before and during operation. Measurements during the initial fill period would be useful for evaluating water temperature under low-storage conditions. Reservoir profile measurements and measurements at the Stone Corral Creek and Funks Creek releases may need to continue in the long term.

Measurements downstream of the release locations could be discontinued if the following conditions are met.

- Sites Reservoir has made releases for at least 2 years when the reservoir was at least 75% full.
- If native fish are found and temperature effects are determined to have little effect on the population(s) (e.g., if only short sections of the creeks below the dams experience temperature effects) or if flow and storage effects on creek temperatures are understood well enough that average daily creek temperatures can be estimated within 3°F based on meteorological conditions, flow, reservoir storage, and reservoir temperature profiles.

7.0 Reporting and Permit Requirements

7.1 Annual Reporting Requirements

Reporting requirements would be met through the preparation and submittal of annual and final reports as part of the Aquatic Study Plan that would be implemented as a part of the Authority's commitments and responsibilities to maintain fish in good condition consistent with CFGC Section 5937.

The first five annual reports would summarize the first 5 years of baseline conditions. All future (operation) reporting efforts would compare the conditions at that time to those collected during the baseline conditions.

The following information would be addressed in comprehensive annual reports with multiple chapters covering fish, bioassessment, hydrogeomorphic, and temperature study results.

- **Fish Study Results.** The annual report would include descriptions and locations of fish communities in Stone Corral Creek and Funks Creek, summarizing monitoring results in the study area. The report would document monitoring results and link results to objectives. The report would identify new or ongoing management issues, threats and stressors, and provide recommendations for future monitoring and management.
- **Bioassessment Results.** The annual reports would include BMI, algae, water quality, and PHAB output and results and a summary of each of these indicators. The most recent version of the SWAMP *Stream Habitat Characterization Form, Full Version* field forms would be provided in appendix format, along with representative photography of the sampling reaches.
- **Hydrogeomorphic Results.** The annual reports would include a summary of the monitoring methods; a summary and analysis of the hydrogeomorphic monitoring results, including an evaluation of site conditions in the context of the performance standards; a discussion of the monitoring results; a discussion of any modifications made to the monitoring methods; a discussion of the previous year's monitoring efforts; and photographs taken from the cross sections and longitudinal profiles.
- **Temperature Results.** The annual reports would include a summary of temperatures that support the aquatic community under existing conditions, and a recommendation of reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam and Funks Creek downstream of Golden Gate Dam after operation has commenced.
- **Monitoring Program Evaluation.** The annual reports would evaluate the Aquatic Study Plan to ensure that data (1) are collected efficiently, (2) address information needs, and (3) adequately assess resource responses to management actions. Changes in monitoring methods, protocols, or frequency would be summarized in the annual reports.
- **Objective Criteria Evaluation.** Annual reports during operations would evaluate whether management actions are meeting project objectives or performance standards (described below). An assessment would be made as to causal factors of observed declines, including the potential role of external stressors outside the parameters of Project effects.
- **Adaptive Management Thresholds.** The link between the technical and decision-making steps requires regular interaction and exchange of information between technical staff and decision-makers. This would be accomplished by annual meetings involving the Authority and the agencies where if necessary, both regulatory and technical expertise can be integrated into revising goals and

objectives, adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed such that any new information discussed assists with the planning of upcoming seasonal work.

7.2 Performance Standards

Performance standards for the Aquatic Study Plan would be based on quantitative metrics. These performance standards would be designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the study reaches.

Fish community performance standards would include measures of community diversity and percent area occupied for both available and total reach distance within the study areas. BMI performance standards would likely include three main indicators—PHAB IPI scores, BMI CSCI scores, and algae ASCI scores. Geomorphic performance standards would focus on channel stability evaluations such as:(1) evidence of significant and detrimental morphologic changes at any of the cross sections; (2) evidence of channel headcutting; (3) significant loss of gravels via dam impoundment; and (4) significant decrease in the channel stability score during the duration of monitoring activities.

Performance standards would be developed in conjunction with the Authority and the relevant agencies (CDFW, USFWS, and Colusa County) prior to the start of operation monitoring.

7.3 Operations Plan

The Authority would use information from the results of implementation of this Aquatic Study Plan, including field studies described herein, to prepare the Operations Plan. The Operations Plan would describe the approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from Stone Corral Creek and Funks Creek, while also ensuring that the Project's flood protection benefits are realized. Further, the Operations Plan would include, but would not be limited to, the approach for reservoir releases into Stone Corral Creek and Funks Creek, including release schedules and volumes. As stated in the Authority's application to appropriate water, the Operations Plan would be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

7.4 Anticipated Schedule

The following schedule is anticipated to result in a reduced workload once a range of flows is encountered with representative variability of environmental conditions (Table 3). For example, the field-based Hydrologic Study could possibly occur over the course of the 5 years leading up to dam construction and could terminate once a suitable range of flows has been measured and analyzed. This could occur within 1 year if flow conditions are variable enough, but more than likely it will occur over a series of years.

Table 3. Anticipated years that each study will be needed to acquire a representative range of environmental conditions for baseline and post operation periods.

Year	Fish Community	Bioassessment Study	Water Quality	Water Temp.	Geomorphic Study	Hydrologic Study (desktop)	Hydrologic Study (field)
Baseline							
2023	√	√	√	√	√	√	√
2024	√		√	√			√
2025	√	√	√	√			√
2026	√		√	√			√
2027	√	√	√	√			√
Post Operation							
2030	√	√	√	√	√		√
2031	√		√	√			
2032	√	√	√	√	√		√
2033	√		√	√			
2034	√	√	√	√	√		√

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8.2 Personal Communications

Rehn, Andrew. Biologist, California Department of Fish and Wildlife. April 6, 2022—Phone conversation with Jeff Peters of ICF and Marco Sigala at Moss Landing Marine Laboratories regarding a suitable number of bioassessment sampling reaches on Funks Creek and Stone Corral Creek for the Sites Reservoir Project.

Style Definition: Heading 2

Stone Corral Creek and Funks Creek Aquatic Study Plan

Commented [AF1]: Good job on this. One global comment -- Colusa County is not yet comfortable that we WILL have to release flows into the creeks. In a number of places in the plan, we assume this to be a given and/or maybe insert personal thoughts on those flows or what the future looks like for these creeks. I've tried to take most of this out. Please scrub again and take all of this out. This should simply be a study plan to collect data that will be used in XYZ way. We want to be very careful to not put in our views of what may happen on these creeks in the future, but simply lay out the facts and details of the study plan.

Commented [JH2R1]: Noted.

~~September 20~~November 15December 14~~October 31~~, 2022

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Contents

Tables

Figures

Acronyms and Abbreviations

°F	degrees Fahrenheit
ADCP	acoustic Doppler current profiler
AFDM	ash-free dry mass
Aquatic Study Plan	Stone Corral Creek and Funks Creeks Aquatic Study Plan
ASCI	Algae Stream Condition Index
Authority	Sites Project Authority
cfs	cubic feet per second
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
Chico ABL	Chico Aquatic Bioassessment Laboratory
CPUE	catch per unit effort
CSCI	California Stream Condition Index
CVRWQCB	Central Valley Regional Water Quality Control Board
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
GCID	Glenn-Colusa Irrigation District
GIS	geographic information system
GPS	global positioning system
LiDAR	light detection and ranging
MPSL-MLML	Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories
PHAB	physical habitat
Project	Sites Reservoir Project
QA/QC	quality assurance/quality control
SQL	Structured Query Language
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TC Canal	Tehama-Colusa Canal
TCCA	Tehama-Colusa Canal Authority
USGS	U.S. Geological Survey

1.0 Introduction and Purpose

1.1 Introduction

This Stone Corral Creek and Funks Creek~~s~~ Aquatic Study Plan (Aquatic Study Plan) has been prepared for the Sites Project Authority (Authority) to guide fisheries technical studies to be conducted prior to and during operation of the Sites Reservoir Project (Project), as well as ongoing monitoring during Project operations, if necessary. The Project is a proposed offstream storage project located on the west side of the Sacramento Valley in Glenn and Colusa Counties, approximately 10 miles west of the community of Maxwell~~ in Glenn and Colusa Counties~~. It is designed to store unappropriated water from winter and spring storm events in the northern Sacramento River watershed. The Project would impound ~~a maximum of~~ 1.5 million acre-feet of water in a reservoir. The reservoir would be created by building Sites Dam on Stone Corral Creek, Golden Gate Dam on Funks Creek, and a series of saddle dams on the northeastern rims of Antelope Valley. While a portion of naturally occurring seasonal flows in Stone Corral Creek and Funks Creek~~s~~ would be retained in the reservoir, the primary source of water for the reservoir would be diversions from the Sacramento River. These diversions would be up to 4,200 cubic feet per second (cfs) via two existing facilities: the Red Bluff fish screen and pumping plant (operated by the Tehama-Colusa Canal Authority [TCCA]) and the Glenn-Colusa Irrigation District's (GCID) fish screen and pumping plant near Hamilton City.

Commented [AF3]: Global - sometimes we use Stone Corral Creek and Funks Creek and sometimes we use Stone Corral and Funks Creek. I don't have a preference, but lets just make it consistent.

Commented [JH4R3]: We will go with the former.

1.2 Purpose of Aquatic~~s~~ Study Plan

As part of the Project alternatives development, the Authority has committed in the Project's Revised Draft ~~Final~~ Environmental Impact Report/Supplemental Draft (RDEIR/SDEIS) ~~and~~ Environmental Impact Statement (RDEIR/SDEIS)~~(EIS)~~, as well as in the Project's application to appropriate water, to prepare this ~~technical study plan~~Aquatic Study Plan and conduct technical studies on Stone Corral Creek and Funks Creek in the reaches of interest (i.e., the stream reaches below the dams) as well as the downstream reaches[3]. The Authority is proposing the following special water right term to be included in its water right permit.:

Commented [AF5]: Lets cite the draft for now as the final has not yet been released.

Also, now that we have drafted this plan, please double check the EIR/EIS text in Ch 2 and the appendix to make sure we are doing what we said we would do. If we need to change the EIR/EIS text and commitments, now is the time to do that. I am going to ask Melissa to remove mention of NMFS in the appendix as a reviewer as they don't have any jurisdictional species in this play so I don't see the need for them to review.

Commented [JH6R5]: @Hendrick, Mike, could you check on this?

Commented [HM7R5]: Is there a separate Funks and Stone Corral Creek Operations plan being proposed? I am only familiar with the Reservoir Operations Plan

Commented [JH8R5]: No, just the Reservoir Ops plan

Commented [AF9]: I know this footnote is a lot. We can move it out of a footnote and into the text if that is better. But I want is very clearly in this document that this document meets the study plan commitments we made in the RDEIR/SDEIS and in the water right permit term. I don't want there to be any question on this.

Commented [JH10R9]: @Hughes, Jessica, how best to accommodate this request?

Commented [JH11]: Update footnotes

Commented [JH12R11]: @editor

~~[3] See Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS.~~

[3] See Section 2.5.2.1. and Appendix D, Section 2D.4 of the RDEIR/SDEIS.

~~[3] The Authority is proposing the following special water right term to be included in its water right permit:~~

~~Within one year of issuance of this permit and prior to impoundments to storage of flows from Funks Creek and Stone Corral Creek under this permit, Permittee shall develop a Technical Studies Plan in accordance with Section 2.5.2.1 and Appendix D, Section 2D.4 of the Project's Revised Draft Environmental Impact Report to guide studies in Funks Creek and Stone Corral Creeks that shall be implemented prior to and during construction activities to collect information necessary to address California Fish and Game Code Section 5937. The Technical Studies Plan shall include, but may not be limited to, assessment of fish assemblage and available habitat, flow characteristics, water temperatures, bioassessment monitoring, losses, and method for reporting data. The Technical Studies Plan shall be developed in consultation with CDFW, and USFWS, and Colusa County, and Colusa County. Permittee shall implement the Technical Studies Plan.~~

~~Using the results of the Technical Studies, within five years of issuance of this permit and prior to impoundments to storage of flows from Funks Creek and Stone Corral Creek under this permit, Permittee shall develop a Funks~~

Within 1~~one~~ year of issuance of this permit and prior to impoundments to storage of flows from Stone Corral Creek and Funks Creek ~~and Stone Corral Creek~~ under this permit, Permittee shall finalize this draft Aquatic Studies Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's RDEIR/SDEIS~~Revised Draft Environmental Impact Report~~ to guide studies in ~~Funks Creek and Stone~~ Corral Creeks and Funks Creek that shall be implemented prior to and during construction activities to collect information necessary to address California Fish and Game Code Section (CFGC) 5937. This Aquatic Studies Plan includes an assessment of fish assemblage and available habitat, flow characteristics, water temperatures, bioassessment monitoring, and method for reporting data. This Aquatic Studies Plan shall be finalized in consultation with the California Department of Fish and Wildlife (CDFW), ~~and~~ the U.S. Fish and Wildlife Service (USFWS), and Colusa County. Permittee shall implement the Technical Studies Plan.

Using the results of the ~~T~~technical ~~S~~studies, within 5~~five~~ years of issuance of this permit and prior to impoundments to storage of flows from ~~Funks Creek and~~ Stone Corral Creek and Funks Creek under this permit, the Permittee shall develop a ~~Funks Creek and~~ Stone Corral Creek and Funks Creek Operations Plan (Operations Plan) in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of ~~T~~the RDEIR/SDEIS. The Authority is proposing the following special water right term to be included in its water right permit.:

~~the Project's Revised Draft Environmental Impact Report.~~ The Operations Plan shall describe Permittee's approach to address CFGC~~California Fish and Game Code~~ Section 5937 requirements, if any, resulting from impoundments to storage of flows from those creeks under this permit, while also ensuring that the Project's flood protection benefits are realized. The Operations Plan shall include, but may not be limited to, the approach for reservoir releases into ~~Funks Creek and~~ Stone Corral Creek and Funks Creek, including release schedules and volumes and a monitoring plan. The ~~Funks Creek and Stone Corral Creek~~ Operations Plan shall be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

Together, these studies would document the two creeks' existing hydrology, assess flow levels needed to maintain fluvial geomorphic processes, and update information on aquatic species presence and habitat use in the reaches downstream of the dams ~~to the streams confluence with each other~~ to establish aquatic baseline information that would be used to determine and subsequently manage environmental releases from the Project into the creeks. As part of the~~is~~ ~~Technical~~Aquatic Stud~~i~~es~~y~~ Plan ~~for Funks and Stone Corral Creeks~~~~Aquatic Study Plan~~, ~~these~~ studies would be initiated once access permission to the creeks through private property is obtained. The studies would also be used to inform final design for the proposed Sites Dam and Golden Gate Dam release facilities and operational requirements. The ~~Technical~~Aquatic Stud~~y~~ies Plan ~~for Funks and Stone Corral Creeks~~ ~~Aquatic Study Plan~~ includes fish ~~and habitat~~ monitoring, a Surface Water Ambient Monitoring Program (SWAMP) bioassessment study, a hydrogeomorphic study, and a temperature study. Specific details for the field studies would be designed and conducted in collaboration with ~~the California Department of Fish and~~

~~Creek and Stone Corral Creek Operations Plan in accordance with Section 2.5.2.1. and Appendix D, Section 2D.4 of the Project's Revised Draft Environmental Impact Report. The Operations Plan shall describe Permittee's approach to address California Fish and Game Code Section 5937 requirements, if any, resulting from impoundments to storage of flows from those creeks under this permit, while also ensuring that the Project's flood protection benefits are realized. The Operations Plan shall include, but may not be limited to, the approach for reservoir releases into Funks Creek and Stone Corral Creek, including release schedules and volumes and a monitoring plan. The Funks Creek and Stone Corral Creek Operations Plan shall be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.~~

~~Wildlife (~~CDFW~~)~~, ~~U.S. Fish and Wildlife Service (~~USFWS~~)~~ and Colusa County. ~~State Water Resources Control Board (SWRCB).~~

The objectives of these studies are as follows.

- Determine existing fish assemblages in these creeks, including locations of fish species presence and habitat use.
- Characterize currently available habitats ~~available~~ (e.g., spawning, rearing, foraging, and sheltering habitats) at varying flow levels, including the presence or absence of pools that persist through summer~~, which may require some supplemental flow~~.
- Characterize flows, including assessing the baseflow during summer and conducting a fluvial geomorphologic study to characterize habitat conditions, substrate compositions, and flow levels ~~necessary for protection of aquatic habitat and sediment mobilization~~.
- Conduct a SWAMP technical study (i.e., a stream bioassessment) that focuses on relationships between physical habitat (PHAB), water quality, and benthic macroinvertebrates.
- Implement hydrological studies to define flow temperature relationships.

~~The Authority would use information from the results of implementation of this Aquatic Study Plan, including field studies described below, to prepare an Reservoir Operations Plan for Stone Corral Creek and Funks Creek. The Reservoir Operations Plan would identify the approach for flow releases, including release schedule and volumes, and an adaptive management plan to maintain fish in good condition consistent with California Fish and Game Code (CFGC) Section 5937 in the creek reaches of interest. These reaches are below the locations of Sites and Golden Gate Dams and upstream of the confluence of Stone Corral Creek and Funks Creek. The information would be integrated to focus on aquatic species of concern in the lower portions of the two creeks with an emphasis on maintaining existing community structure and habitat conditions. It is expected that flow releases from Sites Reservoir into these creeks would mimic the seasonal pattern of their natural discharge, but that releases would be lower during Sacramento River Index Dry and Critically Dry Water Years and higher during Above Normal Water Years.~~

This Aquatic~~s~~ Study Plan summarizes the methods and reporting strategies for the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek. Using information obtained from these field studies, along with currently available information, the Authority would develop a schedule of releases for Stone Corral Creek and Funks Creek to be incorporated into the ~~Reservoir~~ Operations Plan. Flow releases into these creeks would be made to maintain flood control benefits of the Project and would not overtop streambanks or flood downstream areas. The release schedule would also account for meeting demands of senior water right holders on ~~Funks and~~ Stone Corral ~~c~~Creek~~s~~ and Funks Creek consistent with the timing of the existing water right that are downstream from the proposed dams. Appendix 2D, *Best Management Practices, Management Plans, and Technical Studies* of the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) describes the purpose, objectives, content, and timing of the field studies identified above.

Furthermore, if flows in Stone Corral Creek and Funks Creek are needed to maintain fish in good condition in compliance with CFGC Section 5937, then the Authority ~~has~~ would ~~proposed to~~ adapt this study program into an operations monitoring program with a duration of 5 to 10 years to document and adaptively manage the timing and magnitude of flow releases to maintain fish in good condition below the dams ~~and~~ along with the habitats upon which they depend. Performance standards would be developed in conjunction with the Authority and the relevant ~~permitting~~ agencies (CDFW, USFWS, and

Commented [AF13]: I have changed this to mimic the water right term language in that the study plan is coordinated with these three agencies.

Once we share the draft plan with these agencies, we should incorporate a section into the final study plan that describes our outreach to the agencies and then include their comments and responses to those comments in an appendix.

Commented [JH14R13]: Noted.

Commented [AF15]: Please make the second line of the bullets indented by 0.25 throughout.

Commented [JH16R15]: please adjust accordingly.

Commented [AF17]: I have deleted a lot of these statements throughout. Colusa County will be very sensitive to use assuming/conceding that flows are necessary. So please be careful in these statements and lets just lay out the study plan and see where it takes us.

Commented [PJ18]: This was text that was identified in the EIR and in the response to comments in the EIR. I am not sure if it should be deleted here...

Commented [SJ19R18]: In this case, yes. See Ali's first comment for rational.

Commented [AF20]: This paragraph seems to repeat the information from the paragraph above in a slightly different way. Please review the two and delete this one if it is in fact repetitive.

Colusa County~~SWRCB and the Central Valley Regional Water Quality Control Board (CVRWQCB)~~) prior to the start of operations monitoring.

1.2.1 Integration of Fish Monitoring with Aquatic Habitat Survey Methods

Aquatic habitat survey methods for sampling are described below. Note that the field observations and results from other studies (i.e., the stream bioassessment study and hydrogeomorphic study) would aid in the assessment of aquatic habitat and are referenced where applicable.

An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat and final locations would be discussed with CDFW and Colusa County to ensure appropriate placement . Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.

As part of the pre-operation sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study.:

- **Fish community.** – Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)
- **Substrate composition.** – Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)
- **Riparian vegetation cover.** – Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)
- **Benthic macroinvertebrate presence.** – To better understand the entire aquatic community currently present in these creeks, Aa SWAMP bioassessment that focuses on the relationships between PHAB~~physical habitat~~, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on ~~Funks Creek and~~ Stone Corral Creek and Funks Creek. The bioassessment study would be conducted using the methods described in the SWRCB's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study)
- **Water quality.** – Monitoring for general water quality parameters (e.g., temperature, turbidity, pH, conductivity, salinity, and dissolved oxygen~~, contaminants~~ would be conducted to assess surface water quality. Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)
- **Water temperature** – Water temperature profiles for Stone Corral Creek and Funks Creek ~~and Funks Creek~~ would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into

Commented [AF21]: This section feels like intro text and not fish monitoring text. Should this be moved to the end of Chapter 1? Also, can we order these in the same order (generally) as the subsequent chapters?

Commented [HJ22R21]: Moved

Commented [JM23]: Check that addition is valid.

Commented [HJ24R23]: @Moderan, Julien, we are only measuring for general water quality parameters, as stated, so no.

Commented [MJ25R23]: Noted. Only general WQ variables at fish sampling stations. Additional WQ constituents from 4.7 only collected at 2 stations twice a year so not directly possible to integrate with fish study. Might still be relevant as potential explanatory variables for any changes in Fish response before vs after construction and operation.

Commented [WM26]: Can't make this bulleted, but I think it needs to be.

Commented [PJ27R26]: Bulleted now☺

Funks Creek and intake levels for the release to Stone Corral Creek.~~into downstream water bodies.~~ The goal would be to mimic existing temperature profiles ~~to benefit native fish~~ in Funks Creek~~, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study)~~.

- ~~**Water temperature** – Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles to benefit native fish in Funks Creek, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study).~~

Commented [WM28]: Can't make this bulleted, but I think it needs to be.

1.3 Applicable Methods for Determining Operational Streamflows

Commented [AF29]: This section here makes it sound like the operations plans would be based solely on the data collected in Chapter 5. I think the operations plan would be based on all of these studies. So we should consider moving this to Chapter 1 so that its not in a specific study chapter.

Commented [PJ30R29]: This used to be in Chapter 5 and has been moved up here per the comment request.

After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP bBioassessment sStudy), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program,[4] the California Environmental Flows Framework,[5] and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on ~~Funks and~~ Stone Corral Creeks and Funks Creek to maintain fish in good condition. Coordination with the CDFW, USFWS, and Colusa County ~~permitting agencies~~ would be required before a ~~chosen~~ method is selected.

[4] https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow

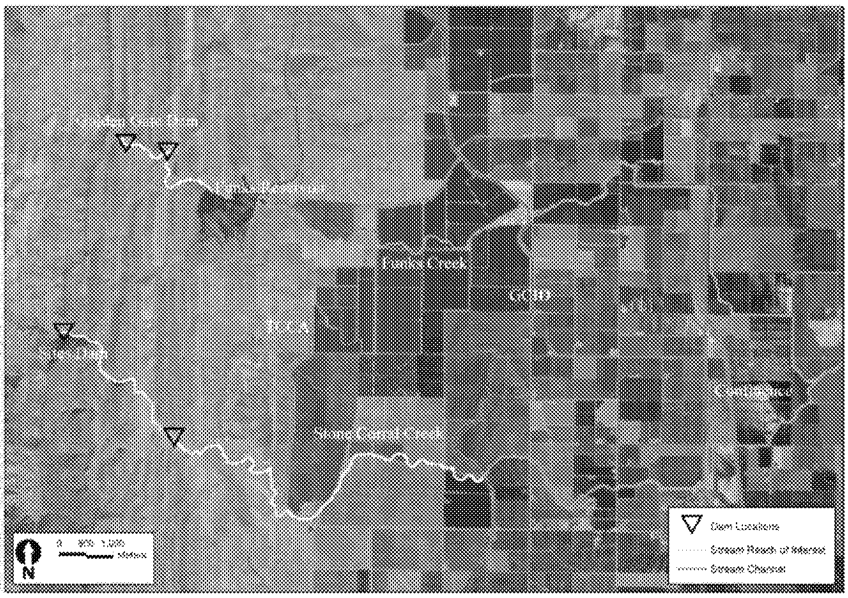
[5] https://ceff.ucdavis.edu/

2.0 Environmental Setting

2.1 Environmental Setting of Stone Corral Creek and Funks Creek~~s~~

Stone Corral Creek and Funks Creek are both small watersheds originating below the snowline on the eastern foothills of the California Coast Range at elevations of 700 to 850 feet. Consequently, they do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flow intermittently, mostly during winter and early spring. From their origins, they flow through low foothills, across Antelope Valley (the proposed ~~site~~ location of Sites Reservoir), through a series of shallow canyons and eventually spill onto the Sacramento Valley floor (Figure 1). For much of their course on the valley floor, they are confined to narrow channels between berms along the edge of agricultural fields and road prisms. While the stream channels of these creeks are not actively managed, their straight alignment and angular turns around agricultural fields and along roads indicate that they were modified from their natural historic channels. In the upper parts of the watersheds just above the dam locations, these streams are largely devoid of riparian cover resulting from livestock use (Bureau of Reclamation and California Department of Water Resources 2008:3-20). In the lower reaches where the streams run through and around agricultural fields, shaded riparian habitat is sparse and consists mostly of low shrubs, grasses, ~~and~~ occasional oaks[6] (*Quercus* sp.), willows (*Salix* sp.), and cottonwood (*Populus* sp.) trees.

[6] According to Colusa County, there are no oaks east of Mills Orchard Rd. east of Stone Corral Creek nor approximately east of Funks Reservoir.


Golden Gate Dam
Funks Reservoir
Funks Creek
GCID
TCCA
Sites Dam
Confluence
Stone Corral Creek
Dam Locations
Stream Reach of Interest
Stream Channel
0 500 1,000 Meters
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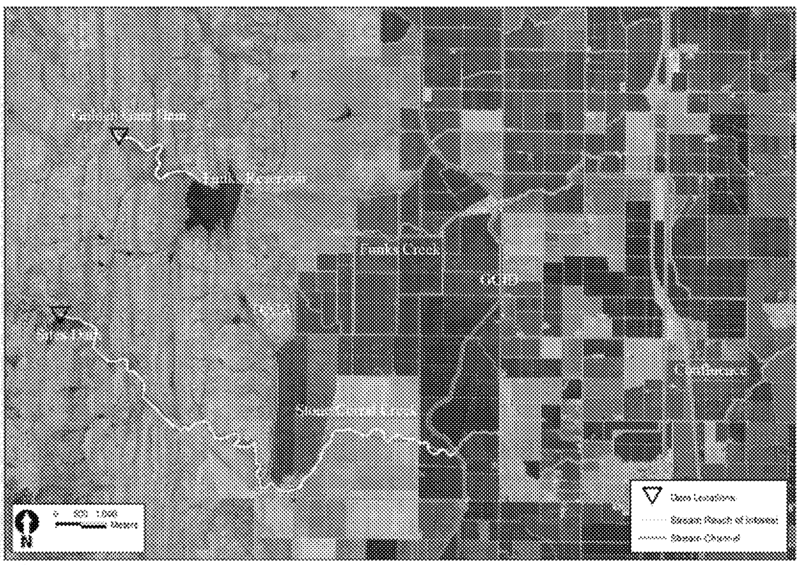

Golden Gate Dam
Funks Reservoir
Funks Creek
GCID
Sites Dam
Confluence
Stone Corral Creek
Dam Locations
Stream Reach of Interest
Stream Channel
0 500 1,000 Meters
N

Figure 1. Stone Corral Creek and Funks Creek Reaches of Interest and Downstream Reaches.

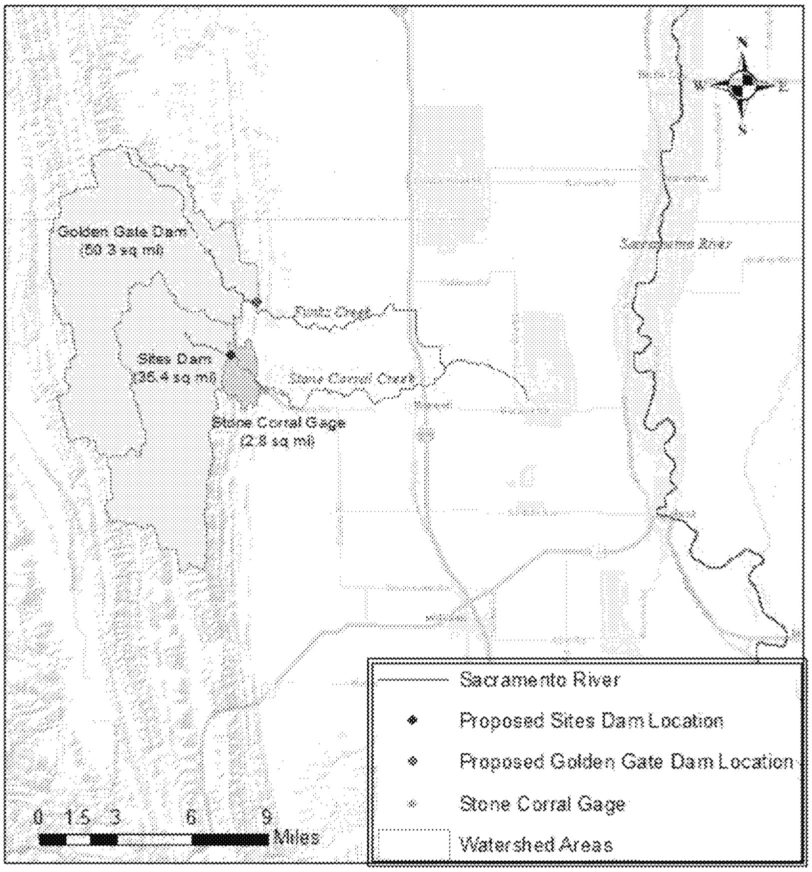
2.1.1 Stone Corral Creek

Stone Corral Creek has a drainage area of 38 square miles ~~at~~ upstream of the proposed Sites Dam. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal (TC Canal) and begins to travel through agricultural lands. About 3 miles below the TC Canal siphon, Stone Corral Creek crosses the GCID Main Canal. Although most of the water in the canal passes under Stone Corral Creek in a siphon, GCID releases water from the canal into Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below the GCID Main Canal, Funks Creek flows into Stone Corral Creek, and then Stone Corral Creek flows an additional 5 miles to the Colusa Basin Drain. Refer to Figure 2 for a figure showing these various elements.

Commented [AF31]: A detailed map showing all of these points along with a separate one for Funks Creek would be helpful. We should try to label all of these points on the map so the reader can understand the area.

Commented [PJ32R31]: Inserted new figure accordingly.

Draft_0021442

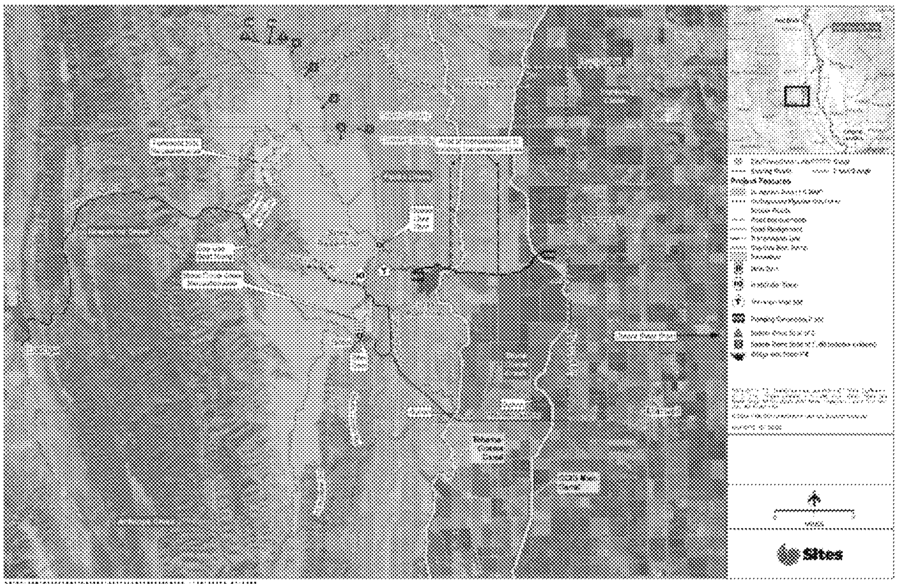


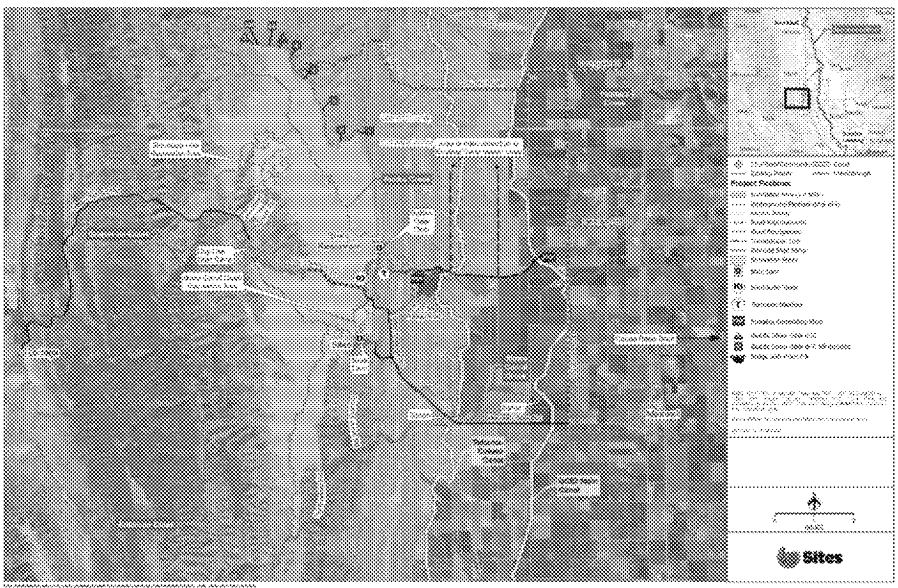
~~Figure 2. Stone Corral Creek and Funks Creek Watersheds Upstream of Proposed Sites Dam and Golden Gate Dam Locations and Stone Corral Creek Gage Location~~

Commented [AF33]: This map isnt referenced until later and thus, should be moved back in the text. Also, it's a little confusing to note the Stone Corral Gage as only a 2.8 sq mi watershed. Maybe hatch or similar color the Sites Dam and Stone Corral drainage to make it clear that the Stone Corral Gage watershed includes the entire Sites Dam watershed. And adjust the area (2.8 sq mi) to include the whole watershed and not just the part downstream of the gage.

Commented [PJ34R33]: I moved the Figure below, but I believe MBK provided us with this figure so they would have to make the suggested changes.

The U.S. Geological Survey (USGS) collected 27 years of discharge measurements at USGS Gage No. 11390672, in Stone Corral Creek near the community of Sites, California, from 1958 through 1985 (Figure ~~2~~3). The data demonstrate a high variability of flow over the period of record, and there were 3 years of zero flow: 1972, 1976, and 1977 (Figure ~~3~~4). Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. The maximum annual discharge during the period of record was 39.9 thousand acre-feet (TAF) in 1983. Based on the USGS period of record, mean annual daily discharge for the period of record was calculated as 9.02 cfs (SD of 67.5, median is 0) and annual average discharge ~~through the creek~~ was 6.5 TAF per year.





Commented [JM35]: The labels and legend font sizes are really small. Consider giving that figure 2 a whole page in landscape orientation for readability.

Figure 2. Project Area Overview

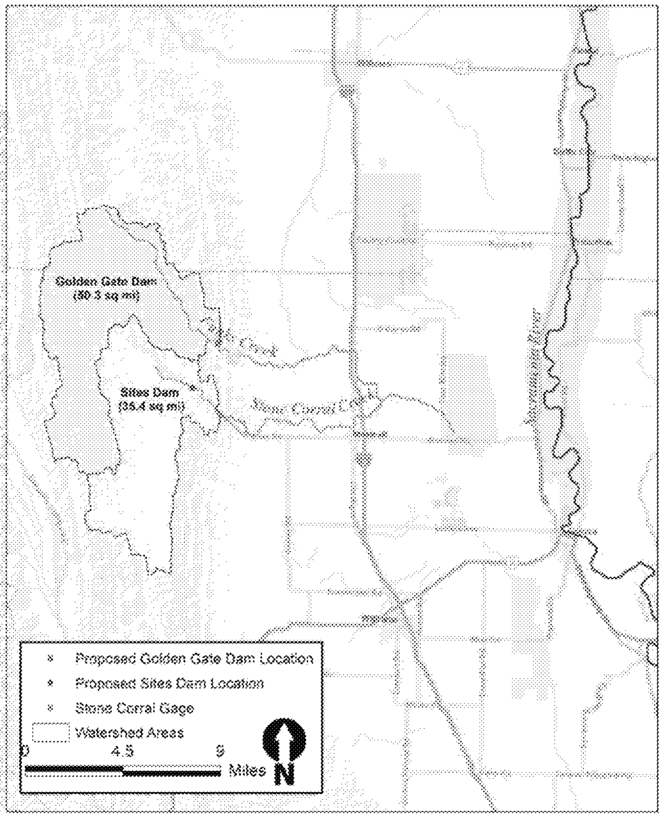
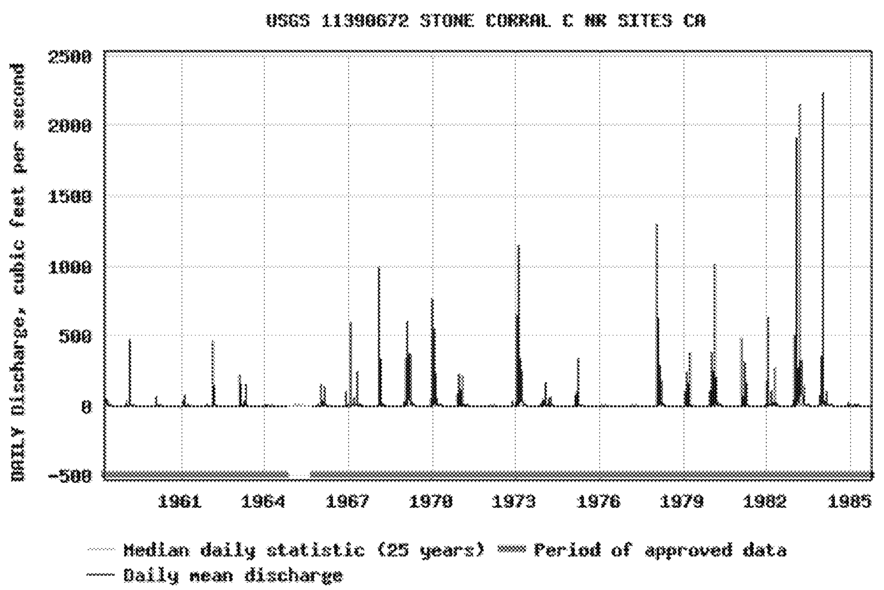


Figure 23. Stone Corral Creek and Funks Creek ~~and Funks Creek~~ Watersheds Upstream of Proposed Sites Dam and Golden Gate Dam Locations. The ~~and~~ Stone Corral Creek Gage Location captures the entire Sites Dam watershed (35.4 sq mi) upstream.

Commented [AF36]: This map isnt referenced until later and thus, should be moved back in the text. Also, it's a little confusing to note the Stone Corral Gage as only a 2.8 sq mi watershed. Maybe hatch or similar color the Sites Dam and Stone Corral drainage to make it clear that the Stone Corral Gage watershed includes the entire Sites Dam watershed. And adjust the area (2.8 sq mi) to include the whole watershed and not just the part downstream of the gage.

Commented [PJ37R36]: I moved the Figure below, but I believe MBK provided us with this figure so they would have to make the suggested changes.

Commented [HJ38R36]: MBK did not change their figure, so I changed the caption to try to clarify Ali's point.



Source: U.S. Geological Survey stream gage 11390672

Figure 4~~3~~. Mean Daily Flow in Stone Corral Creek near Sites (cfs)

Because the historical gage record for Stone Corral Creek is limited and Funks Creek is not gaged, historical stream gage data from Elder Creek was used to produce a longer-term estimate of streamflow on Stone Corral Creek and Funks Creek~~s~~. The Elder Creek gage was chosen because it was the nearest gage on the valley floor with a long record of data available. It was assumed that Elder Creek has relatively similar precipitation and runoff patterns to Stone Corral Creek and Funks Creek~~s~~. The streamflow of Elder Creek, located in Tehama County, has been measured since 1948 (USGS Gage No. 11379500). The gage site is approximately 49 miles northwest of the proposed Sites Reservoir, and has a drainage area upstream of the gage of 92.4 square miles (Attachment 1- MBK Engineers 2022). The overlapping period of gage records for Stone Corral Creek and Elder Creek (1958–1985) was used to determine a logarithmic correlation between the two gages for each month of the year. The developed streamflow timeseries was then further adjusted to account for the difference in watershed areas upstream of the old USGS Stone Corral Creek gage and the proposed location of Sites Dam. Tables 1a and 1b provide~~s~~ the results of this analysis, which shows the average monthly flow volume in acre feet per year and cubic feet per second for each ~~by~~ water year type (MBK Engineers 2022). The average monthly ~~flow~~ volumes are calculated using the gage record for October 1958 through August 1985 with logarithmic monthly correlations for September 1985 through September 2021. Results are summarized by Sacramento Valley Water Year Type: wet, above normal, below normal, dry, and critical.

Table 1Aa. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	42	11	2	5	0	17
Dec	872	242	29	47	54	336
Jan	3,365	2,825	711	345	171	1,663
Feb	4,487	4,667	1,283	135	307	2,317
Mar	2,135	1,522	407	264	179	1,039
Apr	901	319	114	25	35	375
May	136	119	15	7	9	65
Jun	20	8	2	1	1	8
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	11,959	9,713	2,562	828	757	5,827

Commented [AF39]: This is all interesting, but AF arent really relevant to fish species. Can we also include tables on cfs? Average per month or min/average/max per month? Same with Funks below.

Commented [HJ40R39]: @Spranza, John - Please change.

Table 1b. Stone Corral Creek at Proposed Sites Dam Average Monthly Flow Volume (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	21	6	1	3	0	9
Dec	436	121	15	24	27	168
Jan	1,683	1,413	356	173	86	832
Feb	2,244	2,334	642	68	154	1,159
Mar	1,068	761	204	132	90	520
Apr	451	160	57	13	18	188
May	68	60	8	4	5	33
Jun	10	4	1	1	1	4
Jul	1	0	0	0	0	0
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	5,980	4,857	1,282	415	378	2,910

Commented [AF41]: This is all interesting, but AF arent really relevant to fish species. Can we also include tables on cfs? Average per month or min/average/max per month? Same with Funks below.

Commented [HJ42R41]: @Spranza, John - Please change.

Commented [SJ43R41]: Done

2.1.2 Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 50.3 square miles upstream of the proposed Golden Gate Dam. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir is a re-regulating reservoir on the TC Canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA to manage water levels within the TC Canal. ~~However, t~~The Funks Dam gates are opened during large storm events to pass flood waters through Funks Reservoir and down Funks Creek to avoid compromising the TC Canal and its operations. With the exception of passing flood waters, the Funks Dam gates are operated in the closed position~~There are no requirements to maintain flows in Funks Creek below Funks Reservoir~~, but seepage through the dam gates maintains perennial flow for a short distance below the dam in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID Main Canal. While the GCID Main Canal passes under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek. Similar to Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.

There is no flow record for Funks Creek, but given the comparable size, geology, and topography of the two watersheds and their proximity to each other, Funks Creek seasonal flow patterns and flow magnitudes are likely similar to Stone Corral Creek.

The same correlation approach used to estimate streamflow in Stone Corral ~~c~~Creek cannot be followed to estimate streamflow in Funks Creek because there are no streamflow data available for Funks Creek. Therefore, flow in Funks Creek was estimated by prorating monthly Stone Corral Creek streamflow data by the ratio of Stone Corral Creek's and Funks ~~and Stone Corral~~ Creek's watershed areas upstream of the proposed dam locations (MBK Engineers 2022). Tables 2a and 2b provide~~s~~ the results of this analysis and identify~~ies~~ the average monthly flow volume in acre feet per year and cubic feet per second ~~for each~~ for ~~by~~each water year type.

Commented [SJ44]: Note: there is an updated August version of the TM that I will send. I have updated the reference section

Table 2a. Funks Creek Average Monthly Flow Volume (ac-ft) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years ~~3-Year Average~~
Oct	0	0	0	0	0	0
Nov	60	16	3	7	1	24
Dec	1,239	343	41	66	77	485
Jan	4,778	4,011	1,010	489	243	2,362
Feb	6,372	6,628	1,822	192	436	3,290
Mar	3,031	2,161	578	375	255	1,475
Apr	1,280	453	162	36	49	553
May	193	169	21	9	13	93
Jun	28	11	2	1	2	12
Jul	2	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	16,984	13,793	3,638	1,176	1,075	8,275

Commented [AF45]: Why 3 year average here where other table had just average?

Commented [PJ46R45]: Can't recall who provided this table...MBK??

Commented [SJ47R45]: It's an incorrect column title

Table 2b. Funks Creek Average Monthly Flow Volume (cfs) by Water Year Type (1958–2021)

Month	Wet	Above Normal	Below Normal	Dry	Critical	Average of All Years
Oct	0	0	0	0	0	0
Nov	30	8	2	4	1	12
Dec	620	172	21	33	39	243
Jan	2,389	2,006	505	245	122	1,181
Feb	3,186	3,314	911	96	218	1,645
Mar	1,516	1,081	289	188	128	738
Apr	640	227	81	18	25	277
May	97	85	11	5	7	47
Jun	14	6	1	1	1	6
Jul	1	0	0	0	0	1
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
WY Total	8,492	6,896	1,820	588	538	4,148

Commented [AF48]: Why 3 year average here where other table had just average?

Commented [PJ49R48]: Can't recall who provided this table...MBK??

Commented [SJ50R48]: It's an incorrect column title

2.1.3 Physical Characteristics

The only drainages that exit Antelope Valley are Stone Corral Creek and Funks Creek. Each creek continues through the steeper, foothill environments and then transitions to the Sacramento Valley floor, where each is generally shallow and highly altered, primarily for water conveyance and agricultural purposes. Straight channels and angular turns associated with agricultural fields and roads indicate that natural channels have been at least partially modified. Along their reaches on the valley floor, these creeks are mostly confined to narrow channels between berms adjacent to agricultural fields and road prisms.

Stone Corral Creek and Funks Creek are largely devoid of riparian habitat in their upper reaches (foothill environments) due to heavy livestock use. In the lower reaches where the creeks run through and around agricultural fields, riparian habitat is variable and consists mostly of low shrubs, grasses, ~~and~~ occasional oak, willows and cottonwood trees; however, some segments of Stone Corral Creek possess dense stands of mature riparian vegetation.

Although the reaches of interest have been modified by livestock grazing, channelization, irrigation conveyance systems and minor diversions, they are still expected to have available aquatic habitat (i.e., benthic macroinvertebrate [BMI]). They also both experience much of their natural hydrograph (albeit altered due to local conveyance) and fluvial geomorphic processes and provide water and sediment that ultimately flows into the Colusa Basin Drain during rain events. ~~Some of the larger flow events may be important for water (and sediment) contributions to the Colusa National Wildlife Refuge.~~

Commented [AF51]: This statement is going to raise concern with Colusa County. Do we know this for sure? If not, then delete and we can assess this as part of the study efforts.

Commented [PJ52R51]: This was included in part to response to comments. It is fine to delete it here I guess.

3.0 Fish Monitoring

3.1 Purpose of Fish Monitoring Program

The purpose of a fish monitoring program in ~~Funks Creek and~~ Stone Corral Creek and Funks Creek downstream of Sites Reservoir is to establish a pre-project baseline and post-operation assessment of the ~~diversity and abundance estimates~~ ~~of~~ fish species present to determine the existing state of the fish population and whether it is ~~fish are~~ maintained in good condition consistent with CFGC Section~~California Fish and Game code~~ 5937 after project construction and operation. ~~Sites Dam and Golden Gate Dam will be impassable barriers, designed to store diversions from the Sacramento River and retain flows into Funks Creek and Stone Corral Creek. A fish monitoring program will assist the Sites Authority with information that will help determine whether flow releases designed to mimic the ephemeral nature of these creeks are sufficient to maintain fish in good condition.~~

3.2 Overview of Proposed Methods

~~3.1 Study Design~~

Assessment of the goal to maintain fish in good condition in these ephemeral creeks consistent with CFGC Section 5937 would be made using a Before-After-Control-Impact experimental study design, using the reach with perennial flow below Funks Reservoir as a control. Sampling would be conducted to assess fish community and habitat present in the study area for up to 5 years prior to operation of the Project. Following completion of the pre-operation survey, fish communities and aquatic habitats in the study area would be monitored in a similar fashion for a 5-to-10-year period after the Project is operational. Fish community and habitat data that showed statistically significant negative departures from baseline data would trigger reassessment of downstream flow management under a proposed adaptive management plan.

Commented [JM53]: Maybe delete "ephemeral" since it does not seem it adds anything here and is actually a proper hydrology term with a slightly different meaning than intermittent (as the creeks are qualified earlier, despite one of the goals of the study plan being to characterize their status between ephemeral, intermittent or perennial).

Commented [AF54]: Should we explain why we are using this as a control?

Commented [HJ55R54]: @Warburton, Manna, please check this to verify accuracy.

Commented [WM56R54]: Looks good. Alicia may also be requesting that we explain why we are using the downstream reach as the control. The perennial reach below Funks Reservoir is the only nearby waterway appropriate for use as a control.

~~3.1.1~~3.2.1 Pre-operation Baseline Monitoring

Pre-operation baseline monitoring would be conducted within the study area to identify, quantify, and map habitats (Chapter 4, *SWAMP Bioassessment Study Designs and Methodology*), document aquatic species distribution and population characteristics (e.g., relative abundance, diversity), and identify triggers (e.g., decrease in relative abundance) for adaptive management actions. This monitoring establishes a baseline condition from which success criteria are measured and includes initial reconnaissance and pre-operation sampling.

The pre-operation surveys would first involve a reconnaissance survey to observe and record variables that may affect sampling efforts and establish monitoring stations. Data collection would include information about the site, habitat, and fauna that are observed during site visits. Aquatic habitat and fish species sampling would be conducted once the reconnaissance is complete and sampling stations have been established. Data would be collected via standardized electronic or paper forms by experienced biologists during assessments and sampling. Data collected as part of pre-operation efforts would be summarized into yearly reports and a final pre-operation baseline report to the Authority at the end of the pre-operation survey period. Surveys would provide the information required to characterize baseline conditions of the fisheries resources, as well as threats and stressors to fish species and habitat in the pre-operation conditions.

~~3.1.2~~3.2.2 Operations Monitoring

Operations monitoring would occur periodically at ~~appropriate~~ the intervals specified herein~~, or as required by other plans and programs, or as established by the Authority~~. Operations sampling would document fish abundance, condition, and distribution and compare the results with data collected on habitat area, location, and ~~changes in~~ climate-driven changes in habitat characteristics over time. Data from the fish study would be used in documenting compliance with CFGC Section 5937 with data from the SWAMP assessments providing additional details on overall stream status.

Operations sampling methods would be identical to the pre-operation sampling, including returning to established stations and tracking fish abundance, diversity, and distribution through time. Threats and stressors identified in the pre-operation survey would be assessed during operations surveys to differentiate changes in habitat or fish communities not related to the operation of the Project. Data collected as part of the operations sampling effort would be compared against the baseline data, as well as previous years' data and summarized into interim and final reports ~~to the Authority~~.

~~3.1.3 Integration with Aquatic Habitat Survey Methods~~

Commented [AF57]: This section feels like intro text and not fish monitoring text. Should this be moved to the end of Chapter 1? Also, can we order these in the same order (generally) as the subsequent chapters?

~~3.1.4 Aquatic habitat survey methods for sampling are described below. Note that the field observations and results from other studies (i.e., the stream bioassessment study and hydrogeomorphic study) would aid in the assessment of aquatic habitat and are referenced where applicable.~~

~~3.1.5 An initial reconnaissance survey would provide information on existing habitat and inform the selection of sampling stations within the Stone Corral Creek and Funks Creek drainages. Stations would initially be set at fixed distances apart to accommodate between 10 and 15 sampling stations within each drainage. Stations would be mapped prior to going into the field and then field-verified during the reconnaissance survey. Some leeway would be given to adjust locations to prioritize reaches containing optimal fish habitat. Stations that fell within dry or sub-optimal aquatic habitat for fish survival would be de-prioritized or curtailed.~~

~~3.1.6 As part of the pre-operation sampling for fish community and aquatic habitat, the following data would be collected and/or integrated into the fish study:~~

~~3.1.7 Fish community – Surveys would characterize local fish communities using methods described below. As feasible and appropriate, methods would be consistent with those used in previous and ongoing fish community survey~~

~~efforts (e.g., methods accepted as standard practice for sampling aquatic systems; Meador et al. 1993). (Fish Study)~~

~~3.1.8~~ ~~Substrate composition – Surveys would document stream bed substrate particle size using Wolman pebble counts (Wolman 1954; Kondolf and Li 1992), gravelometer, substrate facies mapping, or similar methods. (Hydrogeomorphic Study)~~

~~3.1.9~~ ~~Riparian vegetation cover – Surveys would measure the relative amount (e.g., percent cover) of riparian vegetation cover over aquatic habitat to document conditions. Riparian vegetation cover would be monitored using the California Rapid Assessment Method (Brown 2013), or similar method. (Hydrogeomorphic Study)~~

~~3.1.10~~ ~~Benthic macroinvertebrate presence – A SWAMP bioassessment that focuses on the relationships between physical habitat, water quality, benthic macroinvertebrates, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Funks Creek and Stone Corral Creek. The bioassessment study would be conducted using the methods described in the SWRCB's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study)~~

~~3.1.11~~ ~~Water quality – Monitoring for general water quality parameters (e.g., temperature, turbidity, pH, conductivity, salinity, dissolved oxygen) would be conducted to assess surface water quality. Water quality monitoring would be conducted using methods described in the State Water Board's SWAMP protocols (Ode et al. 2016a, 2016b). (SWAMP Bioassessment Study and Fish Study)~~

~~3.1.12~~ ~~Water temperature: – Water temperature profiles for Stone Corral Creek and Funks Creek would be developed. These water temperature profiles would be used to inform decisions about which tiers of the inlet/outlet (I/O) tower to use when conducting releases into downstream water bodies. The goal would be to mimic existing temperature profiles to benefit native fish in Funks Creek, which are accustomed to the warm temperatures present in this creek under existing conditions (Temperature Study).~~

~~3.1.13~~3.2.3 Fish Sampling Methods

Beach Seining

Seining is a low cost, low impact method for capturing aquatic organisms. The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species, and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.

Circumstances that may affect efficacy include the amount or type of benthic structure, presence/absence of aquatic vegetation, water clarity, flow rate, and water depth. Seining is most effective in smooth bottom habitats free of aquatic debris or vegetation, with elevated turbidity, and are shallow enough for biologists to wade in. When benthic structure is complex, water clarity is high, and habitats contain extremely deep, shallow, or rapidly moving water that may exclude biologists from deploying nets, efficacy is dramatically decreased.

Seines with a "bag" to minimize aquatic organism handling stress are preferred. Seines with a bag are also preferred where obstructions make access to the water (or deployment/retrieval of the seine) difficult (U.S. Fish and Wildlife Service 2012). Blocking nets typically improve efficacy by reducing opportunities for target species to move out of the area being seined. Where the area to be isolated for sampling includes culverts, deep pools, undercut banks, or other cover attractive to fish (e.g., thick overhanging vegetation, root wads, logjams) it may be appropriate to isolate a portion or portions of the study area in phases, rather than attempting to herd fish from the entirety of the work area in a single downstream pass.

~~The size of the seines used for sampling would depend on the size of the habitat being sampled. Larger seines may be up to 30 feet long, 6 feet high, with a mesh size of 0.25 inch and a pocket size of 5 feet by 5 feet. Smaller seines used for small pools and ponds may be 12 feet long, 4 feet high, with a mesh size of 3/16 inch and a pocket that is 5 feet by 5 feet. Seines would be used or deployed in conjunction with block nets to prevent fish from moving out of the area prior to being sampled. Captured specimens would be held in floating net pens or large aerated containers, based on site conditions, prior to being processed. Specimens would be identified to species and the first 20 of each species would be measured for fork length to the nearest millimeter before being released at the capture site. Additional specimens would be tallied and released. Representative specimens would be photographed for positive identification.~~

Electrofishing with Block Nets

~~The effects of electrofishing are typically short-term and limited to fish in the area immediately surrounding the electrical field. However, electrofishing has limited use in deeper water and in low and high conductivity water (Beauchamp 1995). Additionally, not all species are easily targeted by electrofishing (e.g., benthic species may be under-represented) (Beauchamp 1995), and capture may be biased towards larger fish.~~

Previous work in Stone Corral Creek and Funks Creeks indicates that total dissolved solids are high enough to prevent the use of electrofishing as a means of sampling (California Department of Fish and Game and California Department of Water Resources 2000). During reconnaissance surveys, basic water quality measurements would be taken to confirm this observation. If total dissolved solids values are above levels known to interfere with electrofishing, the method would be curtailed in favor of seining. If employed, electrofishing would be done with a Smith-Root type backpack electrofisher. Sections of creeks would be isolated using blocking nets before biologists wade into them, starting from the upstream net and moving downstream. Captured specimens would be held in buckets, floating net pens, or large aerated containers prior to being identified and measured as above for seine sampling. Effort would be calculated using shock time. If fish exhibit signs of stress, including symptoms of tetany or bruising, electrofisher settings would be adjusted accordingly to reduce impacts.

Visual Surveys

Any visual observations by biologists during reconnaissance and sampling of stream fauna would be systematically recorded based on pre-determined reach locations. This would include documenting amphibians and reptiles that may be observed incidentally during fish sampling efforts.

General Water Quality

Water quality data would be measured at every ~~station~~ fish sampling location using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the 2016 version of the SWAMP *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (SWAMP 2016 SOP) (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, turbidity, and pH.

~~3.1.14~~3.2.4 Fish Response

Abundance ~~and diversity~~

All sampling efforts would be quantified using catch per unit effort (CPUE). ~~Catch metrics would be computed based on the CPUE for a specific sampling method. Tracking CPUE by sites would be organized into charts or tables that accurately portray the CPUE for a given site and control effort. When a negative response in the CPUE of a target fish community for a given method is observed across sites or across sampling periods, investigators would assess whether the decline exceeded the threshold for triggering reassessment of flows under the proposed Adaptive Management Plan. If declines were observed to exceed thresholds, the Authority would be notified.~~

The CPUE would be computed for each sample method and assessed once multiple data sets are available for comparison. Numbers of individuals, weight, and area sampled would be recorded. A decline in CPUE, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Condition

Condition factor (K) would be calculated for all fish specimens for which length and weight have been recorded. The condition factor of fish reflects environmental and biological circumstances and fluctuations in feeding conditions and physiological factors (Le Cren 1951). The condition factor also indicates changes in food reserves and can be used as an indicator of the general condition of aquatic organisms. Therefore, information on condition factor can be used to assess biological health of monitored organisms because the measure provides information about the specific condition under which organisms are developing (Araneda et al. 2008).

A decline in condition factor, in comparison to baseline values and accounting for threats and stressors, would reflect a potential adaptive management trigger.

Distribution

Fish presence would be recorded and tracked through the study area. Fish distribution would be determined through reconnaissance and pre-operation surveys, known distributions, and incidental observations made during other sampling efforts. Records may be kept as count data and volumetric data but would ultimately be provided as presence or absence of fish species within sampling reaches.

~~3.2~~3.3 Timing and Frequency

The schedule and effort for the pre-operation and operation portions of the proposed study are detailed below. The pre-operation surveys would be five consecutive annual visits staged at any point prior to start of operation and within the seasonal restrictions indicated below. Monitoring efforts would be one-per-year visits each year following initiation of operation up to a 5- or 10-year timeline as determined by the Authority. For the purposes of this Aquatic Study Plan, it is assumed that sufficient access to the study area would be available in 2023.

Pre-Project implementation:

- Desktop scoping effort: lay out sampling reaches using geographic information system (GIS) data overlaid on aerial imagery, organize data sheets, and coordinate with water quality and SWAMP efforts. Spring 2022
- Initial reconnaissance: 2 days with 2-person crew; ideal timing would be when water levels are most restricted, which is typically in autumn.
- Pre-operation effort 1: 14 days with 4-person crew. 2023
- Pre-operation effort 2: 14 days with 4-person crew. 2024
- Pre-operation effort 3: 14 days with 4-person crew. 2025
- Pre-operation effort 4: 14 days with 4-person crew. 2026
- Pre-operation effort 5: 14 days with 4-person crew. 2027

Post-Project implementation:

- Operation effort 1: 14 days with 4-person crew. ~~2028~~2030
- Operation effort 2: 14 days with 4-person crew. ~~2029~~2031
- Operation effort 3: 14 days with 4-person crew. ~~2030~~2032
- Operation effort 4: 14 days with 4-person crew. ~~2031~~2033
- Operation effort 5: 14 days with 4-person crew. ~~2032~~2034
- Additional efforts up to 10 years after initial operation would be determined by the Authority.

The post-Project implementation schedule may be adjusted based on the Project construction schedule and construction completion.

Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum of Understanding permit would be required to complete the study design as proposed. ~~Benthic Macroinvertebrates (~~BMI~~) s~~samples would be the only ~~sacrificed~~ collected species.

Commented [AF58]: Have we defined this acronym yet?

Commented [AF59]: Can we use another word other than sacrificed? This comes up a few times in the document

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4.0 SWAMP Bioassessment Study Designs and Methods

Commented [AF60]: I like this format in this section -- Purpose, then Overview, then Field Methods, etc. Can we have all these chapters follow this same general outline?

Commented [PJ61R60]: Seems like this has been ironed out...

4.1 Purpose of Bioassessment Monitoring Program

Stream bioassessment monitoring is a method of evaluating and monitoring the environmental health and integrity of freshwater wadeable streams by using BMI, water quality parameters, and physical habitat (PHAB) conditions indicators of stream condition. Bioassessments are especially useful in tracking the aquatic conditions before and after a project is implemented to determine the project effects on aquatic communities. A SWAMP bioassessment that focuses on the relationships between PHABphysical habitat, water quality, BMI, and algal communities would be conducted on the reaches downstream of the proposed impoundments on Stone Corral Creek and Funks Creek.

This information, along with the other ~~required~~ studies (i.e., Fish Assemblage StudyMonitoring and Hydrogeomorphic Study), would help to inform the type of flow releases that should be made to the creeks under various operating conditions.

4.2 Overview of Proposed Methods

The bioassessment effort would be conducted using the methods described in the SWAMP 2016 SOP (Ode et al. 2016a, 2016b), or any updated version thereof. The reach-wide benthos method, which requires collection from each of 11 designated major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, pool), would be employed.

Commented [AF62]: Have we defined this term yet?

Commented [PJ63R62]: Yes, see the General Water Quality section in Section 3.2.2 Operations Monitoring

The ultimate number of individual sites, herein referred to as sampling reaches, on each creek would be based on access and safety; however, it is anticipated that five sampling reaches would be located on Funks Creek and that six sampling reaches would be located on Stone Corral Creek (Figure 54). Since there is no stringent guidance on establishing the number of bioassessment sampling reaches for a project such as this (Rehn pers. comm.), the number of sampling reaches was chosen to both best capture and quantify the two different elevational gradients within the study area (i.e., foothill and valley floor environments), and to have adequate spacing/distance between the sampling reaches (approximately 500 meters apart on Funks Creek above Funks Reservoir and approximately 2 kilometers apart elsewhere). Field and laboratory methods would be fully described in an associated Quality Assurance Project Plan.

Commented [AF64]: I feel like this should be an attachment to this plan. Can we develop this now?

Commented [PJ65R64]: The Quality Assurance Project Plan takes quite some time to develop and we really need to know which sampling reaches will be part of the overall study, so we need access to be worked out first before we develop this plan. Let's keep this on our radar for a future submittal once access is determined.

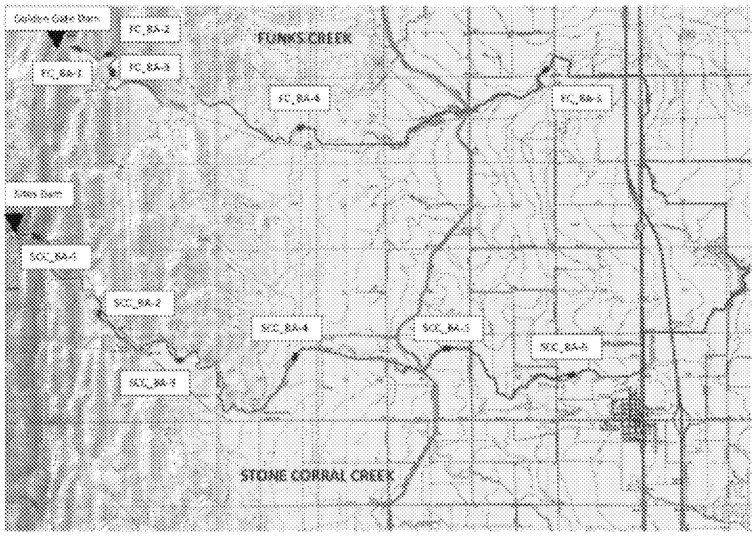

Figure 45. Potential Bioassessment Sampling Reaches, Stone Corral Creek and Funks Creeks

4.3 Field Methods

This section summarizes the methods that would be used to collect all bioassessment data. All surveys would be performed by a qualified team of a biologist or biologists and a geomorphologist with expertise in benthic macroinvertebrate and algae collection, water quality monitoring, and PHABphysical habitat data collection.

4.3.1 Sampling Reach Delineation

As described in Chapter 2 of the SWAMP 2016 SOP, the average wetted width of each sampling reach would be used to determine the sampling reach length (Ode et al. 2016a). The SWAMP 2016 SOP specifies standard sampling reach lengths that are based on wetted width (150 meters for sampling reaches with average wetted widths less than or equal to 10 meters, and 250 meters for sampling reaches with average wetted widths greater than 10 meters).

After the sampling reach length is determined, it would be laid out using marked surveyor's flags for transect identification and transects would be labeled according to the SWAMP 2016 SOP (main transects A–K and inter-transects AB, BC, etc.) for a total of 11 main transects and 10 inter-transects.

4.3.2 Basic Data Collection

Basic information collected at each sampling site would include project name, sampling reach name, time and date of survey, stream/watershed name, global positioning system (GPS) coordinates, and the names of the survey crew members. GPS coordinates would be recorded with an appropriate collection device (e.g., hand-held GPS receiver or iPad). Data collected at the sampling reaches would include water quality and stream discharge measurements, PHABphysical habitat information, and BMI and algae sample collections. The most recent version of the SWAMP *Stream Habitat Characterization Form Full Version* field forms would be used to enter data in the field.

4.3.3 Water Quality and Discharge Measurements

Water quality data would be measured using a YSI Pro DSS unit (or similar collection device), following Chapter 3 of the SWAMP 2016 SOP (Ode et al. 2016a) and recorded on standard SWAMP data forms. Water quality data obtained would include temperature, specific conductivity, salinity, dissolved oxygen, alkalinity, turbidity, and pH.

To determine alkalinity (which is a standard YSI is not capable of doing), a water sample would be collected at each sampling reach. The sample would be taken at approximately 10 to 15 centimeters below the water surface. Using gloves, collectors would fill the water sample bottles to the brim to ensure that air bubbles would not get trapped in the sample bottle. The bottle would then be placed on ice in a cooler until all field data collections were completed. In the evening following each day's sample collection, the water samples would be removed from the coolers and allowed to warm to room temperature. Alkalinity would then be determined by the double endpoint titration method using a Hach Digital Titrator.

Stream discharge would be measured using a Marsh-McBirney Flo-Mate Model 2000 flow meter and following the Velocity Area Method (Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b). E~~very e~~fforts would be made to select a stream transect with a relatively uniform cross section and laminar flow, and at least 20 equally spaced data points would be used to estimate streamflow.

4.3.4 Physical Habitat Assessment and Photo-Documentation

As required by the SWAMP 2016 SOP, ~~physical habitat (~~PHAB~~)~~ information would be collected at the sampling reaches at each transect and inter-transect location. At the 11 main transects, the full measurements listed in Chapter 6 of the SWAMP 2016 SOP would be taken (Ode et al. 2016a, 2016b). At the 10 inter-transects, fewer measurements would be taken per the SWAMP *Stream Habitat Characterization Form Full Version* field forms.

Digital photo documentation for each sampling reach would consist of upstream and downstream views at transects A, F, and K (i.e., the downstream, middle, and upstream portions of the sampling reach). Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded.

At each sampling reach, reach-wide PHAB conditions relative to three Rapid Bioassessment Protocol (RBP) habitat parameters would be evaluated based on visual observations. These observations would include epifaunal substrate/cover, sediment deposition, and channel alteration. Each of these parameters would be scored using the following numeric value and ranked using the following 20-point scale, per the SWAMP 2016 SOP.

- 1–5 rank as poor
- 6–10 rank as marginal
- 11–15 rank as suboptimal
- 16–20 rank as optimal

4.3.5 Benthic Macroinvertebrate Sample Collection

BMI collection would be conducted according to the SWAMP 2016 SOP, using the reach-wide benthos method, which requires collection from each of the 11 major transects across the sampling reach regardless of stream habitat type (e.g., riffle, run, and pool). The BMI samples would be collected 1 meter downstream of each major transect by sampling a 1-foot-square area using a D-frame net. The sampling would begin at transect A (the downstream end) and continue upstream to transect K, with the sample location alternating from left (25% of width), to center (50% of width), to right (75% of width) on each subsequent transect.

All collections from the 11 major transects would be composited into a single sample and transferred into a 1-liter, wide-mouth plastic jar and preserved with 95% ethanol, following the SWAMP 2016 SOP. Samples would be labeled with collection site, time, and collector's name; and a chain-of-custody form would be filled out to accompany the samples on their way to the laboratory for identification. Replicate samples would be collected according to the SWAMP 2016 SOP at one sampling reach for quality assurance/quality control (QA/QC) purposes.

4.3.6 Algae Sample Collection

Algae would be collected in the same manner as the BMI samples, except that the algae would be collected 25 centimeters above the location where the BMI sample would be located. Algae samples would be collected using the sampling tools identified in the SWAMP 2016 SOP, which vary according to the substrate being sampled. A rubber delimiter would be used for large gravel and cobble; a PVC delimiter would be used for fines and gravels; and a syringe scrubber would be used for bedrock and large boulders (if present).

Similar to the BMI sampling, each algae sample collected at the 11 major transects would be composited into a single sample for processing. The processing of the algae would follow the SWAMP 2016 SOP, which would involve removal of algae from the substrates collected and processing the sample for the four algae analyses: quantitative soft-bodied algae, quantitative diatoms, ash-free dry mass (AFDM), and chlorophyll a. A soft-bodied algae qualitative sample would also be collected from each sampling reach by collecting a composite of all types of soft-bodied algae observed within the sampling reach into a single sample. This sample would aid in the identification of soft-bodied algae in the quantitative sample and would be used in the calculation of some of the algae metrics. Replicate algae samples would be collected at the same sampling reaches where replicate BMI samples would be collected.

4.4 Laboratory Processing

This section summarizes the methods that would be used to process all bioassessment data.

4.4.1 Water Quality

Water samples would be collected at each sampling reach to determine total nitrogen and total phosphorus, constituents necessary for helping to determine algal results. Samples would be sent to a local water quality processing laboratory in northern California. The water quality analyses would be consistent with SWAMP protocols for water chemistry. Total nitrogen would be analyzed according to U.S. Environmental Protection Agency Method 351.2, and total phosphorous would be analyzed according to Standard Methods 4500-P B and 4500-P E.

4.4.2 Benthic Macroinvertebrate Sample Processing

BMI sample taxa identification would be conducted by an outside laboratory (most likely by the Chico Aquatic Bioassessment Laboratory [Chico ABL] in Chico, California). BMI samples would be picked, sorted, and identified completely or until a 600 count (SAFIT Level 2) is reached. Chico ABL follows QA/QC procedures developed under the SWAMP program.

4.4.3 Algae Sample Processing

Five types of algae would be collected and processed: qualitative grab, soft-bodied algae, diatoms, AFDM, and chlorophyll a. The qualitative grab, soft algae, and diatom samples would be sent to the CDFW Group at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL-MLML). MPSL-MLML would report the data ~~to Marco Sigala at Moss Landing~~ in SWAMP template formats. ~~Mr. Sigalaoss Landing~~MPSL-MLML would calculate the Algae Stream Condition Index (ASCI) from the data. The samples of AFDM and chlorophyll a would also be sent to MPSL-MLML, who would report the data in California Environmental Data Exchange Network template formats. PSL-MLML follows the QA/QC procedures developed under the SWAMP.

Commented [AF66]: Is this an individual? Should this instead be referencing the laboratory?

Commented [PJ67R66]: Updated accordingly.

4.5 Data Analysis

PHAB information would be entered using the SWAMP Version 2.5 bioassessment data entry forms (Marine Pollution Studies Laboratory 2022) and then loaded into the Microsoft Structured Query Language (SQL) Server database of the MPSL-MLML. BMI and algae taxonomy data, as well as water chemistry data would be loaded from Microsoft Excel templates into the same Microsoft SQL Server database. The data entry forms and templates would be obtained from the MPSL-MLML Data Center website. All data would be verified and checked for completeness after input into the database.

4.5.1 Physical Habitat Information

PHAB data would be entered by the MPSL-MLML using the SWAMP Bioassessment Field Form Microsoft Access database, and then loaded into the MPSL-MLML's Microsoft SQL Server database. After loading, additional error and completeness checks would be run following SWAMP business rules. The data would be sent to the California Environmental Data Exchange Network, where it would be available to the public for viewing and download.

PHAB metrics would be calculated using the SWAMP Bioassessment Reporting Module. The SWAMP protocol contains a subset of parameters measured within the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program for freshwater wadeable streams; therefore, many of their metrics described in Kaufmann et al. (1999) form the basis of the SWAMP Bioassessment Reporting Module output.

SWAMP has developed a PHAB Index similar to the California Stream Condition Index (CSCI) (Section 4.5.3, *Benthic Macroinvertebrates*) for BMI data. The PHAB Index (called the *IPI*) combines eight GIS-calculated metrics with 12 PHAB metrics to produce one IPI value (Rehn et al. 2018). For the purposes of statewide assessments, the IPI has thresholds of physical condition: greater than or equal to 0.94 indicates likely intact condition; 0.93 to 0.84 indicates possibly altered condition; 0.83 to 0.71 indicates likely altered condition; and less than or equal to 0.70 indicates very likely altered condition.

In addition, the results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable*

Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007) (Ode et al. 2011). These select stressor thresholds are not regulatory limits set by SWRCB; rather, they are biology-based stressor thresholds developed by researchers as an objective means to set meaningful, regionally appropriate water quality standards. Two statewide and regional ~~physical habitat~~PHAB biological stressor thresholds, the Percent Fines and Sand and Mean Embeddedness thresholds, are examples of biological stressor thresholds that would be appropriate to analyze for this Project.

4.5.2 Water Quality

Similar to the PHAB analysis described above, water quality results would be compared to key stressor thresholds that best highlight the conditions at the sampling reaches identified in *Ecological Condition Assessment of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Stream Assessment (PSA) (2000–2007)* (Ode et al. 2011).

4.5.3 Benthic Macroinvertebrates

MPSL-MLML would be contracted to assist in the analysis of the BMI data. MPSL-MLML would use the BMI taxonomic data obtained from Chico ABL to calculate CSCI scores for each sampling reach. The CSCI is a statewide biological scoring tool that translates complex data about individual BMIs found living in a stream into an overall measure of stream health (Rehn et al. 2015).

CSCI scores and output would be calculated using R scripts defined in Mazor et al. (2017). CSCI score categories would be applied as defined in Rehn et al. (2015).

- Less than or equal to 0.62: very likely altered
- 0.63–0.79: likely altered
- 0.80–0.91: possibly altered
- Greater than or equal to 0.92: likely intact

MPSL-MLML would also calculate several BMI metrics from the taxonomic data for each sampling reach. These individual metrics would be reviewed to discuss the individual results for each sampling reach and event. Representative metrics may include measures of taxa richness, composition, tolerance, functional feeding groups, and habit measures. These other metrics may be more insightful for determining the biological integrity of the BMI communities than the CSCI scores alone (at least in the valley floor sampling reaches), as valley floor reference sites (the sites used in the CSCI calculations) are relatively limited in abundance (Rehn pers. Comm.).

4.5.4 Algae

Diatoms and Soft Algae

MPSL-MLML would be contracted to calculate the statewide diatom, soft algae, and hybrid ASCI and associated metrics. These predictive biological indices replace past regional indices with a statewide index allowing for improved comparisons across diverse landscapes in a consistent and comparable manner. While ASCI can be calculated for soft algae and diatoms separately, the hybrid ASCI produces stronger species distribution models for more accurate and integrative assessments of biological condition.

Chlorophyll a and Ash-Free Dry Mass

Ode et al. (2011) in their analysis of the results from the statewide Perennial Stream Assessment between 2000 and 2007, have included stressor thresholds for chlorophyll a and AFDM. These thresholds are more protective than levels proposed by previous authors, which were 100 milligrams per square meter for chlorophyll a and 50 grams per square meter for AFDM (Barbour et al. 1999, Welch et al. 1988, Dodds et al. 1998, Sosiak 2002, Dodds and Welch 2000, U.S. Environmental Protection Agency 2000, Biggs 2000). The thresholds proposed by Ode et al. (2011) are not regulatory limits or requirements but rather recommendations. The chlorophyll a and AFDM stressor thresholds (statewide and regional) would be evaluated for each sampling reach by MPSL-MLML.

4.6 Timing and Frequency

The bioassessment surveys would be conducted during the appropriate index period for Central Valley streams (June through August), which is typically 4 to 6 weeks following the last winter storm event. Depending on stream conditions, however, bioassessment surveys may need to be performed prior to the appropriate index period to ensure adequate flow for benthic and algal sampling is present. Baseline (pre-operation monitoring) would occur in the spring for (possibly) 5 years prior to project operation. Follow-up (baseline) surveys would be conducted on an annual basis during the same period for up to 10 years after operation activities are initiated. The Authority and the relevant ~~permitting~~ agencies (CDFW, USFWS, and Colusa County~~SWRCB and the CVRWQCB~~) would be consulted if the frequency of monitoring would be shortened after 5 years.

4.6.1 Permitting Requirements

A CDFW Scientific Collecting Permit (Specific Use) or Memorandum Of Understanding permit would be required to complete the study design as proposed. BMI samples would be the only ~~sacrificed~~ collected species.

Commented [PJ68]: This (the word "sacrificed") was highlighted but I un-highlighted it because there was no associated comment.

Commented [JH69R68]: We need to use a different word.

4.7 Additional Water Quality Measurements

In addition to the standard water quality measurements included in the SWAMP bioassessment as described above, samples would be collected for additional laboratory measurements. The objectives for taking these additional measurements would be to compare pre-Project and Project values, determine any effect of operational adjustments on sampled water quality constituents, and compare measurement values to key stressor thresholds. These additional measurements include:

- **A suite of total and dissolved metals and metalloids**. The suite includes aluminum, arsenic, cadmium, chromium (total), chromium, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc.
- **Cyanobacteria and cyanotoxins**. The cyanobacteria water samples would be collected for the purpose of laboratory analysis for cyanobacteria presence and density and the presence of cyanotoxins (specifically microcystins, anatoxin-a, and cylindrospermopsin).
- **Methymercury in fish tissue**. Level I trophic level fish would likely be more abundant than higher trophic level fish, so the measurements of methylmercury concentrations in fish tissue would focus on these fish. Higher trophic level fish would be sampled intermittently as available. To assess methylmercury in fish tissue, sampling would be conducted using the SWAMP protocol for California rivers and streams (California Water Boards 2011 or most current).

When these additional water quality samples and fish are collected, the following basic survey information and data described above would be collected: project name, sampling reach name, time and date of survey, stream/watershed name, and the names of the survey crew members. Incidental observations such as recent rainfall, fire effects, flooding, and other disturbances would also be recorded. Basic data collected at the sampling sites would include stream discharge measurements, temperature, specific conductivity, dissolved oxygen, turbidity, pH, and water samples for total nitrogen and total phosphorus laboratory measurements. In addition, water samples would be collected for laboratory measurements of dissolved organic carbon and hardness as these parameters influence water quality standards for aquatic life protection for some metals.

These measurements would be taken twice a year, once during a high flow period and once during a low flow period, at the upstream and downstream bioassessment sampling locations on each creek. Sampling would occur during the same years as the rest of the bioassessment studies.

5.0 Hydrogeomorphic Study

5.1 Purpose of Study

The overall purpose of the Hydrogeomorphic Study would be to characterize historical and present-day streamflows, including baseflow during the spring and summer months, on ~~Funks and~~ Stone Corral Creek and Funks Creeks; the relevant geomorphic characteristics of each creek (herein called *geomorphic indicators*); and flow levels necessary for channel maintenance of geomorphic processes required to maintain the channels in their current condition.

A Hydrogeomorphic Study with quantitative and qualitative monitoring data to fully characterize the existing hydrologic regime of ~~Funks Creek and~~ Stone Corral Creek and Funks Creeks, as well as the overall type and abundance of sediment available for aquatic organisms, would be developed. To inform the appropriate streamflows for the creeks under inquiry, a geomorphic assessment ~~of the reaches of interest (i.e., the stream reaches below the dams)~~ would constitute the first step in the analysis. The channel segments upstream of the dams would also be rapidly assessed to provide a greater understanding of the local watershed geomorphic characteristics. The focus of the geomorphic assessment would be to determine the dominant geomorphic processes, document the surrounding landforms and channel bed topography, and to determine how the observed morphology of each creek is influenced by the hydrologic regime and the surrounding land uses. Likewise, collection of geomorphic information would aid in the determination of overall channel stability for each creek, which has important implications for the proposed releases.

The Hydrogeomorphic Study to examine the hydrologic regime of ~~Funks and~~ Stone Corral Creeks and Funks Creek would include a desktop modeling exercise, as well as installation of stilling wells, staff gages, and real-time water surface level collection devices. The goal of the Hydrogeomorphic Study would be to evaluate the physical and hydrologic condition of the reaches of interest within both Stone Corral Creek and Funks Creek. This information, along with the other required studies as discussed in previous chapters (i.e., Fish Assemblage Study and SWAMP bioassessment study), would help to inform the type of flow releases that should be made to the creeks under various Project operating conditions.

After completion of the baseline studies, consideration would be given to when and how flows would be released and whether a portion of these flows are needed to maintain fluvial geomorphic processes (based on the findings from the geomorphic assessment).

5.2 Study Design

The (baseline) Hydrogeomorphic Study components are discussed below. *Field site locations* are applicable to the geomorphic component of the Hydrogeomorphic Study; *hydrologic monitoring locations* represent the potential locations where stilling wells, staff gages, and real-time water surface level collection devices would be installed (i.e., the hydrologic component of the Hydrogeomorphic Study). The ultimate number of field site locations on each creek would be based on access and safety; however, it is anticipated that five sites would be located on Funks Creek and that six would be located on Stone Corral Creek. The locations for the geomorphic component of the Hydrogeomorphic Study would presumably be the same as the bioassessment sampling reaches as part of the SWAMP bioassessment study as described in Chapter 4 (Figure 45).

The ultimate number of hydrologic monitoring locations on each creek would primarily be based on access, due to the need for monitoring during and after precipitation events. It is anticipated that two sites would be located on each creek: one in the foothills and one on the valley floor as shown on Figure ~~5~~6.

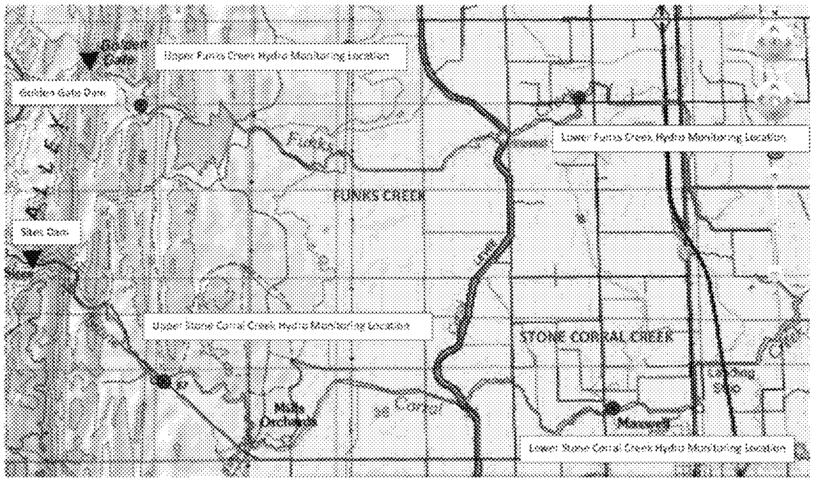

Figure ~~5~~6. Potential Hydrologic Monitoring Locations, Stone Corral Creek and Funks Creek~~s~~

5.2.1 Geomorphic Conditions

Data collected during the geomorphic component of the Hydrogeomorphic Study (geomorphic assessment) would include a host of geomorphic attributes, or indicators, as described below. Topographic data (longitudinal profile and cross sections) needed for the hydrologic model (further described below) would also be collected during the geomorphic assessment. The geomorphic assessment would be conducted by a geomorphologist with expertise in channel and floodplain dynamics, channel stability analyses, and topographic surveying techniques.

The geomorphic assessment would include evaluation of the following indicators.

- Channel classification
- Local watershed inputs
- Hydrologic and flow patterns
- Riparian vegetation condition
- Bankfull width and depth and wetted width
- Bank instability and bank characteristics
- Channel bed substrate composition and embeddedness
- Channel complexity
- Degree of channel incision
- Stage of channel evolution

- Cross section and longitudinal profile surveys

These indicators would be assessed for each field site location (Figure ~~4~~5). In addition, at least three permanent cross sections would be established within each field site location and within each hydrologic monitoring location (Figure ~~5~~6) for collection of quantitative channel morphology information and required modeling input. Evaluation methods for these indicators are described below.

Channel Classification

Stream and r~~R~~iver segments can be grouped into three generalized classifications based on their position in the watershed and the relative balance of transport capacity to sediment supply (Montgomery and Buffington 1998). Headwater source areas are typically transport-limited (often due to limited channel runoff) but do offer sediment storage that is intermittently initiated under large flow events, debris flows, or other gravitational events. Transport segments are composed of morphologically resilient, supply-limited reaches (e.g., bedrock, cascade, and step-pool) that rapidly convey increased sediment inputs. Response segments consist of lower-gradient, more transport-limited depositional reaches (e.g., plane-bed, pool-riffle) where channel adjustments occur in response to changes in sediment supply delivered from upstream.

Based on field observations and the stream classification methodology of Montgomery and Buffington (1998), each field site location would be classified accordingly. The classification would aid in the determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of each field site location on the reaches of interest.

Local Watershed Inputs

Any major inputs of sediment and runoff into the field site locations (e.g., landslides or other mass wasting features, recent burn scars) would be summarized. The objective would be to identify any land use changes that could alter the balance of sediment supply and runoff that could lead to future instability (e.g., channel aggradation of degradation) within the reaches of interest. This would aid in the determination of channel stability and the potential for available habitat to be disrupted or altered in the vicinity of the field site locations.

Hydrologic and Flow Patterns

The hydrologic pattern would be determined throughout the length of the field site locations and would include identification of whether streamflow is perennial, intermittent, or ephemeral. Perennial streams are those which flow year-round; intermittent streams are those which flow for only certain times of the year and receive water from both surface water and groundwater; and ephemeral streams are those which have their channels above the water table year-round and only receive water from surface runoff. This geomorphic indicator would rely on the field-based hydrologic component of the overall Hydrogeomorphic Study, as described below.

Riparian Vegetation Condition

Riparian vegetation is an important indicator for overall stream habitat and function as it serves to stabilize streambanks and allows for canopy cover to create suitable water temperatures for aquatic species. Riparian condition refers to a description of the general health of the riparian area, focusing on the amount and type of vegetative cover.

Within each field site location, riparian condition would be described as low (0–25 % vegetative cover), moderate (25–50 % vegetative cover), high (50–75 % vegetative cover), or very high (75–100 %

vegetative cover). The size and approximate age of any riparian vegetation growing in the channel bed would be documented because this is evidence of channel adjustment and possible re-stabilization from a prior disturbance.

Bankfull Width and Depth and Wetted Width

Bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channel in the field site locations. Specifically, a geomorphic or effective bankfull surface would be identified in the field. The geomorphic bankfull or effective surface is the surface that gets inundated by the discharge that performs the most geomorphic work on a system, typically a flow that occurs every 1.5 to ~~-~~ 2 years (Knighton 1999). This discharge, known as the geomorphic bankfull discharge, is defined as that water discharged when stream water just begins to overflow into the active floodplain. The geomorphic bankfull or effective surface would be identified based on the methodology of Harrelson et al. (1994) and Hauer and Lamberti (1996). Once this surface is recognized, width and depth measurements would be recorded.

Like bankfull width and depth measurements, wetted width and depth measurements would be recorded. Specifically, the wetted surface would be ~~determined~~ identified in the field and width and depth measurements would be recorded.

Bankfull and wetted width and depth data collection would help to determine the size of the channel, which would help in assessing overall available habitat conditions in the field site locations and reaches of interest.

In addition, the "active channel" width would be identified, which typically represents a typical low to moderate flow regime and is usually bounded by the width of the in-channel vegetation.

Bank Instability and Bank Characteristics

The term *bank instability* refers to streambanks that are either actively retreating or have the potential to retreat soon. In brief, weakening processes are any bank or near-bank processes that act to erode or prepare streambanks for further erosion (Lawler 1992). The purpose of assessing this indicator would be to identify fluvial erosion (erosion associated with flowing water) and bank failure (erosion associated with gravitational forces and weakening processes). Fluvial erosion is closely related to boundary shear stress, which can be loosely approximated by unit stream power variations, and bank failure is collapse of all or part of the streambank in situ (Lawler 1995).

Bank stability would be defined as the natural streambank that has stable groundcover. Stable ground cover includes rooted trees, shrubs, herbaceous plants, and naturally occurring rocky substrates. Bank composition and bank height/angle would also be determined. The results, in conjunction with the other indicators, can be used to detect where the channel may be downcutting as suggested by over-steepened banks, and can also be used to describe the potential for the channel to potentially laterally migrate and increase the risk of bank instability.

Bank stability analyses would aid in determination of the sediment regime and bedform morphology, which would help characterize the stream habitat and function of the field site locations, as well as the determination of channel stability and the potential for available habitat to be disrupted or altered in the field site locations.

Channel Bed Substrate Composition and Embeddedness

Substrate composition and embeddedness refer to the size of the substrate materials on the channel bed, and the degree to which these materials are embedded. These conditions indicate how frequently the channel substrate is mobilized. Substrate composition and embeddedness would be measured using the methods described by Bunte and Abt (2001). Substrate composition would identify the available substrate (overall type and abundance) for aquatic species in the vicinity of each field site location~~and would allow for determination as to whether the Reservoir Operations Plan would require gravel augmentation in the reaches of interest~~.

Commented [PJ70]: This was specifically called out in the EIR, and in our response to comments to the EIR, so not sure if it should be deleted here...

Commented [SJ71R70]: Understood, leave it out here please.

Channel Complexity

The presence or absence of gravel bar development and evidence of scour and/or deposition would be determined throughout the length of each field site location. Pool and riffle habitats containing in-channel structures (e.g., instream woody material) that create complexity and habitat niches for aquatic organisms would also be documented. Basic channel or habitat units (e.g., pool, riffle, and flatwater) would be delineated according to standard habitat mapping descriptions in each field site location. A rough proportion of unit types would be calculated.

Channel or habitat units would be defined as follows.

- **Pool**.: Slow water, length, and width at least one-half the bankfull channel width, and a 10-inch minimum residual pool depth. Subcategories define the general type of pool and include scour (lateral, channel, channel confluence, plunge), dam, and backwater, as defined by Overton et al. (1997).
- **Riffle**.: Swiftly flowing, turbulent water, some partially exposed substrate, substrate cobble, and/or boulder dominated (McCain et al. 1990).
- **Flatwater**.: Wide, uniform channel bottom, low to moderate water velocity, and little surface agitation. Encompasses any areas that do not qualify as pool or riffle (McCain et al. 1990).

If appropriate (i.e., if the habitat diversity merits such a method), the field site locations would be habitat typed to provide a more detailed stream habitat inventory. Stream habitats would be delineated into one of the six Level-III habitat classification types (~~per~~ Flosi et al. 2010) based on morphological characteristics. These include overall channel gradient, water velocity and depth, substrate, and, where applicable, the channel features (e.g., boulder, bedrock, woody material, converging flow) causing the formation of the habitat unit through scour and sediment deposition (Flosi et al. 2010). Channel/habitat type determination would allow for identification of available habitat types for aquatic species.

Degree of Channel Incision

The degree to which the channel is incised would be recorded as negligible, low, moderate, high, or very high. The degree of incision would be qualitatively analyzed using the following criteria.

- **Identification of any Quaternary landforms on the floodplain (e.g., terraces, low floodplain, fan, etc.).** Terraces typically have steep ~~stream-banks~~streambanks, and the channel may not necessarily be incised. Steep, unstable streambanks adjacent to a ~~low-floodplain surfaces~~low floodplain surface, however, typically indicate incision.
- **Identification of bedforms downstream of the site where and if the channel is less incised.** Bed and streambank material from incised channels would typically be deposited downstream in somewhat uncharacteristically large deposits on the channel bed (downstream aggradation).

- **Recognition of base level changes downstream.** Dams and other barriers can create upstream changes in channel bed elevation (i.e., headward migration of incision).
- **Visual survey of channel bed at the field site location.** Channel or habitat sequences, such as pool-riffle sequences, are rare in incised channels, and those that do exist do so for only limited time intervals. Additionally, the increased depth of flow associated with incision, coupled with an increased flashy regime, results in bed armoring and a decreased frequency of bed mobilization.
- **Determination of the health of the riparian and floodplain plant species.** Plants that are found in similar, un-incised reaches are usually not present in incised reaches. No vegetation at all is an indicator of no hydrologic interaction between the floodplain and the channel and, therefore, incision.
- **Identification of recent evidence of overbank deposition of fine sediment, plant debris, or other organic matter.** A channel that floods its streambanks frequently would typically have splay (i.e., sand) deposits and vegetation with a smoothed, flooded appearance in the downstream direction. Natural levee development is also an indication of frequent flooding.

Stage of Channel Evolution

A stream evolution model (Cluer and Thorne 2013) would be applied to the entirety of the reaches of interest on ~~Funks and~~ Stone Corral Creek~~s~~ and Funks Creek to provide a template for understanding geomorphic responses and processes within the immediate watershed. The stream evolution model of Cluer and Thorne (2013) revisits and updates two well-established channel evolution models (Schumm et al. 1984, Simon and Hupp 1987) in light of recent research and the authors' practical experiences.

In addition, a channel stability analysis would be conducted at each field site location. The chosen methodology would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2010), or other applicable method. The stream evolution model and the channel stability analyses would aid in the determination of how on ~~Funks and~~ Stone Corral Creek~~s~~ and Funks Creek may evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus, having implications for the available habitat within the channels.

Cross Section and Longitudinal Profile Surveys

As mentioned above, at least three permanent cross sections would be established within each field site location (Figure ~~4~~5) and within each hydrologic monitoring location (Figure ~~5~~6) for collection of quantitative channel morphology information and required modeling input. Permanent cross sections would be established perpendicular to the primary channel following the methodology of Harrelson et al. (1994). Each transect would be surveyed using ground-based surveying equipment to capture and track channel morphology. Elevations along the cross sections would be collected at intervals close enough to capture slope breaks and distinct morphological features within the floodplain (if present), and along the channel sides and bottom.

The location of each cross section would be permanently marked in the field using 4-foo~~ee~~t-tall metal t-posts or wooden lathes (to easily find the general transect location) and with rebar driven vertically into the ground surface, capped with an appropriate cover (to establish known permanent elevations [permanent monuments or benchmarks] on each side of the transect). The permanent benchmarks for each transect would be placed in a stable location above the active channel on the left and right (as viewed facing downstream) banks or terraces of the channel. Transect endpoints (i.e., the permanent

monuments) would be documented using a GPS receiver. Representative photographs would be taken at each cross section.

In addition to the cross sections, a longitudinal profile would be surveyed throughout the length of the channel within a field site location. The spacing between channel bed data points would vary depending on the complexity of the channel bed characteristics. Digital photographs would be taken in the upstream and downstream directions at various locations throughout the longitudinal profile. The location(s) of each cross section would be surveyed on the longitudinal profile for graphical plotting purposes.

Channel Geometry Metrics

As mentioned previously, bankfull width and depth measurements would be recorded to assess the hydraulic capacity of the channels. This would be completed at the cross sections measured in the field. In addition to bankfull, wetted, and active channel width and depth measurements, the bankfull and entire channel width-to-depth ratio would be calculated for each cross section, and sinuosity and gradient of the longitudinal profile would be determined.

5.2.2 Hydrologic Conditions

The hydrologic component of the Hydrogeomorphic Study would consist of both desktop (modeling and historical conditions review) and field-based efforts (generation of stage-discharge relationships), both of which are summarized below. The desktop effort would provide detailed information on various (modeled) flows of interest (i.e., the 2-year, 5-year, 10-year, 50-year, and 100-year flow events), while the field-based efforts would validate/calibrate the modeling results via collection of real-time streamflow data, especially for smaller streamflow events (the flows that are expected to occur most of the time on each creek).

Summary of Modeling Approach

A HEC-HMS rainfall-runoff-routing watershed hydrology model would be created to generate hydrographs for both Stone Corral Creek and Funks Creek. Inputs into the hydrology model would include watershed land use, percent impervious inputs, soil types, precipitation and evapotranspiration, drainage network characteristics, and topography (which would be generated from available light detection and ranging [LiDAR] technology).

The topographic surveys as described above would also serve to augment the existing LiDAR data with on-the-ground data to better capture topography in areas requiring additional detail (such as densely vegetated areas). The topographic surveys would be tied into the State Plane Coordinate System and would be sufficient to generate contours at a 1-foot interval. The data collected via the topographic surveys would also be required for generation of stage discharge relationships, as described below.

It should be noted that HEC-HMS rainfall-runoff-routing watershed hydrology model constitutes the first (somewhat exploratory) step in the hydrologic analysis. As discussed in the RDEIR/SDEIS, any ~~R~~releases into Funks Creek would be made through the transition manifold at the base of Golden Gate Dam and a new pipeline that terminates at Funks Creek below the dam. These facilities would carry up to 100 cfs with a release range of 0 to 100 cfs into Funks Creek. Any ~~R~~releases into Stone Corral Creek would be made through the permanent outlet at Sites Dam. This outlet would have a release range of 0 to 100 cfs, with an emergency release capacity of up to 2,500 cfs. The modeling effort would be the first step in determining if a ~~verifying that this proposed~~ range in flows, as described in the RDEIR/SDEIS, would be needed to~~is adequate to address~~ meet the purpose of CFGC Section 5937 given the modeled hydrology.

Summary of Field-Based Analysis

The primary objective of the field investigation would be to provide an accurate description of the existing watershed hydrology and variations in streamflow and water surface elevations (i.e., stage) on both Stone Corral Creek and Funks Creek. Periodic streamflow measurements (depth and velocity measurements) would be taken to develop stage-discharge relationships (rating curves) to translate the continuous water depth measurements measured with continuous stage recorders (i.e., HOBO water level loggers [Onset Computer Corporation]) into continuous estimates of flow. These measurements would occur at the hydrologic monitoring locations as shown on Figure ~~5~~6.

To determine continuous estimates for streamflow, the stage recorders, which measure water temperature and pressure, and vertical stilling wells would be installed in relatively deep portions of the creeks at the locations as shown on Figure ~~5~~6. The HOBO water level loggers would be set to monitor water depth every 15 or 30 minutes. Additional HOBO water level loggers would also be installed to monitor barometric pressure every 15 or 30 minutes for the purpose of calibrating the depth (water pressure) measurements, which are also affected by barometric pressure. These additional data loggers would be secured to upland surfaces (e.g., trees). Streamflow measurements would be collected to develop equations to convert the continuous stage recorder data into estimated streamflows (discharge). During variable discharge conditions, streamflows would be estimated using a Marsh-McBirney Flo-Mate Model 2000 flow meter and top-setting rod following the procedures described in Module O in Chapter 8 of the SWAMP 2016 SOP (Ode et al. 2016a, 2016b).

Daily precipitation data ~~from~~ obtained from the California Data Exchange Center or the PRISM Climate Group would be used to characterize the rainfall patterns during the study period. Rainfall patterns would be displayed concurrently with the measured streamflow data.

If necessary, acoustic Doppler current profiler (ADCP) technology could be used to capture high flow events. ADCP equipment is particularly useful for collecting accurate and precise water depth and 2-D/3-D velocity data, especially at high flows when other standard surveying techniques as described above are impractical or unsafe. ADCP technology also offers the advantage of detecting bed elevation change resulting from high flow events that would be useful for evaluating sediment mobility in the reaches of interest. The applicability of ADCP would be investigated during the first season of hydrologic monitoring (once ~~biologists ascertain the~~ field conditions at the field site locations are ascertained).

5.3 Timing, Frequency, and Operation Monitoring

5.3.1 Pre-Operations Monitoring

The baseline geomorphic component of the Hydrogeomorphic Study would first be conducted during the winter/spring of 2023. It is anticipated that all relevant geomorphic indicators could be collected during one field trip. Additional baseline geomorphic data collection during subsequent years would be conducted if high ~~necessary if~~ precipitation patterns/high flow events occur during ~~are highly variable during~~ the pre-operation period.

The desktop hydrologic component of the Hydrogeomorphic Study would occur during 2023. The field-based hydrologic component of the Hydrogeomorphic Study would occur at the locations as shown on Figure ~~5-~~6 until the dams are constructed.

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5.3.2 Operations Monitoring

Follow-up geomorphic and hydrologic surveys would be conducted on ~~an annual basis~~a regular (pre-approved) basis for up to 10 years after operations begin. The Authority would consult with the relevant ~~permitting~~ agencies (CDFW, USFWS, and Colusa County~~SWRCB and the CVRWQCB~~) if the frequency of monitoring would be shortened after 5 years. Additional information on each component of is provided below.

Commented [AF72]: Do we really need to do this annually? Or every other year? It seems like the channel isnt going to change that much after we start operations so wondering if we can reduce the frequency.

Commented [PJ73R72]: Updated accordingly.

Geomorphic Stability Monitoring Plan

Operations geomorphic monitoring would generally be like the pre-operation efforts, including returning to established field site locations and collecting information on geomorphic indicators by performing a geomorphic assessment as described above. Data collected as part of the operations geomorphic monitoring effort would be compared against the baseline data and summarized into interim and final reports to the Authority.

The focus of the operations geomorphic monitoring effort, however, would be geomorphic stability monitoring. As such, the primary survey components of ~~the Geomorphic Stability M~~monitoring ~~Plan~~ would include cross section and longitudinal profile surveys, channel bed substrate composition determination, and channel stability evaluations. All methods for these efforts would be identical to those described above. The objectives of these monitoring elements and their relevance to geomorphic stability are summarized below.

Cross Section and Longitudinal Profile Surveys

The objectives of collecting data at the cross sections would be to collect primarily lateral stability information to determine the rate of lateral migration through bank erosion and overall cross-sectional area change. The rate, magnitude, and direction of lateral change and area change would be determined over time using repeat longitudinal profile surveys.

The objective of collecting data at the longitudinal profiles would be to collect primarily vertical stability information to determine rates of aggradation or degradation (whether the stream is downcutting [degrading], filling [aggrading], or remaining static). The rate, magnitude, and direction of vertical change would be determined over time using repeat longitudinal profile surveys.

Channel Bed Substrate Composition and Embeddedness

The objectives of collecting channel bed substrate composition and embeddedness information would be to observe potential shifts in bed material size-frequency distribution, which can be determined over time. Collected grain size information would aid in interpretation in specific geomorphic changes if they occur (such as any changes identified via the cross-sectional and longitudinal profile analyses above).

Channel Stability Evaluations

The chosen methodology for channel stability evaluations would be dictated by site conditions but could include the methods as presented in the modified Pfankuch procedure (Pfankuch 1975) as described by Rosgen (2001), Simon and Down (1995), Bledsoe et al. (2011), or other applicable method. Together with the stream evolution model (Cluer and Thorne 2013), the channel stability analyses would aid in the determination of how ~~on Funks and~~ Stone Corral Creeks and Funks Creek may continue to evolve (e.g., deepen/widen) or remain in a state of equilibrium in the future, thus having implications for the available habitat within the channels.

Hydrologic Monitoring Plan

Operations hydrologic monitoring would be like the pre-operation field-based efforts, including returning to established hydrologic monitoring locations, monitoring stage and stream discharge over time. Data collected as part of the operation hydrologic monitoring effort would be compared against the baseline data and summarized into interim and final reports~~ to the Authority~~.

The level of effort of the operations Hydrologic Monitoring Plan, however, would be considerably less than for the pre-operation effort because, depending on the streamflow and precipitation patterns during the pre-operation time-period, there would presumably already be numerous years of pre-operations hydrologic monitoring data at the hydrologic monitoring locations (in other words, a robust data set with multiple discharge measurements and associated stages would be available). The operation hydrologic monitoring effort would, therefore, primarily consist of measuring streamflow values that were not obtained during the pre-operation monitoring effort (presumably higher flow events) and conducting routine field maintenance activities such as periodic downloads of the HOBO water level loggers and upkeep of field equipment.

~~5.4 Applicable Methods for Maintaining Determining Operational Streamflows~~

~~After baseline hydrogeomorphic conditions are obtained and evaluated in context with the studies from other disciplines (i.e., Fish Assemblage Study and SWAMP bioassessment study), various approaches for estimation of minimum streamflows to maintain ecosystem and geomorphic function would be reviewed, such as "the functional flow" approach suggested by Yarnell et al. (2015), the Instream Flow Incremental Methodology (National Biological Service, U.S. Department of the Interior 1995), the CDFW Instream Flow Program,[7] the California Environmental Flows Framework,[8] and the Richter et al. (2011) approach. These methods would be investigated for their applicability to determine appropriate streamflows on Funks and Stone Corral Creeks to maintain fish in good condition. Coordination with the permitting agencies would be required before a chosen method is selected.~~

Commented [AF74]: This section here makes it sound like the operations plans would be based solely on the data collected in Chapter 5. I think the operations plan would be based on all of these studies. So we should consider moving this to Chapter 1 so that its not in a specific study chapter.

[7] ~~https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow~~

[8] ~~https://ceff.ucdavis.edu/~~

6.0 Temperature Study Design and Methods

6.1 Overview of Proposed Methods

A temperature study would be conducted to characterize temperatures under existing conditions and determine flow and storage effects on temperature in Stone Corral Creek and Funks Creeks under operating conditions. The study would involve evaluating temperatures in the creeks before and after initiation of Project operation ~~and would be conducted in combination with the Hydrogeomorphic Study (Appendix 2D, Section 2D.4.2 in the *Sites Reservoir Project Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Sites Project Authority and Bureau of Reclamation 2021) and Sites Reservoir storage data.~~and would include consideration of the effects of creek -flow and reservoir storage on temperature.

The study would assess the following.

- The temperatures that support the aquatic community under existing conditions.
- Reservoir discharge needed to ~~establish~~ maintain ~~suitable~~ appropriate temperatures to maintain fish in good condition in ~~Funks and~~ Stone Corral Creeks and Funks Creek downstream of Sites ~~Dam~~ Reservoir after the start of operation.
- Documentation of hydrologic and flow patterns (as described in Section 5.2.1, *Geomorphic Conditions*)

~~6.2 Reservoir discharge needed to establish temperatures suitable for native fish in Funks Creek downstream of Golden Gate Dam after operation begin.~~

~~6.3~~6.2 Study Design

Once access to Stone Corral Creek is obtained, a temperature probe would be installed in Stone Corral Creek at the location of Sites Dam release, and four additional probes would be installed downstream by approximately 0.5 mile, 1 mile, 2.4 miles (near where Stone Corral Creek goes under Maxwell Sites Road), and 4.4 miles (near where TC Canal goes under Stone Corral Creek).

Once access to Funks Creek is obtained, a temperature probe would be installed in Funks Creek at the location of the I/O tower release to Funks Creek, and two additional probes would be installed downstream by approximately 0.5 mile and 1 mile (far enough upstream of Funks Reservoir to be unaffected by it). In addition, probes would be installed at the TC Canal inlet to Funks Reservoir, at the TC Canal outlet from Funks Reservoir, and at the Funks Creek outlet from Funks Reservoir.

As described in the draft Reservoir Management Plan included in Appendix 2D of the RDEIR/SDEIS, once operation has commenced, water temperature profiles would be measured near Golden Gate Dam once every 2 weeks at 5-feet depth intervals to inform decisions about which ports of the I/O tower to use during March through October. The temperature probes in the creeks would continuously record hourly temperatures. These temperatures would be used along with specific fish requirements to develop target temperature ranges for operation conditions.

Commented [AF75]: These 2 bullets say the same thing for Funks and Stone Corral creeks, but say it slightly differently. Please make consistent. I would prefer to just mimic the 5937 language of fish in good condition. One HUGE criticism of 5937 is that its doesn't say native fish. We have interpruted it that way, but the language doesn't specify native fish

Commented [AH76R75]: I don't think I wrote this and not sure why there are two bullets here. Question for Jason, Manna, or Jim?

Commented [WM77R75]: Edited to respond to Alicia and Anne's input.

Commented [AF78]: We use May to September on the next page. Please verify and make consistent

Commented [AH79R78]: These time periods represent two different things:
Rice growing season = May – Sep, and
Reservoir profile monitoring = Mar – Oct.

The reservoir monitoring period is longer than the rice growing season because water temperature of the reservoir releases could affect more than rice (i.e., it could affect creek habitat).

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Temperatures recorded after Sites Reservoir is operational would be used in conjunction with flow and storage data to determine flow and storage effects on creek temperatures. If creek temperatures cannot be accurately estimated with flow, storage, meteorology, and the reservoir temperature profiles, water temperature modeling could be performed for ~~both~~ Sites Reservoir, ~~and Funks and~~ Stone Corral Creek~~s~~, and Funks Creek. If modeling is necessary, models would be calibrated with the measured flow, storage, and temperature data.

Water released into Stone Corral Creek would originate from the lower half of Sites Reservoir and would likely be cooler than equilibrium values during months when the reservoir is stratified. The biggest differential between release temperatures and equilibrium values would occur when the reservoir is full and ambient air temperature conditions are high. If it is determined that flow should be maintained in Stone Corral Creek at times when releases would be relatively cool compared to temperatures under existing conditions, lower flows would allow the water to warm farther upstream than higher flows.

Water released to Funks Creek would originate from the I/O tower and, when the reservoir is stratified, would be warmer than the water released to Stone Corral Creek. The temperatures would be warmer because the withdrawals would come from higher in the reservoir and, as described in the Reservoir Management Plan, the I/O tower port openings would be chosen to provide 65 degrees Fahrenheit (°F) or higher water temperatures during the rice growing season (May through~~to~~ September).

~~6.4~~6.3 Timing and Frequency

Water temperature measurements would occur before and during operation. Measurements during the initial fill period would be useful for evaluating water temperature under low-storage conditions. Reservoir profile measurements and measurements at the Stone Corral Creek and Funks Creek releases may need to continue in the long term.

Measurements downstream of the release locations could be discontinued if the following conditions are met.

- Sites Reservoir has made releases for at least 2 years when the reservoir was at least 75% full.
- If native fish are found and ~~T~~temperature effects are determined~~found~~ to have little effect on ~~native fish~~the population(s) (e.g., if only short sections of the creeks below the dams experience temperature effects) or if flow and storage effects on creek temperatures are understood well enough that average daily creek temperatures can be estimated within 3°F based on meteorological conditions, flow, reservoir storage, and reservoir temperature profiles.

7.0 Reporting and Permit Requirements

7.1 Annual Reporting Requirements

Reporting requirements would be met through the preparation and submittal of annual and final reports as part of the ~~Stone Corral and Funks Creeks~~ Aquatic~~s~~ Study Plan that would be implemented as a part of the Authority's commitments and responsibilities to maintain fish in good condition consistent with CFGC Section 5937.

The first five annual reports would summarize the first 5 years of baseline conditions. All future (operation) reporting efforts would compare the conditions at that time to those collected during the baseline conditions.

~~**Annual and Final Reports:**~~ The following information would be addressed in comprehensive annual reports with multiple chapters covering fish, bioassessment, hydrogeomorphic, and temperature study results.

- **Fish Study Results**.~~:~~ The annual report would include descriptions and locations of fish communities in Stone Corral ~~Creek~~ and Funks ~~c~~Creek~~s~~, summarizing monitoring results in the study area. The report would document monitoring results and link results to objectives. The report would identify new or ongoing management issues, threats and stressors, and provide recommendations for future monitoring and management.
- **Bioassessment Results**.~~:~~ The annual reports would include BMI, algae, water quality, and PHAB output and results and a summary of each of these indicators. The most recent version of the SWAMP *Stream Habitat Characterization Form, Full Version* field forms would be provided in appendix format, along with representative photography of the sampling reaches.
- **Hydrogeomorphic Results**.~~:~~ The annual reports would include a summary of the monitoring methods; a summary and analysis of the hydrogeomorphic monitoring results, including an evaluation of site conditions in the context of the performance standards; a discussion of the monitoring results; a discussion of any modifications made to the monitoring methods; a discussion of the previous year's monitoring efforts; and photographs taken from the cross sections and longitudinal profiles.
- **Temperature Results**.~~:~~ The annual reports would include a summary of temperatures that support the aquatic community under existing conditions, and a recommendation of reservoir discharge needed to establish suitable temperatures in Stone Corral Creek downstream of Sites Dam and Funks Creek downstream of Golden Gate Dam after operation has commenced.
- **Monitoring Program Evaluation**.~~:~~ The annual reports would evaluate the Aquatic Study Plan to ensure that data (1) are collected efficiently, (2) address information needs, and (3) adequately assess resource responses to management actions. Changes in monitoring methods, protocols, or frequency would be summarized in the annual reports.
- **Objective Criteria Evaluation**.~~:~~ Annual reports during operations would evaluate whether management actions are meeting project objectives or performance standards (described below). ~~Where the cause of fish and BMI community declines is understood, corrective actions would be recommended based on monitoring data or other scientifically defensible sources of information.~~ An assessment would be made as to causal factors of observed declines, including the potential role of external stressors outside the parameters of Project effects.

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- **Adaptive Management Thresholds**.: The link between the technical and decision-making steps requires regular interaction and exchange of information between technical staff and decision-makers. This would be accomplished by ~~bi-~~annual meetings ~~(approximately every 6 months)~~ involving the Authority and the ~~permitting~~ agencies where if necessary, both regulatory and technical expertise can be integrated into revising goals and objectives, adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed such that any new information discussed assists with the planning of upcoming seasonal work.

7.2 Performance Standards

Performance standards for the Aquatic Study Plan would be based on quantitative metrics. These performance standards would be designed specifically as a means of monitoring the progress and performance of the physical and biological conditions of the study reaches.

Fish community performance standards would include measures of community diversity and percent area occupied for both available and total reach distance within the study areas. BMI performance standards would likely include three main indicators—PHAB IPI scores, BMI CSCI scores, and algae ASCI scores. Geomorphic performance standards would focus on channel stability evaluations such as:(1) evidence of significant and detrimental morphologic changes at any of the cross sections; (2) evidence of channel headcutting; (3) significant loss of gravels via dam impoundment; and (4) significant decrease in the channel stability score during the duration of monitoring activities.

Performance standards would be developed in conjunction with the Authority and the relevant ~~permitting~~ agencies (CDFW, USFWS, and Colusa County ~~and the CVRWQCB~~) prior to the start of operation monitoring.

7.3 ~~Creek~~ Operations Plan

The Authority would use information from the results of implementation of this Aquatic Study Plan, including field studies described ~~below~~herein, to prepare the ~~Funks Creek and Stone Corral Creek~~ Operations Plan. The ~~Funks Creek and Stone Corral Creek~~ Operations Plan would describe the approach to address CFGC Section 5937 requirements, if any, resulting from impoundments to storage of flows from Stone Corral Creek and Funks Creek, while also ensuring that the Project's flood protection benefits are realized. Further, the ~~Creek~~ Operations Plan would include, but would not be limited to, the approach for reservoir releases into ~~Funks Creek and~~ Stone Corral Creek and Funks Creek, including release schedules and volumes. As stated in the Authority's application to appropriate water, the ~~Creek~~ Operations Plan would be developed in consultation with CDFW, USFWS, and Colusa County, and approved by the Deputy Director for Water Rights.

7.4 Anticipated Schedule

The following schedule is anticipated to result in a reduced workload once ~~after the initial year of sampling~~a range of flows is~~are~~ encountered with representative variability of environmental conditions (Table 3). For example, the field-based Hydrologic Study could possibly occur over the course of the 5 years leading up to dam construction and could terminate once a suitable range of flows has~~ve~~ been measured and analyzed. This~~ese~~ could ~~all~~ occur within 1 year if flow conditions are variable enough, but more than likely it will occur over a series of years.

Table 3. Anticipated years that each study will be needed to acquire a representative range of environmental conditions for baseline and post operation periods.

Year	Fish Community	Bioassessment Study	Water Quality	Water Temp.	Geomorphic Study	Hydrologic Study (desktop)	Hydrologic Study (field) *
Baseline							
2023	√	√	√	√	√	√	√
2024	√		√	√			√
2025	√	√	√	√			√
2026	√		√	√			√
2027	√	√	√	√			√
Post Operation							
2030	√	√	√	√	√		√
2031	√		√	√			
2032	√	√	√	√	√		√
2033	√		√	√			
2034	√	√	√	√	√		√

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8.0 References

8.1 Printed References

Commented [CJ80]: Red = no citation found in text for this reference.
Yellow = citation listed in text, but no matching reference listed in this section.

Commented [PJ81R80]:

Commented [JH82R80]: I think so.

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8.2 Personal Communications

Rehn, Andrew. Biologist, California Department of Fish and Wildlife. April 6, 2022—Phone conversation with Jeff Peters of ICF and Marco Sigala at Moss Landing Marine Laboratories regarding a suitable number of bioassessment sampling reaches on Funks Creek and Stone Corral Creek for the Sites Reservoir Project.

From: Mitchell. Terrie [mitchellt@sacsewer.com]
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Subject: RE: [EXTERNAL] RE: Discussion Material for Roundtable Meeting with CDFW and CWC
Attachments: AM Issues for Discussion w- Roundtable & Agencies 2022-12-20 v.1.docx

Hello All;

Attached are some Adaptive Management Plan Considerations for our discussion tomorrow. It is at a high level. There are still a lot of details to work through and contract language to develop. Let me know if you have any comments or concerns.

Thanks...Terrie

Terrie Mitchell
Manager, Legislative & Regulatory Affairs
Manager of Harvest Water A-PMO
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Sacramento Area Sewer District (SASD)
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Subject: RE: [EXTERNAL] RE: Discussion Material for Roundtable Meeting with CDFW and CWC

See attached for Non Public Benefits and Claw Back. We are working to simplify/condense and possibly split it into the two issues. Currently they are combined, but wanted to provide this since it's getting toward the end of the day, and want to give you chance to see it. We are continuing to refine it.

Fiona Sanchez
Director of Water Resources

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Subject: [EXTERNAL] RE: Discussion Material for Roundtable Meeting with CDFW and CWC

Caution:	**This email originated from outside IRWD. Do not click links or open attachments unless you know the sender and were expecting the email.**

Melih - I suggest you present the issues as you have prepared them. I will retitle my paper to “Terminology Related to Public Ecosystem Benefits and Purpose of Contract” and will try to be clear that I am not covering all terminology and definition issues.

All – I am attaching an updated version of my paper that is responsive to comments I have received as of now.

-Mark

GEI

MARK W. COWIN
Vice President

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From: Melih Ozbilgin <MOzbilgin@valleywater.org>
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Subject: [EXT] RE: Discussion Material for Roundtable Meeting with CDFW and CWC

EXTERNAL EMAIL

Good morning all.

Based on the discussion we had last Friday below are the change requests I was assigned (I had one but ended up with two suggested changes).

After reading through Mark's comments, I am wondering if, somehow, these should be integrated with his discussion materials. I am happy to handle these separately or together with Mark.

Melih

Page 26 of 54 (and 43 of 54)

Requested change: Add a definition of Decision Making Body in Section 2 Roles and Responsibilities of the Contract for Administration of Public Ecosystem Benefits.
Justification for requesting change: Depending on the Public Ecosystem Benefits being evaluated Decision Making Body may involve collaboration, permits, and/or agreements from other entities such as National Marine Fisheries Service, US Fish and Wildlife Service, Bureau of Reclamation, etc.

SECTION 1 ABBREVIATIONS AND DEFINITIONS

Benefit Implementation Actions *– actions within a project's control or fundamental to the success of a project that directly influence the quantity and/or quality of a public ecosystem benefit.*
Requested change: Language should be revised by deleting *"or fundamental to the success of a project".*
Justification for requesting change: Project proponent should not be responsible for actions outside their control.

EXHIBIT B
ADAPTIVE MANAGEMENT PLAN

2.1 1.2 Adaptive Management Plan Approach

Adaptive management of the project will be implemented on a five-year cycle. A five-year review cycle provides a regular opportunity to evaluate data from the previous years of project implementation, maintenance, and monitoring, and allows for incorporation of new technologies and lessons learned into subsequent implementation, monitoring, maintenance, and performance tracking.
Requested change: In this paragraph and throughout the document "five-year cycle" should be replaced with "pre-determined decision cycle agreed upon during the development of the Adaptive Management Plan".
Pre-determined decision cycle should be defined as the anticipated Benefit Environmental Response period resulting from Project Implementation Action and Benefit Implementation Actions.
Justification for requesting change: Depending upon the anticipated Benefit Environmental Response, "reasonable and feasible" period may be smaller or much longer than five-year cycle, based on the thresholds and triggers. For example, when a ramp-up period is required for Project Implementation Actions and Benefits Implementation actions, Benefit Environmental Response could be very long. Annual reporting could show progress towards achieving Performance Thresholds without triggering change in Adaptive Management Plan actions. Further, the time and expense to update Adaptive Management Frameworks and obtain new NEPA/CEQA and permitting compliance (e.g., ESA) would make five-year cycle a continuous, never ending process (i.e., with limited additional available data, revise plans, obtain compliance, repeat).

From: Cowin, Mark <mcowin@geiconsultants.com>
Sent: Monday, December 19, 2022 3:51 PM
To: Jerry Brown <jbrown@sitesproject.org>; Marcia Kivett <MKivett@sitesproject.org>; Marguerite Patil <mpatil@ccwater.com>; Mitchell. Terrie <mitchellt@sacsewer.com> <mitchellt@sacsewer.com>; Melih Ozbilgin <MOzbilgin@valleywater.org>; Putty, Roger <rputty@geiconsultants.com>; Ashenfelter, Mark <mashenfelter@geiconsultants.com>; Paul Weghorst <Weghorst@irwd.com> <Weghorst@irwd.com>; Fiona Sanchez (Sanchezf@irwd.com) <Sanchezf@irwd.com>; Elizabeth Hurst <ehurst@ieua.org> <ehurst@ieua.org>; Shivaji Deshmukh <sdeshmukh@ieua.org> <sdeshmukh@ieua.org>; Ryan McCarter <RMcCarter@valleywater.org>; Christopher Hakes <CHakes@valleywater.org>; Dave Richardson <drichardson@woodardcurran.com> <drichardson@woodardcurran.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Cheyanne Harris <charris@brwncald.com> <charris@brwncald.com>; lmunoz@ieua.org; Asante, Kwabena <kasante@geiconsultants.com>; oriolh@sacsewer.com; Maureen Martin <mmartin@ccwater.com>; Taryn Ravazzini <travazzini@losvaquerosjpa.com>
Subject: Discussion Material for Roundtable Meeting with CDFW and CWC

Attaching a deliverable for my assignment to develop discussion materials regarding definition and use of terms for our upcoming Roundtable meeting with DFW and CWC. Trying to keep this as short and specific as possible while addressing more conceptual issues. Not an easy assignment.

Please forward to anyone that should have received this that wasn't included in this email group.

Best,
Mark

GEI

MARK W. COWIN
Vice President
916.631.4500 cell: 916.947.9254
2868 Prospect Park Drive, Suite 400, Rancho Cordova, CA 95670

Issues for Discussion: Adaptive Management Plan Considerations

Issues

- Clarify expected obligations for Adaptive Management Plan, for factors that are outside the control of the Project Proponent, including the limitation of financial risk.
- Clarify that a Contract has been fulfilled if the Project Proponent acts in "good faith" and takes all committed actions and carries out a reasonable adaptive management plan, even if the Benefit Environmental Response is not achieved.
- Clarify that the Dispute Resolution Process does not get initiated for factors that are outside of the Project Proponents' Control.

Background

AM Plan includes monitoring plan, implementation milestones, performance thresholds and AM triggers.

Current Draft Template *(bold added for emphasis)*

- Section 1.2 of AM Plan states that *"the intent of the adaptive management plan is to increase the likelihood of achieving and maintaining the desired Benefit Environmental Responses **given uncertainties**, which can include California hydrology, future regulatory conditions governing water operations, and climate change "*.

- Section 1.3.1 of AM Plan states *"The Project is obligated to deliver Project Implementation Actions and Benefit Implementation Actions identified to be **within the Project's control**..... in order to achieve expected Benefit Environmental Responses. .... as such, failure to achieve a Benefit Environmental Response will trigger adaptive management actions, **including reasonable and feasible modifications** to Project Implementation Actions and/or Benefit Implementation Actions if changes to management of those actions may lead to achievement of the Benefit Environmental Responses."*

- Section 5.1 of the CAPB specifies the criteria that allow the Department to initiate the Public Benefit Dispute Process. One of the criteria states:
  - *"The Parties disagree on appropriate adaptive management actions and the Department determines that failure to adjust adaptive management actions **within the Project Proponent's control,** will result in an insufficient public benefit;"*

Discussion Item

How is financial risk limited when factors outside of the Project's control are affecting the "*Project Implementation Actions", "Benefit Implementation Actions" or* "Benefit Environmental Response" ?

Proponent Position

- The terms "feasible and reasonable" should be defined and include a cost cap on adaptive management measures. Draft definitions for consideration:

- **Reasonable Activities** – Adaptive Management activities that are consistent with the legal authorities of the Project Proponent and consistent with the water rights, hydrology, and climate to be able to provide the intended outcome, and that relevant local experts agree are likely to achieve that outcome.

- **Feasible Activities** – Adaptive Management activities with a cumulative cost, over the life of the Program that does not surpass **X%** 2015 NPV of the benefit monetization of the associated ecological benefit.

- There should be a provision in CAPB and/or AM Plan that provides an "off-ramp" from the AM Plan and Dispute Resolution Process for factors that are outside of Project's control.

- Benefit Response is not an AM metric or AM obligation – It is a goal that management actions may help achieve.

Date: December 21, 2022

Issue: Adaptive Management, Non-Public Benefit Water and Shared Risk

The December 7, 2022, draft Funding Agreement, Public Benefit Agreement, and the latter's Exhibit B Adaptive Management Plan might be read to make each WSIP-funded Project responsible for achieving its defined Benefit Environmental Response, when it is reasonably foreseeable that factors beyond each Project's control may prevent such achievement. Each Project's Benefit Environmental Response was calculated according to methods prescribed by the State, which included modeled water supply development estimates that were used for purposes of determining WSIP grant eligibility funding. Reasonably foreseeable factors that may prevent achievement of a Project's estimated Benefit Environmental Response vary by Project. For some projects, such factors include hydrology being different than assumed in the state-prescribed water supply development modeling and non-hydrologic factors used to evaluate whether a Project is performing its obligations under the Funding Agreement, Public Benefit Agreement, and the latter's Exhibit B Adaptive Management Plan. For example, in the case of the pulse flow projects, the draft agreements might be read to require each Project to monitor and report a failure to achieve an estimated fish population increase or other Benefit Environmental Response as a trigger for the Project to carry out presently undefined adaptive management changes. Those proposed adaptive management changes could reduce the Project's Non-Program water supply benefits and result in the Prop 1 projects subsidizing State benefits.

Proposed Solution: The draft agreements should be updated to clearly define each Project's obligation to implement specified Project Implementation Actions and Benefit Implementation Actions that are within its control and are anticipated to produce the estimated Benefit Environmental Response identified in the State's funding eligibility determination for each Project. The draft agreements should be updated to clarify that so long as a Project is fully performing its specified Project Implementation Actions and Benefit Implementation Actions, then any monitoring results indicating that a Project's estimated Benefit Environmental Response is not being achieved will not trigger adaptive management obligations that could reduce the Project's Non-Program water supply benefits.

The draft agreements should be updated to clarify how the WSIP creates obligations and risks that are shared between the Project Proponents and State. For example, the State (e.g., CDFW or DWR) may need to adaptively manage how it uses Project-provided water supply to help achieve the estimated Benefit Environmental Response.

Affected Agreement Provisions:

<u>Funding Agreement</u>

We should clarify enforceable Project obligations referenced in Section 6(B), which vaguely incorporates unspecified obligations by requiring that "Funding Recipient and its representatives shall:

* * *

B. Accept and agree to comply with all terms, provisions, conditions, and written commitments of this Funding Agreement, including all incorporated documents~~, and to fulfill all assurances, declarations, representations, and statements made by Funding Recipient in the application, documents, amendments, and communications filed in support of its request for Water Quality, Supply, and Infrastructure Improvement Act of 2014 financing~~.

Exhibit H WSIP Contract for Administration of Public Benefit Ecosystem Benefits

This is the so-called "Public Benefits Agreement" referenced above.

To help put into perspective the standard of performance to which Projects will be held, it may help to insert the term "estimated" before this agreement's initial references to the public benefits. For example, Recital B could be revised as follows:

> B. Chapter 8 of Proposition 1 (Wat. Code, §§ 79750-79760) dedicated $2.7 billion for investments in water storage projects that improve the operation of the state water system and provide a net improvement in ecosystem and water quality conditions. The California Water Commission (CWC) administers the Water Storage Investment Program (WSIP) to fund the public benefits associated with these projects. Through a rigorous selection process, the CWC made seven maximum conditional eligibility determinations (MCEDs), one for each project. The MCED represents the maximum amount of state funding a WSIP project is eligible for, based on the the CWC's estimate of public benefits to be provided by each WSIP project, such as flood control, ecosystem benefits, water quality improvements, emergency response, and recreation. At least 50% of the public benefits provided by WSIP projects must be ecosystem benefits.

Recital J can be clarified to more clearly, accurately and fairly state the purpose of the agreement as follows:

> J. The purpose of this Contract is to help ensure that public contribution of funds pursuant to Chapter 8 of Proposition 1 for the Project achieves will be used to help deliver the Public Ecosystem Benefits verified by the Department and described herein. (Wat. Code, § 79755.) These Public Ecosystem Benefits will be deemed achieved by Project Proponent implementing all actions necessary to deliver the benefits as described in this Contract and carrying out adaptive management as described in Exhibit B when necessary to provide for the optimal ecosystem response in consideration of external factors that affect populations of targeted species and the feasibility of possible adaptive management actions.

Section 1's definitions could be clarified as follows to be more neutral. If factors beyond a Project's control result in a Benefit Environmental Response that is less than originally estimated, it will not necessarily be as a result of the Project failing to fully perform Project Implementation Actions or Benefit Implementation Actions within the Project's control:

> B. Adaptive Management Plan – identifies how monitoring will be used to adaptively manage a project's public ecosystems benefit(s) through a meet and confer process~~ and corrective actions~~, when feasible.

Section 2.1 too narrowly defines CDFW's role in the WSIP and this Public Benefit Agreement, making it seem like CDFW and the State have no shared purpose and risk with the Projects:

> The Department has authority as the administering agency for the public ecosystem benefits under the Water Storage Investment Program (WSIP). The Department is responsible for executing a Contract with all WSIP projects to ensure that the public contribution of funds pursuant Water Code § 79755 achieves the public ecosystem benefits identified for the project. The Department will i) provide ongoing technical expertise and guidance toward the administration, implementation, and management of public ecosystem benefits, ii) participate in ecosystem benefit metric tracking, evaluation, and accounting, iii) obtain, manage, and report to the CWC information associated with Project public ecosystem benefits, pursuant Cal. Code Regs., tit. 23, § 6014(a)(2)(A)(4), and iv) inform the CWC of public ecosystem benefits provided, any adaptive management actions triggered, any benefit changes, or other information deemed appropriate.

That makes it sound like a Project must achieve the public ecosystem benefits, including Benefit Environmental Response, even when the Project lacks the control that would be needed to do so. Section 2.1 sounds like a regulatory mandate and not like the shared-risk partnership that more accurately reflects the true nature of the parties' responsibilities here. To illustrate, in the case of the pulse flow projects, CDFW will be providing input to DWR about how to use the pulse-flow water provided by the pulse-flow Projects. If CDFW makes recommendations and DWR follows them, the Project should not be in breach or subjected to adaptive management, when it is CDFW and DWR that need to change what they control. Other Projects may have external factors beyond their control that affect the expected outcomes even through the Project Implementation Actions have been implemented in good faith.

Section 2.2 has a similar problem that could be addressed with the following clarifications:

> The [Project Proponent] has oversight authority for the Project and is responsible for ~~Project implementation as required by this WSIP Contract for Administration of Public Benefits (Contract), for the Project's public ecosystem benefit . [Project Proponent] is~~

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~~responsible for implementation of Project activities (~~Project Implementation Activities~~)~~ and ~~benefit activities (~~Benefit Implementation Activities) ~~necessary for the realization of the public ecosystem benefits (~~identified to help provide the estimated Benefit Environmental Response~~)~~ ~~contracted for~~, including monitoring Project Implementation Activities and Benefit Implementation Activities~~for the ecosystem benefit~~, and reporting to California Department of Fish and Wildlife (Department) and the California Water Commission (CWC) pursuant to Cal. Code Regs., tit. 23, § 6014(a)(2)(A)(3) and § 6014(a)(2)(A)(4), respectively. [Project Proponent] may delegate elements of Project reporting, including the execution of the adaptive management plan. However, it is the responsibility of [Project Proponent] to ensure that the terms and conditions identified in the Contract are met.

Section 4.5, Requirements to Share Data, should be revised to reflect the more clearly defined Project obligations versus State obligations as follows:

In addition to data required by the Annual Summary Report and Adaptative Management Plan Review Report, the Department may make additional specific data requests reasonably related to the administration of the Contract~~.~~; provided that the Project Proponent shall provide data relating to the Project's performance of each Project Implementation Action and Benefit Implementation Action. Either the Project Proponent, when all of the Benefit Implementation Action is within the Project Proponent's Control, or the Department where the Benefit Implementation Action and Response is outside of the direct control of the Project Proponent, shall be responsible for monitoring and reporting data relating to each Benefit Environmental Response. . [[PROJECT PROPONENT] shall provide data responsive to the Department's request on a timeline agreed to by both Parties. Data shall include, but is not limited to, reports, modeling and datasets.

Section 5 defines a dispute-resolution process for adaptive management problems. This section should be clarified. It uses defined terms requiring initial caps and each includes the word "Action". A Project should not be subjected to a dispute-resolution process involving adaptive management for failure to achieve the estimated Benefit Environmental Response, so long as the Project is fully performing its Project Implementation Actions and Benefit Implementation Actions.

Exhibit B Adaptive Management Plan

Section 1.2 of the Adaptive Management Plan should be revised as follows:

> This Adaptive Management Plan outlines a monitoring plan, including project implementation milestones and Performance Thresholds (defined in Section 1.4) which demonstrate a project's success in carrying out the Project Implementation Actions and Benefit Implementation Actions specified in the Project's Contract for Administration of Public Ecosystem Benefits.~~in meeting providing the Public Ecosystem Benefits goals and objectives.~~ It identifies how monitoring will be used to adaptively manage a project's Public Ecosystem Benefits through a meet and confer process and corrective actions, when feasible. The intent of the adaptive management plan is to increase the likelihood of achieving and maintaining the desired ~~outcomes in ecosystem improvements~~ Benefit Environmental Responses given uncertainties, which can include California hydrology, future regulatory conditions governing water operations, and climate change. Adaptive management of the project will be implemented on a five-year cycle. A five-year review cycle provides a regular opportunity to evaluate data from the previous years of project implementation, maintenance, and monitoring, and allows for incorporation of new technologies and lessons learned into subsequent implementation, monitoring, maintenance, and performance tracking.

Section 1.3.1 defines "Adaptive Management Expectations" and should be revised as follows:

> The Project is obligated to deliver Project Implementation Actions and Benefit Implementation Actions identified to be within the Project's control and/or fundamental for the Project to qualify under the WSIP and included in the Contract incorporating this Adaptive Management Plan, in order to achieve expected Benefit Environmental Responses. This Adaptive Management Plan acknowledges that while the Benefit Environmental Responses (i.e., targeted ecosystem improvement outcomes) identified are derived by physical changes resulting from Project Implementation Actions and Benefit Implementation Actions, they ~~may~~ will also be influenced by additional factors that are beyond the Project's control. However, the WSIP intends to achieve ecosystem improvement from physical changes in or resulting from Project operations[2], as such, failure to achieve a Benefit Environmental Response will trigger adaptive management actions, including reasonable and feasible modifications to Project Implementation Actions and/or Benefit Implementation Actions if changes to management of those actions may lead to achievement of the Benefit Environmental Responses. Descriptions of implementation

actions and environmental responses are presented in Table 1. The Project has no obligation to change any Project Implementation Action or Benefit Implementation Action that would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits.

Section 1.3.1 includes narrative descriptions of how adaptive management applies to Benefit Implementation Actions. The narrative should be revised as follows:

> **Benefit Implementation Actions:** Defined as actions within a project's control ~~or fundamental to the success of a project~~ that directly influence the quantity and/or quality of a public ecosystem benefit. Ramping of Benefit Implementation Actions associated with establishing physical benefit quantities may be established as benefit implementation milestones. ~~Agreements and/or operations necessary for benefit implementation should be immediately implemented and maintained for the life of the Contract.~~ In cases where a Benefit Implementation Action is fundamental to achieving the benefit, but may be influenced by factors outside of the project's control , the meet and confer process discussed in Section 1.5 of this Adaptive Management Plan will be used to recommend a course of action should an Adaptive Management Trigger (defined in Section 1.4) occur.

Section 1.3.1's narrative description of how adaptive management applies to Benefit Environmental Response should be revised as follows:

> Benefit Environmental Response: The Ecosystem Improvement as defined in Cal. Code Regs., tit. 23, § 6001, subd. (a)(28): a public benefit that includes changing the timing of water diversions, improvement in flow conditions, temperature, or other public benefits that contribute to the restoration of aquatic ecosystems and native fish and wildlife, including those ecosystems and fish and wildlife in the Delta, per Water Code section 79753(a)(1). Ecosystems include both aquatic and terrestrial habitats and natural communities.. Based on current Best Available Science, the Project Implementation and Benefit Implementation Actions are expected to result in achievement of the Benefit Environmental Response Performance Thresholds identified. Accordingly, if an Adaptive Management Trigger occurs based on a Benefit Environmental Response metric, adaptive management recommendations may call for reasonable and feasible changes to Project Implementation and/or Benefit Implementation Actions, provided that the Project has no obligation to change any Project Implementation Action or Benefit Implementation Action that

would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits.

As part of the communication structure for implementation of this Adaptive Management Plan, a Decision-Making Body between the Project and the Department will be established to coordinate on adaptive management for all public ecosystem benefits. It is the responsibility of both the Project and the Department to identify representatives for participation in the Decision-Making Body. Other partners, resources, and expertise may be involved as needed and at the discretion of the Decision-Making Body.

Section 1.3.1 definition of Adaptive Management Triggers should be revised as follows:

Adaptive Management Triggers are events, situations, and or values determined to be below Performance Thresholds, assessed on a five-year review cycle. Adaptive Management Triggers are evaluated based on monitoring metrics associated with Project Implementation Actions, Benefit Implementation Actions, and Benefit Environmental Response and determined by the evaluation of monitoring metrics compared to the associated Performance Threshold. Adaptive Management Trigger indicates when a Public Ecosystem Benefit is experiencing a potential challenge, is not on the expected trajectory to achieve the Performance Threshold, and the monitoring data is below the Performance Threshold. If an Adaptive Management Trigger occurs, the Project has no obligation to change any Project Implementation Action or Benefit Implementation Action that would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits.

Section 1.5 description of "Decision processes" states as follows:

Should an Adaptive Management Trigger occur, the Project will identify limiting factors and implement appropriate adaptive management actions~~.~~, subject to Section 1.3.1. The Project may also identify reasons why Adaptive Management Actions may not result in the achievement of Performance Thresholds (e.g. extended drought conditions or infrastructure repairs) and will propose a plan to meet Performance Thresholds in the next Adaptive Management Review Report period. The Project will report to the Department as identified in Section 1.6..

The original draft wrongly assumes that a Project has control over achieving Benefit Environmental Response. Consistent with the new language proposed for the end of Section 1.3.1, if the Project is performing its Project Implementation Actions and Benefit Implementation Actions, then DWR and/or CDFW would be responsible for adaptively managing their use of the water the Project makes available to them public benefits. The Project would have no obligation to change any Project Implementation Action or Benefit Implementation Action that would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits. Various paragraphs in Section 1.5 should be revised to expressly refer to Section 1.3.1's new, clarifying language.

Section 1.7, Funding Adaptive Management Plan Implementation provides an opportunity to clarify who is responsible for monitoring and report on Benefit Environmental Response with the following revisions:

> Pursuant the WSIP Regulations Section 6014(a)(2)(A)(1)(e), this Adaptive Management Plan contains public ecosystem benefit monitoring metrics, monitoring locations, frequencies, and timing, metric evaluation methodology and associated thresholds and trigger levels based on best available science that initiate adaptive management actions, decision making processes, funding sources and financial commitments to implement this Adaptive Management Plan, and any other items deemed necessary. The Project may elect to participate in collaborative partnerships regarding the implementation of monitoring and/ or adaptive management actions of ecosystem benefits. However, should existing monitoring undertaken through collaborative partnerships cease, it is the project's _responsibility to implement necessary monitoring for the Benefit Environmental Response under this Adaptive Management Plan. For Projects where the Benefit Implementation Action is triggered by the Department, and where the Benefit Environmental Responses cannot be separated or isolated from other external factors,, it shall be the Department's responsibility to implement necessary monitoring under this Adaptive Management Plan.

Issue:, Refund of WSIP funding and Shared Risk

Similar to the issue related to potential use of non-public benefit water supply, Exhibit B Adaptive Management Plan might be read to make each WSIP-funded Project responsible for achieving its defined Benefit Environmental Response, when it is reasonably foreseeable that factors beyond each Project's control may prevent such achievement. Each Project's Benefit Environmental Response was calculated according to methods prescribed by the State, which included modeled water supply development estimates that were used for purposes of determining WSIP grant eligibility funding. Reasonably foreseeable factors that may prevent achievement of a Project's estimated Benefit Environmental Response vary by Project. For some projects, such factors include hydrology being different than assumed in the state-prescribed water supply development modeling and non-hydrologic factors used to evaluate whether a Project is performing its obligations under the Funding Agreement, The draft agreements might be read to trigger a default for failure to make such adaptive management changes to better achieve Benefit Environmental Response, which could trigger a duty to refund WSIP grant funding already spent on Project implementation.

The adaptive management requirements could increase the Project's cost to provide the public benefits or the Project may not be able to attain the estimated Environmental Benefit Response due to changed conditions that could not have been foreseeably accounted for in the modeled estimated benefits. If the Project proponent implements the Project in good faith, based on the modeled, expected outcomes that were reviewed by the State, then all the risk should not accrue solely to the Project, but should be equally shared. Additionally, funding should not be reimbursed for any partial public benefits delivered.

Proposed Solution: The draft agreements should be updated to clarify how the WSIP creates obligations and risks that are shared between the Project Proponents and State. For example, the State (e.g., CDFW or DWR) may need to adaptively manage how it uses Project-provided water supply to help achieve the estimated Benefit Environmental Response.

Section 14 provides for a Project to return spent WSIP grant funding upon default of its obligations under the Funding Agreement, which incorporates the Public Benefit Agreement and its Adaptive Management Plan:

> 14. WITHHOLDING OF DISBURSEMENTS BY STATE. If State determines that the Project is not being implemented in accordance with the provisions of this Funding Agreement, or that Funding Recipient has failed in any other respect to comply with the provisions of this Funding Agreement, and if Funding Recipient does not remedy any such failure to State's satisfaction, State may withhold from Funding Recipient all or any portion of the State funding and take any other action that it deems necessary to protect its interests. Where a portion of the State funding has been disbursed to the Funding Recipient and State notifies Funding Recipient of its decision not to release funds that have been withheld pursuant to Paragraph 15 (Default Provisions), the portion that has been disbursed shall thereafter be repaid immediately with interest at the California general obligation bond interest rate at the time the State notifies the Funding Recipient, as directed by State. State may consider Funding Recipient's refusal to repay the requested disbursed amount a contract breach subject to the default provisions in Paragraph 15 (Default Provisions). If State notifies Funding Recipient of its decision to withhold the entire funding amount from Funding Recipient pursuant to this paragraph, this Funding Agreement shall terminate upon receipt of such notice by Funding Recipient and the State shall no longer be required to provide funds under this Funding Agreement and the Funding Agreement shall no longer be binding on either party.

Generally, the preceding language might be acceptable—so long as the Project's obligations are clearly defined in a way that is fair and reasonable (i.e., that reflect shared risk and acknowledge factors beyond the Project's control). Those obligations start to be defined in the Funding Agreement but are primarily detailed in the Public Benefit Agreement and its Adaptive Management Plan.

Section 15 of the Funding Agreement defines a list of circumstances in which a Project would be in default. The list include Section 15(C): "Failure to provide public benefits or approved equivalent public benefits." The list also includes Section 15(G): "Failure to meet any of the requirements set forth in Paragraph 8 (Continuing Eligibility)." Section 15(C) should be deleted because it fails to clearly define the Project's performance obligation, which can be clearly defined by Section 15(G), whose reference to Paragraph 8 incorporates by reference the Public Benefit Agreement, which includes the Adaptive Management Plan. So long as the latter clearly define Project performance obligations in a way that is fair and reasonable, the State's listing failure to perform such obligations (without timely cure or excuse, like force majeure) does not seem like a surprising ground for declaring a default.

From: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
Sent: 12/21/2022 6:43:26 AM
To: Harris, Melissa [Melissa.Harris@icf.com]; Briard, Monique [Monique.Briard@icf.com]
CC: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: [EXTERNAL] FW: Sites GHG Comments and Approach

My apologies for not forwarding this earlier. Reclamation has provided feedback on the GHG land use analysis. I believe this is consistent with our agreed upon approach. We will need to discuss this during our meeting with Reclamation next Wednesday.

From: Hunt, Shane D <shunt@usbr.gov>
Sent: Thursday, December 15, 2022 3:19 PM
To: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Cc: Jacobson, Allison M <ajacobson@usbr.gov>; Brick, David A <dbrick@usbr.gov>
Subject: RE: [EXTERNAL] FW: Sites GHG Comments and Approach

Hi Laurie,
We looked high and low for an existing example Reclamation EIS analysis or any other EIS analysis on this issue and didn't find an EIS example. I would note that EPA made a similar comment on Valley Water's Draft EIR for their Pacheco Reservoir Expansion Project that they released for comment in November 2021. We reached out to our Denver office and to EPA to try to come up with ideas on this.

Our EPA reviewer in San Francisco reached out to colleague with the EPA Office of Research and Development seeking guidance/examples. She then shared with us that "Although our NEPA comment referenced the IPCC report, it turns out EPA published an application of the report for the US called Inventory of US GHG Emissions and Sinks: 1990-2020. He directed me to Chapter 6 which covers land use, land use change and forestry. P. 6-115 begins the section on Flooded Lands (reservoirs), and describes the methodology for calculating GHG emissions from flooded lands. As I understand it, there is an emission factor associated with different US biomes, the section explains how the emissions factors were developed, and how there are ones for methane as well as CO2."

We shared the info from EPA with others in Reclamation including our Regional Climate Change Coordinator. He reviewed the described methodology and provided a summary of the work it would entail:
(1) Current land use types (acres)
(2) Inundation area (acres) for all alternatives
(3) Specific location of inundation area over current land use to determine methane and carbon dioxide emission factors per biome type
He said that it would be a pretty straightforward calculation. Is this something we can incorporate in the final and the response to EPA's comment? Could also include it now and say something about refining it in the future if a diff or better method is identified once access to the land opens up? The RDEIR/SDEIS committed to quantifying the GHG emissions from land conversion in the future, if it is possible, and including it in mitigation (see language below).

RDEIR/SDEIS Chapter 21 page 21-6/21-7: "When the Authority takes ownership of the land in the inundation area, it may be possible to quantify GHG emissions from land conversion (Chapter 3, Environmental Analysis, describes lack of access). It is anticipated that, at that time, the necessary data and studies would be attainable. If quantifiable in the future, the net change in GHG emissions from the land conversion would be included in the evaluation of the Project's emissions and net zero commitment, as outlined in this analysis (Impact GHG-1 and Mitigation Measure GHG-1.1)."

Thanks,
Shane

Shane Hunt (he/him)

Environmental Compliance and Conservation Branch
Bureau of Reclamation, CGB-152
2800 Cottage Way
Sacramento, CA 95825
(916) 978-5051 (office)
(916) 202-7158 (cell)

From: Hunt, Shane D
Sent: Wednesday, October 26, 2022 3:41 PM
To: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Cc: Jacobson, Allison M <ajacobson@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>
Subject: RE: [EXTERNAL] FW: Sites GHG Comments and Approach

Hi Laurie,
I'll have to look into this and get back to you.
Thanks,
Shane

Shane Hunt (he/him)
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From: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Sent: Wednesday, October 26, 2022 10:16 AM
To: Hunt, Shane D <shunt@usbr.gov>
Cc: Jacobson, Allison M <ajacobson@usbr.gov>
Subject: [EXTERNAL] FW: Sites GHG Comments and Approach

Hi Shane,

Since Melissa is out the rest of the week, I am forwarding the following email I sent to her yesterday regarding the quantification of GHG emissions related to reservoir projects. We received comments (see yellow highlighted text) from EPA and NMFS as well as NGOs regarding the need to quantify GHG emissions that would result from the operation of Sites Reservoir. We are looking for examples of other projects where this has been addressed.

Do you know if there are any recent Reclamation projects that have included this analysis as part of the NEPA document?

Thank you,

Laurie

From: Laurie Warner Herson
Sent: Tuesday, October 25, 2022 9:49 AM
To: Dekar, Melissa D (mdekar@usbr.gov) <mdekar@usbr.gov>; Jacobson, Allison M <ajacobson@usbr.gov>
Subject: Sites GHG Comments and Approach

Good morning,

As you may recall, we received comments on the RDEIR/SDEIR regarding the lack of analysis of the effects of land conversion on GHG emissions. Specifically "the current list of project activities do not appropriately account for the associated GHG emissions that will come from disturbed natural areas impacted by the reservoir's existence, GHG emissions from changes in the water-level, and other sources of GHGs..."

The RDEIR/SDEIS addressed this issue in the Land Use Change section in Chapter 21, Greenhouse Gas Emissions where it notes that a quantification of these emissions requires "a detailed accounting of local and site-specific variables" and "if quantifiable in the future, the net change in GHG emissions from the land conversion would be included in the evaluation of the Project's emissions and net zero commitment."

Do you know of any examples where Reclamation has quantified GHG emissions related to reservoirs, whether in California or nationwide? We are trying to determine the best approach to these comments without setting precedent.

Thank you,

Laurie

Laurie Warner Herson
Principal/Owner
Phenix
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http://phenixenv.com/

From: Marcia Kivett [MKivett@sitesproject.org]
Sent: 12/21/2022 8:39:19 AM
To: Jerry Brown [jbrown@sitesproject.org]; Kevin Spesert [kspesert@sitesproject.org]
CC: Sandra Yarbrough [syarbrough@sitesproject.org]
Subject: Action Item from December - PRR
Attachments: Public Records Request Log.pdf

I've attached the Public Records Request log that I reformatted for printing purposes. Sandra plans to have a copy for the board members to review on the agenda table.

Let me know if you have any format changes.

Sites Reservoir Project 's Pubic Record Request Log

PRR #	Requestor	Email address	Date of the Request	Response Date	Responsive Recods Provided to Requestor	
22-01	Chuck Chandler	cchandler@valeopartners.com	31-Jan-22	2-Feb-22	6-Feb-22	Pursuant to the California Public Records Act, please provide any document such as, but not limited to: professional services engagement letter; legal services contract; legal services engagement letter; attorney hourly rate schedule that shows the hourly rates agreed to, approved, and/or budgeted for all attorneys at all private law firms retained, hired, or contracted with to do any legal work for your department, division, section, and / or entity for all years subsequent to 2018.
22-02	Ra'iatea Lohe	rlohe@res.us	16-May-22	15-Jun-22	5-Jul-22	preferably as a file geodatabase, or alternatively as shapefiles in a zipped folder, or as URLs to web services if applicable. Please also include any metadata produced with the layers, if available. Layers are identified by their names in the legends of figures from the Revised EIR where possible and by references to text if no maps were produced in the report. EIR and REIR locations and files requested:
22-03	Kathryn Carlisle	kathryncarlisle44@gmail.com	24-Aug-22	24-Aug-22	29-Aug-22	I'd like to request the most recent maps, plans, designs, concepts, layouts, or sketches available that show the proposed improvements and easements throughout the Sites Reservoir project (Construction and operation of an offstream surface water reservoir to provide direct and real benefits to instream flows, the Sacramento–San Joaquin Delta ecosystem, and water supply reliability).Please notify me of any associated costs before fulfilling this request.
22-04	John Coburn/Sydney Walters	swalters@mastagni.com	2-Sep-22	6-Sep-22	21-Sep-22	Any and all documents regarding, relating to, or referencing salary, benefits, stipends, and any other compensation for all employees, executives, board members, associate members, and committee members of the Sites Project Authority, including all compensation related to any and all participation with the reservoir committee.

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 12/23/2022 10:00:24 AM
To: Marcia Kivett [MKivett@sitesproject.org]; Alicia Forsythe [aforsythe@sitesproject.org]; Cheyanne Harris [CHarris@BrwnCald.com]; Mitchell. Terrie, Regional San/SASD [mitchellt@sacsewer.com]; Marguerite Patil (mpatil@ccwater.com) [mpatil@ccwater.com]; MOzbilgin@valleywater.org; Cowin, Mark [mcowin@geiconsultants.com]; Putty, Roger [rputty@geiconsultants.com]; mashenfelter@geiconsultants.com; Mark Beuhler [mbeuhler@wswaterbank.com]; Paul Weghorst [weghorst@irwd.com]; Fiona Sanchez (Sanchezf@irwd.com) [sanchezf@irwd.com]; Maureen Martin [mmartin@ccwater.com]; Elizabeth Hurst [ehurst@ieua.org]; Shivaji Deshmukh [sdeshmukh@ieua.org]; RMcCarter@valleywater.org; Christopher Hakes [CHakes@valleywater.org]; Taryn Ravazzini [travazzini@losvaquerosjpa.com]; Young, Amy@DWR [Amy.Young@water.ca.gov]; Davis-Fadtke, Kristal@Wildlife [kristal.davis-fadtke@wildlife.ca.gov]; Yun, Joseph@DWR [joseph.yun@water.ca.gov]; Sugar, Sarah@Waterboards [Sarah.Sugar@Waterboards.ca.gov]; Robinson, Eric [erobinson@kmtg.com]; Uttley, Paige@Wildlife [Paige.Uttley@wildlife.ca.gov]; Herink, James@DWR [James.Herink@water.ca.gov]; Miller, Kathleen A.@Wildlife [Kathleen.Miller@Wildlife.ca.gov]; Oriol. Heidi [oriolh@sacsewer.com]; Beuhler, Mark [MBeuhler@geiconsultants.com]; Asante, Kwabena [kasante@geiconsultants.com]; Kellie Welch [welch@irwd.com]; Dave Richardson [drichardson@woodardcurran.com]; Nachbaur, James@Waterboards [James.Nachbaur@Waterboards.ca.gov]; Jensen, Laura@DWR [Laura.Jensen@water.ca.gov]; John Whitt [jwhitt@cimgroup.com]; Damien Mitchell [dmitchell@cimgroup.com]; James D. Ciampa [jciampa@lagerlof.com]; Erik Ringelberg [Erik@thefreshwatertrust.org]; Boyt, Jessica@DWR [Jessica.Boyt@water.ca.gov]; Brewer, Robin@DWR [Robin.Brewer@water.ca.gov]
Subject: Follow-up to CDFW, CWC, P1 Roundtable Group 12/21/22 Working Session
Attachments: Terminology and Purpose of Contract Discussion Items 20221219[3].docx; 2022-12-23 REDLINE DRAFT Non-public Water and Claw-back Issues in 2022-12-21 Issues re Draft WSIP Agreements.docx; AM Issues for Discussion w-Roundtable & Agencies 2022-12-21 v.3.docx; DRAFT CAPB Template_Dispute Resoultion Procedures_12.22.22 (00292237xE2E14).docx; Terminology Discussion Items 20221221[1].docx

Team –

Thank you for the productive session we had earlier this week. We're making good progress toward agreement because of your hard work and commitment to our shared purpose. The follow-ups to the meeting are:

1. P1 Proponents Write-ups reviewed during the meeting on Remaining Foundational Issues as follows (attached):
- Commitments and Risks for Public and Non- public benefits (Fiona) – doc name "2022-12-23 REDLINE DRAFT Non-public Water and Claw-back Issues in 2022-12-21 Issues re Draft WSIP Agreements[1]"
- Defining Public Ecosystem Benefit/Environmental Response (Mark) – doc name "Terminology and Purpose of Contract Discussion Items 20221219[3][1]"
- Adaptive Management Plan Considerations (Terrie) – doc name "AM Issues for Discussion w- Roundtable & Agencies 2022-12-21 v.3[1]"
- Dispute Resolution Process (Marguerite) – doc name "DRAFT CAPB Template_Dispute Resoultion Procedures_12.22.22 (00292237xE2E14)[1]"
2. Add'l write-up not reviewed during the meeting but included on the agenda as follows:
- Consider alternate durations between review of monitoring results (Melih) – doc name "Terminology Discussion Items 20221221[1][1]"
3. The remaining item that were shown on the agenda as foundational issues as follows do not have a write-up at this time. Please consider the comments included in the comparison table included in the meeting invite to be the description of the issue and proposed resolution for these items.
- Funding Agreement Reimbursement/Reporting Requirements
- Various Sections of the FA Language (new items on pg 6 of 6)
4. State agencies will caucus and consider the information provided by the P1 Proponents prior to the next scheduled working session.
5. A 2 hr working session will be scheduled among the team for the week of Jan 23 to review the State agencies responses on the foundational issues. The team intends to arrive at a consensus at the next meeting as to on how each

remaining foundational issue will be addressed in the next revision of the FA/PBA/AMP template. The group agreed to the goal of making the Jan mtg the final working session of the entire team. Future sessions after the Jan mtg will be project specific.

Please don't hesitate to speak up if I've incorrectly captured or inadvertently omitted any of our outcomes.

Happy Holidays!
Jerry

Date: December 23, 2022

Issue: Adaptive Management, Non-Public Benefit Water and Shared Risk

The December 7, 2022, draft Funding Agreement, Public Benefit Agreement, and the latter's Exhibit B Adaptive Management Plan should be updated to clearly define the scope of each Project's obligations to implement specified Project Implementation Actions and Benefit Implementation Actions that are within its control and are for the purpose of helping to achieve the estimated Benefit Environmental Response defined for each Project.

The draft agreements should more clearly provide that so long as a Project is fully performing its specified Project Implementation Actions and Benefit Implementation Actions, then any monitoring results indicating that a Project's measured Benefit Environmental Response is less than defined will not trigger adaptive management obligations that could reduce the Project's Non-Program water supply benefits or increase their cost—with "Non-Program" meaning a Project's water supply benefit being developed with funds other than WSIP grants (e.g., Project ratepayer revenue). During the December 21, 2022 roundtable meeting among the WSIP projects, the California Water Commission ("CWC"), the California Department of Fish and Wildlife ("CDFW"), and the State Water Resources Control Board concurred that adaptive management obligations would not reduce Non-Program water supply benefits. With agreement on that principle, the task is to update the draft Funding Agreement, Public Benefit Agreement, and the latter's Exhibit B Adaptive Management Plan to more clearly reflect it.

To that same end, the draft agreements should be updated to clarify how the WSIP creates obligations and risks that are shared between the Project Proponents and all State agencies involved in the administration of WSIP-funded projects. For example, the State (e.g., CDFW or DWR) may need to adaptively manage how it uses Project-provided water supply to help achieve the estimated Benefit Environmental Response.

Affected Agreement Provisions:

<u>Funding Agreement</u>

We should clarify enforceable Project obligations referenced in Section 6(B), which vaguely incorporates unspecified obligations by requiring that "Funding Recipient and its representatives shall:

> * * *
>
> B. Accept and agree to comply with all terms, provisions, conditions, and written commitments of this Funding Agreement, including all incorporated documents~~, and to fulfill all assurances, declarations, representations, and statements made by Funding Recipient in the application, documents, amendments, and communications filed in support of its request for Water Quality, Supply, and Infrastructure Improvement Act of 2014 financing~~.

The preceding clarification is consistent with the Funding Agreement's integration clause and the CWC regulations for implementing the WSIP, which state that the State contracts for administering WSIP grant-funded projects "shall supersede any preliminary operations, monitoring, and management commitments made in the Program application." (23 Cal. Code Regs. § 6014(a)(2).)

Exhibit H WSIP Contract for Administration of Public Benefit Ecosystem Benefits

This is the "Public Benefits Agreement" referenced above.

To help put into perspective the standard of performance to which Projects will be held with respect to public benefits, it may help to insert the term "estimated" before this agreement's initial references to the public benefits. For example, Recital B could be revised as follows:

> B. Chapter 8 of Proposition 1 (Wat. Code, §§ 79750-79760) dedicated $2.7 billion for investments in water storage projects that improve the operation of the state water system and provide a net improvement in ecosystem and water quality conditions. The California Water Commission (CWC) administers the Water Storage Investment Program (WSIP) to fund the public benefits associated with these projects. Through a rigorous selection process, the CWC made seven maximum conditional eligibility determinations (MCEDs), one for each project. The MCED represents the maximum amount of state funding a WSIP project is eligible for, based on the CWC's estimate of public benefits to be provided by each WSIP project, such as flood control, ecosystem benefits, water quality improvements, emergency response, and recreation. At least 50% of the public benefits provided by WSIP projects must be ecosystem benefits.

Recital J can be clarified to more clearly, accurately and fairly state the purpose of the agreement as follows:

> J. The purpose of this Contract is to ensure that public contribution of funds pursuant to Chapter 8 of Proposition 1 for the Project will help to achieve~~s~~ the Public Ecosystem Benefits verified by the Department and described herein. (Wat. Code, § 79755.) The Project Proponent's obligation with respect to providing the~~se~~ specified Public Ecosystem Benefits will be ~~achieved~~ performed by Project Proponent implementing ~~all~~ Project Implementation Actions and Benefit Implementation A~~a~~ctions within its control ~~necessary~~ to enable ~~deliver~~ the Benefit Environmental Response benefits as described in this Contract while ~~and carrying out~~ adaptively managing~~ement~~ ~~as described~~ ~~in~~ under Exhibit B ~~when necessary to provide for the optimal ecosystem response~~ in consideration of external factors that affect

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populations of targeted species and the reasonable feasibility of ~~possible~~ adaptive management actions.

Section 1's definitions could be clarified as follows to be more balanced. If factors beyond a Project's control result in a Benefit Environmental Response that is less than originally estimated, it will not necessarily be as a result of the Project failing to fully perform Project Implementation Actions or Benefit Implementation Actions within the Project's control:

> B. Adaptive Management Plan – identifies how monitoring will be used to adaptively manage a project's ~~public ecosystems benefit(s)~~Benefit Environmental Response through a meet and confer process and corrective actions, when feasible.

If Benefit Environmental response monitoring triggers "corrective action," the adaptive change might require the Administering Agency or others to change how they implement, control or affect the Benefit Environmental Response. Exhibit B specifically applies to the Benefit Environmental Response.

Section 2.1 too narrowly defines CDFW's role in the WSIP and this Public Benefit Agreement. CDFW and the State have a shared purpose and risk with the Benefit Environmental Response for each Project, just as each Project has a shared purpose and risk with its Non-Program water supply or other benefits:

> The Department has authority as the administering agency for the public ecosystem benefits under the Water Storage Investment Program (WSIP). The Department is responsible for executing a Contract with all WSIP projects to ensure that the public contribution of funds pursuant Water Code § 79755 is used toward achievinges the public ecosystem benefits identified for the project. The Department will i) provide ongoing technical expertise and guidance toward the administration, implementation, and management of public ecosystem benefits, ii) participate in ecosystem benefit metric tracking, evaluation, and accounting, iii) obtain, manage, and report to the CWC information associated with Project public ecosystem benefits, pursuant Cal. Code Regs., tit. 23, § 6014(a)(2)(A)(4), and iv) inform the CWC of public ecosystem benefits provided, any adaptive management actions triggered, any benefit changes, or other information deemed appropriate.

Section 2.1 sounds like a regulatory mandate and not like the shared-risk partnership that more accurately reflects the true nature of the parties' responsibilities here. To illustrate, in the case of the pulse flow Projects, CDFW will be providing input to DWR about how to use the pulse-flow water provided by the pulse-flow Projects. If CDFW makes recommendations on how to use a Project's pulse-flow water and DWR follows them, the Project should not be in breach or subjected to adaptive management, when it is CDFW and DWR that need to change what they control. Other Projects may have external factors beyond their control that affect the expected outcomes, even through the Project Implementation Actions have been implemented in good faith.

Section 2.2 has a similar problem that could be addressed with the following clarifications:

> The [Project Proponent] has oversight authority for the Project and is responsible for ~~Project implementation as required by this WSIP Contract for Administration of Public Benefits (Contract), for the Project's public ecosystem benefit . [Project Proponent] is responsible for implementation of Project activities (~~Project Implementation Activities~~)~~ and ~~benefit activities (~~Benefit Implementation Activities) ~~necessary for the realization of the public ecosystem benefits (~~identified to help provide the estimated Benefit Environmental Response~~)~~ ~~contracted for~~, including monitoring Project Implementation Activities and Benefit Implementation Activities~~for the ecosystem benefit~~ , and reporting to California Department of Fish and Wildlife (Department) and the California Water Commission (CWC) pursuant to Cal. Code Regs., tit. 23, § 6014(a)(2)(A)(3) and § 6014(a)(2)(A)(4), respectively. [Project Proponent] may delegate elements of Project reporting, including the execution of the adaptive management plan. However, it is the responsibility of [Project Proponent] to ensure that the terms and conditions identified in the Contract are met.

Section 4.5, Requirements to Share Data, should be revised to reflect the more clearly defined Project obligations versus State obligations as follows:

> In addition to data required by the Annual Summary Report and Adaptative Management Plan Review Report, the Department may make additional specific data requests reasonably related to the administration of the Contract~~.~~; provided that the Project Proponent shall provide data relating to the Project's performance of each Project Implementation Action and Benefit Implementation Action that is under the Project's control. Either the Project Proponent, when all of the Benefit Implementation Action is within the Project Proponent's Control, or the Department, when the Benefit Implementation Action and Response is outside of the direct control of the Project Proponent, shall be responsible for monitoring and reporting data relating to each Benefit Environmental Response. [[PROJECT PROPONENT] shall provide data responsive to the Department's request on a timeline agreed to by both Parties. Data shall include, but is not limited to, reports, modeling and datasets.

Section 5 defines a dispute-resolution process for adaptive management problems. This section should be clarified. It uses defined terms requiring initial caps and each includes the word "Action". A Project should not be subjected to a dispute-resolution process involving adaptive management for failure to achieve the estimated Benefit Environmental Response, so long as the Project is fully performing its Project Implementation Actions and Benefit Implementation Actions.

Exhibit B Adaptive Management Plan

Section 1.2 of the Adaptive Management Plan should be revised as follows:

> This Adaptive Management Plan outlines a monitoring plan, including project implementation milestones and Performance Thresholds (defined in Section 1.4) which demonstrate a project's success in carrying out the Project Implementation Actions and Benefit Implementation Actions specified in the Project's Contract for Administration of Public Ecosystem Benefits.~~in meeting providing the Public Ecosystem Benefits goals and objectives.~~ It identifies how monitoring will be used to adaptively manage a project's ~~Public Ecosystem Benefits~~Benefit Environmental Responses through a meet and confer process and corrective actions, when feasible. The intent of the adaptive management plan is to increase the likelihood of achieving and maintaining the desired ~~outcomes in ecosystem improvements~~ Benefit Environmental Responses given uncertainties, which can include California hydrology, future regulatory conditions governing water operations, and climate change. Adaptive management of the project will be implemented on a five-year cycle. Although not all specified Benefit Environmental Responses are anticipated to occur within every five-year review cycle, a five-year review cycle provides a regular opportunity to evaluate data from the previous years of project implementation, maintenance, and monitoring, and allows for incorporation of new technologies and lessons learned into subsequent implementation, monitoring, maintenance, and performance tracking.

Section 1.3.1 describes "Adaptive Management Expectations" and reasonably defines Benefit Implementation Actions that "a Project is obligated to deliver" as including actions that are "within the Project's control. Fundamental or not, a Project cannot be responsible for actions outside the Project's control. Section 1.3.1 should be revised as follows:

> The Project is obligated to deliver Project Implementation Actions and Benefit Implementation Actions identified to be within the Project's control ~~and/or fundamental for the Project~~ to qualify under the WSIP and included in the Contract incorporating this Adaptive Management Plan, in order to achieve expected Benefit

Environmental Responses. This Adaptive Management Plan acknowledges that while the Benefit Environmental Responses (i.e., targeted ecosystem improvement outcomes) identified are derived by physical changes resulting from Project Implementation Actions and Benefit Implementation Actions, they ~~may~~ will also be influenced by additional factors that are beyond the Project's control. However, the WSIP intends to achieve ecosystem improvement from physical changes in or resulting from Project operations~~2~~, as such, failure to achieve a Benefit Environmental Response will trigger adaptive management actions, including reasonable and feasible modifications to Project Implementation Actions and/or Benefit Implementation Actions if changes to management of those actions may lead to achievement of the Benefit Environmental Responses. Descriptions of implementation actions and environmental responses are presented in Table 1. The Project has no obligation to change any Project Implementation Action or Benefit Implementation Action that would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits.

The preceding changes would be consistent with principle agreed to during the December 21, 2022, roundtable meeting that adaptive management would not take a Project's Non Program water to pursue achievement of a Benefit Environmental Response.

Section 1.3.1 includes narrative descriptions of how adaptive management applies to Benefit Implementation Actions. The narrative should be revised to avoid any implication that a Project is obligated to carry out an action that is beyond its control or to state obligations that are not directly related to adaptive management as follows:

Benefit Implementation Actions: Defined as actions within a project's control ~~or fundamental to the success of a project~~ that directly influence the quantity and/or quality of a public ecosystem benefit. Ramping of Benefit Implementation Actions associated with establishing physical benefit quantities may be established as benefit implementation milestones. Agreements and/or operations necessary for benefit implementation should be ~~immediately~~ implemented ~~and maintained~~\ for the life of the Contract. In cases where a Benefit Implementation Action is fundamental to achieving the benefit, but may be influenced by factors outside of the project's control , the meet and confer process discussed in Section 1.5 of this Adaptive Management Plan will be used to recommend a course of action should an Adaptive Management Trigger (defined in Section 1.4) occur.

Section 1.3.1's narrative description of how adaptive management applies to Benefit Environmental Response should more expressly protect Non-Program benefits, like Non-Program water supply, from reduction or cost-increase by adaptive management as follows:

> Benefit Environmental Response: The Ecosystem Improvement as defined in Cal. Code Regs., tit. 23, § 6001, subd. (a)(28): a public benefit that includes changing the timing of water diversions, improvement in flow conditions, temperature, or other public benefits that contribute to the restoration of aquatic ecosystems and native fish and wildlife, including those ecosystems and fish and wildlife in the Delta, per Water Code section 79753(a)(1). Ecosystems include both aquatic and terrestrial habitats and natural communities.. Based on current Best Available Science, the Project Implementation and Benefit Implementation Actions are expected to result in achievement of the Benefit Environmental Response Performance Thresholds identified. Accordingly, if an Adaptive Management Trigger occurs based on a Benefit Environmental Response metric, adaptive management recommendations may call for reasonable and feasible changes to Project Implementation and/or Benefit Implementation Actions; provided that the Project has no obligation to change any Project Implementation Action or Benefit Implementation Action that would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits.
>
> As part of the communication structure for implementation of this Adaptive Management Plan, a Decision-Making Body between the Project and the Department will be established to coordinate on adaptive management for all public ecosystem benefits. It is the responsibility of both the Project and the Department to identify representatives for participation in the Decision-Making Body. Other partners, resources, and expertise may be involved as needed and at the discretion of the Decision-Making Body.

Section 1.3.1's definition of Adaptive Management Triggers should be revised as follows:

> Adaptive Management Triggers are events, situations, and or values determined to be below Performance Thresholds, assessed on a five-year review cycle. Adaptive Management Triggers are evaluated based on monitoring metrics associated with Project Implementation Actions, Benefit Implementation Actions, and Benefit Environmental Response and determined by the evaluation of monitoring metrics compared to the associated Performance Threshold. Adaptive Management Trigger indicates when a Public Ecosystem Benefit is experiencing a potential challenge, is not on

> the expected trajectory to achieve the Performance Threshold, and the monitoring data is below the Performance Threshold. If an Adaptive Management Trigger occurs, the Project has no obligation to change any Project Implementation Action or Benefit Implementation Action that would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits.

Section 1.5 description of "Decision processes" states as follows:

> Should an Adaptive Management Trigger occur, the Project will identify limiting factors and implement appropriate adaptive management actions~~.~~, subject to Section 1.3.1. The Project may also identify reasons why Adaptive Management Actions may not result in the achievement of Performance Thresholds (e.g. extended drought conditions or infrastructure repairs) and will propose a plan to meet Performance Thresholds in the next Adaptive Management Review Report period. The Project will report to the Department as identified in Section 1.6..

Consistent with the new language proposed for the end of Section 1.3.1, if the Project is performing its Project Implementation Actions and Benefit Implementation Actions, then DWR and/or CDFW would be responsible for adaptively managing their use of the water the Project makes available to them for their use in providing Benefit Environmental Response. The Project would have no obligation to change any Project Implementation Action or Benefit Implementation Action that would directly or indirectly reduce the Project's Non-Program Benefits or that would increase the Project's cost to provide its Non-Program Benefits. Various paragraphs in Section 1.5 should be revised, as above, to expressly refer to Section 1.3.1.

Section 1.7, Funding Adaptive Management Plan Implementation, provides an opportunity to clarify who is responsible for monitoring and reporting on Benefit Environmental Response with the following revisions:

> Pursuant the WSIP Regulations Section 6014(a)(2)(A)(1)(e), this Adaptive Management Plan contains public ecosystem benefit monitoring metrics, monitoring locations, frequencies, and timing, metric evaluation methodology and associated thresholds and trigger levels based on best available science that initiate adaptive management actions, decision making processes, funding sources and financial commitments to implement this Adaptive Management Plan, and any other items deemed necessary. The Project may elect to participate in collaborative partnerships regarding the implementation of monitoring and/~~-~~or adaptive management actions of ecosystem benefits. However, should existing monitoring undertaken through collaborative partnerships

https://www.msn.com/en-us/feedcease, it is the project's and the Department's responsibility to implement necessary monitoring for the Benefit Environmental Response under this Adaptive Management Plan. For Projects where the Benefit Implementation Action is controlled by the Department, and where the Benefit Environmental Responses cannot be separated or isolated from other external factors,, it shall be the Department's responsibility to implement necessary monitoring under this Adaptive Management Plan.

Issue:, Refund of WSIP funding and Shared Risk

Similar to clarifying that Non-Program, or non-public benefit, water supply, would not be used through adaptive management to pursue Benefit Environmental Response, the Exhibit B Adaptive Management Plan should be clarified to emphasize that each WSIP-funded Project is not unconditionally responsible for achieving a defined Benefit Environmental Response, when factors beyond each Project's control can prevent such achievement. Each Project's Benefit Environmental Response was calculated according to methods prescribed by the State, which included modeled water supply development estimates that were used for purposes of determining WSIP grant eligibility funding. Reasonably foreseeable factors that may prevent achievement of a Project's estimated Benefit Environmental Response vary by Project. For some projects, such factors include hydrology being different than assumed in the state-prescribed water supply development modeling and non-hydrologic factors used to evaluate whether a Project is performing its obligations under the Funding Agreement, The draft agreements should be more clear that a Project that is performing its obligations with respect to Project Implementation Actions and Benefit Implementation Actions that it controls will not receive any State request to refund WSIP grant funding already spent on Project implementation, if the anticipated Benefit Environmental Responses do not occur due to factors beyond a Project's control.

If the Project proponent implements the Project in good faith, based on the modeled, expected outcomes that were reviewed by the State, then the risk of Benefit Environmental Responses and Non-Program Benefits occurring as anticipated should be equally shared between the State (as to Benefit Environmental Responses) and each Project (as to Non-Program Benefits). Consistent with that, funding should not be reimbursed partial public benefits delivered.

Proposed Solution: The draft agreements should be updated to clarify how the WSIP creates obligations and risks that are shared between the Project Proponents and State. For example, the State (e.g., CDFW or DWR) may need to adaptively manage how it uses Project-provided water supply to help achieve the estimated Benefit Environmental Response.

Section 14 provides for a Project to return spent WSIP grant funding upon default of its obligations under the Funding Agreement, which incorporates the Public Benefit Agreement and its Adaptive Management Plan:

> 14. WITHHOLDING OF DISBURSEMENTS BY STATE. If State determines that the Project is not being implemented in

> accordance with the provisions of this Funding Agreement, or that Funding Recipient has failed in any other respect to comply with the provisions of this Funding Agreement, and if Funding Recipient does not remedy any such failure to State's satisfaction, State may withhold from Funding Recipient all or any portion of the State funding and take any other action that it deems necessary to protect its interests. Where a portion of the State funding has been disbursed to the Funding Recipient and State notifies Funding Recipient of its decision not to release funds that have been withheld pursuant to Paragraph 15 (Default Provisions), the portion that has been disbursed shall thereafter be repaid immediately with interest at the California general obligation bond interest rate at the time the State notifies the Funding Recipient, as directed by State. State may consider Funding Recipient's refusal to repay the requested disbursed amount a contract breach subject to the default provisions in Paragraph 15 (Default Provisions). If State notifies Funding Recipient of its decision to withhold the entire funding amount from Funding Recipient pursuant to this paragraph, this Funding Agreement shall terminate upon receipt of such notice by Funding Recipient and the State shall no longer be required to provide funds under this Funding Agreement and the Funding Agreement shall no longer be binding on either party.

Generally, the preceding language might be acceptable—so long as the Project's obligations are clearly defined in a way that is fair and reasonable (i.e., that reflect shared risk and acknowledge factors beyond the Project's control). Those obligations start to be defined in the Funding Agreement but are primarily detailed in the Public Benefit Agreement and its Adaptive Management Plan.

Section 15 of the Funding Agreement addresses circumstances relating to possible default. The list should be updated to more clearly define performance obligations. The list includes Section 15(C): "Failure to provide public benefits or approved equivalent public benefits," but those terms are vague. The list also includes Section 15(G): "Failure to meet any of the requirements set forth in Paragraph 8 (Continuing Eligibility)," which incorporates by reference the Public Benefit Agreement that includes the Adaptive Management Plan.[22] Section 15(C) should be deleted because it fails to clearly define the Project's performance obligation, which already are more clearly defined by Section 15(G), whose reference to Paragraph 8 incorporates by reference the Public Benefit Agreement, which includes the Adaptive Management Plan. So long as the latter clearly defines Project performance obligations in a way that is fair and reasonable, the State's listing failure to perform such obligations (without timely cure or excuse, like force majeure) does not seem like a surprising ground for declaring a default.

Issues for Discussion: Adaptive Management Plan Considerations

Issues

- Clarify expected obligations for Adaptive Management Plan, for factors that are outside the control of the Project Proponent, including the limitation of financial risk.
- Clarify that a Contract has been fulfilled if the Project Proponent acts in "good faith" and takes all committed actions and carries out a reasonable adaptive management plan, even if the Benefit Environmental Response is not achieved.
- Clarify that the Dispute Resolution Process does not get initiated for factors that are outside of the Project Proponents' Control.

Background

AM Plan includes monitoring plan, implementation milestones, performance thresholds and AM triggers.

Current Draft Template *(bold added for emphasis)*

- Section 1.2 of AM Plan states that: *"the intent of the adaptive management plan is to increase the likelihood of achieving and maintaining the desired Benefit Environmental Responses **given uncertainties**, which can include California hydrology, future regulatory conditions governing water operations, and climate change ".*

- Section 1.3.1 of AM Plan states that: *"The Project is obligated to deliver Project Implementation Actions and Benefit Implementation Actions identified to be **within the Project's control….** in order to achieve expected Benefit Environmental Responses. … as such, failure to achieve a Benefit Environmental Response will trigger adaptive management actions, **including reasonable and feasible modifications** to Project Implementation Actions and/or Benefit Implementation Actions if changes to management of those actions may lead to achievement of the Benefit Environmental Responses."*

Section 5.1 of the CAPB specifies the criteria that allow the Department to initiate the Public Benefit Dispute Process. One of the criteria states:*"The Parties disagree on appropriate adaptive management actions and the Department determines that failure to adjust adaptive management actions **within the Project Proponent's control,** will result in an insufficient public benefit;"*

Discussion Item

How is financial risk limited when factors outside of the Project's control are affecting the "*Project Implementation Actions*", "*Benefit Implementation Actions*" *or* "Benefit Environmental Response" ?

Proponent Position

- The terms "feasible and reasonable" should be defined and include a cost cap on adaptive management measures. Draft definitions for consideration:

- **Reasonable Activities** – Adaptive Management activities that are consistent with the legal authorities of the Project Proponent and consistent with the water rights, hydrology, and climate to be able to provide the intended outcome, and that relevant local experts agree are likely to achieve that outcome.

- **Feasible Activities** – Adaptive Management activities that can be accomplished technically (e.g., not experimental or speculative) with a cumulative cost, over the life of the Program that does not surpass **X%** of the benefit monetization of the associated ecological benefit and NTE annually of 1%.

  Or

  List of specific available actions in Table 1

  1) NTE X Acre Feet of additional or withholding of released water in a single year (which may affect stored water availability to public benefit in subsequent years)
  2) a change in timing of planned release up to 2 months from baseline within the same year,
  3) deliver planned release to alternate mutually agreed environmental purpose within the same year

  Annual $ cap – NTE $X increase in project proponent's cost

- There should be a provision in CAPB and/or AM Plan that provides an "off-ramp" from the AM Plan and Dispute Resolution Process for factors that are outside of Project's control. AM is simply not needed, and resources should not be expended, if the benefit's ecosystem threshold is exceeded by factors or forces that are obviously outside of the Project's control. Significant funding is being invested by the Project Proponents to accomplish the projects and benefits in addition to the public funding; additional financial risk should not be added to the Project Proponents due to the uncertainties identified in Section 1.2 of the Adaptive Management Plan.
  - Factors within a Project's control are defined as those factors that are directly associated with the Project Implementation Actions and Benefit Implementation Actions.
  - Factors outside of a Project's control are defined as those factors that arise as a result of actions taken by others , or environmental conditions that are not influenced by the Project Proponent.

- Benefit Response is not an AM metric or AM obligation – It is a goal that management actions may help achieve.

From: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
Sent: 12/23/2022 10:11:14 AM
To: Spranza, John [john.spranza@hdrinc.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Two weather systems in the forecast; Valadao leads request for answers from Interior on biops; Rethinking risk and responsibility in wildfire crisis

Thanks John, nothing new here - substantial evidence is always key.

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Friday, December 23, 2022 10:06 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Subject: FW: Two weather systems in the forecast; Valadao leads request for answers from Interior on biops; Rethinking risk and responsibility in wildfire crisis

Sort of a no-brainer to me but at least it's consistent with what our standard practice has been

https://www.ceqachronicles.com/2022/12/court-finds-site-visits-and-reports-taken-before-and-after-issuance-of-nop-adequate-for-establishing-biological-resources-baseline-eirs-emergency-evacuation-analysis-upheld/

John Spranza

D 916.679.8858 M 818.640.2487

From: Maven <maven@mavensnotebook.com>
Sent: Friday, December 23, 2022 9:05 AM
To: Spranza, John <john.spranza@hdrinc.com>
Subject: Two weather systems in the forecast; Valadao leads request for answers from Interior on biops; Rethinking risk and responsibility in wildfire crisis

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MAVEN'S NOTEBOOK

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In California water news today ...

- California will be hit with 2 weather systems this holiday weekend. Here's a timeline of impacts
- Sierra Nevada snow season off to best start in a decade, though experts heed caution
- Congressman Valadao leads request for Answers from interior on biological opinions
- Golden State Salmon Association/Public asks federal officials to intercede in new water operations rules in CA
- King Tides give us a preview of sea level rise
- Court finds site visits and reports taken before and after issuance of NOP adequate for establishing biological resources baseline, EIR's emergency evacuation analysis upheld
- Rethinking risk and responsibility in the western wildfire crisis
- Placer County Water agency blames PG&E for Mosquito Fire, sues for damages
- 7-foot tides expected to bring flooding to San Francisco Bay Area
- Corps, partners sign agreement to move forward on study to aid Salton Sea
- Arizona battles for better billing in Colorado River fight
- And more ...

Click here to read today's Daily Digest.

Also on Maven's Notebook today:

- **UPDATE:** All Curtailments in the Delta Watershed Remain Temporarily Suspended through January 4, 2023
- **FUNDING OPPORTUNITY:** Delta Conservancy Announces Availability of $42M in Grant Funding

---

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Meeting: **Sites Legislative & Outreach Committee**

Locations: Maxwell Project Office, 122 Old Highway 99W, Maxwell, CA 95955
See below for alternate meeting locations.

Call in: **1-916-538-7066** Code: 578 235 959# Click here to join the meeting

Committee Chair: Jeff Sutton (AB Vice-Chair/Tehama-Colusa Canal Authority)
Staff Lead: Kevin Spesert, External Affairs Manager

AGENDA

Wednesday, February 1, 2023, 2:00 PM – 4:00 PM

NO ACTION or DECISION WILL BE TAKEN

ROLL CALL & CALL TO ORDER:

- Introductions.
- Period for Public Comment.

People may speak about any subject of concern, provided it is within the committee's jurisdiction. The time allotted for receiving such public communication shall be limited to 3 minutes per person. Note: No action shall be taken on comments made during this period.

1. Discussion and Information Items:

1.1 Review 2023 Committee Charter Documents.

1.2 Consider proposed 2023 Federal & State Legislative Priorities.

1.3 Discussion on 2023 Communications Program Objectives.

2. Upcoming Meetings:

Joint Reservoir Committee & Authority Board Meeting
Friday, February 17, 2023 (9:00 am – 12:00 pm)

Legislative & Outreach Committee
To Be Determined - April 2023

All meetings are in-person at 122 Old Hwy 99W, CA 95955 & Virtual. Virtual information will be provided before all meetings at Sitesproject.org.

ADJOURN

ADA COMPLIANCE: Upon request, agendas will be made available in alternative formats to accommodate persons with disabilities. In addition, any person with a disability who requires a modification or accommodation to participate or attend this meeting may request the necessary accommodations. Please make your request to the Board Clerk, specifying your disability, the format in which you would like to receive this Agenda, and any other accommodation required no later than 24 hours before the start of the meeting.

Alternate Meeting Locations:

Glenn-Colusa ID, 344 East Laurel Street, Willows, CA 95988

Metropolitan Water District, 700 North Alameda Street, Los Angeles, CA 90012

San Bernardino Valley Municipal WD, 380 E. Vanderbuilt Way, San Bernardino, CA 92408

Tehama-Colusa Canal Authority, 5513 Highway 162, Willows, CA 95988

Reclamation District 108, 975 Wilson Bend Road, Grimes, CA 95950

Zone 7 Water Agency, 100 North Canyons Parkway, Livermore, CA 94511

Sites

TO:	Ad Hoc Legislative & Outreach Committee
DATE:	February 1, 2023
SUBJECT:	Federal Government Affairs/Legislative Priorities

The Government Affairs Team have developed the following federal government affairs/legislative priorities to focus our activities to align with key Amendment 3 milestones and align in a coordinated manner with our state government affairs/legislative activities. This document covers the revised priorities through December 31, 2023.

RECLAMATION's Project Participation

- Complete a Coordinated Operations Agreement with Reclamation. This is envisioned to serve two purposes: 1) how the Sites Project and CVP/SWP wouldcoordinate operations to achieve mutual goals and avoid harm to the projects.
- Coordination with Reclamation throughout the Authority's securing of a water right for the project.
- Continuing partnership with Reclamation as the NEPA lead agency in developing the Environmental Impact Statement (EIS) and securing a Record of Decision by the scheduled date.
- Complete a benefits and obligations contract inclusive of Reclamation's participation in the Project and consistent with the PWAs benefits and obligations.
- Complete all of the Reclamation facility contracting necessary to support the project (ie Warren Act, Land licensing, Refuge Water Delivery)

WIIN ACT and IIJA Storage Funds

- Secure WIIN Act storage account funds and Infrastructure Investment and Jobs Act (IIJA) storage funds at a funding level and at times necessary to support Reclamation's investment in the Project reflected in the post feasibility analysis and the Dec 16 2022 letter expressing interest in 16% capacity share in the Project.
- Advocate for continued appropriation of no less than $134 million to the WIIN Act Storage Account in the regular FY 2024 Energy and Water Development Appropriations bill and in each fiscal year thereafter until the Sites Project is fully funded.
- Monitor and engage on Senator Feinstein's STREAM Act and Congressman Valadao's WATER for California Act and otherwater or drought legislation expected to be introduced, particularly if additional amendments to WIIN Act are considered or deemed necessary for Sites.

WIFIA and OTHER FEDERAL FUNDING

- Identify and secure appropriations/grants/loans to support project elements, i.e., broadband, transportation improvements (bridges), flood control, among others.
    - Identify priority alternative sources of funds to support project elements.

Sites

- Build support for same in Congress and among the federal agencies.
- Work with elected officials and USDA to ensure mutually agreeable terms for the Rural Development Community Facilities Loan

ELECTED OFFICIAL ENGAGMENT

- Ongoing engagement with federal elected officials and their staff, administration officials and federal agency leadership. Prioritize engagement activities with members/staff who overlap the project participants' service areas, key Senate/House committee chairs, and the California Delegation.
    - Prioritize engagement activities with Senator Padilla, Rep. Huffman, Rep. Thompson and Rep. LaMalfa.
- Conduct an 'in person' Federal Legislative Day in spring 2023.

Other items that do not require legislative action but are administrative in nature are listed below. We will need to keep our legislators informed on progress of these items so they can step in when/if needed to assist in keeping them on the timeline required to support the project schedule.

Permitting - Supportive consultation with federal agencies in securing; USFWS Biological Opinion, NMFS Biological Opinion through Reclamation as the Section 7 Consultation Lead for Construction and Oeprations, National Historic Preservation Act Section 106 Programmatic Agreement.

Technical Coordination –Ongoing technical coordination with Reclamation staff on project engineering and geotechnical activities to advance the project.

Public Outreach - Coordinate with appropriate federal agencies on any public outreach activities associated with a recirculated EIS. Support engagement with tribes and continued consultation activities.

Sites

TO:	Ad Hoc Legislative & Outreach Committee
DATE:	February 1, 2023
SUBJECT:	State Government Affairs/Legislative Priorities

The Government Affairs Team have developed the following state government affairs/legislative priorities to focus our activities to align with key Amendment 3 milestones and align in a coordinated manner with our federalgovernment affairs/legislative activities. This document covers the revised priorities through December 31, 2023.

STATE FUNDING

Proposition 1/CWC

- Continue to advance activities to meet the statutory requirements of WSIP to secure the $816 million awarded to the project as opportunities arise.
- Continue to secure WSIP Early Funding for the project.
- Evaluate opportunities for additional WSIP benefits if additional dollars are made available.
- Advance discussions with CDFW to ensure flexibility is reflected in the Public Benefit Agreement for the implementation of the public ecosystem benefits.

Other State Appropriations/Bonds/Grants

- Monitor for opportunities from potential state bond (2024 Climate BOND??) measures to support State's project O&M costs or achieve beneficial financing mechanisms related to climate change adaptation, local community issues, infrastructure development, drought resiliency, water resources and flood control.
- Continue to track and pursue opportunities for state appropriations/grants to offset project cost as appropriate for transportation, economic/workforce development, flood control, infrastructure planning, operations & maintenance, etc.

STATE AGENCY COORDINATION

- Complete a DWR/SWP Coordinated Operations Plan.
  - Continue to Monitor activities of Sites/SWP Participants in their efforts to achieve agreement in principle (AIP) with DWR and other SWC's
- Complete and SUPPORT approvals and permits to achieve the Final Funding Conditions for Prop 1 by **October 2024** for management of WSIP public benefit water produced by the project.
  - All environmental documentation completed, water rights approved, all other federal, state, and local approvals, certifications and agreements required to be completed have been obtained.
- Support the work of the State Strike Team.

ELECTED OFFICIAL ENGAGMENT & NGO OUTREACH

- Ongoing engagement with state elected officials and their staff, administration officials and state agency leadership.
- Coordinate a 'in person' legislative tour, Invite the Governor
  - Planning for a State Legislative Day in **March 2023**.
  - State Delegation Coalition letter in **2nd Quarter 2023**.
- Ongoing engagement with regional/local elected officials (Supervisors & City Council) and local government agencies.
  - Presentations to regional/local electeds (Counties, Cities, Special Districts).
  - Local Government Coalition letter **2nd Quarter 2023**.
- Ongoing engagement with NGOs and Associations. Continued development of a state-wide project coalition.
  - Presentations to NGOs and Association Boards/Membership as avaliable.
  - NGO/Associations Coalition Letter **1st Quarter 2023**.

Other items that do not require legislative/government affairs action but are administrative in nature are listed below. We will need to keep our legislators informed on progress of these items so that they can step in when/if needed to assist in keeping them on the timeline required to support the project schedule.

State Permitting - Ongoing consultation with state agencies to secure required state permits and agreements to advance the project.

Regional/Local Permitting & Agreements – Ongoing consultation and coordination with regional and local governmental agencies to advance necessary permits and agreements to advance the project.

EIR Public Outreach - Coordinate with appropriate state agencies on any public outreach activities associated with a recirculated EIR. AB 52 engagement with tribes and continued consultation activities. Conduct outreach with local non-English speaking communities in Spring 2023.

From: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
Sent: 12/28/2022 7:56:53 AM
To: Brick, David A [dbrick@usbr.gov]; Briard, Monique [Monique.Briard@icf.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Jacobson, Allison M [ajacobson@usbr.gov]; Harris, Melissa [Melissa.Harris@icf.com]; Unverzagt, Lance [Lance.Unverzagt@icf.com]; Kalaskar, Tanya [Tanya.Kalaskar@hdrinc.com]; Cohen, Ariel [Ariel.Cohen@hdrinc.com]
Subject: Sites Reservoir NEPA Coordination Meeting
Attachments: 20221228_NEPA Coordination_Meeting-Agenda.docx; V2-010-App02D1_Mystery_Snail_Memo_122722.docx; RE: [EXTERNAL] FW: Sites GHG Comments and Approach

Good morning all,

Attached is a slightly updated agenda for our meeting this morning. Also attached is 1) a draft memo prepared by ICF to address the Chinese mystery snail, and 2) an email received from Shane regarding Reclamation's coordination with EPA and search for examples of an EIS analysis of the effects of land conversion on GHG emissions.

Please let me know if I need to make any changes to the agenda before our meeting.

Happy holidays -

Laurie

Laurie Warner Herson
Principal/Owner

Phenix
Environmental Planning

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State of California Small Business (#1796182)
Supplier Clearinghouse Women Business Enterprise (#16000323)

http://phenixenv.com/

From: Hunt, Shane D [shunt@usbr.gov]
Sent: 12/15/2022 3:19:16 PM
To: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
CC: Jacobson, Allison M [ajacobson@usbr.gov]; Brick, David A [dbrick@usbr.gov]
Subject: RE: [EXTERNAL] FW: Sites GHG Comments and Approach

Hi Laurie,
We looked high and low for an existing example Reclamation EIS analysis or any other EIS analysis on this issue and didn't find an EIS example. I would note that EPA made a similar comment on Valley Water's Draft EIR for their Pacheco Reservoir Expansion Project that they released for comment in November 2021. We reached out to our Denver office and to EPA to try to come up with ideas on this.

Our EPA reviewer in San Francisco reached out to colleague with the EPA Office of Research and Development seeking guidance/examples. She then shared with us that "Although our NEPA comment referenced the IPCC report, it turns out EPA published an application of the report for the US called Inventory of US GHG Emissions and Sinks: 1990-2020. He directed me to Chapter 6 which covers land use, land use change and forestry. P. 6-115 begins the section on Flooded Lands (reservoirs), and describes the methodology for calculating GHG emissions from flooded lands. As I understand it, there is an emission factor associated with different US biomes, the section explains how the emissions factors were developed, and how there are ones for methane as well as CO2."

We shared the info from EPA with others in Reclamation including our Regional Climate Change Coordinator. He reviewed the described methodology and provided a summary of the work it would entail:
(1) Current land use types (acres)
(2) Inundation area (acres) for all alternatives
(3) Specific location of inundation area over current land use to determine methane and carbon dioxide emission factors per biome type
He said that it would be a pretty straightforward calculation. Is this something we can incorporate in the final and the response to EPA's comment? Could also include it now and say something about refining it in the future if a diff or better method is identified once access to the land opens up? The RDEIR/SDEIS committed to quantifying the GHG emissions from land conversion in the future, if it is possible, and including it in mitigation (see language below).

RDEIR/SDEIS Chapter 21 page 21-6/21-7: "When the Authority takes ownership of the land in the inundation area, it may be possible to quantify GHG emissions from land conversion (Chapter 3, Environmental Analysis, describes lack of access). It is anticipated that, at that time, the necessary data and studies would be attainable. If quantifiable in the future, the net change in GHG emissions from the land conversion would be included in the evaluation of the Project's emissions and net zero commitment, as outlined in this analysis (Impact GHG-1 and Mitigation Measure GHG-1.1)."

Thanks,
Shane

Shane Hunt (he/him)
Environmental Compliance and Conservation Branch
Bureau of Reclamation, CGB-152
2800 Cottage Way
Sacramento, CA 95825
(916) 978-5051 (office)
(916) 202-7158 (cell)

From: Hunt, Shane D
Sent: Wednesday, October 26, 2022 3:41 PM

To: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Cc: Jacobson, Allison M <ajacobson@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>
Subject: RE: [EXTERNAL] FW: Sites GHG Comments and Approach

Hi Laurie,
I'll have to look into this and get back to you.
Thanks,
Shane

Shane Hunt (he/him)
Environmental Compliance and Conservation Branch
Bureau of Reclamation, CGB-152
2800 Cottage Way
Sacramento, CA 95825
(916) 978-5051 (office)
(916) 202-7158 (cell)

From: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Sent: Wednesday, October 26, 2022 10:16 AM
To: Hunt, Shane D <shunt@usbr.gov>
Cc: Jacobson, Allison M <ajacobson@usbr.gov>
Subject: [EXTERNAL] FW: Sites GHG Comments and Approach

Hi Shane,

Since Melissa is out the rest of the week, I am forwarding the following email I sent to her yesterday regarding the quantification of GHG emissions related to reservoir projects. We received comments (see yellow highlighted text) from EPA and NMFS as well as NGOs regarding the need to quantify GHG emissions that would result from the operation of Sites Reservoir. We are looking for examples of other projects where this has been addressed.

Do you know if there are any recent Reclamation projects that have included this analysis as part of the NEPA document?

Thank you,

Laurie

From: Laurie Warner Herson
Sent: Tuesday, October 25, 2022 9:49 AM
To: Dekar, Melissa D (mdekar@usbr.gov) <mdekar@usbr.gov>; Jacobson, Allison M <ajacobson@usbr.gov>
Subject: Sites GHG Comments and Approach

Good morning,

As you may recall, we received comments on the RDEIR/SDEIR regarding the lack of analysis of the effects of land conversion on GHG emissions. Specifically “the current list of project activities do not appropriately account for the associated GHG emissions that will come from disturbed natural areas impacted by the reservoir’s existence, GHG emissions from changes in the water-level, and other sources of GHGs…”

The RDEIR/SDEIS addressed this issue in the Land Use Change section in Chapter 21, Greenhouse Gas Emissions where it notes that a quantification of these emissions requires “a detailed accounting of local and site-specific variables” and “if quantifiable in the future, the net change in GHG emissions from the land conversion would be included in the evaluation of the Project’s emissions and net zero commitment.”

Do you know of any examples where Reclamation has quantified GHG emissions related to reservoirs, whether in California or nationwide? We are trying to determine the best approach to these comments without setting precedent.

Thank you,

Laurie

Laurie Warner Herson
Principal/Owner
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State of California Small Business (#1796182)
Supplier Clearinghouse Women Business Enterprise (#16000323)

http://phenixenv.com/

From: Alicia Forsythe [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A6CDF06A7E904B65BAA21702A82AD329-AFORSYTHE]
Sent: 12/28/2022 11:06:52 AM
To: Angela Bezzone [bezzone@mbkengineers.com]
Subject: RE: Trinity and DWR/Reclamation Terms

And heres the Trinity term. You can remove the underlining.

Ali

The Sites Project's diversions to storage under this Permit shall not include the diversion or rediversion of Trinity River water (water diverted by the Bureau of Reclamation from the Trinity River watershed into the Sacramento River watershed pursuant to its water rights) unless the Trinity River water is abandoned in the Sacramento River and all other diversion criteria in this Permit are met.

Furthermore, the Sites Project's diversions to storage under this Permit shall not negatively impact Trinity River obligations of the Bureau of Reclamation, including but not limited to those obligations specified in the 1959 Contract between the United States and Humboldt County, the Trinity River Mainstem Fishery Restoration Record of Decision, and the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River, and related obligations in the Bureau of Reclamation's water right permits 11966, 11967, 11968, 11969, 11970, 11971, 11972, and 11973.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Angela Bezzone <bezzone@mbkengineers.com>
Sent: Wednesday, December 28, 2022 8:39 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Subject: Trinity and DWR/Reclamation Terms

Hi Ali –

Can you send me what you have for the final version of each of these terms? I think I have both, but I want to double check.

Thanks!

Angela Bezzone, P.E.

MBK Engineers
455 University Ave Suite 100
Sacramento, CA 95825

(916) 456-4400 – Phone
(775) 450-6408 – Cell
(916) 456-0253 – Fax

From: Angela Bezzone [bezzone@mbkengineers.com]
Sent: 12/29/2022 9:08:21 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Sites - Table with Existing Storage Partners and Storage Amounts
Attachments: Copy of Sites-StorageParticipationCorrelation_WORKING_A3.xlsx

I was leaning towards including the table which starts in column G. This is adjusted for Reclamation at 16% and is consistent with what was included for the indicative rating and has a 60 TAF dead storage. The annualized amounts are consistent with Amendment 3, but the storage allocations are adjusted to accommodate Reclamation. Maybe there is a footnote or explanation used in the indicative rating that we could also use? The Reclamation 7% scenarios include a 120 TAF dead storage, but we could consider an alternative to both existing options if needed. Let me know!

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Thursday, December 29, 2022 9:00 AM
To: Angela Bezzone <bezzone@mbkengineers.com>
Subject: Sites - Table with Existing Storage Partners and Storage Amounts

CAUTION - EXTERNAL SENDER: This email originated from outside of the organization. Only open links from **TRUSTED** sources.

I was thinking of adding something like this into Attachment 3. I think you sent me one of these recently, but I cant seem to find it. Can you resend? I'd like for it to add up to 1.5 MAF, so would include the State and Feds. I guess this would mean Reclamation at 7% and I can footnote that this is currently being adjusted.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Project Authority | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

File Provided Natively

From: Stephen Maurano - NOAA Federal [stephen.maurano@noaa.gov]
Sent: 12/29/2022 11:59:29 AM
To: Hunt, Shane D [shunt@usbr.gov]; Dekar, Melissa D [mdekar@usbr.gov]; ajacobson@usbr.gov
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Millsap, Stephanie D [stephanie_millsap@fws.gov]; brittany_reaves@fws.gov; steven_schoenberg@fws.gov; garwin.yip@noaa.gov; dbrick@usbr.gov; Cathy Marcinkevage [cathy.marcinkevage@noaa.gov]; Barbara Byrne [barbara.byrne@noaa.gov]; Naseem Alston [naseem.alston@noaa.gov]; Spranza, John [john.spranza@hdrinc.com]
Subject: Re: Spranza, John shared the folder "2022-Nov_Admin_Draft_BA" with you.

Good Morning,

Thank you for the opportunity to review the draft Sites Reservoir Biological Assessment. We understand that Reclamation requested a high level review and identification of some of the items needing further discussion, and would like to highlight the topics below. The topics are organized by Project Description, Diversion Criteria, Impacts to the Big Notch Project, and Surface Water Quality. We'd be happy to discuss further with Reclamation and coordinate discussions with the Sites Project Authority as appropriate.

Best,

- Stephen

Project Description

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• **Consultation Approach** NMFS noted the consultation approach proposed in the draft BA by Reclamation and looks forward to discussing the appropriate path forward for this consultation given its connection to other ongoing CVP actions. Additional details regarding the coordinated operations agreement between Sites and the CVP/SWP may also be necessary in order to provide sufficient information to determine the effects of the proposed action.

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• **Lifecycle Model** NMFS is interested to review the results of the Winter-run Chinook salmon Lifecycle Model, discuss their interpretation, and see them integrated into the biological assessment effects analysis.

Diversion Criteria

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• **Refining Pulse Protection and Bypass Flows** NMFS made suggestions to the Sites Project Authority in meetings earlier this year (1/26/22 and 1/31/22) as well as comments under NEPA to help further refine the diversion criteria for project operations. NMFS would welcome a discussion with Reclamation to explain the rationale underlying these suggestions, some of which are summarized below, for Bend Bridge Pulse Protection, Minimum Bypass Flows at Red Bluff Pumping Plant, Hamilton City Pump Station, and Wilkins Slough. NMFS would appreciate hearing from Reclamation about the rationale behind the proposed criteria which may offer limited protections.

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• **Bend Bridge** The requirement that there be a simultaneously detected pulse of fish, mainstem flows, and tributary flows, adds complexity and contingencies to the Bend Bridge Pulse Protection potentially limiting its effectiveness. Moreover, the protection may be belated by several days, since the triggering flows are measured as three-day trailing averages, and the triggering fish passage monitoring will require time to process that data, communicate it to the operators and adjust diversions accordingly. In order to be effective, NMFS has suggested that the protection be scheduled based on forecasted river flows to avoid harm to fish pulses during the ascending limb of the hydrograph. If no fish are detected after a number of days, then the protection can be truncated. NMFS would also suggest that protection should also not contingent on increases in tributary inflows since there's recent experience that indicates fish can be mobilized downstream by mainstem Sacramento operational pulse events that are not precipitation generated (e.g. the October 2019 dry weather pulse releases for rice decomposition from Keswick that caused a contemporaneous increase in winter run chinook passage). Similarly, the complicated requirements for when another pulse event can be triggered (based on flows at Bend Bridge, Cow Creek, Cottonwood Creek, and Battle Creek) should be simplified to a relevant biological metric (e.g. when the pulse of fish passage has subsided). NMFS is not aware of how these flow triggers on the tributaries were derived, and in the absence of that information, they seem unsubstantiated. In summary, and as noted previously in comments on the EIS, a protective Bend Bridge Pulse Protection could be especially important for earlier migrants in the first pulse after a relatively drier period, as well as for later migrants facing small windows when downstream and Delta conditions are suitable. Protecting life history diversity, especially in outmigration timing, is key to salmonid population viability.

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• **Red Bluff and Hamilton City** The Minimum Bypass Flows in the Sacramento River at the RBPP and Hamilton City Pump Station need further refinement. Modeling from reports referenced in the draft BA indicates risk of stranding at low flows in the Sacramento River below Keswick Dam concluding that "...substantial juvenile stranding could be avoided by keeping flows above 3,750 cfs." Considering that average flows in the Sacramento River can be approximately 2,000 cfs higher at Red Bluff Diversion Dam compared to Keswick Dam, the proposed 3,250 cfs bypass target could result in substantial stranding of juvenile chinook salmon. Moreover, in the December through February timeframe, flows may need to be substantially higher to reduce Fall-Run redd dewatering and ensure consistency with CVP LTO Keswick Fall Base Flows. The minimum bypass flows at Hamilton City should also be adjusted correspondingly.

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• **Wilkins Slough** The Minimum Bypass Flows in the Sacramento River at Wilkins Slough drop from 10,700 cfs during much of the year to 5,000 cfs in September. However, there can be substantial juvenile Winter-run Chinook Salmon passage at RBDD during September (e.g. 2009, 2019 and 2020). NMFS would like to discuss the protection of rearing and outmigration during this period.

Impacts to the Big Notch Project

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• **Big Notch** NMFS appreciates the commitment from Reclamation to avoid any adverse impacts from Sites Reservoir to the Big Notch Project with the draft BA stating, "The [Sites] Project will operate to preclude any adverse effects to the Big Notch Project's ability to achieve the same level of performance for salmonids in the Sacramento River as it would absent the Project." However, the NMFS has been informed that the final EIR/SEIR intends to remove the previously proposed Fremont Weir Notch Protections and no protections were listed in the draft BA. Initial modeling based on 2009-2012 hydrology shows Sites negatively impacting Big Notch in all water year types - including a 24% cumulative Big Notch flow reduction in the dry year (2009) of the analysis. NMFS would appreciate further discussions with Reclamation regarding the operational changes needed to mitigate these impacts.

Surface Water Quality

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• **Mercury** Mercury impacts on aquatic life should be further analyzed in the effects analysis, especially for sturgeon which have been reported to have higher levels of mercury in tissues, and specifically for the Green Sturgeon sDPS in California's Central Valley for which mercury was part of the cause of species listing.

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• **Temperature** The Water Temperature Index Value Analysis obscures temperature impacts of the project. In particular, the biologically meaningful criteria are too narrow in their definition: requiring both a 5%

difference in days/month and 0.5 F change. For example, temperatures could exceed the targets by 10°F for a single day or increase temperatures by 0.25°F for the entire spawning season. Raising temperatures could result in lethality for salmonids, if that temperature crosses the physiological threshold for the species.

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• **Colusa Basin Drain (CBD) and Yolo Bypass** The proposed monitoring of water quality impacts to Yolo Bypass is sparse and there's a substantial amount of river miles between Wallace Wier to Lisbon Wier and downstream to the Cache Slough complex - with variable intervening habitat, land use, and hydrology. The mitigation measure (to reduce flows when the temperatures are too high and dissolved oxygen is too low) seems counterintuitive since it will potentially increase residence time and reduce reaeration. The monitoring strategy proposed may also not be effective if, for example, the causes of hypoxia are nitrogen and phosphorus loadings from the CBD into the bypass during the winter, but those don't drive eutrophication until the summer. Similarly, loadings of mercury may methylate under certain conditions, and, along with pesticides and herbicides, accumulate in fish tissues or sediments - so that they're not adequately detected in the proposed water column monitoring. For mitigation measures FISH-8.1 and WQ-2.2 a more effective approach may be to develop a water quality model for the relevant parameters (metals, nutrients, Hg, Se, temperature, DO, etc.) for the receiving waters of interest (CBD and Yolo Bypass). A hydrodynamic water quality model would allow forecasting of water quality impacts of Sites Reservoir to determine the fate and transport of pollutants and prioritize locations to mitigate pollutant loadings.

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• **Reservoir Water Quality** Likewise, applying a water quality model for the proposed reservoir to anticipate trophic status and risk of mercury methylation should be considered. The use of CALSIM monthly data (for metals, pesticides, salinity, HABs) lacks the temporal resolution to analyze acute water quality exceedances. The CE-QUAL-W2 model being used for temperature analysis in Sites could be further developed to analyze the other potential water quality impacts in reservoir: namely metals, including mercury, salinity, and especially eutrophication and HABs.

On Wed, Nov 2, 2022 at 10:42 AM Spranza, John <John.Spranza@hdrinc.com> wrote:

Spranza, John shared a folder with you

Hello,
This shared file contains the Sites Project's administrative draft BA. The Authority would appreciate your technical assistance with the further preparation of the document by providing comments and feedback on this draft and identifying any concerns or areas that need additional revision.

Your help is much appreciated, please let me know if you have any questions or if you are having trouble accessing this folder.

Regards,
John

2022-Nov_Admin_Draft_BA

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