13 Recreation

This chapter describes existing recreation uses in the study area for the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project), the various plans and policies related to recreation use in the study area, and the regulatory agencies that oversee recreation planning and use. Although the Project alternatives do not include any specific recreation development, they would affect recreation, and these impacts are discussed in this chapter. For recreation resources, the study area is the Yolo Bypass.

13.1 Environmental Setting/Affected Environment

This section describes the recreation resources in the study area and the surrounding region.

13.1.1 Regional Recreation

The regional setting for the Project includes the Sacramento-San Joaquin Delta (Delta) region and the Sacramento, Feather, and American rivers, as shown on Figure 13-1.

13.1.1.1 Delta Region

The Project area is in the greater Delta region, which is an approximately 1,150-square-mile area consisting of a network of channels and islands at the Sacramento River and San Joaquin River confluence. This vast network of rivers, channels, sloughs, and islands provides a diverse recreation resource in California. The Project area is located primarily in the northern portion of the Delta. In general, the Delta supports a variety of recreational uses, including boating and fishing—the most popular activities—as well as wildlife viewing, hunting, sightseeing, walking, picnicking, and camping (California Department of Water Resources [DWR] and Bureau of Reclamation 2017).

The Delta region has a variety of publicly and privately owned facilities that support the above-mentioned recreational uses. The public facilities include marinas, county parks with boat-launching facilities, fishing access, campgrounds, picnic sites, two State of California (State) park units, federal and State wildlife areas, and nature preserves (DWR and Reclamation 2017). Private facilities include yacht clubs, marinas, nature preserves, and many hunting clubs (DWR and Reclamation 2017).

13.1.1.2 Sacramento River

The Sacramento River corridor is a northern California recreation resource that supports a wide variety of recreational uses, including hiking and walking, fishing, camping, hunting, horseback riding, picnicking, motorized and non-motorized boating, and wildlife viewing. These uses are supported by numerous and varied federal, State, local, and commercial facilities and lands that provide access to the river. Facilities along the river include boat launches, trails and trail access points, fishing facilities, parks, wildlife areas, undeveloped open space areas, and marinas. Near

the Project area, developed recreational facilities are limited although access to the river is available at several federal, State, and local facilities (DWR 2013). The portions of the Sacramento River adjacent to the Yolo Bypass support extensive water-based recreation, with boating and fishing as the primary recreational uses. The primary target species when fishing in the Sacramento River nearest the Project area are striped bass and Chinook salmon (Tsournos et al. 2016). Fishing use generally increases with the opening of the sturgeon fishing season (February) and continues until the Chinook salmon run decreases (typically after October). Fishing typically occurs via boat in this area, but shoreline fishing does occur sporadically throughout the area. Of note, the Sutter Bypass Wildlife Area, managed by the California Department of Fish and Wildlife (CDFW), is located immediately upstream of the Project area on the Sacramento River and portions of the lower Feather River. The wildlife area consists of the Tisdale Bypass and two long, narrow parcels on either side of the Sutter Bypass, for a total of approximately 3,200 acres (CDFW 2017). The wildlife area provides opportunities for fishing, wildlife viewing, and hunting. CDFW manages it as a Type C wildlife area, which CDFW defines as areas that are generally open daily for hunting for all legal species in season and do not require the purchase of a pass for entry (CDFW 2016a). Hunting opportunities seasonally include deer, waterfowl, mourning dove, valley quail, pheasant, rabbits, and turkeys (CDFW 2017).

13.1.2 Project Area Recreation

The Project area is the Yolo Bypass in Yolo, Sutter, and Solano counties in the Sacramento Valley region, as shown on Figure 13-1. The Yolo Bypass spans about 40 miles from its northern to its southern extent and is about 7 miles from west to east at its widest. This area is divided by two major interstate highways (Interstates 5 and 80) and bordered by the larger municipalities of West Sacramento (east) and Davis (west) and smaller towns on its northern and southern extents, including Knights Landing (north), Woodland (west), and Rio Vista (south).

Yolo Bypass lands consist of public and privately owned lands used for agricultural, public recreation, and other purposes. In the late-fall and winter, the Yolo Bypass is used as a floodplain when the bypass is periodically inundated to provide flood control for the Sacramento River. Public lands in the Yolo Bypass are limited and predominantly designated and managed by CDFW as wildlife areas or ecological reserves. These public lands include the Fremont Weir Wildlife Area (FWWA), Sacramento Bypass Wildlife Area (SBWA), Yolo Bypass Wildlife Area (YBWA), and Liberty Island Ecological Reserve (LIER).

Public use of these CDFW-managed areas typically occurs in the spring through early winter or when the Yolo Bypass is not used as a floodplain for the Sacramento River. When the Yolo Bypass is inundated, public access and recreational uses are limited. Each of these areas is managed by CDFW for recreational and agricultural uses, wildlife habitat, and wetlands and described below from north to south. In addition, private recreation areas and sites are dispersed throughout the Project area.

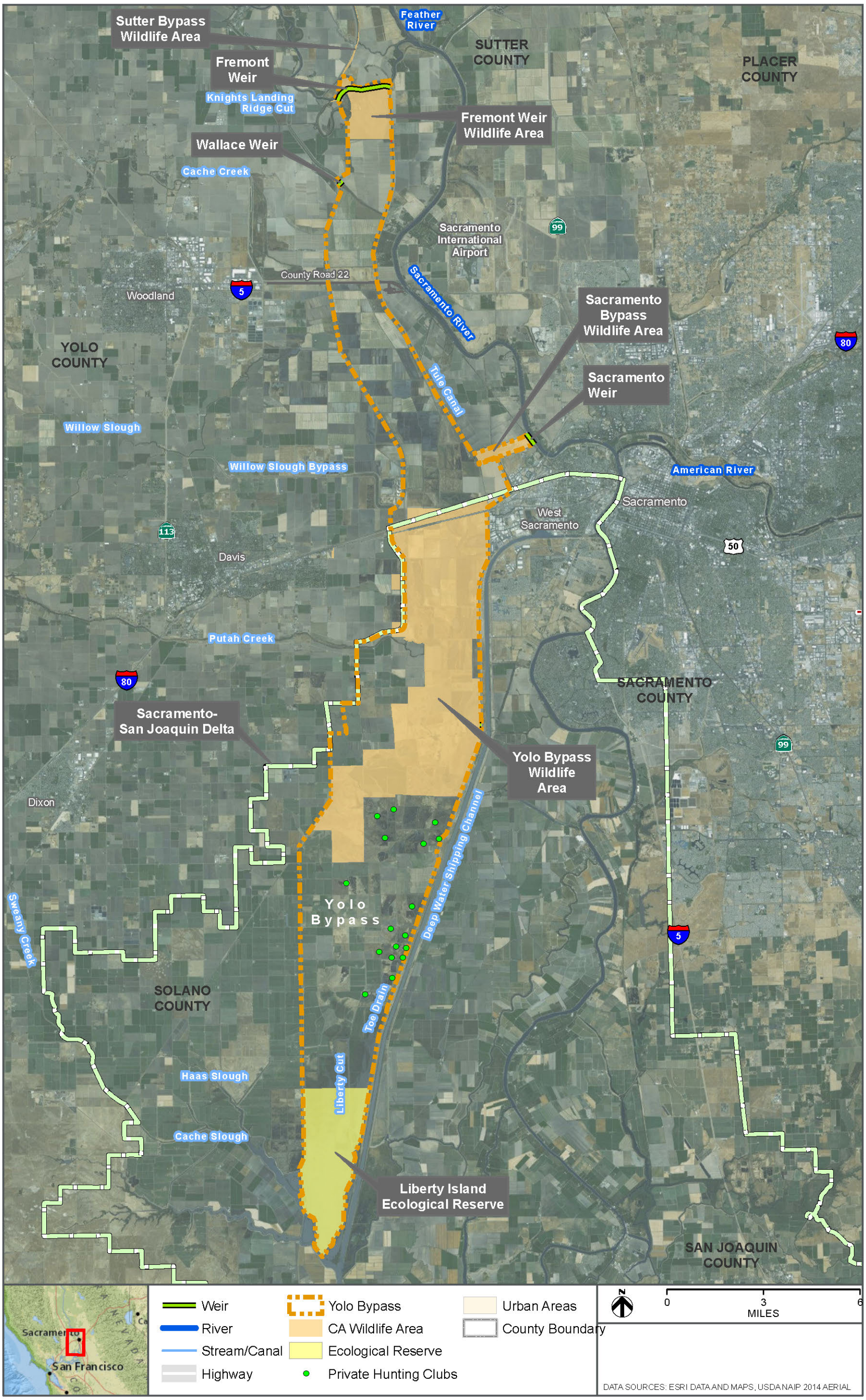

Figure 13-1. Recreation Resources in the Project Area and Region

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13.1.2.1 Fremont Weir Wildlife Area

The FWWA is a 1,461-acre wildlife area situated along the northern boundary of the Yolo Bypass in Sutter and Yolo counties, northeast of the City of Woodland on the south/west side of the Sacramento River. Fremont Weir is situated along the northern edge of the FWWA. The FWWA lands consist of mixed non-native grassland, brush, valley oaks, willows, cottonwoods, and wetlands (CDFW 2016b). The FWWA is managed by CDFW and was designated as a State Wildlife Area in 1981.

The FWWA does not have any facilities or user fees but provides opportunities primarily for seasonal hunting and fishing, bird watching, and wildlife viewing. Hunting is allowed during spring turkey season and daily from July 1 through January 31. CDFW manages the FWWA as a Type C wildlife area, with hunting opportunities for pheasant, waterfowl, quail, turkey, mourning dove, cottontail, jackrabbit, and deer (CDFW 2016b). CDFW's Waterfowl, Upland Game Hunting, and Public Use of Department Lands Regulations (CDFW 2016a) regulate public use for recreational purposes.

The only public entrance to the FWWA is at the end of County Road (CR) 16, which ends at the Yolo Bypass east levee. Recreation use of the FWWA is estimated to be 1,500 recreation-days annually, with two-thirds of the use attributed to hunting (DWR and Reclamation 2017) during the respective open seasons for various game species. Since the FWWA is a floodplain, it is inundated when the Sacramento River reaches water levels sufficient to flow over Fremont Weir into the Yolo Bypass. CDFW strongly cautions the public against use of the FWWA low-lying lands when inundation occurs (CDFW 2016b).

The hunting seasons for respective game species in the FWWA conform to those of other local and regional public lands. For safety reasons, hunters are limited to only archery and shotguns in the FWWA; rifles and handguns are not allowed. In general, the most popular hunting periods are linked to popular target species. Generally, the most popular periods include the archery deer season opener in mid-August, general deer season opener in late-September [Zone D-4]), dove opener on September 1 and re-opener in mid-November, quail in mid-October, pheasant in mid-November, wild turkey in late March through April and in mid-November through mid-December, and waterfowl season beginning in late October and running through January (DWR and Reclamation 2017).

13.1.2.2 Sacramento Bypass Wildlife Area

The SBWA is located immediately adjacent to and east of Tule Canal in the central portion of the Yolo Bypass in Yolo County, west of the City of Sacramento and the Sacramento River (north of Interstate [I] 80), as shown on Figure 13-1. Similar to the FWWA, the SBWA is managed by CDFW and was designated as a Type C wildlife area in 1988. CDFW's Waterfowl, Upland Game Hunting, and Public Use of Department Lands Regulations regulate the wildlife area.

This 360-acre State wildlife area is an important cover and feeding area for wildlife during late fall, winter, and early spring. The SBWA does not have any recreational facilities but provides recreational opportunities for fishing (in Tule Canal and toe canals), wildlife viewing, bird watching, and seasonal hunting (September 1 to January 31) (CDFW 2016c). Game species in

the wildlife area include waterfowl, pheasant, turkey, quail, deer, and dove. Tule Canal offers anglers opportunities to catch white catfish and black crappie while the nearby borrow pits support largemouth bass, bluegill, and white catfish (CDFW 2016c).

Public access to the SBWA occurs at several points from CRs 126 or 127; however, the latter is gated, and vehicles are not allowed on that levee road. CR 126 is paved leading up to the gate, which restricts further vehicle access onto the levee. This gate can also be reached at the south end of CR 124.

13.1.2.3 Yolo Bypass Wildlife Area

The YBWA is in the central portion of the Yolo Bypass in Yolo County between the cities of Davis and West Sacramento (south of I-80). The YBWA is a public and private restoration project owned and managed by CDFW. CDFW designated the area as a wildlife area in 1994. The Yolo Basin Foundation, founded in 1990, is a community-based nonprofit organization dedicated to the appreciation and stewardship of wetlands and wildlife through education and innovative partnerships, with a principal goal to facilitate environmental education in the YBWA (Yolo Basin Foundation 2016).

The YBWA consists of 17 separate management units on about 16,770 acres of wildlife habitat and agricultural land. The YBWA is open year-round from sunrise to sunset except for Christmas Day. Public access to the YBWA occurs at the primary entrance in the northwest corner of the YBWA via CR 32B (I-80, Exit 78, East Chiles Road).

Recreational uses for the YBWA include hunting, fishing, walking, hiking, wildlife viewing, nature exploration and photography, and environmental education activities for students and the general public (CDFW 2016d). Hunting historically has been a popular seasonal use of the YBWA, with about 5,000 acres open for hunting. Principal game species include several species of ducks and geese, ring-necked pheasants, and mourning doves (CDFW 2008). The hunting season runs from the opening of dove season (September) through January, but the most popular hunting season is for waterfowl from late October through January (about 100 days). However, YBWA is only open for waterfowl hunting three days per week during the 100-day open season, which equates to approximately 45 to 47 waterfowl hunting days at YBWA.

CDFW manages the YBWA as a Type A wildlife area, including hunting opportunities for waterfowl and upland game species (CDFW 2016d). CDFW defines a Type A wildlife area as an area with restricted hunter access during waterfowl season and requires a hunting pass to be purchased in advance and exchanged for an entry permit at the wildlife area. Recreational and hunting use in the YBWA can vary from year to year. For instance, use peaked in the 2013–2014 season at 7,200 hunting days compared to 6,100 days in the 2008–2009 season and 3,300 days in the 2003–2004 season (DWR and Reclamation 2017).

In addition, CDFW has partnered with the Yolo Basin Foundation to provide educational programs and outreach. Facilities supporting education uses include trails, gravel roads, and parking areas. The Yolo Basin Foundation estimates that more than 4,000 students, teachers, and parents visit the area annually to participate in the Discover the Flyway program implemented in partnership with CDFW that offers field trips every Tuesday through Friday from September through May (Yolo Basin Foundation 2016). Additional environmental education and interpretation programs offered in the YBWA include Marsh Madness Youth Days, Nature

Bowl, public tours, docent program, Flyway Nights lecture series, California Duck Days, Project Wet, and other workshops (CDFW 2008).

The YBWA is open to the public except during certain Yolo Bypass flooding occurrences. Currently, the YBWA public-access policy is to close the entire area soon after water overtops Fremont Weir. Much of the YBWA is closed to all non-hunting purposes from two weeks before waterfowl season to one week after waterfowl season though areas designated for wildlife viewing purposes are open on most days throughout the year (CDFW 2008). Significant flooding during the 100-day hunting season (mid-October to mid-January) requires CDFW to discontinue access to these areas, resulting in lost hunting time and other public uses (CDFW 2008).

13.1.2.4 Liberty Island Ecological Reserve

The LIER is situated along the southern boundary of the Yolo Bypass in Solano County, southeast of the City of Dixon. CDFW took ownership of the southern portion of Liberty Island in 2011 and designated it as an ecological reserve in 2014 to protect the wetlands and special-status fish species (CDFW 2016e). The LIER consists of 5,303 acres of mostly inundated tidal marsh habitat and open water in the southern portion of Liberty Island between Prospect Slough and Shag Slough (CDFW 2015).

Public access to the LIER is available either by boat or by vehicle. Public boat access occurs via the surrounding sloughs, including Miner, Cache, and Lindsey sloughs. Vehicle access to the northern portion of the ecological reserve occurs from the Town of Dixon via Liberty Island Road. Vehicle access to the southern portion of the LIER occurs from the Town of Rio Vista to the south via Liberty Island Road as well.

CDFW's Waterfowl, Upland Game Hunting, and Public Use of Department Lands Regulations regulate public use of the LIER. Recreational uses include wildlife viewing, shoreline fishing, boat fishing, and waterfowl hunting. Hunting for waterfowl in the ecological reserve is allowed seven days per week during the regular waterfowl season, and specific regulations allow the use of temporary floating blinds that must be removed daily (CDFW 2016e).

13.1.2.5 Private Recreation Areas and Sites

In addition to the public recreation areas, the Yolo Bypass also provides private recreational opportunities. Most of these opportunities are in Yolo County where 17 private hunting clubs, three marinas, and one yacht club are located (DWR 2013). The private hunting clubs are south of the YBWA and north of the LIER, as shown on Figure 13-1. Sutter County has a few private recreational opportunities (two marinas and boat clubs) adjacent to the Project area (DWR 2013). Solano County also has limited private recreational facilities, including two marinas, one yacht club, and one hunting club (DWR 2013).

Most private recreational use and opportunities occurs on the expansive private lands throughout the Yolo Bypass area where private landowners and their personnel and guests have access to private recreational opportunities, many of which occur without developed recreational facilities.

13.2 Regulatory Setting

This section describes the laws, policies, and management plans that guide the recreation resources in the study area.

13.2.1 Federal Plans, Policies, and Regulations

Federal laws and regulations pertaining to recreation resources are discussed below.

13.2.1.1 North American Waterfowl Management Plan

The *North American Waterfowl Management Plan* (NAWMP) was originally adopted in 1986 and subsequently amended in 2012 and 2014. The international plan was established by Canada and the United States in 1986 and later expanded to include Mexico in 1994. In the United States, the NAWMP is administered by the U.S. Fish and Wildlife Service (USFWS). The plan provides a broad framework for waterfowl conservation and management in North America. The plan identified population objectives for key species and established habitat goals to sustain these populations. The plan sets forth three overarching goals for waterfowl conservation (NAWMP Committee 2012):

- **Goal 1:** Abundant and resilient waterfowl populations to support hunting and other uses without imperiling habitat
- **Goal 2:** Wetlands and related habitats sufficient to sustain waterfowl populations at desired levels while providing places to recreate and ecological services that benefit society
- **Goal 3:** Growing numbers of waterfowl hunters, other conservationists, and citizens who enjoy and actively support waterfowl and wetlands conservation

13.2.1.2 U.S. Fish and Wildlife Service's Recreational Fisheries Policy

This policy defines the USFWS's stewardship role in the management of the recreational fishery resources. The policy was designed to unify the agencies, organizations, and individuals throughout the United States to enhance the vitality of the recreational fisheries at the local, state, and national levels. Specifically, the policy is to (USFWS 1989):

1. Protect, restore, and enhance fish populations and their habitats
2. Promote recreational fishing on USFWS and other lands to provide the public with a high quality recreational experience
3. Ensure that recommendations concerning recreational fisheries potentials and opportunities are included as part of appropriate field studies and management assistance efforts performed by USFWS on non-USFWS waters
4. Serve as an active partner with other Federal governmental agencies, states, tribes, conservation organizations, and the public in developing recreational fisheries programs
5. Promote the conservation and enhancement of the nation's recreational fisheries through USFWS's grant and aid programs

6. Improve and expand quantifiable economic valuations of the nation's recreational fisheries to demonstrate the importance of this resource to the health and welfare of society and the nation's economy

13.2.2 State Plans, Policies, and Regulations

State plans, laws, and regulations pertaining to recreation resources are discussed below.

13.2.2.1 California Department of Parks and Recreation – Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh

The California Department of Parks and Recreation (DPR) issued the *Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh* in May 2011 to comply with the Delta Reform Act that required the DPR to develop recommendations to expand State recreation areas in the region. The document represents DPR's vision for the region and recommends the following (DPR 2011):

- A network of recreation areas, including parks, resorts, boating facilities, historic communities, agritourism attractions, and other visitor-oriented businesses. These areas would be connected by scenic driving routes, boating trails, or bicycling and hiking trails.
- Working cooperatively with other State agencies, including DWR.
- Providing residents and visitors with authentic outdoor experiences rooted in the unique and enduring character of the Delta and Suisun Marsh.

Further, the proposal also identifies several specific areas for DWR to consider for recreation that are relevant to the project site. These include:

- Incorporate shoreline access, trails, boat ramps, hunting opportunities, and interpretive facilities, as appropriate, in restoration projects at Dutch Slough, McCormack-Williamson Tract, Suisun Marsh, and other sites (DPR 2011).
- Elkhorn Basin: Create a base camp by partnering with landowners on the Sacramento River to secure about 1,500 acres and restore habitat at the northern end of Yolo Bypass. Provide campsites, picnic sites, trails, fishing, and interpretive services (DPR 2011).
  (The Elkhorn Basin is currently separated from the Project area by the Yolo Bypass east levee.)

13.2.2.2 California Department of Fish and Wildlife Land Management

CDFW owns and manages four areas in the study area, primarily for habitat and species protection and enhancement. These include the FWWA, SBWA, YBWA, and LIER, described above. Visitor use of all CDFW lands is subject to the general regulations in Title 14 of the California Code of Regulations (CCR) Subsections 550 and 550.5. Visitor use of wildlife areas is also subject to CCR Title 14 Subsections 551(a) through 551(h) and any other sections of Title 14 that apply. Visitor use of ecological reserves is also subject to CCR Title 14 Subsections 630(a) and (b) and any other sections of Title 14 that apply. These regulations also include several property-specific regulations of public use of CDFW lands, which are summarized for each area in Table 13-1.

Table 13-1. Regulations for Public Use at CDFW Wildlife Areas and Ecological Reserves in the Yolo Bypass

Area	Subsection of CCR Title 14	Regulation
Entire Yolo Bypass	5.80 (i) – Special Yolo Bypass Flood Control System Sturgeon Closure	It is unlawful to take any sturgeon in the Yolo Bypass, Toe Drain Canal, and Tule Canal upstream of Lisbon Weir at any time.
FWWA	551(o)(15) – Designated Closures and Restrictions on Wildlife Areas	(15) Closed to hunting February 1 through June 30 except for the spring turkey season when only turkeys may be hunted.
	551(r) (18) – Firearm Restrictions on Type C Wildlife Areas	(18) Rifles and pistols are prohibited.
	2.35 – Taking Fish Near Dams, Fishways, Screens, and Egg-Taking Stations	No fish may be taken within 250 feet of: (b) any dam or any weir or rack that has a fishway or an egg-taking station.
SBWA	551(o)(48) – Designated Closures and Restrictions on Wildlife Areas	(48) Closed to hunting February 1 through August 31.
	551(r)(44) – Firearm Restrictions on Type C Wildlife Areas	(44) Rifles, pistols, and archery equipment are prohibited. Buckshot and slugs are prohibited.
	551(t)(22) – Species Restrictions for Hunting on Type C Wildlife Areas	(22) All legal species except big game.
YBWA	551(i)(14) – Wildlife Areas Authorized for Dog Training and/or Dog Trials	(14) Dog training: Allowed with written authorization from the area manager. Dog trials: Not authorized.
	551(j)(9) – Bicycles	(9) Allowed only in designated areas.
	551(l)(29) – Wildlife Areas with Boat and/or Horse and Pack Stock Restrictions	(29) No boats or flotation devices allowed. Horses and pack stock: Prohibited.
	551(o)(62) – Designated Closures and Restrictions on Wildlife Areas	(62) Closed to all non-hunting uses from two weeks prior to opening of waterfowl season through one week after the end of waterfowl season except those areas designated for wildlife-viewing purposes. Pheasant hunting is prohibited in assigned blind areas.
	551(s)(29) – Pheasant Hunting	(29) Pheasant hunting is open daily for the first nine days of the pheasant season and on waterfowl hunt days for the remainder of the pheasant season.
	551(x)(27) – Number of Hunters Per Reservation	(27) Blinds: Up to four hunters. Free roam: Two adults; each adult hunter may bring up to two junior hunters or two non-shooters or one of each. Reservation expires: One and one-half hours before shoot time.
LIER	630(d)(23) – Ecological Reserves with Hunting as a Designated Public Use	(23) Allowed only at such times and in the specific areas designated by the department.
	630(e)(19) – Fishing Restrictions and Additional Regulations on Ecological Reserves pursuant to subsection 550(h) of these regulations	(19) Non-commercial fishing at LIER: Allowed from boats and from shore.
	630(f)(9) – Swimming and Boating	(9) Swimming: Prohibited. Boating: Allowed.

Key: FWWA = Fremont Weir Wildlife Area; LIER = Liberty Island Ecological Reserve; SBWA = Sacramento Bypass Wildlife Area; YBWA = Yolo Bypass Wildlife Area

13.2.2.3 California State Lands Commission Regulations

The California State Lands Commission has jurisdiction over lands that underlie navigable and tidal waterways (sovereign lands). Such lands occur under the Sacramento River adjacent to the Project area. The California State Lands Commission has entered into a memorandum of understanding with DWR to allow DWR access to sovereign lands required for the development, operation, and maintenance of the State Water Project and its related activities and projects.

13.2.2.4 2015 Statewide Comprehensive Outdoor Recreation Plan

The *Statewide Comprehensive Outdoor Recreation Plan* (SCORP) was prepared by DPR and functions as a statewide master plan for State and local parks and outdoor recreational open-space areas. The SCORP also provides policy guidance to outdoor recreation providers, including Federal, State, local, and special district agencies throughout California. The SCORP is the result of broad public input and an assessment of existing statewide park and recreation lands. The critical element of the SCORP that relates to recreation needs and goals is the *Survey on Public Opinions and Attitudes on Outdoor Recreation in California 2012* (SPOA). Specifically, the SPOA provides focused recreational user feedback that can be applied to the Project vicinity.

The 2012 SPOA identifies the top 15 recreational activities in California with the highest latent demand. The following are activities that additional Californians would participate in, from a statewide perspective, if more facilities and opportunities were provided (DPR 2014, 28–29):

1. Picnicking in picnic areas
2. Walking for fitness or pleasure on paved surfaces
3. Camping in developed sites with facilities such as tables and toilets
4. Beach activities
5. Swimming in a pool
6. Day-hiking on unpaved trails
7. Attending outdoor cultural events
8. Visiting outdoor nature museums, zoos, gardens, or arboretums
9. Shopping at a farmers' market
10. Visiting historic or cultural sites
11. Wildlife viewing, bird watching, and viewing natural scenery
12. Driving on paved surfaces for pleasure, sightseeing, and driving through natural scenery
13. Swimming in freshwater lakes, rivers, and/or streams
14. Jogging and running for exercise (on trails, streets, sidewalks, or paths)
15. Bicycling on paved surfaces

Other relevant findings from the 2012 SPOA include (DPR 2014):

- More than two-thirds of Californians reported spending the same (33.2 percent) or more time (35.2 percent) in outdoor recreation activities compared to five years ago.
- Most respondents (91.6 percent) had visited a park within the past 12 months. The majority (71.5 percent) had visited a park within the past month.
- Within the past 12 months, a majority of respondents visited highly developed parks and recreation areas; developed nature-oriented parks and recreation areas; historic or cultural buildings, sites, or areas; and natural and undeveloped areas.
- About three-quarters of Californians traveled to parks with family (52.5 percent) and friends (23.5 percent), whereas almost one-third went to parks with both family and friends.
- The respondents would like to participate more often in picnicking (55.1 percent), walking (37.4 percent), camping (35.1 percent), and beach activities (34.6 percent).
- Over one-third (34.7 percent) of respondents reported using an unpaved trail for hiking, biking, or horseback riding at least once or twice a month or more during the last 12 months. At the same time, 31 percent of respondents reported never using an unpaved trail.
- The most important facilities were wilderness-type areas with no vehicles or development; play areas for children; areas for environmental and outdoor education; large group picnic sites; recreation facilities at lakes, rivers, and reservoirs; and single-use trails.

13.2.3 Regional and Local Plans, Policies, and Regulations

Regional and local plans and policies pertaining to recreation resources are discussed below.

13.2.3.1 Yolo County General Plan

Yolo County's *2030 Countywide General Plan* (County of Yolo 2009) identifies policies to maintain and expand public access and recreational activities throughout the county.

Several policies and implementation actions specifically address recreation. These include policies that generally guide planners to coordinate opportunities to expand recreation lands, access, and facilities.

- **Policy CO-1.1:** Expand and enhance an integrated network of open space to support recreation, natural resources, historic and tribal resources, habitat, water management, aesthetics, and other beneficial uses.
- **Policy CO-1.2:** Develop a connected system of recreational trails to link communities and parks throughout the county.
- **Policy CO-1.3:** Create a network of regional parks and open-space corridors that highlight unique resources and recreational opportunities for a variety of users.
- **Policy CO-1.6:** Develop "gateways" or trailheads that provide access for the public to county, State, and Federal lands. Where located on private land, gateways shall be developed, working with willing landowners.
- **Policy CO-1.8:** Encourage responsible stewardship of private lands. Promote increased opportunities for public access to waterways and other natural areas.

Several policies also address Yolo Bypass specifically. These include:

- **Policy CO-1.23:** Increase public access and recreational uses along waterways wherever feasible, particularly Cache Creek, Lower Putah Creek, Yolo Bypass, and Sacramento River.
- **Policy CO-1.28:** Balance the needs of agriculture with recreation, flood management, and habitat within Yolo Bypass.

Two implementation actions are related to the Project area setting. These are:

- **Action CO-A6:** Connect the future Bay Delta Trail system, the future trail system in the lower Yolo Bypass, and the future Cache Creek Parkway system and link those trails to the American River Bikeway system in Sacramento County.
- **Action CO-A11:** Provide recreational uses that are river- or creek-dependent in locations directly on Cache Creek, Putah Creek, and the Sacramento River. Examples include fishing, canoeing, boating, and nature observation. Except for boat launches and docks, more active uses, such as parking, restrooms, and picnic areas, shall be located in areas away from the river and sensitive riparian habitat.

13.2.3.2 2007 Integrated Regional Water Management Plan

Yolo County also proposed multiple projects with recreation features in its *2007 Integrated Regional Water Management Plan* (Water Resources Association of Yolo County 2007). Proposed recreation improvements include the Knights Landing Boat Launch (just north of the Project area) and Elkhorn Regional Park. The latter proposes to renovate the southern portion of Elkhorn Regional Park located eight miles north of West Sacramento. Improvements would include an accessible educational trail, river overlooks, wildlife habitat, interpretive kiosks, and an easement to connect the park to the state's SBWA.

13.2.3.3 Sutter County General Plan

The *Sutter County General Plan* identifies a vision through 2030 with a desired framework for growth and conservation in unincorporated Sutter County. The purpose of the plan is to ensure a long-term, sustainable county by balancing agricultural traditions, natural resource preservation, and economic growth opportunities. Specific to recreation, the plan has two goals in Chapter 8, Public Services: 1) to ensure that adequate park, recreation, and open-space lands and programs are provided to meet the diverse needs of Sutter County's residents and 2) to support creation of an interconnected multi-use trail system that enhances Sutter County's recreational opportunities (Sutter County 2011).

13.2.3.4 Solano County General Plan

Only a small portion of the Yolo Bypass at the extreme southern end is in Solano County. These lands are mostly privately owned or managed by CDFW in the LIER. Few public lands are in the Yolo Bypass; therefore, much of the *Solano County General Plan* is not directly relevant to the Yolo Bypass.

The Park and Recreation Element of the *Solano County General Plan* provides the overall planning function specific to recreation. The Park and Recreation Element has the stated purpose

"to provide a long-range guide for the development of regional recreation facilities and the preservation of natural and historical resources in Solano County" (Solano County 2008). This element also has two stated goals to guide regional recreation planning: 1) to preserve and manage a diverse system of regional parks and natural resources for the enjoyment of present and future county residents and park visitors and 2) to promote, develop, and manage diversified recreational facilities to meet the regional recreation needs of the county (Solano County 2008).

13.2.3.5 Delta Protection Commission Land Use and Resource Management Plan for the Primary Zone of the Delta

The Delta Protection Commission (DPC) was created by the State legislature in 1992 with the goal of developing regional policies for the Delta to protect and enhance the existing land uses (agriculture, wildlife habitat, and recreation) in the primary zone. The DPC adopted the *Land Use and Resource Management Plan for the Primary Zone of the Delta* initially in 1995 and amended it most recently in 2010. A large portion of the YBWA is within the Primary Zone of the Delta. The DPC's *Land Use and Resource Management Plan for the Primary Zone of the Delta* states the following four goals related to recreation and access (DPC 2010):

- To promote continued recreational use of the land and waters of the Delta
- To ensure needed facilities that support such uses are constructed, maintained, and supervised
- To protect landowners from unauthorized recreational uses on private lands
- To maximize public funds for recreation by promoting public-private partnerships and multiple use of Delta lands

In addition, the plan includes several recreation and access-related goals and policies applicable to YBWA (DPC 2010):

- To encourage new regional recreational opportunities, such as Delta-wide trails that take into consideration environmental, agricultural, infrastructure, and law enforcement needs and private property boundaries, and to promote opportunities for water, hiking, and biking trails
- To support multiple uses of Delta agricultural lands such as seasonal use for hunting and provision of wildlife habitat

13.2.3.6 Delta Plan

The Delta Plan is California's plan for the Delta, developed in consultation with, and to be implemented by California agencies, including the State Water Resources Control Board, the DWR, CDFW, the DPC, and many more State and local agencies. The Delta Plan contains a set of regulatory policies that will be enforced by the Delta Stewardship Council's (DSC) appellate authority and oversight. The Delta Plan also contains non-regulatory recommendations, which call out actions critical to achieving the Delta Plan's coequal goals. One of these recommendations is relevant to recreation as follows (DSC 2013):

- **DP R11: Provide New and Protect Existing Recreation Opportunities**. Water management and ecosystem restoration agencies should provide recreation opportunities, including visitor-serving business opportunities, at new facilities and habitat areas

whenever feasible; and existing recreation facilities should be protected, using California State Parks' Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh and DPC's Economic Sustainability Plan for the Sacramento-San Joaquin Delta as guides.

13.2.3.7 Yolo Bypass Wildlife Area Land Management Plan

The *Yolo Bypass Wildlife Area Land Management Plan (LMP)* was prepared through a partnership between CDFW and the Yolo Basin Foundation with extensive public involvement. The stated purpose of the plan is to (CDFW 2008):

- Guide management of habitats, species, appropriate public uses, and programs to achieve CDFW's mission
- Direct an ecosystem approach to managing YBWA in coordination with the objectives of the CALFED Bay-Delta Program's Ecosystem Restoration Program
- Identify and guide appropriate, compatible public-use opportunities within YBWA
- Direct the management of YBWA in a manner that promotes cooperative relationships with adjoining private-property owners
- Establish a descriptive inventory of the sites and the wildlife and plant resources that occur in YBWA
- Provide an overview of YBWA's operation, maintenance, and personnel requirements to implement management goals and serve as a planning aid for preparation of the annual budget for CDFW's Bay-Delta Region
- Present the environmental documentation necessary for compliance with State and Federal statutes and regulations, provide a description of potential and actual environmental impacts that may occur during plan management, and identify mitigation measures to avoid or lessen these impacts

13.3 Environmental Consequences

This section describes the environmental consequences of the Project alternatives and the No Action Alternative on recreation resources. This section presents the assessment methods used to analyze the effects on recreation, the thresholds of significance that determine the significance of effects, and the environmental consequences and mitigation measures as they relate to each Project alternative.

Detailed descriptions of the alternatives evaluated in this section are provided in Chapter 2, *Description of Alternatives*.

13.3.1 Methods for Analysis

Data collection and analysis for recreation resources consisted of a review of the plans and policies referenced in Section 13.2, a review of the Project operation and maintenance program, and use of geographic information system (GIS) data pertaining to existing public recreation areas and Project components.

Construction impacts were determined using the following methods:

- GIS analysis to determine the distance of recreation areas from the Project, the amount of recreation land that would be affected, and the recreational facilities and functions that would be temporarily affected because of Project construction
- Review and analysis of the design and the proposed construction right-of-way to determine whether there would be temporary or permanent changes to access and reduction in parking capacity for recreation uses

Operation impacts of the Project alternatives were determined using the following methods:

- Review and analysis of the design and location of Project components to determine whether any barriers to recreation-area access and use would be created or changed
- GIS analysis to determine the distance of recreation areas from the Project, the amount of recreation land that would be affected, and the recreational facilities and functions that would be permanently affected
- Review and analysis of the Project alternatives to determine whether there would be any Project-related increase in the use of recreation areas and resources such that substantial physical deterioration of the resource would occur or would be accelerated

Impacts to recreation are determined relative to Existing Conditions (for California Environmental Quality Act [CEQA]) and the No Action Alternative (for the National Environmental Policy Act [NEPA]). However, as described below, the No Action Alternative would be the same as Existing Conditions because recreation resources are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to Existing Conditions.

13.3.2 Thresholds of Significance – CEQA

The thresholds of significance for impacts are based on the environmental checklist in Appendix G of the CEQA Guidelines, as amended. These thresholds also encompass the factors considered under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. An impact resulting from implementing an alternative would be significant under CEQA if it would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated
- Cause a substantial loss of recreational opportunities that would require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment

13.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect effects on recreation resources from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

13.3.3.1 No Action Alternative

13.3.3.1.1 Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Under the No Action Alternative, the Project would not be constructed, and the effects would be similar to Existing Conditions. Therefore, there would be no increase in use of existing recreational areas and no effects on recreational resources overall.

Under the No Action Alternative, no additional actions would be taken to increase seasonal floodplain inundation in the lower Sacramento River Basin or to improve fish passage throughout the Yolo Bypass. The Yolo Bypass would continue to be inundated during overtopping events at Fremont Weir, and additional flows would not pass through Fremont Weir when the Sacramento River is below Fremont Weir. Therefore, there would be no impacts on recreation compared to Existing Conditions.

CEQA Conclusion

Under the No Action Alternative, there would be **no impact** to recreational demand or change to any recreation facilities because adoption of the No Action Alternative would not result in a change in the environment.

13.3.3.1.1 Impact REC-2: Loss of Recreational and Educational Opportunities due to a Reduction in Access and/or Available Lands

Under the No Action Alternative, the Project would not be constructed, and the effects would be similar to Existing Conditions. Therefore, there would be no loss of recreational or educational opportunities due to a reduction in access or available lands.

CEQA Conclusion

Under the No Action Alternative, there would be **no impact** to recreational or educational opportunities because adoption of the No Action Alternative would not result in a change in the environment.

13.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of

Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features. The construction of Alternative 1 would not result in long-term increases in the use of the FWWA nor other nearby wildlife areas such as the SBWA, YBWA, or LIER. Recreational areas in the Project area, namely the SBWA and YBWA, could experience local temporary additional use, depending on the timing and season, due to construction-related FWWA closures. The construction crews would occupy the FWWA access areas temporarily during the 28-week construction period (April 15 to November 1) but would not directly affect the recreational use of the wildlife areas. Maintenance associated with the alternative would be similar but more frequent than Existing Conditions and would not adversely affect recreation opportunities in the Project area. Thus, maintenance is not discussed further.

13.3.3.2.1 Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Closures of portions of the FWWA would be necessary during the construction period for Alternative 1. Construction activities are anticipated to occur from April 15 through November 1, which overlaps with several hunting seasons. The reduced area available for hunting could result in increased hunting use in other areas of the FWWA or increased use at the YBWA or SBWA. Increased use of recreational areas could result in adverse impacts on the condition of those facilities. But, construction and the associated closures would be temporary, and recreation use levels at the FWWA are relatively low (1,500 recreation days annually), with hunters accounting for approximately two-thirds of those use levels. The potential temporary increase in use levels within other areas of the FWWA or adjacent recreation areas (e.g., SBWA and YBWA) would be minimal and temporary and would not be expected to result in the substantial physical deterioration of those recreation areas or require the expansion of those recreation areas to accommodate the temporary increase in use levels. The Sutter Bypass Wildlife Area does exist immediately to the north of the Project area, but the wildlife area is a thin linear levee system stretched out the length of the bypass and does not provide a quality hunting experience and is not a viable alternative area. Thus, it would not require expansion of the wildlife area to accommodate temporary use during the construction period.

CEQA Conclusion

Alternative 1 would result in short-term closures during construction that could temporarily increase use levels within other areas of the FWWA or at SBWA and YBWA, but these increases would be minimal and temporary and would not be expected to result in the substantial physical deterioration of those recreation areas. Therefore, this impact would be **less than significant**.

NEPA Conclusion

As noted, there would be short-term closures during construction. NEPA's guidance is to recommend mitigation to minimize adverse effects. NEPA Mitigation Measure MM-REC-1 would help to minimize the short-term construction-related effects to recreational access due to closures of the areas where construction is occurring through coordination with CDFW FWWA managers and public notifications. Nonetheless, recreational access would still be restricted in the limited areas of temporary construction-related closures (11.2 percent of FWWA lands)

during the construction period from April 15 through November 1, which coincides with much of FWWA's hunting season, including several key hunting periods. Specifically, the construction season would restrict hunting during some of the most popular hunting periods, including the archery deer season opener in mid-August, the general deer season opener in late-September, the dove opener on September 1, quail in mid-October, wild turkey in mid- to late April, and waterfowl season in late October. However, Mitigation Measure MM-REC-1 would provide public notification of the areas of temporary construction-related closure and, thus, allow recreational visitors the ability to utilize FWWA lands outside the construction disturbance (88.8 percent of FWWA lands) or utilize the alternative wildlife areas in the areas that provide similar opportunities, particularly SBWA and YBWA, during the temporary construction period.

NEPA Mitigation Measure MM-REC-1 (NEPA only): Post notices of scheduled closures and coordinate closures with the Fremont Weir Wildlife Area Manager

During construction, the FWWA will remain open to the public for recreational uses, but the lands under construction will be closed to recreational uses. The construction contractor shall post and distribute notifications at the main public access areas. The construction contractor shall notify the CDFW FWWA manager of any scheduled closure of FWWA lands or features at least 30 days in advance of the construction work. Further, the construction contractor shall coordinate with the CDFW FWWA manager at least one week prior to construction and weekly during construction periods so that the manager can provide website notifications related to any access restrictions or area closures. Additionally, the construction contractor, in coordination with DWR, shall make a good faith effort to notify any affected private-property owners or lessees if there will be a closure or other conditions imposed on entry of their respective private property near Project activities.

The construction contractor shall construct and maintain a temporary no-hunting boundary extending 150 yards away from the construction area. The construction contractor will mark the boundary with fencing and provide "No Hunting" signs around the buffer, stating the periods of construction and associated hunting restrictions. Internal route closures and detours (service roads and trails) shall be established by the construction contractor during construction at Fremont Weir and Agricultural Road Crossing 1, as necessary during heavy traffic periods, to ensure public and worker safety. The construction contractor shall construct a detour around the fish passage facility construction area to redirect users traveling along the Fremont Weir to travel south around the construction site.

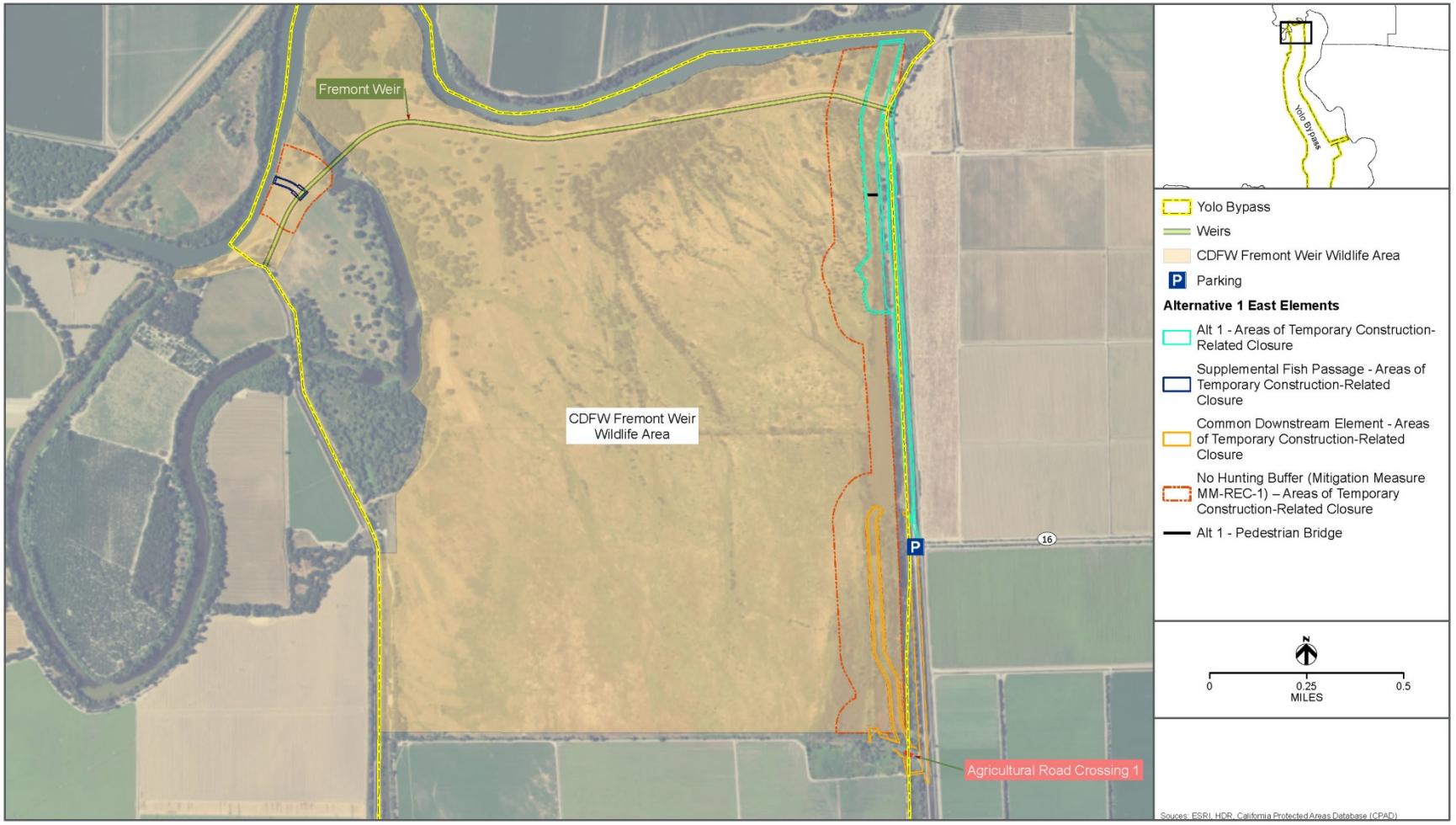
13.3.3.2.2 Impact REC-2: Loss of Recreational and Educational Opportunities due to a Reduction in Access and/or Available Lands

Operation of Alternative 1 would result in social impacts to recreational and educational opportunities due to changes in the access to and lands available for at the established wildlife areas. These social impacts are discussed below.

Effects on Access to Recreation Opportunities at the Established Wildlife Areas

During construction, Alternative 1 could have direct effects on recreational access to FWWA due to temporary closures in areas where construction activities would occur. Since Alternative 1's components only exist within the FWWA, these effects do not exist at SBWA, YBWA, or LIER.

At FWWA, the sole legal public recreational access occurs from Yolo CR 16. This access area would be utilized during construction for staging and access and could be closed to the public to allow for construction equipment and staging, as shown on Figure 13-2. Since this is the only legal public access to FWWA, Alternative 1 could result in reduced access of the FWWA during the construction period. In addition, Alternative 1 components would be located primarily along the eastern boundary of the FWWA, and the construction activities on these lands could further affect recreational access to the FWWA and subsequently affect recreation use. These effects would be short-term and temporary and only occur during the construction period.



Key: CDFW = California Department of Fish and Wildlife

Figure 13-2. Alternative 1 Areas of Temporary Construction-Related Closure in the CDFW Fremont Weir Wildlife Area

Construction of permanent components for Alternative 1 would affect access throughout the FWWA lands due to the location and alignment of the permanent components. The permanent components would not be located within SBWA, YBWA, or LIER and thus these areas would not be affected by the presence of Alternative 1 components. At FWWA, Alternative 1 would have a direct effect on recreational access from CR 16 to FWWA lands due to the barrier created by the proposed transport channels and downstream channel improvements along the full extent of the eastern boundary of the FWWA. However, to maintain access for recreational uses, Alternative 1 includes plans for a pedestrian bridge that would maintain access to and movement through the FWWA lands for recreational uses by crossing the transport channel in the northeast corner of the FWWA, as shown on Figure 13-3. The bridge would maintain access to and movement through FWWA lands.

Effects on Available Lands for Recreation Opportunities at Established Wildlife Area

The construction of Alternative 1 would have a direct effect on the amount of lands available for recreational use at the FWWA due to areas of temporary construction-related closure that includes the Alternative 1 components (e.g., headworks, control building, outlet transition, transport channel, and the supplemental fish passage) and the additional lands needed for construction activities and access. In all, the areas of temporary construction-related closure related to the alternative components only would convert a total of 36.1 acres, or 2.5 percent, of the existing lands at FWWA to a non-recreational use in the short-term during construction, as shown in Table 13-2. An additional “no hunting” buffer of 150 yards around the areas of temporary construction-related closure for alternative structures would be implemented as part of a construction mitigation measure (MM-REC-1 below) that would further reduce the amount of available lands in the short-term during construction, as shown on Figure 13-3. The 150-yard mitigation buffer would convert an additional 127.2 acres, or 8.7 percent, of the existing lands at FWWA to a non-recreational use in the short-term during construction, as shown in Table 13-2. These combined areas would result in a total of 163.3 acres of converted lands or 11.2 percent of the existing lands at FWWA.

Table 13-2. Short-term construction effects of Alternative 1 on Recreational Lands and Uses in the 1,461-acre FWWA

Alternative 1 Affected Areas	Affected FWWA Land (acres)	Affected FWWA Land (percent)
Alternative 1 areas of temporary construction-related closure	36.1	2.5%
No hunting buffer (mitigation)	127.2	8.7%
Total	**163.3**	**11.2%**

Key: FWWA= Fremont Weir Wildlife Area

Key: CDFW = California Department of Fish and Wildlife

Figure 13-3. Alternative 1 Areas of Permanent Disturbance in the CDFW Fremont Weir Wildlife Area

Alternative 1 would have a direct permanent effect on the amount of lands available for recreational use at the FWWA due to the areas of permanent disturbance (e.g., headworks, control building, outlet transition, transport channel, and the supplemental fish passage channel), as shown on Figure 13-3. The components would permanently convert a total of 26.7 acres, or 1.8 percent, of the existing lands at FWWA to a non-recreational use.

Beyond the general reduction in lands, the type of lands that would be permanently lost due to the alternative components could have an effect on specific recreational uses or opportunities. The riparian wooded areas and wetland areas in FWWA provide quality habitat for hunting and birding species. Under Alternative 1, the downstream channel improvements in the southeastern corner of FWWA would be located within a riparian wooded area. Despite being located within the riparian wooded area, the channel improvements would be made to the existing channel between the Tule Pond outlet through Agriculture Road Crossing 1, which currently lacks definition and would have limited effects on the riparian wooded area and be focused on the existing channel. As such, Alternative 1 would not impact the valuable wooded area for birding and recreational hunting for deer or ducks. Regarding wetlands, Alternative 1 would result in the permanent conversion of 7.7 acres, or 11.2 percent, of the wetlands in the FWWA.

In contrast to the access affects, the operation of Alternative 1 could result in a more widespread reduction in the amount of lands available for recreation opportunities at the established wildlife areas due to an increased frequency of inundation. This impact would reduce the overall amount of lands available for recreation. Figure 13-4 and Figure 13-5 show the location and changes in the duration of inundation (number of wet days) at the FWWA and SBWA under Alternative 1 and Existing Conditions, respectively. Figure 13-6 and Figure 13-7 show the location and change in duration of inundation at YBWA under Alternative 1 and Existing Conditions, respectively. LIER is not included in this impact discussion because LIER is tidally influenced with two low tides and two high tides each day and is largely a tidal open water and tidal marsh setting with nominal uplands in the northernmost portion of the reserve. Since the primary recreational uses at LIER are water-based recreation uses (e.g., shoreline fishing, boat fishing, waterfowl hunting often using floating blinds, and wildlife viewing), any changes in inundation of the nominal non-open water/upland areas would have a very limited effect on these recreational uses or access.

At the FWWA, Alternative 1 would result in a decrease in the duration of inundation across most of the FWWA lands (56 percent or 813.9 acres), as shown in Table 13-3. The most prevalent duration decrease would be one to three days. Alternative 1 would result in an increase in the duration of inundation across 37 percent of FWWA lands, or 546.0 acres, as shown in Table 13-3. Most of the increased periods of inundation (29 percent of FWWA lands or 423.5 acres) would be less than one day. Larger periods of increased inundation (from one week to more than four weeks) would be much smaller in scale and localized in the northeast and southeast portions of FWWA, as shown in Table 13-3 and on Figure 13-4. The riparian wooded area in the southeast portion of FWWA (as highlighted above) would not have any increased periods of inundation. Rather, the increased inundation areas would be to the west of the riparian wooded area. The impacts associated with the areas of longer periods of substantial increased inundation (one week to more than four weeks) under Alternative 1 would be limited as these areas are minimal, discontinuous, and localized. In comparison, Existing Conditions would result in a typical duration of inundation of four to six weeks for the majority of FWWA lands, as shown on Figure 13-5.

Table 13-3. Alternative 1 Changes in Duration of Inundation (in Wet Days) at FWWA, SBWA, and YBWA

Average Difference in Duration of Wet Days	Alternative 1 FWWA (acres)	Alternative 1 FWWA (percent)	Alternative 1 SBWA (acres)	Alternative 1 SBWA (percent)	Alternative 1 YBWA (acres)	Alternative 1 YBWA (percent)
More than -2 weeks	6.1	0%	10.0	3%	0.0	0%
-1 to -2 weeks	15.7	1%	0.3	0%	0.0	0%
-3 days to -1 week	147.3	10%	0.1	0%	0.0	0%
-1 day to -3 days	644.7	44%	0.6	0%	0.2	0%
No change	101.1	7%	47.4	13%	2707.7	16%
Less than 1 day	423.5	29%	43.2	12%	3260.5	19%
1 day to 1 week	20.3	1%	16.4	5%	1524.7	9%
1 week to 2 weeks	10.3	1%	153.5	43%	7005.2	42%
2 weeks to 3 weeks	29.7	2%	77.8	22%	2263.1	13%
3 weeks to 4 weeks	42.9	3%	10.7	3%	8.6	<1%
More than 4 weeks	19.5	1%	0.0	0%	0.0	0%
Total	**1,461**	**100%**	**360**	**100%**	**16,770**	**100%**

Key: FWWA= Fremont Weir Wildlife Area; SBWA= Sacramento Bypass Wildlife Area; YBWA= Yolo Bypass Wildlife Area

At the SBWA, Alternative 1 would result in an overall increase in the duration of inundation across the majority of SBWA lands (84 percent or 301.5 acres), as shown in Table 13-3. The most prevalent duration increases would be one to two weeks in areas covering 153.5 acres, or 43 percent of SWBA lands, and two to three weeks in areas covering 77.8 acres or 22 percent of SBWA lands. Alternative 1 would result in small areas (10.7 acres or 3 percent) of SBWA land with an increased duration of three to four weeks. In comparison, Existing Conditions (or No Action Alternative) would result in widely varying periods of inundation across SBWA lands, as shown on Figure 13-5. The predominant period of inundation would be four to six weeks, spanning most of the western and central areas, with some areas resulting in six- to eight-week periods of inundation. Areas of substantially longer periods of inundation would also occur, particularly a large, contiguous area in the eastern portion of SWBA that would result in 10 to 15 weeks of inundation as well as linear areas along the northern and southern boundaries of SBWA that would result in more than 20 weeks of inundation. For the majority of SBWA (i.e., in the central and eastern portions), Alternative 1 impacts would represent a 33 to 50 percent increase in the duration of inundation compared to Existing Conditions. The SBWA lands that would result in the longest periods of increased inundation between three and four weeks under Alternative 1 would have limited effects as these lands are nominal in size and occur within areas of SBWA that would be inundated substantially longer (20 weeks or more) under Existing Conditions.

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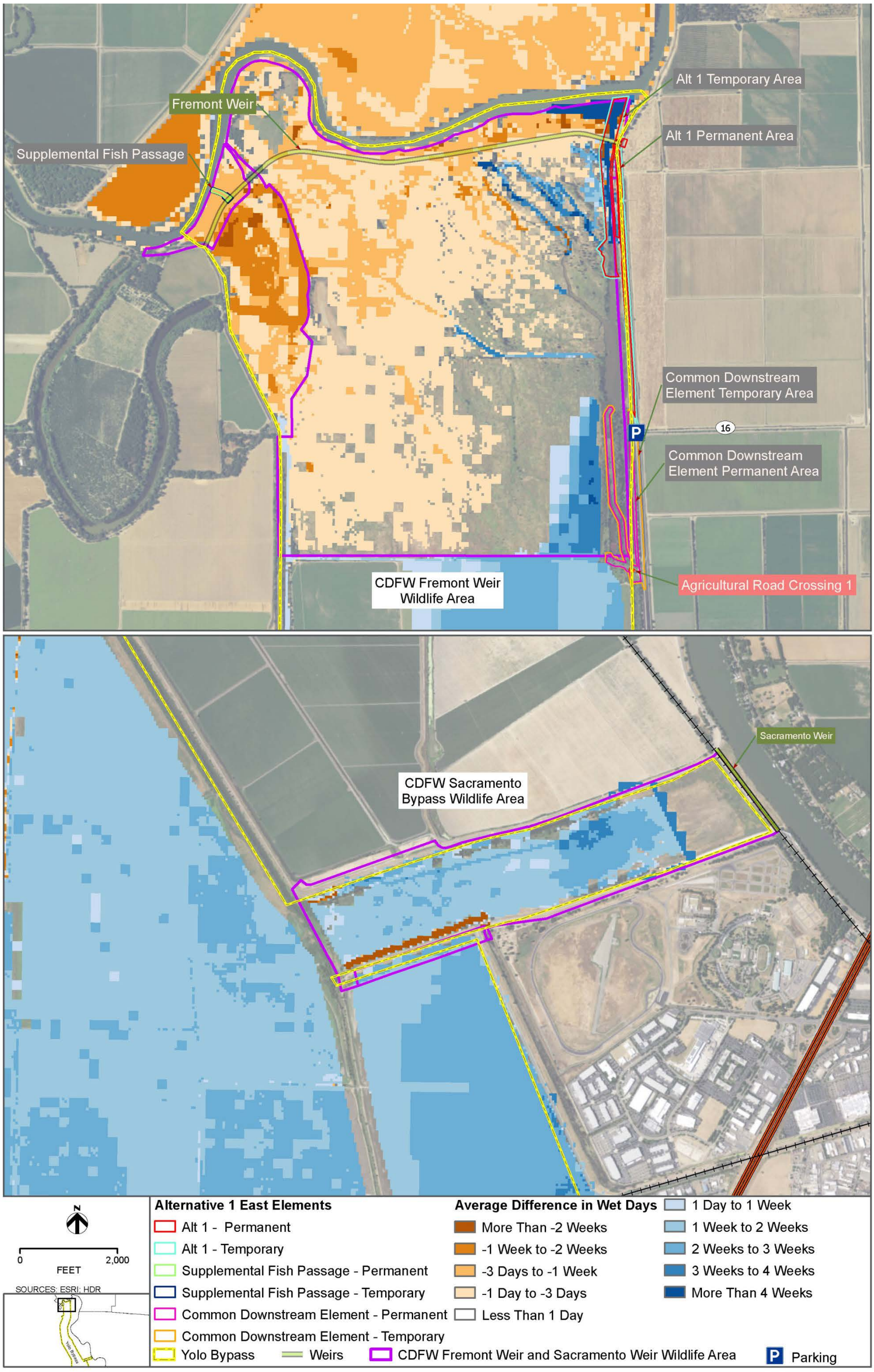

Key: CDFW = California Department of Fish and Wildlife

Figure 13-4. Alternative 1 Location and Change in Frequency of Inundation (in Wet Days) at the CDFW Fremont Weir Wildlife Area and Sutter Bypass Wildlife Area Region

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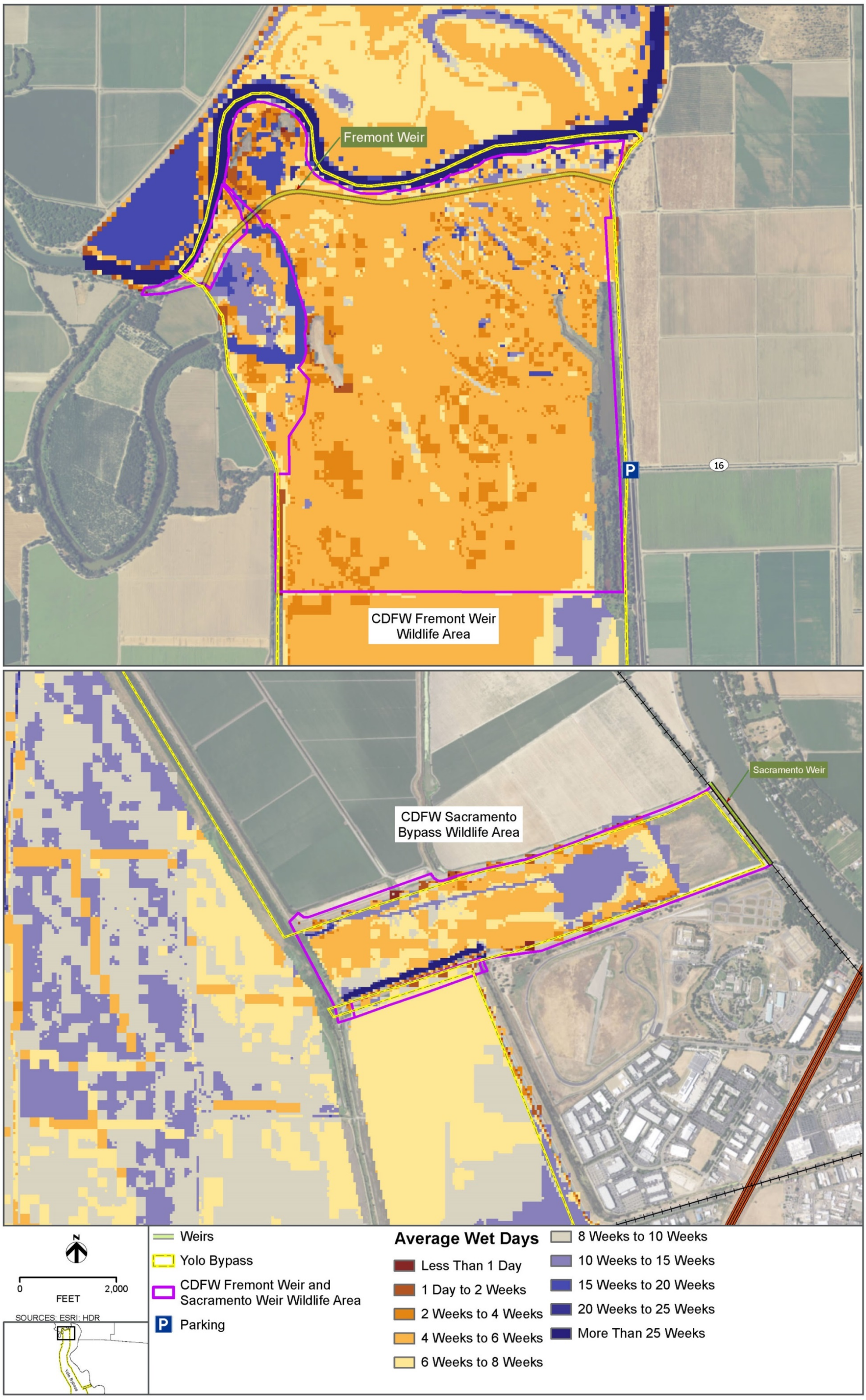

Key: CDFW = California Department of Fish and Wildlife

Figure 13-5. Location and Change in Frequency of Inundation (in Wet Days) at the CDFW Fremont Weir Wildlife Area and Sutter Bypass Wildlife Area under Existing Conditions Region

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At the YBWA, Alternative 1 would result in an overall increase in the duration of inundation across 84 percent of YBWA lands, or 14,062.1 acres, as shown in Table 13-3. The most substantial duration increases would be one to two weeks in areas covering 7,005.2 acres, or 42 percent of YBWA lands, and two to three weeks in areas covering 2,263.1 acres, or 13 percent of YBWA lands, mostly in the northern and central portion of the YBWA where the majority of the recreational and educational uses occur, as shown on Figure 13-6. Alternative 1 would result in only small areas (8.6 acres or less than 1 percent) of YBWA land with an increased duration of three to four weeks. In comparison, Existing Conditions would result in six to eight weeks of inundation, as shown on Figure 13-7. Overall, the Alternative 1 impacts would represent a 38 to 50 percent increase over Existing Conditions.

For the private hunting clubs south of YBWA, Alternative 1 would result in varying periods of increased duration of inundation, as shown on Figure 13-6. Alternative 1 would result in an increase in inundation up to two weeks, on average, for approximately half of the private hunting clubs, up to one week for approximately one-quarter of the clubs, and no change for the remaining one-quarter of the clubs. In comparison, Existing Conditions would result in up to six weeks of inundation, on average, where the private hunting clubs are located, as shown on Figure 13-7. Overall, the Alternative 1 impacts would represent a 33 percent increase over Existing Conditions for most of the private hunting clubs.

Further, the increased duration of inundation from the operation of Alternative 1 could also result in additional YBWA closures that could result in a loss of popular waterfowl hunting, wildlife viewing and educational opportunities that have seasons that overlap with periods of inundation under Existing Conditions. The CDFW closes the YBWA when the water surface elevation at Lisbon Weir is greater than 12 feet. In addition, the YBWA is impacted but not fully closed at lower Lisbon Weir elevations, including above 8.5 feet when low level flooding and above 10 feet when partial closures occur. Refer to Appendix I for summary of days when Lisbon Weir is above 8.5 and 10 feet for each alternative. Waterfowl hunting opportunities at YBWA last for an approximately 100-day period from late October through January; however, CDFW allows hunting only three days per week during this 100-day period, which equates to 45 to 47 actual days that the YBWA is open for waterfowl hunting. Table 13-4 shows the total number of days the YBWA would be closed for the complete 100-day period and the weighted period which equates to 46 percent of the complete 100-day period. The following analysis uses the weighted waterfowl hunting period. Alternative 1 would result in YBWA closures for a total of 4.7 days, on average, which equates to an additional 1.9 days over Existing Conditions (Table 13-4). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 1 would result in additional YBWA closure days (weighted for open days) ranging from 0 days (7 of the 16 water years) to 9.7 days in 2003. Overall, Alternative 1 would result in five or fewer additional closure days in 14 of the 16 water years (Table 13-4). Alternative 1 would result in additional closure days greater than five days in two water years (2003 and 2004). Refer to Appendix I for a detailed summary of the number of days the YBWA would be closed due to inundation for each alternative for each water year (1997-2012) and each month (October-May).

Table 13-4. Alternative 1 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the waterfowl hunting season (late October through January).

Water Year	Existing Condition (100-day season)	Alternative 1 (100-day season)	Difference (100-day season)	Existing Condition (weighted season[1])	Alternative 1 (weighted[1] for open days only)	Difference (weighted[1] for open days only)
1997	40	41	1	18.4	18.9	0.5
1998	14	15	1	6.4	6.9	0.5
1999	0	0	0	0.0	0.0	0.0
2000	0	0	0	0.0	0.0	0.0
2001	0	0	0	0.0	0.0	0.0
2002	7	12	5	3.2	5.5	2.3
2003	9	30	21	4.1	13.8	9.7
2004	0	14	14	0.0	6.4	6.4
2005	0	4	4	0.0	1.8	1.8
2006	28	33	5	12.9	15.2	2.3
2007	0	0	0	0.0	0.0	0.0
2008	0	0	0	0.0	0.0	0.0
2009	0	0	0	0.0	0.0	0.0
2010	0	7	7	0.0	3.2	3.2
2011	1	8	7	0.5	3.7	3.2
2012	0	0	0	0.0	0.0	0.0
Total	99	164	65	45.5	75.4	29.9
Average	6.2	10.3	4.1	2.8	4.7	1.9
Median	0.0	5.5	1.0	0.0	2.5	0.5
Mode	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0	0	0	0.0	0.0	0
Maximum	40	41	21	18.4	18.9	9.7

[1] Weighted season was calculated by multiplying the 100-day season results by 0.46 to account for the 3-day per week wildlife hunting regulation at YBWA (i.e., YBWA is open 45 to 47 days during the 100-day period).

Regarding wildlife viewing, the most popular season at YBWA is November through February. Alternative 1 would result in additional YBWA closures for a total of 16.8 days, on average, which equates to an additional 4.9 days over Existing Conditions (Table 13-5). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 1 would result in additional YBWA closure days ranging from 0 days (6 of the 16 water years) to 21 days in 2003. Overall, Alternative 1 would result in five or fewer additional days in 11 of the 16 water years.

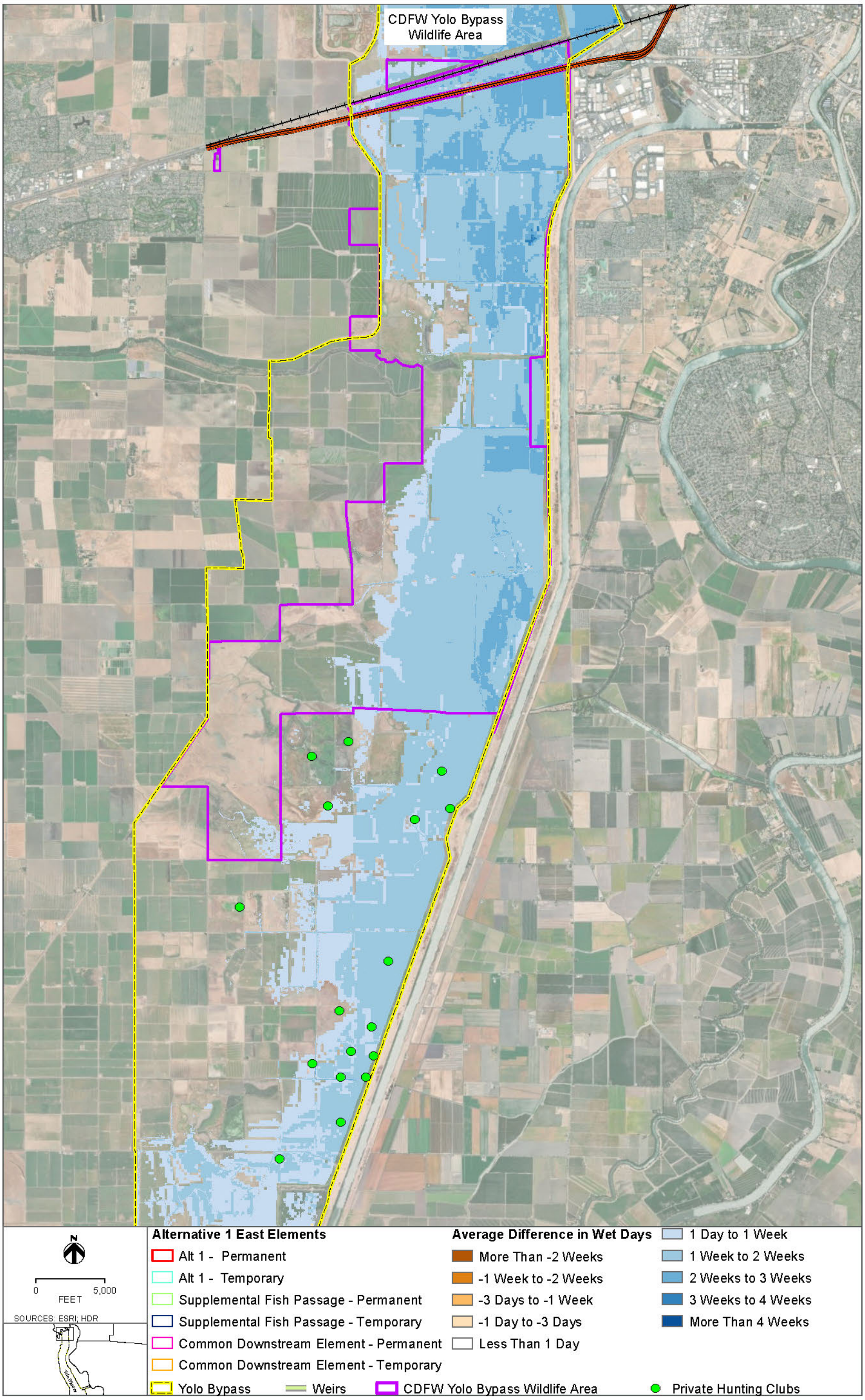
Regarding educational opportunities, the most popular season at YBWA is the school year (September through May in general). For this analysis, the relevant months (i.e., when inundation occurs) is October through May. Alternative 1 would result in additional YBWA closures for a total of 28.3 days, on average, which equates to an additional 5.3 days over Existing Conditions (Table 13-5). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 1 would result in additional YBWA closure days ranging from 0 days (6 of the 16 water years) to 21 days in 2003. Overall, Alternative 1 would result in five or fewer additional days in 11 of the 16 water years.

Refer to Appendix I for a detailed summary of the number of days the YBWA would be closed due to inundation for each alternative for each water year (1997-2012) and each month (October-May).

Table 13-5. Alternative 1 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the wildlife viewing season (late October through January) and educational season (October through May).

	Wildlife Viewing Season (Nov-Feb)			Educational Season (Oct-May)		
Water Year	Existing Condition	Alternative 1	Difference	Existing Condition	Alternative 1	Difference
1997	55	60	5	55	60	5
1998	42	43	1	77	80	3
1999	18	18	0	34	34	0
2000	14	14	0	33	33	0
2001	0	0	0	0	0	0
2002	7	12	5	7	12	5
2003	9	30	21	9	30	21
2004	10	24	14	24	40	16
2005	0	4	4	4	8	4
2006	34	44	10	100	111	11
2007	0	0	0	0	0	0
2008	0	2	2	0	2	2
2009	0	0	0	0	0	0
2010	0	10	10	0	10	10
2011	1	8	7	25	32	7
2012	0	0	0	0	0	0
Total	190	269	79	368	452	84
Average	11.9	16.8	4.9	23.0	28.3	5.3
Median	4.0	11.0	3.0	8.0	21.0	3.5
Mode	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0	0	0	0	0	0
Maximum	55	60	21	100	111	21

The change in depth of the inundation could affect the recreational opportunities particularly waterfowl hunting in the Yolo Bypass due to reductions in available shallow-flooded (i.e., less than 18 inches in depth) seasonal managed wetlands (shallow-flooded wetlands) that are critical to waterfowl. Alternative 1 would result in a loss of shallow-flooded wetlands. This loss of shallow-flooded wetlands would affect the amount of lands available for recreational waterfowl hunting and thus, indirectly could affect the recreational waterfowl hunting opportunities in the managed wetlands of the Yolo Bypass. The operation of Alternative 1 could also potentially indirectly affect the incentive for private hunting clubs to continue to manage the shallow-flooded wetlands for hunting if the loss of critical waterfowl habitat reduced the hunting opportunities, particularly if the loss occurred in successive years or frequently within a short time period. The shallow-flooded wetlands analysis was conducted for the Yolo Bypass overall and did not assess individual parcels; thus, the timing and magnitude of the potential effects on site-specific parcels such as the private hunting club lands are uncertain. Adding to the uncertainty of these effects, some of the private hunting clubs within the Yolo Bypass have additional hunting areas outside the Yolo Bypass as alternatives when hunting areas are inundated within the Yolo Bypass.



Key: CDFW = California Department of Fish and Wildlife

Figure 13-6. Alternative 1 Location and Change in Frequency of Inundation (in Wet Days) at the CDFW Yolo Bypass Wildlife Area

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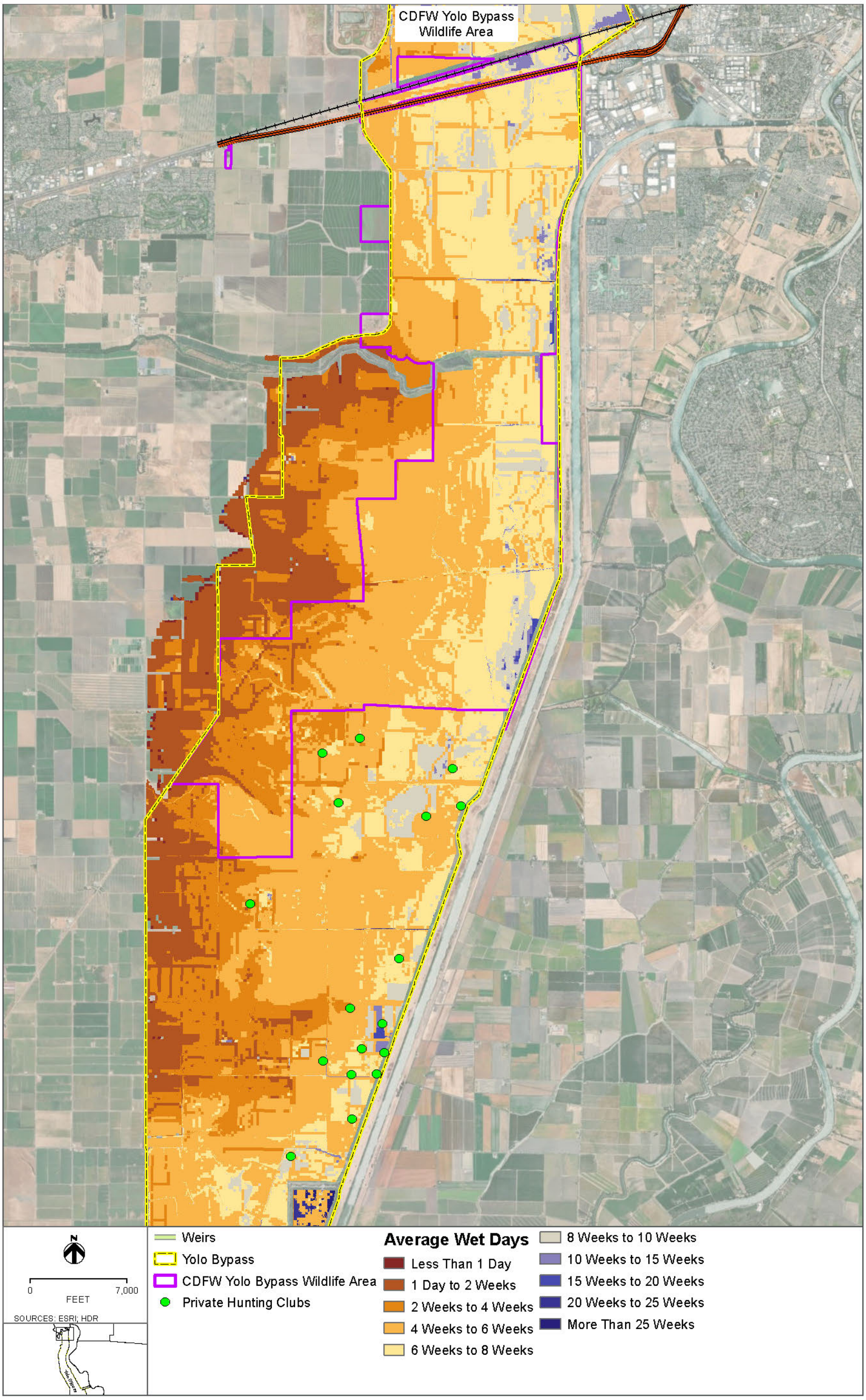

Key: CDFW = California Department of Fish and Wildlife

Figure 13-7. Location and Change in Duration of Inundation (in Wet Days) at the CDFW Yolo Bypass Wildlife Area under Existing Conditions

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More specifically, the operation of Alternative 1 would result in a reduction in the amount of available shallow-flooded wetlands in the three different water years (WY) analyzed -- 1999 (Wet WY), 2002 (Dry WY) and 2005 (Above Normal WY) (Ducks Unlimited 2017). Further, the timing of these reductions would occur during the 100-day waterfowl hunting season from late October through January. In the 1999 Wet WY, Alternative 1 would reduce shallow-flooded wetlands by up to 4,300 acres, or 37 percent of the of the shallow-flooded wetlands under Existing Conditions (11,511 acres). The reductions occur in two separate periods from late November through early December for approximately four weeks and again in the latter half of January into early February for approximately three weeks--both in the midst of the 100-day waterfowl hunting season, as shown on Figure 13-8 (Ducks Unlimited 2017). These two periods of reductions do not occur at all under Existing Conditions. Wet WYs account for 31 percent of the WYs during the period of analysis from 1997-2012 (DWR 2017). In the 2002 Dry WY, Alternative 1 would result in a reduction of shallow-flooded wetlands with the timing and duration of the reductions similar to Existing Conditions from late December through late January for approximately four weeks in the midst of the 100-day waterfowl hunting season, as shown on Figure 13-9 (Ducks Unlimited 2017). However, Alternative 1 would result in slight increases in the magnitude of the reductions up to approximately 1,900 acres, or 25 percent of the of the shallow-flooded wetlands under Existing Conditions. Dry WYs, which includes both Dry and Critically Dry WY classifications, account for 31 percent of the WYs during the period of analysis from 1997-2012 (DWR 2017). In the 2005 Above Normal WY, Alternative 1 would result in a reduction of shallow-flooded wetlands with the timing and duration of the reductions similar to Existing Conditions from late December through late January for approximately four weeks in the midst of the 100-day waterfowl hunting season, as shown on Figure 13-10 (Ducks Unlimited 2017). While the reductions under Alternative 1 occur during the same periods as under Existing Conditions, the reductions are greater in magnitude under Alternative 1 with up to approximately 4,300 acres, or 37 percent of the of the shallow-flooded wetlands under Existing Conditions. Normal WYs, which includes both Above Normal and Below Normal WY classifications, account for 38 percent of the WYs during the period of analysis from 1997-2012 (DWR 2017).

Overall, the operation of Alternative 1 would have an indirect effect on waterfowl hunting opportunities in the Yolo Bypass due to the substantial reductions in the availability of shallow-flooded wetlands, especially when combined with the timing of these reductions during the popular 100-day waterfowl hunting season. While reductions in shallow-flooded wetlands occur under Existing Conditions, the magnitude of the reductions under Alternative 1 is considerably greater. In general, while reductions in shallow-flooded wetlands occur under Existing Conditions, the magnitude of the reductions under Alternative 1 is considerably greater. The operation of Alternative 1 could potentially have a considerable indirect effect on the incentive for private hunting clubs to continue managing the shallow-flooded wetlands for waterfowl hunting, particularly if the loss occurred in successive years or frequently within a short period of time. However, there is uncertainty of the magnitude of the effects on individual parcels such as the private hunting clubs since the analysis was conducted for the Yolo Bypass overall and not for individual sites or areas.

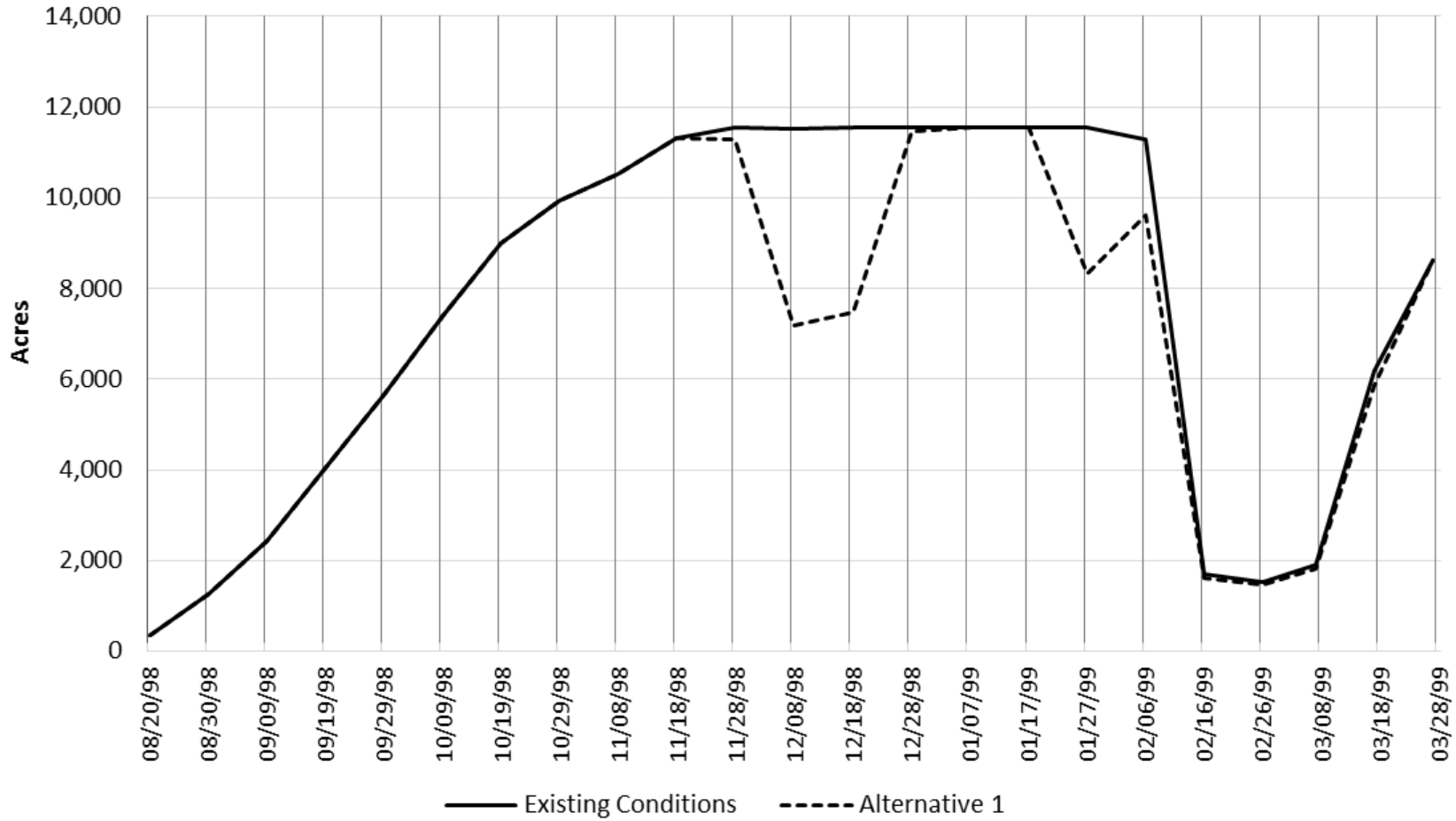


Figure 13-8. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 1 and Existing Conditions in the in the Wet Water Year 1999 (Ducks Unlimited 2017).

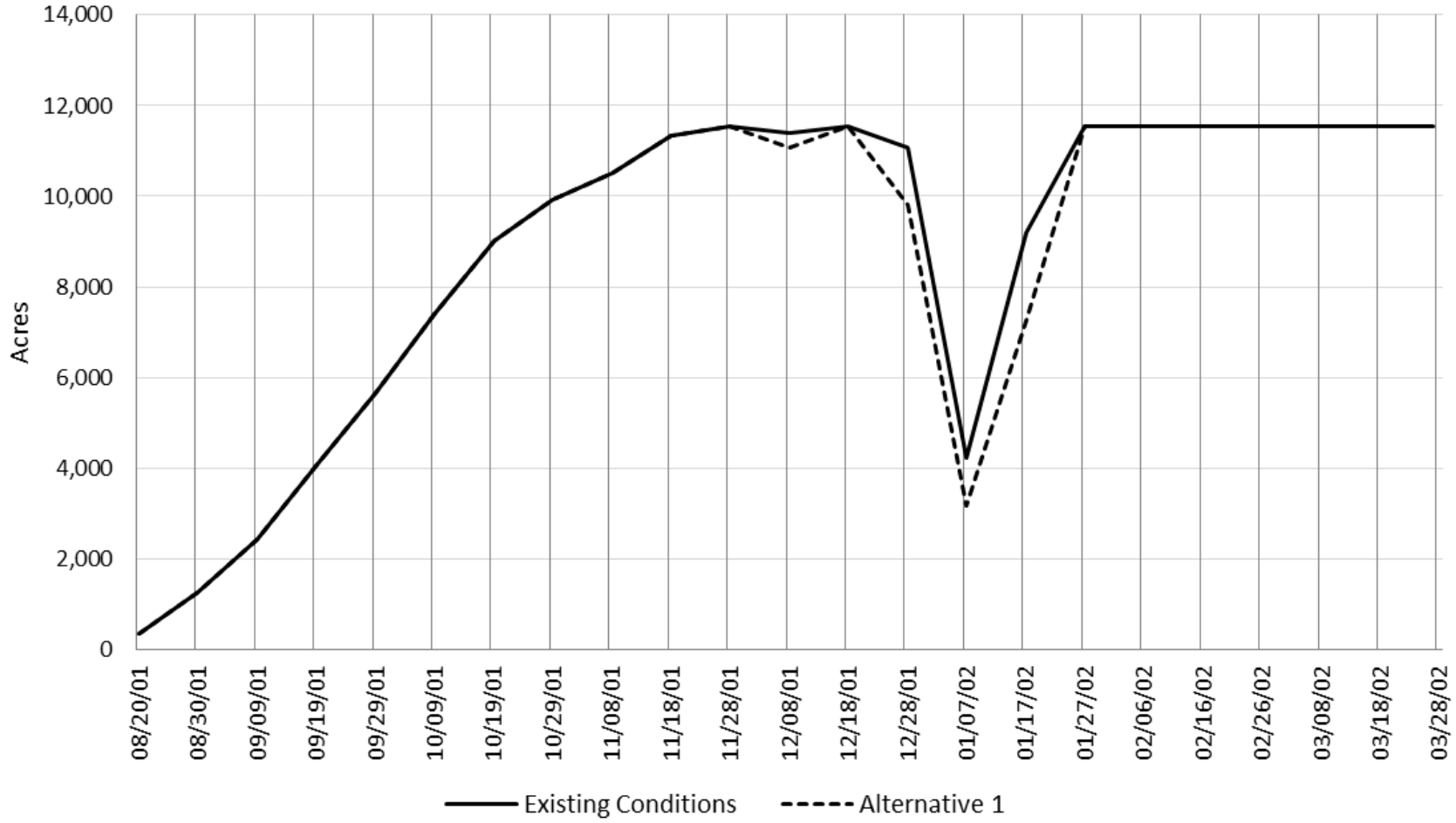


Figure 13-9. Average of number of acres of shallow-flooded (≤18") managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 1 and Existing Conditions in the in the Dry Water Year 2002 (Ducks Unlimited 2017).

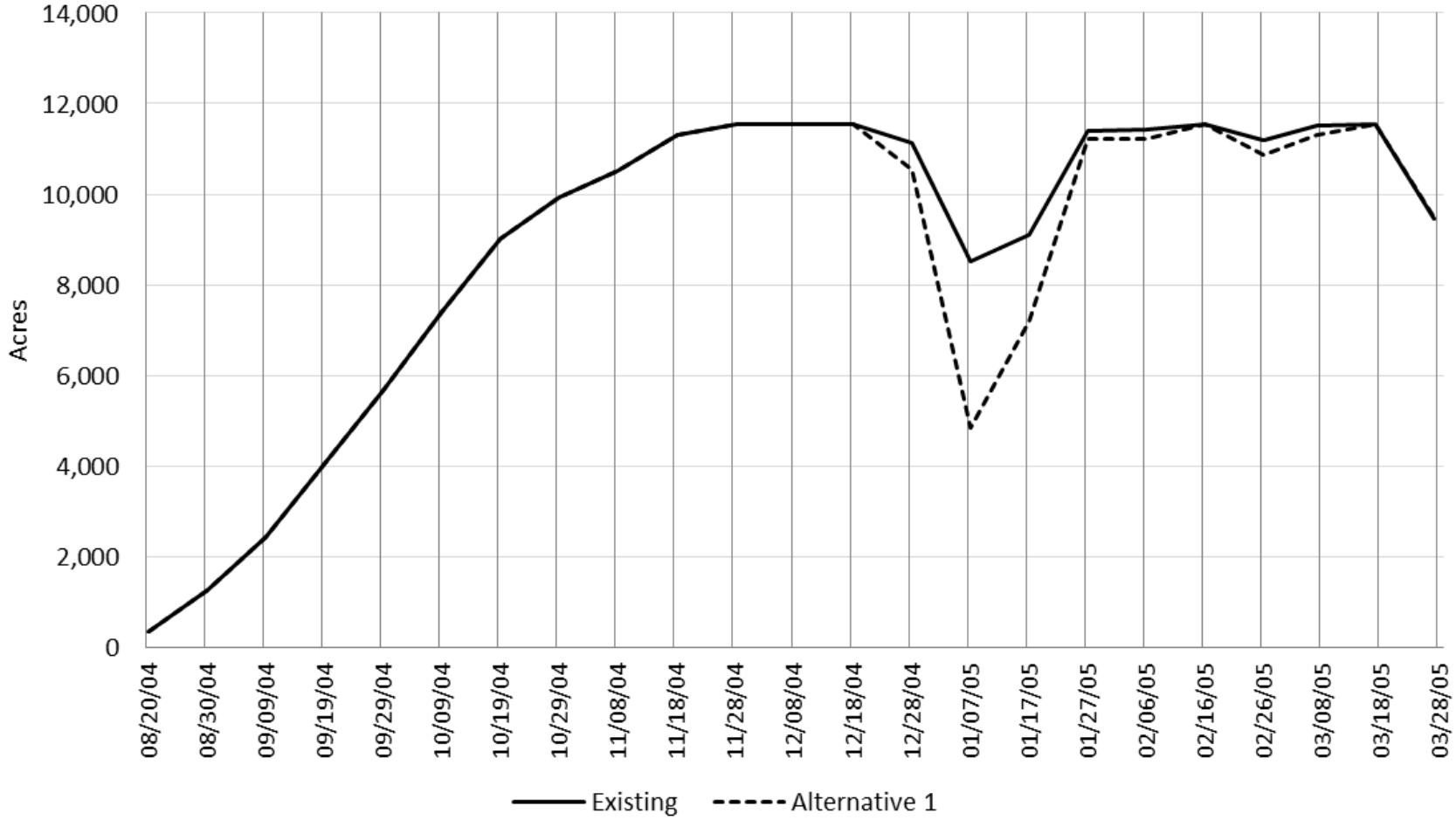


Figure 13-10. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 1 and Existing Conditions in the in the Above Normal Water Year 2005 (Ducks Unlimited 2017).

Closure of Well-Established Wildlife Areas

Alternative 1 would not result in any additional closures due to the presence of the permanent components, particularly with the plans for a pedestrian bridge to maintain access to FWWA lands. However, Alternative 1 could result in additional closures at YBWA due to the increase in the duration of inundation since current CDFW management closes YBWA when certain levels of inundation occur. CDFW does not formally close FWWA or SBWA during periods of inundation. The operation of Alternative 1 would result in 28.3 days of closures, which represents an increase of 5.3 days or 23.0 percent over Existing Conditions. However, when considering YBWA is generally open year-round, Alternative 1 would result in a 1.5 percent increase in the number of days closed over the year, which would not be substantial. When examining the key recreational and education use seasons, Alternative 1 would result in an average of 1.9 additional closure days (range of 0 to 9.7 days across all 16 water years) during the waterfowl hunting season (1.9% of the season), 4.9 additional days (range of 0 to 21 days across all 16 water years) during the peak wildlife viewing season (4.1% of the season), and 5.3 days (range of 0 to 21 days across all 16 water years) during the educational use season (2.0% of the season). Overall across most water years (1997-2012), the additional closure days under Alternative 1 would be minimal (i.e., less than 5% additional closure days).

Consistency with the YBWA LMP by Affecting Access for the Educational Uses of the YBWA

The increased periods of inundation under Alternative 1 could impede access to areas of the YBWA for educational programs and activities, which typically occur from September through May or an approximately 37-week period, particularly the Discover the Flyway program. If substantial increases in the number of wet days occur in the YBWA, impassable road conditions and/or reduced access to bus routes and facilities could occur due to the high water levels. If road and facility access is not available, the educational uses of the YBWA would be reduced, which may not be fully consistent with the goals included in the YBWA Land Management Plan (LMP) to support and expand public use of the YBWA for environmental education and interpretation (i.e., Public-Use Goal 2). As shown in Table 13-4, the operation of Alternative 1 would result in YBWA closures for a total of 28.3 days, on average, which equates to an additional 5.3 days (range of 0 to 21 days across all 16 water years) or a 23.0 percent increase over Existing Conditions. However, the average change across all 16 water years in comparison to the 37-week educational program period would only be a 2.0 percent reduction in days, which would not be expected to reduce access to YBWA facilities in a way that would eliminate or substantially reduce the educational uses of the YBWA. Therefore, Alternative 1 would not be inconsistent with the YBWA LMP by substantially affecting access for educational uses.

Consistency with the Yolo County General Plan by Affecting Public Access for the Recreational Uses of the Yolo Bypass

The increased periods of inundation under Alternative 1 could reduce access to areas of the FWWA, SBWA and YBWA for recreational uses, which may not be fully consistent with the policies in the Yolo County General Plan and particularly Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass. As shown in Table 13-3, the operation of Alternative 1 would result in increased periods of inundation that could reduce public access at FWWA, SBWA and YBWA; and additional closures at YBWA, as shown in Tables 13-4 and

13-5. Therefore, Alternative 1 would result in a minimal decrease in the overall public access for recreational uses at the established wildlife areas overall, which would not be fully consistent with Yolo County General Plan Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass.

CEQA Conclusion

Reductions in recreational and educational opportunities due to changes in access and available lands for these opportunities under Alternative 1 would not result in a substantial adverse effect that would cause a physical change to the environment or adverse social effects. Therefore, the impact is **less than significant**.

NEPA Conclusion

As detailed above, the operation of Alternative 1 would reduce the access to and lands available for recreational and educational opportunities due to increased duration and extent of inundation, particularly at the CDFW's YBWA and SBWA, which is a social impact. The reductions would result in adverse social effects to the recreational and educational opportunities at YBWA and SBWA. The implementation of the NEPA Mitigation Measures MM-REC-2, MM-REC-3 and MM-REC-4 (all NEPA only) would help to minimize the adverse social effects to the educational and recreational uses (i.e., reduction in days available for educational, hunting, and wildlife viewing uses) at YBWA and SBWA, in particular.

Notably, no mitigation measures are necessary for CEQA purposes because the impacts are less than significant. Further, pursuant to its authority under NEPA, Reclamation is not required to mitigate for any impacts under NEPA but can choose to do so. This EIS/EIR, pursuant to Reclamation's NEPA authority, includes mitigation measures to address recreational impacts even though not legally required and refers to such mitigation measures as "NEPA only" or "NEPA mitigation measures."

NEPA Mitigation Measure MM-REC-2 (NEPA Only): Development of alternative recreational or educational access points on the west/southwest side of Yolo Bypass Wildlife Area and/or educational opportunities such as Davis Wetlands

DWR and Reclamation will identify and develop alternative access point(s) within YBWA. These new access points will provide an alternative means of accessing the YBWA, particularly in areas where Alternative 1 has a lesser or reduced inundation impact and provides enhanced opportunities and less lost days to educational, hunting and wildlife viewing opportunities. DWR and Reclamation may look at enhancing additional educational opportunities at other locations such as Davis Wetlands.

NEPA Mitigation Measure MM-REC-3 (NEPA Only): Drainage-related improvements within or adjacent to YBWA

DWR and Reclamation will identify and develop drainage improvements within or adjacent to CDFW's YBWA to enhance the drainage of the managed areas during the descending limb of the hydrograph. Improvements will be designed to provide improved public and operations and maintenance access to YBWA lands sooner after inundation events under Alternative 1.

NEPA Mitigation Measure MM-REC-4 (NEPA Only): Development of viewing platforms or areas at Sacramento Bypass Wildlife Area

DWR and Reclamation will develop viewing platforms or areas around and/or throughout SBWA/YBWA. The access roads and pullouts that currently surround the SBWA will provide continued access to the periphery of the SBWA when the operation of Alternative 1 results in the increased duration and extent of inundation. The development of the viewing platforms/areas will provide enhanced viewing areas during these periods of inundation under Alternative 1 when public access within SBWA/YBWA is reduced.

13.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

13.3.3.3.1 Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Impacts due to the increases in the use of FWWA, SBWA, or YBWA under Alternative 2 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Alternative 2 would result in short-term closures during construction that could temporarily increase use levels within other areas of the FWWA or at SBWA and YBWA, but these increases would be minimal and temporary and would not be expected to result in the substantial physical deterioration of those recreation areas. Therefore, this impact would be **less than significant**.

NEPA Conclusion

As detailed for Alternative 1, implementation of NEPA Mitigation Measure MM-REC-1 would help to minimize the short-term construction-related effects to recreational access and opportunities to the construction disturbance areas (only 23.7 percent of FWWA lands) through coordination with CDFW FWWA managers and public notifications. Nonetheless, recreational access would still be restricted in the construction disturbance areas during the construction period from April 15 through November 1, which coincides with much of FWWA's hunting season, including several key hunting periods. However, NEPA Mitigation Measure MM-REC-1 would provide public notification of the construction disturbance areas and allow recreational visitors the ability to utilize FWWA lands outside the construction disturbance (76.3 percent of FWWA lands) or utilize the alternative wildlife areas in the areas that provide similar opportunities, particularly SBWA and YBWA during the temporary construction period.

13.3.3.3.2 Impact REC-2: Loss of Recreational and Educational Opportunities due to a Reduction in Access and/or Available Lands

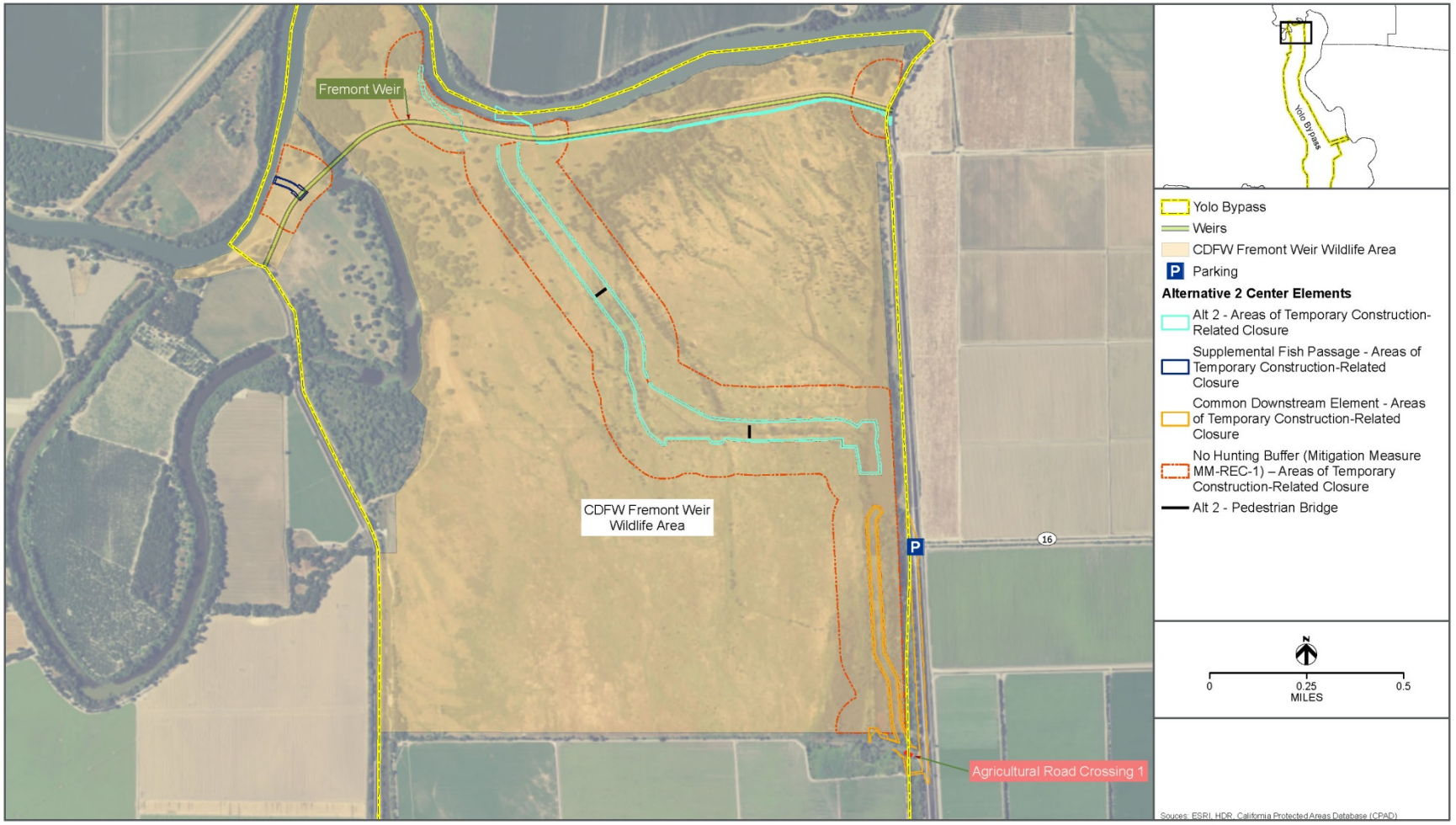
Similar to Alternative 1, the operation of Alternative 2 would result in social impacts to recreational and educational opportunities due to changes in the access to and lands available for recreation at the established wildlife areas. These social impacts are discussed below.

Effects on Access to Recreation Opportunities at the Established Wildlife Areas

Compared to Alternative 1, Alternative 2 would have slightly different components and alignments, but the temporary construction-related effects and mitigation for recreational access would be the same as those associated with Alternative 1, which would affect only FWWA. The linear transport channel in Alternative 2 would be located along the southeastern boundary of FWWA and would bisect the northern portion of FWWA, as shown on Figure 13-11. Refer to Section 13.3.3.2.1 for a more detailed discussion of the effects of Alternative 1. Similar to Alternative 1, the areas of permanent disturbance for Alternative 2 would also affect access throughout the FWWA lands due to the location and alignment of the permanent components but would not affect access within SBWA, YBWA, or LIER. Alternative 2 includes plans for two pedestrian bridges that would maintain access to and movement through the FWWA lands for recreational uses by crossing the transport channel in two locations, as shown on Figure 13-12.

Effects on Available Lands for Recreation Opportunities at Established Wildlife Area

Alternative 2 would have effects similar to Alternative 1 on the amount of available lands due to the areas of temporary construction-related closure and the areas of permanent disturbance. The primary difference between Alternatives 1 and 2 is the extent of the areas of temporary closure and permanent disturbance. Under Alternative 2, the areas of temporary construction-related closure for Alternative 2 components plus the additional 150-yard “no hunting” buffer area as part of MM-REC-1 would result in a total of 346.3 acres of converted lands or 23.7 percent of FWWA lands. Alternative 2 would result in the permanent conversion of 65.4 acres, or 4.5 percent of FWWA lands, which includes 6.8 acres of wetlands or 9.9 percent of wetlands within FWWA.



Key: CDFW = California Department of Fish and Wildlife

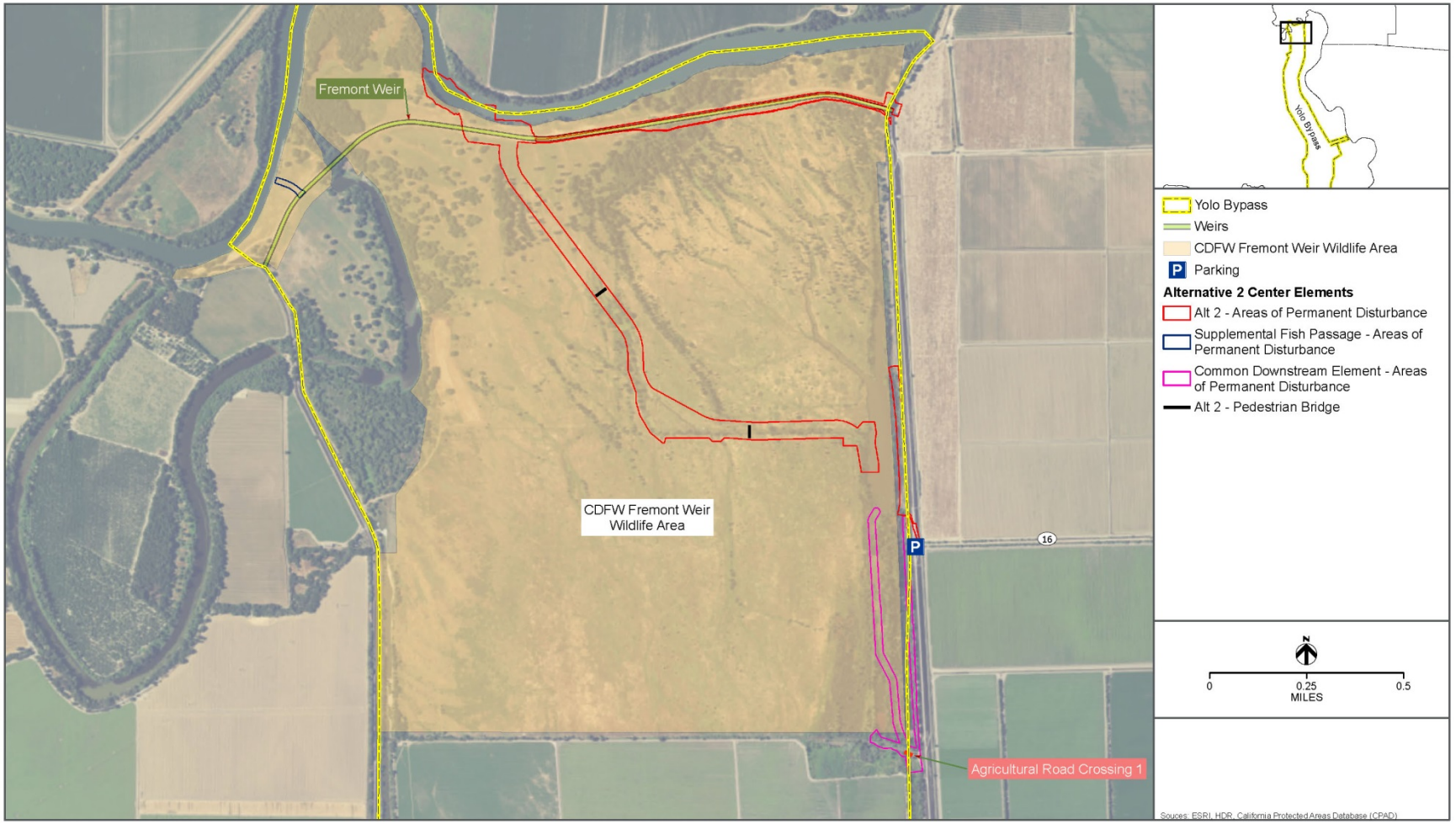
Figure 13-11. Alternative 2 Areas of Temporary Construction-Related Closure in the CDFW Fremont Weir Wildlife Area

Regarding increased duration of inundation, Alternative 2 would have similar changes in the duration of inundation as Alternative 1, with the same resulting impacts, as shown on Figure 13-4 and Figure 13-6 for Alternative 1. YBWA and SBWA would be affected in terms of recreational access and opportunities from increased periods of inundation up to three weeks on average, which would represent a 33 to 50 percent increase over Existing Conditions and would be considerable. In addition, critical waterfowl hunting opportunities and educational programs would be affected due to increased periods of inundation. Alternative 2 would result in additional closures of YBWA by 1.9 additional days during the waterfowl hunting season (late October through January), 4.9 additional days during the peak wildlife viewing season (November through February), and 5.3 days during the educational use season (October through May) which would not be a substantial reduction. Regarding effects on waterfowl hunting opportunities due to changes in the depth of inundation, Alternative 2 would have reductions in the shallow-flooded wetlands and indirect effects on waterfowl hunting opportunities similar to Alternative 1, as shown on Figures 13-8 through 13-10.

Refer to Section 13.3.3.2.1 for a more detailed discussion of the effects of Alternative 1.

Closure of Well-Established Wildlife Areas

Regarding additional closures of the wildlife areas, Alternative 2 would have the same effects as Alternative 1, whereby Alternative 2 would result in 28.3 days of closures, which represents an increase of 5.3 days or 23.0 percent over Existing Conditions. However, when considering YBWA is generally open year-round, Alternative 2 would result in a 1.5 percent increase in the number of days closed over the year, which would not be substantial. When examining the key recreational and education use seasons, Alternative 2 would result in an average of 1.9 additional days (range of 0 to 9.7 days across all 16 water years) during the waterfowl hunting season (1.9% of the season), 4.9 additional days (range of 0 to 21 days across all 16 water years) during the peak wildlife viewing season (4.1% of the season), and 5.3 days (range of 0 to 21 days across all 16 water years) during the educational use season (2.0% of the season). Overall across most water years (1997-2012), the additional closure days under Alternative 2 would not be substantial.



Key: CDFW = California Department of Fish and Wildlife

Figure 13-12. Alternative 2 Areas of Permanent Disturbance in the CDFW Fremont Weir Wildlife Area

Consistency with the YBWA LMP by Affecting Access for the Educational Uses of the YBWA

Alternative 2 would have the same effects as Alternative 1, whereby Alternative 2 would result in YBWA closures for a total of 28.3 days, on average, which equates to an average additional 5.3 days (range of 0 to 21 days across all 16 water years) or a 23.0 percent increase over Existing Conditions. However, the average change across all 16 water years modeled in comparison to the 37-week educational program period would only be a 2.0 percent reduction in days, on average, which would not be expected to reduce access to YBWA facilities in a way that would eliminate or substantially reduce the educational uses of the YBWA. Therefore, implementation of Alternative 2 would not be inconsistent with the YBWA LMP Public-Use Goal 2 by substantially affecting access for educational uses.

Consistency with the Yolo County General Plan by Affecting Public Access for the Recreational Uses of the Yolo Bypass

Alternative 2 would have the same effects as Alternative 1, whereby the increased periods of inundation under Alternative 2 could reduce access to areas of the FWWA, SBWA and YBWA for recreational uses, which may not be fully consistent with the policies in the Yolo County General Plan and particularly Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass. As shown in Table 13-3, the operation of Alternative 2 would result in increased periods of inundation that could reduce public access at FWWA, SBWA and YBWA; and additional closures at YBWA, as shown in Tables 13-4 and 13-5. Therefore, Alternative 2 would result in a minimal decrease in the overall public access for recreational uses at the established wildlife areas overall, which would not be fully consistent with Yolo County General Plan Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass.

CEQA Conclusion

Reductions in recreational and educational opportunities due to changes in access and available lands for these opportunities under Alternative 2 would not result in a substantial adverse effect that would cause a physical change to the environment or adverse social effects. Therefore, the impact is **less than significant**.

NEPA Conclusion

Similar to Alternative 1, the operation of Alternative 2 would reduce the access to and lands available for recreational and educational opportunities due to increased duration and extent of inundation, particularly at the CDFW's YBWA and SBWA, which is a social impact. The reductions would result in adverse social effects to the recreational and educational opportunities at YBWA and SBWA. The implementation of the Mitigation Measures MM-REC-2 (NEPA only), MM-REC-3 (NEPA only) and MM-REC-4 (NEPA only) would help to minimize the adverse social effects to the educational and recreational uses (i.e., reduction in days available for educational, hunting, and wildlife viewing uses) at YBWA and SBWA, in particular.

13.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

13.3.3.4.1 Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Impacts due to the increases in the use of FWWA, SBWA, or YBWA under Alternative 3 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Alternative 3 would result in short-term closures during construction that could temporarily increase use levels within other areas of the FWWA or at SBWA and YBWA, but these increases would be minimal and temporary and would not be expected to result in the substantial physical deterioration of those recreation areas. Therefore, this impact would be **less than significant**.

NEPA Conclusion

As detailed for Alternative 1, implementation of NEPA Mitigation Measure MM-REC-1 would help to minimize the short-term construction-related effects to recreational access and opportunities to the construction disturbance areas (only 19.6 percent of FWWA lands) through coordination with CDFW FWWA managers and public notifications. Nonetheless, recreational access would still be restricted in the construction disturbance areas during the construction period from April 15 through November 1, which coincides with much of FWWA's hunting season, including several key hunting periods. However, NEPA Mitigation Measure MM-REC-1 would provide public notification of the construction disturbance areas and allow recreational visitors the ability to utilize FWWA lands outside the construction disturbance (80.4 percent of FWWA lands) or utilize the alternative wildlife areas in the areas that provide similar opportunities, particularly SBWA and YBWA during the temporary construction period.

13.3.3.4.2 Impact REC-2: Loss of Recreational and Educational Opportunities due to a Reduction in Access and/or Available Lands

Similar to Alternative 1, the operation of Alternative 3 would result in social impacts to recreational and educational opportunities due to changes in the access to and lands available for recreation at the established wildlife areas. These social impacts are discussed below.

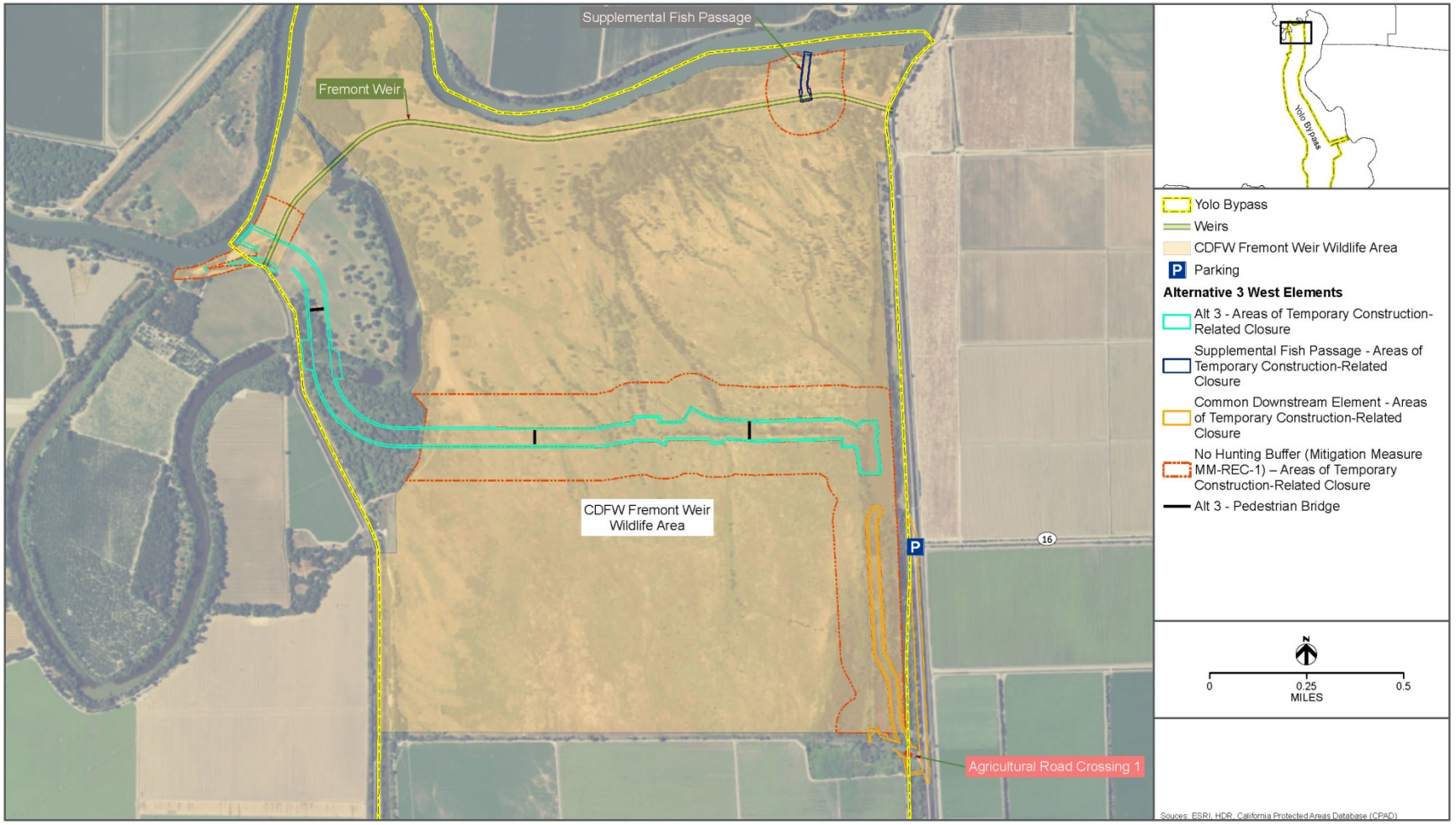
Effects on Access to Recreation Opportunities at the Established Wildlife Areas

Compared to Alternative 1, Alternative 3 would have slightly different components and alignments than Alternatives 1 and 2, but the temporary and permanent effects for recreational

access would be the same as those associated with Alternative 1, which would affect only FWWA. The linear transport channels in Alternative 3 would be located along the southeastern boundary of FWWA and would bisect the northern portion of FWWA similar to Alternative 2 but farther to the west, as shown on Figure 13-13. Similar to Alternative 2, Alternative 3 includes three pedestrian bridges that would maintain access to and movement through FWWA lands for recreational uses by crossing the transport channel, as shown on Figure 13-14.

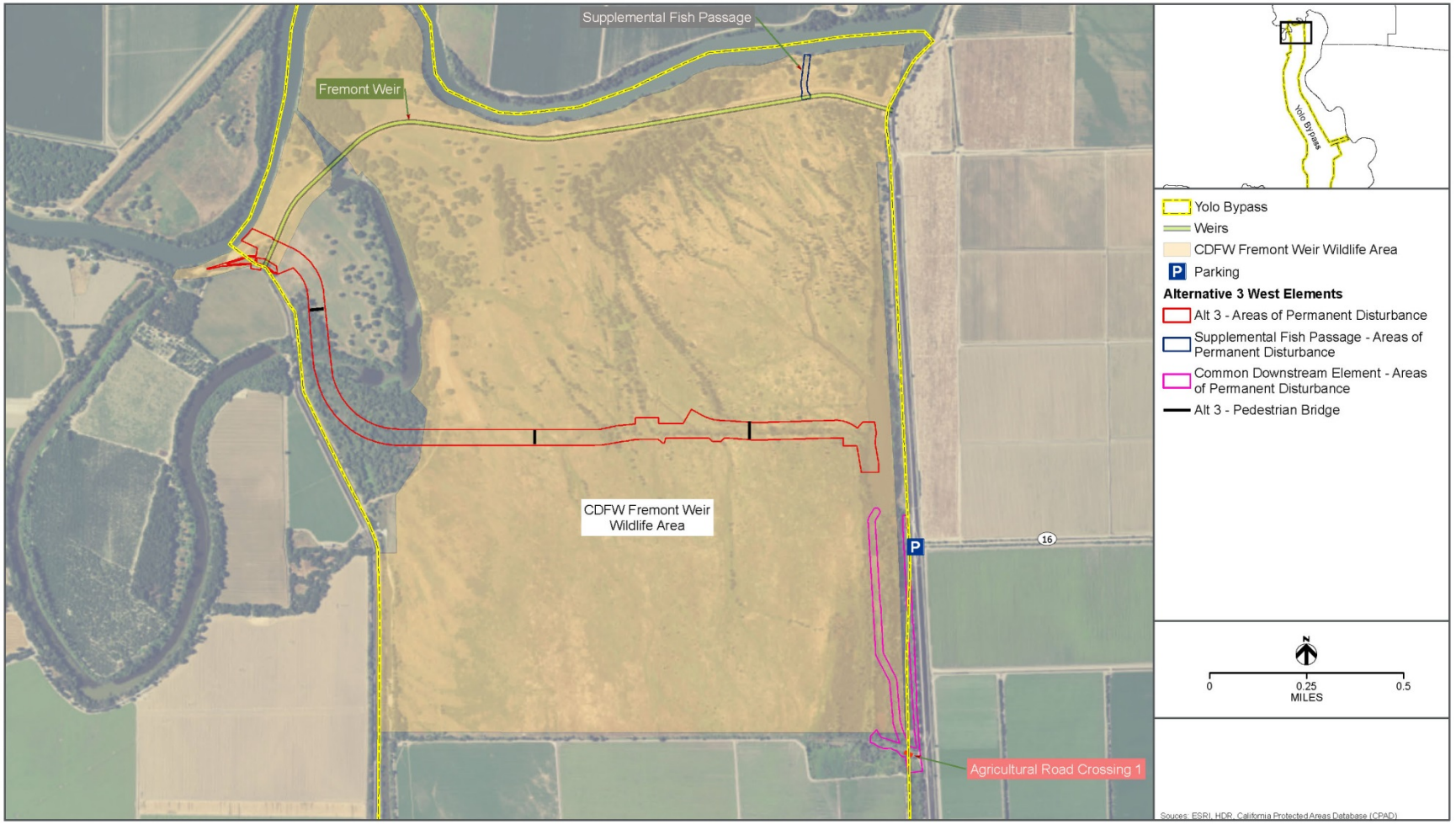
Effects on Available Lands for Recreation Opportunities at Established Wildlife Area

Alternative 3 would have effects similar to Alternative 1 on the amount of available lands due to the areas of temporary construction-related closure and areas of permanent disturbance. Under Alternative 3, the areas of temporary construction-related closure for Alternative 3 components plus the additional 150-yard “no hunting” buffer area as part of MM-REC-1 would result in a total of 286.9 acres of converted lands or 19.6 percent of FWWA lands. Alternative 3 would result in the permanent conversion of 48.4 acres, or 3.3 percent of FWWA lands, which includes 6.8 acres of wetlands or 9.9 percent of wetlands.



Key: CDFW = California Department of Fish and Wildlife

Figure 13-13. Alternative 3 Areas of Temporary Construction-Related Closure in the CDFW Fremont Weir Wildlife Area



Key: CDFW = California Department of Fish and Wildlife

Figure 13-14. Alternative 3 Areas of Permanent Disturbance in the CDFW Fremont Weir Wildlife Area

Regarding increased duration of inundation, Alternative 3 would have similar changes in the duration of inundation as Alternative 1, with the same resulting impacts, as shown on Figure 13-4 and Figure 13-6 for Alternative 1. YBWA and SBWA would be affected in terms of recreational access and opportunities from increased periods of inundation up to three weeks on average, which would represent a 33 to 50 percent increase over Existing Conditions and would be considerable. In addition, critical waterfowl hunting opportunities and educational programs would be affected due to increased periods of inundation. Alternative 3 would result in additional closures of YBWA by 1.9 additional days during the waterfowl hunting season (late October through January), 4.9 additional days during the peak wildlife viewing season (November through February), and 5.3 days during the educational use season (September through May), all of which would not be substantial overall.. Regarding effects on waterfowl hunting opportunities due to changes in the depth of inundation, Alternative 3 would have reductions in the shallow-flooded wetlands and indirect effects on waterfowl hunting opportunities similar to Alternative 1, as shown on Figures 13-8 through 13-10. Refer to Section 13.3.3.2.1 for a more detailed discussion of the effects of Alternative 1.

Closure of Well-Established Wildlife Areas

Regarding additional closures of the wildlife areas, Alternative 3 would have the same effects as Alternative 1, whereby Alternative 3 would result in 28.3 days of closures, which represents an increase of 5.3 days or 23.0 percent over Existing Conditions. However, when considering YBWA is generally open year-round, Alternative 3 would result in a 1.5 percent increase in the number of days closed over the year, which would not be substantial. When examining the key recreational and education use seasons, Alternative 3 would result in an average of 1.9 additional days (range of 0 to 9.7 days across all 16 water years) during the waterfowl hunting season (1.9% of the season), 4.9 additional days (range of 0 to 21 days across all 16 water years) during the peak wildlife viewing season (4.1% of the season), and 5.3 days (range of 0 to 21 days across all 16 water years) during the educational use season (2.0% of the season). Overall across most water years (1997-2012), the additional closure days under Alternative 3 would not be substantial.

Consistency with the YBWA LMP by Affecting Access for the Educational Uses of the YBWA

Alternative 3 would have the same effects as Alternative 1, whereby Alternative 3 would result in YBWA closures for a total of 28.3 days, on average, which equates to an average additional 5.3 days (range of 0 to 21 days across all 16 water years) or a 23.0 percent increase over Existing Conditions. However, the change in comparison to the 37-week educational program period would only be a 2.0 percent reduction in days, on average, which is not expected to reduce access to YBWA facilities in a way that would eliminate or substantially reduce the educational uses of the YBWA. Therefore, implementation of Alternative 3 would not be inconsistent with the YBWA LMP Public-Use Goal 2 by substantially affecting access for educational uses.

Consistency with the Yolo County General Plan by Affecting Public Access for the Recreational Uses of the Yolo Bypass

Alternative 3 would have the same effects as Alternative 1, whereby the increased periods of inundation under Alternative 3 could reduce access to areas of the FWWA, SBWA and YBWA

for recreational uses, which may not be fully consistent with the policies in the Yolo County General Plan and particularly Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass. As shown in Table 13-3, the operation of Alternative 3 would result in increased periods of inundation that could reduce public access at FWWA, SBWA and YBWA; and additional closures at YBWA, as shown in Tables 13-4 and 13-5. Therefore, Alternative 3 would result in a minimal decrease in the overall public access for recreational uses at the established wildlife areas overall, which would not be fully consistent with Yolo County General Plan Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass.

CEQA Conclusion

Reductions in recreational and educational opportunities due to changes in access and available lands for these opportunities under Alternative 3 would not result in a substantial adverse effect that would cause a physical change to the environment or adverse social effects. Therefore, the impact is **less than significant**.

NEPA Conclusion

Similar to Alternative 1, the operation of Alternative 3 would reduce the access to and lands available for recreational and educational opportunities due to increased duration and extent of inundation, particularly at the CDFW's YBWA and SBWA, which is a social impact. The reductions would result in adverse social effects to the recreational and educational opportunities at YBWA and SBWA. The implementation of the Mitigation Measures MM-REC-2 (NEPA only), MM-REC-3 (NEPA only) and MM-REC-4 (NEPA only) would help to minimize the adverse social effects to the educational and recreational uses (i.e., reduction in days available for educational, hunting, and wildlife viewing uses) at YBWA and SBWA, in particular.

13.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. Alternative 4 would allow for two different end dates for when operation of the intake facility would stop allowing inundation flows to enter the bypass—March 7 and March 15. The operational end date would be fixed and would not vary year to year. See Section 2.7 for more details on the alternative features.

13.3.3.5.1 Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Impacts due to the increases in the use of FWWA, SBWA, or YBWA under Alternative 4 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Alternative 4 would result in short-term closures during construction that could temporarily increase use levels within other areas of the FWWA or at SBWA and YBWA, but these increases would be minimal and temporary and would not be expected to result in the substantial physical deterioration of those recreation areas. Therefore, this impact would be **less than significant**.

NEPA Conclusion

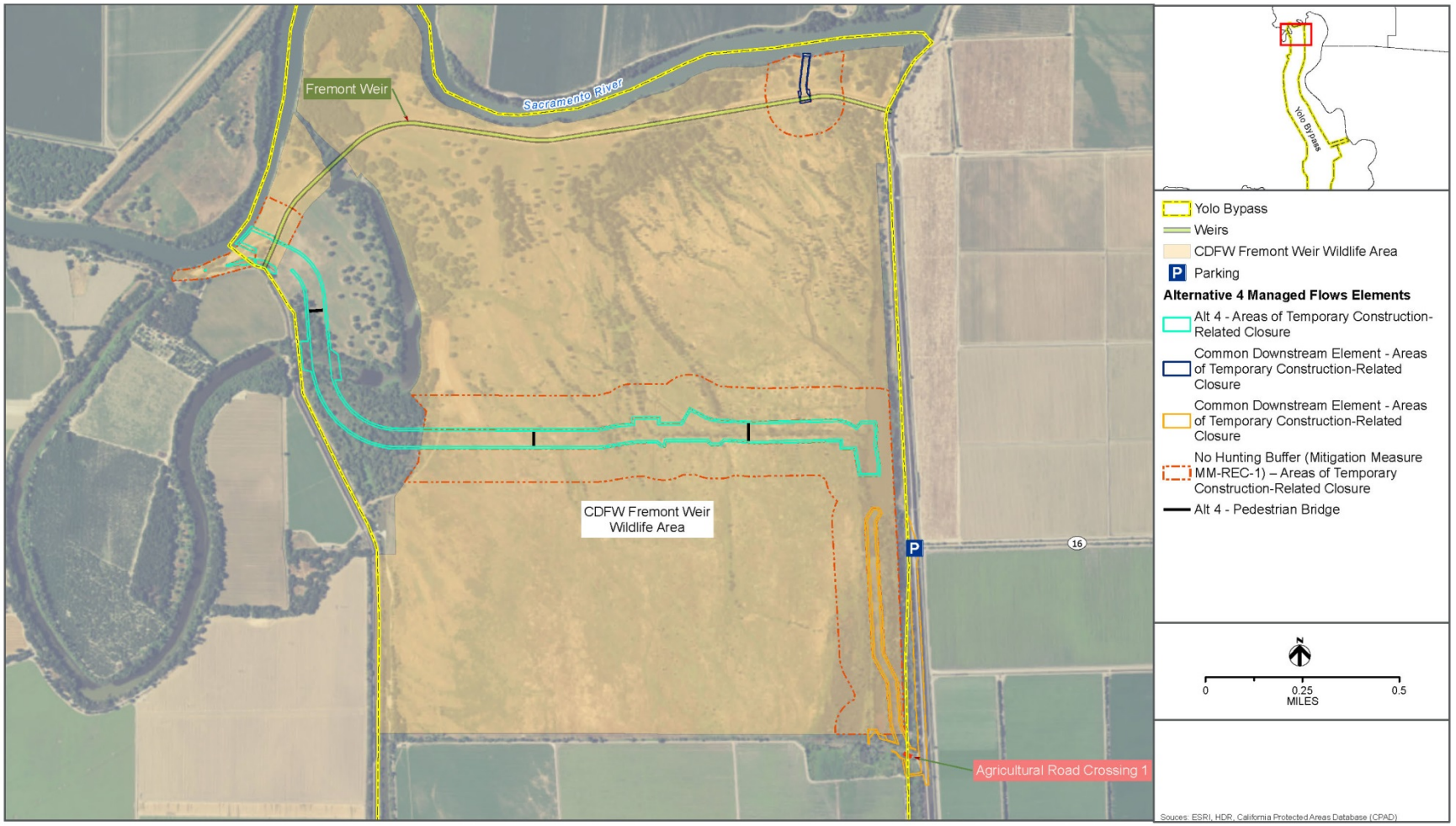
As detailed for Alternative 1, implementation of NEPA Mitigation Measure MM-REC-1 would help to minimize the short-term construction-related effects to recreational access and opportunities to the construction disturbance areas (only 19.6 percent of FWWA lands) through coordination with CDFW FWWA managers and public notifications. Nonetheless, recreational access would still be restricted in the construction disturbance areas during the construction period from April 15 through November 1, which coincides with much of FWWA's hunting season, including several key hunting periods. However, Mitigation Measure MM-REC-1 would provide public notification of the construction disturbance areas and allow recreational visitors the ability to utilize FWWA lands outside the construction disturbance (80.4 percent of FWWA lands) or utilize the alternative wildlife areas in the areas that provide similar opportunities, particularly SBWA and YBWA during the temporary construction period.

13.3.3.5.2 Impact REC-2: Loss of Recreational and Educational Opportunities due to a Reduction in Access and/or Available Lands

Similar to Alternative 1, 2 and 3, the operation of Alternative 4 would result in social impacts to recreational and educational opportunities due to changes in the access to and lands available for recreation at the established wildlife areas. These social impacts are discussed below.

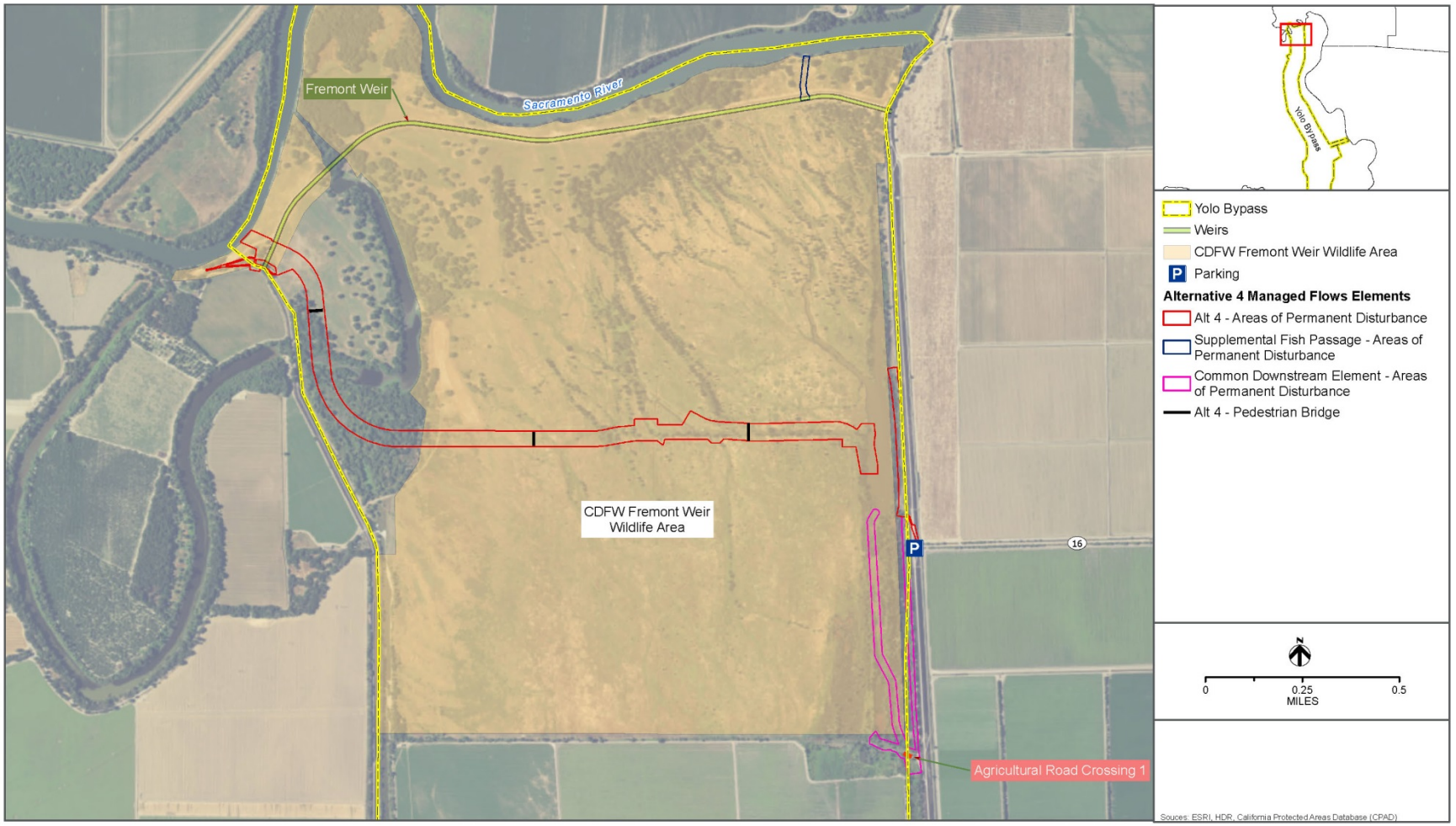
Effects on Access to Recreation Opportunities at the Established Wildlife Areas

Alternative 4 would have slightly different components and alignments than Alternatives 1, 2, and 3, but the temporary and permanent access effects would be the same as those associated with Alternative 1, which would affect only FWWA. The linear transport channels in Alternative 4 would be located along the southeastern boundary of FWWA and would bisect the northern portion of FWWA similar to Alternative 3, as shown on Figure 13-15. As with the other alternatives, Alternative 4 includes three permanent pedestrian bridges in the central and northeastern areas of FWWA (similar to Alternative 3) that would maintain permanent access to and movement through FWWA lands during operation for recreational uses by crossing the transport channel, as shown on Figure 13-16.



Key: CDFW = California Department of Fish and Wildlife

Figure 13-15. Alternative 4 Areas of Temporary Construction-Related Closure in the CDFW Fremont Weir Wildlife Area



Key: CDFW = California Department of Fish and Wildlife

Figure 13-16. Alternative 4 Areas of Permanent Disturbance in the CDFW Fremont Weir Wildlife Area

Effects on Available Lands for Recreation Opportunities at Established Wildlife Area

Alternative 4 would have effects similar to Alternative 1 on the amount of available lands due to the areas of temporary construction-related closure and areas of permanent disturbance. Under Alternative 4, the areas of temporary construction-related closure for Alternative 4 components plus the additional 150-yard "no hunting" buffer area as part of MM-REC-1 would result in a total of 286.9 acres of converted lands or 19.6 percent of FWWA lands. Alternative 4 would result in a total of 48.4 acres of permanently converted lands, or 3.3 percent of the existing lands at FWWA, which includes 6.8 acres of wetlands or 9.9 percent of wetlands within FWWA.

Regarding the periods of inundation, Alternative 4 would have differing effects at FWWA than Alternatives 1, 2, and 3. However, at the SBWA and YBWA, Alternative 4 would result in overall increases in the extent and duration of inundation similar to Alternatives 1, 2, and 3. As a result, Alternative 4 impacts would represent a 33 to 50 percent increase in the duration of inundation at SBWA and a 38 to 50 percent increase at YBWA as compared to Existing Conditions.

For the private hunting clubs south of YBWA, Alternative 4 would result in an increase in the duration of inundation of up to one week, on average, for most of the clubs, as shown on Figure 13-18. The remaining clubs would not experience a change in inundation under Alternative 4. In comparison, Existing Conditions would result in up to six weeks of increased inundation where the private hunting clubs are located, as shown on Figure 13-7. Overall, the Alternative 4 impacts would represent a 17 percent increase over Existing Conditions for most of the private hunting clubs.

Further, the increased duration of inundation from the operation of Alternative 4 could result in additional YBWA closures that could result in a loss of popular waterfowl hunting opportunities and educational opportunities that have short available periods of use and overlap with periods of inundation under Existing Conditions. Waterfowl hunting opportunities at YBWA last for approximately 100 days from late October through January, but waterfowl hunting is only permitted at YBWA three days per week during this period or approximately 45 to 47 days. Table 13-6 shows the total number of days the YBWA would be closed for the complete 100-day period and the weighted period which equates to 46 percent of the complete 100-day period. The following analysis uses the weighted waterfowl hunting period. Alternative 4 would result in YBWA closures for a total of 3.7 days, on average, which equates to an additional 1.9 days over Existing Conditions (Table 13-6). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 4 would result in additional YBWA closure days (weighted for open days) ranging from 0 days (9 of the 16 water years) to 4.1 days in 2003 and 2004. Overall, Alternative 4 would result in five or fewer additional closure days in all 16 water years (Table 13-6). Refer to Appendix I for a detailed summary of the number of days the YBWA would be closed due to inundation for each alternative for each water year (1997-2012) and each month (October-May).

Table 13-6. Alternative 4 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the waterfowl hunting season (late October through January).

Water Year	Existing Condition (100-day season)	Alternative 1 (100-day season)	Difference (100-day season)	Existing Condition (weighted season[1])	Alternative 1 (weighted[1] for open days only)	Difference (weighted[1] for open days only)
1997	40	40	0	18.4	18.4	0.0
1998	14	15	1	6.4	6.9	0.5
1999	0	0	0	0.0	0.0	0.0
2000	0	0	0	0.0	0.0	0.0
2001	0	0	0	0.0	0.0	0.0
2002	7	11	4	3.2	5.1	1.8
2003	9	18	9	4.1	8.3	4.1
2004	0	9	9	0.0	4.1	4.1
2005	0	0	0	0.0	0.0	0.0
2006	28	30	2	12.9	13.8	0.9
2007	0	0	0	0.0	0.0	0.0
2008	0	0	0	0.0	0.0	0.0
2009	0	0	0	0.0	0.0	0.0
2010	0	2	2	0.0	0.9	0.9
2011	1	3	2	0.5	1.4	0.9
2012	0	0	0	0.0	0.0	0.0
Total	99	128	29	45.5	58.9	13.3
Average	6.2	8.0	1.8	2.8	3.7	0.8
Median	0.0	1.0	0.0	0.0	0.5	0.0
Mode	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0	0	0	0.0	0.0	0
Maximum	40	40	9	18.4	18.4	4.1

[1] Weighted season was calculated by multiplying the 100-day season results by 0.46 to account for the 3-day per week wildlife hunting regulation at YBWA (i.e., YBWA is open 45 to 47 days during the 100-day period).

Regarding wildlife viewing, the most popular season at YBWA is November through February. Alternative 4 would result in additional YBWA closures for a total of 13.9 days, on average, which equates to an additional 2.0 days over Existing Conditions (Table 13-7). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 4 would result in additional YBWA closure days ranging from 0 days (8 of the 16 water years) to 9 days in 2003 and 2004. Overall, Alternative 4 would result in five or fewer additional days in 14 of the 16 water years.

Regarding educational opportunities, the most popular season at YBWA is the school year (September through May in general). For this analysis, the relevant months (i.e., when inundation occurs) is October through May. Alternative 4 would result in additional YBWA closures for a total of 25.3 days, on average, which equates to an additional 2.3 days over Existing Conditions (Table 13-7). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 4 would result in additional YBWA closure days ranging from 0 days (8 of the 16 water years) to 10 days in 2003. Overall, Alternative 4 would result in five or fewer additional days in 14 of the 16 water years.

Table 13-7. Alternative 4 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the wildlife viewing season (late October through January) and educational season (October through May).

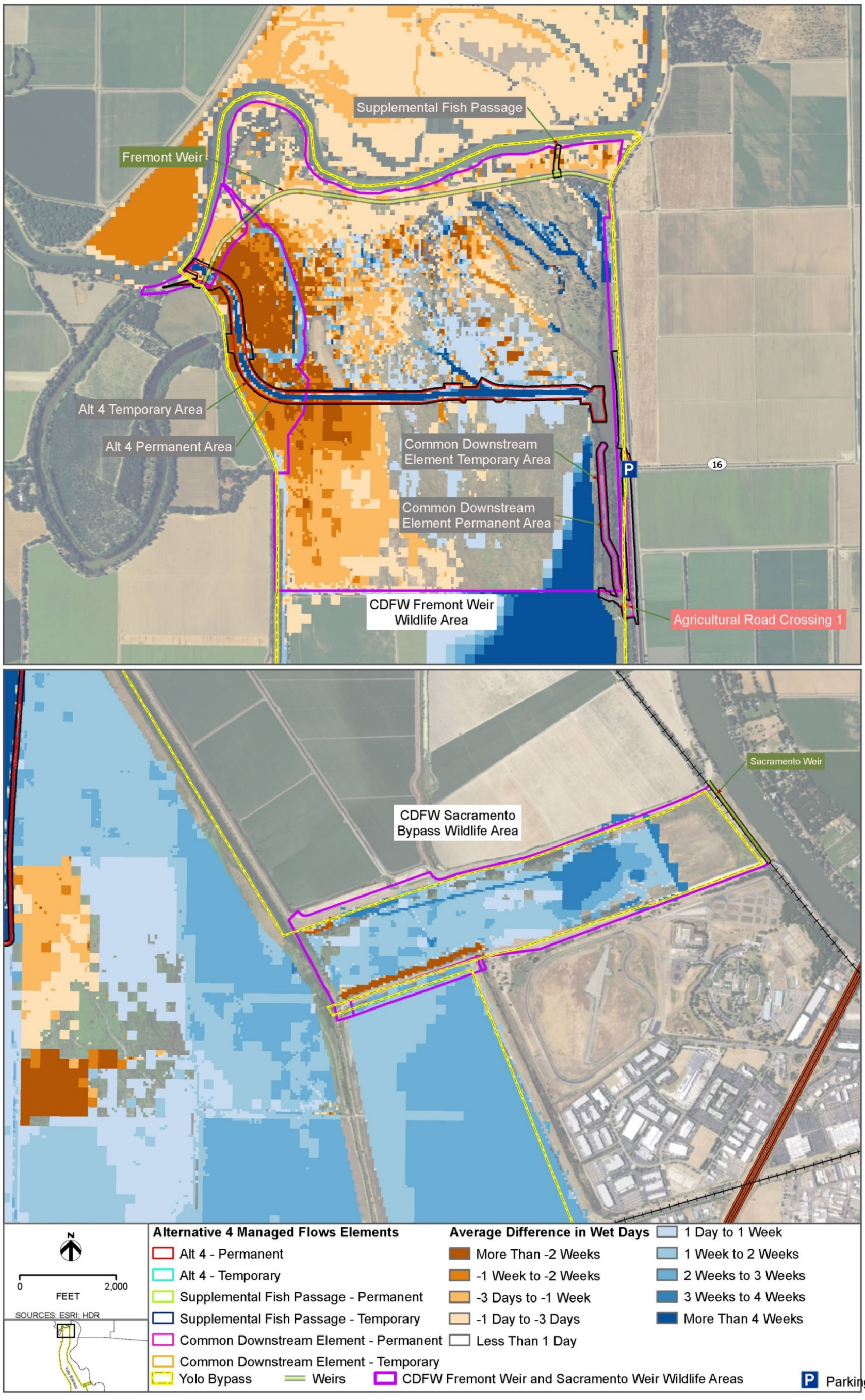
Water Year	Wildlife Viewing Season (Nov-Feb)			Educational Season (Oct-May)		
	Existing Condition	Alternative 4	Difference	Existing Condition	Alternative 4	Difference
1997	55	57	2	55	57	2
1998	42	43	1	77	80	3
1999	18	18	0	34	34	0
2000	14	14	0	33	33	0
2001	0	0	0	0	0	0
2002	7	11	4	7	11	4
2003	9	18	9	9	18	9
2004	10	19	9	24	34	10
2005	0	0	0	4	4	0
2006	34	37	3	100	104	4
2007	0	0	0	0	0	0
2008	0	0	0	0	0	0
2009	0	0	0	0	0	0
2010	0	2	2	0	2	2
2011	1	3	2	25	27	2
2012	0	0	0	0	0	0
Total	190	222	32	368	404	36
Average	11.9	13.9	2.0	23.0	25.3	2.3
Median	4.0	7.0	0.5	8.0	14.5	1.0
Mode	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0	0	0	0	0	0
Maximum	55	57	9	100	104	10

At the FWWA, Alternative 4 would result in an increase in the duration of inundation across 54 percent of FWWA land, or 790.8 acres, as shown in Table 13-8 and on Figure 13-17. The most prevalent amount of increased inundation would be less than one day at 35 percent of FWWA lands or 510.4 acres and one day to one week at 12 percent of FWWA lands or 177.5 acres. Larger periods of increased inundation (from one week to more than four weeks) would be much smaller in scale and localized in the northeast and southeast portions of FWWA, as shown in Table 13-8 and on Figure 13-16. In comparison, Existing Conditions would result in a typical duration of inundation of four to six weeks for the majority of FWWA lands, as shown on Figure 13-5. The impacts associated with Alternative 4 would represent a 17 to 25 percent increase in the duration of inundation compared to Existing Conditions, which would result in a typical duration of inundation of four to six weeks for the majority of FWWA lands.

Table 13-8. Alternative 4 Changes in Duration of Inundation (in Wet Days) at the FWWA, SBWA, and YBWA

Average Difference in Duration of Wet Days	Alternative 1 FWWA (acres)	Alternative 1 FWWA (percent)	Alternative 1 SBWA (acres)	Alternative 1 SBWA (percent)	Alternative 1 YBWA (acres)	Alternative 1 YBWA (percent)
More than -2 weeks	42.4	2.9%	10.8	3.0%	1.5	<0.1%
-1 to -2 weeks	80.3	5.5%	0.5	0.1%	15.4	0.1%
-3 days to -1 week	208.3	14.3%	0.6	0.2%	1.8	0.0%
-1 day to -3 days	237.4	16.2%	0.6	0.2%	2.9	0.0%
No change	101.8	7.0%	47.4	13.2%	2707.7	16.1%
Less than 1 day	510.4	34.9%	51.2	14.2%	4181.3	24.9%
1 day to 1 week	177.5	12.1%	32.3	9.0%	2507.7	15.0%
1 week to 2 weeks	11.9	0.8%	127.9	35.5%	5609.1	33.4%
2 weeks to 3 weeks	7.8	0.5%	51.8	14.4%	1736.3	10.4%
3 weeks to 4 weeks	12.1	0.8%	37.1	10.3%	6.2	<0.1%
More than 4 weeks	71.2	4.9%	0.0	0.0%	0.0	0.0%
Total	**1,461**	**100%**	**360**	**100%**	**16,770**	**100%**

Key: FWWA= Fremont Weir Wildlife Area; SBWA= Sacramento Bypass Wildlife Area; YBWA= Yolo Bypass Wildlife Area



Key: CDFW = California Department of Fish and Wildlife

Figure 13-17. Alternative 4 Location and Change in Frequency of Inundation (in Wet Days) at the CDFW Fremont Weir Wildlife Area and Sutter Bypass Wildlife Area

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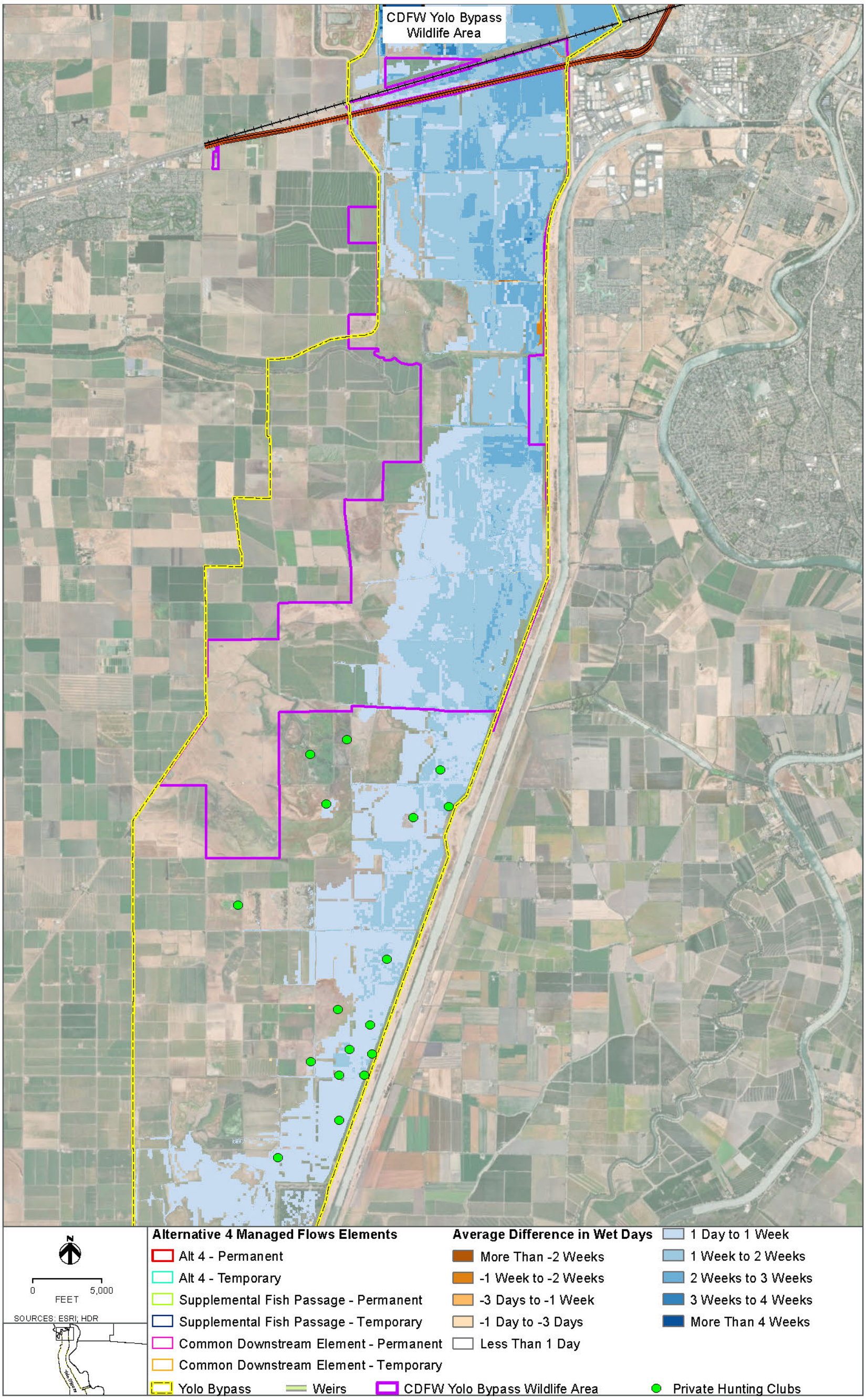

Key: CDFW = California Department of Fish and Wildlife

Figure 13-18. Alternative 4 Location and Change in Frequency of Inundation (in Wet Days) at the CDFW Yolo Bypass Wildlife Area

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The change in depth of the inundation could affect the recreational opportunities particularly waterfowl hunting in the Yolo Bypass due to reductions in available shallow-flood wetlands that are critical to waterfowl. Alternative 4 would result in a loss of shallow-flooded wetlands that would affect the amount of lands available for recreational waterfowl hunting, and thus, potentially indirectly affect the recreational waterfowl hunting opportunities in the shallow-flooded wetlands of the Yolo Bypass similar to Alternative 1. The operation of Alternative 4 could also potentially indirectly affect the incentive for private hunting clubs to continue to use shallow-flooded wetlands for hunting if the loss of critical waterfowl habitat reduced the hunting opportunities, particularly if the loss occurred in successive years or frequently within a short time period. The shallow-flooded wetlands analysis was conducted for the Yolo Bypass overall and did not assess individual parcels; thus, the timing and magnitude of the potential effects on site-specific parcels such as the private hunting club lands are uncertain. Adding to the uncertainty of the private hunting club effects, some of the private hunting clubs within the Yolo Bypass have additional hunting areas outside the Yolo Bypass as alternatives when hunting areas are inundated within the Yolo Bypass.

Similar to Alternative 1, the operation of Alternative 4 would result in a reduction in the amount of available shallow-flooded wetlands in the 1999 Wet WY, 2002 Dry WY and 2005 Above Normal WY; and occur during the 100-day waterfowl hunting season from late October through January. Specifically, in the 1999 Wet WY, Alternative 4 would result in a reduction of shallow-flooded wetlands by up to approximately 1,600 acres, or 14 percent of the of the shallow-flooded wetlands under Existing Conditions. Similar to Alternative 1, the reductions occur in two separate periods but to a lesser magnitude from late November through early December for approximately four weeks and again in the latter half of January into early February for approximately three weeks--both in the midst of the 100-day waterfowl hunting season, as shown on Figure 13-19 (Ducks Unlimited 2017). These two periods of reductions do not occur at all under Existing Conditions. Overall, the timing and duration of these reductions are similar to Existing Conditions, but the magnitude is slightly greater under Alternative 6. In the 2002 Dry WY, Alternative 4 would result in a reduction of shallow-flooded wetlands similar to Alternative 1 in duration and timing, but a slightly greater magnitude. Specifically, Alternative 4 would result in reductions up to approximately 1,400 acres, or up to 22 percent of the of the shallow-flooded wetlands under Existing Conditions, as shown on Figure 13-20 (Ducks Unlimited 2017). The timing and duration of these reductions are similar to Existing Conditions, but the magnitude is greater under Alternative 6. In the 2005 Above Normal WY, Alternative 4 would result in a reduction of shallow-flooded wetlands similar to Alternative 1 in duration and timing, but a slightly greater magnitude. Specifically, Alternative 4 would result in reductions up to approximately 2,900 acres or up to 34 percent of the of the shallow-flooded wetlands under Existing Conditions, as shown on Figure 13-21 (Ducks Unlimited 2017). The timing and duration of these reductions are similar to Existing Conditions, but the magnitude is substantially greater under Alternative 4.

Overall, the operation of Alternative 4 would have an indirect effect on waterfowl hunting opportunities in the Yolo Bypass overall due to the substantial reductions in the availability of shallow-flooded wetlands, especially when combined with the timing of these reductions during the popular 100-day waterfowl hunting season. In general, while reductions in shallow-flooded wetlands occur under Existing Conditions, the magnitude of the reductions under Alternative 4 is considerably greater. The operation of Alternative 4 could also potentially have a considerable

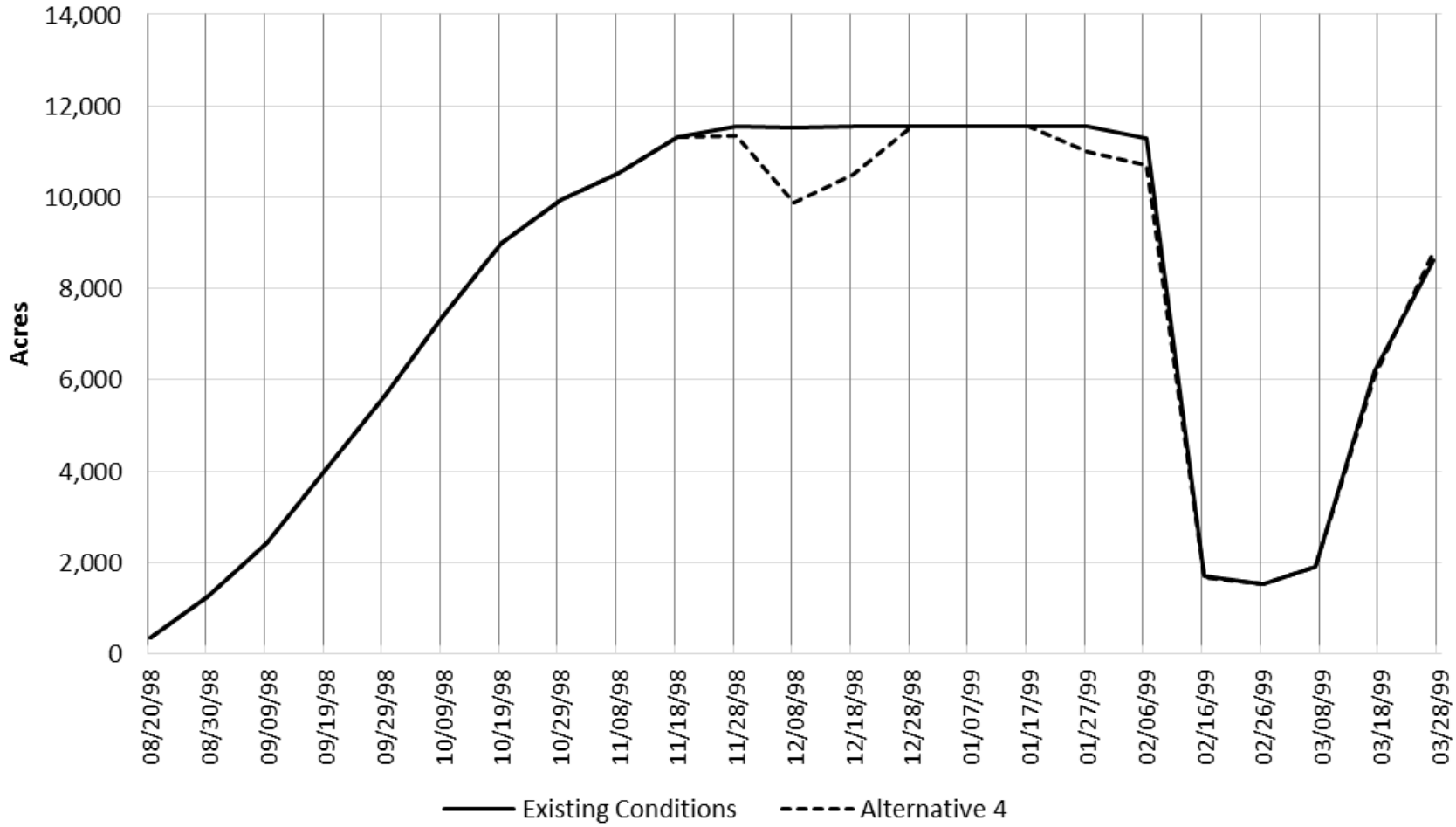


Figure 13-19. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 4 and Existing Conditions in the in the Wet Water Year 1999 (Ducks Unlimited 2017).

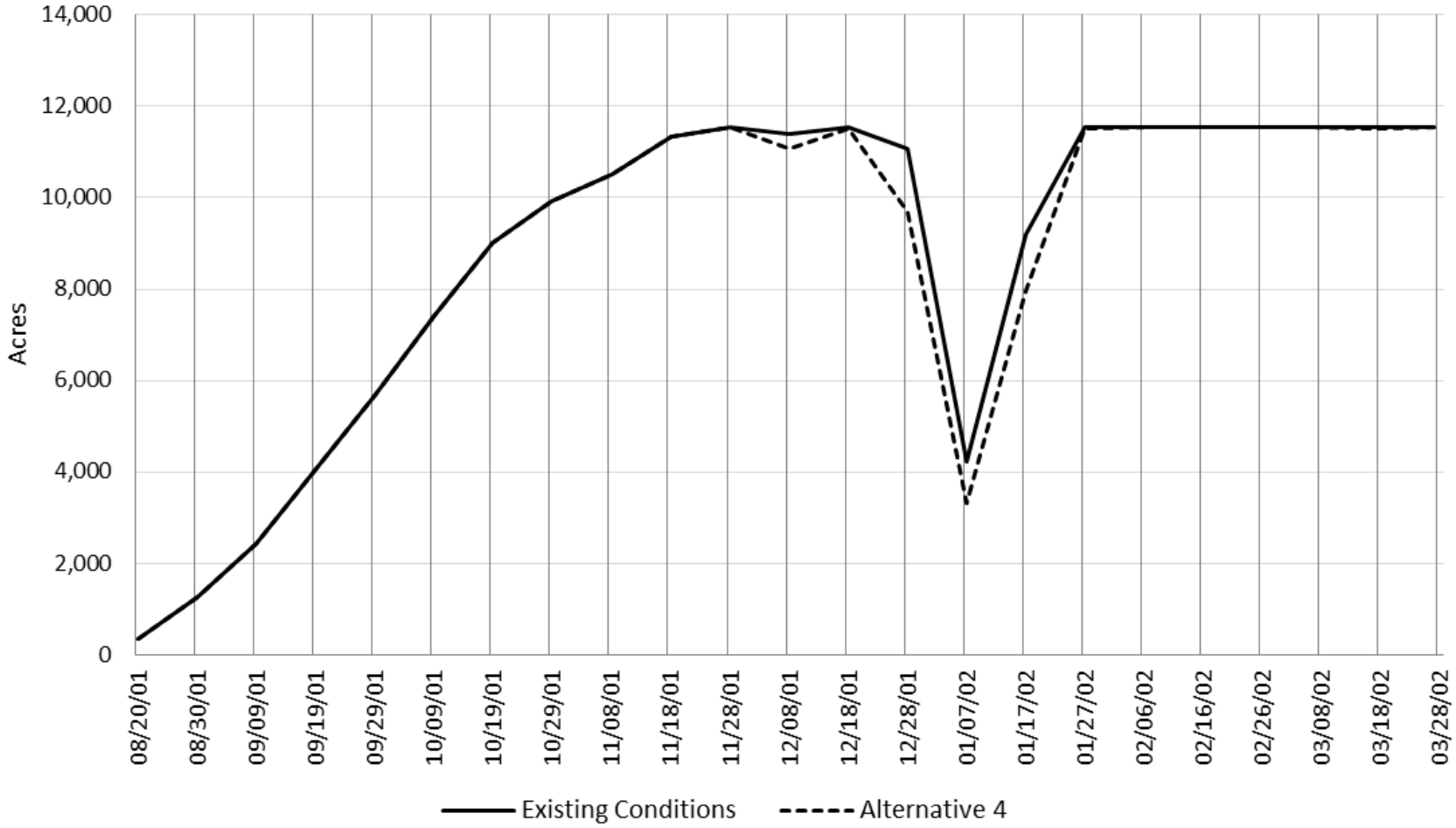


Figure 13-20. Average of number of acres of shallow-flooded (≤18") managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 4 and Existing Conditions in the in the Dry Water Year 2002 (Ducks Unlimited 2017).

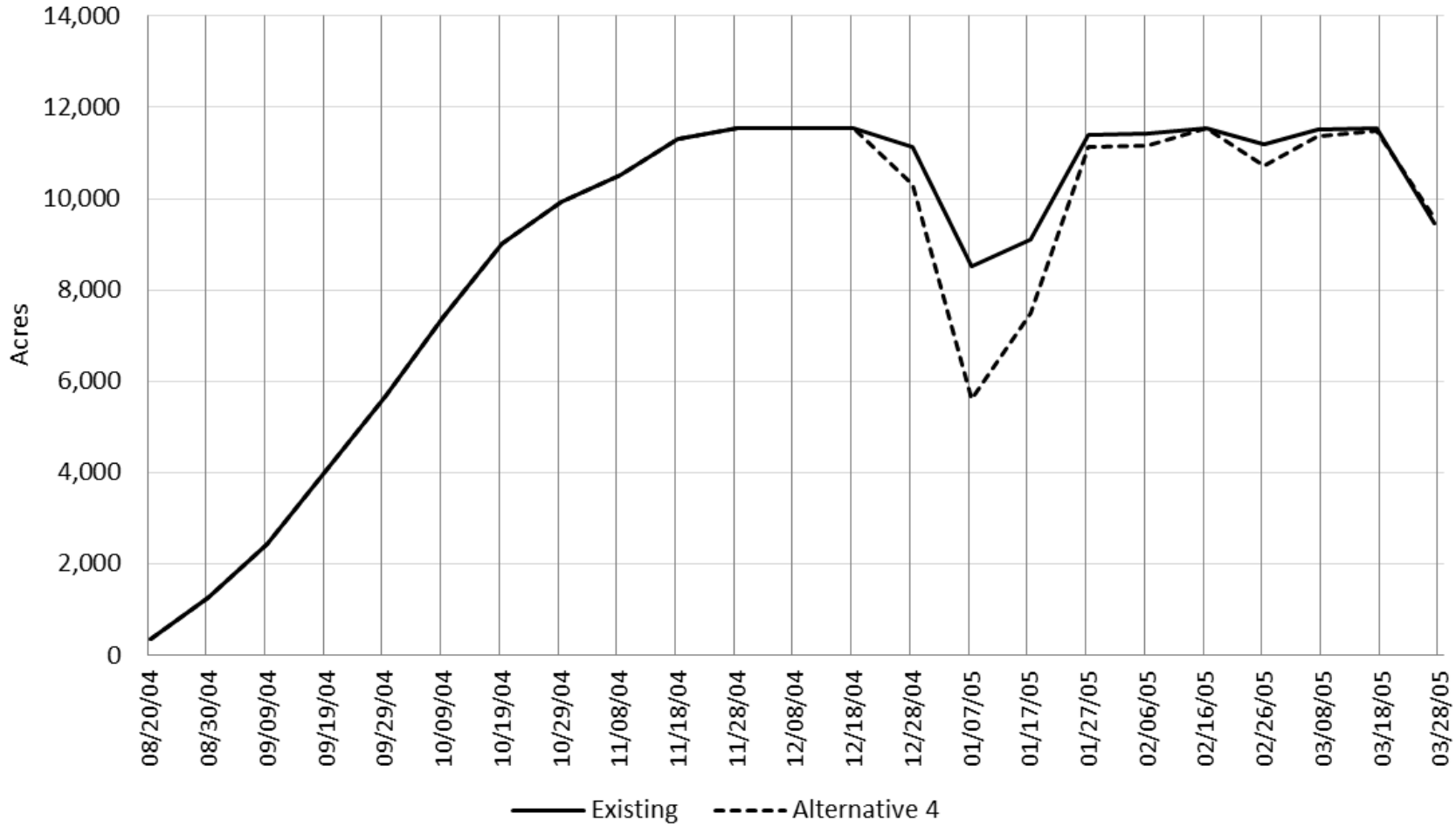


Figure 13-21. Average of number of acres of shallow-flooded (≤18") managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 4 and Existing Conditions in the in the Above Normal Water Year 2005 (Ducks Unlimited 2017).

indirect effect on the incentive for private hunting clubs to continue managing the shallow-flooded wetlands for waterfowl hunting, particularly if the loss occurred in successive years or frequently within a short period of time. However, there is uncertainty of the magnitude of the effects on individual parcels such as the private hunting clubs since the analysis was conducted for the Yolo Bypass overall and not for individual sites or areas.

Closure of Well-Established Wildlife Areas

Alternative 4 would not result in any additional closures due to the presence of the permanent components, particularly with the plans for pedestrian bridges to maintain access to FWWA lands. However, Alternative 4 would result in additional closures at YBWA due to the increase in the duration of inundation since current CDFW management closes YBWA when certain levels of inundation occur. CDFW does not formally close FWWA or SBWA during periods of inundation. Overall, the operation of Alternative 4 would result in 25.3 days of closures, which represents an increase of 2.3 days or 10.0 percent over Existing Conditions. However, when considering YBWA is generally open year-round, Alternative 4 would result in a less than one percent increase in the number of days closed over the year, which would not be substantial. When examining the key recreational and education use seasons, Alternative 4 would result in an average of 0.8 additional days (range of 0 to 4.11 days across all 16 water years) during the waterfowl hunting season (0.8% of the season), 2.0 additional days (range of 0 to 9 days across all 16 water years) during the peak wildlife viewing season (1.7% of the season), and 2.3 days (range of 0 to 10 days across all 16 water years) during the educational use season (0.9% of the season), all of which would not be substantial.

Consistency with the YBWA LMP by Affecting Access for the Educational Uses of the YBWA

As discussed above, the increased periods of inundation would impede upon the access to areas of the YBWA due to closures for educational programs and activities, which typically occur from September through May or an approximately 37-week period. As shown in Table 13-6, the operation of Alternative 4 would result in YBWA closures for a total of 25.3 days, on average, which equates to an average additional 2.3 days (range of 0 to 10 days across all 16 water years) or a 10.0 percent increase over Existing Conditions. However, the average change across all 16 water years in comparison to the 37-week educational program period would be a less than one percent reduction in days, which would not be expected to reduce access to YBWA facilities in a way that would eliminate or substantially reduce the educational uses of the YBWA. Therefore, Alternative 4 would not be inconsistent with the YBWA LMP Public-Use Goal 2 by substantially affecting access for educational uses.

Consistency with the Yolo County General Plan by Affecting Public Access for the Recreational Uses of the Yolo Bypass

Alternative 4 would result increased periods of inundation that could reduce access to areas of the FWWA, SBWA and YBWA for recreational uses, which may not be fully consistent with the policies in the Yolo County General Plan and particularly Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass. As shown in Table 13-6, the operation of Alternative 4 would result in increased periods of inundation that could reduce public access at FWWA, SBWA and YBWA; and additional closures at YBWA. Therefore, Alternative 4 would

result in a minimal decrease in the overall public access for recreational uses at the established wildlife areas overall, which would not be fully consistent with Yolo County General Plan Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass.

CEQA Conclusion

Reductions in recreational and educational opportunities due to changes in access and available lands for these opportunities under Alternative 4 would not result in a substantial adverse effect that would cause a physical change to the environment or adverse social effects. Therefore, the impact is **less than significant**.

NEPA Conclusion

13.3.3.6 As with Alternatives 1, 2 and 3 and detailed above, the operation of Alternative 4 would reduce the access to and lands available for recreational and educational opportunities due to increased duration and extent of inundation, particularly at the CDFW's YBWA and SBWA, which is a social impact. The reductions would result in adverse social effects to the recreational and educational opportunities at YBWA and SBWA. The implementation of the Mitigation Measures MM-REC-2 (NEPA only), MM-REC-3 (NEPA only) and MM-REC-4 (NEPA only) would help to minimize the adverse social effects to the educational and recreational uses (i.e., reduction in days available for educational, hunting, and wildlife viewing uses) at YBWA and SBWA, in particular.

13.3.3.7 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the capture of fish through using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

13.3.3.7.1 Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Impacts due to the increases in the use of FWWA, SBWA or YBWA under Alternative 5 would be to the same as those discussed for Alternative 1.

CEQA Conclusion

Alternative 5 would result in short-term closures during construction that could temporarily increase use levels within other areas of the FWWA or at SBWA and YBWA, but these increases would be minimal and temporary and would not be expected to result in the substantial physical deterioration of those recreation areas. Therefore, this impact would be **less than significant**.

NEPA Conclusion

As detailed for Alternative 1, implementation of Mitigation Measure MM-REC-1 would help to minimize the short-term construction-related effects to recreational access and opportunities to the construction disturbance areas (only 23.7 percent of FWWA lands) through coordination with CDFW FWWA managers and public notifications. Nonetheless, recreational access would still be restricted in the construction disturbance areas during the construction period from April 15 through November 1, which coincides with much of FWWA's hunting season, including several key hunting periods. However, NEPA Mitigation Measure MM-REC-1 would provide public notification of the construction disturbance areas and allow recreational visitors the ability to utilize FWWA lands outside the construction disturbance (76.3 percent of FWWA lands) or utilize the alternative wildlife areas in the areas that provide similar opportunities, particularly SBWA and YBWA during the temporary construction period.

13.3.3.7.2 Impact REC-2: Loss of Recreational and Educational Opportunities due to a Reduction in Access and/or Available Lands

Effects on Access to Recreation Opportunities at the Established Wildlife Areas

Alternative 5 would have slightly different components and alignments as compared to Alternatives 1, 2, 3, and 4, but the temporary and permanent construction-related effects to the recreational access would be the same as those associated with Alternative 1, and would affect only FWWA, as shown on Figure 13-22. The linear transport channels in Alternative 5 would bisect the FWWA from the northwest portion diagonally to the southeast portion, as shown on Figure 13-22. To address access effects, Alternative 5 also includes plans for two pedestrian bridges that would maintain access to and movement through the FWWA lands for recreational uses by crossing the transport channel, as shown on Figure 13-23. Refer to Section 13.3.3.2.1 for a more detailed discussion of the effects of Alternative 1.

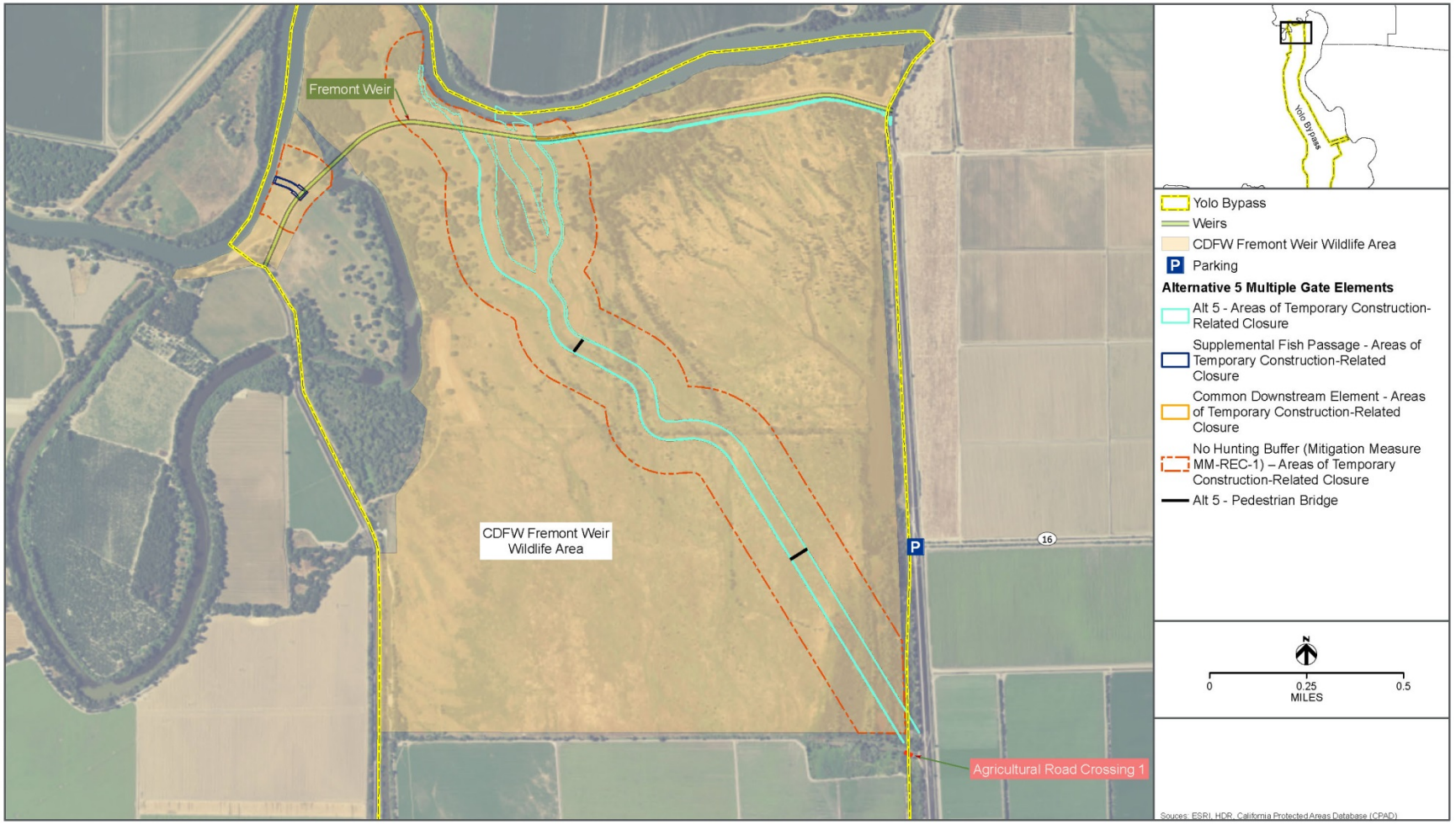
Effects on Available Lands for Recreation Opportunities at Established Wildlife Area

Alternative 5 would have effects similar to Alternative 1 on the amount of available lands due to the areas of temporary construction-related closure and areas of permanent disturbance. Under Alternative 5, the areas of temporary construction-related closure for Alternative 5 components plus the additional 150-yard "no hunting" buffer area as part of MM-REC-1 would result in a total of 345.7 acres of converted lands or 23.7 percent of FWWA lands. Alternative 5 would result in the permanent conversion of 78.9 acres, or 5.4 percent of FWWA lands, which includes 5.1 acres of wetlands or 7.4 percent of wetlands.

Regarding increased duration of inundation, the two-dimensional unsteady flow modeling (TUFLOW) inundation model for Alternative 5 was based upon a design previous to the final design due to a late change to the proposed design. The modeled design had incorporated additional grading to increase the flooded habitat in the FWWA during non-overtopping flows. The additional grading was removed for the final design outside of the proposed trapezoidal transport channels. The grading would not impact the discharge entering the bypass and would have only a slight impact on results downstream of the FWWA. The design modification does not significantly change the inundated area calculations and figures within the FWWA. Thus, the inundated area and change in duration values for the final Alternative 5 design would be similar

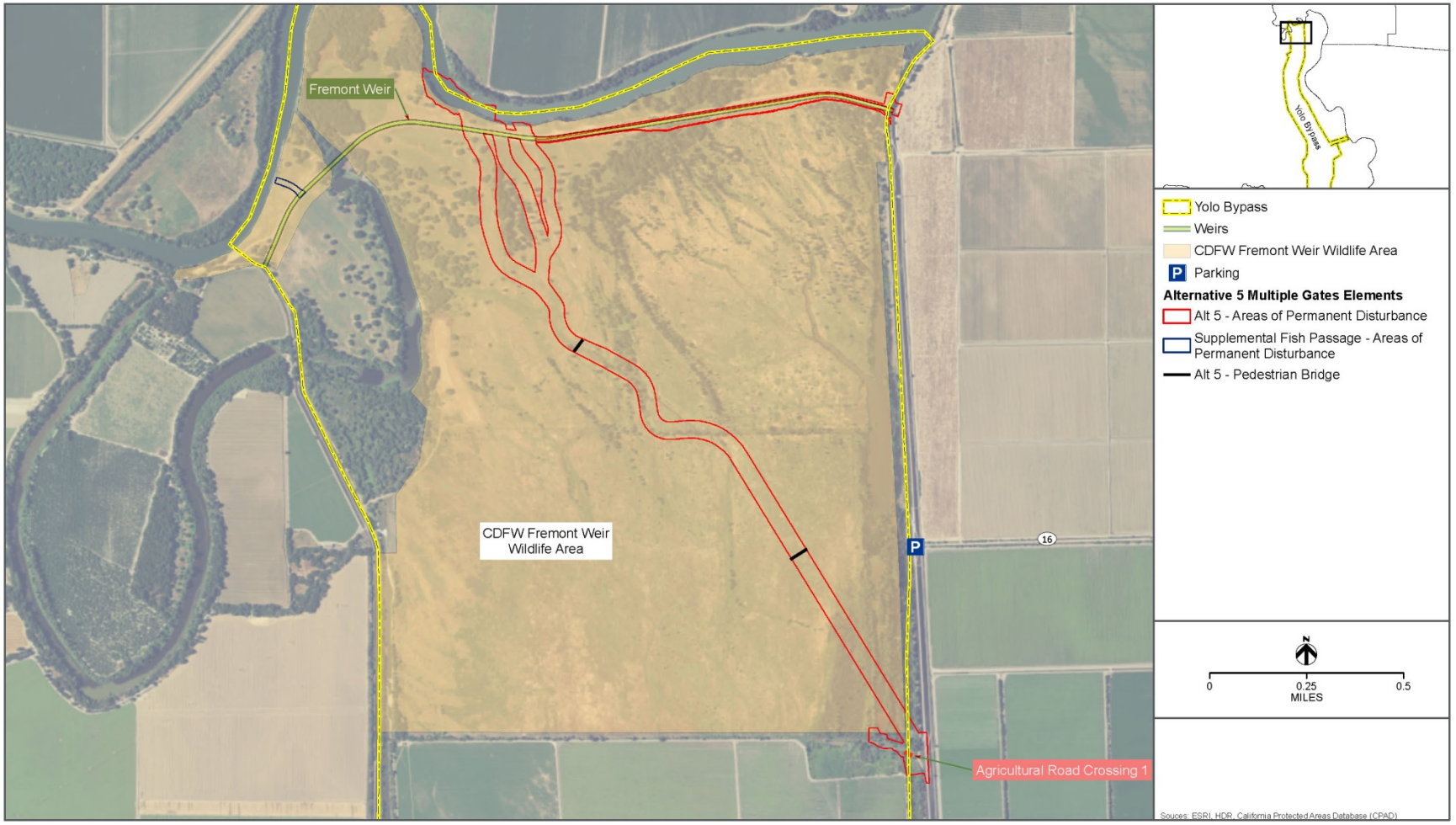
to Alternative 4, which also has additional channels through the FWWA. Refer to the Alternative 4 wetted area acreages (Table 13-8) and inundation figures (Figure 13-17 and Figure 13-18).

As with Alternative 4, the impacts associated with Alternative 5 would represent a 17 to 25 percent increase in the duration of inundation compared to Existing Conditions, which would result in a typical duration of inundation of four to six weeks for the majority of FWWA lands. At the SBWA and YBWA, Alternative 5 impacts would represent a 33 to 50 percent increase in the duration of inundation at SBWA and a 38 to 50 percent increase at YBWA as compared to Existing Conditions.



Key: CDFW = California Department of Fish and Wildlife

Figure 13-22. Alternative 5 Areas of Temporary Construction-Related Closure in the CDFW Fremont Weir Wildlife Area



Key: CDFW = California Department of Fish and Wildlife

Figure 13-23. Alternative 5 Areas of Permanent Disturbance in the CDFW Fremont Weir Wildlife Area

For the private hunting clubs south of YBWA, Alternative 5 would result in the same increases in inundation as Alternative 4, whereby Alternative 4 would result in an increase in the duration of inundation of up to one week, on average, for most of the clubs, as shown on Figure 13-18. The remaining clubs would not experience a change in inundation under Alternative 4. In comparison, Existing Conditions would result in up to six weeks of increased inundation where the private hunting clubs are located, as shown on Figure 13-7. Overall, the Alternative 5 impacts would represent a 17 percent increase over Existing Conditions for most of the private hunting clubs.

The increased duration of inundation from the operation of Alternative 5 could result in additional YBWA closures that could result in a loss of popular waterfowl hunting opportunities that have short available periods of use and overlap with periods of inundation under Existing Conditions. Waterfowl hunting opportunities at YBWA last for approximately 100 days from late October through January, but waterfowl hunting is only permitted at YBWA three days per week during this period or approximately 45 to 47 days. Table 13-9 shows the total number of days the YBWA would be closed for the complete 100-day period and the weighted period which equates to 46 percent of the complete 100-day period. The following analysis uses the weighted waterfowl hunting period. Alternative 5 would result in YBWA closures for a total of 3.8 days, on average, which equates to an additional 0.9 days over Existing Conditions (Table 13-9). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 5 would result in additional YBWA closure days (weighted for open days) ranging from 0 days (9 of the 16 water years) to 4.6 days in 2003. Overall, Alternative 5 would result in five or fewer additional closure days in all 16 water years (Table 13-9). Refer to Appendix I for a detailed summary of the number of days the YBWA would be closed due to inundation for each alternative for each water year (1997-2012) and each month (October-May).

Table 13-9. Alternative 5 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the waterfowl hunting season (late October through January).

Water Year	Existing Condition (100-day season)	Alternative 1 (100-day season)	Difference (100-day season)	Existing Condition (weighted season[1])	Alternative 1 (weighted[1] for open days only)	Difference (weighted[1] for open days only)
1997	40	40	0	18.4	18.4	0.0
1998	14	15	1	6.4	6.9	0.5
1999	0	0	0	0.0	0.0	0.0
2000	0	0	0	0.0	0.0	0.0
2001	0	0	0	0.0	0.0	0.0
2002	7	12	5	3.2	5.5	2.3
2003	9	19	10	4.1	8.7	4.6
2004	0	8	8	0.0	3.7	3.7
2005	0	0	0	0.0	0.0	0.0
2006	28	31	3	12.9	14.3	1.4
2007	0	0	0	0.0	0.0	0.0
2008	0	0	0	0.0	0.0	0.0
2009	0	0	0	0.0	0.0	0.0
2010	0	4	4	0.0	1.8	1.8
2011	1	3	2	0.5	1.4	0.9
2012	0	0	0	0.0	0.0	0.0

Water Year	Existing Condition (100-day season)	Alternative 1 (100-day season)	Difference (100-day season)	Existing Condition (weighted season[1])	Alternative 1 (weighted[1] for open days only)	Difference (weighted[1] for open days only)
Total	99	132	33	45.5	60.7	15.2
Average	6.2	8.3	2.1	2.8	3.8	0.9
Median	0.0	1.5	0.0	0.0	0.7	0.0
Mode	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0	0	0	0.0	0.0	0
Maximum	40	40	10	18.4	18.4	4.6

[1] Weighted season was calculated by multiplying the 100-day season results by 0.46 to account for the 3-day per week wildlife hunting regulation at YBWA (i.e., YBWA is open 45 to 47 days during the 100-day period).

Regarding wildlife viewing, the most popular season at YBWA is November through February. Alternative 5 would result in additional YBWA closures for a total of 14.2 days, on average, which equates to an additional 2.3 days over Existing Conditions (Table 13-10). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 5 would result in additional YBWA closure days ranging from 0 days (8 of the 16 water years) to 10 days in 2003. Overall, Alternative 5 would result in five or fewer additional days in 14 of the 16 water years.

Regarding educational opportunities, the most popular season at YBWA is the school year (September through May in general). For this analysis, the relevant months (i.e., when inundation occurs) is October through May. Alternative 5 would result in additional YBWA closures for a total of 25.5 days, on average, which equates to an additional 2.5 days over Existing Conditions (Table 13-10). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 5 would result in additional YBWA closure days ranging from 0 days (8 of the 16 water years) to 10 days in 2003. Overall, Alternative 5 would result in five or fewer additional days in 14 of the 16 water years.

Table 13-10. Alternative 5 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the wildlife viewing season (late October through January) and educational season (October through May).

Water Year	Wildlife Viewing Season (Nov-Feb)			Educational Season (Oct-May)		
	Existing Condition	Alternative 5	Difference	Existing Condition	Alternative 5	Difference
1997	55	58	3	55	58	3
1998	42	43	1	77	80	3
1999	18	18	0	34	34	0
2000	14	14	0	33	33	0
2001	0	0	0	0	0	0
2002	7	12	5	7	12	5
2003	9	19	10	9	19	10
2004	10	18	8	24	33	9
2005	0	0	0	4	4	0
2006	34	38	4	100	104	4
2007	0	0	0	0	0	0

Water Year	Wildlife Viewing Season (Nov-Feb)			Educational Season (Oct-May)		
	Existing Condition	Alternative 5	Difference	Existing Condition	Alternative 5	Difference
2008	0	0	0	0	0	0
2009	0	0	0	0	0	0
2010	0	4	4	0	4	4
2011	1	3	2	25	27	2
2012	0	0	0	0	0	0
Total	190	227	37	368	408	40
Average	11.9	14.2	2.3	23.0	25.5	2.5
Median	4.0	8.0	0.5	8.0	15.5	1.0
Mode	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0	0	0	0	0	0
Maximum	55	58	10	100	104	10

The change in depth of the inundation could affect the recreational opportunities particularly waterfowl hunting in the Yolo Bypass due to reductions in available shallow-flood wetlands that are critical to waterfowl. Alternative 5 would result in a loss of shallow-flooded wetlands that would affect the amount of lands available for recreational waterfowl hunting, and thus, indirectly could affect the recreational waterfowl hunting opportunities in the shallow-flooded wetlands of the Yolo Bypass similar to the other alternatives. The operation of Alternative 5 could also potentially indirectly affect the incentive for private hunting clubs to continue to use shallow-flooded wetlands for hunting if the loss of critical waterfowl habitat reduced the hunting opportunities, particularly if the loss occurred in successive years or frequently within a short time period. The shallow-flooded wetlands analysis was conducted for the Yolo Bypass overall and did not assess individual parcels; thus, the timing and magnitude of the potential effects on site-specific parcels such as the private hunting club lands are uncertain. Adding to the uncertainty of these effects, some of the private hunting clubs within the Yolo Bypass have additional hunting areas outside the Yolo Bypass as alternatives when hunting areas are inundated within the Yolo Bypass.

Similar to the other alternatives, the operation of Alternative 5 would result in a reduction in the amount of available shallow-flooded wetlands in the 1999 Wet WY, 2002 Dry WY and 2005 Above Normal WY; and occur during the 100-day waterfowl hunting season from late October through January. More specifically, in the 1999 Wet WY, Alternative 5 would result in a reduction of shallow-flooded wetlands compared to Existing Conditions, but similar to Alternative 4 in timing and duration but with a slightly larger magnitude. Specifically, Alternative 5 would result in a reduction of shallow-flooded wetlands by up to approximately 2,400 acres, or 20 percent of the of the shallow-flooded wetlands under Existing Conditions, as shown on Figure 13-24 (Ducks Unlimited 2017).

In both the 2002 Dry and 2005 Above Normal WY, Alternative 5 would result in a reduction of shallow-flooded wetlands compared to Existing Conditions, but similar to Alternative 4 in timing, duration, and magnitude, as shown on Figures 13-25 and 13-26 (Ducks Unlimited 2017).

Overall, the operation of Alternative 5 would have an indirect effect on waterfowl hunting opportunities in the Yolo Bypass due to the reductions in the availability of shallow-flooded wetlands, especially when combined with the timing of these reductions during the popular 100-day waterfowl hunting season. In general, while reductions in shallow-flooded wetlands occur under Existing Conditions, the magnitude of the reductions under Alternative 5 is considerably greater. The operation of Alternative 5 could potentially have an indirect effect on the incentive for private hunting clubs to continue managing the shallow-flooded wetlands for waterfowl hunting, particularly if the loss occurred in successive years or frequently within a short period of time. However, there is uncertainty of the magnitude of the effects on individual parcels such as the private hunting clubs since the analysis was conducted for the Yolo Bypass overall and not for individual sites or areas.

Closure of Well-Established Wildlife Areas

Alternative 5 would not result in any additional closures due to the presence of the permanent components, particularly with the plans for pedestrian bridges to maintain access to FWWA lands. However, Alternative 5 would result in additional closures at YBWA due to the increase in the duration of inundation since current CDFW management closes YBWA when certain levels of inundation occur. CDFW does not formally close FWWA or SBWA during periods of inundation. The operation of Alternative 5 would result in 25.5 days of closures, which represents an increase of 2.5 days or 10.9 percent over Existing Conditions. However, when considering YBWA is generally open year-round, Alternative 5 would result in a less than one percent increase in the number of days closed over the year, which would not be substantial. When examining the key recreational and education use seasons, Alternative 5 would result in an average of 0.9 additional days (range of 0 to 4.6 days across all 16 water years) during the waterfowl hunting season (0.9% of the season), 2.3 additional days (range of 0 to 10 days across all 16 water years) during the peak wildlife viewing season (1.9% of the season), and 2.5 days (range of 0 to 10 days across all 16 water years) during the educational use season (1.0% of the season), all of which would not be substantial.

Consistency with the YBWA LMP by Affecting Access for the Educational Uses of the YBWA

As discussed above, the increased periods of inundation would impede upon access to areas of the YBWA due to closures for educational programs and activities, which typically occur from September through May or an approximately 37-week period. The operation of Alternative 5 would result in YBWA closures for a total of 25.5 days, on average, which equates to an additional 2.5 days (range of 0 to 10 days across all 16 water years) or a 10.9 percent increase over Existing Conditions. However, the average change across all 16 water years in comparison to the 37-week educational program period would only be a 1.0 percent reduction in days, which would not be expected to reduce access to YBWA facilities in a way that would eliminate or substantially reduce the educational uses of the YBWA. Therefore, Alternative 5 would not be inconsistent with the YBWA LMP Public-Use Goal 2 by substantially affecting access for educational uses.

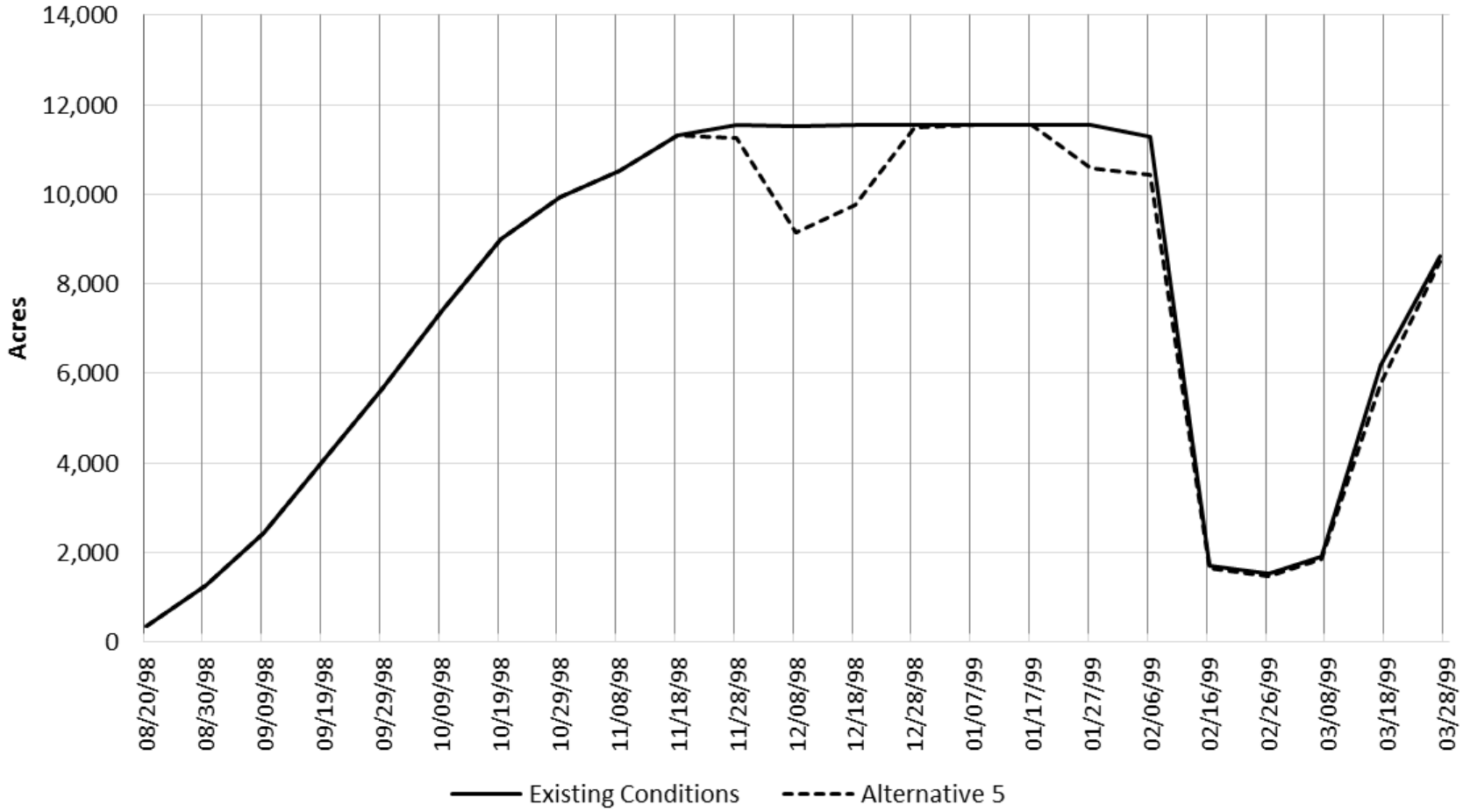


Figure 13-24. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 5 and Existing Conditions in the in the Wet Water Year 1999 (Ducks Unlimited 2017)

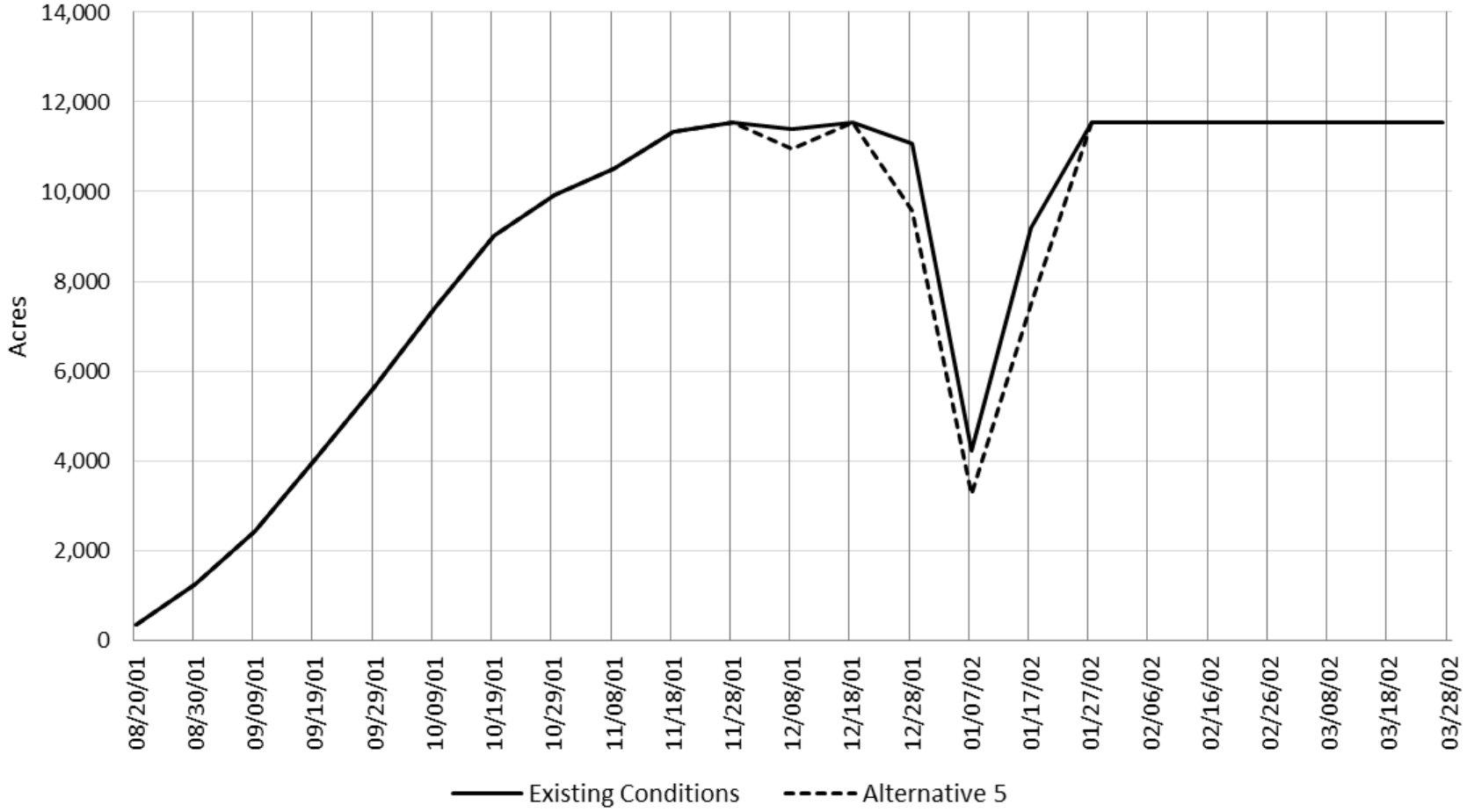


Figure 13-25. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 5 and Existing Conditions in the in the Dry Water Year 2002 (Ducks Unlimited 2017)

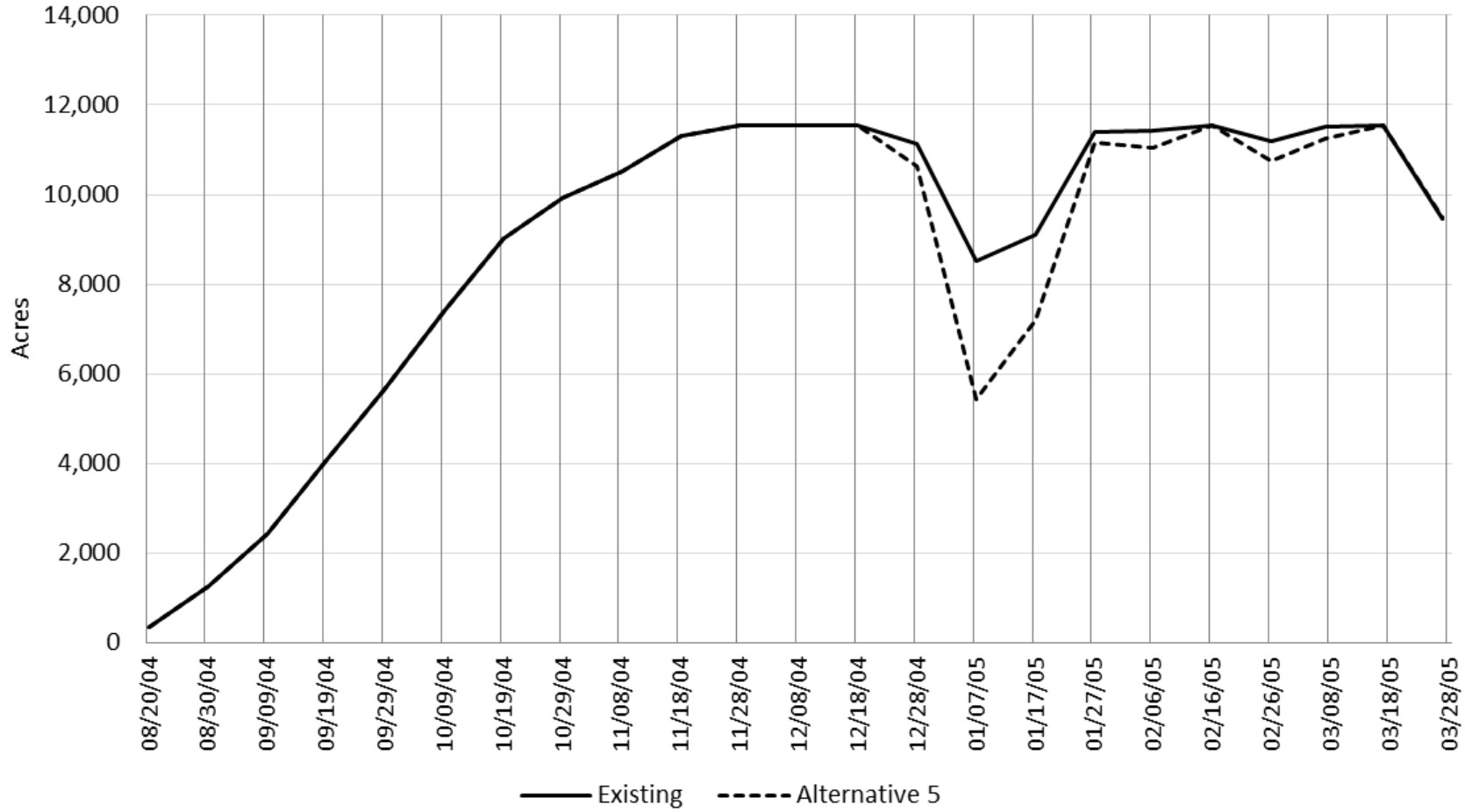


Figure 13-26. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 5 and Existing Conditions in the in the Above Normal Water Year 2005 (Ducks Unlimited 2017)

Consistency with the Yolo County General Plan by Affecting Public Access for the Recreational Uses of the Yolo Bypass

As discussed above, Alternative 5 would result in increased periods of inundation that could reduce access to areas of the FWWA, SBWA and YBWA for recreational uses, which may not be fully consistent with the policies in the Yolo County General Plan and particularly Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass. As shown in Table 13-8, the operation of Alternative 5 would result in increased periods of inundation that could reduce public access at FWWA, SBWA and YBWA; and additional closures at YBWA, as shown in Tables 13-9 and 13-10. Therefore, Alternative 5 would result in a decrease in the overall public access for recreational uses at the established wildlife areas overall, which would not be fully consistent with Yolo County General Plan Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass.

CEQA Conclusion

Reductions in recreational and educational opportunities due to changes in access and available lands for these opportunities under Alternative 5 would not result in a substantial adverse effect that would cause a physical change to the environment or adverse social effects. Therefore, the impact is **less than significant**.

NEPA Conclusion

As with Alternatives 1, 2, 3 and 4 and detailed above, the operation of Alternative 5 would reduce the access to and lands available for recreational and educational opportunities due to increased duration and extent of inundation, particularly at the CDFW's YBWA and SBWA, which is a social impact. The reductions would result in adverse social effects to the recreational and educational opportunities at YBWA and SBWA. The implementation of the Mitigation Measures MM-REC-2 (NEPA only), MM-REC-3 (NEPA only) and MM-REC-4 (NEPA only) would help to minimize the adverse social effects to the educational and recreational uses (i.e., reduction in days available for educational, hunting, and wildlife viewing uses) at YBWA and SBWA, in particular.

13.3.3.7.3 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of I-80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

The Alternative 5 program level of improvements to the Tule Canal floodplain would have no impact on recreation resources because the improvements (a series of secondary channels that connect to Tule Canal north of I-80) would be located outside the established recreational/wildlife areas, and the subsequent increased areas of inundation in these secondary channels would not change the inundation within the established recreational/wildlife areas.

13.3.3.8 Alternative 6: West Side Large Gated Notch

Alternative 6, West Side Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish with the strategy of allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

13.3.3.8.1 Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Impacts due to the increases in the use of FWWA, SBWA, or YBWA under Alternative 6 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Alternative 6 would result in short-term closures during construction that could temporarily increase use levels within other areas of the FWWA or at SBWA and YBWA, but these increases would be minimal and temporary and would not be expected to result in the substantial physical deterioration of those recreation areas. Therefore, this impact would be **less than significant**.

NEPA Conclusion

As detailed for Alternative 1, implementation of NEPA Mitigation Measure MM-REC-1 would help to minimize the short-term construction-related effects to recreational access and opportunities to the construction disturbance areas (only 20.7 percent of FWWA lands) through coordination with CDFW FWWA managers and public notifications. Nonetheless, recreational access would still be restricted in the construction disturbance areas during the construction period from April 15 through November 1, which coincides with much of FWWA's hunting season, including several key hunting periods. However, Mitigation Measure MM-REC-1 would provide public notification of the construction disturbance areas and allow recreational visitors the ability to utilize FWWA lands outside the construction disturbance (79.3 percent of FWWA lands) or utilize the alternative wildlife areas in the areas that provide similar opportunities, particularly SBWA and YBWA during the temporary construction period.

13.3.3.8.2 Impact REC-2: Loss of Recreational and Educational Opportunities due to a Reduction in Access and/or Available Lands

Similar to the other alternatives, the operation of Alternative 6 would result in social impacts to recreational and educational opportunities due to changes in the access to and lands available for recreation at the established wildlife areas. These social impacts are discussed below.

Effects on Access to Recreation Opportunities at the Established Wildlife Areas

Alternative 6 would have components and alignments similar to Alternative 4, and the temporary effects and mitigation for recreational access and the reduction in available lands would be the same as those associated with the other alternatives, which would affect only FWWA. The linear transport channels in Alternative 6 would be located along the southeastern boundary of FWWA

and would bisect the northern portion of FWWA similar to Alternative 4, as shown on Figure 13-27.

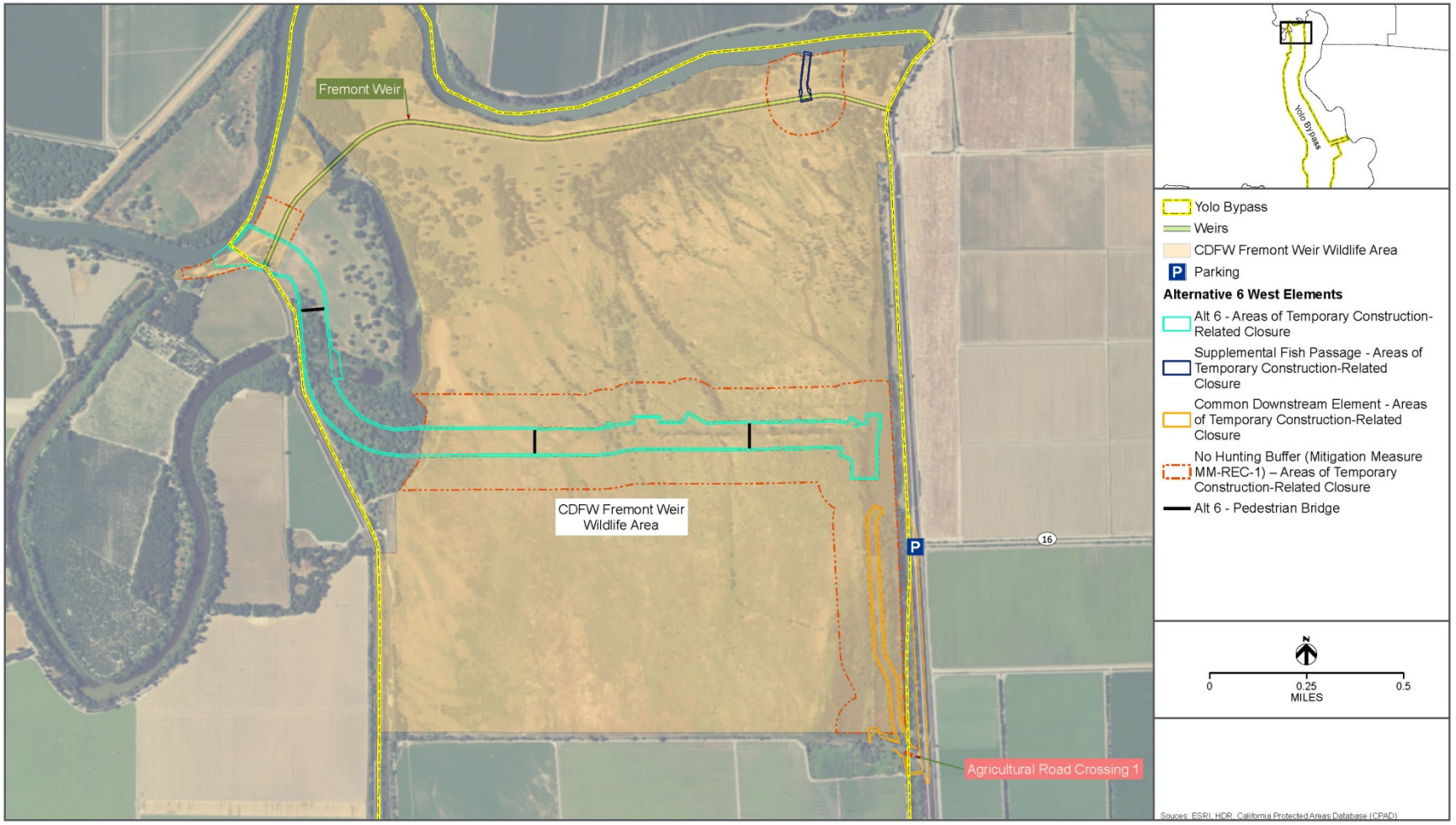
As with the other alternatives, Alternative 6 would affect access throughout the FWWA lands due to the location and alignment of the permanent components and would not affect access within SBWA, YBWA, or LIER. Alternative 6 includes three pedestrian bridges in the central and northeastern areas of FWWA that would maintain access to and movement through FWWA lands for recreational uses by crossing the transport channel, as shown on Figure 13-28.

Effects on Available Lands for Recreation Opportunities at Established Wildlife Area

Alternative 6 would have effects similar to Alternative 1 on the reduction in the amount of available lands due to the areas of temporary construction-related closure and the areas of permanent disturbance. Under Alternative 6, the areas of temporary construction-related closure for Alternative 6 components plus the additional 150-yard "no hunting" buffer area as part of MM-REC-1 would result in a total of 302.1 acres of converted lands or 20.7 percent of FWWA lands. Alternative 6 would result in the permanent conversion of 65.8 acres, or 4.5 percent of FWWA lands, which includes 7.3 acres of wetlands or 10.7 percent of wetlands within FWWA.

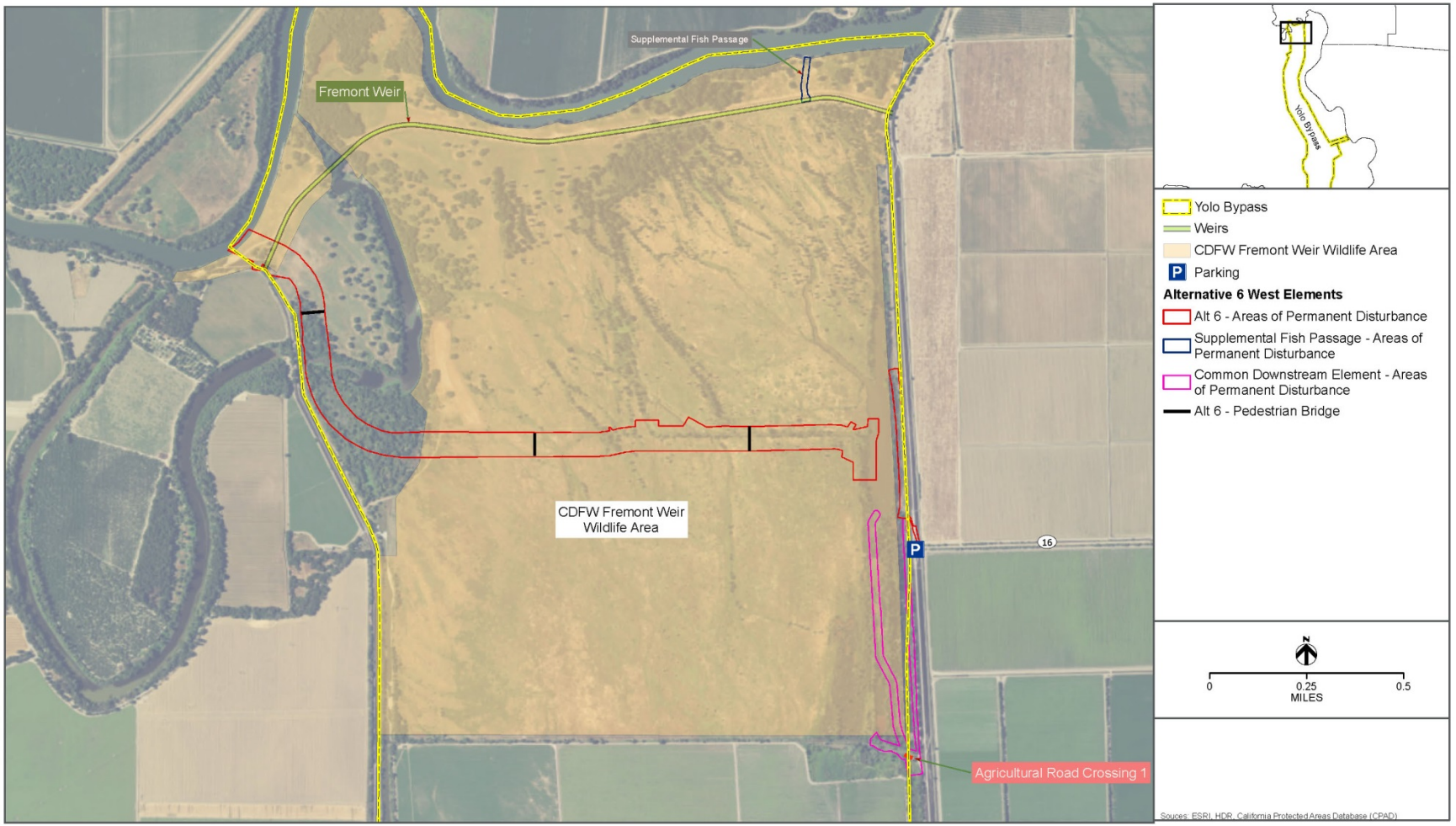
Regarding increases in the duration of inundation, Alternative 6 would have periods of increased inundation at FWWA and YBWA similar to Alternative 1. However, for Alternative 6, the impacts would be slightly different at SBWA, as shown on Figures 13-29, 13-30, and Table 13-11.

For the private hunting clubs south of YBWA, Alternative 6 would result in an increase in the duration of inundation up to three weeks at the majority of the clubs, as shown on Figure 13-30. The remaining clubs would not experience a change in inundation under Alternative 6. In comparison, Existing Conditions would result in up to six weeks of inundation where the private hunting clubs are located, as shown on Figure 13-7. Overall, the Alternative 6 impacts would represent a 50 percent increase over Existing Conditions.



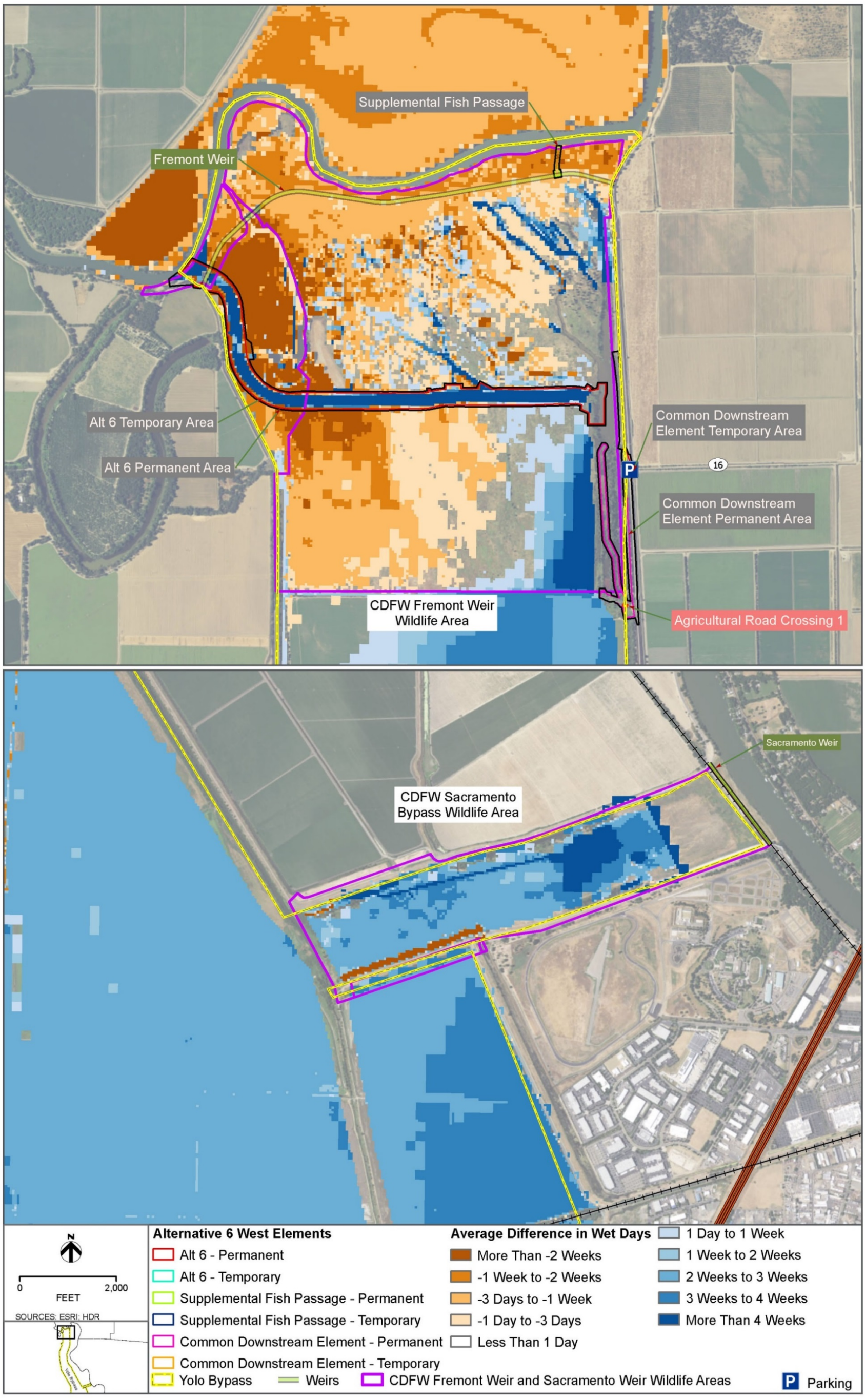
Key: CDFW = California Department of Fish and Wildlife

Figure 13-27. Alternative 6 Areas of Temporary Construction-Related Closure in the CDFW Fremont Weir Wildlife Area



Key: CDFW = California Department of Fish and Wildlife

Figure 13-28. Alternative 6 Areas of Permanent Disturbance in the CDFW Fremont Weir Wildlife Area



Key: CDFW = California Department of Fish and Wildlife

Figure 13-29. Alternative 6 Location and Change in Frequency of Inundation (in Wet Days) at the CDFW Fremont Weir Wildlife Area and Sutter Bypass Wildlife Area

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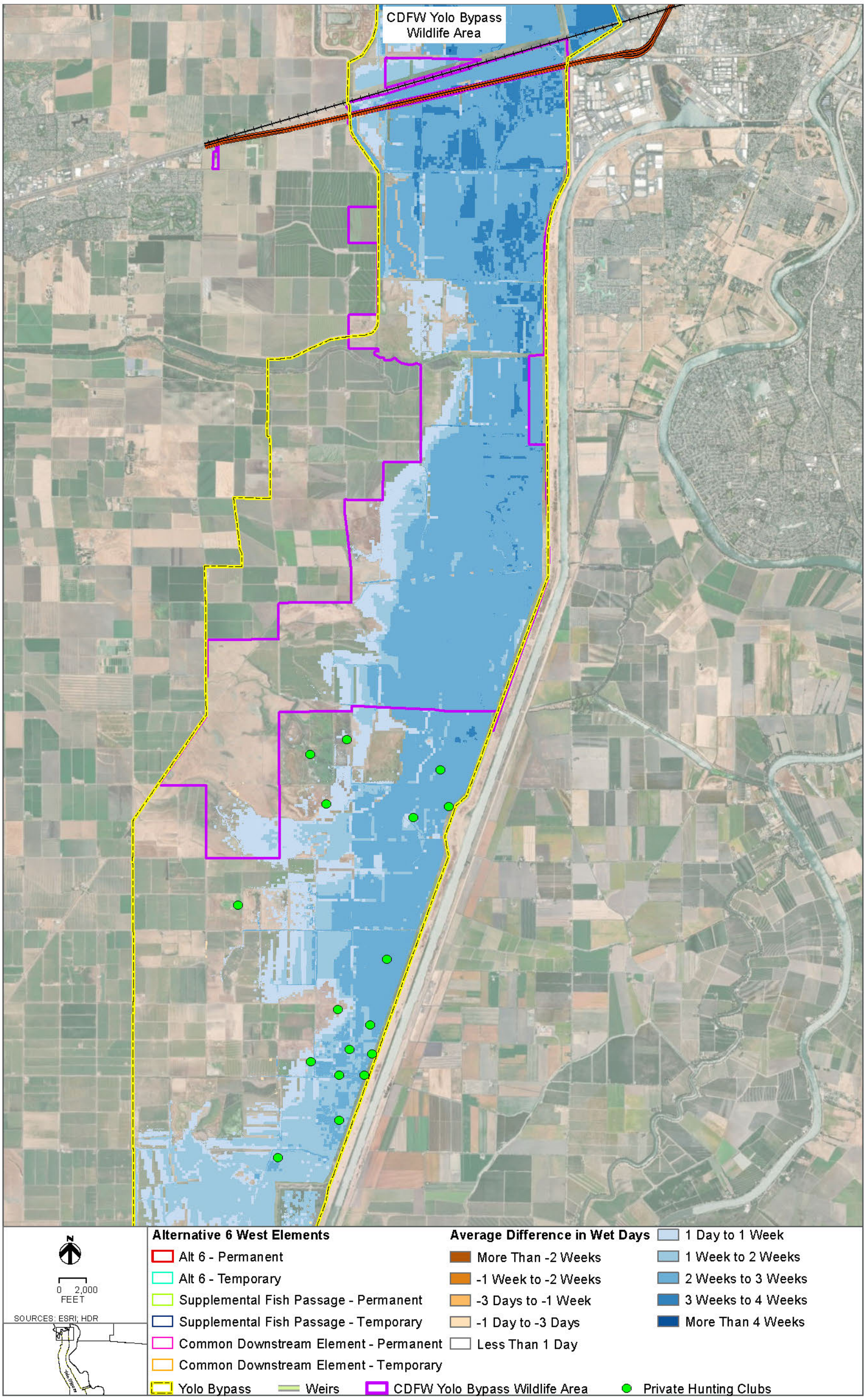

Key: CDFW = California Department of Fish and Wildlife

Figure 13-30. Alternative 6 Location and Change in Frequency of Inundation (in Wet Days) at the CDFW Yolo Bypass Wildlife Area

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Table 13-11. Alternative 6 Changes in Duration of Inundation (in Wet Days) at FWWA, SBWA, and YBWA

Average Difference in Duration of Wet Days	Alternative 1 FWWA (acres)	Alternative 1 FWWA (percent)	Alternative 1 SBWA (acres)	Alternative 1 SBWA (percent)	Alternative 1 YBWA (acres)	Alternative 1 YBWA (percent)
More than -2 weeks	63.3	4.3%	10.0	2.8%	0.0	0.0%
-1 to -2 weeks	151.7	10.4%	0.3	0.1%	0.0	0.0%
-3 days to -1 week	355.1	24.3%	0.1	<0.1%	0.0	0.0%
-1 day to -3 days	287.8	19.7%	0.6	0.2%	3.1	<0.1%
No change	103.0	7.1%	47.4	13.2%	2707.7	16.1%
Less than 1 day	223.3	15.3%	36.2	10.0%	2234.6	13.3%
1 day to 1 week	102.2	7.0%	7.9	2.2%	1515.3	9.0%
1 week to 2 weeks	28.1	1.9%	15.4	4.3%	953.9	5.7%
2 weeks to 3 weeks	28.1	1.9%	140.3	39.0%	8201.7	48.9%
3 weeks to 4 weeks	23.7	1.6%	64.2	17.8%	1153.6	6.9%
More than 4 weeks	94.6	6.5%	37.6	10.5%	0.0	0.0%
Total	**1,461**	**100%**	**360**	**100%**	**16,770**	**100%**

Key: FWWA= Fremont Weir Wildlife Area; SBWA= Sacramento Bypass Wildlife Area; YBWA= Yolo Bypass Wildlife Area

At the SBWA, Alternative 6 would result in an increase in the duration of inundation across 84 percent of SBWA land, or 301.6 acres, as shown in Table 13-11 and on Figure 13-26. The overall area where periods of inundation would occur is similar to Alternative 1; however, the duration of the increases in inundation would be greater—between two and four weeks (56.8 percent or 204.5 acres). The impacts associated with Alternative 6 would represent a 25 to 67 percent increase in the duration of inundation compared to Existing Conditions, which would result in a typical duration of inundation of four to six weeks for the majority of SBWA lands.

However, the increased inundation from the operation of Alternative 6 could result in additional YBWA closures due to the elevation of the inundation at Lisbon Weir that could result in a loss of popular waterfowl hunting opportunities. Waterfowl hunting opportunities at YBWA last for approximately 100 days from late October through January, but waterfowl hunting is only permitted at YBWA three days per week during this period or approximately 45 to 47 days. Table 13-12 shows the total number of days the YBWA would be closed for the complete 100-day period and the weighted period which equates to 46 percent of the complete 100-day period. The following analysis uses the weighted waterfowl hunting period. Alternative 6 would result in YBWA closures for a total of 6.6 days, on average, which equates to an additional 3.7 days over Existing Conditions (Table 13-12). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 6 would result in additional YBWA closure days (weighted for open days) ranging from 0 days (5 of the 16 water years) to 13.3 days in 2003. Overall, Alternative 6 would result in five or fewer additional closure days in 11 of the 16 water years (Table 13-12). Refer to Appendix I for a detailed summary of the number of days the YBWA would be closed due to inundation for each alternative for each water year (1997-2012) and each month (October-May).

Table 13-12. Alternative 6 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the waterfowl hunting season (late October through January).

Water Year	Existing Condition (100-day season)	Alternative 1 (100-day season)	Difference (100-day season)	Existing Condition (weighted season[1])	Alternative 1 (weighted[1] for open days only)	Difference (weighted[1] for open days only)
1997	40	48	8	18.4	22.1	3.7
1998	14	15	1	6.4	6.9	0.5
1999	0	17	17	0.0	7.8	7.8
2000	0	0	0	0.0	0.0	0.0
2001	0	0	0	0.0	0.0	0.0
2002	7	14	7	3.2	6.4	3.2
2003	9	38	29	4.1	17.5	13.3
2004	0	17	17	0.0	7.8	7.8
2005	0	14	14	0.0	6.4	6.4
2006	28	36	8	12.9	16.6	3.7
2007	0	0	0	0.0	0.0	0.0
2008	0	2	2	0.0	0.9	0.9
2009	0	0	0	0.0	0.0	0.0
2010	0	8	8	0.0	3.7	3.7
2011	1	19	18	0.5	8.7	8.3
2012	0	0	0	0.0	0.0	0.0
Total	99	228	129	45.5	104.9	59.3
Average	6.2	14.3	8.1	2.8	6.6	3.7
Median	0.0	14.0	7.5	0.0	6.4	3.5
Mode	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0	0	0	0.0	0.0	0
Maximum	40	48	29	18.4	22.1	13.3

[1] Weighted season was calculated by multiplying the 100-day season results by 0.46 to account for the 3-day per week wildlife hunting regulation at YBWA (i.e., YBWA is open 45 to 47 days during the 100-day period).

Regarding wildlife viewing, the most popular season at YBWA is November through February. Alternative 6 would result in additional YBWA closures for a total of 21.9 days, on average, which equates to an additional 10.0 days over Existing Conditions (Table 13-13). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 6 would result in additional YBWA closure days ranging from 0 days (4 of the 16 water years) to 32 days in 2003. Overall, Alternative 6 would result in greater than five additional days in 10 of the 16 water years and greater than 10 additional days in 9 of the 16 water years.

Regarding educational opportunities, the most popular season at YBWA is the school year (September through May in general). For this analysis, the relevant months (i.e., when inundation occurs) is October through May. Alternative 6 would result in additional YBWA closures for a total of 33.6 days, on average, which equates to an additional 10.6 days over Existing Conditions (Table 13-13). When examining the results across each of the 16 water years from 1997 to 2012, Alternative 6 would result in additional YBWA closure days ranging from 0 days (2 of the 16 water years) to 32 days in 2003. Overall, Alternative 6 would result in greater than five additional days in 10 of the 16 water years and greater than 10 additional days in 9 of the 16 water years.

Table 13-13. Alternative 5 Changes in Number of Days the Yolo Bypass Wildlife Area is Closed due to Inundation during the wildlife viewing season (late October through January) and educational season (October through May).

Water Year	Wildlife Viewing Season (Nov-Feb)			Educational Season (Oct-May)		
	Existing Condition	Alternative 6	Difference	Existing Condition	Alternative 6	Difference
1997	55	68	13	55	68	13
1998	42	43	1	77	80	3
1999	18	35	17	34	52	18
2000	14	15	1	33	34	1
2001	0	0	0	0	2	2
2002	7	14	7	7	14	7
2003	9	41	32	9	41	32
2004	10	27	17	24	43	19
2005	0	14	14	4	18	14
2006	34	53	19	100	120	20
2007	0	0	0	0	0	0
2008	0	10	10	0	10	10
2009	0	0	0	0	2	2
2010	0	11	11	0	11	11
2011	1	19	18	25	43	18
2012	0	0	0	0	0	0
Total	190	350	160	368	538	170
Average	11.9	21.9	10.0	23.0	33.6	10.6
Median	4.0	14.5	10.5	8.0	26.0	10.5
Mode	0.0	0.0	0.0	0.0	2.0	18.0
Minimum	0	0	0	0	0	0
Maximum	55	68	32	100	120	32

The change in depth of the inundation could affect the recreational opportunities particularly waterfowl hunting in the Yolo Bypass due to reductions in available shallow-flood wetlands that are critical to waterfowl. Alternative 6 would result in a loss of shallow-flooded wetlands that would affect the amount of lands available for recreational waterfowl hunting, and thus, indirectly affect the recreational waterfowl hunting opportunities in the shallow-flooded wetlands of the Yolo Bypass similar to the other alternatives. The operation of Alternative 6 could also potentially indirectly affect the incentive for private hunting clubs to continue to use shallow-flooded wetlands for hunting if the loss of critical waterfowl habitat reduced the hunting opportunities, particularly if the loss occurred in successive years or frequently within a short time period. The shallow-flooded wetlands analysis was conducted for the Yolo Bypass overall and did not assess individual parcels; thus, the timing and magnitude of the potential effects on site-specific parcels such as the private hunting club lands are uncertain. Adding to the uncertainty of the private hunting club effects, some of the private hunting clubs within the Yolo Bypass have additional hunting areas outside the Yolo Bypass as alternatives when hunting areas are inundated within the Yolo Bypass.

Similar to the other alternatives, the operation of Alternative 6 would result in a reduction in the amount of available shallow-flooded wetlands in the 1999 Wet WY, 2002 Dry WY and 2005

Above Normal WY; and occur during the 100-day waterfowl hunting season from late October through January. In the 1999 Wet WY, Alternative 6 would result in a reduction of shallow-flooded wetlands by up to approximately 7,000 acres, or 61 percent of the of the shallow-flooded wetlands under Existing Conditions. Similar to Alternative 1, the reductions occur in two separate periods but to a greater magnitude from late November through early December for approximately four weeks and again in the latter half of January into early February for approximately three weeks--both in the midst of the 100-day waterfowl hunting season, as shown on Figure 13-31 (Ducks Unlimited 2017). The timing and duration of these reductions are similar to Existing Conditions, but the magnitude is substantially greater under Alternative 6. In the 2002 Dry WY, Alternative 6 would result in a reduction of shallow-flooded wetlands similar to Alternative 1 in duration and timing, but a slightly greater magnitude. Specifically, Alternative 6 would result in a reduction of shallow-flooded wetlands by up to approximately 3,000 acres, or up to 35 percent of the of the shallow-flooded wetlands under Existing Conditions, as shown on Figure 13-32 (Ducks Unlimited 2017). The timing and duration of these reductions are similar to Existing Conditions, but the magnitude is slightly greater under Alternative 6. In the 2005 Above Normal WY, Alternative 6 would result in a reduction of shallow-flooded wetlands by up to approximately 4,400 acres, or up to 51 percent of the of the shallow-flooded wetlands under Existing Conditions and for a period of approximately three weeks total in early to mid-January at the end of the 100-day waterfowl hunting season, as shown on Figure 13-33 (Ducks Unlimited 2017). The timing and duration of these reductions are similar to Existing Conditions, but the magnitude is substantially greater under Alternative 6.

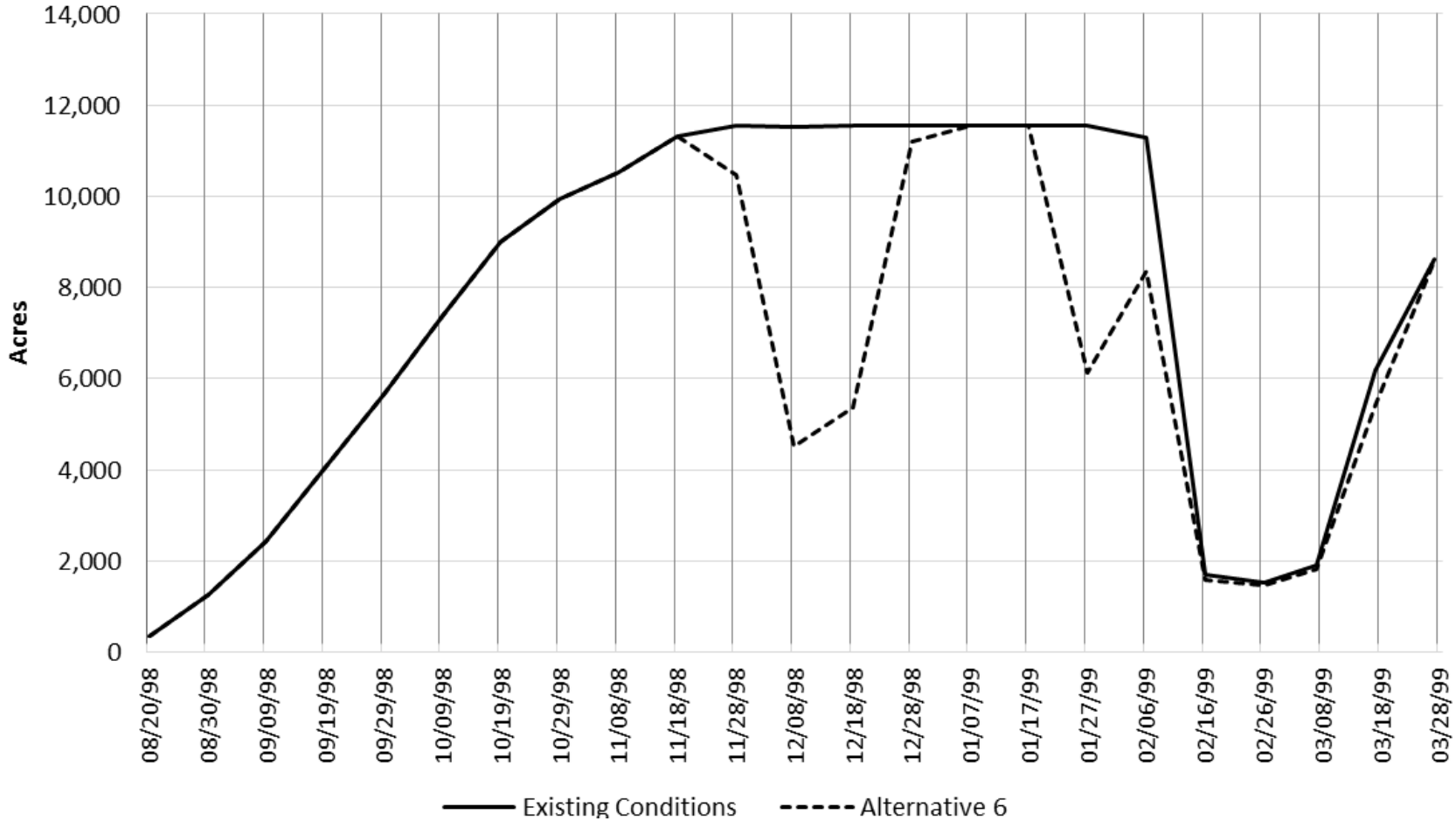

Figure 13-31. Average of number of acres of shallow-flooded (≤18") managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 6 and Existing Conditions in the in the Wet Water Year 1999 (Ducks Unlimited 2017)

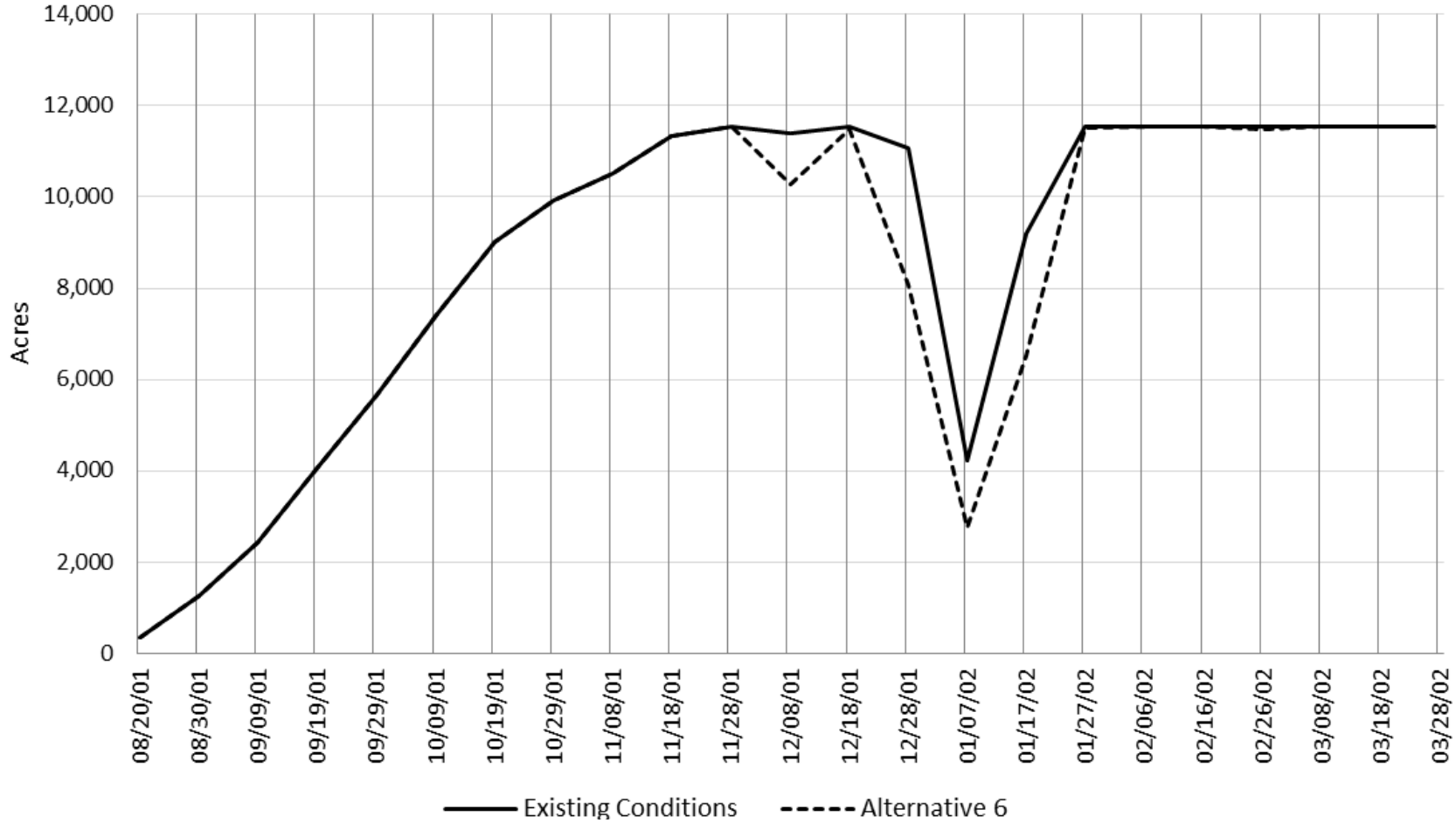

Figure 13-32. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 6 and Existing Conditions in the in the Dry Water Year 2002 (Ducks Unlimited 2017)

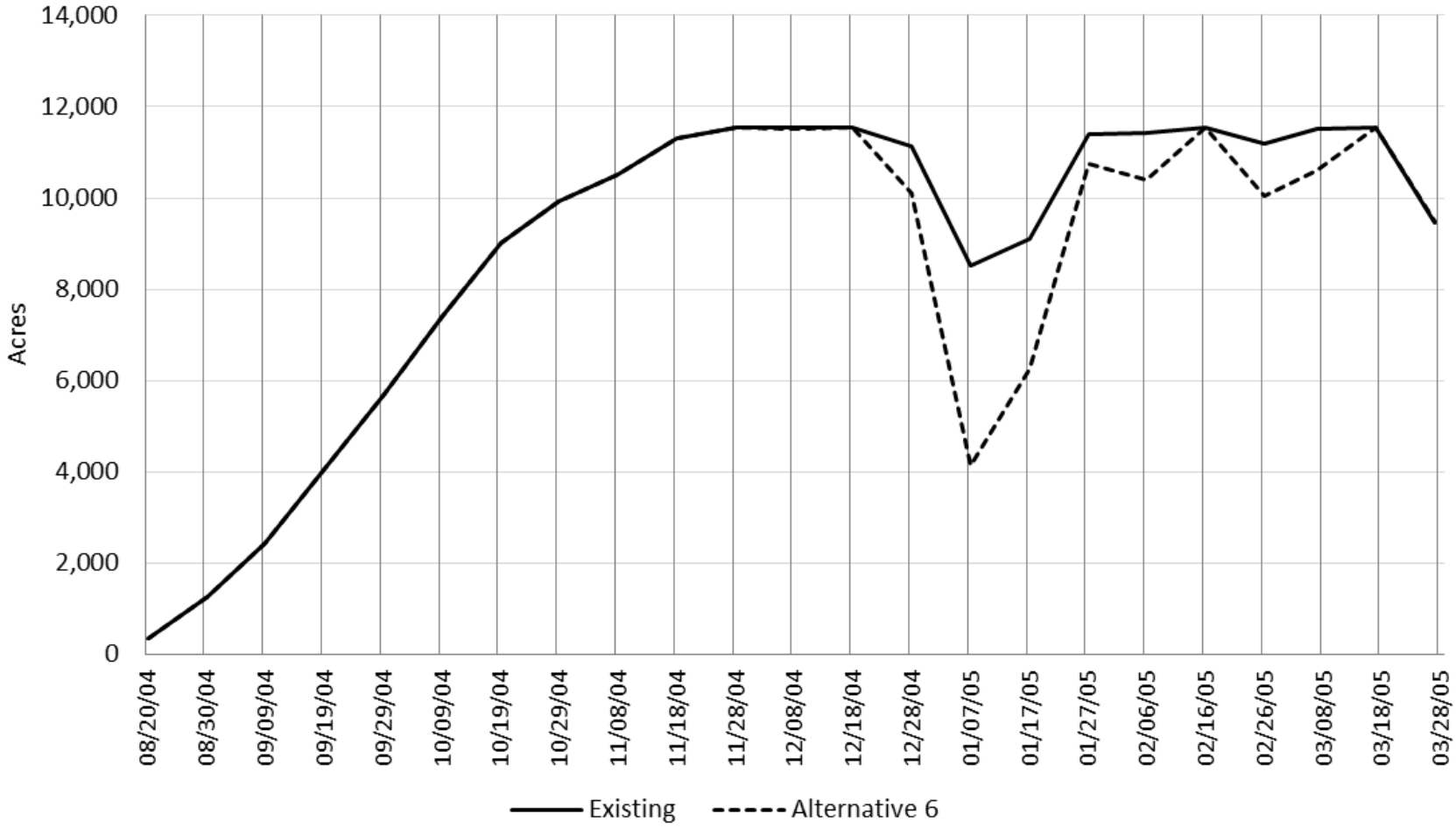

Figure 13-33. Average of number of acres of shallow-flooded (≤18”) managed seasonal wetlands over 10 day periods in the Yolo Bypass for Alternative 6 and Existing Conditions in the in the Above Normal Water Year 2005 (Ducks Unlimited 2017)

Overall, the operation of Alternative 6 would have an indirect effect on waterfowl hunting opportunities in the Yolo Bypass due to the substantial reductions in the availability of shallow-flooded wetlands, especially when combined with the timing of these reductions during the popular 100-day waterfowl hunting season. In general, while reductions in shallow-flooded wetlands occur under Existing Conditions, the magnitude of the reductions under Alternative 1 is considerably greater. The operation of Alternative 6 could potentially have a considerable indirect effect on the incentive for private hunting clubs to continue managing the shallow-flooded wetlands for waterfowl hunting, particularly if the loss occurred in successive years or frequently within a short period of time. However, there is uncertainty of the magnitude of the effects on individual parcels such as the private hunting clubs since the analysis was conducted for the Yolo Bypass overall and not for individual sites or areas.

Closure of Well-Established Wildlife Areas

Alternative 6 would not result in any additional closures due to the presence of the permanent components, particularly with the plans for pedestrian bridges to maintain access to FWWA lands. However, Alternative 6 would result in additional closures at YBWA due to the increase in the duration of inundation since current CDFW management closes YBWA when certain levels of inundation occur. CDFW does not formally close FWWA or SBWA during periods of inundation. The operation of Alternative 6 would result in 33.6 days of closures, which represents an increase of 10.6 days or 46.1 percent over Existing Conditions. However, when considering YBWA is generally open year-round, Alternative 6 would result in a 2.9 percent increase in the number of days closed over the year, which would not be substantial. When examining the key recreational and education use seasons, Alternative 6 would result in an average of 3.7 additional days (range of 0 to 13.3 days across all 16 water years) during the waterfowl hunting season (3.7% of the season), 10.0 additional days (range of 0 to 32 days across all 16 water years) during the peak wildlife viewing season (8.3% of the season), and 10.6 days (range of 0 to 32 days across all 16 water years) during the educational use season (4.1% of the season). Overall across most water years (1997-2012), the additional closure days under Alternative 6 would be substantial for wildlife viewing and educational uses at YBWA in at least 10 of the 16 water years modeled. For waterfowl hunting, Alternative 6 would result in five or fewer additional closure days in 11 of the 16 water years, which would not be substantial.

Consistency with the YBWA LMP by Affecting Access for the Educational Uses of the YBWA

As discussed above, the increased periods of inundation would impede upon access to areas of the YBWA due to closures for educational programs and activities, which typically occur from September through May or an approximately 37-week period. The operation of Alternative 6 would result in YBWA closures for a total of 33.6 days, on average, which equates to an additional 10.3 days (range of 0 to 32 days across all 16 water years) or a 44.8 percent increase over Existing Conditions. However, the change in comparison to the 37-week educational program period is only a 4.1 percent reduction in days, on average, which would not be expected to reduce access to YBWA facilities in a way that would eliminate or substantially reduce the educational uses of the YBWA. However, when examining the impacts across all 16 water years modeled, Alternative 6 would result in seven years where additional closures would range between 11 and 32 days, which would be substantial and, therefore, Alternative 6 would not be

inconsistent with the YBWA LMP Public-Use Goal 2 by substantially affecting access for educational uses.

Consistency with the Yolo County General Plan by Affecting Public Access for the Recreational Uses of the Yolo Bypass

As discussed above, Alternative 6 would result increased periods of inundation that could reduce access to areas of the FWWA, SBWA and YBWA for recreational uses, which may not be fully consistent with the policies in the Yolo County General Plan and particularly Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass. As shown in Table 13-11, the operation of Alternative 6 would result in increased periods of inundation that could reduce public access at FWWA, SBWA and YBWA; and additional closures at YBWA, as shown in Tables 13-12 and 13-13. Therefore, Alternative 6 would result in a decrease in the overall public access for recreational uses at the established wildlife areas overall, which would not be fully consistent with Yolo County General Plan Policy CO-1.23 to increase public access and recreational uses within the Yolo Bypass.

CEQA Conclusion

Reductions in recreational and educational opportunities due to changes in access and available lands for these opportunities under Alternative 6 would not result in a substantial adverse effect that would cause a physical change to the environment or adverse social effects. Therefore, the impact is **less than significant**.

NEPA Conclusion

As with Alternatives 1, 2, 3, 4 and 5 and detailed above, the operation of Alternative 6 would reduce the access to and lands available for recreational and educational opportunities due to increased duration and extent of inundation, particularly at the CDFW's YBWA and SBWA, which is a social impact. The reductions would result in adverse social effects to the recreational and educational opportunities at YBWA and SBWA. The implementation of the Mitigation Measures MM-REC-2 (NEPA only), MM-REC-3 (NEPA only) and MM-REC-4 (NEPA only) would help to minimize the adverse social effects to the educational and recreational uses (i.e., reduction in days available for educational, hunting, and wildlife viewing uses) at YBWA and SBWA, in particular.

13.3.4 Summary of Impacts

Table 13-14 summarizes the identified impacts to recreation resources in the study area.

Table 13-14. Summary of Impacts and Mitigation Measures – Recreation

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact REC-1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated	No Action	NI	—	NI
	All Action Alternatives	LTS	Mitigation measures are not required under CEQA. However, under NEPA, a mitigation measure is included to minimize adverse social effects, including: MM-REC-1	LTS
Impact REC-2: Loss of recreational and educational opportunities due to a reduction in access and/or available lands	No Action	NI	—	NI
	All Action Alternatives	LTS	Mitigation measures are not required under CEQA. However, under NEPA, mitigation measures are included to minimize adverse social effects, including: • MM-REC-2 (Development of alternative access points at YBWA) • MM-REC-3 (Drainage-related improvements within or adjacent to YBWA) • MM-REC-4 (Development of viewing platforms or areas at SBWA).	LTS

Key: LTS = less than significant; NI = no impact

13.4 Cumulative Impacts Analysis

This section describes the cumulative impacts analysis for recreation. Section 3.3, *Cumulative Impacts*, presents an overview of the cumulative impacts analysis, including the methodology and the projects, plans, and programs considered in the cumulative impacts analysis.

13.4.1 Methodology

This evaluation of cumulative impacts for recreation resources considers the effects of the alternatives and how they might combine with the effects of other past, present, and future projects or actions to create significant impacts on specific resources. The area of analysis for these cumulative impacts includes both the Yolo Bypass area and the larger Delta region and Sacramento River system. The timeframe for this cumulative impacts analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

This cumulative impacts analysis uses the project analysis approach described in detail in Section 3.3, *Cumulative Impacts*. Several related and reasonably foreseeable projects and actions could result in impacts to recreation resources in the Project area. In particular, removing and/or relocating levees, other construction projects, and Sacramento River and Delta flood-management projects could affect connected river flows and/or inundation frequencies of the Yolo Bypass, all of which could have effects on recreation resources similar to the effects described in Section 13.3. These projects are listed and described in Chapter 3, Tables 3-1 and 3-2.

13.4.2 Cumulative Impacts

The projects and plans listed above could result in additional construction equipment in the area of analysis, possibly introducing additional construction-related impacts to the established recreation areas. Some of these projects could change the flooding frequencies and durations at the established wildlife and recreational areas in the Yolo Bypass, particularly the Lower Elkhorn Basin Levee Setback Project. This project and any other projects that may affect flooding likely would coordinate proposed actions with this Project to avoid significant cumulative impacts.

The Lead Agencies expect that if any construction-related projects have significant short-term impacts on the area of analysis, these impacts would be mitigated to a less-than-significant level. Additionally, changes in management direction of the CDFW wildlife areas and particularly the *Yolo Bypass Wildlife Area Management Plan* could affect recreational access and uses, but the Lead Agencies expect that any wildlife area management changes would improve the recreational opportunities in the area of analysis rather than adversely affect recreational opportunities. Although some of the cumulative projects and plans could adversely affect recreational resources, implementation of the Project would not contribute to those cumulative effects. Therefore, the action alternatives' incremental contributions to the cumulative effects associated with recreation resources would **not be cumulatively considerable.**

13.5 References

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14 Visual Resources

The following chapter assesses the impacts on visual resources from the implementation of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) alternatives. The chapter identifies and describes existing visual resources in the landscape. The discussion of existing conditions, the No Action Alternative, and potential impacts of the action alternatives on visual resources includes the main components and areas of interaction of the project structures and alignments such as the intake channel, headworks structure, operating control building, access structures, outlet transition, and transport channel. In addition, during construction activities, visual resources in the landscape could be affected by weir demolition and excavation activities and haul routes along public streets for the offsite import and export of materials.

14.1 Environmental Setting/Affected Environment

The Project alternatives would be in Sutter County, Yolo County, within the Fremont Weir Wildlife Area (FWWA), at Agricultural Road Crossing 1 along Tule Canal, and in the adjacent Elkhorn Area. The FWWA is a 1,461-acre riparian area surrounding part of the Sacramento River. It consists of a wide assortment of vegetation, ranging from large trees and shrubs to smaller shrubs and grasses and riparian areas. The FWWA is publicly accessible year-round during daylight hours for fishing, wildlife viewing, bird watching, and seasonal hunting. The surrounding area is flat agricultural land and open fields. Agricultural fields are usually contained by small levees or berms, separated by ditches and canals that carry water from the major aqueducts to the fields. There are no residences within the Project area and only a few residences in the vicinity.

The following section describes the visual resources within the FWWA (specifically at Tule Pond, the Fremont Weir, and the existing Fremont Weir Fish Ladder) and Agricultural Road Crossing 1. Tule Pond and Agricultural Crossing 1 can be viewed from the adjacent, County Road (CR) 107. The Fremont Weir and the Fremont Weir Fish Ladder are only viewable by visitors within the FWWA. Visual quality was analyzed qualitatively using the following terms:

- **Vividness** – Describes the presence of distinctive landscape features, such as topographic relief, geological formations, color, or patterns, that combine to form a striking or memorable visual pattern
- **Intactness** – Describes the integrity of a landscape and the degree to which it is free from incongruous or out-of-place features that detract from the visual pattern
- **Unity** – Describes the appearance of the landscape and the degree to which the visual elements maintain a coherent visual pattern

14.1.1 Tule Pond

Tule Pond is located to the north of Agricultural Road Cross 1 and to the south of Fremont Weir. There are several scour channels, including the existing fish ladder scour channel and the main scour channel, that discharge into the Tule Pond area (Figure 14-1). The area surrounding Tule Pond is generally well vegetated to overgrown with grasses and lined with cattails (Figure 14-2). Except for Alternative 5, all Project alternatives include a channel that connects a new gated notch in Fremont Weir to Tule Pond. Alternative 5 includes new floodplain habitat in the FWWA from which the channels connect to Tule Canal south of Tule Pond.

Tule Pond is situated at the terminus of CR 107. This area is intended for public use. The area is rural, with limited urban elements and has various visual elements such as ponds, trees and vegetation, and other various habitats, offering contrast that provides a pleasant visual experience. Therefore, observers would experience views with high intactness, unity, and moderate vividness looking into the FWWA.

Figure 14-1. Main scour channel entering Tule Pond – photo taken from the East Yolo Bypass Levee looking west (May 2016).

Figure 14-2. Looking west at the fish ladder scour channel entering Tule Pond, showing the vegetation and scour channels (May 2016).

14.1.2 Fremont Weir

Fremont Weir serves as an overflow structure when the water level in the Sacramento River reaches 32 feet North American Vertical Datum of 1988 (NAVD 88) (California Data Exchange Center [CDEC] 2017). When water moves from the Sacramento River to Fremont Weir, it flows in a north to south direction. All action alternatives involve the alteration of Fremont Weir and installation of intake channels and grading from the Sacramento River to the weir.

Fremont Weir is in the northern portion of the FWWA. There is a distinct difference between the heavily vegetated wildlife area and the stark open concrete and dirt foundations of the weir (Figure 14-3). Observers around the weir would experience views with low vividness, unity, and intactness. Observers looking north of the weir would experience an area with limited urban elements and visual sights such as the Sacramento River, trees, and riparian habitats that provide a pleasant visual experience (Figure 14-4). Therefore, observers in this area would experience a view with high intactness, unity, and moderate vividness.

Figure 14-3. East Fremont Weir Headworks location – looking west along the weir crest (May 2016).

Figure 14-4. Fremont Weir fish ladder intake channel – photo taken at the end of the intake channel looking north at the Sacramento River (May 2016).

14.1.3 Fremont Weir Fish Ladder

The existing fish ladder is located within Fremont Weir near the eastern end of Fremont Weir, and a channel extends from the bank of the Sacramento River to the ladder. The existing intake channel from the Sacramento River leading south to the weir is heavily vegetated with grasses and small and large shrubs (Figure 14-5). This area has high visual appeal, unity, and intactness and is dominated by open grassland with large and small trees and shrubs. All action alternatives involve the alteration of the existing fish ladder and connecting channel.

However, as the intake channel extends inland to meet with Fremont Weir, the visual appeal, unity, and intactness, which match that of Fremont Weir, are low looking west and east. The natural and highly vegetated intake channel morphs into the stark and open concrete space. The existing fish ladder (Figure 14-6) has moderate visual appeal, unity, and intactness, whereas the area around the ladder still appears natural. In the area where the ladder passes through the weir, the bank is generally well vegetated with grasses and large and small shrubs (Figure 14-7). The visual appeal, unity, and intactness are low due to the stark contrast of the concrete weir structure and surrounding vegetated land. This area is considered to have low vividness and intactness.

Figure 14-5. Fremont Weir fish ladder intake channel – photo taken from the river side of Fremont Weir at the fish ladder, looking north at the existing grading of the intake channel to the Sacramento River (May 2016).

Figure 14-6. Fremont Weir fish ladder intake channel – photo taken from the river side looking south at the intersection of the fish ladder with the existing intake channel (May 2016).

Figure 14-7. Fremont Weir fish ladder intake channel – photo taken from the bypass side of Fremont Weir looking north at the face of the weir (May 2016).

14.1.4 Agricultural Road Crossing 1

Agricultural Road Crossing 1 is located south of Tule Pond in the southeastern corner of the FWWA. It serves as a vehicular crossing used by farmers and as a water control feature. Features of this area include an embankment that creates a cross-channel connection through Tule Canal,

berms that provide a barrier for fish passage, and a solid earthen-filled walkway with a culvert passing through. Agricultural Road Crossing 1 is situated with CR 107 to the east and agricultural and farm lands to the south. All action alternatives involve improvements to Agricultural Road Crossing 1.

There is a contrast between the heavy vegetation of the waterway and the embankment feature, and there is no coherent pattern in the landscape. Observers in this area would experience views with moderate vividness, unity, and intactness (Figure 14-8).

Figure 14-8. Agricultural Road Crossing 1 – photo taken standing on the crossing looking west (May 2016).

14.2 Regulatory Setting

The following section considers Federal, State of California (State), and local policies, guidelines, and regulations applicable to the maintenance and protection of visual resources.

14.2.1 Federal Plans, Policies, and Regulations

The Federal government, through the National Scenic Byways Program of 1991, designates roads with special archaeological, cultural, historic, natural, recreational, and scenic qualities as National Scenic Byways or All-American Roads. This program provides resources and funding to help manage these roads and maintain their unique qualities.

14.2.2 State Plans, Policies, and Regulations

California has a Scenic Highway Program created by the Legislature in 1963 intended to protect visual resources around designated roads. There are no officially designated roads within the Project area recognized under this program (California Department of Transportation 2011).

14.2.3 Regional and Local Plans, Policies, and Regulations

14.2.3.1 Yolo County General Plan

Yolo County's *2030 Countywide General Plan* (County of Yolo 2009), Land Use and Community Character Element and Conservation and Open Space Element (Growth Management and Preservation of Rural Character), discusses aesthetic resources and their importance to the county's character. The following Land Use (LU), Community Character (CC), and Conservation and Open Space (CO) policies are relevant to the protection of visual resources in the Project area.

- Policy LU-3.6: Avoid or minimize conflicts and/or incompatibilities between land uses.
- Policy CC-1.2: Preserve and enhance the rural landscape as an important scenic feature of the County.
- Policy CC-1.3 Protect the rural night sky as an important scenic feature to the greatest feasible extent where lighting is needed.
- Policy CC-1.8: Screen visually obtrusive activities and facilities such as infrastructure and utility facilities, storage yards, outdoor parking and display areas, along highways, freeways, roads, and trails.
  - Screening could include landscaping with shrubs, ground cover, vegetated berms, and floodplain restoration, which would make new crossing structures less visible from a distance.
- Policy CC-1.10: Protect existing ridgelines and hillsides from visually incompatible development.
- Policy CC-1.13: The following routes are designated as local scenic roadways: CRs 116 and 116B (Knights Landing Ridge Cut to eastern terminus of CR 16) and CRs 16 and 117 and Old River Road (CR 107 to West Sacramento).
- Policy CC-1.15: The following features shall be protected and preserved along designated scenic roadways and routes, except where there are health and safety concerns: trees and other natural or unique vegetation, landforms and natural or unique features, views and vistas, historic structures (where feasible), including buildings, bridges, and signs.
- Policy CC-1.16: The following features shall be stringently regulated along designated scenic roadways and routes with the intent of preserving and protecting the scenic qualities of the roadway or route: signage, architectural design of adjoining structures, construction, repair and maintenance operations, landscaping, litter control, water quality, power poles, towers, above-ground wire lines, wind power, and solar power devices and antennae.
- Policy CC-1.17: Existing trees and vegetation and natural landforms along scenic roadways and routes shall be retained to the greatest feasible extent. Landscaping shall be required to enhance scenic qualities and/or screen unsightly views and shall emphasize the use of native plants and habitat restoration to the extent possible. Removal of trees, particularly those with scenic and/or historic value, shall be generally prohibited along the roadway or route.

- Policy CC-1.18: Electric towers, solar power facilities, wind power facilities, communication and electromagnetic frequency transmission facilities towers, and/or above ground lines shall be avoided along scenic roadways and routes to the maximum feasible extent.
- Policy CC-1.19: Unscreened outdoor storage of industrial and commercial parts and materials; salvage or junk; dismantled vehicles; used or new vehicle sales or building materials for sale; and similar materials, uses, and items along designated scenic roadways and routes shall be prohibited.
- Policy CC-4.12: Require "green" design, construction, and operation, including (A) Site planning sensitive to the natural environment and (L) Light pollution reduction to protect "dark skies."
- Policy CC-4.31: Require the use of regionally native drought-tolerant plants for landscaping where appropriate.
- Policy CO-1.22: Emphasize the use of native grasses, shrubs, and trees as the primary focus of landscaping and restoration work within resource parks and other open spaces.
- Policy CO-1.28: Balance the needs of agriculture with recreation, flood management, and habitat, within the Yolo Bypass.
- Policy CO-1.29: Require clustering and creative site planning in new development areas to preserve and enhance areas of contiguous open space to the extent feasible.
- Policy CO-2.22: Prohibit development within a minimum of 100 feet from the top of banks for of all lakes, perennial ponds, rivers, creeks, sloughs, and perennial streams. The setback will allow for fire and flood protection, a natural riparian corridor (or wetland vegetation), a planned recreational trail where applicable, and vegetated landscape for stormwater to pass through before it enters the water body. Exceptions to this action include irrigation pumps, roads and bridges, levees, docks, boat ramps, and similar uses.
- Policy CO-2.24: Promote floodplain management techniques that increase the area of naturally inundated floodplains and the frequency of inundated floodplain habitat, restore some natural flooding processes and river meanders, and widen riparian vegetation, where feasible.

14.3 Environmental Consequences

This section presents the assessment methods used to analyze the effects on visual resources, the California Environmental Quality Act (CEQA) thresholds of significance that determine significance of effects, and the potential environmental consequences and mitigation measures as they relate to each project alternative. Detailed descriptions of the alternatives evaluated in this chapter are provided in Chapter 2, *Description of Alternatives*. Impacts to visual resources are determined relative to existing conditions (for CEQA) and the No Action Alternative (for the National Environmental Policy Act [NEPA]). However, the No Action Alternative would be the same as existing conditions because changes to the visual environment are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to existing conditions.

14.3.1 Methods for Analysis

This visual resource assessment is based on the visual resource inventory methodology found in the Federal Highway Administration's Visual Impact Assessment for Highway Projects, FHWA-HI-88-054 (Department of Transportation 1988). This methodology is commonly used for a variety of project types and is similar to those methodologies used by the United States Forest Service and Department of the Interior, Bureau of Land Management.

This assessment is based on a review of maps, site photographs, and aerial photographs. Analysis of impacts to visual resources from a Project alternative was based on evaluating the extent and implications of visual changes while considering the following factors:

- Specific changes in the visual composition, character, and specifically valued qualities of the affected environment
- Visual context of the affected environment
- Extent to which the affected environment contained places or features that have been designated in plans and policies for protection or special consideration
- Number of viewers, their activities, and the extent to which these activities are related to the aesthetic qualities affected by the program- and project-related changes

14.3.2 Thresholds of Significance – CEQA

The thresholds of significance for impacts are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of the context and the intensity of its impacts. The Project alternatives were determined to result in a significant impact related to visual resources if they would do any of the following:

- Have a substantial adverse effect on a scenic vista
- Substantially damage scenic resources, including but not limited to scenic trees, rock outcroppings, and historic buildings along a State scenic highway
- Substantially degrade the existing visual character or quality of a site and its surroundings
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in an area

An assessment of visual quality is subjective, and reasonable disagreement can occur as to whether alterations in the visual character of the Project area would have an adverse effect, have no effect, or be beneficial. For this analysis, a conservative approach was taken, and the potential for substantial change to the visual character of the Project area would be considered a significant impact under CEQA.

14.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect effects on visual resources from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

14.3.3.1 No Action Alternative

Under the No Action Alternative, the Project would not be implemented, and none of the Project features would be developed in the Project area. The No Action Alternative would not require any construction and would not affect visual resources.

14.3.3.1.1 Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

The No Action Alternative would result in no construction activities taking place in the Project area. Therefore, there would be no change in the visual character.

CEQA Conclusion

There would be **no impact** to the existing visual character of the area because there would be no change to the physical environment under the No Action Alternative.

14.3.3.1.2 Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Under the No Action Alternative, the Yolo Bypass would continue to be inundated during overtopping events at Fremont Weir. These flows would maintain the dense and lush vegetation of the FWWA. Therefore, there would be no change in the visual character.

CEQA Conclusion

There would be **no impact** to the existing visual character of the area because there would be no change to the physical environment under the No Action Alternative.

14.3.3.1.3 Impact VIS-3: Substantial Changes in Light or Glare.

Under the No Action Alternative, no structures would be built that would create light sources or increase glare.

CEQA Conclusion

There would be **no impact** to the existing visual character of the area because there would be no change to the physical environment under the No Action Alternative.

14.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

14.3.3.2.1 Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Construction sites would be accessed using Interstate (I) 5 to CR 117, north to CR 16, west to the Yolo Bypass east levee, and then north on the east levee crown maintenance road to access the site. CR 16 and portions of the existing levee crown maintenance roads would be used for equipment and offsite haul. These actions would require the use of heavy construction equipment that could temporarily degrade the visual characteristics of the area. The only access provided to visitors to the FWWA is from CR 16 on the east side of the FWWA. The heavy construction equipment and excavation material generated from construction activities would be potentially visible from the FWWA and CR 16 at certain vantage points for visitors, especially along CR 16 where vegetation is sparser than what visitors would experience in the FWWA. This would be especially true during the peak construction period in the middle of July, and there would be a distinct difference between the heavily vegetated wildlife area during normal conditions and during construction activities.

Since the heavy construction equipment would be similar to the equipment typically used in the surrounding agricultural lands, it would not be out of character to see in this area, and it is not anticipated that construction-related traffic associated with equipment and material haul would not lower the value of the visual resources. As areas of damage are identified on roadways, they would be temporarily repaired to accommodate ongoing operations (see Chapter 17 *Transportation, MM-TRAN-1: Periodic Inspection and Minor Repair of Roadways*). The area that would experience the most impact to views due to the presence of heavy construction equipment would be along CR 16—as this is the only access road for visitors—and the areas in the FWWA under construction. As the FWWA is heavily vegetated with trees, grasses, and large and small shrubs, the views to the areas of construction would be limited. Areas disturbed during construction could be replaced with native vegetation. Because the construction work would be temporary, the visual impacts associated with the presence of heavy construction equipment also would be temporary.

CEQA Conclusion

There would be **less than significant** impacts to the existing visual character of the Project area during construction because the presence of heavy construction equipment would be temporary.

14.3.3.2.2 Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Construction of the gated notch on the east side of Fremont Weir, including construction of the intake channel and the outlet channel down to Tule Pond, would disturb scenic resources such as areas of scour channels, existing trees, and larger areas of vegetation.

The intake channel would be constructed with a 30-foot bottom width that slopes from Fremont Weir to the Sacramento River. The outlet transition would be a 100-foot long reinforced concrete channel. Regular maintenance would be needed to maintain the outlet channel and intake structure to prevent debris, sediment, and vegetation build up that would degrade the visual quality of the area.

The east levee of the FWWA is an access area for visitors. The removal of vegetation would substantially alter views from the eastern vantage points in the FWWA, specifically, if visitors were looking north toward the Sacramento River.

In addition to the intake channel and outlet channel, a headworks structure would be constructed to control the flow from the Sacramento River into the Yolo Bypass. The headworks structure would be a multiple-bay, pile-supported, reinforced concrete structure that would bisect the existing Fremont Weir at an eastern location. It would include three operating control gates, concrete control structure, an upstream vehicular bridge crossing, and a concrete channel transition. A concrete control building would be added on the eastern levee. The location of the headworks structure along the eastern levee would be near the parking lot and access area for visitors. The control building would be in context with other agricultural buildings in the area, not more than one story, and made of concrete or a similar material. The headworks bridge would be constructed to provide vehicular and pedestrian crossing to the north of Fremont Weir. The addition of these structures would alter views into the FWWA from along the weir as the concrete structures would provide a stark contrast with the surrounding vegetation. The new structures could impede scenic views and vistas or the paths to scenic views and vistas for visitors to the FWWA.

Alternative 1 would also construct a supplemental fish passage facility at a western location along the existing Fremont Weir. The structure would have a reinforced concrete traffic-rated deck to allow vehicular traffic, similar to the headworks bridge structure. As both structures would provide either vehicular or pedestrian crossings in the FWWA, the view they would offer to visitors may be impacted in their vividness, intactness, and unity.

Alternative 1 would result in the excavation of 265,820 cubic yards of sediment that is expected to be transported off-site to a designated spoil area within two miles of the Yolo Bypass. Reclamation and DWR would first seek to find neighboring landowners that are interested in using the sediment on their properties (in a manner that is helpful to agricultural operations and would not convert agricultural land). Several public comments indicated an interest in obtaining the sediment. If agreements cannot be made, Reclamation and DWR would obtain land for sediment disposal within two miles of the Bypass. Visual resources are analyzed from within the FWWA and the Agricultural Road Crossing area. These spoil piles would not be visible from beyond the site vicinity due to the their distance from the FWWA and Agricultural Road Crossing, and due to screening from vegetation.

CEQA Conclusion

Alternative 1 would result in **significant** impacts to the existing visual character of the Project area because there would be changes to the physical environment that would impact the visual composition, including vegetation removal and the addition of permanent structures.

Mitigation Measure MM-VIS-1: Screen New Structure to Mitigate Visual Resources Impacts

All new structures including the headworks structure and bridges to be constructed over the new notch in the Fremont Weir would not be elevated much higher than the elevation of the existing weir. These structures will be screened to soften the views of the facilities. Screening will be utilized to the extent possible and could include landscaping with shrubs, ground cover, vegetated berms, and floodplain restoration, which will make new crossing structures and facilities less visible from a distance. Natural colors and materials with low reflectivity also will

be used to minimize the visual impact of these structures and, to the extent feasible, make them consistent with the existing character of the region. These new structures will be constructed and landscaped in such a manner as to match the existing character of the artificial structures that already exist in the area and surrounding landscape.

With implementation of Mitigation Measure MM-VIS-1, the impacts to visual resources would be **less than significant** because the contrasts between the new structures and natural vegetation would be reduced.

14.3.3.2.3 Impact VIS-3: Substantial Changes in Light or Glare

Construction throughout the eastern portion of the FWWA would require various equipment staging areas with new, temporary light sources to prevent theft or vandalism or to allow work to continue beyond daylight hours. Beyond the bounds of the FWWA, temporary light sources would not be out of character with the existing land uses and visual character of most of the Project area. Views of these areas from the nearest residences, approximately four miles away, would be obscured by distance, topography, and/or vegetation. Within the FWWA, although temporary lighting may be required during construction, it should not impact visitors as the FWWA is closed to visitors at dusk. Similarly, the new control building on the eastern levee may have night time lighting, but lighting should not affect visitors as the FWWA is closed at dusk.

CEQA Conclusion

This impact would be **less than significant** to the existing visual character of the area as a new source of light or glare would not be created under Alterative 1 that would affect residents or visitors.

14.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

14.3.3.3.1 Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Construction sites would be accessed from the same roads listed for Alternative 1.

As construction activities would take place near the center of Fremont Weir, heavy construction equipment and excavation material may not be visible to visitors along CR 16 from certain vantage points. Construction equipment within the FWWA may substantially degrade the existing visual character of the Project area, especially looking north toward the Sacramento River. Construction equipment would be out of character with the surrounding environment of the FWWA and could degrade the existing visual character of the area. As the FWWA is heavily vegetated with trees, grasses, and large and small shrubs, the views to the areas of construction

would be limited. Because the construction work would be temporary, the visual impacts of the presence of heavy construction equipment also would be temporary.

CEQA Conclusion

There would be **less than significant** impacts to the existing visual character of the area during construction because the presence of heavy construction equipment would be temporary.

14.3.3.3.2 Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

The central notch in Fremont Weir would mostly affect grasses on the intake channel side and trees and larger vegetation near the existing Sacramento River channel. The outlet channel would be constructed from the central notch south through the FWWA to Tule Pond. This channel may degrade the existing visual character of the site as the FWWA is currently heavily vegetated. Visitors to the area would experience scenic views with a stark contrast of the concrete outlet channel structure.

Two separate control buildings would be required for this alternative: an operating control building and a hydraulics building. The control building would be located on the eastern levee, whereas the hydraulics building would be located on the river side of Fremont Weir near the headworks structure. The control building would be in context with other farm buildings in the area, not more than one story, and made of concrete or a similar material. The hydraulics building would be raised above the maximum flood elevation with H-piles, a reinforced concrete pile cap, and streamlined reinforced concrete columns that would further impede scenic views for visitors in the FWWA. The building could degrade the visual character of the site and the surroundings if it is more elevated than the surrounding landscape. The new structures could impede scenic views and vistas or the paths to scenic views and vistas of visitors to the FWWA. In addition, an access road from the east within the FWWA would be improved with rock to allow access during wetter conditions. The improved road could increase the visual character of the site by imitating natural conditions and could act as a visual screen to soften views along the roadway. Similar to Alternative 1, a supplemental fish passage facility would be constructed at the western location along the existing Fremont Weir. The structure would have a reinforced concrete traffic-rated deck to allow vehicular traffic, similar to the headworks bridge structure. As both structures would provide either vehicular or pedestrian crossings in the FWWA, the view they would offer to visitors may be impacted in their vividness, intactness, and unity.

Alternative 2 would result in the excavation of 595,336 cubic yards of sediment that is expected to be transported off-site to a designated spoil area within two miles of the Yolo Bypass. The excavation spoils are expected to be used or transported in the same manner discussed for Alternative 1.

CEQA Conclusion

Alternative 2 would result in **significant** impacts to the existing visual character of the Project area because there would be changes to the physical environment that would impact the visual composition, including vegetation removal and the addition of permanent structures.

Implementation of Mitigation Measure MM-VIS-1 would reduce the impact to **less than significant** because the contrasts between the new structures and natural vegetation under Alternative 2 would be reduced.

14.3.3.3.3 Impact VIS-3: Substantial Changes in Light or Glare

The impacts of Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** to the existing visual character of the area as a new source of light or glare would not be created under Alternative 2 that would affect residents or visitors.

14.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

14.3.3.4.1 Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Construction sites would be accessed from the same roads listed for Alternative 1.

As construction activities will take place on the western side of Fremont Weir, heavy construction equipment and excavation material may not be visible to visitors along CR 16 from certain vantage points as there may be limited access to visitors in this area. The transport channel for this alternative would start at the western portion of Fremont Weir and extend through the FWWA to end near Tule Pond. The impacts under Alternative 3 would be the same as described for Alternative 1 because the construction work and the visual impacts associated with the presence of heavy construction equipment would be temporary.

CEQA Conclusion

There would be **less than significant** impacts to the existing visual character of the area during construction because the presence of heavy construction equipment would be temporary.

14.3.3.4.2 Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

The impacts of Alternative 3 would be similar to those discussed for Alternative 1, except for the notch location in Fremont Weir. Alternative 3 would site the notch on the western side of Fremont Weir. The structures under this alternative include the intake channel, outlet channel, headworks structure, and control building, which would be placed on the western location of the

weir. As this is located at the edge of the FWWA, there may be limited access for visitors in this area. The construction of the intake channel would mostly affect grasses on the intake channel side and trees and larger vegetation near the existing Sacramento River channel. The western notch is the longest alignment option and involves an outlet channel that crosses the oxbow in the Yolo Bypass, which is a historic river bank. This alternative may substantially damage scenic resources and change the visual character of the area. The supplemental fish passage facility would be located on the eastern section of Fremont Weir. The location of the facility would be near the visitor access roads and along CR 116. The facility would be 500 feet long and connect the fish passage facility to the channel transition. Visitors to the FWWA may experience views that are impeded by these structures from vantage points looking north toward the Sacramento River.

Alternative 3 would result in the excavation of 806,050 cubic yards of sediment that is expected to be transported off-site to a designated spoil area within two miles of the Yolo Bypass. The excavation spoils are expected to be used or transported in the same manner discussed for Alternative 1.

CEQA Conclusion

Alternative 3 would result in **significant** impacts to the existing visual character of the area because there would be changes to the physical environment that would impact the visual composition, including vegetation removal and the permanent addition of structures.

Implementation of Mitigation Measure MM-VIS-1 would reduce the impact to **less than significant** because the contrasts between the new structures and natural vegetation under Alternative 3 would be reduced.

14.3.3.4.3 Impact VIS-3: Substantial Changes in Light or Glare

The impacts of Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** to the existing visual character of the area as a new source of light or glare would not be created under Alternative 3 that would affect residents or visitors.

14.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

14.3.3.5.1 Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Construction sites would be accessed from the same roads listed for Alternative 1. Two additional north and south water control structures would be built under this alternative. The construction access for the northern and southern water control structures would degrade due to minor construction traffic associated with equipment and material haul for site mobilization. Construction activities for the water control structures and berms would take place along CR 22. Since CR 22 is not located in the vicinity of the FWWA, visitors to the FWWA would not be able to view these construction activities. Since the heavy construction equipment used would be similar to the equipment that is typically used in the surrounding agricultural lands, it would not be out of character for this equipment to be along CR 22.

The impacts for Alternative 4 would be similar to those described for Alternative 1 because the construction work and the visual impacts associated with the presence of heavy construction equipment would be temporary.

CEQA Conclusion

There would be **less than significant** impacts to the existing visual character of the area during construction because the presence of heavy construction equipment would be temporary.

14.3.3.5.2 Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

The impacts of Alternative 4 would be similar to those discussed for Alternative 3.

Alternative 4 includes two additional water control structures (18 by 18 feet) on Tule Canal. A fish bypass channel would be constructed around each control structure to maintain fish passage. The northern water control structure would be situated just north of CR 22. The water control structure would be a concrete structure that would include three 16-foot-wide “Obermeyer”-style inflatable gates that would raise to maintain water levels. The structure would have a concrete bridge on top of the structure for access, and it would have sheet pile walls that would tie into Tule Canal. Small berms (two to five feet in height) would be constructed on each side of the fish bypass channel to maintain water levels. The bypass channel would include a box culvert adjacent to the water control structure to allow vehicular access across both facilities. The southern water control structure would be situated just south of CR 22 and would have identical features to the northern water control structure. The control building would be in context with other farm buildings in the area, not more than one story, and made of concrete or a similar material. No nearby residences are near these sites, and the berms, fish bypass channel, and embankment would not be readily seen from roadways. The addition of these new structures would not affect the visual character of the area as the structures and operations of the facilities would be in context with the surrounding area.

The excavated materials generated from Alternative 4 would be the same as described for Alternative 3.

CEQA Conclusion

Alternative 4 would result in **significant** impacts to the existing visual character of the area because Alternative 4 includes the same facilities located in the FWWA as Alternative 3. There would be changes to the physical environment that impact the visual composition, including vegetation removal and the addition of permanent structures.

Implementation of Mitigation Measure MM-VIS-1 would reduce the impact to **less than significant** because the contrasts between the new structures and natural vegetation under Alternative 4 would be reduced.

14.3.3.5.3 Impact VIS-3: Substantial Changes in Light or Glare

The impacts of Alternative 4 would be similar to those discussed for Alternative 1. The addition of the northern and southern water control structures along CR 22 would include night lighting. This additional light source would be in context with other farm buildings in the area that also use night lighting.

CEQA Conclusion

This impact would be **less than significant** to the existing visual character of the area as a new source of light or glare would not be created under Alternative 4 that would affect residents or visitors.

14.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish by using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

14.3.3.6.1 Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Construction sites would be accessed from the same roads listed for Alternative 1.

The impacts of Alternative 5 would be similar to those discussed for Alternative 1. Because of the large channel excavation and associated quantity of spoil material under Alternative 5, 10 construction crews would be working concurrently on the grading efforts and would be spread out so that construction could proceed in multiple locations. The associated heavy construction equipment in the FWWA would degrade the existing visual character of the area. Visitors to the FWWA would experience reduced access and views to scenic resources through the FWWA as the construction of the transport channel would extend from the center of the weir to Agricultural Road Crossing 1. However, because the construction work would be temporary, the visual impacts also would be temporary.

CEQA Conclusion

There would be **less than significant** impacts to the existing visual character of the area during construction because the presence of heavy construction equipment would be temporary.

14.3.3.6.2 Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Alternative 5 incorporates multiple gated notches in the central location of the existing Fremont Weir so that the deeper gate can allow more flow to enter the bypass when the river is at lower elevations. The supplemental fish passage facility would be built on the western portion of the weir, similar to Alternative 1.

Alternative 5 includes four gated headworks (with two collocated). Each headworks structure would be connected to the Sacramento River with an intake channel. The approximately 100-foot-long headworks structure would house four bottom hinge control gates with varying elevations, heights, and widths. Two control buildings would be required for this operation: an operating control and a hydraulics building. The operating control building would be a building located on the eastern levee and would be in context with other farm buildings in the area, not more than one story, and made of concrete or a similar material, approximately 12 by 12 feet. Two additional structures would be needed to house the hydraulics controls on the river side of the weir near the headworks structures. The buildings would be of similar size and construction as the operating control structure but would be raised above the probable maximum flood elevation. The foundation of the building would consist of H-piles, reinforced concrete pile caps, and a pair of streamlined reinforced concrete columns. In addition, two pedestrian bridges would be built. The buildings and bridges at these locations would be a new addition to the landscape and could impede scenic views to visitors in the FWWA. These new structures (headworks and hydraulics building) would be above ground level and would disrupt the unity and intactness of the Sacramento River shoreline as well as scenic views or paths to scenic views. In addition, the transport channel would extend from the central part of Fremont Weir, southeast to Tule Canal, and through the FWWA and would degrade the intactness and unity of the area with the stark contrast between concrete structures and vegetation.

In addition, an access road from the east within the FWWA would be improved with rock to allow access during wetter conditions. The improved road could increase the visual character of the site by imitating natural conditions and could act as a visual screen to soften views along the roadway.

Alternative 5 would result in the excavation of 1,041,370 cubic yards of sediment that is expected to be transported off-site to a designated spoil area within two miles of the Yolo Bypass. The excavation spoils are expected to be used or transported in the same manner discussed for Alternative 1.

CEQA Conclusion

Alternative 5 would result in **significant** impacts to the existing visual character of the area because there would be changes to the physical environment that impact the visual composition, including vegetation removal and the addition of permanent structures.

Implementation of Mitigation Measure MM-VIS-1 would reduce the impact to **less than significant** because the contrasts between the new structures and natural vegetation under Alternative 5 would be reduced.

14.3.3.6.3 Impact VIS-3: Substantial Changes in Light or Glare

The impacts of Alternative 5 would be identical to those discussed for Alternative 1. Though there would be more buildings under Alternative 5, the lighting would not affect residents or visitors to the FWWA.

CEQA Conclusion

This impact would be **less than significant** to the existing visual character of the area as a new source of light or glare would not be created under Alternative 5 that would affect residents or visitors.

14.3.3.6.4 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of I-80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Construction activities for the flood plain improvements may be similar to the activities for other alternatives. Construction sites may be accessed from CR 124 and construction activities may also take place along the same road. Visitors and residents in this area would not be impacted by these construction activities. Since the heavy construction equipment would be similar to the equipment that is typically used in the surrounding agricultural lands, it would not be out of character for this equipment to be along County Route 124. Currently, the floodplain improvement area is managed as a wetland habitat for waterfowl. Visitors to this area would experience reduced access and views to this area, temporarily.

CEQA Conclusion

There would be **less than significant** impacts to the existing visual character of the area associated with the Tule Canal Floodplain Improvements during construction because the presence of heavy construction equipment would be temporary.

Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

The Tule Canal floodplain improvements would develop a series of secondary channels that connect to Tule Canal, north of I-80. Channels A, B, and C would have a 30-foot bottom width with 3:1 side slopes (horizontal to vertical). These improvements would also include a fish

bypass channel around the weir with a 10-foot bottom width and 3:1 side slopes (horizontal to vertical). The bypass channel would be about 2,100 feet long. Visitors to this area may experience reduced views of lush vegetation as the channels would provide a stark contrast with the surrounding vegetation.

CEQA Conclusion

Alternative 5 would result in **significant** impacts to the existing visual character of the area because there would be changes to the physical environment that impact the visual composition, including vegetation removal and the addition of permanent structures.

Implementation of Mitigation Measure MM-VIS-1 would reduce the impact to **less than significant** because the contrasts between the new structures and natural vegetation under Alternative 5 would be reduced.

Impact VIS-3: Substantial Changes in Light or Glare

Construction within the Tule Canal floodplain would require various equipment staging areas with new, temporary light sources to prevent theft or vandalism or to allow work to continue beyond daylight hours. Temporary light sources would not be out of character with the existing land uses and visual character of most of the Project area.

CEQA Conclusion

This impact would be **less than significant** to the existing visual character of the area as a new source of light or glare would not be created under Alternative 5 that would affect residents or visitors.

14.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

14.3.3.7.1 Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character

Construction sites would be accessed from the same roads listed in Alternative 1.

The impacts of Alternate 6 would be similar to those described for Alternative 1 because the construction work and the visual impacts associated with the presence of heavy construction equipment would be temporary.

CEQA Conclusion

There would be **less than significant** impacts to the existing visual character of the area during construction because the presence of heavy construction equipment would be temporary.

14.3.3.7.2 Impact VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.

Alternative 6 would result in the excavation of 1,710,680 cubic yards of sediment that is expected to be transported off-site to a designated spoil area within two miles of the Yolo Bypass. The excavation spoils are expected to be used or transported in the same manner discussed for Alternative 1.

The impacts under Alternative 6 would be identical to those described for Alternative 1.

CEQA Conclusion

Alternative 6 would result in **significant** impacts to the existing visual character of the area because there would be changes to the physical environment that would impact the visual composition, including vegetation removal and the addition of permanent structures.

Implementation of Mitigation Measure MM-VIS-1 would reduce the impact to **less than significant** because the contrasts between the new structures and natural vegetation under Alternative 6 would be reduced.

14.3.3.7.3 Impact VIS-3: Substantial Changes in Light or Glare

The impacts of Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** to the existing visual character of the area as a new source of light or glare would not be created that would affect residents or visitors associated with Alternative 6.

14.3.4 Summary of Impacts

Table 14-1. Summary of Impacts and Mitigation Measures – Visual Resources

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Impact VIS-1: Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS
Impact VIS-2: Long–Term, Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character.	No Action	NI	--	NI
	All Action Alternatives	S	MM-VIS-1	LTS
Impact VIS-3: Substantial Changes in Light or Glare	No Action	NI	--	NI

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
	All Action Alternatives	LTS	--	LTS

Key:
LTS = less than significant
NI = no impact
S = significant

14.4 Cumulative Impacts Analysis

This section describes the cumulative impacts analysis for Visual Resources. Section 3.3 presents an overview of the cumulative impacts analysis, including the methodology, the projects, plans, and programs considered in the cumulative impacts analysis.

14.4.1 Methodology

This evaluation of cumulative impacts for Visual Resources considers the impacts of the Project and how they may combine with the impacts of other, past, present, and future projects of actions to create significant impacts on visual resources. The area of analysis for these cumulative impacts includes the larger Yolo Bypass. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

This cumulative impact analysis utilizes the project analysis approach described in detail in Section 3.3. The cumulative projects included in this analysis are:

- Central Valley Flood Protection Plan – A plan to prioritize flood management actions in the Central Valley, including the potential expansion of the Yolo Bypass and the Fremont Weir (DWR 2016).
- Lower Elkhorn Basin Levee Setback Project – A plan to provide public safety by reducing river levels in the Sacramento River and increasing the capacity of Yolo and Sacramento bypasses near the urban communities in the area (DWR 2016).
- Lower Yolo Restoration Project – The project is a tidal and seasonal salmon habitat program that would restore tidal flux to approximately 1,100 acres of existing pasture land at McCormack Ranch, which is now owned by the Westlands Water District. The goal of the project is to provide new sources of food and shelter for a variety of native fish species and ensure continued or enhanced flood protection. The Lower Yolo Restoration Project is a component of the Delta adaptive management approach to determine relative benefits of different fish habitats, quantify the production and transport of food, and gain an understanding of how fish species take advantage of new habitat (State and Federal Contractors Water Agency 2013).
- Sacramento River Bank Protection Project – A plan to enhance public safety and help protect property along the Sacramento River and its tributaries by protecting existing levee and flood control facilities of the Sacramento River Flood Control Project. Actions under the

supplemental authorization may include bank protection in the form of rock revetment, biotechnical bank stabilization, setback levees, or construction of adjacent levees. Identified protection sites include a portion of northern Yolo Bypass.

14.4.2 Cumulative Effects

Historically, the visual conditions in the Project area were substantially different from present day conditions. Land use changes, and other human-caused alterations of the site have substantially altered vegetation, river channels, and associated visual and aesthetic elements in the Project area compared to historical conditions. During the mid-1800s, the Yolo Bypass area would overflow and fill up in the winter months from the surrounding waterways. This created a diverse marsh ecosystem that lasted more than 100 days, resulting in limited travel and access between the surrounding cities. The Sacramento River Flood Control Project was approved in 1911, which diverted water through multiple weirs and bypasses. Since then, much of the floodplain area that has been reclaimed for farming though a large area has been designated as FWWA. Further, levees, dams, other water control structures, and human alterations have substantially altered the landscape and visual elements of the Project area.

Implementing action alternatives could result in new structures and buildings to help increase and control the overflow of water coming in from the Sacramento River. New structures and buildings could have long-term impacts on the scenic vistas and resources of the FWWA. Under Mitigation Measure MM-VIS-1, all new structures would be screened to soften the views of the new facilities.

Several related and reasonably foreseeable projects and actions may result in visual impacts in the Project area. In particular, levee removal and relocation projects through the Central Valley Flood Protection Plan and Lower Elkhorn Basin Levee Setback Project may result in the presence of additional construction equipment in the river channel or FWWA, bare earth associated with levee removal or construction, or the removal of established vegetation in the river channel. Both programs would coordinate proposed actions within the Project area. In addition, the action alternatives include several measures to reduce impacts as described above in Section 14.3.3. Therefore, the action alternatives' incremental contributions to the significant cumulative effects associated with visual resources **would not be cumulatively considerable.**

14.5 References

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15 Public Services, Utilities, and Power

This chapter presents an overview of the area of analysis, regulatory setting, and existing conditions associated with public services, utilities, and power in the vicinity of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) area. Additionally, it presents environmental consequences and mitigation as they pertain to the implementation of the Project alternatives.

15.1 Environmental Setting/Affected Environment

The area of analysis for impacts to public services, utilities, and power is the area of disturbance and operational areas within a portion of the Yolo Bypass, including Fremont Weir, the Fremont Weir Wildlife Area (FWWA), a portion of Tule Canal, one downstream agricultural road crossing (Agricultural Road Crossing 1), and linear canals within and bordering Conaway Ranch between California Interstate (I)-5 and I-80 (see Figure 1-1 in Chapter 1, *Introduction*). The Yolo Bypass is predominantly located within Yolo County, with small portions within Sutter (northwestern corner) and Solano (southern tip) counties. Solano County does not provide any services to the Project area.

15.1.1 Public Services

Public services in the Project area are provided by Yolo and Sutter counties. These services include fire protection, emergency services, law enforcement, and solid waste management.

Fire protection and emergency medical response at the Project area within Yolo County are provided by Yolo County Fire District, Elkhorn Fire Protection District (FPD). Station No. 47 is approximately eight miles south of the FWWA in West Sacramento (Yolo County FPD 2016a). Sutter Basin FPD provides fire and emergency medical response to the Project area within Sutter County. Both Elkhorn FPD and Sutter Basin FPD provide fire protection and basic life support pre-hospital emergency medical services (Citygate Associates 2016, Sutter County 2016). The California Department of Forestry and Fire Protection also provides equipment and staff in Yolo and Sutter counties during the fire season (Yolo County 2009).

Law enforcement is provided by the Yolo County Sheriff for unincorporated areas of Yolo County and Sutter County Sheriff's Department for Sutter County. California Department of Fish and Wildlife (CDFW) also enforces hunting and fishing regulations within the FWWA (CDFW 2018). There are no schools or public parks within the Project area.

CDFW manages the FWWA for public seasonal hunting, fishing, bird watching, and wildlife viewing. One parking area is provided at the intersection of County Road 16 and County Road 107 at the eastern edge of the wildlife area. There are no restrooms or other public facilities available at the wildlife area. Conaway Ranch, south of the FWWA, is not open to the public. Conaway Ranch is used to farm rice, and much of the area is designated wildlife habitat. The United States Department of the Interior, Bureau of Reclamation (Reclamation) manages the

canals and waterways at Conaway Ranch, supplying irrigation water to the area from the Sacramento River.

Waste management services are not currently provided to the FWWA or the Project area within Conaway Ranch. People using the FWWA are encouraged to pack out their own trash. Since Conaway Ranch is not open to the public, there are no stipulations in place for trash management. Yolo County Integrated Waste Management Division (IWMD) provides waste management services to Yolo County and operates the Yolo County Central Landfill. Along with residential and commercial waste, the Yolo County Central Landfill accepts construction waste wood, asphalt, and non-hazardous excavated soil as long as it meets the Soil Acceptable Criteria defined by the county (Yolo County IWMD 2016).

15.1.2 Utilities and Power

There is currently no power, gas, public water system, cable, or telephone service to the Project area. However, transmission lines for power and gas pass through portions of the Project area.

An overhead high voltage power line (230 kilovolts) traverses the FWWA (Yolo County 2009) and includes seven large towers, which support the overhead line. Overhead power service lines traverse the east and west levees bordering the FWWA and through the Conaway Ranch area parallel to Route 22. Pacific Gas and Electric (PG&E) provides power to Yolo and Sutter counties and operates the existing overhead power line through the Project area.

PG&E does not report any gas transmission lines through or near the Project area (PG&E 2016, PG&E 2017). However, a hazardous materials database search conducted of the Project area shows two natural gas pipelines that traverse portions of Conaway Ranch within the Project area and within 0.5-mile of the Project area (Environmental Data Resources [EDR] 2017a and 2017b). All EDR database search information is provided in Appendix J, *Hazardous Materials Database Search*.

Water from the Sacramento River enters the Yolo Bypass and the FWWA during high flow events that overtop Fremont Weir (California Department of Water Resources [DWR] and Reclamation 2017). At the Conaway Ranch Project area, water from the Sacramento River enters the area from the Sacramento River Pumping Station via Tule Canal Siphon to Conaway Cross Canal, operated by Reclamation (Yolo County 2014). No public water system services the Project area.

There is no formal stormwater treatment system, as the area itself was developed for flood control to capture flows in this natural wetland area. There are no wastewater treatment facilities within the Project area (DWR and Reclamation 2017).

15.2 Regulatory Setting

This section describes the regulatory setting for public services, utilities, and power in the Project area.

15.2.1 Federal Plans, Policies, and Regulations

The Energy Policy and Conservation Act of 1975 promotes energy conservation when feasibly obtainable. The Alternative Fuels Act of 1988 amends a portion of the Energy Policy and Conservation Act to pursue the use of alternative fuels, including electricity.

Section 403(b) of the Power Plant and Industrial Fuel Use Act of 1978 (Public Law 95-629) and Executive Order 12185, Conservation of Petroleum and Natural Gas (44 Federal Register Section 75093), encourage conservation of petroleum and natural gas.

The Secretary of Energy is required to enact programs to help improve energy efficiencies, increase the use of renewable energy, reduce environmental impacts, and foster economic growth as part of the Energy Policy Act of 1992. The Energy Policy Act of 2005 directs the Secretary of Energy to develop programs related to "energy efficiency research, development, demonstration and commercial application" (USLegal.Com 2016).

15.2.2 State Plans, Policies, and Regulations

State laws and regulations pertaining to public services, utilities, and power are discussed below.

15.2.2.1 California Energy Commission

The California Energy Commission (CEC) is responsible for, among other things, forecasting future energy needs for the State of California (State). Senate Bill 1389 (Chapter 568, Statutes of 2002) requires the CEC to prepare a biennial Integrated Energy Policy Report (IEPR), assessing major energy trends and issues facing the State's electricity, natural gas, and transportation fuel sectors. The report also provides policy recommendations to conserve resources; protect the environment; and, ensure reliable, secure, and diverse energy supplies (CEC 2017). The most recent report was prepared for 2016.

15.2.2.2 California Public Utilities Commission

The California Public Utilities Commission (CPUC) is a regulatory body overseeing privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies since 1912. CPUC ensures the provision of safe, reliable utility service and infrastructure to consumers (CPUC 2016). CPUC is responsible for ensuring that electric utilities meet the State's Renewable Portfolio Standard, administering gas-related conservation programs and ensuring water utilities meet all Federal and State water quality standards (CPUC 2013).

15.2.2.3 California Integrated Waste Management Act of 1989

The Integrated Waste Management Act of 1989 regulates solid waste management and establishes waste management regulations and guidelines for local agencies. Provisions in the law are focused on source reduction, recycling and composting, and environmentally safe transformation and land disposal (California Department of Resources Recycling and Recovery [CalRecycle] 2016a).

15.2.2.4 Department of Resources Recycling and Recovery

CalRecycle promotes recycling, waste reduction, and product reuse through various programs promoting technology innovation, which helps to achieve a statewide goal of 75 percent recycling by 2020. CalRecycle works with local governments to enforce regulations related, but not limited, to the handling and disposal of non-hazardous waste and cleanup of illegal disposal sites (CalRecycle 2014). Title 14 of the California Code of Regulations contains current CalRecycle regulations regarding the disposal of nonhazardous waste in California. Title 27 contains current CalRecycle and State Water Resources Control Board regulations about disposal of waste to land (CalRecycle 2016b).

15.2.2.5 California Fire Code

In accordance with California Code of Regulations, Title 8 Section 3221 Fire Prevention and Section 6773 Fire Protection and Fire Equipment, the California Division of Occupational Safety and Health has established minimum standards for fire suppression and emergency medical services (California Department of Industrial Relations 2017a and 2017b).

15.2.2.6 California Uniform Fire Code

The Uniform Fire Code contains regulations relating to construction, maintenance, and use of buildings. Topics addressed in the code include fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, fire and explosion hazards, safety, hazardous materials storage and use, provisions intended to protect and assist fire responders, industrial processes, and many other fire-safety requirements for new and existing buildings.

15.2.3 Regional and Local Plans, Policies, and Regulations

The Yolo County *2030 Countywide General Plan* includes policies related to public services, utilities, and power in the Public Facilities and Services Element (County of Yolo 2009). Only Solid Waste and Recycling policies apply to the Project, as excavated material and other construction wastes will be generated and require some offsite disposal. Applicable policies related to Solid Waste and Recycling include:

- PF-9.2 Manage property to ensure adequate landfill space for existing and planned land uses.
- PF-9.4 Prioritize disposal and processing capacity at the landfill for waste materials generated within Yolo County, but accept waste materials from outside the county when capacity is available and the rates cover the full cost of disposal and processing.
- PF-9.8 Require salvage, reuse, or recycling of construction and demolition materials and debris at all construction sites.
- PF-9.9 Encourage use of salvaged and recycled materials in construction.
- PF-11.3 Require utility lines to follow field edges to minimize impacts on agricultural operations.

The *Sutter County 2030 General Plan* has similar policies related to waste management as the Yolo County *2030 Countywide General Plan* (Sutter County 2011).

15.3 Environmental Consequences

These sections describe the environmental consequences associated with each alternative relative to public services, utilities, and power. Chapter 5, *Surface Water Supply*, discusses changes to available water supplies, impacts and benefits to water users in the Project area, and water distribution infrastructure. Detailed descriptions of the alternatives evaluated in this section are provided in Chapter 2, *Description of Alternatives*.

Impacts to public utilities are determined relative to existing conditions (for California Environmental Quality Act [CEQA]) and the No Action Alternative (for the National Environmental Policy Act [NEPA]). However, as described below, the No Action Alternative would be the same as existing conditions because public utilities are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to the impacts of the Existing Conditions.

15.3.1 Methods for Analysis

Impacts to public services, utilities, and power resources could occur during construction of the action alternatives due to the use of construction equipment. The significance of these impacts is assessed qualitatively.

The following resource issues are not discussed in the environmental analysis for the reasons stated below:

- Implementation of the action alternatives would not result in long-term changes in land use or increases in population above expected growth rates that would affect public services, including fire, police, emergency response, or schools.
- There would also be no long-term impacts to wastewater utilities.
- Water supply impacts are discussed and analyzed in Chapter 5, *Surface Water Supply*.
- The management of the FWWA could change with implementation of the action alternatives due to the timing and increases in frequency of water flow or inundation to an area that is currently accessible to the public for seasonal hunting, fishing, and wildlife viewing. However, these changes would not affect public service needs related to fire and public safety.

Potential long-term impacts to energy use and power in the area of analysis could result from the operation of fish passage facilities. These changes are analyzed qualitatively based on the energy impact guidance in CEQA Guidelines Appendix F, Energy Conservation. Specific significance criteria are described below.

15.3.2 Thresholds of Significance – CEQA

The thresholds of significance for impacts described below were developed consistent with Appendices F and G of the State CEQA Guidelines, as amended. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. Impacts considered under the alternatives

were determined to be significant related to public services, utilities, and power resources if they would do any of the following:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives and public access management for any public services, including fire protection, police protection, schools, parks, and other public facilities
- Result in the need for new stormwater facilities
- Require or result in the construction of new stormwater treatment/drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects
- Exceed the capacity of a landfill designated to accommodate the project's solid waste needs or require new facilities to accommodate disposal of excavated material
- Comply with Federal, State, and local statutes and regulations related to solid waste
- Result in the need for additional capacity of local or regional energy supplies
- Result in adverse effects related to the depletion of local or regional energy supplies, including peak demand periods
- Comply with existing energy standards
- Require substantial transportation energy during construction and maintenance operations that could be offset by more efficient measures

15.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect effects on public services, utilities, and power from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

15.3.3.1 No Action Alternative

Under the No Action Alternative, current operations at Fremont Weir, FWWA, and Conaway Ranch would remain unchanged. There would be no construction activities that would result in adverse impacts related to the provision of new or physically altered governmental facilities. The No Action Alternative would not require new water, wastewater, or stormwater facilities to be constructed. Further, the No Action Alternative would not produce solid waste or increase the amount of sediment removal from FWWA to existing offsite disposal areas and would not result in increased energy use or the need for additional energy supply capacity.

Under the No Action Alternative, Reclamation and DWR dispose of approximately 296,550 cubic yards of sediment annually from the bypass through operations and maintenance activities. The frequency of sediment removal is approximately every five years. This material is disposed of off-site at property owned by the agencies. Therefore, there would be no adverse effects for:

- The provision of governmental services or facilities, including fire and police protection, parks, and schools

- The need for new stormwater facilities
- Generation of solid waste in need of disposal, which could exceed the capacity of landfills
- Increased use and/or depletion of local or regional energy supplies

CEQA Conclusion

There would be **no impact** related to public services, utilities, or power because the Project would not be constructed under the No Action Alternative.

15.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

15.3.3.2.1 Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools

Construction, operations, and maintenance activities at the Project area would require the presence of workers and, in the case of an emergency, could require emergency services from local fire or police responders. Fire services closest to the FWWA are located approximately eight miles away in West Sacramento, and law enforcement is located approximately 12 miles in Woodland. The fire and police would be able to respond in the event there was an emergency. Due to the expectation of a limited number of events requiring fire or police, there would not be an adverse effect to the service providers compared to existing conditions.

Construction activities for Alternative 1 would last approximately 28 weeks and would require 202 workers at the peak of the construction period in mid-July. Maintenance activities would occur periodically for debris removal, sediment removal, vegetation removal, and facility inspections. Construction, operations, and maintenance workers are expected to be drawn from the local area and would not necessitate the need for new public services such as schools and parks. As described in the analysis of geological and materials hazards (Chapter 12, *Geology and Soils*; Chapter 13, *Recreation*; and Chapter 19, H*azardous Materials and Health and Safety*), the impact of hazardous conditions during construction, operations, and maintenance, such as landslides, exposure to hazardous materials, or worker conflicts with recreational hunters, would be less than significant or less than significant with mitigation implemented. Construction and maintenance areas at the FWWA would be closed to public use during construction and maintenance, and signage would be posted informing the public about the construction and maintenance schedules and areas accessible for hunting. Operations would be performed from the headworks structure, which is closed to the public. Emergency response or remediation and containment plans would be implemented and Occupational Safety and Health Administration (OSHA) standards would be maintained as described in Chapter 19, *Hazardous Materials and Health and Safety*.

Given the short-term 28-week construction schedule and periodic maintenance schedules, Alternative 1 would not generate an influx of new permanent residents in Yolo County or neighboring cities or counties nor create a short- or long-term impact on public schools compared to existing conditions.

CEQA Conclusion

This impact to the provision of governmental services or facilities under Alternative 1 would be **less than significant** because the use of the local workforce and construction controls for hazardous conditions would have limited effects.

15.3.3.2.2 Impact UTIL-2: Create the need for new stormwater facilities

Construction and maintenance activities of Alternative 1 could lead to the generation of polluted stormwater runoff during grading activities (see Chapter 6, *Water Quality*, Impact WQ-1) compared to existing conditions, which would be a significant impact to water quality, necessitating the need for new stormwater facilities. However, in accordance with Mitigation Measure MM-WQ-3, the Lead Agencies shall prepare a Stormwater Pollution Prevention Plan (SWPPP) that describes Best Management Practices (BMPs) that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after Project construction and maintenance grading activities of one acre or more. The SWPPP will be prepared by the construction contractor prior to initiating construction and maintenance grading activities. Specific BMPs that shall be incorporated into the SWPPP shall be site-specific and shall be prepared in accordance with the Regional Water Quality Control Board field manual.

The implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance. No additional stormwater control structures would be required.

CEQA Conclusion

Grading activities associated with Alternative 1 would result in a **significant** impact regarding the need for additional stormwater facilities. However, with implementation of Mitigation Measure MM-WQ-3: Implement a SWPPP, this impact would be reduced to **less than significant.** The implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance activities.

15.3.3.2.3 Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills

Alternative 1 would require the transport and disposal of approximately 450 cubic yards of construction solid waste during the construction period. The solid waste material would be transported to the closest solid waste landfill (Yolo County Central Landfill), which has an annual capacity of 500,000 to 750,000 cubic yards (CalRecycle 2017). The Yolo County Central Landfill has adequate capacity to serve solid waste disposal needs for construction of the Project.

Alternative 1 would also require the transport and disposal of approximately 265,820 cubic yards of excavated soil during construction to be disposed of at an undeveloped, seven- to eight-acre parcel to be acquired by Reclamation and DWR within two miles of the Yolo Bypass.

In addition to construction spoils, Alternative 1 would require the removal and disposal of an additional 37,800 cubic yards of accumulated sediment every five years when compared to existing conditions. Reclamation and DWR would purchase land outside of the bypass for accumulated sediment removal during maintenance activities. Disposal of this material under Alternative 1 would not affect public landfill capacity.

CEQA Conclusion

Alternative 1 would result in a **less than significant impact** because there is adequate capacity at the landfill to accommodate Alternative 1 needs and excavated soil would not be disposed of at a public landfill.

15.3.3.2.4 Impact UTIL-4: Use and/or depletion of local or regional energy supplies.

During construction and maintenance of Alternative 1, temporary power facilities would be needed for construction equipment, welding, and trailers at the site. Power for construction and maintenance activities would be provided by portable generators and would not use PG&E power supply. Thus, construction and maintenance activities would not cause stress to, or lead to the depletion of, existing power supplies in Yolo County compared to existing conditions.

Construction of Alternative 1 would require the transport of material to be hauled to and from the site for distances ranging between 21 and 66 miles. In addition, approximately 265,820 cubic yards of material excavated during construction would be transported off site to a designated spoils area within two miles of the bypass. Alternative 1 would also require the transport and removal every five years of an additional 37,800 cubic yards of sediment compared to existing conditions as part of maintenance activities. Reclamation and DWR would transport accumulated sediment from the Project area to land purchased by the agencies outside of the bypass. Reuse of excavated material on site was considered to reduce the amount of truck trips; however, to maintain flood control capacity, it is not feasible to reuse excavated material on site. The Lead Agencies would coordinate with other flood control projects in the area to determine whether material excavated as part of the Project could be reused in the region, depending upon schedule considerations.

The electrical service required for operation of the headworks would be three-phase at approximately 100 amperes and 48 volts alternating current (80 kilovolt ampere) during periods of gate operation for fish passage. The electrical service would be provided by PG&E, with construction of underground or overhead power service lines to the control facilities. The new power lines would be connected to existing overhead power sources located on either the east or west levees bordering the Yolo Bypass, which is consistent with Yolo County Policy PF-11.3 described in Section 15.2.3. All new power facilities would comply with current energy standards. The power requirements for operation of the headworks during operations for fish passage would be minimal and would not cause stress to, or lead to the depletion of, existing power supplies, including periods of peak demands in Yolo County compared to existing conditions.

CEQA Conclusion

Alternative 1 would result in a **less than significant** impact to local or regional power supplies because electricity used would be provided to the Project site by temporary generators during construction and maintenance. Operation of the headworks structure would have low power requirements. Alternative 1 would result in a **less than significant** impact to the utilization of transportation energy because truck hauling of the material on and off site is the most efficient method due to the location of the Project area in relation to other means of transportation.

15.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

15.3.3.3.1 Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools

Construction, operations, and maintenance activities associated with Alternative 2 would require the presence of workers and, in the case of an emergency, could require emergency services from local fire or police responders. The location of the nearest emergency services is the same as described under Alternative 1. Construction activities for Alternative 2 would last approximately 28 weeks and require 223 workers drawn from the local area at the peak of the construction period in late July. Operations and periodic maintenance activities would be the same as Alternative 1. The number of workers during the peak construction period would be slightly higher under Alternative 2 than under Alternative 1 (202 workers); however, the impact of hazardous conditions to workers and the public during construction of Alternative 2 would be the same as described under Alternative 1.

CEQA Conclusion

The impact to the provision of governmental services or facilities under Alternative 2 would be **less than significant** because the use of the local workforce and short-term construction period would have limited effects.

15.3.3.3.2 Impact UTIL-2: Create the need for new stormwater facilities

Construction and maintenance activities for Alternative 2 could lead to the generation of polluted stormwater runoff during excavation and earthmoving activities (see Chapter 6, *Water Quality* Impact WQ-1) compared to existing conditions, which would be a significant impact to water quality similar to Alternative 1. However, under CEQA the Lead Agencies would be required to implement Mitigation Measure MM-WQ-3 as described under Alternative 1, and no additional stormwater control structures would be required.

CEQA Conclusion

Grading activities associated with Alternative 2 would result in a **significant** impact regarding the need for additional stormwater facilities. However, with implementation of Mitigation Measure MM-WQ-3, this impact would be reduced to **less than significant.** The implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance activities.

15.3.3.3.3 Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills

Alternative 2 would require the transport and disposal of approximately 420 cubic yards of construction solid waste during the construction period compared to existing conditions. The solid waste material would be transported to the closest solid waste landfill (Yolo County Central Landfill), which has an annual capacity of 500,000 to 750,000 cubic yards (CalRecycle 2017). The Yolo County Central Landfill has adequate capacity to serve solid waste disposal needs for construction of Alternative 2.

Alternative 2 also would require the transport and disposal of approximately 595,336 cubic yards of excavated soil during construction. Excavated soil would be disposed of at a 13- to 15-acre parcel to be acquired by Reclamation and DWR within two miles of the Yolo Bypass. Disposal of this material under Alternative 2 would not affect public landfill capacity.

In addition to construction spoils, Alternative 2 would require the periodic removal and disposal of the same amount of accumulated sediment and the same impacts as those described under Alternative 1.

CEQA Conclusion

Alternative 2 would result in a **less than significant** impact because there is adequate capacity at the landfill to accommodate Alternative 2 needs and excavated soil would not be disposed of at a public landfill.

15.3.3.3.4 Impact UTIL-4: Use and/or depletion of local or regional energy supplies

During construction and maintenance of Alternative 2, temporary power facilities and impacts to power supply would be the same as those described under Alternative 1.

Construction of Alternative 2 would require the transport of material to be hauled to and from the site similar to that described under Alternative 1. In addition, approximately 595,336 cubic yards of material excavated during construction would be transported off site to a designated spoils area within two miles of the FWWA. Alternative 2 would also require the transport and removal of the same amount of additional accumulated sediments as described under Alternative 1. Reuse of excavated material on site was considered to reduce the amount of truck trips; however, to maintain flood control capacity, it is not feasible to reuse excavated material on site. The Lead Agencies would coordinate with other flood control projects in the area to determine whether material excavated as part of the Project could be reused in the region, depending upon schedule considerations.

The electrical service required for operation of the headworks under Alternative 2 would be the same as described under Alternative 1. The electrical service would be provided by PG&E, and installation of the new service would be consistent with Yolo County Policy PF-11.3 described in Section 15.2.3. All new power facilities would comply with current energy standards. The power requirements for operation of the headworks during operations for fish passage would be minimal and would not cause stress to, or lead to the depletion of, existing power supplies, including periods of peak demands in Yolo County compared to existing conditions.

CEQA Conclusion

Alternative 2 would result in a **less than significant** impact to local or regional power supplies because electricity used would be provided to the Project site by temporary generators during construction and maintenance and low power requirements for operation of the headworks structure. Alternative 2 would result in a **less than significant** impact to the utilization of transportation energy because truck hauling of the material on and off site is the most efficient method due to the location of the Project area in relation to other means of transportation.

15.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

15.3.3.4.1 Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools

Construction, operations, and maintenance activities associated with Alternative 3 would require the presence of workers and, in the case of an emergency, could require emergency services from local fire or police responders. The location of the nearest emergency services is the same as described under Alternative 1. Construction activities for Alternative 3 would last approximately 28 weeks and require 277 workers drawn from the local area at the peak of the construction period in mid-July. Operations and periodic maintenance activities would be the same as Alternative 1. The number of workers during the peak construction period would be slightly higher under Alternative 3 than under Alternative 1 (202 workers); however, the impact of hazardous conditions to workers and the public during construction of Alternative 3 would be the same as described under Alternative 1.

CEQA Conclusion

This impact to the provision of governmental services or facilities under Alternative 3 would be **less than significant** because the use of the local workforce and short-term construction period would have limited effects.

15.3.3.4.2 Impact UTIL-2: Create the need for new stormwater facilities

Construction and maintenance activities for Alternative 3 could lead to the generation of polluted stormwater runoff during excavation and earthmoving activities (see Chapter 6, *Water Quality* Impact WQ-1) compared to existing conditions, which could be a significant impact to water quality similar to Alternative 1. However, under CEQA the Lead Agencies would be required to implement Mitigation Measure MM-WQ-3 as described under Alternative 1, and no additional stormwater control structures would be required.

CEQA Conclusion

Grading activities associated with Alternative 3 would result in a **significant** impact regarding the need for additional stormwater facilities. However, with implementation of Mitigation Measure MM-WQ-3, this impact would be reduced to **less than significant.** The implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance activities.

15.3.3.4.3 Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills

Alternative 3 would require the transport and disposal of approximately 470 cubic yards of construction solid waste during the construction period compared to existing conditions. The solid waste material would be transported to the closest solid waste landfill (Yolo County Central Landfill), which has an annual capacity of 500,000 to 750,000 cubic yards (CalRecycle 2017). The Yolo County Central Landfill has adequate capacity to serve solid waste disposal needs for construction of Alternative 3.

Alternative 3 would also require the transport and disposal of approximately 806,050 cubic yards of excavated soil during construction. Soil excavated to construct the Project would be disposed of at a 17- to 20-acre parcel to be acquired by Reclamation and DWR within two miles of the Yolo Bypass. Disposal of this material under Alternative 3 would not affect public landfill capacity.

In addition to construction waste, Alternative 3 would require the periodic removal and disposal of the same amount of accumulated sediment and the impacts would be the same as those described under Alternative 1.

CEQA Conclusion

Alternative 3 would result in a **less than significant** impact because there is adequate capacity at the landfill to accommodate Alternative 3 needs and excavated soil would not be disposed of at a public landfill.

15.3.3.4.4 Impact UTIL-4: Use and/or depletion of local or regional energy supplies

During construction and maintenance of Alternative 3, temporary power facilities and impacts to power supply would be the same as those described under Alternative 1.

Construction of Alternative 3 would require the transport of material to be hauled to and from the site for distances ranging between 21 and 66 miles. In addition, approximately 806,050 cubic yards of material excavated during construction would be transported off site to a designated spoils area within two miles from the bypass. Alternative 3 would also require the transport and removal of the same amount of additional accumulated sediments as described under Alternative 1. Reuse of excavated material on site was considered to reduce the amount of truck trips; however, to maintain flood control capacity, it is not feasible to reuse excavated material on site. The Lead Agencies would coordinate with other flood control projects in the area to determine whether material excavated as part of the Project could be reused in the region, depending upon schedule considerations.

The electrical service required for operation of the headworks under Alternative 3 would be the same as described under Alternative 1.

CEQA Conclusion

Alternative 3 would result in a **less than significant** impact to local or regional power supplies during construction of Alternative 3 because electricity used would be provided to the Project site by temporary generators during construction and maintenance and low power requirements for operation of the headworks structure. Alternative 3 would result in a **less than significant** impact to the utilization of transportation energy because truck hauling of the material on and off site is the most efficient construction method due to the location of the Project area in relation to other means of transportation.

15.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

15.3.3.5.1 Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools

Construction, operations, and maintenance activities associated with Alternative 4 would require the presence of workers and, in the case of an emergency, could require emergency services from local fire or police responders. The location of the nearest emergency services is the same as those described under Alternative 1. Construction activities for Alternative 4 would last approximately 28 weeks and require 363 workers drawn from the local area at the peak of the construction period in mid-July. Operations would be similar as under Alternative 1 with less additional sediment removal during periodic maintenance activities. The number of workers during the peak construction period is higher under Alternative 4 than under Alternative 1 (202 workers); however, the impact of hazardous conditions during construction of Alternative 4 to workers and the public would be the same as described under Alternative 1.

CEQA Conclusion

This impact to the provision of governmental services or facilities under Alternative 4 would be **less than significant** because the use of the local workforce and short-term construction period would have limited effects.

15.3.3.5.2 Impact UTIL-2: Create the need for new stormwater facilities

Construction and maintenance activities for Alternative 4 could lead to the generation of polluted stormwater runoff during excavation and earthmoving activities (see Chapter 6, *Water Quality* Impact WQ-1) compared to existing conditions, which could be a significant impact to water quality similar to Alternative 1. However, under CEQA the Lead Agencies would be required to implement Mitigation Measure MM-WQ-3 as described under Alternative 1, and no additional stormwater control structures would be required.

CEQA Conclusion

Grading activities associated with Alternative 4 would result in a **significant** impact regarding the need for additional stormwater facilities. However, with implementation of Mitigation Measure MM-WQ-3, this impact would be reduced to **less than significant.** The implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance activities.

15.3.3.5.3 Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills

Alternative 4 would require the transport and disposal of approximately 470 cubic yards of construction solid waste during the construction period compared to existing conditions. The solid waste material would be transported to the closest solid waste landfill (Yolo County Central Landfill), which has an annual capacity of 500,000 to 750,000 cubic yards (CalRecycle 2017). The Yolo County Central Landfill has adequate capacity to serve solid waste disposal needs for construction of Alternative 4.

Impacts associated with the transport and disposal of excavated soil during construction and maintenance activities under Alternative 4 would be identical to those discussed under Alternative 1with less accumulated sediment removal during maintenance activities.

CEQA Conclusion

Alternative 4 would result in a **less than significant** impact because there is adequate capacity at the landfill to accommodate Alternative 4 needs and excavated soil would not be disposed of at a public landfill.

15.3.3.5.4 Impact UTIL-4: Use and/or depletion of local or regional energy supplies

During construction and maintenance of Alternative 4, temporary power facilities and impacts to power supply would be the same as those described under Alternative 1.

Construction of Alternative 4 would require the same amount of material imported to and exported from the FWWA construction sites as under Alternative 3 during construction. The spoils areas would be within two miles from the Yolo Bypass. Under Alternative 4, an additional 60,000 cubic yards of soil would be transported to the construction area for the Northern Water Control and the Southern Water Control structures. Soil excavated to construct the water control structures would be reused to build the engineered embankments; however, additional soil would be needed to fulfill design specifications for the embankments, and this soil would need to be imported from off site. Material would be imported from borrow sites located within a few miles of the Project area. Alternative 4 would require the transport and removal of a smaller amount of accumulated sediments than described for Alternative 1. Reuse of excavated material on site was considered to reduce truck trips; however, to maintain flood control capacity, it is not feasible to reuse excavated material on site except at the water control structures. The Lead Agencies would coordinate with other flood control projects in the area to determine whether material excavated as part of the Project could be reused in the region, depending upon schedule considerations.

The electrical service required for operation of the headworks under Alternative 4 would be the same as described under Alternative 1.

CEQA Conclusion

Alternative 4 would result in a **less than significant** impact to local or regional power supplies during construction of Alternative 4 because electricity used would be provided to the Project site by temporary generators during construction and maintenance and low power requirements for operation of the headworks structure. Alternative 4 would result in a **less than significant** impact to the utilization of transportation energy because truck hauling of the material on and off site is the most efficient construction method due to the location of the Project area in relation to other means of transportation.

15.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish by using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

15.3.3.6.1 Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools

Construction, operations, and maintenance activities associated with Alternative 5 would require the presence of workers and, in the case of an emergency, could require emergency services from local fire or police responders. The location of the nearest emergency services is the same as described under Alternative 1. Construction activities for Alternative 5 would last two construction seasons (total of 40 weeks) and require an estimated maximum of 358 workers drawn from the local area at the peak of the construction period in mid-July. Operations would be similar as under Alternative 1 with less additional accumulated sediment removal during periodic maintenance activities. The construction period would be longer and the number of

workers during the peak construction period would be higher under Alternative 5 than under Alternative 1 (202 workers); however, the impact of hazardous conditions to workers and the public during construction of Alternative 5 would be the same as described under Alternative 1.

CEQA Conclusion

This impact to the provision of governmental services or facilities under Alternative 5 would be **less than significant** because the use of the local workforce and short-term construction period would have limited effects.

15.3.3.6.2 Impact UTIL-2: Create the need for new stormwater facilities

Construction and maintenance activities for Alternative 5 could lead to the generation of polluted stormwater runoff during excavation and earthmoving activities (see Chapter 6, *Water Quality* Impact WQ-1) compared to existing conditions, which could be a significant impact to water quality similar to Alternative 1. However, under CEQA the Lead Agencies would be required to implement Mitigation Measure MM-WQ-3 as described under Alternative 1, and no additional stormwater control structures would be required.

CEQA Conclusion

Grading activities associated with Alternative 5 would result in a **significant** impact regarding the need for additional stormwater facilities. However, with implementation of Mitigation Measure MM-WQ-3, this impact would be reduced to **less than significant.** The implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance activities.

15.3.3.6.3 Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills

Alternative 5 would require the transport and disposal of approximately 1,610 cubic yards of construction solid waste during the construction period compared to existing conditions. The solid waste material would be transported to the closest solid waste landfill (Yolo County Central Landfill), which has an annual capacity of 500,000 to 750,000 cubic yards (CalRecycle 2017). The Yolo County Central Landfill has adequate capacity to serve solid waste disposal needs for construction of Alternative 5.

Alternative 5 would require the transport and disposal of approximately 2,095,342 cubic yards of excavated soil during construction for excavation of the intake and transport channels and downstream facilities. An additional 1,053,970 cubic yards of soil could also be excavated in Tule Canal for a total of 3,149,312 cubic yards. Soil excavated to construct Alternative 5 would be disposed of at a 42- to 48-acre parcel acquired by Reclamation and DWR within two miles of the construction area. Disposal of this material under Alternative 5 would not affect public landfill capacity.

Impacts associated with the transport and disposal of excavated soil during maintenance activities under Alternative 5 would be identical to those discussed under Alternative 1.

CEQA Conclusion

Alternative 5 would result in a **less than significant** impact because there is adequate capacity at the landfill to accommodate Alterative 5 needs and excavated soil would not be disposed of at a public landfill.

15.3.3.6.4 Impact UTIL-4: Use and/or depletion of local or regional energy supplies

During construction and maintenance of Alternative 5, temporary power facilities and impacts to power supply would be the same as those described under Alternative 1.

Construction of Alternative would require the transport of material to be hauled to and from the site for distances ranging between 21 and 66 miles. During construction, approximately 2,095,342 cubic yards of material would be transported off site to a designated spoils area, and an additional 1,053,970 cubic yards could also be transported off site for a total of 3,149,312 cubic yards in need of disposal. The spoils areas would be within two miles from the construction area. Alternative 5 would require the transport and removal of less accumulated sediments as described under Alternative 1. Reuse of excavated material on site was considered to reduce the amount of truck trips; however, to maintain flood control capacity, it is not feasible to reuse excavated material on site. The Lead Agencies would coordinate with other flood control projects in the area to determine whether material excavated as part of the Project could be reused in the region, depending upon schedule considerations.

The electrical service required for operation of the headworks under Alternative 5 would be the same as described under Alternative 1.

CEQA Conclusion

Alternative 5 would result in a **less than significant** impact to local or regional power supplies during construction of Alternative 5 because electricity used would be provided to the Project site by temporary generators during construction and maintenance and low power requirements for operation of the headworks structure. Alternative 5 would result in a less than significant impact to the utilization of transportation energy because truck hauling of the material on and off site is the most efficient construction method due to the location of the Project area in relation to other means of transportation.

15.3.3.6.5 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of Interstate 80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all of the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools

Construction, operations, and maintenance activities at the Project area under the Tule Canal Floodplain Improvements would require the presence of workers and, in the case of an

emergency, could require emergency services from local fire or police responders. The location of the nearest emergency services is the same as described under Alternative 1. The construction and maintenance period of the Tule Canal Floodplain Improvements would occur at a different time than the other proposed Alternative 5 improvements. The construction workers for the Tule Canal Floodplain Improvements likely would be drawn from the local area similar to the other alternatives. The impact of hazardous conditions to workers and the public during construction of the Tule Canal Floodplain Improvements would be the same as described under Alternative 1.

CEQA Conclusion

This impact to the provision of governmental services or facilities from the Tule Canal Floodplain Improvements would be **less than significant** because the use of the local workforce and short-term construction period would have limited effects.

Impact UTIL-2: Create the need for new stormwater facilities.

Construction and maintenance activities for the Tule Canal Floodplain Improvements could generate polluted stormwater runoff during excavation and earthmoving activities (see Chapter 6, *Water Quality* Impact WQ-1) compared to existing conditions, which could be a significant impact to water quality similar to Alternative 1. However, under CEQA the Lead Agencies would be required to implement Mitigation Measure MM-WQ-3 as described under Alternative 1, and no additional stormwater control structures would be required.

CEQA Conclusion

Grading activities associated with the Tule Canal Floodplain Improvements would result in a significant impact regarding the need for additional stormwater facilities. However, with implementation of Mitigation Measure MM-WQ-3, this impact would be reduced to less than significant because the implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance.

Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills

The Tule Canal Floodplain Improvements would require the transport and disposal of construction solid waste during the construction and maintenance periods compared to existing conditions. The solid waste material would be transported to the closest solid waste landfill (Yolo County Central Landfill). If the Tule Canal Floodplain Improvements are implemented, the Lead Agencies would analyze whether the capacity of the Yolo County Central Landfill is sufficient to serve solid waste disposal needs for construction and maintenance of the Tule Canal Floodplain Improvements. They could also use the parcel acquired for spoils for the project action (if necessary) to dispose of this material.

CEQA Conclusion

Construction and maintenance of the Tule Canal Floodplain Improvements would result in a **less than significant** impact because the Lead Agencies would ensure that adequate capacity at the

landfill is available or find another nearby landfill with adequate capacity to accommodate the Tule Canal Floodplain Improvements needs.

15.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

15.3.3.7.1 Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools

Construction, operations, and maintenance activities associated with Alternative 6 would require the presence of workers and, in the case of an emergency, could require emergency services from local fire or police responders. The location of the nearest emergency services is the same as described under Alternative 1. Construction activities for Alternative 6 would last approximately 28 weeks and require 414 workers drawn from the local area at the peak of the construction period in mid-July. Operations would be similar as under Alternative 1 with more sediment removal during periodic maintenance activities. The number of workers during the peak construction period would be higher under Alternative 6 than under Alternative 1 (202 workers); however, the impact of hazardous conditions to workers and the public during construction of Alternative 6 would be the same as described under Alternative 1.

CEQA Conclusion

This impact to the provision of governmental services or facilities under Alternative 6 would be **less than significant** because the use of the local workforce and short-term construction period would have limited effects.

15.3.3.7.2 Impact UTIL-2: Create the need for new stormwater facilities

Construction and maintenance activities for Alternative 6 could lead to the generation of polluted stormwater runoff during excavation and earthmoving activities (see Chapter 6, *Water Quality* Impact WQ-1) compared to existing conditions, which could be a significant impact to water quality similar to Alternative 1. However, under CEQA the Lead Agencies would be required to implement Mitigation Measure MM-WQ-3 as described under Alternative 1, and no additional stormwater control structures would be required.

CEQA Conclusion

Grading activities associated with Alternative 6 would result in a **significant impact** regarding the need for additional stormwater facilities. However, with implementation of Mitigation Measure MM-WQ-3, this impact would be reduced to **less than significant.** The implementation of BMPs required under a SWPPP would control stormwater runoff and associated soil erosion and adequately treat anticipated stormwater runoff generated during construction and maintenance activities.

15.3.3.7.3 Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills

Alternative 6 would require the transport and disposal of approximately 920 cubic yards of construction solid waste during the construction period compared to existing conditions. The solid waste material would be transported to the closest solid waste landfill (Yolo County Central Landfill), which has an annual capacity of 500,000 to 750,000 cubic yards (CalRecycle 2017). The Yolo County Central Landfill has adequate capacity to serve solid waste disposal needs for construction of Alternative 6.

Alternative 6 would also require the transport and disposal of approximately 1,710,680 cubic yards of excavated soil during construction. Soil excavated to construct the Project would be disposed of at a 35- to 40-acre parcel to be acquired by Reclamation and DWR within two miles of the construction area. Disposal of this material under Alternative 6 would not affect public landfill capacity.

Impacts associated with the transport and disposal of excavated soil during construction and maintenance activities under Alternative 6 would be identical to those discussed under Alternative 1 even though there would be more accumulated sediment removal during maintenance activities compared to Alternative 1.

CEQA Conclusion

Alternative 6 would result in a **less than significant** impact because there is adequate capacity at the landfill to accommodate Alternative 6 needs and excavated soil would not be disposed of at a public landfill.

15.3.3.7.4 Impact UTIL-4: Use and/or depletion of local or regional energy supplies

During construction and maintenance of Alternative 6, temporary power facilities and impacts to power supply would be the same as those described under Alternative 1.

Construction of Alternative 6 would require the transport of material to be hauled to and from the site for distances ranging between 21 and 66 miles. In addition, approximately 1,710,680 cubic yards of material would be transported off site to a designated spoils area within two miles from the Yolo Bypass. Alternative 6 would also require the transport and removal of more accumulated sediments than described under Alternative 1. Reuse of excavated material on site was considered to reduce the amount of truck trips; however, to maintain flood control capacity, it is not feasible to reuse excavated material on site. The Lead Agencies would coordinate with other flood control projects in the area to determine whether material excavated as part of the Project could be reused in the region, depending upon schedule considerations.

The electrical service required for operation of the headworks under Alternative 6 would be the same as described under Alternative 1.

CEQA Conclusion

Alternative 6 would result in a **less than significant** impact to local or regional power supplies during construction of Alternative 6 because electricity used would be provided to the Project site by temporary generators during construction and maintenance and low power requirements

for operation of the headworks structure. Alternative 6 would result in a **less than significant** impact to the utilization of transportation energy because truck hauling of the material on and off site is the most efficient construction method due to the location of the Project area in relation to other more efficient means of transportation.

15.3.4 Summary of Impacts

Table 15-1 provides a summary of the identified impacts to public services, utilities, and power for construction, operations, and maintenance of the Project.

Table 15-1. Summary of Impacts and Mitigation Measures – Public Services, Utilities, and Power

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Impact UTIL-1: Affect the provision of governmental services or facilities, including fire and police protection, parks, and schools	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS
Impact UTIL-2: Create the need for new stormwater facilities	No Action	NI	--	NI
	All Action Alternatives	S	MM-WQ-3	LTS
Impact UTIL-3: Generate solid waste in need of disposal, which could exceed the capacity of landfills	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS
Impact UTIL-4: Use and/or depletion of local or regional energy supplies	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS

Key: LTS = less than significant; NI = no impact; S = Significant

15.4 Cumulative Impacts Analysis

This section describes the cumulative effects analysis for public services, utilities, and power. Section 3.3, *Cumulative Impacts*, presents an overview of the cumulative effects analysis, including the methodology and the projects, plans, and programs considered in the cumulative effects analysis.

15.4.1 Methodology

This evaluation of cumulative impacts for public services, utilities, and power considers the effects of the Project and how they may combine with the effects of other past, present, and future projects or actions to create significant impacts on specific resources. The area of analysis for these cumulative effects includes both the Project area and the larger regional utility and service systems relied on by visitors to the Yolo Bypass area. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

This cumulative impacts analysis utilizes the project analysis approach described in detail in Section 3.3. The cumulative projects included in this analysis are:

- Agricultural Road Crossing #4 Fish Passage Improvement Project – This is a future project that would include modification of the southernmost agricultural road crossing in the Tule Canal to improve adult fish passage.
- California EcoRestore Projects – A broad range of projects are included in the California EcoRestore initiative to accomplish enhancements and improvements to the overall health of the Sacramento-San Joaquin Delta (Delta), including projects within or adjacent to the Yolo Bypass and include the following five projects.
    - Fremont Weir Adult Fish Passage Modification Project – The project would modify the existing Fremont Weir fish ladder.
    - Lisbon Weir Modification Project – The project would provide an upgrade for adult migrating fish which currently face a migration delay in the Yolo Bypass.
    - Lower Cache Creek Flood Risk Management Feasibility Study and the Woodland Flood Risk Reduction Project – The project would implement flood control measures within the region.
    - Lower Elkhorn Basin Levee Setback Project – The project would increase the capacity of Yolo and Sacramento bypasses by removing and setting back some levees, removing some cross levees, and improving and relocating related infrastructure.
    - Lower Putah Creek Realignment Project – This project will restore ecological functions and enhance fish passage in Lower Putah Creek from the western boundary of the Yolo Bypass Wildlife Area to the Toe Drain.
- Lower Yolo Restoration Project – The project is a tidal and seasonal salmon habitat program that would restore tidal flux to approximately 1,100 acres of existing pasture land at McCormack Ranch, which is now owned by the Westlands Water District.

- Sacramento River General Reevaluation Report – The report reevaluates the Sacramento River Flood Control Project, including potential improvements within Yolo Bypass, which may include widening and constructing setback levees and modifying weir operations.
- Sites Reservoir Project – The Sites Reservoir Project involves the construction of an offstream reservoir for surface storage north of the Delta.
- Wallace Weir Fish Rescue Facility Project – Wallace Weir will be replaced with a permanent structure that will prevent migration of salmon and sturgeon into the Colusa Basin Drain.
- Yolo Habitat Conservation Plan/Natural Communities Conservation Plan and Yolo Local Conservation Plan – The plan includes the construction of projects affecting species' habitat, including habitat enhancement, restoration, and creation actions.

15.4.2 Cumulative Impacts

As described in Section 15.3.3, the action alternatives would have no impact, a less than significant impact, or a less than significant impact after mitigation to the provision of governmental services or facilities, including fire and police protection; parks and schools; the need for new stormwater, water, or wastewater facilities; regional landfill capacity; and energy supplies and resources. The cumulative projects listed above each could have similar or smaller effects related to public services, utilities, and power. Each of the cumulative projects could implement or have already implemented similar measures to maintain compliance with regulatory requirements during construction. **Therefore**, **the action alternatives' incremental contributions to the cumulative effects associated with public services, utilities, and power would not be cumulatively considerable.**

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16 Socioeconomics

This chapter describes the environmental and regulatory settings for socioeconomics in the area of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) as well as environmental consequences as they pertain to the implementation of the Project alternatives.

16.1 Environmental Setting/Affected Environment

The area of analysis for socioeconomics includes counties that could be affected by the implementation of the Project alternatives. Project construction actions would occur within Yolo and Sutter counties. However, employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. The following sections describe relevant portions of the regional economy within the four counties.

16.1.1 Regional Economy (Yolo, Sutter, Solano, and Sacramento counties)

Regional economic data include data from the United States Census Bureau, California Employment Development Department (EDD) and Impact Planning and Analysis (IMPLAN) 2014 data (see Section 16.3.1.1 for a description of IMPLAN). IMPLAN data files are compiled from a variety of sources, including, but not limited to, the United States Bureau of Economic Analysis, the United States Bureau of Labor, and the United States Census Bureau. This section presents IMPLAN data and results for economic output, employment, and labor income. Output is the dollar value of industry production. Employment is measured as the number of jobs. Labor income is the dollar value of total payroll (including benefits) for each industry plus income received by self-employed individuals.

Table 16-1 presents employment, labor income, and output by industry for the combined regional economies of Yolo, Sutter, Solano, and Sacramento counties in 2014. In 2014, services provided the most jobs (601,176 jobs) in the area, followed by government (248,817 jobs) and trade (139,870 jobs). Services also had the highest output ($78.6 billion) of all industries in the region, followed by government ($32.4 billion) and manufacturing ($28.4 billion). Services and government were the top industries in terms of labor income in 2014.

Table 16-1. Summary of 2014 Regional Economy in Yolo, Sutter, Solano, and Sacramento Counties

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	18,596	2,490.4	561.6
Mining	1,830	640.3	74.9
Construction	60,132	10,653.5	2,577.1
Manufacturing	43,261	28,417.0	4,153.9
Transportation, Information, Power, and Utilities (TIPU)	50,940	13,448.3	2,568.6

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Trade	139,870	16,741.9	5,257.9
Service	601,176	78,598.7	25,355.7
Government	248,817	32,398.4	25,216.7
Total	1,164,624	183,388.5	65,766.4

Source: Minnesota IMPLAN Group (MIG) 2016

[a] Employment is measured in number of jobs.

[b] Income is the dollar value of total payroll for each industry plus income received by self-employed individuals.

[c] Output represents the dollar value of industry production.

16.1.2 Agricultural Economy (Yolo, Sutter, Solano, and Sacramento counties)

Nine major crop types were identified in the Yolo Bypass, including corn, rice, wild rice, safflower, sunflower, processing tomatoes, vines (melons), irrigated pasture, and non-irrigated pasture. Table 16-2 provides labor and cost data to produce the identified crops from available University of California Cooperative Extension (UCCE) Agricultural Issues Center cost and return studies. Chapter 11, *Land Use and Agricultural Resources*, presents crop acreages and locations of the crops listed in Table 16-2 within the Project area.

Table 16-2. Crop Cost and Return in Yolo, Sutter, Solano, and Sacramento Counties

Crop Category	Crop Sub-category	Direct Labor Hours/Acre (hours/acre)	Gross Revenue/Acre (dollars/ acre)	Operating Costs/Acre (dollars/ acre)	Year Studied
Corn	Field Corn	2.83	$1,260	$1,117	2015
Rice	Rice Only Rotation, Medium Grain	4.52	$1,760	$1,225	2016
Safflower	Irrigated-Bed Planted, Dryland-Flat Planted	2.02	$363	$206	2011
Sunflower	For Seed	4.13	$1,360	$447	2011
Tomato, processing	Sub-surface, Drip Irrigated	24.96	$3,520	$2,733	2014
	Furrow Irrigated	22.38	$3,040	$2,859	2014

Source:
UCCE 2011a, 2011b, 2014a, 2014b, 2015a, 2015b

The costs and returns presented in Table 16-2 represent costs in various years because UCCE crop studies are prepared and updated in different years for different crops. Table 16-3 presents production costs for the same crops within the Sacramento Valley but uses the National Agricultural Statistics Service prices paid indices to present prices for all crop types in the same respect. Costs are presented in 2008 dollars.

Table 16-3. Production Costs per acre in the Sacramento Valley

Crop Type	Cost (2008 Dollars)[1]	Cost (2016 Dollars)[2]
Corn	$607	$681
Melons	$4,110	$4,614
Rice	$898	$1,008
Safflower	$239	$268
Sunflower	$553	$621
Wild Rice	$502	$564
Tomato, processing	$1,838	$2,063
Pasture Irrigated	$269	$302
Pasture Dry	$118	$132

Source: 1 Yolo County 2013; 2 Bureau of Economic Analysis 2018 (calculated using Implicit Price Deflators for Gross Domestic Product)

16.1.3 County-Specific Regional Economy

16.1.3.1 Yolo County

This section describes income and regional economy within Yolo County. Table 16-4 presents household income and per capita income in Yolo County relative to California. Yolo County had a median income approximately $7,000 less than the median household income in the State of California (State).

Table 16-4. 2011-2015 Yolo County Household Income

	Yolo County	California
Total number of Households	71,997	12,717,801
Households with income less than $10,000	5,336	742,545
Households with income between $10,000 and $14,999	4,509	646,023
Households with income between $15,000 and $24,999	7,784	1,206,056
Households with income between $25,000 and $34,999	6,140	1,134,601
Households with income between $35,000 and $49,999	8,975	1,528,711
Households with income between $50,000 and $74,999	11,593	2,118,346
Households with income between $75,000 and $99,999	7,744	1,542,550
Households with income between $100,000 and $149,000	10,656	1,902,528
Households with income between $150,000 and $199,999	4,832	886,811
Households with income greater than $200,000	4,428	1,009,630
Median Household Income	$54,989	$61,818
Mean Household Income	$78,450	$87,877
Per Capita Income	$28,116	$30,318

Source: United States Census Bureau 2011-2015

Table 16-5 presents employment, labor income, and output by industry for the combined regional economies of Yolo County in 2014. In 2014, services provided the most jobs (46,522 jobs) in the area, followed by government (40,083 jobs). Services also had the highest output ($5.9 billion) of all industries in the region, followed by government ($5.1 billion). Government and services were the top industries in terms of labor income in 2014.

Table 16-5. Summary of 2014 Regional Economy in Yolo County

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	6,810.4	837.6	250.9
Mining	343.3	83.3	13.7
Construction	4,133.1	746.8	196.7
Manufacturing	6,177.1	2,706.6	418.6
TIPU	8,003.1	1,634.0	464.4
Trade	17,002.1	2,515.7	712.7
Service	46,521.9	5,884.6	1,686.5
Government	40,083.1	5,120.9	3,691.8
Total	129,074.0	19,529.5	7,435.3

Source: MIG 2016

[a] Employment is measured in number of jobs.

[b] Income is the dollar value of total payroll for each industry plus income received by self-employed individuals.

[c] Output represents the dollar value of industry production

16.1.3.2 Sutter County

This section describes income and regional economy within Sutter County. Table 16-6 presents household income and per capita income in Sutter County relative to California. Sutter County had a median income approximately $10,000 less than the median household income in the State.

Table 16-6. 2011-2015 Sutter County Household Income

	Sutter County	California
Total number of Households	31,917	12,717,801
Households with income less than $10,000	1,672	742,545
Households with income between $10,000 and $14,999	2,070	646,023
Households with income between $15,000 and $24,999	3,787	1,206,056
Households with income between $25,000 and $34,999	3,334	1,134,601
Households with income between $35,000 and $49,999	4,316	1,528,711
Households with income between $50,000 and $74,999	6,333	2,118,346
Households with income between $75,000 and $99,999	3,688	1,542,550
Households with income between $100,000 and $149,000	4,176	1,902,528
Households with income between $150,000 and $199,999	1,618	886,811
Households with income greater than $200,000	923	1,009,630
Median Household Income	$52,017	$61,818
Mean Household Income	$69,238	$87,877
Per Capita Income	$23,689	$30,318

Source: United States Census Bureau 2011-2015

Table 16-7 presents employment, labor income, and output by industry for the combined regional economies of Sutter County in 2014. In 2014, services provided the most jobs (20,649 jobs) in the area, followed by trade (7,118 jobs) and agriculture (5,242 jobs). Services also had the highest output ($2.1 billion) of all industries in the region, followed by trade ($0.8 billion) and agriculture ($0.7 billion). Services and government were the top industries in terms of labor income in 2014.

Table 16-7. Summary of 2014 Regional Economy in Sutter County

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	5,241.7	$737.2	$146.5
Mining	154.0	$81.4	$9.6
Construction	2,162.1	$357.5	$46.7
Manufacturing	1,688.7	$704.3	$96.9
TIPU	2,639.2	$605.4	$62.9
Trade	7,118.9	$808.5	$234.6
Service	20,648.5	$2,116.9	$509.6
Government	4,419.6	$408.9	$344.6
Total	44,072.8	$5,820.2	$1,451.3

Source: MIG 2016

[a] Employment is measured in number of jobs.

[b] Income is the dollar value of total payroll for each industry plus income received by self-employed individuals.

[c] Output represents the dollar value of industry production

16.1.3.3 Solano County

This section describes income and regional economy within Solano County. Table 16-8 presents household income and per capita income in Solano County relative to California. Solano County had a median income approximately $5,000 greater than the median household income in the State.

Table 16-8. 2011-2015 Solano County Household Income

	Solano County	California
Total number of Households	143,612	12,717,801
Households with income less than $10,000	7,100	742,545
Households with income between $10,000 and $14,999	6,366	646,023
Households with income between $15,000 and $24,999	11,370	1,206,056
Households with income between $25,000 and $34,999	11,336	1,134,601
Households with income between $35,000 and $49,999	16,976	1,528,711
Households with income between $50,000 and $74,999	25,635	2,118,346
Households with income between $75,000 and $99,999	20,844	1,542,550
Households with income between $100,000 and $149,000	25,256	1,902,528
Households with income between $150,000 and $199,999	10,594	886,811
Households with income greater than $200,000	8,135	1,009,630
Median Household Income	$66,828	$61,818
Mean Household Income	$83,446	$87,877
Per Capita Income	$29,185	$30,318

Source: United States Census Bureau 2011-2015

Table 16-9 presents employment, labor income, and output by industry for the combined regional economies of Solano County in 2014. In 2014, services provided the most jobs (86,040 jobs) in the area, followed by government (30,653 jobs). Manufacturing had the highest output ($15.2 billion) of all industries in the region, followed by services ($11.4 billion). Services, government, and manufacturing were the top industries in terms of labor income in 2014.

Table 16-9. Summary of 2014 Regional Economy in Solano County

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	2,614.4	$403.1	$74.9
Mining	484.6	$241.5	$33.5
Construction	11,234.6	$2,128.5	$607.3
Manufacturing	11,661.9	$15,239.5	$1,686.5
TIPU	6,740.1	$1,775.5	$404.8
Trade	25,021.4	$3,005.6	$984.9
Service	86,040.1	$11,447.0	$3,542.3
Government	30,653.2	$4,363.2	$2,693.2
Total	174,450.3	$38,603.9	$10,027.3

Source: MIG 2016

[a] Employment is measured in number of jobs.

[b] Income is the dollar value of total payroll for each industry plus income received by self-employed individuals.

[c] Output represents the dollar value of industry production

16.1.3.4 Sacramento County

This section describes income and regional economy within Sacramento County. Table 16-10 presents household income and per capita income in Sacramento County relative to California. Sacramento County had a median income approximately $6,000 less than the median household income in the State.

Table 16-10. 2011-2015 Sacramento County Household Income

	Sacramento County	California
Total number of Households	522,596	12,717,801
Households with income less than $10,000	33,699	742,545
Households with income between $10,000 and $14,999	30,490	646,023
Households with income between $15,000 and $24,999	51,695	1,206,056
Households with income between $25,000 and $34,999	51,172	1,134,601
Households with income between $35,000 and $49,999	68,299	1,528,711
Households with income between $50,000 and $74,999	93,771	2,118,346
Households with income between $75,000 and $99,999	66,106	1,542,550
Households with income between $100,000 and $149,000	73,670	1,902,528
Households with income between $150,000 and $199,999	31,021	886,811
Households with income greater than $200,000	22,673	1,009,630
Median Household Income	$55,987	$61,818
Mean Household Income	$74,159	$87,877
Per Capita Income	$27,315	$30,318

Source: United States Census Bureau 2011-2015

Table 16-11 presents employment, labor income, and output by industry for the combined regional economies of Solano County in 2014. In 2014, services provided the most jobs (447,966 jobs) in the area, followed by government (173,662 jobs). Services had the highest output ($59.2 billion) of all industries in the region, followed by government ($22.5 billion). Services and government were the top industries in terms of labor income in 2014.

Table 16-11. Summary of 2014 Regional Economy in Sacramento County

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	3,929.8	$512.5	$89.4
Mining	848.0	$234.1	$18.1
Construction	42,602.6	$7,420.7	$1,726.4
Manufacturing	23,733.5	$9,766.5	$1,951.9
TIPU	33,557.7	$9,433.4	$1,636.5
Trade	90,727.8	$10,412.2	$3,325.7
Service	447,965.6	$59,150.1	$19,617.4
Government	173,661.5	$22,505.4	$18,487.1
Total	817,026.5	$119,435.0	$46,852.5

Source: MIG 2016

[a] Employment is measured in number of jobs.

[b] Income is the dollar value of total payroll for each industry plus income received by self-employed individuals.

[c] Output represents the dollar value of industry production

16.2 Regulatory Setting

The following sections describe the applicable federal, State, and local laws and rules relating to socioeconomics.

16.2.1 Federal Plans, Policies, and Regulations

Under the National Environmental Protection Act (NEPA), economic or social effects must be discussed if they are inter-related to the natural or physical environmental effects of a project. NEPA states the following with regard to analysis of economic effects (Title 40, Code of Federal Regulations, Section 1508.14):

> "…economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment."

16.2.2 State Plans, Policies, and Regulations

The California Environmental Quality Act (CEQA) does not consider economic or social changes resulting from a project as adverse effects on the environment. If economic or social effects cause a physical change in the environment, the physical change may be regarded as an

adverse effect. Specifically, under CEQA Guidelines (Section 15358[b]), an Environmental Impact Report (EIR) must analyze impacts "related to a physical change" in the environment. State CEQA Guidelines Section 15131(a) states that "economic or social effects of a project shall not be treated as significant effects on the environment" unless the economic effects result in physical effects.

The Guidelines (Section 15131[a]) also state, "An EIR may trace a chain of cause and effect from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic or social changes. The intermediate economic or social changes need not be analyzed in any detail greater than necessary to trace the chain of cause and effect. The focus of the analysis shall be on the physical changes."

To summarize Guidelines 15131[a] and 15358[b], the economic or social effect of a project may be used to determine the significance of physical changes caused by the project. However, analyses of other environmental resources in this document rely on resource-specific tools or qualitative discussions to determine environmental effects. Therefore, economic effects are not needed to judge the significance of changes to other environmental resources.

Physical effects of the Project alternatives are evaluated separately and do not require economic analysis; therefore, this section does not provide a CEQA analysis. The effects analysis does not make a significance determination under CEQA for the socioeconomic effects.

16.2.3 Regional and Local Plans, Policies, and Regulations

- Local governments have adopted policies and ordinances to protect local economies. County general plans in the area of analysis also have policies to sustain and promote economic development. While the action alternatives would only have direct effects in Yolo County, they could affect the agricultural economies in neighboring counties and information from those counties is also included. Some of the economics related goals pertinent to this project are listed below: Yolo County – 2*030 Countywide General Plan* includes Goal AG-3 to "promote a healthy and competitive farm economy to expand the county's agricultural base" (County of Yolo 2009).
- Additionally, the *Yolo County Agricultural Economic Development Fund* was established in 2014. The fund supports agricultural sustainability within Yolo County (County of Yolo 2014).
- Sutter County – *Sutter County General Plan, Agriculture and Economic Development Element* includes a goal to "preserve and protect high-quality agricultural lands for long-term agricultural production," with policies associated with agricultural land preservation, minimum parcel sizes, and agricultural land conversion (Sutter County 2011).
- Solano County –*Solano County General Plan* includes a goal to "preserve and expand the county's agricultural base by allowing for a wide range of economic activities that support local agriculture" in its economic development chapter (Solano County 2008).
- Sacramento County – The Economic Development Element of the *Sacramento County General Plan of 2005-2030* includes a goal to "provide for continuing sound and healthy agriculture economy in the county and encourage a productive and profitable agricultural

industry through the conservation of agricultural resources and protection of agricultural lands. Promote the agri-tourism economy while encouraging public education and participation in the agriculture industry" in order to improve the economic vitality for the local agricultural industry and the individual farmer and rancher (Sacramento County 2011).

16.3 Socioeconomic Consequences

This section describes the economic consequences associated with each of the project alternatives and the No Action Alternative. Because no environmental consequences have been identified that are not already covered in the resource-specific chapters, no conclusions are made with regard to the economic consequences. Detailed descriptions of the alternatives evaluated in this section are provided in Chapter 2, *Description of Alternatives*.

16.3.1 Methods for Analysis

The socioeconomic effects include changes to employment, income, or output that could result from implementation of the Project alternatives. The analysis uses quantitative and qualitative methods to evaluate potential socioeconomic effects.

16.3.1.1 Construction and Annual Expenditure Effects

Construction and annual maintenance expenditures would create jobs and generate additional economic activity within the region during the period of construction. An important consideration in evaluating regional economic impacts is how much money is spent within the region for construction supplies and equipment and how many workers originate from within the region. If supplies and workers would be imported into the region, there would be a minimal benefit to the region's economy.

In this analysis, the economic region includes Yolo, Sutter, Solano, and Sacramento counties since it assumes the direct labor force for construction activities in the Yolo Bypass would come from areas surrounding the bypass and not be limited to Yolo County.

The regional economic analysis uses 10 percent design cost estimates of total project costs, including materials and labor costs. If labor costs were not available, onsite construction worker estimates were used to determine direct construction effects for labor and employment. IMPLAN was then used to determine indirect and induced effects of construction work. Project contingency costs are evaluated as an industry change in IMPLAN in various sectors or as local government spending. IMPLAN is an input-output (I-O) database and modeling software used to estimate economic impacts of changes in final demand or spending associated with the project alternatives. IMPLAN data files are compiled annually from a variety of sources including, but not limited to, the U.S. Bureau of Economic Analysis, the U.S. Bureau of Labor, and the U.S. Census Bureau.

16.3.1.2 Cropland Conversion Effects

16.3.1.2.1 Quantitative Assessment

An increase in wetted area in the Yolo Bypass resulting from implementation of the Project alternatives could affect crop yields, crop mix, fallowing, and farm income within the Yolo Bypass. The Bypass Production Model (BPM) was used to evaluate the agricultural economic impact resulting from changes in the frequency, duration, and timing of increased Yolo Bypass flooding under each of the Project alternatives. Appendix K1, *Bypass Production Model Technical Appendix*, includes more information about the BPM.

The driving variable behind the economic impacts of the Project alternatives was the change in "ready to plant date" in comparison to baseline. As discussed in Section 16.3.2, existing conditions and the No Action Alternative are assumed to be the same for this resource area. The ready to plant date was defined as the last wet day from the TUFLOW model (see Appendix D, *Hydrodynamic Modeling Report*) plus six days for miscellaneous drydown and an additional 28 days for field preparation. The 28-day field preparation period is the average preparation time and could vary with temperature, winds, and late season rains. The field preparation time includes time for chiseling, discing with a heavy-duty disc (up to two passes in some years), tilling (ripping) to stir deeper soils, and discing again with a finishing disc. This delay in ready to plant date due to project actions was then translated to expected changes in crop yield, profitability, and planting decisions using the BPM. The BPM evaluated economic impacts from Project alternatives expressed in terms of average annual loss in output over the model simulation period. The model simulation period extends from 1997 to 2012.

The average annual loss in output from the BPM was then input to IMPLAN as an industry change under the relevant crop farming sectors. The analysis estimated the direct effects of Project alternatives to the farming sector and estimated indirect and induced effects in Yolo County with IMPLAN. The economic region for agricultural impacts includes only Yolo County because the action alternatives would only affect agricultural lands within Yolo County and consequently only affect economic output within that county. A reduced workforce or loss of farm revenue due to changes in demand causes direct effects. Changes in expenditures by affected regional industries, including purchases of inputs to grow crops and make products, causes indirect effects. Changes in expenditure of household income causes induced effects.

16.3.1.2.2 Qualitative Assessment

Construction of the alternatives has the potential to remove some land from agriculture permanently, but Alternatives 1, 2, 3, 5, and 6 would not affect any land outside the FWWA. Alternative 4 could affect land that is currently used for farming, but these small quantities are not addressed through BPM. Alternative 4 land conversion effects from construction are assessed qualitatively.

An increase in inundation in the Yolo Bypass could potentially change groundwater levels in the area surrounding the bypass. These changes to groundwater levels could affect land use in these areas. In areas that are currently used for farming, increases in groundwater levels to shallower than 5.5 to nine feet below ground surface (bgs) (SJRRP 2017) could result in increased saturation near the root zones of crops. This could result in reduction in crop yields, crop mix,

fallowing, and farm income in the areas surrounding the bypass. Potential changes to regional economy from potential increases to groundwater levels were assessed qualitatively.

16.3.1.2.3 Forward Linkages and Tipping Point Analysis

The IMPLAN analysis discussed above was designed to look at backward linkages[1] of the supply chain in the economy. Forward linkages are typically examined outside the model. Forward linkages describe the process of how a company in a given sector sells its goods, products, or supplies to a company in a different sector. For example, after rice is harvested, it must be transported and milled. For this analysis, forward linkages from Project alternatives to tomato processing, rice milling, and the insurance/banking industry were assessed using the tipping point analysis. The analysis determined the frequency and duration of flooding in the Yolo Bypass and whether this could increase anticipated risk in the area, thereby affecting crop insurance premiums and operating loan lending rates. Increases in insurance premiums and operating loan lending rates could eventually reduce discretionary income of the growers and cause reductions in spending. The analysis did not include lost property taxes as there would be no permanent cropland conversions due to project actions and therefore no changes to property taxes.

The tipping point analysis estimated the conditions under which changes in Yolo Bypass crop production could "tip" the broader industry and cause tomato processing and rice milling industries to leave Yolo County. Appendix K2, *Yolo Bypass Rice and Tomato Tipping Points: Milling and Processing, Crop Insurance, and Loan Rates,* includes information on the tipping point analysis conducted for this project. The study included in Appendix K2 was completed before the hydrologic modeling was complete, so data about the extent of the potential idling of rice and tomatoes was not available. As a conservative assumption, the study assumed that all agriculture in the Yolo Bypass would be idled. The insurance tipping point analysis considered a hypothetical "high risk" scenario where there would be an increase in wetted acreage in the Yolo Bypass in all (or most) years. Since the completion of the tipping point analysis, the hydrologic modeling was completed, and the Project alternatives have been defined. It is clear from the hydrologic modeling that the Project alternatives would cause a marginal incremental increase in wetted acreage in some—but not all—years. Consequently, the assumptions included in the tipping point analysis would have the potential for significantly greater effects than would be likely with implementation of the Project alternatives. Since the completion of the tipping point analysis, there is uncertainty over the incremental effect of the Project on rice and processing tomato crop insurance cost and availability. Therefore, the potential impacts to forward linkages from changes to farming sector in the Yolo Bypass is discussed qualitatively in subsequent sections.

16.3.1.3 Indirect and Induced Effects from Changes in Agricultural Production

The economic analysis uses IMPLAN, an input-output software and data package, which calculates the economic impacts of a change in value of production. IMPLAN is used to estimate the direct effects of construction and reduced crop production as well as the indirect and induced effects in the area of analysis. The direct effects would occur in both the construction and agricultural industries. Indirect effects are caused by expenditures in the region by affected

[1] Backward linkages describe the process of how a company in a given sector receives supplies (information, material and or financial aid) to develop its goods, products, or supplies.

regional industries and include purchases of inputs. Induced effects are caused by expenditure of household income.

IMPLAN estimates effects of various economic measures, including employment, labor income, and total value output. Employment is measured by the number of jobs, including full-time, part-time, and seasonal. Labor income consists of employee compensation and proprietor's income. Value of output is the dollar value of production.

IMPLAN estimates impacts on an annual basis. If the project effects occurred over a shorter period of time, economic effects would be fewer. The 2014 IMPLAN data sets were used for this analysis.

16.3.1.4 Changes to Water Supply Effects

Water shortages could increase water costs if contractors must develop alternate supplies or implement additional water conservation measures. Increased water costs could be passed on to the municipal and industrial water contractors through increased water rates. Increased water rates could result in a reduction in discretionary income and reductions in spending. These effects were evaluated qualitatively. The economic effects were based on the changes to water supplies under each alternative, as evaluated by CalSim II (see Appendix E, *CalSim II Assumptions*). Chapter 5, *Surface Water Supply*, describes the water supply effects of the Project alternatives. Implementation of project alternatives could also increase water costs for Central Valley (CVP) and State Water Project (SWP) contractors depending how costs of the project are allocated; however, this analysis did not include a cost allocation.

16.3.2 Determination of Effects

The No Action Alternative conditions would be very similar to existing conditions because the regional economy is not anticipated to experience substantive changes in the area of analysis. Therefore, existing conditions are used as proxy for No Action Alternative in this chapter. As discussed in Section 16.2.2, NEPA economic analysis is required since the effects of the project are related to physical environmental effects. This section does not provide a CEQA analysis and focuses on NEPA. As required under NEPA, this analysis compares project action to the No Action Alternative. However, the impacts are generally similar if the action alternatives were compared to existing conditions because existing conditions for the regional economy is not expected to change substantially.

16.3.3 Effects

This section provides a project-level evaluation of the direct, indirect, and induced socioeconomic effects of implementing the Project alternatives. Construction of these alternatives could increase jobs, labor income, and output during the construction period and could reduce agricultural production in the region. This analysis is organized by project alternative.

16.3.3.1 No Action Alternative

The No Action Alternative would not result in changed conditions to the regional economy because there would be no activities in the Project area. Therefore, there would be no adverse or beneficial effects for:

- Construction activity changes to employment, income, and output in the regional economy
- Annual maintenance activity changes to employment, income, and output in the regional economy
- Conversion of cropland to nonagricultural use or crop shifting changing employment, income, and output in the regional economy
- Changes to water supply to North of Sacramento-San Joaquin Delta (Delta) and South of Delta contractors affecting the regional economy

16.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

16.3.3.2.1 Impact SOC-1: Increase employment, income, and output in the regional economy.

Alternative 1 project facilities would be constructed within one year over a 28-week period from April through October. Alternative 1 project facilities would cost approximately $44.9 million. The majority of construction under this alternative would occur in Yolo and Sutter counties and temporarily increase employment, output, and labor income in both counties.

Employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. Alternative 1 would provide 163 construction worker jobs. The duration of these jobs would vary and most would not likely be over the entire construction period. There would be additional jobs provided for administrative, engineering, planning, and monitoring personnel, and for other construction support professionals. The total increase in direct labor would be 222 jobs over the construction period. Table 16-12 summarizes total direct, indirect, and induced economic impacts during the construction period resulting from construction of project features. Construction would temporarily increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties.

Table 16-12. Construction-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 1 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (million dollars)	Revenue (million dollars)
Direct Effect	222	$11.8	$35.3
Indirect Effect[1]	76	$3.8	$10.8
Induced Effect[1]	69	$3.2	$9.9
Total Effect	**366**	**$18.8**	**$55.9**

Note:
[1] IMPLAN 2016

The annual maintenance cost for Alternative 1 would be approximately $0.5 million annually. These estimates were developed considering a 50-year project life cycle. Table 16-13 summarizes total direct, indirect, and induced economic impacts associated with annual maintenance under Alternative 1. Direct effects would occur in the maintenance and repair construction of nonresidential structures sector. These effects would occur annually and would increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties.

Table 16-13. Annual Maintenance-Related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 1 (2016 dollars)

Impact Type	Employment (jobs)	Labor Income (million dollars)	Revenue (million dollars)
Direct Effect	3	$0.2	$0.5
Indirect Effect	2	$0.1	$0.2
Induced Effect	1	$0.1	$0.2
Total Effect	**6**	**$0.4**	**$0.9**

Source:
IMPLAN 2016

16.3.3.2.2 Impact SOC-2: Decrease employment, income, and output in the regional economy from conversion of cropland to nonagricultural use or crop shifting.

Alternative 1 operations would include increased inundation in the Yolo Bypass that could change regional economy through (1) changes to agriculture from increased inundation in the Yolo Bypass; (2) changes to agriculture due to increased groundwater levels surrounding the bypass; and (3) changes to forward linkages from changes to agriculture.

Changes to regional economy from increased inundation in the Yolo Bypass

As described in Section 11.3.1.1, the TUFLOW model estimated the last day lands in the Yolo Bypass would be wet because of water releases through Fremont Weir gates under Alternative 1. The model considers how long the new gated notch would operate, and how long it would take for the water to drain off the fields. After the water has drained from the field, field drying and preparation would take an additional 34 days (see Appendix K1 for more detail). Longer inundation of agricultural parcels in the Yolo Bypass could delay planting dates, which in turn would affect crop yields and impact profitability. Impacts to crop yields and profitability could

change planting decisions in the Yolo Bypass and may cause landowners to shift to alternative crops that could result in less agricultural income. Some landowners might temporarily fallow lands, but project action would not cause permanent cropland conversion. Table 16-14 shows the changes in agricultural income for each year modeled (1997-2012) using the BPM. The BPM estimates the changes in agricultural income to the farmer. On an average annual basis, operation of Alternative 1 would decrease net income by $65,222 in the Yolo Bypass. The average change in farm income would be -0.97 percent. The maximum decrease in net income from changes in the Yolo Bypass because of Alternative 1 operations would be approximately -$256,106.

Table 16-14. Modeled Changes in Agricultural Land Use and Income under Alternative 1 (1997-2012)

	No Action	Alternative 1	Alternative 1 minus the No Action Alternative
Year	Acres Planted	Decrease in Acres Planted	Income minus Expenses
1997	29,933	8	-$82,535
1998	7,856	0	-$37,548
1999	26,287	64	-$35,222
2000	28,555	0	$0
2001	30,027	13	-$162,466
2002	30,236	40	-$165,590
2003	24,810	3	$0
2004	29,746	10	-$52,411
2005	10,999	0	$0
2006	12,607	0	-$3,301
2007	30,195	22	-$144,628
2008	30,171	67	-$70,495
2009	30,158	126	-$256,106
2010	26,290	1	-$14,118
2011	25,269	0	$0
2012	29,679	0	$0
Average	25,176	22	-$64,026
Maximum	30,158	126	-$256,106

Source: Appendix K1, *Bypass Production Model Technical Appendix*

Table 16-15 summarizes the regional economic effects associated with the loss of employment, labor income, and revenue from crop shifting within the Yolo Bypass. Direct effects would be any changes of on-farm jobs and farm revenue due to crop shifting, which would affect agricultural employment opportunities and revenue in Yolo County. Indirect effects would occur to agricultural support businesses if farmers purchase fewer inputs such as seed, fertilizer, and fuel. Lastly, induced effects would occur because of the decline in household income to farmers and workers in agriculture and support industries. Relative to the baseline economy (presented in Table 16-5), Alternative 1 would result in the loss of approximately $0.1 million in output and less than 1 job.

Table 16-15. Average Annual Crop Shifting-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 1 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Thousand dollars)	Revenue (Thousand dollars)
Direct Effect	-0.3	-$20.9	-$71.7
Indirect Effect	-0.2	-$8.6	-$19.1
Induced Effect	-0.1	-$3.6	-$11.5
Total Effect	**-0.6**	**-$33.1**	**-$102.3**

Source:
IMPLAN 2016

In addition to the modeled changes to the regional economy discussed above, increased inundation in the Yolo Bypass could cause concerns for grazing lands within the Bypass. Several areas of pasture, including within the Yolo Bypass Wildlife Area (YBWA), could be affected by increased inundation under Alternative 1. The period of inundation is expected to increase by up to two to three weeks in some areas within YBWA. Farmers in the Yolo Bypass have indicated that if pasture areas are inundated constantly for more than 30 days (four weeks), the inundation increases the potential for invasive species that could out-perform the pasture (pers. comm. with Tom Schene, Yolo Bypass Farmer, November 6, 2017). Alternative 1 would extend periods of inundation and could cause increased invasive growth on pasture.

As discussed in Chapter 13, *Recreation*, some private hunting clubs south of YBWA could experience increased periods of inundation under Alternative 1. On average, half of the area of private hunting clubs would experience up to two weeks of increased inundation; one quarter of the clubs would experience up to one week of increased inundation and the other quarter would not experience any change. Most of the private clubs have annual membership dues to cover club expenses and revenue. Increased inundation under Alternative 1 is expected to decrease viable duck hunting period in these private hunting clubs by less than 15 percent. Because these private hunting clubs collect annual membership dues and duck hunting opportunities would decrease by less than 15 percent, impacts to private hunting clubs in the region would be minimal. Additionally, some of these clubs are part of a network of clubs that would provide members alternate sites to hunt during increased inundation.

Changes to regional economy from changes to groundwater levels surrounding the Yolo Bypass

Increased inundation in the Yolo Bypass could affect groundwater levels in the areas surrounding the bypass, which has the potential to affect agricultural production in these areas. Increased inundation provides for additional time when surface water in the bypass could infiltrate the ground and recharge the underlying groundwater aquifer, potentially affecting groundwater levels. The period of inundation is expected to increase by two to three weeks along the eastern side of the bypass and by one to two weeks along the western side of the bypass (near I-80). The largest area with an increased inundation period would be north of I-80. The potential increase in groundwater levels due to the additional recharge/underseepage would be more likely on the eastern side of the bypass, between the Yolo Bypass and the Sacramento River (in the Elkhorn area), because that is the area that would experience the largest increase in inundation duration. There are several factors that would influence groundwater movement into the Elkhorn area, including the area inundated and the height of the water (also called “head”) in the Yolo Bypass. The main way that the action alternatives could affect groundwater seepage into the

Elkhorn area would be increasing head on the levee. Appendix T, *Seepage Analysis*, documents the seepage analysis conducted to estimate the change in head that would occurs under the Project alternatives. The Seepage Analysis evaluated how Alternative 1 could affect the water head on the levees under a high flow condition (when the Yolo Bypass has flood water close to the capacity), a moderate flow scenario (when the Yolo Bypass contains some flood water), and a low flow scenario (when the only flow is through the new gated notch). Table 16-16 shows water surface elevations (WSEs) in the Yolo Bypass and the Sacramento River at five representative cross sections across the Elkhorn area. As summarized in Table 16-16, the difference in head would be less than 0.1 feet under the high flow and moderate flow scenarios. Under the low flow scenario, the difference is head could be as high as 3 feet. The hydrogeologic cross-section figures in Appendix T (see Figures T-16 through T-20) show that under the low flow scenario, WSE would be below the levee toe and, consequently, the head pressure to cause seepage would be lower. Therefore, through seepage and under seepage is not expected to be noticeably higher under Alternative 1.

Table 16-16. Summary of WSE in the Yolo Bypass and Sacramento River under High, Moderate, and Low Flow Scenarios

Cross-Section	Date	WSE in the Yolo Bypass		WSE in the Sacramento River		Difference in WSEs (Alternative 1 minus Existing)	
		Existing Conditions	Alternative 1	Existing Conditions	Alternative 1	Yolo Bypass	Sacramento River
High flow scenario (Flow at Fremont weir ~ 290,000 cfs)							
XS-1	1/5/97	38.4	38.4	38.9	38.9	0.0	-0.1
XS-2		36.1	36.1	38.2	38.1	0.0	-0.1
XS-3		35.4	35.4	36.7	36.6	0.0	-0.1
XS-4		34.7	34.7	36.2	36.1	0.0	-0.1
XS-5		33.9	33.9	35.6	35.6	0.0	-0.1
Moderate flow scenario (Flow at Fremont weir ~ 80,000 cfs)							
XS-1	2/29/2004	31.9	31.8	33.4	33.2	0.0	-0.1
XS-2		29.9	30.0	32.7	32.6	0.1	-0.1
XS-3		29.6	29.7	31.5	31.4	0.0	-0.1
XS-4		29.3	29.4	31.1	30.9	0.0	-0.1
XS-5		28.9	28.8	30.6	30.5	-0.1	-0.1
Low flow scenario (Flow at Fremont weir ~ 0 cfs)							
XS-1	3/8/2001	21.0	23.8	23.1	21.9	2.8	-1.2
XS-2		21.0	22.7	22.5	21.4	1.7	-1.1
XS-3		21.0	22.6	21.4	20.3	1.6	-1.1
XS-4		20.2	22.1	21.0	19.9	1.9	-1.1
XS-5		19.4	21.1	20.7	19.6	1.7	-1.1

Note: All the elevations are in Northern American Vertical Datum of 1988 (NAVD88)

Agriculture is the primary land use in the Elkhorn area and to the west of the bypass near I-80. As discussed previously, seepage is not expected to occur under Alternative 1; however, if unexpected seepage into the Elkhorn area occurs under Alternative 1, it would cause shallow groundwater levels in the areas to rise. Shallower groundwater levels have the potential to increase saturation near the root zones of crops, thereby reducing crop yields. Different types of crops have different root zone depths, which result in different potential for effects from shallow groundwater. The crops grown around the bypass are primarily deciduous fruits and nuts

(walnuts or pistachios); field crops (alfalfa, corn, sudan grass, or safflower); truck and berry crops (tomatoes); or grain crops (rice) (California Department of Water Resources [DWR] 2005, DWR 2008). The San Joaquin River Restoration Program (SJRRP) uses a "threshold" to determine if crops are potentially affected by shallow groundwater levels. The threshold is a combination of root zones (typically five to six feet) and a capillary fringe (0.5 to three feet). Using the SJRRP's rationale, crops in the Project area could be affected if shallow groundwater is less than 5.5 to nine feet bgs (SJRRP 2017).

As discussed in Chapter 7 *Groundwater*, groundwater levels in the Elkhorn area (between the bypass and the Sacramento River) currently vary from 10 feet to 30 feet bgs. Groundwater levels along the western side of the bypass near I-80 currently vary from three feet to 26 feet bgs. Groundwater levels in both areas (Elkhorn areas and the west of the bypass near I-80) are typically deeper than 10 feet bgs, but occasionally are higher than this elevation. Based on this information, there could be periods when the groundwater levels would be above the five to 10 feet bgs depth under the No Action Alternative. The periods of high groundwater levels typically coincide with very wet (or flood) conditions in the area; during flood conditions, the Yolo Bypass receives substantially more flow than under Alternative 1 and the surface water elevations are higher. Increased inundation could increase groundwater levels to shallower than five feet bgs, but this change would be unlikely because the inundation would be less than what is currently experienced under flood conditions.

Because Alternative 1 would not increase water levels in the Yolo Bypass to a substantial extent (see Table 16-16), increases to groundwater levels under Alternative 1 in the Elkhorn area would be minimal. An increase in shallower groundwater levels could have the potential to increase saturation near the root zones of crops, thereby reducing crop yields. Reduced crop yields could result in crop shifting (for example, growers could shift from tree crops with deeper effective root zones ranging from 6 to 9 feet bgs to grain crops with effective root zones ranging from 5 to 8 feet bgs). Additionally, the Elkhorn area and the west side of the bypass (near I-80) only accounts for 1.5 to 3 percent of total agriculture in Yolo County. As discussed in Chapter 2 *Description of Alternatives* (Section 2.4.5), Alternative 1 would include groundwater monitoring efforts to identify periods when water levels could be within the crop root zone and identify if those changes are caused by the Project. Because increases in shallow groundwater levels within the crop root zones are unlikely to be caused by the Project, the Project is also unlikely to cause crop shifting or idling due to shallower groundwater levels in the Elkhorn area and west of the bypass (near I-80). The minimal changes, if any, would only result in minor changes to the regional economy.

As discussed above increased inundation in the Yolo Bypass is expected to increase shallow groundwater levels in the Elkhorn Area maintained by Reclamation District 1600. Reclamation District 1600 operates interceptor drains to drain shallow groundwater levels from their fields into the Tule Canal. These drains are usually gravity fed but when gravity does not allow drainage to the Tule Canal, pumps are used to drain the fields. Increase in shallow groundwater levels in the Elkhorn area could increase the duration of required pumping and also increase the quantity of water getting pumped out of the fields into the Tule Canal. These increases in duration and quantity of pumping would increase groundwater pumping costs to Reclamation District 1600.

Changes to forward linkages from changes to the agriculture in the Yolo Bypass

Changes to farming practices due to Project alternatives could potentially affect key industries supported by major crop production in the Yolo Bypass (in economic terms, forward linkages from the farming sector). Rice and processing tomatoes are the dominant Yolo Bypass crops likely to be affected by Project alternatives. As discussed in Section 16.3.1.1.2, a tipping point analysis was conducted to determine if reduced tomato and/or rice production in the Yolo Bypass would affect rice mills, tomato processors, or the crop insurance/ banking industries within Yolo County. Since the completion of this analysis, some uncertainties have been identified over the incremental effect of the Project on rice and processing tomato crop insurance cost, and availability.

Rice is grown on approximately 7,500 acres in the Yolo Bypass and accounts for approximately 25 percent of Yolo County rice production and 1.4 percent of California rice production (United States Department of Agriculture [USDA] NASS, various years; Howitt et al. 2013). Processing tomatoes are grown on approximately 3,300 acres in the Yolo Bypass, accounting for approximately eight percent of total processing tomato acreage in Yolo County. The analysis of rice milling and tomato processing facilities considers whether idling of agricultural fields in the Yolo Bypass caused by the Project could cause these facilities to close or leave Yolo County, which would affect other growers in the county. Table 16-17 presents the tipping point quantity for tomato processing and rice milling (the quantity at which changes in Yolo Bypass crop production could "tip" the industry and cause tomato processing and rice milling industries to leave Yolo County), the total production for each industry outside of the Yolo Bypass, and net production above the tipping point quantity. As summarized in Table 16-17, tomato processors and rice mills in Yolo County process more than the tipping point quantity even without the Yolo Bypass production and no supplemental tomato and rice sources from other regions. Therefore, the small decreases in processing tomato and rice production due to operation of Alternative 1 would not affect tomato processors or rice mills in Yolo County.

Table 16-17. Summary of Tipping Points for the Tomato Processor and Rice Milling Industries in Yolo County

	2005	2006	2007	2008	2009
Tomato Processor					
Tipping point quantity (tons)	77,695	77,407	75,179	74,910	77,120
Tomato production without Yolo Bypass (tons)	250,000	211,000	247,000	218,000	230,000
Tomato production above the tipping point quantity (tons)	+172,305	+133,593	+171,821	+143,090	+152,880
Rice Milling					
Tipping point quantity (cwt)	802,258	702,615	544,005	399,441	NA
Rice Production without Yolo Bypass (cwt)	3,541,000	3,594,000	3,335,000	3,463,000	NA
Rice production above the tipping point quantity (cwt)	+2,738,742	+2,891,385	+2,790,995	+3,063,559	NA

Key: cwt = hundredweight or quintal; NA = Not Assessed

Longer flooding season in the Yolo Bypass due to operation of Alternative 1 could shorten the growing season for crops in the Yolo Bypass. Most rice growers in the bypass rely on crop insurance policies to offer coverage for late planting and missed plantings (this delayed planting

insurance is not available for other crops in the bypass). Crop insurance, like all insurance, is a way for the purchaser to offset a portion of risk in exchange for a premium payment to the insurer. Growers purchase insurance from an insurer to cover a portion of losses that could occur under adverse events, thereby transferring some risk to the insurer in exchange for an insurance premium payment. Any increase in risk generally translates to higher premiums. The increase in insurance premiums that could occur under Project alternatives is uncertain. The initial tipping point analysis hypothesized a clear increase in farming risk in all years. Subsequent hydrologic modeling of the Project alternatives shows that the Project could cause small incremental changes in inundation under specific year types. Since the incremental change in inundated acreage would be small, the corresponding effect on Yolo Bypass farming risk also would be small—much less than the catastrophic scenario considered in the tipping point studies—and it would be likely that the effect of any increase in farming risk caused by the Project on crop insurance premiums would be less than what was estimated in the initial tipping point study.

Indemnity payments[2] for crop insurance policies are only issued when the crop loss is the result of an insurable event. The United States Department of Agriculture Risk Management Agency (USDA RMA) representatives have indicated that insurable events for prevented planting coverage (a common policy for Yolo Bypass rice growers) would include natural events but may not include "man-made" events. It is not clear at this time if the incremental increase in wetted acreage caused by the operation of the Fremont Weir gates under the proposed Project alternatives would constitute "man-made" or "natural" flooding. As such, it is possible that insurers would no longer offer prevented planting coverage to Yolo Bypass rice growers. However, it is important to note this is not a new issue for California crop insurance. The operation of the Central Valley Project and State Water Project is constantly evolving due to "man-made" changes in operations, where many districts historically received full water supply but now expect lesser allocations in many years. These operational changes in the state and federal water supply system could be viewed as uninsurable ("man-made") events, but rice growers in these regions still have access to prevented planting coverage. Since crop insurance is federally mandated, and insurers are in the business of selling insurance to growers, there are incentives to continue to offer crop insurance policies so long as it is profitable for both insurers and growers. It is important to establish whether the proposed Project alternatives result in additional wetted acreage due to "man-made" events, and if so, whether insurers would continue to offer insurance plans to Yolo Bypass growers (with increased premiums). However, a final resolution would likely not be reached until the USDA RMA, insurers, and the growers are actually facing this situation and have to grapple with the various implications and incentives.

In addition to crop insurance, most growers rely on operating loans to smooth seasonal cash flow. Most crops require a significant capital outlay at planting and payment for management costs through the season, but do not receive payment until sometime after harvest. Short-term seasonal loans can be used to smooth this financial cycle. Current lending rates on these loans are on the order of 5.5 percent (Elliessy 2014). The tipping point analysis estimated increased production risk from increased flooding frequency and duration in the Yolo Bypass would increase operating loan lending rates (interest rates) by 1.3 to three percentage points above current rates. Using these estimated increases to loan lending rates, operating costs across the major crops grown in the Yolo Bypass would increase by $1 to $29 per acre after accounting for

[2] An indemnity payment is money paid to a grower when an insurance claim is filed.

changes in production loan rates. Even with the increased loan rates, growers would still achieve a positive net return above operating costs for all crops reviewed.

16.3.3.2.3 Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy.

Increased diversions from the Sacramento River to the Yolo Bypass under Alternative 1 could reduce CVP and SWP deliveries to North of Delta and South of Delta contractors. Depending on the magnitude of shortage, agencies may implement mandatory water conservation. Securing alternate water supplies and implementing water conservation measures may result in costs for the water agencies. All or a portion of increased water costs would be passed on to the retail agencies and water customers through increased water rates. An increase in water rates would reduce the disposable income and could result in less spending in the regional economy.

As discussed in Chapter 5, *Surface Water Supply*, the difference in deliveries under Alternative 1 compared to existing conditions and the No Action Alternative would be less than one percent of monthly baseline supply; however, these reductions in deliveries would be rare and limited to a few months within a year. These reductions would not be substantial enough to warrant water rate increases that could affect the regional economy.

16.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

16.3.3.3.1 Impact SOC-1: Increase employment, income, and output in the regional economy.

Alternative 2 would be constructed within one year over a 28-week period from April through October. Alternative 2 project facilities would cost approximately $53.8 million. The majority of construction under this alternative would occur in Yolo and Sutter counties and would temporarily increase employment, output, and labor income in both counties.

Employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. Direct labor produced under Alternative 2 would be 180 construction workers. The duration of jobs would vary and most would not likely be over the entire construction period. There would be additional jobs produced for administrative, engineering, planning, and monitoring, personnel, and for other construction support professionals. Total direct labor would be 347 jobs over the construction period. Table 16-18 summarizes total direct, indirect, and induced economic impacts resulting from construction of project features. Construction would temporarily increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-18. Construction-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 2 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	347	$19.6	$53.6
Indirect Effect[1]	122	$6.1	$16.8
Induced Effect[1]	116	$5.4	$16.7
Total Effect	**585**	**$31.2**	**$87.1**

Source:
[1] IMPLAN 2016

Annual maintenance costs for Alternative 2 would be approximately $0.6 million annually. These estimates were developed considering a 50-year project life cycle. Table 16-19 summarizes total direct, indirect, and induced economic impacts associated with annual maintenance under Alternative 2. Direct effects would occur in the maintenance and repair construction of nonresidential structures sector. These effects would occur annually and would increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-19. Annual maintenance-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 2 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	3	$0.2	$0.6
Indirect Effect	2	$0.1	$0.2
Induced Effect	1	$0.1	$0.2
Total Effect	**6**	**$0.4**	**$1.0**

Source:
IMPLAN 2016

16.3.3.3.2 Impact SOC-2: Decrease employment, income, and output in the regional economy from conversion of cropland to nonagricultural use or crop shifting.

Impacts to the regional economy due to temporary conversion of croplands to nonagricultural use or crop shifting in the Project area from operation of Alternative 2 would be identical to those discussed under Alternative 1 because the inundation patterns within the Yolo Bypass would be the same. Project actions would not cause permanent cropland conversion. Impacts from operation of Alternative 2 on farming along the eastern side of the bypass and the western side of the bypass (north of I-80) would also be the same as Alternative 1.

16.3.3.3.3 Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy.

Impacts to the regional economy in the CVP and SWP contractors' service areas from Alternative 2 would be identical to those discussed under Alternative 1.

16.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

16.3.3.4.1 Impact SOC-1: Increase employment, income, and output in the regional economy.

Alternative 3 project facilities would be constructed within one year over a 28-week period from April through October. Alternative 3 project facilities would cost approximately $61.5 million. The majority of construction under this alternative would occur in Yolo and Sutter counties and would temporarily increase employment, output, and labor income in both counties.

Employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. Direct labor effects would consist of an increase of 224 construction workers. The duration of jobs would vary and most would not likely be over the entire construction period. There would be additional jobs produced for administrative, engineering, planning, and monitoring personnel, and for other construction support professionals. Total direct labor would be 385 jobs over the construction period. Table 16-20 summarizes total direct, indirect, and induced economic impacts resulting from construction of project features. Construction would temporarily increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-20. Construction-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 3 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	385	$21.3	$49.5
Indirect Effect[1]	114	$5.7	$15.6
Induced Effect[1]	121	$5.7	$17.4
Total Effect	**620**	**$32.7**	**$82.6**

Source:
[1] IMPLAN 2016

Annual maintenance costs for Alternative 3 would be approximately $0.6 million annually. These estimates were developed considering a 50-year project life cycle. Table 16-21 summarizes total direct, indirect, and induced economic impacts associated with annual maintenance under Alternative 3. Direct effects would occur in the maintenance and repair construction of nonresidential structures sector. These effects would occur annually and would increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-21. Annual maintenance-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 3 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	3	$0.2	$0.6
Indirect Effect	2	$0.1	$0.2
Induced Effect	1	$0.1	$0.2
Total Effect	**6**	**$0.4**	**$1.0**

Source:
IMPLAN 2016

16.3.3.4.2 Impact SOC-2: Decrease employment, income, and output in the regional economy from conversion of cropland to nonagricultural use or crop shifting.

Impacts to the regional economy due to temporary conversion of croplands to nonagricultural use or crop shifting in the Project area from operation of Alternative 3 would be identical to those discussed under Alternative 1 because the inundation patterns within the Yolo Bypass would be the same. Project actions would not cause permanent cropland conversion. Impacts from operation of Alternative 3 on farming along the eastern side of the bypass and the western side of the bypass (north of I-80) would also be the same as Alternative 1.

16.3.3.4.3 Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy.

Impacts to the regional economy in the CVP and SWP contractors' service areas from operation of Alternative 3 would be identical to those discussed under Alternative 1.

16.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

16.3.3.5.1 Impact SOC-1: Increase employment, income, and output in the regional economy.

Alternative 4 project facilities would be constructed within one year over a 28-week period from April through October. Alternative 4 project facilities would cost approximately $90.3 million. The majority of construction under this alternative would occur in Yolo and Sutter counties and would temporarily increase employment, output, and labor income in both counties.

Employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. Direct labor effects would consist of 293 construction workers. The duration of jobs would vary and most would not likely

be over the entire construction period. There would be additional jobs produced for administrative, engineering, planning, and monitoring personnel, and for other construction support professionals. Total direct labor would be 532 jobs over the construction period. Table 16-22 summarizes total direct, indirect, and induced economic impacts resulting from construction of project features. Construction would temporarily increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-22. Construction-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 4 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	532	$19.1	$75.1
Indirect Effect[1]	171	$8.6	$23.7
Induced Effect[1]	173	$8.1	$24.8
Total Effect	**876**	**$35.7**	**$123.6**

Source:
1 IMPLAN 2016

Annual maintenance costs for Alternative 4 would be approximately $0.75 million annually. These estimates were developed considering a 50-year project life cycle. Table 16-23 summarizes total direct, indirect, and induced economic impacts associated with annual maintenance under Alternative 4. Direct effects would occur in the maintenance and repair construction of nonresidential structures sector. These effects would occur annually and would increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-23. Annual maintenance-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 4 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	4	$0.2	$0.7
Indirect Effect	2	$0.1	$0.3
Induced Effect	2	$0.1	$0.2
Total Effect	**8**	**$0.4**	**$1.2**

Source:
IMPLAN 2016

16.3.3.5.2 Impact SOC-2: Decrease employment, income, and output in the regional economy from conversion of cropland to nonagricultural use or crop shifting.

Alternative 4 operations would include increased inundation in the Yolo Bypass that could change regional economy through (1) changes to agriculture from increased inundation in the Yolo Bypass; (2) changes to agriculture due to increased groundwater levels surrounding the bypass; and (3) changes to forward linkages from changes to agriculture due to project actions.

Alternative 4 would also remove some agricultural land from production permanently through construction of new facilities. These four impacts are discussed in the section below:

Changes to regional economy from increased inundation in the Yolo Bypass

As described in Section 11.3.1.1, the TUFLOW model estimated the last day lands in the Yolo Bypass would be wet because of water releases through the Fremont Weir gates under Alternative 4. The model was run once with a last day of inundation operations on of March 15 and again with an end date of March 7. The model considers how long the new gated notch would operate to allow increased inundation flows into the Yolo bypass, and how long it would take for the water to drain off the fields. The gated notches would operate longer under the March 15 closure scenario in comparison to the March 7 closure scenario. Additionally, the water control structures under Alternative 4 would retain water longer in the bypass in comparison to the other action alternatives. These structures would cease operations on the same date as the gate closure, but they would more frequently hold water on the land up until those dates than the other alternatives. The period of inundation is expected to increase by four or more weeks (on average) along the eastern side of the bypass and the western side of the bypass (near I-80). After the water has drained from the field, field drying and preparation would take an additional 34 days (see Appendix K1 for more detail). Under both Alternative 4 scenarios, the drying and field preparation period would be later than the other alternatives since the wet period within the bypass would be delayed and also more often in comparison to the Alternatives 1, 2 and 3. Under both Alternative 4 scenarios, the wet period within the bypass was found to be within the typical planting window between March 15 and June 10 (Yolo County 2013). When comparing a March 15 closure date to the March 7 closure date, the March 15 closure date would result in slightly longer inundation at some parcels in some years. Longer inundation of agricultural parcels in the Yolo Bypass could delay planting dates, which in turn would affect crop yields and impact profitability. Impacts to crop yields and profitability could change planting decisions in the Yolo Bypass and may cause landowners to temporarily remove land from production or shift to alternative crops resulting in less agricultural income. Project actions would not cause permanent cropland conversion.

Alternative 4 could have two potential dates to end inundation operations at the new gates at Fremont Weir: March 7 or March 15. Changes to agricultural income would be higher under both Alternative 4 scenarios in comparison to the other action alternatives because the water control structures would hold water on agricultural land longer than for the other alternatives. Table 16-24 shows the changes in agricultural income for each year modeled (1997-2012) using the BPM. The BPM estimates the changes to income to the farmer. On an average annual basis, operation of Alternative 4 would decrease net income by $179,611 (with a March 15 closure date) or by $127,725 (with a March 7 closure date) in the Yolo Bypass. The average change in farm income would be -2.68 percent (with a March 15 closure date) or -1.90 percent (with a March 7 closure date). Changes to income under the March 15 closure date would be higher than under the March 7 closure date as the later closure date would delay the last day lands in the bypass would be wet and therefore delay planting decisions further within the bypass. The maximum decrease in net income from changes in the Yolo Bypass due to Alternative 4 (March 7 closure date) operations would be approximately -$282,893 and Alternative 4 (March 15 closure date) operation would be -$409,931.

Table 16-24. Modeled Changes in Agricultural Land Use and Income under Alternative 4 (1997-2012)

	No Action	Alt 4 (March 7 Closure)	Alt 4 (March 15 Closure)	Alt 4 (March 7 Closure) minus the No Action Alternative	Alt 4 (March 15 Closure) minus the No Action Alternative
Year	Acres Planted	Decrease in Acres Planted	Decrease in Acres Planted	Income minus Expenses	Income minus Expenses
1997	29,933	19	23	-$128,852	-$218,321
1998	7,856	0	0	-$36,806	-$36,806
1999	26,287	244	255	-$184,416	-$194,167
2000	28,555	0	0	-$6,658	-$7,340
2001	30,027	11	36	-$80,231	-$213,035
2002	30,236	42	71	-$282,893	-$409,931
2003	24,810	256	256	-$215,248	-$215,248
2004	29,746	309	320	-$82,534	-$124,659
2005	10,999	0	0	$0	$0
2006	12,607	0	0	-$4,272	$4,272
2007	30,195	36	66	-$226,712	-$359,300
2008	30,171	77	97	-$135,637	-$253,327
2009	30,158	104	126	-$170,738	-$271,717
2010	26,290	411	408	-$232,549	-$237,027
2011	25,269	8	8	-$63,226	-$64,226
2012	29,679	4	31	-$109,857	-$173,064
Average	25,176	95	106	-$122,602	-$173,903
Maximum	30,236	42	71	-$282,893	-$409,931

Source: Appendix K1, *Bypass Production Model Technical Appendix*

Table 16-25 summarizes regional economic effects associated with the loss of employment, labor income, and revenue from converting these croplands to nonagricultural use or shifting to an alternative crop under the March 15 gate closure scenario. Direct effects would be a loss of on-farm jobs and farm revenue, which would affect agricultural employment opportunities and revenue in Yolo County. Indirect effects would occur to agricultural support businesses if farmers purchase fewer inputs such as seed, fertilizer, and fuel. Lastly, induced effects would occur because of the decline in household income to farmers and workers in agriculture and support industries. Relative to the baseline economy (presented in Table 16-5), which has an agricultural sector employment of 6,810 jobs and $837.6 million in output, losses due to operation of Alternative 4 would be less than one percent of the baseline economy (for either closure date).

Table 16-25. Average Annual Crop Shifting -related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 4 (March 15 Gate Closure) (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Thousand dollars)	Revenue (Thousand dollars)
Direct Effect	-0.5	-$42.5	-$246.6
Indirect Effect	-0.8	-$36.1	-$83.5
Induced Effect	-0.2	-$9.6	-$30.6
Total Effect	**-1.5**	**-$88.2**	**-$360.7**

Source:
IMPLAN 2016

Table 16-26 summarizes regional economic effects associated with the loss of employment, labor income, and revenue from converting these croplands to nonagricultural use or shifting to an alternative crop under the March 7 gate closure scenario.

Table 16-26. Average Annual Crop Shifting -related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 4 (March 7 Gate Closure) (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Thousand dollars)	Revenue (Thousand dollars)
Direct Effect	-0.4	-$30.7	-$191.1
Indirect Effect	-0.7	-$30.1	-$69.9
Induced Effect	-0.2	-$7.4	-$23.5
Total Effect	**-1.3**	**-$68.2**	**-$284.5**

Source:
IMPLAN 2016

In addition to the modeled changes to the regional economy discussed above, increased inundation in the Yolo Bypass could cause concerns for grazing lands within the Bypass. Several areas of pasture, including within the YBWA, could be affected by increased inundation under Alternative 4. The period of inundation is expected to increase by up to two to three weeks in some areas within YBWA. Farmers in the Yolo Bypass have indicated that if pasture areas are inundated constantly for more than 30 days (four weeks), the inundation increases the potential for invasive species that could out-perform the pasture (pers. comm. with Tom Schene, Yolo Bypass Farmer, November 6, 2017). Alternative 4 would extend periods of inundation and could cause increased invasive growth on pasture.

As discussed in Chapter 13, Recreation, some private hunting clubs south of YBWA could experience increased periods of inundation under Alternative 4. On average, most of the private hunting clubs' area would experience up to one week of increased inundation. Most of the private clubs have annual membership dues to cover club expenses and revenue. Increased inundation under Alternative 4 is expected to decrease viable duck hunting period in these private hunting clubs by less than 7 percent. Because these private hunting clubs collect annual membership dues and duck hunting opportunities would decrease by less than 7 percent, impacts to private hunting clubs in the region would be minimal. Additionally, some of these clubs are part of a network of clubs that would provide members alternate sites to hunt during increased inundation.Changes to regional economy from changes to groundwater levels surrounding the Yolo Bypass

Similar to Alternative 1, increased inundation in the Yolo Bypass could affect groundwater levels in the areas surrounding the bypass, which has the potential to affect agricultural production in these areas. Increased inundation provides for additional time when surface water in the bypass could infiltrate the ground and recharge the underlying groundwater aquifer, potentially affecting groundwater levels. Under Alternative 4, the period of inundation is expected to increase by four or more weeks (on average) along the eastern side of the bypass and the western side of the bypass (near I-80). The largest area of this increased inundation period would be north of I-80. The potential increase in groundwater levels due to the additional recharge would be more likely on the eastern side of the bypass, closer to the Sacramento River (in the Elkhorn area), because that is the area that would experience the largest increase in inundation duration. However, while there would be an increase in the duration of inundation, the change in surface water elevation in the Yolo Bypass and Sacramento River under Alternative 4 would be similar to, but smaller than, the changes under Alternative 1. The difference in head would be less than 0.1 feet under the high flow and moderate flow scenarios. Under the low flow scenario, the difference is head could be as high as 3 feet. However, under the low flow scenario WSE would be below the levee toe and cause minimal groundwater seepage. Impacts from operation of Alternative 4 on farming along the eastern side of the bypass and the western side of the bypass (north of I-80) would be similar to, but smaller than, those discussed under Alternative 1.

In addition to impacts from shallow groundwater levels to farming in the areas surrounding the bypass, shallow groundwater levels could also increase the cost for pumping from the Elkhorn area to the Tule Canal similar to those discussed under Alternative 1. The duration of pumping and the quantity of pumping would increase under Alternative 4 and result in increase in pumping costs to Reclamation District 1600.

Changes to forward linkages from changes to the agriculture in the Yolo Bypass

In addition to direct, indirect, and induced region economic effects discussed above, crop shifting is expected to have adverse impacts on the forward linkage industries such as tomato processing and rice milling. Impacts from operation of Alternative 4 on the tomato processing and rice milling sectors would be identical to those discussed under Alternative 1. Additionally, the increase in frequency and duration of flooding under Alternative 4 would be expected to result in the loss or increase of insurance premiums and increase in operating loan lending rates as described for Alternative 1.

Changes to regional economy from construction of new facilities

As discussed in Chapter 11 *Land Use and Agricultural Resources*, Alternative 4 would permanently affect 1 acre of Prime Farmland and 30 acres of Unique Farmland, and temporarily affect an additional 2 acres of Prime Farmland and 50 acres of Unique Farmland. These areas would be affected by construction of the water control structures, fish bypass channels, and berms to manage water in Alternative 4. The permanently converted lands would no longer be available for agricultural uses and would result in direct, indirect, and induced effects to the regional economy. The small amount of acreage change, however, would result in small changes to these factors.

16.3.3.5.3 Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy.

Increased diversions from the Sacramento River to the Yolo Bypass under Alternative 4 could reduce CVP and SWP deliveries to North of Delta and South of Delta contractors. Depending on the magnitude of shortage, agencies may implement mandatory water conservation. Securing alternate water supplies and implementing water conservation measures may result in costs for the water agencies. All or a portion of increased water costs would be passed on to the retail agencies and water customers through increased water rates. An increase in water rates would reduce the disposable income and could result in less spending in the regional economy.

As discussed in Chapter 5, *Surface Water Supply*, there would be no difference in deliveries between Alternative 4 and existing conditions, and the difference between Alternative 4 and the No Action Alternative could be up to one percent under certain months in dry and critical years. These reductions would not be substantial enough to warrant water rate increases that could affect the region's economy.

16.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish through using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

16.3.3.6.1 Impact SOC-1: Increase employment, income, and output in the regional economy.

Alternative 5 project facilities would be constructed over two years, with a 28-week period from April through October in year 1 and a 15-week period during the same construction window in year 2. Alternative 5 project facilities would cost approximately $144.9 million. The majority of construction under this alternative would occur in Yolo and Sutter counties and would temporarily increase employment, output, and labor income in both counties. Employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. Direct labor effects would be an increase of 446 construction workers. The duration of jobs would vary and most would not likely be over the

entire construction period. There would be additional jobs produced for administrative, engineering, planning, and monitoring personnel, and for other construction support professionals. Total direct labor would be 830 jobs over the construction period. Table 16-27 summarizes total direct, indirect, and induced economic impacts resulting from construction of project features. Construction would temporarily increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-27. Construction-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 5 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	721	$39.4	$81.8
Indirect Effect[1]	188	$9.4	$25.8
Induced Effect[1]	218	$10.2	$31.3
Total Effect	**1127**	**$59.1**	**$138.9**

Source:
[1] IMPLAN 2016

Annual maintenance costs for Alternative 5 would be approximately $1.04 million annually. These estimates were developed considering a 50-year project life cycle. Table 16-28 summarizes total direct, indirect, and induced economic impacts associated with annual maintenance under Alternative 5. Direct effects would occur in the maintenance and repair construction of nonresidential structures sector. These effects would occur annually and would increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-28. Annual maintenance-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 5 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	5	$0.3	$1.0
Indirect Effect	3	$0.1	$0.3
Induced Effect	2	$0.1	$0.3
Total Effect	**10**	**$0.5**	**$1.6**

Source:
IMPLAN 2016

16.3.3.6.2 Impact SOC-2: Decrease employment, income, and output in the regional economy resulting from conversion of cropland to nonagricultural use.

Alternative 5 operations would include increased inundation in the Yolo Bypass that could change regional economy through (1) changes to agriculture from increased inundation in the Yolo Bypass; (2) changes to agriculture due to increased groundwater levels surrounding the bypass; and (3) changes to forward linkages from changes to agriculture due to project actions. All three impacts are discussed in the section below:

Changes to regional economy from increased inundation in the Yolo Bypass

As described in Section 11.3.1.1, the TUFLOW model estimated the last day lands in the Yolo Bypass would be wet as a result of water releases through Fremont Weir gates under Alternative 5. The model considers how long the new gated notch would operate, and how long it would take for the water to drain off the fields. After the water has drained from the field, field drying and preparation would take an additional 34 days (see Appendix K1 for more detail). Longer inundation of agricultural parcels in the Yolo Bypass could delay planting dates, which in turn would affect crop yields thereby impacting profitability. Impacts to crop yields and profitability could change planting decisions in the Yolo Bypass and may cause landowners to temporarily remove land from production or shift to alternative crops resulting in less agricultural income. Project actions would not cause permanent cropland conversion. Table 16-29 shows the changes in agricultural income for each year modeled (1997-2012) using the BPM. BPM estimates the changes to income to the farmer. On an average annual basis, Alternative 5 would decrease net income by $78,225 in the Yolo Bypass. The average change in farm income would be -1.17 percent. The maximum decrease in net income from changes in the Yolo Bypass because of Alternative 5 operations would be approximately -$222,091.

Table 16-29. Modeled Changes in Agricultural Land Use and Income under Alternative 5 (1997-2012)

	No Action	Alternative 5	Alternative 5 minus the No Action Alternative
Year	**Acres Planted**	**Decrease in Acres Planted**	**Income minus Expenses**
1997	29,933	17	-$102,490
1998	7,856	0	-$36,623
1999	26,287	66	-$47,112
2000	28,555	77	-$39,297
2001	30,027	12	-$160,049
2002	30,236	43	-$222,091
2003	24,810	9	-$20,166
2004	29,746	197	-$87,550
2005	10,999	0	$0
2006	12,607	0	-$12,108
2007	30,195	23	-$147,626
2008	30,171	79	-$82,400
2009	30,158	126	-$213,513
2010	26,290	4	$17,546
2011	25,269	50	-$25,101
2012	29,679	0	$0
Average	25,176	44	-$75,855
Maximum	30,236	43	-$222,091

Source: Appendix K1, *Bypass Production Model Technical Appendix*

Table 16-30 summarizes regional economic effects associated with the loss of employment, labor income, and revenue from converting these croplands to nonagricultural use. Direct effects

would be a loss of on-farm jobs and farm revenue, which would affect agricultural employment opportunities and revenue in Yolo County. Indirect effects would occur to agricultural support businesses if farmers purchase fewer inputs such as seed, fertilizer, and fuel. Lastly, induced effects would occur because of the decline in household income to farmers and workers in agriculture and support industries. Relative to the baseline economy (presented in Table 16-5), which has an agricultural sector employment of 6,810 jobs and $837.6 million in output, losses due to operation of Alternative 5 would be less than one percent of the baseline economy.

Table 16-30. Average Annual Crop Shifting -related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 5 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Thousand dollars)	Revenue (Thousand dollars)
Direct Effect	-0.3	-$24.0	-$95.3
Indirect Effect	-0.3	-$11.5	-$26.0
Induced Effect	-0.1	-$4.4	-$13.9
Total Effect	**-0.7**	**-$39.9**	**-$135.2**

Source:
IMPLAN 2016

In addition to the modeled changes to the regional economy discussed above, increased inundation in the Yolo Bypass could cause concerns for grazing lands within the Bypass. Several areas of pasture, including within the YBWA, could be affected by increased inundation under Alternative 5. The period of inundation is expected to increase by up to three to four weeks in some areas within YBWA. Farmers in the Yolo Bypass have indicated that if pasture areas are inundated constantly for more than 30 days (four weeks), the inundation increases the potential for invasive species that could out-perform the pasture (pers. comm. with Tom Schene, Yolo Bypass Farmer, November 6, 2017). Alternative 5 would extend periods of inundation and could cause increased invasive growth on pasture.

As discussed in Chapter 13, Recreation, some private hunting clubs south of YBWA could experience increased periods of inundation under Alternative 5. On average, most of the private hunting clubs' area would experience up to one week of increased inundation. Most of the private clubs have annual membership dues to cover club expenses and revenue. Increased inundation under Alternative 5 is expected to decrease the viable duck hunting period in these private hunting clubs by less than 7 percent. Because these private hunting clubs collect annual membership dues and duck hunting opportunities would decrease by less than 7 percent, impacts to private hunting clubs in the region would be minimal. Additionally, some of these clubs are part of a network of clubs that would provide members alternate sites to hunt during increased inundation.Changes to regional economy from changes to groundwater levels surrounding the Yolo Bypass

Similar to Alternative 1, increased inundation in the Yolo Bypass could affect groundwater levels in the areas surrounding the bypass, which has the potential to affect agricultural production in these areas. Increased inundation in the Yolo Bypass could affect groundwater levels in the areas surrounding the bypass. Increased inundation provides for additional time when surface water in the bypass could infiltrate the ground and recharge the underlying groundwater aquifer, potentially affecting groundwater levels. Under Alternative 5, the period of

inundation is expected to increase by a few weeks along the eastern side of the bypass (Elkhorn area) and by two to four weeks along the western side of the bypass (near I-80). The largest area of this increased inundation period would be north of I-80. The potential increase in groundwater levels due to the additional recharge would be more likely on the eastern side of the bypass, closer to the Sacramento River (in the Elkhorn area), because that is the area that would experience the largest increase in inundation duration. However, while there would be an increase in the duration of inundation, the surface water elevation in the Yolo Bypass and Sacramento River under Alternative 5 would be similar to, but smaller than, Alternative 1. The difference in head would be less than 0.1 feet under the high flow and moderate flow scenarios. Under the low flow scenario, the difference is head could be as high as 3 feet. However, under the low flow scenario WSE would be below the levee toe and cause minimal groundwater seepage. Impacts from operation of Alternative 5 on farming along the eastern side of the bypass and the western side of the bypass (north of I-80) would be similar to, but less than, those discussed under Alternative 1.

In addition to impacts from shallow groundwater levels to farming in the areas surrounding the bypass. Shallow groundwater levels could also increase the cost for pumping from the Elkhorn area to the Tule Canal similar to those discussed under Alternative 1. The duration of pumping and the quantity of pumping would increase under Alternative 5 and result in increase in pumping costs to Reclamation District 1600.

Changes to forward linkages from changes to the agriculture in the Yolo Bypass

In addition to direct, indirect, and induced region economic effects discussed above, crop shifting is expected to have adverse impacts on the forward linkage industries such as tomato processing and rice milling. Impacts from operation of Alternative 5 to the tomato processing and rice milling sectors would be identical to those discussed under Alternative 1. Additionally, the increase in frequency and duration of flooding under Alternative 5 would be expected to result in the loss or increase of insurance premiums and increase of operating loan lending rates as described for Alternative 1.

16.3.3.6.3 Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy.

Increased diversions from the Sacramento River to the Yolo Bypass under Alternative 5 could reduce CVP and SWP deliveries to North of Delta and South of Delta contractors. Depending on the magnitude of shortage, agencies may implement mandatory water conservation. Securing alternate water supplies and implementing water conservation measures may result in costs for the water agencies. All or a portion of increased water costs would be passed on to the retail agencies and water customers through increased water rates. An increase in water rates would reduce the disposable income and could result in less spending in the regional economy.

As discussed in Chapter 5, *Surface Water Supply*, there would be no difference in deliveries between Alternative 5 and existing conditions, and the difference between Alternative 5 and the No Action Alternative could be up to one percent under certain months in dry and critical years. These reductions would not be substantial enough to warrant water rate increases that could affect the region’s economy.

16.3.3.6.4 Tule Canal Floodplain Improvements (Program-Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of Interstate 80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all of the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact SOC-1: Increase employment, income, and output in the regional economy.

Program-level facilities associated with the Tule Canal Floodplain Improvements would be constructed the year after completion of the other Alternative 5 facilities. All construction activities would be completed within one year over a 28-week period from April through October. The program-level facilities would cost approximately $34.4 million. The majority of construction under this alternative would occur in Yolo and Sutter counties and would temporarily increase employment, output, and labor income in both counties.

Employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. Direct labor effects would be an increase of 20 construction workers. The duration of jobs would vary and most would not likely be over the entire construction period. There would be additional jobs produced for administrative, engineering, planning, and monitoring personnel, and for other construction support professionals. Total direct labor would be 135 jobs over the construction period. Table 16-31 summarizes total direct, indirect, and induced economic impacts resulting from construction of project features. Construction would temporarily increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-31. Construction-related Direct, Indirect, Induced, and Total Regional Economic Effects from Tule Canal Floodplain Improvements (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	135	$8.8	$40.7
Indirect Effect[1]	91	$4.7	$13.2
Induced Effect[1]	60	$2.9	$9.0
Total Effect	**286**	**$16.4**	**$63.0**

Source:
[1] IMPLAN 2016

Annual maintenance costs associated with the Tule Canal Floodplain Improvements would be approximately $0.96 million annually. These estimates were developed considering a 50-year project life cycle. Table 16-32 summarizes total direct, indirect, and induced economic impacts associated with annual maintenance. Direct effects would occur in the maintenance and repair construction of nonresidential structures sector. These effects would occur annually and would increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-32. Annual maintenance-related Direct, Indirect, Induced, and Total Regional Economic Effects from Tule Canal Floodplain Improvements (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	5	$0.3	$1.0
Indirect Effect	3	$0.1	$0.3
Induced Effect	2	$0.1	$0.3
Total Effect	**10**	**$0.5**	**$1.6**

Source:
IMPLAN 2016

Impact SOC-2: Decrease employment, income, and output in the regional economy from conversion of cropland to nonagricultural use or crop shifting.

There would be no additional impacts to croplands associated with Tule Canal Floodplain Improvements. The improvements to the Tule Canal Floodplain would be located on lands largely functioning as wetlands or designated as fallowed fields. Increased inundation in the secondary channels are not expected to result in conversion of croplands to nonagricultural uses or crop shifting, and consequently there would be no impacts to the regional economy.

Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy.

There would be no additional changes to water supply associated with Tule Canal Floodplain Improvements. The improvements would not affect the timing of flows within the Yolo Bypass and would not increase or decrease the amount of flow within the Yolo Bypass in any months; therefore, these improvements would have no impact on water supply and consequently there would be no impacts to the regional economy.

16.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

16.3.3.7.1 Impact SOC-1: Increase employment, income, and output in the regional economy.

Alternative 6 would be constructed within one year over a 28-week period from April through October. Alternative 6 project facilities would cost approximately $111.6 million. The majority of construction under this alternative would occur in Yolo and Sutter counties and would temporarily increase employment, output, and labor income in both counties. Employment and spending associated with construction actions could also affect regional economies in the neighboring counties of Solano and Sacramento. Direct labor effects would be an increase of 334 construction workers. The duration of jobs would vary and most would not likely be over the entire construction period. There would be additional jobs produced for administrative,

engineering, planning, and monitoring personnel, and for other construction support professionals. Total direct labor would be 627 jobs over the construction period. Table 16-33 summarizes total direct, indirect, and induced economic impacts resulting from construction of project features. Construction would temporarily increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-33. Construction-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 6 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	627	$35.3	$93.0
Indirect Effect[1]	212	$10.6	$29.3
Induced Effect[1]	207	$9.7	$29.7
Total Effect	**1045**	**$55.6**	**$152.0**

Source:
[1] IMPLAN 2016

Annual maintenance costs for Alternative 6 would be approximately $1.1 million annually. These estimates were developed considering a 50-year project life cycle. Table 16-34 summarizes total direct, indirect, and induced economic impacts associated with annual maintenance under Alternative 6. Direct effects would occur in the maintenance and repair construction of nonresidential structures sector. These effects would occur annually and would increase employment, labor income, and revenue in Yolo, Sutter, Solano, and Sacramento counties. This would be an economic benefit to the regional economy.

Table 16-34. Annual maintenance-related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 6 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Million dollars)	Revenue (Million dollars)
Direct Effect	6	$0.3	$1.1
Indirect Effect	3	$0.1	$0.4
Induced Effect	2	$0.1	$0.3
Total Effect	**11**	**$0.5**	**$1.8**

Source:
IMPLAN 2016

16.3.3.7.2 Impact SOC-2: Decrease employment, income, and output in the regional economy resulting from conversion of cropland to nonagricultural use or crop shifting.

Alternative 6 operations would include increased inundation in the Yolo Bypass that could change regional economy through (1) changes to agriculture from increased inundation in the Yolo Bypass; (2) changes to agriculture due to increased groundwater levels surrounding the bypass; and (3) changes to forward linkages from changes to agriculture due to project actions. All three impacts are discussed in the section below:

Changes to regional economy from increased inundation in the Yolo Bypass

As described in Section 11.3.1.1, the TUFLOW model estimated the last day lands in the Yolo Bypass would be wet as a result of water releases through Fremont Weir gates under Alternative 6. The model considers how long the new gated notch would operate, and how long it would take for the water to drain off the fields. After the water has drained from the field, field drying and preparation would take an additional 34 days (see Appendix K1 for more detail). Longer inundation of agricultural parcels in the Yolo Bypass could delay planting dates, which in turn would affect crop yields thereby impacting profitability. Impacts to crop yields and profitability could change planting decisions in the Yolo Bypass and may cause landowners to temporarily remove land from production or shift to alternative crops resulting in less agricultural income. Project actions would not cause permanent cropland conversion. Table 16-35 shows the changes in agricultural income for each year modeled (1997-2012) using the BPM. BPM estimates the changes to income to the farmer. On an average annual basis, operation of Alternative 6 would decrease net income by $101,039 in the Yolo Bypass. The average change in farm income would be -1.51 percent. The maximum decrease in net income from changes in the Yolo Bypass because of Alternative 6 operations would be approximately -$317,084.

Table 16-35. Modeled Changes in Agricultural Land Use and Income for Alternative 6 (1997-2012)

	No Action	Alternative 6	Alternative 6 minus the No Action Alternative
Year	**Acres Planted**	**Decrease in Acres Planted**	**Income minus Expenses**
1997	29,933	15	-$133,880
1998	7,856	0	-$36,766
1999	26,287	11	-$35,744
2000	28,555	0	$0
2001	30,027	15	-$228,390
2002	30,236	51	-$313,744
2003	24,810	3	-$24,376
2004	29,746	21	-$103,358
2005	10,999	0	$0
2006	12,607	0	-$2,345
2007	30,195	32	-$205,243
2008	30,171	90	-$128,421
2009	30,158	137	-$317,084
2010	26,290	39	-$63,966
2011	25,269	0	$0
2012	29,679	0	$0
Average	25,176	26	-$99,645
Maximum	30,158	137	-$317,084

Source: Appendix K1, *Bypass Production Model Technical Appendix*

Table 16-36 summarizes the loss of employment, labor income, and revenue from converting these croplands to nonagricultural use. Direct effects would be a loss of on-farm jobs and farm revenue, which would affect agricultural employment opportunities and revenue in Yolo County.

Indirect effects would occur to agricultural support businesses if farmers purchase fewer inputs such as seed, fertilizer, and fuel. Lastly, induced effects would occur because of the decline in household income to farmers and workers in agriculture and support industries. Relative to the baseline economy (presented in Table 16-5), which has an agricultural sector employment of 6,810 jobs and $837.6 million in output, losses due to operation of Alternative 6 would be less than one percent of the baseline economy.

Table 16-36. Average Annual Crop Shifting -related Direct, Indirect, Induced, and Total Regional Economic Effects under Alternative 6 (2016 dollars)

Impact Type	Employment (Jobs)	Labor Income (Thousand dollars)	Revenue (Thousand dollars)
Direct Effect	-0.5	-$32.9	-$106.6
Indirect Effect	-0.3	-$12.1	-$26.5
Induced Effect	-0.1	-$5.5	-$17.6
Total Effect	**-0.9**	**-50.5**	**-150.7**

Source:
IMPLAN 2016

In addition to the modeled changes to the regional economy discussed above, increased inundation in the Yolo Bypass could cause concerns for grazing lands within the Bypass. Several areas of pasture, including within the YBWA, could be affected by increased inundation under Alternative 6. The period of inundation is expected to increase by up to three to four weeks in some areas within YBWA. Farmers in the Yolo Bypass have indicated that if pasture areas are inundated constantly for more than 30 days (four weeks), the inundation increases the potential for invasive species that could out-perform the pasture (pers. comm. with Tom Schene, Yolo Bypass Farmer, November 6, 2017). Alternative 6 would extend periods of inundation and could cause increased invasive growth on pasture.

As discussed in Chapter 13, *Recreation*, some private hunting clubs south of YBWA could experience increased periods of inundation under Alternative 6. On average, most of the private hunting clubs' area would experience up to three weeks of increased inundation. Most of the private clubs have annual membership dues to cover club expenses and revenue. Increased inundation under Alternative 6 is expected to decrease the viable duck hunting period in these private hunting clubs up to 20 percent. Because these private hunting clubs collect annual membership dues, impacts to private hunting clubs in the region would be minimal. Additionally, some of these clubs are part of a network of clubs that would provide members alternate sites to hunt during increased inundation.

Changes to regional economy from changes to groundwater levels surrounding the Yolo Bypass

Similar to Alternative 1, increased inundation in the Yolo Bypass could affect groundwater levels in the areas surrounding the bypass, which has the potential to affect agricultural production in these areas. Increased inundation in the Yolo Bypass could affect groundwater levels in the areas surrounding the bypass. Increased inundation provides for additional time when surface water in the bypass could infiltrate the ground and recharge the underlying groundwater aquifer, potentially affecting groundwater levels. Under Alternative 6, the period of inundation is expected to increase by three to four weeks along the eastern side of the bypass (Elkhorn area) and by two to three weeks along the western side of the bypass (near I-80). The

largest area of this increased inundation period would be north of I-80. The potential increase in groundwater levels due to the additional recharge would be more likely on the eastern side of the bypass, closer to the Sacramento River (in the Elkhorn area), because that is the area that would experience the largest increase in inundation duration. However, while there would be an increase in the duration of inundation, the surface water elevation in the Yolo Bypass and Sacramento River under Alternative 6 would be similar to, but slightly higher than, Alternative 1. The difference in head would be less than 0.1 feet under the high flow and moderate flow scenarios. Under the low flow scenario, the difference is head could be as high as 3 feet. However, under the low flow scenario WSE would be below the levee toe and cause minimal groundwater seepage. Therefore, through seepage and under seepage would be slightly higher than Alternative 1, it is still likely to be minimal. Impacts from operation of Alternative 6 on farming along the eastern side of the bypass and the western side of the bypass (north of I-80) would be similar to, but slightly greater than, to those discussed under Alternative 1.

In addition to impacts from shallow groundwater levels to farming in the areas surrounding the bypass. Shallow groundwater levels could also increase the cost for pumping from the Elkhorn area to the Tule Canal similar to those discussed under Alternative 1. The duration of pumping and the quantity of pumping would increase under Alternative 6 and result in increase in pumping costs to Reclamation District 1600.

Changes to forward linkages from changes to the agriculture in the Yolo Bypass

In addition to direct, indirect and induced region economic effects discussed above, crop shifting is expected to have adverse impacts on the forward linkage industries such as tomato processing and rice milling. Impacts from operation of Alternative 6 to the agriculture in the Elkhorn area and the tomato processing and rice milling sectors would be identical to those discussed under Alternative 1. Additionally, the increase in frequency and duration of flooding under Alternative 6 would be expected to result in the loss or increase of insurance premiums and increase of operating loan lending rates as described for Alternative 1.

16.3.3.7.3 Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy.

Increased diversions from the Sacramento River to the Yolo Bypass under Alternative 6 could reduce CVP and SWP deliveries to North of Delta and South of Delta contractors. Depending on the magnitude of shortage, agencies may implement mandatory water conservation. Securing alternate water supplies and implementing water conservation measures may result in costs for the water agencies. All or a portion of increased water costs would be passed on to the retail agencies and water customers through increased water rates. An increase in water rates would reduce the disposable income and could result in less spending in the regional economy.

As discussed in Chapter 5, *Surface Water Supply*, there would be no difference in deliveries between Alternative 6 and existing conditions, and the difference between Alternative 6 and the No Action Alternative can be up to one percent under certain months in dry and critical years. These reductions would not be substantial enough to warrant water rate increases that could affect the region’s economy.

16.3.4 Summary of Impacts

Table 16-37 below provides a summary of the identified impacts to socioeconomics within the Project area.

Table 16-37. Summary of Impacts and Mitigation Measures

Impact	Alternative	Effects Determination
Impact SOC-1: Increase employment, income, and output in the regional economy	No Action	No adverse effect
	1	Construction Impacts: Increase of 366 jobs, $18.8 million (M) in labor income, $55.9 M in revenue Annual Maintenance Impacts: Increase of 6 jobs, $0.4 M in labor income, $0.9 M in revenue
	2	Construction Impacts: Increase of 585 jobs, $31.2 M in labor income, $87.1 M in revenue Annual Maintenance Impacts: Increase of 6 jobs, $0.4 M in labor income, $1.0 M in revenue
	3	Construction Impacts: Increase of 620 jobs, $32.7 M in labor income, $82.6 M in revenue Annual Maintenance Impacts: Increase of 6 jobs, $0.4 M in labor income, $1.0 M in revenue
	4	Construction Impacts: Increase of 876 jobs, $35.7 M in labor income, $123.6 M in revenue Annual Maintenance Impacts: Increase of 8 jobs, $0.4 M in labor income, $1.2 M in revenue
	5 (Project)	Construction Impacts: Increase of 1,127 jobs, $59.1 M in labor income, $138.9 M in revenue Annual Maintenance Impacts: Increase of 10 jobs, $0.5 M in labor income, $1.6 M in revenue
	5 (Program)	Construction Impacts: Increase of 286 jobs, $16.4 M in labor income, $63.0 M in revenue Annual Maintenance Impacts: Increase of 10 jobs, $0.5 M in labor income, $1.6 M in revenue
	6	Construction Impacts: Increase of 1,045 jobs, $55.6 M in labor income, $152.0 M in revenue Annual Maintenance Impacts: Increase of 11 jobs, $0.5 M in labor income, $1.8 M in revenue

Impact	Alternative	Effects Determination
Impact SOC-2: Decrease employment, income, and output in the regional economy resulting from conversion of cropland to nonagricultural use	No Action	No adverse effect
	1, 2, 3	Loss of 0.6 jobs, $33,100 in labor income, $102,300 in revenue; Minor impacts to the regional economy due to changes to groundwater levels surrounding the bypass; no effect to forward linkages in the regional economy; potential loss of crop insurance policies or increase in premiums; increase of $1 to $29 per acre in operating costs
	4	Loss of 1.3 to 1.5 jobs, $68,200 to $88,200 in labor income, $284,500 to $360,700 in revenue; Minor impacts to the regional economy due to changes to groundwater levels surrounding the bypass; no effect to forward linkages in the regional economy; potential loss of crop insurance policies or increase in premiums; increase of $1 to $29 per acre in operating costs
	5 (Project)	Loss of 0.7 jobs, $39,900 in labor income, $135,200 in revenue; Minor impacts to the regional economy due to changes to groundwater levels surrounding the bypass; no effect to forward linkages in the regional economy; potential loss of crop insurance policies or increase in premiums; increase of $1 to $29 per acre in operating costs
	5 (Program)	No effect
	6	Loss of 0.9 jobs, $50,500 in labor income, $150,700 in revenue; Minor impacts to the regional economy due to changes to groundwater levels surrounding the bypass; no effect to forward linkages in the regional economy; potential loss of crop insurance policies or increase in premiums; increase of $1 to $29 per acre in operating costs
Impact SOC-3: Changes to water supply to North of Delta and South of Delta contractors affecting the regional economy	No Action	No adverse effect
	1, 2, 3, 4, 5 (Project), 6	Infrequent, less than 1% reduction in monthly deliveries
	5 (Program)	No effect

16.4 Cumulative Impacts Analysis

This section describes the cumulative impacts analysis for socioeconomics.

16.4.1 Methodology

This evaluation of cumulative impacts for the regional economy considers the effects of the project and how they may combine with the effects of other past, present, and future projects or actions to create significant impacts on specific resources. The Project area for these cumulative impacts includes the Yolo, Colusa, Sutter, and Sacramento Counties. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the Project area.

This cumulative impacts analysis uses the project analysis approach described in detail in Section 3.3, *Cumulative Impacts*. The cumulative projects included in this analysis are:

- Central Valley Flood Protection Plan – A plan to prioritize flood management actions in the Central Valley, including removing non-functioning levees along the Mariposa Bypass, upgrades to the Mariposa Bypass Control Structure and Mariposa Drop Structure, and fish passage improvements at Sand Slough Control Structure.
- Sacramento River Bank Protection Project - The project is designed to enhance public safety and help protect property along the Sacramento River and its tributaries by protecting existing levee and flood control facilities of the Sacramento River Flood Control Project.
- Upstream Sacramento River Fisheries Projects - These projects include ongoing and reasonably foreseeable project with the potential to affect aquatic resources and fisheries upstream of Yolo Bypass and Delta including levee improvement and other flood control management projects in and near the Sacramento, Feather, Yuba, and American rivers; modification of Shasta Dam operations.
- Lower Cache Creek Flood Risk Management Feasibility Study and the Woodland Flood Risk Reduction Project - A project that could include the implementation of several flood control measures along Cache Creek including stream channel improvements, a north Woodland floodway, and a northern bypass into the Colusa Drain.
- Lower Elkhorn Basin Levee Setback Project - The project would include setback levee removal in the Lower Elkhorn Basin along the east side of the Yolo Bypass, and the north side of the Sacramento Bypass. It would also include removal of portions of local reclamation district cross levees, and improve or relocate related infrastructure.
- Lower Yolo Restoration Project - The project is a tidal and seasonal salmon habitat program that would restore tidal flux to approximately 1,100 acres of existing pasture land at McCormack Ranch, which is now owned by the Westlands Water District. The goal of the project is to provide new sources of food and shelter for a variety of native fish species and ensure continued or enhanced flood protection. The Lower Yolo Restoration Project is a component of the Delta adaptive management approach to determine relative benefits of different fish habitats, quantify the production and transport of food and gain and understanding of how fish species take advantage of new habitat.

16.4.2 Cumulative Impacts

Several related and reasonably foreseeable projects and actions may result in impacts to the regional economy in the Project area. Specifically, the Central Valley Flood Protection Plan, which includes the Sacramento River Basin-Wide Feasibility Study, Lower Elkhorn Basin Levee Setback Project, Sacramento River Bank Protection Project, and the Sacramento River General Reevaluation Report, may require construction in or adjacent to the Yolo Bypass. Construction activities could be associated with levee setbacks, removal, and improvements, expansion of Fremont Weir and the Yolo Bypass, construction of levees. However, there are no Sacramento River Bank Protection Projects currently under construction immediately adjacent to, or upstream of, the project. Construction activities associated with the other cumulative projects could be beneficial to the regional economy due to the increase in employment, income, and output around the same period as the Project alternatives. Therefore, the Project alternatives' incremental contributions to the cumulative effects associated with construction activities would be **cumulatively beneficial**.

In addition to construction in or adjacent to the Yolo Bypass, the Liberty Island Conservation Bank Project proposes to breach the northernmost east/west levee, which could permanently flood an additional 1,000 acres of land within the Yolo Bypass. The Lower Yolo Restoration Project is intended to restore tidal flux to 1,100 acres of existing pasture land within the Yolo Bypass. The project would convert existing cropland to nonagricultural use within the levee footprint estimated to be between 300 to 490 acres. These actions would result in decreasing employment, income, and output in the regional economy. Impacts from crop shifting are not expected to be substantial under the Project alternatives. Therefore, the Project alternatives' incremental contributions to the cumulative effects associated with cropland conversion would be **cumulatively minimal**.

16.5 References

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17 Transportation

This chapter describes the existing and future circulation network located near the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) area and discusses transportation-related impacts that may result from implementation of the Project alternatives. This chapter includes all aspects of the transportation and circulation network, including vehicle traffic circulation, pedestrian and bicycle circulation, and public transit. Additionally, mitigation measures to reduce or eliminate significant impacts are discussed.

17.1 Environmental Setting/Affected Environment

Regional access to the Project area, primarily the Fremont Weir Wildlife Area (FWWA) because construction of alternatives would be focused in this area, is provided via Interstate (I) 5 and State Routes (SR) 99, 70, and 20. Local access to the area is mainly provided by County Roads (CRs) 102, 16, 116A, and 117. A description of the major roadways located near the Project area is provided below. Figure 17-1 shows the nearby local roadways and highways that would be affected by the Project and the proposed access routes to the Project area, which are discussed later in the chapter.

17.1.1 Regional Access Roadways

I-5 is a north-south freeway from California to Washington. I-5 is located west and south of the FWWA. Access from I-5 to the FWWA is provided via CRs 102 and 117. Approximately five miles south of the Project area, I-5 has two lanes in each direction. Yolo County's *2030 Countywide General Plan* and the *Sacramento County General Plan* classify I-5 as a Freeway (County of Yolo 2009, Sacramento County 2014).

SR 99 is a six-lane, limited access north-south freeway that serves as the main regional route throughout the Central Valley. SR 99 is located east of the FWWA, and access from SR 99 to the Fremont Weir area is provided via I-5. In the immediate vicinity of the FWWA, SR 99 has two lanes in each direction. Sacramento County's *General Plan* classifies SR 99 as a Freeway (Sacramento County 2014).

SR 70 is a two- to four-lane, limited access expressway/highway connecting areas north of Sacramento with United States Route 395. SR 70 is located northeast of the FWWA and terminates at SR 99 in Sutter County. Access from SR 70 to the Fremont Weir area is provided via SR 99 and I-5. SR 70 has four lanes (two lanes in each direction) along sections that are anticipated to be used during portions of the Project's construction timeline. Sutter County's *General Plan* (Sutter County 2010) classifies SR 70 as a Highway, and Yuba County's *General Plan* classifies SR 70 as a Conventional Highway and Freeway, depending on the segment of interest (Yuba County 2011).

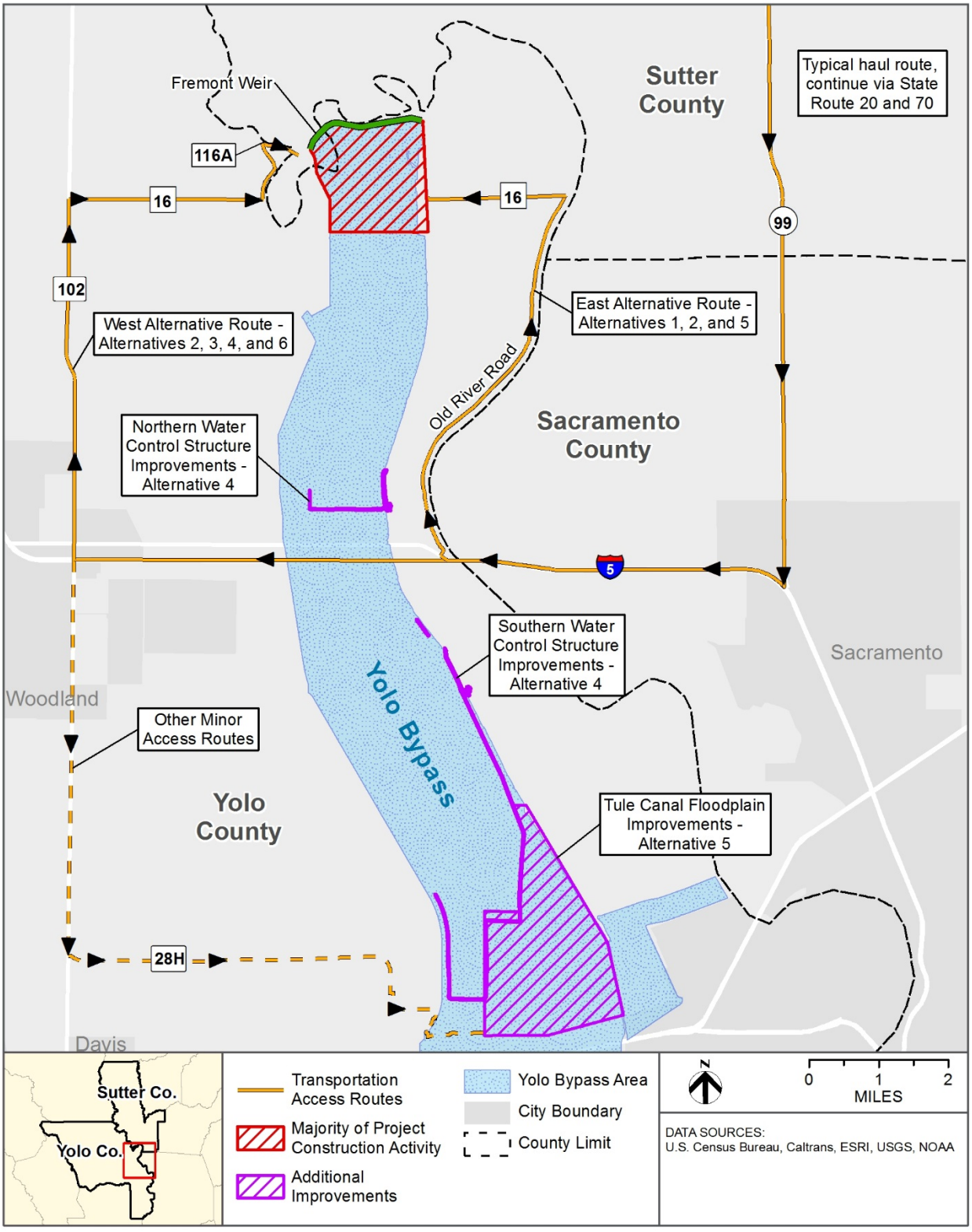

Figure 17-1. Affected Transportation Network and Project Access Routes

SR 20 is an east-west highway running north of Sacramento, between the communities of Colusa and Marysville, and eastward to the Sierra Nevada. It connects SR 1 with I-80. SR 20 is located north of the FWWA. Access from SR 20 to the Fremont Weir area is provided via SR 70, SR 99, and I-5. Along sections of SR 20 that are anticipated to be used during portions of the Project's construction timeline, SR 20 has two lanes (one lane in each direction). The *Yuba County General Plan* classifies SR 20 as a Conventional Highway (Yuba County 2011).

17.1.2 Local Access Roadways

CR 102 is a north-south arterial between Covell Boulevard to the south and SR 113 to the north in Yolo County. South of Covell Boulevard, it continues as Pole Line Road. In the immediate vicinity of the Fremont Weir area, CR 102 has three lanes (two northbound lanes, one southbound lane, and a center-running two-way left-turn lane) within the Woodland city limits and two lanes (one lane in each direction) north of Woodland city limits. CR 102 is located east of the FWWA and provides access to the Fremont Weir area via CRs 16 and 116A. Yolo County's *2030 Countywide General Plan* classifies CR 102 as a Local Road (within Woodland city limits) and as a Major Two-Lane County Road (outside of Woodland city limits) (County of Yolo 2009).

CR 117 is a two-lane north-south arterial between Old River Road and Road 107A. It is located east of the FWWA and provides access to the Fremont Weir area via CR 16. Yolo County's *2030 Countywide General Plan* classifies CR 102 as a Local Road (County of Yolo 2009).

CR 16 is a two-lane east-west roadway that is bisected by the FWWA. It connects CR 102 with CR 116A west of the FWWA and goes from the Yolo Bypass east levee crown road to CR 117 east of the FWWA. The road provides local access to the Fremont Weir area via CRs 116A and 117. Yolo County's 2030 General Plan classifies CR 16 as a Local Road (County of Yolo 2009).

CR 116 is a two-lane roadway connecting SR 113 with the FWWA. CR 116B is a two-lane marked roadway, whereas CR 116A is a two-lane undivided and unmarked roadway. It is located west of the FWWA and provides direct access to the Fremont Weir area. CR 116B is classified as a Local Road, whereas CR 116A is not classified (County of Yolo 2009).

17.1.3 Existing Roadway Operations

The following six highway segments that are near the Project area and could be affected by the project alternatives were evaluated:

- I-5, west of CR 102 (Yolo County)
- I-5, east of CR 22 (Yolo County)
- I-5, north of SR 99 (Sacramento County)
- SR 99, north of I-5 (Sacramento County)
- SR 70, north of SR 99 (Sutter and Yuba counties)
- SR 20, east of SR 70 (Yuba County)

Annual average daily traffic (AADT) values were obtained for these highway segments from 2015 counts collected as part of the California Department of Transportation (Caltrans) Traffic

Census Program (Caltrans 2015). Table 17-1 shows the existing AADT and the corresponding operational level of service (LOS) that has been identified by the governing jurisdiction for the peak hour or weekday for roadway segments near the Project area or anticipated to be used during project construction. LOS is defined in Section 17.1.3.1.

Table 17-1. Existing Roadway Segment AADT near Project Location

Roadway Segment	AADT	Level of Service (LOS)
I-5, west of CR 102 (Yolo County)	47,300	A-C (a.m.); A-C (p.m.)[a]
I-5, east of CR 22 (Yolo County)	56,400	A-C (a.m.); A-C (p.m.)[a]
I-5, north of SR 99 (Sacramento County)	79,700	D (daily)
SR 99, north of I-5 (Sacramento County)	53,500	C (daily)
SR 70, north of SR 99 (Sutter and Yuba counties)	16,500	A-C (daily)[a]
SR 20, east of SR 70 (Yuba County)	16,100	D (daily)

Key: AADT = Average Annual Daily Traffic; LOS = Level of Service; SR = State Route

Source: Caltrans 2015.

[a] The specific LOS letter grade was not defined for roadway segments that had conditions of LOS C or better.

17.1.3.1 Methodology

The operating conditions of highway segments are measured and expressed in LOS, which is a qualitative assessment of the quantitative effects of such factors as traffic volume, roadway geometrics, speed, delay, and maneuverability on roadway operations. LOS values vary from A to F, where LOS A represents free-flow activity and LOS F represents overcapacity operation. Level of service characteristics and criteria are exhibited in Table 17-2.

Table 17-2. LOS Characteristics

LOS	Traffic Conditions
A	Free flow conditions; low volumes; high operating speeds; uninterrupted flow; no restriction on maneuverability; drivers maintain desired speeds; little or no delays.
B	Stable flow conditions; operating speeds beginning to be restricted.
C	Stable flow but speed and maneuverability restricted by higher traffic volumes; satisfactory operating speed for urban conditions; delays at signals.
D	Approaching unstable flow; low speeds; major delays at signals; little freedom to maneuver.
E	Lower operating speeds; volume at or near capacity; unstable flow; major delays and stoppages.
F	Forced flow conditions; low speeds; volumes below capacity, may be zero; stoppages for long periods because of downstream congestion.

Key: LOS = Level of Service

Source: Transportation Research Board 2000.

Yolo, Sacramento, Sutter, and Yuba counties and their respective General Plan Circulation Elements include a set of criteria for assessing the performance of freeways, highways, and arterials based on their maximum daily traffic volumes and roadway design characteristics. Using these daily volume thresholds, the LOS value of a roadway system is determined.

17.1.4 Pedestrian/Bicycle Facilities

The Project area is located within an unincorporated area of Yolo County that has very low pedestrian and bicycle activity. Currently, the Project area has no dedicated pedestrian and bicycle facilities, except along CR 102, which has a Class II Bikeway (bike lane) between CR 22 (Main Street) in the City of Woodland and SR 113 in Knights Landing (Yolo County 2009).

17.1.5 Public Transportation

Public bus service within the Project area is provided by Yolobus, operated by the Yolo County Transportation District (Yolobus 2017). Near the Project area, Yolobus operates the following routes:

- Routes 42A Intercity Loop Clockwise and 42B Intercity Loop Counter-Clockwise – These circular routes connect downtown Sacramento, West Sacramento, Sacramento International Airport, Davis, and Woodland. They provide hourly transit service every day. In the project vicinity, Routes 42A and 42B operate along I-5.
- Route 45 Woodland/Sacramento Express – Route 45 is an express bus service between Woodland and downtown Sacramento. It operates on weekdays, providing five morning trips and four afternoon trips. Near the Project area, Route 45 operates along I-5.
- Route 216 Knights Landing/Woodland – Route 216 provides service between Knights Landing and Woodland on Mondays, Wednesdays, Fridays, and the second Saturday of each month. During weekdays, Route 216 provides a round trip in the morning and afternoon. Near the Project area, Route 216 operates along CR 102.
- Route 217 Dunnigan/Yolo/Woodland – Route 217 operates between Dunnigan, Zamora, Yolo, and Woodland. It operates on Tuesdays and Thursdays, providing one round trip in the morning and afternoon. In the project vicinity, Route 217 operates along I-5, west of SR 113.

About three-quarter-mile route deviations can be requested on some of the local fixed routes.

The Yolo County Transportation District also provides paratransit service through Yolobus Special, which provides local city, intercity, and rural county service. This service provides on-demand, door-to-door transportation for elderly and disabled people.

17.2 Regulatory Setting

This section discusses the regulatory setting for transportation and infrastructure in the Project area.

17.2.1 Federal Plans, Policies, and Regulations

There are no Federal plans, policies, or regulations related to traffic and transportation that are applicable to the Project.

17.2.2 State Plans, Policies, and Regulations

Caltrans has prepared a guide for traffic/transportation impact studies that identifies the LOS C to LOS D transition as the target level of service for State of California (State) transportation facilities. This includes District 3, which governs the area where the Project is located. However, wherever facilities do not currently meet that LOS during peak travel hours, the agency desires to maintain the existing LOS along those facilities. For highways, which are the primary facilities of interest for this project, the density measure of effectiveness is used to define the LOS.

Caltrans District 3 also specifies that a detailed traffic impact study be conducted should one of the three conditions occur on a State highway facility from a proposed project (Caltrans 2002):

- Generate more than 100 peak hour trips
- Generate between 50 and 100 peak hour trips when affected highway facilities are approaching the LOS C to LOS D transition target threshold
- Generate between one and 49 peak hour trips when affected highway facilities are at LOS E or F, the potential risk for traffic incidents and/or safety concerns have been significantly increased, or the local circulation network designs near a State highway facility would be changed

17.2.3 Regional and Local Plans, Policies, and Regulations

Regional and local plans, policies, or regulations related to traffic and transportation are discussed below.

17.2.3.1 Yolo County

Yolo County's *2030 Countywide General Plan* Circulation Element specifies that LOS C or better conditions for roadways and intersections in unincorporated portions of the county are to be generally maintained. However, certain roadway segments that are within incorporated areas or already operating at conditions worse than LOS C use differing LOS standards. They are shown below in the following list (Yolo County 2009):

- I-5 (Woodland City Limit to Sacramento County Line) – LOS F is acceptable to the county.
- CR 102 (CR 13 to CR 17) – LOS D is acceptable, assuming that passing lanes and appropriate intersection improvements are constructed.

17.2.3.2 Surrounding Counties

The General Plans for Sacramento, Sutter, and Yuba counties also have LOS standards identified for their roadways. Sacramento County identifies LOS D or better conditions for rural roadways and LOS E or better conditions for urban roadways, where feasible (Sacramento County 2014). Sutter County utilizes the LOS D standard as being minimally acceptable (Sutter County 2010). Yuba County utilizes LOS by identifying the maximum peak-hour volume along roadway segments based on the functional classification, and physical characteristics of the roadway. The LOS threshold of significance is then based on volumes targeted by the county that would fit service characteristics (Yuba County 2011).

Because roadways to be studied within these counties are under State control, thresholds established by Caltrans would supersede the identified county LOS standards.

17.3 Environmental Consequences

This section describes the environmental consequences associated with the Project alternatives and the No Action Alternative on transportation. This section presents the assessment methods used to analyze the effects on transportation, the thresholds of significance that determine the significance of effects, and the potential environmental consequences and mitigation measures as they relate to each Project alternative.

Impacts to transportation are determined relative to existing conditions (for California Environmental Quality Act [CEQA]) and the No Action Alternative (for the National Environmental Policy Act [NEPA]). However, as described below, the No Action Alternative would be the same as existing conditions because transportation and traffic is not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to existing conditions.

Detailed descriptions of the alternatives evaluated in this chapter are provided in Chapter 2, *Description of Alternatives*.

17.3.1 Methods for Analysis

The majority of transportation trips associated with Project implementation would occur during the temporary construction period. There would be no new onsite permanent employees as a result of the Project; however, while limited additional trips are anticipated to occur during maintenance activities after the Project is constructed, these trips would occur primarily within the immediate local area roadways. Additionally, the Project area is in a rural area with little existing traffic. Therefore, qualitative review and analysis was primarily conducted for the construction period. Newly generated permanent vehicle trips are not anticipated to occur as a result of project implementation.

Analyses pertaining to construction traffic levels as well as anticipated worker travel and construction access routes were qualitatively assessed, and impacts were determined. As necessary, mitigation measures were developed based on assessed impacts. Alternatives were analyzed primarily based on a similar set of expected construction vehicle routing and activities and assessed such that the varying number of these activities would determine differences in impact.

17.3.2 Thresholds of Significance – CEQA

The thresholds of significance for impacts are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds also encompass the factors considered under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. The alternatives under consideration were determined to result in a significant impact related to transportation and traffic resources if they would do any of the following:

a) Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)

b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)

e) Result in inadequate emergency access

f) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)

As the Project pertains to habitat restoration and fish passage in the area, it would not change air traffic patterns, restrict emergency access to the study area (due to the rural nature of the Project area), or conflict with local or regional alternative transportation policies (as the purpose of the Project is unrelated to these policies). Therefore, those criteria are not analyzed further.

17.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect effects on transportation from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

17.3.3.1 No Action Alternative

Under the No Action Alternative, there would be no change to the transportation or traffic conditions in the Project area since no new construction, operation, or maintenance activities would occur under the No Action Alternative, and there is currently very little traffic within the Project area.

CEQA Conclusion

There would be **no impacts** to transportation under the No Action Alternative without implementation of the Project. Therefore, there would be no adverse effects that:

- Increase traffic substantially in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)

17.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

It is estimated that a maximum of 202 construction personnel would work in the Project area during one week. More typical numbers of personnel during the busiest construction duration, July and August, would range from 150 to 200 personnel for one construction season. Construction personnel would travel to the Project area in time for their regularly scheduled shift, starting at 7 a.m. and ending at 6 p.m. six days a week, then personnel would leave the area for the evening. The Project area would be accessed via the East Alternative haul route — I-5 using the Old River Road exit, CR 117, CR 16 (east), and then approaching the Yolo Bypass east levee crown maintenance road. Figure 17-1 shows the proposed East Alternative haul route.

During construction, materials would be imported from various locations in the surrounding region, up to approximately 65 miles away from the site. More specifically, large materials, such as riprap and rock slope protection (RSP), would be obtained primarily from the Parks Bar Quarry, located in Yuba County to the northeast. Materials could be stored within the Project area prior to installation or ordered from the quarry site on a continuous basis for the duration of the riprap and RSP installation. Under the latter option, more materials would need to be brought in daily by dump truck; therefore, this analysis conservatively reviews the anticipated truck volume using this materials delivery approach. Alternative 1 would require a maximum of 626 three-axle dump trucks per day one week of the 28-week construction period. Materials would be assumed to be delivered constantly throughout the standard work day using the East Alternative haul route. This haul route has been identified as using major highway and arterial roadways, including SRs 20, 70, 99, and I-5, prior to accessing the Project area via the local roads.

Other activities, such as cement mixing, pumping, excavation, and clearing, are expected to occur during limited and temporary portions of the construction timeline. They would occur either within the Project area as part of construction activities or would occur off site and would be transported to the Project area in a limited number of trips. Offsite trips to the Project area for materials other than the large rocks, riprap, and RSP would be minor and limited.

Spoils generated during construction and sediment removal that would occur for the duration of the project would be disposed of within two miles of the Project area. For Alternative 1, the spoils site would be located to the east of the Yolo Bypass and west of the Sacramento River.

The Project would not alter any land uses in a way that would result in a permanent increase in traffic levels in the immediate surrounding area. The Project area would continue to serve as a flood relief area along the Sacramento River and as a natural preserve area for nearby wildlife.

17.3.3.2.1 Impact TRAN-1: Construction Personnel Traffic

Most construction personnel would utilize private vehicles to access the Project area via the East Alternative route as the area is not generally accessible by transit or other non-motorized modes

of transportation. In Yolo County, the peak period of travel during a typical weekday is defined as between 7 a.m. to 9 a.m. and from 4 p.m. to 6:30 p.m. (Yolo County 2010). Construction personnel would mostly arrive at and depart from the Project area during off-peak travel hours (i.e., before 7 a.m. and after 6 p.m.) when the roadway level of service and traffic volumes would be lower than peak traffic conditions. Currently, nearby local roadways near the Project area experience little traffic, whereas highways such as I-5 operate at an acceptable LOS during the peak travel hour. Traffic to nearby local and regional roadways from construction personnel would not be expected to substantially encroach upon the peak travel periods in the region because personnel would arrive at and depart from the Project area during off-peak travel periods and would be traveling on roadways operating at an acceptable LOS.

This conclusion was determined by assessing the LOS along affected roadway segments and determining if the additive personnel traffic as a result of construction would exceed the LOS standards identified by Caltrans and Yolo County. The existing LOS is expected to be maintained during peak traffic periods since construction personnel traffic would avoid these times of day.

CEQA Conclusion

This impact would be **less than significant** because construction personnel associated with Alternative 1 would not be expected to substantially encroach upon the peak travel periods in the region.

17.3.3.2.2 Impact TRAN-2: Construction Events and Related Traffic

Alternative 1 would require a total of 626 three-axle dump truck trips per day during one week of the 28-week construction period, which is the equivalent of approximately 63 truck trips per hour (31 inbound and 31 outbound), during the riprap and RSP installation portion of the Project. Materials would be hauled from the Parks Bar Quarry in Yuba County via major highway and arterial roadways, including SRs 20, 70, 99, and I-5, prior to accessing local roadways near the Project area.

The additional 63 hourly trips, or approximately 31 trips in each direction during the rock and riprap hauling period, would occur on the aforementioned major highways that currently operate at an overall acceptable level of service. These trips are an estimate based on the uniform arrival and departure of vehicles to and from the Project site and are anticipated to use the aforementioned major highways to access the Project site. As the average number of hourly trips would be greater than 50 trips, a potential impact on these highway segments could occur even though the level of service on the study roadways is currently acceptable. A potential impact could occur because the level of hourly traffic (approximately one vehicle per minute) would reach the threshold where traffic impacts would be expected, especially during peak travel times such as the a.m. and p.m. commute periods. As such, the addition of these construction vehicles using the currently assumed schedule would potentially exacerbate or introduce additional congestion to nearby highway segments.

Construction vehicles may occasionally slow traffic due to their size and lower typical speeds or when vehicles would need to make wider turns at intersections. However, local roadways that would experience the bulk of the construction vehicle traffic in terms of speed effects currently experience low traffic volumes due to the rural land use and nature of the surrounding area.

Additionally, construction vehicles and equipment would operate in a similar fashion to other agricultural vehicles and equipment that currently use nearby roads. Bicycles (especially on designated bicycle routes), public transportation routes operating nearby, and other general-purpose traffic could be slowed temporarily during materials hauling activities. However, the number of construction vehicles required for such activities would not be substantial. Construction vehicles would heed existing posted speed limits and safety guidelines to ensure hauling does not impede traffic flow. Increases in construction vehicle traffic on local roadways would be temporary and would not be anticipated to exceed the LOS standard applicable to unincorporated portions of Yolo County; volumes on the nearby local roadways are low due to the rural nature of the area. During the construction phase of the project, it is not expected that the project would require continuous road or lane closures in the surrounding area.

CEQA Conclusion

This impact would be **significant** because traffic associated with construction of Alternative 1 would potentially introduce congestion to nearby highway facilities due to the amount of expected hourly truck trips as a result of riprap and RSP hauling.

Mitigation Measure MM-TRAN-3: Identify and Implement Alternative Truck Haul Scheduling

In coordination with DWR and Reclamation, the construction contractor will identify potential scheduling solutions to limit peak period travel on nearby highways or reduce the number of daily and hourly regional truck trips. These alternatives include: scheduling truck trips to occur during off-peak travel periods such as the middle of the day when traffic volumes are generally lower than the peak a.m. and p.m. periods; extending the truck haul schedule to reduce the riprap and RSP volume, and therefore the number of truck trips, being delivered daily to the construction site; and/or consideration of round-the-clock, extended weekend, or early delivery of material to allow for fewer daily truck trips to occur during the project schedule timeline.

Following coordination efforts, when the contractor has identified their preferred scheduling alternative, the proposed solution shall be implemented and reviewed on a regular basis to ensure that fewer than 50 truck trips per hour are to be generated by Project construction activities, especially during peak a.m. and p.m. travel periods (typically 7 a.m. to 9 a.m. and 4 p.m. to 6 p.m.).

Implementation of Mitigation Measure MM-TRAN-3 would ensure that the affected roadways would experience limited temporary increases of project-related traffic during all times of the daily construction shift. With the reduction in hourly and/or daily truck trips, the existing LOS for all affected facilities would be expected to maintain and not exceed LOS D or better conditions during the peak travel hours. Therefore, with these measures, the impact would be reduced to **less than significant**.

17.3.3.2.3 Impact TRAN-3: Construction Roadway Conditions

Roadways providing site access and haul operations would be affected by the increased volume and weight of construction-related vehicles continuously using them. CR 16 and the east levee crown maintenance road are unpaved roadways and would receive most construction vehicle traffic given their proximity to the Project site. This assessment considered the amount of

construction vehicle traffic expected to use nearby local roadways, especially heavier vehicles hauling materials and spoils along unpaved roads. The expected increase in use on these roadways would cause pavement degradation that would increase hazards and possible damage to other vehicles using the same roadways.

CEQA Conclusion

This impact associated with Alternative 1 would be **significant** because these roads would degrade substantially in quality due to vehicle weight and volume during material hauls and vehicle maneuvers.

Mitigation Measure MM-TRAN-1: Periodic Inspection and Minor Repair of Roadways

California Department of Water Resources (DWR) and United States Department of the Interior, Bureau of Reclamation (Reclamation) will periodically review and inspect roadway conditions along haul and construction vehicle routes, particularly unpaved roadways. Limited repairs will be made should roadway conditions deteriorate, including degradation such as aggregate loss along unpaved roads or roadway rutting.

Mitigation Measure MM-TRAN-2: Establish a Road Repair Agreement with Yolo County

DWR and Reclamation will create a road repair agreement with Yolo County and its Public Works Division prior to initiating project construction. This agreement will establish a formal understanding between the county and DWR and Reclamation regarding restoration of county roadways to pre-project conditions should the Project cause impacts in excess of typical wear and tear on roadways used by construction vehicles. Pre-project conditions will be recorded and documented before Project construction starts to establish baseline roadway conditions that repairs will be expected to meet during post-construction restoration. Road repair measures may include, but not be limited to, chip sealing and reconstruction of any disturbed road shoulders.

Implementation of the Mitigation Measures MM-TRAN-1 and MM-TRAN-2 would ensure that the affected roadways would be maintained and returned to pre-project conditions following use of construction vehicles on nearby roads and specified haul routes. With these measures, the impact would be reduced to **less than significant**.

17.3.3.2.4 Impact TRAN-4: Maintenance Related Traffic

Sediments removed during project construction would be hauled and trucked away via local roadways or temporary earth ramps and paths to other areas around the Yolo Bypass that experience low daily traffic volume. Post construction, during the 60-day sediment removal phase, Alternative 1 would require a maximum of 20 personnel and 394 truck trips per day. Similar to construction period, during the sediment removal phase, construction personnel would mostly arrive at and depart from the Project area during off-peak travel hours (i.e., before 7 a.m. and after 6 p.m.) when the roadway level of service and traffic volumes would be lower than those during peak traffic conditions. Additionally, the number of daily truck trips during the sediment removal phase will be less than the number of daily truck trips expected during the construction period. Therefore, traffic operations and impacts on local roadways during the

sediment removal phase are expected to be similar to those during the construction period, as discussed in Section 17.3.3.2.2.

Apart from traffic associated with sediment removal, the Project would not add any new onsite permanent employees. However, limited additional trips are anticipated to occur for maintenance activities after the sediment removal phase; these trips would occur primarily within the immediate local area roadways. Traffic associated with maintenance activities following the sediment removal phase is expected to be similar to existing conditions and would not substantially alter traffic and transportation conditions in the area.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with maintenance of Alternative 1 would not substantially alter traffic and transportation conditions in the area.

17.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

Under Alternative 2, an anticipated maximum of 223 construction personnel would work in the Project area during one week of the construction period. More typical numbers of personnel during the busiest duration of the Project (i.e. July and August), would range from 200 to 225 personnel for up to one construction season.

Two primary access routes have been identified for construction access and activities. The first is the East Alternative route discussed for Alternative 1. Using this access route, the Project area would be accessed via I-5 using the Old River Road exit, CR 117, CR 16 (east), and then approaching the Yolo Bypass east levee crown maintenance road. The second access route is the West Alternative route. Using this access route, the Project area would be accessed via I-5 using CR 102, CR 16 (west), CR 116A, and then approaching the Yolo Bypass west levee crown maintenance road. Figure 17-1 shows the proposed West and East Alternative haul routes.

Alternative 2 would require a total of 587 three-axle dump truck trips per day during one week of the construction period for riprap and RSP installation. Materials would be assumed to be delivered constantly throughout the standard work day, using both the East and West Alternative haul routes. These routes have been identified as using major highway and arterial roadways, including SRs 20, 70, 99, and I-5 prior to accessing the Project area via the aforementioned local roads.

Under Alternative 2, the spoils sites would be located either to the east of the Yolo Bypass and west of the Sacramento River (east site) or to the west of the Yolo Bypass around the Ridge Cut Slough (west site).

17.3.3.3.1 Impact TRAN-1: Construction Personnel Traffic

The majority of construction personnel would utilize private vehicles to access the Project area via either the East or West Alternative routes. Construction personnel would travel to the Project area using a route similar to what was described for Alternative 1 as well as the West Alternative route.

CEQA Conclusion

This impact would be **less than significant** because construction personnel associated with Alternative 2 would not be expected to substantially encroach upon the peak travel periods in the region.

17.3.3.3.2 Impact TRAN-2: Construction Events and Related Traffic

Alternative 2 would require a total of 587 three-axle dump truck trips per day during one week of the construction period, which is the equivalent of approximately 29 trucks per hour in both inbound and outbound directions, or around 59 total hourly trips, during the riprap and RSP installation portion of the Project. Materials would be hauled from the Parks Bar Quarry in Yuba County and approach the Project area via the East or West Alternative routes, depending on the construction schedule and locations of the material needs.

The additional 59 hourly truck trips would be added to roadway segments currently operating at an overall acceptable level of service. These trips during the rock and riprap hauling period are an estimate based on the uniform arrival and departure of vehicles to and from the Project site and are anticipated to use the aforementioned major highways to access the Project site. As the average number of hourly trips would be greater than 50 trips, a potential impact on these highway segments could occur even though the level of service on the study roadways is currently acceptable. A potential impact could occur because the level of hourly traffic (nearly one vehicle per minute) would reach the threshold where traffic impacts would be expected, especially during peak travel times such as the a.m. and p.m. commute periods. As such, the addition of these construction vehicles using the currently assumed schedule would potentially exacerbate or introduce additional congestion to nearby highway segments.

Vehicle traffic within the Project area associated with spoils hauling activities would be similar to Alternative 1 in terms of expected activity on public roadways.

CEQA Conclusion

This impact would be **significant** because traffic associated with construction activities with Alternative 2 would potentially introduce congestion to nearby highway facilities due to the amount of expected hourly truck trips as a result of riprap and RSP hauling.

Implementation of Mitigation Measure MM-TRAN-3 would ensure that the affected roadways would experience limited temporary increases of project-related traffic during all times of the daily construction shift. With the reduction in hourly and/or daily truck trips, the existing LOS for all affected facilities would be expected to maintain and not exceed LOS D or better conditions during the peak travel hours. Therefore, with these measures, the impact would be reduced to **less than significant**.

17.3.3.3.3 Impact TRAN-3: Construction Roadway Conditions

Roadways providing site access and haul operations would be affected by the increased volume and weight of construction-related vehicles continuously using them. In particular, CR 116A and the east and west levee crown maintenance roads are unpaved roadways and would receive substantial construction vehicle traffic given their proximity to the Project area. During material hauls and vehicle maneuvers, these roads would degrade substantially in quality due to vehicle weight and volume.

CEQA Conclusion

This impact would be **significant** because these roads would degrade substantially in quality due to vehicle weight and volume during material hauls and vehicle maneuvers associated with Alternative 2.

Implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2 would ensure that the affected roadways would be maintained and returned to pre-project conditions following use of construction vehicles on nearby roads and specified haul routes.

With the implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2, the impact would be reduced to **less than significant**.

17.3.3.3.4 Impact TRAN-4: Maintenance Related Traffic

Similar to Alternative 1, Alternative 2 would involve the following maintenance-related traffic:

- A maximum of 20 personnel and 394 truck trips per day during the 60-day sediment removal phase, and
- No new onsite permanent employees will be added. However, limited additional trips are anticipated to occur for maintenance activities after the sediment removal phase; these trips would occur primarily within the immediate local area roadways.

Therefore, vehicle traffic within the Project area associated with post-construction maintenance activities would be similar to Alternative 1 in terms of expected activity on public roadways.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with maintenance of Alternative 2 would not substantially alter traffic and transportation conditions in the area.

17.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

Under Alternative 3, an anticipated maximum of 277 construction personnel would work in the Project area during one week of the construction period. More typical numbers of personnel during the busiest duration of the project (i.e. July and August) would range from 184 to 223 personnel for up to one construction season.

The primary access route identified for construction access and activities for this alternative is the West Alternative route. The Project area would be accessed via I-5 using CR 102, CR 16 (west), CR 116A, and then approaching the Yolo Bypass west levee crown maintenance road. Figure 17-1 shows the proposed West Alternative haul route.

Alternative 3 would require a total of 471 three-axle dump truck trips per day during one week of the construction period during riprap and RSP installation. Materials would be assumed to be delivered constantly throughout the standard work day using the West Alternative haul route.

Under Alternative 3, the spoils sites would be located to the west of the Yolo Bypass near the Ridge Cut Slough.

17.3.3.4.1 Impact TRAN-1: Construction Personnel Traffic

Most construction personnel would utilize private vehicles to access the Project area via the West Alternative route. Construction personnel would travel to the Project area using the West Alternative Route, similar to what was described for Alternative 2.

CEQA Conclusion

This impact would be **less than significant** because construction personnel associated with Alternative 3 would not be expected to substantially encroach upon the peak travel periods in the region.

17.3.3.4.2 Impact TRAN-2: Construction Events and Related Traffic

Alternative 3 would require a total of 471 three-axle dump truck trips per day during one week of the construction period, which is the equivalent of approximately an additional 24 trucks per hour in both inbound and outbound directions, or around 47 total hourly trips, during the riprap and RSP installation portion of the Project. Materials would be hauled from the Parks Bar Quarry and approach the Project area via the West Alternative route.

The existing LOS is not expected to be exceeded because all affected facilities operate at LOS D or better during the peak travel hour and less than 50 peak hour trips would be added during the construction timeline. Construction vehicle traffic associated with hauling and materials would be anticipated to blend in with existing traffic flow in the immediate area when arriving or departing the Project area, particularly upon reaching the higher volume county roads and highways.

Vehicle traffic within the Project area associated with spoils hauling activities would be similar to Alternative 1 in terms of expected activity on public roadways.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with construction activities with Alternative 3 would not substantially alter traffic and transportation conditions in the area.

17.3.3.4.3 Impact TRAN-3: Construction Roadway Conditions

CR 116A and the west levee crown maintenance road are unpaved roadways and would receive most construction vehicle traffic under Alternative 3 given their proximity to the Project area. During material hauls and vehicle maneuvers, these roads would degrade substantially in quality.

CEQA Conclusion

This impact would be **significant** because these roads would degrade substantially in quality due to vehicle weight and volume during material hauls and vehicle maneuvers associated with Alternative 3.

Implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2 would ensure that the affected roadways would be maintained and returned to pre-project conditions following use of construction vehicles on nearby roads and specified haul routes.

With the implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2, the impact would be reduced to **less than significant**.

17.3.3.4.4 Impact TRAN-4: Maintenance Related Traffic

Sediments removed during project construction would be hauled and trucked away via local roadways or temporary earth ramps and paths to other areas around the Yolo Bypass that experience low daily traffic volume. Post construction, during the 60-day sediment removal phase, Alternative 3 would require a maximum of 20 personnel and 394 truck trips per day. Similar to construction period, during the sediment removal phase, construction personnel would mostly access the Project area during off-peak period when roadway operations would be better than those during the peak traffic period. Additionally, the number of daily truck trips during the sediment removal phase will be less than the number of daily truck trips expected during the construction period. Therefore, traffic operations and impacts on local roadways during the sediment removal phase are expected to be similar to those during the construction period, as discussed in Section 17.3.3.4.2.

Apart from traffic associated with sediment removal, the Project would not add any new onsite permanent employees. However, limited additional trips are anticipated to occur for maintenance activities after the sediment removal phase; these trips would occur primarily within the immediate local area roadways. Traffic associated with maintenance activities following the sediment removal phase is expected to be similar to existing conditions and would not substantially alter traffic and transportation conditions in the area.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with maintenance of Alternative 3 would not substantially alter traffic and transportation conditions in the area.

17.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

Under Alternative 4, an anticipated maximum of 363 construction personnel would work in the Project area during one week of the construction period. More typical numbers of personnel during the busiest duration of the project would range from 280 to 309 personnel (i.e. June through August) for up to one construction season.

Alternative 4 would construct channel access in the western portion of Fremont Weir into the Yolo Bypass. The primary access route identified for construction access and activities for this alternative is the West Alternative route. Figure 17-1 shows the proposed West Alternative haul route.

Alternative 4 would require a total of 1,031 three-axle dump truck trips per day during one week of the construction period. Materials would be assumed to be delivered constantly throughout the standard work day using the West Alternative haul route. Additional access to the northern and southern water control structure area improvements portion of the Project area would be provided by CR 22 and lightly used local levee crown maintenance roads. A limited number of dump trucks would be used in this area prior to work in the main portion of the Project area.

Under Alternative 4, the spoils site would be located to the west of the Yolo Bypass near the Ridge Cut Slough.

17.3.3.5.1 Impact TRAN-1: Construction Personnel Traffic

The majority of construction personnel would utilize private vehicles to access the Project area via the West Alternative route. Construction personnel would travel to the Project area similar to what was described for Alternative 3.

CEQA Conclusion

This impact would be **less than significant** because construction personnel associated with Alternative 4 would not be expected to substantially encroach upon the peak travel periods in the region.

17.3.3.5.2 Impact TRAN-2: Construction Events and Related Traffic

Alternative 4 would require a total of 1,031 three-axle dump truck trips per day during one week of the construction period, which is equivalent to approximately an additional 52 truck trips per hour in both inbound and outbound directions, or around 103 total hourly trips, during the riprap and RSP installation portion of the Project. Materials would be hauled from the Parks Bar Quarry and approach the Project area via the West Alternative route. The additional 103 hourly trips during rock, riprap, and RSP hauling would be added to roadway segments currently operating at

an overall acceptable level of service. As the average number of hourly trips would be greater than 50 trips, a potential impact on these highway segments could occur even though the level of service on the study roadways is currently acceptable. A potential impact could occur because the level of hourly traffic (more than one vehicle per minute) would reach the threshold where traffic impacts would be expected, especially during peak travel times such as the a.m. and p.m. commute periods. As such, the addition of these construction vehicles using the currently assumed schedule would potentially exacerbate or introduce additional congestion to nearby highway segments.

Vehicle traffic within the Project area associated with spoils hauling activities would be similar to Alternative 1 in terms of expected activity on public roadways.

CEQA Conclusion

This impact would be **significant** because traffic associated with construction activities with Alternative 4 would potentially introduce congestion to nearby highway facilities due to the amount of expected hourly truck trips as a result of riprap and RSP hauling.

Implementation of Mitigation Measure MM-TRAN-3 would ensure that the affected roadways would see limited temporary increases of project-related traffic during all times of the daily construction shift. With the reduction in hourly and/or daily truck trips, the existing LOS for all affected facilities would be expected to maintain and not exceed LOS D or better conditions during the peak travel hours. Therefore, with these measures, the impact would be reduced to **less than significant**.

17.3.3.5.3 Impact TRAN-3: Construction Roadway Conditions

CR 116A and the west levee crown maintenance road are unpaved roadways and would receive most construction vehicle traffic under Alternative 4 given their proximity to the site. During material hauls and vehicle maneuvers, these roads would degrade substantially in quality.

CEQA Conclusion

This impact would be **significant** because these roads would degrade substantially in quality due to vehicle weight and volume during material hauls and vehicle maneuvers associated with Alternative 4.

Implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2 would ensure that the affected roadways would be maintained and returned to pre-project conditions following use of construction vehicles on nearby roads and specified haul routes. With the implementation of MM-TRAN-1 and MM-TRAN-2, the impact would be reduced to **less than significant**.

17.3.3.5.4 Impact TRAN-4: Maintenance Related Traffic

Sediments removed during project construction would be hauled and trucked away via local roadways or temporary earth ramps and paths to other areas around the Yolo Bypass that experience low daily traffic volume. Post construction, during the 30-day sediment removal phase, Alternative 4 would require a maximum of 20 personnel and 399 truck trips per day. Similar to construction period, during the sediment removal phase, construction personnel would

mostly access the Project area during off-peak period when roadway operations would be better than those during the peak traffic period. Additionally, the number of daily truck trips during the sediment removal phase will be less than the number of daily truck trips expected during the construction period. Therefore, traffic operations and impacts on local roadways during the sediment removal phase are expected to be similar to those during the construction period, as discussed in Section 17.3.3.5.2.

Apart from traffic associated with sediment removal, the Project would not add any new onsite permanent employees. However, limited additional trips are anticipated to occur for maintenance activities after the sediment removal phase; these trips would occur primarily within the immediate local area roadways. Traffic associated with maintenance activities following the sediment removal phase is expected to be similar to existing conditions and would not substantially alter traffic and transportation conditions in the area.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with maintenance of Alternative 4 would not substantially alter traffic and transportation conditions in the area.

17.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish by using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

Under Alternative 5, an anticipated maximum of 358 construction personnel would work in the Project area during one week of the construction period. More typical numbers of personnel during the busiest duration of the project would range from 275 to 330 personnel, during the months of May through August, for up to two construction seasons. The second season would be more limited and would require around 40 to 50 workers. Both the West and East Alternative routes would be used for construction access and activities for this alternative. Figure 17-1 shows both the proposed West and East Alternative haul routes.

Alternative 5 would require a total of 629 three-axle dump trucks per day during one week of the construction period. Materials would be assumed to be delivered constantly throughout the standard work day using both alternative haul routes.

For Alternative 5, the spoils sites would be located either to the east of the Yolo Bypass and west of the Sacramento River (east site) or to the west of the Yolo Bypass around the Ridge Cut Slough (west site). Additional spoils would be incurred as part of this alternative due to the large amount of excavation that would occur within the FWWA but would not require more haul trips along public roadways.

17.3.3.6.1 Impact TRAN-1: Construction Personnel Traffic

The majority of construction personnel would utilize private vehicles to access the Project area via both East and West Alternative routes. Construction personnel would travel to the Project area similar to what was described for Alternative 2.

CEQA Conclusion

This impact would be **less than significant** because construction personnel associated with Alternative 5 would not be expected to substantially encroach upon the peak travel periods in the region.

17.3.3.6.2 Impact TRAN-2: Construction Events and Related Traffic

Alternative 5 would require a total of 629 three-axle dump truck trips per day during one week of the construction period, which is the equivalent of approximately an additional 31 trips per hour in both inbound and outbound directions, or around 63 total hourly trips, during the riprap and RSP installation portion of the Project. Materials would be hauled from the Parks Bar Quarry and approach the Project area via the West Alternative route. The additional 63 hourly trips, as part of the rock and riprap hauling, would be added to roadway segments currently operating at an overall acceptable level of service. As the average number of hourly trips would be greater than 50 trips, a potential impact on these highway segments could occur even though the level of service on the study roadways is currently acceptable. A potential impact could occur because the level of hourly traffic (nearly one vehicle per minute) would reach the threshold where traffic impacts would be expected, especially during peak travel times such as the a.m. and p.m. commute periods. As such, the addition of these construction vehicles using the currently assumed schedule would potentially exacerbate or introduce additional congestion to nearby highway segments.

Vehicle traffic within the Project area associated with spoils hauling activities would be similar to Alternative 2 in terms of expected activity on public roadways.

CEQA Conclusion

This impact would be **significant** because traffic associated with construction activities with Alternative 5 would potentially introduce congestion to nearby highway facilities due to the amount of expected hourly truck trips as a result of riprap and RSP hauling.

Implementation of Mitigation Measure MM-TRAN-3 would ensure that the affected roadways would see limited temporary increases of project-related traffic during all times of the daily construction shift. With the reduction in hourly and/or daily truck trips, the existing LOS for all affected facilities would be expected to maintain and not exceed LOS D or better conditions during the peak travel hours. Therefore, with these measures, the impact would be reduced to **less than significant**.

17.3.3.6.3 Impact TRAN-3: Construction Roadway Conditions

CR 116A and the east and west levee crown maintenance roads are unpaved roadways and would receive most construction vehicle traffic under Alternative 5 given their proximity to the

site. During material hauls and vehicle maneuvers, these roads would degrade substantially in quality.

CEQA Conclusion

This impact would be **significant** because these roads would degrade substantially in quality due to vehicle weight and volume during material hauls and vehicle maneuvers associated with Alternative 5.

Implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2 would ensure that the affected roadways would be maintained and returned to pre-project conditions following use of construction vehicles on nearby roads and specified haul routes.

With the implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2, the impact would be reduced to **less than significant**.

17.3.3.6.4 Impact TRAN-4: Maintenance Related Traffic

Sediments removed during project construction would be hauled and trucked away via local roadways or temporary earth ramps and paths to other areas around the Yolo Bypass that experience low daily traffic volume. Post construction, during the 30-day sediment removal phase, Alternative 5 would require a maximum of 20 personnel and 394 truck trips per day. Similar to construction period, during the sediment removal phase, construction personnel would mostly access the Project area during off-peak period when roadway operations would be better than those during the peak traffic period. Additionally, the number of daily truck trips during the sediment removal phase will be less than the number of daily truck trips expected during the construction period. Therefore, traffic operations and impacts on local roadways during the sediment removal phase are expected to be similar to those during the construction period, as discussed in Section 17.3.3.6.2.

Apart from traffic associated with sediment removal, the Project would not add any new onsite permanent employees. However, limited additional trips are anticipated to occur for maintenance activities after the sediment removal phase; these trips would occur primarily within the immediate local area roadways. Traffic associated with maintenance activities following the sediment removal phase is expected to be similar to existing conditions and would not substantially alter traffic and transportation conditions in the area.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with maintenance of Alternative 5 would not substantially alter traffic and transportation conditions in the area.

17.3.3.6.5 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of I-80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact TRAN-1: Construction Personnel Traffic

Access to the Tule Canal floodplain improvements would follow the same routes as described for the southern water control structure under Alternative 4. Alternative access is also available via CR 102, County Road 28H, and minor unpaved roadways continuing from CR 28H. Construction personnel would utilize private vehicles to access the Tule Canal floodplain improvements area.

CEQA Conclusion

This impact would be **less than significant** because construction personnel associated with the improvements would not be expected to substantially encroach upon the peak travel periods in the region.

Impact TRAN-2: Construction Events and Related Traffic

As described in Section 2.8.1.7, an additional 1,053,970 cubic yards of material as part of the Tule Canal floodplain improvements would be excavated and considered excess. Channel construction would also be considered part of these improvements.

At a program level, the improvements likely would require dump truck trips similar to the other Alternative 5 improvements and construction activities as a result of the need to excavate spoils and construct new channels, which would require regional truck travel for riprap and RSP delivery and installation. Materials would be hauled from the Parks Bar Quarry and approach the area via the aforementioned access routes. The number of additional construction trips because of this activity likely would reach the threshold where traffic impacts would be expected, especially during peak travel times such as the a.m. and p.m. commute periods. As such, the addition of these construction vehicles using the currently assumed schedule would potentially exacerbate or introduce additional congestion to nearby highway segments.

CEQA Conclusion

This impact would be **significant** because traffic associated with construction activities with the Tule Canal floodplain improvements would potentially introduce congestion to nearby highway facilities due to the amount of additional hourly truck trips as a result of riprap and RSP hauling.

Implementation of Mitigation Measure MM-TRAN-3 would ensure that the affected roadways would see limited temporary increases of project-related traffic during all times of the daily construction shift. With the reduction in hourly and/or daily truck trips, the existing LOS for all affected facilities would be expected to maintain and not exceed LOS D or better conditions during the peak travel hours. Therefore, with these measures, the impact would be reduced to **less than significant**.

Impact TRAN-3: Construction Roadway Conditions

Access to the Tule Canal Floodplain Improvements portion of the Project area would be provided by CR 22 and lightly used local levee crown maintenance roads. A limited number of dump trucks would be used prior to work within the main portion of the Project area. This

limited number of trips would be lower than the number of trips associated with construction of project-level improvements.

CR 22 and local levee maintenance roads are unpaved roadways and would receive most construction vehicle traffic in the Tule Canal Floodplain Improvements Project area. During material hauls and vehicle maneuvers, these roads would degrade substantially in quality.

CEQA Conclusion

This impact would be **significant** because these roads would degrade substantially in quality due to vehicle weight and volume during material hauls and vehicle maneuvers associated with the program-level improvements.

Implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2 would ensure that the affected roadways will be maintained and returned to pre-project conditions following use of construction vehicles on nearby roads and specified haul routes.

With these measures, the impact would be reduced to **less than significant**.

Impact TRAN-4: Maintenance Related Traffic

The floodplain improvements along Tule Canal is expected to have minimal or no vehicle traffic associated with post-construction maintenance activities in the Project area.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with maintenance of floodplain improvements along Tule Canal would not substantially alter traffic and transportation conditions in the area.

17.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, West Side Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

Under Alternative 6, an anticipated maximum of 414 construction personnel would work in the Project area during one week of the construction period. More typical numbers of personnel during the busiest duration of the project (i.e. July and August) would range from 350 to 400 personnel for up to one construction season. The West Alternative route would be used for construction access and activities for this alternative.

Alternative 6 would necessitate a total of 733 three-axle dump truck trips per day during one week of the construction period. Materials would be delivered throughout the standard work day using the West Alternative haul route. Figure 17-1 shows the proposed West Alternative haul route.

For Alternative 6, the spoils sites would be located to the west of the Yolo Bypass around the Ridge Cut Slough (west site). Additional spoils would be incurred as part of this alternative due

to the additional expected flow traveling into the Yolo Bypass, but the removal of this additional sediment would not require more haul trips along public roadways.

17.3.3.7.1 Impact TRAN-1: Construction Personnel Traffic

The majority of construction personnel would utilize private vehicles to access the Project area via the West Alternative route. Construction personnel would travel to the Project area similar to what was described for Alternative 3.

CEQA Conclusion

This impact would be **less than significant** because construction personnel associated with Alternative 6 would not be expected to substantially encroach upon the peak travel periods in the region.

17.3.3.7.2 Impact TRAN-2: Construction Events and Related Traffic

Alternative 6 would require a total of 733 three-axle dump truck trips per day during one week of the construction period, which is the equivalent of approximately an additional 37 trips per hour in both inbound and outbound directions, or around 73 total hourly trips, during the riprap and RSP installation portion of the Project. Materials would be hauled from the Parks Bar Quarry and approach the Project area via the West Alternative route.

The additional 73 hourly trips during riprap and RSP hauling would be added to roadway segments currently operating at an overall acceptable level of service. However, as the average number of hourly trips would be greater than 50 trips, a potential impact on these highway segments could occur even though the level of service on the study roadways is currently acceptable. A potential impact could occur because the level of hourly traffic (more than one vehicle per minute) would reach the threshold where traffic impacts would be expected, especially during peak travel times such as the a.m. and p.m. commute periods. As such, the addition of these construction vehicles using the currently assumed schedule would potentially exacerbate or introduce additional congestion to nearby highway segments.

Vehicle traffic within the Project area associated with spoils hauling activities would be similar to Alternative 1 in terms of expected activity on public roadways and would not substantially alter traffic and transportation conditions in the area.

CEQA Conclusion

This impact would be **significant** because traffic associated with construction activities with Alternative 6 would potentially introduce congestion to nearby highway facilities due to the amount of expected hourly truck trips as a result of riprap and RSP hauling.

Implementation of Mitigation Measure MM-TRAN-3 would ensure that the affected roadways would see limited temporary increases of project-related traffic during all times of the daily construction shift. With the reduction in hourly and/or daily truck trips, the existing LOS for all affected facilities would be expected to maintain and not exceed LOS D or better conditions during the peak travel hours. Therefore, with these measures, the impact would be reduced to **less than significant**.

17.3.3.7.3 Impact TRAN-3: Construction Roadway Conditions

CR 116A and the west levee crown maintenance road are unpaved roadways and expected to receive most construction vehicle traffic under this alternative given their proximity to the Project area. During material hauls and vehicle maneuvers, these roads would degrade substantially in quality.

CEQA Conclusion

This impact would be **significant** because these roads would degrade substantially in quality due to vehicle weight and volume during material hauls and vehicle maneuvers associated with Alternative 6.

Implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2 would ensure that the affected roadways would be maintained and returned to pre-project conditions following use of construction vehicles on nearby roads and specified haul routes.

With the implementation of Mitigation Measures MM-TRAN-1 and MM-TRAN-2, the impact would be reduced to **less than significant**.

17.3.3.7.4 Impact TRAN-4: Maintenance Related Traffic

Sediments removed during project construction would be hauled and trucked away via local roadways or temporary earth ramps and paths to other areas around the Yolo Bypass that experience low daily traffic volume. Post construction, during the 60-day sediment removal phase, Alternative 6 would require a maximum of 20 personnel and 788 truck trips per day. Similar to construction period, during the sediment removal phase, construction personnel would mostly access the Project area during off-peak period when roadway operations would be better than those during the peak traffic period. Additionally, the number of daily truck trips during the sediment removal phase will be less than the number of daily truck trips expected during the construction period. Therefore, traffic operations and impacts on local roadways during the sediment removal phase are expected to be similar to those during the construction period, as discussed in Section 17.3.3.7.2.

Apart from traffic associated with sediment removal, the Project would not add any new onsite permanent employees. However, limited additional trips are anticipated to occur for maintenance activities after the sediment removal phase; these trips would occur primarily within the immediate local area roadways. Traffic associated with maintenance activities following the sediment removal phase is expected to be similar to existing conditions and would not substantially alter traffic and transportation conditions in the area.

CEQA Conclusion

This impact would be **less than significant** because traffic associated with maintenance of Alternative 6 would not substantially alter traffic and transportation conditions in the area.

17.3.4 Summary of Impacts

Table 17-3 below provides a summary of the identified impacts to transportation within the Project.

Table 17-3. Summary of Impacts and Mitigation Measures –Transportation

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Impact TRAN-1: Construction personnel traffic	No Action	NI	---	NI
	All Action Alternatives	LTS	---	LTS
Impact TRAN-2: Construction events and related traffic	No Action	NI	---	NI
	1, 2, 4-6	S	MM-TRAN-3	LTS
	3	LTS	---	LTS
Impact TRAN-3: Construction roadway conditions	No Action	NI	---	NI
	All Action Alternatives	S	MM-TRAN-1, MM-TRAN-2	LTS
Impact TRAN-4: Maintenance related traffic	No Action	NI	---	NI
	1	LTS	---	LTS
	2-6	LTS	---	LTS

Key: LTS = less than significant; NI = no impact; S = significant

17.4 Cumulative Impacts Analysis

This section describes the cumulative effects analysis for transportation. Section 3.3, *Cumulative Impacts*, presents an overview of the cumulative effects analysis, including the methodology and the projects, plans, and programs considered in the cumulative effects analysis.

17.4.1 Methodology

This evaluation of cumulative effects for transportation considers the effects of the Project and how they may combine with the effects of other past, present, and future projects or actions to create significant impacts on transportation. The area of analysis for these cumulative effects includes both the Yolo Bypass area and the larger Sacramento River system. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

This cumulative impacts' analysis utilizes the project analysis approach described in detail in Section 3.3, *Cumulative Impacts*. The cumulative projects included in this analysis are:

- Fremont Weir Adult Fish Passage Modification Project – The project modified the existing Fremont Weir fish ladder to provide improved upstream passage for salmonids and sturgeon, improved channel and other fish passage conditions, and removed and replaced an earthen agricultural road crossing with a structure that would improve fish passage through the Tule Canal. The project has been constructed and completed.
- Wallace Weir Fish Rescue Facility Project – The Wallace Weir water control structure was replaced with a permanent structure that will prevent migration of salmon and sturgeon into the Colusa Basin Drain. The project also includes a facility to allow for efficient trapping and relocation of fish to the Sacramento River. The project has been constructed and completed.

- Environmental Permitting for Operation and Maintenance – The permitting would operate and maintain the levees, channels, and flood control structures located along the Sacramento River and tributaries between Red Bluff and Rio Vista. It would also provide the long-term maintenance of the Fremont Weir Adult Fish Passage Modification Project structure.
- The Lower Elkhorn Basin Levee Setback Project is a flood control project to increase the capacity of the Yolo and Sacramento bypasses (California Natural Resources Agency 2015). The project consists of approximately seven miles of setback levees in the Lower Elkhorn Basin along the east side of the Yolo Bypass and the north side of the Sacramento Bypass. The project would remove all or portions of the existing levees that would be set back, remove portions of local reclamation district cross levees, and improve or relocate related infrastructure (California Natural Resources Agency 2015). The Notice of Intent and NOP for the EIS/EIR were released in September 2016. Construction of the selected alternative is expected to begin in 2020.

17.4.2 Cumulative Impacts

There are no foreseeable projects and actions that would result in any substantive cumulative transportation impacts in the Project area. The cumulative projects identified above are close to the FWWA and would potentially overlap with this Project in their use of nearby roadways, depending on the type of activity involved and project schedule timeline. However, none of the proposed cumulative projects would impose permanent shifts in traffic on roadways near the FWWA. The cumulative projects are Sacramento-San Joaquin Delta, levee, and weir construction-related programs that primarily deal with water quality, flood prevention, and fisheries concerns in the Sacramento River basin and system.

In general, these programs would be expected to utilize proper mitigation measures to prevent significant construction-related or permanent cumulative impacts. Based on the project descriptions provided, no substantive permanent transportation impacts would occur in the Project area. Therefore, the action alternatives' incremental contributions to the cumulative effects associated with transportation **would not be cumulatively considerable.**

17.5 References

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18 Air Quality and Greenhouse Gases

This chapter describes the environmental and regulatory settings of air quality and greenhouse gases (GHGs) in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) area as well as environmental consequences and mitigation as they pertain to implementation of the Project alternatives. The discussion of air quality existing conditions and the potential impacts of the project alternatives on air quality encompasses Sacramento Valley Air Basin (SVAB), including Yolo and Sutter counties. Appendix L1, *Air Quality Emission Calculations*, provides detailed emission calculations.

18.1 Environmental Setting/Affected Environment

18.1.1 Topography and Meteorology

The study area is within the boundaries of SVAB. SVAB encompasses 11 counties, including all of Shasta, Tehama, Glenn, Colusa, Butte, Sutter, Yuba, Sacramento, and Yolo; the westernmost portion of Placer County; and the northeastern half of Solano County. SVAB is bounded by North Coast Ranges on the west and Northern Sierra Nevada Mountains on the east. The intervening terrain is relatively flat.

Hot dry summers and mild rainy winters characterize the Mediterranean climate of SVAB. During the year, the temperature may range from 20 to 115 degrees Fahrenheit, with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is approximately 20 inches, and the rainy season generally occurs from November through March. The prevailing winds are moderate in strength and vary from moist clean breezes from the south to dry land flows from the north.

The mountains surrounding SVAB create a barrier to airflow, which can trap air pollutants under certain meteorological conditions. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells collect over Sacramento Valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with temperature inversions that trap pollutants near the ground.

The ozone (O_3) season (May through October) in the Sacramento Valley is characterized by stagnant morning air or light winds with the delta sea breeze arriving in the afternoon out of the southwest. Usually the evening breeze transports the airborne pollutants to the north out of the Sacramento Valley. For nearly half of the days from July to September, however, a phenomenon called the “Schultz Eddy” prevents this from occurring. Instead of allowing for the prevailing wind patterns to move north carrying the pollutants out, the Schultz Eddy causes the wind pattern to circle back to the south. Essentially, this phenomenon causes the air pollutants to be blown south. This phenomenon has the effect of exacerbating the pollution levels in the area and increases the likelihood of violating Federal or State of California (State) air quality standards.

The eddy normally dissipates around noon when the delta sea breeze arrives (Yolo-Solano Air Quality Management District [AQMD] 2007).

18.1.2 Projected Climate Trends and Associated Impacts

The projected changes in climate conditions are expected to result in a wide variety of impacts in Yolo County and the Sacramento River area. In general, estimated future climate conditions include changes to:

1. Average daily temperature
2. Extreme heat
3. Precipitation
4. Sea level and storm surge
5. Snowpack and streamflow

These projected changes are discussed in detail in the following paragraphs.

18.1.2.1 Temperature

Global Climate Model data exhibit warming across California under both a low emission scenario and medium-high emission scenario (Cayan et al. 2012). While the data contain variability, there is a steady, linear increase over the 21st century (Cayan et al. 2012). The U.S. Climate Resilience Toolkit reported a similar warming trend in Yolo and Sutter counties (U.S. Federal Government 2016). Table 18-1 summarizes the projected changes in temperature in the region.

Table 18-1. Projected Changes in Average Daily Temperature Compared to Historic Average (1961 to 1990)

Region	Mid-21st Century	End of 21st Century
California[1]	+1.8 to 5.4°F	+3.6 to 9.0°F
Yolo County, California[2]	+3.4 to 4.6°F	+5.1 to 9.3°F
Sutter County, California[2]	+3.5 to 4.6°F	+5.2 to 9.3°F

Source:
[1] Cayan et al. 2012
[2] U.S. Federal Government 2016

18.1.2.2 Extreme Heat

The climate model results consistently show increases in frequency, magnitude, and duration of heat waves when compared to historical averages (1961 to 1990). Historically, extreme temperatures typically occur in July and August. With climate change, these occurrences are likely to begin in June and continue through September (Cayan at al. 2012). Table 18-2 summarizes the projected number of extreme temperature days (i.e., days with temperature above 95°F annually per the U.S. Climate Resilience Toolkit) (U.S. Federal Government 2016).

Table 18-2. Projected Changes in Extreme Temperature Days in Yolo and Sutter Counties, California

Period	Historic/Observed	Low Emission Model	High Emissions Model
Yolo County			
Historic Average (1961 to 1990)	35 days	---	---
Observed Average (2000 to 2005)	48 days	---	---
Mid-21st Century)	---	65 days	78 days
End of 21st Century)	---	77 days	113 days
Sutter County			
Historic Average (1961 to 1990)	44 days	---	---
Observed Average (2000 to 2005)	58 days	---	---
Mid-21st Century)	---	76 days	88 days
End of 21st Century)	---	87 days	122 days

Source: U.S. Federal Government 2016

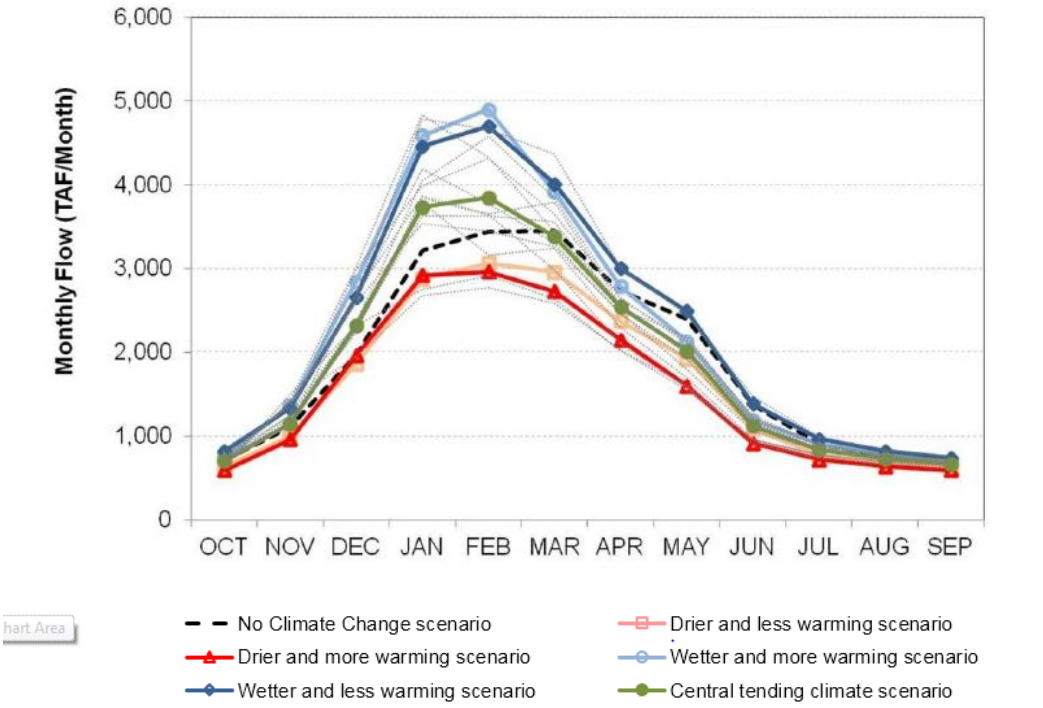
18.1.2.3 Precipitation

On average, the climate model projections show little change in total annual precipitation in California (Cayan et al. 2012). Specifically, the Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling between November and March from North Pacific storms and the prevalence of hot, dry summers (Cayan et al. 2012). In addition, past trends show a large amount of variability from month to month, year to year, and decade to decade. This high degree of variability is expected to continue in the next century (Cayan et al. 2012).

For Sacramento, several model simulations indicate a drying trend when compared to the historical average (1961 to 1990). Under the low emissions scenario, the 30-year mean precipitation is projected to be more than five percent drier by mid-21st century and 10 percent drier by late-21st century (Cayan et al. 2012). The model results showing the drying trend indicate a decline in the frequency of precipitation events but do not show a clear correlation in the precipitation intensity (Cayan et al. 2012).

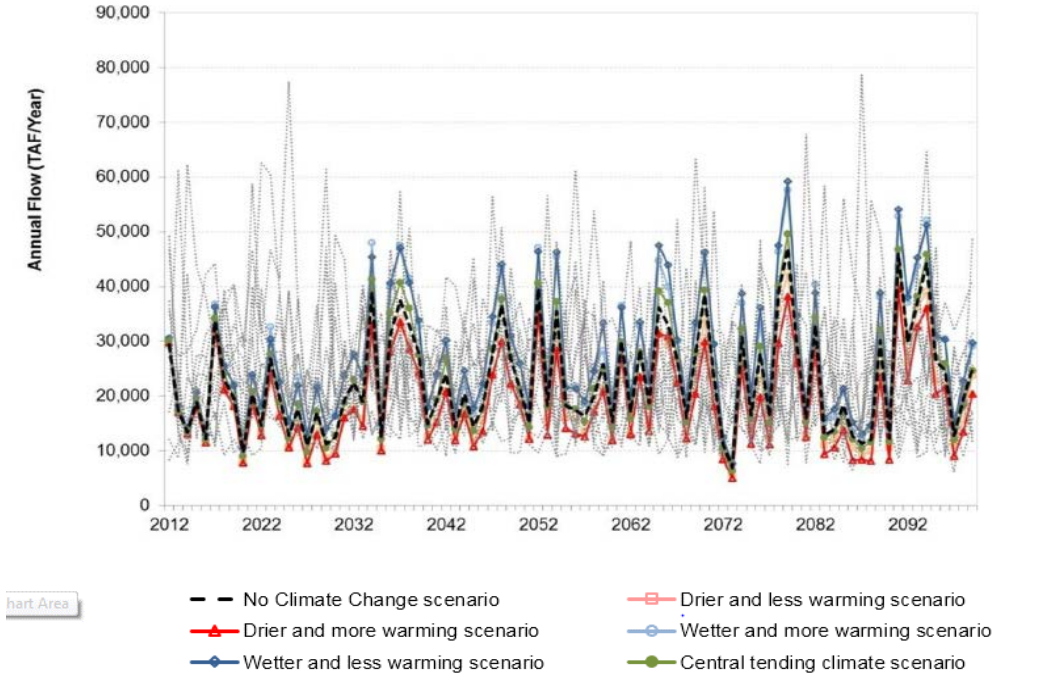
18.1.2.4 Snowpack and Streamflow

Streamflow amounts are projected to shift to more runoff in the winter and less in the spring months. This projected shift occurs because higher temperatures during winter cause more precipitation to occur as rainfall, which increases runoff and reduces snowpack. As shown in Figure 18-1, seasonal runoff shift is greater in the lower elevation Sacramento basins because the lower elevation basins are more susceptible to warming-induced changes in precipitation from snow to rain (United States Department of the Interior, Bureau of Reclamation [Reclamation] 2014).



Source: Reclamation 2014; Key: TAF/yr = thousand acre-feet per year

Figure 18-1. Projected Monthly Flows in the Sacramento Basin under Six Climate Change Scenarios



Source: Reclamation 2014; Key: TAF/yr = thousand acre-feet per year

Figure 18-2. Unimpaired Flows in the Sacramento River System under Six Climate Change Scenarios

Figure 18-2 presents an estimate of wet and dry periods in the future under the climate change scenarios. Historic observations were used to project inter-annual variability of future wet and dry periods. In Figure 18-2, the extended drought periods from 2025 to 2030 correspond to the historic drought between 1929 and 1934. The magnitude of the projected unimpaired flows differs from historical flow and the climate change scenarios.

In California, snow water equivalent (the amount of water held in a volume of snow) is projected to decrease 16 percent by 2035, 34 percent by 2070, and 57 percent by 2099, as compared to measurements between 1971 and 2000 (Melillo et al. 2014). By the end of the century, late spring streamflow could decline by up to 30 percent (California Energy Commission 2011).

18.1.2.5 Stream Water Temperature

Storage levels in Shasta Lake at the end of April are a key indicator of water temperatures in the Sacramento River during the warm season. When Shasta Lake storage at the end of April is less than 3,800,000 acre-feet, management of water temperatures in the Sacramento River during the warm season months becomes increasingly difficult. Under the central tending climate scenario, the frequency of reduced cold-water pool is expected to increase on average by five percent overall during the 21st century (Reclamation 2014).

18.1.2.6 Sea Level Rise

National Research Council Study (2012) has estimated seal level rise along the west coast of United States to be 5.7 inches (+6.0/-4.0) by 2030 relative to sea levels in 2000 and 36.2 inches (+29.4/-19.5) by 2100 relative to 2000. This rise in sea level is expected to increase water levels in the Sacramento and San Joaquin Delta (Delta) similarly. Additionally, the increase in water levels in the Delta will also affect salinity in Delta. Table 18-3 summarizes projected salinity increase at the confluence of the Sacramento River and the Delta under two scenarios.

Table 18-3. Projected Salinity Increase at the Confluence of the Sacramento River and the Delta

Scenario	Percentage increase from no climate change (2012–2040)	Percentage increase from no climate change (2041–2070)	Percentage increase from no climate change (2071–2099)
Central tending climate scenario	11%	28%	83%
Average of California's Climate Action Team scenarios	23%	56%	88%

18.1.3 Criteria Air Pollutants

The United States Environmental Protection Agency (USEPA) regulates ambient concentrations of seven common pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), O_3, particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). Called "criteria" pollutants, various human health and environmentally based criteria set permissible levels for these pollutants.

18.1.3.1 Carbon Monoxide (CO)

CO is a colorless, odorless gas that is highly toxic. It is formed by the incomplete combustion of fuels. In the SVAB, most CO emissions are from mobile sources (76 percent), with residential fuel combustion (12 percent) and managed burning and disposal (10 percent) being the next two

largest sources of CO emissions (California Air Resources Board [CARB] 2013). Exposure to CO can reduce the body's ability to carry oxygen. CO exposure can aggravate heart disease, decrease exercise tolerance in people with peripheral vascular disease and lung disease, impair central nervous system functions, and possibly increase risk to fetuses (CARB 2009a).

18.1.3.2 Lead (Pb)

Lead is a soft and chemically resistant metal that is naturally found in the environment. It has historically been found in motor vehicles and industrial sources, which led to the USEPA's efforts to remove Pb from gasoline in 1980 and beyond. The aviation sector continues to be a major source of Pb emissions from piston aircraft, as are certain industrial sectors like ore and metals processing (USEPA 2016a).

In addition to Pb exposure through air, Pb can also accumulate in soils and other sediments, especially in urban environments where it would have accumulated from years of exposure from leaded gasoline. Lead can be resuspended into the air when contaminated soil is disturbed. Lead exposure can cause impaired blood formation and nerve conduction. Symptoms of Pb exposure include fatigue, anxiety, short-term memory loss, depression, weakness in the extremities, and learning disabilities in children (CARB 2009b).

Inorganic Pb was identified as a toxic air contaminant (TAC) by California in 1997. Unlike other TACs identified by the state, Pb is unique because 1) children are particularly susceptible to the effects of Pb exposure, 2) the chronic noncancer effects are related to blood Pb levels as opposed to ambient air concentrations, and 3) no threshold level[1] of exposure for adverse health effects has been determined. Because of the unique challenges faced with the health effects of Pb, CARB prepared *Risk Management Guidelines for New, Modified, or Existing Sources of Lead* (2001).

18.1.3.3 Nitrogen Dioxide (NO_2)

NO_2 is a reddish-brown to dark brown reactive gas that is formed during high-temperature combustion processes such as those occurring in trucks, cars, and power plants. The sum of nitric oxide and NO_2 is commonly called nitrogen oxides (NO_x), but other oxides like nitrous oxide and nitric acid are also classified as NO_x. While the USEPA's National Ambient Air Quality Standard (NAAQS) covers all NO_x, NO_2 is the component of greatest interest and is the indicator pollutant for this family.

In the presence of sunlight, NO_2 and other NO_x react with volatile organic compounds (VOCs) to form O_3. Additionally, NO_2 can react with ammonia, moisture, and other compounds to form $PM_{2.5}$. Besides being a precursor pollutant to O_3 and $PM_{2.5}$ formation, NO_2 is also regulated as criteria pollutant because exposure is associated with respiratory illness and impaired lung functioning (CARB 2011a; USEPA 2016b).

Short-term exposure (i.e., 1-hour averaging period) to NO_2 can worsen the effect of allergens in allergic asthmatics and can contribute to atmospheric discoloration (i.e., yellow or brown colored hazes caused by high NO_2 concentrations). Long-term exposure (i.e., annual averaging period) can lead to increased respiratory symptoms and medication use in asthmatics, emergency room

[1] Threshold levels are levels below which no adverse health effects are expected to occur. By not having a specific threshold level, this means there is no safe level of Pb exposure.

visits for asthma in children, hospitalization for respiratory and cardiovascular disease, and premature mortality (17 California Code of Regulations [CCR] 70200).

18.1.3.4 Ozone (O_3)

O_3 is a highly reactive and unstable gas that is formed in the atmosphere through complex reactions with sunlight, NO_x, and VOCs. Hot, sunny, and calm days promote O_3 formation. CARB and the USEPA regulate ground-level O_3, which is not to be confused with stratospheric O_3. Ground-level O_3 is close to where people live, breathe, and exercise and can cause adverse health effects; stratospheric O_3 is high in the atmosphere and reduces the amount of ultraviolet light entering the earth's atmosphere, which helps protect animal and plant life.

Certain people are particularly sensitive to the effects of O_3, including people with lung disease, children, older adults, and active people. Generally, as O_3 concentrations increase, both the number of people affected and the seriousness of the health effects increase. The effects of exposure to ground-level O_3 include a cough, chest tightness, and pain upon taking a deep breath; worsened wheezing and other asthma symptoms; reduced lung function; and increased hospitalizations for respiratory causes.

O_3 also has detrimental effects on the environment. O_3 exposure can damage cells and leaf tissue, reducing plants' ability to photosynthesize and produce food. Plants will grow more leaves to produce more food, but this response has the net effect of making plants more susceptible for disease, pests, cold, and drought. O_3 can also damage materials like rubber, plastics, fabrics, paint, and metals (CARB 2008; USEPA 2009).

18.1.3.5 Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter consists of solid and liquid particles of dust, soot, aerosols, and other matter small enough to remain suspended in the air for a long period of time. Particulate matter is divided into two size classes of particles: particles up to 10 microns[2] (PM_{10}) and particles up to 2.5 microns ($PM_{2.5}$). To place the sizes in perspective, a human hair is approximately 60 microns in diameter, which makes it six times larger than the largest coarse particle and over 20 times larger than the largest fine particle.

Primary particles are those that are directly emitted from a source such as construction sites, unpaved roads, fields, smokestacks, or fires. Burning fuels primarily produce $PM_{2.5}$, whereas other sources, like windblown dust, contribute to PM_{10} emissions. Secondary formation of $PM_{2.5}$ can occur from complex reactions in the atmosphere of pollutants like NO_x, sulfur oxides (SO_x), VOC, and ammonia. Most of the $PM_{2.5}$ pollution in the United States occurs from these secondary reactions as opposed to direct (primary) emissions.

Particles smaller than 10 microns (i.e., PM_{10} and $PM_{2.5}$) represent that portion of particulate matter thought to represent the greatest hazard to public health because they can become deeply embedded in someone's lungs. This can lead to adverse health effects, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms (e.g., irritation of the airways, coughing, or difficulty breathing). Aside from adverse health effects, $PM_{2.5}$ is primarily responsible for reduced visibility (haze) in the United States. Particulate matter can also cause

[2] A micron is a unit of measurement that is one-millionth of a meter. A meter is slightly larger than three feet.

aesthetic damage by staining or damaging stone and other materials (CARB 2009c; USEPA 2016c).

18.1.3.6 Sulfur Dioxide (SO_2)

The USEPA's NAAQS is designed to protect against exposure from all SO_x, but SO_2 is the pollutant of greatest concern and used as the indicator for the entire SO_x family. SO_2 is formed when locomotives, ships, and nonroad diesel equipment burn sulfur-containing fuel. Certain industrial processes, such as petroleum refining and metal processing, also contribute to SO_2 emissions. Health effects of SO_2 exposure include bronchoconstriction accompanied by symptoms, which may include wheezing, shortness of breath, and chest tightness, especially during exercise. Continued exposure leads to increased incidence of pulmonary symptoms and disease, decreased pulmonary function, and increased risk of mortality. Children and the elderly are the most susceptible to the negative effects of SO_2 exposure (CARB 2009d; USEPA 2016d).

18.1.3.7 Monitoring Station Data

Criteria air pollutants are monitored at several stations in the SVAB. The closest monitoring station to the Project area is Woodland-Gibson Ranch station. Table 18-4 summarizes air quality data from this station for the most recent three years of available data. Pollutants that are designated attainment are not summarized in the table.

Table 18-4. Ambient Air Quality Monitoring Data

Pollutant [1]	**2013**	**2014**	**2015**
1-Hour O_3			
California designation value [2], ppm	0.09	0.09	0.09
Days above the CAAQS (0.09 ppm)	0	0	0
8-Hour O_3			
National standard design value [3], ppm	0.069	0.068	0.067
California designation value [2], ppm	0.080	0.076	0.072
Days above the NAAQS (0.070 ppm)	0	0	0
Days above the CAAQS (0.070 ppm)	0	1	4
PM_{10} [4],[5]			
Maximum national concentration 24-hour period, µg/m^3	60.3	45.0	70.8
Maximum California concentration 24-hour period, µg/m^3	61.5	47.5	69.4
Annual California concentration, µg/m^3	22.9	17.4	21.8
Estimated number of days above NAAQS (150 µg/m^3) [6]	0	0	0
Estimated number of days above CAAQS (50 µg/m^3) [6]	23.3	0.0	12.2

Pollutant [1]	2013	2014	2015
$PM_{2.5}$ [4],[5]			
24-hour national standard design value [3], µg/m^3	*	16	19
Maximum California concentration 24-hour period, µg/m^3	22.0	14.6	29.4
Annual national standard design value [3], µg/m^3	*	6.6	7.0
Annual California designation value [2], µg/m^3	6	6	8
Estimated number of days above NAAQS (35 µg/m^3) [6]	0	0	0

Source: CARB 2016a

Notes:

[1] An exceedance is not necessarily a violation. Violations are defined in 40 Code of Federal Regulations (CFR) 50 for NAAQS and 17 CCR 70200 for CAAQS.

[2] Designation values are defined as the pollutant concentration used for designating attainment status of an air district with respect to the CAAQS and NAAQS. Generally, the designation value is the highest concentration that remains after excluding certain qualifying values.

[3] Design values are defined as the pollutant concentration used as the basis for determining attainment of an air quality standard. The design value may not be the same as the designation value.

[4] Statistics may include data that are related to an exceptional event.

[5] State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics, therefore, may be based on different samplers.

[6] Most particulate matter measurements are taken every six days; therefore, the number of days over the 24-hour standard in any year is calculated.

Key: * = There were insufficient (or no) data available to determine this value.; CAAQS = California Ambient Air Quality Standard; NAAQS = National Ambient Air Quality Standard; O_3 = ozone; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ppm = parts per million; µg/m^3 = micrograms per cubic meter

18.1.3.8 Attainment Status Designation

The Federal Clean Air Act (CAA) requires states to classify air basins (or portions thereof) as either "attainment" or "nonattainment" with respect to criteria air pollutants, based on whether the NAAQS have been achieved. Areas that previously exceeded the NAAQS, but have since attained the standard, are called "maintenance" areas. States are also required to prepare State Implementation Plans (SIPs) containing emission reduction strategies to maintain the NAAQS for those areas designated as attainment and to attain the NAAQS for those areas designated as nonattainment.

Certain pollutants, namely O_3 and PM_{10}, are further subdivided based on how close an area is to achieving the NAAQS. The possible classifications for the O_3 NAAQS are marginal, moderate, serious, severe, or extreme. Areas with worse classifications are given more time to attain the NAAQS than areas with better air quality. For example, an area classified as an extreme nonattainment area has an attainment date of December 31, 2032 (20 years from the date of designation), whereas an area classified as a marginal nonattainment area had until December 31, 2015 to attain the NAAQS (77 Federal Register [FR] 30160).[3] The possible classifications for the PM_{10} NAAQS are moderate and serious. Section 188 of the CAA (42 United States Code [USC] 7513) states that all areas designated nonattainment for the PM_{10} NAAQS are to be

[3] Areas that did not attain the 2008 O_3 NAAQS by July 20, 2015 were either granted a one-year attainment date extension based in part on their 2014 monitored air quality data or were reclassified as moderate based on their 2012 to 2014 air quality data (USEPA 2016f).

initially classified as moderate; however, an area can be reclassified as serious if the USEPA determines that the area cannot practicably attain the standard by the attainment date.

California also has its own ambient air quality standards (CAAQS) and has designated the air basins within the State based on whether the CAAQS are attained. See Section 18.2.2.1 for more information on the CAAQS. Table 18-5 summarizes the attainment status for the SVAB.

Table 18-5. Attainment Status for SVAB

Pollutant	National Standards [a,b,c]	California Standards [a,b]
O_3	Nonattainment, severe	• Nonattainment (Sacramento and Yolo counties) • Nonattainment-Transitional [d] (Sutter County)
CO	Maintenance (Sacramento and Yolo counties)	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
PM_{10}	Maintenance (Sacramento County)	Nonattainment
$PM_{2.5}$	Nonattainment (Sacramento and Yolo counties) [e]	Attainment/Unclassified
Pb	Attainment	Attainment

Source: CARB 2015; USEPA 2016e; 40 CFR 81.305.

Notes:

[a] Nonattainment means the area does not meet the ambient air quality standard for that pollutant.

[b] Attainment means the area meets the ambient air quality standard for that pollutant.

[c] Maintenance means the area has recently met the standard and must continue to provide USEPA with information showing it is maintaining the standard before the area can qualify for redesignation as attainment.

[d] A region is designated "nonattainment-transitional" if the CAAQS is not exceeded more than three times at any monitoring location within the region during a single calendar year.

[e] Classified as moderate nonattainment for the 2006 24-hour NAAQS.

Key: CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; SO_2 = sulfur dioxide; SVAB = Sacramento Valley Air Basin

Figure 18-3 depicts the nonattainment areas for the $PM_{2.5}$ NAAQS while Figure 18-4 shows the CO and PM_{10} maintenance areas near the study area.

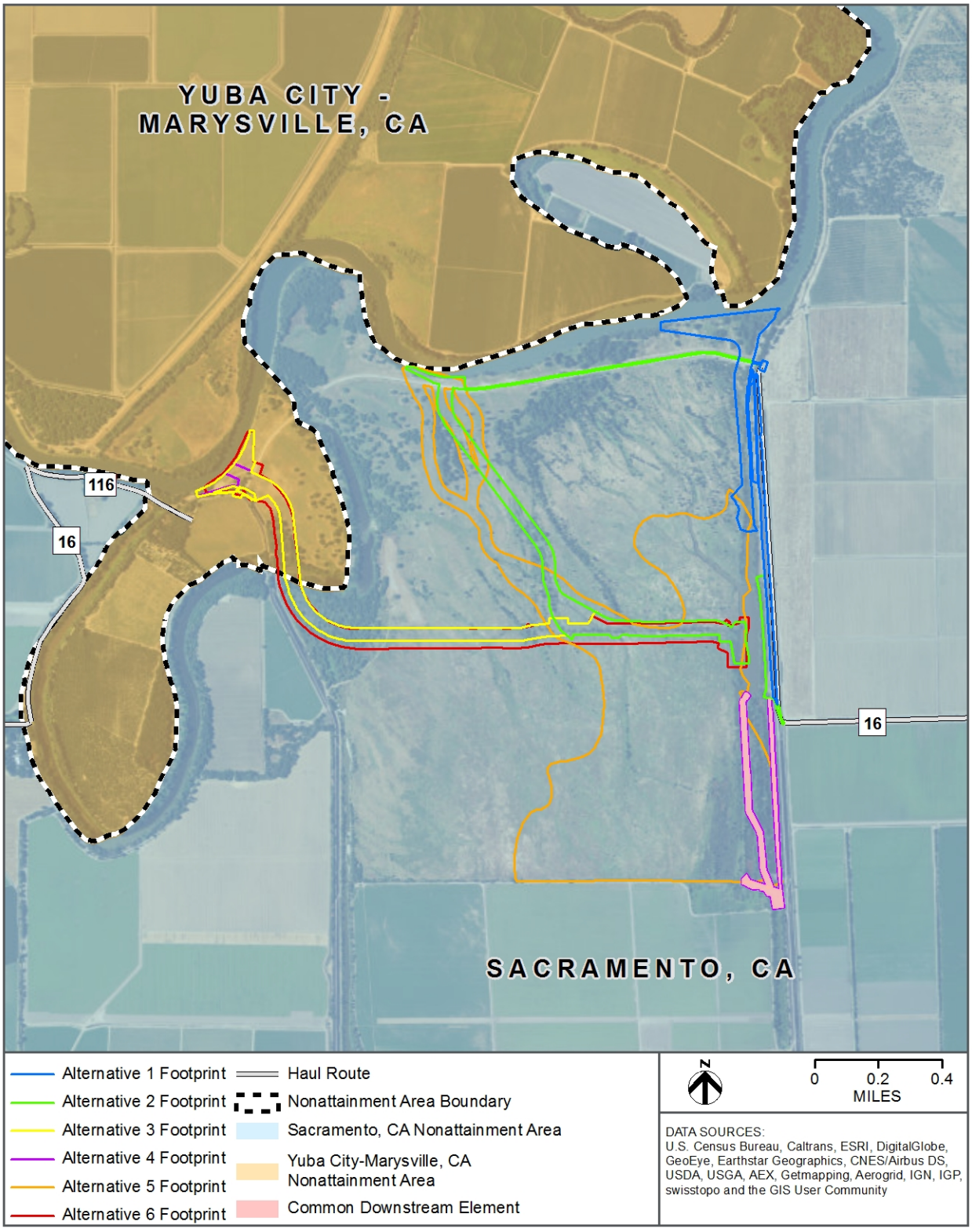


Figure 18-3. $PM_{2.5}$ (2006) NAAQS Nonattainment Areas

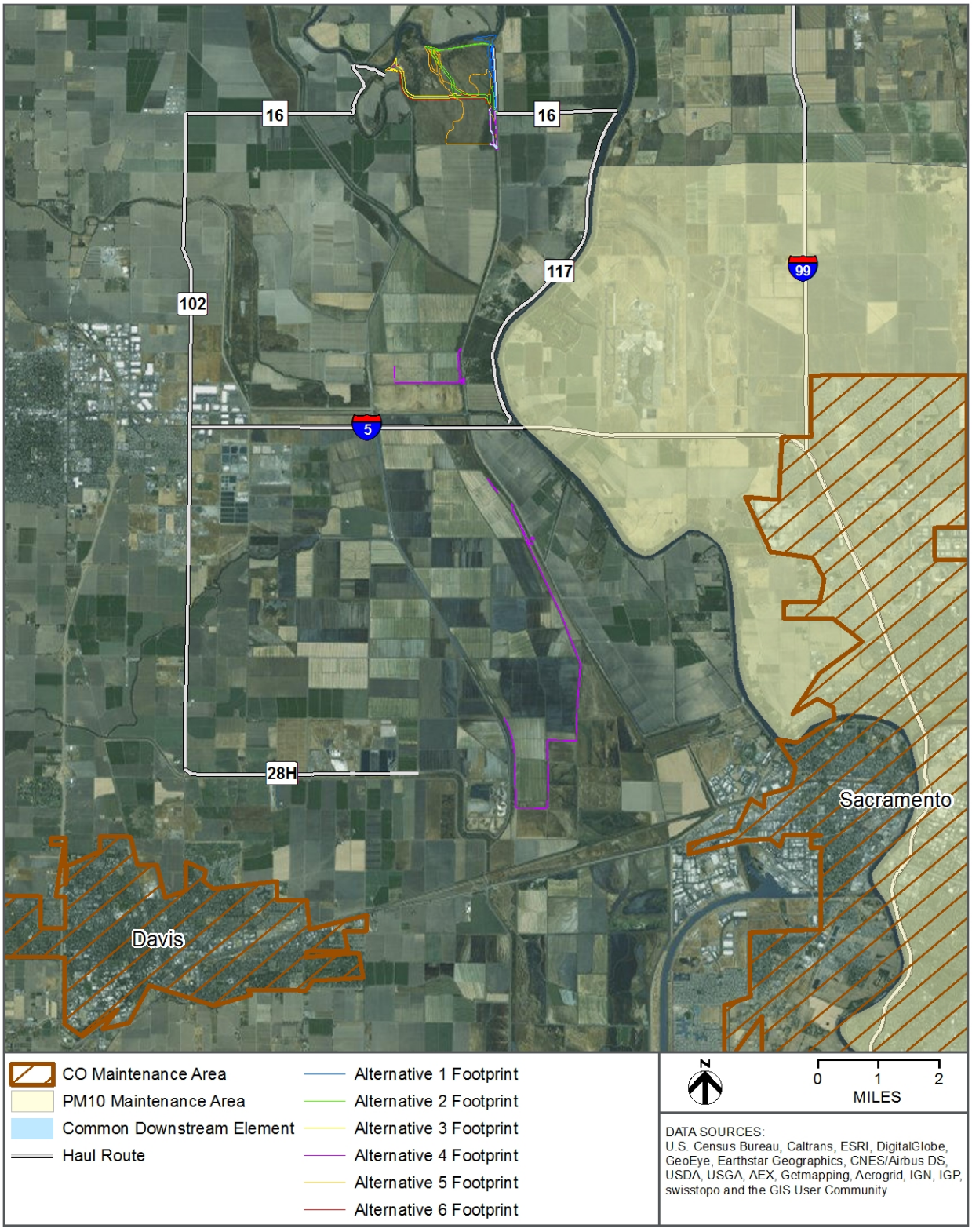


Figure 18-4. CO and PM_{10} Maintenance Areas

18.1.3.9 Emission Sources

Most SO_x emissions (47 percent) in the SVAB are from stationary sources, particularly from fuel combustion. Mobile sources, such as cars and trucks, are the largest contributor to CO, NO_x, and reactive organic gases (ROG)[4] emissions, accounting for 72, 76, and 41 percent of basin-wide emissions, respectively. Areawide sources are responsible for 84 and 69 percent of PM_{10}, and $PM_{2.5}$ emissions, respectively. Table 18-6 summarizes the average daily emissions for emission sources in SVAB.

Table 18-6. SVAB 2012 Estimated Annual Average Emissions Inventory

Stationary Sources	**ROG, tpd**	**CO, tpd**	**NO_x, tpd**	**SO_x, tpd**	**PM_{10}, tpd**	**$PM_{2.5}$, tpd**
Cleaning and surface coatings	11.98	0.03	0.03	0	0.03	0.03
Fuel combustion	3.15	41.61	29.92	1.34	2.66	2.62
Industrial processes	4.61	7.67	2.01	0.28	9.9	4.84
Petroleum production and marketing	11.9	0.46	2.05	0	0	0
Waste disposal	1.19	0.21	0.15	0.06	0.04	0.04
Total Stationary Sources	**32.83**	**49.98**	**34.16**	**1.68**	**12.63**	**7.53**
Areawide Sources						
Miscellaneous processes	27.18	148.33	10	1.12	117.43	31.53
Solvent evaporation	33.79	0	0	0	0.01	0.01
Total Areawide Sources	**60.97**	**148.33**	**10**	**1.12**	**117.44**	**31.54**
Mobile Sources						
On-road motor vehicles	35.68	333.66	93.55	0.41	6.32	3.54
Other mobile sources	28.75	166.25	49.7	0.36	3.11	2.81
Total Mobile Sources	**64.43**	**499.91**	**143.25**	**0.77**	**9.43**	**6.35**
Grand Total	**158.23**	**698.22**	**187.41**	**3.57**	**139.5**	**45.42**

Source: CARB 2013

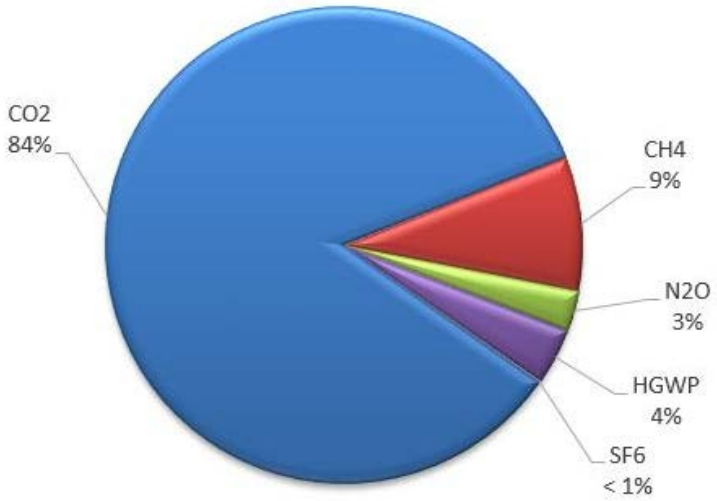
Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate; PM_{10} = inhalable particulate matter; matter; ROG = reactive organic gases; SO_x = sulfur oxides; SVAB = Sacramento Valley Air Basin; tpd = tons per day

18.1.4 Greenhouse Gases (GHGs)

California is the second highest emitter of GHG emissions of the states, only behind Texas. However, from a per capita standpoint, California has the sixth lowest GHG emissions among the states. Worldwide, California would be the 20th largest emitter of carbon dioxide (CO_2) if it were a country; on a per capita basis, California would be ranked 38th in the world (CARB 2014a).

[4] CARB uses the term "reactive organic gases," which is like the term "volatile organic compounds" used by the USEPA, but with different exempt compounds (CARB 2009e). For this analysis, the terms are used interchangeably.

California gross GHG emissions in 2014 (the last year inventoried) totaled approximately 441.5 million metric tons carbon dioxide equivalent ($MMTCO_2e$[5]), a decrease of 2.8 $MMTCO_2e$ compared to 2013 (CARB 2016b). As shown in Figure 18-5, 84 percent of the State's GHG emissions are CO_2, followed by methane (CH_4) emissions (nine percent), high global warming potential[6] gases, which include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6), and nitrous oxide (N_2O) emissions (three percent). Emissions of CO_2 and N_2O are largely byproducts of fossil fuel combustion. Methane, a highly potent GHG, results largely from off-gassing associated with agricultural practices and landfills.



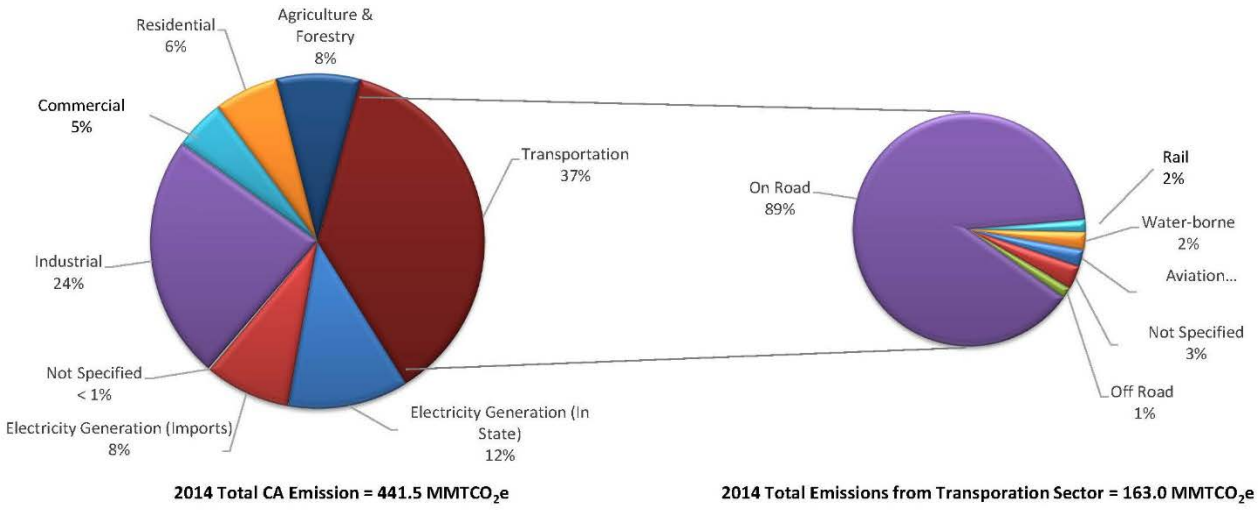
Source: CARB 2016b

Figure 18-5. 2014 California Emissions by GHGs

As shown in Figure 18-6, transportation is responsible for 37 percent of the State's GHG emissions, followed by the industrial sector (24 percent), electricity generation (20 percent), commercial and residential (11 percent), agriculture and forestry (8 percent), and other unspecified sources (two tenths percent). Contributions from the transportation sector include emissions from combustion of fuels sold in-state that are used by on-road and off-road vehicles, aviation, rail, and waterborne vehicles as well as a few other smaller sources. The on-road vehicle fleet is responsible for 89 percent of the transportation sector's emissions, i.e., approximately 33 percent of the State's GHG emissions (CARB 2016c).

[5] CO_2e emissions are calculated by multiplying the mass amount of emissions for each pollutant (e.g., N_2O) by the gas's associated global warming potential (GWP; ratio of the time-integrated radiative forcing from the instantaneous release of one kilogram of a trace substance relative to that of one kilogram of the reference gas CO_2 defined by 40 CFR 98 (Mandatory GHG Reporting).

[6] Each GHG contributes to climate change differently, as expressed by its GWP. CO_2e is determined by multiplying the mass of each GHG by its GWP.



Source: CARB 2016c

Figure 18-6. 2014 California Emissions by Sector

18.1.5 Toxic Air Contaminants

TACs are defined as air pollutants that may cause or contribute to an increase in mortality or serious illness, or which may pose a present and potential hazard to human health (California Health and Safety Code Section 39655(a)). TACs are called hazardous air pollutants (HAPs) in Federal terms; however, the two lists of TACs and HAPs are not the same. For example, California recognizes diesel particulate matter (DPM) and environmental tobacco smoke as TACs, whereas the Federal government does not (42 USC 7412(b)).

The health effects associated with TACs vary but can generally be broken down into three main categories: cancer risks, chronic noncancer risks, and acute noncancer risks. Health risks are a measure of the chance that an individual will experience health problems. The *California Almanac of Emissions and Air Quality Data* (CARB 2009f) indicates that 10 TACs contribute the greatest health risk to California, based on ambient air quality data. These TACs are acetaldehyde, benzene, 1,3-butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and DPM. Of these TACs, DPM is of the greatest concern because it is estimated to be responsible for approximately 70 percent of the total ambient air toxics risk in the state (CARB 2000).

18.1.6 Odors

Odors are generally regulated as nuisances and do not typically pose a health risk. Odorous processes or facilities often lead to citizen complaints to local governments, including the various air districts. Odor impacts are subjective because different people have different sensitivities to odor.

18.1.7 Sensitive Receptors

Sensitive receptors are segments of the population susceptible to poor air quality like children, the elderly, and those with pre-existing health problems. Examples of sensitive receptors include residences, schools and school yards, parks and play grounds, daycare centers, nursing homes, and medical facilities. Please refer to Chapter 20, *Noise*, for more information on sensitive receptors in the study area.

18.2 Regulatory Setting

Air quality management and protection responsibilities exist in Federal, State, and local levels of government. The Federal CAA and California Clean Air Act (CCAA) are the primary statutes that establish ambient air quality standards and establish regulatory authorities to enforce regulations designed to attain those standards.

18.2.1 Federal Plans, Policies, and Regulations

18.2.1.1 Criteria Air Pollutants

18.2.1.1.1 Clean Air Act

The USEPA is responsible for implementation of the CAA. The CAA was enacted in 1955 and amended in 1963, 1965, 1967, 1970, 1977, 1990, and 1997. Under authority of the CAA, USEPA established NAAQS for the following criteria pollutants: CO, Pb, NO_2, O_3, PM_{10}, $PM_{2.5}$, and SO_2.

Table 18-7 presents the current NAAQS for the criteria pollutants. Ozone is a secondary pollutant, meaning it is formed in the atmosphere from reactions of precursor compounds under certain conditions. Primary precursor compounds that lead to formation of O_3 include VOCs and NO_x. $PM_{2.5}$ can be emitted directly from sources (e.g., engines) or can form in the atmosphere from precursor compounds. $PM_{2.5}$ precursor compounds in the area of analysis include SO_x, NO_x, VOCs, and ammonia.

Table 18-7. National Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS Primary	NAAQS Secondary	Violation Criteria
O_3	8-Hour	0.070 ppm (137 µg/m^3)	Same as primary standard	Annual fourth highest daily maximum eight-hour concentration, averaged over three years
PM_{10}	24-Hour	150 µg/m^3	Same as primary standard	Not to be exceeded more than once per year on average over three years
$PM_{2.5}$	24-Hour	35 µg/m^3	Same as primary standard	98th percentile, averaged over three years
$PM_{2.5}$	Annual	12 µg/m^3	15 µg/m^3	Annual mean, averaged over three years
CO	1-Hour	35 ppm (40 mg/m3)	N/A	Not to be exceeded more than once per year

Pollutant	Averaging Time	NAAQS Primary	NAAQS Secondary	Violation Criteria
CO	8-Hour	9 ppm (10 mg/m3)	N/A	Not to be exceeded more than once per year
NO_2	1-Hour	100 ppb (188 µg/m^3)	n/a	98th percentile of 1-hour daily maximum concentrations, averaged over three years
NO_2	Annual	53 ppb (100 µg/m^3)	Same as primary standard	Annual mean
SO_2	1-Hour	75 ppb (196 µg/m^3)	N/A	99th percentile of 1-hour daily maximum concentrations, averaged over three years
SO_2	3-Hour	N/A	0.5 ppm (1,300 µg/m^3)	Not to be exceeded more than once per year
SO_2	24-Hour [a]	0.14 ppm (366 µg/m^3)	N/A	Not to be exceeded more than once per year
SO_2	Annual [a]	0.030 ppm (79 µg/m^3)	N/A	Annual mean
Pb	Rolling 3-Month Average [b]	0.15 µg/m^3	Same as primary standard	Not to be exceeded

Source: CARB 2016d.

Notes:

[a] On June 22, 2010, the 24-hour and annual primary SO_2 NAAQS were revoked (75 FR 35520). The 1971 SO_2 NAAQS (0.14 ppm and 0.030 ppm for 24-hour and annual averaging periods) remain in effect until one year after an area is designated for the 2010 one-hour primary standard. CARB recommended that all of California be designated attainment for the one-hour SO_2 NAAQS (Goldstene 2011), but the USEPA has not yet finalized area designations.

[b] The Pb NAAQS was revised on November 12, 2008 to a rolling three-month average (73 FR 66964). The 1978 Pb NAAQS (1.5 µg/m^3 as a quarterly average) remained in effect until one year after an area is designated for the 2008 standard. On December 31, 2010, final area designations for the 2008 Pb standards became effective; therefore, the 1978 Pb NAAQS is no longer in effect in California (75 FR 71033).

Key: CO = carbon monoxide; N/A = not applicable; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ppb = parts per billion; ppm = parts per million; SO_2 = sulfur dioxide; µg/m^3 = micrograms per cubic meter

18.2.1.1.2 General Conformity

Section 176 (c) of the CAA (42 USC 7506[c]) requires any entity of the Federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate the action conforms to the applicable SIP required under Section 110 (a) of the Federal CAA (42 USC 7410[a]) before the action is otherwise approved. In this context, conformity means that such Federal actions must be consistent with a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards. Each Federal agency must determine that any action proposed that is subject to the regulations implementing the conformity requirements will, in fact, conform to the applicable SIP before the action is taken. This project is subject to the General Conformity Rule because it involves a Federal agency (Reclamation).

On April 5, 2010, the USEPA revised the general conformity regulations at 40 CFR 93 Subpart B for all Federal activities except those covered under transportation conformity (75 FR 17254). The revisions were intended to clarify, streamline, and improve conformity determination and review processes and provide transition tools for making conformity determinations for new NAAQS. The revisions also allowed Federal facilities to negotiate a facility-wide emission budget with the applicable air pollution control agencies and allow the emissions of one precursor pollutant to be offset by the emissions of another precursor pollutant. The revised rules became effective on July 6, 2010.

The general conformity regulations apply to a proposed Federal action in a nonattainment or maintenance area if the total of direct[7] and indirect[8] emissions of the relevant criteria pollutants and precursor pollutants caused by the proposed action equal or exceed certain *de minimis* amounts, thus, requiring the Federal agency to make a determination of general conformity. A Federal agency can indirectly control emissions by placing conditions on Federal approval or Federal funding.

Table 18-8 presents the *de minimis* amounts for nonattainment areas. The *de minimis* threshold for all maintenance areas is 100 tons per year (tpy), except for Pb, which has a *de minimis* threshold of 25 tpy.

The general conformity regulations incorporate a stepwise process, beginning with an applicability analysis. Per USEPA guidance (USEPA 1994), before any approval is given for a proposed action to go forward, the regulating Federal agency must apply the applicability requirements found at 40 CFR 93.153(b) to the proposed action. The guidance states that the applicability analysis can be (but is not required to be) completed concurrently with any analysis required under National Environmental Policy Act (NEPA). If the regulating Federal agency determines that the general conformity regulations do not apply to the proposed action (meaning the project emissions do not exceed the *de minimis* thresholds), no further analysis or documentation is required.

Table 18-8. General Conformity *De Minimis* Thresholds

Pollutant	Classification of Emissions Type	*De Minimis* Threshold (tpy)
O_3 (VOCs or NO_x)	Serious NAA	50
O_3 (VOCs or NO_x)	Severe NAA	25
O_3 (VOCs or NO_x)	Extreme NAA	10
O_3 (VOCs or NO_x)	Other NAA	100
CO	n/a	100
SO_2	n/a	100
NO_2	n/a	100
PM_{10}	Moderate NAA	100
PM_{10}	Serious NAA	70

[7] Direct emissions are those that are caused or initiated by the Federal action and occur at the same time and place as the Federal action.

[8] Indirect emissions are reasonably foreseeable emissions that are further removed from the Federal action in time and/or distance, and can be practicably controlled by the Federal agency on a continuing basis (40 CFR 93.152).

Pollutant	Classification of Emissions Type	*De Minimis* Threshold (tpy)
$PM_{2.5}$	Direct emissions	100
$PM_{2.5}$	SO_2 precursor	100
$PM_{2.5}$	NO_x precursor	100
$PM_{2.5}$	VOC or ammonia precursor [a]	100
Pb	n/a	25

Source: 40 CFR 93.153.

Notes:

[a] Pollutant not subject to *de minimis* threshold if the State does not determine it to be a significant precursor to $PM_{2.5}$ emissions.

Key: CO = carbon monoxide; n/a = not applicable; NAA = nonattainment area; NO_2 = nitrogen dioxide; NO_x = nitrogen oxides; O_3 = ozone; Pb = lead; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; SO_2 = sulfur dioxide; VOC = volatile organic compound

If the general conformity regulations apply to the proposed action, the regulating Federal agency must next conduct a conformity evaluation in accordance with the criteria and procedures in the implementing regulations, publish a draft determination of general conformity for public review, and then publish the final determination of general conformity. For a required action to meet the conformity determination emissions criteria, the total of direct and indirect emissions from the action must comply or be consistent with all relevant requirements and milestones contained in the applicable SIP (40 CFR 93.158[c]) and meet other specified requirements such as:

- For any criteria pollutant or precursor, the total of direct and indirect emissions from the action is specifically identified and accounted for in the applicable SIP's attainment or maintenance demonstration (40 CFR 93.158[a][1]).
- For precursors of O_3, NO_2, or particulate matter, the total of direct and indirect emissions from the action is fully offset within the same nonattainment (or maintenance) area through a revision to the applicable SIP or a similarly enforceable measure that affects emission reductions so that there is no net increase in emissions of that pollutant (40 CFR 93.158[a][2]).
- For O_3 or NO_2, the total of direct and indirect emissions from the action is determined and documented by the State agency primarily responsible for the applicable SIP to result in a level of emissions that, together with all other emissions in the nonattainment (or maintenance) area, would not exceed the emissions inventory specified in the applicable SIP (40 CFR 93.158[a][5][i][A])
- For O_3 or NO_2, the total of direct and indirect emissions from the action (or portion thereof) is determined by the State agency responsible for the applicable SIP to result in a level of emissions that, together with all other emissions in the nonattainment (or maintenance) area, would exceed the emissions inventory specified in the applicable SIP. In addition, the State governor or the governor's designee for SIP actions makes a written commitment to USEPA for specific SIP revision measures reducing emissions to not exceed the emissions inventory (40 CFR 93.158[a][5][i][B]).

18.2.1.2 Toxic Air Contaminants

18.2.1.2.1 Stationary Sources

Section 112 of the CAA (42 USC 7412(b)(1)) established an initial list of 187 HAPs and required USEPA to publish a list of all categories and subcategories of major sources[9] and area sources[10] that could emit each HAP. Section 112 also establishes the National Emissions Standards for Hazardous Air Pollutants program (40 CFR 61 and 40 CFR 63). The 1990 CAA amendments established standards that require the application of technology-based emission standards, called maximum achievable control technology, that are based on emission levels already achieved by similar industries (40 CFR 63). The maximum achievable control technology standards cover 45 stationary source industries such as chemical plants, oil refineries, aerospace manufacturers, and steel mills.

18.2.1.2.2 Mobile Sources

Mobile source air toxics are emitted from highway vehicles and non-road equipment, such as those used in construction activities. Typical mobile source air toxics include benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and DPM. In February 2007, USEPA adopted controls on gasoline, passenger vehicles, and portable fuel containers to reduce emissions of benzene and other HAPs (72 FR 8428). Section 211 of the CAA (42 USC 7545(k)(3)(B)) also requires reformulated gasoline to be used during the high O_3 season to reduce emissions of both VOCs and HAPs. Various regulations also govern efforts to reduce DPM emissions.

18.2.1.3 Odors

There are no Federal laws, regulations, or policies pertaining to odors.

18.2.1.4 Greenhouse Gases

18.2.1.4.1 Clean Air Act of 1970

The CAA was initially enacted in 1970 to regulate air emissions from stationary and mobile sources in the United States. Executive Order 13432 enacted in 2007 gave USEPA the authority to regulate GHG emissions from mobile sources as part of the CAA.

The GHG emissions tailoring rule was first issued in May 2010, under this initiative USEPA established initial emissions threshold for Prevention of Significant Deterioration and Title V permitting of 75,000 to 100,000 tpy of CO_2e.

In June 2012, Step 3 of the GHG emissions tailoring rule was phased into the CAA. Key elements of step 3 included: (1) establishing GHG plantwide applicability limitations on CO_2e emissions and (2) allowing sources that emit 100,000 tpy of CO_2e but have minor source

[9] A "major source" is defined as "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs" (42 USC 7412(a)(1)).

[10] An "area source" is defined as "any stationary source of HAPs that is not a major source." Motor vehicles and nonroad vehicles subject to regulation are excluded from the definition (42 USC 7412(a)(2)).

emissions of all other regulated criteria pollutants to apply for GHG plantwide applicability limitations under minor source status.

18.2.1.4.2 National Environmental Policy Act

In 2016, the Council of Environmental Quality (CEQ) issued final guidance to Federal agencies to assist with their impacts analysis of GHGs and climate change in NEPA reviews. However, CEQ withdrew the final guidance in April 2017. 82 Fed. Reg. 16576, April 5, 2017.

18.2.1.4.3 Department of the Interior

In 2009, the Department of Interior (DOI) issued a Secretarial Order on climate change that expands DOI bureaus' responsibilities in addressing climate change (amended on February 22, 2010). The purpose of Secretarial Order No. 3289 is to provide guidance to bureaus and offices within the DOI on how to provide leadership by developing timely responses to emerging climate change issues. This order replaces Secretarial Order No. 3226, Amendment No.1, issued on January 16, 2009, and reinstates the provisions of Secretarial order No. 3326, issued on January 19, 2001. It reaffirms efforts within DOI that are ongoing with respect to climate change. Among the requirements of the order is one that requires each bureau and office of DOI to "consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, and/or when making major decisions affecting DOI resources."

Reclamation's *National Environmental Policy Act (NEPA) Handbook* (2012) recommends that climate change be considered, as applicable, in every NEPA analysis. The *NEPA Handbook* acknowledges there are two interpretations of climate change regarding Reclamation actions: (1) Reclamation's action is a potentially significant contributor to climate change, and (2) climate change could affect a Reclamation proposed action. The *NEPA Handbook* recommends considering different aspects of climate change (e.g., relevance of climate change to the proposed action and timeframe for analysis) to determine the extent to which it should be discussed under NEPA.

Additionally, DOI Departmental Manual 523 (effective December 20, 2012) states it is DOI policy to use best available science in decision-making water management planning, including integrating adaptation strategies. It also states that climate change be considered in developing or revising management plans. Section B further states, "the Department will promote existing processes and, when necessary, institute new processes to: (1) Conduct assessments of vulnerability to anticipated or current climate impacts, (2) Develop and implement comprehensive climate change adaptation strategies based on vulnerability and other factors, and (3) Include measurable goals and performance metrics."

Furthermore, Reclamation is subject to *Principles and Requirements for Federal Investments in Water Resources* (CEQ 2013). This document requires areas of risk and uncertainty to be identified, described, and considered when analyzing potential investments in water resources. It specifically requires climate change impacts to be accounted for and addressed.

18.2.2 State Plans, Policies, and Regulations

18.2.2.1 Criteria Air Pollutants

The CCAA substantially added to the authority and responsibilities of the State's air pollution control districts. The CCAA establishes an air quality management process that generally parallels the Federal process. The CCAA, however, focuses on attainment of CAAQS that, for certain pollutants and averaging periods, are typically more stringent than the comparable NAAQS. Table 18-9 summarizes the CAAQS.

Table 18-9. California Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS	Violation Criteria
O_3	1-Hour	0.09 ppm (180 µg/m^3)	Not to be exceeded
O_3	8-Hour	0.070 ppm (137 µg/m^3)	Not to be exceeded
PM_{10}	24-Hour	50 µg/m^3	Not to be exceeded
PM_{10}	Annual	20 µg/m^3	Not to be exceeded
$PM_{2.5}$	Annual	12 µg/m^3	Not to be exceeded
CO	1-Hour	20 ppm (23 mg/m^3)	Not to be exceeded
CO	8-Hour	9.0 ppm (10 mg/m^3)	Not to be exceeded
NO_2	1-Hour	0.18 ppm (339 µg/m^3)	Not to be exceeded
NO_2	Annual	0.030 ppm (57 µg/m^3)	Not to be exceeded
SO_2	1-Hour	0.25 ppm (655 µg/m^3)	Not to be exceeded
SO_2	24-Hour	0.04 ppm (105 µg/m^3)	Not to be exceeded
Pb	30-Day Average	1.5 µg/m^3	Not to be equaled or exceeded
Visibility Reducing Particles	8-Hour	See footnote 1	Not to be exceeded
Sulfates	24-Hour	25 µg/m^3	Not to be equaled or exceeded
Hydrogen sulfide	1-Hour	0.03 ppm (42 µg/m^3)	Not to be equaled or exceeded
Vinyl chloride	24-Hour	0.01 ppm (26 µg/m^3)	Not to be equaled or exceeded

Source: CARB 2016d.

Note:

[1] In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Key: CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ppm = parts per million; SO_2 = sulfur dioxide; µg/m^3 = micrograms per cubic meter

The CCAA requires the CAAQS be met as expeditiously as practicable but does not set precise attainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards.

The air quality attainment plan requirements established by the CCAA are based on the severity of air pollution problems caused by locally generated emissions. Upwind air pollution control districts are required to establish and implement emission control programs commensurate with the extent of pollutant transport to downwind districts.

CARB is responsible for developing emission standards for on-road motor vehicles and some off-road equipment in the State. In addition, CARB develops guidelines for the local districts to use in establishing air quality permit and emission control requirements for stationary sources subject to the local air district regulations.

18.2.2.2 Toxic Air Contaminants

18.2.2.2.1 Toxic Air Contaminant Identification and Control Act

The Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807) established a process for both identifying TACs and then managing any risk associated with each substance. AB 2728 further amended AB 1807 by requiring CARB to identify all Federal HAPs as TACs. CARB works collaborated with the Office of Environmental Health Hazard Assessment to assess the potential for human exposure to a potential TAC (CARB) and evaluate any possible health effects (Office of Environmental Health Hazard Assessment). The independent Scientific Review Panel eventually reviews all findings following a series of public workshops (CARB 2014b).

18.2.2.2.2 Air Toxics "Hot Spots" Information and Assessment Act

The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) requires stationary sources (facilities) to report the types and quantities of TACs released into the atmosphere (CARB 2016e). Following the preparation of TAC emission inventories, local air districts rank (prioritize) the facilities based on three main parameters: emissions, potency or toxicity, and the proximity of potential receptors. Local air districts then use these three factors to calculate a score that determines if a facility should complete a health risk assessment (California Air Pollution Control Officers Association [CAPCOA] 1990). AB 2588 also contains provisions that require air districts to notify the public of significant risks associated with nearby facilities. Senate Bill 1731 further amends AB 2588 by requiring the reduction of significant risks (CARB 2016e).

18.2.2.2.3 Mobile and Stationary Source Airborne Toxic Control Measures

CARB promulgated several mobile and stationary source Airborne Toxic Control Measures (ATCMs) that are codified in the CCR. Examples of mobile source measures include limits on DPM emissions from portable engines and limits on diesel-fueled commercial motor vehicle idling. Stationary source measures include limits on specific industries like retail service stations, non-ferrous metal melting, and dry cleaners. Additional stationary source Airborne Toxic Control Measures cover asbestos emissions from construction, grading, quarrying, and surface

mining operations and criteria pollutant emissions from stationary compression ignition engines (CARB 2016f).

18.2.2.3 Odors

There are no state laws, regulations, or policies pertaining to odors.

18.2.2.4 Greenhouse Gases

18.2.2.4.1 California Executive Orders S-3-05 and B-30-15

California Executive Order S-3-05, signed in 2005 by Governor Arnold Schwarzenegger, and Executive Order B-30-15, signed in 2015 by Governor Edmund G. Brown Jr., established the following GHG emission reduction targets for California:

1. By 2010, reduce GHG emissions to 2000 levels.
2. By 2020, reduce GHG emissions to 1990 levels.
3. By 2030, reduce GHG emissions to 40 percent below 1990 levels.
4. By 2050, reduce GHG emissions to 80 percent below 1990 levels.

Executive Order S-3-05 also requires the Secretary of the California Environmental Protection Agency (CalEPA) to report to the governor and the State legislature biannually on progress made toward meeting the GHG emission targets, commencing in January 2006. The Secretary of the CalEPA is also required to report about climate change impacts on water supply, public health, agriculture, the coastline, and forestry. Mitigation and adaptation plans to combat these impacts must also be developed.

CARB reported a three percent decrease in statewide GHG emission from 2000 to 2010. Thus, the State was successful in meeting the first milestone of S-3-05 (CARB 2016c).

18.2.2.4.2 AB 32

California AB 32, the Global Warming Solutions Act of 2006, codifies the state's GHG emissions targets by requiring the State's global warming emissions to be reduced to 1990 levels by 2020 and directs CARB to enforce the statewide cap that phased in starting in 2012. Former Governor Schwarzenegger signed and passed AB 32 into law on September 27, 2006. Key AB 32 milestones are as follows (CARB 2014c):

1. January 2009 – Scoping Plan adopted, indicating how emissions will be achieved from significant sources of GHGs via regulations, market mechanisms, and other actions.
2. During 2009 – CARB staff drafted rule language to implement its plan and held a series of public workshops on each measure (including market mechanisms).
3. January 2010 – Early action measures took effect.
4. During 2010 – CARB conducted a series of rulemakings after workshops and public hearings to adopt GHG regulations, including rules governing market mechanisms.
5. January 2011 – Completion of major rulemakings for reducing GHGs, including market mechanisms.

6. January 2012 – GHG rules and market mechanisms (e.g., cap-and-trade regulation) adopted by CARB took effect and are legally enforceable.
7. May 2014 – First Update to the Scoping Plan adopted in 2009 was released.
8. December 31, 2020 – Deadline for achieving 2020 GHG emissions cap.
9. December 31, 2030 – Deadline for achieving 2030 GHG emissions cap.

CARB is moving forward with a second update to the Scoping Plan to reflect the 2030 target established in Executive Order B-30-15. CARB has been proactive in its implementation of AB 32 and has met each of the milestones identified above that have already passed. CARB is on track to meet the last milestone.

18.2.2.4.3 California Environmental Quality Act (CEQA) Guidelines

Senate Bill 97 enacted in 2007 required the Office of Planning and Research to develop amendments to the CEQA Guidelines that address the analysis and mitigation of GHG emissions. On March 18, 2010, the California Natural Resources Agency adopted amendments to CEQA Guidelines to include provisions for evaluating the significance of GHG emissions. The amended guidelines give the lead agency leeway in determining whether GHG emissions should be evaluated quantitatively or qualitatively but requires that the following factors be considered when assessing the significance of impacts from GHG emissions (14 CCR 15064.4):

1. The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting.
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

The amended CEQA Guidelines also suggest measures to mitigate GHG emissions, including implementing project features to reduce emissions, obtaining carbon offsets to reduce, or sequestering GHG. The CEQA Guidelines also require energy use and conservation measures to be discussed, which are summarized in Chapter 15, *Public Services, Utilities, and Power*.

18.2.2.4.4 California Climate Adaptation Strategy

In 2009, the California Natural Resources Agency adopted a statewide Climate Adaptation Strategy that summarized climate change impacts and recommended adaptation strategies across seven sectors: Public Health, Biodiversity and Habitat, Oceans and Coastal Resources, Water, Agriculture, Forestry, and Transportation and Energy. In 2014, the agency updated its *2009 California Climate Adaptation Strategy* with *Safeguarding California: Reducing Climate Risk*. These policy guidance documents describe advances in climate science, climate risks, work done to date, and recommendations to manage climate risk.

18.2.3 Regional and Local Plans, Policies, and Regulations

18.2.3.1 Criteria Air Pollutants

Multiple air quality management districts and air pollution control districts have jurisdiction over the O_3, PM_{10}, and $PM_{2.5}$ nonattainment areas. The following air districts regulate air quality within the area of analysis:

- Feather River AQMD
- Sacramento Metropolitan AQMD
- Yolo-Solano AQMD

The majority of the construction activities would occur in Sutter County (Feather River AQMD) and Yolo County (Yolo-Solano AQMD); however, it is expected that truck and construction worker trips could occur in Sacramento County (Sacramento Metropolitan AQMD). Figure 18-7 depicts the location of each air district in relation to the components associated with the Project and its alternatives.

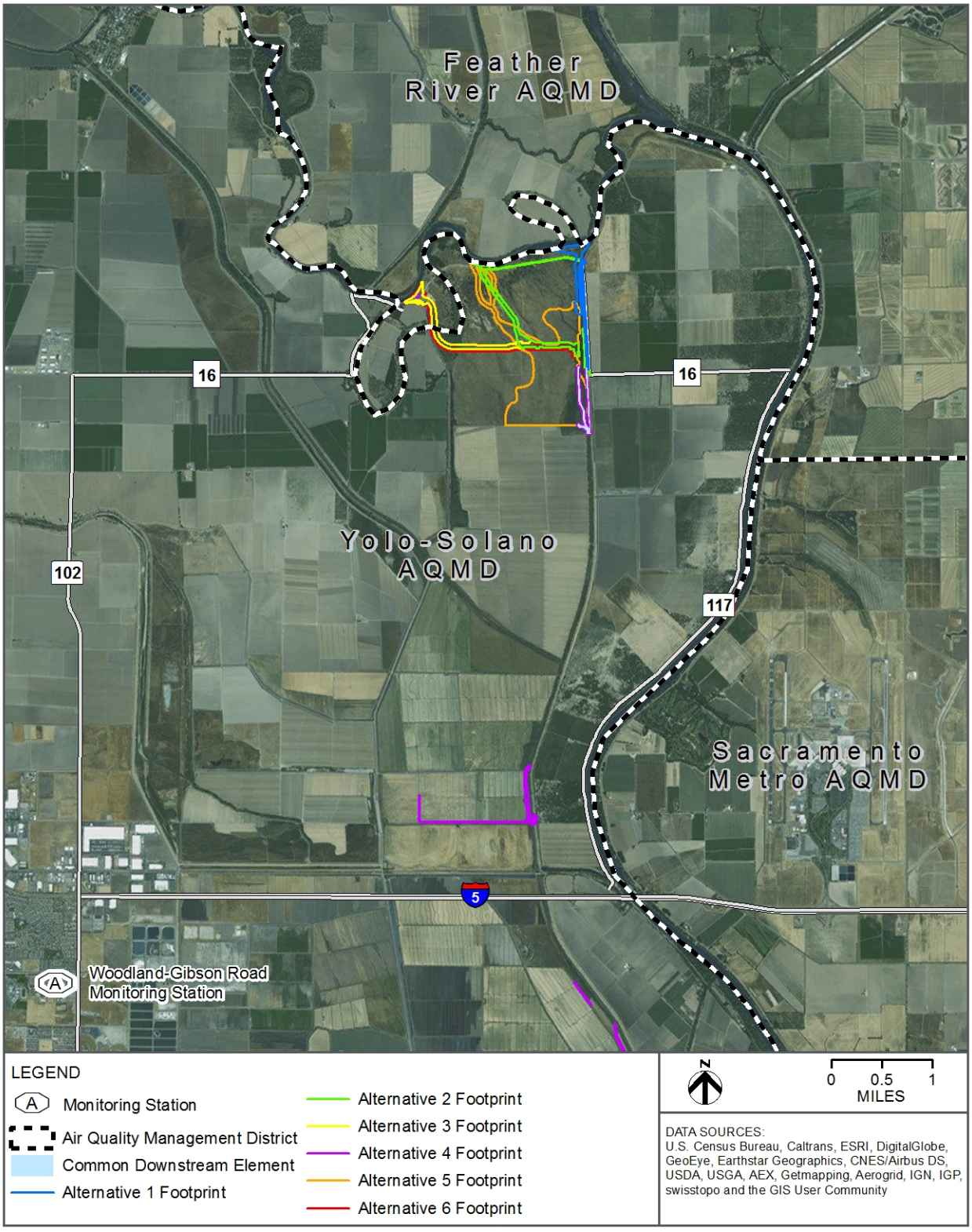


Figure 18-7. Air District Boundaries

Regional and local goals and policies for criteria pollutants are summarized in the following sections.

18.2.3.1.1 Air Quality Management Plans

Air districts are required to adopt plans describing how they intend to meet the CAAQS and NAAQS. These plans require, among other emissions-reducing activities, control technology for existing sources, control programs for area sources and indirect sources, a permitting system designed to ensure no net increase in emissions from any new or modified permitted sources of emissions, transportation control measures, and demonstration of compliance with CARB's established reporting periods for compliance with air quality goals.

Plans currently adopted by the affected air districts are as follows (CARB 2005; Sacramento Metropolitan AQMD 2010; Sacramento Metropolitan AQMD 2013):

- *2004 Revision to the California State Implementation Plan for CO: Updated Maintenance Plan for Ten Federal Planning* Areas (addresses one-hour NAAQS of 35 ppm and eight-hour NAAQS of nine ppm), approved by USEPA on November 30, 2005 (70 FR 71776)
- *PM_{10} Implementation/Maintenance Plan and Redesignation Request for Sacramento County* (addresses 1997 PM_{10} 24-hour NAAQS of 150 µg/m^3), approved by USEPA on September 26, 2013 (78 FR 59261)
- *Sacramento Regional 8-Hour O_3 Attainment and Reasonable Further Progress Plan (2013 SIP Revisions)* (addresses 1997 eight-hour O_3 NAAQS of eight hundredths ppm), approved by USEPA on January 29, 2015 (80 FR 4795)[11]

18.2.3.1.2 CEQA Guidelines

The local air districts publish CEQA Guidelines to provide lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. Construction activities would primarily occur in Yolo and Sutter counties; therefore, the CEQA guidance documents for the air districts with jurisdiction over these areas were evaluated. Limited construction activities, such as worker commuting and haul or vendor truck trips, could also occur in Sacramento and other counties.

- *Handbook for Assessing and Mitigating Air Quality Impacts* (Yolo-Solano AQMD 2007)
- *Indirect Source Review Guidelines: A Technical Guide to Assess the Air Quality Impact of Land Use Projects Under the California Environmental Quality Act* (Feather River AQMD 2010)

[11] Includes portion of study area located in Yolo County.

18.2.3.1.3 General Plans

General plans contain goals, policies, and implementation programs to guide the long-term development of a city or county.

- *2030 Countywide General Plan* (County of Yolo 2009) – The Conservation and Open Space Element of Yolo County's *2030 Countywide General Plan* contains provisions related to air quality. The Goal CO-6 (Air Quality) contains the following policies and actions applicable to the project:
  - Policy CO-6.6: Encourage implementation of Yolo-Solano AQMD best management practices to reduce emissions and control dust during construction activities.
    - Action CO-A105: Implement the regulations and programs established by the Yolo-Solano AQMD to bring local air quality into attainment with State and Federal standards
- Sutter County *2030 General Plan* (2011) – The Environmental Resources (ER) chapter of the Sutter County *2030 General Plan* contains provisions related to air quality. Goal ER 9 seeks to "perfect, maintain, and improve the air quality in Sutter County." The follow policies and actions are applicable to the project:
  - Policy ER 9.5: Submit development proposals to Feather River AQMD for review and comment in accordance with CEQA prior to consideration by the county's decision-making body.
  - Policy ER 9.6: Review and ensure new development projects incorporate feasible measures that reduce construction and operational emissions.
  - Policy ER 9.10: Give preference to contractors who use low-emission equipment and other practices with air quality benefits for county-sponsored construction projects and to businesses that practice sustainable operations.

18.2.3.2 Toxic Air Contaminants

Yolo-Solano AQMD Rule 3.13 and Feather River AQMD Rule 10-7 contain provisions related to the permitting of stationary source emissions of TACs. Both air districts also have several other rules that control TAC emissions from certain industries (e.g., medical waste incinerators) or pollutants (e.g., benzene). The local air districts do not have permitting or other regulatory authority over mobile sources.

18.2.3.3 Odors

Yolo-Solano AQMD Rule 2.5 (Nuisance) generally regulates odors. While the rule does not dictate requirements related to odors, it states that air contaminants should not be discharged if they would cause nuisance or annoyance to any considerable number of persons. The CEQA Guidelines for Yolo-Solano AQMD and Feather River AQMD both provide project screening levels for various potential odor sources, including wastewater treatment facilities, sanitary landfills, petroleum refineries, and other facilities that tend to be odorous.

18.2.3.4 Greenhouse Gases

18.2.3.4.1 Yolo County Climate Action Plan

In 2007, Yolo County, along with 11 other charter members, pledged to reduce GHG emissions by 80 percent by 2050 (Yolo County 2016).

In 2009, Yolo County adopted the *Yolo County 2030 Countywide General Plan Conservation and Open Space Element*. The 2030 General Plan contains more than 350 policies that deal with climate change, including the requirement to develop a Climate Action Plan (Yolo County 2016). The Goal CO-8 (Climate Change) contains the following policies and actions applicable to the project:

- Policy CO-8.1: Assess current GHG emission levels and adopt long-term strategies based on scientific analysis to reduce global climate change impacts.
- Policy CO-8.6: Undertake an integrated and comprehensive approach to planning for climate change by collaborating with international, national, State, and regional organizations.

In 2011, Yolo County adopted the *Climate Action Plan: A Strategy for Smart Growth Implementation, Greenhouse Gas Reduction, and Adaptation to Global Climate Change* (CAP) (Yolo County 2011). The plan sets the following targets to reduce GHG emissions: 613,651 metric tons CO_2 equivalent ($MTCO_2e$) per year by 2020; 447,965 $MTCO_2e$ per year by 2030; and 122,730 $MTCO_2e$ per year by 2050. Adoption of the plan includes an amendment to General Plan Action CO-A118, which outlines procedures for demonstrating project-level CEQA compliance.

18.2.3.4.2 Sutter County Climate Action Plan

In 2011, Sutter County adopted the Sutter County 2030 General Plan. The General Plan defines the county's environmental, social, and economic goals, which include energy conservation and minimizing air quality emissions (Sutter County 2016). The following policies and actions are applicable to the project:

- Policy M 7.3: Support regional air quality and GHG reduction goals through effective management of Sutter County's transportation system to reduce congestion and maintain a high level of service.

In 2011, Sutter County implemented the Sutter County Climate Action Plan to ensure the impact of development on air quality is minimized, energy conserved, and land use decisions within the county are consistent with goals set forth by AB 32 (Sutter County 2010).

18.3 Environmental Consequences

The purpose of this section is to provide information about the environmental consequences of the project alternatives on air quality. This section describes the methodology, criteria for determining significance of effects, and environmental consequences and mitigation measures associated with effects of each of the project alternatives. Implementing the action alternatives

could affect air quality by construction activities, including off-road construction equipment and increased traffic from trucks, construction workers, and maintenance activities.

Detailed descriptions of the alternatives evaluated in this section are provided in Chapter 2, *Description of Alternatives*.

18.3.1 Methods for Analysis

Construction emissions are described as temporary or "short term" in duration. These temporary and short-term emissions, especially emissions of criteria air pollutants (e.g., PM_{10}) and O_3 precursors (e.g., VOCs and NO_x), have the potential to represent a significant air quality impact. Fugitive dust emissions are associated primarily with site preparation and excavation and vary as a function of parameters like soil silt content, soil moisture, wind speed, acreage of disturbance area, and vehicle miles traveled on and off site. Emissions of VOC and NO_x are associated primarily with engine exhaust emissions. Appendix L1 provides detailed information on the emission calculations.

Impacts to air quality and GHG emissions are determined relative to existing conditions (for CEQA) and the No Action Alternative (for NEPA). However, as described below, the No Action Alternative would be the same as existing conditions because air quality and GHG emissions are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to existing conditions.

18.3.1.1 Models Used

The types and quantity of construction equipment were estimated by data provided in the Constructability Report (see Appendix B). The emissions estimation method was primarily based on the California Emission Estimator Model (CalEEMod), Version 2016.3.1 (CAPCOA 2016). However, the calculations were performed outside of the model for flexibility. Construction-related emissions were estimated using multiple sources as described below.

- 2011 Inventory Model for In-Use Off-Road Equipment (Construction, Industrial, Ground Support, and Drilling) (CARB 2011b)
- OFFROAD2007 Off-Road Emissions Inventory Model (CARB 2006)
- EMFAC2014 Web Database (CARB 2014d)
- California Emission Inventory and Reporting System Particulate Matter Speciation Profiles (CARB 2016g)
- AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources
  - Paved road dust emission factors (USEPA 2011)
  - Unpaved road dust emission factor (USEPA 2006a)
  - Material handling emission factors (USEPA 2006b)
  - Grading and bulldozing emission factors (USEPA 1998)
- California Emission Estimator Model User's Guide, Appendix D: Default Data Tables (CAPCOA 2016)

The following sections provide additional discussion of emission estimation methodologies used for each source group.

18.3.1.2 Onsite Construction Equipment Engine Emissions

Emission factors were developed using several of CARB's emission factor models. For off-road construction equipment, the 2011 Inventory Model for In-Use Off-Road Equipment was primarily used to estimate emissions. A Microsoft Access database maintained by CARB, the 2011 Inventory Model, replaces the OFFROAD2007 model for most diesel-fueled equipment. If a piece of construction equipment is not identified in the 2011 Inventory Model, then emission factors were developed from OFFROAD2007. Furthermore, the 2011 Inventory Model only estimates emissions for NO_x, PM_{10}, and VOCs; therefore, OFFROAD2007 was used to develop CO and SO_2 emission factors. Emission factors were developed for the SVAB for calendar year 2021.

If the power rating (horsepower) for equipment was not provided in the Constructability Report (see Appendix B), or could not be estimated from similarly sized equipment, then the default horsepower from the 2011 Inventory Model was used. Appendix L1 summarizes the horsepower and emission factors estimated for each piece of off-road equipment used during construction activities.

The emission factors that were developed for each piece of equipment are multiplied by the number of pieces of each equipment type that would be used during each phase of construction for each alternative. Peak daily and annual emissions were calculated based on the emission factors and data provided by the design engineers. To maximize emissions, it was assumed that every piece of equipment would operate simultaneously over the entire construction duration.

The construction schedule is based on a 10-hour work day (one shift). Construction would occur six days per week (Monday through Saturday).

18.3.1.3 Offsite Haul/Delivery Truck and Construction Worker Engine Emissions and Road Dust

Engine exhaust emissions would occur from several on-road vehicles, including dump trucks, concrete trucks, delivery trucks, gravel/paving trucks, and soil hauling trucks. Water trucks and flatbed trucks could also operate onsite during construction activities. Furthermore, emissions would also occur from construction workers commuting to the various construction sites. Offsite vehicle trip assumptions are consistent with those used in Chapter 17, *Transportation*.

Haul and delivery truck emission factors were estimated using EMFAC2014 for heavy-duty diesel engines while the water and flatbed trucks were assumed to be medium-duty vehicles. Construction worker commuting emissions were estimated from the SVAB's fleet mix for passenger automobiles and light-duty trucks. Both gasoline and diesel engines were assumed to be used by the construction workers.

For the haul/delivery trucks and construction workers, emission factors were estimated from the combined speeds in the SVAB (i.e., a "burden" model run), rather than a specific speed. The onsite trucks were assumed to operate at 15 miles per hour (mph). In addition to engine exhaust emissions, emission factors for tire wear, brake wear, and re-entrained paved road dust were also estimated. The EMFAC2014 model estimates tire wear and brake wear, but paved road dust

emissions were estimated using the USEPA's *Compilation of Air Pollutant Emission Factors* (AP-42, USEPA 2011).

Appendix L1 summarizes the emission factors and detailed calculations.

18.3.1.4 Unpaved Road Dust

Fugitive dust emissions would occur from unpaved access roads within the Project site. The methodology documented in Section 13.2.2 (USEPA 2006a) of AP-42 was used to estimate fugitive dust emissions from the haul trucks operating on these roads.

AP-42 requires an emission factor to be calculated using variables like the surface material silt content and mean vehicle weight on the roads. Two different equations are provided in AP-42, depending on whether the road is located at an industrial site or a publicly accessible road. The latter equation for publicly accessible roads assumes the road will be dominated by light-duty vehicles. Since haul trucks would be the primary equipment on the various haul roads, the equation for industrial sites (shown below) was used to estimate emissions.

$$E = k(s/12)^a(W/3)^b$$

Where:

E = annual size-specific emission factor (pounds per vehicle mile traveled [lbs/VMT])

k, a, and b = empirical constants (Table 18-10)

s = surface material silt content (percent)

W = mean vehicle weight (tons)

Because construction would only occur during the dry season, natural mitigation from precipitation was not included in the emission factor calculations. Table 18-10 summarizes the empirical constants used in the preceding equation and the calculated emission factors for the articulated trucks. A silt content of 4.3 percent was used for all unpaved haul roads, which is the default silt content in CalEEMod (CAPCOA 2016). The vehicular weight was estimated as 127 tons, which is the average of the loaded and unloaded Caterpillar 777E weights, which is assumed to be used at the site.

Table 18-10. Unpaved Road Dust Emission Factors

Constant	PM_{10}	$PM_{2.5}$
k (lbs/VMT)	1.5	0.15
a	0.9	0.9
b	0.45	0.45
E (lbs/VMT)	3.1	0.3

Source: USEPA 2006a

Key: a = empirical constant; b = empirical constant; E = annual size-specific emission factor; k = empirical constant; lbs/VMT = pounds per vehicle miles traveled; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter

For the unpaved haul roads, it was assumed they would be watered regularly to reduce emissions. Unpaved road dust emissions would be reduced by 61 percent with watering (Countess Environmental 2006).

18.3.1.5 Material Handling

Fugitive dust emissions would also occur from material handling activities, truck loading/unloading, and other "drops." The methodology documented in Section 13.2.4 (USEPA 2006b) of AP-42 was used to estimate fugitive dust emissions from these activities. Dust emissions were estimated using the following equation:

$$E = (0.0032)\frac{(U/5)^{1.3}}{(M/2)^{1.4}}$$

Where:

E = emission factor (pounds per ton [lbs/ton])

k = particle size multiplier (0.35 for PM_{10}, 0.053 for $PM_{2.5}$)

U = wind speed (8.59 mph)[12]

M = material moisture content (percent)

Emissions were calculated using the production rates provided in the Constructability Report (see Appendix B). Emission factors varied, depending on the material moisture content of the material being handled, and are summarized in Table 18-11.

Table 18-11. Material Handling (Truck Loading/Unloading) Emission Factors

Material	Material Moisture Content (%)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Excavated spoils	12	0.00018	0.000028
Riprap and other quarry material	2.1	0.0021	0.00032
Demolition debris	2	0.0023	0.00034

Source: CAPCOA 2016; USEPA 2006b

Key: lbs/ton = pounds per ton; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter

It was assumed that disturbed land would be watered regularly to reduce emissions. Dust emissions from material handling would be reduced by 61 percent with watering (Countess Environmental 2006).

18.3.1.6 Grading

Fugitive dust emissions would also occur from grades or scrapers leveling the land. Fugitive dust emissions from this activity were estimated in accordance with Section 11.9 of AP-42 using the following equations (USEPA 1998):

$$E_{TSP} = 0.040(S)^{2.5} \text{ and } E_{PM15} = 0.051(S)^{2.0}$$

[12] Wind speed estimated for 2015 calendar year data from the Sacramento International Airport (SMF) meteorological station (CF031) (MesoWest 2016).

Where:

E_{TSP} = emission factor for total suspended particles up to 30 microns (lbs/VMT)

E_{PM15} = emission factor for particles up to 15 microns (lbs/VMT)

S = mean vehicle speed (mph)

To estimate PM_{10} emissions, the equation for total suspended particulate matter was multiplied by a scaling factor of six tenths, whereas the PM_{15} equation was multiplied by 0.031 to estimate $PM_{2.5}$ emissions. The average grader or scraper speed was assumed to be seven and one tenth mph, which is the default value in AP-42. Using these assumptions, the emission factors were calculated as 1.54 pounds PM_{10} per VMT and 0.17 pounds $PM_{2.5}$ per VMT.

It was assumed that disturbed land would be watered regularly to reduce emissions. Dust emissions from grading would be reduced by 61 percent with watering (Countess Environmental 2006).

Grading activities vary based on the phase and alternative and are summarized in Appendix L1. Using the number of graders provided by the project applicant and assuming construction would occur over a year, the total VMT was estimated for each alternative. The annual VMT was then multiplied by the emission factor to calculate emissions.

18.3.1.7 Bulldozing

Fugitive dust emissions would also occur during bulldozing. Fugitive dust emissions from this activity were estimated in accordance with Section 11.9 of AP-42 (USEPA 1998) using the following equations:

$$E_{TSP} = \frac{5.7(s)^{1.2}}{(M)^{1.3}} \text{ and } E_{PM15} = \frac{1.0(s)^{1.5}}{(M)^{1.4}}$$

Where:

E_{TSP} = emission factor for total suspended particles up to 30 microns (lbs/VMT)

E_{PM15} = emission factor particles up to 15 microns (lbs/VMT)

s = material silt content (6.9 percent)

M = material moisture content (7.9 percent)

To estimate PM_{10} emissions, the equation for total suspended particulate matter was multiplied by the scaling factor of 0.75, whereas the PM_{15} equation was multiplied by 0.105 to estimate $PM_{2.5}$ emissions (USEPA 1998). The material silt and moisture contents were assumed to be 6.9 and 7.9 percent, respectively, which are the default values in AP-42 for bulldozing overburden. Using these assumptions, the emission factors were calculated as 0.75 pounds PM_{10} per hour and 0.41 pounds $PM_{2.5}$ per hour.

It was assumed that disturbed land would be watered regularly to reduce emissions. Dust emissions from bulldozing would be reduced by 61 percent with watering (Countess Environmental 2006).

As with grading, bulldozing activities vary based on the phase and alternative and are summarized in Appendix L1. Using the expected duration of construction for the schedule provided by the project applicant and the quantity of dozers, the number of bulldozing hours per

dozer was estimated. The project hours were then multiplied by the emission factor to estimate project emissions.

18.3.2 Thresholds of Significance – CEQA

The thresholds of significance for impacts are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. The alternatives under consideration were determined to result in a significant impact related to air quality and climate change resources if they would do any of the following:

- Violate any ambient air quality standard or contribute substantially to an existing or projected violation of any ambient air quality standard.
- Conflict with or obstruct implementation of an applicable air quality plan.
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.
- Generate criteria pollutants greater than general conformity *de minimis* thresholds (NEPA only).
- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

The threshold related to cumulative impacts is assessed in the cumulative impacts analysis (Section 18.4). In addition to the general criteria provided above, individual air districts have established significance criteria that are used in the impact analysis. The significance criteria developed by the individual air districts are used to evaluate significance associated with the first three criteria summarized above. Additional significance criteria by air district are provided below.

18.3.2.1 Yolo-Solano AQMD

The Yolo-Solano AQMD publishes a CEQA Handbook (2007) to assist lead agencies with uniform procedures for addressing air quality impacts in environmental documentation. The CEQA Handbook contains qualitative and quantitative significance thresholds for assessing impacts from construction and operational activities. Table 18-12 shows the project-level significance thresholds for construction and operational impacts.

Table 18-12. Yolo-Solano AQMD Thresholds of Significance

Pollutant	Thresholds of Significance
ROG	10 tons per year
NO_x	10 tons per year
PM_{10}	80 pounds per day
CO	Violation of a state ambient air quality standard for CO

Pollutant	Thresholds of Significance
TACs from stationary sources	Probability of contracting cancer for the maximally exposed individual equal to 10 in one million or more. OR Ground-level concentrations of non-carcinogenic TACs would result in a hazard index equal to one for the maximally exposed individual or greater.
Offensive odors	Generates odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property. (Health and Safety Code 41700 and Yolo-Solano AQMD Rule 2.5)

Source: Yolo-Solano AQMD 2007

Key: AQMD = Air Quality Management District; CO = carbon monoxide; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; TAC = toxic air contaminant

18.3.2.2 Feather River AQMD

Feather River AQMD publishes *Indirect Source Review Guidelines* (2010) to assist lead agencies in determining if a project may have a significant impact on air quality. Table 18-13 summarizes the significance thresholds used in this evaluation.

Table 18-13. Feather River AQMD Thresholds of Significance

Project Phase	NO_x	ROG	PM_{10}	$PM_{2.5}$	GHGs
Operational	25 lbs/day	25 lbs/day	80 lbs/day	Not yet established	Not yet established
Construction	25 lbs/day multiplied by project length, not to exceed 4.5 tons/year [a,b]	25 lbs/day multiplied by project length, not to exceed 4.5 tons/year [a,b]	80 lbs/day	Not yet established	Not yet established

Source: Feather River AQMD 2010

Notes:

[a] For example, if a project is six months, then the maximum allowed NO_x emissions are 4,500 pounds (2.25 tons).

[b] NO_x and ROG construction emissions may be averaged over the life of the project but may not exceed 4.5 tons per year.

Key: GHG = greenhouse gas; lbs/day = pounds per day; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases

18.3.2.3 Sacramento Metropolitan AQMD

The Sacramento Metropolitan AQMD publishes the Guide to Air Quality Assessment in Sacramento County (2016) to assist lead agencies with uniform procedures for addressing air quality impacts in environmental documentation. The guide contains qualitative and quantitative significance thresholds for assessing impacts from construction and operational activities. Table 18-14 shows the project-level significance thresholds for construction and operational impacts.

Table 18-14. Sacramento Metropolitan AQMD Thresholds of Significance

Pollutant	Construction Phase	Operational Phase
NOx (O_3 precursor)	85 pounds/day	65 pounds/day
ROG (VOC) (O_3 precursor)	None	65 pounds/day
PM_{10}	Zero. If all feasible BACT/BMPs are applied, then 80 pounds/day and 14.6 tons/year.	Zero. If all feasible BACT/BMPs are applied, then 80 pounds/day and 14.6 tons/year.
$PM_{2.5}$	Zero. If all feasible BACT/BMPs are applied, then 82 pounds/day and 15 tons/year.	Zero. If all feasible BACT/BMPs are applied, then 82 pounds/day and 15 tons/year.
GHG as CO_2e (Land Development and Construction Projects)	1,100 metric tons/year	1,100 metric tons/year

Source: Sacramento Metropolitan AQMD 2015

Key: AQMD = Air Quality Management District; BACT = best available control technology; BMPs = best management practices; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; O_3 = ozone; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; VOC = volatile organic compound

If emissions of any pollutant (NOx, VOC, PM_{10}, or $PM_{2.5}$) exceed the mass daily significance thresholds, then additional enhanced exhaust and dust control practices should be implemented. These practices are outlined in the Sacramento Metropolitan AQMD's *Guide to Air Quality Assessment in Sacramento County* (2016).

18.3.2.4 Department of Water Resources (DWR) Climate Action Plan

In May 2012, DWR adopted the DWR Climate Action Plan-Phase I: Greenhouse Gas Emissions Reduction Plan (GGERP), which details DWR's efforts to reduce its GHG emissions consistent with Executive Order S-3-05 and the Global Warming Solutions Act of 2006 (AB 32). DWR also adopted the Initial Study/Negative Declaration prepared for the GGERP in accordance with the CEQA Guidelines review and public process. Both the GGERP and Initial Study/Negative Declaration are incorporated herein by reference and are available at: http://www.water.ca.gov/climatechange/CAP.cfm. The GGERP provides estimates of historical (back to 1990), current, and future GHG emissions related to operations, construction, maintenance, and business practices (e.g., building-related energy use). The GGERP specifies aggressive 2020 and 2050 emission reduction goals and identifies a list of GHG emissions reduction measures to achieve these goals.

DWR specifically prepared its GGERP as a "Plan for the Reduction of Greenhouse Gas Emissions" for purposes of CEQA Guidelines Section 15183.5. That section provides that such a document, which must meet certain specified requirements, "may be used in the cumulative impacts analysis of later projects." Because global climate change, by its very nature, is a global cumulative impact, an individual project's compliance with a qualifying GHG reduction plan may suffice to mitigate the project's incremental contribution to that cumulative impact to a level that is not "cumulatively considerable." (See CEQA Guidelines, Section 15064, subd. (h)(3).)

More specifically, "[l]ater project-specific environmental documents may tier from and/or incorporate by reference" the "programmatic review" conducted for the GHG emissions reduction plan. "An environmental document that relies on a greenhouse gas reduction plan for a

cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project." (CEQA Guidelines Section 15183.5, subd. (b)(2).)

Section 12 of the GGERP outlines the steps that each DWR project will take to demonstrate consistency with the GGERP. These steps include: 1) analysis of GHG emissions from construction of the proposed project, 2) determination that the construction emissions from the project do not exceed the levels of construction emissions analyzed in the GGERP, 3) incorporation into the design of the project DWR's project level GHG emissions reduction strategies, 4) determination that the project does not conflict with DWR's ability to implement any of the "Specific Action" GHG emissions reduction measures identified in the GGERP, and 5) determination that the project would not add electricity demands to the State Water Project system that could alter DWR's emissions reduction trajectory in such a way as to impede its ability to meet its emissions reduction goals.

Consistent with these requirements, a GGERP Consistency Determination Checklist for each alternative documenting if the project has met each of the required elements is included as Appendix L2.

18.3.2.5 DWR Extraordinary Construction Project Determination

If construction activities are to be performed by outside contractors, then the project must be evaluated against the Extraordinary Construction Project Thresholds established by DWR:

- Total Construction Emissions of 25,000 $MTCO_2e$ or more
- Maximum Annual Construction Emissions of 12,500 $MTCO_2e$ or more.

If the project exceeds either one of these thresholds, then the construction emissions from the project must be analyzed and, if necessary, mitigated on a project-specific basis. Even if a project exceeds the Extraordinary Construction Project thresholds, only the construction activity emissions need to be analyzed on a project-specific basis. However, projects can still rely on the analysis in the GGERP for operations, maintenance, and business activity emissions provided they meet other consistency requirements.

18.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect effects on air quality and greenhouse gas emissions from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

18.3.3.1 No Action Alternative

Under the No Action Alternative, the Project would not be implemented and none of the project features would be developed. This analysis assumes that no short-term construction activities or long-term operational impacts would occur. As such, air quality conditions under the No Action Alternative would be the same as existing conditions.

CEQA Conclusion

The No Action Alternative would have **no impact** because the emissions in the Yolo Bypass vicinity would not change.

18.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

18.3.3.2.1 Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation

To assess whether a proposed project would violate any air quality standards or contribute substantially to an existing or projected air quality violation, the air districts developed significance thresholds for mass daily and/or annual emission rates of criteria pollutants. Construction of the East Channel, Downstream Channel, and Agricultural Road Crossing 1 would occur in Yolo County; the West Supplemental Fish Passage would be in Sutter County.

The emission calculations completed for this analysis include haul truck emissions, construction worker commuting, off-road engine exhaust, and fugitive dust emissions from paved and unpaved roads. While construction of each element would happen concurrently, individual activities would be staggered. For example, construction of the East Channel and Downstream Channel would happen concurrently, but individual activities like clearing and grubbing would be staggered. Detailed information on the construction schedule is provided in Appendix B, *Constructability and Construction Considerations*.

Criteria pollutant emissions from construction equipment exhaust and fugitive dust were estimated using the various tools and methods described in 18.4.1 (Methods for Analysis). Table 18-15 summarizes the maximum daily and annual emissions that would be estimated to occur for each component. Additionally, long-term operational emissions would occur from routine maintenance activities, which include the following: 1) road regrading; 2) removal of debris, vegetation, and sediment; 3) rock replacement; and 4) various repairs and inspections.

Table 18-16 summarizes the maximum daily and annual operational emissions that would occur for each component. Significance was determined for individual air districts. Exceedances of air district thresholds are shown in underline.

Table 18-15. Unmitigated Maximum Daily and Annual Construction Emissions for Alternative 1

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	130	0.7	9.2
Supplemental Fish Passage West	216	<0.1	0.4
Downstream Channel	120	0.4	5.7
Agricultural Road Crossing 1	1	<0.1	0.4
Maximum Construction Emissions[1,2]	**467**	**1.2**	**15.8**
Maximum Construction Emissions in Yolo County	**363**	**1.2**	**15.4**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**227**	**<0.1**	**0.4**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	No

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x annual significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-16. Unmitigated Maximum Daily and Annual Operational Emissions for Alternative 1

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	7	77	4	0.1	0.8
Supplemental Fish Passage West	7	77	4	<0.1	<0.1
Downstream Channel	3	46	2	<0.1	0.1
Agricultural Road Crossing 1	4	41	2	<0.1	<0.1
Total Operational Emissions[1]	**20**	**240**	**12**	**0.1**	**1.0**
Operational Emissions in Yolo County	**14**	**163**	**8**	**0.1**	**0.9**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	No	**Yes**	No	No	No
Operational Emissions in Sutter County	**7**	**77**	**4**	**<0.1**	**<0.1**
Feather River AQMD Significance Threshold[2]	n/a	n/a	80 lbs/day	n/a	n/a
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No	n/a	n/a

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

As shown in Table 18-15, construction-related PM_{10} emissions would exceed Feather River AQMD's and Yolo-Solano AQMD's maximum daily significance thresholds. Yolo-Solano AQMD's annual significance threshold for NO_x would be exceeded. Additionally, as shown in Table 18-16, Yolo-Solano AQMD's operational significance threshold would be exceeded for NO_x.

CEQA Conclusion

The impact would be **significant** under Alternative 1 because PM_{10} and NO_x construction emissions would exceed the significance thresholds established by the air districts, and NO_x operational emissions would exceed Yolo-Solano AQMD's significance threshold.

Mitigation Measure MM-AQ-1: Reduce fugitive dust emissions from unpaved roads

All unpaved roads from the construction areas to offsite sediment disposal areas will be covered with gravel to reduce fugitive dust emissions. Watering will also be maintained to adequately reduce emissions.

Mitigation Measure MM-AQ-2: Reduce off-road exhaust emissions from construction equipment

Impacts on air quality from construction and maintenance activities will be reduced by using Tier 4 construction equipment instead of the fleet average for the Sacramento Valley Air Basin.

Mitigation Measure MM-AQ-3: Reduce exhaust emissions from on-road trucks

Applicable to both construction and maintenance activities, all haul trucks, vendor trucks, or other vehicles operating on site with on-road engines will meet model year 2010 or better emission standards.

Mitigation Measure MM-AQ-4: Implement Best Available Mitigation Measures for Construction Phase

As required by the Feather River AQMD, if construction emissions exceed the significance thresholds provided in Table 18-13, then the project must apply the following best available mitigation measures for the construction phase:

1. All grading operations on a project shall be suspended when winds exceed 20 miles per hour or when winds carry dust beyond the property line despite implementation of all feasible dust control measures.
2. Construction sites shall be watered as directed by the Department of Public Works or Feather River AQMD as necessary to prevent fugitive dust violations.
3. An operational water truck shall be available at all times. Apply water to control dust as needed to prevent visible emissions violations and offsite dust impacts.
4. Onsite dirt piles or other stockpiled particulate matter shall be covered, wind breaks installed, and water and/or soil stabilizers employed to reduce windblown dust emissions. Incorporate

the use of approved non-toxic soil stabilizers per manufacturer's specifications to all inactive construction areas.

5. All transfer processes involving a free fall of soil or other particulate matter shall be operated in such a manner as to minimize the free fall distance and fugitive dust emissions.
6. Apply approved chemical soil stabilizers per the manufacturers' specifications to all-inactive construction areas (previously graded areas that remain inactive for 96 hours), including unpaved roads.
7. To prevent track-out, wheel washers shall be installed where project vehicles and/or equipment exit onto paved streets from unpaved roads. Vehicles and/or equipment shall be washed prior to each trip. Alternatively, a gravel bed may be installed as appropriate at vehicle and equipment site exit points to effectively remove soil buildup on tires and tracks to prevent or diminish track-out.
8. Paved streets shall be swept frequently (water sweeper with reclaimed water recommended; wet broom) if soil material has been carried onto adjacent paved, public thoroughfares from the Project site.
9. Provide temporary traffic control as needed during all phases of construction to improve traffic flow, as deemed appropriate by the Department of Public Works and/or California Department of Transportation, and reduce vehicle dust emissions. An effective measure is to enforce vehicle traffic speeds at or below 15 mph.
10. Reduce traffic speeds on all unpaved surfaces to 15 mph or less and reduce unnecessary vehicle traffic by restricting access. Provide appropriate training, onsite enforcement, and signage.
11. Reestablish ground cover on the construction site as soon as possible and prior to final occupancy through seeding and watering.
12. Prohibit disposal by burning. Open burning is yet another source of fugitive gas and particulate emissions and shall be prohibited at the project site. No open burning of vegetative waste (natural plant growth wastes) or other legal, or illegal, burn materials (e.g., trash or demolition debris) may be conducted at the Project site. Vegetative wastes shall be chipped or delivered as waste to energy facilities (permitted biomass facilities), mulched, composted, or used for firewood. It is unlawful to haul waste materials off site for disposal by open burning.

An additional mitigation measure to extend the schedule was also evaluated. While this mitigation could reduce air quality impacts to less than significant, doing so would negatively affect other resource areas because impacts to biological resources would be extended and fisheries benefits would be delayed. Furthermore, extending the schedule would be disruptive to neighboring residences because air quality and noise impacts would occur for a longer time. Therefore, extending the schedule was found to be an infeasible mitigation measure because of adverse impacts to other resource areas, and it was not considered further in the analysis.

Table 18-17 summarizes the maximum daily and annual mitigated construction emissions, and Table 18-18 summarizes maximum daily and annual mitigated operational emissions. Exceedances of air district thresholds are shown in underline. As shown in the tables, NO_x construction emissions in Yolo County (Yolo-Solano AQMD) and NO_x operational emissions in

Yolo County (Yolo-Solano AQMD) would be reduced to less than significant. However, mitigated PM_{10} construction emissions would continue to exceed both district's AQMD significance thresholds. Therefore, this impact would be **significant and unavoidable**.

Table 18-17. Mitigated Maximum Daily and Annual Construction Emissions for Alternative 1

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	58	0.5	5.5
Supplemental Fish Passage West	89	<0.1	0.3
Downstream Channel	51	0.3	4.1
Agricultural Road Crossing 1	1	<0.1	0.2
Total Construction Emissions for Peak Day[1,2]	**199**	**0.8**	**10.1**
Maximum Construction Emissions in Yolo County	**156**	**0.8**	**9.8**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	No
Maximum Construction Emissions in Sutter County	**97**	**<0.1**	**0.3**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	No

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x annual significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-18. Mitigated Maximum Daily and Annual Operational Emissions for Alternative 1

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)
Intake Channel, Headworks, and Outlet Channel	2	10	<1
Supplemental Fish Passage West	2	10	<1
Downstream Channel	1	5	<1
Agricultural Road Crossing 1	1	6	<1
Total Operational Emissions[1]	**6**	**32**	**1**
Operational Emissions in Yolo County	**4**	**22**	**1**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day
Emissions Greater than Yolo-Solano AQMD Threshold?	No	No	No
Operational Emissions in Sutter County	**2**	**10**	**<1**
Feather River AQMD Significance Threshold	n/a	n/a	80 lbs/day
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases

18.3.3.2.2 Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan

Yolo-Solano AQMD and Feather River AQMD have adopted various air quality plans for the pollutants that are currently designated nonattainment. The significance thresholds developed by the air districts were based on the CEQA environmental checklist to assist with determining if a project could conflict with or obstruct an applicable air quality plan. In other words, if emissions are less than these thresholds, then the project would be determined to not conflict with or obstruct implementation of the various air quality management plans maintained by the air districts. The project is under thresholds except for NOx and PM_{10}.

Although short-term and temporary, construction-related emissions would occur from vehicular exhaust and fugitive dust (discussed under Impact AQ-1). PM_{10} construction emissions would exceed the significance thresholds for the air districts and NO_x construction emissions would exceed the significance thresholds for Yolo-Solano AQMD. Additionally, long-term operational emissions from maintenance activities would exceed the NO_x significance threshold for Yolo-Solano AQMD.

CEQA Conclusion

This impact would be **significant** under Alternative 1 because PM_{10} construction emissions would exceed the significance thresholds for both air districts, NO_x construction emissions would exceed the significance threshold for the Yolo-Solano AQMD, and NO_x operational emissions would exceed Yolo-Solano AQMD's significance threshold.

Implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, and MM-AQ-4 would reduce NO_x construction and maintenance emissions in Yolo County (Yolo-Solano AQMD) to a level that is less than significant. However, PM_{10} construction emissions would continue to exceed the air districts' significance thresholds; thus, construction of this alternative could conflict with or obstruct implementation of the air quality plans, and this impact would be **significant and unavoidable**.

18.3.3.2.3 Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations

To determine if sensitive receptors are exposed to substantial pollutant concentrations, potential health risks must be assessed. Diesel particulate matter is listed as a TAC in California and would be subject to a human health risk assessment under CEQA. The closest sensitive receptors (which include hospitals, K-12 schools, residences, and day care centers) are various farmhouses along the river, but none are within 1,000 feet of the construction areas (see Chapter 20, *Noise*, for residential locations).

The Yolo-Solano AQMD's *Handbook for Assessing and Mitigating Air Quality Impacts* (2007) states that CARB's *Air Quality and Land Use Handbook* (2005) be used to address land use compatibility issues related to health risk. CARB's Handbook states that exposure and health risk from freeways and other high traffic roads drops substantially after 300 feet and further shows that 70 percent of particulate matter drops off at 500 feet. The Handbook also states that sensitive

land uses should not be located within 500 feet of rural roads with 50,000 vehicles per day. Alternative 1 would require a maximum of 626 three-axle dump trucks per day for one week of the 28-week construction period. Materials would be assumed to be delivered constantly throughout the standard work day using the East Alternative haul route (see Chapter 17, Transportation, for haul route description). Post construction, Alternative 1 would require a maximum of 394 truck trips per day on the East Alternative haul route. While some sensitive receptors could be within 500 feet of a rural road, these increased truck trips would not cause vehicular traffic to exceed 50,000 trips per day.

Based on the limited duration of the construction activities and the distance to sensitive land uses under Alternative 1, impacts on sensitive receptors would be minimal. Therefore, implementation of Alternative 1 would not expose sensitive receptors to substantial pollutant concentrations.

CEQA Conclusion

This impact would be **less than significant** because no sensitive receptors are in the immediate vicinity of the Alternative 1 construction footprint, and TAC emissions would be temporary.

18.3.3.2.4 Impact AQ-4: Create objectionable odors affecting a substantial number of people

The use of diesel equipment during construction may generate near-field odors that are a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, odors from diesel exhaust would not affect a substantial number of people. Therefore, implementation of Alternative 1 would not create objectionable odors affecting a substantial number of people.

CEQA Conclusion

This impact would be **less than significant** because construction would be temporary and no receptors would be in the immediate vicinity of Alternative 1 construction footprint.

18.3.3.2.5 Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds

The Project is subject to general conformity because it involves federal funding and approval from a Federal agency. The area of analysis is classified as a severe nonattainment area for O_3, a nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10} and CO; therefore, Alternative 1 is subject to the general conformity *de minimis* thresholds in 40 CFR 93.153(b).[13]

Because the CEQA-related mitigation measures are fully enforceable under California Public Resources Code (PRC) Section 21081.6 and, therefore, a requirement of project implementation, mitigated emissions for this alternative were compared to the general conformity *de minimis* thresholds (i.e., should Alternative 1 be selected and approved, implementation of the alternative

[13] As shown in Figure 18-4, the CO and PM_{10} maintenance areas are outside of the construction footprint for this alternative; however, haul/vendor trucks and construction worker trips could originate in areas designated maintenance.

would be subject to the requirements of the air quality mitigation measures presented herein). Table 18-19 summarizes estimated construction emissions associated with Alternative 1 and compares these emissions to the general conformity *de minimis* thresholds.

Table 18-19. General Conformity Applicability Evaluation for Alternative 1

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
ROG	Sacramento Metro	Severe Nonattainment	0.8	25	No
NO_x	Sacramento Metro	Severe Nonattainment	10.1	25	No
CO	Sacramento Area	Maintenance	7.9	100	No
SO_2	Sacramento	$PM_{2.5}$ Precursor	<0.1	100	No
PM_{10}	Sacramento County	Maintenance	3.1	100	No
$PM_{2.5}$	Sacramento	Nonattainment	0.6	100	No
$PM_{2.5}$	Yuba City-Marysville	Nonattainment	<0.1	100	No

Notes:
Emission calculations assume the incorporation of the environmental commitments described as part of the project design.
Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate; PM_{10} = inhalable particulate matter; matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

As indicated in Table 18-19, construction emissions would be less than the general conformity *de minimis* thresholds. Therefore, a general conformity determination is not required, and Alternative 1 would conform to the SIP.

CEQA Conclusion

This impact would be **less than significant** because emissions associated with Alternative 1 would be less than the general conformity *de minimis* thresholds.

18.3.3.2.6 Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

Construction activities associated with Alternative 1 would directly emit GHG emissions from off-road construction equipment, on-road haul trucks and delivery vehicles, and construction worker commuting.

Each GHG contributes to climate change differently, as expressed by its global warming potential (GWP). GHG emissions are discussed in terms of CO_2e emissions, which express, for a given mixture of GHG, the amount of CO_2 that would have the same GWP over a specific timescale. CO_2e is determined by multiplying the mass of each GHG by its GWP. This analysis uses the GWP from the Intergovernmental Panel and Climate Change Fourth Assessment Report (Forster et al. 2007) for a 100-year time period to estimate CO_2e. This approach is consistent with the Federal GHG Reporting Rule (40 CFR 98), as effective on January 1, 2014 (78 FR 71904) and California's 2000-2014 GHG Emission Inventory Technical Support Document (CARB 2016h). The GWPs used in this analysis are 25 for CH_4 and 298 for N_2O.

Table 18-20 summarizes the GHG emissions associated with Alternative 1. Exceedances of DWR's criteria thresholds are shown in underline. Detailed calculations are provided in Appendix L1.

Table 18-20. GHG Emissions Summary for Alternative 1

Component	Construction Emissions ($MTCO_2e$/project)	Operational Emissions ($MTCO_2e$/year)
Intake Channel, Headworks, and Outlet Channel	2,862	285
Supplemental Fish Passage West	139	13
Downstream Channel	1,728	19
Agricultural Road Crossing 1	137	7
Grand Total	**4,866**	**324**

Note: Totals may not add up because of rounding.
Key: GHG = greenhouse gas; $MTCO_2e$ = metric tons carbon dioxide equivalent

Emissions from construction activities associated with Alternative 1 would not exceed the significance criterion of 12,500 $MTCO_2e$ per year.

CEQA Conclusion

This impact would be **less than significant** because GHG emissions associated with Alternative 1 would not exceed the significance threshold.

18.3.3.2.7 Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities would not exceed the significance criterion of 12,500 $MTCO_2e$ per year, Alternative 1 also would not conflict with the plans, policies, and regulations adopted to reduce GHG emissions, and impacts would be less than significant.

CEQA Conclusion

This impact would be **less than significant** because GHG emissions would not exceed the significance threshold.

18.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

18.3.3.3.1 Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation

Construction of the Center Channel, Downstream Channel, and Agricultural Road Crossing 1 would occur in Yolo County. The West Supplemental Fish Passage would be in Sutter County. Criteria pollutant emissions from construction equipment exhaust and fugitive dust were estimated using the various tools and methods described in 18.4.1 (Methods for Analysis).

Table 18-21 summarizes the maximum daily and annual construction emissions that would be estimated to occur for each component under Alternative 2. Table 18-22 summarizes the maximum daily and annual operational emissions that would occur for each component. Significance was determined for individual air districts. Exceedances of air district thresholds are shown in underline. Detailed calculations are provided in Appendix L1.

Table 18-21. Unmitigated Maximum Daily and Annual Construction Emissions for Alternative 2

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	262	1.2	17.6
Supplemental Fish Passage West	216	<0.1	0.4
Downstream Channel	120	0.4	5.7
Agricultural Road Crossing 1	1	<0.1	0.4
River Grading	3	0.7	5.6
Total Construction Emissions for Peak Day[1,2]	**602**	**2.4**	**29.8**
Maximum Construction Emissions in Yolo County	**503**	**2.3**	**29.4**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**227**	**<0.1**	**0.4**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	No

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-22. Unmitigated Maximum Daily and Annual Operational Emissions for Alternative 2

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	7	77	4	0.1	1.0
Supplemental Fish Passage West	7	77	4	<0.1	<0.1
Downstream Channel	3	46	2	<0.1	0.1
Agricultural Road Crossing 1	4	41	2	<0.1	<0.1
Total Operational Emissions[1]	**20**	**240**	**12**	**0.1**	**1.1**
Operational Emissions in Yolo County	**14**	**163**	**8**	**0.1**	**1.1**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	No	**Yes**	No	No	No
Operational Emissions in Sutter County	7	77	4	<0.1	<0.1
Feather River AQMD Significance Threshold[2]	n/a	n/a	80 lbs/day	n/a	n/a
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No	n/a	n/a

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

As shown in Table 18-21, construction-related PM_{10} emissions would exceed the significance thresholds established by Yolo-Solano AQMD and Feather River AQMD; and construction-related NO_x emissions would exceed Yolo-Solano AQMD's annual significance threshold. Additionally, as shown in Table 18-22, Yolo-Solano AQMD's operational significance threshold would be exceeded for NO_x.

CEQA Conclusion

This impact would be **significant** because PM_{10} emissions associated with Alternative 2 construction would exceed the significance thresholds established by the air districts, NO_x construction emissions would exceed Yolo-Solano AQMD's significance threshold, and NO_x operational emissions would exceed Yolo-Solano AQMD's significance threshold.

Implementation of mitigation measures MM-AQ-1, MM-AQ-2, MM-AQ-3, and MM-AQ-4 would reduce criteria pollutant emissions. Table 18-23 summarizes the maximum daily and annual mitigated construction emissions, and Table 18-24 summarizes maximum daily and annual mitigated operational emissions. As shown in the tables NO_x operational emissions in Yolo County (Yolo-Solano AQMD) would be reduced to less than significant. However, mitigated PM_{10} and NO_x construction emissions would continue to exceed both air districts' significance thresholds, and this impact would be **significant and unavoidable**.

Table 18-23. Mitigated Maximum Daily and Annual Construction Emissions for Alternative 2

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	121	0.8	10.5
Supplemental Fish Passage West	89	<0.1	0.3
Downstream Channel	51	0.3	4.1
Agricultural Road Crossing 1	1	<0.1	0.2
River Grading	3	0.7	1.7
Total Construction Emissions for Peak Day[1,2]	**265**	**1.8**	**16.8**
Maximum Construction Emissions in Yolo County	**226**	**1.7**	**16.6**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**97**	**<0.1**	**0.3**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	No

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-24. Mitigated Daily Maximum and Annual Operational Emissions for Alternative 2

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)
Intake Channel, Headworks, and Outlet Channel	2	10	<1
Supplemental Fish Passage West	2	10	<1
Downstream Channel	1	5	<1
Agricultural Road Crossing 1	1	6	<1
Total Operational Emissions[1]	**6**	**32**	**1**
Operational Emissions in Yolo County	**4**	**22**	**1**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day
Emissions Greater than Yolo-Solano AQMD Threshold?	No	No	No
Operational Emissions in Sutter County	**2**	**10**	**<1**
Feather River AQMD Significance Threshold[2]	n/a	n/a	80 lbs/day
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = air quality management district; lbs/day = pounds per day; n/a = not applicable; NO_X = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases

18.3.3.3.2 Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan

As discussed previously, the air quality plans adopted by Yolo-Solano AQMD and Feather River AQMD are sufficient to determine if a project could conflict with or obstruct an applicable air quality plan.

Although short-term and temporary, construction-related emissions would occur from vehicular exhaust and fugitive dust (discussed under Impact AQ-1). Maximum daily PM_{10} emissions would exceed the significance thresholds for both air districts while annual NO_x emissions would exceed Yolo-Solano AQMD's significance threshold. Additionally, long-term operational emissions from maintenance activities would exceed the NO_x significance threshold for Yolo-Solano AQMD.

CEQA Conclusion

This impact would be **significant** because PM_{10} and NO_x emissions associated with Alternative 2 would exceed the significance thresholds established by the air districts.

Implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, and MM-AQ-4 would reduce operational NO_x emissions in Yolo County (Yolo-Solano AQMD) to less than significant. However, PM_{10} construction emissions would continue to exceed both air districts' significance thresholds, and NO_x construction emissions would continue to exceed Yolo-Solano AQMD's significance threshold. Thus, construction of Alternative 2 could conflict with or obstruct implementation of the air quality plans, and this impact would be **significant and unavoidable**.

18.3.3.3.3 Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations

To determine if sensitive receptors are exposed to substantial pollutant concentrations, potential health risks must be assessed. Diesel particulate matter is listed as a TAC in California and would be subject to a human health risk assessment under CEQA. The closest sensitive receptors (which include hospitals, K-12 schools, residences, and day care centers) are various farmhouses along the river, but none are within 1,000 feet of the construction areas (see Chapter 20, *Noise*, for residential locations). Alternative 2 would require a total of 587 three-axle dump truck trips per day during one week of the construction period. While materials could be hauled to the Project area via the East or West Alternative routes, peak trips could occur on the East Alternative route when all project elements (e.g., Downstream Reach, Fish Passage East, and Agricultural Crossing 1) are considered. Post construction, Alternative 2 would require a maximum of 394 truck trips per day on the East Alternative haul route. While sensitive receptors may be located within 500 feet of a rural road, these increased truck trips would not cause vehicular traffic to exceed 50,000 trips per day.

Based on the limited duration of the construction activities and the distance to sensitive land uses under Alternative 2, impacts on sensitive receptors would be minimal. Therefore, implementation of Alternative 2 would not expose sensitive receptors to substantial pollutant concentrations.

CEQA Conclusion

This impact would be **less than significant** because no sensitive receptors are in the immediate vicinity of the construction footprint for Alternative 2 and TAC emissions would be temporary.

18.3.3.3.4 Impact AQ-4: Create objectionable odors affecting a substantial number of people

The use of diesel equipment during construction of Alternative 2 may generate near-field odors that are a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, odors from diesel exhaust would not affect a substantial number of people. Therefore, implementation of Alternative 2 would not create objectionable odors affecting a substantial number of people.

CEQA Conclusion

This impact would be **less than significant** because Alternative 2 construction would be temporary and no receptors would be in the immediate vicinity of the construction footprint.

18.3.3.3.5 Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds

The Project is subject to general conformity because it involves a Federal agency. The area of analysis is classified as a severe nonattainment area for O_3, a nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10} and CO; therefore, Alternative 2 is subject to the general conformity *de minimis* thresholds in 40 CFR 93.153(b).[14]

Because the CEQA-related mitigation measures are fully enforceable under PRC Section 21081.6 and therefore a requirement of project implementation, mitigated emissions for this alternative were compared to the general conformity *de minimis* thresholds (i.e., should this alternative be selected and approved, implementation of the alternative would be subject to the requirements of the air quality mitigation measures presented herein). Table 18-25 summarizes estimated construction emissions associated with Alternative 2 and compares these emissions to the general conformity *de minimis* thresholds.

Table 18-25. General Conformity Applicability Evaluation for Alternative 2

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
ROG	Sacramento Metro	Severe Nonattainment	1.8	25	No
NO_x	Sacramento Metro	Severe Nonattainment	16.8	25	No
CO	Sacramento Area	Maintenance	15.7	100	No
SO_2	Sacramento	$PM_{2.5}$ Precursor	0.1	100	No

[14] As shown in Figure 18-4, the CO and PM_{10} maintenance areas are outside of the construction footprint for this alternative; however, haul/vendor trucks and construction worker trips could originate in areas designated maintenance.

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
PM_{10}	Sacramento County	Maintenance	4.5	100	No
$PM_{2.5}$	Sacramento	Nonattainment	0.9	100	No
$PM_{2.5}$	Yuba City-Marysville	Nonattainment	<0.1	100	No

Notes:

Emission calculations assume the incorporation of the environmental commitments described as part of the project design.

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

As indicated in Table 18-25, construction emissions would be less than the general conformity *de minimis* thresholds. Therefore, a general conformity determination is not required, and this alternative would conform to the SIP.

CEQA Conclusion

This impact would be **less than significant** under Alternative 2 because emissions would be less than the general conformity *de minimis* thresholds.

18.3.3.3.6 Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

Construction activities associated with Alternative 2 would directly emit GHG emissions from off-road construction equipment, on-road haul trucks and delivery vehicles, and construction worker commuting. Table 18-26 summarizes the GHG emissions associated with Alternative 2. Detailed calculations are provided in Appendix L1.

Table 18-26. GHG Emissions Summary for Alternative 2

Component	Construction Emissions ($MTCO_2e$/project)	Operational Emissions ($MTCO_2e$/year)
Intake Channel, Headworks, and Outlet Channel	5,299	310
Supplemental Fish Passage West	139	13
Downstream Channel	1,728	19
Agricultural Road Crossing 1	137	7
River Grading	2,621	n/a
Grand Total	**9,924**	**350**

Note: Totals may not add up because of rounding.

Key: GHG = greenhouse gas; $MTCO_2e$ = metric tons carbon dioxide equivalent

Emissions from construction activities would not exceed the significance criterion of 12,500 $MTCO_2e$ per year.

CEQA Conclusion

This impact would be **less than significant** under Alternative 2 because GHG emissions would not exceed the significance threshold.

18.3.3.3.7 Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities would not exceed the significance criterion of 12,500 $MTCO_2e$ per year, this alternative also would not conflict with the plans, policies, and regulations adopted to reduce GHG emissions, and impacts would be less significant.

CEQA Conclusion

This impact would be **less than significant** because GHG emissions under Alternative 2 would not exceed the significance threshold.

18.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

18.3.3.4.1 Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation

Construction of the East Supplemental Fish Passage, Downstream Channel, and Agricultural Road Crossing 1 would occur in Yolo County. Construction of West Channel would occur in both Yolo and Sutter counties. Criteria pollutant emissions from construction equipment exhaust and fugitive dust were estimated using the various tools and methods described in 18.4.1 (Methods for Analysis).

Because the data for construction of the West Channel are only available in aggregate form, it is not feasible to separate emissions associated with construction of Alternative 3 between the two counties. To be conservative and to estimate worst-case emissions in each county, it was assumed that 100 percent of emissions could occur in either county for comparison to the CEQA significance thresholds. Table 18-27 summarizes the maximum daily and annual construction emissions that would be estimated to occur for each component. Table 18-28 summarizes the maximum daily and annual operational emissions that would occur for each component. Significance was determined for individual air districts.

Table 18-27. Unmitigated Maximum Daily and Annual Construction Emissions for Alternative 3

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	266	1.7	23.9
Supplemental Fish Passage East	216	<0.1	0.5
Downstream Channel	120	0.4	5.7
Agricultural Road Crossing 1	1	<0.1	0.4
Total Construction Emissions for Peak Day[1,2]	**603**	**2.1**	**30.5**
Maximum Construction Emissions in Yolo County	**603**	**2.1**	**30.5**
Yolo-Solano AQMD Significance Threshold	80	10	10
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**380**	**1.7**	**23.9**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	**Yes**

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-28. Unmitigated Maximum Daily and Annual Operational Emissions for Alternative 3

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	7	78	4	0.1	1.0
Supplemental Fish Passage East	7	77	4	<0.1	<0.1
Downstream Channel	3	46	2	<0.1	0.1
Agricultural Road Crossing 1	4	41	2	<0.1	<0.1
Total Emissions[1]	**20**	**242**	**12**	**0.1**	**1.2**
Operational Emissions in Yolo County	**20**	**242**	**12**	**0.1**	**1.2**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	No	**Yes**	No	No	No
Operational Emissions in Sutter County	**7**	**78**	**4**	**0.1**	**1.0**
Feather River AQMD Significance Threshold	n/a	n/a	80 lbs/day	n/a	n/a
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No	n/a	n/a

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

As shown in Table 18-27, construction-related PM_{10} emissions would exceed the significance thresholds established by Yolo-Solano AQMD and Feather River AQMD; and annual NO_x emissions would exceed both air districts' significance thresholds. Additionally, as shown in Table 18-28, Yolo-Solano AQMD's operational significance threshold would be exceeded for NO_x.

CEQA Conclusion

This impact would be **significant** because PM_{10} and NO_x construction-related emissions associated with Alternative 3 would exceed the significance thresholds established by the air districts. Additionally, NO_x emissions related to long-term maintenance activities would exceed Yolo-Solano AQMD's operational significance threshold.

Mitigation Measure MM-AQ-5: Stagger maintenance activities so that total daily emissions are less than the significance thresholds

Maintenance activities will be staggered to occur on different days so that total emissions would be less than the significance thresholds.

Implementation of mitigation measures MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, and MM-AQ-5 would reduce criteria pollutant emissions. Table 18-29 summarizes the maximum daily and annual mitigated construction emissions, and Table 18-30 summarizes maximum daily and annual mitigated operational emissions. As shown in the tables, NO_x operational emissions in Yolo County (Yolo-Solano AQMD) would be reduced to less than significant. However, mitigated PM_{10} and NO_x construction emissions would continue to exceed Yolo-Solano and Feather River AQMDs' daily and annual significance thresholds, and this impact would be **significant and unavoidable**.

Table 18-29. Mitigated Maximum Daily and Annual Construction Emissions for Alternative 3

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	125	1.0	13.6
Supplemental Fish Passage East	89	<0.1	0.3
Downstream Channel	51	0.3	4.1
Agricultural Road Crossing 1	1	<0.1	0.2
Total Construction Emissions for Peak Day[1,2]	**266**	**1.3**	**18.3**
Maximum Construction Emissions in Yolo County	**266**	**1.3**	**18.3**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**172**	**1.0**	**13.6**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	**Yes**

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-30. Mitigated Maximum Daily and Annual Operational Emissions for Alternative 3

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)
Intake Channel, Headworks, and Outlet Channel	2	11	<1
Supplemental Fish Passage East	2	10	<1
Downstream Channel	1	5	<1
Agricultural Road Crossing 1	1	6	<1
Maximum Emissions[1]	**2**	**11**	**<1**
Operational Emissions in Yolo County	**2**	**11**	**<1**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day
Emissions Greater than Yolo-Solano AQMD Threshold?	No	No[2]	No
Operational Emissions in Sutter County	2	11	<1
Feather River AQMD Significance Threshold[2]	n/a	n/a	80 lbs/day
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No

Notes:

1. Maintenance activities would be staggered so that maintenance of multiple components would not occur simultaneously.
2. Implementation of Mitigation Measure MM-AQ-5 would be sufficient to reduction emissions to less than significant. As is shown on the table, if maintenance activities for individual components were to occur on different days, then the peak daily emissions would be sufficiently minimized.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases

18.3.3.4.2 Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan

As discussed previously, the air quality plans adopted by Yolo-Solano AQMD and Feather River AQMD are sufficient to determine if a project could conflict with or obstruct an applicable air quality plan.

Although short-term and temporary, construction-related emissions would occur from vehicular exhaust and fugitive dust (discussed under Impact AQ-1). NO_x and PM_{10} emissions would exceed the significance thresholds for both air districts. Additionally, long-term operational emissions from maintenance activities would exceed the NO_x significance threshold for Yolo-Solano AQMD.

CEQA Conclusion

This impact would be **significant** because NO_x and PM_{10} emissions would exceed the significant thresholds established by the air districts.

Implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, and MM-AQ-5 would reduce NO_x operational emissions to less than significant, but PM_{10} and NO_x construction emissions would continue to exceed both air districts' significance thresholds. Thus, construction of Alternative 3 could conflict with or obstruct implementation of the air quality plans, and this impact would be **significant and unavoidable**.

18.3.3.4.3 Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations

To determine if sensitive receptors are exposed to substantial pollutant concentrations, potential health risks must be assessed. Diesel particulate matter is listed as a TAC in California and would be subject to a human health risk assessment under CEQA. The closest sensitive receptors (which include hospitals, K-12 schools, residences, and day care centers) are various farmhouses along the river, but none are within 1,000 feet of the construction areas (see Chapter 20, *Noise*, for residential locations). Alternative 3 would require a total of 471 three-axle dump truck trips per day during one week of the construction period. Materials would be assumed to be delivered constantly throughout the standard work day using the West Alternative haul route. Post construction, Alternative 3 would require a maximum of 394 truck trips per day on the East Alternative haul route. While sensitive receptors may be located within 500 feet of a rural road, these increased truck trips would not cause vehicular traffic to exceed 50,000 trips per day.

Based on the limited duration of the construction activities and the distance to sensitive land uses associated with Alternative 3, impacts on sensitive receptors would be minimal. Therefore, implementation of Alternative 3 would not expose sensitive receptors to substantial pollutant concentrations.

CEQA Conclusion

This impact would be **less than significant** because no sensitive receptors are in the immediate vicinity of the construction footprint of Alternative 3, and TAC emissions would be temporary.

18.3.3.4.4 Impact AQ-4: Create objectionable odors affecting a substantial number of people

The use of diesel equipment during construction of Alternative 3 may generate near-field odors that are a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, odors from diesel exhaust would not affect a substantial number of people. Therefore, implementation of Alternative 3 would not create objectionable odors affecting a substantial number of people.

CEQA Conclusion

This impact would be **less than significant** because construction of Alternative 3 would be temporary and no sensitive receptors would be in the immediate vicinity of the construction footprint.

18.3.3.4.5 Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds

The Project is subject to general conformity because it involves a Federal agency. The area of analysis is classified as a severe nonattainment area for O_3, a nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10} and CO; therefore, this alternative is subject to the general conformity *de minimis* thresholds in 40 CFR 93.153(b).[15]

Because the CEQA-related mitigation measures are fully enforceable under PRC Section 21081.6 and, therefore, a requirement of project implementation, mitigated emissions for Alternative 3 were compared to the general conformity *de minimis* thresholds (i.e., should this alternative be selected and approved, implementation of the alternative would be subject to the requirements of the air quality mitigation measures presented herein). Table 18-31 summarizes estimated construction emissions associated with Alternative 3 and compares these emissions to the general conformity *de minimis* thresholds.

Table 18-31. General Conformity Applicability Evaluation for Alternative 3

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
ROG	Sacramento Metro	Severe Nonattainment	1.3	25	No
NO_x	Sacramento Metro	Severe Nonattainment	18.3	25	No
CO	Sacramento Area	Maintenance	13.5	100	No
SO_2	Sacramento	$PM_{2.5}$ Precursor	0.1	100	No
PM_{10}	Sacramento County	Maintenance	5.7	100	No
$PM_{2.5}$	Sacramento	Nonattainment	1.1	100	No
$PM_{2.5}$	Yuba City-Marysville	Nonattainment	0.8	100	No

Notes:

Emission calculations assume the incorporation of the environmental commitments described as part of the project design.

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

As indicated in Table 18-31, construction emissions would be less than the general conformity *de minimis* thresholds. Therefore, a general conformity determination is not required, and this alternative would conform to the SIP.

CEQA Conclusion

This impact would be **less than significant** because emissions associated with Alternative 3 would be less than the general conformity *de minimis* thresholds.

[15] As shown in Figure 18-4, the CO and PM_{10} maintenance areas are outside of the construction footprint for this alternative; however, haul/vendor trucks and construction worker trips could originate in areas designated maintenance.

18.3.3.4.6 Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

Construction activities associated with Alternative 3 would directly emit GHG emissions from off-road construction equipment, on-road haul trucks and delivery vehicles, and construction worker commuting. Table 18-32 summarizes the GHG emissions associated with Alternative 3. Detailed calculations are provided in Appendix L1.

Table 18-32. GHG Emissions Summary for Alternative 3

Component	Construction Emissions ($MTCO_2e$/project)	Operational Emissions ($MTCO_2e$/year)
Intake Channel, Headworks, and Outlet Channel	6,973	327
Supplemental Fish Passage East	170	13
Downstream Channel	1,728	19
Agricultural Road Crossing 1	137	7
Grand Total	**9,008**	**366**

Note: Totals may not add up because of rounding.
Key: GHG = greenhouse gas; $MTCO_2e$ = metric tons carbon dioxide equivalent

Emissions from construction activities associated with Alternative 3 would not exceed the significance criterion of 12,500 $MTCO_2e$ per year.

CEQA Conclusion

This impact would be **less than significant** because GHG emissions associated with Alternative 3 would not exceed the significance threshold.

18.3.3.4.7 Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities under Alternative 3 would not exceed the significance criterion of 12,500 $MTCO_2e$ per year, Alternative 3 would not conflict with the plans, policies, and regulations adopted to reduce GHG emissions, and impacts would be significant.

CEQA Conclusion

This impact would be **less than significant** because GHG emissions under Alternative 3 would not exceed the significance threshold.

18.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of

time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

18.3.3.5.1 Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation.

Construction of the East Supplemental Fish Passage, Downstream Channel, Agricultural Road Crossing 1, and Northern and Southern Water Control Structures would occur in Yolo County. Construction of the West Channel would occur in both Yolo and Sutter counties. Criteria pollutant emissions from construction equipment exhaust and fugitive dust were estimated using the various tools and methods described in 18.4.1 (Methods for Analysis).

Because the data for construction of the West Channel are only available in aggregate form, it is not feasible to separate emissions associated with its construction between the two counties. To be conservative and to estimate worst-case emissions in each county, it was assumed that 100 percent of emissions could occur in either county for comparison to the CEQA significance thresholds. Table 18-33 summarizes the maximum daily and annual construction emissions that would be estimated to occur for each component of Alternative 4. Table 18-34 summarizes the maximum daily and annual operational emissions that would occur for each component. Significance was determined for individual air districts.

Table 18-33. Unmitigated Maximum Daily and Annual Construction Emissions for Alternative 4

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	266	1.7	23.8
Supplemental Fish Passage East	216	<0.1	0.5
Downstream Channel	120	0.4	5.7
Agricultural Road Crossing 1	1	<0.1	0.4
Northern Water Control Structure Improvements	146	0.4	6.6
Southern Water Control Structure Improvements	173	1.1	20.1
Total Emissions for Peak Day[1,2]	**922**	**3.7**	**57.2**
Maximum Construction Emissions in Yolo County	**922**	**3.7**	**57.2**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**380**	**1.7**	**23.8**
Feather River AQMD Significance Threshold	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	**Yes**

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: CO = carbon monoxide; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

Table 18-34. Unmitigated Maximum Daily and Annual Operational Emissions for Alternative 4

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	7	78	4	0.1	0.7
Supplemental Fish Passage East	7	77	4	<0.1	<0.1
Downstream Channel	3	46	2	<0.1	0.1
Agricultural Road Crossing 1	4	41	2	<0.1	<0.1
Northern Water Control Structure Improvements	7	79	4	<0.1	0.3
Southern Water Control Structure Improvements	7	79	4	<0.1	0.5
Total Operational Emissions[1]	**34**	**399**	**20**	**0.1**	**1.6**
Operational Emissions in Yolo County	**34**	**399**	**20**	**0.1**	**1.6**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lb/s/day	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	**Yes**	No	No	No
Operational Emissions in Sutter County	**7**	**78**	**4**	**0.1**	**0.7**
Feather River AQMD Significance Threshold2	n/a	n/a	80 lbs/day	n/a	n/a
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No	n/a	n/a

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

As shown in Table 18-33, construction-related PM_{10} and NO_x emissions would exceed both air districts' significance thresholds. Additionally, as shown in Table 18-34, ROG and NO_x operational emissions would exceed Yolo-Solano AQMD's significance threshold.

CEQA Conclusion

This impact would be **significant** because PM_{10}, NO_x, and ROG emissions associated with Alternative 4 would exceed the significance thresholds established by the air districts.

Implementation of mitigation measures MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, and MM-AQ-5 would reduce criteria pollutant emissions. Table 18-35 summarizes the maximum daily and annual mitigated construction emissions, and Table 18-36 summarizes maximum daily and annual mitigated operational emissions. As shown in the tables, mitigated ROG and NO_x operational emissions would be reduced to less than significant, but mitigated PM_{10} and NO_x

construction emissions would continue to exceed Yolo-Solano AQMD's and Feather River AQMD's daily and annual significance thresholds; therefore, this impact would be **significant and unavoidable**.

Table 18-35. Mitigated Maximum Daily and Annual Construction Emissions for Alternative 4

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	125	1.0	13.6
Supplemental Fish Passage East	89	<0.1	0.3
Downstream Channel	51	0.3	4.1
Agricultural Road Crossing 1	1	<0.1	0.2
Northern Water Control Structure Improvements	77	0.3	4.3
Southern Water Control Structure Improvements	101	0.8	15.5
Total Construction Emissions for Peak Day[1,2]	**443**	**2.4**	**38.1**
Maximum Construction Emissions in Yolo County	**443**	**2.4**	**38.1**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**172**	**1.0**	**13.6**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	**Yes**

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed four and one-half tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-36. Mitigated Maximum Daily and Annual Operational Emissions for Alternative 4

Component	ROG (lbs/day)	NO_x (lbs/day)	CO (lbs/day)
Intake Channel, Headworks, and Outlet Channel	2	11	<1
Supplemental Fish Passage East	2	10	<1
Downstream Channel	1	5	<1
Agricultural Road Crossing 1	1	6	<1
Northern Water Control Structure Improvements	2	10	<1
Southern Water Control Structure Improvements	2	10	<1
Total Operational Emissions[1]	**10**	**53**	**2**
Operational Emissions in Yolo County	**10**	**53**	**2**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day
Emissions Greater than Yolo-Solano AQMD Threshold?	No	No[2]	No

Component	ROG (lbs/day)	NO_x (lbs/day)	CO (lbs/day)
Operational Emissions in Sutter County	**2**	**11**	**<1**
Feather River AQMD Significance Threshold[2]	n/a	n/a	80 lbs/day
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No

Notes:

1. Totals may not add exactly because of rounding.
2. Implementation of Mitigation Measure MM-AQ-5 would be sufficient to reduction emissions to less than significant. As is shown on the table, if maintenance activities for individual components were to occur on different days, then the peak daily emissions would be sufficiently minimized.

Key: AQMD = Air Quality Management District; CO = carbon monoxide; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

18.3.3.5.2 Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan.

As discussed previously, the air quality plans adopted by Yolo-Solano AQMD and Feather River AQMD are sufficient to determine if a project could conflict with or obstruct an applicable air quality plan.

Although short-term and temporary, construction-related emissions would occur from vehicular exhaust and fugitive dust (discussed under Impact AQ-1). NO_x and PM_{10} construction emissions would exceed the significance thresholds for both air districts. Additionally, long-term operational emissions associated with maintenance activities would exceed the ROG and NO_x significance thresholds for Yolo-Solano AQMD.

CEQA Conclusion

This impact would be **significant** because PM_{10}, ROG, and NO_x emissions associated with Alternative 4 would exceed the significance thresholds established by the air districts.

Implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, and MM-AQ-5 would reduce emissions ROG and NO_x operational emissions to less than significant, but PM_{10} and NO_x construction emissions would continue to exceed both air districts' significance thresholds. Thus, construction of this alternative could conflict with or obstruct implementation of the air quality plans, and this impact would be **significant and unavoidable**.

18.3.3.5.3 Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations

To determine if sensitive receptors are exposed to substantial pollutant concentrations, potential health risks must be assessed. Diesel particulate matter is listed as a TAC in California and would be subject to a human health risk assessment under CEQA. The closest sensitive receptors (which include hospitals, K-12 schools, residences, and day care centers) are various farmhouses along the river, but none are within 1,000 feet of the construction areas (see Chapter 20, *Noise*, for residential locations). Alternative 4 would require a total of 1,031 three-axle dump truck trips per day during one week of the construction period. Materials would be assumed to be delivered constantly throughout the standard work day using the West Alternative haul route. Post construction, Alternative 4 would require a maximum of 399 truck trips per day on the West

Alternative haul route. While sensitive receptors may be located within 500 feet of a rural road, these increased truck trips would not cause vehicular traffic to exceed 50,000 trips per day.

Based on the limited duration of the construction activities and the distance to sensitive land uses associated with Alternative 4, any impact on sensitive receptors would be minimal. Therefore, implementation of this alternative would not expose sensitive receptors to substantial pollutant concentrations.

CEQA Conclusion

This impact would be **less than significant** because no sensitive receptors are in the immediate vicinity of the construction footprint of Alternative 4, and TAC emissions would be temporary.

18.3.3.5.4 Impact AQ-4: Create objectionable odors affecting a substantial number of people

The use of diesel equipment during construction may generate near-field odors that are a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, odors from diesel exhaust would not affect a substantial number of people. Therefore, implementation of Alternative 4 would not create objectionable odors affecting a substantial number of people.

CEQA Conclusion

This impact would be **less than significant** because construction associated with Alternative 4 would be temporary and no sensitive receptors would be in the immediate vicinity of the construction footprint.

18.3.3.5.5 Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds

The Project is subject to general conformity because it involves a Federal agency. The area of analysis is classified as a severe nonattainment area for O_3, a nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10} and CO; therefore, this alternative is subject to the general conformity *de minimis* thresholds in 40 CFR 93.153(b).[16]

Because the CEQA-related mitigation measures are fully enforceable under PRC Section 21081.6 and, therefore, a requirement of project implementation, mitigated emissions for this alternative were compared to the general conformity *de minimis* thresholds (i.e., should this alternative be selected and approved, implementation of the alternative would be subject to the requirements of the air quality mitigation measures presented herein). Table 18-37 summarizes estimated construction emissions associated with Alternative 4 and compares these emissions to the general conformity *de minimis* thresholds.

[16] As shown in Figure 18-4, the CO and PM_{10} maintenance areas are outside of the construction footprint for this alternative; however, haul/vendor trucks and construction worker trips could originate in areas designated maintenance.

Table 18-37. General Conformity Applicability Evaluation for Alternative 4

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
ROG	Sacramento Metro	Severe Nonattainment	2.4	25	No
NO_x	Sacramento Metro	Severe Nonattainment	**38.1**	25	**Yes**
CO	Sacramento Area	Maintenance	23.6	100	No
SO_2	Sacramento	$PM_{2.5}$ Precursor	0.2	100	No
PM_{10}	Sacramento County	Maintenance	9.4	100	No
$PM_{2.5}$	Sacramento	Nonattainment	2.1	100	No
$PM_{2.5}$	Yuba City-Marysville	Nonattainment	0.8	100	No

Notes:

Emission calculations assume the incorporation of the environmental commitments described as part of the project design.

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

As indicated in Table 18-37, construction emissions would exceed the general conformity *de minimis* threshold for NO_x. Therefore, a general conformity determination would need to be developed and approved before a Record of Decision can be issued that selects Alternative 4 as the preferred alternative.

CEQA Conclusion

This impact would be **significant and unavoidable** because NO_x emissions associated with Alternative 4 would exceed the general conformity *de minimis* threshold. As previously discussed, the general conformity applicability evaluation already assumes mitigation is incorporated; therefore, no further mitigation is available for Alternative 4.

18.3.3.5.6 Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

Construction activities associated with Alternative 4 would directly emit GHG emissions from off-road construction equipment, on-road haul trucks and delivery vehicles, and construction worker commuting. Table 18-38 summarizes the GHG emissions associated with Alternative 4. Detailed calculations are provided in Appendix L1.

Table 18-38. GHG Emissions Summary for Alternative 4

Component	Construction Emissions ($MTCO_2e$/project)	Operational Emissions ($MTCO_2e$/year)
Intake Channel, Headworks, and Outlet Channel	6,966	200
Supplemental Fish Passage East	170	13
Downstream Channel	1,728	19
Agricultural Road Crossing 1	137	7
Northern Water Control Structure Improvements	2,154	61
Southern Water Control Structure Improvements	6,879	111
Grand Total	**18,034**	**411**

Note: Totals may not add up because of rounding.
Key: GHG = greenhouse gas; $MTCO_2e$ = metric tons carbon dioxide equivalent

Emissions from construction activities would exceed the significance criterion of 12,500 $MTCO_2e$ per year.

CEQA Conclusion

This impact would be **significant** because GHG emissions associated with Alternative 4 would exceed the significance threshold.

Mitigation Measure MM-AQ-6: Purchase of GHG emission offset credits

The contractor will purchase carbon offsets in an amount sufficient to reduce GHG emissions to less than significant. Only emission offsets generated as part of CARB's Compliance Offset Protocols may be used to reduce GHG emissions.

With implementation of Mitigation Measure MM-AQ-6, GHG emissions of Alternative 4 would be reduced to **less than significant**.

18.3.3.5.7 Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities would exceed the significance criterion of 12,500 $MTCO_2e$ per year, Alternative 4 also would conflict with the plans, policies, and regulations adopted to reduce GHG emissions, and impacts would be significant.

CEQA Conclusion

This impact would be **significant** because GHG emissions associated with Alternative 4 would exceed the significance threshold.

Implementation of Mitigation Measure MM-AQ-6 would reduce emissions to **less than significan**t.

18.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the capture of fish through using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

18.3.3.6.1 Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation

Construction of the Center Channel and Agricultural Road Crossing 1 would occur in Yolo County. Construction of the West Supplemental Fish Passage would occur in Sutter County. Criteria pollutant emissions from construction equipment exhaust and fugitive dust were estimated using the various tools and methods described in 18.4.1 (Methods for Analysis).

Table 18-39 summarizes the maximum daily and annual construction emissions that would be estimated to occur for each component. Table 18-40 summarizes the maximum daily and annual operational emissions that would occur for each component. Significance was determined for individual air districts.

Table 18-39. Unmitigated Maximum Daily and Annual Construction Emissions for Alternative 5

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	807	5.7	67.7
Supplemental Fish Passage West	227	<0.1	0.4
Agricultural Road Crossing 1	<1	<0.1	0.4
River Grading	3	0.7	5.6
Total Construction Emissions for Peak Day[1,2]	**1,038**	**6.5**	**74.2**
Maximum Construction Emissions in Yolo County	**811**	**6.4**	**73.7**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**227**	**<0.1**	**0.4**
Feather River AQMD Significance Threshold[3]	80 lbs/day	3.6 tpy	3.6 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	No

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 284 days, the significance threshold is equal to 3.6 tons per year (25 pounds per day x 284 days per year / 2,000 pounds per ton = 3.6 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-40. Unmitigated Maximum Daily and Annual Operational Emissions for Alternative 5

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)	ROG (tpy)	NOx (tpy)
Intake Channel, Headworks, and Outlet Channel	9	104	6	0.1	1.7
Supplemental Fish Passage West	7	77	4	<0.1	<0.1
Agricultural Road Crossing 1	4	41	2	<0.1	<0.1
Total Operational Emissions[1]	**19**	**222**	**12**	**0.2**	**1.8**
Operational Emissions in Yolo County	**13**	**145**	**8**	**0.2**	**1.7**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	No	**Yes**	No	No	No
Operational Emissions in Sutter County	**7**	**77**	**4**	**<0.1**	**<0.1**
Feather River AQMD Significance Threshold	n/a	n/a	80 lbs/day	n/a	n/a
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No	n/a	n/a

Notes:

Totals may not add exactly because of rounding.

Key: CO = carbon monoxide; lbs day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

As shown in Table 18-39, maximum daily construction-related emissions from Alternative 5 would exceed the significance thresholds established by Yolo-Solano AQMD and Feather River AQMD for PM_{10}; and Yolo-Solano AQMD's annual construction significance threshold for NO_x would be exceeded. Additionally, as shown in Table 18-40, Yolo-Solano AQMD's operational significance threshold would be exceeded for NO_x.

CEQA Conclusion

This impact would be **significant** because PM_{10} and NO_x emissions associated with Alternative 5 would exceed the significance thresholds established by the air districts.

Implementation of mitigation measure MM-AQ-1, MM-AQ-2, MM-AQ-3, and MM-AQ-4 would reduce criteria pollutant emissions. Table 18-41 summarizes the maximum daily and annual mitigated construction emissions, and Table 18-42 summarizes maximum daily and annual mitigated operational emissions. As shown in the tables, mitigated NO_x operational emissions would be reduced to less than significant, but mitigated PM_{10} and NO_x construction emissions would continue to exceed Yolo-Solano AQMD's significance thresholds and PM_{10} construction emissions would exceed Feather River AQMD's significance threshold; therefore, this impact would be **significant and unavoidable**.

Table 18-41. Mitigated Maximum Daily and Annual Construction Emissions for Alternative 5

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	378	3.1	27.1
Supplemental Fish Passage West	97	<0.1	0.3
Agricultural Road Crossing 1	<1	<0.1	0.2
River Grading	3	0.7	1.7
Total Construction Emissions for Peak Day[1,2]	**478**	3.8	29.4
Maximum Construction Emissions in Yolo County	**381**	**3.8**	**29.1**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**97**	**<0.1**	**0.3**
Feather River AQMD Significance Threshold[3]	80 lbs/day	3.6 tpy	3.6 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	No

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 284 days, the significance threshold is equal to 3.6 tons per year (25 pounds per day x 284 days per year / 2,000 pounds per ton = 3.6 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-42. Mitigated Maximum Daily and Annual Operational Emissions for Alternative 5

Component	ROG (lbs/day)	NO_x (lbs/day)	$PM_{2.5}$ (lbs/day)
Intake Channel, Headworks, and Outlet Channel	2	18	<1
Supplemental Fish Passage West	2	10	<1
Agricultural Road Crossing 1	1	6	<1
Maximum Operational Emissions[1]	**6**	**35**	**1**
Operational Emissions in Yolo County	**4**	**24**	**1**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day
Emissions Greater than Yolo-Solano AQMD Threshold?	No	No	No
Operational Emissions in Sutter County	**2**	**10**	**<1**
Feather River AQMD Significance Threshold[2]	n/a	n/a	80 lbs/day
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; ROG = reactive organic gases

18.3.3.6.2 Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan

As discussed previously, the air quality thresholds adopted by Yolo-Solano AQMD and Feather River AQMD are sufficient to determine if a project could conflict with or obstruct an applicable air quality plan.

Although short-term and temporary, construction-related emissions would occur from vehicular exhaust and fugitive dust (discussed under Impact AQ-1). Maximum daily PM_{10} emissions would exceed the construction significance thresholds for both air districts while annual NO_x emissions would exceed Yolo-Solano AQMD's construction significance threshold. Additionally, long-term maintenance emissions associated with the maintenance of Alternative 5 would exceed the NO_x significance threshold for Yolo-Solano AQMD.

CEQA Conclusion

This impact would be **significant** because PM_{10} and NO_x emissions associated with Alternative 5 would exceed the significance thresholds established by the air districts.

Implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, and MM-AQ-4 would reduce NO_x operational emissions to less than significant, but PM_{10} and NO_x construction emissions would continue to exceed Yolo-Solano AQMD's significance threshold and PM_{10} construction emissions would continue to exceed Feather River AQMD's significance threshold. Thus, construction of Alternative 5 could conflict with or obstruct implementation of the air quality plans, and this impact would be **significant and unavoidable**.

18.3.3.6.3 Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations

To determine if sensitive receptors are exposed to substantial pollutant concentrations, potential health risks must be assessed. Diesel particulate matter is listed as a TAC in California and would be subject to a human health risk assessment under CEQA. The closest sensitive receptors (which include hospitals, K-12 schools, residences, and day care centers) are various farmhouses along the river, but none are within 1,000 feet of the construction areas (see Chapter 20, *Noise*, for residential locations). Alternative 5 would require a total of 629 three-axle dump truck trips per day during one week of the construction period. Both the West and East Alternative haul routes could be used, but peak impacts could occur on the East Alternative haul route when all project elements (i.e., Fish Passage West and Agricultural Crossing 1) are considered. Post construction, Alternative 5 would require a maximum of 394 truck trips per day on the East Alternative haul route. While sensitive receptors may be located within 500 feet of a rural road, these increased truck trips would not cause vehicular traffic to exceed 50,000 trips per day.

Based on the limited duration of the construction activities and the distance to sensitive land uses, any impact on sensitive receptors would be minimal. Therefore, implementation of Alternative 5 would not expose sensitive receptors to substantial pollutant concentrations.

CEQA Conclusion

This impact would be **less than significant** because no sensitive receptors are in the immediate vicinity of the construction footprint of Alternative 5 and TAC emissions would be temporary.

18.3.3.6.4 Impact AQ-4: Create objectionable odors affecting a substantial number of people

The use of diesel equipment during construction may generate near-field odors that are a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, odors from diesel exhaust associated with Alternative 5 would not affect a substantial number of people. Therefore, implementation of this alternative would not create objectionable odors affecting a substantial number of people.

CEQA Conclusion

This impact would be **less than significant** because construction would be temporary and no receptors would be in the immediate vicinity of the construction footprint of Alternative 5.

18.3.3.6.5 Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds

The Project is subject to general conformity because it involves a Federal agency. The area of analysis is classified as a severe nonattainment area for O_3, a nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10} and CO; therefore, Alternative 5 is subject to the general conformity *de minimis* thresholds in 40 CFR 93.153(b).[17]

Because the CEQA-related mitigation measures are fully enforceable under PRC Section 21081.6 and therefore a requirement of project implementation, mitigated emissions for this alternative were compared to the general conformity *de minimis* thresholds (i.e., should this alternative be selected and approved, implementation of the alternative would be subject to the requirements of the air quality mitigation measures presented herein). Table 18-43 summarizes estimated construction emissions associated with Alternative 5, and compares these emissions to the general conformity *de minimis* thresholds.

Table 18-43. General Conformity Applicability Evaluation for Alternative 5

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
ROG	Sacramento Metro	Severe Nonattainment	3.8	25	No
NO_x	Sacramento Metro	Severe Nonattainment	29.4	25	Yes
CO	Sacramento Area	Maintenance	38.3	100	No
SO_2	Sacramento	$PM_{2.5}$ Precursor	0.2	100	No

[17] As shown in Figure 18-4, the CO and PM_{10} maintenance areas are outside of the construction footprint for this alternative; however, haul/vendor trucks and construction worker trips could originate in areas designated maintenance.

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
PM_{10}	Sacramento County	Maintenance	8.4	100	No
$PM_{2.5}$	Sacramento	Nonattainment	2.0	100	No
$PM_{2.5}$	Yuba City-Marysville	Nonattainment	<0.1	100	No

Notes:

Emission calculations assume the incorporation of the environmental commitments described as part of the project design.

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

This impact would be **significant and unavoidable** because NO_x emissions associated with Alternative 5 would exceed the general conformity *de minimis* threshold. As previously discussed, the general conformity applicability evaluation already assumes mitigation is incorporated; therefore, no further mitigation is available for Alternative 5.

CEQA Conclusion

This impact would be **significant and unavoidable** because NO_x emissions associated with Alternative 5 would exceed the general conformity *de minimis* thresholds.

18.3.3.6.6 Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

Construction activities associated with Alternative 5 would directly emit GHG emissions from off-road construction equipment, on-road haul trucks and delivery vehicles, and construction workers commuting. Table 18-44 summarizes the GHG emissions associated with Alternative 5. Detailed calculations are provided in Appendix L1.

Table 18-44. GHG Emissions Summary for Alternative 5

Component	Year 1 Emissions ($MTCO_2e$/year)	Year 2 Emissions ($MTCO_2e$/year)	Total Emissions ($MTCO_2e$/project)
Intake Channel, Headworks, and Outlet Channel	17,775	507	18,281
Supplemental Fish Passage West	139	n/a	139
Agricultural Road Crossing 1	137	n/a	137
River Grading	2,621	n/a	2,621
Grand Total	**20,672**	**544**	**21,179**

Note: Totals may not add up because of rounding.

Key: GHG = greenhouse gas; $MTCO_2e$ = metric tons carbon dioxide equivalent

Emissions from construction activities would exceed the significance criterion of 12,500 $MTCO_2e$ per year.

CEQA Conclusion

This impact would be **significant** because GHG emissions associated with Alternative 5 would exceed the significance threshold.

With implementation of Mitigation Measure MM-AQ-6, GHG emissions would be reduced to **less than significant**.

18.3.3.6.7 Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities would exceed the significance criterion of 12,500 $MTCO_2e$ per year, Alternative 5 also would conflict with the plans, policies, and regulations adopted to reduce GHG emissions, and impacts would be significant.

CEQA Conclusion

This impact would be **significant** because GHG emissions associated with Alternative 5 would exceed the significance threshold.

Implementation of Mitigation Measure MM-AQ-6 would reduce emissions to **less than significant**.

18.3.3.6.8 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of Interstate 80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation

Alternative 5 would include floodplain improvements along Tule Canal, but these improvements would not be constructed at the same time as the remaining facilities. Construction activities associated with these improvements were not quantified because the analysis was at a programmatic level for this component. It is assumed that criteria pollutant emissions from the Tule Canal floodplain improvements would be equal to emissions associated with the channel improvements (i.e., "Intake Channel, Headworks, and Outlet Channel" line items in emissions tables) for this alternative.

CEQA Conclusion

This impact would be **significant** because PM_{10} and NO_x emissions associated with Tule Canal Floodplain Improvements would likely exceed the significance thresholds established by the Yolo-Solano AQMD.

While implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, and MM-AQ-4 would reduce criteria pollutant emissions, mitigation may not be sufficient to reduce emissions below the air district's significance thresholds. Because PM_{10} and NO_x emissions would continue to exceed Yolo-Solano AQMD's daily and annual significance thresholds, this impact would be **significant and unavoidable**.

Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan.

The air quality thresholds adopted by the Yolo-Solano AQMD are sufficient to determine if a project could conflict with or obstruct an applicable air quality plan. As discussed for Impact AQ-1, PM_{10} and NO_x emissions associated with Tule Canal improvements are expected to exceed the significance thresholds established by the air district.

CEQA Conclusion

This impact would be **significant** because PM_{10} and NO_x emissions associated with Tule Canal improvements would exceed the significance thresholds established by the air districts.

Implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, and MM-AQ-4 would reduce emissions, but PM_{10} and NO_x emissions could continue to exceed Yolo-Solano AQMD's significance threshold. Thus, construction of these improvements could conflict with or obstruct implementation of the air quality plans, and this impact would be **significant and unavoidable**.

Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations

As discussed in Chapter 20, *Noise*, no residences or other sensitive receptors would be within 1,000 feet of the construction areas associated with Tule Canal improvements. Therefore, implementation of the Tule Canal improvements would not expose sensitive receptors to substantial pollutant concentrations.

CEQA Conclusion

This impact would be **less than significant** because no sensitive receptors associated with Tule Canal Floodplain Improvements are in the immediate vicinity of the construction footprint and TAC emissions would be temporary.

Impact AQ-4: Create objectionable odors affecting a substantial number of people

The use of diesel equipment during construction associated with Tule Canal improvements may generate near-field odors that are a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, odors from diesel exhaust would not affect a substantial number of people.

Therefore, construction of the Tule Canal improvements would not create objectionable odors affecting a substantial number of people.

CEQA Conclusion

This impact would be **less than significant** because construction associated with Tule Canal Floodplain Improvements would be temporary and no receptors would be in the immediate vicinity of the construction footprint.

Impact AQ-5: Generate criteria pollutants greater than general conformity de minimis thresholds

As discussed for Impact AQ-1, construction-related emissions are expected to be equivalent to the channel improvement emissions for Alternative 5. NO_x emissions associated with the Tule Canal Floodplain Improvements would exceed the general conformity de minimis threshold.CEQA Conclusion

*. This impact would be **significant and unavoidable** because NO_x emissions associated with the Tule Canal Floodplain Improvements would exceed the general conformity de minimis threshold. As previously discussed, the general conformity applicability evaluation already assumes mitigation is incorporated; therefore, no further mitigation is available. Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment*

As discussed for Impact AQ-1, construction-related emissions are expected to be equivalent to the channel improvement emissions for Alternative 5. Total project GHG emissions are assumed to exceed the significance criterion of 12,500 $MTCO_2e$ per year.

CEQA Conclusion

This impact would be **significant** because GHG emissions associated with Tule Canal Floodplain Improvements would exceed the significance threshold.

With implementation of Mitigation Measure MM-AQ-6, GHG emissions would be reduced to **less than significant**.

Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities would exceed the significance criterion of 12,500 $MTCO_2e$ per year, construction of the Tule Canal improvements would also conflict with the plans, policies, and regulations adopted to reduce GHG emissions, and impacts would be significant.

CEQA Conclusion

This impact would be **significant** under the Tule Canal Floodplain Improvements because GHG emissions would exceed the significance threshold.

Implementation of Mitigation Measure MM-AQ-6 would reduce emissions to **less than significant**.

18.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish with the strategy of allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

18.3.3.7.1 Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation

Construction of the East Supplemental Fish Passage, Downstream Channel, and Agricultural Road Crossing 1 would occur in Yolo County. Construction of the West Channel would occur in both Yolo and Sutter counties. Criteria pollutant emissions from construction equipment exhaust and fugitive dust were estimated using the various tools and methods described in Section 18.3.1 (Methods for Analysis).

Because the data for construction of the West Channel are only available in aggregate form, it is not feasible to separate emissions associated with its construction between the two counties. To be conservative and to estimate worst-case emissions in each county, it was assumed that 100 percent of emissions could occur in either county for comparison to the CEQA significance thresholds. Table 18-45 summarizes the maximum daily and annual construction emissions that would be estimated to occur for each component. Table 18-46 summarizes the maximum daily and annual operational emissions that would occur for each component. Significance was determined for individual air districts.

Table 18-45. Unmitigated Maximum Daily and Annual Construction Emissions for Alternative 6

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	459	3.3	53.4
Supplemental Fish Passage East	1	<0.1	0.5
Downstream Channel	120	0.4	5.7
Agricultural Road Crossing 1	116	<0.1	0.4
Total Construction Emissions for Peak Day[1,2]	**695**	**3.8**	**60.0**
Maximum Construction Emissions in Yolo County	**695**	**3.8**	**60.0**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**466**	**3.3**	**53.4**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	**Yes**	**Yes**

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-46. Unmitigated Maximum Daily and Annual Operational Emissions for Alternative 6

Component	ROG (lbs/day)	NO_x (lbs/day)	PM_{10} (lbs/day)	ROG (tpy)	NOx (tpy)
Intake Channel, Headworks, and Outlet Channel	10	114	6	0.2	2.1
Supplemental Fish Passage East	7	77	4	<0.1	<0.1
Downstream Channel	3	46	2	<0.1	0.1
Agricultural Road Crossing 1	4	41	2	<0.1	<0.1
Total Operational Emissions[1]	**23**	**277**	**14**	**0.2**	**2.3**
Operational Emissions in Yolo County	**23**	**277**	**14**	**0.2**	**2.3**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	No	**Yes**	No	No	No
Operational Emissions in Sutter County	**10**	**114**	**6**	**0.2**	**2.1**
Feather River AQMD Significance Threshold	n/a	n/a	80 lbs/day	n/a	n/a
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No	n/a	n/a

Notes:

Totals may not add exactly because of rounding.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

As shown in Table 18-45, construction-related PM_{10} and NO_x emissions from this alternative would exceed the significance thresholds established by Yolo-Solano AQMD and Feather River AQMD, and ROG emissions would exceed the significance threshold for Feather River AQMD. Additionally, Table 18-46 shows that operational NO_x emissions would exceed Yolo-Solano AQMD's significance threshold.

CEQA Conclusion

This impact would be **significant** because PM_{10}, NO_x, and ROG emissions associated with Alternative 6 would exceed the significance thresholds established by the air districts.

Implementation of mitigation measures MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, and MM-AQ-5 would reduce criteria pollutant emissions. Table 18-47 summarizes the maximum daily and annual mitigated construction emissions, and Table 18-48 summarizes maximum daily and annual mitigated operational emissions. As shown in the tables, ROG construction emissions in Sutter County (Feather River AQMD) and NO_x operational emissions in Yolo County (Yolo-Solano AQMD) would be reduced to less than significant. Mitigated PM_{10} and NO_x emissions

would continue to exceed Yolo-Solano AQMD's and Feather River AQMD's significance thresholds for construction; therefore, this impact would be **significant and unavoidable**.

Table 18-47. Mitigated Maximum Daily and Annual Construction Emissions for Alternative 6

Component	PM_{10} (lbs/day)	ROG (tpy)	NO_x (tpy)
Intake Channel, Headworks, and Outlet Channel	254	2.0	31.9
Supplemental Fish Passage East	<1	<0.1	0.3
Downstream Channel	51	0.3	4.1
Agricultural Road Crossing 1	48	<0.1	0.2
Total Construction Emissions for Peak Day[1,2]	**344**	**2.3**	**36.6**
Maximum Construction Emissions in Yolo County	**344**	**2.3**	**36.6**
Yolo-Solano AQMD Significance Threshold	80 lbs/day	10 tpy	10 tpy
Emissions Greater than Yolo-Solano AQMD Threshold?	**Yes**	No	**Yes**
Maximum Construction Emissions in Sutter County	**252**	**2.0**	**31.9**
Feather River AQMD Significance Threshold[3]	80 lbs/day	2.5 tpy	2.5 tpy
Emissions Greater than Feather River AQMD Threshold?	**Yes**	No	**Yes**

Notes:

1. Total emissions are the maximum daily emissions for all components; however, peak daily emissions for individual components may be different.
2. Totals may not add exactly because of rounding.
3. Feather River AQMD ROG and NO_x significance threshold is equal to 25 pounds per day multiplied by project length, not to exceed 4.5 tons per year. Because the project schedule is 200 days, the significance threshold is equal to 2.5 tons per year (25 pounds per day x 200 days per year / 2,000 pounds per ton = 2.5 tons per year).

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; NO_X = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; tpy = tons per year

Table 18-48. Mitigated Maximum Daily and Annual Operational Emissions for Alternative 6

Component	ROG (lbs/day)	NO_x (lbs/day)	PM10 (lbs/day)
Intake Channel, Headworks, and Outlet Channel	3	14	1
Supplemental Fish Passage East	2	10	<1
Downstream Channel	1	5	<1
Agricultural Road Crossing 1	1	6	<1
Maximum Operational Emissions[1]	**3**	**14**	**1**
Operational Emissions in Yolo County	**3**	**14**	**1**
Yolo-Solano AQMD Significance Threshold	25 lbs/day	25 lbs/day	80 lbs/day
Emissions Greater than Yolo-Solano AQMD Threshold?	No	No[2]	No
Operational Emissions in Sutter County	**3**	**14**	**1**
Feather River AQMD Significance Threshold	n/a	n/a	80 lbs/day
Emissions Greater than Feather River AQMD Threshold?	n/a	n/a	No

Notes:

1. Maintenance activities would be staggered so that maintenance of multiple components would not occur simultaneously.

2. Implementation of Mitigation Measure MM-AQ-5 would be sufficient to reduction emissions to less than significant. As is shown on the table, if maintenance activities for individual components were to occur on different days, then the peak daily emissions would be sufficiently minimized.

Key: AQMD = Air Quality Management District; lbs/day = pounds per day; n/a = not applicable; NO_x = nitrogen oxides; PM_{10} = inhalable particulate matter; ROG = reactive organic gases

18.3.3.7.2 Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan

As discussed previously, the air quality plans adopted by Yolo-Solano AQMD and Feather River AQMD are sufficient to determine if a project could conflict with or obstruct an applicable air quality plan.

Although short-term and temporary, construction-related emissions would occur from vehicular exhaust and fugitive dust (discussed under Impact AQ-1). ROG, NO_x, and PM_{10} emissions would exceed the significance thresholds for the air districts. Additionally, long-term emissions associated with maintenance activities would exceed the NO_x significance threshold for Yolo-Solano AQMD.

CEQA Conclusion

This impact would be **significant** because PM_{10}, NO_x, and ROG emissions associated with Alternative 6 would exceed the significance thresholds established by the air districts.

Implementation of Mitigation Measures MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, and MM-AQ-5 would reduce ROG construction emissions in Sutter County and NO_x maintenance emissions in Yolo County to less than significant. However, PM_{10} and NO_x construction emissions would continue to exceed both air districts' significance thresholds. Thus, construction of this alternative could conflict with or obstruct implementation of the air quality plans, and this impact would be **significant and unavoidable**.

18.3.3.7.3 Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations

To determine if sensitive receptors are exposed to substantial pollutant concentrations, potential health risks must be assessed. Diesel particulate matter is listed as a TAC in California and would be subject to a human health risk assessment under CEQA. The closest sensitive receptors (which include hospitals, K-12 schools, residences, and day care centers) are various farmhouses along the river, but none are within 1,000 feet of the construction areas (see Chapter 20, *Noise*, for residential locations). Alternative 6 would necessitate a total of 733 three-axle dump truck trips per day during one week of the construction period. Materials would be delivered throughout the standard work day using the West Alternative haul route. Post construction, Alternative 6 would require a maximum of 788 truck trips per day on the West Alternative haul route. While sensitive receptors may be located within 500 feet of a rural road, these increased truck trips would not cause vehicular traffic to exceed 50,000 trips per day.

Based on the limited duration of the construction activities and the distance to sensitive land uses, impacts to sensitive receptors would be minimal. Therefore, implementation of this alternative would not expose sensitive receptors to substantial pollutant concentrations.

CEQA Conclusion

This impact would be **less than significant** under Alternative 6 because no sensitive receptors are in the immediate vicinity of the construction footprint and TAC emissions would be temporary.

18.3.3.7.4 Impact AQ-4: Create objectionable odors affecting a substantial number of people

The use of diesel equipment during construction may generate near-field odors that are a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, odors from diesel exhaust would not affect a substantial number of people. Therefore, implementation of Alternative 6 would not create objectionable odors affecting a substantial number of people.

CEQA Conclusion

This impact would be **less than significant** under Alternative 6 because construction would be temporary and no sensitive receptors would be in the immediate vicinity of the construction footprint.

18.3.3.7.5 Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds

The Project is subject to general conformity because it involves federal funding and approval from a Federal agency. The area of analysis is classified as a severe nonattainment area for O_3, a nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10} and CO; therefore, this alternative is subject to the general conformity *de minimis* thresholds in 40 CFR 93.153(b).[18]

Because the CEQA-related mitigation measures are fully enforceable under PRC Section 21081.6 and therefore a requirement of project implementation, mitigated emissions for this alternative were compared to the general conformity *de minimis* thresholds (i.e., should this alternative be selected and approved, implementation of the alternative would be subject to the requirements of the air quality mitigation measures presented herein). Table 18-49 summarizes estimated construction emissions associated with Alternative 6, and compares these emissions to the general conformity *de minimis* thresholds.

[18] As shown in Figure 18-4, the CO and PM_{10} maintenance areas are outside of the construction footprint for this alternative; however, haul/vendor trucks and construction worker trips could originate in areas designated maintenance.

Table 18-49. General Conformity Applicability Evaluation for Alternative 6

Pollutant	Designation Area	Classification	Total Emissions (tpy)	*De Minimis* Threshold (tpy)	Exceed Threshold?
ROG	Sacramento Metro	Severe Nonattainment	2.3	25	No
NO_x	Sacramento Metro	Severe Nonattainment	**36.6**	25	**Yes**
CO	Sacramento Area	Maintenance	24.5	100	No
SO_2	Sacramento	$PM_{2.5}$ Precursor	0.2	100	No
PM_{10}	Sacramento County	Maintenance	10.6	100	No
$PM_{2.5}$	Sacramento	Nonattainment	2.0	100	No
$PM_{2.5}$	Yuba City-Marysville	Nonattainment	1.7	100	No

Notes:

Emission calculations assume the incorporation of the environmental commitments described as part of the project design.

Key: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = fine particulate matter; PM_{10} = inhalable particulate matter; ROG = reactive organic gases; SO_2 = sulfur dioxide; tpy = tons per year

As indicated in Table 18-49, construction emissions would exceed the general conformity *de minimis* threshold for NO_x. Therefore, a general conformity determination would need to be developed before a Record of Decision can be issued that selects Alternative 6 as the preferred alternative.

CEQA Conclusion

This impact would be **significant and unavoidable** because NO_x emissions associated with Alternative 6 would exceed the general conformity *de minimis* threshold. As previously discussed, the general conformity applicability evaluation already assumes that mitigation is incorporated and so no further mitigation is available for Alternative 6.

18.3.3.7.6 Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

Construction activities associated with Alternative 6 would directly emit GHG emissions from off-road construction equipment, on-road haul trucks and delivery vehicles, and construction workers commuting. Table 18-50 summarizes the GHG emissions associated with Alternative 6. Detailed calculations are provided in Appendix L1.

Table 18-50. GHG Emissions Summary for Alternative 6

Component	Construction Emissions ($MTCO_2e$/project)	Operational Emissions ($MTCO_2e$/year)
Intake Channel, Headworks, and Outlet Channel	15,634	664
Supplemental Fish Passage East	170	13
Downstream Channel	1,728	19
Agricultural Road Crossing 1	137	7
Grand Total	**17,669**	**703**

Note: Totals may not add up because of rounding.

Key: GHG = greenhouse gas; $MTCO_2e$ = metric tons carbon dioxide

Emissions from construction activities would be exceed the significance criterion of 12,500 $MTCO_2e$ per year.

CEQA Conclusion

This impact would be **significant** because GHG emissions associated with Alternative 6 would exceed the significance threshold.

With implementation of Mitigation Measure MM-AQ-6, GHG emissions would be reduced to **less than significant**.

18.3.3.7.7 Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities under Alternative 6 would exceed the significance criterion of 12,500 $MTCO_2e$ per year, this alternative also would conflict with the plans, policies, and regulations adopted to reduce GHG emissions, and impacts would be significant.

CEQA Conclusion

This impact would be **significant** because GHG emissions would exceed the significance threshold.

Implementation of Mitigation Measure MM-AQ-6 would reduce emissions associated with Alternative 6 to **less than significant**.

18.3.4 Summary of Impacts

Table 18-51 provides a summary of the identified impacts to air quality and GHGs for construction, operation, and long-term maintenance activities associated with the operation of the Project.

Table 18-51. Summary of Impacts and Mitigation Measures – Air Quality and GHG

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation	No Action	NI	--	NI
	1, 2, 5	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4	SU
	3, 4, 6	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, MM-AQ-5	SU

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan	No Action	NI	--	NI
	1, 2, 5	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4	SU
	3, 4, 6	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, MM-AQ-5	SU
Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS
Impact AQ-4: Create objectionable odors affecting a substantial number of people	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS
Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds	No Action	NI	--	NI
	1, 2, 3	LTS	--	LTS
	4, 5, 6	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4	SU
Impact AQ-6: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment	No Action	NI	--	NI
	1, 2, 3	LTS	--	LTS
	4, 5, 6	S	MM-AQ-6	LTS
Impact AQ-7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs	No Action	NI	--	NI
	1, 2, 3	LTS	--	LTS
	4, 5, 6	S	MM-AQ-6	LTS

Key: GHG = greenhouse gas; LTS = less than significant; NI = no impact; S = significant; SU = significant and unavoidable

18.4 Cumulative Impacts Analysis

This section describes the cumulative impacts analysis for air quality and GHGs. Section 3.3, *Cumulative Impacts*, presents an overview of the cumulative impacts analysis, including the methodology and the projects, plans, and programs considered in the cumulative impacts analysis.

18.4.1 Methodology

This evaluation of cumulative impacts for air quality and GHGs considers the effects of the Project and how they may combine with the effects of other past, present, and future projects or actions to create significant impacts on specific resources. The area of analysis for these cumulative impacts includes the SVAB. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

This cumulative effect analysis utilizes the project analysis approach described in detail in Section 3.3. The cumulative projects included in this analysis are:

- Delta Wetlands Project – This project would construct a new water diversion and storage system on two islands in the Delta.
- Lower Elkhorn Basin Levee Setback Project – The project would increase the capacity of Yolo and Sacramento bypasses by removing and setting back some levees, removing some cross levees, and improving and relocating related infrastructure.
- North Delta Flood Control and Ecosystem Restoration Project – This project would construct setback levees and configure flood bypass areas to create quality habitat for species of concern.
- Sites Reservoir Project – This project would construct offstream surface storage in the northern Sacramento Valley for improved water supply and water supply reliability, improved water quality, and enhanced survival of anadromous fish and other aquatic species.
- Sacramento River Bank Protection Project – This project is designed to enhance public safety and help project property along the Sacramento River. Actions could include bank protection in the form of rock revetment, biotechnical bank stabilization, setback levees, or construction of adjacent levees.
- Upstream Sacramento River Fisheries Projects – Several ongoing and reasonably foreseeable projects that could occur upstream of Yolo Bypass and the Delta include levee improvements and other flood control management projects in and near the Sacramento, Feather, Yuba, and American rivers.
- Yolo Habitat Conservation Plan/Natural Communities Conservation Plan and Yolo Local Conservation Plan – The plan includes the construction of projects affecting species' habitat, including habitat enhancement, restoration, and creation actions.

18.4.2 Cumulative Impacts

Air pollution is largely a cumulative impact because the attainment status of the region is a result of past and present development. As shown on Table 18-4, all counties included in the area of analysis are designated nonattainment for the O_3 NAAQS, the O_3 CAAQS (Sutter County is designated nonattainment-transitional for O_3 CAAQS), and the PM_{10} CAAQS. Additionally, Sacramento and Yolo counties are designated nonattainment for the $PM_{2.5}$ NAAQS. Nonattainment status represents a cumulatively significant impact within the area. O_3 is a secondary pollutant, meaning it is formed in the atmosphere from reactions of precursor compounds under certain conditions. Primary precursor compounds that lead to O_3 formation include VOCs and NO_x; therefore, the significance thresholds established by the air districts for VOC and NO_x are intended to maintain or attain the O_3 CAAQS and NAAQS. Because no single project determines the nonattainment status of a region, individual projects would only contribute to the area's designation on a cumulative basis.

Several air districts, including Yolo-Solano AQMD (2007), develop significance thresholds to determine if a project's individual emissions could result in a cumulatively considerable adverse contribution to the existing air quality conditions. Therefore, if an alternative would produce air quality impacts that are individually significant, then the alternative would also be cumulatively considerable. Conversely, if the alternative's emissions would be less than the significance thresholds, then the alternative would not be expected to result in a cumulatively considerable contribution to the existing significant cumulative impact. All alternatives could exceed NO_x (O_3 precursor) and PM_{10} standards in areas that are in nonattainment for O_3 and/or PM_{10}, which would be a cumulatively considerable effect. Although all alternatives would be cumulatively considerable, the individual alternative's contribution would vary. For example, Alternative 6 would result in the highest NO_x emissions, and Alternative 5 would have the largest PM_{10} emissions; however, Alternative 1 would have the smallest emissions for both pollutants.

Several related and reasonably foreseeable projects and actions may result in air quality and GHG impacts in the Project area. For example, the Lower Elkhorn Basin Levee Setback Project is expected to be constructed at the same time, in the same vicinity, and would involve a substantial amount of earth moving. Additional construction equipment in the area of analysis would increase criteria pollutant and GHG emissions. Annual emissions associated with the construction of the action alternatives would be individually significant. Therefore, the action alternatives' **incremental contribution to the significant cumulative effects would be cumulatively considerable**.

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19 Hazardous Materials and Health and Safety

This chapter describes potential health and safety issues, hazards, and hazardous materials[1] present within the area of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) and analyzes potential impacts to public health and safety during and after construction. Areas and topics of analysis for this chapter include the construction sites associated with the Project alternatives, the public roads that access those sites, and routes that may be used to transport construction debris to area landfills. Potential impacts of natural hazards, such as flood, the water quality anti-degradation policy, and seismic risks, are analyzed in Chapter 4, *Hydrology, Hydraulics, and Flood Control*; Chapter 6, *Water Quality*; and Chapter 12, *Geology and Soils*, respectively. However, potential impacts from wildfire are analyzed in this chapter. Mitigation measures to lessen significant impacts to a less than significant level are also identified in this chapter.

19.1 Environmental Setting/Affected Environment

The area that could be affected by the Project includes the northern portion of the Yolo Bypass, also known as the Fremont Weir Wildlife Area (FWWA), bordered to the north by the existing Fremont Weir and the Sacramento River, to the east by County Road (CR) 107, to the west by CR 116A, and to the south by existing agricultural fields. The area of analysis also includes a portion of Tule Canal and an adjoining agricultural road crossing (referred to as Agricultural Road Crossing 1), a portion of property between Fremont Weir and the Sacramento River, linear canals within and bordering Conaway Ranch between Interstate (I)-5 and I-80, and proposed transport routes used during construction. Chapter 2, *Description of Alternatives*, provides more information about the Project area.

Portions of the Yolo Bypass are located within Yolo, Sutter, and Solano counties, with approximately 82 percent of the bypass located within Yolo County. Most of the Project area is within an unincorporated area of eastern Yolo County between Fremont Weir and I-80. The rest of the Project area, approximately 33.5 acres between Fremont Weir and the Sacramento River, is within unincorporated Sutter County. The FWWA consists of an undeveloped floodway managed by the California Department of Fish and Wildlife (CDFW) as a wildlife area and used for fishing, seasonal hunting, wildlife viewing, and bird watching. Fremont Weir is managed by the California Department of Water Resources (DWR). Conaway Ranch is privately owned.

The unincorporated area surrounding the Project area is mostly undeveloped agricultural land.

[1] The California Health and Safety Code defines a hazardous material as “any material that because of its quantity, concentration, or physical or chemical characteristics poses a significant present or potential hazard to human health and safety, or the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, radioactive materials, and any material which a handler or the administrating agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace of the environment” (Health and Safety Code Section 25501).

The following section describes potential public health and safety issues, hazards, and hazardous materials sites within the area of analysis.

19.1.1 Public Airports and Private Airstrip Activity

The Project area is not located within two miles of a public-use airport. The closest public-use airport is Sacramento International Airport, approximately 2.7 miles southeast of the FWWA and 2.2 miles east of Conaway Ranch. The Project area is within the airport's Traffic Pattern Area but outside of any airport safety zones. Several private air strips are located within the vicinity of the Project area on nearby farms that operate pesticide and herbicide spraying services for farmers in the vicinity.

19.1.2 Hunting Activity

CDFW manages the FWWA, which is a Type C Wildlife Area that allows recreational activities such as hunting, fishing, wildlife viewing, and bird watching (CDFW 2016). Type C wildlife areas are open daily for recreation with no permit or fee required and do not have full-time staff dedicated to daily operation. Rifles and pistols are prohibited at the FWWA. Hunting is allowed on a seasonal basis for pheasant, waterfowl, mourning dove, cottontail, jackrabbits, deer, quail, and wild turkey.

19.1.3 Wildfire

The Project area within the FWWA is a managed wildlife area and surrounded by agricultural lands. An additional Project area within Conaway Ranch is used for rice farming. Yolo County's *2030 Countywide General Plan* includes a map of Fire Hazard Severity Zones in State Responsibility Areas (Yolo County 2009), and the entire Project area is not in a State Responsibility Area, so it is not designated for fire hazard severity. Elkhorn (Yolo County Fire Department) and Sutter Basin (Sutter County Fire Department) Fire Protection Districts provide response services to the Project area for fire protection within the specified county service areas (Citygate 2016). Outside emergency responders may include the California Department of Forestry and Fire Protection (CAL FIRE) as warranted.

19.1.4 Sensitive Receptors

Sensitive receptors are areas where the occupants may be more susceptible to harm caused by exposure to hazardous materials and includes schools and hospitals. There are no schools or hospitals located within one-quarter mile of the Project area. The closest school to the FWWA is the Science and Technology Academy approximately 4.5 miles northwest in Knights Landing within the Woodland Joint Unified School District. The closest hospital is Alderson Convalescent Hospital, located over eight miles away in Woodland, California.

19.1.5 Hazardous Sites

Environmental Data Resources (EDR) conducted computerized database searches in 2016 and 2017 for the existence of any potentially hazardous sites and wells within the Project area of analysis and within a one-half-mile search radius around the Project area boundary. Many databases were searched as part of the EDR service, including Geotracker and Envirostor (the

traditional databases queried for identification of California hazardous sites). The EDR reports include separate reports for hazardous sites and well sites, with maps showing identified sites. There are hazardous site and well site reports for three different areas, including the FWWA and two areas within Conaway Ranch where water control structures are proposed, for a total of six EDR reports. All EDR reports are included in Appendix J.

Federal, State of California (State), and local databases and records were searched for sites with environmental filings. No potential hazardous waste sites were identified within the Project area. Two sites were identified outside the Project area. The first one was found within one-half mile of the FWWA and is described in the 2016 EDR DataMap™ Area Study; however, it is located on the other side of the Sacramento River from the Project area. The site was reported in the mines database, Shriners-Sac River Mid Valley Phase III, and is owned by DWR as a permitted sand and gravel quarry that is currently idle (EDR 2016a). The second site is located at Conaway Ranch near the proposed engineered embankment at the Southern Water Control Structure, which is described in one of the 2017 EDR DataMap Corridor Study. This site is a closed clay mine owned by the Conaway Conservancy Group. The EDR report also disclosed natural gas pipelines located under the Conaway Ranch area (EDR 2017a and 2017b).

The EDR Well Search Report provided research and reporting of existing wells within the Project area and within a one-half mile search radius around the Project area (EDR 2016b). Three dry gas production wells are located within the FWWA, and an additional 10 dry gas production wells are located within one-half mile of the Project area. All of these dry gas wells are plugged and were abandoned at different times between 1961 and 2002, according to the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) standards at the time of abandonment. The wells within the FWWA Project area were abandoned between 1961 and 1994.

The two EDR Well Search Reports (2017c and 2017c) for the Conaway Ranch area show 78 oil and gas well sites within one-half mile of the area of analysis. Most of these wells (48) are plugged and abandoned; however, the other 30 wells have an active or idle status. Abandonment of wells within the area of analysis occurred at different times between 1954 and 2005, according to DOGGR standards at the time of abandonment (EDR 2017c and 2017d). DOGGR does not guarantee that abandoned wells will not start leaking after abandonment (DOGGR 2007).

United States Geological Survey groundwater monitoring wells are listed in the EDR reports: one is within one-half mile of the FWWA Project area, and five are within the Conaway Ranch area of analysis. One abandoned groundwater well and one irrigation well are also located in the Conaway Ranch area of analysis.

19.1.6 Emergency Evacuation Routes

Yolo County Office of Emergency Services (OES) evaluates emergency evacuation routes based on road capacity, conditions, and potential barriers of use such as flooding. Currently, specific evacuation routes are not identified and are determined based on particular events and circumstances at the time of an emergency. However, the major roads accessible from the Project area are some of the primary egress points listed in Yolo County's 2030 *Countywide General Plan* Health and Safety Element and include I-5 – North toward Redding and south into Sacramento, and I-80 – East into Sacramento and west toward Solano County and the San Francisco Bay Area (Yolo County 2009). Access routes from populated areas, such as Knights

Landing or Verona to I-5 and I-80, are outside of the Project area and Project area vicinity. In the Project area, all roads leading to I-5 and I-80 would be evacuation routes out of the Project area.

19.1.7 Disease Spread by Mosquitoes

Some of the diseases spread regionally by mosquitoes include West Nile virus, heartworm disease, Western Equine Encephalomyelitis virus, and St. Louis encephalitis. The Project area is periodically flooded or wet where mosquitoes routinely breed. The Sacramento-Yolo Mosquito & Vector Control District (MVCD) services the Project area and implements vector control activities in response to requests from the public. They also routinely trap mosquitoes in certain areas for surveillance to determine if action may be needed to control mosquito outbreaks (Sacramento-Yolo MVCD 2009). MVCD currently meets with farmers and wetland managers for drainage and maintenance planning within the Yolo Bypass. At areas where mosquito breeding is a problem, MVCD provides ditch maintenance equipment with personnel to help manage these areas. Some landowners implement vegetation management and plant mosquito fish in fish swales for biological control (Yolo County 2014).

19.2 Regulatory Setting

The following section describes the applicable Federal, State, and local laws, rules, regulations, and policies related to hazards and hazardous materials and public health and safety.

19.2.1 Federal Plans, Policies, and Regulations

Federal laws and regulations pertaining to hazardous materials and health and safety are discussed below.

19.2.1.1 Occupational Safety and Health Act of 1970

The Occupational Safety and Health Act is enforced by the United States Department of Labor, Occupational Safety and Health Administration (OSHA). The Occupational Safety and Health Act authorizes the enforcement of standards to assure safe and healthful working conditions for employees; provides research, education, information, and training; and assists the states to encourage employers to assure safe and healthful working conditions (OSHA 2016).

19.2.1.2 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) of 1976, administered by the United States Environmental Protection Agency (USEPA), governs the disposal of solid and hazardous waste. The specific regulations governing hazardous waste under RCRA are found in title 40 Code of Federal Regulations (CFR), parts 260 through 273. Under RCRA, the USEPA was given authority of “cradle-to-grave” control of hazardous waste, and this is the current approach for hazardous waste management. Three programs were established under RCRA, including the solid waste program, hazardous waste program, and underground storage tank (UST) program. Under the law, controls for the generation, transport, treatment, storage, and disposal of hazardous waste are strictly mandated. Only active and future facilities are controlled under RCRA (USEPA 2016a).

There have been three amendments to RCRA, including the Hazardous and Solid Waste Amendments of 1984, the Federal Facility Compliance Act of 1992, and the Land Disposal Program Flexibility Act of 1996 (USEPA 2016a).

19.2.1.3 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), also known as Superfund, created a tax on the chemical and petroleum industries to provide for response and cleanup of hazardous substances that may endanger public health or the environment. CERCLA established requirements for abandoned hazardous waste sites and provided for liability of persons responsible for releases of hazardous waste at these sites (USEPA 2016b).

19.2.1.4 Superfund Amendments and Reauthorization Act

In 1986, the Superfund Amendments and Reauthorization Act (SARA) allowed CERCLA to continue with cleanup of sites and added several amendments. SARA made changes to CERCLA about enforcement authorities and settlement tools. In addition, SARA emphasized the implementation of permanent remediation with the use of innovative treatment technologies for cleanup of hazardous waste sites, increased State coordination with Superfund programs, increased focus on affects to human health by hazardous waste sites, and encouraged the greater public to participate in decision making about site cleanup (USEPA 2016c).

19.2.1.5 Hazardous Materials Transportation Act

The Secretary of Transportation was empowered under the Hazardous Materials Transportation Act of 1975 to develop procedures and policies, material designations, operational rules, and packaging requirements for the transport of hazardous materials. The specific regulations are found in 49 CFR Section 172 Parts 101, 106, 107, and 171 to 180. Compliance orders, civil penalties, and injunctive relief are the enforcement mechanisms established under the act (OSHA 2017).

19.2.1.6 Emergency Planning and Community Right-to-Know Act

The Emergency Planning and Community Right-to-Know Act (1986) requires Federal, state, and local governments, tribes, and industry to plan for emergencies and report on hazardous and toxic chemical use and releases to the public. Provisions within the act are meant to increase public knowledge and information access about chemicals being used and releases at facilities to help improve chemical safety and protect public health and the environment (USEPA 2016d).

19.2.1.7 Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) of 1976 authorizes USEPA to require reporting, record-keeping, testing, and restrictions for chemical substances. Food, drugs, cosmetics, and pesticides are excluded from the TSCA. Specific chemicals, such as polychlorinated biphenyls, asbestos, radon, and lead-based paint, are also addressed within the TSCA regarding the production, importation, use, and disposal of these substances. Within the TSCA various sections address authority to require pre-manufacture notification for new chemical substances, require

testing of chemicals where risks of exposures are of concern, issue new rules where a new use is identified for a substance, maintain a TSCA inventory of chemicals as new ones are manufactured or imported, require certification reporting for import and export of chemicals, and require record-keeping for manufacturers and distributers (USEPA 2016e).

19.2.2 State Plans, Policies, and Regulations

State laws and regulations pertaining to hazardous materials and health and safety are discussed below.

19.2.2.1 Hazardous Waste Control Act

The Hazardous Waste Control Act was passed in 1972 by the State Legislature. The Hazardous Waste Control Act (Health and Safety Code sections 25100 et seq.) mandates regulatory standards for the generation, handling, processing, storage, transportation, and disposal of hazardous wastes through a "cradle to grave" system. The Department of Toxic Substances Control (DTSC) and local Certified Unified Program Agencies (CUPAs) are responsible for administration of the California Hazardous Waste Control Program.

19.2.2.2 The CalEPA Unified Program

The California Environmental Protection Agency (CalEPA) Unified Program was developed to protect Californians from hazardous waste and materials. CalEPA has certified 83 local government agencies as CUPAs (including Yolo County Environmental Health Department), which are responsible for implementing the hazardous waste and materials standards for five different state agencies, including CalEPA, DTSC, Governor's Office of Emergency Services (Cal OES), CAL FIRE, and the State Water Resources Control Board (SWRCB). Under the Unified Program, the administration, permit, inspection, and enforcement activities are consolidated for the following environmental and emergency management programs (CalEPA 2016):

- Aboveground Petroleum Storage Act (APSA) Program
- Area Plans for Hazardous Materials Emergencies
- California Accidental Release Prevention (CalARP) Program
- Hazardous Materials Release Response Plans and Inventories (Business Plans)
- Hazardous Material Management Plan and Hazardous Material Inventory Statements (HMIS) (California Fire Code)
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (tiered permitting) Programs
- Underground Storage Tank Program

A more in-depth discussion of some of these programs that have applicability to the Project are described below.

19.2.2.2.1 Hazardous Material Management Plan and Hazardous Material Inventory Statements

The Hazardous Material Business Plans program mandates the creation of a planning document by businesses and other entities that handle hazardous materials of certain quantities. Business Plans shall include an inventory of hazardous materials, a site location map, an emergency plan, and a training program for employees. These plans are to be submitted electronically to the California Environmental Reporting System (CERS). The local CUPA agency may be contacted for assistance with preparation of Business Plans. The CUPA will verify this information and provide it to "local emergency responders such as firefighters, health officials, planners, public safety officers, health care providers, regulatory agencies, and other interested" parties. This information is prepared in response to federal community right-to-know laws (Cal OES 2016a).

19.2.2.2.2 California Area Plan Program

The California Area Plan Program requires CUPAs to prepare a plan to respond to and minimize the impacts from a release or threatened release of hazardous materials utilizing information from the Hazardous Material Business Plans. The Area Plan includes emergency response procedures to minimize impacts from a hazardous material release or threatened release. Provisions for multi-agency coordination and notification during emergency responses are also to be addressed in the Area Plan (Cal OES 2016b).

19.2.2.3 California Occupational Safety and Health Administration Standards

The California Occupational Safety and Health Administration (Cal OSHA) enforces laws and regulations related to the safety and health of workers in the workplace. Laws and regulations enforced by Cal OSHA include regulations for construction hazards, including falls, excavation, hazardous substance exposure, and electrical hazards. Cal OHSA also provides training tools for employers to provide to their workers (Cal OSHA 2016).

19.2.2.4 State Water Resource Control Board

The California SWRCB is responsible for several programs related to the cleanup and management of hazardous waste sites in California, including the Site Cleanup Program, UST Program, Department of Defense Program, and Land Disposal (SWRCB 2016). These programs are administered by the Central Valley Regional Water Quality Control Board (RWQCB) in Yolo County (SWRCB 2013). The Cleanup Program regulates unauthorized releases to soils and groundwater and, in some cases, surface waters or sediments. The purpose of the UST Program is to "protect public health and safety and the environment from releases of petroleum and other hazardous substances from tanks." The Land Disposal program regulates the discharge of waste "to land for treatment, storage and disposal" (SWRCB 2016).

19.2.2.5 California Department of Water Resources

DWR has an Emergency Action Plan (DWR 2006) for operations at all facilities managed by DWR. The Emergency Action Plan describes procedures for response to different types of emergencies, including general emergency, earthquake, flood, dam failure, fire, civil disturbance, death or injury, equipment malfunction, hazardous materials spills, and other emergencies (DWR

2006). Containment of spills to minimize contamination is emphasized within the plan. Hazardous materials spills are required to be reported to the Area Control Center and personnel who implement the Emergency Action Plan, as appropriate. Assistance from outside emergency responders can be requested if warranted. Outside emergency responders may include Yolo County Fire Department and CAL FIRE.

19.2.2.6 California Department of Conservation, Division of Oil, Gas, and Geothermal Resources

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) provides oversight of drilling, operation, maintenance, and plugging and abandonment of oil, natural gas, and geothermal wells. The abandonment of wells must be conducted in accordance with standards administered by DOGGR. The Well Review Program encourages property owners and developers to obtain an opinion from DOGGR prior to construction regarding an existing well site, even if it was abandoned, to identify potential safety issues during and after construction. Well access must always be maintained if re-abandonment is needed (DOGGR 2007).

19.2.2.7 California Department of Public Health

The California Department of Public Health (CDPH), Vector-Borne Disease Section works with local agencies to protect the public from vector-borne diseases, including mosquito-borne diseases. The agency also oversees the Vector Control Technician Certification and Continuing Education programs, which provide training and educational materials to local government agencies and the public (CDPH 2017). CDPH, the Mosquito and Vector Control Association of California (MVCAC), and the University of California have worked together to develop the *California Mosquito-Borne Virus Surveillance & Response Plan.* This plan provides guidelines and information related to surveillance and control of mosquito-borne viruses, risk assessment models and surveillance data, and local and State agency roles and responsibilities for surveillance and response (CDPH 2017). Best management practices (BMPs) for mosquito control are identified in the *Best Management Practices for Mosquito Control in California,* also prepared by the CDPH and MVCAC (CDPH and MVCAC 2012).

19.2.2.8 California Department of Pesticide Regulation

The California Department of Pesticide Regulation regulates the sale and use of pesticides by encouraging reduced-risk pest management. Enforcement of the regulations is supported by local governments through the county agricultural commissioners. The seven program branches within the Department of Pesticide Regulation include Pesticide Registration, Human Health Assessment, Worker Health and Safety, Enforcement, Environmental Monitoring, Product Compliance, and Pest Management and Licensing (California Department of Pesticide Regulation 2017).

19.2.3 Regional and Local Plans, Policies, and Regulations

Regional and local plans, policies, and regulations pertaining to hazardous materials and health and safety are discussed below.

19.2.3.1 Yolo County OES and Sutter County Office of Emergency Management

Emergency preparedness, coordination, and direction of wide-scale disasters and emergencies are provided by Yolo County OES and Sutter County Office of Emergency Management. Both agencies coordinate planning, response, recovery, and mitigation activities with many agencies and jurisdictions, including special districts, utilities, major businesses, American Red Cross, community groups, and State and Federal agencies. The counties and their partner agencies coordinate and maintain Emergency Operations Plans according to the National Incident Management System for the county. Contained within the counties' Emergency Operations Plans is guidance for handling and managing large-scale incidents and disasters, including public health threats (Yolo County OES 2013 and Sutter County Office of Emergency Management 2015).

In case of an emergency, the *Yolo Operational Area Oil & Hazardous Materials Response Emergency Executive Summary, Emergency Support Function #10 – Annex to local Emergency Operations Plans* (2015) provides for an organized and structured response. This plan defines the structure of the emergency response effort made by the county Hazardous Materials Response Team. This team becomes active when deemed necessary by a fire department officer and combines the forces of the University of California at Davis, Davis, West Sacramento, and Woodland fire departments, and the Yolo County Environmental Health Division (EHD) (Yolo County OES 2015).

19.2.3.2 Yolo County and Sutter County Agriculture Departments

Yolo County and Sutter County agriculture departments issue permits and licensing for pesticide application on farm lands within Yolo and Sutter counties. Special controls are placed on certain pesticides by the California Department of Pesticide Regulation. County permits for pesticide use help to monitor and control the application, location, and human exposure to the chemical. Sensitive locations, such as rivers, schools, hospitals, labor camps, residential areas, endangered species habitats, and susceptible livestock or crops, are required to be mapped within the permit application (Yolo County 2016, Sutter County 2016).

19.2.3.3 Sacramento-Yolo Mosquito and Vector Control District

The Sacramento-Yolo MVCD provides surveillance and policies for the control of mosquitoes and other vectors within the two counties for the protection of public health (Sacramento-Yolo MVCD 2009). The agency published the *Mosquito Reduction Best Management Practices* document in 2008, which describes implementation practices for mosquito control for agricultural irrigation and drainage, dairies, rice fields, stormwater systems, managed wetlands, and urban and suburban mosquito sources (Sacramento-Yolo MVCD 2009).

19.2.3.4 Yolo County Environmental Health Division

Yolo County EHD is part of the County Health Department and regulates hazardous materials in Yolo County. The EHD, as the local CUPA, maintains the Hazardous Materials Business Plan and Inventory Program. EHD also regulates the use, storage, and treatment of hazardous wastes and above-ground storage tanks.

19.2.3.5 Yolo County General Plan Policies for Health and Safety

The Yolo County *2030 Countywide General Plan* includes policies related to health and safety in the Health and Safety Element (Yolo County 2009). Applicable policies related to health and safety include:

- Policy HS-4.1: Minimize exposure to the harmful effects of hazardous materials and waste
- Policy HS-4.3: Encourage the reduction of solid and hazardous wastes generated in the county

19.3 Environmental Consequences

This section describes the approach for the analysis of impacts to hazardous materials and health and safety from the Project. Detailed descriptions of the alternatives evaluated in this section are provided in Chapter 2, *Description of Alternatives*.

19.3.1 Methods for Analysis

The evaluation of these impacts considers the extent to which the proposed construction and maintenance in the Project area has the potential to create hazardous or unsafe conditions by disturbing existing hazardous materials sites, releasing construction-related hazardous materials into the environment, or exposing the public to hazardous materials during the transport of hazardous or contaminated materials from the project construction sites and to offsite disposal facilities.

It also considers the potential for construction and maintenance worker exposure to herbicides or pesticides that may be used to control invasive plant species or pests by neighboring farm operations. Worker and public safety from other hazards, such as potential land use conflicts, proximity to private airstrips, and emergencies, is considered.

The potential for public health concerns related to mosquito population increases in the Yolo Bypass resulting from Project operation is also examined.

Impacts to hazardous materials and health and safety are determined relative to existing conditions (for California Environmental Quality Act [CEQA]) and the No Action Alternative (for the National Environmental Policy Act [NEPA]). However, as described below, the No Action Alternative would be the same as existing conditions because hazardous materials and health and safety are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to the impacts of existing conditions.

19.3.2 Thresholds of Significance – CEQA

The thresholds of significance for impacts are based on the environmental checklist in Appendix G of the State CEQA Guidelines. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of

its impacts. Impacts to hazardous materials and health and safety would be significant if implementing an alternative would result in any of the following:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public and or environment.
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard for people residing or working in the Project area.
- For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the Project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures to a substantial risk of loss, injury, or death involving wildland fires.
- Expose the public or workers to other potentially harmful health and safety issues.

There are no schools or hospitals within one-quarter mile of the Project area and no public airports within two miles of the Project area. Therefore, neither construction nor operation of the Project alternatives would have an impact on a public or public use airport or on an existing or proposed school. During operations of the Project, hazardous materials would not be used except during maintenance activities.

The specific impacts with respect to the remaining significance criteria are discussed in the following subsection.

19.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect effects on health and safety issues, hazards, and hazardous materials from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

19.3.3.1 No Action Alternative

The No Action Alternative includes the most likely future conditions in the absence of the Project. Under the No Action Alternative, there would be no construction and no impacts related to hazards and hazardous materials. No changes to the types or extent of the hazards are

underway that would change the character of hazards or hazardous materials in the future. Therefore, there would be no adverse effects for:

- Increased risk of exposure from hazardous materials to the public and construction workers
- Accidental release of hazardous materials
- Accidental release of hazardous materials from contaminated soil and groundwater
- Increased risk of wildfire within the vicinity of the Project area
- Exposure of workers to hazardous materials or other safety risks associated with low flying aircraft
- Temporary interference with an emergency response plan or emergency evacuation plan for the area
- Unsafe situations for the public and/or construction workers from public use of FWWA for hunting or other uses
- Increased risk of exposure to mosquito-borne viruses resulting from inundation period expansion in Yolo Bypass for fish passage and rearing

CEQA Conclusion

There would be **no impact** related to hazardous materials and health and safety under the No Action Alternative because there would be no changes to the types or extent of the hazards or other safety concerns related to construction activities.

19.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

19.3.3.2.1 Impact HAZ-1: Increase the risk of exposure from hazardous materials to the public and construction workers

During construction and maintenance of Alternative 1, the risk of exposure from hazardous materials to the public and construction workers would increase compared to existing conditions, which would be a significant impact. Some hazardous materials used on site during construction and maintenance may include motor oil, gasoline, diesel fuel, solvents, and degreasers. The Stormwater Pollution Prevention Plan (SWPPP) described in Chapter 6, *Water Quality*, as Mitigation Measure MM-WQ-2 is required by the RWQCB for approval of a General Construction Permit through the National Pollutant Discharge Elimination System program. The SWPPP would require the following safety measures and BMPs to be implemented when transporting, storing, or using hazardous materials. All hazardous materials would be secured

and stored in an area away from drainage paths, and workers would be instructed to follow guidelines outlined within the SWPPP when using hazardous materials. All construction equipment would be serviced in a specific, stabilized area to prevent spills of fluids, oils, or lubricants. This area would consist of clean gravel pads with an impervious liner underneath. All hazardous materials not needed for the operation of the facilities would be removed after the construction is completed. The SWPPP would also describe actions to prevent a release of hazardous materials and procedures in case of an accidental spill or release of hazardous materials during dredging and other work within the reservoir. All spills would be reported to the RWQCB, and the contractor would be required to implement procedures and response protocols for immediate cleanup (per the permit and SWPPP). These procedures may include placement of sandbags, gravel, or other approved features to prevent material from entering surface waters.

CEQA Conclusion

The impact would be **significant**; however, Mitigation Measure MM-WQ-2 would reduce this impact to a **less than significant impact.**

19.3.3.2.2 Impact HAZ-2: Accidental release of hazardous materials

Hazardous materials may be used, stored, and transported to and from the site during construction, operation, and maintenance activities. An accidental release of hazardous materials could be a significant impact to the public and the environment. The use, storage, and transport of hazardous materials are regulated by Federal, State, and local agencies, and compliance with relevant laws is required during project construction and operation.

CEQA Conclusion

The impact would be **significant**; however, implementation of a Spill Prevention Control and Countermeasure Plan (SPCCP) as described in Chapter 6, *Water Quality*, as Mitigation Measure MM-WQ-1 would reduce impacts to a **less than significant** level under Alternative 1.

19.3.3.2.3 Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater

No known hazardous waste sites are within the FWWA, and only one site was identified within one-half mile of the Project area. The one site is a former sand and gravel mine located on the opposite side of the Sacramento River from the Project. Three abandoned dry gas well sites are located within the Project area, and 10 others are located within one-half mile of the Project area. However, since the land has been used for agriculture, there is a chance to encounter contaminated soil at the site during excavation activities associated with Alternative 1. Encountering contaminated soil during construction would be a significant impact compared to existing conditions.

The Project would be constructed within the vicinity of abandoned dry gas wells at the FWWA. There is low potential that abandoned well sites could have leaked hazardous materials into the soil surrounding the wells if proper well abandonment procedures were followed at the time of abandonment. A significant impact could occur if contaminated soil and/or groundwater was encountered and released during construction of Alternative 1 compared to existing conditions.

DOGGR provides oversight of drilling, operation, maintenance, and plugging and abandonment of oil, natural gas, and geothermal wells. The Well Review Program encourages property owners and developers to obtain an opinion from DOGGR prior to construction over an existing well site, even if it was abandoned, to identify potential safety issues during and after construction. Well access must always be maintained in the event that re-abandonment is needed (DOGGR 2007).

CEQA Conclusion

The impacts associated with construction of Alternative 1 would be **significant** because of the proximity of abandoned well sites within the Project area and because unknown soil contamination could be encountered due to prior land uses of the site.

Mitigation Measure MM-HAZ-1: Implement a Construction Risk Management Plan (CRMP) to serve as a contingency plan for hazardous materials and waste operations, if encountered during construction, and construction near abandoned well sites.

The Lead Agencies and the contractor will prepare a CRMP that will include procedures to follow to identify soil contamination during excavation activities and the handling and disposal of any contaminated soil. The CRMP will also require DWR to obtain an opinion through the DOGGR Well Review Program prior to working near the sites. The CRMP will also identify procedures to follow for removal, handling, and disposal if underground storage tanks or other hazardous materials are found during construction of the site. The CRMP will be included in the final plans and specifications for project implementation.

The impact associated with Alternative 1 would be reduced to **less than significant** with implementation of Mitigation Measure MM-HAZ-1**.**

19.3.3.2.4 Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area

The Yolo Bypass and the Project area are not located in a California State Responsibility Area for Wildfire Risk or in an area considered to be a Fire Hazard Severity Zone. However, in dry years, vegetation could provide fuel for a wildfire. Sparks could be generated while using mechanical equipment or if construction equipment were to accidentally hit existing overhead power lines running through the Project area. During construction of Alternative 1, sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry, thus, increasing the risk of wildfire when compared to existing conditions.

Chapter 18, *Air Quality and Greenhouse Gases*, describes the assumption that regular watering would occur during construction on unpaved roads and grading areas for the control of fugitive dust emissions. This assumption was used for preparation of the California Emission Estimator Model and is described in Subsections 18.3.1.4 and 18.3.1.6. Regular watering and access to water trucks during construction may help to lessen the risk of wildlife in some instances.

CEQA Conclusion

The increased fire risk during construction of Alternative 1 would be **significant** because sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry.

Mitigation Measure MM-HAZ-2: Lead Agencies will include specifications within the construction contract requiring construction equipment to be equipped with spark arrestors and safety instructions when working near power lines.

In all construction contracts, the Lead Agencies will require the use of spark arrestors on all construction equipment and safety procedures when working near power lines to avoid accidental contact of construction equipment with the power line. The contract shall also include requirements for the contractor to educate all construction workers about the risk of starting a wildfire, how to avoid it, and who to contact in case a wildfire is started.

The impact for increased fire risk during construction of Alternative 1 would be **less than significant** after implementation of Mitigation Measure MM-HAZ-2**.**

19.3.3.2.5 Impact HAZ-5: Expose workers to hazardous materials or other safety risks associated with low-flying aircraft

Several private airstrips are located within the vicinity of the Project area. Aerial spraying of herbicides and pesticides is conducted periodically at surrounding agricultural fields during farming operations. As stated in Section 19.2.3.2, aerial spraying operations are regulated by Yolo County and Sutter County agricultural departments, and permits are required prior to conducting spraying activities. Sensitive areas near proposed aerial spraying locations are required to be mapped in accordance with the permitting requirements of the county agricultural departments. The FWWA and Yolo Bypass are sensitive areas to be avoided when aerial spraying activities are being conducted to avoid any water quality impacts associated with hazardous chemicals entering the waterways.

CEQA Conclusion

The impact to construction workers' exposure to pesticides and herbicides during construction of Alternative 1 would be **less than significant** with adherence to current county aerial spraying permitting requirements.

19.3.3.2.6 Impact HAZ-6: Temporarily interfere with an emergency response plan or emergency evacuation plan for the area

Construction access for Alternative 1 would be via I-5 and county roads to the Yolo Bypass to access the site. The use of I-5 and county roads could temporarily conflict with emergency response and evacuation plans for the area compared to existing conditions. Yolo County considers any roads leading to I-5 as potential evacuation routes in the case of an emergency. The area surrounding the Project area is farm land with a low population. There is low potential for conflicts with emergency evacuation procedures along the county roads. I-5 is an evacuation route and provides access for emergency vehicles to areas within the county. While there would be some use of I-5 during construction for construction worker commuting and transport of

materials and equipment during construction, there is low potential for conflicts with emergency vehicles or evacuation efforts. If there were an emergency in the area, it is likely that construction activities would be suspended until the emergency ended. The amount of truck traffic along I-5 during construction would not substantially alter traffic and transportation conditions on I-5 according to Chapter 17, *Transportation*.

CEQA Conclusion

There would be a **less than significant impact** to emergency response plans or emergency evacuation plans for the area during construction of Alternative 1 because there is low potential for conflicts with emergency vehicles or evacuation efforts.

19.3.3.2.7 Impact HAZ-7: Public use of the FWWA for hunting or other uses could cause unsafe situations for the public and/or construction workers

The FWWA is open to the public for hunting and other types of recreational activities. Construction activities under Alternative 1 during periods of public use could cause unsafe situations compared to existing conditions.

CEQA Conclusion

The impact would be **significant** to public or worker safety during construction of Alternative 1 due to hunting or other recreation activities at the FWWA. Chapter 13, *Recreation*, states that for safety reasons public recreation use at the FWWA would be restricted to areas not affected by construction. Mitigation Measure MM-REC-1 requires the posting of notices of scheduled closures and coordination with the CDFW FWWA Manager. With implementation of Mitigation Measure MM-REC-1, impacts would be reduced to **less than significant.**

19.3.3.2.8 Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in the Yolo Bypass for fish passage and rearing

Under Alternative 1, the period when the Yolo Bypass within the Project area would be inundated would increase compared to existing conditions. The Yolo Bypass is typically inundated between January and March. However, during wet years it can flood as early as October and remain flooded as late as June. Proposed gate operations under Alternative 1 would increase the typical inundation period in some locations between one day and over four weeks and decrease the typical inundation period between one day and over two weeks, based on hydraulic conditions. As a result, the public's exposure to mosquito-borne viruses could also increase in some locations. Yolo Bypass wetland managers currently work with the Sacramento-Yolo MVCD to implement BMPs for biological control of mosquitos by improving drainage, stocking mosquito fish, and managing vegetation. Chemical control is also used near populated areas. DWR and/or CDFW would continue to implement BMPs recommended by the Sacramento-Yolo MVCD to minimize the potential for impacts to public health from mosquito-borne viruses.

CEQA Conclusion

The impacts to public health related to increased inundation periods of the Yolo Bypass under Alternative 1 would be **less than significant** because current activities to control mosquito-borne diseases would continue**.**

19.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

19.3.3.3.1 Impact HAZ-1: Increase the risk of exposure from hazardous materials to the public and construction workers

The impacts under Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction and maintenance of Alternative 2 would be **significant** due to the increased risk of exposure from hazardous materials to the public and construction workers.

The impact associated with Alternative 2 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-2 because the SWPPP would identify safety measures and BMPs to be implemented when transporting, storing, or using hazardous materials and procedures in case of an accidental spill.

19.3.3.3.2 Impact HAZ-2: Accidental release of hazardous materials

The impacts under Alternative 2 would be identical to those discussed under Alternative 1.

CEQA Conclusion

The impact associated with construction, operation, and maintenance activities of Alternative 2 would be **significant** from an accidental release of hazardous materials.

The impact associated with Alternative 2 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-1, which describes spill prevention, control, and countermeasures to be followed if an accidental spill occurs.

19.3.3.3.3 Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater

The impacts under Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction of Alternative 2 would be **significant** because of the proximity of abandoned well sites within the Project area and unknown soil contamination could be encountered due to prior land uses of the site.

The impact associated with Alternative 2 would be reduced to **less than significant** with implementation of Mitigation Measure MM-HAZ-1 and preparation of a CRMP as a contingency plan if hazardous materials are encountered during construction and work near abandoned well sites.

19.3.3.3.4 Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area

The impacts under Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The increased fire risk during construction of Alternative 2 would be **significant** because sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry.

The impact for increased fire risk during construction of Alternative 2 would be **less than significant** after implementation of Mitigation Measure MM-HAZ-2, which requires the contractor to use equipment with spark arrestors and safety instructions when working near power lines.

19.3.3.3.5 Impact HAZ-5: Expose workers to hazardous materials or other safety risks associated with low-flying aircraft

The impacts under Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to construction workers' exposure to pesticides and herbicides during construction of Alternative 2 would be **less than significant** with adherence to current county aerial spraying permitting requirements.

19.3.3.3.6 Impact HAZ-6: Temporarily interfere with an emergency response plan or emergency evacuation plan for the area

The impacts under Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

There would be a **less than significant impact** to emergency response plans or emergency evacuation plans for the area during construction of Alternative 2 because there would be low potential for conflicts with emergency vehicles or evacuation efforts.

19.3.3.3.7 Impact HAZ-7: Public use of the FWWA for hunting or other uses could cause unsafe situations for the public and/or construction workers

The impacts under Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to public safety associated with public use of the FWWA for hunting and other uses during construction, operation, and maintenance activities of Alternative 2 would be **significant.**

The impact associated with Alternative 2 would be reduced to **less than significant** with implementation of Mitigation Measure MM-REC-1, which requires the posting of notices of scheduled public use closures and coordination with the CDFW FWWA Manager.

19.3.3.3.8 Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in the Yolo Bypass for fish passage and rearing

The impacts under Alternative 2 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impacts to public health related to increased inundation periods of the Yolo Bypass under Alternative 2 would be **less than significant** because current activities to control mosquito-borne diseases would continue**.**

19.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

19.3.3.4.1 Impact HAZ-1: Increase the risk of exposure from hazardous materials to the public and construction workers

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction and maintenance of Alternative 3 would be **significant** due to the increased risk of exposure from hazardous materials to the public and construction workers.

The impact associated with Alternative 3 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-2 because the SWPPP would identify safety

measures and BMPs to be implemented when transporting, storing, or using hazardous materials and procedures in case of an accidental spill.

19.3.3.4.2 Impact HAZ-2: Accidental release of hazardous materials

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction, operation, and maintenance activities of Alternative 3 would be **significant** from an accidental release of hazardous materials.

The impact associated with Alternative 3 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-1, which describes spill prevention, control, and countermeasures to be followed if an accidental spill occurs.

19.3.3.4.3 Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction of Alternative 3 would be **significant** because of the proximity of abandoned well sites within the Project area and unknown soil contamination could be encountered due to prior land uses of the site.

Implementation of Mitigation Measure MM-HAZ-1 would reduce the impacts associated with construction of Alternative 3 to **less than significant** by identifying soil contamination during excavation activities; handling and disposal of any contaminated soil; and implementing removal, handling, and disposal procedures.

19.3.3.4.4 Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The increased fire risk during construction of Alternative 3 would be **significant** because sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry.

Implementation of Mitigation Measure MM-HAZ-2 would reduce impacts for increased fire risk during construction of Alternative 3 to **less than significant** after mitigation by requiring construction equipment to be equipped with spark arrestors and safety instructions when working near power lines.

19.3.3.4.5 Impact HAZ-5: Expose workers to hazardous materials or other safety risks associated with low-flying aircraft

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to construction workers' exposure to pesticides and herbicides during construction of Alternative 3 **would be less than significant** with adherence to current county aerial spraying permitting requirements.

19.3.3.4.6 Impact HAZ-6: Temporarily interfere with an emergency response plan or emergency evacuation plan for the area

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

There would be a **less than significant** impact to emergency response plans or emergency evacuation plans for the area during construction of Alternative 3 because there would be low potential for conflicts with emergency vehicles or evacuation efforts.

19.3.3.4.7 Impact HAZ-7: Public use of the FWWA for hunting or other uses could cause unsafe situations for the public and/or construction workers.

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to public safety associated with public use of the FWWA for hunting and other uses during construction, operation, and maintenance activities of Alternative 3 would be **significant**.

The impact associated with Alternative 3 would be reduced to **less than significant** with implementation of Mitigation Measure MM-REC-1, which requires the posting of notices of scheduled public use closures and coordination with the CDFW FWWA manager.

19.3.3.4.8 Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in Yolo Bypass for fish passage and rearing

The impacts under Alternative 3 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impacts to public health related to increased inundation periods of the Yolo Bypass under Alternative 3 would be **less than significant** because current activities to control mosquito-borne diseases would continue**.**

19.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

19.3.3.5.1 Impact HAZ-1: Increase the risk of exposure from hazardous materials to the public and construction workers

The impacts under Alternative 4 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction and maintenance of Alternative 4 would be **significant** due to the increased risk of exposure from hazardous materials to the public and construction workers.

The impact associated with Alternative 2 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-2 because the SWPPP would identify safety measures and BMPs to be implemented when transporting, storing, or using hazardous materials and procedures in case of an accidental spill.

19.3.3.5.2 Impact HAZ-2: Accidental release of hazardous materials

The impacts under Alternative 4 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction, operation, and maintenance of Alternative 4 would be **significant** from an accidental release of hazardous materials.

The impact associated with Alternative 4 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-1, which describes spill prevention, control, and countermeasures to be followed if an accidental spill occurs.

19.3.3.5.3 Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater

The impacts under Alternative 4 at the FWWA would be identical to those discussed for Alternative 1. However, Alternative 4 proposes construction at two other areas within Conaway Ranch at the proposed Northern and Southern Water Control Structures. No known hazardous waste sites are within the Project area at Conaway Ranch, and only one site and several abandoned or idle oil and gas wells were identified within one-half mile of the Project area at Conaway Ranch as described in Section 19.1.5.

The Project would be constructed within the vicinity of known oil and gas wells at the FWWA and Conaway Ranch. There is potential that well sites could have leaked hazardous materials into the soil surrounding the wells. A significant impact could occur compared to existing conditions if contaminated soil and/or groundwater was encountered and released during construction of Alternative 4.

Conaway Ranch is used for agriculture. There is a chance to encounter contaminated soil at the site during excavation activities. Encountering contaminated soil during construction of Alternative 4 would be a significant impact compared to existing conditions.

DOGGR provides oversight of drilling, operation, maintenance, and plugging and abandonment of oil, natural gas, and geothermal wells. The Well Review Program encourages property owners and developers to obtain an opinion from DOGGR prior to construction over an existing well site, even if it was abandoned, to identify potential safety issues during and after construction. Well access must always be maintained in the event that re-abandonment is needed (DOGGR 2007).

CEQA Conclusion

The impact associated with the construction of Alternative 4 would be **significant** because of the proximity of well sites and natural gas pipelines within the Project area and unknown soil contamination could be encountered due to prior land uses of the site.

Mitigation Measure MM-HAZ-3: The Lead Agencies will contact Pacific Gas and Electric Company (PG&E) to determine the exact location of the underground gas pipelines and determine appropriate safety measures to avoid any contact with the pipeline during construction.

The Lead Agencies will meet with PG&E to determine the exact location of the pipeline and include the location on the plans. Safety measures will be included within the specifications. These measures will be included within the CRMP.

Implementation of Mitigation Measure MM-HAZ-1, preparation of a CRMP and spill contingency plan, and Mitigation Measure MM-HAZ-3 would reduce impacts associated with construction of Alternative 4 to **less than significant** after mitigation**.**

19.3.3.5.4 Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area

The impacts under Alternative 4 at the FWWA would be identical to those discussed for Alternative 1. Construction work proposed at the Conaway Ranch sites for construction of the Northern and Southern Water Control Structures under Alternative 4 would have similar impacts from use of mechanical equipment and work near overhead power lines as under Alternative 1. In addition to these impacts at Conaway Ranch under Alternative 4, the location of existing underground natural gas pipelines also increases the risk of wildfire compared to existing conditions if the pipelines are struck during grading activities.

CEQA Conclusion

The increased fire risk during construction of Alternative 4 would be **significant** because sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry.

Mitigation Measure MM-HAZ-2 would require construction equipment to be equipped with spark arrestors and safety instructions when working near power lines. Mitigation Measure MM-HAZ-3 would require determining appropriate safety measures to avoid any contact with the pipeline during construction. Implementation of these mitigation measures would reduce impacts associated with construction of Alternative 4 to **less than significant.**

19.3.3.5.5 Impact HAZ-5: Expose workers to hazardous materials or other safety risks associated with low-flying aircraft

The impacts under Alternative 4 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to construction workers' exposure to pesticides and herbicides during construction of Alternative 4 would be **less than significant** with adherence to current county aerial spraying permitting requirements.

19.3.3.5.6 Impact HAZ-6: Temporarily interfere with an emergency response plan or emergency evacuation plan for the area

The impacts under Alternative 4 would be identical to those discussed for Alternative 1.

CEQA Conclusion

There would be a **less than significant impact** to emergency response plans or emergency evacuation plans for the area during construction of Alternative 4 because there would be low potential for conflicts with emergency vehicles or evacuation efforts.

19.3.3.5.7 Impact HAZ-7: Public use of the FWWA for hunting or other uses could cause unsafe situations for the public and/or construction workers

The impacts under Alternative 4 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to public safety associated with public use of the FWWA for hunting and other uses during construction, operation, and maintenance activities of Alternative 4 would be **significant**.

The impact associated with Alternative 4 would be reduced to **less than significant** with implementation of Mitigation Measure MM-REC-1, which requires the posting of notices of scheduled public use closures and coordination with the CDFW FWWA Manager.

19.3.3.5.8 Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in Yolo Bypass for fish passage and rearing

The impacts under Alternative 4 would be similar to those discussed for Alternative 1. Inundation periods would increase and decrease in certain locations differently than under Alternative 1; however, the impacts would be the same.

CEQA Conclusion

The impacts to public health related to increased inundation periods of the Yolo Bypass under Alternative 4 would be **less than significant** because current activities to control mosquito-borne diseases would continue**.**

19.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish by using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

19.3.3.6.1 Impact HAZ-1: Increase the risk of exposure from hazardous materials to the public and construction workers

The impacts under Alternative 5 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction and maintenance of Alternative 5 would be **significant** due to the increased risk of exposure from hazardous materials to the public and construction workers.

The impact associated with Alternative 5 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-2 because the SWPPP would identify safety measures and BMPs to be implemented when transporting, storing, or using hazardous materials and procedures in case of an accidental spill.

19.3.3.6.2 Impact HAZ-2: Accidental release of hazardous materials

The impacts under Alternative 5 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction, operation, and maintenance activities of Alternative 5 would be **significant** from an accidental release of hazardous materials.

The impact associated with Alternative 5 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-1, which describes spill prevention, control, and countermeasures to be followed if an accidental spill occurs.

19.3.3.6.3 Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater

The impacts under Alternative 5 at FWWA would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction of Alternative 5 would be **significant** because of the proximity of abandoned well sites within the Project area and unknown soil contamination could be encountered due to prior land uses of the site.

The impact associated with Alternative 5 would be reduced to **less than significant** with implementation of Mitigation Measure MM-HAZ-1 and preparation of a CRMP as a contingency plan if hazardous materials are encountered during construction and work near abandoned well sites.

19.3.3.6.4 Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area

The impacts under Alternative 5 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The increased fire risk during construction of Alternative 5 would be **significant** because sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry.

Implementation of Mitigation Measure MM-HAZ-2 would reduce impacts for increased fire risk during construction of Alternative 5 to **less than significant** by requiring construction equipment to be equipped with spark arrestors and safety instructions when working near power lines.

19.3.3.6.5 Impact HAZ-5: Expose workers to hazardous materials or other safety risks associated with low-flying aircraft

The impacts under Alternative 5 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to construction workers' exposure to pesticides and herbicides during construction of Alternative 5 would be **less than significant** with adherence to current county aerial spraying permitting requirements.

19.3.3.6.6 Impact HAZ-6: Temporarily interfere with an emergency response plan or emergency evacuation plan for the area

The impacts under Alternative 5 would be identical to those discussed for Alternative 1.

CEQA Conclusion

There would be a **less than significant** impact to emergency response plans or emergency evacuation plans for the area during construction of Alternative 5 because there would be low potential for conflicts with emergency vehicles or evacuation efforts.

19.3.3.6.7 Impact HAZ-7: Public use of the FWWA for hunting or other uses could cause unsafe situations for the public and/or construction workers

The impacts under Alternative 5 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to public safety associated with public use of the FWWA for hunting and other uses during construction, operation, and maintenance activities of Alternative 5 would be **significant**.

The impact associated with Alternative 5 would be reduced to **less than significant** with implementation of Mitigation Measure MM-REC-1, which requires the posting of notices of scheduled public use closures and coordination with the CDFW FWWA Manager.

19.3.3.6.8 Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in the Yolo Bypass for fish passage and rearing

The impacts under Alternative 5 would be similar to those discussed for Alternative 1. Inundation periods would increase and decrease in certain locations differently than under Alternative 1; however, the impacts would be the same.

CEQA Conclusion

The impacts to public health related to increased inundation periods of the Yolo Bypass under Alternative 5 would be **less than significant** because current activities to control mosquito-borne diseases would continue**.**

19.3.3.6.9 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of I-80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all of the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact HAZ-1: Increase the risk of exposure from hazardous materials to the public and construction workers

The impacts from Tule Canal Floodplain Improvements would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction and maintenance of the Tule Canal Floodplain Improvements would be **significant** due to the increased risk of exposure from hazardous materials to the public and construction workers.

The impact associated with the Tule Canal Floodplain Improvements would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-2 because the SWPPP would identify safety measures and BMPs to be implemented when transporting, storing, or using hazardous materials and procedures in case of an accidental spill.

Impact HAZ-2: Accidental release of hazardous materials

The impacts from Tule Canal Floodplain Improvements would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction, operation, and maintenance activities of the Tule Canal Floodplain Improvements would be **significant** from an accidental release of hazardous materials.

The impact associated with the Tule Canal Floodplain Improvements would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-1, which describes spill prevention, control, and countermeasures to be followed if an accidental spill occurs.

Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater

Construction and grading activities in the Tule Canal floodplain are being analyzed at a programmatic level in this EIS/EIR, and no EDR reports have been requested to identify hazardous sites. Effects related to existing hazardous sites would be analyzed under a separate document if this alternative is selected. The land has been used for agriculture; therefore, there is a chance to encounter contaminated soil at the site during excavation activities. EDR studies for other portions of the Yolo Bypass have identified oil and gas well sites, and there is a chance that EDR could also identify well sites around the Tule Canal Floodplain Improvements. Encountering contaminated soil during construction would be a significant impact.

CEQA Conclusion

The impact associated with construction of the Tule Canal Floodplain Improvements would be **significant** because of the potential for abandoned well sites to exist within the Project area and unknown soil contamination could be encountered due to prior land uses of the site.

Implementation of Mitigation Measure MM-HAZ-1 (preparation of a CRMP and SPCCP) and Mitigation Measure MM-HAZ-3 (work with PG&E to determine location of underground gas lines and appropriate safety measures) would reduce impacts associated with construction of the Tule Canal Floodplain Improvements to **less than significant**.

Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area

The impacts from Tule Canal Floodplain Improvements would be identical to those discussed for Alternative 1.

CEQA Conclusion

The increased fire risk during construction associated with Tule Canal Floodplain Improvements would be **significant** because sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry.

The impact for increased fire risk during construction of the Tule Canal Floodplain Improvements would be **less than significant** after implementation of Mitigation Measure MM-HAZ-2, which requires the contractor to provide construction equipment to be equipped with spark arrestors and safety instructions when working near power lines.

Impact HAZ-5: Expose workers to hazardous materials or other safety risks associated with low-flying aircraft

The impacts under the Tule Canal Floodplain Improvements would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to construction workers' exposure to pesticides and herbicides during construction of the Tule Canal Floodplain Improvements would be **less than significant** with adherence to current county aerial spraying permitting requirements.

Impact HAZ-6: Temporarily interfere with an emergency response plan or emergency evacuation plan for the area

The impacts under the Tule Canal Floodplain Improvements would be identical to those discussed for Alternative 1.

CEQA Conclusion

There would be a **less than significant** impact to emergency response plans or emergency evacuation plans for the area during construction of the Tule Canal Floodplain Improvements because there would be low potential for conflicts with emergency vehicles or evacuation efforts.

Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in the Yolo Bypass for fish passage and rearing

The impacts under the Tule Canal Floodplain Improvements would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impacts to public health related to increased inundation periods of the Yolo Bypass under the Tule Canal Floodplain Improvements would be **less than significant** because current activities to control mosquito-borne diseases would continue**.**

19.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, West Side Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

19.3.3.7.1 Impact HAZ-1: Increase the risk of exposure from hazardous materials to the public and construction workers

The impacts under Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction, operation, and maintenance activities of Alternative 6 would be **significant** due to the increased risk of exposure from hazardous materials to the public and construction workers.

The impacts associated with Alternative 6 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-2 because the SWPPP would identify safety measures and BMPs to be implemented when transporting, storing, or using hazardous materials and procedures in case of an accidental spill.

19.3.3.7.2 Impact HAZ-2: Accidental release of hazardous materials

The impacts under Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction, operation, and maintenance activities of Alternative 6 would be **significant** from an accidental release of hazardous materials.

The impact associated with Alternative 6 would be reduced to **less than significant** with implementation of Mitigation Measure MM-WQ-1 which describes spill prevention, control, and countermeasures to be followed if an accidental spill occurs.

19.3.3.7.3 Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater

The impacts under Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact associated with construction of Alternative 6 would be **significant** because of the proximity of abandoned well sites within the Project area and unknown soil contamination could be encountered due to prior land uses of the site.

The impact associated with Alternative 6 would be reduced to **less than significant** with implementation of Mitigation Measure MM-HAZ-1 and preparation of a CRMP as a contingency plan if hazardous materials are encountered during construction and work near abandoned well sites.

19.3.3.7.4 Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area

The impacts under Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The increased fire risk during construction of Alternative 6 would be **significant** because sparks or contact between power lines and construction equipment could cause a wildfire if the area is dry.

The impact for increased fire risk during construction of Alternative 6 would be **less than significant** after implementation of Mitigation Measure MM-HAZ-2, which requires the contractor to use equipment with spark arrestors and safety instruction when working near power lines.

19.3.3.7.5 Impact HAZ-5: Expose workers to hazardous materials or other safety risks associated with low-flying aircraft

The impacts under Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to construction workers' exposure to pesticides and herbicides during construction of Alternative 6 would be **less than significant** with adherence to current county aerial spraying permitting requirements.

19.3.3.7.6 Impact HAZ-6: Temporarily interfere with an emergency response plan or emergency evacuation plan for the area

The impacts under Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

There would be a **less than significant** impact to emergency response plans or emergency evacuation plans for the area during construction of Alternative 6 because there would be low potential for conflicts with emergency vehicles or evacuation efforts.

19.3.3.7.7 Impact HAZ-7: Public use of the FWWA for hunting or other uses could cause unsafe situations for the public and/or construction workers

The impacts under Alternative 6 would be identical to those discussed for Alternative 1.

CEQA Conclusion

The impact to public safety associated with public use of the FWWA for hunting and other uses during construction, operation, and maintenance activities of Alternative 6 would be **significant**.

The impact associated with Alternative 6 would be reduced to **less than significant** with implementation of Mitigation Measure MM-REC-1, which requires the posting of notices of scheduled public use closures and coordination with the CDFW FWWA Manager.

19.3.3.7.8 Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in the Yolo Bypass for fish passage and rearing

The impacts under Alternative 6 would be similar to those discussed for Alternative 1. Inundation periods would increase and decrease in certain locations differently than under Alternative 1; however, the impacts would be the same.

CEQA Conclusion

The impacts to public health related to increased inundation periods of the Yolo Bypass associated with Alternative 6 would be **less than significant** because current activities to control mosquito-borne diseases would continue**.**

19.3.4 Summary of Impacts

Table 19-1 provides a summary of the identified impacts to hazardous materials and health and safety for construction and operation and maintenance associated with the Project alternatives.

Table 19-1. Summary of Impacts and Mitigation Measures – Hazardous Materials and Health and Safety

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact HAZ-1: Increase risk of exposure from hazardous materials to the public and construction workers	No Action	NI	--	NI
	All Action Alternatives	S	MM-WQ-2	LTS
Impact HAZ-2: Accidental release of hazardous materials	No Action	NI	--	NI
	All Action Alternatives	S	MM-WQ-1	LTS
Impact HAZ-3: Accidental release of hazardous materials from contaminated soil and/or groundwater	No Action	NI	--	NI
	1, 2, 3, 5, 6	S	MM-HAZ-1	LTS
	4	S	MM-HAZ-1, MM-HAZ-3	LTS
Impact HAZ-4: Increase the risk of wildfire within the vicinity of the Project area	No Action	NI	--	NI
	1, 2, 3, 5, 6	S	MM-HAZ-2	LTS
	4	S	MM-HAZ-2, MM-HAZ-3	LTS
Impact HAZ-5: Expose workers to hazardous materials and other safety risks associated with low-flying aircraft	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS
Impact HAZ-6: Temporarily interfere with emergency response and evacuation plan for the area	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact HAZ-7: Public use of FWWA for hunting or other uses could cause unsafe situations for the public and/or construction workers	No Action	NI	--	NI
	All Action Alternatives	S	MM-REC-1	LTS
Impact HAZ-8: Risk of exposure to mosquito-borne viruses could increase as a result of inundation-period expansion in Yolo Bypass for fish passage and rearing	No Action	NI	--	NI
	All Action Alternatives	LTS	--	LTS

Key: LTS = less than significant; NI = no impact; S = significant

19.4 Cumulative Impacts Analysis

This section describes the cumulative impacts analysis for hazardous materials and health and safety. Section 3.3 presents an overview of the cumulative impacts analysis, including the methodology, and the projects, plans, and programs considered in the cumulative impacts analysis.

19.4.1 Methodology

This evaluation of cumulative impacts for hazardous materials and health and safety considers the effects of the Project and how they may combine with the impacts of other past, present, and future projects or actions to create significant impacts on specific resources. The area of analysis for these cumulative impacts includes both the Project area and the larger Yolo Bypass. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

This cumulative impacts analysis utilizes the project analysis approach described in detail in Section 3.3, *Cumulative Impacts*. The cumulative projects included in this analysis are:

- Agricultural Road Crossing #4 Fish Passage Improvements Project – This is a future project that would include modification of the southernmost agricultural road crossing in the Tule Canal to improve adult fish passage.

- California EcoRestore Projects – A broad range of projects are included in the California EcoRestore initiative to accomplish enhancements and improvements to the overall health of the Sacramento-San Joaquin Delta (Delta), including projects within or adjacent to the Yolo Bypass
- Fremont Weir Adult Fish Passage Modification Project – The project would modify the existing Fremont Weir fish ladder to provide improved upstream passage for salmonids and sturgeon; improve channel and other fish passage conditions; and remove and replace an earthen agricultural road crossing with a structure that would improve fish passage through the Tule Canal.
- Lisbon Weir Modification Project – Project would provide an upgrade for adult migrating fish, which currently face a migration delay in the Yolo Bypass.
- Lower Elkhorn Basin Levee Setback Project – The project would increase the capacity of the Yolo and Sacramento bypasses by removing and setting back some levees, removing some cross levees, and improving and relocating related infrastructure.
- Lower Putah Creek Realignment Project – This project will restore ecological functions and enhance fish passage in Lower Putah Creek from the western boundary of the Yolo Bypass Wildlife Area to the Toe Drain.
- Lower Yolo Restoration Project – The project is a tidal and seasonal salmon habitat program that would restore tidal flux to approximately 1,100 acres of existing pasture land at McCormack Ranch, which is now owned by the Westlands Water District. The goal of the project is to provide new sources of food and shelter for a variety of native fish species and ensure continued or enhanced flood protection. The Lower Yolo Restoration Project is a component of the Delta adaptive management approach to determine relative benefits of different fish habitats, quantify the production and transport of food, and gain an understanding of how fish species take advantage of new habitat.
- Sacramento River General Reevaluation Report – The report reevaluates the Sacramento River Flood Control Project, including potential improvements within Yolo Bypass, which may include widening and constructing setback levees.
- Sites Reservoir Project – The Sites Reservoir Project involves the construction of an offstream reservoir for surface storage north of the Delta. The project would primarily enhance water management flexibility in the Sacramento Valley and California water supply. Secondary objectives are to allow for flexible hydropower generation to support integration of renewable energy resources, develop additional recreation opportunities, and provide incremental flood damage reduction opportunities.
- Wallace Weir Fish Rescue Facility Project – The Wallace Weir water control structure will be replaced with a permanent structure that will prevent migration of salmon and sturgeon into the Colusa Basin Drain. The project also includes a facility to allow for efficient trapping and relocation of fish to the Sacramento River. All permitting has been completed, and the project is under construction.
- Yolo Habitat Conservation Plan/Natural Communities Conservation Plan and Yolo Local Conservation Plan – The plan includes the construction of projects affecting species habitat, including habitat enhancement, restoration, and creation actions.

19.4.2 Cumulative Impacts

The action alternatives would have a less than significant impact on hazardous materials and health and safety with adherence to Federal, State, and local regulations and implementation of proposed mitigation measures. During implementation of the cumulative projects listed above, hazardous materials sites or underground pipelines could be encountered, and hazardous substances may be transported, used, or disposed of during construction, increasing the risk of exposure for workers and the public or the accidental release of hazardous materials into the environment. The cumulative Project areas may also be located near private airstrips which conduct aerial spraying of pesticides or herbicides at nearby agricultural fields, increasing the risk of exposure to workers to these chemicals. However, these cumulative projects would be required to, or already, conform to existing Federal, State, and local regulations, including NEPA and CEQA analysis for project effects. During this analysis, hazardous sites, pipelines, or airstrips within or near the Project areas for the cumulative projects would be identified and construction controls or mitigation measures identified to lessen potential impacts to hazardous materials and health and safety to less than significant levels.

Cumulative projects implementation could increase the risk of wildfire from the use of mechanical equipment. However, mitigation measures would be implemented or have already been implemented as described under the action alternatives to require the use of spark arrestors on all construction equipment and safety procedures when working near overhead power lines and underground natural gas pipelines, reducing impacts to a less than significant level. During construction of the cumulative projects, similar mitigation measures would likely be implemented or have already been implemented, which would lessen potential impacts to a less than significant level.

The action alternatives would have a less than significant impact to hazardous materials and health and safety related to temporary interference with emergency response or evacuation plans in the area. The action alternatives would have a less than significant impact after mitigation to public use of hunting areas within the Yolo Bypass.

Cumulative projects implementation could increase the public's risk of exposure to mosquito-borne viruses. However, implementation of existing policies related to vector control of mosquitos in inundation and wetland areas results in a less than significant impact.

Therefore, the action alternatives' contribution to the cumulative hazardous materials and health and safety condition **would not result in a cumulatively considerable impact.**

19.5 References

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20 Noise

This chapter presents an overview of the existing noise and vibration conditions in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) and the environmental consequences and mitigation, as they pertain to the implementation of the Project alternatives.

20.1 Environmental Setting/Affected Environment

This section begins with background information to support the noise and vibration analysis and then presents the existing noise and vibration conditions and sensitive receptors in the Project area with the potential to be affected by Project implementation.

20.1.1 Noise and Vibration Terminology

This section presents a framework for understanding noise and vibration levels and their potential impacts.

20.1.1.1 Noise

Noise can be generally defined as unwanted sound. Sound, traveling in the form of waves from a source, is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level (referred to as sound level) is the most common descriptor used to characterize the loudness of an ambient sound level. It is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

Pressure oscillation rates can be measured in units of hertz, which correspond to the frequency of a sound. Typically, sound does not consist of a single frequency but rather a broad band of frequencies varying in levels of magnitude (sound power). The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the frequency/sound power level spectrum. The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum; humans cannot hear low and high-end frequencies well. Therefore, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 and above 5,000 hertz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies and greater sensitivity to mid-range frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted dB (dBA). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in Table 20-1.

Table 20-1. Typical Noise Levels Associated with Common Activities

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 miles per hour		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noise urban area, daytime		
Gas lawnmower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quite suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: California Department of Transportation (Caltrans) 2013
Key: dBA = A-weighted decibels

A key concept in evaluating potential noise impacts is the perceived effect of incremental increase in existing noise levels. Table 20-2 presents the effect of increasing noise levels. For example, the table shows that an increase of three dBA is barely perceptible, an increase of five dBA is noticeable, and a 10-dBA increase would be perceived by someone to be a doubling of noise (Federal Highway Administration [FHWA] 2011).

Table 20-2. Perceived Effect of Incremental Increases in Existing Noise Levels

Sound Level Change (dBA)	Relative Loudness/ Impact	Acoustical Energy Gain (%)
0	Reference	0
+3	Barely Perceptible Change	50
+5	Noticeable Change	67
+10	Twice as Loud	90
+20	Four Times as Loud	99

Source: FHWA 2011
Key: dBA = A-weighted decibels

Noise analyses and regulations use the following terms:

- **L_{eq}: Equivalent energy level** – A-weighted sound level corresponding to a steady-state sound level that contains the same total energy as a varying signal over a given sample period. This is typically computed over 1-, 8-, and 24-hour sample periods. An hourly sample period is denoted as $L_{eq}(h)$.

- **L_{dn}: Day-night average level** – The energy average sound level for a 24-hour day determined after the addition of a 10-dBA penalty to all noise events occurring at night between 10 p.m. and 7 a.m. This is a useful measure for community noise impact because people in their homes are much more sensitive to noise at night when they are relaxing or sleeping than they are in the daytime.
- **L_{max}: Maximum noise level** – Representing the highest sound level measured for a given period.
- **L_{min}: Minimum noise level** – Representing the lowest sound level measured for a given period.
- **L_x: Statistical noise descriptor** – The noise level exceeded X percent of a specified time period. For example, L_{10} indicates the noise level that is exceeded 10 percent of the time during a given period.
- **CNEL: Community Noise Equivalent Level** – A 24-hour average L_{eq} that includes the addition of five dBA to sound levels from 7 p.m. to 10 p.m. and an addition of 10 dBA to sound levels from 10 p.m. to 7 a.m. The CNEL is commonly used in California instead of the L_{dn}.

Noise effects on humans can range from annoyance to physical discomfort and harm. Sleeping patterns, speech communication, mental acuity, and heart and breathing rates can all be disturbed by noise. Perception of the noise is affected by its pitch, loudness, and character.

Sound levels from isolated point sources of noise typically decrease by about six dBA for every doubling of distance from the noise source. When the noise source is a continuous line, such as vehicle traffic on a highway, sound levels decrease by about three dBA for every doubling of distance. Noise levels can also be affected by several factors other than the distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can affect the reduction of noise levels. Atmospheric conditions (wind speed and direction, humidity levels, and temperatures) and the presence of dense vegetation can also affect the degree to which sound is attenuated over distance (FHWA 2011).

20.1.1.2 Vibration

Vibration refers to groundborne noise and perceptible motion. The most common impacts from groundborne vibration include annoyance, movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, disruption of vibration-sensitive operations or activities, and triggering of landslides. Vibrations caused by construction can be interpreted as energy transmitted in waves through the soil mass. These energy waves generally dissipate with distance from the vibration source due to spreading of the energy and frictional losses. Thus, groundborne vibrations from most construction activities rarely reach the levels that can damage structures but can achieve the perceptible ranges in buildings very close to construction sites (Federal Transit Authority [FTA] 2006).

In extreme cases, the vibration can cause damage to buildings or equipment. In most circumstances, common ground-induced vibrations related to roadway traffic and construction activities pose no threat to buildings or structures, with the occasional exception of blasting and sheet pile-driving during construction. To assess the potential for structural damage associated

with vibration, the vibratory ground motion near the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions, typically in units of inches per second (in/sec). The PPV is defined as the maximum instantaneous peak of the vibration signal. According to FTA guidelines (2006), the construction vibration damage criterion for non-engineered timber and masonry buildings is 0.2 in/sec, and that of structures or buildings constructed of reinforced-concrete, steel, or timber is 0.5 in/sec.

Annoyance from vibration often occurs when the vibration exceeds the threshold of perception. A vibration level that causes annoyance would be well below the damage threshold for normal buildings. Generally, groundborne vibration does not provoke adverse human reaction to those who are outdoors as the effects associated with the shaking of building are absent. The root mean square amplitude is most frequently used to describe the effect of vibration on the human body. The root mean square amplitude is defined as the average of the squared amplitude of the signal and is approximately 70 percent of the PPV for a single frequency vibration. Vibration velocity level (Lv) in dB notation (VdB) is commonly used to measure root mean square. The dB notation acts to compress the range of numbers required to describe vibration and is referenced to one in one million in/sec in the United States. The threshold of perception for vibration is typically around 64 VdB.

Construction activities can either result in continuous or single-impact (transient) vibration impacts. Typical equipment or activities that could result in continuous vibration impacts include excavation equipment, traffic, vibratory pile drivers, and vibratory compaction equipment; examples of transient vibration sources include blasting and drop balls. Some construction activities, like jackhammers or impact pile drivers, can continually generate single transient events at a high frequency. However, for evaluation purposes, this equipment would be regarded as having frequent or continuous vibration impacts. Damage thresholds for continuous sources are approximately half of the thresholds for transient sources.

20.1.2 Existing Noise and Vibration Sources

The Project involves construction activities within the California Department of Fish and Wildlife's Fremont Weir Wildlife Area (FWWA), most of which is in Yolo County. The western end of Fremont Weir and the northern end of the proposed west side gated notch are in Sutter County. The southern tip of the Yolo Bypass is in Solano County, but no construction is proposed in that area. The FWWA allows visitors to fish, hunt, hike, and view wildlife. There are no residences, buildings, or recreational facilities within the FWWA; however, the FWWA would be partially open to the public during construction.

Haul routes may include portions of Interstate (I) 5 and county roads (CRs) providing access from I-5 to the Project area. CRs 117 and 16 would be used for East (Alternative 1) and Center (Alternatives 2 and 5) alternatives, Downstream Channel improvements, Agricultural Road Crossing 1 improvements, and East Supplemental Fish Passage components. CRs 102, 16, and 116A would be used for West (Alternatives 3, 4, and 6) and Center (Alternatives 2 and 5) alternatives and West Supplemental Fish Passage components. CRs 117 and 22 would be used for the Northern and Southern Water Control structures and fish bypass channel components. CRs 102 and 28H would be used for the Southern Water Control Structure and fish bypass channel components and Tule Canal Floodplain improvements.

The area surrounding the Project area and haul routes is mainly agricultural and rural. Figure 20-1 illustrates the area of analysis for noise and vibration.

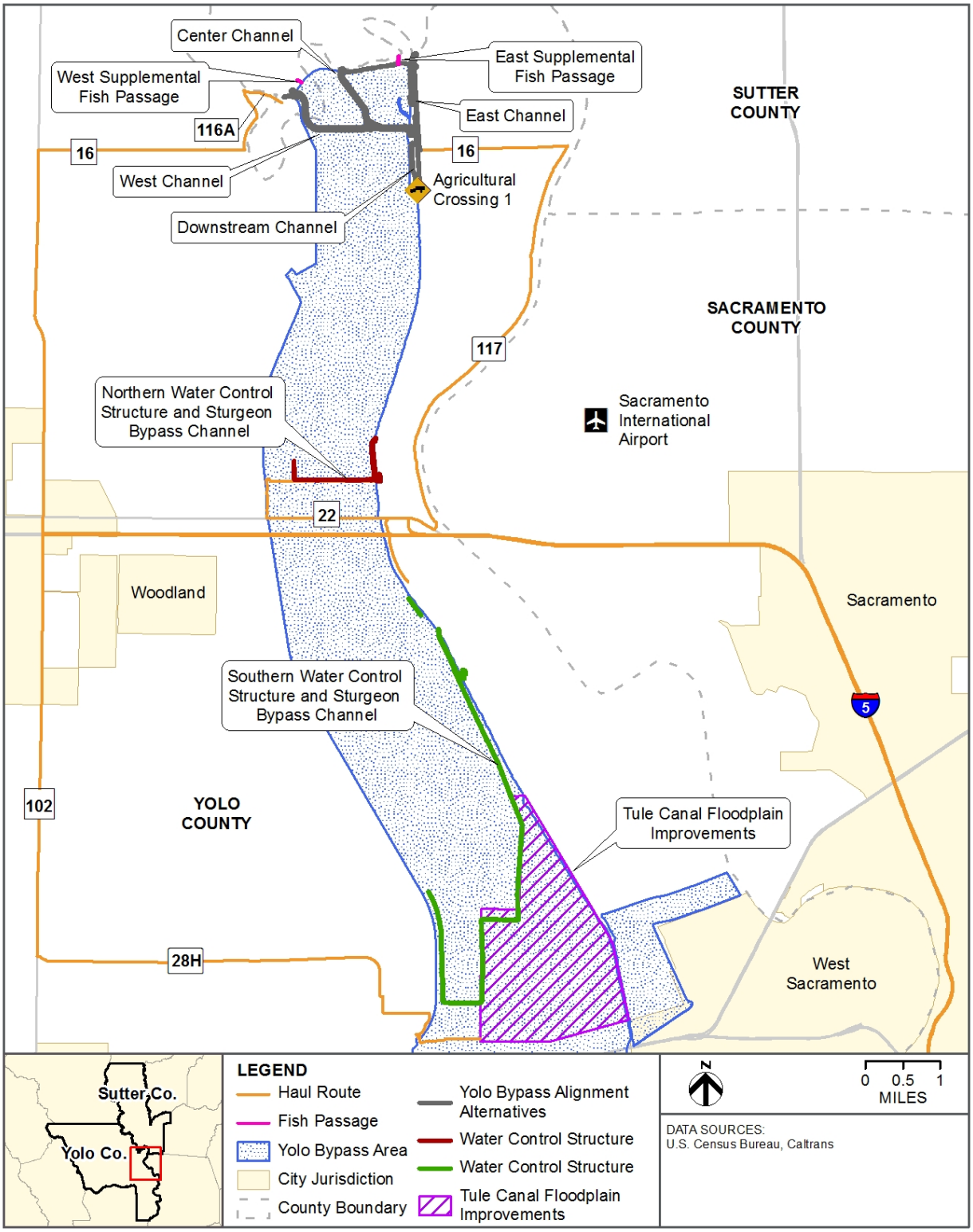

Figure 20-1. Noise and Vibration Area of Analysis

Noise sources in the Project area are of four general types: agricultural, recreational, general stationary, and general mobile.

Agricultural Noise. The predominant land use near the Project area is related to agricultural activities. Farm operations produce noise from a variety of sources. These include heavy equipment for plowing and harvesting, crop-spraying aircraft, onsite processing equipment, and irrigation water pumps. Farm tractors typically produce 78 to 106 dBA L_{max}, with an average of 84 dBA L_{max} at 50 feet (Yolo County 2009). Crop-spraying aircraft typically fly at low altitude and may cause loud temporary noise exceeding those of commercial aircraft from the Sacramento International Airport. Crop-spraying is typically seasonal and short in duration at any given location. In addition to affecting the farmers and farm laborers, agricultural noise also affects those living in or near agricultural areas.

Recreational Noise. Recreational noise can include hunting and boating noise from the FWWA and the Sacramento River, respectively. Firearms typically generate instantaneous noise exceeding 140 dBA (American Speech-Language-Hearing Association 2017). State laws require motorboats to be muffled and to generate less than 75 dBA at the shoreline (California Natural Resources Agency 2017). Vehicle parking for the FWWA is only available on the east side of the FWWA; visitors typically travel on CR 107, which has no residential receptors along the road.

General Stationary Noises. General stationary noises (i.e., those emanating from fixed locations) are associated with a variety of land uses. Stationary sources can include air conditioning units, power tools, motors, generators, appliances, and manufacturing and industrial facilities. As shown in Figure 20-2, there are no residences, industrial facilities, or commercial facilities within the Project area. The nearest residence is 700 feet to the west of the Project area, and the nearest industrial facilities are 2.5 miles to the west of the Project area. Therefore, contribution of general stationary noises to the ambient noise levels in the Project area is minimal.

General Mobile Noise. General mobile noise sources can include vehicles, aircraft, boats, and trains. Mobile noise is usually temporary and variable but can be intense and annoying because of its abruptness and intensity. In urban areas, these mobile sources contribute to the ambient noise.

The closest mobile noise sources to the Project area are agricultural equipment and occasional boat traffic on the Sacramento River. There is minimal stationary noise or ground-based mobile noise; I-5 is over 4.5 miles south of the area, and there are no railroads nearby. The largest source of mobile noise to the Project area is the Sacramento International Airport, located 2.5 miles southeast of the construction area. Planes are typically flying at 1,000 to 3,000 feet above sea level (Sacramento Area Council of Governments [SACOG] 2013). The area falls just outside of the existing 60 dBA CNEL contour (Yolo County 2009) and well outside of the future projected 60 dBA CNEL contour (Yolo County 2009, SACOG 2013) but is located within the Traffic Pattern Area of the *Sacramento International Airport Land Use Compatibility Plan*. It is estimated that the existing noise level in the proposed construction area is approximately 55 dBA CNEL. There are also three private airports (Riego Flight Strip, Lauppes Strip, and Sopwith Farm) within two miles of the Project area.

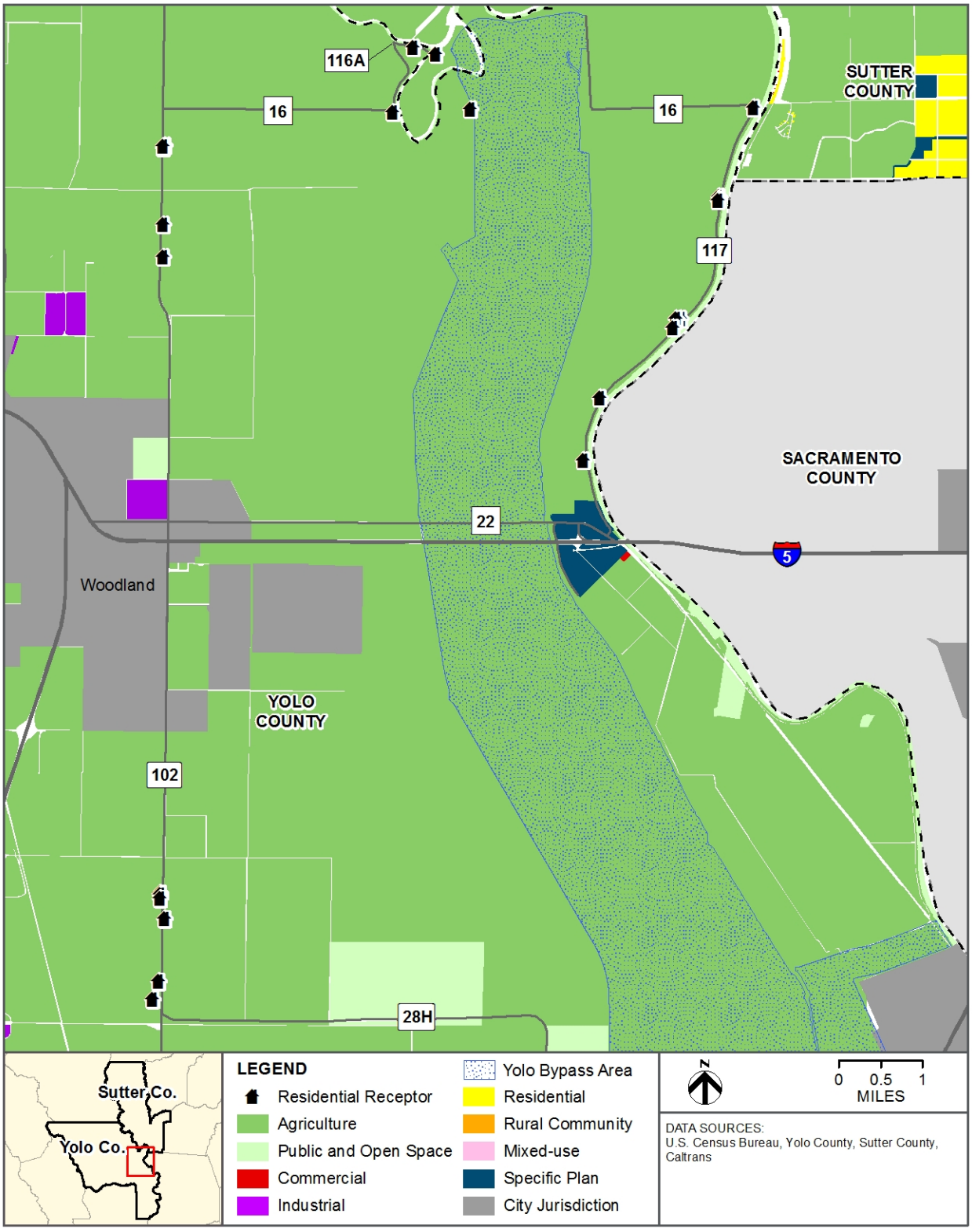

Figure 20-2. Noise-Sensitive Land Uses in the Area of Analysis

20.1.3 Existing Noise and Vibration Sensitive Receptors

Generally, places where quiet is an essential element of a land use's intended purpose qualify as a noise-sensitive receptor, such as historical monuments with significant outdoor use. Places where people normally sleep, like residences, hotels, and hospitals, qualify as noise-sensitive receptors. For these types of receptors, nighttime sensitivity to noise must be considered. Various institutional land uses where excessive noise could interfere with speech, meditation, and concentration also qualify as noise sensitive receptors. These land uses include schools, libraries, theaters, churches, cemeteries, monuments, and museums. Parks may also be considered noise-sensitive receptors, but this classification is dependent on their use. For example, a park intended primarily for active recreation would not be considered a noise-sensitive receptor (FTA 2006). Noise-sensitive receptors may also have stationary noise sources at their locations.

Noise-sensitive receptors located within the Project area include recreational visitors to the FWWA (which would be partially open to the public during construction) and wildlife. Existing wildlife and effects of construction noise on wildlife are discussed in Chapter 9, *Vegetation, Wetlands, and Wildlife Resources*. Noise-sensitive receptors located near the Project area include several residential receptors, approximately 60 to 550 feet from the centerline of CRs 117, 102, 16, and 116A, as shown in Figure 20-2.

20.2 Regulatory Setting

This section describes the applicable noise and vibration laws, rules, regulations, and policies at the Federal, State of California (State), county, and local level.

20.2.1 Federal Plans, Policies, and Regulations

In the past, the United States Environmental Protection Agency (USEPA) coordinated all Federal noise control activities through its Office of Noise Abatement and Control. However, in 1981, Congress concluded that noise issues were best handled at the state or local government level. As a result, the USEPA phased out the office's funding in 1982 as part of a shift in Federal noise control policy to transfer the primary responsibility of regulating noise to state and local governments. However, the Noise Control Act of 1972 and the Quiet Communities Act of 1978 were not rescinded by Congress and remain in effect today although essentially unfunded. Additionally, Title IV – Noise Pollution of the Clean Air Act provides guidance to state and local entities for establishing appropriate noise control standards.

20.2.2 State Plans, Policies, and Regulations

20.2.2.1 California Buildings Standards Code

The State of California has adopted noise standards in areas of regulation not preempted by the Federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation. Title 24 of the California Code of Regulations, also known as the California Buildings Standards Code, establishes building standards applicable to all occupancies throughout the State. The code provides acoustical regulations for both exterior-to-interior sound insulation as well as sound and impact

isolation between adjacent spaces of various occupied units. Title 24 regulations generally state that interior noise levels generated by exterior noise sources shall not exceed 45 dBA L_{dn}/CNEL, with windows closed, in any habitable room for general residential uses.

20.2.2.2 General Plans and Noise Ordinances

The State of California also provides guidance for the preparation of general plans and noise ordinances. In 1976, the State Department of Health Services (now the Department of Public Health) issued *Noise Element Guidelines* (Health and Safety Code Section 46050.1). In 1977, the State Office of Noise Control published a model noise ordinance and mandated that each county develops a noise element as part of its general plan (Section 65302[f] of the California Government Code). The purpose of this element is to identify and appraise noise problems in the community. The Office of Noise Control's model ordinance recommends limits on temporary construction noise levels and operational noise levels in residential, commercial, and industrial areas.

The State's *General Plan Guidelines* recommend that local governments "'analyze and quantify' noise levels and the extent of noise exposure through actual measurement and the use of noise modeling." In addition to other requirements, the guidelines state that "technical data relating to mobile and point sources must be collected and synthesized into a set of noise control policies and programs that 'minimizes the exposure of community residents to excessive noise'" (California Governor's Office of Planning and Research [OPR] 2003).

As part of the county-level planning process, analysis of existing conditions and community tolerance for noise is used to dictate the normally acceptable community noise exposure. Measured in dBA, a normally acceptable community noise exposure is used by the State to signify satisfactory land use in relation to noise exposure. Other terms used by the State to analyze community noise exposure are:

- **Normally Acceptable –** Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
- **Conditionally Acceptable –** New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
- **Normally Unacceptable –** New construction or development generally should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
- **Clearly Unacceptable –** New construction or development generally should not be undertaken.

Table 20-3 displays land use categories and the associated acceptability for community noise exposure levels.

Table 20-3. Noise Compatible Land Use Planning

Land Use	Normally Acceptable L_{dn} or CNEL (dBA) [a]	Conditionally Acceptable L_{dn} or CNEL (dBA) [a]	Normally Unacceptable L_{dn} or CNEL (dBA) [a]	Clearly Unacceptable L_{dn} or CNEL (dBA) [a]
Residential – Low Density Single Family, Duplex, Mobile Homes	50-60	55-70	70-75	75+
Residential – Multi Family	50-65	60-70	70-75	75+
Transient Lodging – Motels, Hotels	50-65	60-70	70-80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-70	60-70	70-80	80+
Auditoriums, Concert Halls, Amphitheaters	N/A	50-70	N/A	65+
Sports Arena, Outdoor Spectator Sports	N/A	50-75	N/A	70+
Playgrounds, Neighborhood Parks	50-70	N/A	67-75	72+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-75	N/A	70-80	80+
Office Buildings, Business Commercial and Professional	50-70	67-77	75+	N/A
Industrial, Manufacturing, Utilities, Agriculture	50-75	70-80	75+	N/A

Source: OPR 2003

Note:

[a] Ranges in the community noise exposure levels (and any subsequent overlaps in the different categories) reflect the differing noise goals of a community, the community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution (OPR 2003).

Key: CNEL = Community Noise Equivalent Level; dBA = A-weighted decibel scale; L_{dn} = day-night average level; N/A = not applicable

20.2.3 Regional and Local Plans, Policies, and Regulations

Most local jurisdictions have adopted noise standards for both transportation and non-transportation sources in noise ordinances and the Noise Element of their general plans.

The Health and Safety Element of the *2030 Countywide General Plan* includes the Noise Element (Yolo County 2009). The goal of the noise element is to protect people from the harmful effects of excessive noise through proper planning and noise reduction measures where necessary and feasible. The plan incorporates Table 20-3 as a guideline for long-term noise compatible land use planning. The plan recommends adopting a comprehensive noise ordinance that includes standards for acceptable exterior and interior noise levels and construction equipment and noise-emitting construction activities. The plan also recommends requiring a noise analysis for all proposed projects that may impact sensitive receptors, such as residences. Yolo County does not have an adopted noise ordinance.

The Noise Element of the Sutter County *2030 General Plan* (2011) has a policy to limit noise-generating construction activities within 1,000 feet of sensitive receptors, such as residences,

between 7:00 a.m. and 6:00 p.m. on weekdays and 8:00 a.m. and 5:00 p.m. on Saturdays. Vibration levels are also limited to impact criteria developed by the FTA. For example, frequent vibration levels should not exceed 72 VdB at residences and 75 VdB on institutional land uses. In addition, noise from new stationary sources should not exceed an $L_{eq}(h)$ of 55 dBA or L_{max} of 70 dBA during the day (between 7:00 a.m. and 10:00 p.m.) and $L_{eq}(h)$ of 45 dBA or L_{max} of 65 dBA at the property line of a sensitive noise receptor, such as a residence. Also, for a residence with an existing L_{dn} of 55 dBA, the increase in exterior noise level as a result of the new development should not be more than 3 dB. To implement these policies, the plan recommends requiring a noise analysis for new projects and adopting a noise ordinance with quantitative maximum allowable noise levels. Sutter County does not have an adopted noise ordinance.

20.3 Environmental Consequences

These sections describe the environmental consequences and environmental impacts associated with each alternative. Detailed descriptions of the alternatives evaluated in this section are provided in Chapter 2, *Description of Alternatives*.

20.3.1 Methods for Analysis

The focus of this analysis is on potential temporary noise impacts during construction. Activities with the potential for generating short-term, temporary increases in noise levels include construction activities and construction-related traffic. Long-term noise impacts are not anticipated from operation and maintenance of new facilities. However, short-term and intermittent noise impacts would occur from maintenance activities, such as from sediment removal.

Appendix M, *Noise and Vibration Calculations*, presents details on the methods used and results of noise modeling conducted for this Environmental Impact Statement (EIS)/Environmental Impact Report (EIR). The noise level at nearby sensitive receptors during the construction of each alternative was calculated by 1) attenuating the construction sound level for distance to the receptor and 2) logarithmically adding the attenuated construction noise source level to the ambient noise level. Construction noise was predicted using the equations and guiding principles from the FHWA Roadway Construction Noise Model. The model database provides maximum noise levels for various pieces of construction equipment at a reference distance of 50 feet. The types of construction equipment that could be used during the construction of each alternative, the percentage of time that the equipment would operate at full power (usage factor) during an hour, and each piece's maximum noise level are presented in Table 20-4. The construction equipment is estimated to operate for 10 hours a day between 7:00 a.m. and 6:00 p.m. Monday through Saturday.

Table 20-4. Construction Equipment Types and Noise Levels

Equipment Type	Usage Factor	L_{max} at 50 Feet
All Other Equipment Greater than 5 hp	50%	85
Compactor (ground)	20%	83
Concrete Mixer Truck	40%	79
Concrete Pump Truck	20%	81
Crane	16%	81
Dozer	40%	82
Dump Truck	40%	76
Excavator	40%	81
Flat Bed Truck	40%	74
Front End Loader	40%	79
Generator	50%	81
Grader	40%	85
Impact Pile Driver	20%	101
Pickup Truck	40%	75
Pumps	50%	81
Roller	20%	80
Scraper	40%	84

Source: FHWA 2006

Key: hp = horsepower; L_{max} = maximum noise level measured during a monitoring period

The analysis of transportation noise impacts associated with construction worker commute traffic and trucks hauling waste and construction materials focuses on sensitive land uses along local and regional roadways. It was assumed that construction workers would commute to the sites using the same roads as the haul trucks. Doubling of traffic would only result in a change of approximately 3 dB, which would be barely perceptible to a human ear (FHWA 2011). Traffic would need to be increased at least 3 times for increased noise to be readily perceived (5 dBA) and at least nine times to double the noise levels (10 dBA). Construction-related traffic was compared against the 2015 annual average daily traffic volumes published by Caltrans (2016). Traffic data for the county roads was not readily available and so a qualitative assessment of impacts was completed if data was not available.

In addition to noise, construction activities have the potential to produce vibration that may be annoying or disturbing to humans and may cause damage to structures. Highest levels of vibration from construction projects are caused by soil compacting, jack hammering, and structure demolition. Table 20-5 presents the PPV (in/sec) and Lv (VdB) for typical construction equipment (FTA 2006). PPV levels were applied to each type of construction equipment as appropriate, and the equivalent PPV at the receptor was calculated. Although PPVs are not additive, total PPV for each action was evaluated for a conservative analysis. Lv levels for all equipment that may be operating simultaneously were added logarithmically. Similar to the noise analysis for alternatives and actions within an alternative that do not have a defined sensitive receptor, such as an existing residence, the distances at which the vibration level would be less than the significance threshold were determined.

Table 20-5. Construction Equipment Types and Vibration Levels

Equipment Type	PPV at 25 feet (in/sec)	Approximate Lv at 25 feet (VdB)
Pile Driver (impact)	0.644	104
Pile Driver (sonic)	0.17	93
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86

Source: FTA 2006

Key: in/sec = inches per second; Lv = vibration velocity level; PPV = peak particle velocity; VdB = vibration decibels

Noise impacts are determined relative to existing conditions (for the California Environmental Quality Act [CEQA]) and the No Action Alternative (for the National Environmental Policy Act [NEPA]). However, as described below, the No Action Alternative would be the same as existing conditions because noise levels are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to existing conditions.

20.3.2 Thresholds of Significance – CEQA

The significance criteria described below were developed consistent with the environmental checklist in Appendix G of the State CEQA Guidelines to determine the significance of potential noise impacts that could result from implementation of the project. These thresholds also encompass the factors considered under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. Noise impacts would be considered significant if the project would result in:

- Exposure of persons to, or generation of noise and vibration levels in excess of, standards established in the local general plan or noise ordinance or applicable standards of other agencies
- Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels
- A substantial permanent increase in ambient noise levels in the Project vicinity
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity
- Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

The evaluation of the significance of exposure of persons to, or generation of noise and vibration levels in excess of, established standards was based primarily on compatibility with noise regulations discussed in Section 20.2.

According to FTA guidelines (2006), a vibration criterion of 0.2 in/sec is the significant impact level for non-engineered timber and masonry buildings. Furthermore, structures or buildings constructed of reinforced-concrete, steel, or timber have a vibration damage criterion of 0.5 in/sec. Also, groundborne vibration levels of 72 VdB at residences and 75 VdB on institutional land uses would be considered annoying (Sutter County 2011). These thresholds were used to

evaluate the significance of exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

For the purpose of this analysis, the noise compatibility guidelines by land use category included in Yolo County's *2030 Countywide General Plan* (2009) were used to determine a substantial increase in noise level. Table 20-3 summarizes the normally and conditionally acceptable noise levels for the residential and agricultural land uses expected to be in the Project area. A substantial increase was considered to be noise levels that exceed the conditionally acceptable levels. Temporary noise from maintenance activities was also compared against the conditionally acceptable levels.

The significance criteria described above apply to the noise receptors that could be affected by the project.

20.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect noise effects from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

20.3.3.1 No Action Alternative

Under the No Action Alternative, the Project would not be implemented and none of the project features would be developed. This analysis assumes that ambient noise levels under the No Action Alternative would be the same as existing conditions. Neither construction-related activities nor increased operational activities would occur.

CEQA Conclusion

Without implementation of the Project under the No Action Alternative, there would be **no impact** to existing noise and vibration levels within the Project area because neither construction-related activities nor increased operational and maintenance activities would occur. Therefore, there would be no adverse effects from:

- Exposure of persons to, or generation of noise and vibration levels in excess of, standards established in the local general plan or noise ordinance or applicable standards of other agencies
- Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels
- A substantial permanent increase in ambient noise levels in the Project vicinity
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity
- Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

20.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

20.3.3.2.1 Impact NOI-1: Exposure of persons to, or generation of noise and vibration levels in excess of, standards established in the local general plan or noise ordinance or applicable standards of other agencies

Construction of East Channel, Downstream Channel, and Agricultural Road Crossing 1 and ongoing maintenance activities would occur in Yolo County. The West Supplemental Fish Passage would be in Sutter County but would not be within 1,000 feet of residential receptors. Yolo County does not have a quantitative noise threshold in their general plan or regulations that are relevant to this Project (Yolo County 2009). As recommended by the *2030 Countywide General Plan* (2009), a noise analysis was performed for this project. Vibration levels from construction and maintenance activities are not anticipated to exceed the 72 VdB annoyance criteria in Sutter County. Therefore, Alternative 1 would be consistent with the general plans of Yolo and Sutter counties.

CEQA Conclusion

Noise and vibration impacts associated with Alternative 1 would be **less than significant** because Alternative 1 construction, operation, and maintenance noise and vibration levels would be consistent with the general plans of Yolo and Sutter counties.

20.3.3.2.2 Impact NOI-2: Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels

Construction equipment associated with Alternative 1, such as pile drivers, drill rigs, dozers, and loaded trucks, would generate vibrations that could result in groundborne noise or vibration that may affect nearby structures and sensitive receptors.

PPV levels during construction of the East Channel, Downstream Channel, West Supplemental Fish Passage, and Agricultural Road Crossing 1 associated with Alternative 1 are estimated to be less than 0.2 in/sec at 100 feet or more from the vibration source. There are no non-engineered timber and masonry buildings within these distances from the construction activities; therefore, construction activities are not anticipated to damage buildings.

Lv levels during construction associated with Alternative 1 are estimated to be less than 72 VdB at 510 feet or more from the vibration source. Although there are no residences within 510 feet of the construction areas, vibration on peak days would be caused mainly by loaded haul truck traffic. Traffic count data on the rural roads is not readily available and so it was conservatively assumed that the traffic volumes would be low and could be negatively affected by the increased truck and worker traffic. Residential receptors adjacent to the haul routes range from 60 to 550

feet from the centerline of the road and would be impacted significantly by the vibration of the roads. On peak construction days, there would be a maximum of 626 haul trips and 378 construction worker trips. There would be up to 20 daily worker trips and 399 daily haul truck trips associated with maintenance activities.

No long-term project operations would occur under Alternative 1 that would generate excessive vibrations or groundborne noise or otherwise expose buildings or persons to such impacts.

CEQA Conclusion

Vibration impacts under Alternative 1 would be **significant** because vibrations from loaded haul trucks along the haul routes could exceed the annoyance threshold for adjacent residential receptors during construction and maintenance.

Mitigation Measure MM-NOI-1: Implement a Noise and Vibration Control Plan

A Noise and Vibration Control Plan (NVCP) will be developed by the construction and maintenance contractor prior to the start of any construction activities to address increased noise and vibration levels associated with Project implementation.

The NVCP will identify the procedures for predicting construction and maintenance noise levels at sensitive receptors and describe the reduction measures and best management practices required to minimize construction noise. The NVCP noise mitigation measures will include but not be limited to:

- All construction equipment shall be stored in a designated staging area during the construction phase to eliminate daily heavy-duty truck trips on local roadways.
- To achieve an hourly average noise level below 60 dBA, speed limits and limits on the number of passbys per hour shall be established and enforced for construction vehicle traffic on local roads adjacent to sensitive receptors to minimize traffic noise.
- Sound attenuation will be used or constructed to minimize noise levels. Potential sound attenuation measures could include but are not limited to stationary barriers placed between the source(s) of construction noise and noise-sensitive receptors. The feasible measures will be determined by the construction contractor based on an initial evaluation of each construction site.
- Contractor will be responsible for maintaining equipment to comply with noise standards (e.g., exhaust mufflers, acoustically attenuating shields, shrouds, or enclosures).
- The public will be kept informed of the construction hours and days.
- The contractor will provide contact information for filing complaints and respond to noise and vibration complaints. The contact information will be posted on the exterior of any sound barriers.
- A pre-construction meeting will be held with contractors and project managers to confirm that noise mitigation procedures are in place.
- All mitigation requirements will be included in bid documents and construction contracts.

Although implementation of Mitigation Measure MM-NOI-1 would reduce vibration impacts to residents, the high number of haul trucks on peak construction and maintenance days would not reduce vibration levels to less than significant levels. Vibration impacts under Alternative 1 would remain **significant and unavoidable**.

20.3.3.2.3 Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity

Construction impacts on ambient noise levels generated by Alternative 1 would be short-term and would not result in permanent increases in ambient noise levels. There would be no impact to the ambient noise levels that would result in a substantial permanent increase.

Operation of Alternative 1 would not require a continuous use of heavy equipment, and noise-generating equipment would be housed in a building, which would provide sufficient noise reduction. Operation of Alterative 1 is not anticipated to have a significant effect on the ambient noise levels. Maintenance activities, including road regrading, debris and vegetation removal, sediment removal, channel repairs, and other basic upkeep, would occur periodically throughout the year. These activities are not anticipated to have a significant effect on the ambient noise levels.

CEQA Conclusion

Permanent noise impacts under Alternative 1 would be **less than significant** because construction and maintenance of Alternative 1 would not cause a permanent increase in noise and operation of Alternative 1 would not cause a significant permanent increase in ambient noise levels.

20.3.3.2.4 Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity

Noise from construction equipment would occur throughout the construction phase of Alternative 1. Ambient noise levels within the Project area would increase because of additional noise from construction equipment. Noise levels would vary, depending on the construction phasing and specific pieces of equipment in use at any given time. There are residences near the construction area and along the haul routes.

Noise levels during construction of the East Channel, Downstream Channel, West Supplemental Fish Passage, and Agricultural Road Crossing 1 associated with Alternative 1 are estimated to be less than the residential significance threshold of 70 dBA at 430 feet or more from the noise source. There are no residential receptors within 430 feet of the construction areas. An agricultural significance threshold of 80 dBA would be affected at 140 feet or less. However, there would be no agricultural receptors within 140 feet of the construction areas.

Haul and commute routes for Alternative 1 would include I-5, CR 117, and CR 16 for the East Channel, Downstream Channel, and Agricultural Road Crossing 1 components (East Alternative haul route) and I-5, CR 102, CR 16, and CR 116A for the West Supplemental Fish Passage (West Alternative haul route). Currently, heavy equipment for agricultural uses travels on these county roads. On peak construction days, there would be 626 haul trips and 378 construction worker trips on the East Alternative haul route. The added trips to I-5 would not double the

traffic on I-5 so the increase in traffic noise level would not be perceptible; however, county roads that do not have frequent existing traffic are expected to experience enough of a traffic increase to double the traffic noise levels. The traffic noise increase would be significant for the residences along those roads.

Operation of the headworks and other facilities would not be expected to generate excessive noise that would exceed the significance criteria. Maintenance activities, such as sediment removal, may also require the use of heavy equipment and haul trucks. Heavy equipment use at the main channel, headworks structure, and buildings is not anticipated to exceed residential or agricultural significance thresholds. However, there may be up to 20 daily worker trips and 399 haul truck trips associated with maintenance activities on the East Alternative haul route. Similar to construction traffic impacts, receptors along county roads with infrequent traffic may experience a temporary significant increase in noise level.

CEQA Conclusion

Impacts from operation of the headworks and other facilities would be expected to be **less than significant**. However, temporary noise impacts under Alternative 1 would be **significant** because ambient noise levels for road-side receptors along the haul and commute routes could increase substantially from construction- and maintenance-related traffic.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce noise impacts, but it would not reduce noise levels to less than significant on peak construction days given the high number of haul trucks estimated for Alternative 1.

Temporary noise impacts under Alternative 1 would remain **significant and unavoidable**.

20.3.3.2.5 Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

The Sacramento International Airport is located 2.5 miles southeast of the channel construction area. Although the Project area is within the airport's Traffic Pattern Area, the Project area lies just outside of the existing 60 dBA CNEL contour (Yolo County 2009) and well outside of the future projected 60 dBA CNEL contour (Yolo County 2009; SACOG 2013). Private airports are used infrequently; therefore, noise from private airports would not be excessive, and workers would not be exposed to excessive noise levels from the public and private airports.

CEQA Conclusion

Airport noise impacts under Alternative 1 would be **less than significant** because people residing or working in the Project area would not be exposed to excessive noise levels from public or private airports.

20.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because

the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

20.3.3.3.1 Impact NOI-1: Exposure of persons to, or generation of, noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies

Construction of the Center Channel, Downstream Channel, and Agricultural Road Crossing 1 would occur in Yolo County. The West Supplemental Fish Passage would be in Sutter County but would not be within 1,000 feet of sensitive receptors. The exposure of persons to noise and vibration levels under Alternative 2 from construction, operation, and maintenance would be the same as those discussed for Alternative 1.

CEQA Conclusion

Noise and vibration impacts associated with Alternative 2 would be **less than significant** because Alternative 2 construction, operation, and maintenance noise and vibration levels would be consistent with the general plans of Yolo and Sutter counties.

20.3.3.3.2 Impact NOI-2: Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels

The exposure of person to groundborne vibration or noise under Alternative 2 would be the same as those discussed for Alternative 1. On peak construction days, there would be 587 haul trips and 442 construction worker trips. Maintenance activities would involve up to 20 daily worker trips and 394 haul truck trips. The vehicles from these trips would generate vibrations that could result in groundborne noise or vibration that may affect residential receptors adjacent to the haul routes.

No long-term project operations would occur under Alternative 2 that would generate excessive vibrations or groundborne noise or otherwise expose buildings or persons to such impacts.

CEQA Conclusion

Vibration impacts under Alternative 2 would be **significant** because vibrations from loaded trucks during construction and maintenance could exceed the annoyance threshold.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce the impacts of vibrations to residents, but it would not reduce vibration levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Alternative 2.

Vibration impacts under Alternative 2 would remain **significant and unavoidable**.

20.3.3.3.3 Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity

Permanent increases in ambient noise levels under Alternative 2 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Permanent noise impacts under Alternative 2 would be **less than significant** because construction and maintenance of Alternative 2 would not cause permanent noise and operation of Alternative 2 would not cause a significant permanent increase in ambient noise levels.

20.3.3.3.4 Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity

Temporary increases in ambient noise levels under Alternative 2 would be the same as those discussed for Alternative 1. Haul and commute routes would include I-5, CR 117, and CR 16 for the Center Channel, Downstream Channel, and Agricultural Road Crossing 1 components (East Alternative haul route) and I-5, CR 102, CR 16, and CR 116A for the West Supplemental Fish Passage (West Alternative haul route). On peak construction days, there would be 587 haul trips and 442 construction worker trips on the East Alternative haul route. Operation of the headworks and other facilities would not be expected to generate excessive noise that would exceed the significance criteria. There would also be up to 20 daily worker trips and 394 haul truck trips associated with maintenance activities on the West Alternative haul route. The vehicles from these trips would increase ambient noise levels that may affect residential receptors adjacent to the haul routes.

CEQA Conclusion

Impacts from operation of the headworks and other facilities would be expected to be **less than significant.** Temporary noise impacts under Alternative 2 would be **significant** because ambient noise levels at road-side receptors could increase substantially from construction- and maintenance-related traffic.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce noise impacts, but it would not reduce noise levels to less than significant on peak construction days given the high number of haul trucks estimated for Alternative 2.

Temporary noise impacts under Alternative 2 would remain **significant and unavoidable**.

20.3.3.3.5 Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

Exposure to airport noise levels under Alternative 2 would be the same as that discussed for Alternative 1.

CEQA Conclusion

Airport noise impacts under Alternative 2 would be **less than significant** because people residing or working in the Project area would not be exposed to excessive noise levels from public or private airports.

20.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

20.3.3.4.1 Impact NOI-1: Exposure of persons to, or generation of, noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies

Construction of the East Supplemental Fish Passage, Downstream Channel, and Agricultural Road Crossing 1 would occur in Yolo County. Yolo County does not have a quantitative noise threshold in their general plan or regulations (Yolo County 2009). As recommended by the *2030 Countywide General Plan* (2009), a noise analysis was performed for this project.

The West Channel construction would partially occur in Sutter County and would be within 1,000 feet of sensitive receptors. Construction is estimated to occur between 7:00 a.m. and 6:00 p.m. Monday through Saturday. Sutter County limits construction activities within 1,000 feet of sensitive receptors to between 7:00 a.m. and 6:00 p.m. on weekdays and 8:00 a.m. and 5:00 p.m. on Saturdays. Construction activities on Saturdays may occur outside of the Sutter County allowed hours. Vibration levels at the closest sensitive receptors at 700 feet from the construction area would be approximately 81 VdB, approximately nine VdB above the annoyance threshold of 72 VdB. Vibration levels from maintenance activities at the closest sensitive receptors would be approximately 78 VdB, approximately six VdB above the annoyance threshold of 72 VdB. Operation is not anticipated to have a significant effect on the ambient noise or vibration levels and therefore would not be expected to exceed standards adopted by Sutter County.

Alternative 3 would be consistent with Yolo County's General Plan but would not be consistent with the Sutter County General Plan.

CEQA Conclusion

Noise and vibration impacts associated with Alternative 3 would be **significant** because Alternative 3 construction noise would not be consistent with the Sutter County General Plan.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce noise and vibration levels, but not enough to reduce to less than significant levels.

Noise and vibration impacts associated with Alternative 3 construction would remain **significant and unavoidable**.

20.3.3.4.2 Impact NOI-2: Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

Construction equipment associated with Alternative 3, such as pile drivers, drill rigs, dozers, and loaded trucks, would generate vibrations that could result in groundborne noise or vibration that may affect nearby structures and sensitive receptors.

PPV levels during construction of the West Channel, Downstream Channel, East Supplemental Fish Passage, and Agricultural Road Crossing 1 associated with Alternative 3 are estimated to be less than 0.2 in/sec at 100 feet or more from the vibration source. There are no non-engineered timber and masonry buildings within these distances from the construction activities; therefore, construction activities are not anticipated to damage buildings.

There is a residential receptor approximately 700 feet from proposed West Channel construction activities. At the receptor, Lv would be approximately 81 VdB, which is above the annoyance threshold of 72 VdB; therefore, construction activities would likely cause human annoyance. Vibration on peak days would be caused mainly by loaded haul truck traffic. Residential receptors adjacent to the haul routes range from 60 to 550 feet from the centerline of the road and would be impacted significantly. On peak construction days, there would be 471 haul trips and 412 construction worker trips. There would also be up to 20 daily worker trips and 394 haul truck trips associated with maintenance activities. The vehicles from these trips would generate vibrations that could result in groundborne noise or vibration that may affect residential receptors adjacent to the haul routes.

Maintenance activities would result in an Lv of approximately 78 VdB at the receptor closest to the West Channel, which would be above the annoyance threshold and would be significant. No long-term project operations would occur under Alternative 3 that would generate excessive vibrations or groundborne noise or otherwise expose buildings or persons to such impacts.

CEQA Conclusion

Vibration impacts under Alternative 3 would be **significant** because vibrations from loaded haul trucks traveling along the haul routes and to the West Channel during construction and maintenance activities could exceed the annoyance threshold.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce the impacts of vibrations to residents, but it would not reduce vibration levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Alternative 3.

Vibration impacts under Alternative 3 would remain **significant and unavoidable**.

20.3.3.4.3 Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity

Permanent ambient noise increases under Alternative 3 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Permanent noise impacts under Alternative 3 would be **less than significant** because construction and maintenance of Alternative 3 would not cause permanent noise and operation of Alternative 3 would not cause a significant permanent increase in ambient noise levels.

20.3.3.4.4 Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity

Noise from construction equipment would occur throughout the construction phase of this proposed alternative. Ambient noise levels within the Project area would increase because of additional noise from construction equipment. Noise levels would vary, depending on the construction phasing and specific pieces of equipment in use at any given time. There are residences near the construction area and haul routes.

Noise levels during construction of the West Channel, Downstream Channel, East Supplemental Fish Passage, and Agricultural Road Crossing 1 associated with Alternative 3 are estimated to be less than the residential significance threshold of 70 dBA at 430 feet or more from the noise source. The closest residential receptor to the West Channel would be 700 feet, and noise level at this receptor would be approximately 70 dBA, which would not exceed the residential significance threshold of 70 dBA. The agricultural significance threshold of 80 dBA would be impacted at 140 feet or less. However, there would be no agricultural receptors within 140 feet of the construction areas.

Haul and commute routes would include I-5, CR 117, and CR 16 for the East Supplemental Fish Passage, Downstream Channel, and Agricultural Road Crossing 1 components (East Alternative haul route) and I-5, CR 102, CR 16, and CR 116A for the West Channel (West Alternative haul route). Currently, heavy equipment for agricultural uses travels on these county roads. On peak days, there would be 471 haul trips and 412 construction worker trips on the West Alternative haul route. The added trips to I-5 would not double the traffic on I-5, so the increase in traffic noise level would not be perceptible; however, county roads that do not have frequent existing traffic are expected to experience enough of a traffic increase to double the traffic noise levels. Traffic noise increases would be significant for the residences along those roads.

Operation of the headworks and other facilities would not be expected to generate excessive noise that would exceed the significance criteria. Maintenance activities, if dewatering and sediment removal are required, may also require the use of heavy equipment and haul trucks. Heavy equipment use at the main channel, headworks structure, and buildings is not anticipated to exceed residential or agricultural significance thresholds. However, there may be up to 20 daily worker trips and 394 haul truck trips associated with maintenance activities on the West Alternative haul route. Similar to construction traffic impacts, receptors along county roads with infrequent traffic may experience temporary significant increases in noise levels.

CEQA Conclusion

Impacts from operation of the headworks and other facilities would be expected to be **less than significant**. Temporary noise impacts under Alternative 3 would be **significant** because ambient noise levels for road-side receptors along the haul and commute routes could increase substantially from construction- and maintenance-related traffic.

With implementation of the NVCP included in Mitigation Measure MM-NOI-1, up to a 10-dBA reduction could be achieved with a physical noise barrier; therefore, implementation of mitigation measure MM-NOI-1 would reduce the noise levels from construction equipment at the residential receptor to a less than significant level. Although Mitigation Measure MM-NOI-1 would also reduce noise levels from construction and maintenance traffic, it would not be enough to reduce noise levels to less than significant levels.

Temporary traffic noise impacts under Alternative 3 would remain **significant and unavoidable**.

20.3.3.4.5 Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

Exposure of people to airport noise under Alternative 3 would be the same as that discussed for Alternative 1.

CEQA Conclusion

Airport noise impacts under Alternative 3 would be **less than significant** because people residing or working in the Project area would not be exposed to excessive noise levels from public or private airports.

20.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

20.3.3.5.1 Impact NOI-1: Exposure of persons to, or generation of, noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies

Construction of the East Supplemental Fish Passage, Downstream Channel, Agricultural Road Crossing 1, and Northern and Southern Water Control structures and fish bypass channels would occur in Yolo County. Yolo County does not have a quantitative noise threshold in their General Plan or regulations (Yolo County 2009). As recommended by the *2030 Countywide General Plan* (2009), a noise analysis was performed for this project.

The West Channel construction would be partially located in Sutter County and within 1,000 feet of sensitive receptors. Construction is anticipated to occur between 7:00 a.m. and 6:00 p.m. Monday through Saturday. Sutter County limits construction activities within 1,000 feet of sensitive receptors to between 7:00 a.m. and 6:00 p.m. on weekdays and 8:00 a.m. and 5:00 p.m. on Saturdays. Vibration levels from construction of the West Channel and the Southern Water Control Structure and fish bypass channels would be approximately 81 VdB and 75 VdB, respectively. They would exceed the annoyance threshold of 72 VdB. Vibration levels from maintenance activities at the closest sensitive receptors would be approximately 78 VdB,

approximately six VdB above the annoyance threshold of 72 VdB. Operation is not anticipated to have a significant effect on the ambient noise or vibration levels and therefore would not be expected to exceed standards adopted by Sutter County.

Alternative 4 would be consistent with the General Plan of Yolo County but would not be consistent with the General Plan of Sutter County.

CEQA Conclusion

Noise and vibration impacts associated with Alternative 4 construction would be **significant** because Alternative 4 would not be consistent with the General Plan of Sutter County.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce construction noise and vibration levels but not enough to reduce to less than significant levels.

Noise and vibration impacts associated with Alternative 4 construction would remain **significant and unavoidable**.

20.3.3.5.2 Impact NOI-2: Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels

Construction equipment associated with Alternative 4, such as pile drivers, drill rigs, dozers, and loaded trucks, would generate vibrations that could result in groundborne noise or vibration that may affect nearby structures and sensitive receptors.

PPV levels during construction of the West Channel, Downstream Channel, East Supplemental Fish Passage, Agricultural Road Crossing 1, and Northern and Southern Water Control structures and fish bypass channel associated with Alternative 4 are estimated to be less than 0.2 in/sec at 100 feet or more from the vibration source. There are no non-engineered timber and masonry buildings within these distances from the construction activities; therefore, construction activities are not anticipated to damage buildings.

There is a residential receptor approximately 700 feet from the proposed West Channel construction activities. At this receptor, Lv would be approximately 81 VdB, which is above the annoyance threshold of 72 VdB; therefore, construction activities would likely cause human annoyance. Lv at the nearest residential receptor to the Southern Water Control Structure and fish bypass channel also would exceed the annoyance threshold at 75 VdB. Vibration on peak activity days would be caused mainly by loaded haul truck traffic. Residential receptors adjacent to the haul routes range from 60 to 550 feet from the centerline of the road and would be impacted significantly. On peak construction days, there would be 1,031 haul trips and 562 construction worker trips. There would also be up to 20 daily worker trips and 399 haul truck trips associated with maintenance activities. The vehicles from these trips would generate vibrations that could result in groundborne noise or vibration that may affect residential receptors adjacent to the haul routes.

No long-term project operations would occur under Alternative 4 that would generate excessive vibrations or groundborne noise or otherwise expose buildings or persons to such impacts.

CEQA Conclusion

Vibration impacts under Alternative 4 during construction and maintenance would be **significant** because vibration from loaded haul trucks could exceed the annoyance threshold.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce the impacts of vibration to residents, but it would not reduce vibration levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Alternative 4.

Vibration impacts under Alternative 4 would remain **significant and unavoidable**.

20.3.3.5.3 Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity

Permanent increase in ambient noise levels under Alternative 4 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Permanent noise impacts under Alternative 4 would be **less than significant** because construction and maintenance of Alternative 4 would not cause permanent noise and operation of Alternative 4 would not cause a significant permanent increase in ambient noise levels.

20.3.3.5.4 Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity

Noise from construction equipment would occur throughout the construction phase of this proposed alternative. Ambient noise levels within the Project area would increase because of additional noise from construction equipment. Noise levels would vary, depending on the construction phasing and specific pieces of equipment in use at any given time. There are residences near the construction area and haul routes.

Noise levels during construction of the West Channel, Downstream Channel, East Supplemental Fish Passage, and Agricultural Road Crossing 1 associated with Alternative 4 are estimated to be less than the residential significance threshold of 70 dBA at 430 feet or more from the noise source. The closest residential receptor to the West Channel would be 700 feet, and noise level at the receptor would be approximately 70 dBA, which would not exceed the residential significance threshold of 70 dBA. Agricultural significance threshold of 80 dBA would be impacted at 140 feet or less. However, there would be no agricultural receptors within 140 feet of the construction areas.

Haul and commute routes would include I-5, CR 117, and CR 16 for the East Supplemental Fish Passage, Downstream Channel, and Agricultural Road Crossing 1 components (East Alternative haul route); I-5, CR 102, CR 16, and CR 116A for the West Channel (West Alternative haul route); and I-5, CR 117, CR 22, CR 102, and/or CR 28 for the Northern and Southern Water Control structures and fish bypass channels. Currently, heavy equipment for agricultural uses travels on these county roads. On peak days, there would be 1,031 haul trips and 562 construction worker trips on the West Alternative haul route. The added trips to I-5 would not double the traffic on I-5, so the increase in traffic noise level would not be perceptible; however,

county roads that do not have frequent existing traffic are expected to experience enough of a traffic increase to double the traffic noise levels. Traffic noise increases would be significant for the residences along those roads.

Operation of the headworks and other facilities would not be expected to generate excessive noise that would exceed the significance criteria. Maintenance activities, if dewatering and sediment removal are required, may require the use of heavy equipment and haul trucks. Heavy equipment use, at the main channel, headworks structure, and buildings, is not anticipated to exceed residential or agricultural significance thresholds. However, there may be up to 20 daily worker trips and 399 haul truck trips associated with maintenance activities on the West Alternative haul route. Similar to construction traffic impacts, receptors along county roads with infrequent traffic may experience temporary significant increases in noise level.

CEQA Conclusion

Impacts from operation of the headworks and other facilities would be expected to be **less than significant.** Temporary noise impacts under Alternative 4 would be **significant** because ambient noise levels for road-side receptors along the haul and commute routes could increase substantially from construction- and maintenance-related traffic.

With implementation of the NVCP included in Mitigation Measure MM-NOI-1, up to a 10-dBA reduction could be achieved with a physical noise barrier; therefore, implementation of mitigation measure MM-NOI-1 would reduce the noise levels from construction equipment at the residential receptor to a less than significant level. Although Mitigation Measure MM-NOI-1 would also reduce noise levels from construction and maintenance traffic, it would not be enough to reduce to less than significant levels.

Temporary noise impacts under Alternative 4 would remain **significant and unavoidable**.

20.3.3.5.5 Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

Exposure of people to airport noise under Alternative 4 would be the same as that discussed for Alternative 1.

CEQA Conclusion

Airport noise impacts under Alternative 4 would be **less than significant** because people residing or working in the Project area would not be exposed to excessive noise levels from public or private airports.

20.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish by using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

20.3.3.6.1 Impact NOI-1: Exposure of persons to, or generation of, noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies

Construction of the Center Channel and Agricultural Road Crossing 1 would occur in Yolo County. The West Supplemental Fish Passage would be located in Sutter County but would not be within 1,000 feet of sensitive receptors. Exposure of persons to noise and vibration under Alternative 5 would be the same as that discussed for Alternative 1.

CEQA Conclusion

Noise and vibration impacts associated with Alternative 5 construction, operation, and maintenance would be **less than significant** because Alternative 5 would be consistent with the general plans of Yolo and Sutter counties.

20.3.3.6.2 Impact NOI-2: Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels

Exposure of persons to groundborne vibration and noise levels under Alternative 5 would be the same as that discussed for Alternative 1. On peak construction days, there would be 629 haul trips and 592 construction worker trips. There would also be up to 20 daily worker trips and 394 haul truck trips associated with maintenance activities. The vehicles from these trips would generate vibrations that could result in groundborne noise or vibration that may affect residential receptors adjacent to the haul routes.

No long-term project operations would occur under Alternative 5 that would generate excessive vibrations or groundborne noise or otherwise expose buildings or persons to such impacts.

CEQA Conclusion

Vibration impacts under Alternative 5 would be **significant** because vibrations from loaded haul trucks during construction and maintenance could exceed the annoyance threshold.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce the impacts of vibrations to residents, but it would not reduce vibration levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Alternative 5.

Vibration impacts under Alternative 5 would remain **significant and unavoidable**.

20.3.3.6.3 Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity

Permanent increases in ambient noise levels under Alternative 5 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Permanent noise impacts associated with Alternative 5 would be **less than significant** because construction and maintenance of Alternative 5 would not cause permanent noise and operation of Alternative 5 would not cause a significant permanent increase in ambient noise levels.

20.3.3.6.4 Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity

Temporary increases in ambient noise under Alternative 5 would be the same as those discussed for Alternative 1. Haul and commute routes would include I-5, CR 117, and CR 16 for the Center Channel and Agricultural Road Crossing 1 components (East Alternative haul route) and I-5, CR 102, CR 16, and CR 116A for the West Supplemental Fish Passage (West Alternative haul route). On peak construction days, there would be 629 haul trips and 592 construction worker trips on the West Alternative haul route. Operation of the headworks and other facilities would not be expected to generate excessive noise that would exceed the significance criteria. There would also be up to 20 daily worker trips and 394 haul truck trips associated with maintenance activities on the West Alternative haul route. The vehicles from these trips would increase ambient noise levels that may affect residential receptors adjacent to the haul routes.

CEQA Conclusion

Impacts from operation of the headworks and other facilities would be expected to be **less than significant**. Temporary noise impacts under Alternative 5 would be **significant** because ambient noise levels at road-side receptors could increase substantially from construction- and maintenance-related traffic.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce noise impacts, but it would not reduce noise levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Alternative 5.

Temporary noise impacts under Alternative 5 would remain **significant and unavoidable**.

20.3.3.6.5 Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

Exposure to airport noise under Alternative 5 would be the same as that discussed for Alternative 1.

CEQA Conclusion

Airport noise impacts under Alternative 5 would be **less than significant** because people residing or working in the Project area would not be exposed to excessive noise levels from public or private airports.

20.3.3.6.6 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of I-80. These improvements would not be constructed at the same time as

the remaining facilities. They are included at a program level of detail to consider all the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact NOI-1: Exposure of persons to, or generation of, noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies

Construction of the Tule Canal Floodplain Improvements would occur in Yolo County. Yolo County does not have a quantitative noise threshold in their General Plan or regulations that are relevant to this Project (Yolo County 2009).

CEQA Conclusion

Noise and vibration impacts under Alternative 5 associated with the Tule Canal Floodplain Improvements would be **less than significant** because the Tule Canal Floodplain Improvements would be consistent with the General Plan of Yolo County.

Impact NOI-2: Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels

Exposure of persons to groundborne vibration or noise levels under the Tule Canal Floodplain Improvements would be similar to that discussed under Alternative 1. Vehicles from construction and maintenance trips would generate vibrations that could result in groundborne noise or vibration that may affect residential receptors adjacent to the haul routes.

No long-term project operations would occur with the Tule Canal Floodplain Improvements that would generate excessive vibrations or groundborne noise or otherwise expose buildings or persons to such impacts.

CEQA Conclusion

Vibration impacts under Alternative 5 associated with the Tule Canal Floodplain Improvements would be **significant** because vibrations from loaded haul trucks during construction and maintenance could exceed the annoyance threshold.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce the impacts of vibrations to residents, but it would not reduce vibration levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Tule Canal Floodplain Improvements (truck volumes assumed to be equivalent to Alternative 5).

Vibration impacts from the Tule Canal Floodplain Improvements would remain **significant and unavoidable**.

Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity

Permanent increases in ambient noise levels under the Tule Canal Floodplain Improvements would be similar to those discussed for Alternative 1.

CEQA Conclusion

Permanent noise impacts under Alternative 5 associated with the Tule Canal Floodplain Improvements would be **less than significant** because construction and maintenance of the Tule Canal Floodplain Improvements would not cause permanent noise and operation of the Tule Canal Floodplain Improvements would not cause a significant permanent increase in ambient noise levels.

Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity

Temporary increases in ambient noise levels under the Tule Canal Floodplain Improvements would be similar to those discussed for Alternative 1. Haul and commute routes would include I-5, CR 102, and CR 28H for the Tule Canal Floodplain Improvements, which are the same routes that would be used for the Southern Water Control Structure associated with Alternative 4. Vehicles from construction and maintenance trips would increase ambient noise levels that may affect residential receptors adjacent to the haul routes. Residential receptors on CR 102 are as close as 130 feet from the centerline of the road.

CEQA Conclusion

Temporary noise impacts under Alternative 5 associated with the Tule Canal Floodplain Improvements would be **significant** because ambient noise levels at road-side receptors could increase substantially from construction- and maintenance-related traffic.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce noise impacts, but it would not reduce noise levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Tule Canal Floodplain Improvements.

Temporary noise impacts from the Tule Canal Floodplain Improvements would remain **significant and unavoidable**.

Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

Exposure to airport noise under the Tule Canal Floodplain Improvements would be the same as that discussed for Alternative 1.

CEQA Conclusion

Airport noise impacts under Alternative 5 associated with the Tule Canal Floodplain Improvements would be **less than significant** because people residing or working in the Project area would not be exposed to excessive noise levels from public or private airports.

20.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, West Side Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while

allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

20.3.3.7.1 Impact NOI-1: Exposure of persons to, or generation of, noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies

Construction of the East Supplemental Fish Passage, Downstream Channel, and Agricultural Road Crossing 1 would occur in Yolo County. Yolo County does not have a quantitative noise threshold in their General Plan or regulations (Yolo County 2009). As recommended by the *2030 Countywide General Plan* (2009), a noise analysis was performed for this project.

The West Channel construction would be partially located in Sutter County and within 1,000 feet of sensitive receptors. Construction is anticipated to occur between 7:00 a.m. and 6:00 p.m. Monday through Saturday. Sutter County limits construction activities within 1,000 feet of sensitive receptors to between 7:00 a.m. and 6:00 p.m. on weekdays and 8:00 a.m. and 5:00 p.m. on Saturdays. Vibration levels at the closest sensitive receptors at 700 feet from the construction area would be approximately 81 VdB, approximately nine VdB above the annoyance threshold of 72 VdB. Vibration levels from maintenance activities at the closest sensitive receptors would be approximately 78 VdB, approximately six VdB above the annoyance threshold of 72 VdB. Operation is not anticipated to have a significant effect on the ambient noise or vibration levels and therefore would not be expected to exceed standards adopted by Sutter County.

Alternative 6 would be consistent with the General Plan of Yolo County but would not be consistent with the General Plan of Sutter County.

CEQA Conclusion

Noise and vibration impacts associated with Alternative 6 would be **significant** because Alternative 6 would not be consistent with the General Plan of Sutter County.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce noise and vibration levels but not enough to reduce to less than significant levels.

Noise and vibration impacts associated with Alternative 6 would remain **significant and unavoidable**.

20.3.3.7.2 Impact NOI-2: Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels

Construction equipment associated with Alternative 6, such as pile drivers, drill rigs, dozers, and loaded trucks, would generate vibrations that could result in groundborne noise or vibration that may affect nearby structures and sensitive receptors.

PPV levels during construction of the West Channel, Downstream Channel, East Supplemental Fish Passage, and Agricultural Road Crossing 1 associated with Alternative 6 are estimated to be less than 0.2 in/sec at 100 feet or more from the vibration source. There are no non-engineered timber and masonry buildings within these distances from the construction activities; therefore, construction activities are not anticipated to damage buildings.

There is a residential receptor approximately 700 feet from the West Channel construction activities. At the receptor, Lv would be approximately 89 VdB, which is above the annoyance threshold of 72 VdB; therefore, construction activities would likely cause human annoyance. Vibration on peak days would be caused mainly by loaded haul truck traffic. Residential receptors adjacent to the haul routes range from 60 to 550 feet from the centerline of the road and would be impacted significantly. On peak construction days, there would be 733 haul trips and 670 construction worker trips. There would also be up to 40 daily worker trips and 788 haul truck trips associated with maintenance activities. The vehicles from these trips would generate vibrations that could result in groundborne noise or vibration that may affect residential receptors adjacent to the haul routes.

No long-term project operations would occur under Alternative 6 that would generate excessive vibrations or groundborne noise or otherwise expose buildings or persons to such impacts.

CEQA Conclusion

Vibration impacts under Alternative 6 would be **significant** because vibration from loaded haul trucks during construction and maintenance could exceed the annoyance threshold.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce the impacts of vibration to residents, but it would not reduce vibration levels to less than significant on peak construction and maintenance days given the high number of haul trucks estimated for Alternative 6.

Vibration impacts under Alternative 6 would remain **significant and unavoidable**.

20.3.3.7.3 Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity

Permanent increases in ambient noise levels under Alternative 6 would be the same as those discussed for Alternative 1.

CEQA Conclusion

Permanent noise impacts under Alternative 6 would be **less than significant** because construction and maintenance of Alternative 6 would not cause permanent noise and operation of Alternative 6 would not cause a significant permanent increase in ambient noise levels.

20.3.3.7.4 Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity

Noise from construction equipment would occur throughout the construction phase of this proposed alternative. Ambient noise levels within the Project area would increase because of additional noise from construction equipment. Noise levels would vary, depending on the construction phasing and specific pieces of equipment in use at any given time. There are residences near the construction area and haul routes.

Noise levels during construction of the West Channel, Downstream Channel, East Supplemental Fish Passage, and Agricultural Road Crossing 1 associated with Alternative 6 are estimated to be at or less than the residential significance threshold of 70 dBA at 370 feet or more from the noise

source. There are no residential receptors within 370 feet of the construction areas. Agricultural significance threshold of 80 dBA would be impacted at 140 feet or less. However, there would be no agricultural receptors within 140 feet of the construction areas.

Haul and commute routes would include I-5, CR 117, and CR 16 for East Supplemental Fish Passage, Downstream Channel, and Agricultural Road Crossing 1 components (East Alternative haul route) and I-5, CR 102, CR 16, and CR 116A for the West Channel (West Alternative haul route). Currently, heavy equipment for agricultural uses travels on these county roads. On peak days, there would be 733 haul trips and 670 construction worker trips on the West Alternative haul route. The added trips to I-5 would not double the traffic on I-5, so the increase in traffic noise level would not be perceptible; however, county roads that do not have frequent existing traffic are expected to experience enough of a traffic increase to double the traffic noise levels. Traffic noise increases would be significant for the residences along those roads.

If dewatering and sediment removal are required under Alternative 6, then the use of heavy equipment and haul trucks may also be required. Heavy equipment use at the main channel, headworks structure, and buildings is not anticipated to exceed residential or agricultural significance thresholds. However, there may be up to 40 daily worker trips and 788 haul truck trips associated with maintenance activities on the West Alternative haul route. Similar to construction traffic impacts, receptors along county roads with infrequent traffic may experience temporary significant increases in noise level.

CEQA Conclusion

Temporary noise impacts under Alternative 6 would be **significant** because ambient noise levels could increase substantially from construction and maintenance noise.

Implementation of the NVCP included in Mitigation Measure MM-NOI-1 would reduce noise levels from construction traffic but not enough to reduce to less than significant levels.

Temporary noise impacts under Alternative 6 would remain **significant and unavoidable**.

20.3.3.7.5 Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports

Exposure to airport noise under Alternative 6 would be the same as that discussed for Alternative 1.

CEQA Conclusion

Airport noise impacts under Alternative 6 would be **less than significant** because people residing or working in the Project area would not be exposed to excessive noise levels from public or private airports.

20.3.4 Summary of Impacts

Table 20-6 provides a summary of the identified noise and vibration impacts for construction, operation, and maintenance of the Project.

Table 20-6. Summary of Impacts and Mitigation Measures – Noise

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact NOI-1: Exposure of persons to, or generation of, noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies	No Action	NI	---	NI
	1, 2, 5 (Project), 5 (Program)	LTS	---	LTS
	3, 4, 6	S	MM-NOI-1	SU
Impact NOI-2: Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels	No Action	NI	---	NI
	All Action Alternatives	S	MM-NOI-1	SU
Impact NOI-3: A substantial permanent increase in ambient noise levels in the Project vicinity	No Action	NI	---	NI
	All Action Alternatives	LTS	---	LTS
Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity	No Action	NI	---	NI
	All Action Alternatives	S	MM-NOI-1	SU
Impact NOI-5: Exposure of people residing or working in the Project area to excessive noise levels from public or private airports	No Action	NI	---	NI
	All Action Alternatives	LTS	---	LTS

Key: LTS = less than significant; NI = no impact; S = significant; SU = significant and unavoidable

20.4 Cumulative Impacts Analysis

This section presents the cumulative impacts analysis for noise and vibration. Section 3.3 presents an overview of the cumulative impacts analysis, including the methodology and the projects, plans, and programs considered in the cumulative impacts analysis.

20.4.1 Methodology

This evaluation of cumulative impacts for noise considers the effects of the Project and how they may combine with the impacts of other past, present, and future projects or actions to create significant impacts on specific resources. The area of analysis for these cumulative effects includes the Project area. For noise and vibration impacts, sources beyond one-half mile are not likely to have cumulative effects. The timeframe for this cumulative analysis includes the past,

present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

This cumulative impacts analysis utilizes the project analysis approach described in detail in Section 3.3, *Cumulative Impacts*. The cumulative project included in this analysis is the Lower Elkhorn Basin Levee Setback (LEBLS) Project. The project would provide improved public safety and system resiliency as part of the *2012 Central Valley Flood Protection Plan* by implementing levee setbacks in the Lower Elkhorn Basin.

20.4.2 Cumulative Impacts

Related and reasonably foreseeable projects and actions may result in noise impacts in the Project area. Although significant and unavoidable impacts would occur for all action alternatives, noise impacts are only cumulative if they are in the same vicinity because noise levels decrease with distance. Therefore, only proposed project elements located near the LEBLS Project were evaluated for cumulative impacts.

In particular, levee removal and relocation that could occur during construction of the LEBLS Project may result in additional construction activities along Tule Canal. Improvements to the Southern Water Control Structure and fish bypass channel and the Tule Canal Floodplain that would occur in the same vicinity under the action alternatives would result in significant cumulative noise impacts when combined with the LEBLS Project. The other construction activities would not be located close enough to the Lower Elkhorn Basin to contribute to the significant cumulative impact.

Because construction activities under Alternative 4 and Alternative 5 that would occur in the Lower Elkhorn Basin would be significant and unavoidable, the action alternatives' incremental contributions to the significant cumulative impacts associated with noise **would be cumulatively considerable.**

20.5 References

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21 Population and Housing

This chapter assesses the potential effects on population and housing that would occur from the implementation of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) alternatives. The discussion of existing conditions and the potential impacts of the alternatives on population and housing encompasses the Project area and the cities of Davis, Sacramento, West Sacramento, and Woodland.

21.1 Environmental Setting/Affected Environment

The following section presents the available data on population and housing characteristics. The indicators of overall economic health of the housing market in an area of analysis help assess the capacity for communities to accommodate population growth that could result from the alternatives. This section presents demographic and housing information from the American Community Survey (ACS) at the State of California (State), county, and city level. Communities in Yolo and Sacramento counties were analyzed for their potential to temporarily house workers during the construction period.

21.1.1 Yolo County

Project alternatives would be constructed within Yolo County for 28 weeks. It is assumed that some portion of the workers could reside temporarily within the vicinity of the Project area, which could include areas within Yolo County, particularly the cities of Davis, West Sacramento, and Woodland.

21.1.1.1 Demographic Data

Yolo County age demographics have a similar trend to the demographics of the State. In Yolo County, 78.1 percent of the population was over 18 years of age and 11 percent over the age of 65, according to the 2015 ACS Estimate. Similarly, in the State of California, 76.1 percent of the population was over 18 years of age and 12.5 percent over the age of 65 (United States Census Bureau 2015a).

Table 21-1. Age Demographics for Yolo County, 2015

	City of Davis		City of West Sacramento		City of Woodland		Yolo County	
	Estimate	Percent	Estimate	Percent	Estimate	Percent	Estimate	Percent
Total Population	66,510	-	50,747	-	56,997	-	207,320	-
18 years and older	55,624	83.6%	37,561	74%	41,962	73.6%	161,954	78.1%
65 years and older	6,249	9.4%	5,658	11.1%	6,913	12.1%	22,757	11%
Median Age	25.6 years	-	33.5 years	-	35.1 years	-	30.9 years	-

Source: United States Census Bureau 2015a

21.1.1.2 Housing Data

Table 21-2 presents housing information for Yolo County and the cities of Davis, West Sacramento, and Woodland. According to the United States Census Bureau in 2015, Yolo County had 76,090 housing units, of which 94.6 percent were occupied. Renters occupied 34,493 units while owners occupied 37,504 units (United States Census Bureau 2015b). The ACS estimated that median monthly rent in Yolo County was $1,102.

Table 21-2. Housing Estimates for Yolo County, City of Davis, City of West Sacramento, and City of Woodland, 2015

	Yolo County		City of Davis		City of West Sacramento		City of Woodland	
	Estimate	Percent	Estimate	Percent	Estimate	Percent	Estimate	Percent
Occupied Housing Units	71,997	94.6%	24,428	96.2%	17,930	95.1%	19,547	93.8%
Vacant Housing Units	4,093	5.4%	953	3.8%	924	4.9%	1,292	6.2%
Owner-Occupied	37,504	52.1%	10,615	43.5%	9,632	53.7%	10,963	56.1%
Renter-Occupied	34,493	47.9%	13,813	56.5%	8,298	46.3%	8,584	43.9%
Median Monthly Rent	$1,102	-	$1,249	-	$895	-	$965	-

Source: United States Census Bureau 2015b

Table 21-3 provides the typical travel distance to Fremont Weir.

Table 21-3. Typical Commute Distances from Davis, West Sacramento, and Woodland to Fremont Weir [1] (miles)

	Davis	West Sacramento	Woodland
Fremont Weir	25.8	21.2	18.8

[1]Distances were approximated using Google Maps and are only accurate to within five miles.

21.1.2 Sacramento County

Project alternatives would be constructed within two miles of Sacramento County for 28 weeks. If needed, it is assumed that some portion of the workers could also be housed temporarily near the Project area in Sacramento County, particularly within the City of Sacramento.

21.1.2.1 Demographic Data

Sacramento County age demographics have a trend similar to the demographics of the State (see Table 21-4). In Sacramento County, 75.4 percent of the population was over 18 years of age and 12.4 percent over the age of 65, according to the 2015 ACS Estimate. Similarly, in the State, 76.1 percent of the population was over 18 years of age and 12.5 percent over the age of 65 (United States Census Bureau 2015a).

Table 21-4. 2015 Age Demographics for Sacramento County

	City of Sacramento		Sacramento County		State of California	
	Estimate	**Percent**	**Estimate**	**Percent**	**Estimate**	**Percent**
Total Population	480,566	-	1,465,832	-	38,421,464	-
18 years and older	365,945	76.1%	1,105,088	75.4%	29,247,121	76.1%
65 years and older	56,513	11.8%	181,287	12.4%	4,797,320	12.5%
Median Age	34 years	-	35.5 years	-	35.8 years	-

Source: United States Census Bureau 2015a

21.1.2.2 Housing Data

Table 21-5 presents the housing information for Sacramento County and the City of Sacramento. According to the United States Census Bureau, in 2015, Sacramento County had 560,271 housing units, of which approximately 93.3 percent were occupied. Renters occupied 232,990 units while owners occupied 289,606 units (United States Census Bureau 2015b). The median monthly rent in Sacramento County was $1,036.

Table 21-5. Housing Estimates for Sacramento County, City of Sacramento, 2015

	Sacramento County		City of Sacramento	
	Estimate	**Percent**	**Estimate**	**Percent**
Occupied Housing Units	522,596	93.3%	178,185	92.2%
Vacant Housing Units	37,675	6.7%	15,113	7.8%
Owner-Occupied	289,606	55.4%	84,129	47.2%
Renter-Occupied	232,990	44.6%	94,056	52.8%
Median Monthly Rent	$1,036	-	$1,022	-

Source: United States Census Bureau 2015b

Table 21-6 provides the typical travel distance from the City of Sacramento to Fremont Weir.

Table 21-6. Typical Commute Distances from City of Sacramento to the Fremont Weir Area[1] (miles)

	City of Sacramento
Fremont Weir Area	22.5

[1]Distances were approximated using Google Maps and are only accurate to within five miles.

21.2 Regulatory Setting

Regulations at the Federal, State, and local levels regarding housing are generally concerned with the proper construction, provision, and siting of housing for a variety of incomes. The project alternatives do not call for the construction of new homes or the demolition of existing homes; therefore, the regulations pertaining to housing do not apply.

21.3 Environmental Consequences

This section provides information about the environmental consequences of the project alternatives on population and housing. This section describes the methodology, criteria for determining significance of effects, and environmental consequences and mitigation measures associated with effects of each alternative. Detailed descriptions of the alternatives evaluated in this section are provided in Chapter 2, *Description of Alternatives*.

21.3.1 Methods for Analysis

This analysis uses both qualitative and quantitative methods to determine the effects on population and housing. Effects considered are related to availability of temporary housing for non-local construction workers and whether the use of housing by construction workers would impact the local housing market. Implementation of the alternatives would not require any land acquisition that would necessitate the relocation of housing units. The project description includes preliminary estimates of the numbers of workers required for construction actions. This analysis compares the housing needs associated with these workers with the existing demographics and housing statistics described in Section 21.2, *Environmental Setting*.

Impacts to population and housing are determined relative to existing conditions (for California Environmental Quality Act [CEQA]) and the No Action Alternative (for the National Environmental Policy Act). However, as described below, the No Action Alternative would be the same as existing conditions because population and housing would follow current trends and are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to existing conditions.

21.3.2 Thresholds of Significance – CEQA

The thresholds of significance for impacts are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. The project would be considered to have significant impacts if it would result in any of the conditions listed below.

- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

These thresholds also encompass the factors taken into account under the National Environmental Policy Act to determine the significance of an action in terms of its context and the intensity of its impacts. It is assumed that the temporary workers would mostly come from outside of the region. The Project area is rural with few residences in the vicinity; therefore, the Project would result in no impact related to the displacement of people or displacement of existing housing. These impacts are not evaluated further.

The threshold for significance that was further evaluated was the potential for the implementation of the project alternatives to directly induce substantial growth in the area by proposing new homes for the temporary workers.

Significant impacts on population and housing would result if the project resulted in substantial population growth in the area of analysis. This analysis considers whether population and household growth would occur with implementation of the Project, specifically, whether this growth would be within the forecasts for the communities in Yolo and Sacramento counties and/or can be considered substantial with respect to the remaining growth potential in those communities.

21.3.3 Effects and Mitigation Measures

This section provides an evaluation of the direct and indirect effects on population and housing from implementing the Project alternatives. This analysis is organized by Project alternative, with specific impact topics numbered sequentially under each alternative.

21.3.3.1 No Action Alternative

Under the No Action Alternative, the Project would not be implemented, and none of the Project features would be developed in the Project area. The No Action Alternative would not require any construction and would not affect population and housing in the area.

21.3.3.1.1 Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

The No Action Alternative would not result in construction activities taking place in the Project area. There would be no influx of temporary workers near the Project area and no impacts on population and housing. Population and housing would follow current trends.

CEQA Conclusion

There would be **no impact** to population and housing associated with the No Action Alternative because population and housing would follow current trends.

21.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of

Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

21.3.3.2.1 Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

Construction likely would begin in late 2020 or early 2021 and is estimated to last 28 weeks, with peak construction periods requiring up to 202 workers for one week in mid-July. The project element that would take the longest to construct would be the headworks structure. The number of workers per week would range from 9 to 202, depending on the construction activities involved. The number of personnel required was identified based on key project components and assumed a standard 10-hour shift work day and 6-day work week.

To be conservative, it was assumed that all workers would come from outside the region and would require housing. However, it is expected that most workers would come from within the region because there is a limited need for specialty services, construction periods are short, and there is a high likelihood of adequate numbers of skilled workers in the region. Although not all vacant houses reported in Tables 21-2 and 21-5 would be available for rent, it is likely that adequate housing would be available for these temporary workers. The additional demand for temporary housing would not be great enough in comparison to the number of houses available to result in increased rental prices.

In addition to vacant properties, construction workers could be temporarily housed in local hotels due to the short, seven-month construction period. There are more than 20 hotels in Sacramento, 13 hotels in West Sacramento, 7 hotels in Davis, and 9 hotels in Woodland that could provide short-term housing. In addition, some workers may bring their own campers or trailers.

Taking into consideration the population estimates shown in Tables 21-1 and 21-4 and projected population increases of 9,869 in 2020 and 11,671 in 2021 for Yolo County and 97,541 in 2020 and 116,078 in 2021 for Sacramento County (California Department of Transportation [Caltrans] 2015), workers who may originate from outside the region during the construction period for construction of Alternative 1 would contribute to a negligible population increase.

CEQA Conclusion

This impact would be **less than significant** because construction workers associated with Alternative 1 would not be expected to relocate permanently if they come from outside of the region, and adequate housing vacancies would be available to accommodate workers during the temporary construction period. Therefore, no new housing or infrastructure would be needed, and there would be a negligible impact on population.

21.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to

provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

21.3.3.3.1 Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

Under Alternative 2, the 28-week construction period would have a peak construction employment of 223 workers for one week in the beginning of August. The weekly number of workers would range from 10 to 223, depending on the construction activities involved. The impacts to population and housing would be the same as described for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** because construction workers would not be expected to relocate permanently if they come from outside of the region, and adequate housing vacancies would be available to accommodate workers during the temporary construction period. Therefore, no new housing or infrastructure associated with Alternative 2 would be needed, and there would be a negligible impact on population.

21.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

21.3.3.4.1 Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

Under Alternative 3, peak construction periods would require 277 workers for one week in the middle of July. The weekly number of workers would range from 10 to 277, depending on the construction activities involved. The impacts to population and housing would be the same as described for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** because construction workers associated with Alternative 3 would not be expected to relocate permanently if they come from outside of the region, and adequate housing vacancies would be available to accommodate workers during the temporary construction period. Therefore, no new housing or infrastructure would be needed, and there would be a negligible impact on population.

21.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

21.3.3.5.1 Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

Under Alternative 4, peak construction periods would require 363 workers for one week in the middle of July. The weekly number of workers would range from 10 to 363, depending on the construction activities involved. The impacts to population and housing would be the same as described for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** because construction workers associated with Alternative 4 would not be expected to relocate permanently if they come from outside of the region, and adequate housing vacancies would be available to accommodate workers during the temporary construction period. Therefore, no new housing or infrastructure would be needed, and there would be a negligible impact on population.

21.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish by using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

21.3.3.6.1 Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

Under Alternative 5, construction likely would begin in late 2020 or early 2021 and continue for two construction seasons. Construction the first year is estimated to last 28 weeks and would continue for 12 weeks the following year. Peak construction periods would require 358 workers for one week in August during the first year. Although this alternative would require approximately twice the number of workers during the week of peak construction, the temporary workers could easily be housed within the region for one week. The weekly number of workers would range from 5 to 358 workers, depending on the construction activities involved. The impacts to population and housing would be the same as described for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** because construction workers associated with Alternative 5 would not be expected to relocate permanently if they come from outside of the region, and adequate housing vacancies would be available to accommodate workers during the temporary construction period. Therefore, no new housing or infrastructure would be needed, and there would be a negligible impact on population.

21.3.3.6.2 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of Interstate 80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all of the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

Peak construction periods would require fewer works than under the project-level components of Alternative 5 due to the small project size. The impacts to population and housing would be the same or less as described for the project-level components of Alternative 5.

CEQA Conclusion

This impact would be **less than significant** because construction workers associated with the Tule Canal Floodplain Improvements would not be expected to relocate permanently if they come from outside of the region, and adequate housing vacancies would be available to accommodate workers during the temporary construction period. In addition, the number of workers needed for the floodplain improvements would be substantially less than the number of workers needed for the Project-level components. Therefore, no new housing or infrastructure would be needed, and there would be a negligible impact on population.

21.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

21.3.3.7.1 Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs.

Under Alternative 6, peak construction periods would require 414 workers for one week in the middle of August. The weekly number of workers would range from 35 to 414, depending on the construction activities involved. The impacts to population and housing would be the same as described for Alternative 1.

CEQA Conclusion

This impact would be **less than significant** because construction workers associated with Alternative 6 would not be expected to relocate permanently if they come from outside of the region, and adequate housing vacancies would be available to accommodate workers during the temporary construction period. Therefore, no new housing or infrastructure would be needed, and there would be a negligible impact on population.

21.3.4 Summary of Impacts

Table 21-7 below provides a summary of the identified impacts to population and housing within the Project area and nearby cities.

Table 21-7. Summary of Impacts and Mitigation Measures – Population and Housing

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact POP-1: Construction-Related Increase in Population and Corresponding Housing Needs	No Action	NI	-	NI
	All Action Alternatives	LTS	-	LTS

Key: LTS = less than significant; NI = no impact

21.4 Cumulative Impacts Analysis

This section describes the cumulative impacts analysis for population and housing. Section 3.3, *Cumulative Impacts*, presents an overview of the cumulative impacts analysis, including the methodology and the projects, plans, and programs considered in the cumulative impacts analysis.

21.4.1 Methodology

This evaluation of cumulative impacts for population and housing considers the effects of the Project and how they may combine with the impacts of other past, present, and future projects or actions to create significant impacts on specific resources. The area of analysis for these cumulative impacts is the same as the alternatives analysis. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis.

21.4.2 Cumulative Impacts

It is expected that over the near term, the principal areas of growth in California will be more in the inlands area, including Sacramento County (Caltrans 2015). Sacramento County historically has a larger population than Yolo County. Sacramento County's population is expected to grow

rapidly over the next five years, with annual growth projected at 1.2 percent per year, which would provide average stressors on the local housing market as the number of new residential units and housing permits would also increase. This would lessen the impacts to the local housing market presented by any population increases.

In the mid-2000s, Yolo County's population grew at an annual average rate of 0.7 percent. Population growth in Yolo County is expected to increase to 0.8 percent per year between 2015 and 2020 (Caltrans 2015). This would result in moderate stress on the local housing market as new home permits are also projected to increase in the future. This would lessen the impacts to the local housing market presented by any population increases.

Implementing the action alternatives would present little to no impact on the local housing market because the construction season would be short. The duration of stay for the number of non-local workers is expected to be temporary, and workers would be expected to either commute or reside in hotels or campers in lieu of obtaining more permanent housing. Additional projects or construction work would not be out of character with the area in the future. The projected population increase presented in the county's economic forecast is expected to include any increases to population due to upcoming construction and developments. Therefore, the action alternatives' small contributions to an increase in population and housing would **not be cumulatively considerable.**

21.5 References

Caltrans. 2015. *California County-Level Economic Forecast 2015-2040.* Accessed on April 10, 2017. Available at: http://www.dot.ca.gov/hq/tpp/offices/eab/docs/Full%20Report%202015.pdf.

United States Census Bureau. 2015a. *Profile of General Population and Housing Characteristics:* 2015 Demographic Profile Page. Accessed on April 10, 2017. Available: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

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22 Environmental Justice

The chapter describes the environmental and regulatory settings of environmental justice in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) area, as well as environmental consequences as they pertain to implementation of the Project alternatives.

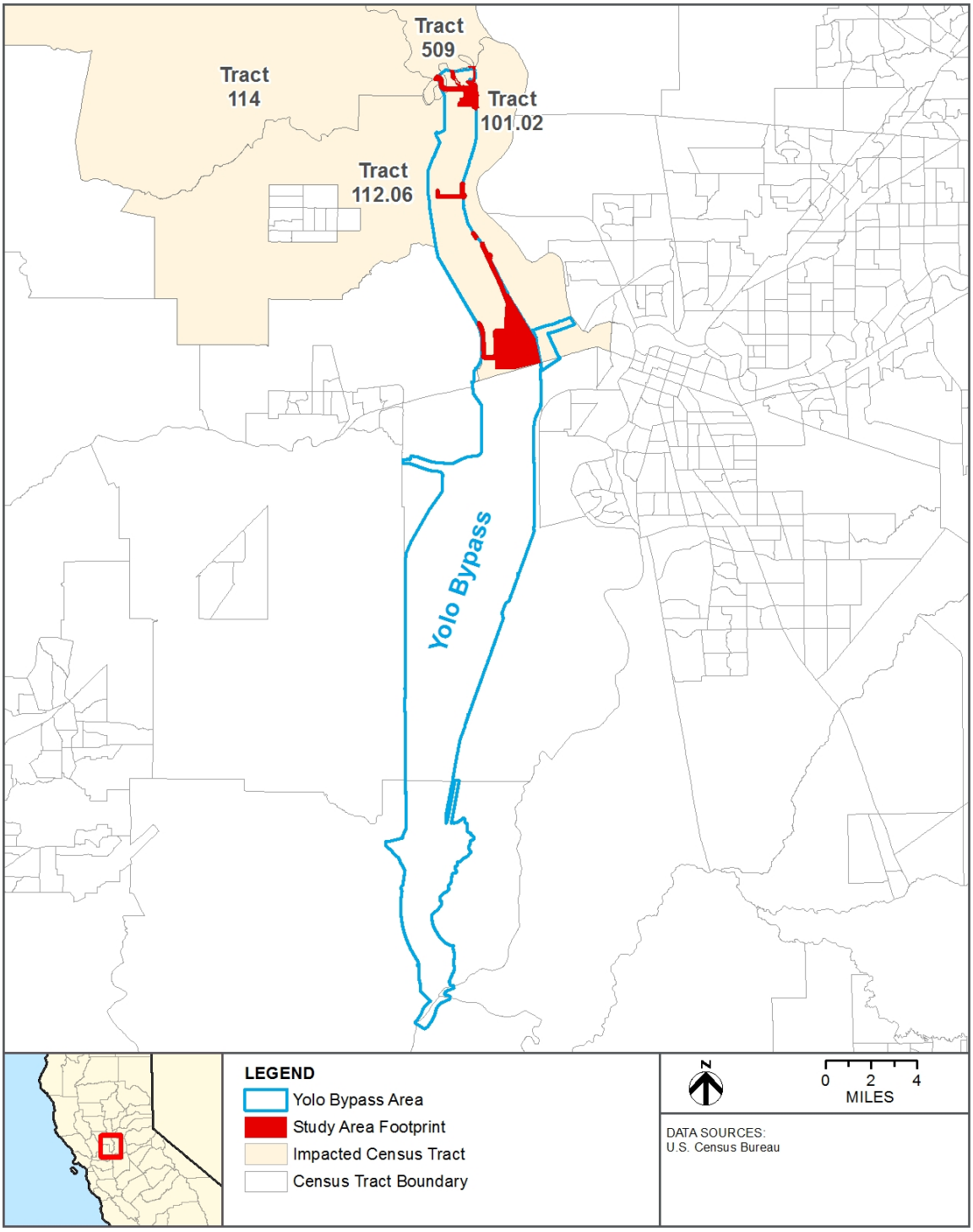
As described in Executive Order (EO) 12898 (59 Federal Register 7629), Federal agencies "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." EO 12898 also aimed to "ensure greater public participation" for people in communities potentially affected by program actions. The concept of environmental justice as applied here is that minority and low-income people should not be disproportionately or adversely affected by economic and quality of life impacts associated with the implementation of the Project. Construction-related activities associated with the Project alternatives could disproportionately or adversely affect areas of minority and low-income populations by increasing air pollution, noise, and traffic in the study area. See Chapters 17, *Transportation*; 18, *Air Quality*; and 20, *Noise* for additional information on these resource effects. Construction and operations under the Project could also place agriculturally productive land out of production, reducing the need for farm labor, which is typically classified as minority and low-income.

22.1 Environmental Setting/Affected Environment

This section describes the affected environment related to environmental justice, as defined by EO 12898 and Council on Environmental Quality (CEQ) Guidance (1997).

The environmental justice analysis is divided into regional (county) and local (census tract) level analysis. Regional and local areas included in this analysis are those where associated project construction would occur, or construction traffic would increase, potentially causing an adverse and disproportionately high effect on neighboring minority and low-income populations, or where agriculturally productive land would be taken out of production. The regional level analysis includes Yolo and Sutter counties. A small portion of the Yolo Bypass (the southern point) is in Solano County. Almost all this area is water (Prospect Slough) and would therefore have no environmental justice effects and is not discussed further. The local level analysis includes Census Tracts 101.02, 112.06, 114, and 509. Construction would not occur in census tracts in the remainder of the Yolo Bypass; therefore, the remaining census tracts are not included in this analysis. Other land use changes in those areas are discussed in Chapter 11, *Land Use and Agricultural Resources*.

Figure 22-1 shows the environmental justice study area.



Source: United State Census Bureau 2010.

Figure 22-1. Environmental Justice Study Area

This section presents the existing regional and local-level demographic and economic characteristic census data, including race, ethnicity, income, and poverty for the Project environmental justice study area. See Section 22.3.1 for assessment methodology on the identified thresholds to determine whether an affected area is considered minority or low-income.

22.1.1 Regional

This section describes demographic and economic characteristic data from the 2015 American Community Survey 1-Year Estimates by the United States Census Bureau for Yolo County. Information for the State of California (State) is presented for comparison purposes.

Table 22-1 presents the racial and ethnic composition of Yolo, Sutter, Solano, and Sacramento counties. These data show that both Sutter and Yolo counties exhibit a total minority proportion exceeding 50 percent, at 52.5 and 52.9 percent, respectively. Solano and Sacramento counties also exhibit a total minority proportion of 50 percent. While the proportion of residents in Yolo and Sutter counties that responded identify as “two or more races” (5.3 and 7.2 percent, respectively) exceeds that of the State (4.5 percent), the total minority population in the two counties is lower than that of the State (62.2 percent). The American Indian population in Sutter County (one percent) exceeds that of the State and Yolo County (0.7 and 0.4 percent, respectively).

Table 22-2 presents the median household income, mean household income, proportion of unemployed individuals, and proportion of individuals living below the poverty threshold for Yolo, Sutter, Solano, and Sacramento counties. The data show that Yolo and Solano counties have a smaller proportion of low-income residents than that for the State (8.8 and 9.6 percent compared to 11.3 percent), whereas the low-income residents in Sutter and Sacramento counties exceed that of the State at 16.9 and 12.6 percent, respectively. Yolo County has a slightly higher unemployment rate than that of the State. Sutter County’s unemployment rate (12.5 percent) is higher than the state average (7.3 percent). Sutter and Yolo counties have a median household income and mean household income lower than the State average; however, neither county falls below the United States Census Bureau's defined poverty thresholds for a four-person family unit (two adults and two children) or an individual ($24,339 and $12,486, respectively [United States Census Bureau 2016]). Similarly, Solano and Sacramento counties do not fall below the defined poverty thresholds for a four-person family unit or an individual.

Table 22-1. 2015 Regional Demographic Characteristics

	Yolo County	Sutter County	Solano County	Sacramento County	California
Population	213,016 (100%)	96,463 (100%)	436,092 (100%)	1,501,335 (100%)	39,144,818 (100%)
Ethnicity[1]					
Hispanic or Latino	67,163 (31.5%)	29,194 (30.3%)	113,485 (26%)	341,449 (27%)	15,184,545 (38.8%)
White alone, Not Hispanic	101,266 (47.5%)	45,478 (47.1%)	169,310 (38.8%)	688,269 (45.8%)	14,815,122 (37.8%)

	Yolo County	Sutter County	Solano County	Sacramento County	California
Race[2]					
White	140,351 (65.9%)	67,966 (70.5%)	233,286 (53.5%)	897,925 (59.8%)	23,824,254 (60.9%)
African American	5,669 (2.7%)	1,053 (1.1%)	61,550 (14.1%)	147,797 (9.8%)	2,277,229 (5.8%)
American Indian	809 (0.4%)	939 (1.0%)	2,367 (0.5%)	8,889 (0.6%)	282,777 (0.7%)
Asian	29,518 (13.9%)	15,125 (15.7%)	67,196 (15.4%)	233,519 (15.6%)	5,548,936 (14.2%)
Pacific Islander	606 (0.3%)	362 (0.4%)	3,673 (0.8%)	16,679 (1.1%)	157,554 (0.4%)
Some Other Race	24,790 (11.6%)	4,039 (4.2%)	37,689 (8.6%)	94,383 (6.3%)	5,300,297 (13.5%)
Two or More Races	11,273 (5.3%)	6,979 (7.2%)	30,331 (7.0%)	102,143 (6.8%)	1,753,771 (4.5%)
Total Minority[3]	111,750 (52.5%)	50,985 (52.9%)	266,782 (61.2%)	813,066 (54.2%)	24,329,696 (62.2%)

Source: United States Census Bureau 2015a.

[1] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "White." The total numbers of Hispanic residents for each geographic region are tabulated separately from the racial distribution by the United States Census Bureau.

[2] A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic.

[3] "Total Minority" is the aggregation of all non-white racial groups with the addition of all Hispanics, regardless of race, with the total for "While Alone, Not Hispanic" subtracted from the total population.

Table 22-2. 2015 Income, Unemployment, and Poverty Characteristics

Geographic Area	Median Household Income[1,2]	Mean Household Income	Unemployment Rate	Percent Population below Poverty Threshold[3]
Yolo County	$58,966	$81,995	7.9%	8.8%
Sutter County	$52,277	$67,427	12.5%	16.9%
Solano County	$67,443	$84,403	8.7%	9.6%
Sacramento County	$58,942	$76,613	8.3%	12.6%
California	$64,500	$91,757	7.3%	11.3%

Source: United States Census Bureau 2015b.

[1] Household income is defined by the United States Census Bureau as “the sum of money income received in the calendar year by all household members 15 years old and over” (United States Census Bureau Undated).

[2] In 2015 inflation-adjusted dollars.

[3] Percentage of families and people whose income in the past 12 months was below the poverty level. The census classifies families and persons as below poverty “if their total family income or unrelated individual income was less than the poverty threshold” as defined for all parts of the country by the Federal government (United States Census Bureau Undated). For 2015, the preliminary Federal weighted average poverty level threshold for an individual was $12,486 and $24,339 for a four-person family unit (two adults and two children) (United States Census Bureau 2016).

22.1.2 Local

This section describes demographic and economic characteristic data from the 2015 American Community Survey 5-Year Estimates by the United States Census Bureau at the census tract level. Information for Sutter County, Yolo County, and the State of California as a whole are also presented for comparison purposes.

Census tracts are defined as "small, relatively permanent statistical subdivisions of a county delineated by local participants as part of the United States Census Bureau's Participant Statistical Areas Program" (United States Census Bureau Undated). These areas generally consist of between 1,500 and 8,000 people and are designed to be homogeneous with respect to population characteristics, economic status, and living conditions. The size of census tracts can vary widely, depending on the density of a settlement (United States Census Bureau Undated). The Project area could have environmental justice impacts in four census tracts: Census Tracts 101.02, 112.06, 114, and 509.

Table 22-3 presents the racial and ethnic composition of the census tracts. These data show that most of the census tracts have total minority proportions greater than 50 percent. Census Tract 114 has the highest minority population at 58.8 percent, whereas Census Tract 509 has the lowest at 43.6 percent. Census Tracts 101.02, 114, and 509 have Hispanic or Latino percentages higher than their county averages, but only Census Tract 114 has a percentage (50.1 percent) higher than the State average of 38.4 percent. Census Tract 101.02 exhibits a higher proportion of Black/African American residents (5.8 percent) than its county (2.6 percent). All census tracts exhibit lower proportions of Black/African American residents than that of the State (5.9 percent).

Table 22-4 presents the median household income, mean household income, proportion of unemployed individuals, and proportion of individuals living below the poverty threshold for the environmental justice study area census tracts. The data show that Census Tracts 101.02, 114, and 509 have a higher proportion of residents living below the poverty threshold than the State and county in which it is located. Census Tracts 101.02 and 114 have unemployment rates greater than both the county and State, whereas Census Tract 509 has an unemployment rate greater than the State but not the county. All but one of the census tracts (Census Tract 112.06) have median and mean household incomes lower than the State and county average; however, these census tracts do not fall below the United States Census Bureau's defined poverty thresholds for a four-person family unit (two adults and two children) or an individual.

Table 22-3. 2011-2015 Local Demographic Characteristics

Geographic Area	Total Population	Hispanic Origin[1]		Race[2]							
		Hispanic or Latino	White Alone, Not Hispanic	White	Black/ African American	American Indian and Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Some Other Race	Two or More Races	Total Minority[3]
CT 101.02	7,274 (100%)	2,552 (35.1%)	3,219 (44.3%)	4,215 (57.9%)	420 (5.8%)	10 (0.1%)	666 (9.2%)	136 (1.9%)	1,223 (16.8%)	604 (8.3%)	4,055 (55.7%)
CT 112.06	7,841 (100%)	2,380 (30.4%)	3,823 (48.8%)	5,444 (69.4%)	93 (1.2%)	309 (3.9%)	1,077 (13.7%)	27 (0.3%)	487 (6.2%)	404 (5.2%)	4,018 (51.2%)
CT 114	4,245 (100%)	2,126 (50.1%)	1,748 (41.2%)	3,073 (72.4%)	79 (1.9%)	111 (2.6%)	221 (5.2%)	0 (0.0%)	635 (15.0%)	126 (3.0%)	2,497 (58.8%)
CT 509	1,696 (100%)	605 (35.7%)	956 (56.4%)	1,363 (80.4%)	32 (1.9%)	24 (1.4%)	0 (0.0%)	20 (1.2%)	195 (11.5%)	62 (3.7%)	740 (43.6%)
Sutter County	95,247 (100%)	28,261 (29.7%)	46,108 (48.4%)	66,258 (69.6%)	2,049 (2.2%)	1,033 (1.1%)	14,044 (14.7%)	288 (0.3%)	5,847 (6.1%)	5,728 (6.0%)	49,139 (51.6%)
Yolo County	207,320 (100%)	64,526 (31.1%)	100,100 (48.3%)	137,009 (66.1%)	5,409 (2.6%)	1,955 (0.9%)	28,324 (13.7%)	1,021 (0.5%)	22,353 (10.8%)	11,249 (5.4%)	107,220 (51.7%)
California	38,421,464 (100%)	14,750,686 (38.4%)	14,879,258 (38.7%)	23,747,013 (61.8%)	2,265,387 (5.9%)	287,028 (0.7%)	5,261,978 (13.7%)	150,370 (0.4%)	4,974,791 (12.9%)	1,734,897 (4.5%)	23,542,206 (61.3%)

Source: United States Census Bureau 2011-2015a.

Notes:

[1] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "White." The total numbers of Hispanic residents for each geographic region are tabulated separately from the racial distribution by the United States Census Bureau.

[2] A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic.

[3] "Total Minority" is the aggregation of all non-white racial groups with the addition of all Hispanics, regardless of race, with the total for "While Alone, Not Hispanic" subtracted from the total population.

Key:

CT = census tract

Table 22-4. 2011-2015 Local Economic Characteristics

Geographic Area	Median Household Income[1,2]	Mean Household Income	Unemployment Rate	Percent Population Below Poverty Threshold[3]
CT 101.02	$39,972	$47,323	17.6%	12.7%
CT 112.06	$81,447	$105,024	8.5%	1.1%
CT 114	$47,456	$65,492	13.9%	14.1%
CT 509	$41,991	$62,650	11.0%	18.2%
Sutter County	$52,017	$69,238	13.2%	14.7%
Yolo County	$54,989	$78,450	9.0%	10.2%
California	$61,818	$87,877	9.9%	12.2%

Source: United States Census Bureau 2011-2015b.

Notes:

[1] Household income is defined by the United States Census Bureau as "the sum of money income received in the calendar year by all household members 15 years old and over" (United States Census Bureau Undated).

[2] In 2015 inflation-adjusted dollars.

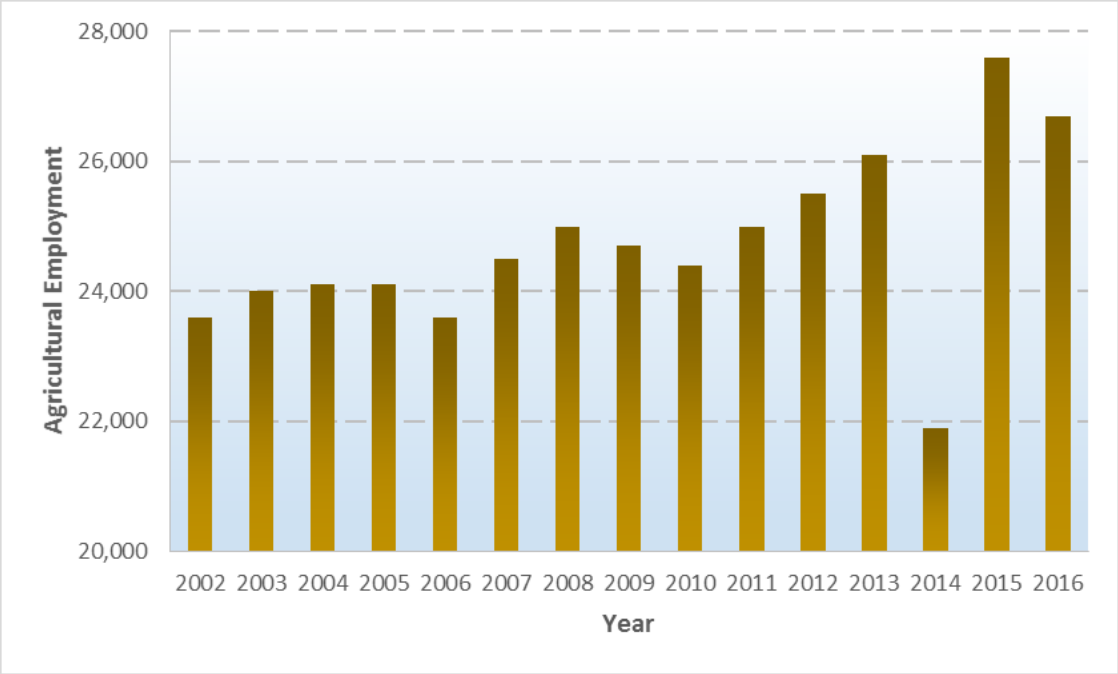
[3] Percentage of families and people whose income in the past 12 months was below the poverty level. The census classifies families and persons as *below poverty* "if their total family income or unrelated individual income was less than the poverty threshold" as defined for all parts of the country by the Federal government (United States Census Bureau Undated).

Key:

CT = census tract

22.1.3 Agricultural Employment

Parts of the study area are in Sutter and Yolo counties, which fall within the Sacramento Valley Agricultural Employment Region as defined by the California Employment Development Department (EDD). Other counties within this region include Butte, Colusa, El Dorado, Glenn, Lassen, Modoc, Nevada, Placer, Plumas, Shasta, Sierra, Siskiyou, Solano, Tehama, and Yuba. Figure 22-2 shows the historical agricultural employment for the Sacramento Valley region. In 2015, Yolo County employed between 5,001 and 10,000 people in the agricultural industry, while Sutter County employed 1,501 to 5,000 people (EDD 2016a). The Sacramento Valley region comprised approximately 6.4 percent of the State's agricultural employment in 2016 (EDD 2016b).



Source: EDD 2016b.

Figure 22-2. Sacramento Valley Historical Agricultural Employment

Tables 22-5 through 22-7 describe demographic and economic characteristic data from the United States Department of Agriculture (USDA) 2012 Census of Agriculture, United States Census Bureau's American Community Survey 5-Year Estimates for 2006-2010, and EDD's 2016 Occupational Employment Statistics and Wages Data Tables. Information for the State of California as a whole is presented for comparison purposes.

Table 22-5 presents the racial and ethnic composition of farm operators, as defined in the 2012 Census of Agriculture (USDA 2014), in Sutter and Yolo counties. The data show that the vast majority of farm operators in Sutter County are White. In Yolo County, the majority of operators are White. There is a slightly higher proportion of Hispanic farm operators in Yolo County (12.6 percent) when compared to the State average of 12.0 percent. Farm operators in Yolo and Sutter counties are not considered to be an environmental justice population because, based on the data, the total minority population within farm operators in Yolo and Sutter counties does not exceed 50 percent.

Table 22-5. 2012 Farm Operators' Demographic Characteristics[1]

Geographic Area	Total Farm Operators[2]	White[3]	Black/ African American[3]	American Indian and Alaska Native[3]	Asian[3]	Native Hawaiian/ Pacific Islander[3]	Two or More Races[3]	All Races, Hispanic[3]
Sutter County	2,297 (100%)	1,641 (71.4%)	3 (0.1%)	41 (1.8%)	479 (20.9%)	13 (0.6%)	29 (1.3%)	179 (7.8%)
Yolo County	1,759 (100%)	1,486 (84.5%)	15 (0.9%)	20 (1.1%)	113 (6.4%)	7 (0.4%)	12 (0.7%)	222 (12.6%)
California	126,099 (100%)	111,141 (88.1%)	526 (0.4%)	1,761 (1.4%)	7,474 (5.9%)	455 (0.4%)	1,030 (0.8%)	15,123 (12.0%)

Source: USDA 2014.

[1] "Total Minority" cannot be computed from the data provided by the USDA Census of Agriculture as a tabulation of "White Alone, Not Hispanic" farm operators is not provided.

[2] The USDA Census of Agriculture provided a tabulation of "Total Farm Operators" for the county and State; therefore, the sum of the farm operators will not equal the value provided for "Total Farm Operators."

[3] Demographic data were collected for a maximum of three operators per farm.

Table 22-6 presents the racial and ethnic composition of laborers and helpers in Sutter and Yolo counties. Information for the State of California as a whole is presented for comparison purposes. The category "laborers and helpers" excludes construction personnel as they are captured under a different category by the United States Census Bureau. However, the category is not necessarily exclusive to farm laborers, and the data may include other manual labor sectors as part of the total. Regardless, the race and ethnic composition of this sector suggests that laborers and helpers, as an employment sector, are generally of minority status, with Hispanics comprising the largest proportion of laborers and helpers in both Sutter and Yolo counties (68.3 and 75.5 percent, respectively). However, the population of Hispanic laborers and helpers does not exceed that of the State (78.8 percent). The population of White laborers and helpers in Sutter and Yolo counties (20.0 and 29.1 percent, respectively) exceeds that of the State (19.2 percent). In Sutter County, the percentage of Asian laborers and helpers are over three times the State average. According to the CEQ guidance (1997), agencies may consider environmental justice communities either as a group of individuals living in geographic proximity to one other or "a geographically dispersed/transient set of individuals (such as migrant workers or Native American[s]) where either type of group experiences common conditions of environmental exposure or effect."

Table 22-7 presents mean annual wage information for farming occupations in Sutter and Yolo counties. While the data do not demonstrate as clearly as the United States Census data the proportion of residents living below the poverty threshold, the information presented in this table does suggest that mean incomes in the farming industry are generally lower than the mean income for all industries, with less skilled workers (agricultural equipment operators and farmworkers) generally earning less than 50 percent of the mean wage for all industries. Farming, fishing, and forestry occupations in Sutter County earn slightly more than 50 percent of the mean wage for all industries in the county, but less than 50 percent of the State mean wage for all industries. Except for first-line supervisors, agricultural workers in Sutter County had mean annual wages lower than the State and Yolo County, in the first quarter of 2016. In Yolo County, the overall farming, fishing, and forestry occupations earn less than 50 percent of the mean wage for all industries in both the county and the State but earn more than the state average

Table 22-6. 2006-2010 Laborers' and Helpers' Demographic Characteristics

Geographic Area	Total Laborers and Helpers	Race[1]						Hispanic Origin[2]		Total Minority[3]
		White	Black/ African American	American Indian and Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Two or More Races or Some Other Race	White Alone, Not Hispanic	All Races, Hispanic[1]	
Sutter County	4,360 (100%)	870 (20.0%)	25 (0.6%)	45 (1.0%)	620 (14.2%)	0 (0%)	0 (0%)	870 (24.5%)	2,680 (75.5%)	3,490 (80.0%)
Yolo County	5,210 (100%)	1,515 (29.1%)	30 (0.6%)	20 (0.4%)	170 (3.3%)	0 (0%)	210 (4.0%)	1,515 (31.7%)	3,260 (68.3%)	3,695 (70.9%)
California	870,025 (100%)	167,320 (19.2%)	29,900 (3.4%)	3,085 (0.4%)	34,505 (4.0%)	3,205 (0.4%)	11,750 (1.4%)	167,320 (21.2%)	620,260 (78.8%)	702,705 (80.8%)

Source: United States Census Bureau 2006-2010

[1] A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic.

[2] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "White." The total numbers of Hispanic residents for each geographic region are tabulated separately from the racial distribution by the United States Census Bureau.

[3] "Total Minority" is the aggregation of all non-white racial groups with the addition of all Hispanics, regardless of race, with the total for "While Alone, Not Hispanic" subtracted from the total population.

Table 22-7. 2016 (First Quarter) Agricultural Workers' Mean Annual Wages

Geographic Area	Farming, Fishing, and Forestry Occupations - Overall	First-Line Supervisors	Agricultural Inspectors	Graders and Sorters	Agricultural Equipment Operators	Farmworkers (Crop, Nursery, and Greenhouse)	Farmworkers (Farm and Ranch Animals)	Agricultural Workers, All Other	All Industries
Sutter County[1]	$22,899	$47,425	--	$20,806	$23,925	$20,521	--	$26,721	$45,755
Yolo County[2]	$25,054	$55,556	$37,830	$29,923	$24,676	$22,015	$22,920	--	$54,295
California	$23,225	$43,929	$43,959	$21,578	$27,544	$21,903	$30,665	$34,557	$56,249

Source: EDD 2016c.

Key:

-- = estimate could not be provided

[1] The Sutter County geographic area is part of the Yuba City Metropolitan Statistical Area.

[2] The Yolo County geographic area is part of the Sacramento-Roseville-Arden Arcade Metropolitan Statistical Area.

for the overall farming, fishing, and forestry occupations. In the first quarter of 2016, the mean annual wages for several agricultural workers and workers in all industries in Yolo County were lower than those of the State.

22.2 Regulatory Setting

The following section describes the applicable laws and rules relating to environmental justice.

22.2.1 Federal Plans, Policies, and Regulations

The concept of environmental justice is rooted in the Civil Rights Act of 1964, which prohibits discrimination in Federally assisted programs, and EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* issued February 11, 1994. EO 12898 requires all Federal agencies to conduct "programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin." Section 1-101 of the order requires Federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of programs on minority and low-income populations (EO 1994).

The CEQ (1997) states that environmental justice concerns may arise from effects on the natural or physical environment, such as human health or ecological effects on minority or low-income populations, or from related social or economic effects.

22.2.2 State Plans, Policies, and Regulations

California law defines environmental justice as the "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies," in Government Code Section 65040.12(e). Section 65040.12(a) designates the Governor's Office of Planning and Research as the coordinating agency in State government for environmental justice programs and requires the Governor's Office of Planning and Research to develop guidelines for incorporating environmental justice into general plans (7 California Government Code 65040.12).

22.2.3 Regional and Local Plans, Policies, and Regulations

There are no known regional or local plans, policies, or regulations related to environmental justice.

22.3 Environmental Consequences

The purpose of this section is to provide information about the environmental consequences of the alternatives as they relate to environmental justice in the Project area. This section presents assessment methods performed to analyze the environmental justice effects and the potential environmental justice effects of the Project alternatives. Detailed descriptions of the alternatives

evaluated in this chapter are provided in Chapter 2, *Description of Alternatives*. Chapter 16, *Socioeconomics,* presents the socioeconomic effects of the alternatives.

22.3.1 Methods for Analysis

This section describes the assessment methods used to analyze potential environmental justice effects under the National Environmental Policy Act (NEPA) of the Project alternatives, including the No Action Alternative. Under EO 12898, demographic information is used to determine whether minority populations or low-income populations are present in the areas potentially affected by the range of Project alternatives. If so, a determination must be made whether implementation of the alternatives may cause disproportionately high and adverse human health or environmental impacts on those populations.

The CEQ (1997) recommends that the following three factors be considered by the environmental justice analysis to determine whether disproportionately high and adverse impacts may accrue to minority or low-income populations:

- Whether there is or would be an impact on the natural or physical environment that substantially and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment.
- Whether the environmental effects are substantial and are, or may be, having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group.
- Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

The methodologies and thresholds used in this analysis are taken from the United States Environmental Protection Agency's (USEPA) final guidance on incorporating environmental justice concerns into NEPA analysis (USEPA 1998) and help define minority and low-income populations. The guidance states that a minority and/or low-income population may be present in an area if the proportion of the populations in the area of interest are "meaningfully greater" than that of the general population or where the proportion exceeds 50 percent of the total population.

The analysis also examines the effects on farmworker employment from cropland conversions in the Yolo Bypass. In this analysis, an effect on farmworkers is determined to be disproportionately high if the ratio of the number of farmworker jobs lost to the total jobs lost in the county is greater than 50 percent. This assumes that the other jobs lost due to project-related actions (agricultural and support industries) are not predominately held by minority or low-income groups. Chapter 16, *Socioeconomics*, uses the Impact Planning and Analysis model to estimate the impacts project actions would have on the regional economy, including employment. Those estimates are used here to project the number of jobs predominately held by minorities that would be lost under each alternative, which helps determine whether a minority population is potentially disproportionately affected by the alternative.

22.3.1.1 Minority

As discussed above, the CEQ (1997) defines the term "minority" as persons from any of the following United States Census categories for race: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native. Additionally, for the purposes of this analysis, "minority" also includes all other nonwhite racial categories such as "some other race" and "two or more races." The CEQ also mandates that persons identified through the United States Census as ethnically Hispanic, regardless of race, should be included in minority counts (CEQ 1997). Hispanic origin is considered to be an ethnic category separate from race, according to the United States Census.

For this analysis, minority populations of Yolo and Sutter counties and the individual census tracts were compared against the California population to determine whether the minority population was “meaningfully greater” than the California population or exceeded 50 percent of the total population. Based on the data in Tables 22-1, 22-2, 22-3 and 22-4, at the regional level, Yolo and Sutter counties were considered minority-affected areas because the minority population was greater than 50 percent. At the local-level, Census Tracts 101.02, 112.06, and 114 were considered minority-affected areas because the minority population was greater than 50 percent, even though, all census tracks had a total minority population lower than the State, and Census tracks 112.06 and 509 had minority populations lower than their respective county’s (Yolo and Sutter, respectively).

22.3.1.2 Low-Income

Persons living with an income below the poverty level are identified as "low-income," according to the annual statistical poverty thresholds established by the United States Census Bureau. The United States Census Bureau poverty threshold indicates that the poverty level for a family of four (two adults and two children) in 2016 was $24,339 and $12,486 for an individual (United States Census Bureau 2016). The guidance states that a census tract exhibiting a proportion of people living in poverty two times higher than the State average of 12.2 percent (a total of 24.4 percent was considered to be meaningfully greater for this analysis) are considered environmental justice populations. No census tracts or counties were considered low-income as none had populations greater than 24.4 percent living below the poverty threshold

This analysis also considered whether an area's median household and per capita incomes were substantially lower than that of the county and/or State average. No census tracts had incomes that were 50 percent or less of the county or State average.

22.3.1.3 Farmworkers

The methodologies and thresholds used in this analysis to analyze potential effects on farmworkers were similar to those used to analyze minority and low-income populations. Based on the data presented in Tables 22-5 through 22-7, Yolo County's farm operators are predominately White, their laborers and helpers are predominately Hispanic, and several agricultural worker groups receive annual wages below the United States Census Bureau's poverty level threshold for a family of four (two adults and two children).

Disproportionately high or adverse effects would occur to Yolo County's farmworker community if construction-related Project actions occurred on agricultural lands or if agricultural productive lands were placed out of production, reducing the need for farm labor.

22.3.2 Determination of Impacts

NEPA requires an analysis of social, economic, and environmental justice effects; however, there is no standard set of criteria for evaluating environmental justice impacts. For the purposes of this Environmental Impact Statement (EIS)/Environmental Impact Report (EIR), the No Action Alternative is the basis of comparison, as required by NEPA. However, the No Action Alternative would be very similar to existing conditions because existing conditions for demographics and regional economics are not anticipated to experience substantive changes in the area of analysis. Therefore, existing conditions is used as a proxy for No Action Alternative in the chapter.

Social, economic, and environmental justice effects are not required to be analyzed under CEQA, and therefore a CEQA analysis is not provided in this chapter.

22.3.3 Effects

This section provides a project-level evaluation of the direct and indirect effects of implementing the alternatives on environmental justice in the Project area. Proposed actions under the alternatives could affect environmental justice areas by conducting construction-related activities in the Project area, increasing construction-related traffic through those areas, and converting croplands to nonagricultural uses. This analysis is organized by project alternative.

22.3.3.1 No Action Alternative

Under the No Action Alternative, the Project would not be implemented, and none of the Project features would be developed in the Project area. The No Action Alternative would not require any construction and would not affect agricultural production in the area; therefore, no minority or low-income populations would be exposed to adverse effects or hazards from project-related construction, and employment would not be disproportionately affected. Therefore, the No Action Alternative would not have an adverse and disproportionately high effect on minority and low-income populations related to:

- Exposure to effects or hazards from project construction
- Changes in employment due to the conversion of cropland to nonagricultural use
- Changes in employment as result of Project construction activities
- Changes to educational opportunities offered in the Yolo Bypass Wildlife Area (YBWA)

22.3.3.2 Alternative 1: East Side Gated Notch

Alternative 1, East Side Gated Notch, would allow increased flow from the Sacramento River to enter the Yolo Bypass through a gated notch on the east side of Fremont Weir. The invert of the new notch would be at an elevation of 14 feet, which is approximately 18 feet below the existing Fremont Weir crest. Alternative 1 would allow up to 6,000 cubic feet per second (cfs) to flow through the notch during periods when the river levels are not high enough to go over the crest of Fremont Weir to provide open channel flow for adult fish passage. See Section 2.4 for more details on the alternative features.

22.3.3.2.1 Impact EJ-1: Exposure of a minority and/or low-income population to adverse and disproportionately high effects or hazards from Project construction

Development of Alternative 1 would require a substantial amount of construction taking place in Yolo and Sutter counties. Construction activities would result in air quality, noise, and transportation impacts. These impacts would be temporary and would be reduced by the mitigation measures described in Chapters 17, *Transportation*; 18, *Air Quality*; and 20, *Noise*. The temporary construction activities could still cause significant impacts to air quality and noise after mitigation measures are implemented. These effects could be experienced by minority or low-income populations.

Minority populations were identified in Yolo and Sutter counties and in Census Tracts 101.02, 112.06, and 114, and were considered minority-affected areas. No census tracts or counties were determined to be low-income affected areas as none had populations greater than 24.4 percent living below the poverty threshold.

The air quality impact thresholds identified in Chapter 18 would be regional, across the entire Sacramento Valley, and not specific to Yolo and Sutter counties. Therefore, adverse and disproportionately high air quality impacts **would not occur** to the minority populations surrounding the Project area due to construction. As described in Chapter 20, there would be very small and localized noise impacts. The sensitive receptors are not known to be in a minority area. Therefore, adverse and disproportionately high noise impacts **would not occur** to the minority populations surrounding the Project area due to construction.

22.3.3.2.2 Impact EJ-2: Conversion of cropland to nonagricultural use could result in a disproportionately high effect on minority and/or low-income employment

As described in Chapter 11, *Land Use and Agricultural Resources*, Alternative 1 is expected to increase the period of inundation in the Yolo Bypass, which would delay crop preparation and planning. Delays in field preparation and planning could result in the reduction of total hours a farmworker could work or a reduction in farmworker jobs. Table 22-8 summarizes the effects on farmworker jobs that would be caused by the proposed cropland conversion associated with Alternative 1, based on the estimated employment values from Chapter 16, *Socioeconomics*. See Chapter 16 for a full analysis of the effects on employment, income, and output in the regional economy.

Table 22-8. Employment Effects of Converting Croplands under Alternative 1

	Total County Farmworkers[1]	Farmworker Jobs Affected[2]	Total Jobs Affected[2]	Percent of Jobs Affected that are Farmworkers	Percent of Total County Farmworkers that are Affected
Yolo County	5,210	-0.3	-0.6	50%	<1%

Source: United States Census Bureau 2006-2010. Direct effect of converting croplands (Chapter 16, Table 16-15)
Notes:
[1] Represents the total number of laborers and helpers in Yolo County.
[2] Negative values represent lost jobs, while positive values represent additional jobs.

As shown in Table 22-8, 0.6 jobs would be lost in Yolo County due to the conversion of croplands to nonagricultural use, half of which would be farmworkers. Even though 50 percent of the total jobs lost due to cropland conversion would be farmworker jobs, the total number of jobs lost is less than one job (less than one percent of farmworker employment in Yolo County). Although the area's farmworker community is considered to include both minority and low-income populations, cropland conversions to nonagricultural use in the Project area would not result in a disproportionately high effect on minority and/or low-income employment because the alternative would result in a minimal loss of farmworker jobs. Fluctuations in farmworker employment occur under existing conditions. This slight shift in employment could be experienced under existing market conditions and is therefore not considered to be a disproportionately high effect on minority and/or low-income populations.

Disproportionately high and adverse effects on minority and low-income employment **would not occur** because the conversion of croplands to a non-production state would result in a marginal reduction in farmworker jobs, which are held largely by minority and low-income groups.

22.3.3.2.3 Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment

The construction period for Alternative 1 would be one season (April to November), about seven months. As described in Chapter 16, *Socioeconomics*, the construction of Alternative 1 would create 365 jobs. Of the 365 jobs created, 221 jobs (61 percent) are considered a direct effect of construction and would include planning, design, construction, and administrative jobs. In addition, the annual maintenance for Alternative 1 would create a total of six jobs, three of which are considered a direct effect and would include jobs in the maintenance and repair construction of non-residential structures sector. This analysis assumes that laborers would be supplied by Yolo, Sutter, Solano, and Sacramento counties.

Minority populations are present in Yolo, Sutter, Solano, and Sacramento counties and in Census Tracts 101.02, 112.06, and 114. Low-income populations were not identified in either county or census tracts. Therefore, construction activities in the Project area would result in a temporary increase in minority employment.

This impact would be temporarily **beneficial** because construction activities would create temporary jobs that would be supplied by workers in Yolo, Sutter, Solano, and Sacramento counties, which could include those in Census Tracts 101.02, 112.06, and 114, all of which have minority populations over 50 percent.

22.3.3.2.4 Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students

The YBWA is the site of the Discover the Flyway program, a program that allows schools to visit the area to learn about the importance and significance of the local wetlands, agriculture, and wildlife and develop land stewardship ethics. As discussed in Chapter 13, *Recreation*, Alternative 1 would result in increased periods of inundation of up to two weeks, which could reduce access to roads and YBWA facilities, reducing the amount of field trips for the Discover the Flyway program.

Increased inundation could increase the number of wet days in the YBWA. Increased number of wet days could result in impassable road conditions and/or reduced access to bus routes and

facilities due to high water levels. If road and facility access is not available, the educational uses of the YBWA would be reduced, which could conflict with the goals included in the YBWA Land Management Plan to support and expand public use of the YBWA for environmental education and interpretation. Most areas within the YBWA would experience an increase in wet days of up to two weeks, whereas other areas would remain wet for an additional two to three weeks for all alternatives. Inundation at YBWA can be estimated with water levels at Lisbon Weir:

- If Lisbon Weir water levels exceed 8.5 feet, YBWA experiences low-level flooding.
- If Lisbon Weir water levels exceed 10 feet, Parking Lot F floods.
- If Lisbon Weir water levels exceed 12 feet, YBWA closes.

This is also discussed in Chapter 13, *Recreation,* Section 13.1.2.3, and under Impact REC-2 in Section 13.3.3.2.2.

During the 2016-2017 program year, the program held 138 teaching days for 181 classes. Of the nearly 4,000 student participants , 44 percent come from Title 1 schools, schools that low-income families typically enroll their children in. Students who attend the program come from 58 schools in 17 different school districts within 5 counties. For comparative purposes, the analysis uses Davis Joint Unified School District (DJUSD) and Sacramento City Unified School District (SCUSD) to determine whether educational opportunities are affected disproportionately. There are approximately 106 schools that could participate in the Discover the Flyway Program in the DJUSD and SCUSD, 17 and 86 schools respectively. Approximately 41 percent of schools in DJUSD are considered Title 1 schools and 79 percent are considered Title 1 schools in SCUSD. The reduction in the number of field trips available at the YBWA could affect over 40 percent of Discover the Flyway Program participants and up to 30 percent of Title 1 schools in DJUSD and up to 57 percent of Title 1 schools in SCUSD. This would suggest that there could be a disproportionate effect on the educational opportunities of low-income students in SCUSD but not on those in DJUSD. Therefore, disproportionately high or adverse effects to the educational opportunities offered in the YBWA on low-income students **could occur** due to increases in inundation in the YBWA.

Mitigation Measure EJ-1 (NEPA Only): Alternative Field Trip Site.

An alternative site in the YBWA that could be used for educational field trips will be made accessible to the Discover the Flyway Program. Reclamation and DWR will make fish passage facilities available for field trips to reduce the adverse effects on low-income students due to reduced educational opportunities offered in the YBWA.

The inclusion of field trip opportunities at fish passage facilities provided in Mitigation Measure EJ-1 (NEPA Only) would reduce the disproportionately high or adverse effects on low-income students that could occur due to increases in inundation in the YBWA.

22.3.3.3 Alternative 2: Central Gated Notch

Alternative 2, Central Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 2 is the location of the notch; Alternative 2 would site the notch near the center of Fremont Weir. This

gate would be a similar size but would have an invert elevation that is higher (14.8 feet) because the river is higher at this upstream location, and the gate would allow up to 6,000 cfs through to provide open channel flow for adult fish passage. See Section 2.5 for more details on the alternative features.

22.3.3.3.1 Impact EJ-1: Exposure of a minority and/or low-income population to adverse and disproportionately high effects or hazards from Project construction

Impacts under Alternative 2 relating to construction effects and hazards exposed to minority and/or low-income populations within the Project area would be similar to those discussed for Alternative 1.

Disproportionately high and adverse effects on minority populations **would not occur** due to the introduction of construction activities in Yolo and Sutter counties and Census Tracts 101.02, 112.06, and 114.

22.3.3.3.2 Impact EJ-2: Conversion of cropland to nonagricultural use could result in a disproportionately high effect on minority and/or low-income employment

Impacts under Alternative 2 relating to minority and/or low-income employment within the Project area would be identical to those discussed for Alternative 1.

Disproportionately high and adverse effects on minority and low-income employment **would not occur** because the conversion of croplands to a non-production state would reduce farmworker jobs, which are held largely by minority and low-income groups, by less than one job.

22.3.3.3.3 Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment

The construction period for Alternative 2 would be one season (April to November), about seven months. As described in Chapter 16, *Socioeconomics*, the construction of Alternative 2 would create 524 jobs. Of the 524 jobs created, 321 jobs (61 percent) are considered a direct effect of construction and would include planning, design, construction, and administrative jobs. In addition, the annual maintenance for Alternative 2 would create a total of six jobs, three of which are considered a direct effect and would include jobs in the maintenance and repair construction of non-residential structures sector. This analysis assumes that laborers would be supplied by Yolo, Sutter, Solano, and Sacramento counties.

Minority populations are present in Yolo, Sutter, Solano, and Sacramento counties and in Census Tracts 101.02, 112.06, and 114. Low-income populations were not identified on the local or regional level. Therefore, construction activities in the Project area would result in a temporary increase in minority employment.

This impact would be temporarily **beneficial** because construction activities would create temporary jobs that would be supplied by workers in Yolo, Sutter, Solano, and Sacramento counties, which could include those in Census Tracts 101.02, 112.06, and 114, all of which have minority populations over 50 percent.

22.3.3.3.4 Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students

Impacts under Alternative 2 relating to the educational opportunities offered in the YBWA on low-income populations within the Project area would be similar to those discussed for Alternative 1.

Disproportionately high and adverse effects to the educational opportunities offered in the YBWA on low-income students **could occur** due to increases in inundation in the YBWA. This is also discussed in Section 13.3.3.3.2 under Impact REC-2.

However, field trip opportunities made available at fish passage facilities, as included in Mitigation Measure EJ-1 (NEPA Only), would reduce the disproportionately high or adverse effects on low-income students that could occur due to increases in inundation in the YBWA.

22.3.3.4 Alternative 3: West Side Gated Notch

Alternative 3, West Side Gated Notch, would provide a similar new gated notch through Fremont Weir as described for Alternative 1. The primary difference between Alternatives 1 and 3 is the location of the notch; Alternative 3 would site the notch on the western side of Fremont Weir. This gate would be a similar size but would have an invert elevation that is higher (16.1 feet) because the river is higher at this upstream location. Alternative 3 would allow up to 6,000 cfs through the gated notch to provide open channel flow for adult fish passage. See Section 2.6 for more details on the alternative features.

22.3.3.4.1 Impact EJ-1: Exposure of a minority and/or low-income population to adverse and disproportionately high effects or hazards from Project construction

Impacts under Alternative 3 relating to construction effects and hazards exposed to minority and/or low-income populations within the Project area would be similar to those discussed for Alternative 1.

Disproportionately high and adverse effects on minority populations **would not occur** due to the introduction of construction activities in Yolo and Sutter counties and Census Tracts 101.02, 112.06, and 114.

22.3.3.4.2 Impact EJ-2: Conversion of cropland to nonagricultural use could result in a disproportionately high effect on minority and/or low-income employment

Impacts under Alternative 3 relating to minority and/or low-income employment within the Project area would be identical to those discussed for Alternative 1.

Disproportionately high and adverse effects on minority and low-income employment **would not occur** because the conversion of croplands to a non-production state would reduce farmworker jobs, which are held largely by minority and low-income groups, by less than one job.

22.3.3.4.3 Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment

The construction period for Alternative 3 would be one season (April to November), about seven months. As described in Chapter 16, *Socioeconomics*, the construction of Alternative 3 would create 619 jobs. Of the 619 jobs created, 385 jobs (62 percent) are considered a direct effect of

construction and would include planning, design, construction, and administrative jobs. In addition, the annual maintenance for Alternative 3 would create a total of six jobs, three of which are considered a direct effect and would include jobs in the maintenance and repair construction of nonresidential structures sector. This analysis assumes that laborers would be supplied by Yolo, Sutter, Solano, and Sacramento counties.

Minority populations are present in Yolo, Sutter, Solano, and Sacramento counties and in Census Tracts 101.02, 112.06, and 114. Low-income populations were not identified in the area of analysis. Therefore, construction activities in the Project area would result in a temporary increase in minority employment.

This impact would be temporarily **beneficial** because construction activities would create temporary jobs that would be supplied by workers in Yolo, Sutter, Solano, and Sacramento counties, which could include those in Census Tracts 101.02, 112.06, and 114, all of which have minority populations over 50 percent.

22.3.3.4.4 Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students

Impacts under Alternative 3 relating to the educational opportunities offered in the YBWA on low-income populations within the Project area would be similar to those discussed for Alternative 1.

Disproportionately high and adverse effects to the educational opportunities offered in the YBWA on low-income students **could occur** due to increases in inundation in the YBWA. This is also discussed in Section 13.3.3.4.2 under Impact REC-2. However, field trip opportunities made available at fish passage facilities, as included in Mitigation Measure EJ-1 (NEPA Only), would reduce the disproportionately high or adverse effects on low-income students that could occur due to increases in inundation in the YBWA.

22.3.3.5 Alternative 4: West Side Gated Notch – Managed Flow

Alternative 4, West Side Gated Notch – Managed Flow, would have a smaller amount of flow entering the Yolo Bypass through the gated notch in Fremont Weir than some other alternatives, but it would incorporate water control structures to maintain inundation for longer periods of time within the northern portion of the Yolo Bypass. Alternative 4 would include the same gated notch and associated facilities as described for Alternative 3; however, it would be operated to limit the maximum inflow to 3,000 cfs. See Section 2.7 for more details on the alternative features.

22.3.3.5.1 Impact EJ-1: Exposure of a minority and/or low-income population to adverse and disproportionately high effects or hazards from Project construction

Impacts under Alternative 4 relating to construction effects and hazards exposed to minority and/or low-income populations within the Project area would be similar to those discussed for Alternative 1.

Disproportionately high and adverse effects on minority populations **would not occur** due to the introduction of construction activities in Yolo and Sutter counties and Census Tracts 101.02, 112.06, and 114.

22.3.3.5.2 Impact EJ-2: Conversion of cropland to nonagricultural use could result in a disproportionately high effect on minority and/or low-income employment

Table 22-9 summarizes the effects on farmworker jobs that would be caused by the proposed cropland conversion associated with Alternative 4, based on the estimated employment values from Chapter 16, *Socioeconomics*. See Chapter 16 for a full analysis of the effects on employment, income, and output in the regional economy.

Table 22-9. Employment Effects of Converting Croplands under Alternative 4

Gate Closure Date	Total County Farmworkers[1]	Farmworker Jobs Affected	Total Jobs Affected	Percent of Jobs Affected that are Farmworkers	Percent of Total County Farmworkers that are Affected
March 15	41,595	-0.5	-1.5	33%	<1%
March 7	41,595	-0.4	-1.3	31%	<1%

Source: United States Census Bureau 2006-2010. Direct effect of converting croplands (Chapter 16, Tables 16-24 and 16-25)

Notes:

[1] Represents the total number of laborers and helpers in Yolo County.

[2] Negative values represent lost jobs, while positive values represent additional jobs

As shown in Table 22-9, the two gate closure date options would result in 1.3 to 1.5 jobs lost in Yolo County due to the conversion of croplands to nonagricultural use; 0.4 to 0.5 of which would be farmworker jobs. Even though up to 33 percent of the total jobs lost due to cropland conversion would be farmworker jobs, the total number of jobs lost would be no more than 1.5 jobs (less than one percent of farmworker employment in Yolo County). Although the area's farmworker community is considered to include both minority and low-income populations, cropland conversions to nonagricultural use in the Project area would not result in a disproportionately high effect on minority and/or low-income employment because the alternative would result in a minimal loss of county farmworker jobs. Fluctuations in farmworker employment occur under existing conditions. This slight shift in employment could be experienced under existing market conditions and is therefore not considered to be a disproportionately high effect on minority and/or low-income populations.

Disproportionately high and adverse effects on minority and low-income employment **would not occur** because the conversion of farmlands to a non-production state would result in a marginal reduction in farmworker jobs in Yolo County, which are held largely by minority and low-income groups.

22.3.3.5.3 Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment

The construction period for Alternative 4 would be one season (April to November), about seven months. As described in Chapter 16, *Socioeconomics*, the construction of Alternative 4 would create 873 jobs. Of the 873 jobs created, 532 jobs (61 percent) are considered a direct effect of construction and would include planning, design, construction, and administrative jobs. In addition, the annual maintenance for Alternative 4 would create a total of eight jobs, four of which are considered a direct effect and would include jobs in the maintenance and repair construction of nonresidential structures sector. This analysis assumes that laborers would be supplied by Yolo, Sutter, Solano, and Sacramento counties.

Minority populations are present in Yolo, Sutter, Solano, and Sacramento counties and in Census Tracts 101.02, 112.06, and 114. Low-income populations were not identified in the area of analysis. Therefore, construction activities in the Project area would result in a temporary increase in minority employment.

This impact would be temporarily **beneficial** because construction activities would create temporary jobs that would be supplied by workers in Yolo, Sutter, Solano, and Sacramento counties, which could include those in Census Tracts 101.02, 112.06, and 114, all of which have minority populations over 50 percent.

22.3.3.5.4 Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students

Alternative 4 would result in increased periods of inundation from one to three weeks, dependent on the location within the YBWA, which could reduce access to roads and YBWA facilities, reducing the amount of field trips for the Discover the Flyway program. The reduction in the number of field trips available at the YBWA could affect over 40 percent of Discover the Flyway Program participants and up to 30 percent of Title 1 schools in DJUSD and up to 57 percent of Title 1 schools in SCUSD. This would suggest that there could be a disproportionate effect on the educational opportunities of low-income students in SCUSD but not on those in DJUSD. Therefore, disproportionately high or adverse effects to the educational opportunities offered in the YBWA on low-income students **could occur** due to increases in inundation in the YBWA. This is also discussed in Section 13.3.3.5.2 under Impact REC-2. However, field trip opportunities made available at fish passage facilities, as included in Mitigation Measure EJ-1 (NEPA Only), would reduce the disproportionately high or adverse effects on low-income students that could occur due to increases in inundation in the YBWA.

22.3.3.6 Alternative 5: Central Multiple Gated Notches

Alternative 5, Central Multiple Gated Notches, would improve the entrainment of fish by using multiple gates and intake channels so that the deeper gate could allow more flow to enter the bypass when the river is at lower elevations. Flows would move to other gates when the river is higher to control inflows. Alternative 5 incorporates multiple gated notches in the central location on the existing Fremont Weir that would allow combined flows of up to 3,400 cfs. See Section 2.8 for more details on the alternative features.

22.3.3.6.1 Impact EJ-1: Exposure of a minority and/or low-income population to adverse and disproportionately high effects or hazards from Project construction

Impacts under Alternative 5 relating to construction effects and hazards exposed to minority and/or low-income populations within the Project area would be similar to those discussed for Alternative 1.

Disproportionately high and adverse effects on minority populations would not occur due to the introduction of construction activities in Yolo and Sutter counties and Census Tracts 101.02, 112.06, and 114.

22.3.3.6.2 Impact EJ-2: Conversion of cropland to nonagricultural use could result in a disproportionately high effect on minority and/or low-income employment

Impacts under Alternative 5 relating to minority and/or low-income employment within the Project area would be similar to those discussed for Alternative 1. Table 22-10 summarizes the effects on farmworker jobs caused by the proposed cropland conversion associated with Alternative 5, based on the estimated employment values from Chapter 16, *Socioeconomics*. See Chapter 16 for a full analysis of the effects on employment, income, and output in the regional economy.

Table 22-10. Employment Effects of Converting Croplands under Alternative 5

	Total County Farmworkers[1]	Farmworker Jobs Affected	Total Jobs Affected	Percent of Jobs Affected that are Farmworkers	Percent of Total County Farmworkers that are Affected
Yolo County	41,595	-0.3	-0.7	43%	<1%

Source: United States Census Bureau 2006-2010. Direct effect of converting croplands (Chapter 16, Table 16-29)
Notes:
[1] Represents the total number of laborers and helpers in Yolo County.
[2] Negative values represent lost jobs, while positive values represent additional jobs

As shown in Table 22-10, 0.7 jobs would be lost in Yolo County due to the conversion of croplands to nonagricultural use, 43 percent of which would be farmworkers. Even though 43 percent of the total jobs lost due to cropland conversion would be farmworker jobs, the total number of jobs lost would be less than one percent of farmworker employment in Yolo County (less than one job). Although the area's farmworker community is considered to include both minority and low-income populations, cropland conversions to nonagricultural use in the Project area would not result in a disproportionately high effect on minority and/or low-income employment because the alternative would result in a minimal loss of farmworker jobs. Fluctuations in farmworker employment occur under existing conditions. This slight shift in employment could be experienced under existing market conditions and is therefore not considered to be a disproportionately high effect on minority and/or low-income populations.

Disproportionately high and adverse effects on minority and low-income employment **would not occur** because the conversion of farmlands to a non-production state would result in a marginal reduction in farmworker jobs, which are held largely by minority and low-income groups.

22.3.3.6.3 Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment

As described in Chapter 16, *Socioeconomics*, the construction of Alternative 5 would create 1,068 jobs. Of the 1,068 jobs created, 697 jobs (65 percent) are considered a direct effect of construction and would include planning, design, construction, and administrative jobs. In addition, the annual maintenance for Alternative 5 would create a total of 10 jobs, five of which are considered a direct effect and would include jobs in the maintenance and repair construction of nonresidential structures sector. This analysis assumes that laborers would be supplied by Yolo, Sutter, Solano, and Sacramento counties.

Minority populations are present in Yolo, Sutter, Solano, and Sacramento counties and in Census Tracts 101.02, 112.06, and 114. Low-income populations were not identified in the area of

analysis. Therefore, construction activities in the Project area would result in a temporary increase in minority employment.

This impact would be temporarily **beneficial** because construction activities would create temporary jobs that would be supplied by workers in Yolo, Sutter, Solano, and Sacramento counties, which could include those in Census Tracts 101.02, 112.06, and 114, all of which have minority populations over 50 percent.

22.3.3.6.4 Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students

Alternative 5 would result in increased periods of inundation in most areas of the YBWA of one to two weeks, while other areas would be inundated for an additional two to three weeks, which could reduce access to roads and YBWA facilities, reducing the amount of field trips for the Discover the Flyway program. The reduction in the number of field trips available at the YBWA could affect over 40 percent of Discover the Flyway Program participants and up to 30 percent of Title 1 schools in DJUSD and up to 57 percent of Title 1 schools in SCUSD. This would suggest that there could be a disproportionate effect on the educational opportunities of low-income students in SCUSD but not on those in DJUSD. Therefore, disproportionately high or adverse effects to the educational opportunities offered in the YBWA on low-income students **could occur** due to increases in inundation in the YBWA. This is also discussed in Section 13.3.3.6.2 under Impact REC-2. However, field trip opportunities made available at fish passage facilities, as included in Mitigation Measure EJ-1 (NEPA Only), would reduce the disproportionately high or adverse effects on low-income students that could occur due to increases in inundation in the YBWA.

22.3.3.6.5 Tule Canal Floodplain Improvements (Program Level)

As described in Section 2.8.1.7, Alternative 5 would include floodplain improvements along Tule Canal, just north of Interstate 80. These improvements would not be constructed at the same time as the remaining facilities. They are included at a program level of detail to consider all of the potential impacts and benefits of Alternative 5. Subsequent consideration of environmental impacts would be necessary before construction could begin.

Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment

Construction of the Tule Canal Floodplain Improvements would be completed within one year over a 28-week period between April and October. As described in Chapter 16, *Socioeconomics*, the construction of these improvements would create 266 jobs. Of the 266 jobs created, 135 jobs (51 percent) are considered a direct effect of construction and would include planning, design, construction, and administrative jobs. In addition, the annual maintenance for the Tule Canal Floodplain Improvements would create a total of 10 jobs, five of which are considered a direct effect and would include jobs in the maintenance and repair construction of nonresidential structures sector. This analysis assumes that laborers would be supplied by Yolo, Sutter, Solano, and Sacramento counties.

Minority populations are present in Yolo, Sutter, Solano, and Sacramento counties and in Census Tracts 101.02, 112.06, and 114. Low-income populations were not identified in the area of

analysis. Therefore, construction activities in the Project area would result in a temporary increase in minority employment.

This impact would be temporarily **beneficial** because construction activities would create temporary jobs that would be supplied by workers in Yolo, Sutter, Solano, and Sacramento counties, which could include those in Census Tracts 101.02, 112.06, and 114, all of which have minority populations over 50 percent.

22.3.3.7 Alternative 6: West Side Large Gated Notch

Alternative 6, Large Gated Notch, is a large notch in the western location that would allow flows up to 12,000 cfs. It was designed with the goal of entraining more fish while allowing more flow into the bypass when the Sacramento River is at lower elevations. See Section 2.9 for more details on the alternative features.

22.3.3.7.1 Impact EJ-1: Exposure of a minority and/or low-income population to adverse and disproportionately high effects or hazards from Project construction

Impacts under Alternative 6, relating to construction effects and hazards exposed to minority and/or low-income populations within the Project area, would be similar to those discussed for Alternative 1.

Disproportionately high and adverse effects on minority populations **would not occur** due to the introduction of construction activities in Yolo and Sutter counties and Census Tracts 101.02, 112.06, and 114.

22.3.3.7.2 Impact EJ-2: Conversion of cropland to nonagricultural use could result in a disproportionately high effect on minority and/or low-income employment

Impacts under Alternative 6 relating to minority and/or low-income employment within the Project area would be similar to those discussed for Alternative 1. Table 22-11 summarizes the effects on farmworker jobs that would be caused by the proposed cropland conversion associated with Alternative 6, based on the estimated employment values from Chapter 16, *Socioeconomics*. See Chapter 16 for a full analysis of the effects on employment, income, and output in the regional economy.

Table 22-11. Employment Effects of Converting Croplands under Alternative 6

	Total County Farmworkers[1]	Farmworker Jobs Affected	Total Jobs Affected	Percent of Jobs Affected that are Farmworkers	Percent of Total County Farmworkers that are Affected
Yolo County	41,595	-0.5	-0.9	56%	<1%

Source: United States Census Bureau 2006-2010. Direct effect of converting croplands (Chapter 16, Table 16-35)
Notes:

[1] Represents the total number of laborers and helpers in Yolo County.

[2] Negative values represent lost jobs, while positive values represent additional jobs

As shown in Table 22-11, 0.9 jobs would be lost in Yolo County due to the conversion of croplands to nonagricultural use, 56 percent of which would be farmworkers. Even though 56 percent of the total jobs lost due to cropland conversion would be farmworker jobs, the total number of jobs lost would be less than one job (less than one percent of farmworker employment in Yolo County). Although the area's farmworker community is considered to include both

minority and low-income populations, cropland conversions to nonagricultural use in the Project area would not result in a disproportionately high effect on minority and/or low-income employment because the alternative would result in a minimal loss of farmworker jobs. Fluctuations in farmworker employment occur under existing conditions. This slight shift in employment could be experienced under existing market conditions and is therefore not considered to be a disproportionately high effect on minority and/or low-income populations.

Disproportionately high and adverse effects on minority and low-income employment **would not occur** because the conversion of farmlands to a non-production state would result in a marginal reduction in farmworker jobs, which are held largely by minority and low-income groups.

22.3.3.7.3 Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment

The construction period for Alternative 6 would be one season (April to November), about seven months. As described in Chapter 16, *Socioeconomics*, the construction of Alternative 6 would create 1,044 jobs. Of the 1,044 jobs created, 627 jobs (60 percent) are considered a direct effect of construction and would include planning, design, construction, and administrative jobs. In addition, the annual maintenance for Alternative 6 would create a total of 11 jobs, 6 of which are considered a direct effect and would include jobs in the maintenance and repair construction of nonresidential structures sector. This analysis assumes that laborers would be supplied by Yolo, Sutter, Solano, and Sacramento counties.

Minority populations are present in Yolo, Sutter, Solano, and Sacramento counties and in Census Tracts 101.02, 112.06, and 114. Low-income populations were not identified on the local or regional level. Therefore, construction activities in the Project area would result in a temporary increase in minority employment.

This impact would be temporarily **beneficial** because construction activities would create temporary jobs that would be supplied by workers in Yolo, Sutter, Solano, and Sacramento counties, which could include those in Census Tracts 101.02, 112.06, and 114, all of which have minority populations over 50 percent.

22.3.3.7.4 Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students

Alternative 6 would increase typical periods of inundation in most areas within the YBWA by two to three weeks, while other areas would be inundated for an additional three to four weeks, which could reduce access to roads and YBWA facilities, reducing the amount of field trips for the Discover the Flyway program. The reduction in the number of field trips available at the YBWA could affect over 40 percent of Discover the Flyway Program participants and up to 30 percent of Title 1 schools in DJUSD and up to 57 percent of Title 1 schools in SCUSD. This would suggest that there could be a disproportionate effect on the educational opportunities of low-income students in SCUSD but not on those in DJUSD. Therefore, disproportionately high or adverse effects to the educational opportunities offered in the YBWA on low-income students **could occur** due to increases in inundation in the YBWA. This is also discussed in Section 13.3.3.7.2 under Impact REC-2. However, field trip opportunities made available at fish passage facilities, as included in Mitigation Measure EJ-1 (NEPA Only), would reduce the disproportionately high or adverse effects on low-income students that could occur due to increases in inundation in the YBWA.

22.3.4 Summary of Impacts

Table 22-12 provides a summary of the identified effects the Project may have on environmental justice populations within the area.

Table 22-12. Summary of Impacts – Environmental Justice

Impact	Alternative	Effects Determination
Impact EJ-1: Exposure of a minority and/or low-income population to adverse and disproportionately high effects or hazards from Project construction	No Action	No Impact
	All Action Alternatives	Adverse and Disproportionate Effect Would Not Occur
Impact EJ-2: Conversion of cropland to nonagricultural use could result in a disproportionately high effect on minority and/or low-income employment	No Action	No Impact
	All Action Alternatives	Adverse and Disproportionate Effect Would Not Occur
Impact EJ-3: Project construction activities and annual maintenance could increase minority and/or low-income employment	No Action	No Impact
	All Action Alternatives	Beneficial
Impact EJ-4: Project actions could reduce educational opportunities offered in the YBWA on low-income students	No Action	No Impact
	All Action Alternatives	Adverse and Disproportionate Effect Could Occur

22.4 Cumulative Impacts Analysis

This section describes the cumulative impacts analysis for Environmental Justice. Section 3.3 presents an overview of the cumulative impacts analysis, including the methodology, and the projects, plans, and programs considered in the cumulative impacts analysis.

22.4.1 Methodology

This evaluation of cumulative impacts for environmental justice considers the effects of the Project and how they may combine with the effects of other past, present, and future projects or actions to create significant impacts on specific resources. The area of analysis for these cumulative effects includes Yolo, Sutter, Solano, and Sacramento counties. The timeframe for this cumulative analysis includes the past, present, and probable future projects producing related or cumulative impacts that have been identified in the area of analysis. This cumulative effect analysis utilizes the project analysis approach described in detail in Section 3.3, *Cumulative Impacts*.

The projects that would require or result in construction activities within the Project area have the potential to impact environmental justice populations in combination with the Project alternatives. These projects are listed below:

- The American River Common Features General Reevaluation Report would involve extensive excavation activities in the Sacramento Bypass near the east side of the Yolo Bypass.
- The Sacramento River Basin-Wide Feasibility Study would include options to improve the bypass system that could consist of a combination of levee setbacks, weir expansions, and new bypass channels.
- The Lower Elkhorn Basin Levee Setback Project would remove portions of existing levees and improve or relocate associated infrastructure.
- The Sacramento River General Reevaluation Report considers widening bypasses and constructing setback levees.
- The Lower Cache Creek Flood Risk Management Feasibility Study would include levee construction near Yolo Bypass.

22.4.2 Cumulative Impacts

The Project alternatives would not result in disproportionately high and adverse effects to minority and/or low-income populations from construction activities. Cumulative impacts relating to transportation, air quality, and noise are discussed in Chapters 17, 18, and 20, respectively.

This analysis assumed that workers from Yolo, Sutter, Solano, and Sacramento counties would be used for construction-related work created by Project actions. The same assumption was made for the cumulative projects in the area. Minority populations were identified in Yolo, Sutter, Solano, and Sacramento counties. No low-income populations were identified. As discussed above, Project actions would not result in disproportionately high and adverse effects on minority employment due to construction. Therefore, the Project alternatives' contribution to the cumulative effects associated with environmental justice would not exacerbate the potential occurrence of disproportionately high impacts to minority populations in Yolo, Sutter, Solano, and Sacramento counties.

22.5 References

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23 Other NEPA/CEQA Required Disclosures

In addition to the factors described in the preceding chapters, California Environmental Quality Act (CEQA) requires consideration of significant and unavoidable impacts, National Environmental Policy Act (NEPA) requires consideration of adverse effects which cannot be avoided, Indian Sacred Sites, and the relationship of short-term uses and long-term productivity, and both NEPA and CEQA require consideration of irreversible and irretrievable commitments of resources and growth-inducing impacts. These considerations are described below.

23.1 Irreversible and Irretrievable Commitment of Resources

NEPA requires that an Environmental Impact Statement (EIS) include a discussion of the irreversible and irretrievable commitments of resources that may be involved should an action be implemented. Similarly, the State of California (State) CEQA Guidelines (Section 15126, subdivision (c)) require that an Environmental Impact Report (EIR) include a discussion of the significant irreversible environmental changes that would be caused by a proposed project should it be implemented.

An irreversible and irretrievable commitment of resources is the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled or those that are consumed or reduced to unrecoverable forms. The proposed action would result in the irreversible and irretrievable commitment of the following:

- Construction materials
- Nonrenewable energy
- Land area and associated loss of agricultural and recreational resources

Implementing Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) actions would require the permanent commitment of material resources. Under all alternatives, construction materials, including riprap material and rock slope protection bedding, would be committed to a variety of actions that would construct or modify existing facilities. The irreversible commitment of these material resources would result in a permanent loss of this resource for the future or alternative purposes.

Implementing Project actions would also commit nonrenewable energy in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for the construction, operation, and maintenance of actions. The electrical service required for operation of the headworks under all the alternatives would be three-phase at approximately 100 amperes and 48-volts alternating current (80 kilovolt ampere) during periods of gate operation for fish passage. The irreversible commitment of this nonrenewable energy would result in a permanent loss of this resource for the future or alternative purposes.

Constructing the Project components would permanently affect grazing land, Farmland of Local Potential, and some Prime Farmland and Unique Farmland and result in a reduction in crop

yields where agricultural production would no longer be feasible due to the construction of project structures, as discussed in Chapter 11, *Land Use and Agricultural Resources*. Total loss of agricultural land due to project structures would be about 31 acres under Alternative 1; about 61 acres under Alternative 2; about 52 acres under Alternative 3; 101 acres under Alternative 4; 77 acres under Alternative 5; and 70 acres under Alternative 6. The majority of these construction-related permanently converted lands are designated as grazing lands within the Fremont Weir Wildlife Area (FWWA) and are not typically used for grazing purposes. Alternative 4 is the only alternative that includes construction actions that would convert Prime Farmland and Unique Farmland (1 acre and 30 acres, respectively). The commitment of this agricultural land would result in an irretrievable loss of this resource. In addition, longer inundation of agricultural parcels could delay planting dates and may cause landowners to temporarily remove land from production in some years, as discussed in Chapter 16, *Socioeconomics*. Under Alternatives 1, 2, and 3, there would be an average of 22 acres temporarily removed from production due to the increased period of inundation. Under Alternatives 4, 5, and 6, an average of 101, 44, and 26 acres, respectively, would be temporarily removed from production.

Implementing project actions would reduce the amount of area available for recreation use due to Project components, as discussed in Chapter 13, *Recreation*. Permanent components (e.g. headworks, control building, outlet transition, transport channel, and the supplemental fish passage) would convert existing lands at FWWA to non-recreational use. Total loss of land would be 26.7 acres under Alternative 1, 65.4 acres under Alternative 2, 48.4 acres under Alternative 3, 48.4 acres under Alternative 4, 78.9 acres under Alternative 5, and 65.8 acres under Alternative 6. The commitment of this recreational land would result in an irretrievable loss of this resource.

23.2 Relationship between Short-term Uses and Long-term Productivity

NEPA requires that an EIS consider “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 Code of Federal Regulations Section 1502.16). Such consideration involves using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare; create and maintain conditions under which humans and nature can exist in productive harmony; and fulfill the social, economic, and other requirements of present and future generations of Americans.

Construction activities would include short-term uses of capital, labor, fuels, and construction materials as well as habitats, agricultural areas, and recreation areas. General commitments of construction materials are largely irreversible because most of the construction materials are unsalvageable. Construction would also result in short-term construction-related effects such as interference with local traffic and circulation and increased air emissions, ambient noise levels, dust generation, and disturbance of wildlife. These effects would be temporary, occurring only during construction, and are not expected to alter the long-term productivity of the natural environment.

In the short term, implementing the Project would directly increase demand for construction and technical services. The additional economic activity in these sectors could create jobs for construction contractors and workers; consulting engineers and designers; environmental consultants, such as biologists, botanists, and ecologists; and other personnel. It also would indirectly increase economic activity in industries that provide construction materials and industries providing goods and services to construction workers. In turn, the demand for these services could result in new jobs.

Conversely, temporary fallowing of agricultural land or crop shifting, as discussed in Section 23.1, would result in fewer jobs in the agricultural sector. The effects of Project implementation on employment and economic activity are discussed in Chapter 16, *Socioeconomics*.

Long-term productivity resulting from implementing the Project would increase in some cases and would decrease or remain unchanged in others. The short-term increase in construction-related economic activity would not be sustained over the long term. Construction of project structures would also permanently convert some grazing lands and Farmlands of Local Potential to nonagricultural uses. Construction of Project structures for Alternative 4 could also permanently remove some Prime Farmland and Unique Farmland from agricultural production.

Within the Project area, implementation would result in other long-term effects such as increased aquatic habitat. No identified adverse effects would pose a long-term risk to human health and safety.

In summary, construction activities would generate regional economic activity in the short term, but these activities would not be sustained over the long term. The benefits of aquatic habitat restoration and self-sustaining salmon populations are substantial and would continue into the long term.

Implementing the Project, including implementation of mitigation measures as described in this EIS/EIR, would foster and promote the general welfare; create and maintain conditions under which people and nature can exist in productive harmony; and fulfill social, economic, and other requirements of present and future generations.

23.3 Indian Sacred Sites and Indian Trust Assets

As defined by Executive Order 13007: Indian Sacred Sites, a sacred site means “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.” Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States government for Indian tribes or individuals, or property protected under United States law for federally recognized Indian tribes or individuals (e.g., land and minerals). ITAs can include land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, and in stream flows associated with a reservation or Rancheria. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the United States government.

The results of the literature and records search indicate that a few ITAs are located within the Sacramento Valley, but none occur within the Project area of potential effect. Figure 23-1 includes a map of ITAs within the southern Sacramento Valley.

The Project area does not include Federal land, and the nearest ITA is approximately 20 miles northeast of the Project area; therefore, there is no potential for Indian Sacred Sites to be affected by the action alternatives.

23.4 Growth-Inducing Impacts

NEPA requires that an EIS consider indirect effects of a project, which are often the result of growth inducement. The State CEQA Guidelines require that an EIR discuss how a project may induce growth (California Code of Regulations, Title 14, Section 15126.2, subdivision (d)). A project will have a growth-inducing impact if it directly or indirectly:

- Removes obstacles to population or economic growth
- Requires the construction of additional community service facilities that could cause significant environmental effects
- Encourages and facilitates other activities that would significantly affect the environment, either individually or cumulatively

In *Napa Citizens for Honest Government v. Napa County Board of Supervisors* (Bennett 2001) 91 Cal. App. 4th 342, 367–371 (110 Cal. Rptr. 2d 579), the California Court of Appeals, Fourth District, provided clear direction on the standards for disclosing growth-inducing effects. The EIR must describe the directness or indirectness of the effect. It must also describe the ability of the lead agency to forecast actual effects. Based on these factors, the lead agency may consider mitigation measures for the anticipated effects. Growth- inducing effects are evaluated for the alternatives in accordance with the California Court of Appeals' finding in *Napa Citizens for Honest Government v. Napa County Board of Supervisors* (Bennett 2001):

> Neither CEQA itself, nor the cases that have interpreted it, require an EIR to anticipate and mitigate the effects of a particular project on growth on other areas. In circumstances such as these, it is sufficient that the Final Environmental Impact Report warns interested persons and governing bodies of the probability that additional housing will be needed so that they can take steps to prepare for or address that probability. The Final Environmental Impact Report need not forecast the impact that the housing will have on as yet unidentified areas and propose measures to mitigate that impact. That process is best reserved until such time as a particular housing project is proposed.

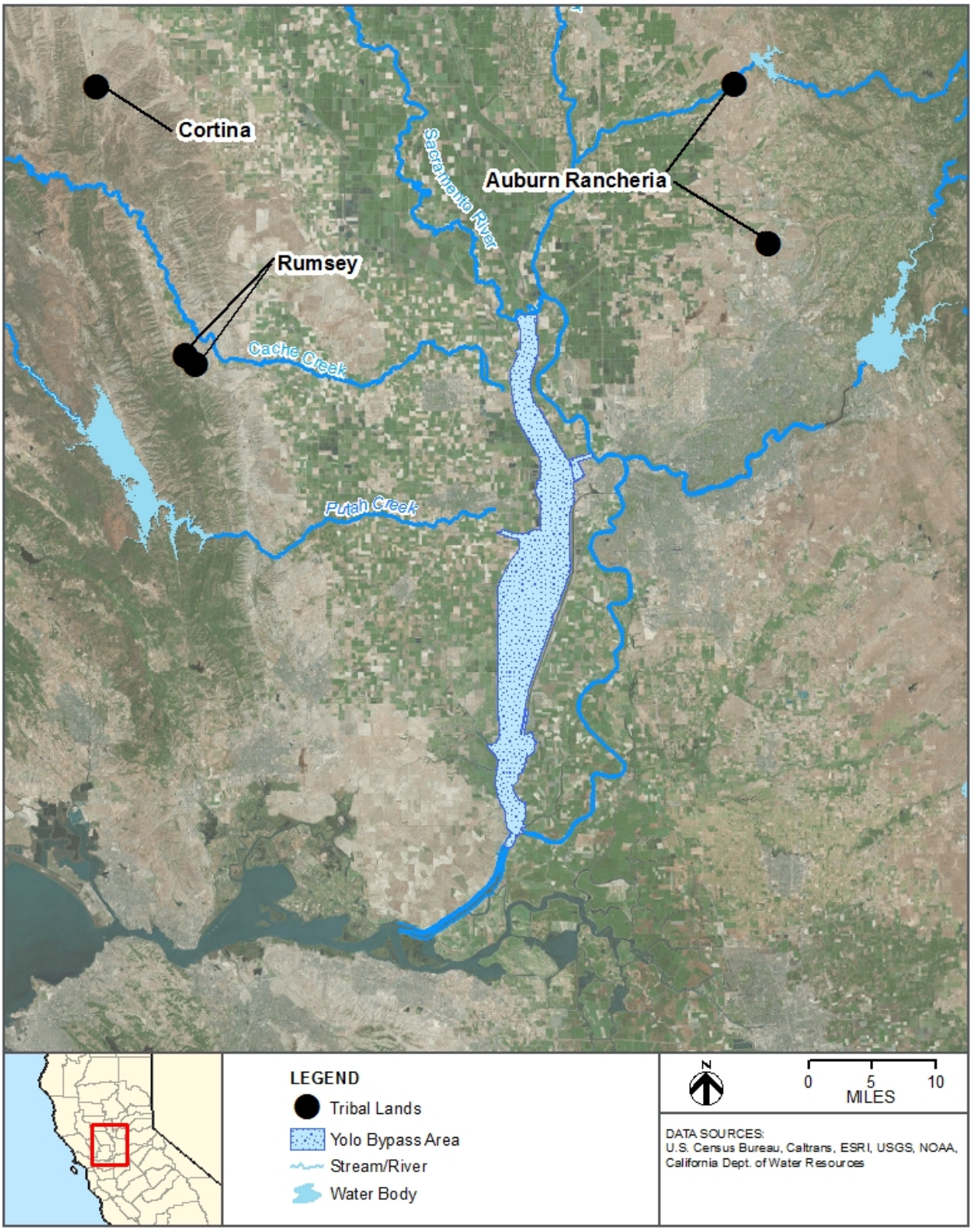

Figure 23-1. Yolo Bypass Proximity to ITAs in the Sacramento Valley (The name Rumsey was the old name used to describe the Yocha Dehe tribe).

None of the Project alternatives removes an obstacle to population or economic growth. No utility (i.e., domestic water, wastewater treatment, sewer, or stormwater treatment) expansion is proposed under any of the alternatives. No new, additional transportation facilities are proposed, nor is there any proposal to increase the capacity of existing facilities. In summary, implementing the Project would not induce growth because the construction workforce would partially come from other areas and is expected to increase demand only for temporary housing, such as hotels, motels, and apartments, and increased economic activity from added recreation opportunities would not be of a magnitude that would drive demand for new housing. Because service systems would not be constructed or expanded, none of the alternatives would remove an impediment to growth.

Project actions would not remove obstacles to growth or require construction of additional community service facilities that could cause significant environmental effects. There would be insufficient economic activity to increase demand for development above that anticipated by local land-use planning agencies.

23.5 Potentially Significant and Unavoidable Impacts

Section 21100, subdivision (b)(2)(A) of CEQA provides that an EIR shall include a detailed statement setting forth "any significant effect on the environment that cannot be avoided if the project is implemented." NEPA also requires the consideration of adverse effects which cannot be avoided (40 CFR 1502.16). Chapters 4 through 22 provide a detailed analysis of all potentially significant environmental impacts of implementing the Project alternatives, list feasible mitigation measures that could reduce or avoid the significant impacts of the alternatives, and specify whether these mitigation measures would reduce these impacts to a less than significant level. If a specific impact cannot be reduced to a less than significant level, it is considered a significant and unavoidable impact. As shown in Table 23-1, Project implementation would result in several significant and unavoidable environmental impacts.

Table 23-1. Summary of Significant and Unavoidable Impacts

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Water Quality				
Impact WQ-2: Operation-related degradation of surface water quality such that it would exceed regulatory standards or would substantially impair beneficial uses of surface water	1, 2, 3, 4, 5 (Project), 6	S	MM-WQ-4	SU
Aquatic Resources and Fisheries				
Impact FISH-15: Impacts to fish species of focused evaluation due to changes in adult fish passage conditions through the Yolo Bypass	6	S	—	SU

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact FISH-16: Impacts to fish species due to changes in potential for stranding and entrainment	4	S	—	SU
Impact FISH-17: Impacts to fish species due to changes in potential for predation	4	S	—	SU
Impact FISH-21: Impacts to fish species of focused evaluation and fisheries habitat conditions	5 (Program)	S	MM-WQ-1-3; MM-TERR-7; MM-FISH-1-5	SU
Cultural Resources				
Impact CULT-3: Impacts on archaeological sites that may not be identified through inventory efforts	All Action Alternatives	S	MM-CULT-3, 4	SU
Impact CULT-4: Damage to Buried Human Remains	5 (Program)	S	MM-CULT-5	SU
Land Use and Agricultural Resources				
Impact AGR-2: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, which may also be protected under the Williamson Act or other conservation programs, to nonagricultural or incompatible uses.	4	S	MM-AGR-1	SU
Air Quality				
Impact AQ-1: Violate air quality standards or contribute substantially to an existing or projected air quality violation	1, 2, 5	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4	SU
	3, 4, 6	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, MM-AQ-5	SU
Impact AQ-2: Conflict with or obstruct implementation of the applicable air quality plan	1, 2, 5	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4	SU
	3, 4, 6	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4, MM-AQ-5	SU
Impact AQ-5: Generate criteria pollutants greater than general conformity *de minimis* thresholds	4, 5, 6	S	MM-AQ-1, MM-AQ-2, MM-AQ-3, MM-AQ-4	SU

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Noise				
Impact NOI-1: Exposure of persons to or generation of noise and vibration levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies	3, 4, 6	S	MM-NOI-1	SU
Impact NOI-2: Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels	All Action Alternatives	S	MM-NOI-1	SU
Impact NOI-4: A substantial temporary or periodic increase in ambient noise levels in the Project vicinity	All Action Alternatives	S	MM-NOI-1	SU

Key: S = significant; SU = significant and unavoidable

Where feasible mitigation exists, it has been included to reduce these impacts; however, the mitigation would not be sufficient to reduce these impacts to a less than significant level. Section 3.3, *Cumulative Impacts*, describes the contribution of the Project to effects caused, or that would be caused, by past, present, and reasonably foreseeable future actions.

23.5.1 Water Quality

All the action alternatives could result in significant and unavoidable impacts to water quality due to with additional inundation of the bypass. Additional inundation is expected to increase pesticides, salts, methylmercury production, bioaccumulation, and export in the outflow to the Sacramento River. Implementation of Mitigation Measure MM-WQ-4 would not be sufficient to reduce increases in water quality constituents to less than significant levels.

23.5.2 Aquatic Resources and Fisheries

Alternative 4 has the potential to affect aquatic resources because of issues associated with the water control structures in Tule Canal and the associated berms and fish bypass channels. These areas would have a significant impact on juvenile fish passage stranding because of the presence of substantially different hydraulic conditions associated with the water control structures and berms. These structures would also have significant impacts on predation of juvenile fish caused by predator fish congregating near artificial structures. Mitigation measures would not be able to reduce these impacts.

Alternative 5 would have significant effects on fish passage through the construction of the Tule Canal Floodplain Improvements. These features are analyzed at a program level. The improvements include a water control structure in Tule Canal to move water into a series of secondary channels. The water control structure would be a barrier to fish passage and could

have direct and indirect construction-related impacts on fish within the canal. Multiple mitigation measures (both in the *Aquatics* and *Terrestrial* sections) could reduce effects, but they would remain significant and unavoidable.

Alternative 6 could have significant effects on fish passage because it would have greater attraction flows entering the notch, which could attract more upstream-migrating fish into the Yolo Bypass instead of the Sacramento River. When these fish reach the Fremont Weir, fish passage may not be available back into the Sacramento River because Alternative 6 has a narrow window for fish passage. Mitigation measures would not be able to reduce these effects.

23.5.3 Cultural Resources

All the action alternatives have the potential to disturb previously unidentified archaeological sites qualifying as historical resources, historic properties, or unique archaeological resources. Although Mitigation Measures MM-CULT-3 and MM-CULT-4 would reduce impacts to cultural resources to the extent practicable, archaeological resources may not be identified prior to disturbance through these measures; therefore, the cumulative impact would remain significant and unavoidable.

Ground disturbing construction from the Tule Canal Floodplain Improvements could materially alter the physical characteristics that convey the significance of previously unidentified resources or disturb human remains. Implementation of Mitigation Measure MM-CULT-5 would minimize adverse effects to human remains; however, due to the uncertainty of the magnitude of the disturbance to human burials remains, the cumulative impact would remain significant and unavoidable.

23.5.4 Land Use and Agricultural Resources

Alternative 4 has the potential to convert agricultural land, including Prime Farmland and Unique Farmland, to nonagricultural or incompatible uses due to the construction of the water control structures in Tule Canal and their associated berms and fish bypass channels. Implementation of Mitigation Measure MM-AGR-1 would not be sufficient to reduce the impacts on agricultural resources to less than significant because it would not prevent the change to Prime Farmland and Unique Farmland.

23.5.5 Air Quality

All the action alternatives could result in significant and unavoidable impacts due to short-term and temporary construction activities. Emissions of inhalable particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}) would exceed Yolo-Solano Air Quality Management District's (AQMD's) and Feather River AQMD's daily construction significance thresholds under all action alternatives; emissions of nitrogen oxides (NO_x) would exceed Yolo-Solano AQMD's annual construction significance threshold for all action alternatives; NO_x emissions would exceed Feather River AQMD's annual construction significance threshold for Alternatives 3, 4, and 6; and reactive organic gas (ROG) emissions would exceed Feather River AQMD's annual construction significance threshold for Alternative 6. Additionally, Alternatives 4, 5, and 6 would generate NO_x emissions that would exceed the general conformity *de minimis* thresholds. Mitigation measures, including applying gravel to

roads, using Tier 4 construction equipment, using on-road vehicles that meet 2010 emission standards, and implementing best available mitigation measures would reduce impacts, but impacts would remain significant.

NO_x emissions would exceed the Yolo-Solano AQMD's daily operational significance threshold for all action alternatives and daily ROG emissions would exceed Yolo-Solano AQMD's daily operational significance threshold for Alternative 4. Although mitigation would reduce impacts from several alternatives and pollutants to less than significant, operational NO_x emissions would remain significant and unavoidable for Alternatives 3, 4, and 6.

23.5.6 Noise

All the action alternatives could result in a significant and unavoidable noise and vibration impact at residences along haul routes. Residential receptors adjacent to the haul routes are located as close as 60 feet from the centerline of the road, and implementation of Mitigation Measure NOI-1 would not reduce noise and vibration levels to less than significant levels. Vibration levels from construction of the West Channel during implementation of Alternatives 3, 4, and 6 could also result in a significant and unavoidable vibration impact to the nearest residence to the West Channel. Vibration levels from construction of the Southern Water Control Structure and Fish bypass channel during implementation of Alternative 4 could result in a significant and unavoidable vibration impact to the nearest residence to the structure. Implementation of Mitigation Measure MM-NOI-1 would not reduce construction vibration to less than significant levels.

23.6 Preferred Alternative

For the purpose of CEQA and in light of the November 15, 2017 decision from the First Appellate District Court of Appeal of the State of California, Washoe Meadows Community v. Department of Parks and Recreation, the California Department of Water Resources (DWR) identified Alternative 1 as the preferred alternative in the Draft EIS/EIR. DWR's identification of a preferred alternative does not foreclose any alternatives or mitigation measures, consistent with the California Supreme Court's decision in Save Tara v. City of West Hollywood. All of the alternatives have been analyzed at a comparable level in this EIS/EIR. Reclamation has identified Alternative 1 as the preferred alternative under NEPA based on the analysis included in this EIS/EIR.

DWR and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) sought input on the alternatives and their environmental effects during the public review of this EIS/EIR. DWR and Reclamation considered feedback received during the public review on the EIS/EIR and the environmental impacts associated with each alternative when developing the Final EIS/EIR and will continue to consider this feedback when selecting an alternative for implementation. Any alternative could be selected by the lead agencies following the conclusion of environmental review.

DWR and Reclamation identified Alternative 1 as the preferred alternative because it balances the ability to achieve the project objectives with environmental effects. As discussed in *Chapter 8, Aquatic Resources*, Alternative 6 would provide the most benefit to juvenile salmonids by increasing availability of floodplain rearing habitat. However, Alternative 6 would provide less

benefit for adult fish passage (and would have significant unavoidable impacts related to fish passage under some conditions). Alternatives 1, 2, and 3 provide the best fish passage for adults, and provide moderate benefit for increased floodplain rearing habitat for juveniles.

Alternative 1 would have the smallest construction footprint and would therefore minimize potential impacts that are driven by construction or facility size (such as air quality, vegetation and wildlife, wetlands, recreation access, and noise). It would have greater environmental effects than Alternatives 4 and 5 related to agricultural land use and waterfowl hunting; however, the differences between alternatives for these resources are of relatively small magnitude. Overall, Alternative 1 would minimize the environmental effects compared to the other alternatives considered for analysis.

In addition to environmental impacts, NEPA considers social and economic effects. The social and economic analysis indicates that Alternatives 1, 2, 3, and 5 have similar impacts. Alternatives 4 and 6 have the potential for increased economic effects because Alternative 4 includes water control structures that maintain water on agricultural fields later in the year, and Alternative 6 includes increased flow into the Yolo Bypass compared to other alternatives.

23.7 Least Environmentally Damaging Practicable Alternative

Reclamation and DWR are working closely with Federal, State, and regional agencies to meet regulatory requirements and avoid and minimize impacts and, where necessary, reach agreement on mitigation measures for impacts that cannot be avoided. One important process that integrates many of the applicable regulatory requirements is the Section 404(b)(1) process, as managed by the United States Army Corps of Engineers (USACE) with oversight from the United States Environmental Protection Agency. The 404(b)(1) process considers if the range of potential alternatives evaluated in the EIS/EIR is an appropriate range of “reasonable” and “practicable” alternatives using the best available information. USACE then determines the Least Environmentally Damaging Practicable Alternative (LEDPA) to meet requirements of NEPA, Sections 401 and 404 of the Clean Water Act, and Section 14 of the Rivers and Harbor Act, with consideration of compliance with the Federal Endangered Species Act and the National Historic Preservation Act.

The LEDPA would be determined based on the entire environmental review and identified in the Record of Decision, consistent with Section 404(b)(1) of the Federal Clean Water Act, which requires that only the LEDPA may be approved and implemented by a Federal agency. This EIS/EIR provides a substantive portion of the environmental information necessary for USACE to determine the LEDPA consistent with Section 404(b)(1) guidelines.

23.8 Environmentally Superior Alternative

The Federal NEPA Council on Environmental Quality (CEQ) regulations require identification of an environmentally preferable alternative, and the State CEQA Guidelines (Section 15126.6[e]) require identification of an environmentally superior alternative. However, the CEQ Guidelines and CEQA Guidelines do not require adoption of the environmentally preferable/superior alternative as the preferred alternative for implementation. The selection of

the preferred alternative is independent of the identification of the environmentally preferable/superior alternative although the identification of both will be based on the information presented in this EIS/EIR.

Section 1505.2(b) of the CEQ Regulations requires the NEPA lead agency to identify the environmentally preferable alternative in a Record of Decision. The CEQ Regulations define the environmentally preferable alternative as "…the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources." Similar to the environmentally preferable alternative under NEPA, the CEQA Guidelines, Sections 15120 and 15126.6(e)(2), require identification of an environmentally superior alternative.

The Draft EIS/EIR provided a substantive portion of the environmental information necessary for Reclamation and DWR to determine the environmentally preferable alternative, and the public and other agencies reviewing the Draft EIS/EIR provided their views in comments on the Draft EIS/EIR. Reclamation and DWR have identified Alternative 1 as the environmentally superior alternative because it balances the ability to achieve the project objectives with environmental effects (as described in more detail in Section 23.6). Reclamation and DWR considered feedback during the public review phase of the Draft EIS/EIR on the environmental benefits and impacts of each alternative when developing the Final EIS/EIR and Record of Decision.

23.9 Controversies and Issues Raised by Agencies and Public

CEQA requires the disclosure of controversial project issues raised by agencies and the public. Table 23-2 presents a summary of the Project issues identified during the public involvement process. The scoping report (Reclamation and DWR 2013) provides further information on issues identified by agencies and the public during the scoping process.

Table 23-2. Summary of Controversies and Issues Raised by Agencies and the Public

Issue	Summary of Issue	Timeline for Addressing or Document/Section Addressing Issue
Flood Control Impacts	The Project must be flood neutral, and any potential impacts should be fully mitigated. The EIS/EIR must evaluate the projected annual frequency of flooding and the expected mean floodplain depth of the Yolo Bypass.	Chapter 4, *Flood Control*
Impacts to Fish	The EIS/EIR must establish a target of how many additional fish to include in the bypass and then analyze how well each alternative meets the target of additional fish to include in the bypass.	Chapter 8, *Aquatics Resources and Fisheries*

Issue	Summary of Issue	Timeline for Addressing or Document/Section Addressing Issue
Impacts to Water Quality	Analysis must include water quality effects related to temperature, salinity, methylmercury, and agricultural drainage.	Chapter 6, *Water Quality*
Impacts to Waterfowl	The Project should avoid a net loss in habitat for waterfowl.	Chapter 9, *Vegetation, Wetlands, and Wildlife Resources*
Impacts to Water Rights and Supply	The EIS/EIR should analyze potential changes to supplies of downstream users, including agricultural users and Sacramento-San Joaquin Delta diverters.	Chapter 5, *Surface Water Supply*
Impacts to Groundwater	The EIS/EIR should evaluate the impact of increased inundation on groundwater levels and seepage conditions and the impact of decreased flows on groundwater percolation.	Chapter 7, *Groundwater*
Impacts to Agriculture	The EIS/EIR should evaluate the potential effects of the seasonal timing of inundation on continued cultivation of crops, particularly rice, and potential effects to grazing opportunities.	Chapter 11, *Land Use and Agricultural Resources*, Chapter 16 *Socioeconomics*
Impacts to Endangered and Special Status Species	The EIS/EIR should survey the occurrence of and fully analyze potential impacts to all endangered special status species and their habitats within the Project area.	Chapter 9, *Vegetation, Wetlands, and Wildlife Resources*
Nonnative Species Impacts	The potential to encourage the establishment or proliferation of aquatic invasive species.	Chapter 8, *Aquatics Resources and Fisheries*
Mosquito Vector Control Impacts	The potential for unintended and secondary effects from late spring flooding that could result in increased mosquito populations.	Chapter 19, *Hazardous Materials and Health and Safety*
Impacts to Recreation	Impacts to recreation should be avoided, and if feasible, the Project should increase recreation opportunities. The EIS/EIR should discuss potential changes to operations and maintenance of the Yolo Bypass Wildlife Area, including education access, and hunting and wildlife viewing access.	Chapter 13, *Recreation*
Climate Change Impacts	The EIS/EIR should conform to the California Global Warming Solutions Act (Assembly Bill 32) and CEQA Guidelines to incorporate a climate change analysis.	Chapter 18, *Air Quality and Greenhouse Gases*

Issue	Summary of Issue	Timeline for Addressing or Document/Section Addressing Issue
Transportation and Existing Infrastructure Impacts	The EIS/EIR should evaluate the potential effects from transportation routes, including emergency service routes. Transportation to and from Ryer Island should not be hindered during periods of inundation.	Chapter 17, *Transportation*
Impacts to Land Use	The project alternatives and the EIS/EIR should be developed consistent with the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP), particularly regarding effects to habitat conservation easements opportunities in the Yolo Bypass. The Yolo HCP/NCCP identifies over 28,000 acres of the Yolo Bypass as acquisition lands for the Yolo HCP/NCCP reserve system. These lands were identified as having a high acquisition priority for the conservation of the Yolo HCP/NCCP's covered species based on the potential habitat that they provide to multiple Yolo HCP/NCCP covered species including giant garter snake, western pond turtle, Swainson's hawk, white-tailed kite, yellow-billed cuckoo, and least Bell's vireo. The project alternatives and the EIS/EIR should be developed consistent with the Central Valley Joint Venture Implementation Plan and existing wetland conservation easements in the Yolo Bypass.	Chapter 11, Land Use and Agricultural Resources

23.10 Mitigation Monitoring and Reporting Program

The Mitigation Monitoring and Reporting Program is included as Appendix P.

23.11 References

Bennett, Richard A. 2001. *Napa Citizens for Honest Government v. Napa County Board of Supervisors*. August 3, 2001. Available at: http://resources.ca.gov/ceqa/cases/2001/Napa_Citizens_080301.html.

Reclamation (Bureau of Reclamation) and DWR (California Department of Water Resources). 2013. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Public Scoping Report.* Available at: https://www.usbr.gov/mp/BayDeltaOffice/docs/public-scoping-report.pdf. July 2013.

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24 Consultation and Coordination

This chapter documents the consultation and coordination efforts that have occurred during development of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project (Project) Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

24.1 Public Involvement

Both the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) encourage public involvement during preparation of EISs and EIRs, respectively. The following sections describe the public involvement opportunities that have occurred during the EIS/EIR process.

24.1.1 Public Notices

On March 4, 2013, the United States Department of the Interior, Bureau of Reclamation (Reclamation) initiated the NEPA process by publishing in the Federal Register a Notice of Intent to prepare an EIS and hold public scoping meetings. On the same day, the California Department of Water Resources (DWR) initiated the CEQA process by publishing a Notice of Preparation with the State Clearinghouse (SCH) (SCH# 2013032004) to prepare an EIR and hold public scoping meetings.

24.1.2 Scoping Process

Multiple meeting notifications were used to announce the intent to start the EIS/EIR process and the public scoping meetings. Display advertisements were run in the Sacramento Bee, Daily Democrat, and West Sacramento Press. Reclamation sent a news release via email to approximately 437 stakeholders, agencies, and individuals that were on the Reclamation and DWR mailing lists. Reclamation and DWR also posted the meeting dates, times, and locations on their project websites at: http://www.usbr.gov/mp/BayDeltaOffice/Documents/yolo.html and http://www.water.ca.gov/environmentalservices/yolo_bypass_salmonid.cfm. On April 11, 2013, postcard notifications were mailed to approximately 150 landowners within the Yolo Bypass.

Public scoping meetings were held on March 14, 2013 in the cities of West Sacramento and Woodland, California. Fifty-four people attended the two meetings, including members of the public and representatives from public agencies. In addition to these scoping meetings, Reclamation and DWR presented information to, and received feedback from, members of the Yolo Bypass Fisheries Enhancement Planning Team (a working group for the Bay Delta Conservation Plan planning process). This team has been working on habitat restoration within the Yolo Bypass.

Both public meetings were held in an open house forum. Six information displays at four stations were set up to walk the public through known potential issues, impacts, agency roles, and opportunities for public involvement. Agency staff were assigned to each display to answer

questions and document issues identified by attendees on a flipchart that accompanied each display. The displays included the following information:

- Project area
- Purpose and need/project objectives and potential elements for alternatives
- Relationships to other projects and initiatives
- Environmental review process
- Key resource areas that have the potential to be affected
- Public participation

Verbal and written comments were received by Reclamation and DWR during both scoping meetings. Additionally, the agencies accepted written comments through mail, e-mail, and fax during the scoping period of March 4, 2013 through May 6, 2013. Table 24-1 provides a list of all commenter and, if available, the affiliation of the author. A hard copy of all scoping comments can be found in Appendix E of the *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Public Scoping Report* (Reclamation and DWR 2013).

Table 24-1. Commenters on the Public Scoping Report

Comment Author	Affiliation
Brown, David	Sacramento – Yolo Mosquito & Vector Control District
Cleak, Trevor	Central Valley Regional Water Quality Control Board
Daly, Barbara	North Delta CARES
Damion, Barbara	
Des Jardin, Deirdre	California Water Research
Katz, David	Knaggs Ranch, LLC and Cal Marsh & Farm Vineyards
Kulakow, Robin	Yolo Basin Foundation
Machado, Michael	Delta Protection Commission
Meserve, Osha	(on behalf of) Local Agencies of the North Delta
Messer, Cindy	Delta Stewardship Council
Oggins, Cy	California State Lands Commission
Orloff, Leah	Contra Costa Water District
Pogledich, Phillip	Yolo County
Pollock, Herbert and Lynnel	Pollock Farms
Pruner, Mark	Clarksburg Fire Protection District
Punia, Jay	Central Valley Flood Protection Board
Ross Merz, Lucas	Sacramento River Preservation Trust
Skophammer, Stephanie	U.S. Environmental Protection Agency, Region IX
Stone, Peter	
Suard, Nicole	Snug Harbor Resorts, LLC
Terry, Melinda	North Delta Water Agency
Wallace, Jim	Colusa Drain Mutual Water Company
Wilson, Mark	Wilson Farms & Vineyards

Based on comments received at the scoping meetings, Reclamation filed a notice on March 29, 2013 (posted April 23, 2013) with the Federal Register to reopen the public comment period for the scoping process. The comment period was originally announced to end on April 4, 2013 but was extended through May 6, 2013. Reclamation and DWR also circulated an additional press release notifying stakeholders of the extension.

Reclamation and DWR prepared the *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Public Scoping Report* (Reclamation and DWR 2013), which summarized the comments and concerns raised during the meetings as well as public comments obtained during the public comment period.

24.1.3 Draft EIS/EIR Review

Reclamation published a Notice of Availability for the Draft EIS/EIR in the Federal Register (Vol. 82, No. 248, 61584-61585 [FR DOC # 2017-28059]) on December 28, 2017. Public meetings were held January 17, 2018 and January 18, 2018 in the cities of Woodland and West Sacramento, California, respectively. The public comment period concluded February 15, 2018. Public meeting minutes and copies of all public comments received during the comment period are included in Appendix N, Comment Letters, and all responses to comments received are included in Appendix O, Comments and Responses.

24.1.4 Final EIS/EIR Circulation

Appendix Q contains the distribution list for the Final EIS/EIR.

24.2 Agency Coordination

Coordination with Cooperating Agencies

In accordance with requirements of NEPA, Reclamation invited eligible governmental agencies to participate as a cooperating agency. The federal cooperating agencies include National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), United States Environmental Protection Agency, United States Army Corps of Engineers (USACE), and Natural Resources Conservation Service.

Reclamation also provided non-Federal agencies with the opportunity to participate as a cooperating agency in the NEPA process if they qualified under Council on Environmental Quality guidance. Reclamation has invited State of California (State) agencies, counties, cities, special districts, and Federally-recognized tribes to be cooperating agencies.

Non-Federal entities that met the specified criteria for cooperating agencies were required to enter into a Memorandum of Understanding (MOU) with Reclamation to memorialize their participation.

Reclamation signed cooperating agency MOUs with the following entities:

- California Central Valley Flood Control Association
- California Department of Fish and Wildlife

- California Regional Water Quality Control Board
- Central Valley Flood Protection Board
- Clarksburg Fire Protection District
- Metropolitan Water District of Southern California
- North Delta Water Agency
- Reclamation District 108
- Reclamation District 2068
- Sacramento-Yolo Mosquito and Vector Control District
- State and Federal Contractors Water Agency
- State Water Resources Control Board
- Yolo County Board of Supervisors

The development of the EIS/EIR required coordination with a variety of local, Federal, and State agencies. The following sections describe these agencies and their roles in the process.

24.2.1 Public Agencies

Multiple Federal, State, and local agencies may need to issue permits or approve the potential project. The Lead Agencies have worked to coordinate closely with these agencies through multiple means, including regular meetings and technical team participation (see Section 24.2.2).

24.2.1.1 NMFS

NMFS developed the *Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project*, which created the need for the Project. Reclamation and DWR need to consult with NMFS under Section 7 of the Endangered Species Act to obtain a biological opinion to implement the Project. NMFS participates in the monthly Core Team meetings with Reclamation and DWR, technical teams, and the landowner and stakeholder meetings (see Section 24.3). In September 2012, NMFS sent a letter to Reclamation concurring with the *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan*.

24.2.1.2 USFWS

Reclamation and DWR coordinated with USFWS on alternative development and analysis of potential impacts to terrestrial resources and associated mitigation. Reclamation and DWR need to consult with USFWS under Section 7 of the Endangered Species Act to obtain a biological opinion and under the Fish and Wildlife Coordination Act to implement the Project. USFWS participates in the monthly Core Team meetings with Reclamation and DWR, technical teams, and the landowner and stakeholder meetings.

24.2.1.3 USACE

The Project has the potential to affect wetlands and flood facilities. Therefore, Reclamation and DWR are coordinating with the USACE Regulatory Division regarding any development of a Clean Water Act Section 404 permit. Additionally, Reclamation and DWR are coordinating on a permit under Section 14 of the Rivers and Harbors Act (also called "Section 408" permit). The USACE participates in the monthly Core Team meetings with Reclamation and DWR, technical teams, and the landowner and stakeholder meetings.

24.2.1.4 California Department of Fish and Wildlife

Reclamation and DWR will need to obtain a consistency determination or incidental take permit under the California Endangered Species Act with the California Department of Fish and Wildlife (CDFW). CDFW has also been involved in alternatives development and analysis. CDFW participates in monthly Core Team meetings with Reclamation and DWR, technical teams, and the landowner and stakeholder meetings.

24.2.1.5 State Historic Preservation Officer

The Project requires compliance with 54 United States Code Section 306108, commonly known as Section 106 of the National Historic Preservation Act. To complete the Section 106 process, as outlined at 36 Code of Federal Regulations Part 800, Reclamation and DWR are required to consult with the State Historic Preservation Officer and afford the Advisory Council on Historic Preservation an opportunity to comment regarding the effects of the proposed undertaking on historic properties. Historic properties are cultural resources that are listed, or eligible for listing, on the National Register of Historic Places. Reclamation and DWR are preparing for this compliance process.

24.2.1.6 Central Valley Regional Water Quality Control Board

The Project could require permits from the Central Valley Regional Water Quality Control Board (RWQCB), including a dewatering permit, coverage under a National Pollution Discharge Elimination System permit for General Construction, 401 water quality certification, a waste discharge requirement permit if a proposed project discharges to waters of the State, and a water quality certification for dredging and land disposal. Reclamation and DWR have been meeting regularly with the Central Valley RWQCB to determine the correct permits and their requirements, and will continue to coordinate.

24.2.1.7 Yolo-Solano Air Quality Management District

The Project has the potential to affect air quality in the Sacramento Valley Air Basin. Reclamation and DWR will coordinate with the Yolo-Solano Air Quality Management District regarding air quality impacts in the Sacramento Valley Air Basin.

24.2.1.8 Local Governments

The Project has the potential to affect land within Yolo and Sutter counties. Reclamation and DWR will coordinate with these cities potentially affected by the Project. Yolo County has participated on technical teams and landowner and stakeholder coordination.

24.2.1.9 Tribal Governments

Consistent with Executive Order 13175, April 29, 1994 memorandum, and the November 5, 2009 memorandum, Reclamation must establish regular and meaningful consultation and collaboration with tribal officials. Reclamation and DWR met with the Yocha Dehe Tribe on March 2, 2016.

Reclamation will continue to consult with each tribe before taking any action that could affect a tribal government. Under the Federal Trust responsibility, Reclamation will provide full disclosure of the beneficial and adverse impacts of the Project to the tribal government in a manner that provides adequate time for review and response. Reclamation will review comments received and consult with the tribal government prior to decisions related to the Project.

24.2.2 Technical Teams

Reclamation and DWR established several technical teams to help develop and analyze the alternatives. Members of the teams were selected because of their technical expertise in the subject matter. These teams and their membership include:

- Fisheries and Engineering Technical Team: Conducted fish benefit analysis of fish passage design, gate selection/design, and agricultural road crossing design. This analysis included the development of a set of fish passage criteria that identified if adult salmon and sturgeon would be able to pass Project structures and move upstream into the Sacramento River. Members include representatives from Reclamation, DWR, NMFS, USFWS, CDFW, USACE, Metropolitan Water District of Southern California, and Yolo County.
- Hydraulic Modeling Technical Team: Assisted with model selection, model runs and analysis, quality assurance, and quality control. Members include representatives from Reclamation, DWR, and USACE.
- Land Use and Agricultural Technical Team: Confirmed land uses and reviewed agricultural impact modeling and analysis. Members include representatives from Reclamation, DWR, and Yolo County.
- Terrestrial Working Group: Obtained temporary entry permits, performed survey work, and met with landowners. Members include representatives from Reclamation, DWR, USFWS, and CDFW.
- Design and Engineering Technical Team: Established basis of design and cost estimates. Members include representatives from Reclamation, DWR, NMFS, USFWS, CDFW, and USACE.
- GIS and Data Support Team: Set up and maintained a data-sharing portal and the project website. Members include representatives from Reclamation and DWR.

24.3 Landowner and Stakeholder Coordination

24.3.1 Yolo Bypass Fisheries Enhancement Planning Team

During development of the Bay-Delta Conservation Plan, DWR formed a stakeholder group, the Yolo Bypass Fisheries Enhancement Planning Team, which included resource agencies, landowners, and non-governmental organizations (NGOs) to help develop a plan for the Yolo Bypass. As the Project started, the Lead Agencies worked through this venue to coordinate with landowners, NGOs, and stakeholders.

24.3.2 Value Planning

Value Planning is part of the federal process in planning projects. The purpose of Value Planning is to identify project objectives and develop approaches to meet those project objectives (Reclamation 2015). Value Planning includes agency representatives, landowners, NGOs, and other stakeholders but is designed to focus on those that have not been key participants in the alternatives formulation process. Reclamation conducted a Value Planning Session in August 2014.

24.3.3 Working Group

After the Value Planning process, the stakeholders that participated in the process continued to meet independently to advance jointly acceptable projects. Additional stakeholders joined this group, which became the Yolo Bypass Biological Opinion Working Group. The Yolo Bypass Biological Opinion Working Group includes a collection of local agencies, landowners, NGOs, and stakeholders that have interests in the Project. The Lead Agencies started working with this group in 2015 to develop alternatives that would be acceptable to the Yolo Bypass Biological Opinion Working Group members, Lead Agencies, and resource agencies.

The Lead Agencies originally started working with this group to identify and refine alternatives, but have continued coordination during development of the impact analysis in this EIS/EIR. The Yolo Bypass Biological Opinion Working Group meetings occur about once every month or two, depending on material available for discussion. The Lead Agencies, NMFS, USFWS, USACE, and CDFW attend these meetings. The meetings provide a forum for the Lead Agencies to hear concerns from local agencies, landowners, NGOs, and stakeholders, and to share preliminary evaluation assessments for feedback.

24.4 References

Reclamation (United States Department of the Interior, Bureau of Reclamation). 2015. *Plain Text Explanation of Services Offered.* Accessed on June 27, 2017. Available at: https://www.usbr.gov/dso-dec/vp/windows/plaintext.html.

Reclamation (United States Department of the Interior, Bureau of Reclamation) and DWR (California Department of Water Resources). 2013. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Public Scoping Report.* Available at: https://www.usbr.gov/mp/BayDeltaOffice/docs/public-scoping-report.pdf. July 2013.

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26 Glossary

100-year flood: A flood having a 1 percent chance of being equaled or exceeded in magnitude in any given year.

acre-foot: The quantity of water required to cover 1 acre to a depth of 1 foot. Equal to 1,233.5 cubic meters (43,560 cubic feet).

affect/effect: To affect (a verb) is to bring about a change. An effect (usually a noun) is the result of an action.

affected environment: Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as a result of a proposed human action.

air quality: Measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

alternatives: Courses of action that may meet the objectives of a proposed action at varying levels, including the most likely future without the project or action. An environmental impact statement (EIS) or an environmental impact report (EIR) identifies and objectively evaluates and analyzes all reasonable alternatives, including a no action alternative.

Ambient Air Quality Standards (AAQS): The U.S. Environmental Protection Agency sets National AAQS, as required by the Clean Air Act as amended in 1990, for pollutants considered harmful to public health or the environment. AAQS are in place for six pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

ambient noise: Also called background noise, ambient noise is the background sound pressure level at a given location, normally specified as a reference level to study a new intrusive sound source.

anadromous fish: Fish that spend a part of their lifecycle in the sea and return to freshwater streams to spawn. Anadromous fish are born in fresh water, migrate to the ocean to grow into adults, and then return to fresh water to spawn.

aquifer: An underground geologic formation of permeable rock that stores, transmits, and yields significant quantities of groundwater to wells and springs.

archaeology: The study of human activity through the recovery and analysis of material culture. The archaeological record consists of artifacts, architecture, biofacts or ecofacts, and cultural landscapes.

Bay Delta Conservation Plan: A habitat conservation plan proposed by the California Department of Water Resources (DWR), United States Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS), and U.S. Department of the Interior Bureau of Reclamation (Reclamation), under the Endangered Species Act, to address the most critical water issues facing California by

constructing new water delivery infrastructure and restoring aquatic habitat. In 2015, the plan was altered and renamed the California WaterFix.

berm: A horizontal strip or shelf built into an embankment or cut to break the continuity of the slope, usually to reduce erosion or to increase the thickness of the embankment at a point of change in a slope or defined water surface elevation. A horizontal step in the sloping profile of an embankment dam. A shelf or artificial ridge that breaks the continuity of a slope.

best management practice: A policy, program, practice, rule, regulation, or ordinance for the use of devices, equipment, or facilities that is an established and generally accepted practice resulting in more efficient use or conservation of water or a practice that has been given to indicate that significant conservation benefits can be achieved.

bypass: A region of land or a large artificial structure designed to convey excess flood waters from a river or stream to reduce the risk of flooding of a key point of interest, such as a city.

CALFED Bay-Delta Program: August 2000 joint Federal and State of California (State) program to address water related issues in the Sacramento-San Joaquin Delta (Delta).

California EcoRestore: A California Natural Resources Agency initiative implemented in coordination with State and Federal agencies to advance the restoration of at least 30,000 acres of Delta habitat by 2020.

California Endangered Species Act (CESA): California legislation that prohibits the "take" of plant and animal species designated by the California Fish and Game Commission as either endangered or threatened. Take includes hunting, pursuing, catching, capturing, killing, or attempting such activity. CESA provides the California Department of Fish and Wildlife (CDFW) with administrative responsibilities over the plant and wildlife species listed under the act as threatened or endangered. CESA also provides CDFW with the authority to permit the take of State-listed species under certain circumstances. See Fish and Game Code 2050–2116.

California Environmental Quality Act (CEQA): California legislation that requires State, regional, and local agencies to prepare environmental impact assessments of proposed projects with potentially significant environmental effects and to circulate these documents to other agencies and the public for comment before making decisions. CEQA requires the lead agency to make findings for all significant impacts identified in an EIR. The lead agency must adopt all mitigation to reduce environmental impacts to a less-than significant level, unless the mitigation is infeasible or unavailable and there are overriding considerations that require the project to be approved. See Public Resources Code 21001.1, 21002, 21080.

California WaterFix: Formerly known as the Bay Delta Conservation Plan, a plan to build two large, four-story tall tunnels to carry fresh water from the Sacramento River under the Delta toward the intake stations for the State Water Project (SWP) and the Central Valley Project (CVP).

CalSim model: CalSim is a planning tool and model designed to simulate the operations of the CVP and SWP reservoir and water delivery system under current and future conditions. CalSim predicts how reservoir storage and river flows would be affected based on changes in system operations. CalSim output is typically used to help assess impacts on water supply, water quality, aquatic resources, and recreation.

Central Valley Project (CVP): As defined by Section 3403(d) of the Central Valley Project Improvement Act, "all Federal reclamation projects located within or diverting water from or to the watershed of the Sacramento and San Joaquin rivers and their tributaries as authorized by the Act of August 26, 1937 (50 Stat. 850) and all Acts amendatory or supplemental thereto,....."

channel: Natural or artificial watercourse, with a definite bed and banks to confine and conduct continuously or periodically flowing water.

confluence: The flowing together of two or more streams; the place of meeting of two or more streams.

crest: The top surface of a weir or dam.

Critical Habitat: A description of the specific areas with physical or biological features essential to the conservation of a listed species and that may require special management considerations or protection. These areas have been legally designated via Federal Register notices.

cubic feet per second (cfs): A measure of the volume rate of water movement. As a rate of stream flow, a cubic foot of water passing a reference section in 1 second of time. One cfs equals 0.0283 meters per second (7.48 gallons per minute). One cfs flowing for 24 hours produces approximately 2 acre-feet.

cultural resources: Prehistoric and historic archaeological sites, architectural/built-environment resources (e.g., levees, weirs, buildings), and places important to Native Americans and other ethnic groups, generally 50 years old or older regardless of their significance.

Delta excess conditions: These conditions exist when all water demands in the Delta watershed and export demands are being met by natural flows, and water in excess of that needed to meet Delta standards is flowing out the Delta.

deposition: Material settling out of the water onto the streambed. Occurs when the energy of the flowing water is unable to support the load of suspended sediment. The process of dropping or getting rid of sediments by an erosional agent such as a river or glacier.

dewatering: Removal of groundwater or surface water from a construction site.

distinct population segment: A vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species.

emigration: One-way fish movement from the home area.

Endangered Species Act (ESA) of 1973, as Amended: Federal legislation that is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and to provide programs for the conservation of those species, thus, preventing extinction of plants and animals. The law is administered by USFWS and NMFS, depending on the species.

entrainment: The incidental trapping of fish and other aquatic organisms in water diverted from streams, rivers, and reservoirs.

erosion: The gradual wearing away of land by water, wind, and general weather conditions.

exceedance: The likelihood of flows being higher than a specified flow rate. A flow with a 0.01 annual exceedance probability has a 1 percent likelihood of being exceeded in any given year.

fish passage: The movement of fish between the sea and any river, including upstream or downstream in that river.

fishery: A community of fish and their habitat.

flood: A temporary rise in water levels resulting in inundation of areas not normally covered by water. May be expressed in terms of probability of exceedance per year such as 1 percent chance flood.

floodplain: Any land area susceptible to inundation by floodwaters from any source.

floodway: The channel of a river or other watercourse and adjacent land areas that convey flood waters.

flow: The volume of water passing a given point per unit of time.

flow-dependent habitat: Lifestage-specific habitat, including suitable water depths, velocities, and substrate, that is, in part, contingent on-stream flow.

fry: A stage in juvenile salmonid development when a fish can find food for itself.

gated notch: Structural change proposed to develop a deeper opening in the Fremont Weir with operational gates to control flow.

groundwater: Any water naturally stored underground in aquifers or that flows through and saturates soil and rock, supplying springs and wells.

groundwater level: Refers to the water level in a well and is defined as a measure of the hydraulic head in the aquifer system.

groundwater pumping: Quantity of water extracted from groundwater storage.

groundwater recharge: The natural and intentional infiltration of surface water into the zones of saturation.

habitat: The place or environment where a plant or animal naturally lives and grows.

habitat conservation plan: A plan that outlines ways of maintaining, enhancing, and protecting a given habitat type needed to protect species; usually includes measures to minimize impacts, and may include provisions for permanently protecting land, restoring habitat, and relocating plants or animals to another area.

headworks: Any structure at the head or diversion point of a waterway. It is used to divert water from a river into a canal or from a large canal into a smaller canal.

hydraulics: Study of the practical effects and control of moving water; used to refer to the relationship among channel geometry and flow, velocity, and depth of water.

hydrology: Scientific study of the properties, distribution, and behavior of water.

hydrostatic pressure: The pressure of water at a given depth resulting from the weight of the water above it.

Indian Sacred Sites: Historic properties of religious and cultural significance to Indian tribes.

Indian Trust Assets: Indian trust assets are legal interests in property held in trust by the federal government for federally recognized Indian tribes or individual Indians. “Assets” are anything owned that has monetary value.

inflow: Water that flows into a body of water.

intake: Any structure through which water can be drawn into a waterway. Any structure in a reservoir, dam, or river through which water can be discharged.

lead agency: The government agency that has the principal responsibility for carrying out or approving a project and therefore the principal responsibility for preparing CEQA/National Environmental Policy Act (NEPA) documents. For the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project EIS/EIR, Reclamation is the Federal lead agency under NEPA, and DWR is the State lead agency under CEQA.

levee: A natural or artificial barrier that helps keep rivers from overflowing their banks.

methylmercury (MeHg): The organic form of mercury that accumulates in the food web and a potent neurotoxin that can impair reproduction and fetal development. Mercury is transformed by a process called methylation into methylmercury, which can be accumulated in the muscle and fatty tissue of fish.

migration corridor: A set route that migratory animals follow when they migrate from one area to another.

National Environmental Policy Act (NEPA): Federal legislation establishing the national policy that environmental impacts will be evaluated as an integral part of any major Federal action. Requires the preparation of an EIS for all major Federal actions significantly affecting the quality of the human environment.

Natural Community: A distinct and reoccurring assemblage of plants and animals associated with specific physical environmental conditions and ecological processes.

Notice of Determination: A brief notice to be filed by a public agency after it approves or determines to carry out a project subject to the requirements of CEQA.

outmigration: The seasonal movement of anadromous fish from fresh to salt water.

overtopping: Flow of water over the top of a dam or embankment.

paleontology: The study of the forms of life existing in prehistoric or geologic times, as represented by the fossils of plants, animals, and other organisms.

parr: A stage in juvenile salmonid development when a fish feeds on small invertebrates and develops a pattern of spots and bars. This phase is larger than fry and smaller than smolts.

predation: A biological interaction where a predator (an organism that is hunting) feeds on its prey (the organism that is attacked).

public involvement: Process of obtaining citizen input into each stage of the development of planning documents. Required as a major input into any EIS or EIR.

qualitative: Having to do with quality or qualities. Descriptive of kind, type, or direction, as opposed to size, magnitude, or degree.

quantitative: Having to do with quantity, capable of being measured. Descriptive of size, magnitude, or degree.

rearing habitat: Areas where larval and juvenile fish find food and shelter.

Reasonable and Prudent Alternative: Alternative action identified during formal consultation (under Section 7 of the ESA) that: 1) can be implemented in a manner consistent with the intended purpose of the action; 2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; 3) are economically and technologically feasible; and 4) USFWS or NMFS believes would avoid the likelihood of jeopardizing the continued existence of listed species or result in the destruction or adverse modification of critical habitat (50 CFR 402.02).

Record of Decision: Concise, public, legal document required under NEPA that identifies and publicly and officially discloses the responsible official's decision on an alternative selected for implementation. It is prepared following completion of an EIS.

refuge: Wildlife refuges—certain portions of land set aside and managed by USFWS or CDFW to provide a water supply and vegetative habitat for migrating waterfowl and wildlife.

Sacramento-San Joaquin Delta (Delta): The legal Delta, as described in the California Water Code Section 12220, generally extends from Sacramento in the north, to Tracy to the south, and from Interstate 5 in the east to Collinsville in the west. The Delta covers approximately 738,000 acres.

salinity: The amount of dissolved salts in a given volume of water.

salmonids: Fish of the family Salmonidae, such as salmon and trout (including steelhead).

scenic vista: A viewpoint that provides expansive views of a highly valued landscape for the benefit of the general public.

sediment: Any finely divided organic and/or mineral matter deposited by air or water in nonturbulent areas.

sedimentation: The phenomenon of sediment or other fine particulates entering a water body or being disturbed from the bottom of a water body such that they move downstream and settle on the substrate in other aquatic areas.

seepage: The slow movement or percolation of water through soil or rock. The movement of water into and through the soil from unlined canals, ditches, and water storage facilities.

siphon: A system of pipes and valves that may be used to convey water to a lower level over intervening higher ground without the use of a pump.

slough: A muddy or marshy area; a secondary channel of a river delta, usually flushed by the tide.

slurry wall: A civil engineering technique used to build reinforced concrete walls in areas of soft earth close to open water or with a high groundwater table. This technique is typically used to build diaphragm walls surrounding tunnels and open cuts and to lay foundations.

smolt: A young salmon that is undergoing physiological and morphological changes for life in seawater. Subyearling smolts are generally between 70 and 120 millimeters in fork length, whereas yearling smolts are usually larger than 180 millimeters in fork length.

spawning: The releasing and fertilizing of eggs by fish.

State Water Project: California's State-owned and -operated water project, consisting of 22 dams and reservoirs, which delivers water 600 miles from the Sacramento Valley to Los Angeles.

stranding: Any event in which fish are restricted to poor habitat as a consequence of physical separation from a main body of water.

subsidence: A local mass movement that involves principally the gradual downward settling or sinking of the earth's surface with little or no horizontal motion.

total maximum daily load: Estimates of the amount of specific pollutants that a body of water can safely take without threatening beneficial uses.

tributary: A stream flowing into a larger stream or a lake.

turbidity: A measure of the cloudiness of water caused by the presence of suspended matter. Turbidity in natural waters may be composed of organic and/or inorganic constituents and has direct implications to drinking water treatment.

visual resources: The natural and artificial features of a landscape that characterize its form, line, texture, and color.

water year: A continuous 12-month period for which hydrological records are compiled and summarized. In California, a water year begins October 1 and ends September 30 of the following year.

water year hydrologic classification: Characterization of the hydrologic record for streams into wet, normal, and dry periods. Based on the Sacramento Valley Index, water year classifications are determined using the following equation:

$$INDEX = 0.4 * X + 0.3 * Y + 0.3 * Z$$

Where:
X = Current year's April through July Sacramento Valley unimpaired runoff
Y = Current October through March Sacramento Valley unimpaired runoff
Z = Previous year's index

Classification	Millions of Acre-Feet
Wet	Equal to or greater than 9.2
Above Normal	Greater than 7.8 and less than 9.2
Below Normal	Equal to or less than 7.8 and greater than 6.5
Dry	Equal to or less than 6.5 and greater than 5.4
Critical	Equal to or less than 5.4

weir: A barrier, such as a small dam, that restricts flow in a stream to raise water level or that diverts flow into a desired course.

Yolo Bypass: One of two flood bypasses in California's Sacramento Valley located in Yolo and Solano counties. Through a system of weirs, the bypass diverts floodwaters from the Sacramento River away from the city of Sacramento and other nearby riverside communities.

Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan: Prepared jointly by DWR and Reclamation to address two specific Reasonable and Prudent Alternative Actions set forth in the NMFS Operation Biological Opinion:

- Action I.6.1: Restoration of Floodplain Rearing Habitat through the increase of seasonal inundation within the lower Sacramento River basin
- Action I.7: Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon through the modification of Fremont Weir and other structures of the Yolo Bypass