Section 3.12
Indian Trust Assets

This section presents the Indian Trust Assets (ITAs) within the area of analysis and discusses potential effects on ITAs from the proposed alternatives.

ITAs are defined as legal interests in property held in trust by the United States government for Indian tribes or individuals, or property protected under U.S. Law for Indian tribes or individuals. An Indian trust has three components: 1) the trustee, 2) the beneficiary, and 3) the trust asset. 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. Beneficiaries of the Indian trust relationship are federally-recognized Indian tribes with trust land; the U.S. is the trustee. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the U.S. The characterization and application of the U.S. trust relationship have been defined by case law that supports Congressional acts, executive orders, and historic treaty provisions.

It is the general policy of the Department of the Interior (DOI), Bureau of Reclamation (Reclamation) to carry out activities in a manner that protects ITAs and avoids adverse effects whenever possible (Reclamation Indian Trust Asset Policy, July 2, 1993). In the event an effect is identified, consultation with affected federally recognized tribal governments proceeds through the Bureau of Indian Affairs (BIA), the Office of the Solicitor, and the Office of American Indian Trust (OAIT).

Groundwater substitution transfers could affect ITAs by increasing groundwater depth and increasing groundwater pumping costs, or stream depletion near ITA sites. Lower groundwater elevations and increased pumping costs could interfere with the exercise of federally-reserved Indian rights. An increase in groundwater pumping could cause an increase in stream flow temperatures which could affect fish which in turn could interfere with the exercise of federally-reserved Indian rights. Cropland idling, crop shifting, reservoir release and conservation transfers would not result in effects to ITAs; therefore, these measures are not further discussed in this analysis. Water purchase agreements are structured to recognize local leadership and work cooperatively with water associations, local government, and local interests, including tribes.

3.12.1 Affected Environment/Environmental Setting

This section describes the area of analysis, regulatory requirements, and environmental setting relevant to ITAs.

3.12.1.1 Area of Analysis

The area of analysis for ITAs includes the reservations or Rancherias that overlay the Sacramento Valley Groundwater Basin where groundwater substitution transfers could occur. In addition, the area of analysis includes reservations or Rancherias within the Buyer Service Area that could benefit from use of transfer water. Figure 3.12-1 shows the area of analysis.

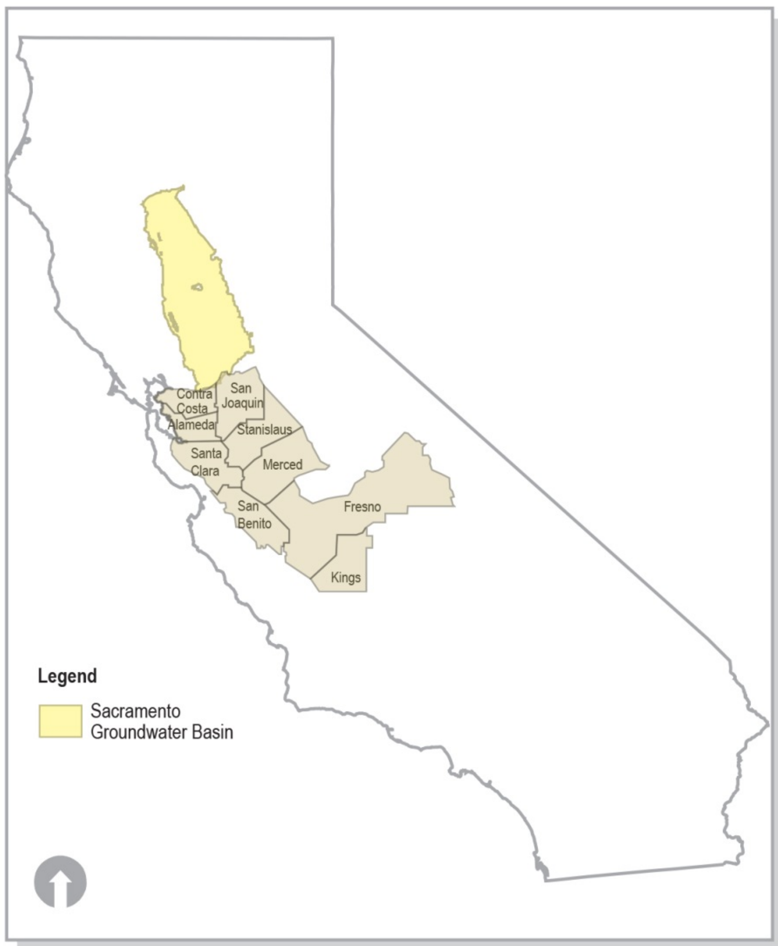


Figure 3.12-1. ITAs Area of Analysis

3.12.1.2 Regulatory Setting

This section describes the applicable laws and rules relating to ITAs. ITAs are regulated by the federal government; therefore, state and regional/local policies do not apply.

President William J. Clinton's 1994 memorandum, "Government-to-Government Relations with Native American Tribal Governments," directed the Bureau of Reclamation (Reclamation) to assess the effects of its programs on tribal trust resources and federally-recognized tribal governments. Reclamation is tasked with actively engaging federally-recognized tribal governments and consulting with such tribes on a government-to-government level (59 Federal Register 1994). Order number 3215, *Principles for the Discharge of the Secretary's Trust Responsibility*, assigns responsibility for ensuring protection of ITAs to the heads of bureaus and offices (Reclamation 2012). Reclamation is required to "protect and preserve Indian trust assets from loss, damage, unlawful alienation, waste, and depletion" (Reclamation 2012). Reclamation is responsible for assessing whether transfers would have the potential to affect ITAs.

It is the general policy of the DOI to perform its activities and programs in such a way as to protect ITAs and avoid adverse effects whenever possible (Reclamation 2012). Reclamation complies with procedures contained in Departmental Manual Part 512 (DOI 1995), which are guidelines that protect tribal resources and require Secretary of the Interior approval before sale of land, natural resources, water, or other assets. Federally-reserved water rights held in trust for tribes by the U.S. are ITAs that are restricted from being separated from tribes and individual Indians without the approval of the Secretary of the Interior.

3.12.1.3 Existing Conditions

The following section describes the existing ITAs within the area of analysis for both the Seller Service Area and Buyer Service Area.

3.12.1.3.1 Seller Service Area

The northernmost indigenous people in the Sacramento Valley region were the Achowami, Atsugewi, Ajumawi, Wintun, Pit River, and the Yana (San Diego State University 2002). Descendants of these tribes live on the Big Bend, Burney Tract, Montgomery Creek, Redding, and Roaring Creek Rancherias in Shasta County (San Diego State University 2002, Redding Rancheria 2000).

Maidu and Wintun people inhabited the area of the Colusa Basin (Camp Dresser & McKee Inc. 1995; Glenn-Colusa Irrigation District, California Department of Fish & Game, Reclamation, U.S. Army Corps of Engineers 1998). The Wintun Tribe comprises three divisions: Patwin, Nomlaki, and Wintu. Present-day descendants of the Wintun live on the Colusa and Cortina Rancherias in Colusa County and the Rumsey Rancheria in Yolo County. Wintun-Wailaki descendants in Glenn County live on the Grindstone Creek Rancheria (San Diego State University 2002). The Paskenta Band of Nomlaki Indians has a tract of trust land in Tehama County (U.S. Census Bureau 2010).

An integrated group of both Maidu and Miwok Indians, historically inhabited parts of the Sierra Nevada Foothills near the American River. Descendants of the tribe, now recognized as the United Auburn Indian Community, hold trust land in Placer County known as the Auburn Rancheria (United Auburn Indian Community, Auburn Rancheria N.D.).

The Shingle Springs Band of Miwok Indians, also descendants of the Miwok and Maidu Indians, in addition to the Nisenan Indians, inhabits parts of El Dorado County, just southwest of the Auburn Rancheria (Shingle Springs Band of Miwok Indians 2012). There are no reservations or Rancherias in Sacramento County (U.S. Census Bureau 2010).

Evidence indicates the Wintun and Maidu people inhabited areas near the Feather River for thousands of years, including portions of the Central Valley and western slopes of the Sierra Nevada to the north and northeast of the Sutter Buttes (City of Oroville 1995; Butte County 1998). Descendants of the Maidu live on the Mooretown and Berry Creek Rancherias in Butte County (San Diego State University 2002). The Enterprise Rancheria is currently a landless tribe of Maidu descendants, but has filed an application for a fee-to-trust transfer and casino and hotel project to be located in Yuba County (70 Federal Register 10138). The Mechoopda Indian Tribe of the Chico Rancheria recently acquired land in fee status in Butte County. There are no reservations or Rancherias in Sutter County (U.S. Census Bureau 2010).

3.12.1.3.2 Buyer Service Area

East Bay Municipal Utility District (MUD)
East Bay MUD provides water services to residents of Alameda and Contra Costa Counties. The Lytton Band of Pomo Indians holds trust land in the City of San Pablo, in Contra Costa County, where they own and operate the San Pablo Lytton Casino (San Pablo Lynton 2011, Rivera 2012). The tribe is serviced by East Bay MUD (Riveria 2012). Alameda County contains no reservations or Rancherias (U.S. Census Bureau 2010).

Contra Costa Water District (WD)
Contra Costa WD also provides water services to residents of Contra Costa County. Although, the Lytton Rancheria is located in Contra Costa County, it is served by the East Bay MUD. There are no other reservations or Rancherias within the Contra Costa WD service boundaries.

San Luis & Delta-Mendota Water Authority (SLDMWA)
No reservations or Rancherias exist in the SLDMWA service area (U.S. Census Bureau 2010).

3.12.2 Environmental Consequences/Environmental Impacts

This section presents assessment methods performed to analyze ITA effects and presents the potential ITA effects for the proposed alternatives.

3.12.2.1 Assessment Methods

Reclamation guidance states that, "Actions that could impact the value, use or enjoyment of the ITA should be analyzed as part of the ITA assessment. Such actions could include interference with the exercise of a reserved water right, degradation of water quality where there is a water right, impacts to fish or wildlife where there is a hunting or fishing right, [and] noise near a reservation when it adversely impacts uses of reservation lands" (Reclamation 2012).

Groundwater substitution is the only transfer method that could impact ITAs. To determine potentially affected reservations and Rancherias, the locations of reservations and Rancherias were overlaid with a map of the Sacramento Valley Groundwater Basin where groundwater substitution transfers could occur. Reservations and Rancherias were identified using a reservation boundary database (U.S. Census Bureau 2010). All identified ITAs within a groundwater substitution basin could be potentially affected by groundwater substitution transfers. ITAs found outside of the groundwater basin would not be affected by groundwater substitution and are not further analyzed in this section.

The following ITAs fall within the boundaries of the Sacramento Valley Groundwater Basin:

- Auburn Rancheria
- Chico Rancheria
- Colusa
- Cortina
- Paskenta
- Rumsey

After determining the tribes that fall within the groundwater basin, their location was compared to changes in groundwater levels from the groundwater model to determine if there would be any effects to ITAs.

Additionally, locations of the above identified tribes were further examined for their proximity to existing streambeds which could experience reductions in stream flow temperatures due to stream flow depletion associated with groundwater recharge from groundwater substitution transfers. Of the tribes identified in the Sacramento Valley

Groundwater Basin, only the Chico Rancheria is located near a streambed; Butte Creek.

3.12.2.2 Alternative 1: No Action/No Project

3.12.2.2.1 Seller Service Area

There would be no effects to ITAs in the Seller Service Area. Groundwater substitution would not occur under the No Action/No Project Alternative; therefore, groundwater depth and pumping costs and stream flow temperatures in the Seller Service Area would continue to fluctuate similar to existing conditions. The No Action/No Project Alternative would have no change from existing conditions for ITAs in the Seller Service Area.

3.12.2.2.2 Buyer Service Area

Limited water supplies could cause adverse effects on ITAs in the Buyer Service Area. The only ITAs present in the Buyer Service Area include the Lytton Band of Pomo Indians, serviced by the East Bay MUD. Under the No Action/No Project Alternative, Central Valley Project (CVP) shortages could reduce water supplies to East Bay MUD in dry and critical years. Depending on the shortage, East Bay MUD may need to implement water shortage contingency measures, such as mandatory conservation. The Lytton Band of Pomo Indians would likely be subject to these measures as an East Bay MUD customer. These reductions in deliveries would be the same as currently experienced and represent no change from existing conditions.

3.12.2.3 Alternative 2: Full Range of Transfers (Proposed Action)

3.12.2.3.1 Seller Service Area

Groundwater substitution transfers could adversely affect ITAs by decreasing groundwater levels, which would potentially interfere with the exercise of a federally-reserved water right use, occupancy, and or character. Under the Proposed Action, groundwater substitution transfers would increase depth to groundwater and could increase groundwater pumping costs.

Auburn Rancheria, Cortina, and Rumsey lie on the border of the basin; therefore, effects from groundwater substitution would be less than those experienced by Chico Rancheria, Colusa and Paskenta, since they are more centrally located in the basin.

Figure 3.12-2 shows the potential groundwater level drawdown under the Proposed Action and the potential ITAs within the Sacramento Basin. The groundwater level changes would be very small near these sites, and would likely not be noticeable. Section 3.3, Groundwater

Resources provides detailed information on the simulation used to develop the groundwater level information.

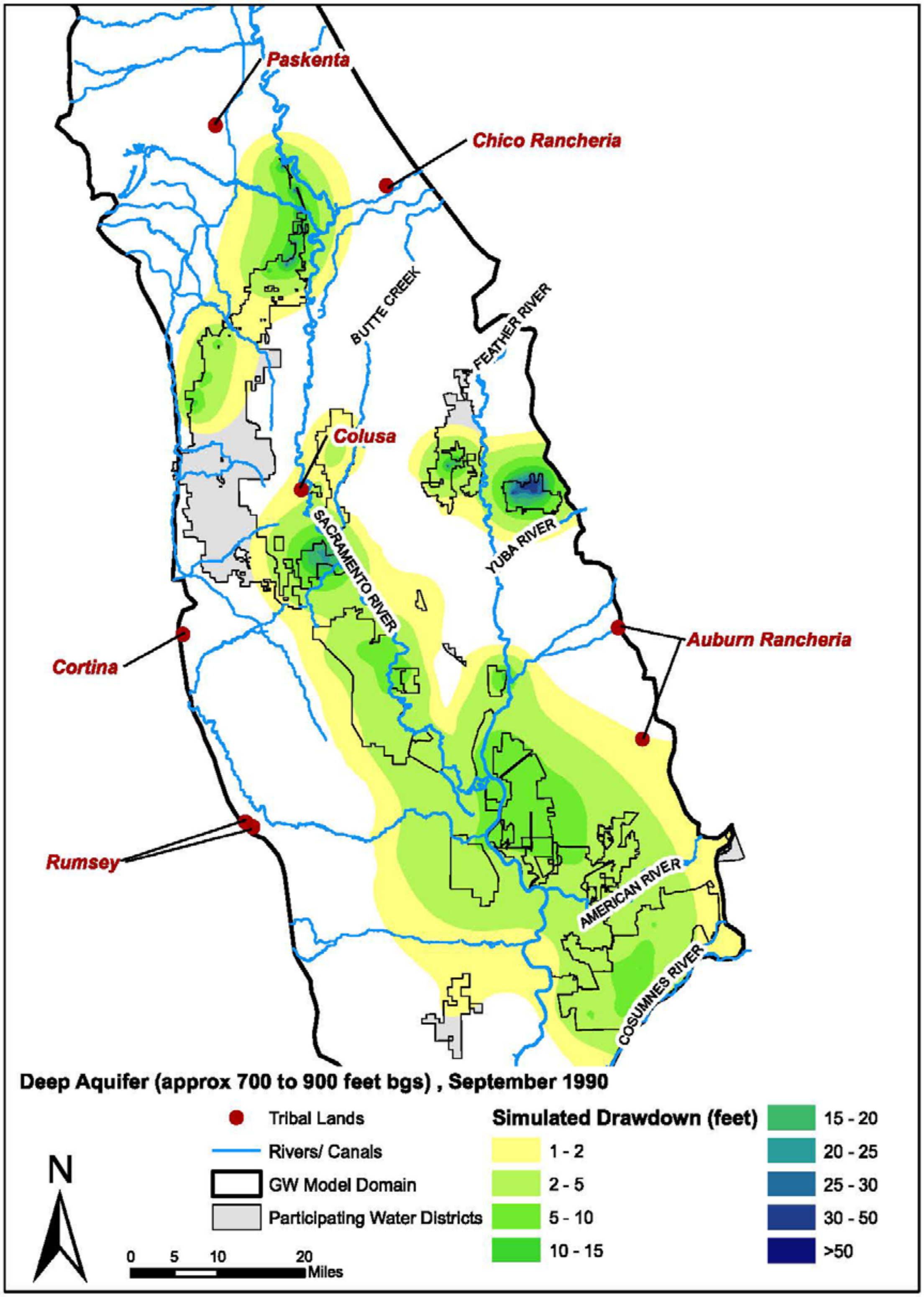
Because groundwater substitution would have negligible effect to groundwater near ITAs, the Proposed Action would not affect the ITAs' federally-reserved water rights.

Groundwater substitution transfers could adversely affect ITAs by reducing the health of tribal members by decreasing water supplies. Under the Proposed Action, groundwater substitution in the Sacramento Valley Groundwater Basin would not reduce groundwater table elevations near project ITA sites; therefore, groundwater substitution would also not decrease water supplies or affect the health of tribal members under the Proposed Action. Because the changes in groundwater levels would be negligible near ITA sites, the Proposed Action would not decrease water supplies to ITAs, thereby reducing the health of tribal members.

Groundwater substitution transfers could affect ITAs by affecting fish and wildlife where there is a federally-reserved hunting, gathering, or fishing right. Under the Proposed Action, groundwater substitution in the Sacramento Valley Groundwater Basin would result in very small changes to groundwater table elevations near ITA sites; therefore, groundwater substitution would not affect fish and wildlife where there is a federally-reserved hunting, gathering, or fishing right. For more information on groundwater substitution effects on aquatic and terrestrial resources in other project areas, see Section 3.7, Fisheries and Section 3.8, Vegetation and Wildlife. Because groundwater substitution would not measurably reduce groundwater elevations near project ITAs, the Proposed Action would not affect fish and wildlife where there is a federally-reserved hunting, gathering, or fishing right.

Groundwater substitution transfers could adversely affect ITAs by causing changes in stream flow temperatures or stream depletion, which would potentially interfere with the exercise of a federally-reserved Indian right. Under the Proposed Action, groundwater substitution transfers in the Sacramento Valley Groundwater Basin could result in an increase in groundwater recharge in the Seller Service Area which could cause small reductions in local base flows in nearby streams.

Chico Rancheria lies near Butte Creek along the boarder of the Sacramento Valley Groundwater Basin; thus, effects from groundwater substitution, including changes in steam flow temperatures would be less than if the ITAs were located more centrally in the basin. Figure 3.12-2 shows the potential groundwater level drawdown under the Proposed Action and the potential ITAs within the Sacramento Basin. The



Source: Department of Water Resources 2012 and U.S. Census Bureau 2010.

Figure 3.12-2. ITAs and Groundwater Basins

groundwater level changes would be very small, and would likely not noticeably increase groundwater recharge effects. Section 3.3, Groundwater Resources provides detailed information on the simulation used to develop the groundwater level information.

Because groundwater substitution would have negligible effects, the effects of groundwater recharge on streams near ITAs would also be negligible. The Proposed Action would not affect ITAs' federally-reserved water rights.

3.12.2.3.2 Buyer Service Area

Use of groundwater substitution transfers could affect ITAs. The Lytton Band of Pomo Indians is the only tribe with federal trust land in the Buyer Service Area and receives water services from Easy Bay MUD, a potential buyer. Under the Proposed Action, East Bay MUD would receive water transfers from willing sellers in the Seller Service Area. Transfers would help East Bay MUD supplement its water supply during dry years, in order to serve its customers, including the Lytton Rancheria. The tribe would benefit from a supplemented water source; therefore, the Proposed Action would have a beneficial effect on ITAs in the Buyer Service Area.

3.12.2.4 Alternative 3: No Cropland Modifications

3.12.2.4.1 Seller Service Area

Effects to ITAs in the Seller Service Area would be the same as under the Proposed Action.

3.12.2.4.2 Buyer Service Area

Effects to ITAs in the Buyer Service Area would be the same as under the Proposed Action.

3.12.2.5 Alternative 4: No Groundwater Substitution

3.12.2.5.1 Seller Service Area

The No Groundwater Substitution Alternative does not include groundwater substitution transfers. Because groundwater substitution would not occur, the No Groundwater Substitution Alternative would have no effect on ITAs.

3.12.2.5.2 Buyer Service Area

Effects to ITAs in the Buyer Service Area would be the same as under the Proposed Action.

3.12.3 Comparative Analysis of Alternatives

Table 3.12-1 lists the potential effects to ITAs of each of the action alternatives. The following text supplements the table by describing the magnitude of the effects under the action alternatives and No Action/No Project Alternative.

Table 3.12-1. Comparative Analysis of Alternatives

Potential Impact	Alternative(s)	Significance	Proposed Mitigation	Significance after Mitigation
CVP shortages could adversely affect ITAs in the Buyer Service Area.	1	No effect	None	No effect
Groundwater substitution transfers could adversely affect ITAs by decreasing groundwater levels, which would potentially interfere with the exercise of a federally-reserved water right use, occupancy, and or character	2, 3	No effect	None	No effect
Groundwater substitution transfers could adversely affect ITAs by reducing the health of tribal members by decreasing water supplies	2, 3	No effect	None	No effect
Groundwater substitution transfers could affect ITAs by affecting fish and wildlife where there is a federally-reserved hunting, gathering, or fishing right.	2, 3	No effect	None	No effect
Groundwater substitution transfers could adversely affect ITAs by causing changes in stream flow temperatures or stream depletion, which would potentially interfere with the exercise of a federally-reserved Indian right	2, 3	No effect	None	No effect
Use of groundwater substitution transfers could affect reservations or Rancherias in the Buyer Service Area to reduce CVP shortages.	2, 3, 4	Beneficial	None	Beneficial

3.12.3.1 No Action/No Project Alternative

Under the No Action/No Project Alternative, there would be no impacts to ITAs in the Seller Service Area. CVP water shortages could reduce East Bay MUD supplies in dry and critical years, but the shortages would be the same as those that occur under existing conditions

3.12.3.2 Alternative 2: Full Range of Transfers (Proposed Action)

The Proposed Action includes increased groundwater pumping in the Seller Service Area. Groundwater levels underlying reservations and Rancherias in the area of analysis would be negligible and would not affect ITAs. Water transfers would provide water to East Bay MUD during dry and critical years, which would increase water supplies available for the Lytton Band of Pomo Indians in the East Bay MUD service area.

3.12.3.3 Alternative 3: No Cropland Modifications

Impacts to ITAs under the No Cropland Modification Alternative would be the same as the Proposed Action.

3.12.3.4 Alternative 4: No Groundwater Substitution

There would be no impacts in the Seller Service Area as a result of Alternative 4. Effects in the Buyer Service Area would be the same as the Proposed Action.

3.12.4 Environmental Commitments/Mitigation Measures

Reclamation's policy is to protect and avoid adverse impacts to ITAs whenever possible. The analysis has not identified any potential impacts to ITAs; therefore, no specific mitigation measures are included. However, if any unanticipated impacts arise during project implementation, Reclamation shall initiate government-to-government consultation to determine interests, concerns, effects, and appropriate mitigation measures. Reclamation will take the lead on consultation with the tribes. Potentially affected tribes and the BIA, OAIT, Regional Solicitor's Office, Reclamation's Native American Affairs Office, and or Regional Native American Affairs coordinator may be involved in identifying ITAs (Reclamation 2012). The agencies will discuss appropriate avoidance and/or minimization strategies on a government-to-government basis. Separate measures may be required for different types of trust assets, including federally-reserved water, land, minerals, fishing, and gathering rights.

Measures necessary to reduce effects will be developed in consultation with the affected federally recognized tribe(s) before implementation. Other measures will be used as determined appropriate through tribal consultation. Consultation and minimization measures would reduce any potential adverse effects on ITAs.

3.12.5 Potentially Significant Unavoidable Impacts

There are no expected significant and unavoidable impacts to ITAs.

3.12.6 Cumulative Effects

The ITAs cumulative analysis focuses only on those programs that potentially affect groundwater in the Seller Service Area and the Buyer Service Area.

3.12.6.1 Alternative 2: Full Range of Transfers (Proposed Action)

3.12.6.1.1 Seller Service Area

Groundwater substitution transfers in combination with other cumulative projects could adversely affect ITAs in the Seller Service Area. Proposed groundwater substitution transfers in combination with existing and foreseeable future groundwater substitution programs and projects could affect ITAs if wells were to be over pumped and dried out on tribal lands, or increase pumping costs. This could interfere with the exercise of a federally-reserved water right, reduce the health of tribal members by decreasing water supplies, and or effect fish and wildlife where there is a federally-reserved hunting, gathering, or fishing right.

State Water Project transfers could also acquire water through groundwater substitution, but these transfers would only be about 6,800 AF. Section 3.3.6.1.1 in the Groundwater Resources analysis describes other existing and forseeable projects that could affect groundwater resources in the Seller Service Area. The groundwater substitution elements of these programs in conjunction with proposed groundwater substitution transfers could reduce groundwater levels and increase pumping costs in the Seller Service Area. If continuous groundwater substitution from multiple projects and programs were to cause over pumping or increased pumping costs near ITAs located in the Sacramento Valley Groundwater Basin, it could result in an adverse cumulative effect.

If potential impacts to ITAs are identified, tribal consultation will then precede any formal groundwater transfer in the vicinity of the identified tribes. Government-to-government consultation shall take place to determine interests, concerns, effects, and appropriate mitigation measures. Consultation may involve the BIA, the regional Solicitor's Office, and Department of Water Resources. Since government-to-government consultations with potentially affected tribes and the development of appropriate minimization measures would be completed prior to the implementation of groundwater substitution transfers, the Proposed Action's contribution to potential cumulative effects on ITAs in the Seller Service Area would be minimized.

3.12.6.1.2 Buyer Service Area

Groundwater substitution transfers in combination with other cumulative projects could adversely affect ITAs in the Buyer Service

Area. Groundwater substitution transfers would provide water to East Bay MUD that could be used to serve the Lytton Band of Pomo Indians. In the future, East Bay MUD would likely experience increased demands as populations increase; however, East Bay MUD has planned for the increased demands so they would not likely adversely affect deliveries to the Lytton Band of Pomo Indians.

3.12.6.2 Alternative 3: No Cropland Modifications

The cumulative impacts of Alternative 3 would be the same as those for the Proposed Action.

3.12.6.3 Alternative 4: No Groundwater Substitution

3.12.6.3.1 Seller Service Area

Alternative 4 does not include groundwater substitution transfers; therefore, there are no actions that could contribute to the cumulative condition in the Seller Service Area.

3.12.2.6.2 Buyer Service Area

The cumulative impacts of Alternative 4 in the Buyer Service Area would be the same as those for the Proposed Action.

3.12.7 References

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Section 3.13 Cultural Resources

This section discusses cultural resources within the area of analysis. It describes the affected environment, potential environmental impacts that may result from implementation of alternatives, and proposes mitigation measures to offset the effects of those alternatives.

3.13.1 Affected Environment/Environmental Setting

This section provides an overview of the area of analysis, the regulatory setting associated with cultural resources, and the existing conditions within the area of analysis. The existing conditions consist of archaeological, ethnographic, and historic background and a summary of the potential cultural resource types within the area of analysis that may be affected by the action alternatives.

3.13.1.1 Area of Analysis

The area of analysis for cultural resources includes all reservoirs in the Seller Service Area and San Luis Reservoir. In order to better describe the area of analysis for cultural resources, however, it is more meaningful to define the area of analysis according to culturally distinguishable geographic regions. Those regions include the following:

- The Sacramento Valley (from Shasta Reservoir to the Delta, including some western Sierra foothills)
- The San Joaquin Valley (Kings County to the Delta, including some western Sierra foothills).

The two regions were defined on the basis of their prehistoric, ethnographic, and historic period culture history. In certain instances, the culture histories of these regions overlapped, and they were therefore discussed collectively as the Central Valley. Figure 3.13-1 illustrates the area of analysis for cultural resources.

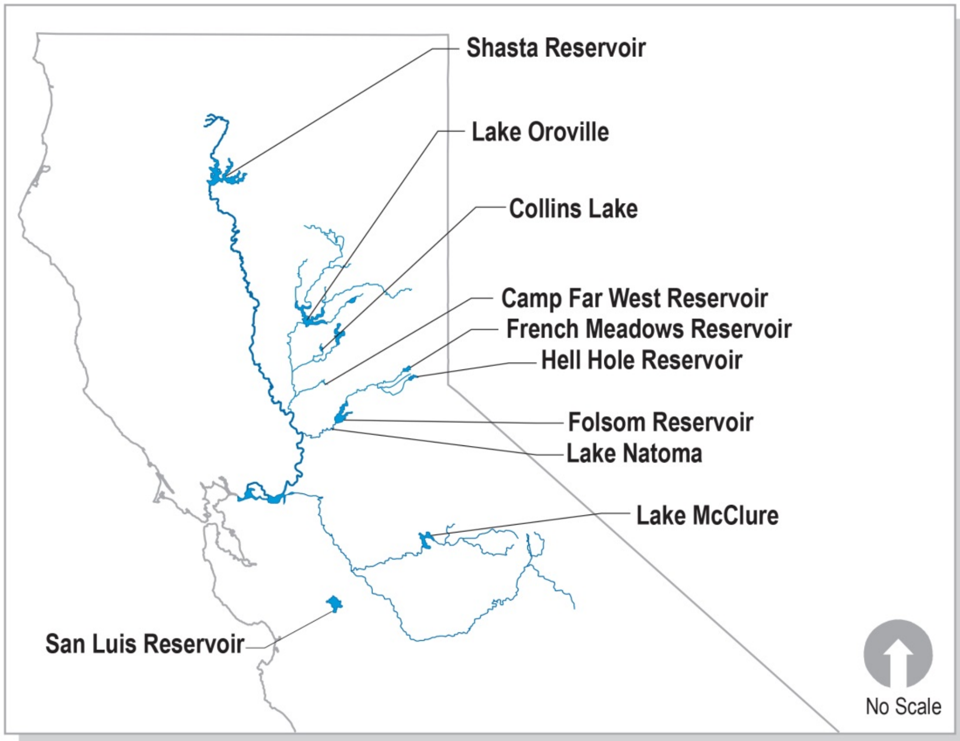

Figure 3.13-1. Cultural Resources Area of Analysis

3.13.1.2 Regulatory Setting

3.13.1.2.1 Federal

Federal laws and regulations for cultural resources include but are not limited to:

- National Historic Preservation Act (NHPA) of 1966, as amended: requires Federal agencies to consider the effects of their actions on historic properties.

- Archaeological Resources Protection Act of 1979 (ARPA): requires permitting for the excavation of cultural resources and identifies criminal and civil penalties for collecting and destruction of cultural resources on Federal land.

- Native American Graves Protection and Repatriation Act (NAGPRA): addresses the rights on lineal descendants, Indian Tribes, and Native Hawaiian organizations to Native American cultural items, including human remains, funerary objects, sacred objects, and objects of cultural patrimony.

- Executive Order 13007: requires Federal agencies responsible for the management of Federal lands to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites.

Because the proposed water transfers would use existing facilities and land uses would remain the same (within historic ranges of use), there are no obligations under Section 106 of the NHPA as the undertaking does not have the potential to effect historic properties, pursuant to 36 Code of Federal Regulations 800.3(a)(1).

3.13.1.2.2 State

The California Environmental Quality Act (CEQA) requires lead agencies to determine if a proposed project would have a significant effect on archaeological resources

The California Register of Historical Resources (CRHR) is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (California Public Resources Code [PRC] Section 5024.1[a]). Criteria for eligibility to the CRHR are based on National Register of Historic Places (NRHP) criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California CRHR, including California properties formally determined eligible for, or listed in, the NRHP.

3.13.1.2.3 Regional/Local

Relevant regional or local cultural resources regulations include but are not limited to those adopted by the counties in the area of analysis. Each county has established its own goals, objectives policies, actions, implementation programs, and ordinances that are presented in county general plans and in some cases in county ordinance codes.

3.13.1.3 Existing Conditions

This section describes existing conditions for cultural resources within the area of analysis. All data regarding existing conditions were collected through an examination of archival and current literature pertinent to the area of analysis. Because action alternatives associated with the project do not involve physical construction-related impacts to cultural resources, no project specific cultural resource studies were conducted in preparation of this Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

3.13.1.3.1 Archaeological Background

A wide range of prehistoric and historic period cultural resources may be present in the area of analysis. Prehistoric cultural resources in the Central Valley and Delta may include archaeological site types ranging from small lithic or midden scatters to large, mounded village sites. Although many smaller, discrete archaeological sites have remained undisturbed, historic period and modern landscape development have destroyed most known examples of larger prehistoric village sites (Rosenthal et al. 2007:147).

Historic period cultural resources in the Central Valley may include those associated with early Spanish expeditions, Spanish settlements (Missions, Pueblos, military), or Mexican Ranchos. Resources related to California's Gold Rush, such as mining machinery, sluices, tailings, cabins, and mills are also common in the region. Other historic period sites may include those pertaining to cattle ranching, agricultural production, early transportation, water development, and townsite development.

Central Valley

Due to the alternating periods of erosion and deposition that have characterized California's Central Valley and Delta regions, many of the Pleistocene landscapes that might hold evidence relating to the earliest human occupation of the region have been eroded away or subsumed by more recent alluvial deposits. Archaeological data about early human occupation of the region have come largely from isolated finds on remnant landforms; such finds have included artifacts found in the southernmost extent of San Joaquin Valley thought to date to the Paleo-Indian Period (11,550–8550 Before Christ [BC]). Evidence for the Lower Archaic Period (8850–5550 BC) in the Central Valley and Delta is also sparse, although shells from the Pacific Coast and obsidian from the Sierra Nevada found at sites dating to this period suggest that regional interaction spheres were established early in the region's prehistory (Rosenthal et al. 2007:151–152).

Archaeological sites dating to the Middle Archaic Period (5550-550 BC) have provided some of the oldest evidence for well-defined cultural traditions in the region. Evidence for increased residential stability, logistical organization, riverine adaptations, and far ranging regional exchange during the Middle Archaic has been recovered (Rosenthal et al. 2007:153-155). The Windmiller Pattern (1850-750 BC), which shows a widespread uniformity of burial practices, is characteristic of the period. The Upper Archaic (550 BC- Anno Domini [AD] 1100) was marked by cultural, economic, and technological diversity. This period also saw the development of large mounded villages in the Delta and lower Sacramento Valley (Rosenthal et al. 2007:156).

During the Emergent Period (AD 1100 to the historic period), native peoples living in the Central Valley and Delta developed the cultural traditions noted at the time of contact with Euro-Americans. These included technological advances such as the bow and arrow and the fish weir. Indigenous trade networks also appear to have changed in the Emergent Period, as shell beads assumed the role of currency throughout much of the region. The population of the Central Valley and Delta regions, which had been growing steadily since the Middle Archaic, continued to climb in the Emergent Period; this growth correlated with an intensification of hunting, gathering, and fishing, as well as increased socio-political complexity (Rosenthal et al. 2007:257-259).

Sierra Nevada

Sierra Nevada prehistoric archaeological deposits were first found during the Gold Rush era. Deposits consisting of mortars, charmstones, pestles, and human remains were among the cultural resources discovered in the 1850s and 1860s (Moratto 1984). In the mid-nineteenth century, mining led to the discovery of many prehistoric sites. In the later nineteenth and twentieth centuries, dam construction within the Sierra Nevada also led to the discovery of numerous archaeological sites.

In 1952, a total of 26 Northern Sierra sites were recorded by University of California Berkeley archaeologists T. Bolt, A.B. Elsasser, and R.F. Heizer. Two archaeological cultures were identified from this survey: the Martis Complex (centered in the Martis Valley) and the Kings Beach Complex (centered in the Lake Tahoe area). The Martis Complex was unusual for its use of basalt rather than obsidian in tool making. Dates from the tools suggest that the complex dated from 4000-2000 BC to AD 500 (Moratto 1984). The Kings Beach Complex (AD 500-1800) was distinguished by flaked obsidian and silicate implements, small projectiles points, the bow and arrow, and occasional scrapers and bedrock mortars (Moratto 1984).

In 1970, Ritter compared various Lake Oroville area sites to the Martis Valley and Kings Beach sites to help develop a chronology for the Lake Oroville area. As so derived, the Lake Oroville chronology spans a period of about 3,000 years and consists of the Mesilla, Bidwell, Sweetwater, and Oroville Complexes, as well as the ethnographic Maidu era (Moratto 1984).

The Mesilla Complex was identified as a sporadic occupation of the foothills. People associated with this complex hunted with atlatls and processed their food in mortar bowls and on millingstones. Shell beads, charmstones, and bone pins show a close relationship between the Mesilla Complex and the Sacramento Valley cultures between 1000 BC and AD 1 (Moratto 1984).

After the Mesilla Complex, the cultural sequence continued with the Bidwell Complex from AD 1-800. The Bidwell Complex people lived in permanent villages, hunted deer and smaller game with slate and basalt projectile points, fished, ground acorns on millingstones, and collected fresh water mussels. A new cultural element for this complex was the manufacture of steatite cooking vessels (Moratto 1984).

The Sweetwater Complex (AD 800-1500) was defined by new cultural items and forms, which included particular shell ornament types; wider use of steatite for cups, bowls and smoking pipes; and, small, lighter projectile points that indicated the use of bows and arrows for hunting (Moratto 1984).

The Oroville Complex is significant because it represents the protohistoric Nisenan (AD 1500 to 1833) (Moratto 1984). The Nisenan culture was characterized by bedrock mortars for acorn processing, dance halls, and burials placed in tightly flexed positions on their sides marked with stone cairns. The Lake Oroville Chronology sequence ended with the historic era and abandonment of traditional settlements in the nineteenth century (Moratto 1984).

3.13.1.3.2 Ethnography

When European colonization of California began, the Central Valley and Sierra foothills were home to an estimated 100,000 people who spoke at least eight different indigenous languages, including Wintu, Yana, Nomlaki, Konkow, River Patwin, and Nisenan in the Sacramento Valley and adjacent Sierra foothills, and Miwok and Yokuts in the San Joaquin Valley and adjacent Sierra foothills. Groups speaking these languages shared many common cultural practices associated with technology, subsistence, ceremonial life, and social organization. Downstream from the Delta, the Costanoans—or Ohlone, as their descendants prefer to be called—inhabited the eastern shores of San Francisco Bay, as well as the San Francisco peninsula and the coastal areas south to Point Sur (for detailed information on particular ethnolinguistic groups see entries in Heizer 1978).

The principal form of social organization among the native groups of the Central Valley was the tribelet, which often included a primary village associated with several outlying hamlets. Most settlements consisted of houses and granaries made of locally available materials (typically bark or tule), as well as semi-subterranean ceremonial structures. Many villages were occupied year-round, except during the fall acorn harvest. Among the Nomlaki and some Yokuts groups, however, people spent most of the year in dispersed family camps in order to utilize diverse ecological zones, coming together only during the winter when they shared surpluses and performed important ceremonies (Lightfoot et al. 2009: 303).

Native Californians living in the Central Valley used a wide variety of resources. Acorns were an important food crop throughout much of prehistory, and oak stands were often owned on the individual, family, or tribelet level. Tule, or bulrush, was another principal plant and was used to make clothing, thatch houses, and construct watercraft. For basketry, which was one of the most important items of material culture in the region, native people used tule, ferns, and grasses. The native people ate the small seeds of a number of plants, as well as berries and greens. As elsewhere in California, native people in the Central Valley relied on prescribed burning to maintain a diverse landscape and to encourage the growth of desired species. Communal hunts of deer, rabbit, and squirrels were also common in the region. The diets for people living along Central Valley rivers and sloughs also included waterfowl and diverse fish species (Lightfoot et al. 2009: 303-338).

Sacramento Valley and Sierra Foothills

The area of analysis lies within the ethnographic territories of the Nisenan, Plains and Southern Sierra Miwok, Northern Yokuts, and Konkow.

The Nisenan, often referred to as the Southern Maidu in anthropological literature, were classified as the southern linguistic group of the Maidu tribe; together with the Maidu and Konkow, they formed a subgroup of the California Penutian linguistic family (Wilson and Towne 1978). The Nisenan linguistic group has been further subdivided based on dialect into Northern Hill Nisenan, spoken in the Yuba River drainage; Southern Hill Nisenan, spoken along the American River; and Valley Nisenan, dominant along a portion of the Sacramento River Valley between the American and Feather Rivers (Beals 1933; Kroeber 1925, 1929).

Prior to Euro-American contact, Nisenan territory extended west into the Sacramento Valley to encompass the lower Feather River drainage; north to include the Yuba River watershed; south to include the whole of the Bear and American River drainages and the upper reaches of the Cosumnes River; and east to the crest of the Sierra Nevada (Wilson and Towne 1978).

The Konkow, also known as Northwestern Maidu, occupied territory below the high Sierra in the foothills where the south, middle, north, and west branches of the Feather River converge. Konkow territory included the upper Butte and Chico creeks and part of the Sacramento Valley along the lower courses of the same drainages (Kroeber 1925).

Plains Miwok belong to the Eastern Miwok division of the Miwokan subgroup of the Utian language family (Levy 1978a:398). The Plains Miwok occupied the lower portion of the Cosumnes and Mokelumne rivers and both banks of the Sacramento River between the modern towns of Rio Vista and Freeport (Levy 1978a:398).

San Joaquin Valley

The Northern Valley Yokuts occupied the northern San Joaquin Valley and possessed a territory that extended from the point where the San Joaquin River turns north up the Central Valley to a point between the Calaveras and Mokelumne rivers (Wallace 1978:462); from east to west their territory spanned from the Sierra foothills to the crest of the Diablo Range (Wallace 1978:462). The northern territorial boundary between the Northern Valley Yokuts and the Plains Miwok is contested and remains less clearly defined (Wallace 1978:462).

The Southern Sierra Miwok belong to the Eastern Miwok division of the Miwokan subgroup of the Utian language family (Levy 1978a:398). The Southern Sierra Miwok occupied the upper Merced and Chowchilla river drainages (Levy 1978a398).

3.13.1.3.3 History

Although the Central Valley was not settled by the Spanish as part of the mission system or the associated presidio and pueblo establishments, the Spanish did explore portions of the San Joaquin and Sacramento Valleys. Expeditions to the Delta region began in the 1770s, and large portions of the

Central Valley were explored further in the early nineteenth century as the Spanish sought to convert the native inhabitants and to punish native raiding parties. After winning its independence from Spain, the Mexican government divided much of its territory in California into individual land grants. Although these ranchos, as they came to be known, were located primarily near the coast, several ranchos were also granted along the banks of the Sacramento and San Joaquin rivers. During the Mexican period, Anglo-American trappers made their way into the Central Valley. Jedediah Smith, one of the most notable early explorers, traversed the San Joaquin and Sacramento valleys in the 1820s (Beck and Haase 1974; Hoover et al. 1990).

In the 1840s, increasing numbers of Anglo-Americans began arriving in California, and many of their major trails crossed the Central Valley. After 1848, the Gold Rush era population explosion transformed the region. Cities along the San Joaquin and Sacramento rivers grew quickly to serve as supply centers and transportation links between San Francisco and the goldfields along the eastern tributaries. By 1849, the placer mines of the foothills were thick with miners; most were men, who hailed from many occupations and ethnicities. Over time, however, many Chinese and Hispanic miners left the goldfields and sought work in other industries such as agriculture and ranching (Hoover et al. 1990; Rawls and Bean 1998:91–103). The Central Valley was also the site of important early developments in oil and gas drilling.

By the late nineteenth century, the Central Valley's role as a great agricultural producer was already established. The demand for water for gold mining and agriculture led to the development of numerous water conveyance systems in the Central Valley. Early, privately financed systems were dwarfed by the early twentieth century systems created by municipalities, such as the Hetch Hetchy Aqueduct, as well as those developed by the Federal government, including the Central Valley Project (CVP) (Beck and Haase 1974).

Sacramento Valley

Constituting the northern portion of the Central Valley, the Sacramento Valley was the site of early Euro-American settlement. In 1839, John Sutter constructed a fort at the mouth of the American River and the east bank of the Sacramento River. There he engaged in a host of enterprises including raising grain and livestock, irrigation, and flour milling (Hoover et al. 1990). His property's strategic location made it a natural destination from the Sierra trails, and he did more to open California to American immigration than any other individual (Hoover et al. 1990:286–287; Lewis Publishing 1891:192–197).

In 1848, James Marshall, Sutter's foreman, discovered gold while constructing a mill at the South Fork of the American River. The gold seekers who began pouring into California as word of Marshall's discovery spread, created a tent city on Sutter's property around his fort. By the Fall of 1849, the nascent city housed 2,000 residents and had become a central stopover point; Sacramento was a point of embarkation to not only the American River mines, but to those on the Feather, Yuba, and Bear rivers, and a natural place for miners to outfit themselves (Hoover et al. 1990:291).

Miners began working the sand bars upstream from Marysville on both the Feather and Yuba Rivers as early as 1848, and scores of mining camps sprang up along the American River in Sacramento, Placer, and El Dorado counties. Many briefly became important towns in the early 1850s only to dwindle or disappear with the surface gold deposits. Gold Rush speculators formed Marysville, the Yuba County seat, in 1850 on land purchased from Sutter. Strategically located at the confluence of the Feather and Yuba rivers, and at the head of navigation for the Feather River, Marysville was also close to the mines. With its accessibility from emerging urban centers and the mines, the town grew rapidly in its first decades and became an important regional commercial center (Hoover et al. 1990:495, 493; Delay 1924:133–137). Oroville, originally Ophir City (est.1849), was the most important of these towns; it became the Butte County seat in 1856 (Lewis Publishing 1891:117–118). Another significant camp was Mormon Island, which today lies under Folsom Reservoir. The Town of Folsom was established in 1855 at the location of Negro Bar, which was originally prospected by African Americans in 1849. Folsom's prosperity peaked in the 1860s when it served as the northern terminus of California's first passenger railroad, as well as the western terminus of the Pony Express (Hoover et al. 1990:289).

Early river mining involved diverting streams from their natural channels by utilizing dams, ditches, and flumes. These structures required miners to begin working together in large numbers, often forming joint stock companies in which each miner invested his labor for a share in potential profits.

After the ditch systems were no longer needed for mining, they were frequently repurposed for agricultural irrigation, and were an invaluable resource for early developers of hydro-electric power in the Sierras (JRP Historical 2000:33, 62).

Some of the most notable river diversions for mining took place on the Feather River above Oroville (Hittell 1861:79) and along the American River. Among the structures that resulted from these efforts were the Big Bend Tunnel on the Feather River, the Natoma Ditch on the American River, the Excelsior Canal Company ditch system on the Yuba River, the Iowa Hill Ditch on the North Fork of the American River, and the El Dorado Canal on the South Fork of the American River (JRP 2000; Brown 1868; Meade 1901). In addition to the ditch systems, mining companies created dozens of reservoirs on the Upper Yuba River for dry season water storage, which by the turn of the century had an aggregate water storage capacity of over a billion cubic feet (Brown 1868; Meade 1901).

The Sawyer decision in 1884 all but ended hydraulic mining in California. As in other Gold Country locales, the Depression brought a limited revival of placer mining to the American River. Mechanized dredging took the place of hydraulic mining on the Feather and Yuba rivers in the early twentieth century, profitably extracting gold from the old tailings, while during the Depression the unemployed once again panned for gold (Hoover et al. 1990:540–541; Hittell 1898:83, 269; Delay 1924:256).

The Gold Rush population boom stimulated agricultural production throughout the Sacramento Valley. Sacramento Valley areas were initially exploited for cattle and wheat production. Citrus groves, rice, hops, and a variety of other crops became common as the area was settled more densely, and the area has remained an agricultural powerhouse. Though the higher-elevation drainages of the American River are somewhat better suited to agriculture, pioneers planted vegetable patches near Coloma as early as 1849. As mining declined, agricultural activities increased, with many mining ditches were actually repurposed for irrigation. In 1855, agricultural crops were being cultivated in Placer, Yuba, Sutter, and El Dorado counties. Lumber extraction, first practiced in conjunction with mining, replaced mining as the leading local industry in areas above 3,000 feet (Department of Water Resources [DWR] 1964:9–10).

In addition to its strategic position along navigable rivers, Sacramento played an important role in the development of regional and national railroad networks. The Sacramento Valley Railroad (SVRR) was the first commercial railroad in California. Completed in 1856, the SVRR ran between Sacramento and Folsom; original plans to extend it as far as Marysville were never realized. In 1860, Theodore Judah, an American railroad engineer, began looking for financial backers for what would become the Central Pacific Railroad (CPRR); he found them in Sacramento Governor Leland Stanford, Charles Crocker, Mark Hopkins, and C.P. Huntington. The CPRR ultimately formed the western leg of the first transcontinental railroad in the United States. The project was authorized by Congress in 1862 and completed in 1869, with Sacramento serving as the CPRR's western terminus (Burg 2007:18–19; Willis 1913:184).

Water development in the Sacramento Valley continued to evolve in tandem with population expansion and expanding transportation networks. That development took the form of irrigation, hydroelectric, and reclamation projects. These projects often began as private ventures, but due to the scale of many of these ventures, they were ultimately taken over by government agencies or eclipsed by government projects. Many water development projects were closely aligned with townsite and regional development. For instance, Horatio Livermore constructed the first dam at Folsom in 1867 in an effort to create an industrial town there. Livermore's multi-purpose system included canals to carry logs to local mills and to provide crop irrigation. The Folsom Power Plant became operational in 1895; it was the first hydroelectric power plant in the Central Valley, and it operated continuously from 1895 to 1952 (Hughes 1983:269–270; JRP Historical 2000:58; Hoover et al. 1990:290).

The California State Legislature authorized the State Water Project (SWP), (then known as the Feather River Project), in 1951. Devastating flooding in the

Sacramento Valley in 1955, which was particularly severe in Marysville and Yuba City, contributed to popular support of the idea that damming the Feather River would prevent future flooding. Oroville Dam was built in response as a multi-purpose project intended to generate power, conserve water, control flooding, and create recreational opportunities (JRP Historical 2000:49, 82; DWR 1974:65– 67).

San Joaquin Valley

Exploration from the central coast into the San Joaquin Valley began with the Gabriel Moraga expeditions of 1806, 1808, and 1810, which brought the Spanish to the Merced and San Joaquin rivers and likely through Pacheco Pass (Hoover et al. 1990:198). By the beginning of the nineteenth century, the Spanish had established an interior north-south road called El Camino Viejo. The route ran from the Los Angeles coast north along the western edge of the San Joaquin Valley to the Patterson Pass (near the modern City of Tracy) and then west to San Antonio (currently East Oakland) (Hoover et al. 1990:85).

Following independence from Spain, Mexican activities in the San Joaquin Valley consisted largely of retaliatory expeditions meant to answer raids by Miwok and Yokut tribes on Mexican colonists. In the 1840s, the Mexican government began issuing land grants in the San Joaquin Valley. Land Grants the vicinity of the project area included Thompson’s Rancho, Rancheria del Rio Estanislao, El Pescador, Orestimba Rancho, Rancho del Puerto, and Sanjon de Santa Rita (granted to Francisco Soberanes in 1841) (Beck and Haase 1974).

Gold mining in the Southern Sierra mining region of the Sierra foothills began with the Gold Rush in 1848. As in other parts of the Sierras, the Gold Rush brought a flood of miners to the western Sierra foothills. By the 1850s, the fever of the Gold Rush had died down and many people relocated to the growing cities in the San Joaquin Valley and other parts of the state. Mining in the foothills and the Sierras transitioned from an emphasis on individual placer mining to small and large scale operations including dredging on the Merced and Tuolumne rivers, hydraulic mining, and lode mining for gold and other ores during the nineteenth and early twentieth century (California Department of Transportation [Caltrans] 2008). Hydraulic mining led to the development of ditches and canals, which later were repurposed for irrigation and hydroelectric systems (JRP and Caltrans 2000:38–50).

Early settlement in San Joaquin Valley occurred along streams and rivers. The early town of Dover was located on the San Joaquin River, five miles north of the mouth of the Merced River. Dover was established in 1844 when Jose Castro attempted to build a fort there, which was later occupied by Americans in 1866 (Hoover et al. 1990: 203). It was later abandoned in favor of Hills Ferry, which was established on the confluence of the Merced River and the San Joaquin River in 1860. Hills Ferry was a crossing point on the San Joaquin River. The coming of the railroad changed the settlement patterns in the San

Joaquin Valley, drawing people away from the waterways to the rails (Hoover et al. 1990:200).

As the gold mining industry in California declined in the 1860s, agriculture and ranching expanded to become important industries for the state economy. Farming in the San Joaquin Valley was characterized by cattle and sheep ranching, grain farming, and irrigation agriculture. Cattle ranching was especially important in the San Joaquin Valley, and companies such as Miller & Lux and the Kern County Land Company controlled millions of acres of rangeland (Hoover et al. 1990:200). With the completion of the transcontinental railway in 1869, farmers in the Central Valley began to export their fruit, nut, and vegetable crops to the rest of the nation.

The demand for water for gold mining and agriculture led to the development of numerous water conveyance systems in the Central Valley. In the San Joaquin Valley, large private land holders drove the movement to irrigate their land which led to the formation of private water companies. Water for irrigation in Madera, Merced, Fresno, and Stanislaus counties came from the Merced and Tuolumne rivers, which facilitated the construction of the San Joaquin and Kings River Canal from Mendota. This canal was the largest single irrigation system in the state in the 1880s (Beck and Haase 1974:76). Although private water companies still exist, privately financed systems have since been dwarfed by the municipal and federal systems and projects that began in earnest in the early twentieth century—including the CVP (Beck and Haase 1974).

3.13.1.3.4 Summary of Potential Cultural Resource Types

A wide range of prehistoric and historic period cultural resources may be present in the Seller or Buyer Service Areas analyzed in this EIS/EIR. Cultural resources may comprise landscapes, districts, sites, buildings, structures, objects, or isolated finds relating to American history, prehistory, architecture, archaeology, engineering, or culture.

Archaeological resources include prehistoric (pre-contact) and historic period (post-contact) cultural resources. Prehistoric resources are the physical remains that result from human activities that predate European contact with native peoples in America. Prehistoric archaeological sites may include villages, campsites, lithic or artifact scatters, fishing sites, roasting pits/hearths, milling features, rock art (petroglyphs/pictographs, intaglios), rock features (circles, blinds, etc.), and/or burials. Historic period archaeological sites are the physical remains of human activity during the historic period (post-contact to 50 years before present). Historic period sites may include the remnants of structures (foundations, cellars, privies), built objects, refuse deposits, subsurface hollow-filled features, landscape modifications, and/or complexes consisting of multiple feature types. Historic archaeological sites may include townsites, homesteads, agricultural or ranching features, mining-related features, refuse concentrations, and/or refuse scatters.

Ethnographic resources include sites, areas, and materials important in Native American or religious, spiritual, or traditional uses. These resources can encompass the sacred character of physical locations (mountain peaks, springs, and burial sites) or particular native plants, animals, or minerals that are gathered for use in traditional ritual activities. These resources are identified by Native American stakeholders and can be classified as a Traditional Cultural Property, which can be evaluated for eligibility for the NRHP.

Prehistoric cultural resources in the Central Valley include various types of archaeological sites ranging from small lithic scatters to large mounded village sites, although in the case of the latter, historic period and modern landscape modifications have destroyed most known examples (Rosenthal et al. 2007:147). Cultural resources that relate to ethnographically documented villages or personages, or sites that represent Traditional Cultural Properties, may also exist. Historic period cultural resources in the Central Valley may include those associated with early Spanish expeditions, Spanish settlements (missions, pueblos, or military presidios) or Mexican ranchos. Resources related to California's Gold Rush, such as mining machinery, sluices, tailings, cabins, and mills are common in the region. Other historic period sites include those pertaining to ranching, agriculture, early transportation, water development, and townsite development.

In the Sacramento River Division, about 2,300 historic sites have been recorded. Between the Sacramento/Sutter County boundary and Freeport along the Sacramento River, there are three historic sites and at least 42 historic structures along this segment of the Sacramento River. The town of Freeport has the potential to be determined an important historical resource. There are 13 historic and one multi-component sites on the American River between Folsom Dam and the Sacramento River.

3.13.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts on cultural resources associated with each alternative.

3.13.2.1 Assessment Methods

The criteria for determining the historical significance of cultural resources are the CRHR eligibility criteria as defined at Section 5024.1 of the California PRC.

An impact is considered significant if a project would have an effect that may change the historical significance of the resource (PRC Section 21084.1). Demolition, replacement, substantial alteration, and relocation of historic properties are actions that would change the historical significance of a property eligible for listing or listed on the CRHR.

To evaluate if a potential impact to cultural resources could occur, the Transfer Operations Model output for the three action alternatives were used. Changes in elevations of any reservoirs that could be affected by the alternatives were compared to elevation changes that would occur under the No Action/No Project Alternative.

3.13.2.2 Significance Criteria

Because the proposed water transfers would use existing facilities and land uses would remain the same (within historic ranges of use), there are no obligations under Section 106 of the NHPA as the undertaking does not have the potential to effect historic properties, pursuant to 36 Code of Federal Regulations 800.3(a)(1).

Cultural resource significance is evaluated in terms of eligibility for listing on the NRHP. CEQA defines a significant historical resource as "a resource listed or eligible for listing on the [CRHR]" (PRC Section 5024.1).

Reservoir fluctuations that exceed historical elevations were used as the primary tool used to determine project effects. Reservoir processes, specifically the human, mechanical and biochemical impacts identified by Ware (1989), can positively or negatively impact the preservation of cultural resources and individual artifact classes. Erosion, flood events, and reservoir processes can cause the transport and redeposition of certain classes of cultural materials, thereby altering the nature of archaeological sites.

Significant impacts would be determined when operations expose previously submerged resources, increasing their vulnerability to vandalism and other factors; and expose resources to increased cycles of inundation (erosion) and drawdown.

3.13.2.3 Alternative 1: No Action/No Project Alternative

Surface water facilities would operate in the same manner as existing conditions and no impacts to cultural resources would occur. Under the No Action/No Project Alternative, surface water facilities would continue to operate in the same manner as under existing operations. Individual agencies would continue to manage cultural resources in a manner consistent with State and Federal laws.

Effects that are currently underway (i.e., disturbance to cultural resources by looters, vehicles, wave action erosion, sedimentation, changing water levels, redistribution of cultural materials, etc.) would continue. Water and irrigation districts would continue to operate their systems as they do under the existing conditions, moving water frequently between facilities. Cultural resources would be subject to currently existing effects, and the No Action/No Project Alternative would reflect the system as it is presently operating.

3.13.2.4 Alternative 2: Full Range of Transfers (Proposed Action)

Transfers that draw down reservoir surface elevations at CVP and SWP reservoirs beyond historically low levels could affect cultural resources. The Proposed Action would affect reservoir elevation in CVP and SWP reservoirs and reservoirs participating in stored reservoir water transfers. Water transfers have the potential to affect cultural resources, if transfers result in changing operations beyond the No Action/No Project Alternative. Reservoir surface water elevation changes could expose previously inundated cultural resources to vandalism and/or increased wave action and erosion.

Table 3.13-1 presents changes in elevation under the Proposed Action relative to the No Action/No Project Alternative. Water could be made available for transfer during the irrigation season of April through September. The model results indicate that elevations would be very similar to those under the No Action/No Project Alternative under all hydrologic conditions. The reservoir surface elevation changes under the Proposed Action for these reservoirs would be within the normal operations and would not be expected to expose previously inundated cultural resources to vandalism or increased wave action and wind erosion. Impacts to cultural resources at Shasta, Oroville and Folsom reservoirs would be less than significant.

Table 3.13-1. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and the Proposed Action (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.3	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.5	1.6	1.1	-0.1	-0.1
C	-0.2	-0.3	-0.3	-0.3	-0.2	-0.2	-0.1	1.0	3.1	0.2	-0.5	-0.5
Lake Oroville												
W	-0.4	-0.4	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
AN	-1.9	-1.9	-1.8	-1.2	-0.9	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.2
BN	-0.3	-0.3	-0.5	-0.4	-0.4	-0.3	-0.3	-0.3	-0.3	-0.5	-0.5	-0.7
D	-0.5	-0.5	-0.5	-0.5	-0.4	-0.3	-0.3	0.6	0.7	0.1	-1.0	-0.5
C	-1.3	-1.7	-1.8	-1.8	-1.6	-1.4	-1.5	-1.3	-0.9	-0.7	-2.3	-2.4
Folsom Reservoir												
W	0.3	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.4	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.4
BN	-0.2	-0.3	-0.5	-0.4	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2
D	0.4	0.3	-0.1	-0.1	-0.2	-0.1	-0.1	0.8	1.4	1.4	1.7	1.9
C	1.2	0.9	0.7	0.7	0.7	0.0	0.1	0.6	1.6	1.6	1.1	1.5

Note: Negative numbers indicate that the Proposed Action would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that the Proposed Action would increase reservoir elevations.

Key: W = wet; AN = above normal; BN = below normal; D = dry; C = critical

Stored reservoir release transfers that draw down reservoir surface elevations at local reservoirs beyond historically low levels could affect cultural resources. Under the Proposed Action, stored reservoir release transfers could affect elevations at participating reservoirs, which could affect the cultural resources of the reservoir. The surface elevation changes under the Proposed Action for these reservoirs could expose previously inundated cultural resources to vandalism, increased wave action, and wind erosion. The reservoirs, however, would not drop below the conservation pool at any of the facilities and expose cultural resources existing below the conservation pool. Changes in water levels are expected to be in line with normal operations and impacts would be less than significant.

3.13.2.5 Alternative 3: No Cropland Modifications

Transfers that draw down reservoir surface elevations at CVP and SWP reservoirs beyond historically low levels could affect cultural resources. Table 3.13-2 presents changes in elevation under Alternative 3 relative to the No Action/No Project Alternative. Water could be made available for transfer during the irrigation season of April through September. The model results indicate that elevations would be very similar to those under the No Action/No Project Alternative under all hydrologic conditions. The reservoir surface elevation changes under Alternative 3 for these reservoirs would be within the normal operations and would not be expected to expose previously inundated cultural resources to vandalism or increased wave action and wind erosion. Impacts to cultural resources at Shasta, Oroville and Folsom reservoirs would be less than significant.

Table 3.13-2. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and Alternative 3 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.3	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.4	1.3	0.9	-0.1	-0.1
C	-0.2	-0.3	-0.3	-0.3	-0.2	-0.2	-0.1	0.5	1.8	-0.1	-0.5	-0.5
Lake Oroville												
W	-0.4	-0.4	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
AN	-1.9	-1.9	-1.8	-1.2	-0.9	0.0	0.0	0.0	0.0	-0.4	-0.3	-0.2
BN	-0.3	-0.3	-0.5	-0.4	-0.4	-0.3	-0.3	-0.3	-0.3	-0.5	-0.5	-0.7
D	-0.5	-0.5	-0.5	-0.5	-0.4	-0.3	-0.3	0.5	0.6	0.1	-1.0	-0.5
C	-1.3	-1.7	-1.8	-1.8	-1.6	-1.4	-1.5	-1.3	-1.1	-1.4	-2.3	-2.4
Folsom Reservoir												
W	0.3	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.4	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.4
BN	-0.2	-0.3	-0.5	-0.4	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2
D	0.4	0.3	-0.1	-0.1	-0.2	-0.1	-0.1	0.8	1.4	1.4	1.7	1.9
C	1.2	0.9	0.7	0.7	0.7	0.0	0.1	0.6	1.5	1.6	1.1	1.5

Note: Negative numbers indicate that Alternative 3 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase reservoir elevations.
Key: W = wet; AN = above normal; BN = below normal; D = dry; C = critical

Stored reservoir release transfers that draw down reservoir surface elevations at local reservoirs beyond historically low levels could affect cultural resources. Water transfers with stored reservoir water would be the same as the Proposed Action. Changes in water levels are expected to be in line with normal operations and impacts would be less than significant.

3.13.2.6 Alternative 4: No Groundwater Substitution

Transfers that draw down reservoir surface elevations at CVP and SWP reservoirs beyond historically low levels could affect cultural resources. Table 3.13-3 presents changes in elevation under the Proposed Action relative to the No Action/No Project Alternative. Water could be made available for transfer during the irrigation season of April through September. The model results indicate that elevations would be very similar to those under the No Action/No Project Alternative under all hydrologic conditions. The reservoir surface elevation changes under Alternative 4 for these reservoirs would be within the normal operations and would not be expected to expose previously inundated cultural resources to vandalism or increased wave action and wind erosion. Impacts to cultural resources at Shasta, Oroville and Folsom reservoirs would be less than significant.

Table 3.13-3. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and Alternative 4 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.4	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.4	0.4	0.0	0.0
Lake Oroville												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.9	-0.5	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.8	0.0	0.0
Folsom Reservoir												
W	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.2	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.6	0.5	0.0	0.0	-0.1	0.0	0.0	0.6	1.0	1.3	1.7	2.0
C	1.4	1.2	1.1	1.0	1.1	0.4	0.1	0.5	1.1	1.0	1.4	1.9

Note: Negative numbers indicate that Alternative 4 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase reservoir elevations.

Key: W = wet; AN = above normal; BN = below normal; D = dry; C = critical

Stored reservoir release transfers that draw down reservoir surface elevations at local reservoirs beyond historically low levels could affect cultural resources. Water transfers with stored reservoir water would be the same as the Proposed Action. Changes in water levels are expected to be in line with normal operations and impacts would be less than significant.

3.13.3 Comparative Analysis of Alternatives

Table 3.13-4 summarizes the effects of each of the action alternatives. The following text supplements the table by describing the magnitude of the effects under the action alternatives and No Action/No Project Alternative.

Table 3.13-4. Comparison of Alternatives

Potential Impact	Alternatives	Significance	Proposed Mitigation	Significance After Mitigation
Surface water facilities would operate in the same manner as existing conditions and no impacts to cultural resources would occur.	1	NCFEC	None	NCFEC
Transfers that draw down reservoir surface elevations beyond historically low levels could affect cultural resources.	2, 3, 4	LTS	None	LTS
Stored reservoir release transfers that draw down reservoir surface elevations at local reservoirs beyond historically low levels could affect cultural resources.	2, 3, 4	LTS	None	LTS

Key:
LTS = less than significant.
NCFEC = no change from existing conditions

3.13.3.1 No Action/No Project Alternative

Surface water facilities would operate in the same manner as existing conditions and no impacts to cultural resources would occur.

3.13.3.2 Alternative 2: Full Range of Transfers (Proposed Action)

Reservoir surface water elevation changes as a result of reservoir draw down could expose previously inundated cultural resources to vandalism and/or increased wave action and erosion. No impacts would occur at CVP, SWP and local reservoirs. Impacts would be less than significant.

3.13.3.3 Alternative 3: No Cropland Modification

Similar to the Proposed Action, no impacts would occur at CVP, SWP, and local reservoirs. Impacts would be less than significant.

3.13.3.4 Alternative 4: No Groundwater Substitution

Similar to the Proposed Action, no impacts would occur at CVP, SWP, and local reservoirs. Impacts would be less than significant.

3.13.4 Environmental Commitments/Mitigation Measures

There would be no significant impacts to cultural resources from implementation of the No Action/No Project Alternative or the action alternatives. Therefore, no environmental commitments/mitigation measures are proposed.

3.13.5 Potentially Significant Unavoidable Impacts

None of the action alternatives would result in potentially significant and unavoidable impacts on cultural resources.

3.13.6 Cumulative Effects

This cumulative effects assessment considers other programs or projects that could impact cultural resources within the same timeframe as the action alternatives considered in this EIS/EIR. Although cultural resources typically manifest as discrete archaeological sites, structures, or objects, the combination of programs or projects within a region can result in the cumulative loss of these resources and their data potential for archaeological research. Similarly, for historic landscapes, districts, and other geographically expansive areas, the combined effects of numerous programs or projects in disparate locations can result in a loss of integrity that diminishes the quality of the individual resources.

3.13.6.1 Alternative 2: Full Range of Transfers (Proposed Action)

Transfers, in combination with other cumulative projects, could draw down CVP and SWP reservoir surface elevations beyond historically low levels and affect cultural resources. Proposed transfers in combination with other cumulative projects could affect cultural resources in CVP and SWP reservoirs if multiple projects occurred in the same year, exacerbating the effects on reservoir elevation. Water operations in response to drought conditions could also result in lower reservoir elevations. The CVP and SWP reservoirs levels fluctuate frequently in response to normal water supply operations and hydrologic year types. Cultural resources within the operating zones are typically exposed to fluctuating water levels. All changes to reservoirs and rivers from the cumulative projects would remain within established water flow, water quality, and reservoir level standards. Therefore, the Proposed Action in combination with other cumulative actions would not result in a cumulative significant impact related to cultural resources in CVP and SWP reservoirs.

Transfers, in combination with other cumulative projects, could draw down local reservoir surface elevations beyond historically low levels and affect cultural resources. Reservoir elevations in local reservoirs fluctuate frequently due to water supply operations. Water transfers could further reduce water levels and expose cultural resources, but any fluctuations are expected to be within the operating zones of the reservoirs. Therefore, the Proposed Action in combination with other cumulative actions would not result in a cumulative significant impact related to cultural resources in non-Project reservoirs.

3.13.6.2 Alternative 3: No Cropland Modifications

The cultural resource impacts under Alternative 3 would be very similar to the Proposed Action. As under the Proposed Action, the cumulative impacts to cultural resources would be less than significant.

3.13.6.3 Alternative 4: No Groundwater Substitution

The cultural resource impacts under Alternative 4 would be very similar to the Proposed Action. As under the Proposed Action, the cumulative impacts to cultural resources would be less than significant.

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Section 3.14
Visual Resources

This section describes the existing aesthetic and visual resources within the area of analysis and discusses potential effects on visual resources from the proposed alternatives.

3.14.1 Affected Environment/Environmental Setting

3.14.1.1 Area of Analysis

The area of analysis for visual resources includes areas where cropland idling and crop shifting, groundwater substitution, reservoir release, and conservation transfers could occur in the Seller Service Area and areas that could receive water for agricultural uses in the Buyer Service Area. The counties included in the visual resources area of analysis are shown in Figure 3.14-1.

In addition to the counties, the area of analysis in the Seller Service Area includes: Sacramento, Feather, Bear, Yuba, American, Merced, and San Joaquin rivers, and Shasta, Oroville, Natoma, McClure, Camp Far West, French Meadow, Hell Hole, Folsom, and New Bullards Bar reservoirs. The area of analysis in the Buyer Service Area includes: San Luis Reservoir.

3.14.1.2 Regulatory Setting

3.14.1.2.1 Federal

National Wild and Scenic Rivers Act (NWSRA) (16 U.S. Code [USC] 1271 et seq.)

Created by Congress in 1968, the NWSRA protects selected rivers which “possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values” for generational enjoyment. Rivers or river segment protected by the Act are classified by the system as wild, scenic, or recreational depending on impoundments, condition of shorelines, and accessibility. Federal management of selected rivers is provided by the U.S. Bureau of Land Management, U.S. Forest Service (USFS), U.S. Fish and Wildlife Service and the National Park Service. While designation helps conserve the special character these rivers possess, it does not necessarily limit all types of developments and users. Management is encouraged to

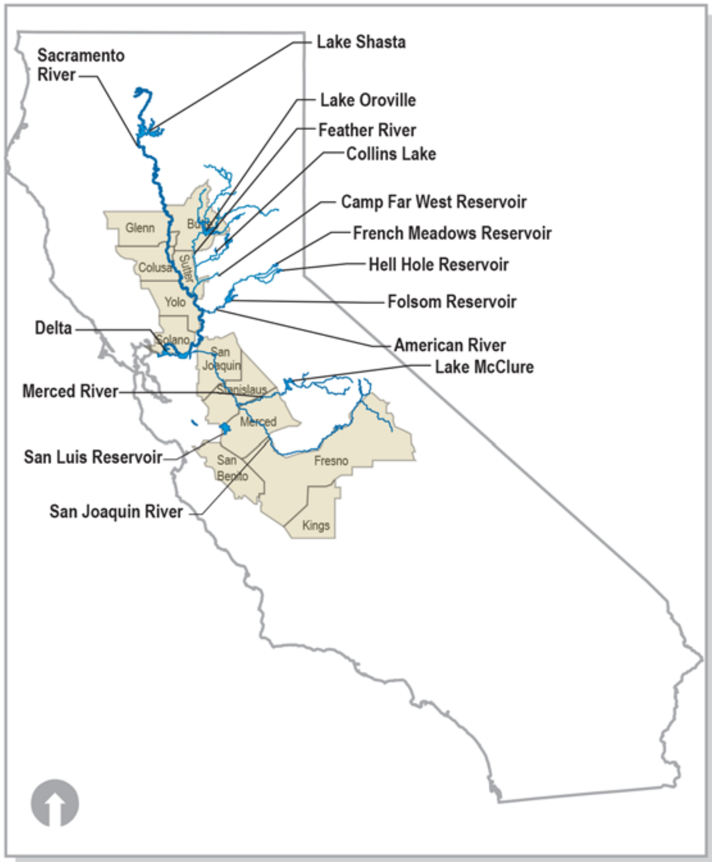

Figure 3.14-1. Visual Resource Area of Analysis

involve landowners, river users, and the general public when developing goals for river protection (National Wild and Scenic Rivers System [NWSRS] 2012). Portions of the American River, Feather River and Merced rivers, each included in this analysis, are designated as part of the NWSRS.

3.14.1.2.2 State

California Wild and Scenic Rivers Act (CWSRA) (Public Resources Code 5093.50-5093.70)

The goal of the CWSRA is to protect selected rivers "which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state." Rivers or river segment protected under the CWSRA are categorized in similar fashion as the NWSRA. A management plan is developed for the river segment and adjacent land according to its categorization. The CWSRA is administrated by the California Natural Resources Agency. Portions of the American River, included in this analysis, are designated as a California Wild and Scenic River System.

State Scenic Highways

The goal of the California Scenic Highway Program is to preserve and enhance the state's natural scenic resources. The laws governing the program establishes the State's responsibility to protect and enhance the states scenic resources by identifying portions of the State highway system and adjacent scenic corridors which require special conservation treatment. California Department of Transportation (Caltrans) manages the Scenic Highway Program but responsibility for developments along scenic corridors lies with local governmental agencies (Caltrans 2012). These state regulations are applicable to visual resources throughout the project area as seen from state scenic highways. State Scenic Highways included within this area of analysis include:

- A three mile stretch of State Route (SR) 151 from Shasta Dam to near Summit City
- Pacheco Pass (SR 152) (along San Luis Reservoir)

3.14.1.3 Existing Conditions

The following section describes the existing visual resources within the area of analysis. The presentation of information in this section is organized by service area, then by river region, which discusses both the river and reservoirs.

3.14.1.3.1 Seller Service Area

The Seller Service Area is bordered on the east by the Sierra Nevada, on the northwest by the Coast Ranges, and on the south by the Sacramento-San Joaquin Delta. Agriculture in the Sacramento Valley, forests in the upper watersheds, and grasslands and woodlands in the foothills characterize the region visually. Other low-elevation characteristics include occasional wetlands, vernal pools, and riparian areas. Much of the upper watershed on the east side of the Central Valley is forested, which limits views for motorists traveling through the area. Reservoirs in the region increase the level of scenic attractiveness at their maximum operating levels.

The following section describes visually sensitive areas, the landscape character, and scenic attractiveness of water bodies and adjacent scenic routes in the Seller Service Area.

Sacramento River Region

The Sacramento River originates above Shasta Reservoir in the north and flows through the Sacramento Valley to the Delta. Agriculture, a Class C visual resource (See Section 3.14.2.1.1 for a description of scenic attractiveness classifications), dominates the land uses near the river along the valley floor, while the upper watershed has retained its oak woodland, grasslands, forests, and rural character. Rice is one of the prominent crops grown in the Sacramento Valley and is noticeable along Interstate 5 (I-5) corridor. The Sacramento Valley also has many acres of field crops and orchards. An example of scenery surrounding the Sacramento River is shown in Figure 3.14-2.

Figure 3.14-2. Sacramento River

Shasta Reservoir is in the Shasta-Trinity National Forest in Shasta County and is the largest manmade reservoir in California. Lands adjacent to Shasta Reservoir consist primarily of steep slopes, upland vegetation, and coniferous forests (Class A and B visual resources). The shorelines of Shasta Reservoir vary from steep and rocky banks to coves of wooded flats. Figure 3.14-3 provides a view of the scenery surrounding Shasta Reservoir.

Figure 3.14-3. Shasta Dam and Shasta Reservoir

A three mile stretch of SR 151 from Shasta Dam to near Summit City is designated as a state scenic highway. This portion of road provides views of the Sacramento River, Shasta Reservoir, and distant hills.

In Sacramento County, a portion of SR 160 from the Contra Costa County line to the southern city limit of Sacramento is designated as a state scenic route. This road offers a glimpse of historic Delta agricultural areas and small towns along the Sacramento River (California Scenic Highway Mapping System [CSHMS] 2012). Views along this portion of roadway are considered Class A and B visual resources.

Feather River Region

Oroville Dam and Reservoir offer dramatic visual scenery surrounded by the Sierra Nevada foothills. Lake Oroville State Recreation Area (SRA) visitor center includes a 47-foot-high observation tower with two high-powered telescopes designed to give panoramic views of the dam and lake. Area views are also seen from developed facilities around the lake such as campgrounds, picnic areas, marinas, and boat launch areas (California Department of Parks and Recreation [CDPR] 2012). The recreational areas have Class A and B visual resources as does the reservoir. Figure 3.14-4 provides a view of the Lake Oroville area.

The lower Feather River terrain is generally flat. Riparian vegetation lines the river, with grassland and croplands in the adjacent agricultural areas. The southern portion of the Feather River, near Marysville, is adjacent to large areas of rice fields, as well as other field crops, which are considered Class C visual resources.

Figure 3.14-4. Lake Oroville

Yuba River Region

The Yuba River flows into the Feather River near Marysville. In this area agricultural lands are a dominant feature as well as grasslands and barren land, Class C visual resources.

American River Region

The American River originates in the Sierra Nevada and flows southwest to Folsom Reservoir and then into the Sacramento River near the City of Sacramento. Main tributaries include the North, Middle, and South Fork. These tributaries are known for their deep canyons, trails, and white water rafting are considered Class A and B high visual quality resources. Figure 3.14-5 provides a view of the Upper American River Region.

French Meadow Reservoir is along the Middle Fork of the American River in Placer County. The reservoir has a shoreline consisting of many varieties of trees and shrubs, as well as wildflowers. The vegetation provides suitable habitat for many wildlife species, and has opportunities for wildlife viewing. The reservoir and surrounding area are considered Class A and B visual resources.

Figure 3.14-5. Upper American River

Hell Hole Reservoir is located in El Dorado County on the Rubicon River, which flows to the Middle Fork of the American River. The reservoir has a 15-mile shoreline of rugged canyon walls. The reservoir's clear water adds to its visual character of the landscape and the shoreline is suitable for wildlife and bird viewing. The reservoir and surrounding area are considered Class A and B visual resources. Figure 3.14-6 provides a view of the visual resources surrounding Hell Hole Reservoir.

Figure 3.14-6. Hell Hole Reservoir

The North, Middle, and South Fork tributaries drain towards Folsom Reservoir. Folsom Reservoir is surrounded by rolling grasslands and wooded foothills. Figure 3.14-7 provides a view of Folsom Reservoir.

Figure 3.14-7. Folsom Reservoir

Folsom Reservoir SRA and Folsom Powerhouse State Historic Park offer multiple recreational opportunities and views of the reservoir. Folsom Reservoir contrasts sharply with the nearby rolling grassland and wooded foothill landscapes. About seven miles downstream of Folsom Dam on the

American River is Lake Natoma formed by Nimbus Dam. Lake Natoma regulates the releases from Folsom Dam made for power generation. The shoreline contains gravel banks, large boulders, and riparian vegetation. Both Lake Natoma and Folsom Reservoir are considered Class A and B visual resources.

The lower American River provides a variety of visual experiences, including steep bluffs, terraces, islands, backwater areas, and riparian vegetation. Figure 3.14-8 provides an aerial view of the lower American River. The water surface, gravel banks, natural grasses, smaller plants, and variety of trees along the river create a natural setting designated as a "protected area" in the American River Parkway Plan by Sacramento County for native plant restoration and habitat protection (Sacramento County 2008). The American River reach through Sacramento is a federally designated Wild and Scenic River. While the river flows through an urban area, the river is buffered by the American River Parkway. Sacramento County's American River Parkway Plan helps preserve the open spaces and natural resources along the American River that "provide Parkway users with a highly-valued natural setting and feeling of serenity, in the midst of a developed urban area" (Sacramento County 2008). The lower American River is considered a Class A visual resource.

Figure 3.14-8. Lower American River

Merced River Region

Lake McClure is a reservoir in the Sierra Nevada foothills on the Merced River. The lake has 80 miles of shoreline and is surrounded by pine and oak woodlands. The reservoir and facilities offer Class A and B visual resources.

The lower Merced River generally flows southwest from Lake McClure out of the foothills to the San Joaquin River. The land upstream from the San Joaquin

River is generally flat and primarily used for agricultural purposes such as field crops and livestock, a Class C visual resource.

3.14.1.3.2 Buyer Service Area

Visual resources that could be affected in the Buyer Service Area include San Luis Reservoir and agricultural areas of San Luis & Delta-Mendota Water Authority participating member agencies.

San Luis Reservoir lies in the western San Joaquin Valley, along historic Pacheco Pass (SR 152), a state scenic highway. The reservoir lies within the San Luis Reservoir SRA, which is surrounded by undeveloped open spaces, and has views of distant rolling hills and the Diablo Range (CDPR 2012). Within the San Luis Reservoir SRA a visitor center at the Romero Overlook offers information on the reservoir and provides telescopes for viewing the area around the reservoir. In the spring, the reservoir area offers wildflower-viewing opportunities (CDPR 2012). The reservoir and facilities offer Class A and B visual resources. Figure 3.14-9 provides an aerial view of the region surrounding San Luis Reservoir.

Figure 3.14-9. San Luis Reservoir and O'Neill Forebay

The majority of the Buyer Service Area is primarily designated for agriculture uses, including tree and row crops, typically a Class C visual resource. The agricultural lands of the Buyer Service Area include tree and row crops, grain, hay, and pasture. Short-term fallow fields also make up a large portion of the Buyer Service Area in any given season.

3.14.2 Environmental Consequences/Environmental Impacts

The following sections describe the environmental consequences/environmental impacts associated with each alternative.

3.14.2.1 Assessment Methods

This section presents the assessment methods applied to evaluate visual resources. Visual resource analysis tends to be subjective and generally expressed qualitatively. In order to analyze the importance of an impact on a visual resource, it is necessary to first classify the value of that visual resource.

3.14.2.1.1 Scenery Management System (SMS)

Assessment methods relied on the SMS developed by the U.S. Department of Agriculture (USDA), USFS in 1995 and outlined in *Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook Number 701*. The SMS helps determine landscapes and landscape character that are important for scenic attractiveness, based on commonly held perceptions of the beauty of landform, vegetation pattern, composition, surface water characteristics, and land use patterns.

The SMS is applied to the alternatives using the following steps:

- **Identify visually sensitive areas.** Sensitivity is considered highest for views seen by people driving to or from recreational activities, or along routes designated as scenic corridors. Views from relatively moderate to high-use recreation areas are also considered sensitive. For this analysis, rivers and reservoirs are considered visually sensitive areas. The analysis also evaluates effects to views of productive agricultural lands.

- **Define the landscape character.** Landscape character gives an area it's visual and cultural image, and consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique. Landscape character refers to images of the landscape that can be defined with a list of scenic attributes.

  The USDA defines these as the following:

  - Landform Patterns and Features: Includes characteristic landforms, rock features, and their juxtaposition to one another.

  - Surface Water Characteristics: The relative occurrence and distinguishing characteristics of rivers, streams, lakes, and wetlands. Includes features such as waterfalls and coastal areas.

- Vegetation Patterns: Relative occurrence and distinguishing characteristics of potential vegetative communities and the patterns formed by them.

- Land Use Patterns and Cultural Features: Visible elements of historic and present land use which contribute to the image and sense of place. Agriculture in the Central Valley contributes to the landscape character of the region.

- **Classify scenic attractiveness.** Scenic attractiveness classifications are a key component of the SMS and are used to classify visual features into the following categories:

  - **Class A, Distinctive –** Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide unusual, unique, or outstanding scenic quality. These landscapes have strong positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

  - **Class B, Typical –** Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide ordinary or common scenic quality. These landscapes have generally positive, yet common, attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance. Normally they would form the basic matrix within the ecological unit.

  - **Class C, Indistinctive** - Areas where landform, vegetation patterns, water characteristics, and cultural land use have low scenic quality. Often water and rockform of any consequence are missing in class C landscapes. These landscapes have weak of missing attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

Class A and B visual resources typically include state or federal parks, recreation, or wilderness areas. Rivers and reservoirs are typically considered Class A or B visual resources. Class C resources generally include areas that have low scenic quality and contain more common landscapes, such as agricultural lands. This analysis evaluates the effects to landscape character from cropland idling but does not evaluate the effects on scenic attractiveness from cropland idling transfers because agricultural is considered a Class C resource.

3.14.2.1.2 Transfers Operation Model

To determine visual effects on rivers and reservoirs, changes in reservoir elevations and river flows under the alternatives are compared to the No Action/No Project Alternative. This analysis uses hydrologic operations modeling to provide estimated changes in reservoir elevation, reservoir storage, and river flows. Appendix B describes the operations modeling methods and assumptions.

As stated above, reservoirs are generally Class A or B visual resources when their water surface elevations are near to or at their maximum. An adverse visual effect to reservoirs would occur if surface water elevation levels decreased to a level such that shoreline riparian vegetation were reduced or the "bathtub" ring was substantially larger than under the existing conditions or the No Action/No Project Alternative. As drawdown occurs during the summer and fall, an increasing area of shoreline devoid of vegetation appears in the area between the normal high water mark and the actual lake level. The exposed rock and soil of the drawdown zone contrasts with the vegetated areas above the high water level and with the lake's surface. See Figure 3.14-10 for a visual of Shasta Reservoir experiencing a bathtub ring effect; notice the exposed rock beneath the high water mark. As a consequence of reservoir operations, the level of scenic attractiveness tends to decline in July and August with increasing drawdown.

Source: Department of Water Resources (DWR) 2012
Figure 3.14-10. The "Bathtub Ring" Effect at Shasta Reservoir

A river would be adversely affected visually if the decrease in flow resulted in exposure of the riverbed, reduction of riparian vegetation along the banks, or changes to any important visual features of the river. Seasonal variations in flow levels of the rivers within this region provide for a wide range of aesthetic opportunities. Most of the rivers in this region have low flow regulations in place. Flow requirements for the various rivers and streams may be found in State Water Resources Control Board water right permits or licenses, Federal Energy Regulatory Commission hydropower licenses, and interagency agreements. Because minimum flow requirements exist and the flows are managed, riparian vegetation along the rivers reflects the results of current management practices. These practices include the use of levees for flood control, managed floodplains and overflow bypasses, and controlled releases from reservoirs. These practices may result in a narrow riparian corridor. Nonetheless, riparian vegetation remains an important visual aspect to all streams and river corridors. Water, shade, and dense cover distinguish the riparian areas from the surrounding land. Increased river flows typically improve visual resources by creating a fuller river, and improving riparian habitat along the river's banks. Reductions in river flows could result in substantial exposure of the river bed, reduction of riparian vegetation along the banks or changes to important visual features of the river.

3.14.2.2 Significance Criteria

Impacts on visual resources would be considered potentially significant if transfers would:

- Substantially degrade the existing landscape character and scenic attractiveness of Class A and B visual resources.

3.14.2.3 Alternative 1: No Action/No Project

3.14.2.3.1 Seller Service Area

There would be no impacts to existing landscape character or scenic attractiveness of Class A and B visual resources in the Seller Service Area. Under the No Action/No Project Alternative, water transfers would not be implemented. Any effects on visual resources in the Seller Service Area relating to lowered reservoir levels and decreased river flows would be the same as existing project operations. Therefore, the No Action/No Project Alternative reflects that of the affected environment and there would be no change from existing conditions on visual resources in the Seller Service Area.

3.14.2.3.2 Buyer Service Area

There would be no impacts to existing landscape character or scenic attractiveness of Class A and B visual resources in the Buyer Service Area. During dry years, the No Action/No Project Alternative could experience increased amounts of cropland idling because of decreased water supplies. Agricultural land is generally considered a Class C visual resource and by definition would not have an impact on Class A and B visual resources. There would be no change in visual resources compared to existing conditions under the No Action/No Project Alternative.

3.14.2.4 Alternative 2: Full Range of Transfers (Proposed Action)

3.14.2.4.1 Seller Service Area

Water transfers could degrade the existing landscape character or scenic attractiveness of Class A and B visual resources at Central Valley Project (CVP) and State Water Project (SWP) reservoirs. Under the Proposed Action, water supply operations related to water transfers could affect reservoir elevations in Shasta, Oroville, and Folsom reservoirs. Decreased reservoir elevations could affect the landscape character and scenic attractiveness of the reservoir. Table 3.14-1 shows the changes in reservoir elevations at these three reservoirs. The changes from the No Action/No Project Alternative would be minor, and the visual effect of the increased bathtub ring would not be noticeable. The impact to visual resources would be less than significant.

Table 3.14-1. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and the Proposed Action (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.6	1.8	1.4	-0.2	-0.2
C	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	1.2	3.7	0.4	-0.5	-0.5
Lake Oroville												
W	-0.5	-0.5	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
AN	-2.2	-2.2	-2.1	-1.4	-1.1	-0.1	-0.1	-0.1	0.0	-0.4	-0.3	-0.3
BN	-0.3	-0.4	-0.6	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.6	-0.7	-0.8
D	-0.7	-0.7	-0.6	-0.6	-0.6	-0.4	-0.4	0.5	0.6	0.0	-1.2	-0.7
C	-1.7	-2.2	-2.3	-2.3	-2.1	-1.8	-1.9	-1.7	-1.4	-0.9	-2.9	-3.0
Folsom Reservoir												
W	0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.5	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.5
BN	-0.3	-0.4	-0.6	-0.5	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.2
D	0.3	0.2	-0.1	-0.2	-0.3	-0.1	-0.1	0.8	1.4	1.4	1.6	1.8
C	1.1	0.8	0.6	0.5	0.6	-0.1	0.0	0.5	1.5	1.5	1.0	1.4

Note: Negative numbers indicate that the Proposed Action would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that the Proposed Action would increase reservoir elevations.
Key: Sac Yr Type = year type, W = wet, AN = above normal, BN = below normal, D = dry, C = critical

Water transfers could degrade the existing landscape character or scenic quality of Class A and B visual resources along surface water bodies. Decreased river flows could affect the visual quality of these rivers. Table 3.14-2 shows changes in river flows on the Sacramento, Feather, American, and Merced rivers. As described above, reservoir operators would need to continue releases to meet downstream flow and water quality standards; these required releases would prevent any changes from substantially changing the visual quality of the channel.

Changes in river flows under the Proposed Action would be within normal river flow fluctuation and would not result in a notable difference in the landscape character of the river. The Proposed Action would have a less-than-significant impact on the landscape character and scenic attractiveness of existing visual resources along the Sacramento, Feather, American, and Merced rivers.

Table 3.14-2. Changes in River Flows between the No Action/No Project Alternative and the Proposed Action (in cfs)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sacramento River at Wilkins Slough												
W	-8.9	-5.1	-8.0	-10.7	-6.3	-5.3	-5.0	-3.2	-1.9	-2.4	-1.4	-1.3
AN	-8.3	-8.2	-27.2	-19.6	-18.2	-7.9	-8.2	-44.3	-2.6	7.2	7.2	7.8
BN	-4.5	-3.7	-3.5	-3.5	-3.5	-3.3	-4.3	0.0	0.0	-3.3	0.0	-3.0
D	-11.0	-14.1	-10.1	-11.0	-7.9	-7.6	-53.1	-33.5	-252.6	465.6	758.9	162.0
C	-21.5	-15.8	-15.2	-14.1	-5.2	-15.1	-0.2	-114.5	-274.4	1,517.7	838.4	356.1
All	-11.5	-9.3	-13.0	-12.6	-8.3	-8.1	-13.0	-38.5	-102.2	394.8	307.3	102.6
Lower Feather River												
W	0.2	-13.8	-32.1	-25.8	-52.4	-16.4	-10.4	-9.1	-3.5	-1.1	7.1	6.4
AN	16.3	-11.7	-9.9	-55.2	-55.8	-196.8	-15.5	-58.8	-22.0	86.1	-39.3	-31.2
BN	5.3	5.4	13.4	-5.0	-7.5	-9.6	-9.2	-7.2	0.0	0.7	10.7	4.0
D	-1.9	-10.0	-8.2	-13.3	-25.2	-35.2	-7.9	-109.4	-16.0	120.1	240.8	-35.7
C	-11.0	-8.5	-0.3	-18.5	-56.0	-21.1	-0.6	-0.5	-31.3	113.9	318.3	49.2
All	0.7	-10.5	-14.8	-26.1	-46.3	-52.1	-8.8	-33.7	-14.5	59.4	104.4	1.0
American River at H Street												
W	16.4	38.7	-39.7	-56.2	-22.4	-2.7	-1.3	8.3	-13.7	4.1	-1.6	3.5
AN	21.2	12.1	0.9	-173.0	-235.7	-34.9	-1.3	-1.3	1.8	32.7	36.5	41.0
BN	12.1	11.9	21.5	-0.4	-79.4	-0.5	-0.4	-0.5	12.3	13.6	-0.3	8.2
D	25.4	8.9	43.7	-53.1	-22.0	-73.9	-114.5	-63.7	-0.9	130.5	80.0	56.9
C	51.5	40.0	30.3	16.9	17.0	25.8	-23.3	19.4	-45.9	195.1	141.3	82.4
All	25.8	27.4	0.2	-57.9	-55.2	-14.9	-25.7	-4.3	-13.8	71.4	49.0	36.1
River at San Joaquin River												
W	0.0	0.0	0.0	0.0	-41.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	-81.3	0.0	0.0	-84.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	127.5	71.4	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	85.0	47.6	0.0	0.0	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	36.4	20.4	0.0	0.0	0.0	0.0
All	0.0	0.0	0.0	0.0	-15.9	-14.4	30.0	16.8	-14.8	0.0	0.0	0.0

Note: Negative numbers indicate that the Proposed Action would decrease river flows compared to the No Action/No Project Alternative; positive numbers indicate that the Proposed Action would increase river flows.
Key: Sac Yr Type = year type, W = wet, AN = above normal, BN = below normal, D = dry, C = critical

Stored reservoir release transfers could substantially degrade the existing landscape character or scenic attractiveness of Class A and B visual resources participating reservoirs. Under the Proposed Action, stored reservoir release transfers could affect elevations at participating reservoirs, which could affect the visual quality of the reservoir. The reservoirs, however, would not drop below the conservation pool at any of the facilities (which defines the bottom of the bathtub ring).

Under the Proposed Action, elevation changes would be of an insufficient magnitude to result in perceptible changes to the visual quality of the reservoirs. Under the Proposed Action, reservoir release would have a less-than-significant impact on the landscape character and scenic attractiveness of existing visual resources at participating reservoirs.

Cropland idling transfers could substantially degrade the existing landscape character and scenic attractiveness of Class A and B visual resources. Agricultural lands are typically considered a Class C visual resource and by definition would not have an impact on Class A and B visual resources. Under the Proposed Action, crop idling would have a less-than-significant impact on the landscape character and scenic attractiveness of existing visual resources in the Sacramento River Region.

3.14.2.4.2 Buyer Service Area

Water transfers could substantially degrade the existing landscape character and quality in the Buyer's Service Area. The conveyance of transfer water through existing conveyance channels in the Buyers Service Area could be visible from adjacent land, vantage points, and roadways. Flows would be similar to what is normally flowing in these channels but would occur for a longer period of time, and could potentially extend into the summer months during years when transfer water is available. Because the conveyance channels are generally located within and near agricultural areas, they are considered Class C resources. Any changes in flow in conveyance channels would not affect Class A or B resources. The effects of increased flows in export conveyance channels would have a less-than-significant impact on visual resources in the Buyers Service Area.

3.14.2.5 Alternative 3: No Cropland Modifications

This section describes the potential visual resources effects of the No Cropland Modifications Alternative.

3.14.2.5.1 Seller Service Area

Water transfers could degrade the existing landscape character or scenic attractiveness of Class A and B visual resources at CVP and SWP reservoirs. Under Alternative 3, water supply operations related to water transfers could affect reservoir elevations in Shasta, Oroville, and Folsom reservoirs (similar to the Proposed Action). Decreased reservoir elevations could affect the landscape character and scenic attractiveness of the reservoir. Table 3.14-3 shows the changes in reservoir elevations at these three reservoirs. The changes from the No Action/No Project Alternative would be minor, and the visual effect of the increased bathtub ring would not be noticeable. The impact to visual resources would be less than significant.

Table 3.14-3. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and Alternative 3 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.4	1.3	0.9	-0.2	-0.2
C	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	0.5	1.8	-0.2	-0.5	-0.5
Lake Oroville												
W	-0.5	-0.5	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
AN	-2.2	-2.2	-2.1	-1.4	-1.1	-0.1	-0.1	-0.1	0.0	-0.4	-0.3	-0.3
BN	-0.3	-0.4	-0.6	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.6	-0.7	-0.8
D	-0.7	-0.7	-0.6	-0.6	-0.6	-0.4	-0.4	0.4	0.5	0.0	-1.2	-0.7
C	-1.7	-2.2	-2.3	-2.3	-2.1	-1.8	-1.9	-1.8	-1.5	-1.8	-2.9	-3.0
Folsom Reservoir												
W	0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.5	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.5
BN	-0.3	-0.4	-0.6	-0.5	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.2
D	0.3	0.2	-0.1	-0.2	-0.3	-0.1	-0.1	0.8	1.4	1.4	1.6	1.8
C	1.1	0.8	0.6	0.5	0.6	-0.1	0.0	0.5	1.5	1.5	1.0	1.4

Note: Negative numbers indicate that Alternative 3 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase reservoir elevations.

Key: Sac Yr Type = year type, W = wet, AN = above normal, BN = below normal, D = dry, C = critical

Water transfers could degrade the existing landscape character or scenic quality of Class A and B visual resources along surface water bodies. Under Alternative 3, decreased river flows could affect the visual quality of these rivers. Table 3.14-4 shows changes in river flows on the Sacramento, Feather, American, and Merced rivers. Changes in river flows under Alternative 3 would be within normal river flow fluctuation and would not result in a notable difference in the landscape character of the river. Alternative 3 would have a less-than-significant impact on the landscape character and scenic attractiveness of existing visual resources along the Sacramento, Feather, American, and Merced rivers.

Table 3.14-4. Changes in River Flows between the No Action/No Project Alternative and Alternative 3 (in cfs)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sacramento River at Wilkins Slough												
W	-8.9	-5.1	-8.0	-10.7	-6.3	-5.3	-5.0	-3.2	-1.9	-2.4	-1.4	-1.3
AN	-8.3	-8.2	-27.2	-19.6	-18.2	-7.9	-8.2	-44.3	-2.6	7.2	7.2	7.8
BN	-4.5	-3.7	-3.5	-3.5	-3.5	-3.3	-4.3	0.0	0.0	-3.3	0.0	-3.0
D	-11.0	-14.1	-10.1	-11.0	-7.9	-7.6	-53.1	-33.5	-248.9	294.9	452.1	75.6
C	-21.5	-15.8	-15.2	-14.1	-5.2	-15.1	-0.2	-119.3	-273.7	715.3	251.9	102.1
All	-11.5	-9.3	-13.0	-12.6	-8.3	-8.1	-13.0	-39.5	-101.5	199.5	132.4	35.1
Lower Feather River												
W	0.2	-13.8	-32.1	-25.8	-52.4	-16.4	-10.4	-9.1	-3.5	-1.1	7.1	6.4
AN	16.3	-11.7	-9.9	-55.2	-55.8	-196.8	-15.5	-58.8	-22.0	86.1	-39.3	-31.2
BN	5.3	5.4	13.4	-5.0	-7.5	-9.6	-9.2	-7.2	0.0	0.7	10.7	4.0
D	-1.9	-10.0	-8.2	-13.3	-25.2	-35.2	-7.9	-106.9	-16.0	102.1	228.7	-40.7
C	-11.0	-8.5	-0.3	-18.5	-56.0	-21.1	-0.6	-0.5	-29.5	185.5	197.5	40.6
All	0.7	-10.5	-14.8	-26.1	-46.3	-52.1	-8.8	-33.3	-14.1	71.0	77.4	-1.6
American River at H Street												
W	16.4	38.7	-39.7	-56.2	-22.4	-2.7	-1.3	8.3	-13.7	4.1	-1.6	3.5
AN	21.2	12.1	0.9	-173.0	-235.7	-34.9	-1.3	-1.3	1.8	32.7	36.5	41.0
BN	12.1	11.9	21.5	-0.4	-79.4	-0.5	-0.4	-0.5	12.3	13.6	-0.3	8.2
D	25.4	8.9	43.7	-53.1	-22.0	-73.9	-114.5	-63.7	-0.9	130.5	80.0	56.9
C	51.5	40.0	30.3	16.9	17.0	25.8	-23.3	20.5	-44.3	191.3	142.5	82.4
All	25.8	27.4	0.2	-57.9	-55.2	-14.9	-25.7	-4.1	-13.5	70.6	49.3	36.1
Merced River at San Joaquin River												
W	0.0	0.0	0.0	0.0	-41.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	-81.3	0.0	0.0	-84.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	127.5	71.4	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	85.0	47.6	0.0	0.0	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	36.4	20.4	0.0	0.0	0.0	0.0
All	0.0	0.0	0.0	0.0	-15.9	-14.4	30.0	16.8	-14.8	0.0	0.0	0.0

Note: Negative numbers indicate that Alternative 3 would decrease river flows compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase river flows.

Key: Sac Yr Type = year type, W = wet, AN = above normal, BN = below normal, D = dry, C = critical

Stored reservoir release transfers could substantially degrade the existing landscape character or scenic attractiveness of Class A and B visual resources participating reservoirs. The impacts to visual resources at reservoirs participating in stored reservoir water transfers would be the same under Alternative 3 as the Proposed Action; these impacts would be less than significant.

3.14.2.5.2 Buyer Service Area

Water transfers could substantially degrade the existing landscape character and quality in the Buyer's Service Area. The impacts to visual resources in the

Buyer Service Area would be the same under Alternative 3 as the Proposed Action; these impacts would be less than significant.

3.14.2.6 Alternative 4: No Groundwater Substitution

This section describes the potential visual resources effects of the No Groundwater Substitution Alternative.

3.14.2.6.1 Seller Service Area

Water transfers could degrade the existing landscape character or scenic attractiveness of Class A and B visual resources at CVP and SWP reservoirs. Under Alternative 4, water supply operations related to water transfers could affect reservoir elevations in Shasta, Oroville, and Folsom reservoirs (similar to the Proposed Action). Decreased reservoir elevations could affect the landscape character and scenic attractiveness of the reservoir. Table 3.14-5 shows the changes in reservoir elevations at these three reservoirs. The changes from the No Action/No Project Alternative would be minor, and the visual effect of the increased bathtub ring would not be noticeable. The impact to visual resources would be less than significant.

Table 3.14-5. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and Alternative 4 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.4	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.4	0.4	0.0	0.0
Lake Oroville												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.9	-0.5	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.8	0.0	0.0
Folsom Reservoir												
W	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.2	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.6	0.5	0.0	0.0	-0.1	0.0	0.0	0.6	1.0	1.3	1.7	2.0
C	1.4	1.2	1.1	1.0	1.1	0.4	0.1	0.5	1.1	1.0	1.4	1.9

Note: Negative numbers indicate that Alternative 4 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase reservoir elevations.

Key: Sac Yr Type = year type, W = wet, AN = above normal, BN = below normal, D = dry, C = critical

Water transfers could degrade the existing landscape character or scenic quality of Class A and B visual resources along surface water bodies. Under Alternative 4, decreased river flows could affect the visual quality of these rivers. Table 3.14-6 shows changes in river flows on the Sacramento, Feather, American, and Merced rivers. Changes in river flows under Alternative 4 would be within normal river flow fluctuation and would not result in a notable difference in the landscape character of the river. Alternative 4 would have a less-than-significant impact on the landscape character and scenic attractiveness of existing visual resources along the Sacramento, Feather, American, and Merced rivers.

Table 3.14-6. Changes in River Flows between the No Action/No Project Alternative and Alternative 4 (in cfs)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sacramento River at Wilkins Slough												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-73.8	279.9	279.9	89.1
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-31.7	-108.3	1,024.0	516.0	255.9
All	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6.5	-35.3	260.2	155.6	68.4
Lower Feather River												
W	0.0	0.0	-6.3	-6.3	0.0	-3.9	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	-40.7	0.0	-16.8	0.0	-33.6	0.0	54.2	-40.7	-14.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	-12.0	-19.5	0.0	-24.3	0.0	-2.1	237.2	-66.0
C	0.0	0.0	0.0	0.0	-44.6	-5.8	0.0	0.0	-13.2	62.2	127.2	12.4
All	0.0	0.0	-2.4	-9.6	-11.3	-9.1	0.0	-10.2	-2.7	22.0	60.9	-11.6
American River at H Street												
W	9.7	36.2	-28.6	-18.6	-20.7	-1.1	0.0	9.6	-13.5	-0.5	-0.8	0.0
AN	10.4	4.4	1.7	-132.1	-233.9	-33.2	0.3	0.1	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	20.8	11.7	57.6	-52.2	-21.2	-72.2	-113.6	-24.3	0.0	55.6	33.9	32.2
C	36.5	28.6	31.5	18.2	18.3	26.8	26.8	38.6	-6.8	97.4	59.6	55.8
All	16.7	22.6	6.0	-35.9	-48.8	-13.5	-14.5	7.3	-6.6	29.7	17.9	17.2
Merced River at San Joaquin River												
W	0.0	0.0	0.0	0.0	-41.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-84.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	162.6	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.7	0.0	0.0
All	0.0	0.0	0.0	0.0	-15.9	0.0	0.0	0.0	-14.8	43.1	0.0	0.0

Note: Negative numbers indicate that Alternative 4 would decrease river flows compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase river flows.
Key: Sac Yr Type = year type, W = wet, AN = above normal, BN = below normal, D = dry, C = critical

Stored reservoir release transfers could substantially degrade the existing landscape character or scenic attractiveness of Class A and B visual resources participating reservoirs. The impacts to visual resources at reservoirs participating in stored reservoir water transfers would be the same under Alternative 4 as the Proposed Action; these impacts would be less than significant.

Cropland idling transfers could substantially degrade the existing landscape character and scenic attractiveness of Class A and B visual resources. The impacts to visual resources at from cropland idling transfers would be the same under Alternative 4 as the Proposed Action; these impacts would be less than significant.

3.14.2.6.2 Buyer Service Area

Water transfers could substantially degrade the existing landscape character and quality in the Buyer's Service Area. The impacts to visual resources in the Buyer Service Area would be the same under Alternative 4 as the Proposed Action; these impacts would be less than significant.

3.14.3 Comparative Analysis of Alternatives

Table 3.14-7 summarizes the effects of each of the action alternatives. The following text supplements the table by describing the magnitude of the effects under the action alternatives and No Action/No Project Alternative.

Table 3.14-7. Comparative Analysis of Alternatives

Potential Impacts	Alternative(s)	Significance	Proposed Mitigation	Significance after Mitigation
There would be no impacts to existing landscape character or scenic attractiveness of Class A and B visual resources in the Seller Service Area	1	NCFEC	None	NCFEC
There would be no impacts to existing landscape character or scenic attractiveness of Class A and B visual resources in the Buyer Service Area	1	NCFEC	None	NCFEC
Water transfers could degrade the existing landscape character or scenic attractiveness of Class A and B visual resources at CVP and SWP reservoirs	2, 3, 4	LTS	None	LTS
Water transfers could degrade the existing landscape character or scenic quality of Class A and B visual resources along surface water bodies	2, 3, 4	LTS	None	LTS
Stored reservoir release transfers could substantially degrade the existing landscape character or scenic attractiveness of Class A and B visual resources participating reservoirs	2, 3, 4	LTS	None	LTS
Cropland idling transfers could substantially degrade the existing landscape character and scenic attractiveness of Class A and B visual resources	2, 4	LTS	None	LTS
Water transfers could substantially degrade the existing landscape character and quality in the Buyer's Service Area	2, 3, 4	LTS	None	LTS

Key: LTS = less than significant, None = no mitigation

3.14.3.1 No Action/No Project Alternative

There would be no impacts on visual resources.

3.14.3.2 Alternative 2: Full Range of Transfers (Proposed Action)

Water transfers under the Proposed Action could affect reservoir elevations and river flows in the area of analysis; however, reported changes in elevation and flow would generally be within normal seasonal fluctuations and would not be expected to result in substantial changes to visual resources.

3.14.3.3 Alternative 3: No Cropland Modifications

Alternative 3 would not include cropland idling, so the minor visual effects associated with idle fields would not occur. The remaining potential effects to visual resources would be the same as the Proposed Action.

3.14.3.4 Alternative 4: No Groundwater Substitution

Effects to visual resources would be the same under Alternative 4 as the Proposed Action.

3.14.4 Environmental Commitments/Mitigation Measures

There are no significant visual resource impacts; therefore no mitigation measures are required.

3.14.5 Potentially Significant Unavoidable Impacts

There are no expected significant and unavoidable impacts to visual resources.

3.14.6 Cumulative Effects

The timeline for the visual resources cumulative effects analysis extends from 2015 through 2024, a ten year period. The relevant geographic study area for the cumulative effects analysis is the same area of analysis as shown in Figure 3.14-1. The following section analyzes the cumulative effects using the project method, which is further described in Chapter 4. Chapter 4 describes the projects included in the cumulative condition.

The cumulative analysis for visual resources considers projects and conditions that could affect landscape character or scenic attractiveness of existing visual resources within the area of analysis.

3.14.6.1 Alternative 2: Full Range of Transfers (Proposed Action)

3.14.6.1.1 Seller Service Area

Water transfers, in combination with other cumulative projects, could degrade the existing landscape character or scenic attractiveness of Class A and B visual resources. Proposed cropland modifications and groundwater substitution transfers in combination with other cumulative projects could affect visual resources if multiple transfers occurred in the same year, elevating the effects on reservoir elevation and river flows. This could substantially degrade the existing landscape character or scenic attractiveness of Class A and B visual resources in the Sacramento River Region.

Existing and foreseeable water acquisition programs with potential to affect reservoir elevation and river flows in the Seller Service Area include the SWP Transfers, which are described in Chapter 4. The proposed additional transfers could contribute to the additional fluctuation of reservoir elevation and river flows, if transfers occurred within the same year. Increased elevation and river flows typically improve visual resources by creating a fuller reservoir or river, and improving riparian habitat along shorelines. Reductions in elevation and river flows could result in substantial exposure of a reservoir's bathtub ring, or the riverbed, reduction in riparian vegetation along the shore or change important visual features a part of the reservoir or river. All changes to reservoirs and rivers from the cumulative projects would remain within established water flow, water quality, and reservoir level standards. Therefore, the Proposed Action in combination with other cumulative actions would not result in a cumulative significant impact related to visual resources.

3.14.6.2 Alternative 3: No Cropland Modifications

The visual impacts under Alternative 3 would be very similar to the Proposed Action. As under the Proposed Action, the cumulative impacts to visual resources would be less than significant.

3.14.6.3 Alternative 4: No Groundwater Substitution

The visual impacts under Alternative 4 would be very similar to the Proposed Action. As under the Proposed Action, the cumulative impacts to visual resources would be less than significant.

3.14.7 References

CDPR. 2012. San Luis Reservoir SRA. Accessed on: 07 19 2012. Available at: http://www.parks.ca.gov.

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Section 3.15 Recreation

This section presents the existing recreational opportunities within the area of analysis and discusses potential effects on recreation from the proposed alternatives. Transfers could affect reservoir levels and river flows, which could affect user days at each recreation resource in the area of analysis.

3.15.1 Affected Environment/Environmental Setting

This section provides a description of the recreational facilities with the potential to be affected by the action alternatives and an overview of the regulatory setting associated with recreation.

3.15.1.1 Area of Analysis

Figure 3.15-1 shows the rivers and reservoirs in the area of analysis for recreation. In the Seller Service Area, the area of analysis includes rivers, reservoirs, waterfront parks, and other recreational amenities that would be affected by changes to the associated river flow and/or reservoir levels as a result of water transfers. In the Buyer Service Area, the only recreation facility that could be affected by water transfers is San Luis Reservoir. The water would be conveyed to buyers through canals and aqueducts that are not recreational facilities; therefore, these conveyance structures are not part of the area of analysis.

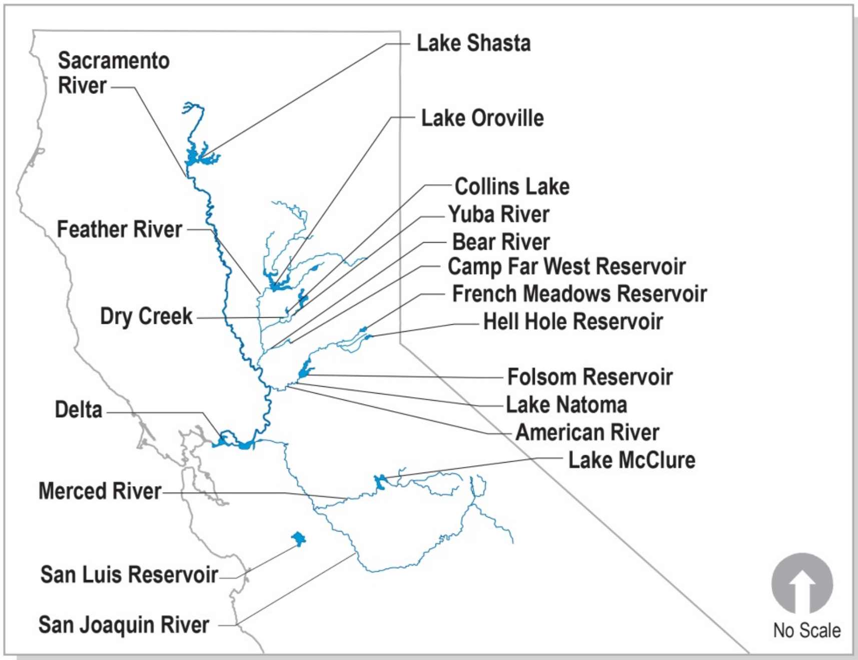

Figure 3.15-1. Recreation Area of Analysis

3.15.1.2 Regulatory Setting

There are no state or federal regulations relevant to recreation for the analysis of long-term water transfers.

3.15.1.3 Existing Conditions

The following section describes the existing recreational areas and types of recreational opportunities within the area of analysis.

3.15.1.3.1 Seller Service Area

Sacramento River

Shasta Reservoir is the major reservoir on the Sacramento River. Shasta Reservoir is managed by the U.S. Forest Service (USFS) Shasta-Trinity National Forest (NF), Shasta Unit. Popular water-related recreational activities at Shasta Reservoir include boating, water-skiing, swimming, and fishing. Both public and private boat launch facilities are available. Table 3.15-1 lists the public boat launches and the number of lanes available at different lake levels. The busiest visitor season is between May and September (USFS Shasta-Trinity NF 2014). In 2008, approximately 47,847 day use tickets were sold at Shasta-Trinity National Recreation Area (NRA) (USFS Natural Resource Manager Shasta-Trinity NRA 2014).

Table 3.15-1. Shasta Reservoir Water Elevation Requirements for Boat Launching

Boat Launch Site	Launching Lanes Available (lake drawdown below elevation 1,067 in feet)
Antlers	4 lanes from 0 to 50 4 lanes from 50 to 75
Bailey Cove	2 lanes from 0 to 50
Centimudi	4 lanes from 0 to 50 4 lanes from 50 to 75 3 lanes from 75 to 95 2 lanes from 95 to 115 2 lanes from 115 to 140 2 lanes from 140 to 160 2 lanes from 160 to 210
Hirz Bay	3 lanes from 0 to 50 3 lanes from 50 to 75 2 lanes from 75 to 95 1 lane from 95 to 115
Jones Valley	4 lanes from 0 to 50 2 lanes from 50 to 75 2 lanes from 75 to 95 2 lanes from 95 to 115 2 lanes from 115 to 140 1 lanes from 140 to 160 1 lanes from 160 to 210
Packers Bay	4 lanes from 0 to 50 2 lanes from 50 to 75 2 lanes from 75 to 95 2 lanes from 95 to 115
Sugarloaf	2 lanes from 75 to 95 2 lanes from 95 to 115 2 lanes from 115 to 140 2lanes from 140 to 160

Source: ShastaLake.com 2014

The Sacramento River encompasses many water dependent recreational areas. Along most of the upper Sacramento River, fishing, rafting, canoeing, kayaking, swimming, and power boating are popular activities. Boating and rafting opportunities are dependent on optimal river flows above 5,000 cubic feet per second (Bureau of Land Management [BLM] n.d.).

Large recreational areas along the river between Red Bluff and Sacramento are owned and/or managed by private companies and several federal, state and local agencies including the California Department of Parks and Recreation (CDPR), Bureau of Reclamation (Reclamation), USFS, U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife, Sutter County, Glenn County, Tehama County, Yolo County, Sacramento County, City of Red Bluff. These areas include parks, wildlife refuges, fishing and hunting accesses, wildlife viewing areas, campsites, and boat launch facilities. California State Park day use and camping visitor statistics are available for some recreation areas for fiscal year 2011/2012. Bidwell-Sacramento River State Recreation Area (SRA) reported 51,211 visitors and Colusa-Sacramento River SRA reported 11,725 visitors (CDPR 2012).

3.15.1.3.2 American River

Figure 3.15-2 shows the American River and associated tributaries and reservoirs within the area of analysis. Hell Hole and French Meadows reservoirs are upstream of Folsom Reservoir within the Tahoe NF and managed by the Placer County Water Agency.

Recreational opportunities at Hell Hole Reservoir include: camping, boating and fishing. One boat ramp is available on the west side and is best used in the late spring to mid-summer because the water level of lake drops later in the summer. Usually, only small boats are seen on the reservoir due to its remote location. The boat ramp at Hell Hole is accessible when the surface water elevation is at 4,530 feet or above. Hydrologic data indicates that the boat ramp has remained open during the recreation season in most water year types except during dry and critically dry years where the ramp may close in mid-August and early September respectively. Placer County Water Agency conducted vehicle counts from May 2007 through May 2008 at all developed recreation facilities including the boat ramp and parking areas. Over the year, an average of 4.3 vehicles with boat trailers, with a maximum of 13 vehicles with boat trailers, were counted on weekdays; and an average of 8.1 vehicles with boat trailers, with a maximum of 21 vehicles with boat trailers, were present at Hell Hole Reservoir (Placer County Water Agency 2010).

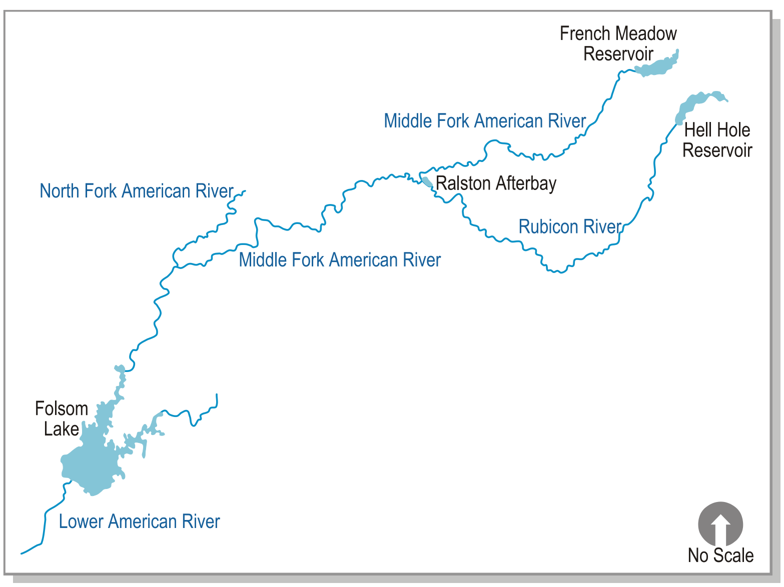

Figure 3.15-2. North and Middle Forks of the American River

Recreational opportunities at French Meadows Reservoir include: camping, picnicking, fishing and boating. The boat ramp at French Meadows Reservoir is accessible when the surface water elevation is at 5,200 feet or above (Placer County Water Agency 2010). Boat ramps are available on both the south and north shores, although water levels drop in the summer months (Placer County Commerce 2014). Hydrologic data indicates that the boat ramps have remained open during the recreation season in all water year types except during critically dry years where the ramp may close in early August. Placer County Water Agency conducted vehicle counts from May 2007 through May 2008 at all developed recreation facilities including the boat ramp and parking areas. Over the year an average of 2.1 vehicles with boat trailers, with a maximum of nine vehicles with boat trailers, were counted on weekdays; and an average of 4.5 vehicles with boat trailers, with a maximum of 13 vehicles with boat trailers, were present at French Meadows Reservoir (Placer County Water Agency 2010).

Folsom Reservoir is within the Folsom Reservoir SRA. Boating, fishing and waterskiing are the primary water related activities at Folsom Reservoir. Table 3.15-2 describes the various boat ramps and guidance for usability according to surface water elevation. Hiking, biking, camping, picnicking, and horseback riding are also popular activities within the SRA. Lake Natoma, downstream of Folsom Dam, is also within the Folsom Reservoir SRA. Non-motorized boats and motorized boats with a maximum speed limit of five miles per hour are allowed on Lake Natoma. The lake is popular for rowing, kayaking, fishing, and canoeing. The California State University, Sacramento Aquatics Sports Center is located on Lake Natoma and offers a variety of non-motorized boating activities. It also hosts rowing competitions each year (CDPR 2013b). Visitor attendance at Folsom SRA was 1,491,025 and included day use and camping visitors for fiscal year 2011/2012 (CDPR 2012).

Table 3.15-2. Folsom Reservoir Water Elevation Guidelines for Boat Launching

Boat Launch Site	Surface Water Elevations (in Feet)
Granite Bay	Low Water – 2 lanes between 369 and 396 Stage 1 - 2 lanes between 397and 430 Stage 2 – 8 lanes between 420 and 438 Stage 3 – 10 lanes between 430 and 452. Stage 4 – 2 lanes between 450 and t465 5% - 4 lanes between 408 and465
Folsom Point	2 lanes between 405 and 465 above
Browns Ravine	4 lanes between 399 and 465 4 lanes between 380 and 435
Rattlesnake Bar	2 lanes between 428 and 465
Peninsula	Old Ramp - 1 lane between 410 and465 New Ramp - 2 lanes between 434 and 465

Source: Folsom Lake Marina 2014.

The north fork of the American River from 0.3 miles upstream of Heath Springs to 1,000 feet upstream of the Colfax-Iowa Hill Bridge, and the lower American River from the confluence with the Sacramento River to Nimbus Dam have been designated as National Wild and Scenic Rivers (National Wild & Scenic Rivers System 2014).

Along the entire American River, whitewater boating is ideal during the boating season with many commercial rafting operations and private boaters. The north fork is popular for boating between April and June and provides more advanced boating levels. The middle and south forks are more popular during the summer months with less advanced terrain and some flat water along the south fork. Other recreational opportunities include kayaking, fishing, biking, hiking and horseback riding (The American River 2014).

3.15.1.3.3 Yuba River

Numerous rivers, creeks, tributaries, and reservoirs along the Yuba River offer recreation opportunities and receive extensive use. Boating on the North Yuba River is challenging and recommended for expert boaters during the spring and is known for good fishing during the rest of year. The South Yuba River offers many activities including boating, camping, fishing, hiking and horseback riding. The South Yuba River has been designated as a California Wild and Scenic River (California Legislative Council 2014). Visitor attendance at the South Yuba River State Park was 662,930 visitors during fiscal year 2011/2012 (CDPR 2012).

Merle Collins Reservoir, also known as Collins Lake, is a year-round recreation area offering camping with lakefront recreational vehicle sites, fishing, boating, and day-use beach area. A boat launch, marina and rental boats are available. Every spring, over 50,000 trout ranging from three to eight pounds are planted (Collins Lake 2014). Visitor days in 2011 included 24,379 persons for day use and 128,112 persons for overnight camping (Young 2014).

Fishing in Dry Creek is hindered in the summer and fall because flows are very low or nonexistent. The water temperatures near its confluence with the Yuba River are not attractive to salmon, which do not enter Dry Creek from the Yuba River (Browns Valley Irrigation District [ID] 2009).

3.15.1.3.4 Feather River

Lake Oroville is within the Lake Oroville SRA. Recreational opportunities on the lake include: camping, picnicking, horseback riding, hiking, sail and power boating, water skiing, fishing, swimming, boat-in camping, floating campsites and horse camping (CDPR 2013a). Water levels at the lake affect the number of accessible boat launch ramps and car-top boat launches, swimming beaches and boat-in camps are available to the public. Table 3.15-3 describes the different launch ramps and the availability for launching based on lake elevations. In fiscal year 2011/2012, 1,095,188 visitors were recorded at Lake Oroville SRA, which includes day use and camping.

Table 3.15-3. Lake Oroville Water Elevation Requirements for Boat Launching

Boat Launch Site	Surface Water Elevation (in Feet)
Bidwell Canyon	7 lanes from 850 to 900 5 lanes from 802 to 850 4 lanes from 781 to 802 2 lanes from 735 to 781 3 lanes from 680 to 745
Loafer Creek	8 lanes from 800 to 900 2 lanes from 775 to 800
Spillway Boat Launch	12 lanes from 810 to 900 8 lanes from 726 to 820 2 lanes from 695 to 726 1 lane from 685 to 695
Lime Saddle	8 lanes from 702 to 900
Enterprise	2 lanes from 820 to 900

Source: California Department of Water Resources 2014.

Popular recreational activities along the Lower Feather River include swimming, fishing, hiking, camping, nature viewing, picnicking, and bicycling (USFS Plumas NF 2014). The middle fork of the Feather River is designated as a Wild and Scenic River within the National Wild and Scenic River System from its tributary streams to one kilometer south of Beckwourth, California (National Wild & Scenic Rivers System 2014).

The Bear River is a tributary to the Lower Feather River and provides many recreational activities including camping, swimming, picnicking, kayaking and rafting, and horseback riding upstream of Camp Far West Reservoir. Downstream of Camp Far West, the land is mostly privately owned and developed for agriculture (Sacramento River Watershed Program 2014).

Recreational opportunities available at Camp Far West Reservoir include: camping, boating, swimming, water skiing, jet skiing, hiking, biking, fishing and horseback riding. The north shore of the lake is accessible year-round and the south shore is only open mid-May to September. The reservoir has two boat ramps, one on the north shore and the other on the south shore (Nevada County 2009).

3.15.1.3.5 Merced River

Recreational activities along the Merced River include rafting, hiking, swimming, picnicking, wildlife viewing, and camping at several camp grounds (BLM 2014). The main stem of the Merced River has been designated as a National Wild and Scenic River from its source to Lake McClure, and the south fork from its source to the confluence with the main stem (National Wild and Scenic River System 2014). Approximately 5,000 commercial whitewater boaters and 20,000 campers visit the Merced River upstream of Lake McClure each year (Horn 2014). Downstream of Lake McClure, the Merced River travels through mostly private land, although some limited public access is available.

Lake McClure and Lake McSwain are owned by the Merced ID. Recreational opportunities at Lake McClure and Lake McSwain include camping, fishing, boating, wildlife viewing, swimming, and picnicking. A boat ramp and marina provide boating amenities year round (Merced ID 2012). Table 3.15-4 shows the surface water elevations needed in Lake McClure to keep the boat ramps operational. In 2010, there were 1,397,190 visitors at Lake McClure and 482,030 visitors to Lake McSwain. These counts include each visit during any portion of a 24-hour period (Merced ID 2012).

Table 3.15-4. Lake McClure Water Elevation Requirements for Boat Launching

Boat Launch Site	Surface Water Elevations (in Feet)
Bagby	794 and above
Horseshoe Bend	759 and above
McClure Point	651 and above
Southern Barrett Cove	631 and above
Northern Barrett Cove	591 and above
Piney Creek	591 and above

Source: San Joaquin River Group Authority 1999

3.15.1.3.6 San Joaquin River Region

The area surrounding the San Joaquin River downstream of the Merced River consists mainly of private agricultural lands; therefore, public recreation is limited.

The San Joaquin River National Wildlife Refuge (NWR) encompasses a section of the San Joaquin River between the Tuolumne and Stanislaus Rivers and is over 7,000 acres. The NWR offers a trail and educational free-roam exploration area as well as a wildlife-viewing platform (USFWS 2013).

3.15.1.3.7 Delta Region

Many recreational opportunities are available within the Delta. Large recreation areas include the Brannan Island and Franks Tract SRAs. Figure 3.15-3 shows the Delta region and some of the recreation areas. Visitor attendance at Brannan Island SRA was 66,680 visitors, including day use and campers during fiscal year 2011/2012. During the same period, visitor attendance at Franks Tract SRA was recorded as 62,089 visitors (CDPR 2012).

Boating, fishing, windsurfing, water skiing and kayaking are some of the water-related recreational opportunities in the Delta. The California Delta Chambers & Visitors Bureau lists approximately 50 public and private marinas on their website each offering a different mix of amenities including: fuel, launching, bait, groceries, propane, restaurants, night clubs, boat sales, marine repair, campgrounds, boat storage, guest docks and boating supplies for sale. Sport fishing is one of the main attractions to the Delta where striped bass, sturgeon, catfish, black bass, salmon, and American shad are caught. Various commercial fishing guides and charter boats are also available for hire (California Delta Chambers & Visitors Bureau 2014).

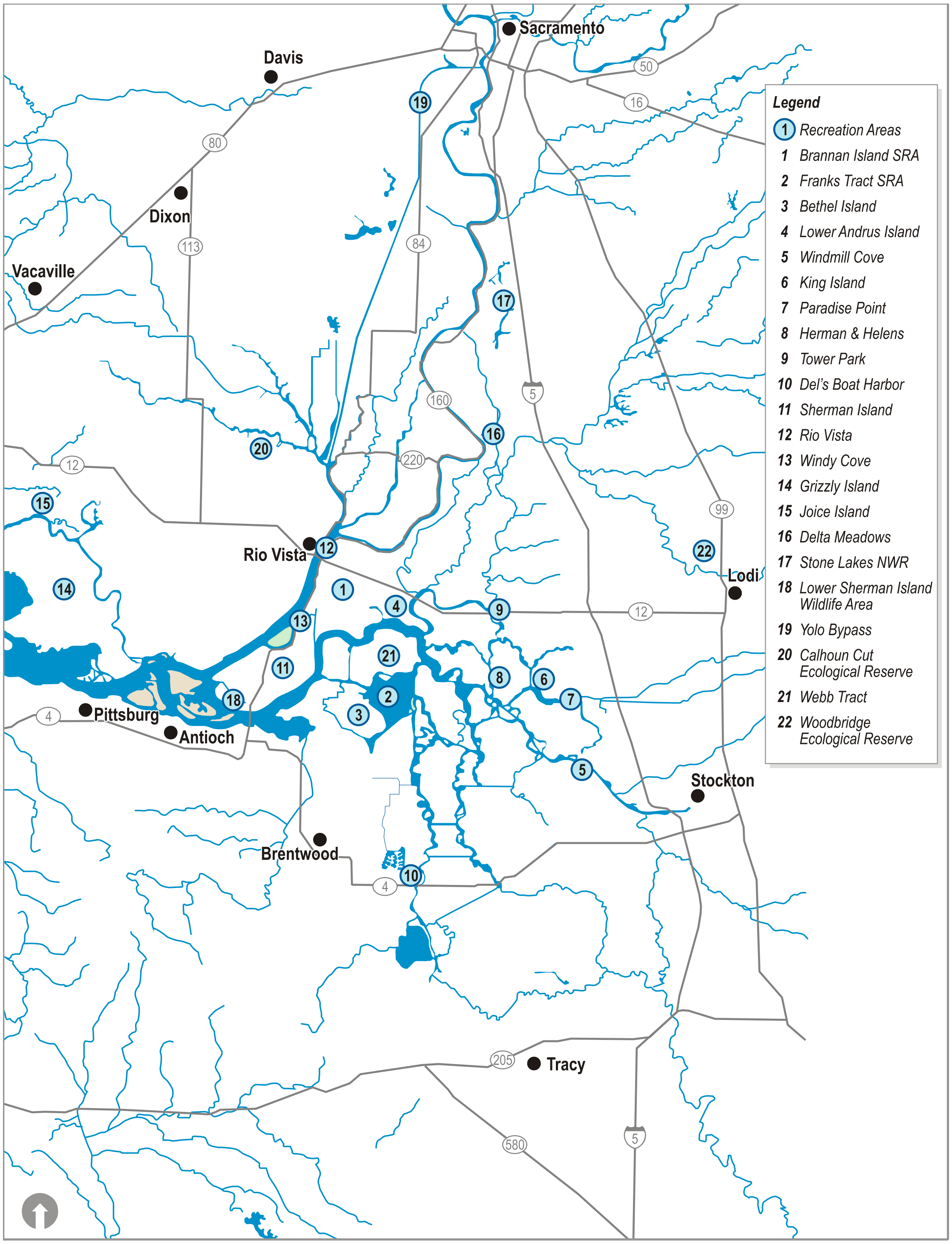

Figure 3.15-3. Sacramento-San Joaquin Delta Major Recreation Areas

3.15.1.3.8 Buyer Service Area

San Luis Reservoir is the only recreation area in the Area of Analysis in the Buyer Service Area. San Luis Reservoir SRA is open year round (Figure 3.15-4) and includes San Luis Reservoir, O'Neill Forebay and Los Banos Creek Reservoir, although Los Banos Creek Reservoir would not be affected by the project. San Luis Reservoir SRA provides for activities such as boating, boardsailing, fishing, camping, and picnicking. Boat access is available via one four-lane boat ramp at the Basalt area at the southeastern portion of the reservoir and at Dinosaur Point at the northwestern portion of the reservoir (Reclamation and CDPR 2012). The boat ramp at Basalt becomes inconvenient to use at low reservoir levels (at elevation 340 feet); the boat ramp at Dinosaur Point is difficult to access at elevation 360 feet. There are no designated swimming areas or beaches at San Luis Reservoir, but O'Neill Forebay (with its stable surface elevation) has swimming, boating, fishing, and camping opportunities (San Joaquin River Group 1999). Visitor attendance during fiscal year 2011/2012 at San Luis SRA was 149,890 visitors including campers (CDPR 2012).

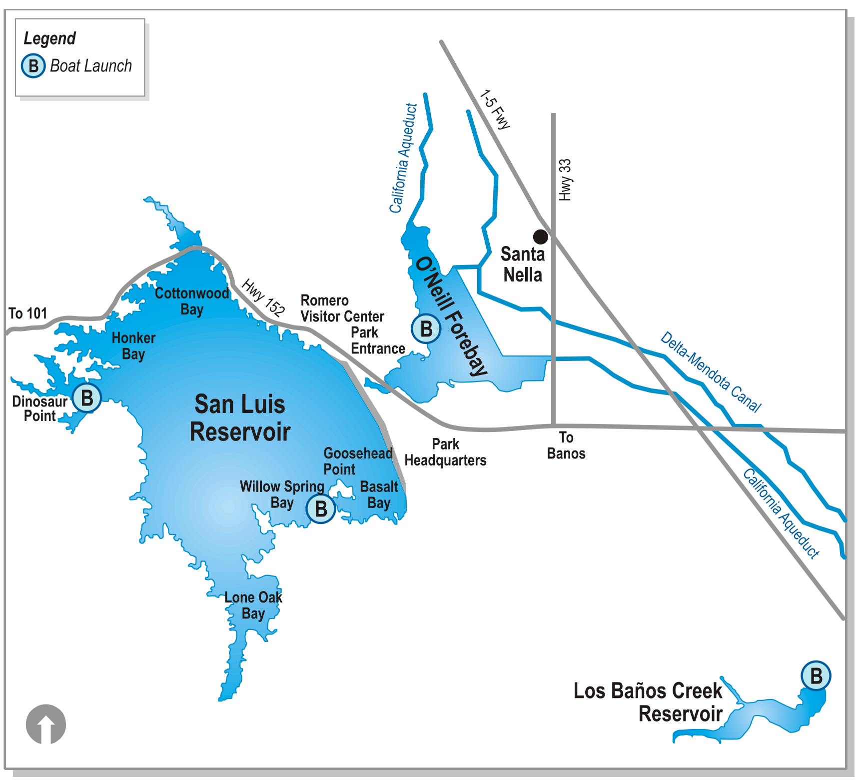

Figure 3.15-4. San Luis Reservoir San Luis SRA

3.15.2 Environmental Consequences/Environmental Impacts

This section describes the assessment methods and environmental consequences/environmental impacts associated with each alternative.

3.15.2.1 Assessment Methods

The effects analysis uses both quantitative and qualitative methods to assess changes in recreational opportunities and use of affected facilities. Quantitative methods include consideration of thresholds at which recreational opportunities are affected (e.g., the reservoir level at which boat ramps become unusable). Qualitative methods used to assess recreation effects include consideration of potential effects on the availability, accessibility, and quality of recreation sites.

The quantitative analysis relies on hydrologic modeling output that estimates changes to river flow and reservoir water surface elevations under the alternatives. Surface water elevation data is not available for all reservoirs included in the area of analysis. Where this data is not available, effects are evaluated based on transfer quantities, changes in water storage, and the timing of proposed transfers under the various action alternatives.

Recreational opportunities at reservoirs would be affected if reservoir levels decline such that boat ramps become unusable. Boat ramp usability was chosen as the limiting factor because it is a quantifiable measurement and lower reservoir levels would generally affect boat ramps prior to affecting other recreational activities (e.g., swimming or fishing). If boat ramps remain usable, it is assumed that there would be sufficient water levels in the reservoir to sustain all other recreational activities. In those cases where boat ramp usability is not a good indicator of ability to use other recreational facilities, this assessment includes a qualitative discussion.

Recreational opportunities in rivers and streams would be affected if flow rates increase or decrease substantially affecting whitewater rafting, kayaking, fishing, swimming and other water depending activities. Change in flow rates is a quantifiable measurement and drastic increases or decreases would affect water-related activities, which could affect visitor attendance.

Recreation at NWRs would not be affected by the any of the proposed alternatives because water supply to these areas would not change. There would be no impacts to wildlife populations or access to NWRs. Impacts to NWRs are not discussed further.

3.15.2.2 Significance Criteria

Impacts on recreation would be considered potentially significant if long-term water transfers would result in:

- Changes in reservoir water surface elevation or river flow rates that would result in substantial changes to the type, amount, or availability of recreation opportunities.

3.15.2.3 Alternative 1: No Action/No Project

There would be no changes in recreation under the No Action/No Project Alternative. Under the No Action/No Project Alternative, recreational opportunities in the Seller and Buyer Service Areas would not be affected by water transfers. Therefore, there would be no impacts to recreation under the No Action/No Project Alternative.

3.15.2.4 Alternative 2: Full Range of Transfers (Proposed Action)

Changes in surface water elevation at Shasta, Folsom, Merle Collins, Oroville, and Camp Far West reservoirs and Lake McClure as a result of water transfers could affect reservoir-based recreation. The results of modeling for these reservoirs under the Proposed Action is shown in Table 3.15-5, which indicates elevations would be very similar to those under the No Action/No Project Alternative under all hydrologic conditions. There would be no changes to the timing of boat ramp closures under existing conditions. These changes would have no impact to the recreational setting or visitor attendance at Shasta, Folsom and Oroville reservoirs.

Reservoir releases at Merle Collins Reservoir (Collins Lake) would result in lower reservoir levels of less than one foot in October and November during wet years and in January and February during dry years; and between one foot and 2.8 feet between in July and December in dry years. It is not likely that these small changes in surface water elevation would cause a significant impact to boating and fishing at Collins Lake as these transfers would already occur during drier years under existing conditions. Browns Valley ID already releases water from Collins Lake for irrigation purposes at other times during the year and the recreation activities continue to operate during these release times. These changes would have no impact to the recreational setting or visitor attendance at Collins Lake. Impacts to Collins Lake recreation as a result of the Proposed Action would be less than significant.

Changes to the average surface water elevation at Camp Far West could be up to 8.5 feet in average surface water elevation. These changes would be imperceptible and would not affect recreational activities at Camp Far West Reservoir because the lake already fluctuates in excess of 8.5 feet throughout the year because of releases under existing conditions.

At Lake McClure, under the Proposed Action the Bagby Boat Ramp would be open 11 months during below normal years instead of 12 months, and open one month instead of three months in dry years compared to existing conditions. The usability of the other five boat ramps would not change, so an alternative exists during the months when the Bagby Boat Ramp would be closed, making the effect to recreation less than significant. These changes would have no impact to the recreational setting or visitor attendance at Lake McClure or Lake McSwain.

Therefore, effects under the Proposed Action to recreation at these reservoirs would be less than significant.

Table 3.15-5. Changes in Shasta, Folsom, Oroville, Camp Far West, and Lake McClure Reservoir Elevations between the No Action/No Project Alternative and the Proposed Action (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.6	1.8	1.4	-0.2	-0.2
C	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	1.2	3.7	0.4	-0.5	-0.5
Merle Collins Reservoir												
W	-0.6	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	-1.6	-1.2	-1.0	-0.9	-0.2	0.0	0.0	0.0	0.0	-1.6	-2.4	-2.8
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake Oroville												
W	-0.5	-0.5	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
AN	-2.2	-2.2	-2.1	-1.4	-1.1	-0.1	-0.1	-0.1	0.0	-0.4	-0.3	-0.3
BN	-0.3	-0.4	-0.6	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.6	-0.7	-0.8
D	-0.7	-0.7	-0.6	-0.6	-0.6	-0.4	-0.4	0.5	0.6	0.0	-1.2	-0.7
C	-1.7	-2.2	-2.3	-2.3	-2.1	-1.8	-1.9	-1.7	-1.4	-0.9	-2.9	-3.0
Folsom Reservoir												
W	0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.5	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.5
BN	-0.3	-0.4	-0.6	-0.5	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.2
D	0.3	0.2	-0.1	-0.2	-0.3	-0.1	-0.1	0.8	1.4	1.4	1.6	1.8

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
C	1.1	0.8	0.6	0.5	0.6	-0.1	0.0	0.5	1.5	1.5	1.0	1.4
Camp Far West Reservoir												
W	-1.4	-0.6	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-3.3	-3.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-1.2	-1.9
C	-5.4	-4.1	-3.5	-3.0	-1.3	-0.5	-0.4	-0.4	-0.4	-3.7	-5.3	-8.5
Lake McClure												
W	-0.6	-0.6	-0.6	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-6.4	-6.6	-6.5	-4.4	-3.8	-2.5	-2.2	-1.7	-0.9	-1.0	-1.1	-1.2
BN	0.0	0.0	0.0	0.0	0.0	0.0	-1.7	-2.7	-2.7	-3.1	-3.5	-3.6
D	-1.2	-1.3	-1.2	-1.2	-1.1	-1.1	-2.1	-2.6	-2.8	-3.2	-3.6	-3.8
C	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	-1.6	-1.8	-2.1	-2.7	-2.9

W = wet
AN = above normal
BN = below normal
D = dry
C = critically dry

Changes in surface water elevations at Hell Hole and French Meadows Reservoirs as a result of water transfers could affect reservoir-based recreation. Recreational users at Hell Hole and French Meadows Reservoirs, include campers, boaters and fishermen. Under existing conditions, each boat ramp at both Hell Hole and French Meadows reservoirs are only useable until the late spring to mid-summer, at which time water begins to be released from the reservoirs. These reservoirs are not accessible during the winter due to snow and other hazardous conditions.

Under the Proposed Action, release of stored water would occur from July through September similar to existing conditions. Camping, shore fishing, swimming, and non-motorized boating would be unaffected under the Proposed Action. These changes would have no impact to the recreational setting or visitor attendance at Hell Hole or French Meadows reservoirs.

Releases under the Proposed Action would be on a similar schedule as under existing conditions, although more water could be released than under existing conditions especially during critically dry years. This increase in water releases would affect the usability of the boat ramps causing one or both boat ramps to be unusable earlier in the year. However, during dry and critically dry years, the boat ramps already close earlier than in other water year types. There are many opportunities in the region for boating at nearby reservoirs. If the boat ramps are unusable for a short time, boaters can visit alternate sites to launch boats. Short-term effects to boat launching at Hell Hole and French Meadows reservoirs would not result in a substantial decrease in recreation opportunities. This impact would be less than significant.

Changes in river flows from water transfers could affect river-based recreation on the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers. The peak recreation activity at these surface water bodies is in the spring, summer and early fall months. Boating is most popular during the spring and summer months. Changes in river flows under the Proposed Action may result in flows below existing conditions in April and May; however, flows must continue to meet in-stream standards. These changes would not result in a notable difference to affect recreation opportunities on the river. Changes in flows under the Proposed Action would not prevent any water-related recreation activity, including rafting, fishing, swimming, and power boating, from occurring on the rivers. The Proposed Action would have a less-than-significant impact on recreational activities along the Sacramento, Feather, American, San Joaquin, and Merced rivers.

Changes in average flow in the Delta could affect river-based recreation. The Delta is a popular boating and fishing area. Water transfers would increase flows into the Delta during the July through September period and slightly decrease flows during other months. The changes in flow under the Proposed Action would not have any noticeable effect to recreation in the Delta. These changes would have no impact to the recreational setting or visitor attendance in the Delta. Therefore, effects to recreation in the Delta would be less than significant.

3.15.2.4.1 Buyer Service Area

Changes in surface water elevation at San Luis Reservoir as a result of water transfers could affect reservoir-based recreation. Under the Proposed Action, transfer water could be temporarily stored in San Luis Reservoir. These slight changes would have minimal affects to any water related activity and would not affect land-based recreation. The boat ramps would remain usable for the same number of months as the No Action/No Project Alternative. These changes would have no impact to the recreational setting or visitor attendance at the San Luis Reservoir SRA. Therefore, there would be no impact to recreation at San Luis Reservoir under the Proposed Action.

3.15.2.5 Alternative 3: No Cropland Modifications

This section describes the potential visual resources effects of the No Cropland Modifications Alternative.

3.15.2.5.1 Seller Service Area

Changes in surface water elevation at Shasta, Folsom, Merle Collins, Oroville, and Camp Far West reservoirs and Lake McClure as a result of water transfers could affect reservoir-based recreation. Table 3.15-6 summarizes changes in elevation under Alternative 3 relative to the No Action/No Project Alternative. At Shasta, Folsom and Oroville reservoirs, there would be very minor changes in elevation and there would be no effect to the usability of boat ramps at these reservoirs.

Changes to surface water elevations at Merle Collins and Camp Far West Reservoirs and Lake McClure would be the same as described for the Proposed Action. Effects to recreation would be less than significant.

Table 3.15-6. Changes in Shasta, Folsom, Oroville, Camp Far West, and Lake McClure Reservoir Elevations between the No Action/No Project Alternative and Alternative 3 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.4	1.3	0.9	-0.2	-0.2
C	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	0.5	1.8	-0.2	-0.5	-0.5
Merle Collins Reservoir												
W	-0.6	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	-1.6	-1.2	-1.0	-0.9	-0.2	0.0	0.0	0.0	0.0	-1.5	-2.4	-2.8
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake Oroville												
W	-0.5	-0.5	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
AN	-2.2	-2.2	-2.1	-1.4	-1.1	-0.1	-0.1	-0.1	0.0	-0.4	-0.3	-0.3
BN	-0.3	-0.4	-0.6	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.6	-0.7	-0.8
D	-0.7	-0.7	-0.6	-0.6	-0.6	-0.4	-0.4	0.4	0.5	0.0	-1.2	-0.7
C	-1.7	-2.2	-2.3	-2.3	-2.1	-1.8	-1.9	-1.8	-1.5	-1.8	-2.9	-3.0
Folsom Reservoir												
W	0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.5	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.5
BN	-0.3	-0.4	-0.6	-0.5	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.2

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
D	0.3	0.2	-0.1	-0.2	-0.3	-0.1	-0.1	0.8	1.4	1.4	1.6	1.8
C	1.1	0.8	0.6	0.5	0.6	-0.1	0.0	0.5	1.5	1.5	1.0	1.4
Camp Far West Reservoir												
W	-1.4	-0.6	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-3.3	-3.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-1.2	-1.9
C	-5.4	-4.1	-3.5	-3.0	-1.3	-0.5	-0.4	-0.4	-0.4	-3.1	-5.3	-8.5
Lake McClure												
W	-0.6	-0.6	-0.6	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-6.4	-6.6	-6.5	-4.4	-3.8	-2.5	-2.2	-1.7	-0.9	-1.0	-1.1	-1.2
BN	0.0	0.0	0.0	0.0	0.0	0.0	-1.7	-2.7	-2.7	-3.1	-3.5	-3.6
D	-1.2	-1.3	-1.2	-1.2	-1.1	-1.1	-2.1	-2.6	-2.8	-3.2	-3.6	-3.8
C	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	-1.6	-1.8	-2.1	-2.7	-2.9

W = wet
AN = above normal
BN = below normal
D = dry
C = critically dry
Note: Negative numbers indicate that Alternative 3 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase reservoir elevations.

Changes in surface water elevations at Hell Hole and French Meadows Reservoirs as a result of water transfers could affect reservoir-based recreation. Effects to recreation at Hell Hole and French Meadows reservoirs would be the same as the described for the Proposed Action. Effects would be less than significant.

Changes in river flows from water transfers could affect river-based recreation on the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers. The peak recreation activity at these surface water bodies is in the spring, summer and early fall months. Boating is most popular during the spring and summer months. Changes in river flows under Alternative 3 would be within normal river flow fluctuation and would not result in a notable difference to affect recreation opportunities on the river. Changes in flows would not prevent any water-related recreation activity, including rafting, fishing, swimming, and power boating, from occurring on the rivers. Alternative 3 would have minimal to no effect to flows in rivers designated as Wild and Scenic. Alternative 3 would have a less-than-significant impact on recreational activities along the Sacramento, Feather, American, San Joaquin, and Merced rivers.

Changes in average flow in the Delta could affect river-based recreation. The Delta is a popular boating and fishing area. Water transfers would increase flows into the Delta during the July through September period and slightly decrease flows during other months. The changes in flow under Alternative 3 would not have any noticeable effect to recreation in the Delta. Therefore, effects to recreation in the Delta would be less than significant.

3.15.2.5.2 Buyer Service Area

Changes in surface water elevation at San Luis Reservoir as a result of water transfers could affect reservoir-based recreation. Under the Alternative 3, transfer water could be temporarily stored in San Luis Reservoir, which would temporarily increase storage. These slight changes would have minimal effects elevations and any water related recreation. The boat ramps would remain usable for the same number of months as the No Action/No Project Alternative. Therefore, there would be no impact to recreation at San Luis Reservoir under Alternative 3.

3.15.2.6 Alternative 4: No Groundwater Substitution

This section describes the potential visual resources effects of the No Groundwater Substitution Alternative.

3.15.2.5.1 Seller Service Area

Changes in surface water elevation at Shasta, Folsom, Merle Collins, Oroville, and Camp Far West reservoirs and Lake McClure as a result of water transfers could affect reservoir-based recreation. Table 3.15-7 summarizes changes in elevation under Alternative 4 relative to the No Action/No Project Alternative. At Shasta, Folsom and Oroville reservoirs, there would be very minor changes in elevation and there would be no effect to the usability of boat ramps at these reservoirs.

Changes to surface water elevations at Merle Collins and Camp Far West Reservoir and Lake McClure would be the same as described for the Proposed Action. Effects to recreation would be less than significant.

Table 3.15-7. Changes in Shasta, Folsom, Merle Collins, Oroville, Camp Far West, and Lake McClure Reservoir Elevations between the No Action/No Project Alternative and Alternative 4 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.4	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.4	0.4	0.0	0.0
Folsom Reservoir												
W	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.2	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.6	0.5	0.0	0.0	-0.1	0.0	0.0	0.6	1.0	1.3	1.7	2.0
C	1.4	1.2	1.1	1.0	1.1	0.4	0.1	0.5	1.1	1.0	1.4	1.9
Merle Collins Reservoir												
W	-0.6	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	-1.6	-1.2	-1.0	-0.9	-0.2	0.0	0.0	0.0	0.0	-2.4	-2.4	-2.8
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake Oroville												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.9	-0.5	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.8	0.0	0.0
Camp Far West Reservoir												
W	-1.4	-0.6	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-3.3	-3.1	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.3	-1.8	-1.9
C	-5.4	-4.1	-3.5	-3.0	-1.3	-0.5	-0.4	-0.4	-0.4	-3.7	-5.3	-8.5

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Lake McClure												
W	-0.6	-0.6	-0.6	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-5.2	-5.4	-5.2	-3.3	-2.9	-2.5	-2.2	-1.7	-0.9	-1.0	-1.1	-1.2
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	-1.2	-1.3	-1.2	-1.2	-1.1	-1.1	-1.0	-0.9	-0.9	-3.2	-3.6	-3.8
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.1	-2.7	-2.9

W = wet
AN = above normal
BN = below normal
D = dry
C = critically dry
Note: Negative numbers indicate that Alternative 4 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase reservoir elevations.

Changes in surface water elevations at Hell Hole and French Meadows Reservoirs as a result of water transfers could affect reservoir-based recreation. Effects to recreation at Hell Hole and French Meadows reservoirs would be the same as the described for the Proposed Action. Effects would be less than significant.

Changes in river flows from water transfers could affect river-based recreation on the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers. The peak recreation activity at these surface water bodies is in the spring, summer and early fall months. Boating is most popular during the spring and summer months. Changes in river flows under Alternative 4 would be within normal river flow fluctuation and would not result in a notable difference to affect recreation opportunities on the river. Changes in flows would not prevent any water-related recreation activity, including rafting, fishing, swimming, and power boating, from occurring on the rivers. Alternative 4 would have minimal to no effect to flows in rivers designated as Wild and Scenic. Alternative 4 would have a less-than-significant impact on recreational activities along the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers.

Changes in average flow in the Delta could affect river-based recreation. The Delta is a popular boating and fishing area. Water transfers would increase flows into the Delta during the July through September period and slightly decrease flows during other months. The changes in flow under Alternative 4 would not have any noticeable effect to recreation in the Delta. Therefore, effects to recreation in the Delta would be less than significant.

3.15.2.5.2 Buyer Service Area

Changes in surface water elevation at San Luis Reservoir as a result of water transfers could affect reservoir-based recreation. Under the

Alternative 4, transfer water could be temporarily stored in San Luis Reservoir, which would temporarily increase storage. These slight changes would have minimal effects elevations and any water related recreation. The boat ramps would remain usable for the same number of months as the No Action/No Project Alternative. Therefore, there would be no impact to recreation at San Luis Reservoir under Alternative 4.

3.15.3 Comparative Analysis of Alternatives

Table 3.15-8 summarizes the effects of each of the action alternatives. The following text supplements the table by comparing the effects of the action alternatives and No Action/No Project Alternative.

Table 3.15-8. Comparison of Alternatives

Potential Impact	Alternative(s)	Significance	Proposed Mitigation	Significance after Mitigation
There would be no changes in recreation under the No Action/No Project Alternative.	1	NCFEC	None	NCFEC
Changes in surface water elevation at Shasta, Folsom, Merle Collins, Oroville, Camp Far West, and Lake McClure reservoirs as a result of water transfers could affect reservoir-based recreation.	2, 3, 4	LTS	None	LTS
Changes in surface water elevations at Hell Hole and French Meadows Reservoirs as a result of water transfers could affect reservoir-based recreation.	2, 3, 4	LTS	None	LTS
Changes in river flows from water transfers could affect river-based recreation on the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers.	2, 3, 4	LTS	None	LTS
Changes in average flow into the Delta from the San Joaquin River from water transfers could affect river-based recreation.	2, 3, 4	NI	None	NI
Changes in surface water elevation at San Luis Reservoir as a result of water transfers could affect reservoir-based recreation	2, 3, 4	NI	None	NI

Key:
LTS = less than significant
NCFEC = no change from existing conditions
NI = no impact

3.15.3.1 Alternative 1: No Action/No Project

There would be no impacts on recreation resources.

3.15.3.2 Alternative 2: Full Range of Transfers (Proposed Action)

Water transfers under the Proposed Action could affect reservoir elevations and river flows in the area of analysis; however, changes in elevation and flow would generally be within normal monthly fluctuations and would not be expected to result in any substantial reductions in recreation opportunities in the area of analysis.

3.15.3.3 Alternative 3: No Cropland Modifications

This alternative would have similar recreation effects as the Proposed Action.

3.15.3.4 Alternative 4: No Groundwater Substitution

Under this alternative, less water would be transferred relative to the Proposed Action. Effects on reservoir elevations and river flows would still occur, but at a lesser rate than the Proposed Action.

3.15.4 Environmental Commitments/Mitigation Measures

There are no significant recreation impacts; therefore no mitigation measures are required.

3.15.5 Potentially Significant Unavoidable Impacts

There are no expected significant and unavoidable impacts to recreation.

3.15.6 Cumulative Effects

The timeline for the recreation cumulative effects analysis extends from 2015 through 2024, a ten-year period. The relevant geographic study area for the cumulative effects analysis is the same area of analysis as described above in Section 3.15.1.1. The following section analyzes the cumulative effects using the project method, which is further described in Chapter 4. Chapter 4 describes the projects included in the cumulative condition. The cumulative analysis for recreation considers projects that could affect reservoir elevation, river flow, or could result in physical impacts on recreation areas within the area of analysis that might restrict or reduce recreational opportunities or affect the recreational setting.

3.15.6.1 Alternative 2: Full Range of Transfers (Proposed Action)

The Proposed Action, in combination with other cumulative projects could affect river- and reservoir-based recreation. Existing and foreseeable water acquisition programs with potential to affect reservoir elevation and river flows in the Seller Service Area include the State Water Project Transfers, which are described in Chapter 4. The proposed additional transfers could contribute to the additional fluctuation of reservoir elevation and river flows, if transfers occurred within the same year. Increased elevation and river flows typically improve recreation opportunities by creating a fuller reservoir or river, and improving riparian habitat along shorelines. Reductions in elevation and river flows could result in elevations dropping below boat ramps, making them unusable. All changes to reservoirs and rivers from the cumulative projects would remain within established water flow, water quality, and reservoir level standards. Therefore, the Proposed Action in combination with other cumulative projects would not result in a cumulative significant impact to recreation.

3.15.6.2 Alternative 3: No Cropland Modifications

The recreation impacts under Alternative 3 would be very similar to the Proposed Action. As under the Proposed Action, the cumulative impacts to recreation would be less than significant.

3.15.6.3 Alternative 4: No Groundwater Substitution

The recreation impacts under Alternative 4 would be very similar to the Proposed Action. As under the Proposed Action, the cumulative impacts to recreation would be less than significant.

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Section 3.16 Power

This chapter presents the existing hydroelectric generation facilities within the area of analysis and discusses potential effects on hydroelectric generation from the proposed alternatives. The discussion of potential impacts of the alternatives on hydroelectric power includes generation from potential water seller facilities and the hydroelectric facilities of the State Water Project (SWP) and Central Valley Project (CVP).

3.16.1 Affected Environment/Environmental Setting

Water storage within the service area of the potential sellers is extensively developed for hydroelectric generation and the release of water from reservoirs is coordinated to optimize power generation along with other reservoir operational considerations (e.g., flood, temperature, or flow management). In the area of analysis, hydropower is generated by several of the willing sellers or sellers receive their water from the CVP/SWP storage facilities that generate power. Water transfers have the potential to alter the elevation of the hydroelectric power reservoirs and this resulting head change can affect hydroelectric power generation efficiency.

3.16.1.1 Area of Analysis

The area of analysis for the evaluation of potential effects of long-term water transfers on hydroelectric generation includes the reservoirs of the CVP/SWP, which supply water to potential sellers in the Sacramento, American, and Feather River systems. Also in the area of analysis are hydroelectric generation facilities belonging to the South Sutter Water District (WD), Placer County Water Agency, and the Merced Irrigation District (ID).

In the potential Buyer Service Area, the analysis includes the pumping plants of the CVP/SWP that also provide hydroelectric power generation. Figure 3.16-1 shows the area of analysis.

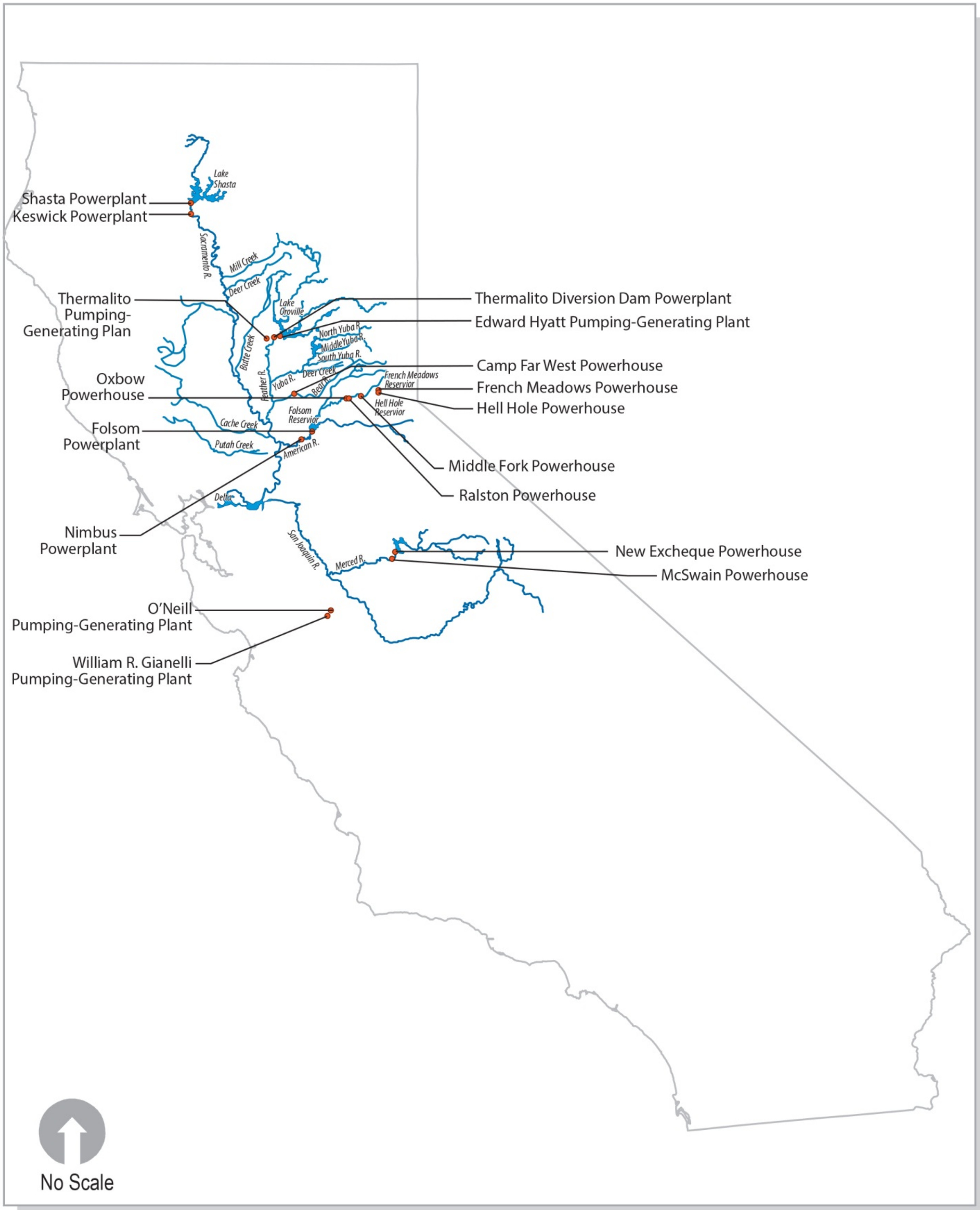

Figure 3.16-1. Area of Analysis

3.16.1.2 Regulatory Setting

Hydroelectric power is regulated by the Federal and State governments. The Federal Energy Regulatory Commission (FERC) regulates non-Federal hydroelectric power projects and provides the power generator flexibility to produce power in response to system demand, hydrology, and operational and maintenance requirements in accordance with other applicable laws and regulation. The U.S. Army Corps of Engineers (USACE) has responsibility to ensure that reservoirs will continue to be operated for flood control. The California Public Utilities Commission regulates privately owned hydroelectric facilities and maintains several operations and maintenance standards with which hydroelectric power supplies must comply. The California Independent System Operator Corporation is an impartial operator of the statewide wholesale power grid with responsibility for system reliability through scheduling available transmission capacity. Outside of the general regulatory provisions for operations of hydroelectric power facilities, there are no specific Federal, State or local regulations that would apply to hydropower facilities if a reservoir owner participates in a water transfer program as described in the proposed alternatives.

There are many other regulatory requirements including water quality, ecosystem health, flood control, and water system operations that affect how reservoirs and hydroelectric projects are operated that are described in other sections of this document.

3.16.1.3 Existing Conditions

The following section describes the existing hydroelectric generation facilities within the area of analysis. In the Seller Service Area, these include the hydroelectric facilities of the CVP/SWP, and the hydroelectric facilities belonging to the local agencies and districts involved in water transfers. In the Buyer Service Area, the hydroelectric facilities include the dual pumping and generating facilities of the CVP/SWP's San Luis Reservoir.

3.16.1.3.1 Seller Service Area

CVP

The CVP has nine hydroelectric facilities in the Seller Service Area. Facilities potentially affected by transfers are shown in Table 3.16-1 and discussed further below. Five of the hydroelectric generating facilities are not on a river system potentially affected by water transfers and consequently are not discussed further.

Table 3.16-1. CVP Hydroelectric Facilities Potentially Affected by a Water Transfers

CVP Hydroelectric Facilities	Installed Capacity (MW)	Annual Average Generation 2001-2007 megawatt-hour	Potentially affected by transfers?
Seller Service Area			
Shasta Powerplant	663	1,978,000	Yes
Trinity Powerplant	140	358,974	No
Judge Francis Carr Powerplant	155	288,122	No
Spring Creek Powerplant	180	274,224	No
Keswick Powerplant	117	418,952	Yes
Lewiston Powerplant	0.35	3,335	No
Folsom Powerplant	198	425,862	Yes
Nimbus Powerplant	14	51,097	Yes
New Melones Powerplant	300	524,292	No
Buyer Service Area			
O'Neill Pumping-Generating Plant	25	5,404	Yes
William R. Gianelli Pumping-Generating Plant (Federal share)	424	126,409	Yes

Source: Reclamation 2007

Shasta Powerplant **-** Shasta Reservoir captures water from the Sacramento River basin for delivery to CVP water users and for power generation. Shasta Reservoir is the largest reservoir of the CVP with a storage capacity of 4,500,000 acre-feet (AF). Shasta Powerplant is located just below Shasta Dam and primarily provides peaking power and generally runs when demand for electricity is high. Its power is dedicated first to meeting the requirements of CVP facilities. The remaining energy is marketed to various preferred customers in Northern California. The maximum operational capacity of the station is 612 megawatts (MW), and it produces a net average of 1,978,024 MW-hours annually (Reclamation 2009a).

Keswick Powerplant **-** The Keswick Powerhouse is downstream of Shasta Dam and is used as a reregulating facility for releases from Shasta Powerhouse. It is a run of the river facility, providing uniform flows to the Sacramento River. The facility has an installed capacity of 117 MW with a net average of 418,952 MW-hours annually (Reclamation 2009b).

Folsom Powerplant - Folsom Dam and Reservoir are a major water management facility located within the greater Sacramento metropolitan area with a storage capacity of 1,010,000 AF. Folsom Powerplant is a peaking hydroelectric facility at the foot of Folsom Dam. Folsom Dam was constructed by USACE and, on completion, was transferred to Reclamation for coordinated water supply and flood control operations. It is an integral part of the CVP and is a key flood control structure protecting the Sacramento metropolitan area. Folsom Powerplant provides a large degree of local voltage control and is increasingly relied on to support local loads during system disturbances. The facility has an installed capacity of 198 MW with a net average of 425,862 MW-hours annually (Reclamation 2013a).

Nimbus Powerplant - Nimbus Dam forms Lake Natoma to act as an afterbay for Folsom Powerplant. It allows dam operators to coordinate power generation and flows in the lower American River during normal reservoir operations. Lake Natoma has a surface area of 500 acres and its elevation fluctuates between four to seven feet daily. Nimbus Powerplant has an installed capacity of 13.5 MW, with a net average of 51,097 MW-hours annually. The powerplant is a run-of-the-river plant providing baseload and station service backup for Folsom Powerplant (Reclamation 2013b).

SWP

Lake Oroville Facilities - Lake Oroville is an important part of the SWP located on the Feather River. The reservoir has a capacity of 3.5 million AF and releases water for SWP needs. The project is operated under FERC license Project No. 2100. Water releases generate power at three powerplants: Edward Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant. The California Department of Water Resources (DWR) schedules hourly releases through the Oroville Facilities to maximize the amount of energy produced when power values are highest. Because the downstream water supply does not depend on hourly releases, water released for power in excess of local and downstream requirements is conserved by pumpback operation during off-peak times into Lake Oroville (DWR 2012). The total installed capacity of the Lake Oroville hydroelectric facilities is 762 MW. The Hyatt Pumping-Generating Plant is the largest of three power plants with a licensed generating capacity of 645 MW; followed by the 114 MW Thermalito Pumping-Generating Plant and the three MW Thermalito Diversion Dam Powerplant. The average annual generation for the Oroville Facilities is 2,382,000 MW-hours (DWR 2013).

Placer County Water Agency

Placer County Water Agency operates the Hell Hole and French Meadows reservoirs on the Middle Fork American River for water supply and power generation and generates on average 1,039,078 MW-hours of energy annually. The project is operated under FERC license Project No. 2079 with an installed capacity of 224 MW from power diversions on the Middle Fork of the American and Rubicon rivers. The project includes the following power and water storage features:

- 134,993 AF French Meadows Reservoir and French Meadows powerhouse discharging water to Hell Hole Reservoir.
- 207,590 AF Hell Hole Reservoir and Hell Hole Powerhouse discharging to the Rubicon River.
- Middle Fork Powerhouse diverting water at Hellhole Reservoir and discharging the water into the Middle Fork American River.

- Ralston Powerhouse diverting water from the Middle Fork American and discharging at the confluence of the Middle Fork American and the Rubicon rivers.

- Oxbow Powerhouse on the Ralston Powerhouse afterbay discharging water into the Middle Fork American River.

On February 23, 2011, Placer County Water Agency filed an application with FERC for a new license to operate and maintain its Middle Fork American River Project No. 2079. As part of the filing, Placer County Water Agency filed a proposal to increase the storage capacity of Hell Hole Reservoir by approximately 7,600 AF increasing both water storage and average annual generation (Placer County Water Agency 2013).

South Sutter WD
South Sutter WD operates Camp Far West Reservoir with a storage capacity of 104,400 AF. South Sutter WD generates approximately seven MW of power at the Camp Far West Powerhouse located at the reservoir. Power generated at Camp Far West Powerhouse is wholesaled to Sacramento Municipal Utilities District. Camp Far West Powerhouse generates power under FERC license 2997 issued in 1981.

Merced ID
Merced ID operates the Merced River Hydroelectric Project (under FERC Project No. 2179) on the Merced River, which generates power and provides water supply from Lake McClure and McSwain Reservoir. Project 2179 stores approximately 1,034,330 AF of water and generated on average 3,510,000 MW-hours of power annually. The installed capacity of the Project is 103.5 MW. Power generation provides peak, base, and load shaping (Merced ID 2012). The project includes the following power and water storage features:

- New Exchequer Dam and Lake McClure – Lake McClure, formed by New Exchequer Dam is on the Merced River approximately 62 miles from the confluence with the San Joaquin River. Lake McClure has a total storage capacity of 1,024,600 AF.

- New Exchequer Powerhouse – The New Exchequer Powerhouse is at the base of New Exchequer Dam on the south side of Merced River with an installed capacity of 94.5 MW.

- McSwain Dam and Reservoir - McSwain Dam creates the McSwain Reservoir on the Merced River approximately 56 miles upstream of the confluence with the San Joaquin River, McSwain has a total storage capacity of 9,730 AF. The McSwain Reservoir operates as a reregulation reservoir for the New Exchequer Powerhouse.

- McSwain Powerhouse – The McSwain Powerhouse is at the base of McSwain Dam on the north side of the Merced River with an installed capacity of 9.0 MW and operates primarily to supply base load.

In February 2012, Merced ID filed an application with FERC for a new license to operate and maintain its Merced River Hydroelectric Project No. 2179.

3.16.1.3.2 Buyer Service Area

This section includes the potential affect to power generation by water transfers in the Buyer Service Area. Water transfers would be moved south of the Delta through pumps belonging to the East Bay Municipal Utility District on the Sacramento River at Freeport; pumps operated by Contra Costa WD in the Delta, the CVP's Jones Pumping Plant, or the SWP's Banks Pumping Plant. None of these pumping plants have complementary power generation facilities and would therefore not affect hydroelectric power generation. Water moved through the CVP or SWP pumping plants (Jones and Banks) could be stored in San Luis Reservoir of the San Luis Unit of the CVP West San Joaquin Division where power generation does occur complementary to pumping.

San Luis Reservoir serves as a pump-storage reservoir for both the CVP and the SWP using the Gianelli and O'Neill pumping-generating plants to fill San Luis Reservoir. The two plants provide the dual functions of generating electricity and pumping water.

The O'Neill Pumping-Generating Plant lifts water from CVP Delta-Mendota Canal into the O`Neill Forebay. When water is released from the forebay to the Delta-Mendota Canal, these units operate as generators. O'Neill Pumping-Generating Plant has an installed capacity of 25 MW and an average annual generation of approximately 5,400 MW-hours.

The Gianelli Pumping-Generating Plant lifts water from the O'Neill Forebay and discharges it into San Luis Reservoir. The Gianelli Pumping-Generating Plant has an installed capacity of 424 MW. When water is released from San Luis Reservoir, it is directed though the Gianelli Pumping-Generating Plant. The average annual generation of the plant is approximately 126,400 MW-hours, with the monthly generation at zero through most of the winter, spiking up to over 50,000 MW-hours in May, and dropping slowly back to zero by September (Reclamation 2008).

3.16.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative.

3.16.2.1 Assessment Methods

Hydroelectric power generation is dependent on water releases. If water releases out of hydroelectric facilities are reduced or increased, power generation may be reduced or increased, respectively.

To analyze these impacts, potential changes to water releases out of hydroelectric facilities are evaluated within the area of analysis. Significant reduction in power generation could impact power recipients and the cost of power.

3.16.2.2 Significance Criteria

Impacts on power generation would be considered potentially significant if the project would:

- Result in long-term adverse effects on power supplies.

The significance criteria described above apply to all power generating facilities that could be affected by the project. Changes in power generation are determined relative to existing conditions (for the California Environmental Quality Act) and the No Action/No Project Alternative (for the National Environmental Policy Act).

3.16.2.3 Alternative 1: No Action/No Project

There would be no effects to the generation of power under the No Action/No Project Alternative. Under the No Action/ No Project Alternative, changes in hydrologic conditions could affect the annual generation of power. These changes, however, would be the same as those that occur under existing conditions.

3.16.2.4 Alternative 2: Full Range of Transfer Measures (Proposed Action)

Acquisition of water via groundwater substitution or cropland idling may cause changes in power generation from CVP and SWP reservoirs. Transfer operations could affect power generation by changing reservoir releases or by changing reservoir elevations.

Transfers would change reservoir releases because of additional water stored in early summer and streamflow depletion. In some years, sellers may start transferring water from cropland idling or groundwater substitution in April, May, or June, before Delta export capacity is available. If possible, Reclamation or DWR could store this water in upstream reservoirs, if excess capacity is available, until export capacity is available in July, August, or September. This “backing up” transfer water would decrease reservoir releases early in the season and increase releases later in the season. Releases could also be affected by streamflow depletion downstream from the reservoirs. Reclamation and DWR will release additional flows to meet downstream standards and/or maintain exports when streamflow is decreased as a result of groundwater recharge associated with groundwater substitution transfers.

Reclamation and DWR would then capture additional flow during the eventual wetter periods, which would decrease releases. Table 3.16-2 shows the changes in reservoir releases from Keswick, Thermalito, and Nimbus (the power regulating facilities associated with Shasta, Oroville, and Folsom reservoirs, respectively.) At these three facilities, reservoir releases increase and decrease in different months over time, but have very little overall change in the long term. Because the releases have very little overall change in the long term, power generation would also not change substantially in the long term.

Table 3.16-2. Changes in Reservoir Releases between the No Action/No Project Alternative and the Proposed Action (in cubic feet per second)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick Reservoir Releases												
W	-3.5	-0.2	-3.3	-5.9	-1.2	0.0	0.9	2.0	2.5	1.5	2.2	2.2
AN	0.9	0.0	-19.4	-9.9	-9.5	0.0	0.9	-36.5	4.3	2.5	2.4	2.7
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.5	0.0	3.1	0.0
D	0.8	-3.2	0.0	-2.5	0.0	0.0	-107.9	-191.7	-455.3	233.1	528.2	2.2
C	0.0	2.8	0.0	0.0	9.4	0.0	-43.6	-466.1	-755.3	971.0	293.9	0.0
Feather River below Thermalito												
W	8.3	-5.4	-16.4	-9.0	-40.8	0.0	0.0	0.0	4.6	6.0	13.3	12.2
AN	29.4	1.1	2.0	0.0	-39.5	-162.9	0.0	0.0	-9.3	96.9	-29.8	-22.5
BN	10.2	10.0	17.9	0.0	0.0	0.0	0.0	0.0	5.4	4.7	14.1	7.0
D	10.7	1.7	3.7	0.0	0.0	0.0	0.0	-105.1	-12.1	43.5	168.1	-70.0
C	10.7	11.1	17.5	0.0	7.7	3.8	11.6	-1.8	-36.5	-84.9	233.4	0.8
Nimbus Reservoir Releases												
W	17.1	39.4	-38.7	-54.9	-20.7	-1.1	0.0	9.6	-12.6	5.1	-0.8	4.2
AN	22.0	12.8	1.7	-171.3	-233.9	-33.2	0.3	0.1	3.0	20.3	23.9	27.9
BN	12.4	12.2	21.9	0.0	-78.9	0.0	0.0	0.0	12.7	14.0	0.0	8.5
D	26.2	9.6	44.5	-52.2	-21.2	-73.0	-113.6	-76.3	-14.0	94.0	58.4	34.6
C	43.9	41.2	31.5	18.2	18.3	26.8	-22.3	20.5	-44.8	152.4	107.1	55.8

Note: Negative numbers indicate that the Proposed Action would decrease reservoir releases compared to the No Action/No Project Alternative; positive numbers indicate that the Proposed Action would increase reservoir releases.
W = Wet Year
AN = Above Normal Year
BN = Below Normal Year
D = Dry Year
C = Critical Year

Transfers would also change reservoir elevations in these three reservoirs (see Table 3-16.3) because of backing up water in storage and streamflow depletion. The lower surface elevations would translate to reduced head and would therefore slightly decrease the head component of generation efficiency at each facility. Although the loss of head pressure would reduce the efficiency of the turbines, and therefore the amount of electricity that can be produced, the power loss would be minimal because of the small difference between elevations. As a result, there would be no long-term adverse effects on power supplies. Therefore, the impacts to power generation associated with the transfers would be less than significant.

Table 3.16-3. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and the Proposed Action (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.6	1.8	1.4	-0.2	-0.2
C	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	1.2	3.7	0.4	-0.5	-0.5
Oroville Reservoir												
W	-0.5	-0.5	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
AN	-2.2	-2.2	-2.1	-1.4	-1.1	-0.1	-0.1	-0.1	0.0	-0.4	-0.3	-0.3
BN	-0.3	-0.4	-0.6	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.6	-0.7	-0.8
D	-0.7	-0.7	-0.6	-0.6	-0.6	-0.4	-0.4	0.5	0.6	0.0	-1.2	-0.7
C	-1.7	-2.2	-2.3	-2.3	-2.1	-1.8	-1.9	-1.7	-1.4	-0.9	-2.9	-3.0
Folsom Reservoir												
W	0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.5	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.5
BN	-0.3	-0.4	-0.6	-0.5	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.2
D	0.3	0.2	-0.1	-0.2	-0.3	-0.1	-0.1	0.8	1.4	1.4	1.6	1.8
C	1.1	0.8	0.6	0.5	0.6	-0.1	0.0	0.5	1.5	1.5	1.0	1.4

Note: Negative numbers indicate that the Proposed Action would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that the Proposed Action would increase reservoir elevations.
W = Wet Year
AN = Above Normal Year
BN = Below Normal Year
D = Dry Year
C = Critical Year

Acquisition of water via stored reservoir water may cause changes in power generation from the facilities that provide water. Releasing water from non-Project reservoirs for stored reservoir water transfers would generate additional power during the period when water is released. After the release, less power would be generated while the reservoir is refilling in subsequent wet seasons. This operation would reduce overall supplies slightly, but it would primarily just change the timing of power generation. In the long-term, this operation would not substantially reduce power supplies; therefore, this impact would be less than significant.

3.16.2.5 Alternative 3: No Cropland Modifications

Acquisition of water via groundwater substitution or cropland idling may cause changes in power generation from CVP and SWP reservoirs. Similar to the Proposed Action, transfer operations in Alternative 3 could affect power generation by changing reservoir releases or by changing reservoir elevations. Table 3.16-4 shows changes in reservoir releases from Keswick, Thermalito, and Nimbus (the power regulating facilities associated with Shasta, Oroville, and Folsom reservoirs, respectively.) At these three facilities, reservoir releases increase and decrease in different months over time, but have very little overall change in the long term. Because the releases have very little overall change in the long term, power generation would also not change substantially in the long term.

Table 3.16-4. Changes in Reservoir Releases between the No Action/No Project Alternative and Alternative 3 (in cubic feet per second)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick Reservoir Releases												
W	-3.5	-0.2	-3.3	-5.9	-1.2	0.0	0.9	2.0	2.5	1.5	2.2	2.2
AN	0.9	0.0	-19.4	-9.9	-9.5	0.0	0.9	-36.5	4.3	2.5	2.4	2.7
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.5	0.0	3.1	0.0
D	0.8	-3.2	0.0	-2.5	0.0	0.0	-107.9	-108.1	-324.9	196.2	355.2	2.2
C	0.0	2.8	0.0	0.0	9.4	0.0	-43.6	-225.1	-382.1	561.9	100.7	0.0
Feather River below Thermalito												
W	8.3	-5.4	-16.4	-9.0	-40.8	0.0	0.0	0.0	4.6	6.0	13.3	12.2
AN	29.4	1.1	2.0	0.0	-39.5	-162.9	0.0	0.0	-9.3	96.9	-29.8	-22.5
BN	10.2	10.0	17.9	0.0	0.0	0.0	0.0	0.0	5.4	4.7	14.1	7.0
D	10.7	1.7	3.7	0.0	0.0	0.0	0.0	-102.6	-12.1	34.4	162.6	-70.0
C	10.7	11.1	17.5	0.0	7.7	3.8	11.6	-1.8	-34.7	15.8	110.3	0.8
Nimbus Reservoir Releases												
W	17.1	39.4	-38.7	-54.9	-20.7	-1.1	0.0	9.6	-12.6	5.1	-0.8	4.2
AN	22.0	12.8	1.7	-171.3	-233.9	-33.2	0.3	0.1	3.0	20.3	23.9	27.9
BN	12.4	12.2	21.9	0.0	-78.9	0.0	0.0	0.0	12.7	14.0	0.0	8.5
D	26.2	9.6	44.5	-52.2	-21.2	-73.0	-113.6	-76.3	-14.0	94.0	58.4	34.6
C	43.9	41.2	31.5	18.2	18.3	26.8	-22.3	21.5	-43.2	148.6	108.4	55.8

Note: Negative numbers indicate that Alternative 3 would decrease reservoir releases compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase reservoir releases.

W = Wet Year

AN = Above Normal Year

BN = Below Normal Year

D = Dry Year

C = Critical Year

Transfers would also change reservoir elevations in these three reservoirs (see Table 3-16.5) because of backing up water in storage and streamflow depletion. The lower surface elevations would translate to reduced head and would therefore slightly decrease the head component of generation efficiency at each facility, but the elevation changes would be small and would not result in long-term adverse effects on power supplies. Therefore, the impacts to power generation associated with the transfers would be less than significant.

Table 3.16-5. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and Alternative 3 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
D	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.2	0.4	1.3	0.9	-0.2	-0.2
C	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	0.5	1.8	-0.2	-0.5	-0.5
Oroville Reservoir												
W	-0.5	-0.5	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
AN	-2.2	-2.2	-2.1	-1.4	-1.1	-0.1	-0.1	-0.1	0.0	-0.4	-0.3	-0.3
BN	-0.3	-0.4	-0.6	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.6	-0.7	-0.8
D	-0.7	-0.7	-0.6	-0.6	-0.6	-0.4	-0.4	0.4	0.5	0.0	-1.2	-0.7
C	-1.7	-2.2	-2.3	-2.3	-2.1	-1.8	-1.9	-1.8	-1.5	-1.8	-2.9	-3.0
Folsom Reservoir												
W	0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
AN	-0.5	-0.6	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.5
BN	-0.3	-0.4	-0.6	-0.5	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.2
D	0.3	0.2	-0.1	-0.2	-0.3	-0.1	-0.1	0.8	1.4	1.4	1.6	1.8
C	1.1	0.8	0.6	0.5	0.6	-0.1	0.0	0.5	1.5	1.5	1.0	1.4

Note: Negative numbers indicate that Alternative 3 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase reservoir elevations.
W = Wet Year
AN = Above Normal Year
BN = Below Normal Year
D = Dry Year
C = Critical Year

Acquisition of water via stored reservoir water may cause changes in power generation from the facilities that provide water. Similar to the Proposed Action, Alternative 3 would shift the power generation timing in the facilities that release water for stored reservoir water transfers. In the long-term, this operation would not substantially reduce power supplies; therefore, this impact would be less than significant.

3.16.2.6 Alternative 4: No Groundwater Substitution

Acquisition of water via groundwater substitution or cropland idling may cause changes in power generation from CVP and SWP reservoirs. Similar to the Proposed Action, transfer operations in Alternative 4 could affect power generation by changing reservoir releases or by changing reservoir elevations. Alternative 4, however, would only change reservoir operations by backing up water into storage. Alternative 4 does not include groundwater substitution transfers and would therefore not have effects associated with streamflow depletion. Table 3.16-6 shows changes in reservoir releases from Keswick, Thermalito, and Nimbus (the power regulating facilities associated with Shasta, Oroville, and Folsom reservoirs, respectively.) At these three facilities, reservoir releases increase and decrease in different months over time, but have very little overall change in the long term. Because the releases would have very little overall change in the long term, power generation would also not change substantially in the long term.

Table 3.16-6. Changes in Reservoir Releases between the No Action/No Project Alternative and Alternative 4 (in cubic feet per second)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick Reservoir Releases												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-86.2	-204.4	142.0	142.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-279.4	-483.7	627.7	119.8	0.0
Feather River below Thermalito												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.2	-40.7	-14.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-24.3	0.0	-99.0	219.6	-75.6
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-13.2	-65.5	107.9	0.0
Nimbus Reservoir Releases												
W	9.7	36.2	-28.6	-18.6	-20.7	-1.1	0.0	9.6	-13.5	-0.5	-0.8	0.0
AN	10.4	4.4	1.7	-132.1	-233.9	-33.2	0.3	0.1	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	20.8	11.7	57.6	-52.2	-21.2	-72.2	-113.6	-24.3	0.0	55.6	33.9	32.2
C	36.5	28.6	31.5	18.2	18.3	26.8	26.8	38.6	-6.8	97.4	59.6	55.8

Note: Negative numbers indicate that Alternative 4 would decrease reservoir releases compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase reservoir releases.

W = Wet Year

AN = Above Normal Year

BN = Below Normal Year

D = Dry Year

C = Critical Year

Table 3.16-7 shows changes in reservoir elevations associated with backing up water into storage. This action would increase water in storage during the summer months, which could temporarily increase power generation. Overall, the impacts to power generation associated with the transfers would not result in long-term adverse effects on power supplies and would be less than significant.

Table 3.16-7. Changes in CVP and SWP Reservoir Elevations between the No Action/No Project Alternative and Alternative 4 (in feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.4	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.4	0.4	0.0	0.0
Oroville Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.9	-0.5	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.8	0.0	0.0
Folsom Reservoir												
W	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	-0.2	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.6	0.5	0.0	0.0	-0.1	0.0	0.0	0.6	1.0	1.3	1.7	2.0
C	1.4	1.2	1.1	1.0	1.1	0.4	0.1	0.5	1.1	1.0	1.4	1.9

Note: Negative numbers indicate that Alternative 4 would decrease reservoir elevations compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase reservoir elevations.

W = Wet Year
AN = Above Normal Year
BN = Below Normal Year
D = Dry Year
C = Critical Year

Acquisition of water via stored reservoir water may cause changes in power generation from the facilities that provide water. Similar to the Proposed Action, Alternative 4 would shift the power generation timing in the facilities that release water for stored reservoir water transfers. In the long-term, this operation would not substantially reduce power supplies; therefore, this impact would be less than significant.

3.16.3 Comparative Analysis of Alternatives

Table 3.16-8 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative.

Table 3.16-8. Comparative Analysis of Alternatives

Potential Impact	Alternatives	Significance	Proposed Mitigation	Significance after Mitigation
There would be no effects to the generation of power under the No Action/No Project Alternative	1	NCFEC	None	NCFEC
Acquisition of water via groundwater substitution or crop idling may cause changes in power generation from CVP and SWP reservoirs	2, 3, 4	LTS	None	LTS
Acquisition of water via stored reservoir water may cause changes in power generation from the facilities that provide water	2, 3, 4	LTS	None	LTS

Notes:
LTS = Less than significant
NCFEC = no change from existing conditions

3.16.3.1 Alternative 1: No Action/No Project Alternative

There would be no impacts on power generation.

3.16.3.2 Alternative 2: Full Range of Transfers (Proposed Action)

Water transfers under the Proposed Action could change reservoir elevations and releases; however, these changes would generally shift the timing of generation rather than reducing it. The transfers would not result in long-term adverse effects on power supplies and the effects on power generation would be less than significant.

3.16.3.3 Alternative 3: No Cropland Modifications

This alternative would have similar effects on power generation as the Proposed Action. The effects to power generation would be less than significant.

3.16.3.4 Alternative 4: No Groundwater Substitution

Alternative 4 would not include groundwater substitution transfers, so the streamflow depletion effects on reservoir elevations and releases in the other two action alternatives would not occur. Effects on reservoir elevations and releases associated with storing and conveying water transfers would still occur, but they would be focused during the transfer period. The effects on power generation would be less than significant.

3.16.4 Environmental Commitments/Mitigation Measures

There are no mitigation measures needed to reduce impacts of the alternatives.

3.16.5 Potentially Significant Unavoidable Impacts

None of the action alternatives would result in potentially significant unavoidable impacts on power supplies.

3.16.6 Cumulative Effects

The timeframe for the Long-Term Water Transfers cumulative analysis extends from 2015 through 2024, a ten year period. The cumulative effects analysis for power considers SWP water transfers, the Lower Yuba River Accord, CVP the Municipal and Industrial Water Shortage Policy, and the San Joaquin River Restoration Program. Chapter 4 further describes these projects and policies.

3.16.6.1 Alternative 2: Full Range of Transfers

Acquisition of water via groundwater substitution or crop idling may cause changes in power generation from CVP and SWP reservoirs. The cumulative projects could result in small operational changes that could affect power generation. None of these projects focus on reoperating reservoirs, but small changes could result from the cumulative projects. Similar to the changes described above for Long-Term Water Transfers, the operational changes are not likely to have a substantial effect on power generation, either incrementally or cumulatively. Therefore, the Proposed Action in combination with other cumulative projects would not result in a cumulative significant impact to power generation.

3.16.6.2 Alternative 3: No Cropland Modification

Cumulative effects would be the same or less than those described for the Proposed Action.

3.16.6.3 Alternative 4: No Groundwater Substitution

Cumulative effects would be the same or less than those described for the Proposed Action.

3.16.7 References

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Section 3.17
Flood Control

This section describes existing flood control facilities within the area of analysis and discusses potential effects on flooding and flood control from the proposed alternatives.

All forms of transfers described in Chapter 2 (groundwater substitution, stored reservoir releases, cropland idling/shifting and conservation transfers) could affect flooding and flood control within the area of analysis.

3.17.1 Affected Environment/Environmental Setting

This section provides a description of current flood control and hydrologic systems with the potential to be affected by the action alternatives. Pertinent regulatory requirements are described below.

3.17.1.1 Area of Analysis

The flood control area of analysis includes conveyance and storage facilities in the Seller and Buyer Service Areas. Effects are assessed in the following regions:

- Seller Service Area: Shasta Reservoir, Sacramento River, Lake Oroville, Feather River, Merle Collins Reservoir, Camp Far West Reservoir, Yuba River, Hell Hole and French Meadow Reservoirs, Middle Fork American River, Folsom Reservoir, Lower American River, Sacramento-San Joaquin Delta, Lake McClure, Merced River, and San Joaquin River.

- Buyer Service Area: San Luis Reservoir.

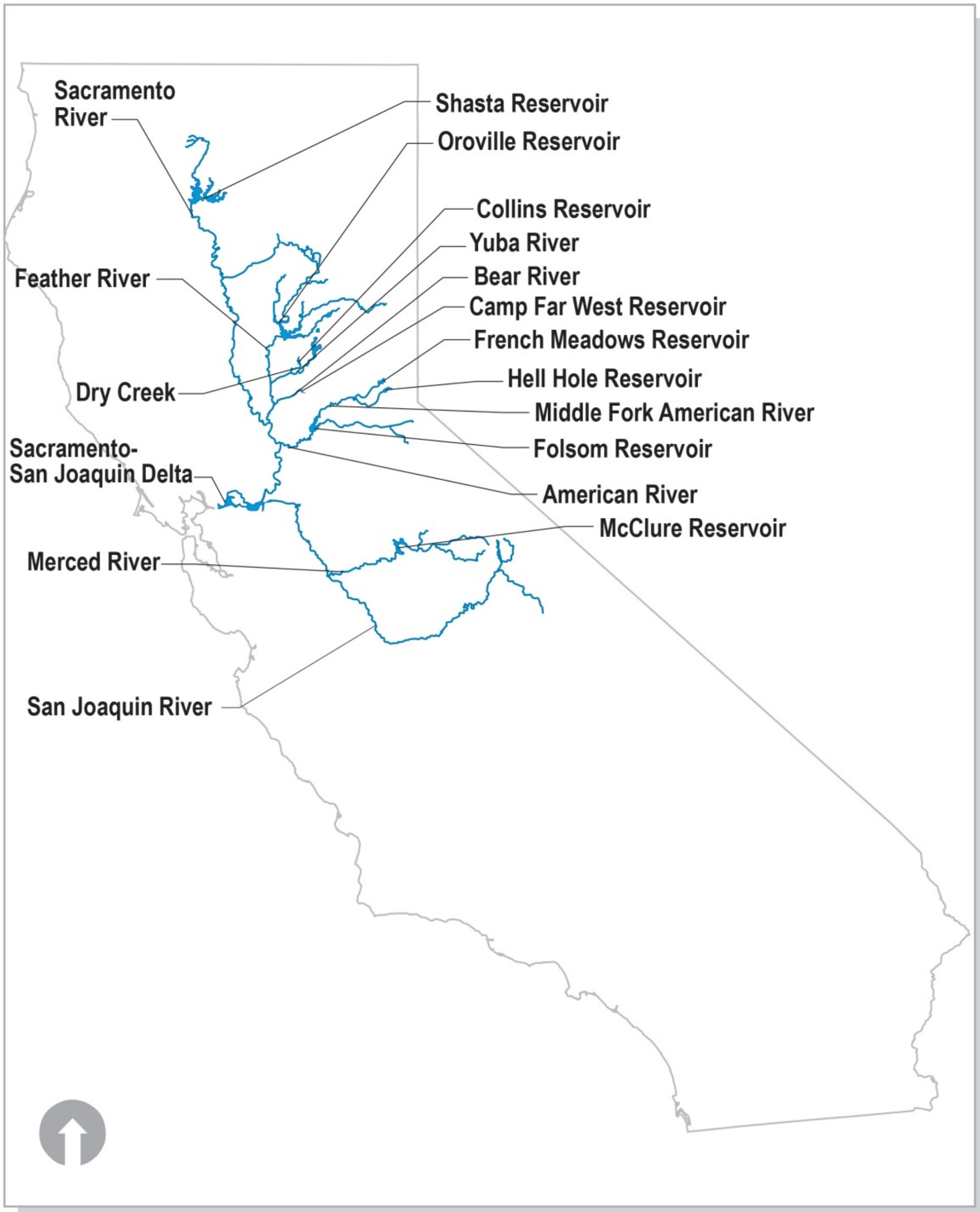

Figure 3.17-1. Flood Control Area of Analysis

3.17.1.2 Regulatory Setting

The National Flood Insurance Program (NFIP) The NFIP is regulated by the Flood Insurance and Mitigation Administration under the Federal Emergency Management Agency (FEMA). The program was established as part of the National Flood Insurance Act of 1968 and includes three components: Flood Insurance, Floodplain Management and Flood Hazard Mapping (FEMA 2002).

Through the voluntary adoption and enforcement of floodplain management ordinances, communities across the United States participate in the NFIP. The

NFIP makes available federally backed flood insurance to homeowners, renters and business owners in participating communities. The NFIP promotes regulations designed to reduce flood risks through sound floodplain management. NFIP maps identify floodplains and assist communities when developing floodplain management programs and identifying areas at risk of flooding.

In 1973, the Flood Disaster Protection Act was passed by Congress. The result of this was the requirement for community participation in the NFIP to receive federal financial assistance for acquisition or construction of buildings and disaster assistance in floodplains. It also “required federal agencies and federally insured or regulated lenders to require flood insurance on all grants and loans for acquisition or construction of buildings in designated Special Flood Hazard Areas” within participating communities (FEMA 2002).

Later, in 1994, the two acts were amended with the National Flood Insurance Reform Act, which included a requirement for FEMA to assess its flood hazard map inventory at least once every five years. FEMA prepares floodplain maps based on the best available science and technical information available. However, changes to the watershed or the availability of new information may cause the need for a map revision. When a revision is required, the applicable community works with FEMA to develop the map revision through a Letter of Map Amendment or a Letter of Map Revision (FEMA 2002).

In order for communities to participate in the NFIP they must adopt and enforce floodplain management criteria.

3.17.1.3 Affected Environment

Flood risk in California is generally highest from late October through March, which marks the rainy season. Levees, rivers, channels, dams, and reservoirs are common structural measures for flood damage reduction throughout the State. Levees confine water flows within a channel. The integrity of a levee and the maximum design flow capacity of the channel dictate a levee’s effectiveness.

Dams and reservoirs can be operated to reduce flows downstream by capturing inflows and controlling releases. The amount of water stored in a reservoir at any point in time (conservation storage) is governed by U.S. Army Corps of Engineers (USACE) criteria stated in the flood control project’s water control manual. The water elevation associated with the top of conservation storage can vary depending on time of year, upstream storage, and the type of storm (rain or snow) that is occurring. In addition to the conservation storage, each reservoir that provides flood control must reserve flood damage reduction space at certain times of the year. This amount varies by flood control project (Resources Agency 1999). This reserved flood damage reduction space ensures that during a large storm event, high amounts of precipitation and runoff can be captured and stored in the reservoir without overtopping the dam or requiring the release of more water than the downstream channels and levees have been designed to convey.

Many agencies have a role in designing, constructing, managing, regulating, and/or operating flood damage reduction facilities, including the Bureau of Reclamation, the USACE, the California Department of Water Resources (DWR), and the Central Valley Flood Protection Board. FEMA oversees the NFIP, which helps provide protection from flood-related damages through its flood insurance program, floodplain management, and flood hazard mapping.

3.17.1.3.1 Seller Service Area

In the Seller Service Area, a variety of infrastructure provides flood damage reduction along the Sacramento and San Joaquin Rivers and their tributaries including the Yuba, Feather, American, and Merced Rivers. These structures include reservoirs, rivers, channels, and levees.

Sacramento River Region

Shasta Reservoir

Shasta Reservoir is the primary reservoir providing flood protection on the upper Sacramento River. The reservoir was formed in 1948 after the construction of the Shasta Dam and is primarily filled from inflows from the Sacramento, Pit, and McCloud Rivers. Reclamation owns and operates the dam and reservoir as part of the Central Valley Project (CVP). Shasta Reservoir has a capacity of 4.55 million acre-feet (AF) and a surface area of 30,000 acres (Reclamation 2012).

Shasta Dam provides flood control for downstream communities along the Sacramento River and water storage for irrigation in the Sacramento and San Joaquin valleys. The normal operating water level at the dam is 522.5 feet. The dam's outlets have a combined capacity of 81,000 AF at a water level of 1,065 feet (Reclamation 2012). Dam operations include a maximum flood control space of 1.3 million AF. This capacity must be available starting October 1 in anticipation of winter storms. Large winter rainstorms historically result in maximum flows between December and March (USACE 1999). Dam operations also restrict releases by not exceeding flows of 79,000 cubic feet per second (cfs) and 100,000 cfs in the Sacramento River below Keswick Dam and at Bend Bridge, respectively (Reclamation 2012). Water releases are required to provide suitable conditions for the conservation of salmon in the Sacramento River. In 1997, Reclamation built a temperature control device that allows water releases at temperature suitable for downstream salmon.

About nine miles downstream of Shasta Dam is Keswick Dam, which helps reregulate flow releases for the power plants. Keswick Dam's normal operating hydraulic level is 587 feet with a maximum of 601.6 feet. At normal operating level, the total water storage is 23,000 AF with a release capacity of 250,000 cfs at the dam's outlets (Reclamation 2012).

Sacramento River
Downstream of Shasta Reservoir, the Sacramento River flows southwards to the Delta. The Sacramento River system is leveed from Ord Ferry to the southern tip of Sherman Island in the Delta. Flood control on the Sacramento River system is also managed by a system of weirs and bypasses constructed by the USACE. The system includes five bypasses: the Butte Basin, Sutter Bypass, Yolo Bypass, Tisdale Bypass, and Sacramento Bypass. Moulton and Colusa Weirs feed floodwaters into the Butte Basin Bypass, Tisdale Weir flows into Sutter Bypass, and Fremont Weir and Sacramento Bypass flow into the Yolo Bypass. The Yolo Bypass carries five-sixths of the volume of the Sacramento River at peak flood flows. The bypasses are large tracts of undeveloped or minimally-developed land. Development within the bypasses typically is limited to agricultural activities that require minimal infrastructure. Water released to the bypass system flows south into the Delta, in effect creating a short-term storage system for the floodwaters. Water released to the bypass system also infiltrates into the ground, recharging groundwater supplies, although this volume is small compared to the total volume of a flood. When flooding occurs, the weir and bypass system diverts water to protect the levee system and free flood storage capacity in the reservoirs. The Sacramento River levee and bypass system has a maximum conveyance capacity of 600,000 cfs, which is much greater than the capacity of the actual Sacramento River channel. Approximately 110,000 cfs is conveyed in the river and almost 500,000 cfs is channeled into the Yolo Bypass (DWR Undated).

Feather River Region

Oroville Reservoir
Oroville Reservoir holds winter and spring runoff for release into the Feather River. During wet years, Oroville reservoir aids in reducing downstream flooding. The current lake was formed in 1969 after the construction of the Oroville Dam and is primarily filled from inflows from the North Fork, Middle Fork, West Branch, and South Forks of the Feather River. DWR owns and operates the dam as part of the State Water Project (SWP). Oroville Reservoir has a capacity of 3.5 million AF at an elevation of 900 feet and a surface area of 15,810 acres (DWR 2012a).

Oroville Reservoir is a key unit in the SWP but also provides flood control for upper portions of the Feather River watershed including Marysville, Yuba City, Oroville, and smaller communities. Controlled releases from Oroville Reservoir combine downstream with flows from the Yuba and Bear Rivers to create the largest tributary to the Sacramento River downstream of Shasta Reservoir. Dam operations follow a Water Control Plan that include a maximum flood control space of 750,000 AF and a minimum of 375,000 AF by mid-October each year, as set by USACE. The USACE also sets downstream flow limits of 150,000 cfs north of Honcut Creek, 180,000 cfs above the mouth of the Yuba River, and 320,000 cfs south of the Bear River (DWR 2012a).

Feather River

The main stem of the Feather River begins downstream of Oroville Dam and generally flows in a south and southwest direction. Long portions of the Feather River have levees on both sides of its banks. On the east bank a levee extends from the confluence with the Sacramento River to Hamilton Bend near the City of Oroville. The west bank extends from the Sacramento River confluence to Honcut Creek. The Feather River design channel capacity from Thermalito Afterbay to the Yuba River is 210,000 cfs, and is 300,000 cfs from the Yuba River to the Bear River (DWR 2010).

Yuba River Region

New Bullards Bar Reservoir

New Bullards Bar Reservoir is a large reservoir located on the North Fork Yuba River. The reservoir was created by the completion of the New Bullards Bar Dam in 1967. The dam and reservoir are currently operated by Yuba County Water Agency. The reservoir provides flood protection to Marysville and Yuba City as well as agricultural land (USACE 1999). The reservoir has a maximum 960,000 AF of storage with 170,000 AF reserved for flood damage reduction between the end of October and the end of March (DWR 2010; Northern California Water Association 2012). The amount of flood damage reduction storage in the reservoir varies from mid-September through October (depending on early season rainfall) and from the end of March through May (depending on the amount of snowfall in the watershed).

Yuba River

The Yuba River originates in the Sierra Nevada and flows to the Feather River downstream of Lake Oroville near the City of Marysville. The channel capacity of the Yuba River from New Bullards Bar Reservoir to its confluence with the Feather River is 120,000 cfs according to its Operation and Maintenance Manual (DWR 2010). Downstream of the New Bullards Bar Dam, the North, Middle, and South Forks of the Yuba River converge and pass the Englebright Dam built in 1941. Englebright reservoir does not have any dedicated flood storage space and is not used for flood control purposes (Reclamation 2007).

Downstream of Englebright Dam, the Yuba River converges with Dry Creek which drains from Merle Collins Reservoir (Collins Lake). Collins Lake is approximately 25 miles northeast of Marysville and is in the Virginia Ranch Reservoir watershed. Collins Lake has a maximum capacity of 57,000 AF and 1,009 surface acres on Dry Creek, a tributary of the Yuba River (Browns Valley Irrigation District [ID] Undated). Flows in Dry Creek are regulated by Browns Valley ID’s operations of the Merle Collins Reservoir (Reclamation et al. 2007)). Browns Valley ID manages Collins Lake water levels, and there are no formal flood damage reduction operations on Collins Lake. Levees along the Yuba River extend from the confluence with the Feather River and continue up past Marysville on both banks of the river.

Bear River and Camp Far West Reservoir

The Bear River is a tributary of the Feather River. Upstream of its confluence with Dry Creek, the design channel capacity is 30,000 cfs. Downstream of Dry Creek, the Bear River design channel capacity is 40,000 cfs. Levees extend on both sides of the Bear River (DWR 2010).

Camp Far West Reservoir receives water from Bear River and Rock Creek. The reservoir has a maximum capacity of 104,000 AF, a maximum surface area of approximately 2,002 acres and 29 miles of shoreline (Sacramento Area Council of Governments 2011; Placer County 2008).

American River Region

Folsom Reservoir

Folsom Reservoir is located in the foothills of the Sierra Nevada about 25 miles northeast of Sacramento's metropolitan area. Folsom Reservoir was created by the completion of Folsom Dam in 1956 by the USACE. The reservoir is located on the American River downstream of the convergence of the North Fork and Middle Fork American River. Reclamation operates Folsom Dam for flood control and water supply in accordance to the USACE Water Control Manual as part of the CVP. Folsom Reservoir impounds approximately 977,000 AF at a reservoir water surface elevation of 466 feet on the American River. The design surcharge pool is 1,084,780 AF at an elevation of 475.4 feet with 5.1 feet of existing freeboard (Reclamation et al. 2006).

Folsom Reservoir is a key unit in the CVP and provides important flood protection for the entire Sacramento region. Management of the reservoir space reserved for flood control is seasonal. According to the Folsom Dam and Reservoir Water Control Manual of 1987, from June 1 through September 30 there is no space designated for flood control. From October 1 through November 17, the amount of space reserved for flood control increases uniformly until February 7. From February 8 through April 20 the flood reservation space is 400,000 AF, which can be reduced after March 15 if basin conditions are dry. From April 21 through May 31, the required flood space decreases uniformly until no flood space is required (Reclamation et al. 2006). A series of dam safety and flood damage reduction structural modifications are underway at Folsom Reservoir, including construction of a new auxiliary spillway. When complete, the modifications have the potential to increase the amount water that can be released from Folsom Dam. The USACE is revising the water control manual to incorporate these modifications.

Approximately seven miles downstream of Folsom Dam on the American River is Nimbus Dam. Nimbus Dam forms Lake Natoma and helps normalize the releases made through the Folsom Power plant at Folsom Dam. Lake Natoma has a capacity of 8,760 AF at elevation 125 feet and a surface area of 540 acres (Reclamation and California Department of Parks and Recreation [CDPR] 2007; Reclamation 2009).

American River

The main stem of the American River generally flows southwest from Folsom Dam. The downstream portions of the American River have levees from the confluence with the Sacramento River up to Sunrise Boulevard on the south bank and to Carmichael Bluffs on the north bank. The levees were constructed by the USACE in 1958 and are designed to accommodate a sustained flow rate of 115,000 cfs and a maximum capacity of 160,000 cfs for a short duration during emergencies, without resulting in levee failure and downstream flooding (Reclamation 2012; Reclamation et al. 2007).

Merced River Region

Lake McClure

Lake McClure and New Exchequer Dam are located in Mariposa County about 20 miles northeast of city of Merced and are operated by the Merced ID. The dam and lake provide flood protection to agricultural lands downstream of the dam and to the communities of Livingston, Snelling, Cressy, and Atwater (Reclamation et al. 2011). Lake McClure's maximum capacity is approximately 1.024 million AF with a surface area of 7,110 acres. Dam operations include a maximum flood management reservation of 350,000 AF between mid-October and mid-March. Six miles downstream of New Exchequer Dam is McSwain Dam and McSwain Lake, which serves as a forebay to regulate releases from Lake McClure (Merced ID 2012). Several smaller diversion dams are located on the river downstream of New Exchequer Dam and are used for irrigation purposes.

Merced River

The Merced River is the third largest tributary to the San Joaquin River. It originates in the Sierra Nevada and flows southwest to the Central Valley where it converges with the San Joaquin River near Turlock. The river above New Exchequer Dam, which forms Lake McClure, is free-flowing and unobstructed. Below Lake McClure, the Merced River flows mainly through irrigated agricultural lands. There are no Federal or State levees along the lower Merced River.

San Joaquin River Region

San Joaquin River

The San Joaquin River from the Merced River to the Delta contains approximately 100 miles of levees constructed by the USACE as part of the Lower San Joaquin River and Tributaries Project. The levees vary in height from six to 15 feet and were designed to contain floods occurring, on average, once every 60 years at the lower end of the project to floods occurring, on average, once every 100 years at the upper limits. Local levees are located along many sections of the river between these project levees (Reclamation et al. 2011). The design channel capacity of the San Joaquin River between the Merced River and the Tuolumne River is 45,000 cfs, and is 46,000 cfs between the Tuolumne River and the Stanislaus River. From the Stanislaus River to Paradise Cut, the design capacity is 52,000 cfs (DWR 2010). From Paradise Cut to the Old River the design capacity is 37,000 cfs, and from the Old River to the Stockton Deep Water Shipping Channel in the Delta is 22,000 cfs (DWR 2010; Reclamation et al 2011).

Sacramento-San Joaquin Delta

The Sacramento-San Joaquin Delta (Delta) includes over 700 miles of sloughs and winding channels and approximately 1,100 miles of levees protecting over 538,000 acres of agricultural lands, homes, and other structures. These levees are operated and maintained by various agencies including Federal, State and local reclamation boards. Unlike the system of reservoirs and weirs that control the magnitude of flooding on the rivers upstream from the Delta, the flood damage reduction system in the Delta (with the exception of the Delta Cross Channel control gates) operates passively.

Since the construction of the CVP and SWP, and more importantly, the Yolo Bypass system, flood flows in the Delta have been more controlled than in earlier years although, Delta pumping is not a flood damage reduction operation. Flooding still occurs, but has been confined to the individual islands or tracts and is due mostly to levee instability or overtopping. The major factors influencing Delta water levels include high flows, high tide, and wind. The highest water stages occur December – February when these factors are compounded.

3.17.1.3.2 Buyer Service Area

The California Aqueduct (CA), a 444 mile long canal managed by DWR as part of the SWP, stretches from the Delta at Banks Pumping Plant to San Luis Reservoir, and 103 miles beyond the reservoir to Kettleman City. The Delta-Mendota Canal (DMC) is a 117 mile long canal managed by Reclamation as part of the CVP, and conveys water along the west side of the San Joaquin Valley from the Tracy Pumping Plant in the Delta to its terminus at the Mendota Pool. These facilities would be used to deliver transfer water from the Seller Service Area through the Sacramento-San Joaquin Delta and south to the Buyer Service Area. These facilities were not constructed for flood control purposes and do not manage floodwaters. There would be no flood control impacts on the CA, DMC, or Contra Costa Water District and East Bay Municipal Utility District (MUD) facilities from water transfers; therefore these are not discussed further.

San Luis Reservoir

San Luis Reservoir in Merced County is the largest off-stream storage reservoir in the United States. San Luis Reservoir provides approximately 2,028,000 AF of off-stream storage capacity. Reclamation manages 47.6 percent (966,000 AF) of the reservoir's capacity for the CVP and DWR operates the remaining 52.4 percent (1,062,000 AF) for the SWP. The reservoir has a maximum water surface elevation of 544 feet[1] and a minimum operating pool elevation of 326 feet (79,000 AF). Reclamation owns San Luis Reservoir and jointly operates it with DWR to provide seasonal storage for the CVP and the SWP. San Luis Reservoir is capable of receiving water from both the DMC and the CA, which enables the CVP and SWP to pump water into the reservoir during the wet season (October through March) and release water into the conveyance facilities during the dry season (April through September) when demands are higher.

San Luis Creek is the major drainage in the San Luis Reservoir area. San Luis Creek once flowed into the San Joaquin River. However, after completion of San Luis Dam, runoff from San Luis Creek is now captured in San Luis Reservoir and diverted for SWP and CVP uses. The potential for flooding is low in San Luis Reservoir because it is an off-stream storage reservoir (Reclamation and CDPR 2012).

3.17.2 Environmental Consequences/Environmental Impacts

3.17.2.1 Assessment Methods

The effects analysis uses both quantitative and qualitative methods to assess changes in flood control. The quantitative assessment methods used to identify impacts on flood control are based on hydrologic modeling and help determine whether changes in stream flows and reservoir storage could cause flooding or inundate areas in the watershed. Increased river flows and increased storage levels at reservoirs as a result of water transfers under each of the proposed alternatives were compared to existing and Future No Action/No Project river and reservoir capacities. Modeling results are not available for several rivers; therefore flows for these rivers are addressed qualitatively.

3.17.2.2 Significance Criteria

For the purposes of this Environmental Impact Statement/Environmental Impact Report, effects on flood control are considered significant if implementation of any of the alternatives would:

- Conflict with the flood damage reduction operation of a reservoir by decreasing flood conservation storage; or
- Increase river flows above channel design capacity and increase risks to levee stability through increased flood stages, excessive seepage and scour, or increased deposition.

[1] Relative to mean sea level.

3.17.2.3 Alternative 1: No Action/No Project

3.17.2.3.1 Seller Service Area

Reservoirs operations would remain the same as existing conditions with regards to flood control, including flood storage capacity and timing of releases. There would be no transfers within the Seller Service Area under the No Action/No Project Alternative. There would be no changes in reservoir storage in the Seller Service Area and risks associated with flood storage capacity would remain the same as existing conditions. There would be no impacts on flood control.

There would be no changes in river flows that could potentially compromise levee stability. There would be no water transfers within the Seller Service Area under the No Action/No Project Alternative. There would be no changes in river flows in the Seller Service Area and risks to levee stability would remain the same as existing conditions. There would be no impacts on flood control.

3.17.2.3.2 Buyer Service Area

There would be no changes to storage at San Luis Reservoir that could affect flood control. Under the No Action/No Project Alternative, water transfers would not occur. Storage in San Luis Reservoir would remain the same as existing conditions. There would be no impacts on flood control.

3.17.2.4 Alternative 2: Full Range of Transfers (Proposed Action)

3.17.2.4.1 Seller Service Area

Water transfers would change storage levels in CVP and SWP reservoirs and potentially affect flood control. Under the Proposed Action, CVP and SWP reservoirs could be used to store water during the transfer season before capacity is available to move the water through the Delta. This action could increase reservoir storage in Shasta, Oroville, and Folsom reservoirs. This increase in storage, however, would only occur during the irrigation season (April through September) during dry and critical years when transfers could occur. During other periods, reservoir levels would be slightly lower under the Proposed Action than the No Action/No Project Alternative because of the increased releases to address downstream streamflow depletion from groundwater substitution transfers. Table 3.17-1 shows the changes in reservoir storage in Shasta, Oroville, and Folsom reservoirs.

Table 3.17-1. Changes in CVP and SWP Reservoir Storage between the No Action/No Project Alternative and the Proposed Action (in thousands of AF)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	-0.6	-0.6	-0.4	-0.1	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.6	-0.7
AN	-4.6	-4.6	-3.4	-2.8	-2.3	-2.3	-2.3	-0.1	-0.4	-0.5	-0.7	-0.8
BN	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.3	-1.5	-1.5	-1.7	-1.7
D	-2.3	-2.1	-2.1	-2.0	-2.0	-2.0	4.4	16.2	43.3	29.0	-3.5	-3.6
C	-5.0	-5.2	-5.2	-5.2	-5.7	-5.7	-3.1	25.6	70.5	10.8	-7.3	-7.3
All	-2.6	-2.6	-2.3	-2.0	-2.0	-2.0	-0.3	8.0	21.9	7.0	-2.5	-2.6
Oroville Reservoir												
W	-4.1	-3.8	-2.8	-2.3	0.0	0.0	0.0	0.0	-0.3	-0.6	-1.5	-2.2
AN	-13.0	-13.0	-13.1	-13.1	-10.9	-0.9	-0.9	-0.9	-0.3	-6.3	-4.4	-3.1
BN	-3.2	-3.8	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9	-5.2	-5.5	-6.4	-6.8
D	-5.1	-5.2	-5.5	-5.5	-5.5	-5.5	-5.2	1.9	3.4	0.7	-9.6	-5.5
C	-12.8	-13.5	-14.6	-14.6	-15.0	-15.2	-15.5	-14.4	-10.9	-5.7	-20.1	-20.1
All	-7.6	-7.7	-7.7	-7.4	-6.3	-4.5	-4.6	-3.1	-2.1	-2.7	-7.5	-6.9
Folsom Reservoir												
W	0.9	-1.5	-1.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.4	-0.8
AN	-2.2	-2.9	-3.1	-0.9	0.0	0.0	0.0	0.0	-0.2	-1.4	-2.8	-4.5
BN	-2.5	-3.1	-4.4	-4.4	0.0	0.0	0.0	0.0	-0.8	-1.6	-1.6	-2.1
D	2.2	1.7	-1.1	-1.1	-2.0	-1.0	-1.0	7.5	12.0	10.2	10.9	12.6
C	6.1	4.0	2.5	1.4	0.4	-1.3	0.0	4.4	12.1	7.8	6.7	8.8
All	1.4	-0.2	-0.9	-0.3	-0.3	-0.4	-0.2	2.2	4.5	2.9	2.6	2.8

Note: Negative numbers indicate that the Proposed Action would decrease water in storage compared to the No Action/No Project Alternative; positive numbers indicate that the Proposed Action would increase water in storage.

The seasonal increases in reservoir storage would not affect flood control because they would not occur during the flood season or in the wetter years when reservoir levels are high. The decreases in storage could provide additional room to store flood flows, which could potentially benefit flood control. These decreased storage levels, however, are very small and would not provide a substantial benefit. Impacts on flood control in CVP and SWP reservoirs would be less than significant.

Water transfers would change storage levels in non-Project reservoirs and potentially affect flood control. Under the Proposed Action, stored reservoir water transfers would decrease carryover storage in non-Project reservoirs of willing sellers (Merle Collins, Camp Far West, Hell Hole, French Meadows, and McClure reservoirs). The decreased reservoir storage levels in these facilities could capture additional flood flows in years following water transfers. The ability to capture flood flows could have beneficial effects on flood control.

Water transfers could increase river flows and potentially affect flood capacity or levee stability. Water transfers in the Proposed Action could increase flows in rivers and in the Delta during the period when water transfers are conveyed from the sellers to the buyers (April through October for East Bay MUD, July through September for transfers conveyed through the Delta). During non-transfer periods, river flows may be slightly lower than under the No Action/No

Project Alternative because of streamflow depletion from groundwater substitution transfers. Table 3.17-2 shows changes in river flows on the major waterways in the Seller Service Area (Sacramento, Feather, American, and Merced rivers).

Table 3.17-2. Changes in River Flows between the No Action/No Project Alternative and the Proposed Action (in cfs)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sacramento River at Wilkins Slough												
W	-8.9	-5.1	-8.0	-10.7	-6.3	-5.3	-5.0	-3.2	-1.9	-2.4	-1.4	-1.3
AN	-8.3	-8.2	-27.2	-19.6	-18.2	-7.9	-8.2	-44.3	-2.6	7.2	7.2	7.8
BN	-4.5	-3.7	-3.5	-3.5	-3.5	-3.3	-4.3	0.0	0.0	-3.3	0.0	-3.0
D	-11.0	-14.1	-10.1	-11.0	-7.9	-7.6	-53.1	-33.5	-252.6	465.6	758.9	162.0
C	-21.5	-15.8	-15.2	-14.1	-5.2	-15.1	-0.2	-114.5	-274.4	1,517.7	838.4	356.1
All	-11.5	-9.3	-13.0	-12.6	-8.3	-8.1	-13.0	-38.5	-102.2	394.8	307.3	102.6
Lower Feather River												
W	0.2	-13.8	-32.1	-25.8	-52.4	-16.4	-10.4	-9.1	-3.5	-1.1	7.1	6.4
AN	16.3	-11.7	-9.9	-55.2	-55.8	-196.8	-15.5	-58.8	-22.0	86.1	-39.3	-31.2
BN	5.3	5.4	13.4	-5.0	-7.5	-9.6	-9.2	-7.2	0.0	0.7	10.7	4.0
D	-1.9	-10.0	-8.2	-13.3	-25.2	-35.2	-7.9	-109.4	-16.0	120.1	240.8	-35.7
C	-11.0	-8.5	-0.3	-18.5	-56.0	-21.1	-0.6	-0.5	-31.3	113.9	318.3	49.2
All	0.7	-10.5	-14.8	-26.1	-46.3	-52.1	-8.8	-33.7	-14.5	59.4	104.4	1.0
American River at H Street												
W	16.4	38.7	-39.7	-56.2	-22.4	-2.7	-1.3	8.3	-13.7	4.1	-1.6	3.5
AN	21.2	12.1	0.9	-173.0	-235.7	-34.9	-1.3	-1.3	1.8	32.7	36.5	41.0
BN	12.1	11.9	21.5	-0.4	-79.4	-0.5	-0.4	-0.5	12.3	13.6	-0.3	8.2
D	25.4	8.9	43.7	-53.1	-22.0	-73.9	-114.5	-63.7	-0.9	130.5	80.0	56.9
C	51.5	40.0	30.3	16.9	17.0	25.8	-23.3	19.4	-45.9	195.1	141.3	82.4
All	25.8	27.4	0.2	-57.9	-55.2	-14.9	-25.7	-4.3	-13.8	71.4	49.0	36.1
Merced River at San Joaquin River												
W	0.0	0.0	0.0	0.0	-41.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	-81.3	0.0	0.0	-84.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	127.5	71.4	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	85.0	47.6	0.0	0.0	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	36.4	20.4	0.0	0.0	0.0	0.0
All	0.0	0.0	0.0	0.0	-15.9	-14.4	30.0	16.8	-14.8	0.0	0.0	0.0

Note: Negative numbers indicate that the Proposed Action would decrease river flows compared to the No Action/No Project Alternative; positive numbers indicate that the Proposed Action would increase river flows.

The flow increases would only be during the dry season of dry and critical years, when flood flows are not present in the system. Decreased river flows during wetter periods could provide additional capacity for flood flows; however, these changes are small and would not provide a substantial benefit. Impacts on flood control in rivers in the Seller Service Area would be less than significant.

3.17.2.4.2 Buyer Service Area

Water transfers would change storage at San Luis Reservoir. Storage at San Luis Reservoir under the Proposed Action could change because the reservoir would be used to regulate transfers. Water level changes would occur during the months when transfers are moving through the Delta (July through September), which is typically when storage is lowest in San Luis Reservoir. Additionally, San Luis Reservoir is an off-stream storage reservoir and has little inflow from natural rivers; therefore the flood risk is generally quite low. Increases in storage would not exceed the maximum capacity of the reservoir and would have little to no effect on flood control. The effects of transfers from the Proposed Action would be less-than-significant for flood control at San Luis Reservoir.

3.17.2.5 Alternative 3: No Cropland Modifications

3.17.2.5.1 Upstream from Delta

Water transfers would change storage levels in CVP and SWP reservoirs and potentially affect flood control. Similar to the Proposed Action, Alternative 3 would increase reservoir levels in Shasta, Oroville, and Folsom reservoirs because they could store water during the transfer season before capacity is available to move the water through the Delta. Alternative 3 would also decrease reservoir levels compared to the No Action/No Project Alternative because of downstream streamflow depletion from groundwater substitution transfers. Table 3.17-3 shows the changes in reservoir storage in Shasta, Oroville, and Folsom reservoirs.

Table 3.17-3. Changes in CVP and SWP Reservoir Storage between the No Action/No Project Alternative and Alternative 3 (in thousands of AF)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	-0.6	-0.6	-0.4	-0.1	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.6	-0.7
AN	-4.6	-4.6	-3.4	-2.8	-2.3	-2.3	-2.3	-0.1	-0.4	-0.5	-0.7	-0.8
BN	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.3	-1.5	-1.5	-1.7	-1.7
D	-2.3	-2.1	-2.1	-2.0	-2.0	-2.0	4.4	11.1	30.4	18.3	-3.5	-3.6
C	-5.0	-5.2	-5.2	-5.2	-5.7	-5.7	-3.1	10.7	33.5	-1.1	-7.3	-7.3
All	-2.6	-2.6	-2.3	-2.0	-2.0	-2.0	-0.3	4.0	12.0	2.7	-2.5	-2.6
Oroville Reservoir												
W	-4.1	-3.8	-2.8	-2.3	0.0	0.0	0.0	0.0	-0.3	-0.6	-1.5	-2.2
AN	-13.0	-13.0	-13.1	-13.1	-10.9	-0.9	-0.9	-0.9	-0.3	-6.3	-4.4	-3.1

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BN	-3.2	-3.8	-4.9	-4.9	-4.9	-4.9	-4.9	-4.9	-5.2	-5.5	-6.4	-6.8
D	-5.1	-5.2	-5.5	-5.5	-5.5	-5.5	-5.2	1.4	2.5	0.4	-9.6	-5.5
C	-12.8	-13.5	-14.6	-14.6	-15.0	-15.2	-15.5	-14.9	-12.3	-13.3	-20.1	-20.1
All	-7.6	-7.7	-7.7	-7.4	-6.3	-4.5	-4.6	-3.3	-2.6	-4.3	-7.5	-6.9
Folsom Reservoir												
W	0.9	-1.5	-1.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.4	-0.8
AN	-2.2	-2.9	-3.1	-0.9	0.0	0.0	0.0	0.0	-0.2	-1.4	-2.8	-4.5
BN	-2.5	-3.1	-4.4	-4.4	0.0	0.0	0.0	0.0	-0.8	-1.6	-1.6	-2.1
D	2.2	1.7	-1.1	-1.1	-2.0	-1.0	-1.0	7.5	12.0	10.2	10.9	12.6
C	6.1	4.0	2.5	1.4	0.4	-1.3	0.0	4.3	12.0	7.9	6.7	8.8
All	1.4	-0.2	-0.9	-0.3	-0.3	-0.4	-0.2	2.2	4.5	2.9	2.6	2.8

Note: Negative numbers indicate that Alternative 3 would decrease water in storage compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase water in storage.

The seasonal increases in reservoir storage would not affect flood control because they would not occur during the flood season or in the wetter years when reservoir levels are high. The decreases in storage could provide additional room to store flood flows, which could potentially benefit flood control. These decreased storage levels, however, are very small and would not provide a substantial benefit. Under Alternative 3, impacts on flood control in CVP and SWP reservoirs would be less than significant.

Water transfers would change storage levels in non-Project reservoirs and potentially affect flood control. Under Alternative 3, stored reservoir water transfers would decrease carryover storage in non-Project reservoirs of willing sellers (Merle Collins, Camp Far West, Hell Hole, French Meadows, and McClure reservoirs). The decreased reservoir storage levels in these facilities could capture additional flood flows in years following water transfers. The ability to capture flood flows could have beneficial effects on flood control.

Water transfers could increase river flows and potentially affect flood capacity or levee stability. Similar to the Proposed Action, water transfers under Alternative 3 would increase flows in rivers and in the Delta during the period when water transfers are conveyed from the sellers to the buyers (April through October for East Bay MUD, July through September for transfers conveyed through the Delta). During non-transfer periods, river flows may be slightly lower than under the No Action/No Project Alternative because of streamflow depletion from groundwater substitution transfers. Table 3.17-4 shows changes in river flows on the major waterways in the Seller Service Area (Sacramento, Feather, American, and Merced rivers).

Table 3.17-4. Changes in River Flows between the No Action/No Project Alternative and Alternative 3 (in cfs)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sacramento River at Wilkins Slough												
W	-8.9	-5.1	-8.0	-10.7	-6.3	-5.3	-5.0	-3.2	-1.9	-2.4	-1.4	-1.3
AN	-8.3	-8.2	-27.2	-19.6	-18.2	-7.9	-8.2	-44.3	-2.6	7.2	7.2	7.8
BN	-4.5	-3.7	-3.5	-3.5	-3.5	-3.3	-4.3	0.0	0.0	-3.3	0.0	-3.0
D	-11.0	-14.1	-10.1	-11.0	-7.9	-7.6	-53.1	-33.5	-248.9	294.9	452.1	75.6
C	-21.5	-15.8	-15.2	-14.1	-5.2	-15.1	-0.2	-119.3	-273.7	715.3	251.9	102.1
All	-11.5	-9.3	-13.0	-12.6	-8.3	-8.1	-13.0	-39.5	-101.5	199.5	132.4	35.1
Lower Feather River												
W	0.2	-13.8	-32.1	-25.8	-52.4	-16.4	-10.4	-9.1	-3.5	-1.1	7.1	6.4
AN	16.3	-11.7	-9.9	-55.2	-55.8	-196.8	-15.5	-58.8	-22.0	86.1	-39.3	-31.2
BN	5.3	5.4	13.4	-5.0	-7.5	-9.6	-9.2	-7.2	0.0	0.7	10.7	4.0
D	-1.9	-10.0	-8.2	-13.3	-25.2	-35.2	-7.9	-106.9	-16.0	102.1	228.7	-40.7
C	-11.0	-8.5	-0.3	-18.5	-56.0	-21.1	-0.6	-0.5	-29.5	185.5	197.5	40.6
All	0.7	-10.5	-14.8	-26.1	-46.3	-52.1	-8.8	-33.3	-14.1	71.0	77.4	-1.6
American River at H Street												
W	16.4	38.7	-39.7	-56.2	-22.4	-2.7	-1.3	8.3	-13.7	4.1	-1.6	3.5
AN	21.2	12.1	0.9	-173.0	-235.7	-34.9	-1.3	-1.3	1.8	32.7	36.5	41.0
BN	12.1	11.9	21.5	-0.4	-79.4	-0.5	-0.4	-0.5	12.3	13.6	-0.3	8.2
D	25.4	8.9	43.7	-53.1	-22.0	-73.9	-114.5	-63.7	-0.9	130.5	80.0	56.9
C	51.5	40.0	30.3	16.9	17.0	25.8	-23.3	20.5	-44.3	191.3	142.5	82.4
All	25.8	27.4	0.2	-57.9	-55.2	-14.9	-25.7	-4.1	-13.5	70.6	49.3	36.1
Merced River at San Joaquin River												
W	0.0	0.0	0.0	0.0	-41.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	-81.3	0.0	0.0	-84.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	127.5	71.4	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	85.0	47.6	0.0	0.0	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	36.4	20.4	0.0	0.0	0.0	0.0
All	0.0	0.0	0.0	0.0	-15.9	-14.4	30.0	16.8	-14.8	0.0	0.0	0.0

Note: Negative numbers indicate that Alternative 3 would decrease river flows compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 3 would increase river flows.

The flow increases would only be during the dry season of dry and critical years, when flood flows are not present in the system. Decreased river flows during wetter periods could provide additional capacity for flood flows; however, these changes are small and would not provide a substantial benefit. Impacts on flood control in rivers in the Seller Service Area would be less than significant.

3.17.2.5.2 Buyer Service Area

Water transfers would change storage at San Luis Reservoir. Similar to the Proposed Action, storage at San Luis Reservoir under Alternative 3 could change because the reservoir would be used to regulate transfers. Because San Luis Reservoir is an off-stream storage reservoir and has little inflow from natural rivers and increases in storage would be at a time of year when the reservoir is typically low, increases in storage would have little to no effect on flood control. The effects of transfers from Alternative 3 would be less-than-significant for flood control at San Luis Reservoir.

3.17.2.6 Alternative 4: No Groundwater Substitution

3.17.2.6.1 Seller Service Area

Water transfers would change storage levels in CVP and SWP reservoirs and potentially affect flood control. Similar to the Proposed Action, Alternative 4 would increase reservoir levels in Shasta, Oroville, and Folsom reservoirs because they could store water during the transfer season before capacity is available to move the water through the Delta. However, Alternative 4 does not include groundwater substitution, so it would not affect reservoir levels during non-transfer periods. Table 3.17-5 shows the changes in reservoir storage in Shasta, Oroville, and Folsom reservoirs.

Table 3.17-5. Changes in CVP and SWP Reservoir Storage between the No Action/No Project Alternative and Alternative 4 (in thousands of AF)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Shasta Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	17.5	8.7	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	46.0	7.4	0.0	0.0
All	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	12.5	3.1	0.0	0.0
Oroville Reservoir												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.3	-0.8	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.9	9.0	-4.5	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.6	6.6	0.0	0.0
All	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.1	2.4	-0.9	0.0
Folsom Reservoir												
W	3.5	1.4	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2
AN	-0.3	-0.5	-0.7	-0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
BN	0.2	0.3	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	4.2	3.5	-0.1	-0.1	-1.0	0.0	0.0	5.2	8.9	9.5	11.7	13.5
C	8.5	7.2	5.7	4.6	3.6	1.9	0.3	3.6	9.1	8.2	10.0	12.1
All	3.8	2.5	1.5	0.8	0.6	0.4	0.1	1.7	3.4	3.4	4.1	4.8

Note: Negative numbers indicate that Alternative 4 would decrease water in storage compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase water in storage.

The seasonal increases in reservoir storage would not affect flood control because they would not occur during the flood season or in the wetter years when reservoir levels are high. Under Alternative 4, impacts on flood control in CVP and SWP reservoirs would be less than significant.

Water transfers would change storage levels in non-Project reservoirs and potentially affect flood control. Under Alternative 4, stored reservoir water transfers would decrease carryover storage in non-Project reservoirs of willing sellers (Merle Collins, Camp Far West, Hell Hole, French Meadows, and McClure reservoirs). The decreased reservoir storage levels in these facilities could capture additional flood flows in years following water transfers. The ability to capture flood flows could have beneficial effects on flood control.

Water transfers could increase river flows and potentially affect flood capacity or levee stability. Similar to the Proposed Action, water transfers under Alternative 4 would increase flows in rivers and in the Delta during the period when water transfers are conveyed from the sellers to the buyers (April through October for East Bay MUD, July through September for transfers conveyed through the Delta). However, Alternative 4 does not include groundwater substitution, so it would not affect river flows during non-transfer periods. Table 3.17-6 shows changes in river flows on the major waterways in the Seller Service Area (Sacramento, Feather, American, and Merced rivers).

Table 3.17-6. Changes in River Flows between the No Action/No Project Alternative and Alternative 4 (in cfs)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sacramento River at Wilkins Slough												
W	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-73.8	279.9	279.9	89.1
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-31.7	-108.3	1,024.0	516.0	255.9
All	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6.5	-35.3	260.2	155.6	68.4
Lower Feather River												
W	0.0	0.0	-6.3	-6.3	0.0	-3.9	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	-40.7	0.0	-16.8	0.0	-33.6	0.0	54.2	-40.7	-14.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	-12.0	-19.5	0.0	-24.3	0.0	-2.1	237.2	-66.0
C	0.0	0.0	0.0	0.0	-44.6	-5.8	0.0	0.0	-13.2	62.2	127.2	12.4
All	0.0	0.0	-2.4	-9.6	-11.3	-9.1	0.0	-10.2	-2.7	22.0	60.9	-11.6

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
American River at H Street												
W	9.7	36.2	-28.6	-18.6	-20.7	-1.1	0.0	9.6	-13.5	-0.5	-0.8	0.0
AN	10.4	4.4	1.7	-132.1	-233.9	-33.2	0.3	0.1	0.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	20.8	11.7	57.6	-52.2	-21.2	-72.2	-113.6	-24.3	0.0	55.6	33.9	32.2
C	36.5	28.6	31.5	18.2	18.3	26.8	26.8	38.6	-6.8	97.4	59.6	55.8
All	16.7	22.6	6.0	-35.9	-48.8	-13.5	-14.5	7.3	-6.6	29.7	17.9	17.2
Merced River at San Joaquin River												
W	0.0	0.0	0.0	0.0	-41.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-84.0	0.0	0.0	0.0
BN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	162.6	0.0	0.0
C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.7	0.0	0.0
All	0.0	0.0	0.0	0.0	-15.9	0.0	0.0	0.0	-14.8	43.1	0.0	0.0

Note: Negative numbers indicate that Alternative 4 would decrease river flows compared to the No Action/No Project Alternative; positive numbers indicate that Alternative 4 would increase river flows.

The flow increases would only be during the dry season of dry and critical years, when flood flows are not present in the system. Impacts on flood control in rivers in the Seller Service Area would be less than significant.

3.17.2.6.2 Buyer Service Area

Water transfers would change storage at San Luis Reservoir. Similar to the Proposed Action, storage at San Luis Reservoir under Alternative 4 could change because the reservoir would be used to regulate transfers. Because San Luis Reservoir is an off-stream storage reservoir and has little inflow from natural rivers and increases in storage would be at a time of year when the reservoir is typically low, increases in storage would have little to no effect on flood control. The effects of transfers from Alternative 4 would be less-than-significant for flood control at San Luis Reservoir.

3.17.3 Comparative Analysis of Alternatives

Table 3.17-7 summarizes the effects of each of the action alternatives. The following text supplements the table by comparing the effects of the action alternatives and No Action/No Project Alternative.

Table 3.17-7. Comparative Analysis of Alternatives

Potential Impacts	Alternative(s)	Significance	Proposed Mitigation	Significance after Mitigation
Reservoirs operations would remain the same as existing conditions with regards to flood control, including flood storage capacity and timing of releases	1	NCFEC	None	NCFEC
There would be no changes in river flows that could potentially compromise levee stability	1	NCFEC	None	NCFEC
There would be no changes to storage at San Luis Reservoir that could affect flood control	1	NCFEC	None	NCFEC
Water transfers would change storage levels in CVP and SWP reservoirs, potentially affecting flood control.	2, 3, 4	LTS	None	LTS
Water transfers could decrease storage levels in non-Project reservoirs, potentially affecting flood control.	2, 3, 4	LTS	None	LTS
Water transfers could change river flows, potentially affecting flood capacity or levee stability.	2, 3, 4	B	None	B
Water transfers would change storage at San Luis Reservoir, potentially affecting flood control.	2, 3, 4	LTS	None	LTS

3.17.3.1 Alternative 1: No Action/No Project Alternative

There would be no impacts on flood control.

3.17.3.2 Alternative 2: Full Range of Transfers (Proposed Action)

Water transfers under the Proposed Action could change reservoir storage and river flows in the area of analysis; however, most of the changes would occur outside the flood season and would be well within the existing capacities of the reservoirs and channels. All effects on flood control would be less than significant.

3.17.3.3 Alternative 3: No Cropland Modifications

This alternative would have similar flood control effects as the Proposed Action. All effects on flood control would be less than significant.

3.17.3.4 Alternative 4: No Groundwater Substitution

Alternative 4 would not include groundwater substitution transfers, so the streamflow depletion effects on reservoir levels and river flows in the other two action alternatives would not occur. Effects on reservoir storage and river flows associated with storing and conveying water transfers would still occur, but they would be focused during the transfer period. All effects on flood control would be less than significant.

3.17.4 Environmental Commitments/Mitigation Measures

There are no significant flood control impacts; therefore no mitigation measures are required.

3.17.5 Potentially Significant Unavoidable Impacts

None of the alternatives would result in potentially significant and unavoidable impacts related to flood control.

3.17.6 Cumulative Effects

The timeline for the flood control cumulative effects analysis extends from 2015 through 2024, a ten year period. The relevant geographic study area for the cumulative effects analysis is the same area of analysis as shown above in Figure 3.17-1. The following section analyzes the cumulative effects using the project method, which is further described in Chapter 4. Chapter 4 describes the projects included in the cumulative condition. The cumulative analysis for flood control considers projects that could affect reservoir storage or river flow, or could otherwise compromise flood control facilities or flood management.

In addition to the cumulative projects in Chapter 4, several other efforts could affect the cumulative condition for flood management. Multiple areas in the Central Valley do not currently have adequate flood protection. The population at risk is over one million people, and the existing level of flood protection is among the lowest for metropolitan areas in the nation (DWR 2012b). In response to existing flood management concerns, multiple efforts are ongoing to improve conditions (DWR 2014):

- American River Watershed Project: construction of dam improvements at Folsom Dam (under the Folsom Joint Federal Project) and levee improvements on the American and Sacramento rivers (under the American River Common Features Project).

- Delta Levees System Integrity Program: levee repair, maintenance, and improvement within the Delta area.

- South Sacramento County Streams Program: improvements to Morrison Creek and Unionhouse Creek have improved flood management in the south Sacramento area.

- Yuba Feather Flood Protection Program: projects within the areas of the Yuba, Feather, and Bear rivers to reduce flooding and improve public safety.

- Urban Streams Protection Program: provides funding for urban flood management; recent focus has included levee improvements near Sacramento and Yuba City.

Multiple other small projects are also ongoing or planned to improve flood management in the Central Valley (DWR 2014).

3.17.6.1 Alternative 2: Full Range of Transfers (Proposed Action)

3.17.6.1.1 Seller Service Area

Water transfers would change storage levels in reservoirs and potentially affect flood control. In addition to the cumulative projects listed above, the projects in Chapter 4 (including SWP transfers, the CVP Municipal and Industrial Water Shortage Policy, the Lower Yuba River Accord, and the San Joaquin River Restoration Program) have the potential to affect storage. These projects, however, would be unlikely to adversely affect storage during the flood season. Overall, the cumulative condition for flood control in the Central Valley includes many areas where existing flood management facilities are not adequate to provide flood protection to people and property. The cumulative condition has significant adverse effects relative to flood control. The Proposed Action would have a minimal effect on CVP and SWP reservoir storage and would be unlikely to affect flood conservation storage. The Proposed Action would have the potential to improve flood management in non-Project reservoirs; however, these improvements would not be sufficient to offset the multiple flood control issues and concerns in the cumulative condition. Therefore, the Proposed Action's incremental contribution would not be cumulatively considerable.

Water transfers could increase river flows and potentially affect flood capacity or levee stability. As described above, the cumulative condition has substantial issues and concerns related to flood management that result in a significant cumulative impact. Water transfers in the Proposed Action could increase flows in rivers and in the Delta during the period when water transfers are conveyed from the sellers to the buyers and decrease river flows because of streamflow depletion from groundwater substitution transfers. The flow increases would only be during the dry season of dry and critical years, when flood flows are not present in the system. Decreased river flows during wetter periods could provide additional capacity for flood flows; however, these changes are small and would not be adequate to substantially improve the cumulative condition. The Proposed Action‘s incremental contribution would not be cumulatively considerable related to flood control.

3.17.6.1.2 Buyer Service Area

Changes in storage at San Luis Reservoir as a result of water transfers could affect flood control. Because San Luis Reservoir does not provide substantial flood management for local flows, the cumulative condition does not include many past, present, or future efforts in the reservoir aimed at flood control. The cumulative condition would be less than significant related to flood control.

3.17.6.2 Alternative 3: No Cropland Modifications

The flood control impacts (and magnitude of those impacts) under Alternative 3 would be very similar to the Proposed Action. As under the Proposed Action, the cumulative condition would have significant effects relative to flood control, but the incremental contribution from Alternative 3 would not be cumulatively considerable.

3.17.6.3 Alternative 4: No Groundwater Substitution

Alternative 4 would have similar (but slightly smaller) potential increases in river and reservoir levels compared to the Proposed Action. As under the Proposed Action, the cumulative condition would have significant effects relative to flood control, but the incremental contribution from Alternative 4 would not be cumulatively considerable.

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Chapter 4
Cumulative Effects Methodology

Cumulative effects are those environmental effects that on their own, may not be considered significant, but when combined with similar effects over time, result in significant adverse effects. Cumulative effects are an important part of the environmental analysis because they allow decision makers to look not only at the impacts of an individual proposed project, but the overall impacts to a specific resource, ecosystem, or human community over time from many different projects. This chapter describes the cumulative effects analysis for the Long-Term Water Transfers Environmental Impact Statement/Environmental Impact Report (EIS/EIR). Each resource section in Chapter 3 includes the complete cumulative effects analysis for that resource.

4.1 Regulatory Requirements

Both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) require consideration of cumulative effects in an EIS/EIR. Additionally, the National Historic Preservation Act (NHPA) requires consideration of cumulative effects to historic properties.

4.1.1 NEPA

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions" (40 Code of Federal Regulations [CFR] Section 1508.7).

NEPA regulations require an analysis of direct, indirect, and cumulative effects and define "effects" as "ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative" (40 CFR Section 1508.8). In addition, the NEPA regulations state that when determining the scope of an EIS, both connected and cumulative actions must be discussed in the same document as the Proposed Action (40 CFR Section 1508.25(a)(1) and (2)).

4.1.2 CEQA

Cumulative effects are defined in the CEQA Guidelines as:

> "Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.
>
> (a) The individual effects may be changes resulting from a single project or a number of separate projects.
>
> (b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (CEQA Guidelines Section 15355)

According to the CEQA Guidelines, a lead agency must discuss the cumulative impacts of a project when a cumulative effect is significant and the project's incremental contribution to the cumulative effect would be "cumulatively considerable," that is, when the incremental effects of a project would be significant when viewed in connection with the effects of past, present, and probable future projects (CEQA Guidelines Section 15065(a)(3); Section 15130(a)).

If the combined cumulative impact associated with the project's incremental effect and the effects of other projects would not be significant, an EIR should briefly indicate why the cumulative impact is not significant (CEQA Guidelines Section 15130(a)(2)).

Additionally, an EIR can determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and therefore not significant. A project's contribution can also be less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The lead agency must identify facts supporting this conclusion (CEQA Guidelines Section 15130(a)(3)).

4.1.3 NHPA

The regulations for Section 106 of the NHPA define "adverse effect" as an undertaking that "may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." (36 CFR Section 800.5(a)(1)). "Adverse effects" explicitly include "reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative." (36 CFR Section 800.5(a)(1)). Cumulative effect under Section 106 of the NHPA applies only to those resources that are listed in or eligible for the National Register.

Section 3.13, Cultural Resources, evaluates effects to historic properties, including cumulative effects. NHPA is not further discussed in this chapter.

4.2 Methodology for Assessing Cumulative Effects

4.2.1 Area of Analysis

NEPA and CEQA require a defined geographic scope for a cumulative effects analysis (Council of Environmental Quality 1997; CEQA Guidelines 15130(b)(3)). The cumulative area of analysis for each resource in the EIS/EIR varies depending on the type of impacts that could occur and the nature of those impacts. The areas of analysis for some resource areas have clearly defined cumulative boundaries while others are more general in nature. Each resource area in Chapter 3 identifies a specific area of analysis for cumulative effects, and it may expand beyond the area of analysis identified for the Environmental Consequences/Environmental Impacts section for project related effects.

4.2.2 Timeframe

This EIS/EIR evaluates water transfers from 2015 through 2024, a ten-year period. Therefore, all projects considered in the cumulative analysis should be implemented and operational during the ten-year period to potentially result in cumulative effects.

4.2.3 Identifying Past, Present, and Future Actions and Projects Contributing to Cumulative Effects

CEQA Section 15130(b)(1) identifies two methods that may be used to analyze cumulative impacts:

1. "A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency," and/or

2. "A summary of projections contained in an adopted local, regional, or statewide plan or related planning document, that describes or evaluates conditions contributing to the cumulative effect. Such plans may include: a general plan, regional transportation plan, or plans for the reduction of greenhouse gas emissions. A summary of projections may also be contained in an adopted or certified prior environmental document for such a plan. Such projections may be supplemented with additional information such as a regional modeling program. Any such document shall be referenced and made available to the public at a location specified by the lead agency."

This EIS/EIR analyzes cumulative impacts using both CEQA methods identified above. These methods are expected to be sufficient to satisfy NEPA and CEQA requirements for identifying past, present, and future actions and projects that may contribute to cumulative effects. Most EIS/EIR resources use one method or the other, but several resource areas use a combination of both methods.

A variety of federal, state, county, and local government sources were reviewed to identify and collect information on past, present, and reasonably foreseeable actions in the project area that could contribute to cumulative effects. These include:

- City and County General Plans;
- Future population, housing, traffic, and other projections found in existing city and county general plans;
- Published reports, documents, and plans;
- Biological Management Plans (biological opinions, Habitat Conservation Plans, etc);
- Environmental documents (such as EIS/EIRs).
- Scoping comments; and
- Consultation with federal and state agencies.

A table or list is provided in each resource section that describes all applicable documents, plans, projects, and other cumulative actions that could contribute to cumulative effects on that specific resource. After the table or list, there is a discussion on the cumulative condition of that resource, referring to the past, present, and reasonably foreseeable future plans, projects, and other actions in the table or list, and what cumulative effects they are contributing to.

4.2.4 Cumulative Effects Determinations

To be consistent with CEQA requirements, there are three different possible impact statement outcomes for the cumulative effects analysis:

1. **There would be no significant cumulative effects**. This requires a discussion providing evidence to support this conclusion.
2. **There would be significant cumulative effects**. The Proposed Action's incremental contribution to the significant cumulative effects would not be cumulatively considerable. This requires a discussion on why the Proposed Action's incremental contribution would not be significant or cumulatively considerable. There may be mitigation implemented to reduce/avoid/minimize impacts, or the magnitude of the impact may be very small, suggesting the Proposed Action's contribution to any significant effects would be minimal.

3. **There would be significant cumulative effects**. The Proposed Action's incremental contribution to the significant cumulative effects would be cumulatively considerable. This requires a discussion of all feasible mitigation. If no feasible mitigation is available, this impact remains cumulatively considerable (significant and unavoidable).

The EIS/EIR must identify potential mitigation measures if a project would result in cumulatively considerable effects.

4.3 Cumulative Projects Considered for All Resources

The following projects or programs are considered in the cumulative analysis for all environmental resources. Each resource section in Chapter 3 identifies additional projects or programs directly relevant to the resource.

4.3.1 State Water Project (SWP) Transfers

SWP contractors also implement transfers from agencies north of the Delta to SWP contractors south of the Delta. Table 4-1 indicates potential SWP transfers that could occur annually over the ten-year period, depending on need and export capacity. The contractors generally serve areas along the Feather River and receive SWP supplies for Lake Oroville.

Table 4-1. Potential SWP Sellers (Upper Limits)

Water Agency (County)	(Acre feet) Groundwater Substitution	Cropland Idling/ Crop Shifting
Biggs-West Gridley WD (Butte)		32,190
Richvale ID (Butte)		12,000
Plumas Mutual Water Company (Yuba)	2,800	1,750
Sutter Extension WD (Sutter)	4,000	11,000
Western Canal WD (Butte and Glenn)		30,000
Total	6,800	86,930

Abbreviations:
ID: Irrigation District
WA: Water Agency
WD: Water District

Water transfers purchased by SWP contractors would largely be used for M&I uses. Some SWP contractors may purchase water for agricultural uses in the south San Joaquin Valley. Table 4-2 lists potential SWP buyers. SWP water transfers would have priority over Central Valley Project (CVP) transfers moved through SWP's Harvey O. Banks Pumping Plant.

Table 4-2. Potential SWP Buyers

Alameda County WD
Antelope Valley East Kern Water Agency
Castaic Lake Water Agency
Central Coast Water Authority
Desert Water Agency
Dudley Ridge Water District
Kern County Water Agency
Metropolitan Water District of Southern California
Mojave Water Agency
Napa County Flood Control and Water Conservation District
Oak Flat Water District
Palmdale Water District
San Bernardino Valley Municipal Water District
San Diego County Water Authority
Santa Clara Valley Water District
Tulare Lake Basin Water Storage District

4.3.2 CVP Municipal and Industrial (M&I) Water Shortage Policy (WSP)

Allocation of CVP water supplies for any given water year is based upon forecasted reservoir inflows and Central Valley hydrologic conditions, amounts of storage in CVP reservoirs, regulatory requirements, and management of Section 3406(b)(2) resources and refuge water supplies in accordance with implementation of the Central Valley Project Improvement Act (CVPIA). In some cases, M&I water shortage allocations may differ between CVP divisions due to regional CVP water supply availability, system capacity, or other operational constraints.

The purposes of the M&I WSP are to:

- Define water shortage terms and conditions applicable to all CVP M&I contractors.
- Establish a water supply level that (a) with M&I contractors' drought water conservation measures and other water supplies will sustain urban areas during droughts, and (b) during severe or continuing droughts will, as far as possible, protect public health and safety.
- Provide information to help M&I contractors develop drought contingency plans.

The M&I WSP and implementation guidelines are intended to provide detailed, clear, and objective guidelines for the distribution of CVP water supplies during water shortage conditions, thereby allowing CVP water users to know when, and by how much, water deliveries may be reduced in drought and other low water supply conditions. This increased level of predictability is needed by water managers and the entities that receive CVP water to better plan for and manage available CVP water supplies, and to better integrate the use of CVP water with other available non-CVP water supplies.

While the specific future policy and shortage allocation process is currently under evaluation, it is likely that both agricultural and M&I water service contractors will receive reduced allocations during shortage conditions. Reclamation will periodically reassess both the availability of CVP water supply and CVP water demand.

Reclamation is currently implementing the 2001 draft M&I WSP, as modified by Alternative 1B of the 2005 Environmental Assessment (Reclamation 2014). Table 4-3 summarizes the water shortage allocations currently being implemented by Reclamation.

Table 4-3. Existing Water Shortage Allocation Steps

Allocation Step	Allocation to Agricultural Water Service Contractors (% of contract total)	Allocation to M&I Water Service Contractors[1]
1	100% to 75%	100% of Contract Total
2	70%	95% of historical use
3	65%	90% of historical use
4	60%	85% of historical use
5	55%	80% of historical use
6	50% to 25%	75% of historical use
7	20%[2]	The maximum of: (1) 70% of M&I historical use or (2) unmet PH&S need up to 75% of historical use
8	15%[2]	The maximum of: (1) 65% of M&I historical use or (2) unmet PH&S need up to 75% of historical use
9	10%[2]	The maximum of: (1) 60% of M&I historical use or (2) unmet PH&S need up to 75% of historical use
10	5%[2]	The maximum of: (1) 55% of M&I historical use or (2) unmet PH&S need up to 75% of historical use
11	0%[2]	The maximum of: (1) 50% of M&I historical use or (2) unmet PH&S need up to 75% of historical use

Source: Reclamation 2014
Note:
[1] The historical use amount is determined by averaging the amount of water the contractor took during the last three years of unconstrained flow (or 100%) M&I allocation.
[2] Allocations to Agricultural water service contractors will be further reduced, if necessary, within the Contract Year to provide public health and safety water quantities to M&I water service contractors within the same Contract Year, provided CVP water is available.
Key:
PH&S = public health and safety
M&I = municipal and industrial

Reclamation is in the process of updating the M&I WSP and is currently preparing the draft EIS for alternatives to the current M&I WSP. It is anticipated that the draft EIS will be available in late 2014.

4.3.3 Lower Yuba River Accord

The Lower Yuba River Accord (Yuba Accord) is a set of three agreements that resolve litigation over in-stream flow requirements on the Lower Yuba River. The three agreements include a Fisheries Agreement, a Water Purchase Agreement, and Conjunctive Use Agreements.

The Fisheries Agreement establishes higher in-stream flow requirements and a flow schedule during specific periods of the year to meet fish needs. The agreement also requires a groundwater substitution program to increase surface flows in the Lower Yuba River and calls for studies of Lower Yuba River fish or fish habitat, monitoring of flows or temperatures and salmon fry studies.

The Water Purchase Agreement establishes conditions when the Yuba County Water Agency would make water available for water supply reliability and fish and wildlife purposes. The agreement separates water purchases into four components with variations in pricing, purpose of use and schedule. For Component 1 Water Supplies, California Department of Water Resources (DWR) purchased 60,000 acre-feet (AF) per year for eight years for fish and wildlife purposes. Components 2, 3, and 4 Water Supplies are also purchased by DWR, but the actual amounts vary depending on hydrologic year types and allocation scenarios.

The Conjunctive Use Agreements require Yuba County Water Agency and seven member districts to implement conjunctive use measures to provide local water supplies in dry years to facilitate storage operations to meet in-stream flow requirements in the Lower Yuba River, as defined in the Fisheries Agreement.

Collectively, the agreements are expected to achieve the following environmental and economic benefits:

- Higher instream flow requirements to protect lower Yuba River Chinook salmon, steelhead, and other fish species, ranging from 260,000 AF in a dry year to more than 574,000 AF in a wet year, an increase of 25,000 AF in a dry year to more than 170,000 AF in a wet year.

- Improved water supply reliability for SWP and CVP water users, including a commitment of 60,000 AF of water per year for environmental purposes (Component 1 Water) and up to an additional 140,000 AF of water (Components 2, 3, and 4 Water) in dry years for the SWP and CVP customers. Presently, CVP customers receive a share of the Yuba Accord water via the San Luis & Delta-Mendota Water Authority (SLDMWA) which has an agreement with DWR.

- A $6 million long-term lower Yuba River fisheries monitoring, studies, and enhancement program.

- Improved water supply reliability for Yuba County farmers, along with a responsible conjunctive use program to improve water use efficiency for local farmers.

- A secure funding source for Yuba County Water Agency and local irrigation districts to finance conjunctive use and water use efficiency activities, levee strengthening, and other water management actions in Yuba County (Yuba County Water Agency 2008).

The Yuba Accord's instream flow requirements may be modified when the Federal Energy Regulatory Commission issues a new long-term Federal Power Act license to Yuba County Water Agency for the Yuba Project, which will occur during or after 2016.

4.3.4 San Joaquin River Restoration Program (SJRRP)

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC) filed a lawsuit, known as NRDC, et al., v. Kirk Rodgers, et al., challenging the renewal of long-term water service contracts between the United States and the CVP Friant Division contractors. On September 13, 2006, after more than 18 years of litigation, the Settling Parties, including NRDC, Friant Water Authority, and the United States Departments of the Interior and Commerce, agreed on the terms and conditions of a Settlement subsequently approved by the United States Eastern District Court of California on October 23, 2006. The San Joaquin River Restoration Settlement Act, included in Public Law 111-11 and signed into law on March 30, 2009, authorizes and directs the Secretary of the Interior to implement the Settlement. The Settlement establishes two primary goals:

1. Restoration Goal – To restore and maintain fish populations in "good condition" in the main stem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

2. Water Management Goal – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement calls for a combination of channel and structural modifications along the San Joaquin River below Friant Dam, releases of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration flows), and reintroduction of Chinook salmon. To achieve the Water Management Goal, the Settlement calls for downstream recapture of Interim and Restoration flows from the San Joaquin River and the Delta and recirculation of that water to replace reductions in water supplies to Friant Division long-term contractors resulting from the release of Interim and Restoration flows. Interim Flow releases began October 1, 2009.

In addition, the Settlement establishes a Recovered Water Account and allows the delivery of surplus water supplies to Friant Division long-term contractors during wet hydrologic conditions.

The SJRRP will implement the Settlement consistent with the San Joaquin River Restoration Settlement Act. Agencies responsible for managing and implementing the SJRRP are Reclamation, National Oceanic and Atmospheric Administration Fisheries Service, DWR, and California Department of Fish and Wildlife. The Settlement includes a detailed timeline for developing and implementing SJRRP actions.

4.4 References

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Chapter 5
Other Required Disclosures

Other required disclosures of environmental documents include irreversible and irretrievable commitment of resources; the relationship between short-term uses and long-term productivity; growth inducing impacts; summary of environmental impacts by alternative; significant and unavoidable impacts; and the environmentally superior alternative.

5.1 Irreversible and Irretrievable Commitment of Resources

According to the National Environmental Policy Act (NEPA), an environmental impact statement (EIS) must contain a discussion of irreversible and irretrievable commitment of resources that would result from the Full Range of Transfers Alternative (Proposed Action) if it was implemented (40 Code of Federal Regulations [CFR] Section 1502.16). The irreversible commitment of resources generally refers to the use or destruction of a resource that cannot be replaced or restored over a long period of time. The irretrievable commitment of resources refers to the loss of production or use of natural resources and represents lost opportunities for the period when the resource cannot be used. The California Environmental Quality Act (CEQA) also requires a discussion of any significant effect on the environment that would be irreversible if the project were implemented or would result in an irretrievable commitment of resources (CEQA Guidelines Sections 15126(c) and 15127).

Transfers from potential sellers upstream from the Delta to buyers in the Central Valley or Bay Area would involve the consumption of nonrenewable natural resources. These nonrenewable natural resources would consist of petroleum for fuels necessary to operate equipment used during groundwater pumping activities. The Full Range of Transfers Alternative (preferred alternative) would include the operation of diesel and natural gas-fueled agricultural engines during groundwater pumping activities.

5.2 Relationship Between Short-Term Uses and Long-Term Productivity

As required by NEPA (40 CFR Section 1502.16), this section describes the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity.

All three action alternatives provide water for transfer through cropland idling, groundwater substitution, crop shifting, conservation, and reservoir release actions. Different combinations of the transfer types would be used in each action alternative. The transfers are temporary as water is transferred from sellers to buyers on an annual basis. The transfers would require short term uses of energy for increased groundwater pumping for groundwater substitution transfers and increased pumping for transfers south of the Delta.

Transfers would benefit long-term productivity in the Buyer Service Area. Water transfers could reduce groundwater pumping in the Buyer Service Area, which could increase groundwater levels, decrease subsidence, and improve groundwater quality. Related beneficial effects would also occur for air quality by reducing windblown erosion (fugitive dust) on otherwise barren fields in the Buyer Service Area because water would be provided for irrigation. Additionally, agricultural land uses would be maintained in the Buyer Service Area with the transferred water. During dry years, water transfers would maintain agricultural productivity in the Buyer Service Area by providing water for irrigation and protect long-term production of permanent crops.

5.3 Growth Inducing Impacts

Both NEPA (Council on Environmental Quality NEPA Sections 1502.16(b) and 1508.8(b)) and CEQA (Section 15126.2(d)) describe the required analysis of direct and indirect impacts of growth-inducing impacts from projects. Section 1502.16(b) requires the analysis of indirect effects. Under NEPA, indirect effects as stated in Section 1508.8(b) include reasonably foreseeable growth inducing effects from changes caused by a project. CEQA Section 15126.2(b) requires an analysis of a project’s influence on economic or population growth, or increased housing construction and the future developments’ associated environmental impacts.

Direct growth-inducing impacts are usually associated with the construction of new infrastructure, housing, or commercial development. A project which promotes growth, such as new employment opportunities or infrastructure expansion (i.e. water supply or waste water treatment capabilities) could have indirect growth inducing effects. Generally, growth inducing impacts would be considered significant if the ability to provide needed public services by agencies is hindered, or, the potential growth adversely affects the environment.

Water proposed for transfer would be transferred from willing sellers to buyers to meet existing demands when there are shortages in Central Valley Project supplies. The proposed water transfers would not directly or indirectly affect growth beyond what is already planned. Therefore, the proposed action would have no growth inducing impacts.

5.4 Significant and Unavoidable Impacts

Significant and unavoidable adverse effects refer to the environmental consequences of an action that cannot be avoided by redesigning the project, changing the nature of the project, or implementing mitigation measures. NEPA requires a discussion of any adverse impacts that cannot be avoided (40 CFR Section 1502.15). The CEQA Guidelines require a discussion on significant environmental effects that cannot be avoided as well as those that can be mitigated but not reduced to an insignificant level (Section 15126.2(b) and Section 15126.2(a)). No significant and unavoidable adverse effects would occur from implementation of the action alternatives.

5.5 Controversies and Issues Raised by Agencies and the Public

CEQA requires the disclosure of controversial project issues raised by agencies and the public. Table 5-1 presents a summary of the project issues identified during the scoping period. The scoping report (Bureau of Reclamation and San Luis & Delta-Mendota Water Authority 2011) provides further information on issues identified by agencies and the public during the scoping process.

Table 5-1. Summary of Controversies and Issues Raised by Agencies and the Public.

Issue	Summary of Issue	Timeline for Addressing or Document/Section Addressing Issue
Alternatives Analyzed in the EIS/EIR	The range of alternatives considered in the EIS/EIR.	Chapter 2 Proposed Action and Description of the Alternatives
Cumulative Impacts	The cumulative effects analysis must include all water transfers and programs that result in additional groundwater pumping.	Chapter 4 Cumulative Effects Methodology
Economic Impacts	Crop idling causes economic impacts to local farmers and farm-related industries.	Chapter 3.10 Regional Economics
Groundwater Impacts	Water transfers could result in long-term impacts to groundwater by decreasing groundwater levels and adversely affecting third party groundwater users.	Chapter 3.3 Groundwater Resources
Impacts to Migratory Waterfowl	The EIS/EIR must analyze the potential impact to migratory waterfowl associated with idling rice, potential loss of wetlands, and impact of delivery to wetlands south of the Delta.	Chapter 3.8 Vegetation and Wildlife
Impacts to Historical Resources	The EIR/EIS must assess whether the project will have an adverse effect on historical resources within the area of analysis.	Chapter 3.13 Cultural Resources
Impacts to Recreation	The EIS/EIR should include analysis of how water transfers may affect the San Luis Reservoir State Recreation Area.	Chapter 3.15 Recreation
Impacts to Water Quality	Analysis must include water quality effects related to degraded water bodies, particularly issues related to mercury and dissolved oxygen	Chapter 3.2 Water Quality
Third Party Impacts	Water transfers could result in third-party impacts to adjacent water users, local economies, and fish and wildlife.	Chapter 3.1 Water Supply, Chapter 3.10 Regional Economics, Chapter 3.7 Fisheries, and Chapter 3.8 Vegetation and Wildlife

Key:
EIS/EIR = Environmental Impact Statement/Environmental Impact Report

5.6 References

U.S. Bureau of Reclamation and San Luis & Delta-Mendota Water Authority. 2011. Long-Term Water Transfers Environmental Impact Statement/ Environmental Impact Report. Scoping Report. May. Accessed on: 07 22 2014. Available online at: http://www.usbr.gov/mp/cvp/ltwt/scoping_report/index.html

Chapter 6 Consultation and Coordination

This chapter documents the consultation and coordination efforts that have occurred during development of the Long-Term Water Transfers Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

6.1 Public Involvement

Both National Environmental Policy Act and California Environmental Quality Act encourage public involvement during preparation of EISs and EIRs. The following sections describe the public involvement opportunities that have occurred or will occur during the EIS/EIR process.

6.1.1 Public Scoping

On December 28, 2010, the Bureau of Reclamation (Reclamation) published a Notice of Intent in the Federal Register and on January 5, 2011, a Notice of Preparation for Long-Term Water Transfers was published with the California State Clearinghouse. Public scoping meetings were held between January 11 and 13, 2011 in the cities of Chico, Sacramento, and Los Banos, California. Reclamation and the San Luis & Delta-Mendota Water Authority (SLDMWA) prepared the "Long-Term Water Transfers EIS/EIR Public Scoping Report" (dated May 2011), which summarized the comments and concerns raised during the meetings, as well as public comments obtained during the public comment period.

6.1.2 Public Meetings

Reclamation and SLDMWA will hold public meetings after release of the Public Draft EIS/EIR to solicit public comments.

6.2 Agency Coordination

The development of the Long-Term Water Transfers EIS/EIR has required coordination with a variety of local, Federal, and State agencies. The following sections describe these agencies and their roles in the process.

6.2.1 Buyers and Sellers

Reclamation and SLDMWA coordinated frequently with buyers and sellers to define transfer types and quantities, provide progress updates on modeling efforts, and discuss potential impacts and proposed mitigation measures. In addition to frequent communication on an individual basis with buyers and sellers, Reclamation facilitated several workshops with buyers and sellers to present preliminary information on the Long-Term Water Transfers EIS/EIR.

Reclamation and SLDMWA also coordinated with the buyers and sellers during development of the 2014 Water Transfers Environmental Assessment and Initial Study, which contributed to development of this EIS/EIR. The 2014 Water Transfers Finding of No Significant Impact and Mitigated Negative Declamation were published on April 11, 2014.

6.2.2 California Department of Water Resources (DWR)

Reclamation and SLDMWA coordinated with DWR throughout development of the EIS/EIR. Specifically, Reclamation and SLDMWA met with DWR to discuss groundwater and surface water modeling approaches and results, transfer types and quantities, and use of State Water Project facilities. DWR was also involved in briefings and reviews related to the Sacramento Valley Finite Element Groundwater Model (SACFEM2013) peer review. DWR's input on the SACFEM2013 peer review process was utilized to make revisions to the model. DWR also provided input on administrative draft sections of the EIS/EIR.

6.2.3 Resource Agencies

Reclamation and SLDMWA have been coordinating efforts with U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife on the impacts analysis on special status species and environmental commitments. Reclamation will submit a Biological Assessment for USFWS review under Section 7 of the Federal Endangered Species Act.

Chapter 7
List of Preparers and Contributors

The following is a list of preparers who contributed to the development of the Long-Term Water Transfers Environmental Impact Statement/Environmental Impact Report.

Table 7-1. Federal Agencies

Preparers	Agency	Role In Preparation
Alex Aviles	Reclamation	Environmental Justice, Air Quality
Bob Collela	Reclamation	Project Description
Georgiana Gregory	Reclamation	Water Supply, Power, Flood Control
Russ Grimes	Reclamation	NEPA Guidance
Shelly Hattleberg	Reclamation	Coordination and Review, Agricultural Land Use, Visual, Air Quality, Climate Change
Brad Hubbard	Reclamation	NEPA Lead Agency Project Manager
John Hutchings	Reclamation	Flood Control, Power
Joshua Israel	Reclamation	Fisheries
Michael Inthavong	Reclamation	Regional Economics
Erma Leal	Reclamation	Project Description
Kirk Nelson	Reclamation	Groundwater
Elizabeth Kiteck	Reclamation	Central Valley Project Operations
Stanley Parrot	Reclamation	Groundwater
Laurie Perry	Reclamation	Cultural Resources
Patricia Rivera	Reclamation	Indian Trust Assets
Tim Rust	Reclamation	Water Supply
Scott Springer	Reclamation	Recreation
David Van Rijn	Reclamation	Vegetation and Wildlife
Natalie Wolder	Reclamation	Water Supply

Notes:
NEPA – National Environmental Policy Act

Table 7-2. Regional Agencies

Preparers	Agency	Role In Preparation
Frances Mizuno	San Luis & Delta-Mendota Water Authority	CEQA Lead Agency Project Manager

Notes:
CEQA – California Environmental Quality Act

Table 7-3. CDM Smith

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Carrie Buckman, P.E.	M. Environmental Engineering 16 years experience	Water Resources Engineer	Project Manager, Project Description, Introduction
Selena Evans	M. Urban and Regional Planning 6 years experience	Environmental Planner	Visual Resources, Environmental Justice, and Indian Trust Assets
Donielle Grimsley	B.S. Biology 8 years experience	Environmental Scientist	Water Quality
Brian Heywood, P.E.	M.S. Civil Engineering 17 years experience	Senior Water Resource Engineer	Groundwater
Anusha Kashyap	M.S. Environmental Engineering 5 years experience	Environmental Engineer	Groundwater and Flood Control
Alexandra Kleyman	M.A. Environmental Policy and Urban Planning 5 years experience	Environmental Planner	Geology and Soils and Agricultural Land Use
Sami Nall, P.E.	M.S. Environmental Engineering 6 years experience	Environmental Engineer	Water Supply and Power
Christopher Park, AICP	M.S. City and Regional Planning 8 years experience	Water Resources Planner	Cumulative
Gwen Pelletier	M.S. Environmental Studies 14 years experience	Environmental Scientist	Air Quality, Greenhouse Gases
Gina Veronese	M.S. Agricultural and Resource Economics 13 years experience	Resource Economist	Regional Economics
Suzanne Wilkins, AICP	B.S. Business Administration 26 years experience	Water Resources Planner	Recreation

Table 7-4. Pacific Legacy

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Lisa Holm	Ph.D., 20 years experience	Supervisor - Prehistoric/Historic Archaeology	Cultural Resources
John Holson	M.A., 35 years experience	Principal - Regulatory Compliance; Prehistoric/Historic Archaeology	Cultural Resources

Table 7-5. ICF International

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Angela Alcala	BS 15 years experience	Wildlife Biology	Terrestrial Resources
Gerrit Platenkamp	PhD, MS, BS 22 years experience	Plant Ecology	Terrestrial Resources
Gregg Roy	BS 25 years experience	CEQA/NEPA	Terrestrial Resources, Aquatic Resources
Rick Wilder	PhD, BS 11 years experience	Fisheries Biology	Aquatic Resources

Table 7-6. MBK Engineers

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Lee Bergfeld	M.S. Civil Engineering, 19 years experience	Hydrological Modeling	Transfers Operations Model, Groundwater Model
Walter Bourez	M.S. Civil Engineering, 25 years experience	Hydrological Modeling	Transfers Operations Model, Groundwater Model

Table 7-7. CH2M Hill

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Peter Lawson	25 years experience	Hydrogeology	Groundwater Model
Nate Brown	19 years experience	Hydrogeology	Groundwater Model
Heather Perry	11 years experience	Hydrogeology	Groundwater Model
Lisa Porta	8 years experience	Groundwater Hydrology	Groundwater Model

Table 7-8. Resource Management Associates

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Marianne Guerin	25 years experience	Delta Modeling	DSM2 modeling, Appendix C

Table 7-9. RMann Economics

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Roger Mann	Ph.D. Agricultural Economics and Economics 37 years experience	Natural Resources Economist	Regional Economics Model

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