Chapter 5

Surface Water Resources and Water Supplies

5.1 Introduction

This chapter describes the surface water resources and water supplies in the study area and potential changes that could occur as a result of implementing the alternatives evaluated in this Environmental Impact Statement (EIS). Implementation of the alternatives could affect these resources through potential changes in operation of the Central Valley Project (CVP) and State Water Project (SWP) and ecosystem restoration components of the long-term operation of the CVP and SWP.

5.2 Regulatory Environment and Compliance Requirements

Potential actions that could be implemented under the alternatives evaluated in this EIS could affect surface water resources, including rivers and reservoirs directly or indirectly impacted by changes in the operations of the CVP or SWP water facilities and users of CVP and SWP water supplies. Actions located on public agency lands or implemented, funded, or approved by Federal and state agencies would need to be compliant with appropriate Federal and state agency policies and regulations, as summarized in Chapter 4, Approach to Environmental Analysis.

5.3 Affected Environment

This section describes the surface water resources and water supplies that could be potentially affected by the implementation of the alternatives considered in this EIS, including:

- **Surface Water Hydrology:** Changes in surface water hydrology may occur in the rivers within the Trinity River and Central Valley regions due to changes in CVP and SWP operations as some rivers in these regions are used to convey CVP and/or SWP water supplies. Changes in reservoir elevations may occur within the Trinity River, Central Valley, San Francisco Bay Area, Central Coast, and Southern California regions due to changes in CVP and SWP operations. The ongoing CVP and SWP facilities and operations are described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

- **Summaries of the Water Supplies used by CVP and SWP Water Users:** The water users which may be affected by changes in CVP and SWP operations are located in the Trinity River, Central Valley, San Francisco Bay Area, Central Coast, and Southern California regions.

5.3.1 Overview of California Water Supply and Water Management Facilities

5.3.1.1 Sources of Water in California

Variability and uncertainty are the dominant characteristics of California's water resources. Precipitation is the source of 97 percent of California's water supply (DWR 2009a). It varies greatly from year to year, as well as by season and location within the state. The unpredictability and geographic variation in precipitation that California receives make it challenging to manage the available runoff to meet urban, agricultural, and environmental water needs. With climate change, precipitation patterns are expected to become even more unpredictable, as described in Appendix 5A, CalSim II and DSM2 Modeling.

In an average water year, precipitation provides California with approximately 200 million acre-feet (MAF) of water falling as either rain or snow (DWR 2009a), including up to 10 MAF from surface water flows entering California due to precipitation falling in the Klamath River and Lost River watersheds in Oregon; and the Colorado River watershed in Wyoming, Colorado, Utah, Nevada, New Mexico, and Arizona, and northwestern Mexico. The total volume of water the state receives can vary dramatically between dry and wet years. California may receive less than 100 MAF of water during a dry year and more than 300 MAF in a wet year (Western Regional Climate Center 2011).

The majority of California's precipitation occurs between November and April, while most of the state's demand for water is in the summer months (Western Regional Climate Center 2011). In addition, most of the precipitation falls in the northern portion of the state and much of the state water demand comes from the central and southern portions of the state where the major agricultural and population centers are located on the Central Valley floor and in Southern California. In some years, the northern regions of the state can receive 100 inches or more of precipitation, while the southern regions receive only a few inches.

Over time, annual precipitation trends have been changing and continue to change, as shown on Figure 5.1. From 1906 to 1960, 33 percent of the water years in California were classified by the California Department of Water Resources (DWR) as "dry" or "critically dry" and that percentage increased to 36 percent from 1961 to 2013 (DWR 2014a). From 1906 to 1960, 45 percent of the water years in California were classified by DWR as "above normal" or "wet" and that percentage increased to 49 percent from 1961 to 2013. Additionally, the 1906 to 1960 period had 42 percent of water years classified as extreme ("critically dry" or "wet") and that percentage increased to 51 percent after 1960.

Although there were more extreme water year classifications in the later period, the overall precipitation averages in pre-1960 years and post-1960 years have little differences.

Despite having similar precipitation averages, the year to year variation and patterns of extreme condition occurrences are significantly different between the time periods. The year to year statewide precipitation variation is larger and more frequent from 1961 to 2013 than 1906 to 1960. Also, the occurrence of a year to year change of more than 10 inches of precipitation is 3 times higher in the post-1960 time period as compared to the pre-1960 time period. There are also more occurrences of sequential "critically dry" years and sequential "wet" years after 1960.

Approximately 50 percent of the precipitation that California receives evaporates, is used consumptively by native vegetation and crops (not including irrigation water supplies), is used by managed wetlands, flows into streams within Oregon or Nevada, flows into saline water bodies (such as Salton Sea), or percolates into saline groundwater aquifers (DWR 2013a). Therefore, less than 50 percent of the water that enters California, or less than 100 MAF per year, is available for use by urban, agricultural, and other environmental uses, collectively.

5.3.1.2 Development of Major California Water Management Facilities

Due to the hydrologic variability that ranges from dry summers and fall months to floods in winter and spring, water from precipitation in the winter and spring must be stored for use in the summer and fall. During an average hydrological year, approximately 15 MAF of water is stored in the Sierra Nevada snowpack (DWR 2013a). However, not all of the snowpack becomes available in a timely manner for uses throughout the state. Therefore, Federal, state, and local agencies and private entities have constructed reservoirs, aqueducts, pipelines, and water diversion facilities to capture and use the rainfall and the subsequent snowmelt.

5.3.1.2.1 Water Facilities Development through the Early 1900s

Spanish settlements were initially established in the late 1700s in southern California, including conveyance systems to bring water to the pueblos. The first water storage and diversion project in California was constructed in 1772, including a 12-foot high dam on the San Diego River and 6 miles of canals to deliver water to the San Diego Mission (Reclamation 1997). Over the next 80 years, other irrigation systems were constructed to provide water for communities and irrigated lands. The major levee was constructed in the Delta in 1840 along Grand Island to protect agricultural lands from floods.

After California became a state in 1850, the state legislature adopted English Common Law, which included the doctrine of riparian rights to provide water supplies to lands adjacent to rivers and streams (Reclamation 1997). The California legislature at this time also recognized "pueblo water rights" that were granted under both Spanish and Mexican governments, including water rights on the Los Angeles and San Diego rivers. Water rights also were influenced by the practice of miners of "posting notice" at their points of diversion to substantiate water rights as an "appropriative right" for areas not adjacent to the rivers and streams. This set of appropriative rights was catalogued with respect to "first in time, first in right." Appropriative water rights were given statutory recognition in 1872.

Between the 1850s and early 1900s, numerous dams and canals were constructed by miners, agricultural water users, and communities (Reclamation 1997). In the 1870s, the first wells were constructed with wood-burning engines. By the late 1890s, natural gas engines and electricity became available to power pumps. Between 1906 and 1910, over 4,000 natural gas or electric groundwater pumps were installed in the San Joaquin Valley. Substantial use of groundwater caused extensive groundwater aquifer depletions and land subsidence in some areas of the Central Valley. The availability of electricity to communities also resulted in more hydroelectric generation facilities and associated dams being constructed throughout the Sierra Nevada.

5.3.1.2.2 Conceptual Development of the Central Valley Project and State Water Project

The need for coordinated water development was evaluated in the 1870s when Congress authorized the Alexander Commission to evaluate water supply concepts in the Sacramento and San Joaquin rivers watersheds, including reservoirs and large-scale irrigation water supply projects (Reclamation 1997).

1919 Marshall Plan

In 1919, Colonel Robert Marshall, chief geographer for the U.S. Geological Survey, proposed a major water storage and conveyance plan to irrigate lands in the Central Valley and San Francisco Bay Area and provide water to communities in the San Francisco Bay Area and southern California (Marshall 1919). The Marshall Plan recommended two major dams on the San Joaquin River near Friant and Stanislaus River between the present locations of Tulloch and Goodwin dams to serve the eastern San Joaquin Valley and reduce groundwater overdraft in Tulare and Kern counties; four dams on Kern River to serve the Los Angeles area; and dams on the Sacramento River near Red Bluff, Klamath River downstream of Klamath Falls, and dams along the Sacramento River tributaries to provide stored water into two canals along the western and eastern sides of the Central Valley to provide exchange water to San Joaquin River water rights holders affected by the San Joaquin River dam, water to other San Joaquin Valley users, and water to communities in Contra Costa, Alameda, Santa Clara, and San Francisco counties.

1930s State Water Plan

During the 1920s, the California state legislature commissioned a series of investigations to further evaluate the Marshall Plan (DPW 1930; Reclamation 1997). The 1930 Division of Water Resources Bulletin No. 25 outlined a statewide water plan, including the concept that became the CVP and SWP. The plan included 37 water supply and flood management reservoirs, including a dam on the San Joaquin River near Friant and canals to distribute the water along the eastern San Joaquin Valley to reduce groundwater overdraft in Tulare and Kern counties; 14 dams along the Trinity River, Sacramento River, and Sacramento River tributaries to provide water to the San Joaquin River water rights contractors affected by the dam on the San Joaquin River and water users on the west side of the San Joaquin Valley and in Contra Costa County; and eight dams on San Joaquin Valley rivers to provide water to the San Joaquin Valley. These dams included recommended facilities near the present CVP Trinity, Shasta, Folsom, New Melones, and Friant dams and the present SWP Oroville Dam. The recommendations also included a Delta Cross Channel canal to improve south Delta water quality; a canal from a south Delta pumping plant to a regulating reservoir and pumping plant near Mendota; canals from Mendota to the San Joaquin Valley; a canal from the Delta into Contra Costa County; and expansion of the San Joaquin River and associated channels with five operable barriers along the San Joaquin River.

The study also addressed use of aquifer storage, improved navigation along the Sacramento and San Joaquin rivers, flood management, salt water barrier along the western Delta, recycled wastewater and stormwater in Southern California, and importation of Colorado River water to Southern California.

In 1933, the state authorized the Central Valley Project Act. However, during the 1930s depression, the state could not raise the funds. The state appealed to the Federal Government for assistance. The overall SWP was approved by the State Legislature in 1941.

As described above, six of the 37 dams in the SWP were included in the CVP and SWP facilities (Reclamation 1997). However, most of the recommended dams were constructed by the U.S. Army Corps of Engineers (USACE), local or regional water supply and/or flood management agencies, and hydropower entities on the Yuba, Bear, Feather, American, Mokelumne, Calaveras, Chowchilla, Fresno, Merced, Tuolumne, Stanislaus, Kings, Kaweah, Tule, and Kern rivers. Dams on the Fresno and Chowchilla rivers were initially developed by the USACE; however, the Hidden and Buchanan dams, respectively, were integrated into the CVP to supply water to portions of the eastern side of the San Joaquin Valley (DPW 1930; Reclamation 1997).

5.3.1.2.3 Overview of the Central Valley Project

With the passage of the Rivers and Harbors Act of 1935, Congress appropriated funds and authorized construction of the CVP by the USACE (Reclamation 1997; Reclamation 2011a). When the Rivers and Harbors Act was reauthorized in 1937, the construction and operation of the CVP was assigned to Reclamation, and the CVP became subject to Reclamation Law (as defined in the Reclamation Act of 1902 and subsequent legislation).

The CVP facilities were initiated in the late 1930s (Reclamation 1997, 2011a). The CVP facilities, as shown on Figure 5.2, include:

- Trinity and Lewiston dams on the Trinity River.
- Shasta and Keswick dams on the Sacramento River.

- Red Bluff Pumping Plant on the Sacramento River to deliver water into the Tehama-Colusa Canal and the Corning Canal.
- Folsom and Nimbus dams on the American River and the Folsom-South Canal.
- Delta Cross Channel in the Delta.
- Rock Slough Intake to deliver water into the Contra Costa Canal, Contra Costa Pumping Plant, and Contra Loma Reservoir.
- Friant Dam along the San Joaquin River to deliver water into the Friant-Kern and Madera.
- C.W. Jones Pumping Plant (Jones Pumping Plant) (previously known as the Tracy Pumping Plant) in the south Delta to deliver water into the Delta-Mendota Canal and Mendota Pool.
- Delta-Mendota Canal/California Aqueduct Intertie downstream of the CVP Jones Pumping Plant and the SWP Banks Pumping Plant.
- San Luis Reservoir-related facilities, including the CVP facilities consisting of the O'Neill Forebay, Pumping Plant, and Canal; Coalinga Canal, Pleasant Valley Pumping Plant, and San Luis Drain. The O'Neill Forebay is operated in coordination with the SWP. The SWP facilities operated in coordination with the CVP include the B.F. Sisk San Luis Dam (the major dam that forms San Luis Reservoir), San Luis Canal, Los Banos and Little Panoche dams, and associated pumping plants.
- Pacheco Tunnel and Conduit to deliver water from the San Luis Reservoir into the San Justo Dam and Reservoir, Hollister Conduit, and Santa Clara Tunnel and Conduit.
- New Melones Dam along the Stanislaus River.

The CVP reservoirs are listed in Table 5.1 and shown on Figures 5.3 through 5.5. Table 5.1 also includes reservoirs of the Bureau of Reclamation Orland Project (which are not part of CVP) because these reservoirs also affect hydrology of Stony Creek, a tributary to the Sacramento River.

Table 5.1 Major Central Valley Project and Orland Project Reservoirs

Project	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
CVP	Millerton Lake	Friant	San Joaquin River	1942	524,000
CVP	Shasta Lake	Shasta	Sacramento River	1945	4,552,000
CVP	Keswick Reservoir	Keswick	Sacramento River	1950	23,772
CVP	Trinity Lake	Trinity	Trinity River	1962	2,447,650
CVP	Lewiston Reservoir	Lewiston	Trinity River	1963	14,660
CVP	Spring Creek Reservoir	Spring Creek Debris Dam	Spring Creek (tributary of Sacramento River)	1963	5,874
CVP	Whiskeytown Lake	Whiskeytown	Clear Creek (tributary of Sacramento River)	1963	241,100
CVP	Folsom Lake	Folsom	American River	1956	967,000
CVP	Lake Natoma	Nimbus	American River	1955	9,000
CVP	Contra Loma Reservoir	Contra Loma	Off-Stream	1967	2,627
CVP	Martinez Reservoir	Martinez	Wildcat Creek	1938	268
CVP	San Luis Reservoir	B.F. Sisk	San Luis Creek	1967	2,041,000
CVP	O'Neill Forebay	O'Neill	San Luis Creek	1967	56,400
CVP	Los Banos Creek Reservoir	Los Banos Detention	Los Banos Creek	1965	34,600
CVP	Little Panoche Creek Reservoir	Little Panoche Detention	Little Panoche Creek	1966	5,580
CVP	San Justo Reservoir	San Justo	Offstream	1985	10,300
CVP	Funks Reservoir	Funks	Funks Creek	1976	2,460
CVP	New Melones Reservoir	New Melones	Stanislaus River	1979	2,400,000
CVP	Hensley Lake	Hidden	Fresno River	1975	90,000
CVP	H.V. Eastman Lake	Buchanan	Chowchilla River	1975	150,000
Orland	East Park Reservoir	East Park	Little Stony Creek (tributary of Sacramento River)	1910	51,000
Orland	Stony Gorge Reservoir	Stony Gorge	Stony Creek (tributary of Sacramento River)	1928	50,350

Sources: DWR 2014b; Reclamation 1994, 2014a, 2014b.

Note: CVP is Central Valley Project; Orland is Orland Project

Detailed information describing the CVP facilities and operations is presented in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

5.3.1.2.4 Overview of the State Water Project

As the CVP facilities were being constructed after World War II, the state began investigations to meet additional water needs through development of the California Water Plan. In 1957, DWR published Bulletin Number 3 that identified new facilities to provide flood control in northern California and water supplies to the San Francisco Bay Area, San Joaquin Valley, San Luis Obispo and Santa Barbara counties in the Central Coast Region, and southern California (DWR 1957, 2012; Reclamation 2011a). The study identified a seasonal deficiency of 2.675 MAF/year in 1950 that resulted in groundwater overdraft throughout many portions of California. The report described facilities to meet the water demands and reduce groundwater overdraft, including facilities that would become part of the SWP.

In 1960, California voters authorized the Burns-Porter Act to construct the initial SWP facilities. The SWP facilities, as shown on Figure 5.2, include:

- Antelope Lake, Lake Davis, and Frenchman Lake on the upper Feather River upstream of Oroville Dam.
- Oroville Dam and Thermalito Diversion Dam on the Feather River.
- Barker Slough Pumping Plant in the north Delta which delivers water to the North Bay Aqueduct.
- Clifton Court Forebay and Harvey O. Banks Pumping Plant (Banks Pumping Plant) in the south Delta, which delivers water into the Bethany Forebay and California Aqueduct.
- South Bay Pumping Plant to deliver water from Bethany Forebay to the South Bay Aqueduct and Lake Del Valle.
- San Luis Reservoir-related facilities, including the SWP facilities B.F. Sisk San Luis Dam (the major dam that forms San Luis Reservoir), San Luis Canal, Los Banos and Little Panoche dams, and associated pumping plants, and the CVP O'Neill Forebay. These facilities are operated in coordination between the SWP and CVP.
- California Aqueduct to deliver water to the San Joaquin Valley, Central Coast, and southern California. The California Aqueduct extends from the Banks Pumping Plant to San Luis Reservoir and continues to Lake Perris in Riverside County. The California Aqueduct reach in southern California also includes Quail Lake, Pyramid Lake, Castaic Lake, Silverwood Lake, Crafton Hills Reservoir, and Lake Perris.
- The Coastal Branch of the California Aqueduct to deliver water from the California Aqueduct to San Luis Obispo and Santa Barbara counties.

Major SWP reservoirs are listed in Table 5.2 and shown on Figures 5.3 through 5.6.

Table 5.2 State Water Project Reservoirs

Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
Frenchman Lake	Frenchman	Little Last Chance Creek (tributary of Feather River)	1961	55,477
Antelope Lake	Antelope	Indian Creek (tributary of Feather River)	1964	22,566
Lake Davis	Grizzly Valley	Big Grizzly Creek (tributary of Feather River)	1966	83,000
Oroville Reservoir	Oroville	Feather River	1968	3,537,577
Thermalito Pool	Thermalito Diversion	Feather River	1967	13,328
Thermalito Forebay	Thermalito Forebay	Cottonwood Creek (tributary of Feather River)	1967	11,768
Thermalito Afterbay	Thermalito Afterbay	Feather River	1967	57,041
Clifton Court Forebay	Clifton Court Forebay	Old River	1970	29,000
Bethany Forebay	Bethany Forebay	Italian Slough	1961	5,250
Patterson Reservoir	Patterson	Offstream	1962	98
Lake Del Valley	Del Valle	Arroyo Valle	1968	77,100
Quail Lake	No dam	Offstream	Historic	5,654
Pyramid Lake	Pyramid	Piru Creek	1973	180,000
Castaic Lake	Castaic	Castaic Creek	1973	323,700
Silverwood Lake	Cedar Springs	Mojave River (West Fork)	1971	78,000
Crafton Hills Reservoir	Crafton Hills	Yucaipa Creek	2001	130
Lake Perris	Perris	Bernasconi Pass	1973	131,452

Sources: DWR 2014b, 2014c.

Detailed information describing the SWP is presented in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

5.3.1.2.5 Other Major Water Supply and Flood Management Reservoirs

During the past 100 years, numerous water supply, flood management, and hydroelectric generation reservoirs were constructed throughout California. Many of these projects were constructed on tributaries to the Sacramento and San Joaquin rivers and tributaries to the Tulare Lake Basin. Operations of these non-CVP and non-SWP reservoirs affect flow patterns into the Sacramento and San Joaquin rivers and the Delta. However, implementation of the alternatives evaluated in this EIS would not result in changes in operations in most of these reservoirs, except on the lower Stanislaus River.

Major non-CVP and non-SWP reservoirs in the Sacramento Valley and San Joaquin Valley watersheds, generally with storage capacities greater than 100,000 acre-feet, which could affect operations of CVP or SWP reservoirs or Delta facilities or could be affected by implementation of the alternatives evaluated in this EIS, are listed in Tables 5.3 and 5.4.

Table 5.3 Major Non-Central Valley Project and Non-State Water Project Reservoirs in the Sacramento Valley Watershed Considered in this EIS

Owner	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
U.S. Army Corps of Engineers	Black Butte Reservoir	Black Butte	Stony Creek (tributary of Sacramento River)	1963	143,700
Yuba County Water Agency	Bullards Bar Reservoir	New Bullards Bar	Yuba River (North Fork)	1970	969,600
U.S. Army Corps of Engineers	Englebright Reservoir	Englebright	Yuba River	1941	70,000
South Sutter Water District	Camp Far West Reservoir	Camp Far West	Bear River	1963	104,500
Pacific Gas & Electric Company	Bucks Lake	Bucks Storage	Bucks Creek (tributary of Feather River)	1928	103,000
Pacific Gas & Electric Company	Lake Almanor	Lake Almanor	Feather River (North Fork)	1927	1,308,000
South Feather Water And Power Agency	Little Grass Valley Reservoir	Little Grass Valley	Feather River (South Fork)	1961	93,010
Pacific Gas & Electric Company	Salt Springs Reservoir	Salt Springs	Mokelumne River (North Fork)	1931	141,900
East Bay Municipal Utility District	Pardee Lake	Pardee	Mokelumne River	1929	209,950
East Bay Municipal Utility District	Camanche Lake	Camanche	Mokelumne River	1963	417,120
Sacramento Municipal Utility District	Union Valley Reservoir	Union Valley	Silver Creek (tributary of American River)	1963	230,000
Placer County Water Agency	French Meadows Reservoir	L. L. Anderson	American River (Middle Fork)	1965	136,400
Placer County Water Agency	Hell Hole Reservoir	Lower Hell Hole	Rubicon River (tributary of American River)	1966	208,400

Sources: DWR 2014b, 2014c.

Table 5.4 Major Non-Central Valley Project and Non-State Water Project Reservoirs in the San Joaquin Valley Watersheds Considered in this EIS

Owner	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
Southern California Edison Company	Lake Thomas A. Edison	Vermilion Valley	Mono Creek (tributary of San Joaquin River)	1954	125,000
Southern California Edison Company	Shaver Lake	Shaver Lake	Stevenson Creek (tributary of San Joaquin River)	1927	135,283
Merced Irrigation Dist	Lake McClure	New Exchequer	Merced River	1967	1,032,000
San Francisco Public Utilities Commission	Cherry Lake	Cherry Valley	Cherry Creek (tributary of Tuolumne River)	1956	273,500
San Francisco Public Utilities Commission	Hetch Hetchy Reservoir	O' Shaughne ssy	Tuolumne River	1923	360,000
Turlock Irrigation District	New Don Pedro Reservoir	New Don Pedro	Tuolumne River	1971	2,030,000
Calaveras County Water District	New Spicer Meadow Reservoir	New Spicer Meadow	Highland Creek (tributary of Stanislaus River)	1989	190,000
Tri-Dam Project	Donnells Reservoir	Donnells	Stanislaus River (Middle Fork)	1958	56,893
Tri-Dam Project	Beardsley Reservoir	Beardsley	Stanislaus River (Middle Fork)	1957	77,600
Tri-Dam Project	Tulloch Reservoir	Tulloch	Stanislaus River	1958	68,400
Oakdale Irrigation District and South San Joaquin Irrigation District	Goodwin Diversion	Goodwin	Stanislaus River	1912	500
South San Joaquin Irrigation District	Woodward Reservoir	Woodward	Simmons Creek (tributary of Stanislaus River)	1918	35,000
U.S. Army Corps of Engineers	New Hogan Lake	New Hogan	Calaveras River	1963	317,000

Sources: DWR 2014b, 2014c.

Major reservoirs used to store CVP and SWP water supplies in the San Francisco Bay Area, Central Coast, and Southern California regions are shown on Figures 5.5 and 5.6 and listed in Tables 5.5, 5.6, and 5.7.

Table 5.5 Major Non-Central Valley Project and Non-State Water Project Reservoirs in the San Francisco Bay Area Region Used to Store Central Valley Project and/or State Water Project Water

Owner	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
Contra Costa Water District	Los Vaqueros Reservoir	Los Vaqueros	Kellogg Creek	1997	160,000
East Bay Municipal Utility District	Briones Reservoir	Briones	Bear Creek	1964	67,520
East Bay Municipal Utility District	San Pablo Reservoir	San Pablo	Bear Creek	1964	38,600
East Bay Municipal Utility District	Lafayette Reservoir	Lafayette	Marsh Creek	1963	4,250
East Bay Municipal Utility District	Upper San Leandro Reservoir	Upper San Leandro	San Leandro Creek	1977	37,960
East Bay Municipal Utility District	Chabot Reservoir	Chabot	San Leandro Creek	1892	10,281

Sources: DWR 2014b, 2014c; East Bay Municipal Utility District (EBMUD) 2011; City and County of San Francisco (CCSF) 2009; Santa Clara Valley Water District (SCVWD) 2011.

Note:
a. Anderson Reservoir capacity is restricted due to California Department of Safety and Dams (SCVWD 2011).

Table 5.6 Major Non-Central Valley Project and Non-State Water Project Reservoirs in the Central Coast Region Used to Store State Water Project Water

Owner	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
Bureau of Reclamation	Cachuma Lake	Bradbury	Santa Ynez River	1953	205,000

Sources: DWR 2014b; Reclamation 2014c.

Table 5.7 Major Non-Central Valley Project and Non-State Water Project Reservoirs in the Southern California Region Used to Store State Water Project Water

Owner	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
United Water Conservation District	Lake Piru	Santa Felicia	Piru Creek	1955	100,000
Metropolitan Water District Of Southern California	Diamond Valley Lake	Diamond Valley Lake	Domenigoni Valley Creek	2000	800,000
Metropolitan Water District Of Southern California	Lake Skinner	Robert A Skinner	Tucalota Creek	1973	43,800
Rancho California Water District	Vail Lake	Vail	Temecula Creek	1949	51,000
City of Escondido	Dixon Lake	Dixon	Escondido Creek	1970	2,500
San Diego County Water Authority	Olivenhain Reservoir	Olivenhain	Escondido Creek	2003	24,900
City of San Diego	Lake Hodges	Lake Hodges	San Dieguito River	1918	37,700
City of San Diego	San Vincente Reservoir	San Vicente	San Vicente Creek	1943	146,994
City of San Diego	El Capitan Reservoir	El Capitan	San Diego River	1934	112,800
Helix Water District	Lake Jennings	Chet Harritt	Quail Canyon Creek	1962	9,790
Sweetwater Authority	Sweetwater Reservoir	Sweetwat er	Sweetwater River	1888	27,700
City of San Diego	Murray Reservoir	Murray	Off-stream	1918	4,818
City of San Diego	Morena Reservoir	Morena	Cottonwood Creek	1912	50,694
City of San Diego	Lower Otay Reservoir	Savage	Otay River	1919	49,849

Sources: DWR 2014b, 2014c; City of San Diego 2014a, 2014b, 2014c, 2014d; SDCWA and USACE 2008.

5.3.2 Hydrologic Conditions and Major Surface Water Facilities

This section of Chapter 5 provides an overview of hydrologic conditions in the Trinity River and Central Valley watersheds. As described below, not all of the tributaries and sub-watersheds would be affected by changes in the CVP and SWP operations considered under the alternatives in this EIS.

Changes in surface water hydrology may occur in the rivers within the Trinity River and Central Valley regions due to changes in CVP and SWP operations because some rivers in these regions are used to convey CVP and/or SWP water supplies. Tributaries to the Sacramento and San Joaquin rivers that are not affected by CVP and SWP operations are also discussed briefly in this section to provide an overview of the major streams in the Central Valley watersheds. Available information related to flow conditions between Water Years 2001 and 2012 (October 2000 through September 2012) are provided for reservoirs and rivers that are affected by CVP and/or SWP operations.

In the San Francisco Bay Area, Central Coast, and Southern California regions, the surface water streams generally are not used to convey CVP and SWP water supplies. The streams downstream of reservoirs that store CVP and SWP water supplies generally receive either reservoir overflows in storm conditions or minimum instream flows related to water rights and/or aquatic resources beneficial uses. After the minimum instream flow requirements are fulfilled, the remaining volumes of water are provided to municipal, agricultural, and/or environmental water users. Changes in CVP and SWP water operations will not affect the need to meet minimum instream flows or high flows during storm conditions.

5.3.2.1 Trinity River Region

The Trinity River Region includes the area along the Trinity River from Trinity Lake to the confluence with the Klamath River; and along the lower Klamath River from the confluence with the Trinity River to the Pacific Ocean. The Trinity River Region includes Trinity Lake, Lewiston Reservoir, the Trinity River between Lewiston Reservoir and the confluence with the Klamath River, and along the lower Klamath River.

5.3.2.1.1 Trinity River Watershed

The Trinity River watershed extends over approximately 1,897,600 acres and ranges in elevation from over 9,000 feet above sea level in the headwaters area to less than 300 feet at the confluence of the Trinity River with the Klamath River (California North Coast Regional Water Quality Control Board [NCRWQCB] et al. 2009; U.S. Fish and Wildlife Service [USFWS] et al. 1999). Average precipitation in the Trinity River watershed range from 30 to 70 inches per year, with a long-term average of approximately 62 inches per year. Over 90 percent of the precipitation has historically occurred between October and April. Precipitation ranges from mostly snow at higher elevations to mostly rain near the confluence with the Klamath River.

The Trinity River includes the mainstem, North Fork Trinity River, South Fork Trinity River, New River, and numerous smaller streams (NCRWQCB et al. 2009; USFWS et al. 1999). The mainstem of the Trinity River flows 170 miles to the west from the headwaters to the confluence with the Klamath River. The CVP Trinity and Lewiston dams are located at approximately River Miles 105 and 112, respectively; and upstream of the confluences of the Trinity River and the North Fork, South Fork, and New River. Flows on the North Fork, South Fork, and New River are not affected by CVP facilities. The Trinity River flows approximately 112 miles from Lewiston Dam to the Klamath River through

Trinity and Humboldt counties and the Hoopa Indian Reservation within Trinity and Humboldt counties.

Trinity Lake, a CVP facility on the Trinity River formed by the Trinity Dam, was constructed by 1962. The 2.4-MAF reservoir is located approximately 50 miles northwest of Redding (USFWS et al. 1999). Lewiston Reservoir, a CVP facility on the Trinity River formed by Lewiston Dam, was constructed by 1963 and is located 7 miles downstream of the Trinity Dam. Lewiston Reservoir is used as a regulating reservoir for downstream releases to the Trinity River and to Whiskeytown Lake, located in the adjacent Clear Creek watershed. Water is diverted from the lower outlets in Trinity Lake to Lewiston Reservoir to provide cold water to Trinity River. There are no other major dams in the Trinity River watershed.

Prior to completion of Trinity and Lewiston dams, flows in the Trinity River were highly variable and could range from over 100,000 cubic feet per second (cfs) in the winter and spring to 25 cfs in the summer and fall (USFWS et al. 1999). Total annual flow volume at Lewiston (immediately downstream of the current location of Lewiston Dam) ranged from 0.27 to 2.7 MAF with a long-term average of 1.2 MAF.

A large portion of the Trinity River flows upstream of Trinity Lake and Lewiston Dam is exported to the Sacramento River watershed through CVP facilities. The reduction in flows in the Trinity River initially caused substantial reductions in the Trinity River fish populations (Department of the Interior [DOI] 2000). In response to the reductions in fish populations, Congress enacted legislation and directed that restoration actions be evaluated for the Trinity River. In December 2000, the U.S. Department of the Interior (DOI) adopted the Trinity River Mainstem Fishery Restoration Record of Decision (Trinity River ROD) which restored Trinity River flow and habitat to produce a healthy, functioning alluvial river system. The Trinity River ROD included physical channel rehabilitation; sediment management; watershed restoration; and variable annual instream flow releases from Lewiston Dam based on forecasted hydrology for the Trinity River Basin as of April 1st each year that range from 368,600 acre-feet/year in critically dry years to 815,000 acre-feet/year in extremely wet years. The Trinity River ROD was challenged in United States District Court for the Eastern District of California (District Court); and the changes in operations related to flow were not allowed to proceed while supplemental environmental documentation was prepared and reviewed (NCRWQCB et al. 2009). In 2004, the United States Court of Appeals for the Ninth Circuit entered an opinion that reversed the District Court order; and all actions in the Trinity River ROD were mandated. The flow actions were not completely implemented until several infrastructure projects in the Trinity River channel were completed to protect areas from flood damage.

Additional water releases periodically occur into the Trinity River as part of flood control operations and to provide other flow releases (NCRWQCB et al. 2009; Reclamation 2011a). Although flood control is not an authorized purpose of the Trinity River Division, flood control benefits are provided through normal operations. The Reclamation Safety of Dams release criteria generally provide for maximum storage in Trinity Lake of 2.1 between November and March. Initial flood releases are discharged from Trinity Lake into Lewiston Reservoir, and then, through the powerplant and into Whiskeytown Lake in the Clear Creek watershed. To reduce the potential for flooding on the Trinity River, releases into Trinity River generally are less than 11,000 cfs from Lewiston Dam (under Safety of Dams criteria) due to local high water concerns in the floodplain and local bridge flow capacities. Reclamation has periodically released water from Lewiston Dam into the Trinity River to improve late summer flow conditions to avoid fish die-offs in the lower Klamath River or for tribal requirements along the Trinity River (DOI 2014; Trinity River Restoration Program [TRPP] 2014).

Temperature objectives for the Trinity River are set forth in State Water Resources Control Board (SWRCB) Water Rights Order 90-5, as summarized in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. These objectives vary by reach and by season. Between Lewiston Dam and Douglas City Bridge, the daily average temperature should not exceed 60 degrees Fahrenheit (°F) from July 1 to September 14, and 56°F from September 15 to September 30. From October 1 to December 31, the daily average temperature should not exceed 56°F between Lewiston Dam and the confluence of the North Fork Trinity River.

Historical water storage volumes and water storage elevations for Trinity Lake for Water Years 2001 through 2012 are presented on Figures 5.7 and 5.8 (DWR 2013d, 2013e). Trinity Lake storage varies in accordance with upstream hydrology and downstream water demands and instream flow requirements. Reclamation maintains at least 600 TAF in Trinity Reservoir, except during the 10 to 15 percent of the years when Shasta Lake is also drawn down.

Historical water storage volumes and water storage elevations in Lewiston Reservoir for Water Years 2001 through 2012 are presented on Figures 5.9 and 5.10 (DWR 2013g, 2013h). The Lewiston Reservoir water storage volume is more consistent throughout the year because this reservoir is used to regulate flow releases to the powerplant and other downstream uses; and not to provide long-term water storage.

Trinity River flows downstream of Lewiston Reservoir at Douglas City are presented on Figure 5.11 (DWR 2013i). The flow record is limited at the Douglas City gauge to 2003 through 2012. The mean monthly flows reflect the wet year pattern in 2006 and the drier year patterns in 2008 and 2009.

5.3.2.1.2 Lower Klamath River from Trinity River Confluence to the Pacific Ocean

The Klamath River watershed extends over 15,600 square miles from southern Oregon to northern California, and ranges in elevation from over 9,500 feet above sea level near the headwaters to sea level at the Pacific Ocean (USFWS et al. 1999). The Klamath River watershed is generally divided into two or three subbasins. For the purpose of this study, the upper Klamath River basin extends over 60 miles from the headwaters to Iron Gate Dam (DOI and DFG 2012).

The lower Klamath River basin extends 190 miles from Iron Gate Dam to the Pacific Ocean. Four major tributaries flow into the lower Klamath River, including Shasta, Scott, Salmon, and Trinity rivers. The lower Klamath River flows 43.5 miles from the confluence with the Trinity River to the Pacific Ocean (USFWS et al. 1999). Downstream of the Trinity River confluence, the Klamath River flows through Humboldt and Del Norte counties and through the Hoopa Indian Reservation, Yurok Indian Reservation, and Resighini Indian Reservation within Humboldt and Del Norte counties (DOI and Department of Fish and Game [now known as Department of Fish and Wildlife] DFG 2012).

The Trinity River is the largest tributary to the Klamath River (DOI and DFG 2012). There are no dams located in the Klamath River watershed downstream of the confluence with the Trinity River. The western portion of the Klamath River watershed receives substantial rainfall during the winter months. Average precipitation in the western portion of the watershed ranges from 60 to 125 inches per year (DWR 2013a). Due to the heavy precipitation and the upstream water supply projects in the Klamath River, approximately 85 percent of the flows in the lower Klamath River occur due to runoff in the lower watershed during the winter months (DOI and DFG 2012).

The Klamath River estuary extends from approximately 5 miles upstream of the Pacific Ocean (DOI and DFG 2012). This area is generally under tidal effects and salt water can occur up to 4 miles from the coastline during high tides in summer and fall when Klamath River flows are low. Klamath River flows at Klamath within the Klamath River estuary are affected by tidal influence within the estuary, as presented on Figure 5.12 (DWR 2014d).

5.3.2.2 Central Valley Region

The Central Valley Region extends from above Shasta Lake to the Tehachapi Mountains, and includes the Sacramento Valley, San Joaquin Valley, Delta, and Suisun Marsh.

5.3.2.2.1 Sacramento Valley

Rivers in the Sacramento Valley that could be affected by changes in CVP and SWP operations include the following:

- Clear Creek from Whiskeytown Reservoirs to the confluence with the Sacramento River
- Sacramento River from Shasta Lake to the confluence with the San Joaquin River in the Delta
- Feather River from upstream of Oroville Reservoir to the confluence with the Sacramento River
- Yuba River from New Bullards Bar Reservoir to the confluence with the Feather River
- Bear River from Camp Far West Reservoir to the confluence with the Feather River

- American River from Folsom Lake to the confluence with the Sacramento River

Flows from smaller tributaries to the Sacramento River and the Cosumnes and Mokelumne rivers in the Sacramento Valley contribute substantial flows into the Sacramento River and affect CVP and SWP operations; however, flows in these rivers would not be affected by changes in CVP and SWP operations. Therefore, hydrologic conditions on these waterbodies are not described in this EIS.

The Sacramento River watershed encompasses an area over 15,360,000 acres in the northern portion of the Central Valley; extends from the foothills of the Coast Ranges and Klamath Mountains on the west; extends from the foothills of the Sierra Nevada and Cascade Range on the east; and extends through the Delta on the south (Reclamation 2013a).

Ground surface elevations in the northern portion of the Sacramento River watershed range from approximately 14,000 feet above mean sea level in the headwaters of the Sacramento River to approximately 1,070 feet at Shasta Lake (Reclamation 2013a). In the mountains surrounding the valley, annual average precipitation generally ranges between 60 and 70 inches up to 90 inches, with snow prevalent at higher elevations. The floor of the Sacramento Valley is relatively flat, with elevations ranging from approximately 60 to 300 feet above mean sea level. This area is characterized by hot dry summers and mild winters. Average precipitation ranges from 15 to 20 inches per year, falling mostly as rain.

The Sacramento River flows approximately 351 miles from the north near Mount Shasta to the confluence with the San Joaquin River at Collinsville in the western Delta (Reclamation 2013a). The Sacramento River receives contributing flows from numerous major and minor streams and rivers that drain the east and west sides of the basin. The Sacramento River also receives imported flows from the Trinity River watershed, as discussed above. The volume of flow increases as the river progresses southward, and is increased considerably by the contribution of flows from the Feather River and the American River.

Upper Sacramento River Watershed Hydrology

The portion of the watershed upstream of Keswick Dam includes the McCloud River, Pit River, Squaw Creek, headwaters of the Sacramento River, and Goose Lake basins. The Goose Lake basin is located within the Pit River watershed; however, water rarely spills from Goose Lake into the Pit River. The last recorded spill occurred in 1880 (Reclamation 2013a). Long-term average annual inflows into Shasta Lake are approximately 4.875 MAF between the mid-1940s and 2010.

The McCloud River watershed extends over approximately 402,000 acres (Reclamation 2013a). The McCloud River flows approximately 59 miles from the headwaters in Moosehead Creek located southeast of Mount Shasta, through McCloud Reservoir, and into Shasta Lake. McCloud Reservoir is operated primarily to generate hydroelectric power.

The Pit River watershed extends over approximately 3,008,000 acres along the north and south forks of the Pit River basins, and includes 21 named tributaries and numerous smaller tributaries (Reclamation 2013a). Pacific Gas and Electric Company operate several hydropower diversions and reservoirs within the Pit River watershed.

The Squaw Creek watershed extends over approximately 66,000 acres located to the east of Shasta Lake (Reclamation 2013a).

The Sacramento River extends approximately 40 miles from the headwaters to Shasta Lake downstream of the town of Delta (Reclamation 2013a). The basin extends into portions of Mount Shasta and the Trinity and Klamath mountains.

Hydrological conditions in these upper watersheds would not be affected by implementation of the alternatives considered in this EIS.

Whiskeytown Lake

Whiskeytown Lake is located within the Clear Creek watershed. The Clear Creek watershed is 238 square miles that extends from the Trinity Mountains to the confluence with the Sacramento River downstream of the City of Redding (DWR 1986 and Western Shasta Resource Conservation District [WSRCD] 2004). Hydrology in the watershed is divided into the upper 238-square mile watershed upstream of Whiskeytown Dam at River Mile 18.1, and the lower 49 square miles watershed downstream of the dam. Clear Creek flows approximately 17 miles from the Trinity Mountains into Whiskeytown Lake. Clear Creek continues for 18.1 miles downstream of Whiskeytown Lake into the Sacramento River downstream of the CVP Keswick Dam and south of the City of Redding.

Whiskeytown Dam, a CVP facility constructed by 1963, is the only dam on Clear Creek and is located approximately 16.5 miles downstream of the headwaters (Reclamation 1997). Whiskeytown Lake, which is formed by the dam, has a storage capacity of 0.241 MAF; and regulates runoff from Clear Creek and diversions from the Trinity River watershed, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Flows from Lewiston Reservoir in the Trinity River watershed are diverted to Whiskeytown Lake through the Clear Creek Tunnel. Currently, the Clear Creek Tunnel between Lewiston Reservoir and Whiskeytown Lake has a capacity of 3,200 cfs (Reclamation 2011b).

Water from Whiskeytown Lake is released to the Sacramento River through the Spring Creek Tunnel which conveys water to the Spring Creek Conduit, and then to Keswick Reservoir. Water from Whiskeytown Lake also is released into Clear Creek directly from Whiskeytown Lake; or during high flow conditions (e.g., flood flows), from a Glory Hole within Whiskeytown Lake through a conduit into Clear Creek. Most of the flows are released through the Spring Creek Tunnel and Powerplant to Keswick Reservoir. These flows into Keswick Reservoir provide cold water flows that reduce temperatures in the upper Sacramento River, especially during the fall months. Water also is discharged from Whiskeytown Lake to Clear Creek to provide for instream flows and water for users located in the CVP Clear Creek South Unit within, or adjacent to, the Clear Creek watershed.

The capacity of the outlet from Whiskeytown Dam that conveys water to Clear Creek is 1,240 cfs when the water elevation in Whiskeytown Lake is at 1,220.5 feet. To provide flows into Clear Creek in excess of 1,240 cfs, the Whiskeytown Reservoir water elevations need to be raised higher than 1,220 feet to allow water to flow through the Glory Hole spillway, as described below (CALFED 2004; Reclamation 2009a).

Historical water storage volume and water storage elevations related to Whiskeytown Lake for Water Years 2001 through 2012 are presented on Figures 5.13 and 5.14 (DWR 2013j, 2013k, 2013l). Whiskeytown Lake storage is relatively constant due to agreements between Reclamation and the National Park Service to maintain certain winter and summer lake elevations for recreation. Whiskeytown Lake outflow variations were greater prior to 2006 when Trinity River restoration flows were implemented which reduced the amount of water available for conveyance to CVP water users. In addition, hydrologic conditions in the years following 2006 were drier than the water years between 2001 and 2006.

Implementation of 2009 National Marine Fisheries Service Biological Opinion

In accordance with the 2009 National Marine Fisheries Service (NMFS) Biological Opinion (BO) Reasonable and Prudent Alternative (RPA), Reclamation is required to manage Whiskeytown Lake releases to meet daily water temperatures in Clear Creek at Igo, as discussed in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

Clear Creek

Substantial modifications of the Clear Creek stream channel occurred due to placer mining activities from the mid-1800s through the early 1900s. In addition, several irrigation diversions were constructed along the lower Clear Creek reach during the late 1800s and early 1900s. One of the largest diversions was the 15-foot-high, 200-foot-wide McCormick-Saeltzer Dam constructed in 1903 at River Mile 6.5 (approximately 12 miles downstream of Whiskeytown Dam). The downstream of Whiskeytown Dam was constructed upstream of a steep gorge along Clear Creek and removed in 2001. More recent channel modifications occurred in the lower Clear Creek due to gravel extraction activities from the 1950s to 1970s.

Construction of Whiskeytown Dam modified the hydraulics, gravel loading, and sediment transport in the lower Clear Creek. The overall average annual flow in the lower Clear Creek was reduced by 87 percent following construction of the dam (DWR 1984, 1986). The dam also reduced gravel loading into the lower Clear Creek and the frequency of high flow events that move the gravel and remove fine sediments from riffles. This change in hydrology and loss of gravel loading adversely affected the salmonid habitat downstream of Whiskeytown Dam, including compaction of riffles with sand. Recently, minimum flow releases from Whiskeytown Lake into Clear Creek occur in accordance with Federal and state requirements (DWR 1984), as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Historical flow data has been collected since 1941 at the Igo Gage at River Mile 10.9 (approximately 7.2 miles downstream of Whiskeytown Dam) (DWR 1986 and WSRCD 2004).

Since the early 1980s, numerous studies were conducted to evaluate methods to rehabilitate and/or restore habitat along lower Clear Creek. In the 1990s, additional studies were conducted following the adoption of the 1992 Central Valley Project Improvement Act (CVPIA). In 1998, a watershed management plan prepared by the WSRCD evaluated methods to achieve healthy fish populations, diverse biological habitats, recreational opportunities, clean and safe conditions for visitors, and protection of property rights developed by the Lower Clear Creek Coordinated Resource Management and Planning Group of local landowners, stakeholders, and agencies (WSRCD 1998). The recommendations included the following:

- Removal of the McCormick-Saeltzer Dam.
- Inject gravel downstream of Whiskeytown Dam and reconstruct gravel channels below McCormick-Saeltzer Dam to reduce stranding.
- Modify water release patterns from Whiskeytown Dam.
- Reduce exotic vegetation along Clear Creek.
- Reduce sands in Clear Creek through erosion control programs in the lower watershed.

This and other studies led to the formation of the Lower Clear Creek Floodway Rehabilitation Project that was implemented under CVPIA (CALFED 2004, WSRCD 2002). Initial actions under this program included gravel augmentation initiated in 1996, increase in Whiskeytown Dam releases initiated in 2001, removal of the McCormick-Saeltzer Dam in 2001, reconstruction and revegetation of the floodway, and reduction of watershed erosion.

Following the removal of the McCormick-Saeltzer Dam, extensive geomorphological studies have been conducted to recommend approaches for restoration of the channel and adjacent floodplain downstream of the McCormick-Saeltzer Dam site. Based upon hydrological data collected at the Igo gage, one of the studies discussed that peak flow events in lower Clear Creek following completion of Whiskeytown Dam occur about once every 3 years; although, the pre-dam frequency was approximately once every 2 years. Clear Creek flows at Igo between 2000 and 2012 are presented on Figure 5.15. During this period, high flow events occurred in April and May of 2003 and December 2005 (DWR 2013s). The high flow events: 1) naturally moved gravel placed downstream of Whiskeytown Dam and along Clear Creek; 2) developed and maintained Clear Creek channel and adjacent floodplain habitat for spring-run and fall-run Chinook Salmon and steelhead; 3) created and maintained deep pools in the channel to support spawning of spring-run Chinook Salmon and steelhead, and create appropriate salmonid habitat within and along Clear Creek; and 4) established and maintained nesting and foraging habitat for neotropical migrant birds, native resident birds, and amphibians.

Following removal of McCormick-Saeltzer Dam, the Clear Creek channel and adjacent floodplain geomorphology changed. The Clear Creek channel capacity is generally about 3,000 cfs. The 2004 studies indicated that flows in excess of 3,000 cfs are required to overflow from the Clear Creek channel onto the adjacent floodplains. The study discussed that during pre- and post-Whiskeytown periods, the 5-year flood event at Igo decreased from 9,000 to 3,400 cfs and the 2.5-year flood event decreased from 6,200 to 1,800 cfs. Therefore, the study discussed that flows in excess of 5,000 cfs did not occur more frequently than 3 times in 10 years (CALFED 2004).

Implementation of 2009 National Marine Fisheries Service Biological Opinion

The 2009 NMFS BO RPA requires Reclamation to release spring attraction flows for adult spring-run Chinook Salmon and channel maintenance flows in Clear Creek and to continue gravel augmentation programs initiated under CVPIA. The spring attraction flows are to be released from Whiskeytown Lake into Clear Creek in at least two pulse flows of at least 600 cfs in May and June.

The channel maintenance flows are to be released at a minimum flow of 3,250 cfs, which is excess of the 1,240 cfs capacity of the Whiskeytown Dam outlet to Clear Creek. Therefore, to provide channel maintenance flows, the Whiskeytown Lake water elevation must be increased to provide flow of water over the Glory Hole inlet. The Glory Hole is designed to operate with the higher water elevations during flood events. However, during non-flood periods, raising the water elevations and operating the Glory Hole inlet can cause safety concerns for recreationists along the Whiskeytown Lake shoreline.

Shasta Lake and Keswick Reservoir

The CVP Shasta and Keswick dams are located at approximately River Miles 308 and 299, respectively, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Shasta Lake, a CVP facility on the Sacramento River formed by Shasta Dam, is located near Redding. Construction on the 4.552-MAF reservoir was initiated in 1945. Water flows from Shasta Lake along the Sacramento River into the 0.0238 MAF Keswick Reservoir, a CVP facility, which operates as an afterbay, or regulating reservoir, for Shasta Lake hydropower operations. Construction on Keswick Reservoir was initiated in 1950. A temperature control device at Shasta Dam was constructed between 1996 and 1998 to provide cold water without power bypass to the Sacramento River downstream of Keswick Reservoir.

Historical water storage volumes and water storage elevations for Shasta Lake for Water Years 2001 through 2012 are presented on Figures 5.16 and 5.17 (DWR 2013m, 2013n, 2013o). Shasta Lake storage varies in accordance with upstream hydrology and downstream water demands and instream flow requirements. For example, storage declined during the drier years in 2008 and 2009.

Keswick Reservoir receives water from Shasta Lake and Whiskeytown Lake, as described above; and from Spring Creek. Flows on Spring Creek are partially regulated by the CVP Spring Creek Debris Dam (Reclamation 2014d, 2014e). The debris dam minimizes the potential for debris entering the Spring Creek Powerplant, which is located at the discharge end of the Spring Creek Conduit immediately upstream of Keswick Reservoir. The debris dam also controls contaminated runoff from old mine tailings on upper Spring Creek, which reduces water quality effects on aquatic resources.

The Keswick Reservoir water storage volume is more consistent throughout the year because this reservoir is used to regulate flow releases to the powerplant and other downstream uses and not to provide long-term water storage, as shown on Figures 5.18 and 5.19 (DWR 2013p, 2013q, 2013r).

Implementation of 2009 National Marine Fisheries Service Biological Opinion

The 2009 NMFS BO RPA requires Reclamation meet specific temperature requirements at Balls Ferry, Jelly's Ferry, and Bend Bridge based upon minimum end-of-September storage in Shasta Lake for a specified frequency over 10 years, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Reclamation also is required to evaluate a monthly Keswick release schedule to address releases in fall and early winter within the range of 7,000 and 3,250 cfs; to be adjusted in consideration of the water year type, Shasta Lake storage, and the need to provide flow releases under the 2009 NMFS BO RPA and to meet other Federal and state water quality requirements in the Delta.

Sacramento River from Keswick Dam to the Delta

Water released from Shasta Dam travels approximately 245 miles over three to four days to the northern Delta boundary near Freeport (Reclamation 2013a). The upper reach of the Sacramento River flows for approximately 60 miles from Keswick Dam to Red Bluff; and the middle reach of the Sacramento River flows approximately 160 miles from Red Bluff to the confluence with the Feather River. The lower reach of the Sacramento River flows for approximately 20 river miles between the confluence with the Feather River and Freeport, immediately downstream of the confluence with the American River.

Moderately high releases (greater than 10,000 cfs) are typically sustained during the major irrigation season of June through September. Flows are released in the fall months from CVP and SWP reservoirs to meet water temperature criteria for winter-run Chinook Salmon spawning and incubation, to provide suitable habitat for spring-run and early returning fall-run Chinook Salmon, provide water supplies to rice farms for rice stubble decomposition, and to provide water for wildlife refuges.

Sacramento River from Keswick Dam to Red Bluff

Reclamation operates the Shasta, Sacramento River, and Trinity River divisions of the CVP to meet (to the extent possible) the provisions of SWRCB Order 90-05. An April 5, 1960 Memorandum of Agreement between Reclamation and

California Department of Fish and Wildlife (CDFW) originally established flow objectives in the Sacramento River for the protection and preservation of fish and wildlife resources. The agreement provided for minimum releases into the natural channel of the Sacramento River at Keswick Dam for normal and critically dry years, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Since October 1981, Keswick Dam has operated based on a minimum release of 3,250 cfs for normal years from September 1 through the end of February, in accordance with an agreement between Reclamation and CDFW. This release schedule was included in SWRCB Order 90-05, which maintains a minimum release of 3,250 cfs at Keswick Dam and Red Bluff Pumping Plant from September through the end of February in all water years except critically dry years.

Generally, releases from Keswick Reservoir are implemented to comply with the minimum fishery requirement by October 15 each year and to minimize changes in Keswick releases between October 15 and December 31. Releases may be increased during this period to meet downstream needs such as higher outflows in the Delta to meet water quality requirements, or to meet flood control requirements. Releases from Keswick Dam may be reduced when downstream tributary inflows increase to a level that will meet flow needs. Reclamation attempts to establish a base flow that minimizes release fluctuations to reduce impacts to fisheries and bank erosion from October through December.

The Sacramento River between Keswick Dam and the City of Red Bluff flows through the northern foothills of the Sacramento Valley. Flows are influenced by outflow from Keswick Reservoir and inflows from Clear Creek (described above); and Cow Creek, Bear Creek, Cottonwood Creek, Battle Creek, and Paynes Creek which provide 15 to 20 percent of the flows in this reach as measured at Bend Bridge. There are several moderate major diversions along the Sacramento River upstream of Red Bluff, including the CVP Wintu Pumping Plant to provide water for the Bella Vista Water District, and the Anderson-Cottonwood Irrigation District Diversion. Both of these diversions near Redding provide water to agricultural, municipal, and industrial water users (Reclamation 1997). No major storage or diversion structures have been constructed in the tributary watersheds in this reach of the Sacramento River, although several small diversions for irrigation, domestic use, and hydroelectric power generation are present (Reclamation 1997). Flow patterns on one major tributary in this reach, Battle Creek, are undergoing changes as the Battle Creek Salmon and Steelhead Restoration Project is implemented to restore ecological processes along 42 miles of Battle Creek and 6 miles of tributaries while minimizing reductions to hydroelectric power generation through the decommissioning of five powerplants.

Sacramento River from Red Bluff to the Delta

Between Red Bluff and Colusa, the Sacramento River is a meandering stream, migrating through alluvial deposits between widely spaced levees. From Colusa to the northern boundary of the Delta near Freeport, flows increase due to the addition of the Feather and American rivers flows.

Recent mean daily flows in the Sacramento River at Bend Bridge (near Red Bluff), Vina Bridge (near Tehama), Hamilton City, Wilkins Slough (upstream of the Feather River confluence), Verona (downstream of the Feather River confluence), and Freeport (downstream of the American River Confluence and near the northern boundary of the Delta), are presented on Figures 5.20 through 5.25 (DWR 2013u, 2013v, 2013w, 2013x, 2103y, 2013z). Flows in the Sacramento River generally peak during winter and spring storm events. Upstream of Hamilton City, sharp increases in flow occur during rainfall events, such as events in February 2004, December 2005/January 2006, and January 2010. Downstream of Hamilton City, the high flow events occur over a longer period of time as water flows into the river from the tributaries.

Historically, Reclamation has maintained a minimum flow of 5,000 cfs at Chico Landing to support navigation in accordance with references to Sacramento River Division operations in the River and Harbors Act of 1935 and the Rivers and Harbors Act of 1937. Currently, there is no commercial traffic between Sacramento and Chico Landing, and USACE has not dredged this reach to preserve channel depths since 1972. However, long-time water users diverting from the river have set their pump intakes just below this level. Therefore, the CVP is operated to meet the navigation flow requirement of 5,000 cfs at the Wilkins Slough gauging station when diversions are occurring downstream, under all but the most critical water supply conditions.

Major diversions in this reach of the Sacramento River include the CVP Red Bluff Pumping Plant, Glenn-Colusa Irrigation District (GCID) intake, and individual diversions for the CVP Sacramento River Settlement Contractors. The Red Bluff Pumping Plant was completed in August 2012 to improve fish passage conditions on the Sacramento River by removing the Red Bluff Diversion Dam, and to continue to divert water from the Sacramento River into the Tehama-Colusa and Corning canals. The GCID Main Pump Station is located near Hamilton City to divert water into the GCID Canal that conveys water to over 130,000 acres, including the USFWS Sacramento National Wildlife Refuge; and terminates at the Colusa Basin Drain near Williams. In 2001, the GCID Fish Screen was completed in addition to several canal improvements to allow year-round water deliveries.

Major streams entering the Sacramento River between Red Bluff and the Feather River include Antelope, Elder, Mill, Thomes, Deer, Stony, Big Chico, and Butte creeks. No major storage or diversion structures have been constructed on Antelope, Elder, Mill, and Thomes creeks, although several small seasonal diversions for irrigation, domestic use, and hydroelectric power generation are present (Reclamation 1997). Moderate non-CVP and non-SWP diversion dams are located on Deer, Big Chico, and Butte creeks.

Stony Creek flows are controlled by East Park Dam, Stony Gorge Dam, and Black Butte Dam (Reclamation 1997). East Park and Stony Gorge reservoirs store surplus water for irrigation deliveries and are operated by Reclamation as part of the Orland Project which is independent of the CVP. Black Butte Dam is operated by the USACE for flood control and irrigation supply. Black Butte Dam operations are coordinated with the CVP. The GCID canal, which crosses Stony Creek downstream of Black Butte Dam, includes a seasonal gravel dam constructed across the creek on the downstream side of the canal.

The Sacramento River between Red Bluff and Chico Landing, the Sacramento River Flood Control Project has provided bank protection and incidental channel modification since 1958 (DWR 2013t). Between Chico Landing and Colusa, the flood management facilities consist of levees and overflow areas. Black Butte Reservoir regulates Stony Creek flood flows, which enter the Sacramento River downstream of Hamilton City. Right bank levees from Ord Ferry through Colusa prevent Sacramento River flood water from entering the Colusa Basin, except when flows exceed 300,000 cfs near Ord Ferry (DWR 2013t). Three flood relief weirs along the right bank, downstream of Chico Landing, allow flood flows to spill into the Butte Basin Overflow Area. The left bank levee begins midway between Ord Ferry and Butte City and extends south through Verona, and includes the Moulton and Colusa weirs that allow flood flows to spill into the Butte Basin Overflow Area. The natural Sutter Basin overflow (Sutter Bypass) to the east of the Sacramento River and downstream of the Sutter Buttes was included in the Sacramento River Flood Control Project. The Sutter Bypass conveys floodwaters from the Butte Basin Overflow Area, Butte Creek, Wadsworth Canal, and Reclamation Districts 1660 and 1500 drainage plants, state drainage plants, and Tisdale Weir to the confluence of the Sacramento and Feather rivers. Downstream of Colusa, Reclamation Districts 70, 108, and 787 pump flood waters from adjacent closed basin lands into the river.

The Colusa Basin Drain provides drainage for a large portion of the irrigated lands on the western side of the Sacramento Valley in Glenn, Colusa, and Yolo counties; and supplies irrigation water to lands in this area. Water from the drain is discharged to the Sacramento River through the Knights Landing Outfall, a gravity flow structure and prevents the Sacramento River from flowing into the Colusa Basin.

Implementation of 2009 National Marine Fisheries Service Biological Opinion

The 2009 NMFS BO RPA requires Reclamation to evaluate approaches to provide minimum flows at Wilkins Slough of less than 5,000 cfs.

Yolo Bypass

Flows from the Sacramento River, Feather River, Sutter Bypass, and Natomas Cross Canal join upstream of Verona on the Sacramento River. When the Sacramento River flows exceed 62,000 cfs, flows spill over the Fremont Weir into the Yolo Bypass. The Yolo Basin was a natural overflow area located to the west of the Sacramento River. The Sacramento River Flood Control Project modified the basin by confining the extent of overflow through a leveed bypass and allowing flood flows to enter the Yolo Bypass from the Sacramento River over the Fremont and Sacramento weirs. The Yolo Bypass conveys floodwaters around the Sacramento metropolitan area and reconnects to the Sacramento River at Rio Vista (DWR 2013t). Tributaries within the Yolo Bypass include the Cache Creek Detention Basin, Willow Slough, and Putah Creek.

Flows also enter the Yolo Bypass from the Colusa Basin, including from the Colusa Basin Drain through the Knights Landing Ridge Cut. In 2011 and 2012, construction at the outfall gates required water from the Colusa Basin Drain to be diverted into the Yolo Bypass. These events temporarily resulted in a fall pulse flow in the Yolo Bypass that increased the volume of flow by more than 300 to 900 percent (Frantzich 2014).

Historical mean daily flows into the Yolo Bypass at Fremont Weir are presented on Figure 5.26 (DWR 2013aa). Between 2002 and 2012, flows have entered the Yolo Bypass at Fremont Weir during 13 periods, including:

- January 2002 – spill continued for 7 days with flows up to 30,000 cfs
- January 2003 – spill continued for 6 days with flows up to 22,000 cfs
- May 2003 – spill continued for 1 day with flows up to 100 cfs
- January 2004 – spill continued for 3 days with flows up to 3,000 cfs
- February 2004 – spill continued for 20 days with flows up to 79,000 cfs
- May 2005 – spill continued for 4 days with flows up to 35,000 cfs
- January/February 2006 (2 events) – spill continued for a total of 37 days with flows up to 205,000 cfs
- March/April/May 2006 – spill continued for 65 days with flows up to 96,000 cfs
- January 2010 – spill continued for 4 days with flows up to 5,000 cfs
- December 2010 – spill continued for 4 days with flows up to 9,000 cfs
- March/April 2011 – spill continued for 24 days with flows up to 85,000 cfs
- December 2012 – spill continued for 5 days with flows up to 26,000 cfs

Implementation of 2009 National Marine Fisheries Service Biological Opinion

The 2009 NMFS BO RPA requires Reclamation to evaluate approaches to increase acreage of seasonal floodplain rearing habitat with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years. The initial performance measure was defined in the RPA as 17,000 to 20,000 acres of floodplain rearing habitat, such as in the Yolo Bypass, excluding tidally influenced areas. Reclamation also is required to develop enhancement plans for Lower Putah Creek, Liberty Island/Lower Cache Slough, and Lower Yolo Bypass. The plans also are required to develop improvements to Fremont Weir and Lisbon Weir to eliminate migration barriers and stranding potential.

Feather River Watershed

The Feather River, with a drainage area of 3,607 square miles on the east side of the Sacramento Valley, is the largest tributary to the Sacramento River below Shasta Dam (Reclamation 1997, DWR 2007a). The Feather River enters the Sacramento River from the east at Verona. The total flow is provided by the Feather River and tributaries, which include the Yuba and Bear rivers.

Upper Feather River, Lake Oroville, and the Thermalito Complex

The upper Feather River includes numerous reservoirs and powerplant diversions, including the 1,308-TAF Lake Almanor owned by Pacific Gas & Electric Company; and the SWP Upper Feather River Lakes, including Antelope Lake, Lake Davis, and Frenchman Lake. The major SWP facility on the Feather River is the 3,500-TAF Lake Oroville, which is formed by the Oroville Dam located at the confluence of the North, Middle, and South forks of the Feather River. Lake Oroville stores winter and spring runoff, which is released into the Feather River to meet SWP water demands; provide pumpback capability to allow for on-peak electrical generation; provide 750 TAF of flood control storage, recreation, and freshwater releases to control salinity intrusion in the Delta; and for fish and wildlife protection, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Historical water storage volumes and water storage elevations for Lake Oroville for Water Years 2001 through 2012 are presented on Figures 5.27 and 5.28 (DWR 2013 ab, 2013ac).

A maximum of 17,400 cfs can be released from Lake Oroville through the Edward Hyatt Powerplant, and the Thermalito Power Canal into the Thermalito Diversion Pool. Water continues through the Thermalito Diversion Pool into the Feather River Fish Hatchery and the 11,768-acre-foot Thermalito Forebay formed by the Thermalito Diversion Dam. Water is released from the Thermalito Forebay through the Thermalito Powerplant into the Thermalito Afterbay and the low flow channel of the Feather River.

Historical water storage volumes and water storage elevations for Thermalito Afterbay for Water Years 2001 through 2012 are presented on Figures 5.29 and 5.30 (DWR 2013ab, 2013ac, 2013ad). Water from the afterbay flows into the Feather River. Historical mean daily flows in the Feather River are presented on Figure 5.31 (DWR 2013af). Local agricultural districts divert water directly from the afterbay.

Maximum allowable ramp-down release requirements in the low flow channel of the Feather River are required to prevent rapid reductions in water levels that could potentially cause redd dewatering and stranding of juvenile salmonids and other aquatic organisms. Water releases from Lake Oroville are also affected by temperature criteria, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

Major diversions on the Feather River downstream of the Thermalito Complex include diversions into the Western Canal, Richvale Canal, the Pacific Gas and Electric Company Lateral, and the Sutter-Butte Canal. Some of the water diverted into these canals is exported to the Butte Creek watershed. Riparian water users along the Feather River also divert water for agricultural and municipal uses within the Feather River and Butte Creek watersheds (Reclamation 1997; DWR 2007).

Lower Yuba River

The Yuba River watershed extends over 1,339 square miles in the Sierra Nevada. The Yuba River is a major tributary to the Feather River, and historically has contributed over 40 percent of the lower Feather River flows (Reclamation 1997). The major reservoir in the watershed is the 970-TAF New Bullards Bar Reservoir that is owned and operated by the Yuba County Water Agency to provide flood control, water storage, and hydroelectric generation (Yuba County Water Agency [YCWA] 2012). The Yuba River watershed also includes over 400 TAF additional storage in reservoirs located upstream of New Bullards Bar Reservoir.

Water is diverted from New Bullards Bar Reservoir through the Colgate Tunnel and Powerhouse and discharged into the Yuba River. The 70-TAF Englebright Lake is formed by the Harry L. Englebright Dam downstream of New Bullards Dam. Englebright Lake was constructed by the California Debris Commission to trap and store sediment from historical hydraulic mining sites in the upper watershed and provide recreation and hydroelectric generation opportunities (USACE 2013). Following decommissioning of the California Debris Commission in 1986, administration of Englebright Dam and Lake was assumed by the USACE (USACE 2012, 2013, 2014). Major water diversions from the Yuba River occur 12.5 miles downstream of Englebright Dam at Daguerre Point Dam. Water transfers have occurred between Yuba County Water Agency and other water agencies, including CVP and SWP water users, since 2008 under the Lower Yuba River Accord, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations (Lower Yuba River Accord, River Management Team [LYRARMT] 2013).

American River from Folsom Lake to Sacramento River

The American River watershed extends over 1,895 square miles and contributes approximately 15 percent of the flow in the lower Sacramento River.

Folsom Lake and Lake Natoma

Folsom Lake and Lake Natoma on the American River are located within portions of the American River watershed that could be affected by changes in CVP and/or SWP operations. Folsom Lake is a CVP facility formed by Folsom Dam 7 miles upstream of the CVP Nimbus Dam (Reclamation et al. 2006). Folsom, Lake is the largest reservoir in the American River watershed, and has a capacity of 967 TAF. Numerous smaller reservoirs in the upper basin provide hydroelectric generation and water supply and are not owned or operated by Reclamation or DWR. The total upstream reservoir storage above Folsom Lake is approximately 820 TAF. Ninety percent of this upstream storage is provided by five reservoirs: French Meadows (136 TAF); Hell Hole (208 TAF); Loon Lake (76 TAF); Union Valley (271 TAF); and Ice House (46 TAF).

Nimbus Dam creates Lake Natoma, a forebay built to re-regulate flows of the American River and to direct water into the CVP Folsom South Canal. Releases from Nimbus Dam to the American River pass through the Nimbus Powerplant when releases are less than 5,000 cfs or the spillway gates for higher flows. The American River flows 23 miles between Nimbus Dam and the confluence with the Sacramento River. Historical water storage volumes and water storage elevations for Folsom Lake and Lake Natoma for Water Years 2001 through 2012 are presented on Figures 5.32 through 5.35) (DWR 2013ag, 2013ah, 2013ai, 2013aj). Median daily flows in American River downstream of Nimbus Dam are presented in Figure 5.36 (DWR 2013ak).

Water is diverted to municipal and industrial water users, including water rights holders, upstream of Folsom Dam, from the Folsom South Canal, and from the American River downstream of Folsom Dam. During extreme critical dry years, water elevations in Folsom Lake can be too low for adequate operation of diversion facilities; and Reclamation has provided temporary barges with intake and conveyance facilities to divert water from the lake to the adjacent water users.

Lower American River Flows

Flow patterns in the lower American River (downstream of Lake Natoma) are influenced by operations of the CVP both within the American River watershed and within the entire Sacramento River watershed. Flows can be affected by local operations such as flood management requirements at Folsom Lake and Lake Natoma, federal and state flow requirements, temperature requirements and water uses in the American River watershed. Flows can also be affected by delta operations including outflow and salinity requirements as well as exports within and south of the delta. Recent mean daily flows in the American River are presented on Figure 5.36 (DWR 2013ak).

Lower American River Flood Management

Flood management requirements and regulating criteria for October 1 through May 31 each year were specified in 1987 by the USACE to manage flooding in the Sacramento area, as practicable; provide maximum amount of water conservation storage in Folsom without impairing the flood control; and provide maximum amount of power practicable and be consistent with required flood control operations and the conservation functions of the reservoir. Following significant flood events in February 1986 and January 1997, the lower American River flooding issues were analyzed; and revised flood operations criteria were developed by the Sacramento Area Flood Control Agency (SAFCA), as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. The SAFCA release criteria are generally equivalent to the USACE plan, except the SAFCA diagram may prescribe flood releases earlier than the USACE plan. The SAFCA diagram also relies on Folsom Dam outlet capacity to make the earlier flood releases. The outlet capacity at Folsom Dam is currently limited to 32,000 cfs based on lake elevation. Since 1996, Reclamation has operated according to modified flood control criteria, which reserve 400 to 670 TAF of flood control space in Folsom Reservoir in combination with empty reservoir space in Hell Hole, Union Valley, and French Meadows to be treated as if it were available in Folsom Reservoir.

Reclamation and USACE constructed an auxiliary spillway under the Joint Federal Project, at Folsom Dam in accordance with the recommendations of the Water Control Manual Update (Reoperation Study). The USACE is also implementing increased system capabilities provided by the authorized features of the Common Features Project to strengthen the American River levees to convey up to 160,000 cfs and completion of the authorized Folsom Dam Mini-Raise Project.

Lower American River Minimum Flow and Temperature Requirements

The minimum allowable flows in the lower American River are defined by SWRCB Water Right Decision 893 (D-893), which states that, in the interest of fish conservation, releases should not ordinarily fall below 250 cfs between January 1 and September 15 or below 500 cfs at other times. D-893 minimum flows are rarely the controlling objective of CVP operations at Nimbus Dam. Nimbus Dam releases are nearly always controlled during significant portions of a water year by either flood control requirements or are coordinated with other CVP and SWP releases to meet CVP water supply and Delta operations objectives. Power regulation and management needs occasionally control Nimbus Dam releases. Nimbus Dam releases generally exceed the D-893 minimum flows in all but the driest of conditions.

Dedication of water in accordance with Section 3406(b)(2) of CVPIA on the American River provides instream flows below Nimbus Dam greater than those that would have occurred under pre-CVPIA conditions, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Instream flow objectives from October through May generally aim to provide suitable habitat for salmon and steelhead spawning, incubation, and rearing, while considering impacts to other CVP and SWP uses. Instream flow objectives for June to September endeavor to provide suitable flows and water temperatures for juvenile steelhead rearing, while balancing the effects on temperature operations into October and November to help support fall-run Chinook Salmon spawning.

In July 2006, Reclamation, the Sacramento Area Water Forum and other stakeholders agreed to a flow and temperature regime (known as the Lower American River Flow Management Standard [FMS]) to improve conditions for fish in the lower American River, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Minimum flow requirements during October, November, and December are primarily intended to address fall-run Chinook Salmon spawning, and flow requirements during January and February address fall-run Chinook Salmon egg incubation and steelhead spawning. From March through May, minimum flow requirements are primarily intended to facilitate steelhead spawning and egg incubation, as well as juvenile rearing and downstream movement of fall-run Chinook Salmon and steelhead. The June through September flows are designed to address over-summer rearing by juvenile steelhead, although this period partially overlaps with adult fall-run Chinook Salmon immigration.

Water temperature control operations in the lower American River are affected by many factors and operational tradeoffs. These include available cold water resources, Nimbus release schedules, annual hydrology, Folsom power penstock shutter management flexibility, Folsom Dam Urban Water Supply Temperature Control Device (TCD) management, and Nimbus Hatchery considerations, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Meeting both the summer steelhead and fall salmon temperature objectives without negatively impacting other CVP project purposes requires reserving water in Folsom Lake for use in the fall to provide suitable fall-run Chinook Salmon spawning temperatures. In most years, the volume of cold water is not sufficient to support strict compliance with the summer water temperature target of 65°F at the downstream end of the compliance reach at the Watt Avenue Bridge; while at the same time reserving adequate water for fall releases to protect fall-run Chinook Salmon, or in some cases, continuing to meet steelhead over-summer rearing objectives later in the summer. The Folsom Water Supply Intake TCD has provided additional flexibility to conserve cold water for later use.

American River Flows to Meet Delta Salinity Requirements

Folsom Reservoir also is operated by Reclamation to release water to meet Delta salinity and flow objectives established to improve fisheries conditions. Weather conditions combined with tidal action and local accretions from runoff and return flows can quickly affect Delta salinity conditions, and require increases in spring Delta inflow to maintain salinity standards, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. In accordance with Federal and state regulatory requirements, the CVP and SWP are frequently required to release water from upstream reservoirs to maintain Delta water quality. Folsom Lake is located closer to the Delta than Lake Oroville and Shasta Lake; therefore, the water generally is first released from Folsom Lake. Water released from Lake Oroville and Shasta Lake generally reaches the Delta in approximately three and four days, respectively. As water from the other reservoirs arrives in the Delta, Folsom Reservoir releases can be reduced.

Implementation of 2009 National Marine Fisheries Service Biological Opinion

The 2009 NMFS BO RPA requires Reclamation to implement the FMS; minimize flow fluctuation effects in the lower American River between January and May; and meet specific temperature requirements in the lower American River, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations, through operational modifications of temperature control shutters on Folsom Dam, and installation of structural improvements (TCDs or the functional equivalent) on several intakes in Folsom Lake and Lake Natoma.

5.3.2.2.2 San Joaquin Valley

The San Joaquin Valley is divided into two drainage major drainage basins. The northern drainage basin extends from the San Joaquin River along the southern boundary of the Delta and along the adjacent lands to the San Joaquin River from the northern drainage of the San Joaquin River in Madera County to the southern drainage in Fresno County (DWR 2013a). The northern drainage basin includes the San Joaquin River; five major tributaries that flow from westward from the Sierra Nevada, including Fresno, Chowchilla, Tuolumne, Merced, Stanislaus, and Calaveras rivers; and three major creeks that flow eastward from the Coast Range, including Del Puerto, Orestimba, and Panoche Creek. All flows in the San Joaquin River flow westward to the Delta.

The southern drainage basin (also known as the Tulare Lake Basin) extends into the southern San Joaquin Valley between the Sierra Nevada on the east, Tehachapi Mountains on the south, and the Coast Rage on the west (DWR 2013a). The southern basin includes four major tributaries, including Kings, Kaweah, Tule, and Kern rivers, which drain towards three ancient lakes on the valley floor, including the Tulare, Buena Vista, and Goose lakes. Flows into these lakes have declined as water supply projects and agricultural development has occurred. The northern and southern drainage basins are generally hydrologically separated by a low, broad ridge that extends across the San Joaquin Valley between the San Joaquin and Kings rivers. However, in flood years, water flows from the Kings River through the James Bypass and Fresno Slough into the San Joaquin River near Mendota; therefore, the basins become hydrologically connected.

Flows from Fresno, Chowchilla, Tuolumne, Merced, Calaveras, Kings, Kaweah, Tule, and Kern rivers contribute substantial flows into the San Joaquin Valley and affect operations of CVP and SWP water users and operations. However, the operations of reservoirs on these rivers are not modified within the alternatives evaluated in this EIS. Therefore, these rivers are not discussed in this chapter. This chapter will focus on the flows in the San Joaquin and Stanislaus rivers that are affected by changes in CVP and SWP operations considered in the alternatives evaluated in this EIS.

San Joaquin River

The San Joaquin River flows 100 miles from Friant Dam to the Delta. Flows in the upper San Joaquin River are regulated by the CVP Friant Dam which forms Millerton Lake. Flows downstream of Friant Dam are influenced by flows from tributary rivers and streams, as described below; including CVP operations of New Melones Reservoir on the Stanislaus River. Flows on the San Joaquin River have recently changed since the expiration of the Vernalis Adaptive Management Plan in 2012.

Millerton Lake

Operations of Millerton Lake and the CVP Friant Division will not be modified by changes in CVP and SWP operations under the alternatives considered in this EIS. Therefore, Millerton Lake and Friant Division are not analyzed in this EIS.

The following information is presented to provide a general understanding of Millerton Lake and Friant Division operations as part of the CVP.

Friant Dam is located on the San Joaquin River, 25 miles northeast of Fresno where the San Joaquin River exits the Sierra foothills and enters the valley. The drainage basin is 1,676 square miles. Millerton Lake, formed by Friant Dam, has a capacity of 520 TAF. Several reservoirs in the upper portion of the San Joaquin River watershed, including Mammoth Pool and Shaver Lake, affect the inflow to Millerton Lake (Reclamation and DWR 2011).

Millerton Lake provides flood control capacity on the San Joaquin River, provides downstream releases to meet senior water rights requirements above Mendota Pool, and provides conservation storage as well as diversion into Madera and Friant-Kern Canals. Flood control storage space in Millerton Lake is based on a complex formula, which considers storage in upstream reservoirs, forecasted snowmelt, and time of year. Flood management releases occur approximately once every 3 years and are managed based on downstream channel design capacity to the extent possible.

San Joaquin River from Friant Dam to Mendota Pool

Historically, in the 40-mile reach between Friant Dam and the Gravelly Ford, flow is influenced by releases from Friant Dam, with minor contributions from agricultural and urban return flows. Gravelly Ford, located downstream of Friant Dam, is a sandy and gravelly section of the San Joaquin River that is subject to high losses of river flow. The 17-mile reach of the San Joaquin River between Gravelly Ford and the Mendota Pool historically has been generally dry since construction of Friant Dam except when flood control flows are released from Millerton Lake. Reclamation releases water from Millerton Lake to comply with Holding Contracts between Reclamation and riparian water right holders downstream of Friant Dam that will provide for at least 5 cfs past each of the Holding Contract diversion locations that extend to Gravelly Ford (San Joaquin River Restoration Program [SJRRP] 2011a). The typical release from Millerton Lake to provide water to water rights holders is approximately 125 cfs (SWRCB 2012).

Two major flood control facilities, the Chowchilla and Eastside bypasses, intercept flows of the San Joaquin, Fresno, and Chowchilla rivers and smaller San Joaquin River tributaries to provide flood protection for downstream agricultural lands. During flood control operations, up to 6,500 cfs of excess flows in the San Joaquin River at Mendota Pool are diverted into the Chowchilla Bypass which conveys water to the Chowchilla River. The East Side Bypass conveys high flows from the Chowchilla River to the San Joaquin River upstream of Fremont Ford. These bypasses are located in highly permeable soils and are used to provide an area for groundwater recharge using flood flows.

The 50-TAF Mendota Pool serves as a forebay for diversions to the Main and Outside canals; and is the termination of the Delta-Mendota Canal, which conveys CVP water from the Delta, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Water also enters

Mendota Pool via Fresno Slough (also known as James Bypass) which conveys flood flows to the San Joaquin River from the Kings River (located in the Tulare Lake Basin). Recent mean daily flows in the San Joaquin River at Mendota are presented on Figure 5.37 (DWR 2013al).

San Joaquin River Restoration Program: Friant Dam to Confluence of Merced River

In 2006, parties to *NRDC, et al., v. Rodgers, et al.*, executed a stipulation of settlement that called for a comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of the Merced River and a self-sustaining Chinook Salmon fishery while reducing or avoiding adverse water supply impacts. The SJRRP implements the settlement consistent with the San Joaquin River Restoration Settlement Act in Public Law 111-11. The USFWS issued a Programmatic BO for the implementation of the SJRRP on August 21, 2012 and NMFS issued a Programmatic BO on September 18, 2012 for SJRRP flow releases of up to 1,660 cfs from Millerton Lake into the San Joaquin River. The settlement-required flow targets for releases from Millerton Lake include six water year types for releases depending upon available water supply as measures of inflow to Millerton Lake, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. The Millerton Lake releases include the flexibility to reshape and retime releases forwards or backwards by 4 weeks during the spring and fall pulse periods. Flood flows may potentially occur and meet or exceed the Settlement flow targets. If flood flows meet the settlement flow targets, then Reclamation would not release additional water from Millerton Lake. The San Joaquin River channel downstream of Friant Dam currently lacks the capacity to convey flows to the Merced River and releases are limited accordingly. Reclamation has initiated planning and environmental compliance activities to improve river channel conveyance and allow for the full release of SJRRP flows. Diversions and infiltration losses reduce the amount of Settlement flows reaching the San Joaquin River and Merced River confluence. For the purposes of this analysis, flows that reach the Merced confluence are assumed to continue to the Delta.

San Joaquin River from Merced River to the Delta

Two major tributaries, the Tuolumne and Stanislaus rivers, join the San Joaquin River between the confluence with the Merced River and Vernalis (located at the southeastern boundary of the Delta). The flows in this reach are influenced by flow and water quality requirements at Vernalis as well as releases from the upstream reach and the two major tributaries. Recent mean daily flows in the San Joaquin River at Vernalis are presented on Figure 5.38 (DWR 2013am).

Stanislaus River

The Stanislaus River originates in the western slopes of the Sierra Nevada and drains a watershed of approximately 900 square miles. The median annual unimpaired runoff in the basin is approximately 1.08 MAF per year (SWRCB 2012). Snowmelt from March through early July contributes the largest portion of the flows in the Stanislaus River, with the highest runoff occurring in the months of April, May, and June.

The North, Middle, and South forks of the Stanislaus River converge upstream of the CVP New Melones Reservoir. The 2.4 MAF New Melones Reservoir is located approximately 60 miles upstream from the confluence of the Stanislaus River and the San Joaquin River. Water from New Melones Reservoir flows into Tulloch Reservoir (Reclamation 2010a). Tulloch Reservoir is owned and operated by the Tri-Dams Project for recreation, power, and flow re-regulation of New Melones Reservoir releases. Water released by Tulloch Reservoir and Powerplant flows downstream to Goodwin Reservoir where water is either diverted to canals to serve, Oakdale Irrigation District, South San Joaquin Irrigation District, and Stockton East Water District; or released from Goodwin Reservoir to the lower Stanislaus River (SWRCB 2012).

Below Goodwin Dam, the lower Stanislaus River flows approximately 40 miles to the confluence with the San Joaquin River. Agricultural return flows and operational spills from irrigation canals also enter the lower Stanislaus River.

New Melones Reservoir

The operating criteria for New Melones Reservoir are constrained by water rights requirements, flood control operations, contractual obligations, and federal requirements under the Federal Endangered Species Act (ESA) and CVPIA. Reclamation must operate New Melones Reservoir to meet senior water rights and in-basin demands. Senior water rights are defined for both current and future upstream water right holders in accordance with the SWRCB Decision 1422 (D-1422) and Decision 1616 (D-1616); through protest settlement agreements with Tuolumne and Calaveras Counties; and for current downstream water right holders and riparian rights whose priorities are either senior to Reclamation or senior to appropriative rights in general, respectively, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Reclamation also is required to make full contract amounts available to Stockton East Water District and Central San Joaquin Water Conservation District except for when contractual shortage provisions apply.

Required releases include flows to meet flow and water quality requirements included in the SWRCB Revised Decision 1641 (D-1641). This includes dissolved oxygen requirements in the lower Stanislaus River in accordance with the Central Valley Regional Water Quality Control Board (CVRWQCB) Basin Plan; minimum flow requirements in the lower San Joaquin River at Vernalis per SWRCB D-1641; and total dissolved solids requirement in the lower San Joaquin River at Vernalis per SWRCB D-1641.

Reservoir storage varies in accordance with upstream hydrology and downstream water demands and instream flow requirements. Recent water storage volumes and elevations for Water Years 2001 through 2012 in New Melones and Goodwin reservoirs are presented on Figures 5.39 through 5.42 (DWR 2013an, 2013ao, 2013ap, 2013aq). Recent mean daily flows in the Stanislaus River downstream of Goodwin Dam are presented on Figure 5.43 (DWR 2013as).

Implementation of 2009 National Marine Fisheries Service Biological Opinion

The 2009 NMFS BO RPA requires Reclamation to adaptively manage available flows to meet minimum instream flow, ramping flow, pulse flow, floodplain inundation, and geomorphic and function flow patterns, through the following actions. The available flows to meet the 2009 NMFS BO RPA are defined following compliance with water rights needs.

- Minimum base flows to optimize available steelhead habitat for adult migration, spawning, and juvenile rearing by water year type, as measured downstream of Goodwin Dam, as specified in Appendix 2-E of the 2009 NMFS BO RPA.
- Fall pulse flows to improve instream conditions sufficiently to attract steelhead to the Stanislaus River.
- Winter instability flows to simulate natural variability in the winter hydrograph and to enhance access to varied rearing habitats.
- Channel forming and maintenance flows in the 3,000 to 5,000 cfs range in above normal and wet years to maintain spawning and rearing habitat quality after March 1 to protect incubating eggs and to provide outmigration flow cues and late spring flows.
- Outmigration flow cues to enhance likelihood of anadromy.
- Late spring flows for conveyance and maintenance of downstream migratory habitat quality in the lowest reaches and into the Delta.

The 2009 NMFS BO also required Reclamation to meet temperature requirements at Orange Blossom Bridge and Knights Ferry to protect steelhead, as discussed in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Reclamation is also required to evaluate an approach to operate New Melones Reservoir flow releases to achieve floodplain inundation flows and improved freshwater migratory habitat for steelhead. Reclamation also participates in gravel augmentation to improve spawning habitat.

5.3.2.2.3 Delta and Suisun Marsh

The Delta and Suisun Marsh area constitutes a natural floodplain that covers 1,315 square miles and drains approximately 40 percent of the state (DWR 2013a). The Delta and Suisun Marsh have a complex web of channels and islands and is located at the confluence of the Sacramento and San Joaquin rivers.

Historically, the natural Delta system was formed by water inflows from upstream tributaries in the Delta watershed and outflow to Suisun Bay and San Francisco Bay. In the late 1800s, local land reclamation efforts in the Delta resulted in the construction of channels and levees that began altering the Delta’s surface water flows. Over time, the natural pattern of water flows continued to change as the result of upper watershed diversions and the construction of facilities to divert and export water through the Delta to areas where supplemental water supplies are needed, including densely populated areas such as San Francisco and Southern California and agricultural regions such as the San Joaquin Valley and Tulare Lake. The SWP and CVP use the Delta as the hub of their conveyance systems to deliver water to large pumps located in the southern Delta.

Inflows to the Delta occur primarily from the Sacramento River system and Yolo Bypass, the San Joaquin River, and other eastside tributaries such as the Mokelumne, Calaveras, and Cosumnes rivers. In general, in any given year, approximately 77 percent of water enters the Delta from the Sacramento River, approximately 15 percent enters from the San Joaquin River, and approximately 8 percent enters from the eastside tributaries (DWR 1994). The Delta is tidally influenced; rise and fall varies from less than 1 foot in the eastern Delta to more than 5 feet in the western Delta (DWR 2013a).

Water quality in the Delta is highly variable and strongly influenced by inflows from the rivers and by seawater intrusion into the western and central portions of the Delta during periods of low outflow that may be affected by high volumes of export pumping. The concentrations of salts and other materials in the Delta are affected by river inflows, tidal flows, agricultural diversions, drainage flows, wastewater discharges, water exports, cooling water intakes and discharges, and groundwater accretions. Seawater intrusion into the Delta is dependent on tidal conditions, inflows to the Delta, and Delta channel geometry. Delta channels are typically less than 30 feet deep, unless dredged, and vary in width from less than 100 feet to more than 1 mile. Although some channels are edged with riparian and aquatic vegetation, steep mud or rip-rap covered levees border most channels. To enhance flow and aid in levee maintenance, vegetation is often removed from the channel margins. The tidal currents carry large volumes of seawater back and forth through the San Francisco Bay-Delta Estuary with the tidal cycle. The mixing zone of salt and fresh water can shift 2 to 6 miles daily depending on the tides, and may reach far into the Delta during periods of low inflow.

Salinity objectives adopted by the SWRCB were established to protect beneficial uses, including agricultural and municipal water supplies, and fisheries. The CVP and SWP facilities are operated to comply with the requirements that would protect the Delta water quality, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. These operational requirements affect the hydrology in the Delta.

Hydrological conditions in the Delta and Suisun Marsh are substantially affected by structures that route water through the Delta towards the major Delta water diversions in the south Delta, including the CVP Jones Pumping Plant, the SWP Banks Pumping Plant, the Delta-Mendota/California Aqueduct Intertie, the CVP Contra Costa Canal Pumping Plant at Rock Slough, and the Contra Costa Water District (CCWD) intakes on Old and Middle rivers; while protecting Delta water quality for these intakes, the SWP Barker Slough Pumping Plant in the north Delta and over 1,800 municipal and agricultural in-Delta diversions (DWR 2010b). These structures include the Delta Cross Channel and temporary barriers in the south Delta. Diversion patterns for the major facilities also are regulated to maintain Delta water quality and to protect fish that are listed as threatened or endangered species under ESA in accordance with the SWRCB D-1641, 2008 USFWS BO, and the 2009 NMFS BO. The diversion patterns are implemented to maintain ratios of exports of the CVP and SWP facilities to the Delta inflow; ratios of San Joaquin River inflow to Delta exports; and reverse flow conditions in Old and Middle rivers (known as the OMR criteria). Operations of the Jones and Banks pumping plants are affected by downstream CVP and SWP water demands and reservoir operations in San Luis Reservoir that is jointly used by the CVP and SWP.

Facilities implemented in Suisun Marsh also affect hydrologic and water quality conditions throughout the Delta. To meet the Delta water quality requirements and water rights requirements of users located upstream of the Delta, the CVP and SWP are operated in a coordinated manner in accordance with Coordinated Operation Agreement (COA), as described in the following section.

Delta Cross Channel

The Delta Cross Channel (DCC) is a gated diversion channel in the Sacramento River near Walnut Grove and Snodgrass Slough, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. When the gates are open, water flows from the Sacramento River through the cross channel to channels of the lower Mokelumne and San Joaquin Rivers toward the interior Delta. The DCC operation improves water quality in the interior Delta by improving circulation patterns of good quality water from the Sacramento River towards Delta diversion facilities.

Reclamation operates the DCC in the open position to (1) improve the movement of water from the Sacramento River to the export facilities at the Banks and Jones Pumping Plants, (2) improve water quality in the southern Delta, and (3) reduce salt water intrusion rates in the western Delta. During the late fall, winter, and spring, the gates are often periodically closed to protect out migrating salmonids from entering the interior Delta. In addition, whenever flows in the Sacramento River at Sacramento reach 20,000 to 25,000 cfs (on a sustained basis) the gates are closed to reduce potential scouring and flooding that might occur in the channels on the downstream side of the gates.

Flow rates through the gates are determined by Sacramento River stage and are not affected by export rates in the south Delta. The DCC also serves as a link between the Mokelumne River and the Sacramento River for small craft, and is used extensively by recreational boaters and fishermen whenever it is open. The SWRCB D-1641 requires closure of the DCC gates for fisheries protection as follows.

- From November through January, the DCC may be closed for up to 45 days for fishery protection purposes.
- From February 1 through May 20, the gates are closed for fishery protection purposes.
- The gates may also be closed for 14 days for fishery protection purposes during the May 21 through June 15 time period.

Implementation of 2009 National Marine Fisheries Service Biological Opinion

The 2009 NMFS BO RPA requires Reclamation to close the DCC for additional days from October 1 through November 30, if fish are present; December 1 through December 14, unless closures cause adverse impacts on water quality conditions; and December 15 through January 31.

Temporary Agricultural Barriers

The DWR South Delta Temporary Barrier Project (TBP) was initiated in 1991to seasonally construct and demolish four rock barriers across south Delta channels, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. In various combinations, these barriers improve water levels and San Joaquin River salmon migration in the south Delta. The existing TBP consists of installation and removal of temporary rock barriers at the following locations.

- Middle River near Victoria Canal, about 0.5 miles south of the confluence of Middle River, Trapper Slough, and North Canal.
- Old River near Tracy, about 0.5 miles east of the DMC intake.
- Grant Line Canal near Tracy Boulevard Bridge, about 400 feet east of Tracy Boulevard Bridge.
- The head of Old River (HOR) at the confluence of Old River and San Joaquin River.

The barriers on Middle River, Old River near Tracy, and Grant Line Canal are flow control facilities designed to improve water levels for agricultural diversions and are in place during the irrigation season. The Head of Old River Barrier (HORB) is only installed from early September to November 30th when requested by CDFW if needed to improve dissolved oxygen in the San Joaquin River. The HORB also has been installed in the spring months to improve outmigrating conditions for juvenile salmonids.

The agricultural barriers at Middle River and Old River near Tracy can be installed as early as March 1 if the HORB is installed; and can be fully operated as early as April 1, if the HORB is installed, or May 15, if the HORB is not installed. From May 15 to May 31 (if the barrier at the head of Old River is removed), the barrier tide gates are tied open in Middle River and Old River near Tracy. After May 31, the barriers in Middle River, Old River near Tracy, and Grant Line Canal are permitted to be operational until they are completely removed by November 30.

Major Delta Water Diversions

Major water diversions in the Delta include the CVP Jones Pumping Plant, the SWP Banks Pumping Plant, the CVP Contra Costa Canal Pumping Plant at Rock Slough, the SWP Barker Slough Pumping Plant for the North Bay Aqueduct, Contra Costa Water District intakes on Old and Middle rivers, and over 1,800 municipal and agricultural diversions for in-Delta use (DWR 2010b).

Delta channels have been modified to allow transport of Delta inflow to the diversions throughout the Delta, including the CVP and SWP south Delta intakes, and to reduce the effects of pumping on the direction of flows and salinity intrusion within the Delta. The conveyance of water from the Sacramento River southward through the Delta to the CVP and SWP south Delta intakes is aided by the Delta Cross Channel (DCC), a constructed, gated channel that conveys water from the Sacramento River to the Mokelumne River.

CVP Jones Pumping Plant

The CVP Jones Pumping Plant, located about 5 miles north of Tracy, has a permitted diversion capacity of 4,600 cfs and sits at the end of a 2.5-mile long earth-lined intake channel that extends to Old River, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Water diverted at the Jones Pumping Plant is discharged to the CVP Delta-Mendota Canal (DMC) which extends 117 miles to the Mendota Pool. Water from Jones Pumping Plant may be pumped from the DMC O'Neill Forebay, and then pumped into San Luis Reservoir by the Gianelli Pumping-Generating Plant. The DMC has an initial capacity of 4,600 cfs at Jones Pumping Plant that decreases to about 3,200 cfs at its terminus.

SWP Clifton Court and Banks Pumping Plant

The SWP facilities in the southern Delta include the 31-TAF Clifton Court Forebay (CCF), located about 10 miles northwest of the city of Tracy, and the Banks Pumping Plant, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Water is diverted from Old River into CCF that provides storage for off-peak pumping, moderates the effect of the pumps on the fluctuation of flow and stage in adjacent Delta channels, and collects sediment upstream of the Banks Pumping Plant and the California Aqueduct. Water flows from CCF to Banks Pumping Plant which conveys the water to California Aqueduct. The California Aqueduct transports water to O'Neill Forebay, from which water can be released to the San Luis Canal, a portion of the California Aqueduct jointly owned by the SWP and CVP; or pumped into San Luis Reservoir at the Gianelli Pumping Plant. Water from San Luis Reservoir is released into the San Luis Canal which ends near Kettleman City. From that location, the California Aqueduct continues to southern California.

The nominal capacity of the Banks Pumping Plant is 10,300 cfs. Permits issued by the USACE regulate the rate of diversion of water into CCF. This diversion rate is normally restricted to 6,680 cfs as a three-day average inflow to CCF and 6,993 cfs as a one-day average inflow to CCF. CCF diversions may be greater than these rates between December 15 and March 15, when the inflow into CCF may be augmented by one-third of the San Joaquin River flow at Vernalis when those flows are equal to or greater than 1,000 cfs.

In 2000, the maximum diversion rate was increased for the months of July, August, and September through 2016 to recover export reductions that occurred due to actions taken to benefit fisheries resources. The expanded maximum allowable daily diversion rate into CCF was increased from 13,870 acre-feet to 14,860 acre-feet and three-day average diversions from 13,250 acre-feet to 14,240 acre-feet (500 cfs per day equals 990 acre-feet per day). Implementation of this action is contingent on meeting the following conditions.

- The increased diversion rate will not result in greater annual SWP water supply allocations than would occur in the absence of the increased diversion rate. Water pumped due to the increased capacity will only be used to offset reduced diversions that occurred or will occur because of actions taken to benefit fisheries.
- Use of the increased diversion rate will be in accordance with all terms and conditions of existing BOs governing SWP operations.
- All three temporary agricultural barriers (Middle River, Old River near Tracy and Grant Line Canal) must be in place and operating when SWP diversions are increased.

Between July 1 and September 30, if the combined salvage of listed fish species reaches a level of concern, the relevant fish regulatory agencies will determine whether the 500 cfs increased diversion is or continues to be implemented. Variations to hydrologic conditions coupled with regulatory requirements may limit the ability of the SWP to fully utilize the proposed increased diversion rate. Also, facility capabilities may limit the ability of the SWP to fully utilize the increased diversion rate. The CCF radial gates are closed during critical periods of the ebb/flood tidal cycle to protect water levels relied upon by local agricultural water diverters in the south Delta area.

Banks Pumping Plant is operated to minimize the impact on power loads on the California electrical grid to the extent practical. Generally more pump units are operated during off-peak periods and fewer during peak periods with water stored temporarily in CCF. Because the installed capacity of the pumping plant is 10,300 cfs, the plant can be operated to reduce power grid impacts by running all available pumps at night and fewer during the higher energy-demand hours.

SWP Barker Slough Pumping Plant

The SWP Barker Slough Pumping Plant (BSPP) diverts water from Barker Slough into the SWP North Bay Aqueduct (NBA) for delivery to the Solano County Water Agency and the Napa County Flood Control and Water Conservation District, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. The current 162.5-cfs NBA intake with a positive barrier fish screen, located approximately 10 miles from the Sacramento River at the end of Barker Slough.

The NBA was designed to deliver up to 131,181 acre-feet per year SWP water supply contracts. However, the ability of BSPP to deliver this amount of water is limited due to several factors. The current BSPP pumping capacity is limited due to a thick bio-film growth on the interior of the NBA pipeline and a need to reduce the pressure in the pipeline within safe limits. Water quality in Barker Slough becomes degraded during winter and spring rainfall events due to elevated levels of coliform bacteria, organic matter, turbidity, and pollutants from the upstream watershed, which limits the period of time that the BSPP can be operated each year. In 2008, USFWS issued a BO for preservation of delta smelt that reduced the total BSPP annual diversion to 71 TAF. In 2009, CDFW issued an incidental take permit for the preservation of longfin smelt that restricted pumping rates during dry and critical dry years from January 15 to March 31. As tidal wetlands in Suisun Marsh and Cache Slough and floodplains in the Yolo Bypass are restored in accordance with the 2008 USFWS BO and 2009 NMFS BO, respectively, Delta smelt, longfin smelt and salmonid populations in the Barker Slough area are anticipated to increase which could further restrict diversions at BSPP.

Contra Costa Water District Intakes

The CCWD diverts approximately 127 TAF per year, including approximately 110 TAF under the CVP water service contract. The CCWD diverts water at the CVP Rock Slough Intake, and at the CCWD Mallard Slough, Old River, and Middle River (on Victoria Canal) intakes, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Water diverted at Mallard Slough, Old River, and Middle River intakes occur under water rights issued by the SWRCB to CCWD. Water diverted at Rock Slough, Old River, and Middle River intakes occur under water rights issued by the SWRCB to Reclamation for the CVP. All four intakes have positive barrier fish screens. Water from the Old River and Middle River intakes can be diverted to the 160-TAF Los Vaqueros Reservoir when Delta salinity is low. When Delta salinity is high, typically in the fall months, CCWD blends low salinity water from Los Vaqueros Reservoir with water from the Delta to meet CCWD water quality goals. Water from Los Vaqueros Reservoir is also used by CCWD when Delta diversions are restricted.

The Mallard Slough Intake, located on a channel that extends to Suisun Bay (across from Chipps Island), can divert water into the CCWD conveyance system, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. Generally, less than 3 percent of CCWD diversions are from Mallard Slough intake due to high salinity in Suisun Bay from late spring until winter.

The CVP Rock Slough Intake, located about four miles southeast of Oakley, can divert into the CVP Contra Costa Canal for conveyance into the CCWD water system. CCWD may divert approximately 30 percent to 50 percent of its total supply through the Rock Slough Intake depending upon salinity.

The Old River Intake, located on Old River near State Route 4, can divert water to the CVP Contra Costa Canal or to the 160-TAF Los Vaqueros Reservoir. Diversion to Los Vaqueros Reservoir storage is limited to 200 cfs by the terms of the Los Vaqueros Project BOs and SWRCB Decision 1629 (D-1629), the water right decision for the Los Vaqueros Project.

The Middle River Intake (formerly referred to as Alternative Intake Project), located on Victoria Canal, diverts water to the Contra Costa Canal or to

Los Vaqueros Reservoir. Salinity at the Middle River Intake is generally lower in the late summer and fall than at the other intakes. Therefore, CCWD can decrease winter and spring diversions while still meeting water quality goals in the summer and fall through use of the Middle River Intake.

Delta-Mendota Canal/California Aqueduct Intertie

The DMC/California Aqueduct Intertie between the DMC and the California Aqueduct allows water to flow in both directions between the CVP and SWP conveyance facilities, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. The DMC/California Aqueduct Intertie achieves multiple benefits, including meeting current water supply demands, allowing for the maintenance and repair of the CVP Delta export and conveyance facilities, and providing operational flexibility to respond to emergencies. The DMC/California Aqueduct Intertie can be used under one of the following three different scenarios.

- Up to 467 cfs may be pumped from the DMC to the California Aqueduct to ease DMC conveyance constraints related to Jones Pumping Plant capacity limitations.
- Up to 467 cfs may be pumped from the DMC to the California Aqueduct to minimize impacts on water deliveries due to temporary restrictions in flow or water levels on the lower DMC (south of the Intertie) or the upper California Aqueduct (north of the Intertie) for system maintenance or due to an emergency shutdown.
- Up to 900 cfs may be conveyed from the California Aqueduct to the DMC using gravity flow to minimize impacts on water deliveries due to temporary restrictions in flow or water levels on the lower California Aqueduct (downstream of the Intertie) or the upper DMC (upstream of the Intertie) for system maintenance or for an emergency shutdown.

San Luis Reservoir

The 2.027-MAF San Luis Reservoir, formed by Sisk Dam, is jointly operated by Reclamation and DWR, with approximately 0.965 MAF used by the CVP and 1.062 MAF used by the SWP. Water generally is diverted into San Luis Reservoir during late fall through early spring when irrigation water demands of CVP and SWP water users are low and are being met by Delta exports.

When all SWP demands are met, including diversion to storage facilities south of the Delta and Table A demands, and the Delta is in excess conditions, DWR would use available excess pumping capacity at Banks Pumping Plant to make excess water supplies, called Article 21 water under the long-term SWP water supply contracts, available to the SWP Contractors. Article 21 of the SWP water contracts describes the conditions under which water can be delivered in addition to the amounts specified in Table A of the contracts.

Unlike Table A water, which is an allocated annual SWP supply made available for scheduled delivery throughout the year, Article 21 water is an interruptible water supply made available only when certain conditions exist. However, while not a dependable supply, Article 21 water is an important part of the total SWP supplies provided to the SWP contractors. As with all SWP water, Article 21 water is pumped consistent with the existing terms and conditions of SWP water rights permits, and is pumped from the Delta under the same environmental, regulatory, and operational constraints that apply to all SWP operations.

Article 21 water is only available as long as the required conditions exist as determined by DWR. As Article 21 deliveries are in addition to scheduled Table A deliveries, this supply is delivered to SWP contractors that can, on relatively short notice, put it to beneficial use. SWP contractors have used Article 21 water to meet needs such as additional short-term irrigation demands, replenishment of local groundwater basins, short-term substitution of local supplies and storage in local surface reservoirs for later use by the requesting SWP contractor, all of which provide SWP contractors with opportunities for better water management through more efficient coordination with their local water supplies. Allocated Article 21 water to a SWP contractor cannot be transferred.

Article 21 water is typically offered to SWP contractors on a short-term (daily or weekly) basis when all of the following conditions exist: the SWP share of San Luis Reservoir is physically full, or projected to be physically full; other SWP reservoirs south of the Delta are at their storage targets or the SWP conveyance capacity to fill these reservoirs is maximized; the Delta is in excess condition; current Table A and SWP operational demands are being fully met; and Banks Pumping Plant has export capacity beyond that which is needed to meet all Table A and other SWP operational demands. The increment of available unused Banks Pumping Plant capacity is offered as the Article 21 delivery capacity. SWP contractors then indicate their desired rate of delivery of Article 21 water. DWR allocates the available Article 21 water in proportion to the requesting SWP contractors annual Table A amounts if requests exceed the amount offered. Deliveries can be discontinued at any time when SWP operations change. In the modeling for Article 21, deliveries are only made in months when the SWP share of San Luis Reservoir is full. In actual operations, Article 21 may be offered a short period in advance of actual filling.

By April or May, demands from both agricultural and M&I SWP Contractors usually exceed the pumping rate at Banks Pumping Plant, and releases from San Luis Reservoir to the SWP facilities are needed to supplement the Delta pumping at Banks Pumping Plant to meet SWP contractor demands for Table A water.

Historical water storage volumes and water storage elevations for San Luis Reservoir for Water Years 2001 through 2012 are presented on Figures 5.44 and 5.45 (DWR 2013as, 2013at).

The San Luis Complex consists of the following.

- O'Neill Pumping-Generating Plant (CVP facility)
- William R. Gianelli Pumping-Generating Plant (joint CVP and SWP facility)
- San Luis Canal (joint CVP and SWP facility)

- Dos Amigos Pumping Plant (joint CVP and SWP facility)
- Coalinga Canal (CVP facility)
- Pleasant Valley Pumping Plant (CVP facility)
- Los Banos and Little Panoche Detention Dams and Reservoirs (joint CVP and SWP facilities)

The CVP diverts water from San Luis Reservoir by the Pacheco Pumping Plant through the Pacheco Tunnel and Pacheco Conduit that conveys water to CVP water service contractors in Santa Clara and San Benito counties, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

Regulatory Limitations on Operations of Delta Water Diversions

Operations of the CVP and SWP are implemented in accordance with SWRCB water rights and water quality decisions, including SWRCB D-1641, and the 2008 USFWS BO and 2009 NMFS BO.

Decision 1641

The SWRCB adopted the 1995 Bay-Delta Plan on May 22, 1995, which became the basis of SWRCB D-1641 (adopted on December 29, 1999 and revised on March 15, 2000). The SWRCB D-1641 amended certain terms and conditions of the SWP and CVP water rights to include flow and water quality objectives to assure protection of beneficial uses in the Delta and Suisun Marsh. SWRCB also grants conditional changes to points of diversion for the CVP and SWP under SWRCB D-1641. The SWRCB adopted a revised Bay-Delta Plan on December 13, 2006; however, there were no changes to the beneficial uses or water quality objectives. The changes were primarily to improve readability and consistency to reflect current physical conditions and other regulations.

The requirements in SWRCB D-1641 address the standards for fish and wildlife protection, water supply water quality, and Suisun Marsh salinity. These objectives include specific Delta outflow requirements throughout the year, specific export limits in the spring, and export limits based on a percentage of estuary inflow throughout the year. The water quality objectives are designed to protect agricultural, municipal and industrial, and fishery uses, and vary throughout the year and by water year type. One of the requirements is to provide a minimum flow on the Sacramento River at Rio Vista in September through December of 3,000 to 4,500 cfs, depending on the month and water year type, to protect water quality for Delta water users.

The SWRCB D-1641 includes two Delta outflow criteria. A Net Delta Outflow Index is specified for all months in all water year types. A “spring X2” Delta outflow is specified from February through June to maintain freshwater and estuarine conditions in the western Delta to protect aquatic life. The criteria require operations of the CVP and SWP upstream reservoir releases and Delta exports in a manner that maintains a salinity objective at an “X2” location. X2 refers to the horizontal distance from the Golden Gate Bridge up the axis of the

Delta estuary to where tidally averaged near-bottom salinity concentration of 2 parts of salt in 1,000 parts of water occurs; the X2 standard was established to improve shallow water estuarine habitat in the months of February through June and relates to the extent of salinity movement into the Delta (DWR, Reclamation, USFWS and NMFS 2013). The location of X2 is important to both aquatic life and water supply beneficial uses.

During February through June, SWRCB D-1641 also limits CVP and SWP exports as compared to Delta inflows (also known as the "E/I Ratio") to reduce potential impacts on migrating salmon and spawning Delta smelt, Sacramento Splittail, and Striped Bass.

Historical mean daily Delta outflow flows for Water Years 2001 through 2012 are presented on Figure 5.46 (DWR 2013au).

Historical mean daily flows for Water Years 2001 through 2012 are presented on Figures 5.46 through 5.52 for diversions at Jones, Banks, Barker Slough, and Contra Costa Canal pumping plants; and Contra Costa Water District intakes at Old River and Middle River (DWR 2013av, 2103aw, 2013ax, 2013ay, 2013az, 2013ba).

Joint Point of Diversion

SWRCB D-1641 authorized the SWP and CVP to jointly use both Jones and Banks pumping plants in the southern Delta, with conditional limitations and required response coordination plans (referred to as Joint Point of Diversion [JPOD]). Use of JPOD is based on staged implementation and conditional requirements for each stage of implementation. The stages of JPOD in SWRCB D-1641 are:

- Stage 1—for water service to a group of CVP water service contractors (Cross Valley contractors, San Joaquin Valley National Cemetery and Musco Family Olive Company), and to recover export reductions implemented to benefit fish;
- Stage 2—for any purpose authorized under the current CVP and SWP water right permits; and
- Stage 3—for any purpose authorized, up to the physical capacity of the diversion facilities.

In general, JPOD capabilities are used to accomplish four basic CVP and SWP objectives:

- When wintertime excess pumping capacity becomes available during Delta excess conditions and total CVP and SWP San Luis storage is not projected to fill before the spring pulse flow period, the Project with the deficit in San Luis storage may elect to pursue the use of JPOD capabilities;
- When summertime pumping capacity is available at Banks Pumping Plant and CVP reservoir conditions can support additional releases, the CVP may elect to use JPOD capabilities to enhance annual CVP south of Delta water supplies;

- When summertime pumping capacity is available at Banks or Jones Pumping Plant to facilitate water transfers, JPOD may be used to further facilitate the water transfer; and
- During certain coordinated CVP and SWP operation scenarios for fishery entrainment management, JPOD may be used to shift CVP and SWP exports to the facility with the least fishery entrainment impact while minimizing export at the facility with the most fishery entrainment impact.

Each stage of JPOD has regulatory terms and conditions that must be satisfied in order to implement JPOD. All stages require a response plan to ensure water elevations in the southern Delta will not be lowered to the injury of local riparian water users (Water Level Response Plan); and a response plan to ensure the water quality in the southern and central Delta will not be significantly degraded through operations of the JPOD to the injury of water users in the southern and central Delta. Stage 2 has an additional requirement to complete an operations plan that will protect fish and wildlife and other legal users of water (Fisheries Response Plan). Stage 3 has an additional requirement to protect water levels in the southern Delta. All JPOD diversions under excess conditions in the Delta are junior to CCWD water right permits for the Los Vaqueros Project, and must have an X2 location west of certain compliance locations consistent with the 1993 Los Vaqueros BO for Delta smelt.

Implementation of 2008 USFWS and 2009 NMFS Biological Opinions

The 2008 USFWS BO and the 2009 NMFS BO restrict CVP and SWP diversions to reduce reverse flows in OMR. The 2008 USFWS BO also includes criteria for fall Delta outflow. The 2009 NMFS BO includes criteria for a San Joaquin River Inflow/Export (I:E) ratio.

2008 USFWS BO OMR Criteria

The 2008 USFWS BO restricts south Delta pumping to preserve certain OMR flows as prescribed in the following three actions.

- **Action 1:** to protect adult Delta smelt migration and entrainment. Limits exports so that the average daily OMR flow is no more negative than -2,000 cfs for a total duration of 14 days, with a 5-day running average no more negative than -2,500 cfs (within 25 percent).
  - December 1 to December 20 – Based upon turbidity data from turbidity stations (Prisoner's Point, Holland Cut, and Victoria Canal) and salvage data from CVP and SWP fish handling facilities at the south Delta intakes, and other parameters important to the protection of delta smelt including, but not limited to, preceding conditions of X2, Fall Midwater Trawl Survey (FMWT), and river flows.
  - After December 20 – The action will begin if the three-day average turbidity at Prisoner's Point, Holland Cut, and Victoria Canal exceeds 12 nephelometric turbidity units (NTU).

- Triggers would be based on:
  - Three-day average of 12 NTU or greater at all three turbidity stations; or
  - Three days of delta smelt salvage after December 20 at either facility or cumulative daily salvage count that is above a risk threshold based upon the “daily salvage index” approach reflected in a daily salvage index value of greater than or equal to 0.5 (daily delta smelt salvage is greater than one-half prior year FMWT index value). The window for triggering Action 1 concludes when either off-ramp condition described below is met. These off-ramp conditions may occur without Action 1 ever being triggered. If this occurs, then Action 3 is triggered, unless the Service concludes on the basis of the totality of available information that Action 2 should be implemented instead.
- Action 1 offramps occur when water temperature reaches 12 degrees Centigrade (°C) based on a three station daily mean at the temperature stations: Mossdale, Antioch, and Rio Vista; or the onset of spawning based upon the presence of spent females in the Spring Kodiak Trawl Survey or at the CVP or SWP fish handling facilities.

• **Action 2:** to protect adult Delta smelt migration and entrainment. An action implemented using an adaptive process to tailor protection to changing environmental conditions after Action 1. As in Action 1, the intent is to protect pre-spawning adults from entrainment and, to the extent possible, from adverse hydrodynamic conditions. The range of net daily OMR flows will be no more negative than -1,250 to -5,000 cfs. Depending on extant conditions, specific OMR flows within this range are recommended by the USFWS Smelt Working Group (SWG) from the onset of Action 2 through its termination. The SWG would provide weekly recommendations based upon review of the sampling data, from real-time salvage data at the CVP and SWP, and utilizing most up-to-date technological expertise and knowledge relating population status and predicted distribution to monitored physical variables of flow and turbidity. The USFWS will make the final determination.
  - Action 2 begins immediately following Action 1. If Action 1 is not implemented based upon triggers, the SWG may recommend a start date for Action 2.
  - Action 2 is suspended when whenever a three-day flow average is greater than or equal to 90,000 cfs in Sacramento River at Rio Vista and 10,000 cfs in San Joaquin River at Vernalis. Once such flows have abated, the OMR flow requirements of Action 2 are restarted.
  - Offramps for Action 2 are related to water temperature reaches 12°C based on a three-station daily average at the temperature stations: Rio Vista, Antioch, and Mossdale; or the onset of spawning based upon the presence of a spent female in the Spring Kodiak Trawl Survey or at the CVP or SWP fish handling facilities.

- **Action 3:** to protect larval and juvenile Delta Smelt. Minimize the number of larval delta smelt entrained at the facilities by managing the hydrodynamics in the Central Delta flow levels pumping rates spanning a time sufficient for protection of larval delta smelt. Net daily OMR flow will be no more negative than -1,250 to -5,000 cfs based on a 14-day running average with a simultaneous 5-day running average within 25 percent of the applicable requirement for OMR. Depending on extant conditions, specific OMR flows within this range are recommended by the SWG from the onset of Action 3 through its termination.
  - Action 3 begins when temperature reaches 12°C based on a three-station average at the temperature stations: Mossdale, Antioch, and Rio Vista; or onset of spawning based upon the presence of a spent female in the Spring Kodiak Trawl Survey or at the CVP or SWP fish handling facilities.
  - Offramps for Action 3 would occur by June 30; or if water temperature reaches a daily average of 25°C for three consecutive days 10 at Clifton Court Forebay.

2009 NMFS BO OMR Criteria

The 2009 NMFS BO includes OMR criteria to protect juvenile salmonids during winter and spring emigration downstream into the San Joaquin River, and to increase survival of salmonids and green sturgeon entering the San Joaquin River from Georgiana Slough and the lower Mokelumne River by reducing the potential for entrainment at the south Delta intakes. The action is implemented from January 1 through June 15, and reduces exports, as necessary, to limit negative flows to -2,500 to -5,000 cfs in Old and Middle Rivers, depending on the presence of salmonids. The reverse flow is managed within this range to reduce flows toward the pumps during periods of increased salmonid presence. The negative flow objective within the range is determine based on the decision tree presented in Table 5.8.

Table 5.8 Old and Middle River Criteria under the 2009 NMFS BO

Date	Action Triggers	Action Responses
January 1 – June 15	January 1 – June 15	-5,000 cfs
January 1 – June 15 First Stage Trigger (increasing level of concern)	Daily SWP/CVP older juvenile loss density (fish per TAF): 1) is greater than incidental take limit divided by 2000, with a minimum value of 2.5 fish per TAF, or 2) daily loss is greater than daily measured fish density divided by 12 TAF, or 3) Coleman National Fish Hatchery coded wire tag late-fall run or Livingston Stone National Fish Hatchery coded wire tag winter-run cumulative loss greater than 0.5%, or 4) daily loss of wild steelhead (intact adipose fin) is greater than the daily measured fish density divided by 12 TAF.	-3,500 to -5,000 cfs
January 1 – June 15 Second Stage Trigger (analogous to high concern level)	Daily SWP/CVP older juvenile loss density (fish per TAF) is: 1) greater than incidental take limit divided by 1000, with a minimum value of 2.5 fish per TAF, or 2) daily loss is greater than daily fish density divided by 8 TAF, or 3) Coleman National Fish Hatchery coded wire tag late-fall run or Livingston Stone National Fish Hatchery coded wire tag winter-run cumulative loss greater than 0.5%, or 4) daily loss of wild steelhead (intact adipose fin) is greater than the daily measured fish density divided by 8 TAF.	-2,500 to -5,000 cfs
End of Triggers	Continue action until June 15 or until average daily water temperature at Mossdale is greater than 72°F (22°C) for 7 consecutive days (1 week), whichever is earlier.	No OMR restriction

2009 NMFS BO San Joaquin River Inflow:Export Ratio

The 2009 NMFS BO requires south Delta exports to be reduced during April and May to protect emigrating steelhead from the lower San Joaquin River into the south Delta channels and intakes. The I:E ratio from April 1 through May 31 specifies that Reclamation operates the New Melones Reservoir to maintain the 2009 NMFS BO flow schedule for the Stanislaus River at Goodwin in accordance with Action III.1.3 and Appendix 2-E of the 2009 NMFS BO. In addition, the CVP and SWP pumps are operated to meet the ratios based upon a 14-day running average, as summarized in Table 5.9.

Table 5.9 Inflow:Export Ratios under the 2009 NMFS BO

San Joaquin Valley Classification	San Joaquin River flow at Vernalis (cfs):CVP/SWP combined export ratio (cfs)
Critically dry	1:1
Dry	2:1
Below normal	3:1
Above normal	4:1
Wet	4:1
Vernalis flow equal to or greater than 21,750 cfs	Unrestricted exports until flood recedes below 21,750 cfs.

During multiple dry years, the ratio will be limited to 1:1 if the New Melones Index related to storage is less than 1,000 TAF and the sum of the "indicator" numbers established for water year classifications in SWRCB D-1641 (based on the San Joaquin Valley 60-20-20 Water Year Classification in SWRCB D-1641) is greater than 6 for the past two years and the current year. The indicator numbers are 1 for a critically dry year, 2 for a dry year, 3 for a below normal year, 4 for an above normal year, and 5 for a wet year.

Implementation of the I:E ratio under all conditions would allow a minimum pumping rate of 1,500 cfs to meet public health and safety needs of communities that solely rely upon water diverted from the CVP and SWP pumping plants.

2008 USFWS BO Fall X2 Criteria

The 2008 USFWS BO also includes an additional Delta salinity requirement in September and October in wet and above normal water years. This new requirement is frequently referred to as "Fall X2." The action requires that 2 Practical Salinity Units (psu) is maintained at 74 kilometers (km) during wet years, and 81 km during above normal water years when the preceding year was wet or above normal based upon the Sacramento Basin 40-30-30 index in the SWRCB D-1641. In November of these years, there is no specific X2 requirement; however, there is a requirement that all inflow into SWP and CVP upstream reservoirs be conveyed downstream to augment Delta outflow to maintain X2 at the locations in September and October. If storage increases during November under this action, the increased storage volume is to be released in December in addition to the requirements under SWRCB D-1641 net Delta Outflow Index.

Coordinated Operation Agreement

The CVP and SWP are operated in a coordinated manner in accordance with Public Law 99-546 (October 27, 1986), directing the Secretary to execute the COA. The CVP and SWP are also operated under the SWRCB decisions and water right orders related to the CVP's and SWP's water right permits and licenses to appropriate water by diverting to storage, by directly diverting to use, or by re-diverting releases from storage later in the year or in subsequent years.

The CVP and SWP are permitted by SWRCB to store water, divert water and re-divert CVP and SWP water that has been stored in upstream reservoirs. The CVP and SWP have built water storage and water delivery facilities in the Central Valley to deliver water supplies to CVP and SWP contractors, including senior water users. The CVP's and SWP's water rights are conditioned by the SWRCB to protect the beneficial uses of water within the watersheds.

As conditions of the water right permits and licenses, SWRCB requires the CVP and SWP to meet specific water quality objectives within the Delta. Reclamation and DWR coordinate operation of the CVP and SWP, pursuant to the COA, to meet these and other operating requirements. The COA is an agreement between the Federal government and the State of California for the coordinated operation of the CVP and SWP. The agreement suspended a 1960 agreement and superseded annual coordination agreements that had been implemented following construction of the SWP.

Obligations for In-Basin Uses

In-basin uses are defined in the COA as legal uses of water in the Sacramento Basin, including the water required under the SWRCB D-1485.

Balanced water conditions are defined in the COA as periods when it is mutually agreed that releases from upstream reservoirs plus unregulated flows approximately equals the water supply needed to meet Sacramento Valley in-basin uses plus exports. Excess water conditions are periods when it is mutually agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in-basin uses plus exports.

During excess water conditions, sufficient water is available to meet all beneficial needs, and the CVP and SWP are not required to make additional releases. In excess water conditions, water accounting is not required and some of the excess water is available to CVP water contractors, SWP water contractors, and users located upstream of the Delta. However, during balanced water conditions, CVP and SWP share the responsibility in meeting in-basin uses.

When water must be withdrawn from reservoir storage to meet in-basin uses, 75 percent of the responsibility is borne by the CVP and 25 percent is borne by the SWP. When unstored water is available for export (i.e., Delta exports exceed storage withdrawals while balanced water conditions exist), the sum of CVP stored water, SWP stored water, and the unstored water for export is allocated 55/45 to the CVP and SWP, respectively. The percentages and ratios included in the COA were derived from negotiations between Reclamation and DWR for SWRCB D-1485 standards and CVP and SWP annual supplies existing at the time and projected into the future. Reclamation and DWR have continued to apply these ratios as new SWRCB standards and other statutory and regulatory changes have been adopted.

Accounting and Coordination of Operations

Reclamation and DWR coordinate on a daily basis to determine target Delta outflow for water quality, reservoir release levels necessary to meet in-basin demands, schedules for joint use of the San Luis Unit facilities, and for the use of each other's facilities for pumping and wheeling. During balanced water conditions, daily water accounting is maintained for the CVP and SWP obligations. This accounting allows for flexibility in operations and avoids the necessity of daily changes in reservoir releases that originate several days' travel time from the Delta.

The accounting language of the COA provides the mechanism for determining the responsibility of each project for Delta outflow influenced standards; however, real-time operations dictate actions. For example, conditions in the Delta can change rapidly. Weather conditions combined with tidal action can quickly affect Delta salinity conditions, and therefore, the Delta outflow required to maintain standards. If, in this circumstance, it is decided the reasonable course of action is to increase upstream reservoir releases, then the response may be to increase Folsom Reservoir releases first because the released water will reach the Delta before flows released from other CVP and SWP reservoirs. Lake Oroville water releases require about three days to reach the Delta, while water released from Shasta Lake requires five days to travel from Keswick Reservoir to the Delta. As water from the other reservoirs arrives in the Delta, Folsom Reservoir releases can be adjusted downward. Any imbalance in meeting each project's initial shared obligation would be captured by the COA accounting.

Reservoir release changes are one means of adjusting to changing in-basin conditions. Increasing or decreasing project exports can also immediately achieve changes to Delta outflow. As with changes in reservoir releases, imbalances in meeting the CVP and SWP initial shared obligations are captured by the COA accounting.

The duration of balanced water conditions varies from year to year. Some very wet years have had no periods of balanced conditions, while very dry years may have had long continuous periods of balanced conditions, and still other years may have had several periods of balanced conditions interspersed with excess water conditions.

Joint Facilities in Suisun Marsh

The Suisun Marsh Preservation Agreement (SMPA) requires DWR and Reclamation to meet salinity standards, sets a timeline for implementing the Plan of Protection, and delineates monitoring and mitigation requirements in accordance with SWRCB D-1641 to implement and operate physical facilities in the Marsh; and management of Delta outflow.

Suisun Marsh Salinity Control Gates

The Suisun Marsh Salinity Control Gates (SMSCG) are located on Montezuma Slough about two miles downstream from the confluence of the Sacramento and San Joaquin Rivers, near Collinsville. The objective of SMSCG operation is to decrease the salinity of the water in Montezuma Slough by restricting the flow of higher salinity water from Grizzly Bay into Montezuma Slough during incoming tides and retaining lower salinity Sacramento River water from the previous ebb tide. Operation of the gates in this fashion lowers salinity in Suisun Marsh channels and results in a net movement of water from east to west. When Delta outflow is low to moderate and the gates are not operating, tidal flow past the gate is approximately 5,000 to 6,000 cfs while the net flow is near zero. When operated, flood tide flows are arrested while ebb tide flows remain in the range of 5,000 to 6,000 cfs. The net flow in Montezuma Slough becomes approximately 2,500 to 2,800 cfs. The USACE permit for operating the SMSCG requires that it be operated between October and May only when needed to meet Suisun Marsh salinity standards. Historically, the gate has been operated as early as October 1, although in some years (e.g., 1996) the gate was not operated at all. When the channel water salinity decreases sufficiently below the salinity standards, or at the end of the control season, CVP and SWP provide unrestricted movement through Montezuma Slough.

The approximately 2,800 cfs net flow induced by SMSCG operation is effective at moving the salinity downstream in Montezuma Slough. Salinity is reduced by roughly 100 percent at Belden's Landing, and by lesser amounts farther west along Montezuma Slough. At the same time, the salinity field in Suisun Bay moves upstream as net Delta outflow (measured nominally at Chipps Island) is reduced by gate operation. Net outflow through Carquinez Strait is not affected. The SMSCG are operated during the salinity control season, which spans from October to May.

Roaring River Distribution System

The Roaring River Distribution System (RRDS) was constructed during 1979 and 1980 to provide lower salinity water to 5,000 acres of private and 3,000 acres of CDFW-managed wetlands on Simmons, Hammond, Van Sickle, Wheeler, and Grizzly islands.

The RRDS includes a 40-acre intake pond that supplies water to Roaring River Slough. Motorized slide gates in Montezuma Slough and flap gates in the pond control flows through the culverts into the pond. A manually operated flap gate and flashboard riser are located at the confluence of Roaring River and Montezuma Slough to allow drainage back into Montezuma Slough for controlling water levels in the distribution system and for flood protection. DWR owns and operates this drain gate to ensure the Roaring River levees are not compromised during extremely high tides.

Water is diverted through a bank of eight 60-inch-diameter culverts equipped with fish screens into the Roaring River intake pond on high tides to raise the water surface elevation in RRDS above the adjacent managed wetlands. Managed wetlands north and south of the RRDS receive water, as needed, through publicly and privately owned turnouts on the system.

Morrow Island Distribution System

The Morrow Island Distribution System (MIDS) was constructed in 1979 and 1980 in the southwestern Suisun Marsh to channel drainage water from the adjacent managed wetlands for discharge into Suisun Slough and Grizzly Bay. This approach increases circulation and reduces salinity in Goodyear Slough.

The MIDS is used year-round, but most intensively from September through June. When managed wetlands are filling and circulating, water is tidally diverted from Goodyear Slough just south of Pierce Harbor through three 48-inch culverts. Drainage water from Morrow Island is discharged into Grizzly Bay by way of the C-Line Outfall (two 36-inch culverts) and into the mouth of Suisun Slough by way of the M-Line Outfall (three 48-inch culverts), rather than back into Goodyear Slough. This helps prevent increases in salinity due to drainage water discharges into Goodyear Slough. The M-Line ditch is approximately 1.6 miles long and the C-Line ditch is approximately 0.8 miles long.

5.3.2.3 CVP and SWP Conveyance Facilities Downstream of San Luis Reservoir

Water is released from the San Luis Reservoir into the lower portion the California Aqueduct that extends to Lake Perris in Riverside County and delivers water to the San Joaquin Valley, Central Coast, and southern California. The first reach of the California Aqueduct, the San Luis Canal, is jointly owned by the SWP and CVP and extends from San Luis Reservoir to Kettleman City. This reach includes Dos Amigos, Buena Vista, Teerink, and Chrisman pumping plants.

Near Kettleman City, water is diverted into the SWP Coastal Branch Aqueduct to serves agricultural areas west of the California Aqueduct and communities in San Luis Obispo and Santa Barbara counties.

The California Aqueduct continues into southern California through the Edmonston Pumping Plant, located at the foot of the Tehachapi Mountains, that raises the water 1,926 feet into approximately 8 miles of tunnels and siphons that convey water into Antelope Valley. At that location, the California Aqueduct divides into two branches; the East Branch and the West Branch.

The East Branch conveys water through the Tehachapi East Afterbay, Alamo Powerplant, Pearblossom Pumping Plant, and Mojave Siphon Powerplant into Silverwood Lake in the San Bernardino Mountains, which stores 73,000 acre-feet of water. From Silverwood Lake, water flows through the San Bernardino Tunnel into Devil Canyon Powerplant to Lake Perris. Lake Perris, located near the City of Riverside, provides up to 131,500 acre-feet of storage, and serves as a regulatory and emergency water supply facility for the East Branch. The Phase I of the East Branch Extension was completed in 2003 and conveys water to San Gorgonio Pass Water Agency and the eastern portion of the San Bernardino Valley Municipal Water District.

The West Branch conveys water through Oso Pumping Plant, Quail Lake, Lower Quail Canal, and William E. Warne Powerplant into Pyramid Lake in Los Angeles County. Water from Pyramid Lake is conveyed through the Angeles Tunnel, Castaic Powerplant, Elderberry Forebay, and Castaic Lake. Castaic Lake, located north of the City of Santa Clarita, provides 324,000 acre-feet of storage, and is a regulatory and emergency water supply facility for the West Branch. The Castaic Powerplant is owned and operated by the Los Angeles Department of Water and Power.

5.3.2.4 Non-CVP and SWP Reservoirs that Store CVP and SWP Water

The CVP and SWP water is delivered to water agencies. Some of those water agencies store the water in regional and local reservoirs. These reservoirs frequently store non-CVP and SWP water supplies, including local runoff or water diverted under separate water rights or contracts. The capacities of these reservoirs are listed in Tables 5.5, 5.6, and 5.7.

In the San Francisco Bay Area Region, CVP water is stored in the Contra Costa Water District Los Vaqueros Reservoir and the East Bay Municipal Utility District Upper San Leandro, San Pablo, Briones, and Lafayette reservoirs and Lake Chabot. The Los Vaqueros Reservoir, as previously described, also stores water diverted from the Delta under separate water rights. The East Bay Municipal Utility District reservoirs primarily store water diverted under water rights on the Mokelumne River.

In the Central Coast Region, a portion of the SWP water supply diverted in the Coastal Branch can be stored in Cachuma Lake for use by southern Santa Barbara County communities. Cachuma Lake is a facility owned and operated by Reclamation in Santa Barbara County as part of the Cachuma Project (not the CVP).

In the Southern California Region, SWP water is stored in the Metropolitan Water District of Southern California's Diamond Valley Lake and Lake Skinner; United Water Conservation District's Lake Piru; City of Escondido's Dixon Lake; City of San Diego's San Vicente, El Capitan, Lower Otay, Hodges, and Murray reservoirs; Helix Water District's Lake Jennings; Sweetwater Authority's Sweetwater Reservoir; and San Diego County Water Authority's Olivenhain Reservoir. There are future plans to expand local and regional water surface water storage.

5.3.3 Water Supplies Used by Central Valley Project and State Water Project Water Users

The CVP and SWP water supplies are the only water supplies available to some water users, many of the CVP Sacramento River Settlement Contractors, communities near Redding (Centerville, Clear Creek, and Shasta community services districts; Shasta County Water Agency), communities in the San Joaquin Valley (cities of Avenal, Coalinga, and Huron), and some communities served by the Antelope Valley-East Kern Water Agency. Other CVP and SWP water users rely upon other surface water supplies and groundwater. However, when the CVP and SWP water supplies are limited due to climate conditions and hydrology, the other surface water supplies are also limited.

Several CVP and SWP water users also rely upon other imported water supplies, including water from Solano Project (used by the Solano County Water Agency), San Francisco Public Utilities Commission (used by portions of the service areas of Alameda County Water District, Santa Clara Valley Water District, and Zone 7 Water Agency), and the Colorado River (used by portions of the service area of the Metropolitan Water District of Southern California and Coachella Valley Water District). These surface water supplies are also subject to reductions due to hydrologic conditions. In the case of water users that rely upon Colorado River water supplies, Delta water is used to dilute the salts and trace elements (e.g., selenium) in the Colorado River water in addition to providing direct water supplies (Reclamation 2012).

In response to recent reductions in CVP and SWP water supply reliability, water agencies have been improving regional and local water supply reliability through enhanced water conservation efforts, wastewater effluent and stormwater recycling, construction of surface water and groundwater storage facilities, and construction of desalination treatment plants for brackish water sources and ocean water sources. In addition, many agencies have constructed conveyance facilities to allow sharing of water supplies between communities, including the recent Bay Area Regional Water Supply Reliability project that provided conveyance opportunities between several CVP and SWP water users in the San Francisco Bay Area Region.

Water conservation is an integral part of water management in the study area. Water use efficiency programs and initiatives reduce the need for more expensive water supplies by facilitating the efficient use of existing water supplies. For example, a cost-effective component of many water plans is to reduce water use through educational tools that include commercial and residential guidance for water efficient landscapes, water use calculators for agricultural and municipal users, and conservation websites. All of these efforts are implemented to meet the statewide goals to reduce municipal per capita water use by 20 percent by 2020 and to optimize agricultural water use efficiency.

Water transfers also are an integral part of water management. Historically, water transfers primarily were in-basin transfers (e.g., Sacramento Valley water seller to Sacramento Valley water user) (Reclamation 2013b; DWR, Reclamation, USFWS and NMFS 2013). However, between 2001 and 2012, water transfers from the Sacramento Valley to the areas located south of the Delta of up to 298,806 acre-feet occurred (not including water transfers under the Environmental Water Account Program in the early 2000s) (DWR, Reclamation, USFWS and NMFS 2013). These transfers occurred in drier years. In the 2012 and 2013, the following types of water transfers occurred (DWR and SWRCB 2014).

- Water transfers involving CVP and SWP water:
  - 2012: 47,420 acre-feet of water transfers (43 percent were between agricultural water users, 36 percent were between municipal water users, and 21 percent were between agricultural and municipal water users).
  - 2013: 63,790 acre-feet of water transfers (28 percent were between agricultural water users, and 72 percent were between agricultural and municipal water users).
- Water transfers involving non-CVP and SWP water:
  - 2012: 188,074 acre-feet of water transfers (72 percent were between agricultural water users, 14 percent were from agricultural water users to

wildlife refuges, and 14 percent were between agricultural and municipal water users).

- 2013: 268,370 acre-feet of water transfers (72 percent were between agricultural water users, 1 percent were from agricultural water users to wildlife refuges, and 27 percent were between agricultural and municipal water users).

Until recently, most of the water transfers extended for one or two years. In 2008, one of the first long-term water transfer agreements was approved by the SWRCB for the Lower Yuba River Accord. The plan was designed to protect and enhance fisheries resources in the Lower Yuba River, increase local water supply reliability, provide DWR with increased operational flexibility for protection of Delta fisheries resources, and provide added dry-year water supplies to CVP and SWP water users, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. In 2013, Reclamation approved an overall program for a 25-year period (2014 to 2038) to transfer up to 150,000 acre-feet per year of water from the San Joaquin River Exchange Contractors Water Authority to DOI for refuge water supplies or CVP and SWP water users (Reclamation 2013b). Reclamation is currently evaluating a long-term water transfer program (2015 to 2024) between water sellers in the Sacramento Valley and water users located in the San Francisco Bay Area and south of the Delta (Reclamation 2014b).

5.3.4 Surface Water Resources and Water Supplies During Droughts

Drought is a gradual phenomenon and can best be thought of as a condition of water shortage for a particular user in a particular location. Although persistent drought may be characterized as an emergency, it differs from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a period of time. There is no universal definition of when a drought begins or ends. Impacts of drought are typically felt first by those most reliant on annual rainfall -- ranchers engaged in dryland grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable water source. Criteria used to identify statewide drought conditions do not address these localized impacts. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

Measurements of California water conditions cover only a small slice of the past. Widespread collection of rainfall and streamflow information began around the turn of the 20th century. During our period of recorded hydrology, the most significant statewide droughts occurred during 1928-34, 1976-77, 1987-92, and 2007-09. A significant regional drought occurred in parts of Southern California in 1999-2002. Historical data combined with estimates created from indirect indicators such as tree rings suggest that the 1928-34 event may have been the driest period in the Sacramento River watershed since about the mid-1550s.

5.3.4.1 Prior General Drought Responses

Previous droughts that have occurred throughout California's history are constantly shaping and innovating the ways in which DWR and Reclamation handle both public health standards and urban and agricultural water demand, as well as protecting the Delta ecosystem and its inhabitants. The most notable droughts in recent history are the droughts that occurred in 1976-77 and 1987-92. The climactic situation helped shape legislation and stressed the importance of maintaining water supplies for all water users.

The impacts of a dry hydrology in 1976 were mitigated by reservoir storage and groundwater availability. The immediate succession of an even drier 1977, however, set the stage for widespread impacts. In 1977 CVP agricultural water contractors received 25 percent of their allocations, municipal contractors received 25 to 50 percent, and the exchange contractors received 75 percent. SWP agricultural contractors received 40 percent of their allocations and urban contractors received 90 percent.

Managing Delta salinity is a major challenge, given the competing needs to preserve critical carry-over storage and to release water from storage to meet Bay-Delta water quality standards. In February 1977, the SWRCB adopted an interim water quality control plan to modify Delta standards to allow the SWP to conserve storage in Lake Oroville. As extremely dry conditions continued that spring, the SWRCB subsequently adopted an emergency regulation superseding its interim water quality control plan, temporarily eliminating most water quality standards and forbidding the SWP to export stored water. As a further measure to conserve reservoir storage, DWR constructed temporary facilities (i.e., rock barriers, new diversions for Sherman Island agricultural water users, and facilities to provide better water quality for duck clubs in Suisun Marsh) in the Delta to help manage salinity with physical, rather than hydraulic, approaches.

In 1977, SWP and CVP contractors used water exchanges to respond to drought. One of the largest exchanges involved 435,000 acre-feet of SWP contract water made available by Metropolitan Water District of Southern California and three other SWP Southern California water contractors for use by San Joaquin Valley irrigators and urban agencies in the San Francisco Bay area.

During the 1987-92 drought, the state's 1990 population was close to 80 percent of present amounts and irrigated acreage was roughly the same as that of the present, but the institutional setting for water management differed significantly. Delta regulatory constraints affecting CVP and SWP operations were based on SWRCB D-1485, which had taken effect in 1978 immediately following the 1976-77 drought. In addition to SWRCB D-1485 requirements on CVP and SWP operations in the Delta, other operational constraints included water temperature standards imposed by the SWRCB through Water Rights Orders 90-5 and 91-01 for portions of the Sacramento and Trinity rivers. As part of managing salinity during the drought, DWR installed temporary barriers at two South Delta locations (along Middle River and in Old River near the Delta-Mendota Canal intake) to improve water levels and water quality/water circulation for agricultural diverters.

5.3.4.2 Recent General Drought Response

As a result of more recent drought conditions, California Governor Edmund G. Brown issued a Drought Emergency Proclamation on January 17, 2014 that is effective through May 31, 2016. This proclamation directs the SWRCB to, among other things, consider petitions, such as Temporary Urgency Change Petitions (TUCP), to modify requirements for reservoir releases or diversion limitations that were established to implement a water quality control plan.

On January 29, 2014, Reclamation and DWR sought a temporary modification to their water rights permits and licenses through a TUCP, allowing the CVP and SWP to reduce Delta outflow and thus conserve upstream storage for later use. The resultant January 31, 2014, Governor's Executive Order (January Order) also allowed the projects to pump at a minimum level (up to a total of 1,500 cfs) to supply essential public health and safety needs when Delta outflow was lower than would typically allow such pumping. Reclamation and DWR convened a Real Time Drought Operations Management Team (RTDOMT) comprised of representatives from Reclamation, DWR, USFWS, NMFS, CDFW, and SWRCB to discuss more flexible operations of the projects while protecting beneficial uses. Throughout 2014, the federal and state fish and wildlife agencies worked in close coordination with Reclamation and DWR to receive, analyze, and respond to the CVP and SWP operators' requests for additional operational flexibility while still remaining within the boundaries of the applicable environmental laws and regulations.

The January Order was amended several times to allow project operators to pump at higher levels to capture storm run-off. The January Order was also extended and/or amended to modify SWRCB D-1641 Delta Outflow requirements. The *CVP and SWP Drought Operations Plan and Operational Forecast for April 1, 2014 through November 15, 2014* (DOP) (Reclamation and DWR 2014a), outlined critical CVP/SWP operational considerations including providing for essential human health and safety needs; maintaining salinity control; planning for installation of three emergency drought barriers; maintaining adequate water supply reserves for 2015; providing for cold water species' needs, CVP and SWP water supplies, and refuge water supplies; and providing for operational flexibility, exchanges, and transfers. The DOP included upstream tributary operations as well as further modifications to D-1641 provisions associated with Delta outflow levels, maximum export limits, Delta E:I averaging period, combined export limitations, Vernalis base and pulse flows, and agricultural salinity compliance locations. Modifications to the DOP were requested in September 2014, regarding changes to San Joaquin River flows at Vernalis and extension of the water transfer window.

The *CVP and SWP Drought Contingency Plan for October 15, 2014 through January 15, 2015* (Drought Contingency Plan) (Reclamation and DWR 2015a), was prepared by Reclamation and DWR in response to the SWRCB October 7, 2014 Modified TUC Order. This Plan provided an overview of current conditions and available supplies as they related to projected flow and storage conditions for assumed hydrology, and addressed projected water operations based on various hydrologic scenarios and potential adjustments to regulatory requirement through January 15, 2015.

The subsequent *Drought Contingency Plan for January 15, 2015 through September 30, 2015*, was prepared to incorporate changes in snowpack, reservoir storage, and updated hydrologic forecasts. The January 15, 2015, *Drought Contingency Plan* appended a December 12, 2014 working draft of the *Interagency 2015 Drought Strategy for the CVP and SWP* (Reclamation and DWR 2014b). The 2015 Drought Strategy described the anticipated coordination, process, planning, and potential drought response actions for 2015.

Similar to 2014, Reclamation and DWR jointly filed several TUCPs starting on January 23, 2015, to temporarily modify requirements in their water right permits and licenses for the SWP and CVP. The TUCPs requested temporary modification of requirements included in SWRCB Revised D-1641 to meet water quality objectives in the *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary*. Specifically, the TUCPs during 2015 requested modifications to Delta outflow, San Joaquin River flow, DCC gate operation, and export limit objectives/or requirements, as well as upstream tributary operations, Rio Vista flows, western Delta salinity, and San Joaquin River salinity objectives.

The combination of virtually no snowpack and diminished reservoir storage in the spring of 2015 convinced federal and state wildlife and water agency managers that an emergency salinity barrier on West False River in the Sacramento-San Joaquin Delta was needed to repel salinity that could threaten a source of water used by 25 million Californians. Installation of a single emergency salinity barrier across West False River began in early May; with removal scheduled by mid-November. The barrier helped to limit the tidal push of saltwater from San Francisco Bay into the central Delta and helped minimize the amount of fresh water that must be released during the summer from upstream reservoirs to repel saltwater. Sufficient reserves in upstream reservoirs are needed to repel saltwater and prevent the contamination of water supplies for residents of the Delta; Contra Costa, Alameda and Santa Clara counties, and the 25 million people who rely on the Delta-based federal and state water projects for at least some of their supplies. Removal of the emergency barrier by November 15 is needed to avoid the flood season and harm to migratory fish. While it is in place, boaters used alternative routes between the San Joaquin River and the Delta's interior.

5.3.4.3 Recent Drought Effects on Surface Water Resources and Supplies

California is currently in its fourth consecutive year of below-average rainfall and very low snowpack. Water Year 2015 is also the eighth of 9 years with below-average runoff, which has resulted in chronic and significant shortages to municipal and industrial, agricultural, and refuge water supplies and historically low levels of groundwater. As of October 2015, 46 percent of the state was experiencing an Extreme Drought and 25 percent was experiencing an Exceptional Drought, as recorded by the National Drought Mitigation Center, U.S. Drought Monitor (Drought Monitor 2015). Of particular concern has been the state's critically low snow pack which typically provides much of California's seasonal water storage. On April 1, 2015, for the first time in 75 years of early-April measurements, DWR found no snow at the Phillips snow course, a primary snowpack measurement site in the Sierra Nevada mountain range. Lack of precipitation the last several years has also contributed to low reservoir storage levels in the Sacramento watershed. Shasta Reservoir on the Sacramento River and Lake Oroville on the Feather River, and Folsom Lake on the American River were at 35 and 30 percent of capacity, respectively, on October 5, 2015 (58 and 49 percent of historical average, respectively). Trinity Lake on the Trinity River was at 22 percent of capacity and 32 percent of historical average. The San Joaquin River watershed in particular has experienced severely dry conditions for the past three years, with and New Melones Reservoir at 11 percent capacity (20 percent historical average as of October 5, 2015.

Recently, one of the most critical reservoir water elevations has occurred at Folsom Lake. On October 5, 2015, the storage was at 17 percent of capacity, or 21 percent of historical average at this time of the year. When the water elevations in Folsom Lake decline substantially, the intakes along Folsom Dam may not be able to operate at full capacity. Therefore, in 2015, Reclamation installed a barge and pump system in Folsom Lake to allow diversions when low water surface elevations would cause capacity issues for existing intakes.

Overall, in 2014 and 2015, CVP and SWP water allocations were substantially reduced. The final 2014 water allocations and the February 2015 water allocations were as follows (Reclamation 2015; DWR 2014e, 2015):

- CVP agricultural water contractors: zero percent in 2014 and 2015.
- CVP municipal and industrial contractors: 50 percent in 2014 and 25 percent in 2015.
- CVP Eastside Division contractors: 55 percent in 2014 and zero percent in 2015.
- CVP Friant Water Division Class I and II contractors: zero percent in 2014 and 2015.
- CVP Sacramento River Water Rights Settlement Contractors and Sacramento Valley wildlife refuges (Level 2 water supplies): 75 percent in 2014 and 2015 (based on preliminary allocations in February 2016).
- CVP San Joaquin River Exchange Contractors and San Joaquin Valley wildlife refuges (Level 2 water supplies): 65 percent in 2014 and 75 percent in 2015 (based on preliminary allocations in February 2016). In 2014 and 2015, San Joaquin River Exchange Contractors received a portion of the contract amounts from Millerton Lake.
- SWP agricultural and urban contractors: up to 20 percent of the Table A water contract amounts in 2014 and 2015.

- SWP Feather River water rights contractors: 100 percent in 2014 and 50 percent in 2015.

The Congressional Research Service summarized the following information prepared by the SWRCB to describe the economic impacts of the 2014 drought period (CRS 2015):

- 428,000 acres agricultural lands idled in the Central Valley, Central Coast, and Southern California regions.
- $447 million of increased cost to increase groundwater pumping.
- $2.2 billion total economic loss, including $1.5 billion direct loss to agriculture (or 3 percent of the total average agricultural production value).
- 17,100 agricultural-related jobs lost (including 3.8 percent of total farm employment).
- Unaccounted loses for commercial and recreational fishing, reservoir and river recreation, and non-agricultural water dependent industrial job losses.

Responses to droughts have changed since the 1976-77 drought. The federal and state governments have acknowledged the droughts early in the process and implemented emergency actions to preserve water supplies for future years in case the droughts extend over long-periods. As discussed above in this section, these actions have included reductions in water supply allocations as well as modification of regulatory requirements to protect future water supplies for all beneficial uses. The responses to drought are generally limited to short-term actions, including stringent water conservation by municipal users, increased groundwater pumping by municipal and agricultural users, and modification of regulatory requirements. However, these short-term responses generally cannot be maintained on a long-term basis without economic effects. Following the drought in 1987-92, longer term programs were initiated by both municipal and industrial water users. For example, water recycling increased 144 percent between 1977 and 1987, and 251 percent between 2009 and 1987 (SWRCB 2009). Other long-term water supply reduction programs were initiated after the previous droughts, including increased use of drip irrigation. For example, Westlands Water District increased the use of drip irrigation from 3 percent of the crops in 1990 to 65 percent of the crops in 2011 (WWD 2013). However, these types of long-term responses take time to implement and once the savings are realized, there is less flexibility to respond to future droughts because the savings have occurred on a long-term basis.

It is also recognized that some effects of droughts do not occur within the year that the drought occurs. For example, increased use of groundwater in one year may result in subsidence in following years. Effects in commercial and sport fishing ocean salmon fishing also would not be realized in the years that the drought occurs because loss of spawning populations affects available salmon stocks for several years and future spawning populations. For example, coded wire tag recoveries of Sacramento River fall-run Chinook Salmon for commercial fishing noticeably declined following the 1987-1992 and 2007-09 droughts up to 95 percent (PFMC 2015).

5.4 Impact Analysis

This section describes the potential mechanisms and analytical methods for change in surface water resources, results of the impact analysis, potential mitigation measures, and cumulative effects.

5.4.1 Potential Mechanisms for Change and Analytical Methods

As described in Chapter 4, Approach to Environmental Analysis, the impact assessment considers changes in surface water resources conditions related to changes in CVP and SWP operations under the alternatives as compared to the No Action Alternative and Second Basis of Comparison.

5.4.1.1 Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Changes in CVP and SWP operations under the alternatives as compared to the No Action Alternative and the Second Basis of Comparison would result in changes to reservoir storage volumes (and elevations) and flow patterns in the downstream rivers. Numerical models are available to quantitatively analyze the changes in CVP and SWP reservoirs and pumping plants in the Central Valley, affected surface water bodies, and deliveries of CVP and SWP water. Changes in reservoirs that store CVP and SWP water outside of the Central Valley are not included in the CVP and SWP numerical models, and are evaluated qualitatively.

The surface water supply analysis was conducted using the CalSim II model, as described in Appendix 5A, CalSim II and DSM2 Modeling, to simulate the operational assumptions of each alternative that were described in Chapter 3, Description of Alternatives.

5.4.1.1.1 Use of CalSim II Model

CalSim II is a reservoir-river basin planning model developed by DWR and Reclamation to simulate the operation of the CVP and SWP over a range of different hydrologic conditions. Inputs to CalSim II include water demands (including water rights), stream accretions and depletions, reservoir inflows, irrigation efficiencies, and parameters to calculate return flows, non-recoverable losses and groundwater operations. Sacramento Valley and tributary rim basin hydrology uses an adjusted historical sequence of monthly stream flows over an 82-year period (1922 to 2003) to represent a sequence of flows at a future level of development. Adjustments to historic water supplies are imposed based on future land use conditions and historical meteorological and hydrologic conditions. The resulting hydrology represents the water supply available from Central Valley streams to the CVP and SWP at a future level of development. Water rights deliveries to non-CVP and non-SWP water rights holders are not modified in the CalSim II simulations of the alternatives. CalSim II produces outputs for river flows and diversions, reservoir storage, Delta flows and exports, Delta inflow and outflow, deliveries to project and non-project users, and controls on project operations.

The CalSim II model monthly simulation of an actual daily (or even hourly) operation of the CVP and SWP results in several limitations in use of the model results. The model results must be used in a comparative manner to reduce the effects of use of monthly assumptions and other assumptions that are indicative of real-time operations, but do not specific match real-time observations. The CalSim II model output is based upon a monthly time step. The CalSim II model output includes minor fluctuations of up to 5 percent due to model assumptions and approaches. Therefore, if the quantitative changes between a specific alternative and the No Action Alternative and/or Second Basis of Comparison are 5 percent or less, the conditions under the specific alternative would be considered to be "similar" to conditions under the No Action Alternative and/or Second Basis of Comparison.

Under extreme hydrologic and operational conditions where there is not enough water supply to meet all requirements, CalSim II utilizes a series of operating rules to reach a solution to allow for the continuation of the simulation. It is recognized that these operating rules are a simplified version of the very complex decision processes that CVP and SWP operators would use in actual extreme conditions. Therefore, model results and potential changes under these extreme conditions should be evaluated on a comparative basis between alternatives and are an approximation of extreme operational conditions. As an example, CalSim II model results show simulated occurrences of extremely low storage conditions at CVP and SWP reservoirs during critical drought periods when storage is at dead pool levels at or below the elevation of the lowest level outlet. Simulated occurrences of reservoir storage conditions at dead pool levels may occur coincidentally with simulated impacts that are determined to be potentially significant. When reservoir storage is at dead pool levels, there may be instances in which flow conditions fall short of minimum flow criteria, salinity conditions may exceed salinity standards, diversion conditions fall short of allocated diversion amounts, and operating agreements are not met.

5.4.1.1.2 Analysis of Changes in Reservoir Storage and Downstream River Flows

CalSim II outputs for the alternatives are compared to the CalSim II outputs for the No Action Alternative and the Second Basis of Comparison to evaluate changes in reservoir storages at Trinity Lake, Shasta Lake, Lake Oroville, Folsom Lake, New Melones Reservoir, and San Luis Reservoir; flows downstream of CVP and SWP reservoirs in Trinity, Sacramento, Feather, American, Stanislaus rivers and Clear Creek; flows from the Sacramento River at Fremont Weir into the Yolo Bypass; Delta outflow; and reverse flows in Old and Middle rivers (OMR criteria).

The analyses discussed in Chapters 5 through 21 do not include specific analysis for Millerton Lake and the San Joaquin River between Friant Dam and the confluence with the Stanislaus River under Alternatives 1 through 5 as compared to the No Action Alternative and Second Basis of Comparison. The results of these analyses (presented in Appendix 5A, CalSim II and DSM2 Modeling) indicated that there were no differences in Millerton Lake storage or San Joaquin River flows upstream of the confluence with the Stanislaus River between Alternatives 1 through 5 as compared to the No Action Alternative and Second Basis of Comparison because implementation of the alternatives would not affect the operations of Millerton Lake. Therefore, conditions at Millerton Lake and the San Joaquin River between Friant Dam and the confluence of the Stanislaus River are not analyzed in this EIS.

The analyses discussed in Chapters 5 through 21 do not include specific analysis for creeks downstream of San Luis Reservoir complex. Unlike the rivers located downstream of CVP and SWP reservoirs (e.g., Sacramento River downstream of Shasta Dam), river channels located downstream of the San Luis Reservoir complex are not used to convey CVP and SWP water. Instream flows in these rivers would not be affected by changes in CVP and SWP operations. Therefore, flows in streams downstream of San Luis Reservoir are not analyzed in this EIS.

Reservoirs that store CVP and SWP water are also located in the San Francisco Bay Area, Central Coast, and Southern California regions. Many of these reservoirs also store water from other water supplies including CVP and SWP water. These reservoirs are not included in the CalSim II model simulation. Storage volumes in non-CVP and SWP reservoirs located south of the Delta that store CVP or SWP water also are affected by the availability local runoff stored in these reservoirs; and from imported Colorado River water in some Southern California reservoirs. This EIS does not analyze availability of future local runoff or imported Colorado River water supplies in 2030. For this EIS, it is assumed that under a worst-case scenario, changes in CVP and SWP water deliveries would result in similar changes to storage in these reservoirs. For example, reductions in CVP or SWP deliveries would result in reductions in storage in reservoirs located south of the Delta. Generally, river channels located downstream of these reservoirs are not used to convey CVP and SWP water. Instream flows in these rivers would not be affected by changes in CVP and SWP operations. Therefore, flows in these streams are not analyzed in this EIS.

5.4.1.2 Changes in Flows over Fremont Weir into Yolo Bypass

All of the alternatives, including the No Action Alternative and the Second Basis of Comparison, include operations of an operable gate at Fremont Weir, as described in Chapter 3, Description of Alternatives. Results of the CalSim II model were used to assess changes in average monthly flows that would flow into the Yolo Bypass over an operable gate at Fremont Weir. Operational assumptions for the operable gate were developed for the purposes of this EIS analysis, and are the same in all alternatives and the Second Basis of Comparison. Specific operational assumptions are being developed by Reclamation and others in a separate analysis that includes separate environmental documentation. Although the operational assumptions for an operable gate at Fremont Weir would be the same under all alternatives and the Second Basis of Comparison; the flow patterns into the Yolo Bypass would change based upon the magnitude of flows in the Sacramento River at Fremont Weir, as evaluated quantitatively using CalSim II model output. Assumptions used in the CalSim II model are described in Appendix 5A, CalSim II and DSM2 Modeling.

Flows also enter the Yolo Bypass at the Sacramento Weir (downstream of Fremont Weir) at a lower flow rate. However, the Sacramento Weir operations are assumed to remain as described in Section 5.3, Affected Environment, in all alternatives and the Second Basis of Comparison.

5.4.1.3 Changes in Delta Conditions

Changes in CVP and SWP operations under the alternatives as compared to the No Action Alternative and Second Basis of Comparison would change the Delta inflows from the tributary watersheds, Delta outflow, and reverse flows in Old and Middle River (as indicated by OMR flows). Results of the CalSim II model were used to assess changes in Delta outflow and positive and negative OMR flows. Assumptions used in the CalSim II model are described in Appendix 5A, CalSim II and DSM2 Modeling.

5.4.1.4 Changes in Delta Exports and CVP and SWP Deliveries

Changes in CVP and SWP operations under the alternatives as compared to the No Action Alternative and Second Basis of Comparison would change CVP and SWP exports and deliveries, as analyzed using the CalSim II model. Assumptions used in the CalSim II model are described in Appendix 5A, CalSim II and DSM2 Modeling.

It should be noted that deliveries to CVP and SWP water users located to the south of the Delta are not necessarily the same volume as the Delta export patterns because a portion of the exported water is stored in San Luis Reservoir and released on a different pattern than Delta exports.

It also should be noted that the monthly CalSim II model results do not represent daily water operations decisions, especially for extreme conditions. For example, in very dry years, the model simulates minimum reservoir volumes (also known as “dead pool conditions”) that appear to prevent Reclamation and DWR from meeting their contractual obligations, including water deliveries to CVP Sacramento River Settlement Contractors, CVP San Joaquin River Exchange Contractors, SWP Feather River Service Area Contractors, and Level II refuge water supplies. Such model results are anomalies that reflect the inability of the monthly model to make real-time policy decisions under extreme circumstances. Projected reservoir storage conditions near dead pool conditions should only be considered as an indicator of stressed water supply conditions, and not necessarily reflective of actual CVP and SWP operations in the future.

5.4.1.5 Effects Related to Water Transfers

Historically water transfer programs have been developed on an annual basis. The demand for water transfers is dependent upon the availability of water supplies to meet water demands. Water transfer transactions have increased over time as CVP and SWP water supply availability has decreased, especially during drier water years.

Parties seeking water transfers generally acquire water from sellers who have available surface water who can make the water available through releasing previously stored water, pumping groundwater instead of using surface water (groundwater substitution), idle crops, or substitute crops that uses less water in order to reduce normal consumptive use of surface water.

Water transfers using CVP and SWP Delta pumping plants and south of Delta canals generally occur when there is unused capacity in these facilities. These conditions generally occur during drier water year types when the flows from upstream reservoirs plus unregulated flows are adequate to meet the Sacramento Valley water demands and the CVP and SWP export allocations (defined as “balanced Delta conditions” in the COA, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations). In nonwet years, the CVP and SWP water allocations would be less than full contract amounts; therefore, capacity may be available in the CVP and SWP conveyance facilities to move water from other sources.

Water transfers using CVP and SWP conveyance facilities frequently do not occur when releases from upstream reservoirs plus unregulated flows are greater than the Sacramento Valley water demands and the CVP and SWP export allocations (defined as “excess Delta conditions in the COA) because the available water is being conveyed to meet the CVP and SWP contract demands. This condition generally occurs in winter and spring months of wet years.

Without implementation of the 2008 USFWS BO and 2009 NMFS BO, water transfers could occur in most months when exports are less than conveyance capacity. The 2008 USFWS BO and 2009 NMFS BO include export restrictions in the winter and spring months that limit use of the conveyance capacity.

Transfers requiring conveyance through the Delta occur when pumping and conveyance capacity at the CVP or SWP export facilities is available. Reclamation and DWR must coordinate review of the transfer proposals and related CVP and SWP operations to assure that the CVP and SWP are not impacted including the ability to exercise their own water rights or to meet their legal and regulatory requirements are not diminished or limited in any way. To avoid impacts to Delta water quality the individual transfer is assessed a carriage water loss to account for flows required to avoid impacts to Delta water quality or flow objectives. All transfers are required to be implemented in accordance with all existing regulations and requirements, including not causing adverse impacts on other water users in accordance with SWRCB requirements.

Reclamation recently prepared a long-term regional water transfer environmental document which evaluated potential changes in surface water conditions related to water transfer actions (Reclamation 2014i). Results from this analysis were used to inform the impact assessment of potential effects of water transfers under the alternatives as compared to the No Action Alternative and the Second Basis of Comparison.

5.4.2 Conditions in Year 2030 without implementation of Alternatives 1 through 5

The impact analysis in this EIS is based upon the comparison of the alternatives to the No Action Alternative and the Second Basis of Comparison in the Year 2030. Changes that would occur over the next 15 years without implementation of the alternatives are not analyzed in this EIS. However, the changes that are assumed to occur by 2030 under the No Action Alternative and the Second Basis of Comparison are summarized in this section.

Many of the changed conditions would occur in the same manner under both the No Action Alternative and the Second Basis of Comparison. Other future conditions would be different under the No Action Alternative as compared to the Second Basis of Comparison due to the implementation of the 2008 USFWS BO and 2009 NMFS BO under the No Action Alternative.

This section of Chapter 5 provides qualitative projections of the No Action Alternative as compared to existing conditions described under the Affected Environment; and qualitative projections of the Second Basis of Comparison as compared to "recent historical conditions." Recent historical conditions are not the same as existing conditions which include implementation of the 2008 USFWS BO and 2009 NMFS BO; and consider changes that would have occurred without implementation of the 2008 USFWS BO and the 2009 NMFS BO.

5.4.2.1 Common Changes in Conditions under the No Action Alternative and Second Basis of Comparison

Conditions in 2030 would be different than existing conditions due to:

- Climate change and sea-level rise
- General plan development throughout California, including increased water demands in portions of Sacramento Valley
- Implementation of reasonable and foreseeable water resources management projects to provide water supplies

These changes would result in a decline of the long-term average CVP and SWP water supply deliveries by 2030 as compared to recent historical long-term average deliveries.

5.4.2.1.1 Changes in Conditions due to Climate Change and Sea-Level Rise

It is anticipated that climate change would result in more short-duration high-rainfall events and less snowpack in the winter and early spring months. The reservoirs would be full more frequently by the end of April or May by 2030 than in recent historical conditions. However, as the water is released in the spring, there would be less snowpack to refill the reservoirs. This condition would reduce reservoir storage and available water supplies to downstream uses in the summer. The reduced end-of-September storage also would reduce the ability to release stored water to downstream regional reservoirs. These conditions would occur for all reservoirs in the California foothills and mountains, including non-CVP and SWP reservoirs.

Sea level rise also would result in reduced CVP and SWP reservoir storage. As sea level rise occurs, the location of the salt water-freshwater zone moves further inland. However, the CVP and SWP must continue to meet the salinity criteria to protect Delta water users and Delta aquatic resources, including the SWRCB D-1641 and other salinity criteria to protect Delta water users. To meet these criteria, the amount of water released from CVP and SWP reservoirs must be increased as compared to recent historical conditions.

Climate change also would cause changes in stream flows. During the storm events, the flows would be higher than in recent historical conditions because a larger portion of the precipitation would occur as rainfall instead of snowfall. Flows would increase in the spring as more water is released from CVP and SWP reservoirs to meet Delta salinity criteria. In the summer and fall months, flows could be lower due to reduced amounts of water remaining in reservoir storage.

Climate change also would reduce groundwater supplies due to reduced groundwater recharge potential and increased groundwater overdraft potential as surface water supplies decline. However, in some locations, sustainable groundwater supplies could remain similar to recent historical conditions or rise due to implementation of groundwater management plans to reduce groundwater overdraft, including the completion of ongoing groundwater recharge and recovery programs.

5.4.2.1.2 General Plan Development in California

Counties and cities throughout California have adopted general plans which identify land use classifications including those for municipal and industrial uses and those for agricultural uses. Preparation of general plans includes an environmental evaluation under the California Environmental Quality Act to identify adverse impacts to the physical environment and to provide mitigation measures to reduce those impacts to a level of less than significance. Most of the counties where CVP and SWP water supplies are delivered have adopted general plans following the environmental review of the plans and appropriate alternatives. Population projections from those general plan evaluations are provided to the State Department of Finance and are used to project future water needs and the potential for conversion of existing undeveloped lands and agricultural lands. Many of the existing general plans for counties with municipal areas recently have been modified to include land use and population projections through 2030. The No Action Alternative and the Second Basis of Comparison assume that land uses will develop through 2030 in accordance with existing general plans.

Development in accordance with the general plans in the Sacramento Valley would result in increased water demands. By 2030, water demands associated with water rights and CVP and SWP contracts in the Sacramento Valley is projected to increase by 443,000 acre-feet per year, especially in the communities in El Dorado, Placer, and Sacramento Counties. Increased water demands in the Sacramento Valley would result in reductions in CVP and SWP water supply availability for other water users under the No Action Alternative and the Second Basis of Comparison.

5.4.2.1.3 Reasonable and Foreseeable Water Resources Management Projects

The No Action Alternative and the Second Basis of Comparison assumes completion of water resources management and environmental restoration projects that would have occurred without implementation of the 2008 USFWS BO and 2009 NMFS BO by 2030, as described in Chapter 3, Description of Alternatives.

The No Action Alternative and the Second Basis of Comparison would include the following actions included in the 2008 USFWS BO and 2009 NMFS BO that are ongoing.

- Restoration of more than 10,000 acres of intertidal and associated subtidal wetlands in Suisun Marsh and Cache Slough and at least 17,000 to 20,000 acres of seasonal floodplain restoration in Yolo Bypass
- Gravel augmentation in the Sacramento Valley watershed
- Replacement of the Spring Creek Temperature Control Curtain
- Restoration of Battle Creek
- Implementation of Red Bluff Pumping Plant
- Implementation of the CVPIA Anadromous Fish Screen Program
- Implementation of the American River Flow Management Standard

Under the No Action Alternative and Second Basis of Comparison, it is assumed that water demands would be met on a long-term basis and in dry and critical dry years using a combination of conservation, CVP and SWP water supplies, other imported water supplies, groundwater, recycled water, infrastructure improvements, desalination water treatment, and water transfers and exchanges. It is anticipated that individual communities or users could be in a situation that would not allow for affordable water supply options, and that water demands could not be fully met. However, on a regional scale, it is anticipated that water demands would be met.

The assumptions related to 2030 municipal water demands are based upon a review of the 2010 Urban Water Management Plans (UWMPs) prepared by CVP and SWP water users. The No Action Alternative and the Second Basis of Comparison assumptions related to future water supplies presented in the UWMPs were evaluated to determine if the projects were reasonable and certain to occur by 2030. Projects that had undergone environmental review, were under design, or under construction were included in the future water supply assumptions for 2030 in the No Action Alternative and the Second Basis of Comparison. Projects described in the UWMPs that currently were under evaluation were included in the Cumulative Effects analysis for future water supplies. Future water supplies considered for municipalities by 2030 are presented in Appendix 5D and summarized in Table 5.10.

Table 5.10 Future Long-Term Average Municipal Water Supply Assumptions for CVP and SWP Water Users

	2030 Water Demands and Water Supplies				
	Central Valley Region – Sacramento Valley	**Central Valley Region – San Joaquin Valley**	**San Francisco Bay Area Region**	**Central Coast and Southern California Regions**	**Total**
2030 Water Demand (after conservation)	747,771	378,999	784,313	5,653,807	7,564,890
CVP Deliveries	214,187	131,150	311,370	–	656,707
SWP Deliveries	88,192	82,946	143,045	1,798,353	2,112,536
Water Rights	724,583	170,600	127,400	240,333	1,262,916
Groundwater	136,759	188,346	101,704	2,216,118	2,642,927
Recycled Wastewater	24,324	25,000	44,270	404,449	498,043
Recycled Stormwater	–	–	–	21,400	21,400
Desalination Water Treatment	–	–	5,100	454,145	459,245
Transfers and Exchanges	156,325	30,000	16,700	–	203,025
Non-CVP and SWP Imported Water Supplies	205,276	–	76,400	1,319,321	1,600,997
Total Supplies	**1,549,646**	**628,042**	**825,989**	**6,454,119**	**9,457,796**

Note: Does not include the East Bay Municipal Utility District dry year water supply.

The No Action Alternative and the Second Basis of Comparison assume that several CVP and SWP water users also rely upon other imported water supplies, including water from Solano Project (used by the Solano County Water Agency), San Francisco Public Utilities Commission (used by portions of the service areas of Alameda County Water District, Santa Clara Valley Water District, and Zone 7 Water Agency), and the Colorado River (used by portions of the service area of the Metropolitan Water District of Southern California).

The No Action Alternative and the Second Basis of Comparison assume that groundwater would continue to be used even if groundwater overdraft conditions continue or become worse. It is recognized that in September 2014 the Sustainable Groundwater Management Act (SGMA) was enacted. The SGMA provides for the establishment of a Groundwater Sustainability Agencies (GSAs) to prepare Groundwater Sustainability Plans (GSPs) that will include best management practices for sustainable groundwater management. The SGMA defines sustainable groundwater management as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results." Undesirable results are defined as any of the following effects.

- Chronic lowering of groundwater levels (not including overdraft during a drought if a basin is otherwise managed)
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies
- Significant and unreasonable land subsidence that substantially interferes with surface land uses
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

The SGMA requires the formation of GSPs in groundwater basins or subbasins that DWR designates as medium or high priority based upon groundwater conditions identified using the CAGESM results by 2022. Sustainable groundwater operations must be achieved within 20 years following completion of the GSPs. In some areas with adjudicated groundwater basins, sustainable groundwater management could be achieved and/or maintained by 2030. However, to achieve sustainable conditions in many areas, measures could require several years to design and construct water supply facilities to replace groundwater, such as seawater desalination. Therefore, it does not appear to be reasonable and foreseeable that sustainable groundwater management would be achieved by 2030; and it is assumed that groundwater pumping will continue to be used to meet water demands not fulfilled with surface water supplies or other alternative water supplies in 2030.

The No Action Alternative and the Second Basis of Comparison assumptions also include implementation of numerous conservation efforts and major water supply projects, including regional and local recycling projects, surface water and groundwater storage projects, conveyance improvement projects, and desalination projects, as described in Chapter 3, Description of Alternatives. There are over 50 projects considered in the study area to be included in the No Action Alternative, including the following major water supply projects.

- Cambria Emergency Water Supply Project desalination project (CCSD 2014)
- Carlsbad Metropolitan Water District (MWD) water recycling project (Carlsbad MWD 2012)
- Central Basin Municipal Water District Southeast Water Reliability Project (CBMWD 2011)
- City of Los Angeles Department of Water and Power groundwater recharge projects (City of Los Angeles 2011, 2013)
- City of Oxnard GREAT Program Desalter (City of Oxnard 2013)
- Eastern Municipal Water District (EMWD) water recycling programs (EMWD 2014a, 2014b)
- Fresno Irrigation District (FID) groundwater recharge projects (FID 2015)
- Inland Empire Utilities Agency (IEUA) groundwater recharge projects (IEUA 2015).
- Kern County and Antelope Valley-East Kern Water Agency (AVEK 2011)
- Los Angeles County Sanitation District expansion of water recycling programs (LACSD 2005)
- San Benito County Water District (SBCWD) expansion of water treatment plant to treat CVP water (SBCWD 2014)
- San Diego County Water Authority (SDCWA) Carlsbad Seawater Desalination Facility (SDCWA 2014)
- Santa Barbara desalination water treatment plant (KEYT News [KEYT] 2015).
- SCVWD wastewater recycling projects (SCVWD 2012a)
- Victor Valley Wastewater Reclamation Authority (VVWRA) water recycling programs (VVWRA 2015)
- Water Replenishment District (WRD) Groundwater Reliability Improvement Program and water recycling programs (WRD 2012, 2015)
- West Basin Municipal Water District recycling water programs (WBMWD 2011)
- Western Development and Storage Antelope Valley Water Bank (Reclamation 2010b)
- Western Municipal Water District (WMD) Arlington Desalter Expansion to use saline groundwater (WMD 2015)
- Woodland-Davis Clean Water Agency (WDCWA) water treatment plant (WDCWA 2013)

Water transfer programs, including those that require Warren Act contracts with Reclamation to convey non-CVP water in CVP facilities, are anticipated to continue under the No Action Alternative and the Second Basis of Comparison. Transfer programs generally involve annual crop changes using temporary crop idling or shifting, release of stored water in reservoirs on different patterns for the purchasers' water demands, and/or groundwater substitution (DWR and Reclamation 2014). The transfers must be approved by the CVP and/or SWP if the transfer involves CVP or SWP water or utilizes CVP or SWP facilities. Except for water transfers among CVP water users, water transfers also require approval from the SWRCB. Environmental documentation is required for all water transfers involving CVP and/or SWP water supplies or facilities. Under State law, water transfers cannot result in injury to other legal users of water; unreasonable impacts on fish and wildlife and instream uses; and unreasonable economic or environmental impact on the county in which the transfer water originates. It is assumed that transfers would continue under the No Action Alternative and the Second Basis of Comparison in a similar manner as have occurred for the past 10 years. It is anticipated that the number of long-term transfer agreements could increase to facilitate annual decisions for water transfers.

5.4.2.2 Changes in Conditions under the No Action Alternative

CVP and SWP operational criteria under the No Action Alternative would be the same as described under the Affected Environment. However, due to the climate change and sea-level rise and increased water demands in the Sacramento Valley, CVP and SWP water deliveries would be less in 2030 than under recent historical conditions. It is anticipated that climate change and sea level rise conditions would result in lower reservoir storage and elevations and flows in the rivers by the end of September.

5.4.2.3 Changes in Conditions under the Second Basis of Comparison

CVP and SWP operational criteria under the Second Basis of Comparison would not include implementation of the 2008 USFWS BO and 2009 NMFS BO. As described in Section 5.4.4.1, CVP and SWP water deliveries would higher than under existing conditions which include implementation of the BOs. However, due to the climate change and sea level rise and increased water demands in the Sacramento Valley, CVP and SWP water supply availability and deliveries would be less in 2030 than under recent historical conditions that existed prior to implementation of the BOs. It is anticipated that climate change and sea level rise conditions would result in lower reservoir storage and elevations and flows in the rivers by the end of September.

5.4.3 Evaluation of Alternatives

As described in Chapter 4, Approach to Environmental Analysis, Alternatives 1 through 5 have been compared to the No Action Alternative; and the No Action Alternative and Alternatives 1 through 5 have been compared to the Second Basis of Comparison.

During review of the numerical modeling analyses used in this EIS, two issues were discovered. First, it was discovered that the demands for the El Dorado Irrigation District (EID) and El Dorado County Water Agency (EDCWA) contracts were not included in Alternatives 3 and 5, as intended. Second, an error was determined in the CalSim II model assumptions related to the Stanislaus River operations for the Second Basis of Comparison, Alternative 1, and Alternative 4 model runs.

With respect to the water demands, the 17 TAF per year Warren Act Contract for EIS and 15 TAF per year under a CVP water service contract for EDCWA were not included in Alternatives 3 and 5, as intended. These demands are not included in the analysis presented in Chapters 5 through 21 of the EIS. A sensitivity analysis comparing the results of the analysis with and without these demands is presented in Appendix 5B of this EIS for Alternatives 3 and 5. The sensitivity analysis focuses on potential changes that would occur within Folsom Lake and along the American River. The results of this analysis indicate that surface water and water temperature conditions in Folsom Lake and in the American River would be similar (within 5 percent or less) in the model run with these demands as compared to model runs without these demands; except in August of critical dry years. In August of critical dry years, the American River flows under Alternative 3 would be 6 percent less with these demands than without these demands. It is anticipated that similar results would occur under the No Action Alternative. The results of these model runs indicated that there was not sensitivity with the addition of these demands in the analyses; therefore, no further model simulations were necessary to capture potential effects and the inclusion of these contracts would not change the previous conclusions in Chapters 5 through 21.

With respect to the CalSim II model assumptions related to the Stanislaus River operations for the Second Basis of Comparison, Alternative 1, and Alternative 4 model runs, a sensitivity analysis was conducted as presented in Appendix 5C. Appendix 5C includes a comparison of the CalSim II model run results presented in this chapter and CalSim II model run results with the error corrected. Appendix 5C also includes a discussion of changes in the comparison of the following alternative analysis.

- No Action Alternative compared to the Second Basis of Comparison
- Alternative 1 compared to the No Action Alternative
- Alternative 3 compared to the Second Basis of Comparison
- Alternative 5 compared to the Second Basis of Comparison

Model results for Alternatives 1, 4, and Second Basis of Comparison are the same, therefore Alternative 4 results are not presented separately. Model results for Alternative 2 and No Action Alternative are the same, therefore Alternative 2 results are not presented separately. Alternative 3 was not compared to the No Action Alternative because the model error did not occur in either of these model runs.

5.4.3.1 No Action Alternative

As described in Chapter 4, Approach to Environmental Analysis, the No Action Alternative is compared to the Second Basis of Comparison.

5.4.3.1.1 Trinity River Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Changes in Trinity Lake storage and surface water elevations under the No Action Alternative as compared to the Second Basis of Comparison in Trinity Lake are summarized in Tables 5.11 and 5.12. A summary of the results is provided following Table 5.12.

Table 5.11 Changes in Trinity Lake Storage under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	1,490	1,516	1,630	1,756	1,921	2,053	2,220	2,245	2,190	2,067	1,939	1,784
Above Normal	1,159	1,178	1,286	1,455	1,658	1,847	2,025	1,999	1,907	1,773	1,619	1,495
Below Normal	1,393	1,400	1,417	1,488	1,575	1,662	1,817	1,743	1,637	1,470	1,304	1,185
Dry	1,152	1,148	1,174	1,182	1,274	1,403	1,539	1,490	1,413	1,253	1,104	1,008
Critical Dry	747	731	746	750	790	872	923	888	862	745	612	536
Second Basis of Comparison												
Wet	1,501	1,535	1,644	1,767	1,931	2,055	2,224	2,250	2,194	2,068	1,939	1,805
Above Normal	1,208	1,245	1,363	1,524	1,718	1,901	2,079	2,053	1,955	1,815	1,647	1,513
Below Normal	1,451	1,472	1,492	1,554	1,641	1,729	1,872	1,799	1,696	1,515	1,337	1,204
Dry	1,178	1,184	1,210	1,230	1,322	1,453	1,586	1,536	1,466	1,302	1,152	1,055
Critical Dry	819	803	813	825	868	949	999	962	929	811	667	598
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-11	-19	-14	-11	-9	-2	-4	-5	-4	0	1	-21
Above Normal	-49	-68	-77	-69	-60	-54	-55	-54	-49	-42	-27	-18
Below Normal	-59	-72	-74	-66	-67	-67	-54	-57	-60	-44	-33	-18
Dry	-26	-36	-36	-48	-48	-49	-47	-46	-53	-48	-48	-48
Critical Dry	-73	-72	-68	-75	-78	-78	-76	-74	-66	-66	-56	-61
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-0.7	-1.3	-0.9	-0.6	-0.5	-0.1	-0.2	-0.2	-0.2	0.0	0.0	-1.2
Above Normal	-4.0	-5.4	-5.7	-4.5	-3.5	-2.9	-2.6	-2.7	-2.5	-2.3	-1.7	-1.2
Below Normal	-4.0	-4.9	-5.0	-4.2	-4.1	-3.9	-2.9	-3.1	-3.5	-2.9	-2.5	-1.5
Dry	-2.2	-3.1	-3.0	-3.9	-3.6	-3.4	-3.0	-3.0	-3.6	-3.7	-4.1	-4.5
Critical Dry	-8.9	-9.0	-8.3	-9.1	-8.9	-8.2	-7.6	-7.7	-7.2	-8.1	-8.4	-10.3

Table 5.12 Changes in Trinity Lake Elevation under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	2,300	2,303	2,313	2,324	2,338	2,347	2,357	2,358	2,355	2,347	2,338	2,327
Above Normal	2,261	2,264	2,276	2,294	2,314	2,330	2,343	2,341	2,335	2,325	2,313	2,302
Below Normal	2,289	2,289	2,291	2,299	2,307	2,315	2,327	2,321	2,313	2,299	2,283	2,272
Dry	2,263	2,265	2,268	2,269	2,279	2,292	2,305	2,301	2,294	2,279	2,264	2,254
Critical Dry	2,210	2,207	2,210	2,213	2,220	2,235	2,242	2,238	2,235	2,220	2,196	2,182
Second Basis of Comparison												
Wet	2,301	2,305	2,314	2,325	2,339	2,347	2,357	2,358	2,355	2,347	2,338	2,328
Above Normal	2,270	2,273	2,286	2,303	2,320	2,335	2,347	2,346	2,339	2,329	2,315	2,304
Below Normal	2,295	2,296	2,298	2,305	2,313	2,320	2,331	2,326	2,318	2,303	2,287	2,274
Dry	2,266	2,269	2,272	2,274	2,284	2,296	2,309	2,304	2,298	2,284	2,269	2,259
Critical Dry	2,218	2,216	2,217	2,222	2,229	2,243	2,250	2,246	2,243	2,227	2,204	2,191
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-1	-2	-1	-1	-1	0	0	0	0	0	0	-2
Above Normal	-8	-10	-10	-9	-7	-5	-4	-4	-4	-4	-2	-2
Below Normal	-6	-7	-7	-6	-6	-6	-4	-5	-5	-4	-3	-3
Dry	-3	-4	-4	-5	-5	-4	-4	-4	-5	-5	-5	-5
Critical Dry	-8	-8	-8	-9	-8	-8	-8	-8	-7	-8	-8	-9
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Above Normal	-0.4	-0.4	-0.5	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1
Below Normal	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1
Dry	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Critical Dry	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4

The following changes in Trinity Lake storage and surface water elevation would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet years, below normal, and dry years, storage would be similar (within 5 percent) in all months.
- In above-normal years, storage would be similar in January through October and less in November and December (up to 5.7 percent).
- In critical dry years, storage would be less in all months (up to 10.3 percent).

- In all months, in all water year types, surface water elevations would be similar.

The following changes would occur on the Trinity River under the No Action Alternative as compared to the Second Basis of Comparison, as shown on Figures 5.53 through 5.55.

- Over long-term conditions (over the 82-year analysis period), flows would be similar in March through November and reduced in December through February (up to 9.5 percent).
- In wet years, flows would be similar in April through November and reduced in December through March (up to 11.2 percent).
- In dry years, flows would be similar all months.

5.4.3.1.2 Central Valley Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Shasta Lake and Sacramento River

Storage levels and surface water elevations in Shasta Lake under the No Action Alternative as compared to the Second Basis of Comparison are summarized in Tables 5.13 and 5.14. Changes in flows in the Sacramento River downstream of Keswick Dam and at Freeport are shown on Figures 5.56 through 5.61. The results are summarized in Table 5.14.

Table 5.13 Changes in Shasta Lake Storage under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	2,700	2,719	3,077	3,384	3,589	3,836	4,298	4,460	4,242	3,735	3,410	2,985
Above Normal	2,369	2,385	2,600	3,167	3,453	4,021	4,404	4,429	4,039	3,407	3,069	2,834
Below Normal	2,587	2,548	2,686	3,062	3,442	3,814	4,026	3,957	3,588	3,002	2,643	2,608
Dry	2,345	2,283	2,428	2,621	3,034	3,505	3,737	3,668	3,284	2,767	2,496	2,462
Critical Dry	1,702	1,633	1,717	1,871	2,031	2,274	2,202	2,088	1,719	1,253	986	937
Second Basis of Comparison												
Wet	2,817	2,926	3,154	3,406	3,597	3,841	4,301	4,453	4,228	3,733	3,362	3,252
Above Normal	2,499	2,578	2,808	3,313	3,515	4,038	4,416	4,417	3,979	3,347	2,975	2,921
Below Normal	2,826	2,846	2,977	3,299	3,646	3,966	4,164	4,042	3,599	3,010	2,601	2,574
Dry	2,409	2,431	2,578	2,755	3,168	3,644	3,861	3,774	3,333	2,800	2,539	2,496
Critical Dry	1,873	1,826	1,911	2,050	2,222	2,460	2,386	2,270	1,861	1,409	1,151	1,086
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-117	-208	-77	-22	-8	-5	-3	7	14	2	49	-267
Above Normal	-130	-193	-208	-146	-62	-17	-12	11	60	60	94	-87
Below Normal	-239	-298	-291	-237	-204	-152	-138	-86	-10	-8	42	33
Dry	-64	-148	-150	-135	-134	-139	-123	-106	-48	-33	-42	-35
Critical Dry	-171	-193	-194	-179	-190	-186	-184	-183	-142	-155	-165	-149
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-4.2	-7.1	-2.4	-0.6	-0.2	-0.1	-0.1	0.2	0.3	0.1	1.4	-8.2
Above Normal	-5.2	-7.5	-7.4	-4.4	-1.8	-0.4	-0.3	0.3	1.5	1.8	3.2	-3.0
Below Normal	-8.5	-10.5	-9.8	-7.2	-5.6	-3.8	-3.3	-2.1	-0.3	-0.3	1.6	1.3
Dry	-2.6	-6.1	-5.8	-4.9	-4.2	-3.8	-3.2	-2.8	-1.5	-1.2	-1.7	-1.4
Critical Dry	-9.1	-10.6	-10.1	-8.7	-8.6	-7.5	-7.7	-8.0	-7.6	-11.0	-14.4	-13.8

Table 5.14 Changes in Shasta Lake Elevation under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	991	992	1,008	1,023	1,031	1,041	1,058	1,064	1,056	1,037	1,024	1,005
Above Normal	967	968	982	1,012	1,025	1,048	1,062	1,063	1,049	1,024	1,009	999
Below Normal	986	985	991	1,009	1,025	1,040	1,048	1,045	1,031	1,006	989	987
Dry	969	967	975	986	1,006	1,027	1,037	1,034	1,018	995	982	980
Critical Dry	927	923	929	939	951	968	965	958	935	899	876	872
Second Basis of Comparison												
Wet	997	1,002	1,012	1,024	1,032	1,041	1,058	1,063	1,055	1,037	1,022	1,017
Above Normal	974	978	992	1,019	1,028	1,048	1,062	1,062	1,046	1,021	1,005	1,003
Below Normal	997	998	1,004	1,019	1,034	1,046	1,053	1,049	1,031	1,006	987	986
Dry	972	974	982	992	1,012	1,032	1,041	1,038	1,020	997	984	982
Critical Dry	938	935	941	950	961	977	974	967	943	910	889	884
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-6	-10	-4	-1	0	0	0	0	1	0	2	-12
Above Normal	-7	-10	-10	-7	-3	-1	0	0	2	3	4	-4
Below Normal	-11	-14	-13	-10	-9	-6	-5	-4	-1	-1	2	1
Dry	-3	-7	-7	-6	-6	-6	-5	-4	-2	-2	-3	-2
Critical Dry	-11	-12	-12	-11	-10	-9	-9	-9	-8	-11	-13	-12
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-0.6	-1.0	-0.4	-0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	-1.2
Above Normal	-0.7	-1.0	-1.0	-0.7	-0.3	-0.1	0.0	0.0	0.2	0.3	0.4	-0.4
Below Normal	-1.1	-1.4	-1.3	-1.0	-0.8	-0.6	-0.5	-0.3	-0.1	-0.1	0.2	0.1
Dry	-0.3	-0.7	-0.7	-0.6	-0.6	-0.5	-0.5	-0.4	-0.2	-0.2	-0.3	-0.2
Critical Dry	-1.2	-1.3	-1.3	-1.1	-1.0	-0.9	-1.0	-1.0	-0.8	-1.2	-1.4	-1.4

The following changes in Shasta Lake storage and surface water elevations would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in October and December through August and reduced in September and November (up to 8.2 percent).
- In above-normal years, storage would be similar in January through September and reduced in October through December (up to 7.5 percent).
- In below-normal years, storage would be similar in March through September and reduced in October through February (up to 10.5 percent).

- In dry years, storage would be similar in January through October and reduced in November and December (up to 6.1 percent).
- In critical dry years, storage would be reduced under all months (up to 14.4 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes in Sacramento River flows would occur under the No Action Alternative as compared to the Second Basis of Comparison, as shown on Figures 5.56 through 5.61.

- Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
  - Over long-term conditions, similar flows would occur in October, February through May, July, and August; increased flows in September and November (up to 37.7 percent); and reduced flows in December, January, and June (up to 7.8 percent).
  - In wet years, similar flows would occur in January through July; increased flows in September through November (up to 77.7 percent); and reduced flows in December and August (up to 14.6 percent).
  - In dry years, similar flows would occur in July through October, December through March, and May; increased flows in November (33.4 percent); and reduced flows in April and June (up to 7.3 percent).
- Sacramento River near Freeport (near the northern boundary of the Delta) (Figures 5.59 through 5.61).
  - Over long-term conditions, similar flows would occur in October, December through May, and August; increased flows in September, November, and July (up to 43.3 percent); and reduced flows in June (11.4 percent).
  - In wet years, similar flows would occur in January through June and October; increased flows in July through September and November (up to 90.3 percent); and reduced flows in December (10.7 percent).
  - In dry years, similar flows would occur in August through October and December through April; increased flows in November and July (up to 15.8 percent); and reduced flows in May and June (up to 11.9 percent).

Lake Oroville and Feather River

Storage levels and surface water elevations in Lake Oroville under the No Action Alternative as compared to the Second Basis of Comparison are summarized in Tables 5.15 and 5.16. Changes in flows in the Feather River downstream of Thermalito Complex are shown on Figures 5.62 through 5.64. The results are summarized in Table 5.16.

1 **Table 5.15 Changes in Lake Oroville Storage under the No Action Alternative as**
2 **Compared to the Second Basis of Comparison**

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	1,691	1,732	2,189	2,554	2,832	2,942	3,300	3,488	3,445	2,964	2,626	2,109
Above Normal	1,279	1,322	1,485	1,959	2,519	2,892	3,247	3,393	3,232	2,600	2,117	1,659
Below Normal	1,542	1,497	1,507	1,719	2,122	2,397	2,653	2,714	2,530	1,923	1,513	1,307
Dry	1,206	1,158	1,177	1,305	1,582	1,938	2,178	2,210	1,951	1,478	1,287	1,144
Critical Dry	1,092	1,029	1,019	1,108	1,223	1,381	1,408	1,392	1,243	1,018	917	865
Second Basis of Comparison												
Wet	1,936	1,984	2,354	2,636	2,871	2,942	3,300	3,477	3,402	2,976	2,728	2,569
Above Normal	1,465	1,523	1,702	2,173	2,648	2,937	3,271	3,357	3,081	2,493	2,087	1,827
Below Normal	1,823	1,783	1,831	2,037	2,361	2,627	2,875	2,836	2,461	1,930	1,637	1,424
Dry	1,371	1,324	1,344	1,473	1,764	2,120	2,363	2,357	2,031	1,688	1,427	1,261
Critical Dry	1,117	1,044	1,041	1,125	1,235	1,406	1,423	1,407	1,219	1,027	911	839
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-245	-252	-165	-82	-39	0	0	10	43	-12	-102	-459
Above Normal	-187	-201	-217	-214	-129	-44	-24	37	150	107	29	-167
Below Normal	-281	-285	-324	-318	-239	-230	-222	-122	69	-7	-125	-117
Dry	-165	-165	-167	-168	-182	-182	-185	-147	-80	-210	-140	-117
Critical Dry	-25	-15	-22	-17	-12	-25	-16	-15	25	-8	6	26
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-12.6	-12.7	-7.0	-3.1	-1.4	0.0	0.0	0.3	1.3	-0.4	-3.7	-17.9
Above Normal	-12.7	-13.2	-12.7	-9.9	-4.9	-1.5	-0.7	1.1	4.9	4.3	1.4	-9.2
Below Normal	-15.4	-16.0	-17.7	-15.6	-10.1	-8.8	-7.7	-4.3	2.8	-0.4	-7.6	-8.2
Dry	-12.0	-12.5	-12.4	-11.4	-10.3	-8.6	-7.8	-6.2	-3.9	-12.4	-9.8	-9.3
Critical Dry	-2.2	-1.5	-2.1	-1.5	-1.0	-1.8	-1.1	-1.1	2.0	-0.8	0.7	3.1

Table 5.16 Changes in Lake Oroville Elevation under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	743	748	794	829	852	859	884	897	894	861	836	790
Above Normal	698	703	722	776	828	856	880	890	879	835	794	746
Below Normal	730	725	726	751	793	818	838	842	828	773	729	704
Dry	688	683	686	704	737	775	798	800	775	724	702	684
Critical Dry	674	667	664	678	693	712	715	712	693	663	648	640
Second Basis of Comparison												
Wet	768	773	810	837	854	859	884	896	891	861	844	831
Above Normal	717	723	745	796	838	859	882	888	869	826	790	763
Below Normal	757	752	757	779	812	834	854	852	823	775	743	719
Dry	706	701	705	721	755	791	814	813	784	748	718	698
Critical Dry	677	668	668	680	694	715	716	714	691	664	647	636
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-24	-25	-16	-8	-3	0	0	1	3	0	-8	-41
Above Normal	-19	-21	-24	-20	-10	-3	-2	3	10	10	4	-18
Below Normal	-27	-27	-31	-28	-20	-17	-16	-9	5	-1	-14	-14
Dry	-18	-18	-18	-17	-18	-16	-15	-14	-9	-24	-17	-15
Critical Dry	-3	-1	-3	-3	-1	-3	-2	-2	2	0	1	4
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-3.2	-3.2	-1.9	-0.9	-0.3	0.0	0.0	0.1	0.3	-0.1	-0.9	-5.0
Above Normal	-2.7	-2.9	-3.2	-2.5	-1.2	-0.4	-0.2	0.3	1.2	1.2	0.5	-2.3
Below Normal	-3.6	-3.6	-4.0	-3.6	-2.4	-2.0	-1.9	-1.1	0.6	-0.2	-1.9	-2.0
Dry	-2.5	-2.6	-2.6	-2.4	-2.4	-2.0	-1.9	-1.7	-1.2	-3.2	-2.3	-2.1
Critical Dry	-0.4	-0.2	-0.5	-0.4	-0.2	-0.4	-0.2	-0.3	0.4	0.0	0.2	0.6

The following changes in Lake Oroville storage and surface water elevations would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in January through August and reduced in September through December (up to 17.9 percent).
- In above-normal years, storage would be similar in February through August and reduced in September through January (up to 13.2 percent).
- In below-normal years, storage would be similar in May through July and reduced in August through April (up to 17.7 percent).

- In dry years, storage would be similar in June and reduced in all other months (up to 12.5 percent).
- In critical dry years, storage would be similar under all months.
- In all months, in all water year types, surface water elevations would be similar.

The following changes in Feather River flows would occur under the No Action Alternative as compared to the Second Basis of Comparison, as shown on Figures 5.62 through 5.64.

- Over long-term conditions, similar flows would occur in November and April; increased flows in July through September (up to 76.1 percent); and reduced flows in October, December through March, May, and June (up to 27.2 percent).
- In wet years, similar flows would occur in October through November and March through May; increased flows in July through September (up to 184 percent) and reduced flows in December through February (up to 26.0 percent).
- In dry years, similar flows would occur in November through March; increased flows in April and July (up to 52.4 percent); and reduced flows in August through October and May and June (up to 27.6 percent).

Folsom Lake and American River

Storage levels and surface water elevations in Folsom Lake under the No Action Alternative as compared to the Second Basis of Comparison are summarized in Tables 5.17 and 5.18. Changes in flows in the American River downstream of Nimbus Dam are shown on Figures 5.65 through 5.67. The results are summarized in Table 5.18.

Table 5.17 Changes in Folsom Lake Storage under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	454	435	514	518	515	632	785	951	941	800	712	576
Above Normal	377	380	429	513	531	640	787	946	887	621	552	477
Below Normal	446	431	467	484	533	619	757	843	780	527	472	453
Dry	394	383	408	423	479	579	691	760	658	495	443	419
Critical Dry	324	305	315	320	366	432	475	486	415	327	267	231
Second Basis of Comparison												
Wet	483	470	522	524	515	632	785	951	937	793	688	646
Above Normal	390	412	467	537	538	640	787	946	857	591	522	485
Below Normal	506	489	502	514	541	626	761	847	739	475	408	387
Dry	405	399	423	437	486	585	698	769	664	486	432	408
Critical Dry	339	317	323	325	369	436	469	482	430	352	288	258
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-29	-35	-8	-6	0	0	0	0	4	7	25	-70
Above Normal	-13	-33	-38	-24	-7	0	0	1	30	31	30	-8
Below Normal	-59	-58	-35	-30	-8	-7	-4	-4	41	52	64	66
Dry	-12	-16	-15	-14	-7	-6	-7	-9	-5	9	11	11
Critical Dry	-14	-11	-9	-5	-3	-3	6	4	-16	-25	-21	-28
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-6.1	-7.4	-1.5	-1.2	0.0	0.0	0.0	0.0	0.5	0.9	3.6	-10.8
Above Normal	-3.4	-7.9	-8.2	-4.5	-1.3	0.0	0.0	0.1	3.5	5.2	5.7	-1.6
Below Normal	-11.7	-11.9	-7.0	-5.8	-1.4	-1.1	-0.5	-0.5	5.5	11.0	15.6	17.1
Dry	-2.9	-4.0	-3.5	-3.2	-1.4	-1.0	-1.1	-1.1	-0.8	1.9	2.5	2.8
Critical Dry	-4.2	-3.6	-2.7	-1.6	-0.7	-0.7	1.2	0.8	-3.6	-7.2	-7.2	-10.8

Table 5.18 Changes in Folsom Lake Elevation under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	409	407	418	418	418	432	448	464	464	449	440	425
Above Normal	394	395	405	418	420	433	449	464	458	430	422	413
Below Normal	408	406	411	414	420	431	445	454	447	418	411	409
Dry	400	399	403	405	413	426	438	445	434	414	408	405
Critical Dry	386	384	389	390	396	406	411	412	401	386	374	366
Second Basis of Comparison												
Wet	412	412	419	419	418	432	448	465	464	449	438	433
Above Normal	397	400	410	421	421	433	448	465	456	427	419	414
Below Normal	415	414	416	417	421	432	446	455	443	410	401	398
Dry	401	401	405	407	414	427	439	446	435	413	406	403
Critical Dry	389	386	390	391	397	406	410	411	404	391	378	372
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-4	-5	-1	-1	0	0	0	-1	0	1	3	-8
Above Normal	-2	-5	-5	-3	-1	0	0	-1	3	4	4	-1
Below Normal	-7	-7	-4	-4	-1	-1	-1	-1	4	8	10	10
Dry	-1	-2	-2	-2	-1	-1	-1	-1	-1	1	1	1
Critical Dry	-3	-2	-2	-1	0	0	1	0	-2	-5	-4	-6
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-0.9	-1.1	-0.2	-0.2	0.0	0.0	0.0	-0.2	-0.1	0.2	0.6	-1.9
Above Normal	-0.6	-1.3	-1.2	-0.7	-0.2	0.0	0.0	-0.1	0.6	0.9	0.8	-0.2
Below Normal	-1.8	-1.8	-1.1	-0.9	-0.2	-0.2	-0.1	-0.2	0.9	1.9	2.5	2.6
Dry	-0.3	-0.5	-0.5	-0.4	-0.2	-0.2	-0.2	-0.3	-0.2	0.3	0.3	0.4
Critical Dry	-0.7	-0.6	-0.4	-0.2	-0.1	-0.1	0.2	0.1	-0.6	-1.2	-1.1	-1.7

The following changes in Folsom Lake storage would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in December through August and reduced in September through November (up to 10.8 percent).
- In above-normal years, storage would be similar in January through June, September, and October; reduced in November and December (up to 8.2 percent); and increased in July and August (up to 5.7 percent).
- In below-normal years, storage would be similar in February through May; reduced in October through January (up to 11.9 percent); and increased in July through September (up to 17.1 percent).

- In dry years, storage would be similar in all months.
- In critical dry years, storage would be similar in October through June and reduced in July through September (up to 10.8 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes in American River flows would occur under the No Action Alternative as compared to the Second Basis of Comparison, as shown on Figures 5.65 through 5.67.

- Over long-term conditions, similar flows would occur in November through May and July; increased flows in September and October (up to 44.7 percent); and reduced flows in June and August (up to 6.1 percent).
- In wet years, similar flows would occur in October through November and January through July; increased flows in September (91.1 percent) and reduced flows in December and August (up to 10.7 percent).
- In dry years, similar flows would occur in all months except October, February and July; increased flows in October (16.5 percent); and reduced flows in February and July (up to 7.3 percent).

Clear Creek

Changes in flows in Clear Creek downstream of Whiskeytown Dam are summarized in Table 5.19. Monthly Clear Creek flows under the No Action Alternative as compared to the Second Basis of Comparison are identical except in May. In May, under the No Action Alternative, flows are up to 40.7 percent higher than under the Second Basis of Comparison in accordance with the 2009 NMFS BO.

Table 5.19 Changes in Clear Creek Flows below Whiskeytown Dam under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	200	200	200	309	356	272	200	277	200	85	85	150
Above Normal	181	182	188	192	196	196	196	277	200	85	85	150
Below Normal	195	195	195	195	195	195	195	274	191	85	85	150
Dry	175	184	188	190	190	190	190	267	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	214	111	85	85	133
Second Basis of Comparison												
Wet	200	200	200	309	356	272	200	200	200	85	85	150
Above Normal	181	182	188	192	196	196	196	200	200	85	85	150
Below Normal	195	195	195	195	195	195	195	195	191	85	85	150
Dry	178	184	188	190	190	190	190	190	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	167	111	85	85	133
No Action Alternative as Compared to Second Basis of Comparison												
Wet	0	0	0	0	0	0	0	77	0	0	0	0
Above Normal	0	0	0	0	0	0	0	77	0	0	0	0
Below Normal	0	0	0	0	0	0	0	78	0	0	0	0
Dry	-3	0	0	0	0	0	0	77	0	0	0	0
Critical Dry	0	0	0	0	0	0	0	47	0	0	0	0
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.1	0.0	0.0	0.0	0.0
Dry	-1.6	0.0	0.0	0.0	0.0	0.0	0.0	40.7	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.3	0.0	0.0	0.0	0.0

New Melones Reservoir and Stanislaus River

Storage levels and surface water elevations in New Melones Reservoir under the No Action Alternative as compared to the Second Basis of Comparison, are summarized in Tables 5.20 and 5.21. Changes in flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 through 5.70. The results are summarized in Table 5.21.

Table 5.20 Changes in New Melones Reservoir Storage under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	1,379	1,390	1,454	1,562	1,666	1,724	1,758	1,878	1,968	1,890	1,773	1,703
Above Normal	1,029	1,060	1,125	1,214	1,317	1,406	1,413	1,484	1,467	1,372	1,277	1,232
Below Normal	1,294	1,305	1,326	1,351	1,413	1,438	1,390	1,383	1,359	1,268	1,175	1,133
Dry	1,094	1,094	1,106	1,121	1,156	1,188	1,154	1,132	1,087	997	914	871
Critical Dry	624	623	638	645	661	656	602	554	526	476	431	408
Second Basis of Comparison												
Wet	1,443	1,446	1,502	1,606	1,709	1,794	1,833	1,962	1,994	1,917	1,803	1,731
Above Normal	1,092	1,116	1,175	1,261	1,360	1,455	1,481	1,543	1,516	1,419	1,321	1,274
Below Normal	1,364	1,366	1,378	1,397	1,453	1,479	1,461	1,447	1,415	1,322	1,228	1,183
Dry	1,149	1,143	1,149	1,161	1,191	1,221	1,210	1,176	1,131	1,039	956	912
Critical Dry	667	663	674	680	696	690	646	585	557	498	449	426
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-64	-56	-49	-44	-43	-70	-75	-84	-25	-27	-30	-28
Above Normal	-62	-56	-50	-46	-43	-48	-68	-59	-49	-46	-44	-42
Below Normal	-69	-61	-52	-46	-40	-41	-71	-63	-55	-54	-52	-51
Dry	-55	-49	-43	-40	-35	-33	-56	-45	-44	-43	-42	-42
Critical Dry	-44	-40	-37	-36	-35	-34	-45	-31	-31	-23	-18	-18
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-4.4	-3.9	-3.2	-2.7	-2.5	-3.9	-4.1	-4.3	-1.3	-1.4	-1.6	-1.6
Above Normal	-5.7	-5.0	-4.2	-3.7	-3.2	-3.3	-4.6	-3.8	-3.3	-3.3	-3.3	-3.3
Below Normal	-5.1	-4.5	-3.8	-3.3	-2.8	-2.8	-4.9	-4.4	-3.9	-4.1	-4.3	-4.3
Dry	-4.8	-4.3	-3.8	-3.4	-3.0	-2.7	-4.6	-3.8	-3.9	-4.1	-4.4	-4.6
Critical Dry	-6.6	-6.1	-5.4	-5.2	-5.0	-5.0	-6.9	-5.3	-5.5	-4.5	-4.0	-4.2

Table 5.21 Changes in New Melones Reservoir Elevation under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	980	982	990	1,004	1,016	1,023	1,026	1,039	1,047	1,040	1,029	1,022
Above Normal	932	937	945	960	974	986	988	997	996	985	973	967
Below Normal	968	969	972	975	985	988	985	985	983	972	960	955
Dry	943	943	944	947	951	957	955	953	948	934	922	915
Critical Dry	856	856	862	864	870	871	860	848	840	828	818	812
Second Basis of Comparison												
Wet	989	990	997	1,009	1,021	1,030	1,034	1,047	1,050	1,043	1,032	1,025
Above Normal	941	944	951	966	979	992	995	1,003	1,001	990	978	972
Below Normal	977	977	979	982	991	994	994	993	991	980	968	962
Dry	951	950	950	953	957	962	963	960	954	941	929	922
Critical Dry	866	866	870	872	878	879	871	856	850	835	823	817
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-9	-8	-7	-6	-5	-8	-8	-8	-3	-3	-3	-3
Above Normal	-9	-7	-6	-6	-6	-6	-8	-7	-5	-5	-5	-5
Below Normal	-9	-8	-7	-7	-6	-6	-9	-8	-7	-8	-8	-8
Dry	-8	-7	-6	-6	-5	-5	-8	-7	-7	-7	-7	-7
Critical Dry	-10	-10	-9	-8	-8	-8	-11	-8	-10	-6	-5	-6
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-0.9	-0.8	-0.7	-0.6	-0.5	-0.7	-0.8	-0.8	-0.3	-0.3	-0.3	-0.3
Above Normal	-0.9	-0.8	-0.7	-0.6	-0.6	-0.6	-0.8	-0.7	-0.5	-0.5	-0.5	-0.5
Below Normal	-0.9	-0.8	-0.7	-0.7	-0.6	-0.6	-0.9	-0.8	-0.7	-0.8	-0.8	-0.8
Dry	-0.8	-0.8	-0.7	-0.7	-0.6	-0.5	-0.9	-0.7	-0.7	-0.7	-0.8	-0.8
Critical Dry	-1.2	-1.1	-1.0	-1.0	-0.9	-0.9	-1.2	-1.0	-1.2	-0.8	-0.6	-0.7

The following changes in New Melones Reservoir storage would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet, below-normal, and dry years, storage would be similar in all months.
- In above-normal years, storage would be similar in all months except October when storage would be reduced by 5.7 percent.
- In critical dry years, storage would be similar in February, March, and July through September and reduced in October through January and April through June (up to 6.9 percent).

- In all months, in all water year types, surface water elevations would be similar.

Flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 to 5.70. Changes in flows in these rivers are summarized below.

- Over long-term conditions, similar flows would occur in May and July through September; increased flows in October, March, and April (up to 148.7 percent); and reduced flows in November through February and June (up to 33.8 percent).
- In wet years, similar flows would occur in February and April; increased flows in October, March, May, July, and August (up to 117.1 percent); and reduced flows in September, November through January, and June (up to 50.8 percent).
- In dry years, similar flows would occur in July through September; increased flows in October and April (up to 154.3 percent); and reduced flows in November through March, May, and June (up to 35.7 percent).

San Joaquin River at Vernalis

Flows in the San Joaquin River at Vernalis are summarized below, as shown on Figures 5.71 through 5.73.

- Over long-term conditions, similar flows would occur in July through September and November through May; increased flows in October (19 percent); and reduced flows in June (8 percent).
- In wet years, similar flows would occur in July through September and November through May; increased flows in October (16.8 percent); and reduced flows in June (9.4 percent).
- In dry years, similar flows would occur in November through March and May through September; and increased flows in October and April (up to 18.3 percent).

San Luis Reservoir

Storage levels and surface water elevations in San Luis Reservoir under the No Action Alternative as compared to the Second Basis of Comparison are summarized in Tables 5.22 and 5.23. A summary of the results is provided following Table 5.23.

Table 5.22 Changes in San Luis Reservoir Storage under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	555	681	931	1,236	1,526	1,788	1,598	1,251	946	741	628	679
Above Normal	490	649	957	1,223	1,441	1,661	1,444	1,048	666	466	433	513
Below Normal	525	624	907	1,141	1,314	1,473	1,312	967	555	500	426	467
Dry	476	590	867	1,150	1,339	1,494	1,413	1,167	840	763	476	469
Critical Dry	478	556	752	1,040	1,204	1,252	1,192	1,028	739	544	343	323
Second Basis of Comparison												
Wet	790	1,017	1,365	1,748	1,965	2,033	2,031	1,852	1,487	1,167	889	925
Above Normal	658	883	1,213	1,671	1,913	2,001	1,995	1,717	1,263	861	612	631
Below Normal	854	1,064	1,334	1,742	1,908	1,980	1,908	1,628	1,251	964	635	591
Dry	617	764	998	1,427	1,728	1,925	1,870	1,665	1,341	1,007	660	596
Critical Dry	622	709	910	1,257	1,556	1,664	1,623	1,451	1,168	808	545	472
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-234	-336	-433	-513	-439	-245	-433	-601	-541	-426	-261	-245
Above Normal	-168	-234	-257	-448	-471	-341	-551	-669	-598	-395	-179	-117
Below Normal	-329	-439	-427	-601	-594	-507	-596	-660	-696	-465	-209	-124
Dry	-141	-174	-130	-277	-390	-431	-457	-498	-501	-244	-185	-127
Critical Dry	-144	-153	-158	-217	-352	-412	-431	-423	-429	-263	-202	-149
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-25.2	-19.8	-21.2	-29.1	-11.8	9.4	-57.2	-51.8	-2.3	5.8	9.6	-3.2
Above Normal	-12.2	-13.6	-12.2	-43.4	-31.3	-12.9	-71.2	-71.0	-24.1	2.6	9.5	-3.5
Below Normal	-29.6	-23.4	-5.3	-42.6	-28.7	-21.2	-60.1	-67.1	-49.5	4.5	20.4	0.7
Dry	-14.0	-16.3	-6.7	-32.3	-39.1	-35.5	-40.7	-44.9	-29.3	34.2	-9.2	-2.8
Critical Dry	-7.7	-15.2	-15.7	-19.4	-38.4	-32.7	-30.7	-25.3	-51.1	60.2	-13.0	-3.0

Table 5.23 Changes in San Luis Reservoir Elevation under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	399	414	443	473	500	523	507	475	444	422	409	416
Above Normal	391	411	445	472	492	512	493	456	415	389	386	398
Below Normal	397	410	442	465	481	496	481	448	400	393	383	389
Dry	391	406	437	466	484	498	490	468	434	426	390	389
Critical Dry	390	400	423	454	470	475	469	453	422	399	369	366
Second Basis of Comparison												
Wet	426	451	485	520	538	543	543	529	497	468	440	443
Above Normal	412	437	470	513	534	541	540	518	477	437	409	411
Below Normal	435	457	483	519	533	539	533	510	476	448	412	406
Dry	407	425	450	492	518	535	530	513	484	453	415	406
Critical Dry	409	419	441	475	502	512	509	494	468	432	400	389
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-26	-37	-42	-46	-38	-20	-36	-53	-53	-46	-30	-27
Above Normal	-21	-26	-25	-41	-41	-29	-47	-61	-62	-48	-23	-14
Below Normal	-38	-47	-42	-54	-52	-43	-52	-62	-76	-56	-30	-17
Dry	-17	-19	-12	-25	-34	-37	-40	-45	-51	-27	-25	-18
Critical Dry	-19	-20	-18	-21	-32	-38	-40	-41	-45	-32	-32	-24
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-6.2	-8.2	-8.7	-8.9	-7.0	-3.7	-6.7	-10.1	-10.7	-9.8	-6.9	-6.1
Above Normal	-5.1	-6.0	-5.4	-8.1	-7.7	-5.3	-8.7	-11.8	-13.0	-11.0	-5.7	-3.3
Below Normal	-8.6	-10.2	-8.6	-10.4	-9.8	-8.0	-9.7	-12.1	-16.0	-12.4	-7.2	-4.1
Dry	-4.1	-4.4	-2.8	-5.1	-6.6	-6.9	-7.5	-8.8	-10.4	-5.9	-6.0	-4.3
Critical Dry	-4.7	-4.7	-4.1	-4.5	-6.4	-7.3	-7.8	-8.3	-9.7	-7.4	-7.9	-6.2

The following changes in San Luis Reservoir storage would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in June and September; increased in March, July, and August (up to 9.6 percent); and reduced in October through February, April, and May (up to 57.2 percent).
- In above-normal years, storage would be similar in July and September; increased in August (9.5 percent); and reduced in October through June (up to 71.2 percent).

- In below-normal years, storage would be similar in July and September; increased in August (20.4 percent); and reduced in October through June (up to 67.1 percent).
- In dry years, storage would be similar in September; increased in July (34.2 percent); and reduced in October through June and August (up to 44.0 percent).
- In critical dry years, storage would be similar in September; increased in July (60.2 percent); and reduced in August and October through June (up to 51.1 percent).

The following changes in San Luis Reservoir surface water elevations would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet years, surface water elevations would be less in all months (up to 10.7 percent).
- In above-normal years, surface water elevations would be less in all months (up to 13.0 percent).
- In below-normal years, surface water elevations would be less in all months (up to 16.0 percent).
- In dry years, surface water elevations would be similar in September through January and less in February through August (up to 10.4 percent).
- In critical dry years, surface water elevations would be similar in October through January and reduced in February through September (up to 9.7 percent).

Changes in Flows into the Yolo Bypass at Fremont Weir

Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under the No Action Alternative as compared to the Second Basis of Comparison are summarized in Table 5.24. The results are summarized following Table 5.24.

Table 5.24 Changes in Flows into the Yolo Bypass at Fremont Weir under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	183	910	8,420	24,291	29,547	18,493	5,627	289	113	0	0	100
Above Normal	100	100	2,765	5,997	13,013	7,928	1,688	100	100	0	0	100
Below Normal	100	100	242	1,004	3,031	883	293	100	100	0	0	100
Dry	100	100	322	902	2,024	1,393	407	100	100	0	0	100
Critical Dry	100	100	149	528	534	396	106	100	100	0	0	100
Second Basis of Comparison												
Wet	147	996	9,888	25,442	30,547	18,997	5,602	289	113	0	0	100
Above Normal	100	100	2,659	6,349	15,114	8,566	1,765	100	100	0	0	100
Below Normal	100	100	262	1,256	4,057	1,166	292	100	100	0	0	100
Dry	100	100	342	932	2,032	1,411	411	100	100	0	0	100
Critical Dry	100	100	149	542	533	408	106	100	100	0	0	100
No Action Alternative as Compared to Second Basis of Comparison												
Wet	37	-86	-1,468	-1,151	-1,000	-504	25	0	0	0	0	0
Above Normal	0	0	106	-352	-2,102	-638	-77	0	0	0	0	0
Below Normal	0	0	-20	-253	-1,026	-283	1	0	0	0	0	0
Dry	0	0	-20	-30	-7	-17	-4	0	0	0	0	0
Critical Dry	0	0	-1	-15	1	-12	0	0	0	0	0	0
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	25.0	-8.7	-14.8	-4.5	-3.3	-2.7	0.4	-0.1	-0.1	0.0	0.0	0.0
Above Normal	0.0	0.0	4.0	-5.5	-13.9	-7.4	-4.3	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	-7.5	-20.1	-25.3	-24.3	0.3	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	-5.9	-3.2	-0.4	-1.2	-1.0	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	-0.5	-2.7	0.2	-2.9	0.0	0.0	0.0	0.0	0.0	0.0

The following changes in flows from the Sacramento River into Yolo Bypass at Fremont Weir would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- In wet years, flows into Yolo Bypass would be similar in January through September; increased in October (25 percent); and reduced in November and December (up to 14.8 percent).
- In above-normal years, flows into Yolo Bypass would be similar in April through December and reduced in January through March (up to 13.9 percent).

- In below-normal years, flows into Yolo Bypass would be similar in April through November and reduced in December through March (up to 25.3 percent).
- In dry years, flows into Yolo Bypass would be similar in January through November and reduced in December (5.9 percent).
- In critical dry years, flows into Yolo Bypass would be similar in all months.

Changes in Delta Conditions

Delta outflow under the No Action Alternative as compared to the Second Basis of Comparison are summarized below and shown on Figures 5.74 through 5.76.

- In wet years, average monthly Delta outflow in July through November, January, April, and May (up to 13,683 cfs) and decrease in December, February, March, and June (up to 1,590 cfs).
- In dry years, average monthly Delta outflow would be similar or increase (up to 3,114 cfs).

The OMR conditions under the No Action Alternative as compared to the Second Basis of Comparison are summarized below and shown on Figures 5.76 through 5.78.

- Under the No Action Alternative, OMR flows are negative except in April and May of wet and above normal years and April of below normal years. Under the Second Basis of Comparison, OMR flows are negative in all months of all water year types.
- In wet years, average monthly OMR flows would be more positive in September through February, April, and May (up to 10,005 cfs) and more negative in March and June through August (up to 923 cfs).
- In dry years, average monthly OMR flows would be more positive in August through June (up to 3,489 cfs) and more negative in June (2,073 cfs).

Changes in CVP and SWP Exports and Deliveries

Delta exports under the No Action Alternative as compared to the Second Basis of Comparison are summarized in Table 5.25.

Table 5.25 Changes in Exports at Jones and Banks Pumping Plants under the No Action Alternative as Compared to the Second Basis of Comparison

Water Year	Monthly Volume (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No Action Alternative												
Wet	410	497	564	513	537	594	204	207	445	669	717	638
Above Normal	376	450	562	406	401	496	130	105	315	587	709	628
Below Normal	386	456	590	387	354	394	134	100	209	657	622	542
Dry	374	398	510	392	315	318	153	126	194	541	296	426
Critical Dry	314	293	384	349	250	179	93	90	64	223	176	242
Second Basis of Comparison												
Wet	549	619	716	724	609	543	476	430	456	632	655	660
Above Normal	428	521	641	716	584	570	453	363	415	572	647	651
Below Normal	548	595	623	674	497	500	337	304	414	629	517	539
Dry	435	475	546	579	518	493	259	228	274	403	325	438
Critical Dry	340	345	455	433	406	266	134	121	132	139	203	249
No Action Alternative as Compared to Second Basis of Comparison												
Wet	-139	-123	-152	-211	-72	51	-272	-223	-11	37	63	-21
Above Normal	-52	-71	-78	-311	-183	-73	-322	-257	-100	15	61	-23
Below Normal	-162	-139	-33	-287	-143	-106	-203	-204	-205	28	105	4
Dry	-61	-77	-36	-187	-202	-175	-105	-102	-80	138	-30	-12
Critical Dry	-26	-52	-71	-84	-156	-87	-41	-31	-67	84	-26	-8
No Action Alternative as Compared to Second Basis of Comparison (percent change)												
Wet	-25.2	-19.8	-21.2	-29.1	-11.8	9.4	-57.2	-51.8	-2.3	5.8	9.6	-3.2
Above Normal	-12.2	-13.6	-12.2	-43.4	-31.3	-12.9	-71.2	-71.0	-24.1	2.6	9.5	-3.5
Below Normal	-29.6	-23.4	-5.3	-42.6	-28.7	-21.2	-60.1	-67.1	-49.5	4.5	20.4	0.7
Dry	-14.0	-16.3	-6.7	-32.3	-39.1	-35.5	-40.7	-44.9	-29.3	34.2	-9.2	-2.8
Critical Dry	-7.7	-15.2	-15.7	-19.4	-38.4	-32.7	-30.7	-25.3	-51.1	60.2	-13.0	-3.0

The following changes would occur in CVP and SWP exports under the No Action Alternative as compared to the Second Basis of Comparison.

- Long-term average annual exports would be 1,051 TAF (18 percent) less under the No Action Alternative as compared to the Second Basis of Comparison.
- In wet years, total exports would be similar in June and September; reduced in October through February, April, and May (up to 57.2 percent); and increased in March, July, and August (up to 9.6 percent).
- In above-normal and below-normal years, total exports would be similar in July and September; reduced in October through June (up to 71.2 and

67.1 percent, respectively); and increased in August (up to 9.5 and 20.4 percent, respectively).

- In dry and critical dry years, total exports would be similar in September; reduced in October through June and August (up to 44.9 and 51.1 percent, respectively); and increased in July (34.2 and 60.2 percent, respectively).

Deliveries to CVP and SWP water users decline under the No Action Alternative as compared to the Second Basis of Comparison, as summarized in Tables 5.26 and 5.27, respectively, due to reduced water supply availability and export limitations.

Table 5.26 Changes in CVP Water Deliveries under the No Action Alternative as Compared to the Second Basis of Comparison

Annual Average Deliveries (TAF)					
				No Action Alternative as Compared to the Second Basis of Comparison	
		No Action Alternative	Second Basis of Comparison	Difference	Percent Change
North of Delta					
CVP Agricultural Water Service Contractors	Long Term	185	219	-34	-16
	Dry	86	122	-37	-30
	Critical Dry	24	35	-12	-34
CVP Municipal and Industrial (M&I) (Including American River Contractors and CCWD)	Long Term	386	392	-7	-2
	Dry	385	390	-5	-1
	Critical Dry	383	383	1	0
CVP M&I American River Contractors	Long Term	113	120	-7	-6
	Dry	97	105	-8	-8
	Critical Dry	75	79	-5	-6
CVP Sacramento River Settlement Contractors	Long Term	1,859	1,858	1	0
	Dry	1,906	1,905	1	0
	Critical Dry	1,737	1,732	5	0
CVP Refuge Level 2 Deliveries	Long Term	146	155	-8	-5
	Dry	146	151	-5	-3
	Critical Dry	102	105	-3	-3

Annual Average Deliveries (TAF)					
		No Action Alternative	Second Basis of Comparison	No Action Alternative as Compared to the Second Basis of Comparison: Difference	No Action Alternative as Compared to the Second Basis of Comparison: Percent Change
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,576	2,624	-48	-2
	Dry	2,523	2,568	-45	-2
	Critical Dry	2,246	2,255	-9	0
South of Delta (Does not include Eastside Contractors)					
CVP Agricultural Water Service Contractors	Long Term	847	1,100	-253	-23
	Dry	445	650	-206	-32
	Critical Dry	131	195	-64	-33
CVP M&I Users	Long Term	112	125	-13	-10
	Dry	99	109	-10	-9
	Critical Dry	80	85	-4	-5
San Joaquin River Exchange Contractors	Long Term	852	852	0	0
	Dry	875	875	0	0
	Critical Dry	741	741	0	0
CVP Refuge Level 2 Deliveries	Long Term	273	272	1	0
	Dry	281	280	1	0
	Critical Dry	234	232	3	1
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,084	2,349	-266	-11
	Dry	1,700	1,914	-216	-11
	Critical Dry	1,186	1,253	-68	-5
Eastside Contractors Deliveries					
Water Rights	Long Term	508	514	-6	-1
	Dry	524	524	0	0
	Critical Dry	445	486	-42	-9

<table>
<tr><th colspan="6">Annual Average Deliveries (TAF)</th></tr>
<tr><th colspan="2" rowspan="2"></th><th rowspan="2">No Action Alternative</th><th rowspan="2">Second Basis of Comparison</th><th colspan="2">No Action Alternative as Compared to the Second Basis of Comparison</th></tr>
<tr><th>Difference</th><th>Percent Change</th></tr>
<tr><td rowspan="3">CVP Water Service Contracts</td><td>Long Term</td><td>104</td><td>118</td><td>-15</td><td>-13</td></tr>
<tr><td>Dry</td><td>84</td><td>98</td><td>-13</td><td>-13</td></tr>
<tr><td>Critical Dry</td><td>4</td><td>25</td><td>-21</td><td>-84</td></tr>
<tr><td rowspan="3">Total Water Rights and CVP Service Contracts Deliveries</td><td>Long Term</td><td>612</td><td>632</td><td>-21</td><td>-3</td></tr>
<tr><td>Dry</td><td>608</td><td>622</td><td>-13</td><td>-2</td></tr>
<tr><td>Critical Dry</td><td>449</td><td>511</td><td>-63</td><td>-12</td></tr>
</table>

The following changes in CVP water deliveries would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 16 percent over the long-term conditions (averaged over the 82-year period analyzed with CalSim II), 30 percent in dry years, and 34 percent in critical dry years.
- Deliveries to CVP North of Delta M&I contractors would be similar in total; however, deliveries to the American River CVP contractors would be reduced by 6 percent over the long-term conditions, 8 percent in dry years, and 6 percent in critical dry years.
- Deliveries to CVP South of Delta agricultural water service contractors would be reduced by 23 percent over the long-term conditions, 32 percent in dry years, and 33 percent in critical dry years.
- Deliveries to CVP South of Delta M&I contractors would be reduced by 10 percent over the long-term conditions, 9 percent in dry years, and 5 percent in critical dry years.
- Deliveries to the Eastside contractors would be similar under the long-term conditions and dry years, but reduce by 12 percent in critical dry years.

Table 5.27 Changes in SWP Water Deliveries under the No Action Alternative as Compared to the Second Basis of Comparison

Annual Average Deliveries (TAF)					
				No Action Alternative as Compared to the Second Basis of Comparison	
		No Action Alternative	Second Basis of Comparison	Difference	Percent Change
North of Delta					
SWP Agricultural Uses	Long Term	0	0	0	0
	Dry	0	0	0	0
	Critical Dry	0	0	0	0
SWP M&I (without Article 21)	Long Term	68	83	-15	-18
	Dry	51	62	-11	-18
	Critical Dry	43	53	-11	-20
SWP M&I Article 21 Deliveries	Long Term	13	12	1	9
	Dry	14	13	1	7
	Critical Dry	13	12	1	9
Total SWP Agricultural and M&I (without Article 21)	Long Term	68	83	-15	-18
	Dry	51	62	-11	-18
	Critical Dry	43	53	-11	-20
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	13	12	1	9
	Dry	14	13	1	7
	Critical Dry	13	12	1	9
South of Delta					
SWP Agricultural Users (without Article 21)	Long Term	610	750	-139	-19
	Dry	455	567	-112	-20
	Critical Dry	378	484	-106	-22

Annual Average Deliveries (TAF)					
				No Action Alternative as Compared to the Second Basis of Comparison	
		No Action Alternative	Second Basis of Comparison	Difference	Percent Change
SWP Agricultural Article 21 Deliveries	Long Term	27	178	-152	-85
	Dry	5	143	-138	-96
	Critical Dry	7	100	-93	-93
SWP M&I Users (without Article 21)	Long Term	1,800	2,183	-383	-18
	Dry	1,406	1,732	-327	-19
	Critical Dry	1,173	1,494	-321	-21
SWP M&I Article 21 Deliveries	Long Term	20	104	-84	-81
	Dry	5	86	-82	-95
	Critical Dry	5	58	-53	-91
Total SWP Agricultural and M&I Users (without Article 21)	Long Term	2,410	2,933	-523	-18
	Dry	1,861	2,299	-439	-19
	Critical Dry	1,551	1,978	-427	-22
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	47	282	-236	-83
	Dry	10	229	-219	-96
	Critical Dry	12	158	-146	-92

The following changes in SWP water deliveries would occur under the No Action Alternative as compared to the Second Basis of Comparison.

- Deliveries without Article 21 water to SWP North of Delta water contractors would be reduced by 18 percent over the long-term conditions; 18 percent in dry years; and 20 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be reduced by 18 percent over the long-term conditions; 19 percent in dry years; and 22 percent in critical dry years.

- Deliveries of Article 21 water to SWP North of Delta water contractors would be increased by 9 percent over the long-term conditions; 7 percent in dry years; and 9 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be reduced by 83 percent over the long-term conditions; 96 percent in dry years; and 92 percent in critical dry years.

Effects Related to Cross Delta Water Transfers

Potential effects to surface water resources could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i). Potential effects were identified as reduced surface water storage in upstream reservoirs and changes in flow patterns in river downstream of the reservoirs if water was released from the reservoirs in patterns that were different than would have been used by the water seller's. Because all water transfers would be required to avoid adverse impacts to other water users and biological resources (see Section 3.A.6.3, Transfers), including impacts associated with changes in reservoir storage and river flow patterns; the analysis indicated that water transfers would not result in substantial changes in storage or river flows. For the purposes of this EIS, it is anticipated that similar conditions would occur due to cross Delta water transfers under the No Action Alternative and the Second Basis of Comparison.

Under the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September in accordance with the 2008 USFWS BO and 2009 NMFS BO. The maximum amount of water to be transferred would be 600,000 acre-feet per year in critical dry years or in dry years following a dry or critical dry year. In all other water year types, the maximum amount of water would be 360,000 acre-feet per year. The maximum amount of water that can be exported in the CVP and SWP facilities is approximately 770,000 acre-feet per month. As indicated in Table 5.25, capacity would be available under the No Action Alternative between July and September for water transfers in all water year types.

Under the Second Basis of Comparison, water could be transferred throughout the year. As indicated in Table 5.25, capacity would be available under the Second Basis of Comparison in all months of all water year types without a maximum volume of transferred water.

Overall, the potential for water transfer conveyance would be less under the No Action Alternative than under the Second Basis of Comparison.

5.4.3.1.3 San Francisco Bay Area, Central Coast, and Southern California Regions

Potential Changes in Surface Water Resources at Reservoirs that Store CVP and SWP Water

The San Francisco Bay Area, Central Coast, and Southern California regions include numerous reservoirs that store CVP and SWP water supplies, including

CVP and SWP reservoirs, that primarily provide water supplies for M&I water users. Changes in the availability of CVP and SWP water supplies for storage in these reservoirs under the No Action Alternative as compared to the Second Basis of Comparison would be consistent with the following changes in water deliveries to M&I water users, as summarized in Tables 5.26 and 5.27.

- Deliveries to CVP South of Delta M&I contractors and reservoirs in the San Francisco Bay Area would be reduced by 10 percent over the long-term conditions; 9 percent in dry years; and 7 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors and reservoirs in the San Francisco Bay Area, Central Coast, and Southern California regions would be reduced by 18 percent over the long-term conditions; 19 percent in dry years; and 22 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors and reservoirs in the San Francisco Bay Area, Central Coast, and Southern California regions would be reduced by 83 percent over the long-term conditions; 96 percent in dry years; and 92 percent in critical dry years.

Changes in CVP and SWP Deliveries

Deliveries to CVP and SWP water users are described in Section 5.4.3.1.2, Central Valley Region.

5.4.3.2 Alternative 1

As described in Chapter 3, Description of Alternatives, Alternative 1 is identical to the Second Basis of Comparison. Alternative 1 is compared to the No Action Alternative and the Second Basis of Comparison. However, because water resource conditions under Alternative 1 are identical to water resource conditions under the Second Basis of Comparison; Alternative 1 is only compared to the No Action Alternative.

5.4.3.2.1 Alternative 1 Compared to the No Action Alternative

Trinity River Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Changes in Trinity Lake storage and surface water elevations under Alternative 1 as compared to the No Action Alternative are summarized in Tables 5.28 and 5.29. A summary of the results is provided following Table 5.29.

Table 5.28 Changes in Trinity Lake Storage under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	1,501	1,535	1,644	1,767	1,931	2,055	2,224	2,250	2,194	2,068	1,939	1,805
Above Normal	1,208	1,245	1,363	1,524	1,718	1,901	2,079	2,053	1,955	1,815	1,647	1,513
Below Normal	1,451	1,472	1,492	1,554	1,641	1,729	1,872	1,799	1,696	1,515	1,337	1,204
Dry	1,178	1,184	1,210	1,230	1,322	1,453	1,586	1,536	1,466	1,302	1,152	1,055
Critical Dry	819	803	813	825	868	949	999	962	929	811	667	598
No Action Alternative												
Wet	1,490	1,516	1,630	1,756	1,921	2,053	2,220	2,245	2,190	2,067	1,939	1,784
Above Normal	1,159	1,178	1,286	1,455	1,658	1,847	2,025	1,999	1,907	1,773	1,619	1,495
Below Normal	1,393	1,400	1,417	1,488	1,575	1,662	1,817	1,743	1,637	1,470	1,304	1,185
Dry	1,152	1,148	1,174	1,182	1,274	1,403	1,539	1,490	1,413	1,253	1,104	1,008
Critical Dry	747	731	746	750	790	872	923	888	862	745	612	536
Alternative 1 as Compared to No Action Alternative												
Wet	11	19	14	11	9	2	4	5	4	0	-1	21
Above Normal	49	68	77	69	60	54	55	54	49	42	27	18
Below Normal	59	72	74	66	67	67	54	57	60	44	33	18
Dry	26	36	36	48	48	49	47	46	53	48	48	48
Critical Dry	73	72	68	75	78	78	76	74	66	66	56	61
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	0.7	1.3	0.9	0.6	0.5	0.1	0.2	0.2	0.2	0.0	0.0	1.2
Above Normal	4.2	5.7	6.0	4.7	3.6	2.9	2.7	2.7	2.5	2.4	1.7	1.2
Below Normal	4.2	5.2	5.2	4.4	4.2	4.0	3.0	3.2	3.6	3.0	2.5	1.5
Dry	2.2	3.2	3.1	4.1	3.8	3.5	3.0	3.1	3.7	3.9	4.3	4.7
Critical Dry	9.7	9.9	9.1	10.1	9.8	8.9	8.2	8.4	7.7	8.8	9.1	11.5

Table 5.29 Changes in Trinity Lake Elevation under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	2,301	2,305	2,314	2,325	2,339	2,347	2,357	2,358	2,355	2,347	2,338	2,328
Above Normal	2,270	2,273	2,286	2,303	2,320	2,335	2,347	2,346	2,339	2,329	2,315	2,304
Below Normal	2,295	2,296	2,298	2,305	2,313	2,320	2,331	2,326	2,318	2,303	2,287	2,274
Dry	2,266	2,269	2,272	2,274	2,284	2,296	2,309	2,304	2,298	2,284	2,269	2,259
Critical Dry	2,218	2,216	2,217	2,222	2,229	2,243	2,250	2,246	2,243	2,227	2,204	2,191
No Action Alternative												
Wet	2,300	2,303	2,313	2,324	2,338	2,347	2,357	2,358	2,355	2,347	2,338	2,327
Above Normal	2,261	2,264	2,276	2,294	2,314	2,330	2,343	2,341	2,335	2,325	2,313	2,302
Below Normal	2,289	2,289	2,291	2,299	2,307	2,315	2,327	2,321	2,313	2,299	2,283	2,272
Dry	2,263	2,265	2,268	2,269	2,279	2,292	2,305	2,301	2,294	2,279	2,264	2,254
Critical Dry	2,210	2,207	2,210	2,213	2,220	2,235	2,242	2,238	2,235	2,220	2,196	2,182
Alternative 1 as Compared to No Action Alternative												
Wet	1	2	1	1	1	0	0	0	0	0	0	2
Above Normal	8	10	10	9	7	5	4	4	4	4	2	2
Below Normal	6	7	7	6	6	6	4	5	5	4	3	3
Dry	3	4	4	5	5	4	4	4	5	5	5	5
Critical Dry	8	8	8	9	8	8	8	8	7	8	8	9
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Above Normal	0.4	0.4	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1
Below Normal	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1
Dry	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Critical Dry	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4

The following changes in Trinity Lake storage and surface water elevation would occur under Alternative 1 as compared to the No Action Alternative.

- In wet years and dry years, storage would be similar in all months.
- In above-normal years, storage would be similar in January through October and increased in November and December (up to 6.0 percent).
- In below-normal years, storage would be similar in January through October and increased in November and December (up to 5.2 percent).
- In critical dry years, storage would be increased in all months (up to 11.5 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes would occur on the Trinity River under Alternative 1 as compared to the No Action Alternative, as shown on Figures 5.53 through 5.55.

- Over long-term conditions, flows would be similar in March through November and increased in December through February (up to 10.5 percent).
- In wet years, flows would be similar in April through November and increased in December through March (up to 12.6 percent).
- In dry years, flows would be similar all months.

Central Valley Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Shasta Lake and Sacramento River

Storage levels and surface water elevations in Shasta Lake under Alternative 1 as compared to the No Action Alternative are summarized in Tables 5.30 and 5.31. Changes in flows in the Sacramento River downstream of Keswick Dam and at Freeport are shown on Figures 5.56 through 5.61. The results are summarized following Table 5.31.

Table 5.30 Changes in Shasta Lake Storage under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	2,817	2,926	3,154	3,406	3,597	3,841	4,301	4,453	4,228	3,733	3,362	3,252
Above Normal	2,499	2,578	2,808	3,313	3,515	4,038	4,416	4,417	3,979	3,347	2,975	2,921
Below Normal	2,826	2,846	2,977	3,299	3,646	3,966	4,164	4,042	3,599	3,010	2,601	2,574
Dry	2,409	2,431	2,578	2,755	3,168	3,644	3,861	3,774	3,333	2,800	2,539	2,496
Critical Dry	1,873	1,826	1,911	2,050	2,222	2,460	2,386	2,270	1,861	1,409	1,151	1,086
No Action Alternative												
Wet	2,700	2,719	3,077	3,384	3,589	3,836	4,298	4,460	4,242	3,735	3,410	2,985
Above Normal	2,369	2,385	2,600	3,167	3,453	4,021	4,404	4,429	4,039	3,407	3,069	2,834
Below Normal	2,587	2,548	2,686	3,062	3,442	3,814	4,026	3,957	3,588	3,002	2,643	2,608
Dry	2,345	2,283	2,428	2,621	3,034	3,505	3,737	3,668	3,284	2,767	2,496	2,462
Critical Dry	1,702	1,633	1,717	1,871	2,031	2,274	2,202	2,088	1,719	1,253	986	937
Alternative 1 as Compared to No Action Alternative												
Wet	117	208	77	22	8	5	3	-7	-14	-2	-49	267
Above Normal	130	193	208	146	62	17	12	-11	-60	-60	-94	87
Below Normal	239	298	291	237	204	152	138	86	10	8	-42	-33
Dry	64	148	150	135	134	139	123	106	48	33	42	35
Critical Dry	171	193	194	179	190	186	184	183	142	155	165	149
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	4.3	7.6	2.5	0.6	0.2	0.1	0.1	-0.2	-0.3	-0.1	-1.4	8.9
Above Normal	5.5	8.1	8.0	4.6	1.8	0.4	0.3	-0.3	-1.5	-1.8	-3.1	3.1
Below Normal	9.3	11.7	10.8	7.7	5.9	4.0	3.4	2.2	0.3	0.3	-1.6	-1.3
Dry	2.7	6.5	6.2	5.1	4.4	4.0	3.3	2.9	1.5	1.2	1.7	1.4
Critical Dry	10.1	11.8	11.3	9.6	9.4	8.2	8.4	8.7	8.3	12.4	16.8	16.0

Table 5.31 Changes in Shasta Lake Elevation under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	997	1,002	1,012	1,024	1,032	1,041	1,058	1,063	1,055	1,037	1,022	1,017
Above Normal	974	978	992	1,019	1,028	1,048	1,062	1,062	1,046	1,021	1,005	1,003
Below Normal	997	998	1,004	1,019	1,034	1,046	1,053	1,049	1,031	1,006	987	986
Dry	972	974	982	992	1,012	1,032	1,041	1,038	1,020	997	984	982
Critical Dry	938	935	941	950	961	977	974	967	943	910	889	884
No Action Alternative												
Wet	991	992	1,008	1,023	1,031	1,041	1,058	1,064	1,056	1,037	1,024	1,005
Above Normal	967	968	982	1,012	1,025	1,048	1,062	1,063	1,049	1,024	1,009	999
Below Normal	986	985	991	1,009	1,025	1,040	1,048	1,045	1,031	1,006	989	987
Dry	969	967	975	986	1,006	1,027	1,037	1,034	1,018	995	982	980
Critical Dry	927	923	929	939	951	968	965	958	935	899	876	872
Alternative 1 as Compared to No Action Alternative												
Wet	6	10	4	1	0	0	0	0	-1	0	-2	12
Above Normal	7	10	10	7	3	1	0	0	-2	-3	-4	4
Below Normal	11	14	13	10	9	6	5	4	1	1	-2	-1
Dry	3	7	7	6	6	6	5	4	2	2	3	2
Critical Dry	11	12	12	11	10	9	9	9	8	11	13	12
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	0.6	1.0	0.4	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	-0.2	1.2
Above Normal	0.7	1.0	1.0	0.7	0.3	0.1	0.0	0.0	-0.2	-0.3	-0.4	0.4
Below Normal	1.1	1.4	1.3	1.0	0.8	0.6	0.5	0.3	0.1	0.1	-0.2	-0.1
Dry	0.3	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.2	0.2	0.3	0.2
Critical Dry	1.2	1.3	1.3	1.2	1.0	0.9	1.0	1.0	0.8	1.2	1.5	1.4

The following changes in Shasta Lake storage and surface water elevations would occur under Alternative 1 as compared to the No Action Alternative.

- In wet years, storage would be similar in December through August and October and increased in September and November (up to 8.9 percent).
- In above-normal years, storage would be similar in January through September and increased in October through December (up to 8.1 percent).
- In below-normal years, storage would be similar in March through September and increased in October through February (up to 11.7 percent).

- In dry years, storage would be similar in February through October and increased in November through January (up to 6.5 percent).
- In critical dry years, storage would be increased under all months (up to 16.8 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes in Sacramento River flows would occur under Alternative 1 as compared to the No Action Alternative, as shown on Figures 5.56 through 5.61.

- Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
  - Over long-term conditions, similar flows would occur in October, February through May, July, and August; reduced flows in September and November (up to 27.4 percent); and increased flows in December, January, and June (up to 8.4 percent).
  - In wet years, similar flows would occur in January through July; reduced flows in September through November (up to 43.7 percent); and increased flows in December and August (up to 17.0 percent).
  - In dry years, similar flows would occur in July through October, December through March, and May; reduced flows in November (25.0 percent); and increased flows in April and June (up to 7.8 percent).
- Sacramento River near Freeport (near the northern boundary of the Delta) (Figures 5.59 through 5.61).
  - Over long-term conditions, similar flows would occur in October, December through May, and August; reduced flows in September, November, and July (up to 30.2 percent); and increased flows in June (12.8 percent).
  - In wet years, similar flows would occur in January through June and October; reduced flows in July through September and November (up to 47.4 percent); and increased flows in December (6.6 percent).
  - In dry years, similar flows would occur in August through October and December through April; reduced flows in November and July (up to 13.6 percent); and increased flows in May and June (up to 13.5 percent).

Lake Oroville and Feather River

Storage levels and surface water elevations in Lake Oroville under Alternative 1 as compared to the No Action Alternative are summarized in Tables 5.32 and 5.33. Changes in flows in the Feather River downstream of Thermalito Complex are shown on Figures 5.62 through 5.64. The results are summarized following Table 5.33.

Table 5.32 Changes in Lake Oroville Storage under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	1,936	1,984	2,354	2,636	2,871	2,942	3,300	3,477	3,402	2,976	2,728	2,569
Above Normal	1,465	1,523	1,702	2,173	2,648	2,937	3,271	3,357	3,081	2,493	2,087	1,827
Below Normal	1,823	1,783	1,831	2,037	2,361	2,627	2,875	2,836	2,461	1,930	1,637	1,424
Dry	1,371	1,324	1,344	1,473	1,764	2,120	2,363	2,357	2,031	1,688	1,427	1,261
Critical Dry	1,117	1,044	1,041	1,125	1,235	1,406	1,423	1,407	1,219	1,027	911	839
No Action Alternative												
Wet	1,691	1,732	2,189	2,554	2,832	2,942	3,300	3,488	3,445	2,964	2,626	2,109
Above Normal	1,279	1,322	1,485	1,959	2,519	2,892	3,247	3,393	3,232	2,600	2,117	1,659
Below Normal	1,542	1,497	1,507	1,719	2,122	2,397	2,653	2,714	2,530	1,923	1,513	1,307
Dry	1,206	1,158	1,177	1,305	1,582	1,938	2,178	2,210	1,951	1,478	1,287	1,144
Critical Dry	1,092	1,029	1,019	1,108	1,223	1,381	1,408	1,392	1,243	1,018	917	865
Alternative 1 as Compared to No Action Alternative												
Wet	245	252	165	82	39	0	0	-10	-43	12	102	459
Above Normal	187	201	217	214	129	44	24	-37	-150	-107	-29	167
Below Normal	281	285	324	318	239	230	222	122	-69	7	125	117
Dry	165	165	167	168	182	182	185	147	80	210	140	117
Critical Dry	25	15	22	17	12	25	16	15	-25	8	-6	-26
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	14.5	14.6	7.6	3.2	1.4	0.0	0.0	-0.3	-1.2	0.4	3.9	21.8
Above Normal	14.6	15.2	14.6	10.9	5.1	1.5	0.8	-1.1	-4.6	-4.1	-1.4	10.1
Below Normal	18.2	19.1	21.5	18.5	11.2	9.6	8.4	4.5	-2.7	0.4	8.2	8.9
Dry	13.7	14.3	14.2	12.9	11.5	9.4	8.5	6.6	4.1	14.2	10.8	10.2
Critical Dry	2.3	1.5	2.2	1.5	1.0	1.8	1.1	1.1	-2.0	0.8	-0.7	-3.0

Table 5.33 Changes in Lake Oroville Elevation under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	768	773	810	837	854	859	884	896	891	861	844	831
Above Normal	717	723	745	796	838	859	882	888	869	826	790	763
Below Normal	757	752	757	779	812	834	854	852	823	775	743	719
Dry	706	701	705	721	755	791	814	813	784	748	718	698
Critical Dry	677	668	668	680	694	715	716	714	691	664	647	636
No Action Alternative												
Wet	743	748	794	829	852	859	884	897	894	861	836	790
Above Normal	698	703	722	776	828	856	880	890	879	835	794	746
Below Normal	730	725	726	751	793	818	838	842	828	773	729	704
Dry	688	683	686	704	737	775	798	800	775	724	702	684
Critical Dry	674	667	664	678	693	712	715	712	693	663	648	640
Alternative 1 as Compared to No Action Alternative												
Wet	24	25	16	8	3	0	0	-1	-3	0	8	41
Above Normal	19	21	24	20	10	3	2	-3	-10	-10	-4	18
Below Normal	27	27	31	28	20	17	16	9	-5	1	14	14
Dry	18	18	18	17	18	16	15	14	9	24	17	15
Critical Dry	3	1	3	3	1	3	2	2	-2	0	-1	-4
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	3.3	3.3	2.0	0.9	0.3	0.0	0.0	-0.1	-0.3	0.1	1.0	5.2
Above Normal	2.7	2.9	3.3	2.6	1.2	0.4	0.2	-0.3	-1.2	-1.1	-0.5	2.4
Below Normal	3.7	3.8	4.2	3.7	2.5	2.0	1.9	1.1	-0.6	0.2	2.0	2.0
Dry	2.6	2.6	2.7	2.5	2.5	2.1	1.9	1.7	1.2	3.3	2.4	2.1
Critical Dry	0.4	0.2	0.5	0.4	0.2	0.4	0.2	0.3	-0.4	0.0	-0.2	-0.6

The following changes in Lake Oroville storage and surface water elevations would occur under Alternative 1 as compared to the No Action Alternative.

- In wet years, storage would be similar in January through August and reduced in September through December (up to 21.8 percent).
- In above-normal years, storage would be similar in February through August and reduced in September through January (up to 15.2 percent).
- In below-normal years, storage would be similar in May through July and reduced in August through April (up to 21.5 percent).

- In dry years, storage would be similar in June and reduced in all other months (up to 14.2 percent).
- In critical dry years, storage would be similar under all months.
- In all months, in all water year types, surface water elevations would be similar.

The following changes in Feather River flows would occur under Alternative 1 as compared to the No Action Alternative, as shown in Figures 5.62 through 5.64.

- Over long-term conditions, similar flows would occur in November and April; reduced flows in July through September (up to 43.2 percent); and increased flows in October, December through March, May, and June (up to 37.4 percent).
- In wet years, similar flows would occur in October, November, and March through May; reduced flows in July through September (up to 64.9 percent); and increased flows in December through February and June (up to 35.1 percent).
- In dry years, similar flows would occur in December through April; reduced flows in July (34.4 percent); and increased flows in August through October, May, and June (up to 38.1 percent).

Folsom Lake and American River

Storage levels and surface water elevations in Folsom Lake under Alternative 1 as compared to the No Action Alternative are summarized in Tables 5.34 and 5.35. Changes in flows in the American River downstream of Nimbus Dam are shown on Figures 5.65 through 5.67. The results are summarized following Table 5.35.

Table 5.34 Changes in Folsom Lake Storage under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	483	470	522	524	515	632	785	951	937	793	688	646
Above Normal	390	412	467	537	538	640	787	946	857	591	522	485
Below Normal	506	489	502	514	541	626	761	847	739	475	408	387
Dry	405	399	423	437	486	585	698	769	664	486	432	408
Critical Dry	339	317	323	325	369	436	469	482	430	352	288	258
No Action Alternative												
Wet	29	35	8	6	0	0	0	0	-4	-7	-25	70
Above Normal	13	33	38	24	7	0	0	-1	-30	-31	-30	8
Below Normal	59	58	35	30	8	7	4	4	-41	-52	-64	-66
Dry	12	16	15	14	7	6	7	9	5	-9	-11	-11
Critical Dry	14	11	9	5	3	3	-6	-4	16	25	21	28
Alternative 1 as Compared to No Action Alternative												
Wet	29	35	8	6	0	0	0	0	-4	-7	-25	70
Above Normal	13	33	38	24	7	0	0	-1	-30	-31	-30	8
Below Normal	59	58	35	30	8	7	4	4	-41	-52	-64	-66
Dry	12	16	15	14	7	6	7	9	5	-9	-11	-11
Critical Dry	14	11	9	5	3	3	-6	-4	16	25	21	28
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	6.5	8.0	1.5	1.2	0.0	0.0	0.0	0.0	-0.5	-0.9	-3.5	12.1
Above Normal	3.5	8.6	8.9	4.7	1.3	0.0	0.0	-0.1	-3.4	-5.0	-5.4	1.7
Below Normal	13.3	13.5	7.5	6.1	1.4	1.1	0.5	0.5	-5.2	-9.9	-13.5	-14.6
Dry	2.9	4.2	3.6	3.3	1.4	1.0	1.1	1.2	0.8	-1.8	-2.5	-2.7
Critical Dry	4.4	3.7	2.8	1.6	0.7	0.7	-1.2	-0.8	3.8	7.7	7.8	12.1

Table 5.35 Changes in Folsom Lake Elevation under Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	412	412	419	419	418	432	448	465	464	449	438	433
Above Normal	397	400	410	421	421	433	448	465	456	427	419	414
Below Normal	415	414	416	417	421	432	446	455	443	410	401	398
Dry	401	401	405	407	414	427	439	446	435	413	406	403
Critical Dry	389	386	390	391	397	406	410	411	404	391	378	372
No Action Alternative												
Wet	409	407	418	418	418	432	448	464	464	449	440	425
Above Normal	394	395	405	418	420	433	449	464	458	430	422	413
Below Normal	408	406	411	414	420	431	445	454	447	418	411	409
Dry	400	399	403	405	413	426	438	445	434	414	408	405
Critical Dry	386	384	389	390	396	406	411	412	401	386	374	366
Alternative 1 as Compared to No Action Alternative												
Wet	4	5	1	1	0	0	0	1	0	-1	-3	8
Above Normal	2	5	5	3	1	0	0	1	-3	-4	-4	1
Below Normal	7	7	4	4	1	1	1	1	-4	-8	-10	-10
Dry	1	2	2	2	1	1	1	1	1	-1	-1	-1
Critical Dry	3	2	2	1	0	0	-1	0	2	5	4	6
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	0.9	1.1	0.2	0.2	0.0	0.0	0.0	0.2	0.1	-0.2	-0.6	1.9
Above Normal	0.6	1.4	1.3	0.7	0.2	0.0	0.0	0.1	-0.6	-0.8	-0.8	0.2
Below Normal	1.8	1.8	1.1	0.9	0.2	0.2	0.1	0.2	-0.9	-1.9	-2.5	-2.6
Dry	0.3	0.5	0.5	0.5	0.2	0.2	0.2	0.3	0.2	-0.3	-0.3	-0.4
Critical Dry	0.7	0.6	0.4	0.2	0.1	0.1	-0.2	-0.1	0.6	1.2	1.1	1.8

The following changes in Folsom Lake storage would occur under Alternative 1 as compared to the No Action Alternative.

- In wet years, storage would be similar in December through August and increased in September through December (up to 12.1 percent).
- In above-normal years, storage would be similar in January through July and September through October; increased in November and December (up to 8.9 percent); and reduced in August (5.4 percent).
- In below-normal years, storage would be similar in February through May; reduced in June through September (up to 14.6 percent); and increased in October through January (up to 13.5 percent).

- In dry years, storage would be similar in all months.
- In critical dry years, storage would be similar in October through June and increased in July through September (up to 12.1 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes in American River flows would occur under Alternative 1 as compared to the No Action Alternative, as shown on Figures 5.65 through 5.67.

- Over long-term conditions, similar flows would occur in November through May and July; reduced flows in September and October (up to 30.9 percent); and increased flows in June (5.4 percent).
- In wet years, similar flows would occur in October, November, and January through July; reduced flows in September (47.7 percent); and increased flows in August (12.0 percent).
- In dry years, similar flows would occur in November through January, March through June, August, and September; reduced flows in October (14.1 percent); and increased flows in February and July (up to 7.9 percent).

Clear Creek

Changes in flows in Clear Creek downstream of Whiskeytown Dam are summarized in Table 5.36.

Monthly Clear Creek flows under Alternative 1 as compared to the No Action Alternative are identical except in May. In May, under Alternative 1, flows are up to 28.9 percent lower than under the No Action Alternative.

Table 5.36 Changes in Clear Creek Flows below Whiskeytown Dam under the Alternative 1 as Compared to the No Action Alternative

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	200	200	200	309	356	272	200	200	200	85	85	150
Above Normal	181	182	188	192	196	196	196	200	200	85	85	150
Below Normal	195	195	195	195	195	195	195	195	191	85	85	150
Dry	178	184	188	190	190	190	190	190	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	167	111	85	85	133
No Action Alternative												
Wet	200	200	200	309	356	272	200	277	200	85	85	150
Above Normal	181	182	188	192	196	196	196	277	200	85	85	150
Below Normal	195	195	195	195	195	195	195	274	191	85	85	150
Dry	175	184	188	190	190	190	190	267	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	214	111	85	85	133
Alternative 1 as Compared to No Action Alternative												
Wet	0	0	0	0	0	0	0	-77	0	0	0	0
Above Normal	0	0	0	0	0	0	0	-77	0	0	0	0
Below Normal	0	0	0	0	0	0	0	-78	0	0	0	0
Dry	3	0	0	0	0	0	0	-77	0	0	0	0
Critical Dry	0	0	0	0	0	0	0	-47	0	0	0	0
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-27.9	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-27.9	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-28.6	0.0	0.0	0.0	0.0
Dry	1.6	0.0	0.0	0.0	0.0	0.0	0.0	-28.9	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-22.1	0.0	0.0	0.0	0.0

New Melones Reservoir and Stanislaus River

Storage levels and surface water elevations in New Melones Reservoir under Alternative 1 as compared to the No Action Alternative are summarized in Tables 5.37 and 5.38. Changes in flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 through 5.70. The results are summarized following Table 5.38.

Table 5.37 Changes in New Melones Reservoir Storage under the Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	1,443	1,446	1,502	1,606	1,709	1,794	1,833	1,962	1,994	1,917	1,803	1,731
Above Normal	1,092	1,116	1,175	1,261	1,360	1,455	1,481	1,543	1,516	1,419	1,321	1,274
Below Normal	1,364	1,366	1,378	1,397	1,453	1,479	1,461	1,447	1,415	1,322	1,228	1,183
Dry	1,149	1,143	1,149	1,161	1,191	1,221	1,210	1,176	1,131	1,039	956	912
Critical Dry	667	663	674	680	696	690	646	585	557	498	449	426
No Action Alternative												
Wet	1,379	1,390	1,454	1,562	1,666	1,724	1,758	1,878	1,968	1,890	1,773	1,703
Above Normal	1,029	1,060	1,125	1,214	1,317	1,406	1,413	1,484	1,467	1,372	1,277	1,232
Below Normal	1,294	1,305	1,326	1,351	1,413	1,438	1,390	1,383	1,359	1,268	1,175	1,133
Dry	1,094	1,094	1,106	1,121	1,156	1,188	1,154	1,132	1,087	997	914	871
Critical Dry	624	623	638	645	661	656	602	554	526	476	431	408
Alternative 1 as Compared to No Action Alternative												
Wet	64	56	49	44	43	70	75	84	25	27	30	28
Above Normal	62	56	50	46	43	48	68	59	49	46	44	42
Below Normal	69	61	52	46	40	41	71	63	55	54	52	51
Dry	55	49	43	40	35	33	56	45	44	43	42	42
Critical Dry	44	40	37	36	35	34	45	31	31	23	18	18
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	4.7	4.0	3.3	2.8	2.6	4.1	4.3	4.5	1.3	1.4	1.7	1.6
Above Normal	6.0	5.3	4.4	3.8	3.3	3.4	4.8	4.0	3.4	3.4	3.5	3.4
Below Normal	5.4	4.7	4.0	3.4	2.8	2.9	5.1	4.6	4.1	4.2	4.5	4.5
Dry	5.0	4.5	3.9	3.5	3.1	2.7	4.8	3.9	4.0	4.3	4.6	4.8
Critical Dry	7.0	6.4	5.8	5.5	5.2	5.2	7.5	5.6	5.9	4.8	4.2	4.4

Table 5.38 Changes in New Melones Reservoir Elevation under the Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	989	990	997	1,009	1,021	1,030	1,034	1,047	1,050	1,043	1,032	1,025
Above Normal	941	944	951	966	979	992	995	1,003	1,001	990	978	901
Below Normal	977	977	979	982	991	994	994	993	991	980	968	962
Dry	951	950	950	953	957	962	963	960	954	941	929	922
Critical Dry	866	866	870	872	878	879	871	856	850	835	823	817
No Action Alternative												
Wet	980	982	990	1,004	1,016	1,023	1,026	1,039	1,047	1,040	1,029	1,022
Above Normal	932	937	945	960	974	986	988	997	996	985	973	897
Below Normal	968	969	972	975	985	988	985	985	983	972	960	955
Dry	943	943	944	947	951	957	955	953	948	934	922	915
Critical Dry	856	856	862	864	870	871	860	848	840	828	818	812
Alternative 1 as Compared to No Action Alternative												
Wet	9	8	7	6	5	8	8	8	3	3	3	3
Above Normal	9	7	6	6	6	6	8	7	5	5	5	5
Below Normal	9	8	7	7	6	6	9	8	7	8	8	8
Dry	8	7	6	6	5	5	8	7	7	7	7	7
Critical Dry	10	10	9	8	8	8	11	8	10	6	5	6
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	0.9	0.8	0.7	0.6	0.5	0.8	0.8	0.8	0.3	0.3	0.3	0.3
Above Normal	1.0	0.8	0.7	0.6	0.6	0.6	0.8	0.7	0.5	0.6	0.5	0.5
Below Normal	1.0	0.9	0.7	0.7	0.6	0.6	0.9	0.8	0.7	0.8	0.8	0.8
Dry	0.9	0.8	0.7	0.7	0.6	0.5	0.9	0.7	0.7	0.7	0.8	0.8
Critical Dry	1.2	1.1	1.0	1.0	0.9	0.9	1.3	1.0	1.2	0.8	0.6	0.7

The following changes in New Melones Reservoir storage would occur under Alternative 1 as compared to the No Action Alternative.

- In wet years, storage would be similar in all months.
- In above-normal years, storage would be similar in December through September and increased in October and November (up to 6.0 percent).
- In below-normal years, storage would be similar in November through September and increased in October (5.4 percent).
- In dry years, storage would be similar in all months.

- In critical dry years, storage would be similar in July through September and increased in October through June (up to 7.5 percent).
- In all months, in all water year types, surface water elevations would be similar.

Flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 to 5.70. Changes in flows in these rivers are summarized below.

- Over long-term conditions, similar flows would occur in July through September; reduced flows in October, March, and April (up to 59.8 percent); and increased flows in November through February and June (up to 51.1 percent).
- In wet years, similar flows would occur in February and April; reduced flows in October, March, May, July, and August (up to 53.9 percent); and increased flows in September, November through January, and June (up to 103.2 percent).
- In dry years, similar flows would occur in July through September; reduced flows in October and April (up to 60.7 percent); and increased flows in November through March, May, and June (up to 55.5 percent).

San Joaquin River at Vernalis

Flows in the San Joaquin River at Vernalis are summarized below, as shown on Figures 5.71 through 5.73.

- Over long-term conditions, similar flows would occur in July through September and November through May; reduced flows in October (16.1 percent); and increased flows in June (8.4 percent).
- In wet years, similar flows would occur in July through September and November through May; reduced flows in October (14.4 percent); and increased flows in June (10.4 percent).
- In dry years, similar flows would occur in November through March and May through September; and reduced flows in October and April (up to 15.3 percent).

San Luis Reservoir

Storage levels and surface water elevations in San Luis Reservoir under Alternative 1 as compared to the No Action Alternative are summarized in Tables 5.39 and 5.40. The results are summarized following Table 5.40.

Table 5.39 Changes in San Luis Reservoir Storage under the Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	790	1,017	1,365	1,748	1,965	2,033	2,031	1,852	1,487	1,167	889	925
Above Normal	658	883	1,213	1,671	1,913	2,001	1,995	1,717	1,263	861	612	631
Below Normal	854	1,064	1,334	1,742	1,908	1,980	1,908	1,628	1,251	964	635	591
Dry	617	764	998	1,427	1,728	1,925	1,870	1,665	1,341	1,007	660	596
Critical Dry	622	709	910	1,257	1,556	1,664	1,623	1,451	1,168	808	545	472
No Action Alternative												
Wet	555	681	931	1,236	1,526	1,788	1,598	1,251	946	741	628	679
Above Normal	490	649	957	1,223	1,441	1,661	1,444	1,048	666	466	433	513
Below Normal	525	624	907	1,141	1,314	1,473	1,312	967	555	500	426	467
Dry	476	590	867	1,150	1,339	1,494	1,413	1,167	840	763	476	469
Critical Dry	478	556	752	1,040	1,204	1,252	1,192	1,028	739	544	343	323
Alternative 1 as Compared to No Action Alternative												
Wet	234	336	433	513	439	245	433	601	541	426	261	245
Above Normal	168	234	257	448	471	341	551	669	598	395	179	117
Below Normal	329	439	427	601	594	507	596	660	696	465	209	124
Dry	141	174	130	277	390	431	457	498	501	244	185	127
Critical Dry	144	153	158	217	352	412	431	423	429	263	202	149
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	59.8	81.8	84.4	64.5	40.1	18.2	35.5	74.9	108.8	88.0	53.1	41.5
Above Normal	38.9	62.8	46.6	55.6	43.8	26.0	45.6	90.9	151.4	110.8	53.6	20.2
Below Normal	91.6	125.0	85.3	85.6	66.4	45.6	56.5	93.5	203.1	136.2	61.6	35.9
Dry	29.4	34.9	15.4	31.1	38.5	35.4	37.2	52.7	70.3	26.1	33.5	18.8
Critical Dry	38.7	39.5	25.0	24.4	37.8	39.5	40.3	43.8	57.1	38.6	46.2	20.1

Table 5.40 Changes in San Luis Reservoir Elevation under the Alternative 1 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	426	451	485	520	538	543	543	529	497	468	440	443
Above Normal	412	437	470	513	534	541	540	518	477	437	409	411
Below Normal	435	457	483	519	533	539	533	510	476	448	412	406
Dry	407	425	450	492	518	535	530	513	484	453	415	406
Critical Dry	409	419	441	475	502	512	509	494	468	432	400	389
No Action Alternative												
Wet	399	414	443	473	500	523	507	475	444	422	409	416
Above Normal	391	411	445	472	492	512	493	456	415	389	386	398
Below Normal	397	410	442	465	481	496	481	448	400	393	383	389
Dry	391	406	437	466	484	498	490	468	434	426	390	389
Critical Dry	390	400	423	454	470	475	469	453	422	399	369	366
Alternative 1 as Compared to No Action Alternative												
Wet	26	37	42	46	38	20	36	53	53	46	30	27
Above Normal	21	26	25	41	41	29	47	61	62	48	23	14
Below Normal	38	47	42	54	52	43	52	62	76	56	30	17
Dry	17	19	12	25	34	37	40	45	51	27	25	18
Critical Dry	19	20	18	21	32	38	40	41	45	32	32	24
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	6.6	8.9	9.6	9.8	7.5	3.9	7.2	11.2	12.0	10.9	7.4	6.6
Above Normal	5.4	6.4	5.7	8.8	8.4	5.6	9.5	13.4	15.0	12.3	6.0	3.4
Below Normal	9.5	11.4	9.4	11.6	10.8	8.7	10.8	13.8	19.0	14.2	7.8	4.3
Dry	4.2	4.6	2.8	5.4	7.1	7.4	8.1	9.7	11.6	6.3	6.3	4.5
Critical Dry	4.9	4.9	4.2	4.7	6.8	7.9	8.4	9.0	10.8	8.0	8.6	6.6

The following changes in San Luis Reservoir storage would occur under Alternative 1 as compared to the No Action Alternative.

- In wet years, storage would be increased in all months (up to 108.8 percent). Water storage elevations would be increased in all months (up to 12.0 percent).
- In above-normal years, storage would be increased in all months (up to 151.4 percent). Water storage elevations would be increased in all months (up to 15.0 percent).
- In below-normal years, storage would be increased in all months (up to 203.1 percent). Water storage elevations would be increased in all months (up to 19.0 percent).
- In dry years, storage would be increased in all months (up to 70.3 percent). Water storage elevations would be increased in all months (up to 11.6 percent).
- In critical dry years, storage would be increased in all months (up to 57.1 percent). Water storage elevations would be increased in all months (up to 10.8 percent).

Changes in Flows into the Yolo Bypass

Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under Alternative 1 as compared to the No Action Alternative are summarized in Table 5.41. The results are summarized following Table 5.41.

Table 5.41 Changes in Flows into the Yolo Bypass at Fremont Weir under the Alternative 1 as Compared to the No Action Alternative

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	147	996	9,888	25,442	30,547	18,997	5,602	289	113	0	0	100
Above Normal	100	100	2,659	6,349	15,114	8,566	1,765	100	100	0	0	100
Below Normal	100	100	262	1,256	4,057	1,166	292	100	100	0	0	100
Dry	100	100	342	932	2,032	1,411	411	100	100	0	0	100
Critical Dry	100	100	149	542	533	408	106	100	100	0	0	100
No Action Alternative												
Wet	183	910	8,420	24,291	29,547	18,493	5,627	289	113	0	0	100
Above Normal	100	100	2,765	5,997	13,013	7,928	1,688	100	100	0	0	100
Below Normal	100	100	242	1,004	3,031	883	293	100	100	0	0	100
Dry	100	100	322	902	2,024	1,393	407	100	100	0	0	100
Critical Dry	100	100	149	528	534	396	106	100	100	0	0	100
Alternative 1 as Compared to No Action Alternative												
Wet	-37	86	1,468	1,151	1,000	504	-25	0	0	0	0	0
Above Normal	0	0	-106	352	2,102	638	77	0	0	0	0	0
Below Normal	0	0	20	253	1,026	283	-1	0	0	0	0	0
Dry	0	0	20	30	7	17	4	0	0	0	0	0
Critical Dry	0	0	1	15	-1	12	0	0	0	0	0	0
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	-20.0	9.5	17.4	4.7	3.4	2.7	-0.4	0.1	0.1	0.0	0.0	0.0
Above Normal	0.0	0.0	-3.8	5.9	16.2	8.0	4.5	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	8.1	25.2	33.9	32.1	-0.3	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	6.2	3.3	0.4	1.2	1.0	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.5	2.8	-0.2	3.0	0.0	0.0	0.0	0.0	0.0	0.0

The following changes in flows from the Sacramento River into Yolo Bypass at Fremont Weir would occur under Alternative 1 as compared to the No Action Alternative.

- In wet years, flows into Yolo Bypass would be similar in January through September; reduced in October (20 percent); and increased in November and December (up to 17.4 percent).
- In above-normal years, flows into Yolo Bypass would be similar in April through December; and increased in January through March (up to 16.2 percent).

- In below-normal years, flows into Yolo Bypass would be similar in April through November; and increased in December through March (up to 33.9 percent).
- In dry years, flows into Yolo Bypass would be similar in January through November; and increased in December (6.2 percent).
- In critical dry years, flows into Yolo Bypass would be similar in all months.

Changes in Delta Conditions

Delta outflow under Alternative 1 as compared to the No Action Alternative are summarized below and shown on Figures 5.74 through 5.76.

- In wet years, average monthly Delta outflow would increase in December, February, March, and June (up to 1,492 cfs) and decrease in July through November, January, April, and May (up to 13,683 cfs).
- In dry years, average monthly Delta outflow would be similar in September; decrease in July, August, and October through May (up to 3,114 cfs); and increase in June (385 cfs).

The OMR conditions under Alternative 1 are shown on Figures 5.77 through 5.79.

- In all water years, average monthly OMR flows would be negative in all months under Alternative 1. Under the No Action Alternative, OMR flows would be positive only in wet and above normal years in April and May and April in above normal years.
- In wet years, average monthly OMR flows, would be more positive in June through August and March (up to 923 cfs); and more negative in April through June and September through February (up to 10,005 cfs).
- In dry years, average monthly OMR flows would be positive in July (up to 2,073 cfs), and more negative in August through June (up to 3,489 cfs).

Changes in CVP and SWP Exports and Deliveries

Delta exports under Alternative 1 as compared to the No Action Alternative are summarized in Table 5.42.

Table 5.42 Changes in Exports at Jones and Banks Pumping Plants under the Alternative 1 as Compared to the No Action Alternative

Water Year	Monthly Volume (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 1												
Wet	549	619	716	724	609	543	476	430	456	632	655	660
Above Normal	428	521	641	716	584	570	453	363	415	572	647	651
Below Normal	548	595	623	674	497	500	337	304	414	629	517	539
Dry	435	475	546	579	518	493	259	228	274	403	325	438
Critical Dry	340	345	455	433	406	266	134	121	132	139	203	249
No Action Alternative												
Wet	410	497	564	513	537	594	204	207	445	669	717	638
Above Normal	376	450	562	406	401	496	130	105	315	587	709	628
Below Normal	386	456	590	387	354	394	134	100	209	657	622	542
Dry	374	398	510	392	315	318	153	126	194	541	296	426
Critical Dry	314	293	384	349	250	179	93	90	64	223	176	242
Alternative 1 as Compared to No Action Alternative												
Wet	139	123	152	211	72	-51	272	223	11	-37	-63	21
Above Normal	52	71	78	311	183	73	322	257	100	-15	-61	23
Below Normal	162	139	33	287	143	106	203	204	205	-28	-105	-4
Dry	61	77	36	187	202	175	105	102	80	-138	30	12
Critical Dry	26	52	71	84	156	87	41	31	67	-84	26	8
Alternative 1 as Compared to No Action Alternative (percent change)												
Wet	33.8	24.7	26.9	41.1	13.3	-8.6	133.6	107.5	2.4	-5.5	-8.7	3.4
Above Normal	13.8	15.8	13.9	76.6	45.5	14.8	247.0	244.4	31.8	-2.5	-8.7	3.6
Below Normal	42.0	30.5	5.5	74.3	40.3	26.9	150.9	203.9	98.1	-4.3	-16.9	-0.6
Dry	16.2	19.4	7.1	47.7	64.2	55.1	68.7	81.5	41.4	-25.5	10.1	2.8
Critical Dry	8.4	17.9	18.6	24.1	62.2	48.5	44.3	33.9	104.4	-37.6	14.9	3.1

The following changes would occur in CVP and SWP exports under Alternative 1 as compared to the No Action Alternative.

- Long-term average annual exports would be 1,051 TAF (22 percent) more under Alternative 1 as compared to the No Action Alternative.
- In wet years, total exports would be similar in June and September; increased in October through February, April through May (up to 133.6 percent); and reduced in March, July, and August (up to 8.7 percent).
- In above-normal years, total exports would be similar in July and September; increased in October through June (up to 244 percent); and reduced in August (8.7 percent).

- In below-normal years, total exports would be similar in July and September; increased in October through June (up to 203.9 percent); and reduced in August (16.9 percent).
- In dry years, total exports would be similar in September; increased in October through June and August (up to 81.5 percent); and reduced in July (25.5 percent).
- In critical dry years, total exports would be similar in September; increased in October through June and August (up to 104.4 percent); and reduced in July (37.6 percent).

Deliveries to CVP and SWP water users increase under Alternative 1 as compared to the No Action Alternative, as summarized in Tables 5.43 and 5.44, respectively, due to increased water supply availability and less export limitations.

Table 5.43 Changes CVP Water Deliveries under the Alternative 1 as Compared to the No Action Alternative

Annual Average Deliveries (TAF)					
				Alternative 1 as compared to the No Action Alternative	
		Alternative 1	No Action Alternative	Difference	Percent Change
North of Delta					
CVP Agricultural Water Service Contractors	Long Term	219	185	34	18
	Dry	122	86	37	43
	Critical Dry	35	24	12	50
CVPM&I (Including American Risver Contractors and Contra Costa Water District)	Long Term	392	386	7	2
	Dry	390	385	5	1
	Critical Dry	383	383	-1	0
CVP M&I American River Contractors	Long Term	120	113	7	6
	Dry	105	97	8	8
	Critical Dry	79	75	5	7
CVP Sacramento River Settlement Contractors	Long Term	1,858	1,859	-1	0
	Dry	1,905	1,906	-1	0
	Critical Dry	1,732	1,737	-5	0
CVP Refuge Level 2 Deliveries	Long Term	155	146	8	5
	Dry	151	146	5	3
	Critical Dry	105	102	3	3

Annual Average Deliveries (TAF)					
		Alternative 1	No Action Alternative	Alternative 1 as compared to the No Action Alternative: Difference	Alternative 1 as compared to the No Action Alternative: Percent Change
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,624	2,576	48	2
	Dry	2,568	2,523	45	2
	Critical Dry	2,255	2,246	9	0
South of Delta (Does not include Eastside Contractors)					
CVP Agricultural Water Service Contractors	Long Term	1,100	847	253	30
	Dry	650	445	206	46
	Critical Dry	195	131	64	49
CVP M&I Users	Long Term	125	112	13	12
	Dry	109	99	10	10
	Critical Dry	85	80	4	5
San Joaquin River Exchange Contractors	Long Term	852	852	0	0
	Dry	875	875	0	0
	Critical Dry	741	741	0	0
CVP Refuge Level 2 Deliveries	Long Term	272	273	-1	0
	Dry	280	281	-1	0
	Critical Dry	232	234	-3	-1
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,349	2,084	265	13
	Dry	1,914	1,700	214	13
	Critical Dry	1,253	1,186	67	6
Eastside Contractors Deliveries					
Water Rights	Long Term	514	508	6	1
	Dry	524	524	0	0
	Critical Dry	486	445	42	9
CVP Water Service Contracts	Long Term	118	104	15	14
	Dry	98	84	13	15
	Critical Dry	25	4	21	525

Annual Average Deliveries (TAF)					
		Alternative 1	No Action Alternative	Alternative 1 as compared to the No Action Alternative: Difference	Alternative 1 as compared to the No Action Alternative: Percent Change
Total Water Rights and CVP Service Contracts Deliveries	Long Term	632	612	20	3
	Dry	622	608	14	2
	Critical Dry	511	449	62	14

The following changes in CVP water deliveries would occur under Alternative 1 as compared to the No Action Alternative.

- Deliveries to CVP North of Delta agricultural water service contractors would be increased by 18 percent over the long-term conditions, 43 percent in dry years, and 50 percent in critical dry years.
- Deliveries to CVP North of Delta M&I contractors would be similar in total, however, deliveries to the American River CVP contractors would be increased by 6 percent over the long-term conditions, 8 percent in dry years, and 7 percent in critical dry years.
- Deliveries to CVP South of Delta agricultural water service contractors would be increased by 30 percent over the long-term conditions, 46 percent in dry years, and 49 percent in critical dry years.
- Deliveries to CVP South of Delta M&I contractors would be increased by 12 percent over the long-term conditions, 10 percent in dry years, and 5 percent in critical dry years.
- Deliveries to the Eastside contractors would be similar under long-term conditions and in dry years and increase by 14 percent in critical dry years.

Table 5.44 Changes SWP Water Deliveries under the Alternative 1 as Compared to the No Action Alternative

Annual Average Deliveries (TAF)					
		Alternative 1	No Action Alternative	Alternative 1 as compared to the No Action Alternative: Difference	Alternative 1 as compared to the No Action Alternative: Percent Change
North of Delta					
SWP Agricultural Uses	Long Term	0	0	0	0
	Dry	0	0	0	0
	Critical Dry	0	0	0	0
SWP M&I (without Article 21)	Long Term	83	68	15	22
	Dry	62	51	11	22
	Critical Dry	53	43	11	25
SWP M&I Article 21 Deliveries	Long Term	12	13	-1	-9
	Dry	13	14	-1	-6
	Critical Dry	12	13	-1	-9
Total SWP Agricultural and M&I (without Article 21)	Long Term	83	68	15	22
	Dry	62	51	11	22
	Critical Dry	53	43	11	25
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	12	13	-1	-9
	Dry	13	14	-1	-6
	Critical Dry	12	13	-1	-9
South of Delta					
SWP Agricultural Users (without Article 21)	Long Term	750	610	139	23
	Dry	567	455	112	25
	Critical Dry	484	378	106	28
SWP Agricultural Article 21 Deliveries	Long Term	178	27	152	569
	Dry	143	5	138	2690
	Critical Dry	100	7	93	1339
SWP M&I Users (without Article 21)	Long Term	2,183	1,800	383	21
	Dry	1,732	1,406	327	23
	Critical Dry	1,494	1,173	321	27

Annual Average Deliveries (TAF)					
		Alternative 1	No Action Alternative	Alternative 1 as compared to the No Action Alternative	
				Difference	Percent Change
SWP M&I Article 21 Deliveries	Long Term	104	20	84	418
	Dry	86	5	82	1788
	Critical Dry	58	5	53	1054
Total SWP Agricultural and M&I Users (without Article 21)	Long Term	2,933	2,410	523	22
	Dry	2,299	1,861	439	24
	Critical Dry	1,978	1,551	427	28
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	282	47	236	504
	Dry	229	10	219	2265
	Critical Dry	158	12	146	1219

The following changes in SWP water deliveries would occur under Alternative 1 as compared to the No Action Alternative.

- Deliveries without Article 21 water to SWP North of Delta water contractors would be increased by 22 percent over the long-term conditions; 22 percent in dry years; and 25 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be increased by 22 percent over the long-term conditions; 24 percent in dry years; and 28 percent in critical dry years.
- Deliveries of Article 21 water to SWP North of Delta water contractors would be reduced by 9 percent over the long-term conditions; 6 percent in dry years; and 9 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be increased by 504 percent over the long-term conditions; 2,265 percent in dry years; and 1,219 percent in critical dry years.

Effects Related to Cross Delta Water Transfers

Potential effects to surface water resources could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i). Potential effects were identified as reduced surface water storage in upstream reservoirs and changes in flow patterns in river downstream of the reservoirs if water was released from the reservoirs in patterns that were different than would have been used by the water seller's. Because all water transfers would be required to avoid adverse impacts to other water users and biological resources (see Section 3.A.6.3, Transfers), including impacts associated with changes in reservoir storage and river flow patterns; the analysis indicated that water transfers would not result in substantial changes in storage or river flows. For the purposes of this EIS, it is anticipated that similar conditions would occur due to cross Delta water transfers under Alternative 1 and the No Action Alternative.

Under Alternative 1, water could be transferred throughout the year. As indicated in Table 5.42, capacity would be available under Alternative 1 in all months of all water year types without a maximum volume of transferred water. Under the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September, and the volume would be limited to 600,000 acre-feet per year in drier years and 360,000 acre-feet in all other years, in accordance with the 2008 USFWS BO and 2009 NMFS BO. As indicated in Table 5.42, capacity would be available under the No Action Alternative between July and September for water transfers in all water year types.

Overall, the potential for water transfer conveyance would be greater under Alternative 1 as compared to the No Action Alternative.

San Francisco Bay Area, Central Coast, and Southern California Regions

Potential Changes in Surface Water Resources at Reservoirs that Store CVP and SWP Water

The San Francisco Bay Area, Central Coast, and Southern California regions include numerous reservoirs that store CVP and SWP water supplies, including CVP and SWP reservoirs, that primarily provide water supplies for M&I water users. Changes in the availability CVP and SWP water supplies for storage in these reservoirs under Alternative 1 as compared to the No Action Alternative would be consistent with the following changes in water deliveries to M&I water users, as summarized in Tables 5.43 and 5.44.

- Deliveries to CVP South of Delta M&I contractors would be increased by 11 percent over the long-term conditions; 10 percent in dry years; and 7 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be increased by 22 percent over the long-term conditions; 24 percent in dry years; and 28 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be increased by 504 percent over the long-term conditions; 2,265 percent in dry years; and 1,219 percent in critical dry years.

Changes in CVP and SWP Exports and Deliveries

Deliveries to CVP and SWP water users are described above in the Central Valley Region.

5.4.3.2.2 Alternative 1 Compared to the Second Basis of Comparison

Alternative 1 is identical to the Second Basis of Comparison.

5.4.3.3 Alternative 2

Surface water resources conditions under Alternative 2 would be identical to the surface water resources conditions under the No Action Alternative; therefore, Alternative 2 is only compared to the Second Basis of Comparison.

5.4.3.3.1 Alternative 2 Compared to the Second Basis of Comparison

Changes to surface water resources conditions under Alternatives 2 as compared to the Second Basis of Comparison would be the same as the impacts described in Section 5.4.3.1, No Action Alternative.

5.4.3.4 Alternative 3

CVP and SWP operations under Alternative 3 are similar to the Second Basis of Comparison with modified OMR flow criteria and New Melones Reservoir operations. Alternative 3 would include changed water demands for American River water supplies as compared to the No Action Alternative or Second Basis of Comparison. Alternative 3 would provide water supplies of up to 17 TAF per year under a Warren Act Contract for El Dorado Irrigation District and 15 TAF per year under a CVP water service contract for El Dorado County Water Agency. These demands are not included in the analysis presented in this section of the EIS. A sensitivity analysis comparing the results of the analysis with and without these demands is presented in Appendix 5B of this EIS.

5.4.3.4.1 Alternative 3 Compared to the No Action Alternative

Trinity River Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Changes in Trinity Lake storage and surface water elevations under Alternative 3 as compared to the No Action Alternative are summarized in Tables 5.45 and 5.45. The results are summarized following Table 5.45.

Table 5.45 Changes in Trinity Lake Storage under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,502	1,537	1,643	1,766	1,928	2,053	2,224	2,248	2,192	2,067	1,936	1,805
Above Normal	1,197	1,230	1,349	1,511	1,707	1,891	2,071	2,045	1,949	1,806	1,646	1,513
Below Normal	1,434	1,457	1,477	1,542	1,629	1,717	1,858	1,786	1,680	1,509	1,334	1,199
Dry	1,173	1,179	1,206	1,226	1,318	1,450	1,585	1,537	1,468	1,301	1,152	1,056
Critical Dry	829	803	817	829	871	952	1,003	968	936	813	664	600
No Action Alternative												
Wet	1,490	1,516	1,630	1,756	1,921	2,053	2,220	2,245	2,190	2,067	1,939	1,784
Above Normal	1,159	1,178	1,286	1,455	1,658	1,847	2,025	1,999	1,907	1,773	1,619	1,495
Below Normal	1,393	1,400	1,417	1,488	1,575	1,662	1,817	1,743	1,637	1,470	1,304	1,185
Dry	1,152	1,148	1,174	1,182	1,274	1,403	1,539	1,490	1,413	1,253	1,104	1,008
Critical Dry	747	731	746	750	790	872	923	888	862	745	612	536
Alternative 3 as Compared to No Action Alternative												
Wet	11	21	13	10	7	0	3	4	3	0	-3	21
Above Normal	38	53	63	56	49	45	46	46	42	33	27	18
Below Normal	41	57	60	54	55	55	40	43	43	38	30	13
Dry	21	31	32	45	44	47	46	47	55	48	48	48
Critical Dry	82	73	71	79	81	81	80	80	73	68	53	64
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	0.7	1.4	0.8	0.6	0.4	0.0	0.1	0.2	0.1	0.0	-0.2	1.2
Above Normal	3.3	4.5	4.9	3.8	2.9	2.4	2.3	2.3	2.2	1.8	1.7	1.2
Below Normal	3.0	4.1	4.2	3.6	3.5	3.3	2.2	2.5	2.6	2.6	2.3	1.1
Dry	1.8	2.7	2.7	3.8	3.5	3.4	3.0	3.1	3.9	3.9	4.3	4.8
Critical Dry	11.0	10.0	9.5	10.5	10.2	9.3	8.7	9.0	8.5	9.1	8.6	11.9

Table 5.46 Changes in Trinity Lake Elevation under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	2,301	2,305	2,314	2,325	2,339	2,347	2,357	2,358	2,355	2,347	2,338	2,328
Above Normal	2,268	2,271	2,284	2,301	2,319	2,334	2,347	2,345	2,339	2,328	2,315	2,304
Below Normal	2,293	2,295	2,297	2,304	2,312	2,319	2,330	2,325	2,317	2,302	2,286	2,274
Dry	2,265	2,268	2,271	2,273	2,283	2,296	2,309	2,305	2,299	2,284	2,269	2,260
Critical Dry	2,226	2,220	2,222	2,225	2,231	2,244	2,252	2,248	2,244	2,229	2,204	2,193
No Action Alternative												
Wet	2,300	2,303	2,313	2,324	2,338	2,347	2,357	2,358	2,355	2,347	2,338	2,327
Above Normal	2,261	2,264	2,276	2,294	2,314	2,330	2,343	2,341	2,335	2,325	2,313	2,302
Below Normal	2,289	2,289	2,291	2,299	2,307	2,315	2,327	2,321	2,313	2,299	2,283	2,272
Dry	2,263	2,265	2,268	2,269	2,279	2,292	2,305	2,301	2,294	2,279	2,264	2,254
Critical Dry	2,210	2,207	2,210	2,213	2,220	2,235	2,242	2,238	2,235	2,220	2,196	2,182
Alternative 3 as Compared to No Action Alternative												
Wet	1	2	1	1	1	0	0	0	0	0	0	2
Above Normal	7	8	8	7	5	4	4	4	4	3	2	2
Below Normal	4	5	6	5	5	5	3	4	4	3	3	2
Dry	3	3	3	4	4	4	4	4	5	5	5	6
Critical Dry	16	13	13	12	11	10	9	9	9	9	8	11
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Above Normal	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
Below Normal	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1
Dry	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Critical Dry	0.7	0.6	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5

The following changes in Trinity Lake storage would occur under Alternative 3 as compared to the No Action Alternative.

- In wet, above-normal years, below-normal, and dry years, storage would be similar in all months.
- In critical dry years, storage would be increased in all months (up to 11.9 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes would occur on the Trinity River under Alternative 3 as compared to the No Action Alternative, as summarized in Figures 5.53 through 5.55.

- Over long-term conditions, flows would be similar in March through November and increased in December through February (up to 11.8 percent).
- In wet years, flows would be similar in April through October; reduced in November (7.0 percent) and increased in December through March (up to 15.1 percent).
- In dry years, flows would be similar in all months.

Central Valley Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Shasta Lake and Sacramento River

Storage levels and surface water elevations in Shasta Lake under Alternative 3 as compared to the No Action Alternative are summarized in Tables 5.47 and 5.48. Changes in flows in the Sacramento River downstream of Keswick Dam and at Freeport are shown on Figures 5.56 through 5.61. The results are summarized following Table 5.48.

Table 5.47 Changes in Shasta Lake Storage under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	2,816	2,932	3,161	3,408	3,597	3,841	4,301	4,453	4,221	3,720	3,370	3,244
Above Normal	2,475	2,555	2,783	3,303	3,509	4,023	4,403	4,401	3,975	3,350	2,998	2,946
Below Normal	2,818	2,851	2,983	3,302	3,650	3,971	4,176	4,056	3,631	3,036	2,669	2,562
Dry	2,431	2,451	2,590	2,770	3,189	3,662	3,885	3,798	3,359	2,826	2,542	2,500
Critical Dry	1,833	1,793	1,877	2,024	2,184	2,424	2,354	2,237	1,836	1,406	1,129	1,066
No Action Alternative												
Wet	2,700	2,719	3,077	3,384	3,589	3,836	4,298	4,460	4,242	3,735	3,410	2,985
Above Normal	2,369	2,385	2,600	3,167	3,453	4,021	4,404	4,429	4,039	3,407	3,069	2,834
Below Normal	2,587	2,548	2,686	3,062	3,442	3,814	4,026	3,957	3,588	3,002	2,643	2,608
Dry	2,345	2,283	2,428	2,621	3,034	3,505	3,737	3,668	3,284	2,767	2,496	2,462
Critical Dry	1,702	1,633	1,717	1,871	2,031	2,274	2,202	2,088	1,719	1,253	986	937
Alternative 3 as Compared to No Action Alternative												
Wet	116	214	84	24	8	5	2	-7	-21	-16	-41	260
Above Normal	106	170	183	136	56	2	-1	-27	-64	-57	-71	112
Below Normal	231	302	296	240	208	157	150	99	42	34	26	-46
Dry	86	168	162	149	155	156	148	130	74	58	45	38
Critical Dry	131	160	160	153	152	149	152	149	117	153	143	129
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	4.3	7.9	2.7	0.7	0.2	0.1	0.1	-0.2	-0.5	-0.4	-1.2	8.7
Above Normal	4.5	7.1	7.0	4.3	1.6	0.1	0.0	-0.6	-1.6	-1.7	-2.3	4.0
Below Normal	8.9	11.9	11.0	7.9	6.0	4.1	3.7	2.5	1.2	1.1	1.0	-1.8
Dry	3.7	7.4	6.7	5.7	5.1	4.5	4.0	3.5	2.3	2.1	1.8	1.6
Critical Dry	7.7	9.8	9.3	8.2	7.5	6.6	6.9	7.1	6.8	12.2	14.5	13.8

Table 5.48 Changes in Shasta Lake Elevation under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	997	1,002	1,012	1,024	1,032	1,041	1,058	1,063	1,055	1,036	1,022	1,017
Above Normal	973	976	990	1,018	1,028	1,048	1,062	1,062	1,046	1,021	1,006	1,004
Below Normal	997	998	1,004	1,019	1,034	1,046	1,054	1,049	1,032	1,008	991	986
Dry	974	976	983	993	1,013	1,033	1,042	1,039	1,021	998	985	983
Critical Dry	935	933	939	948	960	975	972	966	941	910	888	882
No Action Alternative												
Wet	991	992	1,008	1,023	1,031	1,041	1,058	1,064	1,056	1,037	1,024	1,005
Above Normal	967	968	982	1,012	1,025	1,048	1,062	1,063	1,049	1,024	1,009	999
Below Normal	986	985	991	1,009	1,025	1,040	1,048	1,045	1,031	1,006	989	987
Dry	969	967	975	986	1,006	1,027	1,037	1,034	1,018	995	982	980
Critical Dry	927	923	929	939	951	968	965	958	935	899	876	872
Alternative 3 as Compared to No Action Alternative												
Wet	6	10	4	1	0	0	0	0	-1	-1	-2	12
Above Normal	5	8	8	6	2	0	0	-1	-2	-2	-3	5
Below Normal	11	14	13	10	9	6	6	4	2	2	2	-2
Dry	5	9	8	7	7	6	6	5	3	3	3	2
Critical Dry	8	10	10	9	8	7	8	8	7	11	11	11
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	0.6	1.0	0.4	0.1	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2	1.2
Above Normal	0.6	0.8	0.9	0.6	0.2	0.0	0.0	-0.1	-0.2	-0.2	-0.3	0.5
Below Normal	1.1	1.4	1.3	1.0	0.9	0.6	0.5	0.4	0.2	0.2	0.2	-0.2
Dry	0.5	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.3	0.3	0.3	0.2
Critical Dry	0.9	1.1	1.0	1.0	0.9	0.8	0.8	0.8	0.7	1.2	1.3	1.2

The following changes in Shasta Lake storage and surface water elevations would occur under Alternative 3 as compared to the No Action Alternative.

- In wet years, storage would be similar in December through August and increased in September and November (up to 8.7 percent).
- In above-normal years, storage would be similar in January through October and increased in November and December (up to 7.1 percent).
- In below-normal years, storage would be similar in March through September and increased in October through February (up to 11.9 percent).

- In dry years, storage would be similar in March through October and increased in November through January (up to 7.4 percent).
- In critical dry years, storage would increase in all months (up to 12.2 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes in Sacramento River flows would occur under Alternative 3 as compared to the No Action Alternative, as shown on Figures 5.56 through 5.61.

- Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
  - Over long-term conditions, similar flows would occur in October, February through May, July, and August; reduced flows in September and November (up to 20.1 percent); and increased flows in December, January, and June (up to 8.9 percent).
  - In wet years, similar flows would occur in February through August; reduced flows in September through November (up to 42.1 percent); and increased flows in December and January (up to 16.9 percent).
  - In dry years, similar flows would occur in July through September and December through May; reduced flows in November (24.6 percent); and increased flows in January and June (up to 7.3 percent).
- Sacramento River near Freeport (near the northern boundary of the Delta) (Figures 5.59 through 5.61).
  - Over long-term conditions, similar flows would occur in October, December through May, July, and August; reduced flows in September and November (up to 30.1 percent); and increased flows in June (12.1 percent).
  - In wet years, similar flows would occur in January through May, July, and October; reduced flows in August, September, and November (up to 48.1 percent); and increased flows in December and June (up to 6.6 percent).
  - In dry years, similar flows would occur in July through October and December through April; reduced flows in November (14.2 percent); and increased flows in May and June (up to 15.7 percent).

Lake Oroville and Feather River

Storage levels and surface water elevations in Lake Oroville under Alternative 3 as compared to the No Action Alternative are summarized in Tables 5.49 and 5.50. Changes in flows in the Feather River downstream of Thermalito Complex are shown on Figures 5.62 through 5.64. The results are summarized following Table 5.50.

Table 5.49 Changes in Lake Oroville Storage under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,893	1,931	2,315	2,608	2,854	2,942	3,300	3,473	3,375	2,902	2,630	2,499
Above Normal	1,405	1,448	1,623	2,109	2,623	2,945	3,280	3,371	3,129	2,494	2,039	1,778
Below Normal	1,839	1,801	1,846	2,054	2,370	2,636	2,879	2,883	2,610	1,971	1,520	1,354
Dry	1,332	1,288	1,322	1,454	1,733	2,088	2,329	2,319	1,980	1,548	1,343	1,198
Critical Dry	1,129	1,067	1,067	1,156	1,275	1,429	1,449	1,437	1,236	1,029	918	862
No Action Alternative												
Wet	1,691	1,732	2,189	2,554	2,832	2,942	3,300	3,488	3,445	2,964	2,626	2,109
Above Normal	1,279	1,322	1,485	1,959	2,519	2,892	3,247	3,393	3,232	2,600	2,117	1,659
Below Normal	1,542	1,497	1,507	1,719	2,122	2,397	2,653	2,714	2,530	1,923	1,513	1,307
Dry	1,206	1,158	1,177	1,305	1,582	1,938	2,178	2,210	1,951	1,478	1,287	1,144
Critical Dry	1,092	1,029	1,019	1,108	1,223	1,381	1,408	1,392	1,243	1,018	917	865
Alternative 3 as Compared to No Action Alternative												
Wet	201	199	126	54	23	0	0	-15	-70	-62	4	390
Above Normal	126	127	138	151	105	53	33	-22	-102	-106	-78	118
Below Normal	297	303	339	335	248	240	225	169	80	48	8	47
Dry	127	130	145	149	151	150	151	109	29	70	55	55
Critical Dry	37	38	48	48	52	48	41	45	-8	10	1	-3
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	11.9	11.5	5.8	2.1	0.8	0.0	0.0	-0.4	-2.0	-2.1	0.1	18.5
Above Normal	9.9	9.6	9.3	7.7	4.2	1.8	1.0	-0.7	-3.2	-4.1	-3.7	7.1
Below Normal	19.3	20.2	22.5	19.5	11.7	10.0	8.5	6.2	3.2	2.5	0.5	3.6
Dry	10.5	11.2	12.3	11.4	9.6	7.7	6.9	4.9	1.5	4.7	4.3	4.8
Critical Dry	3.4	3.7	4.7	4.3	4.2	3.5	2.9	3.2	-0.6	1.0	0.1	-0.3

Table 5.50 Changes in Lake Oroville Elevation under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	763	767	805	834	853	859	884	895	889	856	836	825
Above Normal	711	717	738	791	836	859	882	889	872	827	786	758
Below Normal	758	754	759	781	813	835	854	855	836	780	730	710
Dry	702	697	703	720	752	789	811	810	779	733	709	691
Critical Dry	679	671	671	684	699	718	719	718	693	665	648	640
No Action Alternative												
Wet	743	748	794	829	852	859	884	897	894	861	836	790
Above Normal	698	703	722	776	828	856	880	890	879	835	794	746
Below Normal	730	725	726	751	793	818	838	842	828	773	729	704
Dry	688	683	686	704	737	775	798	800	775	724	702	684
Critical Dry	674	667	664	678	693	712	715	712	693	663	648	640
Alternative 3 as Compared to No Action Alternative												
Wet	19	19	11	5	2	0	0	-1	-5	-5	0	35
Above Normal	13	14	16	15	9	4	2	-2	-7	-9	-9	13
Below Normal	28	29	32	30	21	17	16	13	8	6	1	6
Dry	14	14	16	16	15	13	13	10	3	8	7	7
Critical Dry	5	5	7	7	6	6	5	6	0	2	0	0
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	2.6	2.6	1.4	0.6	0.2	0.0	0.0	-0.1	-0.5	-0.6	0.0	4.4
Above Normal	1.9	2.0	2.2	1.9	1.0	0.4	0.3	-0.2	-0.8	-1.0	-1.1	1.7
Below Normal	3.9	4.0	4.5	4.0	2.6	2.1	1.9	1.5	1.0	0.8	0.2	0.8
Dry	2.0	2.1	2.4	2.2	2.1	1.7	1.6	1.2	0.4	1.2	1.0	1.0
Critical Dry	0.7	0.7	1.0	1.0	0.9	0.8	0.6	0.8	0.0	0.3	0.1	0.0

The following changes in Lake Oroville storage and surface water elevations would occur under Alternative 3 as compared to the No Action Alternative.

- In wet years, storage would be similar in January through August and increased in September through December (up to 18.5 percent).
- In above-normal years, storage would be similar in February through August and increased in September through January (up to 18.5 percent).
- In below-normal years, storage would be similar in June through September and increased in October through May (up to 22.5 percent).

- In dry years, storage would be similar in May through September and increased in October through April (up to 12.3 percent).
- In critical dry years, storage would be similar under all months.
- In all months, in all water year types, surface water elevations would be similar.

The following changes in Feather River flows would occur under Alternative 3 as compared to the No Action Alternative, as shown on Figures 5.62 through 5.64.

- Over long-term conditions, similar flows would occur in October, November, March, April, and July; reduced flows in August and September (up to 49.4 percent); and increased flows in December through February, May, and June (up to 33.9 percent).
- In wet years, similar flows would occur in October, November, February through May, and July; reduced flows in August and September (up to 70.0 percent) and increased flows in December, January, and June (up to 28.1 percent).
- In dry years, similar flows would occur in September and January through April; reduced flows in October through December and July (up to 14.5 percent); and increased flows in May, June, and August (36.9 percent).

Folsom Lake and American River

Storage levels and surface water elevations in Folsom Lake under Alternative 3 as compared to the No Action Alternative are summarized in Tables 5.51 and 5.52. Changes in flows in the American River downstream of Nimbus Dam are shown on Figures 5.65 through 5.67. The results are summarized following Table 5.52.

Table 5.51 Changes in Folsom Lake Storage under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	486	473	525	524	515	632	785	951	929	790	690	645
Above Normal	388	404	454	537	539	640	787	946	851	580	516	479
Below Normal	513	496	505	514	542	627	764	844	766	506	436	407
Dry	405	398	420	434	482	580	692	761	654	491	436	411
Critical Dry	331	314	322	325	370	436	474	485	431	343	291	257
No Action Alternative												
Wet	454	435	514	518	515	632	785	951	941	800	712	576
Above Normal	377	380	429	513	531	640	787	946	887	621	552	477
Below Normal	446	431	467	484	533	619	757	843	780	527	472	453
Dry	394	383	408	423	479	579	691	760	658	495	443	419
Critical Dry	324	305	315	320	366	432	475	486	415	327	267	231
Alternative 3 as Compared to No Action Alternative												
Wet	33	38	11	6	0	0	0	0	-12	-10	-22	69
Above Normal	11	24	25	25	8	0	0	0	-36	-41	-36	2
Below Normal	67	64	38	30	9	8	6	1	-14	-21	-36	-45
Dry	11	15	12	11	3	1	1	1	-4	-4	-7	-8
Critical Dry	7	8	8	5	3	3	-1	-1	16	16	25	27
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	7.2	8.8	2.1	1.2	0.0	0.0	0.0	0.0	-1.3	-1.3	-3.1	12.0
Above Normal	2.8	6.3	5.8	4.8	1.5	0.0	0.0	0.0	-4.1	-6.7	-6.6	0.5
Below Normal	15.0	14.9	8.2	6.2	1.6	1.3	0.8	0.1	-1.8	-3.9	-7.6	-10.0
Dry	2.8	3.9	2.9	2.6	0.6	0.2	0.1	0.2	-0.6	-0.8	-1.6	-1.9
Critical Dry	2.1	2.7	2.5	1.6	0.9	0.7	-0.2	-0.1	3.9	4.9	9.2	11.6

Table 5.52 Changes in Folsom Lake Elevation under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	413	412	419	419	418	432	448	465	463	448	438	433
Above Normal	395	397	408	421	421	433	448	465	455	425	418	413
Below Normal	416	415	416	417	421	432	446	454	446	415	404	401
Dry	401	401	405	407	414	426	438	445	434	414	407	404
Critical Dry	388	386	390	390	396	406	411	411	403	389	379	372
No Action Alternative												
Wet	409	407	418	418	418	432	448	464	464	449	440	425
Above Normal	394	395	405	418	420	433	449	464	458	430	422	413
Below Normal	408	406	411	414	420	431	445	454	447	418	411	409
Dry	400	399	403	405	413	426	438	445	434	414	408	405
Critical Dry	386	384	389	390	396	406	411	412	401	386	374	366
Alternative 3 as Compared to No Action Alternative												
Wet	4	5	1	1	0	0	0	1	-1	-1	-3	8
Above Normal	0	2	3	3	1	0	0	1	-3	-5	-4	0
Below Normal	8	8	5	4	1	1	1	1	-1	-3	-7	-8
Dry	1	2	1	1	0	0	0	0	0	-1	-1	-1
Critical Dry	2	2	1	1	0	0	0	0	2	3	5	6
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	1.0	1.2	0.3	0.2	0.0	0.0	0.0	0.2	-0.1	-0.3	-0.6	1.9
Above Normal	0.1	0.6	0.6	0.7	0.2	0.0	0.0	0.1	-0.7	-1.2	-1.0	0.1
Below Normal	2.1	2.0	1.2	0.9	0.3	0.2	0.2	0.1	-0.3	-0.7	-1.6	-1.9
Dry	0.3	0.5	0.3	0.3	0.1	0.0	0.0	0.1	-0.1	-0.1	-0.2	-0.3
Critical Dry	0.4	0.5	0.4	0.2	0.1	0.0	-0.1	-0.1	0.5	0.7	1.5	1.7

The following changes in Folsom Lake storage would occur under Alternative 3 as compared to the No Action Alternative.

- In wet years, storage would be similar in December through August and increased in September through December (up to 12.1 percent).
- In above-normal years, storage would be similar in January through June, September, and October; and increased in November and December (up to 6.3 percent); and reduced in July and August (up to 6.7 percent).
- In below-normal years, storage would be similar in February through July; reduced in August and September (up to 10.0 percent); and increased in October through January (up to 15.0 percent).

- In dry years, storage would be similar in all months.
- In critical dry years, storage would be similar in October through July and increased in August and September (up to 11.6 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes in American River flows would occur under Alternative 3 as compared to the No Action Alternative, as shown on Figures 5.65 through 5.67.

- Over long-term conditions, similar flows would occur in November, January through May, July, and August; reduced flows in September and October (up to 28.7 percent); and increased flows in June (5.8 percent).
- In wet years, similar flows would occur in October, November, and January through July; reduced flows in September (45.9 percent); and increased flows in August and December (up to 8.5 percent).
- In dry years, similar flows would occur in November through January and March through September; reduced flows in October (11.2 percent); and increased flows in February (6.1 percent).

Clear Creek

Changes in flows in Clear Creek downstream of Whiskeytown Dam are summarized in Table 5.53.

Monthly Clear Creek flows under Alternative 3 as compared to the No Action Alternative are identical except in May. In May, under Alternative 3, flows are up to 28.9 percent lower than under the No Action Alternative.

Table 5.53 Changes in Clear Creek Flows below Whiskeytown Dam under Alternative 3 as Compared to the No Action Alternative

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	200	200	200	309	356	272	200	200	200	85	85	150
Above Normal	181	182	188	192	196	196	196	200	200	85	85	150
Below Normal	195	195	195	195	195	195	195	195	191	85	85	150
Dry	178	184	188	190	190	190	190	190	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	167	111	85	85	133
No Action Alternative												
Wet	200	200	200	309	356	272	200	277	200	85	85	150
Above Normal	181	182	188	192	196	196	196	277	200	85	85	150
Below Normal	195	195	195	195	195	195	195	274	191	85	85	150
Dry	175	184	188	190	190	190	190	267	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	214	111	85	85	133
Alternative 3 as Compared to No Action Alternative												
Wet	0	0	0	0	0	0	0	-77	0	0	0	0
Above Normal	0	0	0	0	0	0	0	-77	0	0	0	0
Below Normal	0	0	0	0	0	0	0	-78	0	0	0	0
Dry	3	0	0	0	0	0	0	-77	0	0	0	0
Critical Dry	0	0	0	0	0	0	0	-47	0	0	0	0
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-27.9	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-27.9	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-28.6	0.0	0.0	0.0	0.0
Dry	1.6	0.0	0.0	0.0	0.0	0.0	0.0	-28.9	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-22.1	0.0	0.0	0.0	0.0

New Melones Reservoir and Stanislaus River

Storage levels and surface water elevations in New Melones Reservoir under Alternative 3 as compared to the No Action Alternative are summarized in Tables 5.54 and 5.55. Changes in flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 through 5.70. The results are summarized following Table 5.55.

Table 5.54 Changes in New Melones Reservoir Storage under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,562	1,567	1,618	1,720	1,792	1,871	1,906	2,049	2,146	2,057	1,934	1,855
Above Normal	1,269	1,295	1,356	1,442	1,530	1,620	1,634	1,713	1,720	1,627	1,529	1,481
Below Normal	1,530	1,536	1,550	1,570	1,620	1,650	1,614	1,617	1,599	1,501	1,403	1,357
Dry	1,327	1,320	1,326	1,342	1,378	1,409	1,380	1,360	1,319	1,224	1,137	1,091
Critical Dry	828	824	836	846	866	860	803	751	719	653	593	563
No Action Alternative												
Wet	1,379	1,390	1,454	1,562	1,666	1,724	1,758	1,878	1,968	1,890	1,773	1,703
Above Normal	1,029	1,060	1,125	1,214	1,317	1,406	1,413	1,484	1,467	1,372	1,277	1,232
Below Normal	1,294	1,305	1,326	1,351	1,413	1,438	1,390	1,383	1,359	1,268	1,175	1,133
Dry	1,094	1,094	1,106	1,121	1,156	1,188	1,154	1,132	1,087	997	914	871
Critical Dry	624	623	638	645	661	656	602	554	526	476	431	408
Alternative 3 as Compared to No Action Alternative												
Wet	183	177	165	158	126	147	149	172	178	168	161	152
Above Normal	239	235	231	228	213	213	220	229	253	255	252	250
Below Normal	236	231	224	219	207	212	224	234	239	233	228	224
Dry	232	226	220	220	222	221	226	228	232	228	223	221
Critical Dry	205	201	198	201	204	204	202	197	193	177	162	154
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	13.3	12.7	11.3	10.1	7.6	8.5	8.4	9.1	9.0	8.9	9.1	8.9
Above Normal	23.3	22.1	20.5	18.7	16.2	15.2	15.6	15.4	17.2	18.6	19.7	20.3
Below Normal	18.2	17.7	16.9	16.2	14.7	14.7	16.1	16.9	17.6	18.4	19.4	19.8
Dry	21.2	20.7	19.9	19.7	19.2	18.6	19.5	20.1	21.3	22.8	24.4	25.3
Critical Dry	32.8	32.3	31.1	31.1	30.9	31.1	33.6	35.5	36.7	37.3	37.6	37.8

Table 5.55 Changes in New Melones Reservoir Elevation under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,003	1,004	1,010	1,022	1,030	1,038	1,042	1,055	1,064	1,056	1,045	1,037
Above Normal	964	967	974	987	999	1,009	1,012	1,021	1,022	1,013	1,002	924
Below Normal	998	998	1,000	1,002	1,011	1,014	1,011	1,012	1,010	1,000	989	983
Dry	974	973	974	977	981	985	983	982	978	966	954	948
Critical Dry	899	899	902	904	909	909	899	889	883	870	858	852
No Action Alternative												
Wet	980	982	990	1,004	1,016	1,023	1,026	1,039	1,047	1,040	1,029	1,022
Above Normal	932	937	945	960	974	986	988	997	996	985	973	897
Below Normal	968	969	972	975	985	988	985	985	983	972	960	955
Dry	943	943	944	947	951	957	955	953	948	934	922	915
Critical Dry	856	856	862	864	870	871	860	848	840	828	818	812
Alternative 3 as Compared to No Action Alternative												
Wet	23	22	20	18	14	16	15	16	17	16	16	16
Above Normal	32	30	29	28	25	23	24	24	27	28	29	27
Below Normal	30	29	28	27	26	26	26	27	27	28	28	28
Dry	32	31	30	30	30	29	29	29	31	31	32	33
Critical Dry	43	43	40	40	38	38	39	41	43	41	40	40
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	2.3	2.2	2.0	1.8	1.4	1.5	1.5	1.6	1.6	1.5	1.6	1.5
Above Normal	3.4	3.2	3.1	2.9	2.6	2.4	2.4	2.4	2.7	2.9	3.0	3.0
Below Normal	3.1	3.0	2.9	2.8	2.6	2.6	2.7	2.7	2.8	2.9	3.0	3.0
Dry	3.3	3.3	3.2	3.2	3.2	3.0	3.0	3.1	3.2	3.4	3.5	3.6
Critical Dry	5.1	5.0	4.7	4.6	4.4	4.3	4.5	4.9	5.1	5.0	4.9	4.9

The following changes in New Melones Reservoir storage would occur under Alternative 3 as compared to the No Action Alternative.

- In wet years, storage would be increased in all months (up to 13.3 percent).
- In above-normal years, storage would be increased in all months (up to 23.3 percent).
- In below-normal years, storage would be increased in all months (up to 19.8 percent).
- In dry years, storage would be increased in all months (up to 25.3 percent).
- In critical dry years, storage would be increased in all months (up to 37.8 percent).
- In all months, in all water year types, surface water elevations would be similar.

Flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 to 5.70. Changes in flows in these rivers are summarized below.

- Over long-term conditions, reduced flows would occur in October and March through June (up to 58.3 percent); and increased flows in November through February and July through September (up to 36.81 percent).
- In wet years, similar flows would occur in April; reduced flows in October, March, and May (up to 52.9 percent); and increased flows in June through September and November through February (up to 67.8 percent).
- In dry years, similar flows would occur in March and July through September; reduced flows in October and April through June (up to 59.6 percent); and increased flows in November through February (up to 37.0 percent).

San Joaquin River at Vernalis

Flows in the San Joaquin River at Vernalis under Alternative 3 as compared to the No Action Alternative are summarized below, as shown on Figures 5.71 through 5.73.

- Over long-term conditions, similar flows would occur in November through September and reduced flows in October (15.7 percent).
- In wet years, similar flows would occur in November through August; reduced flows in October (14.1 percent); and increased flows in September (5.7 percent).
- In dry years, similar flows would occur in November through March and July through September and reduced flows in October and April through June (up to 15.2 percent).

San Luis Reservoir

Storage levels and surface water elevations in San Luis Reservoir under Alternative 3 as compared to the No Action Alternative are summarized in Tables 5.56 and 5.57. The results are summarized following Table 5.57.

Table 5.56 Changes in San Luis Reservoir Storage under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	810	1,033	1,276	1,555	1,810	1,957	1,975	1,851	1,540	1,228	961	980
Above Normal	619	844	1,109	1,342	1,571	1,756	1,763	1,575	1,155	830	674	703
Below Normal	834	1,043	1,305	1,489	1,623	1,736	1,651	1,338	899	737	585	561
Dry	634	804	1,052	1,302	1,455	1,608	1,593	1,413	1,128	926	590	535
Critical Dry	548	632	804	1,076	1,216	1,256	1,227	1,069	838	572	380	351
No Action Alternative												
Wet	555	681	931	1,236	1,526	1,788	1,598	1,251	946	741	628	679
Above Normal	490	649	957	1,223	1,441	1,661	1,444	1,048	666	466	433	513
Below Normal	525	624	907	1,141	1,314	1,473	1,312	967	555	500	426	467
Dry	476	590	867	1,150	1,339	1,494	1,413	1,167	840	763	476	469
Critical Dry	478	556	752	1,040	1,204	1,252	1,192	1,028	739	544	343	323
Alternative 3 as Compared to No Action Alternative												
Wet	255	351	345	320	284	170	377	599	593	487	334	300
Above Normal	130	194	153	119	129	95	319	526	489	363	241	190
Below Normal	309	419	399	348	309	263	339	371	344	237	160	94
Dry	158	214	185	152	117	114	180	246	288	163	114	66
Critical Dry	70	76	53	37	12	4	35	40	99	28	38	28
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	55.3	76.6	58.4	38.6	25.4	12.5	31.2	68.0	96.3	84.6	58.6	43.5
Above Normal	30.9	56.4	31.9	21.8	20.6	11.1	31.0	71.0	111.4	93.4	63.4	34.8
Below Normal	73.2	106.9	71.2	45.4	32.8	23.5	31.7	45.1	81.6	69.1	59.6	30.0
Dry	39.1	52.1	30.6	18.3	11.8	10.0	14.5	24.2	38.5	19.4	18.5	4.4
Critical Dry	28.6	28.3	10.8	5.5	1.9	0.8	2.5	2.9	16.3	10.1	25.1	29.2

Table 5.57 Changes in San Luis Reservoir Elevation under Alternative 3 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	427	452	477	503	525	537	539	529	502	473	447	449
Above Normal	406	431	459	482	504	520	521	505	467	433	417	420
Below Normal	431	454	480	497	509	519	512	484	440	423	405	401
Dry	410	430	456	480	494	508	506	490	464	444	405	397
Critical Dry	399	409	430	458	472	475	473	457	434	403	375	371
No Action Alternative												
Wet	399	414	443	473	500	523	507	475	444	422	409	416
Above Normal	391	411	445	472	492	512	493	456	415	389	386	398
Below Normal	397	410	442	465	481	496	481	448	400	393	383	389
Dry	391	406	437	466	484	498	490	468	434	426	390	389
Critical Dry	390	400	423	454	470	475	469	453	422	399	369	366
Alternative 3 as Compared to No Action Alternative												
Wet	28	38	34	29	24	14	32	53	58	52	38	33
Above Normal	14	21	15	11	11	8	28	49	51	44	31	23
Below Normal	33	44	39	32	28	23	30	36	40	30	23	12
Dry	19	24	18	14	10	10	16	23	30	18	15	9
Critical Dry	9	10	6	4	2	1	4	4	12	4	6	5
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	6.9	9.1	7.6	6.2	4.9	2.7	6.2	11.2	13.0	12.2	9.3	7.9
Above Normal	3.7	5.0	3.3	2.3	2.3	1.6	5.6	10.6	12.4	11.3	8.1	5.7
Below Normal	8.4	10.7	8.8	6.9	5.8	4.6	6.3	8.0	10.1	7.6	5.9	3.2
Dry	4.9	5.8	4.2	3.0	2.2	2.0	3.2	4.8	6.8	4.2	3.9	2.2
Critical Dry	2.3	2.4	1.5	0.9	0.4	0.2	0.8	1.0	2.8	0.9	1.7	1.4

The following changes in San Luis Reservoir storage would occur under Alternative 3 as compared to the No Action Alternative.

- In wet years, storage would be increased in all months (up to 96.3 percent). Water storage elevations would be increased in all months (up to 13.0 percent).
- In above-normal years, storage would be increased in all months (up to 111.4 percent). Water storage elevations would be similar in October through March and increased in April through September (up to 11.3 percent).
- In below-normal years, storage would be increased in all months (up to 106.9 percent). Water storage elevations would be similar in September and increased in October through August (up to 10.7 percent).
- In dry years, storage would be similar in September and increased in October through August (up to 52.1 percent). Water storage elevations would be similar December through May and July through October and increased in November and June (up to 6.8 percent).
- In critical dry years, storage would be similar in February through May and increased in June through January (up to 29.2 percent). Water storage elevations would be similar in all months.

Changes in Flows into the Yolo Bypass

Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under Alternative 3 as compared to the No Action Alternative are summarized in Table 5.58. The results are summarized following Table 5.58.

Table 5.58 Changes in Flows into the Yolo Bypass at Fremont Weir under Alternative 3 as Compared to the No Action Alternative

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	139	973	9,693	25,241	30,361	18,837	5,617	289	113	0	0	100
Above Normal	100	100	2,686	6,188	14,531	8,490	1,768	100	100	0	0	100
Below Normal	100	100	262	1,250	4,001	1,153	293	100	100	0	0	100
Dry	100	100	342	923	2,007	1,406	410	100	100	0	0	100
Critical Dry	100	100	150	534	545	397	106	100	100	0	0	100
No Action Alternative												
Wet	183	910	8,420	24,291	29,547	18,493	5,627	289	113	0	0	100
Above Normal	100	100	2,765	5,997	13,013	7,928	1,688	100	100	0	0	100
Below Normal	100	100	242	1,004	3,031	883	293	100	100	0	0	100
Dry	100	100	322	902	2,024	1,393	407	100	100	0	0	100
Critical Dry	100	100	149	528	534	396	106	100	100	0	0	100
Alternative 3 as Compared to No Action Alternative												
Wet	-45	64	1,273	950	813	344	-10	1	0	0	0	0
Above Normal	0	0	-78	192	1,519	562	80	0	0	0	0	0
Below Normal	0	0	20	247	970	271	-1	0	0	0	0	0
Dry	0	0	19	22	-17	13	3	0	0	0	0	0
Critical Dry	0	0	1	7	11	1	0	0	0	0	0	0
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	-24.5	7.0	15.1	3.9	2.8	1.9	-0.2	0.2	0.1	0.0	0.0	0.0
Above Normal	0.0	0.0	-2.8	3.2	11.7	7.1	4.8	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	8.3	24.6	32.0	30.7	-0.3	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	6.0	2.4	-0.8	0.9	0.6	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.8	1.2	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0

The following changes in flows from the Sacramento River into Yolo Bypass at Fremont Weir would occur under Alternative 3 as compared to the No Action Alternative.

- In wet years, flows into Yolo Bypass would be similar in January through September; reduced in October (24.5 percent) and increased in November and December (up to 15.1 percent).
- In above-normal years, storage would be similar in April through January and increased in February and March (up to 11.7 percent).
- In below-normal years, flows into Yolo Bypass would be similar in April through November and increased in December through March (up to 32.0 percent).
- In dry years, flows into Yolo Bypass would be similar in January through November and increased in December (6.0 percent).
- In critical dry years, flows into Yolo Bypass would be similar in all months.

Changes in Delta Conditions

Delta outflow under Alternative 3 as compared to the No Action Alternative are summarized below and shown on Figures 5.74 through 5.76.

- In wet years, average monthly Delta outflow would increase in December through March (up to 3,307 cfs) and decrease in April through November (up to 13,678 cfs).
- In dry years, average monthly Delta outflow would increase January, February, June, and July (up to 277 cfs) and decrease in August through December and March through May (up to 2,902 cfs).

The OMR conditions under Alternative 3 as compared to the No Action Alternative are shown on Figures 5.77 through 5.79.

- Under Alternative 3, OMR flows are negative in all months of all water year types except in April in a wet year (405 cfs). Under the No Action Alternative, OMR flows are negative except in April and May of wet and above-normal years and April of below-normal years.
- In wet years, average monthly OMR flows would be more positive in July and August (up to 800 cfs) and more negative in September through June (up to 4,477 cfs).
- In dry years, average monthly OMR flows would be more positive in July and January (up to 728 cfs) and more negative in August through December and February through June (up to 1,847 cfs).

Changes in CVP and SWP Exports and Deliveries

Delta exports under Alternative 3 as compared to the No Action Alternative are summarized in Table 5.59.

Table 5.59 Changes in Exports at Jones and Banks Pumping Plants under Alternative 3 as Compared to the No Action Alternative

Water Year	Monthly Volume (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	544	615	601	559	594	589	494	490	519	648	667	654
Above Normal	430	533	574	414	469	566	441	413	397	586	680	647
Below Normal	524	587	607	394	373	448	312	266	330	683	650	588
Dry	440	471	523	389	314	337	270	242	292	492	318	426
Critical Dry	321	319	401	355	251	180	127	100	131	158	196	245
No Action Alternative												
Wet	410	497	564	513	537	594	204	207	445	669	717	638
Above Normal	376	450	562	406	401	496	130	105	315	587	709	628
Below Normal	386	456	590	387	354	394	134	100	209	657	622	542
Dry	374	398	510	392	315	318	153	126	194	541	296	426
Critical Dry	314	293	384	349	250	179	93	90	64	223	176	242
Alternative 3 as Compared to No Action Alternative												
Wet	134	118	37	45	57	-4	290	283	74	-21	-51	16
Above Normal	54	83	12	8	68	69	311	308	81	-2	-28	19
Below Normal	138	132	17	8	19	54	178	166	121	26	27	45
Dry	66	74	14	-3	-1	19	117	116	98	-49	22	0
Critical Dry	7	27	18	6	0	1	35	10	67	-64	19	3
Alternative 3 as Compared to No Action Alternative (percent change)												
Wet	32.7	23.8	6.6	8.8	10.6	-0.7	142.4	136.5	16.7	-3.1	-7.1	2.5
Above Normal	14.4	18.4	2.2	2.0	16.9	13.9	238.3	292.1	25.9	-0.3	-4.0	3.0
Below Normal	35.8	28.9	2.9	2.0	5.3	13.7	132.2	166.5	58.2	3.9	4.4	8.4
Dry	17.7	18.5	2.7	-0.7	-0.3	6.1	76.2	92.5	50.5	-9.0	7.6	0.1
Critical Dry	2.2	9.2	4.6	1.7	0.1	0.4	37.3	11.0	104.1	-28.9	10.9	1.4

The following changes would occur in CVP and SWP exports under Alternative 3 as compared to the No Action Alternative.

- Long-term average annual exports would be 726 TAF (15 percent) more under Alternative 3 as compared to the No Action Alternative.
- In wet years, total exports would be similar in March, July, and September; increased in October, February and April through June (up to 142.4 percent); and reduced in August (7.1 percent).
- In above-normal years, total exports would be similar in December, January, and July through September and increased in October, November, and February through June (up to 292 percent).
- In below-normal years, total exports would be similar in December, January, July, and August and increased in September through November and February through June (up to 166.5 percent).
- In dry years, total exports would be similar in September and December, and July; increased in October, November, March through June, and August (up to 92.5 percent); and reduced in July (7.6 percent).
- In critical dry years, total exports would be similar in September, October, and December through March; increased in November, April through June and August (up to 104.1 percent); and reduced in July (28.9 percent).

Deliveries to CVP and SWP water users increase under Alternative 3 as compared to the No Action Alternative, as summarized in Tables 5.60 and 5.61, respectively, due to increased water supply availability and export limitations.

Table 5.60 Changes CVP Water Deliveries under Alternative 3 as Compared to the No Action Alternative

Annual Average Deliveries (TAF)					
		Alternative 3	No Action Alternative	Alternative 3 as compared to the No Action Alternative: Difference	Alternative 3 as compared to the No Action Alternative: Percent Change
North of Delta					
CVP Agricultural Water Service Contractors	Long Term	209	185	24	13
	Dry	111	86	25	29
	Critical Dry	31	24	7	29
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	392	386	6	2
	Dry	390	385	6	2
	Critical Dry	384	383	1	0
CVP M&I American River Contractors	Long Term	118	113	6	5
	Dry	104	97	7	7
	Critical Dry	78	75	3	4
CVP Sacramento River Settlement Contractors	Long Term	1,860	1,859	1	0
	Dry	1,906	1,906	0	0
	Critical Dry	1,742	1,737	5	0
CVP Refuge Level 2 Deliveries	Long Term	153	146	7	5
	Dry	149	146	4	3
	Critical Dry	103	102	1	1
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,614	2,576	38	1
	Dry	2,556	2,523	33	1
	Critical Dry	2,260	2,246	14	1
South of Delta (Does not include Eastside Contractors)					
CVP Agricultural Water Service Contractors	Long Term	1,079	847	233	28
	Dry	596	445	151	34
	Critical Dry	168	131	36	27

Annual Average Deliveries (TAF)					
		Alternative 3	No Action Alternative	Alternative 3 as compared to the No Action Alternative: Difference	Alternative 3 as compared to the No Action Alternative: Percent Change
CVP M&I Users	Long Term	122	112	11	10
	Dry	108	99	8	8
	Critical Dry	83	80	2	3
San Joaquin River Exchange Contractors	Long Term	852	852	0	0
	Dry	875	875	0	0
	Critical Dry	741	741	0	0
CVP Refuge Level 2 Deliveries	Long Term	273	273	0	0
	Dry	281	281	0	0
	Critical Dry	234	234	0	0
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,326	2,084	242	12
	Dry	1,860	1,700	160	9
	Critical Dry	1,226	1,186	40	3
Eastside Contractors Deliveries					
Water Rights	Long Term	513	508	5	1
	Dry	524	524	0	0
	Critical Dry	478	445	33	7
CVP Water Service Contracts	Long Term	123	104	20	19
	Dry	109	84	25	30
	Critical Dry	36	4	32	800
Total Water Rights and CVP Service Contracts Deliveries	Long Term	636	612	24	4
	Dry	633	608	25	4
	Critical Dry	514	449	65	14

The following changes in CVP water deliveries would occur under Alternative 3 as compared to the No Action Alternative.

- Deliveries to CVP North of Delta agricultural water service contractors would be increased by 13 percent over the long-term conditions and 29 percent in dry and critical dry years.
- Deliveries to CVP North of Delta M&I contractors would be similar in total; however, deliveries to the American River CVP contractors would increase by 5 percent over the long-term conditions and 7 percent in dry years, and remain similar in critical dry years.
- Deliveries to CVP South of Delta agricultural water service contractors would be increased by 28 percent over the long-term conditions, 34 percent in dry years, and 27 percent in critical dry years.
- Deliveries to CVP South of Delta M&I contractors would be similar in critical dry years and increased by 10 percent over the long-term conditions and 8 percent in dry years.
- Deliveries to the Eastside contractors would be similar under long-term conditions and dry years and increased by 14 percent in critical dry years.

Table 5.61 Changes SWP Water Deliveries under Alternative 3 as Compared to the No Action Alternative

Annual Average Deliveries (TAF)					
				Alternative 3 as compared to the No Action Alternative	
		Alternative 3	**No Action Alternative**	**Difference**	**Percent Change**
North of Delta					
SWP Agricultural Uses	Long Term	0	0	0	0
	Dry	0	0	0	0
	Critical Dry	0	0	0	0
SWP M&I (without Article 21)	Long Term	80	68	11	17
	Dry	60	51	8	17
	Critical Dry	48	43	5	13
SWP M&I Article 21 Deliveries	Long Term	12	13	-1	-4
	Dry	13	14	-1	-5
	Critical Dry	12	13	-1	-5
Total SWP Agricultural and M&I (without Article 21)	Long Term	80	68	11	17
	Dry	60	51	8	17
	Critical Dry	48	43	5	13

Annual Average Deliveries (TAF)					
				Alternative 3 as compared to the No Action Alternative	
		Alternative 3	No Action Alternative	Difference	Percent Change
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	12	13	-1	-4
	Dry	13	14	-1	-5
	Critical Dry	12	13	-1	-5
South of Delta					
SWP Agricultural Users (without Article 21)	Long Term	716	610	106	17
	Dry	533	455	78	17
	Critical Dry	430	378	52	14
SWP Agricultural Article 21 Deliveries	Long Term	73	27	47	175
	Dry	36	5	31	604
	Critical Dry	27	7	21	296
SWP M&I Users (without Article 21)	Long Term	2,106	1,800	306	17
	Dry	1,649	1,406	243	17
	Critical Dry	1,340	1,173	167	14
SWP M&I Article 21 Deliveries	Long Term	33	20	13	65
	Dry	11	5	6	137
	Critical Dry	10	5	5	101
Total SWP Agricultural and M&I Users (without Article 21)	Long Term	2,822	2,410	412	17
	Dry	2,182	1,861	321	17
	Critical Dry	1,770	1,551	219	14
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	106	47	60	128
	Dry	47	10	37	384
	Critical Dry	38	12	26	214

The following changes in SWP water deliveries would occur under Alternative 3 as compared to the No Action Alternative.

- Deliveries without Article 21 water to SWP North of Delta water contractors would be increased by 17 percent over the long-term conditions and in dry years and 13 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be increased by 17 percent over the long-term conditions and in dry years and 14 percent in critical dry years.
- Deliveries of Article 21 water to SWP North of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be increased by 128 percent over the long-term conditions, 384 percent in dry years, and 214 percent in critical dry years.

Effects Related to Cross Delta Water Transfers

Potential effects to surface water resources could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i). Potential effects were identified as reduced surface water storage in upstream reservoirs and changes in flow patterns in river downstream of the reservoirs if water was released from the reservoirs in patterns that were different than would have been used by the water seller's. Because all water transfers would be required to avoid adverse impacts to other water users and biological resources (see Section 3.A.6.3, Transfers), including impacts associated with changes in reservoir storage and river flow patterns, the analysis indicated that water transfers would not result in substantial changes in storage or river flows. For the purposes of this EIS, it is anticipated that similar conditions would occur due to cross Delta water transfers under Alternative 3 and the No Action Alternative.

Under Alternative 3, water could be transferred throughout the year. As indicated in Table 5.59, capacity would be available under Alternative 3 in all months of all water year types without a maximum volume of transferred water. Under the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September, and the volume would be limited to 600,000 acre-feet per year in drier years and 360,000 acre-feet in all other years, in accordance with the 2008 USFWS BO and 2009 NMFS BO. As indicated in Table 5.59, capacity would be available under the No Action Alternative between July and September for water transfers in all water year types.

Overall, the potential for water transfer conveyance would be greater under Alternative 3 as compared to the No Action Alternative.

San Francisco Bay Area, Central Coast, and Southern California Regions

Potential Changes in Surface Water Resources at Reservoirs that Store CVP and SWP Water

The San Francisco Bay Area, Central Coast, and Southern California regions include numerous reservoirs that store CVP and SWP water supplies, including CVP and SWP reservoirs, that primarily provide water supplies for M&I water users. Changes in the availability CVP and SWP water supplies for storage in these reservoirs under Alternative 3 as compared to the No Action Alternative would be consistent with the following changes in water deliveries to M&I water users, as summarized in Tables 5.60 and 5.61.

- Deliveries to CVP South of Delta M&I contractors would be similar in critical dry years; and increased by 9 percent over the long-term conditions and 8 percent in dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be increased by 17 percent over the long-term conditions and in dry years and 14 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be increased by 128 percent over the long-term conditions, 384 percent in dry years, and 214 percent in critical dry years.

Changes in CVP and SWP Exports and Deliveries

Deliveries to CVP and SWP water users are described above in the Central Valley Region.

5.4.3.4.2 Alternative 3 Compared to the Second Basis of Comparison

Trinity River Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Changes in Trinity Lake storage and surface water elevations under Alternative 3 as compared to the Second Basis of Comparison are summarized in Tables 5.62 and 5.63. The results are summarized following Table 5.63.

Table 5.62 Changes in Trinity Lake Storage under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,502	1,537	1,643	1,766	1,928	2,053	2,224	2,248	2,192	2,067	1,936	1,805
Above Normal	1,197	1,230	1,349	1,511	1,707	1,891	2,071	2,045	1,949	1,806	1,646	1,513
Below Normal	1,434	1,457	1,477	1,542	1,629	1,717	1,858	1,786	1,680	1,509	1,334	1,199
Dry	1,173	1,179	1,206	1,226	1,318	1,450	1,585	1,537	1,468	1,301	1,152	1,056
Critical Dry	829	803	817	829	871	952	1,003	968	936	813	664	600
Second Basis of Comparison												
Wet	1,501	1,535	1,644	1,767	1,931	2,055	2,224	2,250	2,194	2,068	1,939	1,805
Above Normal	1,208	1,245	1,363	1,524	1,718	1,901	2,079	2,053	1,955	1,815	1,647	1,513
Below Normal	1,451	1,472	1,492	1,554	1,641	1,729	1,872	1,799	1,696	1,515	1,337	1,204
Dry	1,178	1,184	1,210	1,230	1,322	1,453	1,586	1,536	1,466	1,302	1,152	1,055
Critical Dry	819	803	813	825	868	949	999	962	929	811	667	598
Alternative 3 as Compared to Second Basis of Comparison												
Wet	0	1	-1	-1	-2	-1	-1	-2	-1	0	-3	0
Above Normal	-11	-15	-14	-13	-11	-10	-8	-8	-7	-9	0	0
Below Normal	-17	-15	-15	-12	-12	-12	-14	-13	-16	-6	-3	-5
Dry	-5	-5	-4	-4	-4	-2	-1	0	2	0	0	1
Critical Dry	10	1	3	3	3	3	4	6	7	2	-3	2
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.2	0.0
Above Normal	-0.9	-1.2	-1.1	-0.8	-0.7	-0.5	-0.4	-0.4	-0.3	-0.5	0.0	0.0
Below Normal	-1.2	-1.0	-1.0	-0.8	-0.7	-0.7	-0.8	-0.7	-1.0	-0.4	-0.2	-0.4
Dry	-0.4	-0.4	-0.4	-0.3	-0.3	-0.1	0.0	0.0	0.1	0.0	0.0	0.1
Critical Dry	1.2	0.1	0.4	0.4	0.3	0.3	0.4	0.6	0.7	0.3	-0.5	0.4

Table 5.63 Changes in Trinity Lake Elevation under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	2,301	2,305	2,314	2,325	2,339	2,347	2,357	2,358	2,355	2,347	2,338	2,328
Above Normal	2,268	2,271	2,284	2,301	2,319	2,334	2,347	2,345	2,339	2,328	2,315	2,304
Below Normal	2,293	2,295	2,297	2,304	2,312	2,319	2,330	2,325	2,317	2,302	2,286	2,274
Dry	2,265	2,268	2,271	2,273	2,283	2,296	2,309	2,305	2,299	2,284	2,269	2,260
Critical Dry	2,226	2,220	2,222	2,225	2,231	2,244	2,252	2,248	2,244	2,229	2,204	2,193
Second Basis of Comparison												
Wet	2,301	2,305	2,314	2,325	2,339	2,347	2,357	2,358	2,355	2,347	2,338	2,328
Above Normal	2,270	2,273	2,286	2,303	2,320	2,335	2,347	2,346	2,339	2,329	2,315	2,304
Below Normal	2,295	2,296	2,298	2,305	2,313	2,320	2,331	2,326	2,318	2,303	2,287	2,274
Dry	2,266	2,269	2,272	2,274	2,284	2,296	2,309	2,304	2,298	2,284	2,269	2,259
Critical Dry	2,218	2,216	2,217	2,222	2,229	2,243	2,250	2,246	2,243	2,227	2,204	2,191
Alternative 3 as Compared to Second Basis of Comparison												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	-2	-2	-2	-2	-1	-1	-1	-1	0	-1	0	0
Below Normal	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	0	-1
Dry	0	0	0	0	0	0	0	0	0	0	0	0
Critical Dry	8	5	5	4	3	2	1	2	2	1	0	2
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Above Normal	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0
Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1

In all months, in all water year types, Trinity Lake storage and surface water elevations would be similar under Alternative 3 as compared to the Second Basis of Comparison. Trinity River flows would be similar in all months under long-term conditions and wet and dry years, as shown on Figures 5.53 through 5.55.

Central Valley Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Shasta Lake and Sacramento River

Storage levels and surface water elevations in Shasta Lake under Alternative 3 as compared to the Second Basis of Comparison are summarized in Tables 5.64 and 5.65. Changes in flows in the Sacramento River downstream of Keswick

Dam and at Freeport are shown on Figures 5.56 through 5.61. The results are summarized following Table 5.65.

Table 5.64 Changes in Shasta Lake Storage under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	2,816	2,932	3,161	3,408	3,597	3,841	4,301	4,453	4,221	3,720	3,370	3,244
Above Normal	2,475	2,555	2,783	3,303	3,509	4,023	4,403	4,401	3,975	3,350	2,998	2,946
Below Normal	2,818	2,851	2,983	3,302	3,650	3,971	4,176	4,056	3,631	3,036	2,669	2,562
Dry	2,431	2,451	2,590	2,770	3,189	3,662	3,885	3,798	3,359	2,826	2,542	2,500
Critical Dry	1,833	1,793	1,877	2,024	2,184	2,424	2,354	2,237	1,836	1,406	1,129	1,066
Second Basis of Comparison												
Wet	2,817	2,926	3,154	3,406	3,597	3,841	4,301	4,453	4,228	3,733	3,362	3,252
Above Normal	2,499	2,578	2,808	3,313	3,515	4,038	4,416	4,417	3,979	3,347	2,975	2,921
Below Normal	2,826	2,846	2,977	3,299	3,646	3,966	4,164	4,042	3,599	3,010	2,601	2,574
Dry	2,409	2,431	2,578	2,755	3,168	3,644	3,861	3,774	3,333	2,800	2,539	2,496
Critical Dry	1,873	1,826	1,911	2,050	2,222	2,460	2,386	2,270	1,861	1,409	1,151	1,086
Alternative 3 as Compared to Second Basis of Comparison												
Wet	-1	6	7	2	0	0	0	0	-7	-13	8	-8
Above Normal	-24	-23	-25	-11	-6	-15	-13	-16	-4	3	23	25
Below Normal	-9	5	5	3	4	5	12	13	32	26	68	-13
Dry	22	21	12	15	22	17	24	24	26	25	3	4
Critical Dry	-40	-33	-34	-26	-38	-36	-32	-33	-25	-2	-22	-20
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	-0.2	-0.4	0.2	-0.2
Above Normal	-1.0	-0.9	-0.9	-0.3	-0.2	-0.4	-0.3	-0.4	-0.1	0.1	0.8	0.9
Below Normal	-0.3	0.2	0.2	0.1	0.1	0.1	0.3	0.3	0.9	0.9	2.6	-0.5
Dry	0.9	0.9	0.5	0.5	0.7	0.5	0.6	0.6	0.8	0.9	0.1	0.1
Critical Dry	-2.1	-1.8	-1.8	-1.3	-1.7	-1.5	-1.3	-1.5	-1.3	-0.2	-1.9	-1.9

Table 5.65 Changes in Shasta Lake Elevation under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	997	1,002	1,012	1,024	1,032	1,041	1,058	1,063	1,055	1,036	1,022	1,017
Above Normal	973	976	990	1,018	1,028	1,048	1,062	1,062	1,046	1,021	1,006	1,004
Below Normal	997	998	1,004	1,019	1,034	1,046	1,054	1,049	1,032	1,008	991	986
Dry	974	976	983	993	1,013	1,033	1,042	1,039	1,021	998	985	983
Critical Dry	935	933	939	948	960	975	972	966	941	910	888	882
Second Basis of Comparison												
Wet	997	1,002	1,012	1,024	1,032	1,041	1,058	1,063	1,055	1,037	1,022	1,017
Above Normal	974	978	992	1,019	1,028	1,048	1,062	1,062	1,046	1,021	1,005	1,003
Below Normal	997	998	1,004	1,019	1,034	1,046	1,053	1,049	1,031	1,006	987	986
Dry	972	974	982	992	1,012	1,032	1,041	1,038	1,020	997	984	982
Critical Dry	938	935	941	950	961	977	974	967	943	910	889	884
Alternative 3 as Compared to Second Basis of Comparison												
Wet	0	0	0	0	0	0	0	0	0	-1	0	0
Above Normal	-2	-2	-2	-1	0	-1	0	-1	0	0	1	1
Below Normal	0	0	0	0	0	0	0	1	1	1	4	0
Dry	2	2	1	1	1	1	1	1	1	1	0	0
Critical Dry	-3	-2	-2	-2	-2	-2	-1	-1	-1	0	-1	-1
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Above Normal	-0.2	-0.2	-0.2	-0.1	0.0	-0.1	0.0	-0.1	0.0	0.0	0.1	0.1
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.0
Dry	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Critical Dry	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	0.0	-0.2	-0.1

Shasta Lake storage and surface water elevation would be similar under Alternative 3 as compared to the Second Basis of Comparison in all months and all water years.

The following changes in Sacramento River flows would occur under Alternative 3 as compared to the Second Basis of Comparison, as shown on Figures 5.56 through 5.61.

- Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58) would be similar in all months over the long-term conditions and in wet and dry years.

- Sacramento River near Freeport (near the northern boundary of the Delta) (Figures 5.59 through 5.61).
  - Over long-term conditions and in wet years, flows would be similar in all months.
  - In dry years, similar flows would occur in July through May; and increased flows in June (11 percent).

Lake Oroville and Feather River

Storage levels and surface water elevations in Lake Oroville under Alternative 3 as compared to the Second Basis of Comparison are summarized in Tables 5.66 and 5.67. Changes in flows in the Feather River downstream of Thermalito Complex are shown on Figures 5.62 through 5.64. The results are summarized following Table 5.67.

Table 5.66 Changes in Lake Oroville Storage under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,893	1,931	2,315	2,608	2,854	2,942	3,300	3,473	3,375	2,902	2,630	2,499
Above Normal	1,405	1,448	1,623	2,109	2,623	2,945	3,280	3,371	3,129	2,494	2,039	1,778
Below Normal	1,839	1,801	1,846	2,054	2,370	2,636	2,879	2,883	2,610	1,971	1,520	1,354
Dry	1,332	1,288	1,322	1,454	1,733	2,088	2,329	2,319	1,980	1,548	1,343	1,198
Critical Dry	1,129	1,067	1,067	1,156	1,275	1,429	1,449	1,437	1,236	1,029	918	862
Second Basis of Comparison												
Wet	1,936	1,984	2,354	2,636	2,871	2,942	3,300	3,477	3,402	2,976	2,728	2,569
Above Normal	1,465	1,523	1,702	2,173	2,648	2,937	3,271	3,357	3,081	2,493	2,087	1,827
Below Normal	1,823	1,783	1,831	2,037	2,361	2,627	2,875	2,836	2,461	1,930	1,637	1,424
Dry	1,371	1,324	1,344	1,473	1,764	2,120	2,363	2,357	2,031	1,688	1,427	1,261
Critical Dry	1,117	1,044	1,041	1,125	1,235	1,406	1,423	1,407	1,219	1,027	911	839
Alternative 3 as Compared to Second Basis of Comparison												
Wet	-43	-53	-39	-28	-17	0	0	-5	-27	-73	-98	-70
Above Normal	-61	-75	-78	-64	-24	8	8	14	48	1	-49	-49
Below Normal	16	18	15	17	9	9	3	47	150	41	-117	-70
Dry	-38	-35	-22	-19	-31	-32	-34	-38	-51	-140	-84	-62
Critical Dry	12	23	25	31	39	23	25	30	17	2	7	23
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	-2.2	-2.7	-1.7	-1.1	-0.6	0.0	0.0	-0.1	-0.8	-2.5	-3.6	-2.7
Above Normal	-4.1	-4.9	-4.6	-2.9	-0.9	0.3	0.3	0.4	1.6	0.0	-2.3	-2.7
Below Normal	0.9	1.0	0.8	0.8	0.4	0.4	0.1	1.7	6.1	2.1	-7.2	-4.9
Dry	-2.8	-2.7	-1.6	-1.3	-1.8	-1.5	-1.4	-1.6	-2.5	-8.3	-5.9	-5.0
Critical Dry	1.1	2.2	2.4	2.8	3.2	1.6	1.8	2.1	1.4	0.2	0.8	2.8

Table 5.67 Changes in Lake Oroville Elevation under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	763	767	805	834	853	859	884	895	889	856	836	825
Above Normal	711	717	738	791	836	859	882	889	872	827	786	758
Below Normal	758	754	759	781	813	835	854	855	836	780	730	710
Dry	702	697	703	720	752	789	811	810	779	733	709	691
Critical Dry	679	671	671	684	699	718	719	718	693	665	648	640
Second Basis of Comparison												
Wet	768	773	810	837	854	859	884	896	891	861	844	831
Above Normal	717	723	745	796	838	859	882	888	869	826	790	763
Below Normal	757	752	757	779	812	834	854	852	823	775	743	719
Dry	706	701	705	721	755	791	814	813	784	748	718	698
Critical Dry	677	668	668	680	694	715	716	714	691	664	647	636
Alternative 3 as Compared to Second Basis of Comparison												
Wet	-5	-6	-4	-2	-1	0	0	0	-2	-5	-8	-6
Above Normal	-6	-7	-8	-5	-2	1	1	1	3	1	-5	-5
Below Normal	1	2	2	2	1	1	0	3	13	5	-13	-8
Dry	-4	-4	-2	-2	-3	-3	-3	-4	-6	-16	-10	-7
Critical Dry	2	3	3	4	5	3	3	4	2	1	1	4
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	-0.6	-0.7	-0.5	-0.3	-0.1	0.0	0.0	0.0	-0.2	-0.6	-0.9	-0.8
Above Normal	-0.8	-1.0	-1.0	-0.7	-0.2	0.1	0.1	0.1	0.4	0.1	-0.6	-0.6
Below Normal	0.2	0.3	0.2	0.3	0.1	0.1	0.0	0.4	1.6	0.6	-1.8	-1.2
Dry	-0.6	-0.5	-0.3	-0.2	-0.4	-0.4	-0.3	-0.5	-0.7	-2.1	-1.4	-1.1
Critical Dry	0.3	0.5	0.5	0.6	0.7	0.4	0.4	0.5	0.3	0.2	0.2	0.6

Lake Oroville storage and surface water elevation would be similar under Alternative 3 as compared to the Second Basis of Comparison in all months and all water years.

The following changes in Feather River flows would occur under Alternative 3 as compared to the Second Basis of Comparison, as shown on Figures 5.62 through 5.64.

- Over long-term conditions, similar flows would occur in November and January through June; reduced flows in October, December, and September (up to 12.5 percent); and increased flows in July and August (up to 17.0 percent).
- In wet years, similar flows would occur in November and January through May; reduced flows in October, December, and September (up to 14.6 percent); and increased flows in June through August (up to 10.9 percent).
- In dry years, similar flows would occur in November and January through June; reduced flows in August through October (up to 21.2 percent); and increased flows in July (37.1 percent).

Folsom Lake and American River

Storage levels and surface water elevations in Folsom Lake under Alternative 3 as compared to the Second Basis of Comparison are summarized in Tables 5.68 and 5.69. Changes in flows in the American River downstream of Nimbus Dam are shown on Figures 5.65 through 5.67. The results are summarized following Table 5.69.

Table 5.68 Changes in Folsom Lake Storage under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	486	473	525	524	515	632	785	951	929	790	690	645
Above Normal	388	404	454	537	539	640	787	946	851	580	516	479
Below Normal	513	496	505	514	542	627	764	844	766	506	436	407
Dry	405	398	420	434	482	580	692	761	654	491	436	411
Critical Dry	331	314	322	325	370	436	474	485	431	343	291	257
Second Basis of Comparison												
Wet	483	470	522	524	515	632	785	951	937	793	688	646
Above Normal	390	412	467	537	538	640	787	946	857	591	522	485
Below Normal	506	489	502	514	541	626	761	847	739	475	408	387
Dry	405	399	423	437	486	585	698	769	664	486	432	408
Critical Dry	339	317	323	325	369	436	469	482	430	352	288	258
Alternative 3 as Compared to Second Basis of Comparison												
Wet	3	4	3	0	0	0	0	0	-8	-3	2	-1
Above Normal	-3	-9	-13	1	1	0	0	0	-6	-10	-7	-6
Below Normal	8	6	3	0	1	1	3	-3	27	31	28	21
Dry	-1	-1	-3	-3	-4	-4	-6	-7	-9	5	4	3
Critical Dry	-7	-3	-1	0	1	0	5	3	1	-9	4	-1
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.7	0.8	0.6	0.0	0.0	0.0	0.0	0.0	-0.8	-0.4	0.3	-0.1
Above Normal	-0.7	-2.1	-2.8	0.1	0.2	0.0	0.0	0.0	-0.8	-1.8	-1.3	-1.2
Below Normal	1.5	1.3	0.6	0.1	0.2	0.1	0.3	-0.4	3.6	6.6	6.7	5.3
Dry	-0.1	-0.2	-0.8	-0.7	-0.8	-0.7	-0.9	-1.0	-1.4	1.1	0.8	0.8
Critical Dry	-2.2	-1.0	-0.3	0.0	0.2	0.0	1.0	0.6	0.2	-2.6	1.3	-0.4

Table 5.69 Changes in Folsom Lake Elevation under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	413	412	419	419	418	432	448	465	463	448	438	433
Above Normal	395	397	408	421	421	433	448	465	455	425	418	413
Below Normal	416	415	416	417	421	432	446	454	446	415	404	401
Dry	401	401	405	407	414	426	438	445	434	414	407	404
Critical Dry	388	386	390	390	396	406	411	411	403	389	379	372
Second Basis of Comparison												
Wet	412	412	419	419	418	432	448	465	464	449	438	433
Above Normal	397	400	410	421	421	433	448	465	456	427	419	414
Below Normal	415	414	416	417	421	432	446	455	443	410	401	398
Dry	401	401	405	407	414	427	439	446	435	413	406	403
Critical Dry	389	386	390	391	397	406	410	411	404	391	378	372
Alternative 3 as Compared to Second Basis of Comparison												
Wet	1	1	0	0	0	0	0	0	-1	0	0	0
Above Normal	-2	-3	-3	0	0	0	0	0	-1	-1	-1	-1
Below Normal	1	1	0	0	0	0	0	0	3	5	3	3
Dry	0	0	0	0	-1	-1	-1	-1	-1	1	0	0
Critical Dry	-1	0	0	0	0	0	0	0	0	-2	1	0
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0	0.0
Above Normal	-0.5	-0.8	-0.6	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.2	-0.2
Below Normal	0.3	0.2	0.1	0.0	0.0	0.0	0.1	-0.1	0.7	1.2	0.9	0.6
Dry	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3	0.2	0.1	0.1
Critical Dry	-0.2	-0.1	-0.1	0.0	0.0	-0.1	0.1	0.0	-0.1	-0.5	0.4	-0.1

Folsom Lake storage and surface water elevation would be similar under Alternative 3 as compared to the Second Basis of Comparison in all months and all water years.

The American River flows would be similar in all months over long-term conditions, wet years, and dry years under Alternative 3 as compared to the Second Basis of Comparison, as shown on Figures 5.65 through 5.67.

Clear Creek

Flows in Clear Creek downstream of Whiskeytown Dam would be identical under Alternative 3 as compared to the Second Basis of Comparison, as summarized in Table 5.70.

Table 5.70 Changes in Clear Creek Flows below Whiskeytown Dam under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	200	200	200	309	356	272	200	200	200	85	85	150
Above Normal	181	182	188	192	196	196	196	200	200	85	85	150
Below Normal	195	195	195	195	195	195	195	195	191	85	85	150
Dry	178	184	188	190	190	190	190	190	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	167	111	85	85	133
Second Basis of Comparison												
Wet	200	200	200	309	356	272	200	200	200	85	85	150
Above Normal	181	182	188	192	196	196	196	200	200	85	85	150
Below Normal	195	195	195	195	195	195	195	195	191	85	85	150
Dry	178	184	188	190	190	190	190	190	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	167	111	85	85	133
Alternative 3 as Compared to Second Basis of Comparison												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal	0	0	0	0	0	0	0	0	0	0	0	0
Dry	0	0	0	0	0	0	0	0	0	0	0	0
Critical Dry	0	0	0	0	0	0	0	0	0	0	0	0
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

New Melones Reservoir and Stanislaus River

Storage levels and surface water elevations in New Melones Reservoir under Alternative 3 as compared to the Second Basis of Comparison are summarized in Tables 5.71 and 5.72. Changes in flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 through 5.70. The results are summarized following Table 5.72.

Table 5.71 Changes in New Melones Reservoir Storage under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,562	1,567	1,618	1,720	1,792	1,871	1,906	2,049	2,146	2,057	1,934	1,855
Above Normal	1,269	1,295	1,356	1,442	1,530	1,620	1,634	1,713	1,720	1,627	1,529	1,481
Below Normal	1,530	1,536	1,550	1,570	1,620	1,650	1,614	1,617	1,599	1,501	1,403	1,357
Dry	1,327	1,320	1,326	1,342	1,378	1,409	1,380	1,360	1,319	1,224	1,137	1,091
Critical Dry	828	824	836	846	866	860	803	751	719	653	593	563
Second Basis of Comparison												
Wet	1,443	1,446	1,502	1,606	1,709	1,794	1,833	1,962	1,994	1,917	1,803	1,731
Above Normal	1,092	1,116	1,175	1,261	1,360	1,455	1,481	1,543	1,516	1,419	1,321	1,274
Below Normal	1,364	1,366	1,378	1,397	1,453	1,479	1,461	1,447	1,415	1,322	1,228	1,183
Dry	1,149	1,143	1,149	1,161	1,191	1,221	1,210	1,176	1,131	1,039	956	912
Critical Dry	667	663	674	680	696	690	646	585	557	498	449	426
Alternative 3 as Compared to Second Basis of Comparison												
Wet	119	121	116	114	83	77	73	88	153	141	131	124
Above Normal	177	179	181	181	170	165	153	170	204	208	207	208
Below Normal	167	170	172	173	167	170	153	170	184	179	175	174
Dry	177	177	177	181	187	188	170	183	188	185	181	179
Critical Dry	161	161	162	165	170	170	157	166	162	155	144	137
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	8.2	8.4	7.7	7.1	4.8	4.3	4.0	4.5	7.7	7.3	7.3	7.2
Above Normal	16.3	16.0	15.4	14.4	12.5	11.3	10.3	11.0	13.4	14.7	15.7	16.3
Below Normal	12.2	12.5	12.5	12.4	11.5	11.5	10.5	11.8	13.0	13.6	14.3	14.7
Dry	15.4	15.5	15.4	15.6	15.7	15.4	14.0	15.6	16.6	17.8	19.0	19.6
Critical Dry	24.1	24.3	24.0	24.3	24.4	24.6	24.3	28.3	29.1	31.1	32.0	32.1

Table 5.72 Changes in New Melones Reservoir Elevation under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	1,003	1,004	1,010	1,022	1,030	1,038	1,042	1,055	1,064	1,056	1,045	1,037
Above Normal	964	967	974	987	999	1,009	1,012	1,021	1,022	1,013	1,002	924
Below Normal	998	998	1,000	1,002	1,011	1,014	1,011	1,012	1,010	1,000	989	983
Dry	974	973	974	977	981	985	983	982	978	966	954	948
Critical Dry	899	899	902	904	909	909	899	889	883	870	858	852
Second Basis of Comparison												
Wet	989	990	997	1,009	1,021	1,030	1,034	1,047	1,050	1,043	1,032	1,025
Above Normal	941	944	951	966	979	992	995	1,003	1,001	990	978	901
Below Normal	977	977	979	982	991	994	994	993	991	980	968	962
Dry	951	950	950	953	957	962	963	960	954	941	929	922
Critical Dry	866	866	870	872	878	879	871	856	850	835	823	817
Alternative 3 as Compared to Second Basis of Comparison												
Wet	14	14	13	12	9	8	7	8	14	13	13	12
Above Normal	23	23	23	21	19	18	16	18	21	23	24	23
Below Normal	20	21	21	21	20	20	17	19	20	20	21	21
Dry	24	24	24	24	25	23	20	23	24	24	25	26
Critical Dry	33	33	31	32	31	30	28	33	33	35	35	34
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	1.4	1.4	1.3	1.2	0.9	0.8	0.7	0.8	1.3	1.3	1.2	1.2
Above Normal	2.4	2.4	2.4	2.2	2.0	1.8	1.6	1.7	2.1	2.3	2.4	2.5
Below Normal	2.1	2.1	2.1	2.1	2.0	2.0	1.7	1.9	2.0	2.1	2.1	2.2
Dry	2.5	2.5	2.5	2.5	2.6	2.4	2.1	2.3	2.5	2.6	2.7	2.8
Critical Dry	3.8	3.8	3.6	3.6	3.5	3.4	3.2	3.9	3.9	4.2	4.3	4.2

The following changes in New Melones Reservoir storage and surface water elevations would occur under Alternative 3 as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in March through May and increased in June through February (up to 8.4 percent).
- In above normal years, storage would be increased in all months (up to 16.3 percent).
- In below normal years, storage would be increased in all months (up to 14.7 percent).
- In dry years, storage would be increased in all months (up to 19.6 percent).
- In critical dry years, storage would be increased in all months (up to 32.1 percent).
- In all months, in all water year types, surface water elevations would be similar.

Flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 to 5.70. Changes in flows in the river are summarized below.

- Over long-term conditions, similar flows would occur in October, December, January, and March; reduced flows would occur in November, May, and June (up to 52.3 percent); and increased flows in February, April, July, and August through September (up to 26.8 percent).
- In wet years, similar flows would occur in October, November, January, and April; reduced flows in May and June (up to 44.8 percent); and increased flows in December, February, March, and July through September (up to 68.6 percent).
- In dry years, similar flows would occur in July through October; reduced flows in November through March and May through June (up to 36.0 percent); and increased flows in April (40.2 percent).

San Joaquin River at Vernalis

Flows in the San Joaquin River at Vernalis under Alternative 3 as compared to the Second Basis of Comparison are summarized below, as shown on Figures 5.71 through 5.73.

- Over long-term conditions, similar flows would occur in July through May and reduced flows in June (11.8 percent).
- In wet years, similar flows would occur in September through January, March through May, and July; reduced flows in June (8.3 percent); and increased flows in August and February (6.2 percent).
- In dry years, similar flows would occur in July through March; reduced flows in May and June (up to 12.3 percent); and increased flows in April (6.6 percent).

San Luis Reservoir

Storage levels and surface water elevations in San Luis Reservoir under Alternative 3 as compared to the Second Basis of Comparison are summarized in Tables 5.73 and 5.74. The results are summarized following Table 5.74.

Table 5.73 Changes in San Luis Reservoir Storage under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	810	1,033	1,276	1,555	1,810	1,957	1,975	1,851	1,540	1,228	961	980
Above Normal	619	844	1,109	1,342	1,571	1,756	1,763	1,575	1,155	830	674	703
Below Normal	834	1,043	1,305	1,489	1,623	1,736	1,651	1,338	899	737	585	561
Dry	634	804	1,052	1,302	1,455	1,608	1,593	1,413	1,128	926	590	535
Critical Dry	548	632	804	1,076	1,216	1,256	1,227	1,069	838	572	380	351
Second Basis of Comparison												
Wet	790	1,017	1,365	1,748	1,965	2,033	2,031	1,852	1,487	1,167	889	925
Above Normal	658	883	1,213	1,671	1,913	2,001	1,995	1,717	1,263	861	612	631
Below Normal	854	1,064	1,334	1,742	1,908	1,980	1,908	1,628	1,251	964	635	591
Dry	617	764	998	1,427	1,728	1,925	1,870	1,665	1,341	1,007	660	596
Critical Dry	622	709	910	1,257	1,556	1,664	1,623	1,451	1,168	808	545	472
Alternative 3 as Compared to Second Basis of Comparison												
Wet	21	16	-88	-193	-155	-76	-56	-2	53	61	72	55
Above Normal	-38	-40	-104	-329	-342	-245	-233	-143	-108	-32	63	73
Below Normal	-20	-20	-29	-253	-285	-244	-257	-290	-352	-227	-50	-30
Dry	17	40	55	-125	-273	-317	-277	-252	-214	-81	-70	-61
Critical Dry	-74	-77	-106	-180	-340	-408	-396	-383	-330	-235	-164	-121
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	-2.8	-2.9	-14.1	-15.7	-10.5	-4.9	-3.2	-3.9	-6.0	-1.8	3.6	1.4
Above Normal	-5.8	-3.9	-10.0	-21.7	-16.1	-11.8	-10.0	-10.4	-15.9	-8.3	6.4	12.1
Below Normal	-9.6	-8.0	-7.6	-21.7	-20.2	-15.1	-15.9	-25.0	-40.1	-28.4	-1.3	-4.4
Dry	7.5	12.7	13.2	-9.8	-19.2	-18.7	-16.5	-18.7	-18.6	-5.3	-11.2	-12.1
Critical Dry	-7.3	-8.0	-11.4	-15.2	-26.1	-27.7	-27.0	-28.5	-26.0	-20.6	-14.5	7.6

Table 5.74 Changes in San Luis Reservoir Elevation under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	427	452	477	503	525	537	539	529	502	473	447	449
Above Normal	406	431	459	482	504	520	521	505	467	433	417	420
Below Normal	431	454	480	497	509	519	512	484	440	423	405	401
Dry	410	430	456	480	494	508	506	490	464	444	405	397
Critical Dry	399	409	430	458	472	475	473	457	434	403	375	371
Second Basis of Comparison												
Wet	426	451	485	520	538	543	543	529	497	468	440	443
Above Normal	412	437	470	513	534	541	540	518	477	437	409	411
Below Normal	435	457	483	519	533	539	533	510	476	448	412	406
Dry	407	425	450	492	518	535	530	513	484	453	415	406
Critical Dry	409	419	441	475	502	512	509	494	468	432	400	389
Alternative 3 as Compared to Second Basis of Comparison												
Wet	1	1	**-8**	**-17**	**-13**	**-6**	**-5**	**0**	5	6	8	6
Above Normal	**-7**	**-6**	**-11**	**-31**	**-30**	**-21**	**-20**	**-13**	**-11**	**-4**	8	9
Below Normal	**-4**	**-3**	**-3**	**-22**	**-24**	**-20**	**-22**	**-26**	**-36**	**-26**	**-7**	**-4**
Dry	3	5	6	**-11**	**-24**	**-27**	**-24**	**-23**	**-21**	**-9**	**-9**	**-9**
Critical Dry	**-10**	**-10**	**-12**	**-17**	**-30**	**-37**	**-36**	**-36**	**-34**	**-28**	**-25**	**-19**
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	0.3	0.2	-1.7	-3.3	-2.4	-1.1	-0.8	0.0	0.9	1.2	1.7	1.3
Above Normal	-1.6	-1.3	-2.3	-6.0	-5.6	-3.8	-3.6	-2.5	-2.2	-0.9	1.9	2.3
Below Normal	-0.9	-0.6	-0.6	-4.2	-4.5	-3.7	-4.1	-5.1	-7.5	-5.7	-1.7	-1.1
Dry	0.7	1.1	1.3	-2.2	-4.6	-5.0	-4.5	-4.4	-4.3	-2.0	-2.3	-2.2
Critical Dry	-2.5	-2.3	-2.6	-3.6	-6.1	-7.2	-7.1	-7.4	-7.2	-6.6	-6.4	-4.9

The following changes in San Luis Reservoir storage would occur under Alternative 3 as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in July through November and March through May and reduced in December through February and June (up to 15.7 percent). Surface water elevations would be similar in all months.
- In above-normal years, storage would be similar in November; increased in August and September (up to 12.1 percent); and reduced in October and December through July (up to 21.7 percent). Surface water elevations would be similar in March through December and reduced in January and February (up to 6.0 percent).
- In below-normal years, storage would be similar in August and September and reduced in October through July (up to 40.1 percent). Surface water elevations would be similar in all months.
- In dry years, storage would be reduced in January through September (up to 19.2 percent) and increased in October through December (up to 13.2 percent). Surface water elevations would be similar in all months.
- In critical dry years, storage would be reduced in October through August (up to 28.5 percent) and increased in September (7.6 percent). Surface water elevations would be similar September through January and reduced in February through August (up to 7.4 percent).

Changes in Flows into the Yolo Bypass

Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under Alternative 3 as compared to the Second Basis of Comparison are summarized in Table 5.75. The results are summarized following Table 5.75.

1 **Table 5.75 Changes in Flows into the Yolo Bypass at Fremont Weir under**
2 **Alternative 3 as Compared to the Second Basis of Comparison**

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	139	973	9,693	25,241	30,361	18,837	5,617	289	113	0	0	100
Above Normal	100	100	2,686	6,188	14,531	8,490	1,768	100	100	0	0	100
Below Normal	100	100	262	1,250	4,001	1,153	293	100	100	0	0	100
Dry	100	100	342	923	2,007	1,406	410	100	100	0	0	100
Critical Dry	100	100	150	534	545	397	106	100	100	0	0	100
Second Basis of Comparison												
Wet	147	996	9,888	25,442	30,547	18,997	5,602	289	113	0	0	100
Above Normal	100	100	2,659	6,349	15,114	8,566	1,765	100	100	0	0	100
Below Normal	100	100	262	1,256	4,057	1,166	292	100	100	0	0	100
Dry	100	100	342	932	2,032	1,411	411	100	100	0	0	100
Critical Dry	100	100	149	542	533	408	106	100	100	0	0	100
Alternative 3 as Compared to Second Basis of Comparison												
Wet	-8	-23	-195	-201	-187	-160	15	0	0	0	0	0
Above Normal	0	0	28	-161	-583	-76	4	0	0	0	0	0
Below Normal	0	0	0	-6	-56	-13	0	0	0	0	0	0
Dry	0	0	-1	-9	-24	-4	-2	0	0	0	0	0
Critical Dry	0	0	0	-8	12	-11	0	0	0	0	0	0
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	-5.6	-2.3	-2.0	-0.8	-0.6	-0.8	0.3	0.1	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	1.0	-2.5	-3.9	-0.9	0.2	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.2	-0.5	-1.4	-1.1	0.1	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	-0.2	-0.9	-1.2	-0.3	-0.4	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.2	-1.5	2.2	-2.6	0.0	0.0	0.0	0.0	0.0	0.0

The following changes in flows from the Sacramento River into the Yolo Bypass at Fremont Weir would occur under Alternative 3 as compared to the Second Basis of Comparison.

- In wet years, flows into the Yolo Bypass would be similar in November through September and reduced in October (5.6 percent).
- In above-normal, below-normal, dry, and critical dry years, flows into the Yolo Bypass would be similar in all months.

Changes in Delta Conditions

Delta outflow under Alternative 3 as compared to the Second Basis of Comparison are summarized below and shown on Figures 5.74 through 5.76.

- In wet years, average monthly Delta outflow would increase in November through February and July through September (up to 2,546 cfs) and decrease in October and March through June (up to 1,127 cfs).
- In dry years, average monthly Delta outflow would increase in November through April, July and August (up to 3,391 cfs) and decrease in October, May, and June (up to 373 cfs).

The OMR conditions under Alternative 3 as compared to the Second Basis of Comparison are shown on Figures 5.77 through 5.79.

- Under Alternative 3, OMR flows are negative in all months of all water year types except in April in wet year (405 cfs). Under Second Basis of Comparison, OMR flows are negative in all months of all water year types.
- In wet years, flows would be more positive in September through February, April, and May (up to 5,528 cfs) and more negative in March and June through August (up to 1,453 cfs).
- In dry years, flows would be more positive in August through May (up to 3,249 cfs); and more negative flows in June and July (up to 1,345 cfs).

Changes in CVP and SWP Exports and Deliveries

Delta exports under Alternative 3 as compared to the Second Basis of Comparison are summarized in Table 5.76.

Table 5.76 Changes in Exports at Jones and Banks Pumping Plants under Alternative 3 as Compared to the Second Basis of Comparison

Water Year	Monthly Volume (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 3												
Wet	544	615	601	559	594	589	494	490	519	648	667	654
Above Normal	430	533	574	414	469	566	441	413	397	586	680	647
Below Normal	524	587	607	394	373	448	312	266	330	683	650	588
Dry	440	471	523	389	314	337	270	242	292	492	318	426
Critical Dry	321	319	401	355	251	180	127	100	131	158	196	245
Second Basis of Comparison												
Wet	549	619	716	724	609	543	476	430	456	632	655	660
Above Normal	428	521	641	716	584	570	453	363	415	572	647	651
Below Normal	548	595	623	674	497	500	337	304	414	629	517	539
Dry	435	475	546	579	518	493	259	228	274	403	325	438
Critical Dry	340	345	455	433	406	266	134	121	132	139	203	249
Alternative 3 as Compared to Second Basis of Comparison												
Wet	-5	-5	-115	-165	-15	46	18	60	64	16	12	-5
Above Normal	2	12	-66	-303	-115	-4	-11	50	-19	13	33	-3
Below Normal	-24	-7	-16	-280	-124	-52	-25	-37	-83	54	133	49
Dry	5	-4	-23	-190	-203	-156	12	14	18	89	-7	-12
Critical Dry	-19	-26	-54	-78	-156	-86	-6	-21	0	19	-7	-4
Alternative 3 as Compared to Second Basis of Comparison (percent change)												
Wet	-0.8	-0.7	-16.0	-22.8	-2.4	8.6	3.7	14.0	14.0	2.5	1.8	-0.8
Above Normal	0.5	2.2	-10.3	-42.2	-19.7	-0.7	-2.5	13.8	-4.5	2.3	5.1	-0.5
Below Normal	-4.4	-1.3	-2.5	-41.5	-24.9	-10.4	-7.5	-12.3	-20.2	8.6	25.7	9.1
Dry	1.3	-0.8	-4.1	-32.8	-39.3	-31.6	4.5	6.1	6.5	22.1	-2.3	-2.7
Critical Dry	-5.7	-7.4	-11.8	-18.0	-38.3	-32.4	-4.8	-17.1	-0.2	14.0	-3.5	-1.7

The following changes would occur in CVP and SWP exports under Alternative 3 as compared to the Second Basis of Comparison.

- Long-term average annual exports would be 326 TAF (6 percent) less under Alternative 3 as compared to the Second Basis of Comparison.
- In wet years, total exports would be similar in July through November, February, and April; increased exports in March, May, and June (up to 14.0 percent); and reduced in December and January (up to 22.8 percent).
- In above-normal years, total exports would be similar in June through November, March, and April; reduced exports in December through February (up to 42.2 percent); and increased in May (up to 13.8 percent).
- In below-normal years, total exports would be similar in October through December; reduced exports in January through June (up to 41.5 percent); and increased in July through September (up to 25.7 percent).
- In dry years, total exports would be similar in August through December and April; reduced exports in January through March (up to 39.3 percent); and increased exports in May through July (up to 22.1 percent).
- In critical dry years, total exports would be similar in April, June, August, and September; reduced exports in October through March and May (up to 38.3 percent); and increased exports in July (14.0 percent).

Deliveries to CVP and SWP water users would be similar under Alternative 3 as compared to the Second Basis of Comparison, as summarized in Tables 5.77 and 5.78.

Table 5.77 Changes CVP Water Deliveries under Alternative 3 as Compared to the Second Basis of Comparison

Annual Average Deliveries (TAF)					
				Alternative 3 as Compared to the Second Basis of Comparison	
		Alternative 3	Second Basis of Comparison	Difference	Percent Change
North of Delta					
CVP Agricultural Water Service Contractors	Long Term	209	219	-10	-5
	Dry	111	122	-11	-9
	Critical Dry	31	35	-4	-11

Annual Average Deliveries (TAF)					
				Alternative 3 as Compared to the Second Basis of Comparison	
		Alternative 3	**Second Basis of Comparison**	**Difference**	**Percent Change**
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	392	392	0	0
	Dry	390	390	0	0
	Critical Dry	384	383	2	1
CVP M&I American River Contractors	Long Term	118	120	-2	-2
	Dry	104	105	-1	-1
	Critical Dry	78	79	-2	-3
CVP Sacramento River Settlement Contractors	Long Term	1,860	1,858	2	0
	Dry	1,906	1,905	1	0
	Critical Dry	1,742	1,732	10	1
CVP Refuge Level 2 Deliveries	Long Term	153	155	-1	-1
	Dry	149	151	-2	-1
	Critical Dry	103	105	-2	-2
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	602	612	-10	0
	Dry	501	512	-12	0
	Critical Dry	415	418	5	0
South of Delta (Does not include Eastside Contractors)					
CVP Agricultural Water Service Contractors	Long Term	1,079	1,100	-20	-2
	Dry	596	650	-55	-8
	Critical Dry	168	195	-28	-14

Annual Average Deliveries (TAF)					
				Alternative 3 as Compared to the Second Basis of Comparison	
		Alternative 3	Second Basis of Comparison	Difference	Percent Change
CVP M&I Users	Long Term	122	125	-2	-2
	Dry	108	109	-1	-1
	Critical Dry	83	85	-2	-2
San Joaquin River Exchange Contractors	Long Term	852	852	0	0
	Dry	875	875	0	0
	Critical Dry	741	741	0	0
CVP Refuge Level 2 Deliveries	Long Term	273	272	1	0
	Dry	281	280	1	0
	Critical Dry	234	232	3	1
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	1,202	1,225	-23	-1
	Dry	703	759	-54	-3
	Critical Dry	250	280	-27	-2
Eastside Contractors Deliveries					
Water Rights	Long Term	513	514	-1	0
	Dry	524	524	0	0
	Critical Dry	478	486	-8	-2
CVP Water Service Contracts	Long Term	123	118	5	4
	Dry	109	98	12	12
	Critical Dry	36	25	11	44
Total Water Rights and CVP Service Contracts Deliveries	Long Term	636	632	4	1
	Dry	633	621	11	2
	Critical Dry	514	511	3	1

The following changes in CVP water deliveries would occur under Alternative 3 as compared to the Second Basis of Comparison.

- Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 5 percent over the long-term conditions, 9 percent in dry years, and 11 percent in critical dry years.
- Deliveries to CVP North of Delta M&I contractors (including American River CVP contractors) would be similar in long-term conditions and dry and critical dry years.
- Deliveries to CVP South of Delta agricultural water service contractors would be similar over the long-term conditions and reduced by 8 percent in dry years and 14 percent in critical dry years.
- Deliveries to CVP South of Delta M&I contractors would be similar in long-term conditions and dry and critical dry years.
- Deliveries to the Eastside contractors would be similar under long-term conditions, dry years, and in critical dry years.

Table 5.78 Changes SWP Water Deliveries under Alternative 3 as Compared to the Second Basis of Comparison

Annual Average Deliveries (TAF)					
		Alternative 3	Second Basis of Comparison	Alternative 3 as Compared to the Second Basis of Comparison: Difference	Alternative 3 as Compared to the Second Basis of Comparison: Percent Change
North of Delta					
SWP Agricultural Uses	Long Term	0	0	0	0
	Dry	0	0	0	0
	Critical Dry	0	0	0	0
SWP M&I (without Article 21)	Long Term	80	83	-3	-4
	Dry	60	62	-2	-4
	Critical Dry	48	53	-5	-10
SWP M&I Article 21 Deliveries	Long Term	12	12	0	5
	Dry	13	13	0	1
	Critical Dry	12	12	0	3

Annual Average Deliveries (TAF)					
		Alternative 3	Second Basis of Comparison	Alternative 3 as Compared to the Second Basis of Comparison	
				Difference	Percent Change
Total SWP Agricultural and M&I (without Article 21)	Long Term	80	83	-3	-4
	Dry	60	62	-2	-4
	Critical Dry	48	53	-5	-10
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	12	12	0	5
	Dry	13	13	0	1
	Critical Dry	12	12	0	3
South of Delta					
SWP Agricultural Users (without Article 21)	Long Term	716	750	-34	-4
	Dry	533	567	-34	-6
	Critical Dry	430	484	-54	-11
SWP Agricultural Article 21 Deliveries	Long Term	73	178	-105	-59
	Dry	36	143	-107	-75
	Critical Dry	27	100	-73	-72
SWP M&I Users (without Article 21)	Long Term	2,106	2,183	-77	-4
	Dry	1,649	1,732	-83	-5
	Critical Dry	1,340	1,494	-154	-10
SWP M&I Article 21 Deliveries	Long Term	33	104	-71	-68
	Dry	11	86	-75	-87
	Critical Dry	10	58	-48	-83

Annual Average Deliveries (TAF)					
				Alternative 3 as Compared to the Second Basis of Comparison	
		Alternative 3	Second Basis of Comparison	Difference	Percent Change
Total SWP Agricultural and M&I Users (without Article 21)	Long Term	2,822	2,933	-111	-4
	Dry	2,182	2,299	-117	-5
	Critical Dry	1,770	1,978	-208	-11
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	106	282	-176	-62
	Dry	47	229	-182	-80
	Critical Dry	38	158	-120	-76

The following changes in SWP water deliveries would occur under Alternative 3 as compared to the Second Basis of Comparison.

- Deliveries without Article 21 water to SWP North of Delta water contractors would be similar over the long-term conditions and in dry years and reduced by 10 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be similar over the long-term conditions and in dry years and reduced by 11 percent in critical dry years.
- Deliveries of Article 21 water to SWP North of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be reduced by 62 percent over the long-term conditions; 80 percent in dry years; and 76 percent in critical dry years.

Effects Related to Cross Delta Water Transfers

Potential effects to surface water resources could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i). Potential effects were identified as reduced surface water storage in upstream reservoirs and changes in flow patterns in river downstream of the reservoirs if water was released from the reservoirs in patterns that were different than would have been used by the water seller’s. Because all water transfers would be required to avoid adverse impacts to other water users and biological resources (see Section 3.A.6.3, Transfers), including impacts associated with changes in reservoir storage and river flow patterns, the analysis indicated that water transfers would not result in substantial changes in storage or river flows. For the purposes of this EIS, it is anticipated that similar conditions would occur due to cross Delta water transfers under Alternative 3 and the Second Basis of Comparison.

Under Alternative 3 and the Second Basis of Comparison, water could be transferred throughout the year. As indicated in Table 5.76, capacity would be available under Alternative 3 and the Second Basis of Comparison in a similar manner in all months of all water year types.

San Francisco Bay Area, Central Coast, and Southern California Regions

Potential Changes in Surface Water Resources at Reservoirs that Store CVP and SWP Water

The San Francisco Bay Area, Central Coast, and Southern California regions include numerous reservoirs that store CVP and SWP water supplies, including CVP and SWP reservoirs, that primarily provide water supplies for M&I water users. Changes in the availability CVP and SWP water supplies for storage in these reservoirs under Alternative 3 as compared to the Second Basis of Comparison would be consistent with the following changes in water deliveries to M&I water users, as summarized in Tables 5.77 and 5.78.

- Deliveries to CVP South of Delta M&I contractors would be similar in long-term conditions and dry and critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be similar over the long-term conditions and in dry years and reduced by 11 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be reduced by 62 percent over the long-term conditions, 80 percent in dry years, and 76 percent in critical dry years.

Changes in CVP and SWP Exports and Deliveries

Deliveries to CVP and SWP water users are described above in the Central Valley Region.

5.4.3.5 Alternative 4

Surface water resources conditions under Alternative 4 would be identical to the surface water resources conditions under the Second Basis of Comparison; therefore, Alternative 4 is only compared to the No Action Alternative.

5.4.3.5.1 Alternative 4 Compared to the No Action Alternative

Changes in surface water resources under Alternative 4 as compared to the No Action Alternative would be the same as the impacts described in Section 5.4.3.2.1, Alternative 1 Compared to the No Action Alternative.

5.4.3.6 Alternative 5

CVP and SWP operations under Alternative 5 are similar to the No Action Alternative with modified Old and Middle River flow criteria and New Melones Reservoir operations. Alternative 5 would include changed water demands for American River water supplies as compared to the No Action Alternative or Second Basis of Comparison. Alternative 5 would provide water supplies of up to 17 TAF per year under a Warren Act Contract for El Dorado Irrigation District and 15 TAF per year under a CVP water service contract for El Dorado County Water Agency. These demands are not included in the analysis presented in this section of the EIS. A sensitivity analysis comparing the results of the analysis with and without these demands is presented in Appendix 5B of this EIS.

5.4.3.6.1 Alternative 5 Compared to the No Action Alternative

Trinity River Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Changes in Trinity Lake storage and surface water elevations under Alternative 5 as compared to the No Action Alternative are summarized in Tables 5.79 and 5.80. The results are summarized following Table 5.80.

Table 5.79 Changes in Trinity Lake Storage under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	1,494	1,520	1,635	1,759	1,926	2,056	2,222	2,246	2,191	2,068	1,940	1,781
Above Normal	1,155	1,180	1,290	1,459	1,662	1,850	2,030	2,004	1,912	1,778	1,627	1,503
Below Normal	1,398	1,405	1,422	1,493	1,580	1,667	1,813	1,741	1,637	1,474	1,311	1,190
Dry	1,155	1,150	1,175	1,183	1,275	1,404	1,540	1,492	1,415	1,259	1,110	1,012
Critical Dry	744	726	741	743	784	866	913	878	856	755	622	539
No Action Alternative												
Wet	1,490	1,516	1,630	1,756	1,921	2,053	2,220	2,245	2,190	2,067	1,939	1,784
Above Normal	1,159	1,178	1,286	1,455	1,658	1,847	2,025	1,999	1,907	1,773	1,619	1,495
Below Normal	1,393	1,400	1,417	1,488	1,575	1,662	1,817	1,743	1,637	1,470	1,304	1,185
Dry	1,152	1,148	1,174	1,182	1,274	1,403	1,539	1,490	1,413	1,253	1,104	1,008
Critical Dry	747	731	746	750	790	872	923	888	862	745	612	536
Alternative 5 as Compared to No Action Alternative												
Wet	4	3	5	4	4	2	2	2	2	0	0	-2
Above Normal	-4	2	4	4	4	4	6	6	5	5	8	8
Below Normal	5	5	5	5	5	5	-5	-2	0	4	7	4
Dry	3	1	1	1	1	1	1	1	2	6	6	4
Critical Dry	-2	-5	-4	-7	-6	-6	-10	-10	-7	10	11	3
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	-0.1
Above Normal	-0.4	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.5	0.5
Below Normal	0.4	0.4	0.4	0.3	0.3	0.3	-0.3	-0.1	0.0	0.3	0.5	0.4
Dry	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.4
Critical Dry	-0.3	-0.6	-0.6	-0.9	-0.7	-0.7	-1.1	-1.1	-0.8	1.3	1.8	0.5

Table 5.80 Changes in Trinity Lake Elevation under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	2,300	2,303	2,313	2,325	2,338	2,347	2,357	2,358	2,355	2,347	2,338	2,326
Above Normal	2,259	2,262	2,276	2,294	2,314	2,330	2,343	2,342	2,335	2,326	2,313	2,303
Below Normal	2,289	2,290	2,292	2,299	2,308	2,315	2,326	2,321	2,313	2,299	2,284	2,272
Dry	2,263	2,265	2,268	2,269	2,279	2,292	2,305	2,301	2,294	2,279	2,265	2,254
Critical Dry	2,209	2,206	2,209	2,212	2,220	2,234	2,241	2,237	2,235	2,221	2,199	2,183
No Action Alternative												
Wet	2,300	2,303	2,313	2,324	2,338	2,347	2,357	2,358	2,355	2,347	2,338	2,327
Above Normal	2,261	2,264	2,276	2,294	2,314	2,330	2,343	2,341	2,335	2,325	2,313	2,302
Below Normal	2,289	2,289	2,291	2,299	2,307	2,315	2,327	2,321	2,313	2,299	2,283	2,272
Dry	2,263	2,265	2,268	2,269	2,279	2,292	2,305	2,301	2,294	2,279	2,264	2,254
Critical Dry	2,210	2,207	2,210	2,213	2,220	2,235	2,242	2,238	2,235	2,220	2,196	2,182
Alternative 5 as Compared to No Action Alternative												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	-2	-2	0	0	0	0	0	0	0	0	1	1
Below Normal	1	1	1	1	1	0	0	0	0	0	1	0
Dry	1	0	0	0	0	0	0	0	0	0	1	1
Critical Dry	0	-1	-1	-1	-1	-1	-1	-1	-1	2	3	1
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Above Normal	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1

Trinity Lake storage and surface water elevations would be similar in all months and all water year types under Alternative 5 as compared to the No Action Alternative.

Trinity River flows would be similar in all months under long-term conditions and wet and dry years, as shown on Figures 5.53 through 5.55.Central Valley Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Shasta Lake and Sacramento River

Storage levels and surface water elevations in Shasta Lake under Alternative 5 as compared to the No Action Alternative are summarized in Tables 5.81 and 5.82. Changes in flows in the Sacramento River downstream of Keswick Dam and at Freeport are shown on Figures 5.56 through 5.61. The results are summarized following Table 5.82.

Table 5.81 Changes in Shasta Lake Storage under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	2,704	2,716	3,078	3,385	3,590	3,836	4,299	4,461	4,243	3,736	3,410	2,989
Above Normal	2,369	2,388	2,598	3,164	3,454	4,019	4,401	4,430	4,042	3,409	3,071	2,842
Below Normal	2,603	2,565	2,704	3,077	3,450	3,820	4,039	3,970	3,602	3,012	2,663	2,620
Dry	2,344	2,287	2,433	2,627	3,039	3,509	3,745	3,699	3,315	2,787	2,497	2,459
Critical Dry	1,676	1,611	1,700	1,856	2,015	2,258	2,203	2,104	1,749	1,246	958	910
No Action Alternative												
Wet	2,700	2,719	3,077	3,384	3,589	3,836	4,298	4,460	4,242	3,735	3,410	2,985
Above Normal	2,369	2,385	2,600	3,167	3,453	4,021	4,404	4,429	4,039	3,407	3,069	2,834
Below Normal	2,587	2,548	2,686	3,062	3,442	3,814	4,026	3,957	3,588	3,002	2,643	2,608
Dry	2,345	2,283	2,428	2,621	3,034	3,505	3,737	3,668	3,284	2,767	2,496	2,462
Critical Dry	1,702	1,633	1,717	1,871	2,031	2,274	2,202	2,088	1,719	1,253	986	937
Alternative 5 as Compared to No Action Alternative												
Wet	4	-3	1	1	0	0	1	1	1	0	0	4
Above Normal	0	4	-2	-3	0	-1	-3	2	3	2	2	8
Below Normal	16	16	18	16	8	6	13	13	14	10	20	12
Dry	-1	4	5	6	5	4	8	31	31	20	1	-3
Critical Dry	-25	-22	-17	-15	-16	-16	1	16	31	-7	-28	-26
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Above Normal	0.0	0.2	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.1	0.1	0.1	0.3
Below Normal	0.6	0.6	0.7	0.5	0.2	0.2	0.3	0.3	0.4	0.3	0.8	0.5
Dry	0.0	0.2	0.2	0.2	0.2	0.1	0.2	0.8	0.9	0.7	0.0	-0.1
Critical Dry	-1.5	-1.3	-1.0	-0.8	-0.8	-0.7	0.0	0.8	1.8	-0.6	-2.8	-2.8

Table 5.82 Changes in Shasta Lake Elevation under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	991	992	1,008	1,023	1,031	1,041	1,058	1,064	1,056	1,037	1,024	1,005
Above Normal	967	968	982	1,012	1,025	1,048	1,062	1,063	1,049	1,024	1,009	999
Below Normal	987	985	992	1,009	1,025	1,040	1,048	1,045	1,031	1,006	990	988
Dry	969	967	975	986	1,006	1,027	1,037	1,035	1,019	996	982	980
Critical Dry	925	921	928	938	950	967	965	959	937	899	874	869
No Action Alternative												
Wet	991	992	1,008	1,023	1,031	1,041	1,058	1,064	1,056	1,037	1,024	1,005
Above Normal	967	968	982	1,012	1,025	1,048	1,062	1,063	1,049	1,024	1,009	999
Below Normal	986	985	991	1,009	1,025	1,040	1,048	1,045	1,031	1,006	989	987
Dry	969	967	975	986	1,006	1,027	1,037	1,034	1,018	995	982	980
Critical Dry	927	923	929	939	951	968	965	958	935	899	876	872
Alternative 5 as Compared to No Action Alternative												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal	1	1	1	1	0	0	1	1	1	0	1	1
Dry	0	0	0	0	0	0	0	1	1	1	0	0
Critical Dry	-2	-2	-1	-1	-1	-1	0	1	3	-1	-2	-2
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1
Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
Critical Dry	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	0.0	0.1	0.3	-0.1	-0.3	-0.3

Shasta Lake storage and surface water elevations would be similar in all months and all water year types under Alternative 5 as compared to the No Action Alternative.

The following changes in Sacramento River flows would occur under Alternative 5 as compared to the No Action Alternative, as shown on Figures 5.56 through 5.61.

- Sacramento River flows downstream of Keswick Dam (Figures 5.56 through 5.58) would be similar over the long-term conditions and in wet and dry years.
- Sacramento River near Freeport (near the northern boundary of the Delta) (Figures 5.59 through 5.61) would be similar over the long-term conditions and in wet and dry years.

Lake Oroville and Feather River

Storage levels and surface water elevations in Lake Oroville under Alternative 5 as compared to the No Action Alternative are summarized in Tables 5.83 and 5.84. Changes in flows in the Feather River downstream of Thermalito Complex are shown on Figures 5.62 through 5.64. The results are summarized following Table 5.84.

Table 5.83 Changes in Lake Oroville Storage under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	1,681	1,723	2,179	2,556	2,833	2,942	3,300	3,488	3,447	2,961	2,613	2,103
Above Normal	1,275	1,310	1,471	1,948	2,512	2,892	3,247	3,401	3,241	2,608	2,125	1,668
Below Normal	1,552	1,507	1,517	1,728	2,132	2,406	2,663	2,746	2,569	1,959	1,521	1,305
Dry	1,223	1,173	1,190	1,319	1,595	1,952	2,193	2,255	1,992	1,502	1,295	1,150
Critical Dry	1,102	1,037	1,025	1,114	1,229	1,383	1,415	1,411	1,266	1,045	929	873
No Action Alternative												
Wet	1,691	1,732	2,189	2,554	2,832	2,942	3,300	3,488	3,445	2,964	2,626	2,109
Above Normal	1,279	1,322	1,485	1,959	2,519	2,892	3,247	3,393	3,232	2,600	2,117	1,659
Below Normal	1,542	1,497	1,507	1,719	2,122	2,397	2,653	2,714	2,530	1,923	1,513	1,307
Dry	1,206	1,158	1,177	1,305	1,582	1,938	2,178	2,210	1,951	1,478	1,287	1,144
Critical Dry	1,092	1,029	1,019	1,108	1,223	1,381	1,408	1,392	1,243	1,018	917	865
Alternative 5 as Compared to No Action Alternative												
Wet	-10	-9	-10	1	1	0	0	0	2	-3	-13	-7
Above Normal	-3	-12	-14	-11	-7	0	0	8	9	8	8	9
Below Normal	10	10	10	9	10	10	10	32	39	36	8	-1
Dry	17	15	13	13	13	13	15	45	41	23	8	6
Critical Dry	10	9	6	6	6	3	7	19	22	27	12	8
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	-0.6	-0.5	-0.4	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	-0.5	-0.3
Above Normal	-0.3	-0.9	-0.9	-0.6	-0.3	0.0	0.0	0.2	0.3	0.3	0.4	0.5
Below Normal	0.6	0.7	0.7	0.5	0.5	0.4	0.4	1.2	1.6	1.9	0.6	-0.1
Dry	1.4	1.3	1.1	1.0	0.8	0.7	0.7	2.0	2.1	1.6	0.6	0.5
Critical Dry	0.9	0.8	0.6	0.6	0.5	0.2	0.5	1.3	1.8	2.6	1.3	1.0

Table 5.84 Changes in Lake Oroville Elevation under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	742	746	793	829	852	859	884	897	894	860	835	789
Above Normal	698	701	720	775	827	856	880	891	880	836	795	747
Below Normal	731	726	728	752	794	818	839	845	831	777	730	704
Dry	691	685	688	706	738	777	799	804	779	727	703	685
Critical Dry	676	668	665	679	694	712	716	715	696	667	650	642
No Action Alternative												
Wet	743	748	794	829	852	859	884	897	894	861	836	790
Above Normal	698	703	722	776	828	856	880	890	879	835	794	746
Below Normal	730	725	726	751	793	818	838	842	828	773	729	704
Dry	688	683	686	704	737	775	798	800	775	724	702	684
Critical Dry	674	667	664	678	693	712	715	712	693	663	648	640
Alternative 5 as Compared to No Action Alternative												
Wet	-1	-1	-1	0	0	0	0	0	0	0	-1	-1
Above Normal	0	-1	-2	-1	-1	0	0	1	1	1	1	1
Below Normal	1	1	2	1	1	1	1	2	3	4	1	0
Dry	3	2	2	2	1	1	1	4	4	3	1	1
Critical Dry	2	1	1	1	1	0	1	2	3	4	2	2
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	-0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Above Normal	0.0	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Below Normal	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.3	0.4	0.5	0.1	0.0
Dry	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.5	0.5	0.4	0.2	0.2
Critical Dry	0.2	0.2	0.2	0.2	0.1	0.0	0.1	0.3	0.4	0.6	0.4	0.3

Lake Oroville storage and surface water elevations would be similar in all months and all water year types under Alternative 5 as compared to the No Action Alternative.

The following changes in Feather River flows would occur under Alternative 5 as compared to the No Action Alternative, as shown on Figures 5.62 through 5.64.

- Over long-term conditions, similar flows would occur in June through April and reduced flows in May (6.6 percent).
- In wet years, similar flows would occur in all months.
- In dry years, similar flows would occur in September through April and June; reduced flows in May (27.1 percent) and increased flows in July and August (up to 8.9 percent).

Folsom Lake and American River

Storage levels and surface water elevations in Folsom Lake under Alternative 5 as compared to the No Action Alternative are summarized in Tables 5.85 and 5.86. Changes in flows in the American River downstream of Nimbus Dam are shown on Figures 5.65 through 5.67. The results are summarized following Table 5.86.

Table 5.85 Changes in Folsom Lake Storage under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	454	435	515	518	515	632	785	952	941	794	710	577
Above Normal	375	379	428	513	532	640	787	946	888	622	554	478
Below Normal	440	425	461	483	534	620	758	845	783	523	469	450
Dry	397	386	411	426	479	579	691	766	664	489	435	410
Critical Dry	325	304	314	320	367	433	483	499	411	324	257	231
No Action Alternative												
Wet	454	435	514	518	515	632	785	951	941	800	712	576
Above Normal	377	380	429	513	531	640	787	946	887	621	552	477
Below Normal	446	431	467	484	533	619	757	843	780	527	472	453
Dry	394	383	408	423	479	579	691	760	658	495	443	419
Critical Dry	324	305	315	320	366	432	475	486	415	327	267	231
Alternative 5 as Compared to No Action Alternative												
Wet	0	0	0	0	0	0	0	1	0	-6	-2	1
Above Normal	-2	-1	-1	1	1	0	0	0	1	1	2	1
Below Normal	-6	-7	-6	-2	0	0	0	2	3	-4	-3	-3
Dry	3	3	3	2	0	0	0	6	6	-5	-8	-9
Critical Dry	1	-1	0	0	0	0	8	13	-4	-3	-10	0
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	-0.8	-0.2	0.2
Above Normal	-0.7	-0.4	-0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.4	0.3
Below Normal	-1.4	-1.5	-1.3	-0.3	0.0	0.1	0.1	0.3	0.4	-0.7	-0.6	-0.7
Dry	0.7	0.8	0.6	0.5	0.0	0.0	0.0	0.8	0.8	-1.1	-1.9	-2.1
Critical Dry	0.2	-0.2	-0.1	0.0	0.1	0.1	1.7	2.8	-0.9	-0.9	-3.9	0.2

Table 5.86 Changes in Folsom Lake Elevation under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	409	407	418	418	418	432	448	465	464	449	440	425
Above Normal	394	395	405	418	420	433	449	464	458	431	423	413
Below Normal	406	405	410	413	420	431	445	454	447	417	411	408
Dry	400	400	404	406	413	426	438	446	435	413	406	403
Critical Dry	386	384	389	390	396	406	412	414	400	385	370	365
No Action Alternative												
Wet	409	407	418	418	418	432	448	464	464	449	440	425
Above Normal	394	395	405	418	420	433	449	464	458	430	422	413
Below Normal	408	406	411	414	420	431	445	454	447	418	411	409
Dry	400	399	403	405	413	426	438	445	434	414	408	405
Critical Dry	386	384	389	390	396	406	411	412	401	386	374	366
Alternative 5 as Compared to No Action Alternative												
Wet	0	0	0	0	0	0	0	0	0	-1	0	0
Above Normal	-1	0	0	0	0	0	0	0	0	0	0	0
Below Normal	-2	-2	-1	0	0	0	0	0	0	-1	0	0
Dry	0	0	0	0	0	0	0	1	1	-1	-2	-2
Critical Dry	0	0	0	0	0	0	1	2	-1	-2	-3	0
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Above Normal	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Below Normal	-0.5	-0.4	-0.3	-0.1	0.0	0.0	0.0	0.0	0.1	-0.1	-0.1	-0.1
Dry	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	-0.3	-0.5	-0.5
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	-0.2	-0.4	-0.9	-0.1

Folsom Lake storage and surface water elevations would be similar in all months and all water year types under Alternative 5 as compared to the No Action Alternative.

American River flows would be similar over long-term conditions and in wet and dry years in all months under Alternative 5 as compared to the No Action Alternative, as shown on Figures 5.65 through 5.67.

Clear Creek

Monthly Clear Creek flows under Alternative 5 are identical to flows under the No Action Alternative, as summarized in Table 5.87.

Table 5.87 Changes in Clear Creek Flows below Whiskeytown Dam under Alternative 5 as Compared to the No Action Alternative

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	200	200	200	309	356	272	200	277	200	85	85	150
Above Normal	181	182	188	192	196	196	196	277	200	85	85	150
Below Normal	195	195	195	195	195	195	195	274	191	85	85	150
Dry	175	184	188	190	190	190	190	267	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	214	111	85	85	133
No Action Alternative												
Wet	200	200	200	309	356	272	200	277	200	85	85	150
Above Normal	181	182	188	192	196	196	196	277	200	85	85	150
Below Normal	195	195	195	195	195	195	195	274	191	85	85	150
Dry	177	184	188	190	190	190	190	267	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	214	111	85	85	133
Alternative 5 as Compared to No Action Alternative												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal	0	0	0	0	0	0	0	0	0	0	0	0
Dry	2	0	0	0	0	0	0	0	0	0	0	0
Critical Dry	0	0	0	0	0	0	0	0	0	0	0	0
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

New Melones Reservoir and Stanislaus River

Storage levels and surface water elevations in New Melones Reservoir under Alternative 5 as compared to the No Action Alternative are summarized in Tables 5.88 and 5.89. Changes in flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 through 5.70. The results are summarized following Table 5.89.

Table 5.88 Changes in New Melones Reservoir Storage under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	1,309	1,321	1,388	1,496	1,602	1,668	1,704	1,812	1,906	1,833	1,722	1,653
Above Normal	983	1,014	1,079	1,168	1,271	1,361	1,363	1,413	1,396	1,302	1,207	1,162
Below Normal	1,210	1,220	1,242	1,267	1,329	1,354	1,298	1,276	1,254	1,163	1,071	1,028
Dry	1,018	1,018	1,030	1,045	1,081	1,114	1,066	1,031	990	903	823	781
Critical Dry	558	559	570	578	597	591	506	449	433	391	355	336
No Action Alternative												
Wet	1,379	1,390	1,454	1,562	1,666	1,724	1,758	1,878	1,968	1,890	1,773	1,703
Above Normal	1,029	1,060	1,125	1,214	1,317	1,406	1,413	1,484	1,467	1,372	1,277	1,232
Below Normal	1,294	1,305	1,326	1,351	1,413	1,438	1,390	1,383	1,359	1,268	1,175	1,133
Dry	1,094	1,094	1,106	1,121	1,156	1,188	1,154	1,132	1,087	997	914	871
Critical Dry	624	623	638	645	661	656	602	554	526	476	431	408
Alternative 5 as Compared to No Action Alternative												
Wet	-70	-69	-65	-66	-64	-56	-54	-65	-62	-57	-51	-49
Above Normal	-46	-46	-46	-46	-46	-46	-51	-71	-71	-70	-70	-70
Below Normal	-84	-84	-84	-84	-84	-84	-93	-107	-106	-105	-105	-104
Dry	-77	-76	-76	-76	-75	-74	-88	-100	-97	-94	-91	-89
Critical Dry	-66	-64	-68	-66	-64	-65	-95	-105	-93	-84	-76	-73
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	-5.1	-5.0	-4.5	-4.2	-3.9	-3.2	-3.1	-3.5	-3.2	-3.0	-2.9	-2.9
Above Normal	-4.5	-4.4	-4.1	-3.8	-3.5	-3.3	-3.6	-4.8	-4.8	-5.1	-5.5	-5.7
Below Normal	-6.5	-6.5	-6.4	-6.2	-5.9	-5.8	-6.7	-7.7	-7.8	-8.3	-8.9	-9.2
Dry	-7.0	-7.0	-6.9	-6.8	-6.5	-6.2	-7.6	-8.9	-8.9	-9.4	-10.0	-10.2
Critical Dry	-10.5	-10.3	-10.6	-10.3	-9.8	-9.9	-15.8	-18.9	-17.6	-17.7	-17.7	-17.8

Table 5.89 Changes in New Melones Reservoir Elevation under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	969	971	980	995	1,007	1,016	1,020	1,031	1,040	1,033	1,022	1,015
Above Normal	924	930	939	954	968	980	982	988	987	975	963	890
Below Normal	954	956	959	962	973	977	972	970	968	957	944	938
Dry	930	930	932	934	939	945	940	936	931	918	905	898
Critical Dry	837	838	842	845	853	855	834	818	815	804	796	791
No Action Alternative												
Wet	980	982	990	1,004	1,016	1,023	1,026	1,039	1,047	1,040	1,029	1,022
Above Normal	932	937	945	960	974	986	988	997	996	985	973	897
Below Normal	968	969	972	975	985	988	985	985	983	972	960	955
Dry	943	943	944	947	951	957	955	953	948	934	922	915
Critical Dry	856	856	862	864	870	871	860	848	840	828	818	812
Alternative 5 as Compared to No Action Alternative												
Wet	-11	-11	-10	-9	-8	-7	-7	-7	-7	-7	-6	-6
Above Normal	-8	-7	-6	-6	-6	-6	-6	-8	-8	-9	-10	-7
Below Normal	-13	-13	-13	-13	-12	-12	-13	-15	-15	-15	-16	-16
Dry	-13	-13	-12	-13	-12	-12	-15	-17	-17	-17	-17	-17
Critical Dry	-19	-18	-20	-19	-17	-16	-26	-30	-25	-24	-22	-21
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	-1.2	-1.2	-1.0	-0.9	-0.8	-0.7	-0.7	-0.7	-0.7	-0.6	-0.6	-0.6
Above Normal	-0.8	-0.7	-0.7	-0.6	-0.6	-0.6	-0.6	-0.8	-0.8	-0.9	-1.0	-0.7
Below Normal	-1.4	-1.4	-1.4	-1.3	-1.2	-1.2	-1.3	-1.5	-1.5	-1.6	-1.7	-1.7
Dry	-1.3	-1.3	-1.3	-1.3	-1.3	-1.2	-1.5	-1.8	-1.8	-1.8	-1.9	-1.9
Critical Dry	-2.2	-2.1	-2.3	-2.2	-2.0	-1.9	-3.0	-3.5	-3.0	-2.9	-2.7	-2.6

The following changes in New Melones Reservoir storage and elevation would occur under Alternative 5 as compared to the No Action Alternative.

- In wet years, storage would be similar in all months.
- In above normal years, storage would be similar in October through June and reduced in July through September (up to 5.7 percent).
- In below normal years, storage would be reduced in all months (up to 9.2 percent).
- In dry years, storage would be reduced in all months (up to 10.2 percent).
- In critical dry years, storage would be reduced in all months (up to 18.9 percent).
- In all months, in all water year types, surface water elevations would be similar.

Flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 to 5.70. Changes in flows in these rivers are summarized below.

- Over long-term conditions, flows would be similar in September through February and June; reduced flows would occur in March, July, and August (up to 8.0 percent); and increased flows in April and May (up to 22.4 percent).
- In wet years, similar flows would occur in October, November, January, February, and April through June and reduced flows in December, March, and July through September (up to 18.0 percent).
- In dry years, similar flows would occur in June through March and increased flows in April and May (up to 47.3 percent).

San Joaquin River at Vernalis

Flows in the San Joaquin River at Vernalis under Alternative 5 as compared to the No Action Alternative are summarized below, as shown on Figures 5.71 through 5.73.

- Over long-term conditions and wet years, similar flows would occur in all months.
- In dry years, similar flows would occur in June through March and increased flows in April and May (up to 15.7 percent).San Luis Reservoir.

Storage levels and surface water elevations in San Luis Reservoir under Alternative 5 as compared to the No Action Alternative are summarized in Tables 5.90 and 5.91. The results are summarized following Table 5.91.

Table 5.90 Changes in San Luis Reservoir Storage under Alternative 5 as Compared to the No Action Alternative

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	576	706	958	1,251	1,539	1,804	1,624	1,279	984	787	680	726
Above Normal	488	622	932	1,213	1,440	1,660	1,447	1,046	672	477	442	520
Below Normal	541	628	923	1,157	1,335	1,496	1,305	928	524	476	414	463
Dry	464	572	856	1,139	1,327	1,481	1,324	1,002	691	655	412	418
Critical Dry	429	505	698	994	1,166	1,216	1,103	875	600	428	284	270
No Action Alternative												
Wet	555	681	931	1,236	1,526	1,788	1,598	1,251	946	741	628	679
Above Normal	490	649	957	1,223	1,441	1,661	1,444	1,048	666	466	433	513
Below Normal	525	624	907	1,141	1,314	1,473	1,312	967	555	500	426	467
Dry	476	590	867	1,150	1,339	1,494	1,413	1,167	840	763	476	469
Critical Dry	478	556	752	1,040	1,204	1,252	1,192	1,028	739	544	343	323
Alternative 5 as Compared to No Action Alternative												
Wet	20	25	27	15	13	16	26	28	38	46	52	47
Above Normal	-2	-27	-24	-10	-2	-1	3	-2	6	10	8	7
Below Normal	16	4	16	17	21	23	-7	-39	-31	-24	-12	-4
Dry	-12	-18	-11	-11	-12	-13	-89	-165	-149	-107	-64	-51
Critical Dry	-50	-51	-53	-46	-38	-36	-89	-154	-140	-116	-59	-53
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	7.4	6.9	5.8	1.8	1.2	1.2	2.3	3.5	6.7	8.4	10.0	9.1
Above Normal	1.2	-3.0	-1.4	0.3	1.4	1.1	1.6	0.7	2.3	2.5	2.3	2.0
Below Normal	8.3	4.4	6.8	5.1	3.3	2.9	-0.6	-5.1	-9.2	-9.0	-3.1	-1.3
Dry	-0.4	-1.0	0.6	0.4	0.2	-0.1	-6.5	-14.6	-17.3	-12.7	-13.5	-12.3
Critical Dry	-12.6	-13.9	-10.4	-6.3	-4.3	-3.5	-7.1	-13.0	-15.6	-18.2	-17.6	-16.9

1 **Table 5.91 Changes in San Luis Reservoir Elevation under Alternative 5 as**
2 **Compared to the No Action Alternative**

Water Year	End of Month Storage (TAF)											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Alternative 5												
Wet	402	417	446	475	501	525	509	478	448	427	416	422
Above Normal	391	408	443	471	492	512	494	456	416	390	386	398
Below Normal	399	411	443	467	483	498	481	444	397	390	381	388
Dry	389	404	436	465	483	497	482	451	417	413	381	381
Critical Dry	383	393	417	450	467	471	460	437	405	383	359	357
No Action Alternative												
Wet	399	414	443	473	500	523	507	475	444	422	409	416
Above Normal	391	411	445	472	492	512	493	456	415	389	386	398
Below Normal	397	410	442	465	481	496	481	448	400	393	383	389
Dry	391	406	437	466	484	498	490	468	434	426	390	389
Critical Dry	390	400	423	454	470	475	469	453	422	399	369	366
Alternative 5 as Compared to No Action Alternative												
Wet	3	3	3	1	1	1	2	3	4	5	6	6
Above Normal	**0**	**-3**	**-2**	**-1**	**0**	**0**	0	**0**	1	1	1	1
Below Normal	2	1	2	2	2	2	**-1**	**-4**	**-3**	**-3**	**-2**	**-1**
Dry	**-2**	**-2**	**-1**	**-1**	**-1**	**-1**	**-8**	**-16**	**-17**	**-13**	**-9**	**-7**
Critical Dry	**-7**	**-7**	**-6**	**-4**	**-3**	**-3**	**-9**	**-16**	**-18**	**-16**	**-10**	**-9**
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	0.6	0.7	0.6	0.3	0.2	0.3	0.4	0.6	0.9	1.2	1.5	1.3
Above Normal	-0.1	-0.7	-0.5	-0.2	0.0	0.0	0.1	0.0	0.2	0.3	0.2	0.2
Below Normal	0.4	0.2	0.4	0.3	0.4	0.4	-0.1	-0.9	-0.9	-0.7	-0.4	-0.1
Dry	-0.4	-0.5	-0.3	-0.2	-0.2	-0.2	-1.6	-3.5	-3.9	-2.9	-2.3	-1.9
Critical Dry	-1.8	-1.6	-1.4	-0.9	-0.7	-0.7	-1.9	-3.6	-4.2	-4.1	-2.7	-2.4

The following changes in San Luis Reservoir storage would occur under Alternative 5 as compared to the No Action Alternative.

- In wet years, storage would be similar in January through May and increased in June through December (up to 10.0 percent).
- In above-normal years, storage would be similar in all months.
- In below-normal years, storage would be similar in November, February through April, August, and September; reduced in June and July (up to 9.2 percent); and increased in October, December, January, and May (up to 8.3 percent).
- In dry years, storage would be similar in October through March and reduced in April through September (up to 17.3 percent).
- In critical dry years, storage would be similar in February and March; and reduced in April through January (up to 18.2 percent).
- Surface water elevations would be similar in all months, in all water years.

Changes in Flows into the Yolo Bypass

Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under Alternative 5 as compared to the No Action Alternative are summarized in Table 5.92. The results are summarized following Table 5.92.

1 **Table 5.92 Changes in Flows into the Yolo Bypass at Fremont Weir under**
2 **Alternative 5 as Compared to the No Action Alternative**

Water Year	Average Monthly Flow (cfs)											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Alternative 5												
Wet	170	933	8,400	24,048	29,507	18,512	5,627	289	113	0	0	100
Above Normal	100	100	2,786	6,000	12,885	7,895	1,688	100	100	0	0	100
Below Normal	100	100	242	1,004	3,115	886	293	100	100	0	0	100
Dry	100	100	317	896	2,015	1,398	407	100	100	0	0	100
Critical Dry	100	100	151	525	531	393	106	100	100	0	0	100
No Action Alternative												
Wet	183	910	8,420	24,291	29,547	18,493	5,627	289	113	0	0	100
Above Normal	100	100	2,765	5,997	13,013	7,928	1,688	100	100	0	0	100
Below Normal	100	100	242	1,004	3,031	883	293	100	100	0	0	100
Dry	100	100	322	902	2,024	1,393	407	100	100	0	0	100
Critical Dry	100	100	149	528	534	396	106	100	100	0	0	100
Alternative 5 as Compared to No Action Alternative												
Wet	-13	23	-20	-243	-40	18	0	0	0	0	0	0
Above Normal	0	0	22	4	-128	-34	0	0	0	0	0	0
Below Normal	0	0	-1	0	84	3	0	0	0	0	0	0
Dry	0	0	-5	-6	-10	4	0	0	0	0	0	0
Critical Dry	0	0	2	-3	-3	-3	0	0	0	0	0	0
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	-7.3	2.6	-0.2	-1.0	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.8	0.1	-1.0	-0.4	0.0	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	-0.2	0.0	2.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	-1.6	-0.6	-0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	1.6	-0.5	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0	0.0

Flows from the Sacramento River into Yolo Bypass at Fremont Weir would be similar under Alternative 5 and the No Action Alternative.

Changes in Delta Conditions

Delta outflow under Alternative 5 as compared to the No Action Alternative are summarized below and shown on Figures 5.74 through 5.76.

- In wet years, average monthly Delta outflow would be similar.
- In dry years, average monthly Delta outflow would be similar in July through April and increased in May and June (up to 1,377 cfs).

The OMR conditions under Alternative 5 as compared to the No Action Alternative are shown on Figures 5.77 through 5.79.

- Under Alternative 5, OMR flows would be negative except in April and May of all water year types. Under the No Action Alternative, OMR flows would be negative except in April and May of wet and above normal years and April of below normal years.
- In wet years, OMR flows would be more positive or no change in September, October, January, and April through June (up to 171 cfs) and more negative in November, December, March, and August (up to 124 cfs).
- In dry years, OMR flows would be more positive or no change in October through March (up to 1,359 cfs) and more negative in June through September (up to 568 cfs).

Changes in CVP and SWP Exports and Deliveries

Delta exports under Alternative 5 as compared to the No Action Alternative are summarized in Table 5.93.

Table 5.93 Changes in Exports at Jones and Banks Pumping Plants under Alternative 5 as Compared to the No Action Alternative

Water Year	Monthly Volume (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	408	505	564	514	532	592	202	202	444	667	718	627
Above Normal	376	423	561	407	405	496	127	92	315	590	705	625
Below Normal	381	456	588	387	359	397	103	55	208	663	632	561
Dry	370	394	513	392	315	318	80	41	205	577	333	433
Critical Dry	313	293	382	355	249	179	34	20	69	239	222	243
No Action Alternative												
Wet	410	497	564	513	537	594	204	207	445	669	717	638
Above Normal	376	450	562	406	401	496	130	105	315	587	709	628
Below Normal	386	456	590	387	354	394	134	100	209	657	622	542
Dry	374	398	510	392	315	318	153	126	194	541	296	426
Critical Dry	314	293	384	349	250	179	93	90	64	223	176	242
Alternative 5 as Compared to No Action Alternative												
Wet	-2	8	0	0	-5	-2	-2	-5	-1	-1	0	-11
Above Normal	1	-28	-1	1	4	0	-4	-14	0	2	-4	-3
Below Normal	-5	0	-2	0	5	4	-31	-45	-1	6	10	18
Dry	-4	-4	4	0	0	0	-73	-84	11	36	38	8
Critical Dry	-1	0	-2	6	-1	-1	-59	-70	4	17	46	1
Alternative 5 as Compared to No Action Alternative (percent change)												
Wet	-0.6	1.6	0.0	0.1	-0.9	-0.3	-1.0	-2.6	-0.2	-0.2	0.1	-1.8
Above Normal	0.2	-6.1	-0.1	0.3	0.9	0.0	-2.9	-13.0	-0.1	0.4	-0.5	-0.5
Below Normal	-1.3	0.0	-0.4	0.0	1.4	0.9	-23.4	-45.4	-0.3	0.8	1.6	3.4
Dry	-1.1	-1.0	0.7	-0.1	-0.1	0.0	-47.6	-67.0	5.7	6.7	12.8	1.8
Critical Dry	-0.2	0.1	-0.4	1.8	-0.4	-0.4	-63.8	-77.5	6.9	7.6	25.9	0.6

The following changes would occur in CVP and SWP exports under Alternative 5 as compared to the No Action Alternative.

- Long-term average annual exports would be 45 TAF (1 percent) less under Alternative 5 as compared to the No Action Alternative.
- In wet years, total exports would be similar in all months.
- In above-normal years, total exports would be similar in June through April and reduced in May (13.0 percent).
- In below-normal years, total exports would be similar in June through March and reduced in April and May (up to 45.4 percent).
- In dry years, total exports would be similar in June, July, and September through March; reduced in April and May (up to 67.0 percent); and increased in August (12.8 percent).
- In critical dry years, total exports would be similar in June, July, and September through March; reduced in April and May (up to 77.5 percent); and increased August (25.9 percent).

Deliveries to CVP and SWP water users would be similar under Alternative 5 as compared to the No Action Alternative, as summarized in Tables 5.94 and 5.95, respectively.

Table 5.94 Changes CVP Water Deliveries under Alternative 5 as Compared to the No Action Alternative

Annual Average Deliveries (TAF)					
		Alternative 5	No Action Alternative	Alternative 5 as compared to the No Action Alternative	
				Difference	Percent Change
North of Delta					
CVP Agricultural Water Service Contractors	Long Term	185	185	0	0
	Dry	85	86	0	0
	Critical Dry	24	24	0	0
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	386	386	0	0
	Dry	384	385	0	0
	Critical Dry	384	383	1	0

Annual Average Deliveries (TAF)					
		Alternative 5	No Action Alternative	Alternative 5 as compared to the No Action Alternative: Difference	Alternative 5 as compared to the No Action Alternative: Percent Change
CVP M&I American River Contractors	Long Term	112	113	0	0
	Dry	96	97	0	0
	Critical Dry	74	75	-1	-1
CVP Sacramento River Settlement Contractors	Long Term	1,861	1,859	2	0
	Dry	1,906	1,906	0	0
	Critical Dry	1,747	1,737	10	1
CVP Refuge Level 2 Deliveries	Long Term	146	146	0	0
	Dry	145	146	0	0
	Critical Dry	103	102	1	1
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,578	2,576	2	0
	Dry	2,520	2,523	-3	0
	Critical Dry	2,258	2,246	12	1
South of Delta (Does not include Eastside Contractors)					
CVP Agricultural Water Service Contractors	Long Term	834	847	-13	-2
	Dry	433	445	-12	-3
	Critical Dry	130	131	-1	-1
CVP M&I Users	Long Term	112	112	0	0
	Dry	100	99	1	1
	Critical Dry	80	80	0	0
San Joaquin River Exchange Contractors	Long Term	852	852	0	0
	Dry	875	875	0	0
	Critical Dry	741	741	0	0

Annual Average Deliveries (TAF)					
				Alternative 5 as compared to the No Action Alternative	
		Alternative 5	**No Action Alternative**	**Difference**	**Percent Change**
CVP Refuge Level 2 Deliveries	Long Term	273	273	0	0
	Dry	281	281	0	0
	Critical Dry	232	234	-2	-1
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,071	2,084	-13	-1
	Dry	1,689	1,700	-11	-1
	Critical Dry	1,183	1,186	-3	0
Eastside Contractors Deliveries					
Water Rights	Long Term	502	508	-6	-1
	Dry	524	524	0	0
	Critical Dry	406	445	-39	-9
CVP Water Service Contracts	Long Term	100	104	-4	-4
	Dry	69	84	-16	-19
	Critical Dry	8	4	4	100
Total Water Rights and CVP Service Contracts Deliveries	Long Term	602	612	-10	-2
	Dry	593	608	-15	-2
	Critical Dry	414	449	-35	-8

The following changes in CVP water deliveries would occur under Alternative 5 as compared to the No Action Alternative.

- Deliveries to CVP North of Delta agricultural water service contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries to CVP North of Delta M&I contractors would be similar over the long-term conditions and in dry and critical dry years in total and for the American River CVP contractors.
- Deliveries to CVP South of Delta agricultural water service contractors would be similar over the long-term conditions and in dry and critical dry years.

- Deliveries to CVP South of Delta M&I contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries to the Eastside contractors would be similar under long-term conditions and dry years; and reduced by 8 percent in critical dry years.

Table 5.95 Changes SWP Water Deliveries under the Alternative 5 as Compared to the No Action Alternative

Annual Average Deliveries (TAF)					
		Alternative 5	No Action Alternative	Alternative 5 as compared to the No Action Alternative: Difference	Alternative 5 as compared to the No Action Alternative: Percent Change
North of Delta					
SWP Agricultural Uses	Long Term	0	0	0	0
	Dry	0	0	0	0
	Critical Dry	0	0	0	0
SWP M&I (without Article 21)	Long Term	67	68	-1	-2
	Dry	51	51	0	-1
	Critical Dry	42	43	-1	-1
SWP M&I Article 21 Deliveries	Long Term	13	13	0	3
	Dry	14	14	1	4
	Critical Dry	13	13	1	5
Total SWP Agricultural and M&I (without Article 21)	Long Term	67	68	-1	-2
	Dry	51	51	0	-1
	Critical Dry	42	43	-1	-1
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	13	13	0	3
	Dry	14	14	1	4
	Critical Dry	13	13	1	5

Annual Average Deliveries (TAF)					
		Alternative 5	No Action Alternative	Alternative 5 as compared to the No Action Alternative: Difference	Alternative 5 as compared to the No Action Alternative: Percent Change
South of Delta					
SWP Agricultural Users (without Article 21)	Long Term	598	610	-12	-2
	Dry	449	455	-7	-1
	Critical Dry	369	378	-9	-2
SWP Agricultural Article 21 Deliveries	Long Term	24	27	-2	-9
	Dry	6	5	1	20
	Critical Dry	4	7	-3	-43
SWP M&I Users (without Article 21)	Long Term	1,784	1,800	-15	-1
	Dry	1,397	1,406	-9	-1
	Critical Dry	1,157	1,173	-16	-1
SWP M&I Article 21 Deliveries	Long Term	19	20	-1	-7
	Dry	5	5	0	4
	Critical Dry	3	5	-2	-37
Total SWP Agricultural and M&I Users (without Article 21)	Long Term	2,383	2,410	-27	-1
	Dry	1,845	1,861	-15	-1
	Critical Dry	1,526	1,551	-25	-2
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	43	47	-4	-8
	Dry	11	10	1	12
	Critical Dry	7	12	-5	-41

The following changes in SWP water deliveries would occur under Alternative 5 as compared to the No Action Alternative.

- Deliveries without Article 21 water to SWP North of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries of Article 21 water to SWP North of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be reduced by 8 percent over the long-term conditions and 41 percent in critical dry years; and increased by 12 percent in dry years.

Effects Related to Cross Delta Water Transfers

Potential effects to surface water resources could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i). Potential effects were identified as reduced surface water storage in upstream reservoirs and changes in flow patterns in river downstream of the reservoirs if water was released from the reservoirs in patterns that were different than would have been used by the water seller's. Because all water transfers would be required to avoid adverse impacts to other water users and biological resources (see Section 3.A.6.3, Transfers), including impacts associated with changes in reservoir storage and river flow patterns, the analysis indicated that water transfers would not result in substantial changes in storage or river flows. For the purposes of this EIS, it is anticipated that similar conditions would occur due to cross Delta water transfers under Alternative 5 and the No Action Alternative.

Under Alternative 5 and the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September, and the volume would be limited to 600,000 acre-feet per year in drier years and 360,000 acre-feet in all other years, in accordance with the 2008 USFWS BO and 2009 NMFS BO. As indicated in Table 5.93, capacity would be available under the No Action Alternative between July and September for water transfers in all water year types.

Overall, the potential for water transfer conveyance would be similar under Alternative 5 as compared to the No Action Alternative.

San Francisco Bay Area, Central Coast, and Southern California Regions

Potential Changes in Surface Water Resources at Reservoirs that Store CVP and SWP Water

The San Francisco Bay Area, Central Coast, and Southern California regions include numerous reservoirs that store CVP and SWP water supplies, including CVP and SWP reservoirs, that primarily provide water supplies for M&I water users. Changes in the availability CVP and SWP water supplies for storage in these reservoirs under Alternative 5 as compared to the No Action Alternative would be consistent with the following changes in water deliveries to M&I water users, as summarized in Tables 5.94 and 5.95.

- Deliveries to CVP South of Delta M&I contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be reduced by 8 percent over the long-term conditions and 41 percent in critical dry years; and increased by 12 percent in dry years.

Changes in CVP and SWP Exports and Deliveries

Deliveries to CVP and SWP water users are described above in the Central Valley Region.

5.4.3.6.2 Alternative 5 Compared to the Second Basis of Comparison

Trinity River Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Changes in Trinity Lake storage and surface water elevations under Alternative 5 as compared to the Second Basis of Comparison are summarized in Tables 5.96 and 5.97. The results are summarized following Table 5.97.

1 **Table 5.96 Changes in Trinity Lake Storage under Alternative 5 as Compared to the**
2 **Second Basis of Comparison**

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	1,494	1,520	1,635	1,759	1,926	2,056	2,222	2,246	2,191	2,068	1,940	1,781
Above Normal	1,155	1,180	1,290	1,459	1,662	1,850	2,030	2,004	1,912	1,778	1,627	1,503
Below Normal	1,398	1,405	1,422	1,493	1,580	1,667	1,813	1,741	1,637	1,474	1,311	1,190
Dry	1,155	1,150	1,175	1,183	1,275	1,404	1,540	1,492	1,415	1,259	1,110	1,012
Critical Dry	744	726	741	743	784	866	913	878	856	755	622	539
Second Basis of Comparison												
Wet	1,501	1,535	1,644	1,767	1,931	2,055	2,224	2,250	2,194	2,068	1,939	1,805
Above Normal	1,208	1,245	1,363	1,524	1,718	1,901	2,079	2,053	1,955	1,815	1,647	1,513
Below Normal	1,451	1,472	1,492	1,554	1,641	1,729	1,872	1,799	1,696	1,515	1,337	1,204
Dry	1,178	1,184	1,210	1,230	1,322	1,453	1,586	1,536	1,466	1,302	1,152	1,055
Critical Dry	819	803	813	825	868	949	999	962	929	811	667	598
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-7	-16	-9	-8	-5	1	-2	-3	-3	0	1	-23
Above Normal	-53	-65	-73	-65	-56	-51	-49	-49	-43	-37	-20	-11
Below Normal	-54	-67	-69	-61	-62	-62	-59	-58	-60	-40	-26	-14
Dry	-23	-35	-35	-48	-47	-48	-46	-45	-51	-42	-42	-43
Critical Dry	-75	-77	-72	-82	-84	-84	-86	-84	-73	-56	-45	-59
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-0.5	-1.0	-0.5	-0.4	-0.3	0.0	-0.1	-0.2	-0.1	0.0	0.0	-1.3
Above Normal	-4.4	-5.2	-5.3	-4.3	-3.3	-2.7	-2.4	-2.4	-2.2	-2.0	-1.2	-0.7
Below Normal	-3.7	-4.6	-4.7	-3.9	-3.7	-3.6	-3.2	-3.2	-3.5	-2.7	-1.9	-1.2
Dry	-2.0	-3.0	-2.9	-3.9	-3.5	-3.3	-2.9	-2.9	-3.5	-3.3	-3.6	-4.1
Critical Dry	-9.1	-9.6	-8.8	-10.0	-9.6	-8.8	-8.6	-8.8	-7.9	-6.9	-6.7	-9.8

Table 5.97 Changes in Trinity Lake Elevation under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	2,300	2,303	2,313	2,325	2,338	2,347	2,357	2,358	2,355	2,347	2,338	2,326
Above Normal	2,259	2,262	2,276	2,294	2,314	2,330	2,343	2,342	2,335	2,326	2,313	2,303
Below Normal	2,289	2,290	2,292	2,299	2,308	2,315	2,326	2,321	2,313	2,299	2,284	2,272
Dry	2,263	2,265	2,268	2,269	2,279	2,292	2,305	2,301	2,294	2,279	2,265	2,254
Critical Dry	2,209	2,206	2,209	2,212	2,220	2,234	2,241	2,237	2,235	2,221	2,199	2,183
Second Basis of Comparison												
Wet	2,301	2,305	2,314	2,325	2,339	2,347	2,357	2,358	2,355	2,347	2,338	2,328
Above Normal	2,270	2,273	2,286	2,303	2,320	2,335	2,347	2,346	2,339	2,329	2,315	2,304
Below Normal	2,295	2,296	2,298	2,305	2,313	2,320	2,331	2,326	2,318	2,303	2,287	2,274
Dry	2,266	2,269	2,272	2,274	2,284	2,296	2,309	2,304	2,298	2,284	2,269	2,259
Critical Dry	2,218	2,216	2,217	2,222	2,229	2,243	2,250	2,246	2,243	2,227	2,204	2,191
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-1	-2	-1	-1	0	0	0	0	0	0	0	-2
Above Normal	-10	-11	-11	-9	-7	-5	-4	-4	-4	-3	-2	-1
Below Normal	-5	-6	-6	-5	-5	-5	-5	-5	-5	-3	-3	-2
Dry	-2	-3	-3	-5	-4	-4	-4	-4	-4	-4	-5	-5
Critical Dry	-9	-9	-8	-9	-9	-9	-9	-9	-8	-6	-5	-8
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Above Normal	-0.5	-0.5	-0.5	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	0.0
Below Normal	-0.2	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1
Dry	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Critical Dry	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	-0.2	-0.4

The following changes in Trinity Lake storage and surface water elevations would occur under Alternative 5 as compared to the Second Basis of Comparison.

- In wet, below normal, and dry years, storage would be similar.
- In above normal years, storage would be similar in January through October and reduced in November and December (up to 5.3 percent).
- In critical dry years, storage would be reduced in all months (up to 10.0 percent).
- In all months, in all water year types, surface water elevations would be similar.

The following changes would occur on the Trinity River under Alternative 5 as compared to the Second Basis of Comparison, as summarized on Figures 5.53 through 5.55.

- Over long-term conditions, flows would be similar in March through November and January and reduced in December and February (up to 9.6 percent).
- In wet years, flows would be similar in January and April through November and reduced in December, February, and March (up to 13.9 percent).
- In dry years, flows would be similar in all months.

Central Valley Region

Changes in CVP and SWP Reservoir Storage and Downstream River Flows

Shasta Lake and Sacramento River

Storage levels and surface water elevations in Shasta Lake under Alternative 5 as compared to the Second Basis of Comparison are summarized in Tables 5.98 and 5.99. Changes in flows in the Sacramento River downstream of Keswick Dam and at Freeport are shown on Figures 5.56 through 5.61. The results are summarized following Table 5.99.

1 **Table 5.98 Changes in Shasta Lake Storage under Alternative 5 as Compared to the**
2 **Second Basis of Comparison**

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	2,704	2,716	3,078	3,385	3,590	3,836	4,299	4,461	4,243	3,736	3,410	2,989
Above Normal	2,369	2,388	2,598	3,164	3,454	4,019	4,401	4,430	4,042	3,409	3,071	2,842
Below Normal	2,603	2,565	2,704	3,077	3,450	3,820	4,039	3,970	3,602	3,012	2,663	2,620
Dry	2,344	2,287	2,433	2,627	3,039	3,509	3,745	3,699	3,315	2,787	2,497	2,459
Critical Dry	1,676	1,611	1,700	1,856	2,015	2,258	2,203	2,104	1,749	1,246	958	910
Second Basis of Comparison												
Wet	2,817	2,926	3,154	3,406	3,597	3,841	4,301	4,453	4,228	3,733	3,362	3,252
Above Normal	2,499	2,578	2,808	3,313	3,515	4,038	4,416	4,417	3,979	3,347	2,975	2,921
Below Normal	2,826	2,846	2,977	3,299	3,646	3,966	4,164	4,042	3,599	3,010	2,601	2,574
Dry	2,409	2,431	2,578	2,755	3,168	3,644	3,861	3,774	3,333	2,800	2,539	2,496
Critical Dry	1,873	1,826	1,911	2,050	2,222	2,460	2,386	2,270	1,861	1,409	1,151	1,086
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-114	-211	-76	-21	-8	-5	-2	7	15	3	48	-263
Above Normal	-130	-190	-210	-149	-62	-19	-15	13	63	62	97	-79
Below Normal	-224	-281	-273	-221	-196	-146	-125	-72	3	1	62	45
Dry	-64	-144	-145	-129	-129	-135	-116	-75	-18	-13	-41	-38
Critical Dry	-197	-215	-211	-194	-207	-202	-183	-166	-111	-163	-193	-176
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-4.0	-7.2	-2.4	-0.6	-0.2	-0.1	0.0	0.2	0.4	0.1	1.4	-8.1
Above Normal	-5.2	-7.4	-7.5	-4.5	-1.8	-0.5	-0.3	0.3	1.6	1.8	3.3	-2.7
Below Normal	-7.9	-9.9	-9.2	-6.7	-5.4	-3.7	-3.0	-1.8	0.1	0.0	2.4	1.8
Dry	-2.7	-5.9	-5.6	-4.7	-4.1	-3.7	-3.0	-2.0	-0.5	-0.5	-1.6	-1.5
Critical Dry	-10.5	-11.8	-11.0	-9.5	-9.3	-8.2	-7.7	-7.3	-6.0	-11.5	-16.8	-16.2

Table 5.99 Changes in Shasta Lake Elevation under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	991	992	1,008	1,023	1,031	1,041	1,058	1,064	1,056	1,037	1,024	1,005
Above Normal	967	968	982	1,012	1,025	1,048	1,062	1,063	1,049	1,024	1,009	999
Below Normal	987	985	992	1,009	1,025	1,040	1,048	1,045	1,031	1,006	990	988
Dry	969	967	975	986	1,006	1,027	1,037	1,035	1,019	996	982	980
Critical Dry	925	921	928	938	950	967	965	959	937	899	874	869
Second Basis of Comparison												
Wet	997	1,002	1,012	1,024	1,032	1,041	1,058	1,063	1,055	1,037	1,022	1,017
Above Normal	974	978	992	1,019	1,028	1,048	1,062	1,062	1,046	1,021	1,005	1,003
Below Normal	997	998	1,004	1,019	1,034	1,046	1,053	1,049	1,031	1,006	987	986
Dry	972	974	982	992	1,012	1,032	1,041	1,038	1,020	997	984	982
Critical Dry	938	935	941	950	961	977	974	967	943	910	889	884
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-6	-10	-4	-1	0	0	0	0	1	0	2	-12
Above Normal	-7	-10	-10	-7	-3	-1	-1	0	2	3	4	-4
Below Normal	-10	-13	-12	-10	-8	-6	-5	-3	0	0	3	2
Dry	-3	-7	-7	-6	-6	-5	-4	-3	-1	-1	-3	-2
Critical Dry	-13	-14	-14	-12	-11	-10	-9	-8	-5	-11	-15	-14
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-0.6	-1.0	-0.4	-0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	-1.2
Above Normal	-0.7	-1.0	-1.0	-0.7	-0.3	-0.1	-0.1	0.0	0.2	0.3	0.4	-0.4
Below Normal	-1.0	-1.3	-1.2	-0.9	-0.8	-0.6	-0.4	-0.3	0.0	0.0	0.3	0.2
Dry	-0.3	-0.7	-0.7	-0.6	-0.6	-0.5	-0.4	-0.3	-0.1	-0.1	-0.3	-0.2
Critical Dry	-1.4	-1.5	-1.4	-1.3	-1.1	-1.0	-0.9	-0.9	-0.5	-1.2	-1.7	-1.6

The following changes in Shasta Lake storage and surface water elevation would occur under Alternative 5 as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in October and December through August and reduced in November and September (up to 8.1 percent).
- In above normal years, storage would be similar in February through September and reduced in October through December (up to 7.5 percent).
- In below normal years, storage would be similar in March through September and reduced in October through February (up to 9.9 percent).
- In dry years, storage would be similar in January through October and reduced in November through December (up to 5.9 percent).
- In critical dry years, storage would be reduced in all months (up to 16.8 percent).
- In all months, in all water year types, surface water elevations are similar.

The following changes in Sacramento River flows would occur under Alternative 5 as compared to the Second Basis of Comparison, as shown on Figures 5.56 through 5.61.

- Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
  - Over long-term conditions, flows would be similar in July, August, October, and February through April; reduced in December, January, May and June (up to 8.2 percent); and increased in September and November (up to 38.5 percent).
  - In wet years, flows would be similar in January through July; reduced in December and August (up to 15.0 percent); and increased in September through November (up to 77.3 percent).
  - In dry years, similar flows would occur in July through October and December through March; reduced in April through June (up to 10.1 percent); and increased flows in November (32.1 percent).
- Sacramento River near Freeport (near the northern boundary of the Delta) (Figures 5.59 through 5.61).
  - Over long-term conditions, flows would be similar in October and December through April; reduced in May and June (up to 11.5 percent); and increased in July through September and November (43.4 percent).
  - In wet years, flows would be similar in October and January through June; reduced in December (6.2 percent); and increased in July through September and November (up to 89.0 percent).
  - In dry years, similar flows would occur in August through October and December through April; reduced in May and June (up to 13.6 percent); and increased flows in July and November (up to 19.3 percent).

Lake Oroville and Feather River

Storage levels and surface water elevations in Lake Oroville under Alternative 5 as compared to the Second Basis of Comparison are summarized in Tables 5.100 and 5.101. Changes in flows in the Feather River downstream of Thermalito Complex are shown on Figures 5.62 through 5.64. The results are summarized following Table 5.101.

Table 5.100 Changes in Lake Oroville Storage under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	1,681	1,723	2,179	2,556	2,833	2,942	3,300	3,488	3,447	2,961	2,613	2,103
Above Normal	1,275	1,310	1,471	1,948	2,512	2,892	3,247	3,401	3,241	2,608	2,125	1,668
Below Normal	1,552	1,507	1,517	1,728	2,132	2,406	2,663	2,746	2,569	1,959	1,521	1,305
Dry	1,223	1,173	1,190	1,319	1,595	1,952	2,193	2,255	1,992	1,502	1,295	1,150
Critical Dry	1,102	1,037	1,025	1,114	1,229	1,383	1,415	1,411	1,266	1,045	929	873
Second Basis of Comparison												
Wet	1,936	1,984	2,354	2,636	2,871	2,942	3,300	3,477	3,402	2,976	2,728	2,569
Above Normal	1,465	1,523	1,702	2,173	2,648	2,937	3,271	3,357	3,081	2,493	2,087	1,827
Below Normal	1,823	1,783	1,831	2,037	2,361	2,627	2,875	2,836	2,461	1,930	1,637	1,424
Dry	1,371	1,324	1,344	1,473	1,764	2,120	2,363	2,357	2,031	1,688	1,427	1,261
Critical Dry	1,117	1,044	1,041	1,125	1,235	1,406	1,423	1,407	1,219	1,027	911	839
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-255	-261	-175	-81	-38	0	0	10	45	-15	-115	-466
Above Normal	-190	-213	-231	-225	-136	-44	-24	44	159	115	37	-159
Below Normal	-271	-275	-314	-309	-228	-220	-212	-90	109	28	-116	-118
Dry	-148	-151	-153	-155	-169	-168	-170	-102	-39	-186	-132	-111
Critical Dry	-15	-7	-17	-11	-7	-23	-8	4	47	19	18	34
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-13.1	-13.1	-7.4	-3.1	-1.3	0.0	0.0	0.3	1.3	-0.5	-4.2	-18.1
Above Normal	-13.0	-14.0	-13.6	-10.4	-5.1	-1.5	-0.7	1.3	5.2	4.6	1.8	-8.7
Below Normal	-14.9	-15.4	-17.1	-15.1	-9.7	-8.4	-7.4	-3.2	4.4	1.5	-7.1	-8.3
Dry	-10.8	-11.4	-11.4	-10.5	-9.6	-7.9	-7.2	-4.3	-1.9	-11.0	-9.2	-8.8
Critical Dry	-1.4	-0.6	-1.6	-0.9	-0.5	-1.6	-0.6	0.3	3.8	1.8	2.0	4.1

Table 5.101 Changes in Lake Oroville Elevation under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	742	746	793	829	852	859	884	897	894	860	835	789
Above Normal	698	701	720	775	827	856	880	891	880	836	795	747
Below Normal	731	726	728	752	794	818	839	845	831	777	730	704
Dry	691	685	688	706	738	777	799	804	779	727	703	685
Critical Dry	676	668	665	679	694	712	716	715	696	667	650	642
Second Basis of Comparison												
Wet	768	773	810	837	854	859	884	896	891	861	844	831
Above Normal	717	723	745	796	838	859	882	888	869	826	790	763
Below Normal	757	752	757	779	812	834	854	852	823	775	743	719
Dry	706	701	705	721	755	791	814	813	784	748	718	698
Critical Dry	677	668	668	680	694	715	716	714	691	664	647	636
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-26	-26	-16	-7	-3	0	0	1	3	-1	-9	-42
Above Normal	-19	-22	-25	-21	-11	-3	-2	3	11	10	5	-17
Below Normal	-26	-26	-29	-27	-19	-16	-15	-7	8	2	-13	-14
Dry	-15	-16	-16	-16	-17	-15	-14	-9	-5	-22	-15	-13
Critical Dry	-1	0	-2	-1	-1	-3	-1	1	5	4	3	6
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-3.3	-3.4	-2.0	-0.9	-0.3	0.0	0.0	0.1	0.3	-0.1	-1.0	-5.1
Above Normal	-2.7	-3.1	-3.4	-2.7	-1.3	-0.4	-0.2	0.3	1.3	1.2	0.6	-2.2
Below Normal	-3.4	-3.4	-3.8	-3.4	-2.3	-1.9	-1.8	-0.8	1.0	0.3	-1.8	-2.0
Dry	-2.1	-2.2	-2.3	-2.2	-2.2	-1.9	-1.7	-1.2	-0.7	-2.9	-2.2	-1.9
Critical Dry	-0.2	0.0	-0.3	-0.2	-0.1	-0.4	-0.1	0.1	0.8	0.6	0.5	0.9

The following changes in Lake Oroville storage and surface water elevation would occur under Alternative 5 as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in January through August and reduced in September through December (up to 18.1 percent).
- In above-normal years, storage would be similar in March through August and reduced in September through February (up to 14.0 percent).
- In below-normal years, storage would be similar in May through July and reduced in August through April (up to 17.1 percent).
- In dry years, storage would be similar in May and June and reduced in July through April (up to 11.4 percent).
- In critical dry years, storage would be similar in all months.
- Surface water elevations would be similar in all months, in all years.

The following changes in Feather River flows would occur under Alternative 5 as compared to the No Action Alternative, as shown on Figures 5.62 through 5.64.

- Over long-term conditions, similar flows would occur in November and April; reduced flows in October, December through March, May, and June (up to 27.7 percent); and increased flows in July through September (up to 76.2 percent).
- In wet years, similar flows would occur in October, November, March through May; reduced flows in December through February and June (up to 25.6 percent); and increased flows in July through September (up to 181.9 percent).
- In dry years, similar flows would occur in November through April; reduced flows in October, May, June, August, and September (up to 45.4 percent); and increased flows in July (60.4 percent).

Folsom Lake and American River

Storage levels and surface water elevations in Folsom Lake under Alternative 5 as compared to the Second Basis of Comparison are summarized in Tables 5.102 and 5.103. Changes in flows in the American River downstream of Nimbus Dam are shown on Figures 5.65 through 5.67. The results are summarized below following 5.103.

Table 5.102 Changes in Folsom Lake Storage under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	454	435	515	518	515	632	785	952	941	794	710	577
Above Normal	375	379	428	513	532	640	787	946	888	622	554	478
Below Normal	440	425	461	483	534	620	758	845	783	523	469	450
Dry	397	386	411	426	479	579	691	766	664	489	435	410
Critical Dry	325	304	314	320	367	433	483	499	411	324	257	231
Second Basis of Comparison												
Wet	483	470	522	524	515	632	785	951	937	793	688	646
Above Normal	390	412	467	537	538	640	787	946	857	591	522	485
Below Normal	506	489	502	514	541	626	761	847	739	475	408	387
Dry	405	399	423	437	486	585	698	769	664	486	432	408
Critical Dry	339	317	323	325	369	436	469	482	430	352	288	258
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-29	-35	-8	-6	0	0	0	0	4	1	23	-69
Above Normal	-16	-34	-39	-24	-6	0	0	1	30	32	32	-7
Below Normal	-66	-65	-41	-31	-7	-7	-3	-2	44	49	60	63
Dry	-9	-13	-12	-12	-7	-5	-7	-3	0	4	3	2
Critical Dry	-14	-12	-9	-5	-2	-3	14	17	-19	-28	-31	-27
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-6.0	-7.4	-1.5	-1.2	0.0	0.0	0.0	0.0	0.5	0.1	-6.0	-7.4
Above Normal	-4.0	-8.2	-8.3	-4.4	-1.2	0.0	0.0	0.1	3.5	5.4	-4.0	-8.2
Below Normal	-13.0	-13.2	-8.2	-6.1	-1.4	-1.1	-0.4	-0.2	5.9	10.2	-13.0	-13.2
Dry	-2.2	-3.2	-2.9	-2.7	-1.4	-0.9	-1.0	-0.4	0.0	0.8	-2.2	-3.2
Critical Dry	-4.1	-3.8	-2.8	-1.5	-0.6	-0.7	3.0	3.5	-4.5	-8.0	-4.1	-3.8

1 **Table 5.103 Changes in Folsom Lake Elevation under Alternative 5 as Compared to**
2 **the Second Basis of Comparison**

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	409	407	418	418	418	432	448	465	464	449	440	425
Above Normal	394	395	405	418	420	433	449	464	458	431	423	413
Below Normal	406	405	410	413	420	431	445	454	447	417	411	408
Dry	400	400	404	406	413	426	438	446	435	413	406	403
Critical Dry	386	384	389	390	396	406	412	414	400	385	370	365
Second Basis of Comparison												
Wet	412	412	419	419	418	432	448	465	464	449	438	433
Above Normal	397	400	410	421	421	433	448	465	456	427	419	414
Below Normal	415	414	416	417	421	432	446	455	443	410	401	398
Dry	401	401	405	407	414	427	439	446	435	413	406	403
Critical Dry	389	386	390	391	397	406	410	411	404	391	378	372
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-4	-5	-1	-1	0	0	0	-1	0	0	3	-8
Above Normal	-3	-6	-5	-3	-1	0	0	-1	3	4	4	-1
Below Normal	-9	-9	-6	-4	-1	-1	0	-1	5	7	10	10
Dry	-1	-1	-1	-2	-1	-1	-1	-1	0	0	0	0
Critical Dry	-3	-3	-2	-1	0	0	2	2	-3	-6	-8	-7
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-0.8	-1.1	-0.2	-0.2	0.0	0.0	0.0	-0.2	-0.1	0.0	0.6	-1.9
Above Normal	-0.7	-1.4	-1.3	-0.7	-0.2	0.0	0.0	-0.1	0.6	0.9	0.9	-0.2
Below Normal	-2.3	-2.2	-1.4	-1.0	-0.2	-0.2	-0.1	-0.2	1.0	1.8	2.4	2.5
Dry	-0.2	-0.4	-0.4	-0.4	-0.2	-0.2	-0.2	-0.1	-0.1	0.0	-0.1	-0.1
Critical Dry	-0.7	-0.7	-0.4	-0.2	0.0	-0.1	0.4	0.5	-0.8	-1.6	-2.0	-1.8

The following changes in Folsom Lake storage and surface water elevation would occur under Alternative 5 as compared to the Second Basis of Comparison.

- In wet years, storage would be similar in December through July and reduced in August through November (up to 7.4 percent).
- In above normal years, storage would be similar in January through June, August, and October; reduced in September, November, and December (up to 8.3 percent); and increased in July (5.4 percent).
- In below normal years, storage would be similar in February through May; reduced in August through January (up to 13.2 percent); and increased in June and July (up to 10.2 percent).
- In dry years, storage would be similar in all months.
- In critical dry years, storage would be similar in August and June and reduced in July (8.0 percent).
- Surface water elevations would be similar in all months, in all years.

The following changes in American River flows would occur under Alternative 5 as compared to the Second Basis of Comparison, as shown on Figures 5.62 through 5.64.

- Over long-term conditions, similar flows would occur in November through July; reduced flows in August (5.8 percent) and increased in September and October (42.4 percent).
- In wet years, similar flows would occur in October, November, and January through July; reduced flows in December and August (up to 13.7 percent); and increased flows in September (88.2 percent).
- In dry years, similar flows would occur in November through September and increased flows in October (16.7 percent).

Clear Creek

Changes in flows in Clear Creek downstream of Whiskeytown Dam are summarized in Table 5.104.

Monthly Clear Creek flows under Alternative 5 as compared to the Second Basis of Comparison are identical except in May. In May, under Alternative 5, flows are up to 40.7 percent higher than under the Second Basis of Comparison.

Table 5.104 Changes in Clear Creek Flows below Whiskeytown Dam under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	200	200	200	309	356	272	200	277	200	85	85	150
Above Normal	181	182	188	192	196	196	196	277	200	85	85	150
Below Normal	195	195	195	195	195	195	195	274	191	85	85	150
Dry	177	184	188	190	190	190	190	267	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	214	111	85	85	133
Second Basis of Comparison												
Wet	200	200	200	309	356	272	200	200	200	85	85	150
Above Normal	181	182	188	192	196	196	196	200	200	85	85	150
Below Normal	195	195	195	195	195	195	195	195	191	85	85	150
Dry	178	184	188	190	190	190	190	190	183	85	85	150
Critical Dry	163	167	167	167	167	167	167	167	111	85	85	133
Alternative 5 as Compared to Second Basis of Comparison												
Wet	0	0	0	0	0	0	0	77	0	0	0	0
Above Normal	0	0	0	0	0	0	0	77	0	0	0	0
Below Normal	0	0	0	0	0	0	0	78	0	0	0	0
Dry	**-1**	0	0	0	0	0	0	77	0	0	0	0
Critical Dry	0	0	0	0	0	0	0	47	0	0	0	0
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	0.0	0.0	0.0	0.0
Above Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.1	0.0	0.0	0.0	0.0
Dry	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	40.7	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.3	0.0	0.0	0.1	0.0

New Melones Reservoir and Stanislaus River

Storage levels and surface water elevations in New Melones Reservoir under Alternative 5 as compared to the Second Basis of Comparison are summarized in Tables 5.105 and 5.106. Changes in flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 through 5.70. The results are summarized following Table 5.106.

Table 5.105 Changes in New Melones Reservoir Storage under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	1,309	1,321	1,388	1,496	1,602	1,668	1,704	1,812	1,906	1,833	1,722	1,653
Above Normal	983	1,014	1,079	1,168	1,271	1,361	1,363	1,413	1,396	1,302	1,207	1,162
Below Normal	1,210	1,220	1,242	1,267	1,329	1,354	1,298	1,276	1,254	1,163	1,071	1,028
Dry	1,018	1,018	1,030	1,045	1,081	1,114	1,066	1,031	990	903	823	781
Critical Dry	558	559	570	578	597	591	506	449	433	391	355	336
Second Basis of Comparison												
Wet	1,443	1,446	1,502	1,606	1,709	1,794	1,833	1,962	1,994	1,917	1,803	1,731
Above Normal	1,092	1,116	1,175	1,261	1,360	1,455	1,481	1,543	1,516	1,419	1,321	1,274
Below Normal	1,364	1,366	1,378	1,397	1,453	1,479	1,461	1,447	1,415	1,322	1,228	1,183
Dry	1,149	1,143	1,149	1,161	1,191	1,221	1,210	1,176	1,131	1,039	956	912
Critical Dry	667	663	674	680	696	690	646	585	557	498	449	426
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-134	-125	-114	-110	-108	-126	-129	-149	-88	-84	-81	-77
Above Normal	-108	-102	-96	-92	-89	-94	-118	-130	-120	-117	-114	-112
Below Normal	-154	-145	-137	-130	-124	-125	-164	-170	-161	-159	-157	-155
Dry	-132	-125	-119	-116	-110	-107	-144	-145	-141	-136	-133	-131
Critical Dry	-109	-104	-104	-102	-99	-99	-140	-136	-123	-107	-95	-90
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-9.3	-8.6	-7.6	-6.8	-6.3	-7.0	-7.0	-7.6	-4.4	-4.4	-4.5	-4.5
Above Normal	-9.9	-9.1	-8.1	-7.3	-6.5	-6.5	-8.0	-8.4	-7.9	-8.2	-8.7	-8.8
Below Normal	-11.3	-10.6	-9.9	-9.3	-8.5	-8.5	-11.2	-11.8	-11.4	-12.0	-12.8	-13.1
Dry	-11.5	-11.0	-10.4	-10.0	-9.3	-8.7	-11.9	-12.3	-12.5	-13.1	-13.9	-14.3
Critical Dry	-16.4	-15.7	-15.5	-15.0	-14.2	-14.4	-21.7	-23.2	-22.2	-21.5	-21.1	-21.2

Table 5.106 Changes in New Melones Reservoir Elevation under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	969	971	980	995	1,007	1,016	1,020	1,031	1,040	1,033	1,022	1,015
Above Normal	924	930	939	954	968	980	982	988	987	975	963	890
Below Normal	954	956	959	962	973	977	972	970	968	957	944	938
Dry	930	930	932	934	939	945	940	936	931	918	905	898
Critical Dry	837	838	842	845	853	855	834	818	815	804	796	791
Second Basis of Comparison												
Wet	989	990	997	1,009	1,021	1,030	1,034	1,047	1,050	1,043	1,032	1,025
Above Normal	941	944	951	966	979	992	995	1,003	1,001	990	978	901
Below Normal	977	977	979	982	991	994	994	993	991	980	968	962
Dry	951	950	950	953	957	962	963	960	954	941	929	922
Critical Dry	866	866	870	872	878	879	871	856	850	835	823	817
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-20	-19	-17	-15	-14	-15	-15	-16	-10	-10	-10	-9
Above Normal	-17	-14	-12	-12	-12	-11	-14	-15	-14	-15	-15	-11
Below Normal	-23	-22	-20	-20	-18	-18	-22	-23	-22	-23	-24	-24
Dry	-21	-20	-19	-19	-18	-17	-23	-24	-23	-24	-24	-25
Critical Dry	-29	-28	-29	-27	-25	-24	-37	-38	-35	-31	-27	-27
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-2.1	-1.9	-1.7	-1.4	-1.4	-1.4	-1.4	-1.5	-0.9	-0.9	-0.9	-0.9
Above Normal	-1.8	-1.5	-1.3	-1.3	-1.2	-1.2	-1.4	-1.5	-1.4	-1.5	-1.5	-1.2
Below Normal	-2.3	-2.2	-2.1	-2.0	-1.8	-1.8	-2.2	-2.3	-2.3	-2.4	-2.5	-2.5
Dry	-2.2	-2.1	-2.0	-2.0	-1.8	-1.8	-2.4	-2.5	-2.5	-2.5	-2.6	-2.7
Critical Dry	-3.4	-3.2	-3.3	-3.1	-2.9	-2.7	-4.2	-4.5	-4.1	-3.7	-3.3	-3.3

The following changes in New Melones Reservoir storage would occur under Alternative 5 as compared to the Second Basis of Comparison.

- In wet years, storage would be reduced in all months (up to 9.3 percent).
- In above-normal years, storage would be reduced in all months (up to 9.9 percent).
- In below-normal years, storage would be reduced in all months (up to 13.1 percent).
- In dry years, storage would be reduced in all months (up to 14.3 percent).

- In critical dry years, storage would be reduced in all months (up to 23.2 percent).
- Surface water elevations would be similar in all months, in all water year types.

Flows in the Stanislaus River downstream of Goodwin Dam are shown on Figures 5.68 to 5.70. Changes in flows in the river are summarized below.

- Over long-term conditions, similar flows would occur in August; reduced flows would occur in November through February, June, July, August, and September (up to 35.8 percent) and increased flows in October and March through May (up to 144.8 percent).
- In wet years, similar flows would occur in February and April; reduced flows in November through January and June through September (up to 52.8 percent) and increased flows in October and March (up to 113.1 percent).
- In dry years, similar flows would occur in July through September; reduced flows in November through March and June (up to 35.7 percent); and increased flows in October, April, and May (150.1 percent).

San Joaquin River at Vernalis

Flows in the San Joaquin River at Vernalis under Alternative 5 as compared to the Second Basis of Comparison are summarized below, as shown on Figures 5.71 through 5.73.

- Over long-term conditions, similar flows would occur in November through March, May, and July through September; reduced flows in June (8.2 percent); and increased flows in October and April (18.7 percent).
- In wet years, similar flows would occur in November through May and July through September; reduced flows in June (9.8 percent); and increased flows in October (16.2 percent).
- In dry years, similar flows would occur in November through March and June through September and increased flows in October, April, and May (up to 24.5 percent).

San Luis Reservoir

Storage levels and surface water elevations in San Luis Reservoir under Alternative 5 as compared to the Second Basis of Comparison are summarized in Tables 5.107 and 5.108. The results are summarized following Table 5.108.

Table 5.107 Changes in San Luis Reservoir Storage under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	576	706	958	1,251	1,539	1,804	1,624	1,279	984	787	680	726
Above Normal	488	622	932	1,213	1,440	1,660	1,447	1,046	672	477	442	520
Below Normal	541	628	923	1,157	1,335	1,496	1,305	928	524	476	414	463
Dry	464	572	856	1,139	1,327	1,481	1,324	1,002	691	655	412	418
Critical Dry	429	505	698	994	1,166	1,216	1,103	875	600	428	284	270
Second Basis of Comparison												
Wet	790	1,017	1,365	1,748	1,965	2,033	2,031	1,852	1,487	1,167	889	925
Above Normal	658	883	1,213	1,671	1,913	2,001	1,995	1,717	1,263	861	612	631
Below Normal	854	1,064	1,334	1,742	1,908	1,980	1,908	1,628	1,251	964	635	591
Dry	617	764	998	1,427	1,728	1,925	1,870	1,665	1,341	1,007	660	596
Critical Dry	622	709	910	1,257	1,556	1,664	1,623	1,451	1,168	808	545	472
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-214	-311	-407	-498	-426	-229	-408	-573	-503	-380	-210	-199
Above Normal	-170	-261	-281	-458	-473	-342	-548	-671	-591	-385	-170	-111
Below Normal	-313	-435	-411	-584	-572	-483	-603	-699	-727	-489	-221	-128
Dry	-153	-192	-141	-289	-402	-444	-546	-663	-650	-352	-249	-178
Critical Dry	-193	-204	-212	-263	-390	-448	-520	-577	-569	-379	-261	-202
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-32.8	-41.2	-42.7	-38.1	-27.8	-14.4	-24.5	-40.8	-48.9	-42.3	-28.2	-22.9
Above Normal	-27.2	-40.4	-32.7	-35.5	-29.5	-19.7	-30.2	-47.2	-59.3	-51.4	-33.4	-15.2
Below Normal	-43.5	-53.6	-42.3	-43.4	-37.9	-29.3	-36.5	-51.0	-70.0	-61.5	-40.1	-27.4
Dry	-23.0	-26.7	-12.8	-23.4	-27.7	-26.2	-31.9	-44.1	-51.4	-30.7	-35.2	-26.2
Critical Dry	-37.0	-38.2	-28.3	-24.7	-30.5	-30.8	-33.8	-39.5	-46.3	-41.0	-43.7	-30.8

Table 5.108 Changes in San Luis Elevation Storage under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	402	417	446	475	501	525	509	478	448	427	416	422
Above Normal	391	408	443	471	492	512	494	456	416	390	386	398
Below Normal	399	411	443	467	483	498	481	444	397	390	381	388
Dry	389	404	436	465	483	497	482	451	417	413	381	381
Critical Dry	383	393	417	450	467	471	460	437	405	383	359	357
Second Basis of Comparison												
Wet	426	451	485	520	538	543	543	529	497	468	440	443
Above Normal	412	437	470	513	534	541	540	518	477	437	409	411
Below Normal	435	457	483	519	533	539	533	510	476	448	412	406
Dry	407	425	450	492	518	535	530	513	484	453	415	406
Critical Dry	409	419	441	475	502	512	509	494	468	432	400	389
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-24	-34	-40	-45	-36	-19	-34	-51	-49	-41	-24	-22
Above Normal	-21	-29	-28	-42	-41	-29	-47	-62	-61	-47	-23	-13
Below Normal	-36	-46	-40	-53	-50	-41	-53	-66	-80	-58	-31	-17
Dry	-18	-21	-14	-26	-35	-38	-48	-62	-68	-39	-34	-25
Critical Dry	-26	-26	-24	-26	-36	-41	-49	-57	-63	-48	-42	-33
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-5.6	-7.6	-8.2	-8.6	-6.8	-3.5	-6.3	-9.6	-9.9	-8.7	-5.5	-4.9
Above Normal	-5.2	-6.6	-5.9	-8.2	-7.7	-5.3	-8.6	-11.9	-12.9	-10.7	-5.5	-3.1
Below Normal	-8.2	-10.1	-8.3	-10.1	-9.4	-7.6	-9.9	-12.9	-16.7	-13.0	-7.6	-4.3
Dry	-4.5	-4.9	-3.0	-5.3	-6.8	-7.1	-9.0	-12.0	-13.9	-8.7	-8.1	-6.2
Critical Dry	-6.4	-6.2	-5.4	-5.4	-7.1	-8.0	-9.5	-11.6	-13.5	-11.2	-10.4	-8.5

The following changes in San Luis Reservoir storage and surface water elevations would occur under Alternative 5 as compared to the Second Basis of Comparison.

- In wet years, storage would be reduced in all months (up to 48.9 percent). Surface water elevations would be similar in September and March and reduced in October through February and April through August (up to 9.9 percent).
- In above-normal years, storage would be reduced in all months (up to 59.3 percent). Surface water elevations would be similar in September and reduced in October through August (up to 12.9 percent).
- In below-normal years, storage would be reduced in all months (up to 70.0 percent). Surface water elevations would be similar in September and reduced in October through August (up to 16.7 percent).
- In dry years, storage would be reduced in all months (up to 51.4 percent). Surface water elevations would be similar in October through December and reduced in January through September (up to 13.9 percent).
- In critical dry years, storage would be reduced in all months (46.3 percent). Surface water elevations would be reduced in all months (up to 13.5 percent).

Changes in Flows into the Yolo Bypass

Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under Alternative 5 as compared to the Second Basis of Comparison are summarized in Table 5.109. The results are summarized following Table 5.109.

Table 5.109 Changes in Flows into the Yolo Bypass at Fremont Weir under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	Average Monthly Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	170	933	8,400	24,048	29,507	18,512	5,627	289	113	0	0	100
Above Normal	100	100	2,786	6,000	12,885	7,895	1,688	100	100	0	0	100
Below Normal	100	100	242	1,004	3,115	886	293	100	100	0	0	100
Dry	100	100	317	896	2,015	1,398	407	100	100	0	0	100
Critical Dry	100	100	151	525	531	393	106	100	100	0	0	100
Second Basis of Comparison												
Wet	147	996	9,888	25,442	30,547	18,997	5,602	289	113	0	0	100
Above Normal	100	100	2,659	6,349	15,114	8,566	1,765	100	100	0	0	100
Below Normal	100	100	262	1,256	4,057	1,166	292	100	100	0	0	100
Dry	100	100	342	932	2,032	1,411	411	100	100	0	0	100
Critical Dry	100	100	149	542	533	408	106	100	100	0	0	100
Alternative 5 as Compared to Second Basis of Comparison												
Wet	23	-63	-1,488	-1,394	-1,040	-486	25	0	0	0	0	0
Above Normal	0	0	128	-349	-2,230	-671	-77	0	0	0	0	0
Below Normal	0	0	-20	-252	-942	-280	1	0	0	0	0	0
Dry	0	0	-25	-36	-17	-13	-4	0	0	0	0	0
Critical Dry	0	0	2	-17	-2	-15	0	0	0	0	0	0
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	15.8	-6.3	-15.0	-5.5	-3.4	-2.6	0.4	-0.1	-0.1	0.0	0.0	0.0
Above Normal	0.0	0.0	4.8	-5.5	-14.8	-7.8	-4.4	0.0	0.0	0.0	0.0	0.0
Below Normal	0.0	0.0	-7.7	-20.1	-23.2	-24.0	0.3	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	-7.4	-3.9	-0.8	-0.9	-0.9	0.0	0.0	0.0	0.0	0.0
Critical Dry	0.0	0.0	1.0	-3.2	-0.4	-3.6	0.0	0.0	0.0	0.0	0.0	0.0

The following changes in flows from the Sacramento River into the Yolo Bypass at Fremont Weir would occur under Alternative 5 as compared to the Second Basis of Comparison.

- In wet years, flows would be similar in February through September; reduced flows in November through January (up to 15.0 percent); and increased in October (15.8 percent).
- In above-normal years, flows would be similar in April through December and reduced flows in January through March (up to 14.8 percent).
- In below-normal years, flows would be similar in April through November and reduced flows in December through March (up to 24.0 percent).
- In dry years, flows would be similar in January through November and reduced flows in December (up to 7.4 percent).
- In critical dry years, flows would be similar in all months.

Changes in Delta Conditions

Delta outflow under Alternative 5 as compared to the Second Basis of Comparison are summarized below and shown on Figures 5.74 through 5.76.

- In wet years, average monthly Delta outflow would be increased in July through November, January, and April and May (up to 13,666 cfs) and reduced in December, February, March, and June (up to 1,713 cfs).
- In dry years, average monthly Delta outflow would be increased in July through May (up to 3,384 cfs) and reduced in June (526 cfs).

Changes in OMR Flows

The OMR conditions under Alternative 5 as compared to the Second Basis of Comparison are shown on Figures 5.77 through 5.79.

- Under Alternative 5, OMR flows would be negative except in April and May of all water year types. Under the Second Basis of Comparison, OMR flows would be negative in all months.
- In wet years, OMR flows would be more positive in September through February, April and May (up to 10,017 cfs) and more negative in March and June through August (up to 964 cfs).
- In dry years, OMR flows would be more positive in September through June (up to 4,724 cfs) and more negative in July and August (up to 2,620 cfs).

Changes in CVP and SWP Exports and Deliveries

Delta exports under Alternative 5 as compared to the Second Basis of Comparison are summarized in Table 5.110.

Table 5.110 Changes in Exports at Jones and Banks Pumping Plants under Alternative 5 as Compared to the Second Basis of Comparison

Water Year	Monthly Volume (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Alternative 5												
Wet	408	505	564	514	532	592	202	202	444	667	718	627
Above Normal	376	423	561	407	405	496	127	92	315	590	705	625
Below Normal	381	456	588	387	359	397	103	55	208	663	632	561
Dry	370	394	513	392	315	318	80	41	205	577	333	433
Critical Dry	313	293	382	355	249	179	34	20	69	239	222	243
Second Basis of Comparison												
Wet	549	619	716	724	609	543	476	430	456	632	655	660
Above Normal	428	521	641	716	584	570	453	363	415	572	647	651
Below Normal	548	595	623	674	497	500	337	304	414	629	517	539
Dry	435	475	546	579	518	493	259	228	274	403	325	438
Critical Dry	340	345	455	433	406	266	134	121	132	139	203	249
Alternative 5 as Compared to Second Basis of Comparison												
Wet	-141	-115	-152	-210	-77	49	-274	-228	-11	35	63	-33
Above Normal	-51	-99	-79	-310	-179	-74	-326	-271	-100	17	58	-26
Below Normal	-167	-139	-35	-288	-138	-102	-234	-249	-205	34	115	22
Dry	-65	-81	-33	-187	-203	-175	-178	-186	-69	174	8	-5
Critical Dry	-27	-52	-73	-77	-157	-88	-100	-100	-63	101	19	-6
Alternative 5 as Compared to Second Basis of Comparison (percent change)												
Wet	-25.7	-18.5	-21.2	-29.1	-12.6	9.0	-57.6	-53.1	-2.5	5.6	9.6	-5.0
Above Normal	-12.0	-18.9	-12.3	-43.2	-30.7	-12.9	-72.0	-74.7	-24.2	3.0	8.9	-4.0
Below Normal	-30.5	-23.4	-5.6	-42.6	-27.7	-20.5	-69.5	-82.0	-49.7	5.4	22.3	4.0
Dry	-14.9	-17.1	-6.0	-32.3	-39.2	-35.5	-68.9	-81.8	-25.3	43.2	2.4	-1.0
Critical Dry	-7.9	-15.1	-16.0	-17.9	-38.6	-32.9	-74.9	-83.2	-47.7	72.3	9.6	-2.5

The following changes would occur in CVP and SWP exports under Alternative 5 as compared to the Second Basis of Comparison.

- Long-term average annual exports would be 1,096 TAF (19 percent) less under Alternative 5 as compared to the Second Basis of Comparison.
- In wet years, total exports would be similar in June and September; increased exports in March, July, and August (up to 9.6 percent); and reduced in October through February, April, and May (up to 57.6 percent).
- In above-normal years, total exports would be similar in July and September; increased exports in August (8.9 percent); and reduced in October through June (up to 74.7 percent).
- In below-normal years, total exports would be similar in September; increased exports in July and August (up to 22.3 percent); and reduced in October through June (up to 82.0 percent).
- In dry years, total exports would be similar in August and September; increased in July (43.2 percent); and reduced exports in October through June (up to 81.8 percent).
- In critical dry years, total exports would be similar in September; increased in July and August (up to 72.3 percent); and reduced exports in October through June (up to 83.2 percent).

Deliveries to CVP and SWP water users would decline under Alternative 5 as compared to the Second Basis of Comparison, as summarized in Tables 5.111 and 5.112, respectively, due to reduced water supply availability and export limitations.

Table 5.111 Changes CVP Water Deliveries under Alternative 5 as Compared to the Second Basis of Comparison

Annual Average Deliveries (TAF)					
				Alternative 5 as compared to the Second Basis of Comparison	
		Alternative 5	Second Basis of Comparison	Difference	Percent Change
North of Delta					
CVP Agricultural Water Service Contractors	Long Term	185	219	-34	-16
	Dry	85	122	-37	-30
	Critical Dry	24	35	-11	-31
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	386	392	-6	-2
	Dry	384	390	-6	-2
	Critical Dry	384	383	1	0
CVP M&I American River Contractors	Long Term	112	120	-7	-6
	Dry	96	105	-9	-9
	Critical Dry	74	79	-6	-8
CVP Sacramento River Settlement Contractors	Long Term	1,861	1,858	3	0
	Dry	1,906	1,905	1	0
	Critical Dry	1,747	1,732	15	1
CVP Refuge Level 2 Deliveries	Long Term	146	155	-8	-5
	Dry	145	151	-6	-4
	Critical Dry	103	105	-2	-2
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,578	2,624	-46	-2
	Dry	2,520	2,568	-48	-2
	Critical Dry	2,258	2,255	3	0

Annual Average Deliveries (TAF)					
		Alternative 5	Second Basis of Comparison	Alternative 5 as compared to the Second Basis of Comparison	
				Difference	Percent Change
South of Delta (Does not include Eastside Contractors)					
CVP Agricultural Users Water Service Contractors	Long Term	834	1,100	-266	-24
	Dry	433	650	-217	-33
	Critical Dry	130	195	-65	-33
CVP M&I Users	Long Term	112	125	-13	-10
	Dry	100	109	-9	-8
	Critical Dry	80	85	-5	-6
San Joaquin River Exchange Contractors	Long Term	852	852	0	0
	Dry	875	875	0	0
	Critical Dry	741	741	0	0
CVP Refuge Level 2 Deliveries	Long Term	273	272	0	0
	Dry	281	280	1	0
	Critical Dry	232	232	0	0
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,071	2,349	-278	-12
	Dry	1,689	1,914	-225	-12
	Critical Dry	1,183	1,253	-70	-6
Eastside Contractors Deliveries					
Water Rights	Long Term	502	514	-12	-2
	Dry	524	524	0	0
	Critical Dry	406	486	-80	-16
CVP Water Service Contracts	Long Term	100	118	-19	-16
	Dry	69	98	-29	-30
	Critical Dry	8	25	-17	-68

Annual Average Deliveries (TAF)					
				Alternative 5 as compared to the Second Basis of Comparison	
		Alternative 5	Second Basis of Comparison	Difference	Percent Change
Total Water Rights and CVP Service Contracts Deliveries	Long Term	602	632	-30	-5
	Dry	593	622	-29	-5
	Critical Dry	414	511	-97	-19

The following changes in CVP water deliveries would occur under Alternative 5 as compared to the Second Basis of Comparison.

- Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 16 percent over the long-term conditions, 30 percent in dry years, and 31 percent in critical dry years.
- Deliveries to CVP North of Delta M&I contractors would be similar in long-term conditions and dry and critical dry years; however, American River Contractors would be reduced by 6 percent over the long-term conditions, 9 percent in dry years, and 8 percent in critical dry years.
- Deliveries to CVP South of Delta agricultural water service contractors would be reduced by 24 percent over the long-term conditions, 33 percent in dry years, and 33 percent in critical dry years.
- Deliveries to CVP South of Delta M&I contractors would be reduced by 10 percent in long-term conditions, 8 percent in dry years, and 6 percent in critical dry years.
- Deliveries to the Eastside contractors would be reduced by 5 percent under long-term conditions and dry years and 19 percent in critical dry years.

Table 5.112 Changes SWP Water Deliveries under Alternative 5 as Compared to the Second Basis of Comparison

Annual Average Deliveries (TAF)					
		Alternative 5	Second Basis of Comparison	Alternative 5 as compared to the Second Basis of Comparison: Difference	Alternative 5 as compared to the Second Basis of Comparison: Percent Change
North of Delta					
SWP Agricultural Uses	Long Term	0	0	0	0
	Dry	0	0	0	0
	Critical Dry	0	0	0	0
SWP M&I (without Article 21)	Long Term	67	83	-16	-19
	Dry	51	62	-11	-18
	Critical Dry	42	53	-11	-21
SWP M&I Article 21 Deliveries	Long Term	13	12	1	13
	Dry	14	13	1	11
	Critical Dry	13	12	1	15
Total SWP Agricultural and M&I (without Article 21)	Long Term	67	83	-16	-19
	Dry	51	62	-11	-18
	Critical Dry	42	53	-11	-21
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	13	12	1	13
	Dry	14	13	1	11
	Critical Dry	13	12	1	15
South of Delta					
SWP Agricultural Users (without Article 21)	Long Term	598	750	-152	-20
	Dry	449	567	-118	-21
	Critical Dry	369	484	-115	-24

Annual Average Deliveries (TAF)					
		Alternative 5	Second Basis of Comparison	Alternative 5 as compared to the Second Basis of Comparison: Difference	Alternative 5 as compared to the Second Basis of Comparison: Percent Change
SWP Agricultural Article 21 Deliveries	Long Term	24	178	-154	-86
	Dry	6	143	-137	-96
	Critical Dry	4	100	-96	-96
SWP M&I Users (without Article 21)	Long Term	1,784	2,183	-399	-18
	Dry	1,397	1,732	-335	-19
	Critical Dry	1,157	1,494	-337	-23
SWP M&I Article 21 Deliveries	Long Term	19	104	-83	-82
	Dry	5	86	-82	-95
	Critical Dry	3	58	-55	-95
Total SWP Agricultural and M&I Users (without Article 21)	Long Term	2,383	2,933	-550	-19
	Dry	1,845	2,299	-454	-20
	Critical Dry	1,526	1,978	-452	-23
Total SWP Agricultural and M&I Article 21 Deliveries	Long Term	43	282	-239	-85
	Dry	11	229	-218	-95
	Critical Dry	7	158	-151	-95

The following changes in SWP water deliveries would occur under Alternative 5 as compared to the Second Basis of Comparison.

- Deliveries without Article 21 water to SWP North of Delta water contractors would be reduced by 19 percent over the long-term conditions, 18 percent in dry years, and 21 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be reduced by 19 percent over the long-term conditions, 20 percent in dry years, and 23 percent in critical dry years.

- Deliveries of Article 21 water to SWP North of Delta water contractors would be increased by 13 percent over the long-term conditions, 11 percent in dry years, and 15 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be reduced by 85 percent over the long-term conditions, 95 percent in dry years, and 95 percent in critical dry years.

Effects Related to Cross Delta Water Transfers

Potential effects to surface water resources could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i). Potential effects were identified as reduced surface water storage in upstream reservoirs and changes in flow patterns in river downstream of the reservoirs if water was released from the reservoirs in patterns that were different than would have been used by the water seller's. Because all water transfers would be required to avoid adverse impacts to other water users and biological resources (see Section 3.A.6.3, Transfers), including impacts associated with changes in reservoir storage and river flow patterns, the analysis indicated that water transfers would not result in substantial changes in storage or river flows. For the purposes of this EIS, it is anticipated that similar conditions would occur due to cross Delta water transfers under Alternative 5 and the Second Basis of Comparison.

Under Alternative 5, the timing of cross Delta water transfers would be limited to July through September in accordance with the 2008 USFWS BO and 2009 NMFS BO. The maximum amount of water to be transferred would be 600,000 acre-feet per year in critical dry years or in dry years following a dry or critical dry year. In all other water year types, the maximum amount of water would be 360,000 acre-feet per year. The maximum amount of water that can be exported in the CVP and SWP facilities is approximately 770,000 acre-feet per month. As indicated in Table 5.110, capacity would be available under Alternative 5 between July and September for water transfers in all water year types.

Under the Second Basis of Comparison, water could be transferred throughout the year. As indicated in Table 5.110, capacity would be available under the Second Basis of Comparison in all months of all water year types without a maximum volume of transferred water.

Overall, the potential for water transfer conveyance would be less under Alternative 5 than under the Second Basis of Comparison.

San Francisco Bay Area, Central Coast, and Southern California Regions

Potential Changes in Surface Water Resources at Reservoirs that Store CVP and SWP Water

The San Francisco Bay Area, Central Coast, and Southern California regions include numerous reservoirs that store CVP and SWP water supplies, including CVP and SWP reservoirs, that primarily provide water supplies for M&I water users. Changes in the availability CVP and SWP water supplies for storage in these reservoirs under Alternative 5 as compared to the Second Basis of Comparison would be consistent with the following changes in water deliveries to M&I water users, as summarized in Tables 5.111 and 5.112.

- Deliveries to CVP South of Delta M&I contractors would be reduced by 10 percent in long-term conditions, 9 percent in dry years, and 8 percent in critical dry years.
- Deliveries without Article 21 water to SWP South of Delta water contractors would be reduced by 19 percent over the long-term conditions, 20 percent in dry years, and 23 percent in critical dry years.
- Deliveries of Article 21 water to SWP South of Delta water contractors would be reduced by 85 percent over the long-term conditions, 95 percent in dry years, and 95 percent in critical dry years.

Changes in CVP and SWP Exports and Deliveries

Deliveries to CVP and SWP water users are described above in the Central Valley Region.

5.4.3.7 Summary of Impact Analysis

The results of the impact analysis on surface water conditions and water supplies due to implementation of Alternatives 1 through 5 as compared to the No Action Alternative and the Second Basis of Comparison are presented in Tables 5.113 through 5.116.

Table 5.113 Comparison of Surface Water Conditions under Alternatives 1 through 5 to the No Action Alternative

Alternative	Potential Change	Consideration for Mitigation Measures
Alternative 1	**Trinity Lake** In wet years and dry years, storage would be similar in all months. In above-normal years, storage would be similar in January through October and increased in November and December (up to 6 percent). In below-normal years, storage would be similar in January through October and increased in November and December (up to 5 percent). In critical dry years, storage would be increased in all months (up to 12 percent). In all months, in all water year types, surface water elevations would be similar. **Trinity River downstream of Lewiston Dam** Over long-term conditions, flows would be similar in March through November; and increased in December through February (up to 11 percent). In wet years, flows would be similar in April through November and increased in December through March (up to 13 percent). In dry years, flows would be similar all months. **Shasta Lake** In wet years, storage would be similar in December through August and October and increased in September and November (up to 9 percent).	Environmental effects associated with changes in the following physical conditions are related to impacts on biological resources (as described in Chapter 9, Fish and Aquatic Resources, and Chapter 10, Terrestrial Biological Resources), and recreation resources (as described in Chapter 15, Recreation Resources). Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.

Alternative	Potential Change	Consideration for Mitigation Measures
	In above-normal years, storage would be similar in January through September and increased in October through December (up to 8 percent). In below-normal years, storage would be similar in March through September and increased in October through February (up to 12 percent). In dry years, storage would be similar in February through October and increased in November through January (up to 7 percent). In critical dry years, storage would be increased under all months (up to 17 percent). In all months, in all water year types, surface water elevations would be similar. **Sacramento River at Keswick** Over long-term conditions, similar flows would occur in October, February through May, July, and August; reduced flows in September and November (up to 27 percent); and increased flows in December, January, and June (up to 8 percent). In wet years, similar flows would occur in January through July; reduced flows in September through November (up to 44 percent); and increased flows in December and August (up to 17 percent). In dry years, similar flows would occur in July through October, December through March, and May; reduced flows in November (25 percent); and increased flows in April and June (up to 8 percent). **Sacramento River at Freeport** Over long-term conditions, similar flows would occur in October, December through May, and August; reduced flows in September, November, and July (up to 30 percent); and increased flows in June (13 percent). In wet years, similar flows would occur in January through June and October; reduced flows in July through September and November (up to 47 percent); and increased flows in December (7 percent). In dry years, similar flows would occur in August through October and December through April; reduced flows in November and July (up to 14 percent); and increased flows in May and June (up to 14 percent). **Lake Oroville** In wet years, storage would be similar in January through August and reduced in September through December (up to 22 percent). In above-normal years, storage would be similar in February through August and reduced in September through January (up to 15 percent). In below-normal years, storage would be similar in May through July and reduced in August through April (up to 22 percent). In dry years, storage would be similar in June and reduced in all other months (up to 14 percent). In critical dry years, storage would be similar under all months. In all months, in all water year types, surface water elevations would be similar. **Feather River downstream of Thermalito Complex** Over long-term conditions, similar flows would occur in November and April; reduced flows in July through September (up to 43 percent); and increased flows in October, December through March, May, and June (up to 37 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In wet years, similar flows would occur in October, November, and March through May; reduced flows in July through September (up to 65 percent); and increased flows in December through February and June (up to 35 percent). In dry years, similar flows would occur in December through April; reduced flows in July (34 percent); and increased flows in August through October, May, and June (up to 38 percent). **Folsom Lake** In wet years, storage would be similar in December through August; and increased in September through December (up to 12 percent). In above-normal years, storage would be similar in January through July and September through October; increased in November and December (up to 9 percent); and reduced in August (5 percent). In below-normal years, storage would be similar in February through May; reduced in June through September (up to 15 percent); and increased in October through January (up to 14 percent). In dry years, storage would be similar in all months. In critical dry years, storage would be similar in October through June and increased in July through September (up to 12 percent). In all months, in all water year types, surface water elevations would be similar. **American River downstream of Nimbus Dam** Over long-term conditions, similar flows would occur in November through May and July; reduced flows in September and October (up to 31 percent); and increased flows in June (5 percent). In wet years, similar flows would occur in October, November, and January through July; reduced flows in September (48 percent); and increased flows in August (12 percent). In dry years, similar flows would occur in November through January, March through June, August, and September; reduced flows in October (14 percent); and increased flows in February and July (up to 8 percent). **Clear Creek downstream of Whiskeytown Dam** Flows identical June through April and reduced in May (41 percent). **New Melones Reservoir** In wet years, storage would be similar in all months. In above normal years, storage would be similar in December through September and increased in October and November (up to 6 percent). In below normal years, storage would be similar in November through September and increased in October (5 percent). In dry years, storage would be similar in all months. In critical dry years, storage would be similar in July through September and increased in October through June (up to 8 percent). In all months, in all water year types, surface water elevations would be similar. **Stanislaus River downstream of Goodwin Dam** Over long-term conditions, similar flows would occur in July through September; reduced flows in October, March, and April (up to 60 percent); and increased flows in November through February and June (up to 51 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In wet years, similar flows would occur in February and April; reduced flows in October, March, May, July, and August (up to 54 percent); and increased flows in September, November through January, and June (up to 103 percent). In dry years, similar flows would occur in July through September; reduced flows in October and April (up to 61 percent); and increased flows in November through March, May, and June (up to 56 percent). **San Joaquin River at Vernalis** Over long-term conditions, similar flows would occur in July through September and November through May; reduced flows in October (16 percent); and increased flows in June (8 percent). In wet years, similar flows would occur in July through September and November through May; reduced flows in October (14 percent); and increased flows in June (10 percent). In dry years, similar flows would occur in November through March and May through September and reduced flows in October and April (up to 15 percent). **San Luis Reservoir** In wet years, storage would be increased in all months (up to 109 percent). Water storage elevations would be increased in all months (up to 12 percent). In above-normal years, storage would be increased in all months (up to 151 percent). Water storage elevations would be increased in all months (up to 15 percent). In below-normal years, storage would be increased in all months (up to 203 percent). Water storage elevations would be increased in all months (up to 19 percent). In dry years, storage would be increased in all months (up to 70 percent). Water storage elevations would be increased in all months (up to 12 percent). In critical dry years, storage would be increased in all months (up to 57 percent). Water storage elevations would be increased in all months (up to 11 percent). **Yolo Bypass** In wet years, flows into Yolo Bypass would be similar in January through September; reduced in October (20 percent); and increased in November and December (up to 17 percent). In above-normal years, flows into Yolo Bypass would be similar in April through December and increased in January through March (up to 16 percent). In below-normal years, flows into Yolo Bypass would be similar in April through November and increased in December through March (up to 34 percent). In dry years, flows into Yolo Bypass would be similar in January through November and increased in December (6 percent). In critical dry years, flows into Yolo Bypass would be similar in all months. **Delta Outflow** In wet years, average monthly Delta outflow would increase in December, February, March, and June (up to 1,492 cfs) and decrease in July through November, January, April, and May (up to 13,683 cfs). In dry years, average monthly Delta outflow would be similar in September; decrease in July, August, and October through May (up to 3,114 cfs); and increase in June (385 cfs).	

Alternative	Potential Change	Consideration for Mitigation Measures
	Reverse Flows in Old and Middle Rivers In wet years, average monthly OMR flows, would be more positive in June through August and March (up to 923 cfs) and more negative in April through June and September through February (up to 10,005 cfs). In dry years, average monthly OMR flows would be positive in July (up to 2,073 cfs) and more negative in August through June (up to 3,489 cfs).	
Alternative 2	Surface water conditions identical under Alternative 2 as under No Action Alternative.	None needed.
Alternative 3	**Trinity Lake** In wet, above-normal years, below normal, and dry years, storage would be similar in all months. In critical dry years, storage would be increased in all months (up to 12 percent). In all months, in all water year types, surface water elevations would be similar. **Trinity River downstream of Lewiston Dam** Over long-term conditions, flows would be similar in March through November; and increased in December through February (up to 12 percent). In wet years, flows would be similar in April through October; reduced in November (7 percent); and increased in December through March (up to 15 percent). In dry years, flows would be similar in all months. **Shasta Lake** In wet years, storage would be similar in December through August and increased in September and November (up to 9 percent). In above-normal years, storage would be similar in January through October and increased in November and December (up to 7 percent). In below-normal years, storage would be similar in March through September; and increased in October through February (up to 12 percent). In dry years, storage would be similar in March through October and increased in November through January (up to 7 percent). In critical dry years, storage would increase in all months (up to 12 percent). In all months, in all water year types, surface water elevations would be similar. **Sacramento River at Keswick** Over long-term conditions, similar flows would occur in October, February through May, July, and August; reduced flows in September and November (up to 20 percent); and increased flows in December, January, and June (up to 9 percent). In wet years, similar flows would occur in February through August; reduced flows in September through November (up to 42 percent); and increased flows in December and January (up to 17 percent). In dry years, similar flows would occur in July through September and December through May; reduced flows in November (25 percent) and increased flows in January and June (up to 7 percent). **Sacramento River at Freeport** Over long-term conditions, similar flows would occur in October, December through May, July, and August; reduced flows in September and November (up to 30 percent); and increased flows in June (12 percent).	Environmental effects associated with changes in the following physical conditions are related to impacts on biological resources (as described in Chapter 9, Fish and Aquatic Resources, and Chapter 10, Terrestrial Biological Resources), and recreation resources (as described in Chapter 15, Recreation Resources). Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.

Alternative	Potential Change	Consideration for Mitigation Measures
	In wet years, similar flows would occur in January through May, July, and October; reduced flows in August, September, and November (up to 48.1 percent); and increased flows in December and June (up to 7 percent). In dry years, similar flows would occur in July through October and December through April; reduced flows in November (14 percent); and increased flows in May and June (up to 16 percent). **Lake Oroville** In wet years, storage would be similar in January through August and increased in September through December (up to 19 percent). In above-normal years, storage would be similar in February through August; and increased in September through January (up to 19 percent). In below-normal years, storage would be similar in June through September; and increased in October through May (up to 23 percent). In dry years, storage would be similar in May through September and increased in October through April (up to 12 percent). In critical dry years, storage would be similar under all months. In all months, in all water year types, surface water elevations would be similar. **Feather River downstream of Thermalito Complex** Over long-term conditions, similar flows would occur in October, November, March, April, and July; reduced flows in August and September (up to 49 percent); and increased flows in December through February, May, and June (up to 34 percent). In wet years, similar flows would occur in October, November, February through May, and July; reduced flows in August and September (up to 70 percent) and increased flows in December, January, and June (up to 28 percent). In dry years, similar flows would occur in September and January through April; reduced flows in October through December and July (up to 14 percent); and increased flows in May, June, and August (37 percent). **Folsom Lake** In wet years, storage would be similar in December through August and increased in September through December (up to 12 percent). In above-normal years, storage would be similar in January through June, September, and October; increased in November and December (up to 6 percent); and reduced in July and August (up to 7 percent). In below-normal years, storage would be similar in February through July; reduced in August and September (up to 10 percent); and increased in October through January (up to 15 percent). In dry years, storage would be similar in all months. In critical dry years, storage would be similar in October through July and increased in August and September (up to 12 percent). In all months, in all water year types, surface water elevations would be similar. **American River downstream of Nimbus Dam** Over long-term conditions, similar flows would occur in November, January through May, July, and August; reduced flows in September and October (up to 29 percent); and increased flows in June (6 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In wet years, similar flows would occur in October, November, and January through July; reduced flows in September (46 percent); and increased flows in August and December (up to 9 percent). In dry years, similar flows would occur in November through January and March through September; reduced flows in October (11 percent); and increased flows in February (6 percent). **Clear Creek downstream of Whiskeytown Dam** Flows would be identical June through April and reduced in May (29 percent). **New Melones Reservoir** In wet years, storage would be increased in all months (up to 13 percent). In above-normal years, storage would be increased in all months (up to 23 percent). In below-normal years, storage would be increased in all months (up to 20 percent). In dry years, storage would be increased in all months (up to 25 percent). In critical dry years, storage would be increased in all months (up to 38 percent). In all months, in all water year types, surface water elevations would be similar. **Stanislaus River downstream of Goodwin Dam** Over long-term conditions, reduced flows would occur in October and March through June (up to 58 percent) and increased flows in November through February and July through September (up to 37 percent). In wet years, similar flows would occur in April; reduced flows in October, March, and May (up to 53 percent) and increased flows in June through September and November through February (up to 68 percent). In dry years, similar flows would occur in March and July through September; reduced flows in October and April through June (up to 60 percent); and increased flows in November through February (up to 37 percent). **San Joaquin River at Vernalis** Over long-term conditions, similar flows would occur in November through September and reduced flows in October (16 percent). In wet years, similar flows would occur in November through August; reduced flows in October (14 percent); and increased flows in September (6 percent). In dry years, similar flows would occur in November through March and July through September and reduced flows in October and April through June (up to 15 percent). **San Luis Reservoir** In wet years, storage would be increased in all months (up to 96 percent). Water storage elevations would be increased in all months (up to 13 percent). In above-normal years, storage would be increased in all months (up to 111 percent). Water storage elevations would be similar in October through March and increased in April through September (up to 11 percent). In below-normal years, storage would be increased in all months (up to 107 percent). Water storage elevations would be similar in September and increased in October through August (up to 11 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In dry years, storage would be similar in September; and increased in October through August (up to 52 percent). Water storage elevations would be similar December through May and July through October and increased in November and June (up to 7 percent). In critical dry years, storage would be similar in February through May and increased in June through January (up to 29 percent). Water storage elevations would be similar in all months. **Yolo Bypass** In wet years, flows into Yolo Bypass would be similar in January through September; reduced in October (25 percent); and increased in November and December (up to 15 percent). In above-normal years, storage would be similar in April through January and increased in February and March (up to 17 percent). In below-normal years, flows into Yolo Bypass would be similar in April through November and increased in December through March (up to 32 percent). In dry years, flows into Yolo Bypass would be similar in January through November and increased in December (6 percent). In critical dry years, flows into Yolo Bypass would be similar in all months. **Delta Outflow** In wet years, average monthly Delta outflow would increase in December through March (up to 3,307 cfs) and decrease in April through November (up to 13,678 cfs). In dry years, average monthly Delta outflow would increase in January, February, June, and July (up to 277 cfs) and decrease in August through December and March through May (up to 2,902 cfs). **Reverse Flows in Old and Middle Rivers** In wet years, average monthly OMR flows would be more positive in July and August (up to 800 cfs) and more negative in September through June (up to 4,477 cfs). In dry years, average monthly OMR flows would be more positive in July and January (up to 728 cfs) and more negative in August through December and February through June (up to 1,847 cfs).	
Alternative 4	**Trinity Lake** In wet years and dry years, storage would be similar in all months. In above-normal years, storage would be similar in January through October and increased in November and December (up to 6 percent). In below-normal years, storage would be similar in January through October and increased in November and December (up to 5 percent). In critical dry years, storage would be increased in all months (up to 12 percent). In all months, in all water year types, surface water elevations would be similar. **Trinity River downstream of Lewiston Dam** Over long-term conditions, flows would be similar in March through November; and increased in December through February (up to 11 percent). In wet years, flows would be similar in April through November and increased in December through March (up to 13 percent). In dry years, flows would be similar all months.	Environmental effects associated with changes in the following physical conditions are related to impacts on biological resources (as described in Chapter 9, Fish and Aquatic Resources, and Chapter 10, Terrestrial Biological Resources), and recreation resources (as described in Chapter 15, Recreation Resources). Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.

Alternative	Potential Change	Consideration for Mitigation Measures
	Shasta Lake In wet years, storage would be similar in December through August and October and increased in September and November (up to 9 percent). In above-normal years, storage would be similar in January through September and increased in October through December (up to 8 percent). In below-normal years, storage would be similar in March through September and increased in October through February (up to 12 percent). In dry years, storage would be similar in February through October and increased in November through January (up to 7 percent). In critical dry years, storage would be increased under all months (up to 17 percent). In all months, in all water year types, surface water elevations would be similar. **Sacramento River at Keswick** Over long-term conditions, similar flows would occur in October, February through May, July, and August; reduced flows in September and November (up to 27 percent); and increased flows in December, January, and June (up to 8 percent). In wet years, similar flows would occur in January through July; reduced flows in September through November (up to 44 percent); and increased flows in December and August (up to 17 percent). In dry years, similar flows would occur in July through October, December through March, and May; reduced flows in November (25 percent); and increased flows in April and June (up to 8 percent). **Sacramento River at Freeport** Over long-term conditions, similar flows would occur in October, December through May, and August; reduced flows in September, November, and July (up to 30 percent); and increased flows in June (13 percent). In wet years, similar flows would occur in January through June and October; reduced flows in July through September and November (up to 47 percent); and increased flows in December (7 percent). In dry years, similar flows would occur in August through October and December through April; reduced flows in November and July (up to 14 percent); and increased flows in May and June (up to 14 percent). **Lake Oroville** In wet years, storage would be similar in January through August and reduced in September through December (up to 22 percent). In above-normal years, storage would be similar in February through August and reduced in September through January (up to 15 percent). In below-normal years, storage would be similar in May through July and reduced in August through April (up to 22 percent). In dry years, storage would be similar in June and reduced in all other months (up to 14 percent). In critical dry years, storage would be similar under all months. In all months, in all water year types, surface water elevations would be similar.	

Alternative	Potential Change	Consideration for Mitigation Measures
	Feather River downstream of Thermalito Complex Over long-term conditions, similar flows would occur in November and April; reduced flows in July through September (up to 43 percent); and increased flows in October, December through March, May, and June (up to 37 percent). In wet years, similar flows would occur in October, November, and March through May; reduced flows in July through September (up to 65 percent); and increased flows in December through February and June (up to 35 percent). In dry years, similar flows would occur in December through April; reduced flows in July (34 percent); and increased flows in August through October, May, and June (up to 38 percent). **Folsom Lake** In wet years, storage would be similar in December through August; and increased in September through December (up to 12 percent). In above-normal years, storage would be similar in January through July and September through October; increased in November and December (up to 9 percent); and reduced in August (5 percent). In below-normal years, storage would be similar in February through May; reduced in June through September (up to 15 percent); and increased in October through January (up to 14 percent). In dry years, storage would be similar in all months. In critical dry years, storage would be similar in October through June and increased in July through September (up to 12 percent). In all months, in all water year types, surface water elevations would be similar. **American River downstream of Nimbus Dam** Over long-term conditions, similar flows would occur in November through May and July; reduced flows in September and October (up to 31 percent); and increased flows in June (5 percent). In wet years, similar flows would occur in October, November, and January through July; reduced flows in September (48 percent); and increased flows in August (12 percent). In dry years, similar flows would occur in November through January, March through June, August, and September; reduced flows in October (14 percent); and increased flows in February and July (up to 8 percent). **Clear Creek downstream of Whiskeytown Dam** Flows identical June through April and reduced in May (41 percent). **New Melones Reservoir** In wet years, storage would be similar in all months. In above normal years, storage would be similar in December through September and increased in October and November (up to 6 percent). In below normal years, storage would be similar in November through September and increased in October (5 percent). In dry years, storage would be similar in all months. In critical dry years, storage would be similar in July through September and increased in October through June (up to 8 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In all months, in all water year types, surface water elevations would be similar. **Stanislaus River downstream of Goodwin Dam** Over long-term conditions, similar flows would occur in July through September; reduced flows in October, March, and April (up to 60 percent); and increased flows in November through February and June (up to 51 percent). In wet years, similar flows would occur in February and April; reduced flows in October, March, May, July, and August (up to 54 percent); and increased flows in September, November through January, and June (up to 103 percent). In dry years, similar flows would occur in July through September; reduced flows in October and April (up to 61 percent); and increased flows in November through March, May, and June (up to 56 percent). **San Joaquin River at Vernalis** Over long-term conditions, similar flows would occur in July through September and November through May; reduced flows in October (16 percent); and increased flows in June (8 percent). In wet years, similar flows would occur in July through September and November through May; reduced flows in October (14 percent); and increased flows in June (10 percent). In dry years, similar flows would occur in November through March and May through September and reduced flows in October and April (up to 15 percent). **San Luis Reservoir** In wet years, storage would be increased in all months (up to 109 percent). Water storage elevations would be increased in all months (up to 12 percent). In above-normal years, storage would be increased in all months (up to 151 percent). Water storage elevations would be increased in all months (up to 15 percent). In below-normal years, storage would be increased in all months (up to 203 percent). Water storage elevations would be increased in all months (up to 19 percent). In dry years, storage would be increased in all months (up to 70 percent). Water storage elevations would be increased in all months (up to 12 percent). In critical dry years, storage would be increased in all months (up to 57 percent). Water storage elevations would be increased in all months (up to 11 percent). **Yolo Bypass** In wet years, flows into Yolo Bypass would be similar in January through September; reduced in October (20 percent); and increased in November and December (up to 17 percent). In above-normal years, flows into Yolo Bypass would be similar in April through December and increased in January through March (up to 16 percent). In below-normal years, flows into Yolo Bypass would be similar in April through November and increased in December through March (up to 34 percent). In dry years, flows into Yolo Bypass would be similar in January through November and increased in December (6 percent). In critical dry years, flows into Yolo Bypass would be similar in all months.	

Alternative	Potential Change	Consideration for Mitigation Measures
	Delta Outflow In wet years, average monthly Delta outflow would increase in December, February, March, and June (up to 1,492 cfs) and decrease in July through November, January, April, and May (up to 13,683 cfs). In dry years, average monthly Delta outflow would be similar in September; decrease in July, August, and October through May (up to 3,114 cfs); and increase in June (385 cfs). **Reverse Flows in Old and Middle Rivers** In wet years, average monthly OMR flows, would be more positive in June through August and March (up to 923 cfs) and more negative in April through June and September through February (up to 10,005 cfs). In dry years, average monthly OMR flows would be positive in July (up to 2,073 cfs) and more negative in August through June (up to 3,489 cfs).	
Alternative 5	**Trinity Lake** Similar storage and surface water elevations in all months and all water year types. **Trinity River downstream of Lewiston Dam** Similar flows in all months for long-term conditions and wet and dry years. **Shasta Lake** Similar storage and surface water elevations in all months and all water year types. **Sacramento River at Keswick** Similar flows in all months for long-term conditions and wet and dry years. **Sacramento River at Freeport** Similar flows in all months for long-term conditions and wet and dry years. **Lake Oroville** Similar storage and surface water elevations in all months and all water year types. **Feather River downstream of Thermalito Complex** Over long-term conditions, similar flows would occur in June through April and reduced flows in May (7 percent). In wet years, similar flows would occur in all months. In dry years, similar flows would occur in September through April and June; reduced flows in May (27 percent); and increased flows in July and August (up to 9 percent). **Folsom Lake** Similar storage and surface water elevations in all months and all water year types. **American River downstream of Nimbus Dam** Similar flows in all months for long-term conditions and wet and dry years. **Clear Creek downstream of Whiskeytown Dam** Flows would be identical in all months. **New Melones Reservoir** In wet years, storage would be similar in all months. In above normal years, storage would be similar in October through June and reduced in July through September (up to 6 percent). In below normal years, storage would be reduced in all months (up to 9 percent). In dry years, storage would be reduced in all months (up to 10 percent).	Environmental effects associated with changes in stream flows and reservoir storage related to fish and aquatic resources, terrestrial resources, and recreation are related to impacts on biological resources (as described in Chapter 9, Fish and Aquatic Resources, and Chapter 10, Terrestrial Biological Resources), and recreation resources (as described in Chapter 15, Recreation Resources). Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.

Alternative	Potential Change	Consideration for Mitigation Measures
	In critical dry years, storage would be reduced in all months (up to 19 percent). In all months, in all water year types, surface water elevations would be similar. **Stanislaus River downstream of Goodwin Dam** Over long-term conditions, flows would be similar in September through February and June; reduced flows would occur in March, July, and August (up to 8 percent); and increased flows in April and May (up to 22 percent). In wet years, similar flows would occur in October, November, January, February, and April through June and reduced flows in December, March, and July through September (up to 18 percent). In dry years, similar flows would occur in June through March and increased flows in April and May (up to 47 percent). **San Joaquin River at Vernalis** Over long-term conditions and wet years, similar flows would occur in all months. In dry years, similar flows would occur in June through March and increased flows in April and May (up to 16 percent). **San Luis Reservoir** In wet years, storage would be similar in January through May and increased in June through December (up to 10 percent). In above-normal years, storage would be similar in all months. In below-normal years, storage would be similar in November, February through April, August, and September; reduced in June and July (up to 9 percent); and increased in October, December, January, and May (up to 8 percent). In dry years, storage would be similar in October through March; and reduced in April through September (up to 17 percent). In critical dry years, storage would be similar in February and March and reduced in April through January (up to 18 percent). Surface water elevations would be similar in all months, in all water years. **Yolo Bypass** Similar flows into the Yolo Bypass in all months and all water year types. **Delta Outflow** In wet years, average monthly Delta outflow would be similar. In dry years, average monthly Delta outflow would be similar in July through April and increased in May and June (up to 1,377 cfs). **Reverse Flows in Old and Middle Rivers** In wet years, OMR flows would be more positive or no change in September, October, January, and April through June (up to 171 cfs) and more negative in November, December, March, and August (up to 124 cfs). In dry years, OMR flows would be more positive or no change in October through March (up to 1,359 cfs) and more negative in June through September (up to 568 cfs).	

Table 5.114 Comparison of CVP and SWP Water Supply Deliveries under Alternatives 1 through 5 to the No Action Alternative

Alternative	Potential Change	Consideration for Mitigation Measures
Alternative 1	Long-term average annual exports would be 1,051 TAF (22 percent) more under Alternative 1 as compared to the No Action Alternative. Deliveries to CVP North of Delta agricultural water service contractors would be increased by 18 percent over the long-term conditions, 43 percent in dry years, and 50 percent in critical dry years. Deliveries to CVP North of Delta M&I contractors would be similar in total; however, deliveries to the American River CVP contractors would be increased by 6 percent over the long-term conditions, 8 percent in dry years, and 7 percent in critical dry years. Deliveries to CVP South of Delta agricultural water service contractors would be increased by 30 percent over the long-term conditions, 46 percent in dry years, and 49 percent in critical dry years. Deliveries to CVP South of Delta M&I contractors would be increased by 12 percent over the long-term conditions, 10 percent in dry years, and 5 percent in critical dry years. Deliveries to the Eastside contractors would be similar under long-term conditions and in dry years, but increased by 14 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP North of Delta water contractors would be increased by 22 percent over the long-term conditions, 22 percent in dry years, and 25 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP South of Delta water contractors would be increased by 22 percent over the long-term conditions, 24 percent in dry years, and 28 percent in critical dry years.	None needed.
Alternative 2	Water supply conditions identical under Alternative 2 as under No Action Alternative.	None needed.
Alternative 3	Long-term average annual exports would be 726 TAF (15 percent) more under Alternative 3 as compared to the No Action Alternative. Deliveries to CVP North of Delta agricultural water service contractors would be increased by 13 percent over the long-term conditions and 29 percent in dry and critical dry years. Deliveries to CVP North of Delta M&I contractors would be similar in total; however, deliveries to the American River CVP contractors would increase by 5 percent over the long-term conditions and 7 percent in dry years, but remain similar in critical dry years. Deliveries to CVP South of Delta agricultural water service contractors would be increased by 28 percent over the long-term conditions, 34 percent in dry years, and 27 percent in critical dry years. Deliveries to CVP South of Delta M&I contractors would be similar in critical dry years and increased by 10 percent over the long-term conditions and 8 percent in dry years. Deliveries to the Eastside contractors would be similar under long-term conditions and dry years and increased by 14 percent in critical dry years.	None needed.

Alternative	Potential Change	Consideration for Mitigation Measures
	Deliveries under Table A contracts without Article 21 water to SWP North of Delta water contractors would be increased by 17 percent over the long-term conditions and in dry years and 13 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP South of Delta water contractors would be increased by 17 percent over the long-term conditions and in dry years and 14 percent in critical dry years.	
Alternative 4	Same water supply conditions as described for Alternative 1 compared to the No Action Alternative.	None needed.
Alternative 5	Long-term average annual exports would be 45 TAF (1 percent) less under Alternative 5 as compared to the No Action Alternative. Deliveries to CVP North of Delta agricultural water service contractors would be similar over the long-term conditions and in dry and critical dry years. Deliveries to CVP North of Delta M&I contractors would be similar over the long-term conditions and in dry and critical dry years in total and for the American River CVP contractors. Deliveries to CVP South of Delta agricultural water service contractors would be similar over the long-term conditions and in dry and critical dry years. Deliveries to CVP South of Delta M&I contractors would be similar over the long-term conditions and in dry and critical dry years. Deliveries to the Eastside contractors would be similar under long-term conditions and dry years; and reduced by 8 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP North of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years. Deliveries under Table A contracts without Article 21 water to SWP South of Delta water contractors would be similar over the long-term conditions and in dry and critical dry years.	To mitigate reductions of up to 7 percent in critical dry years to the Eastside Contractors, Reclamation would support water transfers from other basin water rights holders to the Eastside Contractors.

Note: Due to the limitations and uncertainty in the CalSim II monthly model and other analytical tools, incremental differences of 5 percent or less between alternatives and the No Action Alternative are considered to be “similar.”

1 **Table 5.115 Comparison of Surface Water Conditions under the No Action**
2 **Alternative and Alternatives 1 through 5 to the Second Basis of Comparison**

Alternative	Potential Change	Consideration for Mitigation Measures
No Action Alternative	**Trinity Lake** In wet years, below normal, and dry years, storage would be similar in all months. In above-normal years, storage would be similar in January through October; and less in November and December (up to 6 percent). In critical dry years, storage would be less in all months (up to 10 percent). In all months, in all water year types, surface water elevations would be similar. **Trinity River downstream of Lewiston Dam** Over long-term conditions (over the 82-year analysis period), flows would be similar in March through November and reduced in December through February (up to 10 percent). In wet years, flows would be similar in April through November and reduced in December through March (up to 11 percent). In dry years, flows would be similar all months. **Shasta Lake** In wet years, storage would be similar in October and December through August and reduced in September and November (up to 8 percent). In above-normal years, storage would be similar in January through September and reduced in October through December (up to 8 percent). In below-normal years, storage would be similar in March through September and reduced in October through February (up to 11 percent). In dry years, storage would be similar in January through October and reduced in November and December (up to 6 percent). In critical dry years, storage would be reduced under all months (up to 14 percent). In all months, in all water year types, surface water elevations would be similar. **Sacramento River at Keswick** Over long-term conditions, similar flows would occur in October, February through May, July, and August; increased flows in September and November (up to 38 percent); and reduced flows in December, January, and June (up to 8 percent). In wet years, similar flows would occur in January through July; increased flows in September through November (up to 78 percent); and reduced flows in December and August (up to 15 percent). In dry years, similar flows would occur in July through October, December through March, and May; increased flows in November (33 percent); and reduced flows in April and June (up to 7 percent). **Sacramento River at Freeport** Over long-term conditions, similar flows would occur in October, December through May, and August; increased flows in September, November, and July (up to 43 percent); and reduced flows in June (11 percent). In wet years, similar flows would occur in January through June and October; increased flows in July through September and November (up to 90 percent); and reduced flows in December (11 percent).	Not considered for this comparison.

Alternative	Potential Change	Consideration for Mitigation Measures
	In dry years, similar flows would occur in August through October and December through April; increased flows in November and July (up to 16 percent); and reduced flows in May and June (up to 12 percent). **Lake Oroville** In wet years, storage would be similar in January through August; and reduced in September through December (up to 18 percent). In above normal years, storage would be similar in February through August and reduced in September through January (up to 13 percent). In below normal years, storage would be similar in May through July and reduced in August through April (up to 18 percent). In dry years, storage would be similar in June and reduced in all other months (up to 13 percent). In critical dry years, storage would be similar under all months. In all months, in all water year types, surface water elevations would be similar. **Feather River downstream of Thermalito Complex** Over long-term conditions, similar flows would occur in November and April; increased flows in July through September (up to 76 percent); and reduced flows in October, December through March, May, and June (up to 27 percent). In wet years, similar flows would occur in October through November and March through May; increased flows in July through September (up to 184 percent); and reduced flows in December through February (up to 26 percent). In dry years, similar flows would occur in November through March; increased flows in April and July (up to 52 percent); and reduced flows in August through October and May and June (up to 28 percent). **Folsom Lake** In wet years, storage would be similar in December through August and reduced in September through November (up to 11 percent). In above-normal years, storage would be similar in January through June, September, and October; reduced in November and December (up to 8 percent); and increased in July and August (up to 6 percent). In below-normal years, storage would be similar in February through May; reduced in October through January (up to 12 percent); and increased in July through September (up to 17 percent). In dry years, storage would be similar in all months. In critical dry years, storage would be similar in October through June and reduced in July through September (up to 11 percent). In all months, in all water year types, surface water elevations would be similar. **American River downstream of Nimbus Dam** Over long-term conditions, similar flows would occur in November through May and July; increased flows in September and October (up to 45 percent); and reduced flows in June and August (up to 6 percent). In wet years, similar flows would occur in October through November and January through July; increased flows in September (91 percent); and reduced flows in December and August (up to 11 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In dry years, similar flows would occur in all months except October, February and July; increased flows in October (17 percent); and reduced flows in February and July (up to 7 percent). **Clear Creek downstream of Whiskeytown Dam** Flows identical June through April and increased in May (41 percent). **New Melones Reservoir** In wet, below-normal, and dry years, storage would be similar in all months. In above-normal years, storage would be similar in all months except October when storage would be reduced by 6 percent. In critical dry years, storage would be similar in February, March, and July through September and reduced in October through January and April through June (up to 7 percent). In all months, in all water year types, surface water elevations would be similar. **Stanislaus River downstream of Goodwin Dam** Over long-term conditions, similar flows would occur in May and July through September; increased flows in October, March, and April (up to 149 percent); and reduced flows in November through February and June (up to 34 percent). In wet years, similar flows would occur in February and April; increased flows in October, March, May, July, and August (up to 117 percent); and reduced flows in September, November through January, and June (up to 51 percent). In dry years, similar flows would occur in July through September; increased flows in October and April (up to 154 percent); and reduced flows in November through March, May, and June (up to 36 percent). **San Joaquin River at Vernalis** Over long-term conditions, similar flows would occur in July through September and November through May; increased flows in October (19 percent); and reduced flows in June (8 percent). In wet years, similar flows would occur in July through September and November through May; increased flows in October (17 percent); and reduced flows in June (9 percent). In dry years, similar flows would occur in November through March and May through September and increased flows in October and April (up to 18 percent). **San Luis Reservoir** In wet years, storage would be similar in June and September; increased in March, July, and August (up to 10 percent); and reduced in October through February, April, and May (up to 57 percent). Surface water elevations would be less in all months (up to 11 percent). In above-normal years, storage would be similar in July and September; increased in August (10 percent); and reduced in October through June (up to 71 percent). Surface water elevations would be less in all months (up to 13 percent). In below-normal years, storage would be similar in July and September; increased in August (20 percent); and reduced in October through June (up to 67 percent). Surface water elevations would be less in all months (up to 16 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In dry years, storage would be similar in September; increased in July (34 percent); and reduced in October through June and August (up to 44 percent). Surface water elevations would be similar in September through January and less in February through August (up to 10 percent). In critical dry years, storage would be similar in September; increased in July (60 percent); and reduced in August and October through June (up to 51 percent). Surface water elevations would be similar in October through January and reduced in February through September (up to 10 percent). **Yolo Bypass** In wet years, flows into Yolo Bypass would be similar in January through September; increased in October (25 percent); and reduced in November and December (up to 15 percent). In above-normal years, flows into Yolo Bypass would be similar in April through December and reduced in January through March (up to 14 percent). In below-normal years, flows into Yolo Bypass would be similar in April through November and reduced in December through March (up to 25 percent). In dry years, flows into Yolo Bypass would be similar in January through November and reduced in December (6 percent). In critical dry years, flows into Yolo Bypass would be similar in all months. **Delta Outflow** In wet years, average monthly Delta outflow in July through November, January, April, and May (up to 13,683 cfs) and decrease in December, February, March, and June (up to 1,590 cfs). In dry years, average monthly Delta outflow would be similar or increase in all months (up to 3,114 cfs). **Reverse Flows in Old and Middle Rivers** In wet years, average monthly OMR flows would be more positive in September through February, April, and May (up to 10,005 cfs) and more negative in March and June through August (up to 923 cfs). In dry years, average monthly OMR flows would be more positive in August through June (up to 3,489 cfs) and more negative in June (2,073 cfs).	
Alternative 1	Surface water conditions identical under Alternative 1 as under Second Basis of Comparison.	None needed.
Alternative 2	Same surface water conditions as described for No Action Alternative as compared to the Second Basis of Comparison.	Not considered for this comparison.
Alternative 3	**Trinity Lake** Similar storage and surface water elevations in all months and all water year types. **Trinity River downstream of Lewiston Dam** Similar flows in all months for long-term conditions and wet and dry years. **Shasta Lake** Similar storage and surface water elevations in all months and all water year types. **Sacramento River at Keswick** Similar flows in all months for long-term conditions and wet and dry years.	Not considered for this comparison.

Alternative	Potential Change	Consideration for Mitigation Measures
	Sacramento River at Freeport Similar flows in all months for long-term conditions and wet years. In dry years, similar flows would occur in July through May and increased flows in June (11 percent). **Lake Oroville** Similar storage and surface water elevations in all months and all water year types. **Feather River downstream of Thermalito Complex** Over long-term conditions, similar flows would occur in November and January through June; reduced flows in October, December, and September (up to 13 percent); and increased flows in July and August (up to 17 percent). In wet years, similar flows would occur in November and January through May; reduced flows in October, December, and September (up to 15 percent); and increased flows in June through August (up to 11 percent). In dry years, similar flows would occur in November and January through June; reduced flows in August through October (up to 21 percent); and increased flows in July (37 percent). **Folsom Lake** Similar storage and surface water elevations in all months and all water year types. **American River downstream of Nimbus Dam** Similar flows in all months for long-term conditions and wet and dry years. **Clear Creek downstream of Whiskeytown Dam** Flows would be identical in all months. **New Melones Reservoir** In wet years, storage would be similar in March through May and increased in June through February (up to 8 percent). In above-normal years, storage would be increased in all months (up to 16 percent). In below-normal years, storage would be increased in all months (up to 15 percent). In dry years, storage would be increased in all months (up to 20 percent). In critical dry years, storage would be increased in all months (up to 32 percent). In all months, in all water year types, surface water elevations would be similar. **Stanislaus River downstream of Goodwin Dam** Over long-term conditions, similar flows would occur in October, December, January, and March; reduced flows would occur in November, May, and June (up to 52 percent); and increased flows in February, April, July, and August through September (up to 27 percent). In wet years, similar flows would occur in October, November, January, and April; reduced flows in May and June (up to 45 percent); and increased flows in December, February, March, and July through September (up to 69 percent). In dry years, similar flows would occur in July through October; reduced flows in November through March and May through June (up to 36 percent); and increased flows in April (40 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	San Joaquin River at Vernalis Over long-term conditions, similar flows would occur in July through May and reduced flows in June (12 percent). In wet years, similar flows would occur in September through January, March through May, and July; reduced flows in June (8 percent); and increased flows in August and February (6 percent). In dry years, similar flows would occur in July through March; reduced flows in May and June (up to 12 percent); and increased flows in April (7 percent). **San Luis Reservoir** In wet years, storage would be similar in July through November and March through May and reduced in December through February and June (up to 16 percent). Surface water elevations would be similar in all months. In above-normal years, storage would be similar in November; increased in August and September (up to 12 percent); and reduced in October and December through July (up to 22 percent). Surface water elevations would be similar in March through December and reduced in January and February (up to 6 percent). In below-normal years, storage would be similar in August and September and reduced in October through July (up to 40 percent). Surface water elevations would be similar in all months. In dry years, storage would be reduced in January through September (up to 19 percent) and increased in October through December (up to 13 percent). Surface water elevations would be similar in all months. In critical dry years, storage would be reduced in October through August (up to 29 percent) and increased in September (8 percent). Surface water elevations would be similar September through January and reduced in February through August (up to 7 percent). **Yolo Bypass** In wet years, flows into the Yolo Bypass would be similar in November through September and reduced in October (6 percent). In above-normal, below-normal, dry, and critical dry years, flows into the Yolo Bypass would be similar in all months. **Delta Outflow** In wet years, average monthly Delta outflow would increase in November through February and July through September (up to 2,546 cfs) and decrease in October and March through June (up to 1,127 cfs). In dry years, average monthly Delta outflow would increase in November through April, July and August (up to 3,391 cfs) and decrease October, May, and June (up to 373 cfs). **Reverse Flows in Old and Middle Rivers** In wet years, flows would be more positive in September through February, April, and May (up to 5,528 cfs) and more negative in March and June through August (up to 1,453 cfs). In dry years, flows would be more positive in August through May (up to 3,249 cfs) and more negative flows in June and July (up to 1,345 cfs).	
Alternative 4	Surface water conditions identical under Alternative 4 as under Second Basis of Comparison.	None needed.

Alternative	Potential Change	Consideration for Mitigation Measures
Alternative 5	**Trinity Lake** In wet, below-normal, and dry years, storage would be similar. In above-normal years, storage would be similar in January through October and reduced in November and December (up to 5 percent). In critical dry years, storage would be reduced in all months (up to 10 percent). In all months, in all water year types, surface water elevations would be similar. **Trinity River downstream of Lewiston Dam** Over long-term conditions, flows would be similar in March through November and January and reduced in December and February (up to 10 percent). In wet years, flows would be similar in January and April through November and reduced in December, February, and March (up to 14 percent). In dry years, flows would be similar in all months. **Shasta Lake** In wet years, storage would be similar in October and December through August and reduced in November and September (up to 8 percent). In above-normal years, storage would be similar in February through September and reduced in October through December (up to 8 percent). In below-normal years, storage would be similar in March through September and reduced in October through February (up to 10 percent). In dry years, storage would be similar in January through October and reduced in November through December (up to 6 percent). In critical dry years, storage would be reduced in all months (up to 17 percent). In all months, in all water year types, surface water elevations are similar. **Sacramento River at Keswick** Over long-term conditions, flows would be similar in July, August, October, and February through April; reduced in December, January, May and June (up to 8 percent); and increased in September and November (up to 39 percent). In wet years, flows would be similar in January through July; reduced in December and August (up to 15 percent); and increased in September through November (up to 77 percent). In dry years, similar flows would occur in July through October and December through March; reduced in April through June (up to 10 percent); and increased flows in November (32 percent). **Sacramento River at Freeport** Over long-term conditions, flows would be similar in October and December through April; reduced in May and June (up to 12 percent); and increased in July through September and November (43 percent). In wet years, flows would be similar in October and January through June; reduced in December (6 percent); and increased in July through September and November (up to 89 percent). In dry years, similar flows would occur in August through October and December through April; reduced in May and June (up to 14 percent); and increased flows in July and November (up to 19 percent).	Not considered for this comparison.

Alternative	Potential Change	Consideration for Mitigation Measures
	Lake Oroville In wet years, storage would be similar in January through August; and reduced in September through December (up to 18 percent). In above-normal years, storage would be similar in March through August and reduced in September through February (up to 14 percent). In below-normal years, storage would be similar in May through July and reduced in August through April (up to 17 percent). In dry years, storage would be similar in May and June and reduced in July through April (up to 11 percent). In critical dry years, storage would be similar in all months. Surface water elevations would be similar in all months, in all years. **Feather River downstream of Thermalito Complex** Over long-term conditions, similar flows would occur in November and April; reduced flows in October, December through March, May, and June (up to 28 percent); and increased flows in July through September (up to 76 percent). In wet years, similar flows would occur in October, November, March through May; reduced flows in December through February and June (up to 26 percent); and increased flows in July through September (up to 182 percent). In dry years, similar flows would occur in November through April; reduced flows in October, May, June, August, and September (up to 45 percent); and increased flows in July (60 percent). **Folsom Lake** In wet years, storage would be similar in December through July and reduced in August through November (up to 7 percent). In above-normal years, storage would be similar in January through June, August, and October; reduced in September, November, and December (up to 8 percent); and increased in July (5 percent). In below-normal years, storage would be similar in February through May; reduced in August through January (up to 13 percent); and increased in June and July (up to 10 percent). In dry years, storage would be similar in all months. In critical dry years, storage would be similar in August and June and reduced in July (8 percent). Surface water elevations would be similar in all months, in all years. **American River downstream of Nimbus Dam** Over long-term conditions, similar flows would occur in November through July; reduced flows in August (6 percent); and increased in September and October (42 percent). In wet years, similar flows would occur in October, November, and January through July; reduced flows in December and August (up to 14 percent); and increased flows in September (88 percent). In dry years, similar flows would occur in November through September; and increased flows in October (17 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	Clear Creek downstream of Whiskeytown Dam Flows identical June through April and increased in May (41 percent). **New Melones Reservoir** In wet years, storage would be reduced in all months (up to 9 percent). In above-normal years, storage would be reduced in all months (up to 10 percent). In below-normal years, storage would be reduced in all months (up to 13 percent). In dry years, storage would be reduced in all months (up to 14 percent). In critical dry years, storage would be reduced in all months (up to 23 percent). Surface water elevations would be similar in all months, in all water year types. **Stanislaus River downstream of Goodwin Dam** Over long-term conditions, similar flows would occur in August; reduced flows would occur in November through February, June, July, August, and September (up to 36 percent); and increased flows in October and March through May (up to 149 percent). In wet years, similar flows would occur in February and April; reduced flows in November through January and June through September (up to 53 percent); and increased flows in October and March (up to 113 percent). In dry years, similar flows would occur in July through September; reduced flows in November through March and June (up to 36 percent); and increased flows in October, April, and May (150 percent). **San Joaquin River at Vernalis** Over long-term conditions, similar flows would occur in November through March, May, and July through September; reduced flows in June (8 percent); increased flows in October and April (19 percent). In wet years, similar flows would occur in November through May and July through September; reduced flows in June (10 percent); and increased flows in October (16 percent). In dry years, similar flows would occur in November through March and June through September; and increased flows in October, April, and May (up to 25 percent). **San Luis Reservoir** In wet years, storage would be reduced in all months (up to 49 percent). Surface water elevations would be similar in September and March; and reduced in October through February and April through August (up to 10 percent). In above-normal years, storage would be reduced in all months (up to 59 percent). Surface water elevations would be similar in September; and reduced in October through August (up to 13 percent). In below-normal years, storage would be reduced in all months (up to 70 percent). Surface water elevations would be similar in September; and reduced in October through August (up to 17 percent). In dry years, storage would be reduced in all months (up to 51 percent). Surface water elevations would be similar in October through December; and reduced in January through September (up to 14 percent).	

Alternative	Potential Change	Consideration for Mitigation Measures
	In critical dry years, storage would be reduced in all months (46 percent). Surface water elevations would be reduced in all months (up to 14 percent). **Yolo Bypass** In wet years, flows would be similar in February through September; reduced flows in November through January (up to 15 percent); and increased in October (16 percent). In above-normal years, flows would be similar in April through December and reduced flows in January through March (up to 15 percent). In below-normal years, flows would be similar in April through November and reduced flows in December through March (up to 24 percent). In dry years, flows would be similar in January through November and reduced flows in December (up to 7 percent). In critical dry years, flows would be similar in all months. **Delta Outflow** In wet years, average monthly Delta outflow would be increased in July through November, January, and April and May (up to 13,666 cfs) and reduced in December, February, March, and June (up to 1,713 cfs). In dry years, average monthly Delta outflow would be increased in July through May (up to 3,384 cfs) and reduced in June (526 cfs). **Reverse Flows in Old and Middle Rivers** In wet years, OMR flows would be more positive in September through February, April and May (up to 10,017 cfs) and more negative in March and June through August (up to 964 cfs). In dry years, OMR flows would be more positive in September through June (up to 4,724 cfs) and more negative in July and August (up to 2,620 cfs).	

Table 5.116 Comparison of CVP and SWP Water Supply Deliveries under the No Action Alternative and Alternatives 1 through 5 to the Second Basis of Comparison

Alternative	Potential Change	Consideration for Mitigation Measures
No Action Alternative	Long-term average annual exports would be 1,051 TAF (18 percent) less under the No Action Alternative as compared to the Second Basis of Comparison. Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 16 percent over the long-term conditions, 30 percent in dry years, and 34 percent in critical dry years. Deliveries to CVP North of Delta M&I contractors would be similar in total; however, deliveries to the American River CVP contractors would be reduced by 6 percent over the long-term conditions, 8 percent in dry years, and 6 percent in critical dry years. Deliveries to CVP South of Delta agricultural water service contractors would be reduced by 23 percent over the long-term conditions, 32 percent in dry years, and 33 percent in critical dry years. Deliveries to CVP South of Delta M&I contractors would be reduced by 10 percent over the long-term conditions, 9 percent in dry years, and 5 percent in critical dry years. Deliveries to the Eastside contractors would be similar under the long-term conditions and in dry years but were reduced by 12 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP North of Delta water contractors would be reduced by 18 percent over the long-term conditions, 18 percent in dry years, and 20 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP South of Delta water contractors would be reduced by 18 percent over the long-term conditions, 19 percent in dry years, and 22 percent in critical dry years.	Not considered for this comparison.
Alternative 1	Water supply conditions identical under Alternative 1 as under Second Basis of Comparison.	None needed.
Alternative 2	Same water supply effects as described for No Action Alternative as compared to the Second Basis of Comparison.	Not considered for this comparison.
Alternative 3	Long-term average annual exports would be 326 TAF (6 percent) less under Alternative 3 as compared to the Second Basis of Comparison. Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 5 percent over the long-term conditions, 9 percent in dry years, and 11 percent in critical dry years. Deliveries to CVP North of Delta M&I contractors (including American River CVP contractors) would be similar in long-term conditions and dry and critical dry years. Deliveries to CVP South of Delta agricultural water service contractors would be similar over the long-term conditions and reduced by 8 percent in dry years and 14 percent in critical dry years. Deliveries to CVP South of Delta M&I contractors would be similar in long-term conditions and dry and critical dry years. Deliveries to the Eastside contractors would be similar under long-term conditions and dry and critical dry years. Deliveries under Table A contracts without Article 21 water to SWP North of Delta water contractors would be similar over the long-term conditions and in dry years and reduced by 10 percent in critical dry years.	Not considered for this comparison.

Alternative	Potential Change	Consideration for Mitigation Measures
	Deliveries under Table A contracts without Article 21 water to SWP South of Delta water contractors would be similar over the long-term conditions and in dry years and reduced by 11 percent in critical dry years.	
Alternative 4	Water supply conditions identical under Alternative 4 as under Second Basis of Comparison.	None needed.
Alternative 5	Long-term average annual exports would be 1,096 TAF (19 percent) less under Alternative 5 as compared to the Second Basis of Comparison. Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 16 percent over the long-term conditions, 30 percent in dry years, and 31 percent in critical dry years. Deliveries to CVP North of Delta M&I contractors would be similar in long-term conditions and dry and critical dry years; however, American River Contractors would be reduced by 6 percent over the long-term conditions, 9 percent in dry years, and 8 percent in critical dry years. Deliveries to CVP South of Delta agricultural water service contractors would be reduced by 24 percent over the long-term conditions, 33 percent in dry years, and 33 percent in critical dry years. Deliveries to CVP South of Delta M&I contractors would be reduced by 10 percent in long-term conditions, 8 percent in dry years, and 6 percent in critical dry years. Deliveries to the Eastside contractors would be reduced by 5 percent under long-term conditions and dry years and reduced by 19 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP North of Delta water contractors would be reduced by 19 percent over the long-term conditions, 18 percent in dry years, and 21 percent in critical dry years. Deliveries under Table A contracts without Article 21 water to SWP South of Delta water contractors would be reduced by 19 percent over the long-term conditions, 20 percent in dry years, and 23 percent in critical dry years.	Not considered for this comparison.

Note: Due to the limitations and uncertainty in the CalSim II monthly model and other analytical tools, incremental differences of 5 percent or less between alternatives and the Second Basis of Comparison are considered to be "similar."

5.4.3.8 Potential Mitigation Measures

Mitigation measures are presented in this section to avoid, minimize, rectify, reduce, eliminate, or compensate for adverse environmental effects of Alternatives 1 through 5 as compared to the No Action Alternative. Mitigation measures were not included to address adverse impacts under the alternatives as compared to the Second Basis of Comparison because this analysis was included in this EIS for information purposes only.

5.4.3.8.1 Surface Water Conditions

As described above and summarized in Table 5.113, implementation of Alternatives 1 through 5 as compared to the No Action Alternative would result in reductions in river flows downstream of CVP and SWP reservoirs and Delta outflow, and increased negative OMR flows. Environmental effects associated with changes in these physical conditions are related to impacts on biological resources (as described in Chapter 9, Fish and Aquatic Resources, and Chapter 10, Terrestrial Biological Resources), and recreation resources (as described in Chapter 15, Recreation Resources). Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.

5.4.3.8.2 CVP and SWP Water Supply Deliveries

Implementation of Alternatives 1 through 4 would not result in adverse impacts to CVP and SWP water deliveries as compared to the No Action Alternative, as summarized in Table 5.114. Therefore, no mitigation measures are required.

Implementation of Alternative 5 would result in up to 8 percent reductions of CVP water deliveries to the Eastside Contractors (Stockton East Water District and Central San Joaquin Water Conservation District) in critical dry years. A potential mitigation measure for this reduction in critical dry years would be:

- Reclamation would support water transfers from other basin water rights holders to the Eastside Contractors. .

5.4.3.9 Cumulative Effects Analysis

As described in Chapter 3, the cumulative effects analysis considers projects, programs, and policies that are not speculative and are based upon known or reasonably foreseeable long-range plans, regulations, operating agreements, or other information that establishes them as reasonably foreseeable.

The cumulative effects analysis Alternatives 1 through 5 for Water Supplies are summarized in Table 5.117.

Table 5.117 Summary of Cumulative Effects on Water Supply Deliveries under Alternatives 1 through 5 as Compared to the No Action Alternative

Scenarios	Actions	Cumulative Effects of Actions
Past & Present, and Future Actions Included in All Alternatives in Year 2030	Consistent with Affected Environment conditions plus: Actions in the 2008 USFWS BO and 2009 NMFS BO that would have occurred without implementation of the BOs, as described in Section 3.3.1.2 (of Chapter 3, Descriptions of Alternatives), including climate change and sea level rise Actions not included in the 2008 USFWS BO and 2009 NMFS BO that would have occurred without implementation of the BOs, as described in Section 3.3.1.3 (of Chapter 3, Descriptions of Alternatives): • Implementation of Federal and state policies and programs, including Clean Water Act (e.g.,Total Maximum Daily Loads); Safe Drinking Water Act; Clean Air Act; and flood management programs • General plans for 2030. • Trinity River Restoration Program. • Central Valley Project Improvement Act programs • Iron Mountain Mine Superfund Site • Nimbus Fish Hatchery Fish Passage Project • Folsom Dam Water Control Manual Update • FERC Relicensing for the Middle Fork of the American River Project • Lower Mokelumne River Spawning Habitat Improvement Project • Dutch Slough Tidal Marsh Restoration • Suisun Marsh Habitat Management, Preservation, and Restoration Plan Implementation • Tidal Wetland Restoration: Yolo Ranch, Northern Liberty Island Fish Restoration Project, Prospect Island Restoration Project, and Calhoun Cut/Lindsey Slough Tidal Habitat Restoration Project • San Joaquin River Restoration Program • Stockton Deep Water Ship Channel Dissolved Oxygen Project • Grasslands Bypass Project • Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) • Future water supply projects, including water recycling, desalination, groundwater banks and wellfields, and conveyance facilities	These effects would be the same under all alternatives. Climate change and sea level rise, development under the general plans, FERC relicensing projects, and some future projects to improve water quality and/or habitat are anticipated to reduce carryover storage in reservoirs, stream flows and Delta outflow, and the availability of CVP and SWP water supplies as compared to past conditions. Some future water quality and habitat projects could modify surface water conditions; however, water supplies are not anticipated to be affected. Future water supply projects are anticipated to both improve water supply reliability due to reduced surface water supplies and to accommodate planned growth in the general plans. Most of these programs were initiated prior to implementation of the 2008 USFWS BO and 2009 NMFS BO which reduced CVP and SWP water supply reliability.

Scenarios	Actions	Cumulative Effects of Actions
Future Actions Considered as Cumulative Effects Actions in All Alternatives in Year 2030	Actions as described in Section 3.5 (of Chapter 3, Descriptions of Alternatives): • Bay-Delta Water Quality Control Plan Update • FERC Relicensing Projects • Bay Delta Conservation Plan (including the California WaterFix alternative) • Shasta Lake Water Resources, North-of-the-Delta Offstream Storage, Los Vaqueros Reservoir Expansion Phase 2, and Upper San Joaquin River Basin Storage Investigations • El Dorado Water and Power Authority Supplemental Water Rights Project • Sacramento River Water Reliability Project • Semitropic Water Storage District Delta Wetlands • North Bay Aqueduct Alternative Intake • Irrigated Lands Regulatory Program • San Luis Reservoir Low Point Improvement Project • *Westlands Water District v. United States Settlement* • Future water supply projects, including water recycling, desalination, groundwater banks and wellfields, and conveyance facilities (projects that did not have completed environmental documents during preparation of the EIS)	<u>These effects would be the same under all alternatives.</u> Most of the future reasonably foreseeable actions are anticipated to reduce water supply impacts due to climate change, sea level rise, increased water allocated to improve habitat conditions, and future growth. Some of the reasonably foreseeable actions related to improved water quality and habitat conditions (e.g., Water Quality Control Plan Update and FERC Relicensing Projects), could in further reductions in CVP and SWP water deliveries.
No Action Alternative with Associated Cumulative Effects Actions in Year 2030	Full implementation of the 2008 USFWS BO and 2009 NMFS BO	Implementation of No Action Alternative would result in changes stream flows, increased Delta outflow, and reduced CVP and SWP water supplies as compared to historical conditions prior to the BOs. The availability of future water supply projects (discussed above) could reduce the effects of reduced CVP and SWP water supplies. However, these actions also could result in less water for future growth as compared to future conditions without the No Action Alternative.

Scenarios	Actions	Cumulative Effects of Actions
Alternatives 1 and 4 with Associated Cumulative Effects Actions in Year 2030	No implementation of the 2008 USFWS BO and 2009 NMFS BO actions unless the actions would have been implemented without the BO (e.g., Red Bluff Pumping Plant)	Implementation of Alternatives 1 and 4 with reasonably foreseeable actions would result in changes in stream flows, reduced Delta outflows, and increased CVP and SWP water supplies as compared to the No Action Alternative with the added actions. The future water supply projects (discussed above) would be more available to provide water for future growth as compared to future conditions with the No Action Alternative.
Alternative 2 with Associated Cumulative Effects Actions in Year 2030	Full implementation of the 2008 USFWS BO and 2009 NMFS BO CVP and SWP operational actions No implementation of structural improvements or other actions that require further study to develop a more detailed action description.	Implementation of Alternative 2 with reasonably foreseeable actions for water supplies would be the same as for the No Action Alternative with the added actions.
Alternative 3 with Associated Cumulative Effects Actions in Year 2030	No implementation of the 2008 USFWS BO and 2009 NMFS BO actions unless the actions would have been implemented without the BO (e.g., Red Bluff Pumping Plant) Slight increase in positive Old and Middle River flows in the winter and spring months	Implementation of Alternative 3 with reasonably foreseeable actions would result in changes in stream flows, reduced Delta outflows, and increased CVP and SWP water supplies as compared to the No Action Alternative with the added actions. The future water supply projects (discussed above) would be more available to provide water for future growth as compared to future conditions with the No Action Alternative.
Alternative 5 with Associated Cumulative Effects Actions in Year 2030	Full implementation of the 2008 USFWS BO and 2009 NMFS BO Positive Old and Middle River flows and increased Delta outflow in spring months	Implementation of Alternative 5 with reasonably foreseeable actions would result in changes in stream flows, increased Delta outflows, and reduced CVP and SWP water supplies as compared to the No Action Alternative with the added actions. The availability of future water supply projects (discussed above) could reduce the effects of reduced CVP and SWP water supplies. However, these actions also could result in less water for future growth as compared to future conditions under the No Action Alternative.

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