

## Chapter 5

# 1 **Surface Water Resources and Water** 2 **Supplies**

## 3 **5.1 Introduction**

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

## 11 **5.2 Regulatory Environment and Compliance** 12 **Requirements**

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

## 21 **5.3 Affected Environment**

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

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

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

5 **5.3.1 Overview of California Water Supply and Water**  
 6 **Management Facilities**

7 **5.3.1.1 Sources of Water in California**

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

16 In an average water year, precipitation provides California with approximately  
 17 200 million acre-feet (MAF) of water falling as either rain or snow (DWR 2009a),  
 18 including up to 10 MAF from surface water flows entering California due to  
 19 precipitation falling in the Klamath River and Lost River watersheds in Oregon;  
 20 and the Colorado River watershed in Wyoming, Colorado, Utah, Nevada, New  
 21 Mexico, and Arizona, and northwestern Mexico. The total volume of water the  
 22 state receives can vary dramatically between dry and wet years. California may  
 23 receive less than 100 MAF of water during a dry year and more than 300 MAF in  
 24 a wet year (Western Regional Climate Center 2011).

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

33 Over time, annual precipitation trends have been changing and continue to  
 34 change, as shown on Figure 5.1. From 1906 to 1960, 33 percent of the water  
 35 years in California were classified by the California Department of Water  
 36 Resources (DWR) as “dry” or “critically dry” and that percentage increased to  
 37 36 percent from 1961 to 2013 (DWR 2014a). From 1906 to 1960, 45 percent of  
 38 the water years in California were classified by DWR as “above normal” or “wet”  
 39 and that percentage increased to 49 percent from 1961 to 2013. Additionally, the  
 40 1906 to 1960 period had 42 percent of water years classified as extreme  
 41 (“critically dry” or “wet”) and that percentage increased to 51 percent after 1960.

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

4 Despite having similar precipitation averages, the year to year variation and  
5 patterns of extreme condition occurrences are significantly different between the  
6 time periods. The year to year statewide precipitation variation is larger and more  
7 frequent from 1961 to 2013 than 1906 to 1960. Also, the occurrence of a year to  
8 year change of more than 10 inches of precipitation is 3 times higher in the post-  
9 1960 time period as compared to the pre-1960 time period. There are also more  
10 occurrences of sequential “critically dry” years and sequential “wet” years after  
11 1960.

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

### 19 **5.3.1.2 Development of Major California Water Management Facilities**

20 Due to the hydrologic variability that ranges from dry summers and fall months to  
21 floods in winter and spring, water from precipitation in the winter and spring must  
22 be stored for use in the summer and fall. During an average hydrological year,  
23 approximately 15 MAF of water is stored in the Sierra Nevada snowpack (DWR  
24 2013a). However, not all of the snowpack becomes available in a timely manner  
25 for uses throughout the state. Therefore, Federal, state, and local agencies and  
26 private entities have constructed reservoirs, aqueducts, pipelines, and water  
27 diversion facilities to capture and use the rainfall and the subsequent snowmelt.

#### 28 **5.3.1.2.1 Water Facilities Development through the Early 1900s**

29 Spanish settlements were initially established in the late 1700s in southern  
30 California, including conveyance systems to bring water to the pueblos. The first  
31 water storage and diversion project in California was constructed in 1772,  
32 including a 12-foot high dam on the San Diego River and 6 miles of canals to  
33 deliver water to the San Diego Mission (Reclamation 1997). Over the next  
34 80 years, other irrigation systems were constructed to provide water for  
35 communities and irrigated lands. The major levee was constructed in the Delta in  
36 1840 along Grand Island to protect agricultural lands from floods.

37 After California became a state in 1850, the state legislature adopted English  
38 Common Law, which included the doctrine of riparian rights to provide water  
39 supplies to lands adjacent to rivers and streams (Reclamation 1997). The  
40 California legislature at this time also recognized “pueblo water rights” that were  
41 granted under both Spanish and Mexican governments, including water rights on  
42 the Los Angeles and San Diego rivers. Water rights also were influenced by the  
43 practice of miners of “posting notice” at their points of diversion to substantiate

1 water rights as an “appropriative right” for areas not adjacent to the rivers and  
 2 streams. This set of appropriative rights was catalogued with respect to “first in  
 3 time, first in right.” Appropriative water rights were given statutory recognition  
 4 in 1872.

5 Between the 1850s and early 1900s, numerous dams and canals were constructed  
 6 by miners, agricultural water users, and communities (Reclamation 1997). In the  
 7 1870s, the first wells were constructed with wood-burning engines. By the late  
 8 1890s, natural gas engines and electricity became available to power pumps.  
 9 Between 1906 and 1910, over 4,000 natural gas or electric groundwater pumps  
 10 were installed in the San Joaquin Valley. Substantial use of groundwater caused  
 11 extensive groundwater aquifer depletions and land subsidence in some areas of  
 12 the Central Valley. The availability of electricity to communities also resulted in  
 13 more hydroelectric generation facilities and associated dams being constructed  
 14 throughout the Sierra Nevada.

#### 15 **5.3.1.2.2 Conceptual Development of the Central Valley Project and State** 16 **Water Project**

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

##### 21 *1919 Marshall Plan*

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

##### 37 *1930s State Water Plan*

38 During the 1920s, the California state legislature commissioned a series of  
 39 investigations to further evaluate the Marshall Plan (DPW 1930; Reclamation  
 40 1997). The 1930 Division of Water Resources Bulletin No. 25 outlined a  
 41 statewide water plan, including the concept that became the CVP and SWP. The  
 42 plan included 37 water supply and flood management reservoirs, including a dam  
 43 on the San Joaquin River near Friant and canals to distribute the water along the  
 44 eastern San Joaquin Valley to reduce groundwater overdraft in Tulare and Kern



1 counties; 14 dams along the Trinity River, Sacramento River, and Sacramento  
2 River tributaries to provide water to the San Joaquin River water rights  
3 contractors affected by the dam on the San Joaquin River and water users on the  
4 west side of the San Joaquin Valley and in Contra Costa County; and eight dams  
5 on San Joaquin Valley rivers to provide water to the San Joaquin Valley. These  
6 dams included recommended facilities near the present CVP Trinity, Shasta,  
7 Folsom, New Melones, and Friant dams and the present SWP Oroville Dam. The  
8 recommendations also included a Delta Cross Channel canal to improve south  
9 Delta water quality; a canal from a south Delta pumping plant to a regulating  
10 reservoir and pumping plant near Mendota; canals from Mendota to the San  
11 Joaquin Valley; a canal from the Delta into Contra Costa County; and expansion  
12 of the San Joaquin River and associated channels with five operable barriers along  
13 the San Joaquin River,

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

18 In 1933, the state authorized the Central Valley Project Act. However, during the  
19 1930s depression, the state could not raise the funds. The state appealed to the  
20 Federal Government for assistance. The overall SWP was approved by the State  
21 Legislature in 1941.

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

### 32 **5.3.1.2.3 Overview of the Central Valley Project**

33 With the passage of the Rivers and Harbors Act of 1935, Congress appropriated  
34 funds and authorized construction of the CVP by the USACE (Reclamation 1997;  
35 Reclamation 2011a). When the Rivers and Harbors Act was reauthorized in 1937,  
36 the construction and operation of the CVP was assigned to Reclamation, and the  
37 CVP became subject to Reclamation Law (as defined in the Reclamation Act of  
38 1902 and subsequent legislation).

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

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

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- 1 • Red Bluff Pumping Plant on the Sacramento River to deliver water into the  
2 Tehama-Colusa Canal and the Corning Canal.
  - 3 • Folsom and Nimbus dams on the American River and the Folsom-South  
4 Canal.
  - 5 • Delta Cross Channel in the Delta.
  - 6 • Rock Slough Intake to deliver water into the Contra Costa Canal, Contra  
7 Costa Pumping Plant, and Contra Loma Reservoir.
  - 8 • Friant Dam along the San Joaquin River to deliver water into the Friant-Kern  
9 and Madera.
  - 10 • C.W. Jones Pumping Plant (Jones Pumping Plant) (previously known as the  
11 Tracy Pumping Plant) in the south Delta to deliver water into the Delta-  
12 Mendota Canal and Mendota Pool.
  - 13 • Delta-Mendota Canal/California Aqueduct Intertie downstream of the CVP  
14 Jones Pumping Plant and the SWP Banks Pumping Plant.
  - 15 • San Luis Reservoir-related facilities, including the CVP facilities consisting of  
16 the O'Neill Forebay, Pumping Plant, and Canal; Coalinga Canal, Pleasant  
17 Valley Pumping Plant, and San Luis Drain. The O'Neill Forebay is operated  
18 in coordination with the SWP. The SWP facilities operated in coordination  
19 with the CVP include the B.F. Sisk San Luis Dam (the major dam that forms  
20 San Luis Reservoir), San Luis Canal, Los Banos and Little Panoche dams, and  
21 associated pumping plants.
  - 22 • Pacheco Tunnel and Conduit to deliver water from the San Luis Reservoir into  
23 the San Justo Dam and Reservoir, Hollister Conduit, and Santa Clara Tunnel  
24 and Conduit.
  - 25 • New Melones Dam along the Stanislaus River.
- 26 The CVP reservoirs are listed in Table 5.1 and shown on Figures 5.3 through 5.5.  
27 Table 5.1 also includes reservoirs of the Bureau of Reclamation Orland Project  
28 (which are not part of CVP) because these reservoirs also affect hydrology of  
29 Stony Creek, a tributary to the Sacramento River.

1 **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

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

3 Notes:

4 CVP is Central Valley Project; Orland is Orland Project

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

#### 4 **5.3.1.2.4 Overview of the State Water Project**

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

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

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

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

3 **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 Valle	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

4 Sources: DWR 2014b, 2014c.

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

1 **5.3.1.2.5 Other Major Water Supply and Flood Management Reservoirs**  
 2 During the past 100 years, numerous water supply, flood management, and  
 3 hydroelectric generation reservoirs were constructed throughout California.  
 4 Many of these projects were constructed on tributaries to the Sacramento and San  
 5 Joaquin rivers and tributaries to the Tulare Lake Basin. Operations of these  
 6 non-CVP and non-SWP reservoirs affect flow patterns into the Sacramento and  
 7 San Joaquin rivers and the Delta. However, implementation of the alternatives  
 8 evaluated in this EIS would not result in changes in operations in most of these  
 9 reservoirs, except on the lower Stanislaus River.

10 Major non-CVP and non-SWP reservoirs in the Sacramento Valley and San  
 11 Joaquin Valley watersheds, generally with storage capacities greater than  
 12 100,000 acre-feet, which could affect operations of CVP or SWP reservoirs or  
 13 Delta facilities or could be affected by implementation of the alternatives  
 14 evaluated in this EIS, are listed in Tables 5.3 and 5.4.

15 **Table 5.3 Major Non-Central Valley Project and Non-State Water Project Reservoirs**  
 16 **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

Owner	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
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

1 Sources: DWR 2014b, 2014c.

2 **Table 5.4 Major Non-Central Valley Project and Non-State Water Project Reservoirs**  
 3 **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' Shaughnessy	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

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Owner	Reservoir	Dam	Stream	Year Initiated	Capacity (acre-feet)
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

1 Sources: DWR 2014b, 2014c.

2 Major reservoirs used to store CVP and SWP water supplies in the San Francisco  
 3 Bay Area, Central Coast, and Southern California regions are shown on Figures  
 4 5.5 and 5.6 and listed in Tables 5.5, 5.6, and 5.7.

5 **Table 5.5 Major Non-Central Valley Project and Non-State Water Project Reservoirs**  
 6 **in the San Francisco Bay Area Region Used to Store Central Valley Project and/or**  
 7 **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

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

10 Note:

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



1 **Table 5.6 Major Non-Central Valley Project and Non-State Water Project Reservoirs**  
 2 **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

3 Sources: DWR 2014b; Reclamation 2014c.

4 **Table 5.7 Major Non-Central Valley Project and Non-State Water Project Reservoirs**  
 5 **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 Vicente 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	Sweetwater	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

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

**1 5.3.2 Hydrologic Conditions and Major Surface Water Facilities**

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

6 Changes in surface water hydrology may occur in the rivers within the Trinity  
7 River and Central Valley regions due to changes in CVP and SWP operations  
8 because some rivers in these regions are used to convey CVP and/or SWP water  
9 supplies. Tributaries to the Sacramento and San Joaquin rivers that are not  
10 affected by CVP and SWP operations are also discussed briefly in this section to  
11 provide an overview of the major streams in the Central Valley watersheds.  
12 Available information related to flow conditions between Water Years 2001 and  
13 2012 (October 2000 through September 2012) are provided for reservoirs and  
14 rivers that are affected by CVP and/or SWP operations.

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

**25 5.3.2.1 Trinity River Region**

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

**32 5.3.2.1.1 Trinity River Watershed**

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

1 The Trinity River includes the mainstem, North Fork Trinity River, South Fork  
2 Trinity River, New River, and numerous smaller streams (NCRWQCB et al.  
3 2009; USFWS et al. 1999). The mainstem of the Trinity River flows 170 miles to  
4 the west from the headwaters to the confluence with the Klamath River. The  
5 CVP Trinity and Lewiston dams are located at approximately River Miles 105  
6 and 112, respectively; and upstream of the confluences of the Trinity River and  
7 the North Fork, South Fork, and New River. Flows on the North Fork, South  
8 Fork, and New River are not affected by CVP facilities. The Trinity River flows  
9 approximately 112 miles from Lewiston Dam to the Klamath River through  
10 Trinity and Humboldt counties and the Hoopa Indian Reservation within Trinity  
11 and Humboldt counties.

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

22 Prior to completion of Trinity and Lewiston dams, flows in the Trinity River were  
23 highly variable and could range from over 100,000 cubic feet per second (cfs) in  
24 the winter and spring to 25 cfs in the summer and fall (USFWS et al. 1999). Total  
25 annual flow volume at Lewiston (immediately downstream of the current location  
26 of Lewiston Dam) ranged from 0.27 to 2.7 MAF with a long-term average of  
27 1.2 MAF.

28 A large portion of the Trinity River flows upstream of Trinity Lake and Lewiston  
29 Dam is exported to the Sacramento River watershed through CVP facilities. The  
30 reduction in flows in the Trinity River initially caused substantial reductions in  
31 the Trinity River fish populations (Department of the Interior [DOI] 2000). In  
32 response to the reductions in fish populations, Congress enacted legislation and  
33 directed that restoration actions be evaluated for the Trinity River. In December  
34 2000, the U.S. Department of the Interior (DOI), adopted the Trinity River  
35 Mainstem Fishery Restoration Record of Decision (Trinity River ROD) which  
36 restored Trinity River flow and habitat to produce a healthy, functioning alluvial  
37 river system. The Trinity River ROD included physical channel rehabilitation;  
38 sediment management; watershed restoration; and variable annual instream flow  
39 releases from Lewiston Dam based on forecasted hydrology for the Trinity River  
40 Basin as of April 1<sup>st</sup> each year that range from 368,600 acre-feet/year in critically  
41 dry years to 815,000 acre-feet/year in extremely wet years. The Trinity River  
42 ROD was challenged in United States District Court for the Eastern District of  
43 California (District Court); and the changes in operations related to flow were not  
44 allowed to proceed while supplemental environmental documentation was  
45 prepared and reviewed (NCRWQCB et al. 2009). In 2004, the United States

1 Court of Appeals for the Ninth Circuit entered an opinion that reversed the  
2 District Court order; and all actions in the Trinity River ROD were mandated.  
3 The flow actions were not completely implemented until several infrastructure  
4 projects in the Trinity River channel were completed to protect areas from flood  
5 damage.

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

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

30 Historical water storage volumes and water storage elevations for Trinity Lake for  
31 Water Years 2001 through 2012 are presented on Figures 5.7 and 5.8 (DWR  
32 2013d, 2013e). Trinity Lake storage varies in accordance with upstream  
33 hydrology and downstream water demands and instream flow requirements.  
34 Reclamation maintains at least 600 TAF in Trinity Reservoir, except during the  
35 10 to 15 percent of the years when Shasta Lake is also drawn down.

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

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

#### 5 **5.3.2.1.2 Lower Klamath River from Trinity River Confluence to the** 6 **Pacific Ocean**

7 The Klamath River watershed extends over 15,600 square miles from southern  
8 Oregon to northern California, and ranges in elevation from over 9,500 feet above  
9 sea level near the headwaters to sea level at the Pacific Ocean (USFWS et al.  
10 1999). The Klamath River watershed is generally divided into two or three  
11 subbasins. For the purpose of this study, the upper Klamath River basin extends  
12 over 60 miles from the headwaters to Iron Gate Dam (DOI and DFG 2012). The  
13 lower Klamath River basin extends 190 miles from Iron Gate Dam to the Pacific  
14 Ocean. Four major tributaries flow into the lower Klamath River, including  
15 Shasta, Scott, Salmon, and Trinity rivers. The lower Klamath River flows  
16 43.5 miles from the confluence with the Trinity River to the Pacific Ocean  
17 (USFWS et al. 1999). Downstream of the Trinity River confluence, the Klamath  
18 River flows through Humboldt and Del Norte counties and through the Hoopa  
19 Indian Reservation, Yurok Indian Reservation, and Resighini Indian Reservation  
20 within Humboldt and Del Norte counties (DOI and Department of Fish and Game  
21 [now known as Department of Fish and Wildlife] DFG 2012).

22 The Trinity River is the largest tributary to the Klamath River (DOI and DFG  
23 2012). There are no dams located in the Klamath River watershed downstream of  
24 the confluence with the Trinity River. The western portion of the Klamath River  
25 watershed receives substantial rainfall during the winter months. Average  
26 precipitation in the western portion of the watershed ranges from 60 to 125 inches  
27 per year (DWR 2013a). Due to the heavy precipitation and the upstream water  
28 supply projects in the Klamath River, approximately 85 percent of the flows in the  
29 lower Klamath River occur due to runoff in the lower watershed during the winter  
30 months (DOI and DFG 2012).

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

#### 37 **5.3.2.2 Central Valley Region**

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

#### 41 **5.3.2.2.1 Sacramento Valley**

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

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- 1 • Clear Creek from Whiskeytown Reservoirs to the confluence with the  
2 Sacramento River
- 3 • Sacramento River from Shasta Lake to the confluence with the San Joaquin  
4 River in the Delta
- 5 • Feather River from upstream of Oroville Reservoir to the confluence with the  
6 Sacramento River
- 7 • Yuba River from New Bullards Bar Reservoir to the confluence with the  
8 Feather River
- 9 • Bear River from Camp Far West Reservoir to the confluence with the Feather  
10 River
- 11 • American River from Folsom Lake to the confluence with the Sacramento  
12 River

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

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

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

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

1 *Upper Sacramento River Watershed Hydrology*

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

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

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

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

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

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

26 *Whiskeytown Lake*

27 Whiskeytown Lake is located within the Clear Creek watershed. The Clear Creek  
28 watershed is 238 square miles that extends from the Trinity Mountains to the  
29 confluence with the Sacramento River downstream of the City of Redding (DWR  
30 1986 and Western Shasta Resource Conservation District [WSRCD] 2004).

31 Hydrology in the watershed is divided into the upper 238-square mile watershed  
32 upstream of Whiskeytown Dam at River Mile 18.1, and the lower 49 square miles  
33 watershed downstream of the dam. Clear Creek flows approximately 17 miles  
34 from the Trinity Mountains into Whiskeytown Lake. Clear Creek continues for  
35 18.1 miles downstream of Whiskeytown Lake into the Sacramento River  
36 downstream of the CVP Keswick Dam and south of the City of Redding.

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

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1 Whiskeytown Lake through the Clear Creek Tunnel. Currently, the Clear Creek  
 2 Tunnel between Lewiston Reservoir and Whiskeytown Lake has a capacity of  
 3 3,200 cfs (Reclamation 2011b).

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

16 The capacity of the outlet from Whiskeytown Dam that conveys water to Clear  
 17 Creek is 1,240 cfs when the water elevation in Whiskeytown Lake is at  
 18 1,220.5 feet. To provide flows into Clear Creek in excess of 1,240 cfs, the  
 19 Whiskeytown Reservoir water elevations need to be raised higher than 1,220 feet  
 20 to allow water to flow through the Glory Hole spillway, as described below  
 21 (CALFED 2004; Reclamation 2009a).

22 Historical water storage volume and water storage elevations related to  
 23 Whiskeytown Lake for Water Years 2001 through 2012 are presented on  
 24 Figures 5.13 and 5.14 (DWR 2013j, 2013k, 2013l). Whiskeytown Lake storage is  
 25 relatively constant due to agreements between Reclamation and the National Park  
 26 Service to maintain certain winter and summer lake elevations for recreation.  
 27 Whiskeytown Lake outflow variations were greater prior to 2006 when Trinity  
 28 River restoration flows were implemented which reduced the amount of water  
 29 available for conveyance to CVP water users. In addition, hydrologic conditions  
 30 in the years following 2006 were drier than the water years between 2001 and  
 31 2006.

32 *Implementation of 2009 National Marine Fisheries Service Biological*  
 33 *Opinion*

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

39 *Clear Creek*

40 Substantial modifications of the Clear Creek stream channel occurred due to  
 41 placer mining activities from the mid-1800s through the early 1900s. In addition,  
 42 several irrigation diversions were constructed along the lower Clear Creek reach  
 43 during the late 1800s and early 1900s. One of the largest diversions was the  
 44 15-foot-high, 200-foot-wide McCormick-Saeltzer Dam constructed in 1903 at



1 River Mile 6.5 (approximately 12 miles downstream of Whiskeytown Dam). The  
2 downstream of Whiskeytown Dam was constructed upstream of a steep gorge  
3 along Clear Creek and removed in 2001. More recent channel modifications  
4 occurred in the lower Clear Creek due to gravel extraction activities from the  
5 1950s to 1970s.

6 Construction of Whiskeytown Dam modified the hydraulics, gravel loading, and  
7 sediment transport in the lower Clear Creek. The overall average annual flow in  
8 the lower Clear Creek was reduced by 87 percent following construction of the  
9 dam (DWR 1984, 1986). The dam also reduced gravel loading into the lower  
10 Clear Creek and the frequency of high flow events that move the gravel and  
11 remove fine sediments from riffles. This change in hydrology and loss of gravel  
12 loading adversely affected the salmonid habitat downstream of Whiskeytown  
13 Dam, including compaction of riffles with sand. Recently, minimum flow  
14 releases from Whiskeytown Lake into Clear Creek occur in accordance with  
15 Federal and state requirements (DWR 1984), as described in Appendix 3A, No  
16 Action Alternative: Central Valley Project and State Water Project Operations.  
17 Historical flow data has been collected since 1941 at the Igo Gage at River  
18 Mile 10.9 (approximately 7.2 miles downstream of Whiskeytown Dam) (DWR  
19 1986 and WSRCD 2004).

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

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

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

1 Following the removal of the McCormick-Saeltzer Dam, extensive  
2 geomorphological studies have been conducted to recommend approaches for  
3 restoration of the channel and adjacent floodplain downstream of the McCormick-  
4 Saeltzer Dam site. Based upon hydrological data collected at the Igo gage, one of  
5 the studies discussed that peak flow events in lower Clear Creek following  
6 completion of Whiskeytown Dam occur about once every 3 years; although, the  
7 pre-dam frequency was approximately once every 2 years. Clear Creek flows at  
8 Igo between 2000 and 2012 are presented on Figure 5.15. During this period,  
9 high flow events occurred in April and May of 2003 and December 2005 (DWR  
10 2013s). The high flow events: 1) naturally moved gravel placed downstream of  
11 Whiskeytown Dam and along Clear Creek; 2) developed and maintained Clear  
12 Creek channel and adjacent floodplain habitat for spring-run and fall-run Chinook  
13 Salmon and steelhead; 3) created and maintained deep pools in the channel to  
14 support spawning of spring-run Chinook Salmon and steelhead, and create  
15 appropriate salmonid habitat within and along Clear Creek; and 4) established and  
16 maintained nesting and foraging habitat for neotropical migrant birds, native  
17 resident birds, and amphibians.

18 Following removal of McCormick-Saeltzer Dam, the Clear Creek channel and  
19 adjacent floodplain geomorphology changed. The Clear Creek channel capacity  
20 is generally about 3,000 cfs. The 2004 studies indicated that flows in excess of  
21 3,000 cfs are required to overflow from the Clear Creek channel onto the adjacent  
22 floodplains. The study discussed that during pre- and post-Whiskeytown periods,  
23 the 5-year flood event at Igo decreased from 9,000 to 3,400 cfs and the 2.5-year  
24 flood event decreased from 6,200 to 1,800 cfs. Therefore, the study discussed  
25 that flows in excess of 5,000 cfs did not occur more frequently than 3 times in  
26 10 years (CALFED 2004).

27 *Implementation of 2009 National Marine Fisheries Service Biological*  
28 *Opinion*

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

34 The channel maintenance flows are to be released at a minimum flow of  
35 3,250 cfs, which is excess of the 1,240 cfs capacity of the Whiskeytown Dam  
36 outlet to Clear Creek. Therefore, to provide channel maintenance flows, the  
37 Whiskeytown Lake water elevation must be increased to provide flow of water  
38 over the Glory Hole inlet. The Glory Hole is designed to operate with the higher  
39 water elevations during flood events. However, during non-flood periods, raising  
40 the water elevations and operating the Glory Hole inlet can cause safety concerns  
41 for recreationists along the Whiskeytown Lake shoreline.

1 *Shasta Lake and Keswick Reservoir*

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

13 Historical water storage volumes and water storage elevations for Shasta Lake for  
14 Water Years 2001 through 2012 are presented on Figures 5.16 and 5.17 (DWR  
15 2013m, 2013n, 2013o). Shasta Lake storage varies in accordance with upstream  
16 hydrology and downstream water demands and instream flow requirements. For  
17 example, storage declined during the drier years in 2008 and 2009.

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

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

30 *Implementation of 2009 National Marine Fisheries Service Biological*  
31 *Opinion*

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

1 *Sacramento River from Keswick Dam to the Delta*

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

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

17 *Sacramento River from Keswick Dam to the Red Bluff*

18 Reclamation operates the Shasta, Sacramento River, and Trinity River divisions  
 19 of the CVP to meet (to the extent possible) the provisions of SWRCB Order  
 20 90-05. An April 5, 1960 Memorandum of Agreement between Reclamation and  
 21 California Department of Fish and Wildlife (CDFW) originally established flow  
 22 objectives in the Sacramento River for the protection and preservation of fish and  
 23 wildlife resources. The agreement provided for minimum releases into the natural  
 24 channel of the Sacramento River at Keswick Dam for normal and critically dry  
 25 years, as described in Appendix 3A, No Action Alternative: Central Valley  
 26 Project and State Water Project Operations. Since October 1981, Keswick Dam  
 27 has operated based on a minimum release of 3,250 cfs for normal years from  
 28 September 1 through the end of February, in accordance with an agreement  
 29 between Reclamation and CDFW. This release schedule was included in  
 30 SWRCB Order 90-05, which maintains a minimum release of 3,250 cfs at  
 31 Keswick Dam and Red Bluff Pumping Plant from September through the end of  
 32 February in all water years except critically dry years.

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

42 The Sacramento River between Keswick Dam and the City of Red Bluff flows  
 43 through the northern foothills of the Sacramento Valley. Flows are influenced by  
 44 outflow from Keswick Reservoir and inflows from Clear Creek (described

1 above); and Cow Creek, Bear Creek, Cottonwood Creek, Battle Creek, and  
2 Paynes Creek which provide 15 to 20 percent of the flows in this reach as  
3 measured at Bend Bridge. There are several moderate major diversions along the  
4 Sacramento River upstream of Red Bluff, including the CVP Wintu Pumping  
5 Plant to provide water for the Bella Vista Water District, and the Anderson-  
6 Cottonwood Irrigation District Diversion. Both of these diversions near Redding  
7 provide water to agricultural, municipal, and industrial water users (Reclamation  
8 1997). No major storage or diversion structures have been constructed in the  
9 tributary watersheds in this reach of the Sacramento River, although several small  
10 diversions for irrigation, domestic use, and hydroelectric power generation are  
11 present (Reclamation 1997). Flow patterns on one major tributary in this reach,  
12 Battle Creek, are undergoing changes as the Battle Creek Salmon and Steelhead  
13 Restoration Project is implemented to restore ecological processes along 42 miles  
14 of Battle Creek and 6 miles of tributaries while minimizing reductions to  
15 hydroelectric power generation through the decommissioning of five powerplants.

16 *Sacramento River from Red Bluff to the Delta*

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

21 Recent mean daily flows in the Sacramento River at Bend Bridge (near Red  
22 Bluff), Vina Bridge (near Tehama), Hamilton City, Wilkins Slough (upstream of  
23 the Feather River confluence), Verona (downstream of the Feather River  
24 confluence), and Freeport (downstream of the American River Confluence and  
25 near the northern boundary of the Delta), are presented on Figures 5.20  
26 through 5.25 (DWR 2013u, 2013v, 2013w, 2013x, 2103y, 2013z). Flows in  
27 the Sacramento River generally peak during winter and spring storm events.  
28 Upstream of Hamilton City, sharp increases in flow occur during rainfall events,  
29 such as events in February 2004, December 2005/January 2006, and January  
30 2010. Downstream of Hamilton City, the high flow events occur over a longer  
31 period of time as water flows into the river from the tributaries.

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

42 Major diversions in this reach of the Sacramento River include the CVP Red  
43 Bluff Pumping Plant, Glenn-Colusa Irrigation District (GCID) intake, and  
44 individual diversions for the CVP Sacramento River Settlement Contractors. The  
45 Red Bluff Pumping Plant was completed in August 2012 to improve fish passage

## Chapter 5: Surface Water Resources and Water Supplies

1 conditions on the Sacramento River by removing the Red Bluff Diversion Dam,  
2 and to continue to divert water from the Sacramento River into the Tehama-  
3 Colusa and Corning canals. The GCID Main Pump Station is located near  
4 Hamilton City to divert water into the GCID Canal that conveys water to over  
5 130,000 acres, including the USFWS Sacramento National Wildlife Refuge; and  
6 terminates at the Colusa Basin Drain near Williams. In 2001, the GCID Fish  
7 Screen was completed in addition to several canal improvements to allow year-  
8 round water deliveries.

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

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

24 The Sacramento River between Red Bluff and Chico Landing, the Sacramento  
25 River Flood Control Project has provided bank protection and incidental channel  
26 modification since 1958 (DWR 2013t). Between Chico Landing and Colusa, the  
27 flood management facilities consist of levees and overflow areas. Black Butte  
28 Reservoir regulates Stony Creek flood flows, which enter the Sacramento River  
29 downstream of Hamilton City. Right bank levees from Ord Ferry through Colusa  
30 prevent Sacramento River flood water from entering the Colusa Basin, except  
31 when flows exceed 300,000 cfs near Ord Ferry (DWR 2013t). Three flood relief  
32 weirs along the right bank, downstream of Chico Landing, allow flood flows to  
33 spill into the Butte Basin Overflow Area. The left bank levee begins midway  
34 between Ord Ferry and Butte City and extends south through Verona, and  
35 includes the Moulton and Colusa weirs that allow flood flows to spill into the  
36 Butte Basin Overflow Area. The natural Sutter Basin overflow (Sutter Bypass) to  
37 the east of the Sacramento River and downstream of the Sutter Buttes was  
38 included in the Sacramento River Flood Control Project. The Sutter Bypass  
39 conveys floodwaters from the Butte Basin Overflow Area, Butte Creek,  
40 Wadsworth Canal, and Reclamation Districts 1660 and 1500 drainage plants, state  
41 drainage plants, and Tisdale Weir to the confluence of the Sacramento and  
42 Feather rivers. Downstream of Colusa, Reclamation Districts 70, 108, and  
43 787 pump flood waters from adjacent closed basin lands into the river.

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

7 *Implementation of 2009 National Marine Fisheries Service Biological*  
8 *Opinion*

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

11 *Yolo Bypass*

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

23 Flows also enter the Yolo Bypass from the Colusa Basin, including from the  
24 Colusa Basin Drain through the Knights Landing Ridge Cut. In 2011 and 2012,  
25 construction at the outfall gates required water from the Colusa Basin Drain to be  
26 diverted into the Yolo Bypass. These events temporarily resulted in a fall pulse  
27 flow in the Yolo Bypass that increased the volume of flow by more than 300 to  
28 900 percent (Frantzich 2014).

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

- 32 • January 2002 – spill continued for 7 days with flows up to 30,000 cfs
- 33 • January 2003 – spill continued for 6 days with flows up to 22,000 cfs
- 34 • May 2003 – spill continued for 1 day with flows up to 100 cfs
- 35 • January 2004 – spill continued for 3 days with flows up to 3,000 cfs
- 36 • February 2004 – spill continued for 20 days with flows up to 79,000 cfs
- 37 • May 2005 – spill continued for 4 days with flows up to 35,000 cfs
- 38 • January/February 2006 (2 events) – spill continued for a total of 37 days with  
39 flows up to 205,000 cfs

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- 1 • March/April/May 2006 – spill continued for 65 days with flows up to  
2 96,000 cfs
- 3 • January 2010 – spill continued for 4 days with flows up to 5,000 cfs
- 4 • December 2010 – spill continued for 4 days with flows up to 9,000 cfs
- 5 • March/April 2011 – spill continued for 24 days with flows up to 85,000 cfs
- 6 • December 2012 – spill continued for 5 days with flows up to 26,000 cfs

7 *Implementation of 2009 National Marine Fisheries Service Biological*  
8 *Opinion*

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

19 *Feather River Watershed*

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

25 *Upper Feather River, Lake Oroville, and the Thermalito Complex*

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

40 A maximum of 17,400 cfs can be released from Lake Oroville through the  
41 Edward Hyatt Powerplant, and the Thermalito Power Canal into the Thermalito  
42 Diversion Pool. Water continues through the Thermalito Diversion Pool into the



1 Feather River Fish Hatchery and the 11,768-acre-foot Thermalito Forebay formed  
2 by the Thermalito Diversion Dam. Water is released from the Thermalito  
3 Forebay through the Thermalito Powerplant into the Thermalito Afterbay and the  
4 low flow channel of the Feather River.

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

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

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

#### 24 *Lower Yuba River*

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

33 Water is diverted from New Bullards Bar Reservoir through the Colgate Tunnel  
34 and Powerhouse and discharged into the Yuba River. The 70-TAF Englebright  
35 Lake is formed by the Harry L. Englebright Dam downstream of New Bullards  
36 Dam. Englebright Lake was constructed by the California Debris Commission to  
37 trap and store sediment from historical hydraulic mining sites in the upper  
38 watershed and provide recreation and hydroelectric generation opportunities  
39 (USACE 2013). Following decommissioning of the California Debris  
40 Commission in 1986, administration of Englebright Dam and Lake was assumed  
41 by the USACE (USACE 2012, 2013, 2014). Major water diversions from the  
42 Yuba River occur 12.5 miles downstream of Englebright Dam at Daguerre Point  
43 Dam. Water transfers have occurred between Yuba County Water Agency and  
44 other water agencies, including CVP and SWP water users, since 2008 under the

1 Lower Yuba River Accord, as described in Appendix 3A, No Action Alternative:  
 2 Central Valley Project and State Water Project Operations (Lower Yuba River  
 3 Accord, River Management Team [LYRARMT] 2013).

4 *American River from Folsom Lake to Sacramento River*

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

7 *Folsom Lake and Lake Natoma*

8 Folsom Lake and Lake Natoma on the American River are located within portions  
 9 of the American River watershed that could be affected by changes in CVP and/or  
 10 SWP operations. Folsom Lake is a CVP facility formed by Folsom Dam 7 miles  
 11 upstream of the CVP Nimbus Dam (Reclamation et al. 2006). Folsom, Lake is  
 12 the largest reservoir in the American River watershed, and has a capacity of  
 13 967 TAF. Numerous smaller reservoirs in the upper basin provide hydroelectric  
 14 generation and water supply and are not owned or operated by Reclamation or  
 15 DWR. The total upstream reservoir storage above Folsom Lake is approximately  
 16 820 TAF. Ninety percent of this upstream storage is provided by five reservoirs:  
 17 French Meadows (136 TAF); Hell Hole (208 TAF); Loon Lake (76 TAF); Union  
 18 Valley (271 TAF); and Ice House (46 TAF).

19 Nimbus Dam creates Lake Natoma, a forebay built to re-regulate flows of the  
 20 American River and to direct water into the CVP Folsom South Canal. Releases  
 21 from Nimbus Dam to the American River pass through the Nimbus Powerplant  
 22 when releases are less than 5,000 cfs or the spillway gates for higher flows. The  
 23 American River flows 23 miles between Nimbus Dam and the confluence with  
 24 the Sacramento River. Historical water storage volumes and water storage  
 25 elevations for Folsom Lake and Lake Natoma for Water Years 2001 through 2012  
 26 are presented on Figures 5.32 through 5.35) (DWR 2013ag, 2013ah, 2013ai,  
 27 2013aj). Median daily flows in American River downstream of Nimbus Dam are  
 28 presented in Figure 5.36 (DWR 2013ak).

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

35 *Lower American River Flows*

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

1            *Lower American River Flood Management*

2 Flood management requirements and regulating criteria for October 1 through  
3 May 31 each year were specified in 1987 by the USACE to manage flooding in  
4 the Sacramento area, as practicable; provide maximum amount of water  
5 conservation storage in Folsom without impairing the flood control; and provide  
6 maximum amount of power practicable and be consistent with required flood  
7 control operations and the conservation functions of the reservoir. Following  
8 significant flood events in February 1986 and January 1997, the lower American  
9 River flooding issues were analyzed; and revised flood operations criteria were  
10 developed by the Sacramento Area Flood Control Agency (SAFCA), as described  
11 in Appendix 3A, No Action Alternative: Central Valley Project and State Water  
12 Project Operations. The SAFCA release criteria are generally equivalent to the  
13 USACE plan, except the SAFCA diagram may prescribe flood releases earlier  
14 than the USACE plan. The SAFCA diagram also relies on Folsom Dam outlet  
15 capacity to make the earlier flood releases. The outlet capacity at Folsom Dam is  
16 currently limited to 32,000 cfs based on lake elevation. Since 1996, Reclamation  
17 has operated according to modified flood control criteria, which reserve 400 to  
18 670 TAF of flood control space in Folsom Reservoir in combination with empty  
19 reservoir space in Hell Hole, Union Valley, and French Meadows to be treated as  
20 if it were available in Folsom Reservoir.

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

28            *Lower American River Minimum Flow and Temperature Requirements*

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

40 Dedication of water in accordance with Section 3406(b)(2) of CVPIA on the  
41 American River provides instream flows below Nimbus Dam greater than those  
42 that would have occurred under pre-CVPIA conditions, as described in Appendix  
43 3A, No Action Alternative: Central Valley Project and State Water Project  
44 Operations. Instream flow objectives from October through May generally aim to  
45 provide suitable habitat for salmon and steelhead spawning, incubation, and

1 rearing, while considering impacts to other CVP and SWP uses. Instream flow  
2 objectives for June to September endeavor to provide suitable flows and water  
3 temperatures for juvenile steelhead rearing, while balancing the effects on  
4 temperature operations into October and November to help support fall-run  
5 Chinook Salmon spawning.

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

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

### 37 *American River Flows to Meet Delta Salinity Requirements*

38 Folsom Reservoir also is operated by Reclamation to release water to meet Delta  
39 salinity and flow objectives established to improve fisheries conditions. Weather  
40 conditions combined with tidal action and local accretions from runoff and return  
41 flows can quickly affect Delta salinity conditions, and require increases in spring  
42 Delta inflow to maintain salinity standards, as described in Appendix 3A, No  
43 Action Alternative: Central Valley Project and State Water Project Operations. In  
44 accordance with Federal and state regulatory requirements, the CVP and SWP are  
45 frequently required to release water from upstream reservoirs to maintain Delta

1 water quality. Folsom Lake is located closer to the Delta than Lake Oroville and  
 2 Shasta Lake; therefore, the water generally is first released from Folsom Lake.  
 3 Water released from Lake Oroville and Shasta Lake generally reaches the Delta in  
 4 approximately three and four days, respectively. As water from the other  
 5 reservoirs arrives in the Delta, Folsom Reservoir releases can be reduced.

6 *Implementation of 2009 National Marine Fisheries Service Biological*  
 7 *Opinion*

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

16 **5.3.2.2.2 San Joaquin Valley**

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

27 The southern drainage basin (also known as the Tulare Lake Basin) extends into  
 28 the southern San Joaquin Valley between the Sierra Nevada on the east,  
 29 Tehachapi Mountains on the south, and the Coast Range on the west (DWR  
 30 2013a). The southern basin includes four major tributaries, including Kings,  
 31 Kaweah, Tule, and Kern rivers, which drain towards three ancient lakes on the  
 32 valley floor, including the Tulare, Buena Vista, and Goose lakes. Flows into  
 33 these lakes have declined as water supply projects and agricultural development  
 34 has occurred. The northern and southern drainage basins are generally  
 35 hydrologically separated by a low, broad ridge that extends across the San  
 36 Joaquin Valley between the San Joaquin and Kings rivers. However, in flood  
 37 years, water flows from the Kings River through the James Bypass and Fresno  
 38 Slough into the San Joaquin River near Mendota; therefore, the basins become  
 39 hydrologically connected.

40 Flows from Fresno, Chowchilla, Tuolumne, Merced, Calaveras, Kings, Kaweah,  
 41 Tule, and Kern rivers contribute substantial flows into the San Joaquin Valley and  
 42 affect operations of CVP and SWP water users and operations. However, the  
 43 operations of reservoirs on these rivers are not modified within the alternatives  
 44 evaluated in this EIS. Therefore, these rivers are not discussed in this chapter.

1 This chapter will focus on the flows in the San Joaquin and Stanislaus rivers that  
2 are affected by changes in CVP and SWP operations considered in the alternatives  
3 evaluated in this EIS.

#### 4 *San Joaquin River*

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

#### 12 *Millerton Lake*

13 Operations of Millerton Lake and the CVP Friant Division will not be modified  
14 by changes in CVP and SWP operations under the alternatives considered in this  
15 EIS. Therefore, Millerton Lake and Friant Division are not analyzed in this EIS.  
16 The following information is presented to provide a general understanding of  
17 Millerton Lake and Friant Division operations as part of the CVP.

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

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

#### 32 *San Joaquin River from Friant Dam to Mendota Pool*

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

1 Millerton Lake to provide water to water rights holders is approximately 125 cfs  
2 (SWRCB 2012).

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

12 The 50-TAF Mendota Pool serves as a forebay for diversions to the Main and  
13 Outside canals; and is the termination of the Delta-Mendota Canal, which conveys  
14 CVP water from the Delta, as described in Appendix 3A, No Action Alternative:  
15 Central Valley Project and State Water Project Operations. Water also enters  
16 Mendota Pool via Fresno Slough (also known as James Bypass) which conveys  
17 flood flows to the San Joaquin River from the Kings River (located in the Tulare  
18 Lake Basin). Recent mean daily flows in the San Joaquin River at Mendota are  
19 presented on Figure 5.37 (DWR 2013al).

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

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

1 River and Merced River confluence. For the purposes of this analysis, flows that  
2 reach the Merced confluence are assumed to continue to the Delta.

3 *San Joaquin River from Merced River to the Delta*

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

10 *Stanislaus River*

11 The Stanislaus River originates in the western slopes of the Sierra Nevada and  
12 drains a watershed of approximately 900 square miles. The average unimpaired  
13 runoff in the basin is approximately 1.2 MAF per year; the median historical  
14 unimpaired runoff is 1.1 MAF per year. Snowmelt from March through early  
15 July contributes the largest portion of the flows in the Stanislaus River, with the  
16 highest runoff occurring in the months of April, May, and June.

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

28 Below Goodwin Dam, the lower Stanislaus River flows approximately 40 miles to  
29 the confluence with the San Joaquin River. Twenty ungauged tributaries  
30 contribute intermittent flows to the lower portion of the Stanislaus River, and a  
31 portion of the river flow originates from groundwater accretions. Agricultural  
32 return flows and operational spills from irrigation canals also enter the lower  
33 Stanislaus River.

34 *New Melones Reservoir*

35 The operating criteria for New Melones Reservoir are constrained by water rights  
36 requirements, flood control operations, contractual obligations, and federal  
37 requirements under the Federal Endangered Species Act (ESA) and CVPIA.  
38 Reclamation must operate New Melones Reservoir to meet senior water rights  
39 and in-basin demands. Senior water rights are defined for both current and future  
40 upstream water right holders in accordance with the SWRCB Decision 1422  
41 (D-1422) and Decision 1616 (D-1616); through protest settlement agreements  
42 with Tuolumne and Calaveras Counties; and for current downstream water right  
43 holders and riparian rights whose priorities are either senior to Reclamation or  
44 senior to appropriative rights in general, respectively, as described in Appendix



1 3A, No Action Alternative: Central Valley Project and State Water Project  
 2 Operations. Reclamation also is required to make full contract amounts available  
 3 to Stockton East Water District and Central San Joaquin Water Conservation  
 4 District except for when contractual shortage provisions apply.

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

12 Reservoir storage varies in accordance with upstream hydrology and downstream  
 13 water demands and instream flow requirements. Recent water storage volumes  
 14 and elevations for Water Years 2001 through 2012 in New Melones and Goodwin  
 15 reservoirs are presented on Figures 5.39 through 5.42 (DWR 2013an, 2013ao,  
 16 2013ap, 2013aq). Recent mean daily flows in the Stanislaus River downstream of  
 17 Goodwin Dam are presented on Figure 5.43 (DWR 2013as).

18 *Implementation of 2009 National Marine Fisheries Service Biological*  
 19 *Opinion*

20 The 2009 NMFS BO RPA requires Reclamation to adaptively manage flows to  
 21 meet minimum instream flow, ramping flow, pulse flow, floodplain inundation,  
 22 and geomorphic and function flow patterns, through the following actions.

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

38 The 2009 NMFS BO also required Reclamation to meet temperature requirements  
 39 at Orange Blossom Bridge and Knights Ferry to protect steelhead, as discussed in  
 40 Appendix 3A, No Action Alternative: Central Valley Project and State Water  
 41 Project Operations. Reclamation is also required to evaluate an approach to  
 42 operate New Melones Reservoir flow releases to achieve floodplain inundation

1 flows and improved freshwater migratory habitat for steelhead. Reclamation also  
2 participates in gravel augmentation to improve spawning habitat.

### 3 **5.3.2.2.3 Delta and Suisun Marsh**

4 The Delta and Suisun Marsh area constitutes a natural floodplain that covers  
5 1,315 square miles and drains approximately 40 percent of the state (DWR  
6 2013a). The Delta and Suisun Marsh have a complex web of channels and islands  
7 and is located at the confluence of the Sacramento and San Joaquin rivers.

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

19 Inflows to the Delta occur primarily from the Sacramento River system and Yolo  
20 Bypass, the San Joaquin River, and other eastside tributaries such as the  
21 Mokelumne, Calaveras, and Cosumnes rivers. In general, in any given year,  
22 approximately 77 percent of water enters the Delta from the Sacramento River,  
23 approximately 15 percent enters from the San Joaquin River, and approximately  
24 8 percent enters from the eastside tributaries (DWR 1994). The Delta is tidally  
25 influenced; rise and fall varies from less than 1 foot in the eastern Delta to more  
26 than 5 feet in the western Delta (DWR 2013a).

27 Water quality in the Delta is highly variable and strongly influenced by inflows  
28 from the rivers and by seawater intrusion into the western and central portions of  
29 the Delta during periods of low outflow that may be affected by high volumes of  
30 export pumping. The concentrations of salts and other materials in the Delta are  
31 affected by river inflows, tidal flows, agricultural diversions, drainage flows,  
32 wastewater discharges, water exports, cooling water intakes and discharges, and  
33 groundwater accretions. Seawater intrusion into the Delta is dependent on tidal  
34 conditions, inflows to the Delta, and Delta channel geometry. Delta channels are  
35 typically less than 30 feet deep, unless dredged, and vary in width from less than  
36 100 feet to more than 1 mile. Although some channels are edged with riparian  
37 and aquatic vegetation, steep mud or rip-rap covered levees border most channels.  
38 To enhance flow and aid in levee maintenance, vegetation is often removed from  
39 the channel margins. The tidal currents carry large volumes of seawater back and  
40 forth through the San Francisco Bay-Delta Estuary with the tidal cycle. The  
41 mixing zone of salt and fresh water can shift 2 to 6 miles daily depending on the  
42 tides, and may reach far into the Delta during periods of low inflow.

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

7 Hydrological conditions in the Delta and Suisun Marsh are substantially affected  
8 by structures that route water through the Delta towards the major Delta water  
9 diversions in the south Delta, including the CVP Jones Pumping Plant, the SWP  
10 Banks Pumping Plant, the Delta-Mendota/California Aqueduct Intertie, the CVP  
11 Contra Costa Canal Pumping Plant at Rock Slough, and the Contra Costa Water  
12 District (CCWD) intakes on Old and Middle rivers; while protecting Delta water  
13 quality for these intakes, the SWP Barker Slough Pumping Plant in the north  
14 Delta and over 1,800 municipal and agricultural in-Delta diversions (DWR  
15 2010b). These structures include the Delta Cross Channel and temporary barriers  
16 in the south Delta. Diversion patterns for the major facilities also are regulated to  
17 maintain Delta water quality and to protect fish that are listed as threatened or  
18 endangered species under ESA in accordance with the SWRCB D-1641, 2008  
19 USFWS BO, and the 2009 NMFS BO. The diversion patterns are implemented to  
20 maintain ratios of exports of the CVP and SWP facilities to the Delta inflow;  
21 ratios of San Joaquin River inflow to Delta exports; and reverse flow conditions  
22 in Old and Middle rivers (known as the OMR criteria). Operations of the Jones  
23 and Banks pumping plants are affected by downstream CVP and SWP water  
24 demands and reservoir operations in San Luis Reservoir that is jointly used by the  
25 CVP and SWP.

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

### 31 *Delta Cross Channel*

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

40 Reclamation operates the DCC in the open position to (1) improve the movement  
41 of water from the Sacramento River to the export facilities at the Banks and Jones  
42 Pumping Plants, (2) improve water quality in the southern Delta, and (3) reduce  
43 salt water intrusion rates in the western Delta. During the late fall, winter, and  
44 spring, the gates are often periodically closed to protect out migrating salmonids  
45 from entering the interior Delta. In addition, whenever flows in the Sacramento

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1 River at Sacramento reach 20,000 to 25,000 cfs (on a sustained basis) the gates  
 2 are closed to reduce potential scouring and flooding that might occur in the  
 3 channels on the downstream side of the gates.

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

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

16 *Implementation of 2009 National Marine Fisheries Service Biological*  
 17 *Opinion*

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

22 *Temporary Agricultural Barriers*

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

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

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

1 River. The HORB also has been installed in the spring months to improve  
2 outmigrating conditions for juvenile salmonids.

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

#### 11 *Major Delta Water Diversions*

12 Major water diversions in the Delta include the CVP Jones Pumping Plant, the  
13 SWP Banks Pumping Plant, the CVP Contra Costa Canal Pumping Plant at Rock  
14 Slough, the SWP Barker Slough Pumping Plant for the North Bay Aqueduct,  
15 Contra Costa Water District intakes on Old and Middle rivers, and over  
16 1,800 municipal and agricultural diversions for in-Delta use (DWR 2010b). Delta  
17 channels have been modified to allow transport of Delta inflow to the diversions  
18 throughout the Delta, including the CVP and SWP south Delta intakes, and to  
19 reduce the effects of pumping on the direction of flows and salinity intrusion  
20 within the Delta. The conveyance of water from the Sacramento River southward  
21 through the Delta to the CVP and SWP south Delta intakes is aided by the Delta  
22 Cross Channel (DCC), a constructed, gated channel that conveys water from the  
23 Sacramento River to the Mokelumne River.

#### 24 *CVP Jones Pumping Plant*

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

#### 35 *SWP Clifton Court and Banks Pumping Plant*

36 The SWP facilities in the southern Delta include the 31-TAF Clifton Court  
37 Forebay (CCF), located about 10 miles northwest of the city of Tracy, and the  
38 Banks Pumping Plant, as described in Appendix 3A, No Action Alternative:  
39 Central Valley Project and State Water Project Operations. Water is diverted  
40 from Old River into CCF that provides storage for off-peak pumping, moderates  
41 the effect of the pumps on the fluctuation of flow and stage in adjacent Delta  
42 channels, and collects sediment upstream of the Banks Pumping Plant and the  
43 California Aqueduct. Water flows from CCF to Banks Pumping Plant which  
44 conveys the water to California Aqueduct. The California Aqueduct transports

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1 water to O'Neill Forebay, from which water can be released to the San Luis  
 2 Canal, a portion of the California Aqueduct jointly owned by the SWP and CVP;  
 3 or pumped into San Luis Reservoir at the Gianelli Pumping Plant. Water from  
 4 San Luis Reservoir is released into the San Luis Canal which ends near Kettleman  
 5 City. From that location, the California Aqueduct continues to southern  
 6 California.

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

14 In 2000, the maximum diversion rate was increased for the months of July,  
 15 August, and September through 2016 to recover export reductions that occurred  
 16 due to actions taken to benefit fisheries resources. The expanded maximum  
 17 allowable daily diversion rate into CCF was increased from 13,870 acre-feet to  
 18 14,860 acre-feet and three-day average diversions from 13,250 acre-feet to  
 19 14,240 acre-feet (500 cfs per day equals 990 acre-feet per day). Implementation  
 20 of this action is contingent on meeting the following conditions.

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

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

40 Banks Pumping Plant is operated to minimize the impact on power loads on the  
 41 California electrical grid to the extent practical. Generally more pump units are  
 42 operated during off-peak periods and fewer during peak periods with water stored  
 43 temporarily in CCF. Because the installed capacity of the pumping plant is

1 10,300 cfs, the plant can be operated to reduce power grid impacts by running all  
2 available pumps at night and fewer during the higher energy-demand hours.

3 *SWP Barker Slough Pumping Plant*

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

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

28 *Contra Costa Water District Intakes*

29 The CCWD diverts approximately 127 TAF per year, including approximately  
30 110 TAF under the CVP water service contract. The CCWD diverts water at the  
31 CVP Rock Slough Intake, and at the CCWD Mallard Slough, Old River, and  
32 Middle River (on Victoria Canal) intakes, as described in Appendix 3A, No  
33 Action Alternative: Central Valley Project and State Water Project Operations.  
34 Water diverted at Mallard Slough, Old River, and Middle River intakes occur  
35 under water rights issued by the SWRCB to CCWD. Water diverted at Rock  
36 Slough, Old River, and Middle River intakes occur under water rights issued by  
37 the SWRCB to Reclamation for the CVP. All four intakes have positive barrier  
38 fish screens. Water from the Old River and Middle River intakes can be diverted  
39 to the 160-TAF Los Vaqueros Reservoir when Delta salinity is low. When Delta  
40 salinity is high, typically in the fall months, CCWD blends low salinity water  
41 from Los Vaqueros Reservoir with water from the Delta to meet CCWD water  
42 quality goals. Water from Los Vaqueros Reservoir is also used by CCWD when  
43 Delta diversions are restricted.

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

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

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

16 The Middle River Intake (formerly referred to as Alternative Intake Project),  
 17 located on Victoria Canal, diverts water to the Contra Costa Canal or to Los  
 18 Vaqueros Reservoir. Salinity at the Middle River Intake is generally lower in the  
 19 late summer and fall than at the other intakes. Therefore, CCWD can decrease  
 20 winter and spring diversions while still meeting water quality goals in the summer  
 21 and fall through use of the Middle River Intake.

22 *Delta-Mendota Canal/California Aqueduct Intertie*

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

- 32 • Up to 467 cfs may be pumped from the DMC to the California Aqueduct to  
 33 ease DMC conveyance constraints related to Jones Pumping Plant capacity  
 34 limitations.
- 35 • Up to 467 cfs may be pumped from the DMC to the California Aqueduct to  
 36 minimize impacts on water deliveries due to temporary restrictions in flow or  
 37 water levels on the lower DMC (south of the Intertie) or the upper California  
 38 Aqueduct (north of the Intertie) for system maintenance or due to an  
 39 emergency shutdown.
- 40 • Up to 900 cfs may be conveyed from the California Aqueduct to the DMC  
 41 using gravity flow to minimize impacts on water deliveries due to temporary  
 42 restrictions in flow or water levels on the lower California Aqueduct



1 (downstream of the Intertie) or the upper DMC (upstream of the Intertie) for  
2 system maintenance or for an emergency shutdown.

3 *San Luis Reservoir*

4 The 2.027-MAF San Luis Reservoir, formed by Sisk Dam, is jointly operated by  
5 Reclamation and DWR, with approximately 0.965 MAF used by the CVP and  
6 1.062 MAF used by the SWP. Water generally is diverted into San Luis  
7 Reservoir during late fall through early spring when irrigation water demands of  
8 CVP and SWP water users are low and are being met by Delta exports.

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

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

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

35 Article 21 water is typically offered to SWP contractors on a short-term (daily or  
36 weekly) basis when all of the following conditions exist: the SWP share of San  
37 Luis Reservoir is physically full, or projected to be physically full; other SWP  
38 reservoirs south of the Delta are at their storage targets or the SWP conveyance  
39 capacity to fill these reservoirs is maximized; the Delta is in excess condition;  
40 current Table A and SWP operational demands are being fully met; and Banks  
41 Pumping Plant has export capacity beyond that which is needed to meet all  
42 Table A and other SWP operational demands. The increment of available unused  
43 Banks Pumping Plant capacity is offered as the Article 21 delivery capacity.  
44 SWP contractors then indicate their desired rate of delivery of Article 21 water.

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1 DWR allocates the available Article 21 water in proportion to the requesting SWP  
 2 contractors annual Table A amounts if requests exceed the amount offered.  
 3 Deliveries can be discontinued at any time when SWP operations change. In the  
 4 modeling for Article 21, deliveries are only made in months when the SWP share  
 5 of San Luis Reservoir is full. In actual operations, Article 21 may be offered a  
 6 short period in advance of actual filling.

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

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

14 The San Luis Complex consists of the following.

- 15 • O'Neill Pumping-Generating Plant (CVP facility)
- 16 • William R. Gianelli Pumping-Generating Plant (joint CVP and SWP facility)
- 17 • San Luis Canal (joint CVP and SWP facility)
- 18 • Dos Amigos Pumping Plant (joint CVP and SWP facility)
- 19 • Coalinga Canal (CVP facility)
- 20 • Pleasant Valley Pumping Plant (CVP facility)
- 21 • Los Banos and Little Panoche Detention Dams and Reservoirs (joint CVP and  
 22 SWP facilities)

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

28 *Regulatory Limitations on Operations of Delta Water Diversions*

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

32 *Decision 1641*

33 The SWRCB adopted the 1995 Bay-Delta Plan on May 22, 1995, which became  
 34 the basis of SWRCB D-1641 (adopted on December 29, 1999 and revised on  
 35 March 15, 2000). The SWRCB D-1641 amended certain terms and conditions of  
 36 the SWP and CVP water rights to include flow and water quality objectives to  
 37 assure protection of beneficial uses in the Delta and Suisun Marsh. SWRCB also  
 38 grants conditional changes to points of diversion for the CVP and SWP under  
 39 SWRCB D-1641. The SWRCB adopted a revised Bay-Delta Plan on  
 40 December 13, 2006; however, there were no changes to the beneficial uses or

1 water quality objectives. The changes were primarily to improve readability and  
2 consistency to reflect current physical conditions and other regulations.

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

13 The SWRCB D-1641 includes two Delta outflow criteria. A Net Delta Outflow  
14 Index is specified for all months in all water year types. A “spring X2” Delta  
15 outflow is specified from February through June to maintain freshwater and  
16 estuarine conditions in the western Delta to protect aquatic life. The criteria  
17 requires operations of the CVP and SWP upstream reservoir releases and Delta  
18 exports in a manner that maintains a salinity objective at an “X2” location. X2  
19 refers to the horizontal distance from the Golden Gate Bridge up the axis of the  
20 Delta estuary to where tidally averaged near-bottom salinity concentration of  
21 2 parts of salt in 1,000 parts of water occurs; the X2 standard was established to  
22 improve shallow water estuarine habitat in the months of February through June  
23 and relates to the extent of salinity movement into the Delta (DWR, Reclamation,  
24 USFWS and NMFS 2013). The location of X2 is important to both aquatic life  
25 and water supply beneficial uses.

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

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

32 Historical mean daily flows for Water Years 2001 through 2012 are presented on  
33 Figures 5.46 through 5.52 for diversions at Jones, Banks, Barker Slough, and  
34 Contra Costa Canal pumping plants; and Contra Costa Water District intakes at  
35 Old River and Middle River (DWR 2013av, 2103aw, 2013ax, 2013ay, 2013az,  
36 2013ba).

### 37 *Joint Point of Diversion*

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

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

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

- 11 • When wintertime excess pumping capacity becomes available during Delta  
12 excess conditions and total CVP and SWP San Luis storage is not projected to  
13 fill before the spring pulse flow period, the Project with the deficit in San Luis  
14 storage may elect to pursue the use of JPOD capabilities;
- 15 • When summertime pumping capacity is available at Banks Pumping Plant and  
16 CVP reservoir conditions can support additional releases, the CVP may elect  
17 to use JPOD capabilities to enhance annual CVP south of Delta water  
18 supplies;
- 19 • When summertime pumping capacity is available at Banks or Jones Pumping  
20 Plant to facilitate water transfers, JPOD may be used to further facilitate the  
21 water transfer; and
- 22 • During certain coordinated CVP and SWP operation scenarios for fishery  
23 entrainment management, JPOD may be used to shift CVP and SWP exports  
24 to the facility with the least fishery entrainment impact while minimizing  
25 export at the facility with the most fishery entrainment impact.

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

1 *Implementation of 2008 USFWS and 2009 NMFS Biological Opinions*

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

6 *2008 USFWS BO OMR Criteria*

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

- 9 • **Action 1:** to protect adult Delta smelt migration and entrainment. Limits  
10 exports so that the average daily OMR flow is no more negative  
11 than -2,000 cfs for a total duration of 14 days, with a 5-day running average  
12 no more negative than -2,500 cfs (within 25 percent).
- 13 – December 1 to December 20 – Based upon turbidity data from turbidity  
14 stations (Prisoner’s Point, Holland Cut, and Victoria Canal) and salvage  
15 data from CVP and SWP fish handling facilities at the south Delta intakes,  
16 and other parameters important to the protection of delta smelt including,  
17 but not limited to, preceding conditions of X2, Fall Midwater Trawl  
18 Survey (FMWT), and river flows.
- 19 – After December 20 – The action will begin if the three-day average  
20 turbidity at Prisoner’s Point, Holland Cut, and Victoria Canal exceeds  
21 12 nephelometric turbidity units (NTU).
- 22 – Triggers would be based on:
- 23 ○ Three-day average of 12 NTU or greater at all three turbidity stations;  
24 or
- 25 ○ Three days of delta smelt salvage after December 20 at either facility  
26 or cumulative daily salvage count that is above a risk threshold based  
27 upon the “daily salvage index” approach reflected in a daily salvage  
28 index value of greater than or equal to 0.5 (daily delta smelt salvage is  
29 greater than one-half prior year FMWT index value). The window for  
30 triggering Action 1 concludes when either off-ramp condition  
31 described below is met. These off-ramp conditions may occur without  
32 Action 1 ever being triggered. If this occurs, then Action 3 is  
33 triggered, unless the Service concludes on the basis of the totality of  
34 available information that Action 2 should be implemented instead.
- 35 – Action 1 offramps occur when water temperature reaches 12 degrees  
36 Centigrade (°C) based on a three station daily mean at the temperature  
37 stations: Mossdale, Antioch, and Rio Vista; or the onset of spawning  
38 based upon the presence of spent females in the Spring Kodiak Trawl  
39 Survey or at the CVP or SWP fish handling facilities.
- 40 • **Action 2:** to protect adult Delta smelt migration and entrainment. An action  
41 implemented using an adaptive process to tailor protection to changing  
42 environmental conditions after Action 1. As in Action 1, the intent is to

1 protect pre-spawning adults from entrainment and, to the extent possible, from  
 2 adverse hydrodynamic conditions. The range of net daily OMR flows will be  
 3 no more negative than -1,250 to -5,000 cfs. Depending on extant conditions,  
 4 specific OMR flows within this range are recommended by the USFWS Smelt  
 5 Working Group (SWG) from the onset of Action 2 through its termination.  
 6 The SWG would provide weekly recommendations based upon review of the  
 7 sampling data, from real-time salvage data at the CVP and SWP, and utilizing  
 8 most up-to-date technological expertise and knowledge relating population  
 9 status and predicted distribution to monitored physical variables of flow and  
 10 turbidity. The USFWS will make the final determination.

- 11 – Action 2 begins immediately following Action 1. If Action 1 is not  
 12 implemented based upon triggers, the SWG may recommend a start date  
 13 for Action 2.
- 14 – Action 2 is suspended when whenever a three-day flow average is greater  
 15 than or equal to 90,000 cfs in Sacramento River at Rio Vista and  
 16 10,000 cfs in San Joaquin River at Vernalis. Once such flows have  
 17 abated, the OMR flow requirements of Action 2 are restarted.
- 18 – Offramps for Action 2 are related to water temperature reaches 12°C  
 19 based on a three-station daily average at the temperature stations: Rio  
 20 Vista, Antioch, and Mossdale; or the onset of spawning based upon the  
 21 presence of a spent female in the Spring Kodiak Trawl Survey or at the  
 22 CVP or SWP fish handling facilities.
- 23 • **Action 3:** to protect larval and juvenile Delta Smelt. Minimize the number of  
 24 larval delta smelt entrained at the facilities by managing the hydrodynamics in  
 25 the Central Delta flow levels pumping rates spanning a time sufficient for  
 26 protection of larval delta smelt. Net daily OMR flow will be no more  
 27 negative than -1,250 to -5,000 cfs based on a 14-day running average with a  
 28 simultaneous 5-day running average within 25 percent of the applicable  
 29 requirement for OMR. Depending on extant conditions, specific OMR flows  
 30 within this range are recommended by the SWG from the onset of Action 3  
 31 through its termination.
- 32 – Action 3 begins when temperature reaches 12°C based on a three-station  
 33 average at the temperature stations: Mossdale, Antioch, and Rio Vista; or  
 34 onset of spawning based upon the presence of a spent female in the Spring  
 35 Kodiak Trawl Survey or at the CVP or SWP fish handling facilities.
- 36 – Offramps for Action 3 would occur by June 30; or if water temperature  
 37 reaches a daily average of 25°C for three consecutive days 10 at Clifton  
 38 Court Forebay.

39 *2009 NMFS BO OMR Criteria*

40 The 2009 NMFS BO includes OMR criteria to protect juvenile salmonids during  
 41 winter and spring emigration downstream into the San Joaquin River, and to  
 42 increase survival of salmonids and green sturgeon entering the San Joaquin River  
 43 from Georgiana Slough and the lower Mokelumne River by reducing the potential

1 for entrainment at the south Delta intakes. The action is implemented from  
 2 January 1 through June 15, reduce exports, as necessary, to limit negative flows  
 3 to -2,500 to -5,000 cfs in Old and Middle Rivers, depending on the presence of  
 4 salmonids. The reverse flow will be managed within this range to reduce flows  
 5 toward the pumps during periods of increased salmonid presence. The negative  
 6 flow objective within the range shall be determine based on the decision tree  
 7 presented in Table 5.8.

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

1                    *2009 NMFS BO San Joaquin River Inflow:Export Ratio*  
 2     The 2009 NMFS BO requires south Delta exports to be reduced during April and  
 3     May to protect emigrating steelhead from the lower San Joaquin River into the  
 4     south Delta channels and intakes. The I:E ratio from April 1 through May 31  
 5     specifies that Reclamation operates the New Melones Reservoir to maintain the  
 6     2009 NMFS BO flow schedule for the Stanislaus River at Goodwin in accordance  
 7     with Action III.1.3 and Appendix 2-E of the 2009 NMFS BO. In addition, the  
 8     CVP and SWP pumps are operated to meet the ratios based upon a 14-day  
 9     running average, as summarized in Table 5.9.

10     **Table 5.9 Inflow:Export Ratios under the 2009 NMFS BO**

<b>San Joaquin Valley Classification</b>	<b>San Joaquin River flow at Vernalis (cfs):CVP/SWP combined export ratio (cfs)</b>
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.

11     During multiple dry years, the ratio will be limited to 1:1 if the New Melones  
 12     Index related to storage is less than 1,000 TAF and the sum of the “indicator”  
 13     numbers established for water year classifications in SWRCB D-1641 (based on  
 14     the San Joaquin Valley 60-20-20 Water Year Classification in SWRCB D-1641)  
 15     is greater than 6 for the past two years and the current year. The indicator  
 16     numbers are 1 for a critically dry year, 2 for a dry year, 3 for a below normal year,  
 17     4 for an above normal year, and 5 for a wet year.

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

21                    *2008 USFWS BO Fall X2 Criteria*

22     The 2008 USFWS BO also includes an additional Delta salinity requirement in  
 23     September and October in wet and above normal water years. This new  
 24     requirement is frequently referred to as “Fall X2.” The action requires that  
 25     2 Practical Salinity Units (psu) is maintained at 74 kilometers (km) during wet  
 26     years, and 81 km during above normal water years when the preceding year was  
 27     wet or above normal based upon the Sacramento Basin 40-30-30 index in the  
 28     SWRCB D-1641. In November of these years, there is no specific X2  
 29     requirement; however, there is a requirement that all inflow into SWP and CVP  
 30     upstream reservoirs be conveyed downstream to augment Delta outflow to  
 31     maintain X2 at the locations in September and October. If storage increases



1 during November under this action, the increased storage volume is to be released  
2 in December in addition to the requirements under SWRCB D-1641 net Delta  
3 Outflow Index.

#### 4 *Coordinated Operation Agreement*

5 The COA, signed in 1986, defines the project facilities and their water supplies,  
6 coordinates operational procedures, identifies formulas for sharing joint  
7 responsibilities for meeting Delta standards (as the standards existed in SWRCB  
8 Water Right Decision 1485 [D-1485]) and other legal uses of water, identifies  
9 how unstored flow will be shared, establishes a framework for exchange of water  
10 and services between the CVP and SWP, and provides for periodic review of the  
11 agreement.

12 Implementation of the COA principles has continuously evolved since 1986 as  
13 changes have occurred to CVP and SWP facilities and operations criteria, and to  
14 the overall physical and regulatory environment in which the coordinated long-  
15 term operation of the CVP and SWP takes place. New water quality and flow  
16 standards (e.g., SWRCB D-1641) have been adopted by SWRCB; the CVPIA has  
17 changed how the CVP is operated; and finally, the ESA responsibilities have  
18 affected both the CVP and SWP operations. DWR and Reclamation have  
19 operational arrangements to accommodate new facilities, water quality and flow  
20 objectives, the CVPIA, SWRCB criteria, and ESA requirements; however, the  
21 COA has not been formally modified to address these newer operating conditions.

#### 22 *Obligations for In-Basin Uses*

23 In-basin uses are defined in the COA as legal uses of water in the Sacramento  
24 Basin, including the water required under the SWRCB D-1485. Both the CVP  
25 and SWP are obligated to ensure water is available for these uses, but the degree  
26 of obligation is dependent on several factors and changes throughout the year.

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

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

39 When water must be withdrawn from reservoir storage to meet in-basin uses,  
40 75 percent of the responsibility is borne by the CVP and 25 percent is borne by  
41 the SWP. When unstored water is available for export (i.e., Delta exports exceed  
42 storage withdrawals while balanced water conditions exist), the sum of CVP  
43 stored water, SWP stored water, and the unstored water for export is allocated

1 55/45 to the CVP and SWP, respectively. The percentages and ratios included in  
 2 the COA were derived from negotiations between Reclamation and DWR for  
 3 SWRCB D-1485 standards and operating conditions. Reclamation and DWR  
 4 have continued to apply these ratios as new SWRCB standards are adopted.

5 *Accounting and Coordination of Operations*

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

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

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

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

38 *Joint Facilities in Suisun Marsh*

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

1        *Suisun Marsh Salinity Control Gates*

2        The Suisun Marsh Salinity Control Gates (SMSCG) are located on Montezuma  
3        Slough about two miles downstream from the confluence of the Sacramento and  
4        San Joaquin Rivers, near Collinsville. The objective of SMSCG operation is to  
5        decrease the salinity of the water in Montezuma Slough by restricting the flow of  
6        higher salinity water from Grizzly Bay into Montezuma Slough during incoming  
7        tides and retaining lower salinity Sacramento River water from the previous ebb  
8        tide. Operation of the gates in this fashion lowers salinity in Suisun Marsh  
9        channels and results in a net movement of water from east to west. When Delta  
10       outflow is low to moderate and the gates are not operating, tidal flow past the gate  
11       is approximately 5,000 to 6,000 cfs while the net flow is near zero. When  
12       operated, flood tide flows are arrested while ebb tide flows remain in the range of  
13       5,000 to 6,000 cfs. The net flow in Montezuma Slough becomes approximately  
14       2,500 to 2,800 cfs. The USACE permit for operating the SMSCG requires that it  
15       be operated between October and May only when needed to meet Suisun Marsh  
16       salinity standards. Historically, the gate has been operated as early as October 1,  
17       although in some years (e.g., 1996) the gate was not operated at all. When the  
18       channel water salinity decreases sufficiently below the salinity standards, or at the  
19       end of the control season, CVP and SWP provide unrestricted movement through  
20       Montezuma Slough.

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

29       *Roaring River Distribution System*

30       The Roaring River Distribution System (RRDS) was constructed during 1979 and  
31       1980 to provide lower salinity water to 5,000 acres of private and 3,000 acres of  
32       CDFW-managed wetlands on Simmons, Hammond, Van Sickle, Wheeler, and  
33       Grizzly islands.

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

42       Water is diverted through a bank of eight 60-inch-diameter culverts equipped with  
43       fish screens into the Roaring River intake pond on high tides to raise the water  
44       surface elevation in RRDS above the adjacent managed wetlands. Managed

1 wetlands north and south of the RRDS receive water, as needed, through publicly  
2 and privately owned turnouts on the system.

### 3 *Morrow Island Distribution System*

4 The Morrow Island Distribution System (MIDS) was constructed in 1979 and  
5 1980 in the southwestern Suisun Marsh to channel drainage water from the  
6 adjacent managed wetlands for discharge into Suisun Slough and Grizzly Bay.  
7 This approach increases circulation and reduces salinity in Goodyear Slough.

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

### 17 **5.3.2.3 CVP and SWP Conveyance Facilities Downstream of San Luis** 18 **Reservoir**

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

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

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

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

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

9 **5.3.2.4 Non-CVP and SWP Reservoirs that Store CVP and SWP Water**

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

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

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

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

35 **5.3.3 Water Supplies Used by Central Valley Project and State**  
36 **Water Project Water Users**

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

## Chapter 5: Surface Water Resources and Water Supplies

1 and SWP water supplies are limited due to climate conditions and hydrology, the  
2 other surface water supplies are also limited.

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

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

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

33 Water transfers also are an integral part of water management. Historically, water  
34 transfers primarily were in-basin transfers (e.g., Sacramento Valley water seller to  
35 Sacramento Valley water user) (Reclamation 2013b; DWR, Reclamation, USFWS  
36 and NMFS 2013). However, between 2001 and 2012, water transfers from the  
37 Sacramento Valley to the areas located south of the Delta of up to 298,806 acre-  
38 feet occurred (not including water transfers under the Environmental Water  
39 Account Program in the early 2000s) (DWR, Reclamation, USFWS and NMFS  
40 2013). These transfers occurred in drier years. In the 2012 and 2013, the  
41 following types of water transfers occurred (DWR and SWRCB 2014).

- 1 • Water transfers involving CVP and SWP water:
- 2 – 2012: 47,420 acre-feet of water transfers (43 percent were between  
3 agricultural water users, 36 percent were between municipal water users,  
4 and 21 percent were between agricultural and municipal water users).
- 5 – 2013: 63,790 acre-feet of water transfers (28 percent were between  
6 agricultural water users, and 72 percent were between agricultural and  
7 municipal water users).
- 8 • Water transfers involving non-CVP and SWP water:
- 9 – 2012: 188,074 acre-feet of water transfers (72 percent were between  
10 agricultural water users, 14 percent were from agricultural water users to  
11 wildlife refuges, and 14 percent were between agricultural and municipal  
12 water users).
- 13 – 2013: 268,370 acre-feet of water transfers (72 percent were between  
14 agricultural water users, 1 percent were from agricultural water users to  
15 wildlife refuges, and 27 percent were between agricultural and municipal  
16 water users).
- 17 Until recently, most of the water transfers extended for one or two years. In 2008,  
18 one of the first long-term water transfer agreements was approved by the SWRCB  
19 for the Lower Yuba River Accord. The plan was designed to protect and enhance  
20 fisheries resources in the Lower Yuba River, increase local water supply  
21 reliability, provide DWR with increased operational flexibility for protection of  
22 Delta fisheries resources, and provide added dry-year water supplies to CVP and  
23 SWP water users, as described in Appendix 3A, No Action Alternative: Central  
24 Valley Project and State Water Project Operations. In 2013, Reclamation  
25 approved an overall program for a 25-year period (2014 to 2038) to transfer up to  
26 150,000 acre-feet per year of water from the San Joaquin River Exchange  
27 Contractors Water Authority to DOI for refuge water supplies or CVP and SWP  
28 water users (Reclamation 2013b). Reclamation is currently evaluating a long-  
29 term water transfer program (2015 to 2024) between water sellers in the  
30 Sacramento Valley and water users located in the San Francisco Bay Area and  
31 south of the Delta (Reclamation 2014b).

## 32 **5.4 Impact Analysis**

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

### 36 **5.4.1 Potential Mechanisms for Change and Analytical Methods**

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

1     **5.4.1.1     Changes in CVP and SWP Reservoir Storage and Downstream**  
2                 **River Flows**

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

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

15    **5.4.1.1.1    Use of CalSim II Model**

16    CalSim II is a reservoir-river basin planning model developed by DWR and  
17    Reclamation to simulate the operation of the CVP and SWP over a range of  
18    different hydrologic conditions. Inputs to CalSim II include water demands  
19    (including water rights), stream accretions and depletions, reservoir inflows,  
20    irrigation efficiencies, and parameters to calculate return flows, non-recoverable  
21    losses and groundwater operations. Sacramento Valley and tributary rim basin  
22    hydrology uses an adjusted historical sequence of monthly stream flows over an  
23    82-year period (1922 to 2003) to represent a sequence of flows at a future level of  
24    development. Adjustments to historic water supplies are imposed based on future  
25    land use conditions and historical meteorological and hydrologic conditions. The  
26    resulting hydrology represents the water supply available from Central Valley  
27    streams to the CVP and SWP at a future level of development. Water rights  
28    deliveries to non-CVP and non-SWP water rights holders are not modified in the  
29    CalSim II simulations of the alternatives. CalSim II produces outputs for river  
30    flows and diversions, reservoir storage, Delta flows and exports, Delta inflow and  
31    outflow, deliveries to project and non-project users, and controls on project  
32    operations.

33    The CalSim II model monthly simulation of an actual daily (or even hourly)  
34    operation of the CVP and SWP results in several limitations in use of the model  
35    results. The model results must be used in a comparative manner to reduce the  
36    effects of use of monthly assumptions and other assumptions that are indicative of  
37    real-time operations, but do not specific match real-time observations. The  
38    CalSim II model output is based upon a monthly time step. The CalSim II model  
39    output includes minor fluctuations of up to 5 percent due to model assumptions  
40    and approaches. Therefore, if the quantitative changes between a specific  
41    alternative and the No Action Alternative and/or Second Basis of Comparison are  
42    5 percent or less, the conditions under the specific alternative would be  
43    considered to be “similar” to conditions under the No Action Alternative and/or  
44    Second Basis of Comparison.



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

#### 18 **5.4.1.1.2 Analysis of Changes in Reservoir Storage and Downstream** 19 **River Flows**

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

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

40 The analyses discussed in Chapters 5 through 21 do not include specific analysis  
41 for creeks downstream of San Luis Reservoir complex. Unlike the rivers located  
42 downstream of CVP and SWP reservoirs (e.g., Sacramento River downstream of  
43 Shasta Dam), river channels located downstream of the San Luis Reservoir  
44 complex are not used to convey CVP and SWP water. Instream flows in these

1 rivers would not be affected by changes in CVP and SWP operations. Therefore,  
 2 flows in streams downstream of San Luis Reservoir are not analyzed in this EIS.

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

#### 19 **5.4.1.2 Changes in Flows over Fremont Weir into Yolo Bypass**

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

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

#### 39 **5.4.1.3 Changes in Delta Conditions**

40 Changes in CVP and SWP operations under the alternatives as compared to the  
 41 No Action Alternative and Second Basis of Comparison would change the Delta  
 42 inflows from the tributary watersheds, Delta outflow, and reverse flows in Old  
 43 and Middle River (as indicated by OMR flows). Results of the CalSim II model  
 44 were used to assess changes in Delta outflow and positive and negative OMR

1 flows. Assumptions used in the CalSim II model are described in Appendix 5A,  
2 CalSim II and DSM2 Modeling.

3 **5.4.1.4 Changes in Delta Exports and CVP and SWP Deliveries**

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

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

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

25 **5.4.1.5 Effects Related to Water Transfers**

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

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

36 Water transfers using CVP and SWP Delta pumping plants and south of Delta  
37 canals generally occur when there is unused capacity in these facilities. These  
38 conditions generally occur drier water year types when the flows from upstream  
39 reservoirs plus unregulated flows are adequate to meet the Sacramento Valley  
40 water demands and the CVP and SWP export allocations (defined as “balanced  
41 Delta conditions” in the COA, as described in Appendix 3A, No Action  
42 Alternative: Central Valley Project and State Water Project Operations). In  
43 nonwet years, the CVP and SWP water allocations would be less than full

1 contract amounts; therefore, capacity may be available in the CVP and SWP  
 2 conveyance facilities to move water from other sources.

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

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

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

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

#### 30 **5.4.2 Conditions in Year 2030 without implementation of** 31 **Alternatives 1 through 5**

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

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

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

8 **5.4.2.1 Common Changes in Conditions under the No Action**  
9 **Alternative and Second Basis of Comparison**

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

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

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

19 **5.4.2.1.1 Changes in Conditions due to Climate Change and Sea-Level Rise**

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

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

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

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

#### 8 **5.4.2.1.2 General Plan Development in California**

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

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

#### 33 **5.4.2.1.3 Reasonable and Foreseeable Water Resources Management** 34 **Projects**

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

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

- 1 • Restoration of more than 10,000 acres of intertidal and associated subtidal
- 2 wetlands in Suisun Marsh and Cache Slough and at least 17,000 to
- 3 20,000 acres of seasonal floodplain restoration in Yolo Bypass
- 4 • Gravel augmentation in the Sacramento Valley watershed
- 5 • Replacement of the Spring Creek Temperature Control Curtain
- 6 • Restoration of Battle Creek
- 7 • Implementation of Red Bluff Pumping Plant
- 8 • Implementation of the CVPIA Anadromous Fish Screen Program
- 9 • Implementation of the American River Flow Management Standard

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

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

1 **Table 5.10 Future Long-Term Average Municipal Water Supply Assumptions for**  
 2 **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)	760,352	378,999	1,005,403	5,653,807	7,798,561
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	385,946	240,333	1,521,462
Groundwater	136,759	188,346	102,824	2,216,118	2,644,047
Recycled Wastewater	28,250	25,000	55,470	404,449	513,169
Recycled Stormwater	–	–	–	21,400	21,400
Desalination Water Treatment	–	–	–	454,145	454,145
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
<b>Total Supplies</b>	<b>1,553,572</b>	<b>628,042</b>	<b>1,091,755</b>	<b>6,454,119</b>	<b>9,627,488</b>

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

10 The No Action Alternative and the Second Basis of Comparison assume that  
 11 groundwater would continue to be used even if groundwater overdraft conditions  
 12 continue or become worse. It is recognized that in September 2014 the  
 13 Sustainable Groundwater Management Act (SGMA) was enacted. The SGMA  
 14 provides for the establishment of a Groundwater Sustainability Agencies (GSAs)  
 15 to prepare Groundwater Sustainability Plans (GSPs) that will include best  
 16 management practices for sustainable groundwater management. The SGMA  
 17 defines sustainable groundwater management as “the management and use of  
 18 groundwater in a manner that can be maintained during the planning and



1 implementation horizon without causing undesirable results.” Undesirable results  
2 are defined as any of the following effects.

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

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

26 The No Action Alternative and the Second Basis of Comparison assumptions also  
27 include implementation of numerous conservation efforts and major water supply  
28 projects, including regional and local recycling projects, surface water and  
29 groundwater storage projects, conveyance improvement projects, and desalination  
30 projects, as described in Chapter 3, Description of Alternatives. There are over  
31 50 projects considered in the study area to be included in the No Action  
32 Alternative, including the following major water supply projects.

- 33 • Cambria Emergency Water Supply Project desalination project (CCSD 2014)
- 34 • Carlsbad Metropolitan Water District (MWD) water recycling project  
35 (Carlsbad MWD 2012)
- 36 • Central Basin Municipal Water District Southeast Water Reliability Project  
37 (CBMWD 2011)
- 38 • City of Los Angeles Department of Water and Power groundwater recharge  
39 projects (City of Los Angeles 2011, 2013)
- 40 • City of Oxnard GREAT Program Desalter (City of Oxnard 2013)

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- 1 • Eastern Municipal Water District (EMWD) water recycling programs  
2 (EMWD 2014a, 2014b)
- 3 • Fresno Irrigation District (FID) groundwater recharge projects (FID 2015)
- 4 • Inland Empire Utilities Agency (IEUA) groundwater recharge projects (IEUA  
5 2015).
- 6 • Kern County and Antelope Valley-East Kern Water Agency (AVEK 2011)
- 7 • Los Angeles County Sanitation District expansion of water recycling  
8 programs (LACSD 2005)
- 9 • San Benito County Water District (SBCWD) expansion of water treatment  
10 plant to treat CVP water (SBCWD 2014)
- 11 • San Diego County Water Authority (SDCWA) Carlsbad Seawater  
12 Desalination Facility (SDCWA 2014)
- 13 • Santa Barbara desalination water treatment plant (KEYT News [KEYT]  
14 2015).
- 15 • SCVWD wastewater recycling projects (SCVWD 2012a)
- 16 • Victor Valley Wastewater Reclamation Authority (VWVRA) water recycling  
17 programs (VWVRA 2015)
- 18 • Water Replenishment District (WRD) Groundwater Reliability Improvement  
19 Program and water recycling programs (WRD 2012, 2015)
- 20 • West Basin Municipal Water District recycling water programs (WBMWD  
21 2011)
- 22 • Western Development and Storage Antelope Valley Water Bank (Reclamation  
23 2010b)
- 24 • Western Municipal Water District (WMD) Arlington Desalter Expansion to  
25 use saline groundwater (WMD 2015)
- 26 • Woodland-Davis Clean Water Agency (WDCWA) water treatment plant  
27 (WDCWA 2013)

28 Water transfer programs, including those that require Warren Act contracts with  
29 Reclamation to convey non-CVP water in CVP facilities, are anticipated to  
30 continue under the No Action Alternative and the Second Basis of Comparison.  
31 Transfer programs generally involve annual crop changes using temporary crop  
32 idling or shifting, release of stored water in reservoirs on different patterns for the  
33 purchasers' water demands, and/or groundwater substitution (DWR and  
34 Reclamation 2014). The transfers must be approved by the CVP and/or SWP if  
35 the transfer involves CVP or SWP water or utilizes CVP or SWP facilities.  
36 Except for water transfers among CVP water users, water transfers also require  
37 approval from the SWRCB. Environmental documentation is required for all  
38 water transfers involving CVP and/or SWP water supplies or facilities. Under  
39 State law, water transfers cannot result in injury to other legal users of water;

1 unreasonable impacts on fish and wildlife and instream uses; and unreasonable  
2 economic or environmental impact on the county in which the transfer water  
3 originates. It is assumed that transfers would continue under the No Action  
4 Alternative and the Second Basis of Comparison in a similar manner as have  
5 occurred for the past 10 years. It is anticipated that the number of long-term  
6 transfer agreements could increase to facilitate annual decisions for water  
7 transfers.

#### 8 **5.4.2.2 Changes in Conditions under the No Action Alternative**

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

#### 16 **5.4.2.3 Changes in Conditions under the Second Basis of Comparison**

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

#### 27 **5.4.3 Evaluation of Alternatives**

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

32 During review of the numerical modeling analyses used in this EIS, an error was  
33 determined in the CalSim II model assumptions related to the Stanislaus River  
34 operations for the Second Basis of Comparison, Alternative 1, and Alternative 4  
35 model runs. Appendix 5C includes a comparison of the CalSim II model run  
36 results presented in this chapter and CalSim II model run results with the error  
37 corrected. Appendix 5C also includes a discussion of changes in the comparison  
38 of the following alternative analysis.

- 39 • No Action Alternative compared to the Second Basis of Comparison
- 40 • Alternative 1 compared to the No Action Alternative
- 41 • Alternative 3 compared to the Second Basis of Comparison
- 42 • Alternative 5 compared to the Second Basis of Comparison

1 **5.4.3.1 No Action Alternative**  
 2 As described in Chapter 4, Approach to Environmental Analysis, the No Action  
 3 Alternative is compared to the Second Basis of Comparison.

4 **5.4.3.1.1 Trinity River Region**

5 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*  
 6 Changes in Trinity Lake storage and surface water elevations under the No Action  
 7 Alternative as compared to the Second Basis of Comparison in Trinity Lake are  
 8 summarized in Tables 5.11 and 5.12. A summary of the results is provided  
 9 following Table 5.12.

10 **Table 5.11 Changes in Trinity Lake Storage under the No Action Alternative as**  
 11 **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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

1  
2

**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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

- 6 • In wet years, below normal, and dry years, storage would be similar (within  
 7 5 percent) in all months.
- 8 • In above-normal years, storage would be similar in January through October  
 9 and less in November and December (up to 5.7 percent).
- 10 • In critical dry years, storage would be less in all months (up to 10.3 percent).
- 11 • In all months, in all water year types, surface water elevations would be  
 12 similar.

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

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

7 **5.4.3.1.2 Central Valley Region**

8 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*  
 9 *Shasta Lake and Sacramento River*

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

15 **Table 5.13 Changes in Shasta Lake Storage under the No Action Alternative as**  
 16 **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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

1 **Table 5.14 Changes in Shasta Lake Elevation under the No Action Alternative as**  
 2 **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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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

- 6 • In wet years, storage would be similar in October and December through  
 7 August and reduced in September and November (up to 8.2 percent).
- 8 • In above-normal years, storage would be similar in January through  
 9 September and reduced in October through December (up to 7.5 percent).
- 10 • In below-normal years, storage would be similar in March through September  
 11 and reduced in October through February (up to 10.5 percent).
- 12 • In dry years, storage would be similar in January through October and reduced  
 13 in November and December (up to 6.1 percent).
- 14 • In critical dry years, storage would be reduced under all months (up to  
 15 14.4 percent).

## Chapter 5: Surface Water Resources and Water Supplies

- 1 • In all months, in all water year types, surface water elevations would be  
2 similar.
- 3 The following changes in Sacramento River flows would occur under the No  
4 Action Alternative as compared to the Second Basis of Comparison, as shown on  
5 Figures 5.56 through 5.61.
- 6 • Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
- 7 – Over long-term conditions, similar flows would occur in October,  
8 February through May, July, and August; increased flows in September  
9 and November (up to 37.7 percent); and reduced flows in December,  
10 January, and June (up to 7.8 percent).
- 11 – In wet years, similar flows would occur in January through July; increased  
12 flows in September through November (up to 77.7 percent); and reduced  
13 flows in December and August (up to 14.6 percent).
- 14 – In dry years, similar flows would occur in July through October,  
15 December through March, and May; increased flows in November  
16 (33.4 percent); and reduced flows in April and June (up to 7.3 percent).
- 17 • Sacramento River near Freeport (near the northern boundary of the Delta)  
18 (Figures 5.59 through 5.61).
- 19 – Over long-term conditions, similar flows would occur in October,  
20 December through May, and August; increased flows in September,  
21 November, and July (up to 43.3 percent); and reduced flows in June  
22 (11.4 percent).
- 23 – In wet years, similar flows would occur in January through June and  
24 October; increased flows in July through September and November (up to  
25 90.3 percent); and reduced flows in December (10.7 percent).
- 26 – In dry years, similar flows would occur in August through October and  
27 December through April; increased flows in November and July (up to  
28 15.8 percent); and reduced flows in May and June (up to 11.9 percent).

29 *Lake Oroville and Feather River*

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



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**Table 5.15 Changes in Lake Oroville 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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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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.

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

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

- 6 • Over long-term conditions, similar flows would occur in November and April;  
7 increased flows in July through September (up to 76.1 percent); and reduced  
8 flows in October, December through March, May, and June (up to  
9 27.2 percent).

- 10 • In wet years, similar flows would occur in October through November and  
11 March through May; increased flows in July through September (up to  
12 184 percent) and reduced flows in December through February (up to  
13 26.0 percent).

- 14 • In dry years, similar flows would occur in November through March;  
15 increased flows in April and July (up to 52.4 percent); and reduced flows in  
16 August through October and May and June (up to 27.6 percent).

17 *Folsom Lake and American River*

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

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**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

1 **Table 5.18 Changes in Folsom Lake Elevation under the No Action Alternative as**  
 2 **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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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

- 5 • In wet years, storage would be similar in December through August and  
 6 reduced in September through November (up to 10.8 percent).
- 7 • In above-normal years, storage would be similar in January through June,  
 8 September, and October; reduced in November and December (up to  
 9 8.2 percent); and increased in July and August (up to 5.7 percent).
- 10 • In below-normal years, storage would be similar in February through May;  
 11 reduced in October through January (up to 11.9 percent); and increased in July  
 12 through September (up to 17.1 percent).
- 13 • In dry years, storage would be similar in all months.
- 14 • In critical dry years, storage would be similar in October through June and  
 15 reduced in July through September (up to 10.8 percent).

## Chapter 5: Surface Water Resources and Water Supplies

- 1 • In all months, in all water year types, surface water elevations would be  
2 similar.
- 3 The following changes in American River flows would occur under the No Action  
4 Alternative as compared to the Second Basis of Comparison, as shown on  
5 Figures 5.65 through 5.67.
- 6 • Over long-term conditions, similar flows would occur in November through  
7 May and July; increased flows in September and October (up to 44.7 percent);  
8 and reduced flows in June and August (up to 6.1 percent).
- 9 • In wet years, similar flows would occur in October through November and  
10 January through July; increased flows in September (91.1 percent) and  
11 reduced flows in December and August (up to 10.7 percent).
- 12 • In dry years, similar flows would occur in all months except October,  
13 February and July; increased flows in October (16.5 percent); and reduced  
14 flows in February and July (up to 7.3 percent).

15 *Clear Creek*

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

1 **Table 5.19 Changes in Clear Creek Flows below Whiskeytown Dam under the No**  
 2 **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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

3 *New Melones Reservoir and Stanislaus River*

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

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**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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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.

## Chapter 5: Surface Water Resources and Water Supplies

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

- 3 • Over long-term conditions, similar flows would occur in May and July  
 4 through September; increased flows in October, March, and April (up to  
 5 148.7 percent); and reduced flows in November through February and June  
 6 (up to 33.8 percent).
- 7 • In wet years, similar flows would occur in February and April; increased  
 8 flows in October, March, May, July, and August (up to 117.1 percent); and  
 9 reduced flows in September, November through January, and June (up to  
 10 50.8 percent).
- 11 • In dry years, similar flows would occur in July through September; increased  
 12 flows in October and April (up to 154.3 percent); and reduced flows in  
 13 November through March, May, and June (up to 35.7 percent).

14 *San Joaquin River at Vernalis*

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

- 17 • Over long-term conditions, similar flows would occur in July through  
 18 September and November through May; increased flows in October  
 19 (19 percent); and reduced flows in June (8 percent).
- 20 • In wet years, similar flows would occur in July through September and  
 21 November through May; increased flows in October (16.8 percent); and  
 22 reduced flows in June (9.4 percent).
- 23 • In dry years, similar flows would occur in November through March and May  
 24 through September; and increased flows in October and April (up to  
 25 18.3 percent).

26 *San Luis Reservoir*

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

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**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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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).

1 • In critical dry years, storage would be similar in September; increased in July  
2 (60.2 percent); and reduced in August and October through June (up to  
3 51.1 percent).

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

7 • In wet years, surface water elevations would be less in all months (up to  
8 10.7 percent).

9 • In above-normal years, surface water elevations would be less in all months  
10 (up to 13.0 percent).

11 • In below-normal years, surface water elevations would be less in all months  
12 (up to 16.0 percent).

13 • In dry years, surface water elevations would be similar in September through  
14 January and less in February through August (up to 10.4 percent).

15 • In critical dry years, surface water elevations would be similar in October  
16 through January and reduced in February through September (up to  
17 9.7 percent).

18 *Changes in Flows into the Yolo Bypass at Fremont Weir*

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

1 **Table 5.24 Changes in Flows into the Yolo Bypass at Fremont Weir under the No**  
 2 **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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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

- 6 • In wet years, flows into Yolo Bypass would be similar in January through  
 7 September; increased in October (25 percent); and reduced in November and  
 8 December (up to 14.8 percent).
- 9 • In above-normal years, flows into Yolo Bypass would be similar in April  
 10 through December and reduced in January through March (up to  
 11 13.9 percent).
- 12 • In below-normal years, flows into Yolo Bypass would be similar in April  
 13 through November and reduced in December through March (up to  
 14 25.3 percent).

- 1 • In dry years, flows into Yolo Bypass would be similar in January through  
2 November and reduced in December (5.9 percent).
- 3 • In critical dry years, flows into Yolo Bypass would be similar in all months.

4 *Changes in Delta Conditions*

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

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

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

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

24 *Changes in CVP and SWP Exports and Deliveries*

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

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**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
<b>No Action Alternative</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison</b>												
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
<b>No Action Alternative as Compared to Second Basis of Comparison (percent change)</b>												
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

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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).



- 1 • In dry and critical dry years, total exports would be similar in September;  
 2 reduced in October through June and August (up to 44.9 and 51.1 percent,  
 3 respectively); and increased in July (34.2 and 60.2 percent, respectively).
- 4 Deliveries to CVP and SWP water users decline under the No Action  
 5 Alternative as compared to the Second Basis of Comparison, as summarized in  
 6 Tables 5.26 and 5.27, respectively, due to reduced water supply availability and  
 7 export limitations.

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

Annual Average Deliveries (TAF)					
		No Action Alternative	Second Basis of Comparison	No Action Alternative as compared to the Second Basis of Comparison	
				Difference	Percent Change
<b>North of Delta</b>					
CVP Agricultural Water Service Contractors	Long Term	185	221	-36	-16
	Dry	86	124	-39	-31
	Critical Dry	24	38	-14	-37
CVP Municipal and Industrial (M&I) (Including American River Contractors and CCWD)	Long Term	467	486	-19	-4
	Dry	447	461	-14	-3
	Critical Dry	405	410	-5	-1
CVP M&I American River Contractors	Long Term	113	120	-8	-6
	Dry	97	105	-9	-8
	Critical Dry	75	80	-6	-7
CVP Sacramento River Settlement Contractors	Long Term	1,859	1,858	1	0.1
	Dry	1,906	1,905	0	0.0
	Critical Dry	1,737	1,734	3	0.2
CVP Refuge Level 2 Deliveries	Long Term	146	155	-8	-5
	Dry	146	151	-6	-4
	Critical Dry	102	105	-3	-3
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,658	2,720	-62	-2
	Dry	2,584	2,642	-58	-2
	Critical Dry	2,268	2,287	-19	-0.8

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Annual Average Deliveries (TAF)					
		No Action Alternative	Second Basis of Comparison	No Action Alternative as compared to the Second Basis of Comparison	
				Difference	Percent Change
<b>South of Delta (Does not include Eastside Contractors)</b>					
CVP Agricultural Water Service Contractors	Long Term	847	1,108	-262	-24
	Dry	445	662	-218	-33
	Critical Dry	131	210	-78	-38
CVP M&I Users	Long Term	15	17	-2	-10
	Dry	14	15	-1	-9
	Critical Dry	11	12	-1	-7
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	261	261	0	0.0
	Dry	269	268	0	0.1
	Critical Dry	224	224	0	0.0
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	1,975	2,239	-263	-12
	Dry	1,602	1,820	-219	-12
	Critical Dry	1,107	1,186	-79	-7
<b>Eastside Contractors Deliveries</b>					
Water Rights	Long Term	508	510	-2	-0.5
	Dry	524	524	0	0.0
	Critical Dry	445	460	-16	-3
CVP Water Service Contracts	Long Term	104	108	-5	-4
	Dry	84	87	-2	-3
	Critical Dry	4	4	0	0.0
Total Water Rights and CVP Service Contracts Deliveries	Long Term	611	618	-7	-1
	Dry	608	611	-2	-0.4
	Critical Dry	449	465	-16	-3

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

- 3 • Deliveries to CVP North of Delta agricultural water service contractors would  
 4 be reduced by 16 percent over the long-term conditions (averaged over the  
 5 82-year period analyzed with CalSim II); 31 percent in dry years; and  
 6 37 percent in critical dry years.
- 7 • Deliveries to CVP North of Delta M&I contractors would be similar in total;  
 8 however, deliveries to the American River CVP contractors would be reduced  
 9 by 6 percent over the long-term conditions; 8 percent in dry years; and  
 10 7 percent in critical dry years.
- 11 • Deliveries to CVP South of Delta agricultural water service contractors would  
 12 be reduced by 24 percent over the long-term conditions; 33 percent in dry  
 13 years; and 37 percent in critical dry years.
- 14 • Deliveries to CVP South of Delta M&I contractors would be reduced by  
 15 10 percent over the long-term conditions; 9 percent in dry years; and 7 percent  
 16 in critical dry years.
- 17 • Deliveries to the Eastside contractors would be similar under the long-term  
 18 conditions and dry and critical dry years.

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

Annual Average Deliveries (TAF)					
		No Action Alternative	Second Basis of Comparison	No Action Alternative as compared to the Second Basis of Comparison	
				Difference	Percent Change
<b>North of Delta</b>					
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

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Annual Average Deliveries (TAF)					
		No Action Alternative	Second Basis of Comparison	No Action Alternative as compared to the Second Basis of Comparison	
				Difference	Percent Change
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
<b>South of Delta</b>					
SWP Agricultural Users (without Article 21)	Long Term	610	750	-139	-19
	Dry	455	567	-112	-20
	Critical Dry	378	484	-106	-22
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

- 1 The following changes in SWP water deliveries would occur under the No Action  
2 Alternative as compared to the Second Basis of Comparison.
- 3 • Deliveries without Article 21 water to SWP North of Delta water contractors  
4 would be reduced by 18 percent over the long-term conditions; 18 percent in  
5 dry years; and 20 percent in critical dry years.
  - 6 • Deliveries without Article 21 water to SWP South of Delta water contractors  
7 would be reduced by 18 percent over the long-term conditions; 19 percent in  
8 dry years; and 22 percent in critical dry years.

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

7 *Effects Related to Cross Delta Water Transfers*

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

22 Under the No Action Alternative, the timing of cross Delta water transfers would  
 23 be limited to July through September in accordance with the 2008 USFWS BO  
 24 and 2009 NMFS BO. The maximum amount of water to be transferred would be  
 25 600,000 acre-feet per year in critical dry years or in dry years following a dry or  
 26 critical dry year. In all other water year types, the maximum amount of water  
 27 would be 360,000 acre-feet per year. The maximum amount of water that can be  
 28 exported in the CVP and SWP facilities is approximately 770,000 acre-feet per  
 29 month. As indicated in Table 5.25, capacity would be available under the No  
 30 Action Alternative between July and September for water transfers in all water  
 31 year types.

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

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

38 **5.4.3.1.3 San Francisco Bay Area, Central Coast, and Southern California**  
 39 **Regions**

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

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

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

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

17 *Changes in CVP and SWP Deliveries*

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

20 **5.4.3.2 Alternative 1**

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

27 **5.4.3.2.1 Alternative 1 Compared to the No Action Alternative**

28 *Trinity River Region*

29 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*

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

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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



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

- 3 • In wet years and dry years, storage would be similar in all months.
- 4 • In above-normal years, storage would be similar in January through October  
5 and increased in November and December (up to 6.0 percent).
- 6 • In below-normal years, storage would be similar in January through October  
7 and increased in November and December (up to 5.2 percent).
- 8 • In critical dry years, storage would be increased in all months (up to  
9 11.5 percent).
- 10 • In all months, in all water year types, surface water elevations would be  
11 similar.

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

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

#### 19 *Central Valley Region*

##### 20 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows* 21 *Shasta Lake and Sacramento River*

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

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**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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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

- 5 • In wet years, storage would be similar in December through August and  
 6 October and increased in September and November (up to 8.9 percent).
- 7 • In above-normal years, storage would be similar in January through  
 8 September and increased in October through December (up to 8.1 percent).
- 9 • In below-normal years, storage would be similar in March through September  
 10 and increased in October through February (up to 11.7 percent).
- 11 • In dry years, storage would be similar in February through October and  
 12 increased in November through January (up to 6.5 percent).
- 13 • In critical dry years, storage would be increased under all months (up to  
 14 16.8 percent).

## Chapter 5: Surface Water Resources and Water Supplies

- 1 • In all months, in all water year types, surface water elevations would be  
2 similar.
- 3 The following changes in Sacramento River flows would occur under  
4 Alternative 1 as compared to the No Action Alternative, as shown on Figures 5.56  
5 through 5.61.
- 6 • Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
- 7 – Over long-term conditions, similar flows would occur in October,  
8 February through May, July, and August; reduced flows in September and  
9 November (up to 27.4 percent); and increased flows in December,  
10 January, and June (up to 8.4 percent).
- 11 – In wet years, similar flows would occur in January through July; reduced  
12 flows in September through November (up to 43.7 percent); and increased  
13 flows in December and August (up to 17.0 percent).
- 14 – In dry years, similar flows would occur in July through October,  
15 December through March, and May; reduced flows in November  
16 (25.0 percent); and increased flows in April and June (up to 7.8 percent).
- 17 • Sacramento River near Freeport (near the northern boundary of the Delta)  
18 (Figures 5.59 through 5.61).
- 19 – Over long-term conditions, similar flows would occur in October,  
20 December through May, and August; reduced flows in September,  
21 November, and July (up to 30.2 percent); and increased flows in June  
22 (12.8 percent).
- 23 – In wet years, similar flows would occur in January through June and  
24 October; reduced flows in July through September and November (up to  
25 47.4 percent); and increased flows in December (6.6 percent).
- 26 – In dry years, similar flows would occur in August through October and  
27 December through April; reduced flows in November and July (up to  
28 13.6 percent); and increased flows in May and June (up to 13.5 percent).

29 *Lake Oroville and Feather River*

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

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

3

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

- 6 • In wet years, storage would be similar in January through August and reduced  
 7 in September through December (up to 21.8 percent).
- 8 • In above-normal years, storage would be similar in February through August  
 9 and reduced in September through January (up to 15.2 percent).
- 10 • In below-normal years, storage would be similar in May through July and  
 11 reduced in August through April (up to 21.5 percent).
- 12 • In dry years, storage would be similar in June and reduced in all other months  
 13 (up to 14.2 percent).
- 14 • In critical dry years, storage would be similar under all months.

- 1 • In all months, in all water year types, surface water elevations would be  
2 similar.
- 3 The following changes in Feather River flows would occur under Alternative 1 as  
4 compared to the No Action Alternative, as shown in Figures 5.62 through 5.64.
- 5 • Over long-term conditions, similar flows would occur in November and April;  
6 reduced flows in July through September (up to 43.2 percent); and increased  
7 flows in October, December through March, May, and June (up to  
8 37.4 percent).
- 9 • In wet years, similar flows would occur in October, November, and March  
10 through May; reduced flows in July through September (up to 64.9 percent);  
11 and increased flows in December through February and June (up to  
12 35.1 percent).
- 13 • In dry years, similar flows would occur in December through April; reduced  
14 flows in July (34.4 percent); and increased flows in August through October,  
15 May, and June (up to 38.1 percent).

16 *Folsom Lake and American River*

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

1  
2

**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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

3



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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

3

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

- 6 • In wet years, storage would be similar in December through August and  
 7 increased in September through December (up to 12.1 percent).
- 8 • In above-normal years, storage would be similar in January through July and  
 9 September through October; increased in November and December (up to  
 10 8.9 percent); and reduced in August (5.4 percent).
- 11 • In below-normal years, storage would be similar in February through May;  
 12 reduced in June through September (up to 14.6 percent); and increased in  
 13 October through January (up to 13.5 percent).
- 14 • In dry years, storage would be similar in all months.
- 15 • In critical dry years, storage would be similar in October through June and  
 16 increased in July through September (up to 12.1 percent).

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- 1 • In all months, in all water year types, surface water elevations would be  
2 similar.
- 3 The following changes in American River flows would occur under Alternative 1  
4 as compared to the No Action Alternative, as shown on Figures 5.65  
5 through 5.67.
- 6 • Over long-term conditions, similar flows would occur in November through  
7 May and July; reduced flows in September and October (up to 30.9 percent);  
8 and increased flows in June (5.4 percent).
- 9 • In wet years, similar flows would occur in October, November, and January  
10 through July; reduced flows in September (47.7 percent); and increased flows  
11 in August (12.0 percent).
- 12 • In dry years, similar flows would occur in November through January, March  
13 through June, August, and September; reduced flows in October  
14 (14.1 percent); and increased flows in February and July (up to 7.9 percent).

*Clear Creek*

15  
16 Changes in flows in Clear Creek downstream of Whiskeytown Dam are  
17 summarized in Table 5.36.

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

1 **Table 5.36 Changes in Clear Creek Flows below Whiskeytown Dam under the**  
 2 **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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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

1 **Table 5.37 Changes in New Melones Reservoir Storage under the Alternative 1 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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

1 **Table 5.38 Changes in New Melones Reservoir Elevation under the Alternative 1 as**  
 2 **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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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

- 5 • In wet years, storage would be similar in all months.
- 6 • In above-normal years, storage would be similar in December through  
 7 September and increased in October and November (up to 6.0 percent).
- 8 • In below-normal years, storage would be similar in November through  
 9 September and increased in October (5.4 percent).
- 10 • In dry years, storage would be similar in all months.
- 11 • In critical dry years, storage would be similar in July through September and  
 12 increased in October through June (up to 7.5 percent).
- 13 • In all months, in all water year types, surface water elevations would be  
 14 similar.

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

- 3 • Over long-term conditions, similar flows would occur in July through  
 4 September; reduced flows in October, March, and April (up to 59.8 percent);  
 5 and increased flows in November through February and June (up to  
 6 51.1 percent).
- 7 • In wet years, similar flows would occur in February and April; reduced flows  
 8 in October, March, May, July, and August (up to 53.9 percent); and increased  
 9 flows in September, November through January, and June (up to  
 10 103.2 percent).
- 11 • In dry years, similar flows would occur in July through September; reduced  
 12 flows in October and April (up to 60.7 percent); and increased flows in  
 13 November through March, May, and June (up to 55.5 percent).

14 *San Joaquin River at Vernalis*

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

- 17 • Over long-term conditions, similar flows would occur in July through  
 18 September and November through May; reduced flows in October  
 19 (16.1 percent); and increased flows in June (8.4 percent).
- 20 • In wet years, similar flows would occur in July through September and  
 21 November through May; reduced flows in October (14.4 percent); and  
 22 increased flows in June (10.4 percent).
- 23 • In dry years, similar flows would occur in November through March and May  
 24 through September; and reduced flows in October and April (up to  
 25 15.3 percent).

26 *San Luis Reservoir*

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

1 **Table 5.39 Changes in San Luis Reservoir Storage under the Alternative 1 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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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**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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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



- 1 The following changes in San Luis Reservoir storage would occur under  
2 Alternative 1 as compared to the No Action Alternative.
- 3 • In wet years, storage would be increased in all months (up to 108.8 percent).  
4 Water storage elevations would be increased in all months (up to  
5 12.0 percent).
  - 6 • In above-normal years, storage would be increased in all months (up to  
7 151.4 percent). Water storage elevations would be increased in all months (up  
8 to 15.0 percent).
  - 9 • In below-normal years, storage would be increased in all months (up to  
10 203.1 percent). Water storage elevations would be increased in all months (up  
11 to 19.0 percent).
  - 12 • In dry years, storage would be increased in all months (up to 70.3 percent).  
13 Water storage elevations would be increased in all months (up to  
14 11.6 percent).
  - 15 • In critical dry years, storage would be increased in all months (up to  
16 57.1 percent). Water storage elevations would be increased in all months (up  
17 to 10.8 percent).

18 *Changes in Flows into the Yolo Bypass*

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

1 **Table 5.41 Changes in Flows into the Yolo Bypass at Fremont Weir under the**  
 2 **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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

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

- 6 • In wet years, flows into Yolo Bypass would be similar in January through  
 7 September; reduced in October (20 percent); and increased in November and  
 8 December (up to 17.4 percent).
- 9 • In above-normal years, flows into Yolo Bypass would be similar in April  
 10 through December; and increased in January through March (up to  
 11 16.2 percent).
- 12 • In below-normal years, flows into Yolo Bypass would be similar in April  
 13 through November; and increased in December through March (up to  
 14 33.9 percent).

- 1 • In dry years, flows into Yolo Bypass would be similar in January through  
2 November; and increased in December (6.2 percent).
- 3 • In critical dry years, flows into Yolo Bypass would be similar in all months.

4 *Changes in Delta Conditions*

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

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

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

- 14 • In all water years, average monthly OMR flows would be negative in all  
15 months under Alternative 1. Under the No Action Alternative, OMR flows  
16 would be positive only in wet and above normal years in April and May and  
17 April in above normal years.
- 18 • In wet years, average monthly OMR flows, would be more positive in June  
19 through August and March (up to 923 cfs); and more negative in April  
20 through June and September through February (up to 10,005 cfs).
- 21 • In dry years, average monthly OMR flows would be positive in July (up to  
22 2,073 cfs), and more negative in August through June (up to 3,489 cfs).

23 *Changes in CVP and SWP Exports and Deliveries*

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

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**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
<b>Alternative 1</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative</b>												
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
<b>Alternative 1 as Compared to No Action Alternative (percent change)</b>												
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

3

- 1 The following changes would occur in CVP and SWP exports under Alternative 1  
2 as compared to the No Action Alternative.
- 3 • Long-term average annual exports would be 1,051 TAF (22 percent) more  
4 under Alternative 1 as compared to the No Action Alternative.
  - 5 • In wet years, total exports would be similar in June and September; increased  
6 in October through February, April through May (up to 133.6 percent); and  
7 reduced in March, July, and August (up to 8.7 percent).
  - 8 • In above-normal years, total exports would be similar in July and September;  
9 increased in October through June (up to 244 percent); and reduced in August  
10 (8.7 percent).
  - 11 • In below-normal years, total exports would be similar in July and September;  
12 increased in October through June (up to 203.9 percent); and reduced in  
13 August (16.9 percent).
  - 14 • In dry years, total exports would be similar in September; increased in  
15 October through June and August (up to 81.5 percent); and reduced in July  
16 (25.5 percent).
  - 17 • In critical dry years, total exports would be similar in September; increased in  
18 October through June and August (up to 104.4 percent); and reduced in July  
19 (37.6 percent).
- 20 Deliveries to CVP and SWP water users increase under Alternative 1 as compared  
21 to the No Action Alternative, as summarized in Tables 5.43 and 5.44,  
22 respectively, due to increased water supply availability and less export limitations.

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**Table 5.43 Changes CVP 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	Percent Change
<b>North of Delta</b>					
CVP Agricultural Water Service Contractors	Long Term	221	185	36	19.4
	Dry	124	86	39	45.2
	Critical Dry	38	24	14	59.3
CVPM&I (Including American River Contractors and Contra Costa Water District)	Long Term	486	467	19	4.0
	Dry	461	447	14	3.1
	Critical Dry	410	405	5	1.2
CVP M&I American River Contractors	Long Term	120	113	8	6.8
	Dry	105	97	9	8.9
	Critical Dry	80	75	6	7.7
CVP Sacramento River Settlement Contractors	Long Term	1,858	1,859	-1	-0.1
	Dry	1,905	1,906	0	0.0
	Critical Dry	1,734	1,737	-3	-0.2
CVP Refuge Level 2 Deliveries	Long Term	155	146	8	5.7
	Dry	151	146	6	3.9
	Critical Dry	105	102	3	3.0
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,720	2,658	62	2.3
	Dry	2,642	2,584	58	2.2
	Critical Dry	2,287	2,268	19	0.9
<b>South of Delta (Does not include Eastside Contractors)</b>					
CVP Agricultural Water Service Contractors	Long Term	1,108	847	262	30.9
	Dry	662	445	218	48.9
	Critical Dry	210	131	78	59.7
CVP M&I Users	Long Term	17	15	2	11.2
	Dry	15	14	1	9.7
	Critical Dry	12	11	1	7.3
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	261	261	0	0.0
	Dry	268	269	0	-0.1
	Critical Dry	224	224	0	0.0

Annual Average Deliveries (TAF)					
		Alternative 1	No Action Alternative	Alternative 1 as compared to the No Action Alternative	
				Difference	Percent Change
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,239	1,975	263	13.3%
	Dry	1,820	1,602	219	13.6%
	Critical Dry	1,186	1,107	79	7.2%
<b>Eastside Contractors Deliveries</b>					
Water Rights	Long Term	510	508	2	0.5
	Dry	524	524	0	0.0
	Critical Dry	460	445	16	3.6
CVP Water Service Contracts	Long Term	108	104	5	4.4
	Dry	87	84	2	2.9
	Critical Dry	4	4	0	0.0
Total Water Rights and CVP Service Contracts Deliveries	Long Term	618	611	7	1.1
	Dry	611	608	2	0.4
	Critical Dry	465	449	16	3.5

- 1 The following changes in CVP water deliveries would occur under Alternative 1
- 2 as compared to the No Action Alternative.
- 3 • Deliveries to CVP North of Delta agricultural water service contractors would
- 4 be increased by 19 percent over the long-term conditions; 45 percent in dry
- 5 years; and 59 percent in critical dry years.
- 6 • Deliveries to CVP North of Delta M&I contractors would be similar in total;
- 7 however, deliveries to the American River CVP contractors would be
- 8 increased by 7 percent over the long-term conditions; 9 percent in dry years;
- 9 and 8 percent in critical dry years.
- 10 • Deliveries to CVP South of Delta agricultural water service contractors would
- 11 be increased by 31 percent over the long-term conditions; 49 percent in dry
- 12 years; and 60 percent in critical dry years.
- 13 • Deliveries to CVP South of Delta M&I contractors would be increased by
- 14 11 percent over the long-term conditions; 10 percent in dry years; and
- 15 7 percent in critical dry years.
- 16 • Deliveries to the Eastside contractors would be similar under long-term
- 17 conditions and in dry and critical dry years.

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

Annual Average Deliveries (TAF)					
		Alternative 1	No Action Alternative	Alternative 1 as compared to the No Action Alternative	
				Difference	Percent Change
<b>North of Delta</b>					
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
<b>South of Delta</b>					
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
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

3



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

3 • Deliveries without Article 21 water to SWP North of Delta water contractors  
4 would be increased by 22 percent over the long-term conditions; 22 percent in  
5 dry years; and 25 percent in critical dry years.

6 • Deliveries without Article 21 water to SWP South of Delta water contractors  
7 would be increased by 22 percent over the long-term conditions; 24 percent in  
8 dry years; and 28 percent in critical dry years.

9 • Deliveries of Article 21 water to SWP North of Delta water contractors would  
10 be reduced by 9 percent over the long-term conditions; 6 percent in dry years;  
11 and 9 percent in critical dry years.

12 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
13 be increased by 504 percent over the long-term conditions; 2,265 percent in  
14 dry years; and 1,219 percent in critical dry years.

15 *Effects Related to Cross Delta Water Transfers*

16 Potential effects to surface water resources could be similar to those identified in  
17 a recent environmental analysis conducted by Reclamation for long-term water  
18 transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i).

19 Potential effects were identified as reduced surface water storage in upstream  
20 reservoirs and changes in flow patterns in river downstream of the reservoirs if  
21 water was released from the reservoirs in patterns that were different than would  
22 have been used by the water seller's. Because all water transfers would be  
23 required to avoid adverse impacts to other water users and biological resources  
24 (see Section 3.A.6.3, Transfers), including impacts associated with changes in  
25 reservoir storage and river flow patterns; the analysis indicated that water  
26 transfers would not result in substantial changes in storage or river flows. For the  
27 purposes of this EIS, it is anticipated that similar conditions would occur due to  
28 cross Delta water transfers under Alternative 1 and the No Action Alternative.

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

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

1 *San Francisco Bay Area, Central Coast, and Southern California Regions*  
 2 *Potential Changes in Surface Water Resources at Reservoirs that Store CVP*  
 3 *and SWP Water*

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

- 11 • Deliveries to CVP South of Delta M&I contractors would be increased by  
 12 11 percent over the long-term conditions; 10 percent in dry years; and  
 13 7 percent in critical dry years.
- 14 • Deliveries without Article 21 water to SWP South of Delta water contractors  
 15 would be increased by 22 percent over the long-term conditions; 24 percent in  
 16 dry years; and 28 percent in critical dry years.
- 17 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
 18 be increased by 504 percent over the long-term conditions; 2,265 percent in  
 19 dry years; and 1,219 percent in critical dry years.

20 *Changes in CVP and SWP Exports and Deliveries*

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

23 **5.4.3.2 Alternative 1 Compared to the Second Basis of Comparison**

24 Alternative 1 is identical to the Second Basis of Comparison.

25 **5.4.3.3 Alternative 2**

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

29 **5.4.3.3.1 Alternative 2 Compared to the Second Basis of Comparison**

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

33 **5.4.3.4 Alternative 3**

34 CVP and SWP operations under Alternative 3 are similar to the Second Basis of  
 35 Comparison with modified OMR flow criteria and New Melones Reservoir  
 36 operations. Alternative 3 would include changed water demands for American  
 37 River water supplies as compared to the No Action Alternative or Second Basis of  
 38 Comparison. Alternative 3 would provide water supplies of up to 17 TAF per  
 39 year under a Warren Act Contract for El Dorado Irrigation District and 15 TAF  
 40 per year under a Warren Act Contract for El Dorado County Water Agency.

1 These demands are not included in the analysis presented in this section of the  
 2 EIS. A sensitivity analysis comparing the results of the analysis with and without  
 3 these demands is presented in Appendix 5B of this EIS.

4 **5.4.3.4.1 Alternative 3 Compared to the No Action Alternative**

5 *Trinity River Region*

6 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*

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

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

- 3 • In wet, above-normal years, below-normal, and dry years, storage would be  
4 similar in all months.
- 5 • In critical dry years, storage would be increased in all months (up to  
6 11.9 percent).
- 7 • In all months, in all water year types, surface water elevations would be  
8 similar.

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

- 12 • Over long-term conditions, flows would be similar in March through  
13 November and increased in December through February (up to 11.8 percent).
- 14 • In wet years, flows would be similar in April through October; reduced in  
15 November (7.0 percent) and increased in December through March (up to  
16 15.1 percent).
- 17 • In dry years, flows would be similar in all months.

18 *Central Valley Region*

19 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*  
20 *Shasta Lake and Sacramento River*

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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

- 5 • In wet years, storage would be similar in December through August and  
 6 increased in September and November (up to 8.7 percent).
- 7 • In above-normal years, storage would be similar in January through October  
 8 and increased in November and December (up to 7.1 percent).

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- 1 • In below-normal years, storage would be similar in March through September  
2 and increased in October through February (up to 11.9 percent).
- 3 • In dry years, storage would be similar in March through October and  
4 increased in November through January (up to 7.4 percent).
- 5 • In critical dry years, storage would increase in all months (up to 12.2 percent).
- 6 • In all months, in all water year types, surface water elevations would be  
7 similar.

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

- 11 • Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
  - 12 – Over long-term conditions, similar flows would occur in October,  
13 February through May, July, and August; reduced flows in September and  
14 November (up to 20.1 percent); and increased flows in December,  
15 January, and June (up to 8.9 percent).
  - 16 – In wet years, similar flows would occur in February through August;  
17 reduced flows in September through November (up to 42.1 percent); and  
18 increased flows in December and January (up to 16.9 percent).
  - 19 – In dry years, similar flows would occur in July through September and  
20 December through May; reduced flows in November (24.6 percent); and  
21 increased flows in January and June (up to 7.3 percent).
- 22 • Sacramento River near Freeport (near the northern boundary of the Delta)  
23 (Figures 5.59 through 5.61).
  - 24 – Over long-term conditions, similar flows would occur in October,  
25 December through May, July, and August; reduced flows in September  
26 and November (up to 30.1 percent); and increased flows in June  
27 (12.1 percent).
  - 28 – In wet years, similar flows would occur in January through May, July, and  
29 October; reduced flows in August, September, and November (up to  
30 48.1 percent); and increased flows in December and June (up to  
31 6.6 percent).
  - 32 – In dry years, similar flows would occur in July through October and  
33 December through April; reduced flows in November (14.2 percent); and  
34 increased flows in May and June (up to 15.7 percent).

35 *Lake Oroville and Feather River*

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



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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

- 3 • In wet years, storage would be similar in January through August and  
4 increased in September through December (up to 18.5 percent).
- 5 • In above-normal years, storage would be similar in February through August  
6 and increased in September through January (up to 18.5 percent).
- 7 • In below-normal years, storage would be similar in June through September  
8 and increased in October through May (up to 22.5 percent).
- 9 • In dry years, storage would be similar in May through September and  
10 increased in October through April (up to 12.3 percent).
- 11 • In critical dry years, storage would be similar under all months.
- 12 • In all months, in all water year types, surface water elevations would be  
13 similar.

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

- 16 • Over long-term conditions, similar flows would occur in October, November,  
17 March, April, and July; reduced flows in August and September (up to  
18 49.4 percent); and increased flows in December through February, May, and  
19 June (up to 33.9 percent).
- 20 • In wet years, similar flows would occur in October, November, February  
21 through May, and July; reduced flows in August and September (up to  
22 70.0 percent) and increased flows in December, January, and June (up to  
23 28.1 percent).
- 24 • In dry years, similar flows would occur in September and January through  
25 April; reduced flows in October through December and July (up to  
26 14.5 percent); and increased flows in May, June, and August (36.9 percent).

27 *Folsom Lake and American River*

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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

- 3 • In wet years, storage would be similar in December through August and  
4 increased in September through December (up to 12.1 percent).
- 5 • In above-normal years, storage would be similar in January through June,  
6 September, and October; and increased in November and December (up to  
7 6.3 percent); and reduced in July and August (up to 6.7 percent).
- 8 • In below-normal years, storage would be similar in February through July;  
9 reduced in August and September (up to 10.0 percent); and increased in  
10 October through January (up to 15.0 percent).
- 11 • In dry years, storage would be similar in all months.
- 12 • In critical dry years, storage would be similar in October through July and  
13 increased in August and September (up to 11.6 percent).
- 14 • In all months, in all water year types, surface water elevations would be  
15 similar.

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

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

28 *Clear Creek*

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

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

1 **Table 5.53 Changes in Clear Creek Flows below Whiskeytown Dam under**  
 2 **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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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



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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

- 3 • In wet years, storage would be increased in all months (up to 13.3 percent).
- 4 • In above-normal years, storage would be increased in all months (up to  
5 23.3 percent).
- 6 • In below-normal years, storage would be increased in all months (up to  
7 19.8 percent).
- 8 • In dry years, storage would be increased in all months (up to 25.3 percent).
- 9 • In critical dry years, storage would be increased in all months (up to  
10 37.8 percent).
- 11 • In all months, in all water year types, surface water elevations would be  
12 similar.

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

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

24 *San Joaquin River at Vernalis*

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

- 28 • Over long-term conditions, similar flows would occur in November through  
29 September and reduced flows in October (15.7 percent).
- 30 • In wet years, similar flows would occur in November through August;  
31 reduced flows in October (14.1 percent); and increased flows in September  
32 (5.7 percent).
- 33 • In dry years, similar flows would occur in November through March and July  
34 through September and reduced flows in October and April through June (up  
35 to 15.2 percent).

36 *San Luis Reservoir*

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

1 **Table 5.56 Changes in San Luis Reservoir Storage under Alternative 3 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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

- 3 • In wet years, storage would be increased in all months (up to 96.3 percent).  
4 Water storage elevations would be increased in all months (up to  
5 13.0 percent).
- 6 • In above-normal years, storage would be increased in all months (up to  
7 111.4 percent). Water storage elevations would be similar in October through  
8 March and increased in April through September (up to 11.3 percent).
- 9 • In below-normal years, storage would be increased in all months (up to  
10 106.9 percent). Water storage elevations would be similar in September and  
11 increased in October through August (up to 10.7 percent).
- 12 • In dry years, storage would be similar in September and increased in October  
13 through August (up to 52.1 percent). Water storage elevations would be  
14 similar December through May and July through October and increased in  
15 November and June (up to 6.8 percent).
- 16 • In critical dry years, storage would be similar in February through May and  
17 increased in June through January (up to 29.2 percent). Water storage  
18 elevations would be similar in all months.

19 *Changes in Flows into the Yolo Bypass*

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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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

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

- 4 • In wet years, flows into Yolo Bypass would be similar in January through  
 5 September; reduced in October (24.5 percent) and increased in November and  
 6 December (up to 15.1 percent).
- 7 • In above-normal years, storage would be similar in April through January and  
 8 increased in February and March (up to 11.7 percent).
- 9 • In below-normal years, flows into Yolo Bypass would be similar in April  
 10 through November and increased in December through March (up to  
 11 32.0 percent).
- 12 • In dry years, flows into Yolo Bypass would be similar in January through  
 13 November and increased in December (6.0 percent).
- 14 • In critical dry years, flows into Yolo Bypass would be similar in all months.

15 *Changes in Delta Conditions*

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

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

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

- 26 • Under Alternative 3, OMR flows are negative in all months of all water year  
 27 types except in April in a wet year (405 cfs). Under the No Action  
 28 Alternative, OMR flows are negative except in April and May of wet and  
 29 above-normal years and April of below-normal years.
- 30 • In wet years, average monthly OMR flows would be more positive in July and  
 31 August (up to 800 cfs) and more negative in September through June (up to  
 32 4,477 cfs).
- 33 • In dry years, average monthly OMR flows would be more positive in July and  
 34 January (up to 728 cfs) and more negative in August through December and  
 35 February through June (up to 1,847 cfs).

36 *Changes in CVP and SWP Exports and Deliveries*

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

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**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
<b>Alternative 3</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative</b>												
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
<b>Alternative 3 as Compared to No Action Alternative (percent change)</b>												
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



- 1 The following changes would occur in CVP and SWP exports under Alternative 3  
2 as compared to the No Action Alternative.
- 3 • Long-term average annual exports would be 726 TAF (15 percent) more  
4 under Alternative 3 as compared to the No Action Alternative.
  - 5 • In wet years, total exports would be similar in March, July, and September;  
6 increased in October, February and April through June (up to 142.4 percent);  
7 and reduced in August (7.1 percent).
  - 8 • In above-normal years, total exports would be similar in December, January,  
9 and July through September and increased in October, November, and  
10 February through June (up to 292 percent).
  - 11 • In below-normal years, total exports would be similar in December, January,  
12 July, and August and increased in September through November and February  
13 through June (up to 166.5 percent).
  - 14 • In dry years, total exports would be similar in September and December, and  
15 July; increased in October, November, March through June, and August (up to  
16 92.5 percent); and reduced in July (7.6 percent).
  - 17 • In critical dry years, total exports would be similar in September, October, and  
18 December through March; increased in November, April through June and  
19 August (up to 104.1 percent); and reduced in July (28.9 percent).
- 20 Deliveries to CVP and SWP water users increase under Alternative 3 as compared  
21 to the No Action Alternative, as summarized in Tables 5.60 and 5.61,  
22 respectively, due to increased water supply availability and export limitations.

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

Annual Average Deliveries (TAF)					
		Alternative 3	No Action Alternative	Alternative 3 as compared to the No Action Alternative	
				Difference	Percent Change
<b>North of Delta</b>					
CVP Agricultural Water Service Contractors	Long Term	209	185	24	13.0
	Dry	111	86	25	29.7
	Critical Dry	31	24	7	29.8
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	483	467	15	3.3
	Dry	460	447	13	2.9
	Critical Dry	408	405	2	0.6
CVP M&I American River Contractors	Long Term	118	113	6	5.0
	Dry	104	97	7	7.2
	Critical Dry	78	75	3	4.0
CVP Sacramento River Settlement Contractors	Long Term	1,860	1,859	1	0.0
	Dry	1,906	1,906	0	0.0
	Critical Dry	1,742	1,737	5	0.3
CVP Refuge Level 2 Deliveries	Long Term	153	146	7	4.7
	Dry	149	146	4	2.5
	Critical Dry	103	102	1	0.9
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,706	2,658	47	1.8
	Dry	2,626	2,584	42	1.6
	Critical Dry	2,284	2,268	16	0.7
<b>South of Delta (Does not include Eastside Contractors)</b>					
CVP Agricultural Water Service Contractors	Long Term	1,079	847	233	27.5
	Dry	596	445	151	34.0
	Critical Dry	168	131	36	27.5
CVP M&I Users	Long Term	17	15	1	8.8
	Dry	15	14	1	7.9
	Critical Dry	11	11	0	3.6
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	261	261	0	0.0
	Dry	269	269	0	0.0
	Critical Dry	224	224	0	0.0

Annual Average Deliveries (TAF)					
		Alternative 3	No Action Alternative	Alternative 3 as compared to the No Action Alternative	
				Difference	Percent Change
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,209	1,975	234	11.9
	Dry	1,754	1,602	152	9.5
	Critical Dry	1,143	1,107	37	3.3
<b>Eastside Contractors Deliveries</b>					
Water Rights	Long Term	513	508	5	1.0
	Dry	524	524	0	0.0
	Critical Dry	478	445	33	7.5
CVP Water Service Contracts	Long Term	123	104	20	18.9
	Dry	109	84	25	29.3
	Critical Dry	36	4	32	793.7
Total Water Rights and CVP Service Contracts Deliveries	Long Term	636	611	25	4.0
	Dry	633	608	25	4.1
	Critical Dry	514	449	66	14.6

- 1 The following changes in CVP water deliveries would occur under Alternative 3  
2 as compared to the No Action Alternative.
- 3 • Deliveries to CVP North of Delta agricultural water service contractors would  
4 be increased by 13 percent over the long-term conditions and 30 percent in  
5 dry and critical dry years.
  - 6 • Deliveries to CVP North of Delta M&I contractors would be similar in total;  
7 however, deliveries to the American River CVP contractors would be similar  
8 over the long-term conditions and critical dry years and increased deliveries  
9 by 7 percent in dry years.
  - 10 • Deliveries to CVP South of Delta agricultural water service contractors would  
11 be increased by 28 percent over the long-term conditions, 34 percent in dry  
12 years, and 28 percent in critical dry years.
  - 13 • Deliveries to CVP South of Delta M&I contractors would be similar in critical  
14 dry years and increased by 9 percent over the long-term conditions and  
15 8 percent in dry years.
  - 16 • Deliveries to the Eastside contractors would be similar under long-term  
17 conditions and dry years and increased by 15 percent in critical dry years.

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

Annual Average Deliveries (TAF)					
		Alternative 3	No Action Alternative	Alternative 3 as compared to the No Action Alternative	
				Difference	Percent Change
<b>North of Delta</b>					
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
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
<b>South of Delta</b>					
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

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

- 3 • Deliveries without Article 21 water to SWP North of Delta water contractors  
4 would be increased by 17 percent over the long-term conditions and in dry  
5 years and 13 percent in critical dry years.
- 6 • Deliveries without Article 21 water to SWP South of Delta water contractors  
7 would be increased by 17 percent over the long-term conditions and in dry  
8 years and 14 percent in critical dry years.
- 9 • Deliveries of Article 21 water to SWP North of Delta water contractors would  
10 be similar over the long-term conditions and in dry and critical dry years.
- 11 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
12 be increased by 128 percent over the long-term conditions, 384 percent in dry  
13 years, and 214 percent in critical dry years.

14 *Effects Related to Cross Delta Water Transfers*

15 Potential effects to surface water resources could be similar to those identified in  
16 a recent environmental analysis conducted by Reclamation for long-term water  
17 transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i).

18 Potential effects were identified as reduced surface water storage in upstream  
19 reservoirs and changes in flow patterns in river downstream of the reservoirs if  
20 water was released from the reservoirs in patterns that were different than would  
21 have been used by the water seller's. Because all water transfers would be  
22 required to avoid adverse impacts to other water users and biological resources  
23 (see Section 3.A.6.3, Transfers), including impacts associated with changes in  
24 reservoir storage and river flow patterns, the analysis indicated that water  
25 transfers would not result in substantial changes in storage or river flows. For the  
26 purposes of this EIS, it is anticipated that similar conditions would occur due to  
27 cross Delta water transfers under Alternative 3 and the No Action Alternative.

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

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

## Chapter 5: Surface Water Resources and Water Supplies

1 *San Francisco Bay Area, Central Coast, and Southern California Regions*  
 2 *Potential Changes in Surface Water Resources at Reservoirs that Store CVP*  
 3 *and SWP Water*

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

- 11 • Deliveries to CVP South of Delta M&I contractors would be similar in critical  
 12 dry years; and increased by 9 percent over the long-term conditions and  
 13 8 percent in dry years.
- 14 • Deliveries without Article 21 water to SWP South of Delta water contractors  
 15 would be increased by 17 percent over the long-term conditions and in dry  
 16 years and 14 percent in critical dry years.
- 17 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
 18 be increased by 128 percent over the long-term conditions, 384 percent in dry  
 19 years, and 214 percent in critical dry years.

20 *Changes in CVP and SWP Exports and Deliveries*

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

23 **5.4.3.4.2 Alternative 3 Compared to the Second Basis of Comparison**

24 *Trinity River Region*

25 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*

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

1 **Table 5.62 Changes in Trinity Lake Storage under Alternative 3 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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

1 **Table 5.63 Changes in Trinity Lake Elevation under Alternative 3 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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

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



1 *Central Valley Region*  
 2 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*  
 3 *Shasta Lake and Sacramento River*

4 Storage levels and surface water elevations in Shasta Lake under Alternative 3 as  
 5 compared to the Second Basis of Comparison are summarized in Tables 5.64  
 6 and 5.65. Changes in flows in the Sacramento River downstream of Keswick  
 7 Dam and at Freeport are shown on Figures 5.56 through 5.61. The results are  
 8 summarized following Table 5.65.

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

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**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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

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

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

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

10 • Sacramento River near Freeport (near the northern boundary of the Delta)  
11 (Figures 5.59 through 5.61).

12 – Over long-term conditions and in wet years, flows would be similar in all  
13 months.

14 – In dry years, similar flows would occur in July through May; and  
15 increased flows in June (11 percent).

16 *Lake Oroville and Feather River*

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

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**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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

1 **Table 5.67 Changes in Lake Oroville Elevation under Alternative 3 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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

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

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

- 7 • Over long-term conditions, similar flows would occur in November and  
8 January through June; reduced flows in October, December, and September  
9 (up to 12.5 percent); and increased flows in July and August (up to  
10 17.0 percent).
- 11 • In wet years, similar flows would occur in November and January through  
12 May; reduced flows in October, December, and September (up to  
13 14.6 percent); and increased flows in June through August (up to  
14 10.9 percent).
- 15 • In dry years, similar flows would occur in November and January through  
16 June; reduced flows in August through October (up to 21.2 percent); and  
17 increased flows in July (37.1 percent).

18 *Folsom Lake and American River*

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

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

Chapter 5: Surface Water Resources and Water Supplies

1 **Table 5.69 Changes in Folsom Lake Elevation under Alternative 3 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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

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

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



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

5 **Table 5.70 Changes in Clear Creek Flows below Whiskeytown Dam under**  
 6 **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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

Chapter 5: Surface Water Resources and Water Supplies

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

7 **Table 5.71 Changes in New Melones Reservoir Storage under Alternative 3 as**  
 8 **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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

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**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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

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

- 4 • In wet years, storage would be similar in March through May and increased in  
 5 June through February (up to 8.4 percent).
- 6 • In above normal years, storage would be increased in all months (up to  
 7 16.3 percent).
- 8 • In below normal years, storage would be increased in all months (up to  
 9 14.7 percent).
- 10 • In dry years, storage would be increased in all months (up to 19.6 percent).
- 11 • In critical dry years, storage would be increased in all months (up to  
 12 32.1 percent).
- 13 • In all months, in all water year types, surface water elevations would be  
 14 similar.

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

- 17 • Over long-term conditions, similar flows would occur in October, December,  
 18 January, and March; reduced flows would occur in November, May, and June  
 19 (up to 52.3 percent); and increased flows in February, April, July, and August  
 20 through September (up to 26.8 percent).
- 21 • In wet years, similar flows would occur in October, November, January, and  
 22 April; reduced flows in May and June (up to 44.8 percent); and increased  
 23 flows in December, February, March, and July through September (up to  
 24 68.6 percent).
- 25 • In dry years, similar flows would occur in July through October; reduced  
 26 flows in November through March and May through June (up to  
 27 36.0 percent); and increased flows in April (40.2 percent).

28 *San Joaquin River at Vernalis*

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

- 32 • Over long-term conditions, similar flows would occur in July through May  
 33 and reduced flows in June (11.8 percent).
- 34 • In wet years, similar flows would occur in September through January, March  
 35 through May, and July; reduced flows in June (8.3 percent); and increased  
 36 flows in August and February (6.2 percent).
- 37 • In dry years, similar flows would occur in July through March; reduced flows  
 38 in May and June (up to 12.3 percent); and increased flows in April  
 39 (6.6 percent).

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

5 **Table 5.73 Changes in San Luis Reservoir Storage under Alternative 3 as**  
 6 **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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

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**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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

- 1 The following changes in San Luis Reservoir storage would occur under  
2 Alternative 3 as compared to the Second Basis of Comparison.
- 3 • In wet years, storage would be similar in July through November and March  
4 through May and reduced in December through February and June (up to  
5 15.7 percent). Surface water elevations would be similar in all months.
  - 6 • In above-normal years, storage would be similar in November; increased in  
7 August and September (up to 12.1 percent); and reduced in October and  
8 December through July (up to 21.7 percent). Surface water elevations would  
9 be similar in March through December and reduced in January and February  
10 (up to 6.0 percent).
  - 11 • In below-normal years, storage would be similar in August and September and  
12 reduced in October through July (up to 40.1 percent). Surface water  
13 elevations would be similar in all months.
  - 14 • In dry years, storage would be reduced in January through September (up to  
15 19.2 percent) and increased in October through December (up to  
16 13.2 percent). Surface water elevations would be similar in all months.
  - 17 • In critical dry years, storage would be reduced in October through August (up  
18 to 28.5 percent) and increased in September (7.6 percent). Surface water  
19 elevations would be similar September through January and reduced in  
20 February through August (up to 7.4 percent).

21 *Changes in Flows into the Yolo Bypass*

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

Chapter 5: Surface Water Resources and Water Supplies

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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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



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

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

8 *Changes in Delta Conditions*

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

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

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

- 19 • Under Alternative 3, OMR flows are negative in all months of all water year  
20 types except in April in wet year (405 cfs). Under Second Basis of  
21 Comparison, OMR flows are negative in all months of all water year types.
- 22 • In wet years, flows would be more positive in September through February,  
23 April, and May (up to 5,528 cfs) and more negative in March and June  
24 through August (up to 1,453 cfs).
- 25 • In dry years, flows would be more positive in August through May (up to  
26 3,249 cfs); and more negative flows in June and July (up to 1,345 cfs).

27 *Changes in CVP and SWP Exports and Deliveries*

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

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2

**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
<b>Alternative 3</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 3 as Compared to Second Basis of Comparison (percent change)</b>												
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

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

- 3 • Long-term average annual exports would be 326 TAF (6 percent) less under  
4 Alternative 3 as compared to the Second Basis of Comparison.
- 5 • In wet years, total exports would be similar in July through November,  
6 February, and April; increased exports in March, May, and June (up to  
7 14.0 percent); and reduced in December and January (up to 22.8 percent).
- 8 • In above-normal years, total exports would be similar in June through  
9 November, March, and April; reduced exports in December through February  
10 (up to 42.2 percent); and increased in May (up to 13.8 percent).
- 11 • In below-normal years, total exports would be similar in October through  
12 December; reduced exports in January through June (up to 41.5 percent); and  
13 increased in July through September (up to 25.7 percent).
- 14 • In dry years, total exports would be similar in August through December and  
15 April; reduced exports in January through March (up to 39.3 percent); and  
16 increased exports in May through July (up to 22.1 percent).
- 17 • In critical dry years, total exports would be similar in April, June, August, and  
18 September; reduced exports in October through March and May (up to  
19 38.3 percent); and increased exports in July (14.0 percent).

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

1 **Table 5.77 Changes CVP Water Deliveries under Alternative 3 as Compared to the**  
 2 **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	Percent Change
<b>North of Delta</b>					
CVP Agricultural Water Service Contractors	Long Term	209	221	-12	-5.4
	Dry	111	124	-13	-10.7
	Critical Dry	31	38	-7	-18.5
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	483	486	-3	-0.6
	Dry	460	461	-1	-0.2
	Critical Dry	408	410	-2	-0.7
CVP M&I American River Contractors	Long Term	118	120	-2	-1.7
	Dry	104	105	-2	-1.6
	Critical Dry	78	80	-3	-3.5
CVP Sacramento River Settlement Contractors	Long Term	1,860	1,858	2	0.1
	Dry	1,906	1,905	1	0.0
	Critical Dry	1,742	1,734	8	0.5
CVP Refuge Level 2 Deliveries	Long Term	153	155	-2	-1.0
	Dry	149	151	-2	-1.4
	Critical Dry	103	105	-2	-2.0
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,706	2,720	-14	-0.5
	Dry	2,626	2,642	-16	-0.6
	Critical Dry	2,284	2,287	-3	-0.2
<b>South of Delta (Does not include Eastside Contractors)</b>					
CVP Agricultural Water Service Contractors	Long Term	1,079	1,108	-29	-2.6
	Dry	596	662	-66	-10.1
	Critical Dry	168	210	-42	-20.2
CVP M&I Users	Long Term	17	17	0	-2.2
	Dry	15	15	0	-1.6
	Critical Dry	11	12	-1	-3.4

Annual Average Deliveries (TAF)					
		Alternative 3	Second Basis of Comparison	Alternative 3 as compared to the Second Basis of Comparison	
				Difference	Percent Change
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	261	261	0	0.0
	Dry	269	268	1	0.1
	Critical Dry	224	224	0	0.0
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	2,209	2,239	-29	-1.3
	Dry	1,754	1,820	-66	-3.7
	Critical Dry	1,143	1,186	-43	-3.6
<b>Eastside Contractors Deliveries</b>					
Water Rights	Long Term	513	510	3	0.5
	Dry	524	524	0	0.0
	Critical Dry	478	460	18	3.8
CVP Water Service Contracts	Long Term	123	108	15	14.0
	Dry	109	87	22	25.6
	Critical Dry	36	4	32	793.7
Total Water Rights and CVP Service Contracts Deliveries	Long Term	636	618	18	2.9
	Dry	633	611	22	3.6
	Critical Dry	514	465	49	10.7

- 1 The following changes in CVP water deliveries would occur under Alternative 3  
2 as compared to the Second Basis of Comparison.
- 3 • Deliveries to CVP North of Delta agricultural water service contractors would  
4 be similar over the long-term conditions and reduced by 11 percent in dry  
5 years and 19 percent in critical dry years.
  - 6 • Deliveries to CVP North of Delta M&I contractors (including American River  
7 CVP contractors) would be similar in long-term conditions and dry and  
8 critical dry years.
  - 9 • Deliveries to CVP South of Delta agricultural water service contractors would  
10 be similar over the long-term conditions; and reduced by 10 percent in dry  
11 years and 20 percent in critical dry years.

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- 1 • Deliveries to CVP South of Delta M&I contractors would be similar in long-  
2 term conditions and dry and critical dry years.
- 3 • Deliveries to the Eastside contractors would be similar under long-term  
4 conditions and dry years and increased by 11 percent in critical dry years.

5 **Table 5.78 Changes SWP Water Deliveries under Alternative 3 as Compared to the**  
6 **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	Percent Change
<b>North of Delta</b>					
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
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
<b>South of Delta</b>					
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

Annual Average Deliveries (TAF)					
		Alternative 3	Second Basis of Comparison	Alternative 3 as compared to the Second Basis of Comparison	
				Difference	Percent Change
SWP M&I Article 21 Deliveries	Long Term	33	104	-71	-68
	Dry	11	86	-75	-87
	Critical Dry	10	58	-48	-83
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

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

- 3 • Deliveries without Article 21 water to SWP North of Delta water contractors  
 4 would be similar over the long-term conditions and in dry years and reduced  
 5 by 10 percent in critical dry years.
- 6 • Deliveries without Article 21 water to SWP South of Delta water contractors  
 7 would be similar over the long-term conditions and in dry years and reduced  
 8 by 11 percent in critical dry years.
- 9 • Deliveries of Article 21 water to SWP North of Delta water contractors would  
 10 be similar over the long-term conditions and in dry and critical dry years.
- 11 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
 12 be reduced by 62 percent over the long-term conditions; 80 percent in dry  
 13 years; and 76 percent in critical dry years.

14 *Effects Related to Cross Delta Water Transfers*

15 Potential effects to surface water resources could be similar to those identified in  
 16 a recent environmental analysis conducted by Reclamation for long-term water  
 17 transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i).  
 18 Potential effects were identified as reduced surface water storage in upstream  
 19 reservoirs and changes in flow patterns in river downstream of the reservoirs if  
 20 water was released from the reservoirs in patterns that were different than would  
 21 have been used by the water seller's. Because all water transfers would be  
 22 required to avoid adverse impacts to other water users and biological resources  
 23 (see Section 3.A.6.3, Transfers), including impacts associated with changes in  
 24 reservoir storage and river flow patterns, the analysis indicated that water

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1 transfers would not result in substantial changes in storage or river flows. For the  
 2 purposes of this EIS, it is anticipated that similar conditions would occur due to  
 3 cross Delta water transfers under Alternative 3 and the Second Basis of  
 4 Comparison.

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

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

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

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

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

27 *Changes in CVP and SWP Exports and Deliveries*

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

30 **5.4.3.5 Alternative 4**

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

34 **5.4.3.5.1 Alternative 4 Compared to the No Action Alternative**

35 Changes in surface water resources under Alternative 4 as compared to the No  
 36 Action Alternative would be the same as the impacts described in Section  
 37 5.4.3.2.1, Alternative 1 Compared to the No Action Alternative.

38 **5.4.3.6 Alternative 5**

39 CVP and SWP operations under Alternative 5 are similar to the No Action  
 40 Alternative with modified Old and Middle River flow criteria and New Melones



1 Reservoir operations. Alternative 5 would include changed water demands for  
2 American River water supplies as compared to the No Action Alternative or  
3 Second Basis of Comparison. Alternative 5 would provide water supplies of up to  
4 17 TAF per year under a Warren Act Contract for El Dorado Irrigation District  
5 and 15 TAF per year under a Warren Act Contract for El Dorado County Water  
6 Agency. These demands are not included in the analysis presented in this section  
7 of the EIS. A sensitivity analysis comparing the results of the analysis with and  
8 without these demands is presented in Appendix 5B of this EIS.

9 **5.4.3.6.1 Alternative 5 Compared to the No Action Alternative**

10 *Trinity River Region*

11 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*

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

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**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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

3

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

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

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

6 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*  
 7 *Shasta Lake and Sacramento River*

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

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

15

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

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

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

- 7 • Sacramento River flows downstream of Keswick Dam (Figures 5.56 through  
8 5.58) would be similar over the long-term conditions and in wet and dry years.
- 9 • Sacramento River near Freeport (near the northern boundary of the Delta)  
10 (Figures 5.59 through 5.61) would be similar over the long-term conditions  
11 and in wet and dry years.

12 *Lake Oroville and Feather River*

13 Storage levels and surface water elevations in Lake Oroville under Alternative 5  
14 as compared to the No Action Alternative are summarized in Tables 5.83 and  
15 5.84. Changes in flows in the Feather River downstream of Thermalito Complex  
16 are shown on Figures 5.62 through 5.64. The results are summarized following  
17 Table 5.84.

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

3

Chapter 5: Surface Water Resources and Water Supplies

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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



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

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

6 • Over long-term conditions, similar flows would occur in June through April  
7 and reduced flows in May (6.6 percent).

8 • In wet years, similar flows would occur in all months.

9 • In dry years, similar flows would occur in September through April and June;  
10 reduced flows in May (27.1 percent) and increased flows in July and August  
11 (up to 8.9 percent).

12 *Folsom Lake and American River*

13 Storage levels and surface water elevations in Folsom Lake under Alternative 5 as  
14 compared to the No Action Alternative are summarized in Tables 5.85 and 5.86.

15 Changes in flows in the American River downstream of Nimbus Dam are shown  
16 on Figures 5.65 through 5.67. The results are summarized following Table 5.86.

Chapter 5: Surface Water Resources and Water Supplies

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

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

3

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

Water Year	End of Month Elevation (Feet)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

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

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

9 *Clear Creek*

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

1 **Table 5.87 Changes in Clear Creek Flows below Whiskeytown Dam 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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

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

1 **Table 5.88 Changes in New Melones Reservoir Storage 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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

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**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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

1 The following changes in New Melones Reservoir storage and elevation would  
2 occur under Alternative 5 as compared to the No Action Alternative.

- 3 • In wet years, storage would be similar in all months.
- 4 • In above normal years, storage would be similar in October through June and  
5 reduced in July through September (up to 5.7 percent).
- 6 • In below normal years, storage would be reduced in all months (up to  
7 9.2 percent).
- 8 • In dry years, storage would be reduced in all months (up to 10.2 percent).
- 9 • In critical dry years, storage would be reduced in all months (up to  
10 18.9 percent).
- 11 • In all months, in all water year types, surface water elevations would be  
12 similar.

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

- 15 • Over long-term conditions, flows would be similar in September through  
16 February and June; reduced flows would occur in March, July, and August (up  
17 to 8.0 percent); and increased flows in April and May (up to 22.4 percent).
- 18 • In wet years, similar flows would occur in October, November, January,  
19 February, and April through June and reduced flows in December, March, and  
20 July through September (up to 18.0 percent).
- 21 • In dry years, similar flows would occur in June through March and increased  
22 flows in April and May (up to 47.3 percent).

#### 23 *San Joaquin River at Vernalis*

24 Flows in the San Joaquin River at Vernalis under Alternative 5 as compared to the  
25 No Action Alternative are summarized below, as shown on Figures 5.71 through  
26 5.73.

- 27 • Over long-term conditions and wet years, similar flows would occur in all  
28 months.
- 29 • In dry years, similar flows would occur in June through March and increased  
30 flows in April and May (up to 15.7 percent).San Luis Reservoir.

31 Storage levels and surface water elevations in San Luis Reservoir under  
32 Alternative 5 as compared to the No Action Alternative are summarized in  
33 Tables 5.90 and 5.91. The results are summarized following Table 5.91.

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1 **Table 5.90 Changes in San Luis Reservoir Storage 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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

3

## Chapter 5: Surface Water Resources and Water Supplies

- 1 The following changes in San Luis Reservoir storage would occur under  
2 Alternative 5 as compared to the No Action Alternative.
- 3 • In wet years, storage would be similar in January through May and increased  
4 in June through December (up to 10.0 percent).
  - 5 • In above-normal years, storage would be similar in all months.
  - 6 • In below-normal years, storage would be similar in November, February  
7 through April, August, and September; reduced in June and July (up to  
8 9.2 percent); and increased in October, December, January, and May (up to  
9 8.3 percent).
  - 10 • In dry years, storage would be similar in October through March and reduced  
11 in April through September (up to 17.3 percent).
  - 12 • In critical dry years, storage would be similar in February and March; and  
13 reduced in April through January (up to 18.2 percent).
  - 14 • Surface water elevations would be similar in all months, in all water years.

15 *Changes in Flows into the Yolo Bypass*

16 Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under  
17 Alternative 5 as compared to the No Action Alternative are summarized in  
18 Table 5.92. The results are summarized following Table 5.92.

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**Table 5.92 Changes in Flows into the Yolo Bypass at Fremont Weir 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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

1 Flows from the Sacramento River into Yolo Bypass at Fremont Weir would be  
2 similar under Alternative 5 and the No Action Alternative.

3 *Changes in Delta Conditions*

4 Delta outflow under Alternative 5 as compared to the No Action Alternative are  
5 summarized below and shown on Figures 5.74 through 5.76.

- 6 • In wet years, average monthly Delta outflow would be similar.
- 7 • In dry years, average monthly Delta outflow would be similar in July through  
8 April and increased in May and June (up to 1,377 cfs).

9 The OMR conditions under Alternative 5 as compared to the No Action  
10 Alternative are shown on Figures 5.77 through 5.79.

- 11 • Under Alternative 5, OMR flows would be negative except in April and May  
12 of all water year types. Under the No Action Alternative, OMR flows would  
13 be negative except in April and May of wet and above normal years and April  
14 of below normal years.
- 15 • In wet years, OMR flows would be more positive or no change in September,  
16 October, January, and April through June (up to 171 cfs) and more negative in  
17 November, December, March, and August (up to 124 cfs).
- 18 • In dry years, OMR flows would be more positive or no change in October  
19 through March (up to 1,359 cfs) and more negative in June through September  
20 (up to 568 cfs).

21 *Changes in CVP and SWP Exports and Deliveries*

22 Delta exports under Alternative 5 as compared to the No Action Alternative are  
23 summarized in Table 5.93.

1 **Table 5.93 Changes in Exports at Jones and Banks Pumping Plants under**  
 2 **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
<b>Alternative 5</b>												
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
<b>No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative</b>												
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
<b>Alternative 5 as Compared to No Action Alternative (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

- 1 The following changes would occur in CVP and SWP exports under Alternative 5  
2 as compared to the No Action Alternative.
- 3 • Long-term average annual exports would be 45 TAF (1 percent) less under  
4 Alternative 5 as compared to the No Action Alternative.
  - 5 • In wet years, total exports would be similar in all months.
  - 6 • In above-normal years, total exports would be similar in June through April  
7 and reduced in May (13.0 percent).
  - 8 • In below-normal years, total exports would be similar in June through March  
9 and reduced in April and May (up to 45.4 percent).
  - 10 • In dry years, total exports would be similar in June, July, and September  
11 through March; reduced in April and May (up to 67.0 percent); and increased  
12 in August (12.8 percent).
  - 13 • In critical dry years, total exports would be similar in June, July, and  
14 September through March; reduced in April and May (up to 77.5 percent); and  
15 increased August (25.9 percent).
- 16 Deliveries to CVP and SWP water users would be similar under Alternative 5 as  
17 compared to the No Action Alternative, as summarized in Tables 5.94 and 5.95,  
18 respectively.

1 **Table 5.94 Changes CVP Water Deliveries under Alternative 5 as Compared to the**  
 2 **No Action Alternative**

Annual Average Deliveries (TAF)					
		Alternative 5	No Action Alternative	Alternative 5 as compared to the No Action Alternative	
				Difference	Percent Change
<b>North of Delta</b>					
CVP Agricultural Water Service Contractors	Long Term	185	185	0	0.0
	Dry	85	86	0	-0.4
	Critical Dry	24	24	0	1.4
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	467	467	0	0.0
	Dry	447	447	0	0.1
	Critical Dry	405	405	0	0.0
CVP M&I American River Contractors	Long Term	112	113	0	-0.1
	Dry	96	97	0	-0.2
	Critical Dry	74	75	-1	-1.0
CVP Sacramento River Settlement Contractors	Long Term	1,861	1,859	2	0.1
	Dry	1,906	1,906	0	0.0
	Critical Dry	1,747	1,737	10	0.6
CVP Refuge Level 2 Deliveries	Long Term	146	146	0	-0.1
	Dry	145	146	0	-0.2
	Critical Dry	103	102	1	0.7
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,660	2,658	1	0.1
	Dry	2,584	2,584	0	0.0
	Critical Dry	2,279	2,268	11	0.5
<b>South of Delta (Does not include Eastside Contractors)</b>					
CVP Agricultural Water Service Contractors	Long Term	834	847	-13	-1.5
	Dry	433	445	-12	-2.6
	Critical Dry	130	131	-1	-1.0
CVP M&I Users	Long Term	15	15	0	-0.2
	Dry	14	14	0	-0.1
	Critical Dry	11	11	0	-0.7
	Long Term	852	852	0	0
	Dry	875	875	0	0

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Annual Average Deliveries (TAF)					
		Alternative 5	No Action Alternative	Alternative 5 as compared to the No Action Alternative	
				Difference	Percent Change
San Joaquin River Exchange Contractors	Critical Dry	741	741	0	0
CVP Refuge Level 2 Deliveries	Long Term	261	261	0	-0.1
	Dry	269	269	0	0.0
	Critical Dry	222	224	-2	-1.0
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	1,962	1,975	-13	-0.7
	Dry	1,590	1,602	-12	-0.7
	Critical Dry	1,103	1,107	-4	-0.3
<b>Eastside Contractors Deliveries</b>					
Water Rights	Long Term	502	508	-6	-1.1
	Dry	524	524	0	0.0
	Critical Dry	406	445	-39	-8.7
CVP Water Service Contracts	Long Term	100	104	-4	-3.7
	Dry	69	84	-16	-18.4
	Critical Dry	8	4	4	100.0
Total Water Rights and CVP Service Contracts Deliveries	Long Term	602	611	-10	-1.6
	Dry	593	608	-16	-2.5
	Critical Dry	414	449	-35	-7.7



1 The following changes in CVP water deliveries would occur under Alternative 5  
 2 as compared to the No Action Alternative.

- 3 • Deliveries to CVP North of Delta agricultural water service contractors would  
 4 be similar over the long-term conditions and in dry and critical dry years.
- 5 • Deliveries to CVP North of Delta M&I contractors would be similar over the  
 6 long-term conditions and in dry and critical dry years in total and for the  
 7 American River CVP contractors.
- 8 • Deliveries to CVP South of Delta agricultural water service contractors would  
 9 be similar over the long-term conditions and in dry and critical dry years.
- 10 • Deliveries to CVP South of Delta M&I contractors would be similar over the  
 11 long-term conditions and in dry and critical dry years.
- 12 • Deliveries to the Eastside contractors would be similar under long-term  
 13 conditions and dry years; and reduced by 7.7 percent in critical dry years.

14 **Table 5.95 Changes SWP Water Deliveries under the Alternative 5 as Compared to**  
 15 **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
<b>North of Delta</b>					
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

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Annual Average Deliveries (TAF)					
		Alternative 5	No Action Alternative	Alternative 5 as compared to the No Action Alternative	
				Difference	Percent Change
<b>South of Delta</b>					
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

1

2 The following changes in SWP water deliveries would occur under Alternative 5  
 3 as compared to the No Action Alternative.

- 4 • Deliveries without Article 21 water to SWP North of Delta water contractors  
 5 would be similar over the long-term conditions and in dry and critical dry  
 6 years.
- 7 • Deliveries without Article 21 water to SWP South of Delta water contractors  
 8 would be similar over the long-term conditions and in dry and critical dry  
 9 years.
- 10 • Deliveries of Article 21 water to SWP North of Delta water contractors would  
 11 be similar over the long-term conditions and in dry and critical dry years.
- 12 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
 13 be reduced by 8 percent over the long-term conditions and 41 percent in  
 14 critical dry years; and increased by 12 percent in dry years.

1        *Effects Related to Cross Delta Water Transfers*

2        Potential effects to surface water resources could be similar to those identified in  
3        a recent environmental analysis conducted by Reclamation for long-term water  
4        transfers from the Sacramento to San Joaquin valleys (Reclamation 2014i).  
5        Potential effects were identified as reduced surface water storage in upstream  
6        reservoirs and changes in flow patterns in river downstream of the reservoirs if  
7        water was released from the reservoirs in patterns that were different than would  
8        have been used by the water seller's. Because all water transfers would be  
9        required to avoid adverse impacts to other water users and biological resources  
10       (see Section 3.A.6.3, Transfers), including impacts associated with changes in  
11       reservoir storage and river flow patterns, the analysis indicated that water  
12       transfers would not result in substantial changes in storage or river flows. For the  
13       purposes of this EIS, it is anticipated that similar conditions would occur due to  
14       cross Delta water transfers under Alternative 5 and the No Action Alternative.

15       Under Alternative 5 and the No Action Alternative, the timing of cross Delta  
16       water transfers would be limited to July through September, and the volume  
17       would be limited to 600,000 acre-feet per year in drier years and 360,000 acre-  
18       feet in all other years, in accordance with the 2008 USFWS BO and 2009 NMFS  
19       BO. As indicated in Table 5.93, capacity would be available under the No Action  
20       Alternative between July and September for water transfers in all water year  
21       types.

22       Overall, the potential for water transfer conveyance would be similar under  
23       Alternative 5 as compared to the No Action Alternative.

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

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

27       The San Francisco Bay Area, Central Coast, and Southern California regions  
28       include numerous reservoirs that store CVP and SWP water supplies, including  
29       CVP and SWP reservoirs, that primarily provide water supplies for M&I water  
30       users. Changes in the availability CVP and SWP water supplies for storage in  
31       these reservoirs under Alternative 5 as compared to the No Action  
32       Alternative would be consistent with the following changes in water deliveries to  
33       M&I water users, as summarized in Tables 5.94 and 5.95.

- 34       • Deliveries to CVP South of Delta M&I contractors would be similar over the  
35       long-term conditions and in dry and critical dry years.
- 36       • Deliveries without Article 21 water to SWP South of Delta water contractors  
37       would be similar over the long-term conditions and in dry and critical dry  
38       years.
- 39       • Deliveries of Article 21 water to SWP South of Delta water contractors would  
40       be reduced by 8 percent over the long-term conditions and 41 percent in  
41       critical dry years; and increased by 12 percent in dry years.

Chapter 5: Surface Water Resources and Water Supplies

1 *Changes in CVP and SWP Exports and Deliveries*  
 2 Deliveries to CVP and SWP water users are described above in the Central Valley  
 3 Region.

4 **5.4.3.6.2 Alternative 5 Compared to the Second Basis of Comparison**

5 *Trinity River Region*

6 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*

7 Changes in Trinity Lake storage and surface water elevations under Alternative 5  
 8 as compared to the Second Basis of Comparison are summarized in Tables 5.96  
 9 and 5.97. The results are summarized following Table 5.97.

10 **Table 5.96 Changes in Trinity Lake Storage under Alternative 5 as Compared to the**  
 11 **Second Basis of Comparison**

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

12

1 **Table 5.97 Changes in Trinity 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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

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1 The following changes in Trinity Lake storage and surface water elevations would  
 2 occur under Alternative 5 as compared to the Second Basis of Comparison.

- 3 • In wet, below normal, and dry years, storage would be similar.
- 4 • In above normal years, storage would be similar in January through October  
 5 and reduced in November and December (up to 5.3 percent).
- 6 • In critical dry years, storage would be reduced in all months (up to  
 7 10.0 percent).
- 8 • In all months, in all water year types, surface water elevations would be  
 9 similar.

10 The following changes would occur on the Trinity River under Alternative 5 as  
 11 compared to the Second Basis of Comparison, as summarized on Figures 5.53  
 12 through 5.55.

- 13 • Over long-term conditions, flows would be similar in March through  
 14 November and January and reduced in December and February (up to  
 15 9.6 percent).
- 16 • In wet years, flows would be similar in January and April through November  
 17 and reduced in December, February, and March (up to 13.9 percent).
- 18 • In dry years, flows would be similar in all months.

19 *Central Valley Region*

20 *Changes in CVP and SWP Reservoir Storage and Downstream River Flows*

21 *Shasta Lake and Sacramento River*

22 Storage levels and surface water elevations in Shasta Lake under Alternative 5 as  
 23 compared to the Second Basis of Comparison are summarized in Tables 5.98 and  
 24 5.99. Changes in flows in the Sacramento River downstream of Keswick Dam  
 25 and at Freeport are shown on Figures 5.56 through 5.61. The results are  
 26 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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

3

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1  
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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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



- 1 The following changes in Shasta Lake storage and surface water elevation would  
2 occur under Alternative 5 as compared to the Second Basis of Comparison.
- 3 • In wet years, storage would be similar in October and December through  
4 August and reduced in November and September (up to 8.1 percent).
  - 5 • In above normal years, storage would be similar in February through  
6 September and reduced in October through December (up to 7.5 percent).
  - 7 • In below normal years, storage would be similar in March through September  
8 and reduced in October through February (up to 9.9 percent).
  - 9 • In dry years, storage would be similar in January through October and reduced  
10 in November through December (up to 5.9 percent).
  - 11 • In critical dry years, storage would be reduced in all months (up to  
12 16.8 percent).
  - 13 • In all months, in all water year types, surface water elevations are similar.
- 14 The following changes in Sacramento River flows would occur under  
15 Alternative 5 as compared to the Second Basis of Comparison, as shown on  
16 Figures 5.56 through 5.61.
- 17 • Sacramento River downstream of Keswick Dam (Figures 5.56 through 5.58).
    - 18 – Over long-term conditions, flows would be similar in July, August,  
19 October, and February through April; reduced in December, January, May  
20 and June (up to 8.2 percent); and increased in September and November  
21 (up to 38.5 percent).
    - 22 – In wet years, flows would be similar in January through July; reduced in  
23 December and August (up to 15.0 percent); and increased in September  
24 through November (up to 77.3 percent).
    - 25 – In dry years, similar flows would occur in July through October and  
26 December through March; reduced in April through June (up to  
27 10.1 percent); and increased flows in November (32.1 percent).
  - 28 • Sacramento River near Freeport (near the northern boundary of the Delta)  
29 (Figures 5.59 through 5.61).
    - 30 – Over long-term conditions, flows would be similar in October and  
31 December through April; reduced in May and June (up to 11.5 percent);  
32 and increased in July through September and November (43.4 percent).
    - 33 – In wet years, flows would be similar in October and January through June;  
34 reduced in December (6.2 percent); and increased in July through  
35 September and November (up to 89.0 percent).
    - 36 – In dry years, similar flows would occur in August through October and  
37 December through April; reduced in May and June (up to 13.6 percent);  
38 and increased flows in July and November (up to 19.3 percent).

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1 *Lake Oroville and Feather River*  
 2 Storage levels and surface water elevations in Lake Oroville under Alternative 5  
 3 as compared to the Second Basis of Comparison are summarized in Tables 5.100  
 4 and 5.101. Changes in flows in the Feather River downstream of Thermalito  
 5 Complex are shown on Figures 5.62 through 5.64. The results are summarized  
 6 following Table 5.101.

7 **Table 5.100 Changes in Lake Oroville Storage under Alternative 5 as Compared to**  
 8 **the Second Basis of Comparison**

Water Year	End of Month Storage (TAF)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

1 **Table 5.101 Changes in Lake Oroville 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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

- 1 The following changes in Lake Oroville storage and surface water elevation  
2 would occur under Alternative 5 as compared to the Second Basis of Comparison.
- 3 • In wet years, storage would be similar in January through August and reduced  
4 in September through December (up to 18.1 percent).
  - 5 • In above-normal years, storage would be similar in March through August and  
6 reduced in September through February (up to 14.0 percent).
  - 7 • In below-normal years, storage would be similar in May through July and  
8 reduced in August through April (up to 17.1 percent).
  - 9 • In dry years, storage would be similar in May and June and reduced in July  
10 through April (up to 11.4 percent).
  - 11 • In critical dry years, storage would be similar in all months.
  - 12 • Surface water elevations would be similar in all months, in all years.

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

- 15 • Over long-term conditions, similar flows would occur in November and April;  
16 reduced flows in October, December through March, May, and June (up to  
17 27.7 percent); and increased flows in July through September (up to  
18 76.2 percent).
- 19 • In wet years, similar flows would occur in October, November, March  
20 through May; reduced flows in December through February and June (up to  
21 25.6 percent); and increased flows in July through September (up to  
22 181.9 percent).
- 23 • In dry years, similar flows would occur in November through April; reduced  
24 flows in October, May, June, August, and September (up to 45.4 percent); and  
25 increased flows in July (60.4 percent).

26 *Folsom Lake and American River*

27 Storage levels and surface water elevations in Folsom Lake under Alternative 5 as  
28 compared to the Second Basis of Comparison are summarized in Tables 5.102  
29 and 5.103. Changes in flows in the American River downstream of Nimbus Dam  
30 are shown on Figures 5.65 through 5.67. The results are summarized below  
31 following 5.103.

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**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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

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Chapter 5: Surface Water Resources and Water Supplies

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**Table 5.103 Changes in Folsom 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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

1 The following changes in Folsom Lake storage and surface water elevation would  
2 occur under Alternative 5 as compared to the Second Basis of Comparison.

- 3 • In wet years, storage would be similar in December through July and reduced  
4 in August through November (up to 7.4 percent).
- 5 • In above normal years, storage would be similar in January through June,  
6 August, and October; reduced in September, November, and December (up to  
7 8.3 percent); and increased in July (5.4 percent).
- 8 • In below normal years, storage would be similar in February through May;  
9 reduced in August through January (up to 13.2 percent); and increased in June  
10 and July (up to 10.2 percent).
- 11 • In dry years, storage would be similar in all months.
- 12 • In critical dry years, storage would be similar in August and June and reduced  
13 in July (8.0 percent).
- 14 • Surface water elevations would be similar in all months, in all years.

15 The following changes in American River flows would occur under Alternative 5  
16 as compared to the Second Basis of Comparison, as shown on Figures 5.62  
17 through 5.64.

- 18 • Over long-term conditions, similar flows would occur in November through  
19 July; reduced flows in August (5.8 percent) and increased in September and  
20 October (42.4 percent).
- 21 • In wet years, similar flows would occur in October, November, and January  
22 through July; reduced flows in December and August (up to 13.7 percent);  
23 and increased flows in September (88.2 percent).
- 24 • In dry years, similar flows would occur in November through September and  
25 increased flows in October (16.7 percent).

#### 26 *Clear Creek*

27 Changes in flows in Clear Creek downstream of Whiskeytown Dam are  
28 summarized in Table 5.104.

29 Monthly Clear Creek flows under Alternative 5 as compared to the Second Basis  
30 of Comparison are identical except in May. In May, under Alternative 5, flows  
31 are up to 40.7 percent higher than under the Second Basis of Comparison.

1 **Table 5.104 Changes in Clear Creek Flows below Whiskeytown Dam under**  
 2 **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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

3 *New Melones Reservoir and Stanislaus River*  
 4 Storage levels and surface water elevations in New Melones Reservoir under  
 5 Alternative 5 as compared to the Second Basis of Comparison are summarized in  
 6 Tables 5.105 and 5.106. Changes in flows in the Stanislaus River downstream of  
 7 Goodwin Dam are shown on Figures 5.68 through 5.70. The results are  
 8 summarized following Table 5.106.



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**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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

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**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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

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4 The following changes in New Melones Reservoir storage would occur under  
5 Alternative 5 as compared to the Second Basis of Comparison.

- 6 • In wet years, storage would be reduced in all months (up to 9.3 percent).
- 7 • In above-normal years, storage would be reduced in all months (up to  
8 9.9 percent).
- 9 • In below-normal years, storage would be reduced in all months (up to  
10 13.1 percent).
- 11 • In dry years, storage would be reduced in all months (up to 14.3 percent).
- 12 • In critical dry years, storage would be reduced in all months (up to  
13 23.2 percent).
- 14 • Surface water elevations would be similar in all months, in all water year  
15 types.

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

- 3 • Over long-term conditions, similar flows would occur in August; reduced  
4 flows would occur in November through February, June, July, August, and  
5 September (up to 35.8 percent) and increased flows in October and March  
6 through May (up to 144.8 percent).
- 7 • In wet years, similar flows would occur in February and April; reduced flows  
8 in November through January and June through September (up to  
9 52.8 percent) and increased flows in October and March (up to 113.1 percent).
- 10 • In dry years, similar flows would occur in July through September; reduced  
11 flows in November through March and June (up to 35.7 percent); and  
12 increased flows in October, April, and May (150.1 percent).

13 *San Joaquin River at Vernalis*

14 Flows in the San Joaquin River at Vernalis under Alternative 5 as compared to the  
15 Second Basis of Comparison are summarized below, as shown on Figures 5.71  
16 through 5.73.

- 17 • Over long-term conditions, similar flows would occur in November through  
18 March, May, and July through September; reduced flows in June  
19 (8.2 percent); and increased flows in October and April (18.7 percent).
- 20 • In wet years, similar flows would occur in November through May and July  
21 through September; reduced flows in June (9.8 percent); and increased flows  
22 in October (16.2 percent).
- 23 • In dry years, similar flows would occur in November through March and June  
24 through September and increased flows in October, April, and May (up to  
25 24.5 percent).

26 *San Luis Reservoir*

27 Storage levels and surface water elevations in San Luis Reservoir under  
28 Alternative 5 as compared to the Second Basis of Comparison are summarized in  
29 Tables 5.107 and 5.108. The results are summarized following Table 5.108.

Chapter 5: Surface Water Resources and Water Supplies

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**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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

1 **Table 5.108 Changes in San Luis Elevation Storage under Alternative 5 as**  
 2 **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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

1 The following changes in San Luis Reservoir storage and surface water elevations  
2 would occur under Alternative 5 as compared to the Second Basis of Comparison.

- 3 • In wet years, storage would be reduced in all months (up to 48.9 percent).  
4 Surface water elevations would be similar in September and March and  
5 reduced in October through February and April through August (up to  
6 9.9 percent).
- 7 • In above-normal years, storage would be reduced in all months (up to  
8 59.3 percent). Surface water elevations would be similar in September and  
9 reduced in October through August (up to 12.9 percent).
- 10 • In below-normal years, storage would be reduced in all months (up to  
11 70.0 percent). Surface water elevations would be similar in September and  
12 reduced in October through August (up to 16.7 percent).
- 13 • In dry years, storage would be reduced in all months (up to 51.4 percent).  
14 Surface water elevations would be similar in October through December and  
15 reduced in January through September (up to 13.9 percent).
- 16 • In critical dry years, storage would be reduced in all months (46.3 percent).  
17 Surface water elevations would be reduced in all months (up to 13.5 percent).

18 *Changes in Flows into the Yolo Bypass*

19 Flows from the Sacramento River into the Yolo Bypass at Fremont Weir under  
20 Alternative 5 as compared to the Second Basis of Comparison are summarized in  
21 Table 5.109. The results are summarized following Table 5.109.

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**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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

1 The following changes in flows from the Sacramento River into the Yolo Bypass  
 2 at Fremont Weir would occur under Alternative 5 as compared to the Second  
 3 Basis of Comparison.

- 4 • In wet years, flows would be similar in February through September; reduced  
 5 flows in November through January (up to 15.0 percent); and increased in  
 6 October (15.8 percent).
- 7 • In above-normal years, flows would be similar in April through December and  
 8 reduced flows in January through March (up to 14.8 percent).
- 9 • In below-normal years, flows would be similar in April through November  
 10 and reduced flows in December through March (up to 24.0 percent).
- 11 • In dry years, flows would be similar in January through November and  
 12 reduced flows in December (up to 7.4 percent).
- 13 • In critical dry years, flows would be similar in all months.

14 *Changes in Delta Conditions*

15 Delta outflow under Alternative 5 as compared to the Second Basis of  
 16 Comparison are summarized below and shown on Figures 5.74 through 5.76.

- 17 • In wet years, average monthly Delta outflow would be increased in July  
 18 through November, January, and April and May (up to 13,666 cfs) and  
 19 reduced in December, February, March, and June (up to 1,713 cfs).
- 20 • In dry years, average monthly Delta outflow would be increased in July  
 21 through May (up to 3,384 cfs) and reduced in June (526 cfs).

22 *Changes in OMR Flows*

23 The OMR conditions under Alternative 5 as compared to the Second Basis of  
 24 Comparison are shown on Figures 5.77 through 5.79.

- 25 • Under Alternative 5, OMR flows would be negative except in April and May  
 26 of all water year types. Under the Second Basis of Comparison, OMR flows  
 27 would be negative in all months.
- 28 • In wet years, OMR flows would be more positive in September through  
 29 February, April and May (up to 10,017 cfs) and more negative in March and  
 30 June through August (up to 964 cfs).
- 31 • In dry years, OMR flows would be more positive in September through June  
 32 (up to 4,724 cfs) and more negative in July and August (up to 2,620 cfs).

33 *Changes in CVP and SWP Exports and Deliveries*

34 Delta exports under Alternative 5 as compared to the Second Basis of Comparison  
 35 are summarized in Table 5.110.



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**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
<b>Alternative 5</b>												
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
<b>Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison</b>												
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
<b>Alternative 5 as Compared to Second Basis of Comparison (percent change)</b>												
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

## Chapter 5: Surface Water Resources and Water Supplies

1 The following changes would occur in CVP and SWP exports under Alternative 5  
2 as compared to the Second Basis of Comparison.

- 3 • Long-term average annual exports would be 1,096 TAF (19 percent) less  
4 under Alternative 5 as compared to the Second Basis of Comparison.
- 5 • In wet years, total exports would be similar in June and September; increased  
6 exports in March, July, and August (up to 9.6 percent); and reduced in  
7 October through February, April, and May (up to 57.6 percent).
- 8 • In above-normal years, total exports would be similar in July and September;  
9 increased exports in August (8.9 percent); and reduced in October through  
10 June (up to 74.7 percent).
- 11 • In below-normal years, total exports would be similar in September; increased  
12 exports in July and August (up to 22.3 percent); and reduced in October  
13 through June (up to 82.0 percent).
- 14 • In dry years, total exports would be similar in August and September;  
15 increased in July (43.2 percent); and reduced exports in October through June  
16 (up to 81.8 percent).
- 17 • In critical dry years, total exports would be similar in September; increased in  
18 July and August (up to 72.3 percent); and reduced exports in October through  
19 June (up to 83.2 percent).

20 Deliveries to CVP and SWP water users would decline under Alternative 5 as  
21 compared to the Second Basis of Comparison, as summarized in Tables 5.111 and  
22 5.112, respectively, due to reduced water supply availability and export  
23 limitations.

1 **Table 5.111 Changes CVP Water Deliveries under Alternative 5 as Compared to the**  
 2 **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	Percent Change
<b>North of Delta</b>					
CVP Agricultural Water Service Contractors	Long Term	185	221	-36	-16.3
	Dry	85	124	-39	-31.4
	Critical Dry	24	38	-14	-36.4
CVP M&I (Including American River Contractors and Contra Costa Water District)	Long Term	467	486	-19	-3.8
	Dry	447	461	-14	-2.9
	Critical Dry	405	410	-5	-1.3
CVP M&I American River Contractors	Long Term	112	120	-8	-6.5
	Dry	96	105	-9	-8.4
	Critical Dry	74	80	-7	-8.1
CVP Sacramento River Settlement Contractors	Long Term	1,861	1,858	3	0.1
	Dry	1,906	1,905	1	0.0
	Critical Dry	1,747	1,734	13	0.7
CVP Refuge Level 2 Deliveries	Long Term	146	155	-8	-5.6
	Dry	145	151	-6	-4.0
	Critical Dry	103	105	-2	-2.2
Total CVP Agricultural, M&I, Sacramento River Settlement Contractors, and Refuge Level 2 Deliveries	Long Term	2,660	2,720	-60	-2.2
	Dry	2,584	2,642	-58	-2.2
	Critical Dry	2,279	2,287	-8	-0.4
<b>South of Delta (Does not include Eastside Contractors)</b>					
CVP Agricultural Users Water Service Contractors	Long Term	834	1,108	-274	-24.7
	Dry	433	662	-229	-34.6
	Critical Dry	130	210	-80	-38.1
CVP M&I Users	Long Term	15	17	-2	-10.3
	Dry	14	15	-1	-8.9
	Critical Dry	11	12	-1	-7.5

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Annual Average Deliveries (TAF)					
		Alternative 5	Second Basis of Comparison	Alternative 5 as compared to the Second Basis of Comparison	
				Difference	Percent Change
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	261	261	0	-0.1
	Dry	269	268	0	0.1
	Critical Dry	222	224	-2	-1.0
Total CVP Agricultural, M&I, San Joaquin River Exchange Contractors, and Refuge Level 2 Deliveries	Long Term	1,962	2,239	-276	-12.3
	Dry	1,590	1,820	-230	-12.6
	Critical Dry	1,103	1,186	-83	-7.0
<b>Eastside Contractors Deliveries</b>					
Water Rights	Long Term	502	510	-8	-1.6
	Dry	524	524	0	0.0
	Critical Dry	406	460	-54	-11.8
CVP Water Service Contracts	Long Term	100	108	-8	-7.7
	Dry	69	87	-18	-20.7
	Critical Dry	8	4	4	100.0
Total Water Rights and CVP Service Contracts Deliveries	Long Term	602	618	-16	-2.7
	Dry	593	611	-18	-2.9
	Critical Dry	414	465	-51	-10.9

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1 The following changes in CVP water deliveries would occur under Alternative 5  
2 as compared to the Second Basis of Comparison.

- 3 • Deliveries to CVP North of Delta agricultural water service contractors would  
4 be reduced by 16 percent over the long-term conditions, 31 percent in dry  
5 years, and 36 percent in critical dry years.
- 6 • Deliveries to CVP North of Delta M&I contractors would be similar in long-  
7 term conditions and dry and critical dry years; however, American River  
8 Contractors would be reduced by 7 percent over the long-term conditions,  
9 8 percent in dry years, and 8 percent in critical dry years.
- 10 • Deliveries to CVP South of Delta agricultural water service contractors would  
11 be reduced by 25 percent over the long-term conditions, 35 percent in dry  
12 years, and 38 percent in critical dry years.
- 13 • Deliveries to CVP South of Delta M&I contractors would be reduced by  
14 10 percent in long-term conditions, 9 percent in dry years, and 8 percent in  
15 critical dry years.
- 16 • Deliveries to the Eastside contractors would be similar under long-term  
17 conditions and dry years and reduced by 11 percent in critical dry years.

1 **Table 5.112 Changes SWP Water Deliveries under Alternative 5 as Compared to the**  
 2 **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	Percent Change
<b>North of Delta</b>					
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
<b>South of Delta</b>					
SWP Agricultural Users (without Article 21)	Long Term	598	750	-152	-20
	Dry	449	567	-118	-21
	Critical Dry	369	484	-115	-24
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

Annual Average Deliveries (TAF)					
		Alternative 5	Second Basis of Comparison	Alternative 5 as compared to the Second Basis of Comparison	
				Difference	Percent Change
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

1 The following changes in SWP water deliveries would occur under Alternative 5  
 2 as compared to the Second Basis of Comparison.

- 3 • Deliveries without Article 21 water to SWP North of Delta water contractors  
 4 would be reduced by 19 percent over the long-term conditions, 18 percent in  
 5 dry years, and 21 percent in critical dry years.
- 6 • Deliveries without Article 21 water to SWP South of Delta water contractors  
 7 would be reduced by 19 percent over the long-term conditions, 20 percent in  
 8 dry years, and 23 percent in critical dry years.
- 9 • Deliveries of Article 21 water to SWP North of Delta water contractors would  
 10 be increased by 13 percent over the long-term conditions, 11 percent in dry  
 11 years, and 15 percent in critical dry years.
- 12 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
 13 be reduced by 85 percent over the long-term conditions, 95 percent in dry  
 14 years, and 95 percent in critical dry years.

15 *Effects Related to Cross Delta Water Transfers*

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

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1 cross Delta water transfers under Alternative 5 and the Second Basis of  
2 Comparison.

3 Under Alternative 5, the timing of cross Delta water transfers would be limited to  
4 July through September in accordance with the 2008 USFWS BO and 2009  
5 NMFS BO. The maximum amount of water to be transferred would be  
6 600,000 acre-feet per year in critical dry years or in dry years following a dry or  
7 critical dry year. In all other water year types, the maximum amount of water  
8 would be 360,000 acre-feet per year. The maximum amount of water that can be  
9 exported in the CVP and SWP facilities is approximately 770,000 acre-feet per  
10 month. As indicated in Table 5.110, capacity would be available under  
11 Alternative 5 between July and September for water transfers in all water year  
12 types.

13 Under the Second Basis of Comparison, water could be transferred throughout the  
14 year. As indicated in Table 5.110, capacity would be available under the Second  
15 Basis of Comparison in all months of all water year types without a maximum  
16 volume of transferred water.

17 Overall, the potential for water transfer conveyance would be less under  
18 Alternative 5 than under the Second Basis of Comparison.

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

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

22 The San Francisco Bay Area, Central Coast, and Southern California regions  
23 include numerous reservoirs that store CVP and SWP water supplies, including  
24 CVP and SWP reservoirs, that primarily provide water supplies for M&I water  
25 users. Changes in the availability CVP and SWP water supplies for storage in  
26 these reservoirs under Alternative 5 as compared to the Second Basis of  
27 Comparison would be consistent with the following changes in water deliveries to  
28 M&I water users, as summarized in Tables 5.111 and 5.112.

- 29 • Deliveries to CVP South of Delta M&I contractors would be reduced by  
30 10 percent in long-term conditions, 9 percent in dry years, and 8 percent in  
31 critical dry years.
- 32 • Deliveries without Article 21 water to SWP South of Delta water contractors  
33 would be reduced by 19 percent over the long-term conditions, 20 percent in  
34 dry years, and 23 percent in critical dry years.
- 35 • Deliveries of Article 21 water to SWP South of Delta water contractors would  
36 be reduced by 85 percent over the long-term conditions, 95 percent in dry  
37 years, and 95 percent in critical dry years.

38 *Changes in CVP and SWP Exports and Deliveries*

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



1 **5.4.3.7 Summary of Impact Analysis**  
 2 The results of the impact analysis of implementation of Alternatives 1 through 5  
 3 as compared to the No Action Alternative and the Second Basis of Comparison  
 4 are presented in Tables 5.113 and 5.114, respectively.

5 **Table 5.113 Comparison of Alternatives 1 through 5 to No Action Alternative**

Alternative	Potential Change	Consideration for Mitigation Measures
Alternative 1	<p><b>Trinity Lake</b>                      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.</p> <p><b>Trinity River downstream of Lewiston Dam</b>                      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.</p> <p><b>Shasta Lake</b>                      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.</p> <p><b>Sacramento River at Keswick</b>                      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).</p>	<p>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):</p> <ol style="list-style-type: none"> <li>1) Reductions in Sacramento River fall flows.</li> <li>2) Reductions in Feather River summer flows.</li> <li>3) Reductions in American River late summer flows.</li> <li>4) Reductions in Clear Creek spring flows.</li> <li>5) Reductions in Stanislaus River spring, summer, and fall flows.</li> <li>6) Reductions San Joaquin River fall flows.</li> <li>7) Reductions in Delta outflow in late spring, summer, and fall.</li> <li>8) Increased negative OMR flows in fall, winter, and spring.</li> </ol> <p>Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.</p>

Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>Sacramento River at Freeport</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Lake Oroville</b></p> <p>In wet years, storage would be similar in January through August and reduced in September through December (up to 21.8 percent).</p> <p>In above-normal years, storage would be similar in February through August and reduced in September through January (up to 15.2 percent).</p> <p>In below-normal years, storage would be similar in May through July and reduced in August through April (up to 21.5 percent).</p> <p>In dry years, storage would be similar in June and reduced in all other months (up to 14.2 percent).</p> <p>In critical dry years, storage would be similar under all months.</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>Feather River downstream of Thermalito Complex</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Folsom Lake</b></p> <p>In wet years, storage would be similar in December through August; and increased in September through December (up to 12.1 percent).</p> <p>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).</p> <p>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).</p> <p>In dry years, storage would be similar in all months.</p>	

Alternative	Potential Change	Consideration for Mitigation Measures
	<p>In critical dry years, storage would be similar in October through June and increased in July through September (up to 12.1 percent).</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>American River downstream of Nimbus Dam</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Clear Creek downstream of Whiskeytown Dam</b></p> <p>Flows identical June through April and reduced in May (40.7 percent).</p> <p><b>New Melones Reservoir</b></p> <p>In wet years, storage would be similar in all months.</p> <p>In above normal years, storage would be similar in December through September and increased in October and November (up to 6.0 percent).</p> <p>In below normal years, storage would be similar in November through September and increased in October (5.4 percent).</p> <p>In dry years, storage would be similar in all months.</p> <p>In critical dry years, storage would be similar in July through September and increased in October through June (up to 7.5 percent).</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>Stanislaus River downstream of Goodwin Dam</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>San Joaquin River at Vernalis</b></p> <p>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).</p> <p>In wet years, similar flows would occur in July through September and November through May;</p>	

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Alternative	Potential Change	Consideration for Mitigation Measures
	<p>reduced flows in October (14.4 percent); and increased flows in June (10.4 percent).</p> <p>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).</p> <p><b>San Luis Reservoir</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Yolo Bypass</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p>In dry years, flows into Yolo Bypass would be similar in January through November and increased in December (6.2 percent).</p> <p>In critical dry years, flows into Yolo Bypass would be similar in all months.</p> <p><b>Delta Outflow</b></p> <p>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).</p> <p>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).</p> <p><b>Reverse Flows in Old and Middle Rivers</b></p> <p>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).</p>	

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Alternative	Potential Change	Consideration for Mitigation Measures
	<p>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).</p> <p><b>CVP and SWP Exports and Deliveries</b></p> <p>Long-term average annual exports would be 1,051 TAF (22 percent) more under Alternative 1 as compared to the No Action Alternative.</p> <p>Deliveries to CVP North of Delta agricultural water service contractors would be increased by 19 percent over the long-term conditions, 45 percent in dry years, and 59 percent in critical dry years.</p> <p>Deliveries to CVP North of Delta M&amp;I contractors would be similar in total; however, deliveries to the American River CVP contractors would be increased by 7 percent over the long-term conditions, 9 percent in dry years, and 8 percent in critical dry years.</p> <p>Deliveries to CVP South of Delta agricultural water service contractors would be increased by 31 percent over the long-term conditions, 49 percent in dry years, and 60 percent in critical dry years.</p> <p>Deliveries to CVP South of Delta M&amp;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.</p> <p>Deliveries to the Eastside contractors would be similar under long-term conditions and in dry and critical dry years.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	
Alternative 2	No effects on surface water resources or water supplies.	None needed.
Alternative 3	<p><b>Trinity Lake</b></p> <p>In wet, above-normal years, below normal, and dry years, storage would be similar in all months.</p> <p>In critical dry years, storage would be increased in all months (up to 11.9 percent).</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>Trinity River downstream of Lewiston Dam</b></p> <p>Over long-term conditions, flows would be similar in March through November; and increased in December through February (up to 11.8 percent).</p> <p>In wet years, flows would be similar in April through October; reduced in November (7.0 percent); and</p>	<p>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):</p> <p>1) Reductions in Trinity River fall flows.</p>

Alternative	Potential Change	Consideration for Mitigation Measures
	<p>increased in December through March (up to 15.1 percent). In dry years, flows would be similar in all months.</p> <p><b>Shasta Lake</b> 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.</p> <p><b>Sacramento River at Keswick</b> 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).</p> <p><b>Sacramento River at Freeport</b> 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).</p> <p><b>Lake Oroville</b> 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).</p>	<p>2) Reductions in Sacramento River late summer and fall flows. 3) Reductions in Feather River late summer and fall flows. 4) Reductions in American River fall flows. 5) Reductions in Clear Creek spring flows. 6) Reductions in Stanislaus River spring, summer, and fall flows. 7) Reductions in San Joaquin River fall and spring flows. 8) Reductions in Delta outflow in spring, summer, and fall. 9) Increased negative OMR flows in fall and winter.</p> <p>Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.</p>

Alternative	Potential Change	Consideration for Mitigation Measures
	<p>In below-normal years, storage would be similar in June through September; and increased in October through May (up to 22.5 percent).</p> <p>In dry years, storage would be similar in May through September and increased in October through April (up to 12.3 percent).</p> <p>In critical dry years, storage would be similar under all months.</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>Feather River downstream of Thermalito Complex</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Folsom Lake</b></p> <p>In wet years, storage would be similar in December through August and increased in September through December (up to 12.1 percent).</p> <p>In above-normal years, storage would be similar in January through June, September, and October; increased in November and December (up to 6.3 percent); and reduced in July and August (up to 6.7 percent).</p> <p>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).</p> <p>In dry years, storage would be similar in all months.</p> <p>In critical dry years, storage would be similar in October through July and increased in August and September (up to 11.6 percent).</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>American River downstream of Nimbus Dam</b></p> <p>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).</p> <p>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).</p> <p>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).</p>	

Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>Clear Creek downstream of Whiskeytown Dam</b> Flows would be identical June through April and reduced in May (28.9 percent).</p> <p><b>New Melones Reservoir</b> 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.</p> <p><b>Stanislaus River downstream of Goodwin Dam</b> 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).</p> <p><b>San Joaquin River at Vernalis</b> 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).</p> <p><b>San Luis Reservoir</b> 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).</p>	



Alternative	Potential Change	Consideration for Mitigation Measures
	<p>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).</p> <p>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.</p> <p><b>Yolo Bypass</b></p> <p>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).</p> <p>In above-normal years, storage would be similar in April through January and increased in February and March (up to 11.7 percent).</p> <p>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).</p> <p>In dry years, flows into Yolo Bypass would be similar in January through November and increased in December (6.0 percent).</p> <p>In critical dry years, flows into Yolo Bypass would be similar in all months.</p> <p><b>Delta Outflow</b></p> <p>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).</p> <p>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).</p> <p><b>Reverse Flows in Old and Middle Rivers</b></p> <p>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).</p> <p>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).</p> <p><b>CVP and SWP Exports and Deliveries</b></p> <p>Long-term average annual exports would be 726 TAF (15 percent) more under Alternative 3 as compared to the No Action Alternative.</p> <p>Deliveries to CVP North of Delta agricultural water service contractors would be increased by 13 percent over the long-term conditions and 30 percent in dry and critical dry years.</p> <p>Deliveries to CVP North of Delta M&amp;I contractors would be similar in total; however, deliveries to the American River CVP contractors would be similar over the long-term conditions and critical dry years; and increased deliveries by 7 percent in dry years.</p> <p>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 28 percent in critical dry years.</p>	

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Alternative	Potential Change	Consideration for Mitigation Measures
	<p>Deliveries to CVP South of Delta M&amp;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.</p> <p>Deliveries to the Eastside contractors would be similar under long-term conditions and dry years and increased by 15 percent in critical dry years.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	
Alternative 4	Same effects as described for Alternative 1 compared to the No Action Alternative.	See Alternative 1 compared to the No Action Alternative.
Alternative 5	<p><b>Trinity Lake</b> Similar storage and surface water elevations in all months and all water year types.</p> <p><b>Trinity River downstream of Lewiston Dam</b> Similar flows in all months for long-term conditions and wet and dry years.</p> <p><b>Shasta Lake</b> Similar storage and surface water elevations in all months and all water year types.</p> <p><b>Sacramento River at Keswick</b> Similar flows in all months for long-term conditions and wet and dry years.</p> <p><b>Sacramento River at Freeport</b> Similar flows in all months for long-term conditions and wet and dry years.</p> <p><b>Lake Oroville</b> Similar storage and surface water elevations in all months and all water year types.</p> <p><b>Feather River downstream of Thermalito Complex</b> 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).</p> <p><b>Folsom Lake</b> Similar storage and surface water elevations in all months and all water year types.</p>	<p>To mitigate reductions of up to 7 percent in critical dry years to the Eastside Contractors would, Reclamation would coordinate with all water users of water from the Stanislaus River in an attempt to minimize adverse impacts.</p> <p>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):</p> <ol style="list-style-type: none"> <li>1) Reductions in Feather River spring flows.</li> <li>2) Reductions in Stanislaus River spring and summer flows.</li> <li>3) Increased negative OMR flows in winter, spring, and summer.</li> </ol> <p>Mitigation measures, if needed, related to environmental changes caused by changes in surface water conditions are presented in Chapters 9, 10, and 15.</p>

Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>American River downstream of Nimbus Dam</b>                      Similar flows in all months for long-term conditions and wet and dry years.</p> <p><b>Clear Creek downstream of Whiskeytown Dam</b>                      Flows would be identical in all months.</p> <p><b>New Melones Reservoir</b>                      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.</p> <p><b>Stanislaus River downstream of Goodwin Dam</b>                      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).</p> <p><b>San Joaquin River at Vernalis</b>                      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).</p> <p><b>San Luis Reservoir</b>                      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.</p>	

Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>Yolo Bypass</b>                      Similar flows into the Yolo Bypass in all months and all water year types.</p> <p><b>Delta Outflow</b>                      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).</p> <p><b>Reverse Flows in Old and Middle Rivers</b>                      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).</p> <p><b>CVP and SWP Exports and Deliveries</b>                      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&amp;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&amp;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 7.7 percent in critical dry years.                      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.</p>	

1 **Table 5.114 Comparison of No Action Alternative and Alternatives 1 through 5 to**  
 2 **Second Basis of Comparison**

Alternative	Potential Change	Consideration for Mitigation Measures
<p>No Action Alternative</p>	<p><b>Trinity Lake</b>                      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 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.</p> <p><b>Trinity River downstream of Lewiston Dam</b>                      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.</p> <p><b>Shasta Lake</b>                      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.</p> <p><b>Sacramento River at Keswick</b>                      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).</p> <p><b>Sacramento River at Freeport</b>                      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).</p>	<p>Not considered for this comparison.</p>

Alternative	Potential Change	Consideration for Mitigation Measures
	<p>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).</p> <p>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).</p> <p><b>Lake Oroville</b></p> <p>In wet years, storage would be similar in January through August; and reduced in September through December (up to 17.9 percent).</p> <p>In above normal years, storage would be similar in February through August and reduced in September through January (up to 13.2 percent).</p> <p>In below normal years, storage would be similar in May through July and reduced in August through April (up to 17.7 percent).</p> <p>In dry years, storage would be similar in June and reduced in all other months (up to 12.5 percent).</p> <p>In critical dry years, storage would be similar under all months.</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>Feather River downstream of Thermalito Complex</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Folsom Lake</b></p> <p>In wet years, storage would be similar in December through August and reduced in September through November (up to 10.8 percent).</p> <p>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).</p> <p>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).</p> <p>In dry years, storage would be similar in all months.</p> <p>In critical dry years, storage would be similar in October through June and reduced in July through September (up to 10.8 percent).</p>	

Alternative	Potential Change	Consideration for Mitigation Measures
	<p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>American River downstream of Nimbus Dam</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Clear Creek downstream of Whiskeytown Dam</b></p> <p>Flows identical June through April and increased in May (40.7 percent).</p> <p><b>New Melones Reservoir</b></p> <p>In wet, below-normal, and dry years, storage would be similar in all months.</p> <p>In above-normal years, storage would be similar in all months except October when storage would be reduced by 5.7 percent.</p> <p>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).</p> <p>In all months, in all water year types, surface water elevations would be similar.</p> <p><b>Stanislaus River downstream of Goodwin Dam</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>San Joaquin River at Vernalis</b></p> <p>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).</p> <p>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).</p> <p>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).</p>	

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Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>San Luis Reservoir</b></p> <p>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). Surface water elevations would be less in all months (up to 10.7 percent).</p> <p>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). Surface water elevations would be less in all months (up to 13.0 percent).</p> <p>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). Surface water elevations would be less in all months (up to 16.0 percent).</p> <p>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). Surface water elevations would be similar in September through January and less in February through August (up to 10.4 percent).</p> <p>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). Surface water elevations would be similar in October through January and reduced in February through September (up to 9.7 percent).</p> <p><b>Yolo Bypass</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p>In dry years, flows into Yolo Bypass would be similar in January through November and reduced in December (5.9 percent).</p> <p>In critical dry years, flows into Yolo Bypass would be similar in all months.</p> <p><b>Delta Outflow</b></p> <p>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).</p> <p>In dry years, average monthly Delta outflow would be similar or increase in all months (up to 3,114 cfs).</p> <p><b>Reverse Flows in Old and Middle Rivers</b></p> <p>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).</p> <p>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).</p>	



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Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>CVP and SWP Exports and Deliveries</b></p> <p>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.</p> <p>Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 16 percent over the long-term conditions, 31 percent in dry years, and 37 percent in critical dry years.</p> <p>Deliveries to CVP North of Delta M&amp;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 7 percent in critical dry years.</p> <p>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 37 percent in critical dry years.</p> <p>Deliveries to CVP South of Delta M&amp;I contractors would be reduced by 10 percent over the long-term conditions, 9 percent in dry years, and 7 percent in critical dry years.</p> <p>Deliveries to the Eastside contractors would be similar under the long-term conditions and dry and critical dry years.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	
Alternative 1	No effects on surface water resources or water supplies.	None needed.
Alternative 2	Same effects as described for No Action Alternative as compared to the Second Basis of Comparison.	Not considered for this comparison.
Alternative 3	<p><b>Trinity Lake</b> Similar storage and surface water elevations in all months and all water year types.</p> <p><b>Trinity River downstream of Lewiston Dam</b> Similar flows in all months for long-term conditions and wet and dry years.</p> <p><b>Shasta Lake</b> Similar storage and surface water elevations in all months and all water year types.</p> <p><b>Sacramento River at Keswick</b> Similar flows in all months for long-term conditions and wet and dry years.</p>	Not considered for this comparison.

Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>Sacramento River at Freeport</b>                      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).</p> <p><b>Lake Oroville</b>                      Similar storage and surface water elevations in all months and all water year types.</p> <p><b>Feather River downstream of Thermalito Complex</b>                      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).</p> <p><b>Folsom Lake</b>                      Similar storage and surface water elevations in all months and all water year types.</p> <p><b>American River downstream of Nimbus Dam</b>                      Similar flows in all months for long-term conditions and wet and dry years.</p> <p><b>Clear Creek downstream of Whiskeytown Dam</b>                      Flows would be identical in all months.</p> <p><b>New Melones Reservoir</b>                      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.</p> <p><b>Stanislaus River downstream of Goodwin Dam</b>                      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).</p>	

Alternative	Potential Change	Consideration for Mitigation Measures
	<p>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).</p> <p><b>San Joaquin River at Vernalis</b></p> <p>Over long-term conditions, similar flows would occur in July through May and reduced flows in June (11.8 percent).</p> <p>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).</p> <p>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).</p> <p><b>San Luis Reservoir</b></p> <p>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.</p> <p>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).</p> <p>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.</p> <p>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.</p> <p>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).</p> <p><b>Yolo Bypass</b></p> <p>In wet years, flows into the Yolo Bypass would be similar in November through September and reduced in October (5.6 percent).</p> <p>In above-normal, below-normal, dry, and critical dry years, flows into the Yolo Bypass would be similar in all months.</p> <p><b>Delta Outflow</b></p> <p>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).</p> <p>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).</p>	

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Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>Reverse Flows in Old and Middle Rivers</b></p> <p>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).</p> <p>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).</p> <p><b>CVP and SWP Exports and Deliveries</b></p> <p>Long-term average annual exports would be 326 TAF (6 percent) less under Alternative 3 as compared to the Second Basis of Comparison.</p> <p>Deliveries to CVP North of Delta agricultural water service contractors would be similar over the long-term conditions and reduced by 11 percent in dry years and 19 percent in critical dry years.</p> <p>Deliveries to CVP North of Delta M&amp;I contractors (including American River CVP contractors) would be similar in long-term conditions and dry and critical dry years.</p> <p>Deliveries to CVP South of Delta agricultural water service contractors would be similar over the long-term conditions and reduced by 10 percent in dry years and 20 percent in critical dry years.</p> <p>Deliveries to CVP South of Delta M&amp;I contractors would be similar in long-term conditions and dry and critical dry years.</p> <p>Deliveries to the Eastside contractors would be similar under long-term conditions and dry years and increased by 11 percent in critical dry years.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	
Alternative 4	No effects on surface water resources or water supplies.	None needed.
Alternative 5	<p><b>Trinity Lake</b></p> <p>In wet, below-normal, and dry years, storage would be similar.</p> <p>In above-normal years, storage would be similar in January through October and reduced in November and December (up to 5.3 percent).</p> <p>In critical dry years, storage would be reduced in all months (up to 10.0 percent).</p> <p>In all months, in all water year types, surface water elevations would be similar.</p>	Not considered for this comparison.

Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>Trinity River downstream of Lewiston Dam</b></p> <p>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).</p> <p>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).</p> <p>In dry years, flows would be similar in all months.</p> <p><b>Shasta Lake</b></p> <p>In wet years, storage would be similar in October and December through August and reduced in November and September (up to 8.1 percent).</p> <p>In above-normal years, storage would be similar in February through September and reduced in October through December (up to 7.5 percent).</p> <p>In below-normal years, storage would be similar in March through September and reduced in October through February (up to 9.9 percent).</p> <p>In dry years, storage would be similar in January through October and reduced in November through December (up to 5.9 percent).</p> <p>In critical dry years, storage would be reduced in all months (up to 16.8 percent).</p> <p>In all months, in all water year types, surface water elevations are similar.</p> <p><b>Sacramento River at Keswick</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Sacramento River at Freeport</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Lake Oroville</b></p> <p>In wet years, storage would be similar in January through August; and reduced in September through December (up to 18.1 percent).</p>	

Alternative	Potential Change	Consideration for Mitigation Measures
	<p>In above-normal years, storage would be similar in March through August and reduced in September through February (up to 14.0 percent).</p> <p>In below-normal years, storage would be similar in May through July and reduced in August through April (up to 17.1 percent).</p> <p>In dry years, storage would be similar in May and June and reduced in July through April (up to 11.4 percent).</p> <p>In critical dry years, storage would be similar in all months.</p> <p>Surface water elevations would be similar in all months, in all years.</p> <p><b>Feather River downstream of Thermalito Complex</b></p> <p>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).</p> <p>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).</p> <p>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).</p> <p><b>Folsom Lake</b></p> <p>In wet years, storage would be similar in December through July and reduced in August through November (up to 7.4 percent).</p> <p>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).</p> <p>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).</p> <p>In dry years, storage would be similar in all months.</p> <p>In critical dry years, storage would be similar in August and June and reduced in July (8.0 percent).</p> <p>Surface water elevations would be similar in all months, in all years.</p> <p><b>American River downstream of Nimbus Dam</b></p> <p>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).</p> <p>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).</p> <p>In dry years, similar flows would occur in November through September; and increased flows in October (16.7 percent).</p>	

Alternative	Potential Change	Consideration for Mitigation Measures
	<p><b>Clear Creek downstream of Whiskeytown Dam</b> Flows identical June through April and increased in May (40.7 percent).</p> <p><b>New Melones Reservoir</b> 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.</p> <p><b>Stanislaus River downstream of Goodwin Dam</b> 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).</p> <p><b>San Joaquin River at Vernalis</b> Over long-term conditions, similar flows would occur in November through March, May, and July through September; reduced flows in June (8.2 percent); 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).</p> <p><b>San Luis Reservoir</b> 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</p>	

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Alternative	Potential Change	Consideration for Mitigation Measures
	<p>elevations would be similar in September; and reduced in October through August (up to 16.7 percent).</p> <p>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).</p> <p>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).</p> <p><b>Yolo Bypass</b></p> <p>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).</p> <p>In above-normal years, flows would be similar in April through December and reduced flows in January through March (up to 14.8 percent).</p> <p>In below-normal years, flows would be similar in April through November and reduced flows in December through March (up to 24.0 percent).</p> <p>In dry years, flows would be similar in January through November and reduced flows in December (up to 7.4 percent).</p> <p>In critical dry years, flows would be similar in all months.</p> <p><b>Delta Outflow</b></p> <p>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).</p> <p>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).</p> <p><b>Reverse Flows in Old and Middle Rivers</b></p> <p>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).</p> <p>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).</p> <p><b>CVP and SWP Exports and Deliveries</b></p> <p>Long-term average annual exports would be 1,096 TAF (19 percent) less under Alternative 5 as compared to the Second Basis of Comparison.</p> <p>Deliveries to CVP North of Delta agricultural water service contractors would be reduced by 16 percent over the long-term conditions, 31 percent in dry years, and 36 percent in critical dry years.</p> <p>Deliveries to CVP North of Delta M&amp;I contractors would be similar in long-term conditions and dry and critical dry years; however, American River Contractors would be reduced by 7 percent over the long-term conditions, 8 percent in dry years, and 8 percent in critical dry years.</p> <p>Deliveries to CVP South of Delta agricultural water service contractors would be reduced by 25 percent</p>	



Alternative	Potential Change	Consideration for Mitigation Measures
	<p>over the long-term conditions, 35 percent in dry years, and 38 percent in critical dry years.</p> <p>Deliveries to CVP South of Delta M&amp;I contractors would be reduced by 10 percent in long-term conditions, 9 percent in dry years, and 8 percent in critical dry years.</p> <p>Deliveries to the Eastside contractors would be similar under long-term conditions and dry years and reduced by 11 percent in critical dry years.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	

1 **5.4.3.8 Potential Mitigation Measures**

2 As described above and summarized in Table 5.113, implementation of  
 3 Alternatives 1 through 5 as compared to the No Action Alternative would result in  
 4 reductions in river flows downstream of CVP and SWP reservoirs and Delta  
 5 outflow, and increased negative OMR flows. Environmental effects associated  
 6 with changes in these physical conditions are related to impacts on biological  
 7 resources (as described in Chapter 9, Fish and Aquatic Resources, and  
 8 Chapter 10, Terrestrial Biological Resources), and recreation resources (as  
 9 described in Chapter 15, Recreation Resources). Mitigation measures, if needed,  
 10 related to environmental changes caused by changes in surface water conditions  
 11 are presented in Chapters 9, 10, and 15.

12 Implementation of Alternatives 1 through 4 would not result in adverse impacts to  
 13 CVP and SWP water deliveries as compared to the No Action Alternative.  
 14 Implementation of Alternative 5 would result in up to 7 percent reductions of  
 15 CVP water deliveries to the Eastside Contractors (Stockton East Water District  
 16 and Central San Joaquin Water Conservation District) in critical dry years. As a  
 17 mitigation measure, in a critical dry water year when this condition is projected to  
 18 occur, Reclamation would coordinate with all water users of water from the  
 19 Stanislaus River in an attempt to minimize adverse impacts.

1 **5.4.3.9 Cumulative Effects Analysis**

2 As described in Chapter 3, the cumulative effects analysis considers projects,  
3 programs, and policies that are not speculative and are based upon known or  
4 reasonably foreseeable long-range plans, regulations, operating agreements, or  
5 other information that establishes them as reasonably foreseeable.

6 The No Action Alternative, Alternatives 1 through 5, and Second Basis of  
7 Comparison include climate change and sea level rise, implementation of general  
8 plans, and completion of ongoing projects and programs (see Chapter 3,  
9 Description of Alternatives). The effects of these items were analyzed  
10 quantitatively and qualitatively, as described in the Impact Analysis of this  
11 chapter. The discussion below focuses on the qualitative effects of the  
12 alternatives and other past, present, and reasonably foreseeable future projects  
13 identified for consideration of cumulative effects (see Chapter 3, Description of  
14 Alternatives).

15 **5.4.3.9.1 No Action Alternative and Alternatives 1 through 5**

16 Continued coordinated long-term operation of the CVP and SWP under the No  
17 Action Alternative would result in reduced CVP and SWP water supply  
18 availability as compared to recent conditions due to climate change and sea-level  
19 rise by 2030. These conditions are included in the analysis presented above.

20 Future water resource management projects considered in cumulative effects  
21 analysis (see Chapter 3, Description of Alternatives), could increase water supply  
22 availability, including the following programs.

- 23 • Development or expansion of major surface water storage projects, such as the  
24 Shasta Lake Water Resources Investigation, Upper San Joaquin River Basin  
25 Storage Investigation, North-of-the-Delta Offstream Storage, Los Vaqueros  
26 Reservoir Expansion Project, and Delta Wetlands (Reclamation 2013a, 2014j;  
27 DWR 2013bb; Reclamation, CCWD, and Western 2010; SWSD 2011c). The  
28 Bay Delta Conservation Plan (DWR, Reclamation, USFWS, and NMFS 2013)  
29 could improve water supply reliability to CVP and SWP water users in the  
30 Central Valley Region – San Joaquin Valley, San Francisco Bay Area Region,  
31 Central Coast Region, and Southern California Region.
- 32 • Development or expansion of groundwater banks (City of Roseville 2012;  
33 MORE 2015; NSJCGBA 2007; SEWD 2012; MWDSC 2010; KRCD 2012;  
34 BVWSD 2015; City of Los Angeles 2010, 2013; Los Angeles County 2013;  
35 City of San Diego 2009a, 2009b; RCWD 2011, 2012; Reclamation 2011c;  
36 EMWD 2014c; JCSD et al. 2010).
- 37 • Development of recycled water projects for wastewater effluent and  
38 stormwater flows (City of Fresno 2011; City of Los Angeles 2005; MWDSC  
39 2010; USGVMWD 2013; WBMWD 2011, 2015a; OMWD 2015; EMWD  
40 2014c; PWD 2010; Antelope Valley 2013).

- 1 • Development of coastal desalination water projects (BARDP 2015; City of  
2 Santa Barbara 2015; CWD 2015; City of Long Beach 2015; City of  
3 Huntington Beach 2010; City of Oceanside 2012; City of Carlsbad 2006;  
4 WBMWD 2015b; MWDOC 2015; SDCWA 2009, 2015).

5 These projects could provide additional water supplies that could directly result in  
6 additional water deliveries to CVP and SWP water users or could provide more  
7 operational flexibility to CVP and SWP water users that would result in changes  
8 in CVP and SWP operations. The changes in CVP and SWP operations could  
9 increase or decrease monthly flows in the rivers affected by the implementation of  
10 Alternatives 1 through 5 as compared to the No Action Alternative.

11 There also are several ongoing programs that could result in changes in flow  
12 patterns in the Sacramento and San Joaquin rivers watersheds and the Delta that  
13 could reduce availability of CVP and SWP water deliveries as well as local and  
14 regional water supplies. These projects include renewals of hydroelectric  
15 generation permits issued by the Federal Energy Regulatory Commission (FERC  
16 2015) and update of the Water Quality Control Plan for the San Francisco  
17 Bay/Sacramento–San Joaquin Delta Estuary by the SWRCB (SWRCB 2006,  
18 2013). Based upon the available information related to these projects, the  
19 cumulative effects would be to change flow patterns in the rivers and for Delta  
20 outflow in a manner that would improve conditions for biological resources.  
21 However, these changes could reduce the availability of CVP and SWP water  
22 supplies.

23 Implementation of Alternative 5 as compared to the No Action Alternative would  
24 result in reductions to deliveries to CVP water service contractors in the Eastside  
25 Division; and could contribute to cumulative impacts related to CVP water  
26 supplies.

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## Chapter 5: Surface Water Resources and Water Supplies

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