

## **Section 3.15 Recreation**

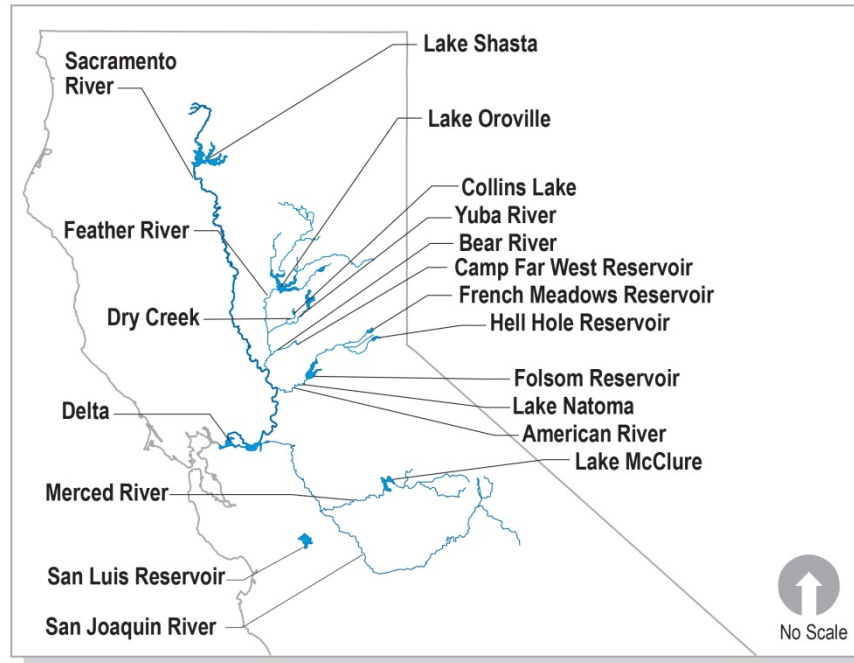
This section presents the existing recreational opportunities within the area of analysis and discusses potential effects on recreation from the proposed alternatives. Transfers could affect reservoir levels and river flows, which could affect user days at each recreation resource in the area of analysis.

### **3.15.1 Affected Environment/Environmental Setting**

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

#### **3.15.1.1 Area of Analysis**

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



**Figure 3.15-1. Recreation Area of Analysis**

### **3.15.1.2 Regulatory Setting**

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

### **3.15.1.3 Existing Conditions**

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

#### **3.15.1.3.1 Seller Service Area**

##### **Sacramento River**

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

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

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

Source: ShastaLake.com 2014

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

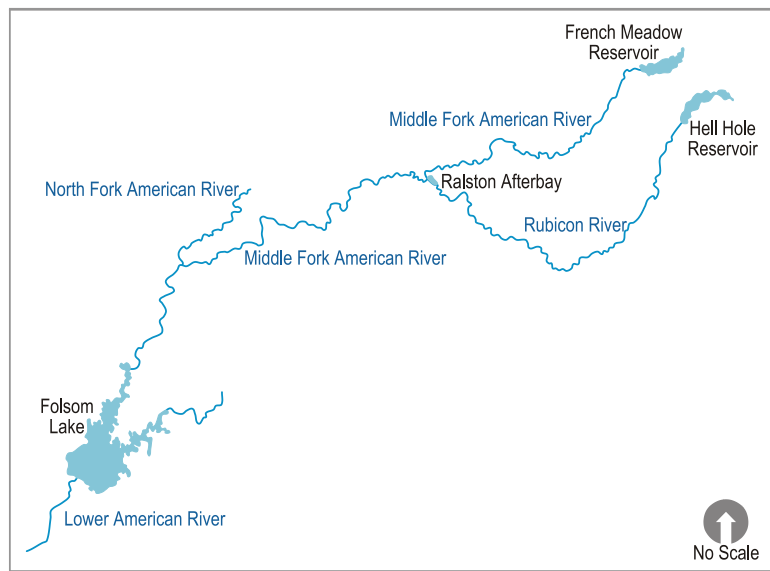
Large recreational areas along the river between Red Bluff and Sacramento are owned and/or managed by private companies and several federal, state and local agencies including the California Department of Parks and Recreation (CDPR), Bureau of Reclamation (Reclamation), USFS, U.S. Fish and Wildlife Service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

areas for fiscal year 2011/2012. Bidwell-Sacramento River State Recreation Area (SRA) reported 51,211 visitors and Colusa-Sacramento River SRA reported 11,725 visitors (CDPR 2012).

### 3.15.1.3.2 American River

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

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



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

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

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

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

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

Source: Folsom Lake Marina 2014.

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

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

#### **3.15.1.3.3 Yuba River**

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

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

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

#### **3.15.1.3.4 Feather River**

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

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

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

Source: California Department of Water Resources 2014.

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

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

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

### **3.15.1.3.5 Merced River**

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

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

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

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

Source: San Joaquin River Group Authority 1999

**3.15.1.3.6 San Joaquin River Region**

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

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

**3.15.1.3.7 Delta Region**

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



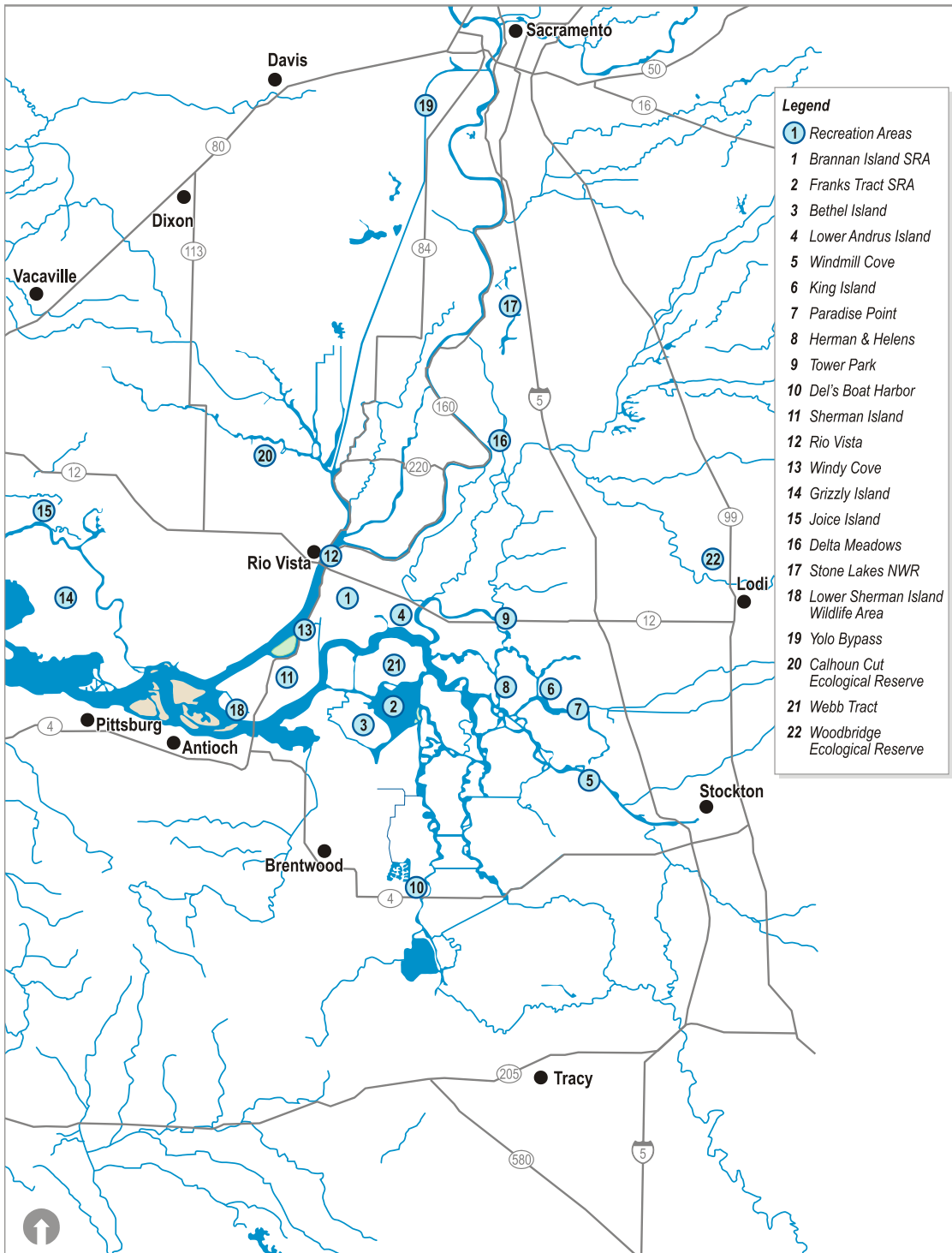


Figure 3.15-3. Sacramento-San Joaquin Delta Major Recreation Areas

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

#### **3.15.1.3.8 Buyer Service Area**

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

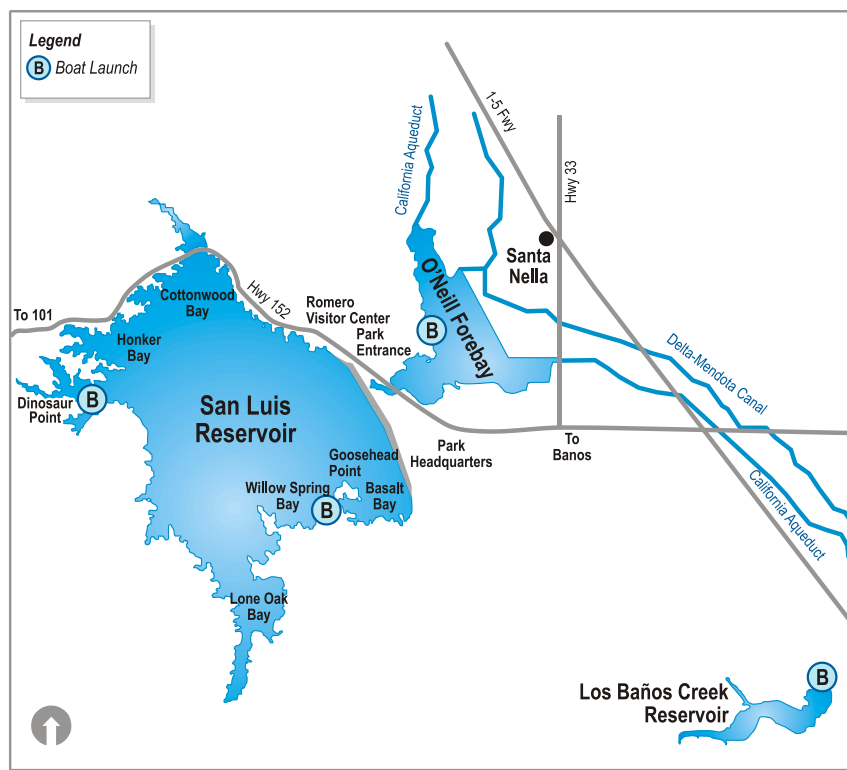


Figure 3.15-4. San Luis Reservoir San Luis SRA

### 3.15.2 Environmental Consequences/Environmental Impacts

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

#### 3.15.2.1 Assessment Methods

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

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

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

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

Recreation at NWRs would not be affected by any of the proposed alternatives because water supply to these areas would not change. ~~There would be no impacts to wildlife populations or access to NWRs. Impacts to vegetation and wildlife resources and NWRs are discussed in Section 3.7. Impacts to NWRs are not discussed further.~~

### 3.15.2.2 Significance Criteria

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

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

### 3.15.2.3 Alternative 1: No Action/No Project

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

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

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

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

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

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

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

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

| Sac Yr Type                    | Oct  | Nov  | Dec  | Jan  | Feb  | Mar  | Apr  | May | Jun  | Jul  | Aug  | Sep  |
|--------------------------------|------|------|------|------|------|------|------|-----|------|------|------|------|
| <i>Shasta Reservoir</i>        |      |      |      |      |      |      |      |     |      |      |      |      |
| W                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | -0.4 | -0.4 | -0.3 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | -0.1 | -0.1 | -0.1 | -0.1 |
| D                              | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | 0.2  | 0.6 | 1.8  | 1.4  | -0.2 | -0.2 |
| C                              | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 1.2 | 3.7  | 0.4  | -0.5 | -0.5 |
| <i>Merle Collins Reservoir</i> |      |      |      |      |      |      |      |     |      |      |      |      |
| W                              | -0.6 | -0.5 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  |

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| Sac Yr Type                    | Oct  | Nov  | Dec  | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  |
|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| D                              | -1.6 | -1.2 | -1.0 | -0.9 | -0.2 | 0.0  | 0.0  | 0.0  | 0.0  | -1.6 | -2.4 | -2.8 |
| C                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| <i>Lake Oroville</i>           |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | -0.5 | -0.5 | -0.3 | -0.2 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -0.1 | -0.2 |
| AN                             | -2.2 | -2.2 | -2.1 | -1.4 | -1.1 | -0.1 | -0.1 | -0.1 | 0.0  | -0.4 | -0.3 | -0.3 |
| BN                             | -0.3 | -0.4 | -0.6 | -0.5 | -0.5 | -0.3 | -0.3 | -0.3 | -0.4 | -0.6 | -0.7 | -0.8 |
| D                              | -0.7 | -0.7 | -0.6 | -0.6 | -0.6 | -0.4 | -0.4 | 0.5  | 0.6  | 0.0  | -1.2 | -0.7 |
| C                              | -1.7 | -2.2 | -2.3 | -2.3 | -2.1 | -1.8 | -1.9 | -1.7 | -1.4 | -0.9 | -2.9 | -3.0 |
| <i>Folsom Reservoir</i>        |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | 0.2  | -0.2 | -0.1 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -0.1 |
| AN                             | -0.5 | -0.6 | -0.5 | -0.1 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -0.1 | -0.3 | -0.5 |
| BN                             | -0.3 | -0.4 | -0.6 | -0.5 | 0.0  | 0.0  | 0.0  | 0.0  | -0.1 | -0.2 | -0.2 | -0.2 |
| D                              | 0.3  | 0.2  | -0.1 | -0.2 | -0.3 | -0.1 | -0.1 | 0.8  | 1.4  | 1.4  | 1.6  | 1.8  |
| C                              | 1.1  | 0.8  | 0.6  | 0.5  | 0.6  | -0.1 | 0.0  | 0.5  | 1.5  | 1.5  | 1.0  | 1.4  |
| <i>Camp Far West Reservoir</i> |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | -1.4 | -0.6 | -0.2 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | -3.3 | -3.1 | -2.1 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| D                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -0.1 | -1.2 | -1.9 |
| C                              | -5.4 | -4.1 | -3.5 | -3.0 | -1.3 | -0.5 | -0.4 | -0.4 | -0.4 | -3.7 | -5.3 | -8.5 |
| <i>Lake McClure</i>            |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | -0.6 | -0.6 | -0.6 | -0.5 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | -6.4 | -6.6 | -6.5 | -4.4 | -3.8 | -2.5 | -2.2 | -1.7 | -0.9 | -1.0 | -1.1 | -1.2 |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -1.7 | -2.7 | -2.7 | -3.1 | -3.5 | -3.6 |
| D                              | -1.2 | -1.3 | -1.2 | -1.2 | -1.1 | -1.1 | -2.1 | -2.6 | -2.8 | -3.2 | -3.6 | -3.8 |
| C                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -1.0 | -1.6 | -1.8 | -2.1 | -2.7 | -2.9 |

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

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

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

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

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

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

#### **3.15.2.4.1 Buyer Service Area**

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

### 3.15.2.5 Alternative 3: No Cropland Modifications

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

#### 3.15.2.5.1 Seller Service Area

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

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

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

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



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

W = wet

AN = above normal

BN = below normal

D = dry

C = critically dry

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

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

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

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

### 3.15.2.5.2 Buyer Service Area

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

### 3.15.2.6 Alternative 4: No Groundwater Substitution

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

#### 3.15.2.6.1 Seller Service Area

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

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

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

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

| Sac Yr Type                    | Oct  | Nov  | Dec  | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  |
|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| <i>Merle Collins Reservoir</i> |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | -0.6 | -0.5 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| D                              | -1.6 | -1.2 | -1.0 | -0.9 | -0.2 | 0.0  | 0.0  | 0.0  | 0.0  | -2.4 | -2.4 | -2.8 |
| C                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| <i>Lake Oroville</i>           |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -0.2 | -0.1 | 0.0  |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| D                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.3  | 0.4  | 0.9  | -0.5 | 0.0  |
| C                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.1  | 0.3  | 0.8  | 0.0  | 0.0  |
| <i>Camp Far West Reservoir</i> |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | -1.4 | -0.6 | -0.2 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | -3.3 | -3.1 | -2.1 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| D                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -1.3 | -1.8 | -1.9 |
| C                              | -5.4 | -4.1 | -3.5 | -3.0 | -1.3 | -0.5 | -0.4 | -0.4 | -0.4 | -3.7 | -5.3 | -8.5 |
| <i>Lake McClure</i>            |      |      |      |      |      |      |      |      |      |      |      |      |
| W                              | -0.6 | -0.6 | -0.6 | -0.5 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| AN                             | -5.2 | -5.4 | -5.2 | -3.3 | -2.9 | -2.5 | -2.2 | -1.7 | -0.9 | -1.0 | -1.1 | -1.2 |
| BN                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| D                              | -1.2 | -1.3 | -1.2 | -1.2 | -1.1 | -1.1 | -1.0 | -0.9 | -0.9 | -3.2 | -3.6 | -3.8 |
| C                              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | -2.1 | -2.7 | -2.9 |

W = wet

AN = above normal

BN = below normal

D = dry

C = critically dry

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

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

*Changes in river flows from water transfers could affect river-based recreation on the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers.* The peak recreation activity at these surface water bodies is in the spring, summer and early fall months. Boating is most popular during the spring and summer months. Changes in river flows under Alternative 4 would be within normal river flow fluctuation and would not result in a notable difference to affect recreation opportunities on

the river. Changes in flows would not prevent any water-related recreation activity, including rafting, fishing, swimming, and power boating, from occurring on the rivers. Alternative 4 would have minimal to no effect to flows in rivers designated as Wild and Scenic. Alternative 4 would have a less-than-significant impact on recreational activities along the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers.

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

**3.15.2.6.2 Buyer Service Area**

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

**3.15.3 Comparative Analysis of Alternatives**

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

**Table 3.15-8. Comparison of Alternatives**

| Potential Impact                                                                                                                                                                                  | Alternative(s) | Significance | Proposed Mitigation | Significance after Mitigation |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|---------------------|-------------------------------|
| There would be no changes in recreation under the No Action/No Project Alternative.                                                                                                               | 1              | NCFEC        | None                | NCFEC                         |
| Changes in surface water elevation at Shasta, Folsom, Merle Collins, Oroville, Camp Far West, and Lake McClure reservoirs as a result of water transfers could affect reservoir-based recreation. | 2, 3, 4        | LTS          | None                | LTS                           |
| Changes in surface water elevations at Hell Hole and French Meadows Reservoirs as a result of water transfers could affect reservoir-based recreation.                                            | 2, 3, 4        | LTS          | None                | LTS                           |

| Potential Impact                                                                                                                                            | Alternative(s) | Significance | Proposed Mitigation | Significance after Mitigation |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|---------------------|-------------------------------|
| Changes in river flows from water transfers could affect river-based recreation on the Sacramento, Yuba, Feather, American, San Joaquin, and Merced rivers. | 2, 3, 4        | LTS          | None                | LTS                           |
| Changes in average flow into the Delta from the San Joaquin River from water transfers could affect river-based recreation.                                 | 2, 3, 4        | NI           | None                | NI                            |
| Changes in surface water elevation at San Luis Reservoir as a result of water transfers could affect reservoir-based recreation                             | 2, 3, 4        | NI           | None                | NI                            |

Key:

LTS = less than significant

NCFEC = no change from existing conditions

NI = no impact

### 3.15.3.1 Alternative 1: No Action/No Project

There would be no impacts on recreation resources.

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

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

### 3.15.3.3 Alternative 3: No Cropland Modifications

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

### 3.15.3.4 Alternative 4: No Groundwater Substitution

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

## 3.15.4 Environmental Commitments/Mitigation Measures

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

## 3.15.5 Potentially Significant Unavoidable Impacts

There are no expected significant and unavoidable impacts to recreation.

### 3.15.6 Cumulative Effects

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

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

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

#### 3.15.6.2 Alternative 3: No Cropland Modifications

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

#### 3.15.6.3 Alternative 4: No Groundwater Substitution

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

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## **Section 3.16 Power**

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

### **3.16.1 Affected Environment/Environmental Setting**

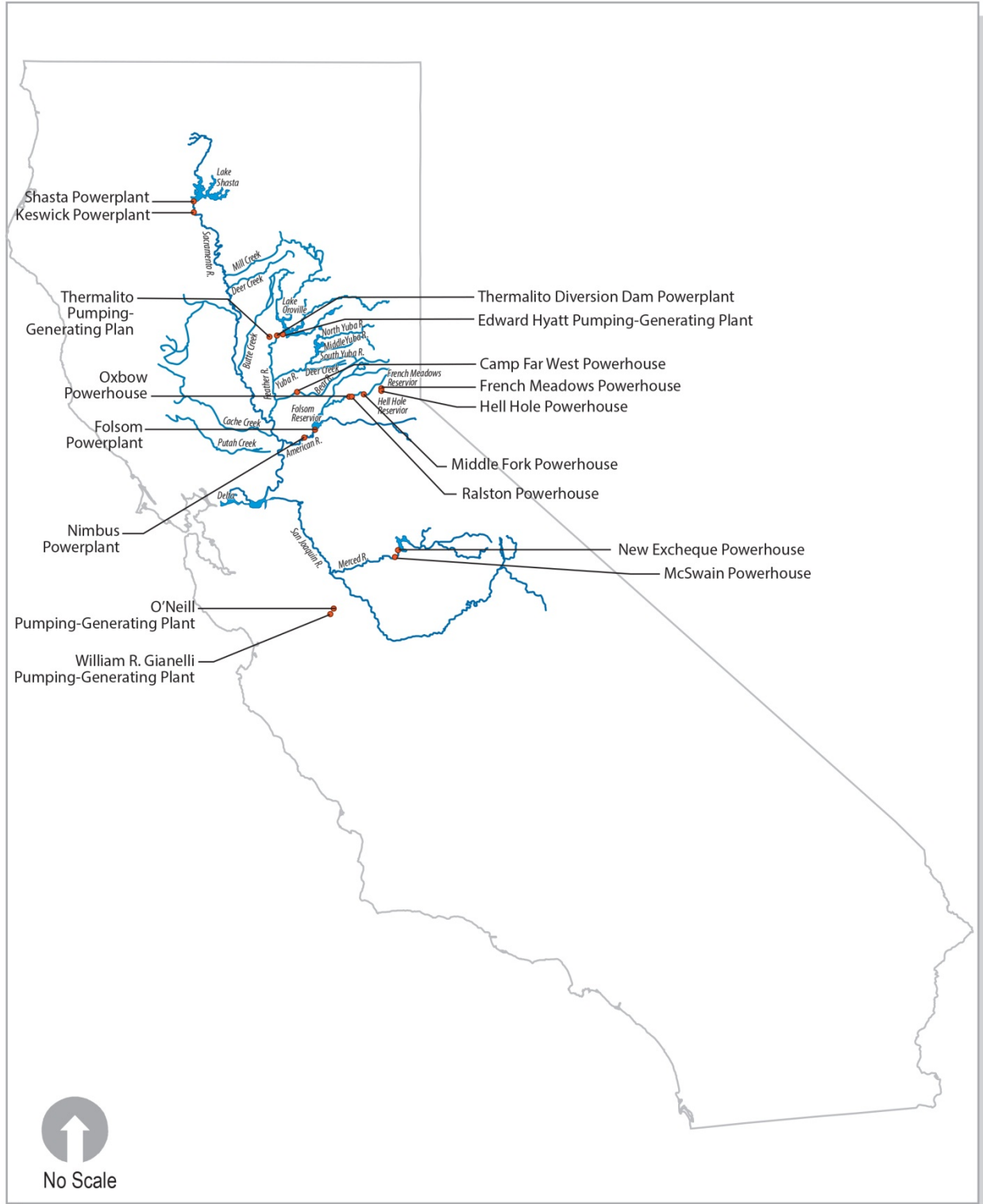
Water storage within the service area of the potential sellers is extensively developed for hydroelectric generation and the release of water from reservoirs is coordinated to optimize power generation along with other reservoir operational considerations (e.g., flood, temperature, or flow management).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

#### **3.16.1.1 Area of Analysis**

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

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

Long-Term Water Transfers  
Final EIS/EIR



**Figure 3.16-1. Area of Analysis**

### **3.16.1.2 Regulatory Setting**

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

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

### **3.16.1.3 Existing Conditions**

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

#### ***3.16.1.3.1 Seller Service Area***

##### **CVP**

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

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

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

Source: Reclamation 2007

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

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

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

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

### **SWP**

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

### **Placer County Water Agency**

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

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

- Ralston Powerhouse diverting water from the Middle Fork American and discharging at the confluence of the Middle Fork American and the Rubicon rivers.
- Oxbow Powerhouse on the Ralston Powerhouse afterbay discharging water into the Middle Fork American River.

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

### **South Sutter WD**

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

### **Merced ID**

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

- New Exchequer Dam and Lake McClure – Lake McClure, formed by New Exchequer Dam is on the Merced River approximately 62 miles from the confluence with the San Joaquin River. Lake McClure has a total storage capacity of 1,024,600 AF.
- New Exchequer Powerhouse – The New Exchequer Powerhouse is at the base of New Exchequer Dam on the south side of Merced River with an installed capacity of 94.5 MW.
- McSwain Dam and Reservoir - McSwain Dam creates the McSwain Reservoir on the Merced River approximately 56 miles upstream of the confluence with the San Joaquin River, McSwain has a total storage capacity of 9,730 AF. The McSwain Reservoir operates as a reregulation reservoir for the New Exchequer Powerhouse.



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

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

#### **3.16.1.3.2 Buyer Service Area**

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

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

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

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

### **3.16.2 Environmental Consequences/Environmental Impacts**

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

### 3.16.2.1 Assessment Methods

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

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

### 3.16.2.2 Significance Criteria

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

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

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

### 3.16.2.3 Alternative 1: No Action/No Project

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

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

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

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

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

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

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

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

W = Wet Year

AN = Above Normal Year

BN = Below Normal Year

D = Dry Year

C = Critical Year

Transfers would also change reservoir elevations in these three reservoirs (see Table 3-16.3) because of backing up water in storage and streamflow depletion. The lower surface elevations would translate to reduced head and would therefore slightly decrease the head component of generation efficiency at each

facility. Although the loss of head pressure would reduce the efficiency of the turbines, and therefore the amount of electricity that can be produced, the power loss would be minimal because of the small difference between elevations. As a result, there would be no long-term adverse effects on power supplies. Therefore, the impacts to power generation associated with the transfers would be less than significant.

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

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

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

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

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

### 3.16.2.5 Alternative 3: No Cropland Modifications

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

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

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

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

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

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

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

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

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

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

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

### 3.16.2.6 Alternative 4: No Groundwater Substitution

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

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

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

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

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

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

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

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

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

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

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



### 3.16.3 Comparative Analysis of Alternatives

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

**Table 3.16-8. Comparative Analysis of Alternatives**

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

Notes:

LTS = Less than significant

NCFEC = no change from existing conditions

#### 3.16.3.1 Alternative 1: No Action/No Project Alternative

There would be no impacts on power generation.

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

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

#### 3.16.3.3 Alternative 3: No Cropland Modifications

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

#### 3.16.3.4 Alternative 4: No Groundwater Substitution

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

### **3.16.4 Environmental Commitments/Mitigation Measures**

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

### **3.16.5 Potentially Significant Unavoidable Impacts**

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

### **3.16.6 Cumulative Effects**

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

#### **3.16.6.1 Alternative 2: Full Range of Transfers**

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

#### **3.16.6.2 Alternative 3: No Cropland Modification**

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

#### **3.16.6.3 Alternative 4: No Groundwater Substitution**

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

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## Section 3.17 Flood Control

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

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

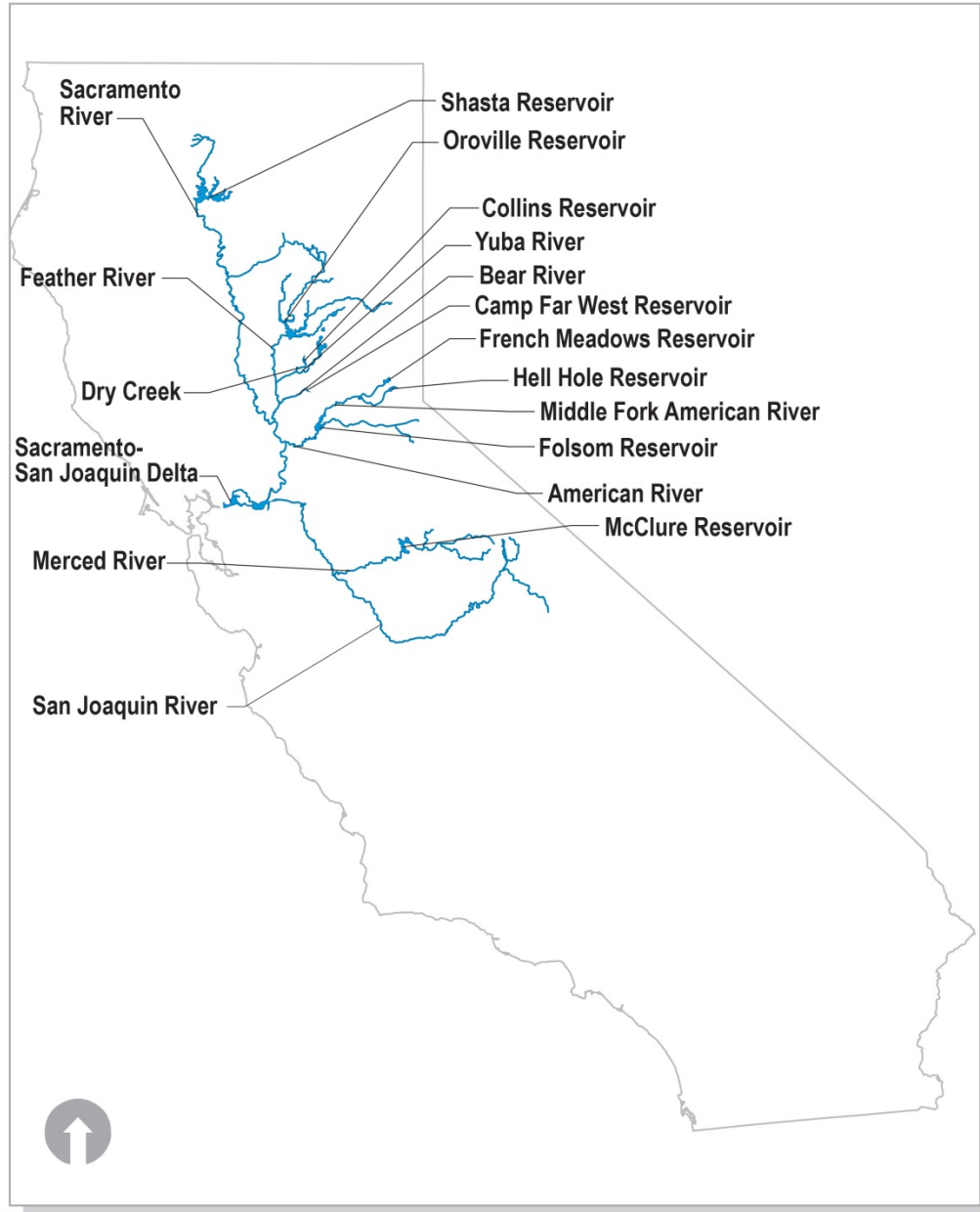
### 3.17.1 Affected Environment/Environmental Setting

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

#### 3.17.1.1 Area of Analysis

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

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



**Figure 3.17-1. Flood Control Area of Analysis**

### 3.17.1.2 Regulatory Setting

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

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

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

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

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

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

### **3.17.1.3 Affected Environment**

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

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

the release of more water than the downstream channels and levees have been designed to convey.

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

#### **3.17.1.3.1 Seller Service Area**

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

### **Sacramento River Region**

#### *Shasta Reservoir*

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

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

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



### *Sacramento River*

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

## **Feather River Region**

### *Oroville Reservoir*

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

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

### *Feather River*

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

## **Yuba River Region**

### *New Bullards Bar Reservoir*

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

### *Yuba River*

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

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

### *Bear River and Camp Far West Reservoir*

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

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

## **American River Region**

### *Folsom Reservoir*

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

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

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

### *American River*

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

## **Merced River Region**

### *Lake McClure*

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

### *Merced River*

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

## **San Joaquin River Region**

### *San Joaquin River*

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

the Tuolumne River and the Stanislaus River. From the Stanislaus River to Paradise Cut, the design capacity is 52,000 cfs (DWR 2010). From Paradise Cut to the Old River the design capacity is 37,000 cfs, and from the Old River to the Stockton Deep Water Shipping Channel in the Delta is 22,000 cfs (DWR 2010; Reclamation et al 2011).

#### *Sacramento-San Joaquin Delta*

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

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

#### **3.17.1.3.2 Buyer Service Area**

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

#### **San Luis Reservoir**

San Luis Reservoir in Merced County is the largest off-stream storage reservoir in the United States. San Luis Reservoir provides approximately 2,028,000 AF of off-stream storage capacity. Reclamation manages 47.6 percent (966,000 AF) of the reservoir's capacity for the CVP and DWR operates the remaining 52.4 percent (1,062,000 AF) for the SWP. The reservoir has a maximum water

surface elevation of 544 feet<sup>1</sup> and a minimum operating pool elevation of 326 feet (79,000 AF). Reclamation owns San Luis Reservoir and jointly operates it with DWR to provide seasonal storage for the CVP and the SWP. San Luis Reservoir is capable of receiving water from both the DMC and the CA, which enables the CVP and SWP to pump water into the reservoir during the wet season (October through March) and release water into the conveyance facilities during the dry season (April through September) when demands are higher.

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

## **3.17.2 Environmental Consequences/Environmental Impacts**

### **3.17.2.1 Assessment Methods**

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

### **3.17.2.2 Significance Criteria**

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

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

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<sup>1</sup> Relative to mean sea level.

### **3.17.2.3 Alternative 1: No Action/No Project**

#### **3.17.2.3.1 Seller Service Area**

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

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

#### **3.17.2.3.2 Buyer Service Area**

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

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

#### **3.17.2.4.1 Seller Service Area**

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

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

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

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

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

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

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



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

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

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

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

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

#### **3.17.2.4.2 Buyer Service Area**

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

### **3.17.2.5 Alternative 3: No Cropland Modifications**

#### **3.17.2.5.1 Upstream from Delta**

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

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

| Sac Yr Type               | Oct   | Nov   | Dec   | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <i>Shasta Reservoir</i>   |       |       |       |       |       |       |       |       |       |       |       |       |
| W                         | -0.6  | -0.6  | -0.4  | -0.1  | 0.0   | 0.0   | -0.1  | -0.2  | -0.3  | -0.4  | -0.6  | -0.7  |
| AN                        | -4.6  | -4.6  | -3.4  | -2.8  | -2.3  | -2.3  | -2.3  | -0.1  | -0.4  | -0.5  | -0.7  | -0.8  |
| BN                        | -1.0  | -1.0  | -1.0  | -1.0  | -1.0  | -1.0  | -1.0  | -1.3  | -1.5  | -1.5  | -1.7  | -1.7  |
| D                         | -2.3  | -2.1  | -2.1  | -2.0  | -2.0  | -2.0  | 4.4   | 11.1  | 30.4  | 18.3  | -3.5  | -3.6  |
| C                         | -5.0  | -5.2  | -5.2  | -5.2  | -5.7  | -5.7  | -3.1  | 10.7  | 33.5  | -1.1  | -7.3  | -7.3  |
| All                       | -2.6  | -2.6  | -2.3  | -2.0  | -2.0  | -2.0  | -0.3  | 4.0   | 12.0  | 2.7   | -2.5  | -2.6  |
| <i>Oroville Reservoir</i> |       |       |       |       |       |       |       |       |       |       |       |       |
| W                         | -4.1  | -3.8  | -2.8  | -2.3  | 0.0   | 0.0   | 0.0   | 0.0   | -0.3  | -0.6  | -1.5  | -2.2  |
| AN                        | -13.0 | -13.0 | -13.1 | -13.1 | -10.9 | -0.9  | -0.9  | -0.9  | -0.3  | -6.3  | -4.4  | -3.1  |
| BN                        | -3.2  | -3.8  | -4.9  | -4.9  | -4.9  | -4.9  | -4.9  | -4.9  | -5.2  | -5.5  | -6.4  | -6.8  |
| D                         | -5.1  | -5.2  | -5.5  | -5.5  | -5.5  | -5.5  | -5.2  | 1.4   | 2.5   | 0.4   | -9.6  | -5.5  |
| C                         | -12.8 | -13.5 | -14.6 | -14.6 | -15.0 | -15.2 | -15.5 | -14.9 | -12.3 | -13.3 | -20.1 | -20.1 |
| All                       | -7.6  | -7.7  | -7.7  | -7.4  | -6.3  | -4.5  | -4.6  | -3.3  | -2.6  | -4.3  | -7.5  | -6.9  |
| <i>Folsom Reservoir</i>   |       |       |       |       |       |       |       |       |       |       |       |       |
| W                         | 0.9   | -1.5  | -1.1  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | -0.1  | -0.4  | -0.4  | -0.8  |
| AN                        | -2.2  | -2.9  | -3.1  | -0.9  | 0.0   | 0.0   | 0.0   | 0.0   | -0.2  | -1.4  | -2.8  | -4.5  |
| BN                        | -2.5  | -3.1  | -4.4  | -4.4  | 0.0   | 0.0   | 0.0   | 0.0   | -0.8  | -1.6  | -1.6  | -2.1  |
| D                         | 2.2   | 1.7   | -1.1  | -1.1  | -2.0  | -1.0  | -1.0  | 7.5   | 12.0  | 10.2  | 10.9  | 12.6  |
| C                         | 6.1   | 4.0   | 2.5   | 1.4   | 0.4   | -1.3  | 0.0   | 4.3   | 12.0  | 7.9   | 6.7   | 8.8   |
| All                       | 1.4   | -0.2  | -0.9  | -0.3  | -0.3  | -0.4  | -0.2  | 2.2   | 4.5   | 2.9   | 2.6   | 2.8   |

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

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

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

*Water transfers could increase river flows and potentially affect flood capacity or levee stability.* Similar to the Proposed Action, water transfers under Alternative 3 would increase flows in rivers and in the Delta during the period when water transfers are conveyed from the sellers to the buyers (April through October for East Bay MUD, July through September for transfers conveyed through the Delta). During non-transfer periods, river flows may be slightly

lower than under the No Action/No Project Alternative because of streamflow depletion from groundwater substitution transfers. Table 3.17-4 shows changes in river flows on the major waterways in the Seller Service Area (Sacramento, Feather, American, and Merced rivers).

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

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

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

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

Impacts on flood control in rivers in the Seller Service Area would be less than significant.

**3.17.2.5.2 Buyer Service Area**

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

**3.17.2.6 Alternative 4: No Groundwater Substitution**

**3.17.2.6.1 Seller Service Area**

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

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

| Sac Yr Type               | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May  | Jun  | Jul  | Aug  | Sep |
|---------------------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|
| <i>Shasta Reservoir</i>   |     |     |     |     |     |     |     |      |      |      |      |     |
| W                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 |
| AN                        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 |
| BN                        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 |
| D                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.3  | 17.5 | 8.7  | 0.0  | 0.0 |
| C                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.2 | 46.0 | 7.4  | 0.0  | 0.0 |
| All                       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.5  | 12.5 | 3.1  | 0.0  | 0.0 |
| <i>Oroville Reservoir</i> |     |     |     |     |     |     |     |      |      |      |      |     |
| W                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 |
| AN                        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | -3.3 | -0.8 | 0.0 |
| BN                        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 |
| D                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.1  | 2.9  | 9.0  | -4.5 | 0.0 |
| C                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7  | 2.6  | 6.6  | 0.0  | 0.0 |
| All                       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5  | 1.1  | 2.4  | -0.9 | 0.0 |

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| Sac Yr Type             | Oct  | Nov  | Dec  | Jan  | Feb  | Mar | Apr | May | Jun | Jul | Aug  | Sep  |
|-------------------------|------|------|------|------|------|-----|-----|-----|-----|-----|------|------|
| <i>Folsom Reservoir</i> |      |      |      |      |      |     |     |     |     |     |      |      |
| W                       | 3.5  | 1.4  | 1.1  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | -0.2 |
| AN                      | -0.3 | -0.5 | -0.7 | -0.9 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.1  |
| BN                      | 0.2  | 0.3  | 0.4  | 0.4  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  |
| D                       | 4.2  | 3.5  | -0.1 | -0.1 | -1.0 | 0.0 | 0.0 | 5.2 | 8.9 | 9.5 | 11.7 | 13.5 |
| C                       | 8.5  | 7.2  | 5.7  | 4.6  | 3.6  | 1.9 | 0.3 | 3.6 | 9.1 | 8.2 | 10.0 | 12.1 |
| All                     | 3.8  | 2.5  | 1.5  | 0.8  | 0.6  | 0.4 | 0.1 | 1.7 | 3.4 | 3.4 | 4.1  | 4.8  |

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

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

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

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

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

| Sac Yr Type                               | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May   | Jun    | Jul     | Aug   | Sep   |
|-------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-------|--------|---------|-------|-------|
| <i>Sacramento River at Wilkins Slough</i> |     |     |     |     |     |     |     |       |        |         |       |       |
| W                                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0    | 0.0     | 0.0   | 0.0   |
| AN                                        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0    | 0.0     | 0.0   | 0.0   |
| BN                                        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0    | 0.0     | 0.0   | 0.0   |
| D                                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | -73.8  | 279.9   | 279.9 | 89.1  |
| C                                         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -31.7 | -108.3 | 1,024.0 | 516.0 | 255.9 |
| All                                       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -6.5  | -35.3  | 260.2   | 155.6 | 68.4  |

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

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

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

### 3.17.2.6.2 Buyer Service Area

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

### 3.17.3 Comparative Analysis of Alternatives

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

**Table 3.17-7. Comparative Analysis of Alternatives**

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

#### 3.17.3.1 Alternative 1: No Action/No Project Alternative

There would be no impacts on flood control.

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

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

#### 3.17.3.3 Alternative 3: No Cropland Modifications

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



#### **3.17.3.4 Alternative 4: No Groundwater Substitution**

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

### **3.17.4 Environmental Commitments/Mitigation Measures**

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

### **3.17.5 Potentially Significant Unavoidable Impacts**

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

### **3.17.6 Cumulative Effects**

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

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

- American River Watershed Project: construction of dam improvements at Folsom Dam (under the Folsom Joint Federal Project) and levee improvements on the American and Sacramento rivers (under the American River Common Features Project).
- Delta Levees System Integrity Program: levee repair, maintenance, and improvement within the Delta area.

- South Sacramento County Streams Program: improvements to Morrison Creek and Unionhouse Creek have improved flood management in the south Sacramento area.
- Yuba Feather Flood Protection Program: projects within the areas of the Yuba, Feather, and Bear rivers to reduce flooding and improve public safety.
- Urban Streams Protection Program: provides funding for urban flood management; recent focus has included levee improvements near Sacramento and Yuba City.

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

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

#### **3.17.6.1.1 Seller Service Area**

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

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

The Proposed Action's incremental contribution would not be cumulatively considerable related to flood control.

#### **3.17.6.1.2 Buyer Service Area**

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

#### **3.17.6.2 Alternative 3: No Cropland Modifications**

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

#### **3.17.6.3 Alternative 4: No Groundwater Substitution**

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

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# Chapter 4

## Cumulative Effects Methodology

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

### 4.1 Regulatory Requirements

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

#### 4.1.1 NEPA

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

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

#### 4.1.2 CEQA

Cumulative effects are defined in the CEQA Guidelines as:

“Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.

(a) The individual effects may be changes resulting from a single project or a number of separate projects.

(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.

Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.” (CEQA Guidelines Section 15355)

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

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

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

#### 4.1.3 NHPA

The regulations for Section 106 of the NHPA define “adverse effect” as an undertaking that “may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.” (36 CFR Section 800.5(a)(1)). “Adverse effects” explicitly include “reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther



removed in distance or be cumulative.” (36 CFR Section 800.5(a)(1)). Cumulative effect under Section 106 of the NHPA applies only to those resources that are listed in or eligible for the National Register.

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

## **4.2 Methodology for Assessing Cumulative Effects**

### **4.2.1 Area of Analysis**

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

### **4.2.2 Timeframe**

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

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

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

1. “A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency,” and/or
2. “A summary of projections contained in an adopted local, regional, or statewide plan or related planning document, that describes or evaluates conditions contributing to the cumulative effect. Such plans may include: a general plan, regional transportation plan, or plans for the reduction of greenhouse gas emissions. A summary of projections may also be contained in an adopted or certified prior environmental document for such a plan. Such projections may be supplemented with additional information such as a regional modeling program. Any such document shall be referenced and made available to the public at a location specified by the lead agency.”

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

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

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

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

#### **4.2.4 Cumulative Effects Determinations**

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

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

the impact may be very small, suggesting the Proposed Action’s contribution to any significant effects would be minimal.

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

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

### 4.3 Cumulative Projects Considered for All Resources

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

#### 4.3.1 State Water Project (SWP) Transfers

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

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

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

Abbreviations:

ID: Irrigation District

WA: Water Agency

WD: Water District

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

**Table 4-2. Potential SWP Buyers**

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

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

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

The purposes of the M&I WSP are to:

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

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

manage available CVP water supplies, and to better integrate the use of CVP water with other available non-CVP water supplies.

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

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

**Table 4-3. Existing Water Shortage Allocation Steps**

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

Source: Reclamation 2014

Note:

<sup>1</sup> The historical use amount is determined by averaging the amount of water the contractor took during the last three years of unconstrained flow (or 100%) M&I allocation.

<sup>2</sup> Allocations to Agricultural water service contractors will be further reduced, if necessary, within the Contract Year to provide public health and safety water quantities to M&I water service contractors within the same Contract Year, provided CVP water is available.

Key:

PH&S = public health and safety

M&I = municipal and industrial

Reclamation is in the process of updating the M&I WSP and is currently preparing the draft EIS for alternatives to the current M&I WSP. It is

anticipated that the draft EIS will be available for public review in late 2014.

#### 4.3.3 Lower Yuba River Accord

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

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

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

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

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

- Higher instream flow requirements to protect lower Yuba River Chinook salmon, steelhead, and other fish species, ranging from 260,000 AF in a dry year to more than 574,000 AF in a wet year, an increase of 25,000 AF in a dry year to more than 170,000 AF in a wet year.
- Improved water supply reliability for SWP and CVP water users, including a commitment of 60,000 AF of water per year for environmental purposes (Component 1 Water) and up to an additional 140,000 AF of water (Components 2, 3, and 4 Water) in dry years for the SWP and CVP customers. Presently, CVP customers receive a share of the Yuba Accord water via the San Luis & Delta-Mendota Water Authority (SLDMWA) which has an agreement with DWR.

- A \$6 million long-term lower Yuba River fisheries monitoring, studies, and enhancement program.
- Improved water supply reliability for Yuba County farmers, along with a responsible conjunctive use program to improve water use efficiency for local farmers.
- A secure funding source for Yuba County Water Agency and local irrigation districts to finance conjunctive use and water use efficiency activities, levee strengthening, and other water management actions in Yuba County (Yuba County Water Agency 2008).

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

#### **4.3.4 San Joaquin River Restoration Program (SJRRP)**

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

1. Restoration Goal – To restore and maintain fish populations in “good condition” in the main stem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.
2. Water Management Goal – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement calls for a combination of channel and structural modifications along the San Joaquin River below Friant Dam, releases of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration flows), and reintroduction of Chinook salmon. To achieve the Water Management Goal, the Settlement calls for downstream recapture of Interim and Restoration flows from the San Joaquin

River and the Delta and recirculation of that water to replace reductions in water supplies to Friant Division long-term contractors resulting from the release of Interim and Restoration flows. Interim Flow releases began October 1, 2009. In addition, the Settlement establishes a Recovered Water Account and allows the delivery of surplus water supplies to Friant Division long-term contractors during wet hydrologic conditions.

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

#### **4.3.5 Refuge Water Supplies**

A Report on Refuge Water Supply Investigations (Reclamation 1989) describes water needs and delivery requirements for National Wildlife Refuges (NWR), State Wildlife Management Areas, and the Grassland Resource Conservation District in the Central Valley of California. In this report, the average annual historical water supplies were termed “Level 2” (L2), and the supplies needed for optimum habitat management were termed “Level 4”. Section 3406(d)(1) of the CVPIA requires the Secretary of the Interior to provide firm delivery of L2 water supplies to certain wildlife refuges in the Central Valley of California. Section 3406(d)(2) of the CVPIA further directs the Secretary to provide additional water supplies to meet Incremental Level 4 needs through the acquisition of water from willing sellers.

For refuge water transfers, Reclamation (as a “willing buyer”), in cooperation with willing sellers, negotiates and develops agreements to purchase water for transfer to CVPIA refuges and prepares the associated National Environmental Policy Act/Endangered Species Act environmental compliance documents, as applicable.

Before Reclamation can facilitate water transfers, it must first provide CVP water to meet all regulatory requirements mandated by the State Water Resources Control Board (Delta flow and water quality standards), CVPIA (specifically the “(b)(2) water” and refuge L2 water), and the Reasonable and Prudent Alternative actions listed in the USFWS’s (2008) and National Oceanic and Atmospheric Administration (NOAA) Fisheries’ (2009) respective Biological Opinions on the Coordinated Operations of the CVP and SWP. Reclamation must then meet its contractual obligations to CVP agricultural and municipal and industrial (M&I) water service contractors. If all these requirements are satisfied and excess pumping capacity is available, only then will Reclamation facilitate potential north-to-south water transfers. Water transfers under this EIS/EIR cannot affect Reclamation’s ability to deliver allocated CVP L2 water to refuges.



Table 4-4 shows Reclamation’s refuge related water transfers (“re-allocation” regarding L2 supplies) from 2009 through 2013. Most of these transfers do not need to be moved through the Delta. Merced Irrigation District (ID) is one exception, but Merced ID has multiple means of delivering transferred water and it does not need to be conveyed through the Delta (see Section 2.3.2.3). Additionally, Reclamation has permanently purchased water from Corning, Thames, and Proberta Water Districts (WDs) that is moved through the Delta in some years; however, this water is more frequently used for refuges in the Sacramento Valley and is not conveyed through the Delta. Because the Level 4 refuge transfers typically do not rely on through-Delta conveyance, the action alternatives are not expected to affect the potential for refuges to receive these supplies.

**Table 4-4. Refuge Transferred Water Supplies, 2009-2013**

| <u>Seller</u>                                                              | <u>Water Transferred (AF)<sup>1</sup></u> | <u>Notes</u>                                                                                                            |
|----------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <u>WY 2013</u>                                                             |                                           |                                                                                                                         |
| <u>Corning, Thames, and Proberta WDs</u>                                   | <u>3,308</u>                              | <u>Permanently purchased NOD IL4 water transferred to the Kern NWR SOD</u>                                              |
| <u>SJRECWA</u>                                                             | <u>19,500</u>                             | <u>Purchased IL4</u>                                                                                                    |
| <u>Merced ID</u>                                                           | <u>7,256</u>                              | <u>Purchased for the East Bear Creek Unit of the San Luis NWR Complex as L2, then exchanged to meet SOD IL4 demands</u> |
| <u>WY 2012</u>                                                             |                                           |                                                                                                                         |
| <u>SJRECWA</u>                                                             | <u>25,000</u>                             | <u>Purchased IL4</u>                                                                                                    |
| <u>Santa Clara Valley WD</u>                                               | <u>10,000</u>                             | <u>Purchased IL4</u>                                                                                                    |
| <u>Merced ID</u>                                                           | <u>3,480</u>                              | <u>Purchased for the East Bear Creek Unit of the San Luis NWR Complex as L2, then exchanged to meet SOD IL4 demands</u> |
| <u>WY 2011</u>                                                             |                                           |                                                                                                                         |
| <u>SJRECWA</u>                                                             | <u>50,333</u>                             | <u>Purchased IL4</u>                                                                                                    |
| <u>Panoche WD</u>                                                          | <u>4,250</u>                              | <u>Purchased IL4</u>                                                                                                    |
| <u>San Luis WD</u>                                                         | <u>5,000</u>                              | <u>Purchased IL4</u>                                                                                                    |
| <u>Santa Clara Valley WD</u>                                               | <u>10,000</u>                             | <u>Purchased IL4</u>                                                                                                    |
| <u>Merced ID</u>                                                           | <u>1,627</u>                              | <u>Purchased for the East Bear Creek Unit of the San Luis NWR Complex as L2, then exchanged to meet SOD IL4 demands</u> |
| <u>East Side Canal and Irrigation Company</u>                              | <u>3,291</u>                              | <u>Purchased as L2, then exchanged to meet IL4 demands</u>                                                              |
| <u>WY 2010</u>                                                             |                                           |                                                                                                                         |
| <u>Corning, Thames, and Proberta WDs and Sacramento Valley NWR Complex</u> | <u>4,506</u>                              | <u>Permanently purchased NOD IL4 water and reallocated NOD conserved L2 water delivered to Kern NWR and GRCD</u>        |
| <u>SJRECWA</u>                                                             | <u>35,714</u>                             | <u>Purchased IL4</u>                                                                                                    |
| <u>Kern-Tulare WD</u>                                                      | <u>7,000</u>                              | <u>Purchased IL4</u>                                                                                                    |
| <u>Panoche WD</u>                                                          | <u>10,000</u>                             | <u>Purchased IL4</u>                                                                                                    |

| <b>Seller</b>                        | <b>Water Transferred (AF)<sup>1</sup></b> | <b>Notes</b>                                                                                                            |
|--------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <u>Merced ID</u>                     | <u>500</u>                                | <u>Purchased for the East Bear Creek Unit of the San Luis NWR Complex as L2, then exchanged to meet SOD IL4 demands</u> |
| <u>Stevinson WD</u>                  | <u>4,080</u>                              | <u>Purchased for the East Bear Creek Unit of the San Luis NWR Complex as L2, then exchanged to meet SOD IL4 demands</u> |
| <u>WY 2009</u>                       |                                           |                                                                                                                         |
| <u>Sacramento Valley NWR Complex</u> | <u>5,342</u>                              | <u>NOD Conserved L2 water delivered to Kern NWR and the GCRD</u>                                                        |
| <u>SJRECWA</u>                       | <u>18,687</u>                             | <u>Purchased IL4</u>                                                                                                    |
| <u>Stevinson WD</u>                  | <u>4,280</u>                              | <u>Purchased as L2, then exchanged to meet IL4 demands</u>                                                              |

Key:

AF – Acre-feet, GCRD – Grasslands Resource Conservation District, ID – Irrigation District, IL4 – Incremental Level 4, L2 – Level 2, NOD – North of Delta, NWR – National Wildlife Refuge, SJRECWA – San Joaquin River Exchange Contractors Water Authority, SOD – South of Delta, WD – Water District, WY – Water Year

Note 1: Gross amount of transferred water (IL4) and re-allocated L2. Conveyance losses from source to destination were incurred and are not represented here; therefore, the amount total does not reflect the amount delivered to the refuges.

## 4.4 References

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## Chapter 5 Other Required Disclosures

Other required disclosures of environmental documents include irreversible and irretrievable commitment of resources; the relationship between short-term uses and long-term productivity; growth inducing impacts; significant and unavoidable impacts; and issues raised by the public. The summary of environmental impacts by alternative; and significant and unavoidable impacts and; the environmentally superior alternative are included in Chapter 2.

### 5.1 Irreversible and Irretrievable Commitment of Resources

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

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

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

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

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

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

### 5.3 Growth Inducing Impacts

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

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

Water proposed for transfer would be transferred from willing sellers to buyers to meet existing demands when there are shortages in Central Valley Project supplies. The proposed water transfers would not directly or indirectly affect growth beyond what is already planned. The term proposed for the transfers under the Proposed Action is 10 years beginning in 2015. The Proposed Action would not induce development growth or remove a barrier for growth because it is not a reliable source of water that could be used to approve development

projects by local agencies. Therefore, the Proposed Action would have no growth inducing impacts.

## **5.4 Significant and Unavoidable Impacts**

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

## **5.5 Controversies and Issues Raised by Agencies and the Public**

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

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

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

Key:

EIS/EIR = Environmental Impact Statement/Environmental Impact Report

## 5.6 References

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



# Chapter 6

## Consultation and Coordination

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

### 6.1 Public Involvement

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

#### 6.1.1 Public Scoping

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

#### 6.1.2 Public Meetings

Reclamation and SLDMWA held public meetings after release of the Public Draft EIS/EIR to solicit public comments. Meetings were held in Sacramento, Los Banos, and Chico, California in October 2014. Reclamation and SLDMWA also provided a 60-day comment period for the public and agencies to submit written comments on the Public Draft EIS/EIR. Appendix J includes comment responses to all comments received at the public hearings and during the comment period.

### 6.2 Agency Coordination

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

### **6.2.1 Buyers and Sellers**

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

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

### **6.2.2 California Department of Water Resources (DWR)**

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

### **6.2.3 Resource Agencies**

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

# Chapter 7

## List of Preparers and Contributors

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

**Table 7-1. Federal Agencies**

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

Notes:

NEPA – National Environmental Policy Act

**Table 7-2. Regional Agencies**

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

Notes:

CEQA – California Environmental Quality Act

**Table 7-3. CDM Smith**

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

**Table 7-4. Pacific Legacy**

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

**Table 7-5. ICF International**

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

**Table 7-6. MBK Engineers**

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

**Table 7-7. CH2M Hill**

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

**Table 7-8. Resource Management Associates**

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

**Table 7-9. RMann Economics**

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

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