

# Chapter 16 Recreation Resources

## 16.1 Introduction

This chapter describes the environmental setting, methods of analysis, and impact analysis for publicly provided recreation resources that would potentially be affected by the construction and operation of the Project. Hydrologic modeling and results are described in Chapter 5, *Surface Water Resources*.

Popular water-related recreational activities in California fall into two categories: (1) water-dependent activities, such as boating, waterskiing, swimming, and fishing; and (2) water-enhanced activities such as wildlife viewing, camping, hiking, and hunting. The quality of the water-dependent recreation experience at lakes, reservoirs, and streams depends on water levels, natural conditions, and the level of facility development. Water-enhanced activities are more dependent on the level of facility development than on water levels in streams or reservoirs.

The study area for recreation resources includes the Project inundation area and construction footprint of the associated facilities. The study area also encompasses the following areas where recreation resources could be affected by Project operation:

- regional SWP and CVP reservoirs (i.e., Shasta Lake, Lake Oroville, Folsom Lake, San Luis Reservoir)
- rivers downstream of SWP and CVP reservoirs
- recreational facilities or areas in the region, such as the Sutter and Yolo Bypasses or wildlife areas and wildlife refuges, that receive water from SWP or CVP facilities

The regulating reservoirs located below the major CVP and SWP reservoirs (Keswick Reservoir, Thermalito Complex, and Lake Natoma) are operated to receive highly variable flows and, as a result, surface water elevations fluctuate substantially on a daily and hourly basis. Changes in the operation of upstream reservoirs with Project implementation would not affect the monthly mean elevation of these regulating reservoirs. Therefore, elevation-related impacts on recreation resources in these regulating reservoirs are not evaluated in this chapter. These regulating reservoirs are included in the study area because Project operations could affect (i.e., potentially reduce) recreational use at these reservoirs in a similar manner to potential effects on recreational use at the larger SWP and CVP reservoirs.

There would be no operational changes for other regional reservoirs (i.e., Lake Almanor, Black Butte, Stony Gorge, New Bullards Bar, East Park, Englebright, Indian Valley, Clear Lake, and Lake Berryessa). These reservoirs may experience a slight reduction in use due to additional recreation opportunities from Sites Reservoir, but this reduction would not result in negative

impacts and could result in slight benefits to these reservoirs. Therefore, these reservoirs are not included in the study area or discussed further.

As described in Chapter 2, the Project would not affect or result in changes in the operation of the CVP, Trinity River Division facilities (including Clear Creek) and thus Trinity River resources are not discussed or analyzed further in this chapter.

There are no public recreation facilities in the footprint of the Project facilities in Yolo County (where the Dunnigan Pipeline would be located) or in Glenn County (where the northernmost saddle dams, saddle dikes, and inundation area would be situated) because this is private land. There are also no public recreation facilities in the Antelope Valley, in the vicinity of Huffmaster Road, in the TRR East area, in the TRR West area, or along the alignment of South Road. The TRR East area consists of agricultural land, the TRR West area consists of grasslands and agricultural land, and the South Road alignment is on private property with agricultural land uses and zoning. No public recreation facilities are present at Funks Reservoir or on the lands surrounding the reservoir, which are owned by Reclamation, because the maintenance roads leading into and around it are closed to the public. These areas are therefore not discussed further.

Tables 16-1a and 16-1b summarize the CEQA determinations and NEPA conclusions for construction and operations impacts, respectively, of the alternatives analyzed in this chapter.

**Table 16-1a. Summary of Construction Impacts and Mitigation Measures for Recreation Resources**

Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Impact REC-1: Increased use of existing neighborhood and regional parks or other recreational facilities that would result in new or accelerated substantial physical deterioration of those facilities			
No Project	NI/NE	–	NI/NE
Alternative 1	LTS/NE	–	LTS/NE
Alternative 2	LTS/NE	–	LTS/NE
Alternative 3	LTS/NE	–	LTS/NE

Notes:

NI = CEQA no impact

LTS = CEQA less-than-significant impact

NE = NEPA no effect or no adverse effect

**Table 16-1b. Summary of Operations Impacts and Mitigation Measures for Recreation Resources**

Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Impact REC-1: Increased use of existing neighborhood and regional parks or other recreational facilities that would result in new or accelerated substantial physical deterioration of those facilities			
No Project	NI/NE	–	NI/NE
Alternative 1	LTS/NE/B	–	LTS/NE/B
Alternative 2	LTS/NE/B	–	LTS/NE/B
Alternative 3	LTS/NE/B	–	LTS/NE/B

Notes:

NI = CEQA no impact  
 LTS = CEQA less-than-significant impact  
 B = NEPA beneficial effects  
 NE = NEPA no effect or no adverse effect

## 16.2 Environmental Setting

The environmental setting for recreation resources in the study area is described for the Project setting and the larger, regional setting. The Project setting is composed of the inundation area and the construction footprint of the associated facilities. The regional setting encompasses existing recreation areas, wildlife refuges, and wildlife areas that could be affected by operation of the Project.

### 16.2.1. Project Setting

There are presently no designated public recreation areas in the Project footprint. The GCID Main Canal, facilities, and lateral bank roads are for the use of authorized personnel only. The use of the GCID Main Canal, facilities, and roads for public recreation or other unauthorized activity is prohibited. Existing county roads are used by the public for access to the local area, including existing reservoirs and the Mendocino National Forest.

There is a park with ballfields in the City of Willows within 100 feet of the GCID Main Canal. The park is on the opposite bank of the canal and outside of the study area. The park is in a residential area that runs parallel to an approximately 1-mile segment of the canal where system upgrades would be implemented.

### 16.2.2. Regional Setting

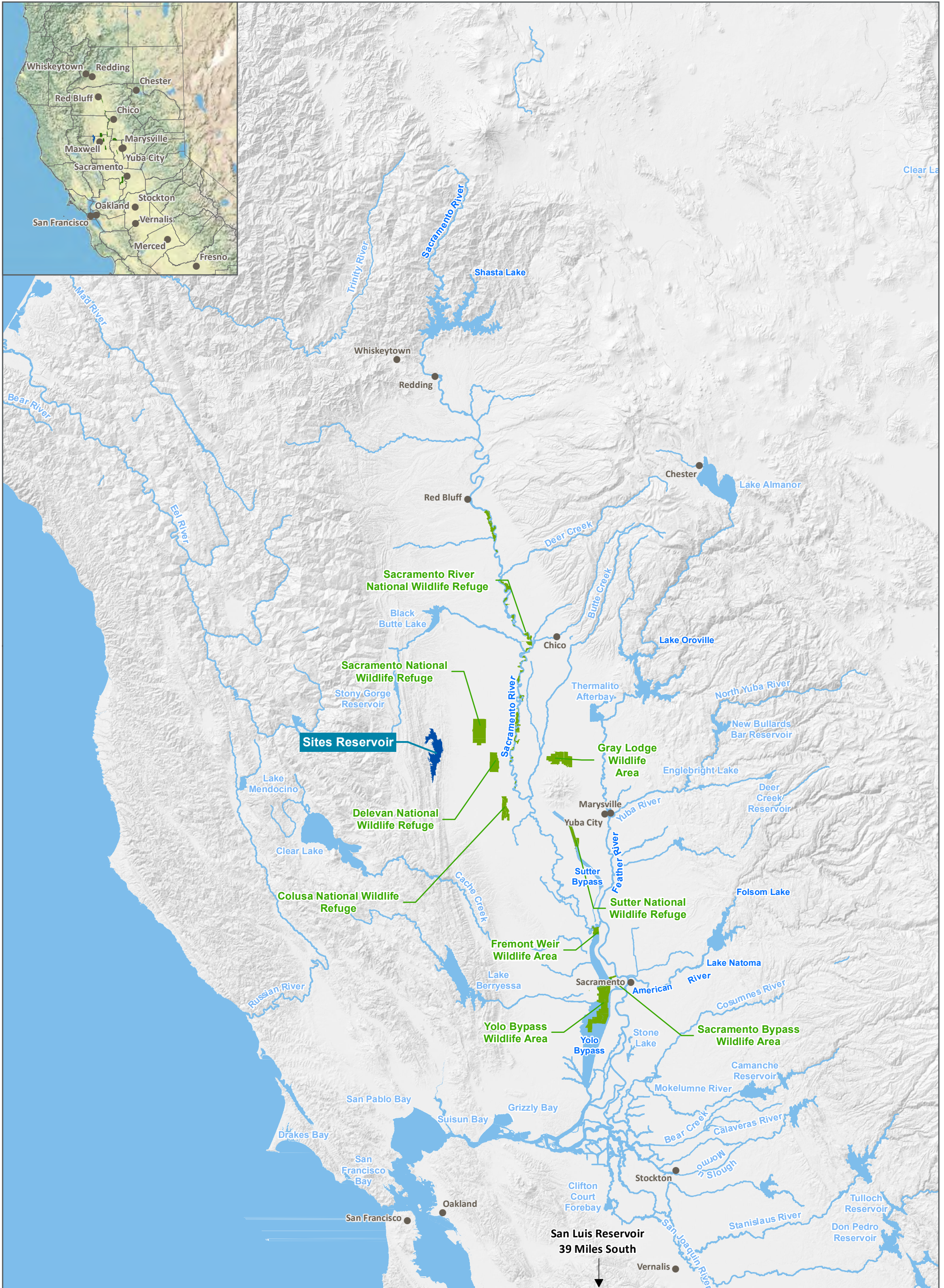
This section describes the recreation areas and then the wildlife refuges and wildlife areas that could be affected by Project-related changes in storage, water levels, or flows in the study area through changes in SWP or CVP operations. The reservoirs and other recreation facilities near the study area are depicted on Figure 16-1.

#### 16.2.2.1. Recreation Areas Directly Affected by Project-Related Changes to SWP or CVP Operations

Table 16-2 summarizes the key characteristics of recreation areas that could be affected by Project-related changes to SWP or CVP operations.

**Table 16-2. Key Recreational Characteristics of Recreation Areas Potentially Affected by Project-Related Changes to SWP or CVP Operations**

Location	Description	Key Facilities	Activities
Shasta Lake - Whiskeytown Shasta Trinity National Recreation Area: Shasta Lake	29,740 surface acres and more than 360 miles of shoreline	Several marinas, campgrounds, boat-in campgrounds, boat ramps, and related facilities Seven public boat ramps, two of which extend more than 160 feet down in elevation	Houseboating, watersports, major fishing destination (with more than 16 species of fish), and bass fishing



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MILES

DATA SOURCES: CPAD Holdings - Calands.org, 2013; Waters, NHD, 2018

**LEGEND**

- City
- ▭ County
- Rivers
- Wildlife Area
- Water Body

DISCLAIMER: This exhibit is preliminary and is subject to change.

**FIGURE 16-1**  
RESERVOIRS AND OTHER RECREATION NEAR THE STUDY AREA

MAP DATE: 6/25/2021

Location	Description	Key Facilities	Activities
		Commercial ramps at Bridge Bay Resort, Digger Bay Marina, and Silverthorn Marina	tournaments.
Shasta Lake – Whiskeytown Shasta Trinity National Recreation Area: Keswick Reservoir (Afterbay for Shasta Lake)	5 miles long with a surface area of 630 acres	Small paved boat ramp and vault toilets at the day-use area	Fishing, off-highway vehicle, mountain bike, and national recreation trail network
Sacramento River – Shasta Dam (Keswick) to Knights Landing	<p>Between Keswick Dam (downstream of Shasta Dam) and Red Bluff—river confined by geology and narrow bands of riparian forest</p> <p>Red Bluff to Chico—river meanders over a broad floodplain</p> <p>Chico to Colusa—sloughs and broad basins extend for miles and extensive system of levees and weirs provides flood control</p>	<p>Sloughs, basins, and flood control facilities create many opportunities for water-based recreation</p> <p>CDFW and USFWS facilities offer opportunities for wildlife-oriented recreation, including hunting, fishing, hiking, and wildlife viewing.</p>	<p>Fly fishing and conventional fishing, with fish species abundance varying during the year</p> <p>Fishing popular downstream of the Red Bluff Diversion Dam</p> <p>Rafting, canoeing, camping, hunting, and swimming</p>
Lake Oroville State Recreation Area	<p>Includes Lake Oroville, second largest storage reservoir in California, and much of the Thermalito Complex. Owned and operated by California Department of Water Resources as part of the SWP</p> <p>Recreational facilities managed by California</p>	<p>Fully developed and primitive camping, two full-service marinas, 10 floating campsites, 84 boat-in campsites, seven two-stall floating toilets, a DWR service ramp, a popular day-use area and aquatic center at Thermalito Forebay</p> <p>Numerous boat ramps: five two- or more lane boat ramps; five one-lane cartop boat ramps, four of which reach only to elevations between 825 and 866 feet, while Foreman Creek Ramp and DWR service ramp, extend to 730 feet.</p> <p>The five major public boat ramps</p>	<p>Boating, fishing, picnicking, swimming, horseback riding, mountain biking, wildlife watching, hunting, waterskiing, camping, water park activities, and picnicking.</p>

Location	Description	Key Facilities	Activities
	Department of Parks and Recreation, in agreement with Feather River Recreation and Park District	(Loafer Creek, Enterprise, Lime Saddle, Spillway, and Bidwell Canyon) launch most of the recreational boats on Lake Oroville.	
Feather River	Downstream of Lake Oroville, Feather River passes through Oroville Wildlife Area, Feather River Wildlife Area, and several towns before joining the Sacramento River at Verona.	<p>Most popular recreation area is Riverfront Park near Marysville. Facilities include picnic areas, restrooms, nearby campgrounds and lodging, and a boat ramp.</p> <p>Verona Marina, located at the mouth of the Feather River, has a boat ramp which is used primarily by boat anglers.</p> <p>Other facilities include private launch ramps, camp and day-use facilities, and trails.</p>	<p>Boating, fishing, camping, picnicking, swimming, wildlife viewing, and hunting.</p> <p>Several miles of the river near the city of Oroville are popular for bank fishing, and boat anglers frequent the lower river.</p>
Folsom Lake State Recreation Area and Lake Natoma	<p>Located east of Sacramento and extends to North and South Forks of American River. Owned by Reclamation and California Department of Parks and Recreation manages recreation</p>	<p>Two major campgrounds; three group camps; extensive trail system, which joins the American River Parkway; and multi-stage boat ramps. Eight major boat ramps with two or more lanes and two one-lane ramps more suitable for cartop boats. Some ramps not available until lake elevation is 18 to 58 feet below normal maximum water surface elevation. Although there are no designated boat-in campgrounds, boaters can beach their boats and camp overnight for up to two nights in unoccupied campsites at Peninsula Campground.</p> <p>California State University Sacramento Aquatic Center near Nimbus Dam has a boat ramp and offers rentals and lessons for aquatic sports.</p>	Boating, camping, fishing, aquatic sports, and picnicking.
Lower American River	Flows for 23 miles downstream of Lake Natoma and Folsom Dam through the greater Sacramento urban area	Passes through the American River Parkway, which has paved bike, walking, running, hiking, and equestrian trail that extends from Lake Natoma to Discovery Park at the confluence of the Sacramento and	Recreational boating, rafting, kayaking, fishing, swimming, and wading in river. Is a Class 1 rafting

Location	Description	Key Facilities	Activities
		American Rivers	river (with three Class II rapids) and used extensively from Memorial Day weekend to Labor Day. Designated "recreational" in the State and federal Wild and Scenic Rivers Systems.
Sutter Bypass	Includes the Sutter National Wildlife Refuge and is part of the Sutter Bypass Wildlife Area.		Hunting, fishing, bird watching, photography, and general nature observation.
Colusa Bypass Wildlife Area	1,200 acres of mostly grasslands	No formal facilities	Hunting, fishing, bird watching, photography, and general nature observation.
Yolo Bypass	Includes the 1,461-acre Fremont Weir Wildlife Area and Sacramento Bypass Wildlife Area.	Fremont Weir and Sacramento Bypass Wildlife Areas have no formal facilities.  Yolo Bypass Wildlife Area has several duck blinds, picnic facilities, and trails.	Hunting, fishing, bird watching, and wildlife viewing.
San Luis Reservoir	A joint CVP/SWP facility and the largest reservoir in the San Joaquin Valley. Includes O'Neill Forebay and is part of San Luis Reservoir State Recreation Area. All facilities are operated by California Department of Parks and Recreation.	Two developed campgrounds and two primitive campgrounds. There are three boat ramps at the two lakes, plus extensive day-use areas with lawns and beaches at O'Neill Forebay.  Reservoir has two major boat ramps. Because of the seasonal changes in water level, Dinosaur Point Boat Ramp may be dewatered and therefore unusable during the late summer months; Basalt Boat Ramp experiences dewatering less frequently.	Forebay has relatively stable water levels and provides popular swimming, boating, fishing, and camping opportunities.  Reservoir has a very large annual water level range and primary activities are fishing, boating, wind surfing, and picnicking.

Sources: U.S. Department of Agriculture 2014; Stienstra 2008 (66–79, 107–112, 125–148, 158–183, 187–194, 309–320);

California Department of Water Resources 2004:12; Rischbieter 2001: ix, 4, 11–29, 43–53, 59–65, and 73–75 ; National Wild and Scenic Rivers System 2020; California Department of Fish and Wildlife 2020, 2021a, 2021b; California Data Exchange Center 2016; and California State Parks 2016.

### 16.2.2.2. **Wildlife Refuges and Wildlife Areas**

A complex of federal and State wildlife refuges in the Sacramento Valley along the Sacramento River provides fishing, hunting, and wildlife viewing opportunities via auto tours and trails. Hunting is generally limited to upland game and waterfowl. These refuges are briefly described in Table 16-3 and include the Sacramento River, Colusa, Sutter, and Delevan National Wildlife Refuges, which are part of the Sacramento National Wildlife Refuge Complex, and the Gray Lodge Wildlife Area.

**Table 16-3. Federal and State Wildlife Refuges in the Sacramento Valley along the Sacramento River**

<b>Refuge</b>	<b>Description</b>	<b>Recreational Activities</b>
Sacramento NWR (Headquarters for Sacramento NWR Complex)	10,819 acres of primarily wetland, grassland, and riparian habitats	Numerous recreational opportunities, including a popular auto tour, two walking trails, 14 in-ground concrete blinds and one aboveground site for photographers, and hunting.
Sacramento River NWR	80-mile stretch of the Sacramento River between Red Bluff and Princeton in Tehama, Butte, Glenn, and Colusa Counties. Thirty properties (or units) total 10,353 acres and consist primarily of restored and remnant riparian habitats, but also include grasslands and some orchards.	Maintained hiking trails, boating, and hunting.
Colusa NWR	Located southwest of Colusa in Colusa County. Encompasses 5,077 acres consisting primarily of wetlands, with some grasslands and riparian habitats. Is in the Colusa Basin and bisected by the Colusa Basin Drain.	Wildlife viewing, photography, auto tour through wetlands, a 1-mile trail along a lush riparian slough with a wildlife viewing platform, photography blind, and hunting.
Sutter NWR	Located southwest of Yuba City in Sutter County. The 2,591-acre refuge consists primarily of wetlands, with some grasslands and riparian habitats. About 80% of is located in the Sutter Bypass.	Limited wildlife viewing and photographic opportunities from Hughes Road, hiking trails for wildlife observation and photography, hunting.
Delevan NWR	Situated east of the town of Maxwell in Colusa County. The refuge encompasses 5,877 acres consisting primarily of wetlands with some riparian and grassland habitats.	Wildlife viewing and photographic opportunities from Maxwell Road and Four Mile Road, a photography blind, and hunting
Gray Lodge Wildlife Area	Considered the most popular of the five refuges in the region	Fishing, hunting, hiking, and photography

Sources: U.S. Fish and Wildlife Service 2020 and California Department of Fish and Wildlife 2020.

Notes: NWR = National Wildlife Refuge



## 16.3 Methods of Analysis

This section describes the qualitative and quantitative methods used to evaluate construction and operation and maintenance impacts of the Project on recreation resources in the study area. The analysis was primarily conducted by qualitatively comparing access and use at existing recreational facilities identified in Section 16.2, *Environmental Setting*, with anticipated Project construction, operation, and maintenance activities to assess the potential for the Project to affect access or use of existing recreational facilities. The quantitative component of the impact analysis consisted of reviewing operational modeling results for the alternatives that are provided in (Appendix 5B, *Water Resources System Modeling*).

### 16.3.1. Construction

Construction impacts are evaluated by identifying the locations of Project components (i.e., inundation area and related facilities) near known recreational areas and facilities to determine whether construction would result in the relocation or need for construction of new or expanded recreation facilities. Project construction would not occur outside of the study area in the SWP or CVP export service areas and would therefore not affect recreational facilities in the service areas.

### 16.3.2. Operation

Operation impacts are evaluated by assessing changes in the level of demand for recreational facilities in the study area (primarily resulting from increased recreational use at the Sites Reservoir). To assess the potential impacts on recreation use in regional SWP and CVP reservoirs from Project operations, average end-of-month reservoir storage (elevation) during the primary recreation season (May 1 through September 20) is analyzed under each alternative and compared to the reservoir storage (elevation) under existing conditions.

The availability of boat ramps is addressed through consideration of operational changes in reservoir surface elevations. To evaluate the potential impacts on boat ramp availability in the regional SWP and CVP reservoirs from Project operations, average end-of-month reservoir elevations and the 90th percent exceedance value for elevation (the elevation that is exceeded 90% of the time) during the primary recreation season are evaluated under each alternative and compared to the reservoir elevations under existing conditions. An increase in average elevation or the 90th percent exceedance value would indicate that boat ramps would be usable more often than under existing conditions.

Use of recreational facilities along the rivers in the study area is also addressed through consideration of operational changes in flows below the SWP and CVP storage reservoirs that would be affected by Project operations (i.e., Sacramento River below Keswick Reservoir, Feather River below Thermalito Complex, and American River below Lake Natoma). To assess the potential impacts on recreational facilities and use in these rivers, average monthly flows during the primary recreation season are evaluated under each alternative and compared to the flows under existing conditions.

### 16.3.3. Thresholds of Significance

An impact on recreation resources would be considered significant if the Project would:

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

The impacts related to the second threshold are addressed in Chapters 5 through 30 because the Project would include construction of recreational facilities, and construction of these facilities would result in environmental effects on many resources. Significant and unavoidable impacts due to the proposed construction of recreational facilities would occur for agricultural resources, air quality, biological resources, cultural resources, paleontological resources, and traffic and transportation. Mitigation measures would also be required for many resources, such as agricultural resources, aquatic resources, cultural resources, paleontological resources, and traffic and transportation. These effects are addressed in each respective resource chapter and therefore are not addressed in this chapter.

#### **16.3.4. Impact Analysis and Mitigation Measures**

##### **Impact REC-1: Increased use of existing neighborhood and regional parks or other recreational facilities that would result in new or accelerated substantial physical deterioration of those facilities**

###### *No Project*

In general, the demand for recreational opportunities at regional lakes and reservoirs can reasonably be expected to increase as the population of California increases. However, the future conditions under the No Project Alternative were assumed to be similar to existing conditions for recreational facilities in Glenn and Colusa Counties given the generally rural nature of the Project setting and limited potential for growth and development in these counties for the foreseeable future. Further, while existing regional reservoirs used for recreational activities may experience differing water levels affecting the physical conditions of those reservoirs, it is speculative whether regional recreational facilities would be physically degraded, how they would be degraded, and to what extent.

###### Significance Determination

The No Project Alternative would not result in increased use of existing neighborhood and regional parks or other recreational facilities that would cause new or accelerated substantial physical deterioration of those facilities. There would therefore be no impact/no effect on recreation resources.

###### *Alternatives 1, 2, and 3*

###### Construction

Constructing the Sites Reservoir, Golden Gate Dam, Sites Dam, saddle dams, saddle dikes, I/O Works, conveyance facilities, roads, and recreation facilities would not substantially affect recreation in the Antelope Valley or the surrounding environs because of the lack of public recreational amenities in these areas. With the exception of the Dunnigan Pipeline and South

Road, construction of Alternative 2 would be largely the same as for Alternatives 1 and 3 with respect to recreation resources because the overall dam, reservoir, and conveyance footprint would be the same. There are no public recreation opportunities in the area of the South Road under Alternative 2, so construction of the road would not affect recreation users.

Modifications to existing Sacramento River diversion facilities and conveyances to regulating reservoirs (e.g., adding new pumps and head gates; upgrading canal siphons, canals, and canal roads) are generally not expected to increase use of recreation resources because many of the facilities are already in place and do not provide recreational opportunities. Construction activities associated with the installation of two additional pumps at the RBPP would not occur within the river, would have no effect on recreation use levels in the Sacramento River near that location, and would not increase use at other recreational facilities. Just outside the study area, the residential area in the City of Willows that lies parallel to approximately 1 mile of the GCID Main Canal system upgrades includes a park with ballfields that would not experience increased recreation. The impacts of increased noise and visual disturbance on the park are discussed in Chapter 19, *Noise*, and Chapter 24, *Visual Resources*, respectively.

### Operation

An estimated 187,000 recreational visitors annually would visit the Sites Reservoir and its recreation areas for all or part of 1 day once the facilities were operational (Sites Project Authority and Bureau of Reclamation 2017). The number of visitors per day would fluctuate, resulting in varying levels of traffic, but most visitors are expected during the primary recreation season of May 1 through September 20. In addition to the Sites Reservoir, the Project would include two primary recreation areas (the Peninsula Hills Recreation Area and the Stone Corral Creek Recreation Area), and a day-use boat ramp area. The Authority would develop and implement an RMP (Section 2D.3) to describe the land uses, fish stocking and vector control practices, and the resources associated with the Sites Reservoir lands.

The impacts of operation of Alternatives 1, 2, and 3 would be similar because the differences in water deliveries would not affect use or deterioration of existing recreational facilities. With the exception of the recreation areas at Sites Reservoir, access to the Project facility sites would be restricted to authorized personnel and these sites would not be used for recreation. The installation and operation of two additional pumps in existing bays at the RBPP would result in increased diversions from the Sacramento River to fill Sites Reservoir when compared to existing conditions. These diversions for Sites Reservoir would result in changes in flows in the Sacramento River (Chapter 5, *Surface Water Resources*) that would not be large enough to affect recreation use levels in the Sacramento River near that location and would not increase visitor use at other recreational facilities.

Changes in water surface elevations would not adversely affect recreation use, access, or maintenance of facilities or cause a reduction in seasonal water surface elevations that would affect the use and deterioration of boat ramps. The regional SWP and CVP reservoirs currently experience water level fluctuations and seasonal changes in storage and water surface elevations, and operational modeling results for Alternatives 1, 2, and 3 indicate that water storage levels would continue to vary from month to month with operation of Alternatives 1, 2, and 3 but would remain within the historical range.

Operational modeling results indicate that Alternatives 1, 2 and 3 would provide increased operational flexibility within these reservoirs. In general, there would be slightly increased storage conditions, particularly in Dry and Critically Dry Water Years, relative to the existing conditions. These changes are not expected to be perceptible to recreational users because changes in storage would result in generally increased water surface elevations, and changes in average surface water elevations are typically less than 2 feet (Tables 16-4 through 16-11). The changes in water surface elevations with Alternatives 1, 2, and 3 would not substantially change access to the boat-in campsites at Shasta Lake, Lake Oroville, or Folsom Lake. These changes in water surface elevation are not expected to increase recreation use of these reservoirs or increase use at these recreational facilities (i.e., boat ramps, campgrounds) associated with these reservoirs.

Many of the existing boat ramps are not accessible at all times during the primary recreation season due to low reservoir water surface elevations. Modeling indicates there would be little change, or a minor increase, in the 90th percent exceedance value for elevation during the primary recreation period (Table 16-4 through Table 16-11). This indicates that access to the major boat ramps at these reservoirs would remain similar to existing conditions under Alternatives 1, 2, and 3.

**Table 16-4. Average Modeled Water Surface Elevation in Shasta Lake (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	1,049.1	1,038.4	1,019.3	1,005.2	999.0
Alternative 1A	1,049.8	1,039.5	1,020.2	1,006.1	999.6
Alternative 1B	1,050.3	1,040.2	1,021.2	1,006.9	1,000.3
Alternative 2	1,049.7	1,039.4	1,020.2	1,005.9	999.4
Alternative 3	1,050.9	1,041.3	1,022.8	1,009.3	1,002.5
<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	0.7	1.0	1.0	0.9	0.6
Alternative 1B	1.2	1.8	1.9	1.8	1.4
Alternative 2	0.7	1.0	0.9	0.7	0.5
Alternative 3	1.8	2.9	3.5	4.1	3.6

**Table 16-5. 90th Percent Exceedance Values of Modeled Water Surface Elevation in Shasta Lake (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	996.0	987.0	973.4	960.3	956.9
Alternative 1A	1,003.3	992.3	980.5	965.0	960.1
Alternative 1B	1,004.6	993.7	982.2	966.7	961.8
Alternative 2	1,003.2	992.3	980.5	965.0	960.1
Alternative 3	1,006.4	997.5	986.1	970.9	966.0
<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	7.4	5.4	7.1	4.7	3.2
Alternative 1B	8.6	6.7	8.8	6.5	4.9

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
Alternative 2	7.3	5.3	7.0	4.7	3.2
Alternative 3	10.4	10.5	12.7	10.6	9.1

**Table 16-6. Average Modeled Water Surface Elevation in Lake Oroville (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	851.2	839.1	804.1	779.3	759.3
Alternative 1A	850.5	840.2	806.7	781.2	760.7
Alternative 1B	850.6	840.3	806.7	781.2	760.6
Alternative 2	850.6	840.0	806.5	781.1	760.5
Alternative 3	851.1	840.4	806.6	781.1	760.6
<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	-0.7	1.1	2.6	2.0	1.5
Alternative 1B	-0.6	1.2	2.6	2.0	1.3
Alternative 2	-0.6	0.9	2.4	1.8	1.2
Alternative 3	-0.1	1.3	2.5	1.8	1.3

**Table 16-7. 90th Percent Exceedance Values of Modeled Water Surface Elevation in Lake Oroville (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	759.4	739.0	706.6	688.4	672.7
Alternative 1A	758.1	746.4	716.1	691.7	675.9
Alternative 1B	759.2	745.9	715.5	691.0	675.3
Alternative 2	758.1	745.2	714.9	690.6	674.8
Alternative 3	762.2	744.3	714.0	691.3	673.3
<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	-1.3	7.4	9.5	3.3	3.2
Alternative 1B	-0.3	6.8	8.9	2.6	2.6
Alternative 2	-1.4	6.1	8.4	2.2	2.1
Alternative 3	2.7	5.2	7.4	3.0	0.6

**Table 16-8. Average Modeled Water Surface Elevation in Folsom Lake (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	454.6	450.4	436.4	426.5	419.4
Alternative 1A	454.6	450.5	436.8	426.8	419.7
Alternative 1B	454.8	450.8	437.1	427.4	420.6
Alternative 2	454.6	450.6	436.9	427.1	420.0
Alternative 3	455.2	451.5	439.3	429.1	422.4
<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	0.0	0.1	0.4	0.4	0.3

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
Alternative 1B	0.2	0.4	0.6	1.0	1.2
Alternative 2	0.0	0.2	0.4	0.7	0.7
Alternative 3	0.7	1.1	2.8	2.7	3.1

**Table 16-9. 90th Percent Exceedance Values of Modeled Water Surface Elevation in Folsom Lake (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	426.1	418.7	407.9	401.1	394.0
Alternative 1A	423.9	419.5	408.5	402.0	395.6
Alternative 1B	424.1	420.7	408.1	400.5	395.9
Alternative 2	423.9	419.5	408.5	402.0	395.6
Alternative 3	426.8	422.4	411.1	404.0	402.0
<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	-2.2	0.8	0.6	1.0	1.6
Alternative 1B	-2.0	2.0	0.1	-0.6	1.8
Alternative 2	-2.2	0.8	0.6	1.0	1.6
Alternative 3	0.7	3.6	3.2	3.0	8.0

**Table 16-10. Average Modeled Water Surface Elevation in San Luis Reservoir (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	512.4	469.6	409.9	364.6	367.2
Alternative 1A	512.0	469.2	409.7	362.7	365.7
Alternative 1B	512.0	469.3	409.9	362.5	366.0
Alternative 2	512.0	469.2	409.7	362.7	365.7
Alternative 3	512.3	469.6	410.7	363.3	367.9
<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	-0.4	-0.4	-0.1	-1.9	-1.5
Alternative 1B	-0.4	-0.3	0.0	-2.1	-1.2
Alternative 2	-0.4	-0.4	-0.1	-1.9	-1.5
Alternative 3	-0.1	0.0	0.8	-1.3	0.7

**Table 16-11. 90th Percent Exceedance Values of Modeled Water Surface Elevation in San Luis Reservoir (feet)**

<b>Alternative</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>
No Action	485.3	431.7	374.6	329.1	330.5
Alternative 1A	487.1	432.6	374.2	329.1	330.6
Alternative 1B	487.1	432.8	374.6	329.1	330.6
Alternative 2	487.1	432.6	374.2	329.1	330.6
Alternative 3	486.8	432.8	380.1	329.1	330.6

<b>Difference (Alternative minus No Action Alternative)</b>					
Alternative 1A	1.8	0.9	-0.4	0.0	0.1
Alternative 1B	1.8	1.1	0.0	0.0	0.1
Alternative 2	1.8	0.9	-0.4	0.0	0.1
Alternative 3	1.5	1.1	5.5	0.0	0.1

The rivers that are below the regional SWP and CVP reservoirs currently experience flow fluctuations and seasonal changes in flow.

Flows in the Sacramento River below Keswick Dam are not anticipated to change substantially with operation of Sites Reservoir, and the changes in flow would be within the historical range of flow fluctuations and would not be perceptible to recreation users.

There are minor differences between Alternatives 1 or 3 and Alternative 2 with respect to potential impacts on recreation in the Sacramento River. During operations under Alternative 2, releases of up to 1,000 cubic feet per second would be made into the Sacramento River through a discharge and energy dissipation structure at the terminus of the Dunnigan Pipeline. The Sacramento River discharge would not affect recreation users on the river because (1) the water velocity would be slowed by the energy dissipation structure; (2) outflow from the discharge would occur when river levels are low (i.e., likely May to October or November); and (3) outflow would be distant from the water's edge. Because the discharge would be small relative to the flow in the Sacramento River, the operation of the Dunnigan Pipeline and discharge and energy dissipation structure is not anticipated to affect recreation use levels in the Sacramento River near that location and would not increase use at other recreational facilities.

Because the flow regime modifications on the Sacramento River expected with operation of Alternatives 1, 2, and 3 would fall within historical ranges, there would be little perceptible change to recreational users. Discharge through the Dunnigan Pipeline under Alternative 2 would be dissipated sufficiently to avoid effects on recreational use at that location. Operation of Alternatives 1, 2, and 3 would not significantly affect river recreation use and would not increase use at existing recreational facilities along the Sacramento River downstream of Keswick Reservoir.

Feather River flows are not anticipated to change substantially with operation of Sites Reservoir and would be within the historical range of flow fluctuations. Changes in flow would not be perceptible to recreation users. The flows on the Feather River expected with implementation of Alternatives 1, 2, and 3 would not significantly affect river recreation use and would not increase use at other recreational facilities.

Operational changes on the American River related to implementation of Alternatives 1, 2, and 3 would result in flows similar to those under the No Action Alternative. Flows in the American River during the primary recreation season with operation of Alternatives 1, 2, and 3 would not increase recreational use or cause the deterioration of recreational facilities along the American River.

**Yolo Bypass**

Operational modeling indicates flows into the Yolo Bypass would differ from existing conditions, depending on the time of year and type of water year. Small percent reductions in Yolo Bypass flows are expected during the rainy season as a result of the diversions to Sites Reservoir storage. Sites Reservoir releases to the Sacramento River (under all Project alternatives) are expected to be greatest during dry conditions, with average peak releases during June–August of Critically Dry Water Years. Additional flows into the Yolo Bypass could occur at any time of year but are assumed to occur during the summer and fall months (August through October) of all water year types. There would be differences in flows in the Yolo Bypass between Alternatives 1, 2, and 3, but these differences would not substantially increase recreation use or cause the deterioration of existing recreational facilities at the Yolo Bypass.

**Wildlife Refuges and Wildlife Areas**

Alternatives 1, 2, and 3 would provide an alternate source of Level 4 water deliveries to the wildlife refuges and wildlife areas. Table 16-12 identifies the additional Level 4 water that would be delivered to North-of-Delta refuges under each alternative. The provision of an alternate source of water to support wildlife refuges and wildlife areas would have a relatively small effect on recreational use levels, and therefore would not cause the deterioration of recreational facilities within the wildlife refuges when compared to existing conditions.



**Table 16-12. Sites Reservoir Delivery of Level 4 Water to North-of-Delta Refuges (thousand acre-feet)**

<b>Alternative</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>Total</b>
No Action Alternative	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alternative 1A	1.4	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.7	1.0	5.0
Alternative 1B	1.4	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.7	1.0	5.0
Alternative 2	1.4	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.7	1.0	5.1
Alternative 3	1.2	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.7	0.9	4.8

### CEQA Significance Determination and Mitigation Measures

With the exception of the Dunnigan Pipeline and South Road, construction of Alternative 2 would be the same as Alternative 1 or 3. The longer Dunnigan Pipeline and the Sacramento River discharge would not affect recreation users because no recreation uses occur along the pipeline alignment and notifications would be posted in the event of in-channel work. Similarly, there are no public recreation opportunities in the vicinity of the South Road and construction of the road would not affect recreation users.

Construction of Alternative 1, 2, or 3 would not substantially affect recreational facilities in the Antelope Valley and surrounding environs because there are no developed public recreational facilities in these areas. Construction of Alternative 1, 2, or 3 would not result in increased use of existing neighborhood and regional parks or other recreational facilities that would cause new or accelerated substantial physical deterioration of those facilities because of the absence of public recreational amenities in the construction areas.

With the exception of the Dunnigan Pipeline and South Road, operation of Alternative 2 would be the same as Alternative 1 or 3 but with slightly smaller water level changes because of the smaller reservoir. Discharge of the Dunnigan Pipeline flows into the Sacramento River would not affect recreation users because the discharge would be away from the water's edge. There are no public recreation opportunities in the vicinity of the South Road and use of the road would not affect recreation users.

Although operation of Alternative 1, 2, or 3 is anticipated to result in operational changes at the regional SWP and CVP reservoirs and the rivers below them, these changes are not expected to be perceptible to recreational users and would not increase recreation use of these reservoirs or increase use at recreational facilities (e.g., boat ramps, campgrounds) associated with these reservoirs and rivers. Recreation use under Alternative 1, 2, or 3 at Sites Reservoir could result in a minor reduction in recreation use, at least initially, at other regional reservoirs, and therefore Alternatives 1, 2, or 3 would not result in increased use of existing neighborhood and regional parks or other recreational facilities that would cause new or accelerated substantial physical deterioration of those facilities. The impacts on recreation resources related to construction and operation of Alternative 1, 2, or 3 would be less than significant.

### NEPA Conclusion

Construction and operation effects would be the same as described above for CEQA. The construction and operation of Alternative 1, 2, or 3 would have no adverse effect on existing recreation resources as compared to the No Project Alternative as a result of increased use. Construction of Alternative 1, 2, or 3 would not substantially affect recreational facilities in the Antelope Valley and surrounding environs because there are no developed public recreational facilities in these areas. Construction of Alternative 1, 2, or 3 would not result in increased use of existing neighborhood and regional parks or other recreational facilities that would cause new or accelerated substantial physical deterioration of those facilities because of the absence of public recreational amenities in the construction areas. A potential beneficial effect could occur as a result of the new recreation opportunities at the Sites Reservoir because potentially less intensive use would occur at other recreational facilities in the study area, which could reduce crowding.

## 16.4 References

### 16.4.1. Printed References

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